IMPACT FEE ANALYSIS (IFA)

PURSUANT TO 11-36A, UTAH CODE

PARKS AND RECREATION, FIRE, TRANSPORTATION, AND STORM WATER

NOVEMBER 2020

APPLE VALLEY, UTAH

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IFA CERTIFICATION

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LYRB certifies that the attached impact fee analysis:

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

LYRB makes this certification with the following caveats:

1. All of the recommendations for implementations of the IFFP made in the IFFP documents or in the IFA documents are followed by City Staff and elected officials.
2. If all or a portion of the IFFP or IFA are modified or amended, this certification is no longer valid.
3. All information provided to LYRB is assumed to be correct, complete, and accurate. This includes information provided by the City as well as outside sources.

LEWIS YOUNG ROBERTSON & BURNINGHAM, INC.

SECTION 1: EXECUTIVE SUMMARY

The purpose of the Impact Fee Analysis ("IFA"), is to fulfill the requirements established in Utah Code Title 11 Chapter 36a, the "Impact Fees Act", and assist Apple Valley (the "City") in planning necessary capital improvements for future growth. This document will address the future facilities and infrastructure needed to serve the City through the next ten years for parks and recreation, fire/EMS, transportation, and storm water, as well as the appropriate impact fees the City may charge to new growth to maintain the adopted levels of service ("LOS"). This analysis is based on the information contained in the IFFPs for each service or utility, all completed by Sunrise Engineering.

- **Service Area:** The service area ("Service Area") is defined as all areas within the City as shown in **Section 3**.
- **Demand Analysis:** The demand units used in this analysis are population, calls for fire services, trips, single family equivalents (SFEs), and acreage. As a result of new growth, the City will need to construct additional facilities to maintain each existing LOS.
- **Level of Service:** The existing LOS for each utility or service is defined in detail in each section of this document. Through an inventory of existing facilities combined with existing development, this analysis identifies the LOS provided to the City's existing development and ensures that future facilities maintain these standards.
- **Existing Facilities and Excess Capacity:** The demand analysis and LOS analysis allow for the development of a list of capital facilities necessary to serve new growth and maintain the existing LOS. This list includes any excess capacity of existing facilities, as well as future system improvements necessary to maintain the LOS. The inclusion of excess capacity is known as a "buy-in." Any demand generated from new development that overburdens the existing system beyond the existing capacity justifies the construction of new facilities. A buy-in component is not contemplated in this analysis for parks, fire service or storm water. In reference to transportation, City general fixed asset schedules were used to determine a value for existing facilities. This cost is then divided by trips served to calculate a buy-in component.
- **Outstanding Debt:** No outstanding debt was considered in the calculation of the impact fees.
- **Future Capital Facilities Analysis:** The following sections in this analysis identify the capital facilities needed to maintain the LOS based on the demand analysis specific to parks and recreation, fire/EMS, transportation, and storm water. The growth projections, improvements necessary to serve the anticipated development and impact fee calculations consider a ten-year time horizon.
- **Funding of Future Facilities:** This analysis assumes future growth-related facilities will be funded through a combination of General Fund revenues, grant monies, other governmental revenues, and impact fee revenues. Where applicable, interest costs can be included in the total cost to fund proposed system improvements.

SUMMARY OF PROPOSED IMPACT FEES

The impact fees proposed in this analysis will be assessed within the entire Service Area. The table below illustrates the calculated impact fees for parks and recreation, fire/EMS, transportation, and storm water by land-use category. The calculation of impact fees relies upon the information contained in this analysis. Impact fees are then calculated based on many variables centered on proportionality share and LOS.

TABLE 1.1: IMPACT FEES PER LAND USE

	PARKS & RECREATION	FIRE/EMS	TRANSPORTATION	STORM WATER*	TOTAL FEE
Single Family Dwelling Unit	$725	$844	$2,660	$1,443	**$5,672**
Multi-Family Dwelling Unit	$725	$571	$1,800	$1,443	**$4,539**
Shopping Center (per 1K SF)	NA	$32,117	$7,466	$1,443	**$41,026**
General Office (per 1K SF)	NA	$16,413	$3,816	$1,443	**$21,672**
Light Industrial (per 1K SF)	NA	$9,594	$2,230	$1,443	**$13,267**

*Assumes 0.5-acre lot

NON-STANDARD IMPACT FEES

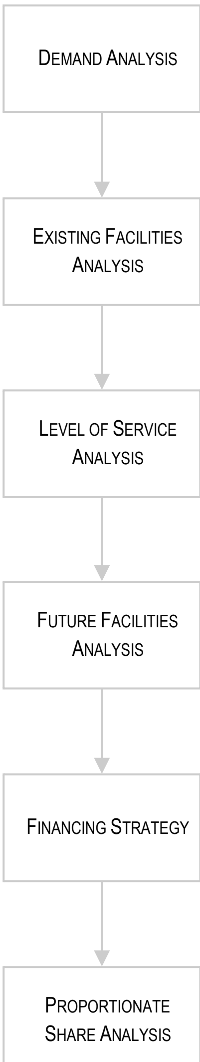
The City reserves the right under the Impact Fees Act to assess an adjusted fee that more closely matches the true impact that a specific land use will have upon public facilities.[1] This adjustment could result in a different impact fee than what is standard for its land use. An adjustment can be made if the developer can provide documentation, evidence, or other credible analysis that the proposed impact will be different than what is proposed in this analysis.

[1] 11-36a-402(1)(c)

SECTION 2: GENERAL IMPACT FEE METHODOLOGY

The purpose of this study is to fulfill the requirements of the Impact Fees Act regarding the establishment of an IFA[2]. The IFFP is designed to identify the demands placed upon the City's existing facilities by future development and evaluate how these demands will be met by the City. The IFFP is also intended to outline the improvements which are intended to be funded by impact fees. The IFA is designed to proportionately allocate the cost of the new facilities and any excess capacity to new development, while ensuring that all methods of financing are considered. Each component must consider the historic level of service ("LOS") provided to existing development and ensure that impact fees are not used to raise that LOS. The following elements are important considerations when completing an IFA:

FIGURE 2.1: IMPACT FEE METHODOLOGY



DEMAND ANALYSIS

The demand analysis serves as the foundation for the analysis. This element focuses on a specific demand unit related to each public service – the existing demand on public facilities and the future demand as a result of new development that will impact public facilities.

EXISTING FACILITY INVENTORY

In order to quantify the demands placed upon existing public facilities by new development activity, the analysis provides an inventory of the City's existing system facilities. The inventory does not include project improvements. The inventory of existing facilities is important to properly determine the excess capacity of existing facilities and the utilization of excess capacity by new development. Any excess capacity identified within existing facilities can be apportioned to future new development.

LEVEL OF SERVICE ANALYSIS

The demand placed upon existing public facilities by existing development is known as the existing LOS. Through the inventory of existing facilities, combined with the growth assumptions, this analysis identifies the LOS which is provided to a community's existing residents and ensures that future facilities maintain these standards.

FUTURE CAPITAL FACILITIES ANALYSIS

The demand analysis, existing facility inventory and LOS analysis allow for the development of a list of capital projects necessary to serve new growth and to maintain the existing system. This list includes any excess capacity of existing facilities as well as future system improvements necessary to maintain the LOS. Any demand generated from new development that overburdens the existing system beyond the existing capacity justifies the construction of new facilities.

FINANCING STRATEGY – CONSIDERATION OF ALL REVENUE SOURCES

This analysis must also include a consideration of all revenue sources, including impact fees, debt costs, alternative funding sources, and the dedication (aka donations) of system improvements, which may be used to finance system improvements.[3] In conjunction with this revenue analysis, there must be a determination that impact fees are necessary to achieve an equitable allocation of the costs of the new facilities between the new and existing users.[4]

PROPORTIONATE SHARE ANALYSIS

The written impact fee analysis is required under the Impact Fees Act and must identify the impacts placed on the facilities by development activity and how these impacts are reasonably related to the new development. The written impact fee analysis must include a proportionate share analysis, clearly detailing each cost component and the methodology used to calculate each impact fee. A local political subdivision or private entity may only impose impact fees on development activities when its plan for financing system improvements establishes that impact fees are necessary to achieve an equitable allocation to the costs borne in the past and to be borne in the future (UCA 11-36a-302).

[2] UC 11-36a-301,302,303,304
[3] 11-36a-302(2)
[4] 11-36a-302(3)

IMPACT FEE METHODOLOGIES

There are two methods employed in this analysis to determine the maximum allowable impact fees: the Growth-Driven Approach and the Plan Based Approach.

GROWTH-DRIVEN (PERPETUATION OF EXISTING LOS)

The growth-driven method utilizes the existing level of service and perpetuates that level of service into the future. Impact fees are then calculated to provide sufficient funds for the entity to expand or provide additional facilities as growth occurs within the community. Under this methodology, impact fees are calculated to ensure new development provides sufficient investment to maintain the current LOS standards in the community. This approach is often used for public facilities that are not governed by specific capacity limitations and do not need to be built before development occurs (i.e. park facilities).

NEW FACILITY – PLAN BASED (FEE BASED ON DEFINED CIP)

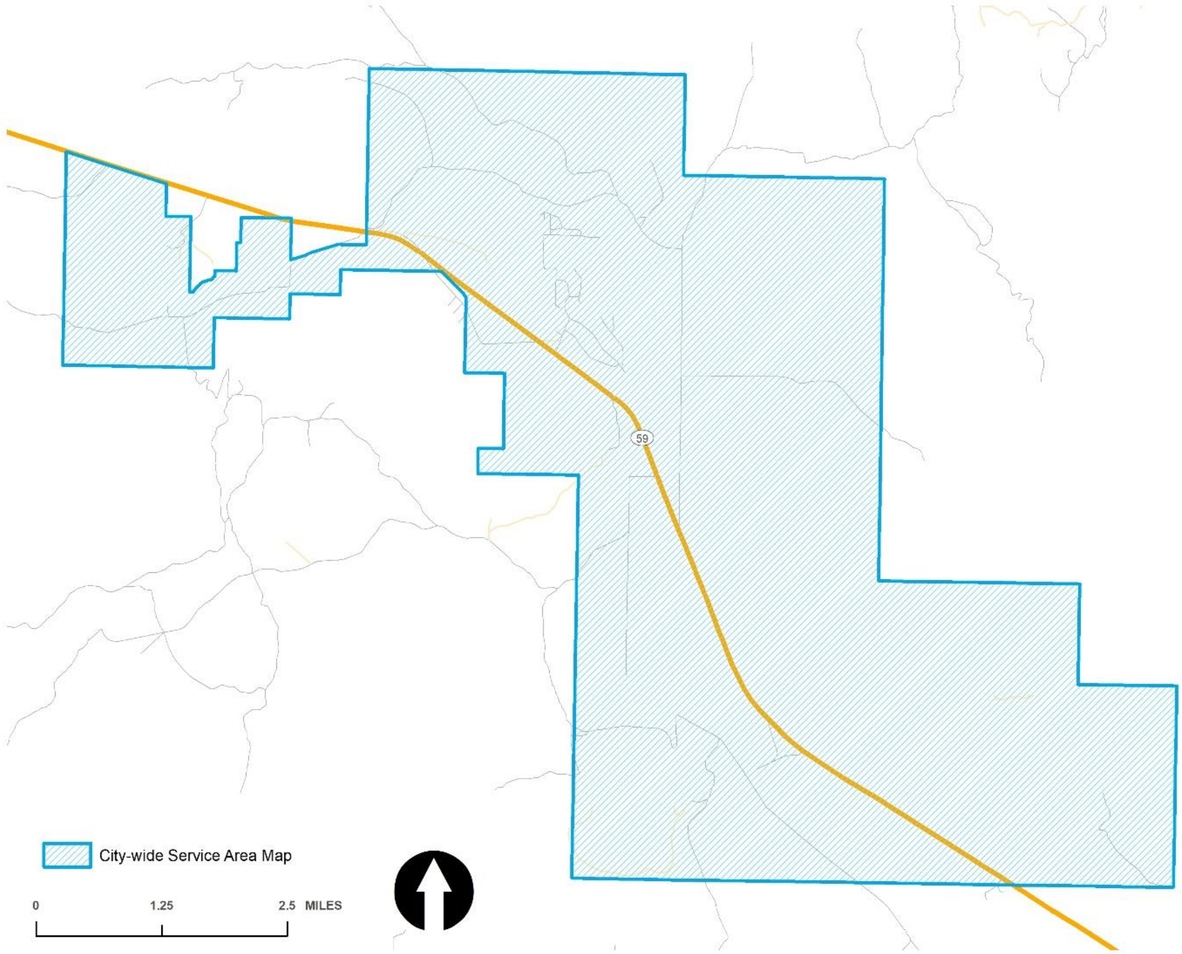
Impact fees can also be calculated based on a defined set of capital costs specified for future development. The improvements are identified in a capital plan or impact fee facilities plan as growth-related system improvements. The total cost is divided by the total demand units the improvements are designed to serve. Under this methodology, it is important to identify the existing level of service and determine any excess capacity in existing facilities that could serve new growth. Impact fees are then calculated based on many variables centered on proportionality and level of service.

SECTION 3: OVERVIEW OF SERVICE AREA AND DEMAND ANALYSIS

SERVICE AREA

Utah Code requires the impact fee enactment establish one or more service areas ("Service Area") within which impact fees will be imposed.[5] The Service Area for this analysis includes all areas within the City, as shown in **FIGURE 3.1** below.

FIGURE 3.1: APPLE VALLEY SERVICE AREA



DEMAND UNITS

The demand units utilized in this analysis include population, fire/EMS calls, single family equivalents (SFEs), and acres. As new development occurs within the City, it generates increased demand on City infrastructure. The system improvements identified in this study are designed to maintain the existing LOS for new property within the City. **TABLE 3.1** identifies existing development within the City, as well as the anticipated new development expected within the planning horizon.

TABLE 3.1: PROJECTED GROWTH IN DEMAND UNITS

YEAR	GROWTH RATE	POPULATION ESTIMATE	SFE ESTIMATE	FIRE/EMS CALL ESTIMATE	STORM DRAINAGE ACREAGE
2019	6%	**873**	403	46	603
2020	6%	925	427	49	620
2021	6%	981	453	52	638
2022	6%	1,040	480	55	656

[5] 11-36a-402(a)

YEAR	GROWTH RATE	POPULATION ESTIMATE	SFE ESTIMATE	FIRE/EMS CALL ESTIMATE	STORM DRAINAGE ACREAGE
2023	6%	1,102	509	58	675
2024	6%	1,168	539	62	694
2025	6%	1,238	572	65	714
2026	5%	1,300	600	69	735
2027	5%	1,365	630	72	756
2028	5%	1,434	662	76	778
2029	5%	1,505	695	79	800
Growth in IFFP		**632**	**292**	**33**	**197**

SECTION 4: PARKS AND RECREATION IFA

Apple Valley is located in Washington County, Utah. The city lies near the convergence of three distinct geological areas: the Mojave Desert, Colorado Plateau, and Great Basin. The area is well known for its natural environment and proximity to several state and national parks. The City's focus on parks and trails facilities, which provide quality of life experiences and complements its location to its natural surroundings, is one of the primary factors driving new development.

Parks impact fees are typically calculated using the growth driven approach. This method calculates a level of service based on existing conditions within the service area, with the intent to perpetuate that level of service into the future. Impact fees are then calculated to provide the revenue necessary for the entity to provide sufficient facilities to future development as growth occurs within the community. This chapter will establish a LOS based on the existing park facilities and amenities provided to development within the service area.

TABLE 4.1: PROJECTED GROWTH IN DEMAND UNITS

YEAR	POPULATION
2019	**873**
2020	925
2021	981
2022	1,040
2023	1,102
2024	1,168
2025	1,238
2026	1,300
2027	1,365
2028	1,434
2029	**1,505**
2030	1,581
10 Yr IFFP Growth	**632**

DEMAND

The primary demand unit related to the park IFA is population growth. The population in the City at the time of the calculation of LOS was approximately 873. The service area should reach approximately 1,505 residents by 2029, or an increase of approximately 632 residents. Because of this growth, the City will need to construct additional park facilities to maintain the existing LOS. If growth projections and land use planning changes significantly in the future, the City will need to update the parks and recreation projections, the IFFP, and the impact fees.

EXISTING FACILITIES INVENTORY

The City's existing parks inventory is shown in **TABLE 4.2.** The improvement costs for parks and recreation are based on the existing improvements to each type of facility and are calculated on a per acre basis. The cost of land was set by City Staff and is very conservative in comparison to land values throughout the Service Area.

TABLE 4.2: ACREAGE OF EXISTING PARKS AND TRAILS

PARK NAME	AREA (ACRES)	AMENITIES
Apple Valley Town Park	0.88	Pavilion, Playground
Source: IFFP Pg. 4		

LEVEL OF SERVICE

The Park LOS is defined as the total acres per 1,000 population. Based on City owned and operated facilities, the City provides 1.01 acres per 1,000 population.

TABLE 4.3: EXISTING PARK LOS

PARK TYPE	CITY OWNED ACREAGE	PER 1,000 CAPITA
Developed Active Park	0.88	1.01

EXCESS CAPACITY

Based on the methodology used in this analysis, there is no excess capacity available for new growth.

MANNER OF FINANCING EXISTING PUBLIC FACILITIES

The City's existing parks and recreation infrastructure has been funded through a combination of general fund revenues, donations, and impact fees. All park land and improvements funded through donations have been excluded from the impact fee calculations unless the developer received a density credit in return for their donation.

FUTURE CAPITAL FACILITIES ANALYSIS

Future planning for park land is an ongoing process based on the changes in population and community preference. The City will purchase and improve parks and recreational facilities to maintain the level of service defined in this document. A summary of the City's future park acreage needs is summarized in **TABLE 4.4**. This analysis assumes that construction of needed park facilities will proceed on a pay-as-you-go basis, and assumes a standard annual dollar amount the City should anticipate collecting and plan to expend on park improvements.

TABLE 4.4: ILLUSTRATION OF APPLE VALLEY PARKS AND RECREATION FUTURE IMPROVEMENTS

TYPE OF IMPROVEMENT	UNIT OF MEASURE	CURRENT LOS PER 1,000	POPULATION INCREASE IFFP HORIZON	NEW PARK ACRES NEEDED
Developed Active Parks	Per Acre	1.01	632	0.64

Future investment will be used to acquire additional parks and recreation land and fund new park improvements and amenities which have a life expectancy of ten (10) years or more,[6] or make improvements to existing park facilities to add capacity to the system. The following types of improvements may be considered:

- Land Acquisition
- Sod and Irrigation Improvements
- Pavilions
- Restrooms and other Parks and Recreation Buildings
- Barbecues (Built-In)
- Drinking Fountains
- Playgrounds
- Trailways/Trailheads
- Volleyball Courts
- Tennis Courts
- Basketball Courts
- Other Recreational Courts and Facilities
- Baseball/Softball Field Facilities
- Multi-Purpose Fields
- Field Lighting
- Concession/ Buildings
- Parking
- Skate Parks
- Urban Fishing
- Dog Parks
- Benches
- Ponds
- Amphitheaters
- Splash Pads
- Bike Parks
- Pickleball Courts
- Other Park and Recreation Amenities

Additionally, the IFFP recommends the following improvements through 2040:

TABLE 4.5: PARK IFFP COST ESTIMATES

RECREATIONAL FACILITY	ACRES	COST	%ELIGIBLE	IF ELIGIBLE COST
Volunteer Park Expansion	0.69	$131,670	100%	$131,670
All-purpose trail	0.68	$208,560	100%	$208,560
Engineering & Incidentals		$64,700	100%	$64,700
Investment by 2040	**1.37**			**$404,930**
Average Cost per Acre				**$295,569**

As shown, the IFFP has identified an estimated cost of over $400,000, with an average cost per acre of $295,569. While the IFFP has identified a total of 1.37 acres of improvements, the IFA includes only the cost needed to maintain the existing LOS of 1.01 acres per 1,000 population. This results in a need for 0.64 acres of new park and recreation facilities, at an average cost of $188,000 as shown in **Table 4.6**.

TABLE 4.6: NEEDED IMPROVEMENTS TO MAINTAIN LOS

TYPE OF IMPROVEMENT	UNIT OF MEASURE	CURRENT LOS PER 1,000	POPULATION INCREASE IFFP HORIZON	NEW PARK ACRES NEEDED	TOTAL VALUE PER ACRE	ESTIMATED FUTURE INVESTMENT
Developed Active Parks	Per Acre	1.01	632	0.64	295,569	$188,298

PROPOSED PARKS AND RECREATION IMPACT FEE

The calculation of impact fees relies upon the information contained in this analysis and the IFFP. Impact fees are calculated based on many variables centered on proportionality share and LOS. The following describes the methodology used for calculating impact fees in this analysis.

[6] 11-36a-102(16)

The methodology utilized in this analysis is based on the Growth-Driven Approach, or the increase (or growth), in residential demand. The current standard of practice in Utah is to assess park and recreation impact fees only to residential development. The growth-driven method utilizes the existing LOS and perpetuates that LOS into the future. Impact fees are then calculated to provide sufficient funds for the City to expand or provide additional facilities, as growth occurs within the community. Under this methodology, impact fees are calculated to ensure new development provides sufficient investment to maintain the current LOS standards in the community. This approach is often used for public facilities that are not governed by specific capacity limitations and do not need to be built before development occurs (i.e. park facilities).

PARKS AND RECREATION IMPACT FEE CALCULATIONS

Using the growth-driven methodology, the fee per capita is $305 as shown in **Table 4.7**. Based on the per capita fee, the proposed impact fee per household ("HH") is illustrated in **Table 4.8.**

TABLE 4.7: IMPACT FEE VALUE PER CAPITA

TYPE OF IMPROVEMENT	TOTAL COST PER ACRE	PROPOSED LOS PER 1,000	PER 1,000 POPULATION	PER CAPITA
Developed Active Parks	$295,569	1.01	$297,939	$298
TYPE OF IMPROVEMENT	**TOTAL COST**		**POPULATION SERVED**	**PER CAPITA**
Professional Services	$4,450		632	$7
			Total Per Capita	**$305**

TABLE 4.8: PARK IMPACT FEE SCHEDULE

IMPACT FEE PER HH	PERSONS PER HH	FEE PER HH
Residential	2.38	$725
Source: 2010 Census for Household ("HH") size		

NON-STANDARD PARK IMPACT FEES

The City reserves the right under the Impact Fees Act to assess an adjusted fee that more closely matches the true impact that a land use will have upon public facilities.[7] The adjustment for Non-Standard Park Impact Fees could result in a different impact fee if the City determines that a particular user may create a different impact than what is standard for its land use. The non-standard impact fee is calculated based on the following formula:

Estimated Population per Unit x Estimate of Impact Fee Per Capita ($305) = Impact Fee per Unit

[7] 11-36a-402(1)(c)

SECTION 5: FIRE/EMS IFA

This section will address the Fire IFA to help the City plan for the necessary capital improvements for future growth. This will address the fire infrastructure and apparatus, both existing and future, needed to serve the City through the next ten years, as well as address the appropriate fire impact fees the City may charge to new growth to maintain the existing LOS.

DEMAND

The IFA is designed to accurately assess the true impact of a particular user upon the City's infrastructure and prevent existing users from subsidizing new growth. Impact fees should be used to fund the costs of growth-related capital infrastructure based upon the historic funding of the existing infrastructure and the intent of the City to equitably allocate the costs of growth-related infrastructure in accordance with the true impact that a user will place on the system

This section focuses on the specific demand units related to fire services, which will be calls for service. The demand analysis focuses on two main elements: 1) the existing demand on public facilities; and 2) the future demand as a result of new development that will impact public facilities.

To do this, two data sets are utilized: existing land-use data and calls for service. **TABLE 5.1** shows the existing amount of single-family equivalent (SFEs) residential units. Call data for the City did not have addresses tied to them, therefore each category was converted to single family equivalents as shown in **TABLE 5.2**. LYRB evaluated call data from 2017-2020, as this was the most recent call data available at the time this study was initiated. Since 2019 is the last full year of data it will be used as the basis for calculating LOS.

TABLE 5.1: FIRE CALLS PER SFE

		EXISTING SFES	HISTORIC CALLS	EXISTING LOS (CALLS PER SFE)
Single Family Equivalent (SFE)	per unit	403	46	**0.11427**

TABLE 5.2: RESIDENTIAL CONVERSION

	DEVELOPED UNITS OR PER 1,000 SF	EXISTING TRIPS	SINGLE FAMILY PM PEAK TRIP RATE	SINGLE FAMILY EQUIVALENT UNITS
Residential (per Unit)	367	363	0.99	367
Commercial (per 1,000 SF)	21	35	1.68	36
Total				**403**
Source: ITE Trip Generation 10th Edition: 4-6 PM Peak Hour Vehicle Trip Generation Rates for the Adjacent Street Traffic (weekday 4-6PM); This Table represents only the most common uses and is NOT all-inclusive.				

TABLE 5.3: PROJECTED CALLS FOR SERVICE

YEAR	POPULATION	ESTIMATED CALLS
2019	873	46
2020	925	49
2021	981	52
2022	1,040	55
2023	1,102	58
2024	1,168	62
2025	1,238	65
2026	1,300	69
2027	1,365	72
2028	1,434	76
2029	1,505	79
2030	1,581	83
2035	1,923	101
2040	2,229	118

A total of 46 calls for service were attributed to residential and non-residential development (not including calls placed from public land-uses or calls that cannot be traced to identifiable land-uses). The level of service does not include calls outside City boundaries. This serves as the basis for the demand calculation in this analysis.

It is anticipated that new growth in the Service Area will increase call volumes as well as response times, which will in turn impact the City's existing facilities. Fire services will need to be expanded in order to maintain the existing LOS as development continues throughout the City. The IFFP, in conjunction with the impact fee analysis, are designed to accurately assess the true impact of a particular user upon the City's infrastructure. Projections of call data on a per capita basis into the future suggest the City will receive an increase of 33 private fire calls by the year 2029. These additional calls will require additional staffing in the department, along with additional facilities to handle the increase in staff. Response times to calls are also critical. As such, the City has put great effort into future planning to ensure that as growth continues, response times are not compromised, and the Fire Department is still able to provide the same service to future development as additional demands are placed on the system.

EXISTING FACILITIES INVENTORY

Based upon the City's fixed asset schedule, the existing fire facilities are valued at approximately $182,547 based on original cost, as shown in **TABLE 5.4**.

TABLE 5.4: DESCRIPTION AND VALUE OF EXISTING FIRE FACILITIES

FACILITIES	DATE IN SERVICE	TOTAL SQ. FT.	AGE	ORIGINAL COST
2005 Building, Fire Station	2005	4,500	15	81,000
2005 Land, Fire Station	2005	-	15	87,000
2007 Concrete Work - FD Driveway	2007	-	13	14,547
Total Facilities		**4,500**		**$182,547**

LEVEL OF SERVICE

The LOS for purposes of this analysis is the current building square feet per call. Impact fees cannot be used to finance an increase in the LOS to current or future users of capital improvements. Therefore, it is important to identify the LOS within the Service Area to ensure that the new capacities of projects financed through impact fees do not exceed the established standard. The City currently has a LOS of 12.60 fire FTE per 1,000 residents.

TABLE 5.2 above illustrates the existing calls for service by land use type, while **TABLE 5.5** shows the existing square footage LOS. The current square footage LOS is calculated as follows: Existing Facility SF (4,500) / 2019 Calls (46) = 98 SF / call. This LOS is used to calculate the needed additional SF to maintain the current level of service: SF / call (98) * IFFP Calls (33) = SF needed to maintain LOS (3,260).

TABLE 5.5: FIRE SF LOS

	FIRE
Total Current SF	4,500
Total Calls (2019)	46
SF/Call	98
IFFP Calls	33
SF Needed to Maintain LOS	**3,260**
% of Total SF	42%

As traffic congestion increases and new developed areas require fire protection services, the Fire Department will need to construct new facilities to ensure the existing response times and service levels remain the same. While the LOS calculated in this report (based on sq. ft. per call) is intended to ensure that facilities similar to existing facilities are built for future development, the location and timing of the new facilities should be based on response times.

This section of the analysis summarizes the existing public facilities related to fire services. The Impact Fees Act allows the City to recover the costs of both buildings and fire suppression vehicles with an original cost of over $500,000. A share of the cost of the fire apparatus, as determined by a proportionate share analysis, can be recovered by non-residential development.

The City covers approximately 74 square miles and serves 873 residents. The Department includes one station, located geographically in the City near Apple Valley Park. In addition, the Department serves as backup on large incidents within the county. The Department also performs inspections for compliance with fire codes and provides advanced EMT services for the City.

EXCESS CAPACITY

This analysis uses the Plan Based Methodology (described below) for calculating the impact fees, and assumes the existing facility is at capacity for the purposes of impact fee calculations. **TABLE 5.5** illustrates that new facilities are needed to maintain the adopted LOS. Future facility costs will be allocated to new development based on the growth-related calls for service anticipated within the IFFP planning horizon.

MANNER OF FINANCING EXISTING INFRASTRUCTURE

The existing public safety infrastructure and apparatus has been funded through a combination of different revenue sources, including general fund revenues, impact fees, and bond issues. Therefore, the City's existing LOS standards have been funded by the City's existing residents. The City does not anticipate receiving revenues from other entities (i.e. grants, federal or state funds, other contributions, etc.) to fund new facilities.

FUTURE CAPITAL FACILITIES ANALYSIS

The City has provided information for the 10-year planning horizon including capital project information, planning analysis and other information that has been compiled to prepare this IFA. The City has provided all future capital project data including project descriptions and estimated project costs. The following paragraph describes the methodology used for calculating impact fees in this analysis.

PLAN BASED (FEE BASED ON DEFINED CAPITAL IMPROVEMENT PLAN)

Impact fees can be calculated using a specific set of costs specified for future development. The improvements are identified in the IFFP or CIP as growth-related projects. The total project costs are divided by the total demand units the projects are designed to serve. Under this methodology, it is important to identify the existing LOS and determine any excess capacity in existing facilities that could serve new growth. As stated above, this analysis assumes existing facilities are at capacity for the purposes of impact fee calculations. Furthermore, the LOS discussion illustrates the City's need to construct additional facilities to maintain the adopted LOS.

Based upon the projected growth throughout the City, City staff has identified future facilities that must be constructed or acquired over the next ten years to serve future development within the planning horizon. The costs of these projects are detailed in **TABLE 5.6**. The project listed in the table below has a useful life of more than ten years. As stated previously, the LOS for this analysis is based on calls for service by land use type and the existing building square footage LOS. The proposed new substation facility cost to add additional capacity is estimated at $398,200.

Additionally, the Impact Fees Act allows Cities to include in the calculation of the impact fee any fire trucks and apparatus with a cost of greater than $500,000. The City plans to purchase a new engine in the next ten years. The fee includes the additional apparatus that will serve development occurring in the next ten years. It should be noted that fire trucks and apparatus can only be funded through impact fees assessed to non-residential development.

The Impact Fees Act allows for the inclusion of a time price differential to ensure that the future value of costs incurred at a later date are accurately calculated to include the costs of construction inflation. A 2.79% annual construction inflation adjustment is applied to projects completed after 2020 (the base year cost estimate). Also, a value of $118.83 was used to estimate the base year cost.

TABLE 5.6: SUMMARY OF FUTURE CAPITAL FACILITIES

FACILITIES	CONSTRUCTION YEAR	TOTAL SQ. FT.	ESTIMATED COST	CONSTRUCTION YEAR COST	TOTAL IMPACT FEE ELIGIBLE COST	DEMAND (CALLS) SERVED
Substation on Highway 59	2021	3,260	$387,391	$398,200	$398,200	33
New Apparatus		NA	$600,000	$650,000	$650,000	61

PROPOSED FIRE/EMS IMPACT FEE

The calculation of impact fees relies upon the information contained in the IFFP and this analysis. Impact fees are calculated based on many variables centered on proportionality and LOS. The proposed future facility and apparatus contemplated in this analysis will be needed to serve new development in the Service Area. Impact fees can be calculated using a specific set of costs specified for future development. The total project costs are divided by the total demand units the projects are designed to serve. Under this methodology, it is important to identify the existing LOS and determine any excess capacity in existing facilities that could serve new growth. **TABLE 5.7** illustrates the proportionate share analysis and cost per call calculations for fire facilities.

TABLE 5.7: FIRE PROPORTIONATE SHARE ANALYSIS

	COST TO FIRE	% TO IFFP	COST TO IFFP	SFE SERVED	COST PER SFE
Buy-in	$182,547	42%	$76,710	292	$263
Future Facilities	$398,200	42%	$167,332	292	$574
Professional Expense*	$1,988	100%	$1,988	292	$7
Subtotal: Facilities	**$582,734**		**$246,030**		**$844**
Future Apparatus	$650,000	42%	$273,144	26	$10,599
Subtotal: Apparatus	**$650,000**		**$273,144**		**$10,599**
Total	**$1,232,734**		**$519,173**		**$11,443**

* The professional expense is allocated to demand in the next six years. The impact fee analysis should be updated within the 6-year horizon.

TABLE 5.8 illustrates the proposed impact fee by land-use type and by function. It is important to note that a political subdivision or private entity may not impose an impact fee on residential development to pay for a fire suppression vehicle.

TABLE 5.8: PROPOSED FIRE IMPACT FEE SCHEDULE

	COST PER SFE	SFE CONVERSION	TOTAL IMPACT FEE PER UNIT
Residential			
Single Family Residential	$844	1.00	$844
Multi-family Residential	$844	0.68	$571
Non-Residential			
Shopping Center (per 1K SF)	$11,443	2.81	$32,117
General Office (per 1K SF)	$11,443	1.43	$16,413
Light Industrial (per 1K SF)	$11,443	0.84	$9,594

NON-STANDARD FIRE IMPACT FEES

The City reserves the right under the Impact Fees Act to assess an adjusted fee that more closely matches the true impact that the land use will have upon public facilities.[8] This adjustment could result in a different impact fee if the City determines that a particular user may create a different impact than what is standard for its land use. To determine the impact fee for a non-standard use, the City should use the following formula:

FORMULA FOR NON-STANDARD FIRE IMPACT FEES:

Residential Fee: SFE Conversion x $844 = Recommended Impact Fee
Non-Residential Fee: SFE Conversion x $11,443 = Recommended Impact Fee

[8] 11-36a-402(1)(c)

SECTION 6: TRANSPORTATION IFA

The purpose of this section of the analysis is to address the transportation IFA and to help the City plan for the necessary capital improvements for future growth. The 2020 Transportation IFFP was completed by Sunrise Engineering and this section will summarize their findings. This will also address the appropriate transportation impact fees the City may charge to new growth to maintain the existing LOS.

DEMAND

Sunrise Engineering worked with City staff to develop an IFFP that would encompass the period from 2019 to 2029. Traffic volume estimates were developed by road segment. Traffic volumes were estimated based on the existing conditions and modeled conditions in the year 2029 and recommended improvements to maintain the LOS. A total of 307 new trips are anticipated in the IFFP planning horizon. These represent PM Peak trip estimates based on the most recent ITE manual trip figures. All trips were converted into single family residential equivalents. The analysis assumes that not much growth will occur in commercial trips through the IFFP horizon and a blended trip rate was used for commercial for accuracy.

TABLE 6.1: GROWTH IN TRIPS

TYPE	UNITS/SF	ITE CODE	WEEKDAY PM PEAK	EXISTING UNITS	EXISTING TRIPS	SINGLE FAMILY EQUIVALENT UNITS	NEW TRIPS BUILDOUT	BUILDOUT SFE	NEW TRIPS IFFP	NEW SFE IN IFFP
Residential	Units	210	0.99	367	363	367	929	938	263	266
Commercial	Per 1,000 SF	Average of (820, 710, 110)	1.68	21	35	36	152	91	43	26
Total				**388**	**399**	**403**	**1,081**	**1,029**	**307**	**292**

Source: ITE Trip Generation 10th Edition: 4-6 PM Peak Hour Vehicle Trip Generation Rates for the Adjacent Street Traffic (weekday 4-6PM); This Table represents only the most common uses and is NOT all-inclusive.

TABLE 6.1 identifies the existing development conditions within the City, as well as the anticipated new development forecasted to occur within the IFFP planning horizon. The existing population is estimated at 873. Population projections provided in the IFFP by Sunrise Engineering and census household data were used to determine the approximate number of future trips, converted to single family equivalent units (SFEs) within the City.

TABLE 6.2: POPULATION AND SFE PROJECTIONS

YEAR	POPULATION	SFES
2019	873	403
2020	925	427
2021	981	453
2022	1,040	480
2023	1,102	509
2024	1,168	539
2025	1,238	572
2026	1,300	600
2027	1,365	630
2028	1,434	662
2029	1,505	695
2030	1,581	730
2035	1,923	888
2040	2,229	1,029

Source: Sunrise Engineering IFFP Pg. 14

EXISTING FACILITIES INVENTORY

Based upon the City's fixed asset schedule, the existing roadway facilities are valued at approximately $2,193,525 based on original cost.

LEVEL OF SERVICE

LOS assesses the level of congestion on a roadway segment or intersection. LOS is measured using a letter grade A through F, where A represents free flowing traffic with absolutely no congestion and F represents grid lock. The future roadway system was designed to achieve a LOS at a threshold equivalent to the performance of the existing road network. As defined in the IFFP "the Town's level of service would consist of a double chip-sealed roadway matching the section shown in the Washington County Public Works Department Standard Gravel Road with Ditches".[9]

EXCESS CAPACITY

Based on the findings in the IFFP, the only buy-in included in this analysis is related to the Gateway Project identified in the IFFP eligible project list. This value is included in the IFA as a future facilities cost. No other buy-in is included in this analysis.

