ORDINANCE 2009-3

City of
Plano

Stormwater Management Ordinance

January 2009

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DIVISION 1
AUTHORITY AND PURPOSE

100.0 AUTHORITY AND PURPOSE

This ordinance is enacted pursuant to the Illinois Municipal Code.

The purpose of this ordinance is to diminish threats to public health, safety and welfare caused by excess stormwater runoff from new development and redevelopment. This ordinance seeks to establish stormwater management practices and promote sustainable planning and design to counter increases in stormwater runoff quantity and rate and the impairment of water quality from development and land improvement.

101.0 OBJECTIVES

This ordinance is adopted to accomplish the following objectives:

1. To assure that new development does not increase the drainage or flood hazards to others, or create unstable conditions susceptible to erosion.

2. To protect new buildings and major improvements to buildings from flood damage due to increased stormwater runoff.

3. To protect human life and health from the hazards of increased flooding.

4. To lessen the burden on the taxpayer for flood control projects, repairs to flood-damaged public facilities and utilities, correction of channel erosion problems, and flood rescue and relief operations caused by increased stormwater runoff quantities from new development.

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

6. To preserve the natural hydrologic and hydraulic functions of watercourses and floodplains and to protect water quality and aquatic habitats.

7. To preserve the natural characteristics of the land in order to moderate flood and stormwater impacts, improve water quality, reduce soil erosion, protect aquatic and riparian habitat, provide recreational opportunities, provide aesthetic benefits and enhance community and economic development.

DIVISION 2
DEFINITIONS

200.0 DEFINITIONS

Adverse Impacts Any deleterious impact on existing drainage characteristics, water resources, or wetlands affecting their capacity, quality, and beneficial uses including recreation, aesthetics, aquatic habitat.

Applicant Any person, firm, or governmental agency who executes the necessary forms to procure official approval from City of Plano of a development or permit to carry out construction of a development.

Base Flood The flood having a one percent probability of being equaled or exceeded in a given year.

Base Flood Elevation The elevation at all locations delineating the level of flooding resulting from the base flood event.

Best Management Practice (BMP) A measure used to control the adverse stormwater-related effects of development. BMPs include structural devices (e.g., swales, filter strips, infiltration trenches, and detention basins) designed to remove pollutants, reduce runoff rates and volumes, recharge groundwater and protect aquatic habitats. BMPs also include non-structural approaches, such as public education efforts to prevent the dumping of household chemicals into storm drains.

Bulletin 71 The document Rainfall Frequency Atlas of the Midwest, by Floyd Huff and James Angel of the Midwest Climate Center, Illinois State Water Survey (1992).

Bypass Flows Stormwater runoff from upstream properties tributary to a property's drainage system but not under its control.

Channel Any river, stream, creek, brook, branch, natural or artificial depression, ponded area, flowage, slough, ditch, conduit, culvert, gully, ravine, wash, or natural or manmade drainage way, which has a definite bed and bank or shoreline, in or into which surface or groundwater flows, either perennially or intermittently.

Channel Modification Alteration of a channel by changing the physical dimensions or materials of its bed or banks. Channel modification includes damming, rip rapping (or other armoring), widening, deepening, straightening, relocating, lining, and significant removal of bottom or woody rooted vegetation. Channel modification does not include the clearing of debris or removal of trash.

Compensatory Storage An artificially excavated, hydraulically equivalent volume of storage created to balance the loss of existing flood storage capacity.

Conduit Any channel, pipe, sewer or culvert used for the conveyance or movement of water, whether open or closed.

Control Structure A structure designed to control the rate of flow that passes through the structure given a specific upstream and downstream water surface elevation.

Critical Duration The duration of a storm event that results in the greatest peak runoff.

Depressional Storage The volume contained below a closed contour on a one-foot contour interval topographic map. The upper elevation of depressional storage shall be determined by the high water elevation of a 100-year flood through the site in the pre-developed condition.

Detention Basin A facility constructed or modified to provide for the temporary storage of stormwater runoff and the controlled release by gravity of this runoff at a prescribed rate during and after a flood or storm.

Detention Time The mean residence time of stormwater in a detention basin.

Development Any man-made change to real property, including:

(a) Submittal to the City of a final plat of subdivision as of the effective date of this ordinance;
(b) Construction, reconstruction, or placement of a building or any addition to a building, with the exception of agricultural structures and accessories thereto;
(c) Installation of a manufactured home on a site, preparing a site for a manufactured home, or installing a travel trailer on a site for more than 180 days;
(d) Drilling, mining, installing utilities, construction of roads, bridges, or similar projects;
(e) Construction or erection of levees, walls, dams, or culverts;
(f) Channel modification, filling, dredging, grading, clearing, excavating, paving, or other non-agricultural alterations of the ground surface;
(g) Storage of materials or deposit of solid or liquid waste; and
(h) Any other activity that will alter the magnitude, frequency, deviation, direction, or velocity of stormwater or flood water flows from a property.

Drainage System All means, natural or man-made, used for conducting stormwater to, through or from a drainage area to the point of final outlet from a property. The stormwater drainage system includes but is not limited to any of the following: conduits and appurtenance features, canals, channels, ditches, streams, culverts, streets, storm sewers, detention basins, swales and pumping stations.

Dry Basin A detention basin designed to drain completely after temporary storage of stormwater flows and to normally be dry over the majority of its bottom area.

Dynamic Modeling Continuous simulation hydraulic modeling that considers gradually varied, unsteady flow hydraulics.

Erosion The general process whereby earth is removed by the action of water, wind, or other forces of nature.

Excess Stormwater Runoff The volume and rate of flow of stormwater discharged from a developed area which is or will be in excess of that volume and rate which pertained before development.

Flood Frequency Normally expressed as a period of years, based on a percent chance of occurrence in any given year from statistical analysis, during which a flood of a stated magnitude may be expected to be equaled or exceeded. For example, the 2-year flood frequency has a fifty percent chance of occurring in any given year, the 10-year flood frequency has a ten percent chance of occurring in any given year, and the 100-year flood frequency has a one percent chance of occurring in any given year.

Flood Fringe That portion of the floodplain outside of the regulatory floodway.

Flood Plain Land adjacent to a body of water with ground surface elevations at or below the base flood or the 100-year frequency flood elevation, including detached ponding areas, etc. The floodplain is also known as the *Special Flood Hazard Area (SFHA).*

Floodway The channel and that portion of the floodplain adjacent to a stream or watercourse which is needed to store and convey the anticipated existing and future 100-year frequency flood discharge with no more than a 0.1 foot increase in flood stage due to any loss of flood conveyance or storage and no more than a ten percent increase in velocities.

Freeboard An increment of height added to the base flood elevation, groundwater table, or 100-year design water surface elevation to provide a factor of safety for uncertainties in calculations, unknown local conditions, wave action, and unpredictable effects.

Hydrograph A graph showing, for a given location on a stream or conduit, the flow rates with respect to time.

Impervious Surface That area of property that is covered by materials resulting in a surface highly resistant to water infiltration, such as parking lots, driveways, sidewalks, patios, roofs, roof extensions, and other structures, also including semi-impervious surfaces such as compacted gravel.

Infiltration Passage or movement of water into the soil surfaces.

Major Drainage System That portion of a drainage system needed to store and convey flows beyond the capacity of the minor drainage system. Where manmade, it is designed to handle the 100-year frequency runoff event.

Minor Drainage System — That portion of a drainage system designed for the convenience of the public. It consists of street gutters, driveway culverts, storm sewers, small open channels, and swales and, where manmade, is designed to handle the 10-year frequency runoff event. It also consists of cross-road culverts which at a minimum shall be designed to handle the 30-year frequency event.

Mitigation — Measures necessary to minimize the negative effects which stormwater drainage and development activities might have on the public health, safety and welfare. Examples of mitigation include compensatory storage, soil erosion and sedimentation control, and channel restoration.

Natural — Conditions resulting from physical, chemical, and biological processes without intervention by man.

Overland Flow Path — A design feature of the major stormwater system which carries flows in excess of the minor stormwater system design capacity in an open channel or swale, or as sheet flow or weir flow over a feature designed to withstand the particular erosive forces involved.

Positive Drainage — Provision of overland paths for all areas of a property including depressional areas that may also be drained by storm sewer.

Peak Flow — The maximum rate of flow of water at a given point in a channel or conduit.

