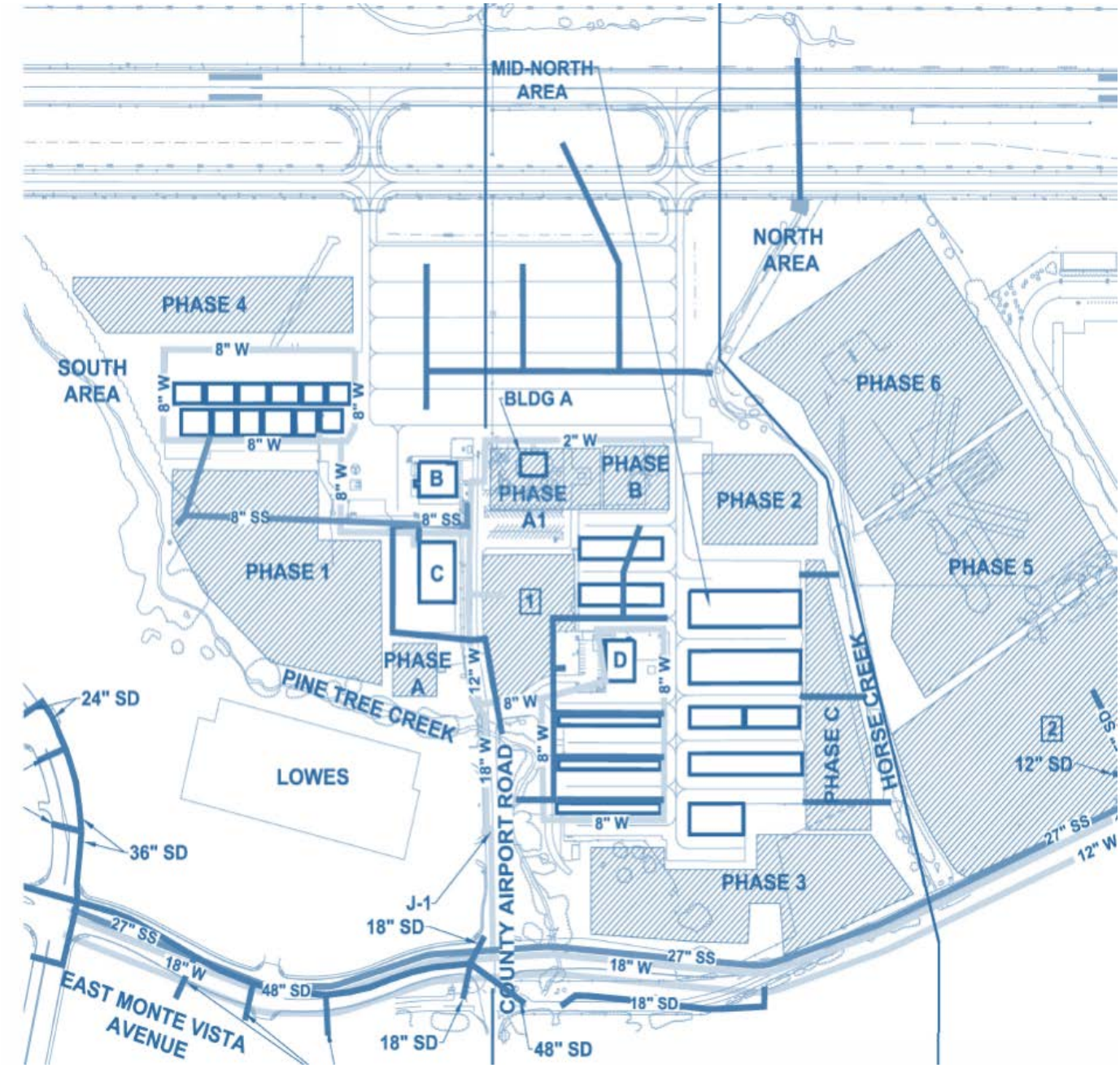
NUT TREE AIRPORT
UTILITY MASTER PLAN



NUT TREE AIRPORT UTILITY MASTER PLAN
2019

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Megan M. Greve, Director
Dave Daly, Airport Manager

Prepared By

Nut Tree Airport
301 County Airport Rd
Vacaville, CA 95688
(With assistance by Kitchell, Sacramento)

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INTRODUCTION

The Nut Tree Airport (Airport) is a general aviation airfield and a part of the National Plan of Integrated Airport Systems (NPIAS). The Airport is located roughly halfway between San Francisco and Sacramento in Vacaville, CA. The Airport is located on the I-80 corridor at the I-505 terminus and has easy freeway access. (See Figure 1A) Vacaville and the Airport are stopping points for travelers visiting the SF Bay Area, the Napa Valley, the State Capitol and Lake Tahoe. Due to south/south-west air currents, the Airport is located within a locally known micro-climate between the SF Bay Area marine environment and the California Central Valley region. The Airport boasts only a limited number of flight days each year that are obscured by weather.

The Airport property consists of 286 acres and is home to approximately 169 based aircraft and 116 aircraft hangars that total 288,150 square feet of floor area. Eleven businesses currently operate on the Airport employing 32 people. The Airport's single 4,700-foot-long runway can accommodate a variety of aircraft from single and multi-engine to small and medium sized business jets.

This Utility Master Plan (UMP) describes the existing airport and pertinent surrounding infrastructure, including existing and future water, sanitary sewer, and storm drainage. The land use for the UMP is based on the following references:

- Airport Layout Plan (ALP) prepared by Mead & Hunt, dated June 2013
- Nut Tree Airport Master Plan (AMP)
- City of Vacaville Northeast Sector Sewer Master Plan dated May 2013
- Nut Tree Airport Business Plan (ABP) prepared and adopted by Solano County dated September 2015.

The proposed recommendations in this UMP assume projected growth to take place through 2025 (Fiscal Year 2025/2026) and considers the minimum utility requirements to meet the Airport's anticipated future growth and demand. This matches the forecasting timelines in the ABP. All capital and construction estimates cited in this report assume 2018 costs.

Condition assessments of existing utilities were not performed. Where information may be limited in terms of storm, sewer, and water systems, reasonable assumptions have been made for this study. This report is intended as a master-level planning document, and not intended for construction.

Figure 1A – Airport Location Map (Source: Vacaville 2102 AMP)

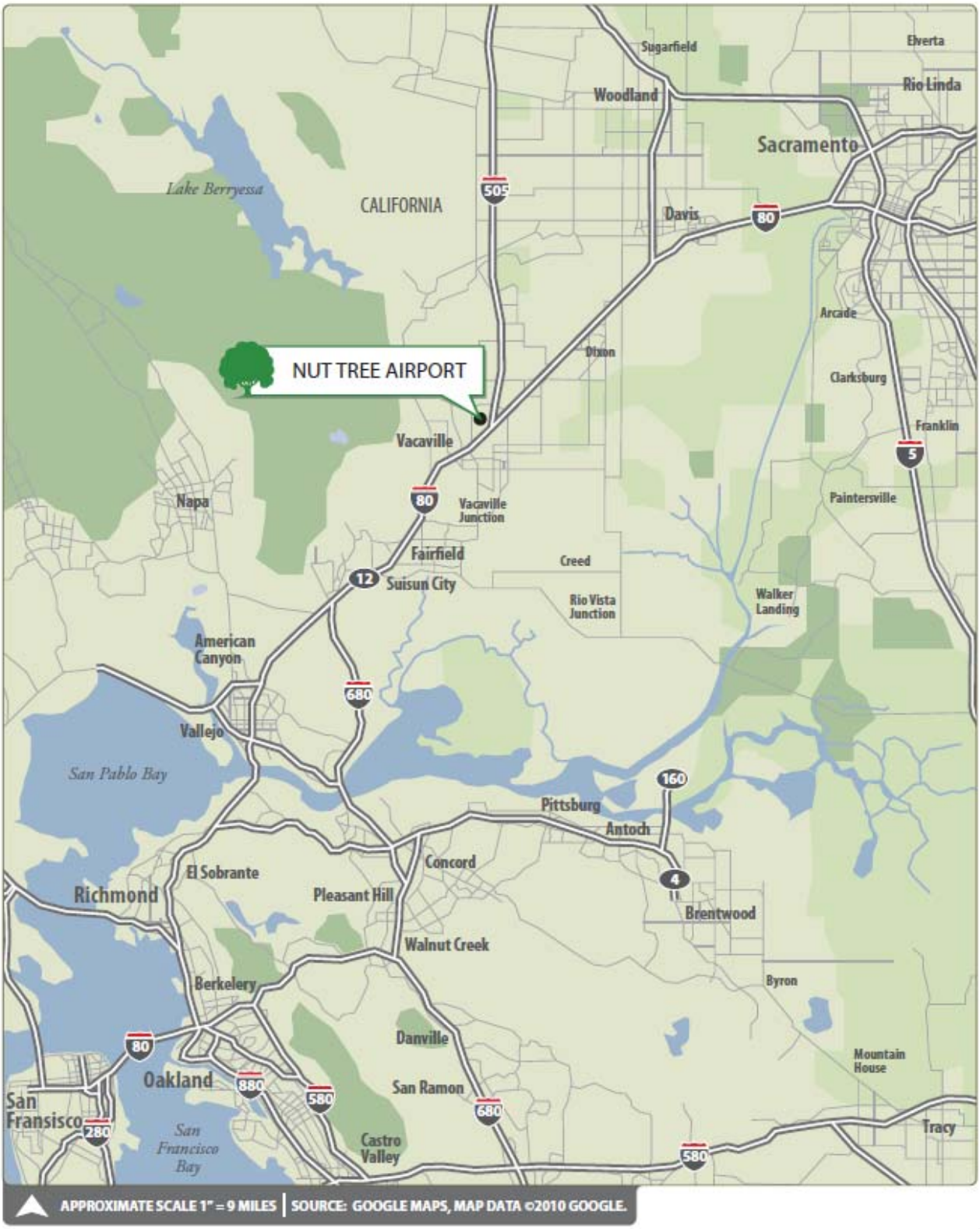
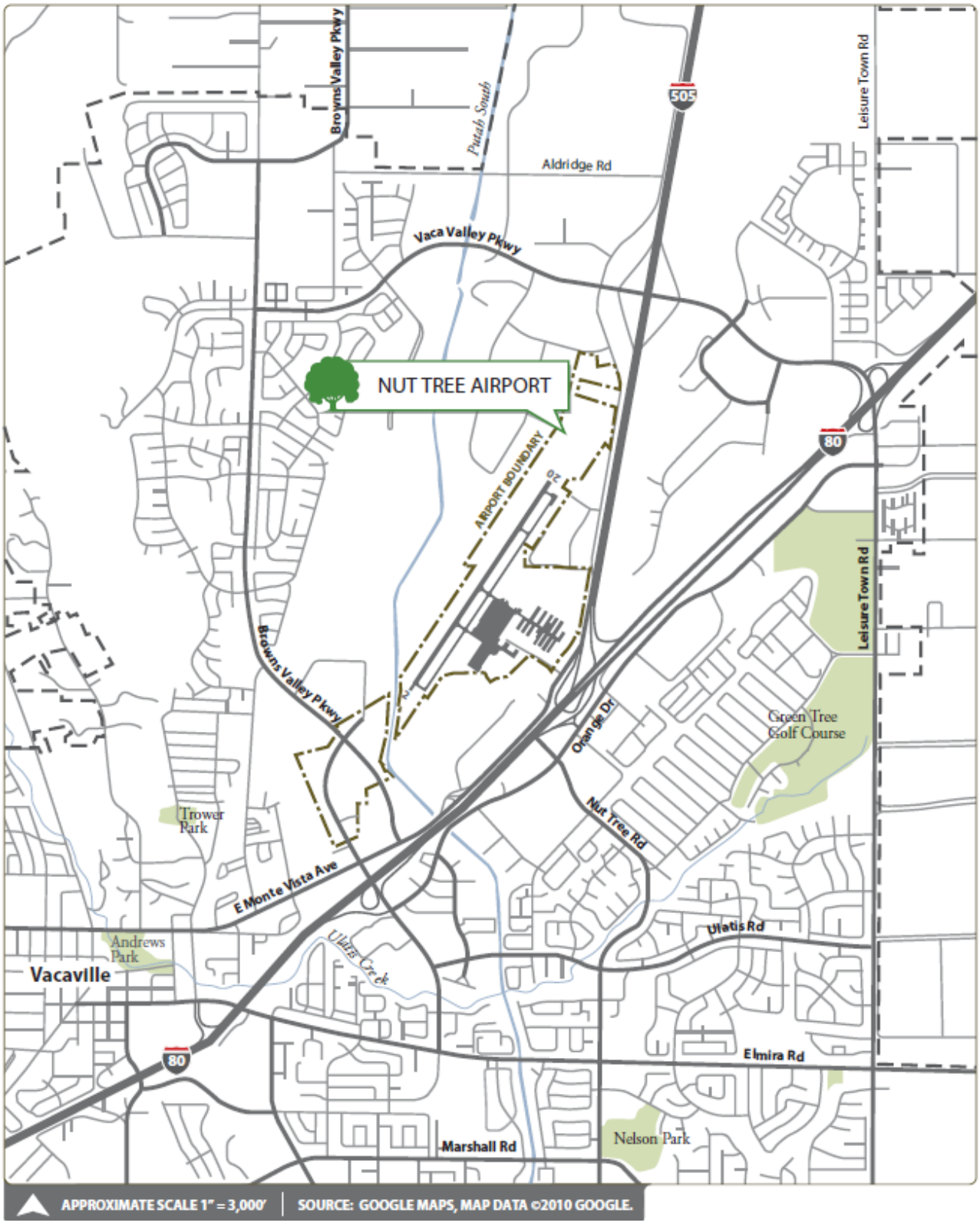


Figure 1B – Airport Vicinity Map (Source: Vacaville 2102 AMP)



EXECUTIVE SUMMARY

Water - Domestic and Fire Protection

Currently, water service is provided by the City of Vacaville (City) via an existing 18-inch line from Monte Vista Avenue, with reduction to a 12-inch water main line. (See Figure 2) The City of Vacaville's water demarcation is located via Double Check Detector Assembly (DCDA) on Airport Rd approx. 630 feet NW of the intersection of Airport Rd and E Monte Vista Ave.

