

STORM SEWER CALCULATIONS

FORMULAE USED
Q_r = AC * I (required)
V_p = (1.486 / n) * R^{2/3} * S^{1/2}
Q_p = A_r * V_p
R = (Pipe Dia. / 4)

Designed By: SAD
Reviewed By: EMR
Date: 3-24-99
Sheet: 1 of 3
Job #: 99-26

LOCATION		TOPOGRAPHY					TIME					DESIGN					TIME		PIPE		REMARKS
From	To	Area Number	Acres	"C" Value	"AC" for Area	"AC" Accumulate	To Inlet "T" (minutes)	In Pipe "Tp" (minutes)	Concentration "T" (minutes)	Intensity "I" 10 Year Storm Sewer		Pipe Size (inches)	"n" Value	Slope in %	Velocity (ft. / sec)		Length of Pipe (feet)	In Pipe "Tp"	Inlet Invert	Outlet Invert	
		1	0.73	0.50	0.37	0.37	12.9	-	12.9	4.74	1.75	12	0.016	0.70	3.08	2.42	35.00	0.2			
		2	0.71	0.50	0.36	0.73	12.9	0.2	13.1	4.71	3.44	12	0.016	4.60	7.91	6.21	93.00	0.2			
		MH	-	-	-	0.73	13.1	0.2	13.3	4.68	3.42	12	0.016	2.00	5.21	4.09	245.00	0.8			
		3	0.40	0.50	0.20	0.20	10.0	-	10.0	5.15	1.03	12	0.016	2.20	5.47	4.29	42.00	0.1			
		4	0.42	0.50	0.21	1.14	13.3	0.8	14.1	4.58	5.22	12	0.016	5.50	8.64	6.79	240.00	0.5			
		5	0.58	0.50	0.29	0.29	10.0	-	10.0	5.15	1.49	12	0.016	0.70	3.08	2.42	41.00	0.2			
		6	0.38	0.50	0.19	1.99	16.0	0.3	16.3	4.33	8.61	15	0.016	3.10	7.53	9.24	219.00	0.5			
		7	0.56	0.50	0.28	2.27	16.3	0.5	16.8	4.27	9.70	18	0.016	1.60	6.11	10.80	33.00	0.1			
		8	0.40	0.50	0.20	2.47	16.8	0.1	16.9	4.26	10.52	18	0.016	1.75	6.39	11.29	112.00	0.3			
		9	1.32	0.50	0.66	0.66	15.0	-	15.0	4.47	2.95	12	0.016	2.00	5.21	4.09	26.00	0.1			
		10	0.39	0.50	0.20	0.86	15.0	0.1	15.1	4.46	3.84	18	0.016	0.40	3.05	5.40	266.00	1.5			
		MH	-	-	-	3.33	16.9	0.3	17.2	4.23	14.08	24	0.016	0.70	4.90	15.38	67.00	0.2			
		11	1.11	0.50	0.56	0.56	18.8	-	18.8	4.07	2.28	12	0.016	1.20	4.04	3.17	83.00	0.3			
		12	0.47	0.50	0.24	0.80	18.8	0.3	19.1	4.04	3.23	12	0.016	3.50	6.90	5.42	222.00	0.5			
		13	0.33	0.50	0.17	0.17	10.0	-	10.0	5.15	0.88	12	0.016	4.00	7.37	5.79	45.00	0.1			
		14	0.64	0.50	0.32	1.29	19.1	0.5	19.6	3.99	5.15	15	0.016	1.50	5.24	6.43	29.00	0.1			
		15	0.52	0.50	0.26	1.55	19.6	0.1	19.7	3.98	6.17	15	0.016	3.50	8.00	9.82	72.00	0.1			
		16	0.30	0.50	0.15	1.70	19.7	0.1	19.8	3.97	6.75	15	0.016	4.90	9.47	11.62	96.00	0.2			
		17	3.04	0.50	1.52	1.52	16.1	-	16.1	4.35	6.61	18	0.016	1.40	5.71	10.10	87.00	0.3			TO EXIST SEC.3 M. 4 LOT 6570
		MH	-	-	-	3.22	19.8	0.2	20.0	3.95	12.73	24	0.016	0.75	5.07	15.92	135.00	0.4			
		18	0.70	0.50	0.35	0.35	10.0	-	10.0	5.15	1.80	12	0.016	1.00	3.69	2.89	26.00	0.1			
		19	0.54	0.50	0.27	7.17	20.0	0.4	20.4	3.92	28.09	24	0.016	4.00	11.70	36.76	96.00	0.1			
		20	1.52	0.50	0.76	0.76	20.5	-	20.5	3.91	2.97	12	0.016	1.50	4.51	3.55	26.00	0.1			
		21	0.38	0.50	0.19	0.95	20.5	0.1	20.6	3.90	3.70	15	0.016	1.00	4.28	5.25	68.00	0.3			
		MH	-	-	-	0.95	20.6	0.3	20.9	3.87	3.68	15	0.016	0.60	3.31	4.07	297.00	1.5			
		22	3.13	0.50	1.57	1.57	22.1	-	22.1	3.77	5.92	15	0.016	1.50	5.24	6.43	26.00	0.1			
		23	0.93	0.50	0.47	2.99	22.1	0.1	22.2	3.76	11.25	18	0.016	3.60	9.16	16.19	137.00	0.2			
		24	0.87	0.50	0.44	3.43	22.2	0.2	22.4	3.74	12.84	24	0.016	0.60	4.53	14.24	147.00	0.5			
		6A	0.73	0.50	0.37	0.37	16.0	-	16.0	4.36	1.61	12	0.016	4.10	7.46	5.86	124.00	0.3			