Previously Developed — For property to be considered as previously developed it must have been:

(a) Developed prior to 1975 and have no known flooding conditions caused by the lack of a stormwater management plan; or

(b) Developed after 1975, have on file with the City a building permit or site development permit covering the development, and have no known flooding conditions.

Property — A parcel or parcels of real estate.

Redevelopment — Any activity, alteration, or change in land use that is undertaken on previously developed land.

Regulatory Floodway — The channel, including on-stream lakes, and that portion of the flood plain adjacent to a stream or watercourse as designated by the Illinois Department of Natural Resources, Office of Water Resources (IDNROWR), which is needed to store and convey the existing and anticipated future 100-year frequency flood discharge with no more than a 0.1 foot increase in stage due to the loss of flood conveyance or storage, and no more than a 10% increase in velocities. To locate the regulatory floodway boundary on any site, the regulatory floodway boundary should be scaled off the regulatory floodway map and located on a site plan, using reference marks common to both maps. Where interpretation is needed to determine the exact location of the regulatory floodway boundary, the IDNR-OWR should be contacted for the interpretation.

Release Rate	The rate at which stormwater runoff flows from the property.
Retention Basin	A facility designed to completely retain a specified amount of stormwater runoff without release except by means of evaporation, infiltration, or emergency bypass.
Riparian Area	Land that borders a waterway and provides habitat for wildlife or vegetation dependant on the proximity of water.
Sedimentation	The process that deposits soils, debris, and other materials either on other ground surfaces or in bodies of water or stormwater drainage systems.
Special Flood Hazard Area (SFHA)	An area having special flood, mudslide or mudflow, or flood related erosion hazards, and which area is shown on an FHBM or FIRM as Zone A, AO, A1-30, AE, A99, AH, VO, V1-30, VE, V, M, or E.
Stormwater Management Plan	A plan, including engineering drawings and supporting calculations, which describes the existing stormwater drainage system, patterns, and environmental features, as well as the drainage system, patterns, and environmental features which are proposed after development of a property.
Stormwater Runoff	The waters derived from snow melt, rain fall, or other precipitation within a tributary drainage basin which are in excess of the infiltration capacity of the soils of that basin.
Storm Sewer	A closed conduit for conveying collected stormwater.
Time of Concentration	Elapsed time for stormwater to flow from the most hydraulically remote point in a drainage basin to a particular point of interest in that watershed.
Urban Runoff Pollutants	Contaminants commonly found in urban runoff which have been shown to adversely affect uses in receiving water bodies. Pollutants of concern include sediment, heavy metals, petroleum-based organic compounds, nutrients, oxygen demanding organics (BOD), pesticides, salt, and pathogens.
Watershed	All of the land surface area drained by or contributing runoff to the same stream, lake, stormwater facility, or given point.
Wet Basin	A detention basin designed to maintain a permanent pool of water after the temporary storage of stormwater runoff.

Wetland Areas inundated or saturated by surface water or ground water at a frequency or duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions.

Wetland Basin A detention basin designed with all or a portion of its bottom area as a wetland.

DIVISION 3
APPLICABILITY

300.0 APPLICABILITY

All development applications shall be accompanied by a Site Plan including required drawings, calculations, and supporting data as necessary to ensure that the provisions of this ordinance are met. Content of the Site Plan shall be determined by the criteria listed in Sections 301 and 302.

No site development permit, building permit, or final plat shall be issued or signed until the City has determined that the proposed development, development application, and Stormwater Management Plan meet all applicable requirements of this ordinance.

301.0 APPLICABILITY FOR STORMWATER RUNOFF DETENTION

All developments in the City of Plano meeting the following criteria shall provide stormwater runoff storage facilities in accordance with this ordinance.

1. The property being developed or redeveloped is a single-family detached residential development with five or more units and having an average lot size less than or equal to 3 acres; or

2. The property being developed or redeveloped is not a single-family detached residential development or is a non-residential land use, excluding agricultural uses, totals three acres or more in size, and results in 45,000 square feet or more of total development or 32,000 square feet or more of impervious area; or

3. The property being developed or redeveloped is not a single-family detached residential development or is a non-residential land use, excluding agricultural uses, totals less than three acres in size, and results in an impervious surface area of 25% or more of the development site.

302.0 PLAN SUBMITTAL REQUIREMENTS

1. All development not subject to the criteria of Section 301.0 shall submit a Step 1 Site Plan.

2. Developments subject to the criteria of Section 301.0 and being 20 acres or less in size shall submit a Step 2 Stormwater Management Plan.

3. Developments subject to the criteria of Section 301.0 and being more than 20 acres in size shall submit a Step 3 Stormwater Management Plan.

4. Development proposed in a flood plain, flood fringe, flood way, or SFHA or development on a property having any portion located within a wetland shall submit a Step 3 Stormwater Management Plan.

Submittals shall include sufficient information to evaluate the environmental characteristics of the property, the potential adverse impacts of the development on water resources both on-site and downstream, and the effectiveness of the proposed Stormwater Management Plan in managing stormwater runoff.

Drawings or exhibits shall be dimensioned or shall be at a maximum scale of 1 inch = 100 feet. Exhibits may be on more that one drawing for clarity.

The applicant shall certify on the drawings that all clearing, grading, drainage, and construction shall be accomplished in strict conformance with City of Plano Ordinances and the approved Stormwater Management Plan.

302.1 Pre-Submittal Meeting

It is recommended that the petitioner schedule a pre-submittal meeting with the City of Plano to review the proposed project, discuss submittal requirements, and discuss questions the petitioner may have.

Appendix A includes a permit submittal checklist for use with this Division. This ordinance shall take precedence over the checklist.

302.2 Step 1 Site Plan

The Step 1 Stormwater Management Plan shall provide the following:

1. A written description of the proposed development and the stormwater management practices being employed.

2. A location map or description providing township, range, and nearest roadways to accurately locate the development site.

3. Acreage and zoning of property area.

4. Property area lines and dimensions including rights-of-way, easements, and setback lines.

5. Existing and proposed site conditions including all buildings, roads, impervious surfaces, and ground elevations where site grading is proposed.

6. Proposed limits and restoration of disturbed areas.

7. Existing and proposed drainage features such as culverts, conduits, swales, streams, ponds, wetlands, etc.

8. Location of subsurface drains and tiles within the development area only.

9. Location of wells, septic systems, water mains, and sanitary sewers.

10. Copies of other permit applications and final permits as required by other jurisdictions and agencies.

302.3 Step 2 Stormwater Management Plan

The Step 2 Stormwater Management Plan shall provide all items from the Step 1 Site Plan in addition to the following:

1. Property topography at one foot contours for the entire property extending to a minimum of one hundred feet beyond the property lines or as necessary to determine off-site impacts of the proposed Stormwater Management Plan.

2. Site contours shall be keyed to a USGS datum and state plane coordinate system.

3. Elevation of all building foundations and indications whether buildings have basements, lookouts, walkouts, or crawl spaces.

4. The property area's location within the major watershed.

5. Sub-watershed boundaries within and across the property area.

6. Soils inventory for the property area.

7. A tile survey within the proposed development area.

8. Delineation of upstream and downstream drainage features and watersheds which affect or are affected by the development including depressional areas and stormwater storage areas.

9. Delineation of proposed stormwater storage facilities, including ponds.

10. Design calculations and plans detailing existing and proposed stormwater runoff, storage, and drainage features.

11. Major and minor drainage system design plans and calculations including delineation of sub drainage areas for all conveyance features.

12. The top of banks and centerline elevations of streams and channels at maximum 100-foot intervals.

13. Cross section data and conveyance calculations for open channel and overland flow paths.

14. Delineation of flood plain, flood way, and base flood elevation and inventory of riparian areas within 100 feet of the property area.

15. Mapping and elevations of historical flooding records as available.

16. Delineation and description of designated conservation areas within 100 feet of the property area.

17. Delineation and inventory of wetlands within 100 feet of the property area.

302.4 Step 3 Stormwater Management Plan

The Step 3 Stormwater Management Plan shall provide all items from the Step 1 Site Plan and Step 2 Stormwater Management Plan in addition to the following:

1. Existing base flood elevation and profile for stream reach affected or modified by the proposed development.

2. Detailed environmental mitigation plans for disturbance of wetlands, riparian, or conservation areas.

3. Flow rates and velocities at representative points in the drainage system.

4. A statement by the design engineer concerning the location and capacity of the complete drainage system's provisions for conveying the 100-year storm event runoff.

5. Phasing of project including expected start and completion dates, duration of exposure of disturbed areas, and expected dates for restoration.