Existing domestic and fire protection water supply serve the portion of the Airport labeled as "South Area." The airport extended the 18-inch water main across Pine Tree Creek to the west side of the creek.

Existing 12 and 18-inch water mains continue along East Monte Vista Avenue with proposed loops to the "North" and "Far North" Areas.

Additional new water lines ranging in size from 8-inches to 12-inches are recommended to service each of the proposed improvement areas and future phases at Nut Tree Airport. Improvements to the existing Water system are estimated to cost $2,536,687.

Sanitary Sewer

There is an existing sewer line which serves Buildings A, B, and C (see Figure 5). Building D (Solano Community College) is on an independent septic tank system. Due to an independent contracting arrangement in place, this septic system is assumed to remain external from systemwide sewer requirements. Other existing hangar buildings located within the South Area are currently served by the existing sewer line.

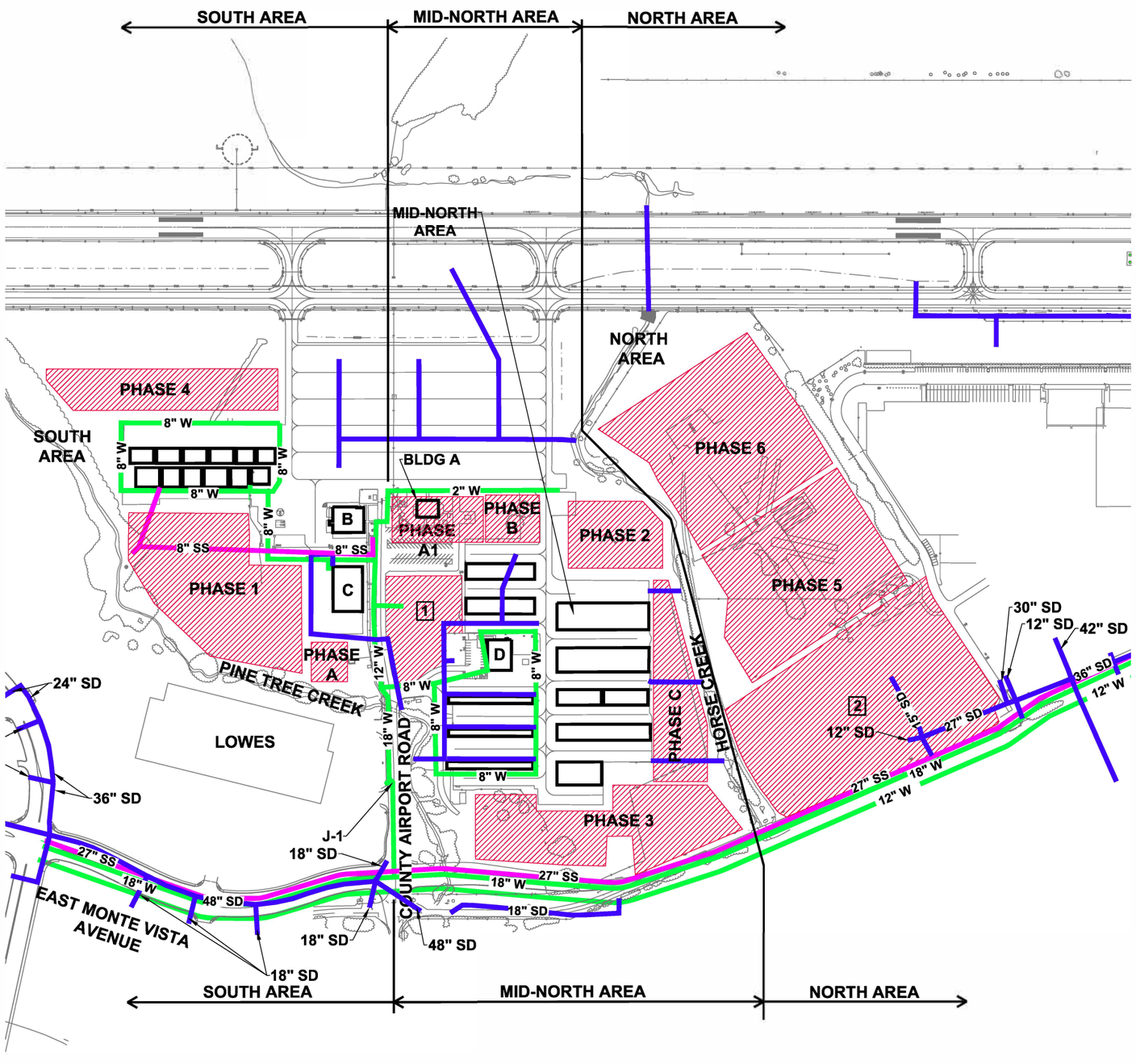
There is currently one sanitary sewer line serving the airport that is tied into the City's sanitary sewer system. The Airport is allocated a total sewer flow disposal allocation of 97,660 gallons per day. According to the Airport Business Plan, it is estimated that the Airport is currently producing approximately 3,500 gallons of sewer flow per day based on City utility bills and domestic consumption rates by the airport. The Airport forecasts a growth based on the potential expansion areas in this plan to 35,000 gallons of sewer flow per day.

To meet these needs, approximately 3,000 feet of 10-inch PVC pipe, 8 manholes, and a lift station will need to be installed. Note that per the calculations, 6" was determined to be a minimum, but 8" and 10" are called out on Figure 5 due to unknown plans for the Ancillary areas. The total cost for Sewer improvements are estimated at $409,807.

Storm Drainage

The existing storm drain system consists of a series of various sized pipes that currently drain into adjacent creeks and a detention basin.

Several Storm drainage lines are located on the airport property that serve all existing improved areas of the airport. Storm drain improvements will be made as necessary to accommodate new construction and development. To account for the proposed airport improvements, reinforced concrete pipe (RCP) ranging in size from 12"-30" will be required. In addition, approximately 15 new catch basins will be required to serve as drainage inlets and junction points. See Figures 6A and 6B for storm drain improvements. Total cost for storm drain improvements is estimated at $470,511.

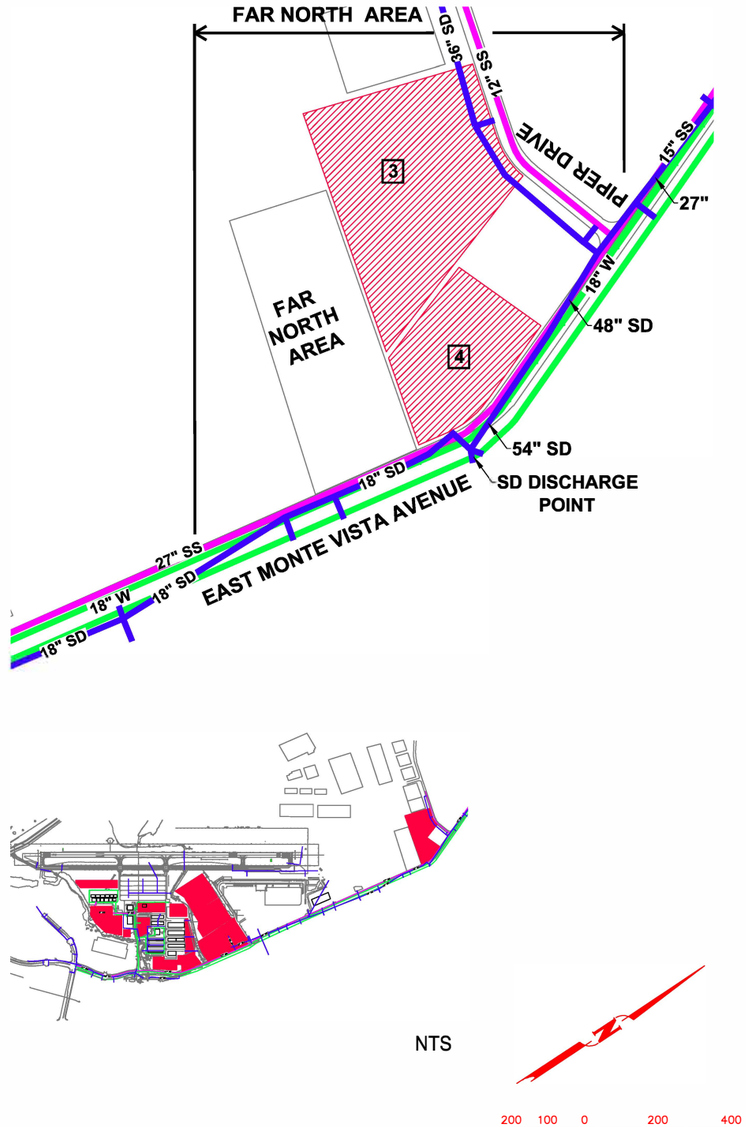


LEGEND

- EXISTING WATERLINE
- EXISTING SEWERLINE
- EXISTING STORM DRAIN LINE
- EXISTING BUILDING
- FUTURE DEVELOPMENT

PHASE X DEVELOPMENT PHASES (AERONAUTICAL)

1 ANCILLARY DEVELOPMENT AREAS (COMMERCIAL/LIGHT-INDUSTRIAL)



NTS

200 100 0 200 400

SCALE: 1" = 200

KITCHELL
2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

FIGURE 2
EXISTING FACILITIES SITE PLAN

SHEET:

DATE: 4/21/18

SCALE: AS NOTED

JOB NO. 6112A3

PROJECT BACKGROUND

On June 23, 2016, Kitchell performed a visual field survey for the project. As part of this survey, fire hydrants, sewer manholes, and storm drain line locations were verified. It was also confirmed that Building D (Solano Community College) ties into an existing septic tank system. Refer to Figure 2 for a layout of the existing utilities.

On March 19, 2018, Airport enlisted Marquee Fire Protection to perform onsite services to record flow rates at three fire hydrants. This information was used to validate the available existing water supply and as reference information for the water distribution modeling and analysis. In addition to verifying flow at one of the major water branches was also provided to the project team who, at the time of the writing of this report, was preparing construction documents for Phase 2. The fire hydrant flow data report is included as Appendix C.

The Airport has four distinctive areas of improvement listed from Southern-most area to Northern-most:

1- **South Area** - The area south of County Airport road
2- **Mid North Area** - The area between Horse Creek on the north and County Airport road on the south
3- **North Area** – The area north of Horse Creek; and
4- **Far North Area** – The area adjacent to the intersection of Piper Drive and East Monte Vista Avenue.

For the purpose of this UMP, the improvements were split into the above respective areas. Each of the areas reflects the "Development Phases" or Areas as identified in the ABP and AMP. Figures 3A and 3B are excerpts from the ABP and show the Aeronautical Development Phases and the Ancillary Development Areas. Figure 3C is an excerpt from the Airport Layout Plan prepared by Mead and Hunt which references airport-related technical and strategic layout objectives. The requirements referenced in this UMP assume additional infrastructure costs. An exhaustive review of facilities which requiring demolition was not assumed for the purposes of this UMP; however, costs for new conduits includes an allowance for cut/patching in its unit pricing. See Appendix H (Conceptual Cost Estimate).

Figure 3A. Source: NTA Airport Business Plan, September 2015

Figure 3B. Source: NTA Airport Business Plan, September 2015

As described and depicted in the ABP, Aeronautical Development Phases 1 – 6 are comprised of aeronautical hangar uses. Ancillary Development Areas 1 – 4 are comprised of Commercial and Light-Industrial uses. Figure 3C, the Airport Layout Plan as prepared by Mead & Hunt, is the plan view of the Airport Master Plan and reflects the Airport's development locations and uses.

