STORM SEWER CALCULATIONS

Upstream Station	Downstream Station	Distance (ft)	AREA NO.	Total Area (Acres)	Picked Up (Acres)	C	CA	Accumulated CA	Tc (Min)	Design Storm (Years)	I (in/hr)	Q (CFS)	S (ft/ft)	Pipe Size (in)	Velocity (fps)	Head Loss (ft)	Flow Time (Min)	Time at D/S (Min)	Δ Velocity Head (ft)	Hydraulic Grade Upstream	Hydraulic Grade Downstream	Proposed Grade
Line D1																						
14+64.81	10+77.09	387.72	6	2.78	2.78	0.50	1.39	1.39	10.00	100	9.80	13.6	0.0036	24	4.3	0.29	1.49	11.49	0.29		470.85	495.00
10+77.09	10+70.72	6.37	Bend	0.00	0.00	0.50	0.00	1.39	10.00	100	9.80	13.6	0.0036	24	4.3	0.29	0.02	10.02	0.00	469.44	469.44	0.00
10+70.72	10+30.94	39.78	7	3.69	3.69	0.50	1.85	3.24	10.00	100	9.80	31.7	0.0060	30	6.5	0.65	0.10	10.10	0.36	469.42	469.06	481.77
10+30.94	5+20.19	510.75	Bend	0.00	0.00	0.50	0.00	3.24	10.00	100	9.80	31.7	0.0060	30	6.5	0.65	1.32	11.32	0.00	468.82	468.82	0.00
5+20.19	5+02.68	17.51	13	3.27	3.27	0.50	1.63	4.87	10.00	100	9.80	47.7	0.0135	30	9.7	1.47	0.03	10.03	0.82	465.76	464.95	474.40
5+02.68	4+01.19	101.49	D4	2.66	2.66	0.50	1.33	6.20	10.00	100	9.80	60.8	0.0219	30	12.4	2.38	0.14	10.14	0.91	464.71	463.98	0.00
4+01.19	1+30.00	271.19	D2	3.70	3.70	0.50	1.85	8.05	10.00	100	9.80	78.9	0.0062	42	8.2	1.04	0.55	10.55	-0.67	461.57	462.24	476.77
1+30.00																				460.57		
Line D2																						
0+67.72	0+00.00	67.72	3.8	3.70	3.70	0.50	1.85	1.85	10.00	100	9.80	18.2	0.0020	30	3.7	0.21	0.30	10.30	0.21		462.48	463.51
0+00.00																		0.00	0.11	462.35	462.24	
Line D3																						
4+19.53	3+83.67	36.26	12	2.66	2.66	0.50	1.33	1.33	10.00	100	9.80	13.0	0.0033	24	4.1	0.27	0.15	10.15	0.27	467.57	467.30	483.79
3+83.67	3+69.53	14.14	0	0.00	0.00	0.50	0.00	1.33	10.00	100	9.80	13.0	0.0033	24	4.1	0.27	0.06	10.06	0.00	467.18	467.18	0.00
3+69.53	0+00.00	369.53	0	0.00	0.00	0.50	0.00	1.33	10.00	100	9.80	13.0	0.0033	24	4.1	0.27	1.49	11.49	0.00	467.13	467.13	0.00
0+20.00	0+00.00	0.00	0	0.00	0.00	0.50	0.00	1.33	10.00	100	9.80	13.0	0.0033	24	12.4	2.38	0.00	10.00	2.11	465.91	469.80	0.00

