Storm Drain Impact Fee Facilities Plan

December 2020

Prepared by:

BOWEN COLLINS & ASSOCIATES

Prepared for:

HERRIMAN CITY

STORM DRAIN IMPACT FEE FACILITIES PLAN

December 2020

2/11/2021

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HERRIMAN CITY

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EXECUTIVE SUMMARY

INTRODUCTION

Herriman City has retained Bowen Collins & Associates (BC&A) to prepare a storm drain impact fee facility plan (IFFP). The purpose of an IFFP is to identify demands placed upon City facilities by future development and evaluate how these demands will be met by the City. The IFFP is also intended to outline the improvements which may be funded through impact fees.

WHY IS AN IFFP NEEDED?

The IFFP provides a technical basis for assessing updated impact fees throughout the City. This document will address the future infrastructure needed to serve the City with regard to current land use planning. The existing and future capital projects documented in this IFFP will ensure that level of service standards is maintained for all existing and future residents who reside within the service area. Local governments must pay strict attention to the required elements of the Impact Fee Facilities Plan which are enumerated in the Impact Fees Act.

SERVICE AREAS

There are two service areas in Herriman City: Main Herriman and the Town Center.

PROJECTED FUTURE GROWTH

Growth and new development in Herriman City is discussed in detail in a technical memorandum prepared by BC&A dated August 12, 2019. The projected 10-year growth in developed acreage for Main Herriman developed acres is estimated to be 2,282 acres and 24 acres in the Town Center.

EXISTING CAPACITY AVAILABLE TO SERVE FUTURE GROWTH

Projected future growth will be met through a combination of available excess capacity in existing facilities and construction of additional capacity in new facilities. The calculated percentage of existing capacity currently in use by existing development, calculated percentage of growth during the next 10 years, and calculated percentage of growth after the 10-year period is presented in Table ES-1.

ES-1
Calculated Percentage of Capacity in the Existing Storm Drainage System

Area	Main Herriman (Percent)	Town Center (Percent)
Existing Development	74.1	77.7
10-yr Growth	21.5	22.3
Growth beyond 10 years	4.4	6.3

REQUIRED SYSTEM IMPROVEMENTS

Beyond available existing capacity, additional improvements will need to be constructed within the next 10 years to serve new growth. These improvements are summarized in Table ES-2.

Table ES-2
Impact Fee Facilities Plan - Costs Required for Future Growth

Project ID	Total Estimated Cost 2020 Dollars	Percentage of Cost Attributable to:		
		Existing	10-year Growth	Beyond 10-Year Growth
P 1	$ 248,724.00	0.0%	90.4%	100.0%
P 2	$ 96,118.65	0.0%	77.1%	100.0%
P 3	$ 196,767.23	0.0%	58.7%	100.0%
P 4	$ 179,659.82	0.0%	58.7%	100.0%
P 5	$ 114,968.16	0.0%	77.1%	100.0%
P 9	$ 63,918.45	0.0%	90.4%	100.0%
P 10	$ 133,281.45	0.0%	58.7%	100.0%
P 11	$ 180,674.55	27.9%	0.9%	72.1%
P 48	$ 613,442.88	22.4%	1.6%	77.6%
P 50	$ 212,905.80	7.4%	65.1%	92.6%
P 51	$ 174,334.95	1.9%	78.8%	98.1%
P 52	$ 219,961.98	0.5%	12.8%	99.5%
P 54	$ 162,614.79	0.1%	75.4%	99.9%
P 61	$ 1,554,513.12	85.0%	0.0%	15.0%
P 62	$ 285,307.52	66.3%	0.0%	33.7%
P 64	$ 68,179.50	0.0%	62.9%	100.0%
P 65	$ 68,179.50	0.0%	62.9%	100.0%
P 66	$ 68,179.50	0.0%	62.9%	100.0%
OC 1	$ 188,726.40	0.1%	75.4%	99.9%
OC 2	$ 60,879.43	0.2%	77.1%	99.8%
OC 3	$ 449,857.77	53.1%	37.6%	46.9%
OC 4	$ 353,487.17	61.8%	38.2%	38.2%
OC 5	$ 424,157.99	48.9%	40.7%	51.1%
OC 6	$ 308,962.95	54.4%	36.1%	45.6%
OC 8	$ 153,126.09	0.2%	77.1%	99.8%
OC 9	$ 182,091.70	51.2%	41.7%	48.8%
OC 13	$ 132,878.04	36.8%	45.3%	63.2%
DB 2	$ 1,801,200.00	67.4%	23.0%	32.6%
DB 3	$ 5,324,900.00	16.2%	14.4%	83.8%
Total	**$ 14,021,999.38**	**$ 4,771,833.30**	**$ 3,527,419.93**	**$ 9,249,561.26**

To satisfy the requirements of state law, Table ES-2 provides a breakdown of the percentage of the project costs attributed to existing and future users. For future use, capacity has been divided between capacity to be used by growth within the 10-year planning window of this IFFP and capacity that will be available for growth beyond the 10-year window.

SECTION 1 – IMPACT FEE FACILITIES PLAN

Herriman City has retained Bowen Collins & Associates (BC&A) to prepare a Storm Drain Impact Fee Facilities Plan (IFFP) and Impact Fee Analysis (IFA). The purpose of an IFFP is to identify demands placed upon City facilities by future development and evaluate how these demands will be met by the City. The IFFP is also intended to outline the improvements which may be funded through impact fees. A separate report will be prepared for the Storm Drain IFA.

Requirements for the preparation of an IFFP are outlined in Title 11, Chapter 36 of the Utah code (the Impact Fees Act). Under these requirements, an IFFP shall accomplish the following for each facility:

1. Identify service areas
2. Identify the existing level of service
3. Establish a proposed level of service
4. Identify excess capacity to accommodate future growth
5. Identify demands of new development
6. Identify the means by which demands from new development will be met
7. Consider the following additional issues
    a. revenue sources to finance required system improvements
    b. necessity of improvements to maintain the proposed level of service
    c. need for facilities relative to planned locations of schools

The following sections of this report have been organized to address each of these requirements.

SECTION 2 – SERVICES AREAS & TYPES OF RECOMMENDED IMPROVEMENTS

This section defines the service areas for Herriman City and the difference between system improvements and local improvements.

SERVICE AREAS

Herriman has been divided into two storm drain service areas: the Town Center and everything outside of the Town Center (Main Herriman). Figure 2-1 shows the boundaries for each service area. A brief description of each is provided below.

- **Town Center –** The Town Center is a 377-acre development on the central east side of Herriman. The Town Center has a separate master plan and has a separate storm drain system from the rest of Herriman City. It also has its own storm drain outfall to Rose Creek. The Town Center Master Plan is included in Appendix A.

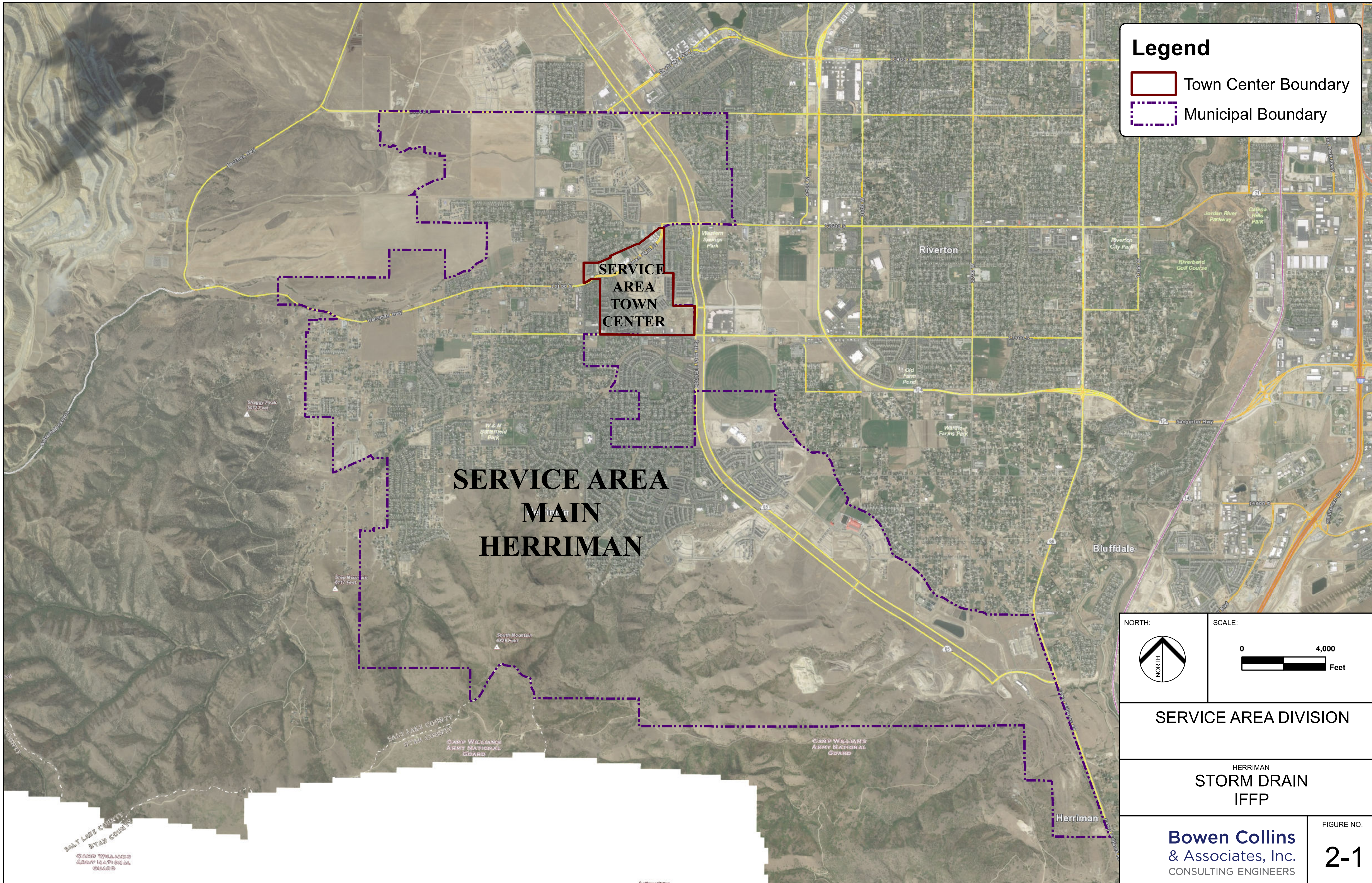
- **Main Herriman** – This service area includes everything in Herriman City outside the Town Center.

TYPES OF RECOMMENDED IMPROVEMENTS

The recommended improvements identified in this IFFP and the Storm Drain Master Plan report (SDMP) include only major storm drain facilities that benefit the City as a whole (system improvements). Local storm drain facilities (project improvements), typically associated with individual development projects, are not included in the SDMP report nor are they eligible to be paid for using impact fees. The SDMP report defines system improvements and project improvements for Herriman's Storm Drain System. The definitions of system improvements and project improvements are presented below.

- **Conveyance Facilities** – Major storm drain conveyance facilities (system improvements) include pipelines or major channels that typically service multiple developments. Local facilities (project improvements) include smaller storm drain conveyance facilities that typically only serve one development and are used to convey storm water runoff to the major conveyance facilities.

- **Detention Facilities –** Development is required to provide local detention facilities (project improvements) to attenuate peak storm water discharges to the limits stated in the SDMP report. A major regional detention facility (system improvement) will attenuate peak runoff from multiple developments to levels that can be safely conveyed through existing downstream facilities.



SERVICE AREA DIVISION

HERRIMAN
STORM DRAIN
IFFP

Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

FIGURE NO.
2-1

SECTION 3 – EXISTING LEVEL OF SERVICE (11-36A-302.1.A.I)

Level of service is defined in the Impact Fees Act as "the defined performance standard or unit of demand for each capital component of a public facility within a service area". This section discusses the level of service being currently provided to existing users.

PERFORMANCE STANDARD

The performance standard defines the level of service the City has established to satisfy City and/or State performance requirements. There is no minimum State standard for storm drain as there are with some other utilities. Every city desires to protect their residents and infrastructure from flooding and attempts to balance the cost of storm drainage improvements with the amount of flow in the streets. The evaluation criteria for this study was provided by Herriman City personnel and was documented in their SDMP. The level of service adopted by Herriman City is similar to the level of service provided by neighboring cities.

STORM DRAIN PIPELINES

Storm drain pipelines are not allowed to surcharge to within two feet from the ground surface during the 10 percent annual chance (10-year) design storm event. Storm drain trunklines are also not to be smaller than 18 inches in diameter. It is important to note that roadways become the major storm water conveyance facility during storms that are larger than the 10-year design event.

OPEN CHANNELS

Open channels should have at least two feet of free board during the 1 percent annual chance (100-year) design storm event. Open channels should also have protective lining. If velocities are less than 4 ft per second (ft/s), the channel may be grass lined. However, if the peak velocity in a channel is over 4 ft/s, then grass will not be sufficient to protect the channel from erosion damage and armoring will be required.

DETENTION BASINS

Detention facilities need to have capacity for the 100-year storm, with at least one foot of freeboard, and have an emergency overflow that directs water away from private property.

DESIGN STORM PARAMETERS

The design storm defines how much precipitation falls and at what rate for a projected precipitation event. The rainfall depth for system evaluation is based on the National Oceanic and Atmospheric Administration (NOAA) Atlas 14. The storm distribution is the 3-hour modified Farmer-Fletcher distribution as described in the SDMP. This data is commonly used by professionals in the industry, and has been shown to produce accurate results in studies conducted in neighboring communities.

It is important to note that not all of the existing facilities in the storm drain system meet the existing level of service. Those deficient storm drain facilities will be remedied over the next 6-years, and will be paid for independent of the impact fees.

SECTION 4 - PROPOSED LEVEL OF SERVICE (11-36A-302.1.A.II)

The proposed level of service is the performance standard used to evaluate system needs in the future. The Impact Fee Act indicates that the proposed level of service may:

1. diminish or equal the existing level of service; or
2. exceed the existing level of service if, independent of the use of impact fees, the City implements and maintains the means to increase the level of service for existing demand within six years of the date on which new growth is charged for the proposed level of service.

No changes in the level of service are proposed for Herriman City. Future facilities will be constructed to meet the same performance standards identified for the existing level of service.

SECTION 5 – EXCESS CAPACITY TO ACCOMMODATE FUTURE GROWTH (11-36A-302.1.A.III)

Projected future growth will be met through a combination of excess capacity in existing facilities and construction of additional capacity in new facilities.

EXISTING DEMAND AND DETERMINATION OF EXCESS CAPACITY

To calculate the percentage of existing excess capacity in the existing Herriman Storm Drain System to be used by future growth, existing and future development patterns were examined. The method used to calculate excess capacity available for use by future development is as follows:

- **Calculate Potential Drainage Area of the Facilities –** The drainage area contributing to the existing storm drain system facilities in existing facilities each service area was calculated for both existing and future development scenarios (See Section 6). Additionally, the area that will be served by future projects was removed from these areas to only counting the existing facilities.
- **Identify Existing Development –** Based on GIS records and available aerial photography, existing developed areas within each service area have been identified.
- **Identify 10-year Growth** – Consistent with the growth memorandum prepared by BC&A dated August 12, 2019, the area associated with projected 10-year growth in each service area has been calculated. The growth memorandum prepared by BC&A dated August 12, 2019 is included in Appendix B. Areas of 10-year growth are identified in Figure 5-1.
- **Calculate Percent of Excess Capacity Used by 10-year Growth** – The percent of excess capacity being used in each service area was calculated by dividing the growth in use in the existing facilities (10-year developed area less existing developed area) by the maximum use of capacity at buildout (total drainage area for the service areas).

Based on the method described above, the percentage of existing capacity currently in use by existing development was calculated, the percentage of growth during the next 10 years was calculated, and percentage of growth after the 10-year period was calculated and is presented in Table 5-1.

Table 5-1
Calculated Percentage of Capacity in the Existing Storm Drainage System

	Main Herriman (Percent)	Town Center (Percent)
Existing Development	74.1	77.6
10-yr Growth	21.5	6.3
Growth beyond 10 years	4.4	16.1
Total	**100.0**	**100.0**

In considering available capacity in existing storm drain facilities, it should be remembered that excess capacity can only serve growth in the areas for which it was constructed. In other words, an existing pipeline that has available capacity for future growth in one area of the City can provide no

LEGEND

- Town Center Boundary
- Herriman Municipal Boundary
- Area of Anticipated Growth Between 2020-2030
- Existing Storm Drain Pipe
- Existing Developed Area (no open space)
- Future Developed Area (no open space)

NORTH:

SCALE: 0 3,500 Feet

AREAS OF ANTICIPATED DEVELOPMENT

HERRIMAN

STORM DRAIN IFFP

BOWEN COLLINS & ASSOCIATES

FIGURE NO. 5-1

P:\Herriman\2018 Storm Drain Master Plan\4.0 GIS\4.4 Figures\IFFP 10-yr Growth.mxd kballentine 7/6/2020

benefit for projected growth in another area of the City. Thus, it is very common for projects to be needed in one area, even though available capacity may exist in another area. By following the procedure to calculate use of capacity as described above, only the existing capacity that will actually be used by 10-year growth has been identified as reimbursable through impact fees.

SECTION 6 – DEMANDS PLACED ON FACILITIES BY NEW DEVELOPMENT (11-36A-302.1.A.IV)

Growth and new development in Herriman City is discussed in detail in a technical memorandum prepared by BC&A dated August 12, 2019 (see Appendix B). A summary of the projections for residential and non-residential growth is contained in the table below. Non-residential growth includes businesses, churches, offices, retail, medical facilities, etc.

Table 6-1
Projected Residential and Non-Residential Growth

Year	Residential Population Projection	Equivalent Non-Residential Population	Residential + Equivalent Residential Population	Percentage of Non-residential
2010	21,785	2,202[a]	23,987	9.2%
2018	51,681	5,225	56,906	9.2%
2019	58,287	6,522	64,808	10.1%
2020	62,010	7,607	69,618	10.9%
2025	79,568	14,054	93,622	15.0%
2029	91,047	20,011	111,059	18.0%
2030	93,465	21,551	115,016	18.7%
2035	102,904	29,280	132,184	22.2%
2040	108,668	36,782	145,450	25.3%
2045	111,961	43,937	155,898	28.2%
2050	113,772	50,786	164,558	30.9%
2055	114,746	57,411	172,158	33.3%
2060	115,265	63,889	179,154	35.7%
2065	115,539	70,275	185,814	37.8%

[a] Herriman City records do not include a breakdown between residential and non-residential use for the year of 2010. Value reported here has been estimated assuming the same ratio of development as observed in 2018.

CONVERSION OF GROWTH AND DEVELOPMENT PROJECTIONS TO STORM WATER DEMANDS

To evaluate the use of existing capacity and the need for future capacity, it is first necessary to calculate the demand associated with existing development and projected growth. Using available information for existing development, BC&A calculated the average acreage associated with each type of development identified in the 10-year growth projections. Those values are summarized in Table 6-2 and 6-3.

Table 6-2
Average Developed Acreage Associated with Different Development Types
(Non-Residential)

Herriman City and Annexation Area	Acres	Average Density of ERUs	Number of ERUs	Equivalent Residential population
Commercial	1,024	3.44	3,521	13,767
Light Industrial/Business Park	333	3.44	4,022	15,727
Military Operation (Camp Williams)	308	0.19	59	231
Mixed Use (maximum 15 du/acre)	86	4.58	392	1,534
Mixed Use (Towne Center)	317	6.58	2,083	8,144
Open Space	3,761	0	0	0
Parks & Recreation	598	0	0	0
Public/Institutional/Schools	418	12.44	5,201	20,337
College Campus	87	18.43	1,601	6,260
Quasi-Public/Utilities	332	3.44	1,141	4,459
Total:	**7,264**		**18,020**	**70,460**

Table 6-3
Average Developed Acreage Associated with Different Development Types
(Residential)

Herriman City and Annexation Area	Acres	Average Density of Residential Units	Number of Residential units	Buildout Residential population
Agricultural Residential (1.8 - 3.0 du/acre)	1,124	2.40	2,697	10,545
High Density Residential (8 to 20 du/acre)	221	14.00	3,087	12,071
Hillside/Rural Residential (0.5 to 1.7 du/acre)	325	1.10	357	1,396
Low Density Residential (1.8 to 2.5 du/acre)	2,513	2.15	5,403	21,126
Medium Density Residential (4.6 to 8 du/acre)	1,095	6.30	6,901	26,984
Mixed Use (maximum 15 du/acre)	86	7.50	643	2,513
Mixed Use (Towne Center)	317	5.50	1,741	6,808
Resort/Recreational (maximum 0.4 du/acre)	154	0.20	31	121
Rural Residential (1 unit per 5 acres)	4,469	0.20	894	3,495
Single Family Residential (2.6 to 4.5 du/acre)	2,218	3.55	7,874	30,786
Total:	**12,522**		**29,628**	**115,844**

Using the information contained in Tables 6-2 and 6-3 and projected growth as summarized in Table 6-1, the 10-year growth projections for the Main Herriman service area was calculated to be 2,282 acres and the Town Center was calculated to be 24 acres. Figure 5-1 identifies the 10-year growth areas, and they are also identified in the BC&A technical memorandum dated August 12, 2019.

