

CHAPTER 11

STORMWATER MANAGEMENT

SECTION **GENERAL** **1101**

1101.1 Stormwater Report Required. All preliminary site and subdivision plans submitted for approval shall be accompanied by a narrative describing how stormwater entering, traveling within, and leaving the site will be managed and to what extent the development will impact existing conditions on-site and off-site. All final site plan and construction drawing submittals shall be accompanied by a Stormwater Report prepared by the developer's engineer.

Every applicant shall provide for stormwater management as required by this chapter, unless a written request is filed and granted by the city to waive this requirement.

Requests to waive the stormwater management plan requirements shall be submitted to the Planning Director for approval.

1101.2 Exemptions and Waivers. When considering a waiver to the Stormwater Management requirements, the Planning Director shall only grant such a waiver, provided that at least one of the following conditions apply:

1. Provisions are made to manage stormwater by an off-site facility. The off-site facility is required to be in place, to be designed and adequately sized to provide a level of stormwater control that is equal to or greater than that which would be afforded by on-site practices and there is a legally obligated entity responsible for long-term operation and maintenance of the stormwater practice.
2. The city engineer finds that meeting the minimum on-site management requirements is not feasible due to the natural or existing physical characteristics of a site.
3. Nonstructural practices, such as pervious pavers and green roofs, will be used on the site that reduce:
 - A. The generation of stormwater from the site;
 - B. The size and cost of stormwater storage; and
 - C. The pollutants generated at the site.

SECTION **METHODS** **1102**

Methods used for computing runoff and generating hydrographs must be by one of the following methods:

1) Rational Method for drainage areas up to one hundred (100) acres or

2) Soil Conservation Service (SCS) Method (TR55) for small and medium size water sheds containing up to ten thousand (10,000) acres.

Other methods may be used upon prior approval of the City Engineer.

SECTION 1103

DESIGN

1103.1 Street and Local Drainage Facilities. All street and local drainage facilities shall be designed using the twenty-five (25) year storm guidelines unless more stringent requirements apply. Piped Drainage Structures shall have a minimum size of fifteen inches (15") in diameter. Inlet and outlet headwalls and toewalls are required for all pipes. Velocities for all pipes shall be kept to a minimum and, if practical, should not exceed four (4) feet per second when flowing full; however, if outlet velocities exceed five (5) feet per second, then energy dissipation devices and vegetative channel protection must be provided.

1103.2 Cross Drains. Pipes and box culverts used for cross drains shall be designed to carry at a minimum the twenty five (25)-year storm discharge, but should also be checked against the one hundred (100)-year storm to insure that the maximum headwater depth (HW) is six inches (6") below the centerline grade of the roadway. Street catch basins may be designed for gutter spread using the ten (10)-year storm provided a four (4) minute time of concentration is used and the remainder of the system is designed for the twenty five (25)-year storm assuming each inlet captures one hundred percent (100%) of the flow (to provide additional capacity for future additions to the system and off site drainage). Inlet capacity at sags, where relief by curb overflow is not provided, shall allow for debris blockage by providing twice the computed opening for the ten (10)-year storm. Curb inlets in the roadway shall be placed in such a way that the spread of water from the ten (10)-year storm does not exceed one half of a lane width on two or three lane streets and one lane width on wider streets. When the typical section includes a full shoulder or parking lane, no encroachment onto the travel lane will be allowed.

1103.3 Drainage Structures within Special Flood Hazard Areas. All drainage structures that lie within streams designated as Special Flood Hazard Areas (SFHA) as defined on the National Flood Insurance Program (NFIP) maps must be designed using the one hundred (100)-year (1% chance) flood event. Designs for structures lying within these streams shall be accompanied by a no-rise certification analysis by the Professional Engineer. All no- rise certifications shall be conducted in accordance with FEMA guidelines.

1103.4 Development within Special Flood Hazard Areas. The floodplain boundary information must be obtained using Federal Emergency Management Agency (FEMA) guidelines. Proposed developments located in approximate "A" zones that will be greater than fifty (50) lots or five (5) acres, whichever is lesser, must provide one hundred (100)-year base flood elevation data. This data should be obtained using appropriate methodologies accepted by FEMA.

