



Storm Drainage & Erosion Control Management Design Manual

1st Edition

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CITY OF FREEPORT

STORM DRAINAGE & EROSION CONTROL MANAGEMENT DESIGN MANUAL

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PART 1 STORM DRAINAGE GENERALLY

1.1 AUTHORITY AND PURPOSE

The purpose of this manual is to prevent threats to public health and safety caused by runoff of excessive stormwater from private property. The excess stormwater may result in damage to property, erosion of topsoil, the destabilization of downstream channels, and the pollution of streams, creeks, and rivers. The City of Freeport Water & Sewer Commission retains the right to seek corrective action at any time. In order to protect the aforementioned, 'grandfathering' of previous facilities is not permissible.

It is the assurance through this design manual that the City allows developments that do not increase the drainage or flood hazards to others, or create unstable conditions susceptible to erosion. The City will take action against those that allow storm water to adversely impact the City and its residents, such that it affects beneficial uses including recreation, aesthetics, and aquatic habitats.

1.1.1 Interpretation

This design manual and its ordinance shall be liberally construed to protect the health, welfare, safety, and the environment of the residents of the City.

Nothing contained in this design manual and its ordinance shall be deemed to consent to, license, permit to locate, construct, or maintain any structure, site, facility or operation, or to carry on any trade, industry, occupation, or activity.

When provisions of this Ordinance differ from any other applicable statute, law, ordinance, regulation, or rule, the more stringent provision shall apply.

1.1.2 Warning and Disclaimer of Liability

The degree of flood protection provided by this design manual and its ordinance is considered reasonable for regulatory purposes and is based on engineering experience and scientific methods of study.

Increased flooding may result from causes beyond the control of the City.

This design manual and its ordinance do not, therefore, imply that areas outside the delineated flood plain or permitted land uses within the delineated flood plain will be free from flooding and associated damages.

This design manual and its ordinance shall not be construed or applied in any manner to create liability on the part of or a cause of action against the City, any community, or any elected official, officer, agent, or employee thereof, for any flood damage resulting from reliance on the provisions of this design manual and its ordinance or from reading or interpreting any map that is part of this design manual and its ordinance.

1.2 GOOD NEIGHBOR POLICY

The City of Freeport enforces through this design manual and its applicable ordinances a Good Neighbor Policy. The policy requires open dialogue between neighboring property owners when handling storm drainage improvements. Property owners shall contact each other prior to and post construction on all land disturbing improvements to ensure no reasonable request has been unfulfilled. The policy shall be applicable to all development regardless of property type or development size or classification and pertains to all existing, current, and future land disturbing activities. Further, in the event of discord and disagreement between property owners conducting improvements, the City shall only take action on those items that are not compliant with the design or recommendations in this manual. Items outside the ordinance or this manual shall be resolved privately between the property owners and their representatives with no recourse on the City of Freeport or its representatives.

1.3 RESIDENTIAL/COMMERCIAL/BUSINESS IMPROVEMENTS

All graded sites shall be developed and maintained to provide control of storm and surface waters. Provisions shall be made to prevent storm or surface waters from damaging the face of an excavation or the sloping face of a hill, and to prevent grading or other construction activity from causing a concentration or acceleration of drainage entering adjacent property without an easement from the owner of the adjacent property, this information shall be presented with the plat to the Executive Director for approval. All easements shall be in a format approved by Corporation Counsel and recorded at the Stephenson County Court House.

All drainage provisions shall be subject to the approval of the City and shall be designed to maintain all storm and surface water draining on site or to carry all or part of storm and surface waters to the nearest practical street, storm drain, or natural water course, approved by the City as a safe place to deposit and receive such waters.

Surface and storm waters shall not be permitted to overland flow from an improvement to the public right of way. All water must enter a positive drainage system meeting the requirements in the design manual. An improvement maybe exempt of this rule if the development is designed such that storm waters enter an approved regional detention basin.

1.4 USE AND IMPLEMENTATION OF BEST MANAGEMENT PRACTICES

The City of Freeport recognizes the EPA's Best Management Practices (BMP) approach for the design of all stormwater and floodplain management system components and requires sustainable drainage systems. The City adheres to the recommendations set by the Environmental Protection Agency for BMP's including but not limited to Low-Impact Development (LID). The implementation of LID shall encourage acquisition of knowledge about a site's hydrology before its development, thereby reducing negative effects on nearby rivers, lakes, creeks, streams, or wetlands. LID Practices use design technologies to promote natural systems for stormwater infiltration, evapotranspiration and reuse.¹

1.5 PRIVATE DRAINAGE SYSTEMS/IMPROVEMENTS

The City shall not be responsible for private drainage; this includes but is not limited to, private storm sewers, detention basins, swales, drain tile, or other drainage appurtenances, not in the public right of way or recorded easements. All private drainage systems shall be the property owner's responsibility for maintenance, improvements, repairs, and replacement.

1.6 AESTHETICS

Drainage improvements shall not adversely impact the aesthetics of the area where the improvements are being conducted. Improvements such as detention basins, storm water outfalls, berms, and other drainage structures shall be designed to have minimal visual impact on the surrounding area. The City recommends landscape architects be consulted on improvements for sites five (5) acres or greater.

1.7 SOURCES AND REFERENCES

This design manual incorporates several design concepts and storm drainage techniques from several other communities including Belvidere, IL; Ogle County, IL, the City of Knoxville, TN; the City of Naperville, IL; the Environmental Council of Pennsylvania; and the US Environmental Protection Agency. Additional design references include:

Illinois Urban Manual NRCS – A Technical Manual for Urban Ecosystem Protection and Enhancement.

Illinois – Procedures and Standards for Urban Soil erosion and Sedimentation Control. Commonly known as the Green Book.

Illinois Department of Transportation (IDOT), Standard Specifications for Road and Bridge Construction, Latest Edition; and specific IDOT Drainage Manual sections as referenced herein.

Metropolitan Washington Council of Governments, Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs.

¹American City & County, 'The Cost of Clean Streams', Meredith Preston, March 2008

PART 2

DEFINITIONS

Adverse impacts: Any deleterious impact on water resources or wetlands affecting their beneficial uses including recreation, aesthetics, or aquatic habitat. Adverse effects can include but not limited to:

1. Increased erosion (anticipated and observed).
2. Reduced water quality (higher quantities of total suspended solids).
3. Increased flooding (frequency and duration).
4. Siltation or sedimentation.
5. Destruction of buildings, structures or wildlife habitats.

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

Base flood elevation: The elevation at all locations delineating the level of flooding resulting from the 100-year frequency flood event.

Bypass flows: Storm water runoff from an upstream property 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, installation of rip rap (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 removing of trash.

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

Detention basin: A facility constructed or modified to provide for the temporary storage of storm water 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 storm water in a detention basin.

Development (Improvement): Refer to City of Freeport Codified Ordinance Chapter 1460.02.

Developer: A person or group of persons acting as unit who invest in and develop the urban or suburban potentialities of real estate.

Drainage plan: A plan, including engineering drawings and supporting calculations, which describes the existing storm water drainage system and environmental features, as well as the drainage system and environmental features which are proposed after development of a property.

Dry basin: A detention basin designated to drain completely after temporary storage of storm water flows and to normally be dry over the majority of its bottom area.

Erosion: The general process whereby earth is removed by flowing water or wave action.

Excess storm water run-off: The volume and rate of flow of storm water discharged from a developed drainage area which is or will be in excess of that volume and rate which pertained before development.

Floodplain: Refer to City of Freeport Codified Ordinance Chapter 1460.02.

Flood fringe: Refer to City of Freeport Codified Ordinance Chapter 1460.02.

Floodway: Refer to City of Freeport Codified Ordinance Chapter 1460.02.

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

Infiltration: The 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 is usually designed to handle the 25 year runoff event and more.

Minor drainage system: The portion of a drainage system designed for the convenience of the public. It consists of street gutter, storm sewers, small open channels, and swales and, where manmade, is usually designed to handle the ten-year runoff event or less, unless required to handle the 25-year event by the City.

Mitigation: Mitigation includes those measures necessary to minimize the negative effects which storm water drainage and development activities might have on the public health, safety and welfare. Examples of mitigation include compensatory storage, erosion and sedimentation control, and channel restoration.

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

One hundred-year event: A rainfall, runoff, or flood event having a one percent chance of occurring in any given year.

Positive drainage: Provision for 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.

Property: A parcel of real estate.

Retention basin: A facility designed to completely retain a specified amount of storm water runoff without release except by means of evaporation, infiltration, emergency bypass or pumping.

Sedimentation: The process that deposits soils, debris, and other materials either on other ground surfaces or in bodies of water or storm water drainage systems.

Storm water drainage system: All means, natural or man-made, used for conducting storm water to, through or from a drainage area to the point of final outlet from a property. The storm water 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.

Storm water runoff: The waters derived from melting snow or rain falling within a tributary drainage basin which are in excess of the infiltration capacity of the soils of that basin, which flow over the surface of the ground or are collected in channels or conduits.

Storm sewer: A closed conduit for conveying collected storm water.

Time of concentration: The elapsed time for storm water to flow from the most hydraulically remote point in a drainage basin to a particular point of interest in that watershed.

Tributary watershed: All of the land surface area that contributes runoff to a given point.

Five-year event: A runoff, rainfall, or flood event having a 20 percent chance of occurring in any given year.

Wet basin: A detention basin designed to maintain a permanent pool of water after the temporary storage of storm water runoff.

PART 3 STORM SEWER SYSTEM DESIGN

3.1 HYDROLOGIC ANALYSIS

3.1.1 General

The City of Freeport uses the term "Design Storm" to define precipitation events used in the design and analysis of all stormwater management facilities in the City. The Design Storm is the frequency with which a given rainfall event is equaled or exceeded, on average, once in a period of years. The probability of occurrence is equal to the reciprocal of the design storm frequency. For example, a 100-year design storm has a 1.0 percent probability of occurrence in any one year.

3.1.2 Rainfall Data

The Illinois State Water Survey (ISWS) publication entitled "Frequency Distributions and Hydro climatic Characteristics of Heavy Rainstorms in Illinois," commonly called "Bulletin 70" shall be used as the rainfall data reference source for the design of stormwater management facilities, unless a continuous simulation approach to drainage system hydrology is used.

3.1.3 Design Storm

Storm sewer systems shall be designed to handle several storm events dependent upon the location within the City. Storm sewer systems for the purposes of smaller, more frequent storms shall be handled by minor drainage systems, and drainage from larger, less frequent storms shall be handled by major storm systems. The standard design storm for all Minor Drainage System components will be the appropriate "10-year or 25-year recurrence interval" rainfall, as defined in ISWS Bulletin 70. Location of the improvement and existing data on storm sewer capacities in the area will determine whether a system will need to be designed for the 10 or 25-year rain event, verification with the Executive Director of the Water & Sewer Commission is required. The standard design storm for all Major Drainage System components will be the appropriate "100-year recurrence interval" rainfall, as defined in ISWS Bulletin 70.

3.1.4 Topographic Data

Topographic data shall be referenced to at least one established City of Freeport benchmark. Contour intervals shall be one foot and shall directly correlate to the USGS datum.

3.1.5 Rainfall-Runoff Modeling Methodology

The following summarizes the application of common rainfall-runoff models:

Model	Product	Usage	Assumptions	Limitations
Rational Method	Peak Discharge	For estimating peak discharge rate.	Watershed size 1-25 acres	Applicable to smaller watersheds only.
TR-20	Hydrograph	For developing: Runoff hydrographs, Channel and reservoir routed hydrographs, Separated or combined hydrographs.	N/A	N/A
TR-55 Tabular Method	Hydrograph	For measuring the effect of land use and/or structure changes in subcatchments on the composite hydrograph for the watershed	Sub-catchment size less than 20 square miles. Precipitation runoff volume not less than 1.5 inches. Little to no variation in soil and land use characteristics within a sub-catchment.	The TR-55 Tabular Method was derived from TR-20 using curve numbers of 75 and rainfall amounts sufficient to produce 3 inches of runoff volume. Characteristics should not vary significantly from those used in the method derivation.
TR-55 Graphical Method	Peak Discharge	For estimating peak discharge rate. Same as the TR-55 Tabular Method. In addition, the initial abstraction must be less than 25 percent of the total 24-hour rainfall volume.	The Graphical Method was developed from the TR-55 Tabular Method, therefore the limitations are the same.	N/A
TR-55 Chart Method	Peak Discharge	For estimating the effect of development on peak discharge rate.	Watershed size: 1-2000 acres	N/A
HEC-1	Hydrograph	For computation of flood hydrographs due to a single recorded or synthetic rainstorms, or snowfall-snowmelt conditions. Model can simulate dambreak conditions and compute expected annual flood damages.	Hydrologic processes can be simulated assuming that individual parameters can be used in representing average sub-basin temporal and special characteristics.	Only one storm can be modeled for each program run because the model does not have a provision for soil moisture recovery during non-precipitation periods. Results are in terms of discharge, not stage. If discharges are stage-dependent, a user specified rating curve must be provided. Hydrologic routings used for open channel flow. If gradually varied, unsteady flow occurs, such as in very flat channels, then hydrologic routings are not accurate. Hydrologic routings used for storage reservoirs. If reservoir outflow is dependent on downstream controls, then hydrologic routings are not accurate.

