

PUBLIC WORKS

WASTEWATER COLLECTION &
WATER RECLAMATION
FACILITY MASTER PLANS



Utility Board Meeting - June 12, 2024 - October 9, 2024

Planning Commission - October 22, 2024

City Council Work Session - November 5, 2024



Why Master Plans?

- Establish Levels of Service
- Project/Estimate Growth
- Quantify System Assets
- Gather Flow Data
- Run Hydraulic Model
- Formulate Capital Projects

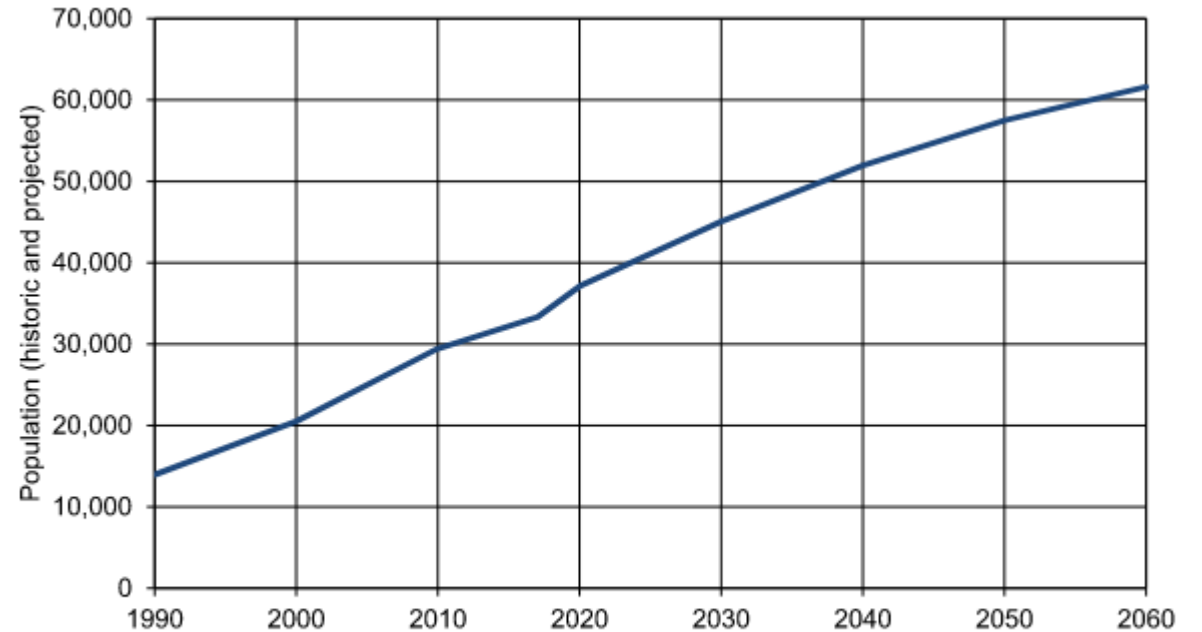
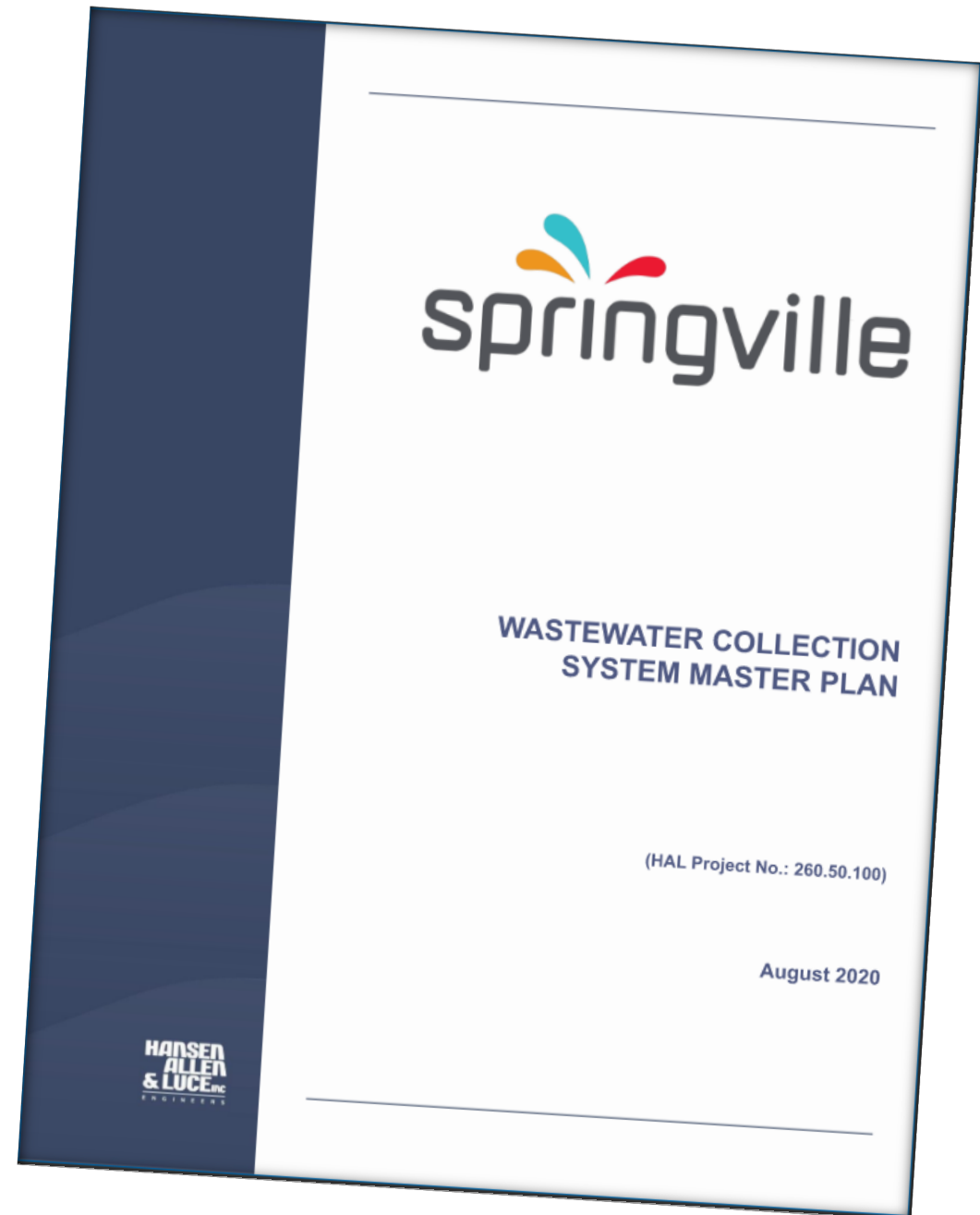
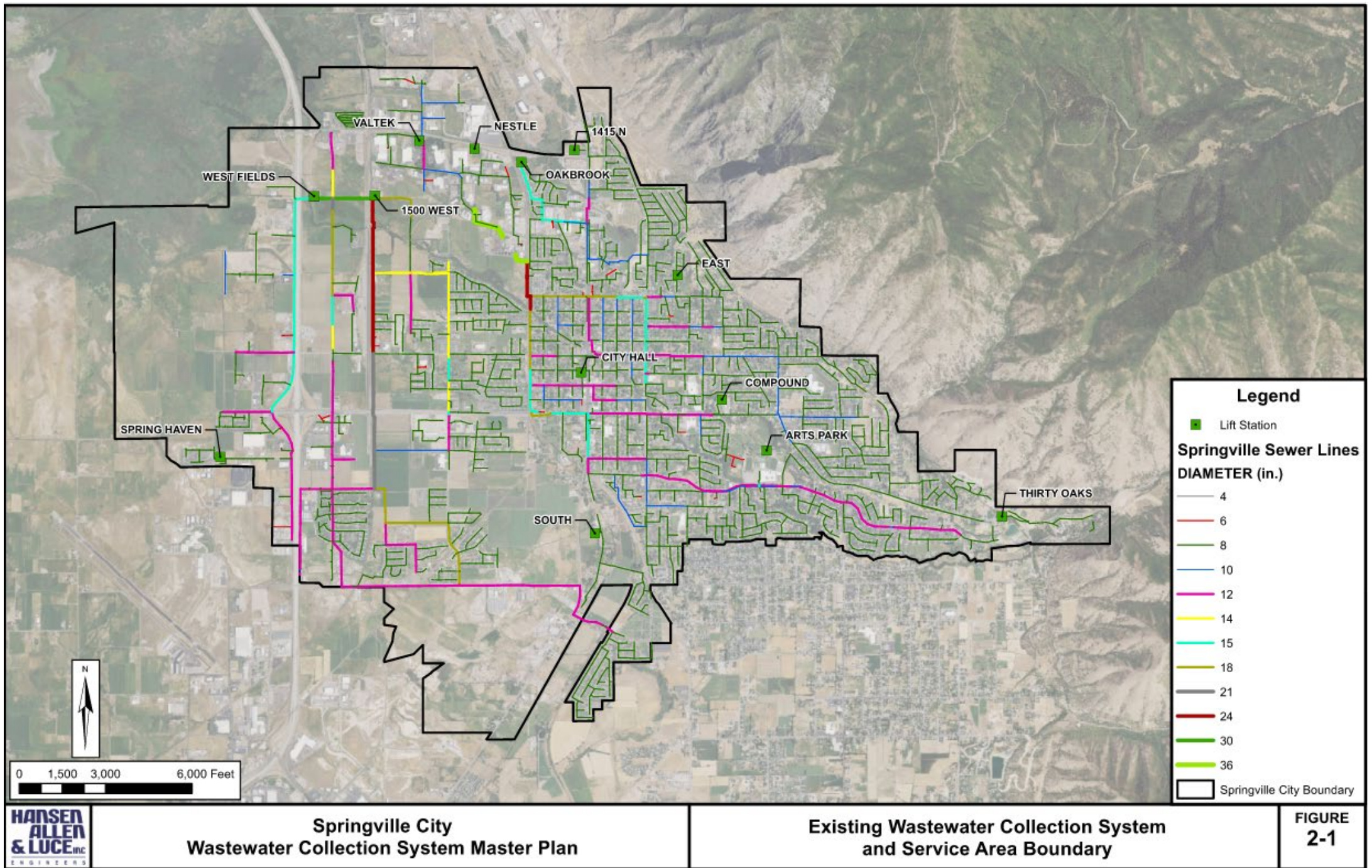