SUBDIVISION WITHIN FLOOD PLAIN

There shall be no platting or subdivision of land allowed by the Board within the area defined as a floodplain unless the following conditions are met:

- A) It is determined after receipt of additional hydrological or grade studies from the subdivider or appropriate federal or state agencies that the lands to be developed are no longer subject to be covered by flood water of a 100-year frequency flood, or
- B) The location, grade, and flood-proofing of all proposed water mains and wastewater collectors which are to be extended into or through any portion of the flood plain to serve the proposed development shall first be approved by the City Engineer, prior to the extensions of such utilities into the flood plain area.
- C) That any proposed use which is located within a flood plain shall not include buildings which are inhabited and will be limited to such uses as open space, streets, and parking areas on that portion of the land within the flood plain where significant damage to life and property from flooding is more likely to occur. Any use approved to be located on land which is included within an area designated as a flood plain shall be approved only where the following factors have been considered and arrangements have been made which are satisfactory to the Board of Aldermen.
 - 1. The danger to life and property by water which may be backed up or diverted by such obstruction or land use;
 - 2. The danger that the obstruction or land use will be swept downstream to the injury of others;
 - 3. The availability of alternate locations;
 - 4. The construction or alteration of the obstruction in such a manner as to lessen any danger;
 - 5. The permanence of the obstruction or land use;
 - 6. The anticipated development in the foreseeable future of the area in which the proposed subdivision is to be located which may be affected by the obstruction or land use; and
 - 7. Any additional conditions adopted by the Board of Aldermen to ensure proper use of the areas within the flood plain.
- D. That the development of any land located within the flood plain will be accomplished so as to completely protect all areas of habitation and employment by raising of the ground elevation to the minimum freeboard requirement of the *Fulton Flood Damage Prevention Ordinance*. The raising of the ground shall be accomplished in such a manner that the general flow and storage of water is not unduly restricted or limited and will not cause flood hazards to other lands and developments, either within the proposed subdivision

or otherwise, and that said protection shall be accomplished without creating the need of significant public expenditures for flood control. This may require a detailed study to ensure the site raising will not cause flood hazards.

- E. The proposed center line grade of streets, roads, or private roadways located within the floodplain that are necessary to serve the proposed development shall not be more than one (1) foot below the 100-year frequency flood elevation.
- F. Any area within a flood plain from which fill is taken shall be hydrologically designed and maintained to reduce the likelihood of becoming refilled by silt. The subdivider must make arrangements satisfactory to the Board binding his/her successors and assigns, to regrade or remove such silt as is necessary to return any area to its approved design after flooding has occurred. Any area from which fill is taken within a flood plain shall be at a grade that will continue to permit adequate drainage into the stream or watercourse. If a water area is to be maintained within the flood plain, consideration shall be given to the effect the water area may have upon the flooding of both the land within the flood plain and other lands outside of the flood plain.

The subdivider shall obtain the approval of the City Engineer for any modifications in the location or design of the borrow area within the flood plain.

SECTION 1105

STORMWATER RETENTION AND DETENTION

1105.1 Stormwater Retention and Detention Required. Whenever the Stormwater Report indicates that an adverse stormwater runoff related impact is expected to result from the development of a property, that project shall be required to provide a stormwater detention facility or facilities so that peak flows from the developed site do not exceed those associated with the pre-developed site.

1105.2 Detention Facility Design. The detention facility shall be designed to accommodate a twenty five (25)-year post development event with the discharge structure designed to release the ten (10)-year pre-development flow. Larger projects, in excess of fifteen (15) acres, may be designed to release the twenty five (25)-year pre-development flow. Detention and retention ponds shall be designed with adequate freeboard to protect against overtopping of the dam or levee from the one hundred (100)-year storm. A variety of methods of achieving stormwater management goals are acceptable in providing detention facilities.

The type of facility provided shall be based on the following criteria:

1. The type of development for which the detention facility is intended to protect.
2. Volume of stormwater to be stored.
3. Origin and magnitude of the flows to be managed.
4. Topographic opportunities and limitations.

