Upstream Station	Downstream Station	Distance Between Collection Points	Area No.	Drainage Area "A"	Incremental Runoff Coeff. "C"	Inc. "CA"	Accumulated "CA"	Time at Upstream Station (min)	Design Storm Frequency (yrs.)	Intensity "I" (inches/hr)	Storm Water Runoff "Q" (c.f.s.)	Slope of Hydraulic Gradient "S" (ft/ft)	Selected Storm Sewer Size (inches)	Velocity Between Collection Pts. "V" (f.p.s.)	Head Loss Coeff. "Kj"	Velocity Head Loss At Upstream Station (feet)	Flow Time in Sewer (min)	Time at Downstream Station (min)	H1	H2	REMARKS
Storm Drain Line "A"																					
24"x24" → ⧖-GRATE INLET	4+08.0	120.00	A4	0.22	0.9	0.20	0.20	10.00	100	8.74	1.73	0.0003	18	0.98	1.25	0.02	2.04	10.00	642.22	642.24	Top = 643.75
24"x24" → ⧖-GRATE INLET	2+68.0	140.00	A3	0.34	0.9	0.31	0.50	10.00	100	8.74	4.40	0.0018	18	2.49	0.50	0.05	0.94	10.00	642.14	642.19	Top = 643.5
30"x30" → ⧖-GRATE INLET	1+58.0	110.00	A2	0.33	0.9	0.30	0.80	10.00	100	8.74	7.00	0.0020	21	2.91	0.50	0.07	0.63	10.00	641.83	641.89	Top = 643.5
30"x30" → ⧖-GRATE INLET	0+00	158.00	A1	0.24	0.9	0.22	1.02	10.00	100	8.74	8.89	0.0031	21	3.70	0.50	0.15	0.71	10.00	641.47	641.61	Beginning Hg = 640.97, Top = 643.75
Storm Drain Line "B"																					
6' INLET	1+99.5	6.30	B-1	0.34	0.9	0.31	0.31	10.00	100	8.74	2.67	0.0006	18	1.51	1.25	0.04	0.07	10.00	637.74	637.78	Gutter = 642.6
1+99.5	0+05.0	194.50					0.31			8.74	2.67	0.0006	18	1.51	0.60	0.01	2.14	10.00	637.72	637.73	
14' INLET	0+94.6	179.73	B-3	0.86	0.9	0.77	0.77	10.00	100	8.74	6.76	0.0041	18	3.83	1.25	0.28	0.78	10.00	639.84	640.12	Gutter = 640.2
6' INLET	0+05.0	89.60	B-2	0.44	0.9	0.40	1.17	10.00	100	8.74	10.23	0.0095	18	5.79	1.25	0.65	0.26	10.00	638.44	639.09	Gutter = 639.6
0+05.0	0+00.00	5.00					1.48			8.74	12.90	0.0151	18	7.30	0.60	0.52	0.01	10.00	637.08	637.59	Beginning Hg = 637 (assumed)
Storm Drain Line "C"																					
14' INLET	0+00.00	29.50	C-1	0.91	0.9	0.82	0.82	10.00	100	8.74	7.16	0.0046	18	4.05	1.25	0.32	0.12	10.00	638.89	639.21	Beginning Hg=638.75, Gutter=640.20
Storm Drain Line "E"																					
14' INLET	0+00.00	18.80	E-1	1.82	0.9	1.64	1.64	10.00	100	8.74	14.32	0.0186	18	8.10	1.25	1.27	0.04	10.00	639.10	640.37	Beginning Hg=638.75, Gutter=641.65
Storm Drain Line "F"																					
6' INLET	0+00.00	18.80	F-1	0.23	0.9	0.21	0.21	10.00	100	8.74	1.81	0.0003	18	1.02	1.25	0.02	0.31	10.00	638.76	638.78	Beginning Hg=638.75, Gutter=640.92
Storm Drain Line "G"																					
6' INLET	0+7.3	13.10	G-1	0.13	0.9	0.12	0.12	10.00	100	8.74	1.02	0.0001	18	0.58	1.25	0.01	0.38	10.00	640.97	640.98	Beginning Hg=640.97, Gutter=642.25
Storm Drain Line "H"																					
6' INLET	0+00.00	15.20	H-1	0.30	0.9	0.27	0.27	10.00	100	8.74	2.36	0.0005	18	1.34	1.25	0.03	0.19	10.00	640.98	641.01	Beginning Hg=640.97, Gutter=643.45
Storm Drain Line "D-1"																					
0+59.7	0+00.00	53.80	A,D1,G,H								2.50	0.0428	8	7.16	1.25	1.00	0.13	10.00	639.97	640.97	Beginning Hg=637.67, Basin FL=638.21
Storm Drain Line "D-2"																					
0+58.3	0+00.00	58.30	C,D2,E,F								9.80	0.0230	15	7.99	1.25	1.24	0.12	10.00	637.51	638.75	Beginning Hg=636.15, Basin FL=635.36