BUILDINGS

NO.	DESCRIPTION	TOP EL. (AMSL) IN FT.
1	AIRPORT ADMINISTRATION/AVIATION MULTI-USE FACILITY	137.1'
2	LARGE BOX HANGAR	135.0'
3	AIRPORT BEACON	238.0'
4	BOX HANGARS	134.0'-145.0'
5	FUEL FARM (TO BE RELOCATED)	118.0'
6	ELECTRIC VAULT	120.0'
7	T-HANGARS	125.0'-132.0'
8	PRIVATE BOX HANGARS	125.0'-131.0'
9	MAINTENANCE SHED	137.1'
10	ASOS (TO BE RELOCATED)	141.0'
11	PAPI	N/A
12	OBSTRUCTION LIGHTING	SEE DWG
13	SEG. CIRCLE AND LTD WIND CONE	N/A
14	POLLUTION CONTROL FACILITY/WASHRACK	130.0'
15	AWOS/ASOS SITE (RELOCATED)	145.0'
16	FUTURE APRON EXPANSION	130.0'
17	FUTURE HANGAR DEVELOPMENT	140.0'
18	FUTURE SHADE HANGAR DEVELOPMENT	
19	MODULAR BUILDING	122.0'
20	FUTURE FUEL ISLAND (ABOVE GROUND)	

NON-STANDARD CONDITIONS

DESCRIPTION	AIRPORT REFERENCE CODE	EXISTING CONDITIONS	FUTURE CONDITIONS	PROPOSED CORRECTION
RUNWAY OBJECT FREE AREA LENGTH BEYOND RW 2 END	B-II	150'	300'	200' SHIFT OF RUNWAY 2/20
LIGHT POLE AND FENCE PENETRATE GROUP II TAXIWAY OBJECT FREE AREA	B-II	<65.5'	65.5'	ACQUIRE PROPERTY AND RELOCATE LIGHT POLE AND FENCE
NON-PRECISION RUNWAY THRESHOLD STRIPES	B-II	3	4	RE-MARK RUNWAY AFTER 200' SHIFT

THRESHOLD SITING SURFACE PENETRATIONS

NO.	DESCRIPTION	ELEVATION	PENETRATION	SURFACE	DISPOSITION
7	TREE	221.0	32.1'	RWY 2 THRESHOLD SITING SURFACE	REMOVE / TOP
8	TREE	191.6	7.2'	RWY 2 THRESHOLD SITING SURFACE	REMOVE / TOP
9	TREE	202.0	20.9'	RWY 2 THRESHOLD SITING SURFACE	REMOVE / TOP
10	TREE	219.0	38.5'	RWY 2 THRESHOLD SITING SURFACE	REMOVE / TOP

OBSTRUCTION SOURCE: NOAA LPV SURVEY 03-26-05.

AIRPORT DATA

	EXISTING	*NEAR-TERM*	*FUTURE*
AIRPORT ELEVATION (AMSL)	116.8'	*SAME*	*SAME*
AIRPORT REFERENCE POINT (ARP)	LAT.38°22'40.00"N LON.121°57'41.70"W	*LAT.38°22'41.64"N LON.121°57'40.31"W*	*LAT.38°22'44.38"N LON.121°57'38.21"W*
AIRPORT REFERENCE CODE	B-II	*SAME*	*SAME*
NPIAS CATEGORY	GENERAL AVIATION	*SAME*	*SAME*
MEAN MAX. TEMPERATURE (HOTTEST MONTH)°F	95°	*SAME*	*SAME*
TERMINAL NAVAIDS	SEG CIRCLE, BEACON	*SAME*	*SAME*
AIRPORT ACREAGE	286	*375.8*	*375.8*

SPONSOR APPROVAL

SIGNATURE DATE

True North

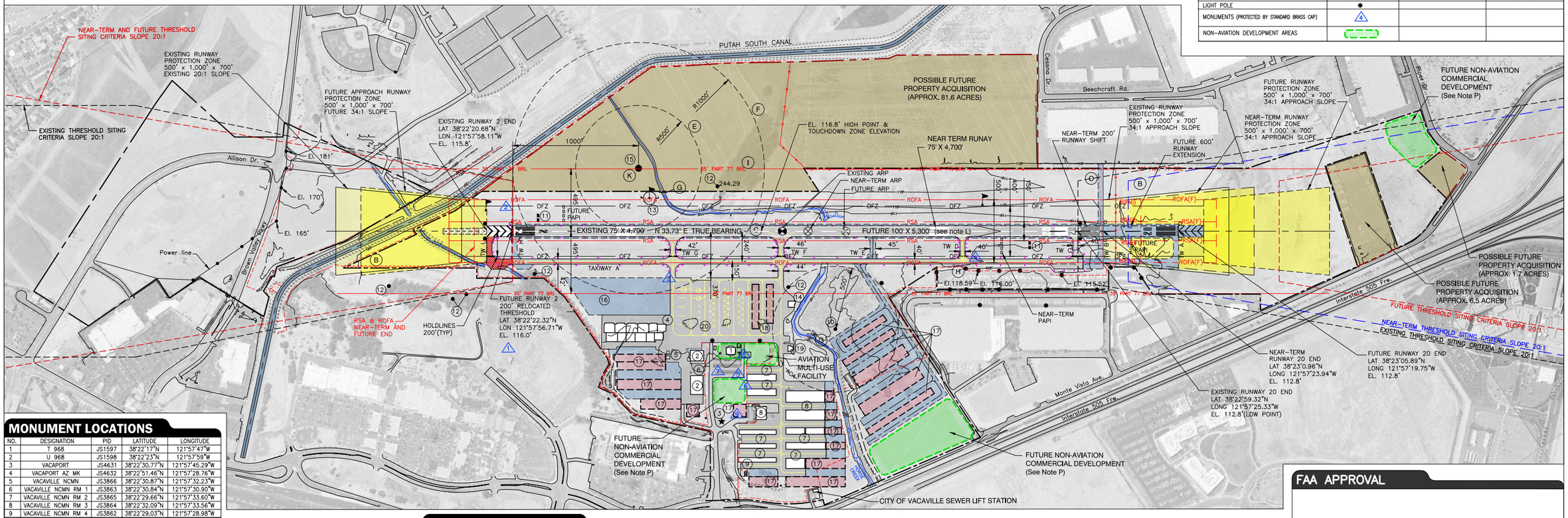
14° 12.0' E MAG. DEC. DECEMBER 2011 -0°6.0'W ANNUAL CHANGE

0 200' 400' 800' 1200'

GRAPHIC SCALE IN FEET

DRAWING LEGEND

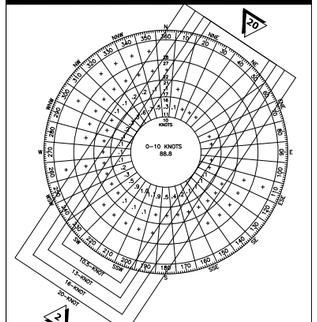
	EXISTING	*NEAR-TERM*	*FUTURE*
AIRPORT PROPERTY LINE			
AIRPORT SECURITY 6' CHAIN LINK FENCE			
AIRPORT SECURITY BARBED WIRE FENCE			
AIRPORT BUILDINGS			
AIRFIELD PAVEMENT			
PAVEMENT TO BE REMOVED			
PAVED ROADS			
UNPAVED ROADS			
AVIGATION EASEMENT			
RUNWAY PROTECTION ZONE			
THRESHOLD SITING SURFACE			
BUILDING RESTRICTION LINE			
RUNWAY SAFETY AREA	RSA	RSA(I)	RSA(F)
RUNWAY OBJECT FREE AREA	ROFA	ROFA(I)	ROFA(F)
OBJECT FREE ZONE (NO OFZ PENETRATIONS)	OFZ		
AIRPORT BEACON			
LIGHTED WIND CONE & SEGMENTED CIRCLE			
WIND CONE			
PRECISION APPROACH PATH INDICATOR (PAPI)			
HOLDLINES			
AIRPORT REFERENCE POINT			
RUNWAY END IDENTIFIER LIGHTS			
LIGHT POLE			
MONUMENTS (PROTECTED BY STANDARD BRASS CAP)			
NON-AVIATION DEVELOPMENT AREAS			



MONUMENT LOCATIONS

NO.	DESIGNATION	PID	LATITUDE	LONGITUDE
1	T 968	JS1597	38°22'17"N	121°57'47"W
2	U 968	JS1598	38°22'23"N	121°57'59"W
3	VACAPORT	JS4631	38°22'30.77"N	121°57'45.29"W
4	VACAPORT AZ MK	JS4632	38°22'51.46"N	121°57'28.76"W
5	VACAVILLE NCMN	JS3866	38°22'30.87"N	121°57'32.23"W
6	VACAVILLE NCMN RM 1	JS3863	38°22'30.84"N	121°57'30.90"W
7	VACAVILLE NCMN RM 2	JS3865	38°22'29.66"N	121°57'33.60"W
8	VACAVILLE NCMN RM 3	JS3864	38°22'32.09"N	121°57'33.56"W
9	VACAVILLE NCMN RM 4	JS3862	38°22'29.03"N	121°57'28.98"W

ALL WEATHER WINDROSE

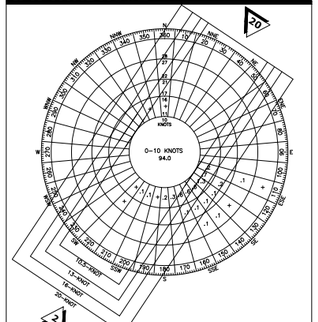


RUNWAY	10.5-KNOT	13-KNOT	16-KNOT	20-KNOT
2/20	96.13%	97.87%	96.27%	99.81%
2	66.50%	66.86%	69.09%	69.58%
20	91.20%	92.14%	91.98%	93.14%

SOURCE: National Oceanic and Atmospheric Administration, National Climatic Data Center, Station 72482, Vacaville, California. Total Observations: 62,056. Period of Record: August 2001-December 2009.

NOTE: Wind analysis tabulated utilizing the FAA Airport Design Software supplied with FAA AC 150/5300-13.

IFR WINDROSE



RUNWAY	10.5-KNOT	13-KNOT	16-KNOT	20-KNOT
2/20	95.21%	96.96%	98.89%	99.52%
2	89.37%	90.50%	91.97%	92.42%
20	92.70%	94.42%	96.35%	96.98%

SOURCE: National Oceanic and Atmospheric Administration, National Climatic Data Center, Station 72482, Vacaville, California. Total Observations: 2,476. Period of Record: August 2001-December 2009.

NOTE: Wind analysis tabulated utilizing the FAA Airport Design Software supplied with FAA AC 150/5300-13.

RUNWAY DATA

ITEM	EXISTING RUNWAY 2/20	*NEAR-TERM RUNWAY 2/20*	*FUTURE RUNWAY 2/20*
APPROACH VISIBILITY MINIMUMS	VISUAL/1-MILE	*1-MILE/1-MILE*	*SAME/SAME*
FAR PART 77 APPROACH CATEGORY	VISUAL/NP	*NP/NP*	*SAME/SAME*
FAR PART 77 APPROACH SLOPE	20:1/34:1	*34:1/34:1*	*SAME/SAME*
RUNWAY WIDTH AND LENGTH	75' X 4,700'	*SAME*	*100' X 5,300' (see note L)*
PAVEMENT SURFACE TYPE	ASPHALT	*SAME*	*SAME*
PAVEMENT STRENGTH (IN LBS.)	30,000 SWG	*SAME*	*SAME*
TAXIWAY SURFACE TYPE	ASPHALT	*SAME*	*SAME*
RUNWAY LIGHTING	HIRL	*SAME*	*SAME*
RUNWAY MARKING	NP, RCL, EDGE	*SAME*	*SAME*
TAXIWAY LIGHTING	MITL	*SAME*	*SAME*
EFFECTIVE RUNWAY GRADIENT %	0.06	*0.07*	*0.06*
MAXIMUM RUNWAY GRADIENT %	0.16	*0.15*	*0.13*
RUNWAY LINE-OF-SIGHT	CRITERIA MET		
VISUAL APPROACH AIDS	PAPI, REIL	*SAME*	*SAME*
INSTRUMENT APPROACH AIDS	VOR, GPS	*SAME*	*SAME*
AIRPORT REFERENCE CODE	B-II	*SAME*	*SAME*
CRITICAL AIRCRAFT	DASSAULT FALCON 50	*SAME*	*SAME*
WING SPAN	61'11"	*SAME*	*SAME*
UNDER CARRIAGE WIDTH	13'	*SAME*	*SAME*
APPROACH SPEED (KNOTS)	113	*SAME*	*SAME*
MAXIMUM TAKEOFF WEIGHT (LBS.)	38,800	*SAME*	*SAME*
RUNWAY SAFETY AREA WIDTH	150'	*SAME*	*SAME*
RUNWAY SAFETY AREA BEYOND R/W END	300'/300'	*SAME/SAME*	*SAME/SAME*
RUNWAY OBJECT FREE AREA WIDTH	500'	*SAME*	*SAME*
RUNWAY OBJECT FREE AREA BEYOND R/W END	300'/300'	*SAME/SAME*	*SAME/SAME*
OBSTACLE FREE ZONE WIDTH	400'	*SAME*	*SAME*
OBSTACLE FREE ZONE BEYOND R/W END	200'/200'	*SAME/SAME*	*SAME/SAME*
OBSTACLE FREE ZONE CRITERIA	NO OFZ OBJECT PENETRATIONS		
RUNWAY CL TO TAXIWAY CL	240'	*SAME*	*SAME*
TAXIWAY CL TO FIXED OR MOVEABLE OBJECT	250'	*SAME*	*SAME*
TAXIWAY OBJECT FREE AREA WIDTH	131'	*SAME*	*SAME*
TAXIWAY SAFETY AREA WIDTH	79'	*SAME*	*SAME*
TAXIWAY WINGTIP CLEARANCE	26'	*SAME*	26'
TAXIWAY CENTERLINE TO FIXED/MOVEABLE OBJECT	370'	*SAME*	*SAME*
THRESHOLD SITING CRITERIA	SEE TABLE		

