

STATE OF GEORGIA  
COUNTY OF FULTON

AN ORDINANCE TO AMEND CHAPTER 103, ARTICLE X111 GRADING AND DRAINAGE,  
SECTION 103-105 EROSION CONTROL TO INCLUDE MINIMUM STANDARDS FOR ANY  
LAND DISTURBANCE ACTIVITIES EXEMPT FROM CHAPTER 109, ARTICLE VI

ARTICLE XIII. GRADING AND DRAINAGE

**Sec. 103-105. Erosion control.**

(a) *Design standards.* 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 this chapter and shall continue to apply until the project has been completed.

(b) *Abandoned projects.* Any project, whose permit has lapsed under the terms expressed in article VI, 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.

(c) *Rules and regulations governing any land disturbing activities not specifically exempted in Chapter 109, Article VI, Section III.* The rules and regulations, ordinances, or resolutions adopted pursuant to this article for the purpose of governing land disturbing activities shall require, as a minimum, protections at least as stringent as the state general permit and BMPs, including sound conservation and engineering practices to prevent and/or minimize erosion and resultant sedimentation, which are consistent with, and no less stringent than, those practices contained in the Manual for Erosion and Sediment Control in Georgia, published by the state soil and water conservation commission as of January 1 of the year in which the land disturbing activity was permitted, as well as the following:

- (1) Proper erosion control measures must be installed along site boundaries prior to stripping of vegetation, regarding, and other development activities as deemed by the director to minimize erosion and prevent soil erosion from leaving the site.
- (2) Cut-fill operations must be kept to a minimum.
- (3) Development plans must conform to topography and soil type so as to minimum erosion potential.
- (4) Natural vegetation that is beyond the permitted limits of land disturbance is retained, and whenever feasible, natural vegetation is retained, protected and supplemented.
- (5) Disturbed soil is stabilized by the close of each business day for utilities, and within five to ten days of initial land disturbance for other commercial/residential sites.
- (6) Temporary vegetation or mulching is employed to protect all exposed areas (especially steep cuts and/or banks, etc.) during development.
- (7) Permanent vegetation and structural erosion control measures are installed upon achieving final grade.
- (8) Sediment in runoff water must be trapped by the use of debris basins, sediment basins, sediment barriers, construction exits or similar BMPs as outlined in the Erosion and Sediment Control Manual until the disturbed area is stabilized. As used in this subsection, a disturbed area is stabilized when it is brought to a condition of continuous compliance with the requirements of this section, and the Soil Erosion and Sedimentation Control Act of 1975 (O.C.G.A. § 12-7-1 et seq.).
- (9) Adequate provisions must be provided to minimize damage from surface water to the cut face of excavations or the sloping surface of fills.
- (10) In cases where cuts and fills endanger adjoining properties, sound engineering practices or methods are employed to protect those adjoining properties.

- a. All slopes are stabilized immediately and shall remain so for a period of no less than one year from the issuance of the project's final certificate of occupancy and/or the recording of a final plat.
- b. All slopes greater than or equal to 3H: 1V must be permanently stabilized with structural or vegetative BMPs.
- c. A plan must be submitted to demonstrate that all slopes associated with fill/cut sections have been adequately designed to be stabilized structurally (such as retaining walls) or vegetatively (erosion mat/blanket, tree bark mulch, etc). Such analysis, reports, or design shall be prepared and approved by a certified design professional.
  - (11) Fills may not encroach upon natural watercourses or constructed channels.
  - (12) Migrated soil materials or soil materials displaced by mechanical means from land disturbing sites to adjacent watercourses, such as lakes, ponds, streams and creeks etc., must be remediated. The remedial work is conducted as per a remedial plan approved by the city.
  - (13) Grading equipment must cross flowing streams by means of temporary or permanent bridges or culverts except when such methods are not feasible, provided, in any case, those such crossings are kept to a minimum.
  - (14) Land disturbing activity plans for erosion and sedimentation control shall include provisions for treatment or control of any source of sediments and adequate sedimentation control facilities to retain sediments on-site or preclude sedimentation of adjacent waters beyond the levels specified in subsection (b)(2) of ARTICLE VI, Division 2, Sec. 109-274.

(Ord. No. 2008-09-48, § 1, 9-16-2008)

**Sec. 103-106. Earthwork.**

(a) *Clearing and grubbing.*

- (1) The area within the typical grading section shall be cleared of all trees, brush, stumps, logs, grass roots, vegetable matter, poles, stubs, rubbish, refuse dumps, sawdust piles, and all other matter resting on or protruding through the original ground surface or appearing or being placed on the area within the typical grading section before final acceptance of work.
- (2) This item also includes the removal and proper disposal of all the debris or any obstructions not to be salvaged such as fences and incidental structures within the proposed area to be graded, which might interfere with construction.
- (3) Clearing and grubbing operations shall be conducted in such a manner as to prevent damage to existing structures, equipment and any proposed work that has been completed, and to provide for the safety of workmen and other personnel on the job site.

(b) *Grading.*

- (1) Grading shall be done in accordance with the lines and grades shown on the approved plan.
- (2) Grading plans shall show existing and proposed contour lines at an interval of not more than two feet.
- (3) A grading plan showing building pad locations may be required to be submitted for residential subdivisions to ensure adequate lot-to-lot drainage. 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.
- (4) Grading plans shall outline the areas which are required to remain undisturbed, i.e. tree protection areas, undisturbed buffers stream buffers, etc., and shall indicate protective fencing or staking to be placed around such areas.
- (5) Shoulder sections shall be provided as required in article XI.
- (6) If the proposed grading is within the jurisdiction of the Metropolitan River Protection Act, the grading shall be consistent with the river corridor certificate approved for the project.
- (7) Grading for all roads and improved ditches shall be shown.

(8) Unclassified excavation consists of all roadway and drainage excavation, regardless of the nature of the material or the manner in which it is removed. It includes the removal and disposal of unsuitable or unstable material under the roadbed section and backfilling with suitable materials.

(9) All rock and boulders in the roadbed shall be excavated to a depth of at least 12 inches below the sub-grade and the space backfilled to the correct grade with material suitable as sub-grade.

(10) Where materials unsuitable for foundation or roadway purposes occur within the limits of the roadbed and front slopes, the same would be excavated to the bottom of their depth and removed.

(c) *Embankments.*

(1) All depressions below the ground surface containing water shall be drained, unsuitable material removed and filled with suitable material and compacted to the ground surface before the embankment proper is begun. Any area deemed jurisdictional under federal, state or local ordinances and regulations shall obtain required approvals or permits prior to any land disturbing activities in those areas.

(2) The entire area upon which the embankment is to be placed shall be plowed, scarified and finely broken up to a depth of at least six inches and all cleavage plains shall be destroyed before the embankment is begun.

(3) The embankment material shall be deposited and spread in uniform horizontal layers not to exceed six inches thick for the full width of the cross sections and the layers shall be kept level by any approved equipment.

(4) Each layer shall be compacted at moisture content proper to permit the compaction specified below. Material containing too much water shall be dried to the correct moisture content. If the material is too dry, water shall be added and uniformly mixed with the soil before it is compacted.