STORM SEWER CALCULATIONS

FORMULAE USED
 $Q_r = AC * I$ (required)
 $V_p = (1.486 / n) * R^{2/3} * S^{1/2}$
 $Q_p = A_p * V_p$
 $R = (\text{Pipe Dia.} / 4)$

Designed By: _____
Reviewed By: _____
Date: _____
Sheet: 2 of 3
Job # 99-61

LOCATION		TOPOGRAPHY					TIME					DESIGN					TIME		PIPE		REMARKS
From	To	Area Number	Acres	"C" Value	"AC" for Area	"AC" Accumulate	To Inlet "T" (minutes)	In Pipe "Tp" (minutes)	Concentration "Tc" (minutes)	Intensity "I" 10 Year Storm Sewer		Pipe Size (inches)	"n" Value	Slope in %	Velocity (ft. / sec)		Length of Pipe (feet)	In Pipe "Tp"	Inlet Invert	Outlet Invert	
		25	0.92	0.50	0.46	3.89	22.6	0.5	23.1	3.69	14.34	24	0.016	1.35	6.80	21.36	46.00	0.1			
		26	0.40	0.50	0.20	4.09	23.1	0.1	23.2	3.68	15.05	24	0.016	4.25	12.06	37.89	142.00	0.2			
		27	1.49	0.50	0.75	0.75	23.6	-	23.6	3.65	2.74	12	0.016	1.50	4.51	3.55	28.00	0.1			
		28	0.44	0.50	0.22	0.97	23.6	0.1	23.7	3.64	3.53	12	0.016	4.80	8.08	6.34	300.00	0.6			
		29	4.24	0.50	2.12	2.12	21.5	-	21.5	3.82	8.10	18	0.016	1.10	5.07	8.95	150.00	0.5			
		30	3.63	0.50	1.82	3.94	21.5	0.5	22.0	3.78	14.88	18	0.016	3.90	9.54	16.85	150.00	0.3			
		31	1.41	0.50	0.71	0.71	16.5	-	16.5	4.30	3.06	12	0.016	1.70	4.81	3.77	185.00	0.6			
		32	1.36	0.50	0.68	1.36	16.5	0.6	17.1	4.24	5.77	15	0.016	1.50	5.24	6.43	28.00	0.1			
		33	0.74	0.50	0.37	6.64	23.7	0.6	24.3	3.59	23.86	30	0.016	0.90	6.44	31.62	300.00	0.8			LOT 6716
		34	1.13	0.50	0.57	7.21	24.3	0.8	25.1	3.53	25.48	30	0.016	1.75	8.98	44.09	48.00	0.1			
		35	0.51	0.50	0.26	0.26	17.8	-	17.8	4.17	1.08	12	0.016	0.70	3.08	2.42	84.00	0.5			
		36	0.56	0.50	0.28	7.75	25.1	0.5	25.6	3.50	27.11	30	0.016	0.70	5.68	27.88	197.00	0.6			
		37	0.19	0.50	0.10	0.10	10.0	-	10.0	5.15	0.52	12	0.016	2.25	5.53	4.34	54.00	0.2			S = 0.70% Qp: 2.42 cfs > Qr
		38	2.34	0.50	1.17	1.17	13.7	-	13.7	4.63	5.42	18	0.016	0.70	4.04	7.14	137.00	0.6			
		39	0.42	0.50	0.21	9.23	25.6	0.6	26.2	3.46	31.89	36	0.016	0.40	4.85	34.27	300.00	1.0			
		40	0.41	0.50	0.21	0.21	10.0	-	10.0	5.15	1.08	12	0.016	0.70	3.08	2.42	54.00	0.3			
		41	0.97	0.50	0.49	9.93	26.2	1.1	27.3	3.38	33.56	36	0.016	0.60	5.94	41.98	73.00	0.2			
		MH	-	-	-	9.93	26.2	0.2	26.4	3.44	34.17	36	0.016	0.60	5.94	41.98	87.00	0.2			
		42	0.27	0.50	0.14	0.14	10.0	-	10.0	5.15	0.72	12	0.016	0.70	3.08	2.42	26.00	0.1			
		43	0.55	0.50	0.28	10.35	26.4	0.2	26.6	3.43	35.47	36	0.016	0.45	5.14	36.35	49.00	0.2			
		44	0.43	0.50	0.22	10.57	26.6	0.2	26.8	3.41	36.08	36	0.016	0.50	5.42	38.32	37.00	0.1			
		45	0.34	0.50	0.17	0.17	10.0	-	10.0	5.15	0.88	12	0.016	0.70	3.08	2.42	26.00	0.1			
		46	0.70	0.50	0.35	0.52	18.7	-	18.7	4.08	2.12	12	0.016	3.70	7.09	5.57	287.00	0.7			
		47	1.76	0.50	0.88	1.40	20.3	-	20.3	3.93	5.50	15	0.016	1.50	5.24	6.43	116.00	0.4			10' STUB
		48	0.66	0.50	0.33	1.73	20.3	0.4	20.7	3.89	6.73	15	0.016	1.90	5.90	7.23	159.00	0.4			
		49	0.31	0.50	0.16	1.89	20.7	0.4	21.1	3.85	7.29	15	0.016	2.20	6.34	7.78	57.00	0.1			
		50	0.38	0.50	0.19	2.08	21.1	0.1	21.2	3.85	8.00	15	0.016	2.65	6.96	8.54	308.00	0.7			
		51	0.90	0.50	0.45	13.10	26.8	0.1	26.9	3.41	44.63	36	0.016	1.20	8.40	59.36	203.00	0.4			
		52	0.87	0.50	0.44	13.54	26.9	0.4	27.3	3.38	45.76	36	0.016	2.60	12.36	87.38	102.00	0.1			
		53	0.84	0.50	0.42	0.42	14.8	-	14.8	4.50	1.89	12	0.016	0.70	3.08	2.42	28.00	0.2			
		54	0.34	0.50	0.17	0.59	14.8	0.2	15.0	4.47	2.64	12	0.016	5.60	8.72	6.85	150.00	0.3			