REVISIONS

NO.	DESCRIPTION	DATE
1	'AIRPORT LAYOUT PLAN' DRAWING, BY MEAD & HUNT, INC., SANTA ROSA, CALIFORNIA	6/2007

RUNWAY COORDINATES & ELEVATIONS

ITEM	RUNWAY 2/20		
	EXISTING	*NEAR-TERM*	*FUTURE*
RUNWAY END COORDINATES	LAT.38°22'20.68"N / LAT.38°22'59.32"N LON.121°57'58.11"W / LON.121°57'25.33"W	*LAT.38°22'22.32"N / LAT.38°23'0.96"N LON.121°57'56.71"W / LON.121°57'23.94"W*	*LAT.38°22'22.32"N / LAT.38°23'05.89"N LON.121°57'56.71"W / LON.121°57'19.75"W*
RUNWAY END ELEVATION	115.8'/112.8'	*116.0'/SAME*	*SAME/SAME*
RUNWAY HIGH/LOW POINT ELEVATION	112.8'/116.8"	*SAME/SAME*	*SAME/SAME*
TOUCHDOWN ZONE ELEVATION (TDZE)	116.8'/116.7'	*SAME/SAME*	*SAME/SAME*

NOTES

A. This drawing reflects planning standards specific to this airport, and is not a product of detailed engineering design analysis. It is not intended to be used for construction documentation or navigation.
B. Coordinates and elevations taken from FAA website, http://nuwww.jccbi.gov/pls/datasheet_prd/pkg_airport.PRO_AIRPORT_RUNWAY?v_cntl_num=3153 All elevations and coordinates are based on NAVD 88 and NAD 83 datum.
C. Forward azimuth reckoned from north. Source: FAA Inverse 3D.
D. Section Corners-The Nut Tree Airport is located in Rancho Los Putos. The original Government Land Office surveys did not survey (set Section Corner Locations) within boundary of Rancho Los Putos.
E. ASOS Zone 1 – Objects restricted to 15' below future wind sensor elevation.
F. ASOS Zone 2 – Objects restricted to 10' above future wind sensor elevation.
G. Creek disposition to be determined.
H. Light pole and fence to be relocated clear of taxiway OFA (65.5 feet from centerline).
I. Eucalyptus trees to be removed.
J. Replace/relocate barbed wire fencing with 6' chain link.
K. Future AWOS/ASOS location does not meet siting criteria per FAA Order 6560.20B. FAA confirmation pending.
L. For runway width space reservation purposes only: Future Runway 2/20 width to remain B-II throughout planning horizon. Project eligibility not factored.
M. Please see Airport Capital Improvement Plan (ACIP) for a complete list of planned development projects.
N. Property lies in a portion of Section 10 & 15, T.6 N, R.1 W, M.D.M. Solano County , CA. No identified section corners appear in the airport layout plan view.
O. Possible Taxiway funded by others concurrent with, or subsequent to, initial 200 foot runway threshold shift.
P. Subject to FAA Review and Approval.

FAA APPROVAL

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration as provided under Title 49, United States Code, section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this plan by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws.

Solano County
General Services Department
Vacaville, CA (707)469-4600

Nut Tree Airport
Vacaville, California

Airport Layout Plan

SCALE	DATE	SHEET NO.
1" = 400'	NOVEMBER 2013	1 of 7

WATER MAIN SYSTEM

BACKGROUND

The City of Vacaville (City) presently provides water to the Airport via 18-inch water line located on Airport Road. This is fed from an 18-inch line on East Monte Vista Ave. The Airport is located within the City pressure zone 1 that is supplies water from the Butcher, Buck and Brown Valley reservoirs at elevations 291 feet to 324 feet that give a static pressure of 85 to 95 psi at the Airport site. City maintains the 18-inch water main within Airport Road from the intersection of East Monte Vista Avenue to a 10-inch double detector check valve located in the NW corner of the first street intersection north and adjacent to Pine Tree Creek. From this point the water main (see Figure 2) reduces to a 12-inch line that continues to the end of Airport Road that provides water service to existing Buildings A, B, C, and to two 8-inch water branches that supply water to all the existing airport hangers and fire hydrants within the airport site.

The existing Airport site is fairly flat at average elevation of 117 feet. Topography and water layout information was provided by the Solano County Public Works Department and a Waterline Installation Plan & Profile drawing prepared by Mead & Hunt (Construction Drawings Nut Tree Airport, July 2006) Consulting Engineers of the installation of the water lines within Airport Road. From this a utility survey file (showing the horizontal location and minimal vertical information) was prepared and field survey information was collected to determine the approximate location of existing water mains and water services within the Airport site.

The Airport's existing water system plan indicates that there are two existing 8-inch and one 12-inch branch water lines that extend from the this City-maintained 18-inch water main. Two 8-inch water lines create looping water line system that surround a cluster of existing aircraft hangers located in both the mid-north and the south areas. The 12-inch water line extends northwest to the end of Airport Road that provides water service to Buildings A, C, and the helicopter terminal.

Adjacent to this 12-inch water line in Airport Road is a 4-inch irrigation line and 8-inch water service line that reduces to a 2-inch line to provide water to the helicopter terminal located north east section of the Airport close to horse creek. Both to these lines are connected to 2-inch water meters and check valves adjacent to the existing 10-inch double detector check assembly previously discussed. The airport presently has a total of 14 fire hydrants, seven water services, ranging from 5/8-inch to 8-inch meters making a total domestic peak hour demand of approximately 14 gallons per minute. All existing buildings A, B, and C do not have fire sprinkler systems and are therefore not connected to the existing water lines

DESIGN CRITERIA

Listed below are the various design criteria used to evaluate and analyze the existing and proposed airport water system. The design criteria are referenced from the 1990 Water Master Plan, City of Vacaville. Chapter 4 states the following criteria shall be used for the design and analysis of water lines (p4-1). The recommend criteria are based on the following conditions:

- The low water level in Zone 1 reservoirs is assumed as 300 feet (although certain reservoirs extend down to approximately 292 feet. Therefore the maximum recommended building pad elevation in zone 1 is 220 feet.

- The high water level in Zone 1 reservoir is 324 feet. Therefore the minimum recommend building pad elevation is 120 feet. Certain areas (like the nut tree airport) in Zone 1 are currently developed at elevations below 120 feet, and high pressure are economically, so pressure reducing devices are needed to mitigate the high pressures.

Minimum condition for fire protection planning and analysis (p 4-2). In testing the fire distribution system, the following two sets of criteria shall be analyzed:

- Test 1:
  - Fire flow at the most critical point in the distribution system plus fire flow based on maximum day water demand
  - A residual pressure of 20 psi
  - The most critical component of the water system is out of service.
  - In Zone 1, The water level in all reservoirs is 305 feet. In all other zones the water level is equal to that with all operational emergency volumes depleted.
  - Peak hour water demand
- Test 2:
  - Peak hour water demand
  - A residual pressure of 30 psi
  - The most critical component of the water system is out of service
  - In Zone 1, the water level in all reservoirs is 305 feet. In all other zones the water level is equal to that with the operational and emergency volumes depleted

Minimum fire Flow (p4-3): The fire flows shown in Table 4-1 were used to plan and analyze the new distribution system. Table 4-1, provides fire flow demands based on the following building uses:

- High Density Residential, Industrial and Commercial building use requires 4,500 gallons per minute (gpm). Medium density Residential and Schools requires 3,000 gpm
- Single Family residential building requires 1,500 gpm
- Since buildings A, B and C are used for office commercial purposes they were given minimum fire flow requirements of 4,500 gpm.
- For building and use areas with normal (Airport use) low occupancy, or where the final building use is not specified or is unknown, a fire flow demand of 1,500 gpm was used. (See California State Fire Code below).

Projected Water demand is based on existing and proposed land use of the airport by the City of Vacaville. City of Vacaville 1990, Figure 2-1 shows that the Airport has a land use designation “P” that represents “other Public land Uses” and Table 2-1 provides the following information:

- P = Other public land uses (shown airport area map) generates 500 gpm/ac
- GC ,OP = General Commercial and office Professional generates 1,400 gpm/ac
- Since Buildings A and B are currently used as professional offices, a land use rate of 1,400 gmp/ac was used to determine average day demand in these areas within the airport. The City of Vacaville landuse map shows the aircraft hanger buildings land use rate of 500 gpm/ac is to be used to generate average day demands of the rest of the airport area.
- At the time of this report, Phase II was entering a design phase. The proposed buildings will include fire sprinkler systems. The requirements per 2016 California Fire Code is 2500 gpm (maximum

without reductions) and fed from the center water loop shown in the Mid-North area. Field measurements exceeded this value.

- From Table 2 of the 2012 Nut Tree Business Plan provides the designated, timing and acreage of anticipated development within the airport area. According to the City of Vacaville 1990 master plan, (p3-3) the hour peaking factor of 4.0 is recommended or 4 times the average day flow to determine the peak hour water demand in the design and analysis the water system. To determine maximum day demand (or gallons per day; gpd) a peaking factor of 2.0 is recommended or 2 times the average day flow to determine the maximum day demand with the fire flow. The peak hour demand and maximum day plus fire flows demands are shown Table 1 and used to evaluate the existing and proposed water system.

California Fire Code.

- Per 2016 California Fire Code Table B105.1(2), fire flow demand for Type IIB and IIIB buildings between 0-5,900 square feet is 1,500 gpm. This is the value assumed for areas where aircraft storage hangars will be constructed.
- Specific sprinkler systems sizing for all locations will be determined by the future designers and coordinated with NTA.

Fire hydrant flow tests.

A fire flow analysis has been performed on the Nut Tree Water at the Mid North Area 8" water loop. Should existing or future buildings require fire sprinkler systems, further analysis of the water system with precise sprinkler design data will be required by the future Architect or Engineer of Record.

- Three Fire hydrant tests within the Airport facility for fire flow were provided by Marquee Fire Protection. See Appendix C for Marquee Fire Protection report dated March 21, 2018. The results are included in the Water System Calculations "Fire Flow-Overall (Fully Developed) Condition" section.
    - Flow Test 1 produced a calculated flow of 8397.6 gpm @ 20 PSI. This test involved (2)-2-1/2" outlets flowing at a measured rate of 2523 gpm.
    - Flow Test 2 produced a calculated flow of 3257.3 gpm @ 20 PSI. This test involved (2)-2-1/2" outlets flowing at a measured rate of 1985 gpm.
    - Flow Test 3 produced a calculated flow of 3182.6 gpm @ 20 PSI. This test involved (2)-2-1/2" outlets flowing at a measured rate of 2042 gpm.

Additional Criteria

- The maximum distance assumed between fire hydrants is 300 feet. This can be relaxed by the future designers of record per applicable codes and standards.
- Fire flow requirements may be reduced by an allowable percentage per CFC where applicable. This is not assumed for the purposes of future water planning.

- Hazen Williams "C" values are determined based on known, assumed, or proposed pipe materials and include:

C-Value	Material
90	Steel Pipe (Existing)
140	Steel Pipe (Proposed)
130	Ductile Iron Pipe
150	PVC Pipe

SYSTEM ASSESSMENT

The Nut Tree Airport will continue to incorporate the use of a variety of building types, including an administration building, corporate hangars, T-Hangars, offices, and commercial and light-industrial uses. In order to meet life safety demands for the varying types of buildings utilized at the Nut Tree Airport, two different scenarios must be met. The first system requirement is meeting maximum day demand plus fire flow while maintaining a system pressure of 20 psi. In areas where aircraft storage hangars are constructed, a fire flow demand of 1,500 gpm was utilized to meet the requirements of the 2016 California Fire Code. In areas where higher occupancy commercial buildings are located or be located in the future phases; or where the final building type is unknown, (such as the Ancillary Areas), a maximum day plus fire flow demand of 4,500 gpm was utilized to comply with the requirements of the City 1990 Water Master Plan.

