

**ARTICLE 8  
SITE GRADING, STORMWATER DETENTION, CULVERTS AND  
PIPED DRAINAGE SYSTEMS, SOIL SEDIMENT CONTROL, AND BIG HAYNES  
CREEK WATERSHED PROTECTION REQUIREMENTS**

- 8.0.1 The water quality requirements contained in this Article are minimum standards for the City, and are required as outlined except as may be otherwise allowed by the City of Suwanee Planning Department. Alternative means to achieve water quality standards may be administratively approved when said requirements fully meet the intent and standards of this Article.
- 8.1 SITE GRADING
- 8.1.1 Grading shall be done in accordance with the lines and grades shown on the approved Grading Plan.
- 8.1.2 Grading plans shall show existing and proposed contour lines at an interval of no more than 2 feet. Grading plans shall outline the areas which are required to remain undisturbed (i.e., Tree Protection Areas, buffer, etc.) and shall indicate protective fencing or staking to be placed surrounding such areas.
- 8.1.3 If the property is within the jurisdiction of the Metropolitan River Protection Act, the grading shall be consistent with the River Corridor Certificate approved for the project.
- 8.1.4 Embankments shall be placed in uniform layers not to exceed a compacted thickness of 6 inches per layer and shall be compacted to a density of 95 percent of the maximum laboratory dry weight per cubic foot as determined by AASHTO Method T-99 in all areas where structure, parking lots and drives, streets, and utilities are to be placed. All other embankments are to be compacted to at least 85 percent.
- 8.1.5 The maximum slopes for cut or fill shall be 2:1 (two feet of horizontal run for each foot of rise or fall), except 1) for earthen dam embankments, 2) for rock cuts, 3) where certified by a professional geotechnical engineer or 4) as discussed in Section 8.1.6 below. Earthen dam embankments shall be 3:1 maximum unless a modification application is approved. The intent of the earthen dam embankment slope regulation is to provide for public safety, soil stability, and dam maintenance consideration. The depth of cut referred to herein shall be the maximum cut or fill that shall be allowed

## City of Suwanee Development Regulations

to occur in any one section of cut or fill. The slope of cut or fill shall be uniform throughout for each section of cut or fill unless benching is approved by the city. When a cut is made in rock that requires blasting, the slope may be steeper if presplitting is employed and upon submission of a geotechnical report which substantiates the integrity of the rock in the steeper condition, subject to the review and approval of the Director. (Note: No blasting shall occur unless a permit has been obtained from the Fire Marshall's office.) Refer to the Standard Drawings for grading section and retaining wall details.

- 8.1.6 While most soils in the area can be safely stabilized at a 2:1 slope, some soils exhibit a low shearing resistance and a low cohesiveness. These soils typically are micaceous silts and sandy soils with little or no clay. If the 2:1 slope shows evidence of shearing, non-cohesiveness, sliding, or inability to maintain compaction, the slope shall be stabilized at 3:1 or by using such mechanical methods as needed (such as retaining walls or "grow mats" stapled in place) to maintain slope, height, and integrity.
- 8.1.7 A grading plan showing building pad locations shall be submitted for residential subdivisions, unless a modification application is approved, zoned for a lot size of less than 12,000 square feet or a density of 4 units per acre or more. The intent of this regulation is to ensure adequate lot to lot drainage. Granting a modification will not nullify the intent of these regulations when the layout has a minimum lot area of 14,520 square feet and a minimum lot width of 90 feet. The grading plan may be used as a construction document prior to approval of the Final Plat or as a guidance document for individual lot grading after approval of the Final Plat.
- 8.1.8 Grading for roads and improved ditches shall be shown.

## 8.2 STORMWATER MANAGEMENT

### 8.2.1 Storm Water Management Report Required

- a. The purpose of a Storm Water Management Report is to support the development of the project site using Best Management Practices and diligent engineering. The report must follow the guidelines set forth in the Gwinnett County Stormwater Systems and Facilities Installation Standards and Specifications and is required for all developments. The report shall be certified by a professional engineer register in the State of Georgia.

## City of Suwanee Development Regulations

- b. The Storm Water Management Report shall identify the locations and quantities of storm water runoff entering and exiting the site for both pre- and post-developed conditions. Analysis of the off-site properties shall anticipate future development in addition to addressing existing conditions.
  
- c. For the purposes of these regulations, the words "downstream" and "analysis" shall have the following meanings. The analysis of downstream conditions in the report shall address each and every point or area along the project site's boundaries at which runoff will exit the property. The analysis shall focus on the portion of the drainageway "immediately" downstream from the project. This area shall extend downstream from the project to a point in the drainage basin where the project area is 10 percent of the total basin area. The analysis shall be in accordance with the Gwinnett County Stormwater Systems and Facilities Installation Standards and Specifications.
  
- d. The following criteria shall be evaluated by the authorized registered professional (refer to Subsection 8.2.1. Paragraph a.) preparing the Storm Water Management Report, and in determining whether or not detention should be required for any portion of any site:
  - (1) Existing land uses downstream;
  - (2) Anticipated future land uses downstream;
  - (3) Magnitude of increase in peak flows due to development;
  - (4) Presence of existing drainage problems;
  - (5) Capacity of existing and anticipated drainage systems;
  - (6) Creation of concentrated flows where none had occurred previously;
  - (7) Availability of feasible locations for detention facilities;
  - (8) Existing flows generated off-site which pass through the project site; and,
  - (9) The nature of the receiving watercourse.
  
- e. Where detention for a proposed project is provided in a regional detention facility that was permitted prior to February 17, 2001, the developer shall provide a copy of the original study that met the regulations at the time the facility was permitted. If the approved study cannot be found, then the engineer shall provide a recreated study. The project shall be exempt from restudy and any

## City of Suwanee Development Regulations

modifications required to meet regulations effective after January 1, 2001, provided the proposed project is in keeping with the intent of the original detention study and the detention facility is maintained.

- f. When a development uses an existing facility where the last approved certification and record drawing of the facility was over 18 months prior to the new development's submittal, the engineer shall provide one of the following.
  - 1) A new survey, drawing and certification showing that the outlet structure is constructed as approved and the flood storage and water quality volume of the facility is equal to or greater than the volume required when the facility was approved.
  - 2) Construction plans and calculations showing that the outlet structure will function as designed and the flood storage and water quality volume of the facility will be equal to or greater than the volume required when the facility was approved once the proposed maintenance has been performed.
  - 3) A new record survey, drawing, study and certification showing that the facility meets the development requirements when the facility was approved.
  
- g. Design Criteria – General.  
All design related to storm water shall be in accordance with the Gwinnett County Stormwater Systems and Facilities Installation Standards and Specifications.
  
- h. Evidence of Acquisition of Applicable Non-Local Permits  
The applicant shall certify and provide documentation that all other applicable environmental permits have been acquired for the site prior to approval of the Storm Water Management Report.

### 8.2.2 Storm Water Detention Required

- a. Whenever a Storm Water Management Report indicates that an adverse impact from storm water runoff is expected to result from the development of a property, that project shall be provided with storm water detention facilities. The meaning of "adverse impact" shall apply when pre-development flows did not cause difficulties and post-development flows do. Difficulties shall include but not be limited to situations where 25-year velocities exceed the non-erosive velocity of the stream, habitable structures are shown to be subject to increased depth of flooding for any frequency up to and

## City of Suwanee Development Regulations

including the regulatory flood, and storm water facilities that can not carry the design storm in accordance with these regulations.

- b. Storm water detention facilities required in section 8.2.2.a shall be provided, unless the authorized registered professional (refer to Subsection 8.2.1. Paragraph a.) certifies and provides certified documentation supporting the conclusion to the director that at least one of the following is true and correct as applicable:
- (1) The non-detained, post-development runoff will leave the project site as sheet flow, and will not have an adverse impact upon downstream properties. The increase for a 25-year storm should not exceed 1 cfs over a length perpendicular to the flow of 100 feet.
  - (2) The effect of detention would be to concentrate flows where sheet flow had occurred under pre-developed conditions, and any impact of increase sheet flows upon downstream properties would be less adverse than that which would result from the concentrated flows from a detention facility even if energy dissipation devices were employed.
  - (3) The undetained flow will pass through downstream properties, in drainage easements obtained by the developer, to an existing detention facility which has been designed to manage the upstream property's runoff or to the point in the downstream analysis (see 8.2.1.c) which shows that detention is not required.
  - (4) Where the site runoff will flow directly into a stream or lake without crossing off-site properties:
    - (a) 24-hour detention of the 1-year storm is required if water quality protection is required for the project.
    - (b) Only peak detention detention for the 2-year though the 25-year storm is not required if the downstream analysis using timing of the hydrographs shows no adverse impact from the exit of the site to the point immediately downstream from the project in the drainage basin where the project area is 10 percent of the total drainage basin area.
- c. Should the authorized registered professional conclude that storm water detention may not be necessary because of anticipated compliance with Section 8.2.2.b., rigid compliance with all of the following criteria is mandatory:

## City of Suwanee Development Regulations

- (1) A storm water management report shall always be required whether or not storm water detention is required.
- (2) If the applicant proposes to show that the detention requirement may be eliminated for all or a portion of a project, then a pre-submittal conference with the Department staff is required prior to preparation and submittal of construction plans for the project.
- (3) At the pre-submittal conference with the staff, the consultant shall be prepared to discuss the downstream analysis findings as follows:
  - (a) The affected stream must be analyzed downstream from the project to a point where the project area is 10 percent of the total drainage basin. The analysis must include all culverts, obstructions, existing and potential erosion problems, elevations of existing improvements, and any other existing modifications to natural conditions; and,
  - (b) If the existing downstream conditions are overburdened by the pre-developed flows in the stream, then detention shall be required unless the developer elects to eliminate the downstream overburdened conditions at his or her expense when the development occurs; and,
  - (c) If there are any existing drainage complaints downstream, then detention shall be required unless the developer elects to minimize the conditions causing the complaint at his or her expense when the development occurs.

