# STORMWATER MANAGEMENT ORDINANCE

## AN AMENDED ORDINANCE REGULATING THE RATE AND VELOCITY OF STORMWATER DISCHARGE FROM PROPOSED DEVELOPMENTS WITHIN THE CITY OF MADISON AND REQUIREMENTS FOR STORMWATER RETENTION AND DETENTION

**WHEREAS**, continued commercial, industrial, and residential development of property is desirable and beneficial to the City of Madison; and,

**WHEREAS**, adequate drainage of existing developments and future developments is a necessary aim of the City of Madison; and,

**WHEREAS**, it is the desire of the City of Madison to preserve and promote the public health, safety, morals, and general welfare of the inhabitants of the City of Madison through the proper use of regulations and regulatory authority; and,

**WHEREAS**, Unregulated and uncontrolled stromwater run-off from desirable development can damage the public health, safety, and general welfare of the inhabitants of the City of Madison; and,

**WHEREAS**, a reasonable balance must be stuck whereby proposed development is encouraged while requiring management of their stormwater in such a way as to protect the public health, safety, and general welfare of the inhabitants of the City of Madison and the public-at-large; and,

**WHEREAS**, this reasonable balance can be struck by regulations requiring management practices which control the rate of stormwater run-off, the quality of stormwater run-off, and the negative impacts of run-off through volume or velocity on downstream property owners or the public-at-large;

**NOW, THEREFORE, BE IT ORDAINED** by the Mayor and the Board of Aldermen of the City of Madison, Mississippi that the Stormwater Management Ordinance adopted January 3, 1991 is hereby amended and recodified as follows:

## I. PURPOSE – STORMWATER MANAGEMENT ORDINANCE

The purpose of this ordinance is to provide the basis for achieving the adopted city goals and objectives defined below:

To diminish threats to public health, safety and general welfare caused by the runoff of excessive stormwater;

To reduce economic losses to individuals and the community-at-large;

To protect, conserve, and promote the orderly development of land, water, and all natural resources.

To ensure the safety of the City's streets and right-of way from flood danger;

To foster the development of the best possible land uses within the boundaries of the City of Madison;

To minimize future operational and maintenance costs to the people of the City of Madison;

To help preserve the environmental quality, social well-being, and economic stability of the City of Madison;

To provide for corrective works which are consistent with the overall goals, policies, standards, and criteria of the City of Madison.

The provisions of this ordinance further regulate, guide, and control:

A. The subdivision layout, redevelopment, and improvement of lands located within the City of Madison.

B. The construction of buildings and drainage of the sites on which structures are located, including parking and other paved areas.

C. The grading of land and/or clear cutting of large sections of trees.

D. The design, construction, and maintenance of stormwater drainage facilities and systems.

## II. GENERAL STANDARDS

### A. Definitions

<u>Design Year Storm</u> – The Design Year Storm is a statistical definition of

the percent chance that a storm has of occurring in any given year. That year should not be considered as an actual number of years between occurrences. For example, the "100-year flood" is not the flood that will occur once every 100 years. Rather, it is the flood elevation that has a 1-percent chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The 100-year flood, which is the standard used by most Federal and State agencies, is used by the National Flood Insurance Program as the standard for floodplain management and to determine the need for flood insurance.

100-Year/24 hour storm – For the purpose of this ordinance the "100-year Flood" shall be defined as the rainfall event which has a 1% chance of occurring in any given year. This is defined in NRCS Technical Release TR-55. For Madison, Mississippi, this storm will be defined as having a rainfall of 9.20 inches in a 24-hour period.

50-Year / 24 hour Storm – For the purpose of this ordinance the "50-year Flood" shall be defined as the rainfall event which has a 2% chance of occurring in any given year. This is defined in NRCS Technical Release TR-55. For Madison, Mississippi, this storm will be defined as having a rainfall of 8.55 inches in a 24 hour period.

25-Year / 24 hour Storm – For the purpose of this ordinance the "25-year Flood" shall be defined as the rainfall event which has a 4% chance of occurring in any given year. This is defined in NRCS Technical Release TR-55. For Madison, Mississippi, this storm will be defined as having a rainfall of 7.63 inches in a 24 hour period.

10-Year / 24 hour Storm – For the purpose of this ordinance the "10-year Flood" shall be defined as the rainfall event which has a 10% chance of occurring in any given year. This is defined in NRCS Technical Release TR-55. For Madison, Mississippi, this storm will be defined as having a rainfall of 6.60 inches in a 24 hour period.

5-Year / 24 hour Storm – For the purpose of this ordinance the "5-year Flood" shall be defined as the rainfall event which has a 20% chance of occurring in any given year. This is defined in NRCS Technical Release TR-55. For Madison, Mississippi, this storm will be defined as having a rainfall of 5.68 inches in a 24 hour period.

2-Year / 24 hour Storm – For the purpose of this ordinance the "2-year Flood" shall be defined as the rainfall event which has a 50% chance of occurring in any given year. This is defined in NRCS Technical Release TR-55. For Madison, Mississippi, this storm will be defined as having a rainfall of 4.42 inches in a 24 hour period.