STORM SEWER CALCULATIONS

FORMULAE USED
 $Q_r = AC * I$ (required)
 $V_p = (1.486 / n) * R^{2/3} * S^{1/2}$
 $Q_p = A_p * V_p$
 $R = (\text{Pipe Dia.} / 4)$

Designed By: _____
Reviewed By: _____
Date: _____
Sheet: 3 of 3
Job #: _____

LOCATION		TOPOGRAPHY					TIME					DESIGN					TIME		PIPE		REMARKS
From	To	Area Number	Acres	"C" Value	"AC" for Area	"AC" Accumulate	To Inlet "T" (minutes)	In Pipe "Tp" (minutes)	Concentration "T" (minutes)	Intensity "I" 10 Year Storm Sewer		Pipe Size (inches)	"n" Value	Slope in %	Velocity (ft. / sec)		Length of Pipe (feet)	In Pipe "Tp"	Inlet Invert	Outlet Invert	
		MH	-	-	-	0.59	15.0	0.3	15.3	4.44	2.62	12	0.016	1.50	4.51	3.55	104.00	0.4			
		55	0.99	0.50	0.50	1.09	15.3	0.4	15.7	4.39	4.79	12	0.016	3.50	6.90	5.42					
		56	27.23	0.50	13.62	28.25	40.0	-	40.0	2.70	76.23										See Cuvert Calculations ? <i>JEB 6775</i>
		57	1.41	0.50	0.71	0.71	15.1	-	15.1	4.46	3.17	42	0.016	2.00	12.02	115.61	256.00	0.4			105.37cfs from Culvert=108.54cfs Required
		58	0.75	0.50	0.38	5.18	23.2	0.2	23.4	3.66	18.98	48	0.016	1.65	11.93	149.92	123.00	0.2			105.37cfs from Culvert=124.35cfs Required
		MH	-	-	-	5.18	23.4	2.0	25.4	3.51	18.19	48	0.016	1.20	10.17	127.85	20.00	0.0			105.37cfs from Culvert=123.56cfs Required
		59	1.26	0.50	0.63	5.81	25.4	0.0	25.4	3.51	20.41	48	0.016	1.20	10.17	127.85	26.00	0.0			105.37cfs from Culvert=125.78cfs Required
		60	1.27	0.50	0.64	0.64	17.8	-	17.8	4.17	2.67	12	0.016	1.50	4.51	3.55	28.00	0.1			
		61	0.47	0.50	0.24	0.88	17.8	0.1	17.9	4.16	3.66	15	0.016	0.80	3.83	4.69	298.00	1.3			
		62	1.76	0.50	0.88	0.88	17.7	-	17.7	4.18	3.68	12	0.015	2.00	5.56	4.37	28.00	0.1			
		63	0.41	0.50	0.21	1.97	17.9	1.3	19.2	4.03	7.94	15	0.016	2.60	6.90	8.46	72.00	0.2			
		MH	-	-	-	1.97	19.2	0.2	19.4	4.01	7.90	15	0.016	3.15	7.59	9.32	245.00	0.5			
		MH	-	-	-	1.97	19.4	0.5	19.9	3.96	7.81	15	0.016	3.15	7.59	9.32	75.00	0.2			
		64	0.73	0.50	0.37	8.15	25.4	0.0	25.4	3.51	28.63	48	0.016	1.35	10.79	135.60	137.00	0.2			105.37cfs from Culvert=134.00cfs Required
		MH	-	-	-	8.15	25.4	0.2	25.6	3.50	28.51	48	0.016	1.35	10.79	135.60	147.00	0.2			105.37cfs from Culvert=133.88cfs Required
		65	0.16	0.50	0.08	0.08	10.0	-	10.0	5.15	0.41	12	0.016	0.70	3.08	2.42	26.00	0.1			
		66	0.53	0.50	0.27	0.35	19.4	-	19.4	4.01	1.40	12	0.016	4.80	8.08	6.34	45.00	0.1			$S = 4.60\%$ $Q_p: 6.21cfs \geq Q_r$
		67	0.21	0.50	0.11	0.46	19.4	0.1	19.5	4.00	1.84	12	0.016	6.65	9.50	7.46	158.00	0.3			$S = 6.62\%$
		68	0.40	0.50	0.20	0.20	10.0	-	10.0	5.15	1.03	12	0.016	0.70	3.08	2.42	31.00	0.2			
		69	0.39	0.50	0.20	0.86	19.5	0.3	19.8	3.97	3.42	12	0.016	4.60	7.91	6.21	70.00	0.1			
		MH	-	-	-	0.86	19.8	0.1	19.9	3.96	3.41	12	0.016	3.65	7.04	5.53	143.00	0.3			
		70	0.38	0.50	0.19	0.19	10.0	-	10.0	5.15	0.98	12	0.016	2.85	6.22	4.89	60.00	0.2			
		71	0.30	0.50	0.15	1.20	19.9	0.3	20.2	3.94	4.72	12	0.016	3.50	6.90	5.42	68.00	0.2			
		MH	-	-	-	1.20	20.2	0.2	20.4	3.92	4.70	12	0.016	5.00	8.24	6.47	72.00	0.1			

