Midway Sanitation District

Wastewater Collection System Master Plan

Capital Improvements & Impact Fees

July 2014

HORROCKS ENGINEERS

Chapter 1

Executive Summary

1.1 Document Purpose and Organization

Midway Sanitation District (MSD) owns and operates a wastewater collection system within the District boundaries to service both residential and commercial connections. This system collects and transfers sanitary sewer wastewater from the district connections and transports it to the Heber Valley Special Service District for treatment. The District has retained Horrocks Engineers to develop a Wastewater Collection System Master Plan which will ensure an adequate collection system.

This document is a compilation of the MSD master plan, long term capital facilities plan, and impact fee analysis, hereafter collectively called the "Master Plan". This Master Plan document combines these elements into one comprehensive study.

The population growth within the MSD boundary has increased the demand on the existing public facilities throughout the District. To continue to adequately service the District's increasing demand, the sanitary sewer capital facilities were analyzed and are reported in this document. This document recommends capital improvements to increase the facilities' capacity to meet demands through the year 2034 and maintain the current District Level of Service (LOS) for those facilities. This document also reports the associated improvement costs for operating expenses and the associated impact fees that were calculated.

In developing the various impact fees documented in this report, MSD has complied with the requirements set forth by the Utah Impact Fees Act – as proposed through the 2011 legislative session. The impact fees have been calculated using methods that insure they are proportionate and reasonably related to the service demands of the future development.

Organization of the Master Plan Document
The first three chapters of this document summarize the purpose of this Master Plan, provide a basis for impact fees, and project population growth within the District. These chapters provide the foundation data necessary to analyze each facility through the 20 year planning period.

MSD's sanitary sewer system was analyzed through the 20 year planning period. Chapters 4 and 5 document the findings of the analysis. A separate appendix contains the additional data and material supporting this document.

1.2 Summary of Capital Improvement Costs

Recommended capital improvements to existing facilities were analyzed and are shown in Chapter 4. These improvements are necessary to maintain the current Level of Service (LOS) during future growth. Impact fees are not used to improve LOS for any Capital Facilities in this study. Projects which may improve existing LOS are paid for by operating funds.

Estimated costs of the recommended improvements are summarized below. The improvement costs are in 2014 dollars and are the costs for all Capital Facilities during the twenty year planning period. Contingencies, engineering, legal and administrative fees are also included. These improvements will be funded through a combination of impact fees, developer contributions, District operating funds, and other funds such as grants or other public or private entity funds.

Estimated Cost of Recommended Improvements (20 year)

Facility	Estimated Cost of Recommended Improvements (2014 dollars)
Sanitary Sewer	$6,255,683

All Capital Facilities projected through the 20 year planning period were determined based on the need created by both future residential and non-residential growth. The cost of each facility was determined from sound estimating procedures using historic construction cost records for each particular facility, current land acquisition costs, typical engineering costs, and normal construction contingencies. Each facility was analyzed to determine if the costs should be funded by impact fees, and if so, what percentage would be paid for by the impact fees. For projects within future developments, the developer is required install, at a minimum, an 8 inch line to serve the development. If a line larger than 8 inch is shown in this Master Plan, the costs for oversizing the line is eligible for impact fees. The costs to be funded by impact fees for all projects within a facility type were totaled. The costs associated with the percentages not funded by impact fees were distributed to one or more of the other funding sources and totaled. These cost distributions and totals can be seen in Chapter 4 in the table listing the estimated cost of each improvement. Costs for any excess capacity in existing facilities have not been included in the cost totals of this study. A majority of any excess capacity has been previously been paid for by impact fees, and the benefit should go to new development.

1.3 Summary of Fees

Impact Fees

Although the total build-out within MSD will probably not come for several decades, proper planning of the District's wastewater system should occur now. The collection of impact fees from new development is one way to offset the costs of adding and/or improving the existing infrastructure. This section recommends the impact fees for the 20 year planning period based on the August 12, 2009 Midway City Land Use Map, projected population growth taken from Mountain Land Association of Government (MAG), and respective facilities that are required

because of the growth during this period. All necessary capital facilities projected through the 20 year planning period have been determined and are shown in Chapter 4. The impact fees were calculated by comparing total costs of improvements to be paid for by impact fees and the number of new residential and non-residential units that will create the need for the improvements.

It is essential that any impact fees collected must be expended within six years. To ensure MSD properly expends impact fee funds, an expenditure plan has been created for each impact fee fund. All the improvements within the 20 year window have been grouped into five year incremental improvements. Projects that were expected to occur first were planned for the 2015 to 2019 time period. The remaining projects were planned into the most feasible five year window up to the year 2034.

The impact fee amount was calculated by taking the total cost of improvements associated with impact fees, plus the necessary bond interest payments, divided by the projected new growth number for 20 years. The growth number is presented as equivalent residential units (ERU's). The impact fees for all years are shown in 2014 equivalent dollars. Bonding was necessary in some instances when projects were grouped into five year windows, and impact fees collected in the earlier years were insufficient to cover projected improvement costs. By considering the full 20 year window to determine the projected impact fees, and then grouping the projects into five year increments, the impact fees are distributed evenly to all development in the 20 year plan. If the impact fee revenue for the first five years does not cover all the improvements planned for that period, bonds and/or loans will be required to cover the remaining costs. Development within the 20 year planning window will all pay equally for future projects so that earlier developments only pay their fair share of facilities that also benefit later developments.

Table 1-1 summarizes the proposed impact fees for the sanitary sewer facilities within MSD. The table shows the projected impact fees collected every five years for all the facilities and the five year incremental improvement costs scheduled to expend the collected impact fees. It also shows the impact fee running balance, after adjusting for bond payments, for each five year increment. The tables in each facility chapter show the bond account balance. For information on the projected ERU's, please see Chapter 4.

Table 1-1 Expenditure Plan Summaries

Facility	2010-2015 5-year Collected Impact Fees	2010-2015 5-year Improvement Costs	2010-2015 5-year Impact Fee Balance[1]	2016-2020 5-year Collected Impact Fees	2016-2020 5-year Improvement Costs	2016-2020 5-year Impact Fee Balance[1]
Sanitary Sewer	$1,605,254	$3,080,073	$181	$1,703,670	$2,291,848	$1,478
Facility	**2021-2025 5-year Collected Impact Fees**	**2021-2025 5-year Improvement Costs**	**2021-2025 5-year Impact Fee Balance[1]**	**2026-2030 5-year Collected Impact Fees**	**2026-2030 5-year Improvement Costs**	**2026-2030 5-year Impact Fee Balance[1]**
Sanitary Sewer	$1,970,084	$38,500	$5,758	$1,958,730	$845,261	$0

1. Balance after considering bond initiation and payments for five year increment. Actual will vary depending on actual improvement costs and bond amounts. The goal is to set balance as close to zero as possible

The MSD service area for sanitary sewer includes everything within the District boundaries. The figure below highlights the boundary of MSD in yellow. The impact fee calculations for the facilities include impact revenue from within the entire boundary of MSD. This plan proposes that all developments within the MSD boundary incur impact fees for sanitary sewer.

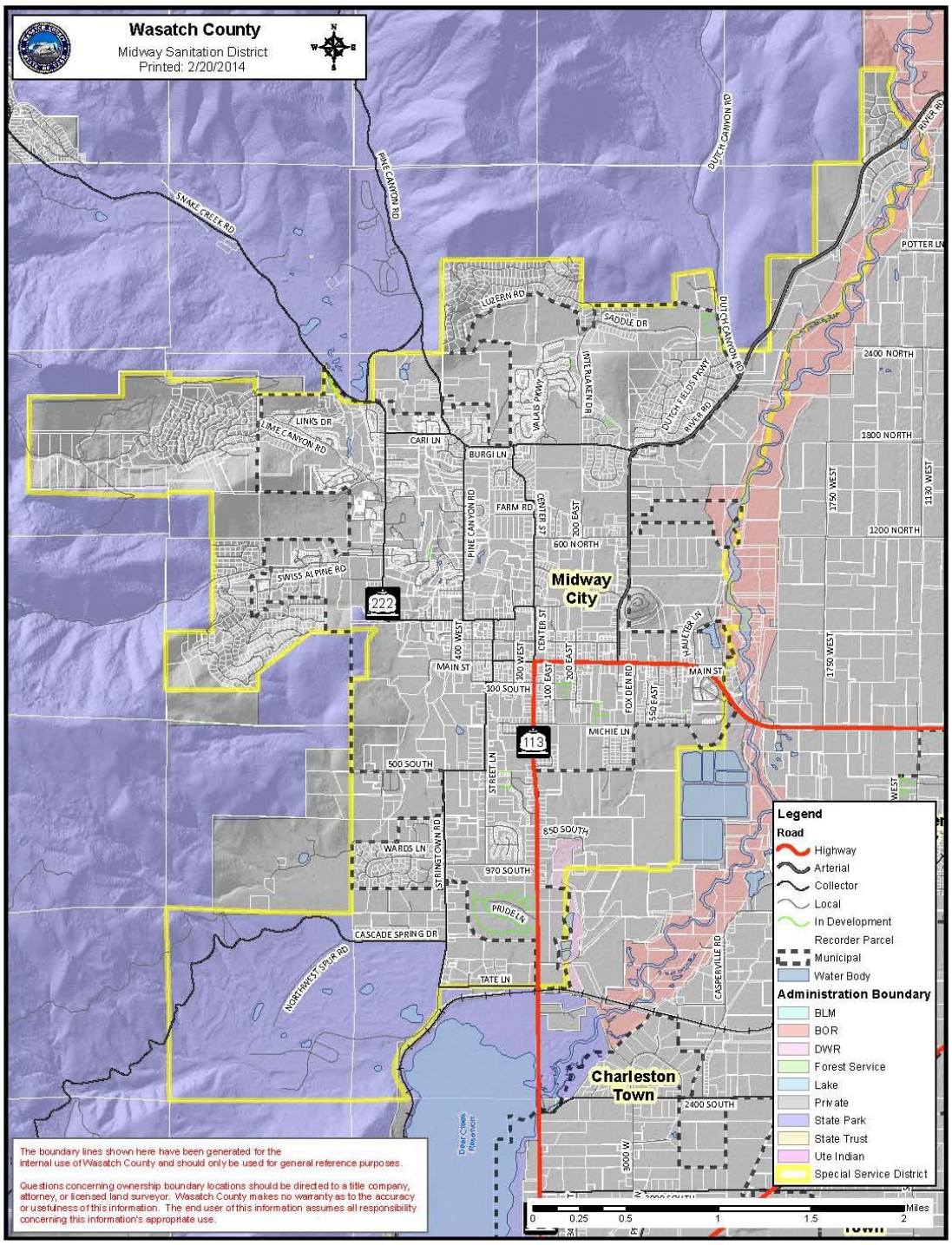


Table 1-2 shows a comparison of the previous and the recommended impact fees. The recommended impact fees will fund the necessary improvements to the District's infrastructure that will maintain the Utah Department of Environmental Quality, Division of Water Quality standards.

Table 1-2 Summary of Impact Fees

Facility	Existing 2014 Impact Fee	Calculated Impact Fee	MSD Board Recommended Impact Fee	Units
Sanitary Sewer	$2,450	$2,590	**$2,450**	ERU*

* Equivalent Residential Unit

Annual Adjustment of Impact Fees

Since growth rates, property values, inflation, zoning, and other variables which affect public facilities change from year to year, it is in the best interest of MSD to ensure that the impact fees are adjusted periodically.

It is recommended the District adopt a policy with this Master Plan update that indexes the cost of improvements to inflation and adjusts impact fees on an annual basis. The index that will be used is the Engineering News Record (ENR) 20 City Construction Cost Index. The ENR December 2013 index of 9547 will be deemed the base index. An annual adjustment to fees may be made by the Board on the percentage change between the December 2013 index and the December index proceeding the next year.

Impact Fee Exemptions

The impact fees recommended in this study must be assessed as recommended to generate sufficient revenue to cover the improvement costs that have been identified. From time to time the District receives requests to exempt all or a portion of impact fees on a given project. If the District desires to exempt any of the fees identified, they must at the same time identify an alternate source of funding that will replace the amount waived.

Utility Fees

Utility Fees or Operational Fees are assessed to the existing population receiving MSD facility services. The utility fees will fund the improvements which maintain the existing MSD facilities. The existing utility fees were not studied or changed with this update.

The current rate structure as of June 2014, shown below, is recommended for funding of all required operational improvements.

- $10.50 1 person per residence
- $13.50 2 persons per residence
- $16.50 3 persons per residence
- $19.50 4 persons per residence
- $22.50 5 persons per residence
- $25.00 6 persons and over per residence

Chapter 2

Impact and Utility Fee Summary

2.1 Administration of Impact Fees

An impact fee is a one-time charge with the purpose of raising revenue for new or expanded public facilities necessitated by development. Impact fees are imposed as a condition of development. Under the Impact Fee Act, such facilities must have a useful life of ten years or more. They must also be owned or operated by or on behalf of a local government. An impact fee, is expressly distinguished from a tax, a special assessment under the special improvement or special district acts, a building permit fee, a hook-up fee, a fee for project improvements, or other reasonable permit or application fees, such as conditional use or subdivision application fees (The Utah Land Use Institute, April 2011, *Utah Impact Fee Handbook and Checklists*).

Impact fees cannot be used to correct existing public facility deficiencies or for routine maintenance activities. The premise behind impact fees is based on the critical assumption that if no development were allowed, the existing facilities would adequately serve the existing level of development within the District, at the existing Level of Service (LOS). Therefore, the recommended improvements, outlined in chapter 4 for each facility, are used in the development of the impact fees. These improvements are growth related and are needed to accommodate the projected growth to maintain the existing Level of Service (LOS) for these facilities within MSD.

Refer to Table 1-2 in the Executive Summary for the current and recommended impact fees. The proposed impact fees will fund the necessary improvements that will maintain the District standards while also maintaining the current District LOS for the respective facilities, while accommodating new development.

2.2 Proportionate Share Analysis

Impact fees are a form of development exaction. An exaction is generally a fee, in-kind requirement, or dedication of land imposed on development to offset the burdens created by that development on municipal services. Exactions provide only a secondary benefit to existing residents. Much has been written about U.S. Supreme Court decisions, such as Dolan v. Tigard (1994) 114 S.ct.2309, and Utah Supreme Court decisions, such as B.A.M Development v. Salt Lake County, 2008 UT 74, 196 P.3d 601 (Utah 2008) and how they mandate the balancing of burdens created by and imposed upon development. The impact fee seeks to do this. (The Utah Land Use Institute, April 2011, *Utah Impact Fee Handbook and Checklists*).

