

# Skye Area Plan

Amendment #2

## SEWER SECTION

July 27, 2023

Prepared By:



ENGINEERS

SURVEYORS

PLANNERS

3302 N Main Street  
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# Skype

## Sewer

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### **Design Criteria:**

Minimum Pipe Size: 8"

Minimum Slope: 0.34%

Design Flow:

Residential	100 gallons per person per day (UT R317-3-2.2.B.1) 3.8 capita / Dwelling Unit
Mixed Use	827 ERUs allocated with Land Use Plan 3.8 capita / ERU
Civic	100 gpd / capita 29 ERUs allocated with Land Use 3.8 capita / ERU
School	100 gpd / capita 24 ERUs allocated with Land Use Plan 3.8 capita / ERU
Peak Factor	100 gpd / capita 3.0

Refer to Appendix A for an exhibit showing each pipe location and Appendix B for a detailed breakdown of sewer flows and pipe sizing.

### **Allowable Flows:**

#### **West Side:**

The original Micron area plan called for an allowable discharge of 1,851 gallons per minute (gpm) into the existing sewer system in 500 W, as well as 62 gpm into the existing outfall near 600 E. The new sewer design will remain consistent with this area plan amendment. 62 gpm will be allowed to flow into the 600 E outfall, while the rest of the west side flow will be routed to the 500 W outfall, including the flow from the additional 300 units from the upper area allowed by the city council. The overall total projected peak flow into this outfall is expected to be 2,054 gpm.

#### **East Side:**

The maximum allowable flow on the east side of Skye was determined based on an agreement between Lehi City and the Timpanogos Special Service District (TSSD). This agreement states that a maximum average flow of 227,000 gallons per day (GPD) is allowed to flow into the existing sewer system. Using a peaking factor of 3, this converts to approximately 473 gpm, or in other words, 597 ERU's. The upper area being added to this area plan is sloped such that some of it will need to sewer down to the east side. This area plan amendment proposes to discharge the flow from approximately 621 ERU's (492 gpm) as approved by TSSD.

**Methodology:**

All pipes were designed according to the Utah administrative Rules as listed below:

**R317-3-2. Sewers.**

2.1. General. Construction of a new sewer system project may not begin unless the applicant has submitted an engineering report detailing the design, and construction plans to the executive secretary for review and approval evidenced by a construction permit. The executive secretary will not normally review construction plans for extensions of the existing sewer systems to new areas or replacement of sanitary sewers in the existing sewer systems unless requested or required by state or federal funding programs. Rain water from roofs, streets, and other areas, and ground water from foundation drains must not be allowed to enter the sewer system through planning, design and construction quality assurance and control measures.

2.2. Basis of Design

A. Planning Period. Sewers should be designed for the estimated ultimate tributary population or the 50-year planning period, whichever requires a larger capacity. The executive secretary may approve the design for reduced capacities provided the capacity of the system can be readily increased when required. The maximum anticipated capacity required by institutions, industrial parks, etc. must be considered in the design.

B. Sewer Capacity. The required sewer capacity shall be determined on the basis of maximum hourly domestic sewage flow; additional maximum flow from industrial plants; inflow; ground water infiltration; potential for sulfide generation; topography of area; location of sewage treatment plant; depth of excavation; and pumping requirements.

1. Per Capita Flow. New sewer systems shall be designed on the basis of an annual average daily rate of flow of 100 gallons per capita per day (0.38 cubic meter per capita per day) unless there are data to indicate otherwise. The per capita rate of flow includes an allowance for infiltration/inflow. The per capita rate of flow may be higher than 100 gallons per day (0.38 cubic meter per day) if there is a probability of large amounts of infiltration/inflow entering the system.

2. Design Flow

a. Laterals and collector sewers shall be designed for 400 gallons per capita per day (1.51 cubic meters per capita per day).

b. Interceptors and outfall sewers shall be designed for 250 gallons per capita per day (0.95 cubic meter per capita per day), or rates of flow established from an approved infiltration/inflow study.

c. The executive secretary will consider other rates of flow for the design if such basis is justified on the basis of supporting documentation.

