

APPENDIX D
GRAVITY SEWER ANALYSIS

San Juan County
 UGA Infrastructure Feasibility Study
 Gravity Sewer System Analysis of Existing System to PS 1
 Town's Buildout Flows

Survey Manhole No	Invert (ft)	Length (ft)	Size (in)	Material	Slope (ft/ft)	Dwelling Units SRMF PSCCO LI	Population SRMF PSCCO LI	Total SRMF PSCCO LI	Airport ²	Ferry ³	Average Dry Weather Flow (ADWF) gpd SRMF PSCCO LI	Acres for sewer pipe	I&I	Total MM Sanitary Flow (gpd)	Peak Flow (cfs)	Peak Flow (gpd)	Peak Flow Mannings No	Max Discharge (cfs) ³	Max Discharge (mgd)	Normal Depth	Percent Full	Percent Capacity Used	
8040	106.87	280	8	Plastic ¹	0.0434	50	0	11	117		4,047	0	298	465,561	0.75	482,942	0.013	2.72	1.76	0.25	37%	27%	
8043	94.72	174	8	Plastic	0.0717	114	0	320	2,700	2,700	9,227	0	2,147	475,170	0.81	520,667	0.013	3.49	2.26	0.23	34%	23%	
8047	82.24	410	8	Plastic	0.0346	123	9	358	2,700	2,700	9,956	537	2,147	484,778	0.83	535,336	0.013	2.42	1.56	0.28	42%	34%	
8108	68.04	63	8	Plastic	0.0338	159	34	488	2,700	2,700	12,869	2,028	2,147	587,273	1.01	655,450	0.013	2.40	1.55	0.31	47%	42%	
8109	65.91	713	8	Plastic	0.0194	159	59	541	2,700	2,700	12,869	3,519	2,147	606,149	1.08	662,290	0.013	1.82	1.18	0.38	57%	58%	
8138	92.06	577	15	Conc	0.0178	159	99	626	2,700	2,700	12,869	5,984	2,147	692,002	1.29	775,686	0.013	9.30	6.01	0.31	25%	13%	
8265	41.82	247	15	Conc	0.0072	299	107	941	2,700	2,700	24,201	6,381	2,147	775,656	1.40	906,774	0.013	5.91	3.82	0.43	34%	24%	
8333	40.03	412	15	Conc	0.0763	299	117	963	2,700	2,700	24,201	6,978	2,147	787,108	1.42	920,412	0.013	19.25	12.44	0.24	19%	7%	
1147	8.59	81	12	Conc	0.0098	299	132	985	2,700	2,700	24,201	7,872	2,147	787,108	1.43	923,930	0.013	3.80	2.46	0.44	44%	38%	
1142	7.8	10	12	PVC	0.0400	299	132	985	2,700	2,700	24,201	7,872	2,147	787,108	1.43	923,930.1	0.01	7.69	4.97	0.30	30%	19%	
67A	7.4	46	12	PVC	0.0040	299	132	985	2,700	2,700	24,201	7,872	2,147	787,108	1.43	923,930	0.013	2.43	1.57	0.58	58%	58%	
67B	7.35	89	18	PVC	0.0067	299	132	985	2,700	2,700	24,201	7,872	2,147	787,108	1.43	923,930	0.013	2.43	1.57	0.58	58%	58%	
Drop	-3.4																						
PS1	-4																						

Notes:
 1. Plastic lining of concrete pipe.
 2. Max Discharge based on pipe diameter and slope.
 3. Flow assumptions based from 2001 Update to the Friday Harbor General Sewer Plan

San Juan County
 UGA Infrastructure Feasibility Study
 Gravity Sewer System Analysis of Existing System to PS 1
 Town and UGA Buildout Flows

Survey Manhole No.	Invert (ft)	Length (ft)	Size (in)	Material	Slope (ft/ft)	Existing Dwelling Units		Future Dwelling Units		Population	Airport	Rem ³	Average Dry Weather Flow (ADWPF) gpd		Acres	Future Inlet	Existing Inlet	Total ADWPF (gpd)	Peak Flow (cfs)	Peak Flow (gpd)	Mannings No	Max Discharge (cfs)	Max Discharge (mgd)	Normal Depth (ft)	Percent Capacity Used
						SPMF	PSCO	SPMF	PSCO				LI	LI											
8040	105.37																								
8043	94.72	260	8"	Plastic	0.0434	50	0	575	1831	0	1,331		50,588	0	145	188,700	465,861	50,588	1.33	656,611	0.013	2.72	1.76	0.34	49%
8047	82.24	174	8"	Plastic	0.0717	114	0		1468	0	1,544	2,700	55,768	4,573	3	188,700	475,170	60,941	1.40	905,233	0.013	3.49	2.26	0.31	46%
8108	68.04	410	8"	Plastic	0.0346	123	9		1487	19	1,563	2,700	56,496	4,573	3	188,700	484,778	62,213	1.43	922,329	0.013	2.42	1.56	0.39	59%
8109	65.61	63	8"	Plastic	0.0538	159	34		1563	72	1,713	2,700	59,410	4,573	32	188,700	587,273	66,302	1.62	1,049,182	0.013	2.40	1.55	0.42	68%
8138	52.08	713	8"	Plastic	0.0184	159	59		1563	126	1,766	2,700	59,410	4,573	7	188,700	608,149	71,478	1.68	1,082,761	0.013	1.82	1.18	0.54	82%
8255	41.82	577	15"	Conc	0.0178	159	89		1563	211	1,851	2,700	59,410	4,573	26	188,700	892,002	76,559	1.84	1,186,940	0.013	9.30	8.01	0.38	20%
8333	40.03	247	15"	Conc	0.0072	299	107		1862	228	2,166	2,700	70,742	4,573	26	188,700	775,856	88,907	2.04	1,320,165	0.013	5.91	3.82	0.53	35%
1147	8.59	412	15"	Conc	0.0783	299	117		1862	249	2,186	2,700	70,742	4,573	4	188,700	787,108	90,178	2.07	1,336,518	0.013	19.25	12.44	0.29	23%
1142	7.8	81	12"	PVC	0.0098	299	132		1862	281	2,219	2,700	70,742	4,573	0	188,700	787,108	92,083	2.08	1,344,140	0.013	9.80	2.46	0.55	55%
67A	3.4	10	12"	PVC	0.0400	299	132		1862	281	2,219	2,700	70,742	4,573	0	188,700	787,108	92,083	2.08	1,344,140	0.013	7.99	4.97	0.37	37%
67B	-3.03	48	12"	PVC	0.0040	299	132		1862	281	2,219	2,700	70,742	4,573	0	188,700	787,108	92,083	2.08	1,344,140	0.013	2.43	1.57	0.76	27%
Drop	-3.4	86	18"	PVC	0.0080	299	132		1862	281	2,219	2,700	70,742	4,573	0	188,700	787,108	92,083	2.08	1,344,140	0.013	16.16	8.66	0.49	86%
PS1	-4					299	132		1862	281	2,219	2,700	70,742	4,573	0	188,700	787,108	92,083	2.08	1,344,140	0.013	16.16	8.66	0.49	21%