N

0 10 20 30 40 60 80 120
SCALE IN FEET

MODIFIED RATIONAL METHOD DETENTION BASIN DESIGN
PROJECT: SOUTH BASIN ALONG WESTGROVE

Runoff Coefficient C = 0.9
Drainage Area - A = 3.48 acres
Time of Concentration - tc = 10 minutes
Maximum Outflow Rate - Q = 9.8 cfs

Duration (minutes)	Intensity (inches/hr)	Depth (inches)	Inflow Discharge Q=CiA	Inflow Volume Cu. Ft.	Outflow Duration (minutes)	Outflow Volume Cu. Ft.	Storage Volume Cu. Ft.
5	10.49	0.87	32.9	9,856	15	4,410	5,446
10	8.74	1.46	27.4	16,424	20	5,880	10,544
15	7.52	1.88	23.6	21,197	25	7,350	13,847
20	6.80	2.27	21.3	25,557	30	8,820	16,737
30	5.75	2.88	18.0	32,416	40	11,760	20,656
40	5.00	3.33	15.7	37,584	50	14,700	22,884
50	4.40	3.67	13.8	41,342	60	17,640	23,702
60	3.91	3.91	12.2	44,086	70	20,580	23,506
70	3.63	4.24	11.4	47,750	80	23,520	24,230
80	3.33	4.44	10.4	50,062	90	26,460	23,602
90	3.18	4.77	10.0	53,783	100	29,400	24,383
120	2.62	5.24	8.2	59,082	130	38,220	20,862
180	1.91	5.73	6.0	64,607	190	55,860	8,747
						Required Storage Volume	24,383 cubic feet
							0.56 acre-feet

Note: 100yr. c=.9 in. 25 yr. c=.5 out

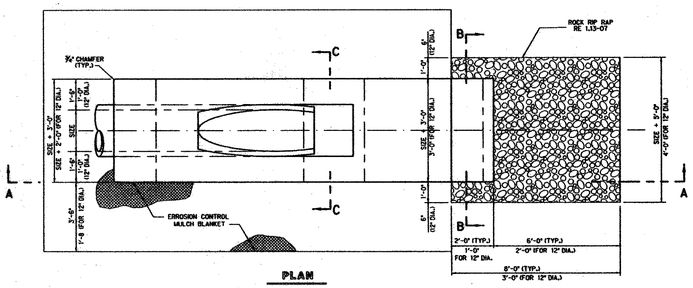
MODIFIED RATIONAL METHOD DETENTION BASIN DESIGN
PROJECT: NORTH BASIN ALONG WESTGROVE

Runoff Coefficient C = 0.9
Drainage Area - A = 2.07 acres
Time of Concentration - tc = 10 minutes
Maximum Outflow Rate - Q = 2.5 cfs

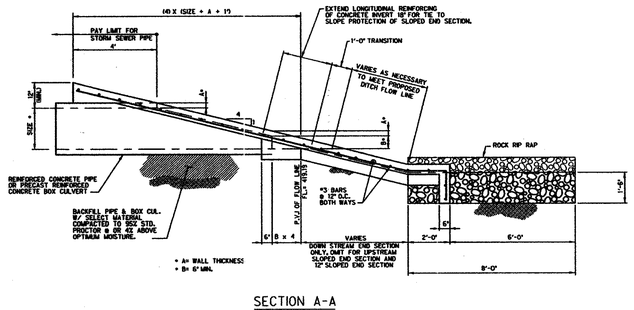
Duration (minutes)	Intensity (inches/hr)	Depth (inches)	Inflow Discharge Q=CiA	Inflow Volume Cu. Ft.	Outflow Duration (minutes)	Outflow Volume Cu. Ft.	Storage Volume Cu. Ft.
5	10.49	0.87	19.5	5,863	15	1,125	4,738
10	8.74	1.46	16.3	9,770	20	1,500	8,270
15	7.52	1.88	14.0	12,609	25	1,875	10,734
20	6.80	2.27	12.7	15,202	30	2,250	12,952
30	5.75	2.88	10.7	19,282	40	3,000	16,282
40	5.00	3.33	9.3	22,356	50	3,750	18,606
50	4.40	3.67	8.2	24,592	60	4,500	20,092
60	3.91	3.91	7.3	26,224	70	5,250	20,974
70	3.63	4.24	6.8	28,403	80	6,000	22,403
80	3.33	4.44	6.2	29,778	90	6,750	23,028
90	3.18	4.77	5.9	31,991	100	7,500	24,491
120	2.62	5.24	4.9	35,144	130	9,750	25,394
180	1.91	5.73	3.6	38,430	190	14,250	24,180
360	1.15	6.90	2.1	46,277	370	27,750	18,527
720	0.73	8.80	1.4	59,020	730	54,750	4,270
						Required Storage Volume	25,394 cubic feet
							0.58 acre-feet

