APPENDIX D

APPENDIX - D

SUPPORT INFORMATION

1. Transportation Memorandum

2. Water Utility Memorandum

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MEMORANDUM

To:	Al Zelinka, RBF Consulting	JN 10104353
From:	Bob Matson, RBF Consulting	
Date:	May 24, 2005	
Subject:	**Proposed Twentynine Palms Highway Bypass Traffic Assessment**	

As you requested, RBF has prepared an assessment to evaluate the traffic impacts associated with constructing a proposed State Route 62 (SR-62) Bypass in the Town of Yucca Valley between Kickapoo Trail and Apache Trail. Twentynine Palms Highway, designated SR-62, provides east-west access for the Town of Yucca Valley and the Morongo Basin.

The proposed Yucca Valley Downtown Specific Plan project includes a proposal to construct a SR-62 Bypass to allow east-west traffic to travel around the Town without impacting the downtown Yucca Valley area. Just east of Kickapoo Trail, the proposed SR-62 Bypass would trend northerly to align with Yucca Trail north of the existing Twentynine Palms Highway. The SR-62 Bypass would rejoin the existing Twentynine Palms Highway in the vicinity of Apache Trail.

This assessment evaluates forecast demand, capacity, and level of service of the following three study roadway segments without and with the proposed SR-62 Bypass assuming buildout of the Town of Yucca Valley General Plan:

- Yucca Trail;
- Twentynine Palms Highway; and
- Santa Fe Trail.

Analysis Methodology

Level of service (LOS) is commonly used as a qualitative description of roadway operation and is based on the capacity of the roadway segment and the volume of traffic using the roadway segment. Table 1 shows the Town of Yucca Valley roadway capacity of average daily traffic (ADT) based on roadway classification and LOS E.

Table 1
Town of Yucca Valley Roadway Capacity LOS & V/C Ranges

Number of Lanes/ Roadway Description	Average Daily Traffic (based on LOS E)
8 / raised median	75,000
6 / raised median	**56,300**
4 / raised median	**37,500**
4 / no median	25,000
2 / painted median	**18,800**
2 / no median	12,500

***Source**: Town of Yucca Valley General Plan Circulation Element*
Note: Applicable criteria used in this analysis are shown in bold.

The V/C ratio analysis method is utilized by the Town of Yucca Valley to determine the operating LOS of the study roadways, which describes the operation of a roadway segment using a range of LOS from LOS A (free-flow conditions) to LOS F (severely congested conditions), based on corresponding V/C ratios as shown in Table 2.

Table 2
LOS & V/C Ranges
Roadway Segment

LOS	V/C Ratio
A	$\leq$ 0.60
B	0.61 to $\leq$ 0.70
C	0.71 to $\leq$ 0.80
D	0.81 to $\leq$ 0.90
E	0.91 to $\leq$ 1.00
F	> 1.00

Performance Criteria

The Town of Yucca Valley goal for roadway segment operation is LOS D or better.

Study Roadway Classification

According to the Town of Yucca Valley General Plan Circulation Element, Twentynine Palms Highway (SR-62) is classified as a six-lane divided highway, Yucca Trail is classified as a two-lane divided industrial roadway, and Santa Fe Trail is classified as a four-lane divided collector. Exhibit 1 shows the General Plan Circulation Element classification of the study roadways.

Forecast General Plan Buildout Conditions Daily Traffic Volumes

This analysis is based upon forecast traffic volumes contained in the *Town of Yucca Valley General Plan Program Circulation Element Traffic Study (Robert Kahn, John Kain and Associates, August 24,*

1995), which assumes buildout of the Town of Yucca Valley General Plan. Exhibit 2 shows the forecast General Plan buildout conditions traffic volumes at the study roadway segments.

Forecast General Plan Buildout Conditions Roadway Segment Level of Service

Exhibit 3 and Table 3 summarize the forecast General Plan buildout conditions V/C ratio and corresponding LOS of the study roadway segments.

Table 3
Forecast General Plan Buildout Conditions Roadway Segment LOS

Roadway Segment	Classification	Volume	Capacity	V/C Ratio	LOS
Yucca Trail	2-lane Divided Industrial	5,000	18,800	0.27	A
Twentynine Palms Highway (SR-62)	6-lane Divided Highway	48,000	56,300	0.85	D
Santa Fe Trail	4-lane Divided Collector	6,000	37,500	0.16	A

As shown in Table 3, all study roadway segments are forecast to operate at an acceptable LOS (LOS D or better) according to Town of Yucca Valley performance criteria for forecast General Plan buildout conditions.

Proposed SR-62 Bypass

With implementation of the proposed realignment of SR-62, the existing Twentynine Palms Highway between Kickapoo Trail and Apache Trail would change classification to a two-lane divided industrial roadway and no longer be designated SR-62, while Yucca Trail would be classified as a six-lane divided highway and designated SR-62; Santa Fe Trail would remain classified as a four-lane divided collector.

Forecast General Plan Buildout With SR-62 Bypass Conditions Daily Traffic Volumes

Forecast General Plan buildout with proposed SR-62 Bypass conditions traffic volumes were derived by reassigning ADT to the study area roadway network assuming the proposed SR-62 bypass. Exhibit 4 shows the forecast General Plan buildout with proposed SR-62 Bypass conditions traffic volumes at the study roadway segments.

Forecast General Plan Buildout With SR-62 Bypass Conditions Roadway Segment LOS

Exhibit 5 and Table 4 summarize the forecast General Plan buildout with proposed SR-62 Bypass conditions V/C ratio and corresponding LOS of the study roadway segments.

Table 4
Forecast General Plan Buildout With SR-62 Bypass Conditions Roadway Segment LOS

Roadway Segment	Classification	Volume	Capacity	V/C Ratio	LOS
Yucca Trail (SR-62)	6-lane Divided Highway	44,500	56,300	0.79	C
Twentynine Palms Highway	2-lane Divided Industrial	7,500	18,800	0.40	A
Santa Fe Trail	4-lane Divided Collector	7,000	37,500	0.19	A

As shown in Table 4, all study roadway segments are forecast to operate at an acceptable LOS (LOS D or better) according to Town of Yucca Valley performance criteria for forecast General Plan buildout with proposed SR-62 Bypass conditions.

Conclusions

The study area roadway network is forecast to operate at an acceptable LOS (LOS D or better) at Town of Yucca Valley General Plan buildout conditions without and with the proposed SR-62 Bypass project.

The V/C ratio of SR-62 is forecast to improve to 0.79-LOS C with the proposed SR-62 Bypass project from 0.85-LOS D without the proposed SR-62 Bypass project.

The V/C ratio and LOS of Twentynine Palms Highway is forecast to improve to 0.40-LOS A with the proposed SR-62 Bypass project from 0.85-LOS D without the proposed SR-62 Bypass project.

