

## **CHAPTER 23: DETENTION BASIN STANDARDS**

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## 23.00 INTRODUCTION AND GOALS

- A. The purpose of this chapter is to explain the City's policy regarding the ownership, design, construction, and maintenance responsibility for detention basins. Detention basins are used to collect and hold stormwater runoff for a period of time to compensate for increases in stormwater runoff caused by reduced ground surface perviousness due to activities such as paving or building construction.
- B. Detention basins historically range in size from backyard detention provided by swales, to large regional detention ponds. Detention basins may be wet or dry bottomed. Residential backyard or sideyard single lot detention is not allowed. Construction of detention for individual lots of less than 5 acres is not recommended; alternate methods such as payment in lieu of detention or one basin for the entire subdivision or development are preferred.

## 23.01 ADMINISTRATION

- A. This chapter applies to detention basins within the City limits and the 1-1/2 mile extra territorial jurisdiction.
- B. Detention basin construction is required for certain conditions by the City of Champaign Stormwater Management Regulations.
- C. Detention basin design shall be reviewed by the City of Champaign through either of the following:
  - 1. Subdivision plan review
  - 2. Grading and drainage plan review
  - 3. Alternate construction plan review (typically public improvements)

## 23.02 STANDARDS

The following standards apply to detention basins:

- A. **Referenced Standards:** Design standards for detention basin design and construction shall comply with the provisions of the following, unless otherwise stated by this manual.
  - 1. City of Champaign Stormwater Management Regulation, latest edition
  - 2. IDOT Standard Specifications, latest edition
  - 3. IDOT Drainage Manual, latest edition
  - 4. Clean Water Act (discharges regulated by the United States EPA through NPDES permits)
- B. **Ownership:**
  - 1. Detention basins are owned by the property owner (often a Homeowner's Association).
  - 2. Regional detention basins owned and maintained by the City of Champaign include the following: the Upper Boneyard Detention Basin, the Eureka-Elm Detention Basin, the Oak-Ash Detention Basin, the Healey Street Detention Basin, and the Boneyard Campustown Detention.

3. Additional regional basins are owned and maintained by other entities. Some of these were constructed all or in part with City funds. Some examples are the First Street Detention Pond, Ponds of Windsor, Baytowne, and Mattis Lake.

**C. Maintenance and Repair Responsibilities:**

1. Detention ponds and associated inflow and outflow systems (to the property line) are maintained by the property owner absent any specific legal agreement to the contrary.
2. Maintenance agreements may be required at the option of the City Engineer to define parties responsible for the maintenance of commercial detention basins and unique detention basin cases.
3. Absent a specific maintenance agreement to the contrary, the detention basin owner shall be responsible for the following items:
  - a. An annual report on the detention basin condition using the checklist in Attachment 23.01 shall be submitted to the City Engineer.
  - b. At 5 year intervals, the basin shall be inspected by a professional engineer registered in the State of Illinois. A report of this inspection shall be submitted to the City Engineer within 60 days of the inspection. The inspection shall include an evaluation of the checklist items in Attachment 23.01. An annual report is not required the year the 5 year report is due.
  - c. Detention basin owners shall notify subsequent owners of their maintenance responsibilities and transfer basin maintenance records to the party with active maintenance responsibility.
  - d. These requirements shall be effective for all detention basins existing in the City of Champaign on the date of adoption of this Manual of Practice as well as detention basins constructed after the effective date.

**D. Design:**

1. *General:*
  - a. Use Chapter 19 of this manual, Hydrologic Design, to determine design storm and hydrologic method of determining peak inflows—100 year design storm of most critical duration.
  - b. Detention basin sizing shall follow the methodology in IDOT Drainage Manual or Pond Pack™ software.
  - c. Outflow shall be limited to 0.18 cfs/acre. Sites smaller than 5 acres shall use a maximum total outflow of 0.9 cfs.
  - d. For sites 5-acres and smaller, basin 100-year storage volume shall be checked against the storage volume obtained from 0.208 ft. times the development area. The larger of the two storage volumes shall be used for the detention basin.
  - e. See also Chapter 20, Culvert and Ditch Standards, for related standards.

## Chapter 23: Detention Basin Standards

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- f. Plans shall clearly indicate normal and high water elevations, design storage volume, minimum, maximum and typical slopes.
  - g. Detention basins shall release the 100-year storage volume within 24 to 48 hours.
  - h. Emergency overflow routes shall be clearly designated for runoff in excess of the 100-year storm.
  - i. Minimum outlet storm sewer size shall be 12 in.; smaller diameter restrictions (e.g. orifice plate or short pipe length) are acceptable.
  - j. Inlet and outlet pipes shall be provided with end sections and erosion protection.
  - k. Weirs, dams and specialized outflows shall be designed by a professional engineer registered in the State of Illinois.
  - l. "Bubble up" outlets are prohibited.
  - m. Pumped outlets and other active control structures are discouraged and must be pre-approved on a case-by-case basis by the City Engineer.
  - n. Temporary erosion techniques shall be used as required to ensure a full stand of cover vegetation in minimum time.
  - o. Detention basin side slopes above normal pool shall be designed with permanent erosion protection consisting of grass, non-grass vegetation, or other permanent finish. Permanent erosion protection shall be aesthetically suitable to the development or existing surrounding land use.
2. *Location:*
- a. In subdivisions, detention basins and their 100-year design high water shall be contained within platted lots dedicated for drainage purposes. In redevelopments, detention basins and their 100-year design high water shall be contained within a drainage easement.
  - b. Parking lot and roof top detention are not allowed.
  - c. Detention basin lots shall have a minimum of 30 ft. frontage on a right-of-way for the purpose of providing unrestricted access for maintenance. Exceptions may be made for infill development.
  - d. A 20 ft. minimum setback shall be required from all property lines to the normal pool elevation.
  - e. Detention basins shall be provided with a minimum of 1 ft. of freeboard above the 100 year design water elevation.
  - f. Buildings within 100 ft. of a detention basin 100-year design high water shall have the lowest water entry point a minimum of 2 ft. above the 100-year design water elevation.