[9] Sunrise Engineering IFFP Pg. 4, diagram found in Appendix A.

MANNER OF FINANCING EXISTING PUBLIC FACILITIES

The City's existing infrastructure has been funded through a combination of General Fund revenues, impact fees, bonds, other governmental revenue, grants and donations. General Fund revenues include a mix of property taxes, sales taxes, federal and state grants, and any other available General Fund revenues. There are no General Obligation Bonds outstanding related to transportation system improvements. Therefore, a credit is not required for this component of the impact fee analysis.

FUTURE CAPITAL FACILITIES ANALYSIS

The City has identified the growth-related projects needed within the next ten years. Capital projects related to curing existing deficiencies were not included in the calculation of the impact fees. Total future projects applicable to new development are shown below. **TABLE 6.3** illustrates the estimated cost of future capital improvements within the Service Area, as identified in the IFFP. The total construction year cost related to new growth is $3,581,900. The total cost attributable to the IFFP is $2,851,879. More detail on cost estimates can be found in the Sunrise Engineering IFFP.

TABLE 6.3: SUMMARY OF FUTURE SYSTEM IMPROVEMENTS WITHIN IFFP PLANNING HORIZON

IMPROVEMENTS	COSTS	% ELIGIBLE	IMPACT FEE ELIGIBLE COST
Project #1 (Main Street Roadway Improvements)	$1,812,250	100%	$1,812,250
Project #2 (SR-59/Main Street Intersections Improvements - By Others)	$304,050	100%	$304,050
Project #3 (Canaan Way Roadway Improvements)	$240,600	100%	$240,600
Project #4 (Apple Valley Drive Roadway Improvements	See SW IFFP	75%	
Project 5 (Gateway Project Road Improvements - Previously Completed)	$1,225,000	40%	$494,979
Total IFFP Costs	**$3,581,900**		**$2,851,879**
Source: Sunrise Engineering IFFP Pg. 9			

PROPOSED TRANSPORTATION IMPACT FEE

This analysis has identified the future demand, the existing and proposed LOS, the availability of excess capacity, and summarizes the future facilities needed to serve new development. The following section identifies the appropriate impact fee to be assessed to new development to maintain the existing LOS.

TRANSPORTATION IMPACT FEE CALCULATION

The transportation impact fee utilizes the New Facility – Plan Based Approach, which is based on a defined set of capital costs specified for future development. The proportionate share analysis determines the proportionate cost assignable to new development based on the proposed capital projects and the new growth served by the proposed projects. The portion of the capital cost attributable to the IFFP time horizon is $808,742. The maximum impact fee cost per trip is shown in **TABLE 6.4**.

TABLE 6.4: MAXIMUM IMPACT FEE COST PER TRIP

	TOTAL COST	% TO IFFP	COST TO IFFP	% TO GROWTH	COST TO GROWTH	FUTURE TRIPS	COST PER TRIP
Buy-In	-	28%	-	100%	-	307	-
Future Facilities	$3,581,900	80%	$2,851,879	28%	$808,742	307	$2,638.00
Professional Expense	$14,950	100%	$14,950	100%	$14,950	307	$49.00
Cost per Trip			**$2,866,829**				**$2,687.00**

IMPACT FEE SUMMARY BY LAND USE TYPE

The proposed impact fee by land use type is shown in **TABLE 6.5**.

TABLE 6.5: PROPOSED IMPACT FEE BY LAND USE TYPE

LAND USE	ITE CODE	UNIT	PM PEAK	PASS BY & INTERNAL ADJUSTMENT	NET TRIP	IMPACT FEE PER LAND USE
Single Family Residential	210	Residential Unit	0.99	0%	0.99	$2,660
Multi-Family Residential	220	Residential Unit	0.67	0%	0.67	$1,800
Shopping Center	820	1,000 sf GLA	4.21	34%	2.78	$7,466
Light Industrial	110	1,000 sf GFA	0.83	0%	0.83	$2,230
Office	710	1,000 sf GFA	1.42	0%	1.42	$3,816
Source: ITE Trip Generation 10th Edition: 4-6 PM Peak Hour Vehicle Trip Generation Rates for the Adjacent Street Traffic (weekday 4-6PM); This Table represents only the most common uses and is NOT all-inclusive.						

NON-STANDARD IMPACT FEES

The City reserves the right under the Impact Fees Act[10] to assess an adjusted fee that more closely matches the true impact that a specific land use will have upon the City's transportation system. This adjustment could result in a different impact fee if evidence suggests a particular user will create a different impact than what is standard for its category. The City may adjust the impact fee if the developer can provide documentation, evidence, or other credible analysis that the proposed impact will be different than what is proposed in this analysis.

FORMULA FOR NON-STANDARD TRANSPORTATION IMPACT FEES:

Total Units x Estimate of PM Peak Hour Trips per Unit x Adjustment Factor x $2,687 = Impact Fee per Unit

[10] 11-36a-402(1)(c)

SECTION 7: STORM WATER IFA

The purpose of this section is to address the storm water IFA and to help the City plan for the necessary capital improvements for future growth. This section will address the future storm water infrastructure needed to serve the City.

TABLE 7.1: DEVELOPED AND UNDEVELOPED ACREAGE

TOTAL AREA DRAINING THROUGH BASINS ANALYZED	UNDEVELOPED LAND WITHIN DRAINAGE BOUNDARY
603	197
Source: Sunrise Engineering IFFP Table V.B.1	

DEMAND

The demand unit used in this analysis is developed and undeveloped acreage. As residential and commercial growth occurs within the City, the impervious surface area within the City will increase, resulting in additional run-off. The storm water capital improvements identified in this study are based on maintaining the current level of service as defined in the IFFP. The proposed impact fees are based upon the projected growth in developed acreage which is used to quantify the impact that future users will have upon the City's system. **Table 7.1** illustrates the current acreage in the City.

EXISTING FACILITIES INVENTORY/EXCESS CAPACITY

An analysis of current capacity based on the LOS illustrates that there is no available capacity within the existing system, and therefore, a buy-in component is not included in this analysis. Capital projects required to maintain existing service levels, as a result of new growth, are considered impact fee eligible projects.

LEVEL OF SERVICE STANDARDS

Impact fees cannot be used to finance an increase in the level of service to current or future users of capital improvements. Therefore, it is important to identify the storm water level of service to ensure that the capacities of projects financed through impact fees do not exceed the established standard. The IFFP identifies the future storm water system improvements that are needed to manage the runoff caused by 10-year and 100-year events. Therefore, the City's storm water infrastructure is sized to manage runoff safely and adequately from the storm intensities and durations indicated in the IFFP.

MANNER OF FINANCING EXISTING PUBLIC FACILITIES

The City has funded existing facilities using several revenue sources including general fund revenues (property taxes, sales taxes, etc.), grants, donations, impact fee revenues and debt. The City anticipates these funding mechanisms will be available for the funding of future facilities. As shown in the next section, the City has determined the portion of future projects that will be funded by impact fees as growth-related, system improvements, as well as alternative funding mechanism related to future facilities.

FUTURE CAPITAL FACILITIES ANALYSIS

The estimated costs attributed to new growth were analyzed based on existing development versus future development patterns. From this analysis, a portion of future development costs were attributed to new growth and included in this impact fee analysis as shown in **TABLE 7.2-7.4.** The costs of capital projects related to curing existing deficiencies cannot be funded through impact fees and were not included in the calculation of impact fees. The table below describes the specific capital improvements necessary to meet the future growth needs anticipated to occur within the City. This cost was inflated to reflect the actual cost of projects at the time they will be constructed. Only a portion of these projects will be built in the next ten years. The following table contains three project cost estimates.

TABLE 7.2: ILLUSTRATION OF CAPITAL IMPROVEMENTS RELATED TO GROWTH

PROJECT #	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	AMOUNT
1	Mobilization	5%	LS	$79,300	$79,300
2	Dust Control & Watering	1.00	LS	$40,000	$40,000
3	Materials Sampling & Compaction Testing	1.00	LS	$10,000	$10,000
4	Clearing and Grubbing	32,000.00	SY	$0.5	$16,000
5	Earthwork/Grading	1.00	LS	$700,000	$700,000
6	Armored Rock Bank with Filter Fabric	32,000.00	SY	$25	$800,000
7	SWPPP & Erosion Control	1.00	LS	$20,000	$20,000
Subtotal					$1,665,500
Contingency				15%	$250,000
Construction Total					**$1,915,500**

PROJECT #	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	AMOUNT
Incidentals					
1	Funding & Administrative Services		LS	$35,000	$35,000
2	Engineering Design	5.10%	LS	$116,000	$116,000
3	Bidding & Negotiating	0.30%	HR	$7,000	$7,000
4	Engineering Construction Services	5.80%	HR	$133,500	$133,500
5	Geotechnical Report	0.30%	EST	$8,000	$8,000
6	Land & ROW Acquisition	2.20%	EST	$50,000	$50,000
7	Land & ROW Negotiation	0.30%	EST	$6,000	$6,000
8	Bond Attorney	0.70%	EST	$15,000	$15,000
9	Miscellaneous Engineering Services	0.40%	EST	$10,000	$10,000
Subtotal					**$380,500**
Total Project Cost					**$2,296,000**

TABLE 7.3: ILLUSTRATION OF CAPITAL IMPROVEMENTS RELATED TO GROWTH (CONT.)

PROJECT #	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	AMOUNT
1	Mobilization	5%	LS	$73,000	$73,000
2	Dust Control & Watering	1.00	LS	$40,000	$40,000
3	Materials Sampling & Compaction Testing	1.00	LS	$60,000	$60,000
4	24" HDPE Stormwater Pipe	2,460.00	LF	$75	$184,500
5	30" HDPE Stormwater Pipe	1,180.00	LF	$105	$124,000
6	Earthwork	63,400.00	CY	$5	$317,000
7	Armored Rock Bank with Filter Fabric	22,100.00	SY	$25	$552,500
8	Reworking Borrow Ditches	16,000.00	LF	$10	$160,000
9	SWPPP & Erosion Control	1.00	LS	$20,000	$20,000
Subtotal					$1,531,000
Contingency				15%	$230,000
Construction Total					**$1,761,000**
Incidentals					
1	Funding & Administrative Services		LS	$40,000	$40,000
2	Engineering Design	4.80%	LS	$108,000	$108,000
3	Bidding & Negotiating	0.30%	HR	$7,000	$7,000
4	Engineering Construction Services	5.50%	HR	$122,500	$122,500
5	Geotechnical Report	0.40%	EST	$8,000	$8,000
6	Land & ROW Acquisition	6.70%	EST	$150,000	$150,000
7	Land & ROW Negotiation	0.50%	EST	$12,000	$12,000
8	Bond Attorney	0.70%	EST	$15,000	$15,000
9	Miscellaneous Engineering Services	0.40%	EST	$10,000	$10,000
Subtotal					**$472,500**
Total Project Cost					**$2,233,500**

TABLE 7.4: ILLUSTRATION OF CAPITAL IMPROVEMENTS RELATED TO GROWTH (CONT.)

PROJECT #	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	AMOUNT
1	Mobilization	5.00%	LS	$17,000	$17,000
2	Traffic Control	1.00	LS	$4,000	$4,000
3	Dust Control & Watering	1.00	LS	$9,000	$9,000
4	SWPPP	1.00	LS	$9,000	$9,000
5	Subsurface Investigation	1.00	LS	$9,000	$9,000
6	Construction Staking	1.00	LS	$12,000	$12,000
7	Materials Sampling and Testing	1.00	LS	$14,000	$14,000
8	Clearing, Grubbing, Saw Cutting, and Demolition	1.00	LS	$18,500	$18,500
9	Import Granular Borrow	1,100.00	Cu Yd	$41	$45,500
10	Earthwork and Grading	1.00	LS	$70,000	$70,000

PROJECT #	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	AMOUNT
11	84" CMP	70.00	LF	$400	$28,000
12	96" CMP	70.00	LF	$450	$31,500
13	6" Untreated Base Course	64,500.00	SF	$1	$58,500
14	Double Chip Seal	8,000.00	SY	$3	$20,000
15	5-Strand Barbed Wire Fence	1,000.00	LF	$4	$4,250
Subtotal					$350,250
Contingency				15%	$53,000
Construction Total					**$403,250**
Incidentals					
1	Geotechnical Report	1.50%	LS	$7,250	$7,250
2	Design Survey & ROW	1.70%	LS	$8,000	$8,000
3	Civil Engineering Design	7.50%	LS	$35,500	$35,500
4	Bidding & Negotiating	0.60%	HR	$3,000	$3,000
5	Engineering Construction Services	4.20%	HR	$20,000	$20,000
Subtotal					**$73,750**
Total Project Cost					**$424,000**
Grand Total Project Cost					**$4,953,500**

Source: Sunrise Engineering IFFP Appendix E Pg. 48-50

The IFFP details the projects shown above and considered in the calculation of the impact fees. The engineers used capital project and engineering data, planning analysis and other information to determine the future needs of the service area, as well as the ability of the existing system to serve future development. All future capital project data, including project descriptions and estimated project costs, is included in the Master Plan and IFFP. The accuracy and correctness of this analysis is contingent upon the accuracy of the data and assumptions included therein. Any deviations or changes in the assumptions due to changes in the economy or other relevant information used by the City for this study may cause this plan to be inaccurate and require modifications.

PROPOSED STORM WATER IMPACT FEE

The calculation of impact fees relies upon the information contained in this analysis. Impact fees are calculated based on many variables centered on proportionality and LOS. As a result of new growth, the storm water system is in need of expansion to perpetuate the LOS that the City has historically maintained. The *Stormwater Impact Fee Facilities Plan*, dated January 2020, outlines the recommended capital projects that will maintain the established LOS. The following paragraph describes the methodology used for calculating impact fees in this analysis.

PLAN BASED (FEE BASED ON DEFINED CAPITAL IMPROVEMENT PLAN)

Impact fees can be calculated using a specific set of costs specified for future development. The improvements are identified in the IFFP as growth related projects. The total project costs are divided by the total demand units the projects are designed to serve. Under this methodology, it is important to identify the existing LOS and determine any excess capacity in existing facilities that could serve new growth.

STORM WATER IMPACT FEE CALCULATION

The IFFP must properly complete the legislative requirements found in the Impact Fee Act if it is to serve as a working document in the calculation of appropriate impact fees. The calculation of impact fees relies upon the information contained in this analysis. Impact fees are then calculated based on many variables centered on proportionality share and LOS.

The storm water impact fees proposed in this analysis will be assessed based on the service area defined in this analysis. **TABLE 7.5** below illustrates the fee associated with projects occurring in the next ten years, future debt expense associated with funding the future projects, and other applicable costs.

TABLE 7.5: CALCULATION OF PROPORTIONATE IMPACT FEE

STORM WATER MASTER PLAN IFA CALCULATION		NOTES
Total Area Draining through basins analyzed	603	See IFFP Table V.B.1
Undeveloped Land within Drainage Boundary	197	See IFFP Table V.B.1
Percent of Cost Impact Fee Eligible:	**32.67%**	**See IFFP Table V.B.1**
Proposed Improvement Projects		
Total Project Cost	**$4,953,500**	Sum of Total Project Cost Identified in Tables 7.2-7.4
Less FEMA Grant	$3,716,000	
Total Impact Fee Eligible Project Costs	**$1,237,500**	Total Project Cost less FEMA Grant
Total Interest from New Debt Service	**$504,000**	The interest from new debt service shown in the calculation is based on a 30-year loan using an interest rate of 2.5%.
% of Project Cost Due to New Growth	$404,000	$1,237,500 x 32.67%
% of Interest Due to New Growth	$164,500	$504,000 x 32.67%
Impact Fee Eligible Cost	**$568,500**	**$404,000 + $164,500**
Impact Fee Calculations		
Total Impact Fee Eligible Cost	$568,500	
Undeveloped Acres within Drainage Boundary	197	
Maximum Impact Fee per Acre of Land within Drainage Boundary	**$2,885.79**	$568,500 / 197 Acres Served
Source: Sunrise Engineering IFFP Table V.B.1		

NON-STANDARD STORM WATER IMPACT FEES

The City reserves the right under the Impact Fees Act[11] to assess an adjusted fee that more closely matches the true impact that the land use will have upon the City's storm water system. This adjustment could result in a different impact fee if evidence suggests a particular user will create a different impact than what is standard for its category.

FORMULA FOR NON-STANDARD STORMWATER IMPACT FEES:

Total acres of development x $2,885.79 = Impact Fee per Unit

[11] 11-36a-402(1)(c)

SECTION 8: GENERAL IMPACT FEE CONSIDERATIONS

SYSTEM VS. PROJECT IMPROVEMENTS

System improvements are defined as existing and future public facilities designed and intended to provide services to service areas within the community at large.[12] Project improvements are improvements and facilities that are planned and designed to provide service for a specific development and considered necessary for the use and convenience of the occupants or users of that specific development.[13] The Impact Fee Analysis may only include the costs of impacts on system improvements related to new growth within the proportionate share analysis.

GRANTS AND DONATIONS FUNDING

The City also received grant monies and donations to fund parks and recreation facilities. All land and improvements funded with grant monies and donations received are excluded from the impact fee calculations.

FUNDING OF FUTURE FACILITIES

The IFFP must include a consideration of all revenue sources, including impact fees and the dedication of system improvements, which may be used to finance system improvements.[14] In conjunction with this revenue analysis, there must be a determination that impact fees are necessary to achieve an equitable allocation of the costs of the new facilities between the new and existing users.[15]

In considering the funding of future facilities, the City has determined the portion of future projects that will be funded by impact fees as growth-related, system improvements. No other revenues from other government agencies, grants or developer contributions have been identified within the IFFP to help offset future capital costs. If these revenues become available in the future, the impact fee analysis should be revised. It is anticipated that future project improvements will be funded by the developer. These costs have not been included in the calculation of the impact fee.

Other revenues such as utility rate revenues will be necessary to fund non growth-related projects and to fund growth related projects when sufficient impact fee revenues are not available. In the latter case, impact fee revenues will be used to repay utility rate revenues for growth related projects. A brief description of alternative financing options is included below.

GENERAL FUND REVENUES

General fund revenues include a mix of property taxes, sales taxes, federal and state grants, and any other available general fund revenues. All land and improvements funded with general fund monies can be included in the impact fee calculations, as these amenities were funded by existing residents.

PROPERTY TAX REVENUES

Property tax revenues are not specifically identified in this analysis as a funding source for capital projects, but interfund loans may be made from the general fund which will ultimately include some property tax revenues. Interfund loans will be repaid once sufficient impact fee revenues have been collected.

UTILITY RATE REVENUES

Utility rate revenues serve as the primary funding mechanism within enterprise funds. Rates are established to ensure appropriate coverage of all operations and maintenance expenses, debt service coverage, and capital project needs. Impact fee revenues are generally considered non-operating revenues and help offset future capital costs.

GRANTS DONATIONS AND OTHER CONTRIBUTIONS

The City does not anticipate any donations from new development for future system-wide capital improvements related to park facilities. A donor and the City may enter into a Development Agreement which may entitle the donor to a reimbursement for the negotiated value of system improvements funded through impact fees if donations are made by new development.

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[12] 11-36a-102(20)
[13] 11-36a102(13)
[14] 11-36a-302(2)
[15] 11-36a-302(3)

DEBT FINANCING

The City does not anticipate the need to utilize debt financing to fund future capital facility projects. Should the City desire to fund future projects through debt financing, the Impact Fees Act allows for the costs related to the financing of future capital projects to be included in the impact fee. However, the impact fee analysis should be updated to reflect this inclusion.

The City may receive grant monies to assist with park and trail construction and improvements. This analysis has removed all funding that has come from federal grants and donations to ensure that none of those infrastructure items are included in the LOS. Therefore, the City's existing LOS standards have been funded by the City's existing residents. Funding the future improvements through impact fees places a similar burden upon future users as that which has been placed upon existing users through impact fees, property taxes, user fees, and other revenue sources.

EQUITY OF IMPACT FEES

Impact fees are intended to recover the costs of capital infrastructure that relate to future growth. The impact fee calculations are structured for impact fees to fund 100 percent of the growth-related facilities identified in the proportionate share analysis as presented in the impact fee analysis. Even so, there may be years that impact fee revenues cannot cover the annual growth-related expenses. In those years, growth-related projects may be delayed, or other revenues such as general fund revenues or other funds' revenues and/or fund balance reserves may be used to make up any annual deficits. Any borrowed funds are to be repaid in their entirety through subsequent impact fees.

NECESSITY OF IMPACT FEES

An entity may only impose impact fees on development activity if the entity's plan for financing system improvements establishes that impact fees are necessary to achieve parity between existing and new development. This analysis has identified the improvements to public facilities and the funding mechanisms to complete the suggested improvements. Impact fees are identified as a necessary funding mechanism to help offset the costs of new capital improvements related to new growth. In addition, alternative funding mechanisms are identified to help offset the cost of future capital improvements.

CONSIDERATION OF ALL REVENUE SOURCES

The Impact Fees Act requires the proportionate share analysis to demonstrate that impact fees paid by new development are the most equitable method of funding growth-related infrastructure.

EXPENDITURE OF IMPACT FEES

Legislation requires that impact fees should be spent or encumbered within six years after each impact fee is paid. Impact fees collected in the next six years should be spent only on impact fee eligible projects to maintain the LOS.

GROWTH-DRIVEN EXTRAORDINARY COSTS

The City does not anticipate any extraordinary costs necessary to provide services to future development.

SUMMARY OF TIME PRICE DIFFERENTIAL

The Impact Fees Act allows for the inclusion of a time price differential to ensure that the future value of costs incurred at a later date are accurately calculated to include the costs of construction inflation. An inflation component was considered in the cost estimates in this study. All costs are represented in construction year dollars. The impact fee analysis should be updated regularly to account for changes in cost estimates over time.

APPLE VALLEY UTAH

IMPACT FEE ANALYSIS FOR PARKS & RECREATION, FIRE, TRANSPORTATION & STORM WATER

LEWIS YOUNG ROBERTSON & BURNINGHAM, INC.

NOVEMBER 2020

INTRODUCTION TO IMPACT FEES

- Before imposing an impact fee, each local political subdivision or private entity shall prepare:

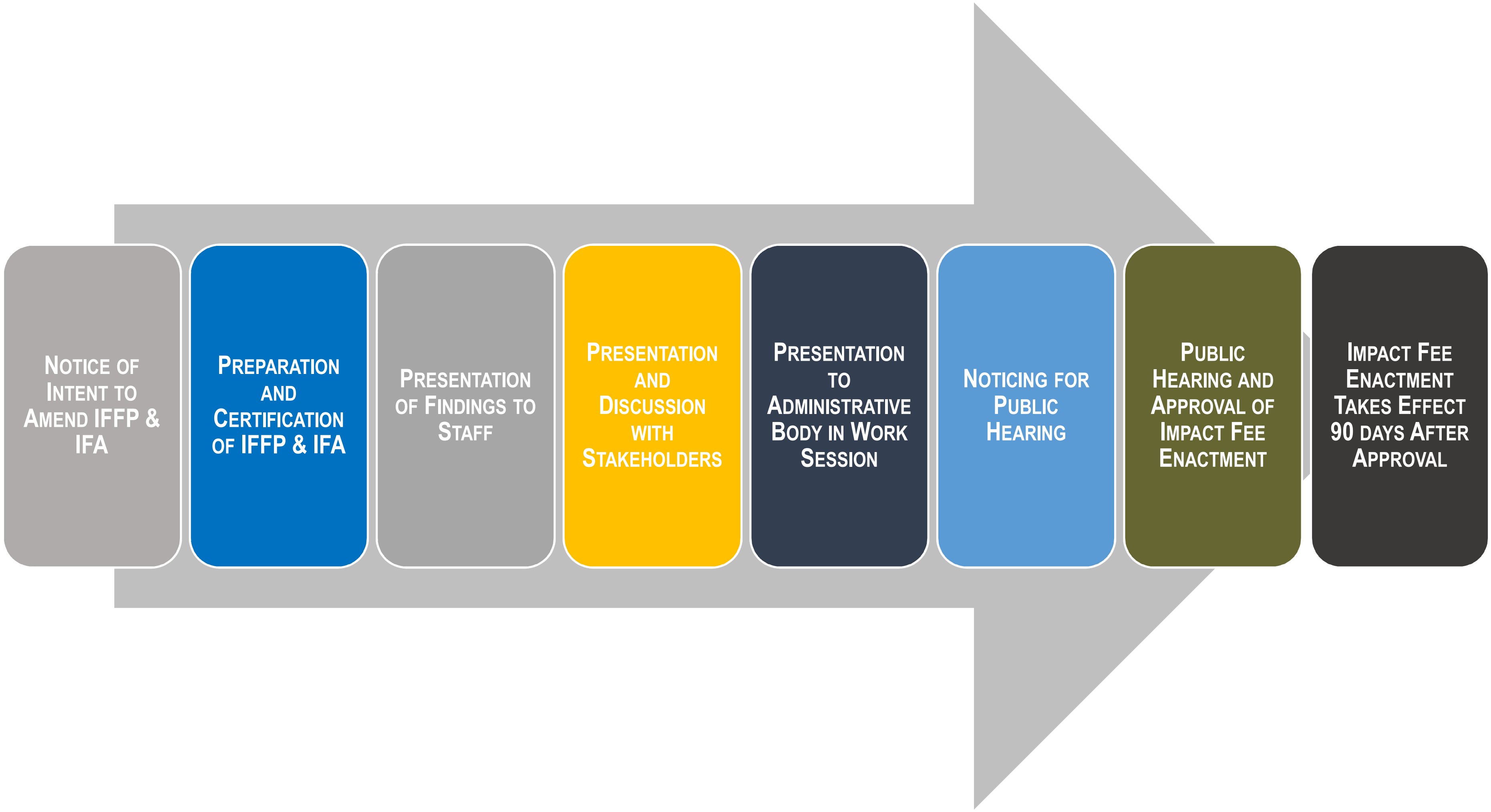
IMPACT FEE FACILITIES PLAN (IFFP)

Identifies the demands placed upon the City's existing facilities by future development and evaluates how these demands will be met by the City. Outlines the improvements which are intended to be funded by impact fees.

IMPACT FEE ANALYSIS (IFA)

Proportionately allocates the cost of the new facilities and any excess capacity to new development, while ensuring that all methods of financing are considered.

IMPACT FEE PROCESS



CRAFTING A WORKING IFFP

1. Determine Demand
2. Provide Inventory of Existing Facilities
3. Establish Existing and Future Level of Service
4. Identify Existing and Future Capital Facilities Necessary to Serve New Growth
5. Consider All Revenue Resources to Finance System Improvements

IMPACT FEE ANALYSIS

1. **Service Area:** All Areas with the City

2. **Demand:** Population, Households, Acres, Trips, and Single-Family Equivalents (SFEs)

3. **Existing Facilities Inventory:** All City Owned, IFA Eligible Facilities

   Types of Facilities Excluded = Non City-Owned, Developer Funded, Other Lands

4. **Level of Service:** This analysis identifies the LOS which is provided to a community's existing residents and ensures that future facilities maintain these standards.

FUTURE FACILITIES & PROPORTIONATE SHARE ANALYSIS

Parks & Recreation

Recreational Facility	Acres	Cost	%Eligible	IF Eligible Cost
Volunteer Park Expansion	0.69	$131,670	100%	$131,670
All-purpose trail	0.68	$208,560	100%	$208,560
Engineering & Incidentals		$64,700	100%	$64,700
Investment by 2040	**1.37**			**$404,930**
Average Cost per Acre				**$295,569**

Type of Improvement	Total Cost Per Acre	Proposed LOS per 1,000	Per 1,000 Population	Per Capita
Developed Active Parks	$295,569	1.01	$297,939	$298
Type of Improvement	**Total Cost**		**Population Served**	**Per Capita**
Professional Services	$4,450		632	$7
			Total Per Capita	**$305**

Impact Fee Per HH	Persons Per HH	Fee per HH
Residential	2.38	$725

Source: 2010 Census for Household ("HH") size

FUTURE FACILITIES & PROPORTIONATE SHARE ANALYSIS

Fire

Facilities	Construction Year	Total Sq. Ft.	Estimated Cost	Construction Year Cost	Total Impact Fee Eligible Cost	SFEs Served
Substation on Highway 59	2021	3,260	$387,391	$398,200	$398,200	694
New Apparatus		NA	$600,000	$650,000	$650,000	26

	Cost to Fire	% to IFFP	Cost to IFFP	SFE Served	Cost per SFE
Buy-in	$182,547	42%	$76,710	292	$263
Future Facilities	$398,200	42%	$167,332	292	$574
Professional Expense*	$1,988	100%	$1,988	292	$7
Subtotal: Facilities	**$582,734**		**$246,030**		**$844**
Future Apparatus	$650,000	42%	$273,144	26	$10,599
Subtotal: Apparatus	**$650,000**		**$273,144**		**$10,599**
Total	**$1,232,734**		**$519,173**		**$11,443**

* The professional expense is allocated to demand in the next six years. The impact fee analysis should be updated within the 6-year horizon.

FUTURE FACILITIES & PROPORTIONATE SHARE ANALYSIS

Fire (cont.)

	Cost per SFE	SFE Conversion	Total Impact Fee per Unit
Residential			
Single Family Residential	$844	1.00	$844
Multi-family Residential	$844	0.68	$571
Non-Residential			
Shopping Center (per 1K SF)	$11,443	2.81	$32,117
General Office (per 1K SF)	$11,443	1.43	$16,413
Light Industrial (per 1K SF)	$11,443	0.84	$9,594

FUTURE FACILITIES & PROPORTIONATE SHARE ANALYSIS

Transportation

IMPROVEMENTS	COSTS	% ELIGIBLE	IMPACT FEE ELIGIBLE COST
Project #1 (Main Street Roadway Improvements)	$1,812,250	100%	$1,812,250
Project #2 (SR-59/Main Street Intersections Improvements - By Others)	$304,050	100%	$304,050
Project #3 (Canaan Way Roadway Improvements)	$240,600	100%	$240,600
Project #4 (Apple Valley Drive Roadway Improvements)	See Storm Water IFFP	75%	
Project 5 (Gateway Project Road Improvements - Previously Completed)	$1,225,000	40%	$494,979
Total IFFP Costs	**$3,581,900**		**$2,851,879**

Source: Sunrise Engineering IFFP Pg. 9

	TOTAL COST	% TO IFFP	COST TO IFFP	% TO GROWTH	COST TO GROWTH	FUTURE TRIPS	COST PER TRIP
Buy-In	-	28%	-	100%	-	307	-
Future Facilities	$3,581,900	80%	$2,851,879	28%	$808,742	307	$2,638.00
Professional Expense	$14,950	100%	$14,950	100%	$14,950	307	$49.00
Cost per Trip			**$2,866,829**				**$2,687.00**

FUTURE FACILITIES & PROPORTIONATE SHARE ANALYSIS

Transportation (cont.)

Land Use	ITE Code	Unit	PM Peak	Pass By & Internal Adjustment	Net Trip	Impact Fee per Land Use
Single Family Residential	210	Residential Unit	0.99	0%	0.99	$2,660
Multi-Family Residential	220	Residential Unit	0.67	0%	0.67	$1,800
Shopping Center	820	1,000 sf GLA	4.21	34%	2.78	$7,466
Light Industrial	110	1,000 sf GFA	0.83	0%	0.83	$2,230
Office	710	1,000 sf GFA	1.42	0%	1.42	$3,816
Source: ITE Trip Generation 10th Edition: 4-6 PM Peak Hour Vehicle Trip Generation Rates for the Adjacent Street Traffic (weekday 4-6PM); This Table represents only the most common uses and is NOT all-inclusive.						

FUTURE FACILITIES & PROPORTIONATE SHARE ANALYSIS

Storm Water

Storm Water Master Plan IFA Calculation	
Total Area Draining through basins analyzed	603
Undeveloped Land within Drainage Boundary	197
Percent of Cost Impact Fee Eligible:	**32.67%**
Total Project Cost	**$4,953,500**
Less FEMA Grant	$3,716,000
Total Impact Fee Eligible Project Costs	**$1,237,500**
Total Interest from New Debt Service	**$504,000**
% of Project Cost Due to New Growth	$404,000
% of Interest Due to New Growth	$164,500
Impact Fee Eligible Cost	**$568,500**
Impact Fee Calculations	
Total Impact Fee Eligible Cost	$568,500
Undeveloped Acres within Drainage Boundary	197
Maximum Impact Fee per Acre of Land within Drainage Boundary	**$2,885.79**

Source: Sunrise Engineering IFFP Table V.B.1

TOTAL IMPACT FEE SUMMARY

	Parks & Recreation	Fire/EMS	Transportation	Storm Water*	Total Fee
Single Family Dwelling Unit	$725	$844	$2,660	$1,443	**$5,672**
Multi-Family Dwelling Unit	$725	$571	$1,800	$1,443	**$4,539**
Shopping Center (per 1K SF)	NA	$32,117	$7,466	$1,443	**$41,026**
General Office (per 1K SF)	NA	$16,413	$3,816	$1,443	**$21,672**
Light Industrial (per 1K SF)	NA	$9,594	$2,230	$1,443	**$13,267**

	Single Family		Multi Family	
Type	Proposed	Existing	Proposed	Existing
Parks	$725	$141	$725	$141
Fire	$844	$59	$571	$59
Transportation	$2,660	$514	$1,800	$315
Storm Water*	$1,443	$86	$1,443	$86
Culinary Water	$1,000	$1,000	$1,000	$1,000
Sewer	$1,500	$1,500	$1,500	$1,500
Total	**$5,672**	**$3,300**	**$4,539**	**$3,101**
$ Change	**$2,372**		**$1,438**	
% Change	**72%**		**46%**	

- *Assumes 0.5-acre lot
- Transportation is base on Townhome designation
- Adopted existing fees for water and sewer are much lower than the proposed fees at that time.

NEXT STEPS

- ❑ Hold public hearing
- ❑ Adopt, Modify, or Reject Proposed Impact Fees
- ❑ 90 Day Wait Period for Increase

ROADWAY FACILITIES PLAN AND IMPACT FEE ANALYSIS

1777 North Meadowlark Drive
Apple Valley, UT 84737

APRIL 2020

PREPARED BY:
Sunrise Engineering, Inc.

Town of Apple Valley
Est. 2004

MAYOR .... Marty Lisonbee

COUNCIL MEMBER .... Denny Bass

COUNCIL MEMBER .... Mike McLaughlin

COUNCIL MEMBER .... Debbie Kopp

COUNCIL MEMBER .... Paul Edwardsen

Taylor Torgersen, E.I.T.	Marv Wilson, P.E. Principal Engineer State of Utah No. 176874

TABLE OF CONTENTS

APPENDICIES

ROADWAY IMPACT FEE FACILITIES PLAN

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

In 2019, the Town of Apple Valley commissioned Sunrise Engineering, Inc. to prepare a Roadway Facilities Plan and perform an impact fee analysis. Transportation facilities such as roadways are an integral part of a community. The location and attributes of transportation facilities have a meaningful impact on the type and course of growth in the community. The Town understands the importance of an early planning process to ensure that a community-wide transportation system fulfills the current and future needs of Apple Valley residents. The specific objective of this plan is to identify roadways within the Town that will need upgrades to improve their level of service to the Town's standard and to prepare an estimated cost for these improvements. Ultimately, the goal of this plan is to provide a general guide to the Town for making decisions pertaining to future roadway development.

1.2 BACKGROUND

The Town of Apple Valley is located south and east of Hurricane along SR-59 in Washington County, Utah. The Town boundaries include Rockville to the Northeast and Hildale to the Southeast with the red and white cliffs of Zion National Park visible to the east of town. Exhibit 1.2-1 shows an area map for Apple Valley.