Note: 100yr. c=.9 in. 25 yr. c=.5 out

No.	Location	Storm Frequency	Time of Conc. (min)	Intensity "I" (in/hr)	Runoff Coeff "C"	Area (acres)	Q (cfs)	Upstream Inlet Carryover (cfs)	Total Gutter Flow (cfs)	Gutter Slope (ft/ft)	Flow Depth (ft)	Selected Inlet Length "Li" (ft)	Type	Downstream Inlet Carrover
Inlet A1	A1	100	10	8.74	0.9	0.24	1.9	0.0	1.9	SAG	< 0.2		2-GRATE	0.0
Inlet A2	A2	100	10	8.74	0.9	0.33	2.6	0.0	2.6	SAG	< 0.2		2-GRATE	0.0
Inlet A3	A3	100	10	8.74	0.9	0.34	2.7	0.0	2.7	SAG	< 0.2		2-GRATE	0.0
Inlet A4	A4	100	10	8.74	0.9	0.22	1.7	0.0	1.7	SAG	< 0.2		2-GRATE	0.0
Inlet B1	B1	100	10	8.74	0.9	0.34	2.7	0.0	2.7	SAG	0.28	6.00	CURB	0.0
Inlet B2	B2	100	10	8.74	0.9	0.44	3.5	0.0	3.5	SAG	0.33	6.00	CURB	0.0
Inlet B3	B3	100	10	8.74	0.9	0.86	6.8	0.0	6.8	SAG	0.30	14.00	CURB	0.0
Inlet C1	C1	100	10	8.74	0.9	0.91	7.2	0.0	7.2	SAG	0.31	14.00	CURB	0.0
Inlet E1	E1	100	10	8.74	0.9	1.79	14.1	0.0	14.3	SAG	0.49	14.00	CURB	0.0
Inlet F1	F1	100	10	8.74	0.9	0.25	2.0	0.0	1.8	SAG	0.22	6.00	CURB	0.0
Inlet G1	G1	100	10	8.74	0.9	0.13	1.0	0.0	1.0	SAG	0.15	6.00	CURB	0.0

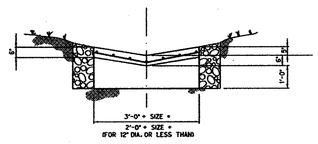


⚠1 1.13-06 SLOPED END SECTION HEADWALL

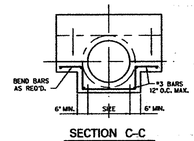


SECTION A-A
N.T.S.

⚠1 1.13-06 SLOPED END SECTION HEADWALL

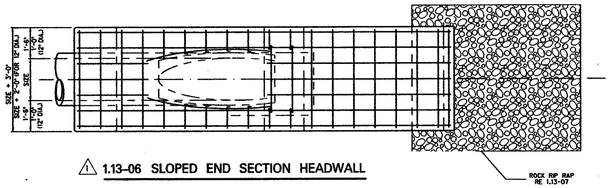


SECTION B-B



SECTION C-C

⚠1 1.13-06 SLOPED END SECTION



⚠1 1.13-06 SLOPED END SECTION HEADWALL

REINFORCING PLAN
SCALE: 1/4" = 1'-0"
(SCALE FOR 24" DIA. R.C.P. ONLY)

STATE OF TEXAS
B. DAVID LITTLETON
62128
LICENSED
PROFESSIONAL ENGINEER
10 AUGUST 1999

⚠2 "AS BUILT"
BASED ON FIELD OBSERVATIONS OF SURVACE FEATURES ON MAY 4, 2000 AND CONTRACTOR PROVIDED INFORMATION. ELEVATIONS NOT FIELD VERIFIED. PARKING STRIPING NOT COMPLETED IN FIELD.

⚠1 REVISED AS SHOWN 11/23/99

BENCHMARK:
"X" CUT IN CONCRETE AS THE NORTHWEST CORNER OF THE SUBJECT TRACT.
ELEV = 645.20

DRAINAGE CALCULATIONS AND DETAILS
ADDISON COM CENTER
JACKSON – SHAW COMPANY
TOWN OF ADDISON, TEXAS

Halff Associates
ENGINEERS . ARCHITECTS . SCIENTISTS . PLANNERS . SURVEYORS

DESIGN	DRAWN	DATE	SCALE	NOTES	FILE	NO.
HALFF	CADD	SEPTEMBER 1999	1"= 40'	AVO 17986 986CALCS		C-4A