### 8.2.3 Detention Design Criteria - General

- a. All storm water detention pond hydrologic and hydraulic analysis and design calculations shall be certified by the authorized registered professional (refer to Subsection 8.2.1. Paragraph a.). The design shall be in accordance with the Gwinnett County Stormwater Systems and Facilities Installation Standards and Specifications.
- b. All storm water detention facilities shall be designed to detain the 1-year storm runoff, for the area draining to the pond, for 24 hours. For the project, this volume called the channel protection volume, shall be equal to or greater than the 1-year storm runoff volume

## City of Suwanee Development Regulations

from the project. In addition, these facilities shall control the peak flow rates associated with storms having 2-year, 5-year, 10-year, and 25-year return frequencies so that flows from the developed site do not exceed those associated with pre-development conditions at the project boundary nor increase the peak flows downstream from the project to the point in the drainage basin where the project area is 10 percent of the total basin. Where adverse impacts, as defined in section 8.2.2.a, occur during the 100-year storm, the 100-year storm shall also be regulated.

- c. The hydrologic methodology used for any given project shall conform to the Gwinnett County Stormwater Systems and Facilities Installation Standards and Specifications.
- d. Runoff coefficients and runoff Curve Numbers used for pre- and post-development conditions shall be consistent with those shown in the Gwinnett County Stormwater Systems and Facilities Installation Standards and Specifications. The USGS Method shall be used where applicable to check the magnitude of peak flows when other hydrologic methods recommended in the manual are used.
- e. Calculations shall be provided showing how all times of concentration or lag times were computed, both for pre- and post-developed conditions. Likewise, adequate support must be provided for all composite runoff coefficients or curve numbers used.

### 8.2.4 Detention Facility Location Criteria

- a. For purposes of these Regulations, a detention facility shall be deemed to consist of the area within the maximum design ponding limits unless a modification application is approved, the dam (if one) including all embankment slopes and wall footings (if applicable), primary and emergency outlet works, any drainage and access easements, and any energy dissipation devices. The intent of these regulations is to ensure that the extent of the facility is defined to allow flooding, access and maintenance. Granting of a modification will not nullify these regulations when the facility is a wet pond or lake, the area within the maximum design ponding limits is reduced to a few feet inside the normal pool elevation, and easements are provided on the perimeter properties to allow for

## City of Suwanee Development Regulations

flooding, access and maintenance around the lake. In addition, granting of the modification shall only be considered when the wet pond is an amenity and under no circumstances shall the dam and outlet structure lie on private property.

- b. Detention facilities, to the greatest extent feasible, shall be located so as to minimize the amount of flow generated on the project site that bypasses the facility.
- c. No portion of any detention facility shall disturb any required (as opposed to voluntary) buffer, landscape strip, or tree protection area, except that natural bottom detention ponds and its appurtenant structures, which require no grading and removal of trees, may encroach into a required construction buffer.
- d. The 100-year ponding limits of a detention facility shall not encroach upon a public right-of-way.
- e. Detention facilities may be located within utility easements or rights-of-way, or encroach upon utility easements or rights-of-way, upon receipt by the Department of written permission from both the property and utility owners.
- f. Detention facilities may be constructed within recreation areas required under Section 5.9 of these Regulations, if the following criteria are met:
  - (1) Ownership of the area will be held by a Qualified Property Owners Association, Homeowners Association, or other private parties.
  - (2) Permanent structures, such as buildings and swimming pools, will not be constructed within the boundaries of the detention facility.
  - (3) Detention facilities within recreation areas will be approved only if the design of the area includes recreation amenities such as ball fields, tennis courts, grassed open areas or other similar improvements. The intent is to provide recreation facilities with detention as a secondary feature.
  - (4) Permanent detention features shall not interfere with the intended use of the recreation amenity, (i.e., a ditch or large swale shall not traverse a ball field, an inlet structure shall not be in a tennis court, etc.).
- g. If a residential subdivision is provided with an on-site detention facility not located within a recreation area as specified in 8.2.4.f above, a mandatory property owners' association shall be established for its ownership and maintenance. The facility shall



## City of Suwanee Development Regulations

be located on a single lot within the development and owned by the property owners association. The lot shall have a minimum of 30 feet of public road frontage and a minimum lot width of 30 feet. If the project is provided with an off-site detention facility, a mandatory property owners' association shall be established for its maintenance. The association bylaws shall be recorded concurrently with the recording of a final subdivision plat. The association bylaws shall include the same provisions as specified in Subsection 5.9.2, Paragraph b. of this regulation.

- h. A non-residential subdivision is not required to locate an on-site detention facility on a separate lot. The property owners served by a detention facility that provides detention for more than one property owner or is located off-site shall enter into a maintenance agreement acceptable to the county for the facility's maintenance. However, if desired by the developer, the facility may be located on a separate lot if it is owned and maintained by a mandatory property owners' association.

### 8.2.5 Detention Facility Easement Requirements

- a. In a non-residential subdivision or project, an easement at least 20 feet in width shall be required so as to provide access to all detention facilities from a public street.
- b. In a residential subdivision, an easement at least 30 feet in width shall be required so as to provide access to all detention facilities from a public street.
- c. Access Easement
  1. The access easement shall be cleared, grubbed and graded so that it can be utilized by rubber-tired construction vehicles.
  2. The minimum drive width shall be 15 feet.
  3. The drive shall be grassed or paved.
  4. The maximum slope shall be 20% (5H:1V).
  5. Access easements may be combined with drainage easements containing an open channel; however, the combined easement shall be a minimum of 30 feet in width and shall be wide enough for the drainage channel and the drive.

## City of Suwanee Development Regulations

- d. Every normally dry detention basin, lake, or parking lot detention facility shall be completely enclosed within a drainage easement. The drainage easement shall extend at least 10 feet beyond the 100-year flooding limits of the detention facility.

### 8.2.6 Detention Facility Maintenance

- a. The detention storage capacity or function of any detention basin, pond or other impoundment, whether natural or man-made, shall not be removed or diminished without the express approval of the Department.
- b. In a residential subdivision, it shall be the responsibility of the mandatory property owners' association to maintain the operational characteristics of any facility constructed on their property for storm water detention pursuant to City requirements, to keep the access drive free of obstructions, and to maintain the facility free of obstruction, silt or debris.
- c. In a non-residential subdivision or project served by a detention facility that provides detention for more than one property or by an off-site facility, the property owners shall enter into a maintenance agreement with the City for maintenance of the operational characteristics of the facility pursuant to City requirements, to keep the access drive free of obstructions, and to maintain the facility free of obstruction, silt or debris.
- d. In a non-residential project with an on-site detention facility which serves only that project, the property owner shall be responsible to maintain the operational characteristics of the facility pursuant to City requirements, to keep the access drive free of obstructions, and to maintain the facility free of obstruction, silt or debris.
- e. Prior to the issuance of a Development Permit, the owner shall submit a detailed schedule of long-term maintenance and inspection activities. This schedule of activities shall be incorporated into a maintenance agreement to be entered into between the City and the owner. The schedule shall describe all maintenance and inspection activities and the parties responsible. The maintenance agreement shall be in a form acceptable to the City and shall be recorded in the deed records of the Clerk of Superior Court of Gwinnett County.

## City of Suwanee Development Regulations

### 8.2.7 Detention Facility Construction Standards

- a. Storm water detention facilities shall be constructed in accordance with plans reviewed and approved by the Department, and shall be in place and inspected prior to the initiation of other improvements. If the detention facility is planned to be a lake, temporary detention facilities shall be provided and shall remain in place until such time as the lake has become effective in providing stormwater management. The construction shall be in accordance with the Gwinnett County Stormwater Systems and Facilities Installation Standards and Specifications.

