

BASIN SUMMARY SHEET

WCE No. Project Name

3/8/2018 17-1752 McCarrolls East 6th Addition

I (2 yr) = 1.418 inches I (10 yr) = 2.619 inches

I (25 yr) = 3.319 inches I (50 yr) = 3.843 inches

I (100 yr) = 4.381 inches

JPP

SPOKANE COUNTY - SRSM - GRASSED PERCOLATION METHOD

Basin	Total sf	Access/Parking /Street (sf)	Sidewalk sf	DV WY	Buildings sf	Total Impervious	Total Pervious	Weighted "C"	PGIS sf	1133 A						
										Pond Area (sf)	Pond Vol (cf)	2 yr	10 yr	25 yr	50 yr	
PRE A	765,243	7,820	2,300	0	0	10,120	755,123	0.16	7,820	407	203	3.98	7.36	9.32	10.80	
PRE B	1,016,353	0	0	0	0	0	1,016,353	0.15	0	0	0	4.96	9.17	11.62	13.45	
PRE C	634,471	0	0	0	0	0	634,471	0.15	0	0	0	3.10	5.72	7.25	8.40	
PRE D	1,168,574	16,800	2,800	0	0	19,600	1,148,974	0.16	16,800	874	437	6.18	11.42	14.48	16.76	
PRE E	352,880	28,500	4,750	0	0	33,250	319,630	0.22	28,500	1,483	741	2.53	4.68	5.93	6.87	
Pre Total	3,937,521	53,120	9,850	0	0	62,970	3,874,551	0.16	53,120.00	2763.31	1381.66	20.76	38.35	48.60	56.27	
Post Onsite Flow																
POST 6A1	40,012	17,234	6,155	8,640	0	32,029	7,983	0.75	25,874	1,346	673	0.98	1.81	2.29	2.65	
POST 6A2	163,109	18,074	0	0	19,200	37,274	125,835	0.32	18,074	940	470	1.71	3.15	3.99	4.62	
TOTAL 6A	203,121	35,308	6,155	8,640	19,200	69,303	133,818	0.41	43,948	2,286	1,143	2.68	4.96	6.28	7.27	
POST 6B1	55,762	7,200	1,125	0	0	8,325	47,437	0.26	7,200	375	187	0.48	0.88	1.11	1.29	
POST 6B2	99,998	10,584	1,890	2,880	3,600	18,954	81,044	0.29	13,464	700	350	0.95	1.76	2.23	2.58	
POST 6B3	118,678	14,000	2,500	3,840	9,600	29,940	88,738	0.34	17,840	928	464	1.31	2.42	3.07	3.55	
TOTAL 6B	274,438	31,784	5,515	6,720	13,200	57,219	217,219	0.31	38,504	2,003	1,001	2.74	5.06	6.41	7.42	
POST 5E	426,083	61,365	2,020	15,360	32,400	111,145	314,938	0.35	76,725	3,991	1,996	4.79	8.85	11.22	12.99	
POST 6E1	18,993	9,100	3,250	4,320	0	16,670	2,323	0.81	13,420	698	349	0.50	0.92	1.17	1.35	
POST 6E2	145,847	9,100	0	0	38,400	47,500	98,347	0.39	9,100	473	237	1.87	3.46	4.38	5.07	
POST 6E3	20,549	10,080	3,600	5,280	0	18,960	1,589	0.84	15,360	799	400	0.56	1.04	1.32	1.53	
POST 6E4	70,298	8,890	0	0	16,800	25,690	44,608	0.42	8,890	462	231	0.97	1.79	2.27	2.63	
POST 6E5	10,438	5,880	2,100	1,920	0	9,900	538	0.86	7,800	406	203	0.29	0.54	0.69	0.79	
POST 6E6	71,524	5,880	0	0	9,600	15,480	56,044	0.31	5,880	306	153	0.73	1.34	1.70	1.97	
POST 6E7	12,279	6,720	2,400	2,560	0	11,680	599	0.86	9,280	483	241	0.35	0.64	0.81	0.94	
POST 6E8	6,935	6,720	0	0	0	6,720	215	0.88	6,720	350	175	0.20	0.37	0.46	0.54	
POST 6E9	18,372	9,520	3,400	2,880	0	15,800	2,572	0.80	12,400	645	323	0.48	0.88	1.11	1.29	
POST 6E10	70,654	6,440	0	0	9,600	16,040	54,614	0.32	6,440	335	168	0.74	1.36	1.72	2.00	
POST 6E11	15,770	8,540	3,050	2,240	0	13,830	1,940	0.81	10,780	561	280	0.41	0.77	0.97	1.12	
POST 6E12	5,931	5,931	0	0	0	5,931	0	0.90	5,931	309	154	0.17	0.32	0.41	0.47	
POST 6E13	7,882	7,840	0	0	0	7,840	42	0.90	7,840	408	204	0.23	0.42	0.54	0.62	
POST 6E14	26,735	14,560	5,200	6,000	0	25,760	975	0.87	20,560	1,070	535	0.76	1.40	1.78	2.06	

Whipple Consulting Engineers
Basin Calculation Worksheet

Intensities from SRSM eqn. 5-13, per Table 5-7, Assumes Tc = 5 min
 I (2 yr) = 1.418 inches I (10 yr)= 2.619 inches NOTE:
 I (25 yr) = 3.319 inches I (50 yr)= 3.843 inches
 I (100 yr) = 4.381 inches

Imp 0.9
Per 0.15

WCE No. Project Name
17-1752 McCarrolls East 6th Addition

JPP

3/8/2018	928,290	176,566	25,020	40,560	106,800	348,946	579,344	0.43	217,126	11,295	5,647	13.05	24.11	30.55	35.37	40.3
TOTAL E																
POST 6G1	24,357	9,435	2,550	0	0	11,985	12,372	0.52	9,435	491	245	0.41	0.76	0.96	1.12	1.2
POST G2	136,797	20,350	5,500	7,040	26,400	59,290	77,507	0.48	27,390	1,425	712	2.12	3.91	4.95	5.73	6.5
TOTAL G	161,154	29,785	8,050	7,040	26,400	71,275	89,879	0.48	36,825	1,916	958	2.53	4.67	5.91	6.85	7.8
Future Basin Flow																
POST H _E	751,544	0	0	0	0	0	751,544	0.15	0	0	0	3.67	6.78	8.59	9.95	11.2
POST I _G	483,346	0	0	0	0	0	483,346	0.15	0	0	0	2.36	4.36	5.52	6.40	7.2
TOTAL H+I	1,234,890	0	0	0	0	0	1,234,890	0.15	0	0	0	6.03	11.14	14.11	16.34	18.6
TOTAL	2,801,893	273,443	44,740	62,960	165,600	546,743	2,255,150	0.30	336,403	17,500	8,750	27.03	49.92	63.27	73.26	83.5

Combined Basins																
POST E+H _E	1,679,834	176,566	25,020	40,560	106,800	348,946	1,330,888	0.31	217,126	11,295	5,647	16.72	30.88	39.14	45.32	51.6
POST G+I	644,500	29,785	8,050	7,040	26,400	71,275	573,225	0.23	36,825	1,916	958	4.89	9.03	11.44	13.25	15.1

*Subscript designates which basin the future basin will contribute to

POND VOLUME WORKSHEET

WHIPPLE CONSULTING ENGINEERS
POND VOLUME CALC SHEET

Project: 17-1752

Designer: JPP

MCCARROLLS 6TH

Date: 3/8/2018

Basins	Ponds/ Swales	Bottom Area sf	Treatment Area (w/ Side Slopes)	Squared Side If	Pond Bottom Elevation at Drywell	Pond Drywell Elevation	Pond Outlet Elevation (avg)	Treatment			Storage		
								Conic Volume to Rim cf	Side Slope Volume cf	Total Volume to Rim cf	Conic Volume to Inlet cf	Side Slope Volume cf	Total Volume to Inlet cf
6A1	Pond 6A1	148	225	12.17	1000.00	1000.50	1000.50	74	18	92	74	18	92
6A1	Pond 6A2	148	225	12.17	1000.00	1000.50	1000.50	74	18	92	74	18	92
6A1	Pond 6A3	148	225	12.17	1000.00	1000.50	1000.50	74	18	92	74	18	92
6A1	Pond 6A4	148	225	12.17	1000.00	1000.50	1000.50	74	18	92	74	18	92
6A1	Pond 6A5	148	225	12.17	1000.00	1000.50	1000.50	74	18	92	74	18	92
6A1	Pond 6A6	148	225	12.17	1000.00	1000.50	1000.50	74	18	92	74	18	92
6A1	Pond 6A7	148	225	12.17	1000.00	1000.50	1000.50	74	18	92	74	18	92
6A1	Pond 6A8	148	225	12.17	1000.00	1000.50	1000.50	74	18	92	74	18	92
6A1	Pond 6A9	135	208	11.62	1000.00	1000.50	1000.80	68	17	85	108	45	153
6A1	Pond 6A10	135	208	11.62	1000.00	1000.50	1000.50	68	17	85	68	17	85
6A1	Pond 6A11	135	208	11.62	1000.00	1000.50	1000.50	68	17	85	68	17	85
6A1	Pond A12	135	208	11.62	1000.00	1000.50	1000.50	68	17	85	68	17	85
6A1	Pond A13	132	205	11.49	1000.00	1000.50	1000.50	66	17	83	66	17	83
6A1	Pond A14	248	348	15.75	1000.00	1000.50	1000.50	124	24	148	124	24	148
6A1	Pond 6A15	248	348	15.75	1000.00	1000.50	1000.50	124	24	148	124	24	148
6A2	Pond 6A16	1,503	1,748	38.77	1000.00	1000.50	1000.50	752	58	810	752	58	810
6A2	Pond 6A17	532	678	23.07	1000.00	1000.50	1000.80	266	35	301	426	89	514
6A2	Pond 6A18	579	731	24.06	1000.00	1000.50	1000.50	290	36	326	290	36	326
6A2	Pond 6A19	96	158	9.80	1000.00	1000.50	1000.50	48	15	63	48	15	63
6A2	Pond 6A20	70	123	8.37	1000.00	1000.50	1000.50	35	13	48	35	13	48
6A2	Pond 6A21	762	937	27.60	1000.00	1000.50	1000.50	381	41	422	381	41	422
6A2	Pond 6A22	762	937	27.60	1000.00	1000.50	1000.50	381	41	422	381	41	422
6A TOTAL		6,656	8,845							3,847			4,128
6B	6B	2,647	2,972	51.45	1000.00	1000.50	1001.50	1,324	77	1,401	3,971	695	4,665
5E+6E	Pond 4AA	2,027	2,312	45.02	1000.00	1000.50	1001.00	1,014	68	1,081	2,027	270	2,297
5E+6E	Pond 4AB	3,618	3,998	60.15	1000.00	1000.50	1001.00	1,809	90	1,899	3,618	361	3,979
5E+6E	Pond 4AC	3,973	4,372	63.03	1000.00	1000.50	1003.00	1,987	95	2,081	11,919	3,404	15,323
5E+6E	Pond 4AD	6,108	6,602	78.15	1000.00	1000.50	1002.00	3,054	117	3,171	12,216	1,876	14,092
E TOTAL	Pond 4A	15,726	17,284							8,233			35,690
G	G	2,858	3,196	53.46	1000.00	1000.50	1001.50	1,429	80	1,509	4,287	722	5,009

**100-YEAR STORM EVENT BOWSTRING
CALCULATIONS**

SRRM RATIONAL METHOD
100-Year Design Storm

PROJECT: 17-1752

PROJECT INFORMATION

BASIN: POST 6A
PGIS Area = 43,948

Tot. Area 203,121 SF
Imp. Area 69,303 SF
Perv. Area 133,818 SF
Wt. C = 0.41

4.66 Acres
C= 0.9
C= 0.15

BOWSTRING METHOD

PROJECT: 17-1752
BASIN: POST 6A
DESIGNER TRW
DATE: 9-Mar-18

Rainfall Intensity Coefficients for Spokane
taken from Table 5-7 SRRM
M₁₀₀ = 12.33
N₁₀₀ = 0.643

WCE Applicable Travel Time Ground Cover Coefficients	
Per Table 5-6 SRRM	
Type of Cover	K (ft/min)
Short Pasture	420
Nearly Bare Ground	600
Small Roadside Ditch/ Grass	900
Paved Area (use for parking lots)	1200
Gutter - 4 inches deep	1500
Gutter - 6 inches deep	2400
Pipe - 12-inch PVC/DI	3000
Pipe - 15/18-inch PVC/DI	3900
Pipe - 24-inch PVC/DI	4700
Reaches	
Reach 1	Offsite also applicable for Pre-Developed Tc
Length	0.00
K	420.00
Slope (ft/ft)	0.0400 be sure this is decimal equivalent slope 0.0000
Travel Time	0.00 Minutes
Reach 2	Finished Lot from House to Street
Length	120.00
K	420.00
Slope (ft/ft)	0.0300 be sure this is decimal equivalent slope 0.0000
Travel Time	1.65 Minutes
Reach 3	Gutter Flow to Inlet/Catch Basin
Length	100.00
K	2400.00
Slope (ft/ft)	0.0200 be sure this is decimal equivalent slope 0.0000
Travel Time	0.29 Minutes
Reach 4	Pipe Flow 1 Pipe Reach One (only need one if no Diam change)
Length	0.00
K	3000.00 12-inch Pipe minimum
Slope (ft/ft)	0.0300 Average Slope for total pipe run
Travel Time	0.00 Minutes
Reach 5	Pipe Flow 2 Add additional pipe reaches for other Diam
Length	0.00
K	3900.00 15/18-inch Pipe
Slope (ft/ft)	0.0050 Average Slope for total pipe run
Travel Time	0.00 Minutes
Sum of Tc	1.94 Minutes
Tc for Analysis	5.00 Minutes

Time (min)	Time Inc. (sec)	Intens. (in/hr)	Q Devel. (cfs)	Vol.In (cu ft)	Vol.Out (cu ft)	Storage (cu ft)
5.00	300	4.38	8.29	3333	900	2433 <==
5	300	4.38	8.29	3333	900	2433 <==
10	600	2.81	5.31	3727	1800	1927
15	900	2.16	4.09	4099	2700	1399
20	1200	1.80	3.40	4427	3600	827
25	1500	1.56	2.95	4719	4500	219
30	1800	1.38	2.62	4983	5400	-417
35	2100	1.25	2.37	5224	6300	-1076
40	2400	1.15	2.18	5448	7200	-1752
45	2700	1.07	2.02	5656	8100	-2444
50	3000	1.00	1.89	5851	9000	-3149
55	3300	0.94	1.77	6036	9900	-3864
60	3600	0.89	1.68	6211	10800	-4589
65	3900	0.84	1.59	6377	11700	-5323
70	4200	0.80	1.52	6536	12600	-6064
75	4500	0.77	1.45	6688	13500	-6812
80	4800	0.74	1.39	6835	14400	-7565
85	5100	0.71	1.34	6976	15300	-8324
90	5400	0.68	1.29	7112	16200	-9088
95	5700	0.66	1.25	7243	17100	-9857
100	6000	0.64	1.21	7371	18000	-10629

"1133A" TREATMENT REQUIREMENTS
Minimum "133A" Volume Required 1,143 cu ft
Provided Treatment Volume - Min. 3,847 cu ft

DRYWELL REQUIREMENTS - 100 YEAR DESIGN STORM

Maximum Storage Required by Bowstring 2433 cu ft
Provided Storage Volume to Inlet - Minimum 4,128 cu ft
Number and Type of Drywells Required 0 Single
3 Double

SRRM RATIONAL METHOD
100-Year Design Storm

PROJECT: 17-1752

PROJECT INFORMATION

BASIN: POST 6B

Tot. Area 274,438 SF
Imp. Area 57,219 SF
Perv. Area 217,219 SF
Wt. C = 0.31
PGIS Area = 38,504

BOWSTRING METHOD

PROJECT: 17-1752
BASIN: POST 6B
DESIGNER TRW
DATE: 9-Mar-18

Time Increment (min) 5
Time of Conc. (min) 5.00
Outflow (cfs) 1
Design Year Flow 100
Area (acres) 6.30
Impervious Area (sq ft) 57219
C' Factor 0.31
Area * C 1.930
PGIS Area 38,504

Rainfall Intensity Coefficients for Spokane
taken from Table 5-7 SRRSM
M₁₀₀ = 12.33
N₁₀₀ = 0.643

WCE Applicable Travel Time Ground Cover Coefficients			
Per Table 5-6 SRRSM			
Type of Cover	K (ft/min)		
Short Pasture	420		
Nearly Bare Ground	600		
Small Roadside Ditch/Grass	900		
Paved Area (use for parking lots)	1200		
Gutter - 4 inches deep	1500		
Gutter - 6 inches deep	2400		
Pipe - 12-inch PVC/DI	3000		
Pipe - 15/18-inch PVC/DI	3900		
Pipe - 24-inch PVC/DI	4700		
Reaches			
Reach 1	Offsite	also applicable for Pre-Developed Tc	
Length	0.00		
K	420.00		
Slope (ft/ft)	0.0400	be sure this is decimal equivalent slope 0.0000	
Travel Time	0.00	Minutes	
Reach 2	Finished Lot from House to Street		
Length	60.00		
K	420.00		
Slope (ft/ft)	0.0300	be sure this is decimal equivalent slope 0.0000	
Travel Time	0.82	Minutes	
Reach 3	Gutter Flow to Inlet/Catch Basin		
Length	300.00		
K	2400.00		
Slope (ft/ft)	0.0200	be sure this is decimal equivalent slope 0.0000	
Travel Time	0.88	Minutes	
Reach 4	Pipe Flow 1 Pipe Reach One (only need one if no Diam change)		
Length	200.00		
K	3000.00	I2-inch Pipe minimum	
Slope (ft/ft)	0.0300	Average Slope for total pipe run	
Travel Time	0.38	Minutes	
Reach 5	Pipe Flow 2 Add additional pipe reaches for other Diam		
Length	0.00		
K	4700.00	15/18-inch Pipe	
Slope (ft/ft)	0.0050	Average Slope for total pipe run	
Travel Time	0.00	Minutes	
Sum of Tc	2.09	Minutes	
Tc for Analysis	5.00	Minutes	

Time (min)	Time Inc. (sec)	Intens. (in/hr)	Q Devel. (cfs)	Vol.In (cu ft)	Vol.Out (cu ft)	Storage (cu ft)
5.00	300	4.38	8.46	3399	300	3099
5	300	4.38	8.46	3399	300	3099
10	600	2.81	5.41	3801	600	3201
15	900	2.16	4.17	4180	900	3280
20	1200	1.80	3.47	4515	1200	3315
25	1500	1.56	3.00	4812	1500	3312
30	1800	1.38	2.67	5081	1800	3281
35	2100	1.25	2.42	5328	2100	3228
40	2400	1.15	2.22	5556	2400	3156
45	2700	1.07	2.06	5768	2700	3068
50	3000	1.00	1.92	5967	3000	2967
55	3300	0.94	1.81	6155	3300	2855
60	3600	0.89	1.71	6334	3600	2734
65	3900	0.84	1.63	6503	3900	2603
70	4200	0.80	1.55	6666	4200	2466
75	4500	0.77	1.48	6821	4500	2321
80	4800	0.74	1.42	6970	4800	2170
85	5100	0.71	1.37	7114	5100	2014
90	5400	0.68	1.32	7253	5400	1853
95	5700	0.66	1.27	7387	5700	1687
100	6000	0.64	1.23	7517	6000	1517

"1133A" TREATMENT REQUIREMENTS

Minimum "1133A" Volume Required
Provided Treatment Volume - Min.

