WILL COUNTY STORMWATER TECHNICAL GUIDANCE MANUAL

August 25, 2010

WILL COUNTY STORMWATER TECHNICAL GUIDANCE MANUAL

LIST OF TABLES

LIST OF FIGURES

TECHNICAL MANUAL REVISION DATE OUTLINE

Section #	Section Title	Current Revision Date
Article 1	Authority, Purpose, and Definitions	
T103	Reference to Watershed Plans	
Article 2	Requirements For Stormwater Management	10/09
T200	General Requirements	10/09
T200.2	Site Runoff Storage Requirements	10/09
T200.3	Exemptions from Site Runoff Storage Requirements	10/09
T201	General Stormwater Requirements	10/09
T201.5	Overland Flow Paths	10/09
T210.6	Protection of Buildings	10/09
T201.7	Depressional Storage	10/09
T202	Site Runoff	10/09
T202.1	Stormwater Facility Discharges	10/09
T202.2	Minor Stormwater System Criteria	10/09
T202.3	Major Stormwater System Criteria	10/09
T202.4	Existing Sub-Surface and Surface Drainage Systems	10/09
T202.5	Design Runoff Rate	10/09
T202.6	Design Rainfall	10/09
T202.7	Stormwater Systems Easements	10/09
T202.8	Flow Depths	10/09
T202.9	Diversions of Flow to Another Watershed	10/09
T202.10	Best Management Practices Requirements	10/09
T203	Site Runoff Storage Requirements (Detention)	10/09
T203.1	Release Rate	10/09
T203.2	Design Methods	10/09
T203.3	Existing Release Rate Less Than Allowed	10/09
T203.4	Downstream Water Surface Elevations	10/09
T203.5	Extended Detention Requirement	10/09
T203.6	Site Runoff Storage Facility Design Requirements	10/09
T203.7	Site Runoff Facility Requirements Within the Regulatory Floodplain	10/09
T203.8	Requirements Within the Regulatory Floodway	10/09
T203.10	Off-Site Facilities	10/09
T203.12	Structures Built Across a Channel for Site Runoff Storage Facilities	10/09
Article 3	Erosion And Sediment Control	10/09
T300.1	Site planning	10/09
T300.2 (a)	Phrased Construction	10/09
T300.2	Standards and Specifications	10/09
T300.3	General Requirements	10/09
T300.4	Extended Construction Shutdown Periods	10/09
T300.5	Hydraulic and Hydrologic Design Requirements	10/09
T300.6	“As Needed” Practices on the Plans	10/09
T300.7	Erosion and Sediment Control Plan Requirements	10/09
T300.8	Conveyance of Off-Site Flow	10/09
T300.9	Stockpiles	10/09
T300.11	Construction Dewatering	10/09
T300.12	Protection of Public/Private Roadways	10/09
T300.12	Temporary Stream Crossings	10/09
Article 4	Protection of Special Management Areas	10/09
T400	General	10/09

T401	**Floodplain, Regulatory Floodplain, Base Flood Elevation and Regulatory Floodway Locations**	**10/09**
T402.2	**Building Protection Standards**	**10/09**
T402.3	**Non-Conforming Structures**	**10/09**
T410	**Contemporary Storage Volume Standards**	**10/09**
T404	**Floodway Standards**	**10/09**
T405	**Riverine Floodplain**	**10/09**
T406	**Bridge and Culvert Standards**	**10/09**
Article 5	**Stormwater Management Permit Submittal Requirements**	**10/09**
T500	**Stormwater Management and other Permits Required**	**10/09**
T500.3	**Professional Seals and Certification Required**	**10/09**
T501.1	**Permit Expiration**	**10/09**
T501.2	**Permit Extension**	**10/09**
T501.3	**Permit Revision**	**10/09**
T502	**Required Submittal**	**10/09**
T502.1	**Modification of Submittal Requirements**	**10/09**
T502.2	**Application and Project Overview**	**10/09**
T504	**Plan Set Submittal**	**10/09**
T502.4	**Stormwater Submittal**	**10/09**
T502.5	**Floodplain**	**10/09**
Article 6	**Long-Term Maintenance**	**10/09**
T600	**Long-Term Maintenance**	**10/09**
Article 7	**Enforcement And Penalties**	**10/09**
T701	**Required Inspections**	**10/09**
T1300	**Fee-in-Lieu of Site Storage Runoff**	**10/09**
T1301	**Procedures; Use of Funds**	**10/09**
Part 2-	**Forms and Appendices**	**10/09**
Appendix A-	**Definitions**	**10/09**
Appendix B	**Effective Flood Insurance Rate Maps**	**10/09**
Appendix C	**Public Bodies of Water**	**10/09**
Appendix D	**Hydrologic and Hydraulic Modeling Software Descriptions**	**10/09**
Appendix E	**Engineering Details**	**10/09**
Appendix F	**Special Service Agreements**	**10/09**
Appendix G	**Manning's Roughness Coefficients**	**10/09**
Appendix H	**Rational Method Coefficients**	**10/09**
Appendix I	**Model Mutual Drain Agreements**	**10/09**

INTRODUCTION

The Will County Stormwater Technical Guidance Manual (Manual) is, as the name suggests, a technical guide to provide developers, applicants, and administrators assistance in complying with the Stormwater Management Ordinance and the technical requirements of a stormwater permit application.

Purpose

The purpose of the Technical Guidance Manual is to supplement the Will County Stormwater Management Ordinance (Ordinance) by providing background, detail, and intent of the minimum technical requirements in the Ordinance. The individual ordinances of certified communities may contain elements more restrictive than the Ordinance. This manual contains discussion, tables, figures and exhibits covering most of the topics found in the Ordinance to assist the applicant in preparing a complete Stormwater Permit Application. The examples illustrated in this Manual are general and attempt to cover the most common requirements. In practice there will be situations that arise in the design of a development that will not be directly related to one of the examples in this manual. The concepts illustrated can be applied to a variety of developments.

The Manual is linked directly to the Will County Stormwater Management Ordinance by using the same Section numbers as those contained in the Ordinance, with a “T” added to the number.

The objective of the Manual is to facilitate implementation and provide guidance necessary to achieve the objectives and standards of the Ordinance. This document has no authority to mandate new criteria and provides a conservative approach for complying with the intent and letter of the criteria. Other techniques may exist that will meet the criteria with less effort or at a lower cost. The applicant accepts the burden of demonstrating the technical adequacy of the development design and is completely responsible for conformance with the criteria of the Ordinance.

The different technical requirements are further defined in this Manual by use of charts, tables and example problems. Recommended forms for compliance with the Ordinance are also provided.

It is expected that the Manual will occasionally need to be revised and updated to meet changing stormwater management techniques and requirements. To facilitate future revisions, the Manual has been printed in a 3-ring binder format so that specific sections may be replaced. A table with the current revision date for each section has also been included following the table of contents. Any suggested changes to the Manual should be provided in writing and will be reviewed for possible inclusion. Please submit any requested revisions to:

Director
Will County Stormwater Management Planning Committee
58 E. Clinton Street, Suite 500
Joliet, Illinois 60432
815.740.8140

Organization

The Manual is comprised of two parts:

- **Part 1** – Technical guidance covering stormwater management criteria, floodplain criteria and permit application requirements; and

- **Part 2** – Forms covering many of the required submittals used by the applicant or certified community, plus appendices.

PART 1 – TECHNICAL GUIDANCE

Article 1 Authority, Purpose, and Definitions

§ T103 Reference to Watershed Plans

Watershed plans recognize the unique parameters of a particular watershed and develop a set of criteria for stormwater management within that watershed. The criteria may be more or less stringent than the criteria specified in the Ordinance. Watershed plans must be approved by the Stormwater Committee and approved by the County board. Once approved by the board, they become a part of the Ordinance and development within that particular watershed is regulated by the criteria outlined in the plan.

Article 2 Requirements For Stormwater Management

§ T200 General Information

The guidance in this manual provides the minimum interpretation of the requirements of the Ordinance. In order to determine if a development requires a Will County Stormwater Management permit, the applicant must refer to § 500 of the Ordinance. In general, a stormwater management permit does not apply to hydraulically disturbed areas less than or equal to 43,560 s.f. (1 acre) of aggregate development, unless the development is located in a Special Management Area, as defined in § 400 of the Ordinance. For activities exempt from the Ordinance, the applicant should refer to section § 801. For any project with more than one permitting authority, it is advisable to have one review specialist.

The Will County Stormwater Management Typical Permit Submittal Flowchart Part 2, Form 1, assists the developer/applicant in determining which components of the stormwater permit submittal will be required. A copy of the flowchart is contained in the Forms section that should be copied and submitted with an application.

Road development in the right-of-way, under the ownership or control of a unit of local government with greater than two acres of new impervious surfaces in aggregate will require stormwater detention. When questions arise regarding the two-acre provision, the Administrator will be the sole judge in determining if the two-acre of new impervious surfaces in aggregate has been exceeded. If roadway stormwater detention is required, the release rate and volume required are determined from the area of new impervious surface created and not the entire hydrologically disturbed area in the right-of-way.

Existing agricultural land uses are addressed in §204 of the Ordinance. In general, only agricultural activities that create new impervious surfaces are regulated. Activities on croplands, pasturelands, or farmsteads, or on

outbuildings associated with these land uses, are regulated under §204 only. If activities on these land uses comply with §204, they are considered compliant with the rest of the Ordinance.

The definition of development excludes maintenance of existing agricultural systems for cultivated areas and crop productions. It also excludes activities undertaken as part of an NRCS conservation plan, such as terracing or other soil erosion prevention measures. When new rooftops or roadways on existing agricultural lands total 25,000 square feet or more in aggregate, then detention is required similar to additions to other existing land uses.

§ T200.2 Site Runoff Storage Requirements

The criteria for site runoff storage requirements is listed in § 200. Table 1 was created to help illustrate the criteria for when site runoff storage facilities are required.

TABLE 1
Applicability of Site Runoff Storage Requirements [§ T200.2]

Land Use	Existing Parcel Size	Is Site Runoff Storage Required?
Residential		
- Single family	< 5 acres	No
	≥ 5 acres	Yes if > 2 single-family residences are to be constructed on the site or > 1 two-family residence is to be constructed on the site.
- Multi family	≤ 1 acre	No
	> 1 acre	Yes
Non-Residential	≤ 1 acre	No
	> 1 acre	Yes
New Development on an Existing Developed Site		
- Multi-family	< 1 acre	No
	≥ 1 acre	Yes if development > 25,000 ft^2 (aggregate development after January 1, 2004.)
- Non-residential	< 1 acre	No
	≥ 1 acre	Yes if development >25,000 ft^2 (aggregate development after January 1, 2004)
Roadway Development		No if ≤2 acre of new impervious area
		Yes if > 2 acre of new impervious area

For developments requiring a general Stormwater Management Permit application, the owner and developer must attest to an understanding of the Ordinance criteria and intent to comply, before initiating development.

§T200.2e - Fee-In-Lieu of Detention

For a commercial or industrial redevelopment project where fee-in-lieu of detention is requested, the applicant must address the release rate and quantity of runoff to demonstrate that the redevelopment will not increase existing flood damages. For example, if the outlet of a redevelopment area is into a storm sewer, the applicant should determine the existing capacity of the storm sewer accounting for all upstream flow into the storm sewer. By determining the hydraulic grade line of the storm sewer for existing and with-project conditions, the applicant can demonstrate the effect of the redevelopment on the existing outlet. The overland flow paths for the runoff that exceeds the storm sewer capacity should be determined and addressed, so as not to increase existing flood damages.

In addition, a redevelopment project requesting fee-in-lieu of detention must demonstrate a net benefit in water quality. One way to improve the water quality associated with runoff from redevelopment is for the applicant to provide retention volume in a basin or swale within the project area. To facilitate evaporation, the depth of a retention basin should not exceed 18-inches and the flow length between the inlet and outlet should be maximized. If choosing this option, the applicant should refer to § T203 to determine the volume of retention required. The amount of runoff directed to the retention basin should be controlled so as not to exceed the volume available. An overflow conveyance mechanism can be used to safely convey excess flow. If this option is used, but the applicant does not provide the required retention volume as determined in section § T203, then the applicant must go through the variance process.

If a retention basin or swale is not used, some other mechanism such as centrifugal separators should be considered to reduce the contaminants associated with urban runoff. Showing that the site plan has a net decrease in impervious area is also presumed to benefit water quality compared to the currently developed condition. The applicant should avoid activities which negate the benefit of decreasing the impervious area.

There are other options available to demonstrate a net benefit in water quality, such as

- Sediments basins
- Bioswales/infiltration trench
- Filtration structures instead of catch basins
- Wetlands prior to stormwater discharge from site

It is the sole discretion of the Administrator to accept these options. The applicant should stress two main points

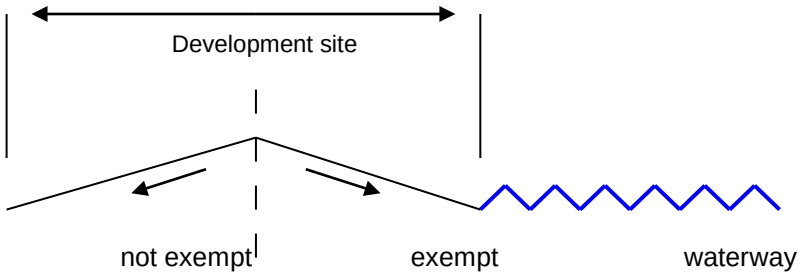
- The project doesn't increase flood damage (this is quantifiable)
- The project provides a net water quality benefit. (this is not as easy to quantify)

§ T200.3 Exemptions from Site Runoff Storage Requirements

Sites within Will County that qualify as direct discharge sites may be exempt from the site runoff storage requirements. Direct discharge sites are located immediately adjacent to the channel banks of the following waterways:

- Des Plaines River
- Chicago Sanitary and Ship Canal
- DuPage River
- Kankakee River

For a direct discharge site to be exempt from the runoff storage requirements, it must be naturally tributary to the waterways listed above, as demonstrated in the following figure:



Direct discharge sites with an industrial zoning and a proposed industrial land use are exempt from providing detention storage. Non-industrial direct discharge sites less than 160 acres in size may qualify for an exemption if they meet the minimum river frontage specified in § 200.3 of the Ordinance.

It is the intention of this exemption to require the development site that is under consideration for permit to have at least one property boundary, or portion of said boundary (if allowed by ordinance) consisting of the channel bank and/or river edge of any of the required waterways. This property must be capable of passing the required stormwater flows without impacting surrounding drainage.

§ T201 General Stormwater Requirements

Stormwater drainage requirements are applied to all development and redevelopment throughout Will County to prevent inappropriate site drainage contributing to increased flood damage. Proper site drainage analysis is meant to protect existing and future structures, as well as sub-surface infrastructure. The developer must consider possible adverse effects of the proposed activity and avoid knowingly undertaking any activity that will cause a violation of the general Standards specified in § 201 of the Ordinance.

The drainage and stormwater storage system must be functional before the issuance of building permits and before commencing general construction. Establishing functional stormwater facilities prior to general construction is required unless it can be demonstrated that this is not practical for single parcel developments. For residential and non-residential subdivision the stormwater facility must be functional and can often be used as a sedimentation basin during the construction of the project.

NPDES Phase II requirements shall be followed. These include:

- Notice of Intent permit
- SWPPP kept onsite with inspections during construction
- Final Stabilization
- Notice of Termination

§ T201.5 Overland Flow Paths

Overland flow paths should be designed to safely convey the baseflood flow. Overland flow paths can be:

- Side/rear yard swales,
- Roadways,
- Storm sewers and sized inlets for upstream tributary areas <20 acres, including offsite area.

The design of an overland flow path must account for the lowest opening of adjacent structures. For sites with the tributary area greater than 20 acres, the lowest entry elevation opening shall be at least 1 foot above the design water surface elevation of the overland flow route. The design flow rate for

overland flow routes shall be a minimum of 1 cfs per tributary acre, however the flow rate shall be calculated using a critical duration analysis, and the higher flow rates shall be used. See § T202.5 for information on critical duration analyses.

The overland flow paths can be sized using Manning's equation:

$$Q = (1.49/n)\, AR^{2/3}\, S^{1/2}$$

n = channel roughness coefficient
A = cross-sectional area (ft^2)
R = Hydraulic Radius = A/p
p = wetted perimeter (ft)
S = channel slope (ft/ft)

Appendix G contains tables of applicable Manning's roughness coefficients. The cross-sectional area (A), wetted perimeter (P) and hydraulic radius (R) can be determined from Figure 1.

FIGURE 1
Geometric Elements of Channel Sections
(Reference: Chow, Ven Te, 1959; Open-Channel Hydraulics)

Note: Freeboard = $D-d$ for all sections

Cross-Sectional Area a	Wetted Perimeter, p	Hydraulic Radius $R=\frac{a}{p}$	Top Width
$bd + Zd^2$	$b + 2d\sqrt{Z^2+1}$	$\frac{bd + Zd^2}{b + 2d\sqrt{Z^2+1}}$	$t = b + 2dZ$ $T = b + 2DZ$

Trapezoidal cross section

Zd^2	$2d\sqrt{Z^2+1}$	$\frac{Zd}{2\sqrt{Z^2+1}}$ or $\frac{d}{2}$ approx.	$t = 2dZ$ $T = \frac{D}{d}t$

Triangular cross section

$\frac{2}{3}td$	$t + \frac{8d^2}{3t}$	$\frac{t^2d}{1.5t^2 + 4d^2}$ or $\frac{2d}{3}$ approx.	$t = \frac{a}{0.67d}$ $T = t\left(\frac{D}{d}\right)^{\frac{1}{2}}$

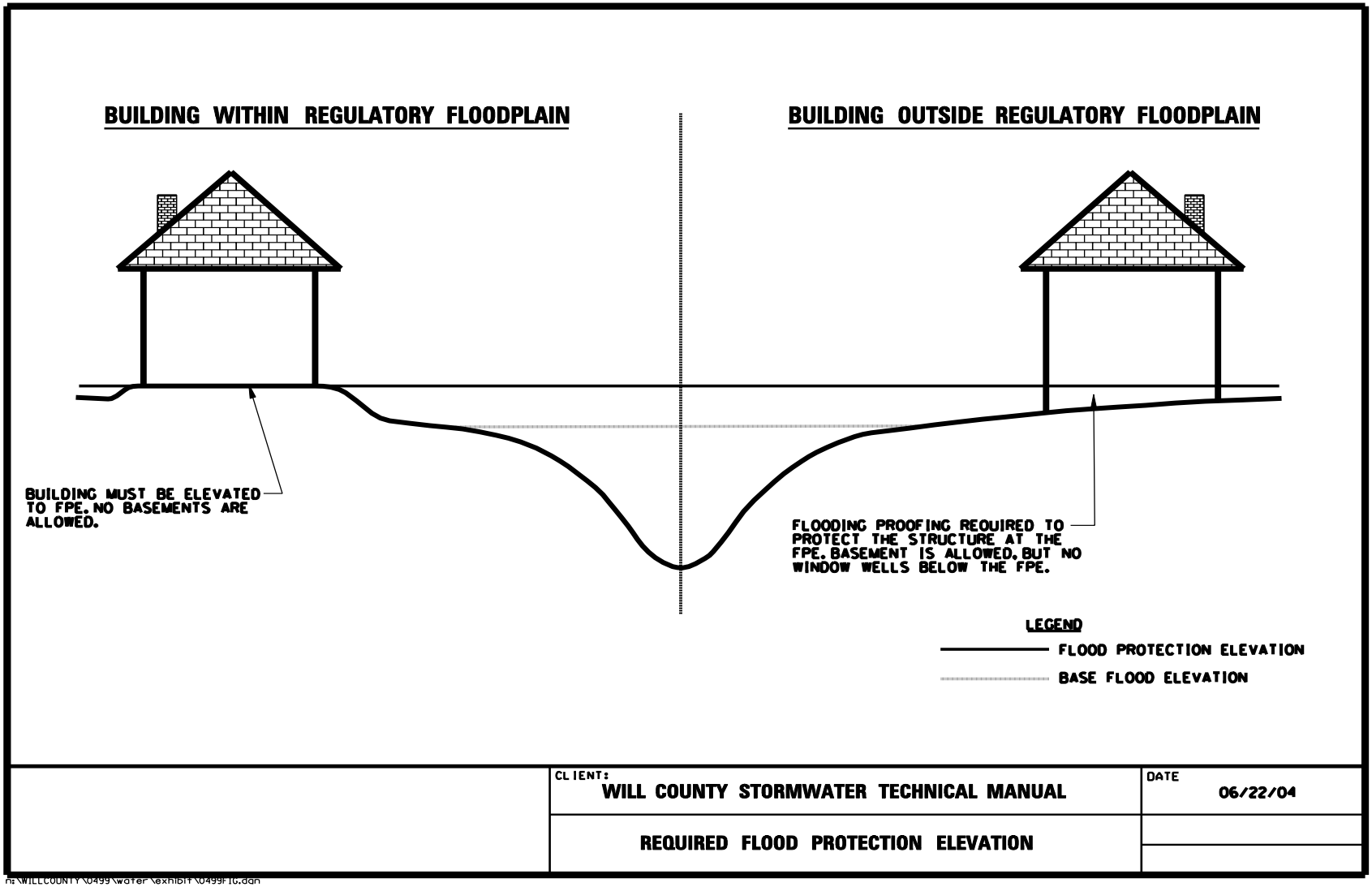
Parabolic cross section

§ T201.6 Protection of Buildings

All usable space in new buildings, additions, and buildings undergoing substantial improvement must be protected against flooding from the base flood. A measure of protection to the usable space of a building has been added by the Ordinance by requiring the usable space to be protected to the flood protection elevation (FPE), which is higher than the base flood elevation (BFE). This can be accomplished by elevating the buildings or floodproofing. Requirements for elevating and floodproofing are described in § T402.2. All usable space in buildings must be 1 foot above the 100-year design elevation (detention HWL, overland flow depth, etc.) or the current FIS elevation, whichever is greater. The required flood protection elevations for buildings are illustrated in Figure 2. Buildings proposed to be located in the floodplain must be ***elevated*** to the flood protection elevation whereas; buildings outside the floodplain must be ***protected*** to the flood protection elevation.

Buildings which must be *elevated* to the FPE must have the lowest floor, including basements, at or above the FPE. Buildings which must be *protected* to the FPE can have a basement floor below the FPE, but all points of entry must be above the FPE. Additionally, the basement must have a sump pump. See Section 402.2 d for additional *protection* requirements.

FIGURE 2
Required Flood Protection Elevation



§ T201.7 Depressional Storage

Note that by definition, the depressional storage does not have a direct gravity outlet but if in agricultural production, it is more than likely drained by a tile and should be modeled as "empty" at the beginning of a storm. Flood storage on-site with a positive gravity surface outlet does not need to be compensated for, except when it qualifies as floodplain storage in Article 4 or when its loss causes a violation of a requirement of § 201.

The function of any existing depressional storage should be modeled using an event hydrograph model [acceptable event hydrograph models are listed in § T202.5] to determine the volume of storage that exists and its effect on existing site release rate. While a simple volume calculation may be sufficient to determine the volume below the gravity outlet, the modeling is necessary to quantify the existing site release rate. The proposed design must demonstrate that the existing discharge rate is not exceeded. In order to prepare such a model, certain information must be obtained, including delineating the tributary drainage area, the stage-storage relationship and discharge rating curve, and identifying the capacity and elevation of the outlet(s).

The tributary area should be delineated on the best available topographic data. When the tributary area is confined to the project site, the site topographic map (1' contour interval) shall be used. If the tributary area to the depressional storage extends beyond the project limits, the Will County 2' topographic maps, which can be purchased online through the Will County website at http://www.willcogis.org/, should be used to supplement on-site survey data. If the County maps are not available, the United States Geological Survey (USGS) maps may be used for off-site areas.

After determining the tributary area, a hydrologic analysis of the watershed should be performed, including a calculation of the appropriate composite runoff curve number and time of concentration. Stage-storage data for the depressional area should be obtained from the site topographic map. The outlet should be clearly marked and any calculations performed to create a stage-discharge rating curve should be included with the stormwater submittal.

A critical duration analysis should be performed within the depressional storage and the corresponding storage volume. The 100-year recurrence interval storm should be used for the 1-, 2-, 3-, 6-, 12-, 18-, 24-, 48-, 72-, 120- and 240-hour storm events. See § T202.5 for more information on the critical duration analysis.

Any depressional storage to be filled by the proposed development must be compensated for at a 1:1 ratio. If the entire existing tributary area is conveyed

to the site runoff storage facility, the compensatory storage shall be provided in the facility. If the off-site area tributary to the depressional area is not conveyed to the detention basin, a separate detention basin should be considered at the location of the existing depressional storage location so off-site flow is attenuated to the same degree in pre-project compared to in post-project conditions. The required compensatory storage should be added to the site storage requirement, and this total volume requirement should be available below the detention basin overflow elevation. It is not necessary to provide incremental compensatory storage for fill of depressional storage.

For developments in which the site storage requirement and depressional storage mitigation are to be provided in the same basin, the outlet structure for the basin should be designed to demonstrate that the storage is utilized during the 100-year design storm. This must be demonstrated using a hydrograph model. For example, the required storage volume for a site is normally based on the allowable release rate of 0.15 cfs/ac for a 100-year storm. If depressional storage mitigation is required, the release rate must be reduced sufficiently so that the 100-year peak elevation corresponds to a storage volume equal to the site storage requirement plus the depressional storage. If the outlet control structure needed to accomplish this is impractical for maintenance reasons, the Administrator may consider alternative designs.

§ T202 Site Runoff Requirements

§ T202 lists some of the appropriate hydrologic and hydraulic calculation methods with which runoff can be calculated and suggest ways in which it can be adequately collected and conveyed without causing any negative impacts for a given design frequency. A site runoff example is contained in Figure 3, where the proposed site drains to one facility.

§ T202.1 Stormwater Facility Discharges

For simple developments with few drainage facilities, the criteria of this section should be met if:

1. All site runoff exits the site through vegetated swales (i.e., runoff velocities are minimized); and

2. All site runoff exits the site either into an adjacent drainage way or spreads overland in the same direction as the predevelopment drainage, or into a drainage easement that is continuous until it reaches an existing downstream drainageway.

3. The runoff from the site demonstrated to be safely conveyed to a stream.

For larger developments or smaller developments that do not meet the above conditions, these criteria require that the developer consider the full impact site drainage system may have on downstream locations. It is necessary to:

1. Identify all points where runoff will exit the drainage site. This will include point discharge locations (where sump pumps discharge or where flows from drainage pipes, culverts, swales, or other drainage ways exit the site) as well as areas where diffused overland flow will exit the site.

2. Determine whether these immediate discharge points will be affected by the discharge. This will include considering the exit points susceptibility to water damage (i.e., is the drainage ditch expected to convey water, or is a walkway expected to stay dry, etc.?).

3. Determine whether the discharge quantity will affect the discharge point adversely. In general, if:

   a) The existing drainage patterns have been retained such that the points of discharge from the site have the same tributary areas as before discharges; and

   b) The discharge quantity at each point will be less than the pre-development flow rate to that point under pre-development conditions; and

   c) The point has been historically free from flood damage;

   then the discharge quantity will probably not cause damage to the adjacent property. It is the responsibility of the applicant to check if the waterway can handle the post development flows long term without causing severe erosion. The applicant should consider using an energy dissipater system at the outlet of a storm sewer system that empties into a waterway.

If all the conditions above are not met, the developer must demonstrate that the proposed site drainage will not affect adjacent properties adversely. The developer is not responsible for rectifying off-site pre-existing failures to meet the criteria of the Ordinance. However, the developer is responsible for demonstrating that the development will not exacerbate existing related flood problems.

§ T202.2 Minor Stormwater System Criteria

Minor stormwater system drainageways are swales, channels, catch basins, drains, pumps, storm sewers, etc., that are designed for the motoring safety and convenience of the public (the normal drainage systems that convey water during frequent storms rather than allowing the runoff to pond or run on walkways, streets, or other locations where it would inconvenience public access or use of a site). The 10-year recurrence frequency is typically selected to define the upper limit for the minor stormwater system; however the choice of design frequencies is a matter of local ordinances such as subdivision codes and highway department policy.

For many developments, storm sewers typically comprise the majority of the minor drainage system. Various texts are available to provide methodologies for designing a storm sewer system. The Ordinance does not specify requirements for storm sewer design; these requirements are intended to be provided by the local ordinance or municipal code. The following points may be useful to consider when designing a storm sewer system:

1. Return Period – the design return period will be determined from the local ordinance. The Ordinance requires Bulletin 70 rainfall data and allows the Rational Method for computation of design runoff rates.
2. Minimum Pipe Size – a 12" diameter pipe is typically the minimum diameter allowed to minimize the potential for pipes to become clogged. However, this is also a local ordinance requirement.
3. Minimum Velocity – To minimize the potential for solids to be deposited in the sewer, the typical minimum velocity should be 3.0 feet/second for a 10-year storm. Table 2 summarizes the slopes needed to achieve 3 ft/s for various pipe diameters and roughness coefficients.
4. Spacing of Manholes – Manholes should be placed whenever there is a junction or a change in grade or direction. The maximum spacing is usually between 300 – 400 feet for smaller pipes, or as much as 500 feet for larger pipes. Guidance should be provided by the local ordinance.
5. Pipe Elevation Changes at Structures – Whenever a pipe or pipes entering a structure have a different diameter than the outlet pipe, there is commonly a grade change between inverts. The crown elevations of the pipes are commonly matched. However, other guidance suggests matching the hydraulic grade lines or the 0.8D (80% of the diameter) points of all pipes.
6. Minimum Depth of Cover – storm sewers typically require approximately 3 feet of cover to protect the structure of the sewer from surface loading. Extra strength pipes or special backfill methods may be used when cover is limited.

Table 2
Minimum Pipe Slopes to Achieve Velocity = 3 ft/s

Pipe Diameter (in.) Flowing full	Percent Slope (ft/ft) * (100)		
	n = .013	*n* = .014	*n* = .015
10	0.555	0.643	0.739
12	0.435	0.505	0.579
15	0.323	0.375	0.430
18	0.253	0.294	0.337
21	0.206	0.239	0.275
24	0.173	0.200	0.230
27	0.148	0.171	0.196
30	0.128	0.149	0.171
36	0.101	0.117	0.134
42	0.082	0.095	0.109
48	0.069	0.079	0.091
54	0.059	0.068	0.078
60	0.051	0.059	0.068
66	0.045	0.052	0.060
72	0.040	0.046	0.053
78	0.036	0.042	0.048

§ T202.3 Major Stormwater System Criteria

Major stormwater system drainageways are flow paths used only during major storms when the minor systems are overloaded. Restricting major stormwater flows to drainageways reduces the potential for flood damage.

All drainageways through the property that convey flows from areas off the development site should be left undisturbed or sized in accordance with the guidance set forth below.

Design of the major/minor systems may require:

1. Calculation of runoff rates for both the minor system criteria (typically 10-year design storm event) and the major system criteria (the 100-year design storm event);

2. Designing culverts, swales, catch basins and other "minor" drains to convey the minor design event fully; and

3. Calculating overland flow paths (broad swales, roadways, etc.) sufficient to carry the major design event flows and verifying that these flow paths do not result in property damage.

Sizing of the drainageways should:

1. Use the Manning's equation for open channels as shown in § T201.5. All drainageways should be designed for open-channel flow conditions. For minor stormwater systems that do not use open-channels, the drainageways may be calculated using the Rational Method.

2. Have major stormwater system hydraulic grade lines (water surface elevation plus the pressure head) below elevations that could potentially cause damage. It is recommended that the building top of foundation be placed no less than one foot above the hydraulic grade line. Hydraulic grade line evaluations must proceed upstream from:

    a) A demonstrated free overflow; or

    b) The expected base flood elevation of the most downstream point analyzed; or

    c) An alternative assumption demonstrated to be appropriate and conservative.

    Steady-state backwater calculations are appropriate for calculating

hydraulic grade lines in low-impact systems remote from the floodplain. Such calculations must consider at least the pressure and velocity heads of all drainageways. Tools that may be appropriate to assist in calculations include spreadsheets, WSP-2, HEC-2, HEC-RAS and, FHWA's HYDRA and Hydraflow.

3. Employ flood routing techniques for hydraulic evaluations for drainageways downstream of storage systems that address the time-varying nature of the storage facility adequately. If all storage basins are off-line or not in sequence, time-varying hydraulic routing need not be considered. Include the maximum discharge rates from the storage facility in the flow estimate at all downstream points.

   For in-line or sequential basins, the routing downstream must consider explicitly, or estimate conservatively, the impact of sequential storms, alternative storm patterns, and routing impacts between storage facilities. Continuous hydrologic routing techniques provide the explicit treatment of these factors. Such routing can be accomplished manually or by using appropriate time-varying hydraulic programs (e.g., STORM, SWMM, FEQ, UNET, HSPF).

4. Control maximum drainage system velocities in flow over roadways to address public safety needs. A commonly applied guide is that the product of velocity (ft./sec.) and depth (ft.) should not exceed a value of 4 for the storm with a 0.01 probability of occurrence in any year. § T202.8 defines the maximum allowable flow depths for transverse stream crossings of roads. This Guidance does not apply to existing watercourses for which the applicant has no control over the design.

Design of drainageways should:

1. Have sufficient energy dissipation at the outlet to prevent scouring of the streambank, bed, or downstream land. Armoring of the stream channel should not be considered in lieu of energy dissipation. Energy dissipation is essential to avoid transferring scour and stability problems further downstream. Examples include stone riprap, concrete baffles, and riprap outlet basins.

2. To the extent possible, open-channel drainageways should have permanently deep rooted vegetated side slopes and inverts with velocities sufficiently limited to prevent scouring. This guide addresses the Plan requirement to control sediment and erosion from drainageways.

3. Have reasonable sideslopes given the engineering properties of the materials. A 3:1 sideslope typically provides adequate stability in an earth channel and is a mowable slope. A 4:1 or shallower sideslope is

desirable. Deviations from the minimum value should be justified by appropriate calculations (e.g., slope stability calculations) and maintenance plans that do not require mowing.

§ T202.4 Existing Sub-Surface and Surface Drainage Systems

The applicant must locate all existing field tile systems on the project site. Particular attention should be paid to those field tile systems that are used to convey off-site flow through the site to a downstream location. It is the responsibility of the developer to maintain adequate capacity of off-site drain tile systems entering the site. The potential for expansion of an existing agricultural drain can be determined by checking the tributary area upstream of a development which contains hydric soil and multiplying by 0.003 cfs/acre. If a drain tile system outlets into an adjacent property's drain tile system, the downstream drain tile capacity must be calculated using the slope and size of the drain tile. If the developer is not able to determine the capacity of the downstream system, then the assumption for the capacity should be limited to 0.003 cfs/acre multiplied by the amount of acres of hydric soil tributary to the downstream system at the point where it exits the developer's property. The developer has the option of:

1. Release into the existing drain tile system at the pro-rated capacity of the downstream field tile or 0.003 cfs/acre, whichever is less. Discharge would be designed in conjunction with extended detention. Or;
2. Negotiate with the downstream property owner to upsize the field tile system to a greater capacity.
3. Bypass the discharge around or through the downstream property to a location with adequate capacity for the flow. Care must be taken to avoid discharge to a different watershed. Easements may be required to make sure the newly installed drainage system can be maintained downstream of the site.
4. Negotiate with the downstream property owner to install a second "Mutual Drain" through the downstream property. See section 203.1 "Release Rates" for further discussion.

If the developer releases at 0.003 cfs/acre for the storm with 1% probability of occurrence in any year, the remaining 0.147 cfs/acre would need to be safely conveyed overland to the downstream property and discharged without scouring. The pro-rated capacity of a field tile can be determined as a percentage of the tributary area.

All field tile systems that do not serve a particular benefit (i.e., draining open space) must be removed. It is not acceptable to only remove a few sections of the tile system. The concentration and conveyance of infiltrated runoff may cause problems if partial tile systems are left in place. Any on-site field tiles which remain on-site must be identified in record drawings.

Sub-surface drains within the right-of-way that are replaced should be sized by either multiplying the amount of acres of hydric soil tributary to the system at the point it exits the right-of-way by 0.003 ac-ft/acre, or the existing size of

the drain, whichever is greater.

§ T202.5 Design Runoff Rate

The design release rate for a development is described in § T203.1. This section describes hydrologic methods associated with conveyance calculations.

Pre-developed runoff rates must account for any depressional storage and all other hydrologic features (e.g., soil conditions, ground cover and topography).Acceptable event hydrograph computer models for determining the allowable release rate are: HEC-HMS, HEC-1 with SCS runoff method, TR-20, and TR-55 tabular method. The Administrator has the discretion to allow other event hydrograph models. The models listed in the Ordinance are all public domain models.

For calculation of design rates for conveyance, the Rational Method can be used for small subareas if the total drainage area at the point of design is 20 acres or less. Table C1 in Part 2 of the Manual lists typical runoff coefficients for use with the Rational Method.

Hydrologic analyses performed to determine design runoff rates for areas greater than 20 acres, or to determine the existing depressional storage on a site, should use a hydrograph model in conjunction with a critical duration analysis. A critical duration analysis calculates the peak runoff rate (or depressional storage volume) from a watershed for the following storm events: 1-, 2-, 3-, 6-, 12-, 18-, 24-, 48-, 72-, 120-, and 240-hour. An example of a critical duration analysis is shown below.

Example: A development has an off-site drainage area of 100 acres as delineated on the Will County 2-foot topographic map. The time of concentration for the off-site area is 1.5 hours, and the Runoff Curve Number is 80. Determine the critical duration and peak discharge to be by-passed through the development.

Solution: A TR-20 hydrologic model was used for the critical duration analysis. The following data was input to the model:

Drainage Area =	0.15625 square miles (100ac)
Time of Concentration =	1.5 hours
Runoff Curve Number =	80

The rainfall tables used (RAINFL 6, 7, 8, 9) are the Huff 1st, 2nd, 3rd, and 4th quartile distributions. The rainfall depths used are ISWS Bulletin 70 values, as listed in Table 3. The TR-20 hydrologic model input/output is listed below. Figure 3 shows the peak discharge is 143 cfs, which corresponds to the 2-hour critical duration storm event.

