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03/12/07 RAL
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DRAINAGE CALCULATIONS

RECORD DRAWING

02/15/08

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RAL
MT

Rockwall Toyota - Storm Sewer Analysis - 100-Year Design Line A

FROM NODE	TO NODE	CONTRIBUTING AREAS	INCREMENTAL			CUMULATIVE		T _c (MIN)	I100 (IN/HR)	100-YR Q (CFS)	REACH (FT)	MANNING n	LINE		DESIGN		FALL (FT)	JUNC. LOSS COEFF. KJ	FLOWLINE		ACTUAL V (FPS)	SLOPE OF H.G.L. (%)	TOTAL HEAD LOSS (FT)	UPST H.G.L. (FT)	DNST H.G.L. (FT)	UPST GUTTER ELEV. (FT)	GUTTER TO HGL (FT)
			AREA (AC)	C	C x A	AREA (AC)	SUM C x A						SIZE (IN)	SLOPE (%)	Q (CFS)	V (FPS)			UP-STREAM	DOWN-STREAM							
N-A1	N-A2	A-01	0.26	0.9	0.23	0.26	0.23	10.0	9.80	2.3	149.00	0.013	24	1.000%	22.7	7.22	1.490	1.00	556.01	554.52	0.73	0.03%	2.30	558.82	556.52	563.00	4.18
N-A2	N-A3	A-01, A-02, A-03	1.24	0.9	1.12	1.50	1.35	10.0	9.80	13.2	41.00	0.013	24	1.000%	22.7	7.22	0.410	1.00	551.42	551.01	4.21	0.16%	1.22	555.89	554.67	558.18	2.29
N-A3	N-A4	A-01, A-02, A-03, B-01, B-02, B-03	1.68	0.9	1.51	3.18	2.86	10.0	9.80	28.0	51.10	0.013	30	1.000%	41.1	8.38	0.511	0.00	548.51	548.00	5.72	0.19%	0.51	554.67	554.16	556.50	1.83
N-A4	N-A5	A-01, A-02, A-03, A-04, A-05, B-01, B-02, B-03	0.75	0.9	0.68	3.93	3.54	10.0	9.80	34.7	198.38	0.013	30	1.000%	41.1	8.38	1.984	0.00	547.90	545.91	7.06	0.24%	1.98	554.16	552.18	556.36	2.20
N-A5	N-A6	A-01, A-02, A-03, A-04, A-05, B-01, B-02, B-03	0.05	0.9	0.05	3.98	3.58	10.0	9.80	35.1	141.00	0.013	30	1.000%	41.1	8.38	1.410	0.00	545.81	544.40	7.15	0.24%	1.41	552.18	550.77	555.00	2.82
N-A6	N-A7	A-01, A-02, A-03, A-04, A-05, A-06, B-01, B-02, B-03, C-01, C-02, C-03, C-04, D-01, D-02	3.82	0.9	3.44	7.80	7.02	10.0	9.80	68.8	27.40	0.013	48	0.690%	119.6	9.52	0.189	0.50	542.90	542.71	5.48	0.13%	0.89	550.77	549.87	551.39	0.62
N-A7	OUTFALL	A-01, A-02, A-03, A-04, A-05, A-06, B-01, B-02, B-03, C-01, C-02, C-03, C-04, D-01, D-02	2.73	0.9	2.46	10.53	9.48	10.0	9.80	92.9	7.22	0.013	48	0.450%	96.6	7.69	0.032	0.00	542.61	542.58	7.39	0.18%	0.03	549.87	549.84	551.00	1.13

Rockwall Toyota - Storm Sewer Analysis - 100-Year Design Line B

FROM NODE	TO NODE	CONTRIBUTING AREAS	INCREMENTAL			CUMULATIVE		T _c (MIN)	I100 (IN/HR)	100-YR Q (CFS)	REACH (FT)	MANNING n	LINE		DESIGN		FALL (FT)	JUNC. LOSS COEFF. KJ	FLOWLINE		ACTUAL V (FPS)	SLOPE OF H.G.L. (%)	TOTAL HEAD LOSS (FT)	UPST H.G.L. (FT)	DNST H.G.L. (FT)	UPST GUTTER ELEV. (FT)	GUTTER TO HGL (FT)
			AREA (AC)	C	C x A	AREA (AC)	SUM C x A						SIZE (IN)	SLOPE (%)	Q (CFS)	V (FPS)			UP-STREAM	DOWN-STREAM							
N-B1	N-B2	B-01	0.61	0.9	0.55	0.61	0.55	10.0	9.80	5.4	132.00	0.013	18	0.500%	7.4	4.22	0.660	0.00	554.08	553.42	3.05	0.14%	0.66	557.15	556.49	557.50	0.35
N-B2	N-B3	B-01, B-02	0.53	0.9	0.48	1.14	1.03	10.0	9.80	10.1	146.00	0.013	18	0.500%	7.4	4.22	0.730	0.00	553.32	552.59	5.69	0.27%	0.73	556.49	555.76	556.60	0.11
N-B3	N-A3	B-01, B-02, B-03	0.54	0.9	0.49	1.68	1.51	10.0	9.80	14.8	182.00	0.013	24	0.600%	17.6	5.59	1.092	0.00	552.09	551.00	4.72	0.18%	1.09	555.76	554.67	556.40	0.64