According to the Nut Tree ABP the total development area for calculating demand is 49.84 acres. Based on the projected total building use, an average demand of 18,886 gpd was determined. Assuming a peak hour factor of 4 this created a total of 92,932 gpd (at 20 PSI) at total build out of the airport site for each phase shown in Table 1 below.

TABLE 1: Peak Hour and Max Day Demand plus fire flow Calcs

					PEAK HOUR WATER DEMAND [TEST 2] (30 PSI)					MAX DAY WATER DEMAND [TEST 1] (20 PSI)				
Phase	Year	AC	Building Type	Demand Factor (1)	Total Average Demand	Peak hr factor (5)	Peak hr Demand per area (7)	Est. Nodes /FH	Peak hr per hydrant	Peak Day factor (5)	Max day demand per area	Max day demand per FH	Fire flow (4),(5)	Max day + fire flow
				gpd/ac	gpd		gpd		gph		gpd	gpd	gph	gpd
1	2016	5.1	T and Box Hangers	500	2,550	4	**10,200**	6	1,700	2	5,100	850	1,500	2,350
2	2019	1.6	T-Hangers (6)	500	800	4	**3,200**	4	800	2	1,600	400	1,500	1,900
3	2022	4.1	T-Hangers	500	2,050	4	**8,200**	4	2,050	2	4,100	1,025	1,500	2,525
4	2022	2.4	Box(3)	500	1,200	4	4,800	4	1,200	2	2,400	600	4,500	**5,100**
5	2026	6.1	T and Box Hangers	500	3,050	4	**12,200**	6	2,033	2	6,100	1,017	1,500	2,517
6	2030	6.6	T and Box Hangers	500	3,300	4	**13,200**	6	2,200	2	6,600	1,100	1,500	2,600
A	2018	0.37	Lg. Box(3)	1,400	518	4	2,072	1	2,072	2	1,036	1,036	4,500	**5,536**
B	2020	0.67	Lg. Box (3)	1,400	938	4	3,752	2	1,876	2	1,876	938	4,500	**5,438**
C	2023	2.1	Box (3)	1,400	2,940	4	**11,760**	2	5,880	2	5,880	2,940	4,500	7,440
A1	2017	1.1	Airport building Rehab/ Expansion	1,400	1,540	4	**6,160**	3	2,053	2	3,080	1,027	4,500	5,527
1	2021	1.8	Professional office	1,400	2,520	4	**10,080**	4	2,520	2	5,040	1,260	4,500	5,760
2	2018	9.3	Commerical / Light Ind	1,400	13,020	4	**52,080**	8	6,510	2	26,040	3,255	4,500	7,755
3	2022	6.1	Commerical / Light Ind	1,400	8,540	4	**34,160**	6	5,693	2	17,080	2,847	4,500	7,347
4	2022	2.5	Commerical / Light Ind	1,400	3,500	4	**14,000**	4	3,500	2	7,000	1,750	4,500	6,250
Total		**49.84**			**18,886**		**185864 at 30 psi**				**92,932**			**68044 at 20 psi**

Footnotes:

(1) Airport land use (P= Other Public Land Use) see Table 2-1 land uses in Vacaville 1990 water master plan
(2) Nut Tree Airport Business Plan
(3) Office Professional , Commerical Service, general commercial, recreational commercial land use
(4) 200 GPM per Vacaville Fire Protection District
(5) 450 GPM per 1990 Water System Master Plan, City of Vacaville, CA.
(6) Sprinklered buildings assume a max 2500 gpm per CFC. Appendix A references over 3,000 gpm available.
(7) Test 2 stipulates 30 PSI per 1990 Water System Master Plan, City of Vacaville, CA.

The first column "Phase" reflects the development or ancillary phases referenced on Figure 2 and other Figures with the NTA sites shown.

Using a peak day factor of 2 creates a max day demand 92,932 gpd for the entire water system. Using a fireflow of 1500 gpd for hangers and 4,500 gpd for commercial buildings the total max day demand and fire flow will be 68,044 gpd. In comparing the peak hour demand (Test 1) and maximum day plus fire flow demand (test2), the peak hour demand governs in most cases.

The water system and master planned improvements have been analyzed and designed utilizing Water CAD Software by Bentley Systems. Appendix A provided a map of the proposed water layout site model and technical results. Appendix B provides the same for the current existing condition. In general, the proposed water sizing reflects the recommendations presented in Figure 4.

RECOMMENDATIONS

The recommended water system improvements to meet fire protection requirements are divided into water loop systems as shown on Figure 4. Proposed loops will bring the existing water system into compliance with listed above criteria. Generally, with each phase of future development, an 8-inch looping water line with fire hydrants constructed every 300 feet that surround future phases will be required to be compliant with domestic demand and fire protection standards. Loops shall be provided by all future development or as indicated by NTA.

With the construction of additional building facilities, new fire sprinker waterline connections will be required to service these buildings. If existing buildings A, B, and C are required to be sprinklered in the future, the proposed improvements shown on Figure 4 would also satisfy water demands to these existing

buildings. In order to reduce costs, a system was designed that would incorporate the use of existing lines as much as practicable. Through the modeling the existing and new water system, it was determined that most of the existing pipes could remain in place, except the 8-inch water lines between building B and C and 8-inch line to building D need to be upsized to 12-inch line.

Within each loop of each design area, it was found that one pipe segment controls the size of all other pipes within the loop. This governing pipe must meet the City's minimum fire flow plus max day or peak hour demand requirements. All other pipes within that particular loop may need to be sized either equal to, or larger than the governing pipe.

To meet these peak hour and max day plus fire flows for each phase and for the fully developed airport site, the following recommendations are required:

South Area

New development within Phase 1 located in the South Area will require a 12-inch water line from the connection of the 12-inch water line in Airport Road to the 8-inch looped system surrounding the cluster of existing 12 aircraft hangers.. A second 8-inch water line connection from existing 12-inch water line in Airport road to the surrounding 8-inch looped line of phase 1 will be also be required with 6 additional fire hydrants spaced 300 feet apart (See Figure 4).

Existing development within the South Area is currently served with an single 8-inch water line. From the 12-inch main in Airport Road to the looping 8-inch water line around the existing hangers. As stated above, this line will need to be upsized to a 12-inch, in order to serve a new sprinkler connection to building C or any new development within the South Area. This new 12-inch service line could be reduced to as necessary if a second connection to Airport Road is made and more specific building use, water demand and fire flow data is available and the water system modeled and checked for adequate capacity and flow. This new 12-inch water line that connects the existing 8-inch looping water line serving existing 12 hangars within the South Area will improve water flow, pressure and hydrant flow of this existing looping 8-inch water line.

Mid-North Area

The Mid-North Area is currently served by a single 8-inch water line from the existing 12-inch water main in Airport Road to a 8-inch loop water system that feeds the various new fire hydrants surrounding the existing hangers and new hangers. This single 8-inch line that connects to the existing 8-inch looping water main through the Mid-North Area will need to be up sized to a 12-inch line when development occurs in phase C, phases 2 and 3. To upgrade and improve the existing fire service to surrounding the existing handers 6 additional fire hydrants are assumed to be installed at 300 feet spacings from the existing fire hydrants. As shown on Figure 4, 8-inch and 12-inch water lines shall be installed to connect all the installed fire hydrants and strengthen the existing system.

Additional development within the Mid-North Area shown as phases A1, B, 2 ancillary Development 1 will require installation of a 12" water line from the existing 12-inch line in Airport Road to a new looping 8-inch water line to Phases C and 2. The addition of this new 12-inch and 8-inch looping water lines with in the Mid-North Hangar water main area will bring the fire protection level up to the minimum fire flow required by the City. With development of phase 3 will be the installation 4- 5 fire hydrants and of a looping

8-inch water surrounding this new phase 3 development. With the construction of all new lines include the installation of fire hydrants at an assumed maximum spacing of 300', to meet current code requirements.

North Area

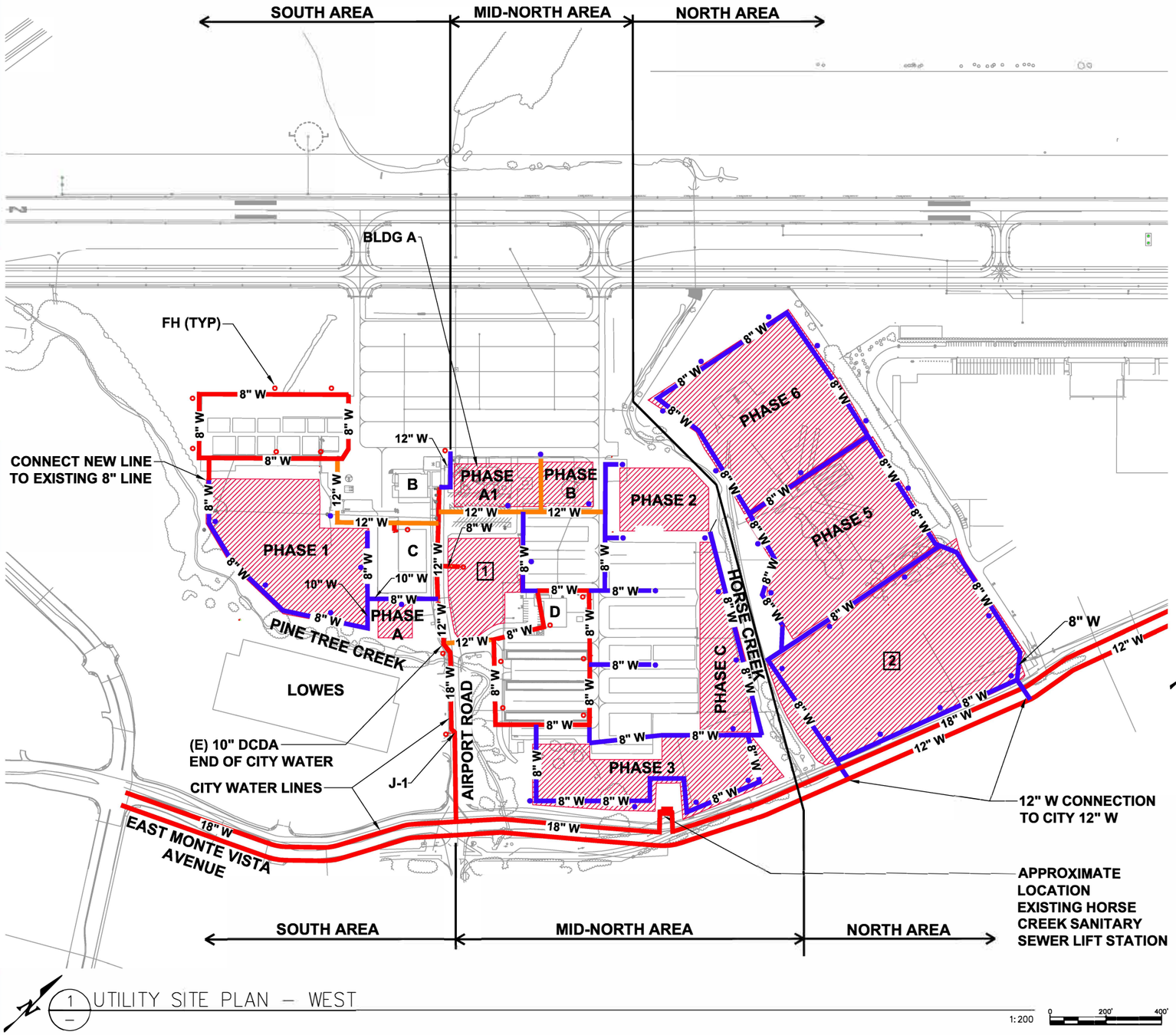
Development of phases 5, 6 and ancillary development area 2 in the North Hangar area will require the installation of 19 fire hydrants and a water loop surrounding each of the respective phases with 8"-12" water lines, as shown in Figure 4. This water main line loop will connect to the existing 18-inchwater main located in East Monte Vista Avenue in two places. With development of phase 5 a looping 8-inch water line surrounding the development with a single 12 water line connection to the existing City 18-inch water line in East Monte Vista Avenue will be required. With the development phase 6 another 8-inch looping water line surrounding the phase 6 development will be required. With the development of ancillary development 2 a second 12-inch connection to the existing 18-inch water line in East Monte Vista Avenue will be required.

Far North Area

The development of the Far North Area will require the installation of 11 fire hydrants and a looping 8-inch water lines surrounding the development, in order to meet fire flow and water demand requirements. The proposed connection of the 8-inch loop is to the existing 12-inch water main located in East Monte Vista Avenue. Depending on the building use and fire demand a second connection from the existing 12' water main in East Monte Vista and the interior 8-inch looping water lines may be required at full buildout.

