Runoff Collection Point (Inlet or Manhole) Downstream Station	Upstream Station	Distance Between Collection Points (feet)	Incremental Drainage Area: Area No.	Drainage Area "A" (Acres)	Runoff Coeff. "C"	Frequency Factor "K"	Incremental "KCA"	Accum-ulated "KCA"	Time at Upstream Station (minutes)	Design Storm Frequency (yrs)	Intensity "I" (inches/hr)	Storm Water Runoff "Q" (c.f.s.)	Slope of Pipe (ft./ft.)	Capacity (c.f.s)	Top of Pipe Downstream (Elev)	Partial Flow (Full/Partial)	Slope of Hydraulic Gradient "S" (ft/ft)	Selected Storm Sewer Size (in.)	Velocity In Sewer Between Collection Points "V" (f.p.s.)	Head Loss Coefff. "Kj"	Vel. Head Loss at Upstream Station w/ Kj Kj x v2/2g (feet)	Vel. Head Loss at Upstream Station v2/2g (feet)	Flow Time in Sewer Distance V x 60 (minutes)	Time at Down-stream Station (minutes)	Hydraulic Grade Line Elevation Downstream (elev)	Hydraulic Grade Line Elevation Upstream (elev)
LINE A																										
A	12+68.84	13+14.21	45.37	INLINE INLET (P)	0.37	0.90	1.00	0.33	0.33	10.00	100	8.74	2.91	0.0032	12.74	620.10	PARTIAL	0.0002	24	0.93	1.25	0.00	0.01	0.82	10.82	619.42	619.43
A	12+13.71	12+68.84	55.13	45º BEND	0.00	0.90	1.00	0.00	0.33	10.00	100	8.74	2.91	0.0032	12.74	619.93	PARTIAL	0.0002	24	0.93	0.35	0.01	0.01	0.99	10.99	619.41	619.41
A	12+08.71	12+13.71	5.00	PIPE SIZE CHANGE	0.00	0.90	1.00	0.00	0.33	10.00	100	8.74	2.91	0.0032	12.74	619.91	PARTIAL	0.0002	24	0.93	0.75	0.01	0.01	0.09	10.09	619.39	619.40
A	9+50.71	12+08.71	258.00	LAT A-6 (E)	0.93	0.90	1.00	0.84	1.17	10.00	100	8.74	10.23	0.0032	23.09	619.10	FULL	0.0006	30	2.08	0.75	0.05	0.07	2.06	12.06	619.18	619.34
A	9+04.21	9+50.71	46.50	LAT A-5 (D)	0.82	0.90	1.00	0.74	1.91	10.00	100	8.74	16.68	0.0032	23.09	618.95	FULL	0.0017	30	3.40	0.75	0.06	0.18	0.23	10.23	618.97	619.05
A	8+75.83	9+04.21	28.38	45º BEND	0.00	0.90	1.00	0.00	1.91	10.00	100	8.74	16.68	0.0032	23.09	618.86	FULL	0.0017	30	3.40	0.35	0.09	0.18	0.14	10.14	618.86	618.91
A	8+48.06	8+75.83	27.77	LAT A-4 (C)	0.45	0.90	1.00	0.41	2.31	10.00	100	8.74	20.22	0.0032	37.55	618.77	PARTIAL	0.0009	36	2.86	0.75	0.10	0.13	0.16	10.16	618.74	618.77
A	7+91.39	8+48.06	56.67	LAT A-11 (H)	0.10	0.90	1.00	0.09	2.40	10.00	100	8.74	21.00	0.0032	37.55	618.59	FULL	0.0010	36	2.97	0.50	0.10	0.14	0.32	10.32	618.62	618.67
A	7+69.12	7+91.39	22.27	LAT A-10 (G)	0.72	0.90	1.00	0.65	3.05	10.00	100	8.74	26.67	0.0032	56.65	618.52	PARTIAL	0.0007	42	2.77	0.75	0.09	0.12	0.13	10.13	618.51	618.53
A	6+98.69	7+69.12	70.43	LAT A-3 (I&J)	1.12	0.90	1.00	1.01	4.06	10.00	100	8.74	35.46	0.0032	56.65	618.30	PARTIAL	0.0012	42	3.69	0.75	0.05	0.21	0.32	10.32	618.27	618.35
A	3+42.90	6+98.69	355.79	JUNCTION BOX (K,L,M,N,O)	1.36	0.90	1.00	1.22	5.28	10.00	100	8.74	46.17	0.0043	92.93	616.77	FULL	0.0011	48	3.67	0.25	0.07	0.21	1.61	11.61	617.84	618.21
A	3+12.90	3+42.90	30.00	45º BEND	0.00	0.90	1.00	0.00	5.28	10.00	100	8.74	46.17	0.0043	92.93	616.64	FULL	0.0011	48	3.67	0.35	0.16	0.21	0.14	10.14	617.73	617.76
