

**311.06 STORMWATER
MANAGEMENT USING
RETENTION/DETENTION
DESIGN**

In general, retention refers to stormwater storage without access to a positive outlet, while detention facilities offer temporary storage accompanied by controlled release of the stored water. Wet detention typically has a pool of water below the outlet elevation; dry detention is typically placed with the basin bottom above the seasonal high water table. Retention and detention can be used separately or together in storage basins as site conditions and management objectives require.

Historically, "detention" basins are used only when such use reduced the outfall size (by reducing the peak discharge) enough to justify the cost. An additional benefit is that they can also be effective in improving stormwater quality.

The drainage volume of the design manual provides general design criteria for retention/detention basins as well as procedures for performing preliminary sizing and final reservoir routing calculations. The Storage Indication Method is presented as an acceptable method for detention calculations. Exfiltration calculations may be required for certain retention systems for estimations of percolated discharge rates.

Land-locked drainage areas will require retention storage areas designed to meet special considerations.

The collection of field and published data for the planning and location of retention/detention facilities should be coordinated so that it can be accomplished concurrently with other aspects of a particular project. A general discussion of data collection procedures is presented in Section 311.02.03.

A key element to proper planning of retention/detention facilities is the selection of potential sites that will provide control of both flooding and stormwater quality. Other important considerations include:

- Runoff quality requirements
- Stormwater management master plan

- Conveyance of drainage to the site
- Availability of land
- Suitability of site for water storage
- Availability of suitable outlet point
- Adjacent land use
- Roadway control elevations
- Soil infiltration capability
- Water table fluctuations
- Outfall high water elevations
- Type of facilities proposed
- Safety and maintenance requirements

Planning for retention/detention facilities should be co-ordinated with the evaluation of borrow requirements for the project. To the maximum extent possible, excavation from construction of the retention/detention basins should be used as fill material. If borrow material is required for basin embankments, it should be obtained within the project limits, if possible.

The objective of drainage design is to provide the necessary roadway drainage facilities which allows the public to use the roadway during times of significant runoff and in a manner that minimizes the potential for adverse effects on adjacent property and existing patterns.

The effect of the roadway on the existing drainage pattern, the potential flood hazards, as well as the effect of floods on the roadway are to be assessed in the design process.

The engineer shall perform a drainage study in accordance with current design methodology, requirements and criteria in the drainage volume of the design manual. The criteria should identify such items as the hydrology method to be used, the design storm frequency to be accommodated, the allowable spread of water on the pavement to be tolerated at the specified storm frequency and any other pertinent hydraulic criteria which is a design control for the project. Applicability of existing Master Drainage Plans will be discussed.

The purpose of the drainage study is to identify potential drainage problems for the proposed improvement, to recommend solutions, and to establish initial pipe and channel sizings and alignments consistent with the improvement concept. The major drainage features shall be