INLET CALCULATIONS

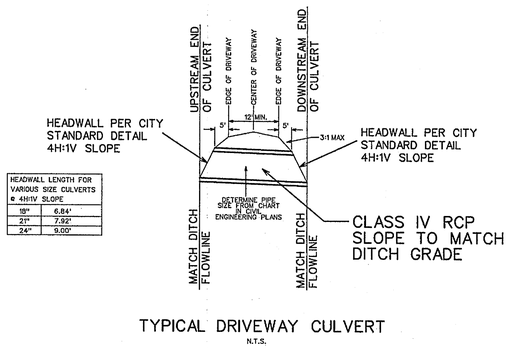
Inlet No.	Inlet Location	Design Storm Freq. (years)	Area Runoff: Q=CIA Tc (min)	Intensity "I" (in/hr)	Runoff Coeff. "C"	Area "A" (acres)	Q (cfs)	Carry-Over from Upstream (cfs)	Total Gutter Flow (cfs)	Gutter Capacity (cfs)	Gutter Slope (ft/100 ft)	Selected Inlet Crown Type	Length (ft)	Type	Inlet Capacity (cfs)	Carry-Over to Downstream Inlet (cfs)
3	4+00.00 Life Springs	100	10	9.8	0.5	2.18	10.7	0.0	10.7	6.0	Low Pt	Ditch	4	WYE	40.0	0.0
4	4+30.00 Life Springs	100	10	9.8	0.5	1.53	7.5	0.0	7.5	6.0	Low Pt	Ditch	4	WYE	40.0	0.0
5	6+42.84 Life Springs	100	10	9.8	0.5	3.27	16.0	0.0	16.0	6.0	Low Pt	Ditch	4	WYE	40.0	0.0
6	11+85.78 Life Springs	100	10	9.8	0.5	3.69	18.1	0.0	18.1	9.5	Low Pt	Ditch	4	WYE	40.0	0.0
7	0+50.93 Limmerhill	100	10	9.8	0.5	2.66	13.0	0.0	13.0	9.5	Low Pt	Ditch	4	WYE	40.0	0.0
8	6+27.35 Limmerhill	100	10	9.8	0.5	2.78	13.6	0.0	13.6	9.5	Low Pt	Ditch	4	WYE	40.0	0.0