5. Safety considerations.
6. Maintenance requirements.
7. Aesthetic considerations.
8. Likelihood of facility operation interfering with access to public or private facilities.
9. Proximity of facility to property lines, utilities, buffers, etc.
10. Similar site-specific constraints as necessary.

The use of detention structures, which are greater than four feet (4') in depth, is strongly discouraged. When a detention structure is over four feet (4') deep and in a location that constitutes a danger to human habitation, a permanent fence or barrier and warning signs shall protect it.

1105.2.1 Fencing. When required, fences shall be a minimum of five feet (5') in height with a ten foot (10') wide gate. All fencing must be decorative wood or dark coated metal, such as aluminum picket or powder coated chain-link, and must be specifically approved, along with a plan of access and appropriate easements, by the City during the plans review process. Detention areas shall be dedicated as public infrastructure to the City, or may be owned and maintained by the neighborhood home owner's association and protected by subdivision covenants.

1105.3 Existing Tree Credit. In addition to standard stormwater facilities, credit may be given to developers for preserving mature trees to be used in a detention or stormwater quality facility on a development site. Mature native trees are an integral part of the stormwater treatment process and should be preserved and maintained where applicable. Stormwater storage credits will be given in the amount of one half ($\frac{1}{2}$) cubic foot per inch (caliper inch at breast height) of mature trees preserved on site. For example, if ten (10) mature trees with a diameter of twelve (12) inches were preserved in an open, pervious area of the site (or other greenspace that is not in parking lots), the developer would receive credit for sixty (60) cubic feet of storage saved. Credits would be given at the discretion of the Planning Director or designee based on location, size and type of trees. It shall be the responsibility of the developer to provide adequate information concerning the location, size, quality, and type of all trees to be preserved. Such information can be provided by means of a survey or other similar and pertinent documentation.

1105.4 Drainage Easements. Drainage easements suitable for the construction and maintenance of the drainage system shall be provided. A minimum of twenty feet (20') in width will be required for any drainage easement along a drainage pipe, ditch, stream or other area that is designated for stormwater to flow. No obstruction shall be built; constructed or planted that would inhibit proper function of the drainage system. All detention facilities shall be accessible from a public street by a minimum twenty foot (20') access easement, and there shall be an easement for the detention facility including twenty feet (20') beyond the toe of the side slope of the containment berm of the structure. No fences or planting of shrubbery shall be allowed on access easements. Fences and/or

shrubbery may be placed within a piped drainage easement, if an indemnification agreement is provided to the City.

1105.5 Slope Requirements. Drainage channels and detention/retention facilities should have maintained banks with slopes no steeper than three linear feet (3') per one vertical foot (3:1). Channel protection should be provided in vegetative form unless otherwise unsuitable. Where vegetative protection is proposed, the use of temporary or permanent erosion control material is required. At a minimum, the use of excelsior mats, or on approved equal, with sod or seed is required.

Whenever a drainage ditch or channel has a depth of five (5) feet or more, or a bank slope of two (2) feet horizontal to one (1) vertical or steeper, a five (5) foot high masonry wall or a five (5) foot high chain link fence may be required by the Planning Commission.

SECTION 1106

STORMWATER POLLUTION PREVENTION

1106.1 General. Prior to beginning development work, sediment control measures shall be established by the developer to prevent stormwater pollution. Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise control runoff in order to prevent pollutants from leaving development project sites and rights-of-way.

The City will not issue approval for work to begin on a project without the proper permits on file. It shall be the responsibility of the developer to apply for, obtain, and maintain applicable stormwater permits from the **Mississippi Department of Environmental Quality**. Permits shall remain on site at all times for inspection by City and/or MDEQ personnel.

1106.2 Stormwater Permits Required. Before beginning projects that will encompass a disturbed area greater than five (5) acres, the developer/builder shall submit a Stormwater Pollution Prevention Plan (SWPPP) to the Mississippi Department of Environmental Quality (MDEQ) for a Large Construction Stormwater General Permit. A copy of the approved SWPPP plan must be provided to the City with construction plans.

