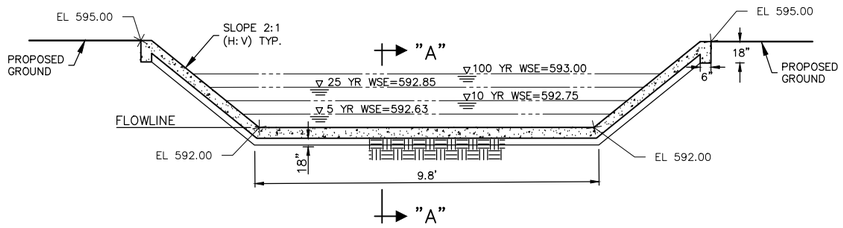
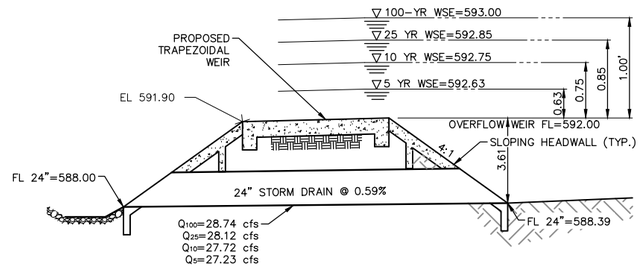


1 EAST TRAPEZOIDAL WEIR DETAIL

(NOT TO SCALE)



EAST DETENTION POND OUTFALL DETAILS

NTS

DETENTION POND OUTFALL CALCULATIONS

EQUATIONS

$Q_{ALLOWABLE} = Q_{TOTAL}$

$Q_{TOTAL} = Q_{CHANNEL} + Q_{ORIFICE}$

$Q_{CHANNEL} = \frac{1.49}{n} A R^{2/3} S^{1/2}$

$Q_{ORIFICE} = CA(2gh)^{1/2}$

VARIABLES

C = COEFFICIENT OF DISCHARGE (0.60)
A = AREA (ft^2)
g = ACCELERATION DUE TO GRAVITY (32.2 ft/s^2)
h_1 = HEAD ACTING ON CENTROID OF ORIFICE
W_P = WETTED PERIMETER (ft)
R = HYDRAULIC RADIUS (ft) = A/W_P
S = CHANNEL SLOPE (ft/ft) (0.0030)
n = MANNINGS ROUGHNESS COEFF. (0.013)

100-YR STORM EVENT ($Q_{ALLOWABLE}$ = 97.27 cfs)

$Q_{CHANNEL}$: A = 11.80, W_P = 14.27, R = 0.83

$Q_{CHANNEL} = \frac{1.49}{0.013}(11.80)(0.83^{2/3})(0.0030^{1/2})$

$Q_{CHANNEL}$ = 65.26 cfs

$Q_{ORIFICE}$: A = 3.14, h_1 = 3.61, C = 0.60

$Q_{ORIFICE} = 0.60(3.14)\sqrt{2*32.2*3.61}$

$Q_{ORIFICE}$ = 28.74 cfs

Q_{TOTAL} = 65.26 + 28.74 = 94.00 cfs

25-YR STORM EVENT ($Q_{ALLOWABLE}$ = 79.80 cfs)

CHANNEL: A = 9.73, W_P = 13.59, R = 0.72

$Q_{CHANNEL} = \frac{1.49}{0.013}(9.73)(0.72^{2/3})(0.0030^{1/2})$

$Q_{CHANNEL}$ = 48.88 cfs

$Q_{ORIFICE}$: A = 3.14, h_1 = 3.46, C = 0.60

$Q_{ORIFICE} = 0.60(3.14)\sqrt{2*32.2*3.46}$

$Q_{ORIFICE}$ = 28.12 cfs

Q_{TOTAL} = 48.88 + 28.12 = 77.00 cfs

10-YR STORM EVENT ($Q_{ALLOWABLE}$ = 69.58 cfs)

$Q_{CHANNEL}$: A = 8.45, W_P = 13.15, R = 0.64

$Q_{CHANNEL} = \frac{1.49}{0.013}(8.45)(0.64^{2/3})(0.0030^{1/2})$

$Q_{CHANNEL}$ = 39.53 cfs

$Q_{ORIFICE}$: A = 3.14, h_1 = 3.36, C = 0.60

$Q_{ORIFICE} = 0.60(3.14)\sqrt{2*32.2*3.36}$

$Q_{ORIFICE}$ = 27.72 cfs

Q_{TOTAL} = 39.53 + 27.72 = 67.25 cfs

5-YR STORM EVENT ($Q_{ALLOWABLE}$ = 58.79 cfs)