NOTES:

1. **MAXIMUM SPACING OF FH IS 300 ft**
2. **ALL CONNECTIONS TO CITY WATER SYSTEM REQUIRES DOUBLE CHECK DETECTOR ASSEMBLY (DCDA).**
3. **THIS DIAGRAM IS FOR AIRPORT FIRE PROTECTION ONLY. DOMESTIC WATER AND IRRIGATION SYSTEMS ARE SEPARATE WATER LINES.**



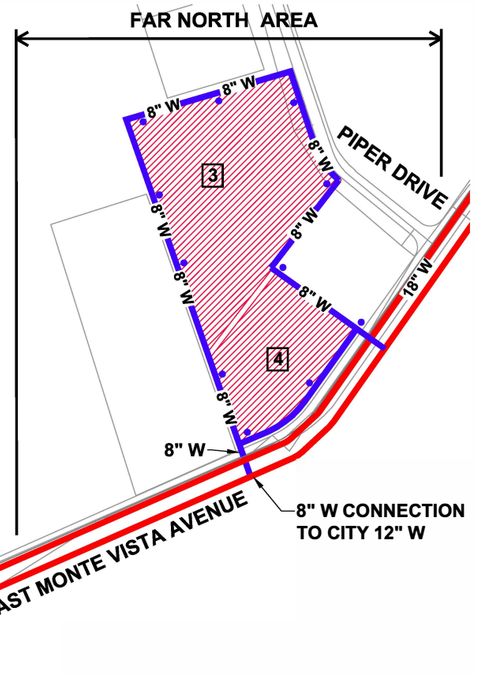
1 UTILITY SITE PLAN – WEST

1: 200

0 200' 400'

LEGEND

- EXISTING WATERLINE
- PROPOSED WATERLINE
- EXISTING 8" WATER LINE UPSIZED TO 12".
- NEW DEVELOPMENT AREA
- P-149 WATER CALCULATION DATA POINTS
- PHASE X DEVELOPMENT PHASES (AERONAUTICAL)
- 1 ANCILLARY DEVELOPMENT AREAS (COMMERCIAL/LIGHT–INDUSTRIAL)
- EXISTING FH
- NEW FH

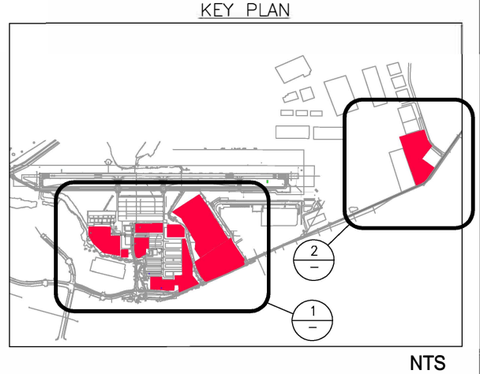


2 UTILITY SITE PLAN – FAR NORTH AREA

1: 200

0 200' 400'

KEY PLAN



NTS

KITCHELL
2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

PROPOSED MASTER WATER PLAN

SHEET: FIGURE 4

DATE: 4/21/18

SCALE: AS NOTED

JOB NO. 6112A3

ESTIMATED COSTS (2018 Dollars) – Water

A preliminary cost analysis has been completed for the proposed improvements listed above and is summarized in Table 1, below for each major area. Please note that demolition of existing structures is not included.

Table 1 – Water Main System Infrastructure

Construction Phase	***Description***	***Cost***
South Area	Pipes ranging in size from 8"-12" will need to be installed. Installation will also include 6 new hydrants at a maximum spacing of 300'.	$401,336
Mid-North Area	Pipes ranging in size from 8"-12" will need to be installed. Installation will also include 19 new hydrants at a maximum spacing of 300'.	$841,394
North Area	Pipes ranging in size from 8"-12" will need to be installed along with two connections to existing City system. Installation will also include 18 new hydrants at a maximum spacing of 300'.	$842,201
Far North Area	8" Pipes installed with a second connection to existing City water main will need to be installed. Installation will also include 11 new hydrants at a maximum spacing of 300'.	$451,755
Total		**$2,536,687**

*Estimates are as of July 1, 2018 and include allowances for cut/patch-related demolition.

SANITARY SEWER SYSTEM

BACKGROUND

According to the City's as-built drawings, Nut Tree Trunk Sewer Project, dated May 16, 2006, there is an 8-inch sanitary sewer main that ties into the City's system in Nut Tree Road. The system extends north across Pine Tree Creek to County Airport Road near Building B and provides service to Buildings A, B and C, as well as to the existing corporate hangars located within the South Area. Building D (Solano Community College) is on an independent septic tank system. Due to an independent contracting arrangement in place, this septic system is assumed to remain external from systemwide sewer requirements.[1] Refer to Figure 5 for a map of the proposed sanitary sewer plan.

The Airport was originally allocated 20,000 gallons per day for disposal into the City's sanitary sewer system as identified in the 1998 Northeast Sector Sewer Master Plan. Since the adoption of the Northeast Sector Sewer Master Plan by the City of Vacaville, 39 acres of non-airport property were purchased by the County and added to the Airport. The City has confirmed that the subject additional properties include a sewer allocation within the Northeast Sector Sewer Master Plan in the amount of 78,000 gallons per day.

On a separate line, the East Monte Vista Trunk Sewer Benefit District expanded the sewer main north along East Monte Vista Avenue by replacing the Pine Tree Sanitary Sewer Lift Station with the Horse Creek Sanitary Sewer Lift Station. In 1979 the NTA was granted 200 gpd "Historical Use" in exchange for the Sanitary Sewer Lift Station Easement. The district extended a gravity trunk main to the north of the Horse Creek Lift Station. The Horse Creek Lift Station force main to the south ties into the gravity system just south of Pine Tree Creek road crossing.

DESIGN CRITERIA

The following criteria were used in designing the future sanitary sewer system: City of Vacaville Standard Specifications and Drawings:

- Average Dry Weather Sanitary Sewer Allowable Flow is based on City master plan design demand of 2,000 gallons per day for existing areas served by the existing sewer main connecting into Nut Tree Road (Buildings A, B, and C and the corporate hangars within the South Area).
- Average Dry Weather Sanitary Sewer Allowable Flow is based on City master plan design demand of 2,000 gallons per day per acre for other vacant areas in the airport to a maximum allowable flow of 97,660 gallons per day (Airport Service Area of the East Monte Vista Sewer Benefit District).
- Peak dry weather factor is 2.5 times the average dry weather flow.
- Infiltration factor (I) is 1,000 gallons per day per acre.
- Pipe velocity minimum required to be 2 fps at design flow conditions.

[1] Permit information for septic systems maintained by Solano County can be obtained by contacting the Dept. of Resource Management at 707.786.6763.

- New 8-inch sanitary sewer collector mains to provide a design slope of 0.0035 ft/ft.
- New 6-inch commercial sanitary service lines to provide a design slope of 0.0035 ft/ft.
- Minimum sanitary sewer line cover is 6 feet at manholes and 3 feet at the building clean outs.
- The NTA's current sewer capacity remains at 200 gpd as the NTA has not purchased any additional capacity at the time of this report. Remaining available sewer capacity allocation for purchase by the NTA is 19,800 gpd. With the NTA's adjacent property purchases (Parcel Acquisitions) since 1998, the sewer capacity allocation associated with each of the purchased parcels has an accumulative sewer capacity (sum) of 77,860 gpd. See
- No parcel's sewer capacity can be reduced below the min. 2,000 gpd per ac allocation noted in the 1998 Northwest Sector Sewer Master Plan. See Appendix G (NTA Sewer Capacity Allocation).[2]

SYSTEM ASSESSMENT

To determine the sewer needs of the Nut Tree Airport, the existing 8-inch Vitrified Clay Pipe (VCP) line was analyzed to verify its capacity and see if it could accommodate the flows that would be generated by future airport development. To verify capacity, two different methods were used.

The more conservative of the two resulted in a capacity of 330,000 gallons per day (gpd)[3]. The first method utilized the City of Vacaville Sewer Design Standards and resulted in flows of approximately 93,000 gpd. The second utilized the number of restrooms, both existing and proposed (using a calculated average sewer generation rate of 300 gpd/restroom); and the size of the proposed T and Box hangars that would be constructed during Development Phase 1 (using a sewage generation rate of 1,500 gpd/Acre) and resulted in flows of approximately 7,200 gpd. Both the 93,000 gpd and the 7,200 gpd were compared to the capacity of the 8-inch VCP line and it was determined that the existing 8-inch VCP line could accommodate the increased demands generated by future Airport improvements in the South Area.

The existing 8-inch Nut Tree Road sanitary sewer main on the west side of Pine Tree Creek is currently the only public system that serves the airport.

The recommended sewer system improvements to meet current and future demand loads are shown on Figure 5, Proposed Sanitary Sewer Plan. It was determined that the existing 8-inch line is sufficient to handle the additional flows generated by the proposed airport improvements in the South Area and the additional limited service for Aeronautical Phase A1 and B, and Ancillary Area 1.

Due to the purchase of additional property and the associated increase of allowable flow by 78,000 gpd to 97,660 gpd, the forecasted increase of flows to the City's system will not exceed allowable limits; however, given the geographical location and separation of the North Area and the Far North Area, additional new

[2] Source: City of Vacaville

[3] City of Vacaville Sewer Design Stds; Appendix G, Table DS 6-2 at 0.0035 ft/ft slope.

points of connection to the City's system will be more practical and necessary for these two development areas.

Two tie-in locations along East Monte Vista Avenue are presented here. The first point of connection is sanitary sewer manhole number 4 (SSMH #4), which is located just south of the Pine Tree Creek crossing at East Monte Vista Avenue. No service connection is proposed at this SSMH.

The second service connection point is at sanitary sewer manhole number 5 (SSMH #5), just north of the Horse Creek Sanitary Sewer Lift Station. This service point can serve the local area for the Mid-North Area south of Horse Creek. The connection point for Ancillary Area 2 within the North Area, located north Horse Creek, is to an existing 8-inch stub-out that connects to the 27-inch sanitary sewer main located in East Monte Vista Avenue. Any service point exceeding 1,500 feet from this service manhole may require the installation of a sewer lift station. Lift stations are assumed to be owned, operated, and maintained by NTA.

Refer to Appendix E (Sewer Calculations) and Appendix H (Conceptual Construction Estimate) for additional information.

RECOMMENDATIONS

South Area

To meet the needs of the South Area, approximately 500' of 6-inch PVC pipe and installation of at least two (2) manholes two (2) cleanouts will be required.

Mid-North Area

For the Mid-North Area, approximately 275' of 6-inch PVC and installation of at least two (2) manholes two (2) cleanouts will be required.

North Area

The North Area will require approximately 1150' of 8-inch PVC with installation of three (3) manholes and two (2) cleanouts. An existing 8-inch provisionary stub up connection was identified by NTA as existing to the East Monte Vista Avenue 27-inch main.[4] An allocation of one (1) lift station is included in the budget for this area.

Far North Area

The Far North Area will require approximately 350' of 8-inch PVC with installation of three (3) manholes and two (2) cleanouts. An existing 8-inch provisionary stub-up connection to the City of Vacaville's sewer system is known to exist.[4]

[4] Source: City of Vacaville Nut Tree UMP Draft Review.

ESTIMATED COSTS (2018 Dollars) – Sanitary Sewer

A preliminary cost analysis has been completed for the proposed improvements listed above. A summary of costs is presented in Tables 2 and 3, below. Please note that demolition of any existing structures is not included.