### 8.2.8 Detention Facility Certification and Record Drawings

- a. When a new facility is constructed in a development, a certified record survey of each detention facility shall be prepared by a land surveyor currently registered in the State of Georgia. A certified record drawing of the facility shall be prepared based upon this survey. Based on the actual parameters established on the record drawing, an addendum to the Storm Water Management Report shall be prepared which demonstrates that the facility, as constructed, complies with the requirements of these Regulations. The amended Storm Water Management Report shall be certified by the authorized registered professional (refer to Subsection 8.2.1. Paragraph a.). The survey shall be performed after substantial completion and stabilization of the project has occurred. The record drawing and addendum to the Storm Water Management Report shall be submitted to the city at least one week prior to the issuance of a Certificate of Occupancy or Final Plat approval (as appropriate to the project).
- b. When a development uses an existing facility without an existing storm water maintenance bond, the facility shall be cleaned out if necessary and a new record survey, drawing and certification showing that the outlet structure exists as approved and the flood storage and water quality volume of the facility is equal to or greater than the volume required when the facility was approved. As an alternative, a new record survey, drawing, study and certification showing that the facility meets the development requirements when the facility was approved shall be submitted.

## City of Suwanee Development Regulations

The survey shall be performed after substantial completion and stabilization of the project has occurred. The certification and supporting data shall be submitted to the City at least one week prior to the issuance of a Certificate of Occupancy or Final Plat approval (as appropriate to the project).

### 8.3 CULVERTS AND PIPED DRAINAGE SYSTEMS

#### 8.3.1 Drainage Improvements Required

Storm water conveyance facilities, which may include but are not limited to culverts, storm drainage pipes, catch basins, drop inlets, junction boxes, headwalls, gutter, swales, channels, and ditches, shall be provided for the protection of public right-of-way and private properties adjoining project sites and/or public rights-of-way. Storm water conveyance facilities which are designed to carry runoff from more than one parcel, existing or proposed, shall meet the requirements of these regulations.

#### 8.3.2 Design Criteria - General

- a. All storm water conveyance facility design calculations shall be certified by the authorized registered professional (refer to Subsection 8.2.1. Paragraph a.).
- b. Methods to calculate storm water flows shall be in accordance with the Gwinnett County Stormwater Systems and Facilities Installation Standards and Specifications that is hereby incorporated by reference. The USGS Method shall be used where applicable to check the magnitude of peak flows when other hydrologic methods recommended in the manual are used.
- c. All portions of a storm water conveyance system which drain areas falling within the same size category above shall be analyzed using the same methodology.
- d. Run-off coefficients used for the Rational Method and runoff Curve Numbers used for the SCS Method shall be consistent with those shown in Gwinnett County Stormwater Systems and Facilities Installation Standards and Specifications.

#### 8.3.3 Design Criteria - Culverts

City of Suwanee Development Regulations

- b. The 100-year ponding limits at and upstream of the culvert shall be shown on the Development Plans and on the Final Plat (if applicable) and shall include a thorough analysis of both inlet and outlet control conditions.
- d. Culvert design is to be in accordance with the methods contained in the Gwinnett County Stormwater Systems and Facilities Installation Standards and Specifications and shall include a thorough analysis of both inlet and outlet control conditions.
- c. When uniform, graded stone rip-rap is used for energy dissipation, ultraviolet resistant filter fabric (200-pound test) shall be used between the stone layers.

Natural bottom arches and box culverts may be used in accordance with the latest Standard Specifications of the Georgia Department of Transportation.

8.4 EROSION CONTROL

8.4.1 Design Standards

- a. The procedures and requirements of the Soil Erosion and Sediment Control Ordinance, as may be amended from time to time, shall be applicable whenever any land disturbance is proposed to occur which requires a permit to be obtained by these regulations and shall continue to apply until the project has been completed.

8.4.2 Abandoned Projects

Any project whose permit has lapsed under the terms expressed in Article 4, shall immediately have all disturbed areas stabilized. This responsibility shall fall upon the owner, developer, contractor, or any and all other responsible parties involved in the land disturbance activity.

8.5 DAMS

Any land disturbing activity that involves a property which is proposed to contain a dam shall comply with the provisions of this Article as well as the provisions contained in Article 3, Section 3.1 of these Regulations.

## City of Suwanee Development Regulations

### 8.5.1 New Dams Which Become Subject to the Requirements of the Georgia Safe Dams Act and Rules for Dam Safety

Dams proposed to be 25 feet or more in height or proposed to have an impounding capacity of 100 acre-feet or more at maximum water storage elevation shall be subject to the following:

- a. The developer of any new dam in which development exists within the proposed breach zone shall be subject to the requirements of the Georgia Safe Dams Act and Rules for Dam Safety adopted by the Georgia Department of Natural Resources. The developer shall obtain necessary approvals and permits from the Environmental Protection Division of the Georgia Department of Natural Resources for the project and the dam prior to securing a Development Permit from the Department. The developer of any new dam as to which development does not exist within the proposed breach zone shall submit construction plans to City of Suwanee for review of the project and the dam prior to securing a Development Permit from the Department.
- b. If the developer elects to construct the new dam in accordance with the design standards for new dams as contained in the Rules for Dam Safety, then new development shall be permitted within the dam breach zone. However, the dam shall meet the design standards for new dams as contained in the Rules for Dam Safety if development currently exists or is proposed in the dam breach zone.
- c. If the developer elects not to construct the new dam to the design standards for new dams as contained in the Rules for Dam Safety, then a dam breach analysis for the dam shall be submitted along with the construction plans for review prior to securing a Development Permit from the Department. The design engineer shall utilize the computer model entitled "DAMBRK" for the dam breach analysis.
- d. Should the new dam not meet the design standards for new dams as contained in the Rules for Dam Safety, then only the following uses and structures shall be permitted within the dam breach easement:

## City of Suwanee Development Regulations

- (1) Agriculture which requires no structures for human habitation within the dam breach zone including forestry, livestock raising, and agricultural and forestry access roads.
  - (2) Fences.
  - (3) Outdoor advertising signs provided they are located no closer than 100-feet from any residence or place of business.
  - (4) Roads, driveways and parking areas.
  - (5) Utility poles, towers, pipelines, water treatment outfalls and facilities, or other similar facilities and structures.
- e. For any new dam that is proposed not to meet the design for new dams as contained in the Rules for Dam Safety, the developer shall obtain a dam breach easement, recorded with the Clerk of Superior Court, from any offsite property owner where it is proposed for the dam breach zone to extend off the property where the dam is being constructed. The developer shall also cause a dam breach easement to be recorded upon the property being developed.
- f. Prior to recording of a Final Plat or issuance of a Certificate of Occupancy, as appropriate, an as-built certification from a registered professional engineer shall be submitted to the Department. The certification shall state that the dam is constructed in accordance with the provisions of these regulations as well as the authorized construction plans. If the project is for the development of a subdivision, the developer shall also establish a legal entity, acceptable to the City, such as a mandatory Property Owners Association, prior to approval of the Final Plat, responsible for the maintenance of the dam and its impoundment.

### 8.5.2 New Dams Subject to Regulation by Gwinnett County and/or City of Suwanee

Dams proposed to be 9 feet or more in height, but less than 25 feet in height, in combination with an impounding capacity proposed to be 20 acre-feet or more at maximum water storage elevation, but less than 100 acre-feet, shall be subject to the following:

- a. If the developer elects not to construct the new dam to the design standards for new dams as contained in the Rules for Dam Safety, then a dam breach analysis for the dam shall be submitted with the construction plans for review and authorization prior to securing a

City of Suwanee Development Regulations

Development Permit from the Department. The design engineer shall utilize the computer model entitled "DAMBRK" for the dam breach analysis.

- b. Should the new dam not meet the design standards for new dams as contained in the Rules for Dam Safety, then only the following uses and structures shall be permitted within the dam breach zone:
  - (1) Agriculture which requires no structures for human habitation within the dam breach zone including forestry, livestock raising, and agricultural and forestry access roads.
  - (2) Fences.
  - (3) Outdoor advertising signs provided they are located no closer than 100-feet from any residence or place of business.
  - (4) Roads, driveways and parking areas.
  - (5) Utility poles, towers, pipelines, water treatment outfalls and facilities, or similar facilities and structures.
  
- c. If the developer elects to construct the new dam in accordance with the design standards for new dams as contained in the Rules for Dam Safety, then new development shall be permitted within the dam breach zone. However, the dam shall meet the design standards for new dams as contained in the Rules for Dam Safety if development currently exists or is proposed in the dam breach zone.
  
- d. Construction plans for new dams defined herein shall be submitted to City of Suwanee and/or Gwinnett County for review for the project and the dam prior to securing a Development Permit from the Department.
  
- e. For any dam that is proposed not to meet the design standards for new dams as contained in the Rules for Dam Safety, the developer shall obtain a dam breach easement, recorded with the Clerk of Superior Court, from any offsite property owner where it is proposed for the dam breach zone to extend off the property where the dam is being constructed. The developer shall also cause a dam breach easement to be recorded upon the property being developed.
  
