Station Range Designation	Runoff Collection Collection Point: Upstream Station	Downstream Station	Distance Between Collection Points (feet)	Incremental Drainage: Area No.	Drainage Area "A"	Runoff Coeff.	Incremental	Accum-ulated	Time at Upstream Station	Design Storm Frequency	Intensity "I"	Storm Water Runoff "Q"	Storm Water Runoff Σ"Q"	Selected Storm Sewer Size	Storm Sewer Type	Slope of Pipe	Capacity	Flowline of Pipe Downstream	Top of Pipe Downstream	Slope of Hydraulic Gradient "S"	Velocity In Sewer Between Collection Points "V"	TYPE OF STRUCTURE AT UPSTREAM STATION	Headloss Calculations: Head Loss Coefff. "Kj"	Downstream of Structure $v^2/2g$	Upstream of Structure "Kj" x $v^2/2g$	Flow Time in Sewer: Distance V x 60	Time of Downstream Station	Partial Flow	Hydraulic Grade Line Elevation Upstream	Hydraulic Grade Line Elevation Downstream
LAT A1																														
1	0+40.82	0+07.68	33.14	AF	0.15	0.90	0.14	0.14	10.00	100-Year	8.74	1.18	1.18	18"	RCP	0.0931	32.05	613.91	615.41	0.0001	0.67	Inlet or Manhole at Beginning of the Line	1.25	0.01	0.00	0.83	10.83	FULL	617.11	617.10
2	0+07.68	0+00.00	7.68	-	0.00	0.90	0.00	0.14	10.83	100-Year	8.54	0.00	1.15	18"	RCP	0.0925	31.95	613.20	614.70	0.0001	0.65	45º Bend	0.35	0.01	0.00	0.20	11.02	FULL	617.00	617.00
LINE B																														
1	6+58.58	6+49.58	9.00	Q	0.72	0.90	0.65	0.65	10.00	100-Year	8.74	5.66	5.66	18"	RCP	0.0038	6.48	616.32	617.82	0.0029	3.20	Inlet or Manhole at Beginning of the Line	1.25	0.16	0.00	0.05	10.05	FULL	619.06	618.84
2	6+49.58	6+13.58	36.00	R	0.28	0.90	0.25	0.90	10.05	100-Year	8.73	2.20	7.86	24"	RCP	0.0038	13.95	616.18	618.18	0.0012	2.50	Inlet on Main Line	1.25	0.10	0.20	0.24	10.29	FULL	618.74	618.69
3	6+13.58	5+45.36	68.22	-	0.00	0.00	0.00	0.90	10.29	100-Year	8.67	0.00	7.80	24"	RCP	0.0038	13.95	615.42	617.42	0.0012	2.48	45º Bend	0.35	0.10	0.03	0.46	10.74	FULL	618.59	618.51
4	5+45.36	4+76.92	68.44	-	0.00	0.00	0.00	0.90	10.74	100-Year	8.56	0.00	7.70	24"	RCP	0.0038	13.95	615.16	617.16	0.0012	2.45	45º Bend	0.35	0.09	0.03	0.47	11.21	FULL	618.41	618.33
5	4+76.92	4+73.20	3.72	-	0.00	0.00	0.00	0.90	11.21	100-Year	8.44	0.00	7.60	27"	RCP	0.0038	19.09	614.90	617.15	0.0006	1.91	Pipe Size Change	0.50	0.06	0.05	0.03	11.24	FULL	618.23	618.23
6	4+73.20	1+76.46	296.74	S	0.50	0.90	0.45	1.35	11.24	100-Year	8.44	3.80	11.39	27"	RCP	0.0038	19.09	613.77	616.02	0.0014	2.86	45º Wye or Cut-In	0.75	0.13	0.04	1.73	12.97	FULL	618.13	617.73
7	1+76.46	1+71.88	4.58	-	0.00	0.00	0.00	1.35	12.97	100-Year	8.02	0.00	10.82	30"	RCP	0.0038	25.28	613.54	616.04	0.0007	2.20	Pipe Size Change	0.50	0.08	0.06	0.03	13.00	FULL	617.63	617.63
8	1+71.88	1+06.04	65.84	T	0.28	0.90	0.25	1.60	13.00	100-Year	8.01	1.98	12.80	30"	RCP	0.0038	25.28	613.28	615.78	0.0010	2.61	45º Wye or Cut-In	0.75	0.11	0.06	0.42	13.42	FULL	617.53	617.46
9	1+06.04	0+00.00	106.04	U & V	1.12	0.90	1.01	2.61	13.42	100-Year	7.90	7.97	20.60	30"	RCP	0.0038	25.28	612.88	615.38	0.0025	4.20	45º Wye or Cut-In	0.75	0.27	0.08	0.42	13.85	FULL	617.27	617.00
LAT B1																														