1,001 cu ft
1,401 cu ft

DRYWELL REQUIREMENTS - 100 YEAR DESIGN STORM

Maximum Storage Required by Bowstring
Provided Storage Volume to Inlet - Minimum
Number and Type of Drywells Required

3315 cu ft
4,665 cu ft
0 Single
1 Double

PEAK FLOW CALCULATION **1752** **PROJECT: 0**
100-Year Design Storm **BASIN: POST 5E+6E+H**
DESIGNER: BNG **DATE: 9-Mar-18**

WCE Applicable Travel Time Ground Cover Coefficients
 Per Table 5-6 SRSM
 Type of Cover: K (ft/min)
 Short Pasture: 420
 Nearly Bare Ground: 600
 Small Roadside Ditch/ Grass: 900
 Paved Area (use for parking lots): 1200
 Gutter - 4 inches deep: 1500
 Gutter - 6 inches deep: 2400
 Pipe - 12-inch PVC/DI: 3000
 Pipe - 15/18-inch PVC/DI: 3900
 Pipe - 24-inch PVC/DI: 4700

Reaches
 Reach 1: Offsite also applicable for Pre-Developed Tc
 Length: 0.00
 K: 420.00
 Slope (ft/ft): 0.0400 bc sure this is decimal equivalent slope 0.0000
 Travel Time: 0.00 Minutes
 Reach 2: Finished Lot from House to Street
 Length: 50.00
 K: 420.00
 Slope (ft/ft): 0.0300 bc sure this is decimal equivalent slope 0.0000
 Travel Time: 0.69 Minutes
 Reach 3: Gutter Flow to Inlet/Catch Basin
 Length: 100.00
 K: 2400.00
 Slope (ft/ft): 0.0200 bc sure this is decimal equivalent slope 0.0000
 Travel Time: 0.29 Minutes
 Reach 4: Pipe Flow/Pipe Reach One (only need one if no Dia change)
 Length: 0.00
 K: 3000.00 12-inch Pipe minimum
 Slope (ft/ft): 0.0050 Average Slope for total pipe run
 Travel Time: 0.00 Minutes
 Reach 5: Pipe Flow/Add additional pipe reaches for other Dia
 Length: 0.00
 K: 3900.00 15/18-inch Pipe
 Slope (ft/ft): 0.0050 Average Slope for total pipe run
 Travel Time: 0.00 Minutes
 Sum of Tc: 0.98 Minutes
 Tc for Analysis: 5.00 Minutes
 Whipple Consulting Engineers

BOWSTRING METHOD **PROJECT: 0**
DETENTION BASIN **BASIN: POST 5E+6E+H**
DESIGN **DESIGNER: BNG** **DATE: 9-Mar-18**

Time Increment (min): 10
 Time of Conc. (min): 5.00
 Outflow (cfs): 3.0
 Design Year Flow: 50
 Area (acres): 38.56
 Impervious Area (sq ft): 348946
 'C' Factor: 0.31
 Area * C: 11,793
 PGIS Area: 217,126

Time Inc. (min): 5.00
 Time Inc. (sec): 300
 Intens. (in/hr): 4.38
 Q Devel. (cfs): 51.66
 Vol. In (cu ft): 20766
 Storage (cu ft): 900
 19866

Time (min)	Time Inc. (sec)	Intens. (in/hr)	Q Devel. (cfs)	Vol. In (cu ft)	Vol. Out (cu ft)	Storage (cu ft)
15	900	2.16	25.49	25540	2700	22840
25	1500	1.56	18.35	29401	4500	24901
35	2100	1.25	14.78	32550	6300	26250
45	2700	1.07	12.58	35239	8100	27139
55	3300	0.94	11.05	37606	9900	27706
65	3900	0.84	9.93	39732	11700	28032
75	4500	0.77	9.06	41673	13500	28173
85	5100	0.71	8.36	43464	15300	28164
95	5700	0.66	7.78	45131	17100	28031
105	6300	0.62	7.29	46694	18900	27794
115	6900	0.58	6.88	48169	20700	27469
125	7500	0.55	6.52	49566	22500	27066
135	8100	0.53	6.21	50896	24300	26596
145	8700	0.50	5.93	52167	26100	26067
155	9300	0.48	5.68	53384	27900	25484
165	9900	0.46	5.45	54553	29700	24853
175	10500	0.45	5.25	55678	31500	24178
185	11100	0.43	5.07	56764	33300	23464
195	11700	0.42	4.90	57814	35100	22714
205	12300	0.40	4.74	58831	36900	21931
215	12900	0.39	4.60	59817	38700	21117
225	13500	0.38	4.47	60774	40500	20274
235	14100	0.37	4.34	61706	42300	19406
245	14700	0.36	4.23	62612	44100	18512
255	15300	0.35	4.12	63496	45900	17596
265	15900	0.34	4.02	64357	47700	16657
275	16500	0.33	3.93	65199	49500	15699
285	17100	0.33	3.84	66022	51300	14722
295	17700	0.32	3.75	66826	53100	13726
305	18300	0.31	3.67	67613	54900	12713
315	18900	0.31	3.60	68384	56700	11684
325	19500	0.30	3.53	69140	58500	10640
335	20100	0.29	3.46	69882	60300	9582
345	20700	0.29	3.39	70609	62100	8509
355	21300	0.28	3.34	71509	63900	7609
365	21900	0.28	3.28	72087	65700	6387
375	22500	0.27	3.22	72853	67500	5353
385	23100	0.27	3.22	74787	69300	5487

****1133A* TREATMENT REQUIREMENTS**
 Minimum *1133A* Volume Required: 5,647 cu ft
 Provided Treatment Volume - Min.: 8,233 cu ft
STORAGE REQ. - 100 YEAR DESIGN STORM
 Maximum Storage Required by Bowstring: 28,173 cu ft
 Provided Pond Storage Volume to Inlet - Min.: 35,690 cu ft
 Provided Drywell/Gallery Storage Volume: - cu ft
Total Provided Volume: 35,690 cu ft

SRSR RATIONAL METHOD
100-Year Design Storm

PROJECT: 17-1752

PROJECT INFORMATION

BASIN: POST G+I

Tot. Area 644,500 SF
Imp. Area 71,275 SF
Perv. Area 573,225 SF
Wt. C = 0.23
PGIS Area = 36,825
14.80 Acres
C= 0.9
C= 0.15

BOWSTRING METHOD

PROJECT: 17-1752
BASIN: POST G+I
DESIGNER TRW
DATE: 9-Mar-18

Time Increment (min) 5
Time of Conc. (min) 9.37
Outflow (cfs) 2
Design Year Flow 100
Area (acres) 14.80
Impervious Area (sq ft) 71275
'C' Factor 0.23
Area * C 3.447
PGIS Area 36,825
Rainfall Intensity Coefficients for Spokane taken from Table 5-7 SRSR
M₁₀₀ = 12.33
N₁₀₀ = 0.643

WCE Applicable Travel Time Ground Cover Coefficients	
Per Table 5-6 SRSR	
Type of Cover	K (ft/min)
Short Pasture	420
Nearly Bare Ground	600
Small Roadside Ditch/ Grass	900
Paved Area (use for parking lots)	1200
Gutter - 4 inches deep	1500
Gutter - 6 inches deep	2400
Pipe - 12-inch PVC/DI	3000
Pipe - 15/18-inch PVC/DI	3900
Pipe - 24-inch PVC/DI	4700
Reaches	
Reach 1	Offsite also applicable for Pre-Developed Tc
Length	500.00
K	420.00
Slope (ft/ft)	0.0400 be sure this is decimal equivalent slope 0.0000
Travel Time	5.95 Minutes
Reach 2	Finished Lot from House to Street
Length	120.00
K	420.00
Slope (ft/ft)	0.0300 be sure this is decimal equivalent slope 0.0000
Travel Time	1.65 Minutes
Reach 3	Gutter Flow to Inlet/Catch Basin
Length	600.00
K	2400.00
Slope (ft/ft)	0.0200 be sure this is decimal equivalent slope 0.0000
Travel Time	1.77 Minutes
Reach 4	Pipe Flow 1 Pipe Reach One (only need one if no Diam change)
Length	0.00
K	3000.00 12-inch Pipe minimum
Slope (ft/ft)	0.0300 Average Slope for total pipe run
Travel Time	0.00 Minutes
Reach 5	Pipe Flow 2 Add additional pipe reaches for other Diam
Length	0.00
K	4700.00 15/18-inch Pipe
Slope (ft/ft)	0.0050 Average Slope for total pipe run
Travel Time	0.00 Minutes
Sum of Tc	9.37 Minutes
Tc for Analysis	9.37 Minutes

Time (min)	Time Inc. (sec)	Intens. (in/hr)	Q Devel. (cfs)	Vol.In (cu ft)	Vol.Out (cu ft)	Storage (cu ft)
9.37	562	2.93	10.08	7595	1124	6470
5	300	4.38	15.10	6069	600	5469
10	600	2.81	9.67	7649	1200	6449
15	900	2.16	7.45	8128	1800	6328
20	1200	1.80	6.19	8613	2400	6213
25	1500	1.56	5.36	9071	3000	6071
30	1800	1.38	4.77	9499	3600	5899
35	2100	1.25	4.32	9898	4200	5698
40	2400	1.15	3.96	10273	4800	5473
45	2700	1.07	3.68	10627	5400	5227
50	3000	1.00	3.43	10961	6000	4961
55	3300	0.94	3.23	11279	6600	4679
60	3600	0.89	3.05	11582	7200	4382
65	3900	0.84	2.90	11871	7800	4071
70	4200	0.80	2.77	12149	8400	3749
75	4500	0.77	2.65	12415	9000	3415
80	4800	0.74	2.54	12672	9600	3072
85	5100	0.71	2.44	12921	10200	2721
90	5400	0.68	2.35	13160	10800	2360
95	5700	0.66	2.27	13393	11400	1993
100	6000	0.64	2.20	13618	12000	1618

<==

"1133A" TREATMENT REQUIREMENTS

Minimum "1133A" Volume Required 958 cu ft
*Provided Treatment Volume - Min. 1,685 cu ft

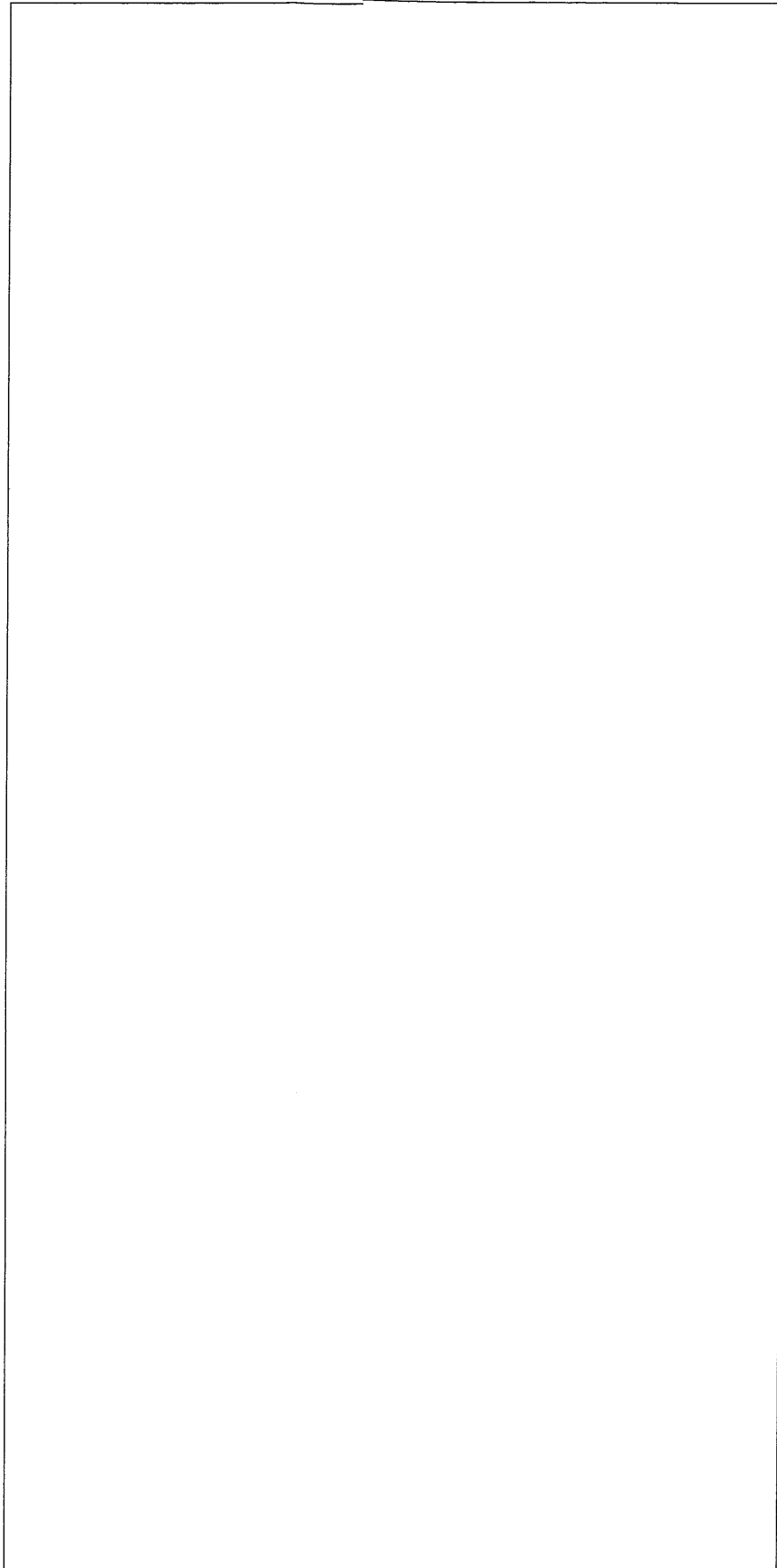
DRYWELL REQUIREMENTS - 100 YEAR DESIGN STORM

Maximum Storage Required by Bowstring 6470 cu ft
*Provided Storage Volume to Inlet - Minimum 7,567 cu ft
Number and Type of Drywells Required 0 Single
2 Double

*Pond G and excess downstream treatment and storage volume from existing ponds were included.