STORM SEWER CALCULATIONS

FORMULAE USED
 $Q_r = AC * I$ (required)
 $V_p = (1.486 / n) * R^{2/3} * S^{1/2}$
 $Q_p = A_p * V_p$
 $R = (\text{Pipe Dia.} / 4)$

LOCATION		TOPOGRAPHY					TIME					DESIGN					TIME		PIPE		REMARKS
From	To	Area Number	Acres	"C" Value	"AC" for Area	"AC" Accumulate	To Inlet "T" (minutes)	In Pipe "Tp" (minutes)	Concentration "T" (minutes)	Intensity "I" 10 Year Storm Sewer		Pipe Size (inches)	"n" Value	Slope in %	Velocity (ft. / sec)		Length of Pipe (feet)	In Pipe "Tp"	Inlet Invert	Outlet Invert	
		1	0.73	0.50	0.37	0.37	12.9	-	12.9	4.74	1.75	12	0.016	0.70	3.08	2.42	35.00	0.2			
		2	0.71	0.50	0.36	0.73	12.9	0.2	13.1	4.71	3.44	12	0.016	4.60	7.91	6.21	93.00	0.2			
		MH	-	-	-	0.73	13.1	0.2	13.3	4.68	3.42	12	0.016	2.00	5.21	4.09	245.00	0.8			
		3	0.40	0.50	0.20	0.20	10.0	-	10.0	5.15	1.03	12	0.016	2.20	5.47	4.29	42.00	0.1			
		4	0.42	0.50	0.21	1.14	13.3	0.8	14.1	4.58	5.22	12	0.016	5.50	8.64	6.79	240.00	0.5			
		5	0.58	0.50	0.29	0.29	10.0	-	10.0	5.15	1.49	12	0.016	0.70	3.08	2.42	41.00	0.2			
		6	0.38	0.50	0.19	1.99	16.0	0.3	16.3	4.33	8.61	15	0.016	3.10	7.53	9.24	219.00	0.5			
		7	0.56	0.50	0.28	2.27	16.3	0.5	16.8	4.27	9.70	18	0.016	1.60	6.11	10.80	33.00	0.1			
		8	0.40	0.50	0.20	2.47	16.8	0.1	16.9	4.26	10.52	18	0.016	1.75	6.39	11.29	112.00	0.3			
		9	1.32	0.50	0.66	0.66	15.0	-	15.0	4.47	2.95	12	0.016	2.00	5.21	4.09	26.00	0.1			
		10	0.39	0.50	0.20	0.86	15.0	0.1	15.1	4.46	3.84	18	0.016	0.40	3.05	5.40	266.00	1.5			
		MH	-	-	-	3.33	16.9	0.3	17.2	4.23	14.08	24	0.016	0.70	4.90	15.38	67.00	0.2			
		11	1.11	0.50	0.56	0.56	18.8	-	18.8	4.07	2.28	12	0.016	1.20	4.04	3.17	83.00	0.3			
		12	0.47	0.50	0.24	0.80	18.8	0.3	19.1	4.04	3.23	12	0.016	3.50	6.90	5.42	222.00	0.5			
		13	0.33	0.50	0.17	0.17	10.0	-	10.0	5.15	0.88	12	0.016	4.00	7.37	5.79	45.00	0.1			
		14	0.64	0.50	0.32	1.29	19.1	0.5	19.6	3.99	5.15	15	0.016	1.50	5.24	6.43	29.00	0.1			
		15	0.52	0.50	0.26	1.55	19.6	0.1	19.7	3.98	6.17	15	0.016	3.50	8.00	9.82	72.00	0.1			
		16	0.30	0.50	0.15	1.70	19.7	0.1	19.8	3.97	6.75	15	0.016	4.90	9.47	11.62	96.00	0.2			
		17	3.04	0.50	1.52	1.52	16.1	-	16.1	4.35	6.61	18	0.016	1.40	5.71	10.10	87.00	0.3			
		MH	-	-	-	3.22	19.8	0.2	20.0	3.95	12.73	24	0.016	0.75	5.07	15.92	135.00	0.4			
		18	0.70	0.50	0.35	0.35	10.0	-	10.0	5.15	1.80	12	0.016	1.00	3.69	2.89	26.00	0.1			
		19	0.54	0.50	0.27	7.17	20.0	0.4	20.4	3.92	28.09	24	0.016	4.00	11.70	36.76	96.00	0.1			
		20	1.52	0.50	0.76	0.76	20.5	-	20.5	3.91	2.97	12	0.016	1.50	4.51	3.55	26.00	0.1			
		21	0.38	0.50	0.19	0.95	20.5	0.1	20.6	3.90	3.70	15	0.016	1.00	4.28	5.25	68.00	0.3			
		MH	-	-	-	0.95	20.6	0.3	20.9	3.87	3.68	15	0.016	0.60	3.31	4.07	297.00	1.5			
		22	3.13	0.50	1.57	1.57	22.1	-	22.1	3.77	5.92	15	0.016	1.50	5.24	6.43	26.00	0.1			
		23	0.93	0.50	0.47	2.99	22.1	0.1	22.2	3.76	11.25	18	0.016	3.60	9.16	16.19	137.00	0.2			
		24	0.87	0.50	0.44	3.43	22.2	0.2	22.4	3.74	12.84	24	0.016	0.60	4.53	14.24	147.00	0.5			
		6A	0.73	0.50	0.37	0.37	16.0	-	16.0	4.36	1.61	12	0.016	4.10	7.46	5.86	124.00	0.3			