$Q_{CHANNEL}$: A = 6.98, W_P = 12.62, R = 0.55

$Q_{CHANNEL} = \frac{1.49}{0.013}(6.98)(0.55^{2/3})(0.0030^{1/2})$

$Q_{CHANNEL}$ = 29.52 cfs

$Q_{ORIFICE}$: A = 3.14, h_1 = 3.24, C = 0.60

$Q_{ORIFICE} = 0.60(3.14)\sqrt{2*32.2*3.24}$

$Q_{ORIFICE}$ = 27.23 cfs

Q_{TOTAL} = 29.52 + 27.23 = 56.75 cfs

EMERGENCY SPILLWAY

$Q_{CHANNEL}$: A = 47.40, W_P = 23.22, R = 2.04

$Q_{CHANNEL} = \frac{1.49}{0.013}(47.40)(2.04^{2/3})(0.0030^{1/2})$

$Q_{CHANNEL}$ = 478.89 cfs

$Q_{ORIFICE}$: A = 3.14, h_1 = 5.61, C = 0.60

$Q_{ORIFICE} = 0.60(3.14)\sqrt{2*32.2*5.61}$

$Q_{ORIFICE}$ = 35.83 cfs

Q_{TOTAL} = 478.89 + 35.83 = 514.72 cfs

CITY OF **ROCKWALL** DETENTION BASIN DESIGN - EAST SIDE
TP 40 - 100 YEAR

GIVEN:
Area = 26.01
Prop C = 0.83
Prop Tc = 10.00 min
Max Q = 97.27 cfs
Prop Q out 94.00 cfs

RESULT:
Maximum
Required Storage = **151,790** **cf**
Provided Storage = 153,453 cf

100 Year

5 min.	I=	10.15	Q=	0.83	x	10.150	x	26.01	=	219.44 cfs
10 min.	I=	9.80	Q=	0.83	x	9.800	x	26.01	=	211.87 cfs
15 min.	I=	9.00	Q=	0.83	x	9.000	x	26.01	=	194.58 cfs
20 min.	I=	8.30	Q=	0.83	x	8.300	x	26.01	=	179.44 cfs
30 min.	I=	6.90	Q=	0.83	x	6.900	x	26.01	=	149.17 cfs
40 min.	I=	5.70	Q=	0.83	x	5.700	x	26.01	=	123.23 cfs
50 min.	I=	5.00	Q=	0.83	x	5.000	x	26.01	=	108.10 cfs
60 min.	I=	4.50	Q=	0.83	x	4.500	x	26.01	=	97.29 cfs
70 min.	I=	4.00	Q=	0.83	x	4.000	x	26.01	=	86.48 cfs
80 min.	I=	3.70	Q=	0.83	x	3.700	x	26.01	=	79.99 cfs
90 min.	I=	3.50	Q=	0.83	x	3.500	x	26.01	=	75.67 cfs
100 min.	I=	3.40	Q=	0.83	x	3.400	x	26.01	=	73.51 cfs
110 min.	I=	3.20	Q=	0.83	x	3.200	x	26.01	=	69.18 cfs
120 min.	I=	2.70	Q=	0.83	x	2.700	x	26.01	=	58.37 cfs