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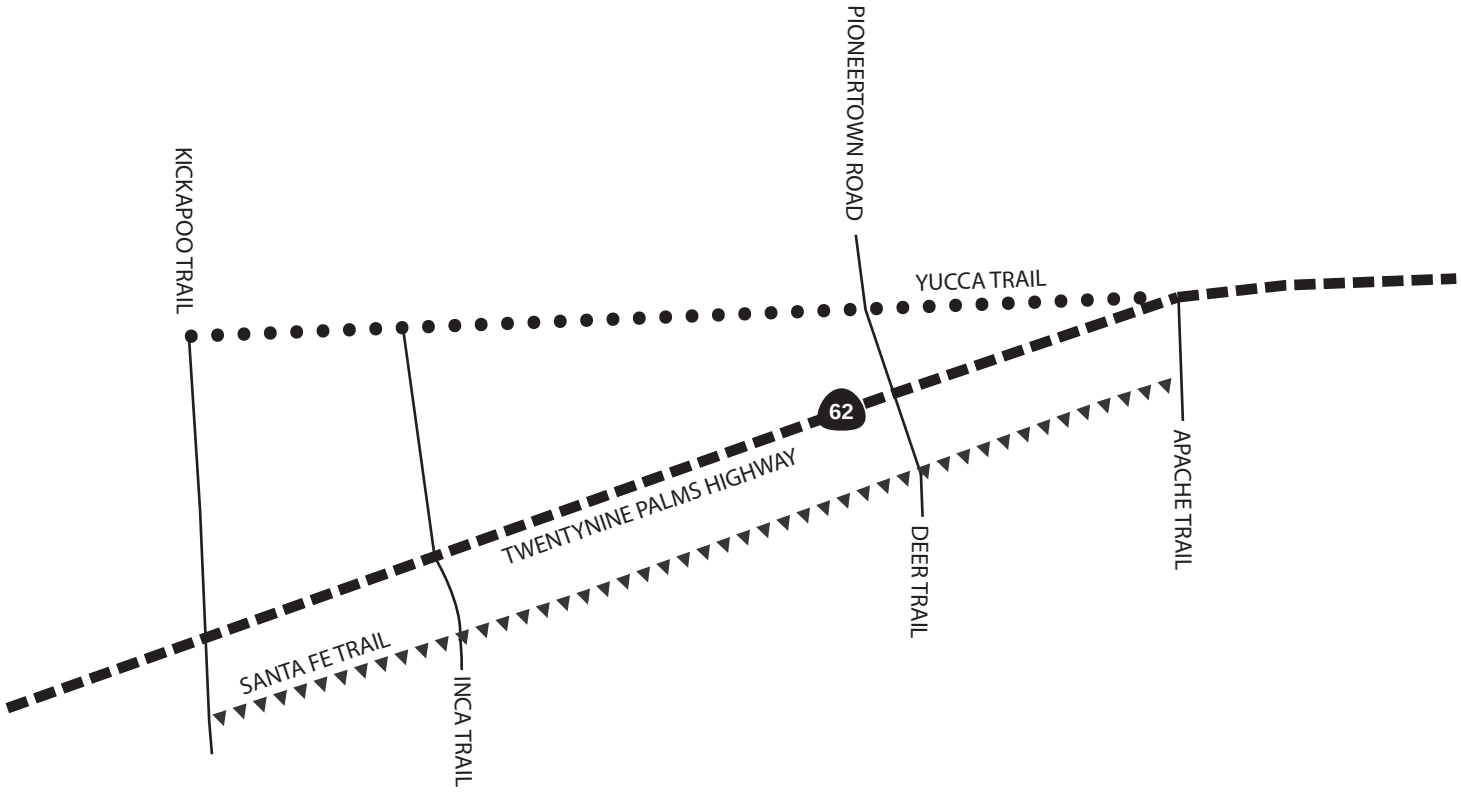

Legend:

- Highway - 6 lanes divided
- Major Collector - 4 lanes divided
- Industrial - 2 lanes divided

Not to Scale

Source: Town of Yucca Valley General Plan Circulation Element

Study Roadway Segments Functional Classification

Exhibit 1

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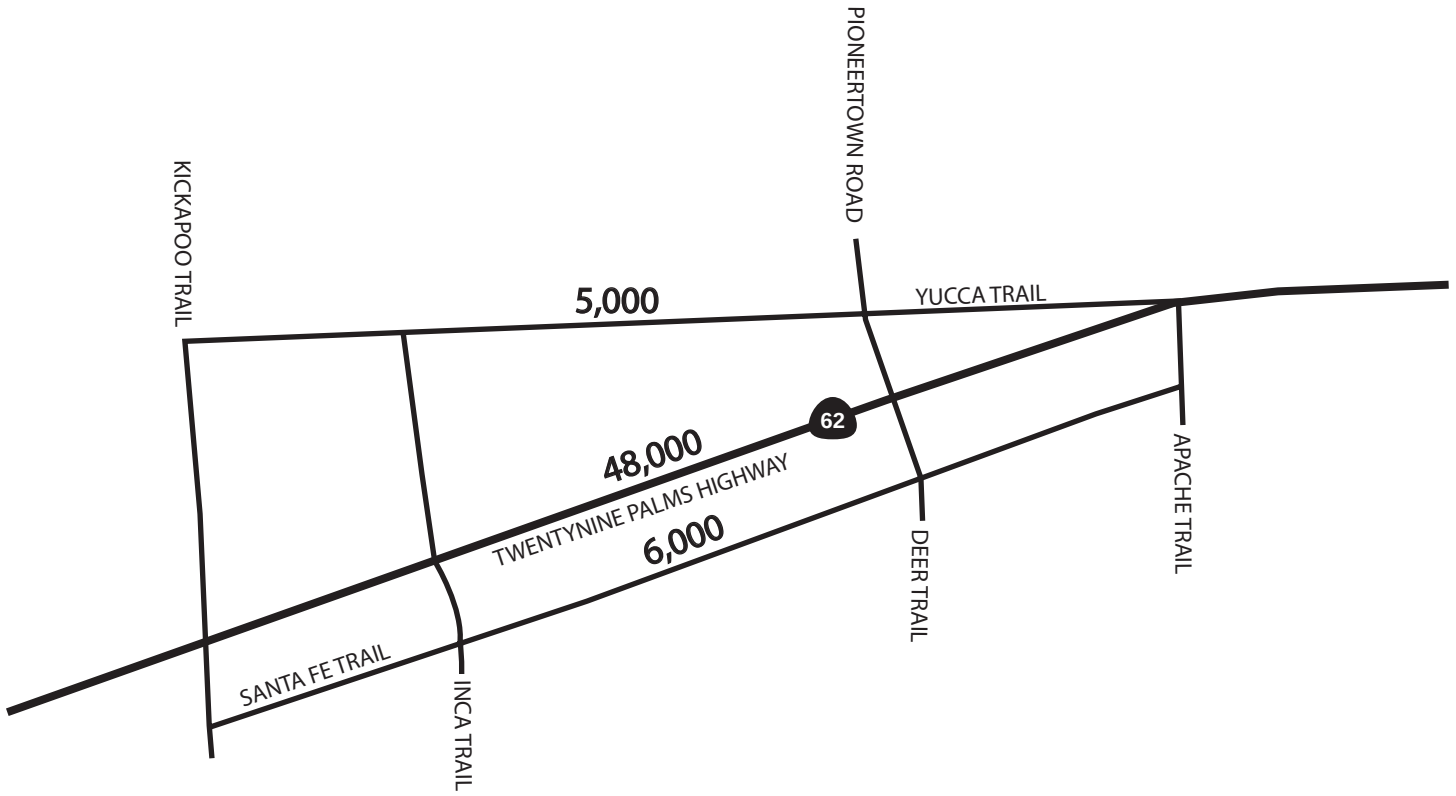