DRIVEWAY CULVERT CALCULATIONS

OUTLET CONTROL — INLET CONTROL

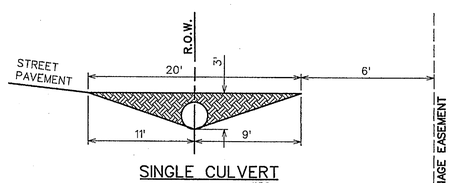
Block	Lot	Receives Drainage From Lots	Drainage Area (ac)	Flow (cfs)	Ditch Slope	Ditch Capacity (cfs)	Pipe Size (in)	No. of Barrels	Area (sf)	Full Flow (per barrel)	Velocity (fps)	Head (ft)	Hydraulic Slope (ft/ft)	Outlet Flowline (ft)	Starting Tailwater (ft)	Length @ Flowline (ft)	Headwater Elevation (ft)	Upstream Soffit Elev. (ft)	Headwater Required (ft)	Inlet Flowline (ft)	Headwater Elevation (ft)	Inlet or Outlet Control?	U/S Elev. (ft)	U/S Elev. vs. Soffit
A	1	1-14	94883	10.7	4.60%	102	21	1	2.4053	4.4	0.31	0.0045	0.00	1.75	38	2.08	3.50	0.85	1.75	3.47	Outlet Control	3.47	-0.02
A	2	2-14	85826	9.7	4.60%	102	21	1	2.4053	4.1	0.25	0.0038	0.00	1.75	38	2.02	3.50	0.71	1.75	3.33	Outlet Control	3.33	-0.17
A	3	3-14	78450	8.8	1.00%	48	21	1	2.4053	3.7	0.21	0.0031	0.00	1.75	38	1.97	2.13	0.58	0.38	1.84	Outlet Control	1.97	-0.16
A	4	4-14	71199	8.0	1.00%	48	21	1	2.4053	3.3	0.17	0.0026	0.00	1.75	38	1.93	2.13	0.48	0.38	1.73	Outlet Control	1.93	-0.20
A	5	5-14	64899	7.3	1.00%	48	18	1	1.7671	4.1	0.28	0.0048	0.00	1.50	36	1.80	1.88	0.73	0.36	1.84	Outlet Control	1.84	-0.02
A	6	6-14	58199	6.5	1.00%	48	18	1	1.7671	3.7	0.21	0.0039	0.00	1.50	36	1.75	1.86	0.59	0.36	1.70	Outlet Control	1.75	-0.11
A	7	7-14	51793	5.8	1.00%	48	18	1	1.7671	3.3	0.17	0.0031	0.00	1.50	36	1.70	1.86	0.47	0.36	1.58	Outlet Control	1.70	-0.16
A	8	8-14	45289	5.1	1.80%	64	18	1	1.7671	2.9	0.13	0.0024	0.00	1.50	36	1.65	2.15	0.38	0.65	1.76	Outlet Control	1.76	-0.39
A	9	9-14	38805	4.4	1.80%	64	18	1	1.7671	2.5	0.09	0.0017	0.00	1.50	36	1.61	2.15	0.28	0.65	1.66	Outlet Control	1.66	-0.49
A	10	10-14	32411	3.6	1.80%	64	18	1	1.7671	2.1	0.07	0.0012	0.00	1.50	36	1.58	2.15	0.18	0.65	1.58	Outlet Control	1.58	-0.57
A	11	11-14	26017	2.9	1.80%	64	18	1	1.7671	1.7	0.04	0.0008	0.00	1.50	36	1.55	2.15	0.12	0.65	1.52	Outlet Control	1.55	-0.60
A	12	12-14	19566	2.2	1.80%	64	18	1	1.7671	1.2	0.02	0.0004	0.00	1.50	36	1.53	2.15	0.07	0.65	1.46	Outlet Control	1.53	-0.62
A	13	13-14	13066	1.5	1.80%	64	18	1	1.7671	0.8	0.01	0.0002	0.00	1.50	36	1.51	2.15	0.03	0.65	1.43	Outlet Control	1.51	-0.64
A	14	14	6566	0.7	1.80%	64	18	1	1.7671	0.4	0.00	0.0000	0.00	1.50	36	1.50	2.15	0.01	0.65	1.41	Outlet Control	1.50	-0.64
B	1	1-5	117599	13.2	1.00%	48	24	1	3.1416	4.2	0.28	0.0034	0.00	2.00	40	2.27	2.40	0.76	0.40	2.16	Outlet Control	2.27	-0.13
B	2	2-5	92326	10.4	1.00%	48	21	1	2.4053	4.3	0.29	0.0043	0.00	1.75	38	2.06	2.13	0.80	0.38	2.06	Outlet Control	2.06	-0.07
B	3	3-5	69826	7.9	1.00%	48	21	1	2.4053	3.3	0.17	0.0025	0.00	1.75	38	1.93	2.13	0.46	0.38	1.71	Outlet Control	1.93	-0.20
B	4	4-5	47326	5.3	1.00%	48	18	1	1.7671	3.0	0.14	0.0028	0.00	1.50	36	1.66	1.86	0.39	0.36	1.50	Outlet Control	1.66	-0.20
B	5	5	23725	2.7	1.00%	48	18	1	1.7671	1.5	0.04	0.0006	0.00	1.50	36	1.54	1.86	0.10	0.36	1.21	Outlet Control	1.54	-0.32
B	6	6-11	160913	18.1	1.80%	64	21	2	2.4053	3.8	0.22	0.0033	0.00	1.75	38	1.98	2.43	0.61	0.65	2.17	Outlet Control	2.17	-0.26
B	7	7-11	137168	15.4	1.80%	64	18	2	1.7671	4.4	0.30	0.0054	0.00	1.50	36	1.84	2.15	0.82	0.65	2.22	Inlet Control	2.22	0.07
B	8	8-11	113463	12.8	1.80%	64	24	1	3.1416	4.1	0.26	0.0032	0.00	2.00	40	2.26	2.72	0.71	0.72	2.43	Outlet Control	2.43	-0.29
B	9	9-11	90199	10.1	1.80%	64	21	1	2.4053	4.2	0.28	0.0041	0.00	1.75	38	2.04	2.43	0.77	0.68	2.33	Outlet Control	2.33	-0.11