1	1+15.14	0+24.18	90.96	U & V	1.12	0.90	1.01	1.01	10.00	100-Year	8.74	8.81	8.81	18"	RCP	0.0178	14.01	614.22	615.72	0.0070	4.99	Inlet on Main Line	1.25	0.39	0.00	0.30	10.30	FULL	618.40	617.76
2	0+24.18	0+00.00	24.18	-	0.00	0.00	0.00	1.01	10.30	100-Year	8.67	0.00	8.74	18"	RCP	0.0178	14.01	613.79	615.29	0.0069	4.94	45º Bend	0.35	0.38	0.14	0.08	10.39	FULL	617.63	617.46
LAT B2																														
1	0+34.71	0+15.86	18.85	T	0.28	0.90	0.25	0.25	10.00	100-Year	8.74	2.17	2.17	18"	RCP	0.0599	25.71	614.96	616.46	0.0004	1.23	Inlet or Manhole at Beginning of the Line	1.25	0.02	0.00	0.26	10.26	FULL	617.77	617.73
2	0+15.86	0+00.00	15.86	-	0.00	0.00	0.00	0.25	10.26	100-Year	8.68	0.00	2.15	18"	RCP	0.0580	25.30	614.04	615.54	0.0004	1.22	45º Bend	0.35	0.02	0.01	0.22	10.47	FULL	617.63	617.63
LAT B3																														
1	0+34.71	0+15.86	18.85	S	0.50	0.90	0.45	0.45	10.00	100-Year	8.74	3.93	3.93	18"	RCP	0.0187	14.36	615.57	617.07	0.0014	2.23	Inlet or Manhole at Beginning of the Line	1.25	0.08	0.00	0.14	10.14	FULL	618.48	618.35
2	0+15.86	0+00.00	15.86	-	0.00	0.00	0.00	0.45	10.14	100-Year	8.71	0.00	3.92	18"	RCP	0.0187	14.36	615.27	616.77	0.0014	2.22	45º Bend	0.35	0.08	0.03	0.12	10.26	FULL	618.25	618.23
LINE C																														
1	0+21.00	0+00.00	21.00	Z	0.66	0.90	0.60	0.60	10.00	100-Year	8.74	5.23	5.23	18"	RCP	0.0843	30.50	612.73	614.23	0.0025	2.96	Inlet or Manhole at Beginning of the Line	1.25	0.14	0.00	0.12	10.12	FULL	617.22	617.00
Line D																														
1	0+30.00	0+00.00	30.00	W	0.69	0.90	0.62	0.62	10.00	100-Year	8.74	5.42	5.42	18"	RCP	0.0748	28.73	613.28	614.78	0.0027	3.07	Inlet or Manhole at Beginning of the Line	1.25	0.15	0.00	0.16	10.16	FULL	617.26	617.00
LAT E1																														
1	0+14.13	0+00.00	14.13	AE	0.16	0.90	0.14	0.14	10.00	100-Year	8.74	1.26	1.26	18"	RCP	0.0100	10.50	613.46	614.96	0.0001	0.71	Inlet or Manhole at Beginning of the Line	1.25	0.01	0.00	0.33	10.33	FULL	617.90	617.89
LAT E2																														
1	0+14.10	0+00.00	14.10	AD	0.11	0.90	0.10	0.10	10.00	100-Year	8.74	0.87	0.87	18"	RCP	0.0100	10.50	613.86	615.36	0.0001	0.49	Inlet or Manhole at Beginning of the Line	1.25	0.00	0.00	0.48	10.48	FULL	617.99	617.98
LAT E3																														
1	0+14.08	0+00.00	14.08	AC	0.11	0.90	0.10	0.10	10.00	100-Year	8.74	0.87	0.87	18"	RCP	0.0100	10.50	614.23	615.73	0.0001	0.49	Inlet or Manhole at Beginning of the Line	1.25	0.00	0.00	0.48	10.48	FULL	618.08	618.07
LAT E4																														
1	0+14.02	0+00.00	14.02	AB	0.15	0.90	0.14	0.14	10.00	100-Year	8.74	1.18	1.18	18"	RCP	0.0100	10.50	614.17	615.67	0.0001	0.67	Inlet or Manhole at Beginning of the Line	1.25	0.01	0.00	0.35	10.35	FULL	618.15	618.14
LINE E5																														
1	0+27.56	0+22.78	4.78	AA	0.22	0.90	0.20	0.20	10.00	100-Year	8.74	1.73	1.73	18"	RCP	0.0100	10.50	614.51	616.01	0.0003	0.98	Inlet or Manhole at Beginning of the Line	1.25	0.01	0.00	0.08	10.08	FULL	618.95	618.93
2	0+22.78	0+00.00	22.78	-	0.00	0.90	0.00	0.20	10.08	100-Year	8.72	0.00	1.73	18"	RCP	0.0010	3.32	614.49	615.99	0.0003	0.98	30º Bend	0.00	0.01	0.00	0.39	10.47	FULL	618.83	618.82