STORM SEWER CALCULATIONS

FORMULAE USED
 $Q_r = AC * I$ (required)
 $V_p = (1.486 / n) * R^{2/3} * S^{1/2}$
 $Q_p = A_p * V_p$
 $R = (\text{Pipe Dia.} / 4)$

Designed By: _____
Reviewed By: _____
Date: _____
Sheet: 2 of 3
Job # 99-61

LOCATION		TOPOGRAPHY					TIME				"Q" Required (c.f.s.)	DESIGN				"Q" Provided (c.f.s.)	TIME		PIPE		REMARKS
From	To	Area Number	Acres	"C" Value	"AC" for Area	"AC" Accumulate	To Inlet "T" (minutes)	In Pipe "Tp" (minutes)	Concentration "T" (minutes)	Intensity "I" 10 Year Storm Sewer		Pipe Size (inches)	"n" Value	Slope in %	Velocity (ft. /sec)		Length of Pipe (feet)	In Pipe "Tp"	Inlet Invert	Outlet Invert	
		25	0.92	0.50	0.46	3.89	22.6	0.5	23.1	3.69	14.34	24	0.016	1.35	6.80	21.36	46.00	0.1			
		26	0.40	0.50	0.20	4.09	23.1	0.1	23.2	3.68	15.05	24	0.016	4.25	12.06	37.89	142.00	0.2			
		27	1.49	0.50	0.75	0.75	23.6	-	23.6	3.65	2.74	12	0.016	1.50	4.51	3.55	28.00	0.1			
		28	0.44	0.50	0.22	0.97	23.6	0.1	23.7	3.64	3.53	12	0.016	4.80	8.08	6.34	300.00	0.6			
		29	4.24	0.50	2.12	2.12	21.5	-	21.5	3.82	8.10	18	0.016	1.10	5.07	8.95	150.00	0.5			
		30	3.63	0.50	1.82	3.94	21.5	0.5	22.0	3.78	14.88	18	0.016	3.90	9.54	16.85	150.00	0.3			
		31	1.41	0.50	0.71	0.71	16.5	-	16.5	4.30	3.06	12	0.016	1.70	4.81	3.77	185.00	0.6			
		32	1.36	0.50	0.68	1.36	16.5	0.6	17.1	4.24	5.77	15	0.016	1.50	5.24	6.43	28.00	0.1			
		33	0.74	0.50	0.37	6.64	23.7	0.6	24.3	3.59	23.86	30	0.016	0.90	6.44	31.62	300.00	0.8			
		34	1.13	0.50	0.57	7.21	24.3	0.8	25.1	3.53	25.48	30	0.016	1.75	8.98	44.09	48.00	0.1			
		35	0.51	0.50	0.26	0.26	17.8	-	17.8	4.17	1.08	12	0.016	0.70	3.08	2.42	84.00	0.5			
		36	0.56	0.50	0.28	7.75	25.1	0.5	25.6	3.50	27.11	30	0.016	0.70	5.68	27.88	197.00	0.6			
		37	0.19	0.50	0.10	0.10	10.0	-	10.0	5.15	0.52	12	0.016	2.25	5.53	4.34	54.00	0.2			
		38	2.34	0.50	1.17	1.17	13.7	-	13.7	4.63	5.42	18	0.016	0.70	4.04	7.14	137.00	0.6			
		39	0.42	0.50	0.21	9.23	25.6	0.6	26.2	3.46	31.89	36	0.016	0.40	4.85	34.27	300.00	1.0			
		40	0.41	0.50	0.21	0.21	10.0	-	10.0	5.15	1.08	12	0.016	0.70	3.08	2.42	54.00	0.3			
		41	0.97	0.50	0.49	9.93	26.2	1.1	27.3	3.38	33.56	36	0.016	0.60	5.94	41.98	73.00	0.2			
		MH	-	-	-	9.93	26.2	0.2	26.4	3.44	34.17	36	0.016	0.60	5.94	41.98	87.00	0.2			
		42	0.27	0.50	0.14	0.14	10.0	-	10.0	5.15	0.72	12	0.016	0.70	3.08	2.42	26.00	0.1			
		43	0.55	0.50	0.28	10.35	26.4	0.2	26.6	3.43	35.47	36	0.016	0.45	5.14	36.35	49.00	0.2			
		44	0.43	0.50	0.22	10.57	26.6	0.2	26.8	3.41	36.08	36	0.016	0.50	5.42	38.32	37.00	0.1			
		45	0.34	0.50	0.17	0.17	10.0	-	10.0	5.15	0.88	12	0.016	0.70	3.08	2.42	26.00	0.1			
		46	0.70	0.50	0.35	0.52	18.7	-	18.7	4.08	2.12	12	0.016	3.70	7.09	5.57	287.00	0.7			
		47	1.76	0.50	0.88	1.40	20.3	-	20.3	3.93	5.50	15	0.016	1.50	5.24	6.43	116.00	0.4			
		48	0.66	0.50	0.33	1.73	20.3	0.4	20.7	3.89	6.73	15	0.016	1.90	5.90	7.23	159.00	0.4			
		49	0.31	0.50	0.16	1.89	20.7	0.4	21.1	3.85	7.29	15	0.016	2.20	6.34	7.78	57.00	0.1			
		50	0.38	0.50	0.19	2.08	21.1	0.1	21.2	3.85	8.00	15	0.016	2.65	6.96	8.54	308.00	0.7			
		51	0.90	0.50	0.45	13.10	26.8	0.1	26.9	3.41	44.63	36	0.016	1.20	8.40	59.36	203.00	0.4			
		52	0.87	0.50	0.44	13.54	26.9	0.4	27.3	3.38	45.76	36	0.016	2.60	12.36	87.38	102.00	0.1			
		53	0.84	0.50	0.42	0.42	14.8	-	14.8	4.50	1.89	12	0.016	0.70	3.08	2.42	28.00	0.2			
		54	0.34	0.50	0.17	0.59	14.8	0.2	15.0	4.47	2.64	12	0.016	5.60	8.72	6.85	150.00	0.3			

