ENOCH CITY
CAPITAL FACILITIES PLAN
APRIL 2011

HORROCKS
ENGINEERS

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Enlarged Figures:





CHAPTER 1 - INTRODUCTION

Enoch City is a growing community located in Iron County between Cedar City (to the south) and Parowan (to the northeast). At the recent 2010 preliminary Census, the population of Enoch was estimated at 5,236 residents. Enoch has been growing steadily for a number of years now. Review of past growth patterns have shown sustained growth rates as high as 6% and 9%. Even with the economic downturn of the past few years Enoch has continued a fairly strong growth rate of over 3%. When projected forward these growth trends estimate Enoch's population to reach approximately 26,000 by the year 2040 with a total build out population of nearly 34,000. Demographics are discussed in the following chapter.

Enoch City was settled by pioneers in the mid 1800's after discovering a water source known as Johnson Springs. Since that time Enoch City has grown and developed because of their water supply. In addition to the culinary water system, Enoch also has started to implement a secondary water system and a storm drain system. Sewer is provided for all existing residents.

This report analyzes Enoch's future growth patterns and projects infrastructure needs as the population increases. Services addressed include the following:

- **Culinary Water**
- **Secondary Water**
- **Sewer**
- **Transportation**
- **Storm Drainage**
- **Public Safety**
- **Parks and Recreation**
- **Administrative Services**

Figures showing existing and proposed conditions are included for many of the services. Infrastructure projects have also been forecasted which include planning level estimates of costs in 2010 dollars. As this is the City's first formal CFP, this document will provide direction as Enoch prepares and modifies master plans for developments, public services, and utility needs.

Proportionate Share

This report does not cover impact fees. However, it should be noted that only a proportionate share of future costs can be assigned to future developments or projects. It is evident that the cost of existing services and infrastructure cannot be assigned a legitimate dollar value per resident since very little information is available as to how the existing infrastructure was financed, what share the City financed, what agency constructed the improvement and how much the improvements actually cost. Therefore, in accordance with the Utah Impact Fees Act, Title 11, Chapter 36, every effort should be made to evaluate impact fees considering only those costs that are attributable to future growth. To assist the City in their future evaluation of impact fees, a current Level of Service (LOS) has been defined for each element.

CHAPTER 2 – DEMOGRAPHICS

The first step in preparing a Capital Facilities Plan is to evaluate and verify the City's current demographics and future population projections. Therefore, the following section discusses Enoch City's current population, growth trends and projected build-out population.

2.1 Existing Conditions

Current Population

Enoch's current population (at the end of 2009) is estimated at 5,236. Population data and projections were obtained from the following 3 sources: the Census Bureau, the Governor's Office of Planning and Budget (GOPB), and the 2007 Enoch City Water Master Plan. Past water billing records and recently issued building permits were also analyzed for current growth trends and short term growth projections.

Average Residents per Household

For purposes of this CFP, the current average household density was estimated at 3.62 residents per household. This value has been established using population estimates developed from census data, building permits, and the number of dwelling units indicated on current billing records. This is also the same value utilized during the 2000 Census.

Current Zoning and Land Use Plans

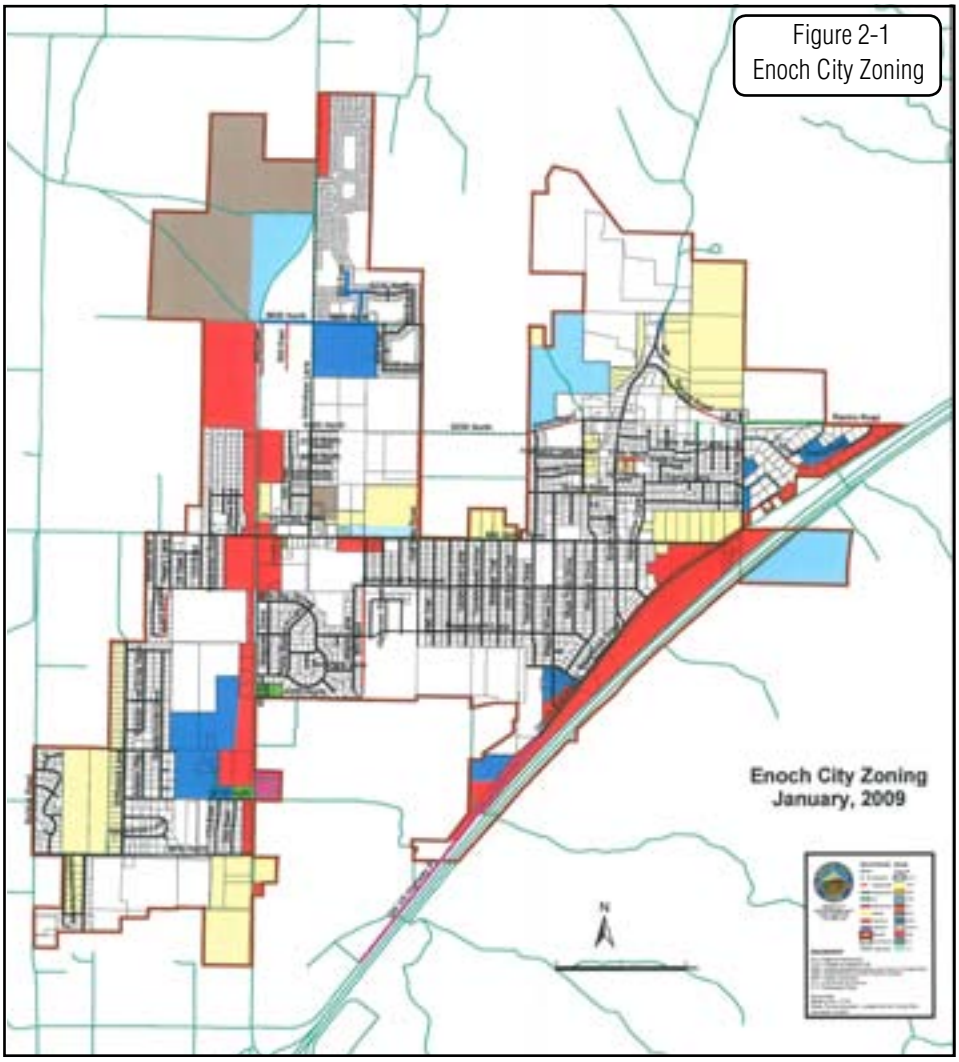
The current Zoning Plan formed the basis of evaluation for future growth and future infrastructure needs within the city limits. Future population densities were assigned based on the type of zoning as shown in Table 2.1.

Table 2.1: Density/Build-Out Projections

Enoch City Build-Out Population Projections					
Land Use Classification	**Area (acre)**	**Density (units/ acre)**	**Total Units**	**Residents* per Unit**	**Residents**
R-1-18	3,890	2.0	7,780	3.62	28,164
Rural Residential - 1	581	1	581	3.62	2,104
Rural Residential - 5	252	0.2	51	3.62	185
Regional Commercial	580	0	0	0	0
Research Industrial Park	372	0	0	0	0
Multiple Residential	220	4	880	2.53	2,227
Mixed Residential	60	2.4	144	2.90	418
Mobile Home Park	15	2.4	36	3.62	132
Community Commercial	13	0	0	0	0
Professional Office	17	0	0	0	0
				Projected Build-Out Population	**33,230**

Varying densities used are based on dwelling unit types as discussed in Section 2.3.

Zoning and Land Use Plans greatly affect the demographics and resulting infrastructure needs of a community. For example, commercial areas have no population but often generate higher traffic volumes than residential areas. Enoch's Zoning Plan is included as Figure 2-1. and was used for the density projections shown in this report.



2.2 Build-out Population

Based on the current Zoning Plan, Enoch's build-out population has been estimated at 33,230 residents. This population includes future annexation property shown on Figure 2-1. Total build-out for a city is reached when all vacant land within the city boundaries has been developed to the current zoning and land use plans. The planning period for this CFP is 30 years or until the year 2040. As illustrated in Tables 2.1 and 2.2, the population of Enoch is estimated to be approximately 26,000 by the year 2040 with projected build-out occurring 15 to 20 years later.

2.3 Current & Future Growth

Growth Trends

Forecasting the City's future needs relies heavily upon projecting future population trends and economic growth. We have used the following data sources to project the future's growth rates for the City of Enoch:

- **Issued Building Permits**
- **2000 Census Information**

- **2001-2004 Census Projections**
- **2010 Preliminary Census Data**
- **Regional Population Patterns**
- **Forecasted Build-Out Population**
- **Current Developments Seeking Approval**

This report estimates that 50% of new developments in the mixed-use zones will not be traditional single family dwellings. Rather, these areas will consist of units similar to townhomes and condominiums. Consequently, it is anticipated that these units will have a lower occupancy rate (2.90) than Enoch's traditional rate (3.62) but higher than multifamily unit zones (2.53).

Future Growth Trends

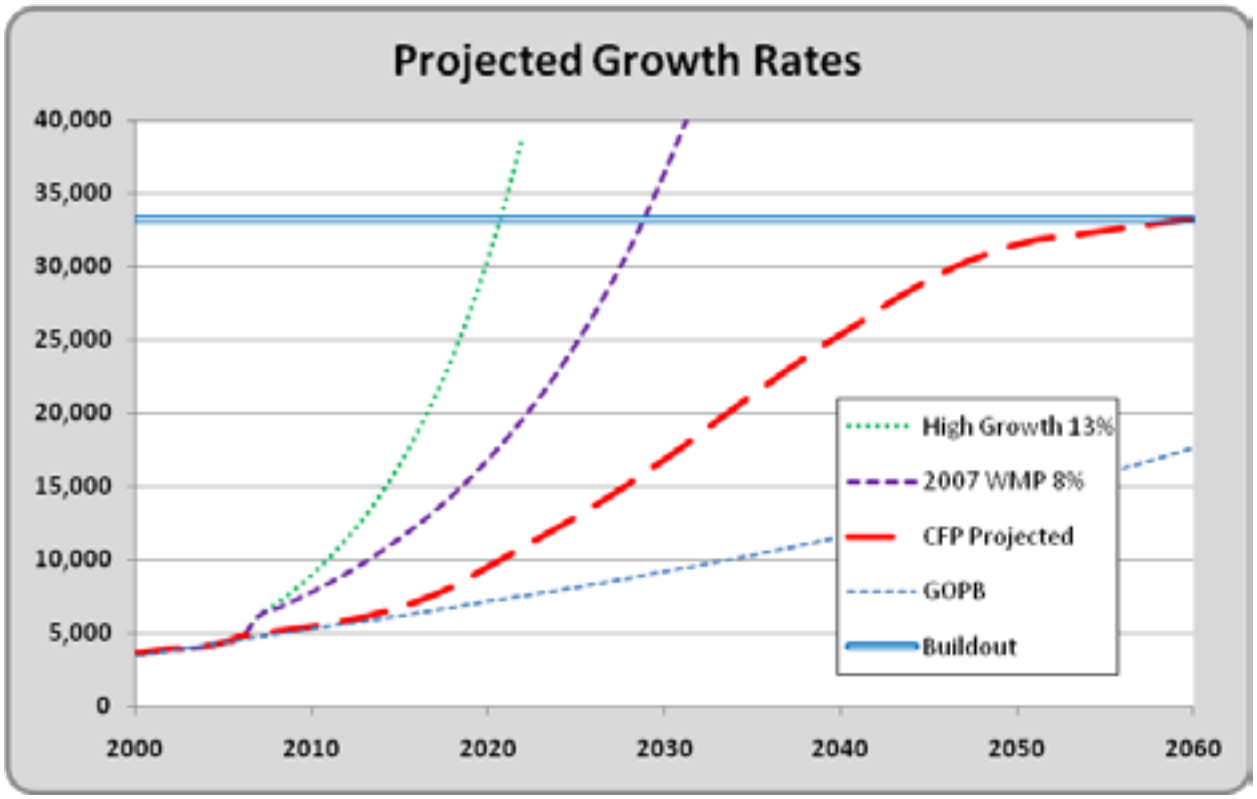
Due to the recent down turn in the housing development market, population growth is not expected to climb as rapidly as it has in the past 5 years. Current projections anticipate a relatively flat growth rate for the next few years. This should be followed by a period of slow growth until rapid growth is again realized.

Table 2.2 summarizes the projected growth patterns anticipated by various organizations. This table, included for comparison purposes, also shows the projections accepted for this study.

Figure 2.2 below graphically illustrates the data contained in Table 2.2.

Figure 2.2 Projected Population Growth

Table 2.2: Various Growth Projections for Enoch City



Population Estimate and Projected Growth Rate Within Enoch City Limits								
Fiscal Year	*GOPB Projected Population*	*GOPB Projected Growth Rate*	*Census Population Estimate*	*Census Growth Rate*	*2007 WMP Projected Population*	*2007 WMP Projected Growth Rate*	*2010 CFP Projected Population*	*2010 CFP Adjusted Growth Rate*
2000	3,467		3,565		3,565		3,565	
2001	3,628	4.63%	3,736	4.80%	3,736		3,736	
2002	3,795	4.63%	3,905	4.52%	3,905		3,905	
2003	3,971	4.63%	3,947	1.08%	3,947		3,947	
2004	4,155	4.63%	4,069	3.09%	4,069		4,069	
2005	4,347	4.63%	4,320	6.17%	4,320		4,320	
2006	4,550	4.63%	4,723	9.33%	4,723		4,723	
2007	4,727	3.90%	4,921	4.19%	6,200		4,921	
2008	4,912	3.90%	5,085	3.33%	6,696	8.0%	5,085	
2009	5,103	3.90%			7,232	8.0%	5,236	
2010	5,302	3.90%			7,810	8.0%	5,393	3.0%
2011	5,464	3.05%			8,435	8.0%	5,582	3.5%
2012	5,630	3.05%			9,110	8.0%	5,805	4.0%
2013	5,802	3.05%			9,839	8.0%	6,066	4.5%
2014	5,979	3.05%			10,626	8.0%	6,370	5.0%
2015	6,161	3.05%			11,476	8.0%	6,720	5.5%
2016	6,349	3.05%			12,394	8.0%	7,123	6.0%
2017	6,543	3.05%			13,385	8.0%	7,586	6.5%
2018	6,743	3.05%			14,456	8.0%	8,117	7.0%
2019	6,948	3.05%			15,613	8.0%	8,767	8.0%
2020	7,157	3.05%			16,862	8.0%	9,468	8.0%
2021	7,337	2.52%			18,211	8.0%	10,131	7.0%
2022	7,522	2.52%			19,667	8.0%	10,840	7.0%
2023	7,712	2.52%			21,241	8.0%	11,490	6.0%
2024	7,906	2.52%			22,940	8.0%	12,180	6.0%
2025	8,105	2.52%			24,775	8.0%	12,910	6.0%
2026	8,310	2.52%			26,757	8.0%	13,620	5.5%
2027	8,519	2.52%			28,898	8.0%	14,370	5.5%
2028	8,734	2.52%			31,210	8.0%	15,160	5.5%
2029	8,954	2.52%			33,707	8.0%	15,994	5.5%
2030	9,181	2.52%			36,403	8.0%	16,793	5.0%
2031	9,394	2.32%			**39,315**	8.0%	17,633	5.0%
2032	9,612	2.32%			42,461	8.0%	18,515	5.0%
2033	9,835	2.32%			45,857	8.0%	19,441	5.0%
2034	10,063	2.32%			49,526	8.0%	20,315	4.5%
2035	10,297	2.32%			53,488	8.0%	21,230	4.5%

Population Estimate and Projected Growth Rate Within Enoch City Limits								
Fiscal Year	*GOPB Projected Population*	*GOPB Projected Growth Rate*	*Census Population Estimate*	*Census Growth Rate*	*2007 WMP Projected Population*	*2007 WMP Projected Growth Rate*	*2010 CFP Projected Population*	*2010 CFP Adjusted Growth Rate*
2036	10,535	2.32%			57,767	8.0%	22,079	4.0%
2037	10,780	2.32%			62,388	8.0%	22,962	4.0%
2038	11,030	2.32%			67,380	8.0%	23,766	3.5%
2039	11,286	2.32%			72,770	8.0%	24,597	3.5%
2040	11,551	2.32%			78,592	8.0%	25,335	3.0%
2041	11,806	2.21%					26,095	3.0%
2042	12,067	2.21%					26,878	3.0%
2043	12,334	2.21%					27,684	3.0%
2044	12,606	2.21%					28,377	2.5%
2045	12,885	2.21%					29,086	2.5%
2046	13,170	2.21%					29,668	2.0%
2047	13,461	2.21%					30,261	2.0%
2048	13,758	2.21%					30,715	1.5%
2049	14,062	2.21%					31,176	1.5%
2050	14,379	2.21%					31,487	1.0%
2051	14,677	2.07%					31,802	1.0%
2052	14,980	2.07%					31,961	0.5%
2053	15,291	2.07%					32,121	0.5%
2054	15,607	2.07%					32,282	0.5%
2055	15,930	2.07%					32,443	0.5%
2056	16,260	2.07%					32,605	0.5%
2057	16,596	2.07%					32,768	0.5%
2058	16,940	2.07%					32,932	0.5%
2059	17,291	2.07%					33,097	0.5%
2060	17,642	2.07%					33,262	0.5%

CHAPTER 3– WATER PLANNING

Enoch City has five wells that are used to pump ground water to meet the needs of its customers. The majority of connections are household residents. Additionally, there are 7 institutional connections, 5 commercial customers, and 6 city connections. Only a few residents have private wells for their water use. The City also has a pressurized irrigation (PI) system that provides water to parks and a few residents. Most water users in the city use culinary water for landscape and garden watering. This water master plan takes into account that Enoch City has a partial PI system. If the PI system is not used and upgraded, the City's culinary water model will need to be updated, subsequently increasing pipe sizes, reservoirs and water source requirements.

3.1 Definitions

ERC	Equivalent Residential Connection
gpm	gallons per minute
gpd	gallons per day
IFC	International Fire Code

Equivalent Residential Connections (ERC)

For the purposes of this study, flows generated by water users, such as businesses, schools, churches, and residents have been converted to common units called Equivalent Residential Connections (ERC). ERCs compare a water user's use rate to that of a single family dwelling.

As an example, the peak water use for a residential connection in Enoch (2009) was approximately 1.125 gallons per minute (gpm). An average institutional connection in Enoch used approximately 4.63 gpm in 2009. Equating a typical institutional connection to a residential connection becomes 4.63/1.125 = 4.11 ERC's.

ERC's will be used in this report to project water needs and have been calculated using water from both indoor and outdoor use. The following ERCs were calculated from this analysis.

Residential:	1.00 ERC
Institutional:	4.11 ERC

3.2 Level of Service (LOS)

The current LOS that Enoch applies to its water system is governed by the minimum requirements dictated by the State of Utah Division of Drinking Water as well as the International Fire Code. The requirements are as follows:

- 20 psi in all areas of the system during peak instantaneous usage
- 20 psi in all areas of the water system during maximum day usage with imposed fire flows
- 1,000 gpm fire flows for all homes under 3,600 square feet
- 1,750 gpm fire flows for all homes between 3,600 and 4,800 sq. ft.
- Adequate fire flows for all other buildings according to IFC standards
- Adequate storage for fire flows according to IFC standards
- 400 gallons of storage per indoor ERC serviced
- 2,528 gallons of storage per irrigated acre
- 800 gpd of source capacity per indoor ERC serviced
- 3.39 gpm of source capacity per irrigated acre
- 0.45 acre-ft of water right per ERC and 1.66 acre-ft per irrigated acre

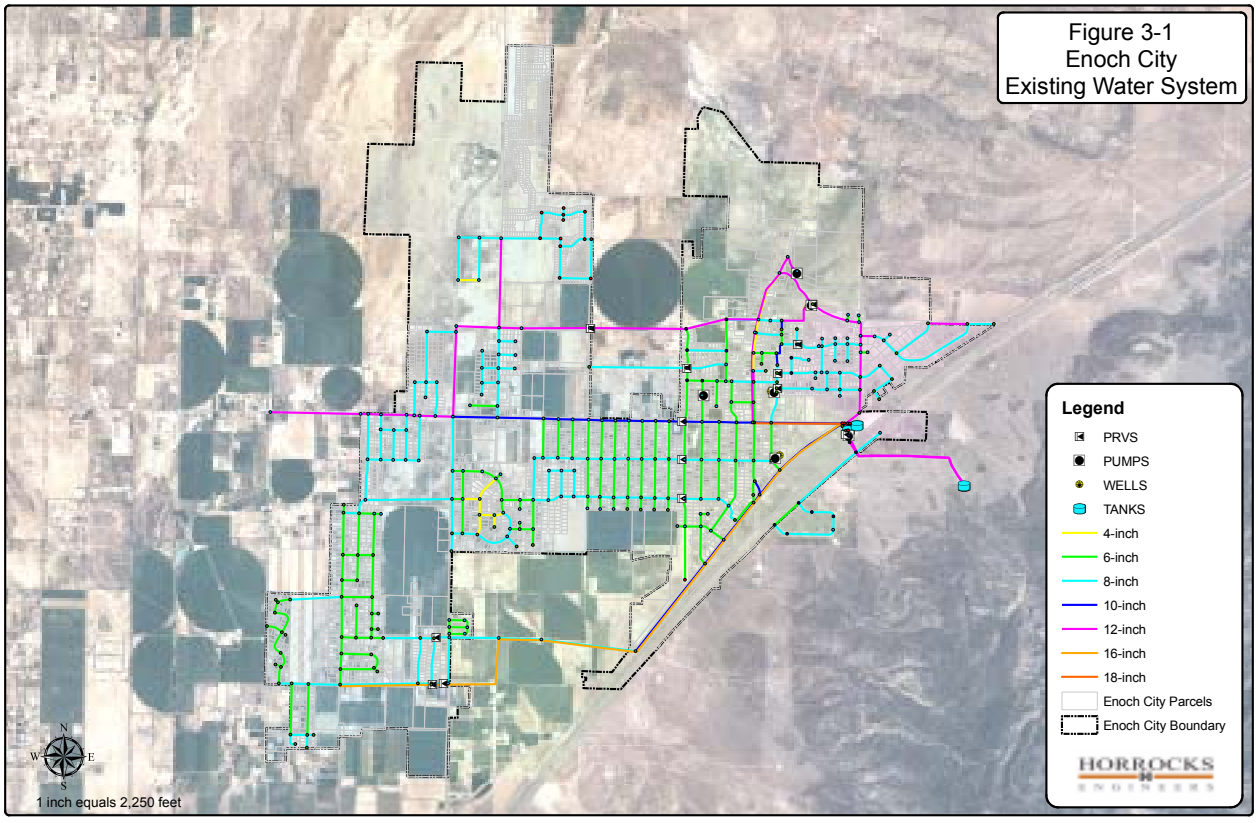
New service areas added after January 1, 2007 are required to meet the following additional requirements:

- 30 psi during peak instantaneous demand
- 40 psi during peak day demand

In order to ensure that Enoch can maintain this same LOS in the future, a water model has been created. Recommendations for the water system have been based on the water model utilizing the requirements above.

3.3 Existing Culinary System

The culinary water system (see Figure 3-1) was analyzed based on existing conditions. Currently, the system complies with state standards, except at a few minor locations. Implementation of the recommended improvements outlined below will bring the city into compliance with minimum state standards.



