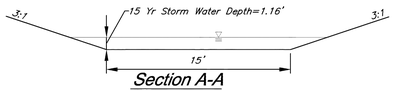


Section A-A

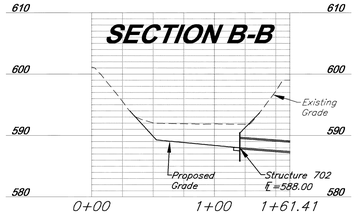
NTS

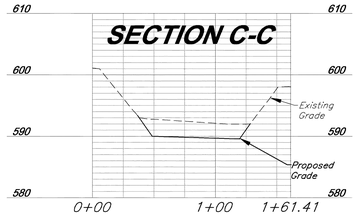
South Swale Storm Data:
15 Year Storm
Drainage Area=14.20 AC
Fully Developed Drainage area at 3.85 CFS/AC
Q=54.67 CFS
Depth of flow=1.16'
V=2.55 FT/S
Shear Stress=0.36 PSF

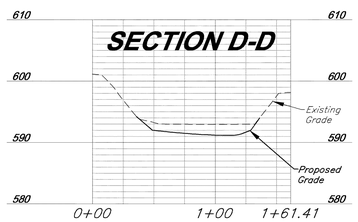
Stormwater Treatment Unit 101A Water Quality Flow Calculation
Treatment Area = 2.25 AC
WQv for treatment unit only = (1.14 x 0.8 x 2.25)/12 = 0.17 AC-FT (0.91 IN)
Modified CN = 1000 / [10 + 5P + 100 - 10(Q2 + 1.250P)1/2]
Q=0.91
P=1.14
Modified CN = 98
GSMM Table 2.1.5-3: Ia/P = 0.036
Tc = 5 min
GSMM Table 2.1.5-6: qu = 1000 CSM/IN
WQF = (1000 CSM/IN) x (1 AC/640 SQMI) x (0.91 IN) = 1.42 CFS

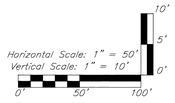
NOTE: The water quality flow for treatment unit 101A is designed for the Justice Center property only; no offsite drainage area has been included in the calculation. The weir in structure 101 will divert the water quality flow to treatment structure 101A with any additional flow continuing through to the detention basin at structure 100.

Site Water Quality Volume Calculation:
WQv=(PxRvxA)/12
P = 1.14"
A = 15.00 AC
% Impervious=(5.08/15)x100 33.87%
Rv=0.05+(0.009x%Impervious)
Rv=0.05+(0.009x33.87)
Rv=0.3548
WQv=(1.14x0.3548x15)/12
WQv=0.51 AC-FT=22,025 CF









Detention Basin Cross Sections

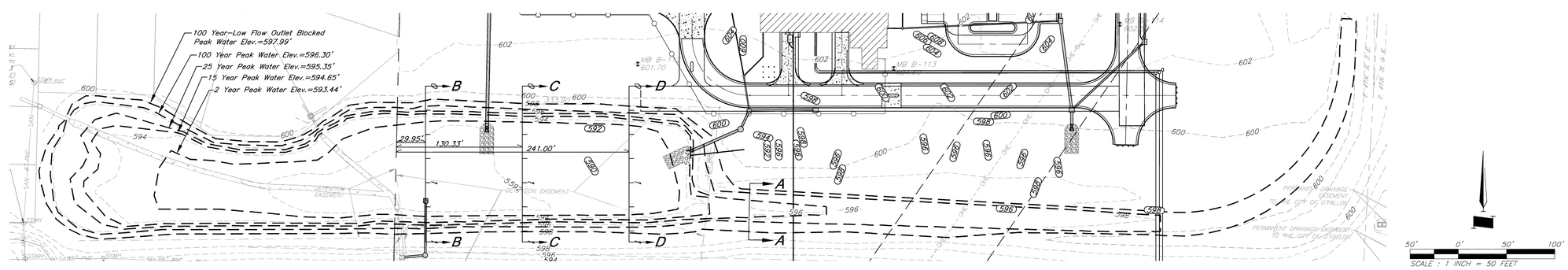
Note: Future development to the North will necessitate revisions to the detention basin outflow structure as presently designed.