100-Year Floodplain – The 100-Year floodplain shall be determined to be that area which is inundated by water during the 100-year / 24- hour rainfall event. This shall be determined by elevation and not by FIRM Mapping shaded area. In the event that the area in question is not included as a part of the detailed study within the FIRM Mapping and Flood Study as defined in this section, calculations determining this elevation which have been approved by the City of Madison and FEMA (in the event that a LOMA, LOMR, or LOMR-F is required) shall supercede the FIRM Mapping listed below in the eyes of the City of Madison.

Aeration – The adding of oxygen into water through means of fountains, waterfalls, or other mechanical means.

Bypass Channels – Bypass Channels are channels which are used to pass flows from upstream of the property through the property without impacting on site stormwater management facilities.

Concentrated Flow – Any flow of run-off that is occurring in a defined channel or culvert in the ground at the exit point from the property in question.

Deep-Rooted Shrub – A deep-rooted shrub is defined as any shrub whose root system tends in the Madison, Mississippi area to penetrate deeper into the ground than the depth of topsoil proposed over substrate at the location of planting. In other words, in the construction of a dam embankment, the cross-section area of the dam will be placed and formed up to the substrate. Up to the substrate, topsoil is then placed on top of the functional dam embankment. If the root system of a shrub will tend to penetrate through the topsoil layer and into the substrate, that would be considered a deep-rooted shrub for the purpose of this ordinance. The type of shrub which fits this definition will then vary with the depth of topsoil placed.

Emergency Spillway – The secondary means through which water exits from a detention or retention basin. The emergency spillway will have flows on an relatively rare basis and will be designed to keep the detention structure from overtopping during the 100-year storm.

FIRM Mapping and Flood Study – Until such time as the City of Madison Officially adopts a set of Federal Insurance Rate Maps (FIRM) and Flood Elevations, the 100-year floodplain shall be preliminarily determined by using the most conservative (highest) 100-year flood elevation from any of the maps presently in use.

Flooding Problem – For the purpose of this ordinance, “flooding problem” will be defined as any one of the following:

1. A building or structure where the pre-development 100-Year flood elevation is more than 1 foot below finished floor elevation and the post-development 100-year flood elevation is less than 1 foot below finished floor elevation;

2. A road, driveway, or culvert for which the pre-development 100-Year flood elevation was below the elevation of the sub grade and the post-development 100-year flood elevation is above the elevation of the sub grade;

3. A road, driveway, or culvert for which the pre-development 100-Year flood elevation did not overtop the facility and the post development 100-year flood elevations does overtop the facility;

4. A building or structure where the pre-development 100-year flood elevation was below the finished floor elevation and the post-development flow is above the finished floor elevation;

5. A building, structure, road, walk, or drive where the pre-development 100-year flood elevation was less that 2 feet deep and the post-development 100-year flood elevation is greater than 2 feet deep;

6. A building, structure, road, walk, or drive where the pre-development 100-year flow velocity was less than 2 feet per second in the pre-developed condition and is greater than 2 feet per second in the post-developed condition.

Floodway – The floodway is a legal limit set by the FIRM Mapping and Flood Study. The floodway is technically defined as the area which must remain clear to pass stormwater flows in order to prevent the 100-year /24-hour storm flood from rising more than 1 foot due to development.

Freeboard – The freeboard is the height from the top of dam to the permanent pool water surface elevation in a retention structure.

Grading – Any disturbance of the existing ground including topsoil stripping, moving, or removal.

Impact Basins (Energy Dissipaters) – Structures utilized to slow water down and control its velocity or to spread water out and control its regime.

Letter of Map Amendment (LOMA) – A correction approved by FEMA to the Official FIRM mapping. This correction will be based upon additional information and/or calculations provided above that provided for the original study.

Letter of Map Revision (LOMR) – A revision approved by FEMA to the official FIRM mapping. This revision will be based upon changes made in the hydraulic characteristics of the channel and/or floodplain.

Letter of Map Revision – Fill (LOMR-F) – A revision approved by FEMA to the official FIRM mapping. This revision will be based upon fill having been legally placed in the floodplain.

NRCS (or SCS) TR-55 – United States Department of Agriculture, Natural Resources Conservation Service, Engineering Division, Technical Release 55, dated June 1986, *Urban Hydrology for Small Watersheds.*

Peak Flow Rate – The maximum rate of flow at a specific point through the duration of a rainfall and run-off event.

Principle Spillway – The primary means through which water exits from a detention or retention basin. The principle spillway will have flows on a regular basis and will be designed accordingly.

SCS TR – 55 – See NRCS (or SCS) TR-55

Sheet Flow – For the purpose of this ordinance, sheet flow shall be defined as any flow of run-off for which there is no defined channel or culvert in the ground at the exit point from the property in question. Any flow which is not "Concentrated Flow" is "Sheet Flow". To avoid confusion, any flow designated as either "Sheet Flow" or "Shallow Concentrated Flow" for the purpose of NRCS TR-55 flow calculations shall be defined as "Sheet Flow" for the purpose of this ordinance.