Improvements Required to Eliminate Existing Deficiencies

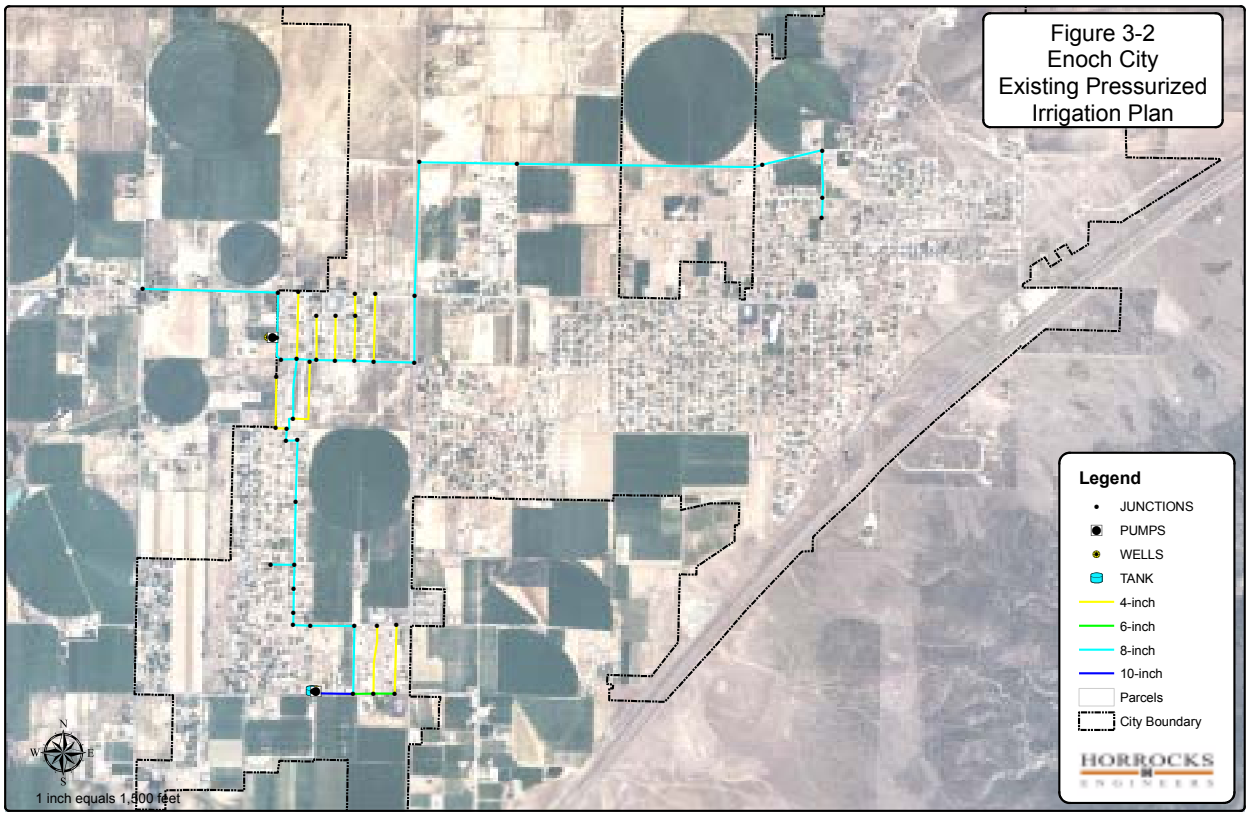
A. Adjust PRV Pressure Settings – Ravine to 60 psi, Cedar Berry to 53 psi, Midvalley to 100 psi, Stagecoach to 100 psi, 3810 to 90 psi, 3600 to 78 psi, Little Eden to 110 psi, and Half Mile to 130 psi, to help with pressures.

B. Primrose Pipe Replacement – Replace approximately 280 feet of 4-inch waterline with 8-inch to increase fire flow.

C. Golden Leaf Circle Pipe Replacement – Replace approximately 360 feet of 4-inch waterline with 8-inch to increase fire flows.

3.4 Existing Pressurized Irrigation System

Enoch City's pressurized irrigation (PI) system currently consists of two wells and a 0.15 million gallon tank. It supplies water to the Cemetery, a few large outdoor water users, and a small number of residents. The system is shown in Figure 3-2.



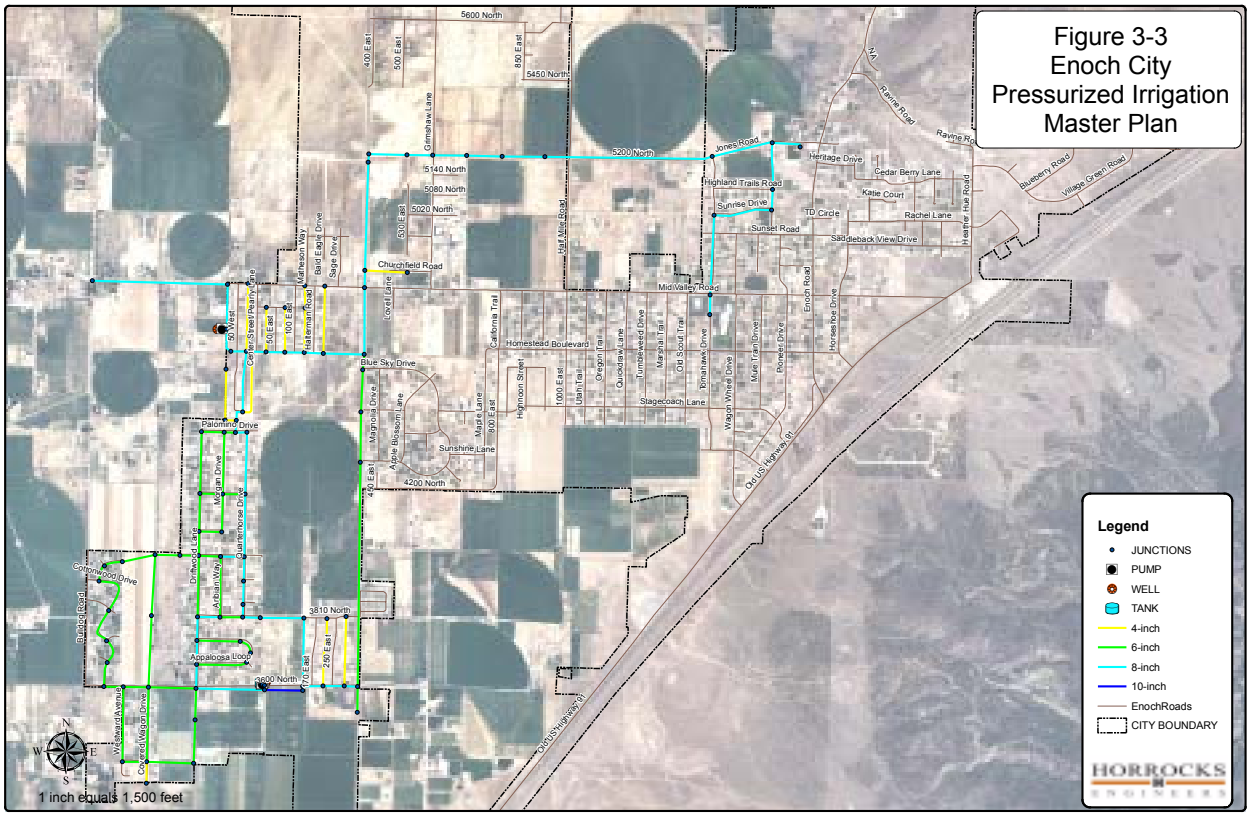
The City desires to service those areas it can with secondary water although it is not the intent of Enoch City to provide secondary water to all users at this time. Currently, Enoch does not have to treat its water supply and the comparative cost of water is low. This results in a very low benefit to cost ratio to provide PI to the entire city. However, expansion of the existing PI system will reduce the demands placed on the culinary water system. This in turn will help reduce overall water costs to all residents.

As part of this CFP, the PI system was first modeled in its existing condition. This was followed by modeling the future expansion of the secondary water system with the following criteria:

- Future water sources will come from surface water required for development.
- Ponds in the south part of Enoch will be utilized for storage (no tanks).
- Minimum 50 psi pressure for new users.
- Minimum pressure for existing PI users must remain the same.

Although pressures were allowed to go as low as 50 psi for new users, it is important to note that residents and businesses currently using potable water for landscaping have designed their irrigation systems for the higher pressures of that system. If these residents were required to use the lower pressures of the secondary system their systems would not operate properly. New users will be able to design and construct their systems to operate at the pressure of the PI system.

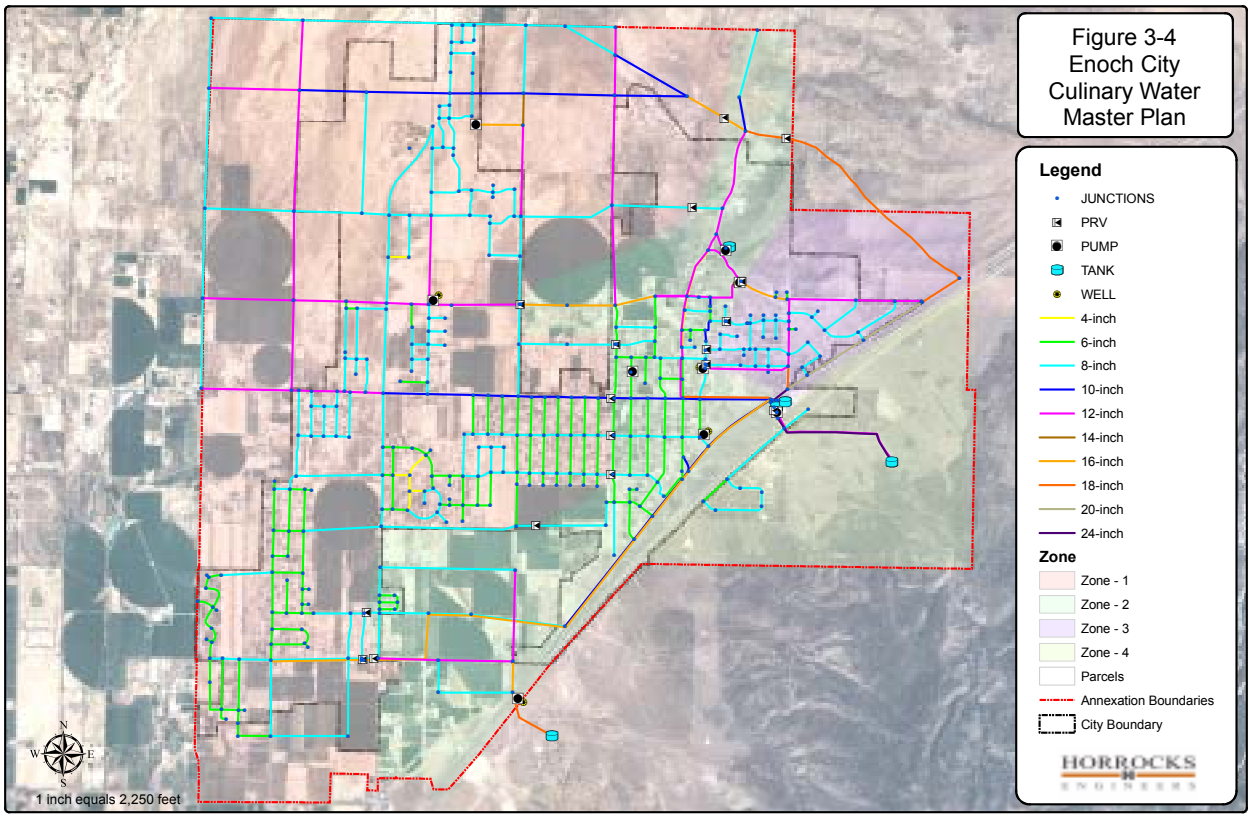
The number of existing residents that could be connected to the PI system at their current culinary water pressures was very limited. Also, the number of future users was restricted. The limited number of connections is due to the pond elevations in the southern part of the City. Pond elevations are much lower than the culinary water tanks resulting in lower pressures or head. There are currently pumps in the PI system which increase the operating pressure above that of gravity flow. Additional pumps or increased pump sizes were modeled as part of the future system. However, increasing the number or size of pumps beyond a certain point caused pressures to fall below acceptable values in other parts of the system. Figure 3.3 shows the maximum expansion of the existing secondary water system under the criteria noted above.



Projects for the expansion of the PI system have been included with culinary water projects listed hereafter.

3.5 Future Facilities

The Enoch water model has been updated to reflect current conditions. Analysis for this section was performed using the City's current zoning plan. The resulting pipe sizes, small structures, and reservoir requirements to service the City during the study period are illustrated on Figure 3-4.



Implementing the projects required to resolve existing deficiencies will not bring the system up to the standards required during future growth. New development will burden the system beyond its current capacity. The projects identified below will add the additional capacity required to service new developments provided that the PI system is also utilized. The following projects are only required for growth and are not listed in order. The water system improvements recommended below are improvements to both the culinary and irrigation water distribution systems. These systems are dependent upon each other to work properly.

Culinary Water Improvements Needed for Future Growth

1. New Blue Bird Well – Convert existing irrigation well to culinary well with a 2000 gpm pump.

2. Heather Hue Pipe Replacement – Replace approximately 690 feet of existing 12-inch pipe with 18-inch pipe from Old Hwy. 91 to Saddleback View Drive.

3. Half Mile Road Trunkline Extension Part A– Install approximately 2730 feet of 12-inch pipe from 5250 N. to approximately 5850 North.

4. Blue Bird Well Connecting Pipe – Install approximately 1400 feet of 16-inch pipe to connect the Blue Bird Well to the rest of the system.

5. Old Hwy. 91 Pipe Extension Part A – Install approximately 710 feet of 20-inch pipe from Heather Hue Rd. to Green Acres Cir.

6. Old Hwy. 91 Pipe Extension Part B – Install approximately 4050 feet of 20-inch pipe from Green Acres Cir. to Ravine Rd.

7. Ravine Road Pipe Replacement Part A – Replace approximately 830 feet of 8-inch pipe with 12-inch pipe from Village Green Rd. to Old Hwy. 91.

8. Upper Tank Pipe Replacement – Replace approximately 4640 feet of existing 12-inch pipe with 24-inch pipe from the existing upper tank to the rest of the system.

9. Ravine Road Pipe Replacement Part B – Replace approximately 830 feet of 12-inch pipe with 16-inch pipe from Heather Hue Rd to Pump Station.

10. Half Mile Road Extension Part B – Install approximately 930 feet of 14-inch pipe from approximately 5850 North to approximately 6400 North.

11. 6400 North Trunkline Part C – Install approximately 1530 feet of 10-inch pipe from Half Mile Rd to a pproximately 770 East.

12. 6400 North Trunkline Part D – Install approximately 660 feet of 10-inch pipe from approximately 770 East to approximately 700 East.

13. 5250 North Well – Drill and install new 2000 gpm well.

14. 5250 North Pipe Replacement Part A – Replace approximately 1220 feet of 12-inch pipe with 16-inch pipe.

15. 5250 North Pipe Replacement Part B – Replace approximately 2800 feet of 12-inch pipe with 16-inch pipe.

16. Enoch Road Pipe Extension Part A – Install approximately 780 feet of 12-inch pipe from approximately 5500 North to approximately 5850 North.

17. Enoch Road Pipe Extension Part B – Install approximately 2460 feet of 12-inch pipe from approximately 5850 North to Belt Route.

18. Old Hwy. 91 Pipe Replacement – Replace approximately 640 feet of 12-inch pipe with 24-inch pipe to increase flow.

19. Ravine Road Connection – Install 2050 feet of 12-inch pipe to help with pressures and fire flow.

20. PRV-1 Install a 8-inch PRV in the waterline that will be installed at approximately 3800 North and 955 East.

21. Various Small Pipe Projects – Installed throughout the City.

22. South Well – Drill and install a new 2000 gpm well.

23. PRV-2 Install an 8-inch PRV in the waterline that will be installed at approximately 5850 North and 1790 East.

24. Belt Route PRV 1 – Install a 16-inch PRV in Belt Route.

25. Belt Route PRV 2 – Install an 18-inch PRV in Belt Route.

26. Iron Works Tank – Install a 4 MG tank near the Iron Works Well.

27. Southern Tank – Install a 4 MG tank.

Pressurized Irrigation Improvements Needed for Future Growth

1. PI Project 1 – 600 feet of 8", 1 City Connections (Park)

2. PI Project 2 – 850 feet of 4", 510 feet of 6", 260 feet of 8", 2 Institutional Connections

3. PI Project 3 – 3,140 feet of 8", 46 Service and 2 Institutional Connections

4. PI Project 4 – 3,610 feet of 6", 31 Service and 1 City (Park) Connections

5. PI Project 5 – 1,750 feet of 6", 35 Service Connections

6. PI Project 6 – 1,830 feet of 6", 1,360 feet of 8", 26 Service Connections

7. PI Project 7 – 1,210 feet of 6", 1,420 feet of 8", 33 Service Connections

8. PI Project 8 – 6,440 feet of 6", 70 Service Connections

9. PI Project 9 – 2,085 feet of 6", 450 ft. of 8", 21 Service Connections

10. PI Project 10 – 2,400 feet of 6", 23 Service Connections

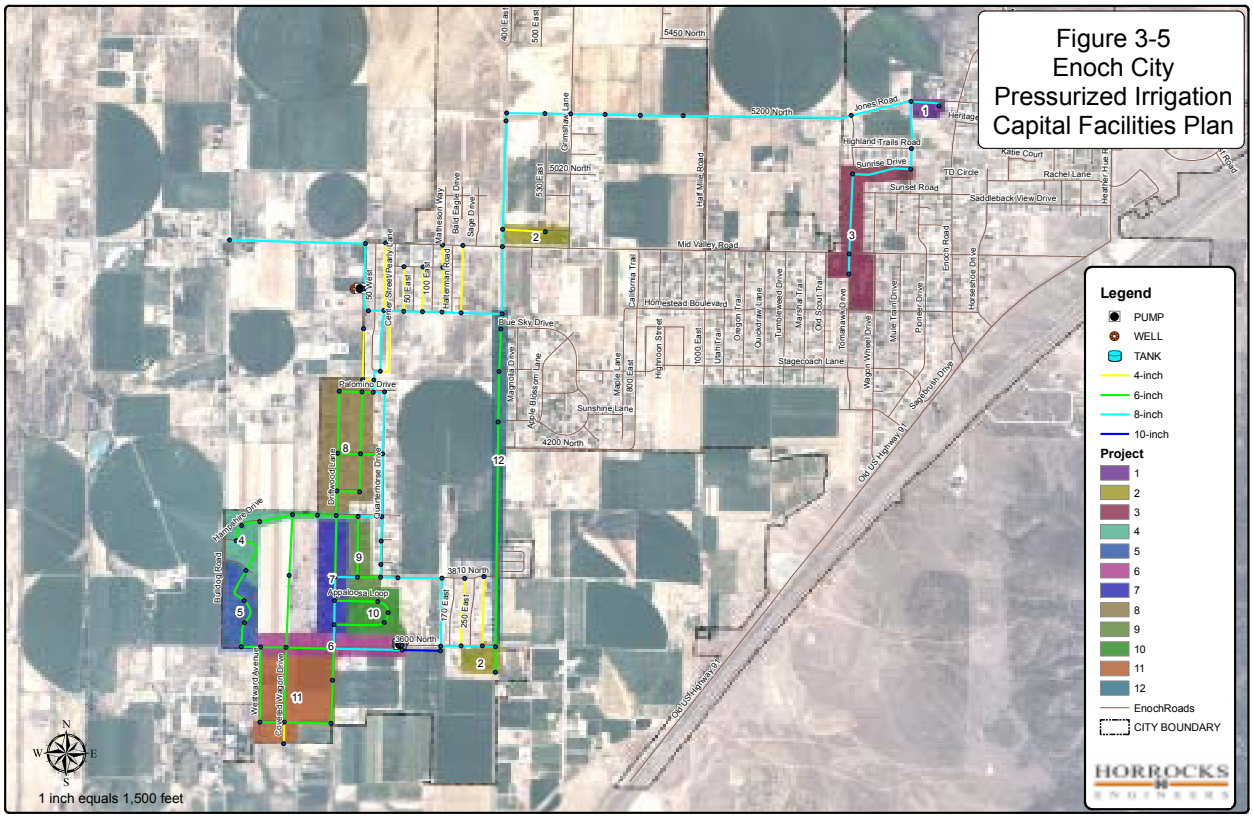
11. PI Project 11 – 430 ft of 4", 3,235 feet of 6", 2,410 ft. of 6", 25 Service Connections

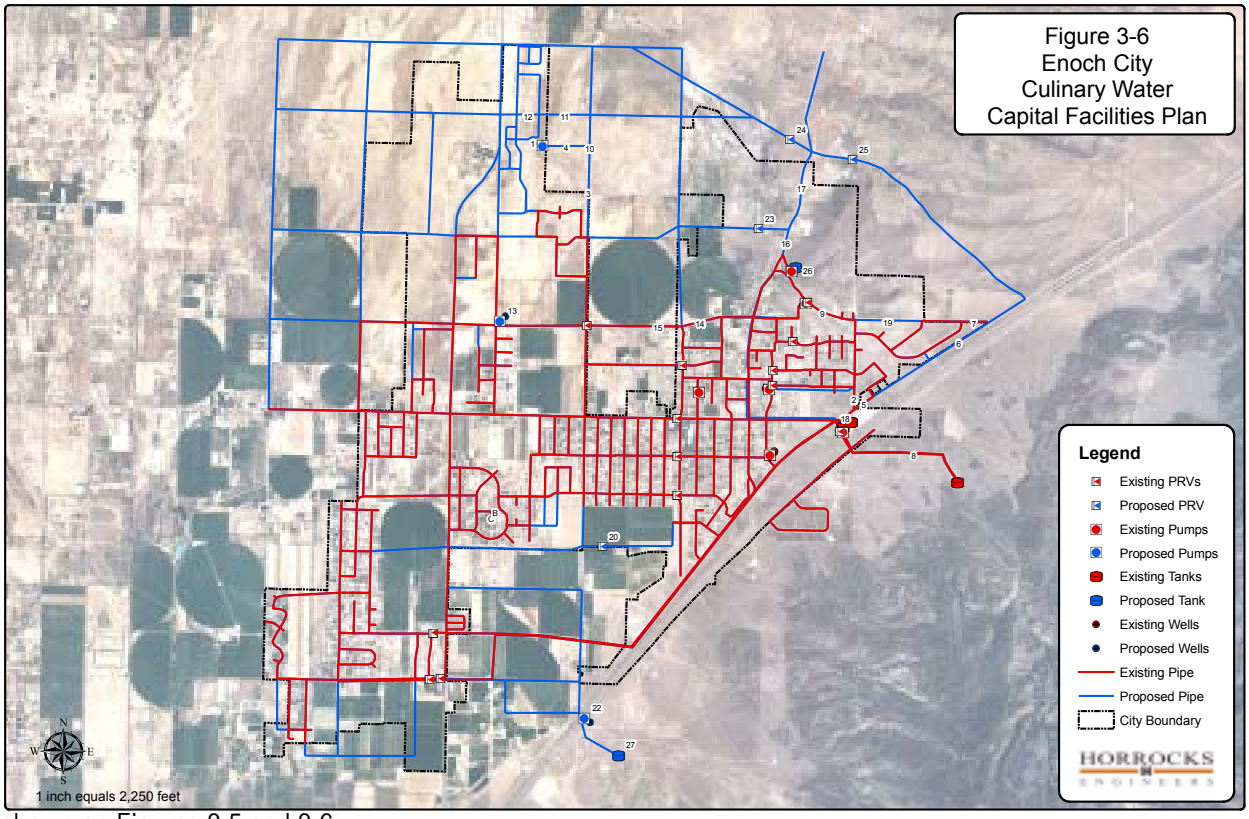
12. PI Project 12 – 2,700 feet of 6", 10 Service Connections

3.6 Capital Facilities Plan

This CFP indicates which Improvements will be needed in the future and provides a planning level cost estimate for each improvement. It provides important information relative to funding needed for future improvements and can be a valuable tool for City officials in the budgeting and planning process.

The aforementioned recommended improvements to culinary water facilities have been separated into the following categories: short range (0-5 years), medium range (6-10 years), and long range (10+ years). These projects are





shown on Figures 3.5 and 3.6.

Table 3-1 summarizes the recommended improvement projects, their projected funding sources, and planning level cost estimates. Budgetary cost estimates developed include acquiring sufficient right-of-way, completely installing new pipelines, engineering design, and construction management.