15 Year Storm - Undeveloped Property to North - Shown on Sheet C7.0

	Structures		Runoff Calculations					Pipe Design							Design Checks									
	From	To	Direct Area (acre)	Total Area (acre)	P.I. (cfs/acre)	Design Q (cfs)	Description	Pipe length (lin ft)	Pipe Slope, %	Pipe Dia. (in)	Q full (cfs)	Pipe Area, sf	V full fps	Design V fps	Hw/D	outlet head, H	HW, Inlet Control, (ft)	HW, Outlet Control, (ft)	Inlet Top Elevation	upstream flowline	downstream flowline	Downstream water elevation	Hydraulic Grade Elev. (Calculated)	Hydraulic Grade (allowable)	Comments
Line 100	105		3.43		1.87	6.4	Area Inlet MH												616.15				611.47	614.15	
		104		3.43	1.87	6.4	RCP	95.96	1.50	30	50.37	4.91	10.26	7.02	0.7	0.08	611.47	609.81		609.73	608.29	609.73			Offsite Drainage
	104		3.09		1.94	6.0	Area Inlet MH												613.92				609.73	611.92	
		103		6.52	1.94	12.6	RCP	143.12	3.00	30	71.24	4.91	14.51	10.92	0.8	0.42	609.73	605.46		607.79	603.50	605.04			
	103		0.58		3.85	2.2	Curb Inlet												610.66				605.04	608.66	
		102		7.10	2.10	14.9	RCP	144.01	3.00	30	71.24	4.91	14.51	11.45	0.8	0.59	605.04	600.54		603.00	598.68	599.95			
	102		1.06		3.85	4.1	Curb Inlet												608.46				599.95	606.46	
		101		8.16	2.32	19.0	RCP	82.18	3.00	30	71.24	4.91	14.51	12.26	0.9	0.67	599.95	597.51		597.68	595.21	596.84			
	101		0.27		3.85	1.0	Curb Inlet/Weir Structure												604.95				596.84	602.95	Junction with Line 500 and Treatment Unit
		100		9.57	2.51	24.0	RCP	168.44	2.50	30	65.03	4.91	13.25	12.22	1.1	1.72	596.84	591.72		594.21	590.00	590.00			
Line 200	205		2.26		2.90	6.6	Curb Inlet												609.55				606.24	607.55	Offsite Drainage
		204		2.26	2.90	6.6	RCP	162.54	2.00	18	14.90	1.77	8.43	8.16	1.0	1.65	606.24	604.83		604.69	601.44	603.18			
	204		1.12		2.93	3.3	Curb Inlet												609.29				603.18	607.29	Offsite Drainage
		203		3.38	2.91	9.8	RCP	40.00	2.00	18	14.90	1.77	8.43	8.98	1.5	1.35	603.18	602.75		600.94	600.14	601.40			
	203		0.09		3.85	0.3	Curb Inlet												609.29				601.40	607.29	
		202		3.47	2.93	10.2	RCP	174.77	1.00	24	22.68	3.14	7.22	7.01	0.9	0.98	601.40	600.94		599.64	597.89	599.96			
	202		1.08		3.85	4.2	Curb Inlet												605.18				599.96	603.18	Junction with Roof Drain
		201		5.09	3.23	16.4	RCP	92.83	1.00	24	22.68	3.14	7.22	7.85	1.2	1.59	599.82	599.96		597.39	596.46	598.37			
	201		0.17		3.85	0.7	Curb Inlet												600.83				598.37	598.83	Junction with Line 600
		200		5.26	3.25	17.1	RCP	21.43	1.00	30	41.13	4.91	8.38	7.91	0.9	0.31	598.37	596.31		596.21	596.00	596.00			
Line 300	303		4.54		1.87	8.5	End Section												N/A				602.10	605.00	Offsite Drainage
		302		4.54	1.87	8.5	29"x45" Conc Elliptical Pipe	21.30	1.00	36	66.88	7.07	9.46	7.95	0.7	0.03	602.10	601.07		600.03	599.82	601.03			36" Equivalent arch pipe
	302		0.03		3.85	0.1	Curb Inlet												603.80				601.03	601.80	Junction with Line 800