3.2 HYDRAULIC ANALYSIS

3.2.1 General

The following table summarizes the application of common hydraulic models: Additional Hydraulic Models may be permissible upon written request of the Executive Director of the Water & Sewer Commission; however EPA - SWMM based models are recommended.

Model	Usage	Assumptions	Limitations
HEC-2	For computing water surface profiles for subcritical or supercritical open channel flow.	One-dimensional, gradually varied, steady flow conditions. Channel slopes are less than 10%.	Program is not capable of modeling movable flow boundaries such as those that occur due to sediment transport.
HEC-RAS	For computing subcritical, supercritical, and mixed flow regime open channel flow water surface profiles. Model has improved routines for evaluating the effects of obstructions such as bridges, culverts weirs, and structures in the floodplain.	Gradually-varied, steady flow conditions.	N/A
WSPRO	For detailed, accurate modeling of open channel flow through bridge openings. Model is able to simulate combined bridge-road overtopping, and multiple opening bridge situations.	Water surface profiles can be computed for any combination of subcritical, critical, or super critical flow as long as the flow can reasonably be classified as one-dimensional, gradually-varied, and steady.	N/A
FEQ	For dynamic modeling of unsteady flow conditions in open channels and through control structures. Model can be used for a variety of stream configurations and is able to read HEC- 2 and WSPRO cross-section input data.	N/A	N/A
SWMM	For single-event or continuous simulation analysis of stormwater quantity and quality problems. Model is used most often on catchments having sophisticated storm sewer networks where accurate simulation of dynamic flow conditions is needed.	Model performs best in urban areas with mostly impervious services. Water quality simulations must be calibrated if the pollutant magnitudes are to be considered reliable.	No sub-surface water quality routing No interaction of water quality processes except for adsorption. Wetland water quality processes are difficult to simulate. Scour-deposition routine is weak. Model uses hydrologic storage routing. User needs to calculate and input the hydraulic characteristics of storage components.

3.2.2 Gravity Flow

All stormwater management facilities in the City of Freeport shall be designed for gravity-flow conditions for the appropriate design storm. Stormwater pumping facilities will only be considered if it can be demonstrated that there are no means of providing for gravity-flow drainage. The design of each stormwater management component must be based on sub-critical flow conditions. Super-critical or critical flow conditions have the potential for high velocities that can be dangerous and damaging. Furthermore, these conditions are unstable and can result in widely fluctuating and unpredictable flow depths.

3.2.3 Pressure Flow

Pressure flow conditions occur in a closed-conduit system when the hydraulic grade line (HGL) is above the crown of the pipe. When it is not possible to restrict the HGL to the crown of the pipe due to topographic constraints, the HGL may be contained within the rim, as approved by the Executive Director of the Water & Sewer Commission. Storm sewers shall be designed for the appropriate design storm based on flowing-full conditions without any pressure head. While pressure flow conditions may occur for runoff events in excess of the design storm, such conditions should be avoided by allowing excess flows to be channeled to overflow routes.

3.3 MINOR DRAINAGE SYSTEM

3.3.1. General

The minor drainage system consists of curb and gutter sections, storm sewers (with appurtenant inlets, catch basins, and manholes), swales/filter strips (side yard, back yard), and small natural or man-made open channels. The function of the minor drainage system is to quickly collect and convey the runoff from the smaller, more frequent storms. Minor stormwater systems shall be sized to convey runoff from the tributary watershed under fully developed conditions consistent with the design requirements in this manual.

3.3.2 Swales and Filter Strips

Swales and Filter strips shall be used to effectively remove pollutants and promote infiltration of runoff; sites shall be designed to maximize the use of swales and filter strips. Wherever practicable, runoff from impervious surfaces shall be directed onto filter strips and swales before being routed to a storm sewer or detention basin. Side yard

and rear yard swales shall be analyzed as open channels with a triangular cross section and a mowed turf grass surface. The minimum longitudinal slope shall be 2 percent. The maximum slope allowed is 5 percent. For greater than 5 percent erosion, safety measures will be required. The swale shall have sufficient hydraulic capacity to convey the design storm peak flow rate with the appropriate freeboard clearances. For residential developments, there shall be not less than 1.5 feet of freeboard between the design high water level in the swale and the lowest adjacent top of foundation elevation. For commercial developments, there shall be no less than 1.0 feet of freeboard between the design high water level in the swale and the lowest adjacent top of foundation elevation. Filter strips must be at least 15 feet wide in the direction of the flow and increase in width to accommodate steeper slopes. The length of the strip shall stretch the entire length of the impervious surface from which stormwater originates, and when adjacent to a natural water body, they shall stretch the entire property or shoreline. Filter strip slopes shall be no less than 1 or 2 percent and no greater than 6 percent. Areas immediately upstream of the strip shall be shaped and graded to prevent erosion and promote sheet flow. Concentrated flow shall not discharge on to filter strips unless a level spreader is included to distribute flow for the entire length of the filter strip. Filter strips and swales shall be constructed using appropriate soil stabilization methods.

3.3.3 Pavement Drainage

Inlets shall be designed to handle pavement drainage and convey storm water to the storm sewer system, and shall not be used as a substitute for pipe changes in direction, pipe size, or other variables in place of a manhole.

Maximum flow depths on any roadway shall not exceed curb height or cause street ponding greater than one lane width, whichever is stricter, during the base flood condition. Inlets are to be located such that these encroachments are not exceeded and will not allow flow to cross-intersecting streets. These standards will apply to all local and collector streets. The following table provides equations that shall be used in computing inlet spacing. The equations are based on the standard City of Freeport gutter width of 12 inches, and a recommended pavement roughness coefficient of 0.015. The maximum flow depth at the face of curb is about 1.7 inches which occurs for the steepest cross-slope of 2.5%. These equations; therefore, are applicable for both roll and barrier curb situations.

Flow Component	Pavement Cross-slope		
	3/16" per foot (1.56%)	1/4" per foot (2.08%)	5/16" per foot (2.5%)
Q Total	(2.147) S ^{1/2}	(3.068) S ^{1/2}	(3.902) S ^{1/2}
Q Gutter	(1.464) S ^{1/2}	(1.966) S ^{1/2}	(2.412) S ^{1/2}

Q Grate Capacity	(0.014) K	(0.019) K	(0.024) K
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S = longitudinal pavement slope in feet per foot.

K = conveyance factor that is unique to the geometry of each grate. Values for the conveyance factors are provided in "Inlet Grate Capacities" published by the Neenah Foundry Company.

For the ponded water condition, stormwater flow bypassed from uphill inlets accumulates at a low point. At lower depths, the flow into most inlet grates takes on the characteristics of flow through a weir. As the ponding depth increases, the inlet grate opening acts more like an orifice. The equations and assumptions applicable for both types of ponded condition flow are found in the above referenced Neenah Foundry publication.

3.3.4 Storm sewers

Storm sewers shall be designed in accordance with the procedures outlined in Chapter 8 of the IDOT Drainage Manual. These procedures use the Rational Method to determine peak stormwater flow rates for both inlet spacing and storm sewer sizing.

All storm sewers within the City of Freeport right-of-way shall be made to minimize the placement of storm sewers in side yard easements. All storm sewer pipes within side yard easements shall have gasketed joints. Material specifications can be found in Part 6 of this manual, corrugated metal pipe is not an approved storm sewer material type.

Storm sewer sizes are to be determined based on flowing-full (non-surcharging) conditions for the appropriate design storm. The minimum and maximum allowable subcritical design flow velocities are 2.5 feet/second and 6 feet/second, respectively. A conventional development has one or more storm sewer networks that discharge to the detention facility for the site. To avoid surcharging conditions, storm sewer outfalls to detention facilities shall be designed such that the invert of the outfall pipe is at or higher than the normal high water elevation of the facility. An exception to this policy may be made if the hydraulic grade line calculations can demonstrate that the design water surface is kept below the street edge of pavement elevation throughout the site.

All areas of the property must provide for an overland flow path that will pass the 100-year flow at a stage at least one foot below the lowest foundation grade in the vicinity of the flow path. Overland flow paths designed to handle flows in excess of the minor drainage system capacity shall be provided drainage easements, and shall be required to drain to a major drainage system, or the design shall include a major drainage system.

Stormwater facilities shall be required and shall be designed so that runoff exits the site at a point where flows will not damage adjacent property.

3.3.5 Culverts

All culverts within the City of Freeport right-of-way shall have the appropriately sized flared-end section on each end. All culverts over 12 inches in diameter shall have the appropriate grating covering the flared-end section opening. Erosion control shall be placed on the outfall side of the culvert and any other erosion control measures required to prevent soil and sediment removal along the channel.

3.4 MAJOR DRAINAGE SYSTEM

3.4.1 General

The major drainage system consists of overflow routes (streets and larger natural or man-made open channels), man-made stormwater storage facilities (basins and ponds), large natural or manmade channels, and floodplains. The major drainage system serves both conveyance and storage functions. This may occur as a result of runoff from the larger, less frequent storms and/or from an obstruction in the minor system. Major stormwater systems shall be sized to carry the base flood without causing additional property damage.

3.4.2 Overflow Routes

3.4.2.1 General

Preferably, overflow routes shall exit a developed site in a common area such as a park or public right-of-way. As a secondary choice, overflow routes shall be designated along a common rear yard property line that is farthest away from homes and buildings, meeting the requirement of the 100 year storm event flood width set as a minimum width.

3.4.2.2 Swales and Filter Strips

Swales and Filter strips shall be used to effectively remove pollutants and promote infiltration of runoff, sites shall be designed to maximize the use of swales and filter strips.

Wherever practical, runoff from impervious surfaces shall be

directed onto filter strips and swales before being routed to a storm sewer or detention basin. Side yard and rear yard swales shall be analyzed as open channels with a triangular cross section and a mowed turf grass surface. The minimum longitudinal slope should be 2 percent. The maximum slope allowed is 5 percent. The swale shall have sufficient hydraulic capacity to convey the design storm peak flow rate with the appropriate freeboard clearances. For residential developments, there shall be not less than 1.5 feet of freeboard between the design high water level in the swale and the lowest adjacent top of foundation elevation. For commercial developments, there shall be no less than 1.0 feet of freeboard between the design high water level in the swale and the lowest adjacent top of foundation elevation. Filter strips must be at least 15 feet wide in the direction of the flow and increase in width to accommodate steeper slopes. The length of the strip shall stretch the entire length of the impervious surface from which stormwater originates, and when adjacent to a natural water body, they shall stretch the entire property or shoreline. Filter strip slopes should be no less than 1 or 2 percent and no greater than 6 percent. Areas immediately upstream of the strip shall be shaped and graded to prevent erosion and promote sheet flow. Concentrated flow shall not discharge on to filter strips unless a level spreader is included to distribute flow for the entire length of the filter strip. Filter strips and swales shall be constructed using appropriate soil stabilization methods such as erosion control mats or blankets.

3.4.3 Stormwater Storage

3.4.3.1 Floodplain Compensatory Storage

Existing floodplain storage shall be preserved and maintained for the post-development condition. For streams with mapped FEMA Zone AE floodplain (base floodplain elevations determined and subsequently approved by FEMA), the floodplain will consist of the base flood elevation(s) set onto the approved site topography. For streams with mapped FEMA Zone A floodplain (no base floodplain elevations determined), the floodplain shall be determined with hydrologic and hydraulic modeling acceptable to the Illinois Department of Natural Resources (IDNR) and the City of Freeport.

3.4.3.2 Natural Depressional Storage

Isolated depressional areas can provide a significant amount of natural stormwater storage in a watershed. Therefore, they shall be included in determining the natural release rate to be compared to the allowable release rate.

3.4.4 Stormwater Detention

3.4.4.1 General

Detention requirements within the City of Freeport are subject to a review and approval process and shall meet or exceed the requirements in Part 4 of this manual. Storm runoff detention is required for all commercial and industrial developments. Detention will also be required for residential developments of 1.0 acre or greater. For residential developments such as a single family property not already approved in a subdivision plat less than 1.0 acre in area, Best Management Practices (BMP's) that facilitate stormwater infiltration shall be required.

3.5 EASEMENT PROVISION

3.5.1 General Drainage Easement Language

Where a subdivision is traversed by a watercourse, drainage way, channel or stream, there shall be provided a stormwater easement or drainage right-of-way conforming substantially to the lines of such watercourse; such easement shall be wide enough to accommodate the runoff from the 100-year storm event. Detailed engineering calculations shall be provided to the satisfaction of the Executive Director of the Water & Sewer Commission to verify the design. Permanent structures including but not limited to patios shall not be placed on or near the 100 year drainage easement and shall be subject to the discretion of the Executive Director of the Water & Sewer Commission. Flood elevation certificates shall be required.