303.0 DETERMINATION OF PROPERTY AREA

The following criteria shall be considered when determining the total area of property being developed or redeveloped and for "grandfathering" of previously developed property.

1. The City shall review the proposed total area of the property being developed or redeveloped in order to preclude inappropriate phasing of developments to circumvent the intent of this ordinance.

2. If a portion of the property area was previously developed, then the previously developed property area may be excluded from the total property area.

3. If a previously developed portion of a site is proposed to be redeveloped, it must be included in the total property area.

DIVISION 4
STORMWATER MANAGEMENT PLAN

400.0 STORMWATER MANAGEMENT PLAN

The following division establishes the design features and the design criteria, standards, and methods to be used in developing a Stormwater Management Plan.

401.0 MINIMIZATION OF INCREASES IN RUNOFF VOLUMES AND RATES

In the selection of a stormwater management plan for a particular development, the applicant shall evaluate and implement site design features that most closely meet the goal of no change in runoff rate or volume from pre-development conditions.

The applicant's Stormwater Management Plan submittal shall include evaluations of site design features that are consistent with the following hierarchy:

1. Minimize impervious surfaces on the property and establish best management practices consistent with the needs of the project.

2. Preserve, establish, and/or restore native plantings and natural areas to increase and promote infiltration and evaporation.

3. Preserve the natural infiltration characteristics of the site and incorporate designed infiltration devices (e.g., trenches and basins).

4. Preserve natural resource features of the development site, including but not limited to flood plain, wetlands, prairies, and woodlands.

5. Attenuate flows and promote infiltration by use of open vegetated swales and natural depressions.

6. Preserve, enhance, and incorporate existing natural stream channels and quality wetlands, stream channels and drainageways.

7. The restoration of wetlands in locations where natural features (e.g., depressional areas, hydric soils, prior converted wetlands) will support such restoration.

8. Infiltrate runoff on-site.

9. Provide stormwater retention facilities.

10. Provide stormwater detention facilities to slow the rate of runoff and reduce runoff pollutants leaving the site.

11. Construct storm sewers.

402.0 WATER QUALITY AND MULTIPLE USES

In the selection of a stormwater management plan for a particular development, the following water quality and multiple use aspects shall be employed:

1. The stormwater management system shall be designed to minimize adverse water quality impacts downstream and on the property itself.

2. Stormwater conveyance and storage areas shall utilize native plantings to increase infiltration and evaporation.

3. Retention and infiltration of stormwater shall be promoted throughout the property's drainage system to reduce the volume of stormwater runoff and to reduce the quantity of runoff pollutants.

4. Stormwater storage areas shall incorporate design features to capture stormwater runoff pollutants.

5. All flows from the development shall be routed through the stormwater storage areas and receive the stormwater quality benefits of the facility (i.e., low flows shall not be bypassed).

6. Stormwater storage design shall give preference to wet bottom and wetland designs.

7. The drainage system shall incorporate multiple uses where practicable. Uses considered compatible with stormwater management include open space, aesthetics, aquatic habitat, recreation (boating, trails, playing fields), wetlands and water quality mitigation.

8. The applicant should avoid using portions of the property exclusively for stormwater management.

403.0 RELEASE RATES

Drainage systems for properties required to provide stormwater runoff storage facilities shall be designed to control the rate of discharge from the property for the two-year and 100-year critical duration events. The peak rate of discharge shall not cause an increase in flooding or channel instability downstream when considered in aggregate with other developed properties and downstream drainage capacities.

Release rates from a property shall be as follows:

1. The peak discharge from events less than or equal to the two-year event shall not be greater than 0.04 cfs per acre of property drained.

2. The peak 100-year discharge shall not be greater than 0.15 cfs per acre of property drained.

3. Requests for variance from the above release rates must be presented to and approved by the City of Plano Council. A request for variance shall be accompanied by a hydrologic and hydraulic analysis of the property utilizing the methodologies of Section 408.0. The analysis must demonstrate that the proposed development will not change the runoff rate or volume of flow from the predevelopment conditions under all frequency of rainfall events.

4. Stormwater management shall be designed to maximize infiltration on the site so as to minimize the volume of stormwater runoff from the site. The total volume of water released from the site, exclusive of pass-through flows, shall be calculated by an approved hydrograph method listed in Section 408.0 below. The total volume of water leaving the site, calculated as the area under the hydrograph, shall be calculated for the 2-year, 24-hour storm event in both the undeveloped and developed conditions. The volume of runoff is not limited to the 24-hour duration of the storm, but it shall include the entire duration of runoff from the site. The total volume of water leaving the site for a 2-year storm event following development shall be equal to or less than the total volume of water leaving the site in the undeveloped condition. This may be accomplished through application of a permanent pool volume, in a basin without, or partially without an impermeable liner, in combination with the infiltration requirements of Section 416.0.

5. In the event the downstream drainage facilities are inadequate to receive the release rate herein above provided, then the allowable release rate shall be reduced to that rate permitted by the receiving downstream sewers, streams, and channels; additional detention shall be required to store that portion of the runoff exceeding the capacity of the downstream facilities.

404.0 DETENTION BASIN OUTLET DESIGN

The capacity of the downstream drainage system shall be evaluated to ensure the detention basin outlet design will not exceed this capacity. Stormwater storage outlets shall not discharge directly into existing storm sewers or drain tiles.

Backwater on the outlet structure from the downstream drainage system shall be evaluated and considered in the design of the outlet.

The outlet design shall not require manual intervention or mechanical means to control flow, except for wet basins for maintenance drawdown. Outlets shall be designed to allow for easy maintenance even during high runoff events. Where the outlet used to control discharge is less than 4 inches in diameter, alternative outlet designs shall be utilized, which avoid clogging of the outlet.

405.0 MAXIMUM BOUNCE

The maximum depth of water from design high water level (open restrictor) to normal water level, or outlet invert shall be four feet (4').

406.0 DETENTION STORAGE REQUIREMENTS

Storage facilities shall be designed and constructed with the following characteristics:

1. The site runoff storage facility shall provide 1 (one) foot of freeboard above the design high water elevation.

2. The storage facilities shall be accessible and easily maintained. The top width of berm shall be a minimum of 5' but shall be increased to a minimum of 10' within the access route to the outlet control structure.

3. Storage facilities shall facilitate sedimentation and catchment of floating material. Unless specifically approved by the City, concrete lined low-flow ditches shall not be used in detention basins.

4. Storage facilities shall be designed such that the existing conditions pre-development peak runoff rate from the 100-year, critical duration rainfall will not be exceeded assuming the primary restrictor is blocked.

5. The design storage to be provided in a detention basin shall be based on the peak runoff from the 100-year storm event determined through a critical duration analysis. Detention storage shall be computed using hydrograph methods as described in this section.

6. The function of existing on-site depressional storage shall be preserved or compensated for at a ratio of 1 to 1 independently of storage required for the development.

406.1 Inlet and Outlet Orientation

To the extent feasible, the distance between detention inlets and outlets shall be maximized. If possible, they should be at opposite ends of the basin. There shall be no low flow bypass between the inlet and outlet and paved low flow channels shall not be used unless specifically approved by the City.

Maximizing the distance between inlets and outlets will prevent the short-circuiting of flows through a basin. Short-circuiting is counter productive to the removal of stormwater pollutants. Short-circuiting can be avoided by designing elongated basins (ideal length: width ratio of at least 3:1), or by the use of baffles or berms in the basin bottom. Because low flows and the "first flush" of storm runoff often contain the most concentrated pollutants, it is critical that all flows be routed through a sedimentation basin to provide opportunities for effective pollutant removal. (See NIPC Model Stormwater Drainage & Detention Ordinance Pages 11 – 24.)

406.2 Minimum Detention Outlet Size

Where a single pipe outlet or orifice plate is to be used to control discharge, it shall have a minimum diameter of two and one half inches (2 ½"). If this minimum orifice size permits release rates greater than those specified in this section, and regional detention is not a practical alternative, alternative outlet design shall be utilized that incorporates self-cleaning flow restrictors.

406.3 Detention Area Retaining Walls

The use of retaining walls as part of any detention system shall be discouraged. However, as a design entrance feature or within commercial areas they may be considered by the City Council subject to the following criteria which must be clearly documented in any request for a detention area retaining wall:

1. Public Safety Provisions
2. Architectural Features
3. Habitat Features
4. Maintenance plan/funding provisions

5. Maximum height of four feet (4') above HWL
6. Any wall shall be designed and sealed by an Illinois Structural Engineer

406.4 Setback from public right of ways

Detention facilities shall not be located within a distance of ten feet (10') plus one and one-half (1.5) times the depth of the detention facility from any public right-of-way and any earthen berm shall not be constructed such that the toe of such berm will be nearer than ten feet (10') to any public right-of-way in accordance with Public Act 86-616.