Impact fees for MSD are proportionate and related to the capital facility service demands of development. The impact fees presented in this document are based on the Impact Fees Act

which includes seven evaluation factors set forth by the Utah Supreme Court decision known as Banberry Development Corp. vs. South Jordan City. These seven factors are incorporated into the following objectives used for the MSD impact fee analysis, and ensure newly developed properties bear only their equitable share of the capital costs in relation to the benefits conferred:

1. Impact fees for culinary water, pressurized irrigation, sewer, streets, storm drain, and parks & trails are based on the anticipated cost of system improvements for each facility needed to serve existing and future development. The costs are generated using local cost factors and construction practices typical to the area. No existing facility costs or excess capacity costs are included in the impact fee calculations for MSD. All existing excess capacity has been previously paid for by impact fees and/or operating funds. New development will benefit from excess capacity in the existing facilities.

2. Public facilities will be financed by a combination of operating and non-operating funds. Revenue sources may include: user fees, special assessments, bonds, general taxes, grants, impact fees, and intergovernmental transfers. Impact fees fund non-operating projects.

3. The extent to which developed properties in MSD have already contributed to the cost of existing capital facilities (by such means as user charges, special assessment, or payment from the proceeds of general taxes), have been taken into account in the impact fee analysis.

4. The extent to which developed properties in MSD contribute to the cost of both new and existing capital facilities in the future have been identified in the impact fee analysis.

5. The extent to which developed properties are entitled to a credit because the District is requiring their developers or owners (by contractual arrangement or otherwise) to provide common facilities (inside or outside the proposed development) that have been provided by MSD and financed through general taxation or other means (apart from user fees) in other parts of MSD have been considered. Newly developed properties should be evaluated in regards to the facilities that have been provided by the owners or developers as compared to common facilities provided by MSD in other parts of the District. Credits may be available for system improvements identified in the District Master Plan. Administrative procedures for credits are addressed in an impact fee ordinance.

6. Extraordinary costs, if any, in servicing newly developed properties are addressed through administrative procedures that allow independent studies to be submitted to MSD.

7. The time-price differential inherent in fair comparisons of the amount paid at different times are addressed in the evaluation of any debt service credits for each type of impact fee. All costs in the impact fee calculations are given in current dollars with no assumed inflation rate over time. Necessary cost adjustments can be made as part of the annual evaluation and update of impact fees.

The following provisions need to be considered during collection of impact fees:

1. Separate geographic zones for the collection and expenditure of impact fees may be considered when a disproportionate share of the public facility cost is attributable to specific locations.

2. MSD may adjust the standard impact fee at the time the fee is charged to:
    - Respond to unusual circumstances in specific cases.
    - Respond to a request for a prompt and individualized impact fee review for the development activity of the state, school district, or charter school.
    - Ensure that the impact fees are imposed fairly.
    - Take into account studies and data submitted by the developer.
    - Allow a credit for the landowner or developer contributions toward projects identified in the master plan that offset the need to collect impact fees; such as dedicating land for a planned improvement; building and dedicating improvements beyond what is needed to serve a development; or dedicating a public facility that the District and developer agree will reduce the need for a master planned improvement.

2.3 Administration of Utility Fees

Utility fees are monthly fees MSD uses to generate sufficient revenue to fund respective operating expenses for various facilities. Operating expenses include the monies used for personnel and contractual services, materials, supplies, depreciation, maintenance, and other miscellaneous expenses. The existing population should fund operating expenses.

The scope of this study does not include the review, analysis, or revisions to existing utility fees for the sewer system of MSD. However key projects funded through utility fees have been identified but are separate from impact fee calculations. All other fees such as taxes, hookup fees, or other fees other than impact fees are not covered in this study.

Chapter 3

Projected Population Growth

3.1 Introduction

Growing population and places of business puts additional burdens on the District's public facilities. To continue providing adequate service to MSD, and maintain the current level of service, the user capacity of the facilities must be analyzed and improved to match population and business growth.

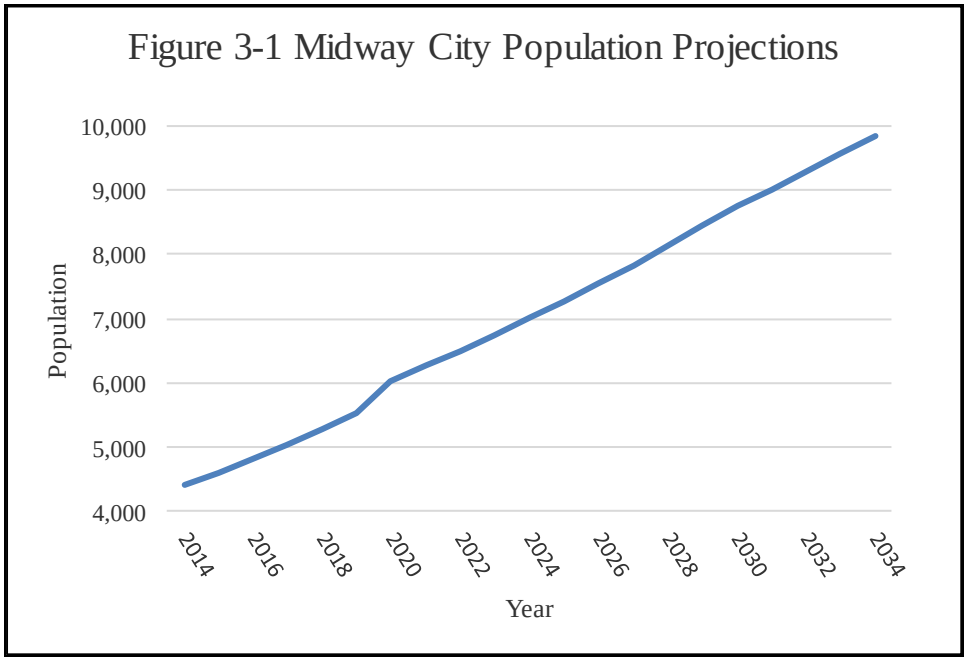
The projected conditions of MSD's infrastructure and facilities are based upon a number of assumptions such as present growth rates, economic stimuli, environmental and recreational development, and residential and commercial development. As these factors change, the projected conditions made in this Master Plan Study also change. To help minimize the effect of changing conditions, the recommendations made in this Master Plan study will be based upon the projected population served by the District's facilities.

3.2 Projected Population

All population statistics were obtained both from Mountain Land Association of Government's (MAG) website and the Governor's Office of Planning and Budget. Growth percentage rates and population projections from these websites were used to project MSD's residential growth. Growth rates of 4.62% from 2010 to 2020, 3.79% from 2021 to 2030, and 2.99% from 2031 to 2034 were used for all residential growth in MSD. An approximated growth rate of 2% was used for non-residential growth outside of Midway City. Population numbers for years 2020 and 2030 were taken directly from the websites, while intermediate numbers were calculated using the growth rate percent.

It is estimated that Midway City's present population is 4403. MSD has approximately 844 people outside of the Midway City municipal boundary, to produce a total MSD population of 5247. Midway City's population is expected to increase by approximately 123% to 9855 people by the year 2034. The population outside of Midway City but still within the MSD boundary is projected to increase by 49%. The population of MSD is expected to increase to 11,113 people by the year 2034. Approximately 30% of all of residential connections within Midway City are second homes, and are therefore not included in the population statistics, but they are included in this study.

Midway City's projected populations are shown in Figure 3-1.



The historical population growth rates at times have exceeded the anticipated growth rate. If population continues to increase at a faster rate than projected, the revenue generated from impact fees will be able to provide enough funds for the recommended improvements, however, the revenue generated from impact fees will need to be monitored to insure funds are spent within the time prescribed by law. If the population increases slower than projected, the revenue generated may be insufficient and financing alternatives may need to be considered to complete projects. It is recommended that the Master Plan be updated periodically to minimize these types of revenue changes.

Table 3-1 shows the incremental population projections for Midway City through the planning period and beyond. The population projections beyond the planning period are simply shown for information purposes and were not directly used in this study. The 3.09 people per household was obtained from the Midway City 2012 General Plan and Midway City's Capital Facilities Plan.

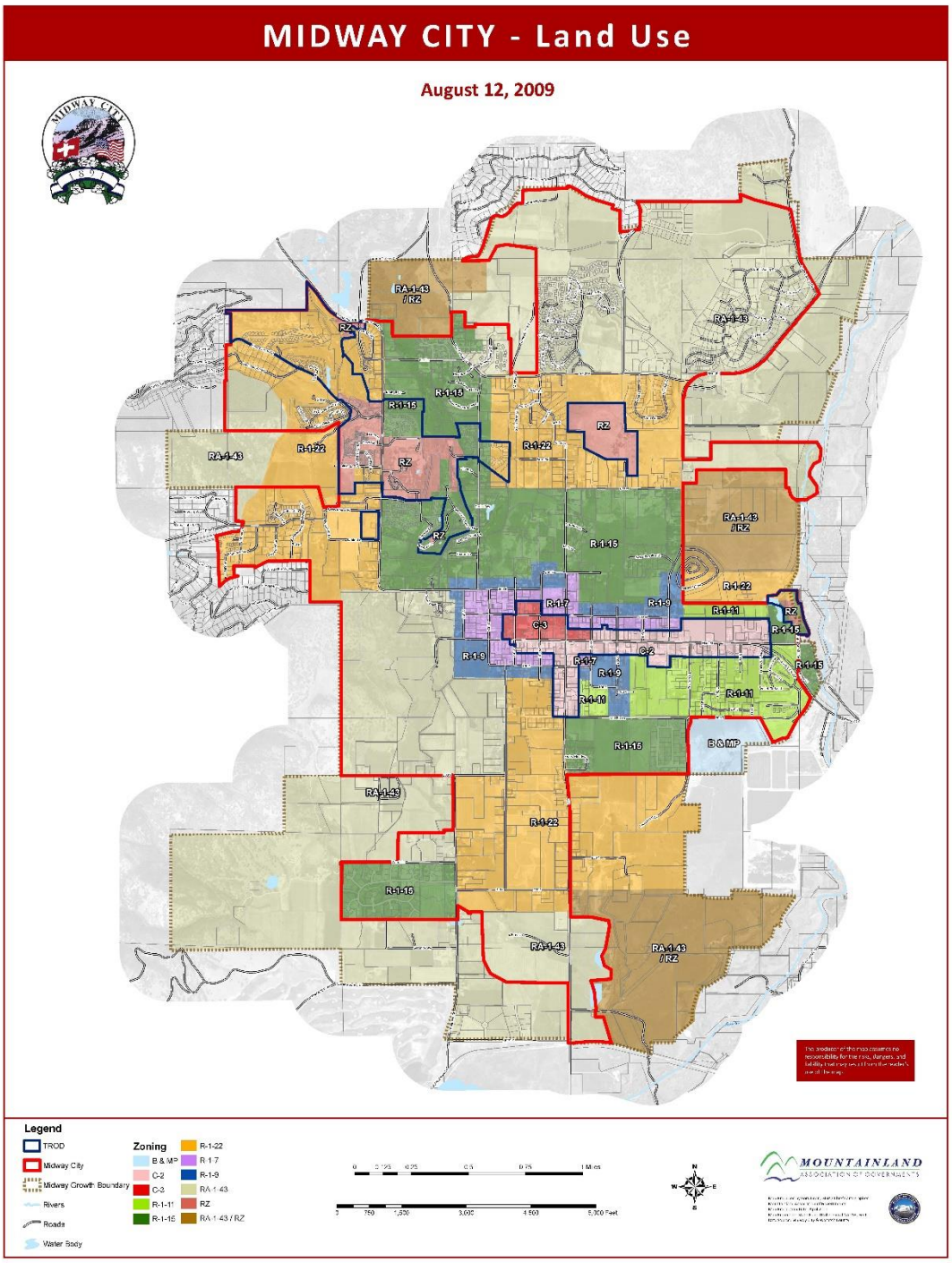
Table 3-1 Midway City's Residential Projections In Annual Increments.

	MAG				GOPB				GROWTH RATES
YEAR	%CHG	TOTAL POP	CHG POP		%CHG	TOTAL POP	CHG POP		
2010		3,845			4.62%	3,845			
2011	4.62%	3,911	66		4.62%	4,023	178		
2012	4.62%	4,023	112		4.62%	4,208	186		
2013	4.62%	4,209	186		4.62%	4,403	194		
2014	4.62%	4,403	194		4.62%	4,606	203		
2015	4.62%	4,607	203		4.62%	4,819	213		MAG Avg Chg/Yr (2010-2020)
2016	4.62%	4,820	213		4.62%	5,042	223		4.62%
2017	4.62%	5,042	223		4.62%	5,275	233		
2018	4.62%	5,275	233		4.62%	5,518	244		MAG Avg Chg/Yr (2020-2030)
2019	4.62%	5,519	244		4.62%	5,773	255		3.79%
2020	4.62%	6,039	520	2,194	4.62%	6,039	266	2,194	
2021	3.79%	6,268	229		3.79%	6,268	229		MAG Avg Chg/Yr (2030-2040)
2022	3.79%	6,505	238		3.79%	6,505	238		2.99%
2023	3.79%	6,752	247		3.79%	6,752	247		
2024	3.79%	7,008	256		3.79%	7,008	256		MAG Avg Chg/Yr (2040-2050)
2025	3.79%	7,273	266		3.79%	7,273	266		2.17%
2026	3.79%	7,549	276		3.79%	7,549	276		
2027	3.79%	7,835	286		3.79%	7,835	286		MAG Avg Chg/Yr (2050-2060)
2028	3.79%	8,132	297		3.79%	8,132	297		2.41%
2029	3.79%	8,440	308		3.79%	8,440	308		
2030	3.79%	8,759	319	2,720	3.79%	8,759	319	2,720	
2031	2.99%	9,021	262		2.99%	9,021	262		
2032	2.99%	9,291	270		2.99%	9,291	270		
2033	2.99%	9,568	278		2.99%	9,568	278		
2034	2.99%	9,855	286		2.99%	9,855	286		
2035	2.99%	10,149	295		2.99%	10,149	295		
2036	2.99%	10,453	303		2.99%	10,453	303		
2037	2.99%	10,765	313		2.99%	10,765	313		
2038	2.99%	11,087	322		2.99%	11,087	322		
2039	2.99%	11,419	332		2.99%	11,419	332		
2040	2.99%	11,759	340	3,000	2.99%	11,759	340	3,000	
2041	2.17%	12,014	255		2.17%	12,014	255		
2042	2.17%	12,275	261		2.17%	12,275	261		
2043	2.17%	12,541	266		2.17%	12,541	266		
2044	2.17%	12,813	272		2.17%	12,813	272		
2045	2.17%	13,091	278		2.17%	13,091	278		
2046	2.17%	13,376	284		2.17%	13,376	284		
2047	2.17%	13,666	290		2.17%	13,666	290		
2048	2.17%	13,962	297		2.17%	13,962	297		
2049	2.17%	14,265	303		2.17%	14,265	303		
2050	2.17%	14,571	306	2,812	2.17%	14,571	306	2,812	
2051	2.41%	14,922	351		2.41%	14,922	351		
2052	2.41%	15,282	360		2.41%	15,282	360		
2053	2.41%	15,650	368		2.41%	15,650	368		
2054	2.41%	16,027	377		2.41%	16,027	377		
2055	2.41%	16,413	386		2.41%	16,413	386		
2056	2.41%	16,809	396		2.41%	16,809	396		
2057	2.41%	17,214	405		2.41%	17,214	405		
2058	2.41%	17,629	415		2.41%	17,629	415		
2059	2.41%	18,054	425		2.41%	18,054	425	3,789	
2060	2.41%	18,481	427	3,910	2.41%	18,481	427		
TOTAL CHANGE		14,636			People per household				
ESTIMATE 2014		4,403			3.09				
TOTAL 2060		**18,481**							

NOTES:
MAG - Mountain Land Association of Governments
GOPB - Governor's Office of Planning and Budget

Since the District will not develop to its maximum density in this study's 20 year planning window, interim 2034 residential population have been projected. The projected population is distributed throughout the land use zones shown in Figure 3-2.

