

**DRAINAGE DESIGN CRITERIA**

BASIS: RATIONAL METHOD Q = CIA  
 Q = CUBIC FEET PER SECOND  
 C = RUNOFF COEFFICIENT  
 I = DESIGN STORM INTENSITY  
 A = DRAINAGE AREA (ACRES)

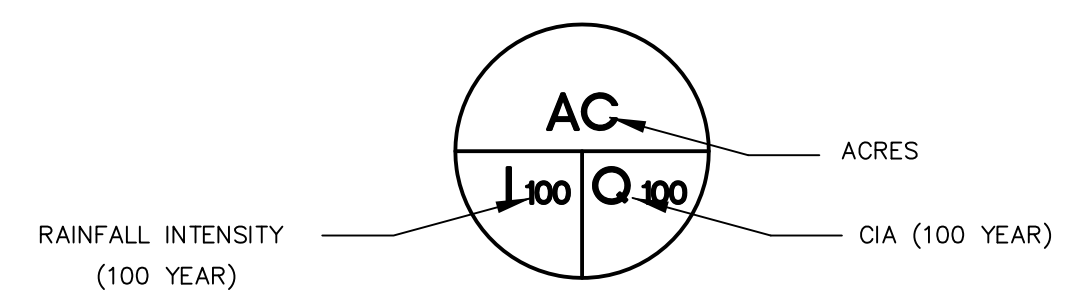
RUNOFF COEFFICIENT:  
 0.90 SHOPPING CENTERS

INTENSITY:  
 RAINFALL INTENSITY-DURATION-FREQUENCY CURVES FOR AREA DEVELOPED FROM NATIONAL WEATHER SERVICE RAINFALL FREQUENCY DATA PRESENTED IN TECHNICAL MEMORANDUM NWS HYDRO-35, DATED JUNE 1977 AND TECHNICAL PAPER NO. 40, DATED MAY 1961.

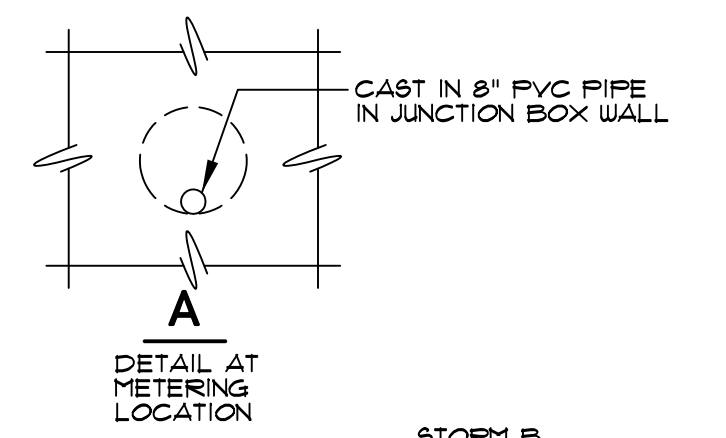
STORM FREQUENCY:  
 100 YEAR

TIME OF CONCENTRATION:  
 10 MINUTES

**DRAINAGE SYMBOL LEGEND**



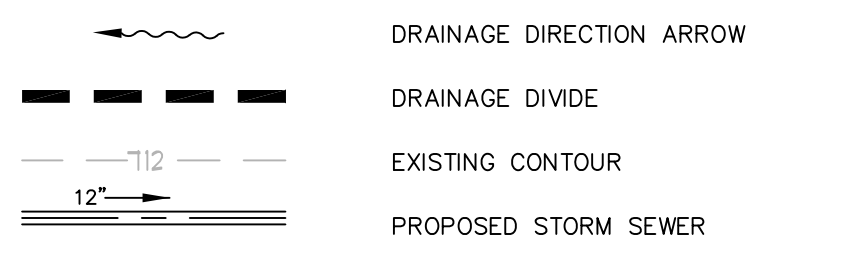
**ORIFICE CALCULATION**



**STORM A**  
 $Q_{100} = 1.48$  cfs  
 $1.48 = .71A\sqrt{2gh} = .71A\sqrt{64.4 (5.79)}$   
 $1.48 = 13.52 A$   
 $A = .109 > .373'$   
 USE 4 1/2"Ø