407.0 DRAINAGE SYSTEM EVALUATION AND DESIGN

The following criteria shall be used in evaluating and designing the drainage system. The underlying objective is to provide capacity to pass the 10-year peak flow in the minor drainage system and an overland flow path for flows in excess of the design capacity to at least the 100-year storm event runoff.

407.1 Detention System Design Selection

Selection of the detention system design shall be based on the following hierarchy:

1. Bio-Infiltration
2. Wetland Detention Basin
3. Wet-Bottom Retention
4. Dry Detention
5. Underground Detention (commercial only)
6. Parking Lot Detention (commercial only)

The applicant shall first thoroughly investigate the first two preferred detention system designs (bio-infiltration followed by wetland detention). If these designs are found to be impractical, the applicant may then investigate the next detention system alternate. Underground and parking lot detention systems will only be considered for commercial uses. All systems shall include an infiltration component in accordance with Section 416.0.

407.2 Design Methodologies

1. For properties up to 10 acres, major and minor drainage systems may be designed using the rational formula.

2. For properties of 10 acres or more, minor drainage systems may be designed using the rational formula.

3. For properties of 10 acres or more, major drainage systems must be designed using runoff hydrograph methods as described in Section 408.0.

4. All detention basins must be designed using runoff hydrograph methods as described in Section 408.0.

407.3 Drainage System Design and Evaluation

Storm sewers shall be designed to convey the 10-year storm in a full pipe (non-surcharged) condition at a minimum. Inlets shall have capacity to allow the inflow of the 10-year storm with no more than three (3) inches of ponding with 50% of the opening blocked. Storm sewer in public right-of-way shall be reinforced concrete pipe confirming to ASTM C76 with gasketed joints confirming to ASTM C443 with sufficient cover per IDOT specifications. Swales shall be designed to carry the 10-year storm without encroachment onto the shoulder of the road.

407.4 Positive Drainage

1. All areas of the property must be provided an overland flow path that will pass the 100-year flow from onsite and offsite tributary area at a stage at least 2 feet below the lowest structure opening of structures hydraulically connected to the flow path.

2. Overland flow routes up to the 100-year flow level shall be placed in exclusive drainage easements.

3. Street ponding and flow depths shall not exceed curb height by more than one inch (1") in the 100-year, plugged inlet condition.

4. Rear yard ponding must not exceed six inches (6") in the 100-year, plugged inlet condition.

5. An exhibit showing the extent of ponding in a 100-year, plugged inlet event shall be provided as part of the stormwater design calculations.

6. When the 100-year flow path is to be contained within a closed conduit system, inlets to that system shall be designed for 50% of the inlet flow area blocked.

407.5 Runoff Characteristics

1. In development areas, determination of ground surface runoff characteristics shall utilize soil types and hydrologic soil classifications one category lower (degraded) than those determined by the soils investigations.

2. Stormwater runoff from a property must exit the property at the point where it exited prior to development.

3. Diversion or transfer of water between watersheds shall be prohibited.

408.0 METHODS FOR GENERATING RUNOFF HYDROGRAPHS

Methods used for generating runoff hydrographs shall be either an appropriate Corps of Engineers HEC model, Soil Conservation Service TR-20, or TR-55 tabular method. The City of Plano must approve alternative methods.

Runoff hydrographs shall be developed incorporating the following assumptions of rainfall amounts and antecedent moisture.

408.1 Rainfall

1. Unless a continuous simulation approach to drainage system hydrology is used, all design rainfall events shall be based on the Illinois State Water Survey's Bulletin 71 data and isohyetal or sectional data.

2. The first quartile point rainfall distribution shall be used for the design and analysis of drainage systems with critical durations less than or equal to 12 hours.

3. The third quartile point rainfall distribution shall be used for the design and analysis of detention basins and drainage systems with critical durations greater than 12 and less than or equal to 24 hours.

4. The fourth quartile distribution shall be used in the design and analysis of systems with durations greater than 24 hours.

5. The first, third, and fourth quartile distributions shall be as described by Huff Bulletin71.

6. The SCS Type II distribution may be used as an alternate to the Huff distributions for use in TR-55 models.

408.2 Antecedent Moisture

Computations of runoff hydrographs that do not rely on a continuous accounting of antecedent moisture conditions shall assume an antecedent moisture condition of two.

409.0 WET DETENTION BASIN DESIGN

Wet detention basins shall be designed to remove stormwater pollutants, to be safe, to be aesthetically pleasing, and as much as feasible to be available for recreational use. Refer to Section 417.0 for additional requirements. A pre-sedimentation basin, inlet / outlet orientation to avoid short-circuiting, and a planting / safety ledge with shallow wetland vegetation to limit shoreline erosion are required elements.

409.1 Wet Basin Depths

1. Wet basins shall be at least three feet deep, excluding near-shore banks and safety ledges.

2. If fish habitat is to be provided wet basins shall be at least ten feet deep over twenty-five percent of the bottom area to prevent winter freeze-out.

409.2 Wet Basin Shoreline Slopes

1. Wet basins shall be provided with stabilized shorelines.

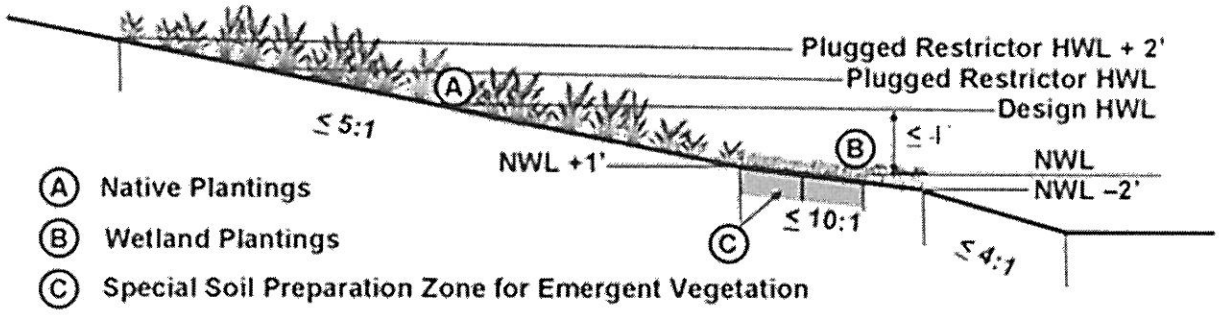
2. Upper slopes of detention basins (higher than one foot above normal stage) should be no steeper than 5:1. Slopes flatter than 5:1 are preferred.

3. From one foot above a normal stage to two feet (2') below normal stage the slopes shall be no steeper than 10:1. Below 2' below NWL the slopes shall be no steeper than 4:1.

4. Appropriate soil conditions shall be provided in the shoreline zone from one foot above the normal pool stage to at least one foot below the normal pool stage.

5. First, compaction of both subsoil and topsoil shall be minimized (i.e., to less than 275 psi). Where subsoil compaction cannot be avoided, it should be disked to a depth of 6-8 inches with a chisel plow before spreading topsoil.

6. Second, suitable, uncompacted topsoil at a minimum thickness of one foot, shall be spread to provide a suitable growth medium for aquatic plants. Coarse soils with minimal clay content and a high organic content are recommended.



Typical Detention Pond

409.3 Shoreline Vegetation

A planting and maintenance schedule shall be provided to the City for review and approval. Methods for stabilization such as deep-rooted vegetation, natural stone, or manufactured products shall be used as approved by the City. Water tolerant native vegetation shall be used to landscape the shorelines of wet detention facilities. The selected plants and planting methods shall conform to the soils, hydrology, and water quality condition present in such facilities, with plants being tolerant of highly variable hydrologic conditions and degraded water quality (e.g., high turbidity and salinity content). A critical consideration in site preparation is the provision of an adequate growing medium for new plants. Construction of stormwater facilities typically requires excessive grading, causing resultant soils to become highly disturbed and unsuitable for planting. The planning and sequencing of construction activity shall minimize the negative impacts on soils and provide means for restoring soils following construction.