ESTIMATED DETENTION POND SIZE FOR 100 YEAR STORM

Present Conditions

C = 0.95 A = 13.70 CxA = 13.02
C = - A = - CxA = -
Total = 13.02

T = 10 min
I_{100} = 8.00 in/hr

Q_{100} = 104.16 cfs

***Max Release Rate= 85.80 cfs**

Future Conditions (To Detention Pond)

C = 0.90 A = 9.08 CxA = 8.17
**C = 0.87 A = 7.07 CxA = 6.15

T = 10 min T = 10 min
I_{100} = 8.74 in/hr I_{100} = 8.74 in/hr

Q_{100}= 125.18 cfs

*Max 100-year release rate per plans prepared by BDD dated 9/8/2000.
**C is a weighted value (Refer to Storm Water Runoff Calculations)

Time (Min)	Rainfall Intensity		Discharge								Volume
5	I= 10.49 in/hr	C*A= 14.32	Q= 150.2 cfs	Inflow	5 *	150.2 *	60	=			45,074 cf
				Outflow	0.5 *	15 *	85.80 *	60	=		38,610 cf
											6,464 cf
10	I= 8.74 in/hr	C*A= 14.32	Q= 125.2 cfs	Inflow	10 *	125.2 *	60	=			75,109 cf
				Outflow	0.5 *	20 *	85.80 *	60	=		51,480 cf
											23,629 cf
15	I= 7.52 in/hr	C*A= 14.32	Q= 107.7 cfs	Inflow	15 *	107.7 *	60	=			96,937 cf
				Outflow	0.5 *	25 *	85.80 *	60	=		64,350 cf
											32,587 cf
20	I= 6.80 in/hr	C*A= 14.32	Q= 97.4 cfs	Inflow	20 *	97.4 *	60	=			116,875 cf
				Outflow	0.5 *	30 *	85.80 *	60	=		77,220 cf
											39,655 cf
25	I= 6.20 in/hr	C*A= 14.32	Q= 88.8 cfs	Inflow	25 *	88.8 *	60	=			133,203 cf
				Outflow	0.5 *	35 *	85.80 *	60	=		90,090 cf
											43,113 cf
30	I= 5.75 in/hr	C*A= 14.32	Q= 82.4 cfs	Inflow	30 *	82.4 *	60	=			148,242 cf
				Outflow	0.5 *	40 *	85.80 *	60	=		102,960 cf
											45,282 cf
35	I= 5.15 in/hr	C*A= 14.32	Q= 73.8 cfs	Inflow	35 *	73.8 *	60	=			154,902 cf
				Outflow	0.5 *	45 *	85.8 *	60	=		115,830 cf
											39,072 cf