Table 3-1: Budgetary Cost Estimates (2010 Dollars)

Segment	Estimate (Millions)	Funding Source
1-5 Year Improvements		
A - Adjust PRVs	$0.00	City
B - Primrose Pipe Replacement	$0.02	City
C - Golden Leaf Circle Pipe Replacement	$0.03	City
1 - New Blue Bird Well (2000 gpm)	$0.54	Impact Fee
2 - Heather Hue Pipe Replacement	$0.07	Impact Fee
3 - Half Mile Rd. Trunkline Extension	$0.25	Impact Fee
4 - Blue Bird Well Connecting Pipe	$0.14	Impact Fee
5 - Old Hwy 91 Pipe Extension Part A	$0.08	Impact Fee
6 - Old Hwy 91 Pipe Extension Part B	$0.44	Impact Fee
7 - Ravine Rd. Pipe Replacement Part A	$0.08	Impact Fee
8 - Upper Tank Pipe Replacement	$0.69	Impact Fee
9 - Ravine Rd. Pipe Replacement Part B	$0.14	Impact Fee
10 – Half Mile Road Extension Part B	$0.08	Impact Fee

Segment	Estimate (Millions)	Funding Source
11 - 6400 North Trunkline Part C	$0.10	Impact Fee
12 - 6400 North Trunkline Part D	$0.04	Impact Fee
PI1 - 600 feet of 8", 1 City Connections (Park)	$0.04	Impact Fee
PI2 - 850 feet of 4", 510 ft of 6", 260 ft of 8", 2 Inst. Connections	$0.04	Impact Fee
PI3 - 3,140 feet of 8", 46 Service and 2 Institutional Connections	$0.23	Impact Fee
PI4 - 3,610 feet of 6", 31 Service and 1 City (Park) Connections	$0.17	Impact Fee
Total 1-5 Year Cost	**$3.18**	
6-10 Year Improvements		
13 - 5250 North Well	$0.54	Impact Fee
14 - 5250 North Pipe Replacement Part A	$0.12	Impact Fee
15 - 5250 North Pipe Replacement Part B	$0.27	Impact Fee
16 - Enoch Road Pipe Extension Part A	$0.06	Impact Fee
17 - Enoch Road Pipe Extension Part B	$0.19	Impact Fee
18 – Old Hwy 91 Pipe Replacement	$0.10	Impact Fee
19 – Ravine Road Connection	$0.19	Impact Fee
20 - PRV-1	$0.07	Impact Fee
PI5 - 1,750 feet of 6", 35 Service Connections	$0.11	Impact Fee
PI6 - 1,830 feet of 6", 1,360 feet of 8", 26 Service Connections	$0.17	Impact Fee
PI7 - 1,210 feet of 6", 1,420 feet of 8", 33 Service Connections	$0.16	Impact Fee
PI8 - 6,440 feet of 6", 70 Service Connections	$0.31	Impact Fee
Total 6-10 Year Cost	**$2.29**	
10+ Year Improvements		
21 - Various Small Pipe Projects	$4.47	Impact Fee
22 – South Well	$0.54	Impact Fee
23 - PRV-2	$0.07	Impact Fee
24 - Belt Route PRV 1	$0.07	Impact Fee
25 - Belt Route PRV 2	$0.07	Impact Fee
26 – Iron Works Tank	$5.40	Impact Fee
27 – Southern Tank	$5.40	Impact Fee
PI9 - 2,085 feet of 6", 450 ft. of 8", 21 Service Connections	$0.13	Impact Fee
PI10 - 2,400 feet of 6", 23 Service Connections	$0.11	Impact Fee
PI11 - 430 ft of 4", 3,235 ft of 6", 2,410 ft. of 6", 25 Service Conn.	$0.24	Impact Fee
PI12 - 2,700 feet of 6", 10 Service Connections	$0.09	Impact Fee
Total 10+ Years Cost	**$16.59**	
Total Cost	**$22.06**	

Currently, the wastewater in Enoch's sewer system travels, in general, from the southeast to the northwest by gravity flow. Wastewater flow begins in 8 inch diameter pipes and travels through increasing pipe sizes until it reaches the outfall line which is 18 inches in diameter. Wastewater is then transported in this 18 inch outfall line, outside of the city boundary, to the northwest where it is treated.

In the future, a force main will need to be added at the north end of the city to accommodate the sewer flow for a large portion of the city north and east of the existing outfall line. In general, land that is north and east of the current outfall line is lower in elevation and thus a force main is required. It is proposed that the new force main run directly west to the existing treatment plant. This alignment would avoid upsizing the existing 18 inch outfall line.

4.1 Definitions

ERC	Equivalent Residential Connection
gpd	gallons per day
gpdpc	gallons per day per capita
MGD	Million gallons per day
d/D	Depth of flow / Diameter of Pipe

Equivalent Residential Connections (ERC)
Similar to water use forecasting (see Chapter 3), flows generated by wastewater producers, such as businesses, schools, churches, and residents are generally converted to common units called Equivalent Residential Connections (ERC). ERCs compare a wastewater user's use rate to that of a single family dwelling.

Unfortunately, there is insufficient data in past water use records to accurately portray wastewater comparisons between the different uses. Consequently, each area's sewer needs were calculated and a sewer model utilizing SewerGEMS® software was created to estimate capacity for residential-type usage throughout the city.

Indoor water usage records were used for the purpose of determining sewer flow. It is assumed that all of the indoor water used will enter the sewer system. As more accurate data becomes available, the sewer model should be updated accordingly. Flow measurement data from flow meters in the northwest of the city were also used to calibrate the sewer model.

Although flow data shows average flows of 40 gpdpc and 3.62 people per connection, Utah's state standard is 100 gpdpc. State regulations allow using less than the standard when supported by water use records. Therefore, for purposes of this study, Enoch has chosen to be more conservative than water use records imply and use 70 gpdpc and 3.62 people per connection. This results in 253 gpd/connection. Other cities also have average daily flows ranging between 60 and 75 gpdpc. Using the state standard would cause unnecessary improvements to the system.

Some of the factors leading to Enoch's lower per capita average flow could be:

- The City has minimal infiltration and inflow (I & I)

- Some homes use modernized low-flow fixtures, resulting in a lower indoor water usage.

4.2 Level of Service (LOS)

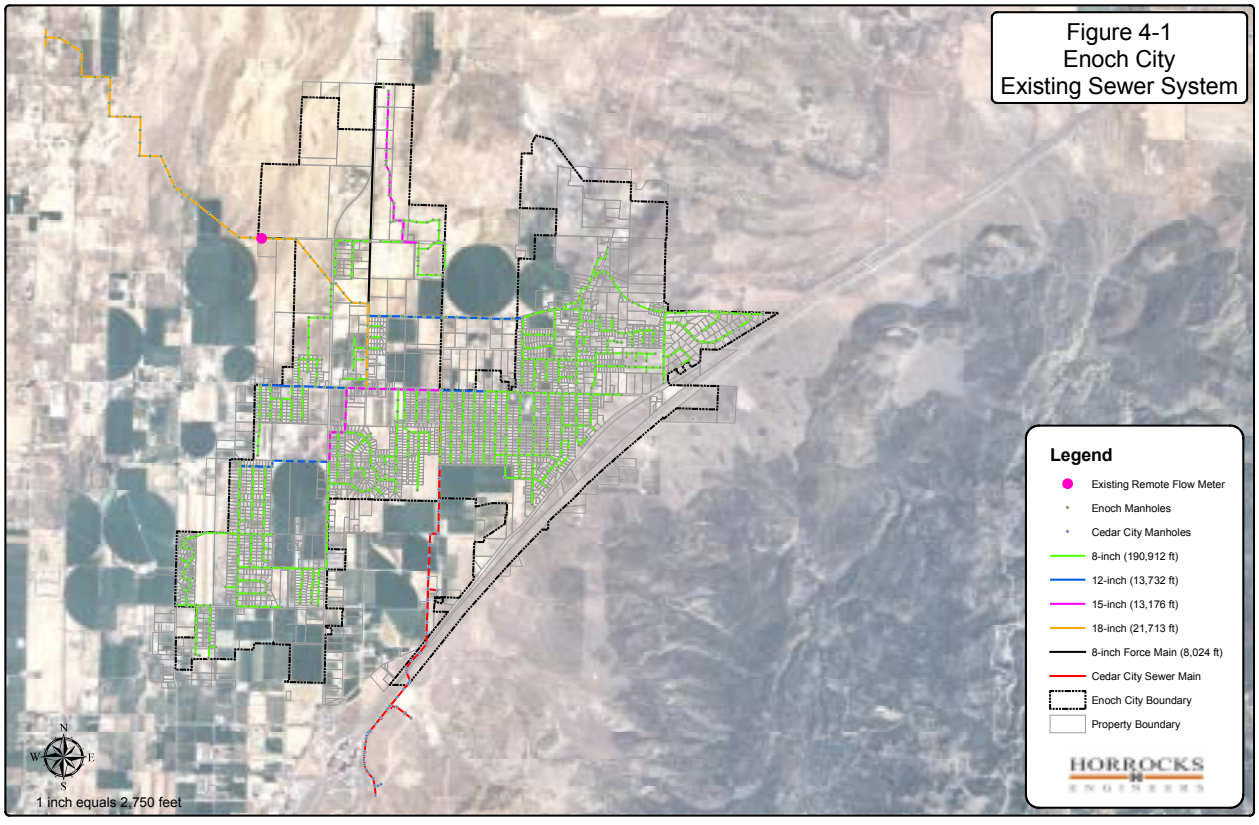
The Utah Department of Environmental Quality provides guidelines and regulations for new sewer system design. These guidelines are useful in new construction, but measured flows have shown that these guidelines are considerably higher than actual flows and could be unnecessary for the City to implement. Design guidelines from other sewer districts were reviewed to help develop local standards. This report recommends the following criteria as the minimum level of service for the sewer system:

- 8-inch thru 15-inch sewer lines are not to exceed 50% capacity at peak flow
- 18-inch and larger sewer lines are not to exceed 75% capacity at peak flow
- New collector lines must provide minimum peak daily flows of 400 gpdpc
- New interceptors and outfall lines must be capable of providing a minimum peak daily flow of 250 gpdpc
- The minimum size of a gravity collection line is 8-inches

In order to ensure that Enoch can maintain this same level of service in the future, this CFP plan has been based upon the these requirements.

4.3 Existing System

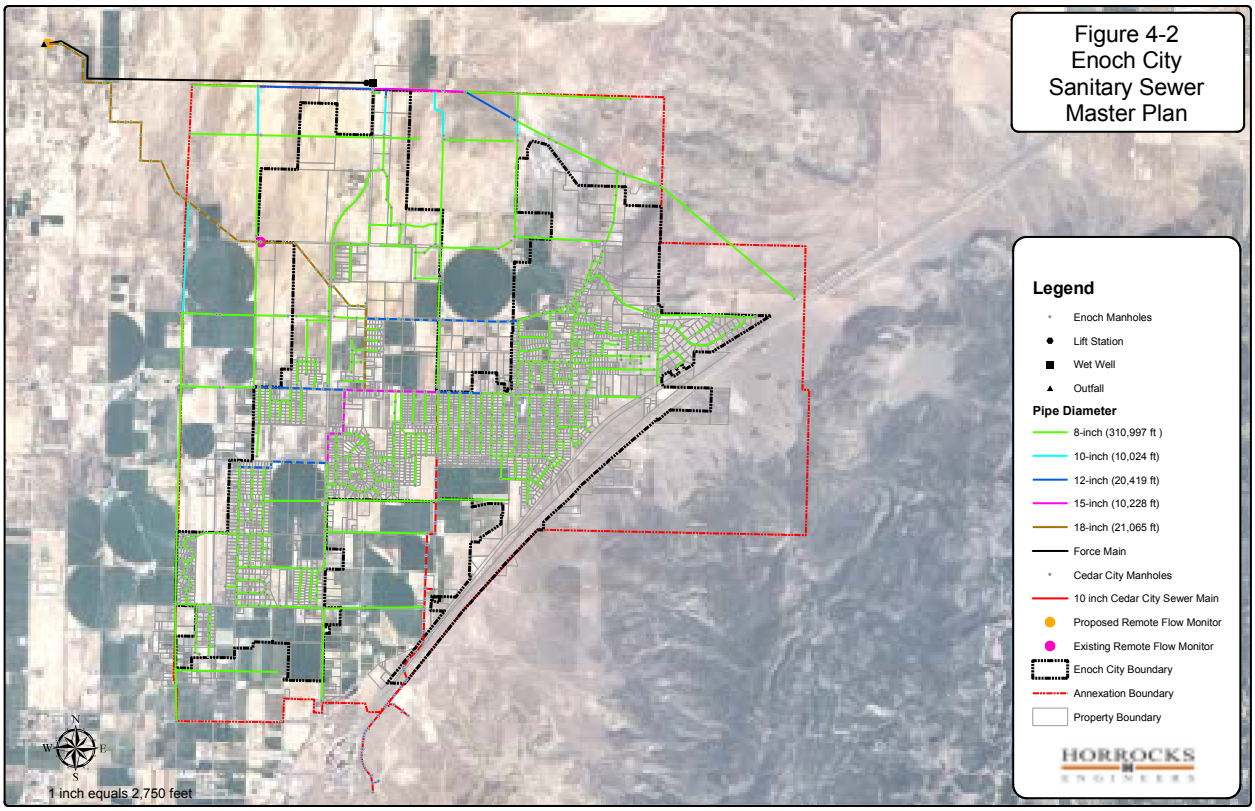
The Enoch sewer system currently treats an average daily flow of 0.264 MGD.
Figure 4.1 illustrates the existing sewer system. The existing sewer system currently complies with the minimum



LOS discussed in section 4.2.

4.4 Future Facilities

As mentioned previously, a sewer model was created to reflect the City's current system and operating conditions. Analysis for the model was based on the City's current zoning plan. Future conditions and the resulting pipe sizes



were also modeled and are illustrated in Figure 4.2.

Projected Sewer Flows

The projected population, historical sewer flows, and typical design criteria were used to project the sewer flows as the City develops and grows.

Sewer pipelines are required to provide capacities for peak hourly and maximum daily flows. This variation of flows is due to the hydrograph or peak that is created by the wastewater as it enters the pipes and is collected from different areas. The farther the wastewater travels in the system, the smaller the peaks become. The "peak" in the flow or hydrograph is referred to as the peaking factor (PF) and is higher for collector lines (15-inch and smaller) than for trunk lines (larger than 15-inch) because the peak is reduced as the wastewater flows downstream.

PFs for Enoch are based upon the Department of Environmental Quality (DEQ) recommendations, historical wastewater flows, and typical design requirements. Flow records indicate that the average wastewater flow in Enoch is 40 gpdpc with an average PF of 2.5. The SewerGEMS® model uses a hydrograph with a PF of 3.0 around the 9:00 a.m. hour. The state standard for a collector line PF is 4.0. However, the loads in the sewer model were added to the interceptor lines. Therefore, the lower PF of 3.0 is used for the purposes of this report. Based on actual flows measured at the flow meter station, a PF of 3.0 better reflects Enoch's conditions.

Using the estimated ERCs and the peak daily flow, Table 4.1 shows the projected average yearly, average daily, and

maximum daily flows through the planning period.

Table 4.1 Projected Sewer Flows in Five Year Increments

Year	Projected ERC	gpd/ERC	Flow Avg Yearly (MG)	Avg Daily (MG)	Max Daily (MGD)
Enoch Metered Flows (40 gpdpc, 3.62 people/connection, 2.15 PF					
2010	1,983	144.8	105	0.29	0.62
2015	2,530	144.8	134	0.37	0.79
2020	3,230	144.8	171	0.47	1.01
2025	4,122	144.8	218	0.60	1.28
2030	5,260	144.8	278	0.76	1.64
2035	6,650	144.8	352	0.96	2.07
2040	8,052	144.8	426	1.17	2.51
Sewer Model Design Flows (70 gpdpc, 3.62 people/connection, 3.0 PF					
2010	1,983	253.4	183	0.50	1.51
2015	2,530	253.4	234	0.64	1.92
2020	3,230	253.4	299	0.82	2.46
2025	4,122	253.4	381	1.04	3.13
2030	5,260	253.4	487	1.33	4.00
2035	6,650	253.4	615	1.69	5.06
2040	8,052	253.4	745	2.04	6.12

In summary, the number of ERCs in the wastewater system are projected to increase by 6,062 by the year 2040. Using the City's metered flow of 40 gpdpc and 3.62 people per household, the average yearly flow is projected to increase from 79 MG to 405 MG. Recommendations in this CFP are based on 70 gpdpc. This value projects the future flows in 2040 to reach 709 MG. Using the state standard of 100 gpdpc would require significant improvements beyond what is actually needed. Using 40 gpdpc would not allow the City to adjust for any deficiencies that might be in the system.

Improvements Needed for Future Growth

Although the current system meets the LOS for existing conditions, future growth will burden the system beyond its capacity. Following are recommended wastewater projects which will add the additional capacity required to service new developments and keep the LOS at acceptable levels.

1. Installation of a 1,500 GPM Lift Station.
2. Installation of 12,636 ft of Force Main.
3. Installation of 875 ft of 8 inch pipe. (4800 N. Extension)
4. Installation of 10,023 ft of 10 inch pipe.
5. Installation of 6,693 ft of 12 inch pipe.
6. Installation of 3,588 ft of 15 inch pipe.

7. Installation of 118,073 ft of 8 inch pipe. (Paid by Developer)

4.5 Capital Facilities Plan

This section indicates which Improvements will be needed in the future and provides a planning level cost estimate for each improvement. It provides important information relative to funding needed for future improvements and can be a valuable tool for City officials in the budgeting and planning process.

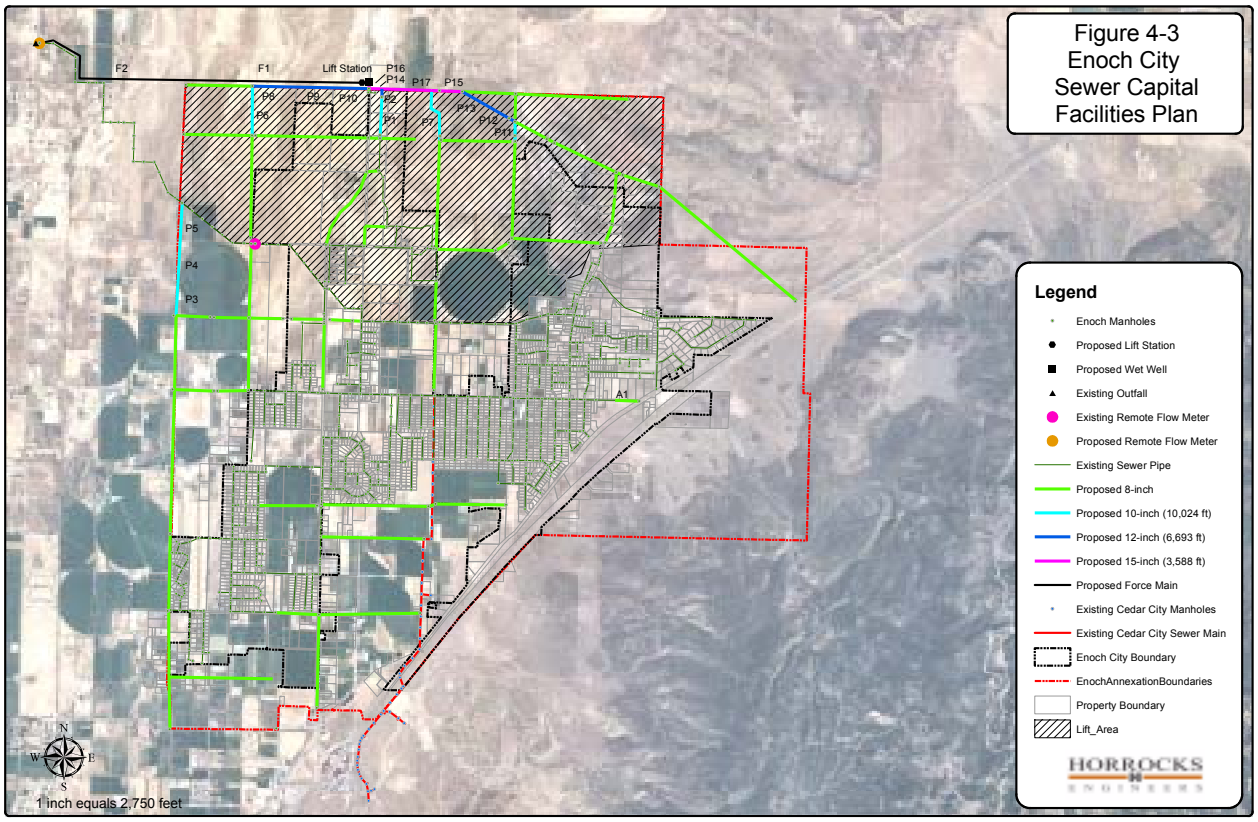
Recommended improvements to sanitary sewer system facilities have been listed in order of priority in Table 4.2. Table 4.2 also estimates project costs and their funding source.

Table 4.2 - Budgetary Cost Estimates (2010 Dollars)

Segment	Estimate (Millions)	Funding Source
1-5 Year Improvements		
P1 - Upsize Existing 8 inch to 10 inch	$0.26	Impact Fee
P2 - New 12 inch (305 ft)	$0.06	Impact Fee
A1 - New 8 inch (875 ft)	$0.13	City
Lift Station	$0.30	Impact Fee
Master Plan Updates and Development	$0.05	Impact Fee
Total 1-5 Year Improvements	**$0.67**	
5-10 Year Improvements		
F1 - New 6 inch Force Main (6,318 ft of 12,636 ft)	$0.38	Impact Fee
F2 - New 6 inch Force Main (6,318 ft of 12,636 ft)	$0.38	Impact Fee
P3 - New 10 inch (1,356 ft of 4,067 ft)	$0.24	Impact Fee
P4 - New 10 inch (1,356 ft of 4,067 ft)	$0.24	Impact Fee
P5 - New 10 inch (1,356 ft of 4,067 ft)	$0.24	Impact Fee
Master Plan Updates and Development	$0.05	Impact Fee
Total 5-10 Year Improvements	**$1.53**	Impact Fee
10+ Year Improvements		
P6 - New 10 inch (1787 ft)	$0.31	Impact Fee
P7 - New 10 inch (1,974 ft)	$0.35	Impact Fee
P8 - New 12 inch (1,400 ft of 4,200 ft)	$0.28	Impact Fee
P9 - New 12 inch (1,400 ft of 4,200 ft)	$0.28	Impact Fee
P10 - new 12 inch (1,400 ft of 4,200 ft)	$0.28	Impact Fee
P11 - New 10 inch (721 ft)	$0.13	Impact Fee
P12 - New 12 inch (1,094 ft)	$0.22	Impact Fee

P13 - New 12 inch (1,094 ft)	$0.22	Impact Fee
P14 - New 15 inch (472 ft)	$0.12	Impact Fee
P15 - New 15 inch (1,104 ft)	$0.28	Impact Fee
P16 - New 15 inch (220 ft)	$0.05	Impact Fee
P17 - New 15 inch (1,793 ft)	$0.45	Impact Fee
Master Plan Updates and Development	$0.06	Impact Fee
Total 10+ Year Improvements	**$3.03**	Impact Fee
Sub-Total	$5.23	
Contingencies 10%	$0.52	
Engineering Design and Construction Management 15 %	$0.80	
Administration, Legal and Bond Counsel 1%	$0.10	
Total Cost	$6.65	

Figure 4.3 corresponds with Table 4.2 and graphically identifies the recommended projects to be completed in the future. The planning level cost estimates indicated in Table 4.2 include installation of new pipelines, upsizing existing pipelines, engineering design, construction administration, general legal counsel and bond counsel.



CHAPTER 5 – TRANSPORTATION PLANNING

This section inventories existing roadway facilities, identifies future needs based upon Enoch's existing roadway master plan, and recommends a plan for installing scheduled improvements. Traffic modeling utilizing QRSII software and review of existing and projected levels of service have been used as a supplement to the existing plan and to help identify areas of future concern.

5.1 Level of Service (LOS)

Adequacy of an existing street system can be quantified by assigning Levels of Service (LOS) to major roadways and intersections. As defined in the Highway Capacity Manual, a special report published by the Transportation Research Board, LOS serves as the traditional measuring stick of a roadway's functionality. LOS is identified by reviewing elements such as the number of lanes assigned to a roadway, the amount of traffic using the roadway and amount of delay per vehicle at intersections. Levels of service range from A (free flow) to F (complete congestion). For example, arterial streets have an LOS based on average vehicle travel speed for the segment, section, or entire arterial under consideration. Following are the LOS definitions used in transportation engineering and for this CFP.

LOS A describes primarily free-flow operations at average travel speeds, usually about 90 percent of the free-flow speed for the arterial classification. Vehicles are seldom impeded in their ability to maneuver in the traffic stream. Delay at signalized intersections is minimal.

LOS B represents reasonably unimpeded operations at average travel speeds, usually about 70 percent of the free-flow speed for the arterial classification. The ability to maneuver in the traffic stream is only slightly restricted and delays are not bothersome.

LOS C represents stable operations; however, ability to maneuver and change lanes in mid-block locations may be more restricted than in LOS "B", and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50 percent of the average free-flow speed for the arterial classification.