B	10	10-11	67699	7.6	1.80%	64	18	1	1.7671	4.3	0.29	0.0053	0.00	1.50	36	1.83	2.15	0.80	0.65	2.20	Inlet Control	2.20	0.05
B	11	11-12	45199	5.1	1.80%	64	18	1	1.7671	2.9	0.13	0.0023	0.00	1.50	36	1.65	2.15	0.38	0.65	1.76	Outlet Control	1.76	-0.39
B	12	12	20269	2.3	1.00%	48	18	1	1.7671	1.3	0.03	0.0005	0.00	1.50	36	1.53	1.86	0.07	0.36	1.18	Outlet Control	1.53	-0.33
B	13	12-13	44654	5.0	1.00%	48	18	1	1.7671	2.6	0.13	0.0023	0.00	1.50	36	1.65	1.86	0.35	0.36	1.46	Outlet Control	1.65	-0.21
B	14	12-14	69039	7.8	1.00%	48	18	1	1.7671	4.4	0.30	0.0055	0.00	1.50	36	1.85	1.86	0.83	0.36	1.84	Inlet Control	1.94	0.08
B	15	12-15	94839	10.7	1.00%	48	21	1	2.4053	4.4	0.31	0.0045	0.00	1.75	38	2.07	2.13	0.85	0.38	2.10	Outlet Control	2.10	-0.63
B	16	12-16	121168	13.6	1.00%	48	21	1	2.4053	5.7	0.50	0.0074	0.00	1.75	38	2.28	2.13	1.39	0.38	2.64	Inlet Control	2.64	0.51
B	17	17	23463	2.9	2.80%	80	18	1	1.7671	1.6	0.04	0.0007	0.00	1.50	36	1.55	2.51	0.11	1.01	1.87	Outlet Control	1.87	-0.64
B	18	17-18	49714	5.6	1.70%	62	18	1	1.7671	3.2	0.16	0.0028	0.00	1.50	36	1.68	2.11	0.43	0.61	1.79	Outlet Control	1.79	-0.32
B	19	17-19	75867	8.5	1.70%	62	21	1	2.4053	3.5	0.20	0.0029	0.00	1.75	38	1.96	2.40	0.54	0.65	2.09	Outlet Control	2.09	-0.33
B	20	17-20	101078	11.4	1.70%	62	21	1	2.4053	4.7	0.35	0.0051	0.00	1.75	38	2.12	2.40	0.98	0.65	2.48	Inlet Control	2.48	0.09
B	21	17-21	115786	13.0	1.70%	62	24	1	3.1416	4.1	0.27	0.0033	0.00	2.00	40	2.27	2.68	0.74	0.68	2.42	Outlet Control	2.42	-0.26
C	1	1-10	131924	14.8	1.70%	62	24	1	3.1416	4.7	0.35	0.0043	0.00	2.00	40	2.35	2.68	0.98	0.68	2.64	Outlet Control	2.64	-0.04
C	2	2-10	96826	10.9	1.70%	62	21	1	2.4053	4.5	0.32	0.0047	0.00	1.75	38	2.09	2.40	0.88	0.65	2.41	Inlet Control	2.41	0.01
C	3	3-10	73130	8.2	1.70%	62	18	1	1.7671	4.7	0.34	0.0061	0.00	1.50	36	1.89	2.11	0.93	0.61	2.30	Inlet Control	2.30	0.18
C	4	4-10	55892	6.3	1.70%	62	18	1	1.7671	3.6	0.20	0.0036	0.00	1.50	36	1.73	2.11	0.55	0.61	1.91	Outlet Control	1.91	-0.20
C	5	5-10	46599	5.3	1.70%	62	18	1	1.7671	3.0	0.14	0.0025	0.00	1.50	36	1.66	2.11	0.39	0.61	1.75	Outlet Control	1.75	-0.36
C	6	6-10	39923	4.5	1.00%	48	18	1	1.7671	2.5	0.10	0.0018	0.00	1.50	36	1.62	1.86	0.28	0.36	1.39	Outlet Control	1.62	-0.24
C	7	7-10	31155	3.5	1.00%	48	18	1	1.7671	2.0	0.06	0.0011	0.00	1.50	36	1.57	1.86	0.17	0.36	1.28	Outlet Control	1.57	-0.29
C	8	8-10	22387	2.5	1.00%	48	18	1	1.7671	1.4	0.03	0.0006	0.00	1.50	36	1.54	1.86	0.09	0.36	1.20	Outlet Control	1.54	-0.32
C	9	9-10	15182	1.7	1.00%	48	18	1	1.7671	1.0	0.01	0.0003	0.00	1.50	36	1.52	1.86	0.04	0.36	1.15	Outlet Control	1.52	-0.34
C	10	10	8032	0.9	1.00%	48	18	1	1.7671	0.5	0.00	0.0001	0.00	1.50	36	1.50	1.86	0.01	0.36	1.12	Outlet Control	1.50	-0.36
D	1	1-4	66338	7.5	3.84%	94	18	1	1.7671	4.2	0.28	0.0051	0.00	1.50	36	1.82	2.88	0.77	1.38	2.91	Inlet Control	2.91	0.02
D	2	2-4	39395	4.4	3.00%	83	18	1	1.7671	2.5	0.10	0.0018	0.00	1.50	36	1.61	2.58	0.27	1.08	2.10	Outlet Control	2.10	-0.48
D	3	3-4	22885	2.6	3.00%	83	18	1	1.7671	1.5	0.03	0.0006	0.00	1.50	36	1.54	2.58	0.09	1.08	1.92	Outlet Control	1.92	-0.66
D	4	4	10008	1.1	2.50%	76	18	1	1.7671	0.6	0.01	0.0001	0.00	1.50	36	1.51	2.40	0.02	0.90	1.67	Outlet Control	1.67	-0.73
D	5	4-5	26508	3.0	2.50%	76	18	1	1.7671	1.7	0.04	0.0008	0.00	1.50	36	1.55	2.40	0.12	0.90	1.77	Outlet Control	1.77	-0.63
D	6	4-6	43008	4.8	2.50%	76	18	1	1.7671	2.7	0.12	0.0021	0.00	1.50	36	1.63	2.40	0.32	0.90	1.97	Outlet Control	1.97	-0.43

