

City Hall • 8500 Santa Fe Drive
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Attachment B - Flood Control Detention Model Procedures and Requirements

Flood Control Detention must be examined for all developments in accordance with Chapter 15.10.400 and Chapter 15.10.450.

- OPKansas website - Stormwater Management Program Standards and Permitting

Flood Control Detention utilizing earthen dams greater than 10-feet in height will need to follow TR-60 requirements under the City's Design Criteria.

- OPKansas website - Design and Construction Standards Volume 1

Provide a flood control detention narrative and/or table showing the outflows from the different layouts to show why a particular design was selected.

Calculation Methods (steps may vary depending on the software package)

1. Create a custom storm utilizing the HEC-1 Storm Distribution with the 24 hour rainfall depth from the McEnroe & Young Study for KCAPWA.
2. Set up the project site with Existing Conditions.
3. Run the model for storm. Note the 10-year peak discharge and the 100-year peak volume. This will determine the maximum allowable release rate and existing runoff volume.
4. Set up the project site with the Proposed Conditions. Include any planned undetained runoff.
5. Rerun the model for all durations with the basin included. Note the 10-year peak discharge and the 100-year peak volume.
6. Design for the detention basin so the 10-year peak discharge for the entire project site in the Proposed Conditions is equal or less than the Existing Conditions 10-year peak discharge.
7. Design of the detention basin so that it is sized to hold the runoff volume from the peak 100-year storm minus the discharge through the primary spillway without utilizing the auxiliary (Emergency) spillway.
8. Design the auxiliary spillway so assuming the basin is full that it can convey the second 100-year storm so that 1-foot of freeboard remains between the top of the detention basin and the energy grade line of the discharge.
9. If approved multi-stage / in-line detention or stormwater treatment facilities are approved, model all storms.

Required Output files / Information in the Stormwater Management Study Stage-Outflow curve

- Inflow and Outflow Hydrographs
- Stage-Storage curve
- Outflow orifice size (for restrictor plate applications)

- Elevations – bottom of basin, primary orifice, emergency spillway, top of basin (required 1ft freeboard from routed 100-yr storm through the emergency spillway)
- Preliminary Study Only – Outflow files for only design storm durations to support selected duration; the preceding storm duration output, the peak storm output, and subsequent storm output should be provided. Final Study – Outflow files for only selected design storm durations.
- Detention basin inflow/outflow calculations
- Emergency Spillway calculations and capacity – must be large enough to convey the 100-year storm. If a sharp-crested weir is to be utilized, calculations must demonstrate that the nappe will be formed. Otherwise, the spillway will be broad-crested and convey less flow.
- Routing information
- Maximum volume in the detention basin calculated to the top of the detention basin berm (at zero freeboard)

Required Information in Construction Plans

- Total site area, ac
- Total area to basin, ac
- Off-site area to basin, ac
- Percent impervious of total site, Pre-developed, %
- Percent impervious of total site, Post-developed, %
- Percent impervious of area to basin, Post-developed, %
- Percent impervious of off-site area to basin, Post-developed, %
- Storage volume at overflow, cf
- Water elevation at 100-year storm, cfs
- Release rate, 10-year storm, cfs
- 10-year Design storm, duration and distribution
- 100-year Design storm, duration and distribution
- Orifice type and area, sf
 - Stage-outflow curve
 - Inflow and outflow hydrographs
 - Stage-storage curve

If the detention basin is to be located on a public storm sewer structure, a detention basin maintenance agreement is required to be executed prior to permit issuance.

- OPKansas website - Detention Maintenance Agreement

Certification Required after Construction

- OPKansas website - Certificate of Completion and Compliance Stormwater Detention Flood Control Facility

Renewal of Certification

- Required every 2 years. Licensed Kansas-registered P.E. reviews basin conditions and determines if it functions as designed. Renewal Certification form mailed to property owner by Public Works.