3. *Dry Bottom Basins:*
  - a. Side slopes shall be a maximum of 4H:1V. If retaining walls are used, their height is limited to 4 ft. Retaining wall design and material type shall be approved by the City Engineer.
  - b. Dry bottom basins shall have 2% minimum bottom slopes or underdrain systems as approved by the City Engineer.
  - c. Dry bottom basins shall include a low flow channel with some form of erosion protection.
  
4. *Wet Bottom Basins:*
  - a. Above water side slopes shall be a maximum of 4H:1V. If retaining walls are used, their height is limited to 4 ft. Retaining wall design and material type shall be approved by the City Engineer.
  - b. In accordance with IDOT Standard Specifications Section 204, below water slopes shall be a maximum of 4H:1V except that slopes of 2H:1V will be permitted below a point where the proposed water depth will be 8 ft of greater.
  - c. Wet bottom basins shall have a natural or artificial means of aeration.
  - d. If fish or other aquatic wildlife are desired, a minimum depth of 8 ft. shall be maintained over at least 25% of the pond's surface area.
  - e. So-called "safety shelves" are not required as they promote the growth of algae and may cause entrapment.
  - f. To minimize erosion caused by wave action, shoreline stabilization shall be required around all wet bottom detention basins. Shoreline stabilization shall extend down the sideslope to an elevation 1-foot below the normal water surface elevation and up the sideslope to an elevation 1-foot above the normal water surface elevation. Approved shoreline stabilization methods include riprap revetment constructed in accordance with the requirements of the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition; cast-in-place portland cement concrete retaining walls; or modular concrete block retaining walls. Alternative shoreline stabilization methods may be submitted to the City Engineer for review and approval. Any proposed shoreline stabilization method shall be reviewed and approved by the City Engineer prior to installation.
  - g. An outlet structure shall be provided to allow dewatering of the pond for maintenance. Gravity dewatering is strongly preferred.
  - h. Wet bottom basin design shall include an evaluation of soil permeability. A basin liner shall be included in the design if needed to ensure water retention to normal pool elevation.

**E. Construction:**

1. Earth excavation and embankment shall be in accordance with IDOT Sections 202 and 205.
2. Erosion control shall be required per Chapter 22 of this Manual. Successful erosion control is one of the critical components of detention basin construction. Erosion control issues of particular concern to the City follow.
  - a. Prevent tracking of dirt or mud from site.
  - b. Prevent sedimentation of downstream ditches and sewers.
  - c. Prevent wind borne dust from leaving the site.

**F. Materials:**

Detention basin side slopes above normal pool shall be provided with a minimum topsoil thickness of 6 in.

**G. Testing and Inspection:**

1. Erosion protection shall be inspected throughout the project duration.
2. Detention basin storage volume shall be verified to the satisfaction of the City Engineer through as-built surveys or other means.
3. Inflow, outflow and emergency overflow elevations shall be verified through as-built surveys.
4. Final vegetative cover shall be inspected for completeness of cover.

**H. Diagrams and Checklists:**

1. Basin plans and specifications for review and approval.
2. Design calculations for basin hydrology and sizing.
  - a. Hydrologic calculations shall include areas tributary to the basin and their land use types.
  - b. Basin stage-storage-discharge tables shall be included in the submittal.
  - c. Emergency overflow routes shall be included in the submittal.

**23.03 STANDARD ATTACHMENTS**

Attachment 23.01 – Detention Basin Inspection Checklist

**Detention Basin Inspection Checklist**

Basin Name/Location

Basin Owner

Basin Maintainer (usually owner)

Basin Type (wet or dry)

Inspection Date

Annual Inspection Items

- A. Debris
- B. Weeds
- C. Bare spots in groundcover
- D. Algae growth
- E. Odor
- F. Sediment
- G. Erosion at normal pool elevation & severity
- H. Erosion of bank slopes & severity
- I. Holes in the ground
- J. Unusual wet areas
- K. Inflow & outflow systems (protective grates, blockages, and structural integrity)
- L. Emergency overflow system
- M. Detention function (normal, impaired)
- N. Other items and comments
- O. Corrective measures

Professional Engineer Inspection (5 year intervals)

Inspection shall include at a minimum the annual inspection items above and the additional items below.

- A. Assessment of pump, pipe, structures present.
- B. Does the basin function per as-built plans?
- C. Are critical inflow, outflow, overflow paths and elevations unchanged from the as-built plans?
- D. Is there evidence of basin changes affecting the storage volume from that shown on the as-built plans? The volume reasonableness check is intended to be a visual check and not a requirement for a survey.
- E. Other items and comments
- F. Corrective measures