With the submittal of stormwater/drainage plans, language shall be included to indicate levels of responsibility post-construction. The provision of an easement should be accompanied by the final plat or final plans and shall be authorized by an Illinois Professional Land Surveyor. The design company shall obtain easements at the time of award for and on behalf of the City. Language to be provided shall read: *An easement is hereby reserved for and granted to the City of Freeport, Illinois within the area as shown on the plat and marked "Drainage Easement". The current or future property owner shall maintain the free flow of surface runoff in, over, under, along and upon the surface of said easement; the City of Freeport shall not be responsible for the expense of said maintenance. The City or its agent shall have the right to enter upon said easement and the adjacent property to remove any obstructions to the free flow of the surface runoff, and collect the expenses incurred from the property owner and/or from the adjacent property owners. The adjacent property owners may construct and maintain an adequate storm sewer in said easement at their expense. All maintenance, repair, or removal costs associated with structures, including but not limited to retaining walls, built in or bordering the drainage easement, shall be the responsibility of the property owner. Other language, without change of intent, may be accepted subject to the Executive Director's approval.*

All easements shall be indicated on the plat prior to final approval and shall be recorded at the Stephenson County Court House.

3.5.2 Storm Sewer Easement

With the submittal of stormwater/drainage plans, language shall be included to indicate levels of responsibility for the utility in the easement and the easement itself post-construction. The provision of an easement shall be accompanied by the final plat or final plans and shall be authorized by an Illinois Professional Land Surveyor. The design company shall obtain easements at the time of award for and on behalf of the City. Minimum permanent easement shall not be less than fifteen (15) feet in width. Language to be provided shall read: *An easement for serving the subdivision and or other property with storm sewer service is hereby reserved for and granted to the City of*

Freeport, their respective successors and assigns, jointly and severally, to install, operate, maintain, and remove, from time to time, facilities used in connection with storm sewer services and over, under, across, along and upon the surface of the property shown within the lines marked on the plat marked "Storm Sewer Easement", and the property designated on the plat for streets and alleys, together with the right to install required service connections over or under the surface of the each lots to serve improvements thereon, the right to serve adjacent lots, the right to cut, trim or remove trees, bushes roots as may be reasonably required incident to the rights herein given, and the right to enter upon the subdivided property for all such purposes. Obstructions shall not be placed over the City's facilities or in, over, or upon the property within the lines marked "Storm Sewer Easement" without the prior written consent of the City. After installation of any such facilities, the grade of the subdivided property shall not be altered in a manner as to interfere with the proper operation and maintenance thereof. Other language may be accepted subject to the Executive Director's approval.

Where topography or other conditions make the inclusion of drainage facilities within road rights-of-way impractical, perpetual unobstructed easements at least 15 feet in width for such drainage facilities shall be provided across property outside the road lines and with access shown and to the satisfaction of the Executive Director of the Water & Sewer Commission. Easements shall be indicated on the plat.

Other utilities shall not run parallel above or below any drainage structures

Storm sewers established on private property by the property owner do not require storm sewer easements. Language shall be provided by the private property owner stating that they shall be responsible for the installation, operation, maintenance, and repairs necessary. The language shall be conveyed on any and all property deeds and pass to future property owners in perpetuity. The City shall not be responsible for any maintenance or repairs of storm sewers on private property. Failure of a property owner to repair a storm sewer or structure on their property where health and safety is compromised may result in notification and fines until the matter is resolved.

All easements shall be indicated on the plat prior to final approval and shall be recorded at the Stephenson County Court House; this also extends to deed adjustments where a private storm sewer system conveys to the property owner.

3.6 SUBDIVISION REQUIREMENTS

3.6.1 General

All subdivisions shall have a site grading plan at the same scale as the sketch plan with existing and proposed contours shown at a maximum interval of two feet, referenced to Freeport, Illinois datum, prepared by an Illinois registered professional engineer, submitted with the construction plans. The site grading plan shall give the following information:

- a. Directional arrows shall be shown for all storm drainage easements indicating the stormwater flow to drainage structures.
- c. Location of all proposed underground storm drains, manholes, and inlets to be built as part of the subdivision.
- d. Detail of typical lot drainage.
- e. Finished elevation at every lot corner.

In general, lots shall be laid out to provide positive drainage away from all buildings, and individual lot drainage shall be coordinated with the general storm drainage pattern for the area.

Where topography or other conditions make it impractical to include drainage facilities within the right-of-way, storm drains will be constructed in easements. Drainage work shall be completed before the placement of any surfacing material.

Each applicant shall submit the following information to ensure that the provisions of this section are met. The submittal shall include sufficient information including:

- a. the environmental characteristics of the property;
- b. the potential adverse impacts of the development on water resources both on-site and off-site downstream of discharge locations;
- c. the effectiveness of the proposed drainage plan in managing storm water runoff; and
- d. a certification on the drawings that all clearing, grading, drainage, and construction shall be accomplished in strict conformance with the drainage plan.

The following information shall be submitted for both existing and proposed property conditions.

Residential developments one acre or less may request a waiver of certain requirements and should contact the Water & Sewer Commission directly to discuss requirements.

3.6.2 Drainage plan

A. Topographic map

Submit a topographic survey of the property at two-foot contours under existing and proposed conditions, and areas upstream and downstream, necessary to determine off-site impacts of the proposed drainage plan. The map shall be keyed to Freeport, Illinois datum.

B. Drainage system

Submit mapping and descriptions, where relevant, of existing and proposed drainage system, features of the property, and the immediate vicinity including:

1. The banks and centerline of streams and channels;
2. Shoreline of lakes, ponds, and detention basins;
3. Farm drains and tiles;
4. Sub-watershed boundaries within the property;
5. Watershed soils classifications;
6. The property's location within the larger watershed;
7. Location, size, and slope of storm water conduits and drainage swales;
8. Other utilities;
9. Depressional storage areas;
10. Delineation of upstream and downstream drainage features and watersheds which may be affected by the development;
11. Detention facilities; (reference manual Part 4 for design information);
12. Roads and streets and associated storm water inlets;
13. Base flood elevation, and regulatory floodway where identified for the property;
14. Basis of design for the final drainage network components;
15. Elevations and maps of 100-year flooding;
16. Cross-section data for open channel flow paths and designated overland flow paths;
17. Direction of storm flows;
18. Flow rates and velocities at representative points in the drainage system;
19. A statement by the design engineer of the drainage system's provisions for handling events greater than the 100-year's runoff; and
20. Engineer's drainage certification of the drainage system's provisions for handling storm events specified by this manual.

C. Environmental features

Submit a depiction of environmental features of the property and immediate vicinity including the following:

1. The limits of wetland areas;
2. Any designated natural areas; and
3. Any proposed environmental mitigation features.

3.6.3 Minimization of increases in runoff volumes and rates.

In the selection of a drainage plan for a development, the applicant shall evaluate and implement, where practicable, site design features which minimize the increase in runoff volumes and rates from the site. These measures shall be used in determining the credit reduction of a storm sewer fee when such fee is based upon validated and certified impervious surface calculations. The applicant's drainage plan

submittal shall include evaluations of site design features which are consistent with the following hierarchy:

- a. Minimize impervious surfaces on the property, consistent with the needs of the project;
- b. Attenuate flows by use of rain gardens, open vegetated swales and natural depressions, porous pavements (where applicable based upon confirmed soil borings), and preserve existing natural stream channels (site drainage patterns shall not be altered to substantially decrease or increase the existing area tributary);
- c. Infiltrate runoff on-site;
- d. Provide underground detention and storage, maximizing space above storage for parking and other uses;
- e. Provide storm water retention structures;
- f. Provide storm water detention structures; and
- g. Construct storm sewers.

Developments shall incorporate the following Best Management Practices into the site design to minimize increases in runoff rates, volumes, and pollutant loads:

- a. All runoff from rooftops, parking lots, and discharge from sump pumps that do not discharge into a site runoff storage facility shall be directed onto vegetated swales or filter strips, for a distance of at least 50 feet.
- b. Vegetated swales shall be utilized, where appropriate, as an alternative to storm sewers to promote the infiltration of stormwater and the filtration of stormwater pollutants.
- c. Effective impervious surface area shall be limited by site designs which minimize the area of streets, parking lots, and rooftops and/or utilize permeable paving material such as concrete grids in low traffic areas.
- d. Other Best Management Practices such as infiltration basins and trenches (where permeable soils are present) and filtration basins and sand filters (on highly impervious or industrial developments) shall be utilized where appropriate.
- e. Developments shall incorporate all best management practices as may be required pursuant to the United States Clean Water Act, 33 U.S.C. §§ 1251 et seq., as amended.

3.6.4 Water quality and multiple uses

The drainage system shall be designed to minimize adverse water quality impacts downstream and on the property itself. Detention basins shall incorporate design features to capture storm water runoff pollutants. Retention and infiltration of storm water shall be promoted throughout the property's drainage systems to reduce the volume of storm water runoff and to reduce the quantity of runoff pollutants.

An oil/water separator or other type of stormwater runoff pretreatment shall be required for drainage areas with greater than 50 percent impervious surface or where there may be a potential source of oil and grease contamination. In addition to most large parking lots, oil and grease contamination is also likely for vehicle fueling and maintenance facilities and shall also be required to provide onsite oil/water separation. Maintenance of the separator shall be the responsibility of the property owner.

The drainage system shall incorporate multiple uses where practicable. Uses considered compatible with storm water management include open space, aesthetics, aquatic habitat, recreation (boating, trails, playing fields), wetlands and water quality mitigation. The applicant shall avoid using portions of the property exclusively for storm water management.

3.6.5 Accommodating flows from upstream tributary areas

Storm water runoff from areas tributary to the property shall be considered in the design of the property's drainage system. Flows from upstream areas that are not to be detained shall be routed around the basin being provided for the site being developed, in a manner designed to prevent adverse impact on neighboring property.

3.6.6 Subsurface drainage

Vacant parcels of land of five acres or more shall comply with the following:

- a. Prior to submittal of a preliminary plat of development, the developer shall retain the services of a qualified subsurface drainage consultant. The consultant shall locate all existing farm and storm drainage tiles by means of slit trenching and hand probing by persons qualified to do such work.

All existing drain tile lines encountered during the investigation shall be repaired to their original condition unless the tile line is to be abandoned, replaced or rerouted.

- b. The developer shall provide two mylar and four paper copies of a topographical boundary map locating these lines, showing:
 1. Location of each slit trench 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 and tile size;
 3. 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 silting, depth of ground cover, and soil texture at grade;
 - 4. Name, address and phone number of person or firm conducting the tile location investigation signed and sealed by the engineer.
- c. The developer shall take steps to preserve and protect the capacity and function of any existing subsurface drainage system as follows:
 - 1. Information collected during the drainage investigation shall be used to design and develop a new subsurface drainage system that will provide drainage for the newly created development. This new system shall not disrupt or alter the functional capacity of any existing or connected tile system.
 - 2. The new subsurface drainage system shall be included as part of the preliminary platting process. Existing and new drain tile lines shall be shown on a mylar overlay and will be submitted at the same time as the preliminary plat for review by the appropriate agencies.
- d. The developer shall not drain, fill or destroy any wetlands located on the parcel in question. The developer shall refer to the Stephenson County Soil and Water Conservation district to determine if wetlands are present on the parcel.
- e. The developer shall meet the detention requirements per Part 4 of this manual. Detention basins shall be designated as an outlot and follow requirements as identified in Part 4 of this manual.

3.6.7 Grading

Requirements for grading shall be as follows:

- a. All grading involved shall be in accordance with the construction plans to be submitted prior to final plat approval or beginning of construction.
- b. Grading shall be undertaken to minimize erosion and sedimentation (see Part 5).
- c. No occupancy permit shall be issued until the final grading has been completed in accordance with the approved drainage plan for the development and certified by the contractor. The certification must be submitted on forms provided by the City and approved by the Director of Community Development or her/his designee. At a minimum, the certification must show the finished grade at all lot corners and at the exterior

corners of any structure. Additional elevations ten feet opposite each exterior corner shall also be provided verifying a five percent pitch away from said structure. If the lot has defined drainage ditches, then the finished elevations every 25 feet along the ditch must be provided.

- d. No change of grade of the land may be effected until preliminary plat approval has been granted.
- e. No occupancy permit shall be issued until the contractor provides a certification by a registered engineer or land surveyor to the Director of Community Development on forms provided by the Community Development Department that any structure's foundation elevation complies with the grading plan for the subdivision or the grading plan approved by the Director of Community Development. The foundation shall not exceed six inches above or three inches below any approved foundation elevation.
- f. No backfill inspection will be conducted until the contractor provides a certification to the Director of Community Development or her designee on forms provided by the city that any structure's foundation elevation complies with the grading plan for the subdivision or, if no grading plan exists, the grading plan approved by the Community Development Department. The foundation shall not be below, or exceed, 12 inches above, the approved minimum foundation elevation.