Figure 1-1: Springville Historic and Projected Population
(U.S. Census Bureau 1990, 2000; 2010; GOMB 2017)



WASTEWATER COLLECTION MASTER PLAN







Establish Levels of Service

ERU = Equivalent Residential Unit

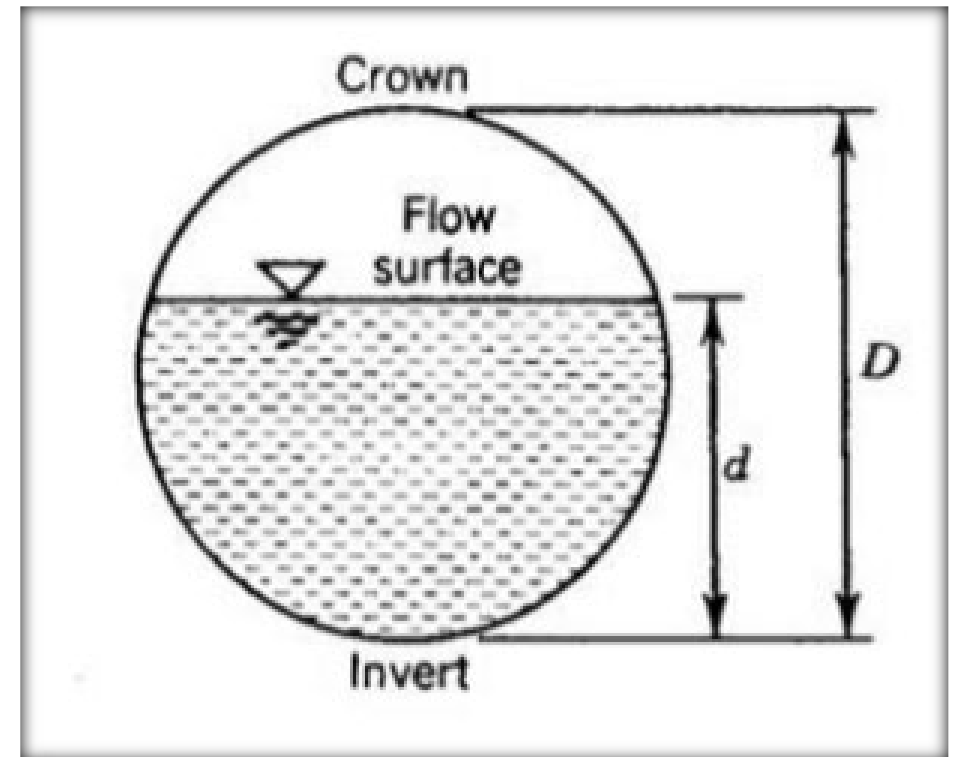
- 250 gallons per day

Peak Daily Flow in Pipe

- Not to exceed a depth/diameter ratio of 0.75

Minimum pipe diameter (State Standard)