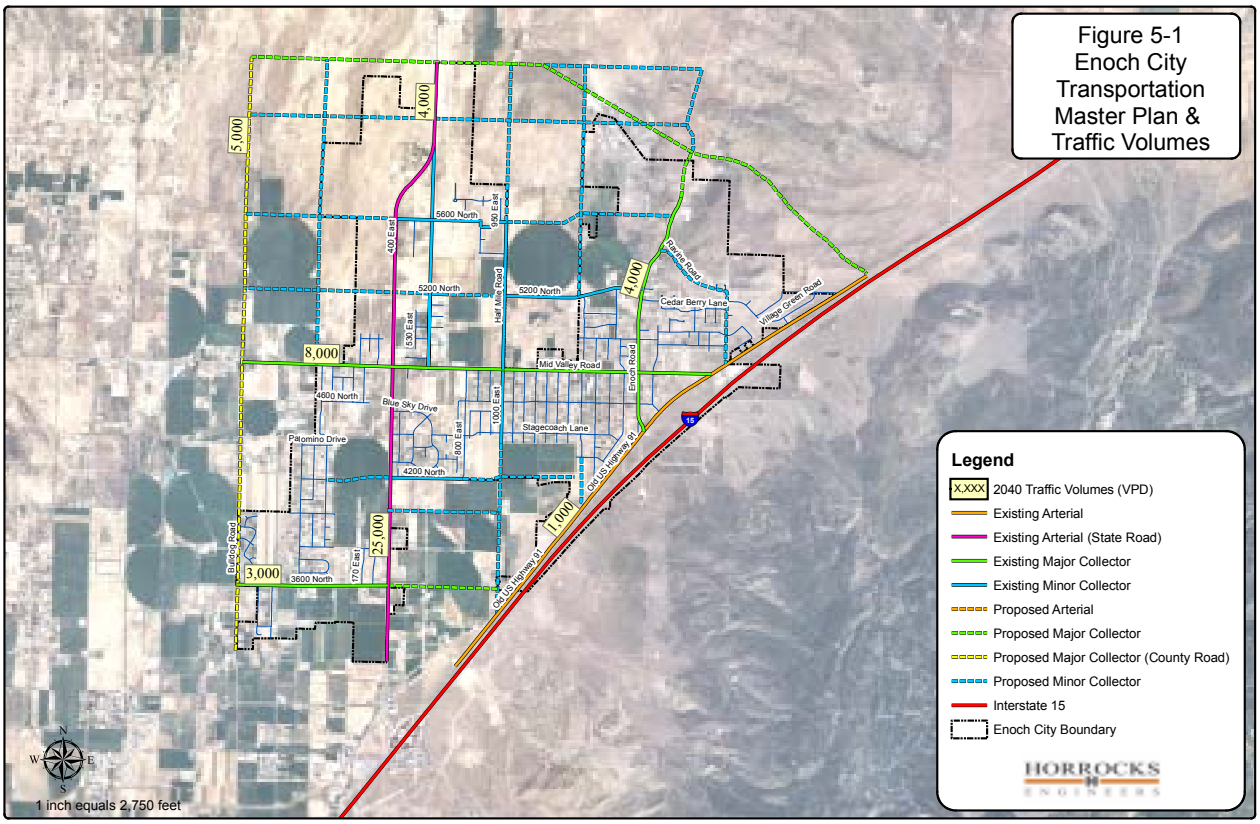
LOS D borders on a range in which small increases in flow may cause substantial increases in approach delay and hence decreases in arterial speed. LOS "D" may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40 percent of free-flow speed.

LOS E is characterized by significant delays and average travel speeds of one-third the free-flow speed or less. Such operations are caused by some combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

LOS F characterizes arterial flow at extremely low speeds, from less than one-third to one-quarter of the free-flow speed. Intersection congestion is likely at critical signalized locations, with long delays and extensive queuing.

5.2 Existing Facilities

As part of this CFP, traffic counts were taken along Midvalley Road, Minersville Highway (SR-130), and Old



Highway 91 to identify existing traffic flows. Figure 5.1 shows Enoch's current roadway master plan and street functional classifications.

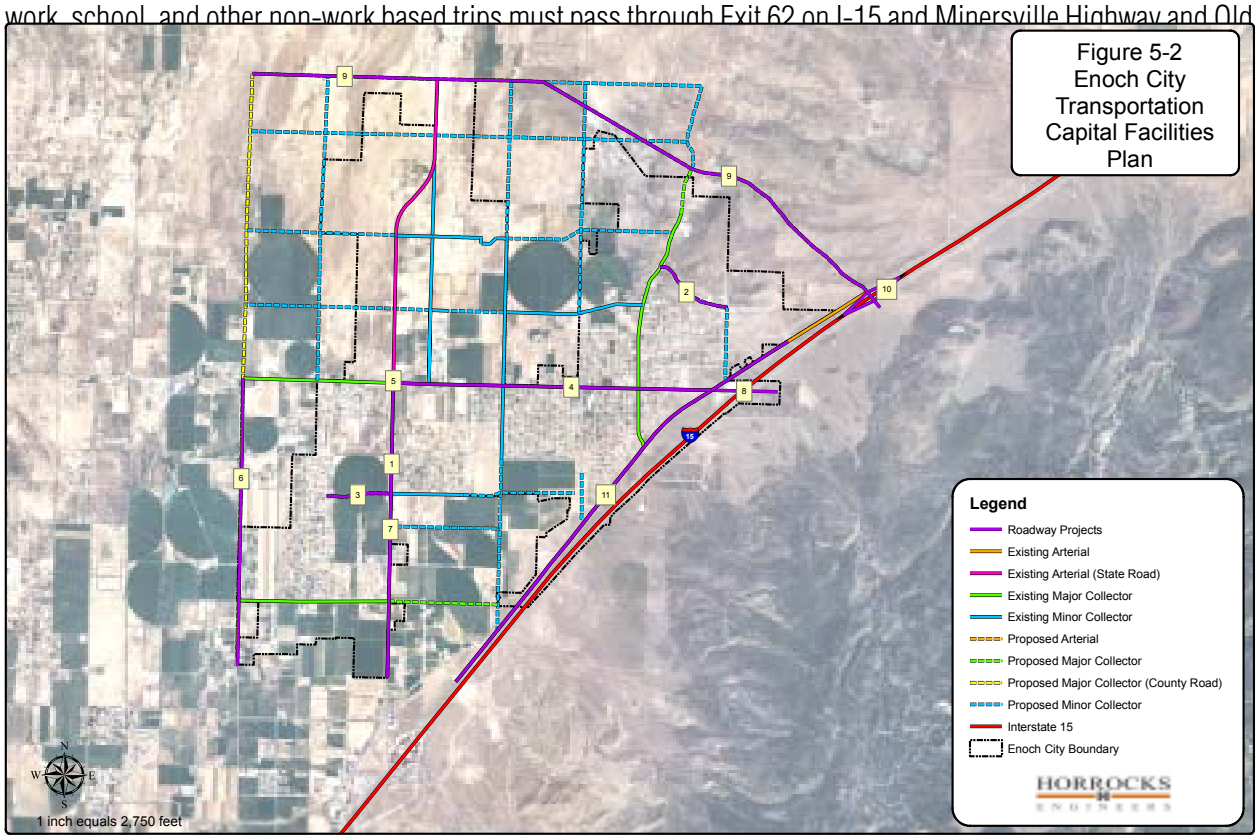
An increase in traffic throughout the city is expected as development continues. If no improvements are made to Enoch's transportation infrastructure, projected traffic volumes will significantly degrade the LOS of the major streets in the city. In order to preserve the quality of life desired by the City's residents, and to provide a sound street system that will support the City's growing population base, improvements will need to be made as growth occurs.

5.3 Future Facilities

Based on the current zoning, demographics, and anticipated growth patterns, Enoch's projected growth will have impacts on traffic volumes and roadways throughout the city. Projections are based upon a new QRSII traffic model that was specifically prepared and tailored for Enoch. The necessary input to create the model is the City's Roadway Masterplan, traffic counts, and the task of identifying smaller zones throughout the City called Traffic Analysis Zones that target where the population lives and works. Using this model, future traffic volumes were

then analyzed. Figure 5.1 shows projected traffic volumes for the planning year 2040.

In 2007, the City of Enoch prepared a Corridor/Interchange Feasibility Study to determine where a future I-15 interchange could be located. A recommendation was made and is used in the traffic model for future traffic scenarios, as can be seen in Figure 5.2. As growth occurs, this interchange will help with traffic throughout the City by providing another access into the City. Today, virtually all of Enoch's population that leaves the City for work, school, and other non-work based trips must pass through Exit 62 on I-15 and Minersville Highway and Old



Highway 91. An additional future interchange further to the north would relieve projected congestion on Exit 62.

Enoch's proposed expansion on the east side of I-15 will require a grade-separated crossing over or under I-15. It is recommended that this crossing be located in the vicinity of Midvalley Road as this would provide easy access for this growing area to the central part of the City and its services. This crossing would also reduce the anticipated high volumes at Exit 62.

With the high volumes expected on SR-130 in 2040 (23,500 vehicles per day, or "vpd") and on Midvalley Road (7,500 vpd), a traffic signal will likely be needed at the intersection of these roadways. The intersection will need to be monitored as volumes begin to cause delays at the stop signs on Midvalley Road to see when a signal is warranted.

Additional recommended projects and their associated costs are addressed further in Section 5.4.

Corridor Preservation

There are several facilities identified in this plan requiring improvements to meet future demands. In planning for these future facilities, corridor preservation techniques should be employed. The main purposes of corridor preservation are to:

- Preserve the viability of future options
- Reduce the cost of these options
- Minimize environmental and socio-economic impacts of future implementation

Corridor preservation seeks to preserve the right-of-way needed for future roadway facilities and prevent development which might be incompatible with these facilities. This is primarily accomplished by the community's ability to apply land use controls such as zoning and approval of developments. New roadways have been approximated in location.

Perhaps the most important elements of corridor preservation are ensuring that the corridors are preserved in the correct location and that they meet the applicable design and right-of-way standards for the type of facility being proposed. Major roadway corridors have been identified in the roadway master plan. Figure 5.1 illustrates the City's current master planned street system. As this plan does not define the exact alignment of each future corridor, it becomes the responsibility of the City to make sure that the corridors are correctly preserved. Final alignments and locations will vary but should remain in the general areas shown in this plan. This will have to be accomplished through the engineering and planning reviews done within the City as development and annexation requests are approved that involve properties within or adjacent to the future corridors.

A large effort has been made to model and anticipate future traffic volumes and roadway requirements. Consequently, this CFP should be a guiding document for the City during times of growth and development. As new areas develop, the City will be able to preserve future corridors and provide adequate roadway widths for future expansion of streets including county and state transportation routes.

5.4 Capital Facilities Plan

The transportation capital facilities plan recommends improvements which will be needed in the future and provides a planning level cost estimate for each improvement. It can provide important information relative to funding needed for future street improvements and can be a valuable tool for City officials in the budgeting and planning process.

Recommended improvements to roadway facilities have been separated into the following categories: short range (0-5 years); medium range (6-10 years); long range (10+ years). Figure 5.2 illustrates and Table 5.1 summarizes the recommended improvement projects and their anticipated costs.

Cost estimates developed include acquiring sufficient right-of-way and installing new roadbase, asphalt, curb and

gutter, park strip, and sidewalk. Costs have also been included for design engineering, construction engineering, and contingencies. The costs are shown in 2010 dollars.

Table 5.1: Budgetary Cost Estimates

Segment	Units	Estimate (millions)	Funding Source
0-5 Year Improvements			
1 – Turning Lanes at Garden Park Subdivision on Minersville Hwy	1 lump	$0.27	City/State
2 – Ravine Road, widen and pave	0.55 mile	$1.6	City/Developers
Subtotal		**$1.87**	
6-10 Year Improvements			
3 – Spanish Trails additional access road	0.40 mile	$1.8	City/Developers
4 – Midvalley Road Widening from 2 lanes to 3 lanes with shoulder	2.25 miles	$5.9	City/Developers
5 – Signal Study and Signal Construction, SR-130 & Midvalley Road	1 lump	$0.22	City/State
Subtotal		**$7.92**	
10+ Year Improvements			
6 – Extend 850 West/Bulldog Rd from Midvalley Road to the south	2.65 miles	$2.6	County
7 – Widen Minersville Highway (SR-130) from 3 to 5 lanes	1.5 miles	$4.0	State
8 – New Grade-Separation Crossing near Midvalley Road and I-15	1 lump	$8.3	City
9 – Belt Route from I-15 along North Side of Enoch to City limit	5 miles	$21.5	City/State
10 – New Interchange on I-15 at North End of Enoch	1 lump	$21.7	State
11 – Widen Old Highway 91 from SR-130 to Northern Boundary	4.50 miles	$7.6	City
Subtotal		**$65.70**	
Total		**$75.49**	

The transportation CFP only addresses improvements needed on major streets and also streets of significant importance. As this plan does not address local streets, there may be improvements required for these roads that will occur during development of the surrounding areas. Also, regular rehabilitation and maintenance costs are not included.

As development continues throughout Enoch, the CFP and roadway master plan should be consulted to identify improvements that may benefit from work or funds required of individual developers. This will help ensure that the correct amount of right-of-way is preserved, as well as identify projects that the developer may be required to construct or contribute to as part of any required on and/or off-site improvements.

As the City grows, increased traffic will overburden the existing infrastructure and improvements will need to be

constructed. As seen in the previous table these costs are large. A significant portion of the future improvements could be constructed with impact fees.

A city's storm drain system plays a vital role in protecting life and property. Planning for Enoch's storm drainage system must consider major flooding that could occur from canals, ditches and mountain drainages that pass through the City, as well as localized flooding that occurs from storm water runoff generated within the City. As Enoch City continues to grow, the potential for localized flooding increases, requiring improvements to the storm drain system to accommodate new development.

6.1 Definitions

ERU Equivalent Residential Unit
cfs - Cubic feet per second
ac-ft Acre foot

Development contributes to storm water runoff based on the amount of impervious area it contains. For the purposes of this study, single family dwellings and multi-family residential units will each be considered one (1) ERU. ERU's for non-residential development including commercial, industrial, school, and church buildings are based on their total impervious surface with one (1) ERU equalling 2,700 square feet of impervious surface area. Therefore:

- Single Family Units = 1 ERU/home unit
- Multi-Family Residential Units = 1 ERU/dwelling unit
- Non-Residential Units = 1 ERU/2,700 SF of impervious area

Detention is defined as short term storage of runoff. This is typically provided by a pond or similar facility. An outlet is provided that allows water to be released from the facility at a predetermined rate.

Retention is defined as long term storage of storm water runoff. This is also provided by a pond or similar facility, but does not allow water to be discharged. Water will stay in a retention pond after a storm event until it either evaporates or soaks into the soil of the pond bottom and sides.

6.2 Design Standards

Presently, Enoch City's construction standards do not comprehensively define storm drain design guidelines. Current wording requires "A technical drainage study plan or method by which the developer proposes to handle storm water drainage for the 25 year, 50 year and 100 year flood as a subdivision application requirement.

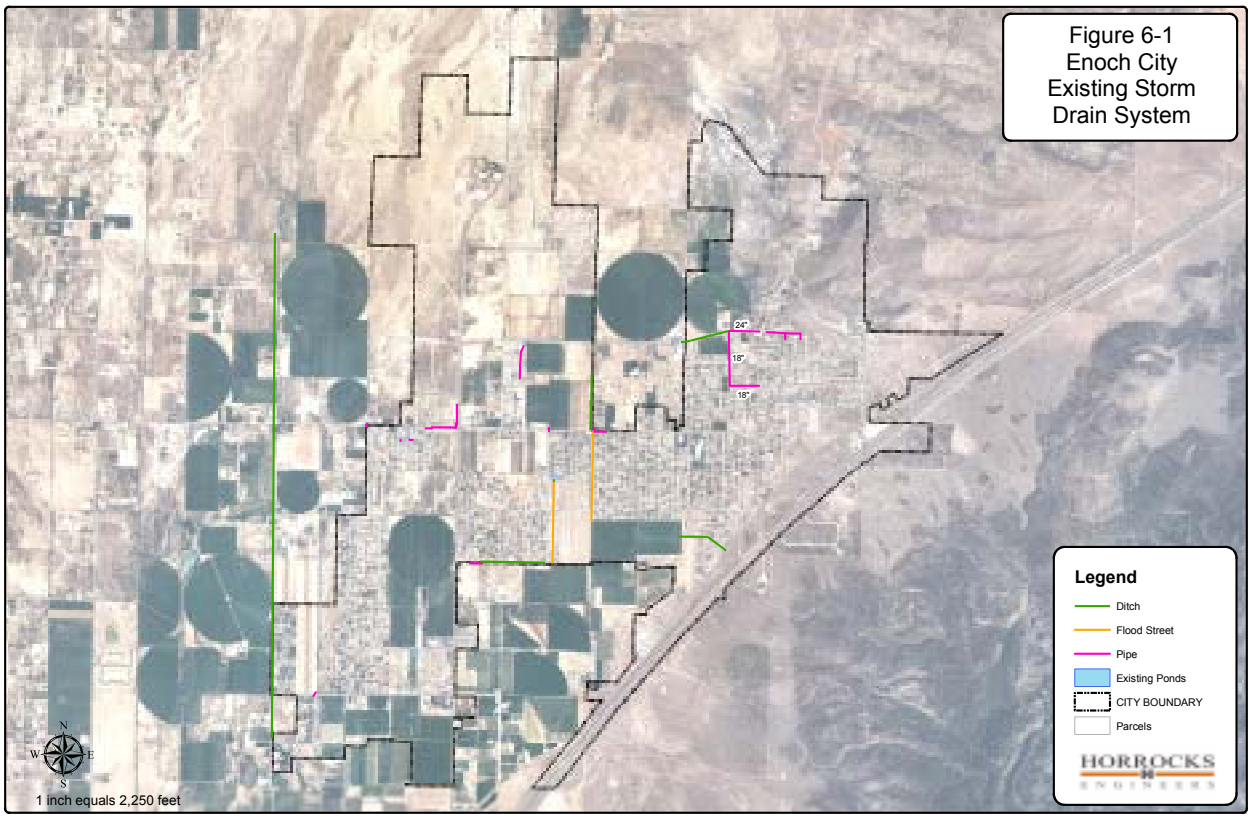
This report recommends that storm drainage facilities be designed to meet the following criteria and LOS:

- Design storm drain pipes and ditches to adequately convey runoff from a 25 year storm event.
- Evaluate how storm drainage facilities will function during a 100 year storm event and identify areas where major flooding may occur.
- Require detention of improved areas that will limit discharge from a 25 year storm event so it doesn't exceed downstream conveyance capacities.

Both existing and future facilities modeling, analysis, and recommendations are based on the above criteria.

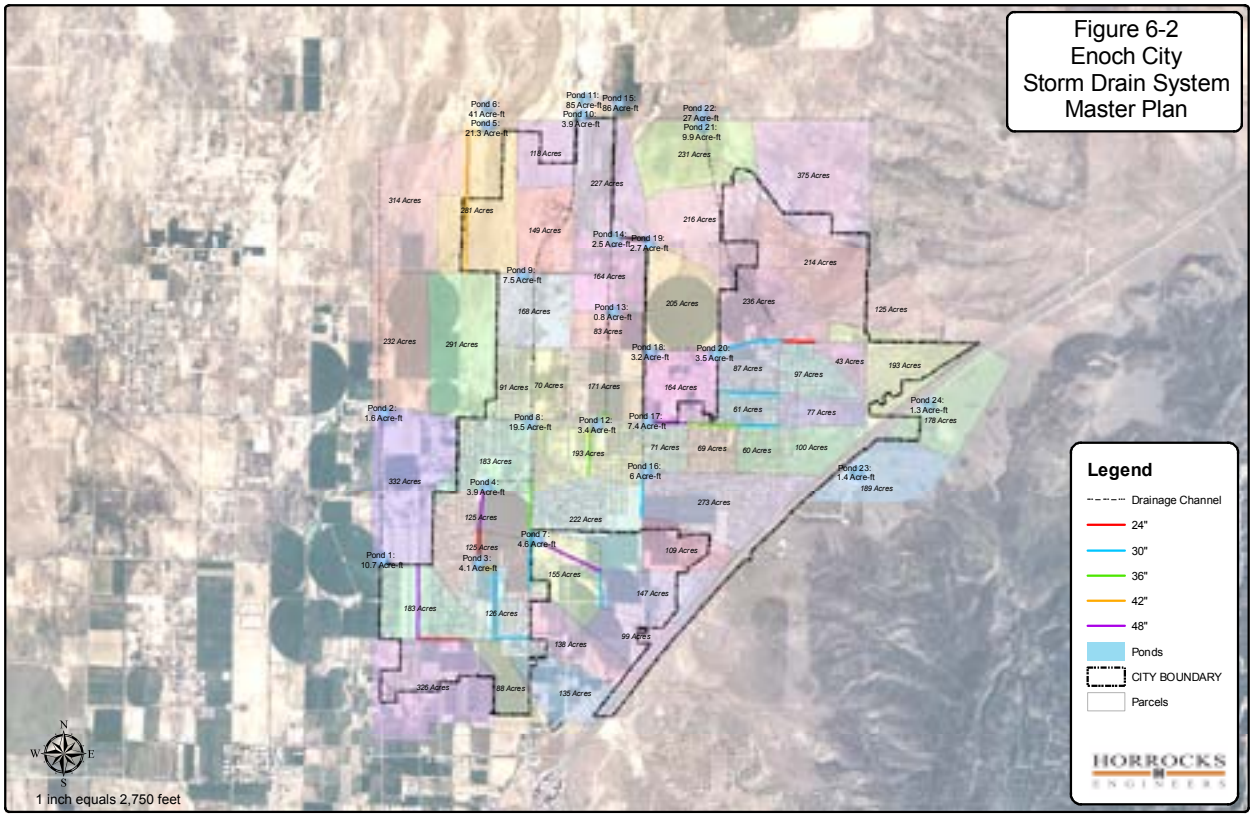
6.3 Existing Facilities

The existing storm drain system is shown in Figure 6-1. It consists of segments of pipes, ditches (or channels) retention, and detention ponds that were installed to correct specific problems and/or to accommodate certain



developments. Many of these systems discharge onto private property. Currently, the City's storm drainage system does not meet the LOS outlined in this report.

Additional facilities are required to correct the existing deficiencies within Enoch City as described below. Figure 6.2 shows the storm drainage master plan created as part of this CFP. Note that Impact fees cannot be used to



correct existing problems.

Existing Deficiencies

The City of Enoch topography causes storm runoff to drain toward the north-central part of the city. The runoff eventually drains to Rush Lake or infiltrates into the ground. Currently, there is not an adequate conveyance system to get the water to Rush Lake.

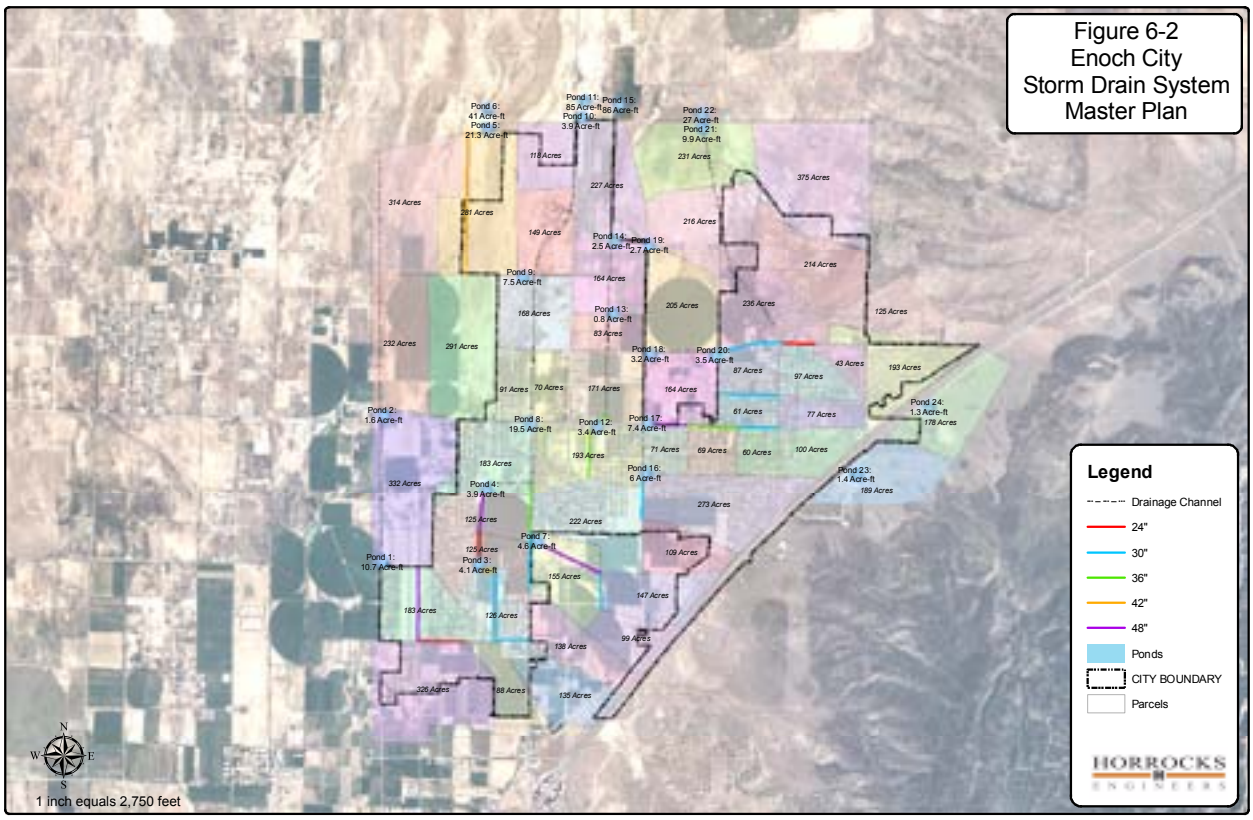
Retention ponds have no outlet and can cause flooding if they are overtopped. Retention ponds are typically not desired unless there is no other viable option for dealing with storm runoff. Some problems associated with the retention ponds include slow infiltration, no overflow system, mosquitoes, weeds, safety, etc.