(5) The top 12 inches of embankment shall be compacted to at least 100 percent of the maximum laboratory dry density as determined by AASHTO method T-99. Embankment material located between one foot and six feet below the top of the embankment shall be compacted to at least 90 percent of maximum laboratory dry density as determined by AASHTO method T-99. The measurements of depth as described above shall begin at an elevation equal to the bottom of sub-grade treatment where sub-grade treatment material is used.

(6) Maximum slope in cut or fill sections shall be 2:1. The slope of cut or fill shall be uniform throughout for each section of cut or fill unless benching is approved by the city.

(7) 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) When a cut is made in rock that requires blasting, slope may be changed to vertical slope upon the written approval of the city engineer and only under the following conditions:

- a. When accompanied by a certification from a registered professional geotechnical engineer stating that the slope material is stable; and,
- b. In no instance shall the slope face be steeper than vertical 1/8-inch batter is preferred; and,
- c. The slope face is free from all deleterious material and is not subject to long-term erosion due to excessive runoff on the face of the slope.

(9) All slopes steeper than 2.5:1 and greater than ten feet in height shall be hydro-seeded and covered with GDOT approved wheat straw, wood fiber matting or coconut fiber matting. All slopes must be protected until a permanent vegetative stand is established and,

(10) Slopes over 20 feet in height shall be stabilized in stages by matting and vegetation. Stabilization measures shall be placed in vertical increments not to exceed 20 feet immediately at the completion of each 20-foot lift.

(Ord. No. 2008-09-48, § 1, 9-16-2008)

**Sec. 103-107. Retaining walls.****(a) General requirements.**

(1) When permanent grades are proposed to be steeper than 2:1 (one vertical foot of rise for every two feet of horizontal displacement) an appropriate retaining structure shall be designed to reinforce or retain the resulting embankment.

(2) An engineered design may be substituted for the reinforced concrete design if approved by the director. All structural components of the wall shall meet the minimum building codes for the proposed use.

(3) All wall designs must demonstrate complete dimensions for line and grade. Wall design will consider foundation drainage and select backfill material for the proposed conditions.

**(b) Permits required.** Where retaining walls are to be installed permits shall be obtained in accordance with article VI of this chapter.

**(c) Indemnification/certification.** For all retaining walls over four feet in height, the owner of the property containing the proposed wall shall complete an owner's indemnification agreement. For all retaining walls over six feet in height, a professional engineer shall design and certify the wall and complete an engineer's certification agreement for each wall permitted.

The following criteria (contained on indemnification/certification agreements) pertain to all walls unless specifically allowed under variance or permission from the appropriate governing authority:

(1) Retaining walls must be located three feet outside the public right-of-way;

(2) Placement of retaining walls shall comply with any and all applicable easement restrictions;

(3) Retaining walls are to be located within the confines of owner's/applicant's property;

(4) Retaining walls shall not be located within undisturbed stream buffers and impervious surface setbacks, floodplains, drainage easements or drainage ways in a manner that impedes the flow of water.

**(d) Retaining wall height and materials.**

(1) All retaining wall structures in excess of six feet shall be designed by a qualified registered professional engineer and shall be constructed of reinforced concrete or other masonry materials as required by the registered professional engineer.

(2) When the necessity for an earth retaining structure is required for a vertical displacement of six feet or less, appropriate landscaping timbers, or approved equal, may be employed if no permanent structure is supported by the soil retained by the retaining wall. The use of railroad cross ties or other timber product will only be allowed in these instances when the wall is constructed as per detail.

**(e) Handrails.** All retaining walls, other than for a stormwater facility, over six feet must have a hand rail or other suitable barrier installed. See section 103-107(h) for requirements for handrails within the stormwater facilities.

**(f) Tiered retaining walls.** Where an assemblage of retaining walls and slopes result in a vertical elevation difference exceeding four feet over horizontal distance that is less than two times the vertical elevation difference, than a retaining wall shall be required, along with applicable indemnification/certification agreement based on criteria found in section 103-107(c).

**(g) Encroachments.** Walls shall be located in such a fashion as to not encroach upon existing or proposed drainage easements, drainage courses, buffers or floodplains or to encumber the natural flow of surface runoff of stormwater. Walls shall be located at a distance from such watercourses to allow for anticipated future maintenance of the easement to prevent a safety hazard to the maintenance workers or to jeopardize the structural integrity of the wall.

**(h) Walls for stormwater facilities.** Retaining walls that are proposed for the purpose of a stormwater detention must be designed to demonstrate that the walls are capable of a hydrostatic load as measured from the top of the foundation footing to the highest elevation along the top of the wall. The hydrological design must allow for a free board dimension of one foot and an emergency overflow capacity equal to the allowable peak discharge for the 100-year storm event. The routing calculations should not take into account the existence of the emergency overflow. Place the overflow device above the projected 100-year flood elevation within the detention area.

Where the walls are located within a fenced stormwater facility no handrails shall be required along the top of the wall. Where no fencing of the facility has been required and the wall exceeds four feet in height (as measured from top of wall to normal water level or pond bottom for dry facilities), a handrail or other suitable barrier, approved by the director, shall be provided along the top of the wall. (Ord. No. 2008-09-48, § 1, 9-16-2008)

### **Sec. 103-108. Culverts.**

(a) *Drainage improvements required.* Stormwater 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. Stormwater conveyance facilities that are designed to carry runoff from more than one parcel, existing or proposed, shall meet the requirements of this chapter.

(b) *Design criteria--General.*

- (1) All stormwater conveyance facility design calculations shall be certified by a registered professional engineer.
- (2) Methods to calculate stormwater flows shall be in accordance with this chapter and the Georgia Stormwater Management Manual.
- (3) 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.
- (4) All portions of a stormwater conveyance system with drainage areas falling within the same size category shall be analyzed using the same methodology.
- (5) Runoff coefficients used for the rational method and runoff curve numbers used for the SCS method shall be consistent with those shown in the Georgia Stormwater Management Manual.
- (6) Sizing and location of all drainage structures shall be the responsibility of a registered professional engineer as per accepted standard design procedures, subject to approval by the director.
- (7) All storm drainage designs shall be in accordance with the Georgia Stormwater Management Manual, and GDOT specifications.
- (8) GDOT standards shall be used in determining class (concrete) or gauge of pipe under fill, method of backfilling and pipe installation.
- (9) A certification of the pipe specifications for each pipe may be required prior to the pipe installation.
- (10) Trench construction for storm drainage pipe shall be in accordance with GDOT specifications, OSHA standards and city ordinances.

(c) *Design criteria--Culverts.*

- (1) When the construction of a proposed public road makes it necessary to cross an open stormwater conveyance system, the developer shall provide and install the required size and length of an acceptable grade of pipe.
- (2) Culvert design is to be in accordance with the methods contained in this chapter and the Georgia Stormwater Management Manual and shall include a thorough analysis of both inlet and outlet control conditions.
- (3) 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).
- (4) Single-barrel or single-cell culvert structures are less prone to clogging and require less maintenance than multibarrel or multicell installations and should therefore be used whenever feasible.
- (5) 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.
- (6) The minimum allowable slope shall be in accordance with the stormwater design manual.
- (7) Minimum culvert size shall be 18 inches.
- (8) Culverts shall have head walls of an approved type on inlet and outlet ends of the pipe.