5 min Storm	In	5	x	219.44	x	60	=				65,831	cf
	Out	0.5	x	15	x	97.27	x	60	=		43,772	cf
								Storage	=		22,060	cf
10 min Storm	In	10	x	211.87	x	60	=				127,123	cf
	Out	0.5	x	20	x	97.27	x	60	=		58,362	cf
								Storage	=		68,761	cf
15 min Storm	In	15	x	194.58	x	60	=				175,118	cf
	Out	0.5	x	25	x	97.27	x	60	=		72,953	cf
								Storage	=		102,166	cf
20 min Storm	In	20	x	179.44	x	60	=				215,330	cf
	Out	0.5	x	30	x	97.27	x	60	=		87,543	cf
								Storage	=		127,787	cf
30 min Storm	In	30	x	149.17	x	60	=				268,514	cf
	Out	0.5	x	40	x	97.27	x	60	=		116,724	cf
								Storage	=		151,790	cf
40 min Storm	In	40	x	123.23	x	60	=				295,755	cf
	Out	0.5	x	50	x	97.27	x	60	=		145,905	cf
								Storage	=		149,850	cf
50 min Storm	In	50	x	108.10	x	60	=				324,293	cf
	Out	0.5	x	60	x	97.27	x	60	=		175,086	cf
								Storage	=		149,207	cf
60 min Storm	In	60	x	97.29	x	60	=				350,236	cf
	Out	0.5	x	70	x	97.27	x	60	=		204,267	cf
								Storage	=		145,969	cf
70 min Storm	In	70	x	86.48	x	60	=				363,208	cf
	Out	0.5	x	80	x	97.27	x	60	=		233,448	cf
								Storage	=		129,760	cf
80 min Storm	In	80	x	79.99	x	60	=				383,963	cf
	Out	0.5	x	90	x	97.27	x	60	=		262,629	cf
								Storage	=		121,334	cf
90 min Storm	In	90	x	75.67	x	60	=				408,609	cf
	Out	0.5	x	100	x	97.27	x	60	=		291,810	cf
								Storage	=		116,799	cf
100 min Storm	In	100	x	73.51	x	60	=				441,038	cf
	Out	0.5	x	110	x	97.27	x	60	=		320,991	cf
								Storage	=		120,047	cf
110 min Storm	In	110	x	69.18	x	60	=				456,604	cf
	Out	0.5	x	120	x	97.27	x	60	=		350,172	cf
								Storage	=		106,432	cf
120 min Storm	In	120	x	58.37	x	60	=				420,283	cf
	Out	0.5	x	130	x	97.27	x	60	=		379,353	cf
								Storage	=		40,930	

CITY OF **ROCKWALL** DETENTION BASIN DESIGN - EAST SIDE
TP 40 - 5 YEAR

GIVEN:
Area = 26.01
Prop C = 0.83
Prop Tc = 10.00 min
Max Q = 58.79 cfs
Prop Q out 56.75 cfs

RESULT:
Maximum
Required Storage = **89,004** **cf**
Provided Storage = 131,506 cf

5 Year

5 min.	I=	7.20	Q=	0.831	x	7.20	x	26.01	=	155.66 cfs
10 min.	I=	6.20	Q=	0.831	x	6.20	x	26.01	=	134.04 cfs
15 min.	I=	5.50	Q=	0.831	x	5.50	x	26.01	=	118.91 cfs
20 min.	I=	4.90	Q=	0.831	x	4.90	x	26.01	=	105.94 cfs
30 min.	I=	4.10	Q=	0.831	x	4.10	x	26.01	=	88.64 cfs
40 min.	I=	3.40	Q=	0.831	x	3.40	x	26.01	=	73.51 cfs
50 min.	I=	2.90	Q=	0.831	x	2.90	x	26.01	=	62.70 cfs
60 min.	I=	2.60	Q=	0.831	x	2.60	x	26.01	=	56.21 cfs
70 min.	I=	2.40	Q=	0.831	x	2.400	x	26.01	=	51.89 cfs
80 min.	I=	2.30	Q=	0.831	x	2.300	x	26.01	=	49.72 cfs
90 min.	I=	2.10	Q=	0.831	x	2.100	x	26.01	=	45.40 cfs
100 min.	I=	1.90	Q=	0.831	x	1.900	x	26.01	=	41.08 cfs
110 min.	I=	1.80	Q=	0.831	x	1.800	x	26.01	=	38.92 cfs
120 min.	I=	1.60	Q=	0.831	x	1.600	x	26.01	=	34.59 cfs