Table 2 – Service Connection Fee-East Monte Vista Sewer District

Assessor's Parcel Number	*Service Area (Acres)*	*Cost per GrossAcre*	*Tots/ Cost*
129-240-200	4.0	$2,800*	$11,200
129-240-900	6.0	$2,800*	$16,800
129-210-100	-	$2,800**	-
Total	-	-	**$28,000**

* East Monte Vista Sewer Benefit Distnct-Resolution No. 1998-152

**Existing 8-inch (Nut Tree Road) has capacity. No fees or capacity issues are reported for the 8" line.

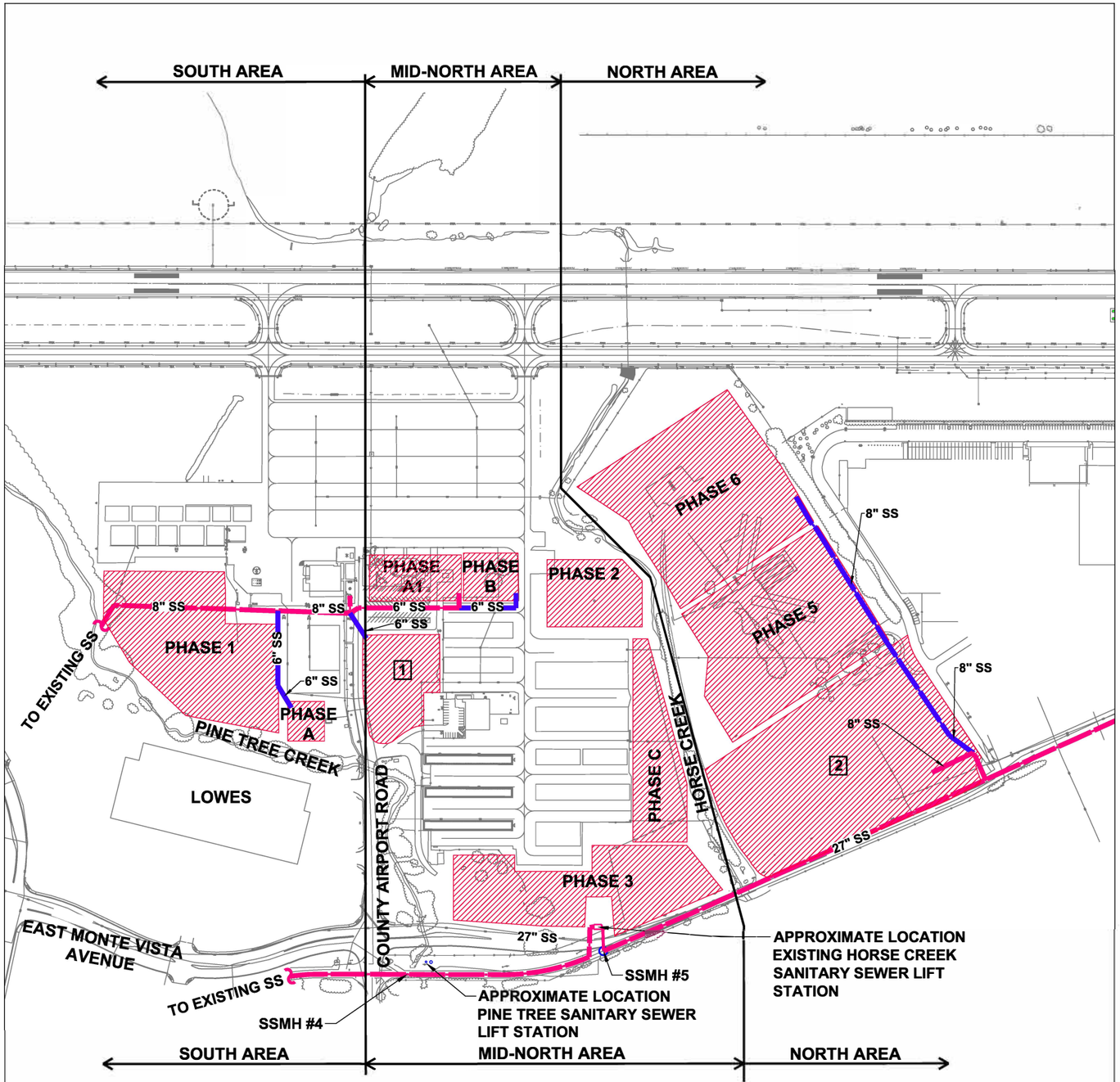
Estimates are as of July 1, 2018 and include allowances for cut/patch-related demolition.

Table 3 – Sewer System Infrastructure

Construction Phase	*Description*	*Cost*
South Area	Install approximately 350' of 6" PVC Pipe and 1 manhole.	$62,923
Mid-North Area	Install approximately 300' of 6" PVC Pipe and 3 manholes.	$45,982
North Area	Install approximately 1300' of 6" PVC Pipe and 3 manholes.	$158,518
Far North Area	Install approximately 400' of 6" PVC Pipe and 1 manhole.	$61,713
Lift Station	Install lift station.	$80,671
Total	-	**$409,807**

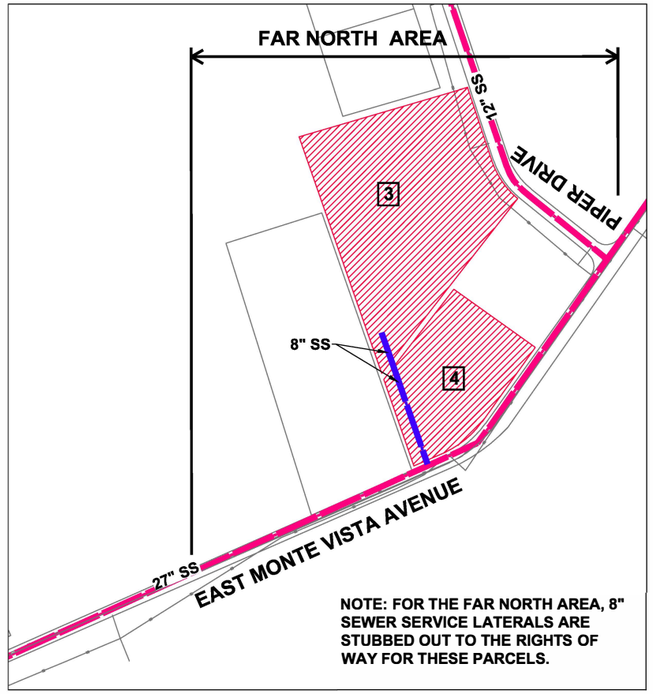
NOTE: Costs are approximate and are based on probable improvements. It is anticipated that at least one lift station will be required to serve the property.

Estimates are as of July 1, 2018 and include allowances for cut/patch-related demolition.

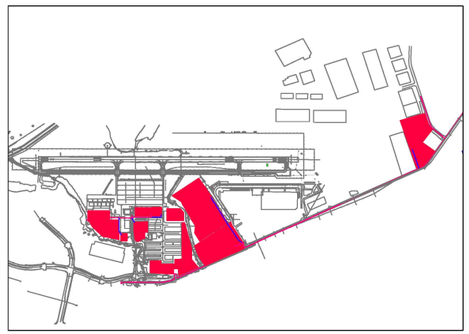


LEGEND

- EXISTING SEWERLINE
- PROPOSED SEWERLINE (OPTION 1)
- NEW DEVELOPMENT AREA
- PHASE X — DEVELOPMENT PHASES (AERONAUTICAL)
- 1 — ANCILLARY DEVELOPMENT AREAS (COMMERCIAL/LIGHT-INDUSTRIAL)



NOTE: FOR THE FAR NORTH AREA, 8" SEWER SERVICE LATERALS ARE STUBBED OUT TO THE RIGHTS OF WAY FOR THESE PARCELS.



NTS

200 100 0 200 400

SCALE: 1" = 200

NUT TREE AIRPORT
COUNTY OF SOLANO
CALIFORNIA

KITCHELL
2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

PROPOSED SANITARY SEWER PLAN

SHEET: FIGURE 5

DATE: 4/21/18

SCALE: AS NOTED

JOB NO. 6112A3

STORM DRAINAGE SYSTEM

BACKGROUND

The existing Nut Tree Airport storm drain lines consist of a series of 12-inch, 18-inch, and 24-inch pipes that currently drain into Pine Tree Creek, Horse Creek, and a detention basin north of RWY 20. Depending on the facility, storm drain maintenance is provided by the Airport, the City of Vacaville and the Solano County Water Agency.

DESIGN CRITERIA

The storm drain system and master planned improvements were analyzed and designed utilizing Autodesk Storm and Sanitary Analysis 2015. Refer to Figure 6A (Storm Drainage Areas) and Figure 6B (Master Storm Drain Plan).

The following criteria and assumptions were used in designing the future storm drain system (the demand flows are based on City of Vacaville requirements):

- All existing storm water runoff from the grass area adjacent to Horse Creek currently flows into the creek and not into the existing storm drain system.

- The existing storm drain system throughout the site is functioning and the pipes are sized to handle the existing flow.

- Based on the City of Vacaville Storm Drain Design Standards (Section DS 4), an average I_{10} (10-year storm) was utilized for the storm calculations. To determine the average I_{10}, Figure 2-2, Figure 3-2 and Table 3-4B of the Solano County Water Agency (SCWA) Hydrology Manual were utilized. An average Tc (time of concentration) was developed utilizing Figure 3-2 based on existing conditions at the Nut Tree Airport.

- Calculation areas were based on potential projects causing changes from pervious areas to impervious areas. Proposed projects that are planned on existing impervious areas were not considered due to no change in runoff coefficients based on the existing storm drain system functioning properly.

- The gray shaded area on Figure 6A identifies the existing impervious area, whereas the blue shaded area is existing pervious area (grass) that will become impervious per the new projects, and utilize the existing storm drains servicing the area.

SYSTEM ASSESSMENT

The recommended storm drain system improvements to meet current and future demand loads are shown in Figure 6B.

The proposed improvements to the airfield will result in increased impervious areas, which will increase the amount of storm water runoff from the site. Due to the increases in runoff, portions of the existing system will need to be upgraded by increasing the size of the pipes. Additional lines will also need to be installed to handle the increased load. Calculations are provided in Appendix F.

RECOMMENDATIONS

- **South Area**

  The South Area will require the installation of 12-inch or 24-inch pipes and catch basins. Phase A-14A will drain to Pine Tree creek, while Phase A-14B will connect into the existing storm drain system via the SD-14B segment.

- **Mid-North Area**

  The Mid-North Area will require the installation of pipes ranging in size from 15"-30" with catch basins. The pipes in the Mid-North Area Phases will drain directly into either Pine Tree Creek or Horse Creek.

- **North Area**

  The North Area will require the installation of 24-inch pipes. The pipes in Phases A-16A and A-16B will drain directly into Horse creek.

- **Far North Area**

  The Far North Area will require the installation of an 18-inch pipe. This pipe will connect to the existing storm drain system in East Monte Vista avenue and will serve to drain Phase A-18. There are existing pipes in Phase A-17. A connection to this system through the installation of a catch basin will serve to drain this area.

  The Airport also utilizes an existing detention basin located north of the end Runway 20 to accommodate Runway 2-20 storm runoff. The subject basin also accommodates storm flow runoff from an adjoining commercial-light industrial area located west of the airport. As the Airport Master Plan and Airport Layout Plan do not show changes in the areas which drain to the existing detention basin, it is assumed that no changes will need to be made to the basin.

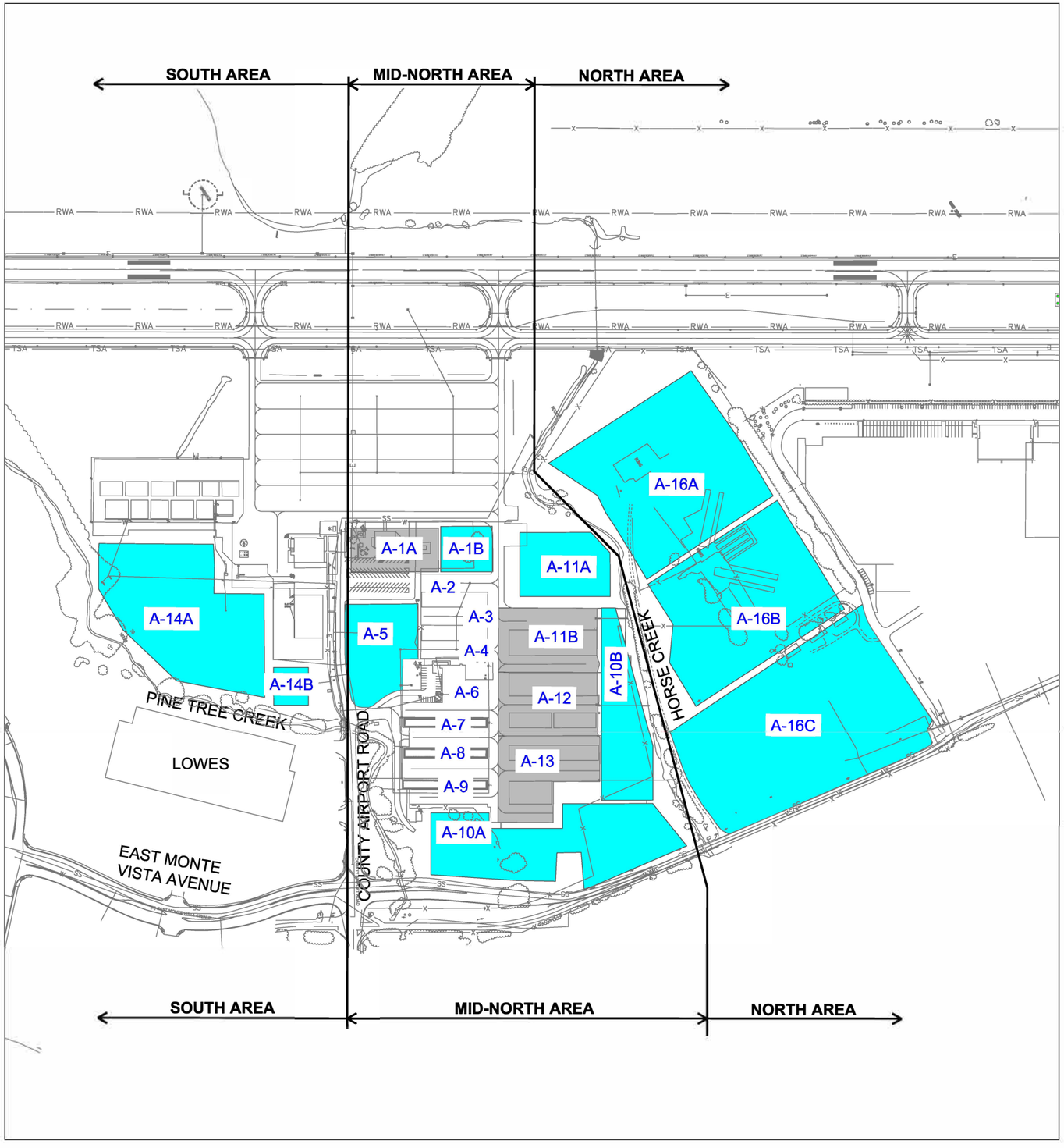
ESTIMATED COSTS (2018 Dollars) - Storm Drain