Projects that will have a total disturbed area of less than five (5) acres, but greater than one (1) acre shall be covered under a Small Construction Stormwater General Permit.

Projects that disturb an area of less than one (1) acre that may not be required to obtain stormwater pollution prevention permits shall follow best management practices regarding erosion and sediment control.

1106.3 Minimum Erosion Control Requirements. As a minimum, the developer / contractor shall provide straw bales or silt fences as a temporary structural practice to minimize erosion and sediment runoff. Straw bales and silt fences shall be properly placed to effectively retain sediment in each independent runoff area; then, as work progresses, shall be removed/replaced/relocated as needed. Erosion control measures must remain in place until vegetative establishment has occurred across the newly developed drainage area.

PIPE CULVERTS AND STORM SEWERS

1107.1 General. The minimum diameter for pipe culverts and storm drain pipe shall be fifteen inches (15"), and when used as a culvert, the length shall be such that the ends project at least four feet (4') beyond the edge of the pavements or beyond the back of the curb.

1107.2 Design. The design of stormwater drainage systems shall insure adequate control of stormwater runoff through the use of properly sized and positioned drainage structures including but not limited to curb and gutter, curb and grate inlets, raised grates, stormwater sewer pipe, box culverts, intersectional drains, open ditches, and bridges. Some such structures may also be required at side and rear lot lines.

The design of all stormwater drainage systems (including main channels) shall be in accordance with the City's plan (if any) for the basin in which the development is located and shall provide for potential affects to upstream and downstream developments in the basin. Drainage facilities shall be designed to meet all City ordinances and prevent excessive runoff onto adjacent properties. Cross drains shall be provided to accommodate all natural water flow and shall be of sufficient length to permit construction of a full width roadway including side slopes. Headwalls or flared end sections, aprons, channel bottom, and slope protection shall be provided at the upstream and discharge end of the cross drains. The use of excelsior mats or an approved equal will provide adequate protection.

1107.2.1 Design Frequencies. The following stormwater design frequencies shall be used in computing design distribution:

100-Year: All major streams, channels, bridges, open ditches, or drains within the jurisdictional limits of the City.

50-Year: Minor streams, channels, open ditches, or sub-drains from tributary to main streams.

25-Year: Side drains and miscellaneous culverts where flooding would cause minor adverse affects.

1107.2.2 Storm Drainage Pipe and Culverts. The following design criteria shall apply to all storm drainage pipe and culverts:

- A.** Calculation of design flows for drainage areas less than ten (10) acres: All pipes, side drains, and open ditches shall be designed using the accepted methodologies. The minimum storm drainage pipe size shall be ten inches (10") and shall be obtained using the Rational Formula.
- B.** Storm sewer design velocities shall not exceed ten feet (10') per second. For small, compact drainage basins less than ten (10) acres, the peak runoff shall be computed from the Rational Formula.

C. Calculation of design flows from drainage areas greater than ten (10) acres: Design flows shall be obtained by using accepted methodologies suitable for urbanized streams.

D. All pipes, side drains and open ditches shall be designed using the applicable frequency curve.

1107.2.3 Streets, Curb and Gutter, and Inlets. The following requirements shall apply to the construction of streets, curb and gutter, and inlets.

A. The horizontal and vertical alignment of streets shall be compatible with the stormwater runoff system and drainage design.

B. Street Grades shall be coordinated with lot drainage as proposed in the grading plan. Street grades shall be above the one hundred (100)-year frequency flood level.

C. The hydraulic capacity of curb inlets shall be determined by generally accepted engineering procedures taking into consideration roughness and street cross slope. The design depth of flow in the curb and gutter section shall not exceed four inches (4").

D. The hydraulic capacity of curb inlets shall be determined by generally accepted engineering procedures taking into consideration inlet geometry and characteristics of the gutter flow. Curb inlets shall be spaced to limit the spread of water to not more than one quarter ($\frac{1}{4}$) of the street width during a design storm of ten (10) year return period and fifteen (15) minute duration. Inlets shall also be placed at all low points in the gutter grade, at intersections where necessary to prevent gutter flow from crossing traffic lanes of an intersecting street or at points of special concern designated by the Planning Director or Designee.