(9) The 100-year pond limits at the upstream end of the culvert shall be indicated on the design plans and final plat if applicable.

(10) Culverts shall be designed to provide a minimum of 1.5 feet of freeboard between the peak design storm elevation and the centerline of the road without raising the established flood elevation on the upstream properties. All crossings shall conform to the floodplain management ordinance. The design storm events are as follows:

Table 13.4-1. Required Storm Events for Culvert Design

TABLE INSET:

STREET CLASSIFICATION	STORM EVENT (RECURRENCE INTERVAL)
Arterial/ Major Collector	100 years
Minor Collector/Local*	50 years
Dead-end/Alleys*	25 years

\* For streets that don't have alternative access routes the design storm event shall be the 100-year event for all street classifications.

(11) Junction boxes having access to the pipe shall be constructed to meet the requirements of GDOT standards and shall be provided with a metal manhole frame and lid for access.

(12) Minimum cover is one foot between the bottom of the base or sub base, if used, and the exterior crown of culvert.

(13) A minimum of 0.5 foot between underground utilities and exterior crown of the culvert shall be provided.

(d) *Materials and installation.*

(1) Acceptable pipe materials shall be as follows:

- a. Reinforced Concrete Pipe (RCP) - required within the right-of-way or when conveying live streams;
- b. Fully Coated or Aluminized Type II Corrugated Metal Pipe;
- c. Other materials as approved by GDOT.

(2) Pipe installed within the right-of-way shall be reinforced concrete pipe and the class as determined by GDOT specifications.

(3) All pipes carrying live streams shall be reinforced concrete or HDPE. HDPE pipe shall conform to the standard GDOT specifications.

(4) Reinforced concrete pipe shall be manufactured in accordance with AASHTO M-1 70 and/or ASTM C76. All pipes shall be in joint lengths of not less than eight feet. All joints shall be bell and spigot and shall be laid with the spigot end pointing downstream. All joints shall use an O-ring gasket conforming to ASTM C-443. Class of pipe and wall thickness shall be accordance with GDOT standard details and specifications.

(5) Metal pipe shall be fully bituminous coated or aluminized type II, with re-rolled ends and bands to match.

(6) Culvert pipe on which the coating has been bruised or broken either in the shop or in shipping or which shows defective workmanship shall be rejected. Among others, the following defects are specified as constituting poor workmanship and the presence of any or all of them in any culvert pipe shall constitute cause for rejection:

- a. Uneven laps;
- b. Elliptical shaping;
- c. Variation from a straight centerline;
- d. Ragged or diagonal sheared edges;
- e. Loose, unevenly lined or spaced rivets;
- f. Poorly formed rivet heads;

- g. Unfurnished ends;
- h. Illegible brand;
- i. Lack of rigidity;
- j. Bruised, slated or broken coating;
- k. Dents or bends in the metal itself.

(7) Field joints shall be made with coupling bands of the same base metal as the culverts. The bands shall not be less than seven inches wide for diameters of eight inches to 30 inches, inclusive; not less than 12 inches wide for culverts with diameters 36 inches to 60 inches inclusive and not less than 24 inches wide for culverts with diameters greater than 60 inches. Such bands shall be so constructed so as to lap on an equal portion of each of the culvert sections to be connected at the ends by galvanized angles having minimum dimensions of 2"x 2" x 3/16". The seven-inch band shall have at least two galvanized bolts not less than 1/2-inch in diameter. The 12-inch band shall have three and the 24-inch band shall have five half-inch bolts. Other equally effective methods of connecting the coupling bands may be used if approved by the director.

(8) The gauge of the culvert metal will be determined from the thickness of the galvanized sheets as approved by GDOT Standards.

(9) Corrugated metal pipe shall conform to the requirements of AASHTO M36, sizes, shapes, types, base metal, gauges; bituminous coating and paved inverts shall be as provided in the GDOT specifications or as directed by the Director.

(10) All joints and couplings shall be in accordance with the manufacturer's recommendations. Each end of each pipe to be joined by a coupling band shall have minimum of two annular corrugations. Bands shall be manufactured from the same material as the pipe. The minimum band gauges for aluminized pipe shall be as specified in AASHTO M-36, Section 9.

(11) Pipe sections shall be laid in a prepared trench with outside laps of circumferential joints pointing upstream and with longitudinal joints at the sides. Coupling bands fastened by two or more bolts shall join the sections. The space between adjoining sections shall not be more than the width of one corrugation.

(12) Before any traffic over a storm drain is allowed, the developer shall provide an adequate depth and width of backfill to protect the structure from damage or displacement. All pipe structures shall be cleaned before the work is accepted. Any damage or displacement that may accrue due to traffic or erosion shall be repaired or corrected at the developer's expense.

(e) *Bedding and backfill.*

(1) *General.* All approved pipe material shall be bedded in accordance with the manufacturers' and engineers' specifications.

(2) *Bedding.* All pipes shall be placed on stable earth of fine granular foundation, the characteristics of which would be expected to provide long-term stability. In all live stream pipe installations, areas of low bearing capacity, solid or nonuniform foundations, where rock is encountered at the foundation level, or in other locations where conditions warrant, a minimum of six inches of crushed stone bedding is required (maximum size of stone is three inches). Geogrids or geotextiles may also be required by the department in problem areas.

When concrete pipe is used all bedding material shall be suitably excavated to allow for the bell and uniformly support the pipe.

(3) *Backfill.* Backfill on all pipe installations shall be constructed using foundation backfill material Type I or Type II as specified in Sections 812.2.01 and 812.2.02 respectively in the GDOT Standard Specifications. These materials shall be placed in layers of not more than six inches loose. Compaction of these materials shall be accomplished by hand tamping or machine tamping. Required compaction levels are as follows:

a. Backfill within all street rights-of-way shall be compacted to 95 percent maximum laboratory dry density as determined by AASHTO Method T-99. The top 12 inches shall be compacted to 98 percent maximum density. Base material shall be compacted to 100 percent maximum laboratory dry density as determined by AASHTO method T-180.

b. Backfill in all other areas shall be compacted to 95 percent maximum density using the AASHTO Method T-99.

(f) *Pipe end treatments.*

(1) Headwalls or other end treatments are required on all culverts and at the end of all piped collection systems. Headwalls are to be pre-cast concrete, stone masonry with reinforced footings or poured in place reinforced concrete with reinforced footings.

(2) End treatments that conform to the slope may be masonry, pre-cast concrete, metal, reinforced concrete slope collars or grouted riprap. Concrete and metal flared end sections shall conform to GDOT standards.

(g) *Bridges.* Bridges shall be designed on a 100-year flood basis. Bridge piling shall be driven to state highway load standards for loading. Certification of pile load shall be by registered professional engineer.

(Ord. No. 2008-09-48, § 1, 9-16-2008)

### **Sec. 103-109. Pipe collection systems.**

(a) *General requirements.*

(1) The maximum velocity in a corrugated metal pipe system for the design flow shall be 15 fps. Velocities over ten 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.

(2) The minimum allowable slope shall be in accordance with the Stormwater Design Manual.