Stormwater Detention – A surface water run-off storage facility that is normally dry but is designed to hold (detain) surface water temporarily during and immediately after a run-off event. Examples of detention basins include but are not limited to: natural swales with crosswise earthen berms, constructed or natural surface depressions, subsurface tanks, pipes or reservoirs.

Stormwater Retention – A pond or basin which always contains (retains) a substantial volume of water to serve recreational, aesthetic, water supply, or other functions.

Stormwater Retention/Detention Basin: A pond or basin which provides for the permanent storage of water while utilizing the freeboard above the permanent pool elevation for detention of stormwater run-off.

Stormwater Run-Off – The amount of water which leaves a site or area in direct correlation to a rainfall event.

Wet Pond – That portion of a retention or retention/detention basin which permanently stores water.

B. Applicability and Exceptions

This ordinance shall be applicable within the City of Madison's jurisdictional area and shall apply to any land disturbance activity that results in the disturbance of one-acre or more of land surface and **any** land disturbance activity that results in a development having greater than 50% impervious surface.

C. Cutting of Trees

i. The cutting of trees shall be governed by the requirements of the Landscape Ordinance of the City of Madison.

ii. If, as a portion of the compliance review of the Tree Removal Plan as required in the Landscape Ordinance, the City of Madison determines that the removal of trees will create an increase in stormwater run-off flow rate or velocity to the detriment of downstream property owners or the public-at-large, the City reserves the right to require that all of the regulations state herein as well as those regulations given in the Land Disturbance and Erosion Control Ordinance of the City of Madison be enforced.

D. Regulations Governing Rate of Run-off

i. Rate of run-off (as defined in Section IIA – above) shall be determined at each point where run-off leaves the property being developed in its pre-development state;

ii. The Stormwater Management System shall be designed so that the Peak Flow Rate at any exit point in the post-developed condition shall be less than or equal to the peak Flow Rate for that exit point in the pre-developed condition for the 2-year, 10-year, and 50-year / 24 hour storms;

iii. In addition to the Peak Flow requirement listed above, it shall be the responsibility of the developer and his engineer to ensure that the run-off of the 100-year storm event does not create a flooding problem at any street, drive, or culvert within 500 feet of any run-off exit point from the property which did not pre-exist the development.

iii. For the purpose of this ordinance, "flooding problem" will be defined as any one of the following:

1. A building or structure where the pre-development 100-year flood elevation is more than 1 foot below finished floor elevation and the post-development 100-year flood elevation is less than 1 foot below finished floor elevation.

2. A road, driveway, or culvert for which the pre-development 100-Flood elevation was below the elevation of the sub grade and the post-development 100- year flood elevation is above the elevation of the sub grade;

3. A road, driveway, or culvert for which the pre-development 100-Year flood elevation did not overtop the facility and the post development 100-year flood elevations does overtop the facility;

4. A building or structure where the pre-development 100-year flood elevation was below the finished floor elevation and the post development flow is above the finished floor elevation;

5. A building, structure, road, walk, or drive where the pre-development 100-year flood elevation was less than 2 feet deep and the post-development 100-year flood elevation is greater than 2 feet deep;

6. A building, structure, road, walk, or drive where the pre-development 100-year flow velocity was less than 2 feet per second in the pre-developed condition and is greater than 2 feet per second in the post-developed condition.

E. Regulations Regarding Velocity of Run-Off

i. Velocity calculations for the purpose of compliance with this ordinance shall be calculated using the 2-year/24 hour storm;

ii. The velocity of flow at any of the stormwater run-off exit points from the property for the post-developed condition shall be less than or equal to the velocity of flow in the pre-developed condition.

F. Regulations Regarding Regimes of Flow

i. For the purpose of this ordinance, there will be considered to be two regimes of flow: sheet flow and concentrated flow.

ii. Sheet flow shall be defined as any flow for which there is no defined channel in the ground at the exit point from the property.

Any flow designated as either “sheet flow” or “shallow concentrated” flow for the purpose of SCS TR-55 flow calculations will fall into the category of sheet flow for the purpose of this portion of the ordinance;

iii. Concentrated flow shall be defined as any flow for which there is a defined channel or culvert in the ground at the exit point from the property;

iv. Flow must exit the property in the post-developed condition in the same regime as it exited the property in the pre-developed condition.

G. Regulations Regarding Bypass of Upstream Flows

i. If it is desired by the developer of a piece of property to pass upstream flows through the property through means of a drainageway physically separated from the Stormwater management System of the development, this is an acceptable practice;

ii. The bypass drainageway must be designed to pass the 100-year / 24 hour storm without overtopping;

iii. The bypass drainageway must exit the property in the post-developed condition at the same location as the drainage from that upstream basin exited the property in the pre-developed condition;

iv. The bypass drainageway must have approximately the same flow exiting the property as it did entering the property or must be included in the calculations for the overall Stormwater Management Plan for the development.

v. In addition to the Peak Flow requirement listed above, it shall be the responsibility of the developer and his engineer to ensure that any change in timing of the run-off of the 100-year storm event does not create a flooding problem at any street, drive, or culvert within 500 feet of any run-off exit point from the property which did not pre-exist the development.

vi. Refer to Section II.C.iv. of this ordinance for the definition of “flooding problem”.

