CULVERT DESIGN CALCULATIONS

Culvert Location: Storm Drain 'T-1'
Length, L: 255.70
Total Discharge, Q: 11.3 c.f.s.
Design Storm Freq.: 100 yr
Roughness Coeff., n: 0.013
Max. Vel.: 8 ft/s
Tailwater: 1.00 ft.
D.S. Channel Width: 2.0 ft
Entrance Description: Type 4, Spigot End with Headwall

RDWY. Elev.: 582.60
U.S. Culv. F.L.: 580.64
D.S. Culv. F.L.: 577.40
Difference: 1.96
Difference: 3.24
Req'd Freeboard: 0.5 FT.
Culv. Slope, $S_o = \frac{\text{Diff. Ft}}{\text{Length Ft.}}$
Allow. Headwater: 1.46 FT.
So= 1.40%

TRIAL CULVERT										HEADWATER CALCULATION																		The Greater Controlling Head Water (Inlet or Outlet) (feet)	Selected Conduit Size (inches)
		DEPTH RANGE			POSSIBLE CULVERT SIZES					INLET CONTROL					OUTLET CONTROL														
																CASE III					CASE IV								
																					ho=dc+D/2 or ho=TW (use larger)								
Trial Area of Opening T*A=Q/V (sq. ft.)	Channel Width "W" (feet)	T*Ac/W (feet)	AHW (feet)	Trial Depth "D" (feet)	No. Openings	Width of Box "B" (feet)	Box Depth or Pipe Diameter "D" (feet)	Total Culvert Area "Ac" (sq.ft.)	"Q" Each Opening (c.f.s.)	Entrance Type	Case NO.	Q/B (c.f.s.)	HW/D (figure 25&26)	HW	Entrance Coeff Ke	"H" (feet)	"TW" (feet)	LxSo (feet)	"HW" (feet)	"H" (feet)	dc (feet)	dc+D/2 (feet)	TW	ho	LxSo	"HW"		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1.41	2.00	0.71	1.46	2.00	1.00	2.00	2.00	3.14	11.30	Type 4	Case 1	5.65	0.95	1.90	0.50	0.94	1.00	3.24	-1.30	0.94	1.18	1.59	1.00	1.59	3.24	-0.71	1.90	24.00

CULVERT DESIGN CALCULATIONS

Culvert Location: Storm Drain 'A-2.1'
Length, L: 78.74 ft.
Total Discharge, Q: 15.89 c.f.s.
Design Storm Freq.: 100 yr
Roughness Coeff., n: 0.013
Max. Vel.: 8 ft/s
Tailwater: 1.00 ft.
D.S. Channel Width: 2.0 ft.
Entrance Description: Type 4, Spigot End with Headwall

RDWY. Elev.: 577.83
U.S. Culv. F.L.: 575.58
D.S. Culv. F.L.: 574.41
Difference: 2.25 ft.
Difference: 1.17 ft
Req'd Freeboard: 0.50 ft.
Culv. Slope, $S_o = \frac{\text{Diff. Ft}}{\text{Length Ft.}}$
Allow. Headwater: 1.75 ft.
So= 1.48%

TRIAL CULVERT										HEADWATER CALCULATION																		The Greater Controlling Head Water (Inlet or Outlet) (feet)	Selected Conduit Size (inches)
		DEPTH RANGE			POSSIBLE CULVERT SIZES					INLET CONTROL					OUTLET CONTROL													
																CASE III					CASE IV							
																					ho=(dc+D)/2 or ho=TW (use larger)							
TRIAL AREA OF OPENING T*A=Q/V (sq. ft.)	Channel Width "W" (feet)	T*Ac/W (feet)	AHW (feet)	Trial Depth "D" (feet)	No. Openings	Width of Box "B" (feet)	Box Depth or Pipe Diameter "D" (feet)	Total Culvert Area "Ac" (sq.ft.)	"Q" Each Opening (c.f.s.)	Entrance Type	Case NO.	Q/B (c.f.s.)	HW/D (figure 25&26)	HW	Entrance Coeff Ke	"H" (feet)	"TW" (feet)	LxSo (feet)	"HW" (feet)	"H" (feet)	dc	dc+D/2	TW	ho	LxSo	"HW"		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1.99	2.00	0.99	1.75	2.25	1.00	2.25	2.25	3.98	15.89	Type 4	Case 1	7.06	0.94	2.12	0.50	0.54	1.00	1.17	0.37	0.54	1.35	1.80	1.00	1.80	1.17	1.17	2.12	27.00

CULVERT DESIGN CALCULATIONS

Culvert Location: Storm Drain 'E-1'
Length, L: 69.17 ft.
Total Discharge, Q: 13.10 c.f.s.
Design Storm Freq.: 100 yr
Roughness Coeff., n: 0.013
Max. Vel.: 8 ft/s
Tailwater: 1.00 ft.
D.S. Channel Width: 2.0 ft.
Entrance Description: Type 4, Spigot End with Headwall

RDWY. Elev.: 593.58
U.S. Culv. F.L.: 590.25
D.S. Culv. F.L.: 589.90
Difference: 3.33 ft.
Difference: 1.17 ft
Req'd Freeboard: 0.50 ft.
Culv. Slope, $S_o = \frac{\text{Diff. Ft}}{\text{Length Ft.}}$
Allow. Headwater: 2.83 ft.
So= 0.50%

TRIAL CULVERT										HEADWATER CALCULATION																		The Greater Controlling Head Water (Inlet or Outlet) (feet)	Selected Conduit Size (inches)
		DEPTH RANGE			POSSIBLE CULVERT SIZES					INLET CONTROL					OUTLET CONTROL													
																CASE III					CASE IV							
																					ho=(dc+D)/2 or ho=TW (use larger)							
TRIAL AREA OF OPENING T*A=Q/V (sq. ft.)	Channel Width "W" (feet)	T*Ac/W (feet)	AHW (feet)	Trial Depth "D" (feet)	No. Openings	Width of Box "B" (feet)	Box Depth or Pipe Diameter "D" (feet)	Total Culvert Area "Ac" (sq.ft.)	"Q" Each Opening (c.f.s.)	Entrance Type	Case NO.	Q/B (c.f.s.)	HW/D (figure 25&26)	HW	Entrance Coeff Ke	"H" (feet)	"TW" (feet)	LxSo (feet)	"HW" (feet)	"H" (feet)	dc	dc+D/2	TW	ho	LxSo	"HW"		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1.64	2.00	0.82	2.83	2.00	1.00	2.00	2.00	3.14	13.10	Type 4	Case 2	6.55	1.04	2.08	0.50	0.74	1.00	0.35	1.39	0.74	2.05	2.03	1.00	2.03	0.35	2.42	2.42	24.00

RECORD DRAWING 10/11/2013

TO THE BEST OF OUR KNOWLEDGE WIER & ASSOCIATES, INC., HERBY STATES THAT THIS PLAN IS AS-BUILT. THIS INFORMATION PROVIDED IS BASED ON SURVEYING AT THE SITE AND INFORMATION PROVIDED BY THE CONTRACTOR.

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CITY OF ROCKWALL
IMPROVEMENTS TO
CORPORATE CROSSING
(FROM S.H. 276 TO L.H. 30)

CULVERT CALCULATIONS

WA# 08029
STATE OF TEXAS
RONALD RAMIREZ
81821
REGISTERED PROFESSIONAL ENGINEER
10/11/13

LAST SHEET EDIT DATE 09-12-2013
WA# 08029
SHEET NO. D007

TIME 14:28 FILE i:\0007-DA-Calcs-08029.dwg