(3) The maximum allowable slope for a concrete drainage pipe shall be ten 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 ten percent, anchor collars may be required.

(4) Drop inlets and junction boxes shall conform to Fulton County or GDOT construction standards.

(5) Catch basins and/or drop inlets shall be designed by the developer's engineer or registered surveyor to GDOT standards and subject to approval by the director.

(b) *Methodology.* The rational method shall be used to determine the size of all pipe collection systems in accordance with the methodology provided in the Georgia Stormwater Management Manual. Closed storm drainage systems shall be designed using the 25-year storm event.

(c) *Minimum pipe size.* Minimum pipe size shall be 18 inches.

(d) *Inlet location and gutter spread.*

(1) Catch basins shall be located at low points of streets and at all points where the gutter spread exceeds one-half of the width of the travel lane or eight feet whichever is smaller. Flows shall be based on a 25-year design storm event and shall be calculated as described in the Georgia Stormwater Management Manual. Gutter spread calculations shall be included in the stormwater management study.

(2) Junction boxes or inlets shall be provided at all changes in pipe grades, direction or materials. All junction boxes or inlets shall be provided with metal manhole frames and lids for access.

(e) *Pipe slope.* All storm sewer pipes shall be sloped to provide a minimum velocity of 2.5 fps, actual velocity. In no case shall the slope be less than one percent for corrugated metal pipe or one-half percent for reinforced concrete pipe.

(f) *Flow and outlet velocity.* Maximum flow velocity, actual or full flow, is 20 fps. Maximum outlet velocity, actual or full flow, is five fps with adequate energy dissipation devices installed at the pipe outlet.

(g) *Hydraulic grade line.* Complete flow, velocity, and hydraulic grade line computations shall be provided for all portions of a closed drainage system. Hydraulic grade lines shall be shown on the storm drainage profiles for the 25-year design storm event. Hydraulic grade line calculations shall include any tail-water or backwater effect from downstream structures.

(h) *Easements.* Easements shall be required as provided in article XII.

- (i) *Cover.* Minimum cover shall be 12 inches on all drainage pipes, as measured from the bottom of the sub-grade or sub-base if used. Maximum cover shall be as defined in GDOT Specifications.
- (j) *Maximum pipe length.* Maximum continuous runs of pipe shall be as follows:

Table 13.5-1. Maximum Continuous Pipe Length

TABLE INSET:

PIPE DIAMETER (inches)	MAXIMUM CONTINUOUS LENGTH (feet)
18	300
24--60	400
Larger than 60	500

(k) *Subdrainage.* Subdrainage may be required to be installed to control any surplus groundwater by intercepting seepage or by lower or regulating the groundwater level where such conditions exist.

(l) *Backfill.* The backfill around and over storm sewer pipes, culverts and minor structures shall be of selected material Type I or Type II. The backfill shall be placed and compacted so as to avoid unbalanced loading and to avoid placing undue stress on the structure. Backfill shall be built up in horizontal layers not more than six inches thick and each layer shall be thoroughly compacted by the use of rapid striking mechanical tampers or hand tampers. After compaction, the dry weight per cubic foot for each layer of backfill shall be at least 95 percent of the maximum laboratory dry weight per cubic foot. Backfills shall be built up and compacted above pipe and culverts to a thickness of at least two feet or half the vertical inside diameter of the pipe, whichever is greater, unless these dimensions exceed the proposed height of embankment, in which case the backfill shall be made and compacted to the height of the embankment.

(m) *Outlet location--Culverts and pipe systems.*

(1) Outlet structures (such as headwalls) shall not be located closer to the project site's property line than the distance necessary to construct any outlet protection or a flow distance equal to six pipe diameters, whichever is greater. For noncircular conduits, the distance equal to six pipe diameters shall be six times the rise dimension of the conduit. The design of the outlet protection shall be in compliance with the Manual for Erosion and Sediment Control in Georgia.

(2) The invert elevation of a culvert or pipe outlet shall be no more than two feet above the elevation of the bottom of the receiving watercourse at the outlet, unless adequate slope protection and channel are constructed to safely convey the discharge from the outlet of the pipe to the receiving channel.

(n) *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 pre-developed condition velocity.

(o) *Discharge of concentrated flows.*

(1) The discharge of concentrated flows of stormwater into public roadways shall be avoided. Applicant shall demonstrate to the satisfaction of the director that all reasonable efforts have been made to control stormwater on the project site.

(2) 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 two acres, unless contained within a piped drainage system or maintained in a natural watercourse. The stormwater conveyance shall be in a drainage easement.

(p) *Storm drain stenciling.* When required by the city, all residential subdivision and commercial entity storm drainage structures or facilities (catch basins, storm sewer inlets, manholes and other structures that capture and convey stormwater runoff) shall be properly identified as draining to a stream.

(Ord. No. 2008-09-48, § 1, 9-16-2008)

**Sec. 103-110. Stormwater management.**

(a) *Design criteria--General.*

(1) All design related to the stormwater facilities shall be in accordance with the Georgia Stormwater Management Manual as adopted or amended.

(2) Installation of properly functioning stormwater facilities, including outflow control devices shall be the responsibility of the owner. If any facilities are damaged or destroyed during grading or construction activities, all processes shall cease until such devices are restored to their functional capacity. The owner, through application for a land disturbance permit, agrees to accept this responsibility.

(b) *Stormwater management report required.* A stormwater management report shall be provided for every project as required by the city's stormwater management ordinance. The purpose of this report shall be to formulate a plan to manage stormwater runoff so that stormwater runoff hazards are not created and existing runoff related problems are not exacerbated, either upstream or downstream from or within the boundaries of the property being developed. The engineer shall be responsible for obtaining all information necessary for the report. Hydrologic analysis and detention pond hydraulics, pipe and open channel hydraulics, culvert hydraulics and water quality best management practices shall be certified by a professional engineer registered in the State of Georgia.

(c) *Stormwater detention.*

(1) Whenever a stormwater management report indicates that an adverse impact from stormwater runoff is expected to result from the development of a property, that project shall be provided with stormwater detention facilities. The meaning of adverse impact shall apply to situations where the post developed discharge velocities and/or flows, up to and including the 100-year storm event, exceed those determined for the pre-developed conditions or where the downstream conditions indicated that the design flow exceeds the conveyance capacity of the receiving facility or potentially creates flooding conditions in downstream structures.

(2) Stormwater 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 flow rates and flow velocities at the site's boundary line no greater than those which occurred at the same location under pre-developed conditions.

(3) Peak flow rate and velocity control shall normally be provided only for the two-year, five-year, ten-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.

(4) Stormwater detention facilities shall be provided, unless the registered professional engineer provides certified documentation supporting the conclusion to the director that at least one of the following is true and correct as applicable:

a. 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 which shows that detention is not required; or,

b. Where the site runoff will flow directly into a stream or lake without crossing off-site properties and the following conditions are met:

1. Conveyance systems on the project site are adequately designed or sufficient in their existing conditions to transport the undetained flows without further degradation; and,

2. The downstream analysis, using timing of the hydrographs, shows no adverse impacts from the exit of the site to the point in the drainage basin where the project area is ten percent of the total drainage basin area.