409.4 Pool Volume and Elevation

1. The permanent pool volume in a wet basin at normal depth shall be equal to the runoff volume from its watershed for the two-year critical duration storm event.

2. The peak 100-year pool elevation shall be at least two feet below the lowest structure opening of all structures hydraulically connected to the detention basin.

410.0 WETLAND AND DRY DETENTION BASIN DESIGN

In addition to the other requirements of this ordinance, wetland and dry basins shall be designed to remove stormwater pollutants, to be safe, to be aesthetically pleasing and, as much as feasible, to be available for multiple uses.

410.1 Dry Basin Drainage

1. Dry basins shall be designed so that the portion of their bottom area that is intended to be dry shall have standing water no longer than seventy-two hours for any runoff event less than or equal to the 100-year event. Underdrains may be used to meet this requirement. Low flow channels are prohibited. Paved low flow channels shall not be used unless specifically approved by the City.

2. Dry bottom ponds shall have a minimum slope of 2% and maximum sideslope of 4:1. However, infiltration trenches, wetland channels with soil stabilization fabric, or other permanent erosion and silt control measures are required.

3. Direct connections of detention basin inlets to basin outlets are prohibited.

4. The dry portion of the basin may be planted with either native, deep-rooted vegetation to promote infiltration or with turf grasses.

5. The peak 100-year detention elevation shall not be greater than 4 feet above the bottom of the outlet. If turf grasses are proposed, the basin depth from outlet to high water level shall not exceed 2 feet.

6. A planting and maintenance schedule shall be provided to the City for review and approval.

7. The peak 100-year detention elevation shall be at least two feet below the lowest structure opening for all structures hydraulically connected to the detention pond.

410.2 Velocity Dissipation

1. Velocity dissipation measures shall be incorporated into dry basin designs to minimize erosion at inlets and outlets and to minimize the re-suspension of pollutants and sediments.

2. A stilling basin shall be provided at each major inlet.

410.3 Wetland Basin Grading

1. The side slopes of wetland basins (from one foot above the normal pool stage to at least one foot below the normal pool stage) and the basin bottom shall not be steeper than 10 to 1 (horizontal to vertical). Steeper slopes are permitted in settling basins and open water zones near the basin outlet.

2. Appropriate soil conditions shall be provided in the shoreline zone and basin bottom. As indicated in the guidance for wet basins, soil preparation is critical in shoreline and shallow water zones.

3. First, compaction of both subsoil and topsoil shall be minimized (i.e., to less than 275 psi). Where subsoil compaction cannot be avoided, it should be disked to a depth of 6-8 inches with a chisel plow before spreading topsoil.

4. Second, suitable uncompacted topsoil at a minimum thickness of one foot (1') shall be spread to provide a suitable growth medium for aquatic plants. Coarse soils with minimal clay content and a high organic content are recommended.

5. Upper slopes of detention basins (higher than one foot (1') above normal stage) should be no steeper than 5:1. Slopes flatter than 5:1 are preferred.

410.4 Wetland Vegetation

Water tolerant native vegetation shall be used to landscape the shorelines and bottoms (non-open water areas) of wetland detention facilities. The selected plants and planting methods shall conform to the soils, hydrology, and water quality conditions present in such facilities, with plants being tolerant of highly variable hydrologic conditions and degraded water quality (e.g., high turbidity and salinity content). Plant selection should conform to the guidance in the *Native Plant Guide for Streams and Stormwater Facilities in Northeastern Illinois* (NRCS et al, 1998), which is hereby adopted by reference.

Native vegetation is required for side slopes (higher than one foot above normal stage) of all wet and wetland detention facilities to a point two vertical feet (2') above the high water level during the plugged restrictor condition.

410.5 Stilling/Sedimentation Basins

Wetland detention basins shall be constructed with sediment basins or forebays at all major inlets to the basins. The volume of the basins should be at least 500 cubic feet per acre of impervious surface in the drainage area. Side slopes below one foot (1') of depth should be no steeper than 5 to 1 (horizontal to vertical) and basin depth should be at least three feet (3') and designed to allow access for sediment removal equipment.

411.0 DETENTION IN FLOODPLAINS

The placement of detention basins within the floodplain is strongly discouraged because of questions about their reliable operation during flood events. However, the stormwater detention requirements of this ordinance may be fulfilled by providing detention storage within flood fringe areas on the project site provided the following provisions are met.

411.1 Detention in Flood Fringe Areas

1. The placement of a detention basin in a flood fringe area shall require compensatory storage for 1.5 times the volume below the base flood elevation occupied by the detention basin including any berms. Along watercourses with known flooding problems, the City may, at its discretion, require compensatory storage in excess of 1.5 times the volume occupied.

2. The release from the detention storage provided shall still be controlled consistent with the requirements of this ordinance.

3. The applicant shall demonstrate its operation for all stream flow and floodplain backwater conditions.

4. Excavations for compensatory storage along watercourses shall be opposite or adjacent to the area occupied by detention.

5. All floodplain storage lost below the ten-year flood elevation shall be replaced below the ten-year flood elevation. All floodplain storage lost above the existing ten-year flood elevation shall be replaced above the proposed ten-year flood elevation.

6. All compensatory storage excavations shall be constructed to drain freely and openly to the water course.

411.2 Detention in Floodways

Detention in floodways is prohibited.

411.3 On-Stream Detention:

On-Stream detention basins are prohibited.

412.0 PROTECTION OF WETLANDS AND DEPRESSIONAL STORAGE AREAS

Wetlands and other depressional storage areas shall be protected from damaging modifications and adverse changes in runoff quality and quantity associated with land developments. The function of existing on-site depressional storage shall be preserved for both on-site and off-site tributary flows in addition to required detention. In addition to the other requirements of this ordinance, the following requirements shall be met for all developments whose drainage flows into wetlands and depressional storage areas:

412.1 Detention in Wetlands and Depressional Storage Areas

1. When depressional storage is removed it must be compensated for in the site runoff storage facility at no less than a 1 to 1 ratio. This requirement is in addition to the site runoff storage required in this Ordinance.

2. The City may allow the function of depressional storage to be preserved if the applicant performs detailed pre- and post-project hydrologic and hydraulic modeling to identify the effect of the depressional storage on discharges over a range of rainfall frequencies.

3. Existing wetlands shall not be modified for the purposes of stormwater detention unless it is demonstrated that the existing wetland is low in quality and the proposed modifications will maintain or improve its habitat and ability to perform beneficial functions.

a. Low quality wetlands are those that have been substantially disturbed. This disturbance is usually reflected in a low diversity of habitat and the presence of only insensitive and/or invasive plant species (e.g., a monoculture of cattails). Certain modifications of low quality wetlands, such as the limited excavation of open water areas, may actually enhance their value. It is important, however, that the storage functions of wetlands and depressional storage areas be preserved, in addition to meeting the detention requirements of this Ordinance.

4. Existing storage and release rate characteristics of wetlands and other depressional storage areas shall be maintained and the volume of detention storage provided to meet the requirements of this section shall be in addition to this existing storage.

412.2 Sediment Control

The existing wetland shall be protected during construction by appropriate soil erosion and sediment control measures and shall not be filled.

412.3 Alteration of Drainage Patterns

Site drainage patterns shall not be altered to substantially decrease or increase the existing area tributary to the wetland.

412.4 Detention/Sedimentation

All runoff from the development shall be routed through a preliminary detention/sedimentation basin designed to capture the two-year, 24-hour event and hold it for at least twenty-four (24) hours before being discharged to the wetland. This basin shall be constructed before property grading begins. In addition, the following drainage hierarchy should be implemented to minimize runoff volumes and rates being discharged to the wetland.

412.5 Vegetated Buffer Strip

A vegetated buffer strip of at least twenty-five feet (25') in width, containing native plant species, shall be maintained or restored around the periphery of existing or constructed wetlands which are not defined as wetland detention areas.

413.0 SUBSURFACE DRAINAGE (DRAIN TILES)

The applicant shall submit a subsurface drainage inventory. The inventory shall locate existing farm and storm drainage tiles by means of slit trenching and other appropriate methods performed by a qualified subsurface drainage consultant. All existing drain tile lines damaged during the investigation shall be repaired and functional.