Legend:

X,XXX Average Daily Traffic

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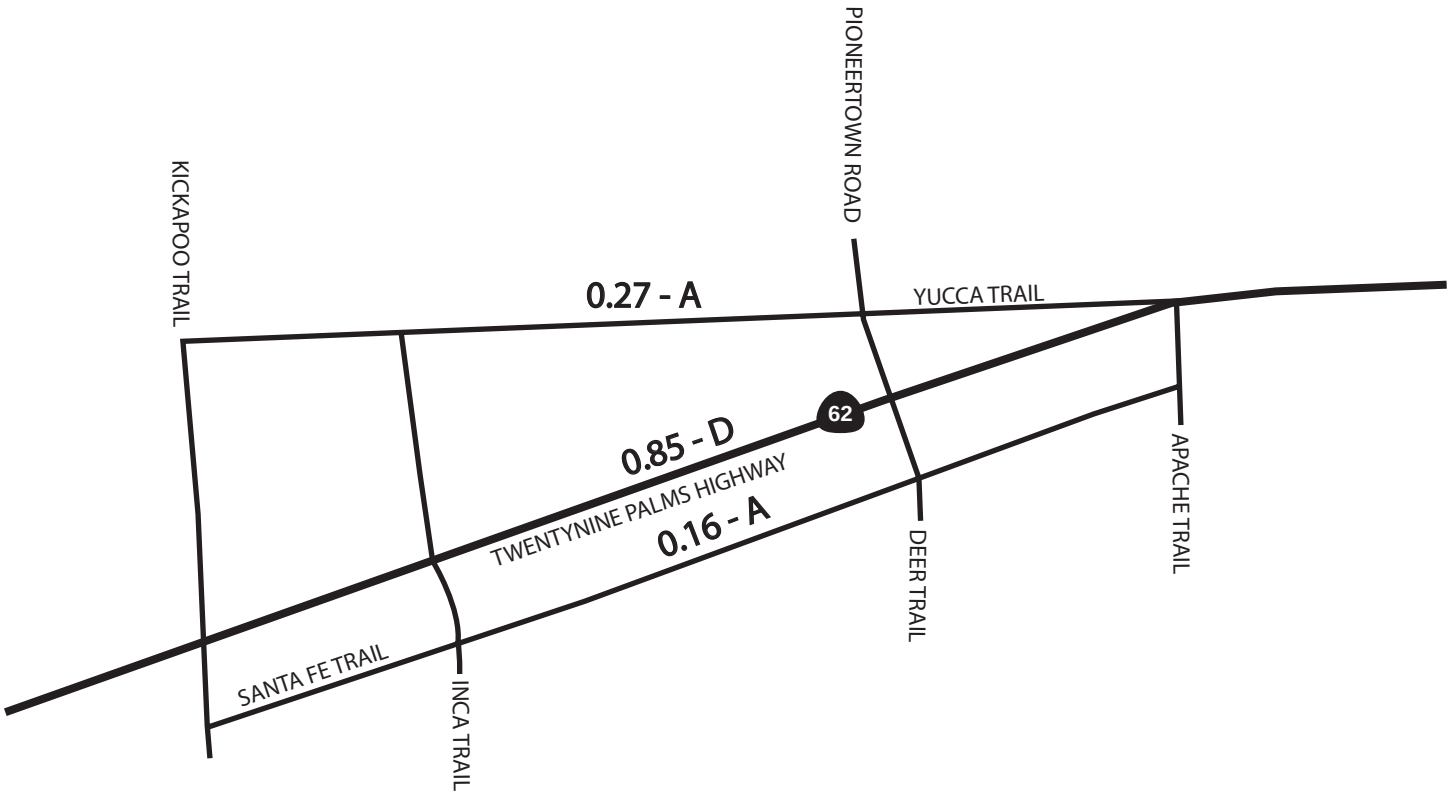
Source: Town of Yucca Valley General Plan Program Circulation Element Traffic Study (Robert Kahn, John Kain, and Associates, August 24, 1995)

Forecast General Plan Buildout ADT Volumes

Exhibit 2



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X.XX-X Volume/Capacity Ratio - Level of Service

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Forecast General Plan Buildout Conditions Roadway Segment V/C Ratio & LOS

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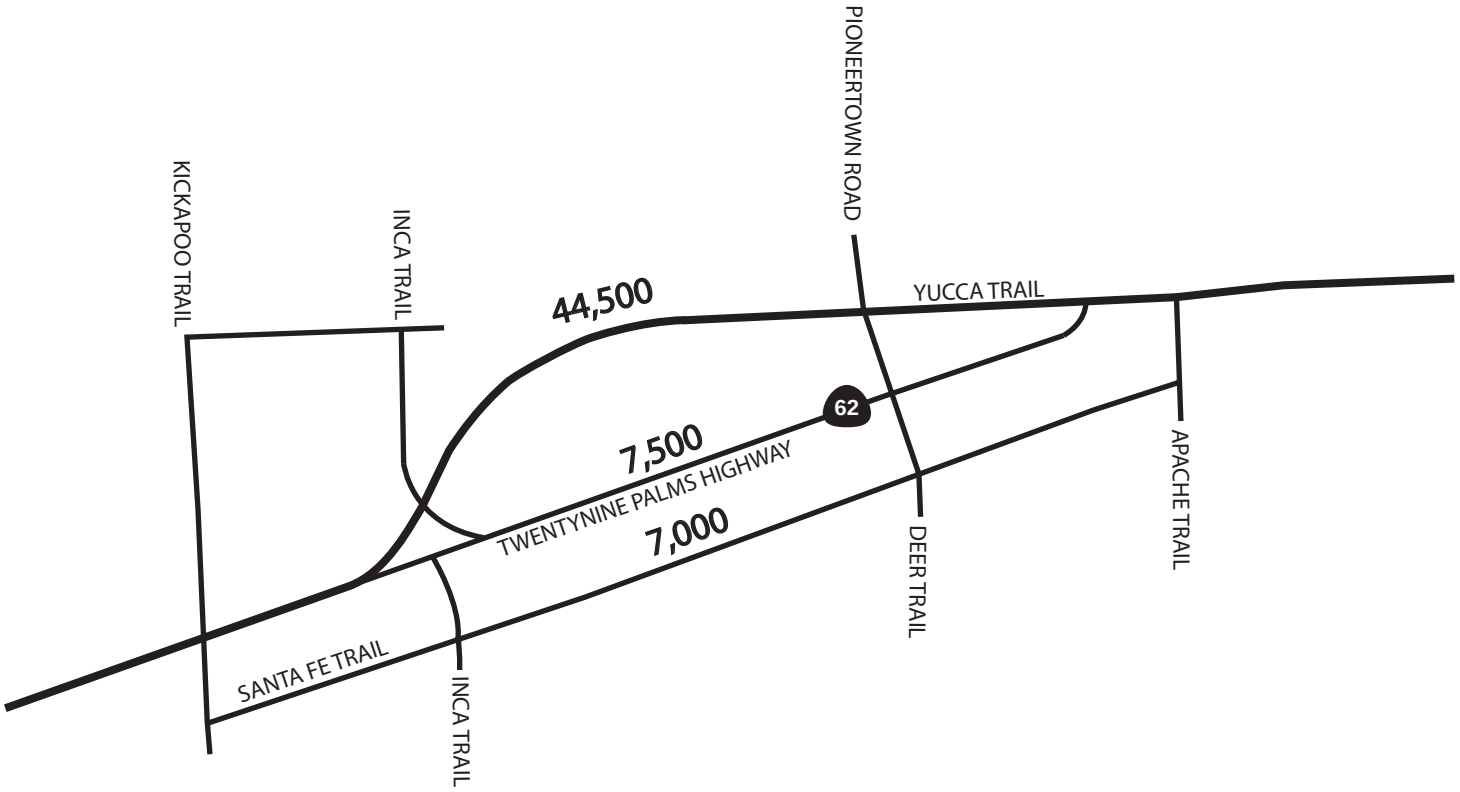
Exhibit 3



