Section 5.0: STORM WATER MANAGEMENT

5.01. General

A. Storm water management structures shall be provided by the developer as required by Section 6.0: Cherokee County Post Development Stormwater Management.

B. The Cherokee County Engineering Department will utilize the policy, criteria and information including technical specifications and standards in the latest edition of the Georgia Stormwater Management Manual and any relevant local addenda, for the proper implementation of the requirements of this ordinance. The manual may be updated and expanded periodically, based on improvements in science, engineering, monitoring and local maintenance experience.

C. All proposed storm water management structures shall be designed and certified by an appropriate state approved professional, and shall be subject to the approval of the County Engineer.

D. Storm water management structures shall be designed based on a twenty-five (25) year storm event. The drainage formula used in design of all drainage structures shall be determined by the developer's appropriate state approved professional and based on sound engineering practice.

E. All cross-drain pipes under streets carrying live streams and all bridges shall be designed for a one hundred (100) year storm event.

F. A dam breach zone is required if an existing or proposed pond or lake is part of the proposed development and if there are any lots located within the dam breach zone. If there is an existing or proposed pond or lake, a geotechnical engineer must certify the integrity of the dam regardless of lot location. Certification that there is not a potential for a “Category 1” structure must be submitted as a part of the LDP review process (NOTE: Dam breach analysis *is not required* for dry detention ponds unless otherwise specified in this ordinance).

G. Subdrainage structures shall be installed as necessary to control surplus groundwater by intercepting side hill seepage or lowering or regulating the ground water level.

H. Energy dissipation devices shall be installed at all discharge points of storm drains in compliance with the approved soil erosion and sediment control plan. At a minimum, an area of rip rap six (6) times the pipe diameter in length and two (2) times the pipe diameter in width shall be provided. If the exit velocity from the pipe will exceed 10 fps, rip rap set in concrete, stilling basins, baffle wall basins, impact blocks or other energy dissipation devices approved by the County Engineer shall be required.

I. Structural supports shall be installed on all storm drainage pipes having a slope of fifteen

percent (15%) or greater.

J. Maintenance of all storm water detention ponds either above ground or underground and all drainage easements outside of the County right-of-way shall be the responsibility of the owner or the homeowners association and agrees to perform annual inspections and provide all necessary maintenance.

K. Cherokee County shall not be responsible for maintenance of any pipes, ditches, detention ponds or other structures within any drainage easement outside the County right-of-way.

5.02. Storm Water Management Facilities

A. General

1. All pipe installation and backfilling shall be done according to current Georgia DOT Standard Specifications for Construction of Roads and Bridges.

2. A certification by the supplier of the specifications for each pipe shall be required before installation. All pipe manufacturers must be Georgia DOT approved.

3. 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. Any debris or silt that constricts the flow through a pipe shall be removed by the developer as often as necessary to maintain drainage. All pipe structures shall be cleaned before the work is accepted. Any damage or displacement that may occur due to traffic or erosion shall be repaired or corrected at the developer's expense.

4. Between the bottom of the road base, or sub-base if used, and the exterior crown of any culvert, the minimum clearance shall be one (1) foot, or greater if required by Georgia DOT.

5. A minimum one-half (0.5) foot clearance shall be maintained between underground utilities and the exterior crown or floor of culverts.

6. Storm drainage pipe shall be bedded in “Type 57” stone, if the trench bottom material is not suitable for bedding.

7. Drainage easements shall be cleaned and opened to the extent necessary for drainage purposes at the time of development to control surface water runoff. Runoff slopes and side slopes shall be specified by the developer's appropriate state approved professional, in accordance with sound engineering practice.

8. Changes in the construction plans of storm drainage facilities caused by field conditions shall be made in compliance with Section 3.02-G of the Development

Ordinance.

9. Bridge piling shall be driven to Georgia DOT standards for loading. Certification of pile load shall be provided by a registered professional engineer.

10. The developer and/or homeowner shall be responsible for keeping dirt, mud, building materials, concrete and other foreign materials off of the pavement and curbing of existing county roads during the construction of buildings in all developments covered by these regulations

B. Catch Basins

1. The costs of any catch basins or drop inlets shall be the responsibility of the Developer. These facilities shall be designed by the developer's appropriate state approved professional to Georgia DOT standards and shall be approved by the County Engineer. Catch basins shall be located outside of intersection radii.