		301	z e	4.57	1.88	4.3	19"x30" Conc Elliptical Pipe	47.43	1.00	24	22.68	3.14	7.22	6.79	0.7	0.07	601.03	600.56		599.62	599.15	600.49			Calculation shown is for one of two pipes, 24" equivalent
	301		0.15		3.85	0.6	Curb Inlet												603.48				600.49	601.48	
		300		7.32	1.95	7.1	19"x30" Conc Elliptical Pipe	24.58	1.00	24	22.68	3.14	7.22	7.25	0.8	0.15	600.49	598.85		598.95	598.70	598.70			Calculation shown is for one of two pipes, 24" equivalent
Line 400	403		0.76		3.85	2.9	Curb Inlet												598.45				596.42	596.45	
		402		0.76	3.85	2.9	RCP	68.85	0.50	15	4.58	1.23	3.73	3.94	0.9	0.42	596.42	595.43		595.36	595.02	595.02			
	402		0.37		3.85	1.4	Manhole												599.71				595.96	597.71	Junction with Roof Drain
		401		1.13	3.85	4.4	RCP	20.91	0.50	18	7.45	1.77	4.21	4.38	0.8	0.19	595.96	594.80		594.72	594.61	594.61			
	401		5.26		3.85	20.3	Overflow Manhole												957.50				596.79	598.50	BMP Outflow
		400		6.39	3.85	24.6	24"x38" Conc Elliptical Pipe	60.32	0.50	30	29.08	4.91	5.92	6.63	1.1	0.95	596.79	594.76		594.11	593.81	593.81			30" equivalent arch pipe
Line 500	504		0.53		3.47	1.8	Area Inlet MH												608.92				600.81	606.92	Offsite Drainage
		503		0.53	3.47	1.8	RCP	59.47	3.00	15	11.22	1.23	9.14	6.69	0.7	0.15	600.81	598.82		599.89	598.10	598.68			
	503		0.32		3.58	1.1	Curb Inlet												602.33				598.68	600.33	Offsite Drainage
		502		0.85	3.51	3.0	RCP	34.31	1.30	15	7.39	1.23	6.02	5.69	0.9	0.27	598.68	598.40		597.60	597.16	598.12			
	502		0.29		3.63	1.1	Curb Inlet												602.38				598.12	600.38	Offsite Drainage
		501		1.14	3.54	4.0	RCP	41.83	1.00	15	6.48	1.23	5.28	5.54	1.0	0.56	598.12	597.00		596.86	596.44	596.44			
	501		0.00		3.63	0.0	Manhole												603.14				597.41	601.14	
		101		1.14	3.54	4.0	RCP	92.69	1.00	15	6.48	1.23	5.28	5.54	1.0	1.00	597.41	596.21		596.14	595.21	595.21			Junction with Line 100
Line 600	602		0.24		3.85	0.9	Curb Inlet												605.65				600.77	603.65	
		601		0.24	3.85	0.9	RCP	113.52	1.50	15	7.93	1.23	6.46	4.28	0.7	0.06	600.77	599.02		599.91	598.21	598.96			
	601		0.30		3.85	1.2	Curb Inlet												602.79				598.96	600.79	
		202		0.54	3.85	2.1	RCP	103.09	1.50	15	7.93	1.23	6.46	5.45	0.8	0.29	598.96	596.75		598.01	596.46	596.46			Junction with Line 200
Line 700	702		58.42		3.07	21.3	18" Headwall												N/A				594.65	598.00	Proposed Detention Basin Low Flow
		701		58.42	3.07	21.3	RCP	53.94	1.50	18	12.90	1.77	7.30	7.30	4.5	7.57	594.76	601.22		588.00	587.19	593.66			Flows and Elevations Calculated using HEC-HMS
	701		0.00		3.07	0.0	Manhole												595.02				593.66	598.74	
		EX1		58.42	3.07	21.3	RCP	23.98	1.50	18	12.90	1.77	7.30	7.30	4.5	4.86	593.66	591.39		586.89	586.53	586.53			
Line 800	801		2.60		1.95	5.1	Curb Inlet												605.44				602.34	603.44	Offsite Drainage
		302		2.60	1.95	5.1	RCP	107.49	1.00	24	22.68	3.14	7.22	5.68	0.7	0.17	602.34	599.99		600.90	599.82	599.82			Junction with Line 300