INLET DESIGN CALCULATIONS

INLET	Design Storm Frequency (yrs.)	Time of Conc. (min.)	Intensity I (in./hr.)	Runoff Coeff. "C"	Area (Ac.)	"Q" (c.f.s)	Carry-Over From Upstream Inlet (c.f.s.)	SELECTED INLET TYPE	Inlet Capacity (c.f.s.)	Carry-Over To Downstream Inlet (c.f.s.)	Comment
LAT A-1	100	10	8.74	0.90	0.15	1.18	-	5' CURB	8.75	-	SAG
LINE C	100	10	8.74	0.90	0.66	5.23	-	5' COMBO	12	-	SAG
LINE D	100	10	8.74	0.90	0.69	5.42	-	5' COMBO	12	-	SAG
LAT B-1	100	10	8.74	0.90	0.16	1.26	-	2'X2' GRATE	6.6	-	SAG
LAT B-2	100	10	8.74	0.90	0.28	2.17	-	5' COMBO	12	-	SAG
LAT B-3	100	10	8.74	0.90	0.50	3.93	-	5' COMBO	12	-	SAG
LINE B (1)	100	10	8.74	0.90	0.26	2.05	-	5' CURB	8.75	-	SAG
LINE B (2)	100	10	8.74	0.90	0.80	6.29	-	5' CURB	8.75	-	SAG
LAT E-1	100	10	8.74	0.90	0.16	1.26	-	5' CURB	8.75	-	SAG
LAT E-2	100	10	8.74	0.90	0.11	0.87	-	5' CURB	8.75	-	SAG
LAT E-3	100	10	8.74	0.90	0.11	0.87		5' CURB	8.75		SAG
LAT E-4	100	10	8.74	0.90	0.15	1.18		5' CURB	8.75		SAG
LAT E-5	100	10	8.74	0.90	0.22	1.73	-	2'X2' GRATE	6.6	-	SAG

100 Year Release Rate Outlet Structure

Rectangular Orfice Opening: Q = c*a √(2gh)

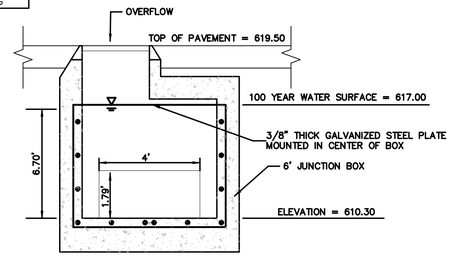
Invert Elevation @ Restrictor = 610.30 feet
100-Year Storage WSEL = 617.00 feet
Storage Depth = 6.70 feet
100 Year Release Rate = 85.83 cfs
c = 0.62
a = 7.16 square feet
h = 5.81 feet
g = 32.20

Width Of Orfice Opening = 4.00 feet
Height Of Orfice Opening = 1.79 feet

Open Detention Pond Volume

Elevation	Area (SF)	Storage Volume (CF)	Rainfall Event Storage
612	0	0	
613	976	488	
614	1,799	1,876	
615	2,782	4,166	
616	3,940	7,527	
617	5,645	12,320	100-YR WSEL

Remaining Volume Requirement for Underground Storage: 32,962 CF
Diameter of Underground Deteniton Storage: 72 in
Length of Pipe required for Detention: 1,166.40 lf



DETENTION POND OUTFALL ORIFICE
SCALE: N.T.S.

Stantec
TBPE # F-6324
TBPLS # 10194229
12222 Merit Drive, Suite 400
Dallas TX
www.stantec.com

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Revision	By	Appd.	YY.MM.DD

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Client/Project
CAWLEY PARTNERS

CAWLEY - FOURTEEN555 PHASE 2
14555 DALLAS PARKWAY
TOWN OF ADDISON, DALLAS COUNTY, TEXAS

Title
HYDRAULIC & DETENTION CALCULATIONS

Permit-Seal

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Not for Construction or Permit Purposes
Stantec
Engineer JOSHUA A. MILLSAP
P.E. No. 100118 Date 02/12/2019

Project Number: 222011532
File Name: 11532_c2_001_dr.dwg

RR	JM	JM	19.02.12
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No. C4.5
Revision ----
Sheet C4.5

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ORIGINAL SHEET - ANSI D