3.8 FLOODPLAIN MANAGEMENT

Reference City of Freeport Codified Ordinance Chapter 1460.

PART 4 STORM WATER DETENTION DESIGN

4.1 STORM WATER DETENTION GENERALLY

4.1.1 General

A detention basin is the most common method to satisfy both stormwater detention and stormwater quality requirements. It is applicable to small and large developments, can be easily designed and constructed, is long-lasting, and can be aesthetically pleasing and durable while reducing peak flows (with adequate inspection and maintenance). This practice will also provide a significant reduction in sediment, as well as a partial reduction in nutrients, toxic materials, heavy metals, floatable materials, oxygen demanding substances, and oil and grease.

4.1.2 Minimization of Increases in Runoff Volumes and Rates

In the selection of a drainage plan for a new development or redevelopment, the applicant shall evaluate and implement site design features which minimize the increase in runoff volumes and rates from the site and addresses the water quality treatment requirements of this manual and its ordinance.

4.1.3 Water Quality and Multiple Uses

The drainage system shall be designed to minimize adverse surface and groundwater quality impact off-site and on the property itself. Detention basins shall incorporate design features to capture storm water runoff pollutants. In particular, designers shall ensure all flows from the development shall be routed through the basin (i.e. low flows shall not be bypassed, nor shall they be fast tracked through the detention basin). Detention of storm water shall be promoted throughout the property's drainage system to reduce the volume off storm water runoff and reduce the quantity of runoff pollutants.

An oil/water separator or other type of stormwater runoff pretreatment shall be required for drainage areas with greater than 50 percent impervious surface or where there may be a potential source of oil and grease contamination. In addition to most large parking lots, oil and grease contamination is also likely for vehicle fueling and maintenance facilities and shall also be required to provide onsite oil/water separation. Maintenance of the separator shall remain with the property owner.

The drainage system shall incorporate multiple uses where practicable. Uses considered compatible with storm water management include open space, aesthetics, (if wet basin) aquatic habitat, recreation (playing fields), wetlands (under Stephenson County Soil and Water Conservation direction), and water quality mitigation.

4.1.4 Regional Detention in Lieu of On-Site Detention

Regional detention is encouraged in lieu of constructing a detention basin on-site. Regional detention, where available, shall be constructed for the purpose of detaining storm water runoff for the entire drainage area. The release rate shall be less than or equal to

the five (5) year storm event, pre-developed condition. The long term maintenance of the regional detention basin shall be provided by the developer. The developer shall meet the requirements for maintenance set forth in the City of Freeport Codified Ordinances Chapter 1050. A dedicated easement shall be established for the basin using easement language per Section 4.3.2.1 of this manual

4.2 DESIGN AND SIZING CONSIDERATIONS

4.2.1 General

A permanent detention basin design must be stamped by a professional engineer licensed in the State of Illinois. The professional engineer must be qualified by education and experience to perform the necessary hydrologic and hydraulic calculations.

The City of Freeport Water & Sewer Commission requires the design of extended detention basins for wet and dry ponds.

4.2.2 Release Rates

Storm water management practices shall limit the peak discharge from the post-developed site to the peak discharge of the pre-developed site for the 5-year, 24-hour rainfall event, for all events upto and including the 100 year, 24-hour rainfall event. This requirement is intended to limit stream bank erosion downstream from the facility under bank-full flow conditions.

The release rate and required detention/volume shall be limited to the carrying capacity of downstream natural channels and downstream storm sewer capacity. The allowable release rate shall be reduced to that rate permitted by the receiving downstream sewer, streams, and channels; additional detention may be required to store that portion of the runoff exceeding the capacity of the receiving sewers, streams, and channels. For this purpose the capacity of downstream sewers shall be taken to mean the capacity when flowing full with no surcharge. When considering downstream sewers, runoff from upstream watersheds shall be based on the Design Storm Event. When considering downstream natural or other surface water courses, surface drainage runoff shall be based on a minimum 100-Year Storm Event.

In cases where the facility's discharge will not have adverse impact on the downstream conveyance system, the Executive Director of the Water & Sewer Commission may waive the release requirements, however, First Flush volume treatment may still required, see 4.2.4.

4.2.3 Detention Storage Requirements

The design maximum storage to be provided in a detention basin shall be based on the runoff from the 100-year event of the duration producing the maximum peak stormwater discharge and reservoir (also called modified Puls or level pool) routing. Detention storage shall be computed using hydrograph methods as described in Part 3 of this manual.

4.2.4 Water Quality Requirements

Water quality is obtained through the use of the first flush treatment volume. The first 0.5 inches of stormwater runoff, over the entire contributing drainage area of the development, is defined as the first flush volume (with a minimum value of 4500 cubic feet). The initial wave of stormwater runoff is more likely to contain aerially-deposited sediments, particulates from vehicles (such as incomplete combustion, dust from brake linings, tire particles), leaves, trash, cigarette butts, and other debris. The first flush volume must be captured and then slowly released over a minimum 24-hour period (and maximum of 72 hours). The overall goal for stormwater treatment is based on 75 percent removal of total suspended sediments for first flush volume. Upon certification from a professional engineer this requirement may be waived see section 4.2.5 of this manual.

Additional measures may be required to improve stormwater quality, depending upon the nature of the land use and expected pollutants. Pretreatment of stormwater runoff with a media filtration inlet or oil/water separator may be necessary.

A trash rack for capturing floating debris shall be considered standard equipment for a stormwater treatment BMP, and is required.

4.2.5 Design Requirements

The designer shall establish flow paths to minimize potential short-circuiting by locating the inlets as far away from the outlet structure as possible. The length-to-width ratio of a basin shall be at least 3:1. Baffles, earthen berms, or backslope drains may be used to prevent short-circuiting. The extended flow path slows the rate of flow and allows non-point source pollutants to settle and filter out.

If topography or aesthetics require the pond to have an irregular shape, the designer shall increase pond area and volume to compensate for the dead spaces. It is important to reduce the velocity of incoming stormwater using riprap or other energy dissipaters.

Installation of a sediment forebay shall be required for both dry and wet basin designs. The small basin within the main basin shall be separated by a berm or barrier near the inlet to trap and filter sediment and debris first entering the basin. The berm shall be constructed of earth or riprap and shall be vegetated. Upon presentation and certified statement from a professional engineer, the First Flush Volume pollutant reduction may be achieved by the forebay area and therefore the requirement for the First Flush Volume may be waived by the Executive Director of the Water & Sewer Commission.

Landscaping shall include native species with deep root systems to assist stormwater percolate into the ground and recharge groundwater. Landscaping plans with appropriate plantings to meet water velocities and encourage groundwater recharge shall be submitted with the final plat, see Part 5 Erosion and Sediment Control.

The use of low flow channels shall be subject to the approval and request of the Executive Director of the Water & Sewer Commission.

4.3 BASIN LOCATION AND LAYOUT

4.3.1 Utilities

Interaction with site utilities shall be considered during preliminary design. Typical utilities include electrical, telephone, cable TV, water, sewer, natural gas, and petroleum. These utilities may or may not be in a dedicated utility easement, and so the property owner shall be required to conduct a site survey. Detention basins (including embankments) shall not be permitted over public utility lines. Conversely, utility trenches shall not be constructed on existing detention basin structures.

4.3.2 Easements and Access

Detention basin easements and access shall be presented during preliminary design. Easements and access shall be granted according to the easement language in section 4.3.2.1 of this manual. Detention basins that are not frequently inspected and maintained may become a nuisance rather than a beneficial part of a stormwater management program. Access shall be provided for inspection and maintenance to the sediment forebay and to the outlet control structure. Appropriate signage to encourage or discourage public access to the detention basin (by using site grading, signs, fences or gates) shall be required. Additional safety elements, including trash racks, grating over pipes and culverts, gentle side slopes, shall be installed whenever possible, including increased visibility and/or lighting in residential areas.

4.3.2.1 Detention Basin Easement Provisions

The design company shall obtain easements at the time of award for and on behalf of the City. Language to be provided shall read: *An easement is hereby reserved for and granted to the City of Freeport, Illinois within the area as shown by dotted lines on the plat/drawing and marked "Detention Pond Easement" to provide for the periodic retention of surface runoff from the subdivision/private property. The City of Freeport shall not be responsible for the expense of construction or maintenance of said detention basin. The City, its agent, or designee shall have the right to enter upon said easement in the event the detention basin is not being maintained by the property owner to construct or maintain said detention pond, and collect the expenses incurred from the lot owners/housing association/property developer in the subdivision or from the party or parties responsible for the required construction or maintenance. No permanent buildings or obstructions shall be placed on said easement, but same may be used for gardens, shrubs, landscaping and other purposes that do not then and later interfere with the aforesaid uses or the rights herein granted. Other language, without change of intent, may be accepted subject to the Executive Director's approval.*

4.3.3 Location of Detention Basins

The location of detention basins shall be designed to avoid reasonable risk of flooding or damage to property or persons is avoided. The City of Freeport Water & Sewer Commission retains the right to define reasonable risk. The minimum separation between the right-of-way of a public street and the high water level of a detention basin or pond is 10 feet plus one and one (1.5) half times the maximum design depth of the detention facility.

4.4 EXTENDED WET DETENTION BASIN DESIGN

4.4.1 General

Wet detention basins shall be designed to remove storm water pollutants, to be safer, to be aesthetically pleasing, and as feasible, to be available for recreational use.

4.4.2 Design

a. Wet basins shall be at least three feet deep, excluding near-shore banks and safety ledges. If fish habitat is to be provided they shall be at least ten (10) feet deep over twenty-five percent (25%) of the bottom area to prevent winter kill.

b. The maximum side-slopes of a detention pond adjacent to a residential area, including multi-family developments, shall be 6 to 1 (6:1, or 6 feet horizontally for every 1 foot drop in elevation). The maximum side slopes of a detention pond adjacent to a commercial area shall be 4 to 1. The maximum depth of stormwater storage in a detention basin shall be 6 feet. This depth is measured from the normal water level elevation to the design high water elevation. It is recommended that native aquatic vegetation be established around the perimeter to provide protection from shoreline erosion. A vegetated buffer strip of at least 25 feet in width, preferably vegetated with native plant species, shall be maintained or restored around the periphery of wet basin where practical.

c. The basin shall be comprised of an inlet structure, forebay to be separated from the permanent pool by a submerged barrier, outlet structure with outfall protection, safety shelf, and spillway. The permanent pool volume in a wet basin at normal depth shall be equal to the runoff volume from its watershed for the 5 year, 24 hour event as a minimum.

d. The distance between detention inlets and outlets shall be maximized. Inlets and outlets shall be at opposite ends of the basin providing that the orientation does not create undue hardship based on topography or other natural constraints. Designers are encouraged to use baffles or berms in the basin bottom to prevent short-circuiting. There shall be no low flow bypass between the inlet and outlet. Paved low flow channels shall not be used.

e. Depending on the embankment soil, height of dam, and amount of compaction for the embankment, an anti-seep collar or a cutoff layer of compacted clay shall be required around the outlet pipe to prevent internal piping and erosion. An anti-seep collar shall extend at least one pipe diameter from the culvert in all directions, with compacted clay backfill using small mechanical tampers.

f. The developer shall provide a permanent means for vehicle access to the detention basin. Detention basins shall be located in a maintenance easement so that the City shall have the right to inspect the facility. This easement shall be free of large trees and excessive vehicle grades.

4.4.3 Aeration Facilities

Aeration facilities to prevent pond stagnation shall be provided. Design calculations to substantiate the effectiveness of these aeration facilities shall be submitted with final engineering plans. Agreements for the perpetual operation and maintenance of aeration facilities shall be prepared to the satisfaction of the City of Freeport Water & Sewer Commission. When detention basins have been designed to promote the growth of a riparian environment, the use of aeration devices may be waived with approval from the City. At least one quarter of the detention pond area (as measured at the normal water level) shall have a minimum depth of 10 feet below the normal water level to provide a refuge for fish to survive during the winter. A detention pond must have an 8-foot wide safety ledge located 3 feet below the normal water level where emergent plants are not desired, unless a justification is otherwise provided and approved by the City. This safety ledge provides a stopping point for someone who may have inadvertently fallen into the water.

4.4.4 Maintenance

Maintenance of detention basins is dealt with in more detail in the City of Freeport Codified Ordinances Chapter 1050. In general, provisions

shall be made to dredge, test, and properly dispose of the sediment on a regular basis. The responsibility of maintenance and long-term maintenance remain with the property owner/association/developer, and shall be performed by an Illinois licensed and qualified contractor.

A maintenance schedule, statement of procedures and cost estimate shall be part of the detention basin design. A maintenance agreement shall be created before constructing the basin for establishing responsible parties for maintenance, sediment cleaning, and repair.