**STORM B**  
 $Q_{100} = 3.62$  cfs  
 $3.62 = .71A\sqrt{2gh} = .71A\sqrt{64.4 (5.79)}$   
 $3.62 = 13.52 A$   
 $A = .268 > .584'$   
 USE 1"Ø

**DRAINAGE LEGEND**



NOTE: IF IMPROVEMENTS ARE INSTALLED PRIOR TO CONSTRUCTION OF TXDOT SYSTEMS, PLUG THE METERING INSERT AT EACH DISCHARGING INLET AND THE ENDS OF PROPOSED PIPES INSTALLED A "V" NOTCH WEIR ADJACENT TO CURB INLETS (48") UNTIL TXDOT INLETS ARE INSTALLED. AFTER INSTALLATION OF THE TXDOT INLETS THE PROJECT CONTRACTOR WILL CONNECT TO THE TXDOT INLETS AND REMOVE THE "V" NOTCH WEIR.

BENCHMARK:  
 ON SITE BENCHMARK, FINISH FLOOR OF EXISTING BUILDING, RELATIVE ELEVATION - 100.00 = 595.28 CITY DATUM.

REV. NO.	TYPE OF WORK	ENG.	DATE	CITY OF ROCKWALL	DATE
<b>DRAINAGE AREA MAP</b>					
2008 PARKING ADDITION					
FIRST BAPTIST CHURCH - ROCKWALL, TX					
PUBLIC WORKS DEPARTMENT					
<b>CITY OF ROCKWALL, TEXAS</b>					
DESIGN	DRAWN	DATE	SCALE	NOTES	FILE NO.
J. PITT	R. MITCH	AUG 28 2008			C-3

**DETENTION ANALYSIS**  
 25AUG08

PREDEVELOPMENT CONDITIONS  
 C = 0.90, A = 0.44 (AREA "A")  
 C = 0.50, A = 1.23 (AREAS "B", "C" AND "D")  
 Tc = 20 min.  
 $I_{100} = 8.30$   
 $Q = 0.50 \times 8.30 \times 1.23 = 5.10$  cfs (AREAS "B", "C" AND "D")  
 TOTAL 5.10 cfs

POSTDEVELOPMENT CONDITIONS  
 C = 0.90, A = 1.23 (AREAS "B", "C" AND "D")  
 Tc = 10 min.  
 $I_{100} = 9.80$   
 $Q = 0.90 \times 9.80 \times 1.23 = 10.84$  cfs (AREAS "B", "C" AND "D")  
 TOTAL 10.84 cfs

15 min.	I = 9.00	Q = .90 X 9.00 X 1.23 =	9.96 cfs
20 min.	I = 8.30	Q = .90 X 8.30 X 1.23 =	9.19 cfs
30 min.	I = 6.90	Q = .90 X 6.90 X 1.23 =	7.64 cfs
40 min.	I = 5.80	Q = .90 X 5.80 X 1.23 =	6.42 cfs
50 min.	I = 5.00	Q = .90 X 5.00 X 1.23 =	5.54 cfs
60 min.	I = 4.50	Q = .90 X 4.50 X 1.23 =	4.98 cfs
70 min.	I = 4.10	Q = .90 X 4.10 X 1.23 =	4.54 cfs
80 min.	I = 3.90	Q = .90 X 3.90 X 1.23 =	4.32 cfs