In general, both the conveyance system and detention facilities are inadequate. Several developments have curb and gutter while others have roadside drainage ditches. For the most part, these developments do not have the capacity to convey runoff from large storm events. Because there is not an adequate conveyance system,

detention and retention ponds should be used in conjunction with conveyance systems to minimize the size of the downstream pipe or channel.

6.4 Future Facilities

A storm drainage master plan has been created as part of this CFP. Figure 6.2 shows the various runoff areas and a proposed channel, pipe, and pond network to move the flows towards the north end of the city. This plan is the basis for the recommendations of this chapter and is based on the storm drainage model of Enoch created utilizing



PondPack V8i. This software program uses the Soil Conservation Services Method to calculate peak runoff rates. Following is a brief discussion of design decisions made in order to create the storm drainage master plan.
Pre-developed flows for Utah Cities typically range from 0.1 to 0.2 cfs/acre. These numbers were used as a starting point for the detention pond design. However in some cases, there is not adequate pipe or channel capacity for the lower 0.1 cfs/acre pond release rate. In these cases, future flows for conveyance systems and detention ponds were based on downstream conveyance structures being able to carry approximately 65 cfs. This value is based upon a naturally lined channel with a 2-foot wide bottom with 1:1 side slopes, a water depth of three feet, and placed on a minimum 0.5% slope. This channel represents a typical proposed drainage ditch that will run to the northern City boundary. In some cases a channel would need to be widened in order to convey a significantly higher flow rate and adjust for changes in ground slope. (See table 6.2 for flows in excess of 65cfs)

It should be noted that depending on site conditions, available right of way, and maintenance capabilities, the channel cross-sections may need to be modified to include flatter side slopes, up to 3' horizontal to 1' vertical, to convey necessary flows.

In general, the proposed facilities follow natural drainage patterns allowing for storm runoff to travel northward in a connected storm drain system.

All calculations performed reflect post-developed flows. The analysis was performed using post-developed curve numbers and times of concentration.
Precipitation frequency estimates were obtained from the National Oceanic and Atmospheric Administration (NOAA) website. (Point Precipitation frequency estimates from NOAA Atlas 14, Volume 1, Version 4, as extracted in June 2010).

Post-developed peak flows were calculated for the 25-year storm event. These flows were then used to estimate allowable release rates for the different drainage areas and detention ponds in order to not exceed available downstream conveyance capacities.

Proposed Improvements
Future growth in Enoch will require storm drain system improvements to be made in addition to those needed to correct existing deficiencies. Master planned channels, pipe sizes and possible pond locations required for both future development and to correct existing deficiencies are illustrated in the storm drain master plan included as Figure 6.2.

The detention ponds and channels which drain to the north will have an outfall location at the north end of the City. This runoff should eventually be conveyed to Rush Lake. Enoch City will need to determine the best method of conveying storm drainage flows from the northern boundary to Rush Lake. Possible options are:

- Acquire the rights/easements necessary to continue flows through public/private lands.
- Construct large retention ponds at the City boundary to capture and hold the runoff. This is the option currently shown on this capital facilities plan.
- Construct smaller detention ponds at the City boundary to detain peak flows but allow historic or minimal flows to continue northward in natural watercourses.

Enoch City does not currently own property at the points of discharge along the northern boundary. It is recommended that further studies be made to determine the best outfall solution for the City. Parks can be designed to function as detention ponds and agreements can be put in place, at this early stage, which protect and establish runoff locations and flows. If ponds are needed land should be purchased or set aside as early as possible to minimize costs. In areas where a pond will not be built within the 1-5 year time period, a suitable outfall must be found for runoff which will drain to the pond location. This outfall may include natural washes, farm fields or ditches.

Storm Drain Pipes and Channels
The proposed storm drain pipes are designed to handle runoff from the 25-year storm event. It was assumed that pipes will be located along existing/ proposed roads or close to natural washes where possible. Pipe sizes were calculated using flows obtained from the PondPack model and were based on the existing slopes of the natural ground.

Table 6.1 and Table 6.2 summarize the proposed pipe and channel details. The ID number corresponds to the storm drainage model. The city has the flexibility of reducing pipe and channel sizes by increasing the overall detention pond volumes as needed. This reduction in size can also be accomplished by requiring new development

to detain the difference between the pre-development flows and the post developments for the design year storm.

Table 6.1: Proposed Pipes

Pipe ID	Diameter (in)	Length (ft)	Slope (%)	25-year Flow (cfs)
1	24	1730	0.80	13
2	48	1574	0.30	52
3	48	1084	0.60	51
8	30	1212	1.50	46
9	30	2584	1.30	46
10	42	490	0.50	44
11	24	894	1.10	9
12	48	1395	0.50	55
14	30	2141	1.40	21
15	36	1833	0.60	45
16	30	1342	2.10	27
17	48	2327	1.30	83
30	36	1645	0.50	39
31	42	160	0.50	38
32	36	371	0.30	31
39	30	1655	1.00	41
41	30	1495	4.40	77
42	36	1796	3.10	92
43	48	1485	0.80	123
46	30	2165	3.30	14
49	24	1194	7.20	9
50	30	943	3.00	30
51	30	1480	1.60	29
60	42	5135	0.30	55
61	42	519	0.50	47

Table 6.2: Proposed Drainage Ditches

Channel ID	Length (ft)	Slope (%)	25-year Flow (cfs)
4	1190	0.20	51
5	5367	0.50	9
6	4815	0.40	45
7	4458	0.50	59
13	1546	0.20	20
18	1992	0.40	62
19	2521	0.50	29
20	2654	0.40	61
21	1206	0.40	66
22	392	0.30	65
23	376	0.30	65
24	363	0.30	64

Channel ID	Length (ft)	Slope (%)	25-year Flow (cfs)
25	383	0.30	64
26	255	0.40	64
27	332	0.30	64
28	2865	0.70	87
29	219	0.50	162
33	2347	0.40	31
34	1334	0.40	63
35	2689	0.40	74
36	908	0.50	83
37	3403	0.50	209
38	331	0.50	209
40	2012	0.40	58
44	1304	0.50	72
45	1073	0.40	72
47	1334	1.20	26
48	2546	0.50	37
52	4017	0.50	122
53	788	0.30	128
54	796	0.30	127
55	784	1.80	65
56	1805	0.40	65
57	3089	0.50	75
58	1902	0.40	107
59	186	0.50	107
62	197	0.50	82

Regional Detention

Regional detention basins were also designed for a 25 year storm event. Detention pond analysis was performed using PondPack software. Detention ponds should be constructed with an emergency overflow structure designed to handle the 100 year storm. Locations are flexible but should be in the general area shown on the master plan.

Table 6.3 summarizes proposed detention pond information. Pond surface areas were estimated using a four foot water depth, 3H:1V side slopes, and one foot of freeboard. Note that the detention basins shown on the master plan are schematic only (not to scale).

Table 6.3: Proposed Detention Ponds

Pond ID	Pond Volume (acre-ft)	Peak Flow In (cfs)	Peak Flow Out (cfs)	Receives Flow From:
Pond 1	10.71	64.92	9.48	Channel 4, Upstream Area
Pond 2	1.638	59.57	42.2	Upstream Area
Pond 3	4.12	65.84	8.70	Pipe 10, Upstream Area
Pond 4	3.93	78.14	20.48	Pipe 12, Upstream Area
Pond 5	21.34	302.64	81.67	Pipe 61, Upstream Area

Pond ID	Pond Volume (acre-ft)	Peak Flow In (cfs)	Peak Flow Out (cfs)	Receives Flow From:
Pond 6	41.00	82.00	0	Channel 62
Pond 7	4.61	118.15	34.13	Pipe 17, Upstream Area
Pond 8	19.50	96.38	29.07	Channel 18, Upstream Area
Pond 9	7.50	102.63	13.65	Upstream Area
Pond 10	3.88	76.92	29.87	Upstream Area
Pond 11	85.00	162.00	0	Channel 29 (Pond 10)
Pond 12	3.36	73.14	30.65	Pipe 31, Upstream Area
Pond 13	0.77	28.56	12.20	Upstream Area
Pond 14	2.51	45.86	13.18	Upstream Area
Pond 15	86.00	208.00	0	Channel 38
Pond 16	5.98	160.92	27.79	Upstream Area
Pond 17	7.43	160.49	23.18	Pipe 43, Upstream Area
Pond 18	3.20	78.47	17.15	Upstream Area
Pond 19	2.72	58.58	9.59	Upstream Area
Pond 20	3.46	99.11	37.32	Channel 47, Pipe 51, Upstream Area
Pond 21	9.94	152.30	44.56	Channel 58, Upstream Area
Pond 22	27.00	152.00	0	Pond 21
Pond 23	1.36	59.03	32.53	Upstream Area
Pond 24	1.25	55.32	31.54	Upstream Area

6.5 Considerations and Recommendations

Changes in runoff characteristics created from new development are difficult to mitigate. Development generally increases the amount of impervious area, increases runoff volumes and velocities, and concentrates storm water runoff at discharge points. Design engineers should carefully consider the impacts that proposed development will have on existing and future drainage facilities and use sound engineering principles. Engineers should use design measures that will reduce or eliminate negative impacts and convey the runoff in a safe and responsible manner.

Drainage Ordinance

It is the recommendation of this report that the City of Enoch develop, adopt and implement a comprehensive Storm Drainage Ordinance that follows the general recommendations of this Storm Drain Plan. This ordinance should develop clear and concise requirements pertaining to storm drainage within the City of Enoch and especially how it will pertain to new development. The following should be given consideration when developing the Storm Drain Ordinance:

- All development in areas where development is anticipated as part of this study should detain storm water runoff such that discharge to a City drainage facility does not exceed the 25-year storm. However, additional detention may be required if existing downstream facilities lack adequate capacity to safely convey storm runoff.
- All new development in areas where development was not anticipated as part of this study shall detain storm water runoff such that discharge to a City storm drainage facility is less than or equal to the discharge generated under the existing undeveloped conditions during the design storm

- Each development should be required to handle all design flows, including the 100 year event, coming to and through the site such that no flooding of structures will occur.
- All homes and structures, including the lowest opening, should be built above the elevation of the adjacent road way or adjacent drainage channel to minimize flooding during large storm events. A typical requirement here is 1 to 2 feet as the Enoch City sees fit.
- All storm drain improvement projects should be designed and constructed to manage runoff from full build-out conditions in accordance with the approved general plan of Enoch City.
- All storm drain inlet facilities should be sufficient in size and number to collect the design storm and transfer it into the storm drainage facility.
- All detention basins should be designed to include emergency spillways or overflows located to minimize downstream flooding and sized to pass the 100 year event.
- Outlets for detention basins should be sized to drain the basin within 24 hours.
- Storm water best management practices (BMP's) should be utilized to reduce sediment loads and to help the City meet UPDES requirements. These requirements may be imposed in the future.
- All improvements and other channel modifications involving natural channels should incorporate appropriate erosion control measures.
- Natural drainages should be preserved and (where necessary) enlarged as needed to protect adjacent property and provide capacity for storm water discharges.
- Storm water pipes should be designed to provide minimum velocities of 2 feet per second. Minimum pipe sizes should be15 inches.
- Detention facilities should be designed with a dual purpose in mind such as parks, play grounds, opens space, etc.

100 Year Storm

As previously mentioned in this report, consideration should be given to the flows generated during a 100 year event. Storms of this magnitude will often cause considerable damage to a community however this damage can be minimized with careful planning. The following items are offered for consideration:

Where drainage outfalls follow roadways, provisions should be made to minimize damage due to a 100 year storm by:

- Making use of roadway right-of-ways to handle additional runoff. The driving surface may be used providing one or two driving lanes, as determined by the City, remain drivable.
- Make use of adjacent easement areas (generally 15 feet in width) to assist the movement of drainage runoff. This area should have a positive slope to the drainage facility and the roadway to keep water away from structures.
- Elevate all structures and basement openings a minimum of 1 to 2 feet above the road way elevation. If it is determined that the elevation of the 100 year storm is higher than this, the structure should be raised to provide at least 1 foot of freeboard.
- Increase front setbacks in these areas to assist with flood carrying capabilities.

Where drainage outfalls do not follow roadways, provisions should be made to minimize damage due to a 100 year storm by:

- Elevating all structures and basement openings a minimum of 1 to 2 feet above the top of the drainage outfall channel.
- Where a pipe is used as the outfall, and it does not follow a roadway, shape the finished grade above the pipe to create a swale to act as a channel to carry additional flows. Elevate all structures and lowest openings to minimize impacts.
- Acquire or reserve additional easement width to provide for future, larger flows.

- Where possible, provide for the area outside the drainage channels to slope towards the channel to increase large flow capacity and to avoid ponding outside the drainage channels.

Fissure (Enoch – Graben)

In 2009 the UGS was contacted for a possible "fault" that was damaging infrastructure in Enoch. During the reconnaissance investigation, the UGS found a 2.4 mile-long earth fissure that had formed. In addition to damaging streets, curb and gutters, sidewalks and other infrastructure, the vertical displacement associated by the fissure could have a major affect on storm drainage. A study has been funded by the Iron County Water Conservancy District and has been conducted by the UGS. This study is in its final stages and should be published soon. It is recommended that there be close coordination with the UGS and the study findings. Modifications to this storm drainage plan including how and where drainage and detention is handled throughout this area may be necessary. Detention basin locations may need to be modified as well as the type of construction. As more becomes known about the Enoch – Graben Fissure and the ground subsidence additional recommendations can be developed. It may also be possible to adjust detention basin design and locations to facilitate future ground water recharge program.

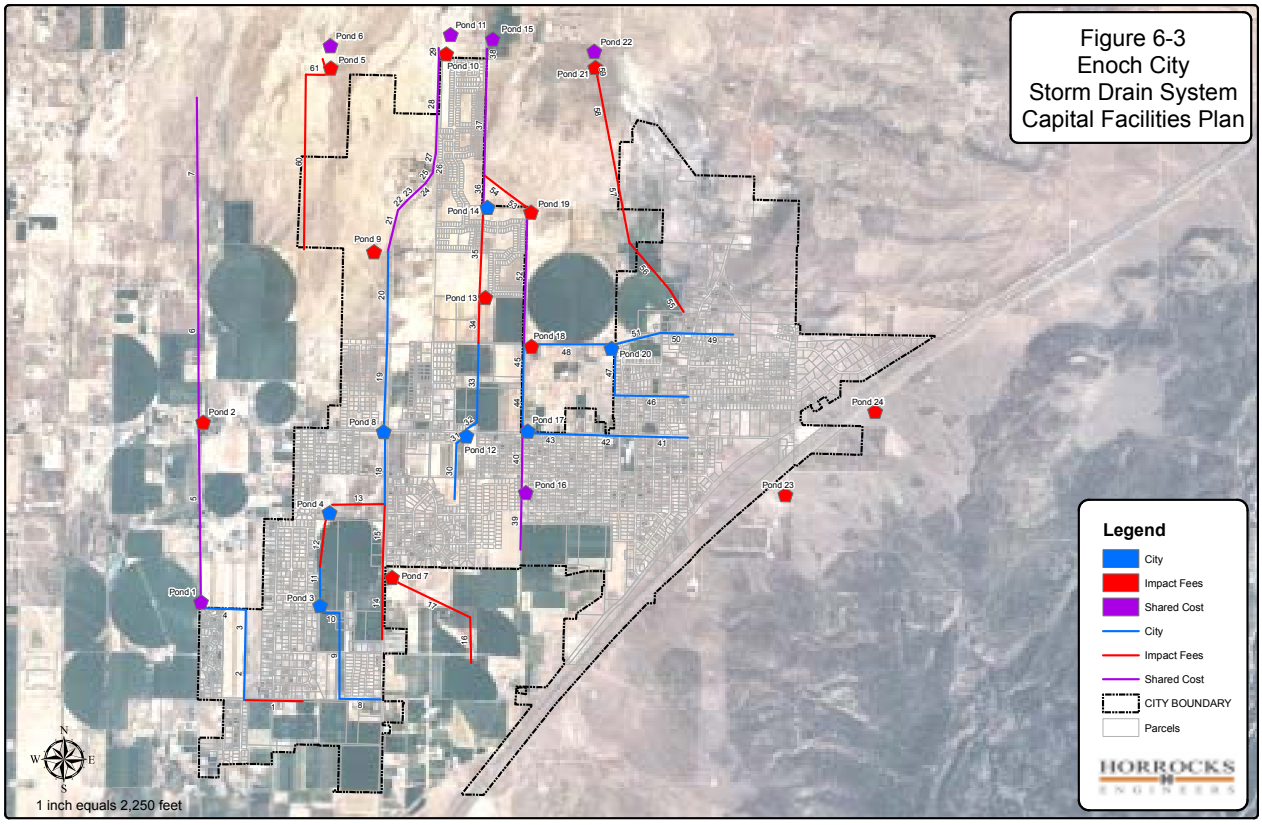
Funding

Funding of drainage improvements is often a difficult task. General Fund allocations and Impact Fees are generally insufficient to cover the costs associated with building and maintaining a drainage system. It is the recommendation of this report that Enoch City look into implementing a Drainage Fee. This is a monthly fee that will be charged to each resident and commercial establishment throughout the City. Many Cities in Southern Utah charge a drainage fee. These fees range from $1.50 per ERU is St. George to as high as $10.62 per ERU in Ivins. Successful implementation of a city wide fee would provide the City with a consistent revenue source to dedicate

to drainage.

6.6 Storm Drain Capital Facilities Plan

As mentioned previously, the existing storm drainage system has a number of deficiencies which cannot be constructed using impact fees. This section arranges the proposed improvements according to anticipated construction time. Planning level cost estimates and the source of funding are included. Tables 6.4 and 6.5



summarize the improvement projects and Figure 6.3 graphically shows which portions of the storm drain system which will be funded by the City and which can be funded by impact fees.

Table 6.4: Channel/Pipe Estimates and Funding Source

Channel/ Pipe Segment	Estimate	Funding Source
1-5 Year Improvements		
31	$24,062	City
32	$43,776	City
39	$180,194	Shared Costs
41	$162,821	City
42	$211,745	City
43	$233,888	City
46	$235,762	City
49	$110,106	City

Channel/ Pipe Segment	Estimate	Funding Source
50	$102,700	City
51	$148,840	City
18	$85,460	City
33	$104,935	City
34	$59,661	Impact Fees
35	$120,216	Impact Fees
36	$39,946	Shared Costs
37	$149,804	Shared Costs
38	$14,571	Shared Costs
40	$88,563	Shared Costs
44	$58,295	City
45	$47,994	City
47	$59,665	City
48	$111,863	City
52	$176,805	Shared Costs
53	$35,247	Impact Fees
54	$35,607	Impact Fees
Total 1-5 Year Pipe/Channel Cost	$2,642,526	
5-10 Year Improvements		
1	$159,469	Impact Fees
2	$248,016	City
3	$170,703	City
8	$131,932	City
9	$274,655	City
10	$73,845	City
11	$82,446	City
12	$196,540	Impact Fees
4	$53,228	City
19	$112,711	City
20	$118,654	City
21	$53,068	Shared Costs
22	$17,247	Shared Costs
23	$16,569	Shared Costs

Channel/ Pipe Segment	Estimate	Funding Source
24	$15,969	Shared Costs
25	$16,839	Shared Costs
26	$11,235	Shared Costs
27	$14,617	Shared Costs
28	$126,124	Shared Costs
29	$9,631	Shared Costs
30	$194,032	City
13	$69,131	Impact Fees
Total 5-10 Year Pipe/Channel Cost	$2,166,661	
10+ Year Improvements		
14	$233,067	Impact Fees
15	$216,141	Impact Fees
16	$158,241	Impact Fees
17	$366,508	Impact Fees
60	$773,273	Impact Fees
61	$78,181	Impact Fees
5	$236,254	Shared Costs
6	$211,935	Shared Costs
7	$196,246	Shared Costs
55	$35,066	Impact Fees
56	$80,705	Impact Fees
57	$138,123	Impact Fees
58	$85,044	Impact Fees
59	$8,322	Impact Fees
62	$8,824	Impact Fees
Total 10+ Years Pipe/Channel Cost	$2,825,930	
Impact Fees Subtotal	$3,869,342	
City Subtotal	$3,792,641	
Total	$7,688,983	

Table 6.5: Pond Estimates and Funding Source

Pond ID	Estimate *(Including Property Costs)*	Estimate *(Not Including Property Costs)*	Funding Source
1-5 Year Improvements			
Pond 12	$187,833	$60,682	City
Pond 14	$141,371	$46,386	City
Pond 17	$410,307	$129,135	City
Pond 20	$193,300	$62,364	City
Total 1-5 Year Pond Cost	$932,811		
5-10 Year Improvements			
Pond 1	$589,597	$184,301	Shared Cost
Pond 3	$229,376	$73,464	City
Pond 4	$218,991	$70,269	City
Pond 8	$1,070,074	$332,141	City
Pond 9	$414,133	$130,313	Impact Fees
Pond 10	$216,258	$69,428	Impact Fees
Pond 11	$4,650,419	$1,433,785	Shared Cost
Pond 13	$46,260	$17,121	Impact Fees
Pond 15	$4,705,081	$1,450,604	Shared Cost
Pond 16	$331,047	$104,748	Shared Cost
Pond 18	$179,088	$57,991	Impact Fees
Total 5-10 Year Pond Cost	$12,650,324		
10+ Year Improvements			
Pond 5	$1,170,652	$363,087	Impact Fees/Developers
Pond 6	$2,245,302	$693,749	Shared Cost
Pond 7	$256,161	$81,706	Impact Fees
Pond 2	$93,706	$31,720	City
Pond 19	$152,850	$49,918	Impact Fees
Pond 21	$547,508	$171,351	Impact Fees
Pond 22	$1,480,037	$458,283	Shared Cost
Pond 23	$78,510	$27,044	Impact Fees
Pond 24	$72,497	$25,194	Impact Fees
Total 10+ Years Pond Cost	$6,097,223		
Impact Fees Subtotal		$10,134,657	
City Subtotal		$9,545,700	
Portion of Cost For Property (90 acres)		$9,752,213	
Total		$19,680,356	

Estimates are in 2010 dollars.

CHAPTER 7 – PUBLIC SAFETY PLANNING

Enoch City has always provided a community of safety and security. Currently, Enoch maintains a police force of four full time officers, and one part time officer, and one part time clerical. The police department also secures the help of police volunteers, who are primarily retired law enforcement, fire fighters, and paramedics. Fire department, ambulance, and emergency medical forces (EMS) are currently contracted services outside of the City. Continual accessibility to these necessities is vital to the quality of life, health, and safety of Enoch's citizens. The following planning recommendations assume that Enoch City safety facilities will be provided in the future at the same LOS as currently exists.

7.1 Level of Service

Fire Protection

Currently, Enoch City contracts with the Cedar City Fire Department for fire protection services. Enoch assisted financially in building Fire Station #2 located at 2580 N Commerce Road. This station is located just outside Enoch's boundary and presently uses volunteers for staffing. The Cedar City Fire Station #1 is located further south in Cedar City and is staffed around the clock. At this time, it is the intent of the City to continue contracting out this service in the future. As fire protection facilities are currently owned by and located in Cedar City, these facilities were not evaluated as part of this report.

Emergency Medical Services

Emergency medical service, including ambulance, is currently contracted out with Iron County. It is the City's desire to continue contracting EMS services with Iron County in the future. Therefore, EMS services and LOS are not included in this study.