5 min Storm	In	5	x	155.66	x	60	=				46,698	cf
	Out	0.5	x	15	x	58.79	x	60	=		26,456	cf
								Storage	=		20,243	cf
10 min Storm	In	10	x	134.04	x	60	=				80,425	cf
	Out	0.5	x	20	x	58.79	x	60	=		35,274	cf
								Storage	=		45,151	cf
15 min Storm	In	15	x	118.91	x	60	=				107,017	cf
	Out	0.5	x	25	x	58.79	x	60	=		44,093	cf
								Storage	=		62,924	cf
20 min Storm	In	20	x	105.94	x	60	=				127,123	cf
	Out	0.5	x	30	x	58.79	x	60	=		52,911	cf
								Storage	=		74,212	cf
30 min Storm	In	30	x	88.64	x	60	=				159,552	cf
	Out	0.5	x	40	x	58.79	x	60	=		70,548	cf
								Storage	=		89,004	cf
40 min Storm	In	40	x	73.51	x	60	=				176,415	cf
	Out	0.5	x	50	x	58.79	x	60	=		88,185	cf
								Storage	=		88,230	cf
50 min Storm	In	50	x	62.70	x	60	=				188,090	cf
	Out	0.5	x	60	x	58.79	x	60	=		105,822	cf
								Storage	=		82,268	cf
60 min Storm	In	60	x	56.21	x	60	=				202,359	cf
	Out	0.5	x	70	x	58.79	x	60	=		123,459	cf
								Storage	=		78,900	cf
70 min Storm	In	70	x	51.89	x	60	=				217,925	cf
	Out	0.5	x	80	x	58.79	x	60	=		141,096	cf
								Storage	=		76,829	cf
80 min Storm	In	80	x	49.72	x	60	=				238,679	cf
	Out	0.5	x	90	x	58.79	x	60	=		158,733	cf
								Storage	=		79,946	cf
90 min Storm	In	90	x	45.40	x	60	=				245,165	cf
	Out	0.5	x	100	x	58.79	x	60	=		176,370	cf
								Storage	=		68,795	cf
100 min Storm	In	100	x	41.08	x	60	=				246,462	cf
	Out	0.5	x	110	x	58.79	x	60	=		194,007	cf
								Storage	=		52,455	cf
110 min Storm	In	110	x	38.92	x	60	=				256,840	cf
	Out	0.5	x	120	x	58.79	x	60	=		211,644	cf
								Storage	=		45,196	cf
120 min Storm	In	120	x	34.59	x	60	=				249,057	cf
	Out	0.5	x	130	x	58.79	x	60	=		229,281	cf
								Storage	=		19,776	cf

CITY OF **ROCKWALL** DETENTION BASIN DESIGN - EAST SIDE
TP 40 - 10 YEAR

GIVEN:
Area = 26.01
Prop C = 0.83
Prop Tc = 10.00 min
Max Q = 69.58 cfs
Prop Q out 67.25 cfs

RESULT:
Maximum
Required Storage = **103,177** **cf**
Provided Storage = 138,542 cf

10 Year

5 min.	I=	8.20	Q=	0.83	x	8.20	x	26.01	=	177.28 cfs
10 min.	I=	7.10	Q=	0.83	x	7.10	x	26.01	=	153.50 cfs
15 min.	I=	6.50	Q=	0.83	x	6.50	x	26.01	=	140.53 cfs
20 min.	I=	5.90	Q=	0.83	x	5.90	x	26.01	=	127.56 cfs
30 min.	I=	4.70	Q=	0.83	x	4.70	x	26.01	=	101.61 cfs
40 min.	I=	4.00	Q=	0.83	x	4.00	x	26.01	=	86.48 cfs
50 min.	I=	3.40	Q=	0.83	x	3.40	x	26.01	=	73.51 cfs
60 min.	I=	3.00	Q=	0.83	x	3.00	x	26.01	=	64.86 cfs
70 min.	I=	2.80	Q=	0.83	x	2.800	x	26.01	=	60.53 cfs
80 min.	I=	2.60	Q=	0.83	x	2.600	x	26.01	=	56.21 cfs
90 min.	I=	2.40	Q=	0.83	x	2.400	x	26.01	=	51.89 cfs
100 min.	I=	2.20	Q=	0.83	x	2.200	x	26.01	=	47.56 cfs
110 min.	I=	2.00	Q=	0.83	x	2.000	x	26.01	=	43.24 cfs
120 min.	I=	1.80	Q=	0.83	x	1.800	x	26.01	=	38.92 cfs