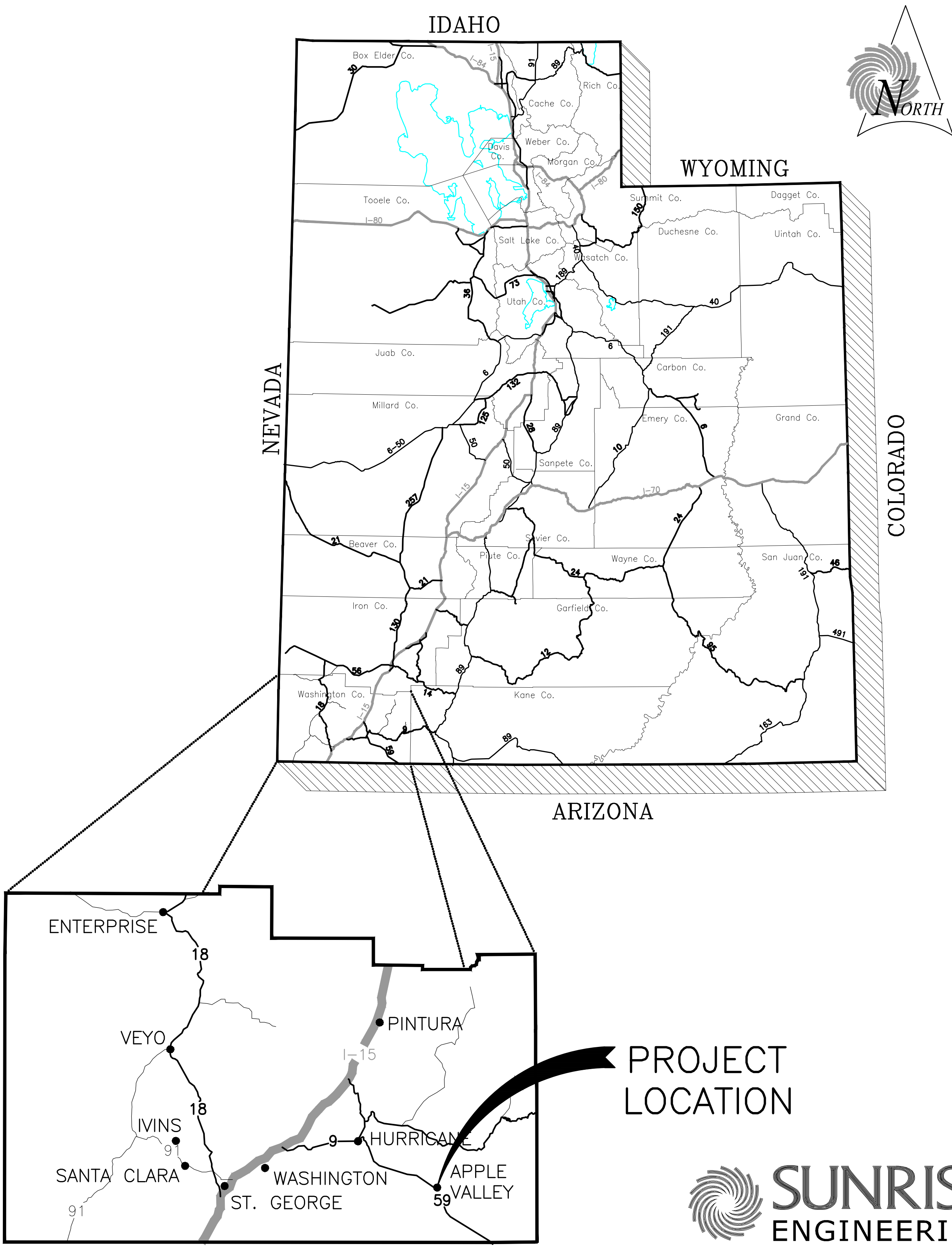
1.3 STUDY PURPOSE AND NEED

The purpose of this study is to provide a plan for the future transportation facilities within the service area of Apple Valley and to provide an estimated cost to implement these improvements. With a large number of private- and BLM-owned parcels and the potential for future development, the Town needs to develop a plan to address transportation and access corridors to benefit the community as a whole. This study will provide the Town with information and recommendations for future roadway improvements that will help the planning and construction of roadways. The study will also provide a breakdown of the estimated costs of these improved roadways and the amount of the cost that is impact fee eligible. This will allow the Town to be better prepared to manage the roadway needs for the expected future growth.

1.4 STUDY AREA

The service area used for this study consists of the Town of Apple Valley. See Exhibit 1.2-1 for the approximate location of the Town. There are several topographical challenges associated with the service area including major and minor drainages, State Route 59, and the large service area covered by the town.

1.2-1 - AREA MAP



SUNRISE ENGINEERING

11 NORTH 300 WEST
WASHINGTON, UT 84780
TEL 435.652.8450 · FAX 435.652.8416
www.sunrise-eng.com

2.0 STUDY PROCESS

2.1 PRELIMINARY DATA COLLECTION

To properly analyze Apple Valley's existing conditions, it was necessary to gather data about the parcels and land ownership in the Town. Data on existing roads, parcels, land ownership, and easements were provided by the Washington County GIS department. Additional data from a previously completed transportation master plan was also used. The existing data as well as the previous master plan was incorporated into the Apple Valley Future Roads GIS map.

2.2 ANALYSIS OF EXISTING CONDITIONS

After gathering the existing data and combining it in Apple Valley's GIS map, an analysis of the existing roadways, parcels, right-of-way, previous transportation plans, and other collected data was performed to identify areas where future roadway improvements are needed.

2.3 LEVEL OF SERVICE DEFINITION

To determine the definition of the Town's level of service, SEI both held discussions with the Town and looked at previously completed improvements. It was determined that the Town's level of service would consist of a double chip-sealed roadway matching the section shown in the Washington County Public Works Department Standard Dwg. No. 143, "Standard Gravel Road with Ditches" (see Appendix A).

2.4 POPULATION ANALYSIS

In order to properly perform the Impact Fee Analysis, it was necessary to gather information on the existing population in the Town and project that population out through a 20-year period. The Town of Apple Valley was established in 2004 with approximately 700 residents. Since then the town has continued to experience growth. More recent years have experienced a rapidly increasing growth rate. Census records indicate a population of 701 residents in or around 2010, with an estimated 2020 population of 925 residents. The average annual growth from 2010 to present based on these estimates is 2.00% per year.

For the impact fee analysis, a growth rate of 6% will be used for the first five years and subsequently reduced by 1% every five years until the end of the 20-year planning period. See Table 2.4.1 for projected annual growth rates in the planning period.

Year	Projected Growth Rate
2020-2025	6%
2026-2030	5%
2031-2035	4%
2036-2040	3%

Table 2.4.1 - Projected Growth Rates

Many communities in Washington County, including Hurricane and St. George are experiencing rapid growth in general, and there is potential for this growth to push out to Apple Valley. The town is anticipating some near future residential developments, which may increase the community's growth rate above the previously observed annual growth rate, depending on how quickly the development occurs. Sunrise Engineering, Inc. recommends the Town revisit these projections every five years or upon experiencing a rapid increase in growth. This report should be updated when actual growth is observed to exceed these projections, or when other significant changes occur with the town's facilities. See Table 2.4.2 for the Town's projected populations. A more detailed breakdown of the projected population is presented in Appendix B.

Year	Projected Population
2020	925
2025	1238
2030	1580
2035	1922
2040	2228

Table 2.4.2 - Projected Population

2.5 COORDINATION WITH APPLE VALLEY

After reviewing the existing data and compiling a list of preliminary recommendations and areas to discuss, representatives from SEI held a meeting with Apple Valley. At the meeting, SEI presented their list of recommendations and future roadway improvements to discuss. The parties went over the recommendations and problem areas to discuss what future roadway improvements would be needed and how these would fit into Apple Valley's visions for the Town. In general, five areas for improvement were identified which are further discussed in the Summary of Road Improvements section:

1) Main Street Roadway Improvements
2) SR-59/Main Street Intersection Improvements
3) Canaan Way Roadway Improvements
4) Apple Valley Drive Roadway Improvements
5) Apple Valley Way Improvements (Previously Completed)

2.6 REVIEW

Based on the feedback from the meeting with Apple Valley, SEI incorporated the recommended changes into the plan. SEI then prepared estimates for all the improvements before holding another meeting with Apple Valley to review. The finalized version of the Apple Valley Roadway Facilities Plan is shown in Appendix C. A summarized list of the proposed recommendations is found in the next section.

3.0 SUMMARY OF ROAD IMPROVEMENTS

3.1 ROADWAY PROJECTS

The planned roadway improvements generally consist of upgrades to existing roadways to improve their level of service to the Town's standard previously described in this report. A list of these improvements, identified as "Projects," are shown below with comments and estimated costs. The Project numbers for each proposed improvement correspond to the numbers shown on the Future Roadway Improvements Exhibit in Appendix C. A more detailed cost breakdown is presented in Appendix D. These Projects are not ranked by any kind of priority.

Project # 1 (Main Street Roadway Improvements)
This project will extend along Main Street (Smithsonian Butte National Backcountry Byway) from its intersection with SR-59 north approximately 2.86 miles to its intersection with the dirt road leading west towards the town and Gooseberry Mesa. The purpose of this project will be to upgrade the roadway to the Town's level of service so that it can better serve future developments accessed at the north end of the roadway. These improvements will consist of improving the existing subgrade along the roadway and placing 6" of untreated base course (UTBC) and a double chip seal. Additional minor improvements such as installation of drainage culverts and barbed wire fence will also be completed.

Impact Fee Eligible Cost Estimate: $1,812,250

Project # 2 (SR-59/Main Street Intersection Improvements)
This project will involve constructing improvements to the intersection of Main Street and SR-59. Currently, this intersection is skewed with Main Street intersecting SR-59 at an angle of approximately 23°. This project will realign the intersection so that Main Street will instead be perpendicular to SR-59. This project will also involve other improvements to the intersection required due to the realignment. This project will be funded by both the Town and the Utah Department of Transportation (UDOT). UDOT will cover the costs of all improvements inside their right-of-way while the Town will be required to cover the costs of all other improvements outside the UDOT right-of-way. The cost given below and the cost estimate shown in Appendix B only shows the expenses associated with work done outside the UDOT right-of-way that the Town is required to pay for.

Impact Fee Eligible Cost Estimate: $304,050

Project # 3 (Canaan Way Roadway Improvements)
This project will improve the west end of Canaan Way in the southeast corner of town from where the road leaves the west end of the houses to where it intersects an existing north-south dirt road. Currently, the road is a gravel road in the area adjacent to the houses in before it turns into a two-track dirt road on the west end. In order to get the west end of the road up to the Town's level of service, the road will require clearing & grubbing in the right-of-way and placement of granular borrow and UTBC to improve the subgrade. Once the subgrade has been improved, a double chip seal will be placed.

Impact Fee Eligible Cost Estimate: $240,600

Project # 4 (Apple Valley Drive Roadway Improvements)
This project will construct drainage improvements to Apple Valley Drive so that the road will not be washed out during large rain events. Currently, there are two existing drainage channels that cross the east-west section of the road on their way to a 9' pipe culvert the carries storm water underneath SR-59. It was determined that a

96" pipe and 84" pipe will need to be installed at the east and west ends of this section of road, respectively, in order to handle large storm events. This project will also improve the existing roadway up to the Town's level of service by placing 6" of UTBC and a double chip seal. This project and its associated costs are shown under the Stormwater Impact Fee Facilities Plan.

Project # 5 (Gateway Project Road Improvements – Previously Completed)
This project consists of previously completed improvements to roads within in Apple Valley. As part of these improvements, an existing bridge in town was demolished and replaced. It was determined that of the total project cost, the bridge replacement, accounting for approximately 40% of the total project amount, would be impact fee eligible. The Town took out a loan of $1,318,000 for the project of which there is a current principal balance of $1,225,000. Based on the 40% impact fee eligible factor, $494,979 of that remaining balance is impact fee eligible.

Impact Fee Eligible Impact-Fee Eligible Costs: $494,979

4.0 IMPACT FEE ANALYSIS

4.1 IMPACT FEE ELIGIBLE COSTS

The Impact Fees Act allows for the charging of Impact Fees to pay for transportation facilities needed to mitigate the impact of new development on public infrastructure. A portion of these improvements will be designated as Impact Fee eligible due to the Town needing to install the necessary infrastructure to accommodate new growth. Below is a list of projects, costs, and estimated percent Impact Fee Eligible amounts prior to adding estimated financing or inflation. The total cost of the project shown in the table below shows those portions of the streets for which the City would be responsible. A detailed breakdown of costs is shown in Appendix D.

Table 4.1.1 – Impact Fee Eligible Costs

IMPROVEMENTS	COSTS	% E.F. El.	I.F. El. COSTS
Project #1 (Main Street Roadway Improvements)	$ 1,812,250	100%	$ 1,812,250
Project #2 (SR-59/Main Street Intersections Improvements - By Others)	$ 304,050	100%	$ 304,050
Project #3 (Canaan Way Roadway Improvements)	$ 240,600	100%	$ 240,600
Project #4 (Apple Valley Drive Roadway Improvements)	SEE STORMWATER IMPACT FEE FACILITIES PLAN		
Project # 5 (Gateway Project Road Improvements – Previously Completed)	$ 1,225,000	40%	$ 494,979
SUBTOTAL	$ 3,581,900		$ 2,851,879
2020 Roadway Impact Fee Facilities Plan	$		10,500
2025 Roadway Impact Fee Facilities Plan	$		12,500
2030 Roadway Impact Fee Facilities Plan	$		14,500
SUBTOTAL	$		37,500
TOTAL	$ 3,619,400		$ 2,889,379

All the listed projects are considered by this report to be necessitated due to new growth (100% impact fee eligible) except for Projects #4 and #5. Project #4 was determined to be 75% impact fee eligible. This impact fee eligibility was determined by comparing the area of currently developed land being served by the road versus land that is expected to have future development. Project #5 was determined to be 40% impact fee eligible. This was done by finding out how much of the initial project cost went towards replacing the bridge structure. From

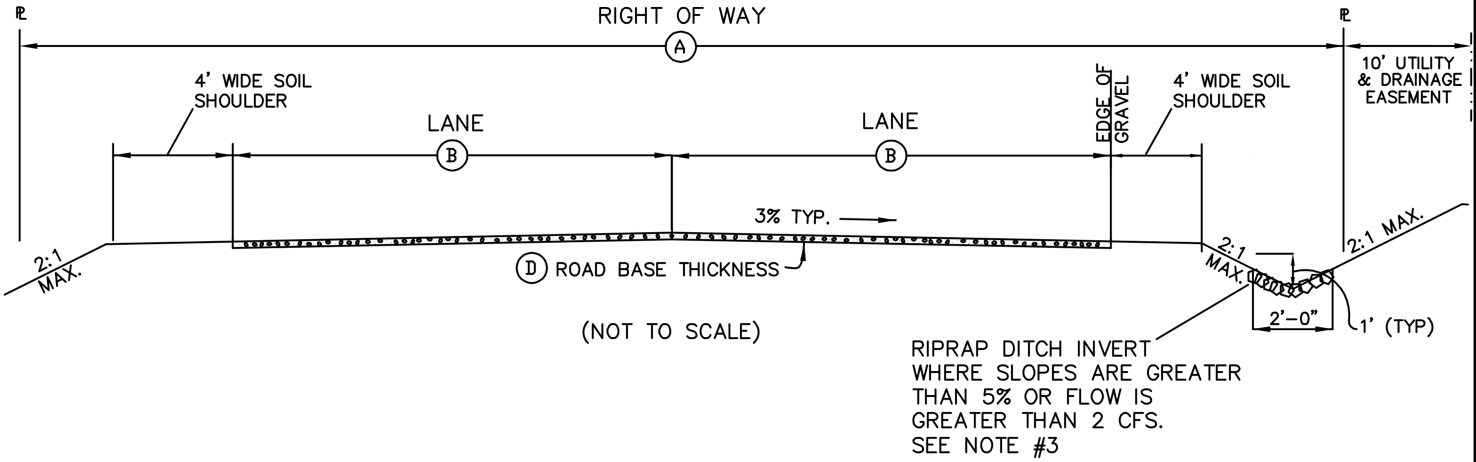
SUNRISE ENGINEERING

there, that percentage was factored into the remaining loan balance to determine how much of the current principal is impact fee eligible.

4.2 IMPACT FEE ANALYSIS

The information obtained during this study will be used by Lewis Young Robertson & Burningham, Inc., to determine what the maximum eligible impact fee amount is for Apple Valley.

Appendix A
Washington County Public Works Department
Standard Drawing No. 143 – Standard Gravel Road with Ditches



DIMENSIONS				
MARK	LOCAL	MINOR COLLECTOR	MAJOR COLLECTOR	ARTERIAL
A	50'	60'	66'	80'+
B	14'	19'	22'	29'(MIN)
D	SEE STANDARD SPECIFICATIONS			

NOTES:

1) OTHER EROSION CONTROL MATERIALS MAY BE USED UPON APPROVAL OF THE COUNTY REPRESENTATIVE.

2) 10' MINIMUM WIDE UTILITY EASEMENT REQUIRED OUTSIDE OF RIGHT OF WAY, BOTH SIDES OF STREET.

WASHINGTON COUNTY PUBLIC WORKS DEPARTMENT

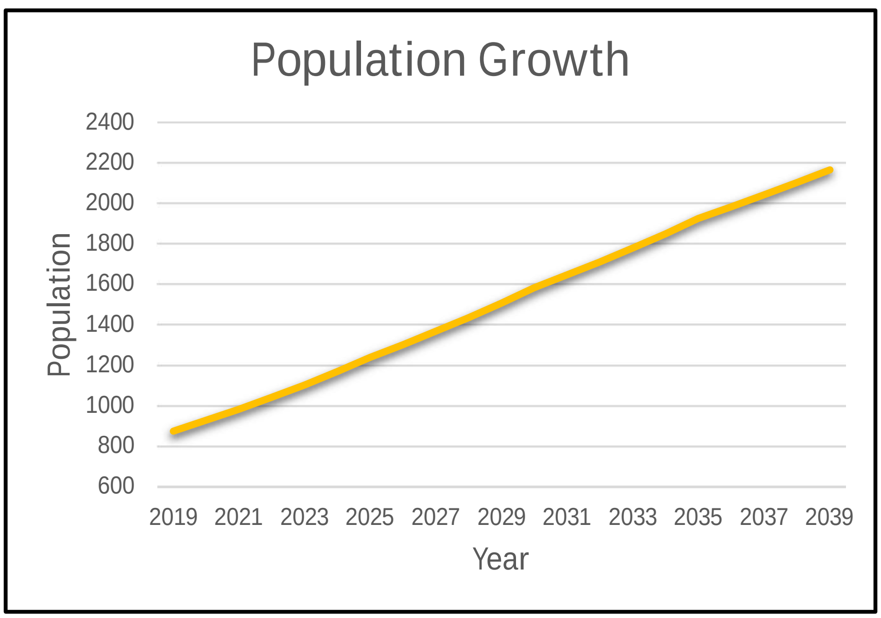
REVISIONS		
DATE	DESCRIPTION	BY

STANDARD GRAVEL ROAD WITH DITCHES

STANDARD DWG. NO.	
143	1 OF 1
APPROVED:	
DATE: APR 2017	BY: TE

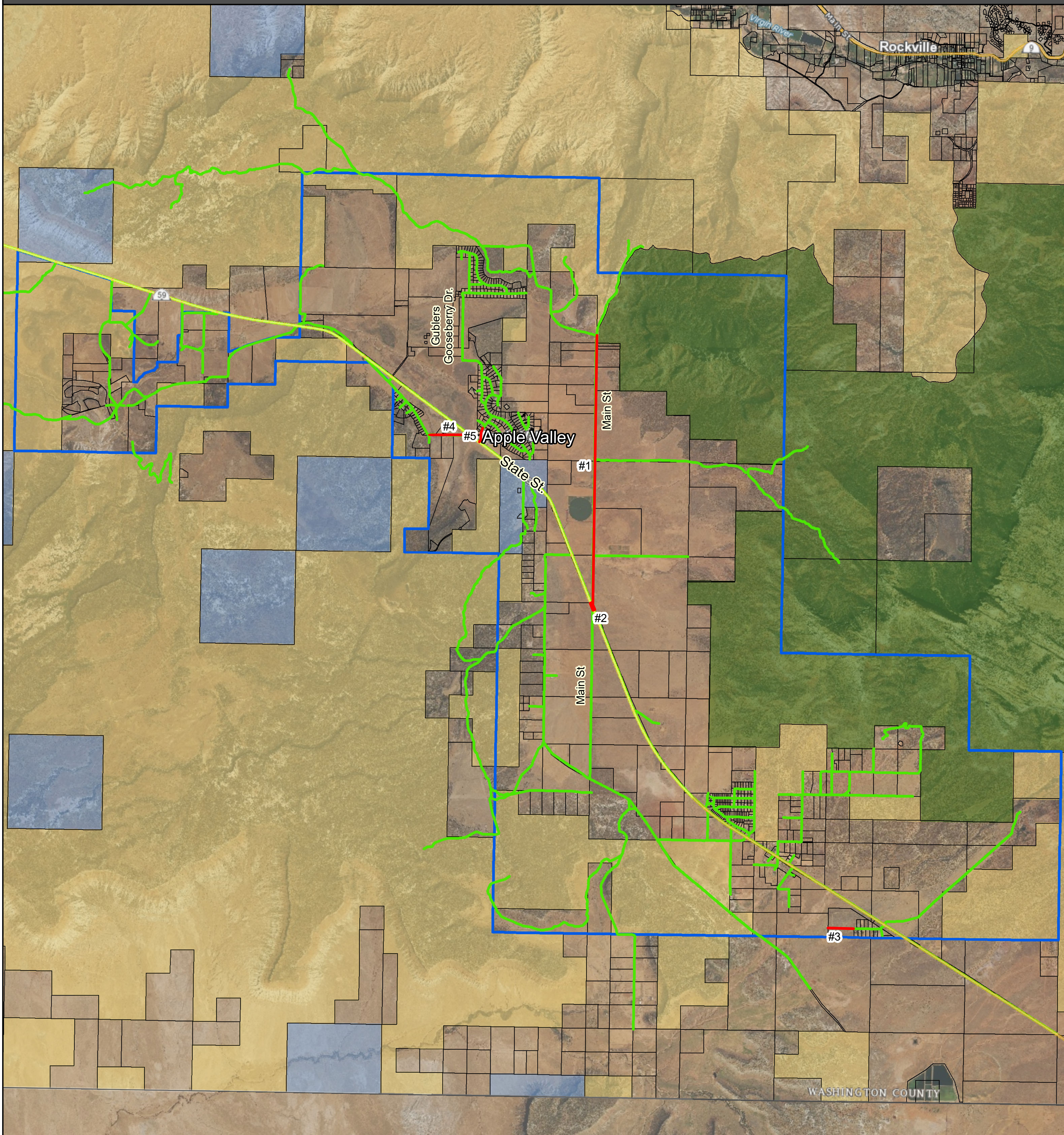
Appendix B
Population and Growth Projections

Year	Projected Population	Growth Rate
2019	873	6%
2020	925	6%
2021	981	6%
2022	1040	6%
2023	1102	6%
2024	1168	6%
2025	1238	6%
2026	1300	5%
2027	1365	5%
2028	1434	5%
2029	1505	5%
2030	1581	5%
2031	1644	4%
2032	1709	4%
2033	1778	4%
2034	1849	4%
2035	1923	4%
2036	1981	3%
2037	2040	3%
2038	2101	3%
2039	2164	3%
2040	2229	3%



Appendix C
Town of Apple Valley Roadway Facilities Plan

Apple Valley Roadway Facilities Plan



Legend

Proposed Roads

Existing Roads

Apple Valley Municipality

Parcels

Private Land

State Trust Lands

National Wilderness Area

Bureau of Land Management

0 1 2 1 in = 1 mi

N

Roadway Improvements

#1 Main Street Roadway Improvements

#2 SR-59/Main Street Intersections Improvements

#3 Canaan Way Roadway Improvements

#4 Apple Valley Drive Roadway Improvements

#5 Apple Valley Way Improvements (Previously Completed)

Town of Apple Valley Est. 2004

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Appendix D
Roadway Improvements Cost Estimates

SUNRISE ENGINEERING

11 North 300 West, Washington, Utah 84780
TEL 435.652.8450 | FAX 435.652.8416 | sunrise-eng.com

ENGINEER'S OPINION OF PROBABLE COST

ROADWAY IMPROVEMENTS COST ESTIMATE 4/30/2020
APPLE VALLEY TOWN TCT

NO.	DESCRIPTION	EST QTY	UNIT	UNIT PRICE	AMOUNT	% IMPACT FEE ELIGIBLE	IMPACT FEE TOTAL
MAIN STREET ROADWAY IMPROVEMENTS							
CONSTRUCTION							
1	Mobilization	5%	LS	$ 64,500.00	$ 64,500	100%	$ 64,500
2	Traffic Control	1	LS	$ 23,000.00	$ 23,000	100%	$ 23,000
3	Dust Control & Watering	1	LS	$ 57,000.00	$ 57,000	100%	$ 57,000
4	SWPPP	1	LS	$ 57,000.00	$ 57,000	100%	$ 57,000
5	Subsurface Investigation	1	LS	$ 57,000.00	$ 57,000	100%	$ 57,000
6	Construction Staking	1	LS	$ 75,000.00	$ 75,000	100%	$ 75,000
7	Materials Sampling and Testing	1	LS	$ 90,000.00	$ 90,000	100%	$ 90,000
8	Clearing, Grubbing, Saw Cutting, and	1	LS	$ 45,000.00	$ 45,000	100%	$ 45,000
10	Export Waste Material	950	Cu Yd	$ 14.00	$ 13,500	100%	$ 13,500
11	Import Granular Borrow	950	Cu Yd	$ 41.00	$ 39,000	100%	$ 39,000
12	Earthwork and Grading	1	LS	$ 175,000.00	$ 175,000	100%	$ 175,000
13	6" Untreated Base Course	426,500	SF	$ 0.90	$ 384,000	100%	$ 384,000
14	Double Chip Seal	47,000	SY	$ 2.50	$ 117,500	100%	$ 117,500
15	24" HDPE	625	LF	$ 72.00	$ 45,000	100%	$ 45,000
15	36" HDPE	375	LF	$ 108.00	$ 40,500	100%	$ 40,500
16	Misc. Storm Drain Appurtenances	1	LS	$ 15,000.00	$ 15,000	100%	$ 15,000
17	5-Strand Barbed Wire Fence	13,000	LF	$ 4.25	$ 55,250	100%	$ 55,250
				Subtotal	$ 1,353,250	100%	$ 1,353,250
			15%	Contingency	$ 203,000		$ 203,000
				CONSTRUCTION SUBTOTAL	$ 1,556,250		$ 1,556,250
PROFESSIONAL SERVICES AND INCIDENTALS							
1	Geotechnical Report	1.38%	LS	$ 25,000.00	$ 25,000	100%	$ 25,000
2	Design Survey & ROW	1.66%	LS	$ 30,000.00	$ 30,000	100%	$ 30,000
3	Civil Engineering Design	6.07%	LS	$ 110,000.00	$ 110,000	100%	$ 110,000
4	Bidding & Negotiating	0.61%	HR	$ 11,000.00	$ 11,000	100%	$ 11,000
5	Engineering Construction Services	4.41%	HR	$ 80,000.00	$ 80,000	100%	$ 80,000
				PROFESSIONAL SERVICES SUBTOTAL	$ 256,000		$ 256,000
				MAIN STREET ROADWAY IMPROVEMENTS SUBTOTAL	$ 1,812,250		$ 1,812,250

SR-59/MAIN STREET INTERSECTION IMPROVEMENTS								
CONSTRUCTION								
1	Mobilization	5%	LS	$ 10,500.00	$ 10,500	100%	$ 10,500
2	Traffic Control	1	LS	$ 3,000.00	$ 3,000	100%	$ 3,000
3	Dust Control & Watering	1	LS	$ 7,000.00	$ 7,000	100%	$ 7,000
4	SWPPP	1	LS	$ 7,000.00	$ 7,000	100%	$ 7,000
5	Subsurface Investigation	1	LS	$ 7,000.00	$ 7,000	100%	$ 7,000
6	Construction Staking	1	LS	$ 9,000.00	$ 9,000	100%	$ 9,000
7	Materials Sampling and Testing	1	LS	$ 11,000.00	$ 11,000	100%	$ 11,000
8	Clearing, Grubbing, Saw Cutting, and	1	LS	$ 13,500.00	$ 13,500	100%	$ 13,500
10	Export Waste Material	600	Cu Yd	$ 14.00	$ 8,500	100%	$ 8,500
11	Import Granular Borrow	600	Cu Yd	$ 41.00	$ 25,000	100%	$ 25,000
12	Earthwork and Grading	1	LS	$ 40,000.00	$ 40,000	100%	$ 40,000
13	6" Untreated Base Course	47,500	SF	$ 0.90	$ 43,000	100%	$ 43,000
14	Double Chip Seal	6,000	SY	$ 2.50	$ 15,000	100%	$ 15,000
15	5-Strand Barbed Wire Fence	3,400	LF	$ 4.25	$ 14,450	100%	$ 14,450
				Subtotal	$ 213,950	100%	$ 213,950
			15%	Contingency	$ 32,100		$ 32,100
				CONSTRUCTION SUBTOTAL	$ 246,050		$ 246,050
PROFESSIONAL SERVICES AND INCIDENTALS								
1	Geotechnical Report	1.64%	LS	$ 5,000.00	$ 5,000	100%	$ 5,000
2	Design Survey & ROW	1.64%	LS	$ 5,000.00	$ 5,000	100%	$ 5,000
3	Civil Engineering Design	8.22%	LS	$ 25,000.00	$ 25,000	100%	$ 25,000
4	Bidding & Negotiating	0.66%	HR	$ 2,000.00	$ 2,000	100%	$ 2,000
5	Engineering Construction Services	6.91%	HR	$ 21,000.00	$ 21,000	100%	$ 21,000
				PROFESSIONAL SERVICES SUBTOTAL	$ 58,000		$ 58,000
				SR-59/MAIN STREET INTERSECTION IMPROVEMENTS SUBTOTAL	$ 304,050		$ 304,050
CANAAN WAY ROADWAY IMPROVEMENTS								
CONSTRUCTION								
1	Mobilization	5%	LS	$ 8,500.00	$ 8,500	100%	$ 8,500
2	Traffic Control	1	LS	$ 3,000.00	$ 3,000	100%	$ 3,000
3	Dust Control & Watering	1	LS	$ 6,000.00	$ 6,000	100%	$ 6,000
4	SWPPP	1	LS	$ 6,000.00	$ 6,000	100%	$ 6,000
5	Subsurface Investigation	1	LS	$ 6,000.00	$ 6,000	100%	$ 6,000
6	Construction Staking	1	LS	$ 8,000.00	$ 8,000	100%	$ 8,000
7	Materials Sampling and Testing	1	LS	$ 9,000.00	$ 9,000	100%	$ 9,000
8	Clearing, Grubbing, Saw Cutting, and	1	LS	$ 12,000.00	$ 12,000	100%	$ 12,000
10	Export Waste Material	550	Cu Yd	$ 14.00	$ 8,000	100%	$ 8,000
11	Import Granular Borrow	550	Cu Yd	$ 41.00	$ 23,000	100%	$ 23,000
12	Earthwork and Grading	1	LS	$ 35,000.00	$ 35,000	100%	$ 35,000
13	6" Untreated Base Course	41,000	SF	$ 0.90	$ 37,000	100%	$ 37,000
14	Double Chip Seal	5,000	SY	$ 2.50	$ 12,500	100%	$ 12,500
				Subtotal	$ 174,000	100%	$ 174,000
			15%	Contingency	$ 26,100		$ 26,100
				CONSTRUCTION SUBTOTAL	$ 200,100		$ 200,100
PROFESSIONAL SERVICES AND INCIDENTALS								
1	Geotechnical Report	1.66%	LS	$ 4,000.00	$ 4,000	100%	$ 4,000
2	Design Survey & ROW	1.66%	LS	$ 4,000.00	$ 4,000	100%	$ 4,000
3	Civil Engineering Design	8.31%	LS	$ 20,000.00	$ 20,000	100%	$ 20,000
4	Bidding & Negotiating	0.62%	HR	$ 1,500.00	$ 1,500	100%	$ 1,500
5	Engineering Construction Services	4.57%	HR	$ 11,000.00	$ 11,000	100%	$ 11,000
				PROFESSIONAL SERVICES SUBTOTAL	$ 40,500		$ 40,500
				CANAAN WAY ROADWAY IMPROVEMENTS SUBTOTAL	$ 240,600		$ 240,600

GATEWAY PROJECT IMPROVEMENTS (ALREADY COMPLETED)							
Project Total/Original Loan Amount					$ 1,318,000	40%	$ 532,557
Current Principal Balance					$ 1,225,000	40%	$ 494,979
GATEWAY PROJECT IMPROVEMENTS (ALREADY COMPLETED) SUBTOTAL					$ 1,225,000		$ 494,979
TOTAL PROJECT COSTS					$ 3,581,900	80%	$ 2,851,879
FUTURE ROADWAY IMPACT FEE FACILITIES PLANS							
1	2020 Roadway Impact Fee Facilities Plan	1	LS	$ 10,500.00	$		10,500
2	2025 Roadway Impact Fee Facilities Plan	1	LS	$ 12,500.00	$		12,500
3	2030 Roadway Impact Fee Facilities Plan	1	LS	$ 14,500.00	$		14,500
FUTURE ROADWAY IMPACT FEE FACILITIES PLANS SUBTOTAL					$		37,500
TOTAL					$ 3,619,400		$ 2,889,379

In providing opinions of probable construction cost, the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as to the accuracy of such opinions compared to bid or actual costs.

THE TOWN OF APPLE VALLEY

STORMWATER IMPACT FEE FACILITIES PLAN

JANUARY 2020

PREPARED BY:

SUNRISE ENGINEERING

THE TOWN OF APPLE VALLEY
STORMWATER IMPACT FEE FACILITIES PLAN

JANUARY 2020

MAYOR .... Marty Lisonbee
COUNCIL MEMBER .... Denny Bass
COUNCIL MEMBER .... Mike McLaughlin
COUNCIL MEMBER .... Debbie Kopp
COUNCIL MEMBER .... Paul Edwardsen

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Principal Engineer
State of Utah No. 176874

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I. INTRODUCTION

This Stormwater Impact Fee Facilities Plan has been prepared for the Town of Apple Valley, located in Washington County, Utah, east of St. George and Hurricane along State Route 59. The Town of Apple Valley was established in 2004 with approximately 700 residents. Since then the town has continued to experience growth. As this growth has occurred, the construction of homes, roads and other improvements typical of developed communities has altered the natural terrain upon which the community was built. These alterations have resulted in an increase in stormwater runoff generated by storm events and have changed the routes by which storm runoff is directed through the Town.

The Town's existing stormwater drainage improvements include borrow ditches, street culverts, a bridge, and a curb and gutter with integrated storm drain inlet boxes and piped systems. These improvements have been analyzed with regard to build out conditions based on current zoning.

This study analyzes those areas which are currently developed and/or which directly route stormwater runoff through the Town. Undeveloped drainage basins falling within the Town boundary were not analyzed in this study. It is assumed that runoff from these areas will flow directly into Little Creek.

This Plan includes general requirements for the sizing, maintenance, and configuration of a stormwater management system in the Town of Apple Valley and makes recommendations for addressing specific problem areas in the Town.

In addition, this Plan provides operation and maintenance recommendations for existing and future stormwater improvements.

It is intended that this 2019 Stormwater Master Plan will help the Town of Apple Valley manage current and future stormwater routing scenarios.

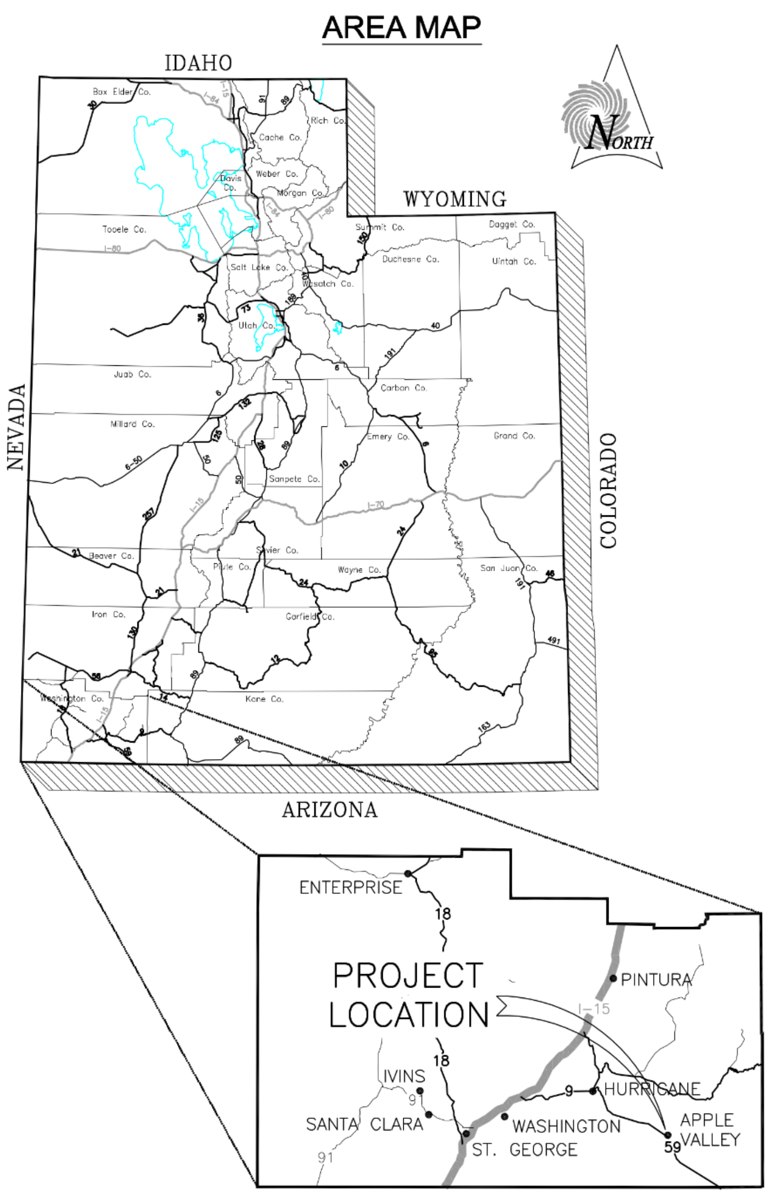


Figure I-1: Area Map

II. BASIN DESCRIPTION & DATA COLLECTION

A. FIELD INVESTIGATION

The Town of Apple Valley is located south and east of Hurricane along SR-59 in Washington County, Utah. The Town boundaries include Rockville to the east, and Hildale to the south. The community can be classified as rural and suburban due to varied land uses within the Town. These land uses range from pasture and farmland to moderate density residential housing and light commercial use. Development in the Town has had a direct impact on the natural drainage patterns and native ground cover historically found in the area. These changes in ground cover and drainage patterns are the primary cause of stormwater problems and potential flooding in the Town.

To assist with preparation of this Plan, Sunrise Engineering's staff conducted a detailed field investigation of the Town. The overall purpose of the field investigation was to collect information regarding existing drainage improvements, drainage patterns, and existing problematic areas throughout Apple Valley. The findings of the field investigation were compared to digitized information and supplemented by maps obtained from various entities regarding soil types, land uses, and digital elevation models. The gathered information was used in a hydrologic analysis of the study area to determine the amount of runoff generated by specific precipitation events and to evaluate the ability for existing infrastructure to convey runoff flows.