- f. Prior to recording of a Final Plat or issuance of a Certificate of



## City of Suwanee Development Regulations

Occupancy, as appropriate, an as-built certification from a registered professional engineer shall be submitted to the Department. The certification shall state that the dam is constructed in accordance with the provisions of these regulations as well as the authorized construction plans. If the project is for the development of a subdivision, the developer shall also establish a legal entity, acceptable to City of Suwanee, such as a mandatory Property Owners Association, at time of recording of the Final Plat, responsible for the maintenance of the dam and its impoundment.

### 8.5.3 Existing Dams

Existing dams that are located on a project site and will remain after construction is complete, shall comply with the provisions of this article and all referenced articles as if they were new dams.

### 8.5.4 Existing Category II Dams

When an existing Category II dam may be reclassified to a Category I dam because of a proposed development downstream of the dam, the following shall be provided by the developer for review by the Georgia Safe Dams Program.

- (a) Location of the Category II dam and the proposed development; and,
- (b) A surveyed cross-section of the stream valley at the location of the proposed development including finished floor elevations; and,
- (c) A dam breach analysis using the Dambreak computer model to establish the height of the floodwave in the downstream floodplain. The Dambreak modeling shall be completed in accordance with the Safe Dams Program Quality Assurance Program by a qualified registered engineer.

## 8.6 EXTENDED DETENTION

- a. Easement Requirements  
Easement requirements shall be as specified in Section 8.2.5 of these regulations with the change that the easement enclosing the facility shall be named a Best Management Practice (BMP) easement.

## City of Suwanee Development Regulations

- b. **Engineer's Certification and Record Drawings**  
A certified record survey of each facility shall be prepared by a land surveyor currently registered in the State of Georgia. A certified record drawing of the facility shall be prepared based upon this survey. The design engineer shall certify that the facility functions hydraulically as designed. The record drawing shall be submitted to the department at least one week prior to the issuance of a Certificate of Occupancy or Final Plat approval (as appropriate to the project). Record drawings of off-site facilities shall be recorded at least one week prior to the recording of the Final Plat.

### 8.7 Stream Buffers and Impervious Surface Setbacks

Refer to the Zoning Ordinance for buffer and impervious surface setback requirements from streams.

- 8.7.1 **Wet and Extended Detention Facility Maintenance**  
Maintenance requirements shall be as specified in Section 8.2.6 of these regulations.

### 8.8 WATER QUALITY BEST MANAGEMENT PRACTICES

- 8.8.1 **Treatment of Runoff**
  - a. All projects, unless exempt pursuant to 8.9.1.d below, that meet one or more of the following criteria shall provide water quality treatment based on the modeled Total Suspended Solids (TSS) load off the project for post construction conditions. The determination of the TSS load shall be in accordance with the Stormwater Systems and Facilities Installation Standards and Specifications. The modeled TSS load shall not exceed 850 pounds/acre/year.
    - i. New development that involves the creation of 5,000 square feet or more of impervious cover, or that involves other land development activities of 1 acre or more;
    - ii. Redevelopment that includes the creation, addition or replacement of 5,000 square feet or more of impervious cover, or that involves other land development activity of 1 acre or more; or,
    - iii. Land development activities that are smaller than the minimum applicability criteria set forth in items i and ii, above, if such

## City of Suwanee Development Regulations

activities are part of a larger common plan of development, even though multiple, separate and distinct land development activities may take place at different times on different schedules.

- c. Runoff from any new development or redevelopment, regardless of size, that is defined by the director to be a hotspot land use or activity shall be adequately treated and addressed through the use of structural storm water controls, nonstructural practices and pollution prevention practices.
- d. The following activities are exempt from providing treatment:
  - i. Individual single-family or duplex residential lots that are not part of a subdivision or phased development project;
  - ii. Additions or modifications to existing single-family or duplex residential structures; and,
  - iii. Repairs to any storm water management facility or practice deemed necessary by the director.

### 8.8.2 Facility Location Criteria

- a. Facility location criteria shall be as specified for detention facilities in Section 8.2.4 of these regulations.
- b. In a residential subdivision, the following Best Management Practices must be located on a separate lot in accordance with Section 8.2.4.g if not located on a recreation area lot as specified in 8.2.4.h:
  - (1) Extended detention ponds;
  - (2) Retention ponds;
  - (3) Sand filters;
  - (4) Constructed wetlands;
  - (5) Infiltration trenches;
  - (6) Oil/grit separators.

### 8.8.3 Easement Requirements

- a. Facility easement requirements shall be as specified in Section 8.2.5 of these regulations with the exception that the easement enclosing the facility shall be named a Best Management Practice (BMP) easement.

## City of Suwanee Development Regulations

- b. Stream Buffer Easements shall be shown on the final plat for areas that are claimed in the TSS model as Undisturbed Stream Buffers for the site. These areas shall be left in a natural, undisturbed condition except for walking trails. Trails shall not be allowed within 25 feet of a stream bank without a state waters buffer variance.
- c. Upland Area Easements in non-residential subdivisions that are claimed as undisturbed upland areas for the site, shall be recorded in an easement acceptable to the city. These areas shall be left in a natural, undisturbed condition except for walking trails.

### 8.8.4 Facility Maintenance

- a. Maintenance requirements shall be as specified in Section 8.2.6 of these regulations.
- b. Prior to or concurrent with the recording of a Final Plat for a subdivision, or issuance of a Certificate of Occupancy for a non-subdivision project, the developer shall provide acceptable surety such as a bond or letter of credit providing for the maintenance of the facility for a period of not less than 18 months. The amount of the surety shall be the greater of fifty (50) percent of construction costs of the facility or 100 percent of the cost to clean out the facility. At the end of 18 months, the City may require the surety to be renewed due to anticipated maintenance caused by such concerns as future construction activity in the basin draining to the facility. A renewed surety may be required up to a total maximum of ten (10) years. The surety for a facility shall be renewed during the ten years until:
  - 1) The surface water drainage area within the project has undergone final stabilization and all planned construction activity has been completed;
  - 2) All storm water runoff in the surface water drainage area within the project is coming from undisturbed or stabilized areas;
  - 3) At least 90% of the lots in that surface water drainage area within the project have been sold to an unrelated party, permanent structures completed and final stabilization achieved;
  - 4) The accumulation of acreage of undeveloped lots, lots with no completed permanent structure and no final stabilization, within the surface water drainage area within the project is

## City of Suwanee Development Regulations

less than five acres or 10 percent of the total area of the common development draining to the facility, whichever is greater; and

- 5) Within two (2) months of surety release, the facility shall be cleaned out if necessary and a new record survey drawing and certification showing that the volume of the facility is equal to or greater than the volume shown in the record survey, drawing and certification when the facility was approved. As an alternative, a new record survey, drawing and certification showing that the facility complies with these regulations as specified in section 8.2.8 shall be submitted.

### 8.8.5 Facility Certification and Record Drawings

Requirements for a certified record survey and addendum to the Storm Water Management Report shall be the same for water quality facilities as for detention facilities in section 8.2.8.

### 8.8.6 Redevelopment and Use of Existing Detention Facilities

- a. When 5,000 square feet or more of new impervious surface area is added or 1 acre or more of a developed project site is disturbed for redevelopment and the disturbed area is more than 50% of the property, the water quality requirements of this section must be met for the entire site.
- b. When 5,000 square feet of new impervious surface area is added, or less than 1 acre of land of a developed project site is disturbed for either redevelopment or improvement, the project is exempt from having to provide the water quality requirements of this section for the project or for the rest of the site.
- c. When 5,000 square feet or more of new impervious surface area is added or 1 acre or more of a developed project site is disturbed for redevelopment and the disturbed area is less than 50% of the property, the project shall provide water quality treatment for just the improvements on the site.

**ARTICLE 9  
PERFORMANCE GUIDELINES**

9.1 GENERAL

9.1.1 Purpose

The sections enumerated in this article are guidelines, and are intended to be benchmark indicators of what standards could be acceptable. They are further intended to allow alternate designs which could produce results similar to these performance standards and similar protection to the public. The objective of these performance standards is not to suggest a single methodological standard of acceptance exclusive of all others. Rather they establish what would otherwise be allowed in the absence of an acceptable alternative.

9.1.2 Constraints

The alternative design solutions are constrained by the Design Requirements of Article 5, the Access Requirements and Street and Right-of-Way Requirements and the Street Construction Standards of Article 6, and the Grading, Detention, Drainage Requirements of Article 8, as well as the Purpose and Intent of these Regulations.

9.1.3 Documentation Required

In the event that an alternative is suggested by the applicant, studies and reports conducted by professionals currently certified in the State of Georgia will be required to be submitted to and approved by the Department. These studies and reports must clearly relate to the desired results and purposes expressed or implied in the applicable performance standard. Once an alternative has been approved by the Department, it shall become a required standard applicable to the specific approved permit only.