FIGURE 3

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY*****************

JOB TR-20                                                        NOPLOTS
TITLE     Will County Technical Manual
TITLE     Critical Duration Analysis Example        JJJ DEC04
 5 RAINFL 6            0.05                                          HUFF 1ST
 8          0.00       0.16       0.33       0.43       0.52       QUARTILE
 8          0.60       0.66       0.71       0.75       0.79
 8          0.82       0.84       0.86       0.88       0.90
 8          0.92       0.94       0.96       0.97       0.98
 8          1.         1.         1.         1.         1.
 9 ENDTBL
 5 RAINFL 7            0.05
 8          0.00       0.03       0.08       0.12       0.16       HUFF 2ND
 8          0.22       0.29       0.39       0.51       0.62       QUARTILE
 8          0.70       0.76       0.81       0.85       0.88
 8          0.91       0.93       0.95       0.97       0.98
 8          1.         1.         1.         1.         1.
 9 ENDTBL
 5 RAINFL 8            0.05
 8          0.00       0.03       0.06       0.09       0.12       HUFF 3RD
 8          0.15       0.19       0.23       0.27       0.32       QUARTILE
 8          0.38       0.45       0.57       0.70       0.79
 8          0.85       0.89       0.92       0.95       0.97
 8          1.00       1.00       1.00       1.00       1.00
 9 ENDTBL
 5 RAINFL 9            0.05
 8          0.00       0.02       0.05       0.08       0.10       HUFF 4TH
 8          0.13       0.16       0.19       0.22       0.25       QUARTILE
 8          0.28       0.32       0.35       0.39       0.45
 8          0.51       0.59       0.72       0.84       0.92
 8          1.         1.         1.         1.         1.
 9 ENDTBL
 6 RUNOFF 1   1      2 .15625     80.          1.50              1 100ac
   ENDATA
 7 INCREM 6             0.25
 7 COMPUT 7   1    1      0.0        3.92        1.     6 2      1  1hr
   ENDCMP 1
 7 COMPUT 7   1    1      0.0        4.84        2.     6 2      1  2hr
   ENDCMP 1
 7 COMPUT 7   1    1      0.0        5.34        3.     6 2      1  3hr
   ENDCMP 1
 7 COMPUT 7   1    1      0.0        6.25        6.     6 2      1  6hr
   ENDCMP 1
 7 COMPUT 7   1    1      0.0        7.25       12.     7 2      1  12hr
   ENDCMP 1
 7 COMPUT 7   1    1      0.0        7.84       18.     8 2      1  18hr
   ENDCMP 1
1