413.1 Drain Tile Investigation

The applicant shall provide a topographical boundary map locating these lines showing:

1. Location of each slit trench and identified to correspond with the tile investigation report and field staked at no less than 50 foot intervals;

2. Location of each drain tile with a flow direction arrow, tile size and any connection to adjoining properties; a summary of the tile investigation report showing trench identification number, tile size, material and quality, percentage of the tile filled with water, percentage of restrictions caused by sitting, depth of ground cover, and soil texture at grade; and

3. Name, address and phone number of person or firm conducting tile location investigation.

413.2 Subsurface Drainage Design

Information collected during the drainage investigation shall be used to design and develop a stormwater management system that will provide drainage that is appropriate for the development and connecting tile lines on adjoining properties.

Stormwater systems shall properly incorporate and be compatible with existing subsurface and surface drainage systems including agricultural systems. Designs shall not cause damage to the existing drainage system(s) or the existing adjacent or tributary land including those with agricultural uses. The following principles and requirements shall be observed in the design:

1. Off-Site Outfall: Existing downstream agricultural subsurface systems shall not be utilized for the outfall of any stormwater system. Existing downstream surface drainage systems shall be evaluated with regard to their capacity and capability to properly convey low flow groundwater and site runoff storage facility release without damage to downstream structures and land use on the adjacent property. If the existing outfall drainage systems prove to be inadequate it will be necessary to modify the existing systems or construct new systems which will not conflict with the existing systems and will not impact the existing agricultural land use.

2. On-Site: Agricultural drainage systems shall be located and evaluated on-site. All existing on-site agricultural drain tile not serving a beneficial use shall be abandoned by trench removal prior to other development and recorded on record plans. If any existing drain tiles continue to upland watersheds the developer must maintain drainage service during construction until new sewers can be installed for a permanent connection.

3. Off-Site Tributary: Existing drainage systems shall be evaluated with regard to existing capabilities and reasonable future expansion capacities. All existing tributary drain tiles shall be incorporated into the new conduits including observation structures located at the property limits, shall provide a free flow discharge and shall not allow surface runoff to enter the system.

4. New roadway construction shall preserve existing sub-surface systems within the right-of-way. Inspection wells shall be placed at the right-of-way (ROW) and tiles found to not be flowing between inspection wells at the end of the construction shall be replaced.

5. Existing subsurface drains shall be excavated and removed to a point not less than ten feet (10') from any proposed structure within the development prior to the excavation of any foundation, or as a component of mass site grading, whichever is earlier and applicable to the proposed development.

414.0 EXTENDED DETENTION BASINS

The requirements of this section will apply only when an existing agricultural land use is downstream of and adjacent to a site runoff storage facility outlet.

414.1 Extended Detention Requirements

1. The runoff from not less than a 0.75-inch rainfall event over the hydraulically connected impervious area of the new development shall be stored below the elevation of the primary gravity outlet (extended detention) of the site runoff storage facility.

2. The facility may be designed to allow for evapotransporation or infiltration of this volume and shall not be conveyed through a direct positive connection to downstream areas.

3. The hydraulically connected impervious area used in the calculation of required extended detention volume may be reduced by the City if the soils are prepared to maximize infiltration and deep rooted grasses or other plants selected for their ability to promote infiltration or water absorption are planted in areas appropriately dedicated.

4. The reduction in hydraulically connected impervious area used in the calculation shall be equal to the area of the development meeting the above soils/native planting requirement.

414.2 Subsurface Drainage for Extended Detention Basins

Subsurface drainage systems may be designed as a component of the extended detention portion of the detention basin to assist in infiltration in accordance with the following criteria:

1. The extended detention volume shall be discharged at a rate no greater than that required to empty the calculated extended detention volume within 5 days of the storm event.

2. No subsurface drainage pipe shall be located within ten feet (10') of drainage pipes directly connected to the detention basin.

3. For purposes of meeting the maximum subsurface drainage discharge requirements, flow control orifices and weirs may be used.

4. All design extended detention volume shall be provided above the seasonal high ground water table or the invert elevation of the groundwater control system.

5. Farm field tile shall not be considered a subsurface drainage system.

6. Design infiltration from extended detention facilities will be counted toward meeting the infiltration requirements for the site.

415.0 STREET, PARKING LOT, CULVERT, AND PROPERTY DRAINAGE

This section sets requirements where streets, parking lots, and culverts are proposed to be used for stormwater detention or conveyance.

415.1 Streets

1. If streets are to be used as part of the minor drainage system, a maximum 3 feet of spread onto the traveled roadway may be allowed and inlet spacing must be sufficient to collect the entire street runoff based on a 10-year storm event.

2. Street ponding and flow depths shall not exceed curb height by more than one inch (1") in the 100-year, plugged inlet condition.

3. If streets are to be used as part of the major drainage system, (100 year overland flow route), ponding depths shall not exceed curb height by more than one inch (1") in the 100-year condition and shall not remain flooded for more than eight (8) hours for any event less than or equal to the 100-year event.

4. An exhibit showing the extent of ponding in a 100-year, plugged inlet event shall be provided as part of the stormwater design calculations.

415.2 Parking Lots

1. The use of parking lots to provide stormwater detention will be limited by the storage volume and detention time requirements of this Ordinance.

2. As parking lot detention provides little or no water quality benefits, it is, therefore, discouraged as a primary source of detention. However, parking lot storage may be useful in providing supplementary storage for a traditional detention basin.

3. The parking lot may be located at a higher elevation than the detention basin bottom and would only store water for more extreme events (e.g., greater than a 10 year recurrence interval).

4. Where allowed, parking lot detention shall be accompanied by measures to promote water quality.

5. Release from parking lot detention systems shall be directed through sedimentation basins, vegetated swales, or buffer strips.

6. An exhibit showing the extent of ponding in a 100-year, plugged inlet event shall be provided as part of the stormwater design calculations.

7. The maximum storm water ponding depth in any parking area shall not exceed six inches (6") in a plugged inlet condition.

8. The maximum duration of ponding in any parking area shall not exceed eight hours

415.3 Underground Detention

Use of underground detention shall be reviewed and approved on a case by case basis. Underground detention systems shall provide for easy access and low maintenance. Design of underground facilities shall include measures to collect sediment and floatable debris, designed with regards to access and maintenance. 50% of the volume of stone void space shall be allowed as detention volume provided that approved infiltration calculations reveal that the 2 year-24 hour storm will be fully infiltrated with 24 hours. All designs of underground facilities shall be signed and sealed by an Illinois licensed Structural Engineer.

415.4 Culvert Road and Driveway Crossings

1. All culverts, including driveway culverts, shall be sized to convey the minor drainage system using Federal Highway Administration culvert nomographs or more sophisticated backwater models.

2. Sizing of culvert crossings shall consider entrance and exit losses as well as tailwater conditions on the culvert.

415.5 Property Drainage

Drainage from a property within a development for which a stormwater management plan exists shall not cross property lines, except under the following conditions and restrictions:

1. The drainage is contained within a drainage easement.

2. The drainage is consistent with the approved overall grading plan of the development.

3. Any downspout or sump pump discharge line must outlet:

    a. At least two feet from the foundation of the structure being drained,

    b. At least two feet from any adjacent property line,

    c. Perpendicular to any adjacent property line and/or along the flow line of the drainage easement.

416.0 INFILTRATION PRACTICES

1. To effectively reduce runoff volumes, infiltration practices should be located on soils in hydrologic soil groups "A" or "B" as designated by the U.S. Soil Conservation Service.

2. Sites should be designed to maximize the use of vegetated filter strips and swales.

3. Wherever practicable, runoff from impervious surfaces should be directed onto filter strips and swales before being routed to a storm sewer or detention basin.

4. Infiltration basins and trenches designed to recharge groundwater shall not be located within seventy-five feet of a water supply well or a building foundation. For well drained sand and gravel soils this separation shall be extended to 100 feet.

5. A sediment settling basin shall be provided to remove coarse sediment from stormwater flows before they reach infiltration basins or trenches.

6. Stormwater shall not be allowed to stand more than seventy-two hours over eighty percent of a dry basin's bottom area for the maximum design event to be ex-filtrated.

7. The bottom of infiltration facilities shall be a minimum of four feet above seasonally high groundwater and bedrock.

8. Reference the Illinois Urban Drainage Manual for determining feasibility and sizing of infiltration facilities.

416.1 Applicability

BMPs shall be designed, installed and maintained to infiltrate runoff to the maximum extent practicable in accordance with the following, except for:

1. Storage and loading areas from industrial properties, although rooftops and parking areas shall be infiltrated.

2. Fueling and vehicle maintenance areas.

3. Areas with less than two feet (2') separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater or the top of bedrock.