B. EXISTING DRAINAGE FACILITIES

Roadway Conveyance

Excess stormwater generated by a given rainfall event typically sheet flows to roadside borrow ditches lining the street drainage area. These ditches route stormwater runoff in the direction of highest gradient to the nearest drainage. Where necessary culverts are located at street intersections to route stormwater underneath the intersection. Due to the large watershed and non-ridged drainage channels sheet flow can cause problems by overtopping ditches and flowing into residential properties. Some of these specific problem areas and solutions are discussed in later sections.

Storm Drain Pipe System

Storm drain pipe systems are located near the towns gas station and bridge. These systems include catch basins, cleanout boxes, pipe segments, and outfall structures which discharge storm-water to natural drainage features and ultimately to Little Creek. The majority of Apple Valley does not include storm drain piping. A comprehensive map of the existing drainage improvements has been included as Figure IV.C.1 in Appendix A.

Drainage Channels

The primary natural drainage channel in Apple Valley is Little Creek. Little Creek runs next to SR 59 for the majority of its path through Apple Valley. This ephemeral creek is the major drainage feature for Apple Valley. All subsequent washes and drainage improvements ultimately drain into the Little Creek.

A. WATERSHED INFORMATION

Work performed during the data collection and field investigation phase of this study included a detailed review of how stormwater runoff within the Town of Apple Valley is routed to the primary drainage channels and pipe systems previously described, and ultimately to Little Creek. The direction of stormwater flow was established for local developments and existing stormwater conveyance facilities were reviewed to understand how they route stormwater to the major drainage channels. After these patterns were determined, watershed drainage basins were delineated.

A drainage basin is a portion of a greater watershed area that has specific, well-defined boundaries and produces runoff at a downstream point location. Dividing larger watershed areas into individual drainage basins and allows more detailed and accurate analyses of the individual areas. These individual analyses can then be combined to generate data for the large basins and the watershed as a whole. This process was followed for this Plan.

The Town of Apple Valley contains several drainage basins. The basins on the east side of the mesa merge together and drain directly into Little Creek. The basins on the west of the mesa drain at separate points into Little Creek. Figure II.C.1 in Appendix A illustrates the drainage basins as they exist presently.

B. SOIL TYPE INFORMATION

The soil type within a watershed area has a significant impact on how much excess stormwater is available for runoff because the soil type determines the precipitation infiltration rate. This infiltration rate is the rate at which water moves from the ground surface into subsurface soil layers. If the infiltration rate is very high, stormwater runoff generated by precipitation events is lower because a greater volume of moisture is absorbed by the soil. Conversely, if the infiltration rate is low, higher volumes of runoff are generated because minimal absorption occurs in the subsurface soil layers. The Soil Conservation Service (SCS) has studied soil types throughout the United States and has grouped soils according to their type and infiltration rates. These groups are described in the list below:

Group A: These soils have a high infiltration rate. They are chiefly deep, well drained sands or gravel, deep loess, or aggregated silts. *They have low runoff potential.*

Group B: These soils have a moderate infiltration rate when thoroughly wet. They are moderately deep and well drained and of moderately fine to moderately coarse texture. Examples are shallow loess and sandy loam.

Group C: These soils have a slow infiltration rate when wet. They are soils with a layer that impedes downward movement of water and typically have moderately fine to fine texture. Examples are clay loams or shallow sandy loams. These soils are typically low in organic content and high in clay content.

Group D: These soils have a very slow infiltration rate. They are chiefly clay soils with high swelling potential. A high water table is often permanent. Clay pan is often found at or near the surface. A shallow layer of soil may cover a nearly impervious material. Examples include heavy plastic clays and certain saline soils. *They have high runoff potential.*

The United States Department of Agriculture, National Resource Conservation Service (NRCS) has performed several studies of soils throughout the United States including those in the Town of Apple Valley and the surrounding area. These studies reveal that the soil types located in the study area are primarily of groups B, B/C, and C Soil data used for the study area consisted primarily of data from the SSURGO database which was obtained from the NRCS Web Soil Survey website. This data was supplemented by data from the STATSGO database which was obtained from the NRCS Soil Data Mart website. The data collected was used in the watershed analysis described by this Plan. A map of the SCS soil types in the study area is included as Figure II.D.1 in Appendix A.

C. LAND USE PATTERNS

The type of land use in a given watershed area is a factor that significantly affects the magnitude of stormwater flow and runoff volume generated by precipitation events. Land uses that have relatively higher percentages of impervious surfaces such as parking lots, shopping areas, storage yards and high density residential housing tracts generate more stormwater runoff than areas with lower percentages of impervious surfaces such as parks and grasslands.

The Town's current zoning map was used to evaluate the land use conditions in Apple Valley assuming a build out condition in the study area. Additionally, review of current aerial photographs and information collected during the field investigation was used to refine the land use categories used in this Plan. The Town has a variety of developed land uses including:

<u>Commercial</u>: This includes retail shopping, restaurants, hotels, Town offices, churches, and other businesses.

<u>Low Density Residential</u>: This use includes residential housing on average lot sizes of 5 or more acres.

<u>Medium Density Residential</u>: This use includes residential housing from 1 to 5 acres.

<u>High Density Residential</u>: This use includes residential housing on average lot sizes of 1 acre.

<u>Multi-Family/PCD/Mobile Home</u>: This use includes residential housing on average lot sizes of 6,000 square feet or less.

<u>Open Space</u>: This use includes public recreation grounds and facilities, other grassy areas, and some agricultural land.

<u>Brush Terrain</u>: This area includes regions of undeveloped natural brush terrain.

Over the past several years, Apple Valley has experienced periods of high to moderate growth and periods of very low growth. Development in the Town has been governed by and has generally followed guidelines established by adopted zoning ordinances. It was assumed, for the purposes of this study and for predicting future land use patterns within the Town, that development and land use will follow the current Apple Valley Town Zoning Map. The current zoning map has been included as Figure II.E.1 in Appendix A.

D. HISTORY OF FLOODING & COMPLAINTS

The data collection and field investigation process completed for this study included a review of locations within the Town where flooding due to precipitation events has been a problem. A summary of the problem areas as provided by Apple Valley Town are summarized below:

East Zion Circle: Runoff during large precipitation events flows into the cul-de-sac causing the road and adjacent houses to be partially flooded and distributes large sediment deposits. The area is a relative low point (belly) that holds water until it can be conveyed away by ditches. Runoff from these streets is intended to sheet flow to the side of the street in which it is generated and cross only in designated locations such as culverts or other storm water improvements.

1240 Apple Blossom Ln: Runoff during medium to large storm events overruns existing borrow ditches causing flow to pass through neighborhood homes around 1240 Apple Blossom Ln. Homes yards are being eroded away from the floods. The flow follows the predevelopment geological flow path. Borrow ditches have been constructed to re-route water for this area but have not been sized large enough to handle the larger storm events.

Borrow Ditches: Borrow ditches throughout the town have caused localized flooding. Borrow ditches fill with sediment when flow goes through the ditches. If the ditches are not maintained it causes areas with localized flooding. This flooding has washed out driveways and sent water through yards in the town.

N. Apple Valley Dr: Runoff during medium to large storm events causes water to overtop North Apple Valley Drive. The drive has a section that was constructed to dip down into an existing flow path. When the watershed receives significant rain, the storm water erodes the lowered portion of the road.

III. HYDROLOGICAL ANALYSIS

A. INTRODUCTION

After the field investigation and data collection process outlined in Section II of this Plan was performed, a hydrologic analysis of the drainage basins which contribute runoff flow to the Apple Valley study area was completed. The HEC-GEOHMS software package was used to determine the basin characteristics required by HEC-HMS as inputs. HEC-HMS, a system developed by the Army Corps of Engineers, was used in this analysis to determine peak and total volume flows generated in the drainage basins. The main purpose of this analysis is to provide reference information for future analyses, basic data for future designs, and to ensure that no current systems within the Town of Apple Valley are largely undersized or under designed.

Certain assumptions and modeling parameters that mathematically describe precipitation and runoff characteristics of the study area were required for development of the computer model. These parameters include:

Method of Analysis
Basin Delineation
Rainfall Data
Design Storm
Soil Type and Land Use Characteristics
Lag Time

A discussion of these input parameters and the process of creating the hydrologic model is given in Section B below. Results generated by the computer model are discussed in Section C.

E. HYDROLOGICAL MODEL

Method of Analysis

Numerous methods have been developed for performing hydrologic analyses for given watersheds. Each of the methods has its strengths and weaknesses; therefore, particular methods are better suited to specific watershed characteristics and configurations. The method chosen to analyze the Town of Apple Valley watershed was the SCS Unit Hydrograph Method. This method, developed by the Soil Conservation Service, is best suited for urban or rural conditions with drainage basin areas ranging from one to 2,000 acres. Data required for input includes rainfall intensities, predominant soil types, land use patterns, runoff times of concentration (T_c) for individual basins and runoff curve numbers (CN) for individual basins. Output results are runoff hydrographs from which peak flows and volumes can be determined.

In the Unit Hydrograph Method, input data is used to create a direct hydrograph that results from one inch of excess rainfall uniformly distributed over the watershed area for a specific duration storm event. After the unit hydrograph is created, it can be used to generate flood hydrographs for design storms (i.e. 10-year 3-hour, 100-year 3-hour, etc.) based on the theory that individual hydrographs resulting from successive increments of rainfall excess that occur throughout a storm period will be proportional in discharge throughout their length. The HEC-GEOHMS and HEC-HMS software package has the ability to run the SCS method to generate stormwater discharge hydrographs based on the required input data. Hence, this package was appropriately suited for analysis of the Town of Apple Valley watershed.

Basin Delineation

In order to effectively model precipitation and runoff scenarios for the Town of Apple Valley watershed, the study area was divided into drainage basins as described in Section II. Figure II.C.1 included in Appendix A shows the basin delineations. Basins were automatically delineated from a digital elevation model (DEM) imported into HEC-GEOHMS from the Utah AGRC website and corrected based on information obtained from the field investigation. These basins represent the current storm runoff configuration for the Town.

Rainfall Data

Rainfall data necessary for input into the computer model was taken from the National Oceanic Atmospheric Administration (NOAA) website ATLAS 14. The table provides information regarding design storm depth-duration-frequency (DDF) of rainfall depths as given in Table III.B.1 in Appendix B. The precipitation data given in a DDF table can be used to create a DDF curve which is a relationship between the depth, duration, and frequency or return period of a given storm event. This, in turn, can be used to produce a storm temporal distribution. This distribution is a relationship between the percentage of rain produced given the amount of time that has elapsed. These distributions are related to the design storm duration and the distribution used in this study can be found in Table III.B.2 in Appendix B.

Design Storm

The design storm for a hydrologic analysis is normally chosen based upon data observations that reveal the type of precipitation event that produces the highest peak flows and volumes for a given watershed under realistic rainfall event conditions. In the western United States and especially arid areas, storms that generally produce the highest levels of runoff are thunderstorms. Historically, the rainfall event frequency used to size storm drain conveyance facilities in Utah has been either the 5-year or 10-year 3-hour storm while the 100-year 3-hour storm has generally been used to size detention facilities.

It has been concluded for this Plan that runoff conveyance facilities for the Town of Apple Valley should be designed for the 10-year 3-hour storm and detention facilities to be designed for the 100-year 3-hour storm. This standard is consistent with that used in most areas of Utah and is the same as the design criteria for storm drain systems in St. George Town.

Soil Type and Land Use Characteristics

One factor that significantly affects the amount of runoff generated by a particular watershed is the soil type within the watershed. Different soils have different infiltration rates, or rates at which water can move through the surface to subsurface layers and thus be held from flowing off the watershed via surface drainage. If the infiltration rate is high, the runoff generated from storms is decreased. If the infiltration rate is comparatively low, precipitation will flow off the watershed rather than being absorbed.

Another important factor that affects the amount of runoff generated by a watershed is land use. Developed areas have a higher percentage of impervious surfaces like streets, driveways, parking lots and roofs while undeveloped areas are typified by pervious surfaces and plant features that are more efficient at absorbing precipitation, preventing it from leaving the watershed as runoff. The results is that higher rates are expected with increased development than are typically observed from a watershed in its natural condition.

The effect of soil types and land uses on watershed runoff flows and volumes is accounted for within the SCS Unit Hydrograph method for hydrologic analysis by the runoff curve number (CN). The Soil Conservation Service has calculated CN values for each soil group based on particular land uses. Representative curve numbers were calculated by the computer model according to soil maps and land use maps imported into the model under build out conditions. These soil type maps and land use maps are given in Figure II.D.1 and Figure II.E.1 in Appendix A. Each basin was assigned by the model a composite CN value based on a weighted average of the different soil and land use types located within each basin. Curve number values assigned to each of the basins are included in tabular form in Table III.B.3 in Appendix B.

Time of Concentration

The final input parameter required for the hydrologic model is the lag time (T_l) which is generally defined as the time between the center of mass of effective rainfall and the inflection point on the recession (falling limb) of the direct runoff hydrograph. This is often related to the time of concentration which is defined as the time that must elapse before the entire basin area is contributing runoff at the outflow point of the basin. This parameter helps to define the shape and peak of the resulting hydrographs from rainfall events. Factors that determine the lag time are the length of overland flow (*L*) which is the maximum distance that water must travel from the upper extremity of the basin to the outflow point, the curve number (*CN*) which accounts for the soil infiltration capacity, and the slope (*S*) which is the average surface slope within the basin.

Of the various methods used to calculate the lag time, the SCS lag method is well suited for the hydrologic conditions characteristic of the Town of Apple Valley watershed area. The SCS lag equation was developed from observations of agricultural watersheds where overland flow paths were poorly defined and channel flow was absent, but the method has been adapted to small urban watersheds less than 2,000 acres in area and performs reasonably well for areas that are completely paved. Hence, the method can be applied to each of the basins within the Town of Apple Valley study area. The SCS lag equation is expressed as follows:

$$T_l = \frac{L^{0.8}\left(\left[\frac{1000}{CN} - 10\right] + 1\right)^{0.7}}{1900 * \sqrt{S}}$$

where T_l is the lag time in hours, *L* is the basin hydraulic length in feet, *CN* is the SCS runoff curve number and *S* is the average surface slope of the basin in percentage.

Evaluation of the lag time equation reveals that as the length of the basin decreases and the SCS runoff curve number and slope increase, the calculated lag time decreases. It is important to note that the time of concentration and the lag time has a significant effect on the size and timing of the peak flow from a watershed basin; therefore, care must be taken to accurately calculate this parameter. The lag time was calculated in HEC-GEOHMS for each basin within the study area. Table III.B.3 in Appendix B includes a column that lists the calculated lag times for each basin.

F. HYDROLOGICAL MODEL RESULTS

Information regarding basins, rainfall data, design storms, land uses, soil types and times of concentration were compiled using HEC-GEOHMS watershed modeling software. Following the compilation of the watershed and rainfall information, an analysis using HEC-HMS was run which generated runoff hydrographs for each basin in the watershed area. The runoff hydrographs provided values on peak flows and total runoff volumes for each basin. Peak flows and volumes resulting from the 10-year 3-hour storm event and the 100-year 3-hour event under build out conditions in the Town of Apple Valley are summarized in Table III.B.3 in Appendix B.

IV. SYSTEM ANALYSIS

A. INTRODUCTION

After the hydrologic analysis described in Section III of this Plan was completed, a general overall evaluation of existing drainage conditions and facilities in the Town of Apple Valley was performed to determine the adequacy of existing storm drain conveyance and routing facilities. This evaluation included hydraulic analyses of existing drainage features such as roadways, storm drain pipe systems, drainage swales, etc. The results of this analysis were used to reveal locations of flooding potential, to indicate where additional storm drain systems, improvements, or repairs are needed, and to provide insight on the prioritization of future projects and improvements. This evaluation involved studying the hydrologic data and discussion from Section III and a confirmation of the compiled data from the field investigation.

The discussion presented in this section includes an analysis of existing storm drain facilities, recommendations for repairs to the existing system, and proposed construction of additional storm drain facilities. A brief and general description of the existing storm drain facilities is given in Subsection B. Subsection C presents the recommended improvements and changes to the Apple Valley Town stormwater system which are needed to alleviate present problems.

B. EXISTING FACILITIES

Primary stormwater conveyance facilities existing in the Town of Apple Valley include borrow ditches, storm drain pipe systems, culverts and natural drainage channels. A brief discussion of the role and conveyance capabilities of each is given in the following highlighted subsections. This subsection is meant to be informative and provide details regarding the design methods used to determine system improvements.

Swales

Similar to the roadway conveyance systems in the Town, a specific inventory of all the swales within the Town will not be listed here, but any specific problem areas will be discussed later on in this section. The stormwater conveyance capacity of a swale is governed primarily by its cross sectional shape. Like any other conveyance channel, the longitudinal slope and surface roughness also strongly influences the capacity. Assuming these governing factors, the swale capacity can be approximated by Manning's equation:

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

Where *Q* is the flow capacity of the swale in cubic feet per second, *n* is Manning’s roughness coefficient, *A* is the area of fluid flow in square feet, *R* is the hydraulic radius in feet and *S* is the longitudinal slope of the swale in foot per foot.

Since the majority of the swales in the Town of Apple Valley are somewhat vegetated the n-value used for this analysis was a conservative value of 0.025. Also, to simplify the analysis process, all the swales in the Town were assumed to be triangular shaped, with a depth of 2’ and 1:1 side slopes. With these assumptions the above equation was simplified to the following equation:

$$Q = 188.7 * S^{1/2}$$

If the street has swales on both sides then the capacity is doubled since this equation is for a single swale. Table IV.B.1 in Appendix C presents the conveyance capacity of the typified roadway swale outlined above based on slope.

Storm Drain Pipe Systems

Storm drain pipe systems are currently installed in few areas of the Town. These systems generally include catch basins, cleanout boxes, pipe segments, and outfall structures. The storm drain pipe is located at the fire station and the bridge. These systems function as complete isolated systems and do not tie into larger Town storm drain mains. Each of the storm drains discharge into the Clear Creek Wash.

The isolated systems are functioning as designed and are effectively conveying stormwater out of the nearby streets and developed areas. Table IV.B.2 in Appendix A presents the conveyance capacity of several types of piped systems based on slope.

Excess stormwater routed into these systems generally enters the storm drain pipe system through catch basins and inlet boxes. Covers and grates for these inlet boxes have many different sizes and configurations which affect the amount of stormwater that can be captured by these boxes. If the actual grate is smaller or becomes choked with debris or is otherwise clogged, the capture capacity is reduced. Limited capacity at a grate may cause localized flooding and may also cause flooding at downstream grate locations due to the reduced amount of water being captured at upstream locations. Future storm drain system designs and development requirements should respect these facts.

Culverts

The majority of the conveyance facilities in the Town of Apple Valley are comprised of natural drainage channels along the edge of the road. With this being the case, several culverts are located throughout the Town to convey stormwater under roadways or other such embankments.

The shapes of these culverts may vary, but most are understood to be circular. Culvert construction materials also vary. Many are made from steel, concrete, and plastics. Culvert inlet and outlet configurations also vary. All these factors, including the size of the culvert, contribute to the conveyance capacity.

G. SYSTEM IMPROVEMENTS

The runoff results of the hydrologic analysis (summarized in Table III.B.3 and Table III.B.4) were compared to the flow capacities of the existing improvements near the location of the basin outlets. This comparison was the basis for the improvement recommendations provided in this section.

In general, the runoff generated in the existing drainage basin which drains the majority of the developed portion of the Town does not exceeds the capacity of the existing downstream improvements. A portion of the town has areas where the runoff exceeds the existing structure capacity. These conditions exist on the East side of town. The recommended improvements focus on routing large runoff amounts around the east end of town as identified in Section II.F of this report.

A map of the recommended improvements has been included as Figure IV.C.2 in Appendix A.

Recommended Improvements

East Apple Valley Drainage Channel

Install a 16’ channel that increases to a 45’ drainage channel on the East side of town. The channel is positioned on the west side of parcels AV-1321-A, AV-1328-B, AV-1329, and AV-1343-A-1.

Install a detention basin capable of holding 4,500,000 gallons of water at the north east section of town. The detention basin lies on parcel AV-1329.

24-inch HDPE storm drain system from Mt. Zion Circle between Parcels AV-AVR-3-4 and AV-AVR-3-5-B-1 along S. Mt. Zion Drive that fronts parcels AV-1-2-29-3101, AV-1330-E, AV 1330-D-1, and AV 1330-C.

Install 96-inch CMP culvert under N Apple Valley Drive. See exhibit IV.C.2 for location.

Install 84-inch CMP culvert under N Apple Valley Drive. See exhibit IV.C.2 for location.

Borrow Ditch Improvements

The town has given direction to keep borrow ditches as the standard vehicle for drainage with the town boundaries. Borrow ditches will need to be cleaned and expanded in around half of the streets in Apple Valley.

For main streets and areas where additional development is expected to take place, the Town should consider having the developer install curb & gutter.

Incorporating these improvements would alter the basin delineation described previously in this report. The changes to the drainage basin delineation based on completing the recommended improvements are shown in Figure IV.C.3 in Appendix A.

H. NATURAL DRAINAGE CHANNEL INFRASTRUCTURE

Due to the critical nature of the natural drainage channels for conveying and routing stormwater runoff within the Apple Valley Town boundaries, it is recommended that the Town take proper action to preserve and protect them for this purpose. It is recommended that the Town adopt an ordinance to preserve these existing channels as drainage rights-of-way to be maintained and preserved by the Town as part of the stormwater facilities owned and operated by the Town.

It is not economical for the Town to construct infrastructure consisting of underground stormwater conveyance trunk lines as long as these natural channels remain unobstructed and in working condition. With this intended use of the natural drainage channels, it also recommended that future developments in the Town shall not obstruct these channels. In the event that this is not possible, for one reason or another, then it should be the responsibility of the developer to reconstruct an open channel or an underground piping system to convey the flows through the development. In turn, future developments within the should be allowed to discharge stormwater produced in the development into these natural drainage channels at the same natural rate prior to development. Doing so will most likely require construction of a detention facility. The developer will be responsible for determining the historical discharge rate produced by the land being developed and the proper capacity of the detention facility. Such determination by developer should be subject to review and acceptance by the Town.

In order to prevent excessive pollutants from entering these natural channels, it is also recommended that stormwater be partially treated before being discharged into the channels. Possible treatment could include the removal of suspended solids, trash, debris, and oil. See Subsection F for further information regarding water quality improvements.

I. MAINTENANCE AND MISCELLANEOUS IMPROVEMENTS

There are several improvements and practices that will enhance the ability for the Town of Apple Valley to manage stormwater runoff. These improvements include both structural and non-structural items. They are:

<u>Pave or Chip Seal Unimproved Roads:</u> Sedimentation that occurs in storm drain systems is often caused by erosion from construction areas as well as unpaved roads within the Town and can result in significant costs and maintenance to the system. The total amount of sedimentation in the storm drain system can be greatly reduced or eliminated by paving or chip sealing unimproved roads.

<u>Reshape Existing Roads:</u> Some of the roads in Apple Valley Town lack the ideal 2% cross slope to centerline. Without a proper crown in the roadway, the ability of the roadway to convey stormwater and drain properly is diminished. It is recommended that as roadways are resurfaced, care be taken to ensure that the proper cross slope is established.

<u>Complete Regular Street Sweeping:</u> A comprehensive street sweeping and cleanup program should be developed to remove sediment and trash from the streets and gutters so debris is not washed to downstream storm drain control facilities and ultimately into the Little Creek. It is anticipated that this simple maintenance procedure will greatly reduce future costs for maintenance of the storm drain system.

<u>Complete Regular Facility Cleaning</u>: A comprehensive facility maintenance program should be established to clean inlet boxes, manholes, pipe systems, and any future pollution control structures. Regular maintenance will ensure the proper functionality of these structures, prolong life expectancy and reduce future maintenance costs.

<u>Ensure Proper Grate Orientation</u>: Ensure that the catch basins in the Apple Valley Town storm drain system that are fitted with directional grates have the directional grates installed in the correct orientation to function at maximum efficiency. Maintenance of the storm drain system should include a procedure to ensure that the grates on every catch basin are oriented properly.

<u>Establish Standard Maintenance Program</u>: It is recommended that the Town develop a regular storm drain system maintenance program with proper tracking and record keeping. This process is most easily accomplished using current computer technology including mapping and record keeping software. Implementing such a system will allow the Town to maintain the storm drain system at the highest level of efficiency.

<u>Maintain a Current System Map</u>: It is strongly recommended that Apple Valley Town maintain a thorough storm drain system map. Modern computer technology makes this task relatively simple and having the map will significantly reduce storm drain system maintenance costs. If

possible, this map should include sizes, materials, and slopes of existing improvements.

J. WATER QUALITY IMPROVEMENT MEASURES

One of the primary goals of a stormwater management plan is to enhance the quality of water discharged to downstream stormwater conveyance facilities. Runoff generated from urban and suburban areas often contains pollutants such as sediments, road salts, oils, greases, solvents, pesticides, fertilizers, detergents, trash and many other forms of pollutants which may be discharged to downstream rivers and lakes. The Environmental Protection Agency (EPA) requires that these pollutants be controlled, mitigated and otherwise eliminated before they are discharged.

The first line of defense against pollution discharges are detention basin facilities installed near low segments of storm drain systems. Detention basins control peak flows that would otherwise be routed directly to receiving discharge facilities. As stormwater runoff is held in the detention basin, flow velocity of the water is minimized and many of the suspended pollutants are able to settle out. Some of the pollutants are broken down organically while the physical debris, such as trash and sediment, can be manually cleaned from the detention basin and disposed of properly. This study recommends installation of local detention basin facilities in future developments in the Town. These would be implemented by individual developers.

The second line of defense against pollution discharges are Best Management Practice (BMP) structures such as oil and grease separation structures. These structures are devices that are designed to remove oils, greases and other similar materials from stormwater before it is discharged to downstream receiving facilities. It is recommended that a structure of this type be installed at each of the detention basins to ensure that these pollutant types are removed from stormwater before it is discharged from the storm drain system into the Little Creek. It should be noted that these facilities require regular maintenance. If not cleaned and maintained properly, these devices cease to function and no pollutants are removed from the discharge flows.

V. COST & PROPOSED IMPACT FEES

A. SYSTEM IMPROVEMENT

The recommended storm drain improvements were outlined in the Recommended Improvements list given in the previous section of this study. Unit costs were applied to the recommended improvements and cost estimates were derived for the purpose of future financial planning. Table V.A.1 in Appendix E is the Engineer's Opinion of Probable Cost for each of the recommended improvements. It should be noted that these cost estimates are based on current, 2020, market prices.

K. STORM DRAIN IMPACT FEES

As detailed throughout this report, Apple Valley Town is in need of additional storm drain system infrastructure to meet the needs of current and future drainage scenarios. The Town is responsible for the current deficiencies in the storm drain system, but future development that occurs within the drainage area analyzed will further add to the deficiencies in the system. Because of this, an appropriate share of the costs associated with the recommended improvements should be borne by development.

To determine this appropriate share, the total area of undeveloped land within the drainage area analyzed, but understood to be developable, was divided by the total area of the drainage area. This percentage was taken to be the portion of the improvement costs that is impact fee eligible. The figure delineating the undeveloped versus developed land is included as Figure V.B.1 in Appendix A. The current Build-out Study prepared by the Eastern Washington County Rural Planning Organization was used as the basis for this delineation.

Table V.B.1 in Appendix E shows the calculations used to determine the maximum impact fee per acre of land. The interest from new debt service shown in the calculation is based on a 30-year loan using an interest rate of 2.5%.

The maximum impact fee allowable based on this calculation is $2,886 per acre. It is the responsibility of the Town to set the actual impact fee, but it is recommended that the impact fee be set so that the Town will have sufficient funds to cover annual expenses resulting from improvement projects.

It should be noted that no estimate was included for curb and gutter improvements recommended in this report and costs for these improvements were not included in the impact fee calculation. The primary reason for this is because curb and gutter improvements for areas that have previously been developed are understood to be ineligible to be paid for using impact fees. In addition, it is understood that curb and gutter improvements will be constructed by developers in areas where new development takes place.

It should also be noted that this study recommends not charging impact fees for development falling outside of the major drainage basins which route storm water flow through the Town. The reason for this is because the areas falling outside of this boundary route storm water directly to the Little Creek without first passing through the Town. In other words, these developments will not impact the existing infrastructure of the Town. The developers will be responsible to construct adequate storm water improvements without increasing the downstream runoff to these natural drainage channels.

If the Town determines not to move forward with the recommended project as proposed, then the Town should consider not implementing impact fees as proposed to ensure that the Town is in compliance with the Impact Fee Act. If the Town determines to move forward with the recommendations in this report in phases or as funds become available to cover the costs of phased improvements, the Town will be responsible to ensure that impact fees collected are projected to be incurred or encumbered within six years of collecting the impact fee to ensure compliance with the Impact Fee Act.

The Impact Fee Analysis contained herein:

includes only the costs for qualifying public facilities that are:

a) allowed under the Impact Fee Act;
b) projected to be incurred or encumbered within six years after each impact fee is paid;
c) contains no cost for operation and maintenance of public facilities;
d) offsets costs with grants or other alternate sources of payment;
e) does not include costs for qualifying public facilities that will raise the level of service for the facilities, through impact fees, above the level of service that is supported by existing residents, and;
f) complies in each and every relevant respect with the Impact Fees Act.

This certification is valid as long as the recommendations outlined in this report are followed and as long as the Town expends impact fees collected on qualifying expenses within 6 years from the date of collection. See Appendix F for more information regarding this certification.

L. PROPOSED FINANCING PLAN

A possible financing plan for the recommended improvements has been included as Table V.C.1 in Appendix E. This financing plan is submitted only as a guide and should be used only as such. It should be noted that an increase in drainage rates would be required in order to proceed with a project covering all of the recommended improvements. This increase will be explained in the following sub-section.

M. DRAINAGE RATE ANALYSIS

The Town of Apple Valley currently charges for drainage according to the following rate structure. The differing rates are based on the zoning type.

Residential	$10 per month
Commercial	$25 per month

The Town currently has 318 residential customers and 1 commercial customers. The average rate per billing is $10.05.

In order to proceed with one project covering all of the recommended projects, financing would need to be obtained for the capital expense associated with the project and a rate increase would be needed. The revenues generated must be sufficient to cover the expenses incurred by the construction, maintenance, and administration of the storm water system. These administrative expenses include debt service, insurance, personnel salaries, legal and professional fees, and other miscellaneous items.

If the Town were to move forward with the project in 2022, the first year of debt service would need to be paid in 2023. The Town budget from fiscal year ending in 2018, 2019, and 2020 were used as a source to determine existing expenses relating to the Drainage utility. The expenses were projected assuming a 3% annual inflation rate to estimate the expenses in fiscal year 2023.

In order to determine the required average drainage fee rate, the total expenses estimated were reduced by the estimated amount of impact fees to be collected. This amount was determined by using the growth rate projections given to SEI by the town. As shown in Table V.C.1 in Appendix E, the projected number of impact fees to be collected in fiscal year 2023 is 22.

The amount of expenses remaining after taking into account the projected income from impact fees, was divided by the projected number of customers in fiscal year 2023. As shown in Table V.C.1 in Appendix E, the number of customers projected is 377. The final average monthly rate per customer was determined by dividing the number calculated above by the 12 months of the year. Based on the financing plan and drainage rate analysis described previously, the average monthly rate per customer required to move forward with a single project including all of the recommended projects is $15.21. This calculation is shown on the Proposed Financing Plan included as Table V.C.1 in Appendix E.

Drainage rates and related fees should be evaluated regularly to ensure that they are sufficient to cover actual expenses incurred by the utility.

N. CASH FLOW ANALYSIS

Using the information from the proposed financing plan, a cash flow analysis was performed for the life of the loan associated with the project. This analysis assumes an annual rate increase of 3%. The analysis also includes a renewal and replacement fund equal to 5% of the projected annual expenses to be used for ongoing maintenance and replacements. It is strongly recommended that the Town incorporate this type of fund into the budget for the drainage utility.

The Cash Flow Analysis has been included as Table V.E.1 in Appendix E.