15 Year Storm - Developed Property to North - Shown on Sheet C7.1

	Structures		Runoff Calculations					Pipe Design							Design Checks									
	From	To	Direct Area (acre)	Total Area (acre)	P.I. (cfs/acre)	Design Q (cfs)	Description	Pipe length (lin ft)	Pipe Slope, %	Pipe Dia. (in)	Q full (cfs)	Pipe Area, sf	V full fps	Design V fps	Hw/D	outlet head, H	HW, Inlet Control, (ft)	HW, Outlet Control, (ft)	Inlet Top Elevation	upstream flowline	downstream flowline	Downstream water elevation	Hydraulic Grade Elev. (Calculated)	Hydraulic Grade (allowable)	Comments
Line 100	105		6.52		3.85	25.1	Area Inlet MH												616.15				612.45	614.15	
		104		6.52	3.85	25.1	RCP	95.96	1.50	30	50.37	4.91	10.26	10.23	1.1	1.28	612.45	611.82		609.73	608.29	610.54			
	104		0.10		3.85	0.4	Area Inlet MH												613.92				610.54	611.92	
		103		6.62	3.85	25.5	RCP	143.12	3.00	30	71.24	4.91	14.51	13.28	1.1	1.72	610.54	607.66		607.79	603.50	605.94			
	103		0.58		3.85	2.2	Curb Inlet												610.66				605.94	608.66	
		102		7.20	3.85	27.7	RCP	144.01	3.00	30	71.24	4.91	14.51	13.57	1.2	2.05	605.94	603.07		603.00	598.68	601.02			
	102		1.06		3.85	4.1	Curb Inlet												608.46				601.02	606.46	
		101		8.26	3.85	31.8	RCP	82.18	3.00	30	71.24	4.91	14.51	14.07	1.3	1.87	601.02	599.99		597.68	595.21	598.11			
	101		0.27		3.85	1.0	Curb Inlet/Weir Structure												604.95				598.11	602.95	Junction with Line 500 and Treatment Unit
		100		9.57	3.83	36.7	RCP	168.44	2.50	30	65.03	4.91	13.25	13.62	1.6	4.02	598.11	594.02		594.21	590.00	590.00			
Line 200	205		1.18		3.85	4.5	Open Back Curb Inlet												609.55				605.85	607.55	
		204		1.18	3.85	4.5	RCP	162.54	2.00	18	14.90	1.77	8.43	7.37	0.8	0.79	605.85	603.23		604.58	601.33	602.43			
	204		0.60		3.85	2.3	Open Back Curb Inlet												609.29				602.43	607.29	
		203		1.78	3.85	6.9	RCP	40.00	2.00	18	14.90	1.77	8.43	8.25	1.1	0.66	602.43	601.74		600.83	600.03	601.08			
	203		0.09		3.85	0.3	Curb Inlet												609.29				601.08	607.29	
		202		1.87	3.85	7.2	RCP	174.77	1.00	24	22.68	3.14	7.22	6.40	0.8	0.49	601.08	599.95		599.53	597.78	599.46			
	202		1.08		3.85	4.2	Curb Inlet												605.18				599.46	603.18	Junction with Roof Drain
		201		3.49	3.85	13.4	RCP	92.83	1.00	24	22.68	3.14	7.22	7.50	1.0	1.06	599.46	599.28		597.39	596.46	598.22			
	201		0.17		3.85	0.7	Curb Inlet												600.83				598.22	598.83	Junction with Line 600
		200		3.66	3.85	14.1	RCP	21.43	1.00	30	41.13	4.91	8.38	7.58	0.8	0.21	598.22	596.21		596.21	596.00	596.00			
Line 300	303		4.54		3.85	17.5	End Section												N/A				602.29	605.00	Offsite Drainage
		302		4.54	3.85	17.5	29"x45" Conc Elliptical Pipe	21.30	1.00	36	66.88	7.07	9.46	7.95	0.8	0.15	602.29	601.93		600.03	599.82	601.78			36" Equivalent arch pipe
	302		0.03		3.85	0.1	Curb Inlet												603.80				601.78	601.80	Junction with Line 800
		301		4.57	3.85	8.8	19"x30" Conc Elliptical Pipe	47.43	1.00	24	22.68	3.14	7.22	6.79	0.8	0.30	601.27	601.78		599.62	599.15	601.48			Calculation shown is for one of two pipes, 24" equivalent
	301		0.15		3.85	0.6	Curb Inlet												603.48				601.48	601.48	