Legend:

X,XXX Average Daily Traffic

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Forecast General Plan Buildout With SR-62 Bypass Project ADT Volumes

Exhibit 4

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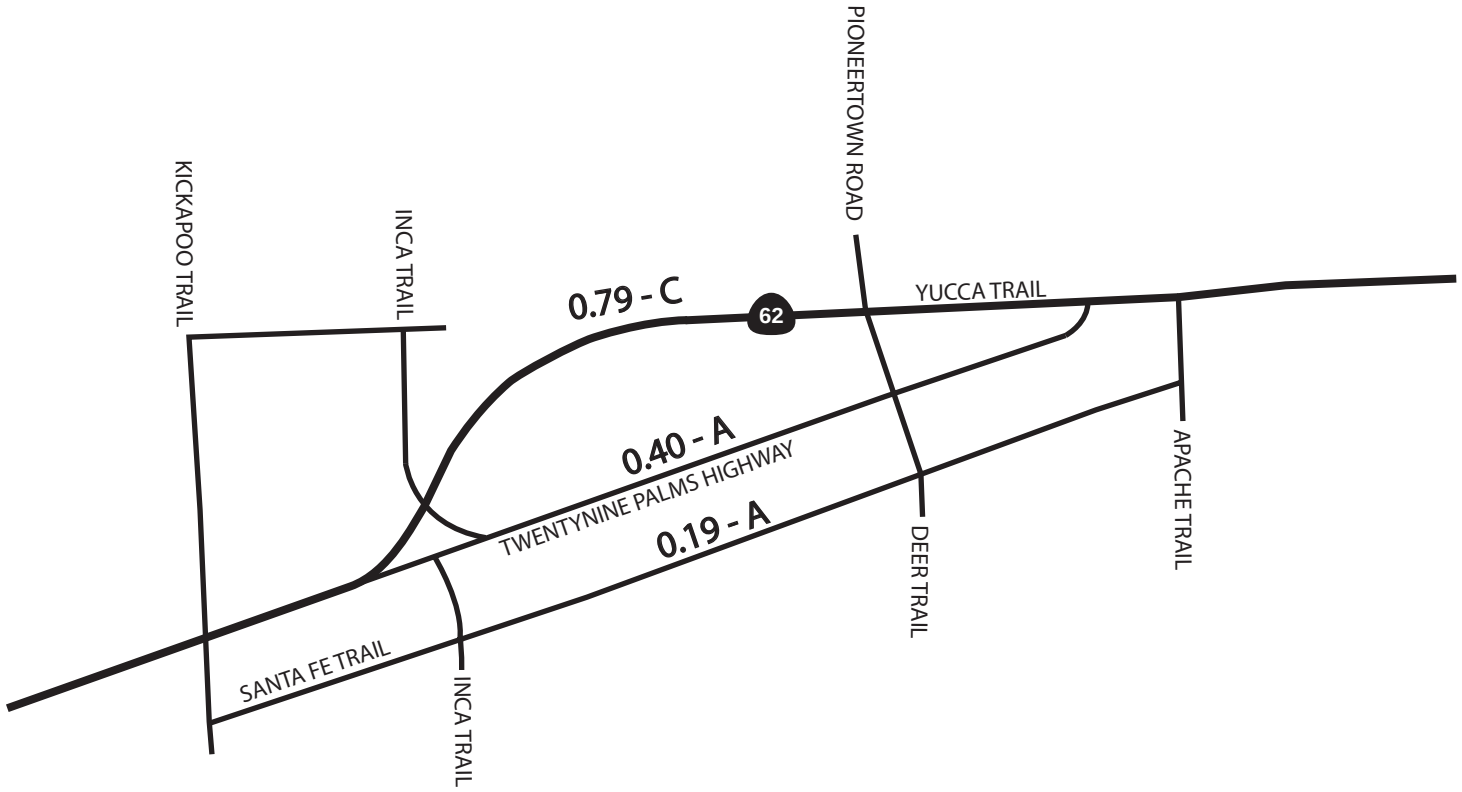

Legend:

X.XX-X Volume/Capacity Ratio - Level of service

Not to Scale

Forecast General Plan Buildout With SR-62 Bypass Project
Roadway Segment V/C Ratio & LOS

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MAY/2005

Exhibit 5

M E M O R A N D U M

To: Al Zelinka & David Barquist, MS 445 JN 10-103453

From: Corey Hess and Charlie Marr, MS 210

Date: September 19, 2005

Subject: Yucca Valley Revitalization Project – Old Town Specific Plan Draft Utility

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The Town of Yucca Valley is located north of the desert city of Palm Springs, across the San Bernardino County line. Yucca Valley and surrounding cities and communities are commonly known as the High Desert due to its elevation above mean sea level. The Yucca Valley Revitalization (Project) study area encompasses the Old Town Specific Plan and is located within the Yucca Valley city limits along the SR 62 Highway from Katje Way to approximately 650 lineal feet east of Church Street, as shown in Exhibit 1. The study area is divided into four districts as the Old Town Commercial/Residential; Old Town Highway Commercial; Old Town Mixed Use; and Old Town Industrial. The boundary of each sub-district is shown in Exhibit 2.

The study area consists of approximately 185 gross acres of various land use types. Existing land uses in the project area include residential, commercial and industrial. A summary of the existing land uses is provided as Table 1. It is anticipated that the revitalization of the inner neighborhoods within the Project area will transform the Project site to an area with high-density residential, commercial, and industrial use along State Route 62. At ultimate build out, the Project could include up to 1,115 residential units and 2,900,604 square feet of non-residential building space.

