(DRF=sh:SLD\023300\MSGRA\330ht02.dgn - ON=1-56
DGN=dg:\SLD\023300\MSGRA\330ht02.dgn - ON=1-56
(DRF=sh:SLD\023300\MSGRA\330ht02.dgn - LOG=(ELI) - ON=1-12,15,16,18,20,21,30,34,35,44,45
(DRF=sh:SLD\023300\MSGRA\consshot.dgn - LOG=(ELI) - ON=1-12,15,16,18,20,21,30,34,35,44,45
(DRF=sh:SLD\023300\MSGRA\330ht02.dgn - ON=1-56
PRF=\\DAL-SLD\SAN\OL2\JPA1700KM_330ht02.prf - ROT=90.000000 - SCALE=20.000000
(DRF=sh:SLD\023300\MSGRA\330ht02.dgn - LOG=(TBL-\\DALFS1-ONI-63 - TBL=\\ANDREWT1.TBL)
USER=tipton JOB=UNKNOWN PLOTTED Thu Mar 09 13:48:56 2006

DETENTION BASIN FLOW DATA

Description	Direct Area (Acres)	Diverted Area (Acres)	Total Area (Acres)	Time of Conc. * (min)	Wolted Coef. "c"	Intensity 100 Year (In./Hr.)	100 Yr Flow Rate (cfs)	REMARKS
1	2	3	4	5	6	7	8	9
I. SIDE DITCH DRAINAGE AREA *****								
PROPOSED CONDITIONS **	0.26		0.26	10	0.80	8.74	1.82	For design of West property line swale.
including: Commercial Development	0.26		0.26	10	0.80	8.74	1.82	
II. OFFSITE AREA ****								
EXISTING CONDITIONS *	2.2		2.2	15	0.40	7.52	6.62	
III. STORM DRAIN LINE SD-1	2.46		2.46	15	0.44	7.52	8.18	Only for design of SD-1
IV. PROPOSED BUSINESS TRACT FLOW								
EXISTING CONDITIONS *	1.86		1.86	15	0.40	7.52	5.59	
PROPOSED CONDITIONS **	1.86		1.86	10	0.80	8.74	13	
including: Commercial Development	1.86		1.86	10	0.80	8.74	13	
V. TOTAL ULTIMATE OUTFLOW ***								
EXISTING CONDITIONS	4.06		4.06	15	0.40	7.52	12.2	Flow for sizing the controlling structure.
PROPOSED CONDITIONS	4.06		4.06	15	0.58	7.52	17.8	Assumed with detained offsite flow.

Notes: * - Time of Concentration is estimated, based on single-family residential development land use.
** - Detention volume determined as a difference of the proposed Commercial and single-family residential land use.
*** - Detention Basin Controlling structure sized based on ultimate combined outflow through detention basin.
**** - Offsite area flows is assumed to be detained by others.

DETENTION BASIN CALCULATIONS

Designation Area	EXISTING Coef. "c"	EXISTING Tc (min)	EXISTING Intensity (in/hr.)	PROPOSED Coef. "c"	PROPOSED Tc (min)	PROPOSED Intensity (in/hr.)	Total Area Existing (Ac.)	Total Area Proposed (Ac.)	Rain Frequency (yr.)	Qmain Existing (cfs)	Qmain Proposed (cfs)	Qmain Released (cfs)	High Water Elevation (Ft.)	Storage Volume (c.f.)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Addison Business Tract	0.40	15	7.52	0.58	15	7.52	4.06	4.06	100	12.2	17.8	12.2	632.14	5,663

OUTFLOW PIPE DESIGN

PROJECT: Addison Business Tract
LOCATION: City of Addison
Project No.: 023313.00
Date: 10/28/2005
CULVERT LOCATION: Detention Outflow System
Designed By: PC
Checked By: GP
Inlet Control/Entrance Flow Coefficient K = 1
CULVERT SLOPE: S = 0.41% = 0.0041 ft/ft
CULVERT LENGTH: L = 294 ft
Culvert M = 0.053

Entrance Code No.	CULVERT DESCRIPTION (entrance type)	Design Q	SIZE D	HEADWATER COMPUTATION: INLET CONTROL HW/D	INLET CONTROL HW	OUTLET CONTROL (HW=H+h+-LS*) K*	H	D<	D<±D/2	TW	h*	L* S*	HW	CONTROLLING HW	V OUTLET	COMMENTS
		cfs	in.		ft.		ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	fps	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Inlet	8.39	24	0.96	1.95	0.20	1.14	1.25	1.63	2.20	2.28	1.20	2.34	2.34	5.2	