*********************80-80 LIST OF INPUT DATA (CONTINUED)*********************

 7 COMPUT 7   1    1      0.0        8.34       24.     8 2      1  24hr
   ENDCMP 1
 7 COMPUT 7   1    1      0.0        9.00       48.     9 2      1  48hr
   ENDCMP 1
 7 COMPUT 7   1    1      0.0        9.67       72.     9 2      1  72hr
   ENDCMP 1
 7 COMPUT 7   1    1      0.0        9.96      120.     9 2      1  120hr
   ENDCMP 1
 7 COMPUT 7   1    1      0.0       11.14      240.     9 2      1  240hr
   ENDCMP 1
   ENDJOB 2
0*******************************END OF 80-80 LIST*******************************
```

FIGURE 3
Critical Duration Analysis TR-20 Model Output (continued)

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 0 STORM 1													
XSECTION 1	RUNOFF	.16	6	2	.25	.0	3.92	1.00	1.98	---	1.40	131.05	838.7
XSECTION 1	RUNOFF	.16	6	2	.25	.0	4.84	2.00	2.75	---	1.57	143.17	916.3
XSECTION 1	RUNOFF	.16	6	2	.25	.0	5.34	3.00	3.19	---	1.72	137.53	880.2
XSECTION 1	RUNOFF	.16	6	2	.25	.0	6.25	6.00	4.00	---	2.09	116.73	747.1
XSECTION 1	RUNOFF	.16	7	2	.25	.0	7.25	12.00	4.92	---	5.90	101.28	648.2
XSECTION 1	RUNOFF	.16	8	2	.25	.0	7.84	18.00	5.47	---	12.14	89.76	574.4
XSECTION 1	RUNOFF	.16	8	2	.25	.0	8.34	24.00	5.94	---	15.93	76.12	487.2
XSECTION 1	RUNOFF	.16	9	2	.25	.0	9.00	48.00	6.56	---	41.22	43.70	279.7
XSECTION 1	RUNOFF	.16	9	2	.25	.0	9.67	72.00	7.20	---	61.38	32.11	205.5
XSECTION 1	RUNOFF	.16	9	2	.25	.0	9.96	120.00	1.71	---	74.75	5.31	34.0
XSECTION 1	RUNOFF	.16	9	2	.25	.0	11.14	240.00	.46	---	74.75?	1.61?	10.3

TR20 XEQ 12-02-04 10:01 Will County Technical Manual JOB 1 SUMMARY
REV PC 09/83(.2) Critical Duration Analysis Example JJJ DEC04 PAGE 4

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 1
XSECTION 1	.16	
ALTERNATE 0		1.61

END OF 1 JOBS IN THIS RUN

§ T202.6 Design Rainfall

For design storm events, the Illinois State Water Survey (ISWS) Bulletin 70 Northeast Sectional Rainfall Statistics will be used. When designing for storage volume the 24-hour duration must be used. To design the conveyance capacity for stormwater systems when the Rational Method is not being used, or for the hydrologic analysis of a watershed, the critical duration with the highest peak discharge shall be selected. The durations that comprise a critical duration analysis are the 1-. 2-. 3-, 6-, 12-, 18-, 24-, 48-, 72-, 120-, 240-hour storm events. Table 3 lists the ISWS Bulletin 70 precipitation depths for various duration's and recurrence intervals. The values in Table 3 were determined using the Isohyetal maps for Northeast Illinois found in Bulletin 70 and shown in Figure 4; they represent an average rainfall depth for Will County. Each Stormwater Administrator may require different rainfall depths based on the municipality's location within the county.

TABLE 3
Illinois State Water Survey Bulletin 70
Rainfall Depths Averaged for Will County

	Frequency						
Duration	**1-year**	**2-year**	**5-year**	**10-year**	**25-year**	**50-year**	**100-year**
5 min	0.31 inch	0.38 inch	0.49 inch	0.59 inch	0.71 inch	0.84 inch	1.00 inch
10 min	0.54	0.66	0.85	1.03	1.25	1.47	1.75
15 min	0.69	0.85	1.09	1.32	1.61	1.89	2.25
30 min	0.95	1.17	1.50	1.81	2.20	2.58	3.08
1 hour	1.21	1.49	1.90	2.30	2.80	3.28	3.92
2 hour	1.49	1.83	2.35	2.84	3.45	4.05	4.84
3 hour	1.64	2.02	2.59	3.14	3.81	4.47	5.34
6 hour	1.93	2.37	3.03	3.67	4.47	5.24	6.25
12 hour	2.24	2.75	3.52	4.26	5.18	6.07	7.25
18 hour	2.41	2.97	3.80	4.61	5.60	6.56	7.84
24 hour	2.57	3.16	4.05	4.90	5.96	6.98	8.34
48 hour	2.77	3.42	4.37	5.29	6.43	7.54	9.00
72 hour	2.98	3.67	4.69	5.68	6.91	8.10	9.67
120 hour	3.25	3.93	4.91	5.70	6.93	8.04	9.96
240 hour	4.12	4.95	6.04	6.89	8.18	9.38	11.14

FIGURE 4
Isohyetal Maps for Northeast Illinois from Illinois State Water Survey Bulletin 70

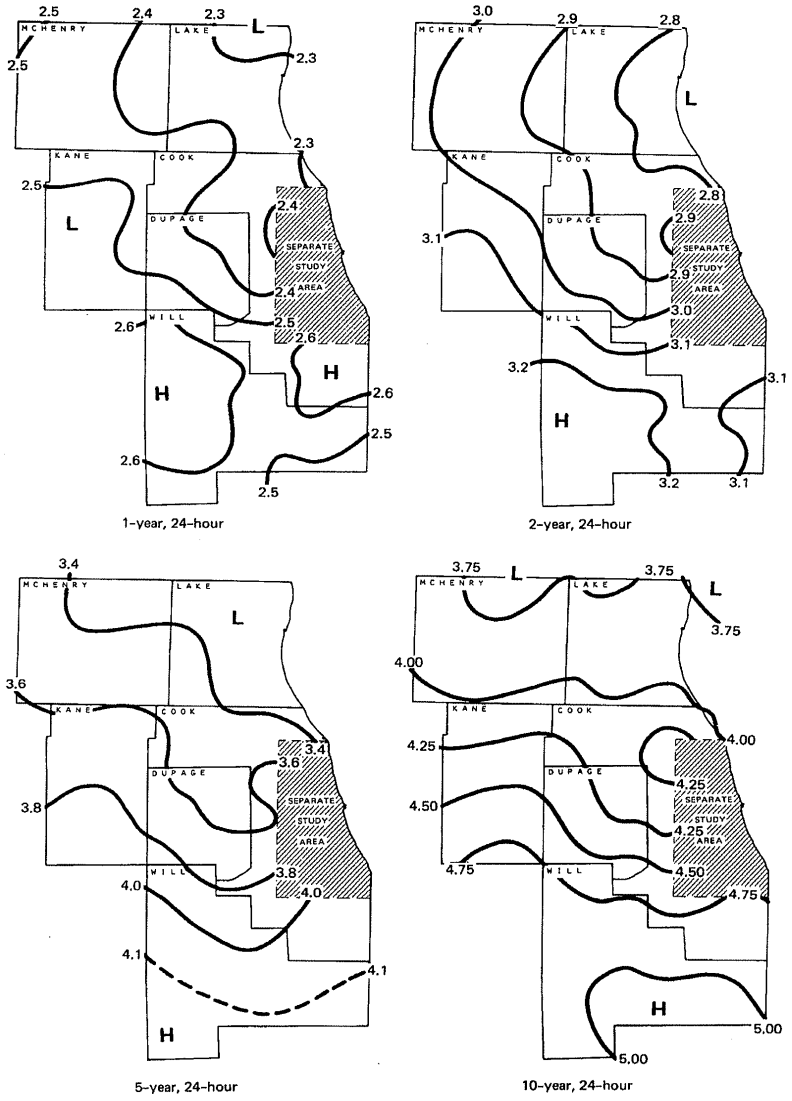


Figure 14. Frequency distribution of 24-hour maximum rainfall (inches), six-county area (adjusted)

FIGURE 4
Isohyetal Maps for Northeast Illinois from Illinois State Water Survey Bulletin 70 (continued)

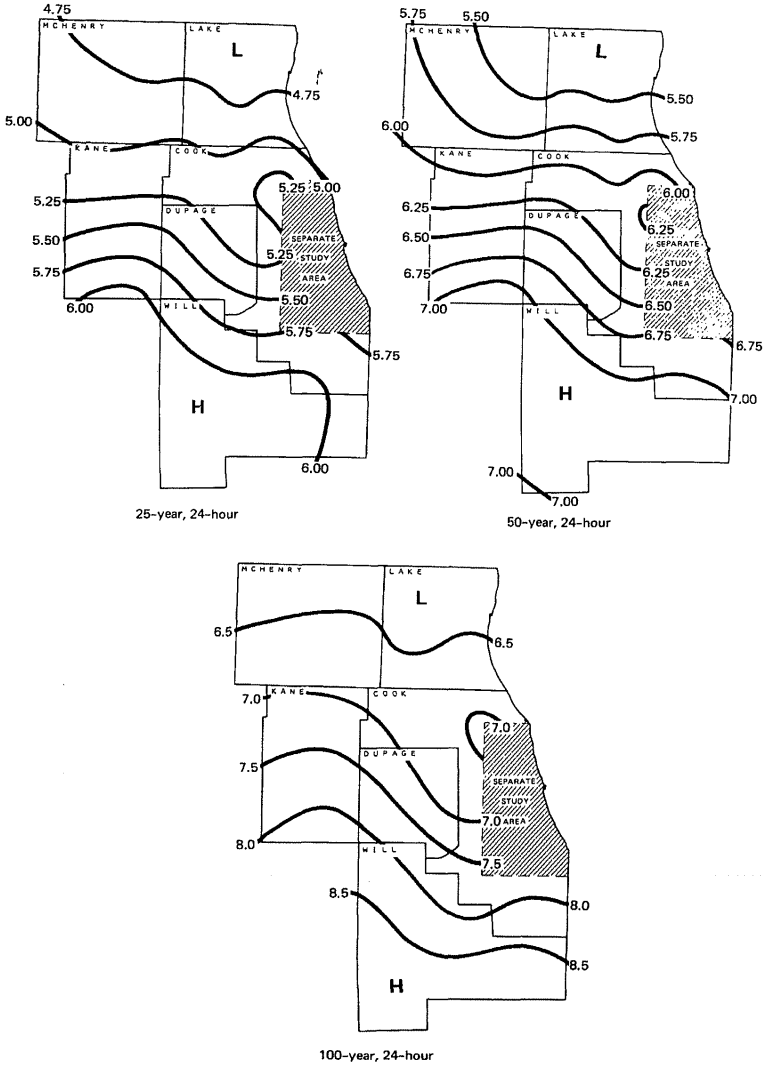


Figure 14. Concluded

Other sources of rainfall data , such as from the National Weather Service – National Oceanic and Atmospheric Administration, may provide useful data for various hydrologic analyses. However, the rainfall depths summarized in Bulletin 70 will remain the basis for all regulatory requirements, such as determining detention storage volumes and conveyance flow rates.

§ T202.7 Stormwater System Easements

The criteria of § 202.7 of the Ordinance suggests the land should be graded to drain to an existing public easement on the property (e.g., a public utility easement or existing drainage easement). If no such easement exists on the property, easements providing public access for maintenance shall be granted on the property title to the local jurisdiction (Village, City, etc., or County in unincorporated areas) for any stormwater structures (e.g., culverts, swales, ponds, etc.).

For development sites, the easement determination criteria required are:

1. Mapping of both the major and minor stormwater systems.

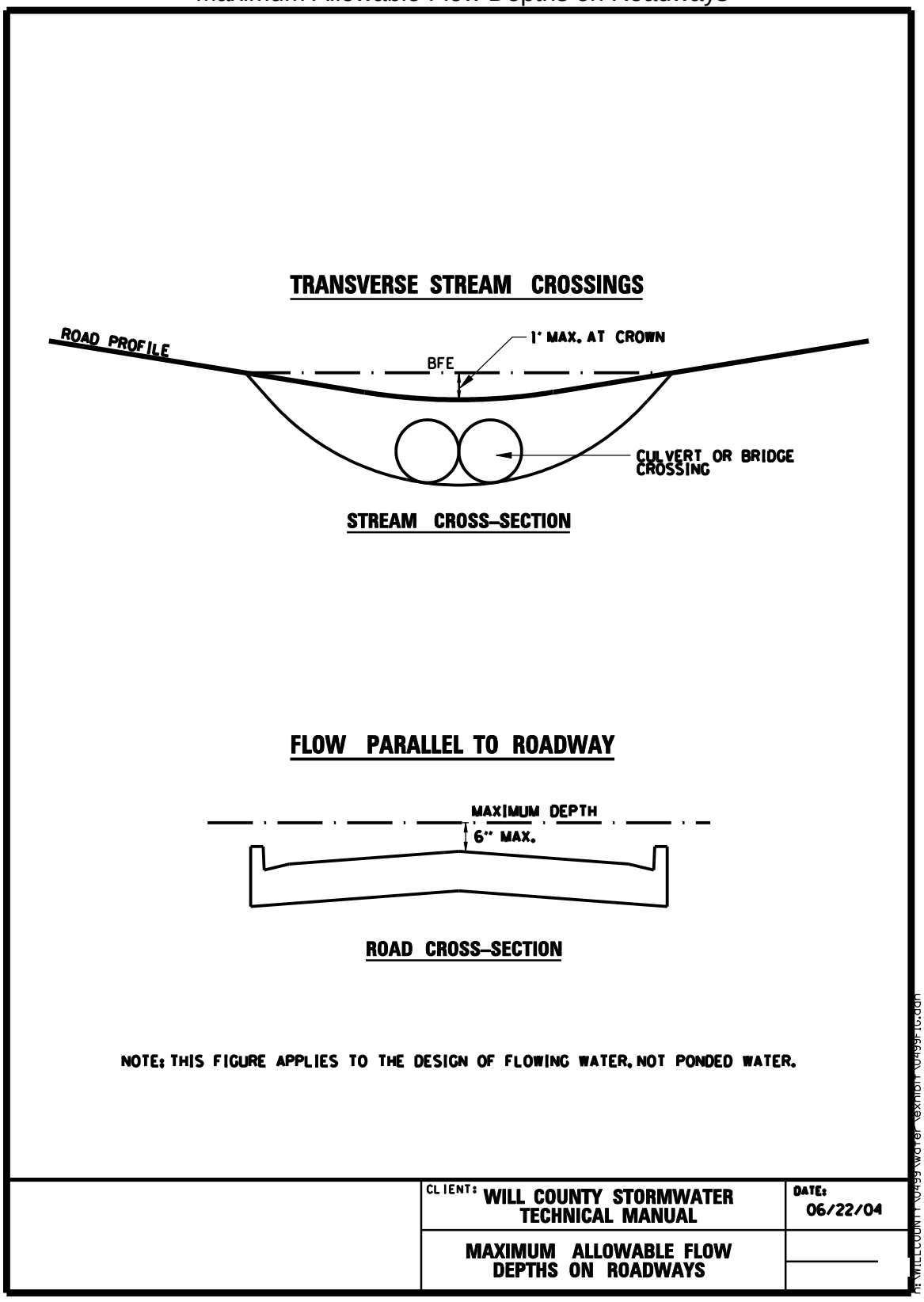
2. Mapping of an easement sufficient for maintenance or replacement for each of the stormwater facilities shown. A sufficient maintenance easement should be at least 10 feet wide around the perimeter of storage basins and along the drainageway, and extend continuously from a public roadway or access.

3. Dedication of the mapped easement on all plats or titles of all parcels containing the easement. The dedication must indicate clearly that the purpose of the easement is for maintenance access to the stormwater facilities. This requirement does not require access for other public purposes, such as trails.

§ T202.8 Flow Depths

The major stormwater system may use roadways for conveyance of flows if such use of roadways is not otherwise prohibited (e.g., use of major traffic routes may be prohibited by highway regulations for safety reasons). In cases where roadways are included in the major drainage system, the depth of flow shall be calculated by the hydraulic methods described in § T202.3. Figure 5 helps explain the criteria of the Ordinance in regards to the maximum allowable flow depths on roadways.

FIGURE 5
Maximum Allowable Flow Depths on Roadways



§ T202.9 Diversions of Flow to Another Watershed

The criteria of § 202.9 of the Ordinance can be met best by designing all post-project runoff flow to a discharge from the site at the same location where it drained in pre-project conditions. Illinois drainage law must be consulted with regard to diversions and this Ordinance does not allow diversions prohibited by Illinois drainage law.

If the developer wishes to change the discharge locations this discharge must be approved in writing by the Administrator [§ 202.1]. It will be necessary to calculate flows and hydraulic grade lines on all affected waterways for both the minor system design criteria and the major system design criteria, and to verify that the resultant hydraulic grade lines are below low entry point elevations or other damaging elevations.

The calculations should extend down both affected drainageways to the point where the prediversion flow direction joins the postdiversion flow stream, and up the affected drainageways to the point where the prediversion hydraulic grade line is calculated to be within 0.1 foot of the postdiversion hydraulic grade line. If any of these drainageways have defined floodplains, the calculations must be accomplished in accordance with the guidance for floodplain hydraulic analysis [see § T401].

§ T202.10 Best Management Practices Requirements

Compliance with the need to incorporate the U.S. EPA best management practices can be met by following the requirements cited in the U.S. Clean Water Act, which can be located at http://www.epa.gov/lawsregs/laws/cwa.html.

In general:

1. Impervious surfaces on the property should be minimized. Reducing impervious surfaces is one method for controlling increases of stormwater runoff, and, controlling future increases in stormwater damages. This method of reducing stormwater increases also provides control at the most site-specific or local level possible.

2. Natural flow paths and vegetated channels should be used and left undisturbed to the maximum extent possible. By using natural drainage features and keeping them undisturbed, site-specific and simple methods can be employed as encouraged by the Plan.

3. On-site infiltration of stormwater should be encouraged where soils and subsurface conditions are sufficiently permeable. As encouraged by the Plan, onsite infiltration accomplishes site-specific or local control of future increases in stormwater damages while preserving groundwater recharge.

4. To the extent practicable, drainage from impervious areas (i.e., roofs, driveways, sidewalks, parking lots, and streets) should drain across pervious areas. Directing drainage from impervious areas across pervious areas is one method to control increases of stormwater runoff, and thus control future increases in stormwater damages. This method of reducing stormwater increases will also provide control at the most site-specific or local level possible.

5. Directing sump pump flow away from storm sewer systems is one method for controlling increases of peak stormwater runoff, and thus controlling future increases in stormwater damages. Many homeowners view sump-pump discharges as a nuisance and it can cause continual “wet spots” in a yard making mowing difficult. In residential developments, these concerns must also be addressed. However, redirecting sump pumps to sanitary sewers is prohibited by water quality regulations.

6. To the extent practicable, drainage should be directed to and through on-site storage swales. The swales should be vegetated with water-tolerant species to prevent erosion and promote infiltration and pollutant capture.

The Chicago Metropolitan Agency for Planning (CMAP), formerly known as Northern Illinois Planning Commission (NIPC), has given regular courses of instruction in BMP design, and the course notebook "*Urban Stormwater Best Management Practices for Northeastern Illinois*" is a comprehensive reference. CMAP's website has useful information for incorporating BMPs into stormwater management facilities. The website is www.CMAP.illinois.gov. CMAP's "*Strategic Plan for Water Resource Management*" and "*Conservation Design Resource Manual"* are also useful for incorporating BMP's into stormwater management facilities. These publications are available from CMAP which is located at 233 S. Wacker Drive, Suite 800, Chicago, Illinois, 60606, or by telephone at (312) 454-0400.

§ T203 Site Runoff Storage Requirements (Detention)

The objective of § T203 is to discuss the hydrologic models that can be used to develop peak-discharge frequency estimates for any watershed in question. The hydrologic models are used to size appropriate stormwater system(s) that are used to attenuate the increase in peak discharges due to additional impervious surfaces.

§ T203.1 Release Rate

The peak release rate from a development site shall not exceed 0.15 cfs/acre of development for the 100-year frequency storm in any year. In addition, the peak release rate from a development site shall not exceed 0.04 cfs/acre of development for the 2-year frequency storm in any year. The Ordinance release rate is a conservative public policy decision setting a uniform standard and level of protection. It is reflective of the relatively low capacity of stormwater infrastructure in Will County. These release rates may be overruled by a more conservative release rate specified in an adopted watershed plan. To check whether a watershed plan is in place for a project location, the Administrator should be contacted.

The release rate is to be calculated by determining the hydrologically disturbed area of the development. For roadway improvements, the release rate is to be calculated by determining the amount of new impervious area created. § T200 explains roadway detention. If the site has more than one outlet, the allowable release for each discharge point shall be calculated based on the hydrologically disturbed area of the development tributary to that particular outlet. Site runoff storage volume is required for only the area of the site that has been hydrologically disturbed. If the development on a 60-acre site disturbs only 40 acres of the site, then the site runoff storage volume is necessary for only 40 acres. Figure 6 shows an example of this requirement.

When a development has offsite flow that is to be routed through a detention basin, the release rate should be sized for 0.15 cfs/ac for the entire tributary area at the design high water level (HWL) for the basin. In this case, an analysis should first be performed using the on-site area only to determine the 2- and 100-year high water levels. This model should demonstrate that the basin releases at a maximum of 0.04/0.15 cfs/ac for the 2- and 100-year storms. Using the HWL's obtained from this model, the outlet control structure can be designed for the offsite flow. The proposed outlet structure should pass 0.04 cfs/ac for the entire drainage area at the 2-year HWL, and 0.15 cfs/ac for the entire drainage area at the 100-year HWL. If the upstream areas are undetained, the basin will likely overflow during a 100-year event. The overflow weir should be designed accordingly. However, if the upstream areas are developed in the future according to the Ordinance, the actual HWL of the basin should match the design HWL.

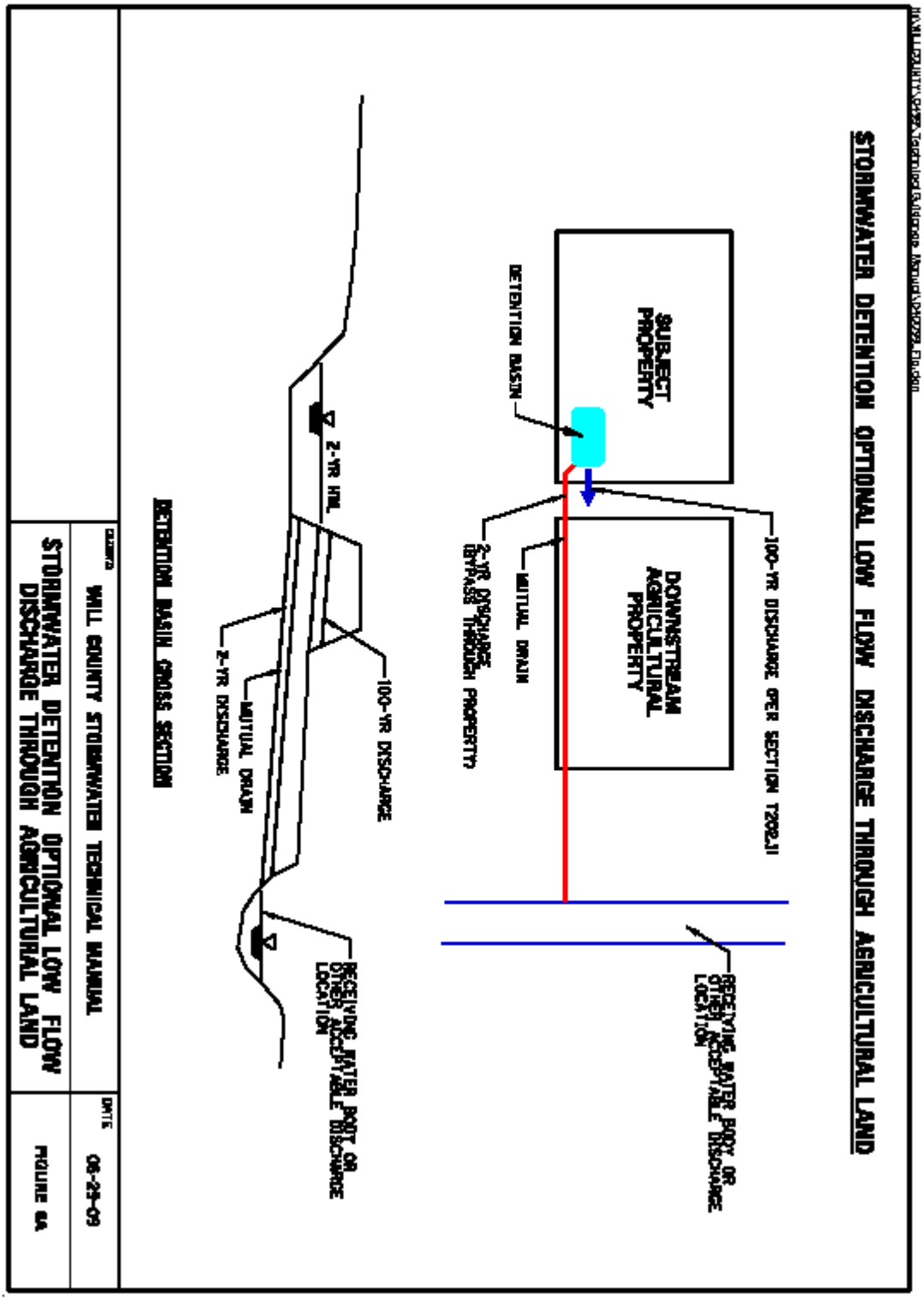
When considering design options for the development, attention needs to be given to the downstream receiving property. Particular land uses, such as agricultural uses, at times, are not capable of managing the slow releases required by this Ordinance. The Ordinance's release rate requirements result in a longer duration of low flow being conveyed to the downstream property. This longer duration has been known to increase erosion, reduce crop yields,

and restrict and hinder access to agricultural property. Figure 6A is an alternative design suggested to help address these concerns. The design calls for the release of the 2-year storm, at the required rate, into subsurface system designated and designed to accept the 2 year flow. This “Mutual Drain” would be installed across the downstream agricultural property and outlet to an appropriate and acceptable location. This “Mutual Drain” would be sized to handle the development’s peak 2-year discharge. It can be an option to size this “Mutual Drain” to allow the connection of “feeder” lines from the downstream agricultural property’s field tile system of which the “Mutual Drain” is being installed.

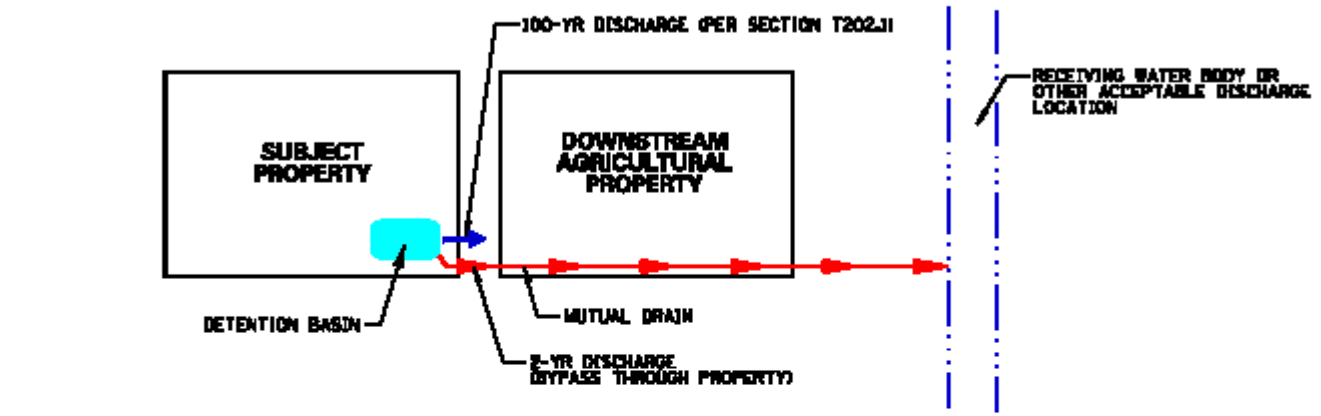
An agreement between the developer and the owner of the downstream agricultural land is needed to determine the ownership and maintenance responsibilities for the “Mutual Drain.” This agreement needs to be a legally binding document to make sure that the drain is properly maintained through the downstream property. Appendix I provides model agreements.

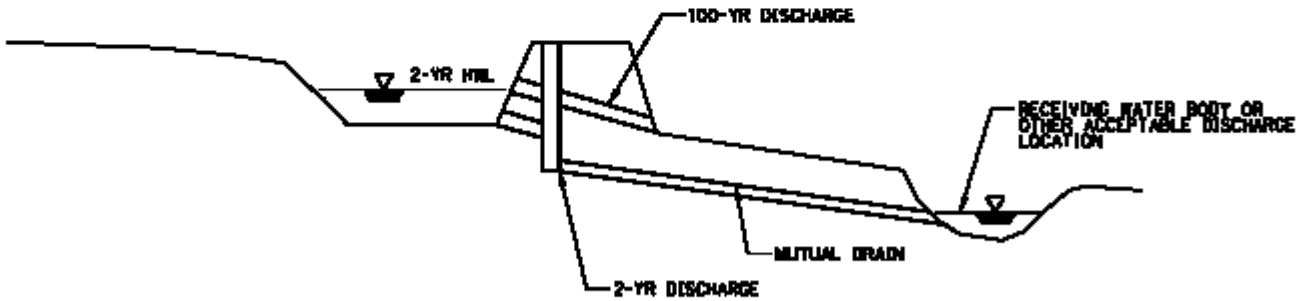
If the downstream property owner wishes to connect to the “Mutual Drain” with field tiles, it is their responsibility to make sure that both the “Mutual Drain” and the receiving waterway have the capacity to accommodate the additional flow.

FIGURE 6A and 6B
Optional Low Flow Discharge Through Agricultural Land



STORMWATER DETENTION OPTIONAL LOW FLOW DISCHARGE THROUGH AGRICULTURAL LAND OPTION "B"

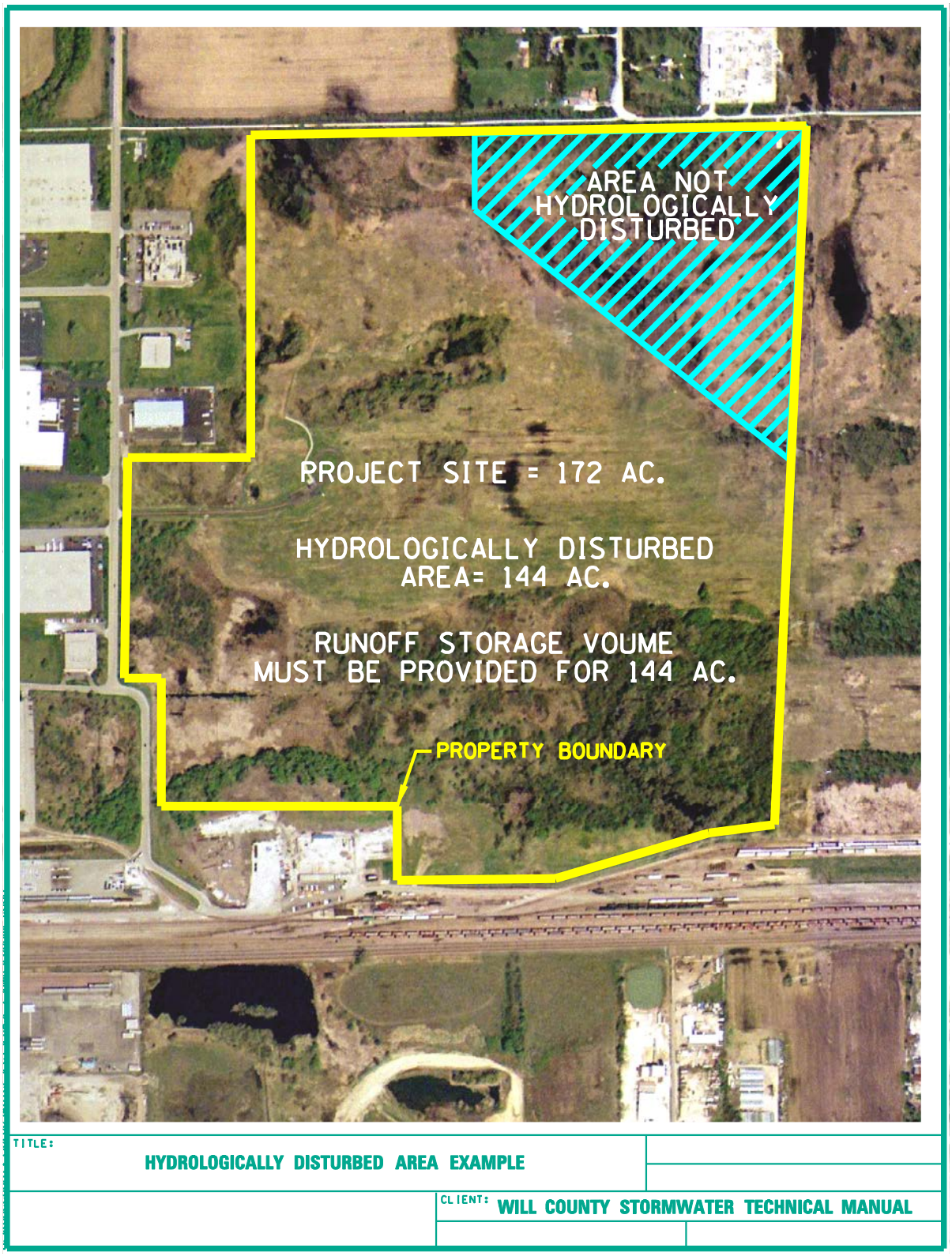




DETENTION BASIN CROSS SECTION

	CLIENT: WILL COUNTY STORMWATER TECHNICAL MANUAL	DATE: 06-25-09
	STORMWATER DETENTION OPTIONAL LOW FLOW DISCHARGE THROUGH AGRICULTURAL LAND	FIGURE 6B

FIGURE 6
Hydrologically Disturbed Area Example



§ T203.2 Design Methods

In order to calculate the required storage volume, either an event hydrograph routing method or the Modified Rational Method shall be used. An explanation of the Modified Rational Method is included later in this section. There are several computer programs developed explicitly for determining the required storage volume using event hydrograph routing methods. Acceptable models include HEC-1 (only when used with SCS runoff method), HEC-HMS (also, using the SCS runoff method), TR-20 or TR-55 tabular method. The HEC-1 and HEC-HMS are U.S. Army Corps of Engineers hydrologic models. TR-20 and TR-55 were developed by the Soil Conservation Service (now named the Natural Resources Conservation Service). The HEC programs can be downloaded off the internet from:

http://www.hec.usace.army.mil

The TR-20 program can be downloaded off the internet from:

http://www.wsi.nrcs.usda.gov/products/W2Q/H&H/Tools_Models/other/TR20

All event hydrograph routing methods shall use the Huff rainfall distribution appropriate for the storm duration as shown in Tables 4 and 5. Rainfall depths for different frequencies and durations are shown in Table 3 in § T202(f). Figure 7 shows the four Huff Quartile Distributions in graphical format. The only exception to using the Huff Quartile Distributions is when the TR-55 tabular method is used. When using the TR-55 tabular method it is acceptable to use the SCS Type II rainfall distribution. An antecedent moisture condition of 2 must be used when using the TR-20 event hydrograph program.

TABLE 4

Huff Rainfall Distributions

(Source: Illinois State Water Survey Bulletin 70, Frequency Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois, by Floyd Huff and James Angel, 1989

Rainfall Duration (hours)	Huff Distribution
1	1st
2	1st
3	1st
6	1st
12	2nd
18	3rd
24	3rd
48	4th
72	4th
120	4th
240	4th

TABLE 5

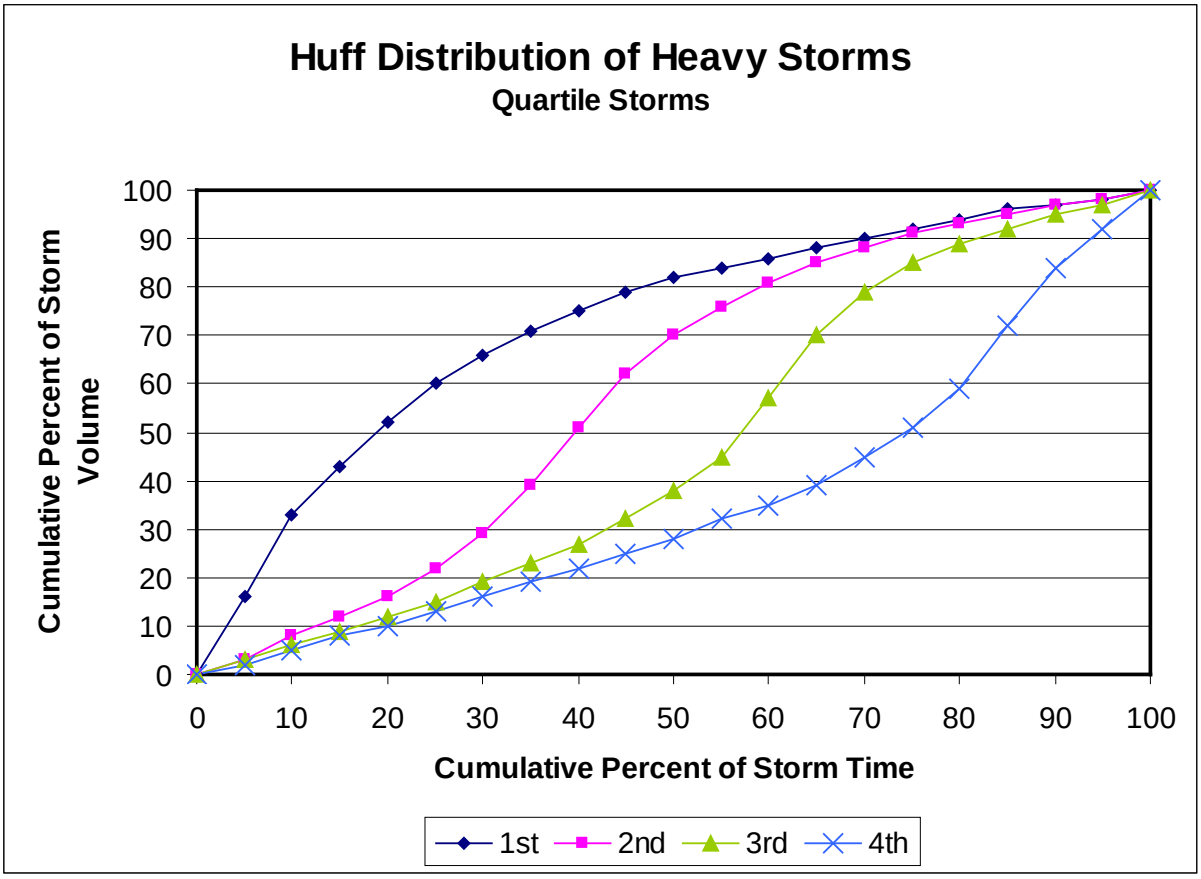
Huff Quartile Distributions*

(Source: Illinois State Water Survey Bulletin 70, Frequency Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois, by Floyd Huff and James Angel, 1989)

Cumulative Storm Percentage	Percent of Total Rainfall			
	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
05	16	03	03	02
10	33	08	06	05
15	43	12	09	08
20	52	16	12	10
25	60	22	15	13
30	66	29	19	16
35	71	39	23	19
40	75	51	27	22
45	79	62	32	25
50	82	70	38	28
55	84	76	45	32
60	86	81	57	35
65	88	85	70	39
70	90	88	79	45
75	92	91	85	51
80	94	93	89	59
85	96	95	92	72
90	97	97	95	84
95	98	98	97	92

* Applies to drainage areas less than 10 square miles.

FIGURE 7
Median Time Distribution of Heavy Storm Rainfall at a Point
(Reference: ISWS, 1992; Rainfall Frequency Atlas of the Midwest)



All runoff volumes shall be calculated using the 24-hour duration with a 1% probability of occurrence in any one year. An antecedent moisture condition (AMC) of 2 shall be used for all runoff calculations. An AMC=2 represents average soil moisture conditions.

A simple method for approximating the required storage volume for a development can be determined using the unit area detention method. The Northeastern Illinois Planning commission in their publication, *Investigation of Hydrologic Methods for Site Design in Northeastern Illinois* (Dreher and Price, 1991), developed a chart by which unit area detention volumes can be determined from the impervious percentage of the developed site. Figure 8 shows a graph which can be used to approximate the storage required based on the percentage of impervious surface area on the site. The graph was developed to utilize rainfall depths specific to Will County. The graph is an option for a simplified method of calculating detention requirements. However, the Stormwater Administrator may approve other methods that are at least as strict as the Ordinance requires. The actual required storage must be determined from an event hydrograph routing method.

The volume requirements for small detention basins may be estimated using Figure 8, which relates the percent of impervious area to unit area detention volume. Figure 8 is a useful tool for estimating the storage required for a site. It is recommended for use on sites less than 20 acres. However, Figure 8 cannot be used in place of the hydrograph methods required by the Ordinance.

FIGURE 8
100-Year Detention Volume vs. Percent Impervious

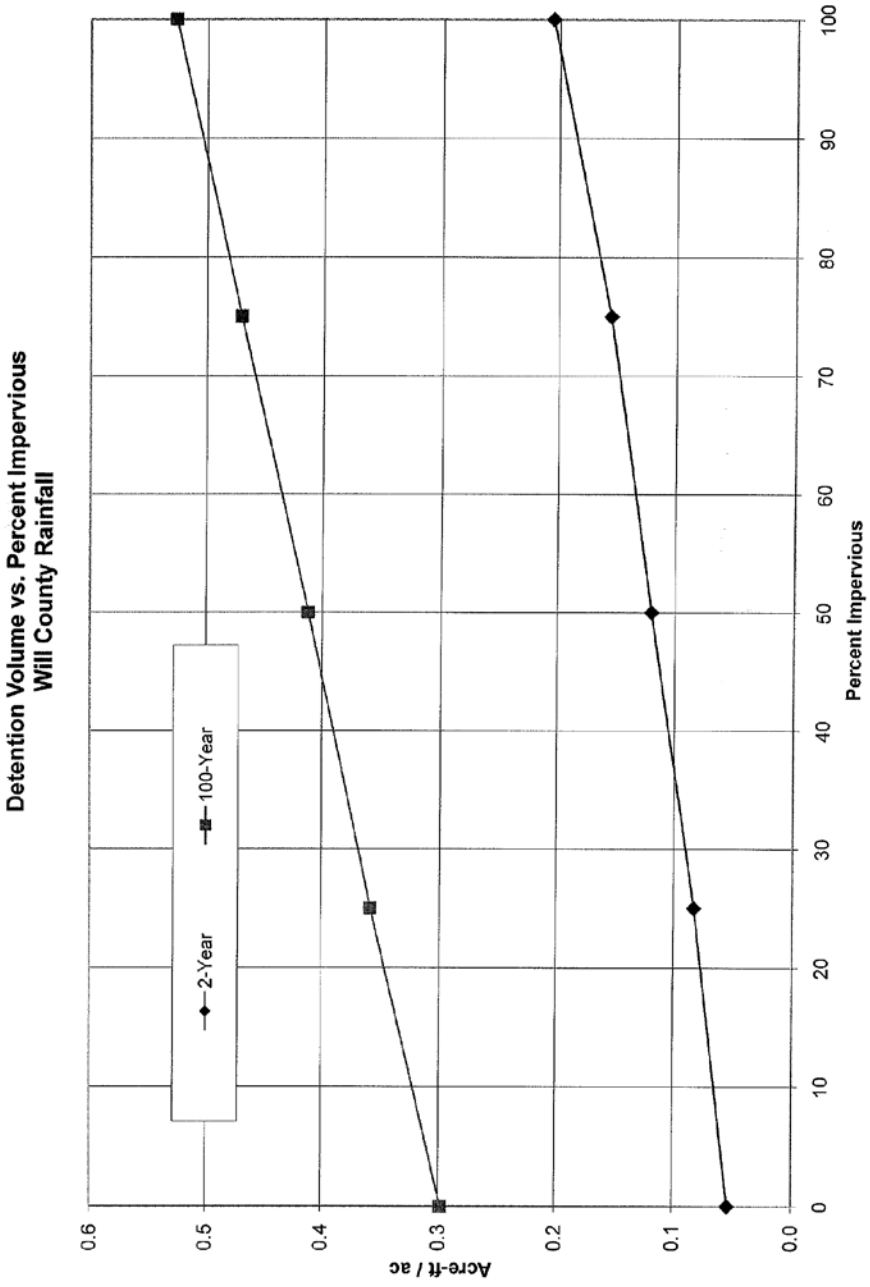
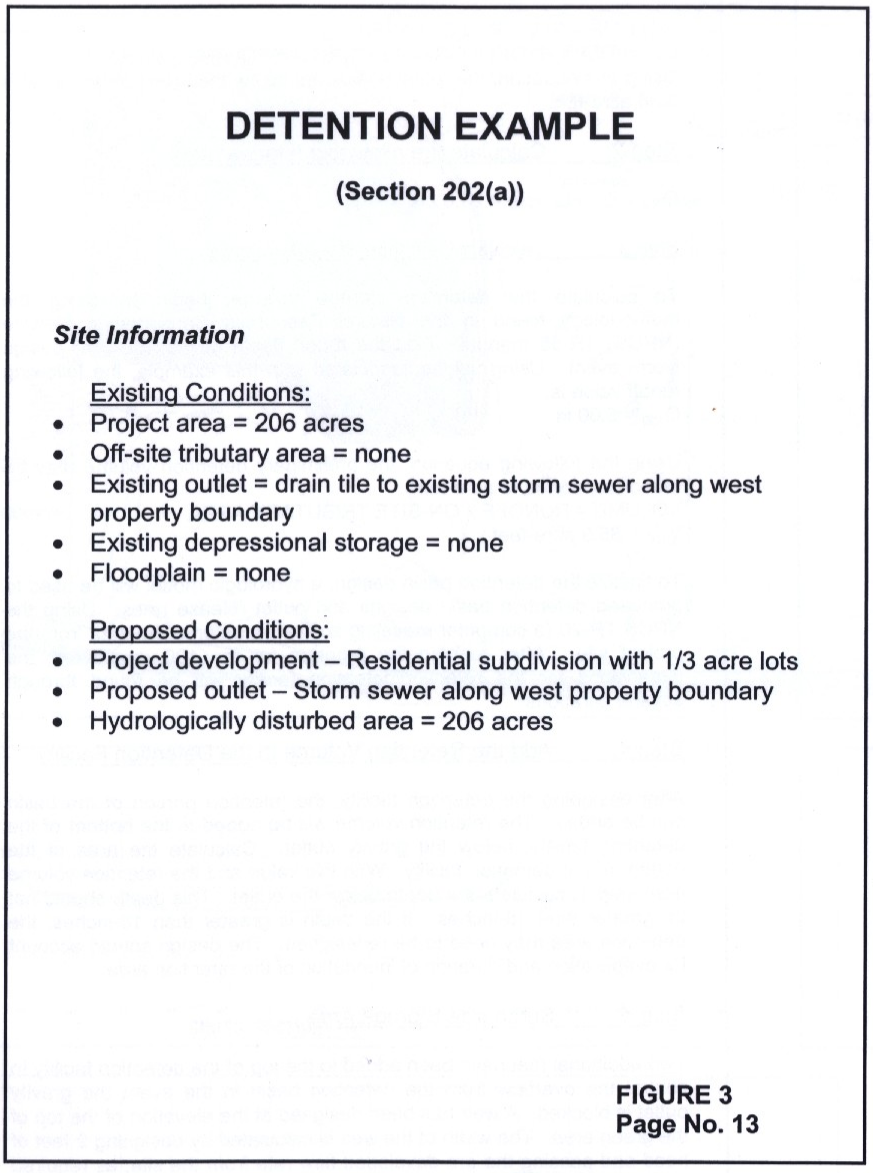

Detention Volume vs. Percent Impervious
Will County Rainfall
2-Year
100-Year
Acre-ft / ac
0.0
0.1
0.2
0.3
0.4
0.5
0.6
Percent Impervious
0
10
20
30
40
50
60
70
80
90
100

FIGURE 9
Detention Example



DETENTION EXAMPLE

(Section 202(a))

Site Information

Existing Conditions:

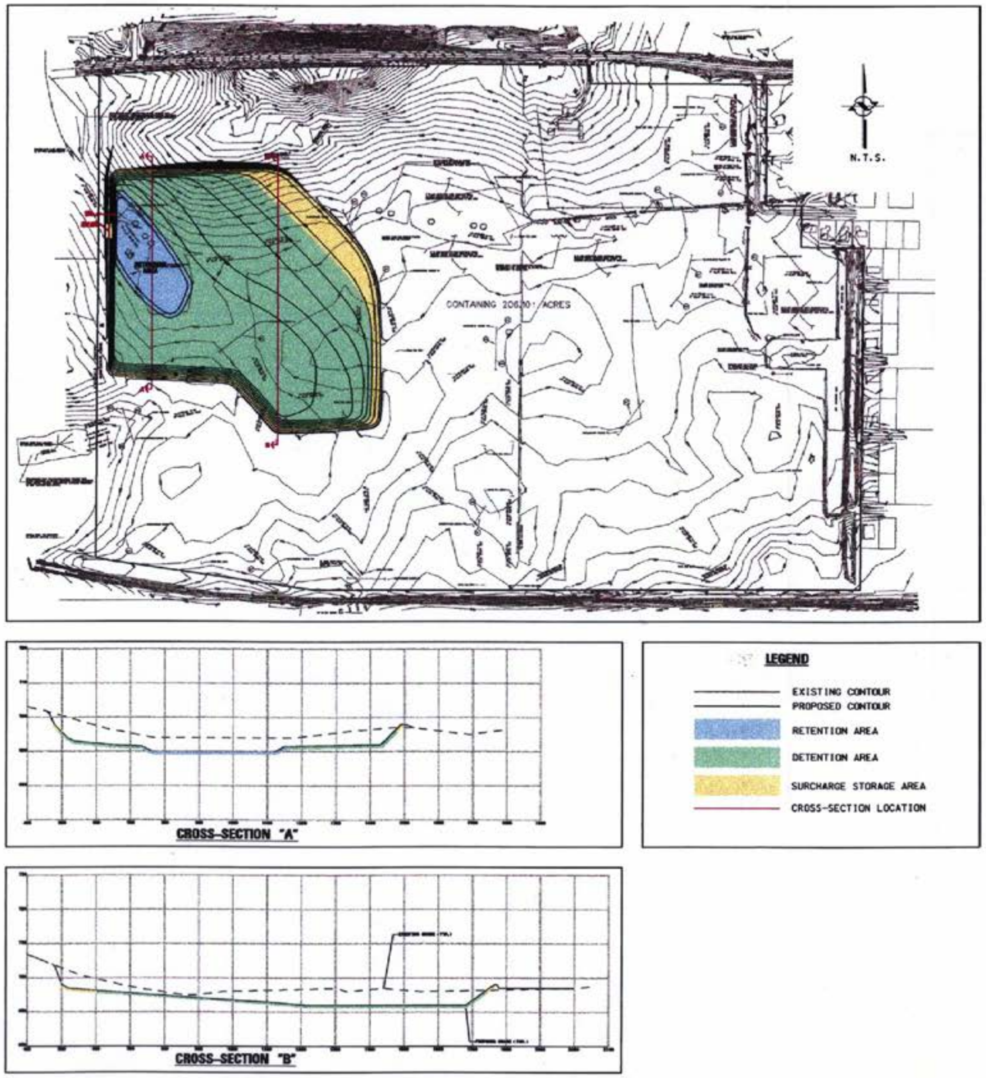
- Project area = 206 acres
- Off-site tributary area = none
- Existing outlet = drain tile to existing storm sewer along west property boundary
- Existing depressional storage = none
- Floodplain = none

Proposed Conditions:

- Project development – Residential subdivision with 1/3 acre lots
- Proposed outlet – Storm sewer along west property boundary
- Hydrologically disturbed area = 206 acres

FIGURE 3
Page No. 13

FIGURE 9
Detention Example (continued)



PROCEDURE TO DETERMINE REQUIRED STORAGE

Step 1: Calculate volume to be retained

VOLUME = RUNOFF x DCI AREA
DCI AREA = HYDROLOGICALLY DISTURBED AREA x 0.30
Using this equation, the retention volume below the invert of the outlet is 3.86 acre-ft.

Step 2: Calculate the allowable release rates

Step 3: Calculate Detention Storage Volume

To calculate the detention storage volume, begin by using the methodology found in the Natural Resources Conservation Service (NRCS) TR-55 manual. Find the runoff depth of the 100-year design storm event. Using values associated with this example, the following runoff value is:
Q_{100} = 5.00 in.

Using the following equation, the preliminary detention volume may be found (converted to acre-feet).
VOLUME = RUNOFF x ON-SITE TRIBUTARY AREA
V_{100} = 85.9 acre-feet

To finalize the detention basin design, a hydrologic model will be used to proposed detention basin designs and outlet release rates. Using the NRCS TR-20 (a computer modeling software), enter in the data from the project site. After running the program for the 100-year event, the dimensions for the retention/detention facility will be found through several iterations.

Step 4: Add the Retention Volume to the Detention Facility

After designing the detention facility, the retention portion of the basin can be added. The retention volume will be added to the bottom of the detention facility, below the gravity outlet. Calculate the area of the bottom of the detention facility. With this value and the retention volume from step 1, calculate the depth below the outlet. This depth should not be greater than 18-inches. If the depth is greater than 18-inches, the detention area may need to be redesigned. The design should account for evaporation and duration of inundation of the retention area.

Step 5: Surcharge Storage Area

Two additional feet have been added to the top of the detention facility to control the overflow from the detention basin in the event the gravity outlet is blocked. A weir has been designed at the elevation of the top of the green area. The width of the weir is calculated by designing 2 feet of head and passing the pre-developed flow rate from the site, as required in the ordinance.

The final facility dimensions and layout are located on the figure to the left.

MODIFIED RATIONAL METHOD FOR
CALCULATION OF DETENTION STORAGE VOLUME:

Example: A development has a tributary area of 100 acres consisting of 55% single family residential subdivision with 0.5-acre lots, 25% commercial, and 10% open space. The site storage facilities are expected to comprise 10% of the site. The hydrologic soil group is C, and the slope of the drainage area is roughly 4%. Use the modified rational method to determine the required detention volume for the site for the 2- and 100-year recurrence intervals. The assumed date of final engineering approval is June 18, 2004.

Solution:

The calculation begins with computing a composite runoff coefficient for the drainage area. Note that the coefficients listed below are suggested values and will vary by community. The Administrator should be contacted to determine the appropriate values.

Landuse Type	Area (acres)	Runoff Coefficient (RC)
Single family residential	55	0.5
Commercial	25	0.75
Open Space	10	0.3
Detention	10	1.0

$$\text{Composite Runoff Coefficient} = \frac{\sum RC(Area)}{\sum Area}$$

$$= \frac{55(0.50)+25(0.75)+10(0.30)+10(1.0)}{100}$$

$$= 0.59$$

Next, the site's allowable release rate must be calculated for the 2- and 100-year recurrence intervals.

$Q_{2\text{-year}}$ = 0.04 (cfs/acre)* 100 (acres) = 4 cfs

$Q_{100\text{-year}}$ = 0.15 (cfs/acre)* 100 (acres) = 15 cfs

The previously calculated values are input into the following Modified Rational Method spreadsheets that utilize rainfall depths found in Section 202-6.

MODIFIED RATIONAL METHOD - DETENTION STORAGE CALCULATIONS

ISWS BULLETIN 70 2-YR RAINFALL INTENSITIES

2-Year Detention Requirement

TRIBUTARY AREA	=	100
COMPOSITE RUNOFF COEFFICIENT	=	0.59
ALLOWABLE RELEASE RATE	=	4
COMPUTED DETENTION STORAGE	=	9.7

(A) DURATION (hrs)	(B) DURATION (min)	(C) RAINFALL DEPTH (in.)	(D) RAINFALL INTENSITY (in/hr)	(E) INFLOW RATE (cfs)	(F) STORED RATE (cfs)	(G) RESERVOIR SIZE (acre-ft)
0.17	10	0.66	3.96	233.6	229.6	3.189
0.33	20	0.92	2.75	162.0	158.0	4.388
0.50	30	1.17	2.34	138.1	134.1	5.586
0.67	40	1.28	1.92	113.0	109.0	6.055
0.83	50	1.38	1.66	97.9	93.9	6.524
1	60	1.49	1.49	87.9	83.9	6.993
1.5	90	1.66	1.11	65.3	61.3	7.662
2	120	1.83	0.92	54.0	50.0	8.331
3	180	2.02	0.67	39.7	35.7	8.932
4	240	2.14	0.54	31.6	27.6	9.188
5	300	2.26	0.45	26.7	22.7	9.445
6	360	2.37	0.40	23.3	19.3	9.653
7	420	2.43	0.35	20.5	16.5	9.614
8	480	2.49	0.31	18.4	14.4	9.576
9	540	2.55	0.28	16.7	12.7	9.538
10	600	2.61	0.26	15.4	11.4	9.499
11	660	2.68	0.24	14.4	10.4	9.510
12	720	2.75	0.23	13.5	9.5	9.521
13	780	2.79	0.21	12.7	8.7	9.384
14	840	2.82	0.20	11.9	7.9	9.198
15	900	2.86	0.19	11.2	7.2	9.062
16	960	2.89	0.18	10.7	6.7	8.876
17	1020	2.93	0.17	10.2	6.2	8.739
18	1080	2.97	0.17	9.7	5.7	8.603
19	1140	3.00	0.16	9.3	5.3	8.417
20	1200	3.03	0.15	8.9	4.9	8.231
21	1260	3.06	0.15	8.6	4.6	8.045
22	1320	3.09	0.14	8.3	4.3	7.859
23	1380	3.12	0.14	8.0	4.0	7.673
24	1440	3.16	0.13	7.8	3.8	7.537

MODIFIED RATIONAL METHOD - DETENTION STORAGE CALCULATIONS
ISWS BULLETIN 70 100-YR RAINFALL INTENSITIES

100-Year Detention Requirement

TRIBUTARY AREA	=	100
COMPOSITE RUNOFF COEFFICIENT	=	0.59
ALLOWABLE RELEASE RATE	=	15
COMPUTED DETENTION STORAGE	=	29.8

(A) DURATION (hrs)	(B) DURATION (min)	(C) RAINFALL DEPTH (in.)	(D) RAINFALL INTENSITY (in/hr)	(E) INFLOW RATE (cfs)	(F) STORED RATE (cfs)	(G) RESERVOIR SIZE (acre-ft)
0.17	10	1.75	10.50	619.5	604.5	8.396
0.33	20	2.42	7.25	427.5	412.5	11.457
0.50	30	3.08	6.16	363.4	348.4	14.518
0.67	40	3.36	5.04	297.4	282.4	15.687
0.83	50	3.64	4.37	257.7	242.7	16.855
1	60	3.92	3.92	231.3	216.3	18.023
1.5	90	4.38	2.92	172.3	157.3	19.660
2	120	4.84	2.42	142.8	127.8	21.297
3	180	5.34	1.78	105.0	90.0	22.505
4	240	6.34	1.59	93.5	78.5	26.172
5	300	7.34	1.47	86.6	71.6	29.838
6	360	6.25	1.04	61.5	46.5	23.229
7	420	6.42	0.92	54.1	39.1	22.799
8	480	6.58	0.82	48.6	33.6	22.368
9	540	6.75	0.75	44.3	29.3	21.938
10	600	6.92	0.69	40.8	25.8	21.507
11	660	7.08	0.64	38.0	23.0	21.076
12	720	7.25	0.60	35.6	20.6	20.646
13	780	7.35	0.57	33.4	18.4	19.879
14	840	7.45	0.53	31.4	16.4	19.113
15	900	7.55	0.50	29.7	14.7	18.346
16	960	7.64	0.48	28.2	13.2	17.580
17	1020	7.74	0.46	26.9	11.9	16.813
18	1080	7.84	0.44	25.7	10.7	16.047
19	1140	7.92	0.42	24.6	9.6	15.206
20	1200	8.01	0.40	23.6	8.6	14.366
21	1260	8.09	0.39	22.7	7.7	13.526
22	1320	8.17	0.37	21.9	6.9	12.686
23	1380	8.26	0.36	21.2	6.2	11.845
24	1440	8.34	0.35	20.5	5.5	11.005

Formula Key:

Rainfall Intensity: C/A = D
Inflow Rate: (Tributary Area) x (RC) x D = E
Stored Rate: E – (Allowable Release Rate) = F
Reservoir Size: (A x F)/12

Finally, the Ordinance assesses a penalty for the use of the Modified Rational Method based on the approval date of the final engineering plan. For this example, it is assumed that final engineering plans were approved on June 18, 2004. Therefore, an additional 10% of detention storage must be included in the design, as shown in the following table.

Schedule for penalties associated with using the Modified Rational Method:

Date of Final Engineering Plan Approval	**Penalty**
01/01/2004 through 12/31/2004	10%
01/01/2005 through 12/31/2005	20%
01/01/2006 through 12/31/2006	30%
After 12/31/2006	30%

$Vol_{2\text{-}yr}$ = 1.10* 9.7 (acre-ft) = 10.7 acre-ft

$Vol_{100\text{-}yr}$ = 1.10* 29.8 (acre-ft) = 32.8 acre-ft

§ T203.3 Existing Release Rate Less Than Allowable

For all developments, the existing conditions release rate must be computed. If the existing release rate for the design storm event with a 1% probability of occurrence in any one year with a 24-hour duration is less than 0.15 cfs/acre, then that will be the developed maximum release rate. It is common for sites with small amounts of tributary area and significant depressional storage to have the existing undeveloped release rate less than 0.15 cfs/acre. It is also possible for a site to have a positive, although restricted, outlet condition. A restrictive culvert that creates “depressional storage” upstream of the roadway would be an example. In this case, depressional storage mitigation is not required. However, the existing release rate must be verified, and if less than 0.15 cfs/ac, must be used to design the proposed storage facilities.

§ T203.4 Downstream Water Surface Elevations

Outfalls are hydraulic structures whose capacity is governed by a balance between upstream and downstream head. Outfall capacity must be calculated within the range of differences in upstream and downstream hydraulic grade line that can be expected to occur statistically for a 100-year return period. It is important to make realistic assumptions about the outfall capacity.

Calculations should assume free outfall conditions only if hydraulic grade line calculations for the discharge channel indicate the outfall will be free during major storms. Hydraulic grade line evaluations must proceed upstream from:

1. A demonstrated free overflow; or

2. The expected 1% probability flood elevation at the most downstream point analyzed; or

3. An alternative assumption demonstrated to be appropriate and conservative.

When the outfall occurs in a regulatory floodplain, see the discussion in T203.7.

§ T203.5 Extended Detention Requirement

The extended detention (retention) requirement compensates for the amount of rainfall that typically is absorbed into the ground from pervious areas, prior to surface runoff. Studies have been performed that indicate the first 0.75 inches of rainfall are absorbed into the ground from pervious areas before the ground becomes saturated under typical agricultural row-crop uses. Extended detention is required for sites that have an agricultural land use downstream of its storage facility. To compensate for the hydraulically connected impervious areas that do not provide any possible absorption of rainfall into the ground, these developments must retain a volume equivalent to the hydraulically connected impervious area times 0.75 inches. The volume is to be retained below the primary gravity outlet for which the 1% probability storm event is designed.

If discharge from the retention system is through subsurface drains, connected to any type of conveyance system (agricultural drain tile, storm sewer, open channel, overland flow, etc.), the retained volume should be designed to discharge at a rate that empties the retention volume no earlier than 5 days after the storm event. A Subsurface drainage system with restrictor can be used to assist in the discharge of the retention volume. Existing agricultural drain tiles (field tiles) shall not be used to provide discharge from a retention system. If subsurface drains are used, they shall be newly installed.

If the retention area is dewatered strictly through infiltration, there is no need to restrict the natural infiltration rate to meet the 5-day criteria. A long term maintenance program must be submitted which provides for regular cleaning of silt and sediment which collects in the bottom of the retention facility. It is recommended to include a filter fabric under the topsoil layer to reduce the amount of silt which can clog the infiltration layer beneath the retention facility. The maintenance program must be approved by the Administrator.

Soil borings shall be provided that show the parent material at the bottom of the retention facility. Soil Surveys can be used to determine the infiltration rate of the material under the retention facility.

The retention volume may be reduced or compensated for, by providing other measures on-site. An alternative plan to providing the retention volume required must be presented and deemed acceptable by the Administrator. In order to reduce the amount of the retention volume, the developer can plant in open areas deep-rooted native vegetation that is capable of greater infiltration than typical lawn/turf grasses. The soils in the areas of deep rooted native grasses should be susceptible to infiltration. Such planted areas should be dedicated as part of the stormwater easements for the site and have a short and long term maintenance program. Most importantly, the

runoff from the hydraulically connected impervious areas should be directed into the planted areas to obtain the benefit of runoff reduction. There is practically no benefit to a planted area that is located upstream of the hydraulically connected impervious areas. The area of deep-rooted native vegetation being planted will compensate at a 1:1 ratio the hydraulically connected impervious area being created by the development. For example, if 10 acres of impervious area is being created by the development, and 1 acre of deep-rooted vegetation is planted, the retention area must retain a volume equivalent to 0.75 inches times 9 acres.

Figure 10 illustrates the concept of providing deep rooted native vegetation around a detention pond. The area provided for the plantings is larger than the hydraulically connected impervious area; therefore, assuming the plan meets the Administrator's approval, no retention volume is required. Figure 10 also illustrates that the runoff conveyed from the storm sewer system is discharged across the planting area prior to entering the detention system. The planted area negates the requirement for the retention volume due to the increased infiltration volume but does not or will not affect the required detention volume for the development.

Subsurface drainage systems can be used to assist in the infiltration of the retention volume. Figures 11, 12, and 13 illustrate the use of a field tile system in conjunction with the discharge of the retention volume. Because the bottom will be wet over an extended period of days, wetland vegetation should be used which can handle the extended wet durations. The Native Plant Guide for Streams and Stormwater Facilities in Northeastern Illinois (NRCS, et. al., 1997) has a list of applicable wetland plantings. The wetland plantings will benefit the water quality of the runoff being filtered through the retention pond. Figure 14 illustrates how the retention volume can be designed for a given project.

Evaporation can be accounted for over the designed retention area. A typical average evaporation rate for the summer months is 4.2 in/month. All subsurface drainage pipes shall be separated by at least 10 feet from those drainage pipes connected to the detention basin.

An option available to avoid providing retention is to route the discharge around the agricultural land downstream of the property to a receiving body of water which can be shown to have sufficient capacity for the discharge under all storm events.

FIGURE 10
Conceptual Park Area to Compensate for Retention Volume

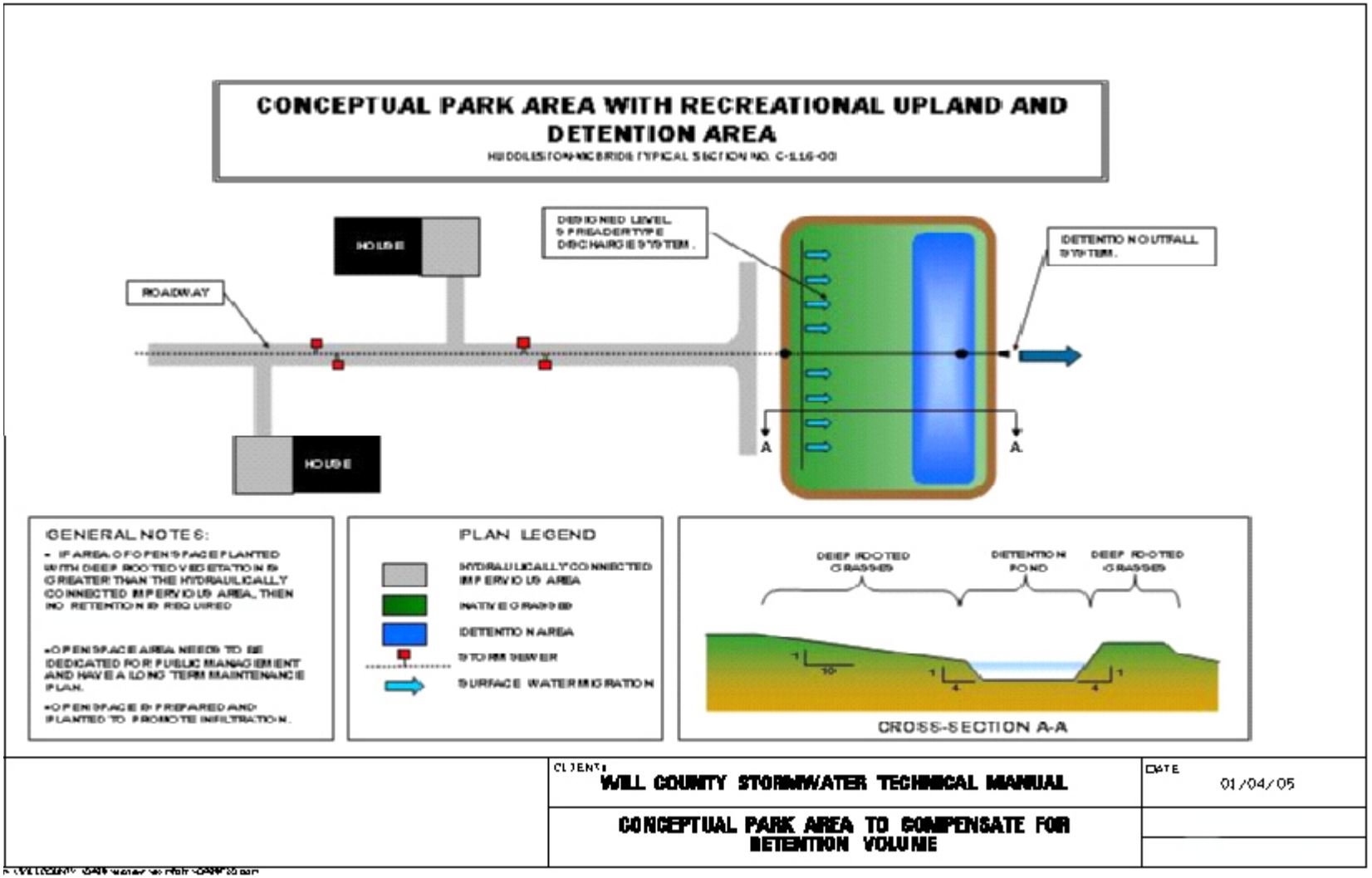


FIGURE 11
Detention Configuration for Proposed Requirements
When Water Table is Above Pond Bottom

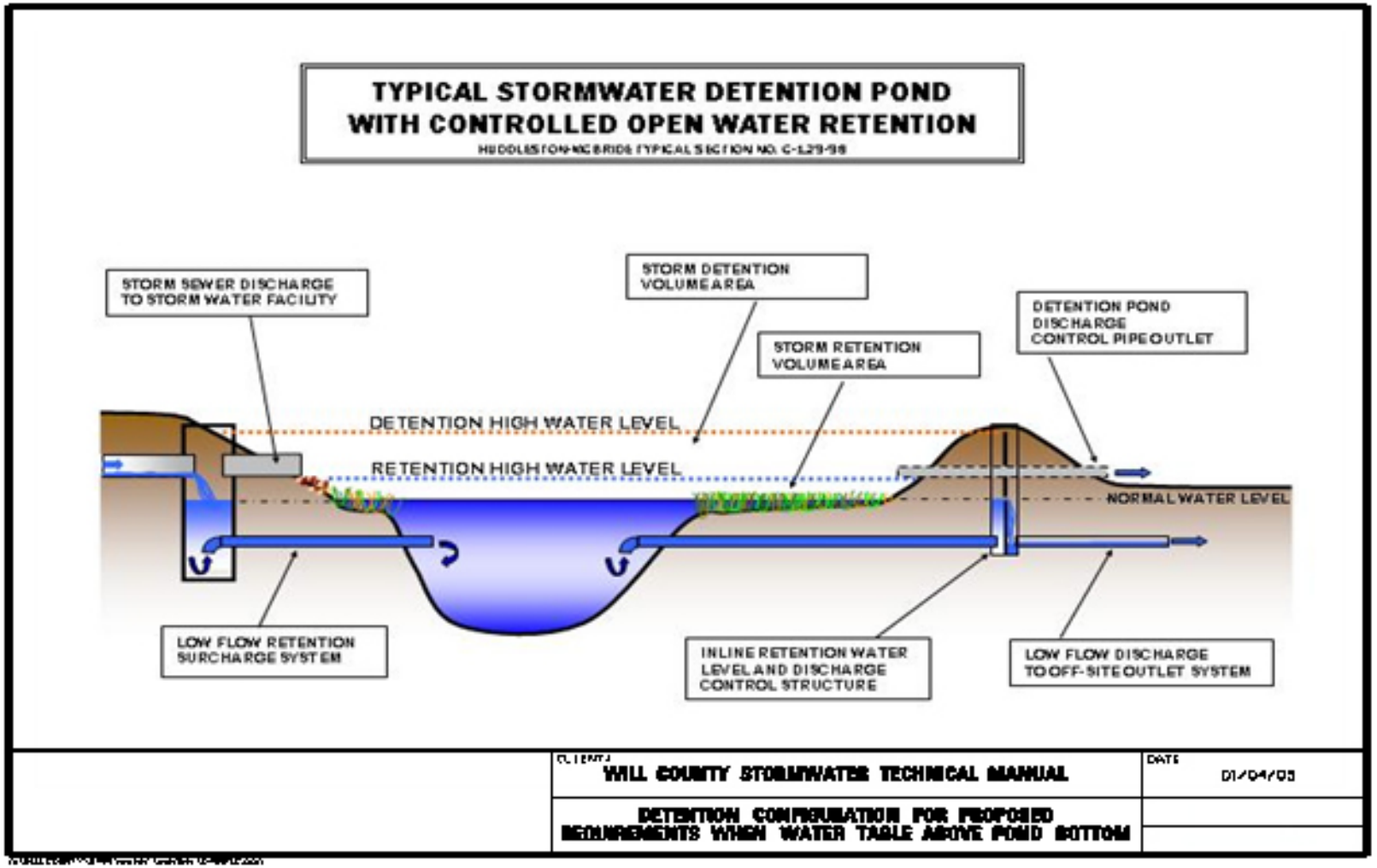


FIGURE 12
Detention Configuration for Proposed Requirements
When Water Table is Below Pond Bottom

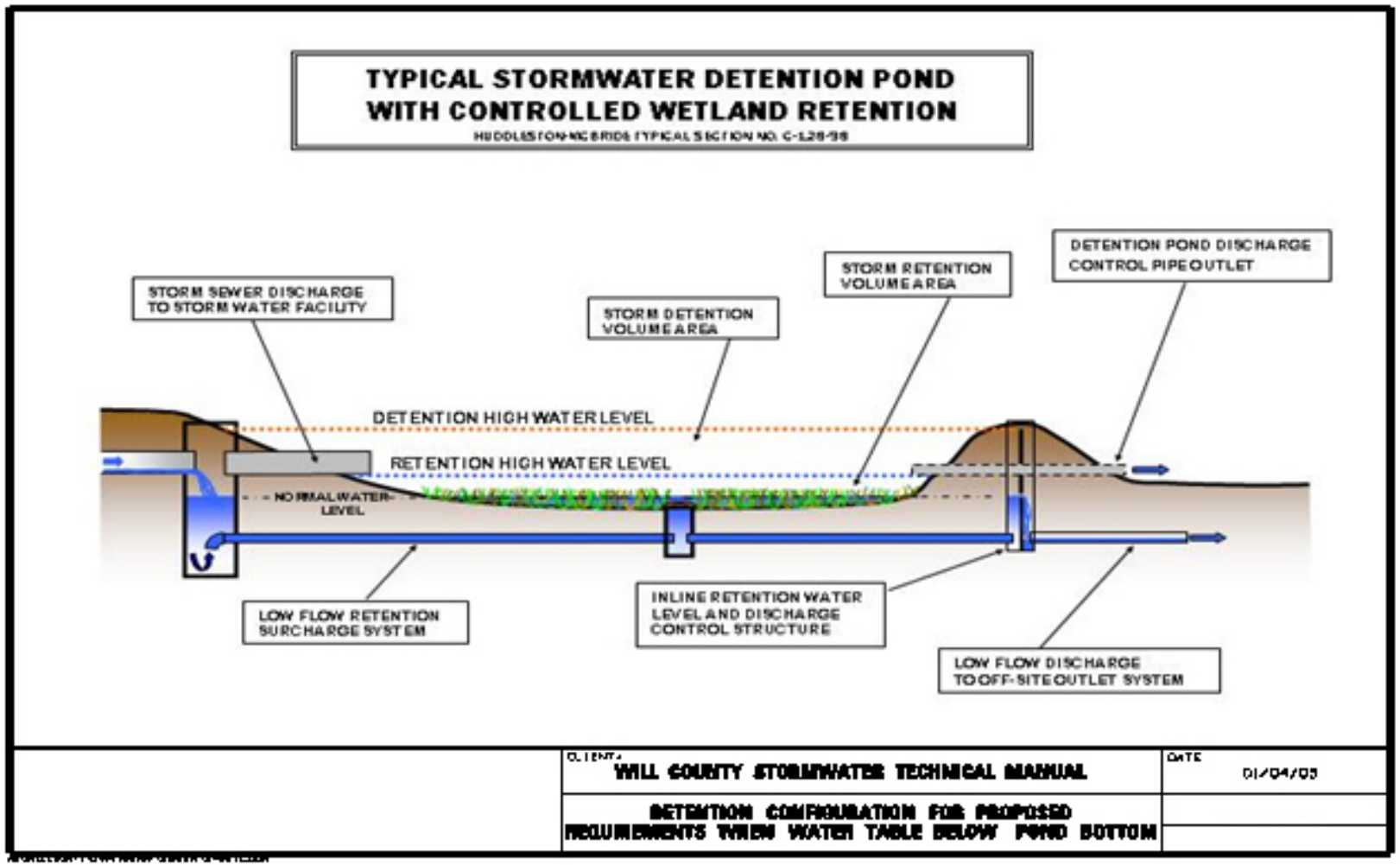


FIGURE 13
Detention Configuration for Proposed Requirements
When Water Table is Above Pond Bottom

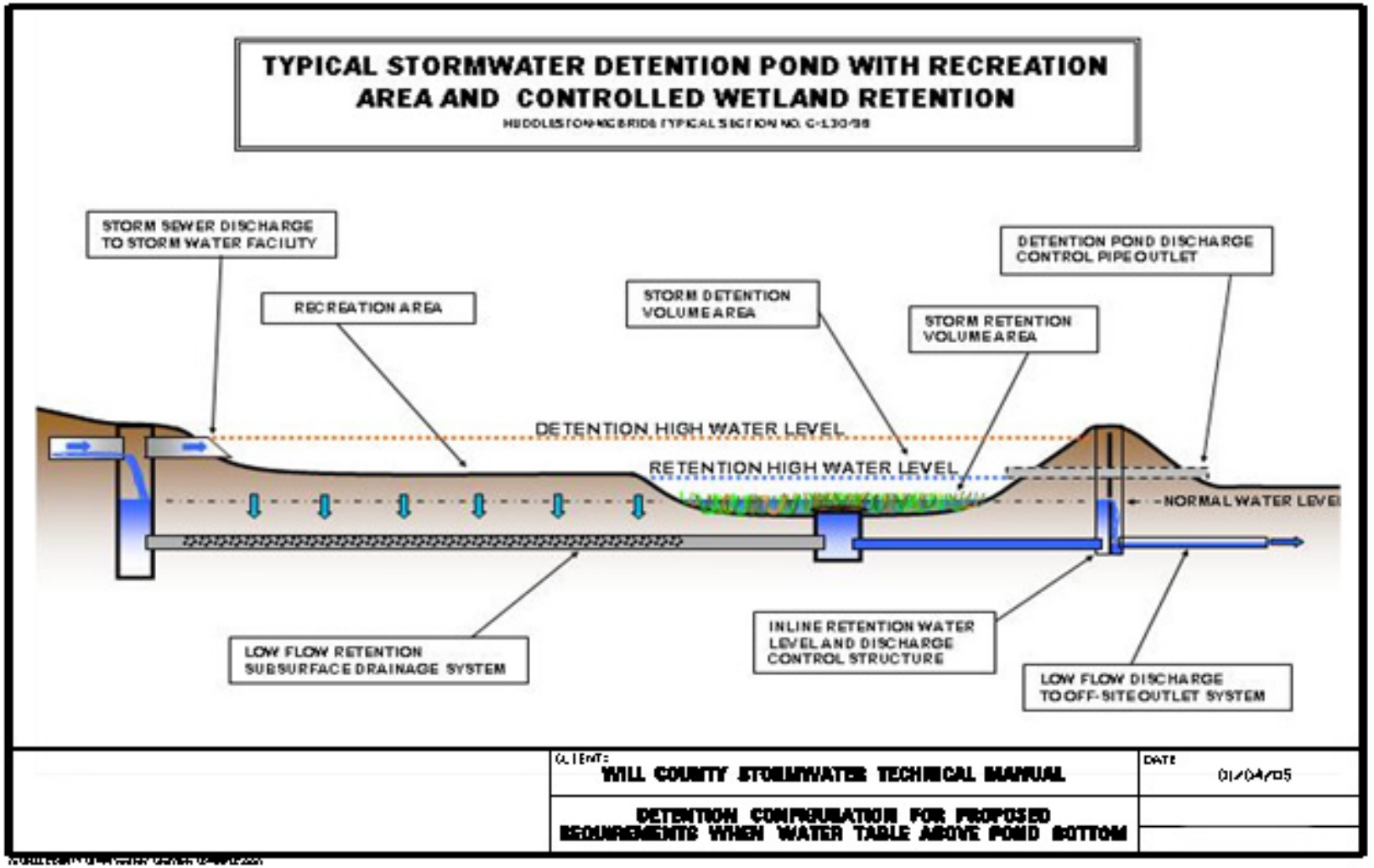
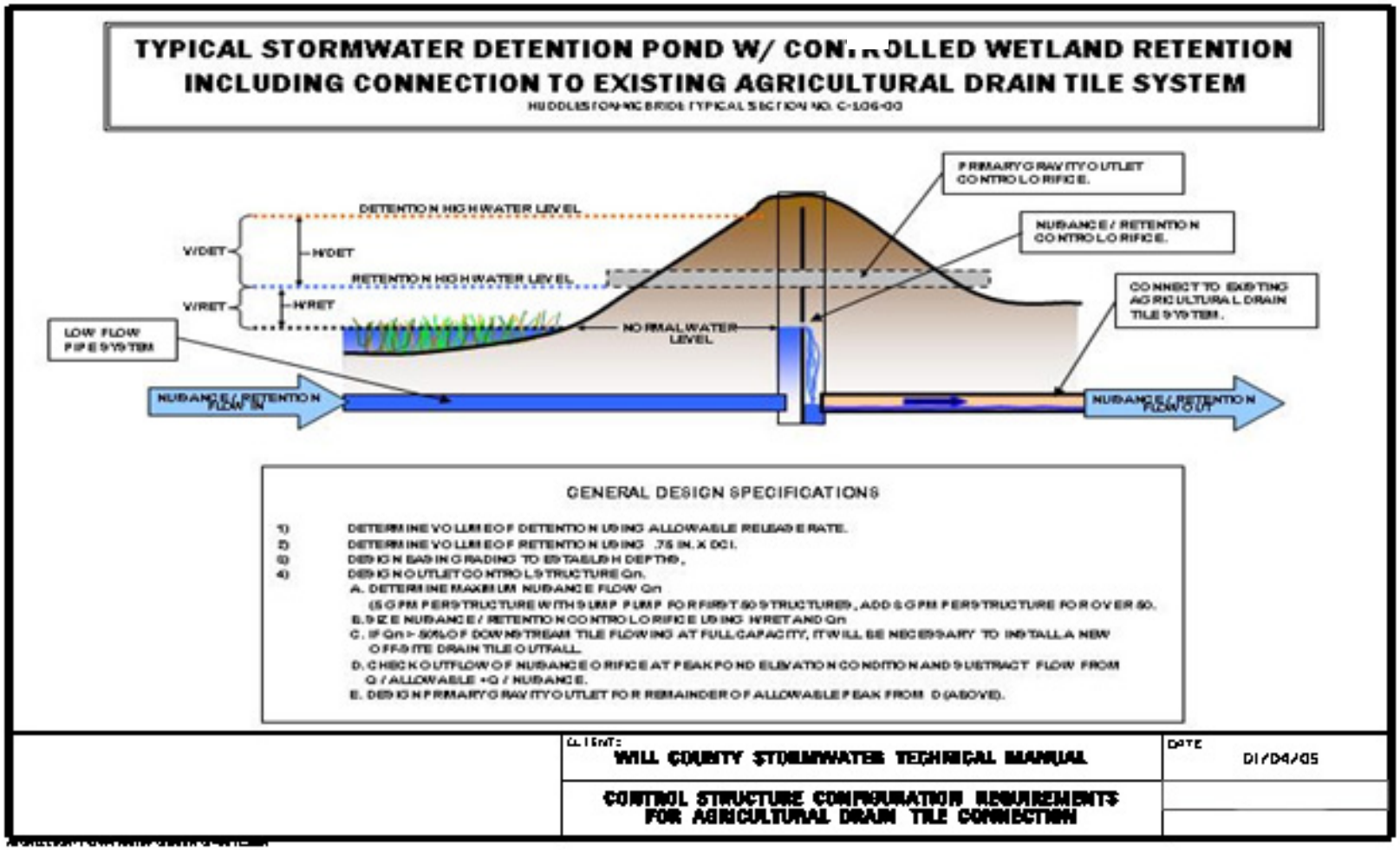


FIGURE 14
Control Structure Configuration Requirements for
Agricultural Drain Tile Connection



§ T203.6 Site Runoff Storage Facility Design Requirements

Recommended steps for design of the site runoff storage facility:

1. Determine the site and development area and the natural outlet point(s).

2. Calculate the off-site tributary area and the corresponding peak runoff rate from the 100-year, critical duration design storm event.

3. Determine if regulatory floodplain or floodway exists on the development site.

4. Calculate the existing release rate from the site, accounting for any depressional storage.

5. From the hydrologically disturbed area, determine the percent impervious area and calculate the approximate detention volume required using Figure 7. Be aware that the Stormwater Administrator may require other methods to determine the detention storage volume required.

6. Determine the location(s) of stormwater storage facilities and the existing outlets, including invert/overland flow elevations.

7. Calculate the required extended detention volume following the procedure outline in § T203.5, if required.

8. Determine the allowable fluctuation in water depth (bounce) due to site topography and the outlet elevation.

9. Use an event hydrograph routing method to iterate the size of the detention pond knowing the allowable release rate, an approximate storage volume, and allowable bounce elevation, and modeling the inflow hydrograph from the development area. The final model should show that the allowable 2- and 100-year release rates are met. The stage-storage-discharge rating curve in the model should match the plan data.

10. According to Section 203.6(f) of the Ordinance, determine the discharge from the basin in the scenario where the restrictor(s) are blocked. This can be calculated using the hydrograph model from step 9 by modifying the stage-discharge rating curve. A zero discharge value should be used at all elevations up to the overflow elevation, above which outflow is controlled by the overflow weir. The outflow value cannot exceed the existing conditions peak discharge from the

site at the given location, which can be determined using a critical duration analysis.

11. If step 10 shows that the proposed discharge exceeds existing, the storage volume must be increased and the discharge reduced.

12. The storage facility slopes should be planted with vegetation that can withstand the designed water elevation fluctuation. In general, naturalized detention ponds should be planted with wet prairie or shoreline vegetation from the normal water level to 1' above the NWL. Mesic prairie mix can be used on the side slopes of the basin above the NWL. Further information on selecting vegetation for stormwater facilities can be found in the NRCS' "Native Plant Guide for Streams and Stormwater Facilities in Northeastern Illinois".

§ T203.7 Site Runoff Storage Facility Requirements Within the Regulatory Floodplain