C. Design Calculations. Detailed computations, such as the basis of design and hydraulic calculations showing depth of flow, velocity, water surface profiles, and gradients shall be submitted with plans.

### 2.3. Design and Construction Details

#### A. Minimum Size

1. No gravity sewer shall be of less than eight inches (20 centimeters) in diameter.
2. A 6-inch (15 centimeters) diameter pipe may be permitted when the sewer is serving only one connection, or if the applicant justifies the need for such diameter on the basis of supporting documentation.

B. Depth. Sewers should be sufficiently deep to receive sewage from basements and to prevent freezing. Insulation shall be provided for sewers that cannot be placed at a depth sufficient to prevent freezing.

C. Odor and Sulfide Generation. The design shall incorporate features to control and mitigate odor and sulfide generation in sewers. Such features may include steeper slope to achieve higher velocity, reaeration through induced turbulence, etc.

#### D. Slope

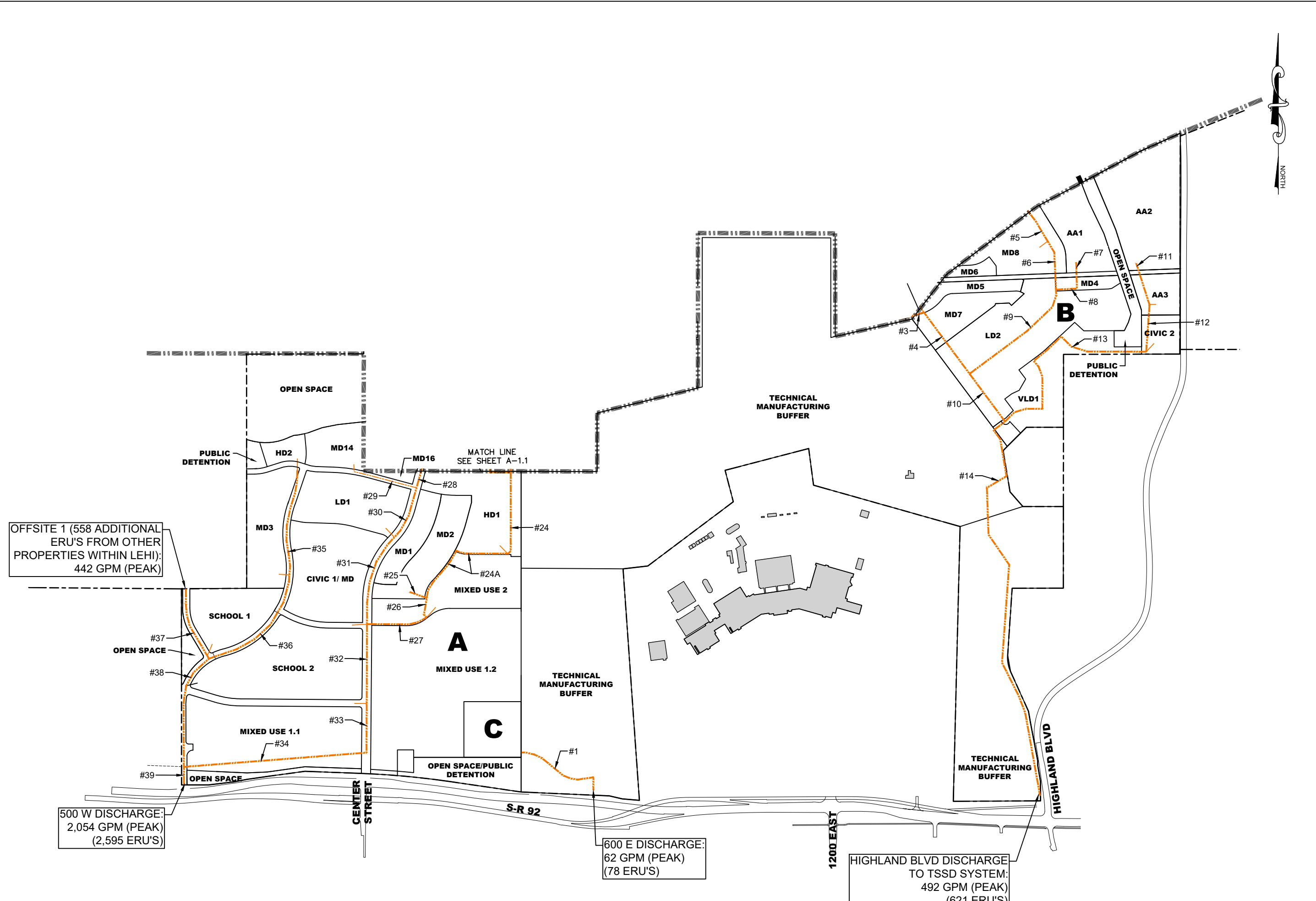
1. The pipe diameter and slope shall be selected to obtain velocities to minimize settling problems.
2. All sewers shall be designed and constructed to give mean velocities of not less than 2 feet per second (0.61 meter per second), when flowing full, based on Manning's formula using an n value of 0.013.
3. Sewers shall be laid with uniform slope between manholes.
4. Table R317-3-2.3(D)(4) shows the minimum slopes which shall be provided; however, slopes greater than these are desirable.