H. Regulations Regarding Detention in the 100-Year Floodplain

i. In the event that detention is to be provided within the 100-year floodplain, no storage will be considered below the flood elevation for the appropriate design storm (e.g. 2-year, 10-year, 25-year or 100-year / 24 hour storm);

ii. In the event that calculations determining the elevation of the appropriate design storm are (in the decision of the City Engineer of the City of Madison) not conclusively presented, no storage will be considered below the 100-year flood elevation.

I. Regulations Regarding Retention in Detention Ponds (Wet Ponds)

i. For the purpose of this ordinance, "retention" will be considered the permanent storage of water and "detention" will be considered the temporary storage of water for the purpose of stormwater management. Therefore, a retention/detention basin provides for the permanent storage of water while utilizing the freeboard above the permanent pool elevation for detention of stormwater run-off. The phrase "wet pond" will be used to mean the retention portion of the basin.

ii. No volume below the permanent pool elevation for the wet pond will be considered for storage in the detention calculations;

iii. The City reserves the right to require aeration in any wet pond at the expense of the developer. The City must make this request prior to Site Plan Approval. In the event that the developer questions such a requirement, he must provide calculations showing that the pond will not become a nuisance during any month of the year.

J. Existing Downstream Erosion and Flooding Problems

i. When the situation presents itself, developers are strongly encouraged to provide assistance with downstream drainage problems by means of decreasing rates of flow to substantially less than their pre-development conditions or slowing flow velocities to substantially less than their pre-development conditions.

ii. In the event that such an opportunity exists, the City Engineer of the City of Madison will make the possibility known to the developer at the earliest opportunity.

iii. In the event that such improvements are made and the City of Madison agrees that such improvements benefit the public welfare

of the people of the City of Madison, the provisions of Section V, Article B of this ordinance may apply.

K. Easement Requirements

All stormwater detention ponds in their entirety, bypass channels, channels which drain more than one property, and all drainage structures must be within a public right-of-way or public easement regardless of the maintenance requirements and obligations of the City and the Homeowner's Association.

III. TECHNICAL STANDARDS

A. Detention Basins

i. Definition

A surface water run-off storage facility that is normally dry but is designed to hold (detain) surface water temporarily during and immediately after a run-off event. Examples of detention basins include but are not limited to: natural swales with crosswise earthen berms, constructed or natural surface depressions, subsurface tanks, pips or reservoirs.

ii. Storage Volumes

The detention basin shall provide storage sufficient to control the excess run-off from the 2-year, 10-year, and 50-year / 24 hour storms;

iii. Sideslopes

Sideslopes of the wet side of a detention basin dam shall be 4:1 or flatter. Sideslopes of the dry side of a detention basin dam shall be 3:1 or flatter. These criteria are maximum slopes and are not intended to be design guidelines. The developer's engineer shall use geotechnical expertise and engineering judgment in the determination of appropriate slopes.

iv. Principle Spillway (PSW)

The principle spillway shall be a reinforced concrete pipe of a class suitable for the depth of cover and other loads. The inlet control structure shall be the pipe itself or shall be a weir structure constructed over the inlet of the pipe. This weir shall be cast-in-place or precast concrete and designed

to operate utilizing gravity and water head as the only driving forces. Inlet control structures utilizing pumps or other artificial operators are prohibited. The minimum diameter of the outfall pipe of the principle spillway is 18 inches. Seepage collars or a foundation trench, chimney drain, and strip drain will be required on all pipes through the dam embankment.

v. Impact Basins (Energy Dissipaters)

Impact basins will be required for any detention basin where the depth from the emergency spillway elevation to the bottom of the basin is greater than five feet. Otherwise impact basins are required as necessary to meet the velocity control requirements of this ordinance. Please note section II.D. of this ordinance for velocity requirement. All impact basins shall be subject to the approval of the City of Madison.

vi. Emergency Spillways (ESW)

Whenever possible, emergency spillways should be constructed in cut conditions and should not be provided over the dam embankment. In the event that a ramp spillway (a spillway over the embankment) is required by site conditions, this spillway must be paved using either concrete or riprap from the beginning of the control section to at least five feet past the downstream toe of dam. Emergency spillways must be open channels and may not be pipes. The control section of the ESW must be a section which is level in profile, is set at the ESW elevation, and is at least ten feet long in profile. Vegetative cover must be established over all unpaved portions of the ESW. The ESW must be designed to pass the 100-year / 24-hour storm event in the event that the principle spillway gets clogged.

vii. Downstream Channels

Calculations must be provided showing the capacity of downstream channels to handle the rate and velocity of flow from the detention basin. These calculations shall model the channel at the downstream property line of the development. These calculations must also meet all the standard stromwater design criteria of the City of Madison.

viii. Appearance

Natural vegetation shall be maintained in detention areas where possible. In lieu of this, the basins shall be grassed with vegetation such as shrubs and permanent ground cover around the borders. No trees or deep-rooted shrubs shall be planted in the detention dam. This ordinance does not supercede the Landscape Ordinance of the City of Madison.

ix. Seed, Sod, and Mulch

The requirements for seeding, sodding, and mulching shall be in accordance with the City of Madison Landscape Ordinance and the Mississippi Department of Transportation Standard Specifications. In the event of discrepancy, the more conservative regulations will apply.