PIPE & DITCH CALCULATIONS

Hydraflow Stc® Plan

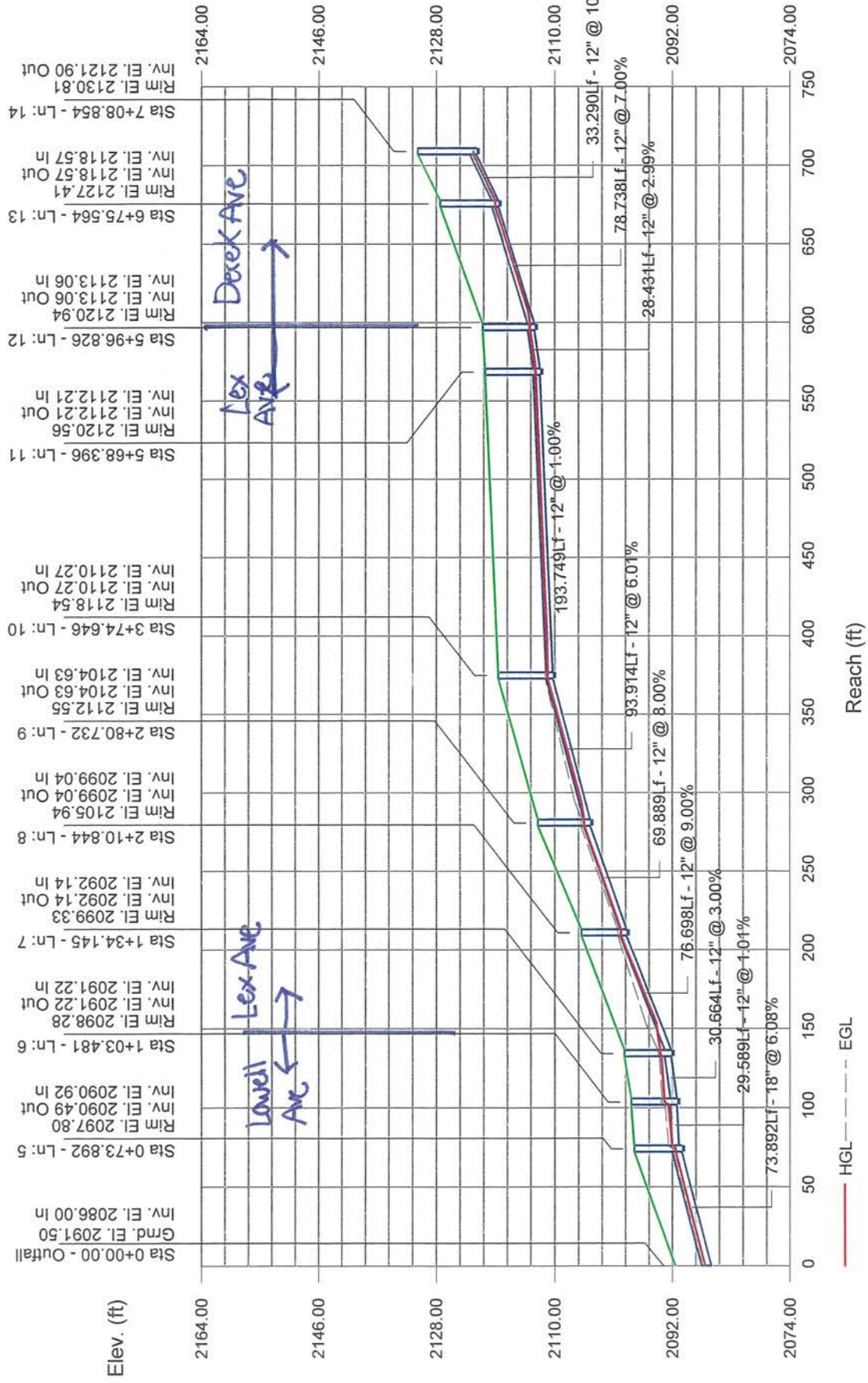


Project File: 1752-PIPE ANAL Date: 2/22/2018

Storm Sewer Profile

Lowell - Lex - Derek

Row B

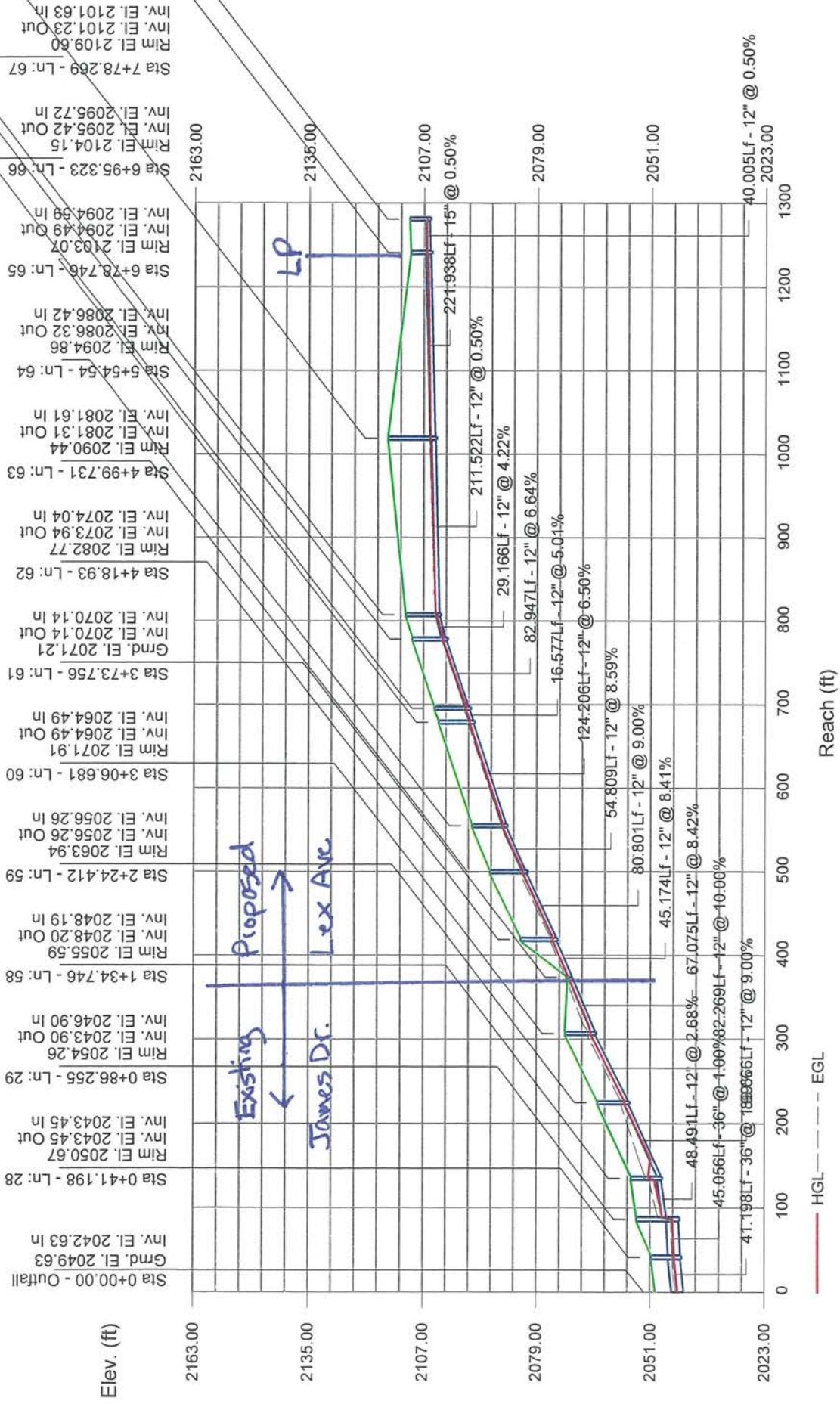


Storm Sewer Profile

Lex Ave

Proj. file: 1752-PIPE ANALYSIS.sstr

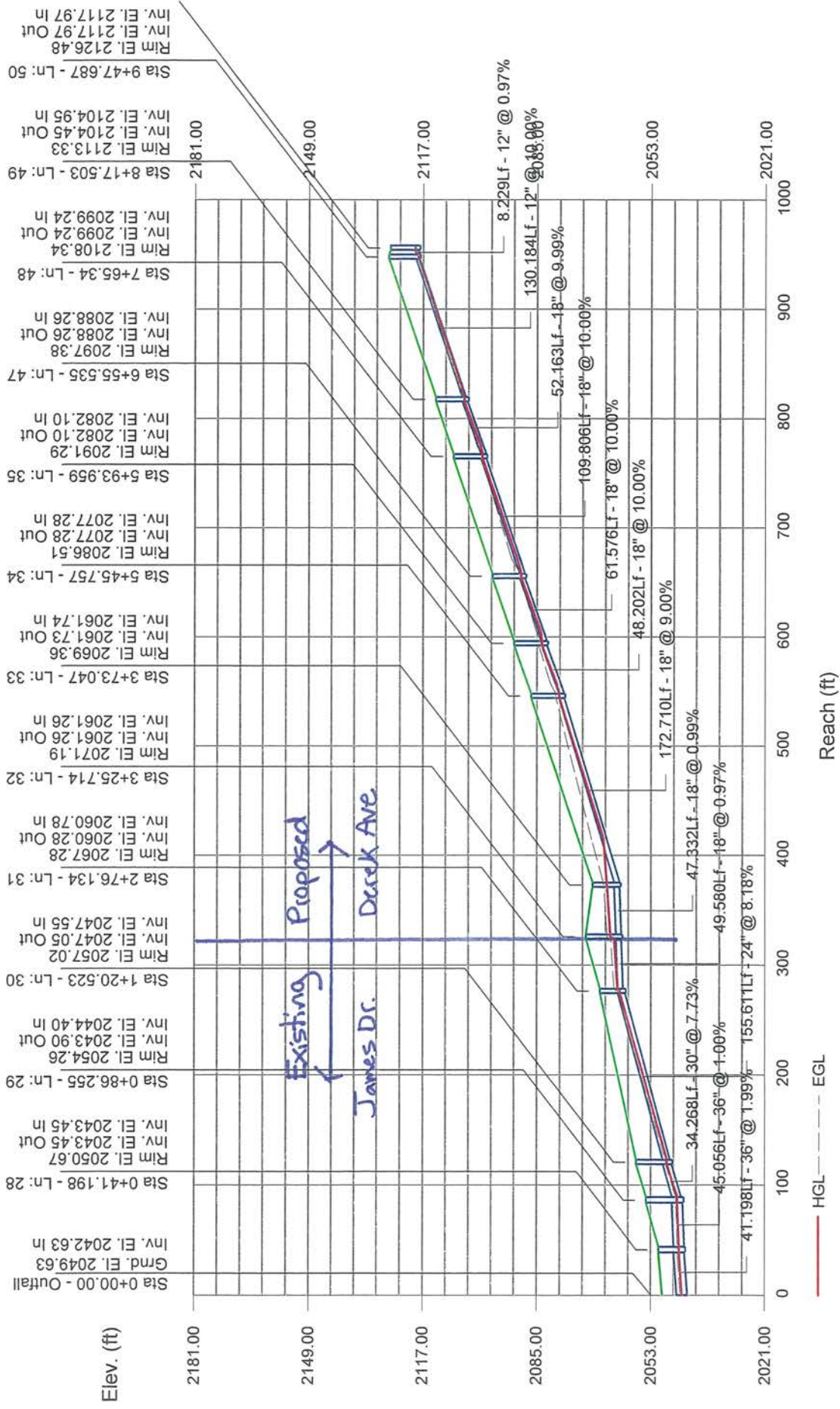
Pond 4A



Storm Sewer Profile

Derek Ave

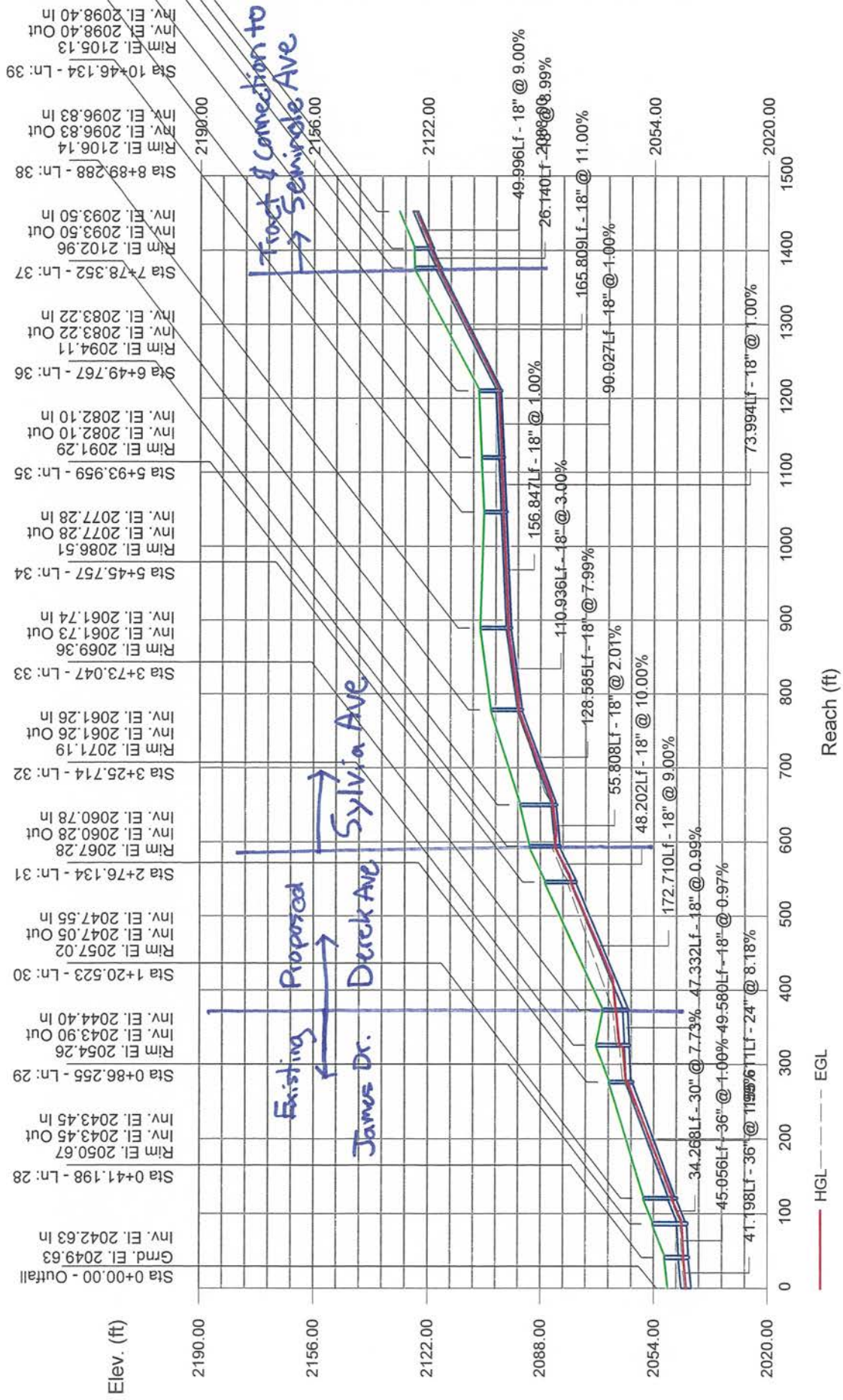
Pond 4A



Storm Sewer Profile

Sylvia Ave

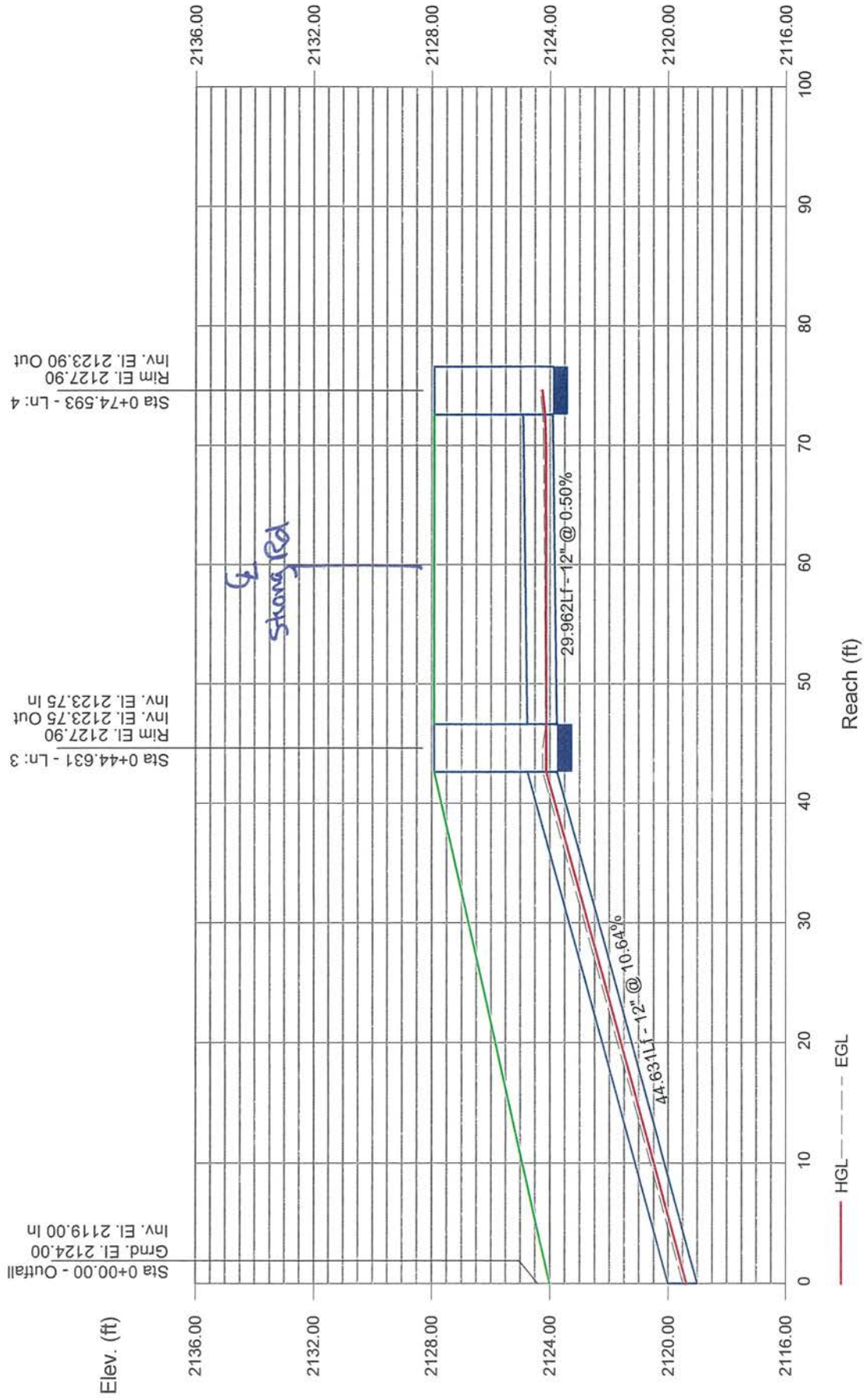
Proj. file: 1752-PIPE ANALYSIS.stm



Storm Sewer Profile

Strong Rd

Pond G

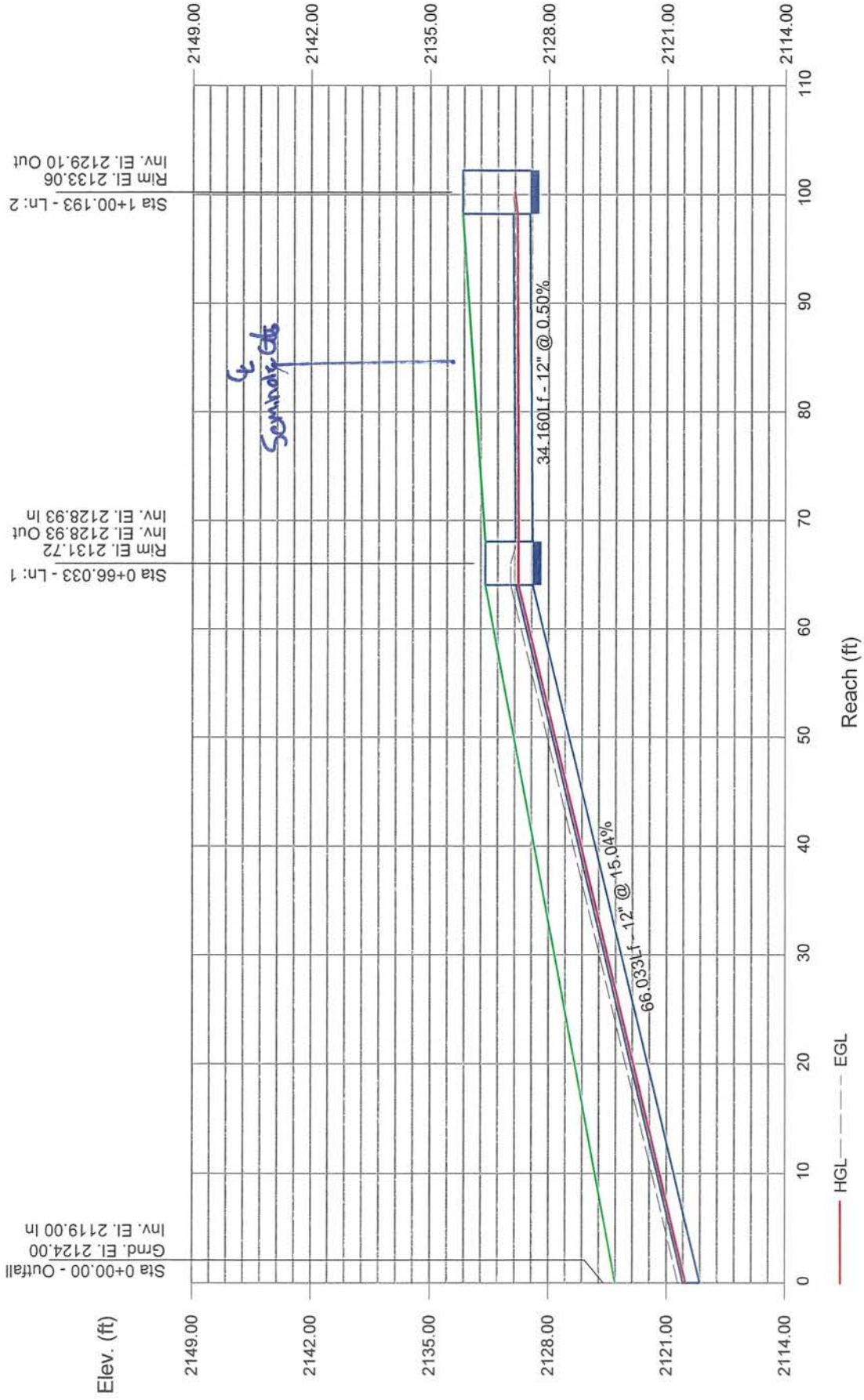


Storm Sewer Profile

Seminole Ct (future)

Included for completeness

Pond G

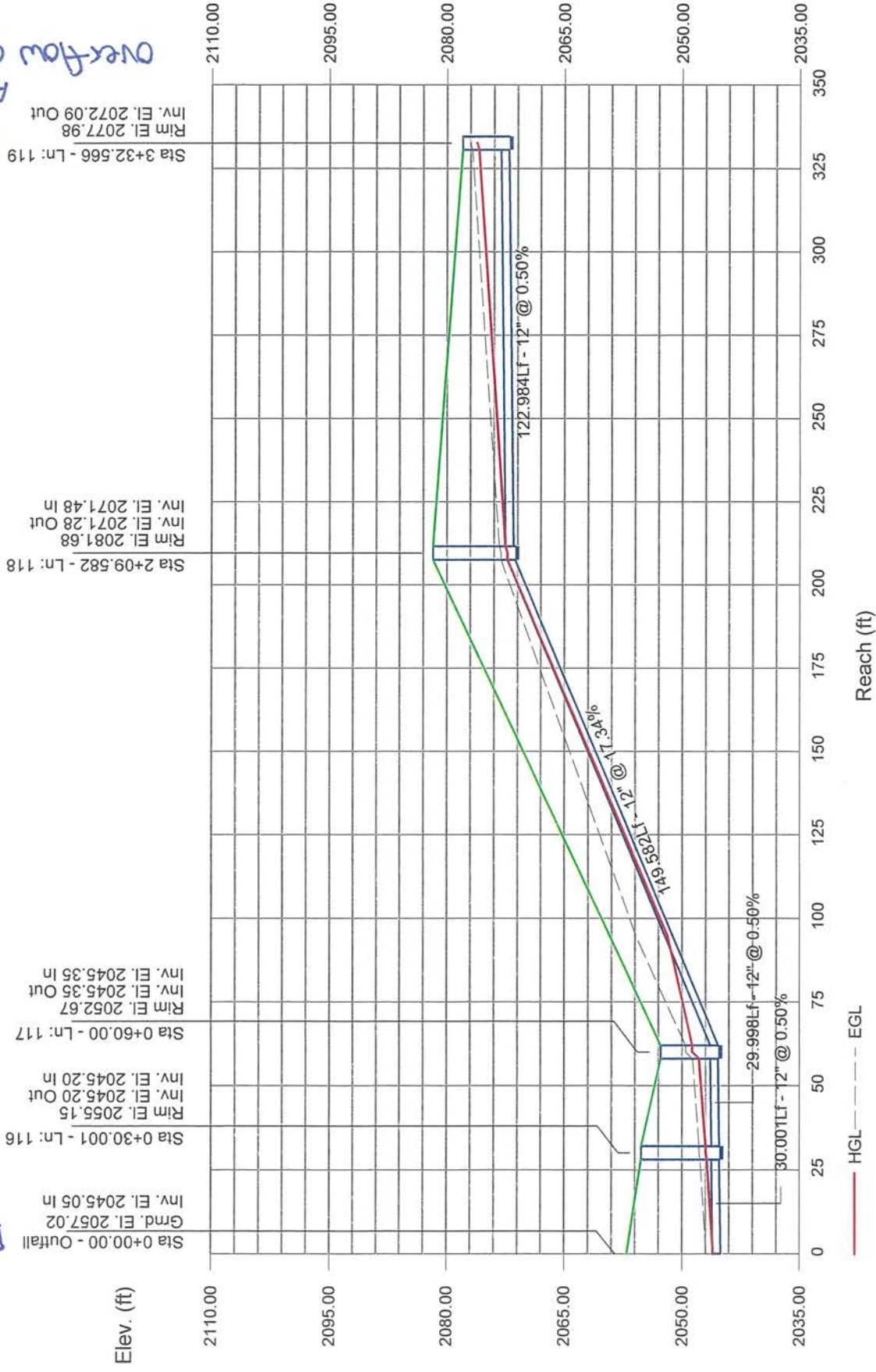


Storm Sewer Profile Lowell Ave

Proj. file: 1752-PIPE ANALYSIS.stm

Ex. Drywells

Lowell Ave from
Overflow catch basins



FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q		Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD		Date: 2/22/2018							
					C1 = 0.2	C2 = 0.5	C3 = 0.9					Total Flow	Q (cfs)		Up (ft)	Down (ft)	Fall (ft)			Size (in)	Slope (%)		Vel (ft/s)	Cap (cfs)	Frequency: 10 yrs				
																										Incr-ment (ac)	Sub-Total (ac)	Sum CA	Line description
1	End	MH	0.013	66.033	0.00	0.00	0.00	0.23	0.22	0.00	0.00	1.96	2131.72	2129.77	2119.84	9.93	12	15.04	5.57	3.92	Pipe - (77)								
					0.00	0.00	0.00					3.92		2129.93	2120.00	2120.00		12	15.04	17.58	13.81								
					0.00	0.00	0.00							2128.93	2119.00	2119.00		Cir											
2	1	MH	0.013	34.160	0.00	0.00	0.00	0.00	0.23	0.00	0.00	1.96	2133.06	2129.85	2129.77	0.08	12	0.24	2.94	1.96	Pipe - (78)								
					0.00	0.00	0.00					1.96		2130.10	2129.93	2129.93		12	0.50	3.20	2.51								
					0.00	0.00	0.00							2129.10	2128.93	2128.93		Cir											
3	End	MH	0.013	44.631	0.00	0.00	0.00	1.03	0.77	0.00	0.00	0.38	2127.90	2124.11	2119.36	4.75	12	10.64	2.94	0.76	Pipe - (76) (4)								
					0.00	0.00	0.00					0.76		2124.75	2120.00	2120.00		12	10.64	14.79	11.62								
					0.00	0.00	0.00							2123.75	2119.00	2119.00		Cir											
4	3	MH	0.013	29.962	0.00	0.00	0.00	0.00	1.03	0.00	0.00	0.38	2127.90	2124.16	2124.11	0.05	12	0.16	1.90	0.38	Pipe - (76)								
					0.00	0.00	0.00					0.38		2124.90	2124.75	2124.75		12	0.50	3.21	2.52								
					0.00	0.00	0.00							2123.90	2123.75	2123.75		Cir											
5	End	MH	0.013	73.892	0.00	0.00	0.00	3.76	0.36	0.00	0.00	0.00	2097.80	2091.43	2086.94	4.49	18	6.08	5.10	5.97	Pipe - (172)								
					0.00	0.00	0.00					5.97		2091.99	2087.50	2087.50		18	6.08	14.65	25.89								
					0.00	0.00	0.00							2090.49	2086.00	2086.00		Cir											
6	5	MH	0.013	29.589	0.00	0.00	0.00	3.69	0.08	0.00	0.00	0.00	2098.28	2092.52	2091.92	0.60	12	2.04	6.48	5.09	Pipe - (86)								
					0.00	0.00	0.00					5.09		2092.22	2091.92	2091.92		12	1.01	4.57	3.59								
					0.00	0.00	0.00							2091.22	2090.92	2090.92		Cir											
7	6	MH	0.013	30.664	0.00	0.00	0.00	3.59	0.10	0.00	0.00	0.00	2099.33	2093.61	2093.18	0.43	12	1.40	5.36	4.21	Pipe - (87)								
					0.00	0.00	0.00					4.21		2093.14	2092.22	2092.22		12	3.00	7.85	6.17								
					0.00	0.00	0.00							2092.14	2091.22	2091.22		Cir											
8	7	MH	0.013	76.698	0.00	0.00	0.00	3.35	0.24	0.00	0.00	0.00	2105.94	2099.90	2093.80	6.10	12	7.96	5.59	4.21	Pipe - (88)								
					0.00	0.00	0.00					4.21		2100.04	2093.14	2093.14		12	8.00	13.60	10.68								
					0.00	0.00	0.00							2099.04	2092.14	2092.14		Cir											
9	8	MH	0.013	69.889	0.00	0.00	0.00	3.13	0.22	0.00	0.00	0.00	2112.55	2105.49	2099.90	5.59	12	8.00	5.83	4.21	Pipe - (89)								
					0.00	0.00	0.00					4.21		2105.63	2100.04	2100.04		12	8.00	12.82	10.07								
					0.00	0.00	0.00							2104.63	2099.04	2099.04		Cir											
10	9	MH	0.013	93.914	0.00	0.00	0.00	2.76	0.37	0.00	0.00	0.00	2118.54	2111.05	2105.49	5.56	12	5.92	4.83	3.33	Pipe - (90)								
					0.00	0.00	0.00					3.33		2111.27	2105.63	2105.63		12	6.01	11.11	8.73								
					0.00	0.00	0.00							2110.27	2104.63	2104.63		Cir											