5 min Storm	In	5	x	177.28	x	60	=				53,184	cf
	Out	0.5	x	15	x	69.58	x	60	=		31,311	cf
								Storage	=		21,873	cf
10 min Storm	In	10	x	153.50	x	60	=				92,099	cf
	Out	0.5	x	20	x	69.58	x	60	=		41,748	cf
								Storage	=		50,351	cf
15 min Storm	In	15	x	140.53	x	60	=				126,474	cf
	Out	0.5	x	25	x	69.58	x	60	=		52,185	cf
								Storage	=		74,289	cf
20 min Storm	In	20	x	127.56	x	60	=				153,066	cf
	Out	0.5	x	30	x	69.58	x	60	=		62,622	cf
								Storage	=		90,444	cf
30 min Storm	In	30	x	101.61	x	60	=				182,901	cf
	Out	0.5	x	40	x	69.58	x	60	=		83,496	cf
								Storage	=		99,405	cf
40 min Storm	In	40	x	86.48	x	60	=				207,547	cf
	Out	0.5	x	50	x	69.58	x	60	=		104,370	cf
								Storage	=		103,177	cf
50 min Storm	In	50	x	73.51	x	60	=				220,519	cf
	Out	0.5	x	60	x	69.58	x	60	=		125,244	cf
								Storage	=		95,275	cf
60 min Storm	In	60	x	64.86	x	60	=				233,491	cf
	Out	0.5	x	70	x	69.58	x	60	=		146,118	cf
								Storage	=		87,373	cf
70 min Storm	In	70	x	60.53	x	60	=				254,245	cf
	Out	0.5	x	80	x	69.58	x	60	=		166,992	cf
								Storage	=		87,253	cf
80 min Storm	In	80	x	56.21	x	60	=				269,812	cf
	Out	0.5	x	90	x	69.58	x	60	=		187,866	cf
								Storage	=		81,946	cf
90 min Storm	In	90	x	51.89	x	60	=				280,189	cf
	Out	0.5	x	100	x	69.58	x	60	=		208,740	cf
								Storage	=		71,449	cf
100 min Storm	In	100	x	47.56	x	60	=				285,378	cf
	Out	0.5	x	110	x	69.58	x	60	=		229,614	cf
								Storage	=		55,764	cf
110 min Storm	In	110	x	43.24	x	60	=				285,378	cf
	Out	0.5	x	120	x	69.58	x	60	=		250,488	cf
								Storage	=		34,890	cf
120 min Storm	In	120	x	38.92	x	60	=				280,189	cf
	Out	0.5	x	130	x	69.58	x	60	=		271,362	cf
								Storage	=		8,827	cf

CITY OF **ROCKWALL** DETENTION BASIN DESIGN - EAST SIDE
TP 40 - 25 YEAR

GIVEN:
Area = 26.01
Prop C = 0.83
Prop Tc = 10.00 min
Max Q = 79.80 cfs
Prop Q out 77.00 cfs

RESULT:
Maximum
Required Storage = **118,979** **cf**
Provided Storage = 144,466 cf

25 Year

5 min.	I=	9.30	Q=	0.83	x	9.30	x	26.01	=	201.06 cfs
10 min.	I=	8.30	Q=	0.83	x	8.30	x	26.01	=	179.44 cfs
15 min.	I=	7.40	Q=	0.83	x	7.40	x	26.01	=	159.98 cfs
20 min.	I=	6.70	Q=	0.83	x	6.70	x	26.01	=	144.85 cfs
30 min.	I=	5.50	Q=	0.83	x	5.50	x	26.01	=	118.91 cfs
40 min.	I=	4.60	Q=	0.83	x	4.60	x	26.01	=	99.45 cfs
50 min.	I=	4.00	Q=	0.83	x	4.00	x	26.01	=	86.48 cfs
60 min.	I=	3.50	Q=	0.83	x	3.50	x	26.01	=	75.67 cfs
70 min.	I=	3.30	Q=	0.83	x	3.300	x	26.01	=	71.34 cfs
80 min.	I=	3.00	Q=	0.83	x	3.000	x	26.01	=	64.86 cfs
90 min.	I=	2.80	Q=	0.83	x	2.800	x	26.01	=	60.53 cfs
100 min.	I=	2.60	Q=	0.83	x	2.600	x	26.01	=	56.21 cfs
110 min.	I=	2.40	Q=	0.83	x	2.400	x	26.01	=	51.89 cfs
120 min.	I=	2.20	Q=	0.83	x	2.200	x	26.01	=	47.56 cfs