(5) Should the authorized registered professional conclude that stormwater detention may not be necessary, rigid compliance with all of the following criteria is mandatory:

a. A stormwater management report shall always be required whether or not stormwater detention is required.

b. 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.

c. At the pre-submittal conference with the staff, the consultant shall be prepared to discuss the downstream analysis findings as follows:

1. The affected stream must be analyzed downstream from the project to a point where the project area is ten 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,

2. 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,

3. 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.

(6) Where it is determined by the analysis required by this section that stormwater detention is not required it should not be interpreted as a waiver of channel protection and water quality requirements.

(7) All stormwater detention/retention structures (both above and below ground) shall be located outside of building setbacks and zoning buffers.

(d) *Extended detention.* Extended detention shall normally be provided in accordance with the requirements of the city stormwater ordinance.

(e) *Water quality.* Water quality measures shall be installed in accordance with the city stormwater ordinance.

(f) *Upstream conditions.*

(1) All culverts, pipe systems and open channel flow systems shall be sized based on all on-site upstream areas being developed in accordance with the development plans and the off-site upstream areas being fully developed in accordance with the land use plan with no detention. Upstream detention may be included when determining flows, provided the engineer calculates the reduced flow by routing the developed flows through any stormwater facility included in the analysis rather than assuming that a reduction will occur. The engineer shall show that detention facilities used in the analysis will remain, be properly maintained and the storage volume and outlet structure configuration is based on current conditions.

(2) Detention facilities shall be designed using pre-developed flows based on existing conditions for all upstream areas including existing on-site lakes, ponds and detention facilities. Post developed flows shall be based on the upstream basin areas being developed as shown on the approved development plans and existing conditions for off-site upstream areas. Upstream detention may be included if it meets the conditions as described for culverts, pipe systems and open channel flow systems.

(g) *Existing conditions (pre-development).* Existing or pre-development conditions shall be defined as the conditions of the site at the time the development permit is applied for. The existing condition shall include all on-site lakes, ponds, or detention facilities. Predeveloped flows shall be determined by routing the flows through these stormwater facilities.

If it is determined by the director that the existing conditions downstream of the project site warrant further protection the director may require the existing conditions analysis to assume that the site is in its natural, undisturbed state.

(h) *Hydrology report requirements.* The stormwater management report shall comply with the city's stormwater management ordinance and shall include the following information when applicable:

- (1) Cover sheet signed and sealed in accordance with the stormwater management ordinance;
- (2) Table of contents;
- (3) Narrative summary;
- (4) Numerical summary;
- (5) Basin delineation maps (pre and post, tc flow paths, sub-basin CN);
- (6) Hydrograph input and output;
- (7) Routing input and output;
- (8) Stage-storage/outflow relationships;

- (9) Outlet control details;
- (10) Ten percent downstream analysis;
- (11) Channel/ditch calculations;
- (12) Pipe chart (shown on plans also);
- (13) Gutter spread calculations;
- (14) Downstream sediment analysis.

(i) *Side slope and fencing requirements.* All stormwater facilities shall be constructed with maximum 2:1 side slopes or fenced when the facility contains a permanent pool deeper than 18 inches or the 25-year maximum flood depth exceeds 18 inches (use a 24-hour duration for facilities designed using SCS methodology). The fence shall be a minimum of six feet high and made of a durable material with a ten-foot wide access gate. The fence shall comply with all applicable zoning requirements.

(j) *Temporary facilities.* Stormwater detention facilities shall be constructed in accordance with the approved plans and shall be in place and inspected prior to the initiation of other improvements. If the detention facility is planned to be a lake, micro pool or constructed wetland, temporary detention facilities shall be provided and shall remain in place until the feature has become a functional stormwater management facility.

(k) *Redevelopment and the use of existing stormwater facilities.*

(1) 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:

- a. 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; or,
- b. 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; or,
- c. A new record survey, drawing, study and certification showing that the facility meets the development requirements when the facility was approved.

(2) When the development is part of a redevelopment strategy or the proposed development intends to use a master facility that does not meet current stormwater standards as established in the stormwater management ordinance, the following shall apply:

- a. When 5,000 square feet or more of impervious surface is created, added, or replaced, or one acre or more of a developed project site is disturbed for redevelopment, and the disturbed area is more than 50 percent of the property, the water quality requirements of this section must be met for the entire site.
- b. When less than 5,000 square feet of impervious surface area is created, added, or replaced, or less than one acre of land of a developed project site is disturbed for redevelopment, 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 impervious surface area is created, added, or replaced, or one acre or more of a developed project site is disturbed for redevelopment, and the disturbed area is less than 50 percent of the property, the project shall provide water quality treatment for just the improvements on the site.
- d. Where water quality treatment for a proposed development is to be provided in an existing detention basin then treatment must be provided for the entire original project basin. A modification to the 25-year detention requirement may be granted for the purpose of retrofitting the detention pond to meet current water quality regulations. Granting of a modification will meet the intent and purpose of this chapter when:
  - 1. The detention requirements of the current regulations are provided in the facility for the one-year, two-year, five-year and ten-year and 25-year storm. For a retrofitted basin, the volume of the one-year storm shall be based on the original project area being detained instead of the total area draining to the basin; and,

2. The water quality requirements of the current ordinance are provided for the original project area in the facility; and,

3. The ponding limits create a hardship if no modification is granted; and, the outlet structure meets the requirements of the current chapter.

(l) *Evidence of acquisition of applicable nonlocal permits.* The applicant may be required to provide documentation that all other applicable environmental permits have been acquired for the site prior to approval of the stormwater management report.

(m) *Stormwater facility location criteria.*

(1) For purposes of this chapter, a stormwater facility shall be deemed to consist of the area within the maximum design ponding limits, 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 forebay or energy dissipation devices.

The intent of this chapter is to ensure that the extent of the facility is defined to allow flooding, access and maintenance. Granting of a modification will not nullify this chapter 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 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 that is not in some form of common ownership.

(2) Detention facilities, to the greatest extent feasible, shall be located so as to minimize the amount of flow generated on the project site that by-passes the facility.

(3) No portion of any stormwater facility shall disturb any required buffer, landscape strip, or tree protection area.

(4) The 100-year ponding limits of a stormwater facility shall not encroach upon a public right-of-way.

(5) Stormwater facilities may be located within or encroach upon utility easements or utility rights-of-way upon receipt by the department of written permission from both the property and utility owners.

(6) Stormwater facilities may be constructed within recreation areas if the following criteria are met:

a. Ownership of the area will be held by a qualified property owner's association, homeowner's association, or other private parties.

b. Permanent structures, such as buildings and swimming pools, will not be constructed within the boundaries of the stormwater facility.

c. Stormwater facilities within active 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.

d. Permanent stormwater features shall not interfere with the intended used 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.).

(7) A residential subdivision of more than three lots that is required by this chapter or the stormwater management ordinance to provide stormwater management facilities shall locate those facilities on an individual lot of record within the development. Lots created within a development project to accommodate detention and retention facilities which are incidental, related, appropriate, and clearly subordinate to the main use in the project are exempt from the minimum lot size requirements in all zoning districts. No other construction/building is permitted on this lot and the lot shall be owned by the homeowners association or the owners of the lots of record being served by this facility. The lot shall have a minimum of 20 feet of public road frontage. Access to the facility shall be located on this lot and shall be provided in a manner which allows for access and maintenance of the facility. 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.