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

Project File: 1752-PIPE ANALYSIS.snr

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q Total Flow (cfs)	Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD Full Flow	Date: 2/22/2018	Frequency: 10 yrs	Proj: 1752-PIPE ANA	Line description							
					Incr-ment (ac)	Sub-Total (ac)	Sum CA							Up (ft)	Down (ft)	Fall (ft)								Size (in)	Slope (%)	Vel (ft/s)	Cap (cfs)			
																												C1 = 0.2	C2 = 0.5	C3 = 0.9
11	10	MH	0.013	193.749	0.00	0.00	0.00	1.73	1.04	0.00	0.00	2120.56	2111.05	1.83	12	0.94	4.05	2.44			Pipe - (91)									
				0.00	0.00	0.00	0.00				2.44		2113.21	2111.27		12	1.00	4.54	3.56											
				0.00	0.00	0.00	0.00						2112.21	2110.27	1.94	Cir														
12	11	MH	0.013	28.431	0.00	0.00	0.00	1.57	0.15	0.00	0.00	2120.94	2112.88	0.85	12	2.99	4.38	2.44				Pipe - (92)								
				0.00	0.00	0.00	0.00				2.44		2114.06	2113.21		12	2.99	7.84	6.16											
				0.00	0.00	0.00	0.00						2113.06	2112.21	0.85	Cir														
13	12	MH	0.013	78.738	0.00	0.00	0.00	0.73	0.84	0.00	0.00	2127.41	2113.73	5.31	12	6.74	2.80	1.22				Pipe - (93)								
				0.00	0.00	0.00	0.00				1.22		2119.57	2114.06	5.51	12	7.00	11.99	9.42											
				0.00	0.00	0.00	0.00						2118.57	2113.06	5.51	Cir														
14	13	MH	0.013	33.290	0.00	0.00	0.00	0.37	0.36	0.00	0.00	2130.81	2122.37	3.33	12	10.00	3.41	1.22				Pipe - (94)								
				0.00	0.00	0.00	0.00				1.22		2122.90	2119.57	3.33	12	10.00	14.34	11.26											
				0.00	0.00	0.00	0.00						2121.90	2118.57	3.33	Cir														
15	14	MH	0.013	8.188	0.00	0.00	0.00	0.00	0.18	0.00	0.00	2130.31	2122.31	-0.06	12	-0.75	2.23	0.61				Pipe - (98)								
				0.00	0.00	0.00	0.00				0.61		2122.98	2122.90		12	0.98	4.48	3.52											
				0.00	0.00	0.00	0.00						2121.98	2121.90	0.08	Cir														
16	14	MH	0.013	17.419	0.00	0.00	0.00	0.00	0.37	0.00	0.00	2130.31	2122.40	0.03	12	0.17	2.23	0.61				Pipe - (97)								
				0.00	0.00	0.00	0.00				0.61		2123.07	2122.90		12	0.98	4.48	3.52											
				0.00	0.00	0.00	0.00						2122.07	2121.90	0.17	Cir														
17	12	MH	0.013	5.953	0.00	0.00	0.00	0.00	0.13	0.00	0.00	2120.44	2113.45	-0.28	12	-4.77	1.93	0.61				Pipe - (96)								
				0.00	0.00	0.00	0.00				0.61		2114.12	2114.06		12	1.01	4.55	3.58											
				0.00	0.00	0.00	0.00						2113.12	2113.06	0.06	Cir														
18	12	MH	0.013	19.707	0.00	0.00	0.00	0.00	0.42	0.00	0.00	2120.44	2113.59	-0.14	12	-0.73	1.93	0.61				Pipe - (95)								
				0.00	0.00	0.00	0.00				0.61		2114.26	2114.06		12	1.01	4.57	3.59											
				0.00	0.00	0.00	0.00						2113.26	2113.06	0.20	Cir														
19	10	MH	0.013	5.789	0.00	0.00	0.00	0.00	0.17	0.00	0.00	2118.04	2111.05	-0.45	12	-7.69	1.59	0.44				Pipe - (100)								
				0.00	0.00	0.00	0.00				0.44		2111.33	2111.27		12	1.04	4.62	3.63											
				0.00	0.00	0.00	0.00						2110.33	2110.27	0.06	Cir														
20	10	MH	0.013	19.651	0.00	0.00	0.00	0.00	0.58	0.00	0.00	2118.04	2111.05	-0.31	12	-1.55	1.59	0.44				Pipe - (99)								
				0.00	0.00	0.00	0.00				0.44		2111.47	2111.27		12	1.02	4.57	3.59											
				0.00	0.00	0.00	0.00						2110.47	2110.27	0.20	Cir														

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l)	Total CA	Add Q	Inlet elev (ft)	Elev of HGL			Rise	HGL	ADD		Date: 2/22/2018									
					C1 = 0.2	C2 = 0.5	C3 = 0.9							Up (ft)	Down (ft)	Fall (ft)			Span	Pipe		Full Flow	Frequency: 10 yrs							
																								Incr-ment (ac)	Sub-Total (ac)	Sum CA	Size (in)	Slope (%)	Vel (ft/s)	Cap (cfs)
Proj: 1752-PIPE ANAL																														
21	9	MH	0.013	8.535	0.00	0.00	0.00	0.00	0.00	0.00	0.44	2112.05	2104.99	2105.49	-0.50	12	-5.85	1.56	0.44	Pipe - (102)										
					0.00	0.00	0.00				0.44	2105.72	2105.63	2105.63	12	1.06	4.66	3.66												
					0.00	0.00	0.00					2104.72	2104.63	0.09	Cir															
22	9	MH	0.013	16.906	0.00	0.00	0.00	0.00	0.00	0.00	0.44	2112.05	2105.07	2105.49	-0.42	12	-2.48	1.56	0.44	Pipe - (101)										
					0.00	0.00	0.00				0.44	2105.80	2105.63	2105.63	12	1.01	4.55	3.57												
					0.00	0.00	0.00					2104.80	2104.63	0.17	Cir															
23	5	MH	0.013	30.723	0.00	0.00	0.00	0.56	0.00	0.00	0.00	2099.18	2092.39	2091.43	0.96	12	3.12	2.62	0.88	Pipe - (85)										
					0.00	0.00	0.00				0.88	2093.00	2091.92	2091.92	12	3.52	8.50	6.68												
					0.00	0.00	0.00					2092.00	2090.92	1.08	Cir															
24	23	MH	0.013	18.786	0.00	0.00	0.00	0.00	0.00	0.00	0.44	2098.77	2092.46	2092.39	0.07	12	0.38	2.03	0.44	Pipe - (57) (1)										
					0.00	0.00	0.00				0.44	2093.19	2093.00	2093.00	12	1.01	4.56	3.58												
					0.00	0.00	0.00					2092.19	2092.00	0.19	Cir															
25	23	MH	0.013	6.751	0.00	0.00	0.00	0.00	0.00	0.00	0.44	2098.76	2092.34	2092.39	-0.05	12	-0.72	2.03	0.44	Pipe - (57)										
					0.00	0.00	0.00				0.44	2093.07	2093.00	2093.00	12	1.04	4.62	3.63												
					0.00	0.00	0.00					2092.07	2092.00	0.07	Cir															
26	6	MH	0.013	8.630	0.00	0.00	0.00	0.00	0.00	0.00	0.44	2097.78	2093.18	2093.18	0.00	12	0.01	0.56	0.44	Pipe - (55) (1)										
					0.00	0.00	0.00				0.44	2092.31	2092.22	2092.22	12	1.04	4.63	3.64												
					0.00	0.00	0.00					2091.31	2091.22	0.09	Cir															
27	6	MH	0.013	16.652	0.00	0.00	0.00	0.00	0.00	0.00	0.44	2097.78	2093.18	2093.18	0.00	12	0.01	0.56	0.44	Pipe - (55)										
					0.00	0.00	0.00				0.44	2092.39	2092.22	2092.22	12	1.02	4.58	3.60												
					0.00	0.00	0.00					2091.39	2091.22	0.17	Cir															
28	End	MH	0.013	41.198	0.00	0.00	0.00	3866.9	0.22	0.00	0.00	2050.67	2044.96	2044.14	0.82	36	1.99	6.19	22.06	6 (1)										
					0.00	0.00	0.00				22.06	2046.45	2045.63	2045.63	36	1.99	13.31	94.09												
					0.00	0.00	0.00					2043.45	2042.63	0.82	Cir															
29	28	MH	0.013	45.056	0.00	0.00	0.00	3866.7	0.24	0.00	0.00	2054.26	2045.41	2044.96	0.45	36	1.00	6.19	22.06	6										
					0.00	0.00	0.00				22.06	2046.90	2046.45	2046.45	36	1.00	9.43	66.66												
					0.00	0.00	0.00					2043.90	2043.45	0.45	Cir															
30	29	MH	0.013	34.268	0.00	0.00	0.00	3866.5	0.19	0.00	0.00	2057.02	2048.35	2045.41	2.94	30	8.57	6.87	14.82	Pipe - (38)										
					0.00	0.00	0.00				14.82	2049.55	2046.90	2046.90	30	7.73	23.23	114.0												
					0.00	0.00	0.00					2047.05	2044.40	2.65	Cir															

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (m/hr) ; Time of flow in section is based on full flow.

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow In sect (min)	Inten (l) (in/hr)	Total CA	Add Q		Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD		Date: 2/22/2018		
					Incre- ment (ac)	Sub- Total (ac)	Sum CA					Total Flow	Q (cfs)		Elev of Crown		Slope (%)			Vel (ft/s)	Cap (cfs)			
															Up (ft)	Down (ft)							Fall (ft)	Size (in)
C1 = 0.2 C2 = 0.5 C3 = 0.9												Proj: 1752-PIPE ANAL		Line description										
31	30	MH	0.013	155.61	0.00	0.00	0.00	3865.9	0.55	0.00	0.00	0.00	2067.28	2061.67	2048.35	13.32	24	8.56	9.54	14.81	Pipe - (74)			
					0.00	0.00	0.00				14.81	2062.28	2049.55	2060.28	2047.55	12.73	24	8.18	20.59	64.69				
					0.00	0.00	0.00					2060.28	2047.55	2047.55	12.73	24	8.18	20.59	64.69					
32	31	MH	0.013	49.580	0.00	0.00	0.00	564.9	0.10	0.00	0.00	0.00	2071.19	2063.27	2062.28	0.99	18	1.99	8.38	14.80	Pipe - (69)			
					0.00	0.00	0.00				14.80	2062.76	2062.28	2061.26	2060.78	0.48	18	0.97	5.85	10.33				
					0.00	0.00	0.00					2061.26	2060.78	2060.78	0.48	18	0.97	5.85	10.33					
33	32	MH	0.013	47.332	0.00	0.00	0.00	564.8	0.10	0.00	0.00	0.00	2069.36	2065.24	2064.36	0.88	18	1.87	8.11	14.34	Pipe - (130)			
					0.00	0.00	0.00				14.34	2063.23	2062.76	2061.74	2061.26	0.47	18	0.99	5.92	10.46				
					0.00	0.00	0.00					2061.73	2061.26	2061.26	0.47	18	0.99	5.92	10.46					
34	33	MH	0.013	172.71	0.00	0.00	0.00	564.5	0.35	0.00	0.00	0.00	2086.51	2078.67	2065.39	13.28	18	7.69	8.25	14.34	Pipe - (130) (1)			
					0.00	0.00	0.00				14.34	2078.78	2063.24	2061.74	2061.26	0.47	18	9.00	17.83	31.50				
					0.00	0.00	0.00					2077.28	2061.74	2061.74	0.47	18	9.00	17.83	31.50					
35	34	MH	0.013	48.202	0.00	0.00	0.00	564.4	0.10	0.00	0.00	0.00	2091.29	2083.48	2078.67	4.81	18	9.97	8.15	13.88	Pipe - (131)			
					0.00	0.00	0.00				13.88	2083.60	2078.78	2077.28	2077.28	4.82	18	10.00	18.79	33.21				
					0.00	0.00	0.00					2082.10	2077.28	2077.28	4.82	18	10.00	18.79	33.21					
36	35	MH	0.013	55.808	0.00	0.00	0.00	269.4	0.25	0.00	0.00	0.00	2094.11	2084.21	2083.48	0.74	18	1.32	4.60	6.60	Pipe - (111)			
					0.00	0.00	0.00				6.60	2084.72	2083.60	2082.10	2082.10	1.12	18	2.01	8.42	14.88				
					0.00	0.00	0.00					2083.22	2082.10	2082.10	1.12	18	2.01	8.42	14.88					
37	36	MH	0.013	128.58	0.00	0.00	0.00	5.32	0.61	0.00	0.00	0.00	2102.96	2094.47	2084.21	10.25	18	7.97	5.12	6.26	Pipe - (110)			
					0.00	0.00	0.00				6.26	2095.00	2084.72	2083.22	2083.22	10.28	18	7.99	16.80	29.69				
					0.00	0.00	0.00					2093.50	2083.22	2083.22	10.28	18	7.99	16.80	29.69					
38	37	MH	0.013	110.93	0.00	0.00	0.00	4.75	0.57	0.00	0.00	0.00	2106.14	2097.75	2094.47	3.29	18	2.96	4.90	5.74	Pipe - (109)			
					0.00	0.00	0.00				5.74	2098.33	2095.00	2093.50	2093.50	3.33	18	3.00	10.30	18.19				
					0.00	0.00	0.00					2096.83	2093.50	2093.50	3.33	18	3.00	10.30	18.19					
39	38	MH	0.013	156.84	0.00	0.00	0.00	3.86	0.89	0.00	0.00	0.00	2105.13	2099.28	2097.75	1.52	18	0.97	4.71	5.21	Pipe - (108)			
					0.00	0.00	0.00				5.21	2099.90	2098.33	2096.83	2096.83	1.57	18	1.00	5.95	10.51				
					0.00	0.00	0.00					2098.40	2096.83	2096.83	1.57	18	1.00	5.95	10.51					
40	39	MH	0.013	73.994	0.00	0.00	0.00	3.36	0.50	0.00	0.00	0.00	2105.84	2099.94	2099.28	0.66	18	0.89	4.30	4.36	Pipe - (107)			
					0.00	0.00	0.00				4.36	2100.64	2099.90	2099.90	0.66	18	1.00	5.94	10.50					
					0.00	0.00	0.00					2099.14	2098.40	2098.40	0.74	18	1.00	5.94	10.50					

Project File: 1752-PIPE ANALYSIS.sfr

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l)	Total CA	Add Q		Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD		Date: 2/22/2018						
					Incr-ment (ac)	Sub-Total (ac)	Sum CA					Q	Total Flow		Up (ft)	Down (ft)	Fall (ft)			Size (in)	Slope (%)		Vel (ft/s)	Cap (cfs)	Line description			
																										Elev of Crown		Full Flow
																										Elev of Invert		
41	40	MH	0.013	90.027	0.00	0.00	0.00	2.61	0.75	0.00	0.00	0.00	2106.75	2100.76	2099.94	0.81	18	0.90	3.95	3.51	Pipe - (106)							
					0.00	0.00	0.00				3.51	3.51	2101.54	2100.64	2099.14	0.90	18	1.00	5.94	10.50								
					0.00	0.00	0.00						2100.04	2099.14	2099.14		Cir											
42	41	MH	0.013	165.809	0.00	0.00	0.00	1.22	1.39	0.00	0.00	0.00	2126.03	2119.00	2100.76	18.24	18	11.00	4.23	3.51	Pipe - (105)							
					0.00	0.00	0.00				3.51	3.51	2119.78	2101.54	2100.04	18.24	18	11.00	19.71	34.83								
					0.00	0.00	0.00						2118.28	2100.04	2100.04		Cir											
43	42	MH	0.013	26.140	0.00	0.00	0.00	0.59	0.31	0.00	0.00	0.00	2126.10	2121.23	2119.00	2.23	18	8.55	3.41	2.50	Pipe - (104)							
					0.00	0.00	0.00				2.50	2.50	2122.13	2119.78	2119.00	2.23	18	8.99	17.82	31.49								
					0.00	0.00	0.00						2120.63	2118.28	2118.28	2.35	Cir											
44	43	None	0.013	49.996	0.00	0.00	0.00	0.00	0.59	0.00	0.00	2.50	0.00	2125.62	2121.23	4.39	18	8.78	3.42	2.50	Pipe - (103)							
					0.00	0.00	0.00				2.50	2.50	2126.52	2122.02	2122.02	4.50	18	9.00	17.83	31.50								
					0.00	0.00	0.00						2125.02	2120.52	2120.52	4.50	Cir											
45	42	MH	0.013	53.789	0.00	0.00	0.00	0.52	0.70	0.00	0.00	0.37	2125.46	2119.74	2119.14	0.60	12	1.11	3.56	1.01	Pipe - (122)							
					0.00	0.00	0.00				1.01	1.01	2120.32	2119.78	2119.78	0.54	12	1.00	4.54	3.57								
					0.00	0.00	0.00						2119.32	2118.78	2118.78	0.54	Cir											
46	45	MH	0.013	25.322	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.64	2125.46	2119.90	2119.74	0.16	12	0.64	2.42	0.64	Pipe - (123)							
					0.00	0.00	0.00				0.64	0.64	2120.57	2120.32	2120.32	0.25	12	0.99	4.51	3.54								
					0.00	0.00	0.00						2119.57	2119.32	2119.32	0.25	Cir											
47	35	MH	0.013	61.576	0.00	0.00	0.00	564.1	0.25	0.00	0.00	0.00	2097.38	2089.30	2083.48	5.83	18	9.46	4.91	7.28	Pipe - (139)							
					0.00	0.00	0.00				7.28	7.28	2089.76	2083.60	2083.60	6.16	18	10.00	18.80	33.21								
					0.00	0.00	0.00						2088.26	2082.10	2082.10	6.16	Cir											
48	47	MH	0.013	109.806	0.00	0.00	0.00	563.6	0.49	0.00	0.00	0.77	2108.34	2100.24	2089.30	10.93	18	9.96	5.20	6.66	Pipe - (144)							
					0.00	0.00	0.00				6.66	6.66	2100.74	2089.76	2089.76	10.98	18	10.00	18.79	33.21								
					0.00	0.00	0.00						2099.24	2088.26	2088.26	10.98	Cir											
49	48	MH	0.013	52.163	0.00	0.00	0.00	113.8	0.27	0.00	0.00	0.00	2113.33	2105.36	2100.24	5.13	18	9.83	4.74	5.60	Pipe - (146)							
					0.00	0.00	0.00				5.60	5.60	2105.95	2100.74	2100.74	5.21	18	9.99	18.78	33.19								
					0.00	0.00	0.00						2104.45	2099.24	2099.24	5.21	Cir											
50	49	MH	0.013	130.184	0.00	0.00	0.00	107.7	6.04	0.00	0.00	0.00	2126.48	2118.19	2105.36	12.83	12	9.85	1.57	0.28	Pipe - (159)							
					0.00	0.00	0.00				0.28	0.28	2118.97	2105.95	2105.95	13.02	12	10.00	14.34	11.26								
					0.00	0.00	0.00						2117.97	2104.95	2104.95	13.02	Cir											