## **Appendix A: Pipe Location Exhibit**



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OFFSITE 1 (558 ADDITIONAL ERU'S FROM OTHER PROPERTIES WITHIN LEHI):  
442 GPM (PEAK)

500 W DISCHARGE:  
2,054 GPM (PEAK)  
(2,595 ERU'S)

600 E DISCHARGE:  
62 GPM (PEAK)  
(78 ERU'S)

HIGHLAND BLVD DISCHARGE  
TO TSSD SYSTEM:  
492 GPM (PEAK)  
(621 ERU'S)

**SKYE  
LEHI, UTAH  
SEWER PLAN**

REVISIONS	
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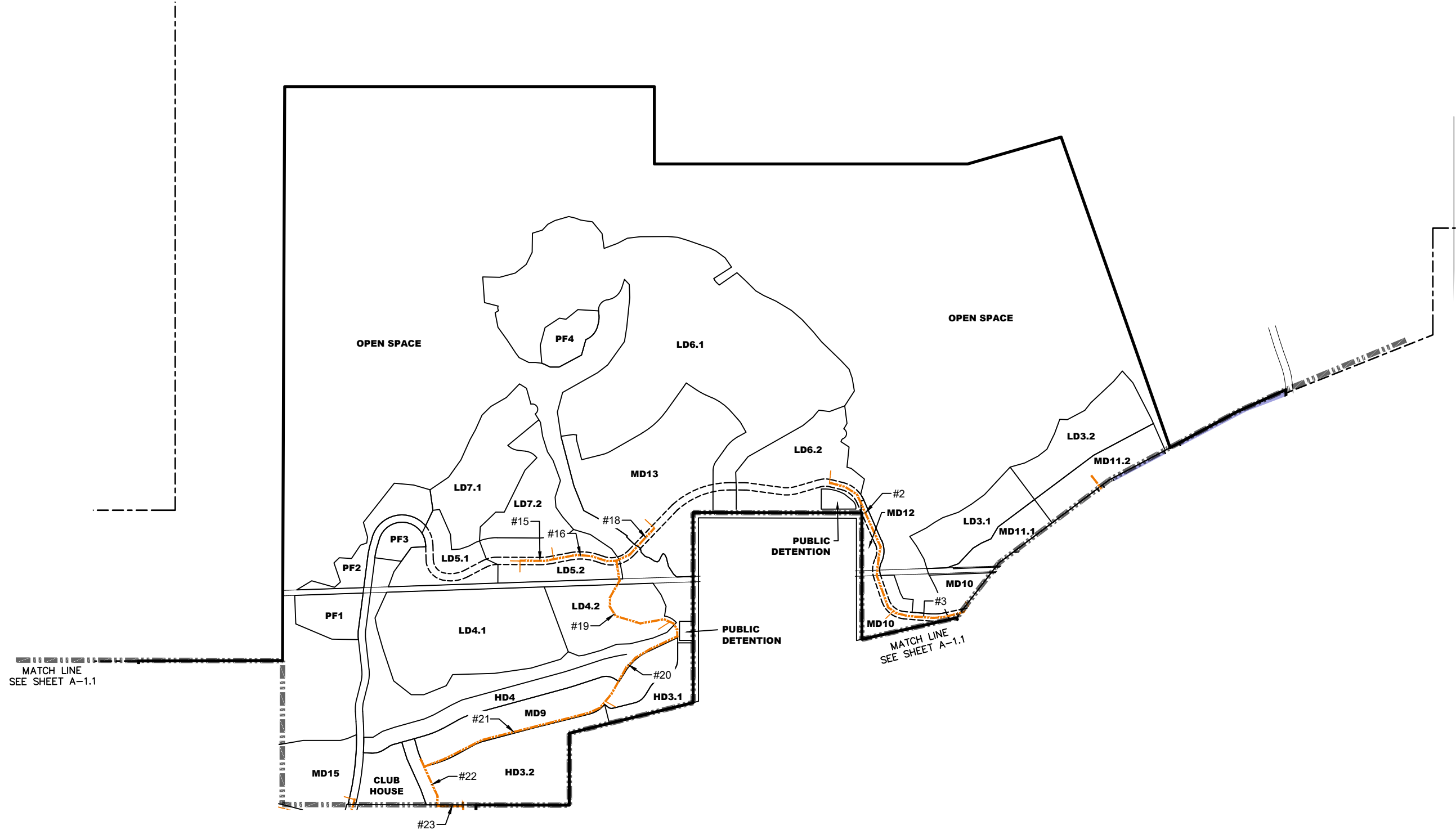
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**2020-0067**  
DRAWN BY:  
**RWH**  
DESIGNED BY:  
**BCT**  
SCALE:  
**1" = 1000'**  
DATE:  
**07/27/2023**