SECTION 7 – INFRASTRUCTURE REQUIRED TO MEET DEMANDS OF NEW DEVELOPMENT (11-36A-302.1.A.V)

To satisfy the requirements of state law, demand placed upon system facilities by future development was projected using the process outlined below.

1. **Existing Capacity** – The capacities of the existing facilities were evaluated using a hydraulic storm water model as part of the master plan.
2. **Existing Deficiencies** – Existing deficiencies in the system were identified by comparing defined levels of service against calculated capacities. Identified deficiencies were verified by City staff (see Chapter 5 of the SDMP).
3. **Future Demand** - The demand that future development will place on the system was estimated based on development projections as discussed in Section 6.
4. **Future Deficiencies** - Future deficiencies in the storm drain infrastructure were identified based on the defined level of service.
5. **Recommended Improvements** – Needed storm drain improvements were identified to resolve the projected deficiencies.

The steps listed above describe the "demands placed upon existing public facilities by new development activity at the proposed level of service; and… the means by which the political subdivision or private entity will meet those growth demands" (Section 11-36a-302-1.a of the Utah Code).

10-YEAR IMPROVEMENT PLAN

Planned improvements to satisfy level of service requirements for projected demands at build out have been identified in the Herriman City SDMP. These improvements will be constructed in phases as development occurs. Only infrastructure to be constructed within a ten-year horizon will be considered in the calculation of these impact fees to avoid uncertainty surrounding improvements further into the future.

To identify improvements to be built within the 10-year window, BC&A compared all of the projects identified at build-out with the distribution of projected growth as identified in the growth technical memorandum prepared by BC&A dated August 12, 2019. Those projects that will service areas of projected growth within the next 10 years were added to the City's 10-year improvement plan. Table 7-1 summarizes the projects that are projected to be needed within the next ten years. The location of these projects is shown on Figures 7-1 and 7-2.

It should be noted that Table 7-1 only includes those projects with components of cost that are eligible to be included in the impact fee calculation. Other storm drain projects that may be completed over the next ten years but have not been shown in the table include: projects for maintenance and repair (to be paid for by existing users) and project level improvements (to be paid for by individual developers).

L E G E N D

Recommended Pipe Improvements (cfs)

Size (inches)

- 18
- 24
- 30
- 36
- 42
- 48
- 60
- 66
- Detention Basin Improvement
- Municipality Boundary
- Major Creek and Canal
- Midas Creek Drainage Area
- Rose Creek Drainage Area
- Area South of Wood Hollow
- Wood Hollow Drainage Area
- Retention Area

Recommended Improvements Key

P 5 — Project ID

6 — Peak Flow Rate (cfs)

Discharge Requirements (applies to the 100-year storm):
- Midas Creek Drainage Area: Detain Peak flows to 0.02 cfs/ac
- Rose Creek Drainage Area: Detain Peak flow to 0.02 cfs/ac
- Retention Area: Retain storm water runoff on-site
- Wood Hollow Drainage Area: Retain Runoff on-site until Wood Hollow is improved by the County. After that, may discharge at pre-development conditions (0.02 - 0.05 cfs/ac)
- Area South of Wood Hollow: Discharge at pre-development conditions (0.02 - 0.05 cfs/ac)

South Jordan

Herriman

Riverton

P 48 4

P 50 6

P 51 12

P 52 6

P 61 92

P 1 8

P 9 13

P 10 22

P 2

P 4 4

P 5 7

P 3 4

P 11 10

P 62 7

Midas Creek

Butterfield Creek

Rose Creek

DB 2

DB 3

Remove Detention Basin

NORTH:

SCALE: 0 1,000 2,000 Feet

RECOMMENDED IMPROVEMENTS

HERRIMAN

STORM DRAIN MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO. 7-1

LEGEND

- Natural Drainage Swales

Recommended Pipe Improvements (cfs)

Size (inches)

- 18
- 24
- 30
- 36
- 42
- 48
- 54
- Recommended Channel Improvement (cfs)
- Municipality Boundary
- Existing Storm Drain Pipe
- Major Creek and Canal
- Detention Basin Improvement
- Midas Creek Drainage Area
- Rose Creek Drainage Area
- Area South of Wood Hollow
- Wood Hollow Drainage Area
- Retention Area

Recommended Improvements Key

Project ID

P 5

6

Peak Flow Rate (cfs)

NORTH:

SCALE:

0 1,100 2,200 Feet

RECOMMENDED IMPROVEMENTS

HERRIMAN

HERRIMAN STORM DRAIN MASTER PLAN

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FIGURE NO. 7-2

Natural drainage swales need to be maintained during development. Channels will need to be constructed along natural drainages, or debris basins will need to be installed upstream of storm drain pipes that collect runoff from the drainage swales.

Discharge Requirements (applies to the 100-year storm):
- Midas Creek Drainage Area: Detain Peak flows to 0.02 cfs/ac
- Rose Creek Drainage Area: Detain Peak flow to 0.02 cfs/ac
- Retention Area: Retain storm water runoff on-site
- Wood Hollow Drainage Area: Retain Runoff on-site until Wood Hollow is improved by the County. After that, may discharge at pre-development conditions (0.02 - 0.05 cfs/ac)
- Area South of Wood Hollow: Discharge at pre-development conditions (0.02 - 0.05 cfs/ac)

P:\Herriman\2018 Storm Drain Master Plan\4.0 GIS\4.4 Figures\Figure 7-2 - IFFP.mxd kballentine 12/17/2020

Table 7-1
Summary of Future Storm Drain Impact Fee Facility Improvements

Project Identifier	Total Estimated Cost	Existing Developed Area (ac)	10-yr Developed Area (ac)	Future Developed Area (ac)	Percentage of Cost Attributable to:			Cost Attributable to:		
					Existing Development	10-yr Growth	Future Development	Existing Development	10-yr Growth	Future Development
P 1	$ 248,724.00	0	65.2	72.1	0.0%	90.4%	100.0%	$ -	$ 224,855.33	$ 248,724.00
P 2	$ 96,118.65	0	96.0	124.5	0.0%	77.1%	100.0%	$ -	$ 74,065.09	$ 96,118.65
P 3	$ 196,767.23	0	30.8	52.4	0.0%	58.7%	100.0%	$ -	$ 115,484.83	$ 196,767.23
P 4	$ 179,659.82	0	30.8	52.4	0.0%	58.7%	100.0%	$ -	$ 105,444.31	$ 179,659.82
P 5	$ 114,968.16	0	96.0	124.5	0.0%	77.1%	100.0%	$ -	$ 88,589.74	$ 114,968.16
P 9	$ 63,918.45	0	65.2	72.1	0.0%	90.4%	100.0%	$ -	$ 57,784.55	$ 63,918.45
P 10	$ 133,281.45	0	30.8	52.4	0.0%	58.7%	100.0%	$ -	$ 78,224.34	$ 133,281.45
P 11	$ 180,674.55	111.3	3.5	399.0	27.9%	0.9%	72.1%	$ 50,371.00	$ 1,566.59	$ 130,303.55
P 48	$ 613,442.88	1.1	0	5.0	22.4%	1.6%	77.6%	$ 137,686.58	$ 9,834.76	$ 475,756.30
P 50	$ 212,905.80	1.1	9.8	15.1	7.4%	65.1%	92.6%	$ 15,791.69	$ 138,600.27	$ 197,114.11
P 51	$ 174,334.95	1.1	46.1	58.5	1.9%	78.8%	98.1%	$ 3,338.27	$ 137,375.58	$ 170,996.68
P 52	$ 219,961.98	7.0	171.4	1342.8	0.5%	12.8%	99.5%	$ 1,140.13	$ 28,070.84	$ 218,821.85
P 54	$ 162,614.79	0	158.2	209.8	0.1%	75.4%	99.9%	$ -	$ 122,598.70	$ 162,521.77
P 61	$ 1,554,513.12	182.8	0	215.0	85.0%	0.0%	15.0%	$ 1,321,636.20	$ -	$ 232,876.92
P 62	$ 285,307.52	96.4	0	145.4	66.3%	0.0%	33.7%	$ 189,243.39	$ -	$ 96,064.13
P 64	$ 68,179.50	0.0	198	315.0	0.0%	62.9%	100.0%	$ -	$ 42,855.69	$ 68,179.50
P 65	$ 68,179.50	0.0	198	315.0	0.0%	62.9%	100.0%	$ -	$ 42,855.69	$ 68,179.50
P 66	$ 68,179.50	0.0	198	315.0	0.0%	62.9%	100.0%	$ -	$ 42,855.69	$ 68,179.50
OC 1	$ 188,726.40	0	158.2	209.8	0.1%	75.4%	99.9%	$ -	$ 142,284.79	$ 188,618.44
OC 2	$ 60,879.43	0	175.6	227.9	0.2%	77.1%	99.8%	$ -	$ 46,909.25	$ 60,764.55
OC 3	$ 449,857.77	914.1	646.9	1721.9	53.1%	37.6%	46.9%	$ 238,809.13	$ 169,005.59	$ 211,048.65
OC 4	$ 353,487.17	66.9	41.4	108.3	61.8%	38.2%	38.2%	$ 218,346.63	$ 135,140.54	$ 135,140.54
OC 5	$ 424,157.99	610.0	508.7	1248.5	48.9%	40.7%	51.1%	$ 207,229.18	$ 172,833.67	$ 216,928.82
OC 6	$ 308,962.95	845.1	560.9	1552.1	54.4%	36.1%	45.6%	$ 168,221.03	$ 111,660.31	$ 140,741.91
OC 8	$ 153,126.09	0	175.6	227.9	0.2%	77.1%	99.8%	$ -	$ 117,987.79	$ 152,837.13
OC 9	$ 182,091.70	66.9	54.4	130.6	51.2%	41.7%	48.8%	$ 93,269.88	$ 75,882.00	$ 88,821.82
OC 13	$ 132,878.04	161.7	198.9	439.2	36.8%	45.3%	63.2%	$ 48,928.00	$ 60,165.31	$ 83,950.05
DB 2	$ 1,801,200.00	235.9	80.7	350.2	67.4%	23.0%	32.6%	$ 1,213,213.67	$ 415,052.20	$ 587,986.33
DB 3	$ 5,324,900.00	233.8	208.1	1440.2	16.2%	14.4%	83.8%	$ 864,608.53	$ 769,436.51	$ 4,460,291.47
							Total	**$ 4,771,833.30**	**$ 3,527,419.93**	**$ 9,249,561.26**

PROJECT COST ATTRIBUTABLE TO FUTURE GROWTH

To satisfy the requirements of state law, Table 4 provides a breakdown of the impact fee facility projects and the percentage of the project costs attributed to existing and future users. As defined in Section 11-36-304, the impact fee facilities plan should only include "the proportionate share of the costs of public facilities [that] are reasonably related to the new development activity."

For some projects, the division of costs between existing and future users is easy because 100 percent of the project costs can be attributed to one category or the other (e.g. infrastructure needed solely to serve new development can be 100 percent attributed to new growth). There are some projects that will benefit existing users (e.g., a new facility is being added that will be used to convey flow from both existing and future sources). An example of this is the situation where an existing development discharges into a small open ditch. The ditch may have capacity for the existing flows but is not capable of conveying future flows. In this case, no existing deficiencies exist at this location. However, with the construction of a new pipeline for future growth, it makes little sense for the City to maintain the ditch parallel to the new pipeline to convey existing flows. As a result, this plan identifies installation of a new pipeline with adequate capacity for both existing and future flows and abandonment of the existing ditch. In this type of situation, costs have been divided between the two categories based on the ratio of flow needed for each type of user. For example, if the peak flow through a proposed facility will save 4.0 acres of existing development and 10.0 acres at buildout, 40 percent of the costs of the project have been assigned to existing users with 60 percent assigned to future growth.

The method used to calculate flows associated with each type of development is as follows:

- **Calculate Potential Drainage Area of the Facilities –** The total drainage area contributing to each project at buildout was calculated.
- **Identify Existing Development –** Based on GIS records and available aerial photography, existing developed areas within each drainage area were identified.
- **Identify 10-year Growth** – Consistent with the growth memorandum prepared by BC&A dated August 12, 2019, the area associated with projected 10-year growth in each area has been calculated.
- **Calculate Percent of Capacity Used by Future Growth** – The percent of capacity being used in each facility was calculated by dividing the developable area of each type (existing, 10-year, and beyond 10-year) contributing to each facility by the total drainage area for the project.

It should be noted that Table 4 does not include bond costs related to paying for impact fee eligible improvements. These costs, if any, should be added as part of the impact fee analysis.

PROJECT COST ATTRIBUTABLE TO 10 YEAR GROWTH

Included in Table 4 is a breakdown of capacity associated with growth through the next 10 years and for growth beyond 10 years. A challenge with storm drain infrastructure is that it is not cost effective to add capacity in small increments. Once a pipeline is being built, it needs to be built to satisfy long-term capacity needs. As a result, the improvements proposed in the impact fee facility plan will include capacity for growth beyond the 10-year planning window. To most accurately evaluate the cost of providing service for growth during the next ten years, added consideration has been given to evaluating how much of each improvement will be used in the next 10 years. This has been done following the same methodology as described above.

BASIS OF CONSTRUCTION COST ESTIMATES

The costs of construction for projects to be completed within ten years have been estimated based on past BC&A experience with projects of a similar nature. Pipeline project costs are based on average per foot costs for pipes of a similar nature. Costs include consideration of other components of the storm drain system including manholes, catch basins, and surface restoration as appropriate for each project. For more detailed information on cost estimate for the recommended storm drain improvements, see the SDMP.

TOWN CENTER

It is important to note that the Town Center does not have recommended storm drain improvements to be constructed within the next 10-years. The projects identified on Table 4 only include storm drain facilities to be constructed in the Main Herriman Service Area.

SECTION 8 – ADDITIONAL CONSIDERATIONS

MANNER OF FINANCING (11-36A-302.2)

The City may fund the infrastructure identified in this IFFP through a combination of different revenue sources:

FEDERAL AND STATE GRANTS AND DONATIONS

Impact fees cannot reimburse costs funded or expected to be funded through federal grants and other funds that the District has received for capital improvements without an obligation to repay. Grants and donations are not currently contemplated in this analysis. If grants become available for constructing facilities, impact fees will need to be recalculated and an appropriate credit given. Any existing infrastructure funded through past grants will be removed from the system value during the impact fee analysis.

BONDS

None of the costs contained in this IFFP include the cost of bonding. The cost of bonding required to finance impact fee eligible improvements identified in the IFPP may be added to the calculation of the impact fee. This will be considered in the impact fee analysis.

INTERFUND LOANS

Because infrastructure must generally be built ahead of growth, there often arises situations in which projects must be funded ahead of expected impact fee revenues. In some cases, the solution to this issue will be bonding. In others, funds from existing user rate revenue will be loaned to the impact fee fund to complete initial construction of the project and will be reimbursed later as impact fees are received. Consideration of potential interfund loans will be included in the impact fee analysis and should also be considered in subsequent accounting of impact fee expenditures.

IMPACT FEES

It is recommended that impact fees be used to fund growth-related capital projects as they help to maintain the proposed level of service and prevent existing users from subsidizing the capital needs for new growth. Based on this IFFP, an impact fee analysis will be able to calculate a fair and legal fee that new growth should pay to fund the portion of the existing and new facilities that will benefit new development.

DEVELOPER DEDICATIONS AND EXACTIONS

Developer exactions are not the same as grants. Developer exactions may be considered in the inventory of current and future Storm Drain infrastructure. If a developer constructs facility or dedicates land within the development, the value of the dedication is credited against that particular developer's impact fee liability.

If the value of the dedication/exaction is less than the development's impact fee liability, the developer will owe the balance of the liability to the City. If the value of the improvements dedicated is worth more than the development's impact fee liability, the City must reimburse the difference to the developer from impact fee revenues collected from other developments.

It should be emphasized that the concept of impact fee credits pertains to system level improvements only. For project level improvement (i.e. projects not identified in the impact fee

facility plan), developers will be responsible for the construction of the improvements without credit against the impact fee.

No developer dedications are expected for system level Storm Drain infrastructure.

NECESSITY OF IMPROVEMENTS TO MAINTAIN LEVEL OF SERVICE (11-36A-302.3)

According to State statute, impact fees cannot be used to correct deficiencies in the system and must be necessary to maintain the proposed level of service established for all users. Only those projects or portions of projects that are required to maintain the proposed level of service for future growth have been included in this IFFP. This will result in an equitable fee as future users will not be expected to fund any portion of the projects that will benefit existing residents.

SCHOOL RELATED INFRASTRUCTURE (11-36A-302.2)

As part of the noticing and data collection process for this plan, information was gathered regarding future school district and charter school development. Where the City is aware of the planned location of a school, required public facilities to serve the school have been included in the impact fee analysis.

NOTICING AND ADOPTION REQUIREMENTS (11-36A-502)

The Impact Fees Act requires that entities must publish a notice of intent to prepare or modify any IFFP. If an entity prepares an independent IFFP rather than include a capital facilities element in the general plan, the actual IFFP must be adopted by enactment. Before the IFFP can be adopted, a reasonable notice of the public hearing must be published in a local newspaper at least 10 days before the actual hearing. A copy of the proposed IFFP must be made available in each public library within the City during the 10-day noticing period for public review and inspection. Utah Code requires that the City must post a copy of the ordinance in at least three places. These places may include the City offices and the public libraries within the City's jurisdiction. Following the 10-day noticing period, a public hearing will be held, after which the City may adopt, amend and adopt, or reject the proposed IFFP.

SECTION 9 – IMPACT FEE CERTIFICATION (11-36A-306.1)

This report has been prepared in accordance with Utah Code Title 11 Chapter 36a (the "Impact Fees Act"), which prescribes the laws pertaining to Utah municipal capital facilities plans and impact fee analyses. The accuracy of this report relies upon the planning, engineering, and other source data, which was provided by the City and their designees.

In accordance with Utah Code Annotated, 11-36a-306(1), Bowen Collins & Associates, makes the following certification:

I certify that this impact fee facility plan:

1. Includes only the cost of public facilities that are:
    a. allowed under the Impact Fees Act; and
    b. actually incurred; or
    c. projected to be incurred or encumbered within six years after the day on which each impact fee is paid;
2. Does not include:
    a. costs of operation and maintenance of public facilities;
    b. cost of qualifying public facilities that will raise the level of service for the facilities, through impact fees, above the level of service that is supported by existing residents;
    c. an expense for overhead, unless the expense is calculated pursuant to a methodology that is consistent with generally accepted cost accounting practices and the methodological standards set forth by the federal Office of Management and Budget for federal grant reimbursement; and
3. Complies in each and every relevant respect with the Impact Fees Act.

Kameron Ballentine

Dated: December 17, 2020

APPENDIX A
TOWN CENTER MASTER PLAN

M2 CIVIL
PLANNING & ENGINEERING
10421 S. Jordan Gateway Blvd. #200
South Jordan, UT 84095
801-316-3193 Telephone

March 15, 2018

Herriman City
5355 West Main Street
Herriman, Utah 84096

RE: HTC Pod 30 Storm Drain Submittal

Dear Jonathan,

An updated storm drain master plan was submitted as part of HTC Pod 25. Attached are the updated model results and exhibits to this master plan. The attached catchment area calculations show storm water volumes that are calculated based on the 100-year 24 hour storm. Curve Numbers are calculated based on weighted runoff from within each catchment area using this storm.

SWMM 5 software was used for modeling. The attached model results show that the designed storm water system will pass the peak flows from the 10-year 3 hour storm without flooding for the proposed and future build out conditions. The 100-year 3-hour storm results show that all existing ponds will have 1' or more of freeboard for the storm water that is routed through the piped network systems to and from these ponds. Salt Lake County informed me that the 100-year 3-hour storm provides the highest peak flows in their model for this portion of the valley. This is what they use in their model for everything that discharges to Rose Creek. The peak discharge from the 100-year 3-hour storm at the outfall into the UDOT retention pond is 39.11 cfs. The allowable discharge from all areas above this discharge point is 0.20 cfs per acre which equates to 55.84 cfs as shown on the catchment area spreadsheet.

If you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

Corwin Willmore P.E.