Project File: 1752-PIPE ANALYSIS.sfr

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q			Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD		Date: 2/22/2018						
					C1 = 0.2	C2 = 0.5	C3 = 0.9					Total Flow	Q (cfs)	Up (ft)		Down (ft)	Fall (ft)	Size (in)			Slope (%)	Vel (ft/s)		Cap (cfs)	Frequency: 10 yrs				
																										Incr-ment (ac)	Sub-Total (ac)	Sum CA	Line description
51	50	MH	0.013	17.093	0.00	0.00	0.00	0.80	0.00	0.00	0.28	2118.36	2118.19	0.17	12	0.99	2.21	0.28	Pipe - (165)										
					0.00	0.00	0.00			0.00	0.28	2119.14	2118.97		12	0.99	4.52	3.55											
					0.00	0.00	0.00			0.00	0.00	2118.14	2117.97	0.17	Cir														
52	50	MH	0.013	8.229	0.00	0.00	0.00	107.72	0.00	0.00	0.00	2119.05	2118.19	0.86	12	10.47	0.00	0.00	Pipe - (166)										
					0.00	0.00	0.00			0.00	0.00	2119.05	2118.97		12	0.97	4.47	3.51											
					0.00	0.00	0.00			0.00	0.00	2118.05	2117.97	0.08	Cir														
53	49	MH	0.013	19.389	0.00	0.00	0.63	0.11	0.00	0.00	0.00	2105.53	2105.36	0.17	18	0.85	4.81	5.32	Pipe - (124)										
					0.00	0.00	0.00			5.32	5.32	2106.14	2105.95		18	0.98	5.88	10.39											
					0.00	0.00	0.00			0.00	0.00	2104.64	2104.45	0.19	Cir														
54	53	MH	0.013	30.537	0.00	0.00	0.46	0.17	0.00	0.00	0.32	2106.45	2105.53	0.92	18	3.01	4.88	5.32	Pipe - (125)										
					0.00	0.00	0.00			5.32	5.32	2107.06	2106.14		18	3.01	10.32	18.23											
					0.00	0.00	0.00			0.00	0.00	2105.56	2104.64	0.92	Cir														
55	54	None	0.013	78.101	0.00	0.00	0.00	0.46	0.00	0.00	5.00	2117.12	2108.84	8.28	18	10.60	9.15	5.00	Pipe - (126)										
					0.00	0.00	0.00			0.00	5.00	2117.76	2109.95		18	10.00	18.79	33.21											
					0.00	0.00	0.00			0.00	0.00	2116.26	2108.45	7.81	Cir														
56	48	MH	0.013	9.598	0.00	0.00	500.8	62.82	0.00	0.00	0.00	2100.24	2100.24	0.00	12	0.00	0.01	0.00	Pipe - (128)										
					0.00	0.00	0.00			0.00	0.00	2100.84	2100.74		12	1.04	4.63	3.64											
					0.00	0.00	0.00			0.00	0.00	2099.84	2099.74	0.10	Cir														
57	56	MH	0.013	38.258	0.00	0.00	0.00	500.80	0.00	0.00	0.00	2110.00	2104.00	6.00	12	15.69	0.60	0.00	Pipe - (129)										
					0.00	0.00	0.00			0.00	0.00	2110.00	2104.99		12	13.10	16.41	12.89											
					0.00	0.00	0.00			0.00	0.00	2109.00	2103.99	5.01	Cir														
58	29	MH	0.013	48.491	0.00	0.00	424.3	0.09	0.00	0.00	0.00	2049.91	2047.90	2.01	12	4.14	9.23	7.25	5										
					0.00	0.00	0.00			7.25	7.25	2049.20	2047.90		12	2.68	7.42	5.83											
					0.00	0.00	0.00			0.00	0.00	2048.20	2046.90	1.30	Cir														
59	58	MH	0.013	89.666	0.00	0.00	424.1	0.18	0.00	0.00	0.00	2057.22	2051.23	5.99	12	6.68	8.15	6.37	3										
					0.00	0.00	0.00			6.37	6.37	2057.26	2049.19		12	9.00	13.60	10.68											
					0.00	0.00	0.00			0.00	0.00	2056.26	2048.19	8.07	Cir														
60	59	MH	0.013	82.269	0.00	0.00	424.0	0.17	0.00	0.00	0.00	2065.45	2057.22	8.23	12	10.00	8.20	6.36	2										
					0.00	0.00	0.00			6.36	6.36	2065.49	2057.26		12	10.00	14.34	11.26											
					0.00	0.00	0.00			0.00	0.00	2064.49	2056.26	8.23	Cir														

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

Project File: 1752-PIPE ANALYSIS.str

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l)	Total CA	Add Q		Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD		Date: 2/22/2018					
					Incr-ment (ac)	Sub-Total (ac)	Sum CA					Q	Total Flow		Up (ft)	Down (ft)	Fall (ft)			Size (in)	Slope (%)		Vel (ft/s)	Cap (cfs)			
																									C1 = 0.2	C2 = 0.5	C3 = 0.9
61	60	None	0.013	67.075	0.00	0.00	0.00	423.8	0.16	0.00	0.00	0.00	2071.21	2071.08	2065.45	5.62	12	8.39	7.11	5.48	Pipe - (93)(0)						
					0.00	0.00	0.00				5.48	5.48	2071.14	2065.49	2064.49	5.65	12	8.42	13.16	10.34							
					0.00	0.00	0.00						2070.14	2064.49							Proj: 1752-PIPE ANAL						
62	61	MH	0.013	45.174	0.00	0.00	0.00	423.7	0.11	0.00	0.00	0.00	2082.77	2074.88	2071.08	3.80	12	8.41	7.16	5.48	Pipe - (93)(0) (1)						
					0.00	0.00	0.00				5.48	5.48	2074.94	2071.14	2070.14	3.80	12	8.41	13.15	10.33							
					0.00	0.00	0.00						2073.94	2070.14													
63	62	MH	0.013	80.801	0.00	0.00	0.00	423.5	0.19	0.00	0.00	0.00	2090.44	2082.25	2074.88	7.37	12	9.12	7.48	5.48	Pipe - (94)(0)						
					0.00	0.00	0.00				5.48	5.48	2082.31	2075.04	2074.04	7.27	12	9.00	13.60	10.68							
					0.00	0.00	0.00						2081.31	2074.04													
64	63	MH	0.013	54.809	0.00	0.00	0.00	423.4	0.16	0.00	0.00	0.00	2094.86	2087.21	2082.25	4.96	12	9.06	7.46	4.60	Pipe - (95)(0)						
					0.00	0.00	0.00				4.60	4.60	2087.32	2082.61	2081.61	4.71	12	8.59	13.29	10.44							
					0.00	0.00	0.00						2086.32	2081.61													
65	64	MH	0.013	124.206	0.00	0.00	0.00	423.0	0.35	0.00	0.00	0.00	2103.07	2095.38	2087.21	8.17	12	6.58	6.55	4.60	Pipe - (96)(0)						
					0.00	0.00	0.00				4.60	4.60	2095.49	2087.42	2086.42	8.07	12	6.50	11.56	9.08							
					0.00	0.00	0.00						2094.49	2086.42													
66	65	MH	0.013	16.577	0.00	0.00	0.00	423.0	0.05	0.00	0.00	0.00	2104.15	2096.31	2095.38	0.93	12	5.61	6.55	4.60	Pipe - (97)(0)						
					0.00	0.00	0.00				4.60	4.60	2096.42	2095.59	2094.59	0.83	12	5.01	10.15	7.97							
					0.00	0.00	0.00						2095.42	2094.59													
67	66	MH	0.013	82.947	0.00	0.00	0.00	422.7	0.29	0.00	0.00	0.00	2109.60	2102.05	2096.31	5.74	12	6.92	6.53	3.72	Pipe - (98)(0)						
					0.00	0.00	0.00				3.72	3.72	2102.23	2096.72	2095.72	5.51	12	6.64	11.69	9.18							
					0.00	0.00	0.00						2101.23	2095.72													
68	67	MH	0.013	29.166	0.00	0.00	0.00	422.5	0.13	0.00	0.00	0.00	2111.31	2103.58	2102.06	1.52	12	5.21	6.69	2.84	Pipe - (108)(0)						
					0.00	0.00	0.00				2.84	2.84	2103.86	2102.63	2101.63	1.23	12	4.22	9.31	7.31							
					0.00	0.00	0.00						2102.86	2101.63													
69	68	MH	0.013	211.522	0.00	0.00	0.00	421.6	0.98	0.00	0.00	0.00	2115.68	2105.30	2103.96	1.34	12	0.63	3.61	2.84	Pipe - (100)(0)						
					0.00	0.00	0.00				2.84	2.84	2105.02	2103.96	2102.96	1.06	12	0.50	3.21	2.52							
					0.00	0.00	0.00						2104.02	2102.96													
70	69	MH	0.013	221.938	0.00	0.00	0.00	420.0	1.60	0.00	0.00	0.00	2110.17	2105.93	2105.33	0.60	15	0.27	3.16	2.84	Pipe - (100) (1)						
					0.00	0.00	0.00				2.84	2.84	2106.48	2105.37	2104.12	1.11	15	0.50	3.72	4.57							
					0.00	0.00	0.00						2105.23	2104.12													

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

Project File: 1752-PIPE ANALYSIS.sfr

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l)	Total CA	Add Q		Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD		Date: 2/22/2018									
					Incre- ment (ac)	Sub- Total (ac)	Sum CA					Q	Total Flow		Up (ft)	Down (ft)	Fall (ft)			Size (in)	Slope (%)		Vel (ft/s)	Cap (cfs)	Line description						
																										C1 = 0.2		C2 = 0.5		C3 = 0.9	
																										Full Flow		Full Flow		Full Flow	
71	70	MH	0.013	40.005	0.00	0.00	0.00	245.4	174.55	0.00	0.00	0.00	2110.44	2106.18	2106.18	0.00	12	0.00	0.01	0.00	Pipe - (52)										
					0.00	0.00	0.00				0.00	0.00		2106.56	2106.36	0.20	12	0.50	3.21	2.52											
					0.00	0.00	0.00				0.00	0.00		2105.56	2105.36		Cir														
72	71	MH	0.013	18.748	0.00	0.00	0.00	0.00	245.41	0.00	0.00	0.00	2110.05	2106.65	2106.18	0.47	12	2.51	0.00	0.00	Pipe - (53)										
					0.00	0.00	0.00				0.00	0.00		2106.65	2106.56	0.09	12	0.48	3.14	2.47											
					0.00	0.00	0.00				0.00	0.00		2105.65	2105.56		Cir														
73	71	MH	0.013	6.574	0.00	0.00	0.00	0.00	86.06	0.00	0.00	0.00	2110.05	2106.59	2106.18	0.41	12	6.24	0.00	0.00	Pipe - (54)										
					0.00	0.00	0.00				0.00	0.00		2106.59	2106.56	0.03	12	0.46	3.06	2.41											
					0.00	0.00	0.00				0.00	0.00		2105.59	2105.56		Cir														
74	70	MH	0.013	6.574	0.00	0.00	0.00	0.00	86.06	0.00	0.00	0.00	2109.77	2106.26	2106.18	0.08	12	1.21	0.00	0.00	Pipe - (51)										
					0.00	0.00	0.00				0.00	0.00		2106.26	2106.23	0.03	12	0.46	3.06	2.41											
					0.00	0.00	0.00				0.00	0.00		2105.26	2105.23		Cir														
75	70	MH	0.013	18.748	0.00	0.00	0.00	0.00	245.41	0.00	0.00	0.00	2109.77	2106.32	2106.18	0.14	12	0.74	0.00	0.00	Pipe - (49)										
					0.00	0.00	0.00				0.00	0.00		2106.32	2106.23	0.09	12	0.48	3.14	2.47											
					0.00	0.00	0.00				0.00	0.00		2105.32	2105.23		Cir														
76	67	MH	0.013	4.491	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.69	2109.10	2101.93	2102.05	-0.12	12	-2.77	2.26	0.69	Pipe - (107) (1)										
					0.00	0.00	0.00				0.69	0.69		2102.58	2102.53	0.05	12	1.11	4.79	3.76											
					0.00	0.00	0.00				0.00	0.00		2101.58	2101.53		Cir														
77	67	MH	0.013	20.509	0.00	0.00	0.00	0.00	1.41	0.00	0.00	0.19	2109.10	2101.92	2102.05	-0.13	12	-0.65	1.23	0.19	Pipe - (107)(0)										
					0.00	0.00	0.00				0.19	0.19		2102.74	2102.53	0.21	12	1.02	4.59	3.60											
					0.00	0.00	0.00				0.00	0.00		2101.74	2101.53		Cir														
78	48	MH	0.013	15.725	0.00	0.00	0.00	0.00	0.74	0.00	0.00	0.28	2107.84	2100.12	2100.24	-0.12	12	-0.76	1.47	0.28	Pipe - (127)										
					0.00	0.00	0.00				0.28	0.28		2100.90	2100.74	0.16	12	1.02	4.57	3.59											
					0.00	0.00	0.00				0.00	0.00		2099.90	2099.74		Cir														
79	40	MH	0.013	8.313	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.67	2105.49	2100.06	2099.94	0.12	12	1.45	3.11	0.67	Pipe - (121)										
					0.00	0.00	0.00				0.67	0.67		2100.72	2100.64	0.08	12	0.96	4.45	3.50											
					0.00	0.00	0.00				0.00	0.00		2099.72	2099.64		Cir														
80	40	MH	0.013	17.009	0.00	0.00	0.00	0.00	1.24	0.00	0.00	0.18	2105.49	2099.98	2099.94	0.04	12	0.26	1.44	0.18	Pipe - (120)										
					0.00	0.00	0.00				0.18	0.18		2100.81	2100.64	0.17	12	1.00	4.54	3.56											
					0.00	0.00	0.00				0.00	0.00		2099.81	2099.64		Cir														

Project File: 1752-PIPE ANALYSIS.str

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l)	Total CA	Add Q		Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD		Date: 2/22/2018						
					C1 = 0.2	C2 = 0.5	C3 = 0.9					Total Flow	Q		Up (ft)	Down (ft)	Fall (ft)			Size (in)	Slope (%)		Vel (ft/s)	Cap (cfs)				
																									Incr-ment (ac)	Sub-Total (ac)	Sum CA	Line description
81	39	MH	0.013	8.959	0.00	0.00	0.00	0.18	0.00	0.00	0.67	0.67	2104.63	2099.33	2099.28	0.05	12	0.59	2.65	0.67	Pipe - (119)							
					0.00	0.00	0.00				0.67			2099.90	2099.90	0.09	12	1.01	4.55	3.57								
					0.00	0.00	0.00							2098.99	2098.90		Cir											
82	39	MH	0.013	16.452	0.00	0.00	0.00	1.20	0.00	0.00	0.18	0.18	2104.63	2099.23	2099.28	-0.04	12	-0.27	1.32	0.18	Pipe - (118)							
					0.00	0.00	0.00							2100.06	2099.90		12	0.97	4.47	3.51								
					0.00	0.00	0.00							2099.06	2098.90	0.16	12											
83	38	MH	0.013	6.665	0.00	0.00	0.00	0.26	0.00	0.00	0.34	0.34	2105.77	2097.64	2097.75	-0.11	12	-1.70	1.71	0.34	Pipe - (117)							
					0.00	0.00	0.00							2098.40	2098.33		12	1.05	4.64	3.65								
					0.00	0.00	0.00							2097.40	2097.33	0.07	12											
84	38	MH	0.013	18.658	0.00	0.00	0.00	1.36	0.00	0.00	0.18	0.18	2105.76	2097.69	2097.75	-0.06	12	-0.32	1.27	0.18	Pipe - (116)							
					0.00	0.00	0.00							2098.52	2098.33		12	1.02	4.58	3.59								
					0.00	0.00	0.00							2097.52	2097.33	0.19	12											
85	66	MH	0.013	3.426	0.00	0.00	0.00	0.06	0.00	0.00	0.69	0.69	2103.65	2096.10	2096.31	-0.22	12	-6.31	2.14	0.69	Pipe - (104)(0)							
					0.00	0.00	0.00							2096.75	2096.72		12	0.88	4.25	3.33								
					0.00	0.00	0.00							2095.75	2095.72	0.03	12											
86	66	MH	0.013	21.574	0.00	0.00	0.00	1.49	0.00	0.00	0.19	0.19	2103.65	2096.12	2096.31	-0.19	12	-0.90	1.20	0.19	Pipe - (103)(0)							
					0.00	0.00	0.00							2096.94	2096.72		12	1.02	4.58	3.60								
					0.00	0.00	0.00							2095.94	2095.72	0.22	12											
87	37	MH	0.013	8.011	0.00	0.00	0.00	0.31	0.00	0.00	0.34	0.34	2102.46	2094.32	2094.47	-0.15	12	-1.82	1.65	0.34	Pipe - (115)							
					0.00	0.00	0.00							2095.08	2095.00		12	1.00	4.53	3.56								
					0.00	0.00	0.00							2094.08	2094.00	0.08	12											
88	37	MH	0.013	17.455	0.00	0.00	0.00	1.27	0.00	0.00	0.18	0.18	2102.46	2094.35	2094.47	-0.11	12	-0.64	1.24	0.18	Pipe - (114)							
					0.00	0.00	0.00							2095.18	2095.00		12	1.03	4.60	3.62								
					0.00	0.00	0.00							2094.18	2094.00	0.18	12											
89	47	MH	0.013	5.614	0.00	0.00	0.00	0.22	0.00	0.00	0.34	0.34	2097.30	2089.06	2089.30	-0.24	12	-4.34	1.56	0.34	Pipe - (168)							
					0.00	0.00	0.00							2089.82	2089.76		12	1.07	4.69	3.68								
					0.00	0.00	0.00							2088.82	2088.76	0.06	12											
90	47	MH	0.013	19.707	0.00	0.00	0.00	0.92	0.00	0.00	0.28	0.28	2097.03	2089.18	2089.30	-0.13	12	-0.64	1.43	0.28	Pipe - (167)							
					0.00	0.00	0.00							2089.96	2089.76		12	1.01	4.57	3.59								
					0.00	0.00	0.00							2088.96	2088.76	0.20	12											

Project File: 1752-PIPE ANALYSIS.sfm

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l)	Total CA	Add Q Total Flow	Inlet elev (ft)	Elev of HGL			Rise	HGL	ADD		Date: 2/22/2018									
					C1 = 0.2	C2 = 0.5	C3 = 0.9							Up (ft)	Down (ft)	Fall (ft)			Span	Pipe		Vel (ft/s)	Cap (cfs)	Frequency: 10 yrs						
																									Incre- ment (ac)	Sub- Total (ac)	Sum CA	Size (in)	Slope (%)	Line description
91	36	MIH	0.013	4.749	0.00	0.00	0.00	0.00	0.00	0.00	0.34	2093.62	2084.01	2084.21	-0.20	12	-4.26	1.61	0.34	Pipe - (113)										
					0.00	0.00	0.00				0.34	2084.77	2084.72	2084.72	12	1.05	4.66	3.66												
					0.00	0.00	0.00					2083.77	2083.72	2083.72	Cir															
92	36	MIH	0.013	20.580	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2093.62	2084.93	2084.21	0.72	12	3.49	0.00	0.00	Pipe - (112)										
					0.00	0.00	0.00				0.00	2084.93	2084.72	2084.72	12	1.02	4.58	3.60												
					0.00	0.00	0.00					2083.93	2083.72	2083.72	Cir															
93	63	MIH	0.013	4.067	0.00	0.00	0.00	0.00	0.00	0.00	0.69	2089.94	2082.00	2082.25	-0.25	12	-6.20	2.08	0.69	Pipe - (106)(0)										
					0.00	0.00	0.00				0.69	2082.65	2082.61	2082.61	12	0.98	4.49	3.52												
					0.00	0.00	0.00					2081.65	2081.61	2081.61	Cir															
94	63	MIH	0.013	20.934	0.00	0.00	0.00	0.00	0.00	0.00	0.19	2089.94	2082.00	2082.25	-0.25	12	-1.19	1.18	0.19	Pipe - (105)(0)										
					0.00	0.00	0.00				0.19	2082.82	2082.61	2082.61	12	1.00	4.54	3.57												
					0.00	0.00	0.00					2081.82	2081.61	2081.61	Cir															
95	34	MIH	0.013	6.543	0.00	0.00	0.00	0.00	0.00	0.00	0.18	2086.01	2078.02	2078.67	-0.65	12	-9.87	1.11	0.18	Pipe - (170)										
					0.00	0.00	0.00				0.18	2078.85	2078.78	2078.78	12	1.07	4.69	3.69												
					0.00	0.00	0.00					2077.85	2077.78	2077.78	Cir															
96	34	MIH	0.013	18.791	0.00	0.00	0.00	0.00	0.00	0.00	0.28	2086.01	2078.19	2078.67	-0.48	12	-2.56	1.30	0.28	Pipe - (169)										
					0.00	0.00	0.00				0.28	2078.97	2078.78	2078.78	12	1.01	4.56	3.58												
					0.00	0.00	0.00					2077.97	2077.78	2077.78	Cir															
97	31	MIH	0.013	190.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2072.39	2064.12	2061.67	2.45	24	1.29	0.45	0.01	Pipe - (67)										
					0.00	0.00	0.00				0.01	2066.08	2062.28	2062.28	24	2.00	10.18	31.99												
					0.00	0.00	0.00					2064.08	2060.28	2060.28	Cir															
98	97	MIH	0.013	205.778	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2077.10	2068.23	2064.12	4.11	24	2.00	0.60	0.01	Pipe - (134)										
					0.00	0.00	0.00				0.01	2070.20	2066.08	2066.08	24	2.00	10.19	32.00												
					0.00	0.00	0.00					2068.20	2064.08	2064.08	Cir															
99	98	MIH	0.013	50.334	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2076.58	2069.57	2069.32	0.25	18	0.50	0.56	0.00	Pipe - (135)										
					0.00	0.00	0.00				0.00	2071.04	2070.79	2070.79	18	0.50	4.19	7.40												
					0.00	0.00	0.00					2069.54	2069.29	2069.29	Cir															
100	99	None	0.013	66.503	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2074.37	2070.05	4.32	12	6.50	0.42	0.00	Pipe - (163)										
					0.00	0.00	0.00				0.00	2074.37	2071.04	2071.04	12	5.01	10.15	7.97												
					0.00	0.00	0.00					2073.37	2070.04	2070.04	Cir															