APPENDIX A – MASTER PLAN FIGURES

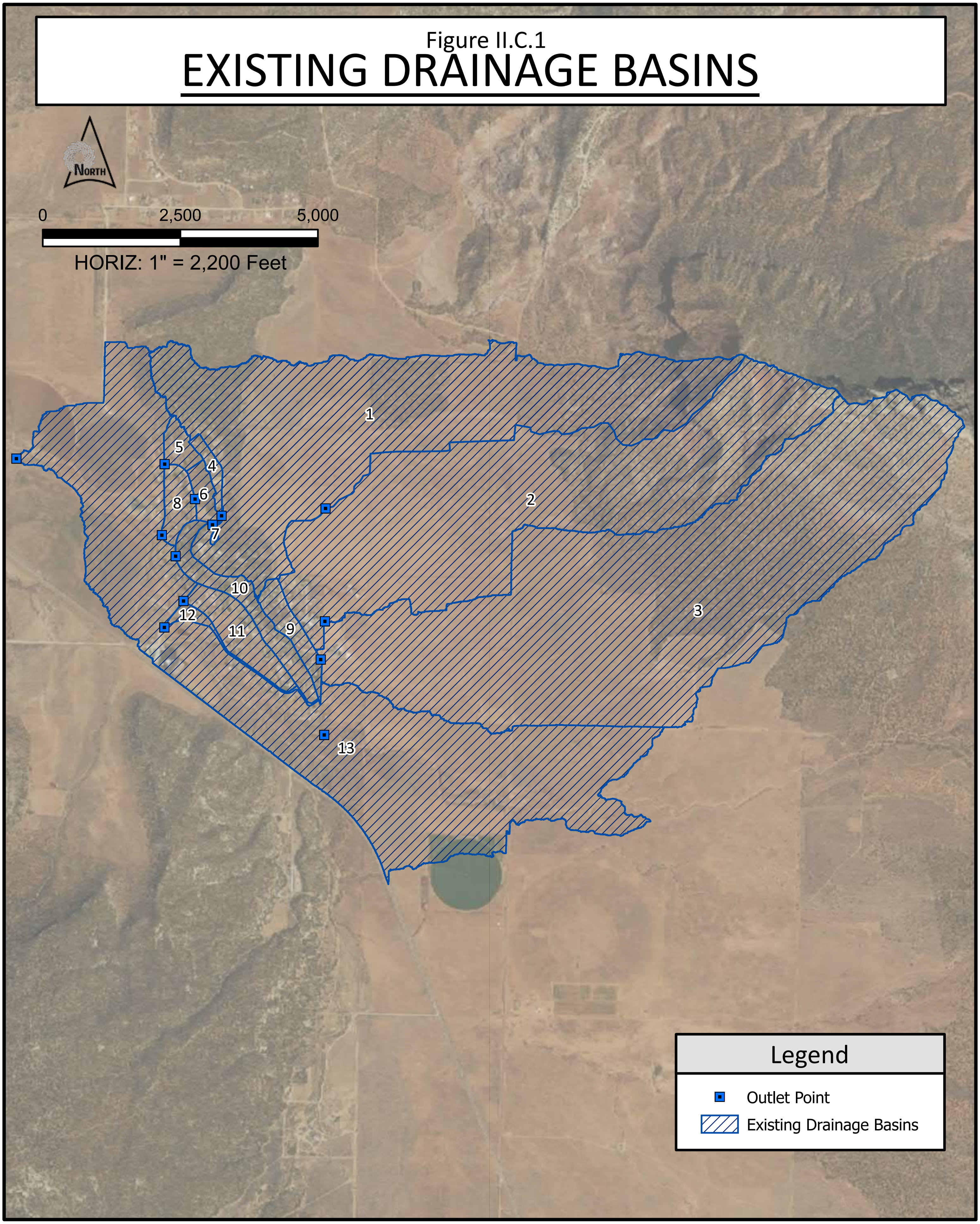


Figure II.C.1
EXISTING DRAINAGE BASINS

Figure II.B.1

SOILS MAP

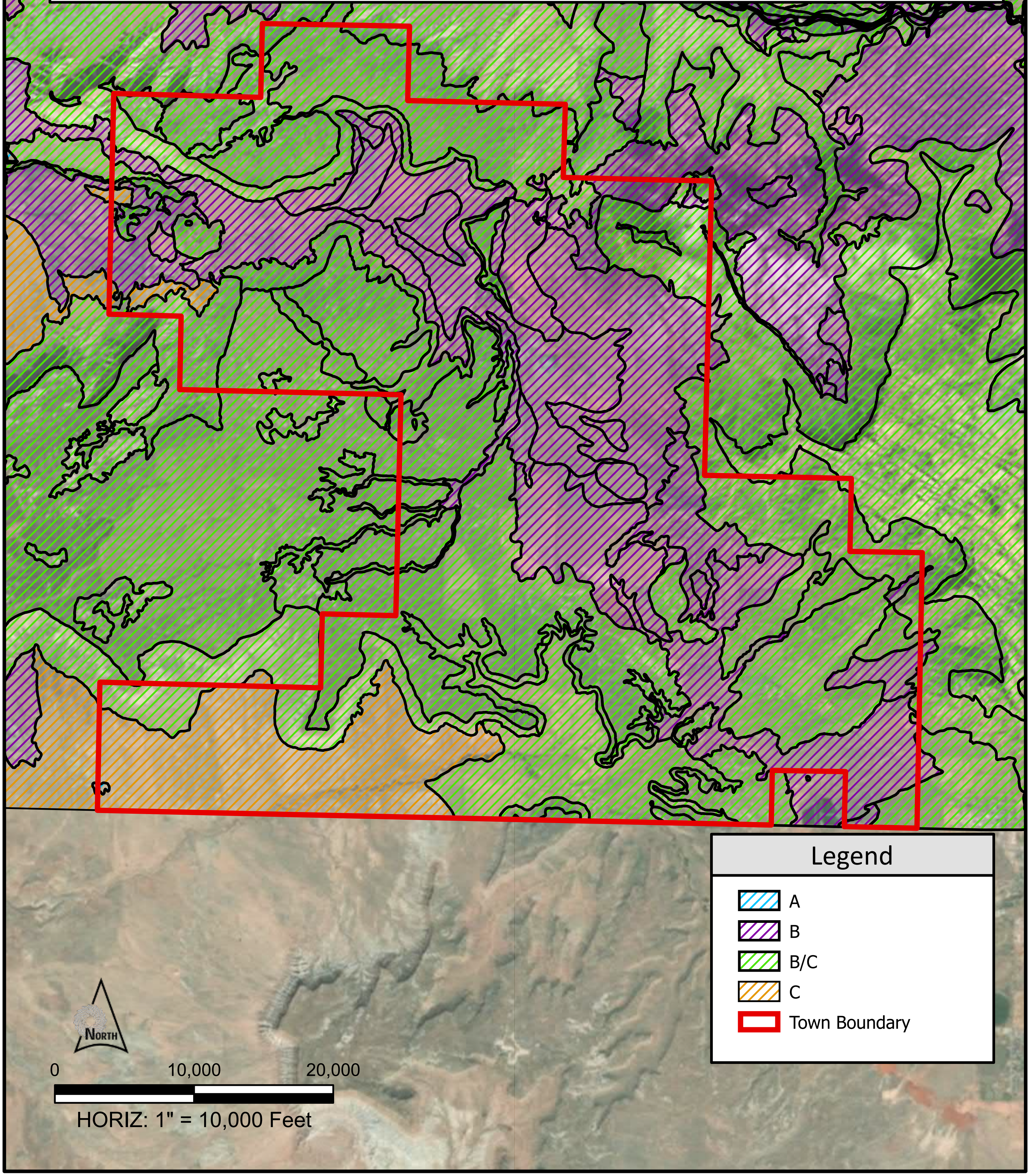
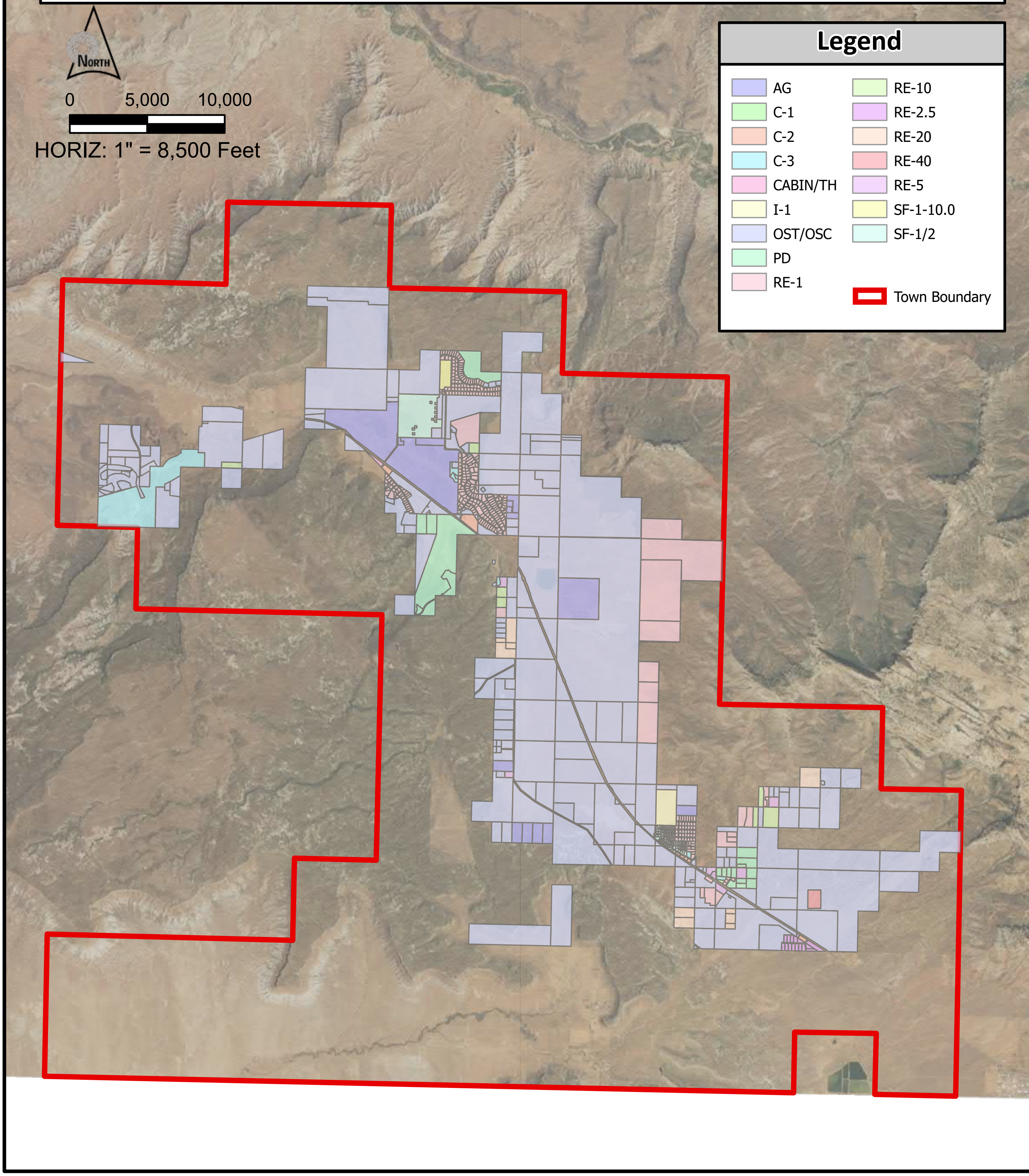


Figure II.E.1

Apple Valley Zoning Map



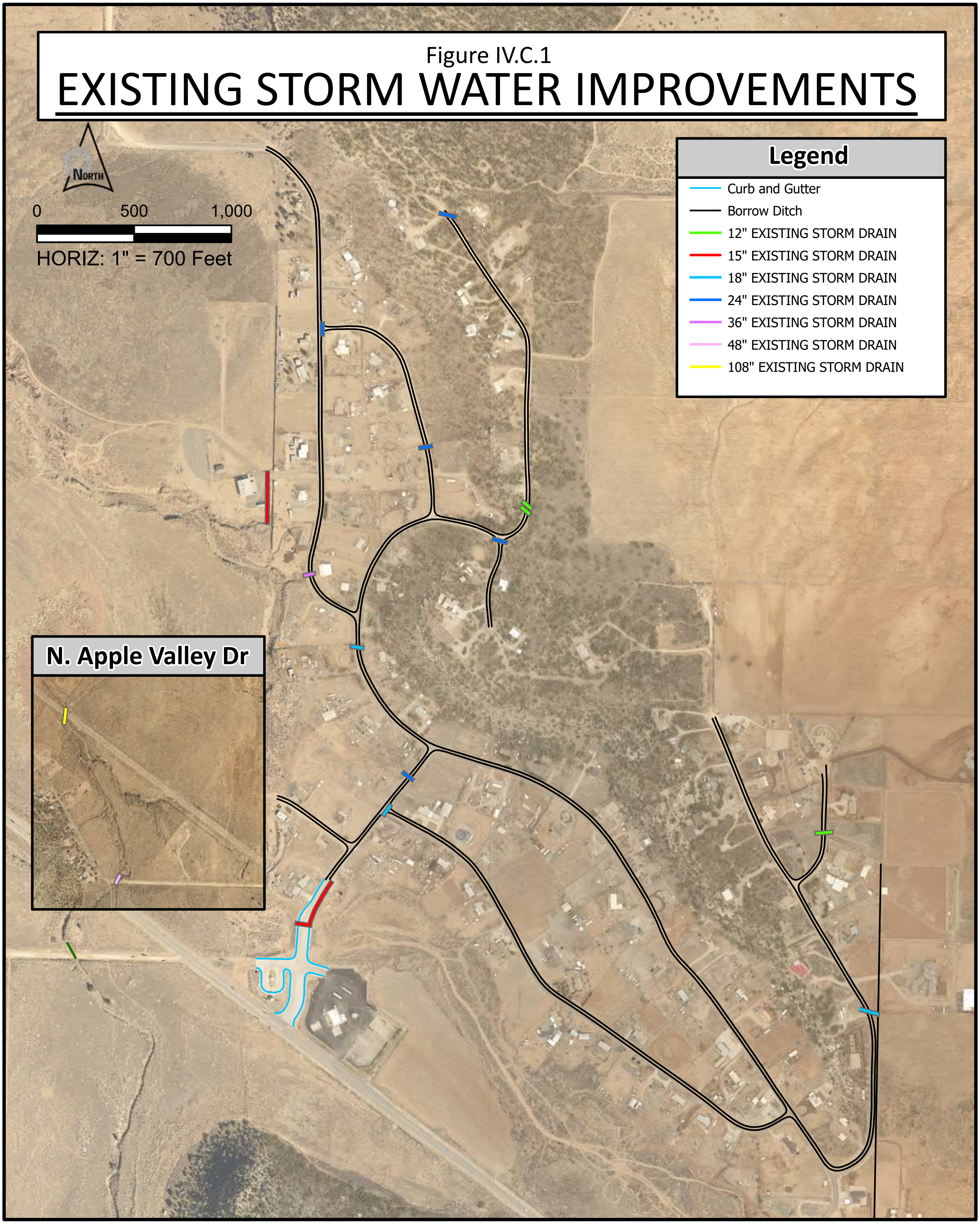


Figure IV.C.1
EXISTING STORM WATER IMPROVEMENTS
NORTH
0
500
1,000
HORIZ: 1" = 700 Feet
Legend
Curb and Gutter
Borrow Ditch
12" EXISTING STORM DRAIN
15" EXISTING STORM DRAIN
18" EXISTING STORM DRAIN
24" EXISTING STORM DRAIN
36" EXISTING STORM DRAIN
48" EXISTING STORM DRAIN
108" EXISTING STORM DRAIN
N. Apple Valley Dr

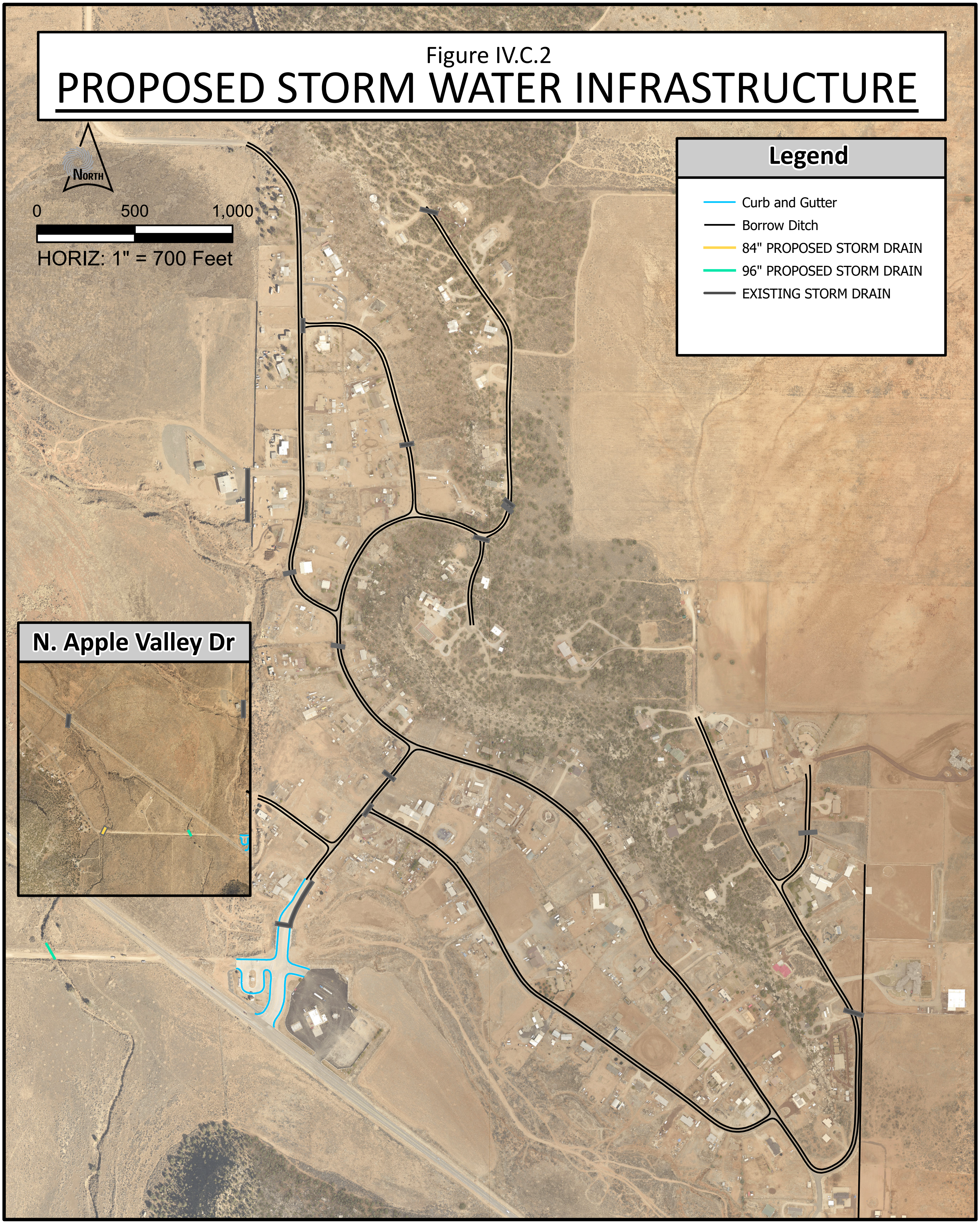


Figure IV.C.2
PROPOSED STORM WATER INFRASTRUCTURE
NORTH
0
500
1,000
HORIZ: 1" = 700 Feet
Legend
Curb and Gutter
Borrow Ditch
84" PROPOSED STORM DRAIN
96" PROPOSED STORM DRAIN
EXISTING STORM DRAIN
N. Apple Valley Dr

Figure IV.C.2

PROPOSED STORM WATER INFRASTRUCTURE

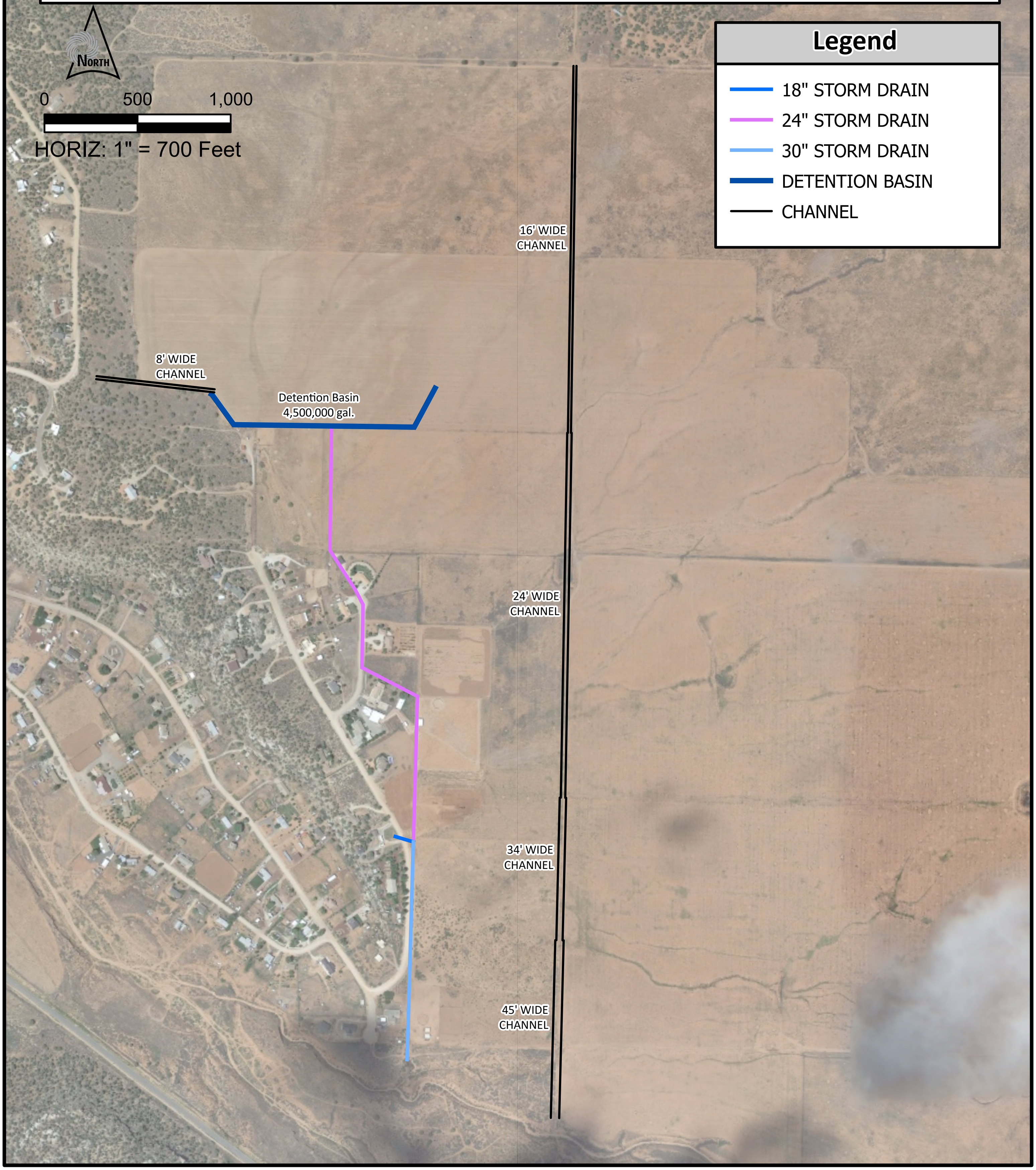


Figure IV.C.3

DRAINAGE BASINS AFTER IMPROVMENTS

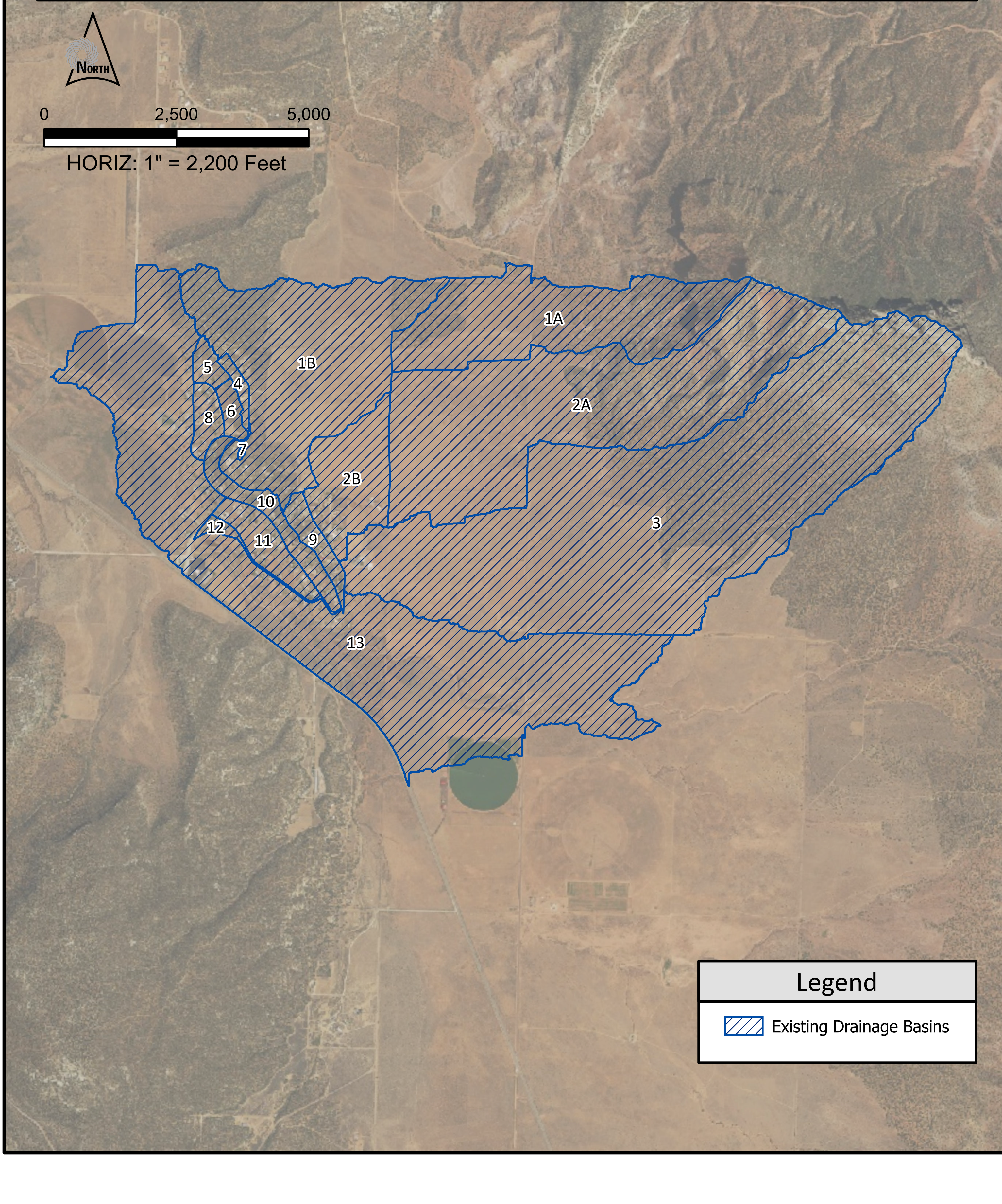
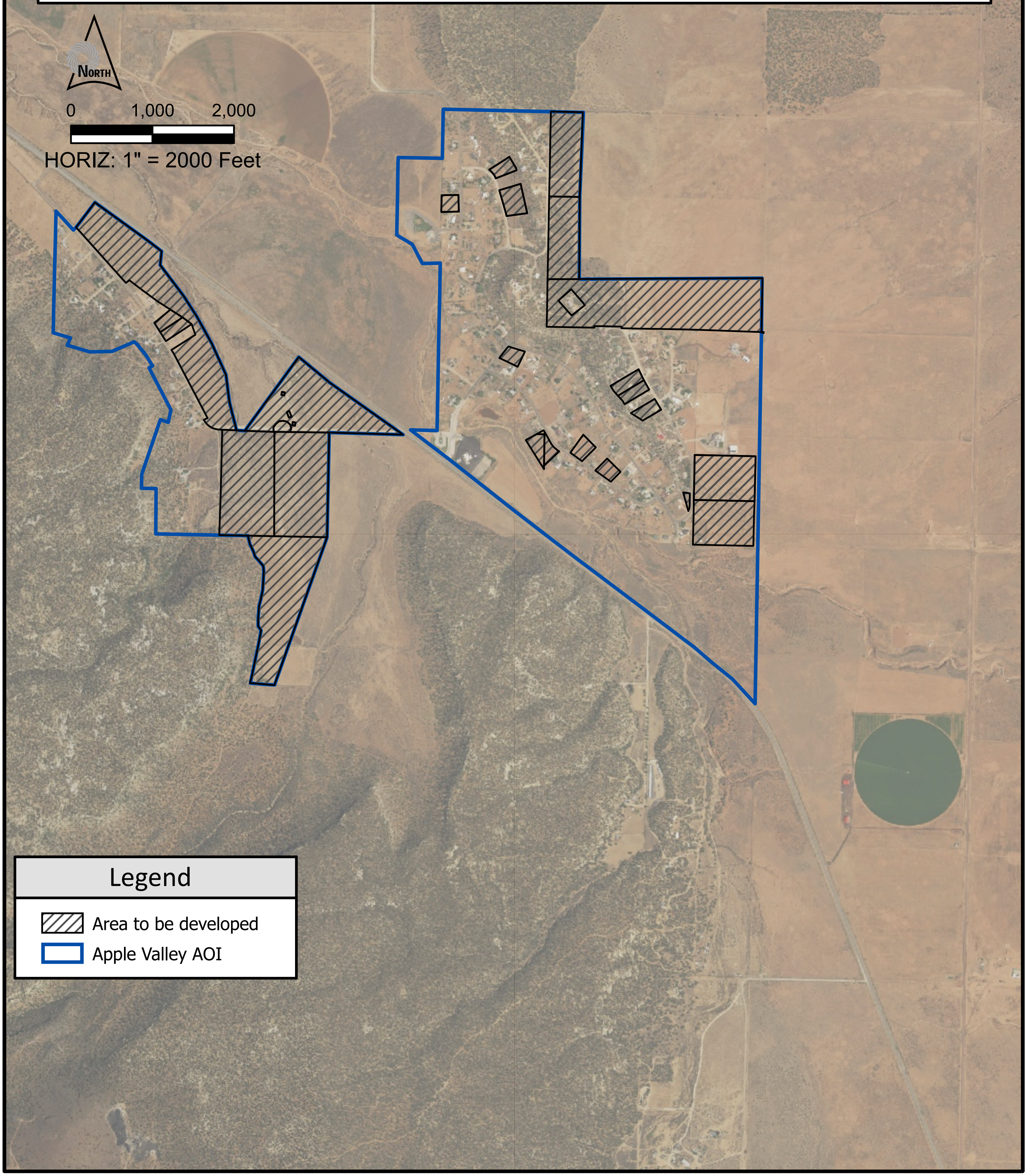


Figure V.B.1

AREA TO BE DEVELOPED



APPENDIX B – MASTER PLAN TABLES

Table III.B.1
NOAA Precipitation Data

Rainfall Depth-Duration-Frequency (DDF)						
	Rainfall Depth, in inches					
	Storm Frequency, in years					
Duration	2	5	10	25	50	100
5-min	0.19	0.26	0.32	0.42	0.50	0.59
10-min	0.29	0.40	0.49	0.63	0.76	0.90
15-min	0.36	0.49	0.61	0.79	0.94	1.12
30-min	0.48	0.66	0.82	1.06	1.27	1.51
1-hour	0.60	0.82	1.01	1.31	1.57	1.87
2-hour	0.71	0.94	1.14	1.45	1.72	2.03
3-hour	0.79	1.02	1.22	1.52	1.77	2.08
6-hour	0.99	1.25	1.47	1.80	2.06	2.35
12-hour	1.24	1.56	1.82	2.17	2.44	2.73
24-hour	1.48	1.85	2.15	2.56	2.89	3.22

NOAA Atlas 14, Volume 1, Version 5
Location name: Hurricane, Utah, USA*
Latitude: 37.1029°, Longitude: -113.1227°
Elevation: 4775.6 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.147 (0.126-0.173)	0.189 (0.162-0.224)	0.259 (0.221-0.308)	0.321 (0.271-0.380)	0.416 (0.345-0.493)	0.499 (0.407-0.590)	0.594 (0.474-0.708)	0.704 (0.547-0.845)	0.875 (0.653-1.07)	1.03 (0.742-1.27)
10-min	0.223 (0.192-0.263)	0.288 (0.247-0.342)	0.395 (0.336-0.468)	0.489 (0.412-0.579)	0.633 (0.526-0.750)	0.759 (0.620-0.899)	0.904 (0.722-1.08)	1.07 (0.832-1.29)	1.33 (0.994-1.62)	1.56 (1.13-1.93)
15-min	0.277 (0.237-0.326)	0.357 (0.306-0.423)	0.489 (0.417-0.580)	0.607 (0.511-0.718)	0.785 (0.652-0.930)	0.941 (0.769-1.11)	1.12 (0.895-1.34)	1.33 (1.03-1.59)	1.65 (1.23-2.01)	1.94 (1.40-2.40)
30-min	0.372 (0.320-0.440)	0.480 (0.412-0.570)	0.659 (0.562-0.781)	0.817 (0.689-0.967)	1.06 (0.877-1.25)	1.27 (1.03-1.50)	1.51 (1.21-1.80)	1.79 (1.39-2.15)	2.22 (1.66-2.71)	2.61 (1.89-3.23)
60-min	0.461 (0.396-0.544)	0.595 (0.510-0.706)	0.816 (0.696-0.967)	1.01 (0.852-1.20)	1.31 (1.09-1.55)	1.57 (1.28-1.86)	1.87 (1.49-2.23)	2.21 (1.72-2.66)	2.75 (2.05-3.36)	3.23 (2.33-3.99)
2-hr	0.559 (0.487-0.645)	0.707 (0.616-0.818)	0.937 (0.814-1.08)	1.14 (0.983-1.32)	1.45 (1.23-1.68)	1.72 (1.43-1.99)	2.03 (1.66-2.37)	2.39 (1.90-2.81)	2.94 (2.25-3.51)	3.43 (2.54-4.15)
3-hr	0.624 (0.552-0.711)	0.785 (0.694-0.899)	1.02 (0.899-1.17)	1.22 (1.07-1.39)	1.52 (1.31-1.74)	1.77 (1.51-2.04)	2.08 (1.74-2.40)	2.42 (1.98-2.82)	2.95 (2.34-3.54)	3.44 (2.66-4.19)
6-hr	0.787 (0.703-0.891)	0.985 (0.883-1.12)	1.25 (1.12-1.42)	1.47 (1.31-1.67)	1.80 (1.57-2.04)	2.06 (1.78-2.34)	2.35 (2.01-2.68)	2.69 (2.26-3.10)	3.24 (2.65-3.79)	3.72 (2.98-4.41)
12-hr	0.990 (0.888-1.11)	1.24 (1.11-1.39)	1.56 (1.39-1.75)	1.82 (1.62-2.04)	2.17 (1.91-2.43)	2.44 (2.13-2.75)	2.73 (2.36-3.09)	3.03 (2.59-3.45)	3.49 (2.92-4.02)	3.94 (3.26-4.60)
24-hr	1.19 (1.09-1.29)	1.48 (1.36-1.61)	1.85 (1.70-2.01)	2.15 (1.97-2.34)	2.56 (2.34-2.79)	2.89 (2.62-3.15)	3.22 (2.91-3.52)	3.57 (3.20-3.91)	4.04 (3.58-4.45)	4.41 (3.87-4.89)
2-day	1.36 (1.25-1.47)	1.69 (1.57-1.84)	2.12 (1.96-2.30)	2.47 (2.27-2.68)	2.95 (2.70-3.20)	3.33 (3.04-3.62)	3.72 (3.37-4.06)	4.12 (3.72-4.51)	4.68 (4.16-5.16)	5.12 (4.51-5.68)
3-day	1.47 (1.36-1.60)	1.84 (1.70-2.00)	2.31 (2.13-2.50)	2.69 (2.48-2.91)	3.21 (2.95-3.48)	3.62 (3.31-3.94)	4.05 (3.68-4.42)	4.50 (4.05-4.92)	5.11 (4.55-5.63)	5.59 (4.93-6.20)
4-day	1.59 (1.47-1.72)	1.99 (1.84-2.15)	2.49 (2.30-2.70)	2.90 (2.68-3.14)	3.47 (3.19-3.76)	3.92 (3.58-4.25)	4.39 (3.99-4.78)	4.88 (4.39-5.33)	5.54 (4.93-6.10)	6.07 (5.34-6.73)
7-day	1.89 (1.73-2.06)	2.37 (2.18-2.58)	2.99 (2.74-3.25)	3.48 (3.19-3.79)	4.16 (3.79-4.53)	4.68 (4.25-5.11)	5.23 (4.72-5.73)	5.79 (5.19-6.37)	6.56 (5.81-7.27)	7.16 (6.28-7.98)
10-day	2.10 (1.93-2.30)	2.65 (2.43-2.89)	3.36 (3.08-3.66)	3.92 (3.60-4.27)	4.70 (4.29-5.13)	5.31 (4.82-5.81)	5.94 (5.35-6.52)	6.59 (5.89-7.26)	7.48 (6.60-8.30)	8.18 (7.15-9.15)
20-day	2.71 (2.49-2.94)	3.40 (3.13-3.69)	4.23 (3.89-4.60)	4.87 (4.47-5.29)	5.72 (5.23-6.21)	6.36 (5.79-6.91)	7.00 (6.35-7.64)	7.64 (6.88-8.38)	8.49 (7.57-9.37)	9.13 (8.07-10.1)
30-day	3.30 (3.03-3.59)	4.14 (3.81-4.50)	5.15 (4.74-5.61)	5.93 (5.44-6.45)	6.94 (6.34-7.55)	7.69 (7.00-8.37)	8.44 (7.65-9.22)	9.18 (8.27-10.1)	10.1 (9.06-11.2)	10.8 (9.63-12.0)
45-day	3.92 (3.59-4.29)	4.94 (4.52-5.40)	6.21 (5.68-6.78)	7.18 (6.56-7.85)	8.48 (7.71-9.27)	9.47 (8.57-10.4)	10.5 (9.43-11.5)	11.5 (10.3-12.7)	12.8 (11.3-14.2)	13.8 (12.2-15.4)
60-day	4.57 (4.16-5.02)	5.76 (5.24-6.33)	7.25 (6.59-7.97)	8.40 (7.62-9.23)	9.91 (8.97-10.9)	11.1 (9.97-12.2)	12.2 (11.0-13.5)	13.4 (11.9-14.9)	15.0 (13.2-16.7)	16.1 (14.1-18.2)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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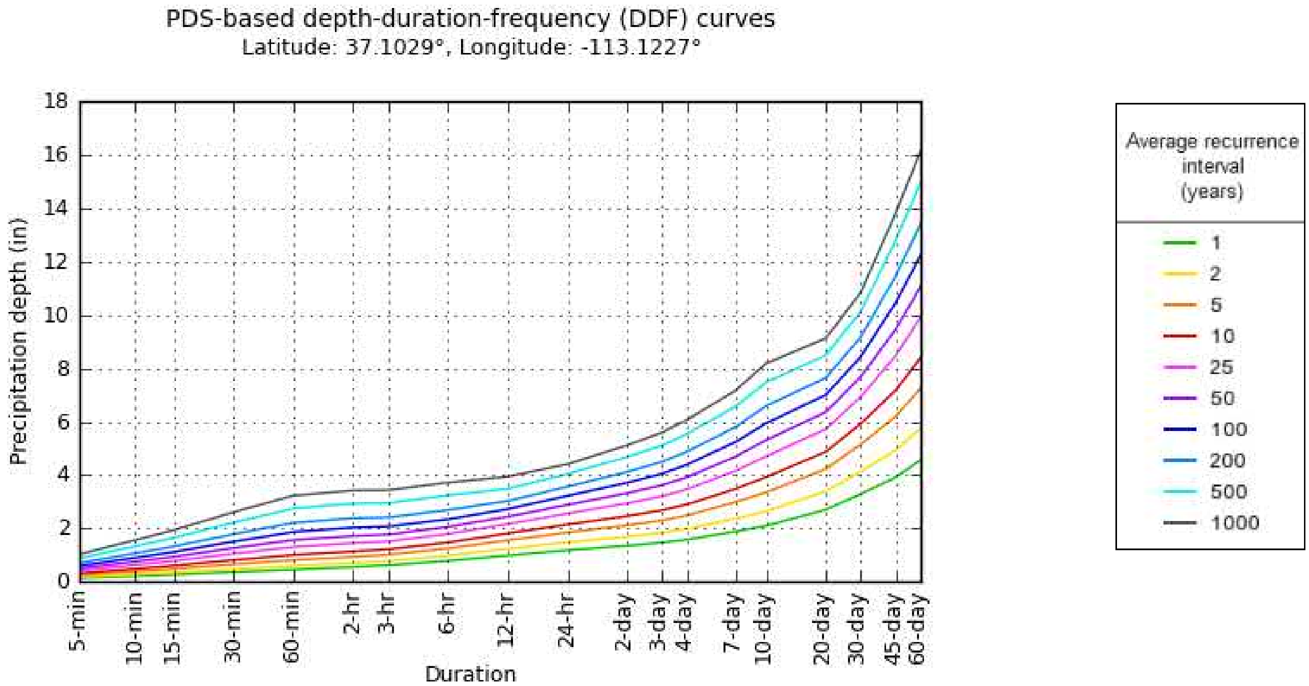
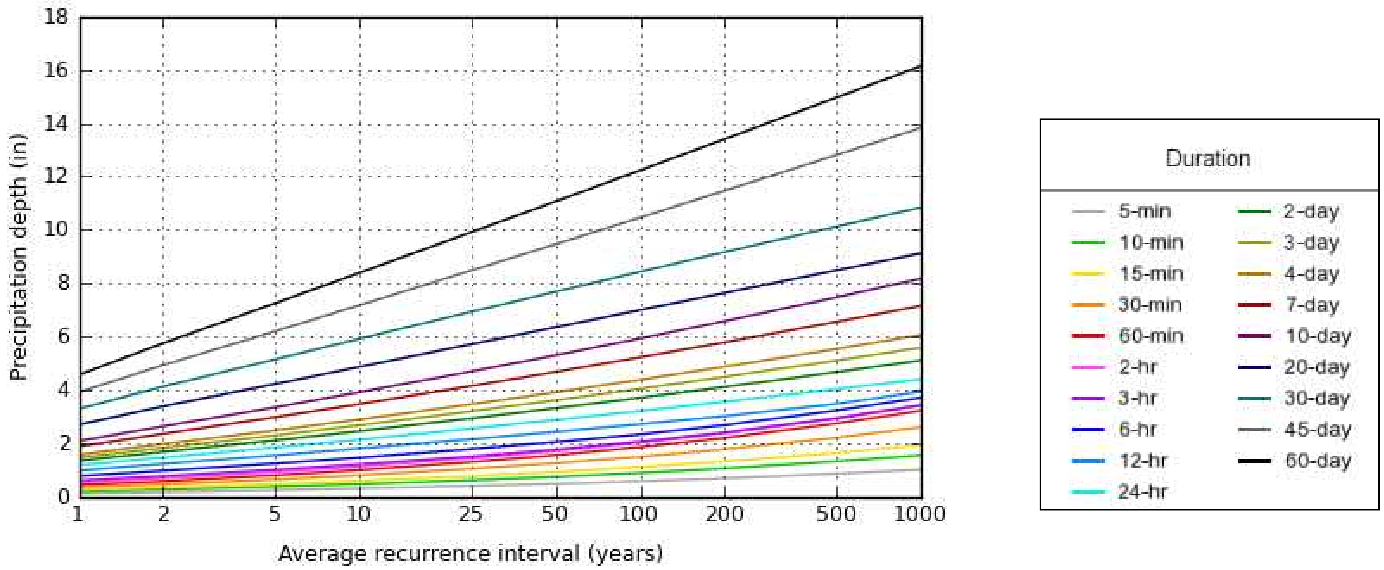
PF graphical