9.2 LOTS

9.2.1 Lots should be designed generally such that they are no more than four times as deep as they are wide at the building setback line, unless excepted by the Director.

a. The Department may require notation that a House Location Plan

## City of Suwanee Development Regulations

(HLP) is required to be approved prior to issuance of a building permit on certain lots when particular care in locating the house or other improvements will be necessary. Such lots include, but are not limited to:

- (1) a lot which presents particular or unusual difficulties for a builder to meet minimum required building setbacks;
- (2) a lot upon which is located an easement of unusual configuration;
- (3) a lot containing floodplain but upon which no fill or other encroachment into the floodplain is anticipated at the time the Final Plat is filed;
- (4) a lot upon which is located all or a part of a stormwater detention facility;
- (5) a lot upon which is located a buffer which was required by the Zoning Ordinance as a condition of zoning approval;
- (6) all duplex lots;
- (7) all lots within, or partially within, the Chattahoochee River Corridor, or containing a River Corridor Tributary Buffer Zone.

b. The Department may require notation that a Residential Drainage Plan (RDP) is required to be approved prior to issuance of a building permit on certain lots where additional (site specific) engineering will be necessary to properly grade the lot or locate the building or other improvements. Such lots include, but are not limited to:

- (1) a lot containing floodplain where fill or other encroachment into the floodplain is planned or reasonably expected;
- (2) a lot containing severe topographic features interdicting the building site;
- (3) a lot containing a drainage easement with a pipe discharge or other facilities, or flow characteristics which may adversely affect the location of a building or other site improvements.

c. The Department may require notation that a Residential Drainage Study (RDS) is required to be approved prior to issuance of a building permit on certain lots where particular attention to site grading will be necessary, but formal engineering is not needed. Such an RDS is conducted in the field where the effect of the site grading must be accomplished with adequate care so as not to create a drainage problem on neighboring property.

## City of Suwanee Development Regulations

- 9.2.2 Side lot lines generally should be at right angles (90 degrees) to straight street lines or radial to curved street lines as much as practical. Side lot lines should be radial to the radius points of all cul-de-sacs. Variations of more than 10 degrees shall require approval of the Department, but shall be approved when appropriate to the reasonable loading pattern of the subdivision, efficient use of the land relative to topographic conditions, or provisions of improved building sites over those which would result without variation of the side lot lines.
- 9.2.3 Corner lots shall be sufficiently larger so that they have the same width between minimum side setback lines as an interior lot, but in no case shall more than 75 feet between side setback lines on a corner lot be required.
- 9.3 BLOCKS
- 9.3.1 The lengths, widths, and shapes of blocks shall be determined with regard to:
- a. Provision of adequate building sites suitable to the special needs of the type of use contemplated,
  - b. Applicable zoning requirements as to lot size and dimensions,
  - c. Needs for convenient access, circulation, control, and safety of street traffic,
  - d. Limitations and opportunities of topography.
- 9.3.2 In blocks over 1,000 feet long, the Director may, when existing or proposed pedestrian circulation patterns or public gathering places so justify, require pedestrian ways or pedestrian access easements, as appropriate, through the block.
- 9.4 ACCESS
- A maximum number of 200 residential dwelling units shall be allowed to be constructed with only one street outlet to an existing public street. If a second access to an existing public road is not available or, in the opinion of the Director, could induce non-residential traffic through the development, a single entrance may be allowed if designed with a traffic signal and/or sufficient right-of-way and improvements to provide a protected left-turn lane, subject to the approval of the Engineering



City of Suwanee Development Regulations

Department.

9.5 ROADWAY DESIGN

9.5.1 Street Grades and Design Speeds

- a. Minimum grade for all local and minor collector streets shall be 1.5%. Minimum grades for all major collector and arterial streets shall conform to Georgia D.O.T. practice.
- b. Minimum grade of less than 1.5% on a local street may be approved by the Department, based on adequate engineering designs, where at least 1.5% cannot reasonably be achieved due to topographical limitations imposed by the land. In such cases, a Record 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 spread at catch basins, or other hazardous conditions occur shall be reconstructed or otherwise improved to eliminate such conditions.
- c. Minimum vehicle design speeds and maximum grades allowable in City of Suwanee by street classification shall be as shown in Table 9-A.
- d. Maximum grade on any cul-de-sac turnaround shall be 6%.

TABLE 9-A  
MINIMUM DESIGN SPEEDS AND MAXIMUM GRADES

<u>STREET CATEGORY</u>	<u>MAXIMUM GRADE</u>	<u>DESIGN SPEED</u>
Principal Arterial	6%	60 MPH
Major Arterial	8%	50 MPH
Minor Arterial	10%	40 MPH
Major Collector	10%	40 MPH
Minor Collector	10%	30 MPH
Local	15%*	20 MPH

-----  
\* Grades between 12% and 14% shall not exceed a length of one hundred and fifty feet (150') and shall require an "as graded" survey prior to the installation of the curb or utilities. The distance shall be measured as the tangent length between points of curvature.

City of Suwanee Development Regulations

9.5.2 Vertical Street Alignment

- a. All changes in street profile grades having algebraic difference greater than 1% shall be connected by a parabolic curve having a minimum length (L) equal to the product of the algebraic difference between the grades in percent (A) and the design constant (K) assigned to the street according to its category (i.e.,  $L=KA$ ).
- b. Constant (K) values are shown in the Table 9-B for both desirable and minimum acceptable ("hardship") conditions. In all cases, the "desirable" value shall be used, unless it cannot be achieved due to topographic conditions beyond the developer's control. In such hardship situations, the Department may approve a lesser value to the extent required by the hardship situation, but in no event less than the value shown in the Table as "minimum."

TABLE 9-B  
CONSTANT (K) VALUES FOR VERTICAL CURVES

<u>STREET CATEGORY</u>	<u>CREST CURVES</u>		<u>SAG CURVES</u>	
	<u>MINIMUM</u>	<u>DESIRABLE</u>	<u>MINIMUM</u>	<u>DESIRABLE</u>
Principal Arterial	200	320	125	155
Major Arterial	100	170	80	110
Minor Arterial	55	80	55	70
Major Collector	55	80	55	70
Minor Collector	30	30	35	35
Local	10	10	20	20

9.5.3 Horizontal Street Alignment

- a. All new streets shall adhere to the following standards governing horizontal curvature and superelevation:

TABLE 9-C  
HORIZONTAL CURVES

<u>STREET CATEGORY</u>	<u>MINIMUM RADIUS (FT)</u>	<u>MAXIMUM SUPERELEVATION</u>
Principal Arterial	1333	0.06

City of Suwanee Development Regulations

Major Arterial	833	0.06
Minor Arterial	560	0.04
Major Collector	560	0.04
Minor Collector	300	0.04*
Local	120	0.00

-----  
 \* No superelevation will be allowed on Minor Collectors internal to residential subdivisions.  
 -----

- b. Superelevation for horizontal curves shall be calculated utilizing the following formula:

-----  
 R = minimum radius curve  
 v = vehicle design speed (MPH)  
 e = rate of superelevation (decimal of a foot rise per foot roadway)  
 f = side friction factor

$$R = \frac{v^2}{15(e + f)}$$

Vehicle Design Speed (v)	30	40	50	60
Side Friction Factor (f)	.16	.15	.14	.12

-----

- c. Widening section along existing streets shall be designed reflecting existing curvature and superelevation, if any, unless the existing street has been included in a specific design by the City, County, or Georgia D.O.T. which calls for different standards, in which case the project will be coordinated with the overall design.

- d. Superelevation Runoff

Roadway edge curves shall be provided for tangent runout (bringing edge from a normal crown to centerline elevation) and superelevation runoff (from the end of tangent runout to the point of design superelevation) in accordance with design standards of the Georgia Department of Transportation or other professional engineering standards.

- e. Tangents and Compound Curves

City of Suwanee Development Regulations

Between reverse horizontal curves there shall be not less than the minimum centerline tangents shown in Table 9-D unless otherwise specified by the Georgia Department of Transportation. Compound radii curves are prohibited. At least the "desirable" length shall be provided unless hardship conditions of topography or property configuration will not allow lengths greater than those shown as "minimum." For compound circular curves, the ratio of the flatter radius to the sharper radius shall not exceed 1.5 to 1.

TABLE 9-D  
TANGENTS

<u>STREET CATEGORY</u>	<u>MINIMUM TANGENT LENGTH</u>	<u>DESIRABLE TANGENT LENGTH</u>
Principal Arterial	150	180 Feet
Major Arterial	125	150 Feet
Minor Arterial	100	120 Feet
Major Collector	100	120 Feet
Minor Collector	75	90 Feet
Local	50	60 Feet

-----  
NOTE: Minimum tangents are based on the distance traveled in 1.7 seconds at the design speed for each category of street. Desirable length is based on distance traveled in 2.0 seconds.  
-----

9.5.4 Horizontal and Vertical Clearances  
a. Horizontal Clearances

- (1) A shoulder of no less than 11 feet from the back of curb or edge of pavement, appropriately graded and having gentle slopes of not more than 0.5 inch per foot and rounded cross-sectional design shall be maintained along all streets. Beyond the shoulder but within the right-of-way, slopes shall not exceed one foot of rise for each two feet of horizontal distance on a cut slope, and one foot of fall for each three feet of horizontal distance on a fill slope.
- (2) Along all public streets, a clear zone shall be provided for a minimum distance of six (6) feet from back of curb or edge of pavement wherein nothing may be located above ground level except traffic/street signs, public utility structures, and mail boxes.