Law Enforcement

Required police forces are generally proportional to the population of a city, although many other factors, such as crime rate, determine the number of officers needed. Law enforcement needs must be assessed on a case by case basis by the City and its local police departments.

The Enoch City Police Department protects and serves its citizens at a LOS of 0.86 officers per 1,000 residents or 4 full time officers and 1 part time officer providing round the clock law enforcement protection. As a comparison, Table 71 in the Uniform Crime Report published by the Federal Bureau of Investigation reports that cities in the Mountain West with less than 10,000 inhabitants average 3.2 police officers/staff per 1,000 residents. For cities with populations in excess of 10,000, this number decreases to 1.9 employees per 1,000 residents.

It is the intent of Enoch City to continue to provide a local police department in the future. This CFP makes recommendations regarding what facilities will need to be built or upgraded in order to maintain the current LOS as the City population grows. Public safety facilities will be measured in units of square footage per 1,000 residents.

7.2 Existing Facilities

Law Enforcement

Enoch City employs its own law enforcement officers and desires to continue to provide this service to its residents. The Police Department currently shares its facility with other city departments at the City Offices Building located on Midvalley Road. The Police Department uses 2,472 square feet in the City Offices Building. Based on current population estimates, of 5,236 residents, the LOS for Enoch City is 472 square feet per 1000 residents. However, office space is full and future facilities will be needed in the near future as the City grows and additional officers, staff, and equipment are needed.

7.3 Future Facilities

To assist Enoch City in its future planning of emergency services, we recommend the guidelines in the National Fire Protection Association Standards (NFPA) 1720. This standard uses response times as an indication of LOS. It is recommended that Enoch work with the Cedar City Fire Department and Iron County EMS Services to meet the recommendations of this standard.

According to NFPA 1710, a fire department's fire suppression resources shall be deployed to provide for the arrival of an engine company within a 4-minute response time and the initial full alarm assignment within an 8-minute response time to 90 percent of the incidents that require a full assignment of apparatus.

With respect to emergency medical service calls (EMS), NFPA 1710 calls for the arrival of a first responder with an automatic external defibrillator (AED) to arrive on scene with a 4-minute response time to 90 percent of the incidents. Additionally, the fire department's EMS for providing advanced life support (ALS) shall be deployed to provide for the arrival of an ALS company within an 8-minute response time to 90 percent of the incidents.

Law Enforcement

As Enoch City's population reaches the estimated 2040 population of 27,729 residents additional officers will be required to maintain the current LOS. Current public safety facilities provide 472 sq ft per 1000 residents. However, this total includes 180 sq ft of storage and 1,280 sq ft of forensic space which service multiple officers. Office space per officer is about 170 sq ft. As officers are added to the police force additional office space will need to be added at about the same ratio. Areas servicing multiple officers, such as forensics, will need to be increased at a much smaller ratio.

Additionally, as development reaches the extents of the city boundaries and as traffic volumes increase, it may become necessary to strategically locate public safety services further away from the city center.

7.4 Capital Improvements Plan

If the current LOS is maintained in the future, Enoch will need to add an additional police officer for every additional 1,163 residents. As the population increases the ratio of officers to residents will also increase.

Based on the demographics estimated in Chapter 2, the first additional officer will be needed in 2015. Between 2017 and 2022, 4 more law enforcement personnel will be required (doubling the current staff), if the current LOS is maintained.

It is estimated that Enoch's population will be greater than 10,000 around 2021. Based on statistics, the ratio of officers to residents would need to increase around this population. This report assumes a modified ratio of 1 officer per 1000 residents from 2023 to 2040. During this 17 year span, nearly 1 law enforcement officer per year, 15 total, will need to be added to Enoch's staff.

Table 7.1 summarizes the anticipated costs, funding sources, and size requirements for future law enforcement buildings. A ratio of 150 sq ft of office space and 20 sq ft of storage per officer was used. It is estimated that the current forensics area will service up to 10 officers before it needs to be expanded. Estimated costs include land purchases.

Table 7.1 Future Law Enforcement Facilities

Future Facility	Area (sf)	2010 Cost	Construction Year	Funding Source
Police Station Addition	850	$127,500.00	2015	
New Police Station	5,000	$1,425,000.00	2023	Impact Fees
Police Station Addition	3,500	$997,500.00	2035	Impact Fees
Total	**9,350**	**$2,550,000.00**		

Note: Estimates provided in 2010 dollars

The areas indicated above are much lower than the guidelines suggested in the NFPA. However, even at build out Enoch will be a fairly small bedroom type community and should require less law enforcement than national averages.

CHAPTER 8– PARKS AND RECREATION PLANNING

Enoch City provides a high quality of life and health to the community through their parks and recreation facilities. As the population increases open space will be replaced with buildings and pavement. The open "feel" Enoch currently enjoys could be lost unless a plan is in place and followed. Therefore, in order to maintain this same quality of life the city must continue to plan for and provide additional parks, trails, and recreation facilities.

8.1 Level of Service

At this time, the City owns approximately 15.9 acres of developed recreational space. An additional 6.8 acres is under construction and will be completed shortly. Facilities include the beginning of a trail network, 5 city parks, a baseball diamond, and the city cemetery. The current LOS is 22.7 acres for 5,236 residents or 4.34 acres per 1,000 residents.

There are a few churches located within the City which also have developed recreational space adjacent to the church building. Although the community is allowed to use these facilities they were not included in the current LOS.

The National Parks and Recreation Association recommends a LOS of 5 to 10 acres per 1,000 residents. Enoch desires to continue to provide parks and trails to its residents. However, with the average lot size being around .5 acres, the City believes the amount of area needed for parks and open space is substantially lower than for larger cities with higher density developments. Additionally, residents enjoy quick and easy access to vast areas of public land and recreation. Therefore, this report reduces the LOS from the existing conditions to 2.0 acres per 1,000 residents.

8.2 Existing Facilities

Table 8-1 summarizes Enoch's existing park areas and Table 8-2 shows the current inventory of trails within the city limits.

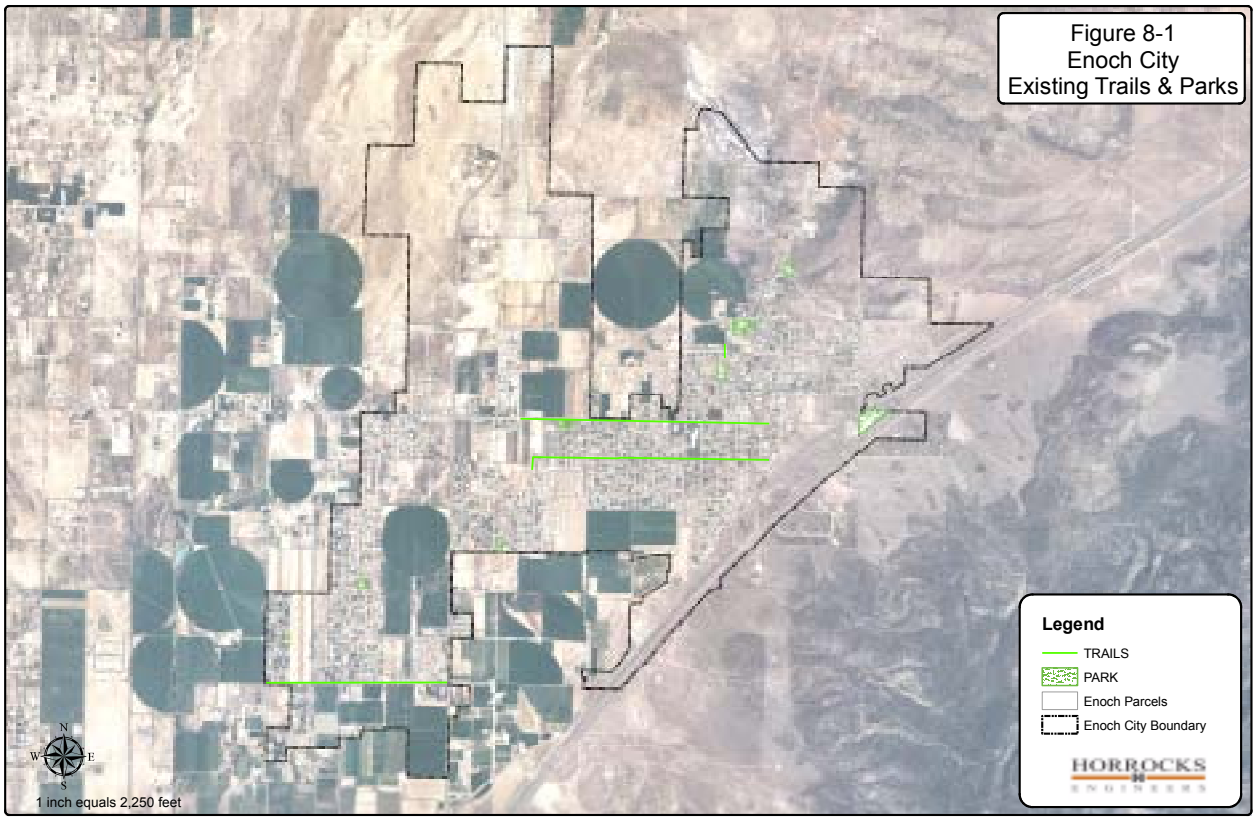
Table 8-1: Park Inventory

Parks	Area (acres)	Owner	Current Status
Neighborhood Park	1.0	City	Complete
Neighborhood Park	1.2	City	Complete
Neighborhood Park	0.8	City	Complete
Learning Park	1.9	City	Complete
City Offices Park	1.3	City	Complete
City Recreation Complex	6.8	City	Under Construction
Baseball Complex	4.5	City	Complete
City Cemetery	2.4	City	Complete
Total	**19.9**		

Table 8-2: Trail Inventory

Trails	Area (acres)	Owner	Current Status
Walking Trails	2.8	City	Complete
Total	**2.8**		

Figure 8.1 identifies the location of the City's existing parks and trails.



8.3 Future Facilities

This study analyzes the growth period from 2010 to 2040 when the projected population will be approximately 28,000. In order to provide a minimum LOS of 2.0 acres per 1,000 residents, the city will need to provide an additional 44 acres of parks and recreational facilities.

Future facilities should not be limited to landscaped parks and ball fields. Trail systems, including equestrian trails and facilities, rodeo grounds, hiking and mountain biking trails, and nature areas fulfill this requirement without the high development and maintenance costs. Providing a variety of recreation areas and opportunities will better meet the different interests of the community. Preserving future trail corridors to public lands (such as Three Peaks) and future park areas will ensure the LOS desired by the City and its residents.

City Recreation Center

As population increases the City plans to provide a community recreation facility complete with swimming pools, ball fields, indoor recreation activities, senior citizens center, restrooms, etc. This future recreation facility is reflected in the CFP outlined below.

8.4 Capital Facilities Plan

Table 8.3 summarizes a conceptual plan to provide the future recreation facilities required to maintain its current LOS. It is recommended that Enoch identify early where future facilities are going to be located. Early purchase and/or preservation of property for future recreation facilities are the most effective ways to keep costs down.

Table 8.3 – Conceptual Parks and Recreation Facilities Plan

Project	Area (acres)	Construction Year	Cost (2010)	Funding Source
4 Acres of Community Trails	4	2016	$500,000	Impact Fees
Various Parks (20 Acres by Developers)	20	2012 to 2028	$606,000	Impact Fees
5 Acres of Community Trails	5	2020	$500,000	Impact Fees
5 Acre Community Park	5	2030	$500,000	Impact Fees
10 Acre Recreation Center	10	2036	$4,000,000	City / Impact Fees
Total	**44**			

Growth will also require the expansion of city offices and other public facilities. As the population increases so will the demands for public services and employees. These facilities will not be eligible for impact fee funding.

9.1 Existing Facilities

At present, the City operates out of two buildings or facilities. The old city buildings located on 600 East, are currently used for public works personnel and equipment. The newer city office building situated on Midvalley Road includes space for the police department, library, and city offices. These two facilities have a combined total area of 18,303 square feet of space. This provides a LOS of approximately 2,677 square feet per 1,000 residents.

With the exception of law enforcement, the current facilities are adequate for the existing needs of the city. When a new law enforcement facility is built, as discussed in chapter 7, then the current offices should be sufficient for number of years to come.

9.2 Future Facilities

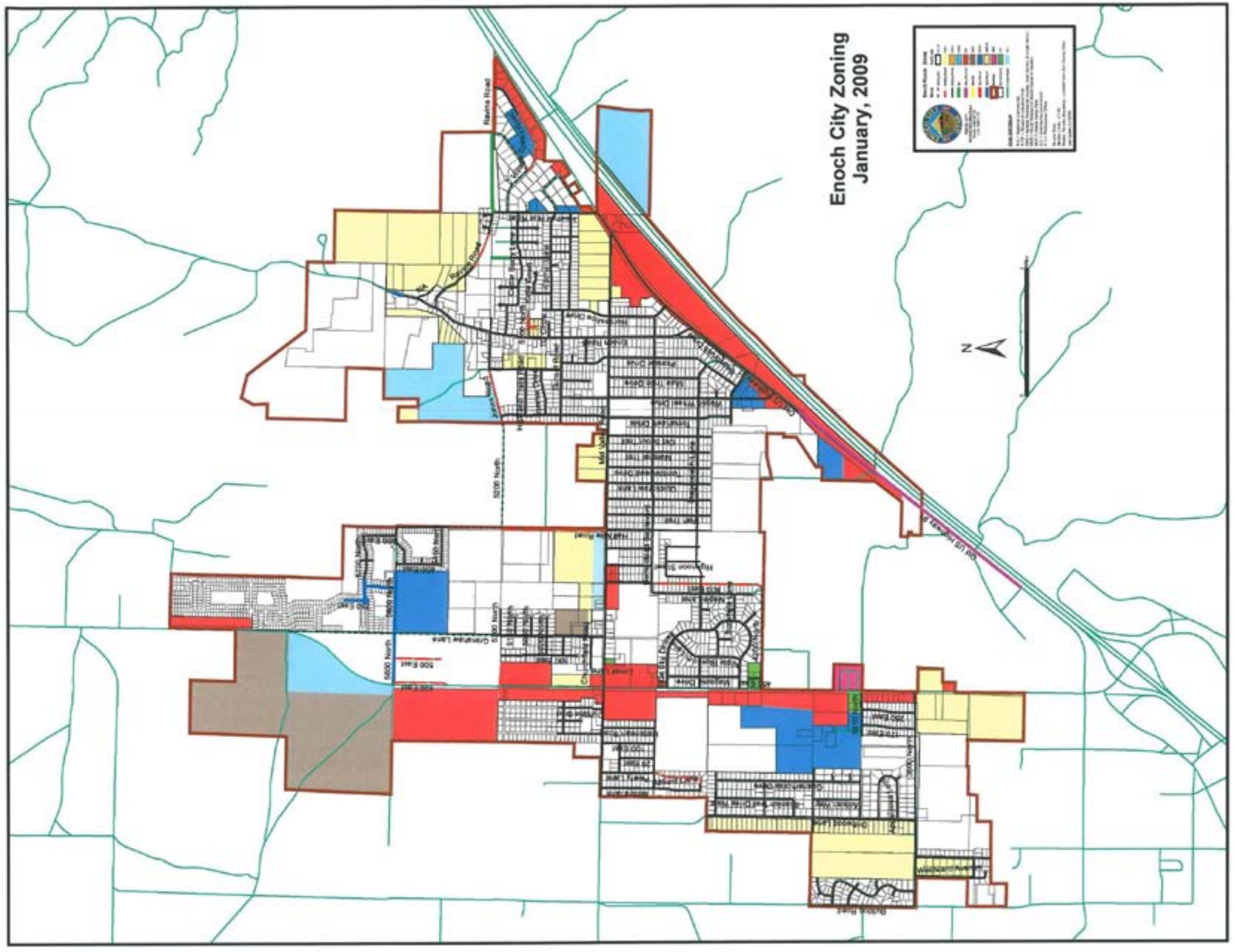
Table 9.1 summarizes the expansion of existing buildings and the new facilities anticipated as the population of Enoch increases. Future growth will require additional employees and office space. Planning level costs estimates and their projected years of construction are also included in Table 9.1.

Table 9.1 – Budgetary Estimates for Future Public Facilities

Project	Area (s.f.)	Construction Year	Cost (2010)	Funding Source
New Animal Shelter	3,300	2016	$544,500	City / Impact
New Public Works Building	12,000	2020	$1,980,000	Impact Fees
City Hall Addition	12,000	2027	$2,820,000	Impact Fees
Sewer Building Addition	10,000	2032	$1,650,000	Impact Fees
New Library	18,000	2035	$4,230,100	Impact Fees
Animal Shelter Addition	4,500	2040	$742,500	Impact Fees
		Total Cost	**$11,967,000**	

The city hall and library estimated at $220 per square foot. The public works building, sewer building addition, and animal shelter facilities are estimated at $150 per square foot. Property needs are based on 2 acres per 10,000 square feet of building space. The price for land is estimated at $75,000 per acre.50 for City Hall

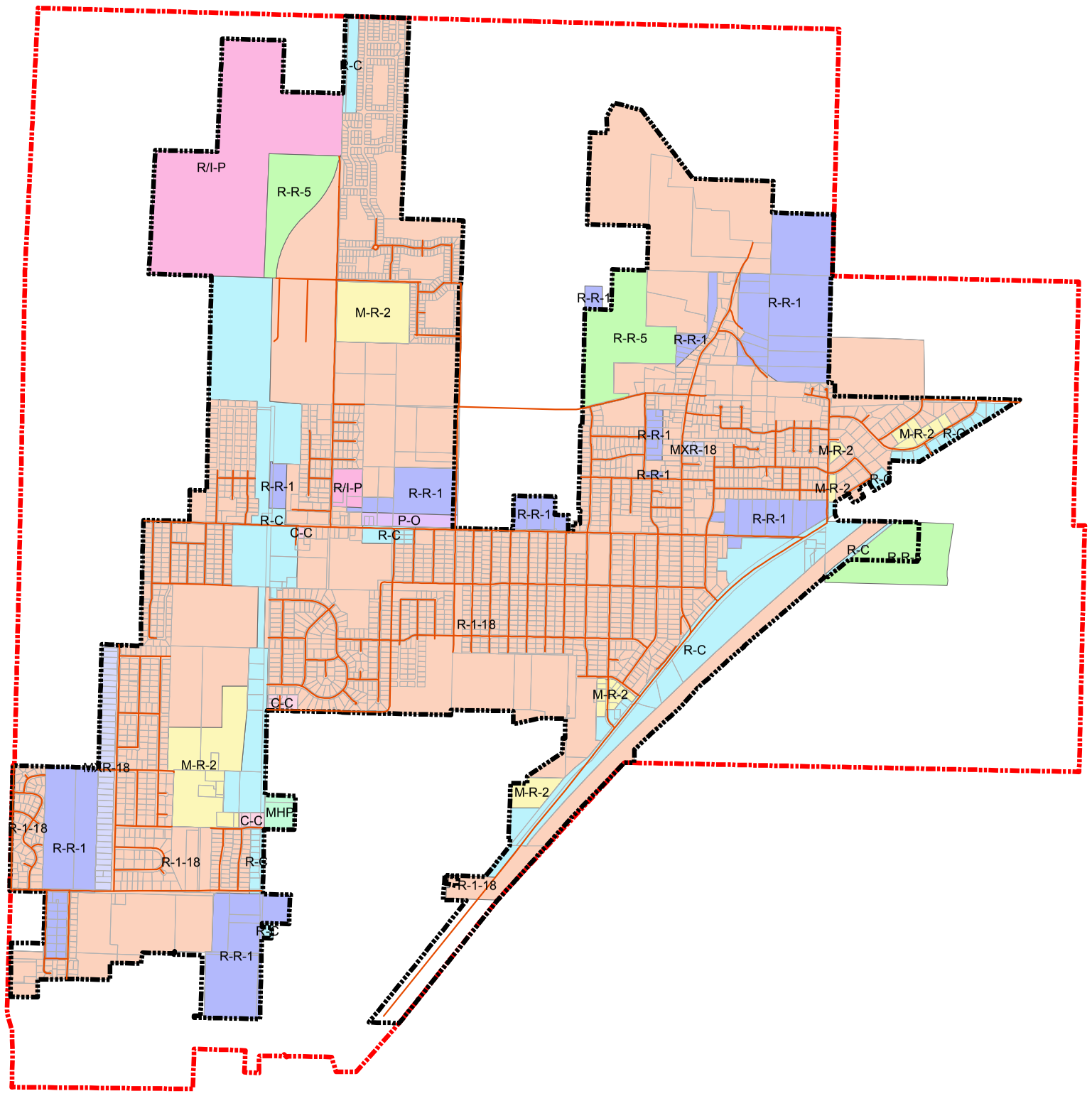
The City has an agreement in place to relocate the existing animal shelter to a new location within the next 7 years. Table 9.1 reflects a new shelter twice the size of the current facility.