SHEET  
**A-1.1**



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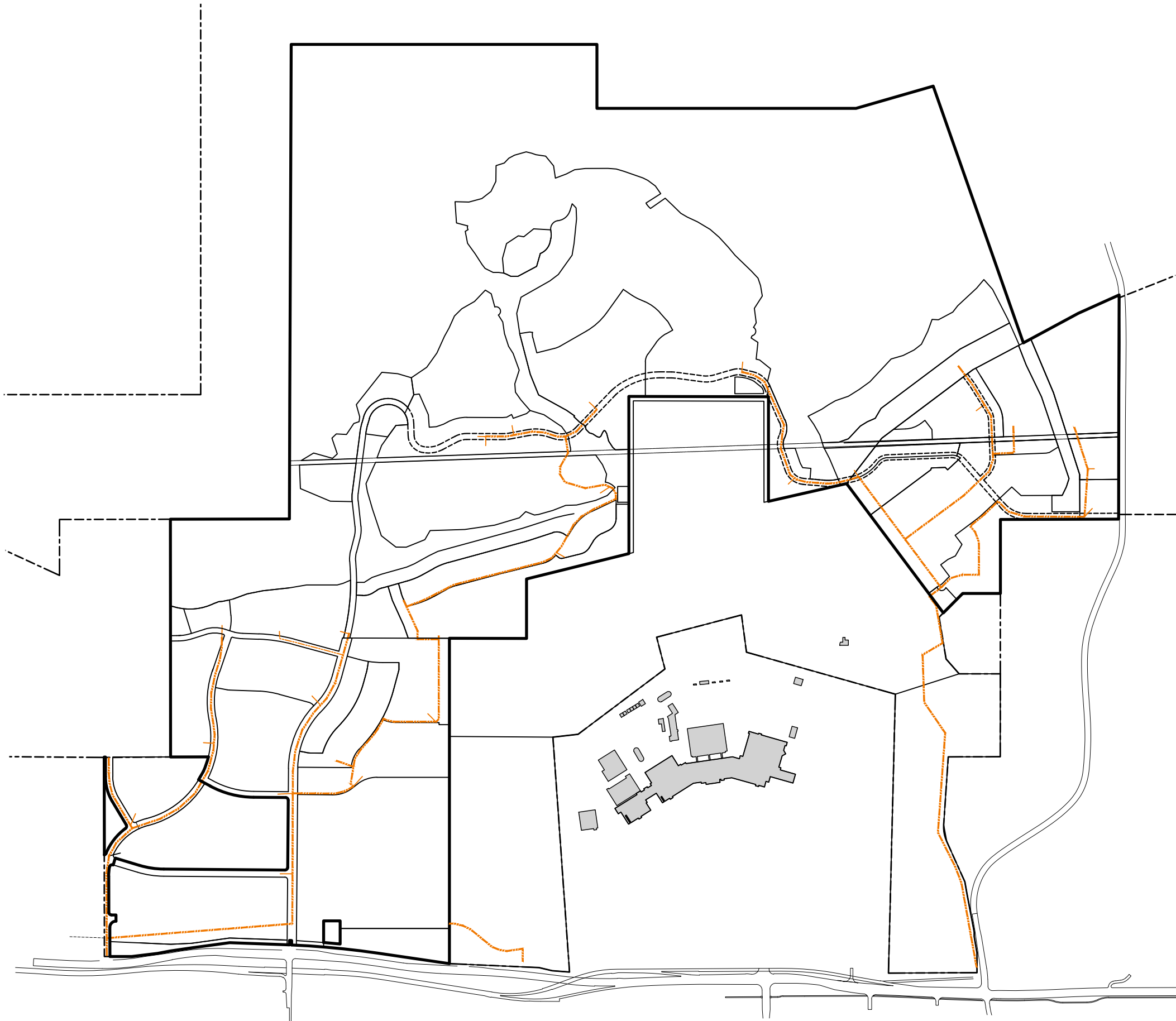
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 DRAWN BY: RWH  
 DESIGNED BY: BCT  
 SCALE: 1" = 1000'  
 DATE: 07/27/2023  
 SHEET

**A-1.2**



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LEHI, UTAH  
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REVISIONS	
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**07/27/2023**

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## **Appendix B: Detailed Pipe Flows and Pipe Sizing**

## SKYE AREA PLAN

### Sewer Flows - West Side A

Land Use	Area (acres)	Residential Units or ERU's (units)	Capita/ERU (capita/unit)	Capita (capita)	Flow/Capita (gpd/capita)	Average Flow (gpd)	Peak Factor	Peak Hourly Flow	
								(gpd)	(gpm)
Mixed Use	106.29	749	3.8	2,846	100	284,600	3.0	853,800	593
Civic	22.59	27	3.8	103	100	10,300	3.0	30,900	21
LD	188.05	282	3.8	1,073	100	107,300	3.0	321,900	224
HD	54.75	516	3.8	1,961	100	196,100	3.0	588,300	409
MD	25.18	86	3.8	326	100	32,600	3.0	97,800	68
MD	78.47	347	3.8	1,319	100	131,900	3.0	395,700	275
School	42.98	24	3.8	91	100	9,100	3.0	27,300	19
Clubhouse	5.97	6	3.8	22	100	2,200	3.0	6,600	5
Offsite 1	290.18	558	3.8	2,120	100	212,040	3.0	636,120	442
<b>Total West Side A</b>		<b>2,595</b>		<b>9,861</b>		<b>986,140</b>		<b>2,958,420</b>	<b>2,054</b>