Figure 3-2 Midway City's Future Land Use



3.3 Connections and Equivalent Residential Units (ERU's)

The total number of projected residential, and non-residential connections with the calculated equivalent residential units (ERU's) are shown in Table 3-2. To evaluate residential and non-residential connections on an equal basis, ERU's are used to equate the different types of connections. The connections were determined from the Midway City water rate summary report, the MSD rate summary report, as well as business listings obtained from the Heber Valley Chamber of Commerce. The number of residential and non-residential connections were determined, and the number of ERU's per connection were determined based on the water connection size and the number of units or number of fixtures per connection.

Table 3-2 Midway City and MSD Connections

Year	MSD Residental Connections	MSD Non-Residential Connections	Midway City Residential Connections	Midway City Non-Residential Connections	Non-Midway City Residential Connections	Non-Midway City Non-Residential Connections	MSD Estimated Residential ERU's	MSD Estimated Non-Residential ERU's	Midway City Estimated Residential ERU's
Feb 2014 (from Midway City Rate Summary Report)	1968		1791		177				
Feb 2014 (MSD and Midway City Rate Summary Report)	1994	31	1643	63	351	3			
Feb 2014 (corrected from business listings)	**1959**	**66**	**1644**	**62**	**315**	**4**	**2232**	**400**	**1917**

Table 3-3 is a summary of the projected population, residential ERU's, non-residential ERU's, and connections in MSD. Information beyond the planning period is shown for information purposes only. Connections from Jordanelle Special Service District (JSSD) are not shown in this table. However, the demand from JSSD is accounted for in the study with respect to facility sizing and sewer modeling.

Table 3-3 Population and ERU Projections

	MIDWAY CITY POPULATION				RESIDENTIAL Midway City (ERU)			RESIDENTIAL Non-Midway City (ERU)				NON-RESIDENTIAL					RES+NON-RES		FLOW	
YEAR[2]	% CHG	TOTAL	CHG		UNITS	CHG		%CHG[1]	UNITS	CHG		% CHG	CONN	CHG	ERU's		ERU's		mgd	mg
2012	4.62%	4,023													ERU's/Conn =				gpd/ERU =	
2013	4.62%	4,209	186									4.62%			6.1				400	
2014	4.62%	4,403	194		1,917				315			4.62%	66				-			
2015	4.62%	4,607	203		2,006	89		2.00%	321	6	6	4.62%	69	3	18		113			
2016	4.62%	4,820	213		2,098	93		2.00%	328	6		4.62%	72	3	19		118			
2017	4.62%	5,042	223		2,195	97		2.00%	334	7		4.62%	76	3	20		124			
2018	4.62%	5,275	233		2,297	101		2.00%	341	7		4.62%	79	3	21		129			
2019	4.62%	5,519	244		2,403	106	486	2.00%	348	7	33	4.62%	83	4	22	101	135	620		
2020	4.62%	6,039	520	6,039	2,514	111		2.00%	355	7		4.62%	87	4	23		141			
2021	3.79%	6,268	229		2,609	95		2.00%	362	7		3.79%	90	3	20		122			
2022	3.79%	6,505	238		2,708	99		2.00%	369	7		3.79%	93	3	21		127			
2023	3.79%	6,752	247		2,810	103		2.00%	376	7		3.79%	97	4	21		131			
2024	3.79%	7,008	256		2,917	107	514	2.00%	384	8	36	3.79%	100	4	22	107	136	658		
2025	3.79%	7,273	266		3,028	111		2.00%	392	8		3.79%	104	4	23		141			
2026	3.79%	7,549	276		3,142	115		2.00%	399	8		3.79%	108	4	24		147			
2027	3.79%	7,835	286		3,261	119		2.00%	407	8		3.79%	112	4	25		152			
2028	3.79%	8,132	297		3,385	124		2.00%	416	8		3.79%	117	4	26		158			
2029	3.79%	8,440	308		3,513	128	596	2.00%	424	8	40	3.79%	121	4	27	124	163	761		
2030	3.79%	8,759	319	2,720	3,646	133		2.00%	432	8		3.79%	126	5	28		169			
2031	2.99%	9,021	262		3,755	109		2.00%	441	9		2.99%	129	4	23		140			
2032	2.99%	9,291	270		3,868	112		2.00%	450	9		2.99%	133	4	23		145			
2033	2.99%	9,568	278		3,983	116		2.00%	459	9		2.99%	137	4	24		149			
2034	2.99%	9,855	286		4,102	119	589	2.00%	468	9	44	2.99%	141	4	25	123	153	756		
2035	2.99%	10,149	295		4,225	123		2.00%	477	9		2.99%	145	4	26		158			
2036	2.99%	10,453	303		4,351	126		2.00%	487	10		2.99%	150	4	26		162			
2037	2.99%	10,765	313		4,482	130		2.00%	497	10		2.99%	154	4	27		167			
2038	2.99%	11,087	322		4,616	134		2.00%	507	10		2.99%	159	5	28		172			
2039	2.99%	11,419	332		4,754	138		2.00%	517	10		2.99%	164	5	29		177			
2040	2.99%	11,759	340	3,000	4,896	142	671	2.00%	527	10	50	2.99%	169	5	30	140	182	860		
2041	2.17%	12,014	255		5,002	106		2.00%	538	11		2.17%	172	4	22		139			
2042	2.17%	12,275	261		5,110	109		2.00%	548	11		2.17%	176	4	23		142			
2043	2.17%	12,541	266		5,221	111		2.00%	559	11		2.17%	180	4	23		145			
2044	2.17%	12,813	272		5,335	113		2.00%	571	11		2.17%	184	4	24		148			
2045	2.17%	13,091	278		5,450	116	555	2.00%	582	11	55	2.17%	188	4	24	116	151	725		
2046	2.17%	13,376	284		5,569	118		2.00%	594	12		2.17%	192	4	25		155			
2047	2.17%	13,666	290		5,690	121		2.00%	606	12		2.17%	196	4	25		158			
2048	2.17%	13,962	297		5,813	123		2.00%	618	12		2.17%	200	4	26		161			
2049	2.17%	14,265	303		5,939	126		2.00%	630	12		2.17%	204	4	26		165			
2050	2.17%	14,571	306	2,812	6,068	129	618	2.00%	643	13	61	2.17%	209	4	27	129	168	807		
2051	2.41%	14,922	351		6,214	146		2.00%	655	13		2.41%	214	5	30		190			
2052	2.41%	15,282	360		6,364	150		2.00%	669	13		2.41%	219	5	31		194			
2053	2.41%	15,650	368		6,517	153		2.00%	682	13		2.41%	224	5	32		199			
2054	2.41%	16,027	377		6,675	157		2.00%	696	14		2.41%	230	5	33		203			
2055	2.41%	16,413	386		6,835	161	767	2.00%	709	14	67	2.41%	235	6	34	160	208	994		
2056	2.41%	16,809	396		7,000	165		2.00%	724	14		2.41%	241	6	34		213			
2057	2.41%	17,214	405		7,169	169		2.00%	738	14		2.41%	247	6	35		218			
2058	2.41%	17,629	415		7,342	173		2.00%	753	15		2.41%	253	6	36		224			
2059	2.41%	18,054	425		7,519	177		2.00%	768	15		2.41%	259	6	37		229			
2060	2.41%	18,481	427	3,910	7,700	181	864	2.00%	783	15	74	2.41%	265	6	38	180	234	1,118		
TOTAL CHANGE			14,458			5,783				468				199	1,206		7,457		2.98	1,089
EST 2014			4,403			1,917				315				66	400		2,632		1.05	384
TOTAL 2034			9,855			4,102				468				141	855		5,426		2.17	792
TOTAL 2045			10,149			4,225				477				145	1,137		7,169			
TOTAL 2060			18,481			7,700				783				265	1,606		10,088		4.04	1,473

1. Estimated residental growth rate outside of Midway City
2. Data is assumed to be for Feb of each year. Change in connections and ERU's are from Feb of previous year to year stated.
3. Midway City has second home type connections. Therefore the connection number is greater than the population divided by 3.09.

Chapter 4

Sanitary Sewer System

4.1 Summary and Recommendations

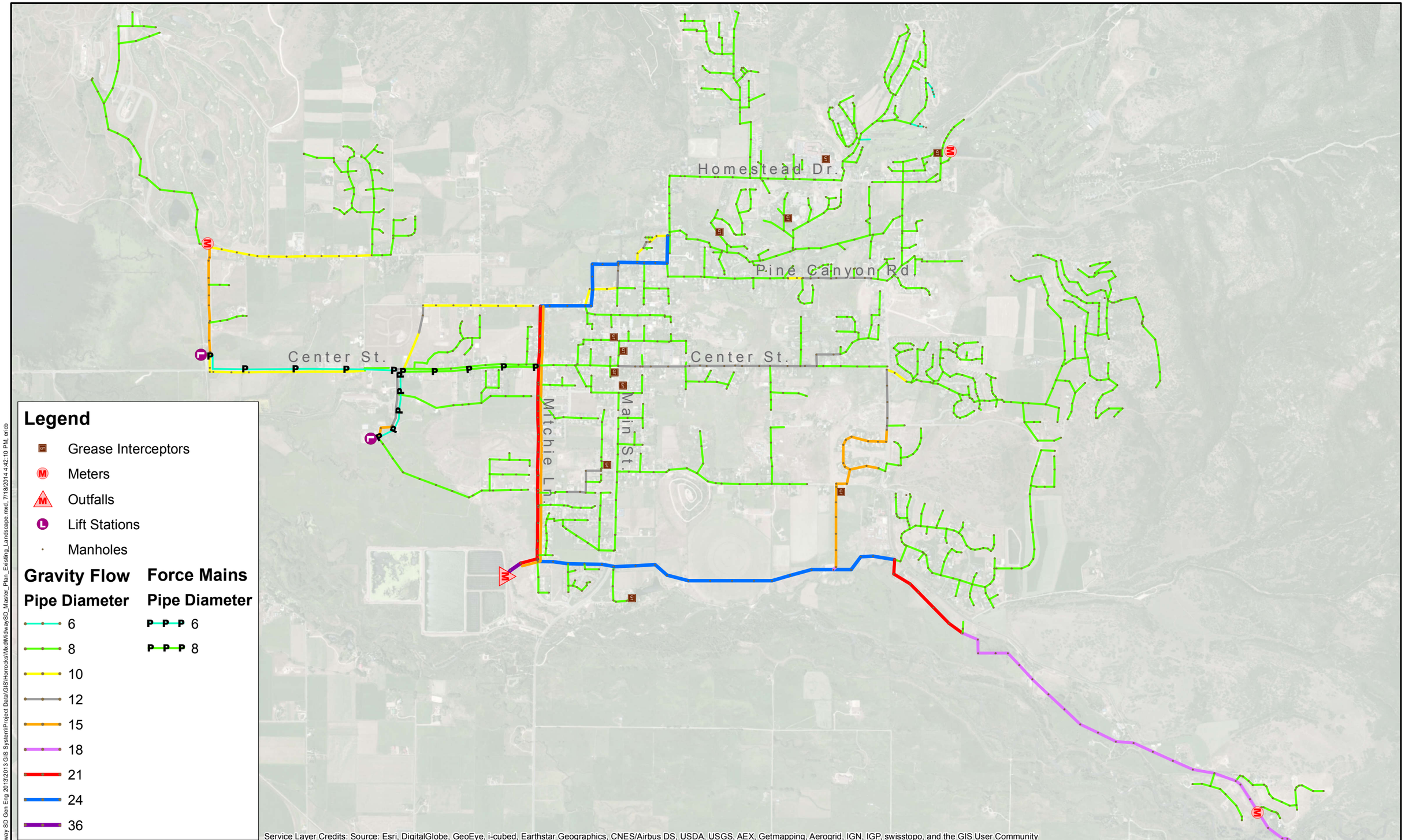
Introduction
Population growth in MSD has increased the demand on the existing infrastructure throughout the District. To continue to adequately serve the District's population, the capacity of the sanitary sewer system has been analyzed. Improvements have been recommended to increase the sewer system capacity to meet the demands of the projected population through the 20 year planning period. The impact fees have also been analyzed to determine the feasibility of implementing the recommendations.

The software SewerCAD was used to create a computerized model to analyze the existing sewer system and determine the respective capacities in collector and interceptor lines. Then, using the potential areas of development and the projected sewer flow, improvements were recommended.

MSD provides a connection and sewer line capacity for Jordanelle Special Service District (JSSD) via the sewer line in River Road, along the Provo River, in the northeast part of the District. Projected demands for JSSD and its impact on the system have been included in the study. This sewer line along the Provo River also serves development in the northeast side of the District.