2. The spacing of catch basins shall be as follows:

Grades up to 7%	500 feet
Grades from 7% to 10%	400 feet
Grades over 10%	250 feet

These spacing requirements can be altered if justified by sound engineering practice.

3. Cul-de-sacs on downhill street centerline grades shall have six (6) inch vertical curb and gutter along the circumference, beginning at the twenty-five foot transition radius and ending at the second twenty-five foot transition radius. A catch basin throat design or standard Georgia DOT detail shall be submitted for downhill street centerline grade cul-de-sacs.

4. A hooded grate may be used in an intersection radius with approval of the County Engineer.

C. Piping

1. Storm drainage pipes shall be sloped so as to maintain a velocity of three (3) fps to prevent the collection of sediment.

2. Compaction test on all cross drain pipes within a roadway section shall be taken at intervals of one per line or one (1) per day, whichever is greater. Compaction tests on all longitudinal pipe running from catch basin to catch basin shall be taken at intervals of one per two hundred fifty feet (1/250’) or one per day, whichever is greater. All ditches shall be backfilled and compacted in eight (8) inch lifts. The minimum compaction is to be ninety-five (95) percent in accordance with the standard proctor test and one hundred (100) percent for the top twelve inches.

3. All drainage pipes in a county right-of-way shall be a minimum of eighteen (18) inches in diameter. No storm drainpipe parallel to any existing or proposed county roads shall be placed beneath a proposed deceleration lane without the approval of the County Engineer.

4. The inlet and outlet ends of all storm drain pipes for streets with speed limits of 35 miles per hour or greater, within or connected to county right-of-way, shall have concrete headwalls or a metal flared-end section with safety grates, or county-approved grate and frame, or raised pedestal drop inlets meeting the standards of the Georgia DOT.

5. On only the downstream side of a roadway, storm drain pipes thirty (30) inches in diameter or smaller shall extend into the rear building setback line, but not more than 120 linear feet from the right-of-way, for all zoning districts except the R-40 through AG districts. Storm drainpipes larger than thirty (30) inches in diameter at a minimum shall extend from edge of right-of-way to edge of right-of-way. The drainage ditch on each end of the pipe shall be designed to limit runoff velocity to less than five (5) fps or the ditch must be lined to prevent erosion.

6. The maximum continuous length for pipes shall be three hundred (300) feet for pipes less than forty-two (42) inches. Junction boxes providing pipe access shall be constructed to current Georgia DOT standards. Junction box covers shall not be made of plastic.

7. All man-made storm water drainage ditches shall be designed by an appropriate State approved professional. The ditch profile and typical cross sections, including the velocity of flow, shall be shown on the plans. Maximum velocity for unlined ditches shall be five (5) fps design flow.

8. On all live streams, reinforced concrete pipes shall be used from headwall to headwall. Concrete headwalls are required for all pipes on live streams.

9. Under all roads, Georgia DOT approved concrete pipe shall be used from headwall to headwall, regardless of depth or slope.

10. Outside of the right-of-way, where more than ten (10) feet of fill will be located over the crown of the pipe, Georgia DOT approved concrete pipe shall be used from junction box to junction box, regardless of depth or slope.

11. For the installation of pipes in live streams, the following is hereby required:

    a) A concrete pipe placed from zero feet to five feet (0’ – 5’) in depth shall require a ten- (10) foot easement.

b) If the pipe is to be placed at a depth of more than five (5) feet in depth, a twenty (20) foot easement shall be required for a concrete pipe and a ratio of four (4) times the vertical depth shall be used for all pipes except R.C.P.

D. Materials

1. The class or gauge of pipe under fill shall be determined using current Georgia Department of Transportation standards.

2. All metal pipe shall be fully coated or aluminized.

3. High-density polyethylene pipe (HDPE) shall meet AASHTO M-294 Type "S" with an annular exterior and smooth interior. Pipe shall consist of a bell and spigot joint incorporating an F477 gasket to insure a leak-tight performance. HDPE located within a right-or-way shall be utilized according to Georgia Department of Transportation Standards which includes cross drain (low volume roads with an A.D.T. less than 250), longitudinal storm and side drain approval. Proposed subdivisions may utilize HDPE in all drainage areas, except in live streams. HDPE pipe shall be back filled by concurrently applying 8" lifts on each side of the pipe using two (2) tamps (one for each side). Backfill soil shall conform to Class II, B2 of the Georgia Department of Transportation Standard Specifications for Construction of Roads and Bridges, current edition.