Number of Culverts = 1

Controlling Orifice Design

Q = K x A* x (2g x (h*- h*/2*D))^0.5
Orifice Flo: 12.39 cfs.
Required Area of Orifice (Ao): 1.73 sq. Ft.
Required Diameter of Orifice (Do): 17.81 In.
Water head prior to orifice (h1): 4.44 Ft.
Water head after orifice (h2): 2.34 Ft.
Flow Coefficient (K=C0): 0.62
Weir Flow Elevation = 630.80
Required Weir Elevation = 630.34
Weir Controlling Flow Elevation = 630.34 ok

Spillway Weir Analyses

h = (Q/(C*L))^(1/1.5)
Spillway Ultimate Flowthat = 5.60 cfs.
Length of Weir (L) = 15 Ft.
Sides of Weir Contraction = 0 each
Head of (h) = 0.27 Ft.
Height of (): 4.34 Ft.
Coef. of (K) = 3.24
Weir Elevat = 632.41
Spillway Weir Elevation = 632.14
Size of Inlet: 3' x 3' Grate Inlet

FINAL DESIGN
N.T.S.
INV ELEV.= 628.04
BANK ELEV.= 638.50
SIDE 26% RCP
W ELEV.= 629.80
FL.ELEV.= 628.00
SLOPE 0.41 %
CONC 125 ft.
LENGTH 294 ft.
VELOCITY 5.2 fps.
FREE BOARD 3.41 ft.
3' x 3' Grate Inlet
FL.ELEV.= 635.80

OUTFLOW PIPE DESIGN

PROJECT: Addison Business Tract
LOCATION: City of Addison
Project No.: 023313.00
Date: 10/28/2005
CULVERT LOCATION: Backside Drainage, Line SD-1
Designed By: PC
Checked By: GP
Inlet Control/Entrance Flow Coefficient K = 1
CULVERT SLOPE: S = 4.762% = 0.0476 ft/ft
CULVERT LENGTH: L = 21 ft
Culvert M = 0.053

Entrance Code No.	CULVERT DESCRIPTION (entrance type)	Design Q	SIZE D	HEADWATER COMPUTATION: INLET CONTROL HW/D	INLET CONTROL HW	OUTLET CONTROL (HW=H+h+-LS*) K*	H	D<	D<±D/2	TW	h*	L* S*	HW	CONTROLLING HW	V OUTLET	COMMENTS
		cfs	in.		ft.		ft.	ft.	ft.	ft.	ft.	ft.	ft.	ft.	fps	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	3' x 3' Drop Inlet	8.38	18	1.09	1.64	0.20	0.53	1.00	1.30	3.14	3.14	1.00	2.67	2.67	11.6	

Number of Culverts = 1

Culvert approach open channel analysis

Channel M = 0.030

Entrance Code No.	CHANNEL LOCATION	Rain Intensity	CHANNEL GEOMETRY: Design Flow Qd	Bottom Width Bw	Side Slope (Z/1)	Depthd	Top Width T	Slope S	Hyd Radius r	Vel. Flow V	Flow Area A
No.		year	cfs	ft		ft	ft	%	ft	fps	sq.ft.
1	UPSTREAM	100	1.82	0	3	0.58	3	0.77	0.27	1.8	1.0

Drop Inlet Sizing

h = (Q/(C*L))^(1/1.5)
Spillway Ultimate Flowthat = 5.60 cfs.
Length of Weir (L) = 12 Ft.
Sides of Weir Contraction = 0 each
Head of (h) = 0.27 Ft.
Height of () = 0 Ft.
Coef. of (K) = 3.40
Inflow Elevation = 634.00
High Water = 634.27
Size of Inlet: 3' x 3' Drop Inlet

FINAL DESIGN
N.T.S.
INV ELEV.= 632.67
BANK ELEV.= 635.30
SIDE 18% RCP
W ELEV.= 632.14
FL.ELEV.= 630.80
SLOPE 4.76 %
CONC 3.59 ft.
LENGTH 21 ft.
VELOCITY 11.6 fps.
FREE BOARD 2.6 ft.
FL.ELEV.= 629.80

DETENTION BASIN DESIGN for 100 Year Storm

Project: Addison Business Tract
Location: City of Addison Texas
Project No.: 023313.010
Date: 10/25/2005
Designed By: PC
Checked By: GP

Limitations set of a usage of the Modified Rational Method for this Design = 600 Ac.