MSD's sewer system was evaluated for the projected population, number of connections and sewer flows. Using State and District design requirements and historical sewer flows, the flows were projected and analyzed through the planning period. State and District Standards were also used as minimum design criteria for the sewer system. The existing flow data compared to existing ERU data was used to determine the actual flow demand per ERU and to determine the design criteria. The design criteria used in this study are summarized below:

• Flow:	- Average Yearly	400 gpd/ERU
	- Peak Hour Collector Lines	Average Yearly x 4.0
	- Peak Hour Interceptor Lines	Average Yearly x 2.5
• Pipe Capacity >8 inch	- Maximum	85% of Full Capacity
• Pipe Capacity 8inch	- Maximum	75% of Full Capacity
• Pipe Sizes:	- Minimum	8-inches
• Velocities:	- Minimum	2 fps
	- Maximum	15 fps



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Existing Sewer System

Midway Sanitation District

N

1 in = 2,000 ft

2,000 0 2,000 Feet

DATE 7/18/2014

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Figure 4-1

Existing System
MSD has approximately 60 miles of sewer lines that collect the wastewater and convey it to the Heber Valley Special Service District (HVSSD) via a 36 inch outfall line. Figure 4-1 shows the layout of the existing sewer system. Collection lines in the District range from 6 inch to 36 inch and carry and average yearly flow of 300 million gallons (mg) of wastewater.

Projected Sewer Flow
Using 5,426 projected equivalent residential units in 2034, the average yearly flow will increase by 319 mg, from 300 mg to 619 mg, over the next 20 years.

District sewer records show an increase of approximately 40 percent in flow during the summer months as compared to the winter months. This percent increase has not dropped in the last several years, however, the total average flow in both winter and summer months has decreased in the last several years. This may indicate the total infiltration has decreased while the percent increase from winter to summer months remains the same. The recent decrease in total average flow could also indicate less year round culinary water use year due to conservation measures or a combination of both a decrease in infiltration and culinary use. It should also be noted that approximately 30 percent of homes in MSD are second homes or vacation homes. The flow from these second homes could affect the infiltration calculation depending on when and how frequent these second homes are occupied.

Recommended Sewer System Improvements
Improvements recommended to meet the projected population's flows are shown in Figure 4-2. These recommendations were determined by using a computer model of the District's sewer system and input from MSD Engineers. A detailed listing of the recommended improvements is given in the following paragraphs.

Projects labeled as "Ultimate" are beyond the 20 year planning window and therefore the improvement cost and associated populations served have been excluded from impact fee calculations.

> ***S-001 Homestead Drive, Bigler Lane to 500 West:*** A 15-inch line should be constructed from Bigler Lane to approximately 500 West to tie into the existing 24 inch sewer line in Homestead Drive near 500 West.
>
> ***S-002: Upsize Pumps and Wet Well at Tate Lane***: The existing pump station at Tate lane should be upsized. This project should be done in conjunction with S-003.
>
> ***S-003 Center Street Pressure Pipe, Tate Ln to 850 S:*** A 12 inch pressure pipe should be constructed along Center Street from the pump station at Tate Lane to the pressure pipe discharge manhole at 850 South.
>
> ***S-004 850 South, Center Street to Pump 2:*** An 18-inch line should be constructed along 850 South from Center Street to the HVSSD pump station.
>
> ***S-005 Cascades Phase 2:*** A 10-inch line should be constructed with Phase 2 of Cascades at Soldier Hollow to divert the sewer from Coldwater Way to Stringtown Road via Phase 2 and relieve demand from the 8 inch line constructed in Phase 1.

S-006 Upsize HVSSD Pumps and Wet Well: The existing HVSSD pump station should be upsized. This project should be done in conjunction with S-007. This project was not included in the impact fee calculation because it is a HVSSD pump and will therefore be funded 100% by HVSSD.

S-007 Center Street Pressure Pipe, HVSSD Pump to 300 S: An 18 inch pressure pipe should be constructed along from the HVSSD pump station to the pressure pipe discharge manhole in 300 South, or from the HVSSD pump station to the 36 inch outfall line near the treatment plant. Figure 4-1 shows two alternate alignments for this pressure pipe.

S-008 Burgi Lane North Extension: An 8-inch line should be constructed north of Burgi Lane as shown in Figure 4-2 as development continues into the undeveloped area north of Burgi Lane. This will serve future development in this area.

S-009 700 East Main Street to 250 South: A 10-inch line should be construction along 700 East from Main Street to 250 South or along South Fox Den Road from Main Street to 250 South. Figure 4-2 show two alternate alignments for this project depending on when and where development proceeds. If development proceeds near 700 East before the capacity is reached, the 700 East alignment should be built with this development.

S-010 Pine Canyon, 700 North to 200 North: A 12-inch line should be constructed in Pine Canyon Road from 700 North to 200 North.

S-011 Lime Canyon Road Sections: Approximately 240 feet of 8 inch pipe line should be replaced with 10 inch in Lime Canyon Road near Homestead Drive at the approximate location shown on Figure 4-1. The the 8 inch line in Lime Canyon should be monitored for flow exceeding capacity as development continues upstream.

S-012 Valais Parkway Sections: Approximately 1000 feet of 8-inch pipe should be replaced with 10 inch in Valais Parkway from approximately 300 feet north of the second round-about to the first round-about. The capacity of this line should be monitored as development continues upstream.

(Ultimate) S-013 River Road Upgrade: A 15-inch line should be installed to increase capacity along River Road to Mitchie Lane. It is not foreseen that this improvement will be needed in the next 20 years, however, this improvement should allow for ultimate build-out along River Road and upstream of River Road.

S-014 Mitchie Lane West Extension: A 10-inch line should be constructed along Mitchie Lane to the west and then north as development continues into the undeveloped area west of Midway City. This will serve future development in this area. See Figure 4-2 for further location explanation.

S-015 Pine Canyon North Extension: An 8-inch line should be constructed in Pine Canyon Road as development continues north near Pine Canyon. This will serve future development in this area.

S-016 Master Plan Update (4 times): The facilities master plan should have major updates every five years. As part of the annual update, flows should be analyzed, maps revised, sanitary sewer system modeled, and impact fees evaluated.

(Ultimate) Stringtown Road Sections: A 12-inch or 15-inch line should be installed to increase capacity in two sections along Stringtown Road between 970 South and Cascade Scenic Drive. It is not foreseen that this improvement will be needed in the next 20 years, however, this improvement should allow future flow in Stringtown Road.

System Capacity Improvements

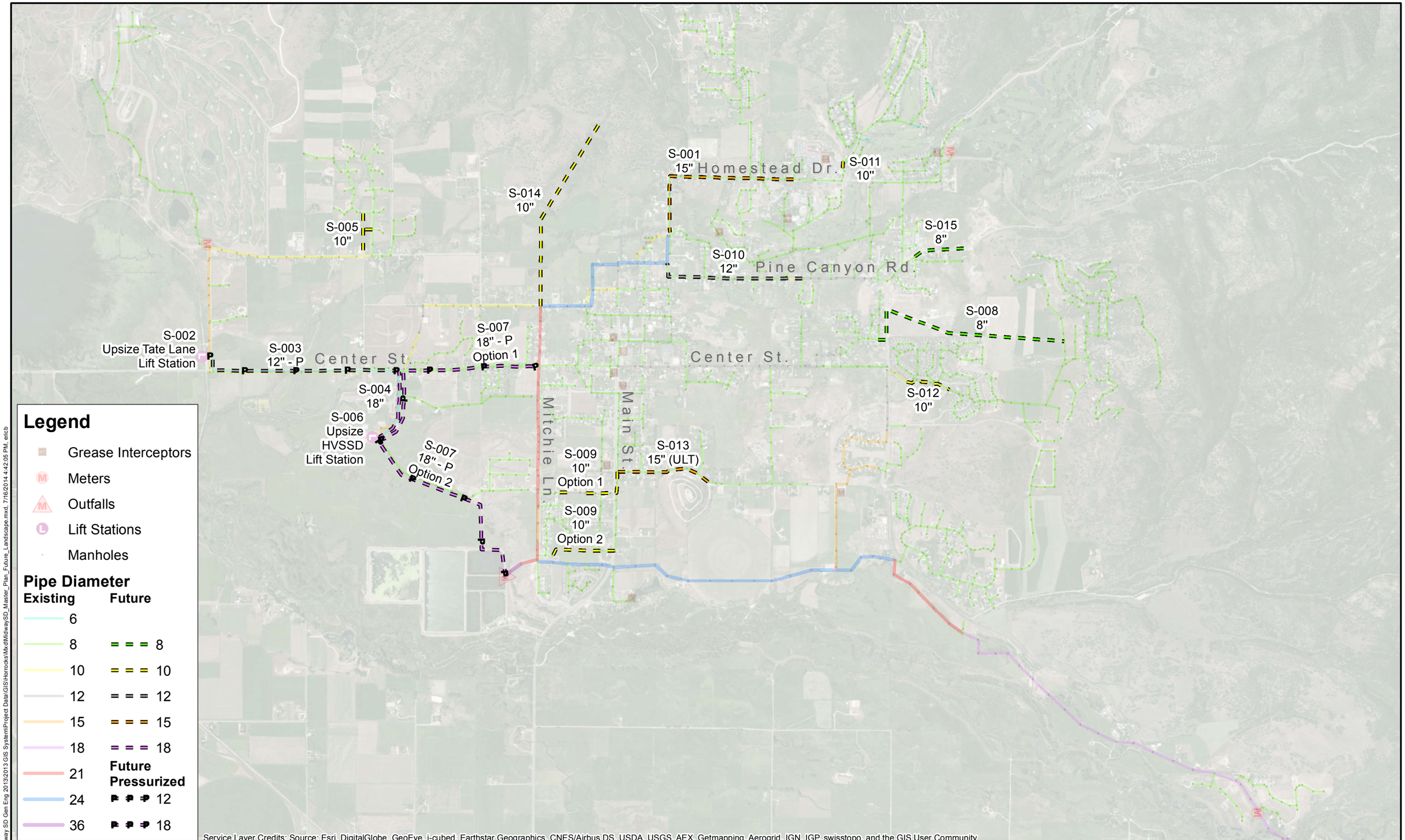
The existing sewer system will need various upgrades to have sufficient capacity to meet the needs of the projected growth and maintain the current Level of Service (LOS). Figure 4-2 shows the additional lines needed to handle the flow generated from the growth projected through the planning period.

Currently HVSSD has a treatment capacity of 4 mgd. Heber City is using approximately 30 percent and MSD is using another 25 percent. HVSSD has recently expanded their capacity by adding a mechanical treatment facility with a rapid infiltration basin. These changes ensure discharge limitations do not affect their ability to service the Heber Valley.

Costs for any excess sewer capacity in existing facilities have not been included in the cost totals of this study. A majority of any excess sewer capacity has been previously paid for by impact fees, and the benefit should go to new development.

Impact Fee Recommendations

The new Sewer Impact Fee was calculated to be $2,239 per ERU without any accumulated interest from loans or bonds in the calculation, and $2,590 per ERU if interest from potential loans and bonds is included in the calculation. At the July 1, 2014 Board Meeting, it was recommended that the current impact fee of $2,450 per ERU be maintained which should be sufficient to generate revenue to fund the recommended improvements if interest charges are minimized. However, to keep abreast of inflation and construction costs, the sewer rates and impact fees should be updated periodically according to the change in the construction cost index.



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HORROCKS ENGINEERS

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Future Sewer System

Midway Sanitation District

N

1 in = 2,000 ft

2,000 0 2,000 Feet

DATE 7/16/2014

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Figure 4-2

4.2 Sewer Flow Data

Future conditions in MSD will affect the sewer flow and the improvements needed to meet increased flow. Information used to determine the future conditions are:

- Present growth rates and future projected population growth rates
- Existing sewer flow
- Existing ERUs
- Projected residential and non-residential development areas
- Projected residential and non-residential ERU's

As this information changes, so will the timing of when recommended improvements are needed. This study will limit recommendations to all improvements needed by the end of the 20 year planning period. Interim phasing or timing of improvements will be determined and periodically adjusted by the District as information is accumulated.

MSD's population has been projected through the planning period. The projected number of sewer connections was determined based upon the projected population and the percent of the population connected to the system. To determine where the projected sewer flows will occur, the potential areas of development were analyzed. Using historical sewer flows and State design requirements, the sewer flows have been projected through the planning period.

Projected Population
The projected population for MSD during the planning period to 2034 is discussed in Chapter 3 - Projected Population. The 2014 population is estimated to be 5427. The 2034 MSD population is projected to be 11,113.

Equivalent Residential Connections
Sewer flow from residential connections differs from commercial, church, government and other non-residential connections. To evaluate residential and non-residential connections on an equal basis, Equivalent Residential Unit's (ERU's) are used to equate the different types of connections. For this study, each non-residential connection was compared to a single family home and given a number which compares that connection to a single family home.
For example, a non-residential connection which uses twice as much water as a single family home is two (2) ERU's. All the non-residential connection ERU values were totaled and divided by the total number of connections. This gives the average ERU per non-residential connection.

For MSD, the resulting average ERU's per non-residential connection is approximately 6.1. Therefore, in terms of ERU's, MSD currently has 2,232 residential units and 400 non-residential ERU's (66 non-residential connections x 6.1 ERU's per connection), for a total of 2,632 ERU's connected to the system.

The total number of projected residential, church, government, and commercial ERU's, are shown in Table 4-1 in five year increments to 2034.