E. Finished grades of all buildings shall be a minimum of one foot (1') above the one hundred (100)-year flood elevation.

F. The structural design of all box culverts or bridges shall conform to the standard plan of the Mississippi State Highway Department for a load capacity of HS-20 minimum.

G. All culverts, cross drainage, and storm sewers shall be constructed in accordance with the technical specifications contained herein.

1107.3 Materials. All materials and construction practices shall conform to the requirements of the *Mississippi Standard Specifications for State Aid Road and Bridge Construction (2004 Edition)*.

Head walls or flared end sections shall be provided on all eighteen inch (18") pipes and larger.

Plastic Pipe and fittings shall conform to the requirements of Type "S" High Density Polyethylene (HDPE) corrugated pipe under AASHTO M 294. It shall be "N-12 Pipe", as manufactured by Advance Drainage Systems, Hilliard, Ohio, or equal. Couplings used at pipe joints shall provide a watertight connection and gaskets shall conform to the requirements under ASTM F-477.

Reinforced concrete pipe shall conform to ASTM C-76.

1107.4 Installation. Pipe shall be installed according to the Manufacturer's recommendations. Excavation shall be true to line and grade within 0.05 feet. Excavation carried below the grade shall be backfilled at the Contractor's expense with selected materials. Unsuitable materials excavated from the trenches shall not be used for backfill and shall be disposed of as directed by the Developer's Engineer. Any material encountered in way of pipe trenches, including buried drainage structures and obstructions, shall be excavated.

The trench width shall not be less than twelve inches (12") greater than the outside diameter of the pipe. The Contractor shall do such trench bracing, de-watering, sheathing, or shoring necessary to perform and protect the excavation, and shall remove such material as backfill progresses.

The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform, and any pipe which is not in true alignment, or which shows any settlement after laying, shall be taken up and re-laid. Pipe shall be laid on a prepared bed which will provide a full bearing for the barrel and which is uniformly firm throughout its entire length.

Concrete pipe shall be used beneath all paved areas.

1107.5 Backfilling. The backfill material shall be approved by the Developer's Engineer. Great care shall be used to obtain thorough compaction under the haunches and along the sides to the top of the pipe. The backfill shall be placed in loose layers not exceeding six inches (6") in depth and successive layers shall not be placed until thorough compaction is obtained. Trenches under areas to be paved shall be compacted to ninety-five percent (95%) Standard Proctor density.

1107.6 Connections. Where the plans call for connections to existing or proposed structures or lines, these connections shall be watertight and made so that a smooth uniform flow line will be obtained.

The joints of all pipe culverts to other drainage structures shall be caulked and filled with mortar. Joints shall be thoroughly wet before applying mortar, and sufficient mortar shall be used to form a bead around the outside of the joint and to fill the whole joint to the inside of the connection. The inside of the joint shall be wiped and finished smooth. After the initial set, the mortar on the outside shall be cured with a cover of thoroughly wetted earth or burlap.

STORMWATER SYSTEM CONSTRUCTION RECORDS

The following records must be provided prior to approval of the Final Plat or release of the Construction Bond:

- A. A certification letter from the Developer's Engineer that the improvements were constructed in substantial conformance with the approved construction plans and specifications, accompanied by inspection documentation records and construction inspection photographs. The Developer, or his Designee, is responsible for maintaining inspection records to ensure that all improvements were constructed according to approved plans.
- B. RECORD DRAWINGS shall accurately represent the completed construction including locations of appurtenances. Provide four (4) printed sets and two (2) sets on CD or other media in PDF or other acceptable machine-readable file format.
- C. Copies of the manufacturer's literature necessary for reference in operating and maintaining the facilities including but not limited to manufacturer's product descriptive literature for materials incorporated into the work, operation and maintenance manuals for equipment, copies basic warranty information, etc.
- D. Contact information for the source of supply.
- E. Other information as may be requested by the Planning Director.