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Department of Transportation

Airport • Building Permits • Const. Mgmt. • Engineering • GIS • Vehicle Maint
Int'l Bridges • Property Management • Public Works • Right of Way • Solid Waste • Subdivisions

Pete Sepulveda, Jr.
Director

David A. Garcia
Assistant Director

ELEMENTS OF A DRAINAGE PLAN
COMMERCIAL STRUCTURES

The following are the minimum requirements:

1. Provide flood zone description
2. Scale (not less than 1'= 40'), north arrow, date and project title
3. Property lines and project limits if applicable
4. Typical existing features, including existing buildings, pavement and drainage structures.
5. Existing topography.
6. Show proposed grading and elevations of proposed drainage system
7. Show proposed drainage improvements (pipes, detention ponds, inlets, etc.)
8. On site detention will be required for all developments greater than 0.50 acres.
9. Drainage calculations
10. Detention calculations
11. Drainage structure details
12. Detention pond details
13. Outfall calculations
14. Erosion Control Plan (TCEQ requirements)

All applicable drawings shall be sealed in accordance with the State of Texas Architect's and\or Engineer's Practice Act.

1390 W. Expressway 83 San Benito, Texas 78586 Phone (956)247-3518 Fax (956)361-8278

ON-SITE DETENTION

ALL SITES WITH AREA OF 0.5 ACRE OR MORE MUST INCLUDE ON SITE DETENTION AS PART OF THE DESIGN. THE RELEASE RATE IS THE "Q" ATTRIBUTABLE TO THE SITE IN ITS UNDEVELOPED STATE. THE INFLOW RATE IS THE "Q" ATTRIBUTABLE TO THE SITE IN ITS DEVELOPED STATE. THE FOLLOWING ARE DESIGN STORM FREQUENCIES USED FOR VARIOUS SIZE SITES:

AREA	* FREQUENCY
LESS THAN 0.5 ACRE	DETERMINED ON A CASE BY CASE BASIS
0.5 ACRE TO 1.0 ACRE	5 YEARS
1.0 ACRE TO 5.0 ACRE	10 YEARS
5 - 10 ACRE	25 YEARS
10 - 25 ACRE	50 YEARS
OVER 25 ACRE	100 YEARS

* THESE FREQUENCIES ASSUME AN OUTLET FOR THE SITE.

THE RATIONAL FORMULA, Q = CIA IS USED. ATTACHED ARE NOMOGRAPHS FOR TIME OF CONCENTRATION AND INTENSITY, A CHART FOR VALUES OF "C", AND A WORKSHEET FOR COMPUTING DETENTION VOLUME REQUIRED.

WORKSHEET FOR DETENTION FACILITY: _____

TOTAL TRIBUTARY ARE (A):

DEVELOPED RUNOFF COEFFICIENT (C):

RELEASE RATE:

STORAGE VOLUME DETERMINATION:

RUNOFF FACTOR	STORM DURATION	RAINFALL INTENSITY	DRAINAGE AREA	INFLOW RATE	RELEASE RATE	STORAGE RATE	STORAGE REQUIRED
C	T (HR.)	I (IN./HR.)	A (AC.)	Q1 = CIA (CFS.)	QO (CFS.)	(Q1-Q0) (CFS.)	1/12 (Q1-Q0) X (T) (AC.-FT.)
	0.17 HR..						
	0.33 HR.						
	0.50 HR.						
	0.67 HR.						
	0.83 HR.						
	1.0 HR.						
	1.5 HR.						
	2.0 HR.						
	3.0 HR.						
	4.0 HR.						
	5.0 HR.						
	6.0 HR.						
	7.0 HR.						
	8.0 HR.						
	9.0 HR.						
	10.0 HR.						

ACTUAL STORAGE VOLUME:

ACTUAL RELEASE RATE:

RAINFALL INTENSITY – DURATION – FREQUENCY CURV

BROWNSVILLE, TEXAS
1923 – 1951

FIGURE 12