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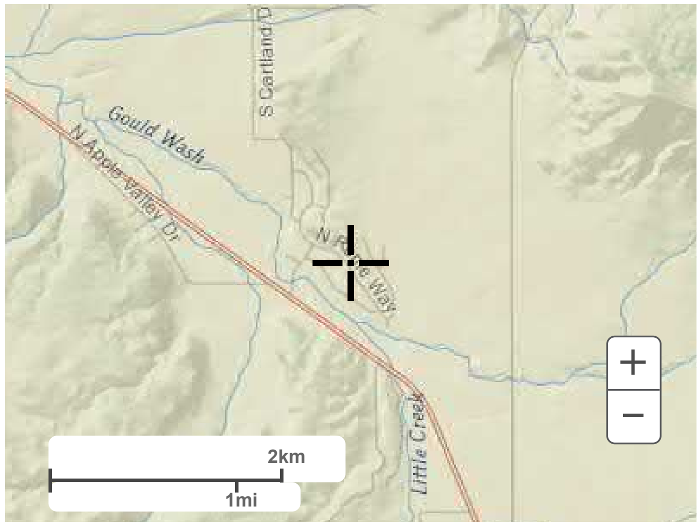
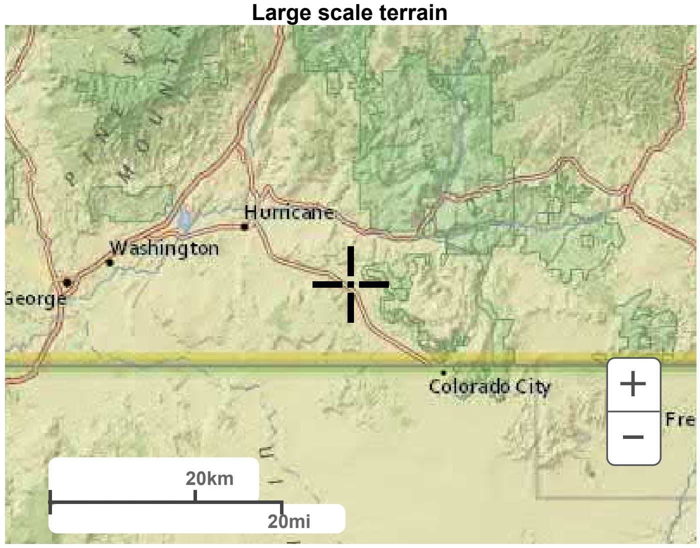
Maps & aerials

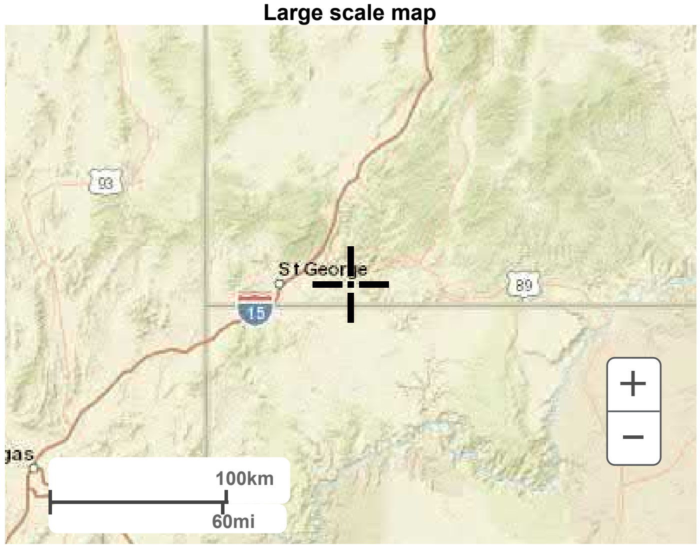
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

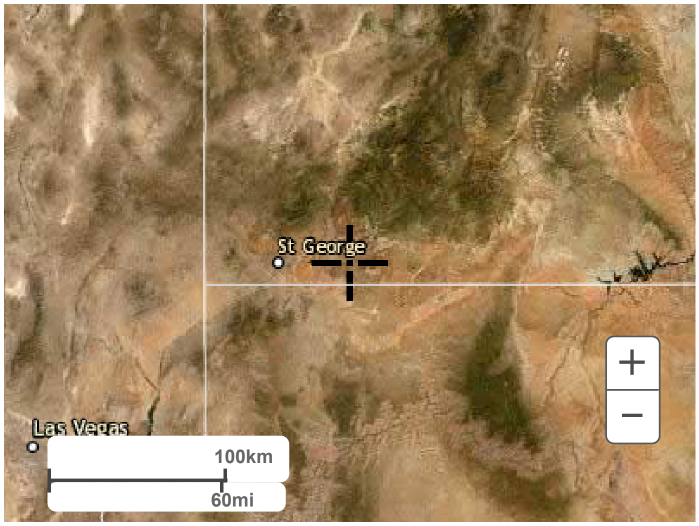


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Table III.B.2
Rainfall Distribution

Time	Inches (incremental)	* Inches (cumulative)	Difference	Distributed	Cumulative	Percentage
0	0.0000	0.00	0.000	0.000	0.000	0.00
15	0.0405	0.61	0.607	0.020	0.020	1.64
30	0.0272	0.82	0.210	0.020	0.040	3.28
45	0.0203	0.91	0.097	0.033	0.073	5.94
60	0.0168	1.01	0.097	0.033	0.105	8.61
75	0.0139	1.04	0.033	0.097	0.202	16.52
90	0.0119	1.08	0.033	0.607	0.809	66.27
105	0.0105	1.11	0.033	0.210	1.019	83.48
120	0.0095	1.14	0.033	0.097	1.115	91.39
135	0.0086	1.16	0.020	0.033	1.148	94.06
150	0.0079	1.18	0.020	0.033	1.180	96.72
165	0.0073	1.20	0.020	0.020	1.200	98.36
180	0.0068	1.22	0.020	0.020	1.220	100.00

* Taken from the NOAA Atlas 14 data and interpolated for unknown points.

Actual data from Atlas 14
Interpolated data from Atlas 14

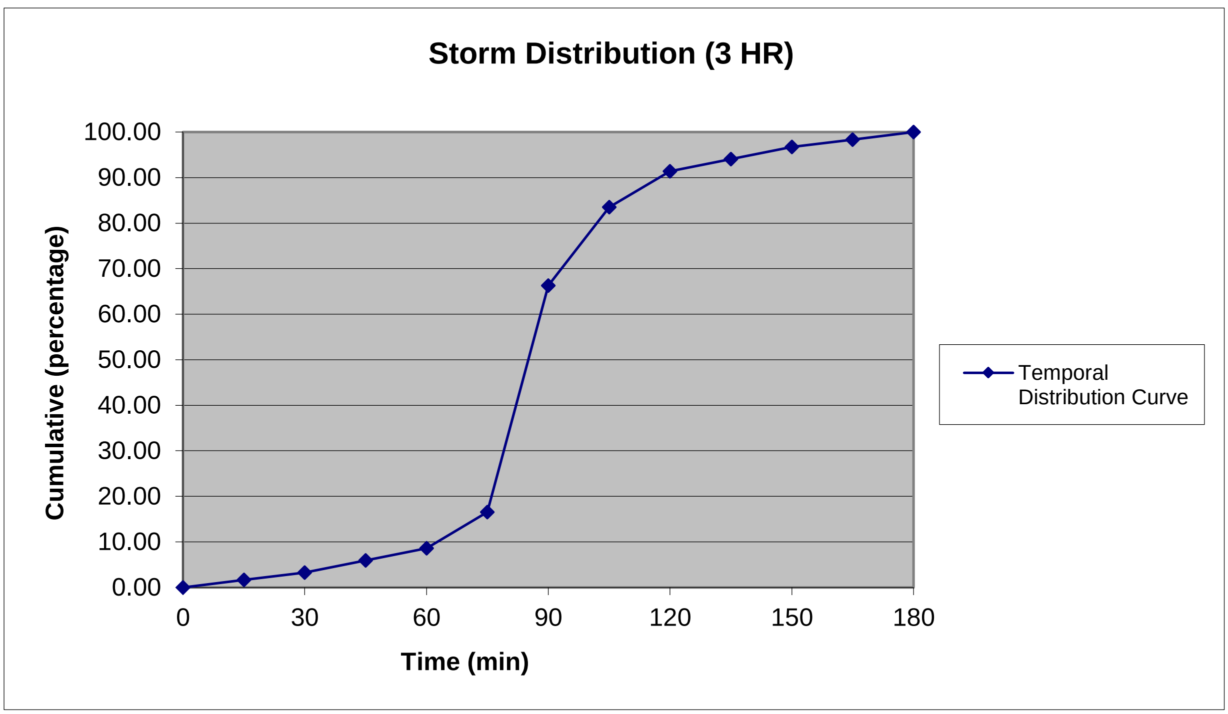

Table III.B.3
Drainage Basin Parameters Analysis Results (1 of 2)

Basin Name	Basin Area (mi2)	Basin Slopes (ft/ft)	CN	Lag Time (hr)	10-Year 3-Hour		100-Year 3-Hour	
					Peak Flow (cfs)	Total Flow (Ac-Ft)	Peak Flow (cfs)	Total Flow (Ac-Ft)
1	0.714	0.079	82.8	0.685	74.8	8.5	270.3	28.1
2	0.739	0.158	84.8	0.439	128.5	11.0	419.7	33.3
3	1.135	0.156	83.9	0.615	142.4	15.3	510.7	48.1
4	0.010	0.092	83.0	0.138	2.4	0.1	9.6	0.4
5	0.015	0.219	87.8	0.047	6.8	0.3	20.1	0.8
6	0.014	0.153	84.4	0.063	4.3	0.2	15.7	0.6
7	0.001	0.037	81.4	0.071	0.3	0.0	1.2	0.0
8	0.023	0.097	87.3	0.112	10.0	0.4	30.7	1.2
9	0.027	0.061	87.9	0.178	9.8	0.5	29.4	1.5
10	0.048	0.146	84.6	0.212	10.9	0.7	36.1	2.2
11	0.047	0.013	87.3	0.489	10.3	0.9	30.3	2.5
12	0.010	0.015	86.8	0.480	2.1	0.2	6.2	0.5

Table III.B.3
Drainage Basin Parameters Analysis Results (2 of 2)

Outlet	10-Year 3-Hour		100-Year 3-Hour	
	Peak Flow (cfs)	Total Flow (Ac-Ft)	Peak Flow (cfs)	Total Flow (Ac-Ft)
Junction 1	197.0	19.6	684.4	61.4
Junction 2	343.9	35.5	1216.2	111.0
Junction 3	324.0	35.6	1174.4	111.5
Junction 6	12.4	1.1	36.5	3.0
Junction 7	12.1	1.1	36.2	3
Junction 8	2.4	0.1	9.6	0.4
Junction 9	2.5	0.1	10.4	0.5
Junction 10	12.9	0.8	44.2	2.6
Junction 12	4.3	0.2	15.7	0.6
Junction 13	18.4	1	60.4	2.7
Junction 14	6.8	0.3	20.1	0.8

Table III.B.4 (1 of 2)
Drainage Basin Parameters Analysis Results (After Improvements)

Basin Name	Basin Area (mi2)	Basin Slopes (ft/ft)	CN	Lag Time (hr)	10-Year 3-Hour		100-Year 3-Hour	
					Peak Flow (cfs)	Total Flow (Ac-Ft)	Peak Flow (cfs)	Total Flow (Ac-Ft)
1a	0.304	0.137	82.8	0.389	42.2	3.6	166.9	12.0
1b	0.410	0.036	82.8	0.564	48.6	4.9	184.0	16.2
2a	0.624	0.184	84.8	0.390	112.8	9.3	394.5	28.1
2b	0.115	0.016	84.8	0.605	16.4	1.7	55.8	5.2
3	1.135	0.156	83.9	0.615	142.4	15.3	510.7	48.1
4	0.010	0.092	83.0	0.138	2.4	0.1	9.6	0.4
5	0.015	0.219	87.8	0.047	6.8	0.3	20.1	0.8
6	0.014	0.153	84.4	0.063	4.3	0.2	15.7	0.6
7	0.001	0.037	81.4	0.071	0.3	0.0	1.2	0.0
8	0.023	0.097	87.3	0.112	10.0	0.4	30.7	1.2
9	0.027	0.061	87.9	0.178	9.8	0.5	29.4	1.5
10	0.048	0.146	84.6	0.212	10.9	0.7	36.1	2.2
11	0.047	0.013	87.3	0.489	10.3	0.9	30.3	2.5
12	0.010	0.015	86.8	0.480	2.1	0.2	6.2	0.5

Table III.V.4 (2 of 2)
Drainage Basin Parameters Analysis Results (After Improvements)

Outlet	10-Year 3-Hour		100-Year 3-Hour	
	Peak Flow (cfs)	Total Flow (Ac-Ft)	Peak Flow (cfs)	Total Flow (Ac-Ft)
Junction 1	42.2	3.6	166.9	12.0
Junction 2	151.4	13.0	537.5	40.2
Junction 3	150.6	13.0	510.1	40.3
Junction 4	291.7	28.9	1027.3	90.1
Junction 5	272.7	29.0	993.9	90.5
Junction 6	12.4	1.1	36.5	3.0
Junction 7	12.1	1.1	36.2	3
Junction 8	2.4	0.1	9.6	0.4
Junction 9	2.5	0.1	10.4	0.5
Junction 10	12.9	0.8	44.2	2.6
Junction 12	4.3	0.2	15.7	0.6
Junction 13	18.4	1	60.4	2.7
Junction 14	6.8	0.3	20.1	0.8

APPENDIX C – HYDROLOGIC EVALUATION RESOURCES

Table IV.B.1
Conveyance Capacity of Roadway Swales

Slope (%)	One Swale		Two Swales	
	Q (cfs)	Q (gpm)	Q (cfs)	Q (gpm)
0.25	9.44	4,235	18.87	8,469
0.5	13.34	5,989	26.69	11,977
1	18.87	8,469	37.74	16,939
2	26.69	11,977	53.38	23,955
3	32.69	14,669	65.37	29,339
4	37.74	16,939	75.48	33,877
5	42.20	18,938	84.39	37,876
6	46.22	20,746	92.45	41,491
7	49.93	22,408	99.86	44,815
8	53.38	23,955	106.75	47,910
9	56.61	25,408	113.23	50,816
10	59.68	26,782	119.35	53,565

Table IV.B.2 (1 of 2)

Conveyance Capacity of Pipe Storm Drain Systems

CMP			Slope =	0.0025
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.022	0.36	161	1.03
10	0.022	0.65	291	1.19
12	0.022	1.06	474	1.34
15	0.022	1.91	859	1.56
18	0.022	3.11	1,397	1.76
21	0.022	4.69	2,107	1.95
24	0.022	6.70	3,008	2.13
30	0.022	12.15	5,454	2.48
36	0.022	19.76	8,868	2.80
42	0.022	29.81	13,377	3.10
48	0.022	42.55	19,098	3.39
60	0.022	77.16	34,628	3.93

RCP			Slope =	0.0025
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.013	0.61	272	1.74
10	0.013	1.10	493	2.01
12	0.013	1.79	802	2.27
15	0.013	3.24	1,453	2.64
18	0.013	5.27	2,364	2.98
21	0.013	7.94	3,565	3.30
24	0.013	11.34	5,090	3.61
30	0.013	20.56	9,229	4.19
36	0.013	33.44	15,007	4.73
42	0.013	50.44	22,638	5.24
48	0.013	72.01	32,320	5.73
60	0.013	130.57	58,601	6.65

HDPE			Slope =	0.0025
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.009	0.88	393	2.51
10	0.009	1.59	712	2.91
12	0.009	2.58	1,158	3.29
15	0.009	4.68	2,099	3.81
18	0.009	7.61	3,414	4.30
21	0.009	11.47	5,150	4.77
24	0.009	16.38	7,352	5.21
30	0.009	29.70	13,331	6.05
36	0.009	48.30	21,677	6.83
42	0.009	72.86	32,699	7.57
48	0.009	104.02	46,685	8.28
60	0.009	188.60	84,645	9.61

CMP			Slope =	0.0050
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.022	0.51	227	1.45
10	0.022	0.92	412	1.68
12	0.022	1.49	670	1.90
15	0.022	2.71	1,215	2.21
18	0.022	4.40	1,975	2.49
21	0.022	6.64	2,979	2.76
24	0.022	9.48	4,254	3.02
30	0.022	17.18	7,712	3.50
36	0.022	27.94	12,541	3.95
42	0.022	42.15	18,918	4.38
48	0.022	60.18	27,009	4.79
60	0.022	109.12	48,971	5.56

RCP			Slope =	0.0050
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.013	0.86	385	2.45
10	0.013	1.55	697	2.85
12	0.013	2.53	1,134	3.22
15	0.013	4.58	2,056	3.73
18	0.013	7.45	3,343	4.21
21	0.013	11.23	5,042	4.67
24	0.013	16.04	7,199	5.11
30	0.013	29.08	13,052	5.92
36	0.013	47.29	21,224	6.69
42	0.013	71.33	32,014	7.41
48	0.013	101.84	45,708	8.10
60	0.013	184.66	82,874	9.40

HDPE			Slope =	0.0050
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.009	1.24	555	3.55
10	0.009	2.24	1,007	4.11
12	0.009	3.65	1,638	4.65
15	0.009	6.62	2,969	5.39
18	0.009	10.76	4,828	6.09
21	0.009	16.23	7,283	6.75
24	0.009	23.17	10,398	7.37
30	0.009	42.01	18,853	8.56
36	0.009	68.31	30,656	9.66
42	0.009	103.04	46,243	10.71
48	0.009	147.11	66,022	11.71
60	0.009	266.73	119,707	13.58

CMP			Slope =	0.0100
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.022	0.72	321	2.05
10	0.022	1.30	583	2.38
12	0.022	2.11	947	2.69
15	0.022	3.83	1,718	3.12
18	0.022	6.22	2,793	3.52
21	0.022	9.39	4,213	3.90
24	0.022	13.40	6,016	4.27
30	0.022	24.30	10,907	4.95
36	0.022	39.52	17,736	5.59
42	0.022	59.61	26,754	6.20
48	0.022	85.11	38,197	6.77
60	0.022	154.31	69,255	7.86

RCP			Slope =	0.0100
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.013	1.21	544	3.47
10	0.013	2.20	986	4.03
12	0.013	3.57	1,603	4.55
15	0.013	6.48	2,907	5.28
18	0.013	10.53	4,727	5.96
21	0.013	15.89	7,130	6.61
24	0.013	22.68	10,180	7.22
30	0.013	41.13	18,458	8.38
36	0.013	66.88	30,015	9.46
42	0.013	100.88	45,275	10.49
48	0.013	144.03	64,641	11.46
60	0.013	261.14	117,201	13.30

HDPE			Slope =	0.0100
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.009	1.75	785	5.01
10	0.009	3.17	1,424	5.82
12	0.009	5.16	2,316	6.57
15	0.009	9.36	4,199	7.62
18	0.009	15.21	6,828	8.61
21	0.009	22.95	10,299	9.54
24	0.009	32.76	14,705	10.43
30	0.009	59.41	26,662	12.10
36	0.009	96.60	43,355	13.67
42	0.009	145.72	65,398	15.15
48	0.009	208.04	93,370	16.56
60	0.009	377.21	169,291	19.21

CMP			Slope =	0.0150
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.022	0.88	394	2.51
10	0.022	1.59	714	2.92
12	0.022	2.59	1,160	3.29
15	0.022	4.69	2,104	3.82
18	0.022	7.62	3,421	4.31
21	0.022	11.50	5,160	4.78
24	0.022	16.42	7,368	5.23
30	0.022	29.76	13,358	6.06
36	0.022	48.40	21,722	6.85
42	0.022	73.01	32,766	7.59
48	0.022	104.24	46,781	8.29
60	0.022	188.99	84,820	9.63

RCP			Slope =	0.0150
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.013	1.48	666	4.25
10	0.013	2.69	1,208	4.93
12	0.013	4.38	1,964	5.57
15	0.013	7.93	3,560	6.46
18	0.013	12.90	5,789	7.30
21	0.013	19.46	8,733	8.09
24	0.013	27.78	12,468	8.84
30	0.013	50.37	22,606	10.26
36	0.013	81.91	36,760	11.59
42	0.013	123.55	55,451	12.84
48	0.013	176.40	79,168	14.04
60	0.013	319.83	143,542	16.29

HDPE			Slope =	0.0150
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.009	2.14	962	6.14
10	0.009	3.89	1,744	7.13
12	0.009	6.32	2,836	8.05
15	0.009	11.46	5,143	9.34
18	0.009	18.63	8,362	10.54
21	0.009	28.11	12,614	11.69
24	0.009	40.13	18,010	12.77
30	0.009	72.76	32,654	14.82
36	0.009	118.31	53,098	16.74
42	0.009	178.47	80,095	18.55
48	0.009	254.80	114,354	20.28
60	0.009	461.98	207,338	23.53

CMP			Slope =	0.0200
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.022	1.01	454	2.90
10	0.022	1.84	824	3.37
12	0.022	2.99	1,340	3.80
15	0.022	5.41	2,429	4.41
18	0.022	8.80	3,950	4.98
21	0.022	13.28	5,959	5.52
24	0.022	18.96	8,507	6.03
30	0.022	34.37	15,425	7.00
36	0.022	55.89	25,083	7.91
42	0.022	84.30	37,835	8.76
48	0.022	120.36	54,018	9.58
60	0.022	218.23	97,942	11.11

RCP			Slope =	0.0200
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.013	1.71	769	4.91
10	0.013	3.11	1,394	5.70
12	0.013	5.05	2,267	6.43
15	0.013	9.16	4,111	7.46
18	0.013	14.90	6,685	8.43
21	0.013	22.47	10,084	9.34
24	0.013	32.08	14,397	10.21
30	0.013	58.16	26,104	11.85
36	0.013	94.58	42,447	13.38
42	0.013	142.67	64,029	14.83
48	0.013	203.69	91,416	16.21
60	0.013	369.31	165,748	18.81

HDPE			Slope =	0.0200
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.009	2.48	1,111	7.09
10	0.009	4.49	2,014	8.23
12	0.009	7.30	3,275	9.29
15	0.009	13.23	5,938	10.78
18	0.009	21.52	9,656	12.18
21	0.009	32.45	14,566	13.49
24	0.009	46.34	20,796	14.75
30	0.009	84.01	37,705	17.12
36	0.009	136.62	61,313	19.33
42	0.009	206.07	92,486	21.42
48	0.009	294.22	132,045	23.41
60	0.009	533.45	239,413	27.17

Table IV.B.2 (2 of 2)
Conveyance Capacity of Pipe Storm Drain Systems

CMP			Slope =	0.0500
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.022	1.60	719	4.59
10	0.022	2.90	1,303	5.32
12	0.022	4.72	2,118	6.01
15	0.022	8.56	3,841	6.97
18	0.022	13.92	6,246	7.88
21	0.022	20.99	9,421	8.73
24	0.022	29.97	13,451	9.54
30	0.022	54.34	24,389	11.07
36	0.022	88.37	39,659	12.50
42	0.022	133.29	59,823	13.85
48	0.022	190.31	85,411	15.14
60	0.022	345.05	154,860	17.57

RCP			Slope =	0.0500
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.013	2.71	1,216	7.76
10	0.013	4.91	2,205	9.01
12	0.013	7.99	3,585	10.17
15	0.013	14.48	6,500	11.80
18	0.013	23.55	10,570	13.33
21	0.013	35.53	15,944	14.77
24	0.013	50.72	22,764	16.15
30	0.013	91.96	41,273	18.73
36	0.013	149.54	67,115	21.16
42	0.013	225.58	101,238	23.45
48	0.013	322.06	144,541	25.63
60	0.013	583.93	262,070	29.74

HDPE			Slope =	0.0500
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.009	3.91	1,756	11.21
10	0.009	7.10	3,185	13.01
12	0.009	11.54	5,178	14.69
15	0.009	20.92	9,389	17.05
18	0.009	34.02	15,268	19.25
21	0.009	51.32	23,030	21.33
24	0.009	73.26	32,881	23.32
30	0.009	132.84	59,617	27.06
36	0.009	216.01	96,944	30.56
42	0.009	325.83	146,233	33.87
48	0.009	465.20	208,781	37.02
60	0.009	843.46	378,546	42.96

CMP			Slope =	0.0750
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.022	1.96	880	5.62
10	0.022	3.56	1,596	6.52
12	0.022	5.78	2,595	7.36
15	0.022	10.48	4,704	8.54
18	0.022	17.04	7,650	9.65
21	0.022	25.71	11,539	10.69
24	0.022	36.71	16,474	11.68
30	0.022	66.56	29,870	13.56
36	0.022	108.23	48,572	15.31
42	0.022	163.25	73,268	16.97
48	0.022	233.08	104,606	18.55
60	0.022	422.60	189,663	21.52

RCP			Slope =	0.0750
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.013	3.32	1,489	9.51
10	0.013	6.02	2,700	11.03
12	0.013	9.78	4,391	12.46
15	0.013	17.74	7,961	14.45
18	0.013	28.84	12,946	16.32
21	0.013	43.51	19,527	18.09
24	0.013	62.12	27,880	19.77
30	0.013	112.63	50,549	22.95
36	0.013	183.15	82,199	25.91
42	0.013	276.27	123,991	28.72
48	0.013	394.44	177,026	31.39
60	0.013	715.17	320,969	36.42

HDPE			Slope =	0.0750
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.009	4.79	2,151	13.73
10	0.009	8.69	3,900	15.93
12	0.009	14.13	6,342	17.99
15	0.009	25.62	11,499	20.88
18	0.009	41.66	18,699	23.58
21	0.009	62.85	28,206	26.13
24	0.009	89.73	40,271	28.56
30	0.009	162.69	73,016	33.14
36	0.009	264.55	118,732	37.43
42	0.009	399.06	179,098	41.48
48	0.009	569.75	255,704	45.34
60	0.009	1033.03	463,622	52.61

CMP			Slope =	0.1000
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.022	2.26	1,016	6.49
10	0.022	4.11	1,842	7.53
12	0.022	6.68	2,996	8.50
15	0.022	12.10	5,432	9.86
18	0.022	19.68	8,833	11.14
21	0.022	29.69	13,324	12.34
24	0.022	42.39	19,023	13.49
30	0.022	76.85	34,491	15.66
36	0.022	124.97	56,086	17.68
42	0.022	188.51	84,602	19.59
48	0.022	269.14	120,789	21.42
60	0.022	487.98	219,004	24.85

RCP			Slope =	0.1000
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.013	3.83	1,720	10.98
10	0.013	6.95	3,118	12.74
12	0.013	11.30	5,070	14.38
15	0.013	20.48	9,193	16.69
18	0.013	33.31	14,948	18.85
21	0.013	50.24	22,548	20.89
24	0.013	71.73	32,193	22.83
30	0.013	130.06	58,369	26.49
36	0.013	211.49	94,915	29.92
42	0.013	319.01	143,173	33.16
48	0.013	455.46	204,412	36.24
60	0.013	825.81	370,623	42.06

HDPE			Slope =	0.1000
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.009	5.53	2,484	15.86
10	0.009	10.03	4,504	18.40
12	0.009	16.32	7,323	20.78
15	0.009	29.59	13,278	24.11
18	0.009	48.11	21,592	27.22
21	0.009	72.57	32,570	30.17
24	0.009	103.61	46,501	32.98
30	0.009	187.86	84,311	38.27
36	0.009	305.48	137,100	43.22
42	0.009	460.80	206,805	47.89
48	0.009	657.89	295,261	52.35
60	0.009	1192.83	535,344	60.75

CMP			Slope =	0.1500
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.022	2.77	1,245	7.94
10	0.022	5.03	2,256	9.22
12	0.022	8.18	3,669	10.41
15	0.022	14.82	6,653	12.08
18	0.022	24.10	10,818	13.64
21	0.022	36.36	16,318	15.12
24	0.022	51.91	23,298	16.52
30	0.022	94.12	42,243	19.17
36	0.022	153.06	68,691	21.65
42	0.022	230.87	103,616	24.00
48	0.022	329.62	147,935	26.23
60	0.022	597.65	268,225	30.44

RCP			Slope =	0.1500
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.013	4.69	2,106	13.44
10	0.013	8.51	3,819	15.60
12	0.013	13.84	6,210	17.62
15	0.013	25.09	11,259	20.44
18	0.013	40.79	18,308	23.08
21	0.013	61.53	27,616	25.58
24	0.013	87.85	39,428	27.96
30	0.013	159.29	71,488	32.45
36	0.013	259.02	116,247	36.64
42	0.013	390.71	175,350	40.61
48	0.013	557.83	250,352	44.39
60	0.013	1011.41	453,919	51.51

HDPE			Slope =	0.1500
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.009	6.78	3,042	19.42
10	0.009	12.29	5,516	22.53
12	0.009	19.99	8,969	25.45
15	0.009	36.24	16,262	29.53
18	0.009	58.92	26,445	33.34
21	0.009	88.88	39,890	36.95
24	0.009	126.90	56,952	40.39
30	0.009	230.08	103,260	46.87
36	0.009	374.14	167,912	52.93
42	0.009	564.36	253,284	58.66
48	0.009	805.75	361,620	64.12
60	0.009	1460.92	655,660	74.40

CMP			Slope =	0.2000
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.022	3.20	1,437	9.17
10	0.022	5.81	2,606	10.64
12	0.022	9.44	4,237	12.02
15	0.022	17.12	7,682	13.95
18	0.022	27.83	12,492	15.75
21	0.022	41.99	18,843	17.46
24	0.022	59.94	26,903	19.08
30	0.022	108.68	48,778	22.14
36	0.022	176.73	79,318	25.00
42	0.022	266.59	119,645	27.71
48	0.022	380.62	170,821	30.29
60	0.022	690.10	309,719	35.15

RCP			Slope =	0.2000
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.013	5.42	2,432	15.52
10	0.013	9.82	4,409	18.01
12	0.013	15.98	7,170	20.34
15	0.013	28.97	13,000	23.60
18	0.013	47.10	21,140	26.66
21	0.013	71.05	31,888	29.54
24	0.013	101.44	45,528	32.29
30	0.013	183.93	82,547	37.47
36	0.013	299.09	134,230	42.31
42	0.013	451.15	202,477	46.89
48	0.013	644.12	289,082	51.26
60	0.013	1167.87	524,140	59.48

HDPE			Slope =	0.2000
d (in)	Mannings n	Q (cfs)	Q (gpm)	Flowing Full V (fps)
8	0.009	7.83	3,513	22.42
10	0.009	14.19	6,369	26.02
12	0.009	23.08	10,357	29.38
15	0.009	41.84	18,778	34.10
18	0.009	68.04	30,535	38.50
21	0.009	102.63	46,061	42.67
24	0.009	146.53	65,762	46.64
30	0.009	265.67	119,234	54.12
36	0.009	432.01	193,888	61.12
42	0.009	651.66	292,467	67.73
48	0.009	930.40	417,562	74.04
60	0.009	1686.92	757,091	85.91

APPENDIX D – HYDROLOGIC MODEL OUTPUT

10-Year 3-Hour Storm (Existing)

Global Summary Results for Run "10 Year 3 Hour Storm"

Project: Improvements   Simulation Run: 10 Year 3 Hour Storm

Start of Run: 01Jan2000, 00:00   Basin Model: Basin 1
End of Run: 01Jan2000, 23:15   Meteorologic Model: Met 1
Compute Time: 04Apr2020, 17:42:17   Control Specifications: Control 1

Show Elements: All Elements   Volume Units: IN AC-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	1.45160	197.0	01Jan2000, 02:15	0.25
Reach-1	1.45160	197.7	01Jan2000, 02:15	0.25
2	0.73810	128.5	01Jan2000, 02:15	0.28
3	1.13470	142.4	01Jan2000, 02:15	0.25
1	0.71350	74.8	01Jan2000, 02:30	0.22
9	0.02660	9.8	01Jan2000, 01:45	0.39
Junction-2	2.61290	343.9	01Jan2000, 02:15	0.25
Reach-2	2.61290	324.0	01Jan2000, 02:15	0.26
Junction-3	2.61290	324.0	01Jan2000, 02:15	0.26
13 Outlet	0.89610	164.3	01Jan2000, 02:15	0.31
Reach-6	0.01148	2.1	01Jan2000, 01:45	0.23
4	0.01010	2.4	01Jan2000, 01:45	0.23
Reach-3	0.00000	2.1	01Jan2000, 01:45	n/a
Junction-8	0.01010	2.4	01Jan2000, 01:45	0.23
Reach-5	0.01010	2.3	01Jan2000, 01:45	0.23
7	0.00138	0.3	01Jan2000, 01:45	0.19
Junction-9	0.01148	2.5	01Jan2000, 01:45	0.23
10	0.04840	10.9	01Jan2000, 02:00	0.27
Junction-10	0.05988	14.9	01Jan2000, 02:00	0.31
11	0.04710	10.3	01Jan2000, 02:15	0.36
12	0.00980	2.1	01Jan2000, 02:15	0.35
Junction-6	0.05690	12.4	01Jan2000, 02:15	0.36
Reach-4	0.05690	12.1	01Jan2000, 02:15	0.36
Junction-7	0.05690	12.1	01Jan2000, 02:15	0.36
8	0.02340	10.0	01Jan2000, 01:45	0.36
5	0.01480	6.8	01Jan2000, 01:45	0.38
Junction-14	0.01480	6.8	01Jan2000, 01:45	0.38
Reach-9	0.01480	5.2	01Jan2000, 01:45	0.39
6	0.01440	4.3	01Jan2000, 01:45	0.27
Junction-12	0.01440	4.3	01Jan2000, 01:45	0.27
Reach-8	0.01440	3.2	01Jan2000, 01:45	0.27
Junction-13	0.05260	18.4	01Jan2000, 01:45	0.34

100-Year 3-Hour Storm (Existing)

Global Summary Results for Run "100 Year 3 Hour Storm"

Project: Improvements   Simulation Run: 100 Year 3 Hour Storm

Start of Run: 01Jan2000, 00:00   Basin Model: Basin 1
End of Run: 01Jan2000, 23:15   Meteorologic Model: Met 2
Compute Time: 04Apr2020, 17:42:21   Control Specifications: Control 1

Show Elements: All Elements   Volume Units: IN AC-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
Junction-1	1.45160	684.4	01Jan2000, 02:15	0.79
Reach-1	1.45160	696.5	01Jan2000, 02:15	0.79
2	0.73810	419.7	01Jan2000, 02:15	0.85
3	1.13470	510.7	01Jan2000, 02:15	0.79
1	0.71350	270.3	01Jan2000, 02:30	0.74
9	0.02660	29.4	01Jan2000, 01:45	1.03
Junction-2	2.61290	1216.2	01Jan2000, 02:15	0.80
Reach-2	2.61290	1174.4	01Jan2000, 02:15	0.80
Junction-3	2.61290	1174.4	01Jan2000, 02:15	0.80
13 Outlet	0.89610	521.9	01Jan2000, 02:15	0.89
Reach-6	0.01148	9.1	01Jan2000, 01:45	0.76
4	0.01010	9.6	01Jan2000, 01:45	0.75
Reach-3	0.00000	8.7	01Jan2000, 01:45	n/a
Junction-8	0.01010	9.6	01Jan2000, 01:45	0.75
Reach-5	0.01010	9.2	01Jan2000, 01:45	0.76
7	0.00138	1.2	01Jan2000, 01:45	0.67
Junction-9	0.01148	10.4	01Jan2000, 01:45	0.75
10	0.04840	36.1	01Jan2000, 02:00	0.83
Junction-10	0.05988	52.9	01Jan2000, 01:45	0.96
11	0.04710	30.3	01Jan2000, 02:15	0.98
12	0.00980	6.2	01Jan2000, 02:15	0.96
Junction-6	0.05690	36.5	01Jan2000, 02:15	0.98
Reach-4	0.05690	36.2	01Jan2000, 02:15	0.98
Junction-7	0.05690	36.2	01Jan2000, 02:15	0.98
8	0.02340	30.7	01Jan2000, 01:45	0.98
5	0.01480	20.1	01Jan2000, 01:45	1.02
Junction-14	0.01480	20.1	01Jan2000, 01:45	1.02
Reach-9	0.01480	16.8	01Jan2000, 01:45	1.04
6	0.01440	15.7	01Jan2000, 01:45	0.82
Junction-12	0.01440	15.7	01Jan2000, 01:45	0.82
Reach-8	0.01440	12.9	01Jan2000, 01:45	0.84
Junction-13	0.05260	60.4	01Jan2000, 01:45	0.96

