

## CITY OF DECATUR

### STORM DRAINAGE POLICY

#### I. Purpose

It is the purpose of this policy to promote public safety and general welfare, and to minimize public and private losses due to flood conditions. This policy's intent is designed to:

- a. protect human life and health;
- b. minimize damage to public facilities and utilities;
- c. minimize expenditures of public money; and
- d. protect private property.

This policy is subject to negotiation or change at the direction of the Director of Public Works.

#### II. Design Standards

All development within the Corporate Limits or under control of the City of Decatur, except for minor subdivisions as designated by five lots or less with no street improvements, shall provide storm drainage retention/detention.

1. Maximum allowable run-off shall be:
  - a. 1 cfs/acre for development on any unimproved site of two acres or less.
  - b. Limited to the flow that would occur during a three-year storm under existing conditions for sites larger than two acres.
  - c. For developed sites undergoing redevelopment or expansion:
    1. If 30 percent or more of the impervious area is increased or modified, detention must be provided for the entire site and outflow is not to exceed what would occur for a 3-year storm under existing conditions.
    2. If less than 30 percent of the site is effected, then detention shall be provided for only the area that is developed or modified.
2. A drainage plan is required and is to include engineering drawings and supporting calculations, which describes existing storm water drainage systems and environmental features, as well as the drainage system and the environmental features which are proposed after development of a property.

## Basic Drainage Plan

- a. Topographic survey of the property at 2 ft. contours or spot elevations that adequately define drainage.
  - b. Banks and centerline of streams and channels.
  - c. Shoreline of lakes, ponds, and detention basins.
  - d. Farm drain and tiles.
  - e. Sub-watershed boundaries within the property.
  - f. Property's location within larger watershed.
  - g. Location, size, and slope of storm water conduits and drainage of water.
  - h. Sanitary or combined sewers.
  - i. Delineation of upstream and downstream drainage features and watersheds which might be affected by the development.
  - j. Retention/Detention facilities.
  - k. Roads, streets, inlets, and storm sewers.
  - l. Site plan with lots, public improvements, drainage easements, and building outlines.
  - m. Base flood elevation and regulatory floodway where identified for the property.
  - n. Sealed by Engineer.
3. Where an existing storm sewer system is available a detention pond shall discharge by storm sewer to the existing system. The minimum storm sewer size shall be 12 inches.
4. Design Formula: Unless otherwise approved by the Director of Public Works, the Rational Method shall be used for the run-off analysis.
- III. Minimum Detention Outlet Size - Where a single pipe outlet or orifice plate is to be used to control discharge, it shall have a minimum diameter of 6". If the minimum size permits release rates greater than those specified, alternative outlet designs shall be utilized which incorporate self-cleaning flow restrictors.
- IV. Detention Storage Requirement - The design maximum storage to be provided in a detention basin shall be based on the run-off from the 100-year storm. Detention storage shall be computed using the Modified Rational Method as outlined in Chapter 12 of the Illinois Division of Highway Standards Drainage Manual.
- V. A detention pond shall be defined as an area designated to store excess run-off temporarily with no permanent pool and shall incorporate the following design criteria.
- a. A minimum 2 percent bottom slope or implementation of a low flow system or underdrain.