**100 YEAR STORM**

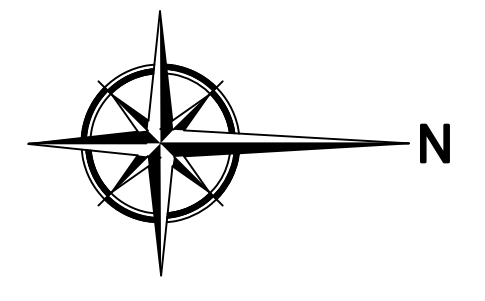
Storage Volume	Inflow	Outflow	Remarks
15 min. Storm	Inflow 15 X 9.96 X 60 sec./min. = 8,964 cf	Outflow 0.5 X 25 X 5.10 X 60 sec./min. = 3,825 cf	
20 min. Storm	Inflow 20 X 9.19 X 60 sec./min. = 11,028 cf	Outflow 0.5 X 30 X 5.10 X 60 sec./min. = 4,590 cf	
30 min. Storm	Inflow 30 X 7.64 X 60 sec./min. = 13,752 cf	Outflow 0.5 X 40 X 5.10 X 60 sec./min. = 6,120 cf	
40 min. Storm	Inflow 40 X 6.42 X 60 sec./min. = 15,408 cf	Outflow 0.5 X 50 X 5.10 X 60 sec./min. = 7,650 cf	
50 min. Storm	Inflow 50 X 5.54 X 60 sec./min. = 16,620 cf	Outflow 0.5 X 60 X 5.10 X 60 sec./min. = 7,440 cf	
60 min. Storm	Inflow 60 X 4.98 X 60 sec./min. = 17,928 cf	Outflow 0.5 X 70 X 5.10 X 60 sec./min. = 10,710 cf	
70 min. Storm	Inflow 70 X 4.54 X 60 sec./min. = 19,068 cf	Outflow 0.5 X 80 X 5.10 X 60 sec./min. = 12,240 cf	
80 min. Storm	Inflow 80 X 4.32 X 60 sec./min. = 20,736 cf	Outflow 0.5 X 90 X 5.10 X 60 sec./min. = 13,270 cf	
PEAK VOLUME	= 7,758 ft <sup>3</sup> at 40 min. Storm		

**DRAINAGE CRITERIA Q = CIA**

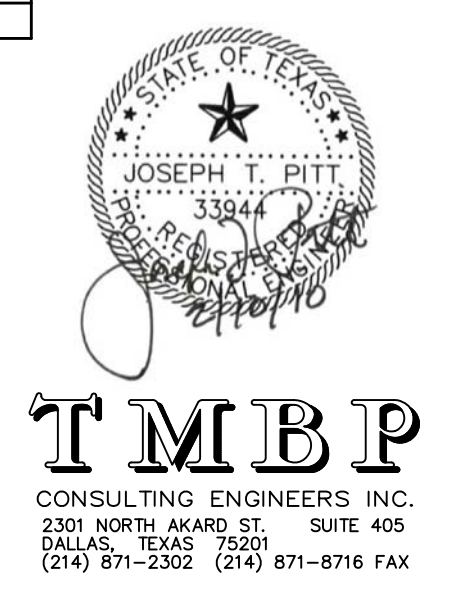
AREA NO.	AREA AC	Tc	c	I IN	Q <sub>100</sub>	REMARKS
A	0.44	10	0.90	9.80	3.88	15' CURB INLET
B	0.36	10	0.90	9.80	3.17	5' CURB INLET
C	0.42	10	0.90	9.80	3.70	5' CURB INLET
D	0.45	10	0.90	9.80	3.97	10' CURB INLET
E	0.07	10	0.90	9.80	0.62	OFF SITE
F	0.18	10	0.90	9.80	1.59	OFF SITE

**DETENTION DISCHARGE**

YEAR	DETAINED VOLUME	WATER SURFACE ELEV.	STORM A "Q" ACTUAL	STORM A "Q" ALLOWED	STORM B "Q" ACTUAL	STORM B "Q" ALLOWED
2 YEAR	3,222 ft <sup>3</sup>	592.08	1.45 cfs	0.71 cfs	3.55 cfs	1.75 cfs
5 YEAR	4,546 ft <sup>3</sup>	592.19	1.46 cfs	0.87 cfs	3.58 cfs	2.14 cfs
10 YEAR	5,274 ft <sup>3</sup>	592.21	1.46 cfs	1.04 cfs	3.59 cfs	2.54 cfs
25 YEAR	6,036 ft <sup>3</sup>	592.24	1.47 cfs	1.20 cfs	3.60 cfs	2.93 cfs
50 YEAR	6,840 ft <sup>3</sup>	592.27	1.47 cfs	1.30 cfs	3.61 cfs	3.18 cfs
100 YEAR	7,758 ft <sup>3</sup>	592.29	1.48 cfs	1.48 cfs	3.62 cfs	3.62 cfs



RECORD DRAWINGS  
 FEBRUARY 10, 2010



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