x. Proximity of Structures to Existing Homes

The Site Plan presented to the City of Madison Department of Community Development for review and approval shall clearly show the distance from and proposed structure (detention structure, energy dissipater, flow regime structure, etc.) To the nearest residential structure. The Site Plan must also include a sketch or clear explanation of the visual nature of the structure.

xi. Ownership of Detention or Retention Facilities

Any development which is required under this ordinance or any development which chooses for any reason to construct any form of stormwater detention or retention facilities must have in place a Homeowner's Association or other designated body to act on behalf of the property owners of the development for the maintenance and upkeep of the facility. This association must be a legal entity capable of owning land. Any detention facility which is constructed by requirement or by choice must be wholly located on property owned by such an association and may not be located in whole or in part on property owned by a single resident or property owner within the development.

B. Retention Basins

i. Definition

Retention Basin: A pond or basin which always contains (retains) a substantial volume of water to serve recreational, aesthetic, water supply, or other functions.

Retention/Detention Basin: a pond or basin provides for the permanent storage of water while utilizing the freeboard above the permanent pool elevation for detention of stormwater run-off.

ii. Retention/Detention Criteria

Retention/Detention basins shall conform to all of the criteria listed in Article A, above.

iii. Minimum Depths

The minimum depth of the permanent pool shall be four feet.

iv. Facilities for Emptying

For emergency purposes and periodic maintenance, facilities shall be provided or plans prepared to permit emptying and drainage. Pumps may be planned to be used for this purpose but an emergency plan must be prepared which details the precise location for obtaining the pump and an estimated time for its arrival.

v. Sideslopes

Below water sideslopes shall be 4:1 or flatter. A ledge shall be located between 2 and 3 feet under the permanent pool elevation which slopes back toward shore at about 1 % slope. This ledge shall be a minimum of four feet wide. These criteria are maximum slopes and are not intended to be design guidelines. The developer's engineer shall use geotechnical expertise and engineering judgment in the determination of appropriate slopes.

vi. Freeboard

There shall be a freeboard of at least 12 inches from the permanent pool elevation to the top of dam and the spillway structure should be capable of passing the 100-year storm before overtopping of the dam.

vii. Sediment Storage

Sediment storage shall be provided in all retention ponds such that sediment removal should be required no more than annually.

C. Freestanding Velocity Control Structures (Energy Dissipaters)

i. Where energy dissipaters are required to meet the velocity requirements contained within this ordinance, those structures shall be constructed in a permanent nature and shall be comprised of concrete, masonry, or stone.

ii. Energy dissipaters are considered to be freestanding when they are more than 100 feet downstream from a detention or retention dam. Otherwise, they fall under the requirements of Article A, above.

D. Flow Regime Structures

i. Where flow regime structures are required to meet the flow regime requirements contained within this ordinance, those structures shall be constructed in a permanent nature and shall be comprised of concrete, masonry, or stone.

ii. Flow will be considered to have been returned from concentrated flow to sheet flow when the flow width has been increased to five times the concentrated flow width (top of bank to top of bank) or 40 feet, whichever is greater.

## IV. SUBMITTAL REQUIREMENTS

The following is a listing of the plans and calculations which must be submitted as part of the Construction Drawings.

A. Rate of Run-off

i. Pre-Development Conditions Drainage Map – A drainage map shall be provided to the City Engineer of the City of Madison showing (at a minimum) the following:

1. Contours of the land at 2-foot maximum contour intervals (inflate areas, spot shots and drainage areas, delineating the drainage basins, and showing the points where run-off exits the property;

2. Property lines and easements with purposes noted. Name of all adjacent property owners and all property owners within 500 feet downstream;

3. Vicinity Map

4. Public rights-of-way adjacent to the property

5. Existing drainage facilities and structures;

6. Peak flow rates and velocities for design flows at all exit points from the property;

7. Peak flow rates for the 100-year storm at points 500 feet downstream from all exit points;

8. A graphical display of the hydraulic length of the different drainage basins which was used for calculating the times of concentration and travel time;

9. Location and elevations of all defined floodplains for the site.

ii. Pre-Development Conditions Calculations – Calculations shall be provided which show the pre-development rate of run-off at each of the exit points for the 2-year, 10-year, and 50-year/24 hour storms. These calculations shall use the SCS TR-55 methodology or other methodology approved by the City Engineer;

iii. Post-Development Calculations (without detention) – Calculations shall be provided which show the post-development rate of run-off at each of the exit points for the 2-year, 10-year, and 50-year storms. These calculations shall use the SCS TR-55 methodology or other methodology approved by the City Engineer. These calculations shall use the same methodology and assumptions which were used to calculate the existing peak flow rates;

iv. Post-Development Drainage Map – A drainage map shall be provided to the City Engineer of the City of Madison showing (as a minimum) the following:

1. The existing and proposed contours of the land (2-foot intervals) showing the effect of proposed development on the delineation of the drainage basins and on the points where run-off exits the property;

