SECTION 02061---- - FLOOD CONTROL PROJECTS (Detention Basin Designs)
CONSTRUCTION STANDARD

PART 1: GENERAL

1.01 Scope of Standard

A. Design elements for enhanced water quality will be incorporated in future flood control projects when the following two criteria are met:

1. Significant improvement in the quality of discharge can be reasonably expected and,
2. Incorporation of the additional storage volume for water quality is technically feasible.

B. UT recognizes that project conditions and requirements vary and that engineering calculations, space limitations, and site investigations are required to determine adherence to the items identified herein. However, unless there is adequate written justification, it is expected that these guidelines will govern the design and specification for Detention Basins on UT projects.

1.02 Reference Standards

The University of Texas at Austin, *Design and Construction Standards*, *Architectural and Civil Standards, Part 02060 Storm Water Management*.

Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices found on the Texas Natural Resources Conservation Commission website at: www.tnrcc.state.tx.us/admin/topdoc/rg/348/index.html.

PART 2: PRODUCTS – NOT USED

PART 3: EXECUTION

3.01 GENERAL

A. Detention Basin Designs for Flood Control
To minimize erosion the following five criteria for all detention basin designs will be incorporated:

(1) On-site detention ponds will be designed to reduce post-development peak rates of discharge to existing pre-development peak rates of discharge for the 2, 10 and 25-year storm events. In addition, the capacity of the existing downstream systems will be considered in determining the need for managing the 100-year storm event. For the post-development

hydrologic analysis, any off-site areas that drain to the pond shall be assumed to remain in the existing developed condition.

(2) For contributing areas up to 10 acres, the Modified Rational Method (MRM) may be used to determine capture volumes. For contributing areas greater than 10 acres, a flow routing analysis using detailed hydrographs must be applied. The Soil Conservation Service hydrologic methods (available in TR-20, HEC-HMS) can be used. The engineer may use other methods but must have their acceptability approved by The University.

(3) All concentrated flows into a flood control pond will be collected and conveyed into the pond in such a way as to prevent erosion of the side slopes. Additionally, outfalls into the pond will be designed to be stable and non-erosive.

(4) Side slopes of the pond should be 3:1 (H:V) or flatter for grass stabilized slopes. Slopes steeper than 3:1 (H:V) should be stabilized with an appropriate slope stabilization practice. This is to prevent the basins from contributing additional sediment to the runoff.

(5) For online facilities, special consideration should be given to the facility's outfall location. Flared pipe end sections that discharge at or near the stream invert are preferred. A stilling basin may be required to reduce flow velocities from the primary spillway to non-erosive velocities.

B. Water Quality Enhancement Design for Flood Control Structures
Assessment of potential for implementing water quality design features in flood control structures is determined from site inspections to determine whether the runoff has received a higher level of treatment than available in an extended detention basin if:

(1) grassy swales and vegetative buffers used to convey stormwater have a removal efficiency greater than that of a detention basin. Determination of existing conditions to design guidelines developed for these devices found in the guidance manual for compliance with the Edwards Rules (Barrett, 1999).

(2) significant additional pollutant removal can be expected in the detention basin. An assessment of the technical feasibility of incorporating the water quality volume in the flood control basin is determined by such factors as available hydraulic head and sufficient space.

If the water quality enhancement review indicates that significant water quality improvement is likely and that construction of a detention basin with additional volume to treat this runoff is technically feasible, then the following four criteria will apply to the design of the basins:

(1) *Capture Volume* – Many studies of the water quality of urban runoff have identified a "first flush" effect, which describes the phenomenon of

higher concentrations and relative loads in the first portion of the runoff event. Consequently, the University will attempt to capture and treat this volume in future flood control detention basins to enhance the water quality benefits. The water quality volume will consist of the first 0.5 inch of runoff from the contributing watershed.

(2) *The Basin Configuration* – A high aspect ratio improves the performance of detention basins; consequently, the outlets should be placed to maximize the flowpath through the facility. The ratio of flowpath length to width from the inlet to the outlet should be at least 2:1 (L:W) where feasible. The flowpath length is defined as the distance from the inlet to the outlet as measured at the surface. The width is defined as the mean width of the basin. Basin depths optimally range from 2 to 5 feet.

(3) *Basin Inlet* – Energy dissipation is required at the basin inlet to reduce resuspension of accumulated sediment and to reduce the tendency for short-circuiting.

(4) *Outflow Structure* – A gate valve or orifice plate should regulate the facility's drawdown time. In general, the outflow structure should have a trash rack or other acceptable means of preventing clogging at the entrance to the outflow pipes. The outflow structure should be sized to allow for complete drawdown of the water quality volume in 24 hours. For online facilities, the principal and emergency spillways must be sized to safely pass the flow from 100-year storm.