- b. A low flow by-pass system wherever feasible.
  - c. Be located at least one foot from the property line.
  - d. Have 3:1 or flatter side slopes.
  - e. Provide a minimum of 2 feet of freeboard or 50 percent of the maximum pond depth whichever is less.
  - f. Energy dissipation and/or erosion control for areas where velocities meet or exceed six feet/sec.
  - g. Emergency overflow designed to pass the peak inflow which would occur in a 100-year storm.
- VI. Landscaping and multiple use shall be encouraged in all pond designs.
- VII. Subdivision detention ponds shall be incorporated into multiple properties to encourage maintenance or shall incorporate recreational use and be the responsibility of the Home Owner's Association.
- VIII. Provisions shall be provided to allow ease of clearing outlet structures.
- IX. Flows from ponds shall be deposited directly into an approved storm sewer system where available.
- X. Facilities discharging to a state highway drainage systems shall be designed to IDOT standards for storm water run-off.
- XI. A retention pond shall be defined as a permanent pool with sufficient capacity to store excess run-off and shall incorporate the following design criteria:
- a. Shall be designed so that a significant flush occurs in a 3-year storm.
  - b. Approaching slopes are a maximum 5:1 or flatter.
  - c. The pond shall have a shelf area along the sides, a minimum of three feet in width and a depth of no more than one foot before the pond pool area.
  - d. The pond area shall be a minimum of three feet in depth.
  - e. A two-stage weir shall be incorporated. First stage to allow flushing of the pond and second stage to limit the outflow for detention. Pond size shall be designed so that a significant flush occurs in a three-year storm.

- f. The pond shall incorporate an emergency overflow able to pass the inflow that would occur in a 100-year storm.
- g. It is recommended that as much flow as possible enter the pond through grass swales or sheet flow across grass areas. This helps to filter out sediment and improve water quality.
- h. Developer shall submit a maintenance plan for sediment removal and water quality control. A structure capable of emergency dewatering the pond within 48 hours shall be incorporated into the pond design.

#### Maintenance Responsibilities

##### Commercial Development

- 1. Maintenance of all structures, conduits, and pooling areas required to convey flow or provide detention for the development shall be the maintenance responsibility of the owner to its connection to a City-owned system or its release onto right-of-way. A signed drainage covenant as provided by the City of Decatur shall be provided prior to site plan approval.

##### Residential Development

- 1. Pond area shall be a part of buildable lots and shall be maintained by adjacent residents. All conduits and structures shall be placed in easements and shall be the responsibility of the City.
- 2. Pond areas not incorporated into buildable lots shall be designated as a recreation area and shall be the responsibility of a Home Owner's Association. Proof of Home Owner's Association requirements and responsibilities shall be submitted with preliminary plat.

DRAINAGE COVENANT

THIS COVENANT, made, this \_\_\_\_\_ day of \_\_\_\_\_, 1993, by and between the City of Decatur, Illinois, a municipal corporation, (City) and \_\_\_\_\_ (Owner, which term includes successors and assigns).

WHEREAS, the Owner is owner of certain real property located at \_\_\_\_\_ in Decatur, Illinois, (the Property) and more particularly described as follows:

And that pursuant to City ordinances, regulations, and other applicable laws, the Owner is required to install and/or maintain certain drainage facilities on the Property, the parties wish to provide for an agreement as to the obligations and responsibilities for same.

1. DESCRIPTION OF FACILITIES

The following facilities are to be constructed and/or maintained by the Owner:

2. CONSTRUCTION OF DRAINAGE FACILITIES

The Owner shall construct the drainage facilities in accordance with standards, plans, and specifications prescribed and approved by the City.

3. MAINTENANCE OF FACILITIES

The Owner shall, at his cost in accordance with the standards, plans, and specifications prescribed by the City, maintain said drainage facility. The City shall have the right to enter periodically upon the Property to inspect the drainage facility without notice to the Owner.

4. FAILURE TO COMPLY AND LIEN

In the event that the Owner shall fail to construct the drainage facility in accordance with standards, plans, and specifications prescribed and approved by the City or fail to adequately maintain said facilities, the City shall give the Owner notice in writing to construct, correct, or maintain said facilities, and if the Owner fails to comply therewith within \_\_\_\_\_ days, the City may enter upon said Property to perform the necessary construction or maintenance. The cost of the City's performing such construction, maintenance, or correction shall be paid by the Owner. In the event the Owner fails to pay said cost within thirty (30) days after being billed for same, the City may file a lien against the Property for the cost of such construction, maintenance, or correction.