Enoch City Zoning Map

Figure 2-1

FIGURE 2-2
Zoning



- EnochRoads
- Enoch City Boundary
- Enoch Buildout Boundary
- EnochParcels

Zoning

- R-1-18
- R-R-1
- R-R-5
- R-C
- R/I-P
- M-R-2
- MXR-18
- MHP
- C-C
- P-O

N
W E
S

1 inch equals 2,500 feet

HORROCKS ENGINEERS

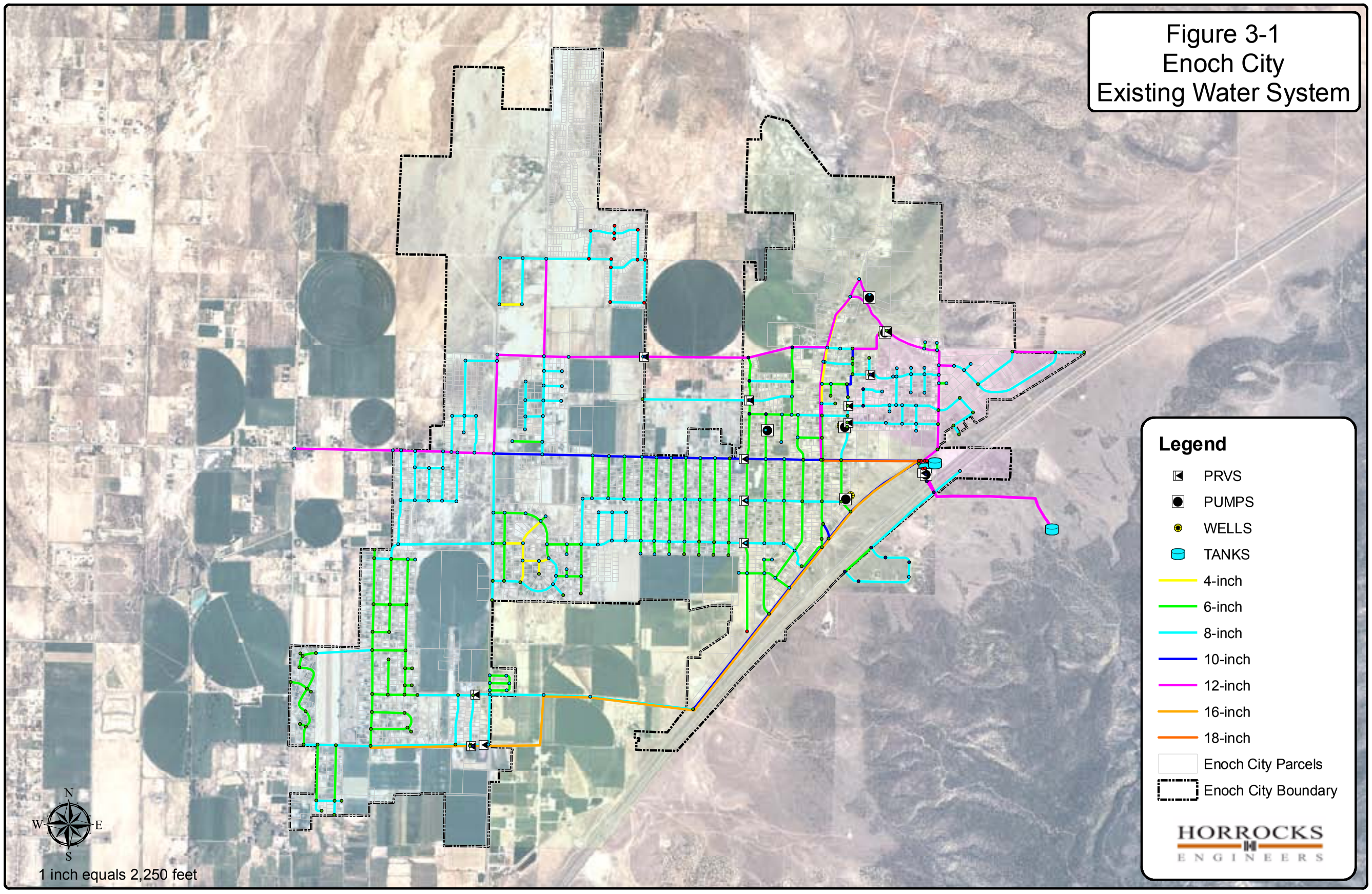


Figure 3-1
Enoch City
Existing Water System
Legend
PRVS
PUMPS
WELLS
TANKS
4-inch
6-inch
8-inch
10-inch
12-inch
16-inch
18-inch
Enoch City Parcels
Enoch City Boundary
HORROCKS
ENGINEERS
N
W
E
S
1 inch equals 2,250 feet

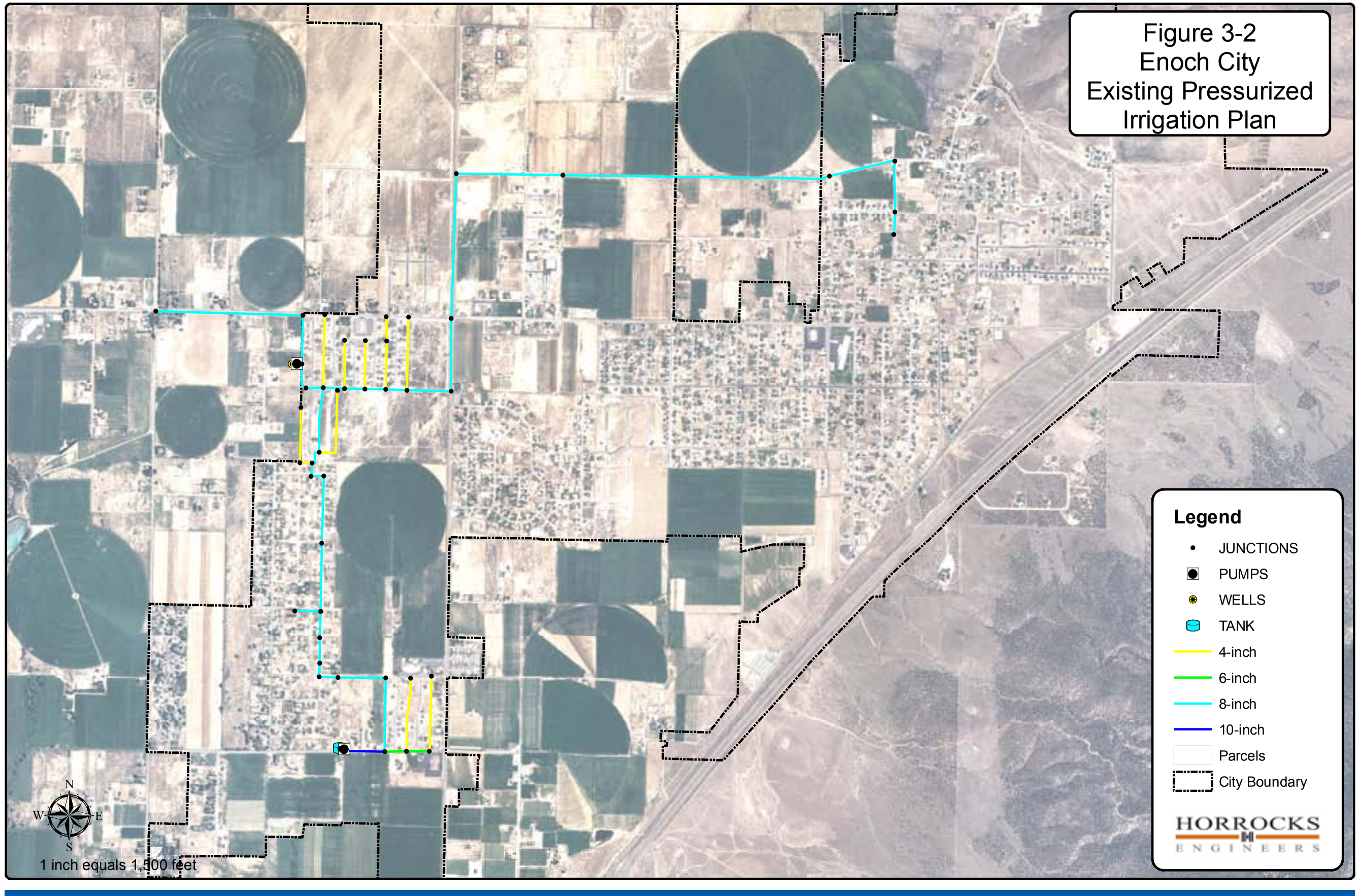
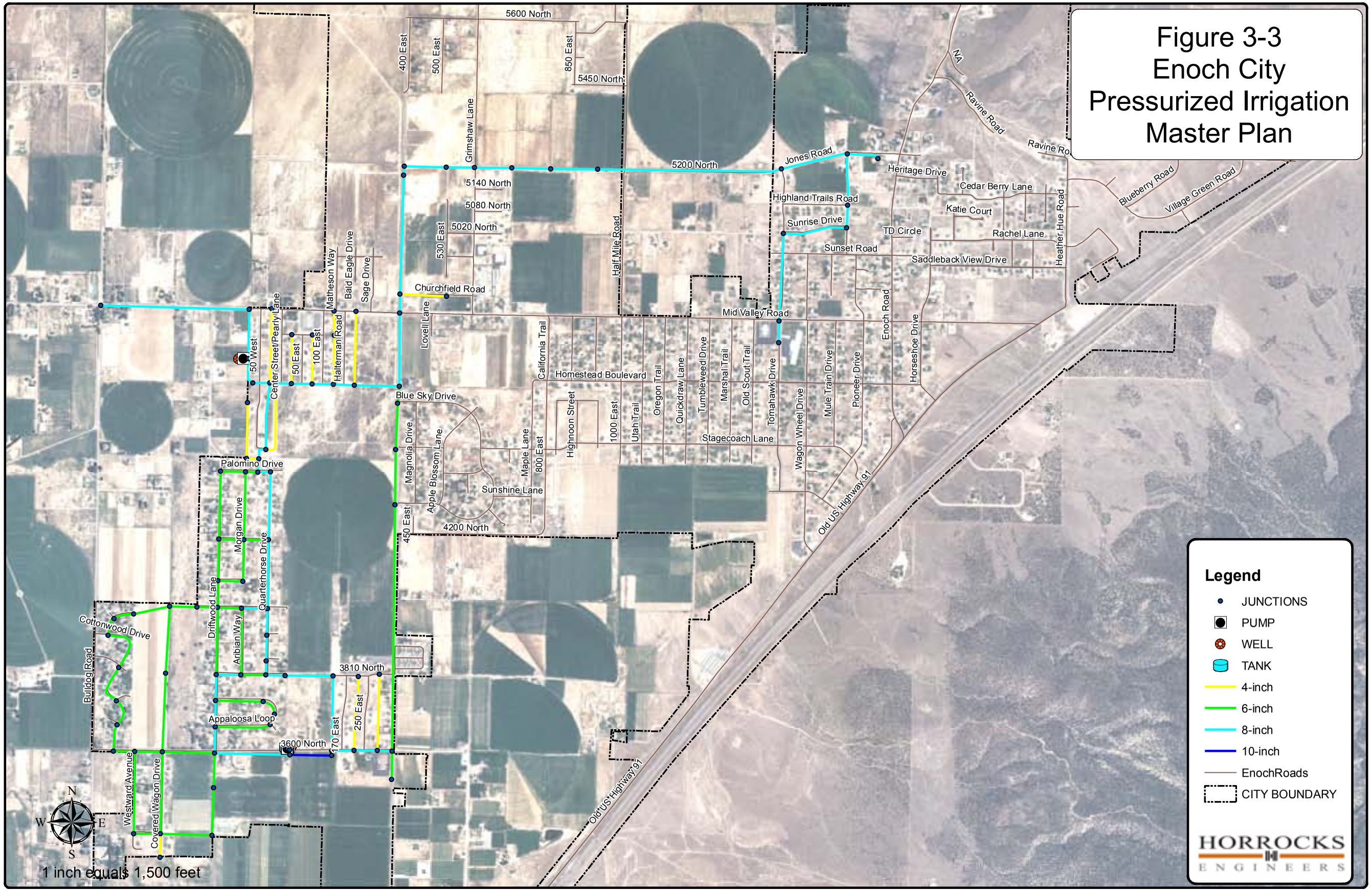


Figure 3-2
Enoch City
Existing Pressurized
Irrigation Plan
Legend
JUNCTIONS
PUMPS
WELLS
TANK
4-inch
6-inch
8-inch
10-inch
Parcels
City Boundary
HORROCKS
ENGINEERS
N
W
E
S
1 inch equals 1,500 feet

Figure 3-3
Enoch City
Pressurized Irrigation
Master Plan



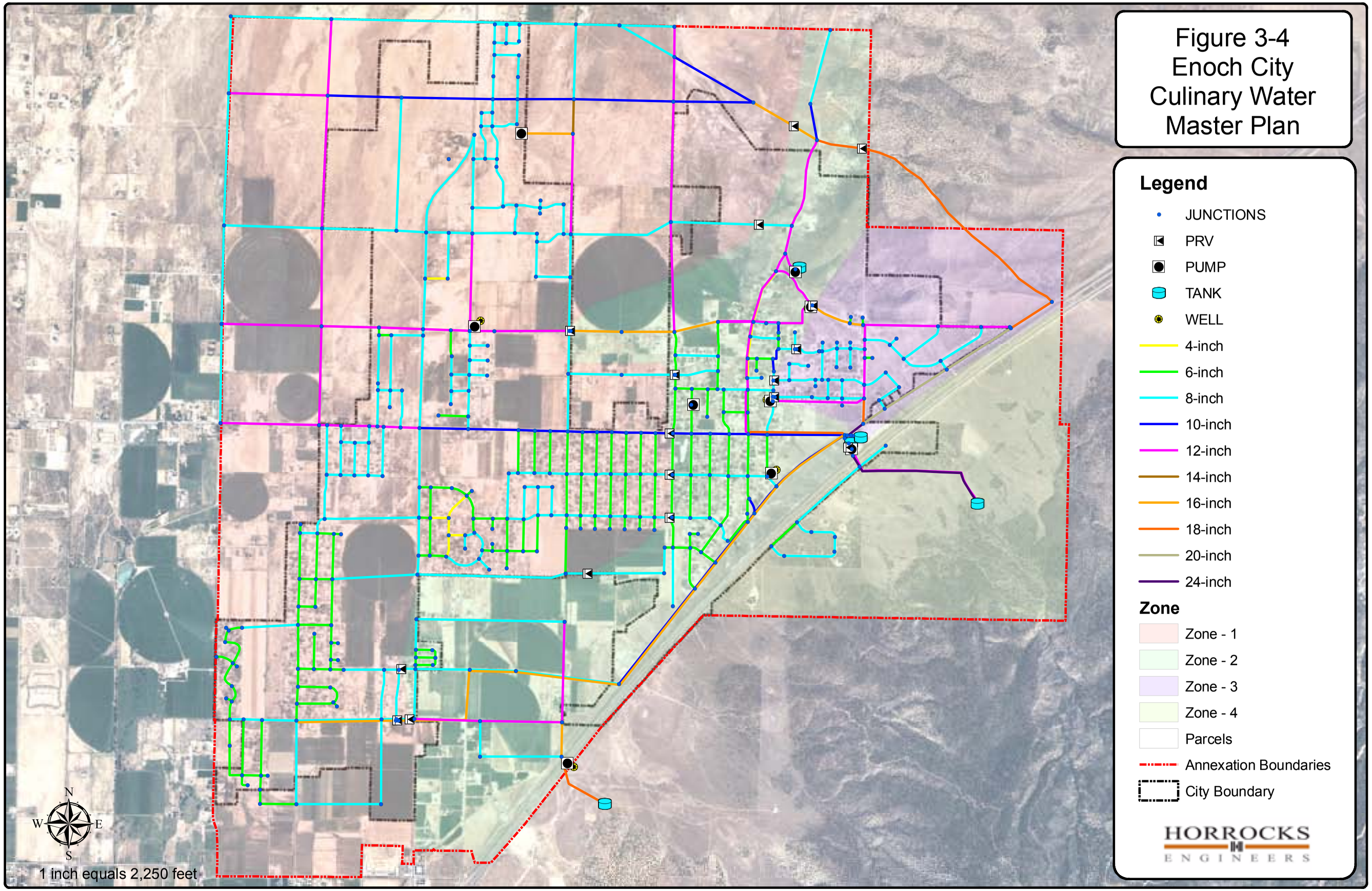
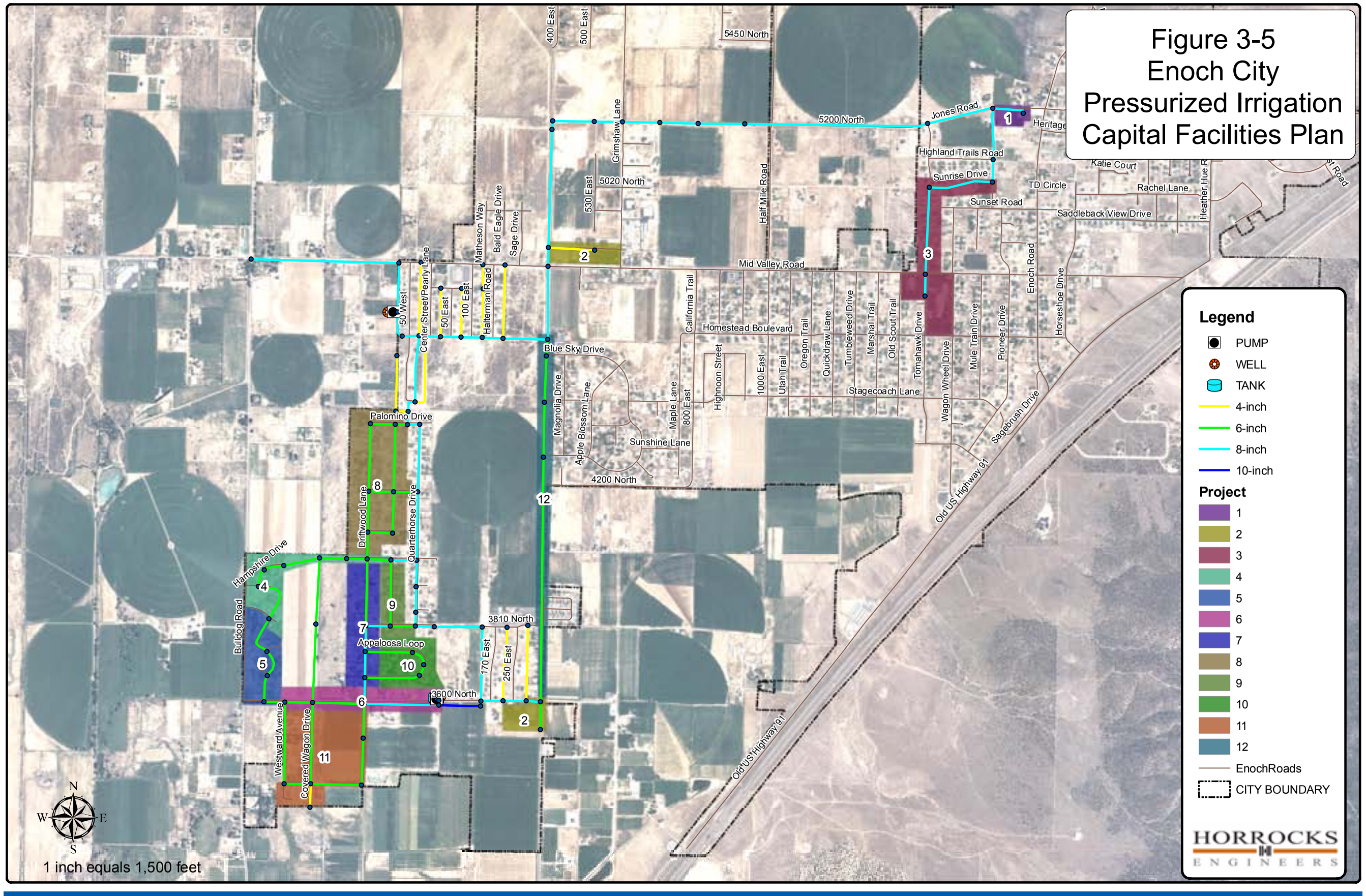


Figure 3-4
Enoch City
Culinary Water
Master Plan
Legend
JUNCTIONS
PRV
PUMP
TANK
WELL
4-inch
6-inch
8-inch
10-inch
12-inch
14-inch
16-inch
18-inch
20-inch
24-inch
Zone
Zone - 1
Zone - 2
Zone - 3
Zone - 4
Parcels
Annexation Boundaries
City Boundary
HORROCKS
ENGINEERS
N
W
E
S
1 inch equals 2,250 feet

Figure 3-5
Enoch City
Pressurized Irrigation
Capital Facilities Plan



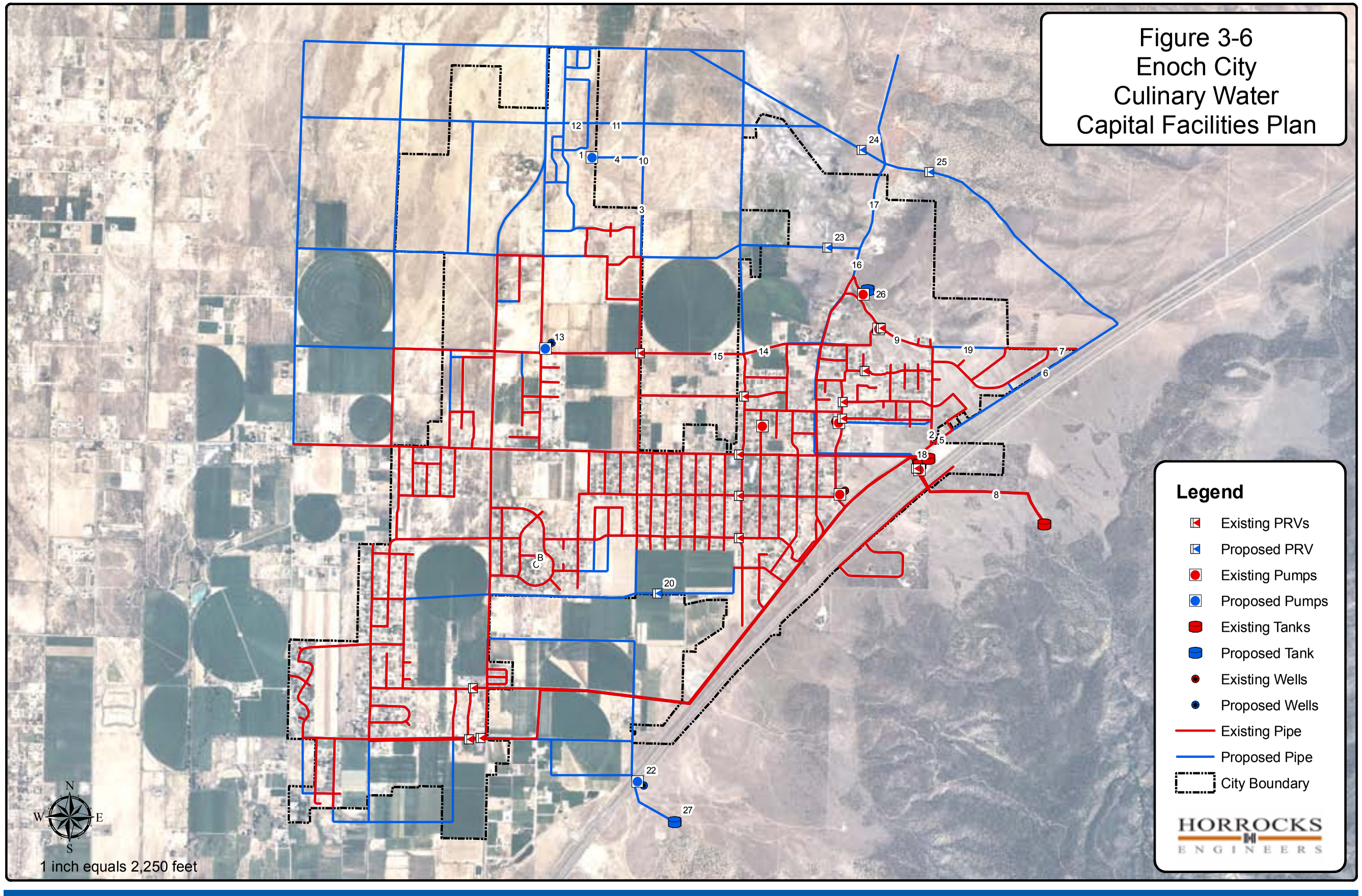


Figure 3-6
Enoch City
Culinary Water
Capital Facilities Plan
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
22
23
24
25
26
27
A
B
C
Legend
Existing PRVs
Proposed PRV
Existing Pumps
Proposed Pumps
Existing Tanks
Proposed Tank
Existing Wells
Proposed Wells
Existing Pipe
Proposed Pipe
City Boundary
HORROCKS
ENGINEERS
N
W
E
S
1 inch equals 2,250 feet

Figure 4-1
Enoch City
Existing Sewer System

Legend

- Existing Remote Flow Meter
- Enoch Manholes
- Cedar City Manholes
- 8-inch (190,912 ft)
- 12-inch (13,732 ft)
- 15-inch (13,176 ft)
- 18-inch (21,713 ft)
- 8-inch Force Main (8,024 ft)
- Cedar City Sewer Main
- Enoch City Boundary
- Property Boundary