10-Year 3-Hour Storm (After Improvements)

Global Summary Results for Run "10 Year 3 Hour Storm"

Project: APPLE VALLEY DRAINAGE Simulation Run: 10 Year 3 Hour Storm

Start of Run: 01Jan2000, 00:00 Basin Model: Basin 1
End of Run: 01Jan2000, 23:15 Meteorologic Model: Met 1
Compute Time: 03Apr2020, 15:57:34 Control Specifications: Control 1

Show Elements: All Elements Volume Units: IN AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
3	1.13470	142.4	01Jan2000, 02:15	0.25
1a	0.30400	42.2	01Jan2000, 02:00	0.22
Junction-2	0.92800	151.4	01Jan2000, 02:15	0.26
Junction-1	0.30400	42.2	01Jan2000, 02:00	0.22
Junction-3	0.92800	150.6	01Jan2000, 02:15	0.26
Reach-2a	0.92800	150.6	01Jan2000, 02:15	0.26
Reach-1	0.30400	42.1	01Jan2000, 02:15	0.22
2a	0.62400	112.8	01Jan2000, 02:00	0.28
Reach-2b	0.92800	145.5	01Jan2000, 02:15	0.26
9	0.02660	9.8	01Jan2000, 01:45	0.39
Junction-4	2.08930	291.7	01Jan2000, 02:15	0.26
Reach-3	2.08930	272.7	01Jan2000, 02:15	0.26
Junction-5	2.08930	272.7	01Jan2000, 02:15	0.26
13 Outlet	0.89610	164.3	01Jan2000, 02:15	0.31
1b	0.41000	48.6	01Jan2000, 02:15	0.22
2b	0.11460	16.4	01Jan2000, 02:15	0.28
Reach-6	0.01148	2.1	01Jan2000, 01:45	0.23
4	0.01010	2.4	01Jan2000, 01:45	0.23
Junction-8	0.01010	2.4	01Jan2000, 01:45	0.23
Reach-5	0.01010	2.3	01Jan2000, 01:45	0.23
7	0.00138	0.3	01Jan2000, 01:45	0.19
Junction-9	0.01148	2.5	01Jan2000, 01:45	0.23
10	0.04840	10.9	01Jan2000, 02:00	0.27
Junction-10	0.05988	12.9	01Jan2000, 02:00	0.27
11	0.04710	10.3	01Jan2000, 02:15	0.36
12	0.00980	2.1	01Jan2000, 02:15	0.35
Junction-6	0.05690	12.4	01Jan2000, 02:15	0.36
Reach-4	0.05690	12.1	01Jan2000, 02:15	0.36
Junction-7	0.05690	12.1	01Jan2000, 02:15	0.36
Reach-9	0.01480	5.2	01Jan2000, 01:45	0.39
Reach-8	0.01440	3.2	01Jan2000, 01:45	0.27
5	0.01480	6.8	01Jan2000, 01:45	0.38
6	0.01440	4.3	01Jan2000, 01:45	0.27
8	0.02340	10.0	01Jan2000, 01:45	0.36
Junction-14	0.01480	6.8	01Jan2000, 01:45	0.38
Junction-12	0.01440	4.3	01Jan2000, 01:45	0.27
Junction-13	0.05260	18.4	01Jan2000, 01:45	0.34

100-Year 3-Hour Storm (After Improvements)

Global Summary Results for Run "100 Year 3 Hour Storm"

Project: APPLE VALLEY DRAINAGE   Simulation Run: 100 Year 3 Hour Storm

Start of Run: 01Jan2000, 00:00   Basin Model: Basin 1
End of Run: 01Jan2000, 23:15   Meteorologic Model: Met 2
Compute Time: 03Apr2020, 15:57:39   Control Specifications: Control 1

Show Elements: All Elements   Volume Units: IN AC-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
3	1.13470	510.7	01Jan2000, 02:15	0.79
1a	0.30400	166.9	01Jan2000, 02:00	0.74
Junction-2	0.92800	537.5	01Jan2000, 02:00	0.81
Junction-1	0.30400	166.9	01Jan2000, 02:00	0.74
Junction-3	0.92800	510.1	01Jan2000, 02:15	0.82
Reach-2a	0.92800	510.1	01Jan2000, 02:15	0.82
Reach-1	0.30400	154.8	01Jan2000, 02:15	0.74
2a	0.62400	394.5	01Jan2000, 02:00	0.85
Reach-2b	0.92800	507.6	01Jan2000, 02:15	0.82
9	0.02660	29.4	01Jan2000, 01:45	1.03
Junction-4	2.08930	1027.3	01Jan2000, 02:15	0.81
Reach-3	2.08930	993.9	01Jan2000, 02:15	0.81
Junction-5	2.08930	993.9	01Jan2000, 02:15	0.81
13 Outlet	0.89610	521.9	01Jan2000, 02:15	0.89
1b	0.41000	184.0	01Jan2000, 02:15	0.74
2b	0.11460	55.8	01Jan2000, 02:15	0.85
Reach-6	0.01148	9.1	01Jan2000, 01:45	0.76
4	0.01010	9.6	01Jan2000, 01:45	0.75
Junction-8	0.01010	9.6	01Jan2000, 01:45	0.75
Reach-5	0.01010	9.2	01Jan2000, 01:45	0.76
7	0.00138	1.2	01Jan2000, 01:45	0.67
Junction-9	0.01148	10.4	01Jan2000, 01:45	0.75
10	0.04840	36.1	01Jan2000, 02:00	0.83
Junction-10	0.05988	44.2	01Jan2000, 01:45	0.82
11	0.04710	30.3	01Jan2000, 02:15	0.98
12	0.00980	6.2	01Jan2000, 02:15	0.96
Junction-6	0.05690	36.5	01Jan2000, 02:15	0.98
Reach-4	0.05690	36.2	01Jan2000, 02:15	0.98
Junction-7	0.05690	36.2	01Jan2000, 02:15	0.98
Reach-9	0.01480	16.8	01Jan2000, 01:45	1.04
Reach-8	0.01440	12.9	01Jan2000, 01:45	0.84
5	0.01480	20.1	01Jan2000, 01:45	1.02
6	0.01440	15.7	01Jan2000, 01:45	0.82
8	0.02340	30.7	01Jan2000, 01:45	0.98
Junction-14	0.01480	20.1	01Jan2000, 01:45	1.02
Junction-12	0.01440	15.7	01Jan2000, 01:45	0.82
Junction-13	0.05260	60.4	01Jan2000, 01:45	0.96

APPENDIX E – FINANCIAL TABLES

SUNRISE ENGINEERING, INC.

11 North 300 West, Washington, Utah 84780
Tel: (435) 652-8450 Fax: (435) 652-8416

Engineer's Opinion of Probable Cost

Apple Valley Storm Drain Improvements 21-Apr-20
Town of Apple Valley ncw/

NO.	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	AMOUNT
GENERAL CONSTRUCTION					
1	Mobilization	5%	LS	$ 79,300.00	$ 79,300.00
2	Dust Control & Watering	1	LS	$ 40,000.00	$ 40,000.00
3	Materials Sampling & Compaction Testing	1	LS	$ 10,000.00	$ 10,000.00
4	Clearing and Grubbing	32,000	SY	$ 0.50	$ 16,000.00
5	Earthwork/Grading	1	LS	$ 700,000.00	$ 700,000.00
6	Armored Rock Bank with Filter Fabric	32,000	SY	$ 25.00	$ 800,000.00
7	SWPPP & Erosion Control	1	LS	$ 20,000.00	$ 20,000.00
			SUBTOTAL		**$ 1,665,500.00**
			CONTINGENCY	15%	**$ 250,000.00**
			CONSTRUCTION TOTAL		**$ 1,915,500.00**
INCIDENTALS					
1	Funding & Adminstrative Services		LS	$ 35,000.00	$ 35,000.00
2	Engineering Design	5.1%	LS	$ 116,000.00	$ 116,000.00
3	Bidding & Negotiating	0.3%	HR	$ 7,000.00	$ 7,000.00
4	Engineering Construction Services	5.8%	HR	$ 133,500.00	$ 133,500.00
5	Geotechnical Report	0.3%	EST	$ 8,000.00	$ 8,000.00
6	Land & RoW Acquisition	2.2%	EST	$ 50,000.00	$ 50,000.00
7	Land & RoW Negotiation	0.3%	EST	$ 6,000.00	$ 6,000.00
8	Bond Attorney	0.7%	EST	$ 15,000.00	$ 15,000.00
9	Miscellaneous Engineering Services	0.4%	EST	$ 10,000.00	$ 10,000.00
			SUBTOTAL		$ 380,500.00
			TOTAL PROJECT COST		**$ 2,296,000.00**

In providing opinions of probable construction cost, the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as to the accuracy of such opinions compared to bid or actual costs.

SUNRISE ENGINEERING, INC.
11 North 300 West, Washington, Utah 84780
Tel: (435) 652-8450 Fax: (435) 652-8416

Engineer's Opinion of Probable Cost

Apple Valley Storm Drain Improvements 21-Apr-20
Town of Apple Valley ncw/

NO.	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	AMOUNT
GENERAL CONSTRUCTION					
1	Mobilization	5%	LS	$ 73,000.00	$ 73,000.00
2	Dust Control & Watering	1	LS	$ 40,000.00	$ 40,000.00
3	Materials Sampling & Compaction Testing	1	LS	$ 60,000.00	$ 60,000.00
4	24" HDPE Storm Drain Pipe	2,460	LF	$ 75.00	$ 184,500.00
5	30" HDPE Storm Drain Pipe	1,180	LF	$ 105.00	$ 124,000.00
6	Earthwork	63,400	CY	$ 5.00	$ 317,000.00
7	Armored Rock Bank with Filter Fabric	22,100	SY	$ 25.00	$ 552,500.00
8	Reworking Borrow Ditches	16,000	LF	$ 10.00	$ 160,000.00
9	SWPPP & Erosion Control	1	LS	$ 20,000.00	$ 20,000.00
			SUBTOTAL		**$ 1,531,000.00**
			CONTINGENCY	15%	**$ 230,000.00**
			CONSTRUCTION TOTAL		**$ 1,761,000.00**
INCIDENTALS					
1	Funding & Adminstrative Services		LS	$ 40,000.00	$ 40,000.00
2	Engineering Design	4.8%	LS	$ 108,000.00	$ 108,000.00
3	Bidding & Negotiating	0.3%	HR	$ 7,000.00	$ 7,000.00
4	Engineering Construction Services	5.5%	HR	$ 122,500.00	$ 122,500.00
5	Geotechnical Report	0.4%	EST	$ 8,000.00	$ 8,000.00
6	Land & RoW Acquisition	6.7%	EST	$ 150,000.00	$ 150,000.00
7	Land & RoW Negotiation	0.5%	EST	$ 12,000.00	$ 12,000.00
8	Bond Attorney	0.7%	EST	$ 15,000.00	$ 15,000.00
9	Miscellaneous Engineering Services	0.4%	EST	$ 10,000.00	$ 10,000.00
			SUBTOTAL		$ 472,500.00
			TOTAL PROJECT COST		**$ 2,233,500.00**

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SUNRISE ENGINEERING, INC.

11 North 300 West, Washington, Utah 84780
Tel: (435) 652-8450 Fax: (435) 652-8416

Engineer's Opinion of Probable Cost

Apple Valley Storm Drain Improvements 21-Apr-20
Town of Apple Valley ncw/

NO.	DESCRIPTION	EST. QTY	UNIT	UNIT PRICE	AMOUNT
GENERAL CONSTRUCTION					
1	Mobilization	5%	LS	$ 17,000.00	$ 17,000.00
2	Traffic Control	1	LS	$ 4,000.00	$ 4,000.00
3	Dust Control & Watering	1	LS	$ 9,000.00	$ 9,000.00
4	SWPPP	1	LS	$ 9,000.00	$ 9,000.00
5	Subsurface Investigation	1	LS	$ 9,000.00	$ 9,000.00
6	Construction Staking	1	LS	$ 12,000.00	$ 12,000.00
7	Materials Sampling and Testing	1	LS	$ 14,000.00	$ 14,000.00
8	Clearing, Grubbing, Saw Cutting, and Demolition	1	LS	$ 18,500.00	$ 18,500.00
9	Import Granular Borrow	1,100	Cu Yd	$ 41.00	$ 45,500.00
10	Earthwork and Grading	1	LS	$ 70,000.00	$ 70,000.00
11	84" CMP	70	LF	$ 400.00	$ 28,000.00
12	96" CMP	70	LF	$ 450.00	$ 31,500.00
13	6" Untreated Base Course	64,500	SF	$ 0.90	$ 58,500.00
14	Double Chip Seal	8,000	SY	$ 2.50	$ 20,000.00
15	5-Strand Barbed Wire Fence	1,000	LF	$ 4.25	$ 4,250.00
			SUBTOTAL		**$ 350,250.00**
			CONTINGENCY	15%	**$ 53,000.00**
			CONSTRUCTION TOTAL		**$ 403,250.00**
INCIDENTALS					
1	Geotechnical Report	1.5%	LS	$ 7,250.00	$ 7,250.00
2	Design Survey & ROW	1.7%	LS	$ 8,000.00	$ 8,000.00
3	Civil Engineering Design	7.5%	LS	$ 35,500.00	$ 35,500.00
4	Bidding & Negotiating	0.6%	HR	$ 3,000.00	$ 3,000.00
5	Engineering Construction Services	4.2%	HR	$ 20,000.00	$ 20,000.00
			SUBTOTAL		$ 73,750.00
			TOTAL PROJECT COST		**$ 424,000.00**

In providing opinions of probable construction cost, the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as to the accuracy of such opinions compared to bid or actual costs.

TABLE V.B.1
THE TOWN OF APPLE VALLEY
STORM WATER MASTER PLAN
IMPACT FEE CALCULATION

4/21/20

IMPACT FEE ELIGIBILITY CALCULATION

Total Area Draining through Basins Analyzed	603	acres
Undeveloped Land within Drainage Boundary	197	acres
Percent of Cost Impact Fee Eligible:		**32.6%**

PROPOSED IMPROVEMENT PROJECTS

Total Non-Grant Estimated Project Costs		$1,237,500
Total Interest From New Debt Service		$504,000
% of Project Cost Due to New Growth	32.6%	$ 404,000
% of Interest Due to New Growth	32.6%	$ 164,500
Impact Fee Eligible Cost		$ 568,500

MAXIMUM IMPACT FEE CALCULATION

Total Impact Fee Eligible Cost	$ 568,500	
Undeveloped Land within Drainage Boundary	197	acres
Maximum Impact Fee per Acre of Land within Drainage Boundary	$ 2,886	/ acre

PROPOSED IMPACT FEE

Proposed Impact Fee	**$ 2,886**	**/ acre**

Zone	Average Lot Size	Impact Fee
R-A-1	1.00	$ 2,886
R-1-14	0.32	$ 923
R-1-10	0.23	$ 664
R-1-8	0.18	$ 519
R-3-6	0.14	$ 404

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TABLE V.C.1

APPLE VALLEY IMPACT FEE FACILITIES PLAN
FY 2023 PROPOSED FINANCING PLAN

TOTAL PROJECT COST			**$ 4,953,500**
FY 2023 EXPENSES			
Proposed Funding:	**Rate**	**Term in Yrs.**	**Principal**
Self Participation			$75,000
FEMA Grant (75%)			$3,716,000
CIB Loan (25%)	2.50%	30	$1,162,500
TOTAL PROJECT FUNDING:			**$4,953,500**
EXPENSES: (First Year of New Debt Serv. Pmt.)			
Personal Services			$6,556
Contracted Services			$0
Operating & Maintenance			$13,113
Other Supplies & Expenses			$0
Depreciation Expense			$0
Subtotal Expenses:			**$19,669**
EXISTING DEBT SERVICE			
			$0
Subtotal Existing Annual Debt Service:			**$0**
NEW DEBT SERVICE			
New Loan(s)			$55,542
Loan Reserve (Payment/10)			$5,554
Subtotal New Annual Debt Service:			**$61,096**
Renewal and Replacement Fund			$983
GRAND TOTAL EXPENSES:			**$81,748**
ANNUAL INCOME			
New Impact Fees	$404	22	$8,888
Total Number of Customers			399
Average Monthly Rate/Customer			**$15.21**
TOTAL ANNUAL INCOME:			**$81,748**

TABLE V.E.1
CASH FLOW ANALYSIS

Annual Population Growth Rate		6.00%	6.00%	6.00%	6.00%	6.00%	5.00%	5.00%	5.00%	5.00%	5.00%	4.00%	4.00%	4.00%
Annual Rate Increase	3.00%													
Annual Inflation Rate	3.00%													
Fiscal Year Beginning July 1	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Ending June30	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
Average Rate Per Customer	$ 10.05	$ 10.05	$12.44	**$14.83**	$15.27	$15.73	$16.20	$16.69	$17.19	$17.71	$18.24	$18.79	$19.35	$19.93
Connection Fee	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Base Residential Impact Fee	$860	$860	$860	**$391**	$391	$391	$391	$391	$391	$391	$391	$391	$391	$391
System Users:														
Total Residential Customers	318	337	357	379	401	426	447	469	493	517	543	565	587	611
Total Commercial Customers	1	1	1	1	1	1	1	1	2	2	2	2	2	2
New Customers	19	19	20	22	23	24	21	22	24	25	26	22	23	24
Total Customers:	338	357	377	399	422	446	467	489	513	538	564	586	609	633
REVENUES:	40,768													
User Fees (Drainage Fee)	40,768	43,058	56,299	71,018	77,353	84,213	90,812	97,965	105,851	114,366	123,479	132,163	141,442	146,114
Connection Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Late Fees & Penalties	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Impact Fees	16,460	16,340	17,200	8,602	8,993	9,384	8,211	8,602	9,384	9,775	10,166	8,602	8,993	9,384
TOTAL REVENUE:	**$57,228**	**$59,398**	**$73,499**	**$79,620**	**$86,346**	**$93,597**	**$99,023**	**$106,567**	**$115,235**	**$124,141**	**$133,645**	**$140,765**	**$150,435**	**$155,498**
EXPENSES: (Inc. O&M & Debt Serv.)														
Personal Services	6,000	6,180	6,365	6,556	6,753	6,956	7,165	7,380	7,601	7,829	8,064	8,306	8,555	8,812
Contracted Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating & Maintenance	12,000	12,360	12,731	13,113	13,506	13,911	14,328	14,758	15,201	15,657	16,127	16,611	17,109	17,622
Other Supplies & Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Depreciation Expense	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-Total Operation & Maintenance	**$18,000**	**$18,540**	**$19,096**	**$19,669**	**$20,259**	**$20,867**	**$21,493**	**$22,138**	**$22,802**	**$23,486**	**$24,191**	**$24,917**	**$25,664**	**$26,434**
EXISTING DEBT SERVICE (810-820)														
None	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-Total Existing Debt Service	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
NEW DEBT SERVICE (810-820)														
New Loan	0	0	0	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607
Loan Reserve (Payment/10)	0	0	0	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361
Self Participation	0	0	$75,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Debt Service	**$0**	**$0**	**$75,000**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**
Total Debt Service	**$0**	**$0**	**$75,000**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**
OTHER SERVICE														
Renewal and Replacement Fund (590)	0	0	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322
Total Renewal and Replacement Fund	$0	$0	$955	$983	$1,013	$1,043	$1,075	$1,107	$1,140	$1,174	$1,210	$1,246	$1,283	$1,322
Storm Water Impact Fee Facilities Plan Update	$0	$0	$0	$0	$50,000	$0	$0	$0	$0	$55,000	$0	$0	$0	$0
TOTAL EXPENSES:	**$18,000**	**$18,540**	**$95,051**	**$79,620**	**$130,240**	**$80,878**	**$81,536**	**$82,213**	**$82,910**	**$138,628**	**$84,369**	**$85,131**	**$85,915**	**$86,724**
Net Cashflow	**$39,228**	**$40,858**	**($21,551)**	**$0**	**($43,894)**	**$12,719**	**$17,487**	**$24,354**	**$32,324**	**($14,488)**	**$49,276**	**$55,634**	**$64,520**	**$68,774**
CASH ON HAND														
*Fund Balance	39,228	80,086	58,535	58,535	14,641	27,360	44,847	69,201	101,526	87,038	136,314	191,948	256,469	325,243
Renewal and Replacement Account Balance:	0	0	955	1,938	2,951	3,995	5,069	6,176	7,316	8,491	9,700	10,946	12,229	13,551
New Bond Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**$39,228**	**$80,086**	**$59,490**	**$60,473**	**$17,592**	**$31,355**	**$49,917**	**$75,378**	**$108,842**	**$95,529**	**$146,015**	**$202,894**	**$268,698**	**$338,794**

**Fund Balance is obtained by adding the previous year's balance to the net cash flow, minus any self funded portion of future projects. Fund Balance includes Impact Fees.*

TABLE V.E.1
CASH FLOW ANALYSIS

Annual Population Growth Rate	4.00%	4.00%	3.00%	3.00%	3.00%	3.00%	3.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Annual Rate Increase														
Annual Inflation Rate														
Fiscal Year Beginning July 1	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
Ending June30	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**
Average Rate Per Customer	$20.53	$21.15	$21.78	$22.43	$23.10	$23.79	$24.50	$25.24	$26.00	$26.78	$27.58	$28.41	$29.26	$30.14
Connection Fee	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Base Residential Impact Fee	$391	$391	$391	$391	$391	$391	$391	$391	$391	$391	$391	$391	$391	$391
System Users:														
Total Residential Customers	635	661	681	701	722	744	766	781	797	813	829	846	863	880
Total Commercial Customers	2	2	2	2	2	2	2	2	3	3	3	3	3	3
New Customers	25	25	20	20	21	22	22	15	16	16	16	17	17	17
Total Customers:	658	683	703	723	744	766	788	803	819	835	851	868	885	902
REVENUES:														
User Fees (Drainage Fee)	156,533	167,711	177,888	188,692	200,159	212,322	225,218	236,661	248,663	261,245	274,430	288,343	302,909	318,260
Connection Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Late Fees & Penalties	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Impact Fees	9,775	9,775	7,820	7,820	8,211	8,602	8,602	5,865	6,256	6,256	6,256	6,647	6,647	6,647
TOTAL REVENUE:	**$166,308**	**$177,486**	**$185,708**	**$196,512**	**$208,370**	**$220,924**	**$233,820**	**$242,526**	**$254,919**	**$267,501**	**$280,686**	**$294,990**	**$309,556**	**$324,907**
EXPENSES: (Inc. O&M & Debt Serv.)														
Personal Services	9,076	9,348	9,628	9,917	10,215	10,521	10,837	11,162	11,497	11,842	12,197	12,563	12,940	13,328
Contracted Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating & Maintenance	18,151	18,696	19,257	19,835	20,430	21,043	21,674	22,324	22,994	23,684	24,395	25,127	25,881	26,657
Other Supplies & Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Depreciation Expense	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-Total Operation & Maintenance	**$27,227**	**$28,044**	**$28,885**	**$29,752**	**$30,645**	**$31,564**	**$32,511**	**$33,486**	**$34,491**	**$35,526**	**$36,592**	**$37,690**	**$38,821**	**$39,985**
EXISTING DEBT SERVICE (810-820)														
None	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-Total Existing Debt Service	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
NEW DEBT SERVICE (810-820)														
New Loan	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607	$53,607
Loan Reserve (Payment/10)	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361	$5,361
Self Participation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Debt Service	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**
Total Debt Service	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**	**$58,968**
OTHER SERVICE														
Renewal and Replacement Fund (590)	1,361	1,402	1,444	1,488	1,532	1,578	1,626	1,674	1,725	1,776	1,830	1,885	1,941	1,999
Total Renewal and Replacement Fund	$1,361	$1,402	$1,444	$1,488	$1,532	$1,578	$1,626	$1,674	$1,725	$1,776	$1,830	$1,885	$1,941	$1,999
Storm Water Impact Fee Facilities Plan Update	$60,000	$0	$0	$0	$0	$65,000	$0	$0	$0	$0	$70,000	$0	$0	$0
TOTAL EXPENSES:	**$147,556**	**$88,414**	**$89,297**	**$90,208**	**$91,145**	**$157,110**	**$93,105**	**$94,128**	**$95,184**	**$96,270**	**$167,390**	**$98,543**	**$99,730**	**$100,952**
Net Cashflow	**$18,752**	**$89,072**	**$96,410**	**$106,305**	**$117,224**	**$63,813**	**$140,715**	**$148,398**	**$159,735**	**$171,231**	**$113,297**	**$196,447**	**$209,826**	**$223,954**
CASH ON HAND														
*Fund Balance	343,995	433,066	529,477	635,782	753,006	816,820	957,535	1,105,933	1,265,668	1,436,899	1,550,195	1,746,643	1,956,469	2,180,423
Renewal and Replacement Account Balance:	14,912	16,314	17,759	19,246	20,778	22,357	23,982	25,657	27,381	29,157	30,987	32,871	34,813	36,812
New Bond Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**$358,907**	**$449,381**	**$547,235**	**$655,028**	**$773,785**	**$839,176**	**$981,517**	**$1,131,589**	**$1,293,049**	**$1,466,056**	**$1,581,182**	**$1,779,514**	**$1,991,281**	**$2,217,235**
**Fund Balance is obtained by adding the previous year's balance to the net cash flow, minus any self funded portion of future projects. Fund Balance includes Impact Fees.*														

THE TOWN OF APPLE VALLEY

PARKS & RECREATION FEE FACILITIES PLAN

MARCH 2020

PREPARED BY:

SUNRISE ENGINEERING

THE TOWN OF APPLE VALLEY
PARKS & RECREATION IMPACT FEE FACILITIES PLAN

FEBRUARY 2020

MAYOR .... Marty Lisonbee
COUNCIL MEMBER .... Denny Bass
COUNCIL MEMBER .... Mike McLaughlin
COUNCIL MEMBER ....Debbie Kopp
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Principal Engineer
State of Utah No. 176874

TABLE OF CONTENTS

APPENDICES

I. EXECUTIVE SUMMARY

A. USER ANALYSIS

A population and growth projection give the town an idea of what future demands will be required and how the town should plan through that period. The following points have been calculated and presented in this study:

- Growth Rate of 6% Per Year for first 5 years reduced by 1% every 5 years
- 20-Year Planning Horizon or Period
- Existing Estimated Projections For 2020:
  - Population = 925
- Future Estimated Projections For 2040:
  - Population = 2,229

B. INVENTORY

Providing an accurate inventory is essential to determining the existing Level of Service (LOS) for the community. To accomplish this, a complete inventory was collected from City staff.

- Existing Facilities:
  - 1 Park = 0.88 *acres*
- Existing LOS:
  - Parks and Recreation = 1.01 *acres/1,000 people*

C. DEMAND ANALYSIS

The demand analysis focuses on the desired or target LOS and the future efforts needed to maintain the current or existing LOS. Discussion on the target LOS and future demands due to growth are outlined in the plan.

- Target LOS:
  - NRPA guidelines suggest 6.0 *acres/1,000 people* as a park facility LOS.
  - For this report the existing LOS of parks and recreation will be used for the target LOS for parks and recreation.
- Growth Demand for Planning Horizon:
  - Parks and Recreation = 1.37 *acres*

D. FACILITIES PLAN

This facilities plan provides further analysis of the LOS and then outlines an action plan and recommended capital improvements to guide the Parks and Recreation Department and the Town for the next 20 years.

- Facilities Improvements Plan
  - Expand Existing Park = 0.69 Acres
  - All Purpose Trail = 0.68 (3,700 Linear Feet)

II. INTRODUCTION

A. PURPOSE AND SCOPE

In 2019, the Town of Apple Valley commissioned Sunrise Engineering, Inc. to conduct a Parks and Recreation Master Plan. The Town understands the importance of an early planning process to ensure that a community-wide park and recreation system fulfills the current and future recreational needs of Apple Valley residents.

Parks and recreation facilities are an integral part of a community. The location and attributes of park and recreational facilities have a meaningful impact on the type and course of growth in the community. Likewise, these facilities can enhance the quality of life, and contribute positively to, a neighborhood's and community's aesthetics.

The specific objectives of this plan are to analyze population growth rates and projections, identify existing parks and recreation facilities to help determine a baseline level of service (LOS), and establish a facility plan to guide future growth. Ultimately, the goal of this plan is to provide a general guide to the Town for making decisions pertaining to future parks and recreation development and to help avoid mistakes inherent to a lack of proper planning.

B. BACKGROUND INFORMATION

The Town of Apple Valley is located south and east of Hurricane along SR-59 in Washington County, Utah. The Town boundaries include Rockville to the Northeast, and Hildale to the Southeast. The red and white rock cliffs of Zion National Park can be seen to the East of town. Figure II-1 shows an area map for Apple Valley.

The community can be classified as rural and suburban due to varied land uses within the Town. These land uses range from pasture and farmland to moderate density residential housing and light commercial use.

C. ANALYSIS AREA

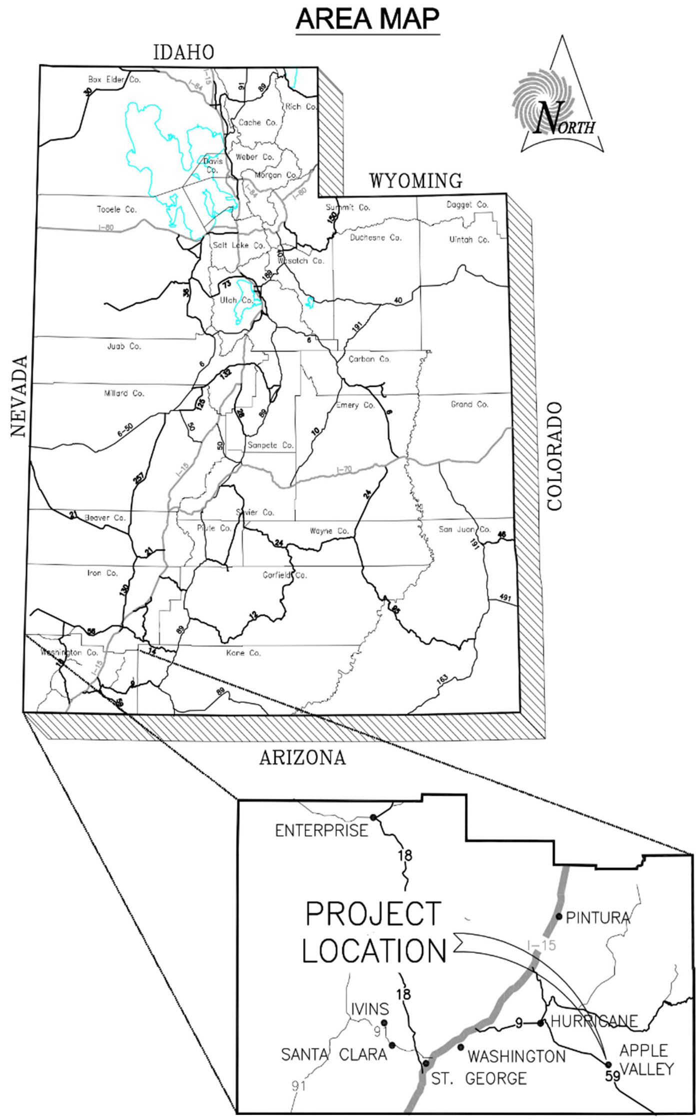


Figure II-1: Area Map

The plan area is contained within the existing Apple Valley Town limits. It should be noted that while this master plan will focus on the park and recreational facilities within town limits, there are many trails and recreational activities that can be accessed nearby which makes the apparent level of service feel greater than what it is determined to be in this plan.

III. USER ANALYSIS

A. GROWTH RATE

To determine what future projects will be required as Apple Valley grows, projections for the population and growth rate must be calculated. Projecting the future population is a subjective process, especially with fluctuating growth trends for Apple Valley.

B. LENGTH OF PLANNING HORIZON

Master Plans typically use a 10- to 20-year planning horizon or period. This plan will assume a 20-year planning horizon, noting the following points:

- Assumptions, objectives, goals, etc. can change within a 20-year period. This change in conditions may especially be realized if dramatic population changes take place within the 20-year planning horizon. For this reason, we recommend that master plans be reviewed every 5 years.

C. POPULATION ANALYSIS

The Town of Apple Valley was established in 2004 with approximately 700 residents. Since then the town has continued to experience growth. More recent years have experienced a rapidly increasing growth rate. Census records indicate a population of 701 residents in or around 2010, with an estimated 2020 population of 925 residents. The average annual growth from 2010 to present based on these estimates is 2.00% per year.

For this plan, a growth rate of 6% will be used for the first five years and subsequently reduced by 1% every five years until the end of the 20-year planning period. See Table III-1 for projected annual growth rates in the planning period.

Year	*Projected Growth Rate*
2020-2025	*6%*
2026-2030	*5%*
2031-2035	*4%*
2036-2040	*3%*

Table III-1. Projected Growth Rates

Many communities in Washington County, including Hurricane and St. George are experiencing rapid growth in general, and there is potential for this growth to push out to Apple Valley. The town is anticipating some near future residential developments, which may increase the community's growth rate above the previously observed annual growth rate, depending on how quickly the development occurs. Sunrise Engineering, Inc. recommends the Town of Apple Valley revisit these projections every five years or upon experiencing a rapid increase in growth. This report should be updated when actual growth is observed to exceed these projections, or when other significant changes occur with the town's facilities. See Table III-2 for Apple Valley Town projected population.

Year	Projected Population
2020	925
2025	1238
2030	1580
2035	1922
2040	2228

Table III-2. Projected Population

IV. INVENTORY

A. EXISTING FACILITIES

Apple Valley Town has one park that is Town owned and that the community has access to. The park is equipped with a playground, open space, and a pavilion with tables. There is currently no existing trail system operated and maintained by the Town of Apple Valley. See Appendix A for a map of Apple Valley and its existing parks. Table IV-1 summarizes the acreage and name of the park included in the existing facilities inventory.

PARK NAME	AREA *(acres)*
Apple Valley Town Park	0.88

Table IV-1. Existing Facilities

B. NRPA GUIDELINES

The National Recreation and Park Association (NRPA) has identified and established guidelines for the development of park facilities to help communities establish a framework for the types, sizes, proximity, and number of recreational facilities that should be provided for the community (see Appendix C).

The NRPA cautions communities that these recommendations are only guidelines, and that each community can adjust them as needed to meet their individual requirements.

Apple Valley is in an area with a variety of outdoor recreational opportunities. Its proximity to mountainous terrain, public lands, and a large network of trails support the recreational needs of the community. Therefore, it may not be necessary for the town to strictly adhere to the NRPA guidelines; however, these guidelines are beneficial in planning and developing a recreational facilities plan.

C. PARK CLASSIFICATION

The Town of Apple Valley is a small community, but as it grows there will be various recreational demands. These demands may require several types of facilities to meet these demands. Using the NRPA's guidelines as a basis, the following park classifications have been identified as types of facilities that help meet the recreational demand of the community. The following classifications include a description of each type of classification and whether or not the classification is applicable to the overall LOS. A classification comparison table is provided as Table IV-2.

i. Private Park Facility

Description: The private park facility is the smallest park classification and is used to address limited or isolated recreational needs for private communities. They are generally developed within a residential area for the exclusive use of residents and are maintained through a neighborhood association. Even though all parks within this classification are private they still serve the recreational needs of the local neighborhoods. However, they are not a complete substitute for public recreation space.

Location: Private park facilities are located central to a neighborhood or servicing a specific recreational need or taking advantage of a unique opportunity. Often, location of these private park facilities will be determined by a developer with input from the Town.

Access: By way of interconnecting trails, sidewalks, or low-volume residential streets.

Desirable Size: 0.25 – 1 acre

Area Served: ¼ mile radius

Examples: Private parks, private clubhouses

Application to LOS: No

ii. Neighborhood Park

Description: The neighborhood park is the basic unit of a park system and serves as the recreational and social focus of the neighborhood. This type of park provides activities for all age groups and addresses the specific recreational needs of the nearby neighborhood. Facilities may include play structures, picnic areas, shaded seating, soft and hard surface courts, restrooms, trails, and open areas for informal play activities. Typically, parks in this classification have no lighted athletic fields for team competition, and no schedule for organized programs.

Location: Neighborhood parks are often centrally located within a service area and uninterrupted by non-residential roads and other physical barriers.

Access: By way of interconnecting trails, sidewalks, or low volume residential streets.

Desirable Size: 4 – 10 acres

Area Served: ½ mile radius

Application to LOS: Yes

iii. School Park

Description: The school park combines the resources of two public agencies and provides a range of recreational services and facilities to several neighborhoods that are served by a school. Depending on circumstances, school park sites often complement open space and could possibly serve in several capacities, such as a neighborhood park or youth athletic field. Even though all parks within this classification are located and maintained by the managing school district, it is important to understand that these schools serve the recreational needs of surrounding neighborhoods.

Location: These parks are located adjacent to a school facility.

Access: By way of interconnecting trails, sidewalks, and streets. These normally have direct access from a collector street.