The Ordinance does not prohibit the construction of site runoff storage facilities in the floodplain, but requires that their design consider carefully the function of the facility during flood flows. Detention volume sizing shall assume a free discharge, establishing a required volume. Actual detention analysis must consider all stream flow and backwater conditions in the receiving stream up to the 10 year storm. Analysis of the operation of the facility must also consider the requirement that existing conditions 100-year peak runoff rate not be exceeded where the restrictor is blocked. "Berming off" of existing floodplain storage and uncontrolled site discharge (on-line storage) is highly discouraged and requires a variance. Excavating "new" storage in the floodplain and controlling the discharge while allowing overflow into basins of the stream system for infrequent floods can be beneficial to the watershed.

The Administrator may approve designs not otherwise realized by the requirements in Sections 203.7 a, b, and c of the Ordinance, if it can be shown using detailed hydrologic and hydraulic analysis that the design of a storage facility within the regulatory floodplain provides a watershed benefit; the Administrator may approve the design. To show a watershed benefit, the applicant must demonstrate that there is a decrease in flood elevations for the 100-year, critical design storm event, either upstream and/or downstream of the development site. The decrease in elevation should be greater than 0.1 feet and in no locations, upstream or downstream of the development site should water surface elevations increase.

The applicant is still responsible for any permit requirements of the IDNR-OWR and any other agencies which require permitting for work within the floodplain or floodway.

§ T203.8 Requirements Within the Regulatory Floodway

A hydrologic and hydraulic analysis must be performed to demonstrate no adverse impact upstream or downstream of the development site, as well as demonstrating that the required site storage volume will actually be available under all stream conditions. The storage facility shall provide a net watershed benefit.

§ T203.10 Off-Site Facilities

It is assumed that the site runoff storage will normally be located on the development site. If this is not the case, then the runoff storage site will itself constitute a development site and be subject to all of the requirements for development under the Ordinance.

The storage volume in the offsite facility, therefore, must be at least equal to the sum of the storage volume required for the original development, plus the volume required for development of the storage facility. If any other areas drain to the storage facility, additional storage volume must be provided as indicated under "Off-Site Flows", above. Further, the developer must demonstrate that the required storage volume is intentionally and operationally available under the full range of hydrologic and hydraulic conditions from dry weather to base flood conditions.

Runoff from the development site must be conveyed to the storage site. It precludes the option of oversizing an offsite storage volume and undersizing the outlet to compensate for allowing a larger discharge rate on the original development site. Conveyance from the development site to the storage site must be sized to convey the base flood peak flows considering both tailwater and headwater hydraulic conditions.

§ T203.12 Structures Built Across a Channel for Site Runoff Storage Facilities

Where a stream traverses a development site, special considerations for the location of detention facilities are warranted. The practice of building an impounding structure or dam across the stream to meet detention requirements is often problematic when a longer term view of the stream system is taken. In perennial streams, which in general are streams that exhibit a constant flow, a number of other processes are at work which the cross stream structure interrupts. These are (1) the movement of sediments downstream and (2) distribution of nutrients to aquatic organisms. In general the impact of this interruption is much more severe on perennial than intermittent streams where these processes are more likely to be in evidence. Therefore, structures built across a channel to impound water to obtain the

required site runoff storage requirements are prohibited on any perennial stream unless it is part of a public flood control project with a net watershed benefit.

When no better information is available, USGS 7.5-minute quadrangle maps can be consulted for the location of an intermittent stream. Intermittent streams are shown as “broken blue” lines. Where a stream is shown as a “solid blue” line on these maps, they are assumed to be perennial unless better information is submitted and accepted by the Administrator. Better information may include documented flow monitoring. The flow monitoring must be carried on for a minimum of one water year (October 1 through September 30) and documented by an individual who has had training in stream monitoring protocol and statistical analysis of stream flows.

Streams shown as other than solid blue lines on a USGS Quadrangle Map may be assumed to be intermittent if they have a defined bed and banks and no flow is observed in them for some period of time. Where no bed and banks of a stream are observed, or above the discharge point of agricultural field tile systems, streams may be assumed ephemeral.

A stream’s bed and bank configuration at any given time is related to a number of factors, but generally it is a product of the base flow, energy gradient, total sediment load, and size of the sediment particles. A change in any one of these four factors causes the stream to experience a long period of instability that tends back towards stability in a new configuration. A dam can affect the base flow of the stream and interrupts the sediment load that the stream is carrying. Sediment starved discharges from the impoundment pick up a new sediment load downstream. Increases in the base flow velocity can cause stream banks to widen in response to seeking equilibrium.

An ephemeral stream has no base flow by definition. The ephemeral portions of streams are located in the upland watershed where under certain circumstances cross stream structures can actually be beneficial to the watershed on a regional basis when considering peak discharges.

Stream stability calculations must document the streams current geomorphological classification for a significant reach downstream and upstream that would be influenced by the proposed dam. This length can vary based on the particular conditions but should be assumed to be no less than one thousand feet upstream of the pool and downstream of the impounding structure. This distance may extend off site. The submittal must include documentation that the proposed dam will not substantially change the base flow of the stream system, nor exacerbate known stream instability problems within the influenced reach. This submittal also must document the likelihood that other aquatic resources are present and what impact the cross

stream structure would be on these resources. Where the impacts cannot be adequately mitigated then the cross stream structure should be considered prohibited.

These requirements are in addition to any requirements imposed by the U.S. Army Corps of Engineers (COE) in their permitting process or other requirements imposed by this ordinance. Also, any impounding structure must also satisfy Illinois Department of Natural Resources – Office of Water Resources Dam Safety permitting requirements.

Article 3 Erosion and Sediment Control

Erosion and sedimentation are naturally occurring geological phenomena. Land development activities have initiated more drastic, undesirable and damaging alterations in the natural cycle by accelerating the erosion – sedimentation process. The original natural vegetative cover of prairie grasses, trees and shrubs allowed only a minimal amount of soil to be eroded. But as soon as cover was disturbed, first by the plow, and more recently by development activities, the exposed ground surface has become subject to accelerated stormwater runoff and resultant soil erosion. The primary cause of soil erosion is the energy impact of the falling rain on the exposed soil.

Stream beds tend to build-up with sediment during the construction phase of development and then erode dramatically as the area stabilizes and runoff increases. As such, erosion interferes with water uses, degrades water quality, destroys natural plant growth and buries substrates important for fish feeding and spawning.

All construction activities that disturb 1 acre of land or more require a National Pollution Discharge Elimination System Phase II (NPDES Phase II) permit from the Illinois Environmental Protection Agency (IEPA) prior to any construction. The goal of the federally mandated Phase II program is to preserve, protect and improve the nation's water resources from polluted stormwater runoff. NPDES Phase II is intended to reduce adverse impacts to water quality and aquatic habitat by instituting the use of controls on the unregulated sources of stormwater discharges that have the greatest likelihood of causing continued environmental degradation. By complying with the sediment and erosion control portion of the Ordinance, applicants will likely satisfy the NPDES Phase II requirements. A permit will still need to be obtained from the IEPA. To obtain a NPDES Phase II permit for construction activities, the applicant must meet the following requirements:

1. Develop a Stormwater Pollution Prevention Plan. The plan must be kept on the job site from project initiation until final stabilization. The plan should incorporate elements from Article 3 of the Ordinance.
2. Submit a completed Notice of Intent (NOI) to the IEPA. Unless notified by IEPA to the contrary, coverage under the Storm Water General NPDES permit is automatic. Operators are authorized to discharge storm water from construction sites under the terms and conditions of the permit 30 days after the date the NOI is postmarked, provided the project has received sign-off from IDNR and the Illinois Historic Preservation Agency (IHPA) that the project complies with endangered species and historic preservation laws. Additionally, it is the responsibility of the applicant to report any Incidence of Non-Compliance (ION) that occurs on the site as required by the terms and conditions of the permit.
3. Submit a completed Notice of Termination (NOT). The permittee should submit a NOT to the Agency after the land disturbing activities are complete

and the site has been finally stabilized. USEPA considers that a site has been finally stabilized when all land disturbing activities are complete and a uniform perennial vegetative cover with a density of 70 percent of the cover for unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures have been used.

All pertinent forms, as well as additional information regarding stormwater runoff and NPDES Phase II, are available on the IEPA website at the following address: http://www.epa.state.il.us/water/permits/storm-water/index.html.

§ T300.1 Site Planning

The primary goal of any erosion and sediment control site plan should be to prevent soil erosion by minimizing the amount of bare soil exposed at any one time during construction. On-site sediment control is a secondary mechanism to prevent eroded soil from leaving the development site. Soil Erodibility factors have been calculated for all soil types in the County and are shown in Table 6. The potential erodibility of surface soil becomes greater with an increase in the erodibility co-efficient (k) used. Soil type information will provide assistance to the designer in selection of appropriate management practices for both temporary and permanent stabilization.

TABLE 6
Soil Erodibility

Soil Map Unit	Soil	Surface Erosion Factor (k)	Subsoil Erosion Factor (k)
23	Blount	.43	.43
25	Hennepin	0.37	.37, 9”-24”/.24 below 37”
27	Miami	0.37	0.37
49	Watseka	---	---
53	Bloomfield	---	---
59	Lisbon	0.28	0.43
60	LaRose	0.32	0.32
67	Harpster	0.28	0.28
69	Milford	0.28	0.43
76	Otter	0.28	0.43
82	Millington	0.28	0.28
88	Sparta	0.17	.17
89	Maumee	---	---
90	Plainfield	---	---
93	Rodman	.20	.10
98	Ade	.17	.17
102	La Hogue	.28	28”-38’,.28 / 38”-60”, .20
103	Houghton	---	---
130	Gilford		
131	Alvin	.24	.24

Soil Map Unit	Soil	Surface Erosion Factor (k)	Subsoil Erosion Factor (k)
132	Starks	.37	.37
134	Camden	.37	.37/.32 below 34”
145	Saybrook	.32	.43, 18”-26”/.37
146	Elliott	.32	.43
148	Proctor	.32	.43, 13”-37”/.32
149	Brenton	.28	.28
151	Ridgeville	.20	.20
152	Drummer	.28	.28
154	Flanagan	.28	.37
157	Symerton		
184	Roby	.20	6” – 32”, .28 / .10
189	Martinton	.32	below 13”, .43
190	Onarga		
194	Morley	.37	.37
197	Troxel	.28	.28
206	Thorp	.37	.37
210	Lena	---	---
219	Millbrook	.32	.32
223	Varna	.32	.37
224	Strawn	.37	below 22” .32
228	Nappanee	.43	below 9” .32
232	Ashkum	.28	.28
235	Bryce	.28	.28
238	Rantoul		
240	Plattville	.32	
241	Chatsworth	.43	.43
290	Warsaw	.28	.10
293	Andres	.28	14” – 42”, .28 / below 42”, .32
294	Symerton	.32	13” – 34”, .32 / below 34”, .43
295	Mokena	.28	.28
298	Beecher	.37	.37
311	Ritchely	.28	.10
313	Rodman	.32	.10
314	Joliet	.28	.10
315	Channahon	.37	.10
316	Romeo	.37	---
317	Millsdale		
318	Lorenzo	.28	16” – 60”, .10
320	Frankfort	.37	.37
321	Du Page	.28	.28
325	Dresden	.28	.10
326	Homer		
327	Fox	.37	.10
329	Will	.28	.28, 15”-31”/.10
330	Peotone	.28	.28
347	Cannisteo	.32	.32
451	Lawson	.32	35” – 60” , .43
504	Sogn	.32	below 12”, ---
531	Markham	.37	.32, 7”-31”/.43

From current Field Office Technical Guide

Risk	K
Low	< .25
Mod	.25 - .30
High	.30 - .35
Very High	> .35

Consult NRCS for any changes.

Those areas of the site with soils having a higher risk of erosion will require strong erosion prevention measures. The erosion and sediment control site plan should note soil erodibility throughout the site.

§ T300.1 (a) Phased Construction

When existing site vegetation is inadequate to stabilize areas not currently being constructed in a phased development, several options are available for vegetative stabilization.

1) If construction will occur within one-year the site may be planted with a temporary cover of annual grasses included in Table 7.

2) If construction of the phase will be greater than 1 year, stabilization may be accomplished with a cover that uses a mix of annual and perennial grasses shown in Table 8.

TABLE 7
Seed Mixtures For Temporary Stabilization
Remaining Less Than One Year

Seed	Rate	Soil Drainage				Planting Period
	Lbs./ac.	ED	WD	SP	PD	
Timothy	5		X	X	X	Spring
Kentucky Blue Grass	5		X	X		Spring/Fall
With one of the following:						
Oats	90					Early Spring-July 1
Cereal Rye	90					Early Spring-Oct 15
Spring or Winter Wheat	90					Early Spring-Oct 15
Spring Planting – Early Spring to June 15 **Fall Planting – August 1 to October 15**						

*ED = Excessively Drained; WD = Well Drained; SP = Somewhat Poorly Drained; PD = Poorly Drained

TABLE 8
Seed Mixtures For Temporary or Permanent Stabilization
Remaining For More Than One Year

Mix/Seed	Rate Lbs./ac.	Soil Drainage ED	WD	SP	PD	Planting Period
1. Tall Fescue	24.0	X	X	X		Spring/Fall/Dormant
2. Smooth Brome	24.0	X	X			Spring/Fall/Dormant
3. Tall Fescue or Smooth Brome and Alfalfa	24.0 8.0	X	X			Spring/Dormant
4. Tall Fescue and Timothy or Red Top	14.5 3.0, 3.0	X	X	X	X	Spring/Fall/Dormant
5. Tall Fescue	14.5		X	X		
Red Top	3.0					
Alsike Clover	9.5					
6. Orchard Grass	7.0		X			Spring
Alsike or Ladino Clover	3.5					
7. Timothy and Alsike or Ladino Clover	4.0 8.0		X	X	X	Spring
Hayland Mixtures						
8. Alfalfa	12.0		X			Spring/Dormant
9. Alfalfa and	8.0		X			Spring/Dormant
10. Orchard Grass	4.0					Spring/Dormant
11. Alfalfa and Timothy	8.0 4.0		X	X	X	Spring/Dormant
12. Alfalfa and Tall Fescue or Smooth Brome	8.0 6.0		X	X		Spring/Dormant
With one of the following:						
A. Oats	30					Early Spring-July 1
B. Cereal Rye	30					Early Spring-Oct 15
C. Spring or Winter Wheat	20					Early Spring-Oct 15

*ED = Excessively Drained; WD = Well Drained; SP = Somewhat Poorly Drained; PD = Poorly Drained

Erosion control methods should be appropriate for the size of site, the duration of construction and the slope, length and grade. Soil stabilization with vegetative cover is generally the most effective stabilization. Hydroseeding with mulch application or periodic hydromulching may be used for soil stabilization alone on slopes flatter than 3:1. When hydroseeding does not produce dense vegetation, areas should be re-seeded periodically until growth occurs or if short duration summer stabilization is required and hydroseeding should be supplemented with heavy hydromulching. For steep slopes and drainage ways, erosion control blankets or gypsum-plaster may be more appropriate.

The vegetative stabilization must meet the requirements of the NPDES. It is

the responsibility of the applicant to determine the most recent NPDES requirements.

§ T300.2 Standards and Specifications

The "Illinois Urban Manual: A Technical Manual Designated for Urban Ecosystem Protection and Enhancement" is the primary resource for design detail for effective erosion and sediment control.

The "Illinois Urban Manual" may be obtained from the following source:

USDA NRCS
1201 S. Gouger Road
New Lenox, Illinois 60451
815.462.3106

or online at http://www.il.nrcs.usda.gov/technical/engineer/urban

The "Procedures and Standards for Urban Soil Erosion and Sedimentation Control for Illinois" (revised July, 1988) (The "Green Book") is available at Public Libraries throughout the Country. Additional information on erosion and sediment control practices including product source guides is available from:

International Erosion Control Association
341 Quebec Street
Suite 3500
Denver, CO 80207
800.455.4322
ecinfo@ieca.org

§ T300.3 General Requirements

Sediment control facilities are utilized to prevent sediment from leaving the site or entering buffers or special management areas within a development site. Sediment control structures commonly used include, sediment basins, sediment traps and silt fences. Sediment control facilities will be in place for all drainage leaving the site prior to mass grading. Plans for sediment control facilities should include grading or installation plan, sizing information, and maintenance procedures. Straw bale dikes are not preferred sediment control structures and should not be used.

§ T300.4 Extended Construction Shutdown Periods

The condition of the site for extended construction shut down periods should be one of maximum stabilization and sediment trapping. All of the site that will not be constructed prior to the fall planting season should be stabilized with appropriate vegetative cover. The fall planting season ends on approximately October 15. Temporary seeding should be completed by this date. From October 1 until October 15, heavy mulch should be applied with the seed to prevent seedling losses to early frost. Prior to October 1, standard mulching rates apply. In years with prolonged summer droughts, heavy mulching should be applied with all seeding. The use of erosion control blankets with seeding is preferred on slopes 3:1 or greater and that are more than 100 feet in length.

Areas that are to be worked after October 15 shall be stabilized with tacified heavy mulch or erosion control blankets.

The stabilization for extended construction shutdown periods must meet the requirements of the NPDES.

§ T300.5 Hydraulic and Hydrologic Design Requirements

Construction of sediment control structures is economically most practical when combined with stormwater management facilities. Because the site must have sediment control prior to mass grading, construction of the permanent detention facility as a sediment stilling basin is preferred. The ordinance sets a minimum design standard for sediment basins and traps that is commensurate with the duration of the rainfall event and the size of the drainage area.

For all areas greater than 3-acres, the minimum storm frequency to the detained for sediment removal is as follows:

Project Length	Design Event	Probability of Occurrence
< 6 months	2 year	50%
6 months – 1 year	5 year	20%
> 1 year	10 year	10%

Sufficient volume shall be created to retain all sediment from these design storm events. The facility shall be sized to hold the required volume for a period not less than 10-hours. This is the minimum settling time necessary to remove a substantial volume of the sediment from the runoff. To achieve a minimum 10-hour detention time from a 10-year, 24-hour storm event, the maximum design outflow would be limited to 0.065 cfs per acre-inch of runoff. The actual size of the facility may need to be larger where a site has one or more of the following conditions:

- The area of disturbance is greater than 75% of the maximum.
- Long or steep unvegetated slopes are present and will remain unstabilized for periods in excess of 7 days.
- The site drains into an adjacent wetland or special aquatic resource.
- The site drains into a previously developed parcel.
- The site drains across public highway or off-site private road.

§ T300.6 "As Needed" Practices on the Plans

"As needed practices" provide the permittee and the Administrator with a means to correct a deficiency in the management of erosion or in sediment control. Measures should be divided into temporary stabilization and sedimentation control measures. For each of these measures a typical detail should be provided.

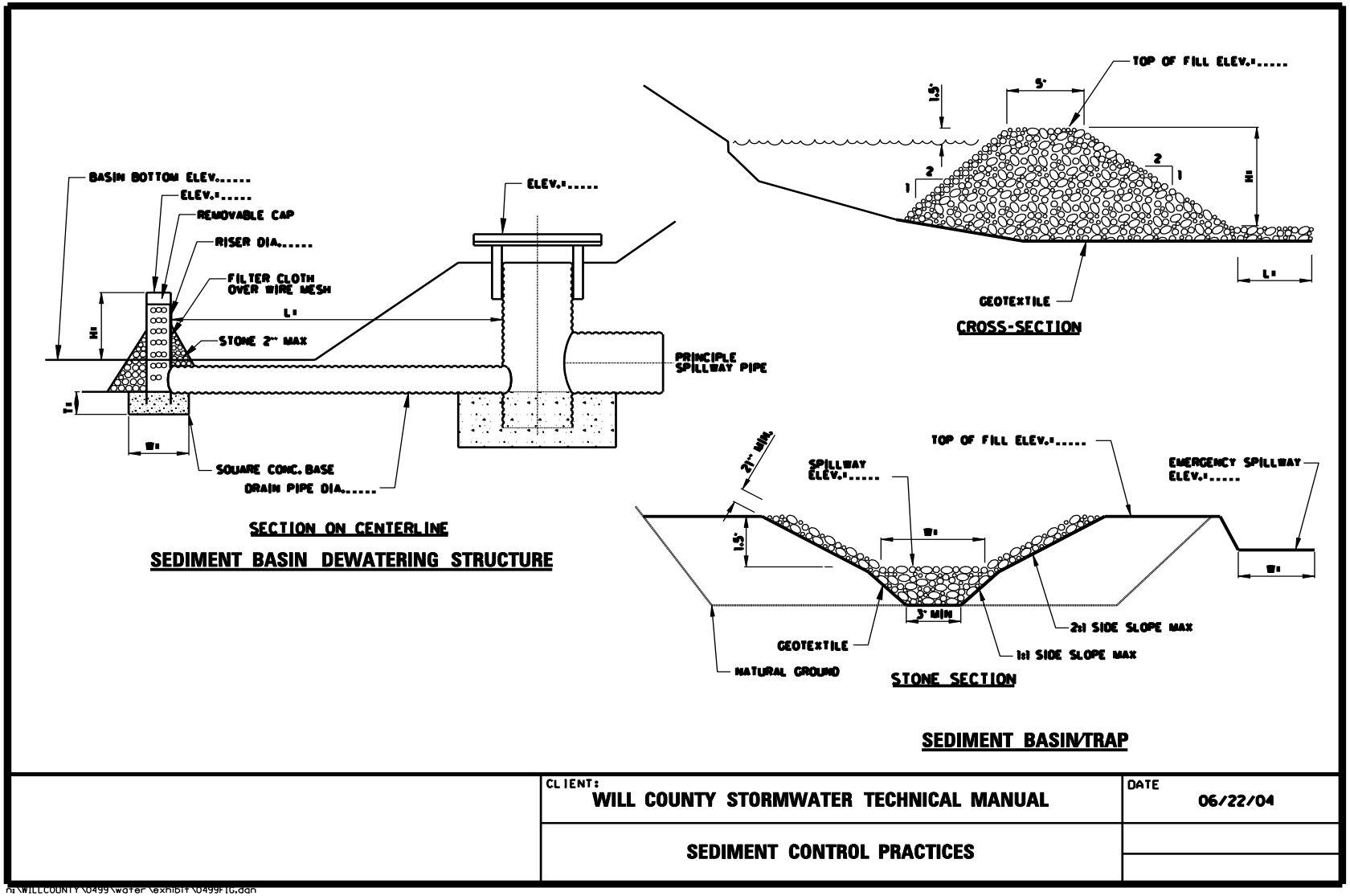
Sediment Control (Figure 15A, 15B)

a) Sediment Basins
b) Sediment Traps
c) Silt Fences

Stabilization (Figure 16A, 16B)

a) Temporary Seeding
b) Mulching
c) Erosion Control Blankets
d) Sod

FIGURE 15A
Sediment Control Practices



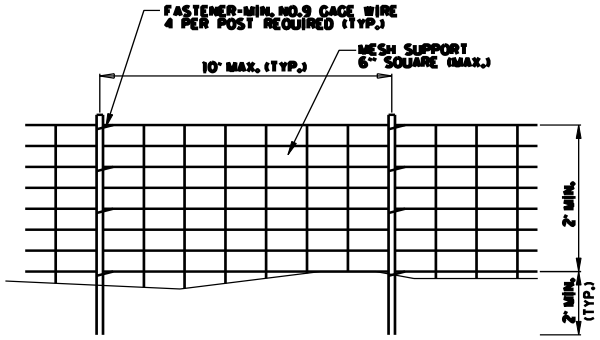
H:\WILLCOUNTY\0499\water\exhibit\0499FIG.dgn

FIGURE 15B
Sediment Control Practices

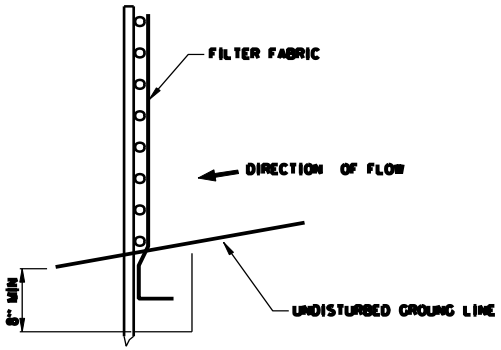
TEMPORARY SWALE
(Feet)
CODE 980

CHANNEL CROSS-SECTION REQUIRMENTS	A	B
DRAINAGE AREA	<5 ACRES	5-10 ACRES
BOTTOM WIDTH FLOW CHANNEL	4 FEET	6 FEET
DEPTH OF FLOW CHANNEL	1 FOOT	1 FOOT
SIDE SLOPES	2:1 OR FLATTER	2:1 OR FLATTER
GRADE	0.5% MIN.	0.5% MIN.

CHANNEL STABILIZATION REQUIRMENTS			
TYPE OF TREATMENT	CHANNEL GRADE	A <5 ACRES	B 5-10 ACRES
1	0.5-3.0%	SEED & STRAW MULCH	SEED & STRAW MULCH
2	3.1-5.0%	SEED & COVER W/ JUTE	SEED & COVER W/ JUTE OR EXCELSIOR; SOD; OR, LINE W/ 100T CA-2 OR CA-3 COARSE AGGREGATE
3	5.1-8.0%	SEED & COVER W/ JUTE OR EXCELSIOR; SOD; LINE W/ 100T CA-2 OR CA-3 COARSE AGGREGATE	LINE W/ 100T RR-3 ROCK
4	8.1-20.0%	LINE W/ 100T RR-3 ROCK	ENGINEERING DESIGN



ELEVATION

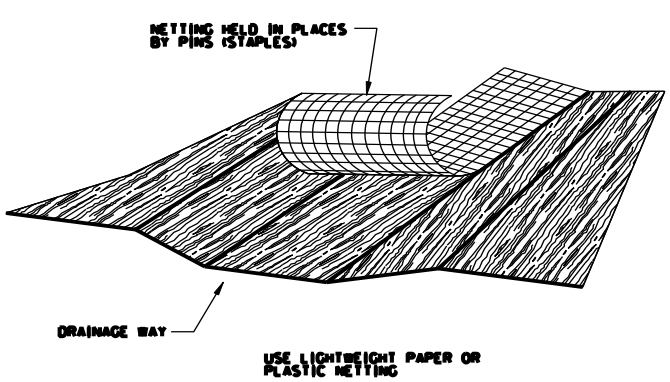


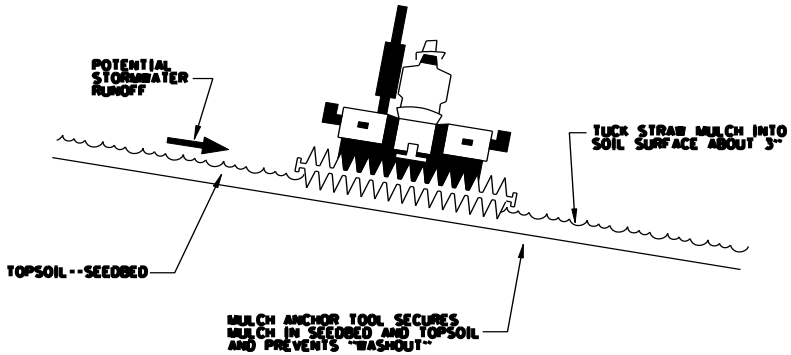
SILT FENCE

	CLIENT: WILL COUNTY STORMWATER TECHNICAL MANUAL	DATE 06/22/04
	SEDIMENT CONTROL PRACTICES	

N:\WILLCOUNTY\0499\water\exhibit\0499F1C.dgn

Figure 16A
Soil Stabilization Practices



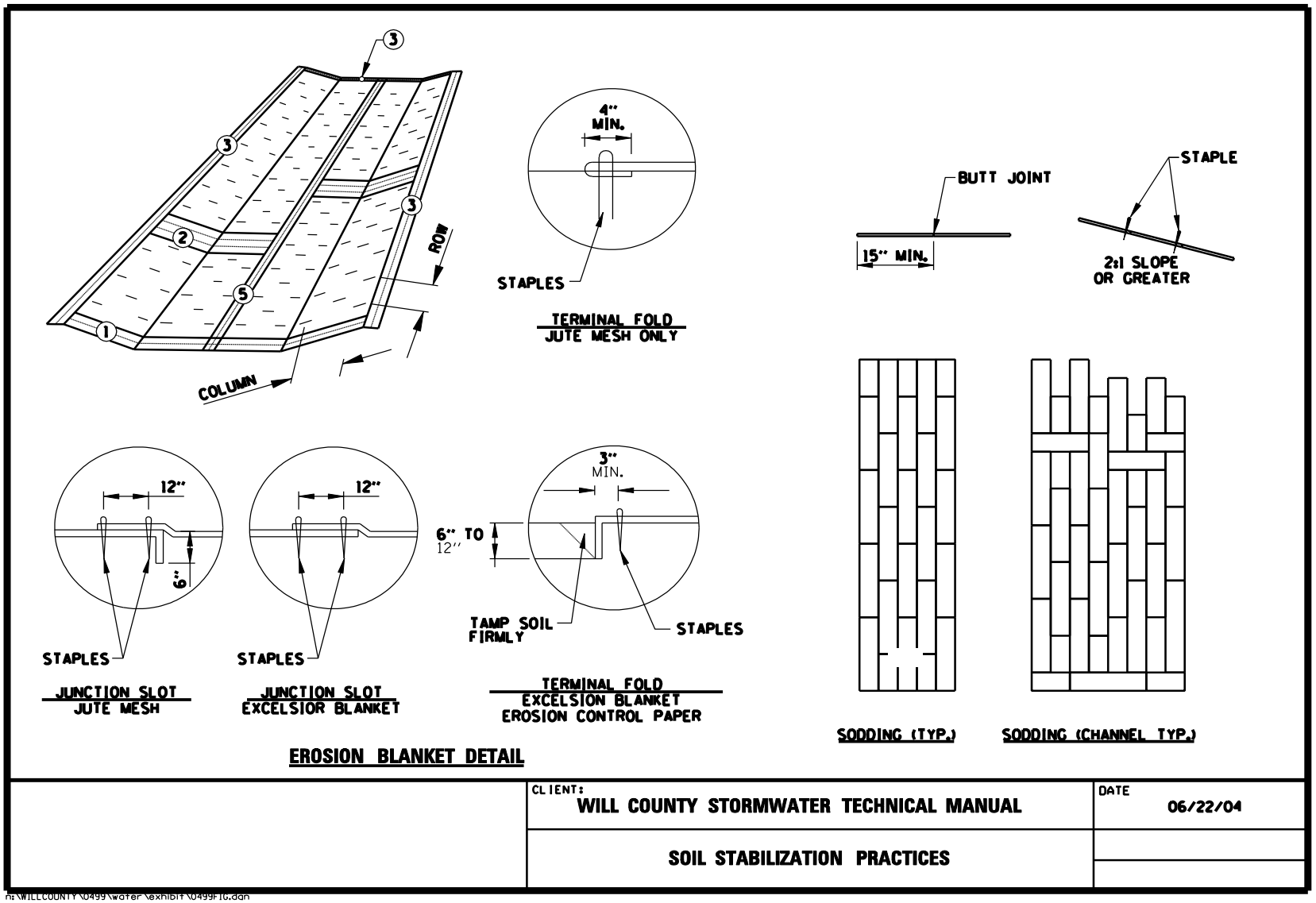


MULCH TYPE	EROSION CONTROL	SEED ESTABLISHMENT	REMARKS
STRAW	MEDIUM	MEDIUM	LEVEL, NON-WINDY APPLICATIONS ONLY
PUNCHED STRAW	MEDIUM	HIGH	GENTLE SLOPES
NET ANCHORED STRAW	HIGH	HIGH	SLOPE TO 3:1
TACIFIED STRAW	HIGH	MEDIUM	SOME SEED ESTABLISHMENT PROBLEMS
WOODCHIPS	MEDIUM	LOW	LEVEL GROUND ONLY
WOOD FIBER	MEDIUM	HIGH	HYDRO-APPLY, COMMONLY W/ TACIFIER
MULCH BLANKET	MEDIUM	MEDIUM	
EXCELSIOR BLANKET	HIGH	HIGH	ALL SLOPES, ALL CONDITIONS EXCEPT SHADE
STRAW COCONUT MAT	HIGH	HIGH	ALL SLOPES, ALL CONDITIONS EXCEPT SHADE

	CLIENT: WILL COUNTY STORMWATER TECHNICAL MANUAL	DATE 06/22/04
	SOIL STABILIZATION PRACTICES	

H:\WILLCOUNTY\0499\water\exhibit\0499FIG.dgn

Figure 16B
Soil Stabilization Practices



§ T300.7 Erosion and Sediment Control Plan Requirements

Figure 17 illustrates the minimum components necessary for an erosion and sediment control plan sheet. The plan should clearly detail all phases of site construction and the erosion and sediment control practices to be installed. All permanent stabilization is to be shown on a separate plan sheet using practices shown in Table 9. At a minimum the 2-year and 10-year runoff rates for all off-site flows need to be shown along with an appropriate method for conveying the flows without increased velocities or erosion from within the construction site.

A maintenance schedule and weekly inspection worksheet shall also be included. The maintenance schedule should be placed on the erosion and sediment control plan sheet. Form 11 shows an inspection worksheet. The inspection shall evaluate stabilization as well as sediment control. Inspections shall be scheduled weekly and after 0.5 inch of rainfall or greater until permanent stabilization has been completely established. Weekly inspections may be reduced upon installation of permanent stabilization.

FIGURE 17
Sediment and Erosion Control Plan

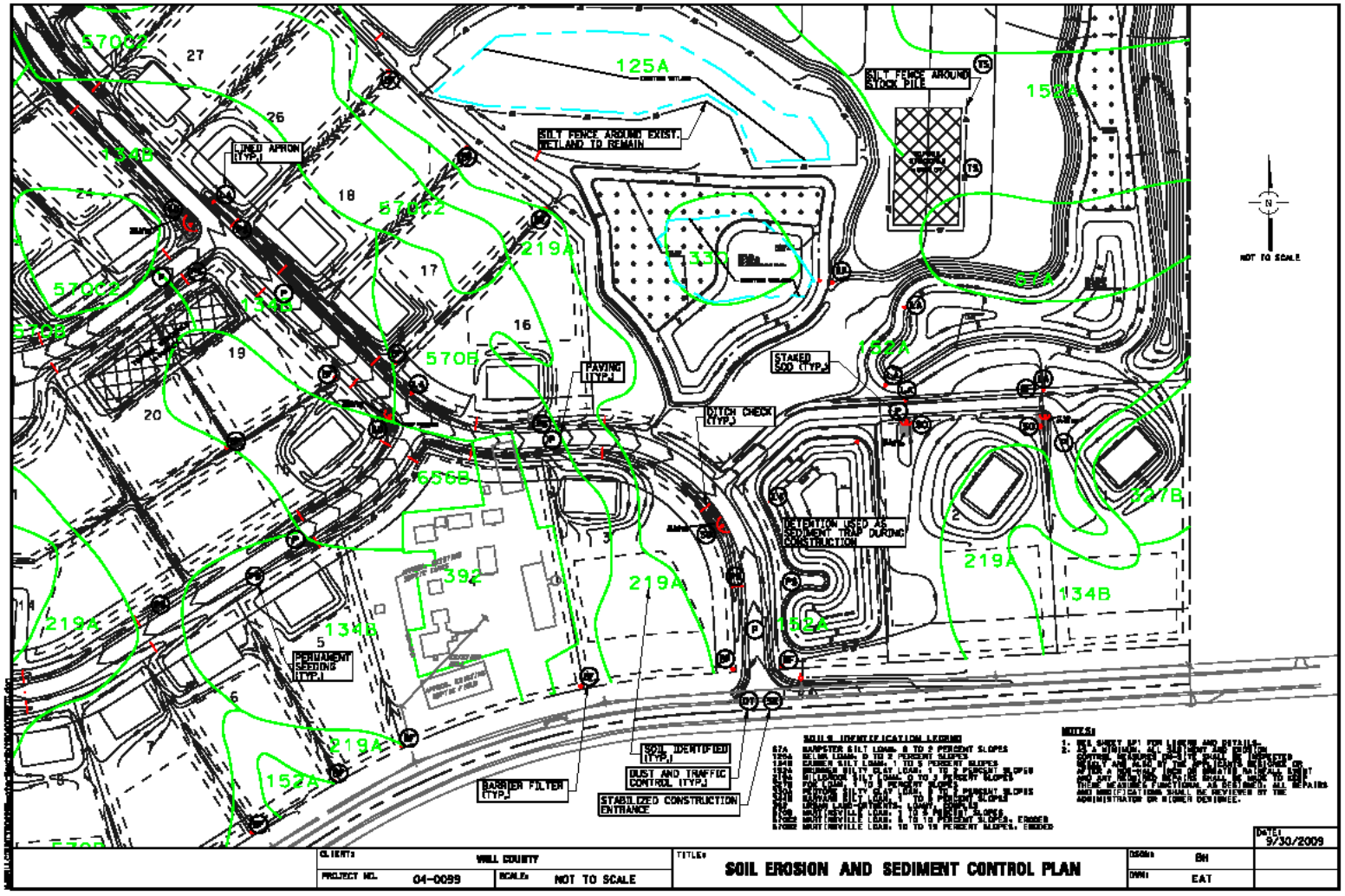


TABLE 9
Permanent Stabilization Practices

Permanent Stabilization Strategy	Illinois Urban Manual Code	Sheet & Rill Erosion	Rill & Gully Erosion	Stream-bank Erosion	Stream Channel Erosion	Nutrients, Heavy Metals & Salt	Flooding	Increased Peak Discharge	Sediment Damage
Urban Stormwater Wetlands	880				Excellent	Excellent	Excellent	Excellent	Excellent
Erosion Blanket	830	Good	Fair	Fair	Fair				Fair
Filter Strip (Buffer)	835	Good		Excellent	Excellent	Good			Excellent
Vegetated Channels (Swales)	840			Good	Good	Fair	Fair		Fair
Infiltration Trench	847	Fair	Fair			Fair		Fair	
Level Spreader	870	Fair	Fair	Fair		Fair			Fair
Mulching	875	Good	Good	Fair		Fair		Fair	
Permanent Seeding	880	Excellent	Excellent	Good		Good			Good
Permeable Pavement	890	Fair	Fair	Fair		Fair	Fair	Fair	Fair
Pool & Riffle System				Fair	Good				Good
Rock Check Dam	905		Good						Fair
Rock Outlet Protection	910	Good	Good	Good					Good
Sedimentation Forebay						Good			Good
Sodding	925	Excellent	Excellent	Good		Good			Good
Structural Streambank Stabilization	940			Excellent					Excellent
Vegetative Streambank Stabilization	995			Excellent					Excellent

§ T300.8 Conveyance of Off-Site Flow

Ditches and waterways that convey off-site flow through the site shall be permanently stabilized upon construction. The permanent stabilization should replace temporary measures but it may be necessary to leave some temporary measures in place while the permanent stabilization establishes. Stabilization of off-site conveyance must protect the downstream land from erosion and sedimentation. Permanent stabilization must therefore include velocity reduction features at the property boundary. Use of level spreaders, lined aprons, and drop inlet pipe spillways are preferred.

§ T300.9 Stockpiles

Stockpiles are not to be placed in any special management areas or buffers. When stockpiles remain for more than 3 days they require temporary stabilization. Use the specifications located in Table 7 and 8 for temporary stabilization. An adequate distance should be kept between the stockpile and special management areas such that maintenance of stabilization can be performed without entry into the special management area.

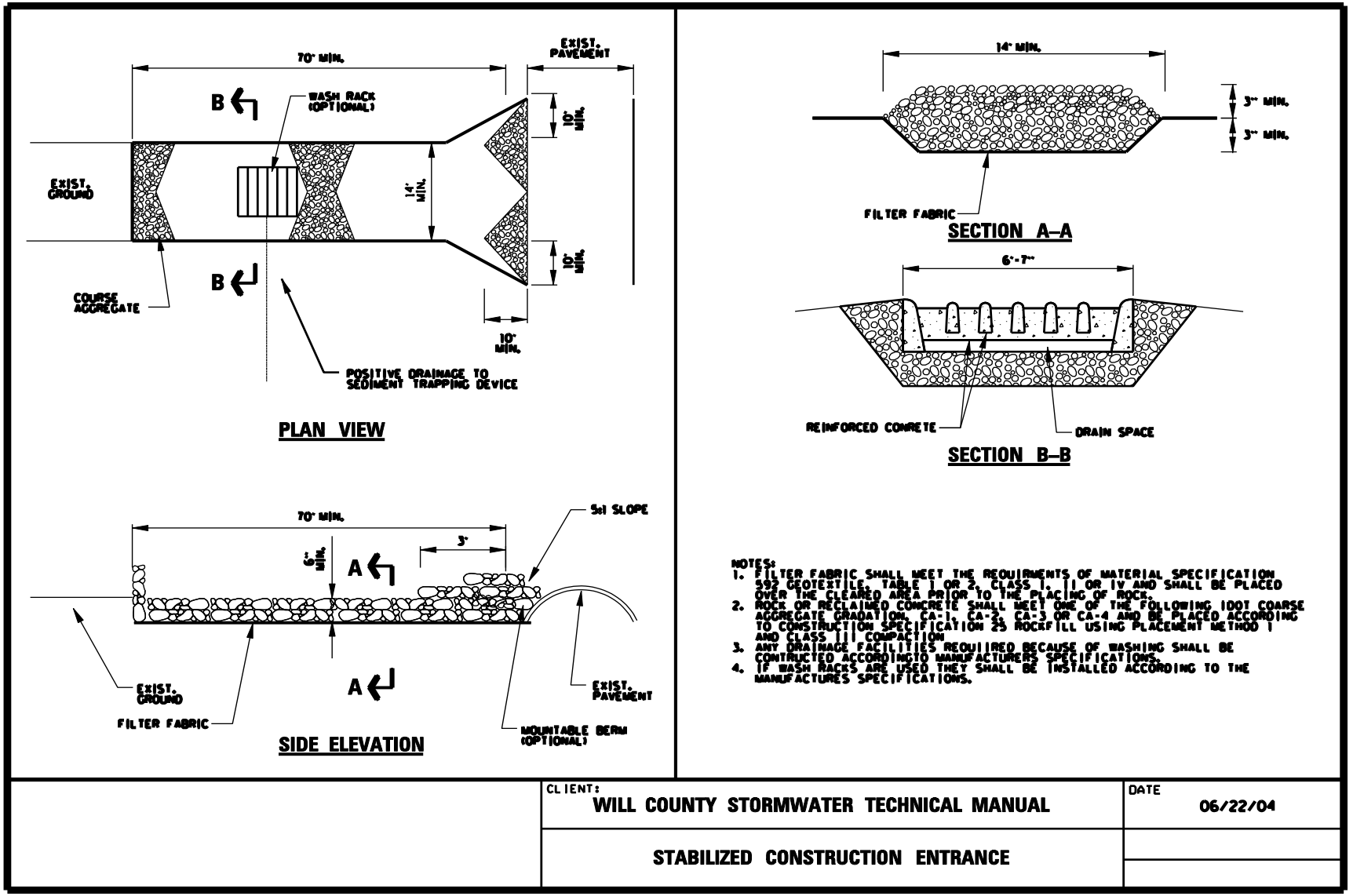
§ T300.11 Construction Dewatering

Discharge from site dewatering activities must be maintained in a manner that does not increase on-site erosion, convey sediment off-site or cause off-site flood damages. Dewatering discharge may not be outletted into wetlands on or off-site where practicable, discharge from on-site dewatering shall be filtered and a means shall be provided to reduce erosion.

§ T300.12 Protection of Public/Private Roadways

Public and private roadways must be kept free of nuisance soil. Access to the site must be large enough to provide a stabilized construction entrance (Figure 17) of sufficient width and length, on-site parking, and vehicle washdown facility where appropriate. Soil tracked onto public right-of-way must be cleaned before the end of each workday. Street sweeping provides a mechanism for removal of loose soil materials, but may not be sufficient to remove materials compacted onto the roadway surfaces. Removal of such compacted materials during each workday and when required by the Administrator is also required. Removal of adhered soil materials will be done in a manner that does not damage the roadway or other right-of-way appurtenances.

FIGURE 18
Stabilized Construction Entrance



§ T300.13 Temporary Stream Crossings

Temporary stream crossings (bridges, fords, and culvert crossings) should be designed for short-term use periods not to exceed 1 year. Temporary stream crossings are to be used only where there is no practicable alternative for moving heavy equipment from one side of a stream channel to another or where light duty equipment must cross a stream frequently for a very short period (<3 months).

Temporary stream crossings are applicable where the upstream drainage area does not exceed one square mile. For areas greater than one square mile, engineered structures should be designed. The following criteria should be addressed when designing temporary stream crossings:

- Erosion and sediment control
- Structural stability
- Safety
- Utility

At a minimum, the structure must be designed to pass the 2-year, 24-hour event and withstand erosion force of the 100-year (BFE) event. The outlet design velocity of the stream crossing structure should be non-erosive for the receiving stream.

It is the applicants responsibility to determine if permits are required from other agencies, including the IDNR-OWR and Army Corps of Engineers

Article 4 Protection Of Special Management Areas

A Special Management Area is defined as a floodplain, regulatory floodplains, and regulatory floodway.

The Ordinance includes basic objectives for development, which are directly related to special management areas and are summarized below:

1. Prevent damages, including loss of life and inconveniences to the public, due to periodic flooding, to the greatest extent possible.
2. Preserving and enhancing the natural hydrologic and hydraulic functions and natural characteristics of watercourses and floodplains to protect water quality, protect aquatic habitats, reduce flood damages, reduce soil erosion, provide recreational and aesthetic benefits and enhance community and economic development.
3. Protecting environmentally sensitive areas from deterioration or destruction by private or public actions.
4. Requiring the design and evaluation of each site Stormwater Management plan consistent with watershed capacities
5. Meeting the Illinois Department of Natural Resources-Office of Water Resources floodway permitting requirements delineated in 615 ILCS 5/18g (1992) ("An Act in Relation to the Regulation of the Rivers, Lakes, and Streams of the State of Illinois"), as amended from time to time.
6. Making federally subsidized flood insurance available to individual Communities and for property throughout the Count by fulfilling the requirements of the National Flood Insurance Program.
7. Complying with the rules and regulations of the National Flood Insurance Program codified in Title 44 of the Code of federal Regulations
8. Encouraging cooperation and consistency in Stormwater Management activities within and between the units of government having floodplain and stormwater Management jurisdiction.
9. Assure the new development does not increase flood hazards to others.
10. Minimize new financial burdens for taxpayers for operations related to flooding.
11. Promote the orderly development of land and water resources and conserve the natural functions of floodplains.

The Ordinance does not enforce wetland regulations on a countywide basis and does not define a wetland as a special management area. However, there will be occasions when wetlands will be located on development sites in Will County that are regulated by either the municipality or the US Army Corps of Engineers. To make that determination, first, the local ordinance should be consulted. Each community must enforce an ordinance at least as restrictive as the countywide Ordinance; a more restrictive ordinance including wetland regulations may be in

place in a particular community. For instance, all wetlands are regulated in unincorporated areas of Will County under the Water Resources Ordinances (1999).

Secondly, the U.S. Army Corps of Engineers (COE) may have regulatory jurisdiction for wetlands in any part of the county. The COE regulates the discharge of dredged or fill material into jurisdictional wetlands and waters of the U.S. under Section 404 of the U.S. Clean Water Act. To determine if a site contains Corps of Engineers regulated wetlands, the developer should submit a request to the Corps to complete a Jurisdictional Determination. If the COE determines that they do not have jurisdiction under Section 404, then only the local wetland regulations (if any) would apply. If the COE does have jurisdiction, any proposed modification of the wetland must follow the required COE permitting procedures, which are not covered in this manual. The developer can learn more about these procedures by contacting the Chicago District of the Corps or a wetland consultant familiar with local procedures.

§ T400 General

This Section notes that the Ordinance does not abrogate the permitting requirements or Authority of the State as administered by IDNR-OWR for floodplains. The Ordinance also does not require that approvals or other letters of exemption be obtained from IDNR-OWR in situations covered by Statewide floodplain construction permitting program. There are requirements in the Ordinance that are more strict than the 3700 and 3708 rules administered by IDNR-OWR, and those more strict rules must be observed when applicable.

The Ordinance recognizes the general and specific conditions of the Statewide Permits and Regional Permits. For projects which meet the tests for applicability, and can meet the requirements of these permits, no additional requirements of the Ordinance with respect to floodplains apply. The applicant must send the Administrator documentation that the project complies with a Statewide or Regional permits.

Table 1 of Section 400 of the Ordinance contains a summary of the requirements for developments in the floodplain. The left column of the Table refers to the type of floodplain on-site. The difference between the floodplain and the regulatory floodplain is the jurisdiction of IDNR-OWR. The floodplain is a more general area with elevations at or below the base flood elevation that does not necessarily have one square mile of drainage area. A site without any type of stream or creek flowing through or near it could have floodplain on site if there is a depressional area that contains runoff at or below the base flood elevation determined from a hydrologic model of the tributary watershed area.

§ T401 Floodplain, Regulatory Floodplain, Base Flood Elevation and Regulatory Floodway Locations

Developers must identify all floodplains (regulatory and non-regulatory) on the property proposed for development. Developers also must identify Regulatory Floodway affected by the development. Developers should check with the community official or Administrator to determine if any LOMRs have been published for the development area. Each community, whether certified or not, is responsible for maintaining the effective FIS for their community. If Regulatory Floodway is shown on a Flood Boundary and Floodway Map (FBFM) or Flood Insurance Rate Map (FIRM) for the project area, it shall also be clearly depicted on site topographic plans.

The best available information may include reports and studies published by the U.S. Army Corps of Engineers (COE), the U.S. Department of Agriculture – Natural Resources Conservation Service (NRCS), the U.S. Geological Survey (USGS), the Illinois State Water Survey (ISWS), the Illinois Department of Transportation, Illinois Department of Natural Resources-Office of Water Resources (IDNR-OWR) or the Chicago Metropolitan Agency for Planning (CMAP). The Administrator will need to approve the use of any floodplain study not previously designated as a regulatory study prior to the use of the BFEs, flood profiles or delineations. Applicants should check for the best available information with ISWS Floodplain Repository for BFE data associated with “A Zone” delineations on FEMA maps. Project specific floodplain delineation requires detailed and sophisticated studies. Determining the relationship between the project site and the floodplain is the responsibility of the applicant.

For projects where no Regulatory Floodplain, or “A Zone” floodplain is shown on the FEMA FIRM, the applicant is responsible for determining the project site BFE. The FEMA manual entitled “Managing Floodplain Development in Approximate Zone A Areas” should be used to determine the BFE.

Additionally, if there is 640 acres (one square mile) or more of upstream tributary drainage area at the outlet point of the site this analysis must be accepted for permitting by IDNR-OWR. The BFE can be determined using a hydrologic and hydraulic (H&H) analysis of the upstream tributary drainage area. Any project-specific floodplain analysis for areas greater than 640 acres may also identify a floodway consistent with IDNR-OWR requirements.

For project sites with less than 640 acres of upstream tributary drainage area and no riverine Regulatory Floodplain, the Administrator or Director may require a project-specific floodplain analysis. If the Hydrologic Atlas, published by the United States Geologic Survey (USGS), shows a historic flood area (colored in blue) on the project site, an alternative to a project-specific floodplain analysis may be interpolating the elevation of the

inundation area to determine the BFE. For these sites, 3 feet shall be added to the USGS historic flood elevation to determine the BFE. The Flood Protection Elevation (FPE) would remain 1' above the BFE.

It should be noted that BFEs which appear on FEMA FIRMs are rounded to the nearest whole foot. It is necessary to consult the FIS flood profiles, which can be read to the nearest 0.1 foot. The flood profile, used in conjunction with site-specific topography, is the definitive floodplain for permitting purposes, but the FEMA mapping is considered definitive for flood insurance and floodway boundaries. If there are inconsistencies and insurable structures are proposed within the FEMA floodplain boundaries, map revisions will be required.

The location of the Regulatory Floodway shall be delineated from the IDNR-OWR designated Regulatory Floodway maps. To locate the floodway boundary, the Regulatory floodway limits should be scaled from the Regulatory Floodway map and transferred to the project site plan using reference marks common to both maps, such as section lines. It is important that the accurate floodway width be maintained during the data transfer process from the regulatory floodway maps to the applicant's site plan. As with the regulatory floodplain maps, an accurate delineation of the floodway boundary is important to determine the applicable floodway requirements of the Ordinance. The applicant should then check the floodway location in relation to the stream and the site topography. If it appears that the floodway location is unreasonable, the applicant may wish to pursue a Letter of Map Revision (LOMR) based on improved site topography. The LOMR request is made to FEMA through the IDNR-OWR or its designee and the Director.