HORROCKS ENGINEERS

N
W E
S

1 inch equals 2,750 feet

Figure 4-2 Enoch City Sanitary Sewer Master Plan

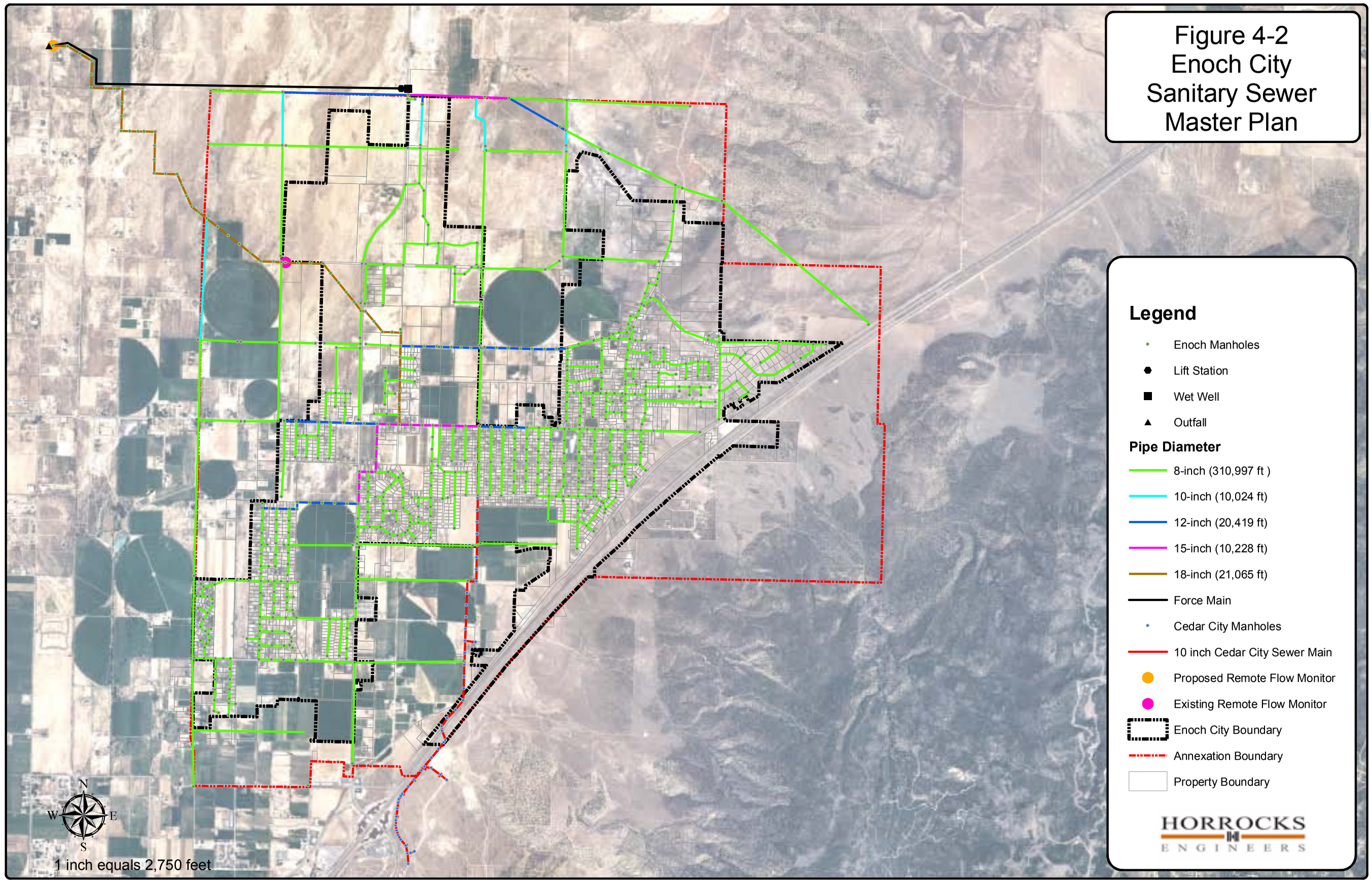
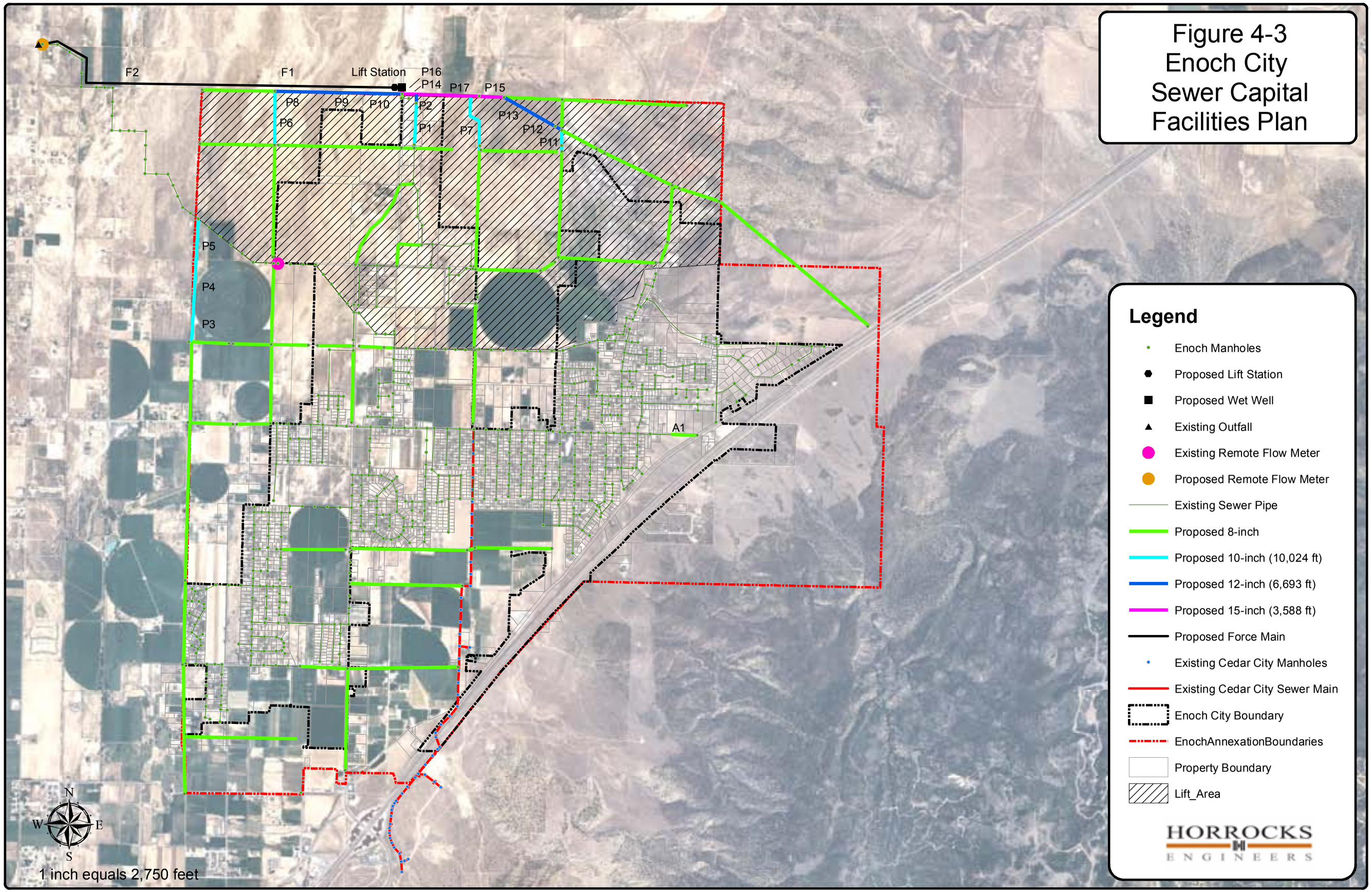


Figure 4-3 Enoch City Sewer Capital Facilities Plan

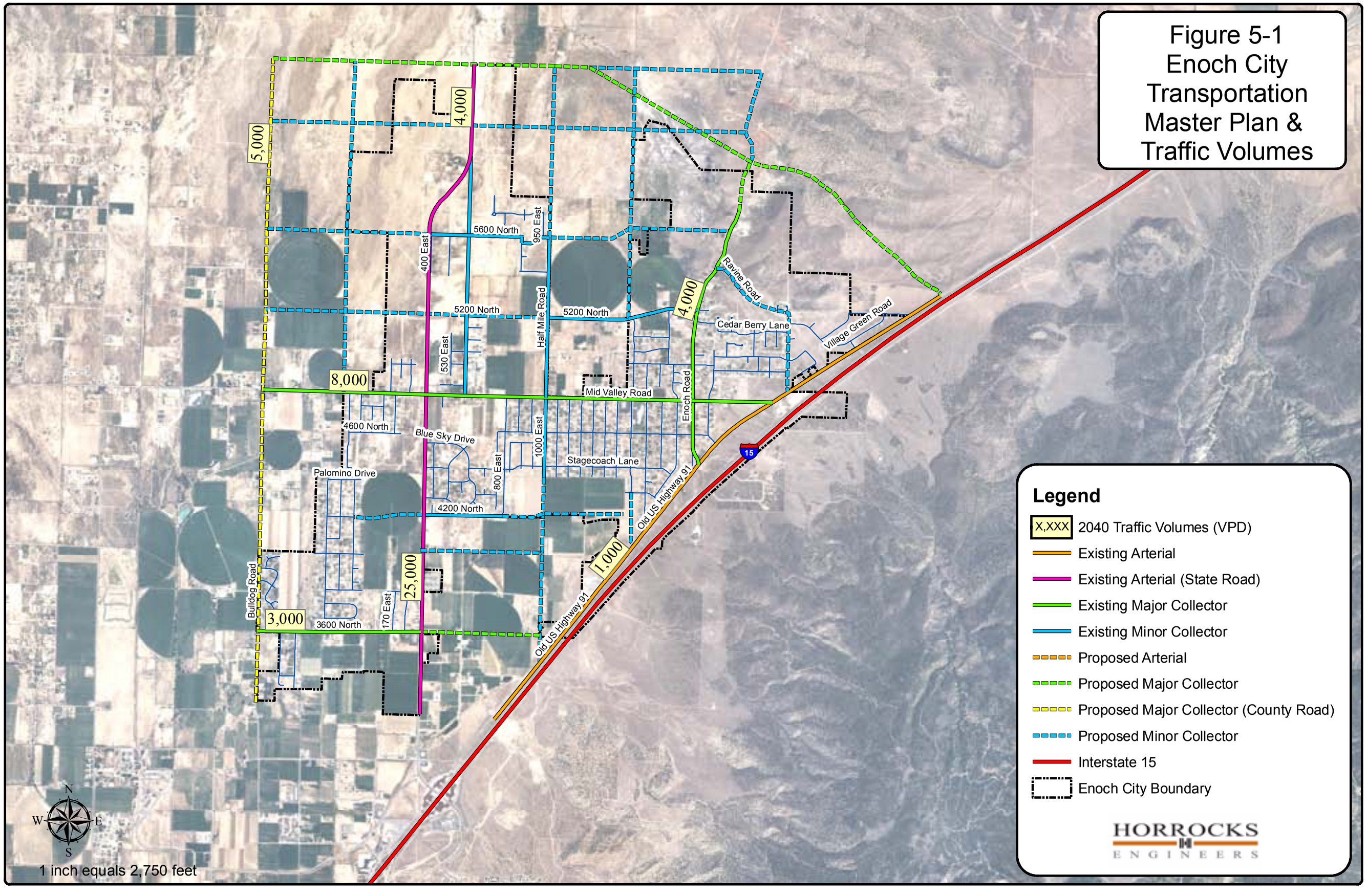


Legend

- Enoch Manholes
- Proposed Lift Station
- Proposed Wet Well
- Existing Outfall
- Existing Remote Flow Meter
- Proposed Remote Flow Meter
- Existing Sewer Pipe
- Proposed 8-inch
- Proposed 10-inch (10,024 ft)
- Proposed 12-inch (6,693 ft)
- Proposed 15-inch (3,588 ft)
- Proposed Force Main
- Existing Cedar City Manholes
- Existing Cedar City Sewer Main
- Enoch City Boundary
- EnochAnnexationBoundaries
- Property Boundary
- Lift_Area

HORROCKS ENGINEERS

Figure 5-1 Enoch City Transportation Master Plan & Traffic Volumes



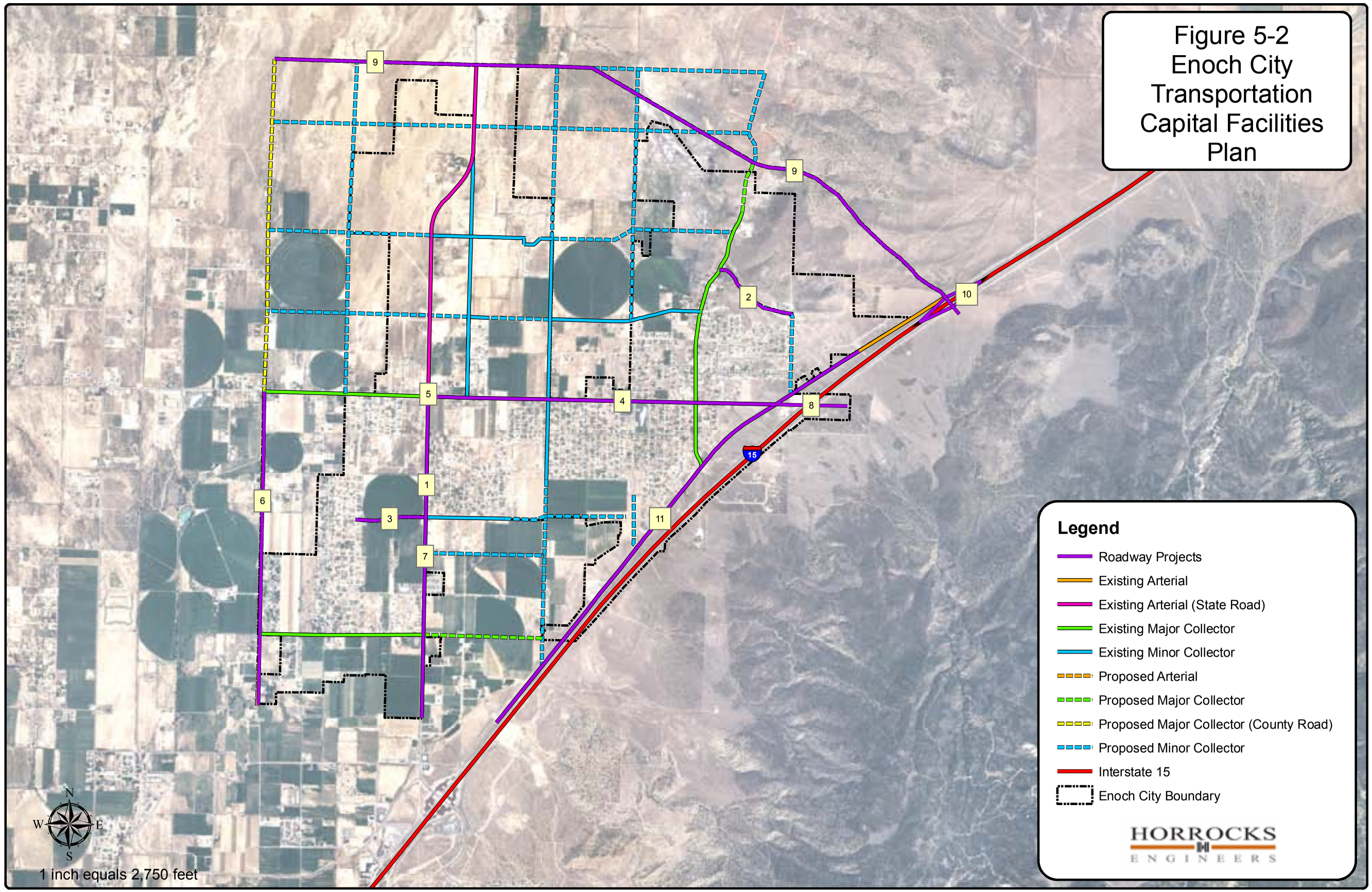


Figure 5-2
Enoch City
Transportation
Capital Facilities
Plan
9
9
10
2
5
4
8
15
1
6
3
11
7
N
W
E
S
1 inch equals 2,750 feet
Legend
Roadway Projects
Existing Arterial
Existing Arterial (State Road)
Existing Major Collector
Existing Minor Collector
Proposed Arterial
Proposed Major Collector
Proposed Major Collector (County Road)
Proposed Minor Collector
Interstate 15
Enoch City Boundary
HORROCKS
ENGINEERS

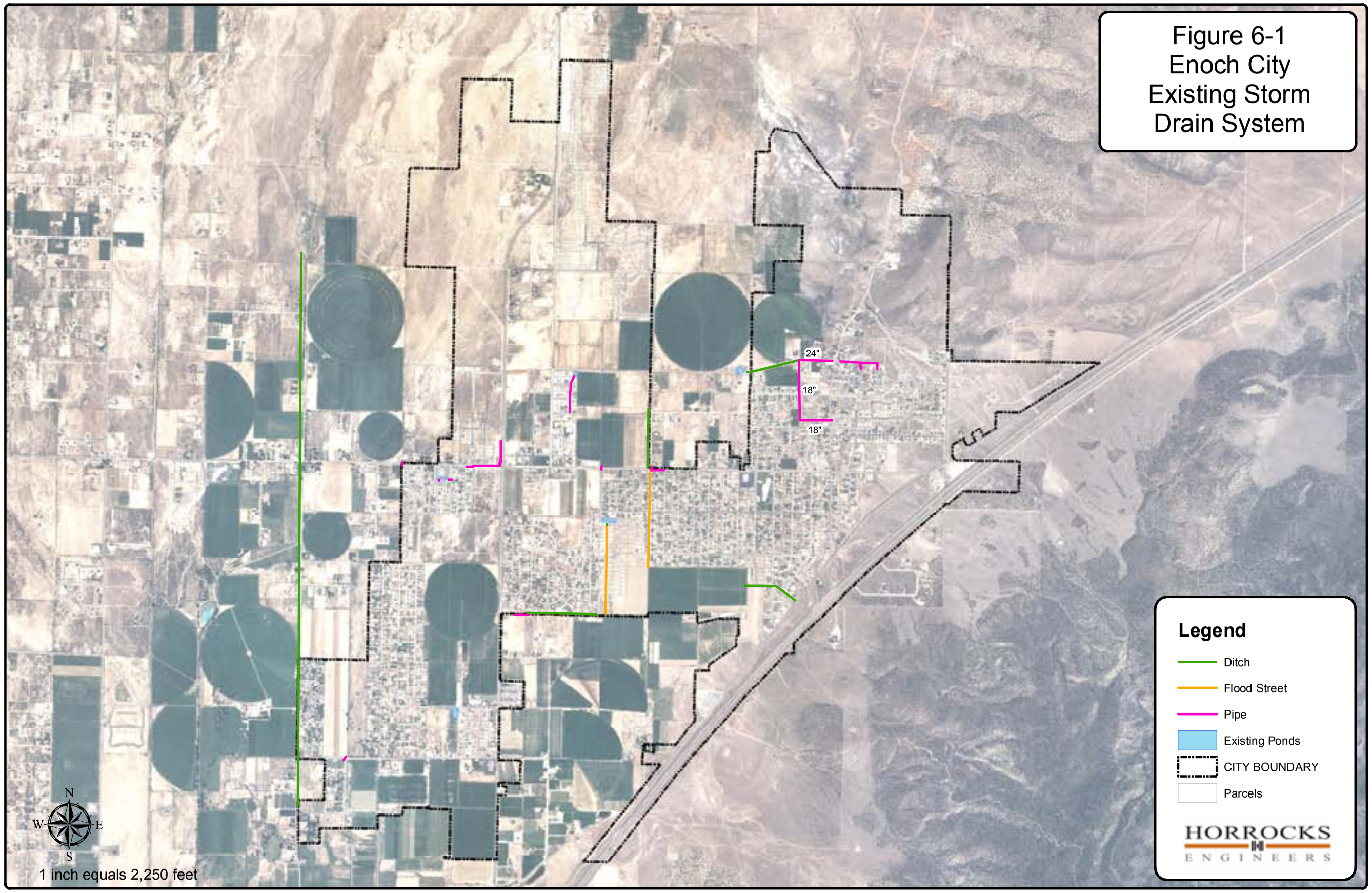


Figure 6-1
Enoch City
Existing Storm
Drain System
24"
18"
18"
Legend
Ditch
Flood Street
Pipe
Existing Ponds
CITY BOUNDARY
Parcels
HORROCKS
ENGINEERS
N
W
E
S
1 inch equals 2,250 feet

Figure 6-2
Enoch City
Storm Drain System
Master Plan

Pond 6:
41 Acre-ft
Pond 5:
21.3 Acre-ft
Pond 11:
85 Acre-ft
Pond 10:
3.9 Acre-ft
Pond 15:
86 Acre-ft
Pond 22:
27 Acre-ft
Pond 21:
9.9 Acre-ft
118 Acres
231 Acres
375 Acres
227 Acres
314 Acres
281 Acres
216 Acres
149 Acres
Pond 14:
2.5 Acre-ft
Pond 19:
2.7 Acre-ft
214 Acres
Pond 9:
7.5 Acre-ft
164 Acres
205 Acres
236 Acres
125 Acres
168 Acres
Pond 13:
0.8 Acre-ft
83 Acres
232 Acres
291 Acres
Pond 18:
3.2 Acre-ft
Pond 20:
3.5 Acre-ft
43 Acres
87 Acres
97 Acres
193 Acres
91 Acres
70 Acres
171 Acres
164 Acres
Pond 2:
1.6 Acre-ft
Pond 8:
19.5 Acre-ft
Pond 12:
3.4 Acre-ft
Pond 17:
7.4 Acre-ft
61 Acres
77 Acres
Pond 24:
1.3 Acre-ft
178 Acres
71 Acres
69 Acres
60 Acres
100 Acres
193 Acres
183 Acres
Pond 16:
6 Acre-ft
Pond 23:
1.4 Acre-ft
189 Acres
332 Acres
Pond 4:
3.9 Acre-ft
273 Acres
125 Acres
222 Acres
Pond 7:
4.6 Acre-ft
125 Acres
109 Acres
Pond 1:
10.7 Acre-ft
Pond 3:
4.1 Acre-ft
155 Acres
147 Acres
183 Acres
126 Acres
99 Acres
138 Acres
326 Acres
88 Acres
135 Acres

N
W
E
S

1 inch equals 2,750 feet

Legend

- Drainage Channel
- 24"
- 30"
- 36"
- 42"
- 48"
- Ponds
- CITY BOUNDARY
- Parcels

HORROCKS ENGINEERS

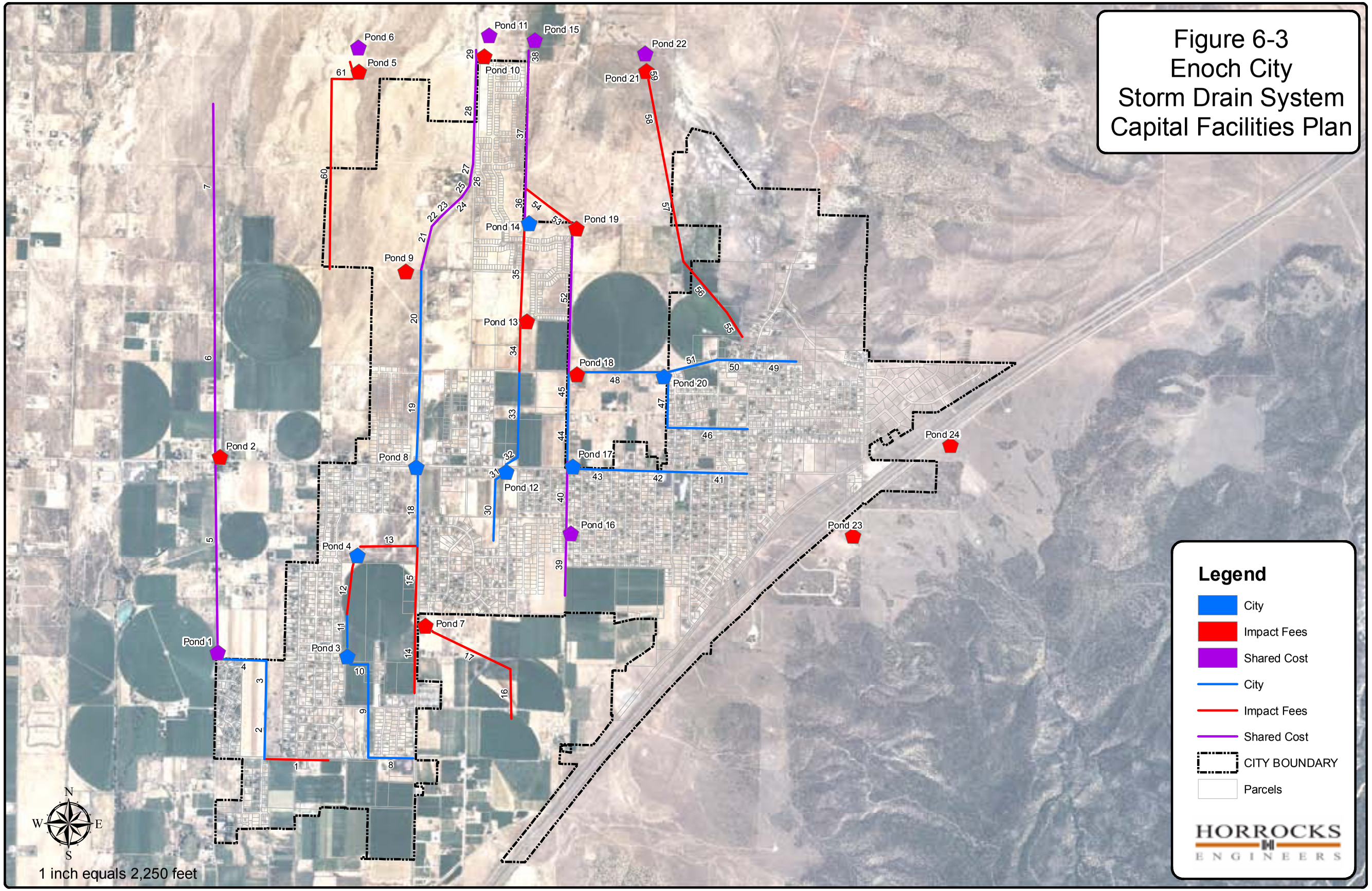


Figure 6-3
Enoch City
Storm Drain System
Capital Facilities Plan
Pond 1
Pond 2
Pond 3
Pond 4
Pond 5
Pond 6
Pond 7
Pond 8
Pond 9
Pond 10
Pond 11
Pond 12
Pond 13
Pond 14
Pond 15
Pond 16
Pond 17
Pond 18
Pond 19
Pond 20
Pond 21
Pond 22
Pond 23
Pond 24
Legend
City
Impact Fees
Shared Cost
City
Impact Fees
Shared Cost
CITY BOUNDARY
Parcels
HORROCKS ENGINEERS
N
W
E
S
1 inch equals 2,250 feet

Figure 8-1
Enoch City
Existing Trails & Parks