City of Suwanee Development Regulations

- (3) At selected locations, such as the outside of a sharp curve a wider clear zone with greater horizontal clearances provided to any roadside obstruction may be required.
- (4) The Department of Transportation, in accordance with Georgia Law 32-6-51, is authorized to remove or direct the removal of any sign, signal, device, or other structure erected, placed, or maintained on the right-of-way of a public road which because of its nature, construction, or operation, constitutes a danger to, or interferes with the vision of, drivers of motor vehicles.

b. Vertical Clearances

Vertical clearance at underpasses shall be at least 14.5 feet over the entire roadway width.

9.6 STREET INTERSECTIONS

9.6.1 Angle of Intersection

Intersections shall generally be at right angles and shall not be at an angle of less than 85 degrees unless approved by the Department, nor less than 80 degrees unless the intersection is signalized in which case the angle of the intersection may be reduced subject to the review and approval of the Traffic Engineer.

9.6.2 Maximum Grade

Street intersections should be designed with a flat grade wherever possible, but in no case should the grade exceed 2% in normal situations (or 4% in topographical hardship situations on local streets).

9.6.3 Intersection Approaches: Horizontal Alignment

- a. New local streets which approach an intersection with a street in a category higher than itself on a horizontal curve having a centerline radius less than 240 feet shall provide a tangent section of roadway at least 30 feet long. Minor collectors approaching an intersection with a major thoroughfare on a horizontal curve having a centerline radius of less than 550 feet shall also provide the 30 foot tangent section. The tangent length shall be measured along the centerline of the street, from the right-of-way line of the intersecting street, extended, to the point of tangency with the centerline of the curve

City of Suwanee Development Regulations

section.

- b. New major thoroughfares shall provide tangent sections at intersections with streets in equal or higher categories as needed to provide adequate stopping distances at their design speeds.

9.6.4 Intersection Approaches: Vertical Alignment

- a. For intersections with local or minor collector streets, a leveling of the street at a grade not exceeding 2 percent shall be provided but no level approach distance is required for streets approaching at less than 7 percent, and a minimum 25 foot level approach distance shall be provided for streets approaching at a grade of 7 percent or more. (See Standard Drawings).
- b. As a street approaches an intersection with a major thoroughfare, there shall be a suitable leveling of the street at a grade not exceeding 2 percent and for a distance not less than the following minimums:

TABLE 9-D  
APPROACH DISTANCES AT MAJOR INTERSECTIONS

<u>APPROACHING STREET CATEGORY</u>	<u>MINIMUM APPROACH DISTANCE</u>
Principal Arterial	100 Feet
Major Arterial	100 Feet
Minor Arterial	100 Feet
Major Collector	75 Feet
Minor Collector	75 Feet
Local	50 Feet

\* Distance of the approach is measured from edge of pavement of the intersecting street to the point of curvature in the approaching street.

9.6.5 Intersection Radii

Intersection radii for roadways measured at back of curb and for the right-of-way lines shall be as follows. For intersecting streets of difference classification, the larger radii shall be provided. In all cases, adequate

City of Suwanee Development Regulations

right-of-way shall be provided to maintain minimum of 11 feet from back-of-curb. Larger radii may be required for streets intersecting at angles less than 90 degrees.

TABLE 9-E  
INTERSECTION RADII

<u>STREET CATEGORY</u>	<u>ROADWAY RADII</u>	<u>R/W RADII</u>
Arterial	40 Feet	20 Feet
Major Collector	40 Feet	20 Feet
Minor Collector-Residential	25 Feet	9 Feet
Minor Collector-Nonresidential	40 Feet	20 Feet
Local-Residential	20 Feet	9 Feet
Local-Commercial or Office	25 Feet	11 Feet
Local-Industrial	40 Feet	25 Feet

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 \* Intersecting right-of-way lines may be joined by an arc having the minimum radius shown, or by a miter which cuts across the right-of-way lines connecting the points where the required radius would have otherwise been tangent.  
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9.6.6 Islands

Islands in street intersections shall conform to the design requirements of the standard drawings. In no case shall anything in an island extend more than 3 feet above the street grade within the right-of-way, except traffic regulatory devices and other infrastructure erected or approved by City of Suwanee. No island shall be approved which contains less than 100 square feet.

9.6.7 Intersection Corner Sight Distance

- a. Intersections shall be designed with adequate corner sight distance for each street which approaches a street in an equal or higher street category (except an intersection of two local streets). Where necessary, backslopes shall be flattened and horizontal or vertical curves lengthened to provide the minimum required sight distance.
- b. The minimum corner sight distance from the approaching street shall be equal to or exceed 10 times the regulated speed of the

## City of Suwanee Development Regulations

intersecting street, as measured from the center of the approaching street in both directions along the right-of-way line of the intersecting street. As an alternative, the minimum corner sight distance requirement may be calculated using AASHTO "Policy on Geometric Design of Highways and Streets," Chapter 9 (at-grade intersections), latest edition. The sight distance shall provide clear visibility of an object 4 feet above the intersecting street viewed from the centerline of the approaching street at the right-of-way line of the intersecting street, at a height of 3.5 feet above the ground.

### 9.6.8 Obstructing Visibility at Intersections

On any corner lot, within an area formed by the lot lines on the street sides of such lot and a line (miter) joining points on such lot lines located at a distance of 20 feet from the point of their intersection, the following shall apply:

- a. There shall be no fence or wall or hedge higher than three feet.
- b. There shall be no obstruction to vision, other than a post or column or tree (except standards erected by Gwinnett County or City of Suwanee) not exceeding one foot in greatest cross-sectional dimension, between a height of three feet and a height of 15 feet above the established grade of either of the intersecting streets.

### 9.6.9 Turning Lanes at Intersections

Left turning lanes shall be provided on all new internal project streets, classified as a minor collector or major thoroughfare, intersecting a major thoroughfare, and may be required in other locations to meet traffic demand and safe operations. Right turning lanes may be required to meet traffic demands or safety concerns. When provided, turning lanes shall meet the following criteria:

- a. Storage length - A minimum of 150 feet of storage length for turning lanes on any arterial roadway shall be used. A minimum of 100 feet of storage length for turning lanes on all collectors shall be used.
- b. Taper Length - The minimum taper length shall be 50 feet.
- c. Left turning lanes from arterial roads shall be subject to longer storage lengths and tapers as determined on a case by case



City of Suwanee Development Regulations

basis.

9.7 DRIVEWAY INTERSECTIONS

9.7.1 Angle and Improvements

Driveways shall generally intersect streets at right angles. The portion of a driveway located within a public right-of-way shall be paved, if any. Driveways providing access to parking lots which contain six (6) more spaces shall be paved in accordance with the parking lot requirements of the Zoning Ordinance.

9.7.2 Driveway Design Standards

a. Driveways serving single-family detached or duplex residences may be no less than ten feet wide at the right-of-way line and shall provide a radius to the back of curb or edge of pavement of the roadway of no less than five feet. All other driveway curb cuts on public streets shall conform to the standards shown on the driveway details contained in the Standard Drawings, by land use type as follows:

(1) Driveway Detail 1 (32' Width, 25' Radius) for:

- (a) Service Stations;
- (b) Commercial Sites (over 80,000 Square Feet);
- (c) Office/Institutional Complexes (Over 100,000 Square Feet);
- (d) Apartment/Condo Complexes (Over 200 Units); and;
- (e) Mobile Home Complexes (Over 200 Lots).

(2) Driveway Detail 2 (28' Width, 25' Radius) for:

- (a) Commercial Sites (80,000 Square Feet or Less);
- (b) Office/Institutional Complexes (100,000 Square Feet or Less);
- (c) Apartment/Condo Complexes (200 Units or Fewer); and,
- (d) Mobile Home Complexes (200 Lots or Fewer)

(3) Driveway Detail 3 (32' Width, 40' Radius) for:

- (a) Industrial Sites

(4) Driveway Detail 4 (Optional Design with Island) for:

- (a) Private Commercial/Office Street Entrances;
- (b) Private Entrances to Apartment/Condo Complexes

City of Suwanee Development Regulations

- (c) (Over 200 Units); and,  
Private Entrances to Mobile Home Complexes (Over 200 Lots).

- b. All driveways and driveway curb cuts on State highways shall conform to Georgia DOT standards unless County requirements are more restrictive.

9.7.3 Auxiliary Lanes

Along any major thoroughfare, a deceleration lane, acceleration lane, larger turning radius, traffic islands, or other devices or designs may be required to avoid specific traffic hazards which would otherwise be created by the proposed driveway location.