An applicant may apply to the Administrator for conditional approval of a site plan with respect to the floodway boundaries prior to finalizing project design. This will provide 1) the Administrator an opportunity to verify the accuracy of the applicant's floodway boundary delineation on the site plan, and 2) the applicant with a level of assurance from the Administrator prior to spending additional time and money on plan and site design.

In the case of property with an elevation higher than the BFE, but located within the regulatory floodway, the property is subject to the regulations of the Ordinance until such time as the LOMR is received from FEMA.

§ T402.2 Building Protection Standards

The Ordinance states explicitly that any new construction or changes to existing structures must meet its requirements. However, the Ordinance does not require that all existing structures located in the regulatory floodplain prior to adoption of the Ordinance be brought into compliance with the current regulations. In the special case of substantial improvement of a structure in the floodplain, the Ordinance requires that the entire structure, both the improvement and the pre-existing portions, be brought into full compliance with the Ordinance. A structure is considered to be improved substantially whenever the improvement exceeds 50 percent of the fair market value of the structure.

Residential Buildings

The Ordinance stipulates that the lowest floor, including basement, of new or substantially improved residential buildings (altered buildings that increase the first floor area by more than 20%; or manufactured homes), must be elevated above the Flood Protection Elevation (FPE), which is one foot above the BFE. This exceeds the NFIP regulations which require the lowest floor, including basement, to be only at or above the BFE. One foot above the BFE accounts for a factor of safety and the impact of wave action during the base flood event. The requirement for a minimum elevation in new or substantially improved residential buildings reflects the fact that other floodproofing methods have a poor performance record and may become quite costly. The reduction of the threat of loss of life is one of the primary purposes of the Ordinance and this stringent requirement in use of the FPE assists in the achievement of that purpose. Dry floodproofing may not be considered in lieu of elevation for residential buildings.

Substantial Improvement is defined as any repair, reconstruction or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either, a) before the improvements or repair is started, or b) if the structure has been damaged, and is being restored, the market value before the damage occurred. For the purpose of this definition “substantial improvement” is considered to occur when the first alteration of any wall, ceiling, floor or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not, however, include either 1) any project for improvement of a structure to comply with existing state or local health, sanitary, or safety code specifications which are solely necessary to assure safe living conditions or 2) any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

For purposes of determining substantial improvement, market value pertains only to the structure in question. It does not pertain to the land, landscaping

or detached accessory structures on the property. For determining substantial improvement, the value of the land must always be subtracted.

Acceptable estimates of market value can be obtained from the following sources:

1. Independent appraisals by a professional appraiser.

2. Detailed estimates of the structure's Actual Cash Value (used as a substitute for market value based on the preference of the community).

3. Property appraisals used for tax assessment purposes (Adjusted Assessed Value: used as a screening tool).

4. The value of buildings taken from NFIP claims data (used as a screening tool).

5. "Qualified estimates" based on sound professional judgment made by staff of the local building department or local or State tax assessor's office.

As indicated above, some market value estimates should only be used as screening tools to identify those structures where the substantial improvement ratios are obviously less than or greater than 50% (e.g., less than 40% or greater than 60%). For structures that fall between the 40% and 60% range, more precise market value estimates should be used.

The use of assessed value has some limitations that, if not considered and accounted for, can produce erroneous estimates of market value. These limitations are:

1. Appraisal Cycle: How often are the appraisals done and when was the date of the last appraisal? Market value estimated can be grossly outdated if the cycle is long and the community happens to be in the latter stage of its cycle and has not been appraised for many years.

2. Land Values: In most cases, land values and the value of improvements (structures) thereon will be assessed separately and listed as such on the tax roles. In cases where they are not distinguished, a determination of the value of the land will have to be made and subtracted from the total assessed value.

3. Assessment Level: In Will County the established statutory ratio between the assessor's estimate of the value and the true fair market value is 33.3%.

In cases where the assessment level is unacceptably low or where the projected ratio of cost of repair to market value is close to 50%, adjustments for assessment level must be made. If the use of assessed value is questioned, an appeal is warranted, but the burden of proof can be placed on the permit applicant who can be required to submit an independent appraisal by a qualified appraiser.

If a structure is rebuilt in violation of the County's floodplain management regulations and not elevated to or above FPE (or floodproofed if nonresidential), the flood insurance rates and premiums may be significantly higher. In addition, the Certified Community can pursue legal action. For substantially damaged structures which have their lowest floors, including basements, several feet or more below the BFE, the annual premium cost increase to thousands of dollars. The guidance provided here on substantial improvement is contained in Answers to Questions About Substantially Damaged Buildings (Federal Emergency Management Agency, FEMA – 213, May 1991).

Fill Placed to Elevate a Residential Structure must have the top of the fill and lowest floor, including basement, at or above the FPE. A buffer of fill above the FPE is required for a continuous distance of ten feet out from the building to reduce the potential damages associated with hydrostatic forces on the building. The top of the fill for an attached garage must be 0.5 foot above the BFE. The fill shall not settle below the BFE for a residential structure and not below 0.5 foot above the BFE for an attached garage. The applicant should check for compliance with FEMA Technical Bulletin 10-01.

The applicant will need to provide the Administrator with evidence that fill placed to elevate a residential building is protected against erosion and settlement below the FPE. It is strongly recommended that fill be placed in accordance with the FEMA criteria for development. § 65.6 (a)(6) of the NFIP regulations reads as follows:

(i) Fill must be compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test method used by the American Society for Testing and Materials (ASTM Standard D-698).

(ii) Fill slopes for granular materials are not steeper than one vertical on one-and-one-half horizontal unless substantiating data justifying steeper slopes is submitted.

(iii) Adequate protection is provided for fill slopes exposed to flood waters with expected velocities during the occurrence of the base flood of five feet per second or less by covering them with grass, vines, weeds, or similar vegetation undergrowth.

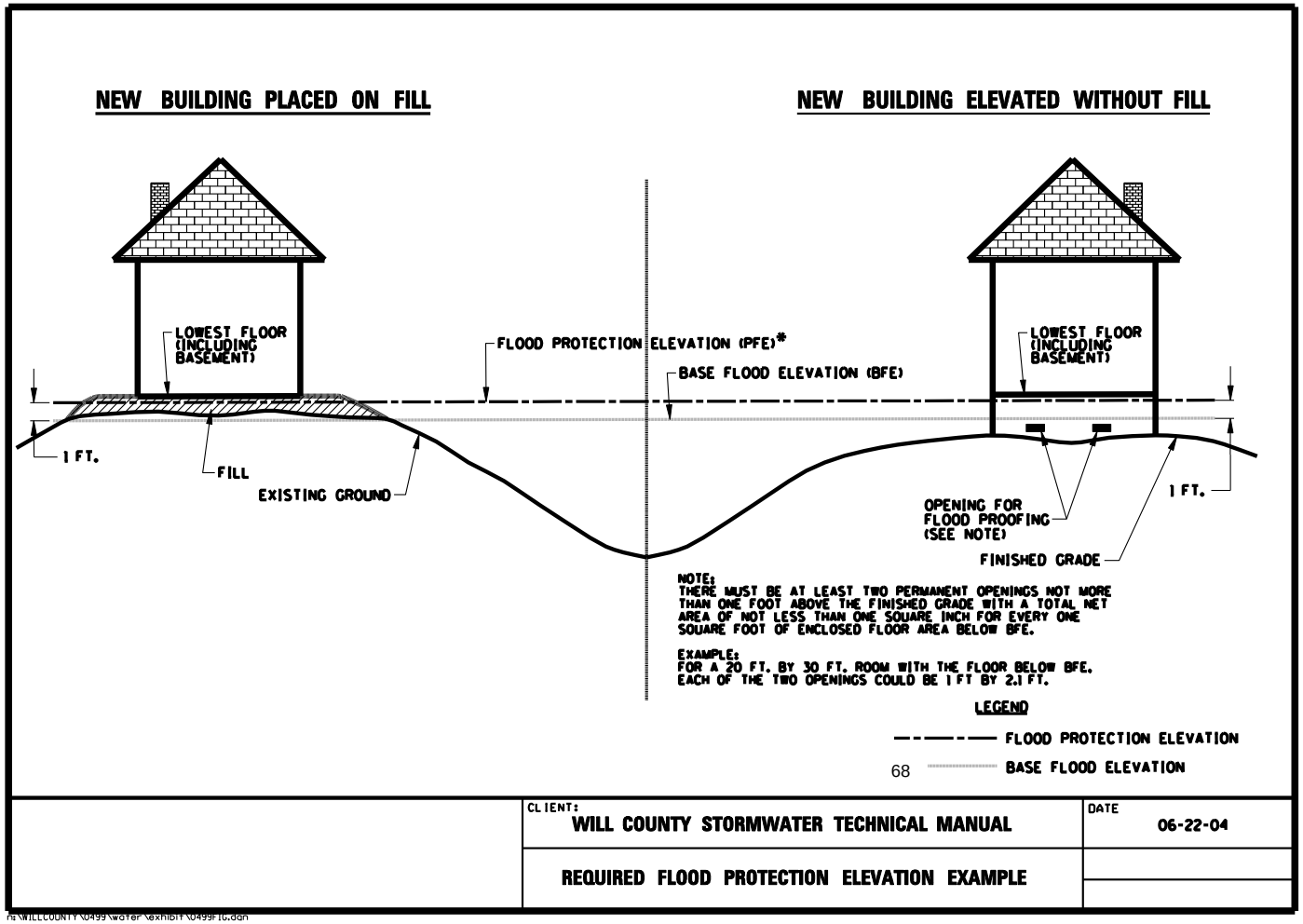
(iv) Adequate protection is provided for fill slopes exposed to flood waters with velocities during the occurrence of the base flood of greater than five feet per second by armoring them with stone or rock slope protection."

Because the flood carrying capacity of the regulatory floodplain must be maintained, fill placed in the regulatory floodplain must be shown to not singularly or cumulatively create a damaging increase in flood heights or velocities, or impair the natural hydrologic functions of the floodplain or channel. Therefore, for any development involving fill placement, whether for a building pad or other reasons, the applicant must evaluate the impacts of the fill upon the existing floodplain storage and provide compensatory storage. The requirements for compensatory storage are defined in § T403.

When a residential building is elevated by a means other than filling in the floodplain, restrictions apply to how the structure can be elevated and how the space below the elevated structure may be used. New or substantially improved residential buildings that are elevated by crawl space, walls, pilings or stilts require that the support structure be permanently open below the lowest floor, including basement and not subject to hydrostatic pressures of the base flood. The openings must have a total net area of not less than one square inch for every one square foot of enclosed area subject to flooding below the BFE. These criteria basically allow the area under the elevated structure to be used for storage and conveyance of flood waters. Using this space for flood storage may avoid the need for compensatory storage. The requirements are similar to those of the NFIP and should be familiar to the professional engineer or architect responsible for the design and certification of the permit submittal. The foundation and supporting members must be anchored and aligned in relation to flood flows and adjoining structures to minimize exposure to known hydrodynamic forces such as current, waves, ice, and floating debris. This reduces the risk of structural damage. These considerations are also required by the NFIP regulations. Storage of materials beneath the elevated structures is prohibited. The materials used to elevate the structure, and any other materials in the space below the elevated structure, must be able to withstand several days of inundation by flood waters without sustaining damage.

Figure 18 shows the required flood protection elevation for a structure being placed on fill and a structure elevated without fill.

FIGURE 19
Required Flood Protection Elevation



Nonresidential Buildings

The lowest floor, including basement of all new construction or substantial improvements for nonresidential buildings must either be elevated above the FPE or be structurally dry floodproofed. The dry floodproofing must be effective below the FPE and certified by an Illinois Professional Engineer or Registered Structural Engineer. The certification of the dry floodproofing performance should be stamped on the site plan and the overall building and site plans must be approved by the Administrator. Additionally, the attendant utilities must be watertight and capable of withstanding the base flood. The dry floodproofing must either make the building watertight or be automated with a backup power source requiring no human intervention. The NFIP regulations (§ 60.3(c)(4)) require the community NFIP official to maintain a record of approved buildings and the elevations to which they are floodproofed.

Manufactured Homes and Recreational Vehicles

The Ordinance contains additional criteria, mandated by NFIP regulations, related to placing manufactured homes or recreational vehicles in the floodplain. Under the Ordinance, this includes existing manufactured homes moved to a new site and new manufactured homes at a new or existing site. Protection from flood damage below the FPE is required if the manufactured home or recreational vehicle will be installed on a site for more than 180 days. The applicant should refer to the Illinois Manufactured Home Tie-Down code.

Auxiliary Structures

Auxiliary structures such as tool sheds and detached garages on an existing, single-family platted lot, may be constructed with the lowest floor below the FPE provided that requirements of Article 4, § 402.2(d) are met for restrictions on construction, use, structure size and value. Applicants should indicate on the site plan the number and location of buildings which are in this category. More than one such structure on a single-family lot may require a hydraulic analysis to properly assess the impact on the existing or proposed floodplain.

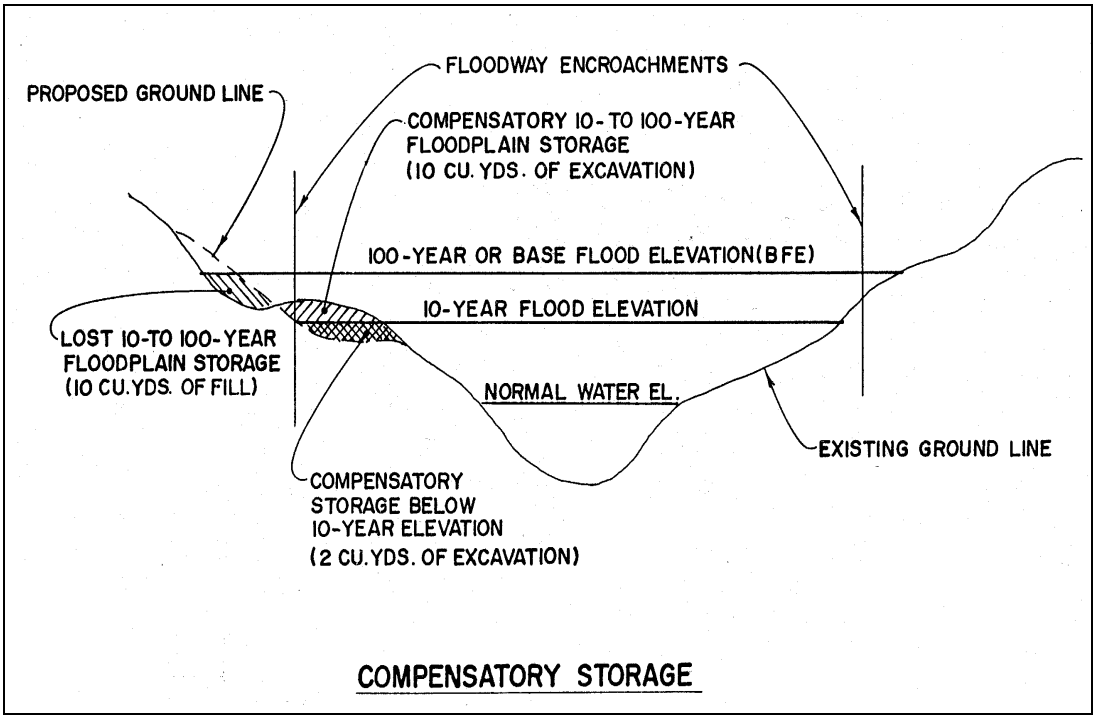
§ T402.3 Non-Conforming Structures

A structure that is non-conforming to the Ordinance contains a lowest floor, including basement, which is below the FPE. A non-conforming structure that is damaged by flood, fire, wind or other natural or man-made disaster may be restored on-site as long as the damage does not exceed 50% of its market value prior to being damaged. Damage in excess of 50% of the structure's market value places the restoration into the substantial improvement category and therefore, the building must conform to the requirements of Article 4, § 402.2.

§ T403 Compensatory Storage Volume Standards

Compensatory storage is the replacement of the existing floodplain and, in rare exceptions, the floodway storage lost due to fill. Compensatory storage is required in both riverine and non-riverine floodplain systems. Compensatory storage is required when a portion of the floodplain is filled, occupied by a structure, or a change in the channel hydraulics reduces the existing available floodplain storage. An example is the placement of fill for the construction of a structure. It is important that the natural storage volume be preserved, since it functions like a flood control reservoir to reduce peak flood flows. Figure 20 provides an example of compensatory storage and its relationship with the 10-year and 100-year floods.

FIGURE 20
Compensatory Storage Example



Flood storage is measured between the normal water surface elevation and the BFE for a particular cross-section. The Ordinance defines hydraulically equivalent compensatory storage as storage placed between the proposed normal water surface elevation and the proposed BFE. All lost storage below the existing 10-year flood elevation is replaced below the proposed 10-year flood elevation and the storage lost above the existing 10-year flood elevation is replaced above the proposed 10-year flood elevation. It is important that

the distinction between existing and proposed water surface elevations be maintained, since large scale regrading of the floodplain by excavation and fill will often result in a change in flood elevation for a given flood frequency. Isolated areas of minor fill in the floodplain will not normally change the flood profile of streams with larger drainage areas, so the existing and proposed flood profiles may be the same.

When developing a grading plan to provide compensatory storage, the Ordinance provisions concerning channel modifications, grading transitions, and buffers must also be followed. The compensatory storage should be located adjacent or opposite the site of the fill, but must also comply with the other Ordinance provisions. This requirement will often limit the extent to which a floodplain may be filled at a particular location.

Where regulatory floodways are mapped, the compensatory storage for floodway storage must be contained within the proposed floodway boundaries. Shifting of the floodway boundaries outside of the existing floodway may be permissible as a way of providing floodway compensatory storage, but all other provisions of the Ordinance regarding floodplains and flood easements must be met and both IDNR-OWR or its designee and FEMA must approve the floodway boundary change. Hydraulically equivalent compensatory storage for fill in the floodway associated with roadway crossings shall meet the same requirements stated above. Artificially created storage upstream of a restrictive bridge or culvert need not be replaced, provided that damages will not occur downstream. Normally, regulatory flows are not attenuated by restrictive stream crossings and are therefore unchanged upstream and downstream of the restrictive crossing. The floodplain downstream of the crossing should be reviewed to determine whether structures are damaged. If it appears that there is a risk of additional damage, a detailed hydrologic investigation should be performed to establish the extent to which the artificial storage decreases flood flows and to determine what damages might be incurred.

For riverine floodplains, or any floodplain with a regulatory floodway, calculations for floodplain volume should be submitted in tabular form showing calculations by cross-section. The volume of floodplain storage under the without-project conditions and the with-project conditions should be determined using the average end-area method with plotted cross-sections.

Floodplain storage cross-sections should be prepared as follows:

1. Cross-sections should be located parallel to each other and perpendicular to a stream reference line shown on the grading plan. The cross-sections used in the hydraulic analysis should be located perpendicular to flood flows, and may not be suitable for volumetric

calculations.

2. All cross-sections should be plotted at the same standard engineering scale and should be at a horizontal:vertical ratio of between 5:1 and 10:1.

3. The scale chosen should be large enough to show the intent of the proposed grading.

4. Cross-sections should reflect both the existing and proposed conditions on the same plot.

5. All cross-sections should show the normal water level and the 100-year flood elevation. For riverine floodplains, the cross-sections should also include the 10-year flood frequency elevation and where there is a regulatory floodway, the regulatory floodway encroachments should be scaled onto the cross-sections.

6. Cross-section should span the full floodplain and should include all existing and proposed structures.

In non-riverine floodplains, where the grading plan utilizes a one-foot contour interval and the drawing is at a maximum scale of 1”=50’, floodplain storage may be calculated by measuring contour areas.

A grading plan of the project site should be provided to show existing and with-project conditions for the following details:

1. Planimetric Data for All Structures and Construction (Including Location and Dimensions);

2. All Property Lines:

3. Certified Elevation Data, Including Ground Contours at Intervals of 2 Feet or less;

4. Location of Drainage and Flood Control Easements; and

5. Location and Orientation of Cross-Sections.

§ T404 Floodway Standards

Development proposed within the regulatory floodway will require hydraulic calculations to analyze the impacts of the development upon the floodway and floodplain. Backwater models such as HEC-2, HEC-RAS, WSP-2, and are acceptable models. For simple crossings such as culverts or clear-span bridges, hand calculations such as USGS regression equations or the equations found in the Federal Highway Administration (FHWA) manuals may be sufficient.

Appropriate Uses

Development in the floodway must be an appropriate use of the floodway as stated in the Ordinance. Only development that is an appropriate use will be allowed in the floodway.

Modifications to an existing building that would not increase the enclosed floor area of the building below the BFE, and which will not obstruct flood flows are an appropriate use of the floodway and will require a permit from the Certified Community. Allowable modifications include fireplaces, bay windows, decks, patios, and second story additions.

If the proposed development within a regulatory floodway is not an appropriate use under the Ordinance, the development may only take place by revising the regulatory floodway designation on the site. It will be necessary to construct that portion of the project that revised the floodway on the property prior to the initiation of any building construction. In order to do this, the applicant must obtain local government concurrence of the revised floodway and an agreement from the unit local government to maintain it. The FEMA Community Acknowledgement form, to accompany the request for a proposed revision to the floodway is included as Form 11 in the next part of the manual. The maintenance agreement should be a statement from a community official that acknowledges the revised floodway and that the unit of local government will either assume responsibility to operate and maintain any revised floodway or will agree, upon default of the party responsible for such operation and maintenance, to undertake such operation and maintenance. In addition, all the information required to obtain a CLOMR must be submitted to IDNR-OWR or its designee and then FEMA (depending on the source of the map). A stormwater permit may then be issued to proceed with the revision of the floodway. Upon completion of the construction necessary to revise the floodway, as-built plans must be submitted to the Administrator and FEMA to have a LOMR issued. Once a LOMR is issued revising the floodway map, and all necessary permits have been obtained, development may proceed in the former floodway area.

Engineering Criteria

Conveyance

Regulatory floodway conveyance must be maintained for all flood events up to and including the 100-year frequency flood except at bridges, culvert crossings, and dams. Conveyance is defined as:

$$K = [1.486/n] * A*[R^{(2/3)}], \text{ where}$$

n = Manning's roughness factor
A = effective area of the cross-section
R = hydraulic radius

The same Manning's n-value shall be used for both existing and proposed conditions unless a recorded maintenance agreement with a federal, state, or local unit of government can assure the proposed conditions will be maintained or the land cover is changing from a vegetative to a non-vegetative land cover. (For a discussion of conveyance, consult Open Channel Hydraulics by Ven Te Chow, 1959, McGraw-Hill, New York, New York.)

Transition Sections

Expansion and contraction of flow require transition sections to determine effective regulatory floodway conveyance and shall be located and determined as described in the Ordinance. Alternative transitions shall require review and approval by IDNR-OWR. Expansion is the hydraulic condition of water flowing from a narrower section to a wider section and shall be assumed to occur no faster than at a rate of one foot horizontal for every four feet of the stream length. Contraction, the condition of water flowing from a wider section to a narrower section, shall be assumed to occur no faster than at a rate of one foot horizontal for every one foot of stream length. The floodplain area outside of the expansion and contraction flow area is considered to be ineffective flow area. Effective conveyance transition sections and expansion and contraction of flow are demonstrated in many hydraulic textbooks and manuals for hydraulic computer programs. When considering effective conveyance in a vertical direction, the expanding and contracting vertical transition shall be one foot vertical transition for every ten feet of stream length. The compensatory storage required by the ordinance may be placed within areas of ineffective conveyance within the floodway.

Average Channel Velocities

Channel velocities shall not be increased as a result of development. Minor increases may be permissible at some cross-sections along the project reach but the flow velocity of the change must remain below the scour velocity. Channel conditions vary, but channel scour must be considered if a velocity of above five feet per second is attained.

Flood Elevations

Flood elevations generated by the regulatory model must first be duplicated before updated data to reflect the existing conditions is input to the model. The flood profiles, flows and floodway data in the regulatory floodway study must be used for analysis of the regulatory conditions. If the study data appears to be in error or conditions have changed, IDNR-OWR or its designee shall be contacted for approval and concurrence on the appropriate existing conditions data. Once the output of the regulatory model has been duplicated to within 0.1 foot of the regulatory profile, revisions should be input to reflect the existing conditions.

If existing conditions in the watershed outside of the applicant's project site will be affected by the development, the applicant shall obtain the best available information of the proposed off-site changes to anticipate the impacts of the proposed change. The existing and with-project conditions shall be modeled based on this data.

On-stream structures built for the purpose of retaining water must be approved by the Dam Safety Section of IDNR-OWR by way of a permit or a letter stating that a permit is not required. The address for the Dam Safety Section is:

Illinois Department of Natural Resources
Office of Water Resources
2050 W. Stearns Road
Bartlett, Illinois 60103

Floodway Permit Applications Involving Hydraulic Analysis

There are two different conditions for development within a regulatory floodway. Either the applicant is trying to maintain the existing regulatory profile and floodway boundaries or a LOMR is requested.

The discharges from the regulatory model shall be used except where the Administrator requires new discharges. The necessity for new discharges will depend on the correlation between the existing conditions profile, the regulatory profile, and the magnitude of the impacts on the profile due to the

project. If the existing conditions profile is calculated to be lower than the regulatory profile, the effects of lost storage must be analyzed and the new hydrologic analysis must reflect the future land use. The Administrator or the applicant may contact the Director for an opinion on the suitability of the regulatory discharges. New discharges shall be developed based on stream gage analysis (if available), or shall follow the methodologies outlined in the "Hydrologic Techniques" section within the "Stormwater Runoff" portion of this manual.

The first step to determine if a revision of the regulatory floodway conditions is desired is to duplicate the regulatory profile using the same hydraulic model (usually HEC-2 or WSP-2). Data input into the duplicate model should be identical to the data which generated the regulatory profile. It is not necessary to duplicate the entire regulatory profile but the applicant should start the profile at least four cross-sections downstream of the project site. Once the input from the regulatory model has been duplicated, the output of the duplicate model should be verified against the output of the regulatory model. A copy of the regulatory profile should be submitted along with the duplicate model run as part of the permit application package.

Where there is a designated floodway mapped, but there is no computer model available, the engineer should consult the Director about how to proceed with the specifics of modeling the existing conditions.

Once the duplicated model has been prepared and is operational, it must be updated to create an existing conditions model for a comparison against the with-project conditions. As discussed in "Floodplain Performance Standards", cross sections should be added to the regulatory model where it is appropriate to add them for both the existing and with-project hydraulic analyses. The existing conditions model should include all corrections to the regulatory profile and should be modeled with attention to areas of ineffective conveyance. The applicant is responsible for all existing field conditions within the watershed which may affect the existing conditions hydraulic model. These areas can be maintained in the model for storage volume and area calculations by imputing an artificially high n-value for these areas (such as 99). This will cause the computer model to treat these areas as ones of ineffective flow, but the cross-sectional area is still maintained for the area and volume calculations. Ineffective flow areas should be clearly annotated on the plans and cross-sections.

The existing conditions profile must tie-in to the regulatory profile to within 0.5 foot, based on FEMA requirements, upstream and downstream of the project reach. Where it is not possible to meet the regulatory profile, a new hydrology study is required.

If the applicant is trying to maintain the existing regulatory floodway boundaries, he should scale the floodway encroachments off the regulatory floodway map and input this data into the existing conditions model. This will create the existing conditions floodway model. The with-project model must demonstrate that the proposed development has no incremental impact if the with-project condition maintains the conveyance, storage, and travel time of the existing conditions model and the flood stages are not increased.

If the applicant is trying to establish or revise a regulatory floodway, one of the standard floodway encroachment methodologies from the computer models shall be utilized. The floodway must meet the floodway definition of this Ordinance.

The floodway is considered to meet the surcharge criteria of no more than a 0.1 foot increase if the floodway meets the requirements of the Ordinance. It will be necessary for the applicant to check that the 10% velocity rule is met and these calculations should be part of the submittal to the Administrator.

The preferred approach for developing floodway encroachments involves the use of an equal amount of flood conveyance on each side of the stream centerline. Modifications to the floodway encroachment which reduce conveyance on one side of the stream shall first consider an increase of conveyance on the streamside directly opposite the modified encroachment. When proposed floodway modifications form the affected property owners. Floodway encroachment methodologies generally create floodways by removing conveyance from the ends of the cross-sections and will typically create floodways with a considerably narrower floodway than necessary to meet the velocity criteria. The routines are a useful tool in developing a floodway that centers its conveyance about the centerline of the stream. The applicant will have to manually adjust the encroachments to develop a floodway which meets all the criteria of the Ordinance floodway definition.

When manually adjusting the floodway encroachments at every cross-section, the applicant should start at the most downstream cross-section and work upstream. In using a backwater model floodway encroachment methodology, the upstream cross-sections should generally not have any effect on the generated encroachments form the downstream section.

The with-project conditions model will use the same regulatory discharges and cross-section locations as the regulatory conditions model to reflect the development on the site. The applicant should first run the model using the with-project topography with the fixed encroachments set at the existing condition. If the conveyance, storage, and travel time are maintained and the flood stages are not increased, the with-project floodway will be allowed if it does not differ from the existing conditions floodway. If the rules are not yet

met, there are two options: to revise the design to meet the criteria of the Ordinance or to develop a new floodway that meets the Ordinance definition and obtain a LOMR from FEMA, revising the regulatory floodway. Table 10 identifies the data requirements and reviewing agencies for the various types of revisions.

TABLE 10
Data Requirements for Revisions to Mapped Areas

Type of Revision	Data or Hydraulic Model (H.M.) Utilized	Reviewing/Approving Agency
LOMA	Elevation	Administrator, FEMA
LOMR Based on Fill	Elevation, Certification of Fill Compaction	Administrator, FEMA
Revision to Regulatory BFEs Based on Existing Conditions	Regulatory Conditions H.M. Existing Conditions H.M.	Administrator, IDNR-OWR, FEMA
Revision to Regulatory BFEs Based on Proposed Project	Regulatory conditions H.M. Existing Conditions H.M. With-Project H.M.	Administrator, IDNR-OWR, FEMA
Revision to Regulatory Floodplain Boundaries	Elevation	Administrator, IDNR-OWR, FEMA
Revision to Regulatory Floodway Based on Existing Conditions	*Regulatory Conditions Floodway H.M. *Existing Conditions Floodway H.M.	Administrator, IDNR-OWR, FEMA
Revision to Regulatory Floodway Based on a Proposed Project	Regulatory Conditions H.M. Existing Conditions H.M. With-Project Conditions Floodway H.M.	Administrator, IDNR-OWR, FEMA

* Where applicable, otherwise use the regulatory profile with scaled and encoded floodway encroachments.

Note: Forward copies of all submittals to the Director.

Public Flood Control Project

Public flood control project will be considered compliant with the Ordinance if the applicant can demonstrate to the Administrator and IDNR-OWR through a detailed hydrologic and hydraulic analysis that the proposed project will not singularly or cumulatively result in increased flood heights outside the project right-of-way or easements. This must be valid for all flood events up to and including the 100-year flood. A public control project shall have a public agency as either the applicant or co-applicant.

§ T405 Riverine Floodplain

Within all regulatory riverine floodplains where the regulatory floodway has not been determined by the IDNR-OWR or FEMA, the applicant must provide a detailed hydrologic and hydraulic analysis which demonstrates a stormwater runoff conveyance path for the proposed development. The

detailed analysis must conform to the hydrologic and hydraulic modeling requirements described in the “Basic Stormwater Management Requirement” section of the manual and this section, respectively. For mapped regulatory floodplains with certified 100-year flood discharges, the applicant may request from the Administrator permission to use the existing 100-year flood discharge. However, if the study conditions have changed, the Administrator may require a new hydrologic analysis. By definition, the stormwater conveyance path determination is slightly less detailed than a floodway determination under IDNR-OWR regulations. The stormwater conveyance path is essentially a conveyance floodway only and will not require an analysis of the floodway storage component.

The stormwater conveyance path must demonstrate that the proposed development will have no singular or cumulative impact on flood heights or velocities. A detailed analysis must be submitted and approved by the Administrator prior to the issuance of a watershed development permit. For riverine floodplains with a drainage area greater than 1.0 square mile, the applicant must also request and receive IDNR-OWR approval. In cases where the analysis of the flood conveyance path yields a revision to the FEMA mapped floodplain boundaries, the applicant will also need to request a LOMR from FEMA.

Upon acceptance of the stormwater conveyance path by the Administrator, the applicant has the option to locate all of the development outside the flood conveyance path or to meet the floodway performance standards. The hydraulic analysis of the relocated stormwater conveyance path cannot impact adjacent properties by more than 0.1 foot.

The applicant may limit the study to a floodplain determination and apply the performance standards of Article 4, § 401 to the entire floodplain, with the exception of the appropriate use requirements of Section 404. Therefore, compensatory storage for the displacement of floodplain storage due to fill or structures will be required.

§ T406 Bridge and Culvert Standards

Permits involving new stream crossings or any significant modifications to existing structures will require a hydraulic model if the stream has a regulatory floodway. Both the existing and with-project conditions should contain the same cross-section locations so that each case can be compared at all locations along the reach.

For modification or replacement of existing structures, a determination must be made whether or not the existing structure is a source of flood damage. This is done by comparing the profile of the natural channel (as if the structure did not exist) against the profile of the channel with the existing structure in place. By delineating the floodplains of each of the two profiles upstream of the restrictive structure, the applicant can determine the area that is impacted by backwater created by the restrictive structure. If a building is located in the floodplain when analyzing a restrictive structure, but not in the floodplain when the structure is removed, the structure may be a source of flood damage. The applicant must then evaluate the feasibility of redesigning the structure to reduce the existing backwater, taking into consideration the effects on flood stages on upstream and downstream properties.

All excavations for new construction or modifications to existing structures at crossings must be designed in accordance with Article 4 of the Ordinance for limitations on average channel or regulatory floodway velocities.

Lost floodway storage must be compensated for as required in Section 403 of the Ordinance except that artificially created storage lost due to a reduction in head loss behind a bridge shall not be required to be replaced, provided no damage will be incurred downstream.

Application submittal material should be submitted to IDNR-OWR for stream crossings over public bodies of water so that IDNR-OWR may issue a public notice. Also, where hydraulic analyses are required for road crossings, the application submittal material should also be submitted to IDNR-OWR for concurrence that a conditional LOMR is not required.

The detailed hydraulic analysis of upstream flood stages must be based on the Administrator approved regulatory discharges and corresponding flood elevations for tailwater conditions. Culverts must be analyzed using the U.S. DOT, FHWA Hydraulic Chart for the Selection of Highway Culverts. Bridges must be analyzed using the FHWA Hydraulics of Bridge Waterways calculation procedures, or an appropriate hydraulic computer model approved for use by the Administrator.

Article 5 Stormwater Management Permit Submittal Requirements

§ T500 Stormwater Management and Other Permits Required

To determine if a Stormwater Management Permit is required for a particular development, the developer should follow the flowchart provided as Form 1, in Part 2 of this Manual. The developer must show the project location on the Flood Insurance Rate Map (FIRM), published by the Federal Emergency Management Agency (FEMA). Many of the FIRMs published by FEMA are from the early 1980's and have been restudied and revised. Therefore, the developer shall request from the community or county the latest FIRM for the project area. Each community is responsible for maintaining the latest set of FIRMs for their jurisdictional area.