STORM SEWER CALCULATIONS

FORMULAE USED
 $Q_r = AC * I$ (required)
 $V_p = (1.486 / n) * R^{2/3} * S^{1/2}$
 $Q_p = A_p * V_p$
 $R = (\text{Pipe Dia.} / 4)$

Designed By: _____
Reviewed By: _____
Date: _____
Sheet: 3 of 3
Job # _____

LOCATION		TOPOGRAPHY					TIME				"Q" Required (cfs.)	DESIGN				"Q" Provided (cfs.)	TIME		PIPE		REMARKS
From	To	Area Number	Acres	"C" Value	"AC" for Area	"AC" Accumulate	To Inlet "T" (minutes)	In Pipe "Tp" (minutes)	Concentration "T" (minutes)	Intensity "I" 10 Year Storm Sewer		Pipe Size (inches)	"n" Value	Slope in %	Velocity (ft./sec)		Length of Pipe (feet)	In Pipe "Tp"	Inlet Invert	Outlet Invert	
		MH	-	-	-	0.59	15.0	0.3	15.3	4.44	2.62	12	0.016	1.50	4.51	3.55	104.00	0.4			
		55	0.99	0.50	0.50	1.09	15.3	0.4	15.7	4.39	4.79	12	0.016	3.50	6.90	5.42					
		56	27.23	0.50	13.62	28.25	40.0	-	40.0	2.70	76.23										See Cuvert Calculations
		57	1.41	0.50	0.71	0.71	15.1	-	15.1	4.46	3.17	42	0.016	2.00	12.02	115.61	256.00	0.4			105.37cfs from Culvert=108.54cfs Required
		58	0.75	0.50	0.38	5.18	23.2	0.2	23.4	3.66	18.98	48	0.016	1.65	11.93	149.92	123.00	0.2			105.37cfs from Culvert=124.35cfs Required
		MH	-	-	-	5.18	23.4	2.0	25.4	3.51	18.19	48	0.016	1.20	10.17	127.85	20.00	0.0			105.37cfs from Culvert=123.56cfs Required
		59	1.26	0.50	0.63	5.81	25.4	0.0	25.4	3.51	20.41	48	0.016	1.20	10.17	127.85	26.00	0.0			105.37cfs from Culvert=125.78cfs Required
		60	1.27	0.50	0.64	0.64	17.8	-	17.8	4.17	2.67	12	0.016	1.50	4.51	3.55	28.00	0.1			
		61	0.47	0.50	0.24	0.88	17.8	0.1	17.9	4.16	3.66	15	0.016	0.80	3.83	4.69	298.00	1.3			
		62	1.76	0.50	0.88	0.88	17.7	-	17.7	4.18	3.68	12	0.015	2.00	5.56	4.37	28.00	0.1			
		63	0.41	0.50	0.21	1.97	17.9	1.3	19.2	4.03	7.94	15	0.016	2.60	6.90	8.46	72.00	0.2			
		MH	-	-	-	1.97	19.2	0.2	19.4	4.01	7.90	15	0.016	3.15	7.59	9.32	245.00	0.5			
		MH	-	-	-	1.97	19.4	0.5	19.9	3.96	7.81	15	0.016	3.15	7.59	9.32	75.00	0.2			
		64	0.73	0.50	0.37	8.15	25.4	0.0	25.4	3.51	28.63	48	0.016	1.35	10.79	135.60	137.00	0.2			105.37cfs from Culvert=134.00cfs Required
		MH	-	-	-	8.15	25.4	0.2	25.6	3.50	28.51	48	0.016	1.35	10.79	135.60	147.00	0.2			105.37cfs from Culvert=133.88cfs Required
		65	0.16	0.50	0.08	0.08	10.0	-	10.0	5.15	0.41	12	0.016	0.70	3.08	2.42	26.00	0.1			
		66	0.53	0.50	0.27	0.35	19.4	-	19.4	4.01	1.40	12	0.016	4.80	8.08	6.34	45.00	0.1			
		67	0.21	0.50	0.11	0.46	19.4	0.1	19.5	4.00	1.84	12	0.016	6.65	9.50	7.46	158.00	0.3			
		68	0.40	0.50	0.20	0.20	10.0	-	10.0	5.15	1.03	12	0.016	0.70	3.08	2.42	31.00	0.2			
		69	0.39	0.50	0.20	0.86	19.5	0.3	19.8	3.97	3.42	12	0.016	4.60	7.91	6.21	70.00	0.1			
		MH	-	-	-	0.86	19.8	0.1	19.9	3.96	3.41	12	0.016	3.65	7.04	5.53	143.00	0.3			
		70	0.38	0.50	0.19	0.19	10.0	-	10.0	5.15	0.98	12	0.016	2.85	6.22	4.89	60.00	0.2			
		71	0.30	0.50	0.15	1.20	19.9	0.3	20.2	3.94	4.72	12	0.016	3.50	6.90	5.42	68.00	0.2			
		MH	-	-	-	1.20	20.2	0.2	20.4	3.92	4.70	12	0.016	5.00	8.24	6.47	72.00	0.1			