9.7.4 Corner Sight Distance

All driveways approaching a minor collector or major thoroughfare shall provide adequate corner sight distance. The minimum corner sight distance from the driveway shall be equal to or exceed 10 times the regulated speed of the intersecting street, as measured from the center of the driveway in both directions along the right-of-way line of the intersecting street. As an alternative, the minimum corner sight distance requirement may be calculated using AASHTO "Policy on Geometric Design of Highways and Streets," Chapter 0 (at-grade intersections), latest edition. The sight distance shall provide clear visibility of an object 4 feet above the intersecting street viewed from the centerline of the driveway at the right-of-way line of the intersecting street, at a height of 3.5 feet above the ground.

9.7.5 Separation and Spacing

All driveways except those serving residential units on individual lots shall be recommended to meet the following criteria:

- a. Minimum separation from a street intersection: 100' from centerline of driveway to nearest right-of-way line of the intersecting street, extended. For any driveway on a major thoroughfare having a centerline between 100' and 200' from the intersecting street right-of-way line, access restriction may be imposed to avoid traffic hazards. Greater separation may be required for safe operation of a free-right lane, acceleration or deceleration lane, etc.
- b. Minimum separation between driveways along the same side of a major thoroughfare: 100' between centerline as measured along the

## City of Suwanee Development Regulations

roadway edge or back of curb.

- c. Whenever possible, proposed driveways along one side of a street shall coincide with existing or proposed driveways on the opposite side of such street.
- d. Maximum number of driveways serving a single project: one (1) for each 400' of property frontage, or fraction thereof per street, along a major thoroughfare. This is not meant to be a spacing standard but only an expression of the total number of driveways that are permitted serving a single project.

### 9.8 STORMWATER DETENTION GUIDELINES

#### 9.8.1 General

- a. Storm water detention facilities shall be designed so that their peak release rates, when combined with those of all detention bypass areas in the same basin, produce peak flowrates and flow velocities at the site's boundary line no greater than those which occurred at the same location for pre-developed conditions.
- b. The positive effects of storm water management via on-site detention facilities diminish rapidly as the distance downstream from the point of discharge increases, and the smaller the facility's contribution is, as a percentage of the total runoff contributing to downstream flow, the shorter the distance downstream that the benefits are realized. Because of these limitations, on-site detention is effective at controlling flooding only when flow from the facility is a significant percentage of the total flow at the point of interest, and only if the point of interest is immediately downstream. The concepts of immediately downstream and significant percentage of total flow are inseparable. The portion of a receiving watercourse (one which receives and conveys runoff from a site) which lies downstream from the site to the point where the area of the site is 10 percent of the total drainage area, shall generally be considered to constitute that portion of the watercourse which is immediately downstream. However, the total flow in the receiving watercourse may become very large, relative to the flow contributed by the site, within a much shorter distance. For this reason, the significant percentage test must also always be applied. For purposes of these Regulations, the flow from a site represents a significant percentage of the total flow in a watercourse only when the ratio of the peak flow

## City of Suwanee Development Regulations

rate from the site to the peak flow rate in the watercourse (including the contribution from the site) is greater than 5 percent.

- c. Peak flowrate control shall normally be provided only for the 2-year, 5-year, 10-year, and 25-year frequency storm events. However, under certain conditions, the 100-year event must also be detained to the pre-developed rate. Such control of the 100-year event shall be provided when failure to do so would result in flooding of other habitable dwellings, property damage, or public access and/or utility interruption.
- d. For any storm water analysis, the composite "C" (Rational Method) or CN (SCS Method) used for analysis of pre-development conditions shall not exceed 0.25 or 60, respectively, unless prior approval has been obtained from the Department. A pre-design conference between the design engineer and appropriate Department personnel, which may in certain straightforward cases be conducted via the telephone, is required.
- e. Rational Method runoff coefficients used for analysis of pre- and post-development conditions shall be consistent with those shown in the Storm Water Design Manual.

### 9.8.2 Dam Design and Construction Criteria

- a. Detention facilities which take the form of normally-dry basins, ponds, or lakes usually are created by damming a drainage way or watercourse. Such dams can take a variety of different forms, the most common being earthen embankments and reinforced concrete walls. Each type of dam has different characteristics, and the selection of the most appropriate type for a particular site should be made by a Professional Engineer and based on the physical features of the dam site, the purpose of the dam, the type of impoundment, safety, and maintenance requirements.
- b. For purposes of these Regulations, dams will be addressed separately for each of the three most frequently encountered types of detention facilities: normally-dry basins, ponds, and lakes. A normally-dry basin is one designed to impound storm water runoff for only a brief period of time following a storm event. The vast majority of the time the basin will be completely dry except for any normal stream flows which pass through unimpeded. Lakes and

## City of Suwanee Development Regulations

ponds, on the other hand, are designed to impound a body of water at least several feet in depth on a more-or-less permanent basis. Lakes and ponds vary from one another only in terms of magnitude. The magnitude of a lake is determined primarily from the height of its dam, the size of its contributing drainage area, and the volume of water it is capable of impounding. For purposes of these Regulations, a pond is any lake having a dam height of less than 9 feet and which is incapable of impounding more than 20 acre-feet of water.

- c. All dam design shall be certified by a Professional Engineer currently registered in the State of Georgia.
- d. Dams for normally-dry detention basins shall conform to the following:
  - (1) Dams for normally-dry detention basins may be constructed of earth, reinforced concrete, mortared rubble, or other suitable materials.
  - (2) The design of any concrete or rubble wall over 5 feet in height shall be certified by a Structural Engineer currently registered as a Professional Engineer in the State of Georgia, and the structural design shall be based on soil tests certified by a Geotechnical Engineer currently registered as a Professional Engineer in the State of Georgia.
  - (3) Any non-earthen structure shall be designed to prevent piping failure through its subgrade and abutments.
  - (4) The construction of walls over 5 feet in height shall be monitored and approved by a qualified materials testing company.
  - (5) Earthen dams for normally-dry detention basins shall have a top width of no less than 8 feet.
  - (6) For earthen dams for normally-dry detention basins, there shall be at least 1.5 feet of vertical separation between the 100-year ponding elevation in the basin and the low point on the top of the dam. One (1) foot of this distance is to provide a margin of safety against overtopping of the dam and the other 6 inches is to allow for settlement. Separation is not required for a non-earthen dam if it has been designed to overtop safely.
  - (7) More stringent design and construction criteria shall be used

## City of Suwanee Development Regulations

for dams for normally-dry detention basins whenever the probable consequences of dam failure are severe.

- e. Dams for ponds shall conform to the following:  
Any engineer responsible for the design of a dam for a pond is expected to be knowledgeable of the criteria contained within the Georgia Safe Dams Act, Georgia Department of Natural Resources "Rules for Dam Safety" publication, and the U.S.D.A. Soil Conservation Service's Technical Release No. 60 "Earth Dams and Reservoirs." The provisions of each are to be applied wherever applicable. Applicability shall be determined based upon site-specific constraints and downstream conditions. Consultation with appropriate Department personnel both prior to and throughout the design process is encouraged.
- f. Dams for lakes shall conform to the following:  
Any engineer responsible for the design of a dam for a lake is expected to be thoroughly familiar with the criteria contained within the Georgia Safe Dams Act, Georgia Department of Natural Resources "Rules for Dam Safety" publication, and the U.S.D.A. Soil Conservation Service's Technical Release No. 60 "Earth Dams and Reservoirs." All design is to be in accordance with the applicable requirements contained in each of the above referenced publications.

### 9.8.3. Detention Facility Outlet Devices

- a. Because of the variables that may be associated with the choice of an outlet device for any given condition, the design consultant is responsible for the selection of the device, subject to the review and approval of the Department.
- b. The Department will include in its consideration the ease of maintenance, longevity of the system, freedom from congestion, practicality, and aesthetics in its review of the outlet device. The consultant should be guided by the Departmental preference of vertical weir designs since they have proven to generally meet most of the considerations expressed herein.
- c. Orifices shall not be smaller than 3 inches in diameter. An orifice smaller than 15 inches in diameter shall be protected by a trash rack. A trash rack protecting an orifice shall have surface area of

## City of Suwanee Development Regulations

at least 10 square feet. Design shall be in accordance with the Storm Water Design Manual. No opening in the trash rack shall have an area more than one-half the size of the area of the orifice being protected. Two-stage trash racks, or screens having progressively smaller openings placed in series, are suggested. To facilitate outlet operation, curved or inclined trash racks designed to allow debris to rise with the water level are preferred. In all cases, trash racks shall be either hinged or removable to facilitate maintenance operations.