### Sewer Flows - East Side B

Land Use	Area (acres)	Residential Units or ERU's (units)	Capita/ERU (capita/unit)	Capita (capita)	Flow/Capita (gpd/capita)	Average Flow (gpd)	Peak Factor	Peak Hourly Flow	
								(gpd)	(gpm)
AA	41.03	231	3.8	878	100	87,800	3.0	263,400	183
Civic	4.44	2	3.8	8	100	800	3.0	2,400	2
LD	113.98	170	3.8	646	100	64,600	3.0	193,800	135
VLD	15.22	18	3.8	68	100	6,800	3.0	20,400	14
MD	7.99	48	3.8	182	100	18,200	3.0	54,600	38
MD	40.99	152	3.8	578	100	57,800	3.0	173,400	120
<b>Total East Side B</b>		<b>621</b>		<b>2,360</b>		<b>236,000</b>		<b>708,000</b>	<b>492</b>

### Sewer Flows - West Side C

Land Use	Area (acres)	Residential Units or ERU's (units)	Capita/ERU (capita/unit)	Capita (capita)	Flow/Capita (gpd/capita)	Average Flow (gpd)	Peak Factor	Peak Hourly Flow	
								(gpd)	(gpm)
Mixed Use	9.70	78	3.8	296	100	29,600	3.0	88,800	62
<b>Total West Side C</b>		<b>78</b>		<b>296</b>		<b>29,600</b>		<b>88,800</b>	<b>62</b>

### Sewer Flows - Offsite Detailed

Offsite Area	Land Use	Area (acres)	Residential Units or ERU's (units)	Capita/ERU (capita/unit)	Capita (capita)	Flow/Capita (gpd/capita)	Average Flow (gpd)	Peak Factor	Peak Hourly Flow	
									(gpd)	(gpm)
Offsite 1	Canyon Hills (Existing)	78.67	244	3.8	927	100	92,720	3.0	278,160	193
	Peck Property (Lehi - 1.5 units/ac)	58.89	88	3.8	334	100	33,440	3.0	100,320	70
	Entrata (Draper - 1.5 units/ac))	149.28	224	3.8	851	100	85,120	3.0	255,360	177
	Canyon Hills Church	3.34	2	3.8	8	100	760	3.0	2,280	2
<b>Total Offsite</b>			<b>558</b>		<b>2,120</b>		<b>212,040</b>		<b>636,120</b>	<b>442</b>