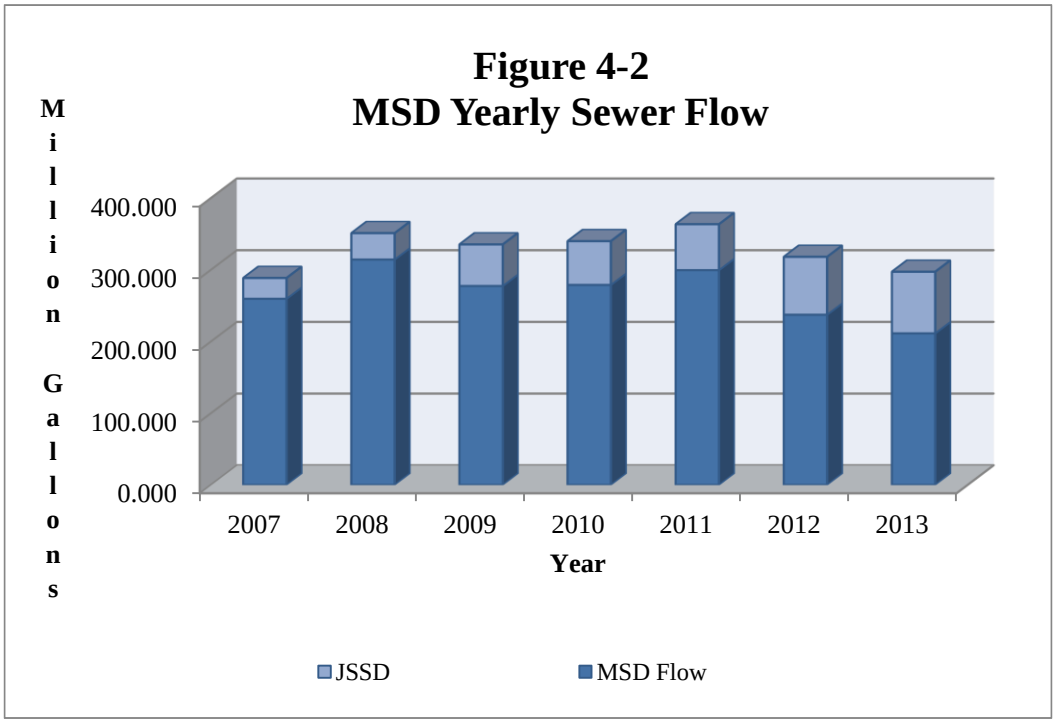
Table 4.1 Projected New Equivalent Residential Units (ERU) for Sewer

Year	Residential Units*	Non-Residential ERU's	New ERU's	Total ERU's
2014 (Actual Total)	2232	400		2632
2015-2019	518	101	620	3,251
2020-2024	550	107	658	3,909
2025-2029	636	124	761	4,670
2030-2034	633	123	756	5,426

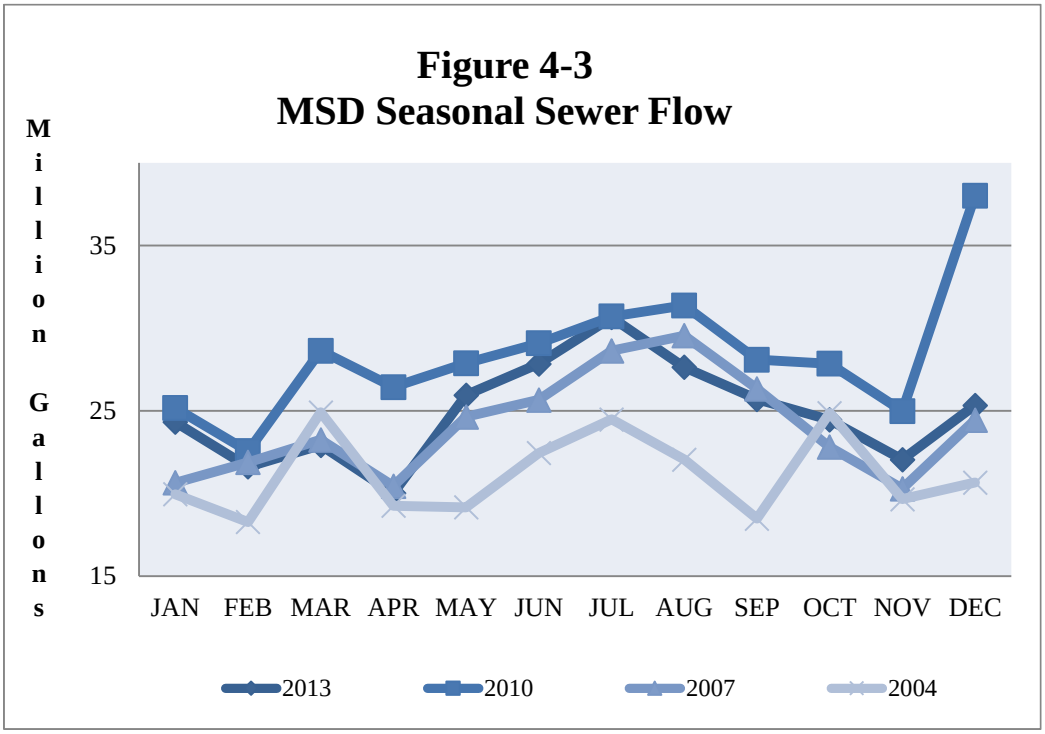
*Note: These incremental residential ERU values have not included JSSD.

Historical Sewer Flow

MSD's total yearly sewer flow has fluctuated from 2007 to 2013 as shown in Figure 4-2. The average yearly sewer flow during this period was 269 mg, not including JSSD. However, in 2007 the average flow was 260 mg while in 2013 the average flow decreased to 211 mg. The decrease from 2007 to 2013 could be from a decrease in both infiltration and culinary water use, as discussed in the next section.



As shown in Figure 4-3, MSD experiences seasonal fluctuations in flow throughout the year. Over the past four years, the low flow has averaged 223 gpd per ERU and the high flow has averaged 382 gpd per ERU for an average increase from low flow to high flow of 41.8 percent. These increases and fluctuations in flow are thought to be related to seasonal infiltration from ground water and other inflow sources such as rainfall or sump pumps. MSD's historical sewer flow data is contained in the Appendix.



Infiltration and Inflow

MSD sewer records show an increase of 31 to 43 percent in flow between low flow months and high flow months between the years 2000 and 2013. The total average yearly sewer flow has dropped in recent years from 339 mg/yr to 220 mg/yr. The percent increase from low flow to high flow has not significantly changed, however, the difference between the high and low flow has steadily decreased which signifies a decrease in infiltration.

The reduced total flow in recent years could be due a combination of recent projects to reduce infiltration and a reduction in culinary water use due to conservation measures. If both the culinary water usage is reduced and infiltration is reduced, the percent increase would remain fairly constant, as the records are showing.

A reduction in infiltration could be a result of the recent installation of secondary irrigation systems which reduces flood irrigation, which in turn lowers the ground water table. If the reduction is mainly due to reduced levels of ground water and is unrelated to the secondary irrigation, the District will continue to see increased infiltration during times of normal or above normal ground water. However, the total infiltration amount should still be lower than past records indicate due to the recent projects to reduce the infiltration. The District should continue to monitor sewer lines for opportunities to reduce infiltration and lower treatment costs from the

Heber Valley Special Service District (HVSSD).

The existing lines have sufficient capacity for the current population and infiltration experienced. It is recommended, however, that as the population grows, MSD should explore additional opportunities to reduce infiltration. When normal or above normal ground water occurs, the sewer infrastructure should be visually checked or monitored with meters for infiltration.

Infiltration and inflow increase flow in the sewer lines can cause higher sewer treatment costs. If these additional flows are large, they may cause the flow to exceed the capacity of the lines. The original sanitary sewer system was constructed using caulked mortar joints or concrete pipe with gasket joints which have since developed leaks. These leaking joints have acted as subsurface drains allowing groundwater to infiltrate into the sewer line during the months containing high water tables.

Infiltration and Inflow Improvements

While major strides have been made to reduce infiltration and inflow in MSD's sewer system, it continues to contribute an estimated 42 percent of the flow during high flow. This should be monitored for opportunities for further reductions. Observing high flows in late evening or early morning, when low flow should be low, could indicate excessive infiltration. Observing seasonal surcharging may indicate infiltration or other inflow problems. Sewer lines should be videoed periodically to determine if any leaks or breaks are in the line. Based on the problems found, decisions can be made on the type of improvements needed. Improvement options may include the following:

- Fix existing leaking manholes
- Slip-line leaking pipes
- Replace leaking pipes
- Construct new drainage lines

These improvements can reduce sewer flow and lower treatment costs from the HVSSD. As the population grows, MSD should explore additional opportunities to reduce infiltration and inflow.

The District currently has a maintenance program to reduce infiltration and inflow. It is recommended this maintenance program be maintained and continue to be implemented.

Calculation of Sewer Flow

The State of Utah Administrative Rule R317-3-2, in the Appendix, contains the requirements for sewer system design. At a minimum, new sewer systems are required to be designed on the basis of an annual average rate of flow of 100 gallons per capita per day, unless there is data to indicate otherwise. This includes an allowance for infiltration, and the rate may be higher if there is probability of large amounts of infiltration entering the system. Design flow is calculated from this base flow plus a peaking factor. A peaking factor of 2.5 for interceptor and outfall sewers is used, and 4.0 for laterals and collector sewers is used. Using the District's average population estimate of 3.09 people per household, as discussed in Chapter 3, equates to an Average Yearly flow of approximately 309 gpd per equivalent residential connection (ERU). However, the States minimum design requirements are lower than the District's historical recorded highest flow per ERU which includes infiltration and inflow. District's flow records

were used to determine the projected sewer flow, rather than the State's design criteria. The District's ten year average high flow rate is 404 gallons per ERU and the three year average high flow rate is 382 gallons per ERU. These numbers do not yet take into consideration peaking factors, but they are taken from the total high flow months. An average flow of 400 gallons per ERU was used for this study.

It should be noted that there has been a downward trend in the average flow rate over the past few years. This may be due to the installation of the secondary irrigation system, a reduced ground water table, infiltration reduction measures, and/or reduced culinary water use. The District should consider adjusting the average yearly flow criteria down, if the downward trend continues, to at least the State's minimum design criteria.

Projected Number of Sewer Connections

The projected number of new residential sewer connections is determined using the growth numbers in Chapter 3. The residential connections within the Midway City boundary are assumed to increase at the same rate as population growth. Residential connection outside of the Midway City boundary have an assumed two percent growth rate. In 2014 there were approximately 2,232 residential sewer connections.

Commercial, church/government, and other non-residential connections are assumed to increase at a rate equal to the projected residential growth within Midway City. In 2014 there were approximately 400 non-residential sewer connections.

Summary of Projected Sewer Flow

The projected population, historical sewer flow, and design criteria were used to project the sewer flow through the year 2034. Infiltration and inflow of approximately 41.8 percent is used. An Average Yearly Flow of 400 gpd/ERU was used to calculate future flow, which includes infiltration and inflow.

Sewer lines are designed to provide capacity for the Peak Hourly flow with the lines at no more than 85 percent of full capacity. The ratio of the Peak Hourly flow to the Average Daily flow is referred to as the peaking factor. Peaking factors are higher for collector lines than for outfall or interceptor lines because the peak is reduced as the distance from the source increases. Peaking factors for MSD are based on the State Department of Environmental Quality (DEQ) recommendations of 2.5 for interceptor and outfall sewers and 4.0 for laterals and collector sewers. Table 4-2 shows the projected Average Yearly flow through the planning period with the additional contribution from JSSD.

Table 4-2 Projected Sewer Flow in Five Year Increments

Year	Projected ERU's	Average Yearly (gpd / ERU)	Average Yearly Flow (mgd)	Average Yearly Flow (mg)	JSSD Flow (mg)
2014	2,745	400	1.10	401	86
2019	3,251	400	1.30	475	127
2024	3,909	400	1.56	571	189
2029	4,670	400	1.87	682	280
2034	5,426	400	2.17	792	415

4.3 Sewer System Analysis and Level of Service

MSD's sewer system was analyzed to find the existing capacity and Level of Service (LOS). Future improvements needed to maintain the existing LOS were determined. This section describes the existing sewer system, along with a discussion of the concerns and improvements necessary to maintain the current LOS with future population growth. State and District standard requirements will be used as criteria to analyze the sewer system. Information obtained from a computer sewer model of MSD's system will be presented with the recommended improvements needed to meet the projected population's sewer flow. Figure 4-1 shows the existing sewer system.

Level of Service

The existing sewer system of MSD serves its residents with no interruption. Each pipe in the system is checked to ensure it is in good condition and large enough for its designated flow. MSD has approximately 60 miles of sewer lines that collect the sewer and convey it to HVSSD with 36-inch and 21-inch outfall lines. Collection lines in the District range from 6-inch to 24-inch mains and carry an average flow of 300 mg per year. Two sewer lift stations help convey the sewer from elevations lower than the HVSSD plant. One lift station is owned and operated by HVSSD, and the other lift station near Tate lane is owned and operated by MSD. Flow from JSSD enters the MSD system via the 18 inch line in River Road. A flow meter measures the flow from JSSD.

The ERU capacity of incremental sewer line sizes is shown in Table 4-3. The capacity is calculated at 75 and 85 percent of full capacity depending on the size, using minimum slopes, a PVC roughness coefficient, and an appropriate peaking factor. As discussed in the previous section, outfall and interceptor lines experience smaller peaks than collector lines do, therefore a smaller peaking factor is used. Table 4-3 also represents sewer line capacities and the current sewer LOS that existing residents in MSD experience.

Table 4-3. Sewer Line Capacity by Pipe Size

Size	Percent of Full Capacity	Min. Slope @ 2 fps	Capacity @ Min. Slope	PF	Capacity @400gpd * PF
(in)		(ft/ft)	(mgd)		ERU
8	75	0.00334	0.44	4	344
10	85	0.00248	0.78	4	609
12	85	0.00194	1.12	4	875
15	85	0.00144	1.75	2.5	2,188
18	85	0.00113	2.52	2.5	3,150
21	85	0.00092	3.43	2.5	4,288
24	85	0.00077	4.48	2.5	5,600
30	85	0.000571	7	2.5	8,750
36	85	0.000449	10.09	2.5	12,613

Computer Model of Sewer System

A computer program called *SewerCAD V 8i* was used to model MSD's sewer system. The program uses the flows generated by each sewer connection to calculate the full flow, maximum flow, and flow velocity for each pipe. From the output of the model, the amount of sewer flowing in each line can be approximated. Information for the existing sewer system, including the pipe diameters, lengths, manhole locations, and invert elevations, were previously obtained.

Using the ultimate build-out conditions and the anticipated zoning from the Midway City Land Use Map in undeveloped areas, the projected number of future ERU's were calculated. Flows metered at HVSSD and a few other chosen locations within MSD were previously used to calibrate the existing sewer system model. The additional flows generated by the future ERU's were entered into the sewer model, producing projected sewer flows into the existing and newly proposed interceptor lines. The model was run to determine upgrades needed for demands on the existing sewer system and the additional demands placed on the system in the future.

The existing sewer system was modeled using peaking factors to determine the peak hour flow. Any mains approaching a service level of 85 percent of full capacity were identified as in need of expansion.

All mains in the existing sewer system have sufficient capacity to handle current flows except for the existing 8 and 10 inch line in Homestead Drive, the 8 inch line in Pine Canyon Road, a section of 8 inch line in Valais, and a short section of 8 inch line in Lime Canyon near Homestead Drive.