(8) A nonresidential subdivision is not required to locate an on-site stormwater facility on a separate lot. The property owners served by a stormwater facility that provides detention and/or water quality for more

than one property owner or is located off-site shall enter into a maintenance agreement acceptable to the city 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.

(n) *Stormwater facility access requirements.*

(1) In both residential and nonresidential projects, an easement at least 20 feet in width shall be required so as to provide access to all detention facilities from a public street. The easement shall conform to the following requirements:

- a. The access easement shall be cleared, grubbed and graded so that it can be utilized by rubber-tired construction vehicles.
- b. The minimum drive surface width shall be 15 feet.
- c. The drive shall be grassed or paved.
- d. The maximum slope shall be 30 percent.
- e. 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.
- f. A drive to the bottom of the pond shall be provided when the facility is over ten feet deep from the bench elevation or the facility is wider than 50 feet as measured from bench to bench.
- g. Where the facility is completely enclosed by walls, stairs shall be provided into the facility to allow for inspection and maintenance activities.

(2) When not located on an individual lot of record, every normally-dry stormwater basin, lake, or parking lot detention facility shall be completely enclosed within a drainage easement. The drainage easement shall extend at least ten feet beyond the 100-year flooding limits of the stormwater facility and shall encompass any dam, outlet structure and energy dissipation devices.

(o) *Stormwater facility maintenance.*

(1) The storage capacity or function of any stormwater basin, pond or other impoundment, whether natural or manmade, shall not be removed or diminished without the express approval of the department.

(2) In a residential subdivision, it shall be the responsibility of the mandatory property owner's association to maintain the operational characteristics of any facility constructed on their property for stormwater management pursuant to city requirements, to keep the access drive free of obstructions, and to maintain the facility free of obstruction, silt or debris.

(3) In a nonresidential project with an on-site stormwater 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.

(4) Where no maintenance covenant has been recorded, it shall be the responsibility of the property owner to maintain the operational characteristics of any facility constructed on their property for stormwater management pursuant to county requirements, to keep the access drive free of obstructions, and to maintain the facility free of obstruction, silt or debris.

(5) 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 covenant signed by the property owner. The schedule shall describe all maintenance and inspection activities and the parties responsible. The maintenance covenant shall be in a form acceptable to the city and shall be recorded in the deed records of the clerk of superior court.

(p) *Stormwater facility certification and as-built drawings.*

(1) When a new facility is constructed in a development, a certified as-built drawing of each stormwater facility shall be prepared by a land surveyor currently registered in the State of Georgia.

(2) Based on the actual parameters established on the as-built drawing, an addendum to the stormwater management report shall be prepared which demonstrates that the facility, as constructed, complies with the requirements of this chapter. The amended or as-built stormwater management report shall be certified by the authorized registered professional. Any deviations from the original design shall be

clearly noted as well as any impact, if any, these deficiencies may have on the operational characteristics of the facility.

(3) The survey shall be performed after substantial completion and stabilization of the project has occurred. The as-built drawing and addendum to the stormwater 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).

(4) The as-built drawing shall show the following information. Where elevations or dimensions are shown on the as-built, the original design data should be shown and struck through with the actual as-built data indicated next to that:

- a. Horizontal and vertical alignment;
- b. Locations of all manholes, catch basins and junction boxes;
- c. Detention, retention, water quality facilities;
- d. Storm system outfalls;
- e. Creeks and drainage swales or ditches;
- f. Piping materials;
- g. Location and extent of easements;
- h. Property lines.

This information shall be provided in the form of plans, profiles, details, sections and plats and when possible provided to the city in an electronic format compatible with the city database.

(q) *Parking lot detention facilities.*

(1) Parking lot detention facilities shall generally be of one of the two following types:

- a. Depressed areas of pavement at drop inlet locations; and
- b. Ponding areas along sections of raised curbing. The curbing in these areas is usually higher than a standard curbed section.

(2) 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.

(3) The maximum depth of detention ponding in a parking lot, except at a flow control structure, shall be six inches for a ten-year storm, and nine 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.

(4) In truck parking areas, the maximum depth of ponding shall be 12 inches for the ten-year storm.

(5) Detention ponding areas are to be drained within 30 minutes after the peak inflow occurs.

(6) Parking lot detention areas shall have a minimum surface slope of one percent, and a maximum slope of five percent.

(r) *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 requirements 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 city.

(s) *Sediment basins.*

(1) 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.

(2) 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.

(3) In cases where a normally-dry detention basin is planned to be used to trap sediment as well as provide stormwater control, under cutting of the basin will not be permitted.

(4) The design of sediment basins shall be in accordance with Appendix C of the "Manual for Erosion and Sediment Control in Georgia."

(5) Trapping of sediment in state waters shall not be allowed.

(t) *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 this chapter shall apply, but may be modified in instances where a specific requirement is clearly detention oriented rather than safety-based.

(Ord. No. 2008-09-48, § 1, 9-16-2008)

### **Sec. 103-111. Dams.**

(a) *Application and exemptions.* This dam section shall apply to all new, rebuilt, or modified stormwater impoundment's including appurtenant works whose height exceeds ten feet as measured from the natural bed of the stream or watercourse at the downstream toe of the barrier, or the lowest elevation of the outside limit of the barrier, if the barrier is not across a stream channel or watercourse, to the maximum water storage elevation, with the exception of:

- (1) Any Category I dam requiring permitting under the control of the Georgia Safe Dams Program.
- (2) Any dam owned and operated by any department or agency of the United States Government.
- (3) Any newly constructed dam financially assisted by the United States Soil Conservation Service or any other department or agency of the United States government when such department or agency designed or approved plans and supervised construction and maintains a regular program of inspection of the dam.
- (4) Any dam licensed by the federal energy regulatory commission, or for which a license application is pending with the federal energy regulatory commission.

(b) *Existing dams.* Any dam currently constructed and operating and not subject to regulation under the Georgia Safe Dams Act of 1978 or located on a site for which a development permit is requested is hereby grandfathered in its present state with the owner thereof assuming all rights, responsibilities, and liabilities thereof, subject to the provisions of section 103-111(c). Upon any modification to the dam it shall become subject to this chapter.

Dams that are located on a project site for which a development permit is being requested shall be brought up to the minimum design standards contained in this chapter regardless of whether any modifications are proposed to the dam or appurtenant structures. If the dam and structures are not wholly contained within the project boundaries the director may waive any or all of these requirements when satisfied that all reasonable efforts have been unsuccessful to obtain the approval from adjacent land owners for any work necessary to comply with this chapter.

(c) *Emergency draining of a lake.* Upon obtaining evidence which indicates that a potentially hazardous condition may exist, such as:

- (1) Excessive leakage transporting soil from the dam interior (i.e. piping);
- (2) Slope failure, excessive scouring or other apparent soil instability;
- (3) Longitudinal cracks, bulging, or shifts in alignment;
- (4) Excessive sloughing or seepage;
- (5) Failure of the spillways and/or outlet devices to function properly (due to clog age, damage or other deficiency).