5 min Storm	In	5	x	201.06	x	60	=				60,318	cf
	Out	0.5	x	15	x	79.80	x	60	=		35,910	cf
								Storage	=		24,408	cf
10 min Storm	In	10	x	179.44	x	60	=				107,665	cf
	Out	0.5	x	20	x	79.80	x	60	=		47,880	cf
								Storage	=		59,785	cf
15 min Storm	In	15	x	159.98	x	60	=				143,986	cf
	Out	0.5	x	25	x	79.80	x	60	=		59,850	cf
								Storage	=		84,136	cf
20 min Storm	In	20	x	144.85	x	60	=				173,821	cf
	Out	0.5	x	30	x	79.80	x	60	=		71,820	cf
								Storage	=		102,001	cf
30 min Storm	In	30	x	118.91	x	60	=				214,033	cf
	Out	0.5	x	40	x	79.80	x	60	=		95,760	cf
								Storage	=		118,273	cf
40 min Storm	In	40	x	99.45	x	60	=				238,679	cf
	Out	0.5	x	50	x	79.80	x	60	=		119,700	cf
								Storage	=		118,979	cf
50 min Storm	In	50	x	86.48	x	60	=				259,434	cf
	Out	0.5	x	60	x	79.80	x	60	=		143,640	cf
								Storage	=		115,794	cf
60 min Storm	In	60	x	75.67	x	60	=				272,406	cf
	Out	0.5	x	70	x	79.80	x	60	=		167,580	cf
								Storage	=		104,826	cf
70 min Storm	In	70	x	71.34	x	60	=				299,646	cf
	Out	0.5	x	80	x	79.80	x	60	=		191,520	cf
								Storage	=		108,126	cf
80 min Storm	In	80	x	64.86	x	60	=				311,321	cf
	Out	0.5	x	90	x	79.80	x	60	=		215,460	cf
								Storage	=		95,861	cf
90 min Storm	In	90	x	60.53	x	60	=				326,887	cf
	Out	0.5	x	100	x	79.80	x	60	=		239,400	cf
								Storage	=		87,487	cf
100 min Storm	In	100	x	56.21	x	60	=				337,264	cf
	Out	0.5	x	110	x	79.80	x	60	=		263,340	cf
								Storage	=		73,924	cf
110 min Storm	In	110	x	51.89	x	60	=				342,453	cf
	Out	0.5	x	120	x	79.80	x	60	=		287,280	cf
								Storage	=		55,173	cf
120 min Storm	In	120	x	47.56	x	60	=				342,453	cf
	Out	0.5	x	130	x	79.80	x	60	=		311,220	cf
								Storage	=		31,233	cf

RECORD DRAWING

THE SIGNED AND SEALED CONSTRUCTION DOCUMENT HAS BEEN REVISED TO REFLECT CONSTRUCTION RECORDS MAINTAINED AND PROVIDED BY THE CONTRACTOR FOR THIS PROJECT. THE INFORMATION SHOWN ON THIS RECORD DRAWING, WHICH WAS PROVIDED BY THE CONTRACTOR, OR OTHERS NOT ASSOCIATED WITH THE DESIGN ENGINEER, CANNOT BE VERIFIED FOR ACCURACY OR COMPLETENESS. PACHECO KOCH SHALL ASSUME NO LIABILITY FOR ANY CHANGES MADE DURING CONSTRUCTION THAT WERE NOT SPECIFICALLY APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION. THE SEALED CONSTRUCTION DRAWINGS ARE ON FILE AT THE OFFICES OF PACHECO KOCH.

ATTESTED BY:

SIGNATURE: _____

ENGINEER OF RECORD: CHET LEUGERS, P.E.

CONTRACTOR: MILLER-VALENTINE CONSTRUCTION

DATE REVISED: 06/08/2017

NO.	DATE	REVISION
2	06/09/2017	RECORD DRAWINGS
1	08/25/2016	ADDED THIS SHEET

Pacheco Koch
7557 RAMBLER ROAD, SUITE 1400
DALLAS, TX 75231 972.235.3031
TX REG. ENGINEERING FIRM F-14439
TX REG. SURVEYING FIRM LS-10193805

EAST DETENTION POND CALCULATIONS

ROCKWALL MANUFACTURING FACILITY

LOT 1, BLOCK A, ROCKWALL TECHNOLOGY PARK, PHASE IV

CITY OF ROCKWALL, ROCKWALL COUNTY, TEXAS

DESIGN	DRAWN	DATE	SCALE	NOTES	FILE	NO.
CTL	RHB	JULY 2016	N.T.S.			C8.3

Rockwall Manufacturing Facility

Case Number: SP2016-12

JNELSON
6/14/2017 12:04 PM
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