Attachments :
Herriman Towne Center Storm Water Catchment Areas Exhibit (05.03.17)
Herriman Towne Center Storm Water Network Exhibit (05.03.17)
Herriman Towne Center Catchment Areas Storm Drain Calculations
Pipe Network Design Table

Legend

Storm Water Catchment Areas

Land Cover Type

- Apartments (75% Impervious)
- Commercial (85% Impervious)
- Impervious Area
- MultiFamily (75% Impervious)
- Residential Lots

HERRIMAN MAIN ST

5600 West

13400 South

Mountain View Corridor

BACH

BCA

UEAST

UEAST2

U27

U25

U23

U19

PLAT E PHASE 1

PLAT E PHASE 2

PLAT B

PLAT H

POD 31

POD 32

POD41

POD 26 POND

TPOND

A25-17

A25-20

A25-21

A25-7

HH126

HH124

HH119

HH102

HH100

HH252

HH251

HH111

HH108

C205

C206

C207

C201

P30-5

P30-1

P30-9

E3-19

E3-13

E3-18

E3-12

E3-11

E3-10

C-1

C-2

C5

C6

C7

C8

C9

C10

C12

B-6

B-13

B-14

B-5

B-15

B-4

B-10

B-17

B-1

B-20

B-19

T320

T321

T329

T330

T240

T241

W2

W

TB

MC

9D

9E

9G

PH2-14

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26B

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HERRIMAN TOWNE CENTER

Storm Water Catchment Areas Exhibit (05.03.17)

0 200 400 800 1,200 1,600 Feet

HERRIMAN TOWNE CENTER
Storm Water Network (05.03.17)

0 187.5 375 750 1,125 1,500 Feet

Herriman Towne Center Catchment Area Storm Drain Calculations

Catchment Area	Trunkline	Catchment Area (SF)	Catchment Area (acre)	Impervious Area (SF)	Housing Lot Area (SF)	Landscaped Area (SF)	Weighted Rational C	100 Year 24-hour Impervious Runoff Volume (CF)	100 Year 24-hour Housing Area Runoff Volume (CF)	100 Year 24-hour Landscaped Area Runoff Volume (CF)	Total 100-Year 24-hour Storm Runoff Volume (CF)	Rational Method Runoff Volume (CF)	Total 100-Year 24-hour Storm Runoff Volume (acre-ft)	Total 100-Year 24-hour Storm Runoff (in.)	Back calculated CN	Subbasin Area Length (ft)	Subbasin Area Elevation Difference (ft)	Subbasin Area Width (ft)	Subbasin Average Slope (ft/ft)	Allowable Discharge at 0.2 cfs/acre (cfs)
2	BRUNDISI	92,844	2.131	77,191	0	15,653	0.79	15,054	0	845	15,900	15,717	0.37	2.06	95	530	8.5	175	0.0160	0.43
3	BRUNDISI	52,696	1.210	26,943	23,295	2,458	0.69	5,255	3,250	133	8,637	7,819	0.20	1.97	94	530	8	99	0.0151	0.24
8	COPELAND DRIVE (COPE)	11,753	0.270	6,253	0	5,500	0.60	1,220	0	297	1,517	1,500	0.03	1.55	89	125	0.7	94	0.0056	0.05
9	COPELAND DRIVE (COPE)	7,187	0.165	5,931	0	1,256	0.79	1,157	0	68	1,225	1,210	0.03	2.04	95	96	2	75	0.0208	0.03
C201	COPELAND DRIVE (COPE)	24,839	0.570	22,047	0	2,792	0.83	4,300	0	151	4,451	4,399	0.10	2.15	96	334	2	74	0.0060	0.11
C205	COPELAND DRIVE (COPE)	62,955	1.445	13,689	49,266	0	0.59	2,670	6,542	0	9,212	7,914	0.21	1.76	91.5	438	10	144	0.0228	0.29
C206	COPELAND DRIVE (COPE)	22,972	0.527	13,766	0	9,206	0.64	2,685	0	497	3,182	3,146	0.07	1.66	90.5	443	10	52	0.0226	0.11
C207	COPELAND DRIVE (COPE)	23,149	0.531	11,212	0	11,937	0.56	2,187	0	645	2,831	2,800	0.06	1.47	88	365	2	63	0.0055	0.11
10	FORT HERRIMAN 2 (FH2)	21,053	0.483	13,327	0	7,726	0.66	2,599	0	417	3,016	2,982	0.07	1.72	91.5	203	2.5	104	0.0123	0.10
11	FORT HERRIMAN 2 (FH2)	19,675	0.452	13,124	0	6,551	0.68	2,560	0	354	2,913	2,880	0.07	1.78	92	203	2.5	97	0.0123	0.09
12	FORT HERRIMAN 2 (FH2)	26,312	0.604	14,256	976	11,080	0.61	2,780	130	598	3,508	3,446	0.08	1.60	90	271	6	97	0.0221	0.12
13	FORT HERRIMAN 2 (FH2)	29,804	0.684	15,736	2,723	11,345	0.62	3,069	303	613	3,985	3,932	0.09	1.60	90	271	6	110	0.0221	0.14
14	FORT HERRIMAN 2 (FH2)	29,829	0.685	20,935	0	8,894	0.71	4,083	0	480	4,563	4,511	0.10	1.84	92.5	496	4	60	0.0081	0.14
15	FORT HERRIMAN 2 (FH2)	54,130	1.243	34,699	0	19,431	0.67	6,767	0	1,049	7,817	7,729	0.18	1.73	91.5	528	4	103	0.0076	0.25
21	FORT HERRIMAN 1 (FH1)	32,945	0.756	32,945	0	0	0.90	6,425	0	0	6,425	6,350	0.15	2.34	98	369	2.67	89	0.0072	0.15
22	FORT HERRIMAN 1 (FH1)	31,303	0.719	31,303	0	0	0.90	6,105	0	0	6,105	6,034	0.14	2.34	98	369	2.67	85	0.0072	0.14
24	HERRIMAN ROSE 3 (HR3)	33,088	0.760	27,294	0	5,794	0.79	5,323	0	313	5,636	5,571	0.13	2.04	95	478	11.5	69	0.0241	0.15
25	HERRIMAN ROSE 3 (HR3)	6,879	0.158	5,309	1,570	0	0.81	1,035	208	0	1,244	1,191	0.03	2.17	96	178	5	39	0.0281	0.03
26B	HERRIMAN ROSE 3 (HR3)	9,910	0.228	5,004	4,823	83	0.70	976	640	4	1,621	1,485	0.04	1.96	94	170	4	58	0.0235	0.05
27	HERRIMAN ROSE 3 (HR3)	65,920	1.513	40,308	0	25,612	0.65	7,861	0	1,383	9,244	9,141	0.21	1.68	91	569	12	116	0.0211	0.30
29	HERRIMAN ROSE 3 (HR3)	13,459	0.309	12,358	0	1,101	0.85	2,410	0	59	2,470	2,441	0.06	2.20	96.5	322	7	42	0.0217	0.06
31	HERRIMAN ROSE 3 (HR3)	226,740	5.205	195,798	0	30,942	0.81	38,186	0	1,671	39,857	39,397	0.91	2.11	95.5	359	8	632	0.0223	1.04
34	HERRIMAN ROSE 3 (HR3)	59,008	1.355	19,110	35,951	3,947	0.61	3,727	4,774	213	8,714	7,745	0.20	1.77	92	446	6	132	0.0135	0.27
35	HERRIMAN ROSE 3 (HR3)	29,917	0.687	29,917	0	0	0.90	5,835	0	0	5,835	5,767	0.13	2.34	97.5	493	7	61	0.0142	0.14
46	HERRIMAN ROSE 3 (HR3)	8,827	0.203	8,827	0	0	0.90	1,722	0	0	1,722	1,701	0.04	2.34	98	193	6	46	0.0311	0.04
47	HERRIMAN ROSE 3 (HR3)	68,786	1.579	60,931	0	7,855	0.83	11,883	0	424	12,307	12,165	0.28	2.15	96	193	6	356	0.0311	0.32
49	HERRIMAN ROSE 3 (HR3)	60,915	1.398	6,698	0	54,217	0.32	1,306	0	2,928	4,234	4,194	0.10	0.83	78	252	4	242	0.0159	0.28
53	FORT HERRIMAN 3 (FH3)	24,089	0.553	24,089	0	0	0.90	4,698	0	0	4,698	4,643	0.11	2.34	98	410	5	59	0.0122	0.11
54	FORT HERRIMAN 3 (FH3)	23,696	0.544	23,696	0	0	0.90	4,621	0	0	4,621	4,567	0.11	2.34	98	410	5	58	0.0122	0.11
B-1	PARKVIEW TOWNS 1	21,456	0.493	13,227	0	8,229	0.65	2,580	0	444	3,024	2,990	0.07	1.69	91	197	3.5	109	0.0178	0.10
B-4	PARKVIEW TOWNS 1	8,505	0.195	6,770	0	1,735	0.77	1,320	0	94	1,414	1,398	0.03	2.00	94.5	103	2.5	83	0.0243	0.04
B-5	PARKVIEW TOWNS 1	34,686	0.796	22,973	0	11,713	0.68	4,480	0	633	5,113	5,055	0.12	1.77	92	413	7.5	84	0.0182	0.16
B-6	PARKVIEW TOWNS 1	9,962	0.229	5,323	0	4,639	0.60	1,038	0	251	1,289	1,274	0.03	1.55	89	205	4	49	0.0195	0.05
B-10	PARKVIEW TOWNS 1	11,762	0.270	9,122	0	2,640	0.75	1,779	0	143	1,922	1,900	0.04	1.96	94	233	5	50	0.0215	0.05
B-13	PARKVIEW TOWNS 2	57,518	1.320	26,229	0	31,289	0.55	5,115	0	1,690	6,805	6,731	0.16	1.42	87.5	353	9.5	163	0.0269	0.26
B-14	PARKVIEW TOWNS 2	18,755	0.431	9,920	0	8,835	0.59	1,935	0	477	2,412	2,385	0.06	1.54	89	118	1	159	0.0085	0.09
B-15	PARKVIEW TOWNS 2	17,049	0.391	11,838	0	5,211	0.70	2,309	0	281	2,590	2,561	0.06	1.82	92.5	237	2	72	0.0084	0.08
B-17	PARKVIEW TOWNS 2	27,878	0.640	18,318	0	9,560	0.68	3,573	0	516	4,089	4,043	0.09	1.76	92	254	2	110	0.0079	0.13
B-19	PARKVIEW TOWNS 2	6,362	0.146	4,006	0	2,356	0.66	781	0	127	909	898	0.02	1.71	91	99	3	64	0.0303	0.03
B-20	PARKVIEW TOWNS 2	7,703	0.177	6,881	0	822	0.83	1,342	0	44	1,386	1,370	0.03	2.16	96	125	4	62	0.0320	0.04
C-1	GREENWOOD VILLAGE	67,114	1.541	14,661	52,441	12	0.59	2,859	5,834	1	8,694	8,442	0.20	1.55	89.5	510	13	132	0.0255	0.31
C-2	GREENWOOD VILLAGE	13,583	0.312	8,357	5,210	16	0.75	1,630	580	1	2,210	2,170	0.05	1.95	94	313	8.5	43	0.0272	0.06
C6	GREENWOOD VILLAGE	53,756	1.234	9,157	44,598	1	0.57	1,786	4,962	0	6,748	6,541	0.15	1.51	88.5	358	4	150	0.0112	0.25
C5	GREENWOOD VILLAGE	30,673	0.704	14,847	13,380	2,446	0.67	2,896	1,489	132	4,516	4,425	0.10	1.77	92	365	4.5	84	0.0123	0.14
C7	GREENWOOD VILLAGE	9,584	0.220	6,685	0	2,899	0.70	1,304	0	157	1,460	1,444	0.03	1.83	92.5	111	2.5	86	0.0225	0.04
C8	GREENWOOD VILLAGE	2,973	0.068	1,782	0	1,191	0.64	348	0	64	412	407	0.01	1.66	90.5	64	1.5	46	0.0234	0.01
C9	GREENWOOD VILLAGE	50,836	1.167	39,190	7,627	4,019	0.79	7,643	849	217	8,709	8,586	0.20	2.06	95	488	3.5	104	0.0072	0.23
C10	GREENWOOD VILLAGE	106,175	2.437	19,038	87,120	17	0.57	3,713	9,692	1	13,406	13,000	0.31	1.52	88.5	377	2	282	0.0053	0.49
C12	HERRIMAN ROSE 3 (HR3)	47,784	1.097	11,252	36,532	0	0.59	2,194	4,064	0	6,259	6,081	0.14	1.57	89.5	169	3	283	0.0178	0.22
TPOND	TOWERS PHASE 1	1,365,748	31.353	714,552	287,830	363,366	0.64	139,358	38,224	19,622	197,203	188,007	4.53	1.73	91.5	1750	36	780	0.0206	6.27
T237	TOWERS PHASE 1	5,943	0.136	3,898	0	2,045	0.68	760	0	110	871	861	0.02	1.76	91.5	78	1	76	0.0128	0.03

Herriman Towne Center Catchment Area Storm Drain Calculations

Catchment Area	Trunkline	Catchment Area (SF)	Catchment Area (acre)	Impervious Area (SF)	Housing Lot Area (SF)	Landscaped Area (SF)	Weighted Rational C	100 Year 24-hour Impervious Runoff Volume (CF)	100 Year 24-hour Housing Area Runoff Volume (CF)	100 Year 24-hour Landscaped Area Runoff Volume (CF)	Total 100-Year 24-hour Storm Runoff Volume (CF)	Rational Method Runoff Volume (CF)	Total 100-Year 24-hour Storm Runoff Volume (acre-ft)	Total 100-Year 24-hour Storm Runoff (in.)	Back calculated CN	Subbasin Area Length (ft)	Subbasin Area Elevation Difference (ft)	Subbasin Area Width (ft)	Subbasin Average Slope (ft/ft)	Allowable Discharge at 0.2 cfs/acre (cfs)
T240	TOWERS PHASE 1	40,309	0.925	33,510	0	6,799	0.79	6,535	0	367	6,903	6,823	0.16	2.05	95	510	6.5	79	0.0127	0.19
T241	TOWERS PHASE 1	43,507	0.999	40,574	0	2,933	0.86	7,913	0	158	8,071	7,978	0.19	2.23	96.5	510	6.5	85	0.0127	0.20
T320	TOWERS PHASE 1	44,885	1.030	26,907	0	17,978	0.64	5,248	0	971	6,218	6,149	0.14	1.66	90.5	475	3.5	94	0.0074	0.21
T321	TOWERS PHASE 1	13,328	0.306	11,993	0	1,335	0.83	2,339	0	72	2,411	2,383	0.06	2.17	96	298	2	45	0.0067	0.06
T324	TOWERS PHASE 1	20,648	0.474	17,432	0	3,216	0.80	3,400	0	174	3,573	3,532	0.08	2.08	95	448	7	46	0.0156	0.09
T325	TOWERS PHASE 1	14,209	0.326	11,451	0	2,758	0.77	2,233	0	149	2,382	2,355	0.05	2.01	94.5	309	6	46	0.0194	0.07
T329	TOWERS PHASE 1	24,530	0.563	20,441	0	4,089	0.79	3,987	0	221	4,207	4,159	0.10	2.06	95	470	15	52	0.0319	0.11
T330	TOWERS PHASE 1	24,394	0.560	21,753	0	2,641	0.83	4,242	0	143	4,385	4,334	0.10	2.16	96	510	17	48	0.0333	0.11
T363	TOWERS PHASE 1	19,610	0.450	19,610	0	0	0.90	3,825	0	0	3,825	3,780	0.09	2.34	98	450	4	44	0.0089	0.09
HH243	HORIZON HEIGHTS PH1-3	21,452	0.492	20,856	0	596	0.88	4,068	0	32	4,100	4,052	0.09	2.29	97.5	390	3.5	55	0.0090	0.10
HH244	HORIZON HEIGHTS PH1-3	3,194	0.073	3,042	0	152	0.87	593	0	8	601	594	0.01	2.26	97	70	0.75	46	0.0107	0.01
HH247	HORIZON HEIGHTS PH1-3	15,256	0.350	15,029	0	227	0.89	2,931	0	12	2,943	2,909	0.07	2.32	97.5	330	3	46	0.0091	0.07
HH245	HORIZON HEIGHTS PH1-3	18,860	0.433	17,282	0	1,578	0.85	3,370	0	85	3,456	3,416	0.08	2.20	96.5	350	4	54	0.0114	0.09
HH249	HORIZON HEIGHTS PH1-3	8,782	0.202	6,284	0	2,498	0.72	1,226	0	135	1,360	1,345	0.03	1.86	93	160	2.5	55	0.0156	0.04
HH250	HORIZON HEIGHTS PH1-3	6,270	0.144	4,790	0	1,480	0.75	934	0	80	1,014	1,003	0.02	1.94	94	75	0.5	84	0.0067	0.03
HH251	HORIZON HEIGHTS PH1-3	41,466	0.952	12,144	27,401	1,921	0.61	2,368	3,639	104	6,111	5,378	0.14	1.77	92	240	5	173	0.0208	0.19
HH252	HORIZON HEIGHTS PH1-3	39,570	0.908	14,892	22,888	1,790	0.64	2,904	3,193	97	6,194	5,417	0.14	1.88	93	275	7	144	0.0255	0.18
HH253	HORIZON HEIGHTS PH1-3	18,254	0.419	7,243	9,673	1,338	0.64	1,413	1,350	72	2,834	2,504	0.07	1.86	93	284	7	64	0.0246	0.08
HH254	HORIZON HEIGHTS PH1-3	6,945	0.159	5,820	0	1,125	0.79	1,135	0	61	1,196	1,182	0.03	2.07	95	230	1	30	0.0043	0.03
HH255	HORIZON HEIGHTS PH1-3	6,817	0.156	6,024	0	793	0.82	1,175	0	43	1,218	1,204	0.03	2.14	96	170	2.5	40	0.0147	0.03
HH256	HORIZON HEIGHTS PH1-3	6,078	0.140	5,983	0	95	0.89	1,167	0	5	1,172	1,158	0.03	2.31	97.5	170	1.5	36	0.0088	0.03
HH262	HORIZON HEIGHTS PH1-3	10,340	0.237	8,016	0	2,324	0.75	1,563	0	125	1,689	1,670	0.04	1.96	94	180	2	57	0.0111	0.05
HH272	HORIZON HEIGHTS PH1-3	29,599	0.679	11,658	0	17,941	0.51	2,274	0	969	3,242	3,208	0.07	1.31	86	490	2.5	60	0.0051	0.14
HH273	HORIZON HEIGHTS PH1-3	5,460	0.125	2,997	0	2,463	0.61	584	0	133	718	710	0.02	1.58	89.5	50	1	109	0.0200	0.03
HH274	HORIZON HEIGHTS PH1-3	22,315	0.512	11,165	0	11,150	0.58	2,177	0	602	2,780	2,749	0.06	1.49	88.5	210	3	106	0.0143	0.10
HH276	HORIZON HEIGHTS PH1-3	6,152	0.141	6,152	0	0	0.90	1,200	0	0	1,200	1,186	0.03	2.34	98	170	2	36	0.0118	0.03
HH297	HORIZON HEIGHTS PH1-3	2,824	0.065	1,304	0	1,520	0.55	254	0	82	336	333	0.01	1.43	87.5	60	1	47	0.0167	0.01
HH298	HORIZON HEIGHTS PH1-3	5,035	0.116	2,032	0	3,003	0.51	396	0	162	558	552	0.01	1.33	86	50	1	101	0.0200	0.02
HH100	HORIZON HEIGHTS PH4-5	13,281	0.305	9,474	0	3,807	0.71	1,848	0	206	2,053	2,030	0.05	1.86	93	160	2.5	83	0.0156	0.06
HH101	HORIZON HEIGHTS PH4-5	3,574	0.082	2,692	0	882	0.74	525	0	48	573	566	0.01	1.92	93.5	80	2	45	0.0250	0.02
HH102	HORIZON HEIGHTS PH4-5	27,240	0.625	22,081	0	5,159	0.78	4,306	0	279	4,585	4,532	0.11	2.02	94.5	295	1.5	92	0.0051	0.13
HH103	HORIZON HEIGHTS PH4-5	10,152	0.233	7,501	0	2,651	0.73	1,463	0	143	1,606	1,588	0.04	1.90	93.5	350	2	29	0.0057	0.05
HH107	HORIZON HEIGHTS PH4-5	10,710	0.246	8,611	0	2,099	0.77	1,679	0	113	1,793	1,772	0.04	2.01	94.5	120	3.5	89	0.0292	0.05
HH108	HORIZON HEIGHTS PH4-5	26,814	0.616	19,548	0	7,266	0.72	3,812	0	392	4,205	4,157	0.10	1.88	93	350	6	77	0.0171	0.12
HH110	HORIZON HEIGHTS PH4-5	6,741	0.155	5,187	0	1,554	0.75	1,012	0	84	1,096	1,083	0.03	1.95	94	250	2.5	27	0.0100	0.03
HH111	HORIZON HEIGHTS PH4-5	44,426	1.020	32,139	0	12,287	0.72	6,268	0	664	6,932	6,853	0.16	1.87	93	250	2.5	178	0.0100	0.20
HH112	HORIZON HEIGHTS PH4-5	8,968	0.206	7,773	0	1,195	0.81	1,516	0	65	1,580	1,562	0.04	2.11	95.5	120	3.5	75	0.0292	0.04
HH115	HORIZON HEIGHTS PH4-5	9,097	0.209	7,864	0	1,233	0.81	1,534	0	67	1,600	1,582	0.04	2.11	95.5	120	3	76	0.0250	0.04
HH119	HORIZON HEIGHTS PH4-5	47,019	1.079	33,041	0	13,978	0.71	6,444	0	755	7,199	7,117	0.17	1.84	92.5	170	1	277	0.0059	0.22
HH121	HORIZON HEIGHTS PH4-5	10,339	0.237	8,235	0	2,104	0.77	1,606	0	114	1,720	1,700	0.04	2.00	94.5	120	3	86	0.0250	0.05
HH123	HORIZON HEIGHTS PH4-5	10,059	0.231	8,132	0	1,927	0.78	1,586	0	104	1,690	1,671	0.04	2.02	94.5	120	4	84	0.0333	0.05
HH124	HORIZON HEIGHTS PH4-5	33,073	0.759	27,393	0	5,680	0.79	5,342	0	307	5,649	5,584	0.13	2.05	95	290	3	114	0.0103	0.15
HH125	HORIZON HEIGHTS PH4-5	7,781	0.179	6,018	0	1,763	0.75	1,174	0	95	1,269	1,254	0.03	1.96	94	290	3	27	0.0103	0.04
HH126	HORIZON HEIGHTS PH4-5	34,956	0.802	25,745	0	9,211	0.73	5,021	0	497	5,518	5,456	0.13	1.89	93.5	180	2	194	0.0111	0.16
HH127	HORIZON HEIGHTS PH4-5	9,835	0.226	8,031	0	1,804	0.78	1,566	0	97	1,664	1,645	0.04	2.03	94.5	120	3	82	0.0250	0.05
HH129	HORIZON HEIGHTS PH4-5	5,265	0.121	3,876	0	1,389	0.73	756	0	75	831	821	0.02	1.89	93.5	180	2	29	0.0111	0.02
U1	U-ROAD	14,476	0.332	13,768	0	708	0.87	2,685	0	38	2,723	2,692	0.06	2.26	97	260	3	56	0.0115	0.07
U2	U-ROAD	13,133	0.301	12,361	0	772	0.86	2,411	0	42	2,452	2,424	0.06	2.24	97	260	2	51	0.0077	0.06
U3	U-ROAD	9,661	0.222	7,689	0	1,972	0.77	1,500	0	106	1,606	1,588	0.04	1.99	94.5	630	8	15	0.0127	0.04
U4	U-ROAD	11,436	0.263	10,362	0	1,074	0.84	2,021	0	58	2,079	2,055	0.05	2.18	96.5	190	1.5	60	0.0079	0.05
U5	U-ROAD	9,725	0.223	8,679	0	1,046	0.83	1,693	0	56	1,749	1,729	0.04	2.16	96	200	2	49	0.0100	0.04