- 8-inches





Project/Estimate Growth

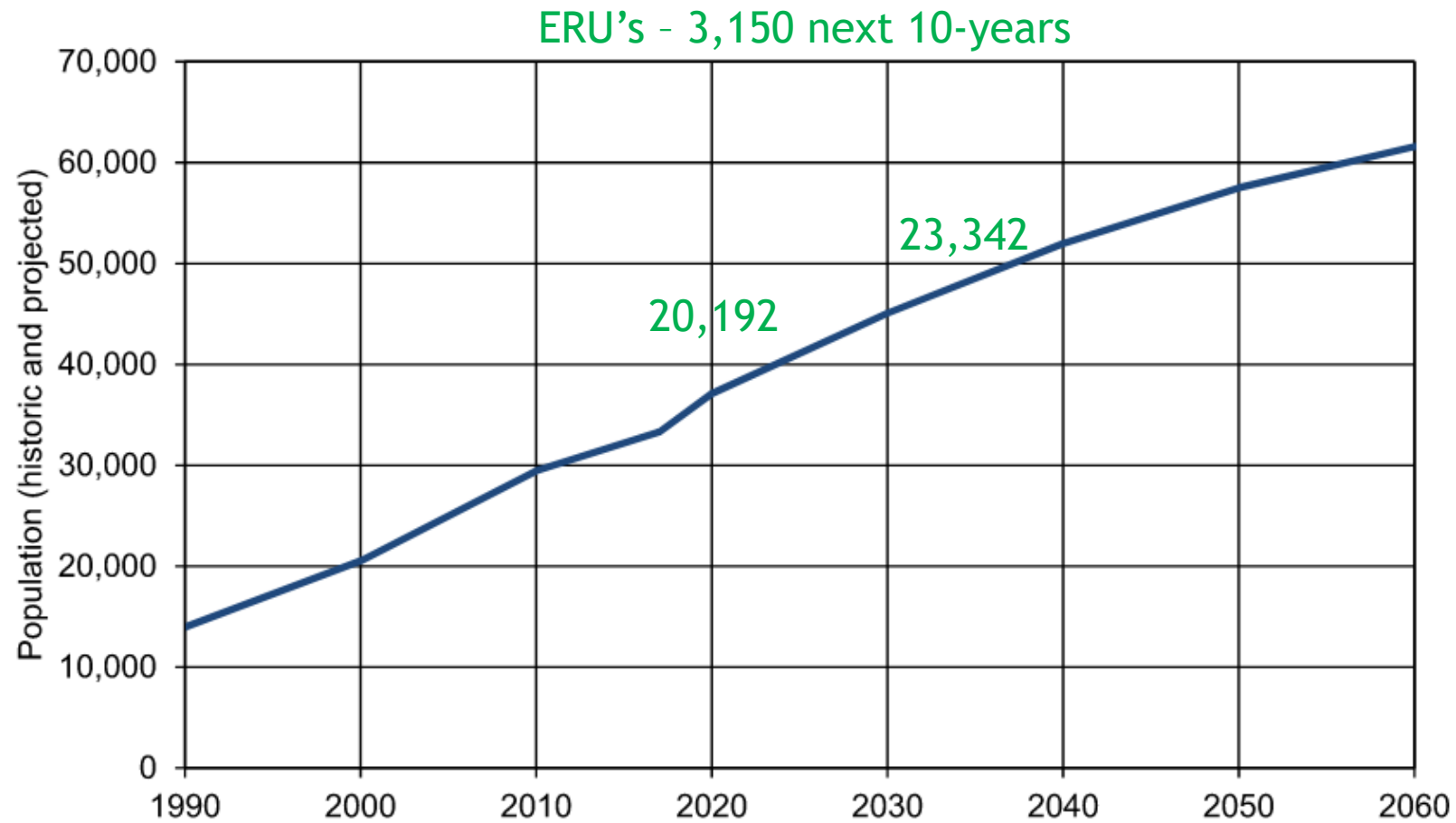
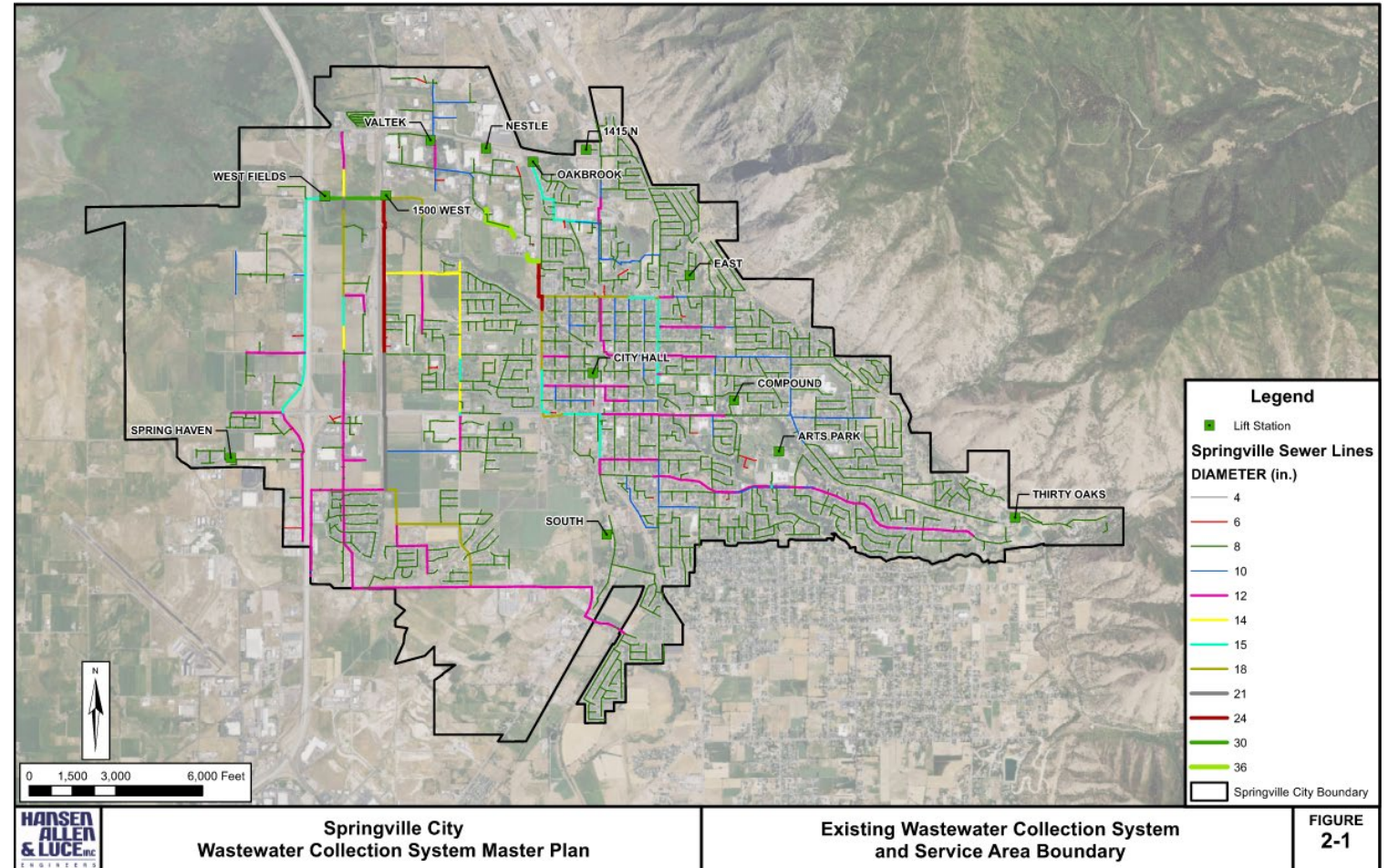


Figure 1-1: Springville Historic and Projected Population
(U.S. Census Bureau 1990, 2000; 2010; GOMB 2017)



Quantify System Assets

- 135 miles of gravity pipelines
 - 4" to 36" diameter
- 12 Sewer Pumping Stations
 - Force Mains 2" to 12" diameter
- 2,700 manholes





Gather Flow Data

Flow Study Locations Determine

- Infiltration - groundwater
 - Changes in the base-flow (minimum flow)
 - 0.4 MGD
- Inflow - surface water
 - 2.0 MGD

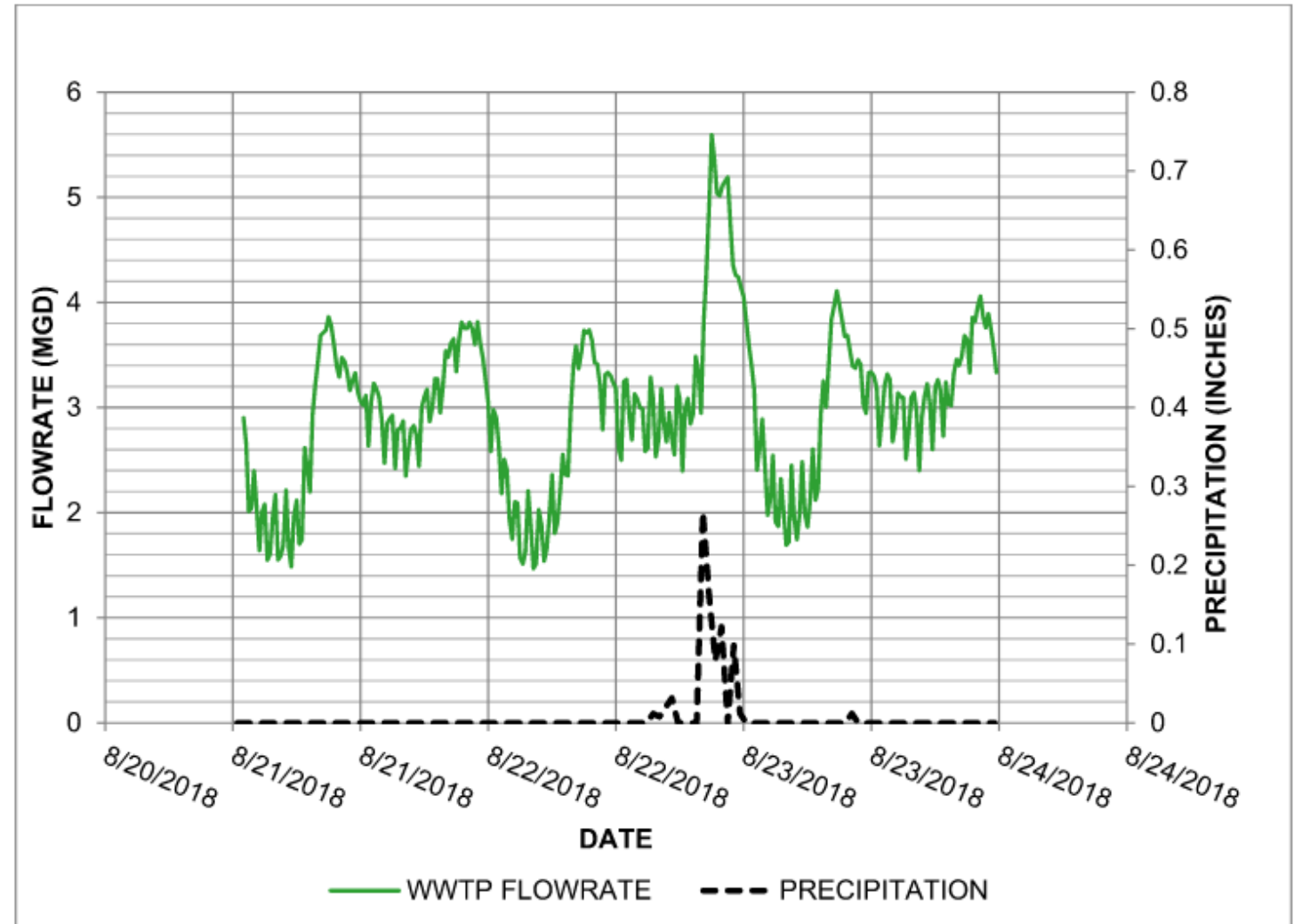


FIGURE 4-6 WWTP FLOW VS. PRECIPITATION



Run Hydraulic Model

Determine flow patterns and variations

- Proper sizing of:
 - Pipelines
 - Pumping Stations
 - Wastewater Treatment Plant