5. LIABILITY

The City shall not be liable for any property or personal damages to the Owner resulting from its construction, modification, or maintenance of said facilities and the Owner hereby agrees to hold the City harmless for any and all personal or property damages caused by negligence or otherwise by the City as a result of its construction, modification, or maintenance of said facilities.

6. NOTICE

The written notice provided for herein shall be accomplished by mailing same to:

The Owner may change said address by giving written notice, certified mail, return receipt requested to the City Engineer, City of Decatur, #1 Gary K. Anderson Plaza, Decatur, Illinois 62523.

7. INDEMNIFICATION AND HOLD HARMLESS

The Owner agrees to defend, indemnify, and hold harmless, the City, its officials, agents, and employees from and against any and all claims, actions, suits, or proceedings of any kind brought against said parties for or on account of any matter arising from the drainage facility provided for herein or the Owner's failure to construct, maintain, or modify the drainage facility under this covenant.

3. COVENANT RUNNING WITH THE PROPERTY

The obligation of the Owner set forth herein shall be binding upon the Owner, his heirs, successors, and assigns, and the Property of the Owner as described herein and will run with said Property until released by the City.

OWNER

By: \_\_\_\_\_

Title: \_\_\_\_\_

REVIEWED BY THE  
LEGAL DEPARTMENT:

CITY OF DECATUR

\_\_\_\_\_  
Corporation Counsel

\_\_\_\_\_  
Director of Public Works

Example Using Modified Rational Method  
to Determine the Required Storm Water Detention  
for a Proposed Site

Method Parameters

1. This method makes no promises for and does not address any method of by-passing storm water received from upstream.
2. Allowable constant runoff is that from the site undeveloped for a three-year storm, the duration of which is the time of concentration for the site.  $Q = C.I.A.$
3. The rainfall intensity data source is U.S. Weather Bureau Technical Paper No. 70.

Example

Assume a gently sloping grassy two acre tract being developed as a commercial business with paved parking.

Procedure

I. Determine allowable runoff from  $Q = C.I.A.$

$$A = 2$$

$$C = .30 \text{ (recommended from IDOT Manual)}$$

Time of Concentration = 25 min. (Average grassy surface at 0.5% slope with a 260 foot long drainage strip.)

I - 3-year = 2.62 in/hr (Illinois north central section for a 25 min. duration on 3-year frequency.)

$$Q = 2 \times .3 \times 2.62 = 1.57 \text{ CFS}$$

Since the area meets the criteria of two acres or less for this example, 2 cfs would be the maximum allowable run-off.

II. Determine weighted or composite runoff coefficient after development.

|                   |   |                       |   |      |   |              |
|-------------------|---|-----------------------|---|------|---|--------------|
| Bldg. 100 X 60    | = | 6,000 Sq. Ft.         | X | 0.95 | = | 5,700        |
| Parking 250 X 250 | = | 62,500 Sq. Ft.        | X | 0.90 | = | 56,250       |
| Grassy            | = | <u>18,620</u> Sq. Ft. | X | 0.30 | = | <u>5,586</u> |

$$87,120 \text{ Sq. Ft.} \qquad 67,536$$

$$67,536 \div 87,120 = .77$$



III. Detention determination (Modified Rational Method)

| A     |          | B            | C           | D                 |                                       |
|-------|----------|--------------|-------------|-------------------|---------------------------------------|
| Storm | Duration | Intensity    | Inflow Rate | Required          | Detention                             |
| (Hrs) | (Min)    | 100-Yr storm | Area X CW X | Storage           | Col A (hrs)                           |
|       |          | (In/Hr)      | 100-Yr I(B) | Col C -           | X Col D ÷                             |
|       |          |              |             | Allowable         | 12 (Acre Ft)                          |
|       |          |              |             | Runoff            |                                       |
| 0.17  | 10       | 9.12         | 14.0        | 12.00             | .17                                   |
| 0.33  | 20       | 6.3          | 9.7         | 7.7               | .21                                   |
| 0.50  | 30       | 5.12         | 7.88        | 5.88              | .24                                   |
| 0.67  | 40       | 4.19         | 6.45        | 4.45              | .25                                   |
| 0.83  | 50       | 3.62         | 5.57        | 3.57              | .25 -                                 |
|       |          |              |             | Maximum Detention | Required                              |
| 1.0   | 60       | 3.00         | 4.62        | 2.62              | .22                                   |
| 1.5   | 90       | 2.52         | 3.88        | 1.88              | .23                                   |
| 2.0   | 120      | 2.04         | 3.14        | 1.14              | .19                                   |
| 3.0   | 180      | 1.46         | 2.25        | .25               | .06                                   |
| 4.0   | 240      | 1.0          | 1.54        |                   |                                       |
|       |          |              |             |                   | .25 X 43,560 = 10,890 ft <sup>3</sup> |

