

# CITY OF HOLBROOK

## DRAINAGE AND DETENTION CRITERIA

August 2004

Drainage reports and/or engineered grading and drainage plans are required to: (1) analyze the impact that the proposed development will have on stormwater discharges; (2) provide adequate data to ensure that the development is designed to be protected from flooding and conforms to applicable floodplain and stormwater management regulations; and (3) provide data for the design of public and private drainage facilities.

Drainage reports shall be of sufficient detail to demonstrate that the development or project will not create drainage or flooding problems and that any on-site drainage facilities are properly sized to detain and/or convey the design storm flows.

The purpose of this guideline is to present criteria for submittals of drainage reports, floodplain studies, grading and drainage plans, and public drainage improvement plans to the City of Holbrook for review and approval.

Additional criteria are found, by order of precedence, in Navajo County Stormwater Design Criteria, the Arizona Department of Transportation (ADOT) Highway Drainage Design Manual and appropriate FEMA guidelines. Improvement designs should utilize Maricopa Association of Governments (MAG) and/or ADOT standard specifications and details.

### **General Requirements**

Drainage reports will be required for the following land development activities:

1. Residential, commercial and industrial subdivisions.
2. Any multi-family residential or commercial development or parking lots.
3. Public improvements involving new streets, culverts, storm drains, open channels, and private/public detention facilities or other drainage infrastructure.
4. Application for Conditional Letter of Map Revision (CLOMR) or Letter of Map Revision (LOMR) to the Federal Emergency Management Agency (FEMA).
5. Any other improvements which, in the opinion of the City, require a report.

A drainage report may also be required for application for a building permit, floodplain permit, or grading permit if site conditions warrant or if drainage dictates the development of the site. Any project disturbing one acre or more will be required to have an approved Storm Water Pollution Prevention Plan (SWPPP) prior to commencing construction.

Drainage reports submitted to the City for review and approval shall be prepared and sealed by an Arizona registered Professional Engineer. The City of Holbrook recommends discussing all proposed development submittals with City staff prior to preparation or submittal of a report.

**Improvement Guidelines**

Design frequencies for drainage improvements are as follows:

<u>Type of Facility</u>	<u>Structure Type</u>	<u>Design Frequency</u>
Arterial Streets	Bridges	50 years
	All other structures	50 years
	Pavement Drainage	10 years
Collector Streets	Bridges	25 years or 50 years when conditions warrant
	All other structures	25 years
	Pavement Drainage	10 years
Minor Streets	All structures	25 years
	Pavement drainage	10-years

All weather access shall be provided on streets. This is defined as no greater than one foot of flow over the road for the 100-year frequency.

**Hydrology Methods**

The City of Holbrook will normally accept the following technical procedures for the estimation of design discharges. The Navajo County Stormwater Design Criteria, the Arizona Department of Transportation (ADOT) Highway Drainage Design Manual and appropriate FEMA guidelines should be used for guidance when utilizing the following methods:

1. Rational Method – This method is for small urban watersheds, less than 160 acres and with fairly uniform land use. Use of this method will produce peak discharges and runoff volumes and should not be used for more complex watersheds. This method is normally used to size drainage structures for the peak discharge of a selected return period.
2. TR-55 – Technical Release No. 55 “Urban Hydrology for Small Watersheds,” was developed to provide solutions for a wide variety of small watershed hydrology problems including computation of peak discharge, hydrograph generation, reach routing, and detention storage estimates. For more complex watersheds and modeling, TR-55 is recommended.
3. HEC-1 – This method is the U.S. Army Corp of Engineers rainfall runoff model. It should be used for modeling larger, more complex watersheds or drainage networks. It is suggested that the coefficients to be utilized in the HEC-1 model be thoroughly reviewed prior to utilizing any HEC-1 options. The SCS type II 24-hour storm distributions with antecedent moisture condition II shall normally be used.

Other hydrologic methods such as the Soil Conservation Service (SCS) Technical Release 20 (TR-20) will normally be accepted. The use of these methods must conform to the procedures outlined in the SCS manual.

### **Storm Water Detention**

Detention is not required for developments of 1 acre in size or less or with an impervious area of less than 15,000 sf.

When preparing plans utilizing onsite detention, the engineer should consider the impact of the retarded peak release rates on flows from upper portions of larger drainage basins. That is, the analysis should evaluate how the detained runoff will impact the overall basin discharge rate. Cases may be encountered where onsite detention facilities would actually increase the discharge in the receiving stream or would have no beneficial effect. When such cases are encountered, the hydrological analysis should be included together with an explanation and request that the onsite detention requirements be waived due to its detrimental affect on the receiving stream. It is suggested that a more thorough analysis, such as the HEC-1 or TR-20 method, be utilized whenever more complex basins are involved. The Rational Method and TR-55 methods are simplified approximations that are only applicable to the most straightforward application.

Whenever stormwater detention or other methods are employed to hold runoff to historic levels, the analysis shall address the affects of the 2-year, 10-year and 50-year events. Regardless of the calculation method utilized to analyze the detention it will be necessary to illustrate the runoff is held to historic levels during the 2-year, and 10-year 24-hour events. The detention facility must have adequate capacity to safely convey the 100-year event through the detention structure. No freeboard on the ponds will be required. The adequacy of the system to convey the 100-year event flowrates will be considered adequate freeboard.

Runoff from small basins, typically those less than 10 acres in size, may be analyzed using the modified rational method as described in, "Design Methods for the Design of Detention Facilities", "Urban Stormwater Management", or "Practices in Detention of Urban Stormwater Runoff." Detention basins for drainage areas ranging in size from 10 acres to 40 acres in size may be designed using the methods as outlined in the SCS TR-55.

It is the City's policy that onsite detention only be utilized when it will provide the necessary beneficial affect of reducing runoff to historic levels or to hold runoff to the capacity of critical downstream facilities. Whenever onsite detention is proposed, a method of providing long term maintenance of the facility shall be established. The maintenance responsibility resides with the property owner or an established property owners' association. The City of Holbrook will not be responsible for the maintenance of private detention facilities.