Rockwall Toyota - Storm Sewer Analysis - 100-Year Design Line C

FROM NODE	TO NODE	CONTRIBUTING AREAS	INCREMENTAL			CUMULATIVE		T _c (MIN)	I100 (IN/HR)	100-YR Q (CFS)	REACH (FT)	MANNING n	LINE		DESIGN		FALL (FT)	JUNC. LOSS COEFF. KJ	FLOWLINE		ACTUAL V (FPS)	SLOPE OF H.G.L. (%)	TOTAL HEAD LOSS (FT)	UPST H.G.L. (FT)	DNST H.G.L. (FT)	UPST GUTTER ELEV. (FT)	GUTTER TO HGL (FT)
			AREA (AC)	C	C x A	AREA (AC)	SUM C x A						SIZE (IN)	SLOPE (%)	Q (CFS)	V (FPS)			UP-STREAM	DOWN-STREAM							
N-C1	N-C2	C-01	1.12	0.9	1.01	1.12	1.01	10.0	9.80	9.9	161.00	0.013	24	0.250%	11.3	3.61	0.403	0.00	546.89	546.49	3.15	0.12%	0.40	552.76	552.35	552.25	-0.51
N-C2	N-C2a	C-01, C-02	0.72	0.9	0.65	1.84	1.66	10.0	9.80	16.2	146.00	0.013	30	0.300%	22.5	4.59	0.438	0.00	545.99	545.55	3.31	0.11%	0.44	552.35	551.92	551.75	-0.60
N-C2a	N-C3	C-01, C-02, C-03, D-01, D-02	1.50	0.9	1.35	3.34	3.01	10.0	9.80	29.5	53.00	0.013	36	0.300%	36.6	5.18	0.159	0.00	545.05	544.89	4.17	0.12%	0.16	551.92	551.76	553.25	1.33
N-C3	N-C4	C-01, C-02, C-03, D-01, D-02	0.21	0.9	0.19	3.55	3.20	10.0	9.80	31.3	162.50	0.013	36	0.300%	36.6	5.18	0.488	0.00	544.89	544.40	4.43	0.13%	0.49	551.76	551.27	553.20	1.44
N-C4	N-A6	C-01, C-02, C-03, C-04, D-01, D-02	0.48	0.9	0.43	3.82	3.44	10.0	9.80	33.7	167.60	0.013	36	0.300%	36.6	5.18	0.503	0.00	544.40	543.90	4.77	0.14%	0.50	551.27	550.77	552.50	1.23

Rockwall Toyota - Storm Sewer Analysis - 100-Year Design Line D

FROM NODE	TO NODE	CONTRIBUTING AREAS	INCREMENTAL			CUMULATIVE		T _c (MIN)	I100 (IN/HR)	100-YR Q (CFS)	REACH (FT)	MANNING n	LINE		DESIGN		FALL (FT)	JUNC. LOSS COEFF. KJ	FLOWLINE		ACTUAL V (FPS)	SLOPE OF H.G.L. (%)	TOTAL HEAD LOSS (FT)	UPST H.G.L. (FT)	DNST H.G.L. (FT)	UPST GUTTER ELEV. (FT)	GUTTER TO HGL (FT)
			AREA (AC)	C	C x A	AREA (AC)	SUM C x A						SIZE (IN)	SLOPE (%)	Q (CFS)	V (FPS)			UP-STREAM	DOWN-STREAM							
N-D1	N-D2	D-01	0.54	0.9	0.49	0.54	0.49	10.0	9.80	4.8	166.00	0.013	18	1.000%	10.5	5.96	1.660	0.00	548.97	547.31	2.70	0.13%	1.66	554.34	552.68	556.64	2.30
N-D2	N-C3	D-01, D-02	0.75	0.9	0.68	1.29	1.16	10.0	9.80	11.4	76.00	0.013	24	1.000%	22.7	7.22	0.760	0.00	546.81	546.05	3.62	0.14%	0.76	552.68	551.92	553.50	0.82