Herriman Towne Center Catchment Area Storm Drain Calculations

Catchment Area	Trunkline	Catchment Area (SF)	Catchment Area (acre)	Impervious Area (SF)	Housing Lot Area (SF)	Landscaped Area (SF)	Weighted Rational C	100 Year 24-hour Impervious Runoff Volume (CF)	100 Year 24-hour Housing Area Runoff Volume (CF)	100 Year 24-hour Landscaped Area Runoff Volume (CF)	Total 100-Year 24-hour Storm Runoff Volume (CF)	Rational Method Runoff Volume (CF)	Total 100-Year 24-hour Storm Runoff Volume (acre-ft)	Total 100-Year 24-hour Storm Runoff (in.)	Back calculated CN	Subbasin Area Length (ft)	Subbasin Area Elevation Difference (ft)	Subbasin Area Width (ft)	Subbasin Average Slope (ft/ft)	Allowable Discharge at 0.2 cfs/acre (cfs)
U6	U-ROAD	13,472	0.309	10,806	0	2,666	0.77	2,107	0	144	2,251	2,226	0.05	2.01	94.5	540	8.5	25	0.0157	0.06
U7	U-ROAD	14,251	0.327	13,033	0	1,218	0.84	2,542	0	66	2,608	2,577	0.06	2.20	96.5	240	2	59	0.0083	0.07
U8	U-ROAD	7,865	0.181	7,585	0	280	0.88	1,479	0	15	1,494	1,477	0.03	2.28	97	180	1.5	44	0.0083	0.04
U9	U-ROAD	27,491	0.631	11,628	0	15,863	0.52	2,268	0	857	3,124	3,091	0.07	1.36	86.5	340	9	81	0.0265	0.13
U10	U-ROAD	9,703	0.223	7,472	0	2,231	0.75	1,457	0	120	1,578	1,560	0.04	1.95	94	160	1.5	61	0.0094	0.04
U11	U-ROAD	7,673	0.176	7,396	0	277	0.88	1,442	0	15	1,457	1,440	0.03	2.28	97	180	1.5	43	0.0083	0.04
U12	U-ROAD	19,146	0.440	11,327	0	7,819	0.63	2,209	0	422	2,631	2,602	0.06	1.65	90.5	270	2.5	71	0.0093	0.09
U14	U-ROAD	8,074	0.185	7,689	0	385	0.87	1,500	0	21	1,520	1,503	0.03	2.26	97	180	2	45	0.0111	0.04
U15	U-ROAD	10,902	0.250	7,250	0	3,652	0.68	1,414	0	197	1,611	1,593	0.04	1.77	92	150	2	73	0.0133	0.05
U16	U-ROAD	7,229	0.166	6,837	0	392	0.86	1,333	0	21	1,355	1,339	0.03	2.25	97	160	2	45	0.0125	0.03
U17	U-ROAD	7,866	0.181	7,601	0	265	0.88	1,482	0	14	1,497	1,479	0.03	2.28	97	165	2	48	0.0121	0.04
U19	U-ROAD	47,830	1.098	40,496	0	7,334	0.80	7,898	0	396	8,294	8,198	0.19	2.08	95.5	240	3	199	0.0125	0.22
U20	U-ROAD	9,730	0.223	8,936	0	794	0.85	1,743	0	43	1,786	1,765	0.04	2.20	96.5	210	3	46	0.0143	0.04
U22	U-ROAD	11,765	0.270	10,299	0	1,466	0.82	2,009	0	79	2,088	2,064	0.05	2.13	95.5	205	2	57	0.0098	0.05
U23	U-ROAD	41,158	0.945	35,756	0	5,402	0.81	6,973	0	292	7,265	7,181	0.17	2.12	95.5	205	2	201	0.0098	0.19
U24	U-ROAD	8,537	0.196	7,528	0	1,009	0.82	1,468	0	54	1,523	1,505	0.03	2.14	96	170	1.5	50	0.0088	0.04
U25	U-ROAD	46,490	1.067	40,209	0	6,281	0.81	7,842	0	339	8,181	8,087	0.19	2.11	95.5	185	1.5	251	0.0081	0.21
U26	U-ROAD	12,787	0.294	12,025	0	762	0.86	2,345	0	41	2,386	2,359	0.05	2.24	97	250	2	51	0.0080	0.06
U27	U-ROAD	109,556	2.515	81,891	6,222	21,443	0.75	15,971	826	1,158	17,955	17,599	0.41	1.97	94	400	2	274	0.0050	0.50
CH200	U-ROAD	9,996	0.229	7,471	0	2,525	0.74	1,457	0	136	1,593	1,575	0.04	1.91	93.5	133	3	75	0.0226	0.05
CH201	U-ROAD	2,381	0.055	2,381	0	0	0.90	464	0	0	464	459	0.01	2.34	98	88	2	27	0.0227	0.01
CH202	U-ROAD	14,670	0.337	12,779	0	1,891	0.82	2,492	0	102	2,594	2,564	0.06	2.12	95.5	111	3	132	0.0270	0.07
CH203	U-ROAD	7,855	0.180	7,433	0	422	0.87	1,450	0	23	1,472	1,455	0.03	2.25	97	125	1.5	63	0.0120	0.04
CH205	U-ROAD	15,137	0.347	4,754	0	10,383	0.45	927	0	561	1,488	1,472	0.03	1.18	84	102	3	148	0.0294	0.07
CH206	U-ROAD	16,297	0.374	13,886	0	2,411	0.80	2,708	0	130	2,838	2,806	0.07	2.09	95.5	150	4	109	0.0267	0.07
CH207	U-ROAD	4,722	0.108	4,515	0	207	0.87	881	0	11	892	881	0.02	2.27	97	76	2	62	0.0263	0.02
CH209	U-ROAD	7,495	0.172	7,495	0	0	0.90	1,462	0	0	1,462	1,445	0.03	2.34	98	66	1.5	114	0.0227	0.03
CH211	U-ROAD	19,347	0.444	17,200	0	2,147	0.83	3,354	0	116	3,470	3,430	0.08	2.15	96	160	2	121	0.0125	0.09
CH213	U-ROAD	5,028	0.115	5,028	0	0	0.90	981	0	0	981	969	0.02	2.34	98	66	1.5	76	0.0227	0.02
CH214	U-ROAD	20,083	0.461	17,017	0	3,066	0.80	3,319	0	166	3,484	3,444	0.08	2.08	95.5	219	4	92	0.0183	0.09
CH216	U-ROAD	13,574	0.312	11,825	0	1,749	0.82	2,306	0	94	2,401	2,373	0.06	2.12	95.5	121	4	112	0.0331	0.06
CH218	U-ROAD	2,046	0.047	1,464	0	582	0.72	286	0	31	317	313	0.01	1.86	93	44	1	47	0.0227	0.01
CH219	U-ROAD	2,514	0.058	2,204	0	310	0.82	430	0	17	447	441	0.01	2.13	96	82	3	31	0.0366	0.01
CH220	U-ROAD	30,549	0.701	26,651	0	3,898	0.82	5,198	0	210	5,408	5,346	0.12	2.12	95.5	152	5	201	0.0329	0.14
CH221	U-ROAD	6,140	0.141	5,289	0	851	0.81	1,032	0	46	1,077	1,065	0.02	2.11	95.5	95	4	65	0.0421	0.03
CH222	U-ROAD	6,366	0.146	5,552	0	814	0.82	1,083	0	44	1,127	1,114	0.03	2.12	95.5	100	3	64	0.0300	0.03
CH224	U-ROAD	4,883	0.112	4,883	0	0	0.90	952	0	0	952	941	0.02	2.34	98	35	1	140	0.0286	0.02
CH226	U-ROAD	5,004	0.115	5,004	0	0	0.90	976	0	0	976	965	0.02	2.34	98	66	1.5	76	0.0227	0.02
CH227	U-ROAD	1,707	0.039	0	0	1,707	0.25	0	0	92	92	91	0.00	0.65	74	20	0.5	85	0.0250	0.01
CH228	U-ROAD	2,131	0.049	0	0	2,131	0.25	0	0	115	115	114	0.00	0.65	74	35	1	61	0.0286	0.01
CH229	U-ROAD	7,222	0.166	7,222	0	0	0.90	1,408	0	0	1,408	1,392	0.03	2.34	98	119	3	61	0.0252	0.03
CH230	U-ROAD	12,269	0.282	11,713	0	556	0.87	2,284	0	30	2,314	2,287	0.05	2.26	97	177	4	69	0.0226	0.06
CH233	U-ROAD	63,675	1.462	37,261	0	26,414	0.63	7,267	0	1,426	8,693	8,596	0.20	1.64	90.5	229	5	278	0.0218	0.29
CH235	U-ROAD	32,732	0.751	29,918	0	2,814	0.84	5,835	0	152	5,987	5,917	0.14	2.19	96.5	206	6	159	0.0291	0.15
CH236	U-ROAD	5,084	0.117	3,376	0	1,708	0.68	658	0	92	751	742	0.02	1.77	92	144	5	35	0.0347	0.02

Herriman Towne Center Catchment Area Storm Drain Calculations

Catchment Area	Trunkline	Catchment Area (SF)	Catchment Area (acre)	Impervious Area (SF)	Housing Lot Area (SF)	Landscaped Area (SF)	Weighted Rational C	100 Year 24-hour Impervious Runoff Volume (CF)	100 Year 24-hour Housing Area Runoff Volume (CF)	100 Year 24-hour Landscaped Area Runoff Volume (CF)	Total 100-Year 24-hour Storm Runoff Volume (CF)	Rational Method Runoff Volume (CF)	Total 100-Year 24-hour Storm Runoff Volume (acre-ft)	Total 100-Year 24-hour Storm Runoff (in.)	Back calculated CN	Subbasin Area Length (ft)	Subbasin Area Elevation Difference (ft)	Subbasin Area Width (ft)	Subbasin Average Slope (ft/ft)	Allowable Discharge at 0.2 cfs/acre (cfs)
CH237	U-ROAD	46,480	1.067	35,956	0	10,524	0.75	7,012	0	568	7,581	7,494	0.17	1.96	94	272	4	171	0.0147	0.21
CH238	U-ROAD	10,022	0.230	6,894	0	3,128	0.70	1,345	0	169	1,513	1,496	0.03	1.81	92.5	123	3	81	0.0244	0.05
CH239	U-ROAD	25,573	0.587	10,775	0	14,798	0.52	2,101	0	799	2,901	2,869	0.07	1.36	86.5	296	8	86	0.0270	0.12
CH240	U-ROAD	2,741	0.063	1,968	0	773	0.72	384	0	42	426	421	0.01	1.86	93	49	1	56	0.0204	0.01
CH241	U-ROAD	26,416	0.606	21,838	0	4,578	0.79	4,259	0	247	4,506	4,454	0.10	2.05	95	162	4	163	0.0247	0.12
CH242	U-ROAD	9,358	0.215	2,479	0	6,879	0.42	483	0	371	855	846	0.02	1.10	82.5	64	4	146	0.0625	0.04
CH243	U-ROAD	3,830	0.088	3,830	0	0	0.90	747	0	0	747	738	0.02	2.34	98	37	1	104	0.0270	0.02
CH246	U-ROAD	2,521	0.058	772	0	1,749	0.45	151	0	94	245	242	0.01	1.17	83.5	26	0.5	97	0.0192	0.01
CH247	U-ROAD	845	0.019	439	0	406	0.59	86	0	22	108	106	0.00	1.53	89	12	0.5	70	0.0417	0.00
CH248	U-ROAD	31,347	0.720	23,384	0	7,963	0.73	4,561	0	430	4,991	4,934	0.11	1.91	93.5	143	1	219	0.0070	0.14
CH249	U-ROAD	99,865	2.293	4,821	0	95,044	0.28	940	0	5,132	6,073	6,018	0.14	0.73	75.5	400	7	250	0.0175	0.46
CH250	U-ROAD	26,206	0.602	8,284	0	17,922	0.46	1,616	0	968	2,583	2,556	0.06	1.18	84	370	8	71	0.0216	0.12
E3-11	WEATHERFORD LANE	6,431	0.148	4,464	1,967	0	0.78	871	261	0	1,132	1,071	0.03	2.11	95.5	123	1	52	0.0081	0.03
E3-12	WEATHERFORD LANE	76,681	1.760	10,128	66,544	9	0.55	1,975	8,837	0	10,813	9,078	0.25	1.69	91	419	2	183	0.0048	0.35
E3-13	WEATHERFORD LANE	39,414	0.905	12,008	27,389	17	0.62	2,342	3,637	1	5,980	5,248	0.14	1.82	92.5	445	2	89	0.0045	0.18
E3-18	WEATHERFORD LANE	9,960	0.229	5,660	4,269	31	0.73	1,104	567	2	1,672	1,550	0.04	2.02	94.5	188	2	53	0.0106	0.05
E3-19	WEATHERFORD LANE	70,553	1.620	12,722	57,777	54	0.57	2,481	7,673	3	10,157	8,642	0.23	1.73	91.5	182	2.5	388	0.0137	0.32
P8-200	POD 8	21,150	0.486	19,549	0	1,601	0.85	3,813	0	86	3,899	3,854	0.09	2.21	96.5	418	6	51	0.0144	0.10
P8-202	POD 8	19,908	0.457	19,045	0	863	0.87	3,714	0	47	3,761	3,717	0.09	2.27	97	373	6	53	0.0161	0.09
P8-204	POD 8	54,115	1.242	36,768	0	17,347	0.69	7,171	0	937	8,108	8,016	0.19	1.80	92	341	6	159	0.0176	0.25
P8-206	POD 8	39,644	0.910	31,253	0	8,391	0.76	6,095	0	453	6,548	6,473	0.15	1.98	94	464	8	85	0.0172	0.18
P8-207	POD 8	22,902	0.526	22,145	0	757	0.88	4,319	0	41	4,360	4,309	0.10	2.28	97	398	2	58	0.0050	0.11
P8-247	POD 8	7,435	0.171	5,457	0	1,978	0.73	1,064	0	107	1,171	1,158	0.03	1.89	93	247	1.5	30	0.0061	0.03
P8-248	POD 8	6,493	0.149	4,318	0	2,175	0.68	842	0	117	960	949	0.02	1.77	92	139	1.5	47	0.0108	0.03
P8-249	POD 8	19,321	0.444	10,810	0	8,511	0.61	2,108	0	460	2,568	2,539	0.06	1.59	90	425	7.5	45	0.0176	0.09
PH2-1	BRUNDISI	57,758	1.326	46,771	0	10,987	0.78	9,122	0	593	9,715	9,603	0.22	2.02	94.5	432	3	134	0.0069	0.27
PH2-2	BRUNDISI	13,337	0.306	13,337	0	0	0.90	2,601	0	0	2,601	2,571	0.06	2.34	98	432	3	31	0.0069	0.06
PH2-4	BRUNDISI	57,621	1.323	46,106	0	11,515	0.77	8,992	0	622	9,614	9,503	0.22	2.00	94.5	400	2	144	0.0050	0.26
PH2-5	BRUNDISI	11,980	0.275	11,980	0	0	0.90	2,336	0	0	2,336	2,309	0.05	2.34	98	400	2	30	0.0050	0.06
PH2-6	BRUNDISI	43,663	1.002	35,394	0	8,269	0.78	6,903	0	447	7,349	7,265	0.17	2.02	94.5	216	1	202	0.0046	0.20
PH2-7	BRUNDISI	3,716	0.085	2,788	0	928	0.74	544	0	50	594	587	0.01	1.92	93.5	93	0.5	40	0.0054	0.02
PH2-9A	BERRY CREEK (BC)	18,171	0.417	8,330	8,506	1,335	0.67	1,625	1,187	72	2,883	2,588	0.07	1.90	93.5	290	6	63	0.0207	0.08
PH2-9C	BERRY CREEK (BC)	8,038	0.185	5,987	0	2,051	0.73	1,168	0	111	1,278	1,264	0.03	1.91	93.5	120	2.5	67	0.0208	0.04
9D	BERRY CREEK (BC)	8,083	0.186	5,578	1,206	1,299	0.74	1,088	168	70	1,326	1,274	0.03	1.97	94	190	4	43	0.0211	0.04
9E	BERRY CREEK (BC)	35,148	0.807	29,010	0	6,138	0.79	5,658	0	331	5,989	5,920	0.14	2.04	95	290	3	121	0.0103	0.16
9F	BERRY CREEK (BC)	7,799	0.179	5,969	0	1,830	0.75	1,164	0	99	1,263	1,249	0.03	1.94	94	290	3	27	0.0103	0.04
9G	BERRY CREEK (BC)	42,000	0.964	28,141	0	13,859	0.69	5,488	0	748	6,237	6,166	0.14	1.78	92	280	2.5	150	0.0089	0.19
9H	BERRY CREEK (BC)	8,311	0.191	5,914	0	2,397	0.71	1,153	0	129	1,283	1,268	0.03	1.85	93	280	2.5	30	0.0089	0.04
PH2-10	BERRY CREEK (BC)	41,426	0.951	36,265	0	5,161	0.82	7,073	0	279	7,351	7,266	0.17	2.13	95.5	478	9	87	0.0188	0.19
PH2-11A	BERRY CREEK (BC)	11,519	0.264	8,549	0	2,970	0.73	1,667	0	160	1,828	1,807	0.04	1.90	93.5	165	2	70	0.0121	0.05
PH2-11B	BERRY CREEK (BC)	4,488	0.103	2,883	0	1,605	0.67	562	0	87	649	642	0.01	1.74	91.5	110	1.5	41	0.0136	0.02
PH2-13	BERRY CREEK (BC)	11,302	0.259	7,490	0	3,812	0.68	1,461	0	206	1,667	1,648	0.04	1.77	92	287	6	39	0.0209	0.05
PH2-14	BERRY CREEK (BC)	37,462	0.860	6,167	23,198	8,097	0.51	1,203	3,236	437	4,876	4,106	0.11	1.56	89.5	301	2.75	124	0.0091	0.17
PH2-15	BERRY CREEK (BC)	9,105	0.209	4,736	3,710	659	0.69	924	518	36	1,477	1,345	0.03	1.95	94	128	1.5	71	0.0117	0.04
BCA	BERRY CREEK (BC)	60,169	1.381	25,201	0	34,968	0.52	4,915	0	1,888	6,803	6,730	0.16	1.36	86.5	500	9	120	0.0180	0.28
A25-1	POD 25	8,755	0.201	7,217	0	1,538	0.79	1,408	0	83	1,491	1,473	0.03	2.04	95	111	0.6	79	0.0054	0.04
A25-4	POD 25	6,685	0.153	5,034	0	1,651	0.74	982	0	89	1,071	1,059	0.02	1.92	93.5	231	1.2	29	0.0052	0.03
A25-5	POD 25	30,686	0.704	17,125	10,618	2,943	0.70	3,340	1,481	159	4,980	4,595	0.11	1.95	94	372	5	82	0.0134	0.14
A25-7	POD 25	48,777	1.120	9,617	36,802	2,358	0.57	1,876	5,134	127	7,137	5,921	0.16	1.76	91.5	478	8	102	0.0167	0.22
A25-9	POD 25	17,650	0.405	6,427	10,170	1,053	0.63	1,253	1,419	57	2,729	2,384	0.06	1.86	93	203	3	87	0.0148	0.08
A25-12	POD 25	38,267	0.878	6,934	29,701	1,632	0.56	1,352	4,144	88	5,584	4,604	0.13	1.75	91.5	344	4.5	111	0.0131	0.18
A25-13	POD 25	21,044	0.483	6,621	12,800	1,623	0.61	1,291	1,786	88	3,165	2,734	0.07	1.80	92.5	326	4.5	65	0.0138	0.10
A25-17	POD 25	63,963	1.468	9,454	52,131	2,378	0.55	1,844	7,273	128	9,245	7,532	0.21	1.73	91.5	469	6.5	136	0.0139	0.29