IV. Determine type of control for outlet, pipe, swale, etc.  
 Determine amount of head available.

>>>> I-D-F Curve <<<<<

2-YR. storm intensities for central Ill.

Recurrence Frequency = 2

| <u>DURATION</u><br><u>minutes</u> | <u>INTENSITY</u><br><u>inches/hour</u> |
|-----------------------------------|--|
| 5                                 | 4.32                                   |
| 10                                | 3.96                                   |
| 15                                | 3.24                                   |
| 20                                | 2.73                                   |
| 25                                | 2.4                                    |
| 30                                | 2.24                                   |
| 35                                | 2.00                                   |
| 40                                | 1.83                                   |
| 45                                | 1.69                                   |
| 50                                | 1.58                                   |
| 55                                | 1.49                                   |
| 60                                | 1.42                                   |
| 65                                | 1.38                                   |
| 70                                | 1.33                                   |
| 75                                | 1.29                                   |
| 80                                | 1.24                                   |
| 85                                | 1.20                                   |
| 90                                | 1.16                                   |
| 95                                | 1.11                                   |
| 100                               | 1.07                                   |
| 105                               | 1.02                                   |
| 110                               | 0.98                                   |
| 115                               | 0.93                                   |
| 120                               | 0.89                                   |
| 180                               | .64                                    |
| 360                               | .38                                    |

>>>> I-D-F Curve <<<<<

3-yr storm intensities for central Ill.

Recurrence Frequency = 3

| <u>DURATION</u><br>minutes | <u>INTENSITY</u><br>inches/hour |
|----------------------------|---------------------------------|
| 5                          | 4.68                            |
| 10                         | 4.30                            |
| 15                         | 3.52                            |
| 20                         | 2.96                            |
| 25                         | 2.62                            |
| 30                         | 2.42                            |
| 35                         | 2.16                            |
| 40                         | 1.98                            |
| 45                         | 1.83                            |
| 50                         | 1.71                            |
| 55                         | 1.62                            |
| 60                         | 1.60                            |
| 65                         | 1.55                            |
| 70                         | 1.49                            |
| 75                         | 1.44                            |
| 80                         | 1.39                            |
| 85                         | 1.33                            |
| 90                         | 1.28                            |
| 95                         | 1.23                            |
| 100                        | 1.17                            |
| 105                        | 1.12                            |
| 110                        | 1.07                            |
| 115                        | 1.01                            |
| 120                        | 0.96                            |

>>>> I-D-F Curve <<<<

5-yr storm intensities for central Ill.

Recurrence Frequency = 5

| DURATION<br>minutes | INTENSITY<br>inches/hour |
|---------------------|--------------------------|
| -----               | -----                    |
| 5                   | 5.40                     |
| 10                  | 4.98                     |
| 15                  | 4.08                     |
| 20                  | 3.42                     |
| 25                  | 3.05                     |
| 30                  | 2.78                     |
| 35                  | 2.49                     |
| 40                  | 2.28                     |
| 45                  | 2.11                     |
| 50                  | 1.97                     |
| 55                  | 1.87                     |
| 60                  | 1.77                     |
| 65                  | 1.72                     |
| 70                  | 1.66                     |
| 75                  | 1.61                     |
| 80                  | 1.55                     |
| 85                  | 1.50                     |
| 90                  | 1.44                     |
| 95                  | 1.39                     |
| 100                 | 1.33                     |
| 105                 | 1.28                     |
| 110                 | 1.22                     |
| 115                 | 1.17                     |
| 120                 | 1.11                     |
| 180                 | .80                      |
| 360                 | .48                      |

>>>> I-D-F Curve <<<<<

10 yr storm intensities for central Ill.