4.5 EXTENDED DRY DETENTION BASIN DESIGN

4.5.1 General

In addition, to other requirements in this design manual, dry basins shall be designed to remove storm water pollutants, to be safe, to be aesthetically pleasing; and to the extent feasible, be available for multiple uses.

4.5.2 Design

a. Dry basins shall be designed so that eighty percent (80%) of their bottom area shall have standing water no longer than seventy-two (72) hours for any runoff event less than the 100 year, 24-hour event. Grading plans shall clearly distinguish the wet portion of the basin bottom. Under drains direct to the outlet may be used to accomplish this requirement.

b. The maximum side-slopes of a detention basin adjacent to a residential area, including multifamily developments, shall be 6 to 1 (6:1, or 6 feet horizontally for every 1 foot drop in elevation). The maximum side-slopes of a detention basin adjacent to a commercial area shall be 4 to 1. The maximum depth of stormwater storage in a detention basin shall be 6 feet. This depth is measured from the lowest point in the basin (located at the invert of the outlet pipe or at the rim elevation of an inlet grate) to the design high water elevation. It is recommended that native aquatic vegetation be established around the perimeter to provide protection from shoreline erosion. In no case shall a side slope exceed a 3 to 1 slope. A vegetated buffer strip of at least 25 feet in width, preferably vegetated with native plant species, shall be maintained or restored around the periphery of a dry basin.

c. Velocity dissipation measures shall be incorporated into dry basin designs to minimize erosion at inlets and outlets and to minimize resuspension of pollutants.

d. The distance between detention inlets and outlets shall be maximized. Inlets and outlets shall be at opposite ends of the basin providing that the orientation does not create undue hardship based on topography or other natural constraints. Designers are encouraged to use baffles or berms in the basin bottom to prevent short-circuiting. There shall be no low flow bypass between the inlet and outlet.

e. A sediment trap shall be constructed at each major inlet to a dry basin during construction. The Illinois Urban Manual is an accepted reference for design of sediment traps.

f. To prevent the outlet from clogging, the designer shall include trash racks or other debris barriers with a maximum opening size of 6 inches on all outlet structures. Trash racks shall be placed at an angle to the direction of flow to force debris up and away from the outlet opening. The racks shall be regularly cleaned and maintained in accordance with the maintenance agreement or for pre existing conditions by the property owner.

g. Provide a permanent means for vehicle access to the detention basin. Detention basins shall be located in a permanent easement to ensure the City have the right to inspect the facility. The easement shall be free of large trees and excessive vehicle grades.

h. The bottom of a detention basin must be sloped toward the outlet or inlet grate(s) to provide drainage after it has stored stormwater. The bottom slope shall be 2 percent with an allowable range of 1.5 percent minimum to 2.5 percent maximum.

4.5.3 Infiltration practices

To effectively reduce runoff volumes, infiltration practices including basins, trenches, and porous pavement shall be located on soils in hydrologic soil groups "A" or "B" as designated by the U.S. Soil Conservation Service. Infiltration basins and trenches designed to recharge groundwater shall not be located within 1000 feet of a water supply well or 100 feet of a building foundation. A sediment settling basin shall be provided to remove coarse sediment from storm water flows before they reach infiltration basins or trenches. Storm water shall not be allowed to stand for more than 72 hours over eighty percent of a dry basin's bottom area for the maximum design event to be ex-filtrated. The bottom of infiltration facilities shall be a minimum of four feet above seasonally high groundwater and bedrock.

If a request is made to reduce the volume of the basin based on proposed infiltration rates, soil borings and infiltration rates shall be submitted to support the detention basin design.

4.5.4 Maintenance

Maintenance of detention basins is dealt with in more detail in Chapter 1050 of the City of Freeport Codified Ordinances. In general, provisions must be made to dredge, test, and properly dispose of the sediment on a regular basis. The responsibility of ongoing and long-term maintenance shall remain with the property owner/ association/ developer, and shall be performed by a licensed and qualified contractor.

A maintenance schedule, statement of procedures and cost estimate shall be part of the detention basin design. A maintenance agreement shall also be developed before constructing the basin for establishing responsible parties for maintenance, sediment cleaning, and repair.

4.6 EMERGENCY SPILLWAY

4.6.1 General

An emergency spillway shall be included in addition to the primary outlet structure on a detention basin. The purpose of this spillway is to pass storm events that exceed the design capacity of the pond, in order to prevent overtopping the embankment. The emergency spillway shall be located over an undisturbed abutment area and not over the embankment fill for stability reasons, except where approved by the Executive Director of the Water & Sewer Commission. The emergency spillway capacity shall be designed to prevent overtopping the embankment structure or dam during a storm event commensurate with the impoundment volume, dam size, and downstream flood hazard potential in event of dam failure. The minimum spillway capacity shall be capable of handling a 100-year storm event.

4.7 OUTLET STRUCTURE

4.7.1 Headwalls

Detention basin outlet structures shall be constructed of durable materials, such as concrete or masonry block. Corrugated metal pipe (CMP) and plastic (HDPE) risers and drain pipes *shall not be approved*. A concrete outlet structure is generally preferable to a masonry block structure. Provisions shall be made for sufficient reinforcement and anchoring.

4.7.2 Pipe Flow Restriction

Where a single pipe or orifice is to be used to control discharge, it shall have a minimum diameter of twelve (12) inches. If the design release rate calls for a smaller outlet, a design that minimizes the possibility of clogging shall be used. If an outlet restrictor is required to meet design, it shall be placed such that maintenance can be performed, i.e. placed in an accessible manhole structure downstream of the detention basin outfall. The specific flow-controlling elements of an outlet structure may include one or more of the following: a circular orifice, a noncircular orifice, a rectangular weir, a trapezoidal weir, a triangular weir, a V-notch weir, culvert entrance control or a riser overflow opening.

4.8 RETAINING WALLS USED FOR DETENTION FACILITIES

Retaining walls are not permitted in or adjacent to single-family residential developments. Where permitted, retaining walls around stormwater detention facilities shall not exceed three feet in height. If a wall greater than 3 feet in height is required, the wall must be terraced after the first 3 feet high lift. A minimum horizontal space of 8 feet shall be required between wall lifts. A landscape buffer shall be required around the back of the bottom retaining wall.

4.9 UNDERGROUND DETENTION

Underground storage shall be allowed and recommended as an alternative to a surface detention facility. The City shall require that the owner of an underground detention facility have a qualified engineer inspect the system annually and subsequently furnish an inspection report to the City. The report shall include a certification that the condition of the detention system is such that it will operate in accordance with the original design intent. Detention easement language submitted with the final plat for the development shall include specific language to cover this requirement.

4.10 USE OF PUBLIC STREETS FOR DETENTION PROHIBITED

Public street pavements shall not be used for stormwater detention storage.

4.11 DETENTION REQUIREMENTS FOR FLOODPLAINS, FRINGE AREAS, AND WETLANDS

4.11.1 Detention in floodplains

The placement of detention basins within the floodplain shall not be permitted because of questions about their reliable operation during flood events. However, the storm water detention requirements of his ordinance may be fulfilled by providing detention storage within flood fringe areas on the project site provided the following provisions are met.

4.11.2 Detention in flood fringe areas

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. The release from the detention storage provided shall still be controlled consistent with the requirements of this section. The applicant shall demonstrate its operation for all stream flow and floodplain backwater conditions. Excavations for compensatory storage along watercourses shall be opposite or adjacent to the area occupied by detention. 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. All compensatory storage excavations shall be constructed to drain freely and openly to the watercourse.

4.11.3 Detention in wetlands

Existing wetlands shall not be modified for the purposes of storm water 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. Existing depression storage in wetlands shall be maintained and the volume of detention storage provided to meet the requirements of the section shall be in addition to this existing storage.

4.11.3.1 Drainage into wetlands

Wetlands shall be protected from damaging modifications and adverse changes in runoff quality and quantity associated with land developments. In addition to the other requirements of this section, the following requirements shall be met for all developments whose drainage flows into wetlands.

a. Sediment control

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

b. Detention/sedimentation

All runoff from the development shall be routed through a preliminary detention/sedimentation basin designed to capture the five-year, 24-hour event and hold for at least 24 hours, before being discharged to the wetland. This basin shall be constructed before property grading begins.

c. Vegetated buffer strip

A buffer strip of at least 25 feet in width, preferably vegetated with native plant species, shall be maintained or restored around the periphery of the wetland.

4.12 EARLY COMPLETION OF DETENTION FACILITIES

Where detention, retention, or depressional storage areas are to be used as part of the drainage system for a property, they shall be constructed as the first element of 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.

4.13 PUBLIC SAFETY

4.13.1 Safety considerations

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.

Avoid steep slopes and drop-offs; consider routes for escaping the detention basin if a person accidentally falls in. Avoid depths over 4 feet when possible.

4.13.2 Safety Design Features

All wet detention basins shall have a level safety ledge at least 4 feet in width, 2.5 to 3 feet below the normal water depth.

Velocities throughout the surface drainage system shall be controlled to safe levels, taking into consideration rates and depths of flow. When velocities exceed 6 feet per second, proper safety measures shall be provided and approved the Executive Director of the Water & Sewer Commission. Velocity calculations shall be submitted to the Director.

All storm water detention basins shall be provided with an overflow structure capable of safely passing excess flows at stage at least one foot below the lowest foundation in the vicinity of the detention basin. The design flow rate of the overflow structure shall be equivalent to the 100 year, 24 hour inflow rate.

PART 5

EROSION AND SEDIMENT CONTROL REQUIREMENTS

5.1 GENERAL

5.1.1 Objective

It is the objective of this section to control soil erosion and sediment caused by development activities, including clearing, grading, stripping, excavating, and filling of land within the City. Measures taken to control soil erosion and offsite sediment runoff shall be adequate to assure that sediment is not transported from the site by a storm event of ten-year frequency or less.

5.1.2 Applicability

Except as otherwise provided in this section, no person shall commence or perform any clearing, grading, stripping, excavating, or filling of land as described in the following provisions without having first obtaining approval. To obtain approval, a complete set of construction plans, including a detailed erosion and sediment control plan must be submitted for:

- a. Any land disturbing activity (i.e., clearing, grading, stripping, excavation, fill or any combination thereof) that will affect an area in excess of 5,000 square feet.
- b. Any land disturbing activity that will affect an area in excess of 500 square feet if the activity is within 100 feet of a lake, pond, stream, storm drainage systems, floodplain, or wetland; or
- c. Excavation, fill, or any combination thereof that will exceed 100 cubic yards.
- d. The City of Freeport Water & Sewer Commission reserves the right to require any non-agricultural, construction development activity, regardless of disturbed area or type of activity, to comply with this section if it is determined to be the cause of, or a contributor to, an existing or potential erosion, sediment, or stormwater impact. All developments, whether a permit is required or not, shall incorporate stormwater management measures that control and manage runoff from such developments, as provided in this section.

Erosion and sediment control planning for individual home sites may submit an erosion and sediment control plan without construction plans.

5.1.3 Exceptions

- a. Agricultural use of land, including the implementation of conservation measures included in a farm conservation plan approved by the appropriate soil and water conservation district, and including the construction of agricultural structures.

- b. Installation, renovation, or replacement of a septic system to serve an existing dwelling or structure.
- c. Repair work by utilities such as ComEd, NICOR Gas, cable television services, and City utilities, as long as such repair work involves a total ground area disturbed less than 5,000 square feet, is completed within 72 hours, and an erosion control mat is placed with seed for areas greater than 100 square feet on a slope greater than or equal to 3 percent. Disturbed areas on slopes less than 3 percent do not require erosion control matting, but shall require seeding.

5.2 APPLICATION FOR EROSION CONTROL PERMIT

5.2.1 Application for approval

The application shall be made by the owner of the property or his/her authorized agent to the City of Freeport Water & Sewer Commission. Each application shall bear the name(s) and address (es) of the owner or developer of the site and of any consulting firm retained by the applicant together with the name of the applicant's principal contact at such firm, and shall be on file at the City. Each application shall require the signature of a licensed professional engineer as an assurance that the development will take place in accordance with the approved plans. Each application shall include certification that any land clearing, construction, or development involving the movement of earth shall be in accordance with the plans approved upon issuance of the permit.

5.2.2 Design Principles

The following principles shall apply to all regulated development activities within the city and to the preparation of the submissions required of this section:

- a. Plan the development to fit the particular topography, soils, drainage patterns, and natural vegetation of the site.
- b. Preserve and protect areas of natural vegetation on the site.
- c. Take special precautions to prevent damages which could result from development activity.
- d. Minimize the extent and duration of the area exposed at one time.
- e. Apply temporary erosion control practices as soon as possible to stabilize exposed soils and prevent on-site damage.
- f. Install sediment basins or traps, filter barriers, diversions, and perimeter control prior to site clearing and grading to protect disturbed areas from off-site and on-site runoff, and to prevent sediment damage to areas located downslope of the development site.