Herriman Towne Center Catchment Area Storm Drain Calculations

Catchment Area	Trunkline	Catchment Area (SF)	Catchment Area (acre)	Impervious Area (SF)	Housing Lot Area (SF)	Landscaped Area (SF)	Weighted Rational C	100 Year 24-hour Impervious Runoff Volume (CF)	100 Year 24-hour Housing Area Runoff Volume (CF)	100 Year 24-hour Landscaped Area Runoff Volume (CF)	Total 100-Year 24-hour Storm Runoff Volume (CF)	Rational Method Runoff Volume (CF)	Total 100-Year 24-hour Storm Runoff Volume (acre-ft)	Total 100-Year 24-hour Storm Runoff (in.)	Back calculated CN	Subbasin Area Length (ft)	Subbasin Area Elevation Difference (ft)	Subbasin Area Width (ft)	Subbasin Average Slope (ft/ft)	Allowable Discharge at 0.2 cfs/acre (cfs)
A25-18	POD 25	24,413	0.560	9,077	13,105	2,231	0.63	1,770	1,828	120	3,719	3,272	0.09	1.83	92.5	448	6.75	54	0.0151	0.11
A25-20	POD 25	59,074	1.356	10,757	46,202	2,115	0.56	2,098	6,446	114	8,658	7,134	0.20	1.76	92	439	5	135	0.0114	0.27
A25-21	POD 25	39,508	0.907	6,395	24,277	8,836	0.51	1,247	3,387	477	5,111	4,305	0.12	1.55	89	315	3	125	0.0095	0.18
A25-23	POD 25	14,225	0.327	3,638	9,895	692	0.59	710	1,381	37	2,127	1,798	0.05	1.79	92	112	1	127	0.0089	0.07
MC	FORT HERRIMAN 1 (FH1)	225,944	5.187	207,341	0	18,603	0.85	40,437	0	1,005	41,442	40,961	0.95	2.20	96.5	364	5	621	0.0137	1.04
PLAT B	HERRIMAN ROSE 1 (HR1)	1,102,112	25.301	394,585	617,210	90,317	0.62	76,955	81,965	4,877	163,798	146,985	3.76	1.78	92	1106	6	996	0.0054	5.06
PLAT E PHASE 1	COPELAND DRIVE (COPE)	658,453	15.116	261,079	311,573	85,802	0.63	50,918	43,470	4,633	99,021	88,281	2.27	1.80	92.5	1424	25	462	0.0176	3.02
PLAT E PHASE 2	WEATHERFORD (WEA)	411,793	9.453	99,748	250,886	61,159	0.56	19,454	33,318	3,303	56,074	49,367	1.29	1.63	90.5	1121	18	367	0.0161	1.89
PLAT H	HERRIMAN ROSE 2 (HR2)	1,644,049	37.742	888,122	571,458	184,469	0.69	173,209	75,889	9,961	259,060	242,256	5.95	1.89	93.5	1850	27	889	0.0146	7.55
POD 26 POND	HERRIMAN ROSE 4 (HR4)	73,568	1.689	21,089	0	52,479	0.44	4,113	0	2,834	6,947	6,875	0.16	1.13	83	430	18	171	0.0419	0.34
P30-1	HTC POD 30	32,383	0.743	8,106	21,653	2,624	0.58	1,581	2,876	142	4,598	4,022	0.11	1.70	91	270	8	120	0.0296	0.15
P30-3	HTC POD 30	9,506	0.218	6,147	0	3,359	0.67	1,199	0	181	1,380	1,365	0.03	1.74	91.5	69	3	138	0.0435	0.04
P30-4	HTC POD 30	31,456	0.722	28,951	0	2,505	0.85	5,646	0	135	5,782	5,714	0.13	2.21	96.5	389	5	81	0.0129	0.14
P30-5	HTC POD 30	60,033	1.378	42,155	0	17,878	0.71	8,221	0	965	9,187	9,083	0.21	1.84	92.5	346	4	174	0.0116	0.28
P30-8	HTC POD 30	17,661	0.405	12,313	0	5,348	0.70	2,401	0	289	2,690	2,660	0.06	1.83	92.5	338	2	52	0.0059	0.08
P30-9	HTC POD 30	239,903	5.507	10,505	78,278	151,120	0.36	2,049	10,395	8,161	20,605	18,498	0.47	1.03	81.5	442	2.5	543	0.0057	1.10
POD 31	COPELAND DRIVE (COPE)	123,410	2.833	92,558	0	30,853	0.74	18,051	0	1,666	19,717	19,492	0.45	1.92	93.5	467	10	264	0.0214	0.57
POD32	COPELAND DRIVE (COPE)	99,335	2.280	74,501	0	24,834	0.74	14,530	0	1,341	15,871	15,690	0.36	1.92	93.5	384	10	259	0.0260	0.46
POD 41	FORT HERRIMAN 1 (FH1)	156,798	3.600	133,278	0	23,520	0.80	25,993	0	1,270	27,263	26,949	0.63	2.09	95.5	495	8	317	0.0162	0.72
TB	HERRIMAN ROSE 3 (HR3)	98,826	2.269	80,168	0	18,658	0.78	15,635	0	1,008	16,643	16,451	0.38	2.02	94.5	290	5	341	0.0172	0.45
U EAST	BERRY CREEK (BC)	217,002	4.982	184,452	0	32,550	0.80	35,973	0	1,758	37,731	37,296	0.87	2.09	95.5	730	5	297	0.0068	1.00
U EAST2	BERRY CREEK (BC)	386,551	8.874	289,913	0	96,638	0.74	56,541	0	5,218	61,760	61,055	1.42	1.92	93.5	1070	8	361	0.0075	1.77
W	FORT HERRIMAN 1 (FH1)	211,991	4.867	185,036	0	26,955	0.82	36,087	0	1,456	37,543	37,109	0.86	2.13	95.5	624	10	340	0.0160	0.97
W2	HERRIMAN ROSE 3 (HR3)	29,250	0.671	24,863	0	4,388	0.80	4,849	0	237	5,086	5,027	0.12	2.09	95.5	219	6	134	0.0274	0.13
			279.204									TOTAL =	42.64						TOTAL =	55.84

Pipe Network Design Table

PIPE LOCATION	DRAWING WHERE DESIGNED	UPSTREAM STRUCTURE LABEL	Model Pipe Label	Pipe lookup #	Downstream Pipe lookup #	Size (in)	Upstream Junction Ground Elevation	Pipe Slope (%)	Pipe Length (ft)	Upstream Pipe Depth (ft)	Upstream Pipe Invert Elevation	Pipe Outlet Offset (ft)	Modeled Maximum 10-Year Storm HGL	Modeled 10-year Maximum Peak Flow (cfs)
Summerdale Drive	FHP-PHASE1	J1	P1	1	217	18	4820.30	0.45%	189.81	5.33	4814.97	0	4815.60	2.29
Summerdale Drive	FHP-PHASE1	J3	P2	2	1	18	4819.63	0.44%	146.78	4.01	4815.62	0	4816.27	2.33
Summerdale Drive	FHP-PHASE1	J2	P3	3	2	18	4819.64	1.22%	28.67	3.67	4815.97	0	4816.43	1.57
Fort Herriman Parkway North	FHP-PHASE1	C-11	P4	4	17	18	4812.95	0.30%	39.49	4.50	4808.45	1.5	4810.30	6.57
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-237	P5	5	45	18	4807.14	3.33%	30.95	3.77	4803.37	2.65	4804.26	7.28
Berry Creek Drive	FHP-PHASE2	2-15	2-P16B	6	216	18	4813.96	0.53%	18.92	10.46	4803.50	0	4810.10	0.25
HERRIMAN ROSE WEST	Plat C	JH	H-P24	7	37	24	4843.21	2.31%	902.00	4.50	4838.71	2	4839.55	12.37
Copeland Drive	FHP-PHASE1	J9	P8	8	11	18	4826.73	0.51%	31.47	5.25	4821.48	0	4824.69	5.40
Copeland Drive	FHP-PHASE1	J8	P9	9	8	18	4826.71	0.86%	28.92	3.98	4822.73	1	4824.70	0.61
Fort Herriman Parkway North	FHP-PHASE1	J54	P10	10	11	18	4828.24	2.28%	60.02	5.55	4822.69	0	4825.74	7.58
Fort Herriman Parkway North	FHP-PHASE1	J7	P11	11	59	18	4827.82	0.88%	236.20	6.50	4821.32	0	4824.50	11.99
Fort Herriman Parkway North	FHP-PHASE1	J10	P12	12	59	18	4824.90	2.36%	69.92	4.00	4820.90	0	4821.06	0.39
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-324	P13	13	44	18	4806.85	10.68%	6.18	3.91	4802.94	2	4803.45	1.08
Fort Herriman Parkway North	FHP-PHASE1	J12	P14	14	60	18	4818.68	2.55%	69.92	4.00	4814.68	0	4814.84	0.42
Fort Herriman Parkway North	FHP-PHASE1	J48	P15	15	17	24	4814.10	0.86%	254.41	5.07	4809.03	0	4811.11	13.25
Fort Herriman Parkway North	FHP-PHASE1	J14	P16	16	17	18	4812.57	0.34%	69.92	4.00	4808.57	1.5	4809.94	0.54
Fort Herriman Parkway North	FHP-PHASE1	J15	P17	17	107	30	4812.58	0.81%	65.52	5.75	4806.83	0	4809.93	20.58
Cranford Drive	FHP-PHASE1	J26A	P30A	18	30	18	4818.42	2.56%	69.26	4.00	4814.42	0	4814.75	1.76
Cranford Drive	FHP-PHASE1	J25A	P29A	19	29	18	4823.37	8.02%	44.62	4.28	4819.09	0	4819.27	0.92
HERRIMAN ROSE WEST	FHP-PHASE1	ST41	P20	20	42	18	4812.14	0.50%	27.84	4.00	4808.14	1.5	4810.10	3.05
Fort Herriman Parkway South	FHP-PHASE1	J19	P21	21	43	24	4813.06	0.28%	35.32	8.46	4804.60	0.75	4806.37	9.93
Fort Herriman Parkway South	FHP-PHASE1	J20	P22	22	21	24	4812.40	0.12%	389.24	7.32	4805.08	0	4807.21	10.49
Fort Herriman Parkway South	FHP-PHASE1	J23	P23	23	22	18	4811.50	0.12%	142.77	6.25	4805.25	0	4809.16	10.69
Fort Herriman Parkway South	FHP-PHASE1	JW	P24	24	26	18	4810.67	0.52%	30.75	5.00	4805.67	0	4809.36	3.45
Fort Herriman Parkway South	FHP-PHASE1	J21	P25	25	23	18	4810.99	1.30%	57.11	4.00	4806.99	1	4809.24	0.90
Fort Herriman Parkway South	FHP-PHASE1	J22	P26	26	23	18	4810.99	1.81%	14.40	5.48	4805.51	0	4809.27	4.25
Fort Herriman Parkway South	FHP-PHASE1	JMC	P27	27	23	18	4812.00	0.50%	142.12	6.04	4805.96	0	4809.68	5.61
Cranford Drive	FHP-PHASE1	J24	P28	28	19	18	4823.38	1.01%	28.67	4.00	4819.38	0	4819.68	0.68
Cranford Drive	FHP-PHASE1	J25B	P29C	29	18	18	4822.16	0.88%	123.77	6.65	4815.51	0	4815.98	1.77
Cranford Drive	FHP-PHASE1	J26B	P30B	30	32	18	4816.65	0.65%	38.63	4.00	4812.65	0	4814.01	1.83
Cranford Drive	FHP-PHASE1	J27	P31	31	32	18	4816.40	0.86%	28.92	3.75	4812.65	0	4814.04	2.45
Cranford Drive	FHP-PHASE1	J28	P32	32	39	24	4816.40	0.45%	179.23	4.00	4812.40	1	4814.00	3.97
Marketplace Drive	FHP-PHASE1	J46	P33	33	39	18	4818.78	0.51%	23.51	6.78	4812.00	1.28	4813.73	4.30
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-216	P34	34	254	18	4834.35	0.60%	18.45	3.50	4830.85	0	4831.95	0.47
HERRIMAN ROSE WEST	FHP-PHASE1	HalfMoonPond	P35	35	36	30	4828.00	0.12%	51.33	12.00	4816.00	0	4821.85	9.25
HERRIMAN ROSE WEST	FHP-PHASE1	J29	P36	36	37	30	4828.46	0.14%	35.24	12.52	4815.94	0	4821.83	9.58
HERRIMAN ROSE WEST	FHP-PHASE1	J30	P37	37	38	18	4828.68	0.37%	331.64	12.79	4815.89	0	4822.54	12.25
HERRIMAN ROSE WEST	FHP-PHASE1	J31	P38	38	39	18	4821.99	2.41%	168.37	7.34	4814.65	0	4815.69	15.37
HERRIMAN ROSE WEST	FHP-PHASE1	J32	P39	39	40	24	4818.90	0.55%	130.14	8.30	4810.60	0	4813.66	22.31
HERRIMAN ROSE WEST	FHP-PHASE1	J33	P40	40	42	24	4816.38	0.95%	354.23	6.50	4809.88	0	4811.43	22.19
HERRIMAN ROSE WEST	FHP-PHASE1	J34	P41	41	42	18	4812.06	0.52%	34.92	3.88	4808.18	1.5	4810.06	0.84

Pipe Network Design Table

PIPE LOCATION	DRAWING WHERE DESIGNED	UPSTREAM STRUCTURE LABEL	Model Pipe Label	Pipe lookup #	Downstream Pipe lookup #	Size (in)	Upstream Junction Ground Elevation	Pipe Slope (%)	Pipe Length (ft)	Upstream Pipe Depth (ft)	Upstream Pipe Invert Elevation	Pipe Outlet Offset (ft)	Modeled Maximum 10-Year Storm HGL	Modeled 10-year Maximum Peak Flow (cfs)
HERRIMAN ROSE WEST	FHP-PHASE1	J35	P42	42	107	30	4812.07	0.66%	30.46	5.57	4806.50	0	4810.05	22.19
HERRIMAN ROSE EAST	TOWERS PHASE 1	J18	P43	43	44	36	4813.02	1.20%	290.00	9.27	4803.75	0	4806.15	55.43
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-318	P44	44	45	36	4807.23	1.21%	48.95	6.95	4800.28	0	4803.38	55.59
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-319	P45	45	48	36	4806.80	4.01%	273.24	7.11	4799.69	0	4801.74	62.22
HERRIMAN ROSE EAST	TOWERS PHASE 1	POD26POND	P46	46	48	36	4804.00	0.29%	95.87	15.00	4789.00	0	4798.74	32.55
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-321	P47	47	48	18	4804.66	2.07%	65.22	3.91	4800.75	10.68	4800.90	0.28
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-320	P48	48	49	24	4804.72	0.60%	261.88	16.00	4788.72	0	4798.38	31.74
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-327	P49	49	51	24	4797.09	1.77%	248.32	9.93	4787.16	0	4792.69	31.74
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-330	P50	50	51	18	4787.54	0.58%	65.22	3.90	4783.64	0.5	4784.00	0.60
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-329	P51	51	52	30	4787.54	3.76%	254.43	4.78	4782.76	0	4784.00	31.93
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-328	P52	52	131	30	4778.20	3.82%	252.20	5.00	4773.20	0	4774.30	31.93
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-218	P53	53	254	18	4835.65	4.67%	19.50	4.00	4831.65	0	4831.96	2.17
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-219	P54	54	53	18	4837.58	2.06%	93.86	4.00	4833.58	0	4834.00	2.11
PARKING EAST OF CITY HALL	HCH-PHASE1	CH-220	P55	55	54	18	4838.17	1.39%	42.50	4.00	4834.17	0	4834.50	1.07
Marketplace Drive	FHP-PHASE1	J47	P56	56	33	18	4818.77	1.43%	18.92	6.50	4812.27	0	4815.46	2.66
PARKING EAST OF CITY HALL	HCH-PHASE1	CH-221	P57	57	54	18	4839.07	3.97%	37.53	4.00	4835.07	0	4835.29	0.94
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-106	P58	58	46	24	4804.00	0.20%	154.27	14.69	4789.31	0	4798.58	
Fort Herriman Parkway North	FHP-PHASE1	J11	P59	59	60	18	4824.91	2.35%	270.62	5.66	4819.25	0	4820.35	12.56
Fort Herriman Parkway North	FHP-PHASE1	J13	P60	60	15	24	4818.69	1.22%	317.42	5.79	4812.90	0	4813.94	13.25
Cranford Drive	FHP-PHASE1	C12	P29B	61	29	18	4822.00	0.49%	28.33	6.35	4815.65	0	4816.08	0.87
U-ROAD	U-ROAD	U-15	P62	62	63	18	4833.08	0.60%	45.17	3.90	4829.18	0	4829.97	0.21
U-ROAD	U-ROAD	U-13	P63	63	64	18	4833.56	1.03%	44.62	4.65	4828.91	0	4829.97	6.60
U-ROAD	U-ROAD	EXU-11	P64	64	10	18	4833.35	1.48%	389.30	4.90	4828.45	0	4829.21	6.58
Fort Herriman Parkway North	FHP-PHASE1	J53	P65	65	10	18	4828.07	1.97%	69.92	4.00	4824.07	0	4825.03	0.67
PARKING EAST OF CITY HALL	HCH-PHASE1	CH-222	P66	66	57	18	4840.37	2.97%	43.83	4.00	4836.37	0	4836.59	0.72
PARKVIEW TOWNHOMES WEST	PARKVIEW TOWNHOMES	B1	P-B1	67	68	18	4833.10	1.05%	76.83	3.80	4829.30	0	4829.50	0.42
PARKVIEW TOWNHOMES WEST	PARKVIEW TOWNHOMES	B2	P-B2	68	94	18	4833.18	0.54%	44.83	4.69	4828.49	0	4828.74	0.41
PARKVIEW TOWNHOMES EAST	PARKVIEW TOWNHOMES	B16	P-B17	69	70	18	4822.43	0.50%	66.05	5.51	4816.92	0	4817.47	1.67
PARKVIEW TOWNHOMES EAST	PARKVIEW TOWNHOMES	B18	P-B18	70	79	18	4822.99	0.50%	87.96	6.40	4816.59	0	4817.11	1.67
HTC POD 8	HTC POD 8	8-200	P-71	71	72	18	4815.44	1.27%	20.50	3.83	4811.61	1.55	4811.85	0.49
HTC POD 8	HTC POD 8	8-201	P-72	72	76	18	4815.79	0.68%	86.75	5.99	4809.80	0	4810.09	0.71
HTC POD 8	HTC POD 8	8-202	P-74	74	76	18	4815.15	1.25%	20.00	4.00	4811.15	1.69	4811.40	0.54
HTC POD 8	HTC POD 8	8-203	P-76	76	207	18	4815.34	0.95%	146.60	6.13	4809.21	0	4809.58	1.37
Weatherford Lane	Plat E Ph3	F7	P-F7	77	325	18	4839.72	0.50%	139.00	7.41	4832.31	0	4833.66	5.06
Weatherford Lane	Plat E Ph3	JE1	P-F8	78	77	18	4837.12	0.48%	170.00	4.00	4833.12	0	4834.18	5.20