Section 500.1(b) of the Ordinance includes exclusions from the necessity of obtaining a Stormwater Management Permit for developments that disturb more than 43,560 square feet of ground cover. The installation of storm sewers are not included as an exclusion because the storm sewers would be considered an improvement to the hydraulic conveyance of runoff that would otherwise have to flow overland or be absorbed into the ground.

Developments that do not require a Stormwater Management Permit are not excluded from obtaining all other appropriate stormwater management related approvals from federal, state and regional authorities.

§ T500.3 Professional Seals and Certification Required

A professional engineer shall certify a Stormwater Management Permit application by signing and sealing the front cover and Section 1 of a bound application. By certifying the front cover and Section 2 of the application, the professional engineer is attesting to the contents of the entire bound application. If the professional engineer does not attest to a sheet or part of the application, it must be noted. Otherwise, it will be assumed that the contents of entire bound document are being attested to by the signature and seal of the professional engineer. For applications with separate plan sheets from the bound application, the professional engineer shall sign and seal the front cover of the bound plan set. When the total project site is over 20 acres, or if floodplain exists on the site, the survey must also be tied into the Will County Survey Control Network. New Plats, for parcels greater than 20-acres in size, must also be submitted in an electronic format designated by the County. These files will not be used to define or record property holdings.

§ T501.1 Permit Expiration

Permits are valid for a minimum of three years. Permits expire on December 31 of the third year following the date of their issuance. If a permit is issued on January 2, 2002, the permit shall expire on December 31, 2005. If a permit is issued December 1, 2002, the permit shall expire on December 31, 2005.

§ T501.2 Permit Extension

The permittee may request an extension of a permit to pursue the permitted activity before the expiration date if the permitted activity has been started. For permitted activities in special management areas, a permit extension may be applied for but the activity must be in compliance with the current requirements of the Ordinance on December 31st of the year in which the original permit expires.

§ T501.3 Permit Revision

In cases where a permit has been issued for a particular activity and after receiving the permit, the design for the proposed activity is changed; the permittee shall submit revised plans to be reviewed along with a written explanation of the changes and the reason for the changes. These changes cannot be started until a written permit revision is received from the Administrator.

§ T502 Required Submittals

A stormwater management permit application must be submitted to the appropriate authority listed in Form 5 whenever a permit is required. For linear developments spanning several municipal jurisdictions, it will be acceptable for the jurisdictions to utilize the same qualified review specialist(s).

The applicant shall refer to Table 2 in §502 of the Ordinance and Form 1 in Part 2 of this manual to determine the required permit submittal sections. All Stormwater Management Permit applications shall include an application and project overview (Form 2), plan set submittal, performance security, and maintenance schedule and funding. All permitted activities shall provide record drawings at the completion of the project. Applicants shall review and complete all necessary parts of Form 3 – Will County Stormwater Management Submittal Checklist and include the original forms with the required signatures in the bound application.

§ T502.1 Modification of Submittal Requirements

If the developer/applicant believes their project warrants special consideration for which a part of the submittal requirements are not required, the developer/applicant shall request in writing from the Administrator a modification in the requirements of the submittal. For example, if a developer was to redevelop a one square block in a downtown area that is nearly 100% impervious, they may request from the Administrator that no subsurface drainage investigation be performed because of the site's impervious area and location.

§ T502.2 Application and Project Overview

Form 2 in the latter part of this manual contains the information requested in §502.2 of the Ordinance. The applicant may obtain from the developer a letter authorizing the applicant to sign any documents related to the Stormwater Management Permit Application. In such cases the signed letter by the developer shall be attached to Form 2. In completing parts (g) through (i) of §502.2, the sheet(s) addressing each part shall be attached to Form 2.

§ T502.3 Plan Set Submittal

The correct scale for the submittal should be 1 inch = 100 feet or larger. The Will County benchmark used for the project shall be identified on the plan set. Where it is practical, two FEMA benchmarks should be tied-in to verify accuracy. All benchmarks shall be labeled on the plan set. A plan set submittal shall include the following basic plan exhibits:

1. Site Topographic Map.
2. General Plan View Drawing.
3. Sediment/Erosion Control Plan.
4. Vicinity Topographic Map.

§ T502.4 Stormwater Submittal

A stormwater submittal shall document the hydrologic and hydraulic evaluation that is required when any land is subdivided or developed. The plan evaluates stormwater runoff conditions and determines the need for site runoff controls and stormwater drainage facilities consistent with watershed capacities.

It is important that each stormwater management project and permit application be handled in an equitable, fair and consistent manner. A stormwater submittal provides the technical basis for accomplishing this and is an accepted practice throughout the country. The Ordinance provides the basis for determining capacities of existing facilities and thus for identifying the need to control potential problems associated with proposed changes. In addition, the relationship of a specific project to watershed concerns, such as off-site impacts or the use of a regional stormwater storage facility also can be considered. Certification that the stormwater calculations and plans are prepared under the direct supervision of a professional engineer is required to encourage proper technical input.

Calculations should be submitted in the form of design reports, calculation sheets, and/or computer model documentation identifying and explaining the assumptions, data, and coefficients used in sizing the major and minor stormwater systems. The calculation of the hydraulic grade lines must be documented. Any time a computer model is used in the stormwater calculations the output should be included along with the input and output on diskette or other common media.

Form 3 in Part 2 of this manual consists of the Will County Stormwater Management Submittal Checklist. This form should be included with each stormwater submittal. It is meant to assist the organization of the report into a standardized format that will help the reviewer find the necessary written report and calculations supporting the proposed activity. The applicant should identify those parts of the submittal appropriate for the specific submittal through the use of the checklist.

For the subsurface drainage investigations, all existing field tile systems, including the tiles entering and exiting the site, should be shown. The size, type, quality, and depth for each field tile should be noted, as well as the percentage of flow and silt found for each slit trench location. The percentage of the total depth of flow found is the percentage of tile diameter occupied by active flow. Any restrictions or surcharged conditions should be noted. Similarly, for percentage of silt, the percentage of tile diameter that is restricted by silt should be identified. If possible, field tile lines should be identified as mainline tile, sub-main tile or lateral tile.

An example of a narrative description is as follows:

Example:

"The Main project proposes a development of a 50 acre parcel located in New Lenox, Illinois. The existing site conditions consist of farmed row crops. The Main project will consist of 40 acres of ¼-acre residential lots and 10-acres of open space. The general drainage pattern or the site is from the northwest to the southeast. There are 20-acres of off-site area that is tributary to the site and enters the site at the northwest corner. The off-site tributary area is conveyed through a detention pond prior to entering the Main project site. A storm sewer has been sized to collect and convey the 10-year off-site flow through the site. Flows greater than the 10-year design storm event will be conveyed via swale to the southeast corner of the site. The Main project will have two stormwater storage facilities on the east side of the site. The outflows from both facilities will be directed into an existing storm sewer which has been demonstrated to have existing capacity to accept this additional volume without surcharging."

The applicant will have to address each of the statements with technical support, calculations and models where necessary. All stormwater storage facilities should be functional and in working order prior to development of the remainder of the site. In projects with tributary off-site flow, a stormwater system shall also be in place to safely convey off-site flow prior to development of the site.

§ T502.5 Floodplain Submittal

A floodplain submittal is required whenever a hydrologic disturbance is proposed within a floodplain. The submittal is required if any part of the hydrologic disturbance will be in the floodplain, even if the majority of the development lies outside the floodplain. All floodplain modifications shall be the minimum required to accomplish the development.

The applicant shall provide a copy of the permit obtained from IDNR-OWR and approval from FEMA for all new base flood and floodway determinations when their permitting authority applies. It will be the decision of the Administrator whether or not the review of the stormwater permit application will begin prior to written receipt of IDNR-OWR and FEMA approval in such cases as permits are required. Hydraulic disturbance of the base flood and floodway shall not occur until all necessary permits are issued and received by the Administrator.

The floodplain submittal must include sufficient information for the qualified review specialist to ascertain compliance or noncompliance of the proposed development with the criteria of the Ordinance.

At a minimum, the floodplain submittal must contain:

1. Floodplain delineation.
2. Floodway delineation.
3. Floodplain calculations.
4. Topographic survey with Will County benchmark used.
5. IDNR-OWR permits and FEMA approval, if required.
6. Floodproofing measures, if required.
7. Flood easements, if required.

The applicant must provide the delineation by a professional engineer of floodplain boundaries on or adjacent to the proposed development site. The floodplain must be delineated for pre-development and post-development conditions. The floodplain delineations should be shown on maps at the same scale as these required for the site stormwater submittals (floodplain boundaries on the development site should be shown on the site topographic map and nearby off-site floodplain boundaries should be shown on a vicinity topographic map).

The applicant must provide calculations and drawings sufficient for the certified review specialist to determine compliance of the proposed development set forth in Article 4 of the Ordinance. In addition, the calculations and drawings must be sufficient to meet the requirements of the NFIP regulations.

Article 6 Long-Term Maintenance

The scheduled maintenance program must include at least:

1. A list of the planned maintenance tasks to be performed for each drainage facility and the frequency of each task; and

2. All supporting infrastructure (storm sewer, swales, etc.)

3. Identification of the party responsible for performing the maintenance of the drainage facility

It is expected that naturally vegetated detention storage facilities and conservation areas within private lots of a development meet a set of minimum performance standards. The performance standards requirement was developed in order for the Certified community to conclude if the plantings were “successful” enough to warrant a finding of compliance, and that the preserved areas are not degrading. If compliance is not met, corrective measures and subsequent monitoring is required to meet the terms and conditions of the Certified Community. The corrective measures will be funded by the SSA, backup SSA, or other funding measures.

The success of naturalized detention ponds and buffers in achieving the desired effect is very dependent upon periodic management with a set of goals. The following is an example management and monitoring plan that includes a schedule describing minimum management requirements for success of the naturalized detention ponds and buffers contained within a project site. This set of performance standards has been developed to assist the entity/person responsible for the maintenance with defining what is acceptable under the Ordinance.

The applicant is required to conform to the long term maintenance requirements of other permitting agencies such as the USACE and IEPA. These requirements may be different than those listed here. The more stringent requirement shall be followed.

§ T600 Long-Term Maintenance

Long-term maintenance of stormwater facilities is needed to promote the following goals:

- Protection of preserved areas from impacts directly associated with development activities.
- Stabilize disturbed areas of the site to reduce or eliminate erosion.
- Provide a native vegetated buffer around detention ponds and preserved conservation areas to assist with filtering detrimental contaminants in the runoff.

A qualified consultant shall periodically visit the site during the first five years after planting to monitor the progress and health of the plantings and the preserved areas. These visits are to determine if remedial measures are required and to recommend procedures to correct any deficiencies. In most cases, these deficiencies are related to the maintenance of the basin (i.e. eroded side slopes, clogged outlets, trash, debris dumping). The following minimum maintenance activities shall be completed every other month unless otherwise indicated during the growing season (March 1-October 31):

1. Debris Management: All trash, brush, grass clippings, debris, etc. shall be removed from the created detention ponds and buffer areas.

2. Stormwater Management Structures: All stormwater control structures and silt basins, etc. shall be cleaned out and/or repaired every two weeks to prevent clogging. This is especially important in early spring and late fall. Dammed water can drown certain wetland plants if not rectified quickly.

3. Soil Erosion Control Management: All soil erosion control devices, structures and features, etc. are to be installed as required by the soil erosion control plan and function properly at all times. Any deficiencies shall be corrected immediately.

The following management activities should be completed annually unless otherwise specified in the management plan:

1. Prescribed Burn Management: Naturalized detention ponds shall undergo periodic prescribed burns after the second growing season or as fuel allows. These burns help to reduce undesirable weedy species and encourage native species. These burns should only be performed by a qualified burn contractor. An IEPA open burn permit is required; additional permits from the local municipality may also be required. In lieu of burning, mowing at a height of 6” to 8” may also be performed.

2. Protection of Preserved Woodlands on Private Lots: Preserved woodlands shall have construction fencing placed around the limits of no construction zone. No equipment or materials shall be stored within the no construction zone and no equipment shall be driven within it.

An example of performance standards for the detention ponds and conservation areas is as follows:

A. A temporary cover crop shall be planted on all slopes immediately upon completion of detention pond grading. Within 3 months, at least 90% of the slopes, as measured by aerial cover, shall be vegetated. If the long-term slope vegetation is not planted with the temporary crop, then it should be

planted in the first available growing season appropriate for each species. Prior to replanting, rill erosion shall be repaired; any gully erosion shall require drainage improvements to eliminate them from reoccurring. All cover crop species must be nonpersistent or native and not allelopathic. If a temporary cover crop is not planted immediately upon completion of grading, erosion blanket or heavy mulch must be installed to prevent erosion.

B. By the end of the fifth year, no individual area over the entire detention pond buffer area greater than 0.25 square meters shall be devoid of vegetation, as measured by aerial coverage.

C. By the end of the fifth year, none of the three most dominant plant species in any of the mitigated or preserved wetland community zones may be non-native or weedy species including by not limited to: cattails, reed canary grass, giant reed, blue grass, purple loosestrife, sandbar willow, thistle or barnyard grass, unless otherwise indicated on the approved mitigation plan.

Vegetation sampling is conducted to assist with determining if the performance standards have been met.

The sampling must occur prior to early June and again in August/September following the planting and be completed twice in Years 3, 4, and 5 during the monitoring period. Sampling will consist of a time meander search to record species presence. A visual estimate of species dominance and cover will be made. A Floristic Quality Assessment shall be performed (see § T412(c)). The number of native species present should increase over the 5 year monitoring period. Representative photographs will be taken at the time of sampling. An annual monitoring report will contain the following information:

A. Vegetation Map – This information shall be descriptive and shall define the limits of all vegetation areas by general community type, based on field observations. Dominant species within each zone shall be identified. Representative photographs of each vegetation area by general community zone shall be submitted to the entity responsible for maintenance and the certified community.

B. Cover shall be determined by visual estimate to ensure no bare earth is exposed leaving the area open to erosion.

C. Plant Community Quality – Calculate the native mean *C* values, FQI and native mean wetness coefficient for all of the areas. The native mean *C* value and FQI for the area should increase each year for a 5-year period. If the native mean *C* value or the FQI decreases, then corrective measures should be taken in these areas.

An annual monitoring report based on the above sampling and soil erosion control

inspection reports shall be submitted to the Administrator by the end of February of the year following the completion of monitoring and management tasks. The report will include a review of progress toward meeting goals and performance standards. If any of the performance criteria are not met for any year, the responsible entity must provide a detailed explanation and propose corrective measures. Particular attention should be given at the end of the second year to areas initially planted with native vegetation.

It is the applicant's responsibility to rectify any deficiencies in the detention ponds, mitigation areas and preserved areas through replanting and management including but not limited to burning and selective herbicide use.

Article 7 Enforcement And Penalties

§ T701 Required Inspections

The Administrator shall inspect or have inspected projects which are permitted under this ordinance from time to time. Inspection should be performed during construction to insure compliance with the permitted plans, but should also be performed occasionally after the permitted project is completed so that such things as required maintenance can be monitored and so that no changes to facilities are made without a permit. The Administrator has the authority to develop his own inspection program and shall be guided by the requirement for long term maintenance of permitted projects as well as by the requirements contained in this ordinance for obtaining a permit prior to development. Changes to facilities on permitted projects made after the final inspection shall be considered as new development requiring new permits. As an aid to Administrators, Forms 8 and 9 are provided in Part 2 of this Manual and may be used in lieu of developing an inspection program.

ARTICLE 13 – FEE-IN-LIEU OF SITE RUNOFF STORAGE

§ T1300 Fee-in-Lieu of Site Storage Runoff

The Director or Administrator may in some limited circumstances allow a fee-in-lieu of site runoff storage to fulfill part or all of the site runoff storage requirement. The fee will be determined to be the lesser of

a fee per acre foot or part thereof computed from a schedule adopted by the permitting authority.

OR

the verifiable cost of providing the required storage

§ T1301 Procedures; Use of Funds

The Administrator shall grant or deny the fee-in-lieu request within 45 days of written request. The funds shall be collected and used in the same watershed for which they were paid. The fees may be used to plan, design, construct or improve stormwater management facilities in the watershed for which they were collected.

PART 2 – FORMS AND APPENDICES

FORMS

The following sheets contain forms that are meant to be copied and used by either the developer/applicant, community official or review engineer. The forms contained in this section are listed below. Note that Form 10, the FEMA community acknowledgement form, is routinely updated by FEMA. The current versions of all FEMA forms can be found online at http://www.fema.gov/business/nfip/forms.shtm.

ADMINISTRATIVE FLOWCHARTS

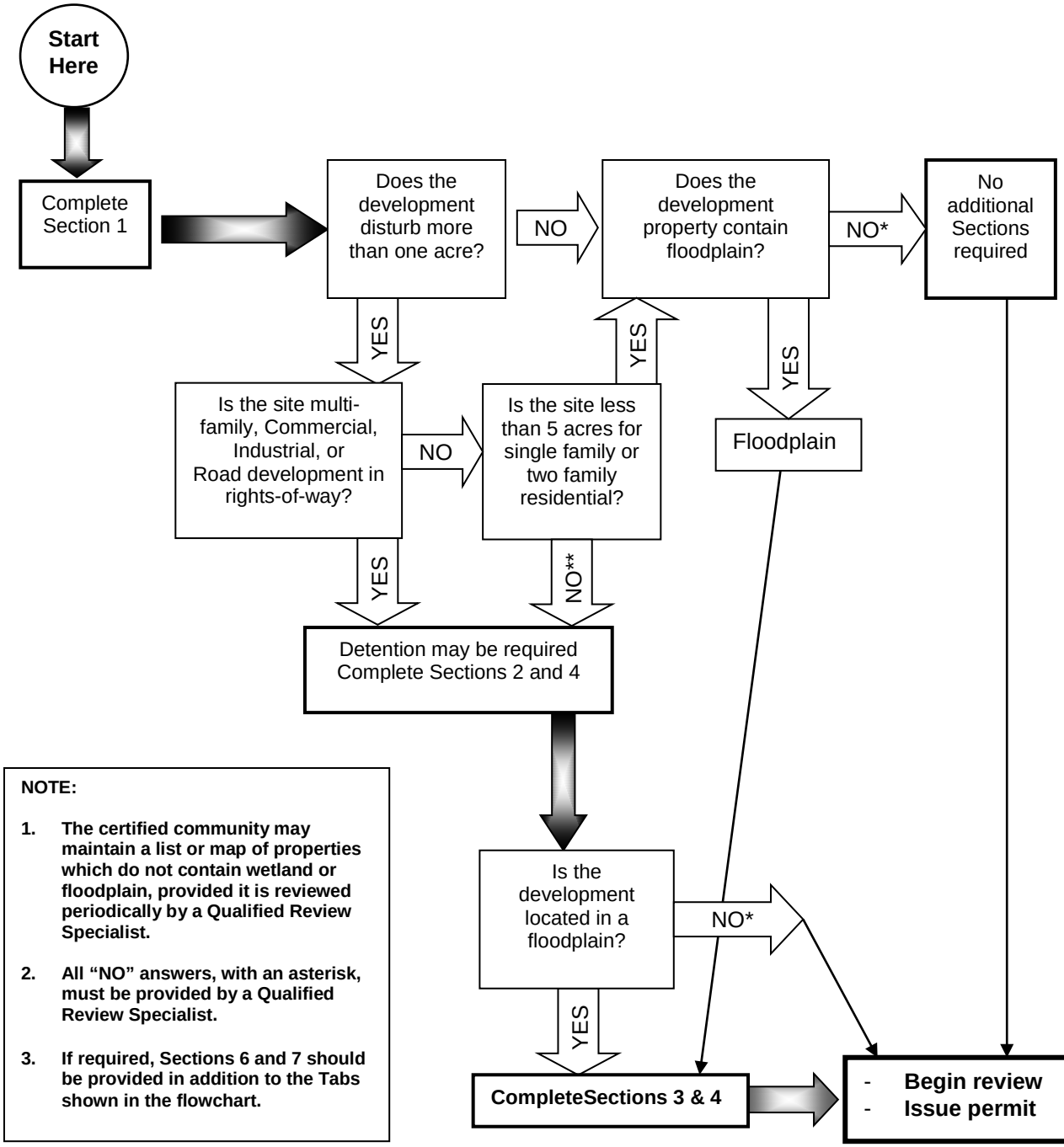
The following flowcharts are included to summarize and guide permit applicants and administrators through various administrative procedures:

FORM 1

WILL COUNTY STORMWATER MANAGEMENT TYPICAL PERMIT SUBMITTAL FLOWCHART
(EXCLUDING REDEVELOPMENT AND AGRICULTURAL)

COMPONENTS OF STORMWATER PERMIT SUBMITTAL

SECTION 1 – Project Overview
SECTION 2 – Stormwater Submittal
SECTION 3 – Floodplain Submittal
SECTION 4 – Plan Set Submittal
SECTION 5 – Security Submittal
SECTION 6 – Variance Submittal



NOTE:

1. **The certified community may maintain a list or map of properties which do not contain wetland or floodplain, provided it is reviewed periodically by a Qualified Review Specialist.**
2. **All "NO" answers, with an asterisk, must be provided by a Qualified Review Specialist.**
3. **If required, Sections 6 and 7 should be provided in addition to the Tabs shown in the flowchart.**

REV 12/04

FORM 2

REV 12/04

WILL COUNTY STORMWATER MANAGEMENT PERMIT APPLICATION

Date Application Received:	Date Permit Issued:

Name & Address of Applicant: Name & Address of Owner(s): Name & Address of Developer:

_____ _____ _____

_____ _____

_____ _____ _____ _____

Title:_____

Telephone no. during business hours: A/C( )_____-_____

Telephone no. during business hours A/C( )_____-_____

Indicate which Submittals apply to application* (see flowchart):

☐Stormwater Submittal

☐Flood Plain Submittal

☐No special management areas encroach the development

*Must be identified by qualified review specialist

Names, addresses and telephone numbers of all adjoining property owners within 250 feet of the development (use additional sheets if necessary):

Common Address of Development:

_____
Street address

_____
Community

_____
Name of local governing authority

_____
Watershed planning area and tributary

Legal Description (attach):

_____
¼, Section, Township, Range

_____
P.I.N.

Is any portion of this project now complete? _____ Yes _____ No, If "yes," explain in description portion.

I hereby certify that all information presented in this application is true and accurate to the best of my knowledge. I have read and understand the Will County Stormwater Management Ordinance, and fully intend to comply with those provisions.

_____ _____
Signature of Developer Date

I have read and understand the Will County Stormwater Management Ordinance, and fully intend to comply with those provisions.

_____ _____
Signature of Owner Date

Will County Stormwater Management Submittal Checklist FORM 3

REV 12/04

Applicant:	Reviewer:	Stormwater Permit No.:

The following tables contain a checklist of the requirements before a review for a Stormwater submittal will be accepted. The flow chart on the previous page shall be completed prior to completing the following tables. The flow chart identifies which Section(s) need to be completed for a particular submittal. Not all requirements pertain to every stormwater submittal. For those requirements that you believe do not pertain to the submittal, please give the reasons in the comment box.

SECTION 1 – PROJECT OVERVIEW

Identifier	Requirement	Section	Comments
1A	Completed Stormwater Permit Application	503(b)	
1B	Copy of a completed Joint Application form with transmittal letters to the appropriate agencies (wetland or floodplain submittal).	503(b)	
1C	Copies of other relevant permits or approvals (include applications if permits have not been issued)	503(b)	
1D	Narrative description of development, existing and proposed conditions, and project planning principles considered, including BMPs utilized.	503(b)	
1E	Subsurface drainage investigation report	503(b)	

Name of Applicant: _____ Name of Reviewer: _____

Signature of Applicant: _____ Signature of Reviewer: _____

Date: _____ Date: _____

PROJECT INFORMATION:

Project Name: _____

Site Location: _____

Township, Range: _____

Site Area (acres): _____

Please check the following activities that apply (from the flow chart):

Type of development: ☐Residential ☐Commercial ☐Industrial ☐Agricultural ☐Other

The site has the following constraints:

Floodplain	Floodway	Wetlands
☐YES	☐YES	☐YES
☐NO _____	☐NO _____	☐NO _____
Qualified Review Specialist Signature	Qualified Review Specialist Signature	Qualified Wetland Review Specialist
_____	_____	_____
Print Name	Print Name	Print Name

Note: Please attach a narrative project description to this Section, if Applicant is not completing Section 2.

Will County Stormwater Management Submittal Checklist

SECTION 2 – STORMWATER SUBMITTAL

Identifier	Requirement	Section	Comments
2A	Narrative description of the existing and proposed site conditions. Include description of off-site conditions.		
2B	Schedule for implementation of the site stormwater plan.		
	Site runoff calculations:		
2C	Documentation of the procedures/assumptions used to calculate hydrologic and hydraulic conditions for sizing major and minor systems.	202.3, 202.4, 202.8	
2D	Cross-section data for open channels.	203.14	
2E	Hydraulic grade line and water surface elevations under design conditions.		
2F	Hydraulic grade line and water surface elevations under base flood conditions		
	Site Runoff and Storage Calculations:		
2G	Calculation of hydraulically connected impervious area and corresponding retention volume.	203.7	
2H	Documentation of the procedures/assumptions used to calculate hydrologic and hydraulic conditions for determining the allowable release rate.	203.2, 203.4	
2I	Documentation of the procedures/assumptions used to calculate on-site depressional storage.	201.8	
2J	Documentation of the procedures/assumptions used to calculate hydrologic and hydraulic conditions for determining the storage volume.	203.7, 203.8	
2K	Elevation-area-storage data.		
2L	Elevation-discharge data.	203.5	

Will County Stormwater Management Submittal Checklist

Section 3 – FLOODPLAIN SUBMITTAL

Identifier	Requirement	Section	Comments
3A	Regulatory floodplain boundary determination:	400	
3B	Provide source of flood profile information.	401.1.a, 402.6	
3C	Provide all hydrologic and hydraulic study information for site-specific floodplain studies, unnumbered Zone A area elevation determinations, and floodplain map revisions.	203.9, 203.10, 401.1	
3D	Floodway hydrologic and hydraulic analyses for the following conditions:		
3E	Existing conditions (land use and stream system).		
3F	Proposed conditions (land use and stream system).		
3G	Tabular summary of 100-year flood elevations and discharges for existing and proposed conditions.		
3H	Calculations used for model development.		
3I	Floodplain fill and compensatory storage calculations for below and above 10-year flood elevation:	401.7	
3J	Tabular summary for below and above 10-year flood elevation of fill, compensatory storage, and compensatory storage ratios provided in proposed plan.		
3K	Floodproofing Measures:	401.4	
3L	Narrative discussion of flood proofing measures including material specifications, calculations, design details, operation summary, etc.		
3M	Flood Easements when required by the countywide ordinance or local jurisdiction.		

Will County Stormwater Management Submittal Checklist

SECTION 4 – PLAN SET SUBMITTAL

Identifier	Requirement	Section	Comments
5A	All drawings should be signed and sealed by a P.E.		
5B	Site Topographic Map:		
5B-1	Map scales at 1 inch = 100 feet (or less) and accurate to +/- 0.5 feet.		
5B-2	Existing and proposed contours on-site and within 100 feet of site.		
5B-3	Existing and proposed drainage patterns and watershed boundaries.		
5B-4	Delineation of pre-development regulatory floodplain/floodway limits.		
5B-5	Delineation of post-development regulatory floodplain/floodway limits.		
5B-6	Location of cross-sections and any other modeled features.		
5B-7	Location of drain tiles.		
5B-8	Location of all wetlands, lakes, ponds, etc. with normal water elevation noted.		
5B-9	Location of all buildings on the site.		
5B-10	Nearest base flood elevations.		
5B-11	FEMA and Will County Survey Control Network benchmark.		
5C	General Plan View Drawing (may be more than one drawing for clarity)		
5C-1	Map scales at 1 inch = 100 feet (or less) and accurate to +/- 0.5 feet contour interval.		
5C-2	Existing major and minor stormwater systems.		
5C-3	Proposed major and minor stormwater systems.		
5C-4	Design details for stormwater facilities (i.e. structure and outlet work detail drawings, etc.).		
5C-6	Scheduled maintenance program for permanent stormwater facilities including BMP measures.		
5C-7	Planned maintenance tasks and schedule.		
5C-8	Identification of persons responsible for maintenance.		
5C-9	Permanent public access maintenance easements granted or dedicated to, and accepted by, a government entity.		
5D	Sediment/Erosion Control Plan:		
5D-1	Sediment/erosion control installation measures.		
5D-2	Existing and proposed roadways, structures, parking lots, driveways, sidewalks and other impervious surfaces.		

Will County Stormwater Management Submittal Checklist

Identifier	Requirement	Section	Comments
5D-3	Limits of clearing and grading.		
5D-4	Wetland location(s).		
5D-5	Proposed buffer location.		
5D-6	Existing soil types, vegetation and land cover conditions.		
5D-7	List of maintenance tasks and schedule for sediment/erosion control measures.		
5E	Vicinity Topographic Map:		
5E-1	Vicinity topographic map covering entire area upstream of the development site and downstream to a suitable hydraulic boundary condition.		
5E-2	A 2' contour map is preferred at a scale readable by the reviewer.		
5E-3	Watershed boundaries for areas draining through or from the development.		
5E-4	Soil types, vegetation and land cover affecting runoff upstream of the site for any area draining through the site.		
5E-5	Location of development site within the major watersheds.		

Will County Stormwater Management Submittal Checklist

SECTION 5 – SECURITY SUBMITTAL

Identifier	Requirement	Section	Comments
	Estimate of Probable Cost to construct stormwater facilities.		
	Development security:		
	Schedule for the completion of stormwater facilities.		
	Irrevocable letter of credit for 110% of estimated probable cost to construct the stormwater facilities.		
	Right to draw on the security statement - signed by the holder of the security.		
	Right to enter the development site to complete required work that is not completed according to schedule.		
	Indemnification statement - signed by developer.		
	Sediment and erosion control security:		
	Irrevocable letter of credit for 110% of estimated probable cost to install sediment and erosion control facilities.		
	Right to draw on the security statement - signed by the holder of the security.		
	Right to enter the development site to complete required work that is not installed and maintained according to schedule.		
	Letter of Credit Requirements:		
	Statement that indicates that the lending institution capital resources at least $10,000,000, or as authorized.		
	Lending institution has an office location within the Chicago Metropolitan Area.		
	Lending institution is insured by the Federal Deposit Insurance Corporation.		
	Allows Administrator to withdraw without consent of developer.		
	Allows Administrator to withdraw within 45 days of expiration date.		

Will County Stormwater Management Submittal Checklist

SECTION 6 – VARIANCE SUBMITTAL

Identifier	Requirement	Section	Comments
	Completed Stormwater Permit Application and all required submittals.		
	Completed variance petition including all information identified in Section 15-236.7.a.-l.		
	Statement as to how the variance sought satisfies the standards in Section 15-236.10. Address each condition separately.		

FORM 4

CERTIFIED COMMUNITY STATUS LIST

COMMUNITY	COMMUNITY PURSUING CERTIFICATION	MULTI-COUNTY COMMUNITY OPTING INTO ALTERNATIVE STORMWATER PROGRAM	DATE EXEMPT LIST RECEIVED	DATE OF COMMITTEE ACTION	DATE PETITION RECEIVED	DATE OF COMMITTEE ACTION	PETITION STATUS
VILLAGES							
Beecher	YES	N.A.	May 12, 2003	November 18, 2003	May 12, 2003	November 18, 2003	Certified
Bolingbrook*	YES		December 23, 2003	January 20, 2004	December 23, 2003	January 20, 2004	Certified
Channahon	YES	N.A.	May 5, 2003	November 18, 2003	November 14, 2003	December 16, 2003	Certified
Coal City	NO	N.A.	N.A.	N.A.	N.A.	N.A.	Non-Certified
Crete	YES	N.A.	December 4, 2003	December 16, 2003	December 4, 2003	December 16, 2003	Certified
Diamond	YES	N.A.	N.A.	N.A.	N.A.	January 10, 2006	Certified
Elwood	YES	N.A.	February 2, 2004	February 17, 2004	February 2, 2004	February 17, 2004	Certified
Frankfort	YES	N.A.	Revised December 2, 2003	December 16, 2003	April 17, 2003	November 18, 2003	Certified
Godley	NO CONTACT	N.A.	November 23, 2005	January 10, 2006	N.A.	January 10, 2006	Non-Certified
Homer Glen	YES	N.A.	December 4, 2003	December 16, 2003	December 4, 2003	December 16, 2003	Certified
Lemont*	NO	opt to DUPAGE	N.A.	N.A.	N.A.	N.A.	N.A.
Manhattan	YES	N.A.	December 31, 2003	January 20, 2004	December 31, 2003	January 20, 2004	Certified
Minooka	YES	N.A.	January 9, 2004	January 20, 2004	January 9, 2004	January 20, 2004	Certified
Mokena	YES	N.A.	December 18, 2003	January 20, 2004	December 18, 2003	January 20, 2004	Certified
Monee	YES	N.A.	December 30, 2003	January 20, 2004	December 30, 2003	January 20, 2004	Certified
New Lenox	YES	N.A.	Revised December 2, 2003	December 16, 2003	Revised December 2, 2003	December 16, 2003	Certified
Orland Park	YES	N.A.	December 16, 2003	January 20, 2004	December 16, 2003	January 20, 2004	Certified
Park Forest	YES	N.A.	December 17, 2003	January 20, 2004	December 17, 2003	January 20, 2004	Certified
Peotone	YES	N.A.	March 22, 2004	April 20, 2004	March 22, 2004	April 20, 2004	Certified
Plainfield	YES	N.A.	December 15, 2003	January 20, 2004	December 15, 2003	January 20, 2004	Certified
Rockdale	YES	N.A.	December 26, 2003	January 20, 2004	December 26, 2003	January 20, 2004	Certified
Romeoville	YES	N.A.	April 3, 2003		April 3, 2003	November 18, 2003	Certified
Shorewood	YES	N.A.	June 24, 2003	November 18, 2003	December 4, 2003	December 16, 2003	Certified
Steger	YES	N.A.	12/30/03; revised 02/03/04	01/20/04; 02/17/04	January 7, 2004	January 20, 2004	Certified
Symerton	NO CONTACT	N.A.	N.A.	N.A.	N.A.	N.A.	Non-Certified
Tinley Park	YES	N.A.	October 24, 2003	December 16, 2003	October 24, 2003	December 16, 2003	Certified
University Park	YES	N.A.	December 31, 2003	January 20, 2004	December 31, 2003	January 20, 2004	Certified
Woodridge*	NO	opt to DUPAGE	N.A.	N.A.	N.A.	N.A.	N.A.
Sauk Village	YES – June 2004	N.A.	N.A.	N.A.	N.A.	N.A.	Non-Certified

COMMUNITY	COMMUNITY PURSUING CERTIFICATION	MULTI-COUNTY COMMUNITY OPTING INTO ALTERNATIVE STORMWATER PROGRAM	DATE EXEMPT LIST RECEIVED	DATE OF COMMITTEE ACTION	DATE PETITION RECEIVED	DATE OF COMMITTEE ACTION	PETITION STATUS
CITIES							
Aurora*	NO	opt to KANE	N.A.	N.A.	N.A.	N.A.	N.A.
Braidwood	YES	N.A.	July 1, 2004		July 1, 2004	July 13, 2004	Certified
Crest Hill	YES	N.A.	December 22, 2003	January 20, 2004	December 22, 2003	January 20, 2004	Certified
Joliet	YES	N.A.	Revised December 1, 2003	December 16, 2003	Revised December 1, 2003	December 16, 2003	Certified
Lockport	YES	N.A.	December 4, 2003	December 16, 2003	December 4, 2003	December 16, 2003	Certified
Naperville*	YES		May 2003; Rev 12/19/03; Completed 2/22/04	01/20/04; 02/17/04	December 19, 2003	January 20, 2004	Certified
Wilmington	YES	N.A.	December 23, 2003	January 20, 2004	December 23, 2003	January 20, 2004	Certified
COUNTY							
Will County	YES	N.A.	December 30, 2003	January 20, 2004	December 30, 2003	January 20, 2004	Certified

*multi-county community, may opt to another stormwater program

REV 10/09

COMMUNITY CONTACT FOR STORMWATER MANAGEMENT QUESTIONS FORM 5

Community	Certified	City/Vlg Mngr Admnstrtr	SW ADMIN FName	SW ADMIN LName	Street	City	State	Zip	Phone
City of Braidwood	YES	Richard Benson	Jim	Hutton	141 W. Main St.	Braidwood	IL	60408	(815) 458-6808
City of Crest Hill	YES	John Tomasoski	Steve	Kuzckowski	1610 Plainfield Rd.	Crest Hill	IL	60403	(815) 741-5106
City of Joliet	YES	Tom Thanas	Jim	Trizna	150 W. Jefferson St.	Joliet	IL	60432	(815) 724-4200
City of Lockport	YES	Tim Schloneger	Amy	Ries, P.E.	921 S. State St.	Lockport	IL	60441	(815) 838-0549
City of Naperville	YES	Robert Marshall	Bill	Novak, P.E.	400 S. Eagle St.	Naperville	IL	60566	(630) 420-6704
City of Wilmington	YES	Tony Graff	Marty	Orr	1165 S. Water St.	Wilmington	IL	60481	(815) 476-2176
Village of Beecher	YES	Bob Barber	Bob	Barber	724 Penfield	Beecher	IL	60401	(708) 946-2261
Village of Bolingbrook	YES	James S. Boan	Thomas	Pawlowicz, P.E.	375 W. Briarcliff Rd.	Bolingbrook	IL	60440	(630) 226-8851
Village of Channahon	YES	Jamie Bowden	Don	Kinzler, CFM	24555 S. Navajo	Channahon	IL	60410	(815) 467-6644
Village of Coal City	NO	Matt Fritz	Thomas	Carroll, P.E.	58 E. Clinton St., Ste 500	Joliet	IL	60432	(815) 740-8140
Village of Crete	YES	Thomas Durkin	Thomas	Durkin	524 W. Exchange St	Crete	IL	60417	(708) 672-5431
Village of Diamond	YES		Teresa	Kernc	1750 E Division Street	Diamond	IL	60416-6006	(815)634-8149
Village of Elwood	YES	Aimee Ingalls	Bill	Offerman	401 E. Mississippi Ave	Elwood	IL	60421	(815) 423-5011