- g. Keep runoff velocities low, less than 4.5fps, and provide for retention of runoff on the site.
- h. Provide measures to prevent sediment from being tracked onto public or private roadways.
- i. Implement final grading and install permanent vegetation on disturbed areas as soon as possible.
- j. Emphasize erosion controls first then address sediment control.

5.2.3 Submittals

Each application for an approved erosion and sediment control permit shall be accompanied by the following plans, data and information which, upon approval of the City and issuance of an erosion and sedimentation control permit, shall constitute the erosion and sedimentation control plans for the parcel:

- a. Name, phone number, and address of applicant, common address, property PIN, and legal description of the site where the development will take place, mailing address of property owner and the signature of the applicant or the applicant's agent.
- b. A map showing sufficient detail to enable easy field location of the site for which the plan approval is sought, and including the boundary line and approximate acreage of the site, and a legend and scale. The legend shall describe or explain any and all map symbols, abbreviations, or acronyms used on the map.
- c. Plan Drawing
 - 1. Show existing topography of the site and adjacent land within approximately 100 feet of the boundaries, drawn at no greater than two-foot (2') contour intervals and clearly portraying the conformation and drainage pattern of the area. All topographic information drawn or shown on any map shall represent elevations acquired from site specific survey work, not a reproduction of United States Geologic Survey topographic maps or similar product. The scale of such maps shall not exceed one inch of map distance equaling 100 feet of ground distance.
 - 2. Show the location of existing buildings, structures, utilities, streams, lakes, floodplains, wetlands, and depressions, drainage facilities, vegetative cover, paved areas, and other significant natural or man-made features on the site and adjacent land within 100 feet of the boundary.

3. Provide a general description of the predominant soil types on the site, their location, and their limitations for the proposed use.
4. Identify the proposed use of the site, including present development and planned utilization; areas of clearing, stripping, grading, excavation, and filling; proposed contours, finished grades, and street profiles; provisions for storm drainage, including storm sewers, swales, detention basins, and any other measures to control the rate of runoff, with a drainage area map indicating flow direction and calculations; types and locations of utilities; and areas and acreage proposed to be paved, covered, sodded or seeded, vegetative stabilized, or left undisturbed. Any map used to portray this information shall be prepared at the same scale as the topographic map referenced above.

5.2.3.1 Erosion and Sediment Control Plan

The plan shall include a narrative and shall be submitted showing all measures necessary to meet the objectives of this section throughout all phases of construction. The development of a soil erosion and sediment control plan shall follow the requirements of this section and the procedures in the latest edition of the "Illinois Procedures and Standards for Urban Soil Erosion and Sediment Control" (commonly known as the Green Book). Permanent erosion and sediment control features needed at the completion of any development site shall be included in the submittal. The submitted erosion and sediment control plan shall include:

- a. Location and description, including standard details, of all sediment control measures and design specifics of sediment basins and traps, including outlet details.
- b. Location and description of all soil stabilization and erosion control measures, including seeding mixtures and rates, types of sod, method of seedbed preparation (type and extent of tillage, weed control, planting equipment, etc.), expected seeding dates, type, method and rate of lime and fertilizer application (soil fertility testing required), kind and quantity of mulching for both temporary and permanent vegetative control measures, and types of nonvegetative stabilization measures.
- c. Location and description of all runoff control measures, including diversions, waterways, and outlets.

- d. Location and description of methods to prevent tracking of sediment offsite, including construction entrance details, as appropriate.
- e. Description of dust and traffic control measures.
- f. Locations of stockpiles and description of stabilization methods.
- g. Description of offsite fill or borrow volumes, locations, and methods of stabilization.
- h. Provisions for maintenance of control measures, including type and frequency of maintenance, easements, and estimates of the cost of maintenance.
- i. Identification (name, address, and telephone) of the person(s) or entity which will have legal responsibility for maintenance of erosion control structures and measures during development and after development is completed.

5.2.3.2 Proposed Phasing

A proposed phasing plan shall include stripping and clearing, rough grading, and construction, and final grading and landscaping. Phasing shall identify the expected date on which clearing will begin, the estimated duration of exposure of cleared areas, and the sequence of installation of temporary sediment control measures (including perimeter controls), clearing and grading, installation of storm drainage, paving streets and parking areas, final grading and the establishment of permanent vegetative cover, and the removal of temporary measures. It shall be the responsibility of the applicant to notify the City's public works department and/or their authorized review agent of any changes which occur in the site development schedule after the initial erosion and sediment control plan has been approved.

5.2.4 Authority to Waive

The City of Freeport Water & Sewer Commission may waive specific requirements for the content of submissions upon finding that the information submitted is sufficient to show that the work will comply with the objectives and principles of this section.

5.3 REVIEW AND APPROVAL

Each application for an approved erosion and sediment control plan shall be reviewed and acted upon according to the following procedures:

5.3.1 Review Process

The City of Freeport Water & Sewer Commission shall review each application for an erosion and sedimentation control permit to

determine its conformance with the provision of this section. The City may also refer any application to the Stephenson County Soil and Water Conservation and/or any other State agency within whose jurisdiction the site is located for review and comment. Any fees incurred by such a referral shall be paid by the person applying for the permit. The City's approval or disapproval of each application shall be submitted in writing to applicant and copied to the Department of Community Development. The applicant shall submit all required items to the district the same day that the application is made to the City. The Executive Director of the Water & Sewer Commission shall:

- a. Review the applicant's soil erosion and sediment control plans regarding the adequacy (effectiveness) to address the provisions of this section. The Director may retain the services of a certified professional in erosion and sediment control (CPESC) to perform the services outlined in this section, if warranted. See Ordinance 1050 for applicability of fees.
- b. Attend a preconstruction meeting with the applicant or designated agent to review implementation of erosion and sediment control plans.
- c. Conduct on-site inspections during the active construction phases of land development projects to determine whether site development is in compliance with the approved erosion and sediment control plans, and determine adjustments needed to the approved plans. After construction has been completed, determine whether permanent site stabilization has been achieved and identify operation and maintenance needs.
- d. Prepare correspondence as needed regarding the effectiveness (or corrective measures needed) or adequacy of soil erosion and sediment control measures.
- e. Consult with land developers, consultants, and contractors concerning the design criteria, installation and maintenance procedures and other information regarding conservation practices recommended under the provisions of this section.

5.3.2 Approval Process

- a. After review of the application and required submissions, if the Executive Director of the Water & Sewer finds them to be in conformance with the provisions of this section, he or she shall approve the erosion and sediment control plan.
- b. Executive Director of the Water & Sewer may approve the erosion and sediment control plan subject to such reasonable conditions as may be necessary to secure substantially the objectives of this section, and issue the approval subject to these conditions.

- c. Should the Director disapprove the erosion and sediment control plan, he or she shall indicate the deficiencies and the procedure for submitting a revised application and/or submission.
- d. The City shall receive a performance bond as outlined in Section 5.3.4 of this manual.

5.3.3 Reason for Denial

No approval for an erosion and sediment control plan shall be issued for an intended development site unless one or more of the following conditions have been met:

- a. The development, including but not limited to subdivisions and planned unit development, has been approved by the city where applicable; or such permit is accompanied by or combined with a valid building permit issued by the City Building Inspector; OR
- b. The proposed earth moving is coordinated with any overall development program previously approved by the City for the area in which the site is situated; AND
- c. All relevant Federal and State permits including, but not limited to NPDES, 404, 401, NRI's, have been received for the portion of the site subject to soil disturbance.

5.3.4 Bonds

The applicant shall be required to file with the City a performance bond, letter of credit, or other improvement security satisfactory to Corporation Counsel in an amount deemed sufficient by the City to cover all costs of improvements, landscaping, maintenance of improvements and landscaping, and soil erosion and sediment control measures for such period as specified by the City, and engineering and inspection costs to cover the cost of failure or repair of improvements installed on the site.

5.4 DESIGN AND OPERATION STANDARDS

5.4.1 Requirements

All clearing, grading, stripping, excavating, and filling which is subject to the approval requirements of this section shall be subject to the applicable standards and requirements set forth and/or referenced in this section.

5.4.1.1 Responsibility

The permittee shall not be relieved of responsibility for damage to persons or property otherwise imposed by law, and the City or its officers or agents, including the directors and staff of the City will not be made liable for such damage, by:

- a. The issuance of a permit under this section;

- b. Compliance with the provisions of that permit or with conditions attached to it by the City;
- c. Failure of the City officials to observe or recognize hazardous or unsightly conditions;
- d. Failure of the City officials to recommend denial of or to deny a permit; or
- e. Exemptions from the permit requirements of this section.

5.4.1.2 General Site Design

Practice standards and specifications for measures outlined in the soil erosion and sediment control plan shall follow criteria in the latest edition of the "Illinois Urban Manual: A Technical Manual Designed for Urban Ecosystem Protection and Enhancement", which is hereby incorporated into this section by reference.

The City may waive specific requirements upon finding that the objectives and principles of this section have been met.

5.4.2 Onsite Sediment Control Measures

Such measures as specified by the following criteria, shall be constructed and functional prior to initiating clearing, grading, stripping, excavating or fill activities on the site.

- a. For disturbed areas draining less than one acre, filter barriers, including filter fences (heavy duty fabric only) or equivalent control measures shall be constructed to control all offsite runoff. Vegetated filter strips, with a minimum width of 35 feet, may be used as an alternative only where runoff is expected to be sheet flow (vegetated filter strips must be established prior to land disturbing activities).
- b. Filter barriers are appropriate sediment control measures for small drainage areas where concentrated flow is not present or expected.
- c. For disturbed areas draining more than one but less than five acres, a sediment trap or equivalent control measure shall be constructed at the downslope point(s) of the disturbed area(s). Sediment barriers such as silt fences are ineffective and unreliable in such situations.
- d. For disturbed areas draining more than five acres, a sediment basin or equivalent control measure shall be constructed at the downslope point(s) of the disturbed area(s).
- e. Sediment basins and sediment trap designs shall provide for both detention storage and sediment storage. The

detention storage shall be composed of equal volumes of "wet" detention storage and "dry" detention storage and each shall be sized for 25-year, 24-hour runoff from the site under maximum runoff conditions during construction. The release rate of the basin shall be that rate required to achieve minimum detention times of at least ten hours. The elevation of the outlet structure shall be placed such that it only drains the dry detention storage.

- f. The sediment storage shall be sized to store the estimated sediment load generated from the site over the duration of the construction period with a minimum storage equivalent to the volume of sediment generated in one year. For construction periods exceeding one year, the one-year sediment load and a sediment removal schedule may be substituted at the Executive Director of the Water and Sewer Commission's discretion.
- g. A site requiring onsite dry detention basins may incorporate sediment storage into an alternate use for the basins. This shall be stated on the plans and be in narrative form also to describe the dual function of the basins during construction. Use of wet detention basins is not allowed. Removal of the sediment shall be required for final inspection and approval of the basin.

5.4.3 Open Stormwater Systems

Stormwater conveyance channels, including ditches, swales, and diversions, and the outlets of all channels and pipes shall be designed to withstand the expected flow velocity from the 100-year frequency storm without erosion. All constructed or modified channels shall be stabilized within 48 hours, consistent with the following standards:

- a. For grades up to four percent ($<4\%$), seeding in combination with mulch, erosion blanket, or an equivalent control measure shall be applied. Sod or erosion blanket or mat shall be applied to the bottom of the channel.
- b. For grades of four to eight percent ($4-8\%$), sod or an equivalent control measure shall be applied in the channel.
- c. For grades greater than eight percent ($>8\%$), rock, riprap, or an equivalent control measure shall be applied, or the grade shall be effectively reduced using drop structures.

5.4.4 Temporary and Permanent Stabilization

Disturbed areas shall be stabilized with temporary or permanent measures within ten days following the end of active disturbance, or redisturbance, consistent with the following criteria:

- a. Temporary or permanent stabilization measures shall include seeding, mulching, sodding, and/or non-vegetative measures.

- b. Areas having slopes greater than 12 percent shall be stabilized with sod, mat or blanket in combination with seeding. The use of any stabilization mat, blanket, or sod shall require the implementation of approved standards and specifications for installation procedures.
- c. Whenever channel relocation is necessary, the new channel shall be constructed in dry conditions and be fully stabilized before flow is diverted.

5.4.5 General Control Measures

- a. Storm sewer inlets and culverts shall be protected by sediment traps or filter barriers meeting accepted design standards and specifications.
- b. Soil storage piles containing more than ten cubic yards of material shall not be located with a downslope drainage length of less than 25 feet to a roadway or drainage channel. Filter barriers, including silt fence, or equivalent, shall be installed immediately around the perimeter of the soil storage pile(s).
- c. If dewatering devices are used, discharge locations shall be protected from erosion. All pumped discharges including discharge water from basement sump pumps, shall be routed through appropriately designed sediment traps or basins or equivalent.
- d. Each site shall have graveled (or equivalent) entrance roads, access drives, and parking areas of sufficient length and width to prevent sediment from being tracked onto public or private roadways. A wash down area may be approved, provided there is adequate storm drain protection. Any sediment reaching a public or private roadway shall be removed by shoveling or street cleaning (not flushing with water) before the end of each workday and transported to a controlled sediment disposal area.
- e. All temporary and permanent erosion and sediment control practices shall be maintained and repaired as needed to assure effective performance of their intended function.
- f. All temporary erosion and sediment control measures shall be disposed of within 30 days of final site stabilization with permanent soil stabilization measures. Trapped sediment and other disturbed soils resulting from the disposition of temporary measures shall be permanently stabilized to prevent further erosion and sedimentation.