A	0+00.00	3+12.90	312.90	LAT A-1 (A,B&F)	3.21	0.90	1.00	2.89	8.17	10.00	100	8.74	71.42	0.0030	98.24	615.70	FULL	0.0016	54	4.49	0.75	0.00	0.31	1.16	11.16	617.00	617.50
LAT. A-1																										
A-1	2+75.56	4+18.53	142.97	INLINE INLET (B)	1.27	0.90	1.00	1.14	1.14	10.00	100	8.74	9.99	0.0080	36.69	617.90	PARTIAL	0.0006	30	2.04	1.25	0.02	0.06	1.17	11.17	617.78	617.87
A-1	2+50.48	2+75.56	25.08	45º BEND	0.00	0.90	1.00	0.00	1.14	10.00	100	8.74	9.99	0.0080	36.69	617.70	FULL	0.0006	30	2.04	0.35	0.05	0.06	0.21	10.21	617.75	617.76
A-1	0+67.43	2+50.48	183.05	45º BEND	0.00	0.90	1.00	0.00	1.14	10.00	100	8.74	9.99	0.0080	36.69	616.24	FULL	0.0006	30	2.04	0.35	0.00	0.06	1.50	11.50	617.62	617.72
A-1	0+06.72	0+67.43	60.71	PIPE SIZE CHANGE	0.71	0.90	1.00	0.64	1.78	10.00	100	8.74	15.57	0.0080	59.66	615.75	FULL	0.0005	36	2.20	0.75	0.06	0.08	0.46	10.46	617.53	617.56
A-1	0+00.00	0+06.72	6.72	LAT A1.1	1.23	0.90	1.00	1.11	2.89	10.00	100	8.74	25.25	0.0080	175.89	615.70	FULL	0.0002	54	1.59	0.75	0.00	0.04	0.07	10.07	617.50	617.50
LAT. A-1.1																										
A-1.1	0+26.56	1+18.10	91.54	INLINE INLET (A)	1.23	0.90	1.00	1.11	1.11	10.00	100	8.74	9.68	0.0100	22.62	616.02	FULL	0.0018	24	3.08	1.25	0.05	0.15	0.50	10.50	617.60	617.78
A-1.1	0+00.00	0+26.56	26.56	45º BEND	0.00	0.90	1.00	0.00	1.11	10.00	100	8.74	9.68	0.0100	22.62	615.75	FULL	0.0018	24	3.08	0.35	0.18	0.15	0.14	10.14	617.50	617.55
LAT. A-2																										
A-2	4+91.47	5+55.47	64.00	INLINE INLET (O)	0.30	0.90	1.00	0.27	0.27	10.00	100	8.74	2.36	0.0048	7.26	622.03	PARTIAL	0.0005	18	1.34	1.25	0.02	0.03	0.80	10.80	620.27	620.30
A-2	4+68.53	4+91.47	22.94	INLINE INLET (P)	0.32	0.90	1.00	0.29	0.56	10.00	100	8.74	4.88	0.0048	7.26	621.92	PARTIAL	0.0022	18	2.76	1.25	0.09	0.12	0.14	10.14	620.07	620.12
A-2	3+22.72	4+68.53	145.81	45º BEND	0.00	0.90	1.00	0.00	0.56	10.00	100	8.74	4.88	0.0060	17.52	621.05	PARTIAL	0.0005	24	1.55	0.75	0.03	0.04	1.57	11.57	619.97	620.04
A-2	2+97.72	3+22.72	25.00	45º BEND	0.00	0.90	1.00	0.00	0.56	10.00	100	8.74	4.88	0.0060	17.52	620.90	PARTIAL	0.0005	24	1.55	0.75	0.03	0.04	0.27	10.27	619.93	619.94
A-2	2+76.35	2+97.72	21.37	45º BEND	0.62	0.90	1.00	0.56	1.12	10.00	100	8.74	9.75	0.0060	17.52	620.77	PARTIAL	0.0019	24	3.10	0.75	0.11	0.15	0.11	10.11	619.78	619.82
A-2	1+30.01	2+76.35	146.34	45º BEND	0.00	0.90	1.00	0.00	1.12	10.00	100	8.74	9.75	0.0060	17.52	619.89	PARTIAL	0.0019	24	3.10	0.75	0.04	0.15	0.79	10.79	619.40	619.67
A-2	1+16.35	6+98.69	582.34	45º BEND	0.00	0.90	1.00	0.00	1.12	10.00	100	8.74	9.75	0.0060	17.52	616.40	FULL	0.0019	24	3.10	0.75	0.05	0.15	3.13	13.13	618.28	619.36
A-2	0+92.95	1+16.35	23.40	45º BEND	0.00	0.90	1.00	0.00	1.12	10.00	100	8.74	9.75	0.0060	51.66	616.26	FULL	0.0002	36	1.38	0.35	0.02	0.03	0.28	10.28	618.26	618.27
A-2	0+00.00	0+92.95	92.95	LAT A-7	0.07	0.90	1.00	0.06	1.18	10.00	100	8.74	10.30	0.0060	51.66	615.70	FULL	0.0002	36	1.46	0.75	0.00	0.03	1.06	11.06	618.21	618.24