ALL CULVERTS SHALL BE RCP WITH SLOPED SAFETY END TREATMENTS

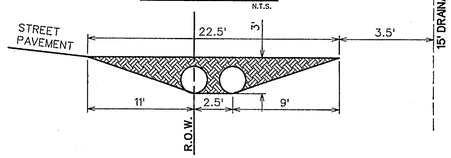


HEADWALL LENGTH FOR VARIOUS SIZE CULVERTS @ 4H:1V SLOPE	
18"	6.84'
21"	7.92'
24"	9.00'

TYPICAL DRIVEWAY CULVERT
N.T.S.



SINGLE CULVERT
N.T.S.



DOUBLE CULVERT
N.T.S.

NOTE:
ALL LOTS WILL NEED TO PREPARE A SEPARATE SITE PLAN WITH PROPOSED GRADING PRIOR TO PERMIT BEING ISSUED TO ENSURE LOCATION OF DRIVEWAY AND CULVERT.

STATE OF TEXAS
BRANDON DAVIDSON
87682
REGISTERED PROFESSIONAL ENGINEER
8/25/14

The seal appearing on this document was authorized by Brandon Davidson P.E. 87682, on August 25, 2014

AS-BUILT MARCH 2015
INFORMATION PROVIDED BY CONTRACTORS
(NOT FIELD VERIFIED)

CORWIN ENGINEERING, INC.
200 W. BELMONT, SUITE E
ALLEN, TEXAS 75013 (972)396-1200
TBPE FIRM #5951

DEVELOPMENT PLANS FOR
BREEZY HILL
PHASE IV
ROCKWALL, TEXAS

DRAINAGE CALCULATIONS

DRAWN BY	DESIGNED BY	CHECKED BY	SHEET NO.
			4 OF 19
JOB NUMBER 14025	DATE AUGUST 2014	SCALE: HOR: 1"=40' VER: 1"=4'	