Recurrence Frequency = 10

| DURATION<br>minutes | INTENSITY<br>inches/hour |
|---------------------|--------------------------|
| -----               | -----                    |
| 5                   | 6.36                     |
| 10                  | 5.88                     |
| 15                  | 4.80                     |
| 20                  | 4.05                     |
| 25                  | 3.58                     |
| 30                  | 3.28                     |
| 35                  | 2.95                     |
| 40                  | 2.69                     |
| 45                  | 2.49                     |
| 50                  | 2.33                     |
| 55                  | 2.20                     |
| 60                  | 2.09                     |
| 65                  | 2.02                     |
| 70                  | 1.96                     |
| 75                  | 1.90                     |
| 80                  | 1.83                     |
| 85                  | 1.77                     |
| 90                  | 1.70                     |
| 95                  | 1.64                     |
| 100                 | 1.57                     |
| 105                 | 1.51                     |
| 110                 | 1.44                     |
| 115                 | 1.38                     |
| 120                 | 1.31                     |
| 180                 | .94                      |
| 360                 | .57                      |

>>>> I-D-F Curve <<<<<

50 yr storm intensities for central Ill.

Recurrence Frequency = 50

| DURATION<br>minutes<br>----- | INTENSITY<br>inches/hour<br>----- |
|------------------------------|-----------------------------------|
| 5                            | 8.76                              |
| 10                           | 8.04                              |
| 15                           | 6.56                              |
| 20                           | 5.52                              |
| 25                           | 4.92                              |
| 30                           | 4.50                              |
| 35                           | 4.03                              |
| 40                           | 3.68                              |
| 45                           | 3.41                              |
| 50                           | 3.19                              |
| 55                           | 3.01                              |
| 60                           | 2.86                              |
| 65                           | 2.77                              |
| 70                           | 2.68                              |
| 75                           | 2.60                              |
| 80                           | 2.51                              |
| 85                           | 2.42                              |
| 90                           | 2.33                              |
| 95                           | 2.24                              |
| 100                          | 2.15                              |
| 105                          | 2.07                              |
| 110                          | 1.98                              |
| 115                          | 1.89                              |
| 120                          | 1.80                              |
| 180                          | 1.28                              |
| 360                          | .78                               |

>>>> I-D-F Curve <<<<<

100 yr storm intensities for central Ill.

Recurrence Frequency = 100

| DURATION<br>minutes | INTENSITY<br>inches/hour |
|---------------------|--------------------------|
| -----               | -----                    |
| 5                   | 9.96                     |
| 10                  | 9.12                     |
| 15                  | 7.48                     |
| 20                  | 6.30                     |
| 25                  | 5.59                     |
| 30                  | 5.12                     |
| 35                  | 4.59                     |
| 40                  | 4.19                     |
| 45                  | 3.88                     |
| 50                  | 3.62                     |
| 55                  | 3.43                     |
| 60                  | 3.00                     |
| 65                  | 2.92                     |
| 70                  | 2.84                     |
| 75                  | 2.76                     |
| 80                  | 2.68                     |
| 85                  | 2.60                     |
| 90                  | 2.52                     |
| 95                  | 2.44                     |
| 100                 | 2.36                     |
| 105                 | 2.28                     |
| 110                 | 2.20                     |
| 115                 | 2.12                     |
| 120                 | 2.04                     |
| 180                 | 1.46                     |
| 360                 | .88                      |