4. Areas with runoff from industrial, commercial and institutional parking lots and roads and residential arterial roads with less than four feet (4') separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater or the top of bedrock.

5. Areas within four-hundred feet (400') of a community water system well or within one-hundred feet (100') of a private well except for residential infiltration devices capturing less than one (1) acre of tributary acreage.

6. Any area where the soil does not exhibit one of the following characteristics between the bottom of the infiltration system and the seasonal high groundwater and top of bedrock:

    a. At least a 2–foot soil layer with 20% fines or greater; or

    b. At least a 4–foot soil layer with 10% fines or greater.

    This exclusion does not apply where the soil medium within the infiltration system provides an equivalent level of protection and does not prohibit infiltration of roof runoff.

416.2 Exemptions

The following are not required to meet the requirements of this section:

1. Areas where the infiltration rate of the soil is less than 0.4 inches/hour measured at the bottom of the infiltration system.

2. Parking areas and access roads less than 5,000 square feet for commercial and industrial development.

3. Roads in commercial, industrial and institutional land uses and arterial residential roads.

416.3 Residential Requirements

For residential developments one of the following shall be met:

1. Infiltrate sufficient runoff volume so that the post development infiltration volume shall be at least 90% of the predevelopment infiltration volume, based on an average annual rainfall.

   However, when designing appropriate infiltration systems to meet this requirement, no more than 1% of the project site is required as an effective infiltration area.

2. Infiltrate 25% of the post development runoff volume from the 2–year, 24–hour design storm with a Type II distribution.

3. Separate curve numbers for pervious and impervious surfaces shall be used to calculate runoff volumes and not composite curve numbers as defined in TR–55. However, when designing appropriate infiltration systems to meet this requirement, no more than 1% of the project site is required as an effective infiltration area.

4. Design infiltration from extended detention facilities will be counted toward meeting the infiltration requirements for the site.

416.4 Nonresidential Requirements

For nonresidential development, including commercial, industrial and institutional development, one of the following shall be met:

1. Infiltrate sufficient runoff volume from rooftop and parking areas so that the post development infiltration volume shall be at least 60% of the predevelopment infiltration volume, based on an average annual rainfall over those areas.

   However, when designing appropriate infiltration systems to meet this requirement, no more than 2% of the project site is required as an effective infiltration area.

2. Infiltrate 10% of the post development runoff volume from rooftop and parking areas for the 2–year, 24–hour design storm with a Type II distribution.

3. Separate curve numbers for pervious and impervious surfaces shall be used to calculate runoff volumes and not composite curve numbers as defined in TR−55. However, when designing appropriate infiltration systems to meet this requirement, no more than 2% of the project site is required as an effective infiltration area.

4. Pretreatment: Before infiltrating runoff, pretreatment shall be required for parking lot runoff and for runoff from new road construction in commercial, industrial and institutional areas that will enter an infiltration system. The pretreatment shall be designed to protect the infiltration system from clogging prior to scheduled maintenance and to protect groundwater quality. Pretreatment options may include, but are not limited to, oil/ grease separation, sedimentation, bio-infiltration, filtration, swales and/or filter strips.

5. Design infiltration from extended detention facilities will be counted toward meeting the infiltration requirements for the site.

416.5 Soils

To effectively reduce runoff volumes, infiltration practices including basins, trenches, and porous pavement should be located on soils in hydrologic soil groups "A" or "B" as designated by the U.S. Soil and Water Conservation District when present within the project area. A sediment settling basin shall be provided to remove coarse sediment from stormwater flows before they reach infiltration basins or trenches.

416.6 Bypass During Construction

While under construction, and prior to the establishment of permanent soil stabilization practices, an upstream stormwater bypass system shall be constructed and maintained to prevent siltation and plugging of infiltration BMPs. During this period, temporary stormwater controls shall be in place to prevent peak discharges in excess of those permitted of this Ordinance.

416.7 Vegetated Filter Strips and Swales

To effectively filter stormwater pollutants and promote infiltration of runoff, sites should be designed to maximize the use of vegetated filter strips and swales. Runoff from impervious surfaces should be directed onto filter strips and swales before being routed to a storm sewer or detention basin. Native vegetation should be used for landscaping of filter strips and swales.

417.0 SAFETY CONSIDERATIONS

1. The drainage system components, especially all detention basins, shall be designed to protect the safety of any children or adults coming in contact with the system during runoff events.

2. The use of restrictive fences shall be kept to a minimum and used only as a last resort when no other method is feasible.

417.1 Side Slopes

1. The side slopes of detention basins at 100-year capacity shall be as level as practicable to prevent accidental falls into the basin and for stability and ease of maintenance. The side slopes of all detention basins at one hundred year capacity shall be a maximum six to one (horizontal to vertical).

2. Side slopes of detention basins and open channels shall not be steeper than 5:1 (horizontal to vertical) above water, and 4:1 underwater.

3. At least one foot (1') of freeboard should be provided around the perimeter of the detention area.

417.2 Safety Ledge

All wet detention basins shall have a level safety ledge at least eight feet in width a maximum of two feet below the normal water depth.

417.3 Velocity

With the exception of existing drainageways being left undisturbed, velocities throughout the surface drainage system shall be controlled to safe levels taking into consideration rates and depths of flow. Velocities shall not exceed the product of velocity, in feet per second, times depth, in feet, equal to four.

417.4 Overflow Structures

1. All stormwater detention basins shall be provided with an overflow structure capable of safely passing excess flows at a stage at least 2 feet below the lowest structure opening for all structures hydraulically connected to the detention basin.

2. The design flow rate of the overflow structure shall be equivalent to the peak 100-year inflow rate based on a critical duration analysis.

3. All detention ponds and overflow structures shall comply with IDNR Dam Safety requirements where applicable.

417.5 Inlet/Outlet Pipe Protection

The inlet and outlet pipes from all stormwater basins shall be designed to minimize the velocity of flow as it enters and exits the basin. Inlet and outlet pipes shall be supplied with sloped grating per IDOT Standards.

418.0 MAINTENANCE CONSIDERATIONS

1. The stormwater drainage system shall be designed to minimize and facilitate maintenance.

2. Outlet control structures shall be designed as simply as possible and shall require little or no attention for proper operation. Moveable restrictors to meet draw down times are prohibited.

3. Turfed side slopes shall be designed to allow lawn mowing equipment to easily negotiate them.

4. Wet basins shall be provided with alternate outflows that can be used to completely drain the pool for sediment removal. (Pumping may be considered if drainage by gravity is not feasible.)

5. Pre-sedimentation basins shall be included~~, where feasible,~~ for localizing sediment deposition and removal.

6. Access for heavy equipment shall be provided and located within an ingress and egress or maintenance easement.

7. On detention basin side slopes steeper than 5:1, excelsior blankets or similar erosion devices shall be used during construction to minimize erosion.

8. Long term maintenance also shall include the routine removal of excessive trash or debris and the removal of obstructions from the basin outlet structure.

9. Periodic removal of accumulated sediment (e.g., from swales, forebays, and settling basins) also shall be done to maintain the function and aesthetics of stormwater facilities. At a minimum, sediment shall be removed from forebays and sediment basins whenever one foot (1') or more of sediment has accumulated in the basin bottom.

10. Naturally landscaped areas of detention and drainage facilities may be maintained via controlled burning every one to three years, as needed to control invasive weeds. Where controlled burning is not feasible, a program of mowing and application of selective herbicides shall be performed as needed.

11. Mowing should be performed on all turfed areas on a regular basis to maintain grass height below six inches (6").

419.0 NATURAL CONDITION, SOILS

The recommendations of the Kendall County Soil Manual must be followed with respect to the land plan and construction details of proposed subdivisions. Soil borings must be made to confirm the soils map information included in the USDA, NRCS Soil Survey of Kendall County, Illinois. Representative soil borings must be taken to a depth at least five feet (5') below the lowest proposed foundation, two feet (2') below the lowest proposed sewer, or the point of refusal. At least one boring must be made per ten acres (10) or more if necessary to confirm the Soil Survey.

DIVISION 5
FLOWS FROM UPSTREAM TRIBUTARY AREAS

500.0 FLOWS FROM UPSTREAM TRIBUTARY AREAS

Stormwater runoff from areas tributary to the property shall be considered in the design of the property's drainage system. Whenever practicable, flows from upstream areas that are not to be detained should be routed around the basin being provided for the site being developed.