# Skye Area Plan

## Sewer Pipe Sizing

Pipe ID.	Contributing Area (ac)	Peak Hourly Flow (gpm)	Peak Hourly Flow (cfs)	Pipe Dia. (inches)	Min Slope (%)	Qpipe (cfs)	Velocity (fps)	Pipe Check
1	<b>MU1.2 (600 E outfall)</b>	<b>62</b>	<b>0.14</b>	<b>8</b>	<b>0.34</b>	<b>0.71</b>	<b>2.02</b>	<b>OK</b>
2	LD6.2	19	0.04	8	0.34	0.71	2.02	OK
3	LD6.2, MD12, MD10	36	0.08	8	0.34	0.71	2.02	OK
4	LD6.2, MD12, MD10, LD3.1, MD11.1, MD5, MD6, MD7	126	0.28	8	0.34	0.71	2.02	OK
5	LD3.2, MD11.2	47	0.10	8	0.34	0.71	2.02	OK
6	LD3.2, MD11.2, MD8	86	0.19	8	0.34	0.71	2.02	OK
7	AA1	49	0.11	8	0.34	0.71	2.02	OK
8	AA1, MD4	59	0.13	8	0.34	0.71	2.02	OK
9	LD3.2, MD11.2, MD8, AA1, MD4	146	0.32	8	0.34	0.71	2.02	OK
10	LD6.2, MD12, MD10, LD3.1, MD11.1, MD5, MD6, MD7, LD3.2, MD11.2, MD8, AA1, MD4	272	0.61	8	0.34	0.71	2.02	OK
11	AA2	110	0.25	8	0.34	0.71	2.02	OK
12	AA2, AA3	134	0.30	8	0.34	0.71	2.02	OK
13	AA2, AA3, CIV 2	135	0.30	8	0.34	0.71	2.02	OK
14	<b>Full Build-out (East Side)</b>	<b>492</b>	<b>1.10</b>	<b>8</b>	<b>0.82</b>	<b>1.10</b>	<b>3.14</b>	<b>OK</b>
15	LD5.1, LD4.1, LD7.1	61	0.14	8	0.34	0.71	2.02	OK
16	LD5.1, LD4.1, LD7.1, LD7.2	73	0.16	8	0.34	0.71	2.02	OK
18	LD6.1, MD13	162	0.36	8	0.34	0.71	2.02	OK
19	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2	265	0.59	8	0.34	0.71	2.02	OK
20	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2, LD4.2	277	0.62	8	0.34	0.71	2.02	OK
21	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2, LD4.2, HD3.1	319	0.71	8	0.35	0.72	2.05	OK
22	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2, LD4.2, HD3.1, MD9, HD4	456	1.02	8	0.71	1.02	2.92	OK
23	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2, LD4.2, HD3.1, MD9, HD4, CLUBHOUSE	459	1.02	8	0.72	1.03	2.95	OK