LAT. A-3																										
A-3	0+00.00	0+10.28	10.28	INLINE INLET (I)	0.16	0.90	1.00	0.14	0.14	10.00	100	8.74	1.26	0.0360	19.93	618.72	PARTIAL	0.0001	18	0.71	1.25	0.00	0.01	0.24	10.24	618.35	618.36
LAT. A-4																										
A-4	0+05.00	0+81.56	76.56	INLINE INLET (C)	0.60	0.90	1.00	0.54	0.54	10.00	100	8.74	4.72	0.0047	7.23	615.72	FULL	0.0020	18	2.67	0.75	0.08	0.11	0.48	10.48	618.77	618.93
A-4	0+00.00	0+05.00	5.00	PIPE SIZE CHANGE	0.00	0.90	1.00	0.00	0.54	10.00	100	8.74	4.72	0.0047	45.92	615.70	FULL	0.0001	36	0.67	0.75	0.00	0.01	0.12	10.12	618.77	618.77
LAT. A-5																										
A-5	0+55.00	1+71.50	116.50	INLINE INLET	0.05	0.90	1.00	0.05	0.05	10.00	100	8.74	0.39	0.005	2.52	617.86	FULL	0.0001	12	0.50	1.25	0.00	0.00	3.88	13.88	619.52	619.54
A-5	0+47.93	0+55.00	7.07	45º BEND	0	0.90	1.00	0.00	0.05	10.00	100	8.74	0.39	0.005	2.52	617.83	FULL	0.0001	12	0.50	0.35	0.00	0.00	0.24	10.24	619.52	619.52
A-5	0+42.43	0+47.93	5.50	45º BEND	0	0.90	1.00	0.00	0.05	10.00	100	8.74	0.39	0.005	2.52	617.80	FULL	0.0001	12	0.50	0.35	0.00	0.00	0.18	10.18	619.52	619.52
A-5	0+00.00	0+42.43	42.43	INLINE INLET (D)	0.82	0.90	1.00	0.74	0.78	10.00	100	8.74	6.84	0.0495	23.37	618.72	FULL	0.0042	18	3.87	1.25	0.00	0.23	0.18	10.18	619.05	619.23
LAT. A-6																										
A-6	0+00.00	0+42.43	42.43	INLINE INLET (E)	0.93	0.90	1.00	0.84	0.84	10.00	100	8.74	7.32	0.0306	18.38	696.45	PARTIAL	0.0048	18	4.14	1.25	0.00	0.27	0.17	10.17	619.34	619.55
LAT. A-11																										
A-11	0+00.00	0+05.00	5.00	INLINE INLET (H)	0.10	0.90	1.00	0.09	0.09	10.00	100	8.74	0.79	0.0306	18.38	696.45	PARTIAL	0.0001	18	0.45	1.25	0.00	0.00	0.19	10.19	618.67	618.67
LINE B																										
B	8+48.84	10+44.96	196.12	WYE INLET	0.81	0.90	1.00	0.73	0.73	10.00	100	8.74	6.37	0.0050	7.43	619.32	FULL	0.0037	18	3.61	1.25	0.15	0.20	0.91	10.91	621.80	622.53
B	8+12.85	8+48.84	35.99	45º BEND	0.00	0.90	1.00	0.00	0.73	10.00	100	8.74	6.37	0.0050	7.43	619.14	FULL	0.0037	18	3.61	0.75	0.15	0.20	0.17	10.17	621.52	621.65
B	5+92.24	8+12.85	220.61	45º BEND	0.00	0.90	1.00	0.00	0.73	10.00	100	8.74	6.37	0.0050	7.43	618.04	FULL	0.0037	18	3.61	0.75	0.10	0.20	1.02	11.02	620.56	621.37
B	3+70.48	5+92.24	221.76	MANHOLE	0.00	0.90	1.00	0.00	0.73	10.00	100	8.74	6.37	0.0030	22.47	618.37	FULL	0.0002	30	1.30	0.50	0.01	0.03	2.85	12.85	620.49	620.54
B	2+16.17	3+70.48	154.31	CURB INLET	0.51	0.90	1.00	0.46	1.19	10.00	100	8.74	10.38	0.0030	22.47	617.91	FULL	0.0006	30	2.12	0.50	0.03	0.07	1.22	11.22	620.36	620.46
B	0+61.00	2+16.17	155.17	MANHOLE	0.00	0.90	1.00	0.00	1.19	10.00	100	8.74	10.38	0.0016	26.68	618.38	FULL	0.0002	36	1.47	0.50	0.03	0.03	1.76	11.76	620.30	620.34
B	0+00.00	0+61.00	61.00	MANHOLE	0.80	0.90		0.72	1.91	10.00	100	8.74	16.68	0.0016	26.68	618.28	FULL	0.0006	36	2.36	0.75	0.00	0.09	0.43	10.43	620.20	620.24