501.0 UPSTREAM AREAS NOT MEETING ORDINANCE REQUIREMENTS

When upstream property tributary to the applicant's property does not meet the stormwater runoff storage and release requirements of this ordinance, regionalized detention on the applicant's property shall be explored by the applicant. The following steps shall be followed.

1. The applicant shall compute the storage volume needed for his property based on the applicant's property area and the release rates and procedures described in Division 4.

2. Areas tributary to the applicant's property, not meeting the storage and release rate requirements of this ordinance, shall be identified.

3. The applicant shall compute the storage volume needed for the areas determined in 501.2 above plus the applicant's property area based on the combined properties and the release rates and procedures described in Division 4.

4. If the tributary areas are not currently developed, a reasonable fully developed land cover, based on anticipated zoning, shall be assumed for the purposes of computing storage.

5. Once the necessary combined storage is computed, the City may choose to pay for increasing the size of the applicant's detention basin to accommodate the regional flows. The applicant's responsibility will then be limited to the storage for his property as computed in 501.1 above.

6. If regional storage is selected by the City then the design produced in 501.3 above shall be implemented.

7. If regional storage is rejected by the City the applicant shall bypass all tributary area flows around the applicant's basin whenever practicable as determined by the City.

8. If the City determines that the applicant may route upstream flows through his basin, the applicant must comply with the requirements of 502.3 and 502.4.

9. If the upstream areas being routed through the applicant's basin are conveyed by drainageways identified on USGS mapping, the applicant must meet the provisions of Section 411.3 for on-stream basins.

502.0 UPSTREAM AREAS MEETING ORDINANCE REQUIREMENTS

When upstream property tributary to the applicant's property meets the storage and release requirements of this ordinance, the upstream flows shall be handled in the following hierarchy:

1. Upstream flows shall be bypassed around the applicant's detention basin, unless the applicant justifies to the City that bypassing of flows is not feasible.

2. Upstream flows shall be routed through the applicant's detention basin if the City determines that this is the only feasible alternative.

3. Storage needed for the applicant's property shall be computed as described in 501.1. However, if the City decides to route tributary area flows through an applicant's basin, the final design stormwater releases shall be based on the combined total of the applicant's property plus tributary areas.

DIVISION 6
ADMINISTRATION

600.0 ADMINISTRATION

This division details the administration aspects of this ordinance, including scheduling and maintenance.

601.0 EARLY COMPLETION OF DETENTION FACILITIES

Soil erosion and sedimentation controls shall be established concurrent with the start of earthwork. Where detention, retention, or other storage areas are to be used as part of the drainage system for a property, they shall be constructed as the first element concurrent with the initial earthwork program.

Any eroded sediment captured in these facilities shall be removed by the applicant before project completion in order to maintain the design volume of the facilities.

602.0 MAINTENANCE RESPONSIBILITY

1. Maintenance of stormwater drainage facilities located on private property shall be the responsibility of the owner of that property.

2. Before a site development permit, building permit, or final plat is issued or signed by the City the applicant shall execute a maintenance agreement with City of Plano guaranteeing that the applicant and all future owners of the property will maintain the property's stormwater drainage system.

3. The maintenance agreement shall also specifically authorize representatives or subcontractors of City of Plano to enter onto the property for the purpose of inspections and maintenance of the drainage system.

4. The maintenance agreement shall include a schedule for regular maintenance of each aspect of the property's stormwater drainage system and shall provide for access to the system for inspection by authorized personnel of City of Plano.

5. The maintenance agreement shall stipulate that if the City of Plano Planning, Building, and Zoning Department notifies the property owner in writing of maintenance problems that require correction, the property owner shall make such corrections within thirty calendar days of such notification.

6. If the corrections are not made within this time period the City may have the necessary work completed and assess the cost to the property owner.

7. Such maintenance agreement shall be recorded with the Recorder of Deeds of Kendall County.

8. City of Plano has the option of requiring a bond to be filed by the property owner for maintenance of the stormwater drainage system.

603.0 INSPECTIONS

603.1 Inspections During Construction

1. A City of Plano Engineering Department representative shall conduct periodic inspections and surveys of the work in progress to be certain that the drainage system is being built as designed.

2. If any violations of the provisions or requirements of this ordinance are noted during such inspections, the City of Plano Planning, Building, and Zoning Department shall notify the property owner in writing of the items needing correction.

3. The property owner shall have ten calendar days to make such corrections unless given a specific extension of time in writing by the City of Plano Planning, Building, and Zoning Department.

4. Failure to complete such corrections within the specified time period shall constitute a violation of this ordinance.

603.2 Final Inspection

1. Upon notification by the applicant that the drainage system is completed, a City of Plano Planning, Building, and Zoning Department representative shall conduct a final inspection.

2. If the drainage system is found to contain deficiencies which require correction the City of Plano Planning, Building, and Zoning Department representative shall notify the property owner of the necessary corrections.

3. The property owner shall correct such deficiencies within ten calendar days unless given a specific extension of time in writing by the City of Plano Planning, Building, and Zoning Department.

4. Failure to make necessary corrections within the specified time shall constitute a violation of this ordinance.

5. Upon completion of the drainage system and all noted deficiencies, the petitioner shall perform a site survey and submit as built plans and revised stormwater management calculations to the City. A Registered Professional Engineer shall certify the as-built plans and calculations.

6. The project Letter of Credit for stormwater related facilities shall not be reduced until the as-built plans and calculations have been reviewed and approved by the City.

7. Upon finding that the drainage system and as-builts meets the provisions and requirements of this ordinance the City of Plano Planning, Building, and Zoning Department shall issue in writing a notice of drainage system completion to the property owner.

603.3 Routine Inspections

1. All privately owned drainage systems may be inspected by representatives of the City of Plano Planning, Building, and Zoning Department.

2. A written report shall be filed of the results of any inspection and a copy sent to the property owner detailing any problems that need correction.

604.0 ENFORCEMENT

The administration and enforcement of this ordinance shall be the responsibility of the City of Plano Building Department.

605.0 VARIANCES AND APPEALS

1. Where the Planning, Building, and Zoning Department Director finds that extraordinary hardships may result from the strict compliance with this Ordinance, he may, after written application and documentation by the developer, recommend in writing to the Planning, Building, and Zoning Committee variations or exceptions to the regulations.

   Recommendation may be subject to specific conditions, so that substantial justice may be done and the public interest secured, provided that such variations or exceptions shall not have the effect of nullifying the intent and purpose of this Ordinance.

2. From the Planning, Building, and Zoning Committee, the recommendations shall be communicated to the City Council in writing with reasons therefore. The City Council may approve the variations from these regulations in specific cases, which in their opinion do not affect the general plan or the spirit of the Ordinance.

3. The Planning, Building, and Zoning Department Director shall not recommend variations or exceptions to the regulations of this Ordinance unless he shall make findings based on the evidence presented to him in each specific case, that:

   (a) Because of the particular physical surroundings, shape, or topographic conditions of the specific property involved a particular hardship to the owner would result, as distinguished from a mere inconvenience, if the strict letter of the regulations was carried out.

   (b) The conditions upon which the request for a variation is based are unique to the property for which the variation is sought and are not applicable, generally, to other property, and have not been created by any person having an interest in the property.

   (c) The purpose of the variation is not based upon economic feasibility.

   (d) The granting of the variation will not be detrimental to the public safety, health, or welfare, or injurious to other property or improvements in the locale in which the property is located.

4. All appeals to the City of Plano Planning, Building, and Zoning Department Director decisions regarding the interpretation of this ordinance shall be heard by the City of Plano Planning, Building, and Zoning Committee.

606.0 SEVERABILITY

If any section, clause, provision or portion of this ordinance is judged unconstitutional or invalid by a court of competent jurisdiction, the remainder of this ordinance shall remain in force and not be affected by such judgment.

607.0 PENALTIES

Any person determined to be guilty of violating any of the provisions or requirements of this ordinance shall be guilty of an ordinance violation and shall be subject to a fine of not more than One Thousand Dollars ($1,000.00). Each day the violation continues shall be considered a separate offense (amended 8/17/2004 per Ordinance 2004-29).

608.0 EFFECTIVE DATE

This ordinance shall be in full force and effect from and after its passage and approval and publication, as required by law.

Passed by the City Council of City of Plano, Illinois, this 26 day of Jan, 2008.

Deanna Brown
Clerk

APPROVED by me this 26 day of Jan, 2008.

City of Plano Council Mayor

ATTESTED and FILED in my office this 26 day of Jan, 2008.

Deanna Brown
Clerk