The Hi-Desert Water District (HDWD or District) currently provides water service to the Project area. Wastewater collection and disposal is performed via private septic systems. With the increased development density that could result from the Revitalization Project, we understand that wastewater service will eventually be converted to a new sewerage collection system. The purpose of this memorandum is to evaluate the existing water system, and make recommendations to ensure appropriate water distribution facilities will be in place to support the

Project under current State and local water system operating requirements and within the intentions of the *Hi-Desert Water District Water Master Plan Update* (December 2001).

Water Supply and Quality

Water service to the study area is provided from the Hi-Desert Water District (HDWD) with the exception of the Blue Skies Country Club, the Institute of Mental Physics, and approximately 16 individual domestic users. The HDWD relies upon the Warren Groundwater Basin in the Valley area as its primary source of water. Although the State Water Project (SWP) recharges the basin, septic tank discharges have contaminated some of the groundwater supply with high nitrate levels. According to the HDWD *2001 Water Supply Master Plan Update,* seven wells pump directly into the District's west side which directly benefits Yucca Valley. The 2001 Master Plan also mentioned the intent of the HDWD to design and build a nitrate and air removal treatment facility for the high nitrate wells on the east side of the District, and was expected to be on-line by early 2002. Therefore, this study assumes a total source capacity for the District's west and east sides of 7.2 mgd, which is adequate for projected needs through 2015 (in 2001, actual maximum day water demand was 4.4 mgd).

Future wastewater improvements (elimination of private septic systems, construction of a new wastewater collection, treatment and disposal systems) should improve the water quality and reduce the contamination problem. As indicated in the Yucca Valley General Plan-Water Resources Element, the maximum contaminant level allowed for nitrate is 45 milligrams per liter. Tests performed in 1992 showed nitrate measurements ranging between 2.9 and 24.1 milligrams per liter. However, as of this writing, no recent test results have been provided.

Water Distribution

The Project area is currently served by the Hi-Desert Water District's (HDWD) water distribution system. The HDWD was originally formed as the Yucca Valley Water District in 1962. The development of the distribution system can be traced back to the purchase of several separate private water systems. In 1971, the District officially changed its name to the Hi-Desert County Water District. In 1980, the District formally adopted its current name. In 1990, the distribution

system expanded through the purchase of the Yucca Water Company. Today, the District has approximately 8,400 service connections, and a service area that spans approximately 52 square miles. In addition, the District operates 16 storage tanks, 17 wells, and maintains nearly 300 miles of transmission and distribution pipelines.

Information was gathered to develop an understanding of the current water distribution system within the Project area. The location and size of the existing facilities were determined from the HDWD February 2002 Water System Atlas and through meetings with District staff. The distribution system in the Project area includes pipelines ranging in size from 2.5- to 12- inches in diameter within the 3495 Pressure Zone.

The 3495 Zone is the largest and lowest major zone within the District's system and acts as the supply zone that the west side wells pump directly into. The December 2001 HDWD master plan identifies a need for additional 3495 Zone distribution storage. Evaluation of storage capacity is included in a later section.

Water Demand

A water demand estimate was calculated for existing users within the Project area for comparison with estimated ultimate Project demands. Demand factors for the estimate are based on factors from Table IV-3 of the District's December 2001 water master plan. These factors appear quite low by current-day standards within the waterworks industry, which is acknowledged in the 2001 water master plan and accepted as a permanent and real water use habit for this high desert region. Other desert areas of Southern California, such as Victorville, Palm Springs, the Beaumont/Banning regions and other unincorporated areas of Riverside County, experience much higher unit usage. This is most likely due to higher irrigation demands for major (common-area) landscape regions and fuel modification zones for fire protection. If the Town of Yucca Valley undergoes other similar redevelopment projects, this could initiate a higher water use trend and overall increase in unit water usage within the HDWD.

For the purpose of comparison, the HDWD unit water usage factors and water demand factors adopted by other desert agencies are as follows:

Land Use Type	HDWD Duty Factor			Other Southern California Desert Regions*
	AF/Ac/Yr	**gpd/Ac**	**gpd/DU**	
Rural Residential				
1 DU/Ac	**0.3**	-	-	**0.75 – 3.36 AF/Ac/Yr**
1 DU/2.5 Ac	**0.15**	-	-	**0.75 – 3.36 AF/Ac/Yr**
1 DU/ 5 Ac	**0.08**	-	-	**0.75 – 3.36 AF/Ac/Yr**
1 DU/ 10, 20, 40 Ac	**0.03**	-	-	**0.75 – 2.35 AF/Ac/Yr**
Residential				
1 DU/Ac	0.3	268	**268**	**700 - 1500 gpd/DU**
2 DU/Ac	0.69	616	**308**	**700 - 1000 gpd/DU**
2.5 DU/Ac	0.8	715	**286**	**700 - 800 gpd/DU**
5 DU/Ac	1.1	983	**197**	**400 - 540 gpd/DU**
Multi Family	4.85	4330	**216****	**300 - 400 gpd/DU**
Industrial/ Commercial	0.26	**232**	-	**1500 - 2000 gpd/Ac**

* Borrowed from Eastern Municipal WD and Ranch California WD guidelines.

** Assuming 20 DUs/acre.

Using other Southern California desert regions' demand factors shown above, the existing average day demand for the Project area was determined to be 322,500 gallons per day (gpd), as shown in Table 2A. Using HDWD demand factors shown above, the existing average day demand for the Project area is determined to be 76,000 (gpd), as shown in Table 2B. This represents a four-fold difference in the estimated demands. Estimated peaking of the average demands shows even higher demand estimate differences. Average, maximum-day and peak-hour demands estimates based on other Southern California desert regions and HDWD respective peaking factors are summarized as follows:

Water Demand	Other Southern California Desert Regions	HDWD
Average	322,500 gpd	76,000 gpd
Maximum-day	644,900 gpd	133,100 gpd
Peak-hour	896 gpm	185 gpm

As with existing demand estimate of Tables 2A and 2B, projected water demand of the project is shown in Tables 3A and 3B, respectively. Another important consideration of water demand is fire flow requirements. Fire flow requirements are provided in the District's master plan, and outlined in the following section.

Proposed Water System

The two critical operating scenarios are peak normal demand and fire flow demand. To be sure, public water system operating criteria must always consider peak normal demands. The 2001 *Water Master Plan Update* stressed that a critical operating scenario includes normal peak daily demands (peak-hour) during summer weekday afternoons between 1:00 and 5:00 when most District pumps are not operating. However, the focus of this study is on fire flow requirements due to the likelihood that this scenario is the most critical to plan for.