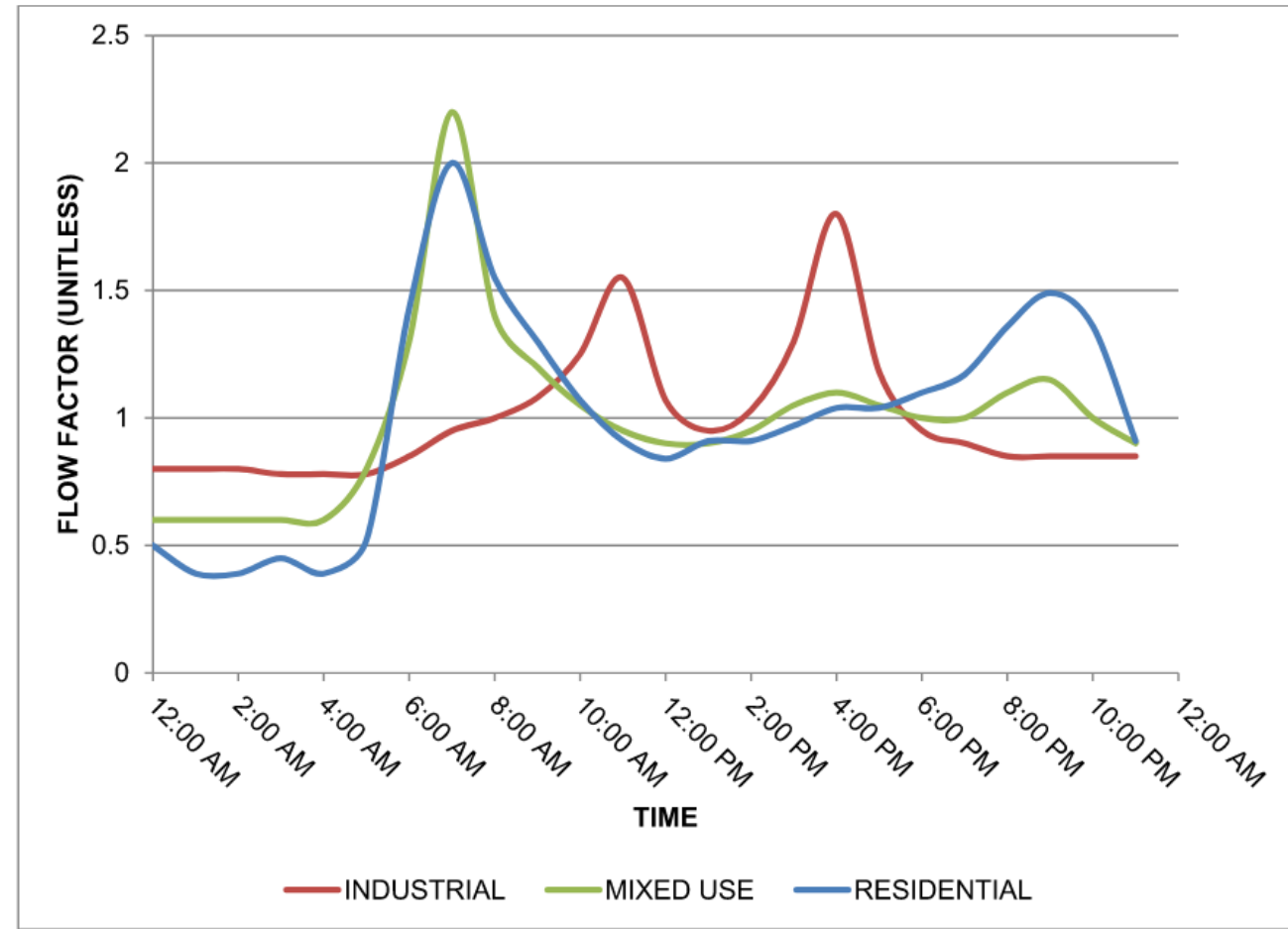
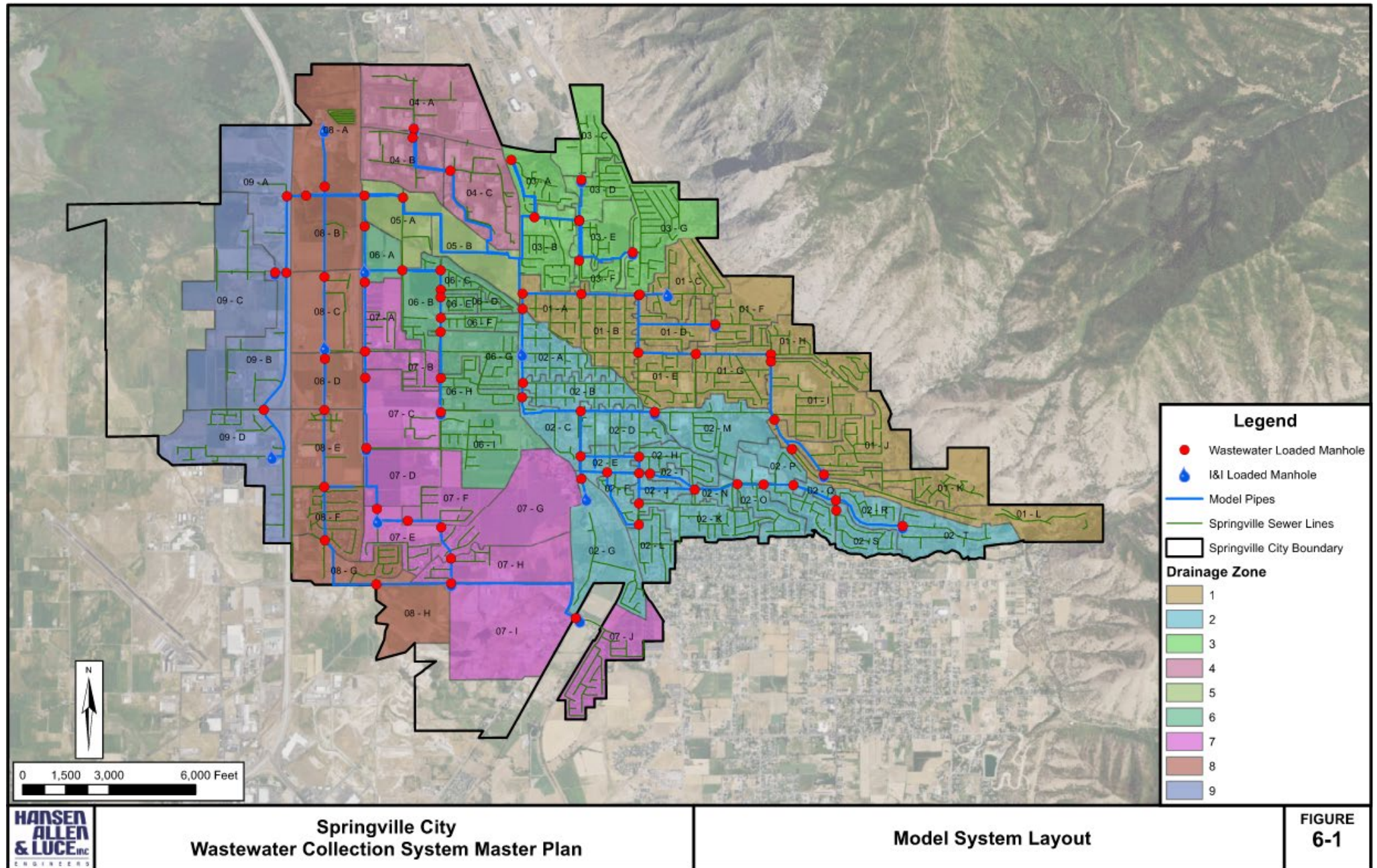