5.5 MAINTENANCE OF CONTROL MEASURES

All soil erosion and sediment control measures installed to meet the requirements of this section shall be maintained by the applicant or subsequent land owner during the period of land disturbance and development of the site in a satisfactory manner to ensure adequate performance. Responsibility for maintenance of the control measures shall be established in the maintenance agreement as outlined in Chapter 1050 of the City of Freeport Codified Ordinances and recorded with the deed. The applicant or the contractor responsible for maintaining the erosion and sediment control practices shall inspect all such practices at least once every seven days or immediately following a precipitation event equal to or exceeding 1/2 inch of rainfall in a 24-hour period of time.

5.6 INSPECTION

The City shall make inspections as hereinafter required and shall either approve that portion of the work completed or shall notify the permittee wherein the work fails to comply with the site development or erosion and sediment control plan as approved.

5.7 SPECIAL PRECAUTIONS

5.7.1 Grading

If at any stage of the grading of any development site the city determines by inspection that the nature of the site is such that further work authorized by an existing permit is likely to imperil any property, public way, stream, lake, wetland, or drainage structure, the City may require, as a condition of allowing the work to be done, that such reasonable special precautions to be taken as are considered advisable to avoid the likelihood of such peril. "Special precautions" may include, but are not limited to, a more level exposed slope, construction of additional drainage facilities, berms, terracing, compaction, cribbing, installation of plant materials for erosion control, and recommendations of an Illinois licensed soils engineer, certified professional erosion and sediment control specialist, or licensed professional geologist which may be made a requirement for further work.

5.7.2 Property Damage

Where it appears that storm damage may result because the grading on any development site is not complete, work may be stopped and the permittee required to install temporary structures or take such other measures as may be required to protect adjoining property or the public safety. On large developments or where unusual site conditions prevail, the City may specify the time of starting grading or completion of, or may require that the operations be conducted in specific stages so as to ensure completion of protective measures or devices prior to the advent of seasonal rains.

PART 6 MATERIAL SPECIFICATIONS

6.1 MATERIAL SPECIFICATIONS

The City of Freeport Water & Sewer Commission approves the follow storm sewer construction materials. Designers may submit in writing to the Commission alternatives to the products in this specification.

6.2 REFERENCED STANDARDS

Specific technical aspects of all storm sewers shall be designed in accordance with this manual and in accordance with, but not limited to, the following design standards:

- a. IDOT Drainage Manual
- b. IDOT Standard Specifications for Road and Bridge Construction
- c. Standard Specifications for Water & Sewer Main Construction in Illinois

6.3 STORM SEWER PIPE

Pipe material shall conform to IDOT Standard Specifications for Road and Bridge Construction, with the exception of metal pipe conforming to IDOT Standard Article 1006.1 (a), (b), (d), or (h), which shall not be approved. Other pipe material may be approved if, such as plastic pipe and drainage structures such as those supplied by Advanced Drainage Systems (ADS) and Nyloplast Engineered Surface Drainage Products, if, in the opinion of the Executive Director of the Water & Sewer Commission, the location and use will not create additional maintenance or cost for the City. Alternate pipe materials will require strict adherence to City of Freeport Water & Sewer Commission requirements and the industry standard (ASTM, etc.) material and installation requirements.

- a. In non-paved areas, the minimum cover from the top of the pipe to the finished grade shall be 2 feet.
- b. Minimum cover from the bottom of the pavement to the top of the pipe shall be 1 feet.
- c. No curved alignments shall be allowed. Manholes or inlets shall be provided at all changes in direction.
- d. Minimum separation between utilities shall conform to Standard Specifications for Water & Sewer Main Construction in Illinois.
- e. All easements shall conform to Part 3 of this Manual.
- f. Minimum public storm sewer size shall be 12 inches in diameter.

- g. Catch basins (as defined by the IDOT standards) or other structures with sumps shall not be allowed for use on public storm sewer systems.
- h. Areas within the rights-of-way that require backfill shall be constructed with IDOT Trench Backfill. All other locations shall be backfilled in accordance with Article 542.03 Method 1 for storm sewer construction in the IDOT Standard Specifications.

6.4 CASTING / FRAME AND GRATES

6.4.1 Heavy Duty Castings

Storm inlet and manhole castings located in the right-of-way and in areas subject to vehicular traffic shall be heavy duty. The following applications are referenced by Neenah Foundation Catalogue Number, 12th edition. Similar casting provided by another manufacturer may be acceptable and are subject to approval by the Executive Director of the Water & Sewer Commission.

Casting Location	Neenah Casting* Number
Barrier Curb	R-3246 (AL), Type C, L, & R, embossed "DUMP NO WASTE DRAINS TO RIVER" with fish logo.
Driveway or Sidewalk Conflict	R-3508-A2
Barrier Curb, High Runoff Volume	N/A – use IDOT Curb Opening Inlet with access through concrete top slab.
Backyard or Area Drains	R-4353
Storm Manholes frame and cover /Inlets	R-1713 embossed "STORM SEWER" Non-Rocking

* Or an approved equivalent.

6.4.2 Pavement Castings

Castings located within a paved area shall be set in a full bed of mortar and sealed completely around the outside with concrete.

6.4.3 Yard / Parkway Castings

Castings located outside a paved area shall be set in a full bed of mastic and shall be constructed with an external chimney seal.

6.4.4 Constructed Elevation

Castings located in unpaved areas that are designed to accept storm water flows shall be constructed with the top of the casting 1 in. below the adjacent ground surface. All other castings located in unpaved areas that are not designed to accept storm water flows shall be constructed with the top of the casting one (1) inch above the adjacent

ground surface. The frame and grate will be constructed to the plan elevation in accordance with Standard Specification for Road and Bridge Construction. A maximum of 8 inches of adjusting rings shall be allowed.

6.5 MANHOLES

6.5.1 General

- a. All manholes shall conform to IDOT standards for a Type A manhole.
- b. Manholes shall be installed at the end of each storm sewer line, at all changes in grade or alignment, at all storm sewer intersections, and at distances not to exceed 400 feet. Greater spacing may be permitted in storm sewers larger than 48 inches in diameter.
- c. Minimum drop between influent and effluent pipes in a manhole, if there is no change in pipe diameter, shall be 0.1 feet. and the desirable maximum drop shall be 24 inches.
- d. When the influent and effluent pipes differ in diameter, no hydraulic losses shall be allowed. In manholes where pipe sizes change, the hydraulic grade lines shall be matched by setting the larger effluent pipe invert at 0.8 (deff-dinf) below the influent pipe invert. An example of calculating the drop across a manhole with a 24 in. outlet (effluent) and a 12 in. inlet (influent) is calculated by the following method:

Outlet pipe diameter (in feet) - inlet pipe diameter (in feet) = elevation difference in feet (2.0 ft.-1.0 ft. =1.0 ft.). Then the elevation difference times 0.8 (1.0 ft. x 0.8 = 0.8 ft.).

The outlet pipe invert is lowered a minimum of 0.8 feet below the inlet pipe invert.

6.5.2 Specifications

- a. Precast circular reinforced concrete structures - ASTM C478 and ASTM C443.
- b. Size:
 - For sewers 18 inches in diameter or less, manholes shall have a 48 inch inside diameter.
 - For sewers 21 to 36 inches in diameter, manholes shall have a 60 inch inside diameter.
 - For sewers greater than 36 inches in diameter, manholes shall have an offset riser pipe of 48 inch inside diameter.
- c. No more than four (4) precast concrete or composite adjusting rings with an eight (8) inches maximum height adjustment shall be allowed.

- d. All pipe connection openings shall be precast with mastic watertight pipe to manhole seals. Manhole ring sections shall be sealed using watertight mastic. External flexible watertight sleeves shall also be used from the manhole cone to the manhole frame.
- e. All bottom sections shall be precast concrete including bases and poured concrete invert flowlines.
- f. Manhole steps - Neenah No. R-1981-I or approved plastic. IV - 17.

6.6 CRUSHED GRANULAR BEDDING

Crushed aggregate - IDOT CA-7, CA-11, or approved equal.

6.7 HEADWALLS/FLARED END SECTIONS

Storm pipes discharging to rivers or streams shall terminate at a reinforced concrete headwall with wing walls or with a precast concrete flared end section and rip-rap, as permitted by the Executive Director of the Water & Sewer Commission, IDOT (Division of Water Resources) and/or U.S. Army Corp. of Engineers. Approved grating and/or screens with locking devices shall be installed on all end sections and headwalls unless waived by the Executive Director.

6.7.1 Flared End Section - Rip Rap

Rip rap shall be per section 281 of the IDOT Standard Specification for Road and Bridge Construction and shall include filter fabric. Rock shall be no less than Gradation No.3*.

*Design calculations for rip rap size and area covered based upon velocity of maximum discharge shall be required.

6.8 LOADINGS

The depth to which a particular type or class of pipe may be used shall be selected to provide protection against structural failure when subject to all future dead loads, live loads and impact. For design purposes, live load plus impact shall be assumed to be in no case less than that resulting from a surcharge at the ground surface of 250 pounds per square foot.

In computing trench loading, the Marston formula or table based on the Marston formula shall be used with proper consideration for pipe material, class, trench width and depth.

PART 7 CONSTRUCTION REQUIREMENTS

7.1 GENERAL

The requirements in this section are specific to the City of Freeport Water & Sewer Commission and do not supersede responsible construction practices such as the Illinois Department of Transportation (IDOT) Standard Specifications for Road and Bridge Construction or the Standard Specification for Water & Sewer Main Construction in Illinois, which shall remain in place and supplement the following conditions.

7.2 PRE CONSTRUCTION

All work subject to adoption by the City of Freeport Water & Sewer Commission shall be discussed at a pre construction meeting to be arranged by the developer/property owner/design engineer/contractor.

At the pre construction meeting any modifications or requests to change materials shall be made to the City.

7.3 COMMUNICATION REQUIREMENTS

Prior to commencing any storm water improvements, the City of Freeport Water & Sewer Commission shall be contacted at 815.233.1686 or 815.297.1166 a minimum of two (2) business days in advance.

7.4 INSPECTION

General site grading shall not begin until the Executive Director of the Water & Sewer Commission has received confirmation in writing from the design engineer necessary detention facilities are in place and operational. At which time the Executive Director shall notify the Community Development Director the basins are established.

7.4.1 Detention Basin Inspection

Inadequate storage is the most frequent problem that occurs in the design review before construction, and also for the as-built review after construction. This can occur for several reasons:

- a. The design engineer did not allow enough room to construct the detention basin (most often due to insufficient design detail such as slope transitions, setbacks, parking lot widths, inaccurate contours, utilities not shown).
- b. The engineer who performs the stormwater computations is not the same person as the design engineer who does site layout and grading. The required detention storage volume and outlet structure details need to be communicated clearly to the design engineer for inclusion on the plans and for construction layout.

- c. The construction contractor does not correctly follow the design plans, and consequently, does not excavate deep enough or build berms of sufficient height to hold the required detention volume. This may occur due to rock formations encountered or to groundwater. It is important that the elevation-volume configuration shown on the plans be preserved during construction so that the detention basin functions according to intended design.
- d. The construction contractor changes the basin configuration during the construction without being aware of the required volume. Approval from the engineer was not obtained for a design change.

The City of Freeport Water & Sewer Commission shall require the design engineer to be present onsite to conduct construction inspection of the detention basin. The inspection shall be conducted such that the design engineer is able to fulfill the requirements stated in 7.5.1 of this manual. Special attention shall be given to the detention basin volume, elevations of each outlet, embankment crest and emergency spillway crest; side slopes, size and shape of various weirs or orifices, and installation of cutoff collars in embankments.

The Executive Director of the Water & Sewer Commission or his representative may also conduct periodic inspections of the work in progress to be certain that the drainage system is being built as designed; the City's inspection does not relinquish the design engineer's responsibility to be on-site during a City inspection. If any violations of the provisions or requirements of this manual are noted during such inspections, the City shall notify the property owner in writing of the items needing correction. The property owner shall have ten (10) calendar days to make such corrections unless given a specific extension of time in writing by the City.

Failure to complete such corrections within the specified time period shall constitute a violation of this design manual and its ordinance.

7.4.2 Storm Sewer Drainage System Inspection

The City of Freeport Water & Sewer Commission shall require the design engineer to be present onsite to conduct construction inspection of the of the storm sewer drainage system for all private and public improvements, unless a waiver is granted by the Executive Director of the Water & Sewer Commission. The inspection shall be conducted such that the design engineer is able to fulfill the requirements stated in 7.5.1 of this manual.