Village of Frankfort	YES	Jerry P. Ducay	Adam	Nielsen	432 W. Nebraska St.	Frankfort	IL	60423	(815) 469-2177
Village of Godley	NO		Thomas	Carroll, P.E.	58 E. Clinton St., Ste. 500	Joliet	IL	60432	(815) 740-8140
Village of Homer Glen	YES	Paula Wallrich	Mike	Salamowicz	14933 S. Founders Crossing	Homer Glen	IL	60491	(708) 301-0632
Village of Manhattan	YES	Marian Gibson	Jon	Dykstra, CFM	10045 W. Lincoln Highway	Frankfort	IL	60423	(815) 806-0300
Village of Minooka	YES	James Grabowski	Sean	Kelly, P.E., CFM	304 E. Mondamin	Minooka	IL	60447	(815) 467-8490
Village of Mokena	YES	John Downs	Paul	Pearson, Jr., P.E.	11004 Carpenter St.	Mokena	IL	60448	(708) 479-3927
Village of Monee	YES	Missy Tovo	Michael	Waldron, P.E	1170 South Houbolt Rd.	Joliet	IL	60431	(815) 744-4200
Village of New Lenox	YES	Kurt Carroll	Will	Nash, P.E.	1 Veterans Pkwy	New Lenox	IL	60451	(815) 485-6452
Village of Orland Park	YES	Paul Grimes	John	Ingram	14700 Ravinia Ave	Orland Park	IL	60462	(708) 403-6350

Community	Certified	City/Vlg Mngr Admnstrtr	SW ADMIN FName	SW ADMIN LName	Street	City	State	Zip	Phone
Village of Romeoville	YES	Steve Gulden	Jon	Zabrocki, PE, CFM	10045 W. Lincoln Highway	Frankfort	IL	60423	(815) 806-0300
Village of Sauk Village	NO	Richard Dieterich	Thomas	Carroll, P.E.	58 E. Clinton St., Suite 500	Joliet	IL	60432	(815) 740-8140
Village of Shorewood	YES		Kurt	Carroll	One Towne Ctr.	Shorewood	IL	60404	(815) 725-2150
Village of Steger	YES	Conrad Kiebles	Carmen	Recupito	35 West 34th St	Steger	IL	60475	(708) 754-3395
Village of Symerton	NO		Thomas	Carroll, P.E.	58 E. Clinton, Ste. 500	Joliet	IL	60432	(815) 740-8140
Village of Tinley Park	YES	Scott Niehaus	Chris	King, P.E.	17000 South Harlem Ave	South Holland	IL	60473	(708) 331-6700
Village of University Park	YES	David Savier	David	Sevier	698 Burnham Dr.	University Park	IL	60466	(708) 534-6451
Will County, Unicorp.	YES	N/A	Thomas	Carroll, P.E.	58 E. Clinton St., Ste. 500	Joliet	IL	60432	(815) 740-8140

FORM 6

EXAMPLE OF PUBLIC NOTICE FOR EXEMPT PROJECT LIST

On (DATE), the (MUNICIPALITY OR OTHER GOVERNMENTAL AGENCY) will conduct a public hearing to consider and take formal action with respect to the approval of the following list of developments proposed as exempt from the provisions of the Will County Stormwater Management Ordinance, adopted by the Will County Board on January 1, 2004. Any person wishing to do so may attend the meeting and be heard prior to the (VILLAGE BOARD OR OTHER GOVERNING BOARD) taking such action. The meeting will take place at the (LOCATION).

LIST PROJECTS HERE

FORM 7

INSPECTION CHECKLIST DURING CONSTRUCTION

1. Is the sediment an erosion control system as depicted on the plans installed?

2. Has the developer been maintaining the system after rain fall events?

3. Is there evidence of sediment being carried downstream from the development site at the project boundaries? If so, this is an indicator of an inadequate sediment erosion control plan and corrective action must be taken.

4. As construction progresses are there provisions for handling off site flows into the construction site without increasing upstream water surface elevations?

5. Is there adequate stormwater storage provided in sedimentation basins? Is there functional detention storage being provided for the development as it is being constructed? (In general, some sort of detention basin must be in place prior to the construction of impervious surfaces.)

6. Are existing wetlands to be preserved adequately protected during construction with fencing and other appropriate sediment and erosion control measures to limit both vehicle access and the impact of sediment from the construction site?

7. Is any required culvert or bridge being constructed in a manner to provide the least disturbance of the aquatic resource?

8. Are buffers delineated in the field and protected from intrusion by construction vehicles and other construction activities?

9. Are any required restrictor structures installed as soon as practicable on the conveyance system?

10. Are sediments being removed from basins and disposed of properly on site in a manner that does not promote their reintroduction into the stream system?

11. Are the limitations to the amount of area that can be worked being followed?

FORM 8

INSPECTION CHECKLIST AFTER CONSTRUCTION

1. Are required storm water detention/retention facilities in place and generally as they appear on the as-builts from the permitted plans?

2. Are any required restrictors in place and is the outlet control structure generally “clean”?

3. Are any required on site buffers around wetlands in place and free from prohibited activities?

4. Are there signs of failed construction?

    a. Settlement of berms.
    b. Slope instability.
    c. Accumulated sediment in detention/retention facilities.
    d. Questionable conditions at facilities related to retaining walls.
    e. Adequate stabilization of surfaces – i.e., stand of grass or other stabilizing means.

5. Have “record drawings” been submitted?

FORM 9

REV 12/04

DEVELOPER'S STATEMENT

Right to Draw on Securities
Section 1201.1 (c & d) & 1202.1.b

I, _____, do hereby grant to the Administrator of _____
Developer's Name County/Municipality
The right to draw on performance security posted in accordance with the Storm Water Permit _____ for the purpose of completing any and all
(Number/Description)
Stormwater Facilities and completing or maintaining Sediment and Erosion Control Measures included in the referenced permit. The decision to draw on the security shall be at the discretion of the Administrator. I further grant the right to enter the property for the purpose of performing the work to whoever the Administrator designates and agree to identify _____ against any increased costs
County/Community
attributable to concurrent activities or conflicts between the Administrators design's and any other contractors on site. I further warrant that I am a duly authorized representative of the developer with the authority to make this statement, and that this statement shall remain binding until final inspection and acceptance of all permitted Stormwater Facilities.

STATEMENT FOR: _____
Developer

BY: _____
Name and Signature

TITLE: _____

RELEASED BY FINAL ACCEPTANCE

FOR: _____
County/Community

BY: _____
Administrator

DATE: _____

INSERT MT-2 FORMS

FORM 11

REV 12/04

EROSION AND SEDIMENT CONTROL INSPECTION REPORT

Project Name: _____ File No.: _____

Inspection Date: _____ Time: _____ Inspected By: _____

Stage of Construction

___ Pre-Construction Mtg. ___ Rough Grading ___ Finish Grading
___ Clearing & Grubbing ___ Building Construction ___ Final Stabilization

YES	NO	N/A	Inspection Checklist
__	__	__	1. Have all disturbed areas requiring temporary or permanent stabilization been stabilized? Seeded? Mulched? Graveled?
__	__	__	2. Are soil stockpiles adequately stabilized with seeding and/or sediment trapping measures?
__	__	__	3. Does permanent vegetation provide adequate stabilization?
__	__	__	4. Have sediment trapping facilities been constructed as a first step in disturbance activity?
__	__	__	5. For perimeter sediment trapping measures, are earthen structures stabilized?
__	__	__	6. Are sediment basins installed where needed?
__	__	__	7. Are finished cut and fill slopes adequately stabilized?
__	__	__	8. Are on-site channels and outlets adequately stabilized?
__	__	__	9. Do all operational storm sewer inlets have adequate inlet protection?
__	__	__	10. Are stormwater conveyance channels adequately stabilized with channel lining and/or outlet protection?
__	__	__	11. Is in-stream construction conducted using measures to minimize channel damage?
__	__	__	12. Are temporary stream crossings of non-erodible material installed where applicable?
__	__	__	13. Is necessary restabilization of in-stream construction complete?
__	__	__	14. Are utility trenches stabilized properly?
__	__	__	15. Are soil and mud kept off public roadways at intersections with site access roads?
__	__	__	16. Have all temporary control structures that are no longer needed been removed? Have all control structure repairs and sediment removal been performed?
			17. Are properties and waterways downstream from development adequately protected from soil erosion and sediment deposition due to increases in peak stormwater runoff?

FORM 12
REV. 12/04

STORMWATER MANAGEMENT FACILITY LIST

MUNICIPALITY: _____

SWM PERMIT #	FACILITY LOCATION	DESIGN VOLUME (ac-ft)	NWL (ft)	HWL (ft)	RESTRICTOR

FORM 13

WILL COUNTY STORMWATER MANAGEMENT PERMIT LIST

Municipality: _____

Stormwater Permit #	Date of Issuance	Project Name	Location	Check which apply				
				Detention	Depressional Storage	Floodplain Fill	Comp. Storage	Variance

FORM 14
REV 12/04

PERMIT FOLLOW-UP LOG SHEET

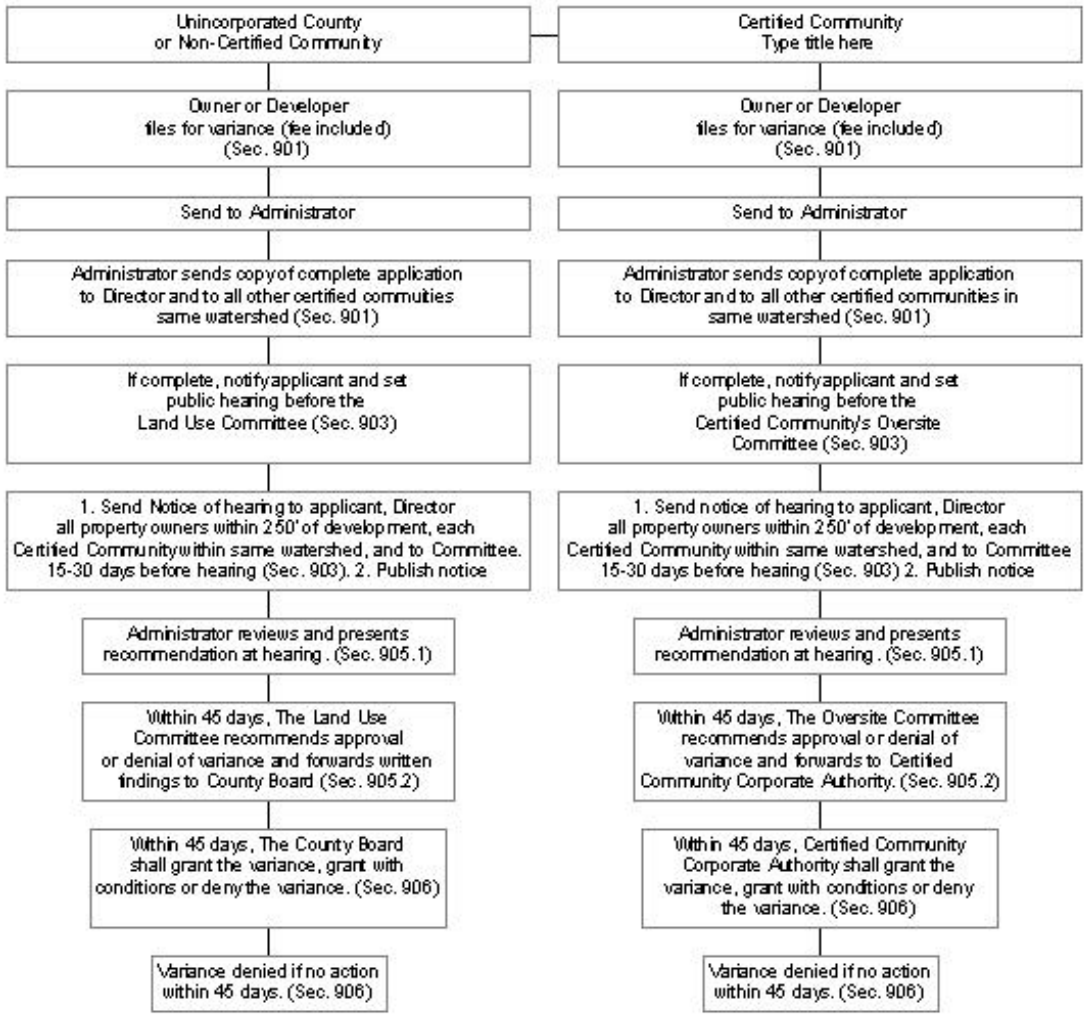
Municipality: _____

Permit #: _____

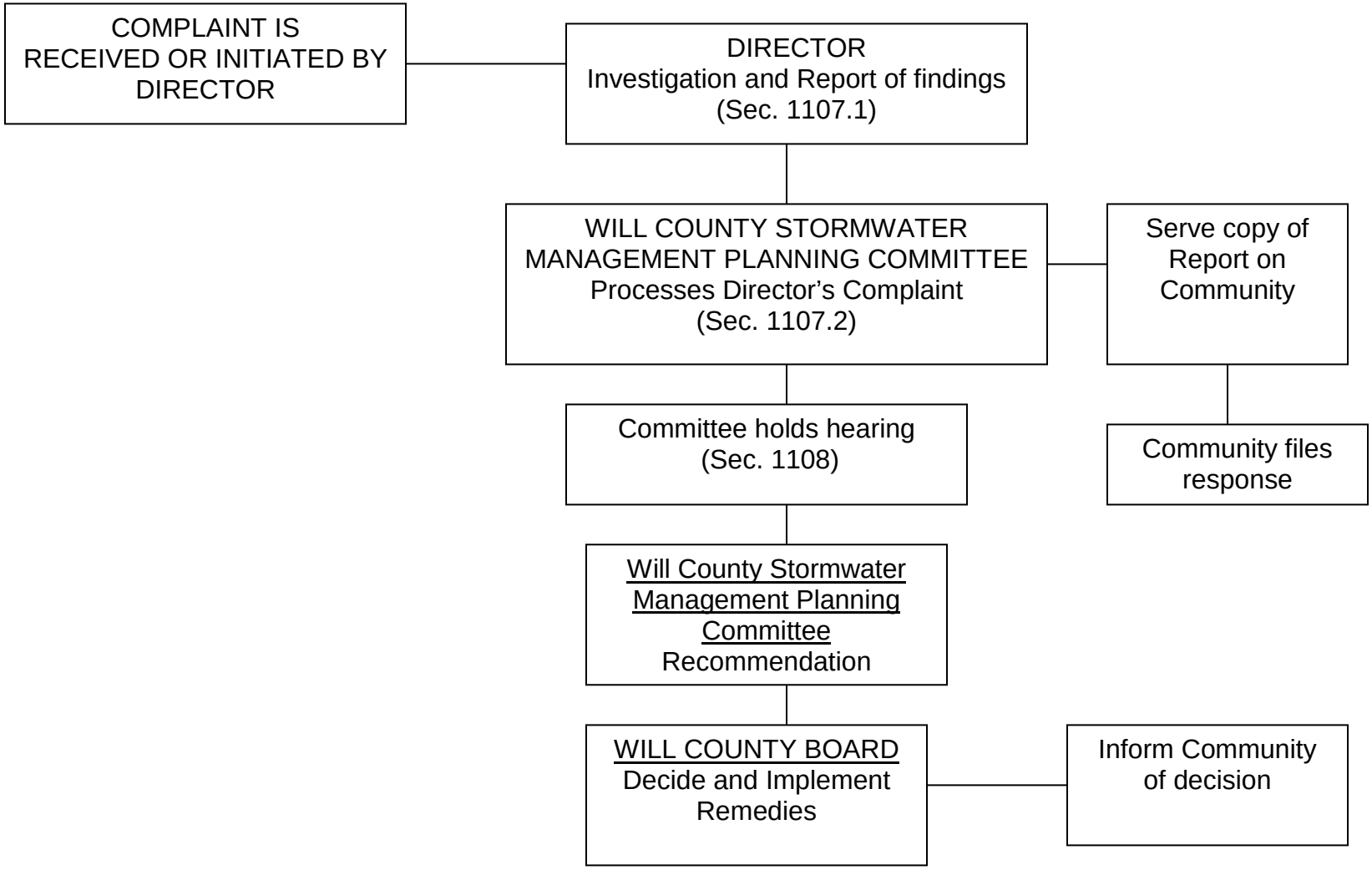
Follow-up Permit Condition	Date Approved	Approved By	Comments

WILL COUNTY STORMWATER MANAGEMENT ORDINANCE

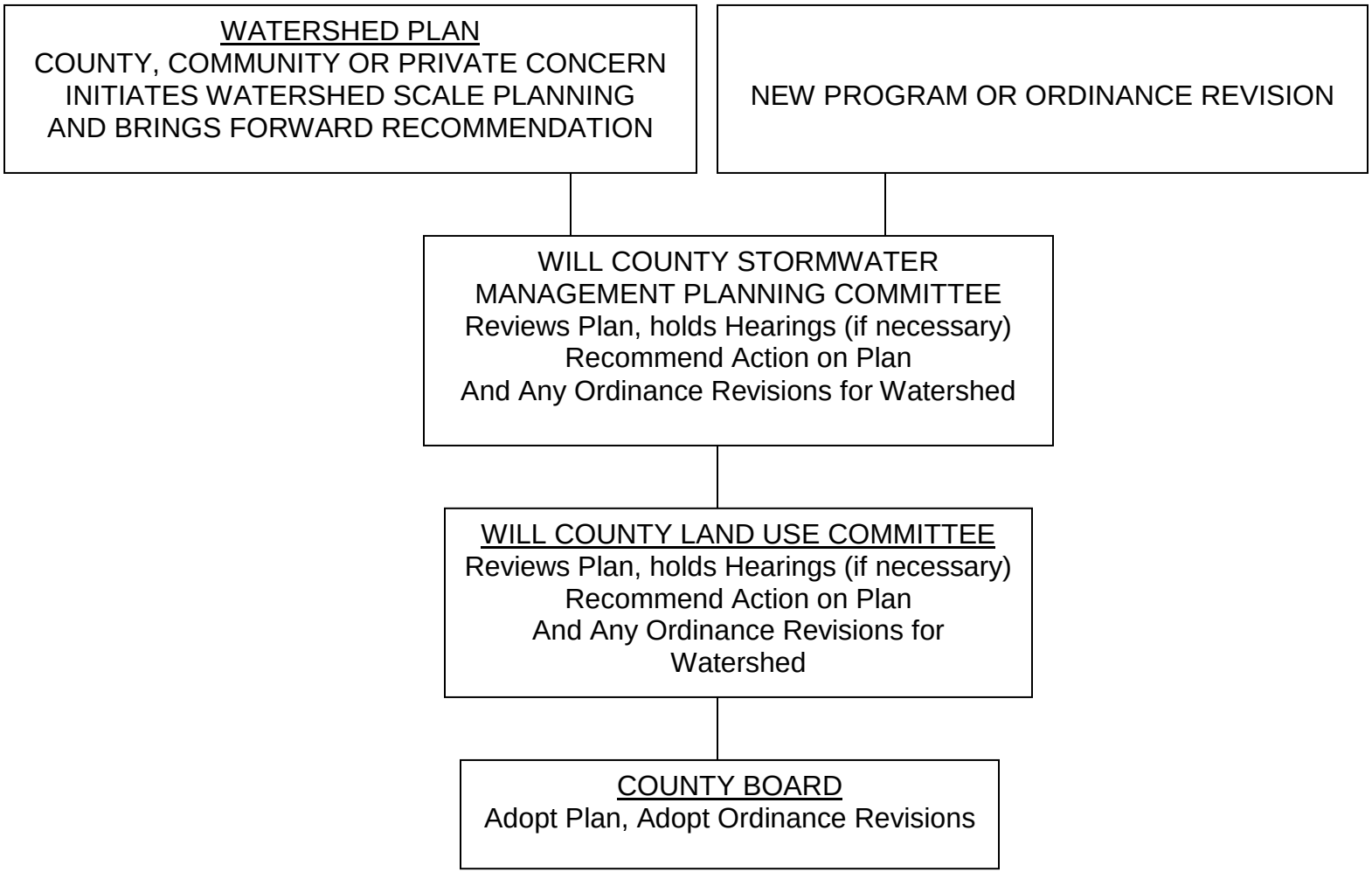
VARIANCE PROCESS (Article 9)



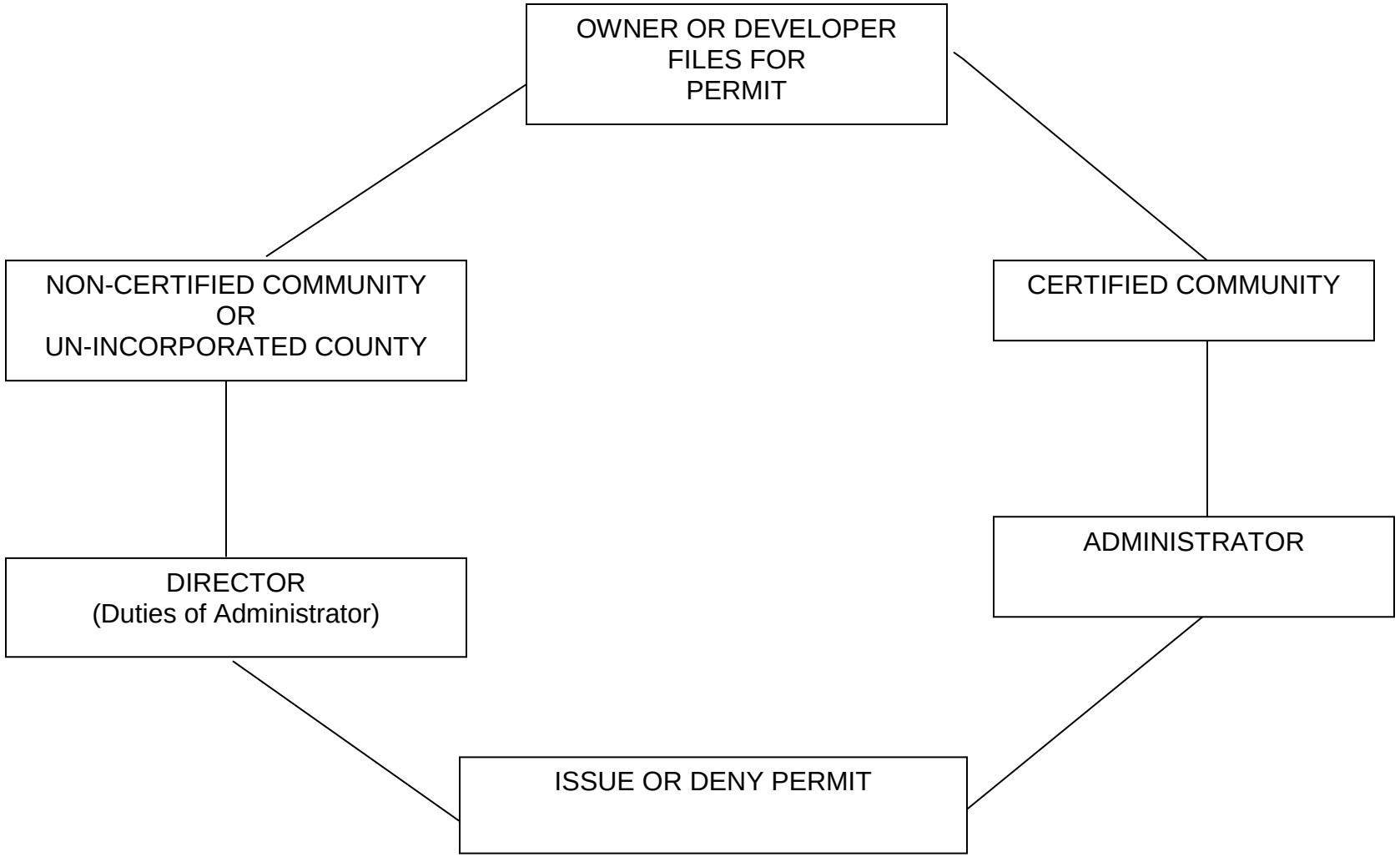
WILL COUNTY STORMWATER MANAGEMENT ORDINANCE
COMPLAINTS ON IMPLEMENTATION AND ENFORCEMENT (Sec. 1107)



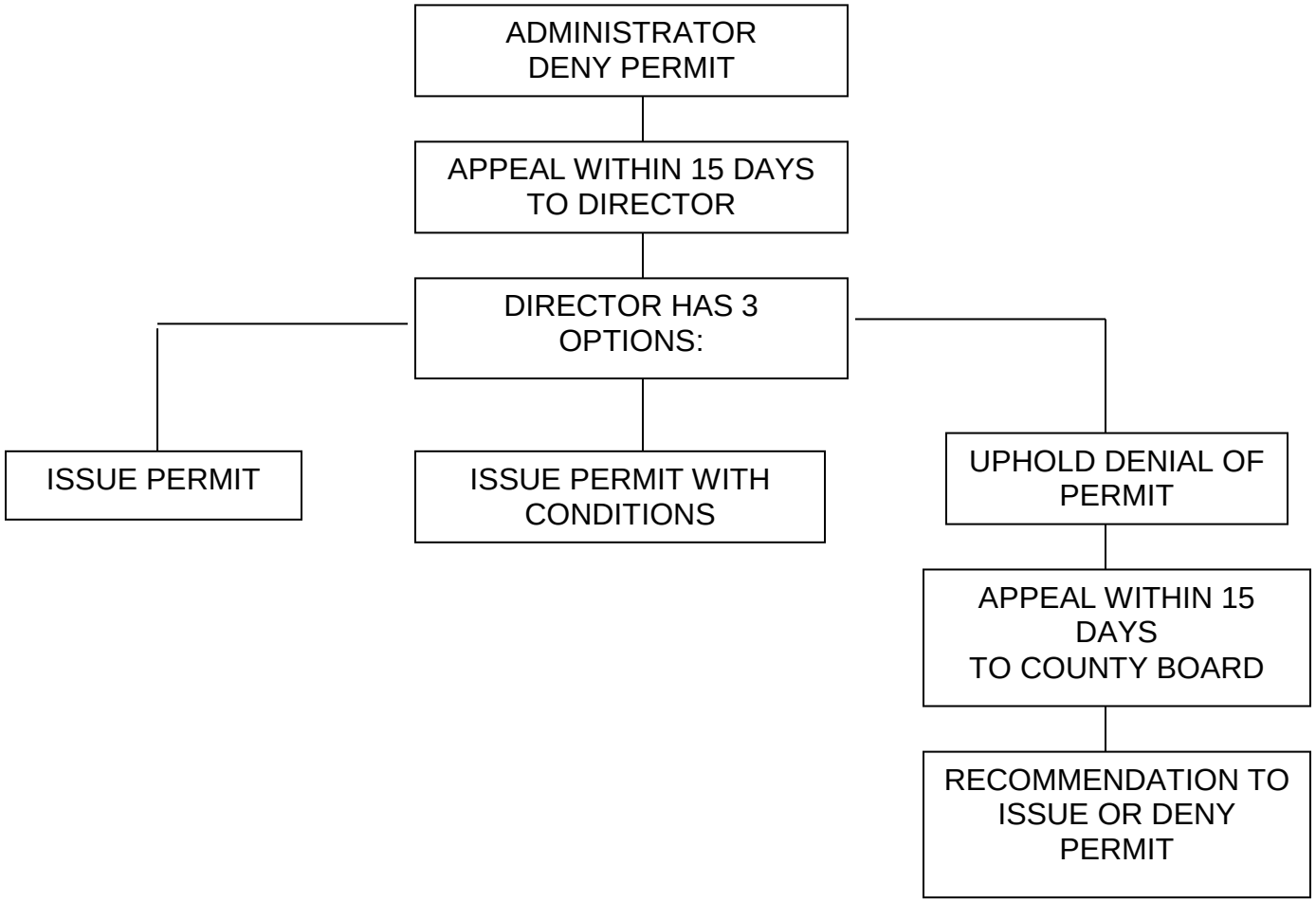
WILL COUNTY STORMWATER MANAGEMENT ORDINANCE
NEW PROGRAM, ORDINANCE REVISION, WATERSHED PLANS



WILL COUNTY STORMWATER MANAGEMENT ORDINANCE
PERMIT SUBMITTALS WITHOUT VARIANCES



WILL COUNTY STORMWATER MANAGEMENT ORDINANCE
APPEAL OF ADMINISTRATORS DECISION ON PERMITS (Sec. 505)



APPENDICES

APPENDIX A – DEFINITIONS

The following definitions can also be found in Section 104 of the Ordinance:

Administrator. The person designated by the permitting authority to administer and enforce this Ordinance;

Administrative Violation. An administrative violation of the ordinance occurs when rules and procedures regarding permit applications and Stormwater Management permits are not followed.

Agricultural Review Advisory Committee. The Agricultural Review Advisory Committee shall be composed of at least three (3) Will County residents who live and own and operate or tenant operate at least 60 contiguous acres of farmland in Will County and Representatives appointed by the following Agencies: Will and South Cook Soil and Water Conservation District U.S.D.A., Natural Resource Conservation Service and Will County Farm Bureau. The Stormwater Management Committee will appoint these individuals in accordance with Article 3, Section 1D of the bylaws. The Stormwater Committee will consider Committee member nomination recommendations from any active Will County Agricultural Not for Profit Organization.

Agricultural Subsurface Drainage. A water management technique driven by economic and safety concerns, where the rate at which surplus groundwater should be removed is determined primarily by the moisture/air requirements of the vegetation (commonly called “Tiles, “Field Tiles”, etc.)

Applicable Engineering Practice. Procedures, methods, or materials recommended in standard engineering textbooks or references as suitable for the intended purpose.

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 County or appropriate Certified Local Governmental unit.

Appropriate Use. *Only uses of the designated floodway that are permissible and will be considered for permit issuance. The list of permissible uses is contained in Article 4.*

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

(BFE) Base Flood Elevation. The highest water surface elevation that can be expected during the base flood.

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

Building. A structure that is principally above ground and is enclosed by walls and a roof. The term includes a gas or liquid storage tank, a manufactured home, mobile home or a prefabricated building. This term also includes recreational vehicles and travel trailers to be installed on a site for more than 180 days, unless fully licensed and ready for highway use.

Buffer. An area of predominantly vegetated land located adjacent to channels, wetlands, lakes or ponds for the purpose of reducing contaminants in stormwater that flows to such areas.

Bulletin 70. "Frequency Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois" by Floyd Huff and James Angel of the Illinois State Water Survey (1989).

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

Certified Community. *A Community which has met the requirements to be delegated the responsibility for ordinance enforcement as determined by the Stormwater Committee.*

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, groundwater, effluent, or industrial discharges flow either perennially or intermittently.

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

Commercial. Sale of goods to the public at large where the traffic generated warrants construction of site improvements.

Commercial Redevelopment. Development on a parcel upon which the existing condition is buildings, parking lots and infrastructure associated with commercial activities. Additions to existing buildings and new impervious surfaces added after the effective date of the Ordinance are specifically excluded from this definition.

Committee. The Will County Stormwater Management Planning Committee.

Community. The County or any city or village within the County.

Compensatory Storage. An excavated, hydrologically and hydraulically equivalent volume of storage created to offset the loss of existing flood storage.

(CLOMA) Conditional Letter of Map Amendment. A FEMA comment letter on a development proposed to be located in, and affecting only that portion of, the area of floodplain outside the regulatory floodway and having no impact on the existing regulatory floodway or base flood elevations.

(CLOMR) Conditional Letter of Map Revision. A letter that indicates that FEMA will revise base flood elevations, flood insurance rate zones, flood boundaries, or floodways as shown on an effective FIRM or FBFM after the record drawings are submitted and approved.

COE. The United States Army Corps of Engineers.

Conservation Planning. The practices and procedures associated with the management of soil, water, plants, plant nutrients and other elements of agricultural production. Documentation of the management system shall only be as required by the NRCS or in cases of a complaint, as requested by the Administrator in response to a notification of a complaint.

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

County. Will County, Illinois.

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

Dam. Any obstruction, wall embankment, or barrier, together with any abutments and appurtenant works, constructed to store or divert water or to create a pool (not including underground water storage tanks).

Department. Will County Land Use Department.

Depressional Storage. The volume contained below a closed contour on a 1-foot contour interval topographic map, the upper elevation which is determined by the invert of a surface gravity outlet.

Detention Basin. (Site Runoff Storage Facility) A constructed structure for the temporary storage of stormwater runoff with a controlled release rate.

Developer. A person who creates or causes a development.

Development. *Any constructed change to real estate including: a) construction, reconstruction, repair, or replacement of a building or an addition to a building; b) installing a manufactured home on a site, preparing a site for a Manufactured Home, or installing a travel trailer or recreational vehicle on a site for more than 180 days. If the travel trailer or recreational vehicle is on-site for less than 180 days, it must be fully licensed and ready for highway use; c) drilling, mining, installing utilities, construction of roads, bridges or similar projects; d) construction or erection of levees, walls, fences, dams, or culverts, channel modifications, filling, dredging, grading, excavating, paving, or other non-agricultural alterations of the ground surface, storage materials, deposit of solids or liquid waste; e) any other activity of man that might change the direction, height, or velocity of flood or surface water, including extensive vegetation removal; f) plowing and cultivation and other similar agricultural practices that do not involve filling, grading or construction of levees as regulated in Section 204. The following are not considered development: maintenance of existing buildings and facilities such as reroofing or resurfacing of roads with an impervious surface when there is no increase in elevation.*

Direct Discharge Sites. *Parcels of land, or portions thereof, which are immediately adjacent and naturally drain directly to the banks of the Des Plaines River, Chicago Sanitary and Ship Canal, DuPage River, and Kankakee River without crossing over other private or public property.*

Director. *The Will County Executive or his or her designee charged with performing the duties specified in this Ordinance.*

Drainage Area. The land area above a given point that may contribute runoff flow at that point from rainfall.

Effective Date. The date to be determined by the County Board.

Elevation Certificates. A form published by FEMA, or its equivalent, that is used to certify the base flood elevation and the lowest elevation of usable space to which a building has been constructed.

Ephemeral Stream. *A stream whose bed elevation does not intersect the groundwater table, it carries flow only during and immediately after a runoff producing rainfall event.*

Erosion. The process whereby soil is detached by the action of water or wind.

Existing Manufactured Home Park or Subdivision. *A Manufactured Home Park or subdivision for which the construction of facilities for servicing the lots on which the Manufactured Homes are to be affixed (including at a minimum the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) has been completed before April 1, 1990.*

Expansion to an Existing Manufactured Home Park or Subdivision. *The preparation of additional sites by the construction of facilities for servicing the lots on which the Manufactured Homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).*

Extended Detention. *A volume of runoff temporarily detained and released over a long period of time as specified in Section 203.5.*

Fee-in-Lieu of Detention. A fee paid by a developer to the Permitting Authority, commensurate with the costs and fee schedules adopted by the County and/or the Certified Community based on the detention volume required for the development to meet the ordinance release rates. Rules and procedures for fee in lieu of detention are contained in Article 13 of this Ordinance.

(FEMA) Federal Emergency Management Agency. The Federal Agency and its regulations, at 44 CFR 59-79, effective as of September 29, 1989 or as amended.

Flood. *A general and temporary condition of partial or complete inundation of normally dry land areas from overflow of inland or tidal ways or the unusual and rapid accumulation of runoff of surface waters from any source.*

(FBFM) Flood Boundary and Floodway Map. A floodplain management map issued by FEMA that depicts, based on detailed analysis, the boundaries of the base flood, the two tenth percent (0.2%) probability flood, and the floodway.

Flood Frequency. Normally expressed as a period of years, based on a percent chance of occurrence in any given year from statistical analysis, during which a flood of a stated magnitude may be expected to be equaled or exceeded. For example, the 2-year flood frequency has a fifty percent (50%) chance of occurrence in any given year. Similarly, the 100-year flood frequency has a one percent (1%) chance of occurrence in any given year.

Flood Fringe. *That portion of the floodplain outside of the designated floodway.*

(FHBM) Flood Hazard Boundary Map. *A map issued by FEMA that is an official Community map, which depicts generalized areas of floodplains, replaced by a detailed Flood Insurance Study.*

(FIRM) Flood Insurance Rate Map. A map issued by FEMA that is an official Community map, on which map FEMA has delineated both the special flood hazard areas and the risk premium zones applicable to the Community. This map may or may not depict floodways.

(FIS) Flood Insurance Study. A study of flood discharges and flood profiles for a Community, adopted and published by FEMA.

Floodplain. *That land typically adjacent to a body of water with ground surface elevations at or below the base flood or the 100-year frequency flood elevation including detached special flood hazard areas, ponding areas, etc. The floodplain is also known as the special flood hazard areas (SFHA).*

(FPE) Flood Protection Elevation. The elevation of the BFE plus 1 foot of freeboard for structures within the plan limits of the base flood elevation. Outside the plan limits, the water table or 100-year design water surface elevation of any adjacent stormwater facility, whichever is higher, plus 1 foot of freeboard.

Floodproof. Any combination of structural and non-structural additions, changes or adjustments to structures or property which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Floodproofing Certificate. A form published by FEMA that is used to certify that a building has been designed and constructed to be structurally dry flood proofed to the FPE.

Floodway or Designated Floodway. The floodway includes the channel, on stream lakes, and that portion of the floodplain adjacent to a stream or channel which is needed to store and convey the critical duration 100-year frequency flood discharge with no more than a 0.1 foot increase in flood stage due to the loss of flood conveyance or storage, and no more than a 10% increase in velocities.

Floodway Conveyance. The measure of the flow carrying capacity of the floodway section and is defined using Manning's equation as, $K = \frac{1.4863\ AR^{2/3}}{n}$

where “n” is Manning’s roughness factor, “A” is the effective area of the cross-section, and "R" is ratio of the wetted area to the wetted perimeter.

Freeboard. An increment of height added to the BFE or 100-year design water surface elevation to provide a factor of safety for uncertainties in calculations, unknown local conditions, wave actions and unpredictable effects such as those caused by ice or debris jams.

Functional. In the context of the usage in this Ordinance, functional refers to stormwater facilities, which serve their primary purpose of meeting developed release rate requirements but do not meet all of the final design conditions. For example, a detention basin, which has been excavated but has not had the side slopes graded, nor the final landscaping placed, may be considered "functional" as a site runoff storage facility.

Good Husbandry. Generally accepted agricultural practices found in good farm management.

Groundwater. Water that is located within soil or rock below the surface of the earth. Same as subsurface water.

Groundwater Control System. *A designed system which may consist of tiles, under drains, French drains, or other appropriate stormwater facilities whose purpose is to lower the groundwater table to a predictable elevation throughout the year.*

Historic Structure. *Any structure that is a) listed individually in the National Register of Historic Places, or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register; b) certified or preliminarily determined by the Secretary of the Interior as contributing to the historic district or a district preliminary determined by the Secretary to qualify as a registered historic district; c) individually listed on the State Inventory of Historic Places by the Illinois Historic Preservation Agency; d) individually listed on a local inventory of historic places that has been certified by the Illinois Historic Preservation Agency.*

Hydraulics. The science and study of the mechanical behavior of water in physical systems and processes.

Hydraulically Connected Impervious Area. Hydraulically connected impervious area shall consist of those areas of concrete, asphalt and gravel surfaces along with roof tops which convey flows directly to an improved drainage system consisting of storm sewers or paved channels. Rooftops whose downspouts discharge to unpaved surfaces which are designed for the absorption and filtration of stormwater runoff shall not be considered as hydraulically connected impervious surfaces. Roadways whose primary conveyance is through open ditches and swales shall not be considered as hydraulically connected impervious surface. Roadways drained by curb and gutter and storm sewer, and driveways hydraulically connected to those roadways shall be considered as directly connected impervious surface.

Hydraulically Equivalent Compensatory Storage. Compensatory storage either adjacent to the floodplain fill or not located adjacent to the development but can be shown by hydrologic and hydraulic analysis to be equivalent to compensatory storage located adjacent to the development.

Hydrologically Disturbed. An area where the land surface has been cleared, grubbed, compacted, or otherwise modified that changes runoff, volumes, rates, or direction.

Hydrology. The science of the behavior of water, including its dynamics, composition, and distribution in the atmosphere, on the surface of the earth, and underground.

IDNR-OWR. The Illinois Department of Natural Resources, Office of Water Resources.

Impervious. Surfaces that cause the majority of rainfall to be converted to direct runoff. Asphalt, concrete and roofing systems will be considered impervious.

Industrial Redevelopment. Development on a parcel upon which the existing condition is buildings, parking lots and infrastructure associated with industrial activities. Additions to existing buildings and new impervious surfaces added after the effective date of the Ordinance are specifically excluded from consideration as Industrial Redevelopment.

Interim Watershed Plan. A regional study of a watershed which does not address the entire range of purposes, goals and objectives outlined in the Countywide Stormwater Management Plan approved by the Committee and adopted by the County.

Intermittent Stream. *A stream whose bed intersects the groundwater table for only a portion of the year on the average or any stream which flows continuously for at least one month out of the year but not the entire year.*

(LOMA) Letter of Map Amendment. The official determination by FEMA that a specific structure is not in a regulatory floodplain. A LOMA amends the effective FHBM, FBFM, or FIRM.

(LOMR) Letter of Map Revision. A letter from FEMA that revises base flood elevations, flood insurance rate zones, flood boundaries, or floodway as shown on an effective FHBM, FBFM, or FIRM.

Lake. A natural or artificial body of water encompassing an area of two or more acres, which retains water throughout the year.

Major Stormwater System. That portion of a stormwater facility needed to store and convey flows beyond the capacity of the minor stormwater system.

Manufactured Home. *A structure transportable in one or more sections, which is built on a permanent chassis and is designated for use with or without a permanent foundation when attached to the required utilities. The term Manufactured Home also includes park trailers, travel trailers, and other similar vehicles placed on site for more than 180 consecutive days. The term Manufactured Home does not include a recreational vehicle.*

Manufactured Home Park or Subdivision. *A parcel (or contiguous parcels) of land divided into two or more Manufactured Home lots for rent or sale.*

Mass Grading. Development in which the primary activity is a change in topography affected by the movement of earth materials.

Minor Stormwater System. Shall consist of all infrastructure including curb, gutter, culverts, roadside ditches and swales, storm sewers, and sub-surface drainage systems intended to convey stormwater runoff at less than a 100-year flood frequency. The design frequency for minor stormwater systems shall be in accordance with the applicable ordinances of the local Community, or Highway Department jurisdiction.

Mitigation. Measures taken to offset negative impacts from development in wetlands or the floodplain.

(NFIP) National Flood Insurance Program. A Federal program whose requirements are codified in Title 44 of the Code of Federal Regulations.

Net Benefit in Water Quality. The institution of best management practices as part of a development that when compared to the pre-development condition can be judged to reduce downstream sediment loading or pollutant loadings.

Net Watershed Benefit. A finding that, when compared to the existing condition, the developed project will do one of the following: substantially reduce (more than 10%) downstream peak discharges; reduce downstream flood stages (more than 0.1 ft.); or reduce downstream damages to structures occurring in the pre-development condition. The demonstration of one of these conditions must be through detailed hydrologic and hydraulic analysis of watersheds on a regional scale as approved by the Administrator.

New Manufactured Home Park or Subdivision. *Manufactured Home Park or Subdivision for which the construction of facilities for servicing the lots on which the Manufactured Homes are to be affixed (including at a minimum the installation of utilities, the construction of streets and either final site grading or the pouring of concrete pads) has been completed on or after April 1, 1990.*

Non-riverine. Areas not associated with a stream or river such as isolated depressional storage areas, ponds and lakes.

NRCS. The United States Department of Agriculture, Natural Resources Conservation Service.

Observation Structures. Structures built on a field tile where the pipe inflow and outflow is visible upon removal of a lid.

Open Channel. *A conveyance system with a definable bed and banks carrying the discharge from field tiles and surface drainage. Open channels do not include grassed swales within farm fields under agricultural production, which are ephemeral in nature.*

Ordinary High Water Mark (OHWM). *The point on the bank or shore up to which the presence and action of surface water is so continuous so as to leave a distinctive mark, such as by erosion, destruction or prevention of terrestrial vegetation, predominance of aquatic vegetation, or other easily recognized characteristic.*

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

Oversight Committee. *A Certified Community's body of officials charged by the Certified Community with overseeing variance of the Stormwater Management Ordinance within the Certified Community. The Oversight Committee may be a body of elected or appointed officials. See Section 1004.*

Perennial Streams. *Riverine watercourses whose thalwag generally intersects the groundwater table elevation and flows throughout the year.*

Permitting Authority. *The County or a Certified Community.*

Plan. The Will County Comprehensive Countywide Stormwater Management Plan, adopted by the Will County Board on October 13, 1998, as amended from time to time.

Pond. A body of water of less than two acres, which retains a normal water level year round.

Primary Gravity Outlet. *The outlet structure designed to meet the release rate requirements of this Ordinance.*

Professional Land Surveyor. A land surveyor registered in the State of Illinois, under The Illinois Land Surveyors Act. (225 ILCS 330/1, et seq.), as amended.

Professional Engineer. An engineer registered in the State of Illinois, under The Illinois Professional Engineering Practice Act. (225 ILCS 325/1 et seq.), as amended.

Property. Contiguous land under single ownership or control.

Public Bodies of Water. *All open public streams and lakes capable of being navigated by watercraft in whole or in part for commercial uses and purposes and all lakes, rivers and streams, which in their natural conditions were capable of being improved and made navigable, or that are connected with or discharge their waters into navigable lakes or rivers within, or upon the borders of the State of Illinois, together with all bayous, sloughs, backwaters, and submerged lands that are open to the main channel or body of water directly accessible thereto.*

Public Flood Control Project. *A flood control project, which will be operated and maintained by a public agency to reduce flood damages to existing buildings and structures, which includes a hydrologic and hydraulic study of the existing and proposed conditions of the watershed. Nothing in this definition shall preclude the design, engineering, construction or financing in whole or in part of a flood control project by persons or parties who are not public agencies.*

Public Flood Easement. An easement acceptable to the appropriate jurisdictional body that meets the regulations of the OWR, the Department, and the Community, and that provides legal assurances that all areas subject to flooding in the created backwater of the development will remain open to allow flooding.

Record Drawings. Drawings prepared, signed, and sealed by a registered professional engineer or registered land surveyor representing the final "as-built" record of the actual in-place elevations, location of structures, and topography.

Recreational Vehicle or Travel Trailer. *A vehicle which is: a) built on a single chassis; b) 400 square feet or less when measured at the largest horizontal projection; c) designed to be self propelled or permanently towable by a light duty truck; and d) designed primarily not for use as a permanent dwelling, but as a temporary living quarters for recreational camping travel or seasonal use.*

Registered Structural Engineer. A person licensed under the laws of the State of Illinois as a structural engineer.

Regulatory Floodway. Regulatory floodways are those portions of the floodplain depicted on maps as floodway and recognized by the IDNR-OWR for regulatory purposes.

Regulatory Floodplain. The floodplain as depicted on maps recognized by FEMA as defining the limits of the SFHA.

Retention Facility. A retention facility stores stormwater runoff without a gravity release.

River Frontage. That property that is immediately adjacent to and naturally drains directly to the Des Plaines River, Chicago Sanitary and Ship Canal, DuPage River, or Kankakee River without crossing over other private or public property.

Riverine. Related to, formed by, or resembling a channel (including creeks and rivers).

Runoff. The waters derived from melting snow or rain falling within a tributary drainage basin that exceeds the infiltration capacity of the soils of that basin.

Seasonal High Groundwater Table. *The upper limits of the soil temporarily saturated with water, being usually associated with spring wetness conditions. This may be indicated by soil mottles with a Munsell color of 2 chroma or less.*

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

Sediment Trap. A structure or area that allows for the temporary deposit and removal or disposal of sediment materials from stormwater runoff.

Seepage. The movement of drainable water through soil and rock.

(SFHA) Special Flood Hazard Area. An area having special flood, mudslide or mudflow, or flood-related erosion hazards, and which area is shown on an FHBM or FIRM as Zone A, AO, A1-30, AE, A99, AH, VO, V1-30, VE, V, M, or E.

Stormwater Facility. All ditches, channels, conduits, bridges, culverts, levees, ponds, natural and man-made impoundments, wetlands, riparian environment, tile, swales, sewers, or other natural or artificial structures or measures which serve as a means of draining surface and subsurface water from land.

Stormwater Management Permit. The permit issued under Article 5.

Structure. The results of a built change to the land constructed on or below the ground,

including the construction, reconstruction or placement of a building or any addition to a building; installing a Manufactured Home on a site; preparing a site for a Manufactured Home or installing a travel trailer on a site for more than 180 days unless they are fully licensed and ready for highway use.

Substantial Improvement. *The following three occasions, when work is performed on an existing building, is classified as a substantial improvement 1) an improvement made to a building whose cost is equal to or exceeds 50% of the buildings' market value before the improvement; 2) reconstruction or repair of a building, the cost of which equals or exceeds 50% of the market value of the building before reconstruction or repair; or 3) additions to an existing building whose cost equals or exceeds 50% of the market value of a structure, or increases the floor area by more than 20%. Note that if a building is substantially improved, then the entire building must comply with the building protection standards.*

Subsurface Drainage. The removal of excess soil water to control water table levels at predetermined elevations for structural, environmental or other reasons in areas already developed or being developed for agricultural, residential, industrial, commercial, or recreational uses.

Subsurface Water. Water beneath the ground or pavement surface. Sometimes referred to as ground water or soil water.

T Factor. The T factor is the soil loss tolerance. It is defined as the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained. Erosion losses are estimated by Universal Soil Loss Equation (USLE) and Revised Universal Soil Loss Equation (RUSLE).

Technical Manual. The manual adopted by the County Board, which refers to this Ordinance and provides additional explanations and examples.

Thalwag. A line along the lowest point in a channel.

Transition Section. *Reaches of the stream or floodway where water flows from a narrow cross-section to a wide cross-section, or vice versa.*

Usable Space. Space used for dwelling, storage, utilities, or other beneficial purposes, including without limitation basements.

Water Table. The upper limit of a free water surface in a saturated soil or underlying material.

Waters of the U.S. *As defined by the United States Army Corps of Engineers in their Federal Methodology for the Regulation of Wetlands. For purposes of this Ordinance, waters of the U.S. include wetlands, lakes, rivers, streams, creeks, bogs, fens, and ponds. Waters of the U.S. do not include maintained stormwater facilities.*

Watershed. All land area drained by, or contributing water to, the same stream, lake, stormwater facility, or draining to a point.

Watershed Benefit. (See Net Watershed Benefit).

Watershed Characteristics. Watershed characteristics include land use, physiology, habitat, climate, drainage system and community profile.

Watershed Plan. A study and evaluation of an individual drainage basin's stormwater management, floodplain management, water quality and flood control needs and capabilities.

Wetland. As defined in current Federal methodology recognized by the U.S. Army Corps of Engineers for regulatory purposes.

APPENDIX B

FEMA FIRM MAPS EFFECTIVE AS FOLLOWS

PANEL NUMBER	COMMUNITY NUMBER	EFFECTIVE DATE
17197C0010 E	170695	9/6/1995
17197C0017 E	170695	9/6/1995
17197C0030 E	170695	9/6/1995
17197C0031 E	170695	9/6/1995
17197C0032 E	170695	9/6/1995
17197C0033 F	170695	9/22/1999
17197C0034 E	170695	9/6/1995
17197C0036 E	170695	9/6/1995
17197C0037 E	170695	9/6/1995
17197C0038 E	170695	9/6/1995
17197C0039 E	170695	9/6/1995
17197C0045 F	170695	9/22/1999
17197C0052 E	170695	9/6/1995