Rockwall Toyota - Storm Sewer Analysis - 100-Year Design Line E

FROM NODE	TO NODE	CONTRIBUTING AREAS	INCREMENTAL			CUMULATIVE		T _c (MIN)	I100 (IN/HR)	100-YR Q (CFS)	REACH (FT)	MANNING n	LINE		DESIGN		FALL (FT)	JUNC. LOSS COEFF. KJ	FLOWLINE		ACTUAL V (FPS)	SLOPE OF H.G.L. (%)	TOTAL HEAD LOSS (FT)	UPST H.G.L. (FT)	DNST H.G.L. (FT)	UPST GUTTER ELEV. (FT)	GUTTER TO HGL (FT)
			AREA (AC)	C	C x A	AREA (AC)	SUM C x A						SIZE (IN)	SLOPE (%)	Q (CFS)	V (FPS)			UP-STREAM	DOWN-STREAM							
TD	N-A5	A-05	0.05	0.9	0.05	0.05	0.05	10.0	9.80	0.4	132.00	0.013	6	1.000%	0.6	2.87	1.320	0.00	549.13	547.81	2.25	0.22%	1.32	555.48	554.16	555.00	-0.48

Rockwall Toyota - Storm Sewer Analysis - 100-Year Design Line F - From Detention Outfall Structure to Townsend Blvd. Outfall

FROM NODE	TO NODE	CONTRIBUTING AREAS	INCREMENTAL			CUMULATIVE		T _c (MIN)	I100 (IN/HR)	100-YR Q (CFS)	REACH (FT)	MANNING n	LINE		DESIGN		FALL (FT)	JUNC. LOSS COEFF. KJ	FLOWLINE		ACTUAL V (FPS)	SLOPE OF H.G.L. (%)	TOTAL HEAD LOSS (FT)	UPST H.G.L. (FT)	DNST H.G.L. (FT)	UPST GUTTER ELEV. (FT)	GUTTER TO HGL (FT)
			AREA (AC)	C	C x A	AREA (AC)	SUM C x A						SIZE (IN)	SLOPE (%)	Q (CFS)	V (FPS)			UP-STREAM	DOWN-STREAM							
N-F1	N-F2	All Areas From Project	11.48	0.35	4.02	11.48	4.02	10.0	8.30	33.3	379.00	0.013	36	0.600%	51.8	7.33	2.274	0.00	541.92	539.65	4.72	0.14%	2.27	544.92	542.65	549.84	4.92
N-F2	N-F3	None	0.00	0.9	0.00	11.48	4.02	10.0	8.30	33.3	469.00	0.013	36	0.600%	51.8	7.33	2.814	0.00	536.09	533.27	4.72	0.14%	2.81	540.25	537.43	552.14	11.89
N-F2	N-F3	None	0.00	0.9	0.00	11.48	4.02	10.0	8.30	33.3	87.00	0.013	36	0.600%	51.8	7.33	0.522	0.00	533.17	532.65	4.72	0.14%	0.52	537.43	536.91	544.29	6.86
N-F3	Outfall	None	0.00	0.9	0.00	11.48	4.02	10.0	8.30	33.3	82.00	0.013	36	0.600%	51.8	7.33	0.492	0.50	532.55	532.06	4.72	0.14%	0.91	536.91	536.00	540.97	4.06

MODIFIED RATIONAL METHOD FOR SIZING DETENTION PONDS

CONDITION	AREA Ac.	RUNOFF COEFF "C"	TIME OF CONC. (min.)	INTENSITY I100 (in/hr)	FLOW Q100 (cfs)
EXISTING	11.48	0.35	20	8.3	33.35
PROPOSED	11.48	0.90	10	9.8	101.25

DURATION	INTENSITY	FLOW	INFLOW	OUTFLOW	STORAGE
min.	in/hr	cfs	cf	cf	cf
10	9.80	101.25	60752	20010	40743
20	8.30	85.76	102907	30014	72892
30	6.90	71.29	128323	40019	88304
40	5.80	59.93	143821	50024	93797
50	5.00	51.66	154980	60029	94951
60	4.50	46.49	167378	70034	97345
70	4.20	43.3944	182256	80039	102218
80	3.80	39.2616	188456	90043	98412
90	3.50	36.162	195275	100048	95227
100	3.20	33.0624	198374	110053	88321

PROPOSED POND STAGE STORAGE ANALYSIS

ELEVATION	POND DEPTH (ft)	CUM. VOLUME (cy)	CUM. VOLUME (cf)
541.92	0.00	0	0
542.00	0.08	0	0.81
543.00	1.08	27	729
544.00	2.08	85	2295
545.00	3.08	307	8289
546.00	4.08	780	21060
547.00	5.08	1387	37449
547.17	5.25	1512	40811
547.58	5.66	1806	48750
548.00	6.08	2109	56943
548.29	6.37	2357	63628
548.86	6.94	2843	76767
549.00	7.08	2964	80028
549.23	7.31	3143	84860
549.80	7.88	3750	101250
549.84	7.92	3786	102218

DESIGN STORM STORAGE REQUIRED (cf) STORAGE REQUIRED (Ac-ft)

DESIGN STORM	STORAGE REQUIRED (cf)	STORAGE REQUIRED (Ac-ft)
100 YR	1022	