Pipe Network Design Table

PIPE LOCATION	DRAWING WHERE DESIGNED	UPSTREAM STRUCTURE LABEL	Model Pipe Label	Pipe lookup #	Downstream Pipe lookup #	Size (in)	Upstream Junction Ground Elevation	Pipe Slope (%)	Pipe Length (ft)	Upstream Pipe Depth (ft)	Upstream Pipe Invert Elevation	Pipe Outlet Offset (ft)	Modeled Maximum 10-Year Storm HGL	Modeled 10-year Maximum Peak Flow (cfs)
PARKVIEW TOWNHOMES EAST	PARKVIEW TOWNHOMES	B19	P-B19	79	80	18	4823.94	2.48%	126.02	7.79	4816.15	0	4816.48	1.81
PARKVIEW TOWNHOMES EAST	PARKVIEW TOWNHOMES	B20	P-B20	80	31	18	4820.06	0.50%	74.37	7.04	4813.02	0	4814.07	1.93
Greenwood Village	Greenwood Village	30-1	P-C1	81	220	18	4818.99	0.30%	133.62	5.79	4813.20	0	4814.20	3.27
Greenwood Village	Greenwood Village	F-C1	P-C2	82	83	18	4821.21	0.31%	28.84	7.94	4813.27	0	4814.01	0.70
Greenwood Village	Greenwood Village	F-C2	P-C3	83	220	18	4820.33	0.31%	121.91	7.15	4813.18	0	4814.00	0.95
Greenwood Village	Greenwood Village	C-3	P-C4	84	86	18	4817.62	0.31%	131.02	5.00	4812.62	0	4813.75	4.11
Greenwood Village	Greenwood Village	C-5	P-C5	85	86	18	4816.68	2.36%	19.50	4.00	4812.68	0	4813.42	0.41
Greenwood Village	Greenwood Village	C-4	P-C6	86	89	18	4816.90	0.30%	56.28	4.68	4812.22	0	4813.42	4.48
Greenwood Village	Greenwood Village	C-7	P-C7	87	88	18	4816.24	0.70%	28.67	3.80	4812.44	0	4813.12	0.23
Greenwood Village	Greenwood Village	C-8	P-C8	88	89	18	4816.24	0.43%	44.13	4.00	4812.24	0	4813.11	0.21
Greenwood Village	Greenwood Village	C-6	P-C9	89	91	18	4816.37	0.42%	388.88	4.32	4812.05	0	4813.11	5.14
Greenwood Village	Greenwood Village	C-10	P-C10	90	91	18	4814.41	1.04%	18.35	3.80	4810.61	0	4811.26	0.86
Greenwood Village	Greenwood Village	C-9	P-C11	91	4	18	4814.42	1.41%	139.79	4.00	4810.42	0	4811.25	6.57
PARKING EAST OF CITY HALL	HCH-PHASE1	CH-223	P92	92	66	18	4843.20	3.15%	74.03	4.50	4838.70	0	4838.87	0.48
HTC POD 8	HTC POD 8	8-207	P-93	93	318	18	4813.70	0.51%	62.58	10.12	4803.58	0.76	4804.82	3.29
PARKVIEW TOWNHOMES WEST	PARKVIEW TOWNHOMES	B4	P-B4	94	97	18	4832.25	1.29%	37.34	4.00	4828.25	0	4828.52	0.68
PARKVIEW TOWNHOMES WEST	PARKVIEW TOWNHOMES	B5	P-B5	95	96	18	4832.13	1.74%	19.56	3.80	4828.33	0	4828.55	0.50
PARKVIEW TOWNHOMES WEST	PARKVIEW TOWNHOMES	B6	P-B6	96	97	18	4831.99	1.21%	18.23	4.00	4827.99	0	4828.28	0.66
PARKVIEW TOWNHOMES WEST	PARKVIEW TOWNHOMES	B7	P-B7	97	98	18	4831.77	3.48%	71.93	4.00	4827.77	0	4828.04	1.34
PARKVIEW TOWNHOMES WEST	PARKVIEW TOWNHOMES	B8	P-B8	98	100	18	4829.97	0.93%	30.12	4.70	4825.27	0	4826.61	1.23
PARKVIEW TOWNHOMES WEST	PARKVIEW TOWNHOMES	B-12	P-B9	99	100	18	4834.69	1.55%	162.35	7.19	4827.50	0	4828.66	10.27
PARKVIEW TOWNHOMES WEST	PARKVIEW TOWNHOMES	B9	P-B10	100	101	18	4828.99	1.92%	19.76	4.00	4824.99	0	4826.60	11.13
PARKVIEW TOWNHOMES WEST	PARKVIEW TOWNHOMES	B10	P-B11	101	102	18	4828.61	9.21%	71.79	4.00	4824.61	0	4825.61	11.27
PARKVIEW TOWNHOMES WEST	PARKVIEW TOWNHOMES	B11	P-B12	102	35	18	4829.00	1.18%	169.91	11.00	4818.00	0	4823.49	11.27
PARKVIEW TOWNHOMES EAST	PARKVIEW TOWNHOMES	B13	P-B13	103	69	18	4822.53	4.18%	38.54	4.00	4818.53	0	4818.71	0.67
PARKVIEW TOWNHOMES EAST	PARKVIEW TOWNHOMES	B14	P-B14	104	105	18	4821.45	1.00%	18.92	3.80	4817.65	0	4817.85	0.32
PARKVIEW TOWNHOMES EAST	PARKVIEW TOWNHOMES	B15	P-B15	105	69	18	4821.46	0.51%	105.58	4.00	4817.46	0	4817.75	0.60

Pipe Network Design Table

PIPE LOCATION	DRAWING WHERE DESIGNED	UPSTREAM STRUCTURE LABEL	Model Pipe Label	Pipe lookup #	Downstream Pipe lookup #	Size (in)	Upstream Junction Ground Elevation	Pipe Slope (%)	Pipe Length (ft)	Upstream Pipe Depth (ft)	Upstream Pipe Invert Elevation	Pipe Outlet Offset (ft)	Modeled Maximum 10-Year Storm HGL	Modeled 10-year Maximum Peak Flow (cfs)
PARKVIEW TOWNHOMES EAST	PARKVIEW TOWNHOMES	B17	P-B16	106	69	18	4822.24	5.78%	22.85	4.00	4818.24	0	4818.37	0.42
HERRIMAN ROSE EAST	FHP-PHASE1	J16	P7	107	43	36	4812.45	0.56%	35.95	6.15	4806.30	2.35	4809.50	46.58
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-325	P108	108	45	18	4806.69	2.29%	26.17	3.75	4802.94	2.65	4803.10	0.33
PARKING EAST OF CITY HALL	HCH-PHASE1	CH-224	P109	109	92	18	4844.53	3.80%	46.82	4.05	4840.48	0	4840.65	0.49
U-ROAD	U-ROAD	U-7	P110	110	128	24	4828.44	0.51%	391.83	11.42	4817.02	0	4818.72	14.77
Marketplace Drive	MARKETPLACE LOTS 5&6	JTB	MP-P1	111	113	18	4820.09	1.63%	152.52	5.04	4815.05	0	4815.49	2.26
Marketplace Drive	MARKETPLACE LOTS 5&6	JW2	MP-P2	112	113	18	4818.50	0.41%	36.26	5.78	4812.72	0	4813.76	0.87
Marketplace Drive	MARKETPLACE LOTS 5&6	MP-J1	MP-P3	113	33	18	4819.79	0.41%	138.19	7.22	4812.57	0	4813.75	1.64
U-ROAD	U-ROAD	U-8	P114	114	110	18	4828.47	4.34%	21.19	3.90	4824.57	6.63	4824.58	0.00
U-ROAD	U-ROAD	U-11	P115	115	110	18	4829.76	0.94%	188.75	4.33	4825.43	6.64	4825.66	0.48
U-ROAD	U-ROAD	U-12	P116	116	115	18	4830.04	0.43%	69.06	4.31	4825.73	0	4825.93	0.25
U-ROAD	U-ROAD	U-9	P117	117	110	18	4828.44	0.52%	61.97	11.10	4817.34	0	4818.73	1.15
U-ROAD	U-ROAD	U-10	P118	118	117	18	4828.60	0.70%	22.78	4.43	4824.17	6.67	4824.36	0.24
U-ROAD	U-ROAD	CH-251	P119	119	117	18	4830.27	0.54%	28.00	12.78	4817.49	0	4818.74	0.67
U-ROAD	U-ROAD	U-6A	P120	120	110	18	4830.31	1.00%	192.17	4.74	4825.57	6.63	4829.00	12.99
Summerdale Drive	FHP-PHASE2	2-1	2-P1	121	122	18	4823.70	0.86%	28.92	3.75	4819.95	0	4820.28	0.79
Summerdale Drive	FHP-PHASE2	2-2	2-P2	122	123	18	4823.70	0.39%	191.33	4.00	4819.70	0	4820.14	1.09
Summerdale Drive	FHP-PHASE2	2-3	2-P3	123	125	18	4822.95	0.61%	199.75	4.00	4818.95	0	4819.32	1.07
Summerdale Drive	FHP-PHASE2	2-4	2-P4	124	125	18	4821.73	0.86%	28.92	3.75	4817.98	0	4818.32	0.74
Summerdale Drive	FHP-PHASE2	2-5	2-P5	125	127	18	4821.73	0.51%	215.07	4.00	4817.73	0	4818.30	2.05
Summerdale Drive	FHP-PHASE2	2-6	2-P6	126	127	18	4820.64	0.86%	28.92	3.75	4816.89	0	4817.23	0.82
Summerdale Drive	FHP-PHASE2	2-7	2-P7	127	217	18	4820.64	1.16%	218.16	4.00	4816.64	0	4817.16	2.88
Berry Creek Drive	FHP-PHASE2	U-28	2-P8	128	217	24	4822.98	1.70%	54.19	7.95	4815.03	0	4816.73	19.61
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-242	P-T258	129	NA	36	4767.29	0.36%	16.45	4.22	4763.07	0	4765.70	31.97
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-241	P-T245	130	129	36	4770.56	0.89%	20.27	7.31	4763.25	0	4766.13	31.97
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-240	P-T254	131	130	36	4771.40	0.35%	89.50	7.84	4763.56	0	4766.64	31.86
Towers Outfall	TOWERS PHASE 1	T-239	P-T249	132	131	36	4769.00	0.34%	29.08	5.34	4763.66	0	4766.64	3.55
Front of City Hall	HCH-PHASE1	CH-225	P133	133	109	18	4844.56	0.51%	76.93	3.69	4840.87	0	4841.07	0.26
Front of City Hall	HCH-PHASE1	CH-226	P134	134	133	18	4845.46	0.51%	56.46	4.30	4841.16	0	4841.36	0.27
Front of City Hall	HCH-PHASE1	CH-227	P135	135	134	18	4845.43	0.61%	125.27	3.50	4841.93	0	4842.01	0.04
Front of City Hall	HCH-PHASE1	CH-228	P136	136	135	18	4846.18	1.84%	40.70	3.50	4842.68	0	4842.73	0.02
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-215	P137	137	254	18	4838.24	1.97%	132.79	4.89	4833.35	0	4833.89	4.15
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-214	P138	138	137	18	4837.25	0.57%	17.50	3.80	4833.45	0	4833.91	0.59
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-212	P139	139	137	18	4840.68	1.82%	143.79	4.71	4835.97	0	4836.52	3.60
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-213	P140	140	139	18	4842.97	5.71%	52.50	4.00	4838.97	0	4839.07	0.23
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-210	P141	141	139	18	4840.97	0.53%	75.44	4.60	4836.37	0	4837.14	3.40
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-211	P142	142	141	18	4843.19	4.97%	56.75	4.00	4839.19	0	4839.36	0.63

Pipe Network Design Table

PIPE LOCATION	DRAWING WHERE DESIGNED	UPSTREAM STRUCTURE LABEL	Model Pipe Label	Pipe lookup #	Downstream Pipe lookup #	Size (in)	Upstream Junction Ground Elevation	Pipe Slope (%)	Pipe Length (ft)	Upstream Pipe Depth (ft)	Upstream Pipe Invert Elevation	Pipe Outlet Offset (ft)	Modeled Maximum 10-Year Storm HGL	Modeled 10-year Maximum Peak Flow (cfs)
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-209	P143	143	141	18	4840.48	0.63%	17.54	4.00	4836.48	0	4837.14	0.33
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-208	P144	144	141	18	4842.28	1.16%	111.66	4.61	4837.67	0	4838.15	2.49
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-207	P145	145	144	18	4843.30	2.66%	48.50	4.34	4838.96	0	4839.22	1.08
PARKING WEST OF CITY HALL	HCH-PHASE1	CH-206	P146	146	145	18	4843.21	1.13%	22.12	4.00	4839.21	0	4839.54	0.88
PARKING WEST OF CITY HALL	HCH-PHASE1	CH-229	P147	147	146	18	4845.63	2.50%	73.51	4.58	4841.05	0	4841.19	0.32
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-204	P148	148	144	18	4842.64	0.53%	73.12	4.58	4838.06	0	4838.55	1.43
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-203	P149	149	148	18	4842.84	2.40%	32.44	4.00	4838.84	0	4838.98	0.30
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-201	P150	150	148	18	4843.69	3.25%	50.17	4.00	4839.69	0	4839.91	0.92
PARKING WEST OF CITY HALL	HCH-PHASE1	CH-202	P151	151	150	18	4844.75	1.67%	63.55	4.00	4840.75	0	4840.96	0.53
HERRIMAN CITY HALL ROAD A	HCH-PHASE1	CH-200	P152	152	150	18	4844.56	0.83%	104.52	4.00	4840.56	0	4840.74	0.28
HERRIMAN CITY HALL ROAD B	HCH-PHASE2	CH-240	P153	153	248	18	4830.33	2.47%	19.00	4.00	4826.33	0	4829.06	1.39
HERRIMAN CITY HALL ROAD B	HCH-PHASE2	CH-234	P154	154	248	18	4832.70	3.19%	89.14	4.00	4828.70	0	4829.41	5.50
HERRIMAN CITY HALL ROAD B	HCH-PHASE2	CH-235	P155	155	154	18	4833.14	1.16%	38.03	4.00	4829.14	0	4830.08	5.56
HERRIMAN CITY HALL ROAD B	HCH-PHASE2	CH-236	P156	156	155	18	4833.96	1.42%	29.50	4.40	4829.56	0	4830.30	3.42
Parking East of Splash Park	HCH-PHASE3	CH-237	P157	157	155	18	4834.83	0.92%	183.38	4.00	4830.83	0	4831.19	1.26
Parking East of Splash Park	HCH-PHASE3	CH-238	P158	158	157	18	4835.83	3.76%	26.57	4.00	4831.83	0	4831.95	0.27
HERRIMAN CITY HALL ROAD B	HCH-PHASE2	CH-231	P159	159	156	18	4837.14	0.51%	402.99	5.53	4831.61	0	4832.32	3.37
HERRIMAN CITY HALL ROAD B	HCH-PHASE2	CH-233	P160	160	159	18	4835.81	0.55%	36.44	4.00	4831.81	0	4832.36	1.14
HERRIMAN CITY HALL ROAD B	HCH-PHASE2	CH-230	P161	161	159	18	4839.34	2.87%	130.18	4.00	4835.34	0	4835.51	0.46
Parking West of Splash Park	HCH-PHASE2	CH-243	P162	162	159	18	4839.33	0.53%	153.59	6.91	4832.42	0	4832.93	1.88
Parking West of Splash Park	HCH-PHASE2	CH-241	P163	163	162	18	4839.05	0.54%	62.89	6.29	4832.76	0	4833.31	1.73
Skate Park Drainage	HCH-PHASE2	CH-245	P164	164	163	18	4838.73	0.57%	35.15	5.77	4832.96	0	4833.39	0.93
Skate Park Drainage	HCH-PHASE2	CH-242	P165	165	164	18	4836.45	0.51%	95.80	3.00	4833.45	0	4833.60	0.15
Skate Park Drainage	HCH-PHASE2	CH-248	P166	166	164	18	4839.18	4.37%	50.80	4.00	4835.18	0	4835.37	0.79
Skate Park Drainage	HCH-PHASE2	CH-247	P167	167	166	18	4839.38	1.33%	73.75	3.22	4836.16	0	4836.24	0.06
Skate Park Drainage	HCH-PHASE2	CH-246	P168	168	167	18	4839.73	1.00%	57.04	3.00	4836.73	0	4836.80	0.05
Parking West of Splash Park	HCH-PHASE3	CH-205	P169	169	148	18	4842.16	0.59%	20.20	3.98	4838.18	0	4838.55	0.23
Amptheater Park	HCH-PHASE2	CH-250	P170	170	119	18	4829.14	0.54%	44.48	2.70	4826.44	8.71	4826.76	0.65
Amptheater Park	HCH-PHASE2	CH-249	P171	171	170	18	4829.57	0.55%	23.82	3.00	4826.57	0	4826.86	0.45
Acklins Drive	Pod 25	25-19	P172	172	216	18	4815.08	1.00%	114.97	4.58	4810.50	5.95	4811.14	3.29
Acklins Drive	Pod 25	25-22	P173	173	172	18	4815.53	1.10%	45.49	4.53	4811.00	0	4811.39	1.42
Acklins Drive	Pod 25	25-23	P174	174	173	18	4815.32	0.57%	20.98	4.20	4811.12	0	4811.41	0.32
Acklins Drive	Pod 25	25-21	P175	175	173	18	4816.55	0.94%	132.55	4.30	4812.25	0	4812.59	1.10
Acklins Drive	Pod 25	25-20	P176	176	175	18	4816.37	0.54%	27.61	3.97	4812.40	0	4812.76	0.70
Bilston Lane	Pod 25	25-17	P177	177	172	18	4815.54	1.63%	46.01	4.29	4811.25	0	4811.68	1.90
Bilston Lane	Pod 25	25-18	P178	178	177	18	4815.53	0.59%	20.50	4.16	4811.37	0	4811.69	0.32
Bilston Lane	Pod 25	25-16	P179	179	193	18	4817.27	1.33%	38.39	4.52	4812.75	0	4813.05	0.86
Bilston Lane	Pod 25	25-15	P180	180	194	18	4820.14	1.47%	91.79	4.50	4815.64	0	4815.92	0.87
Bilston Lane	Pod 25	25-13	P181	181	192	18	4822.28	1.50%	79.79	4.28	4818.00	0	4818.28	0.87
Bilston Lane	Pod 25	25-12	P182	182	181	18	4822.13	0.77%	21.99	3.96	4818.17	0	4818.45	0.53
Acklins Drive	Pod 25	25-8	P183	183	277	18	4818.62	0.42%	85.43	9.02	4809.60	0	4810.19	1.82