E. Driveway Culverts

Each site shall be analyzed for storm water runoff flow patterns. Where a wet weather stream exists between a proposed road and the building line on a lot, the design professional shall size the driveway culvert as if the driveway was at the lowest point on the lot. The construction plans and the final plat shall show the minimum driveway pipe size required and shall comply with all county standards for pipe installation.

F. Storm Water Detention

1. Storm Water Management Report Required

a) Every project shall provide a Storm Water Management Report prepared by a Professional Engineer currently registered in the State of Georgia that shall take into account the entire project area regardless of phasing. The purpose of this report shall be to formulate a plan to manage storm water runoff so that storm water 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.

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. Detention facilities shall be designed using pre-development flows based on existing on-site lakes and detention. Post-development flows shall be based on onsite upstream areas being developed per the development plans and existing conditions for offsite upstream areas. Existing conditions shall be defined as the conditions of the site at the time a land disturbance permit is applied for. The existing condition includes onsite lakes and ponds. The report shall contain drainage area delineation maps and other exhibits at satisfactory scale and sufficient in quantity and scope to define the boundaries of the site and off-site areas, relative to watercourses, drainage divides, drainage structures, and other pertinent features.

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 drainage way “immediately” downstream from the project. This area shall extend downstream from the project to a point in the drainage basin where there is a major creek crossing, and/or construction, or to a point in the drainage basin where the project area is ten (10) percent of the total basin area. The following shall also be addressed:

1. The report shall examine the conditions downstream of the project to a point where the project is ten (10) percent of the total drainage basin, or to the first major creek crossing culvert and/or construction, whichever comes first;

2. The analysis must include all existing and potential erosion problems, existing drainage complaints, and any pertinent observations made by the engineer preparing the report. The downstream watercourses and receiving conveyance shall be analyzed to ensure that channel velocities do not exceed the non-erosive velocity of the stream;

3. Comparison of peak flows shall include the timing of the hydrographs; and

4. Hydrographs for basins larger than fifty (50) acres shall be based on the 24-hour storm. The Rational Method may be used for basins less than fifty (50) acres.

d) The following criteria shall be evaluated by the Engineer 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 use 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 drainage systems,
6. Creation of concentrated flows where none occurred previously,
7. Availability of feasible locations for detention facilities,
8. Existing flows generated off-site which pass through the project site,
9. The nature of the receiving water course.

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 required to provide 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 are not limited to situations where 26-year velocities exceed the non-erosive velocity of the stream, and habitable structures are shown to be subject to increased depth of flooding for any frequency up to and including the regulatory flood. The detention facilities shall be designed such that the peak flows from the developed site do not exceed those associated with pre-development conditions at the project boundary.

b) Storm water detention facilities required in Section 3.02-H-4 of the Development Ordinance shall be provided, unless the registered Professional Engineer preparing the Storm Water Management Report certifies and provides certified documentation supporting the conclusion to the Cherokee County Engineering Department that at least one of the following is true and correct is possible:

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 on (1) cfs over a length perpendicular to the flow of one hundred (100) feet.

2. The effect of detention would be to concentrate flows where sheet flow had occurred under pre-development conditions, and any impact of increased 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 site runoff will flow directly into a stream or lake with a contributing drainage area of at least one hundred (100) acres without compromising off-site properties, and the increase in site runoff will result in a no-rise in the 100-year storm elevation (<0.05-ft. increase) for the receiving watercourse at the point where the watercourse crosses the project site's downstream property line.

4. 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 a <0.05-ft. increase in the 100-year flood elevation due to the increase in peak runoff leaving the project site.

5. The site runoff will flow directly into a stream or lake without crossing off-site properties, and the downstream analysis, using timing of the hydrographs, show 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 ten (10) percent of the total drainage basin.

c) Should the Professional Engineer conclude that storm water detention may not be necessary because of anticipated compliance with Section 3.02-H-4 of the Development Ordinance, rigid compliance with all of the following criteria is mandatory:

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 the project, then a pre-submittal conference with the Cherokee County Engineering Department 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

ten (10) percent of the total drainage basin.