FIGURE 4-2 DIURNAL CURVES

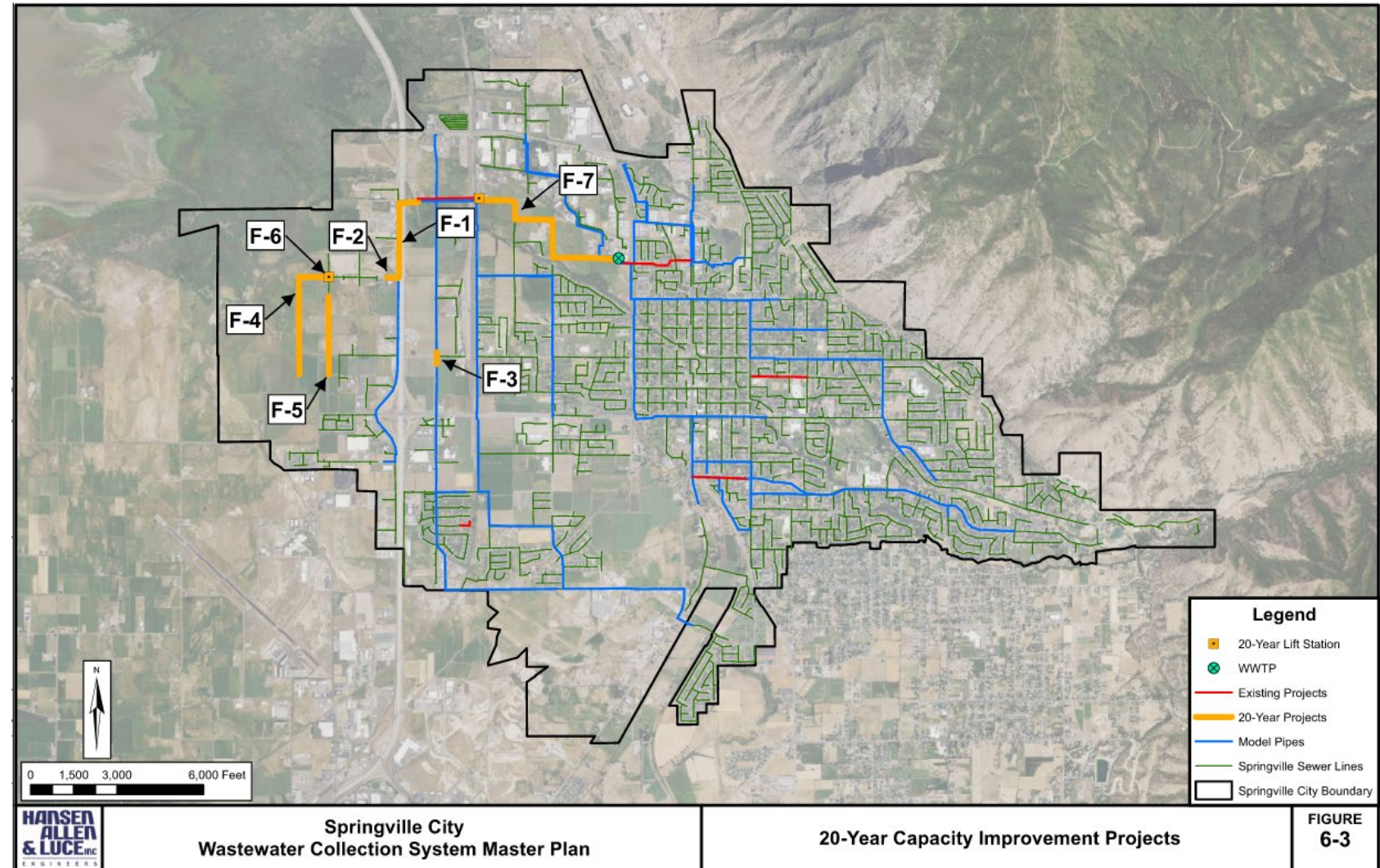




Formulate Capital Projects

Existing Deficiencies

20-Year Capacity
Improvement
Projects





GROWTH RELATED FACILITIES

Growth Related Facilities

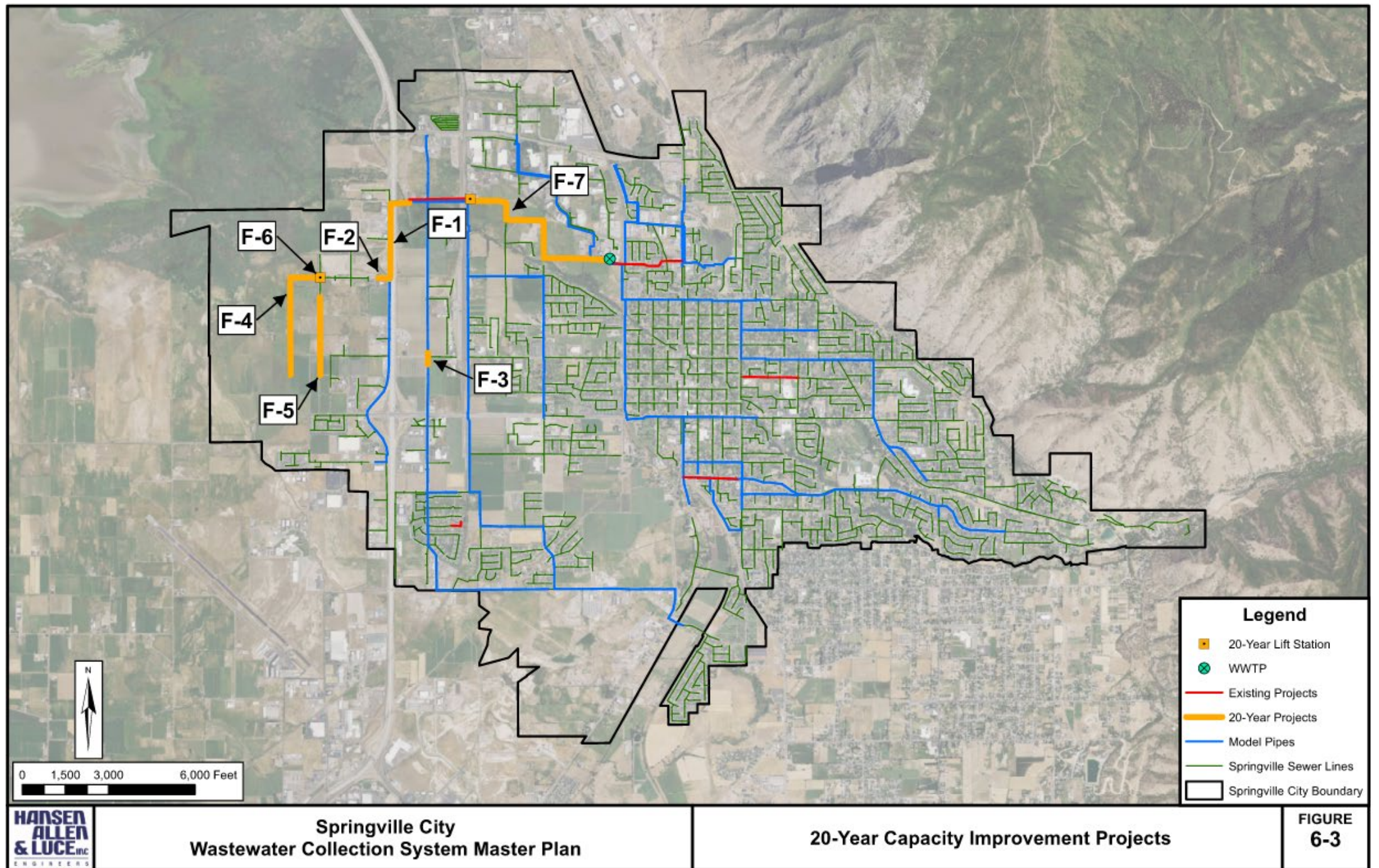
Table 3-4
Estimated Cost of Growth-Related Facilities