Pipe Network Design Table

PIPE LOCATION	DRAWING WHERE DESIGNED	UPSTREAM STRUCTURE LABEL	Model Pipe Label	Pipe lookup #	Downstream Pipe lookup #	Size (in)	Upstream Junction Ground Elevation	Pipe Slope (%)	Pipe Length (ft)	Upstream Pipe Depth (ft)	Upstream Pipe Invert Elevation	Pipe Outlet Offset (ft)	Modeled Maximum 10-Year Storm HGL	Modeled 10-year Maximum Peak Flow (cfs)
Acklins Drive	Pod 25	25-9	P184	184	183	18	4818.42	0.61%	24.67	4.64	4813.78	4.03	4814.03	0.39
Blythswood Lane	Pod 25	25-7	P185	185	183	18	4818.90	5.57%	22.46	4.02	4814.88	4.03	4815.18	1.45
Blythswood Lane	Pod 25	25-6	P186	186	185	18	4820.36	0.97%	77.65	4.73	4815.63	0	4815.95	0.87
Blythswood Lane	Pod 25	25-5	P187	187	186	18	4821.35	1.60%	76.67	4.49	4816.86	0	4817.13	0.87
Blythswood Lane	Pod 25	25-4	P188	188	187	18	4824.47	1.55%	159.73	5.14	4819.33	0	4819.50	0.35
Blythswood Lane	Pod 25	25-3	P189	189	188	18	4824.87	1.63%	55.81	4.63	4820.24	0	4820.38	0.24
Blythswood Lane	Pod 25	25-2	P190	190	189	18	4827.08	1.25%	142.87	5.05	4822.03	0	4822.18	0.25
Blythswood Lane	Pod 25	25-1	P191	191	190	18	4827.40	3.40%	24.15	4.55	4822.85	0	4822.97	0.25
Bilston Lane	Pod 25	25-14	P192	192	180	18	4821.30	1.50%	77.29	4.50	4816.80	0	4817.08	0.87
Bilston Lane	Pod 25	25-16B	P193	193	177	18	4816.74	1.52%	65.05	4.50	4812.24	0	4812.50	0.86
Bilston Lane	Pod 25	25-15B	P194	194	195	18	4818.78	1.54%	54.53	4.49	4814.29	0	4814.57	0.87
Bilston Lane	Pod 25	25-15C	P195	195	179	18	4817.95	1.55%	45.09	4.50	4813.45	0	4813.73	0.86
Copeland Drive	Copeland Drive	C-200	P196	196	8	18	4827.22	2.10%	68.47	4.30	4822.92	0	4824.94	5.15
Copeland Drive	Copeland Drive	C-201	P197	197	196	18	4827.33	0.56%	51.92	4.12	4823.21	0	4825.04	3.68
Copeland Drive	Copeland Drive	C-202	P198	198	197	18	4828.11	0.53%	114.20	4.30	4823.81	0	4825.15	3.18
Copeland Drive	Copeland Drive	C-203	P199	199	198	18	4828.79	0.50%	136.58	4.30	4824.49	0	4825.29	3.17
Copeland Drive	Copeland Drive	C-204	P200	200	199	18	4829.21	0.53%	78.86	4.30	4824.91	0	4825.70	3.17
Copeland Drive	Copeland Drive	C-205	P201	201	200	18	4829.39	0.61%	46.00	4.20	4825.19	0	4825.73	1.16
Copeland Drive	Copeland Drive	C-206	P202	202	201	18	4829.39	0.66%	30.15	4.00	4825.39	0	4825.74	0.29
Copeland Drive	Copeland Drive	C-207	P203	203	197	18	4827.37	0.52%	30.97	4.00	4823.37	0	4825.04	0.28
Copeland Drive	Copeland Drive	ST31	P204	204	200	18	4830.00	1.02%	58.00	4.50	4825.50	0	4825.98	2.06
Copeland Drive	Copeland Drive	ST32	P205	205	196	18	4830.00	1.00%	60.00	6.48	4823.52	0	4824.96	2.00
HTC POD 8	HTC POD 8	8-204	P206	206	207	18	4814.34	0.87%	24.17	3.83	4810.51	2.49	4810.85	0.87
HTC POD 8	HTC POD 8	8-205	P207	207	93	18	4814.32	1.05%	117.14	6.51	4807.81	3	4808.32	2.32
HTC POD 8	HTC POD 8	8-206	P208	208	93	18	4813.62	5.89%	17.67	9.00	4804.62	0	4804.83	0.66
Berry Creek Drive	FHP-PHASE2	2-13	2-P11	211	321	18	4814.98	1.56%	30.72	4.00	4810.98	1.77	4811.12	0.21
Berry Creek Drive	FHP-PHASE2	2-9C	2-P12C	212	346	36	4806.13	3.62%	51.08	8.57	4797.56	0	4799.67	32.81
Berry Creek Drive	FHP-PHASE2	2-11A	2-P13	213	347	18	4802.93	0.52%	115.00	3.93	4799.00	2.5	4799.66	0.38
Berry Creek Drive	FHP-PHASE2	2-11B	2-P14	214	213	18	4803.12	1.88%	19.11	3.76	4799.36	0	4799.66	0.11
Berry Creek Drive	FHP-PHASE2	2-14	2-P16A	216	318	18	4813.90	0.54%	26.01	10.50	4803.40	0.76	4804.83	3.89
Berry Creek Drive	FHP-PHASE2	2-8	2-P17	217	321	30	4821.32	1.88%	285.78	7.21	4814.11	0	4815.48	24.64
Berry Creek Drive	FHP-PHASE2	2-10	2-P18B	218	347	36	4804.80	0.11%	27.59	8.87	4795.93	0	4799.66	27.04
HERRIMAN ROSE WEST	Plat C	JB	H-P18	219	55	18	4852.50	2.54%	543.00	4.52	4847.98	0	4848.44	2.76
Greenwood Village	Greenwood Village	C-13	P-C13	220	84	18	4817.89	0.31%	58.64	5.09	4812.80	0	4813.98	4.12
HTC POD 30	HTC POD 30	30-2	P-221	221	81	18	4820.80	3.33%	60.09	5.30	4815.50	0.3	4815.90	2.77
HTC POD 30	HTC POD 30	30-3	P-222	222	221	18	4820.16	2.25%	29.83	3.99	4816.17	0	4816.70	2.77
HTC POD 30	HTC POD 30	30-4	P-223	223	222	18	4822.86	3.27%	71.27	4.36	4818.50	0	4818.89	2.57
HTC POD 30	HTC POD 30	30-5	P-224	224	223	18	4822.83	1.41%	20.50	4.04	4818.79	0	4819.12	0.89
HTC POD 30	HTC POD 30	30-6	P-225	225	223	18	4823.26	1.88%	40.52	4.00	4819.26	0	4819.60	1.32
HTC POD 30	HTC POD 30	30-7	P-226	226	225	18	4826.94	0.94%	292.99	4.94	4822.00	0	4822.38	1.32
HTC POD 30	HTC POD 30	30-8	P-227	227	226	18	4827.06	2.13%	49.72	4.00	4823.06	0	4823.18	0.21

Pipe Network Design Table

PIPE LOCATION	DRAWING WHERE DESIGNED	UPSTREAM STRUCTURE LABEL	Model Pipe Label	Pipe lookup #	Downstream Pipe lookup #	Size (in)	Upstream Junction Ground Elevation	Pipe Slope (%)	Pipe Length (ft)	Upstream Pipe Depth (ft)	Upstream Pipe Invert Elevation	Pipe Outlet Offset (ft)	Modeled Maximum 10-Year Storm HGL	Modeled 10-year Maximum Peak Flow (cfs)
HTC POD 30	HTC POD 30	30-9	P-228	228	226	18	4826.80	3.44%	22.10	4.04	4822.76	0	4823.04	1.12
HTC POD 8	HTC POD 8	8-247	P-229	229	207	12	4811.24	0.51%	83.64	3.00	4808.24	0	4808.38	0.12
HTC POD 8	HTC POD 8	8-248	P-230	230	76	12	4812.65	0.52%	84.94	3.00	4809.65	0	4809.81	0.14
HTC POD 8	HTC POD 8	8-249	P-231	231	72	18	4813.15	0.74%	47.49	3.00	4810.15	0	4810.31	0.22
U-ROAD	U-ROAD	CH-239	P248	248	120	18	4829.86	2.20%	13.17	4.00	4825.86	0	4829.16	5.84
U-ROAD	U-ROAD	U-6	P249	249	120	18	4831.01	1.09%	64.46	4.74	4826.27	0	4829.88	7.40
U-ROAD	U-ROAD	U-5	P250	250	249	18	4831.11	0.52%	61.32	4.52	4826.59	0	4830.81	7.11
U-ROAD	U-ROAD	U-4	P251	251	250	18	4833.28	1.02%	195.45	4.70	4828.58	0	4832.61	6.99
U-ROAD	U-ROAD	U-3	P252	252	251	18	4833.17	0.68%	61.32	4.17	4829.00	0	4832.61	1.48
U-ROAD	U-ROAD	U-2A	P253	253	251	18	4835.17	1.04%	157.17	4.95	4830.22	0	4831.52	7.65
U-ROAD	U-ROAD	CH-217	P254	254	253	18	4834.87	0.74%	70.04	4.13	4830.74	0	4831.95	6.69
U-ROAD	U-ROAD	U-2	P255	255	253	18	4835.92	1.08%	74.07	4.90	4831.02	0	4831.54	0.98
U-ROAD	U-ROAD	U-1	P256	256	255	18	4835.81	0.42%	61.32	4.53	4831.28	0	4831.56	0.43
U-ROAD	U-ROAD	U-14	P257	257	63	18	4832.77	1.14%	16.67	3.67	4829.10	0	4829.97	0.25
U-ROAD	U-ROAD	U-16	P258	258	63	18	4834.95	1.12%	157.40	4.27	4830.68	0	4831.56	6.19
U-ROAD	U-ROAD	U-17	P259	259	258	18	4834.83	0.57%	61.35	3.80	4831.03	0	4831.56	0.22
U-ROAD	U-ROAD	U-18	P260	260	258	18	4837.66	1.14%	148.65	5.29	4832.37	0	4833.22	5.78
U-ROAD	U-ROAD	U-20	P261	261	260	18	4836.93	1.03%	31.10	4.24	4832.69	0	4833.22	0.28
U-ROAD	U-ROAD	U-19	P262	262	260	18	4836.75	2.00%	29.98	3.78	4832.97	0	4833.26	1.25
U-ROAD	U-ROAD	U-21	P263	263	260	18	4838.91	1.59%	125.53	4.54	4834.37	0	4835.00	4.39
U-ROAD	U-ROAD	U-21A	P264	264	263	18	4840.19	1.29%	51.90	5.15	4835.04	0	4835.80	4.39
U-ROAD	U-ROAD	U-21B	P265	265	264	18	4840.19	1.03%	87.61	4.25	4835.94	0	4835.94	0.00
U-ROAD	U-ROAD	U-22	P266	266	264	18	4840.19	1.20%	77.25	4.22	4835.97	0	4836.72	4.39
U-ROAD	U-ROAD	U-23	P267	267	266	18	4840.08	0.51%	61.32	3.80	4836.28	0	4836.76	1.07
U-ROAD	U-ROAD	U-24	P268	268	266	18	4842.58	1.23%	195.45	4.20	4838.38	0	4838.91	3.09
U-ROAD	U-ROAD	U-25	P269	269	268	18	4842.75	0.59%	61.32	4.01	4838.74	0	4839.18	1.66
U-ROAD	U-ROAD	U-24A	P270	270	268	18	4844.80	1.23%	155.92	4.50	4840.30	0	4840.68	1.66
U-ROAD	U-ROAD	U-26	P271	271	270	18	4845.51	1.22%	83.32	4.19	4841.32	0	4841.74	1.67
U-ROAD	U-ROAD	U-27	P272	272	271	18	4845.39	0.60%	61.32	3.70	4841.69	0	4842.14	1.34
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-298	P273	273	5	18	4808.43	0.71%	149.54	4.00	4804.43	0	4804.61	0.22
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-272	P274	274	273	18	4810.02	1.52%	71.91	4.50	4805.52	0	4805.64	0.17
HERRIMAN ROSE EAST	TOWERS PHASE 1	T-363	P275	275	5	18	4807.25	0.72%	18.08	3.75	4803.50	0	4804.26	0.45
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-246	P276	276	5	18	4808.02	0.92%	70.91	4.00	4804.02	0	4805.09	6.54
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-257	P277	277	299	18	4815.93	0.43%	56.08	6.69	4809.24	0	4809.95	1.81
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-244	P278	278	276	18	4808.12	2.72%	11.39	3.79	4804.33	0	4805.10	1.90

Pipe Network Design Table

PIPE LOCATION	DRAWING WHERE DESIGNED	UPSTREAM STRUCTURE LABEL	Model Pipe Label	Pipe lookup #	Downstream Pipe lookup #	Size (in)	Upstream Junction Ground Elevation	Pipe Slope (%)	Pipe Length (ft)	Upstream Pipe Depth (ft)	Upstream Pipe Invert Elevation	Pipe Outlet Offset (ft)	Modeled Maximum 10-Year Storm HGL	Modeled 10-year Maximum Peak Flow (cfs)
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-276	P279	279	278	18	4808.82	0.83%	70.10	3.91	4804.91	0	4805.34	1.63
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-243	P280	280	279	18	4809.76	0.83%	119.95	3.86	4805.90	0	4806.22	0.92
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-242	P281	281	280	18	4810.19	0.99%	29.38	4.00	4806.19	0	4806.40	0.41
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-247	P282	282	281	18	4810.05	1.98%	18.20	3.50	4806.55	0	4806.74	0.41
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-273	P283	283	279	12	4808.80	1.50%	92.81	2.50	4806.30	0	4806.52	0.44
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-274	P284	284	283	12	4808.80	1.14%	43.77	2.00	4806.80	0	4807.01	0.32
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-262	P285	285	278	18	4808.40	3.25%	17.56	3.50	4804.90	0	4805.10	0.25
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-245	P286	286	276	18	4808.21	1.01%	32.72	3.86	4804.35	0	4805.39	4.86
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-248	P287	287	286	18	4811.39	0.90%	339.24	4.00	4807.39	0	4808.10	4.48
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-249	P288	288	287	18	4811.10	0.52%	17.34	3.62	4807.48	0	4808.10	0.20
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-256	P289	289	287	18	4811.34	1.22%	13.08	3.79	4807.55	0	4808.44	4.33
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-297	P290	290	289	12	4810.16	1.54%	39.60	2.00	4808.16	0	4808.44	0.05
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-261	P291	291	289	18	4812.23	0.57%	73.81	4.26	4807.97	0	4808.90	4.11
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-259	P292	292	291	18	4812.53	1.77%	31.58	4.00	4808.53	0	4808.90	0.16
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-250	P293	293	292	18	4812.41	2.00%	19.00	3.50	4808.91	0	4809.03	0.19
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-260	P294	294	291	18	4813.62	0.43%	60.20	5.39	4808.23	0	4809.24	3.97
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-255	P295	295	294	18	4813.67	3.68%	42.09	3.89	4809.78	0	4809.89	0.22
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-251	P296	296	294	18	4813.43	5.66%	30.75	3.46	4809.97	0	4810.16	0.84
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-254	P297	297	294	18	4813.49	0.48%	26.91	5.13	4808.36	0	4809.36	3.05
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-258	P298	298	297	18	4814.50	0.41%	108.92	5.69	4808.81	0	4809.61	2.94

Pipe Network Design Table

PIPE LOCATION	DRAWING WHERE DESIGNED	UPSTREAM STRUCTURE LABEL	Model Pipe Label	Pipe lookup #	Downstream Pipe lookup #	Size (in)	Upstream Junction Ground Elevation	Pipe Slope (%)	Pipe Length (ft)	Upstream Pipe Depth (ft)	Upstream Pipe Invert Elevation	Pipe Outlet Offset (ft)	Modeled Maximum 10-Year Storm HGL	Modeled 10-year Maximum Peak Flow (cfs)
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-253	P299	299	298	18	4813.54	0.43%	44.48	4.54	4809.00	0	4809.86	2.95
Horizon Heights Phase 1-3	Horizon Heights Phase 1-3	H-252	P300	300	299	18	4813.52	2.58%	20.12	4.00	4809.52	0	4809.85	0.85
Weatherford Lane	Plat E Ph3	E3-1	E3-P1	301	99	18	4834.88	0.24%	61.92	7.23	4827.65	0	4829.91	10.27
Weatherford Lane	Plat E Ph3	E3-3	E3-P2	302	301	18	4834.73	3.14%	49.44	5.53	4829.20	0	4829.94	3.01
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-108	P303	303	58	24	4807.41	0.20%	88.63	17.92	4789.49	0	4798.67	13.36
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-107	P304	304	303	18	4803.99	1.00%	126.50	4.00	4799.99	9.24	4800.18	0.35
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-109	P305	305	303	24	4808.13	0.26%	23.37	18.58	4789.55	0	4798.72	12.83
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-105	P306	306	305	18	4810.94	1.99%	175.13	3.94	4807.00	13.96	4807.27	0.98
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-104	P307	307	306	18	4812.84	1.34%	106.59	4.41	4808.43	0	4808.74	1.00
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-101	P308	308	307	18	4813.36	2.43%	25.49	4.31	4809.05	0	4809.23	0.44
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-100	P309	309	308	18	4813.31	0.85%	30.50	4.00	4809.31	0	4809.52	0.33
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-102	P310	310	307	18	4813.28	1.59%	53.61	4.00	4809.28	0	4809.47	0.43
Weatherford Lane	Plat E Ph3	E311	E3-P11	311	301	18	4834.37	2.10%	26.16	6.17	4828.20	0	4830.31	7.34
Weatherford Lane	Plat E Ph3	E310	E3-P12	312	311	18	4834.36	0.63%	18.92	4.00	4830.36	2.04	4830.69	0.66
Weatherford Lane	Plat E Ph3	E313	E3-P13	313	311	18	4835.24	0.46%	173.80	6.24	4829.00	0	4831.28	6.86
Weatherford Lane	Plat E Ph3	E312	E3-P14	314	313	18	4835.47	0.51%	37.40	4.28	4831.19	2	4831.54	0.71
Weatherford Lane	Plat E Ph3	E314	E3-P15	315	313	18	4835.86	0.51%	68.08	6.51	4829.35	0	4831.65	5.82
Weatherford Lane	Plat E Ph3	E315	E3-P16	316	315	18	4836.31	0.46%	91.58	6.54	4829.77	0	4832.10	5.82
Weatherford Lane	Plat E Ph3	E316	E3-P17	317	316	18	4836.83	0.69%	98.32	6.38	4830.45	0	4832.57	5.82
Berry Creek Drive	FHP-PHASE2	2-9B	2-P12B	318	349	30	4813.84	0.50%	183.56	11.34	4802.50	0	4804.73	32.00
Weatherford Lane	Plat E Ph3	E319	E3-P19	319	325	18	4837.37	2.03%	67.86	4.37	4833.00	0	4833.34	1.65
Weatherford Lane	Plat E Ph3	E318	E3-P20	320	319	18	4837.40	1.23%	25.28	4.09	4833.31	0	4833.53	0.25
Berry Creek Drive	FHP-PHASE2	2-9A	2-P12A	321	318	30	4814.73	13.25%	47.02	6.00	4808.73	0	4809.54	25.12
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-103	P322	322	307	18	4812.54	0.52%	21.01	4.00	4808.54	0	4808.75	0.13
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-111	P323	323	305	24	4807.73	0.24%	33.96	18.10	4789.63	0	4798.77	12.50
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-110	P324	324	323	18	4807.73	0.54%	20.51	4.17	4803.56	13.82	4803.71	0.14
Weatherford Lane	Plat E Ph3	E317	E3-P25	325	317	18	4837.69	0.67%	175.89	6.07	4831.62	0	4833.27	5.82

Pipe Network Design Table

PIPE LOCATION	DRAWING WHERE DESIGNED	UPSTREAM STRUCTURE LABEL	Model Pipe Label	Pipe lookup #	Downstream Pipe lookup #	Size (in)	Upstream Junction Ground Elevation	Pipe Slope (%)	Pipe Length (ft)	Upstream Pipe Depth (ft)	Upstream Pipe Invert Elevation	Pipe Outlet Offset (ft)	Modeled Maximum 10-Year Storm HGL	Modeled 10-year Maximum Peak Flow (cfs)
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-114	P326	326	323	24	4808.51	0.30%	78.95	15.65	4792.86	2.99	4798.84	11.89
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-113	P327	327	326	18	4808.81	0.99%	37.36	8.86	4799.95	6.72	4800.14	0.32
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-112	P328	328	327	18	4805.22	1.00%	126.51	4.00	4801.22	0	4801.40	0.32
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-117	P329	329	326	24	4809.93	0.30%	145.00	16.63	4793.30	0	4798.93	11.29
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-116	P330	330	329	18	4809.96	0.99%	37.36	8.24	4801.72	8.05	4801.91	0.32
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-115	P331	331	330	18	4806.99	1.00%	126.51	4.00	4802.99	0	4803.17	0.32
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-118	P332	332	329	24	4809.63	0.30%	96.07	16.04	4793.59	0	4799.01	10.95
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-119	P333	333	332	24	4809.16	0.31%	25.46	15.49	4793.67	0	4799.06	11.35
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-120	P334	334	333	24	4809.66	0.31%	39.12	15.87	4793.79	0	4799.11	10.75
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-122	P335	335	334	24	4810.07	0.30%	160.30	15.80	4794.27	0	4799.23	10.74
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-121	P336	336	335	18	4806.91	1.00%	164.50	4.00	4802.91	7	4803.09	0.33
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-126	P337	337	335	24	4808.45	0.30%	144.72	13.74	4794.71	0	4799.35	11.05
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-125	P338	338	337	18	4811.97	1.91%	159.50	4.73	4807.24	9.49	4807.49	0.84
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-124	P339	339	338	18	4811.74	1.89%	26.50	4.00	4807.74	0	4808.00	0.71
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-129	P340	340	337	18	4808.47	1.07%	21.50	9.79	4798.68	3.74	4799.35	0.45
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-123	P341	341	340	18	4804.09	1.00%	141.00	4.00	4800.09	0	4800.27	0.33
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-128	P342	342	337	24	4807.10	0.30%	145.49	11.96	4795.14	0	4799.47	10.42
Horizon Heights Phase 4-5	Horizon Heights Phase 4-5	H-127	P343	343	342	18	4803.75	1.00%	164.50	4.00	4799.75	2.96	4799.93	0.31
Berry Creek Drive	FHP-PHASE2	2-9G	P344	344	342	24	4805.71	0.31%	133.40	10.16	4795.55	0	4799.59	10.84
Berry Creek Drive	FHP-PHASE2	2-9H	P345	345	344	18	4805.75	1.02%	21.50	4.00	4801.75	5.98	4801.88	0.14
Berry Creek Drive	FHP-PHASE2	2-9J	P346	346	344	24	4805.80	0.62%	25.81	10.09	4795.71	0	4799.66	10.58
Berry Creek Drive	FHP-PHASE2	2-12	P347	347	346	36	4805.03	0.35%	54.74	9.13	4795.90	0	4799.66	26.83
Berry Creek Drive	FHP-PHASE2	2-9K	P348	348	212	36	4809.17	2.81%	128.42	8.00	4801.17	0	4802.49	23.92

Pipe Network Design Table

PIPE LOCATION	DRAWING WHERE DESIGNED	UPSTREAM STRUCTURE LABEL	Model Pipe Label	Pipe lookup #	Downstream Pipe lookup #	Size (in)	Upstream Junction Ground Elevation	Pipe Slope (%)	Pipe Length (ft)	Upstream Pipe Depth (ft)	Upstream Pipe Invert Elevation	Pipe Outlet Offset (ft)	Modeled Maximum 10-Year Storm HGL	Modeled 10-year Maximum Peak Flow (cfs)
Berry Creek Drive	FHP-PHASE2	2-9D	P349	349	348	36	4809.58	1.64%	25.03	8.00	4801.58	0	4803.52	32.15
Berry Creek Drive	FHP-PHASE2	2-9E	P350	350	348	18	4808.82	0.83%	24.24	4.82	4804.00	2.63	4804.36	0.89
Berry Creek Drive	FHP-PHASE2	2-9F	P351	351	350	18	4808.89	3.84%	23.16	4.00	4804.89	0	4804.98	0.15
Berry Creek Drive	FHP-PHASE2	BC	2-P18A	NA	218	36	4805.00	0.15%	46.19	9.00	4796.00	0	4799.66	27.70

APPENDIX B
GROWTH TECHNICAL MEMORANDUM FOR HERRIMAN

BOWEN COLLINS & ASSOCIATES

TECHNICAL MEMORANDUM DRAFT

TO:	Blake Thomas, P.E. Herriman City Engineer 5355 W Herriman Main St Herriman, UT 84096
COPIES:	Brynn MacDonald, Justun Edwards, Gordon Haight
FROM:	Andrew McKinnon, Keith Larson Bowen Collins & Associates
DATE:	August 12, 2019
SUBJECT:	Growth Projections for Herriman City Planning Documents
JOB NO.:	483-18-01

INTRODUCTION

Herriman City is one of the fastest growing communities in the State of Utah. As a result, City planning documents need regular updates to keep up with changes to planning conditions within the City. The fast pace of growth needs to be supported by improvements in the City's infrastructure or utility systems (roads, pipelines, parks, etc.) The purpose of this document is to summarize existing population estimates within the City and to document projections of growth that will be used for The City's next round of future planning documents.