- d. If the primary detention facility outlet is a conduit through a dam, and there is not an orifice, weir-box, or other flow-control device affixed to the upstream end, then the conduit shall be analyzed for both inlet and outlet control conditions. If an orifice or weir-box is affixed, then the conduit shall be analyzed to determine if any flows will occur for which outlet control conditions in the conduit, rather than the hydraulic characteristics of the flow-control structure, will determine the total flows occurring. In any case where the conduit through the dam is less than 15 inches in diameter, the trash rack provisions of "c" above shall be followed.
- e. Unless the 100-year maximum flow velocity in a conduit through a dam forming a pond or a lake is less than 10 feet per second, and the hydraulic grade line for the 100-year condition is at or below the crown of the conduit for at least 90 percent of its length, the conduit must be equal or superior to Class V reinforced concrete pipe in its structural characteristics.

### 9.8.4 Emergency Overflow Requirements

- a. For every type of detention facility, a planned safe flowpath must be provided for conveyance of flows of water in excess of those for which the detention facility was designed. In many instances, this function can be provided through installation of an emergency spillway. Emergency spillways are usually excavated open channels, either vegetated or paved with reinforced concrete.
- b. Every earthen dam shall be provided with an open-channel emergency spillway, unless all of the following apply:
  - (1) The principal spillway is a closed conduit having a cross-sectional area that can pass 125 percent of the 100-year

## City of Suwanee Development Regulations

- storm routed peak discharge.
- (2) The principal spillway is a closed conduit having a cross-sectional area of at least one square foot per each three acres of drainage area, or a maximum of twenty square feet of surface area, whichever is less.
  - (3) The principal spillway capacity is at least equal to the capacity required for an open-channel emergency spillway.
  - (4) The low point of the dam crest is not in a fill section except for roadway embankments.
  - (5) A trash rack or other debris protection is provided on the outlet control.
- c. Any portion of any emergency spillway excavated into a dam embankment or other fill section must be paved. Pavement material shall be either reinforced concrete or asphalt, as dictated by the design life of the dam and the potential consequences of its failure. Any portion of any emergency spillway excavated into natural ground shall be vegetated in accordance with the practices described in the "Manual for Erosion and Sediment Control in Georgia."
- d. In determining the necessary dimensions of an open-channel spillway for a normally-dry basin, a pond, or a lake, the methodology contained in the "Earth Emergency Spillway Design Data" section of the "Manual for Erosion and Sediment Control in Georgia" should be used.
- e. Emergency spillway capacity for dams shall be as follows:
- (1) For normally-dry detention basins, ponds, and lakes, having a dam height of less than 9 feet and which are incapable of impounding more than 20 acre-feet of water, and for which the probable sequences of dam failure are not severe, an emergency spillway should be provided. Its capacity should be at least equal to the difference between the routed 100-year peak flow into the detention facility assuming the principal spillway is.
  - (2) For normally dry detention basins, ponds, and lakes, having a dam height of 9 feet or more and which are capable of impounding 20 acre-feet or more of water, an emergency spillway should be provided. Its capacity should be at least equal to the greater of either the routed 100-year peak flow



## City of Suwanee Development Regulations

rate out of the facility assuming the principal spillway is blocked, or the routed one-fourth PMF hydrograph out of the facility. In cases when State or Federal regulations may require greater spillway capacity, those more stringent regulations shall govern.

- f. Emergency overflow for non-earth dams may take the form of planned structure overtopping. In such cases, however, care must be taken to prevent flows from eroding supporting soils along the toe of or immediately downstream from the dam so as to cause it to be undermined. The profile of the top of the dam shall be so designed as to prevent flows along the ends of the structure which might result in abutment erosion.

### 9.8.5 Parking Lot Detention Facilities

- a. Parking lot detention facilities shall generally be of one of the two following types:
  - (1) Depressed areas of pavement at drop inlet locations; and,
  - (2) Ponding areas along sections of raised curbing. The curbing in these areas is usually higher than a standard curbed section.
- b. The detention methodology utilized for all parking lot detention facility design shall conform to the Storm Water Design Manual.
- c. Parking lot detention areas shall be located so as to restrict ponding to areas other than parking spaces near buildings, and to not encroach upon entrance drives.
- d. The maximum depth of detention ponding in a parking lot, except at a flow control structure, shall be 6 inches for a 10-year storm, and 9 inches for a 100-year storm. The maximum depth of ponding at a flow control structure shall be 12 inches for a 100-year storm.
- e. In truck parking areas, the maximum depth of ponding shall be 12 inches for the 10-year storm.
- f. Detention ponding areas are to be drained within 30 minutes after the peak inflow occurs.

## City of Suwanee Development Regulations

- g. Parking lot detention areas shall have a minimum surface slope of 1 percent, and a maximum slope of 5 percent.

### 9.8.6. Underground and Rooftop Detention Facilities

The design of underground or rooftop detention facilities shall be in accordance with current engineering standard practice, and shall conform to the general spirit and intent of this Article. In the case of rooftop detention, permissible structural loads and weatherproofing shall be governed by the Georgia State Building Code as may be amended by the County.

### 9.8.7. Sediment Basins

- a. Stormwater management and sediment trapping functions should be separated whenever possible. Every erosion control design should seek to: first, prevent erosion from occurring; second, trap sediments as close to their sources as possible, and: third, provide a second-tier or backup line of defense against sediments leaving the project site. This backup defense will usually consist of check dams/and or sediment basins.
- b. Whenever a sediment basin and a detention facility are both required on the same watercourse, the sediment basin should be located immediately upstream of the detention facility.
- c. In unusual cases where a normally-dry detention basin is planned to be used to trap sediment as well as provide stormwater control, the basin may be undercut to accommodate the sediment so that the required detention characteristics, particularly volume, will be maintained.
- d. The design of sediment basins shall be in accordance with Appendix C of the "Manual for Erosion and Sediment Control in Georgia."

### 9.8.8 Ponds and Lakes Not Used for Detention

In such cases where a pond or lake is provided as part of a development, but is not planned to function as a stormwater detention facility, the same general and specific criteria contained in these Regulations shall apply, but may be modified in instance where a specific requirement is clearly detention oriented rather than safety-based.

## City of Suwanee Development Regulations

### 9.9 CULVERTS AND PIPE COLLECTION SYSTEM GUIDELINES

#### 9.9.1 Culverts

- a. Single barrel or single cell culvert structures are less prone to clogging and require less maintenance than multi-barrel or multi-cell installations and should therefore be used whenever feasible.
- b. The maximum velocity in a corrugated metal culvert for the 100-year flow shall be 15 fps (feet per second). Velocities over 10 fps in a pipe of any material shall be considered a special design with particular attention required to pipe or structure invert protection and to fill slope, stream bed, and stream bank stability.
- c. The minimum allowable slope shall be in accordance with the Storm Water Design Manual.

#### 9.9.2 Pipe Collection Systems

- a. The maximum velocity in a corrugated metal pipe system for the design flow shall be 15 fps. Velocities over 10 fps in a pipe of any material shall be considered a special design with particular attention required to pipe invert protection and the ability of the receiving waterway or detention facility to accept the flow without damage.
- b. The minimum allowable slope shall be in accordance with the Storm Water Design Manual.
- c. The maximum allowable slope for a concrete storm drainage pipe shall be 10 percent, for a corrugated metal pipe shall be 14 percent and for a HDPE pipe shall be 14 percent. Greater slopes may be approved if installation is in accordance with manufacturer's recommendations. In cases where the slope is in excess of 10 percent, anchor collars may be required.
- d. A minimum pipe cover of one (1) foot shall be required.

#### 9.9.3 Outlet Location - Culverts and Pipe Systems

- a. Outlet structures (such as headwalls) shall not be located closer to the project site's property line with an adjoining property than the

City of Suwanee Development Regulations

greater of the distance necessary to construct any velocity protection or a flow distance equal to six (6) pipe diameters. For non-circular conduits, this distance shall be six (6) times the rise dimension of the conduit.

- b. The invert elevation of a culvert or pipe outlet shall be no more than 2 feet above the elevation of the bottom of the receiving watercourse at the outlet.

9.9.4 Energy Dissipation

The maximum developed condition flow velocity at the project site's downstream property line with an adjoining tract shall not exceed the maximum predeveloped condition velocity. Calculations may be required to support this velocity standard on a case-by-case basis.

9.9.5 Discharge of Concentrated Flows

- a. The discharge of concentrated flows of stormwater into public roadways shall be avoided. In no case shall such concentrated flows, including flows from swales, ditches, draws, driveways, or piped systems, exceed the allowable peak flow rates in Table 9-G, below.

TABLE 9-G  
MAXIMUM FLOWS INTO STREETS

<u>STREET CLASSIFICATION</u>	<u>ALLOWABLE PEAK FLOW RATE FOR A 2-YEAR STORM</u>
Local	2.0 cfs
Minor Collector	1.0 cfs
Other	0.5 cfs

- b. In residential subdivisions, the drainage area contributing to the peak flow along any property line between lots within 50 feet of the building setback line for either lot shall not exceed 2 acres, unless contained within a piped drainage system or maintained in a natural watercourse. The storm water conveyance shall be in a drainage easement.