

Runoff Determination and Design Calculations

- Design storm rainfall shall be 4.1 inches for a 100-year, 3-hour event unless engineer can substantiate otherwise.
- The Storm Water Management Plan (SWMP) shall make provisions to accept and pass through upstream runoff to the extent that existed in pre-developed conditions.
- Allowable methods for calculation runoff and routing are the Rational Method, TR-55, Sedcad, or equivalent.
- When selecting the existing condition runoff and routing coefficient or curve number (C or C_n), the historically established land usage should be used if different from the usage immediately prior to development. If the existing condition is farming, the normal farming method (i.e. no-till, row w/residue, etc) should be utilized.
- If an area is proposed as a crushed stone parking area, proposed condition runoff coefficients or curve numbers should be viewed as paved unless justification is given that it will never be paved.
- Time of Concentration calculations shall be shown including designation of flow paths and assumptions regarding roughness coefficients and travel times.
- For discharge structures and conveyances, all design parameters such as pipe/channel cross-sections, roughness, and loss coefficients should be clearly listed. The input section of a computer analysis alone is not sufficient unless it clearly displays the parameters.

General Construction

- All paved ditches should have a minimum slope of 0.5%. Earthen ditches should have a minimum slope of 1.0%.
- Earthen channel side slopes should be no steeper than 2 horizontal to 1 vertical when the depth is less than 8 feet and 4 to 1 when the depth is greater than 8 feet. Side slopes on ditches steeper than 3 to 1 should be rip-rap or concrete. Side slopes greater than 2 to 1 should be reinforced wall.
- All work performed in the right-of-way of a public road shall be built in accordance to the City of Hopkinsville Public Improvement Standards.
- Structures immediately downstream should be checked for proper capacity.
- The use of any pipe material other than reinforced concrete pipe (RCP) or corrugated metal pipe (CMP) is subject to the approval of the Flood Safety Officer on a case by case basis.

Detention Structure

- The basin shall have the capacity to hold a volume equal to the difference between the pre-development and post-development runoff for a 100-year frequency, 3-hour duration event.
- The outlet structure shall be sized to prevent a discharge rate higher than pre-development and able to drain the basin within 72 hours from end of rainfall event.
- The emergency spillway shall be capable of passing the 100-year frequency, 3-hour duration event without over-topping the basin.
- The smallest allowable size for discharge pipe should be 6 inches in diameter.
- When PVC pipe is used for discharge, an anti-seep collar is recommended.
- All exposed pipes and risers should be of material that is sunlight exposure resistive.
- All discharge structures need to have adequate grates, trash racks, etc. to prevent trash, debris, animals and children from entering the pipe. Any inlet placed in traffic areas should be certified for traffic loads and bicycle traffic.
- All discharge pipes shall have adequate protection to both inlet and outlet to prevent scouring and undermining.
- The bottom of all basins should be graded for positive drainage. If the slope across the bottom is less than 1.0%, a paved ditch should be provided.

Vegetation and Erosion Prevention

- Steep slopes in basins should be vegetated with sod or seeded with a low growing, low maintenance ground cover. (i.e. crown vetch)
- Silt checks, silt fences, etc should be used to control erosion during construction and turf establishment.
- Emergency spillways should be sodded, rip rapped or concreted to prevent erosion.
- Ditch velocities should be checked. Ditches with velocities greater than 6 feet per second should be paved or rip-rapped. Energy dissipating structures can be installed to reduce the discharge velocities. Rock rip-rap should be used as a last resort for channel or spillway armoring. Where rock rip-rap is used, calculations should be provided to show that the channel will not be stable with grass lining.
- The storm water management facilities should have vegetation maintained in accordance with current City of Hopkinsville Grass, Trash, and Weeds Ordinance 93.03.

Submittal Drawing

- All drawings shall be stamped and signed by a Kentucky licensed Professional Engineer (PE). Record or "As Built" drawing should always have the professional engineer seal and the registered licensed surveyor seal when the drawing contains land survey information not performed by the PE performing the design. Engineers and surveyors should include their firm license number unless licensure is exempted by statute (i.e. sole proprietor working in his/her own name).
- Inlet and outlet structure details should be shown on the drawings. All storm water management structures must be drawn to scale, either on the plan sheets or separate detail sheets.
- Maintenance notes should be placed on the drawings. These notes state the frequency of maintenance and the party responsible for maintenance.
- "As-Built" drawings should show final elevations, materials and structures as installed. References to "proposed" or "install" should be deleted. Drainage easements should be shown. Basin volume and limits of basin area should be shown.

Inspection

- All pipes and drainage structures should be flushed or cleaned prior to final inspection.
- Lift rings in pre-cast structures should be removed and grouted.
- All erosion control devices (i.e. silt checks, silt fence) should be removed after establishment of vegetation
- Grout or seal between all pipes and pre-cast structures.

Construction in the Flood Plain

- A study shall be performed using either Hec-2 or HEC-RAS with zero impact on the water surface elevation.
- The river levels and flow rate should use the latest FEMA flood study information.

- The Flood Safety Officer should be consulted for any new encroachments to the flood plain since the last FEMA study. These encroachments should be incorporated into the study to prevent significant rise caused by the collective effect that may not be noticeable singularly.
- The stationing of cross sections shall be from downstream to upstream, with the left bank being on the left when looking upstream.
- Suggested Manning's "n" as utilized in the 1979 Flood Study
- 0.036 for relatively smooth grassed areas.
- 0.021 for densely wooded, shallow areas with considerable underbrush.
- 0.03 to 0.08 for heavily brushed, irregular side slopes
- Unless waived by the Flood Safety Officer, detention basins placed in the 100-year flood plain shall be flood proofed. The spillway elevation should be equal to or higher than the 100-year flood elevation. Backflow prevention should be installed on outlets below the 100-year flood elevation.