Additional sewer facilities that will need to be constructed to maintain the current sewer LOS as the MSD develops to the North, South, and East are listed in section 4.1 and are shown in Figure 4-2. These make up the backbone sewer system and generally consist of mains 10-inches and larger.

A summary of the recommended future improvements and estimated costs are shown in Table 4-4. Improvements generated by future growth are shown. With contingencies, engineering, construction management and inspection, the total estimated cost is $6,255,682.84. A breakdown of the costs are shown in the Appendix.

Table 4-4 MSD's Estimated Cost of Future Sewer Improvements

ULT	CIP #	Recommended Improvements	Size (in)	Total Cost	Funding Proportionate Share Analysis							
					Operating		Other[1]		Developer		Impact Fees	
					%	$	%	$	%	$	%	$
	S-001	Homestead Drive, Bigler Lane to 500 West	15	$1,642,342	0%	$0	0%	$0	0%	$0	100%	$1,642,342
	S-002	Upsize Pumps and WW at Tate Lane		$264,000	0%	$0	30%	$79,200	0%	$0	70%	$184,800
	S-003	Center St Pressure Pipe, Tate Ln to 850 S.	12	$1,805,911	0%	$0	0%	$0	0%	$0	100%	$1,805,911
	S-004	850 South, Center Street to Pump	18	$659,466	0%	$0	0%	$0	0%	$0	100%	$659,466
	S-005	Cascades Phase 2	10	$149,893	0%	$0	0%	$0	80%	$119,914	20%	$29,979
	S-006	Upsize HVSSD Pumps and WW		$264,000	0%	$0	100%	$264,000	0%	$0	0%	$0
	S-007	Center St Pressure Pipe, Pump to 300 S	18	$1,368,213	0%	$0	100%	$1,368,213	0%	$0	0%	$0
	S-008	Burgi Lane North Extension	8	$1,097,295	0%	$0	0%	$0	100%	$1,097,295	0%	$0
	S-009	700 East Main St to 250 S	10	$581,648	0%	$0	0%	$0	60%	$348,989	40%	$232,659
	S-010	Pine Canyon, 700 N to 200 N	12	$1,262,635	0%	$0	28%	$354,043	0%	$0	72%	$908,592
	S-011	Lime Canyon Rd Sections	10	$113,889	0%	$0	0%	$0	0%	$0	100%	$113,889
	S-012	Valais Parkway Sections	10	$376,749	0%	$0	0%	$0	0%	$0	100%	$376,749
ULT	S-013	River Road Upgrade	15	$0	0%	$0	0%	$0	0%	$0	0%	$0
	S-014	Mitchie Lane West Extension	10	$736,478	0%	$0	0%	$0	80%	$589,182	20%	$147,296
	S-015	Pine Canyon North Extension	8	$327,878	0%	$0	0%	$0	100%	$327,878	0%	$0
	S-016	Master Plan Update (4 times)		$154,000	0%	$0	0%	$0	0%	$0	100%	$38,500
ULT	S-017	Stringtown Road Sections	12	$0	0%	$0	0%	$0	0%	$0	0%	$0
		TOTAL EXPENDITURES		**$10,804,397**		**$0**		**$2,065,456**		**$2,483,258**		**$6,255,682.84**

1. "Other" includes grants, special assesments, previously collected impact fees, and funds from Soldier Hollow.
For S-002, $79,200 will come from Soldier Hollow Fund, for S-006 & S-007, 100% will come from HVSSD, for S-010 approximately 28% will come from existing impact fee fund.
2. Assumed 5.0 % interest rate on bonds. All bonds assumed to be paid off by 2030.
3. The aerial digital map and Master Plan update need to be done 4 times in the next 20 years. Amount in "Impact Fee" column is 1/4 the total cost in 20 years

Chapter 5

Economic Feasibility Analysis

5.1 Summary

The two types of funding for MSD's sewer system are operating and non-operating. Independently, these two funds should generate sufficient revenue to fund the respective needs of the sewer system. Operating expenses include the monies used for personnel and contractual services, betterment and replacement type capital improvement projects, materials, supplies, depreciation, and other operating expenses. Revenue to fund these operating expenses is generated from wastewater fees. Non-operating expenses comprise expansion type capital improvement projects, developer reimbursements, master planning, aerial mapping, and bond repayment. The revenue for non-operating expenses is generated from impact fees. Generally, operating expenses should be funded by the existing connected population, and non-operating expenses necessary for future development should be paid by the future population by way of impact fees.

In this section, only the non-operating expenses are discussed. Projected revenue and expenditures have been analyzed to determine if present impact fees are sufficient to fund the recommended improvements and other non-operating expenses.

5.2 Non-operating Fund (Impact Fee Fund)

The Impact Fee fund or capital project fund is used to fund improvements needed to maintain the current LOS and meet the increased flows due to the growth. Revenue is currently generated from the "impact fee" charged to new development. This revenue is used for capital improvement projects and bond repayment.

Currently, the impact fee charged to new development is $2,450 per ERU or per 400 gpd of Average Yearly flow. Table 5-1 shows the new calculated impact fee based on the estimated cost of the required improvements every five years. With bond interest added, the new total proportionate share for impact fees for the next 20 years is $6,255,682.84. The projected new number of residential and non-residential ERU's is 2,794. A new impact fee of $2,590 per ERU has been calculated, and the Board recommended maintaining the impact fee at $2,450.

The impact fee amount was calculated by taking the total cost of improvements associated with impact fees, plus the necessary bond interest payments, divided by the projected new ERU's for 20 years. The impact fees for all 20 years are shown in 2014 equivalent dollars. Bonding was necessary when projects were grouped into five year windows and there were insufficient impact fees collected, during the earlier years, to cover the five year projected improvement costs.

By considering the full 20 years window to determine the projected impact fees, and then grouping the projects into five year increments, the impact fees are distributed evenly to all development in the 20 year plan. Development within the 20 year planning window will all pay

equally for future projects; therefore, earlier developments only pay their fair share of facilities that also benefit later developments.

Since the order in which development will occur throughout the District is not known exactly, the project order may change as development dictates project needs. Table 5-1 also illustrates how the collected impact fee money will be expended within five years of the time of collection. This allows for a one year buffer to ensure compliance with the law's six year expenditure requirement. The fees should be analyzed at each 5-Year Master Plan Update to keep abreast of inflation and rising construction costs.

Other funding Sources

Table 5-1 lists other funding sources that could be potential resources of money. Bonds are listed, and the anticipated bond debt service payments are figured into the impact fee calculation. Potential grants have not been included as a funding source. Any grants that may be awarded in the future would reduce funding requirements. MSD does not currently charge any special assessment fees.

Developer Contributions

The District has a policy that developers are responsible for 100 percent of the cost of on-site improvements needed to serve their development. Developers are also responsible for extending any off-site services needed to serve their development. The District will reimburse developers of any over sizing of mains above 8-inches as impact fee funds are available.

Table 5-1 Projected Impact Fee Revenue and Expenditure Plan

Impact Fee Expenditure Plan						Impact Fee Balance	Bond Loan Plus Payments	Fund Running Balance
Year	ERUs[2]	Impact Fee Collected ($)	5-year Available Funds ($)	Improvement Projects[1]	5-year Improvement Costs ($)			
2015	113	$293,557		S-001 S-016			$0	
2016	118	$306,692		S-010			$0	
2017	124	$320,425		S-011			$0	
2018	129	$334,784		S-012			$0	
2019	135	$349,797	**$1,605,254**		$3,080,073	($1,474,819)	$1,475,000	$181
2020	141	$365,495		S-005 S-016			($142,105)	
2021	122	$316,599		S-006			($142,105)	
2022	127	$328,269		S-007 S-002			($142,105)	
2023	131	$340,375		S-008 S-003			($142,105)	
2024	136	$352,933	**$1,703,670**	S-009	$2,291,848	($588,178)	$1,157,895	$1,478
2025	141	$365,960		S-016			($310,461)	
2026	147	$379,474					($310,461)	
2027	152	$393,493					($310,461)	
2028	158	$408,035					($310,461)	
2029	163	$423,122	**$1,970,084**		$38,500	$1,931,584	($685,461)	$5,758
2030	169	$438,773		S-004 S-016			($223,845)	
2031	140	$363,694		S-014			($223,845)	
2032	145	$374,346					($223,845)	
2033	149	$385,313					($223,845)	
2034	153	$396,603	**$1,958,730**		$845,261	$1,113,468	($223,845)	($0)
	2,794	$7,237,738			$6,255,683	**$982,055**	($982,055)	

NOTES:
1. Project order in which development will occur in District is approximated and will change as development dictates.

Estimated ERU's in 2014	**2,632**	**Impact Fee per ERU (no bonding) =**	**$2,239**
Estimated ERU's in 2034	**5,426**	**Impact Fee per ERU with Bond Interest =**	**$2,590**
NEW ERU's	**2,794**		

5.3 Assessing Sewer Impact Fees

Impact fees in this Master Plan assume an average of 400 gpd for residential connections and 2,440 gpd (6.1 ERUs x 400 gpd per ERU) for non-residential connections at the HVSSD treatment plant. All single family and multi-family residential is assessed 1 ERU per unit regardless of size since water meter records have not shown a consistent measureable difference in the indoor usage among various units. Non-residential, however, has significant variations and requires an accurate method to calculate the actual fees when a building permit is requested. The method used is based on the proposed water usage from State recommendations, fixtures, and any other information available to estimate the property's s impact on the sewer system.

A non-residential property is typically assumed to generate wastewater in quantities equal to the average water usage. The State estimates the quantity of wastewater flow from various types of establishments and lists these values in Table 3 under Utah Administrative Code R317-4-13. This table is used to determine the amount of effluent the development will discharge into the system and is displayed in Table 5-2 below. The amount determined from this table is converted into an equivalent residential unit (ERU) value. For the purpose of estimating the wastewater flow from non-residential developments, one ERU shall equal 400 gpd/ERU, which is the estimated flow at a single residence including infiltration. It is assumed that the values in the table include infiltration.

For example, if a hairdresser has eight (8) chairs which from Table 5-2 have a value of 65 gpd per chair, the development would be assigned an average flow of 520 gpd (65 gpd/chair x 8 chairs). Dividing this flow by 400 gpd per ERU, would equate to 1.3 ERU's for the development. The minimum ERU's allowed by MSD for new non-residential properties is 1 ERU per connection.

Table 5-2 Estimated Flow Rates of Wastewater

Type of Establishment	Gallon per Day
Airports	
a. per passenger	3
b. per employee	15
Boarding and Rooming Houses	
a. for each resident boarder and employee	50 per person
b. additional for each nonresident boarder	10 per person
Bowling Alleys, not including food service	85 per alley
Camps	
a. developed with flush toilets and showers	30 per person
b. developed with flush toilets	20 per person
c. developed with no flush toilets	5 per person
Churches, per person	5
Condominiums, Multiple Family Dwellings	150 per person

or Apartments	
Dentist's Office	
a. per chair	200
b. per staff member	35
Doctor's Office	
a. per patient	10
b. per staff member	35
Fairgrounds	1 per person
Fire Stations	
a. with full-time employees and food preparation	70 per person
b. with no full-time employees and no food preparation	5 per person
Food Service Establishment (b)	
a. ordinary restaurants, not 24 hour service	35 per seat
b. 24 hour service	50 per seat
c. single service customer utensils only	2 per customer
d. or, per customer served, includes toilet and Kitchen wastes	10
Gyms	
a. participant and staff member	25 per person
b. spectator	4 per person
Hairdresser, per chair	65
Highway Rest Stops, improved with restroom facilities	5 per vehicle
Hospitals	250 per bed space
Hotels, Motels, and Resorts	125 per unit
Industrial Buildings, exclusive of industrial waste	
a. with showers, per 8 hour shift	35 per person
b. with no showers, per 8 hour shift	15 per person
Labor or Construction Camps	50 per person
Launderette	580 per washer
Mobile Home Parks	400 per unit
Movie Theaters	
a. auditorium	5 per seat
b. drive-in	10 per car space
Nursing Homes	200 per bed space
Office Buildings and Business	15 per employee

Establishments, not including food service, per eight hour shift	
Picnic Parks, toilet wastes only	5 per person
Recreational Vehicle Parks	
a. temporary or transient with no sewer connections	50 per space
b. temporary or transient with sewer connections	125 per space
Recreational Vehicle Dump Station per self-contained vehicle	50
Schools	
a. boarding	75 per person
b. day, without cafeteria gymnasiums or showers	15 per person
c. day, with cafeteria but no gymnasiums and showers	20 per person
d. day, with cafeteria gymnasium and showers	25 per person
Service Stations, per day, per pump	250
Skating Rink, Dance Halls, Ski Areas, etc.	10 per person
Stores, including Convenience Stores	
a. per public toilet room	500
b. per employee	11
Swimming Pools and Bathhouses, Using Maximum Bather Load	10 per person
Taverns, Bars, Cocktail lounges with No Food Service	20 per seat
Visitor Centers	5 per visitor

Midway Sanitation District

APPENDIX

July 2014

HORROCKS
ENGINEERS

CERTIFICATION OF IMPACT FEE ANALYSIS BY CONSULTANT

In accordance with Utah Code Annotated, § 11-36-201{6}(b}, Horrocks Engineers makes the following certification:

We certify that the intent of the attached impact fee analysis includes only the costs for qualifying public facilities that
are:

- Allowed under the Impact Fees Act;
- Projected to be incurred or encumbered within six years after each impact fee is paid;
- Contains no cost for operation and maintenance of public facilities;
- Offsets costs with grants or other alternate sources of payment;
- Does not include costs for 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; and
- Complies with the Impact Fees Act.

HORROCKS ENGINEERS makes this certification with the following caveats:

1. All of the recommendations for implementations of the Master Plan made in the CFP documents or in the Impact Fee Analysis documents are followed in their entirety by Midway Sanitation District staff and elected officials.

2. If all or a portion of the CFPs or Impact Fee Analyses are modified, amended, or not adhered to, this certification is no longer valid.

3. All information provided to Horrocks Engineers, its contractors or suppliers is assumed to be correct, complete and accurate. This includes information provided by Midway Sanitation District and outside sources.

Dated: 7/18/14

HORROCKS ENGINEERS

Willa Motley

By Willa Motley, P.E.