2. A table which gives the following information for each exit point:
    a. Existing and proposed acreage draining to that point;
    b. Existing and proposed times of concentration;
    c. Existing and proposed Curve Number;
    d. Existing and proposed Peak Flow Rates for the 2, 10, 50-year, and 100-year/24-hour storms. (without detention)
3. Proposed type of street drainage: roadside ditch, curb, or curb and gutter;

4. Proposed storm sewers and open drainageways;

5. Location of proposed detention basins numbered to correspond with details;

6. Proposed peak flow rates and velocities for design flows at all exit points from the property including bypass channels;

7. Proposed peak flow rates for the 100-year storm at points 500 feet downstream from all exit points including bypass channels;

8. Location and elevations of all defined floodplains

v. Stormwater Detention Calculations – In the event that stormwater detention is utilized to manage the stormwater peak flow rate, calculations must be provided which show the following for each exit point:
    1. Stage-Storage-Discharge curves for the detention basins;
    2. Inflow Hydrographs for the 2, 10, and 50-year/24-hour storms (these must use the same methodology and assumptions as the peak flow calculations listed in item iv.);
    3. Outflow hydrographs for the 2, 10, and 50-year/24-hour storms;
    4. Emergency Spillway Elevations with section and profile views;
    5. Inlet riser details showing elevations and principle spillway details;
    6. Top of Dam and Overtop Elevations;
    7. Listing of all input assumptions (if computer software used);

8. Backwater elevations for the flood elevations for the 2-year, 10-year, and 50-year / 24-hour storm and any impacts on the storage volume:
9. The FEMA 100-year flood elevation at the location of the proposed detention basin and any impacts on the storage volume.

vi. Final Grading and Drainage Plan – A plan shall be provided to the City Engineer of the City of Madison showing the effect of the proposed development with detention on the contours of the land, the delineation of the drainage basins, and on the points where run-off exits the property. This plan must include the following as a minimum:

1. A table which gives the following information for each exit point:
   a. Existing and proposed acreage draining to that point;
   b. Existing and proposed times of concentration;
   c. Existing and proposed Curve Numbers;
   d. Existing and proposed Peak Flow Rates for the 2, 10, and 50-year / 24-hour storms. (with detention)
2. Layout of all proposed improvements on the site;
3. Existing and proposed contours with a 2-foot minimum interval;
4. The banks and centerlines of streams and channels;
5. The normal shoreline of lakes, ponds, retention basins and detention basins;
6. Storm, sanitary, and combined sewers with inverts and outfalls;
7. Delineation of 100-year floodplain as established by the 100-year flood elevations and the surveyed contours of the property;
8. Environmental features such as wetlands and designated natural areas;
9. Proposed storm sewers including sizes, inverts, outfalls, slopes, design flows, and headwater depths.
10. Location and invert elevation of proposed or existing sanitary sewers at all locations where they cross storm sewers;
11. A table which gives the following information for the site:
    a. Overall Site Acreage
    b. Existing Impervious Surface Percentage
    c. Proposed Impervious Surface Percentage
12. For each retention/detention basin, a table shall be shown giving the following information at a minimum:

a. Permanent Pool Elevation (retention only)
b. Permanent Pool Storage in acre-feet (retention only)
c. Emergency Spillway Elevation
d. Pool Storage at Emergency Spillway Elevation in acre-feet
e. Outflow Rate at Emergency Spillway Elevation
f. Top of Dam Elevation
g. Pool Storage at Top of Dam Elevation in acre-feet
h. Outflow Rate at top of dam elevation
i. The FEMA 100-year floodplain elevation at the location of the detention basin

B. Routing of the 100-year Storm

i. Calculations shall be provided demonstrating that the 100-year storm has been routed through the proposed drainage system utilizing the SCS TR-55 methodology or other methodology approved by the city engineer. The calculations shall show the following at a minimum:
   1. The ability of the detention dam / emergency spillway system to handle the 100-year storm without overtopping;
   2. A comparison of existing versus proposed 100-year flood elevations at any street crossings, driveway crossings, culverts, or existing structures within 500 feet of the exit point from the proposed property.
   3. That the impacts of the 100-year flood in the post-developed condition do not satisfy any of the criteria for "flooding problems" as listed in this ordinance for any culvert, road, drive, walk, building, or structure within 500 feet from any run-off exit point from the property. This includes structures which are located on the far side of an adjacent property owner or right-of-way.

C. Velocity of Run-off

i. Calculations for all exit points giving the velocities of flow in the pre-developed and the post-developed conditions. These calculations shall take into account changes in flow rates, changes in cross-section, changes in channel lining, changes in flow regime, and proximity of detention dam outfall.
ii. The above calculations shall use the 2-year / 24-hour storm.

iii. Calculations showing the impact of energy dissipators as required n the velocity of flow.

D. Regimes of Flow

i. Detailed information shall be provided for each run-off exit point from the property which determines the pre-development flow regime. Survey information, photographic evidence, or engineer's certification are acceptable;
ii. Should it be required to change a concentrated flow to a sheet flow, calculations will be required showing the minimum spread of flow;
iii. Sketches will be required showing the layout of the overflow structure and how it meets the minimum flow spread.