The existing system has been in operation for many decades and much of the system pipelines have not been replaced since original construction. Current-day water system standards probably require higher fire flows than the criteria at the time of HDWD's system construction. Although the HDWD recently completed several miles of pipeline upgrades during the 1995-96 Pipeline Improvement Project, the area will require further pipeline upgrades to meet fire flow standards under typical water system flow velocity criteria. Fire flow criteria (as provided in the 2001 Water Master Plan Update) and appropriate system pipeline diameter are as follows:

Land Use	Minimum Required Fire Flow (gpm)	Minimum Pipe Diameter	Applicability To Project
Low Density Residential	1,500	8-inch	N/A
Residential	2,000	10-inch (Looping 8-inch)	N/A
Commercial. Multi - Family Residential	3,000	12-inch (Looping 10-inch)	Yes
Industrial	4,000	12-inch (Looping 12-inch)	Yes

For the purposes of the water master plan study for the Specific Plan, pipe diameter is offered here based on the typical, and conservative, industry standard of ten feet per second (fps) velocity. This ensures a reasonable unit headloss within the system for maximum ability to provide the fire flows at the minimum residual pressure of 20 psi dictated by the Uniform Fire Code (UFC). Hydraulic analysis should be performed at the design phase of the Project to verify that these pipe diameters work within the operation of the HDWD transmission system as a whole.

The 1995-96 Pipeline Improvement Project resulted in the construction of 22,300 linear feet of new pipeline replacement projects within the District's west side, which will directly benefit the 3495W Zone and the Project area. However, several older (and smaller – 2-inch, 3-inch, 4-inch) pipelines are still in operation, and some still serve fire hydrants, which are sorely insufficient for providing even the lowest of current-day fire flow requirements. The existing system facilities are shown in Exhibit 3.

In 1997, the District began a pipeline replacement program, which aimed to replace old and undersized pipelines within the District. This study assumes the 2002 Water System Atlas incorporates all replacement projects completed to date. The following table includes notable replacement projects recently completed:

Fiscal Year of Construction	*Area*	*Lineal Footage Installed*
2000/ 2001	Jemez Trail and Highland Trail between Kickapoo Trail and Inca Trail	1,500
2000/ 2001	Inca Trail and Mariposa Trail between Mariposa and Fox Trait between Yucca Trail and 29 Palms Hwy	2,300
2002/ 2003	Coyote Trail and Apache Trail, north of 29 Palms Hwy.	3,400

The following table is a list of additional pipeline upgrades recommended as part of the Revitalization Project area:

	Proposed Improvement	Approximate Length (ft)
1	Replace Existing 4" Steel Pipe with 8" PVC pipe	1,300
2	Replace Existing 6" Steel/PVC Pipe with 12" PVC pipe	1,685
3	Replace Existing 8" Steel/PVC Pipe with 10" PVC pipe	3,350
4	Replace Existing 8" Steel/PVC Pipe with 12" PVC pipe	7,580
5	Replace Existing 10" Steel/PVC Pipe with 12" PVC pipe	860
6	Replace Existing Unknown Pipe with 12" PVC pipe	700
7	Install New 8" PVC Pipe	3,770
8	Install New 10" PVC Pipe	2,820
9	Install New 12" PVC Pipe	5,655
10	Abandon 2.5" Steel Pipe in R-O-W	160
11	Abandon 3.5" PVC/ Steel Pipe in R-O-W	700
12	Abandon 4" Steel Pipe in R-O-W	2,495
13	Abandon 8" Steel Pipe in R-O-W	1,650
14	Abandon 10" Steel Pipe in R-O-W	905
15	Abandon 12" ACP Pipe in R-O-W	1,150
16	Abandon "Unknown" PVC Pipe in R-O-W	1,840

The Revitalization Project could also represent an opportunity to ensure adequate fire hydrant coverage. In locations that cannot be reached by conventional fire department equipment from existing public fire hydrants, new fire hydrants could be added and/or old hydrants replaced as part of the infrastructure upgrades. Exhibit 4 shows the pipeline upgrades recommended within

the Project area. The proposed system upgrades should be verified with computer model simulation prior to design.