Heber Valley Special Service District
Midway Sanitation District Flow Summary

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	Total Cost
1992	7.333	9.554	9.544	11.026	19.534	13.495	13.684	12.471	15.351	15.406	10.663	7.713	145.774	$ 75,802.48
1993	10.258	9.131	26.883	16.36	20.228	22.118	22.85	20.352	14.21	13.035	9.286	9.164	193.875	$ 100,815.00
1994	9.228	9.142	14.797	10.998	19.493	16.445	15.449	17.846	14.656	12.105	12.072	13.004	165.235	$ 85,922.20
1995	15.227	14.163	16.491	11.504	17.433	19.704	25.436	21.839	15.672	12.116	10.908	11.639	192.132	$ 99,908.64
1996	11.288	12.892	20.893	12.788	18.588	24.676	22.489	20.207	18.531	13.969	14.018	17.564	207.903	$ 108,109.56
1997	17.657	16.376	25.57	14.706	23.68	27.743	28.05	24.449	20.904	13.173	11.475	11.854	235.637	$ 122,531.24
1998	12.648	11.508	16.441	14.169	22.102	26.013	28.856	30.762	20.01	16.152	14.082	13.164	225.907	$ 117,471.64
1999	13.623	15.968	14.217	13.805	20.359	23.266	23.941	23.645	20.589	15.982	12.239	14.519	212.153	$ 110,319.56
2000	15.367	14.771	13.49	13.457	19.214	19.611	18.277	19.174	19.307	16.346	14.014	14.343	197.371	$ 102,632.92
2001	14.95	14.4	16.062	17.591	21.457	22.812	21.004	21.134	21.323	17.943	16.401	18.791	223.868	$ 116,411.36
2002	16.784	18.234	21.599	19.537	20.432	19.427	18.26	18.98	18.381	17.757	14.976	17.5	221.867	$ 115,370.84
2003	16.501	15.737	17.702	17.991	23.161	22.174	20.762	21.235	19.781	19.558	20.331	21.819	236.752	$ 123,111.04
2004	19.947	18.266	24.902	19.26	19.155	22.44	24.477	22.043	18.475	24.863	19.648	20.655	254.131	$ 132,148.12
2005	29.627	20.774	24.233	19.991	23.409	22.862	23.095	25.288	21.077	19.012	17.184	20.742	267.294	$ 138,992.88
2006	24.69	18.593	27.571	23.28	22.608	24.537	26.021	25.025	25.618	23.517	20.659	22.296	284.415	$ 147,895.80
2007	20.649	21.88	23.247	20.445	24.634	25.658	28.628	29.549	26.332	22.81	20.29	24.442	288.564	$ 150,053.28
2008	26.458	27.106	36.818	30.442	28.647	30.625	33.428	32.46	30.078	24.992	25.082	24.994	351.13	$ 182,587.60
2009	29.925	26.26	31.05	26.91	29.394	29.038	30.845	31.771	28.32	26.842	21.584	25.056	336.995	$ 175,237.40
2010	25.164	22.553	28.626	26.426	27.882	29.081	30.709	31.374	28.089	27.852	24.982	38.014	340.752	$ 177,191.04
2011	30.71	22.769	35.093	32.611	30.0801	34.982	35.761	36.353	33.865	27.233	23.119	23.896	366.4721	$ 190,565.49
2012	23.229	22.513	25.696	21.847	27.42	33.653	34.287	29.436	27.008	24.983	23.955	24.658	318.685	$ 165,716.20
2013	24.311	21.612	22.915	20.008	25.950	27.834	30.647	27.639	25.692	24.452	22.043	25.328	298.4307	$ 155,183.96
2014	24.785	26.080	26.515	22.933	27.154	30.412								
TOTAL	440.359	410.282	520.355	438.0847	532.0141	568.606	556.956	543.032	483.269	430.098	379.011	421.155	5565.3428	
23 YR AVE	19.146	17.838	22.624	19.047	23.131	24.722	24.215	23.610	21.012	18.700	16.479	18.311	241.971	
3 YR AVE	24.108	23.402	25.042	21.596	26.841	30.633	21.645	19.025	17.567	16.478	15.333	16.662	205.705	

Jordanelle Special Service District
Flow Summary (million gallons)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2007	2.258	2.945	3.261	3.146	3.152	3.485	3.586	4.1	3.041				28.974
2008	0.688	4.061	2.578	6.017	4.039	3.656	3.495	2.929	2.294	2.079	2.074	2.893	36.803
2009	3.710	2.500	4.012	4.901	5.330	5.438	6.089	5.437	5.597	5.600	4.290	5.015	57.919
2010	5.537	4.342	5.096	4.997	3.929	4.951	6.258	5.745	5.219	5.817	3.976	5.147	61.014
2011	3.482	3.833	5.803	5.523	4.826	7.413	5.312	5.997	4.321	5.963	6.220	5.351	64.043
2012	5.631	5.678	6.475	4.933	5.339	9.993	9.558	8.182	7.483	5.811	5.167	6.448	80.698
2013	7.247	6.042	6.877	5.402	7.767	8.858	9.900	8.375	6.986	6.069	5.547	6.805	85.876
2014	7.283	7.189	7.409	5.614	6.925	9.417							43.837

Known meter problems

Wasatch Mountain State Park
Flow Summary (million gallons)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2009	0.37600	0.33817	0.44404	0.10020	0.07703	0.08117	0.04486	0.04166	0.03445	0.02326	0.01731	0.03469	1.6128
2010	0.02753	0.03409	0.07097	0.09357	0.06322	0.04576	0.01461	0.24751	0.03293	0.04234	0.02396	0.09474	0.7912
2011	0.06832	0.06895	0.28885	0.45660	0.52177	0.56928	0.44531	0.13035	0.21030	0.06572	0.03184	0.02530	2.8826
2012	0.02979	0.02229	0.05614	0.05480	0.11835	0.06006	0.06502	0.05807	0.04159	0.04610	0.04592	0.02247	0.6206
2013	0.02191	0.02020	0.05290	0.03872	0.06156	0.27367	0.53336	0.05719	0.04630	0.03436	0.01527	0.01068	1.1661
2014	0.01765	0.01846	0.03101	0.03699	0.05593	0.07322							0.2333

Midway Sanitation District
Flow Summary (million gallons)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2009	25.839	23.422	26.594	21.909	23.987	23.519	24.711	26.292	22.689	21.219	17.277	20.006	277.463
2010	19.599	18.177	23.459	21.336	23.889	24.085	24.436	25.382	22.837	21.992	20.982	32.772	278.947
2011	27.160	18.867	29.001	26.632	24.733	26.999	30.004	30.226	29.334	21.204	16.868	18.520	299.547
2012	17.568	16.813	19.165	16.859	21.962	23.600	24.664	21.196	19.483	19.126	18.743	18.188	237.366
2013	17.042	15.549	15.985	14.567	18.121	18.703	20.213	19.207	18.659	18.348	16.480	18.512	211.388
2014	17.485	18.873	19.075	17.282	20.174	20.921	0.000	0.000	0.000	0.000	0.000	0.000	113.809

MSD Flow per ERU (gpd)													**AVERAGE**
2011	353.27	262.34	377.22	357.95	321.71	362.89	390.27	393.15	394.28	275.81	226.72	240.89	329.71
2012	228.52	233.77	249.28	226.61	285.67	317.21	320.81	275.70	261.87	248.78	251.92	236.57	261.39
2013	221.68	216.21	207.93	195.79	235.70	251.38	262.92	249.82	250.80	238.66	221.51	240.79	232.77
2014	227.43	245.48	248.11	224.79	262.40	272.13	0.00	0.00	0.00	0.00	0.00	0.00	123.36

Sewer Price List

Size	Description	Price	Units
8	8" Sewer Main	$34.00	LF
10	10" Sewer Main	$39.00	LF
12	12" Sewer Main	$42.00	LF
15	15" Sewer Main	$53.00	LF
21	21" Sewer Main	$64.00	LF
24	24" Sewer Main	$80.00	LF
30	30" Sewer Main	$100.00	LF
36	36" Sewer Main	$120.00	LF
	48" Man Hole	$3,500.00	Each
	60" Man Hole	$5,000.00	Each
	Additional Drain Rock Bedding	$20.00	Ton
	Trench Stabilization Material	$20.00	Ton
	Existing Sewer Laterals	$1,000.00	Each
	Saw Cut	$2.00	LF
	Asphalt Pavement Patching	$6.50	SF
	Boring/Stream Crossing	$100,000.00	Each
	Rock Excavation	$42.00	CY
	ROW or Easement Acquisition (NOT USED)	$50,000.00	ACRE
	Bypass Pumping	$7.50	LF
	Remove Old Sewer Lines and MHs	$3.00	LF
	Imported Select backfill	$16.00	Ton
	Design, CM, Insp	20%	
	Contingency	10%	

Cost Summary of Recommended Sewer Improvements

SEWER CAPITAL IMPROVEMENTS																						
		IMPROVEMENT DESCRIPTION	LENGTH or COST	DIA	LUMP SUM	LINE	MANHOLE	ADDITIONAL BEDDING	STABILIZE	LATERAL	LAT CONFLICT	BORING	SAW CUT	ASPHALT	FILL	ROCK EXCAVATION NEW TRENCH	ROCK EXCAVATION EXISTING TRENCH	BYPASS PUMPING	REMOVE LINES AND MANHOLES	ENG CM INSP	COST
ULT	CIP #		ft	in	f	g	h	i	j[1]	k	l	m	n	o	p[2]					q	
	S-001	Homestead Drive, Bigler Lane to 500 West	4,200	15		X	X			X			X	X	X		X	X	X	X	$1,642,342
	S-002	Upsize Pumps and WW at Tate Lane	200,000		X															X	$264,000
	S-003	Center St Pressure Pipe, Tate Ln to 850 S.	4,600	12		X			X				X	X	X	X				X	$1,805,911
	S-004	850 South, Center Street to Pump	1,870	18		X	X		X	X			X	X	X			X	X	X	$659,466
	S-005	Cascades Phase 2	1,200	10		X	X		X						X						$149,893
	S-006	Upsize HVSSD Pumps and WW	200,000		X															X	$264,000
	S-007	Center St Pressure Pipe, Pump to 300 S	5,000	18		X			X				X	X	X					X	$1,368,213
	S-008	Burgi Lane North Extension	4,800	8		X	X								X	X					$1,097,295
	S-009	700 East Main St to 250 S	1,650	10		X	X			X			X		X	X		X	X	X	$581,648
	S-010	Pine Canyon, 700 N to 200 N	3,400	12		X	X			X				X	X		X	X	X	X	$1,262,635
	S-011	Lime Canyon Rd Sections	240	10		X	X		X	X			X	X	X	X		X	X	X	$113,889
	S-012	Valais Parkway Sections	1,000	10		X	X		X	X			X	X	X		X	X	X	X	$376,749
ULT	S-013	River Road Upgrade	2,400	15		X	X		X						X		X	X	X	X	$535,918
	S-014	Mitchie Lane West Extension	5,000	10		X	X		X			X			X						$736,478
	S-015	Pine Canyon North Extension	1,000	8		X	X						X	X	X	X					$327,878
	S-016	Master Plan Update (4 times)	140,000		X																$154,000
ULT	S-017	Stringtown Road Sections	830	12		X	X	X		X			X	X	X			X	X	X	$281,661
		TOTAL SEWER:																			**$11,621,976**

NOTES:

2. an analysis of all known alternatives which would eliminate or reduce the need for plant bypassing;

3. cost-benefit and effective analysis of alternatives, including an assessment of resource damages;

4. the minimum and maximum duration of bypassing under each alternative;

5. the applicant's preferred alternative for conducting the bypass;

6. the projected date of initiation of bypass.

C. Approval or Denial of a Construction-related Bypass

1. The request for a construction-related bypass will be approved or denied following a thorough review with due consideration of compliance with the discharge permit(s); water quality standards; and all known available and reasonable methods to abate water pollution.

2. An approval issued to permit bypass will contain all restrictions necessary to minimize the duration of bypassing. A denial determination will state the reasons for the denial and will direct the permittee to initiate a plan of action to implement an alternative to bypassing.

1.12. Innovative Processes Evaluation

A. Basic requirements. The Director will consider the evaluation of innovative approaches to wastewater treatment in the interest of encouraging advances in technology, processes, equipment and material not covered by this rule, provided that:

1. a favorable recommendation has been made by a professional engineer licensed to practice in Utah, following his own evaluation of developmental processes or equipment or material, for a specific project;

2. the applicant has capital and technical resources to replace or modify developmental processes, equipment and material with conventional processes, equipment and material;

3. the risk incurred with the experimentation rests solely with the proponent of processes, equipment and material as evidenced by the written acknowledgement to the Director; and

4. the applicant will replace the failed processes, equipment and material with a proven conventional processes, equipment and material as evidenced by the written acknowledgement to the Director.

B. Approval Limitations

1. The Director may approve developmental processes, equipment and material may be approved in the form of terms and conditions to a construction permit, when reliable operating data from full scale installations are not available. The term and conditions may include such as, but not necessarily limited to, demonstration period for a successful application, requirements to submit reports on the operation of the system during the experimental period.

2. The Director may limit the number of approvals for the same developmental processes, equipment and material until reliable and valid operational experience is gained.

C. Evaluation Criteria. The evaluation of innovative processes will include the following factors:

1. anticipated performance of the system in full scale field conditions,

2. ability to consistently meet required effluent and water quality standards,

3. any evidence of equivalence to conventional technology,

4. the owner's ability to finance, and to operate and maintain the system with the level of expertise necessary, and

5. submission of process descriptions, schematics, reports, monitoring and performance data, costs, specific studies, bench scale test data and pilot plant test data, and any other information appropriate and necessary for the evaluation.

R317-3-2. Sewers.

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

2.2. Basis of Design

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

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

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

2. Design Flow

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

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

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

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

2.3. Design and Construction Details

A. Minimum Size

1. No gravity sewer shall be of less than eight inches (20 centimeters) in diameter.

2. A 6-inch (15 centimeters) diameter pipe may be permitted when the sewer is serving only one connection, or if the applicant justifies the need for such diameter on the basis of supporting documentation.

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

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

D. Slope

1. The pipe diameter and slope shall be selected to obtain velocities to minimize settling problems.

2. All sewers shall be designed and constructed to give mean velocities of not less than 2 feet per second (0.61 meter per second), when flowing full, based on Manning's formula using an n value of 0.013.

3. Sewers shall be laid with uniform slope between manholes.

4. Table R317-3-2.3(D)(4) shows the minimum slopes which shall be provided; however, slopes greater than these are desirable.