E. Bypass Channels

i. Calculations showing the ability of the bypass channel to handle to 100-year / 24-hour storm without overtopping;
ii. Calculations showing the ability of the bypass channel to handle the 2-year / 24-hour storm without major erosion problems.

F. Retention Basins

i. Calculations demonstrating that the retention basin can pass the 100-year storm without overtopping the dam;
ii. Calculations confirming that the retention basin has sufficient storage to store one average year of sediment.

G. Required Details

i. Cross-Section of proposed detention or retention dams;
ii. Detail of Principle Spillway Inlet Structure;
iii. Cross-Section of Emergency Spillway;
iv. Profile of Emergency Spillway;
v. Detail of Impact Basin at Principle Spillway Outlet (if required);
vi. Cross-Sections of all major proposed drainage channels showing lining;
vii. Details of Freestanding Velocity Control Structures (if required);
viii. Details of Flow Spread Structures (if required)
ix. Sections of retention basin sideslopes;
x. Detail of retention basin emptying system.

H. Engineer's Statement

The above maps and calculations shall be accompanied by a transmittal letter which contains the following statement:

"I hereby state that the reports, calculations, and plans for the stormwater management design of Name of Development were prepared under my direct supervision and to the best of my knowledge and belief they are in

accordance with the provisions of the City of Madison Stormwater Management Ordinance."

Registered Professional Engineer
State of Mississippi
Registration No.

## V. IMPROVEMENT REGULATIONS

### A. Easements

Easements will be required over all basins and stormwater conveyances which are involved in the conveyance of stormwater through or from the property. Said easements will be in a format which meets the requirements of the City Engineer of the City of Madison. The existence of easements provides right of access to the city only. It is not intended to imply any responsibility on the part of the City of Madison for the maintenance or upkeep of private facilities.

### B. Maintenance of Facilities

The developer shall be responsible for the maintenance of all improvements until such time as 80 percent of the lots have been improved with buildings and occupancy permits issued. However, the developer may not transfer these improvements for the purpose of maintenance until he has complied with all aspects of this ordinance and until he has received final approval, final inspection, and a Certificate of Compliance from the City Engineer and the Public Works Director.

All improvements, including landscaping, shall be maintained in perpetuity and cannot be developed for any other use which would limit or cause to limit the use of the improvements. The improvements shall be owned and maintained by the Property Owner's Association of the development and each property owner shall own a proportionate share of the improvements and shall bear his proportionate responsibility for the continued maintenance in accordance with the above.

Each property shall, within the contents of his deed, be liable for the combined maintenance of the improvements. A special note to this effect shall appear on the final plat of subdivision or any plat of condominium and their declarations.

The Property Owner's Association shall be formed by the Developer in perpetuity for the maintenance of improvements. Membership shall be mandatory by all property owners. Articles of agreement of the Property

Owner's Association must be approved by the Board of Aldermen of the City of Madison before recording.

In outparcel subdivisions from commercial developments wherein the detention requirements and maintenance are being accepted by a primary tenant, the provision of a Property Owner's Association may be waived, provided that other parts of this section have been met.

When problems arise due to inadequate maintenance, the City Engineer or Public Works Director or their Agents of the City of Madison may inspect the improvements and compel the correction of the problem by written notice. Should the Property Owner's Association fail to comply with the written notice, the City of Madison may enter the facility as needed and provide the necessary maintenance and may then charge the Property Owner's Association all reasonable charges incurred by the City for said maintenance. Should these charges not be paid, the City of Madison shall have the right to charge an interest rate of 1.5% per month against any outstanding balance of such an action after 30 days.

If the City of Madison chooses to maintain any such facilities, said facilities must be located in dedicated public rights-of-way and/or dedicated and easily accessible drainage easements. Should construction of structures, buildings, or fences make such an easement not easily accessible, it will be the responsibility of the Property Owner's Association to make the easement easily accessible or to maintain the facility at its own expense. In that event, the above paragraphs would apply.

C. Dedication of Facilities

Whenever drainage facilities are planned to service several projects or a specific area deemed necessary by the City of Madison, the drainage facilities may be dedicated to the City. If the City Engineer agrees that these facilities benefit inhabitants of the City of Madison outside of the development or improve the public welfare, the City of Madison will maintain these facilities. In these cases, access easements must be provided to the City.

D. Inspection of Facilities

Prior to transfer of the maintenance responsibility for these facilities from the developer to the Property Owner's Association, the developer shall provide to the city a certification signed by a registered professional engineer stating that the facilities are:

i. Complete;

ii. Built as per the approved plans;
iii. Ready for inspection by the city.

Upon receipt of this certification, the City Engineer shall inspect the drainage facilities. When facilities are not complete or are not constructed as per the approved plans, the City of Madison has explicit authority to compel compliance and have any situations corrected which are not according to the approved plans. Failure to comply with the above could result in monetary penalties as outlined in this ordinance, holding or use and occupancy permits by the City, or utilization of performance bonds by the City to complete the construction. All drainage facilities whether dedicated to the City or not shall have an implicit right of access for the purpose of inspection by duly authorized City Officials.