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

Project File: 1752-PIPE ANALYSIS.stm

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q			Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD		Date: 2/22/2018						
					C1 = 0.2	C2 = 0.5	C3 = 0.9					Total Flow	Q (cfs)	Up (ft)		Down (ft)	Fall (ft)	Size (in)			Slope (%)	Vel (ft/s)		Cap (cfs)	Frequency: 10 yrs				
																										Incre-ment (ac)	Sub-Total (ac)	Sum CA	Line description
101	99	MH	0.013	15.722	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2076.08	2071.12	2070.06	1.06	12	6.77	0.19	0.00	Pipe - (136)									
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2076.08	2071.12	2070.04	0.08	12	0.51	3.24	2.54										
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2076.08	2070.12	2070.04	0.08	Cir													
102	99	MH	0.013	6.278	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2076.08	2071.07	2070.06	1.01	12	16.15	0.19	0.00	Pipe - (138)									
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2076.08	2071.04	2070.04	0.03	12	0.48	3.14	2.46										
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2076.08	2070.07	2070.04	0.03	Cir													
103	98	MH	0.013	4.810	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2076.60	2070.22	2069.22	1.00	12	20.87	0.18	0.00	Pipe - (137)									
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2076.60	2070.22	2070.20	0.02	12	0.42	2.93	2.30										
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2076.60	2069.22	2069.20	0.02	Cir													
104	60	MH	0.013	4.836	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2071.58	2068.07	2067.97	0.10	12	2.08	3.21	0.69	1A									
					0.00	0.00	0.00	0.00	0.00	0.00	0.69	2071.58	2068.72	2068.67	0.05	12	1.03	4.61	3.62										
					0.00	0.00	0.00	0.00	0.00	0.00	0.69	2071.58	2067.72	2067.67	0.05	Cir													
105	60	MH	0.013	19.266	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2071.88	2067.95	2067.85	0.10	12	0.52	1.91	0.19	1									
					0.00	0.00	0.00	0.00	0.00	0.00	0.19	2071.88	2068.77	2068.67	0.10	12	0.52	3.27	2.57										
					0.00	0.00	0.00	0.00	0.00	0.00	0.19	2071.88	2067.77	2067.67	0.10	Cir													
106	97	MH	0.013	49.580	0.00	0.00	833.3	365.06	0.00	0.00	0.00	2073.13	2066.09	2064.60	1.50	18	3.02	0.87	0.00	Pipe - (66)									
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2073.13	2067.57	2066.08	1.49	18	3.01	10.30	18.20										
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2073.13	2066.07	2064.58	1.49	Cir													
107	106	MH	0.013	5.888	0.00	0.00	0.00	77.08	0.00	0.00	0.00	2072.63	2067.60	2066.59	1.01	12	17.23	0.19	0.00	Pipe - (73)									
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2072.63	2067.60	2067.57	0.03	12	0.51	3.24	2.54										
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2072.63	2066.60	2066.57	0.03	Cir													
108	106	None	0.013	63.657	0.00	0.00	0.00	833.27	0.00	0.00	0.00	0.00	2070.12	2066.58	3.54	12	5.56	0.39	0.00	Pipe - (65)									
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2070.12	2067.57	2.55	12	4.01	9.08	7.13										
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2069.12	2066.57	2.55	Cir													
109	106	MH	0.013	19.132	0.00	0.00	0.00	250.44	0.00	0.00	0.00	2072.63	2067.67	2066.59	1.08	12	5.67	0.19	0.00	Pipe - (133)									
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2072.63	2067.67	2067.57	0.10	12	0.52	3.28	2.57										
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2072.63	2066.67	2066.57	0.10	Cir													
110	97	MH	0.013	7.135	0.00	0.00	0.00	93.39	0.00	0.00	0.00	2066.64	2066.12	2065.10	1.02	12	14.36	0.20	0.00	Pipe - (72)									
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2066.64	2066.12	2066.08	0.04	12	0.56	3.40	2.67										
					0.00	0.00	0.00	0.00	0.00	0.00	0.00	2066.64	2065.12	2065.08	0.04	Cir													

Project File: 1752-PIPE ANALYSIS.str
 NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q Total Flow (cfs)	Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD Full Flow (cfs)	Date: 2/22/2018							
					Incr- ment (ac)	Sub- Total (ac)	Sum CA							Up (ft)	Down (ft)	Fall (ft)					Size (in)	Slope (%)	Vel (ft/s)	Cap (cfs)			
																									Elev of Crown		
																									Line description		
111	32	MH	0.013	5.888	0.00	0.00	0.00	0.43	0.00	0.00	0.18	2067.34	2064.36	2062.79	2061.79	12	0.00	0.23	0.18	Pipe - (70)							
					0.00	0.00	0.00				0.18		2062.76	2061.76		12	0.51	3.24	2.54								
					0.00	0.00	0.00						2061.79	2061.76		Cir											
112	32	MH	0.013	19.132	0.00	0.00	0.00	0.89	0.00	0.00	0.28	2067.34	2064.36	2062.76	2061.85	12	0.01	0.36	0.28	Pipe - (132)							
					0.00	0.00	0.00				0.28		2062.76	2061.76		12	0.47	3.11	2.44								
					0.00	0.00	0.00						2061.85	2061.76		Cir											
113	31	MH	0.013	7.135	0.00	0.00	0.00	93.39	0.00	0.00	0.00	2066.85	2062.32	2061.67	2061.28	12	9.17	0.00	0.00	Pipe - (71)							
					0.00	0.00	0.00				0.00		2062.32	2061.67		12	0.56	3.40	2.67								
					0.00	0.00	0.00						2061.32	2061.28		Cir											
114	58	MH	0.013	18.609	0.00	0.00	0.00	1.28	0.00	0.00	0.19	2055.18	2051.31	2051.23	2051.04	12	0.44	1.85	0.19	4							
					0.00	0.00	0.00				0.19		2052.13	2052.04		12	0.48	3.15	2.47								
					0.00	0.00	0.00						2051.13	2051.04		Cir											
115	58	None	0.013	5.391	0.00	0.00	0.00	0.10	0.00	0.00	0.69	0.00	2051.44	2051.34	2051.09	12	1.71	3.14	0.69	3A							
					0.00	0.00	0.00				0.69		2052.09	2052.04		12	0.93	4.37	3.43								
					0.00	0.00	0.00						2051.09	2051.04		Cir											
116	End	MH	0.013	30.001	0.00	0.00	0.00	0.07	0.00	0.00	0.00	2055.15	2046.81	2046.00	2045.05	12	2.70	7.62	5.94	Pipe - (145)							
					0.00	0.00	0.00				5.94		2046.20	2046.05		12	0.50	3.21	2.52								
					0.00	0.00	0.00						2045.20	2045.05		Cir											
117	116	MH	0.013	29.998	0.00	0.00	0.00	0.07	0.00	0.00	0.00	2052.67	2047.78	2046.95	2045.20	12	2.78	7.56	5.94	Pipe - (151)							
					0.00	0.00	0.00				5.94		2046.35	2046.20		12	0.50	3.21	2.52								
					0.00	0.00	0.00						2045.35	2045.20		Cir											
118	117	MH	0.013	149.582	0.00	0.00	0.00	0.33	0.00	0.00	0.00	2081.68	2072.23	2048.67	2045.35	12	15.75	7.62	5.93	Pipe - (147)							
					0.00	0.00	0.00				5.93		2072.28	2046.35		12	17.34	18.88	14.83								
					0.00	0.00	0.00						2071.28	2045.35		Cir											
119	118	MH	0.013	122.984	0.00	0.00	0.00	0.27	0.00	0.00	0.00	2077.98	2075.90	2072.48	2071.48	12	2.78	7.55	5.93	Pipe - (150)							
					0.00	0.00	0.00				5.93		2073.09	2072.48		12	0.50	3.19	2.51								
					0.00	0.00	0.00						2072.09	2071.48		Cir											
120	119	MH	0.013	70.330	0.00	0.00	0.00	0.16	0.00	0.00	0.00	2077.22	2078.11	2076.16	2072.29	12	2.78	7.55	5.93	Pipe - (149)							
					0.00	0.00	0.00				5.93		2073.64	2073.29		12	0.50	3.20	2.51								
					0.00	0.00	0.00						2072.64	2072.29		Cir											

Project File: 1752-PIPE ANALYSIS.str

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area			Time of conc (min)	Time of Flow in sect (min)	Inten (l) (in/hr)	Total CA	Add Q		Inlet elev (ft)	Elev of HGL			Rise Span	HGL Pipe	ADD		Date: 2/22/2018					
					C1 = 0.2	C2 = 0.5	C3 = 0.9					Total Flow	Q		Up (ft)	Down (ft)	Fall (ft)			Size (in)	Slope (%)		Vel (ft/s)	Cap (cfs)			
																									Incr-ment (ac)	Sub-Total (ac)	Sum CA
121	120	None	0.013	12.377	0.00	0.00	0.00	0.19	0.06	0.00	0.00	0.00	2073.76	2079.08	2074.00	2073.00	12	0.61	3.54	2.78	Pipe - (152)						
					0.00	0.00	0.00			2.78	2.78	2.78		2074.00	2073.94	2072.94	12	0.49	3.16	2.48							
					0.00	0.00	0.00							2073.00	2072.94	2072.94	Cir										
122	121	None	0.013	41.161	0.00	0.00	0.00	0.00	0.19	0.00	0.00	2.78	2073.97	2079.52	2074.21	2073.21	12	0.61	3.54	2.78	Pipe - (153)						
					0.00	0.00	0.00					2.78		2074.21	2074.00	2073.00	12	0.51	3.24	2.54							
					0.00	0.00	0.00							2073.21	2073.00	2073.00	Cir										
123	120	None	0.013	25.849	0.00	0.00	0.00	0.00	0.11	0.00	0.00	3.15	2074.29	2079.20	2074.21	2073.21	12	0.78	4.01	3.15	Pipe - (148)						
					0.00	0.00	0.00					3.15		2074.21	2073.94	2072.94	12	1.04	4.63	3.64							
					0.00	0.00	0.00							2073.21	2072.94	2072.94	Cir										

NOTES: Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83 (in/hr) ; Time of flow in section is based on full flow.

**CATCH BASIN ANALYSIS &
FLOODED WIDTH CALCS**

**CATCH BASIN ANALYSIS &
FLOODED WIDTH CALCS**

Inlet Report

Lowell Ave Low Point (East Side)

Curb Inlet

Location	= Sag
Curb Length (ft)	= 2.00
Throat Height (in)	= 6.00
Grate Area (sqft)	= -0-
Grate Width (ft)	= -0-
Grate Length (ft)	= -0-

Gutter

Slope, Sw (ft/ft)	= 0.030
Slope, Sx (ft/ft)	= 0.030
Local Depr (in)	= 1.00
Gutter Width (ft)	= 2.00
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

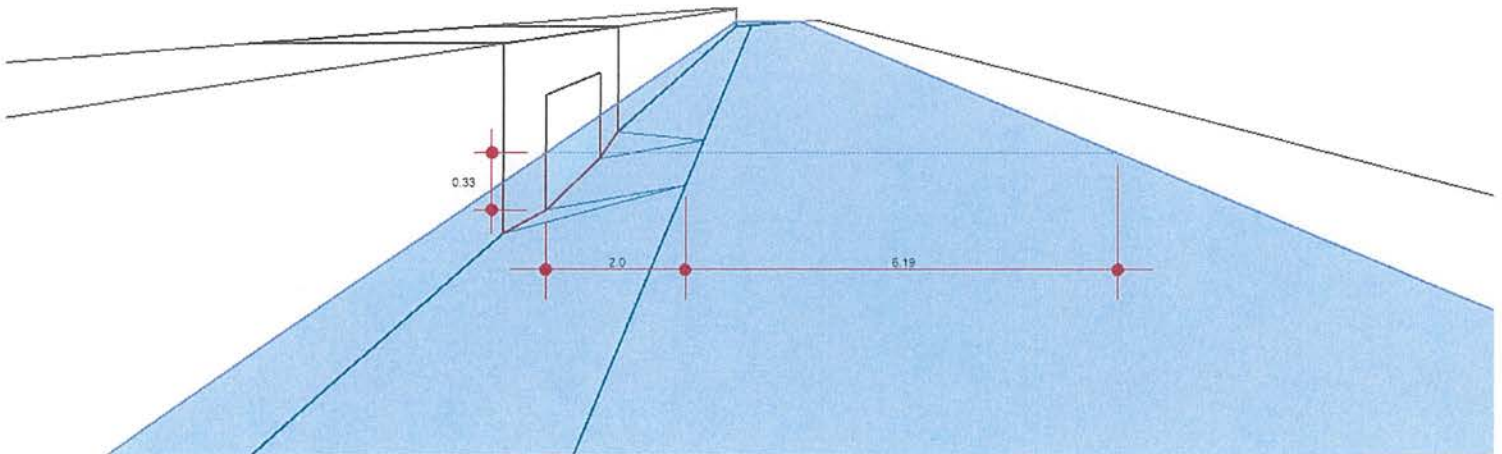
Calculations

Compute by:	Known Q
Q (cfs)	= 1.57

Highlighted

Q Total (cfs)	= 1.57
Q Capt (cfs)	= 1.57
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 3.95
Efficiency (%)	= 100
Gutter Spread (ft)	= 8.19
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-

All dimensions in feet



Inlet Report

Lowell Ave Low Point (West Side)

Curb Inlet

Location	= Sag
Curb Length (ft)	= 2.00
Throat Height (in)	= 6.00
Grate Area (sqft)	= -0-
Grate Width (ft)	= -0-
Grate Length (ft)	= -0-

Gutter

Slope, Sw (ft/ft)	= 0.030
Slope, Sx (ft/ft)	= 0.030
Local Depr (in)	= 1.00
Gutter Width (ft)	= 2.00
Gutter Slope (%)	= -0-
Gutter n-value	= -0-

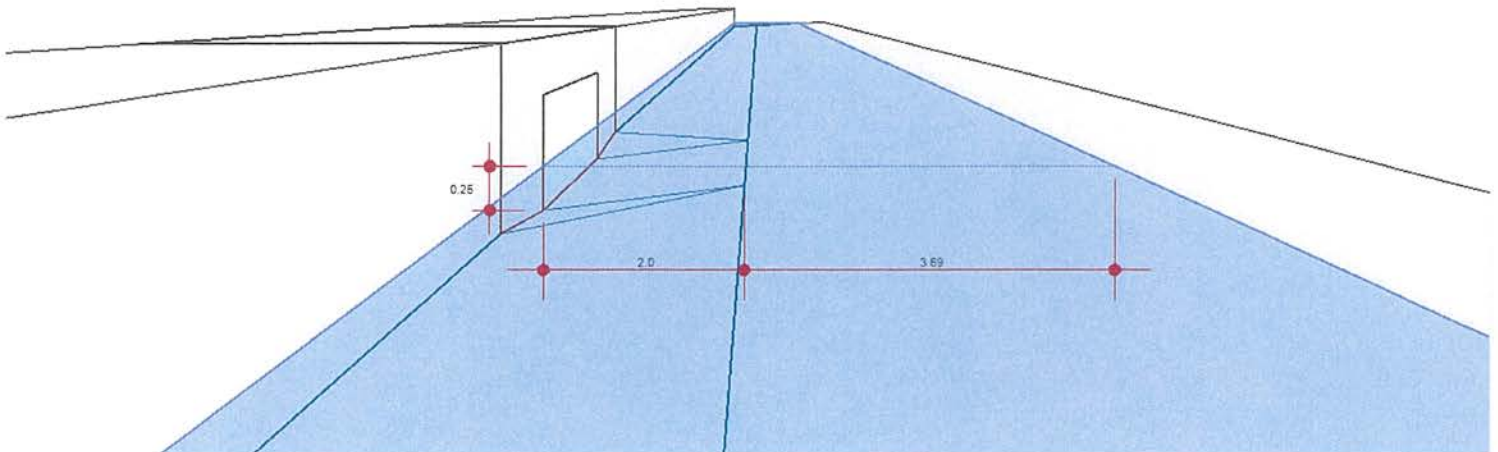
Calculations

Compute by:	Known Q
Q (cfs)	= 0.91

Highlighted

Q Total (cfs)	= 0.91
Q Capt (cfs)	= 0.91
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 3.05
Efficiency (%)	= 100
Gutter Spread (ft)	= 5.69
Gutter Vel (ft/s)	= -0-
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-

All dimensions in feet



SOILS INFORMATION

May 27, 2016
Project No. 216-186G

Mr. Dennis Crapo
Diamond Rock Construction
2602 North Sullivan
Spokane Valley, Washington 99216

RE: Stormwater Management Facility Recommendations
McCarrolls East 5th Addition
Indian Trail Road & Strong Road
Spokane, Washington

Mr. Crapo:

As you requested, **ALLWEST Testing & Engineering, LLC (ALLWEST)** has completed our stormwater management facility recommendations for the above-referenced project in Spokane, Washington. The purpose of our services was to evaluate the soil, bedrock, and groundwater conditions at the project site and provide recommendations for stormwater management facilities at the site. This report summarizes the results of our field and laboratory testing and our recommendations.

AVAILABLE INFORMATION

We were provided with preliminary Street Improvement plans from Whipple Consulting Engineers, Inc. (WCE) dated May 3, 2016. The preliminary Street Improvement plans showed the proposed roadways, lots, stormwater management areas, and existing contours and surrounding streets. The Street Improvement plans were prepared by WCE and were dated May 3, 2016.

Our review of the available geologic data indicates the on-site soils consist of Marble variant sandy loam (McB, see Figure 2). The Marble soil is described as a very deep, excessively drained soil that formed in sandy glacial outwash. Based on our observations, test pit data, laboratory test results, and review of geologic maps and data, the on-site soils appear to be consistent with the soil mapping.

FIELD EVALUATION AND RESULTS

We excavated eleven (11) test pits at the site on May 13, 2016 to collect samples for testing. The test pits were excavated to approximate depths of twelve (12) feet below the existing ground surface. Ground surface elevations at the test pit locations were not available at the time of this report. The test pits typically encountered approximately four (4) to five (5) inches of silty sand topsoil at the surface. Below the topsoil, the test pits typically encountered silty and poorly-graded sands to their termination depths. Groundwater was not encountered in the test pits. Test pit TP-5 encountered lean clay with sand from nine (9) to fifteen (15) feet below the ground surface and test pit TP-8 encountered silt with fractured basalt cobbles from eleven (11) to fifteen (15) feet below the ground surface. Groundwater is believed to exist below the termination depths of the test pits. Well logs in the vicinity of the project indicate groundwater may exist between 50 and 100 feet below the ground surface.

We collected samples from the test pits and returned them to our laboratory to perform classification tests. We performed particle size analysis tests on the samples to aid in classification of the site soils. The particle size distribution tests were performed in general accordance with the American Society for Testing and Materials (ASTM) Method of Test D 6913. The results of the laboratory tests performed are attached.

ANALYSIS AND RECOMMENDATIONS

Stormwater Facilities

We understand it is desired to convey stormwater runoff to swale(s) which will infiltrate the water in a grassed infiltration area and direct overflow into drywells through inlets placed in the bottoms of the swale infiltration areas. Based on the results of our field and laboratory testing, it is our opinion this approach will be feasible. A permeability rate and an outflow rate for the poorly-graded sand encountered in the test pits were estimated using the Spokane 200 Method from the Spokane Regional Stormwater Manual (SRSM). The estimated permeability and outflow rates are as follows:

Test Pit No.	Depth (ft)	Percent Fines	Estimated Permeability Rate (cm/s)	Normalized Outflow Rate (cfs/ft)	Actual Drywell Outflow Rate (cfs)		Design Drywell Outflow Rate (cfs)	
					Type "A"	Type "B"	Type "A"	Type "B"
TP-1	5 - 15	2.6	1.2×10^{-1}	0.24	1.4	2.4	0.3	1.0
TP-4	6 - 15	4.0	4.9×10^{-2}	0.12	0.7	1.2	0.3	0.9
TP-9	5 - 15	4.1	4.7×10^{-2}	0.12	0.7	1.2	0.3	0.9



Based on the grain size analysis data, the percent fines for the poorly-graded sands encountered in the test pits were less than the maximum allowable percent fines for drywell design according to the SRSM. The estimated design outflow rates include a safety factor of 1.5 as recommended in Table 4A-1 of the SRSM. The maximum design drywell outflow rates allowed by Spokane County guidelines are 0.3 cfs for Type A (single depth) drywells and 1.0 cfs for Type B (double depth) drywells.