24	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2, LD4.2, HD3.1, MD9, HD4, CLUBHOUSE, HD3.2	621	1.38	8	1.31	1.39	3.97	OK
24a	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2, LD4.2, HD3.1, MD9, HD4, CLUBHOUSE, HD3.2, HD1	748	1.67	8	1.89	1.67	4.77	OK
25	MD1, MD2	95	0.21	8	0.34	0.71	2.02	OK
26	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2, LD4.2, HD3.1, MD9, HD4, CLUBHOUSE, HD3.2, HD1, MD1, MD2	843	1.88	8	2.41	1.88	5.39	OK
27	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2, LD4.2, HD3.1, MD9, HD4, CLUBHOUSE, HD3.2, HD1, MD1, MD2, MU2	1088	2.42	12	0.47	2.45	3.12	OK
28	MD15	20	0.04	8	0.34	0.71	2.02	OK
29	MD14	16	0.04	8	0.34	0.71	2.02	OK
30	MD15, MD14, MD16	39	0.09	8	0.34	0.71	2.02	OK
31	MD15, MD14, MD16, LD1	71	0.16	8	0.34	0.71	2.02	OK
32	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2, LD4.2, HD3.1, MD9, HD4, CLUBHOUSE, HD3.2, HD1, MD1, MD2, MU2, MD15, MD14, MD16, LD1, CIV1	1181	2.63	12	0.55	2.65	3.37	OK
33	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2, LD4.2, HD3.1, MD9, HD4, CLUBHOUSE, HD3.2, HD1, MD1, MD2, MU2, MD15, MD14, MD16, LD1, CIV1, SCH2	1193	2.66	12	0.56	2.67	3.40	OK
34	LD5.1, LD4.1, LD7.1, LD7.2, LD6.1, MD13, LD5.2, LD4.2, HD3.1, MD9, HD4, CLUBHOUSE, HD3.2, HD1, MD1, MD2, MU2, MD15, MD14, MD16, LD1, CIV1, SCH2, MU1.1, MU1.2	1540	3.43	18	0.11	3.56	2.01	OK
35	HD2	20	0.04	8	0.34	0.71	2.02	OK
36	HD2, MD3	66	0.15	8	0.34	0.71	2.02	OK
37	OFFSITE 1	442	0.98	8	0.66	0.98	2.82	OK
38	HD2, MD3, OFFSITE 1, SCH1	514	1.15	12	0.20	1.60	2.03	OK
39	<b>All Pipes on West Side</b>	<b>2054</b>	<b>4.58</b>	<b>18</b>	<b>0.19</b>	<b>4.59</b>	<b>2.60</b>	<b>OK</b>

Note:

1. Offsite 1 is composed of the following properties - Canyon Hills, Peck Property, Entrata, and Canyon Hills Church (See Sewer Flows table on previous page for a detailed breakdown of offsite flows)