E. Waiving of Detention Requirements

The requirements for on-site retention/detention facilities may be waived by the City of Madison if one of the following is determined:

i. The development of detention at the location is question would be detrimental to the stormwater management patterns of the general area. A technical study of the area will have to be prepared and submitted to the City of Madison which show the stormwater flows of the area along with the peak flows in the pre-developed, post-developed without detention, and post-developed with detention states;
ii. Engineering, aesthetic, or economic factors make a regional facility more practical for construction by the city.

If the City of Madison chooses to waive the detention requirement for one of the above reasons, the developer shall be required to participate in the construction of the regional detention facility through one of the following means:

i. Payment of a fee to the City to be held until such time as funds are made available from other sources to be combined with the developer-supplied funds to construct the regional project. The fee would be determined by dividing the total estimated construction cost of the regional detention project (including land acquisition) by the total number of acres in the drainage basin and within the city limits of the City of Madison and multiplying that by the total acres of the development less any permanent greenspace and before any dedications.

ii. The dedication of land toward the regional facility. The amount of land required would be determined by calculating the estimated fee above and dividing by the assessed value of the land on a per acre basis.

## VI. FEE-IN-LIEU OF ONSITE DETENTION

If the City of Madison determines that it is in the best interest of the people of the City to waive the requirement for onsite detention for a specific project, the City will assess a fee-in-lieu of detention. The City will use either a published rate of calculation for said fee or shall negotiate a fee with the developer. The ability of the City to waive this requirement does not imply any right on the part of the developer to avoid construction of on-site detention. Such a waiver is at the sole discretion of the City of Madison and must be clearly demonstrable to meet all of the technical criteria of this ordinance.

## VII. JOINT DETENTION AGREEMENTS BETWEEN DEVELOPERS

If is strongly encouraged by the City that developers work together to provide joint detention and water quality improvement projects during the development of projects within the same drainage basin. The City may, at their discretion, choose to provide incentives for developers that choose to work together in this fashion. Any such incentives must be discussed prior to any approvals being issued or any construction started. Any incentives which require variances from any other ordinance of the City of Madison must comply with the full variance process for that ordinance.

## VIII. MISCELLANEOUS

1. Penalties for Violation – In the event that a development is found to be in violation of this Ordinance, a notice-of-violation will be sent by certified mail to the developer. This letter will state the nature of the violation and will request that the developer meet with the City of Madison to determine a plan and schedule for corrective action.

   In the event that a plan and schedule of corrective action is not in place within 15 calendar days of the original notice, a stop work order will be issued by the City for all work associated with the development. The contractor will be notified of the stop work order on site and the developer will be notified via certified mail.

   In the event that a plan and schedule of corrective action is not in place and the implementation of the corrective action plan has not begun within 30 days, the developer will be found to be in violation of the terms and provisions of this Ordinance and shall be guilty of a misdemeanor and subject to a minimum fine of $500 and a maximum fine of $500 per day

until the corrective action plan is accepted, implementation is begun, and it is on schedule. In addition to the fines, the developer may be imprisoned for up to 90 days.

2. Validity – If any term or provision of this Ordinance shall be held to be unconstitutional or otherwise unenforceable, the remainder thereof shall not be affected thereby and shall remain in full force and effect.

3. Conflict – All ordinances heretofore adopted on the subject of this Ordinance which are in conflict herewith are hereby repealed and the applicable provisions of the Ordinance are substituted in their place.

4. Variances – The Mayor and Board of Aldermen shall have the power through a unanimous vote to authorize variances from the provisions or requirements of this Ordinance as will not be contrary to the public interest. No variance from the strict application of any provision shall be granted unless it is found that:

   xi. Literal interpretation of this Ordinance would in any way pose a threat to public health or safety;
   xii. Granting of the variance will be in the overall best interest of the citizens of the City of Madison and will not be injurious to the immediate neighborhood or otherwise detrimental to the public welfare.

VIII. REPEALING CLAUSE

All Ordinances or Resolutions of the Mayor and Board of Aldermen of the City of Madison that conflict with the provisions of this Ordinance shall be, and the same are hereby repealed, and rescinded, but only to the extent of such conflict.

IX. SEVERABILITY

If any provision of this Ordinance is determined by a court of competent jurisdiction to be invalid or otherwise unenforceable, such findings shall not effect the other provisions hereof which shall remain in full force and effect.

X. EFFECTIVE DATE

This Ordinance shall become effective as provided by law.

* * * * * * * * *

The above Ordinance was first reduced to writing and considered by the Sections at a Regular Meeting of the Mayor and Board of Aldermen on the 17 day of May, 2005 and on motion duly made for the adoption of said Ordinance by Aldermen Hickok and seconded was made by Aldermen Clingan-Smith. A vote was taken as follows:

| | |
|---|---|
| Alderman Tatum Voted: | YEA |
| Alderman Peeler Voted: | YEA |
| Alderman Prather Voted: | YEA |
| Alderman Hickok Voted: | YEA |
| Alderman Clingan-Smith Voted: | YEA |

Thereupon the Mayor declared the Ordinance duly adopted, this the 17 day of May, 2005, and declared same to be in full force and effect according to law.

Mary Hawkins Butler, Mayor

ATTEST:

Susan B. Crandall, City Clerk
Director of Finance and Administration