17197C0053 E	170695	9/6/1995
17197C0054 E	170695	9/6/1995
17197C0056 E	170695	9/6/1995
17197C0058 E	170695	9/6/1995
17197C0061 E	170695	9/6/1995
17197C0062 E	170695	9/6/1995
17197C0065 F	170695	9/22/1999
17197C0070 E	170695	9/6/1995
17197C0090 E	170695	9/6/1995
17197C0095 E	170695	9/6/1995
17197C0110 E	170695	9/6/1995
17197C0126 E	170695	9/6/1995
17197C0127 E	170695	9/6/1995
17197C0130 F	170695	9/24/2002
17197C0134 E	170695	9/6/1995
17197C0135 F	170695	9/22/1999
17197C0137 E	170695	9/6/1995
17197C0139 E	170695	9/6/1995
17197C0140 E	170695	9/6/1995
17197C0141 F	170695	3/17/2003
17197C0142 E	170695	9/6/1995
17197C0143 F	170695	3/17/2003
17197C0144 E	170695	9/6/1995
17197C0153 E	170695	9/6/1995
17197C0154 E	170695	9/6/1995
17197C0155 E	170695	9/6/1995
17197C0156 E	170695	9/6/1995
17197C0157 E	170695	9/6/1995
17197C0158 E	170695	9/6/1995
17197C0159 E	170695	9/6/1995
17197C0161 E	170695	9/6/1995
17197C0162 E	170695	9/6/1995
17197C0163 E	170695	9/6/1995
17197C0164 E	170695	9/6/1995
17197C0170 E	170695	9/6/1995
17197C0180 E	170695	9/6/1995
17197C0185 E	170695	9/6/1995
17197C0190 E	170695	9/6/1995
17197C0195 F	170695	3/17/2003
17197C0211 F	170695	3/17/2003
17197C0212 F	170695	11/6/2000
17197C0213 E	170695	9/6/1995
17197C0214 E	170695	9/6/1995
17197C0216 F	170695	11/6/2000
17197C0218 E	170695	9/6/1995
17197C0255 E	170695	9/6/1995
17197C0260 E	170695	9/6/1995
17197C0265 E	170695	9/6/1995

PANEL NUMBER	COMMUNITY NUMBER	EFFECTIVE DATE
17197C0270 E	170695	9/6/1995
17197C0280 E	170695	9/6/1995
17197C0285 E	170695	9/6/1995
17197C0286 E	170695	9/6/1995
17197C0290 E	170695	9/6/1995
17197C0295 E	170695	9/6/1995
17197C0303 E	170695	9/6/1995
17197C0305 E	170695	9/6/1995
17197C0310 E	170695	9/6/1995
17197C0311 E	170695	9/6/1995
17197C0315 E	170695	9/6/1995
17197C0320 E	170695	9/6/1995
17197C0326 E	170695	9/6/1995
17197C0327 E	170695	9/6/1995
17197C0331 E	170695	9/6/1995
17197C0350 E	170695	9/6/1995
17197C0351 F	170695	11/6/2000
17197C0353 E	170695	9/6/1995
17197C0354 F	170695	11/6/2000
17197C0358 F	170695	11/6/2000
17197C0359 F	170695	11/6/2000
17197C0361 E	170695	9/6/1995
17197C0362 E	170695	9/6/1995
17197C0365 E	170695	9/6/1995
17197C0366 E	170695	9/6/1995
17197C0367 E	170695	9/6/1995
17197C0370 E	170695	9/6/1995
17197C0378 F	170695	11/6/2000
17197C0379 E	170695	9/6/1995
17197C0385 E	170695	9/6/1995
17197C0386 E	170695	9/6/1995
17197C0390 E	170695	9/6/1995
17197C0395 E	170695	9/6/1995
17197C0405 E	170695	9/6/1995
17197C0408 E	170695	9/6/1995
17197C0409 E	170695	9/6/1995
17197C0410 E	170695	9/6/1995
17197C0415 E	170695	9/6/1995
17197C0416 E	170695	9/6/1995
17197C0417 E	170695	9/6/1995
17197C0420 E	170695	9/6/1995
17197C0430 E	170695	9/6/1995
17197C0440 E	170695	9/6/1995
17197C0450 E	170695	9/6/1995
17197C0475 E	170695	9/6/1995
17197C0500 E	170695	9/6/1995
17197C0505 E	170695	9/6/1995
17197C0507 E	170695	9/6/1995
17197C0509 E	170695	9/6/1995
17197C0510 E	170695	9/6/1995
17197C0515 E	170695	9/6/1995
17197C0520 E	170695	9/6/1995
17197C0526 E	170695	9/6/1995
17197C0528 E	170695	9/6/1995
17197C0530 E	170695	9/6/1995
17197C0535 E	170695	9/6/1995
17197C0540 E	170695	9/6/1995
17197C0545 E	170695	9/6/1995
17197C0560 E	170695	9/6/1995
17197C0580 E	170695	9/6/1995
17197C0585 E	170695	9/6/1995

APPENDIX C – PUBLIC BODIES OF WATER

http://dnr.state.il.us/owr/resman/3704RULE.htm#370440

- "Public Bodies of Water" or "Public Waters" All lakes, rivers, streams and waterways which are or were navigable and are open or dedicated to public use including all bayous, sloughs, backwaters and submerged lands connected by water to the main channel or body of water during normal flows or stages.

- The following public bodies of water were navigable in their natural condition or were improved for navigation and opened to public use. The entire length and surface area in Illinois, including all backwater lakes and sloughs open to the main channel or body of water at normal flows or stages, are open to the public unless limited to a head of navigation as stated. Head of navigation descriptions use the U.S. rectangular survey system and these abbreviations: T = township, R = range, PM = principal meridian, Sec. = section, 1/4 = quarter section, N = north, E = east, S = south, W = west, USGS = U.S. Geological Survey.

    - Kankakee River

- The following public bodies of water are primarily artificial navigable waters that were opened to public use.

    - Illinois and Michigan Canal

APPENDIX D –HYDROLOGIC AND HYDRAULIC MODELING SOFTWARE DESCRIPTIONS

(Source: Lake County Stormwater Management Commission Technical Reference Manual)

HEC-1 – The Flood Hydrograph Package, HEC-1, was developed by the U. S. Army Corps of Engineers Hydrologic Engineering Center (HEC). The model is designed to simulate the surface runoff response of a drainage basin to a given precipitation input for a single stormwater runoff event. The model represents the basin as an interconnected system of hydrologic and hydraulic components. Each component models an aspect of the precipitation-runoff process within a portion of the basin, commonly referred to as a subbasin. A component may represent a surface runoff entity, a stream channel, or a reservoir. Representation of a component requires a set of parameters that specify the particular characteristic of the component and mathematical relations that describe the physical process. The result of the modeling process is the computation of streamflow hydrographs at desired locations in the river basin.

Information is available for obtaining the software and support documentation by visiting the U.S. Corps of Engineer's website at: http://www.hec.usace.army.mil/.

HEC-HMS – The hydrologic Modeling System (HEC-HMS) is a derivative of the HEC – 1 performing similar calculations within a graphical context, covering a variety of precipitation and runoff processes. The precipitation modeling provides options to include historical or hypothetical storm event data or a specific weighted gage method. The basin modeling may be performed in a linear or consolidated manner utilizing various methods to determine losses including NRCS Curve Numbers. The modeling can analyze by either Kinematic Wave or unit hydrograph methods.

One caution regarding this program is related to sharing the output files. Special care needs to be taken when providing the output files to ensure that the file path is properly defined in order for the reviewer to access the file. A disk of the input and output files will need to be submitted.

Information is available for obtaining the software and support documentation by visiting the U.S. Corps of Engineers at http://www.hec.usace.army.mil/.

HSPF – The Hydrologic Simulation Program – Fortran (HSPF) developed by the U.S. Environmental Protection Agency performs continuous simulation of water quantity/quality processes of the hydrologic cycle. Due to the potential for massive data manipulation, HSPF software is planned around a time series management system operating on direct access principles. The program represents the components of the hydrologic cycle that affect streamflow. Rainfall, snowfall and snowmelt, infiltration, soil moisture storage, evapotranspiration, surface runoff, interflow, and ground water flow are represented mathematically by parameters characterizing watershed conditions. The system is designed so that the various

simulation subroutines can be invoked conveniently, either individually or in tandem.

TR-20 – The Technical Release No. 20, "Computer Program for Project Formulation – Hydrology", TR-20 was originally developed by the NRCS and has been modified by the NRCS and other groups. One advantage to this program is the capability to perform multiple storm events in a single computer run. TR-20 uses the procedures described in the National Engineering Handbook, Section 4, Hydrology (NRCS NEH-4), except for the newly revised reach routing procedure (Att-Kin method) which has superseded the Convex method. Section 3.2.B.1. (b). provides an example of a typical TR-20-input and output file.

Information is available for obtaining the software and support documentation by visiting the NRCS website at:
http://www.wwc.nrcs.usda.gov/water/quality/frame/hydrology.html.

TR-55 – The Technical Release No. 55, "Urban Hydrology for Small Watersheds", TR-55 presents simplified procedures to calculate storm runoff volume, peak rate of discharge, hydrographs, and storage volumes required for detention structures. TR-55 has limited application in Lake County. The primary function is determining Curve Numbers (herein after "CN") and t_c. Runoff storage volumes generated from TR-55 are not acceptable since the rainfall distribution cannot be modified for the Huff Distribution that is required in Lake County.

Information is available for obtaining the software and support documentation by visiting the NRCS website at:
http://www.wwc.nrcs.usda.gov/water/quality/frame/hydrology.html.

SWMM – Under the sponsorship of the U.S. Environmental Protection Agency (EPA), a comprehensive mathematical model capable of representing urban stormwater runoff and combined sewer overflow phenomena was developed, named the Stormwater Management Model (SWMM). SWMM simulates the runoff of a drainage basin for any prescribed rainfall pattern. A total watershed is segmented into a number of smaller basins or subcatchments that can be readily described by its hydraulic or geometric properties. Manning's equation is used to route the excess uniform rainfall across overland surfaces, and through gutters, pipes and streams. The SWMM model simulates both water quantity and quality aspects that are associated with urban runoff and combined sewer systems.

ILLUDAS – The Illinois Urban Drainage Area Simulator (ILLUDAS) was developed by the Illinois State Water Survey using the method initially developed by the British Road Research Laboratory. ILLUDAS uses an observed or specific temporal rainfall pattern uniformly distributed over the basin as the primary input. The basin is divided into subbasins, which is commonly located at a design point. Paved-area and grassed-area hydrographs are produced from each subbasin by applying a rainfall pattern to the appropriate contributing areas.

The following hydraulic computer models are recommended for use by applicants in

the preparation of the required detailed hydraulic analysis:

HEC-2: the Water Surface Profiles model was developed by the U.S. Army Corps of Engineers Hydrologic Engineering Center (HEC). The model is designed for calculating water surface profiles for steady gradually varied flow in natural or man-made channels. Both subcritical and supercritical flow profiles can be calculated. The effects of various obstructions such as bridges, culverts, weirs and structures in the floodplain may be considered in the computations. The computational procedure, commonly referred to as the standard step method, is based on the solution of the one-dimensional energy equation with energy loss due to friction evaluated in Manning's equation. The model is designed for applications in floodplain management and flood insurance studies to evaluate floodway encroachments.

WSP-2: The Water Surface Profiles 2 model is also a standard step backwater model that was developed in the U. S. Department of Agriculture's Soil Conservation Service by the Engineering Division and is available through the National Technical Information Service. Characteristics of the model are similar to those of HEC-2 but usage of WSP-2 is mostly regional.

WSPRO: The Water Surface Profile model was developed by James O. Shearman of the U. S. Geological Survey for the Federal Highway Administration and is available through the Federal Highway Administration. WSPRO was developed in order to better determine flood profiles through bridges both for analysis of existing bridges and for use as a design tool. The model approximates two-dimensional flow through bridges and its input data can be converted into HEC-2 input data, which is useful in supplementing the shortcomings in floodway determination, output, and other culvert calculations.

FEQ: FEQ was developed by Dr. Delbert Franz and is available through the Department of Engineering Professional Development at the University of Wisconsin-Madison. This is a fully dynamic runoff and flood routing model that can analyze the effects of floodplain encroachment, on-line and off-line storage, diversions, channel improvements, bridges, culverts, dams, weirs and other impediments to flow.

APPENDIX E – ENGINEERING DETAILS

APPENDIX F – SAMPLE SPECIAL SERVICE AREA ORDINACES

THE FOREGOING SPECIAL SERVICE AREA ORDINANCES ARE JUST DRAFT EXAMPLES. THE COUNTY IS NOT GIVING LEGAL ADVICE TO THE CERTIFIED COMMUNITY ON HOW TO GO ABOUT PROPOSING, ESTABLISHING OR ENACTING A SPECIAL SERVICE AREAS AND THE CERTIFIED COMMUNITY SHOULD NOT RELY ON THESE DOCUMENTS IN PROPOSING, ESTABLISHING OR ENACTING ANY SPECIAL SERVICE AREAS. EACH CERTIFIED COMMUNITY SHOULD WORK WITH AN ATTORNEY TO OBTAIN LEGAL ADVICE ON ALL ASPECTS OF PROPOSING, ESTABLISHING AND ENACTING A SPECIAL SERVICE AREA.

AN ORDINANCE PROPOSING THE ESTABLISHMENT OF A STORMWATER SPECIAL SERVICE AREA NUMBER ____ IN THE CERTIFIED COMMUNITY AND PROVIDING FOR OTHER PROCEDURES IN CONNECTION THEREWITH

BE IT ORDAINED BY THE CERTIFIED COMMUNITY'S BOARD, WILL COUNTY, ILLINOIS, AS FOLLOWS:

Section 1. Authority.

The Certified Community (Community) is authorized pursuant to Article VII, Section 7(6) of the Constitution of the State of Illinois, and pursuant to the provisions of the Illinois Special Service Area Tax Law, 35 ILCS 200/27-5 *et. seq.,* ("Act") which provides, *inter alia*, the manner of levying taxes and issuing bonds for the provision of special services to areas within the boundaries of municipalities and counties.

Section 2. Findings.

The Certified Community's Board finds and determines as follows:

(a) The owners of record ("Owners") of the property within that portion of the Community as legally described in Exhibit A ("Subject Property"), which is attached hereto and incorporated herein, have expressed an interest in the performance of various special services to their properties.

(b) Pursuant to Section 27-20 of the Act, the Owners filed an application ("Application") with the Certified Community with jurisdiction over the Subject Property, requesting the Community establish a special service area ("Special Service Area") for the Subject Property.

(c) It is in the public interest that the Certified Community Board considers the creation of the requested Special Service Area for the Subject Property.

(d) The proposed Special Service Area is compact and contiguous and commonly described as: a portion of the property located _____ all in the Certified Community, Will County, Illinois which Proposed Special Service Area is also outlined on the map of a portion of the Community, which is attached hereto and incorporated herein as “Exhibit B”.

(e) The proposed Special Service Area will benefit from the special services to be provided thereto.

Section 3. Proposal.

In response to the expressed interest of the Owners, the Certified Community’s Board hereby accepts the Application and proposes the establishment of Certified Community Special Service Area Number ____ for the performance of special services to serve the Subject Property. If the Proposed Special Service Area is formed, the Community Board (i.e., Board of the Special Service Area) shall only levy taxes thereunder in the event the Certified Community Board determines, in its sole discretion, that the Applicant, the homeowners’ association, or any person or entity charged with the upkeep and maintenance of the Subject Property has not properly performed the upkeep and maintenance duties required under the Stormwater Management Permit (“Special Services”) for the Subject Property, which is attached hereto and incorporated herein as “Exhibit C”, as required by section _____ of the Will County Stormwater Management Ordinance.

Section 4. Public Hearing.

A public hearing shall be held on _____, at _____, in the Certified Community, Illinois, to consider the creation of the Certified Community Special Service Area Number ____ for the Subject Property. At the hearing the following method of financing special services within the Proposed Special Service Area will be considered, including but not necessarily limited to: the levy by the Community (i.e. Special Service Area) of a tax in the Proposed Special Service Area sufficient to produce revenues to provide Special Services to the Proposed Special Service Area; the maximum rate of such taxes to be extended in any year for Special Services under this ordinance within the Proposed Stormwater Special Service Area shall not exceed the amount necessary to produce a maximum annual tax levy of $_____. The Special Services to be provided to the Proposed Stormwater Special Service Area may include all those Special Services as provided and/or needed in the Stormwater Management Permit, attached hereto as Exhibit C. This tax is to be levied upon all taxable property within the Proposed Special Service Area on an *ad valorem* basis.

Section 5. Notice of Public Hearing.

Notice of hearing shall be published in accordance with provisions as provided in Section 1007of the Will County Stormwater Management Ordinance and the Illinois Special Service Area Tax Law, 35 ILCS 200/27-5 *et. seq.* If notice by mail is required, the notice shall be sent postage prepaid, to the person whose name the general taxes for the last preceding year were paid. In the event that general taxes

for the preceding year were not paid, the notice shall be sent to the person last listed on the tax rolls prior to that year as the owner of the property.

Section 6. Supersede Conflicting Ordinances.

All ordinances or parts of ordinances in conflict with the provisions of this ordinance are repealed to the extent of such conflict.

Section 7. Bonds.

The Community has heretofore incurred preliminary expenditures, including architectural, legal, engineering and similar costs, in connection with the Special Services prior to the issuance of the Bonds. The Community reasonably expects to reimburse such costs with proceeds of the Bonds. This Resolution constitutes a declaration of official intent under Treasury Regulation Section 1.150-2.

Section 8. Effective Date.

This Ordinance shall be in full force and effect from and after its passage and approval in the manner provided by law.

AN ORDINANCE ESTABLISHING STORMWATER SPECIAL SERVICE AREA NUMBER ____ IN THE CERTIFIED COMMUNITY

BE IT ORDAINED BY THE CERTIFIED COMMUNITY BOARD, CERTIFIED COMMUNITY, ILLINOIS, AS FOLLOWS:

Section 1. Authority.

The Certified Community ("Community") is authorized pursuant to Article VII, Section 7(6) of the Constitution of the State of Illinois, and pursuant to the provisions of the Illinois Special Service Area Tax Law, 35 ILCS 200/27-5 *et. seq.,* ("Act") to establish special service areas for the provision of special governmental services in the portions of the Community and to levy or impose a special tax and to issue bonds for the provision of such special services.

Section 2. Findings.

(f) The question of establishment of the area hereinafter described as a Special Service Area was considered by the Certified Community Board pursuant to "An Ordinance Proposing the Establishment of Special Service Area Number _____ in the Certified Community and Providing for Other Procedures in Connection Therewith", as Ordinance No. ____, adopted on _____. The establishment of the Special Service Area was considered at a public hearing held on _____, "Public Hearing"). The Public Hearing was held pursuant to notice duly published in a newspaper of general circulation within the Community, pursuant to the Special Service Area Tax Law, ordinance requirements and to notice by mail addressed to the person(s) in whose the name the general taxes for the last preceding year were paid on each lot, block,

tract or parcel of land lying within the Special Service Area. A certificate of publication of notice and evidence of mailing of notice are attached to this Ordinance as Exhibit A and Exhibit B, respectively. Said notices conform to the requirements of the Special Service Area Tax Law and pertinent ordinances.

(g) At the Public Hearing, all interested persons were given an opportunity to be heard on the question as published and set forth in "An Ordinance Proposing the Establishment of Special Service Area Number _____ in the Certified Community and Providing for Other Procedures in Connection Therewith

(h) After considering the testimony and data as presented, the Certified Community Board has determined that it is in the best interests of the Community , its residents and property owners within Special Service Area _____ that said Special Service Area, as hereinafter described, be established.

(i) The proposed Special Service Area is compact and contiguous and commonly described as: a portion of the property located _____ all in the Certified Community, Will County, Illinois which Proposed Special Service Area is also outlined on the map of a portion of the Community, which is attached hereto and incorporated herein as "Exhibit C".

(j) An annual *ad valorem* special tax upon all taxable property in the Special Service Area as described shall not exceed (insert specific rate), the tax rate or method proposed in the notice of Public Hearing.

(k) It is in the best interests of the Certified Community that the Special Service Area be created for the financing of the Special Services within the Special Service Area and that taxes be levied on the real property within the Special

Service Area to cover the costs and expenses connected with the provision of the Special Services within the Special Service Area.

(l) It is in the best interests of Certified Community Special Service Area No. _____ that the furnishing of the Special Services proposed be considered for the common interests of the Maintenance Special Service Area.

Section 3. Certified Community Special Service Area No. ___ Established.

A special service area to be known as designated as "Certified Community Maintenance Special Service Area No. ____" is hereby established and shall consist of the continuous territory legally described on Exhibit D attached hereto and made a part hereof, and outlined as on Exhibit E, attached hereto and made a part hereof.

Section 4. Purpose of Area.

Certified Community Maintenance Special Service Area No. ____ is established to provide special services to the Special Service Area. Special Service Area No. ____ is formed with the intent that the Community shall only levy taxes thereunder in the event the Certified Community Board determines, in its sole discretion, that the Applicant, the homeowners' association operating the Subject Property or any other such entity which is charged with the upkeep and maintenance of the Special Service Area fails to perform Special Services as provided in the Stormwater Permit, attached hereto and incorporated herein as Exhibit F and required by the Will County Stormwater Ordinance.

Section 5. *Ad Valorem* Taxation.

The special taxes levied and extended under Maintenance Special Service Area No. ___- shall be levied and extended on an *ad valorem* basis against all taxable property within the Special Service Area.

Section 6. Supersede Conflicting Ordinances.

All ordinances or parts of ordinances in conflict with the provisions of this ordinance are repealed to the extent of such conflict.

Section 7. Effective Date.

This Ordinance shall be in full force and effect from and after its passage and approval in the manner provided by law.

APPENDIX G – MANNING'S ROUGHNESS COEFFICIENT

TABLE G1
Composite Runoff Coefficients for Unlined Channels
(Reference: Chow, Ven Te, 1959; Open-Channel Hydraulics)

Coefficients	Channel Conditions	Value
Material Type	Earth	0.020
n_o	Rock cut	0.025
	Fine Gravel	0.024
	Course Gravel	0.028
Degree of Irregularity	Smooth	0.000
n_1	Minor	0.005
	Moderate	0.010
	Severe	0.020
Variation of Channel	Gradual	0.000
Cross Section	Alternating Occasionally	0.005
n_2	Alternating Frequently	0.010-0.015
Relative Effect	Negligible	0.000
of Obstructions	Minor	0.010-0.015
n_3	Appreciable	0.020-0.030
	Severe	0.040-0.060
Vegetation	Low	0.005-0.010
n_4	Medium	0.010-0.025
	High	0.025-0.050
	Very High	0.050-0.100
Degree of Meandering	Minor	1.000
m_5	Appreciable	1.150
	Severe	1.3

TABLE G2
Typical Roughness Coefficients for Open Channels
(Reference: Chow, Ven Te, 1959; Open-Channel Hydraulics)

TYPE OF CHANNEL AND DESCRIPTION			Minimum	Normal	Maximum
EXCAVATED OR DREDGED					
a.	Earth, straight and uniform				
	1.	Clean, recently constructed	0.016	0.018	0.020
	2.	Clean, after weathering	0.018	0.022	0.025
	3.	Gravel, uniform section, clean	0.022	0.025	0.030
	4.	With short grass, few weeds	0.022	0.027	0.033
b.	Earth, winding and sluggish				
	1.	No vegetation	0.023	0.025	0.030
	2.	Grass, some weeds	0.025	0.030	0.033
	3.	Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
	4.	Earth bottom and rubble sides	0.028	0.030	0.035
	5.	Stony bottom and weedy banks	0.025	0.035	0.040
	6.	Cobble bottom and clean sides	0.030	0.040	0.050
c.	Dragline-excavated or dredged				
	1.	No vegetation	0.025	0.028	0.033
	2.	Light brush on banks	0.035	0.050	0.060
d.	Rock cuts				
	1.	Smooth and uniform	0.025	0.035	0.040
	2.	Jagged and irregular	0.035	0.040	0.050
e.	Channels not maintained, weeds and brush uncut				
	1.	Dense weeds, high as flow depth	0.050	0.080	0.120
	2.	Clean bottom, brush on sides	0.040	0.050	0.080
	3.	Same, highest stage of flow	0.045	0.070	0.110
	4.	Dense brush, high stage	0.080	0.100	0.140

TABLE G2 (continued)
Typical Roughness Coefficients for Open Channels
(Reference: Chow, Ven Te, 1959; Open-Channel Hydraulics)

TYPE OF CHANNEL AND DESCRIPTION			MINIMUM	NORMAL	MAXIMUM
NATURAL STREAMS					
Minor streams (top width at flood stage < 100 feet)					
a.	Streams on plain				
	1.	Clean, straight, full stage, no rifts or deep pools	0.25	0.030	0.033
	2.	Same as above, but more stones and weeds	0.030	0.035	0.040
	3.	Clean, winding, some pools and shoals	0.033	0.040	0.045
	4.	Same as above, but more weeds and stones	0.0.35	0.045	0.050
	5.	Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
	6.	Same as 4, but more stones	0.045	0.050	0.060
	7.	Sluggish reaches, weedy deep pools 0.050	0.070	0.080	
	8.	Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush 0.075	0.100	0.150	
LINED OR BUILT-UP CHANNELS					
a.	Corrugated Metal		0.021	0.025	0.030
b.	Concrete				
	1.	Trowel finish	0.011	0.013	0.015
	2.	Float finish	0.013	0.015	0.016
	3.	Finished, with gravel on bottom	0.015	0.017	0.020
	4.	Unfinished 0.014	0.017	0.020	
	5.	Gunite, good section	0.016	0.019	0.023
	6.	Gunite, wavy section	0.018	0.022	0.025
	7.	On good excavated rock	0.017	0.020	
	8.	On irregular excavated rock	0.022	0.027	

TABLE G2 (continued)
Typical Roughness Coefficients for Open Channels
(Reference: Chow, Ven Te, 1959; Open-Channel Hydraulics)

Type of Channel and Description			Minimum	Normal	Maximum
c.	Concrete bottom, float finished with sides of				
	1.	Dressed stone in mortar	0.015	0.017	0.020
	2.	Random stone in mortar	0.017	0.020	0.024
	3.	Cement rubble masonry, plastered	0.016	0.020	0.024
	4.	Cement rubble masonry	0.020	0.025	0.030
	5.	Dry rubble or riprap	0.020	0.030	0.035
d.	Gravel bottom with sides of				
	1.	Formed concrete	0.017	0.020	0.025
	2.	Random stone in mortar	0.020	0.023	0.026
	3.	Dry rubble or riprap	0.023	0.033	0.036
e.	Asphalt				
	1.	Smooth	0.013	0.013	
	2.	Rough	0.016	0.016	
f.	Vegetal lining		0.030		0.500

TABLE G3
Manning's Roughness Coefficients for Straight Channels
Without Shrubbery or Trees

	Depth of Flow of 0.7 to 1.5 feet	Depth of Flow greater Than 3.0 feet
Bermuda grass, Buffalo grass, Kentucky Bluegrass		
a. Mowed to 2 inches	0.035	0.030
b. Length 4-6 inches	0.040	0.030
Good stand, any grass		
a. Length of 12 inches	0.070	0.035
b. Length of 24 inches	0.100	0.035
Fair stand, any grass		
a. Length of 12 inches	0.060	0.035
b. Length of 24 inches	0.070	0.035

APPENDIX H – RATIONAL METHOD COEFFICIENTS

TABLE H1
Urban Runoff Coefficients for the Rational Method

Description of Area	Runoff Coefficients
Business	
Downtown	0.70 to 0.95
Neighborhood	0.50 to 0.70
Residential	
Single-family	0.30 to 0.50
Multi-units, detached	0.40 to 0.60
Multi-units, attached	0.60 to 0.75
Apartments	0.50 to 0.70
Industrial	
Light	0.50 to 0.80
Heavy	0.60 to 0.90
Parks, cemeteries	0.10 to 0.25
Playgrounds	0.20 to 0.35
Unimproved	0.10 to 0.30

TABLE H2
Values Used to Determine a Composite Runoff Coefficient for an Urban Area

Description of Area	Runoff Coefficients
Pavement	
Asphalt and Concrete	0.70 to 0.95
Brick	0.70 to 0.85
Roofs	0.75 to 0.95
Lawns, sandy soil	
Flat, 2 percent	0.05 to 0.10
Average, 2 to 7 percent	0.10 to 0.15
Steep, 7 percent	0.15 to 0.20
Lawns, heavy soil	
Flat, 2 percent	0.13 to 0.17
Average, 2 to 7 percent	0.18 to 0.22
Steep, 7 percent	0.25 to 0.35
Water Impoundment	1.00

Appendix I – Model Mutual Drain Agreement(s)

Will County Stormwater Management Planning Committee
Draft Mutual Drain Design, Construction and Maintenance Agreement

MODEL

AGREEMENT 1

between

_____
Landowner A (owner of upper lands)

and

_____
Landowner B (owner of lower lands)

for

DESIGN, CONSTRUCTION AND MAINTENANCE OF A MUTUAL DRAIN WHERE MUTUAL BENEFIT WILL ACCRUE

AGREEMENT

This agreement for the design, construction, operation and maintenance of a mutual drain is made and entered into this _____ day of _____, 20__ by and between _____ to be identified herein as Landowner A and _____ to be identified as Landowner B.

RECITALS

WHEREAS, Landowner A and Landowner B hold rights to adjacent lands to provide for positive drainage of lands to facilitate land use; and

WHEREAS, Illinois Drainage Law provides that a landowner must receive water flowing naturally from higher ground and that the owner of the lower ground is bound to receive surface water from higher ground; and

WHEREAS, the Will County Stormwater Management Ordinance provides that stormwater systems shall properly incorporate and be compatible with existing subsurface and surface drainage systems including agricultural systems and that designs shall not cause damage to the existing drainage system(s) or the existing adjacent or tributary land including those with agricultural uses; and

WHEREAS, Landowner A and Landowner B agree that a mutual drain will be of benefit to Lands A (a legal description of Lands A is attached hereto and incorporated herein as “Exhibit A”) and Lands B (a legal description of Lands B is attached hereto and incorporated herein as “Exhibit B”); and

WHEREAS, Landowner A, an owner of higher land, desires to by-pass drainage past the lands of Landowner B, an owner of the lower land, so as to neither exceed the capacity of nor be limited by the capacity of, nor damage or overload the subsurface drainage system for Lands B; and

WHEREAS, Landowner A and Landowner B desire to install a mutual drain for the mutual drainage benefit of both Lands A and Lands B to provide sufficient capacity for positive drainage from both upper and lower lands; and

WHEREAS, the benefits to accrue to the upper lands (Lands A) will be the positive drainage of Lands A; and

WHEREAS, the benefits to accrue to the lower lands (Lands B) will be the avoidance of an overloaded subsurface system due to increased peak flows from the upper lands and improved drainage of Lands B; and

WHEREAS, this agreement does not preclude any local, state or federal regulatory requirements for either upper or lower lands;

NOW THEREFORE in consideration of the mutual agreements, benefits, and considerations, it is agreed as follows:

1. Landowner A may retain engineering services for preparation of engineering design and construction plans for a subsurface drain to cross Land B and shall provide the design calculations, construction plans and drainage benefits allocations to Landowner B for review and approval prior to award of construction of the drain.

2. The capacity of the mutual drain shall be sized for flows from Lands A and Lands B.
3. Construction plans shall include repair of the ground surface to pre-construction condition.
4. The engineering plans described in item 1 above shall provide design calculations and drainage benefits allocations to determine the proportional allocation of benefits to accrue to Lands A and Lands B.
5. Landowner B may retain engineering services for review of engineering design and construction plans.
6. Upon written approval of engineering, proportional allocation of benefits and construction plans by Landowner B, Landowner A shall retain construction services.
7. Landowner B shall provide access to Lands B for the purpose of construction.
8. If construction is to occur during the land preparation, growing season or harvest season, Landowner A shall pay Landowner B for damage to standing crops or delays to planting or harvesting as reasonably determined by Landowner B.
9. Landowners A and B shall share the costs of construction according to the agreed allocation of benefits formula agreed to per item 4 above.
10. Landowner B agrees to provide access to Lands B for the purpose of inspection and maintenance.

11. Landowners A and B shall share the costs of inspection and maintenance according to the agreed allocation of benefits formula agreed to per item 1 above.
12. Inspection shall occur every five years from the date of completion of construction. Landowners A and B shall agree to an inspection interval and schedule consistent with this timeframe.
13. If inspection and maintenance is to occur during the land preparation, growing season or harvest season, Landowner A shall pay Landowner B for damage to standing crops or delays to planting or harvesting as reasonably determined by Landowner B.
14. Landowner A and Landowner B shall record this document with the Will County Recorder of Deeds and take all steps necessary to effectuate the same within five (5) days of execution of this agreement.
15. This document shall be assigned by Landowner A to any subsequent purchaser of Lands A and by Landowner B to any subsequent purchaser of Lands.
16. The rights and responsibilities associated with this agreement shall run with the land and be binding upon all heirs, successors, assigns, and subsequent purchasers.

IN WITNESS WHEREOF, the parties to the agreement set their hands and seals as of the date first written above.

BY: _____
Landowner A

BY: _____
Landowner B

MODEL

AGREEMENT 2

between

_____
Landowner A (owner of upper lands)

and

_____
Landowner B (owner of lower lands)

for

DESIGN, CONSTRUCTION AND MAINTENANCE OF A MUTUAL DRAIN WHERE BENEFIT WILL ACCRUE TO UPPER LANDS ONLY

AGREEMENT

This agreement for the design, construction, operation and maintenance of a mutual drain is made and entered into this _____ day of _____, 20___ by and between _____ to be identified herein as Landowner A and _____ to be identified as Landowner B.

RECITALS

WHEREAS, Landowner A and Landowner B hold rights to adjacent lands to provide for positive drainage of lands to facilitate land use; and

WHEREAS, Illinois Drainage Law provides that a landowner must receive water flowing naturally from higher ground and that the owner of the lower ground is bound to receive surface water from higher ground; and

WHEREAS, the Will County Stormwater Management Ordinance provides that stormwater systems shall properly incorporate and be compatible with existing subsurface and surface drainage systems including agricultural systems and that designs shall not cause damage to the existing drainage system(s) or the existing adjacent or tributary land including those with agricultural uses; and

WHEREAS, Landowner A and Landowner B agree that a mutual drain will be of benefit to Lands A (a legal description of Lands A is attached hereto and incorporated herein as “Exhibit A”); and

WHEREAS, Landowner A, an owner of higher land, desires to by-pass drainage past the lands of Landowner B, an owner of the lower land, so as to neither exceed the capacity of nor be limited by the capacity of, nor damage or overload the subsurface drainage system for Lands B (a legal description of Lands B is attached hereto and incorporated herein as “Exhibit B”); and

WHEREAS, Landowner A and Landowner B desire to install a mutual drain for the drainage benefit of Lands A and to provide sufficient capacity for positive drainage from the upper land; and

WHEREAS, the benefits to accrue to the upper lands (Lands A) will be the positive drainage of Lands A; and

WHEREAS, the benefits to accrue to the lower lands (Lands B) will be the avoidance of an overloaded subsurface system due to increased peak flows from the upper lands; and

WHEREAS, this agreement does not preclude any local, state or federal regulatory requirements for either upper or lower lands;

NOW THEREFORE in consideration of the mutual agreements, benefits, and considerations, it is agreed as follows:

1. Landowner A may retain engineering services for preparation of engineering design and construction plans for a subsurface drain to cross Lands B and shall provide the design calculations and construction plans to Landowner B for review and approval prior to award of construction of the drain.

2. The capacity of the mutual drain shall be sized for flows from Lands A only.
3. Construction plans shall include repair of the ground surface to pre-construction condition.
4. Landowner B may retain engineering services for review of engineering design calculations and construction plans.
5. Upon written approval of engineering calculations and construction plans by Landowner B, Landowner A shall retain construction services.
6. Landowner B agrees to provide access to Lands B for the purpose of construction.
7. If construction is to occur during the land preparation, growing season or harvest season, Landowner A shall pay Landowner B for damage to standing crops or delays to planting or harvesting as reasonably determined by Landowner B.
8. Landowner A shall bear the full costs of construction and all costs associated therewith.
9. Landowner B agrees to allow access to Lands B for the purpose of inspection and maintenance.
10. Landowner A shall bear the costs of inspection and maintenance.
11. Inspection shall occur every five years from the date of completion of construction. Landowners A and B shall agree to an inspection interval and schedule consistent with this timeframe.

12. If inspection and maintenance is to occur during the land preparation, growing season or harvest season, Landowner A shall pay Landowner B for damage to standing crops or delays to planting or harvesting as reasonably determined by Landowner B.
13. Landowner A and Landowner B shall record this document with the Will County Recorder of Deeds and take all steps necessary to effectuate the same within five (5) days of execution of this agreement.
14. This document shall be assigned by Landowner A to any subsequent purchaser of Lands A and by Landowner B to any subsequent purchaser of Lands B.
15. The rights and responsibilities associated with this agreement shall run with the land and be binding upon all heirs, successors, assigns and subsequent purchasers.

IN WITNESS WHEREOF, the parties to the agreement set their hands and seals as of the date first written above.

BY: _____
Landowner A

BY: _____
Landowner B