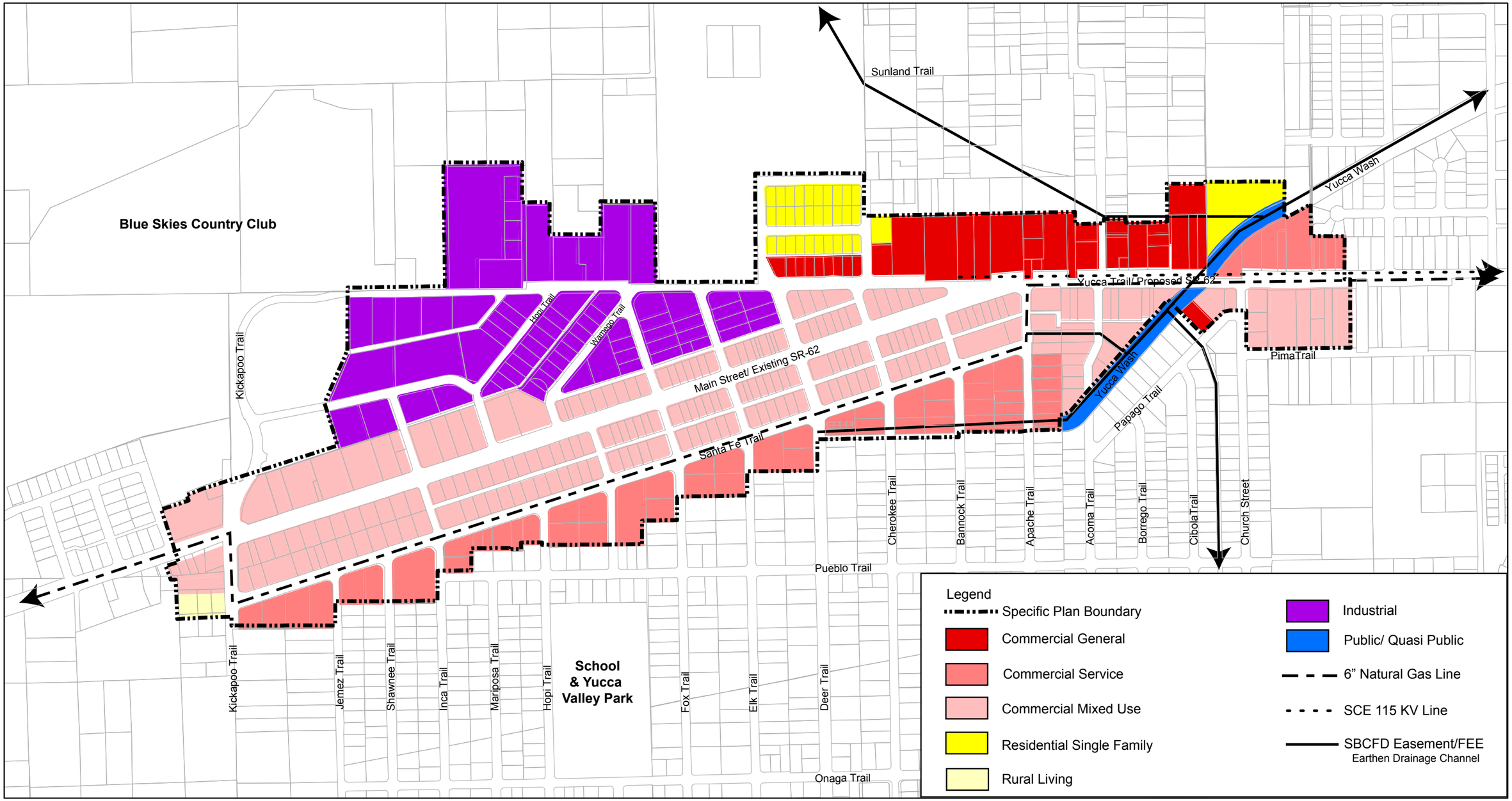
Storage

The master plans define storage requirements due to three separate needs – operational, emergency and fire. Both the 1995 and 2001 master plans discuss the need for additional storage in the 3495 Pressure Zone. The *2001 HDWD Water Master Plan Update* (Section VII) describes additional storage capacity needs to the District's existing (2001) storage capacity of 4.5 million gallons (MG). Projected water demands for the 3495 Pressure Zone (both East and West sides) produce a need for 4.72 million gallons (MG) for Year 2005, and 5.57 MG for Year 2020, according to Tables VII-1B and VII-1A of the Update. This represents an additional storage need for the 3495 Zone, as a whole, of approximately 0.2 MG and 1.1 MG, respectively. A comparison of Tables 2B and 3B estimates the Revitalization Project adding approximately 205,500 gallons of demand during a maximum day. Assuming fire flow capacity already exists in the existing storage capacity, and depending on the additional storage needs attributable to the West side, current storage capacity in the 3495W Zone may be adequate for the additional demands estimated from the Project.

Recommendations

The following recommendations are offered as a result of this water system infrastructure study for the Revitalization Project:

- Verify system pipeline upgrade diameters shown in Exhibit 4 using computer simulation of critical operating conditions;
- Periodically evaluate actual water consumption trends to verify the accuracy of City water usage factors for estimating future demands;
- Evaluate the feasibility of a regional wastewater collection system for high density developments, such as that proposed for the Revitalization Project; and
- Add the water system pipeline projects outlined here to the City's capital improvement program