The Executive Director of the Water & Sewer Commission or his representative may also conduct periodic inspections of the work in progress to be certain that the drainage system is being built as designed; the City's inspection does not relinquish the design engineer's responsibility to be on-site during a City inspection. If any violations of the provisions or requirements of this manual are noted during such inspections, the City shall notify the property owner in writing of the items needing correction. The property owner shall have ten (10) calendar days to make such corrections unless given a specific extension of time in writing by the City.

Failure to complete such corrections within the specified time period shall constitute a violation of this design manual and its ordinance.

7.5 POST CONSTRUCTION

7.5.1 Certificate of Completion

On completion of the project, the property owner or the design engineer in charge of the project on the property owner's behalf shall certify in writing to the City that the project was completed in conformity with the provisions of this manual, its Ordinance, Federal, State and local laws, rules and regulations, and the permit, plans and specifications submitted, and shall furnish a final contour map with as-built drawings in paper and in ArcView GIS compatible formatting.

Upon completion of construction, the property owner or design engineer in charge of the project on the property owner's behalf shall submit to the Executive Director of the Water & Sewer Commission a completed Elevation Certificate (FEMA 81-31, April 82, 593-117, as amended from time to time). The City shall maintain for public inspection such records as required under federal law. (44 CFR 60.3(b) (5)).

PART 8 PERMIT AND APPLICATION PROCEDURES

8.1 PERMITS

Permits shall be required for all storm water drainage improvements and erosion control activities conducted within the City limits of Freeport, and shall extend to extraterritorial jurisdiction.

Permits may be obtained in person or in writing from the Executive Director of the Freeport Water & Sewer Commission or his representative. Final approval of a permit may be required from the board of Commissioners at which time the applicant must appear at the next regular meeting of the Commission.

The Executive Director of the Commission is located at 524 West Stephenson Street, Freeport, Illinois, 61032 and may be reached at 815.233.0111. Requests for information may be directed to other support staff, including the City Engineer at 815.297.1166.

An approved permit will be in writing and shall not be granted verbally. Work shall not commence on any drainage or erosion control activities without such permit.

8.2 APPLICATION

An application for permit shall be submitted in accordance with the procedures outlined in this design manual as discussed in Parts 3, 4, and 5.

PART 9 CHECKLISTS AND REVIEW PROCESS

9.1 GENERAL

The applicant's drainage plan submittal shall include evaluations of site design features which are consistent with the following hierarchy:

- a. Minimize impervious surfaces on the property, consistent with the needs of the project;
- b. Attenuate flows by use of rain gardens, open vegetated swales and natural depressions, where applicable based upon confirmed soil borings porous pavements, and preserve existing natural stream channels;
- c. Infiltrate runoff on-site;
- d. Provide storm water retention structures;
- e. Provide storm water detention structures; and
- f. Construct storm sewers.

The preceding list clearly identifies the Commission's priorities of reducing runoff from improvements and shall be the basis upon which a permit is approved. The designer shall be responsible for determining the best methods by which to reduce runoff from an improvement, however the City shall retain the right to subject the proposal to a third party if they feel alternate methods may also be suitable. The cost of the third party review shall be paid for by the developer, designer, and/or property owner, as stated in Chapter 1050 of the City of Freeport Codified Ordinances, and shall in no case be the responsibility of the City of Freeport Water and Sewer Commission.

9.2 REVIEW PROCEDURE

Upon receipt of an improvement per the requirements in this design manual, the Freeport Water & Sewer Commission shall perform a compliance review. The review is NOT an engineering validation of calculation or design process. The review shall be specific in looking for the items detailed in 9.1 above, and the standards as stated in this design manual and its ordinance. The following section outlines the checklists the Commission shall use in its compliance review. Other departments may be consulted for compliance also; the designer shall be notified verbally if another department is consulted.

9.3 CHECKLISTS

- a. Plan Review
- b. Checklist of Common Best Management Practices
- c. Pre/During/Post Improvement Checklist



City of Freeport
Water & Sewer Commission
524 West Stephenson Street
Freeport, Illinois 61032

Title:

Date Received:

Plan Review Checklist

Distribution

- ☐ Proposed water service connection and existing water main
- ☐ Check fire line requirements
- ☐ Material Specification
- ☐ Valve arrangements
- ☐ Minimum 5.5 ft cover
- ☐ Show all fire hydrants per City of Freeport Ordinance
- ☐ Are all minimum separation requirements met? If minimum separation requirements can not be met, show and provide details of encasement

Comments:

Collection

- ☐ Provide plan and profile of all new sanitary sewer pipes
- ☐ Show at the manholes the invert in and out as well as rim or top elevations
- ☐ Are there any outside drop manholes? If so clearly identify, and show on a separate sheet the manhole detail
- ☐ Show on the pipe the diameter, slope and pipe material, are minimum and maximum velocities met. If velocity is greater than 20% are anchors provided? If velocities are greater than 15 feet per second are erosion controls in place?
- ☐ Check for minimum slopes, 8inch – 0.5%, 10inch – 0.28%, 12inch – 0.22%, etc.
- ☐ Minimum pipe diameter 8 inches.
- ☐ Maximum sewer reach maximum of 400feet.
- ☐ Minimum cover 4feet in berm/ grass areas and 5feet in the road
- ☐ Is the design consistent, with no erratic slopes that may create blockages?
- ☐ Are all minimum separation requirements met? If minimum separation requirements cannot be met, show and provide details of encasement.

- ❑ Are drop manholes clearly marked? Is the outside drop greater than 2 vertical feet and less than 16 vertical feet? Five (5) feet diameter manholes are minimum requirement for drop manholes.
- ❑ Provide design calculations for the proposed sanitary sewer taking into consideration the proposed and potential future build out of the area, the impact at the point of connection to the existing system, and the minimum and maximum sewer grades and velocities proposed.

Comments:

Drainage

- ❑ Storm Sewer Design in accordance with City of Freeport Codified Ordinance Chapter 1050.
- ❑ NPDES Permit (and submit SWPPP) to the IEPA, if necessary.
- ❑ Has the site been checked for natural springs?
- ❑ Has the designer submitted plan and profile of all new storm sewer pipes?
- ❑ Show manholes: invert in and out as well as rim or top elevations.
- ❑ Drop manholes? If so clearly identify, and show on a separate sheet the manhole detail.
- ❑ Pipe: diameter, slope and material type.
- ❑ Maximum sewer reach maximum of 400 feet.
- ❑ Minimum separation requirements met? If minimum separation requirements cannot be met, details of encasement?
- ❑ Design calculations for the proposed storm sewer taking into consideration the full drainage area not only the build out area, the impact at the point of connection to the existing system, and the minimum and maximum sewer grades and velocities of the proposed.
- ❑ Erosion Control provided, temporary seeding specified during phased construction, permanent landscaping to include deep roots plantings
- ❑ Outfall structures – adequate rip rap provided

Comments:

Storm Water Detention

- ☐ Detention in accordance with the City of Freeport Ordinance Chapter 1050.
- ☐ Location of proposed development to the zones marked on the FEMA map. See Flood Plain checklist for development near the floodway/plain.
- ☐ Design calculations to show the release rate from the site to the detention area/drainage ways. What are the impacts on the drainage ways from the additional volume?
- ☐ "Creative" landscaping e.g. prairie grasses or other plantings with deep root structures.
- ☐ Erosion control: post construction; landscaping to protect side slopes, i.e. straw matting.

Comments:

General

- ☐ Use of BMP's, see also Checklist of Common BMP's
- ☐ Implementation of Low-Impact Development Practices (LID)
- ☐ Easements
- ☐ Erosion control is per Section 5 of the Design Manual
- ☐ Sewers should follow the roads or lots lines where practical and not diagonally cross lots where access may become a problem.
- ☐ Water and Sanitary Sewer connections must be applied for at the Water and Sewer Commission office. All connection and inspection fees must be paid for prior to construction.
- ☐ Plans may be produced on paper not greater than 24"X 36", using a standard scale, and securely bound; design calculations may be submitted electronically or bound on 8.5" X 11" paper.
- ☐ Provide all details of connections, manholes, pipe bedding, trenching, pipe abandonment, etc, on the plans and in the specifications.

Comments:

**Checklist
Best Management
For Development or Re-Development**

of

Practices

**Common
(BMPs)**

Description of BMP	Was BMP Used in Project?	Location Used or Basis for Nonusage:
Discharge Elimination BMPs		
1. Reduce area of impervious surface (pavement, roofs, etc.)		
2. French drains and subsurface drains		
3. Infiltration trench and dry well		
4. Exfiltration trench		
5. Porous pavement		
6. Retention (infiltration) basin		
Stormwater BMPs		
7. Detention Basin with outlet protection		
8. Extended detention basin		
9. Wetland treatment area		
10. Parking lot/rooftop runoff storage with outlet		

protection		
11. Grit chambers/manholes		
12. Diversion channel		
Floatable/Oil Removal BMPs		
13. Floatable skimmer		
14. Parking lot oil/grease separators		
Sediment Control BMPs		
15. Riprap or other storm drain outlet protection		
16. Storm drain inlet protection		
17. Slope stabilization and erosion control measures		
18. Vegetated swale		
Nonstructural BMPs		
19. Fertilizer management		
20. Other (describe):		

Suggested Best Management Practices

Minor Structural Source Controls

- Diversion Channels
- Grass Swales
- Natural Channels to Reduce Erosion
- Vegetative Controls on Exposed Soils
- Storm Sewer Outlet Protection
- Slope Stabilization and Erosion Control Measures
- Riprap Protection

Minor Structural Discharge Elimination Methods

- Development and Maintenance of Recharge Areas
- Development and Maintenance of Porous Pavement
- French Drains and Infiltration Trench

Moderate Structural Controls for Floatables/Oils Removal

- Development and Maintenance of Parking Lot Oil/Grease Separators
- Development and Maintenance of Parking Lot and Rooftop Runoff Storage with Outlet Protection

Major Structural Controls for Floatables/Oils Removal

- Detention Basin with Outlet Skimmer
- Wetlands Treatment Area

Major Structural Controls for Floatables, Metals, Microorganisms, and Nutrient Removal

- Lime Precipitation, Filters, and Chlorination/Dechlorination to Detention Basins
- Lime Precipitation, Chlorination/Dechlorination to Wetlands



City of Freeport Water & Sewer Commission
524 West Stephenson Street
Freeport, Illinois 61032

Title: _____

Date Received: _____

Storm Water Drainage and Erosion Control Pre/During/Post Improvement Checklist

Pre Improvement

- ☐ All design manual requirements provided per sections:
 - Part 3 _____
 - Part 4 _____
 - Part 5 _____
 - Part 6 _____
 - Part 7 _____
 - Part 8 _____
 - Part 9 _____
 - Part 10 _____
- ☐ Have all fees been paid? _____
- ☐ Pre construction meeting date, time _____
And Location _____

Comments:

During Improvement

- ☐ On site construction inspection is being performed by:
 - Company _____
 - Contact Person _____
 - Contact Phone _____
- ☐ Erosion Control installation per design.
- ☐ Log of complaints transferred to onsite inspector.
- ☐ Commission staff site visits _____.
- ☐ NPDES Permit copied to the Freeport Water & Sewer Commission.

Comments:

Post Improvement

- ☐ Maintenance Agreement signed and on file with the City of Freeport, Water & Sewer Commission.
 - Maintenance Responsible Party _____
 - Address _____
 - Contact Phone Numbers _____;
- ☐ NPDES Permit closed with the IEPA, copy sent to the Commission.
- ☐ Verification of punchlist items completed.
- ☐ As built plans on file with the Commission along with GIS compatible information.
- ☐ Post Construction erosion control structures in place.
- ☐ Detention basin cleared of debris and inspector has verified final elevations.
- ☐ Certificate of Completion on file with the Commission.

Comments:

PART 10 REPORTING REQUIREMENTS

10.1 STORM SEWER DRAINAGE

The designer shall provide information per Part 3 of the design manual for review to the Freeport Water & Sewer Commission. Maintenance requirements shall be per Chapter 1050 of the City of Freeport Codified Ordinances.

10.2 DETENTION BASINS

The designer shall provide the Commission with a report stating the following:

- a. Narrative on the design intent and projected performance of the proposed detention facilities.
- b. Summary on response to early public concern.
- c. Calculations supporting the design performance of the basin and how it shall meet the requirements as set in Part 4 of the design manual.
- d. Maintenance requirements. The property owner is responsible for maintenance of the detention facility and shall submit in writing an agreement and plan with a contact name and number. Easement language, including maintenance requirements, shall be recorded with the deed.

10.3 EROSION AND SEDIMENT CONTROL

The designer shall provide information per Part 5 of the design manual for review to the Freeport Water & Sewer Commission. Maintenance requirements shall be per Chapter 1050 of the City of Freeport Codified Ordinances.