E. Flatter Slopes. Slopes flatter than those required for the 2-feet-per-second (0.61 meter per second)-velocity criterion when flowing full, may be permitted by the Director provided that:

1. there is no other practical alternative;

2. the depth of flow is not less than 30 percent of the diameter at the average design rate of flow;

3. the design engineer has furnished with the report the computations showing velocity and depth of flow corresponding to the minimum, average and peak rates of flow for the present and design conditions in support of the request for variance; and

4. the operating authority of the sewer system submits a written acknowledgement of the ability to provide any additional sewer maintenance required by flatter slopes.

F. Steep Slopes

1. Where velocities greater than 15 feet per second (4.6 meters per second) are attained, special provision shall be made to protect against displacement by erosion and shock.

2. Sewers on 20 percent slopes or greater shall be anchored securely against lateral and axial displacement with suitable thrust blocks, concrete anchors or other equivalent restraints, spaced as follows:

a. Not over 36 feet (11 meters) center to center on grades 20 percent and up to 35 percent;

b. Not over 24 feet (7.3 meters) center to center on grades 35 percent and up to 50 percent;

c. Not over 16 feet (4.9 meters) center to center on grades 50 percent and over.

G. Alignment. Sewers 24 inches (61 centimeters) in diameter or less shall be laid with a straight alignment

between manholes. The alignment shall be checked by either using a laser beam or lamping.

H. Changes in Pipe Size. When a smaller sewer joins a large one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.

I. Materials

1. The material of pipe selected should be suitable for local conditions. The material of sewer pipe should be compatible with factors such as industrial wastewater characteristics, putrecibility, physical and chemical properties of adjacent soil, heavy external loading, etc.

2. The material of pipe must withstand superimposed loads without any damage. The design of trench widths and depths should allow for loads. Special bedding, concrete cradle or encasement, or other special construction may be used to withstand extraordinary superimposed loading.

2.4. Curved Sewers. Curved sewers are permitted only under circumstances where conventional sewer construction is not feasible. A conceptual approval must be obtained before beginning the design.

A. Design

1. The minimum radius of curvature shall be greater than 200 feet or one-half of the maximum deflection angle for the material of pipe allowed by the manufacturer.

2. The design n value for the sewer pipe shall be 0.018.

3. Only one horizontal curve in the sewer alignment will be allowed between manholes. No vertical curves shall be permitted.

4. Manhole spacing shall not exceed 400 feet (122 meters).

5. Manholes must be provided at the beginning and the end of a curved alignment (i.e. change in radius of curvature).

6. The design should consider increased erosion potential due to high velocities.

B. Other Requirements

1. Maintenance equipment shall be available at all times for inspection and cleaning.

2. Horizontal and vertical alignment of the sewer after the construction must be verified and certified by a registered professional engineer.

a. Accurate record or as-built drawings must be prepared showing the physical location of the pipe in the ground, and submitted to the division in accordance with the requirements of R317-3-1.

2.5. Installation Requirements

A. Standards

1. The technical specifications shall require that installation be in accordance with the requirements based on the criteria, standards and procedures established by:

a. this rule;

b. recognized industry standards and practices as published in their technical publications;

c. the product manufacturer's recommendations and guidance;

d. Uniform Building Code, Uniform Plumbing Code, Uniform Mechanical Code and National Electrical Code;

e. American Society of Testing Materials;

f. American National Standards Institute; and

g. Occupational Safety and Health Administration (OSHA), US Department of Labor or its succeeding agencies.

2. Requirements shall be set forth in the specifications for the pipe and methods of bedding and backfilling thereof so as not to damage the pipe or its joints, impede cleaning operations and future tapping, nor create excessive side fill pressures or ovalation of the pipe, nor seriously impair flow capacity.

B. Identification of Sewer Lines. A clearly labelled tracer location tape shall be placed two feet above the top of sewer lines less than or equal to 24 inch (61 centimeters) in diameter, along its entire length.

C. Deflection Test

1. Deflection test shall be performed on all flexible pipes. The test shall be conducted after the final backfill has been in place at least 30 days.

2. No pipe shall show a deflection in excess of 5 percent.

3. If the deflection test is run using a rigid ball or mandrel, it shall have a diameter equal to 95 percent of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.

D. Joints and Infiltration

1. Joints. The installation procedures of joints and the materials to be used shall be included in the specifications. Sewer joints shall be designed to minimize infiltration and to prevent the entrance of roots throughout the life of the system.

2. Leakage Tests. Procedures for leakage tests shall be specified. This may include appropriate water or low pressure air testing. The leakage outward or inward (exfiltration or infiltration) shall not exceed 200 gallons per inch of pipe diameter per mile per day (0.19 cubic meter per centimeter of pipe diameter per kilometer per day) for any section of the system. An exfiltration or infiltration test shall be performed with a minimum positive head of 2 feet (0.61 meter). The air test, if used, shall, as a minimum, conform to the test procedure described in the American Society of Testing Materials standards. The testing methods selected should take into consideration the range in ground water elevations projected during the test.

E. Inspection

1. The specifications shall include requirements for inspection of manholes for water-tightness prior to placing in service, including television inspection.

2. Records of television inspection shall be retained for future reference.

2.6. Manholes

A. Location. Manholes shall be installed at:

1. the end of each line exceeding 150 feet (46 meters) in length;

2. all changes in grade, size, or alignment;

3. all intersections; and

4. distances not greater than:

a. 400 feet (120 meters) for sewers 15 inches (38 centimeters) or less; and

b. 500 feet (150 meters) for sewers 18 inches (46 centimeters) to 30 inches (76 centimeters).

5. Distances up to 600 feet (180 meters) may be approved in cases where adequate cleaning equipment for such spacing is provided.

6. Greater spacing may be permitted in larger sewers.

7. Cleanouts shall not be substituted for manholes nor installed at the end of lines greater than 150 feet (46 meters) in length.

B. Drop Type Manholes

1. A drop pipe should be provided for a sewer entering a manhole at an elevation of 24 inches (61 centimeters) or more above the manhole invert. Where the difference in elevation between the incoming sewer and manhole invert is less than 24 inches (61 centimeters), the invert should be filleted to prevent solids deposition.

2. Drop manholes should be constructed with an outside drop connection. If an inside drop connections is necessary, it shall be secured to the interior wall of the manhole and provide access for cleaning.

3. Due to the unequal earth pressures that would result from the backfilling operation in the vicinity of the manhole, the entire outside drop connection shall be encased in concrete.

C. Diameter. The minimum diameter of manholes shall be 48 inches (1.22 meters); larger diameter manholes are preferable for large diameter sewers. A minimum diameter of 22 inches (56 centimeters) shall be provided for safe access.

D. Flow Channel. The flow channel through manholes should be made to conform in shape and slope to that of the sewers. The depth of flow channels should be up to one-half to three-quarters of the diameter of the sewer. Adjacent floor area should drain to the channel with the minimum slope of 1 inch per foot (8.3 centimeters per meter).

E. Watertightness

1. Manholes shall be of the pre-cast concrete or poured-in-place concrete type. Manholes shall be waterproofed on the exterior.

2. Inlet and outlet pipes shall be joined to the manhole with a gasketed flexible watertight connection arrangement that allows differential settlement of the pipe and manhole wall to take place.

3. Watertight manhole covers shall be used wherever the manhole tops may be flooded by street runoff or high water. Locked manhole covers may be desirable in isolated easement locations or where vandalism may be a problem.

F. Electrical. Electrical equipment installed or used in manholes shall conform to appropriate National Electrical Code requirements.

2.7. Inverted Siphons. Inverted siphons shall consist of at least two barrels, with a minimum pipe size of 6 inches (15 centimeters) with an arrangement to exclude debris and solids. The siphon shall be provided with necessary appurtenances for convenient flushing and maintenance. The manholes shall have adequate clearances for rodding; and in general, sufficient head shall be provided and pipe sizes selected to secure velocities of at least 3.0 feet per second (0.92 meter per second) for average flows. The inlet and outlet details shall be so arranged that the normal flow is diverted to 1 barrel, and that either barrel may be cut out of service for cleaning. The vertical alignment should permit cleaning and maintenance.

2.8. Sewers In Relation To Streams

A. Location of Sewers on Streams

1. The top of all sewers entering or crossing streams shall be at a sufficient depth below the natural bottom of the stream bed to protect the sewer line. In general, the following cover requirements must be met:

a. one foot (30 centimeters) of cover is required where the sewer is located in bedrock;

b. three feet (90 centimeters) of cover is required in other material;

c. cover in excess of 3 feet (90 centimeters) may be required in streams having a high erosion potential; and

d. in paved stream channels, the top of the sewer must be placed below the bottom of the channel pavement.

2. If the proposed sewer crossing will not interfere with the future improvements to the stream channel, then reduced cover may be permitted.

B. Horizontal Location. Sewers shall be located along streams outside of the stream bed and sufficiently removed therefrom to provide for future possible stream widening and to prevent pollution by siltation during construction.

C. Structures. The sewer outfalls, headwalls, manholes, gate boxes, or other structures shall be located so they do not interfere with the free discharge of flood flows of the stream.

D. Alignment

1. Sewers crossing streams should be designed to cross the stream as nearly at right angles to the stream flow as possible, and shall be free from change in grade.

2. Sewer systems shall be designed to minimize the number of stream crossings.

E. Construction

1. Materials. Sewers entering or crossing streams shall be constructed of cast or ductile iron pipe with mechanical joints; otherwise they shall be constructed so they will remain watertight and free from changes in alignment or grade. Material used to backfill the trench shall be stone, coarse aggregate, washed gravel, or other materials which will not cause siltation.

2. Siltation and Erosion. Construction methods that will minimize siltation and erosion shall be employed. The design engineer shall include in the project specifications the method(s) to be employed in the construction of sewers in or near streams to provide adequate control of siltation and erosion. Specifications shall require that cleanup, grading, seeding, and planting or restoration of all work areas shall begin immediately. Exposed areas shall not remain unprotected for more than seven days.

F. Aerial Crossings

1. A carrier pipe shall be provided for all aerial sewer crossings. Support shall be provided for all joints in pipes utilized for aerial crossings. The supports shall be designed to prevent frost heave, overturning and settlement.

2. Precautions against freezing, such as insulation and increased slope, shall be provided. Expansion jointing shall be provided between above-ground and below-ground sewers.

3. The design engineer shall consider the impact of flood waters and debris for aerial stream crossings. The bottom of the pipe should be placed below the elevation of twenty-five (25) year flood. Crossings, in no case, shall block the channel.

2.9. Protection of Water Supplies. The applicant must review the requirements stated in R309-112-2 - Distribution System Rules, Drinking Water and Sanitation Rules, to assure compliance with the said rule.

A. Water Supply Interconnections. There shall be no physical connections between a public or private potable water supply system and a sewer, or appurtenance thereto which would permit the passage of any sewage or polluted water into the potable supply. No water pipe shall pass through or come in contact with any part of a sewer manhole.

B. Relation to Water Mains

1. Horizontal Separation

a. Sewers shall be laid at least 10 feet (3.0 meters) horizontally from any existing water main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten foot separation, a deviation may be allowed based on the supportive data from the design engineer. Such deviation may allow installation of the sewer closer to a water main, provided that the sewer is laid:

(1) in a separate trench, or

(2) on an undisturbed earth shelf located on one side of the sewer trench, or

(3) in the sewer trench which has been backfilled and compacted to not less than 95 percent of the optimum density as determined by the ASTM Standard D-690, as amended, and

b. In each of the above cases, the bottom of the water main shall be at least 18 inches (46 centimeters) above the top of the sewer.

2. Crossings. Sewers crossing above water mains shall be laid to provide a minimum vertical distance of 18 inches (46 centimeters) between the outside of the water main and the outside of the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer to prevent damage to the water main.

3. Special Conditions. When it is impossible to obtain proper horizontal and vertical separation as stated above, the sewer shall be designed and constructed of cast iron, ductile iron, galvanized steel or protected steel pipe with mechanical joints for the minimum distance of 10 feet on either side of the point of crossing. The design engineer may use other types of joints if equivalent joint integrity is demonstrated. The lines shall be pressure tested to assure watertightness before backfilling.

R317-3-3. Sewage Pumping Stations.

3.1. General. Sewage pumping station structures, and electrical and mechanical equipment shall be protected from physical damage that would be caused by a 100-year flood. Sewage pumping stations must remain fully operational and accessible during a 25-year flood.

3.2. Design

A. Pumping Rates. The pumps and controls of main pumping stations, and especially pumping stations pumping to the treatment works or operated as part of the treatment works, should be selected to operate at varying delivery rates to permit discharging sewage at approximately its rate of delivery to the pump station.

B. System - Head Calculation

1. The design engineer shall submit system-head calculations and curves. System-head curves for C values of 100, 120 and 140 in the Hazen William's equation for calculating head loss corresponding to minimum, median and maximum water levels shall be developed.

2. A system-head curve for C value of 120 corresponding to median (normal operating) water level shall be used to make preliminary selection of motor and pump. The pump and motor must operate satisfactorily over the entire range of system-head curves for C values of 100 and 140 corresponding to minimum and maximum water levels intersected by the head-discharge relationship of a given pump.

3. Pumps and motors shall be sized for the 10-year peak flows; preferably the 20-year sewage flow requirements. These operating points shall be shown on the system-head curves.

C. Accessibility. The pumping station shall be readily accessible by maintenance vehicles during all weather conditions. The facility should be located off the traffic way of streets and alleys.

D. Grit. Where it is necessary to pump sewage before grit removal, the design of the wet well and pump station piping shall be such that operational problems from the accumulation of grit are avoided.

E. Odor and Corrosion Control. The pumping station design should incorporate measures for:

1. mitigating the effects of sulfide corrosion to structure and equipment; and

2. effective odor control when a populated area is within close proximity.

F. Structures

1. Dry wells, including their superstructure, shall be completely separated from the wet well.

2. Provision shall be made to facilitate maintenance and removal of pumps, motors, and other mechanical and electrical equipment.

3. Safe means of access and proper ventilation shall be provided to dry wells and to wet wells containing either bar screens or mechanical equipment requiring inspection or maintenance.

a. For built-in-place pump stations, a stairway with rest landings shall be provided at vertical intervals not to exceed 12 feet (3.7 meters). For factory-built pump stations over 15 feet (4.6 meters) deep, a rigidly fixed landing shall be provided at vertical intervals not to exceed 10 feet (3.0 meters). Where a landing is used, a