Desirable Size: Dependent upon school district

Area Served: 1 mile or service boundary of school

Application to LOS: No

iv. Community Park

Description: The community park is typically larger in size and serves a broader purpose than the neighborhood parks. Their focus is on meeting a wide range of recreational activities for several neighborhoods or sections of the community. They allow for group activities and offer other recreational opportunities not feasible – nor perhaps desirable – at the neighborhood level. Community parks can accommodate special events and gatherings and can provide for a broad variety of activities and recreation opportunities. Community parks may be highly developed with amenities such as playgrounds, lighted athletic fields, programmed sports which accommodate specific needs of user groups and athletic associations based on demand and program offering, or they may include large open spaces with sensitive environments such as wildlife habitat, river corridors, flood plains, greenways, and other protected open space and sensitive lands.

Location: Community parks should be viewed as a strategically located community-wide facility rather than serving a defined neighborhood or area. They should not be adjacent to residential areas unless buffering (topographic breaks, vegetation, walls, etc.) is used, but more importantly, the quality of the natural resource base should play a significant role in site selection. Identifying new locations for these facilities is critical to avoid long-term conflicts.

Access: The site should be serviced by a collector road and not through a residential street. Given that a community park will likely be used for various types of league play and tournaments, access routes from outside the community should also be considered. The site should also be easily accessible by way of interconnecting trails.

Desirable Size: 10 – 40+ acres

Area Served: 1.5 mile radius

Application to LOS: Yes

v. Trail

Description: Trails or trail systems are generally transportation corridors for non-motorized modes of transportation such as walking, jogging, running and cycling, and provide valuable recreation and transportation opportunities for residents and visitors. They are used to interconnect parks, neighborhoods, downtown, and bordering cities and sites. Providing a community-wide system of interconnected trails, corridors, pathways and parks is an essential part of the recreation system and a way to preserve significant unique features of the community.

Location: Trails are often located in natural corridors such as along stream and riverbanks and along washes. Care should be taken to ensure preservation and enhancement of these natural corridors and habitats to maintain the fragile ecosystems in which they are placed.

Access: These trails should be serviced mainly by other park classifications to capitalize on existing facilities or features. Some trails may require controlled access to preserve environmental features. All trails should interconnect and have access points to parks, residential roads, local connectors and main thoroughfares.

Desirable Size: 10 feet minimum in width, length varies

Area Served: Apple Valley Town and surrounding region

Examples: Typically, 10-12' wide asphalt trail corridor with use-specific variation.

Application to LOS: Yes

vi. Recreation Center

Description: The recreation center represents the contribution of a public community center to the park and recreation system. The offerings of a recreation center can be as follows: aquatic facilities including swimming pools, lap pools, water features, splash pads, slides, etc., health and fitness areas including weight rooms, aerobics rooms, tracks, etc., and court facilities including tennis, racquetball, basketball, gymnastics, pickleball, rock climbing, etc.

Location: Recreation centers should be centrally located within the community and should be identified prior to development to avoid conflicts.

Access: The site should be serviced by a collector road and not through a residential street. It should be easily accessible throughout its service area by way of interconnecting trails and sidewalks.

Desirable Size: 50,000 – 125,000 sf

Area Served: 4+ mile radius

Examples: Typically, community center, aquatics center, gymnasium, etc.

Application to LOS: Yes

vii. Regional Park

Description: The regional park classification is a large recreation area that serves an entire Town or region. The regional park often includes multiple special use facilities including golf courses, lakes, nature centers, campgrounds, state parks, national parks and a broad expanse of natural scenery or open space. Regional parks are designed to accommodate large numbers of people for a variety of day-use activities.

Location: Regional parks are often developed around a unique or significant resource or to emphasize a regional recreational interest. They also serve as a buffer and separation between communities or other areas.

Access: Typically, regional parks are serviced by a main arterial road

Desirable Size: Variable, large scale

Area Served: Apple Valley Town and surrounding counties

Examples: Nearby State and National Parks, nearby National Forests

Application to LOS: No

CLASSIFICATION	DESCRIPTION	TYPICAL SIZE	AREA SERVED	APPLICATION OF LOS
Private Park/Facility	Used to address limited or isolated recreational needs for private communities.	0.25 - 1 acre	0.15 mile radius	No
Neighborhood Park	Remain the basic unit of the park system and serves as the recreational and social focus of the neighborhood.	4 - 10 acres	0.50 mile radius	Yes
School Park	Often complement open space and could possibly serve in number of capacities such as a neighborhood park or youth athletic field.	Dependent upon school district	1 mile radius or boundary of school	No
Community Park	Serves broader purpose than neighborhood park. Focus is on meeting a wide range of recreational activities (passive, active, programmed sports, league play, tournaments, etc.) for the several neighborhoods or the entire community.	10 - 40+ acres	1.5 mile radius	Yes
Trail	Serves as transportation corridors for non-motorized modes of transportation. Used to interconnect parks, neighborhoods, downtown, and bordering cities and sites.	10 width, length varies	Apple Valley Town and surrounding region	Yes
Recreation Facility	Represents the contribution of a public community center to the park and recreation system and the recreational opportunities. Characteristics often include aquatic, health, fitness, and court type programs and facilities.	50,000 - 125,000 square feet	4+ mile radius	Yes
Regional Park	Large recreation area that serves an entire city or region. Often includes multiple special use facilities and accommodates large numbers of people for a variety of day use activities.	Variable, large scale	Apple Valley Town and surrounding counties	No

Table IV-2. Park Classification Summary

D. EXISTING LEVEL OF SERVICE

Establishing an existing LOS is a fundamental part of a Master Plan. Based on the aforementioned inventory, guidelines, and classifications, the existing LOS for Apple Valley Town will be evaluated for parks only, since the Town does not currently have a recreation center or trails.

viii. Parks

The existing LOS for parks is based upon an acreage per thousand people (acres/1,000 people). To calculate the LOS, the area of each park was divided by the current estimated population and then multiplied by 1,000 as illustrated in the following equation:

$$\frac{Area\ of\ Park}{Estimated\ Population}(1{,}000) = LOS$$

$$\frac{0.88\ acres}{873\ people}(1{,}000) = 1.01\frac{acres}{1{,}000\ people}$$

Ultimately, a value of **1.01** (acres/1,000 people) was calculated by the summation of the existing LOS as shown in Table IV-3.

PARK NAME	CLASSIFICATION	AREA *(acres)*	LEVEL OF SERVICE (LOS) (acres/1,000 people)
Apple Valley Town Park	Neighborhood Park	0.88	1.01

Table IV-3I. Existing parks Level of Service

ix. Trails

There are currently no maintained existing trails within Apple Valley Town limits. Usually existing LOS for trails is based upon a mileage per thousand people (miles/1,000 people) of existing paved routes considered to be part of the trail system. The method for calculating existing LOS is the same as that explained in the prior parks section. Since there is no existing trail system in Apple Valley Town the LOS is **0** (miles/1,000 people).

V. DEMAND ANALYSIS

This section sets forth goals established by Apple Valley Town for parks and recreation in the community, establishes a Target Level of Service (LOS) desired by Apple Valley and quantifies the future demands on parks, trails and recreation facilities necessary to maintain the existing LOS.

A. TARGET LEVEL OF SERVICE

For the target LOS to be established it is necessary to understand the existing LOS that is being provided to the citizens of Apple Valley Town.

The NRPA standard is 6.0 acres of park per 1,000 residents. NRPA guidelines specify one trail network per region with a daily capacity of 40 hikers/mile for rural setting and up to 90 hikers/day/mile in urban areas. NRPA doesn't specify a target LOS for trail systems.

In the future, it is recommended that the Town of Apple Valley determine an appropriate target LOS for its parks and recreational facilities based upon the following points:

- NRPA standards are only guidelines; each community can adjust these guidelines to meet their individual requirements.
- NRPA standards are tailored more for an urban environment.
- Apple Valley is in an ideal location for outdoor recreation and access to numerous trail systems.

The Town is happy with the existing LOS for both parks and trails and would like to maintain these levels of service into the future. Thus, for this study, the target LOS for parks and trails equals the existing LOS.

B. GROWTH DEMANDS

The additional growth demand or impact on recreational facilities in terms of additional population is calculated by taking the difference between future population at the end of the planning horizon (2040) and the current population (2020) as shown in the equation.

$$2{,}229\, people - 873\, people = 1{,}356\, people$$

Once the population increase due to growth is calculated, this figure is simply multiplied by the existing LOS to obtain the increase in demand at the end of the planning period due to new growth, as shown in these equations.

$$1{,}356\, people\left(\frac{1.01\, acres}{1{,}000\, people}\right) = \mathbf{1.37\, acres}$$

See Table V-1 for the park and recreation facilities demand for every 5 years of the planning period.

Park & Recreation Demand		
Year	Population	Park & Recreation Demand (Acres)
Current	873	0
2025	1238	0.37
2030	1580	0.35
2035	1922	0.35
2040	2228	0.31
Total		**1.37**

Table V-1 Park & Recreation Demand

VI. FUTURE IMPROVEMENTS

C. PARK AND RECREATION IMPROVEMENTS PLAN

This Master Plan provides Apple Valley Town with direction in terms of parks and recreation development to meet future demands and satisfy the recreational needs of the community. To maintain the existing LOS for future demand, Apple Valley Town will need to build new facilities or expand existing facilities. By the end of the planning period (2040), Apple Valley Town should increase their existing parks and recreation facilities by 1.37 acres for a total of 2.38 acres.

D. RECOMMENDED IMPROVEMENTS

The Town of Apple Valley has identified two future park and recreation facility improvements to be constructed to meet future demands. The Town plans to expand the existing Apple Valley Volunteer Park and develop an all-purpose trail between Rome Way and Main Street. The park expansion will be approximately 0.69 acres while the all-purpose trail will be 0.7 miles for an approximate area of 0.68 acres. The total 1.37 combined acres of the proposed projects satisfies the existing parks and recreation LOS required by Apple Valley Town at the end of the planning period. Maps showing the location of the recommended projects can be found in Appendix A – Maps, titled "Apple Valley Future Parks and Recreation Facilities."

x. Cost Analysis

An important part of planning future improvements is understanding and estimating the costs associated with new infrastructure. The total cost for each recommended project generally has two categories:

Construction: The cost for construction was obtained from recent bid tabulations provided by Sunrise Engineering for parks, trails, and recreation facilities. The tabulation of these bid estimates is found in Appendix E.

Land: Land for the expansion of the Apple Valley Volunteer Park is already owned by the Town of Apple Valley, so a cost for land was omitted in calculations for the existing park expansion. However, the all-purpose trail would extend between two parcels owned by other parties and would need acquisition. Cost for the land has been determined by average land costs per acre in the Apple Valley area.

The estimated project costs calculated for each recreation improvement are summarized in Table VI-1 below. Detailed calculations on how these unit prices were calculated are found In Appendix D.

RECREATIONAL FACILITY	AREA (acres)	COST OF PROPOSED FACILITY	% I.F. ELIGIBLE	I.F. ELIGIBLE COST
Volunteer Park Expansion	0.69	$ 131,670.00	100%	$ 131,670.00
All-Purpose Trail	0.68	$ 208,560.00	100%	$ 208,560.00
Engineering &Incidentals		$ 64,700.00	100%	$ 64,700.00
TOTALS	**1.37**			**$ 404,930.00**

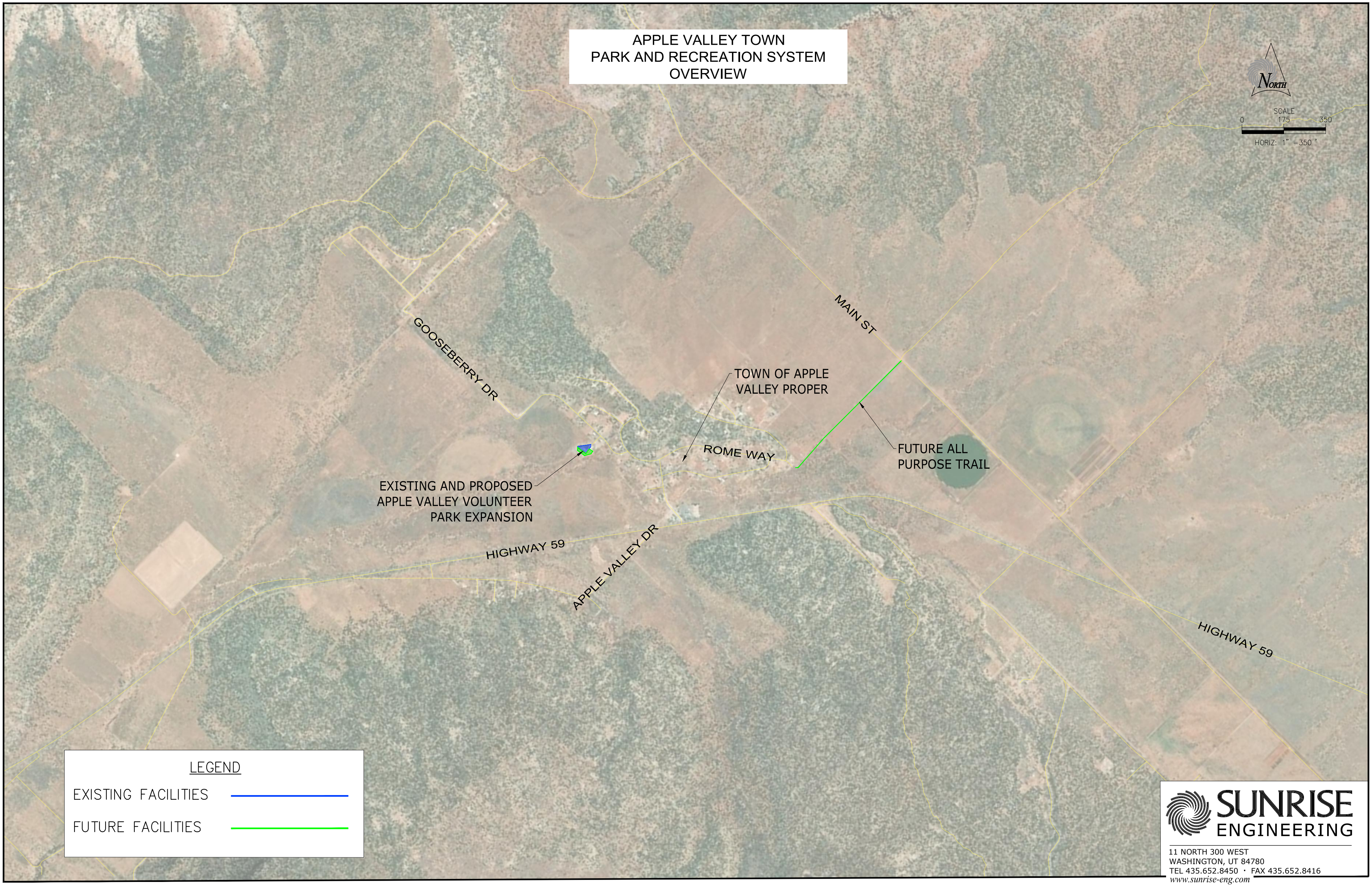
Table VI-1. Estimated cost of future parks and recreation projects

E. CONCLUSIONS

The Town of Apple Valley currently has an LOS of 1.01 acres per 1,000 residents. The NRPA guidelines recommend an LOS of 6.00 acres per 1,000 residents. Apply Valley Town may consider increasing their LOS for the future by building more parks, trails, and recreational facilities. However, an increase in the LOS of the Town's parks and recreation will not be Impact Fee eligible but will be beneficial for the future residents of Apple Valley.

Though Apple Valley is a small community with a low LOS for Town owned Parks and Recreational facilities, there is an abundance of recreation opportunities accessible just outside the town limits through state and federally owned lands. These recreational opportunities increase the quality of life for those living in Apple Valley and also promote tourism. Apple Valley Town should work with the government entities and other owners to form agreements and promote accessibility to the surrounding recreational opportunities.

APPENDIX A – MAPS


APPLE VALLEY TOWN
PARK AND RECREATION SYSTEM
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HORIZ: 1" = 350'
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ROME WAY
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PARK EXPANSION
HIGHWAY 59
APPLE VALLEY DR
HIGHWAY 59
LEGEND
EXISTING FACILITIES
FUTURE FACILITIES
SUNRISE
ENGINEERING
11 NORTH 300 WEST
WASHINGTON, UT 84780
TEL 435.652.8450 · FAX 435.652.8416
www.sunrise-eng.com


APPLE VALLEY TOWN
EXISTING PARK SYSTEM
NORTH
SCALE
0
175
350
HORIZ: 1" =350 '
ROME AVE
CARTLAND DR
APPLE VALLEY
VOLUNTEER
PARK
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ROME WAY
APPLE BLOSSOM LN
APPLE VALLEY DR
HIGHWAY 59
LEGEND
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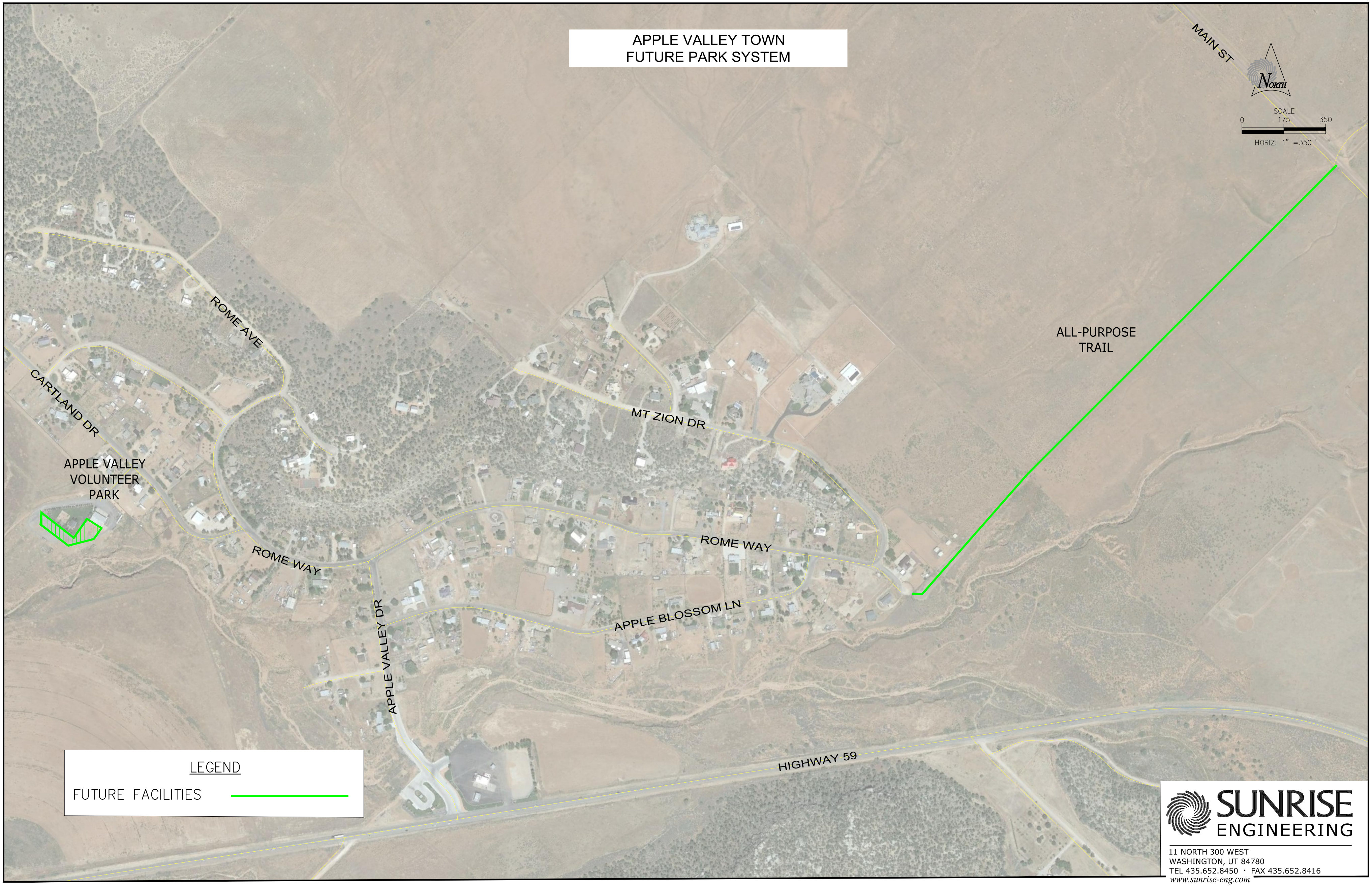
APPLE VALLEY TOWN
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APPLE BLOSSOM LN
APPLE VALLEY DR
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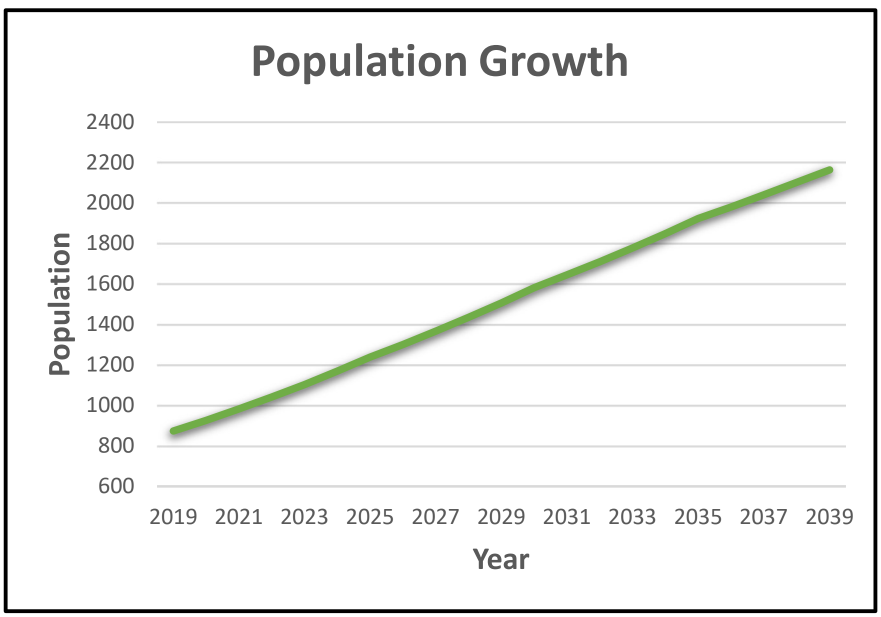
APPENDIX B – POPULATION AND GROWTH PROJECTIONS

Year	Projected Population	Growth Rate
2019	873	6%
2020	925	6%
2021	981	6%
2022	1040	6%
2023	1102	6%
2024	1168	6%
2025	1238	6%
2026	1300	5%
2027	1365	5%
2028	1434	5%
2029	1505	5%
2030	1581	5%
2031	1644	4%
2032	1709	4%
2033	1778	4%
2034	1849	4%
2035	1923	4%
2036	1981	3%
2037	2040	3%
2038	2101	3%
2039	2164	3%
2040	2229	3%



APPENDIX C – NRPA STANDARDS AND GUIDE

NRPA Parks and Open Space Classifcations (1995)

PARKS AND OPEN SPACE CLASSIFICATIONS				
Classification	**General Description**	**Location**	**Size Criteria**	**Application of LOS**
Mini-Park	Used to address limited, isolated or unique recreational needs	Less 1/4 mile distance in residential setting	Between 2500 sq. ft. and one acre in size	No
Neighborhood Park	Neighborhood park remains the basic unit of the park system and serves as the recreational and social focus of the neighborhood. Focus is on informal activity and passive recreation.	1/4 mile to 1/2 mile distance and uninterrupted by non-residential roads and other physical barriers	5 acres is considered minimum size. 5 to 10 acres is optimal	Yes
School-Park	Depending on circumstances, combining parks with school sites can fulfill the space requirements for other classes of parks, such as neighborhood, community, sports complex, and special use.	Determined by location of school district property	Variable depends on function	No
Community Park	Serves broader purpose than neighborhood park. Focus is on meeting community-based recreation needs, as well as preserving unique landscapes and open spaces.	Determined by the quality and suitability of the site. Usually serves two or more neighborhoods within a 1/2 to 3 mile distance	As needed to accommodate desired uses. Usually between 30 and 50 acres	Yes
Large Urban Park	Large Urban parks serve a broader purpose than community parks and are used when community and neighborhood parks are not adequate to serve the needs of the community. Focus is on meeting community-based recreational needs as well as preserving unique landscapes and open spaces.	Determined by the quality and suitability of the site. Usually serves the entire community.	As needed to accommodate desired uses. Usually a minimum of 50 acres with 75 or more acres being optimal	No
Natural Resource Areas	Lands set aside for preservation of significant natural resources, remnant landscapes, open space and visual aesthetics or buffering.	Resource availability and Opportunity	Variable	No
Greenways	Effectively tie the park system components together to form a continuous park environment.	Resource availability and Opportunity	Variable	No
Sports Complex	Consolidates heavily programmed athletic fields and associated facilities to larger and fewer sites strategically located throughout the community.	Strategically located Community-wide facilities	Determined by projected demand usually a minimum of 25 acres with 40 to 80 acres being optimal	No
Special Use	Covers a broad range of parks and recreation facilities oriented toward single-purpose use.	Variable – dependent on specific use	Variable	Depends on type of use
Private Park/Recreation Facility	Parks and recreational facilities that are privately owned yet contribute to the public park and recreation system.	Variable – dependent on specific use	Variable	Yes

PATHWAY CLASSIFICATIONS		
Classification	**General Description**	**Description of Each Type**
Park Trail - Type I	Multi-purpose trails located within greenways, parks and natural resource areas. Focus is on recreational value and harmony with the natural environment.	Separate/single-purpose hard-surfaced trails for pedestrians or bicyclists/in-line skates.
Park Trail - Type II		Multipurpose hard-surfaced trails for pedestrians and bicyclists/in-line skaters.
Park Trail - Type III		Nature trails for pedestrians, which may use either hard or soft surfaces.
Connector Trails - Type I	Multipurpose trails that emphasize safe travel for pedestrians to and from parks and around the community. Focus is as much on transportation as it is on recreation.	Separate/single-purpose hard-surfaced trails for pedestrians or bicyclists/in-line skates located in independent Rights-of-ways (ROWs) e.g., old railroad ROW.
Connector Trails - Type II		Separate/single-purpose hard-surfaced trails for pedestrians or bicyclists/in-line skates. Typically, located within road ROW.
On-Street Bikeways - Bike Route	Paved segments of roadways that serve as a means to safely separate bicyclists from vehicular traffic.	Designated portions of the roadway for the preferential or exclusive use of bicyclists.
On-Street Bikeways - Bike Lane		Shared portions of the roadway that provide separation between motor vehicles and bicyclists, such as paved shoulders.
All-Terrain Bike Trail	Off-road trail for all terrain (mountain) bikes.	Single-purpose loop trails usually located in larger parks and natural resource areas.
Cross-Country Ski Trail	.Trails developed for traditional and skate-style cross-country skiing	Loop trails usually located in larger parks and natural resource areas.
Equestrian Trails	Trails developed for horseback riding.	Loop trails usually located in larger parks and natural resource areas. Sometimes developed as multipurpose with hiking and all-terrain biking where conflicts can be controlled.

Suggested Outdoor Facility Development Standards				
Activity Format	**Recommended Size and Dimensions**	**Recommended Space Requirements**	**Recommended Orientation**	**Service Radius and Location Notes**
Badminton	Singles—17' x 44' Doubles—20' x44' with 5' unobstructed area on both sides.	1622 sq. ft.	Long axis north - south	1/4 - 1/2 mile. Usually in school recreation center or church facility. Safe walking or biking or biking access.
Basketball **1. Youth** **2. High school** **3. Collegiate**	 46' - 50' x 84' 50' x 84' 50' x 94' with 5' unobstructed space all sides.	 2400-3036 sq. ft. 5040-7280 sq. ft. 5600-7980 sq. ft.	 Long axis north - south	 1/4 - 1/2 mile. Same as badminton. Outdoor courts in neighborhood/community parks, plus active recreation areas in other park settings.
Handball (3-4 wall)	20' x 40' with a minimum of 10' to rear of 3-wall court. Minimum 20' overhead clearance.	800 sq. ft. for 4-wall, 1000 sq. ft. for 3-wall.	Long axis is north - south. Front wall at north end.	15 - 30 min. travel time, 4-wall usually indoor as part of multi-purpose building. 3-2 all usually in park or school setting.
Ice hockey	Rink 85' x 200' (Min. 85' x 185') Additional 5000 22,000 sq. ft. including support area.	22,000 sq. ft. including support area.	Long axis is north - south if outdoors.	1/2 - 1 hour travel time. Climate important consideration affecting no. of units. Best as part of multi-purpose facility.
Tennis	36' x 78'. 12 ft. clearance on both ends.	Min. of 7,200 sq. ft. single court area (2 acres per complex).	Long axis north - south.	1/4 - 1/2 mile. best in batteries of 2 - 4. Located in neighborhood/ community park or near school site.
Volleyball	30' x 60'. Minimum of 6' clearance on all sides.	Minimum 4,000 sq. ft.	Long axis north - south.	1/2 - 1 mile.
Baseball **1. Official** **2. Little League**	 Baselines - 90' Pitching dist.- 60.5' Foul lines - min. 320' Center field - 400'+ Baselines - 60' Pitching distance-46' Foul lines - 200' Center field - 200'-250'	 3.0 -3.85 A min. 1.2 A min.	 Locate home plate so pitcher is not throwing across sun, and batter not facing it. Line from home plate through pitchers mound to run east-northeast.	 1/4-1/2 mile. Part of neighborhood complex. Lighted fields part of community complex.
Field Hockey	180' x 300' with a minimum of 10' clearance on all sides	Minimun 1.5 A	Fall season - Long axis northwest or southeast. For longer periods, north/south	15-30 minute travel time. Usually part of baseball, football, soccer complex in community park or adjacent to high school.
Football	160' x 360' with a minimum of 6' clearance on all sides.	Minimum 1.5 A	Same as field hockey.	15 - 30 min. travel time. Same is field hockey.
Soccer	195' to 225' x 330' to 360' with 10' minimum clearance on all sides.	1.7 - 2.1 A.	Same as field hockey.	1 - 2 miles. Number of units depends on popularity. Youth popularity. Youth soccer on smaller fields adjacent to fields or neighborhood parks.

Golf - driving range	900' x 690' wide. Add 12' width each additional tee.	13.5 A for min. of 25 tees.	Long axis is southwest -northeast with golfer driving northeast.	30 minute travel time. Park of golf course complex. As separate unit may be privately operated.
1/4 mile running track	Over-all width - 276' length -600'. Track width for 8 - 4 lanes is 32'.	4.3 A	Long axis in sector from north to south to northwest - southeast, with finish line at north end.	15-30 minute travel time. Usually part of a high school or community park complex in combination with football, soccer, etc.
Softball	Baselines - 60' pitching dist. - 45' men. 40' women Fast pitch field radius from plate - 225' Slow pitch - 275' (men) 250' (women).	1.5 - 2.0 A	Same as baseball. indimensions for 16".	1/4 - 1/2 mile. Slight difference May also be used for youth baseball.
Multiple use court (basketball, tennis, etc.)	120' x 80'	9,840 sq. ft.	Long axis of court with primary use north and south.	1 - 2 miles, in neighborhood or community parks.
Archery range	300' length x minimum 10' between targets. Roped, clear area on side of range minimum 30', clear space behind targets minimum of 90' x 45' with bunker.	Minimum 0.65 A	Archer facing north + or - 45 degrees.	30 minutes travel time. Part of a regional/metro complex.
Golf				
1. Par 3 (18 hole)	Average length varies -600 - 2700 yards.	50 - 60 A	Majority of holes on north/south axis	1/2 - 1 hour travel time
2. 9-hole standard	Average length 2250 yards.	Minimum of 50 A		9-hole course can accomodate 350 people/day.
3. 18-hole standard	Average length 6500 yards.	Minimum 110 yds		500 - 550 people/day. Course may be located in community, district or regional/metro park.
Swimming pools	Teaching - min. 25 yds x 45' even depth of 3-4 ft. Competitive - min. 25 m x 16 m. Min. of 25 sq. ft. water surface per swimmer. Ration of 2 to 1 deck to water.	Varies on size of pool and amenities. Usually 1 - 2 A sites.	None, but care must be taken in siting life stations in relation to afternoon sun	15 to 30 minute travel time. Pools for general community use should planned for teaching competitive and recreational purposes with enough to accomodate 1m and 3m diving boards. Located in community park or school site.
Beach areas	Beach area should have 50 sq. ft. of land and 50 sa. ft. of water per user. Turnover rate is 3. There should be a 3 -4 A supporting area per A of beach.	N/A	N/A	1/2 to 1 hour travel time. Should have a sand bottom with a maximum slope of 5%. Boating areas completely segregated from swimming areas. In regional/metro parks.

APPENDIX D – ENGINEER’S ESTIMATE OF PROBABLE COST

SUNRISE ENGINEERING, INC.
11 North 300 West, Washington, Utah 84780
Tel: (435) 652-8450 Fax: (435) 652-8416

Engineer's Opinion of Probable Cost

2020 - PARKS & RECREATION MASTER PLAN Feb-28
Apple Valley, Utah TLN

NO.	DESCRIPTION	Estimated Quantity	Units	Unit Price	Total Cost
All Purpose Trail					
1	Mobilization	5.0%	LS	$ 5,700.00	$ 5,700.00
2	Dust Control and Watering	1	LS	$ 5,000.00	$ 5,000.00
3	Land Acquisition	0.7	ACRE	$ 75,000.00	$ 51,000.00
4	Clearing & Grubbing	1	LS	$ 5,000.00	$ 5,000.00
5	Earthwork & Grading	1	LS	$ 25,000.00	$ 25,000.00
6	Granular Borrow (6" Thick)	500	CY	$ 20.00	$ 10,000.00
7	Untreated Base Course ("6"Thick)	500	CY	$ 36.00	$ 18,000.00
Apple Valley Volunteer Park Expansion					
8	Apple Valley Volunteer Park Expansion	0.69	Acre	$ 276,000.00	$ 189,600.00
	Construction Contingency	10%	EST	$ 30,900.00	$ 30,900.00
	Contstruction Total				**$ 340,200.00**
Engineering & Incidentals					
9	Administrative Services	1%	Est.		$ 3,500
10	Engineering Design	10%	L.S.		$ 34,000
11	Construction Observation	7%	Est.		$ 27,200
	TOTAL PROJECT COST				**$ 404,900.00**

In providing opinions of probable construction cost, the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes

APPENDIX E – UNIT COST CALCULATIONS

PARKS								
Owner	Name	Year	Project Type	Project Costs			Total Acreage	Cost / Acre
				Construction	Incidentals	Total		
Lincoln County	Pioneer Park Phase I & II	2011, 2014	Upgrade	$ 749,700.00	$ 157,700.00	$ 907,400.00	3.2	$ 283,562.50
St. George City	Royal Oaks Park	2014	New Facility	$ 412,000.00	$ 72,225.41	$ 484,225.41	1.0	$ 484,225.41
St. George City	Silkwood Park	2014	New Facility	$ 385,300.00	$ 67,544.78	$ 452,844.78	1.5	$ 301,896.52
St. George City	Sunset Park	2014	Upgrade	$ 560,900.00	$ 98,328.24	$ 659,228.24	2.4	$ 274,678.43
White Pine County	Preston Park	2013	New Facility	$ 155,400.00	$ 36,500.00	$ 191,900.00	0.7	$ 274,142.86
White Pine County	North Ely Park	2013	New Facility	$ 162,400.00	$ 44,100.00	$ 206,500.00	1.0	$ 206,500.00
White Pine County	Bianchi Park	2013	Upgrade	$ 153,600.00	$ 22,100.00	$ 175,700.00	0.6	$ 292,833.33
White Pine County	McGill Park	2013	Upgrade	$ 255,100.00	$ 36,800.00	$ 291,900.00	1.3	$ 224,538.46
White Pine County	Steptoe Park	2013	Upgrade	$ 103,200.00	$ 14,900.00	$ 118,100.00	0.4	$ 295,250.00
White Pine County	Courthouse Park	2013	Upgrade	$ 229,500.00	$ 48,100.00	$ 277,600.00	1.3	$ 213,538.46
St. George City	Little Valley Pickleball	2012	New Facility	$ 813,800.00	$ 90,500.00	$ 904,300.00	2.5	$ 361,720.00
Lincoln County	Pioche Park Phase II	2012	Upgrade	$ 758,000.00	$ 167,500.00	$ 925,500.00	2.7	$ 342,777.78
Washington City	Sullivan Virgin River Phase I	2011	New Facility	$ 1,497,200.00	$ 262,465.74	$ 1,759,665.74	10.6	$ 166,006.20
Lincoln County	Rachel Park	2011	Upgrade	$ 239,600.00	$ 52,600.00	$ 292,200.00	1.5	$ 194,800.00
City of Caliente	Dixon Park	2008	New Facility	$ 2,180,900.00	$ 287,000.00	$ 2,467,900.00	5.3	$ 465,641.51
City of Caliente	Super Park	2008	New Facility	$ 784,900.00	$ 181,000.00	$ 965,900.00	3.0	$ 321,966.67
City of Caliente	Rose Park	2008	Upgrade	$ 394,900.00	$ 85,000.00	$ 479,900.00	1.3	$ 369,153.85
Washington City	Green Springs Park	2007	New Facility	$ 834,300.00	$ 146,256.46	$ 980,556.46	8.6	$ 114,018.19
			Subtotal	**$ 10,670,700.00**	**$ 1,870,620.64**	**$ 12,541,320.64**	**48.9**	**$ 256,468.72**
			Cost / Acre	**$ 218,214.72**	**$ 38,254.00**	**$ 256,468.72**		
			Average Construction Year	**2012**				
		Rounded Cost / Acre Including Inflation (2020 Costs)	**3.0%**	**$ 276,000.00**	**$ 48,000.00**	**$ 324,000.00**		