EXISTING RESIDENTIAL POPULATION

The U.S. Census Bureau publishes estimates of City population. Table 1 lists the current U.S. Census Bureau's estimates. The City's planning department also prepares its own population estimates. The City estimate of population within the City is based on the number of housing unit permits issued by July 1st of each year and the American Community Survey of household size for Herriman City (3.91 persons/household for 2013-2017). These estimates are also shown in Table 1.

Table 1
Historical and Existing Population Estimates

Date	US Census Estimate	Herriman City Planning Department Estimate	Percent Difference
April 1, 2010	21,785	21,785	0%
July 1, 2017	39,224	44,465	13%
July 1, 2018	44,877	51,681	15%
July 1, 2019		58,287	

City personnel are more confident in their internal population estimates than in the estimates prepared by the U.S. Census Bureau. It appears that the Census Bureau may be underestimating the rapid growth that has been occurring within Herriman City based on building permits. The more rapid growth estimated by the City planning department appears to be supported by historic growth numbers. The average annual growth rate of the City from 2000 to 2010 (based on census data) was approximately 30.5 percent.

LANDUSE AND BUILDOUT POPULATION

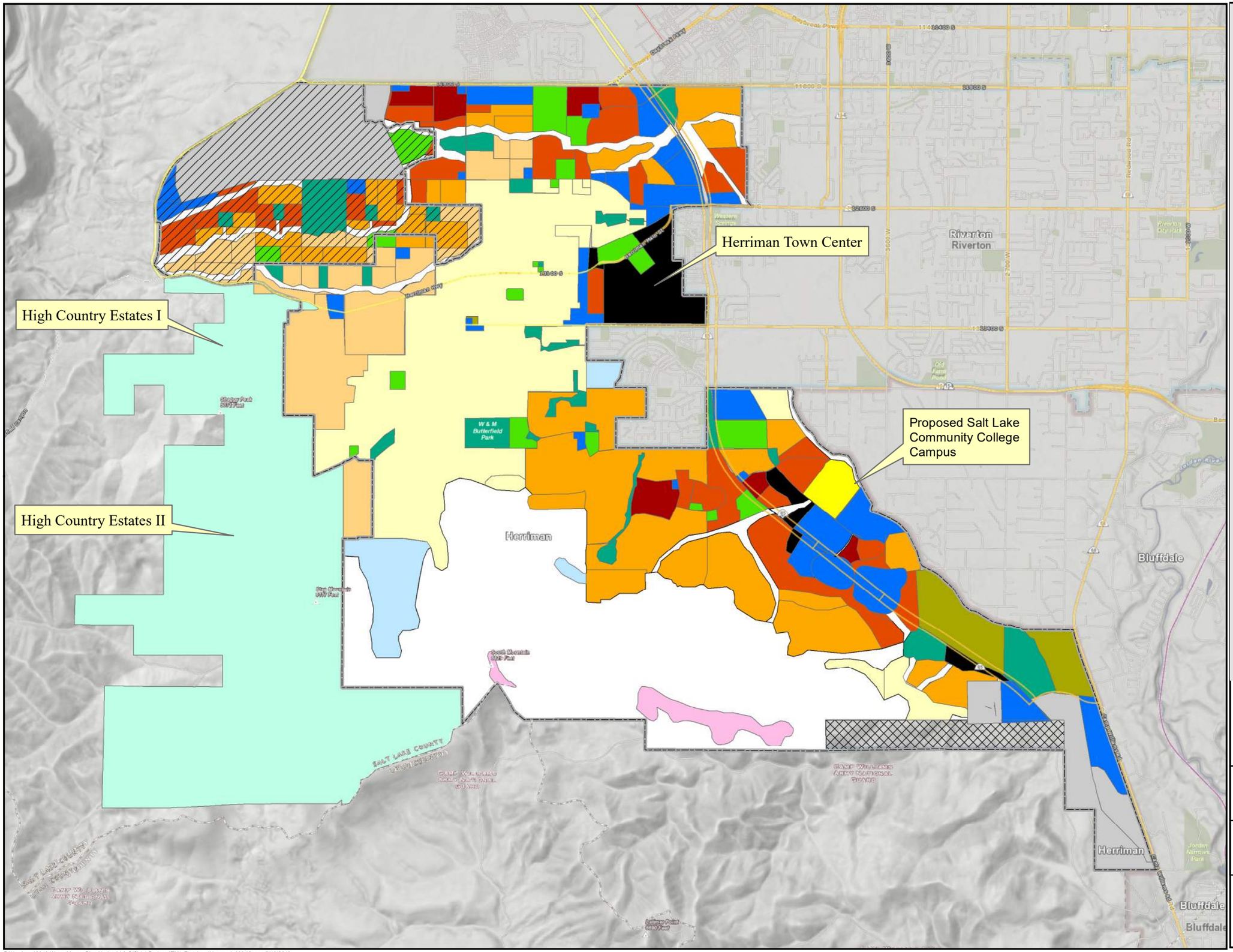
The City's most recently adopted general plan includes the land uses shown in Figure 1. Included in Figure 1 is the City's planned annexation area boundary. Total acreage associated with each land use type and the corresponding population of each land use type at buildout is summarized in Table 2. The total projected buildout population for the City (including areas projected to be annexed) is 116,000.

Table 2
Herriman City Land Use and Buildout Residential Population Estimate

Herriman City and Annexation Area	Acres	Average Density of Residential Units	Number of Residential units	Buildout Residential population
Agricultural Residential (1.8 - 3.0 du/acre)	1,124	2.40	2,697	10,545
High Density Residential (8 to 20 du/acre)	221	14.00	3,087	12,071
Hillside/Rural Residential (0.5 to 1.7 du/acre)	325	1.10	357	1,396
Low Density Residential (1.8 to 2.5 du/acre)	2,513	2.15	5,403	21,126
Medium Density Residential (4.6 to 8 du/acre)	1,095	6.30	6,901	26,984
Mixed Use (maximum 15 du/acre)	86	7.50	643	2,513
Mixed Use (Towne Center)	317	5.50	1,741	6,808
Resort/Recreational (maximum 0.4 du/acre)	154	0.20	31	121
Rural Residential (1 unit per 5 acres)	4,469	0.20	894	3,495
Single Family Residential (2.6 to 4.5 du/acre)	2,218	3.55	7,874	30,786
Non-residential Land Uses	7,697	0	0	0
Total:	**20,218**		**29,628**	**115,844**

RESIDENTIAL GROWTH PROJECTIONS

In 2002, the Wasatch Front Regional Council (WFRC) predicted the Herriman City population in 2010 would be 8,600. When compared to actual census data of 21,785, this represents an under prediction of more than 60 percent. In 2012, the State of Utah Governor's Office of Management and Budget projected that the Herriman City 2017 population would be 32,800 people. The US Census projection for the population in 2017 was 39,224. When compared to Herriman City's estimate of 44,465 people that actual lived in the City in 2017, this represents an under prediction of between 17 percent and 27 percent. While these two planning groups are regularly used for predicting residential population



Legend

- Future Annexation Area
- City Area

Landuse Description

- Mixed Use
- High Density Residential
- Medium Density Residential
- Single Family Residential
- Agricultural Residential
- Low Density Residential
- Rural Residential
- Hillside/Rural Residential
- Resort/Recreational
- Commercial
- Light Industrial/ Business Park
- Open Space
- Parks & Recreation
- Public College Campus
- Public/Institutional/Schools
- Quasi-Public/Utilities
- Military Operation (Camp Williams)

NORTH:

SCALE: 0 2,000 4,000 Feet

EXISTING GENERAL PLAN LAND USE

HERRIMAN CITY

PROJECTIONS OF GROWTH

BOWEN COLLINS & ASSOCIATES

FIGURE NO. 1

P:\Herriman\2019 Water Master Plan Update\4.0 GIS\4.1 Projects\TM1-Fig1-LandUse.mxd AMcKinnon 7/10/2019

across the Wasatch Front, Herriman City is reluctant to rely exclusively on State of Utah or WFRC projections of growth for its internal planning requirements.

The City's preferred approach for predicting population growth is based on the following observations:

- **2018 Population** –The City's 2018 population estimate (based on building permits and the American Community Survey of household size) is believed to be more accurate than recent U.S. Census estimates. Correspondingly, the City's own 2018 estimate will be used as the basis for projections moving forward.
- **2019 Population** – The average growth rate of the residential population from 2015 to 2018 within the City was 12.8 percent per year. The City's 2019 population was correspondingly estimated by applying the recent 4-year average growth rate to the 2018 population estimate.
- **Expected Future Slowing of Growth –** If growth continued within Herriman City at 12.8 percent per year, the City would reach its buildout population estimate by the year 2035. However, the City does not expect future growth rates within the City to continue at the same aggressive rates observed in recent years. Private property availability and other logistical issues (such as construction of roads, utilities) will prevent such rapid growth continuing indefinitely. As a result, the City anticipates that growth rates will gradually decline as the readily developable areas of the City are reduced.
- **Logistic Growth Model –** Because of slowing growth as discussed above, the City expects that future growth within Herriman will follow a logistic growth curve[1].

Using the logistic growth equation with an initial growth rate of 12.8 percent and a buildout population of 116,000, projected population growth in the City is summarized in Table 3 and shown in Figure 2. Based on these projections, the City is expected to reach 99.5 percent of its buildout population by the year 2060.

Table 3
Herriman City Residential Population Projection

Year	Residential Population Projection
2010	21,785
2018	51,681
2019	58,287
2020	62,010
2025	79,568
2029	91,047
2030	93,465
2035	102,904
2040	108,668
2045	111,961
2050	113,772
2055	114,746
2060	115,265
2065	115,539

[1] When land and resources are limited, population projections will a logistic growth curve. In logistic growth, population expansion decreases as resources become scarce, leveling off when the carrying capacity of the area is reached, resulting in an S-shaped curve.

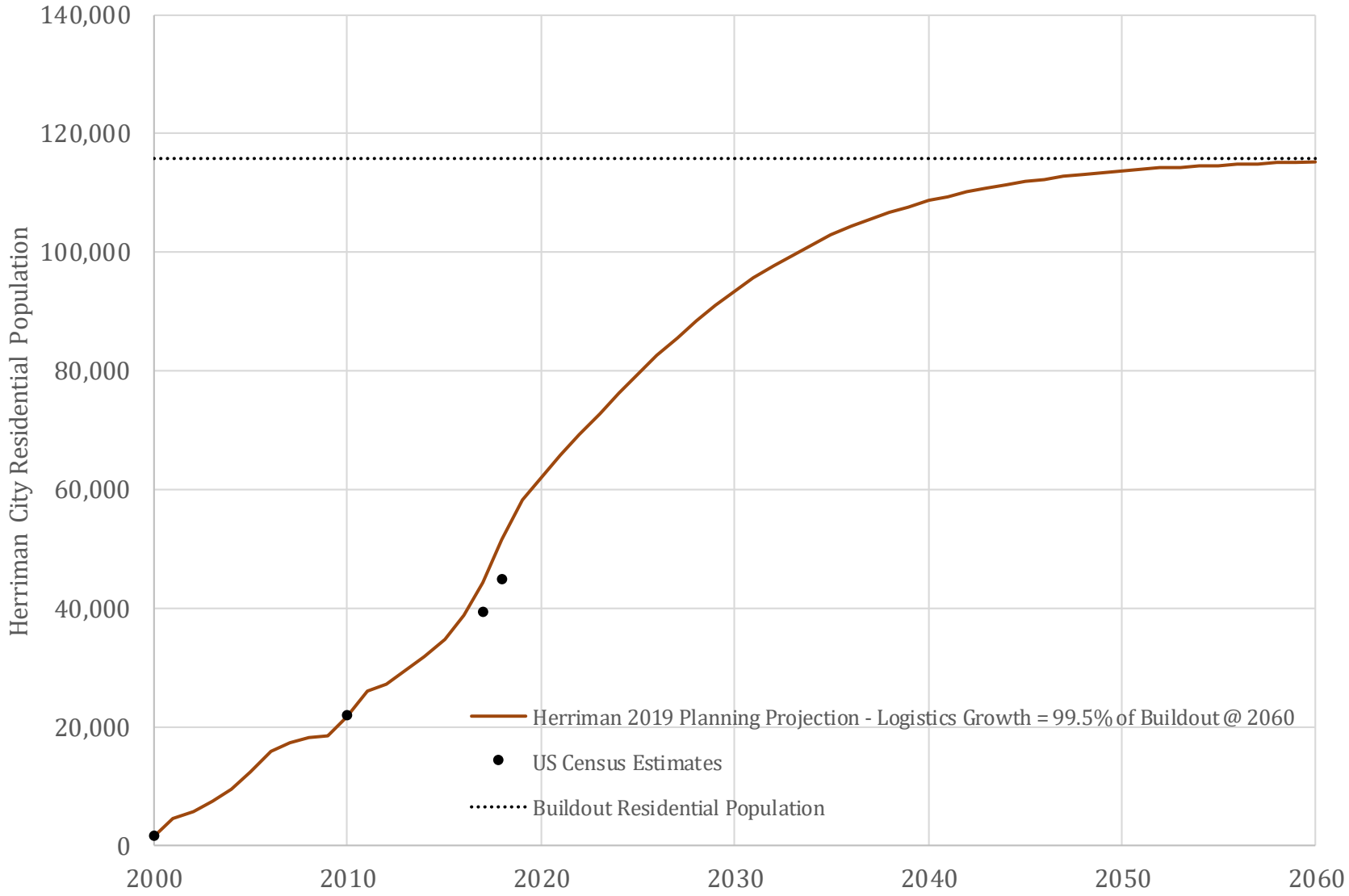


Figure 2 – Herriman City Population Projection

EQUIVALENT NON-RESIDENTIAL PROJECTIONS

Thus far, growth projections have only addressed residential growth. However, non-residential development will also place significant demands on City utilities and must be accounted for. Non-residential growth can sometimes be difficult to quantify because demands associated with non-residential development will vary depending on the type of development and the utility involved. For the purpose of this memo, projections of non-residential growth have been based on the projected indoor water demand associated with non-residential use and its equivalency in terms of residential indoor water use[2].

Following the same approach outlined for residential growth, non-residential growth projections are as follows:

- **Existing Non-Residential Development** – Based on indoor water use records, existing non-residential development used the same amount of water as approximately 1,336 equivalent residential units (ERUs). This was based on the recommended planning value for per capita indoor water use of 54.2 gallons per capita per day (gpcd) and a household size of 3.91. This is equivalent to a residential population of 5,225.

- **Non-Residential Development at Buildout –** Projected non-residential development at buildout based on land use is summarized in Table 4. Non-residential development expressed in terms of both equivalent residential units (ERUs) and equivalent residential population. Total non-residential development projected at buildout is 18,020 ERUs, or an equivalent population of 70,460.
- **Projected Non-Residential Growth –** Using similar assumptions to those identified previously for residential growth (e.g. logistic growth curve, buildout as calculated in Table 4, etc.), non-residential growth has been projected for the City and is summarized in Table 5.

[2] The effects of non-residential growth on Herriman City services such as water, transportation, parks, fire, and safety can be significantly different depending on the type of infrastructure. For example, the proposed public college campus near Mountain View Corridor on the east side of Herriman may have a significantly higher impact on roads into and out of the City than on water use within the City. Each type of infrastructure or utility should consider how the growth of non-residential development may uniquely affect its facilities in planning documents.

Table 4
Herriman City Land Use and Non-Residential Development at Buildout

Herriman City and Annexation Area	Acres	Average Density of ERUs	Number of ERUs	Equivalent Residential population
Commercial	1,024	3.44	3,521	13,767
Light Industrial/Business Park	333	3.44	4,022	15,727
Military Operation (Camp Williams)	308	0.19	59	231
Mixed Use (maximum 15 du/acre)	86	4.58	392	1,534
Mixed Use (Towne Center)	317	6.58	2,083	8,144
Open Space	3,761	0	0	0
Parks & Recreation	598	0	0	0
Public/Institutional/Schools	418	12.44	5,201	20,337
College Campus	87	18.43	1,601	6,260
Quasi-Public/Utilities	332	3.44	1,141	4,459
Residential Land Uses (not including mixed use)	12,119	0	0	0
Total:	**20,218**		**18,020**	**70,460**

Table 5
Equivalent Non-Residential Population Projection

Year	Residential Population Projection	Equivalent Non-Residential Population	Residential + Equivalent Residential Population	Percentage of Non-residential
2010	21,785	2,202[a]	23,987	9.2%
2018	51,681	5,225	56,906	9.2%
2019	58,287	6,522	64,808	10.1%
2020	62,010	7,607	69,618	10.9%
2025	79,568	14,054	93,622	15.0%
2029	91,047	20,011	111,059	18.0%
2030	93,465	21,551	115,016	18.7%
2035	102,904	29,280	132,184	22.2%
2040	108,668	36,782	145,450	25.3%
2045	111,961	43,937	155,898	28.2%
2050	113,772	50,786	164,558	30.9%
2055	114,746	57,411	172,158	33.3%
2060	115,265	63,889	179,154	35.7%
2065	115,539	70,275	185,814	37.8%

[a] Herriman City records do not include a breakdown between residential and non-residential use for the year of 2010. Value reported here has been estimated assuming the same ratio of development as observed in 2018.

As can be seen in the last column, the percentage of non-residential contributions to the City's overall water demand is expected to increase significantly through the year 2065. This is not unexpected as the City is still young and currently heavy on residential development. As the City matures, a greater portion of commercial and industrial development is expected. Addition of an expected college campus in the City will also add significantly to the portion of water used by non-residential development.

TOTAL ERU PROJECTIONS

For the purpose of water demand modeling, it is also convenient to covert these growth projections into ERUs as summarized in Table 6.

Table 6
Total ERU Projection

Year	Residential Units	Non-Residential ERUs	Total ERUs
2010	5,572	563	6,135
2018	13,218	1,336	14,554
2019	14,907	1,668	16,575
2020	15,859	1,946	17,805
2025	20,350	3,594	23,944
2029	23,286	5,118	28,404
2030	23,904	5,512	29,416
2035	26,318	7,488	33,807
2040	27,792	9,407	37,199
2045	28,635	11,237	39,872
2050	29,098	12,989	42,086
2055	29,347	14,683	44,030
2060	29,480	16,340	45,820
2065	29,550	17,973	47,523
Buildout	29,668	18,020	47,688

SHORT-TERM GROWTH DISTRIBUTION

In addition to projecting overall growth in the City, planning efforts for City infrastructure must also consider where this growth will occur. Based on information provided by developers and the availability of developable lands, the City's planning department has identified where it anticipates growth will occur within existing City limits over the next 10-years. Figure 3 shows the general location and timing of future growth while Table 7 summarizes the amount of growth possible within the areas identified based on the land use type.

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