Project	Map ID ¹	Total Cost	Percent Eligible for Impact Fee ²	Total Eligible Cost
500 North to 1000 North along 2000 West	F-1	\$3,038,000	100%	\$3,038,000
500 North near 2000 West	F-2	\$223,000	90%	\$201,000
75 South to 25 North along 1750 West	F-3	\$210,000	37%	\$78,000
Anderson Development to Spring Point Lift Station	F-4	\$2,271,000	100%	\$2,271,000
East side of the 2400 West drain toward Spring Point Lift Station	F-5	\$1,362,000	100%	\$1,362,000
Spring Point Lift Station Upgrade (900 gpm)	F-6	\$1,950,000	100%	\$1,950,000
Total		\$9,054,000	-	\$8,900,000

8" to 12" Upsizing

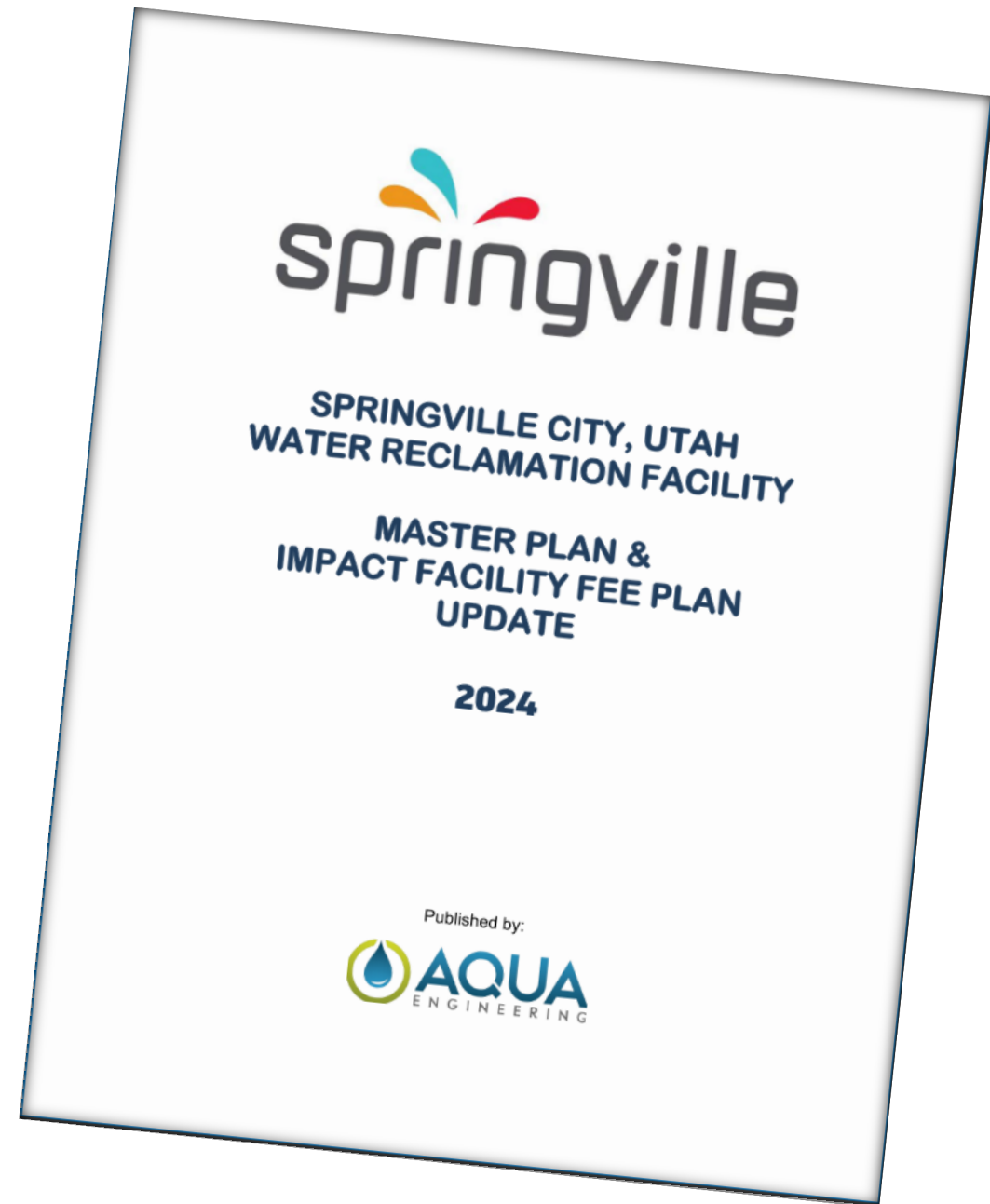


1. Refer to Figure 6-3 of the wastewater collection system master plan for the project and its corresponding ID number. This figure has been included in Appendix A for reference.
2. Percent eligible for impact fee was determined in the previous wastewater collection system master plan.





WATER RECLAMATION FACILITY MASTER PLAN





Establish Levels of Service

ERU = Equivalent Residential User - 2.3 persons

- 250 gpd (peak flow)
- 0.46 lbs BOD/day (at 0.20 lbs. BOD/day per person)
 - BOD = Biological Oxygen Demand - measurement of organic material
- 0.35 lbs. TSS/day (at 0.156 lbs. TSS/day per person)
 - TSS = Total Suspended Solids - measurement of organic & inorganic solids
- 0.072 lbs. TKN/day (at an influent concentration of 45 mg/L)
 - TKN = Total Kjeldahl Nitrogen - organic nitrogen & ammonia
- 0.013 lbs. Phosphorus/day (at an influent concentration of 6.5 mg/L)



Project/Estimate Growth

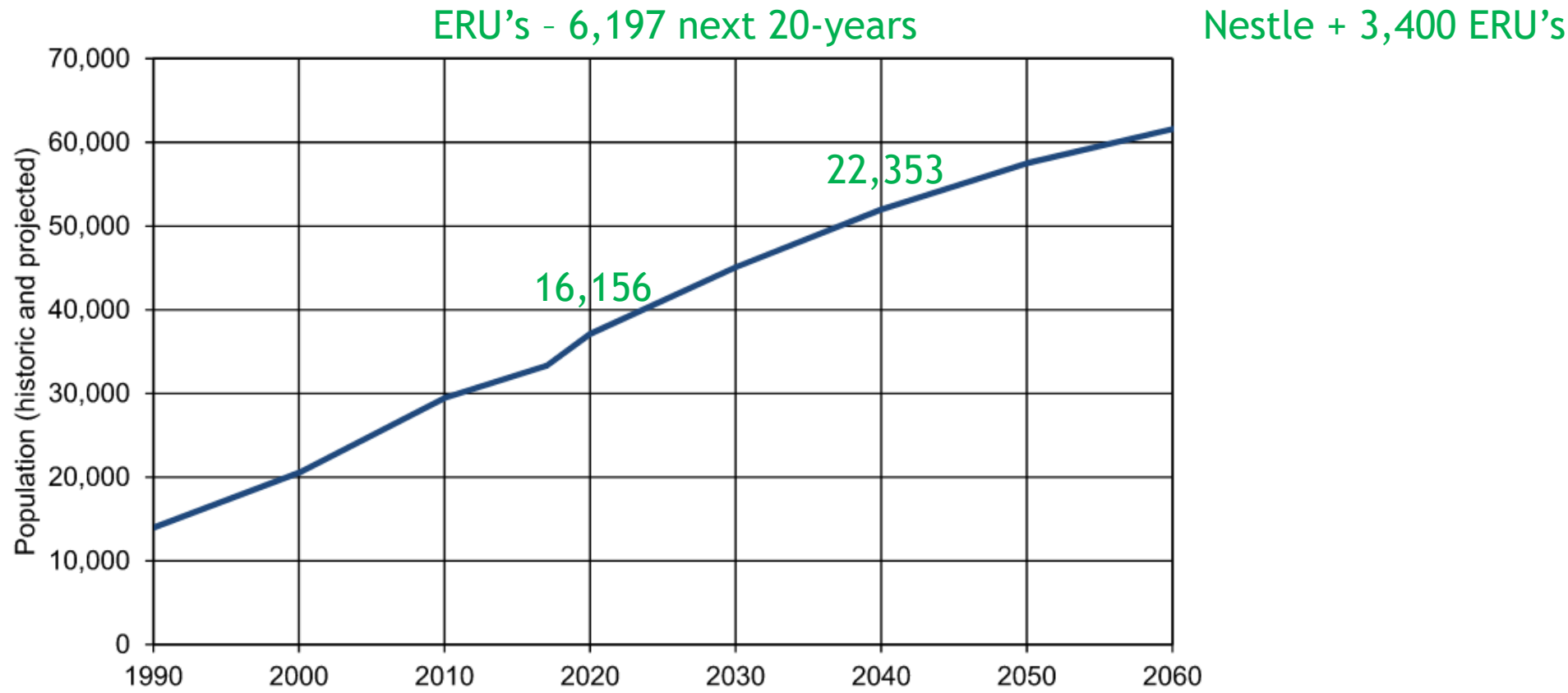


Figure 1-1: Springville Historic and Projected Population
(U.S. Census Bureau 1990, 2000; 2010; GOMB 2017)