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} = 85.80 cfs

***Max Release Rate= 85.80 cfs**

Future Conditions (To Detention Pond)

C = 0.90 A = 9.08 CxA = 8.17
C = 0.40 A = 6.61 CxA = 2.64

T = 10 min T = 15 min
I_{100} = 8.74 in/hr I_{100} = 7.52 in/hr

Q_{100}= 91.31 cfs

*Max release rate per plans prepared by BDD dated 9/8/2000.

Time (Min)	Rainfall Intensity						Discharge										Volume
5	I=	10.49	in/hr	C*A=	10.82	Q=	113.5	cfs	Inflow	5	*	113.5	*	60	=	34,038 cf
									Outflow	0.5	*	15	*	85.80 * 60	=	38,610 cf
																-4,572 cf
10	I=	8.74	in/hr	C*A=	10.82	Q=	94.5	cfs	Inflow	10	*	94.5	*	60	=	56,719 cf
									Outflow	0.5	*	20	*	85.80 * 60	=	51,480 cf
																5,239 cf
15	I=	7.52	in/hr	C*A=	10.82	Q=	81.3	cfs	Inflow	15	*	81.3	*	60	=	73,203 cf
									Outflow	0.5	*	25	*	85.80 * 60	=	64,350 cf
																8,853 cf
20	I=	6.80	in/hr	C*A=	10.82	Q=	73.5	cfs	Inflow	20	*	73.5	*	60	=	88,259 cf
									Outflow	0.5	*	30	*	85.80 * 60	=	77,220 cf
																11,039 cf
25	I=	6.20	in/hr	C*A=	10.82	Q=	67.1	cfs	Inflow	25	*	67.1	*	60	=	100,589 cf
									Outflow	0.5	*	35	*	85.80 * 60	=	90,090 cf
																10,499 cf
30	I=	5.75	in/hr	C*A=	10.82	Q=	62.2	cfs	Inflow	30	*	62.2	*	60	=	111,946 cf
									Outflow	0.5	*	40	*	85.80 * 60	=	102,960 cf
																8,986 cf
35	I=	5.15	in/hr	C*A=	10.82	Q=	55.7	cfs	Inflow	35	*	55.7	*	60	=	116,975 cf
									Outflow	0.5	*	45	*	85.8 * 60	=	115,830 cf
																1,145 cf