		300		8.92	3.85	17.2	19"x30" Conc Elliptical Pipe	24.58	1.00	24	22.68	3.14	7.22	7.92	1.3	0.87	601.48	599.57		598.95	598.70	598.70			Calculation shown is for one of two pipes, 24" equivalent
Line 400	403		0.76		3.85	2.9	Curb Inlet												598.45				596.42	596.45	
		402		0.76	3.85	2.9	RCP	68.85	0.50	15	4.58	1.23	3.73	3.94	0.9	0.42	596.42	595.43		595.36	595.02	595.02			
	402		0.37		3.85	1.4	Manhole												599.71				595.96	597.71	Junction with Roof Drain
		401		1.13	3.85	4.4	RCP	20.91	0.50	18	7.45	1.77	4.21	4.38	0.8	0.19	595.96	594.80		594.72	594.61	594.61			
	401		3.66		3.85	14.1	Overflow Manhole												957.50				596.35	598.50	BMP Outflow
		400		4.79	3.85	18.4	24"x38" Conc Elliptical Pipe	60.32	0.50	30	29.08	4.91	5.92	6.25	0.9	0.53	596.35	594.34		594.11	593.81	593.81			30" equivalent arch pipe
Line 500	504		0.43		3.85	1.7	Area Inlet MH												608.92				600.80	606.92	
		503		0.43	3.85	1.7	RCP	59.47	3.00	15	11.22	1.23	9.14	6.58	0.7	0.12	600.80	598.77		599.89	598.10	598.65			
	503		0.32		3.58	1.1	Curb Inlet												602.33				598.65	600.33	Offsite Drainage
		502		0.75	3.73	2.8	RCP	34.31	1.30	15	7.39	1.23	6.02	5.59	0.8	0.24	598.65	598.33		597.60	597.16	598.09			
	502		0.29		3.63	1.1	Curb Inlet												602.38				598.09	600.38	Offsite Drainage
		501		1.04	3.71	3.9	RCP	41.83	1.00	15	6.48	1.23	5.28	5.51	1.0	0.51	598.09	596.95		596.86	596.44	596.44			
	501		0.00		3.63	0.0	Manhole												603.14				597.37	601.14	
		101		1.04	3.71	3.9	RCP	92.69	1.00	15	6.48	1.23	5.28	5.51	1.0	0.91	597.37	596.12		596.14	595.21	595.21			Junction with Line 100
Line 600	602		0.24		3.85	0.9	Curb Inlet												605.65				600.77	603.65	
		601		0.24	3.85	0.9	RCP	113.52	1.50	15	7.93	1.23	6.46	4.28	0.7	0.06	600.77	599.02		599.91	598.21	598.96			
	601		0.30		3.85	1.2	Curb Inlet												602.79				598.96	600.79	
		202		0.54	3.85	2.1	RCP	103.09	1.50	15	7.93	1.23	6.46	5.45	0.8	0.29	598.96	596.75		598.01	596.46	596.46			Junction with Line 200
Line 700	702		58.42		3.07	21.3	18" Headwall												N/A				594.65	598.00	Proposed Detention Basin Low Flow
		701		58.42	3.07	21.3	RCP	53.94	1.50	18	12.90	1.77	7.30	7.30	4.5	7.57	594.76	601.22		588.00	587.19	593.66			Flows and Elevations Calculated using HEC-HMS
	701		0.00		3.07	0.0	Manhole												595.02				593.66	598.74	
		EX1		58.42	3.07	21.3	RCP	23.98	1.50	18	12.90	1.77	7.30	7.30	4.5	4.86	593.66	591.39		586.89	586.53	586.53			
Line 800	801		4.20		3.85	16.2	Open Back Curb Inlet												605.44				603.29	603.44	Offsite Drainage
		302		4.20	3.85	16.2	RCP	107.49	1.00	24	22.68	3.14	7.22	7.78	1.2	1.71	603.29	601.53		600.90	599.82	599.82			Junction with Line 300



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O'FALLON JUSTICE CENTER
CONSTRUCTION DOCUMENTS
O'FALLON, MISSOURI

REV	DATE	DESCRIPTION
1	3/25/2016	City Comments

STATE OF MISSOURI
BRADLEY D. BURTON
NUMBER E-29777
REGISTERED PROFESSIONAL ENGINEER
3/25/16

PROJECT NUMBER
13326.00

DATE
03/25/16
CONSTRUCTION DOCUMENTS

DESIGNED: HTR/JWM/JRH
DRAWN: HTR/JWM/JRH
REVIEWED: HTR/BDB

SHEET TITLE
Storm Drainage Calculations

SHEET NUMBER
C7.2

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Engineering COA# 000133
Architecture COA# 000312
Land Surveying COA# 000059

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