We recommend the site be graded such that storm run-off water is directed away from the structures and pavement areas to a stormwater drainage system. We recommend landscape areas be sloped a minimum of six (6) inches within ten (10) feet of the structures and slabs be sloped a minimum of two (2) percent. In addition, we recommend gutters and downspouts with long splash blocks or extensions. We do not recommend directing water from roof gutters into a foundation drain pipe system.

Additional Considerations

We understand the Street Improvement plans for this project address the construction of the roadways and utilities and may not specifically reflect grading plans for constructing the single family homes within the subdivision. As such, at the time this report was prepared, ALLWEST has only provided recommendations for stormwater management facilities. Depending upon the final grading of the lots for the single family homes, additional geotechnical recommendations for lot fill and slope stability may be needed prior to the construction of the single family homes. We recommend the subdivision owner/developer, the civil engineer, and ALLWEST or another qualified geotechnical engineer review the grading for the roadway construction, and if the roadway grading affects the future residential home building sites, additional geotechnical recommendations be obtained prior to construction of the residential homes.

REPORT LIMITATIONS

This report has been prepared to assist the planning and design stormwater management facilities for the proposed McCarroll's East 5th Addition Subdivision in Spokane, Washington. Our services consist of professional opinions and conclusions made in accordance with generally accepted geotechnical engineering principles and practices in our local area at the time this report was prepared. This acknowledgement is in lieu of all warranties either expressed or implied.



Construction Materials Testing & Special Inspection
Geotechnical Engineering
Environmental Consulting
Non-Destructive Testing
Welder Certification

REMARKS

Thank you for the opportunity to provide our services. If you have questions or require additional information, please do not hesitate to contact our office at (509) 534-4411.

Sincerely,

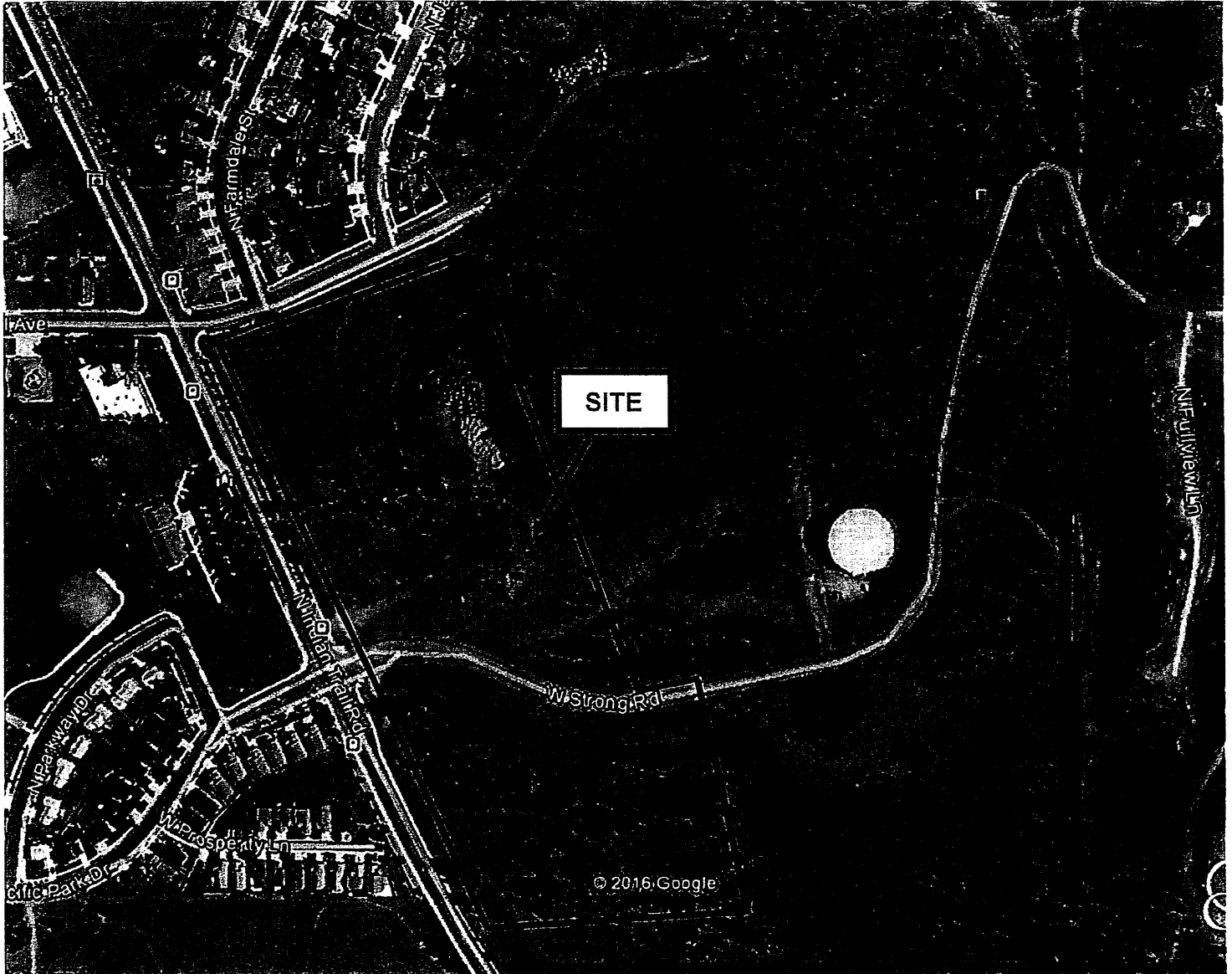
ALLWEST Testing & Engineering, LLC



Andy J. Eliason, P.E.
Spokane Area Manager



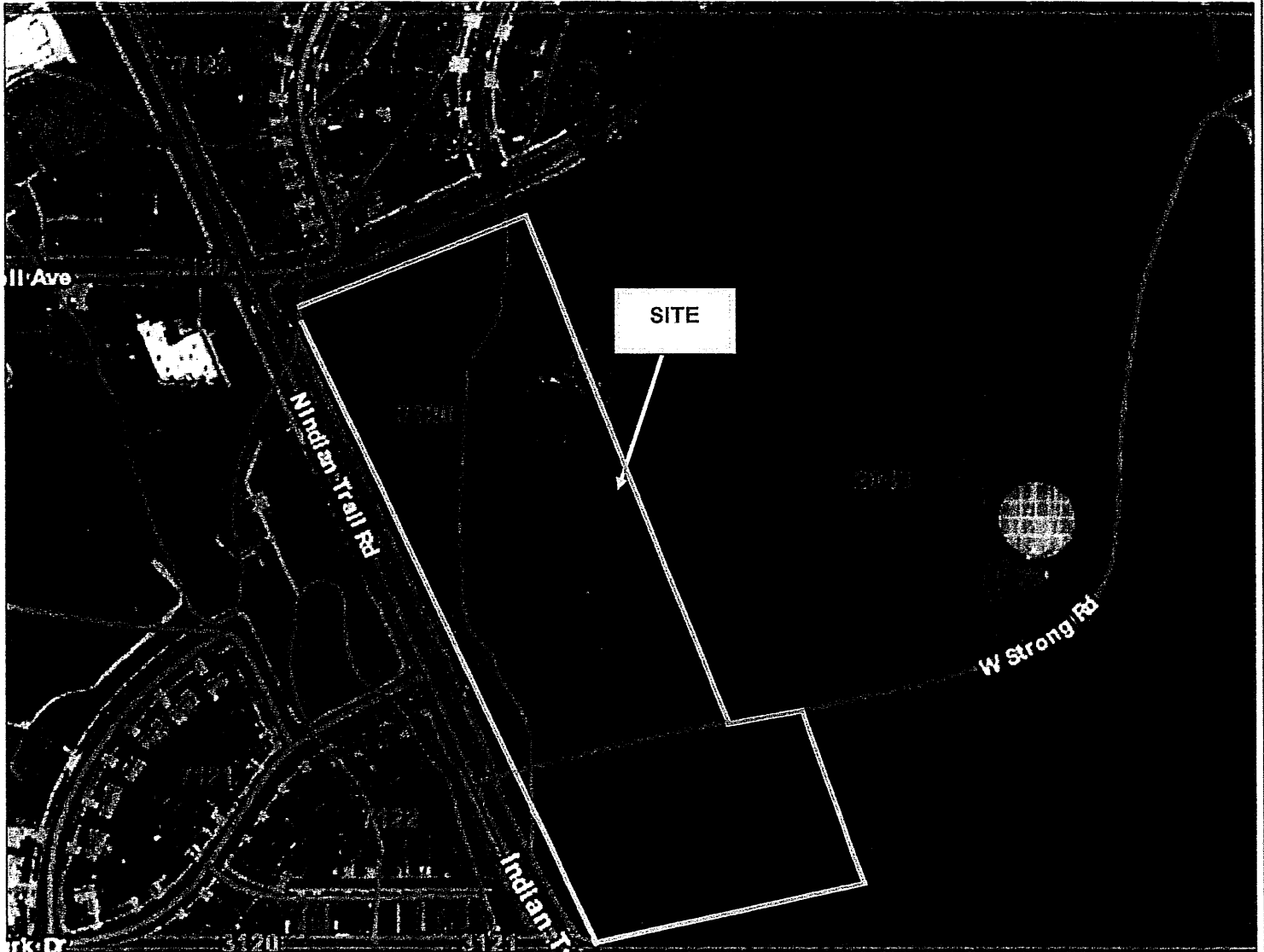
Attachments: Figure 1, Site Location Map
 Figure 2, NRCS Soil Map
 Figure 3, Test Pit Location Map
 Logs of Test Pits TP-1 through TP-11
 Grain Size Analysis Test Results




ALLWEST
 Testing & Engineering

3005 North Industrial Lane, 5th Street
 Spokane Valley, Washington 99216
 Phone: 509-534-4411 Fax: 509-534-9326

FIGURE 1—SITE LOCATION MAP
STORMWATER MANAGEMENT FACILITY RECOMMENDATIONS
McCARROLLS EAST 5TH ADDITION
INDIAN TRAIL ROAD & STRONG ROAD, SPOKANE, WASHINGTON
Client Name DIAMOND ROCK CONSTRUCTION
Project No. 216-186G
Date MAY 27, 2016



3005 North Industrial Lane, 5th Street
 Spokane Valley, Washington 99216
 Phone: 509-534-4411 Fax: 509-534-9326

FIGURE 2—NRCS SOIL MAP

STORMWATER MANAGEMENT FACILITY RECOMMENDATIONS

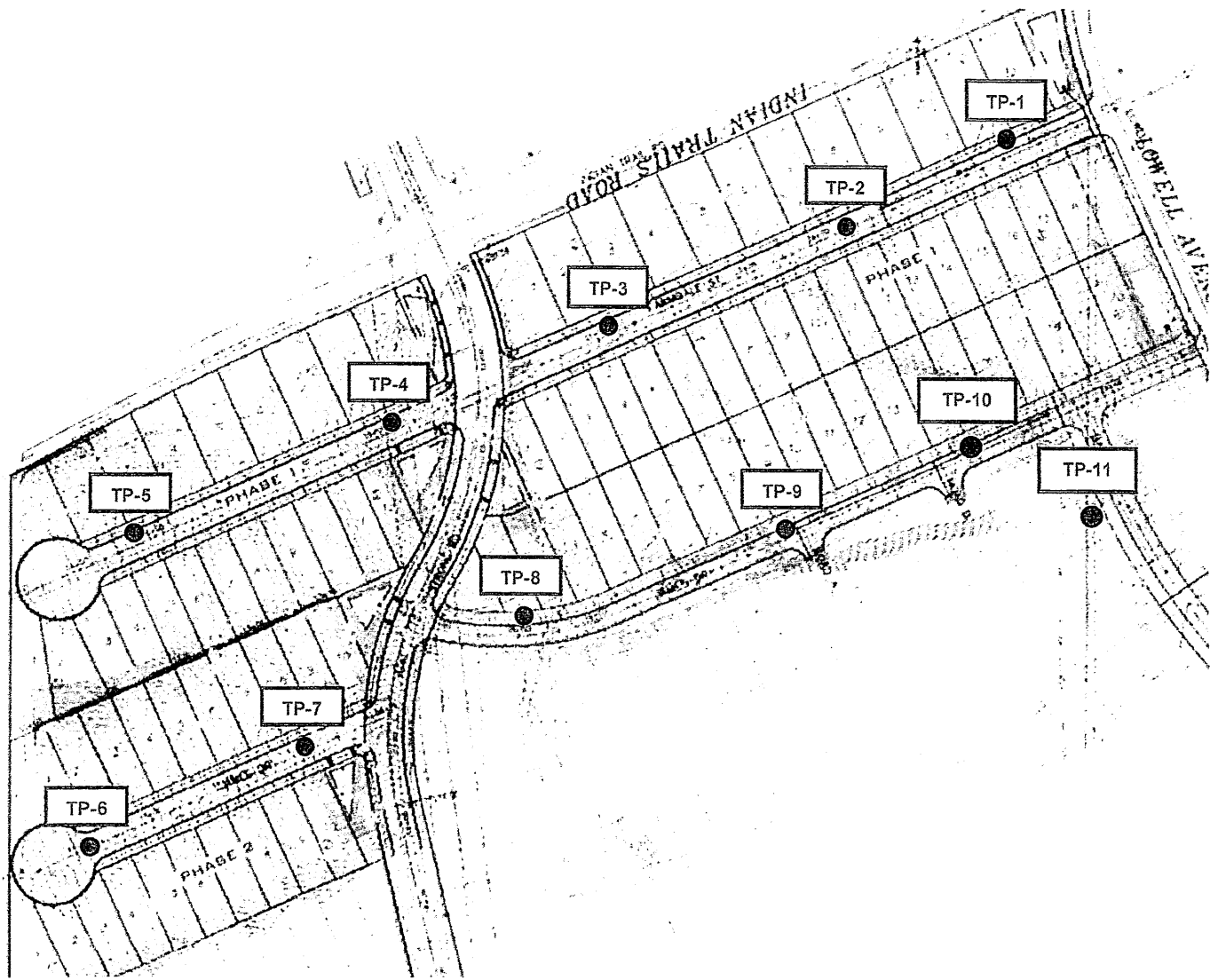
McCARROLLS EAST 5TH ADDITION

INDIAN TRAIL ROAD & STRONG ROAD, SPOKANE, WASHINGTON

Client Name DIAMOND ROCK CONSTRUCTION

Project No. 216-186G

Date MAY 27, 2016



TP-X = Test Pit Number and Location



3005 North Industrial Lane, 5th Street
 Spokane Valley, Washington 99216
 Phone: 509-534-4411 Fax: 509-534-9326

FIGURE 3—TEST PIT LOCATION MAP

STORMWATER MANAGEMENT FACILITY RECOMMENDATIONS

McCARROLLS EAST 5TH ADDITION

INDIAN TRAIL ROAD & STRONG ROAD, SPOKANE, WASHINGTON

Client Name DIAMOND ROCK CONSTRUCTION

Project No. 216-186G

Date MAY 27, 2016

LOG OF TEST PIT



PROJECT: Stormwater Management Facility Recommendations McCarrolls East 5th Addition Indian Trail Road & Strong Road Spokane, Washington Project No. 216-186G		TEST PIT: TP-1	
		LOCATION: See Test Pit Location Map - Figure A-3.	
		DATE: 05/13/16	SCALE: 1" = 2.5'
Depth	ASTM D2487 Symbol	Description of Materials	WL
0.0			
0.3	SM	SILTY SAND, medium grained, brown, moist. (Topsoil)	
	SM	SILTY SAND, very fine to fine grained, light brown, moist. (Alluvium)	
5.0			
	SP	POORLY-GRADED SAND, medium grained, brown, moist. (Alluvium)	
15.0			
		End of test pit. Groundwater not encountered at time of excavation. Test pit immediately backfilled.	

(See Report and Standard Plates for elevation and descriptive terminology.)

LOG OF TEST PIT



PROJECT: Stormwater Management Facility Recommendations McCarrolls East 5th Addition Indian Trail Road & Strong Road Spokane, Washington Project No. 216-186G		TEST PIT: TP-2	
		LOCATION: See Test Pit Location Map - Figure A-3.	
		DATE: 05/13/16	SCALE: 1" = 2.5'
Depth	ASTM D2487 Symbol	Description of Materials	WL
0.0			
0.4	SM	SILTY SAND, medium grained, brown, moist. (Topsoil)	
		SILTY SAND, very fine to fine grained, light brown, moist. (Alluvium)	
	SM		
5.5			
		POORLY-GRADED SAND, medium grained, gray, moist. (Alluvium)	
	SP		
15.0			
		End of test pit. Groundwater not encountered at time of excavation. Test pit immediately backfilled.	

(See Report and Standard Plates for elevation and descriptive terminology.)

LOG OF TEST PIT



PROJECT: Stormwater Management Facility Recommendations McCarrolls East 5th Addition Indian Trail Road & Strong Road Spokane, Washington Project No. 216-186G		TEST PIT: TP-3	
		LOCATION: See Test Pit Location Map - Figure A-3.	
		DATE: 05/13/16	SCALE: 1" = 2.5'
Depth	ASTM D2487 Symbol	Description of Materials	WL
0.0			
0.4	SM	SILTY SAND, medium grained, brown, moist. (Topsoil)	
		SILTY SAND, very fine to fine grained, light brown, moist. (Alluvium)	
	SM		
6.0			
		POORLY-GRADED SAND, medium grained, gray, moist. (Alluvium)	
	SP		
15.0			
		End of test pit. Groundwater not encountered at time of excavation. Test pit immediately backfilled.	

(See Report and Standard Plates for elevation and descriptive terminology.)

LOG OF TEST PIT



PROJECT: Stormwater Management Facility Recommendations McCarrolls East 5th Addition Indian Trail Road & Strong Road Spokane, Washington Project No. 216-186G		TEST PIT: TP-4		
		LOCATION: See Test Pit Location Map - Figure A-3.		
		DATE: 05/13/16	SCALE: 1" = 2.5'	
Depth 0.0	ASTM D2487 Symbol	Description of Materials	WL	Tests or Notes
0.5	SM	SILTY SAND, medium grained, brown, moist. (Topsoil)		
	SP-SM	POORLY-GRADED SAND WITH SILT, medium grained, brown, moist. (Alluvium)		
6.0				
	SP	POORLY-GRADED SAND WITH GRAVEL, with a trace of Cobbles, medium grained, brown, moist. (Alluvium)		
15.0				
		End of test pit. Groundwater not encountered at time of excavation. Test pit immediately backfilled.		

(See Report and Standard Plates for elevation and descriptive terminology.)

LOG OF TEST PIT



PROJECT: Stormwater Management Facility Recommendations McCarrolls East 5th Addition Indian Trail Road & Strong Road Spokane, Washington Project No. 216-186G	TEST PIT: TP-5	
	LOCATION: See Test Pit Location Map - Figure A-3.	
	DATE: 05/13/16	SCALE: 1" = 2.5'

Depth	ASTM D2487 Symbol	Description of Materials	WL	Tests or Notes
0.0	SM	SILTY SAND, fine to medium grained, light brown, moist. (Topsoil)		
	SP-SM	POORLY-GRADED SAND WITH SILT, medium grained, brown, moist. (Alluvium)		
9.0	CL	LEAN CLAY WITH SAND, brown, moist. (Residuum)		
15.0		End of test pit. Groundwater not encountered at time of excavation. Test pit immediately backfilled.		

(See Report and Standard Plates for elevation and descriptive terminology.)

LOG OF TEST PIT



PROJECT: Stormwater Management Facility Recommendations McCarrolls East 5th Addition Indian Trail Road & Strong Road Spokane, Washington Project No. 216-186G			TEST PIT: TP-6	
			LOCATION: See Test Pit Location Map - Figure A-3.	
			DATE: 05/13/16	SCALE: 1" = 2.5'
Depth	ASTM D2487 Symbol	Description of Materials	WL	Tests or Notes
0.0				
0.4	SM	SILTY SAND, medium grained, brown, moist. (Topsoil)		Moderately hard digging at 4'-12'
	SP-SM	POORLY-GRADED SAND WITH SILT, medium grained, brown, moist. (Alluvium)		
4.0				
	SP-SM	POORLY-GRADED SAND WITH SILT, medium grained, with Gravel and Cobbles from 4' to 12', brown, moist. (Alluvium)		
15.0				
		End of test pit. Groundwater not encountered at time of excavation. Test pit immediately backfilled.		

(See Report and Standard Plates for elevation and descriptive terminology.)

LOG OF TEST PIT



PROJECT: Stormwater Management Facility Recommendations McCarrolls East 5th Addition Indian Trail Road & Strong Road Spokane, Washington Project No. 216-186G	TEST PIT: TP-7	
	LOCATION: See Test Pit Location Map - Figure A-3.	
	DATE: 05/13/16	SCALE: 1" = 2.5'

Depth	ASTM D2487 Symbol	Description of Materials	WL	Tests or Notes
0.0				
0.5	ML	SILT, light brown, moist. (Topsoil)		
	SM	SILTY SAND WITH GRAVEL, medium grained, brown, moist. (Alluvium)		
3.0				
	SP-SM	POORLY-GRADED SAND WITH SILT, medium grained, with Gravel, brown, moist. (Alluvium)		
5.0				
	SP-SM	POORLY-GRADED SAND WITH SILT, medium grained, with Gravel and Cobbles, brown, moist. (Alluvium)		
15.0				
		End of test pit. Groundwater not encountered at time of excavation. Test pit immediately backfilled.		