RBF CONSULTING

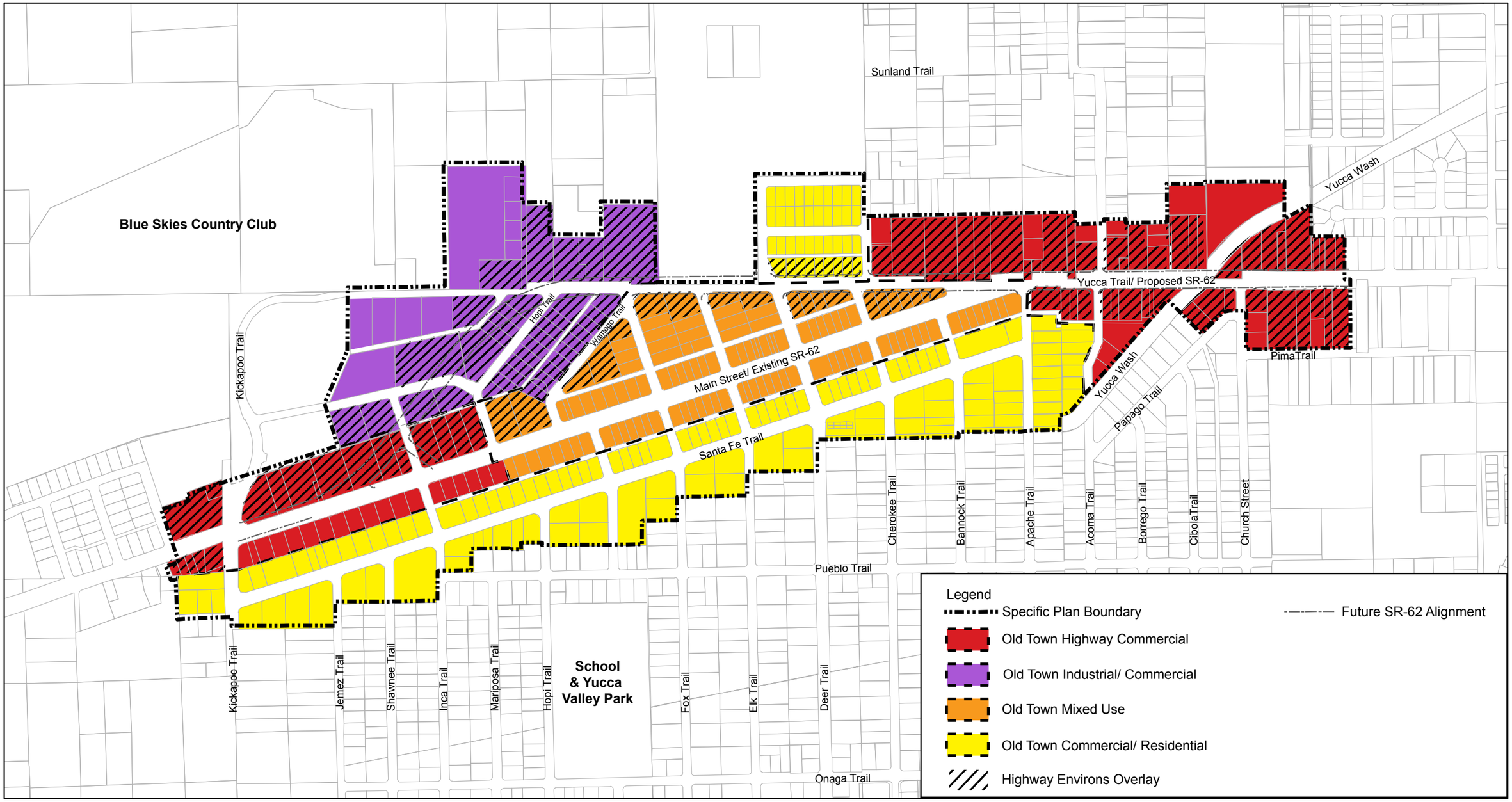
NOT TO SCALE

10103453

Old Town Yucca Valley Specific Plan

Existing Land Use Map

Exhibit 1



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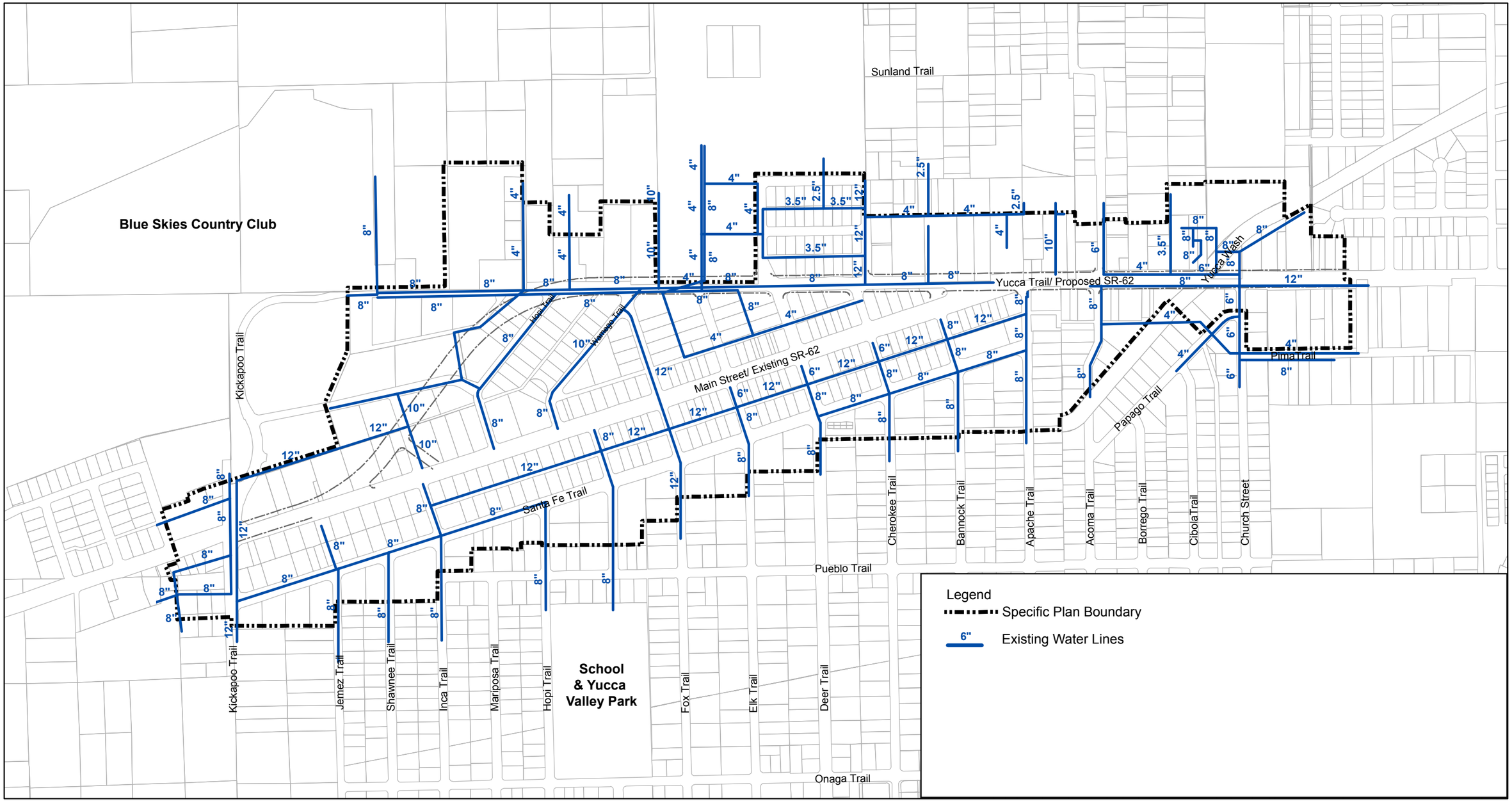
Old Town Yucca Valley Specific Plan

Proposed Land Use Map

Exhibit 2



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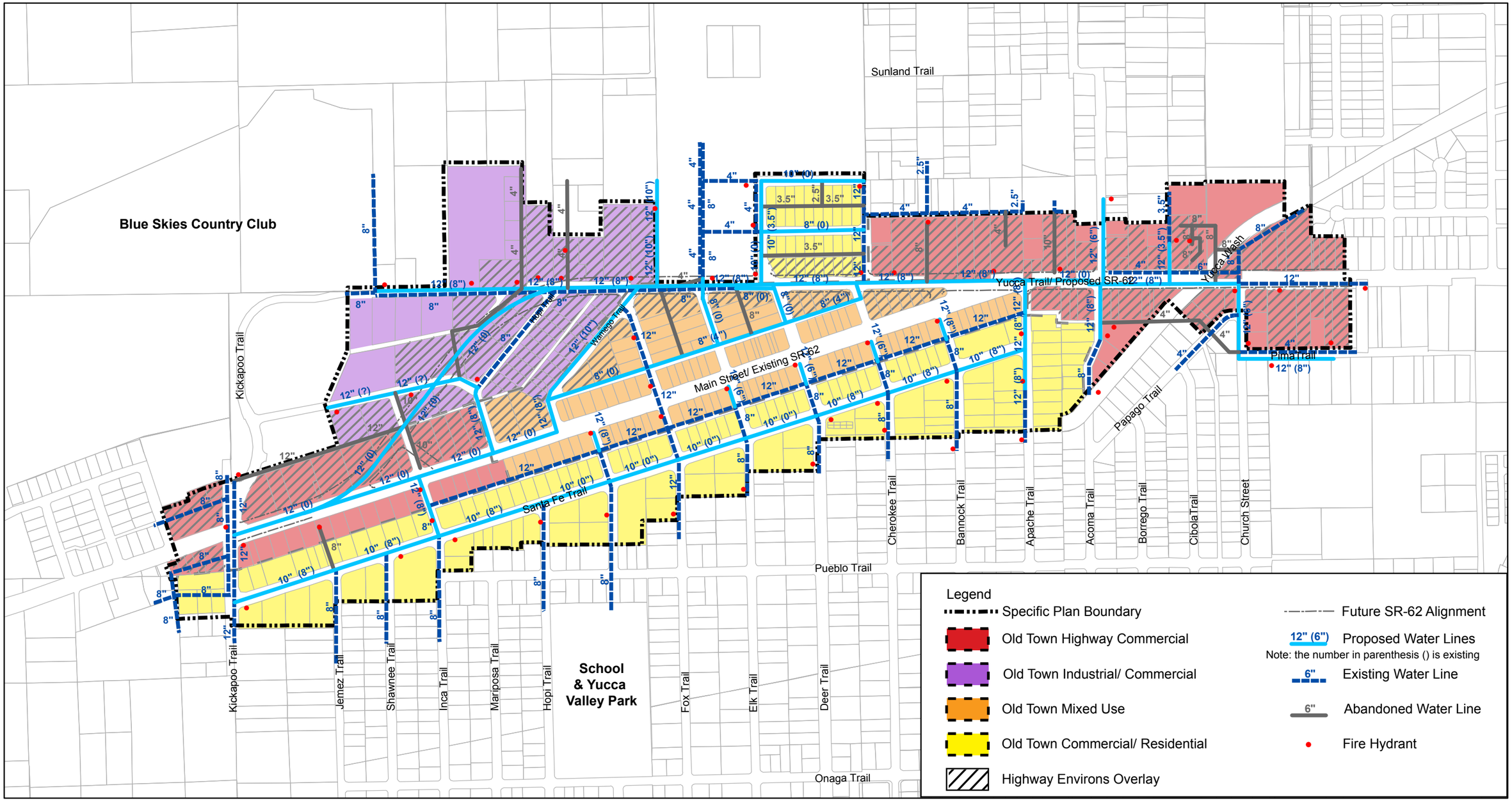
Old Town Yucca Valley Specific Plan

Existing Water Plan

Exhibit 3



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Old Town Yucca Valley Specific Plan

Proposed Water Plan

Exhibit 4