Existing site condition: Watershed Area = 1.86 Ac. = 0.003 Sq.Miles
K = 1 Cu = 0.4 Tc (u) = 15 Storm Frequency = 100
Rain Intensity Iu = 7.52 in/hr. Peak Runof 5.59 cfs.

Proposed site condition: Watershed Area = 1.86 Ac. = 0.003 Sq.Miles
K = 1 Cd = 0.8 Tc (d)= 10 Storm Frequency = 100
Rain Intensity Id = 8.74 in/hr. Peak Runoff Rate Od = 13.00 cfs.

Rainfall Duration Interval = 3 min. Actual Rate of Release Or = 5.59 cfs.
Total Design Rainfall (TR = I*Tc/60): 1.46 in. Total Design Runoff (R = K*C*TR): 1.16 in.
Total Design Runoff Volume @ Proposed Site Condition (V' = A*R*3630): 7,864 cf.
Peak Runoff Ratio (qo / qi): 0.45

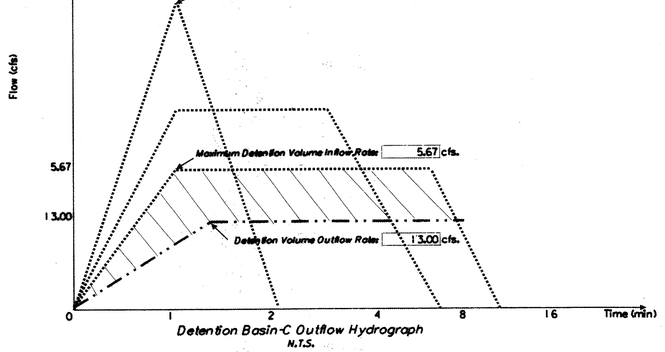
HYDROGRAPH SIMULATIONS

Triangular pattern of Design Storm Duration (Tb=V1/Qd*30): 20.2 min.
Required Design Storm Duration (Tp=Tb*3/8): 7.6 min.
Time Lag of Design Storm Duration (Tlag=Tc (d)-Tp): 2.4 min.
Total Runoff Volume from project site at existing condition (Vo = Tb*Qo*30): 3,388 cf.
Hydrograph Required Storage Volume per Modified Rational Method (SVh = V1-Vo): 3,576 cf.
The same in (acre-ft) 0.08 acre-ft.
Required Detention Ratio to total Runoff Volume (Vs /Vr): 0.314
Hydrograph Required Storage Volume per Technical Release (TR-55) by USDA (SVh = V1*Vs/Vr): 0 cf.
The same in (acre-ft) 0 acre-ft.

ROUTING SIMULATIONS

Line	Rainfall Duration t (min.)	Rainfall Intensity I (in/hr.)	Proposed Inflow Rate Q' (cfs.)	Volume (c.f.) (in) V'	Volume (c.f.) (out) V*	Required Storage Volume S V (cf.)	COMMENTS & ASSUMPTIONS
0	1	2	3	4	5	6	7
1	10	8.74	13.01	7,806	3,354	4,452	1. Detention Design is based on Modified Rational Method.
2	13	8.01	11.92	9,298	4,360	4,937	2. Runoff rates for the Peak Runoff Ratio are calculated per Rational Method.
3	16	7.38	10.98	10,541	5,366	5,174	3. This spreadsheet is using data of City of Addison rain intensity duration.
4	19	6.96	10.36	11,840	6,371	5,468	
5	22	6.61	9.84	12,989	7,379	5,610	
6	25	6.29	9.36	14,040	8,385	5,655	
7	28	5.96	8.87	14,902	9,391	5,510	
8	31	5.68	8.45	15,717	10,397	5,320	
9	34	5.47	8.14	16,606	11,404	5,202	
10	37	5.25	7.81	17,338	12,410	4,928	
11	40	5.04	7.50	18,000	13,416	4,584	
12	43	4.86	7.23	18,653	14,422	4,231	
13	46	4.68	6.96	19,210	15,428	3,781	
14	49	4.50	6.70	19,698	16,435	3,263	
15	52	4.33	6.44	20,093	17,441	2,652	
16	55	4.18	6.22	20,525	18,447	2,079	
17	58	4.02	5.98	20,810	19,453	1,357	
18	61	3.88	5.77	21,118	20,459	659	
19	64	3.81	5.67	21,773	21,466	307	
20	67	3.73	5.55	22,381	22,472	-161	
Routing Required Storage Volume SVR = Max(S+)=						5,655 cf.	Required Storage Volume SV = Max(S+,SR)= 5,655 cf.
The same in (acre-ft)						0.13 acre-ft.	Required Storage Volume in (acre-ft)= 0.13 acre-ft.
							Designed Storage Volume in (acre-ft)= 0.13 acre-ft.