The director has the authority to order the immediate and complete draining of the lake in whatever manner deemed necessary at the time and to require the owner to keep the pool down until remedial work, as is deemed most appropriate to create a safe dam condition, is completed and approved by the director.

(d) *New Category I and Category II dams.* Any new or modified dams classified as Category I or Category II as defined by the Georgia Safe Dams Act of 1978, O.C.G.A. § 12-5-375 shall be subject to the following:

- (1) These dams are generally defined as any artificial barrier which impounds or diverts water and either of the following is true:
  - a. The barrier is more than 25 feet in height as measured from the natural bed of the stream or watercourse at the downstream toe of the barrier, or from the lowest elevation of the outside limit of the

barrier, if the barrier is not across a stream channel or watercourse to the maximum water storage elevation; or

b. It has an impounding capacity of 100 acre-feet or more.

(2) The developer of any new dam classified as a Category I dam under the rules of the Georgia Safe Dams Act of 1978 shall be subject to the requirements of the Georgia Safe Dams Act of 1978 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 land disturbance permit from the department.

(3) The developer of any new dam classified as Category II under the rules of the Georgia Safe Dams Act of 1978 shall submit construction plans to the city for review of the project and the dam prior to securing a land disturbance permit from the department subject to the following:

a. If the developer elects to construct the new Category II dam in accordance with the design standards for new dams as contained in the rules for dam safety, i.e. Category I standards, then new development shall be permitted within the dam breach zone.

b. If the developer elects not to construct the new Category II dam to the design standards for new dams as contained in the rules for dam safety, then the following information shall be submitted along with the construction plans for review prior to securing a development permit from the department:

1. A dam breach analysis for the dam shall be submitted. The design engineer shall utilize the computer model entitled "DAMBRK" for the dam breach analysis. The breach analysis shall be based on a full pool, sunny day breach; and,

2. The dam shall be required to meet the minimum city standards contained in this development ordinance for dam construction; and,

3. For any new 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 off-site 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. Only the following uses and structures shall be permitted within the dam breach easement:

i. Agriculture which requires no structures for human habitation within the dam breach zone including forestry, livestock raising and agricultural and forestry access roads.

ii. Fences.

iii. Outdoor advertising signs provided they are located no closer than 100 feet from any residence or place of business.

iv. Roads, driveways and parking areas.

v. Utility poles, towers, pipelines, water treatment outfalls and facilities, or other similar facilities and structures.

(5) 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 this chapter 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.

(e) *New dams between ten feet and 25 feet in height.* Any newly constructed or modified dams that is ten feet or more in height but less than 25 feet in height or having a storage capacity in between 50 acre-feet and 100 acre-feet at the maximum water storage elevation shall be subject to regulation under these development standards. Any dam that meets the height thresholds of this section and which does not meet the design standards contained in the rules for dam safety shall meet the following minimum standards:

(1) *General requirements.*

- a. Design shall be by a professional engineer registered and licensed to practice engineering in the State of Georgia.
  - b. Plans shall be submitted to the city for review and comment.
  - c. Prior to construction of any dam over ten vertical feet or any dam impounding more than 50 acre-feet, the contractor shall provide the city with sufficient documentation of his qualifications to construct dams.
  - d. A pre-design meeting shall be held with representatives of the engineering division to review any proposed dam or proposed dam changes for any dam over ten vertical feet or impounding more than 50 acre feet. Depending on the level of downstream risk, and size of impoundment, the city may require a dam breach analysis to be submitted for any proposed or existing dam contained within a proposed development, utilizing the National Weather Service's DAMBREAK program or other methodology approved by the Georgia Safe Dams Program.
  - e. When a dam breach analysis is required by the city, a sunny day dam breach analysis shall be performed under full pool conditions as a minimum.
  - f. All impoundments shall have a permanent drain capable of draining the pool to a depth of no more than two feet within 24 hours.
  - g. No roadways shall be constructed over any permanent water impoundment structure if that roadway provides the only means of egress for any lot of record, without prior approval of the city.
  - h. No utilities are permitted to pass through any dam, either longitudinally or transversely, without prior approval of the city.
  - i. In addition to the storm events that are required in this chapter, any dam that impounds stormwater to meet the requirements of the city's post development stormwater management chapter shall also be evaluated based on the storm required in that ordinance.
- (2) *Report requirements.* Guidelines are available from the State of Georgia Safe Dams program (EPD) to assist the design/construction professional. Dam design documents shall include, but not be limited to:
- a. Hydrology/hydraulic report;
  - b. Geotechnical report (with borrow study, applicable);
  - c. Drainage basin map with land use and land improvement parameters;
  - d. Existing topography of site;
  - e. Plan view of dam;
  - f. Cross sections at all critical points;
  - g. Delineated dam breach zone;
  - h. Complete details;
  - i. Technical specifications;
  - j. Names and professional seals of design civil engineer and geotechnical engineer with 24-hour contact;
  - k. Designated contractor (if available).
- (3) *Outlet/spillway requirements.* Because of the variables associated with selecting spillway(s), outlet device(s) or appurtenant structure(s) to suit a given site condition, the design consultant is responsible for the selection, subject to the review and approval of the stormwater division. The division will include in its consideration the case of maintenance, longevity of the system, blockage potential, and practicality of operations.
- a. No orifice shall be less than 3 inches in diameter unless it is installed to meet a state or local requirement.
  - b. All risers (standpipes) shall be equipped with a debris deflector (trash rack) and an anti-vortex device. To facilitate outlet operation, curved or inclined a-ash 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. Corrugated metal pipe is not permitted for standpipes.
  - c. Spillways: Every dam shall be provided with a principal spillway, fully capable of passing at least the 50-year flood, with excess spillway capacity provided by the emergency spillway(s) capable of handling excess flows up to the design storm. The principal spillway can be sized for floods of less magnitude than the 50-year flood only if the emergency spillway is appropriately armored against scour with concrete or other suitable lining as protection against more frequent usage.

d. **Principal Spillway:** All spillways shall be analyzed (hydraulically rated) for both inlet and outlet control conditions using appropriate tail-water ratings. If a control-box or weir-box is affixed, then the control system (inlet control box and outlet conduit) shall be hydraulically rated to determine the stage-discharge relationship.

e. **Emergency Spillway(s):** For every type of water impounding facility a planned safe flow path must be provided for conveyance of flows of water in an emergency. In many instances, this function can be provided through installation of an emergency spillway. Emergency spillways may be excavated open channels, either vegetated or paved with reinforced concrete or weir sections of concrete walls, or, appropriately designed conduit. Any portion of an open channel spillway excavated into a dam embankment or other fill section must be paved with reinforced concrete equipped with appropriate seepage controls, under-drainage and cut-off walls.

f. Any portion of any spillway excavated into undisturbed residual soil shall be vegetated in accordance with the practices described in the "Manual for Erosion and Sediment Control in Georgia" or protected against scour and erosion by other suitable measures if vegetation does not provide adequate stabilization. The spillway is activated by storms smaller than the 50-year frequency, and then vegetation alone will not be considered sufficient protection against scour according to these standards.