Quantify System Assets

Water Reclamation Facility

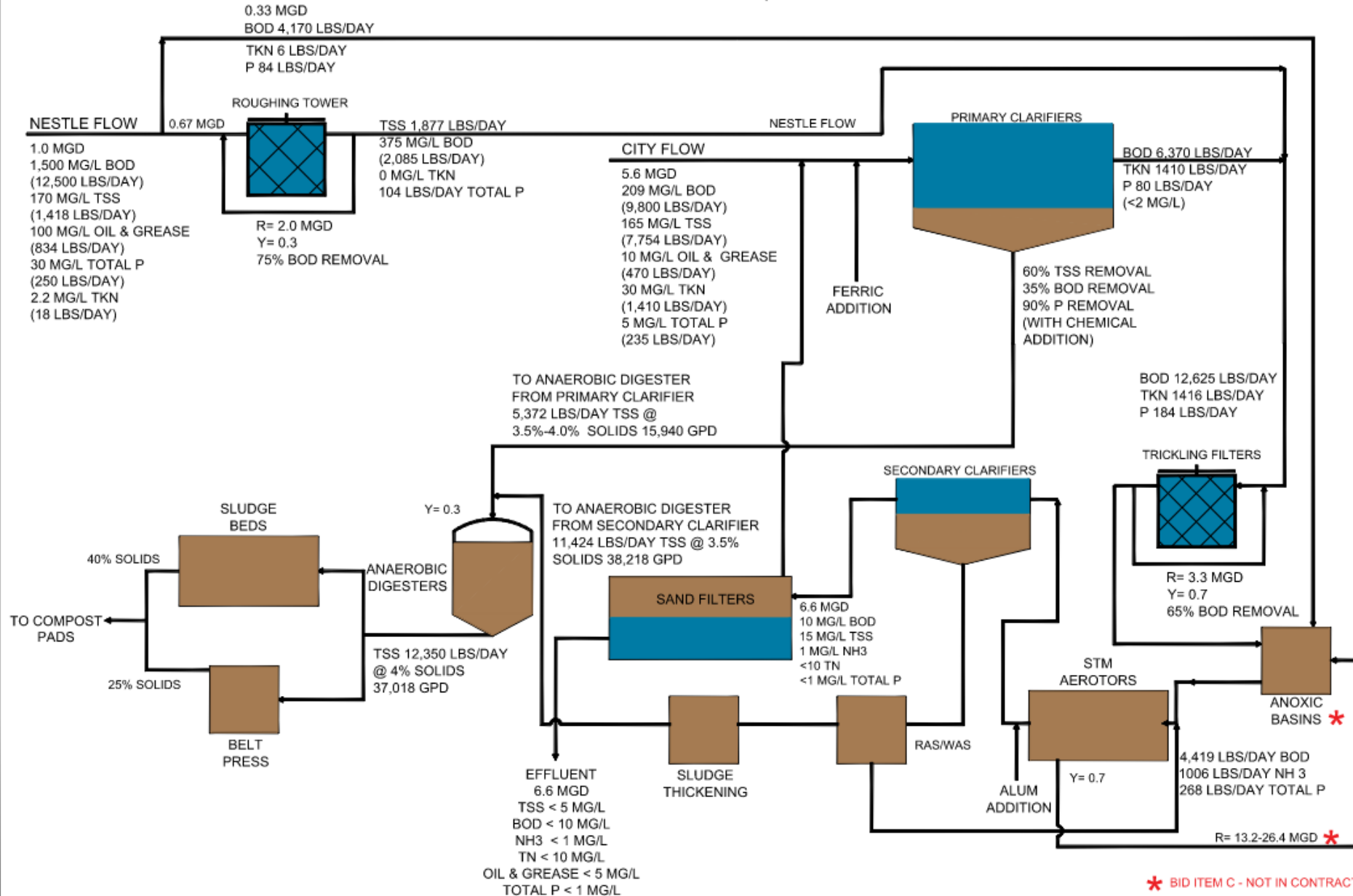
- Average Daily Flow - 6.6 MGD
- Peak Hour Flow - 9.3 MGD

Effluent Discharge

- Little Spring Creek



SPRINGVILLE CITY POTW
MASS FLOW BALANCE
TO A POPULATION OF 49,000
AND NESTLE BOD LOADING OF 12,500 LBS/DAY



NO.	DATE	DESIGN	DRAWN	CHECKED	BY	DATE	REVISIONS
1	10/14/2021						
2							
3							
4							
5							
6							
7							
8							
9							
10							

SPRINGVILLE CITY
700 NORTH 500 WEST, SPRINGVILLE, UT
WWTP 2020 GENERAL UPGRADE
GENERAL
MASS FLOW BALANCE

* BID ITEM C - NOT IN CONTRACT



Gather Flow Data

Table 2-7: Summary of recommended design parameters.

Parameter	2023	2043	2060
Population	36,772	50,875	58,378
Collection System ERUs	16,156	22,353	25,649
Nestle ERUs	3,400	3,400	3,400
Total Design ADF @ 250 gpm/ERU (Design ADF Capacity is 6.6 MGD)	4.89 MGD	6.44 MGD	7.26 MGD*
Calculated Total Peak Flow** (Design PHF Capacity is 9.3 MGD)	7.3 MGD	9.7 MGD*	11.0 MGD*
Domestic/Collection System BOD Load (Design BOD Capacity is 9,800 #/day)	7,432 #/day	10,282 #/day*	11,799 #/day*
Design Nestle BOD Load (Max)	12,500 #/day	12,500 #/day	12,500 #/day
Total Influent BOD Loading (Design Total BOD Capacity is 22,300 #/day)	19,932 #/day	22,782 #/day*	24,299 #/day*
BOD Loading to Secondary Process† (Design Secondary BOD Capacity is 12,625 #/day)	11,086 #/day	12,939 #/day*	13,924 #/day*
Total TSS Loading (Design TSS Capacity is 10,100 #/day)	8,000 #/day	10,169 #/day	11,323 #/day
Total TKN Loading (Design TKN Capacity is 1,416 #/day)	1,163 #/day	1,609 #/day	1,847 #/day
Total Phosphorus Loading	398 #/day	479 #/day	521 #/day

* Values highlighted in yellow indicate parameters that exceed the current rated capacity of the WRF.

** Assumes increasing I&I with growth. If I&I remains stable, projected peak 2060 flow is 9.5 MGD.

† Accounts for Nestle BOD reduction in roughing tower and municipal BOD removal in primary clarifiers.



Formulate Capital Projects - Phase 1

Immediate - 1 to 2 Years

Near Term - 3 to 6 Years

Table 3-14: Summary of recommended Phase 1 upgrades.