(See Report and Standard Plates for elevation and descriptive terminology.)

LOG OF TEST PIT



PROJECT: Stormwater Management Facility Recommendations McCarrolls East 5th Addition Indian Trail Road & Strong Road Spokane, Washington Project No. 216-186G		TEST PIT: TP-8		
		LOCATION: See Test Pit Location Map - Figure A-3.		
		DATE: 05/13/16	SCALE: 1" = 2.5'	
Depth	ASTM D2487 Symbol	Description of Materials	WL	Tests or Notes
0.0				
0.3	SM	SILTY SAND, medium grained, brown, moist. (Topsoil)		
		POORLY-GRADED SAND WITH SILT, medium grained, brown, moist. (Alluvium)		
	SP-SM			
11.0		SILT, with Basalt Cobbles, brown, moist. (Alluvium)		
	ML			
15.0		End of test pit.		
		Groundwater not encountered at time of excavation, Test pit immediately backfilled.		

(See Report and Standard Plates for elevation and descriptive terminology.)

LOG OF TEST PIT



PROJECT: Stormwater Management Facility Recommendations McCarrolls East 5th Addition Indian Trail Road & Strong Road Spokane, Washington Project No. 216-186G		TEST PIT: TP-9	
		LOCATION: See Test Pit Location Map - Figure A-3.	
		DATE: 05/13/16	SCALE: 1" = 2.5'
Depth	ASTM D2487 Symbol	Description of Materials	WL
0.0	SM	SILTY SAND, medium grained, brown, moist. (Topsoil)	
		POORLY-GRADED SAND WITH SILT, medium grained, brown, moist. (Alluvium)	
	SP-SM		
15.0		End of test pit. Groundwater not encountered at time of excavation. Test pit immediately backfilled.	

(See Report and Standard Plates for elevation and descriptive terminology.)

LOG OF TEST PIT



PROJECT: Stormwater Management Facility Recommendations McCarrolls East 5th Addition Indian Trail Road & Strong Road Spokane, Washington Project No. 216-186G		TEST PIT: TP-10	
		LOCATION: See Test Pit Location Map - Figure A-3.	
		DATE: 05/13/16	SCALE: 1" = 2.5'
Depth	ASTM D2487 Symbol	Description of Materials	WL
0.4	SM	SILTY SAND, very fine to fine grained, light brown, moist. (Topsoil)	
3.0	SM	SILTY SAND WITH GRAVEL, medium grained, brown, moist. (Alluvium)	
15.0	SP	POORLY-GRADED SAND, medium grained, gray, moist. (Alluvium)	
		End of test pit. Groundwater not encountered at time of excavation, Test pit immediately backfilled.	

(See Report and Standard Plates for elevation and descriptive terminology.)

LOG OF TEST PIT

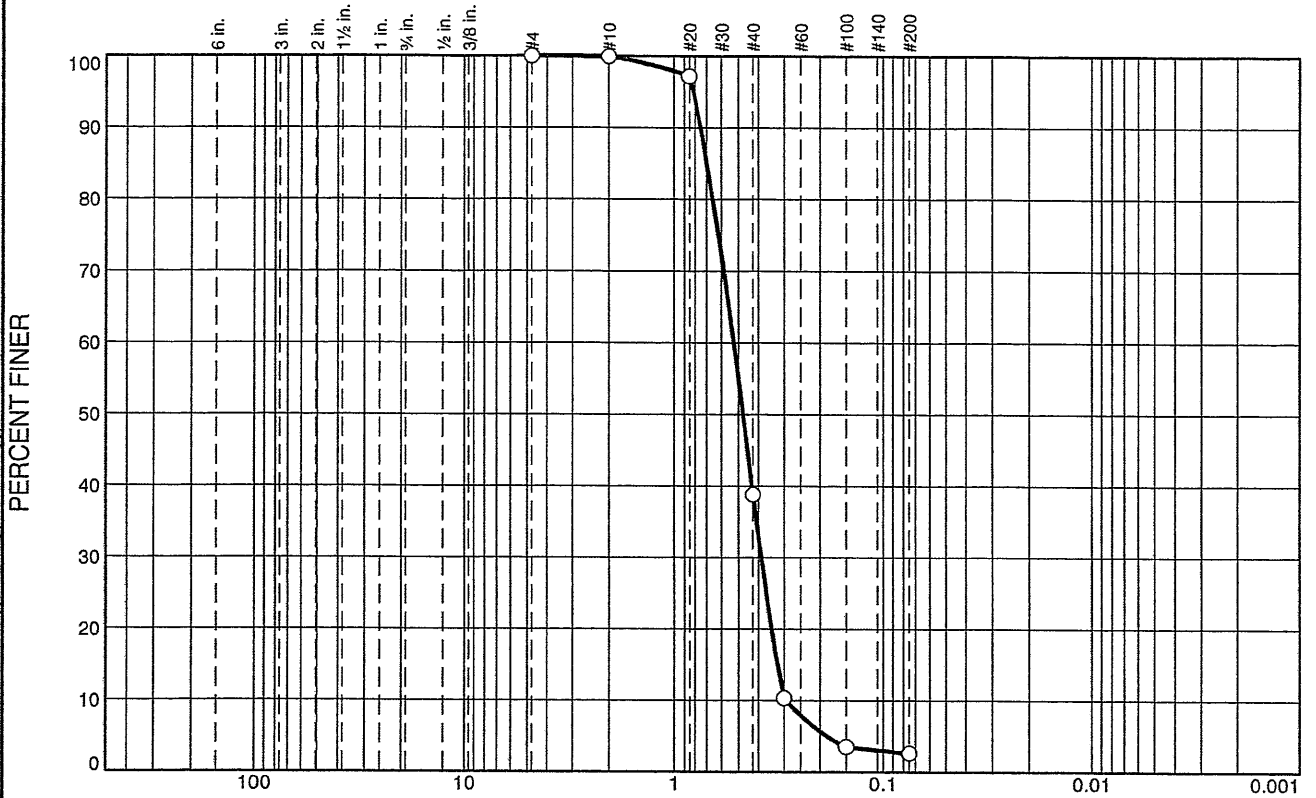


PROJECT: Stormwater Management Facility Recommendations McCarrolls East 5th Addition Indian Trail Road & Strong Road Spokane, Washington Project No. 216-186G		TEST PIT: TP-11	
		LOCATION: See Test Pit Location Map - Figure A-3.	
		DATE: 05/13/16	SCALE: 1" = 2.5'
Depth	ASTM D2487 Symbol	Description of Materials	WL
Tests or Notes			
0.0			
0.4	SM	SILTY SAND, very fine to fine grained, light brown, moist. (Topsoil)	
		POORLY-GRADED SAND WITH SILT, medium grained, brown, moist. (Alluvium)	
	SP-SM		
15.0			
		End of test pit. Groundwater not encountered at time of excavation. Test pit immediately backfilled.	

(See Report and Standard Plates for elevation and descriptive terminology.)

Particle Size Distribution Report

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% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	61	36	3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#10	100		
#20	97		
#40	39		
#50	10		
#100	4		
#200	2.6		

Soil Description

Poorly Graded Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 0.7501 D₈₅= 0.6994 D₆₀= 0.5270
D₅₀= 0.4760 D₃₀= 0.3875 D₁₅= 0.3232
D₁₀= 0.2929 C_u= 1.80 C_c= 0.97

Classification

USCS= SP AASHTO=

Remarks

A.Eliason sampled 5-13-16

* (no specification provided)

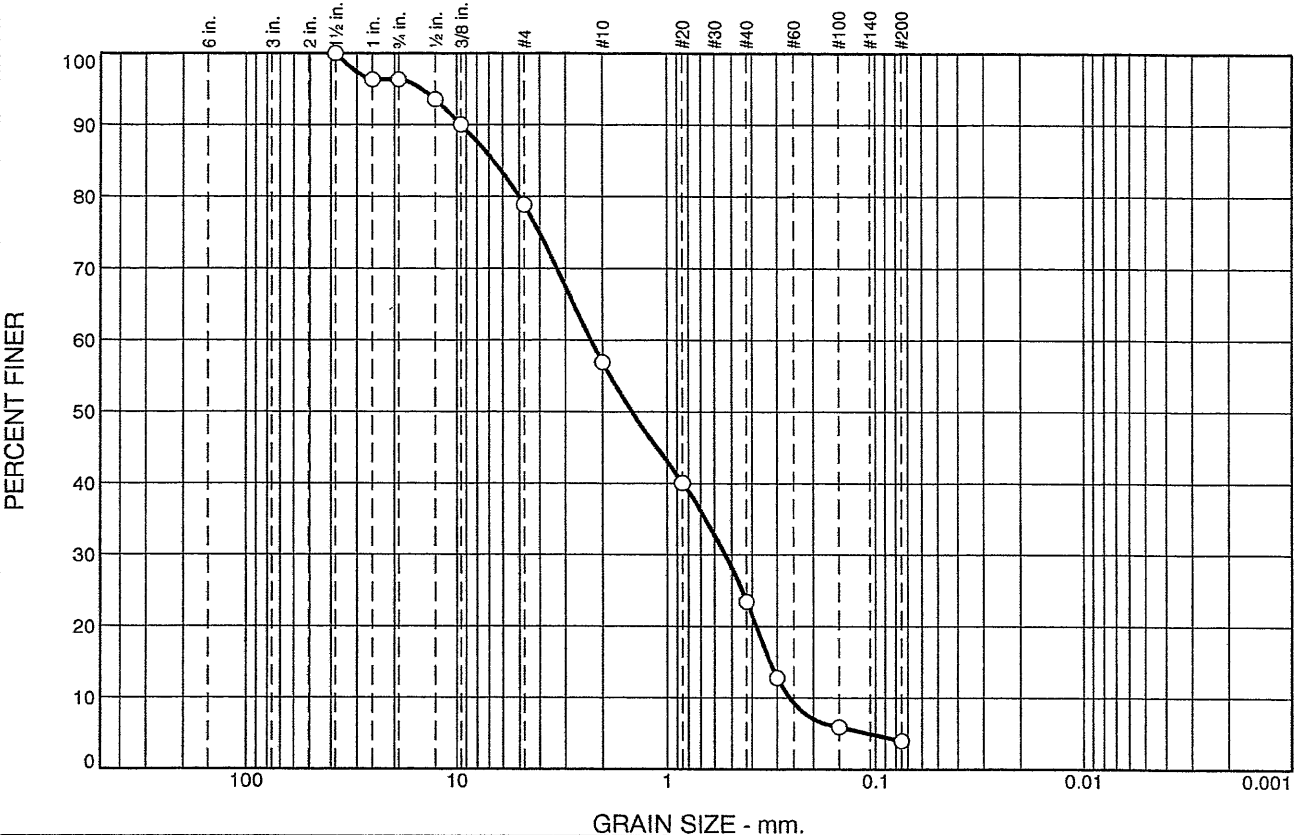
Location: TP-1 Sample Number: S216-214 Depth: @ 5.0' - 15.0' Date: 5-27-16

ALLWEST TESTING & ENGINEERING, LLC Spokane, WA	Client: Diamond Rock Construction Project: McCarrolls East 5th Addition Project No: 216-186G Reviewed By:
--	--

Tested By: D.Schmitz Checked By: A.Eliason

Particle Size Distribution Report

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% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	4	17	22	34	19	4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100		
1"	96		
3/4"	96		
1/2"	94		
3/8"	90		
#4	79		
#10	57		
#20	40		
#40	23		
#50	13		
#100	6		
#200	4.0		

Soil Description

Poorly Graded Sand with Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 9.5032 D₈₅= 6.6483 D₆₀= 2.2655
D₅₀= 1.4445 D₃₀= 0.5362 D₁₅= 0.3252
D₁₀= 0.2615 C_u= 8.66 C_c= 0.49

Classification

USCS= SP AASHTO=

Remarks

A.Eliason sampled 5-13-16

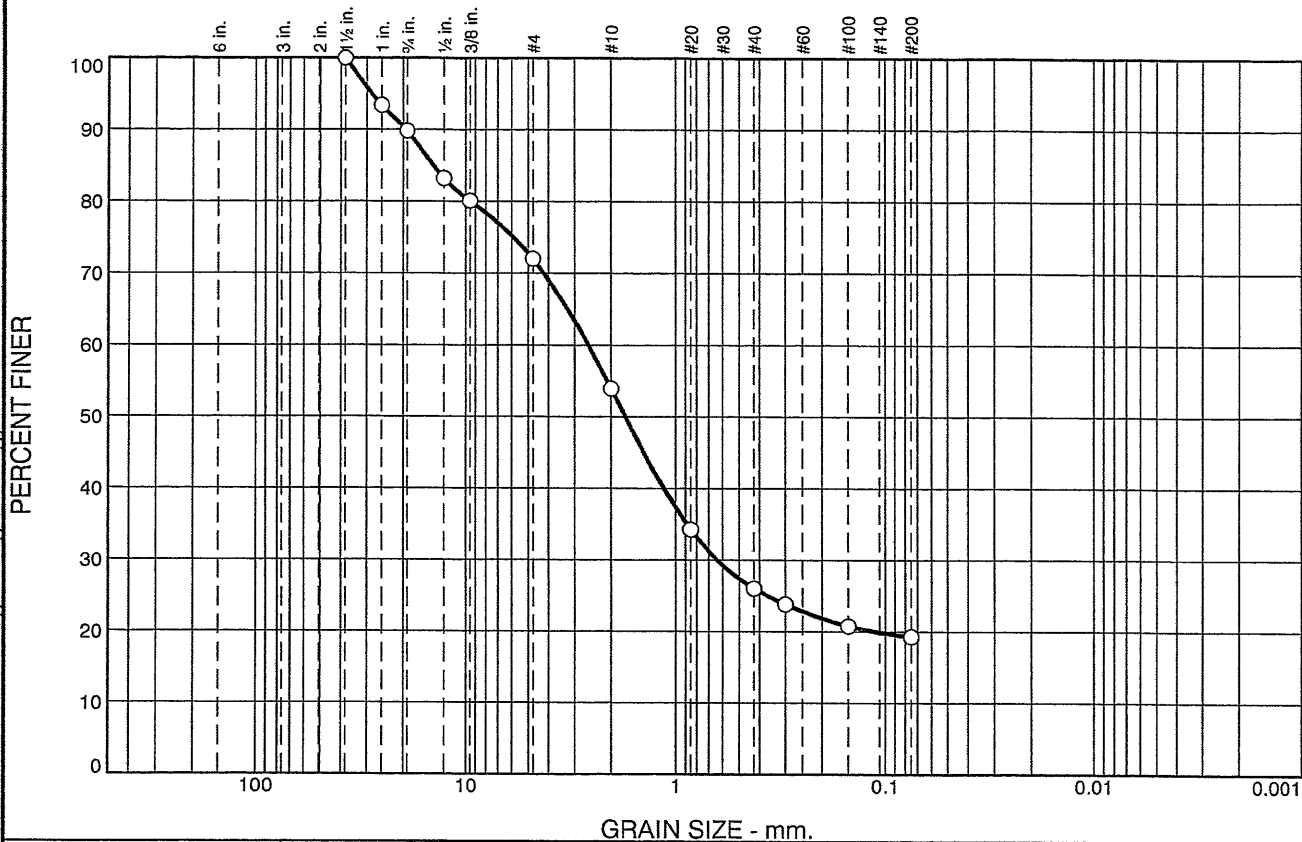
* (no specification provided)

Location: TP-4 Sample Number: S216-215 Depth: @ 7.0' - 15.0' Date: 5-27-16

ALLWEST TESTING & ENGINEERING, LLC Spokane, WA	Client: Diamond Rock Construction Project: McCarrolls East 5th Addition Project No: 216-186G Reviewed By:
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Tested By: D.Schmitz Checked By: A.Eliason

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	10	18	18	28	7	19	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100		
1"	93		
3/4"	90		
1/2"	83		
3/8"	80		
#4	72		
#10	54		
#20	34		
#40	26		
#50	24		
#100	21		
#200	19		

Soil Description

Silty Sand with Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 19.3070 D₈₅= 14.2351 D₆₀= 2.5781
D₅₀= 1.7064 D₃₀= 0.6384 D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

A.Eliason sampled 5-13-16

* (no specification provided)

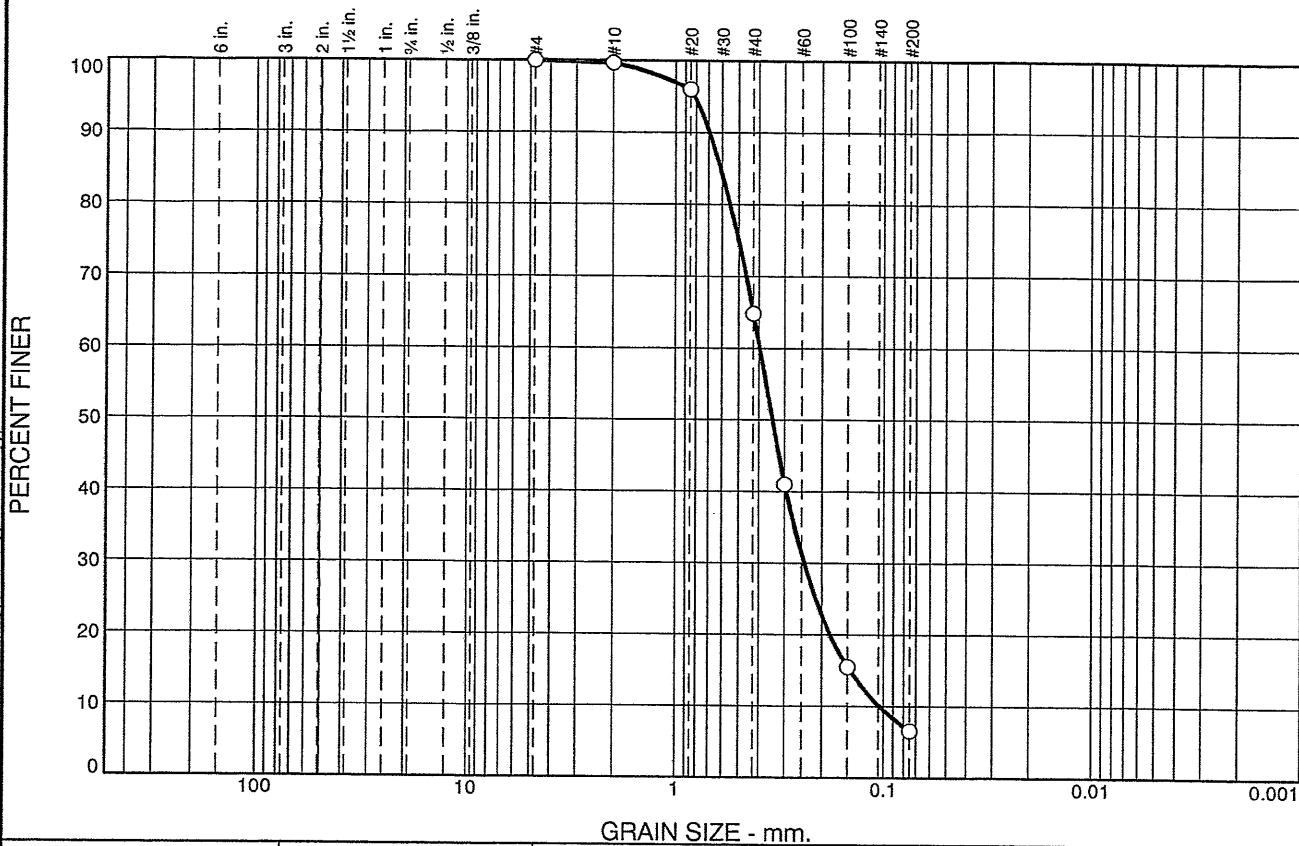
Location: TP-7 Sample Number: S216-216 Depth: @ 0.3' - 5.0' Date: 5-27-16

ALLWEST TESTING & ENGINEERING, LLC Spokane, WA	Client: Diamond Rock Construction Project: McCarrolls East 5th Addition Project No: 216-186G Reviewed By:
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Tested By: D.Schmitz Checked By: A.Eliason

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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	35	58	7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#10	100		
#20	96		
#40	65		
#50	41		
#100	16		
#200	6.6		

Soil Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 0.6923 D₈₅= 0.6114 D₆₀= 0.3962
D₅₀= 0.3437 D₃₀= 0.2428 D₁₅= 0.1462
D₁₀= 0.1047 C_u= 3.78 C_c= 1.42

Classification

USCS= SP-SM AASHTO=

Remarks

A.Eliason sampled 5-13-16

* (no specification provided)

Location: TP-11 Sample Number: S216-218 Depth: @ 0.4' - 15.0' Date: 5-27-16

ALLWEST TESTING & ENGINEERING, LLC Spokane, WA	Client: Diamond Rock Construction Project: McCarrolls East 5th Addition Project No: 216-186G Reviewed By:
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Tested By: D.Schmitz Checked By: A.Eliason