(4) *Permanent impoundments.* The following requirements shall apply to lakes and ponds that maintain a permanent pool of water:

a. *Earthen dam.*

1. Design storm shall be at least 25 percent of the probable maximum precipitation storm event ( 1/4 PMP).

2. Principal spillway shall be adequate to handle at least the 50-year flood.

3. Emergency spillway(s) as a minimum shall be adequate to handle flows in excess of the 50-year flood, up to the 1/4 PMP. Front and back slopes, each, shall not be steeper than 3:1 unless design includes a slope stability analysis that confirms and documents a steeper slope will be stable. In no condition, however, will a slope steeper than 2:1 be permitted.

4. All organics and topsoil shall be removed from the entire footprint of the dam and the foundation certified by a geotechnical engineer (PE).

5. Earthen fill shall be CL or ML material approved for use by geotechnical engineer (PE) and placed and compacted to not less than 95 percent standard proctor under said engineer's direction.

6. Compaction records accompanied by a geotechnical engineer's certification that soil compaction meets this specification shall be forwarded to the city.

7. The low level outlet (lake drain) shall be concrete pressure pipe or ductile iron pressure pipe, cradled in concrete. Bedding shall be in concrete poured the full width of the exposed trench and as a minimum, up to the spring line of the pipe. Pipe and joints shall be rated for internal pressures exceeding that of the design storm and shall meet or exceed ASTM 361 or AWWA C-301. Corrugated metal pipe is not allowed.

8. A lake drain may also be comprised of a valve-operated siphon system designed by a registered civil engineer licensed in the State of Georgia. Piping for a siphon system shall be ductile iron with mechanical joints or PV joints with adequate strength and anchoring to sustain the water forces incumbent with operation.

9. Freeboard of dam above the design storm maximum pool shall be three feet in lieu of fetch calculations of wave height justifying a lesser freeboard. The city reserves the right to require additional freeboard above the nominal three-foot requirement if supported by fetch calculations.

10. Crest width shall be not less than eight feet.

11. Embankments shall be protected from erosion by appropriate vegetation, rip rap, paving or some other type of protective surface and maintained in a safe condition. In appropriate vegetation such as trees or shrubs and hedges that may obscure inspection of the dam shall not be allowed or shall be removed. A qualified professional shall be consulted prior to the removal of trees over four inches dbh or where the removal of any trees may endanger the function or stability of the dam.

b. *Gravity dam* (reinforced concrete or masonry).

1. Design, construction supervision, and certification of completion according to plans and specifications to be by design civil engineer and a geotechnical engineer both licensed to practice in the State of Georgia.
  2. Design shall address and account for overturning, uplift, and seepage with adequate safety factor and adequate freeboard.
  3. All slab on grade concrete, including concrete footings, shall be designed and constructed to control seepage and piping of foundation soil along the underside of the slab in incorporating cutoff walls, or other appropriate measures.
  4. Design storm shall be at least 25 percent of the probable maximum precipitation ( 1/4 PMP).
  5. Principal spillway shall be adequate to handle at least the 50-year flood unless the emergency spillway is appropriately armored against scouring.
  6. Emergency spillway shall be adequate to handle flows in excess of the 50-year flood, up to the 1/4 PMP.
  7. Freeboard of dam above the design storm maximum pool shall be three feet in lieu of fetch calculations of wave height justifying a lesser freeboard. Additional freeboard above the nominal three feet required if supported by fetch calculations.
  8. All organics and topsoil shall be removed from the entire footprint of the dam and the foundation certified by a geotechnical engineer (PE).
  9. Earthen fill (if any) shall be subject to the criteria specified above for earthen embankments.
- (5) *Temporary/dry impoundments.* The following requirements shall apply to those stormwater facilities that are normally dry, i.e. dry detention ponds:
- a. *Design criteria:*
    1. Design storm shall be at least the 100-year, 24-hour storm.
    2. Multifrequency outflow control shall be provided in accordance with the Georgia Stormwater Manual. Storm frequencies may include: 24-hour extended detention for the one-year event and peak flow attenuation for the 25-year and 100-year events.
    3. Principal spillway shall be adequate to handle at least the 25-year flood.
    4. Emergency spillway(s) shall be provided to handle flows in excess of the 25-year flood, up to the 100-year flood.
    5. Where fencing is required by section 103-110(i) the fence shall not extend across the emergency spillway in such a manner as to create a possible clogging hazard.
  - b. *Earthen dam:*
    1. Front slope shall not be steeper than 2.5:1 unless design includes a slope stability analysis that confirms and documents a steeper slope will be stable. In no condition, however, can any slope be steeper than 2:1.
    2. All organics and topsoil shall be removed from the entire footprint of the dam and the foundation inspected and approved by the city prior to fill placement.
    3. Earthen fill shall be CL or ML material approved for use by geotechnical engineer (PE) and placed and compacted to not less than 95 percent standard proctor under said engineer's direction.
    4. Freeboard of dam above the 100-year design storm maximum pool shall be 2.0 feet in lieu of fetch calculations of wave height justifying a lesser freeboard. The city reserves the right to require additional freeboard above the nominal two-foot requirement if supported by fetch calculations.
    5. Crest width shall be not less than eight feet, unless approved by the department.
    6. Embankments shall be protected from erosion by appropriate vegetation, riprap, paving or some other type of protective surface and maintained in a safe condition. In appropriate vegetation such as trees or shrubs and hedges that may obscure inspection of the dam shall not be allowed or shall be removed. A qualified professional shall be consulted prior to the removal of trees over four inches dbh or where the removal of any trees may endanger the function or stability of the dam.
  - c. *Gravity dam (reinforced concrete or masonry).*
    1. Design shall address and account for overturning uplift, and seepage with adequate safety factor, and adequate freeboard.

2. All slab on grade concrete, including concrete footings, shall be designed and constructed to incorporate appropriate cutoff walls.
  3. Under no condition, can any fill slope (if any) be steeper than 2:1.
  4. All organics and top soil shall be removed from the entire footprint of the dam and the foundation inspected and approved by the city prior to gravity dam concrete or masonry placement.
  5. Earthen fill (if required) shall be approved for use by geotechnical engineer (PE) and placed and compacted to not less than 95 percent standard proctor under said engineer's direction.
  6. Freeboard of dam above the 100-year design storm maximum pool shall be two feet along any earth fill sections of the dam, in lieu of fetch calculations of wave height justifying a lesser freeboard. The city reserves the right to require additional freeboard above the nominal two-feet requirement if supported by fetch calculations.
- (f) *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.
- (1) Location of the Category II dam and the proposed development; and,
  - (2) A surveyed cross-section of the stream valley at the location of the proposed development including finished floor elevations; and,
  - (3) A dam breach analysis using the dam break computer model to establish the height of the flood wave in the downstream floodplain. The dam break modeling shall be completed in accordance with the safe dams program quality assurance program by a qualified registered engineer.
- (Ord. No. 2008-09-48, § 1, 9-16-2008)

This Ordinance is effective April 20, 2010; and

**ORDAINED** this the 20<sup>th</sup> day of April 20, 2010.

Approved:



Eva Galambos, Mayor

Attest:



Michael Casey, City Clerk  
(Seal)

