

800.813 Drainage And Floodplains

General

The following design standards apply to the design of all stormwater and floodplain improvements for areas within Richfield City (the City). All hydrologic and hydraulic evaluation and design for a proposed development shall be performed in accordance with sound and accepted engineering practice. All drainage studies and design must be completed and prepared by a professional engineer, licensed in the State of Utah and qualified to perform such work.

1.1 Hydrologic Evaluation

The hydrologic evaluation should meet the following criteria:

- All components of the storm drainage system shall be sized based on the design frequency in the table below. The size of the drainage area shall include on-site and off-site lands contributing to the design point.

Design Storm	Facilities
10-year	Inlets, laterals, minor trunk lines, and roadway spread
100-year	Storage basins, culverts, major trunk lines, and major conveyance facilities

- The peak rate of runoff for all areas can be estimated using the NRCS (SCS) method. The rational method shall only be used to estimate the peak rate of runoff for areas of up to 10 acres.
- Runoff volume shall be calculated based on the NRCS method. For detention design, a 100-year 24-hour storm shall be used to calculate basin inflow. Detention basin outflow shall be based on the pre-development 10-year 24-hour and 100-year 24-hour storm events.
- Precipitation depth and intensity shall be obtained from NOAA Atlas 14.
- When using the NRCS method of analysis, the NRCS Type II 24-hour precipitation temporal distribution and the NRCS unit hydrograph shall be used.
- The designer shall use the NRCS velocity method or other appropriate method to estimate time of concentration. In all instances, a minimum time of concentration of 5 minutes shall be used.

1.2 Hydraulic Evaluation

Hydraulic capacity for open channel or closed conduit flow shall be determined by the Manning Equation. Velocities in open channels at design flow shall not be greater than that velocity which will begin to cause erosion or scouring of the channel. Velocities in closed conduits at design flow shall be at least 2 ft/sec but not more than the velocity which will cause erosion damage to the conduit. Manholes are to be placed every 500 feet or every change of grade or angle.

1.3 Storage Criteria

Surface Storage Facilities

Surface storage facilities must include xeriscape or lawn surfacing that extends to the property boundary and is maintained by the developer or an established HOA. Facilities that are to become property of the City must include xeriscape surfacing that extends beyond the storage facility to the property boundary.

1. Retention Facilities

Retention facilities are used as infiltration basins, with the only outlet being the emergency spillway. Due to concerns with sedimentation and inadequate infiltration capacities, surface storage retention basins that will become the property of Richfield City must be pre-approved by the City. When surface retention basins are allowed, soil studies of the saturated and unsaturated zones are required to ensure that the retention basin will function properly over the life of the basin. Surface storage facilities shall be designed to completely drain within 3 days after the end of a storm event. Retention Facilities must also meet storage requirements set forth under the detention facilities.

2. Detention Facilities

Detention facilities are used to temporarily detain stormwater runoff and release it at a controlled rate. The controlled rate is outlined in the Storage Criteria Design Requirements section below. These facilities shall be designed to completely drain within 3 days after the end of a storm event.

All new development must provide sufficient storage to account for the additional runoff created by the development. Adequate storage shall be provided such that each of the following applies:

- Post-developed discharge rates shall not exceed pre-developed discharge rates for the 10-year and 100-year storms.
- The entire 100-yr 24-hour storm shall be routed through the principal outlet without activating the emergency spillway.
- Retention basins, if allowed by the City, must be sized with a storage volume equal to the entire 100-yr post-developed runoff volume.
- Runoff greater than that occurring from the 100-year 24-hour storm will be passed through an emergency spillway.
- Principal outlets shall be at least 18-inches in diameter to minimize the chance of clogging and to facilitate cleaning. Orifice plates may be used on the upstream end of the principal outlet pipe to reduce the maximum release rate as needed.
- Emergency spillways shall be designed to safely pass the entire post-developed 100-year flood, routed through the detention basin assuming the principal outlets are not functioning. A minimum of 1 foot of freeboard above the emergency spillway design water surface elevation is required.

The peak discharge rate from the detention basin shall not exceed the capacity of the downstream conveyance system. Conveyance systems below detention basins must have sufficient capacity for the greater of the following:

- Sufficient capacity to safely convey the 100-yr 24-hour peak flow obtained from combining the Principal Outlet Outflow Hydrograph with downstream inflow hydrographs.
- Sufficient capacity to safely convey the 100-yr 24-hour peak flow obtained from combining the Emergency Spillway Outflow Hydrograph with downstream inflow hydrographs.

If the detention basin is classified as a dam, the facility shall also comply with prevailing dam safety standards as outlined by the Utah State Dam Safety Act and the Utah Division of Water Rights.

Subsurface Facilities

Subsurface retention facilities are an acceptable means of stormwater retention and must meet the requirements set forth under the detention facilities. Additionally, subsurface facilities must accommodate traffic loadings where applicable.

1.4 Drainage Report and Plan

Below is a list of requirements that apply to stormwater systems. If the Final Plat is to be presented in sections, a drainage plan for the entire area shall be presented with the first section, and appropriate development stages for the drainage system for each section indicated. Information identified in the checklist should be submitted:

- Drainage Report
 - Prepared and stamped by a professional engineer, licensed in the State of Utah and qualified to perform such work
 - Narration for basis of selection and operation of the drainage design
 - Pre- and Post-development peak flows rate calculations
 - Pre- and post-development runoff volume calculations
 - Document any applicable field test results
 - Copies of associated permits, easements, and discharge agreements
 - Operation and Maintenance (O&M) Plan
- Comprehensive and complete drainage plan;
 - Topographic map of pre-development and finished grade contours
 - Onsite proposed building elevations of adjoining lots & finish floors
 - Grade of all impervious surfaces
 - Existing drainage and irrigation water conveyance systems within the property line or developed site
 - New or modified drainage systems including system dimensions, profiles, and elevations
 - Detail sheets

The drainage report and plan will be reviewed by the City Engineer and will recommend final approval based on meeting requirements outlined in this document.

1.5 Floodplains

The Floodplain Development Permit is the mechanism by which the City evaluates any and all impacts of activities proposed within regulated floodplains. Any party undertaking development within a designated floodplain must obtain a Floodplain Development Permit prior to the work commencing.

- No work may start until a permit has been issued by the City.
- The permit may be revoked if:
 - Any false statements are made in the Floodplain Development Permit.
 - The effective Flood Insurance Rate Map has been revised.
 - The work is not done in accordance with local, state, and federal regulatory requirements.
 - The work is different than what is described and submitted to the City as part of the Floodplain Development Permit.
- If revoked, all work must cease until permit is re-issued.

- If the permit cannot be re-issued, then the owner of the development will be responsible to correct the issue which may require removal of any development that may have occurred.
- Other applicable local, state, and federal permits must also be obtained.