Springville WRF Phase 1 Upgrade - Cost Estimate Summary	
Immediate Needs Projects	
Item	Cost
Influent Flow & Headworks Upgrades*	\$ 3,329,040.00
Recoat Existing Primary Clarifier Mechanisms**	\$ 310,200.00
Tertiary Filtration Upgrades	\$ 2,437,600.00
Digester & Biogas Handling Upgrades	\$ 591,662.00
Replace Pump Bldg. MCCs, PLC, and Transformer	\$ 483,000.00
Immediate Needs Subtotal	\$ 7,151,502.00
Recommended Near-Term Projects	
Item	Cost
Digester Heating & Lid Rehabilitation	\$ 1,903,687.00
Retrofit STM Aerotor Basins w/ Fine Bubble Diffusers	\$ 1,270,150.00
Standby Generators	\$ 1,322,520.00
Sludge Dewatering Upgrades	\$ 1,468,038.00
Near-Term Projects Subtotal	\$ 5,964,395.00
PHASE 1 TOTAL	\$ 13,115,897.00

* Assumes replacement of grit removal with new system and classifier. Cost estimate without new grit equipment is \$2.55 million.

** Replacement is included with Phase 2 improvements but may be required sooner depending on the condition of the mechanisms.



Formulate Capital Projects - Phase 2 by 2035

Table 3-22: Summary of Phase 2 expansion cost estimates.

Springville WRF Phase 2 Upgrade - Cost Estimate Summary	
Item	Cost
Replace Primary Clarifier Mechanisms	\$ 2,955,095.00
BNR & Aeration Basins Replacing Trickling Filters*	\$ 14,019,720.00
UV Disinfection Expansion (Type I Reuse)	\$ 4,298,937.00
Digester Sidestream Treatment	\$ 348,562.00
Digester, Sludge Handling & Building Rehabilitation	\$ 2,927,925.00
Expand Composting Facility Area	\$ 1,569,750.00
Miscellaneous Phase 2 Civil Upgrades	\$ 2,302,300.00
TOTAL	\$ 28,422,289.00
Nestle Roughing Tower Upgrades**	\$ 2,976,545.00

* Timing would coincide with permit changes associated with total N limits.

** Costs may be shared with or even completed covered by Nestle rather than the City.



Summary

Water Reclamation Facility

- Sufficient hydraulic and biological capacity to meet *current* permit requirements for an estimated 15 years.
- Phase 2 incorporates BNR (biological nutrient removal) to address total nitrogen limits and provide biological phosphorus removal



FUTURE IMPACT FEE ELIGIBLE COSTS

Table 4-2: Summary of Phase 1 upgrade expenses and impact fee eligibility.

SPRINGVILLE WRF PHASE 1 UPGRADES TOTAL COST & IMPACT FEE SUMMARY											
	Phase 1 Upgrade/Project Item	Planning (Year)	Installation (Year)	Existing ERUs	Nestle ERUs Served	New ERUs Served	% Impact Fee Eligible	Estimated Total Cost	Impact Fee Eligible	Expense for Existing Users	
Immediate	Headworks Upgrades	2023	2024	16,156	-0-	6,844	29.76%	\$ 3,329,040.00	\$ 990,606.51	\$ 2,338,433.49	
	Primary Clarifier Rehabilitation	2024	2024-25	16,156	-0-	6,844	0.00%	\$ 310,200.00	\$ -	\$ 310,200.00	
	Tertiary Filtration Upgrades	2023-24	2024-25	16,156	3,400	6,844	0.00%	\$ 2,437,600.00	\$ -	\$ 2,437,600.00	
	Digester Biogas Handling	2023-24	2024-25	16,156	3,400	6,844	0.00%	\$ 591,662.00	\$ -	\$ 591,662.00	
	MCC, PLC, & Transformer Replacement	2023-24	2024-25	16,156	3,400	6,844	0.00%	\$ 483,000.00	\$ -	\$ 483,000.00	
Near-Term	Digester Sludge Handling Upgrades	2024	2025	16,156	3,400	6,844	0.00%	\$ 1,903,687.00	\$ -	\$ 1,903,687.00	
	Convert STM to Aeration Basin	2024	2025-26	986	3,400	6,844	0.00%	\$ 1,270,150.00	\$ -	\$ 1,270,150.00	
	Standby Generator	2025	2026-27	16,156	3,400	6,844	25.92%	\$ 1,322,520.00	\$ 342,853.29	\$ 979,666.71	
	Sludge Dewatering Upgrades	2025	2026-27	16,156	3,400	6,844	25.92%	\$ 1,468,038.00	\$ 380,577.73	\$ 1,087,460.27	
TOTAL COST FOR ALL IMPROVEMENTS								\$13,115,897.00			
SUBTOTAL OF IMPACT FEES FOR NEW CONNECTIONS FROM PROPOSED IMPROVEMENTS								\$1,714,037.53			
SUBTOTAL OF IMPACT FEES FROM PREVIOUS IMPROVEMENTS								\$8,458,724.27			
TOTAL IMPACT FEE ELIGIBLE COSTS (PAST & PROPOSED)								\$10,172,761.80			
TOTAL COST FOR EXISTING CONNECTIONS ASSOCIATED WITH PROPOSED IMPROVEMENTS								\$11,401,859.47			



EXISTING IMPACT FEE ELIGIBLE COSTS

Table 4-3: Summary of impact fees from previous and proposed improvements.

Springville WRF - Past Improvements Impact Fee Summary						
	Total Cost	Existing ERUs	Nestle ERUs	New ERUs	% Impact Fee	Impact Fee Eligible
Initial Plant - All ERUs ¹	\$ 9,275,103.17	16,156	3,400	2,444	11.11%	\$ 1,030,379.64
2010 WRF Upgrade & Expansion ²	\$ 10,704,309.90	16,156	3,400	6,844	60.94%	\$ 6,523,581.86
Post 2010 Plant Upgrades - All ERUs	\$ 2,181,253.41	16,156	3,400	6,844	25.92%	\$ 565,473.42
TOTAL	\$ 22,160,666.48	TOTAL IMPACT FEE FROM PAST IMPROVEMENTS				\$ 8,119,434.92
TOTAL NEW PROPOSED IMPACT FEES (SEE TABLE 4-2)						\$ 1,714,037.53
Total Proposed Impact Fee Eligible Costs						\$ 9,833,472.45

1 Original plant design and buy-in was 5.5 MGD equating to 22,000 ERUs.

2 2010 Upgrade & Expansion provides ammonia polishing for existing connections and full ammonia *and* full BOD removal for new connections, resulting in a net ~61% of the expanded capacity remaining for future connections.



COMPARING IMPACT FEE COSTS

CITY	WASTEWATER
Highland	\$7,754
Vineyard	\$7,372
Payson	\$7,177
Saratoga Springs	\$6,198
Pleasant Grove	\$6,015
Cedar Hills	\$5,910
Lehi	\$5,849
American Fork	\$5,821
Eagle Mountain	\$5,603
Salem	\$5,377
Alpine	\$5,344
Elk Ridge	\$5,209
COUNTY AVERAGE	\$5,148
Santaquin	\$5,096
Woodland Hills	\$4,612
Provo	\$4,450
Spanish Fork	\$4,215
Mapleton	\$3,157
Springville Proposed	\$2,886
Lindon	\$1,809
Springville Current	\$1,716
Orem	\$847



COMPARING IMPACT FEE COSTS

Springville Impact Fee Comparison					
Impact Fee	Springville Current Fee	Springville Maximum Allowable Fee	County Average Fee	Percent Increase Proposed	Percent Over/Under County Average
Drinking Water Indoor	\$1,068.00	\$1,256.00	\$2,663.33		
***Drinking Water Outdoor	\$1,443.00	\$2,772.00			
***PI	\$1,443.00	\$2,341.00	\$3,450.45		
ALL Water Combined (Indoor and Outdoor)	\$2,511.00	\$3,597.00	\$4,743.92	43%	-24%
Sewer Collections & **Treatment	\$1,716.00	\$2,886.15	\$5,148.13	68%	-44%
*Storm Water	\$615.60	\$2,645.04	\$993.61	330%	166%
Transportation	\$848.81	\$1,406.79	\$1,642.81	66%	-14%
Parks	\$6,062.70	\$8,235.00	\$3,693.24	36%	123%
Public Safety	\$478.74	\$1,098.00	\$649.93	129%	69%
Total of All Fees	\$12,232.85	\$19,867.98	\$16,871.64	62%	18%
Electrical	\$1,277.00	\$1,277.00	\$1,605.18	0%	-20%

PUBLIC WORKS



QUESTIONS?