Shajers 4
Culvert

CURRENT DATE: 06-02-1999
CURRENT TIME: 14:25:16

FILE DATE: 06-02-1999
FILE NAME: 9961-1

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0
CULVERT SHAPE, MATERIAL, INLET
SITE DATA
INLET OUTLET CULVERT BARRELS
ELEV. ELEV. LENGTH SHAPE SPAN RISE MANNING INLET
(ft) (ft) (ft) MATERIAL (ft) (ft) n TYPE
NO. 1 706.43 705.11 132.01 1 CSP 3.50 3.50 .024 CONVENTIONAL
2
3
4
5
6

SUMMARY OF CULVERT FLOWS (cfs) FILE: 9961-1 DATE: 06-02-1999

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
708.68	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
708.90	11.9	11.9	0.0	0.0	0.0	0.0	0.0	0.00	1
709.18	23.9	23.9	0.0	0.0	0.0	0.0	0.0	0.00	1
709.67	35.8	35.8	0.0	0.0	0.0	0.0	0.0	0.00	1
710.26	47.8	47.8	0.0	0.0	0.0	0.0	0.0	0.00	1
710.83	59.8	59.8	0.0	0.0	0.0	0.0	0.0	0.00	1
711.22	71.7	71.7	0.0	0.0	0.0	0.0	0.0	0.00	1
711.70	83.7	83.7	0.0	0.0	0.0	0.0	0.0	0.00	1
712.58	95.6	95.6	0.0	0.0	0.0	0.0	0.0	0.00	1
713.39	105.4	105.4	0.0	0.0	0.0	0.0	0.0	0.00	1
714.27	119.5	115.0	0.0	0.0	0.0	0.0	0.0	4.43	4
714.00	112.2	112.2	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: 9961-1 DATE: 06-02-1999

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
708.68	0.000	0.00	0.00	0.00
708.90	0.000	11.95	0.00	0.00
709.18	0.000	23.90	0.00	0.00
709.67	0.000	35.85	0.00	0.00
710.26	0.000	47.80	0.00	0.00
710.83	0.000	59.75	0.00	0.00
711.22	0.000	71.70	0.00	0.00
711.70	0.000	83.65	0.00	0.00
712.58	0.000	95.60	0.00	0.00
713.39	0.000	105.37	0.00	0.00
714.27	-0.001	119.50	0.03	0.03

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

FILE DATE: 06-02-1999

FILE NAME: 9961-1

[illegible]

PERFORMANCE CURVE FOR CULVERT 1 - 1(3.50 (ft) BY 3.50 (ft)) CSP

[illegible]

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	708.68	0.00	2.25	0-NF	0.00	0.00	0.00	3.57	0.00	0.00
11.95	708.90	1.43	2.47	3-M1f	1.11	1.05	3.50	3.57	1.24	0.00
23.90	709.18	2.11	2.75	3-M1f	1.62	1.50	3.50	3.57	2.48	0.00
35.85	709.67	2.69	3.24	3-M1f	2.07	1.85	3.50	3.57	3.73	0.00
47.80	710.26	3.26	3.83	3-M1f	2.55	2.15	3.50	3.57	4.97	0.00
59.75	710.83	3.85	4.40	3-M1f	3.50	2.42	3.50	3.57	6.21	0.00
71.70	711.22	4.51	4.79	3-M1f	3.50	2.64	3.50	3.57	7.45	0.00
83.65	711.70	5.27	5.26	3-M1f	3.50	2.84	3.50	3.57	8.69	0.00
95.60	712.58	6.15	5.80	3-M1f	3.50	2.99	3.50	3.57	9.94	0.00
105.37	713.39	6.96	6.29	3-M1f	3.50	3.12	3.50	3.57	10.95	0.00
115.03	714.27	7.84	6.83	3-M1f	3.50	3.24	3.50	3.57	11.96	0.00

El. inlet face invert	706.43 ft	El. outlet invert	705.11 ft
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El. inlet throat invert	0.00 ft	El. inlet crest	0.00 ft
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[illegible]

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***** SITE DATA ***** CULVERT INVERT *****
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INLET STATION	0.00 ft
INLET ELEVATION	706.43 ft
OUTLET STATION	132.00 ft
OUTLET ELEVATION	705.11 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0100
CULVERT LENGTH ALONG SLOPE	132.01 ft

***** CULVERT DATA SUMMARY *****

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	3.50 ft
BARREL MATERIAL	CORRUGATED STEEL
BARREL MANNING'S n	0.024
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

[illegible]

[illegible]

CONSTANT WATER SURFACE ELEVATION
708.68

ROADWAY OVERTOPPING DATA

WEIR COEFFICIENT	3.00
EMBANKMENT TOP WIDTH	20.00 ft

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***** USER DEFINED ROADWAY PROFILE
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CROSS-SECTION COORD. NO.	X ft	Y ft
1	0.00	714.50
2	10.00	714.50
3	11.50	714.00
4	21.50	714.00
5	23.00	714.50
6	33.00	714.50

[illegible]