- Notes:
1. Plastic lining of concrete pipe.
 2. Max Discharge based on pipe diameter and slope.
 3. Flow assumptions based from 2001 Update to the Friday Harbor General Sewer Plan

San Juan County
 UGA Infrastructure Feasibility Study
 Gravity Sewer System Analysis of Existing System to WWTP
 Town and UGA Buildout Flows with Improvements

PDU 2.13
 PF 4
 II 3200 gpcd
 SFMF 38 gpcd
 PSCO 28 gpcd
 LI 0.6 gpcd

Survey Manhole No	Asphalt Manhole No.	Invert (ft)	Length (ft)	Size (in)	Material	Slope (ft/ft)	Dwelling Units		Dwelling Units		Population		Average Dry Weather Flow (ADWF) gpd		Acreage for sewer pipe	Future I&I	PS 1 Total ADWF	Existing I&I	Total ADWF (mgd)	City Limit Buildout		Mannings No	Max Discharge (cfs) ²	Max Discharge (mgd)	Normal Depth	Percent Full
							SFMF	PSCO	SFMF	PSCO	SFMF	PSCO	SFMF	PSCO						Peak Flow (cfs)	Peak Flow (mgd)					
892	38	187.77	131	8	Conc	0.0863	85	33	0	809	1904	70	0	1975	72,360	1,968	0	176,100	154,951	0.972	628,365	0.013	3.83	2.48	0.24	36%
8349	37	178.47	174	8	Conc	0.1922	89	33	0		1913	70	0	1983	72,684	1,968	0	176,100	184,427	0.989	638,136	0.013	5.71	3.69	0.19	29%
974	36	143.03	303	8	Conc	0.0238	93	33	0		1921	70	0	1982	73,008	1,968	0	176,100	173,321	1.005	649,325	0.013	2.01	1.30	0.40	52%
8348	35	135.83	313	8	Conc	0.0795	95	33	0		1926	70	0	1996	73,170	1,968	0	176,100	182,621	1.020	659,273	0.013	3.68	2.38	0.28	37%
MH #33	33	110.95	230	8	Conc	0.0549	99	33	0		1934	70	0	2004	73,494	1,968	0	176,100	233,157	1.100	711,103	0.013	3.05	1.97	0.32	43%
787	26	98.32	379	8	Plastic	0.0154	140	38	10		2021	81	21	2124	78,812	2,266	13	176,100	283,692	1.201	776,157	0.013	1.62	1.05	0.53	68%
638	25	92.49	356	8	Plastic	0.0494	140	42	17		2021	89	36	2147	78,812	2,505	22	176,100	297,801	1.224	791,256	0.013	2.90	1.87	0.35	47%
622	24	74.89	182	15	PVC	0.0068	148	50	17		2038	107	36	2181	77,460	2,942	22	176,100	311,910	3.955	2,555,967	0.013	5.75	3.72	0.80	64%
579	23	73.65	380	10	PVC	0.0675	149	51	17		2041	109	36	2185	77,541	3,042	22	176,100	328,021	3.986	2,576,218	0.013	6.14	3.97	0.51	62%
3617	22	48	246	10	PVC	0.0622	157	51	25		2058	109	53	2219	78,188	3,042	32	176,100	344,181	4.015	2,594,960	0.013	5.89	3.81	0.53	64%
776	21	33.08	120	15	PVC	0.0052	157	51	25		2058	109	53	2219	78,188	3,042	32	176,100	344,181	4.015	2,594,960	0.013	5.02	3.24	0.89	71%
																				4.015	115,482	0.013	5.02	3.24	0.89	71%

Notes:
 1. Plastic lining of concrete pipe.
 2. Max Discharge based on pipe diameter and slope.
 3. MH #33 is from City asbuilts and appears to correct based on comparison of survey data of existing structures.

#N/A #N/A