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.

3. Detention Design Criteria – General

a) All storm water detention design calculations shall be certified by a Professional Engineer currently registered in the State of Georgia.

b) All storm water detention facilities shall be designed to control the 2-year, 5-year, 10-year, 25-year, and 100-year return frequencies.

c) A variety of methods achieving storm water management goals shall include providing detention facilities. The type of facility provided shall be based on the following criteria:

1. The type of development which the detention facility is being provided,
2. The type of development which the detention facility is intended to protect,
3. Volume of storm water to be stored,
4. Origin and magnitude of the flows to be managed.
5. Topographic opportunities and limitations,
6. Safety considerations,
7. Maintenance requirements,
8. Aesthetic considerations,
9. Likelihood of facility operation interfering with access to public or private facilities,
10. Proximity of facility to property lines, utilities, buffers, etc., and
11. Similar site-specific constraints.

d) Detention facilities may be of the following types, and two or more types may be used in combination with one another:

1. Normally dry basins, whether excavated or created by damming a natural drainage feature, or a combination of both methods (Damming may be achieved by the construction of an earthen dam or approved masonry wall),
2. Lakes and ponds, whether excavated or created by damming a natural drainage feature, or a combination of both methods,
3. Parking lot facilities,

4. Underground facilities,
5. Roof top facilities,
6. All detention pond slopes shall be a maximum of two (2) foot horizontal to one (1) foot vertical except for masonry walls, and
7. Fences a minimum of five (5) feet in height with a minimum of a ten (10) foot wide gate shall be required on all detention ponds where the sides of the pond have a vertical slope of greater than three (3) horizontal to one (1) vertical or greater, and, per the basin design in the hydrological study, the 100 year storm depth of the water in the pond is greater than four (4) feet. If the pond has a side slope of three (3) foot horizontal to one (1) foot vertical or less then fencing will not be required.

e) Reservoir routing methods shall be used for all detention facility design.

f) The detention methodology used for any given project shall be the SCS Method, utilizing a 24-hour storm, with the exception of basins less than fifty (50) acres, which may apply the Rational Method.

g) Runoff coefficients and runoff Curve Numbers used for pre- and post-development conditions shall be documented by the registered professional preparing the Storm Water Management Report.

h) Calculations shall be provided showing how all times of concentration or lag times were computed, for both pre- and post-developed conditions. Likewise, adequate support must be provided for all composite runoff coefficients or curve numbers used.

i) If a computer program is used for detention design, including generating and routing hydrographs, the output from the program shall be summarized in the Storm Water Management Report.

j) The outlet system for all detention facilities shall be evaluated for malfunctioning (i.e., the clogging of small orifices and weirs). A safe path for overflow condition flows shall be provided.

4. Detention Facility Location Criteria

a) For the purpose of these regulations, a detention 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 drainage and access easements, and any energy dissipation devices.

b) Detention facilities, to the greatest extent feasible, shall be located so as to minimize the amount of flow generated on-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 their appurtenant structures, which require no grading and removal of trees, may encroach into a required construction buffer.

d) 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 County Engineer of written permission from both the property and utility owners.

e) Detention facilities may be constructed within recreation areas required, 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 or 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 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…).

5. Detention Facility Easement Requirements

a) An easement of at least ten (10) feet in width shall be required to provide access to all detention facilities from a public street. This easement shall be cleared, grubbed and graded so that it can be utilized by rubber-tired construction vehicles that require access to the outlet structure. The easement location shall be such as to minimize the amount of grading required.

b) 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 ten (10) feet beyond the limits of the detention facility.

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 County Engineer.

b) It shall be the responsibility of the property owner or property owners association to maintain the operational characteristics of any facility constructed on their property for storm water detention pursuant to the Cherokee County Post Development Stormwater Management Ordinance.

7. Detention Facility Engineer's Certification and Record Drawings

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 approved Storm Water Management Report or a certification letter will be submitted demonstrating that the facility, as constructed, complies with the requirements of these regulations. The amended Storm Water Management Report shall be certified by a Professional Engineer currently registered in the State of Georgia.