Snayers 4
Culvert

CURRENT DATE: 06-02-1999
CURRENT TIME: 14:25:16

FILE DATE: 06-02-1999
FILE NAME: 9961-1

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0
CULVERT SHAPE, MATERIAL, INLET
SITE DATA
CULVERT SHAPE, MATERIAL, INLET
INLET OUTLET CULVERT BARRELS
ELEV. ELEV. LENGTH SHAPE SPAN RISE MANNING INLET
(ft) (ft) (ft) MATERIAL (ft) (ft) n TYPE
1 706.43 705.11 132.01 1 CSP 3.50 3.50 .024 CONVENTIONAL
2
3
4
5
6

SUMMARY OF CULVERT FLOWS (cfs) FILE: 9961-1 DATE: 06-02-1999

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
708.68	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
708.90	11.9	11.9	0.0	0.0	0.0	0.0	0.0	0.00	1
709.18	23.9	23.9	0.0	0.0	0.0	0.0	0.0	0.00	1
709.67	35.8	35.8	0.0	0.0	0.0	0.0	0.0	0.00	1
710.26	47.8	47.8	0.0	0.0	0.0	0.0	0.0	0.00	1
710.83	59.8	59.8	0.0	0.0	0.0	0.0	0.0	0.00	1
711.22	71.7	71.7	0.0	0.0	0.0	0.0	0.0	0.00	1
711.70	83.7	83.7	0.0	0.0	0.0	0.0	0.0	0.00	1
712.58	95.6	95.6	0.0	0.0	0.0	0.0	0.0	0.00	1
713.39	105.4	105.4	0.0	0.0	0.0	0.0	0.0	0.00	1
714.27	119.5	115.0	0.0	0.0	0.0	0.0	0.0	4.43	4
714.00	112.2	112.2	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: 9961-1 DATE: 06-02-1999

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
708.68	0.000	0.00	0.00	0.00
708.90	0.000	11.95	0.00	0.00
709.18	0.000	23.90	0.00	0.00
709.67	0.000	35.85	0.00	0.00
710.26	0.000	47.80	0.00	0.00
710.83	0.000	59.75	0.00	0.00
711.22	0.000	71.70	0.00	0.00
711.70	0.000	83.65	0.00	0.00
712.58	0.000	95.60	0.00	0.00
713.39	0.000	105.37	0.00	0.00
714.27	-0.001	119.50	0.03	0.03

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 06-02-1999

FILE DATE: 06-02-1999

CURRENT TIME: 14:25:16

FILE NAME: 9961-1

PERFORMANCE CURVE FOR CULVERT 1 - 1(3.50 (ft) BY 3.50 (ft)) CSP
 DIS- HEAD- INLET OUTLET
 CHARGE WATER CONTROL CONTROL FLOW NORMAL CRIT. OUTLET TW OUTLET TW
 FLOW ELEV. DEPTH DEPTH TYPE DEPTH DEPTH DEPTH DEPTH DEPTH VEL. VEL.
 (cfs) (ft) (ft) (ft) <F4> (ft) (ft) (ft) (ft) (ft) (fps) (fps)

0.00 708.68 0.00 2.25 0-NF 0.00 0.00 0.00 3.57 0.00 0.00
 11.95 708.90 1.43 2.47 3-M1f 1.11 1.05 3.50 3.57 1.24 0.00
 23.90 709.18 2.11 2.75 3-M1f 1.62 1.50 3.50 3.57 2.48 0.00
 35.85 709.67 2.69 3.24 3-M1f 2.07 1.85 3.50 3.57 3.73 0.00
 47.80 710.26 3.26 3.83 3-M1f 2.55 2.15 3.50 3.57 4.97 0.00
 59.75 710.83 3.85 4.40 3-M1f 3.50 2.42 3.50 3.57 6.21 0.00
 71.70 711.22 4.51 4.79 3-M1f 3.50 2.64 3.50 3.57 7.45 0.00
 83.65 711.70 5.27 5.26 3-M1f 3.50 2.84 3.50 3.57 8.69 0.00
 95.60 712.58 6.15 5.80 3-M1f 3.50 2.99 3.50 3.57 9.94 0.00
 105.37 713.39 6.96 6.29 3-M1f 3.50 3.12 3.50 3.57 10.95 0.00
 115.03 714.27 7.84 6.83 3-M1f 3.50 3.24 3.50 3.57 11.96 0.00

El. inlet face invert 706.43 ft El. outlet invert 705.11 ft
 El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT *****

INLET STATION 0.00 ft
 INLET ELEVATION 706.43 ft
 OUTLET STATION 132.00 ft
 OUTLET ELEVATION 705.11 ft
 NUMBER OF BARRELS 1
 SLOPE (V/H) 0.0100
 CULVERT LENGTH ALONG SLOPE 132.01 ft

***** CULVERT DATA SUMMARY *****

BARREL SHAPE CIRCULAR
 BARREL DIAMETER 3.50 ft
 BARREL MATERIAL CORRUGATED STEEL
 BARREL MANNING'S n 0.024
 INLET TYPE CONVENTIONAL
 INLET EDGE AND WALL SQUARE EDGE WITH HEADWALL
 INLET DEPRESSION NONE

El. inlet face invert 706.43 ft El. outlet invert 705.11 ft
 El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

TAILWATER

CONSTANT WATER SURFACE ELEVATION
708.68

ROADWAY OVERTOPPING DATA

WEIR COEFFICIENT	3.00
EMBANKMENT TOP WIDTH	20.00 ft

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***** USER DEFINED ROADWAY PROFILE
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CROSS-SECTION COORD. NO.	X ft	Y ft
1	0.00	714.50
2	10.00	714.50
3	11.50	714.00
4	21.50	714.00
5	23.00	714.50
6	33.00	714.50

[illegible]