100 Year Detention Volume Hydrograph
Volume (c.f.): 5,800 / 5,600 / 5,400 / 5,200 / 5,000 / 4,800 / 4,600 / 4,400
Time (min.): 10 / 15 / 20 / 25 / 30 / 35 / 40
Volume Hydrograph



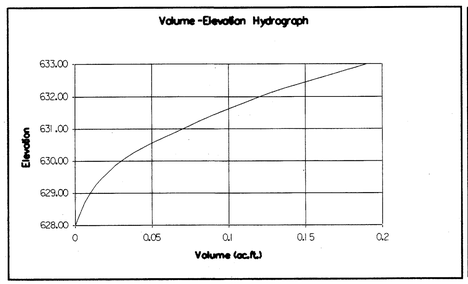
Detention Basin-C Outflow Hydrograph
N.T.S.

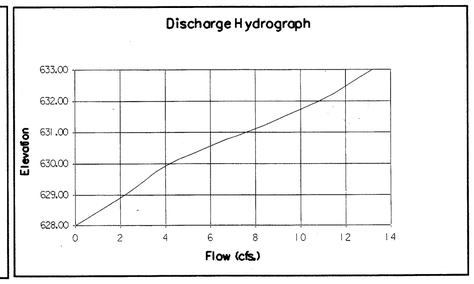
DETENTION VOLUME ANALYSIS

Volume Elev.	Area (sq.ft.)	Area (ac.)	Volume (ac.ft.)	Volume Sum	Flow
628.00	0	0.000	0.00	0.00	0
629.00	759	0.017	0.01	0.01	2.2
630.00	1,325	0.030	0.02	0.03	4.2
631.00	1,943	0.045	0.04	0.07	7.6
632.00	2,824	0.065	0.05	0.12	10.8
633.00	3,645	0.084	0.07	0.19	13.2

100 YEAR DETENTION VOLUME ANALYSIS
Require Detention Volume = 0.13 ac.ft.
Require High Water Elevation : 632.14
Design High Water Elevation : 632.14
Design Detention Volume = 0.13 ac.ft.

Notes:
1. Incremental volume computed by the Conic Method for Reservoir Volumes.
2. Volume = (1/3) x (EL2 - EL1) x (Area1 + Area2 + sq. rt. (Area1 x Area2))
Where: EL1 - Lower elevation of increment; EL2 - Upper elevation of increment.
Area1 - Lower area of increment; Area2 - Upper area of increment.





RECORD DRAWING
THIS DRAWING HAS BEEN MODIFIED TO REFLECT CONSTRUCTION RECORDS PROVIDED TO THE ENGINEER

PIOTR L. GULER 87141 LICENSED PROFESSIONAL ENGINEER 3.9.06

DATE	REVISION	MADE	CKD	APPD

Carter=Burgess
Carter & Burgess, Inc. 7950 Elmbrook Drive Dallas, Texas 75247-4961
(214) 638-0145 Metro (214) 263-2019 Fax (214) 638-0447

DRAINAGE CALCULATIONS

ADDISON OFFICE CONDOS

TOWN OF ADDISON, DALLAS COUNTY, TEXAS

DESIGN	DRAWN	CHECKED	SCALE	DATE	FILE	NO.
TIPTON	GUERIN	POWELL	1" = 20'	MARCH'06	01-6628	16 OF 17

DGN=dg:\SLD\023300\MSGRA\330ht02.dgn - ON=1-56
The seal appearing on this document was authorized by Pyotr L. Guler, P.E. 87141, on March 09, 2006. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.
C&B JOB No. 023313010