INLET DESIGN CALCULATIONS

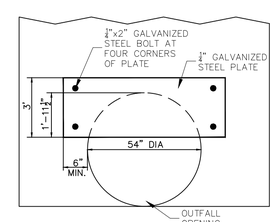
INLET	Design Storm Frequency (yrs.)	Time of Conc. (min.)	Intensity I (in./hr.)	Runoff Coeff. "C"	Area (Ac.)	"Q" (c.f.s)	Carry-Over From Upstream Inlet (c.f.s.)	SELECTED INLET TYPE	Inlet Capacity (c.f.s.)	Carry-Over To Downstream Inlet (c.f.s.)	Comment
LINE A	100	10	8.74	0.90	0.37	2.90	-	2'x2' Grate Inlet	6.60	-	SAG
LAT A-1	100	10	8.74	0.90	1.27	9.97	-	6-Grate	13.50	-	SAG
LAT A-1.1	100	10	8.74	0.90	1.23	9.68	-	6-Grate	13.50	-	SAG
LAT A-2 (N)	100	10	8.74	0.90	0.32	2.52	-	2'x2' Grate Inlet	6.60	-	SAG
LAT A-2 (O)	100	10	8.74	0.90	0.30	2.32	-	2'x2' Grate Inlet	6.60	-	SAG
LAT A-3	100	10	8.74	0.90	0.16	1.22	-	2'x2' Grate Inlet	6.60	-	SAG
LAT A-4	100	10	8.74	0.90	0.45	3.53	-	5' Curb Inlet	8.75	-	SAG
LAT A-5	100	10	8.74	0.90	0.82	6.47	-	5' Curb Inlet	8.75	-	SAG
LAT A-6	100	10	8.74	0.90	0.93	7.30	-	5' Curb Inlet	8.75	-	SAG
LAT A-11	100	10	8.74	0.90	0.10	0.76	-	2'x2' Grate Inlet	6.60	-	SAG

100 Year Release Rate Outlet Structure

Orfice Opening: Q = c*A √(2gh)

Invert Elevation @ Restrictor = 610.60 feet
100-Year Storage WSEL = 615.33 feet
Storage Depth = 4.73 feet
100 Year Release Rate = 85.61 cfs
c = 0.62
A = 9.25 square feet
h = 3.46 feet
g = 32.20

Stage Storage Volume		
WS Elevation	Storage Volume (CF)	Rainfall Event Storage
611.10	123.29	
611.60	493.16	
612.10	1109.61	
612.60	1972.64	
613.10	3082.25	
613.60	4438.44	
614.10	6041.21	
614.60	7890.56	
615.10	9986.49	
615.33	11042.59	100-Year Event (11,039 CF)
615.60	12329.00	



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

CITY OF DALLAS FILE NO: 311T-9310

V:\2222\active\222210632\civil\cad\sheet\10632STM.dwg
2018/04/16 8:21 AM By: Bacon, Jeff

ORIGINAL SHEET - ANSI D

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

The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay.
The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.

Revision	By	Appd.	YY.MM.DD
1 LANDMARK EXTENSION	JDB	JAM	18.02.08
2 RFI 033	JDB	JAM	17.08.01
3 SANITARY SEWER REVISIONS	JDB	JAM	17.07.27
4 W/CR #03 - HUB CITY RESPONSES	JDB	JAM	17.06.29
5 W/CR #02 - GARAGE UPDATES	JDB	JAM	17.06.28

Issued	By	Appd.	YY.MM.DD

PROJECT RECORD

To the best of North Texas Contracting, Inc. belief and knowledge the as-built conditions shown on this drawing constitute an accurate and complete depiction of the manner in which this portion of the work was actually installed.

North Texas Contracting, Inc.
7/16/18
Carson Collier, Project Manager

Client/Project
CAWLEY PARTNERS

Cowley - Fourteen555
14555 DALLAS PARKWAY
TOWN OF ADDISON, DALLAS COUNTY, TEXAS

Title
HYDRAULIC & DETENTION CALCULATIONS

Permit-Seal
STATE OF TEXAS
JOSHUA A. MILLSAP
100118
LICENSED PROFESSIONAL ENGINEER
11/3/18

Project Number: 222210632
File Name: 10632stm.dwg

JDB	JAM	JAM	18.04.11
Dwn.	Chkd.	Dsgn.	YY.MM.DD

Drawing No. C4.8
Revision ----
Sheet C4.8