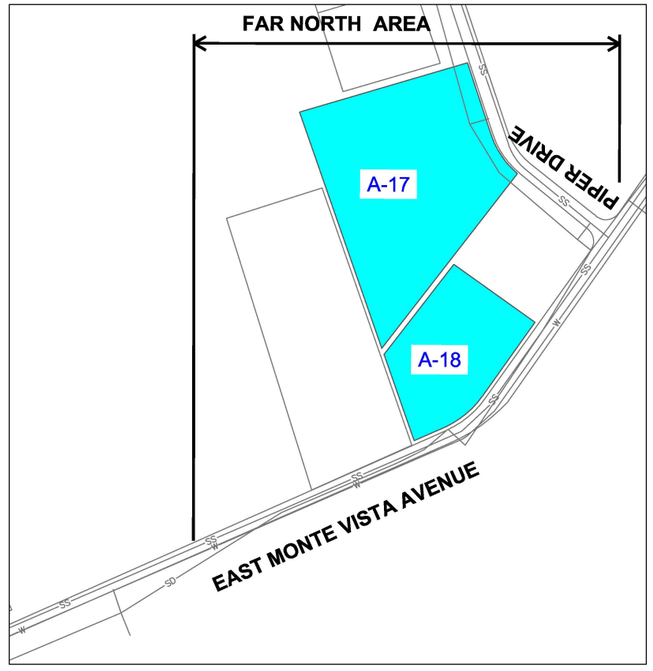
A preliminary cost analysis has been completed for the proposed improvements listed above. A summary of costs is presented in Table 4, below. Please note that demolition of any existing structures is not included.

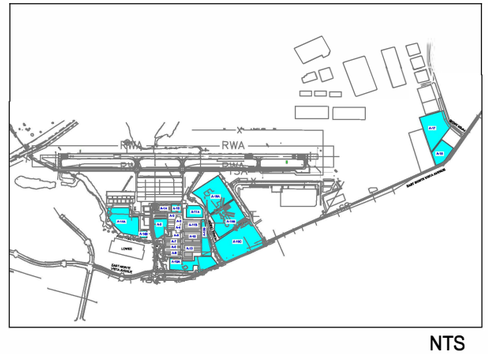
Table 4 – Storm Drain System Infrastructure

Construction Phase	***Description***	***Cost***
South Area	Install a combination of 12" and 24" RCP. Install 4 catch basins.	$33,357
Mid-North Area	Install a combination of 15", 18", 21", 24", 27", and 30" RCP. Install 16 catch basins.	$377,740
North Area	Install approximately 125' of 24" RCP. Install 3 catch basins.	$40,335
Far North Area	Install approximately 65' of 18" RCP. Install 2 catch basins.	$19,079
Total		**$470,511**

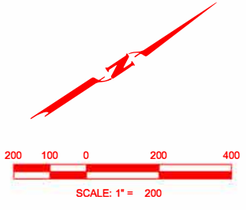
*Estimates are as of July 1, 2018 and include allowances for cut/patch-related demolition.







NTS



PROPOSED ADDITIONAL IMPERVIOUS AREA

EXISTING IMPERVIOUS AREA USED FOR CALCULATIONS

NUT TREE AIRPORT
COUNTY OF SOLANO
CALIFORNIA

KITCHELL
2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

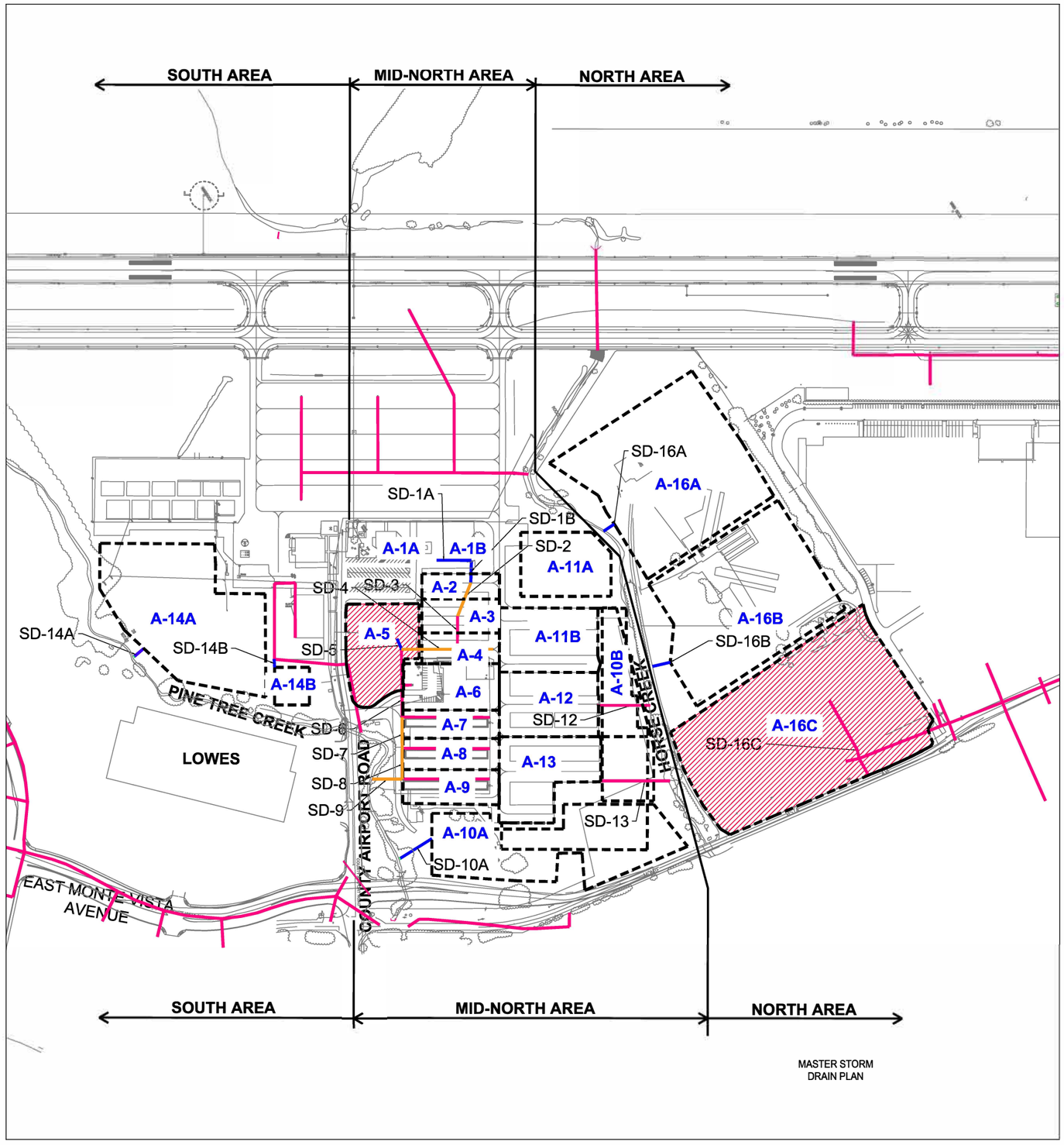
STORM DRAINAGE AREAS

SHEET: FIGURE 6A

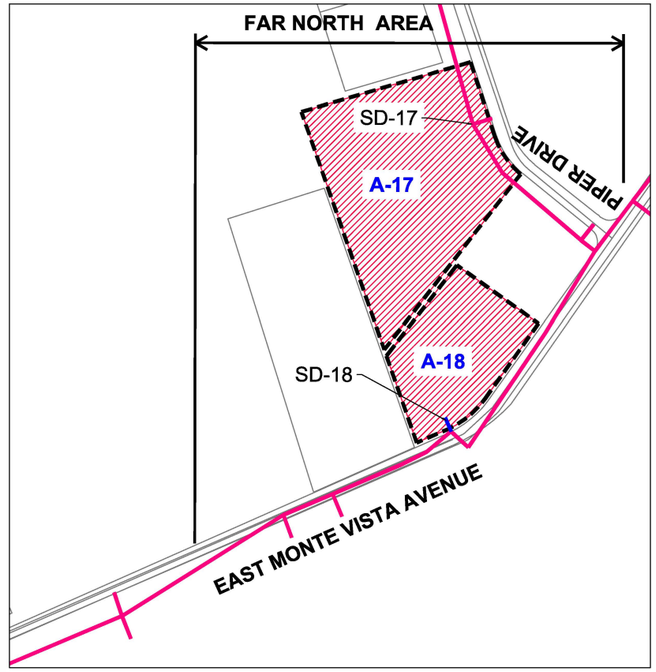
DATE: 4/21/18

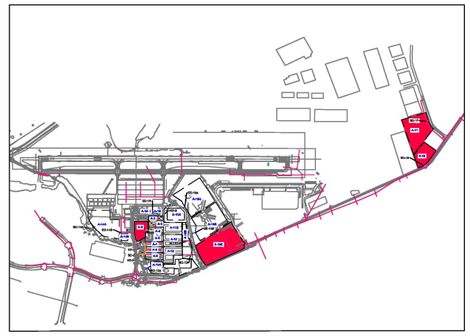
SCALE: AS NOTED

JOB NO. 6112A3



MASTER STORM DRAIN PLAN





NTS

EXISTING STORM DRAIN

PROPOSED STORM DRAIN

UPSIZED STORM DRAIN

APPROXIMATE STORM DRAIN AREA NEW

DEVELOPMENT AREAS

PHASE X DEVELOPMENT PHASES (AERONAUTICAL)

ANCILLARY DEVELOPMENT AREAS (COMMERCIAL/LIGHT-INDUSTRIAL)

200 100 0 200 400

SCALE: 1" = 200

Storm Pipe Table		
Storm Pipe	Existing Pipe Size	Propopsed Pipe size
SD-1A	None	15"
SD-1B	None	15"
SD-2	12"	18"
SD-3	18"	18"
SD-4	18"	21"
SD-5	None	24"
SD-6	24"	24"
SD-7	24"	27"
SD-8	24"	27"
SD-9	24"	30"
SD-10A	None	21"
SD-12	15"	15"
SD-13	18"	18"
SD-14A	None	24"
SD-14B	None	12"
SD-16A	None	24"
SD-16B	None	24"
SD-16C	27"	27"
SD-17	36"	36"
SD-18	None	18"

NUT TREE AIRPORT
COUNTY OF SOLANO
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SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

MASTER STORM DRAIN PLAN

SHEET: FIGURE 6B

DATE: 4/21/18

SCALE: AS NOTED

JOB NO. 6112A3

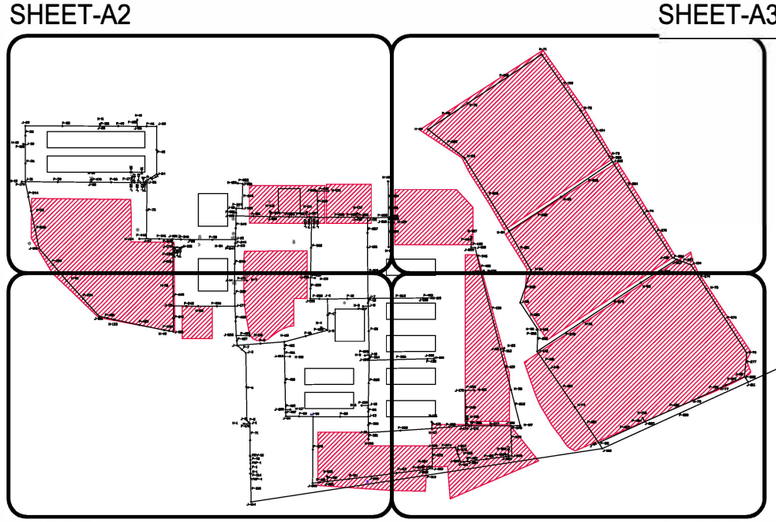
APPENDIX A – PROPOSED WATER PLAN

KITCHELL
2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

SHEET-A6

SHEET-A2

SHEET-A3



SHEET-A4

SHEET-A5

1 PROPOSED UTILITY LAYOUT – OVERALL

1: 300

0 100' 200'

NUT TREE AIRPORT

UTILITY MASTER PLAN

APPENDIX A

PROPOSED WATER LAYOUT MODEL

SHEET: A1

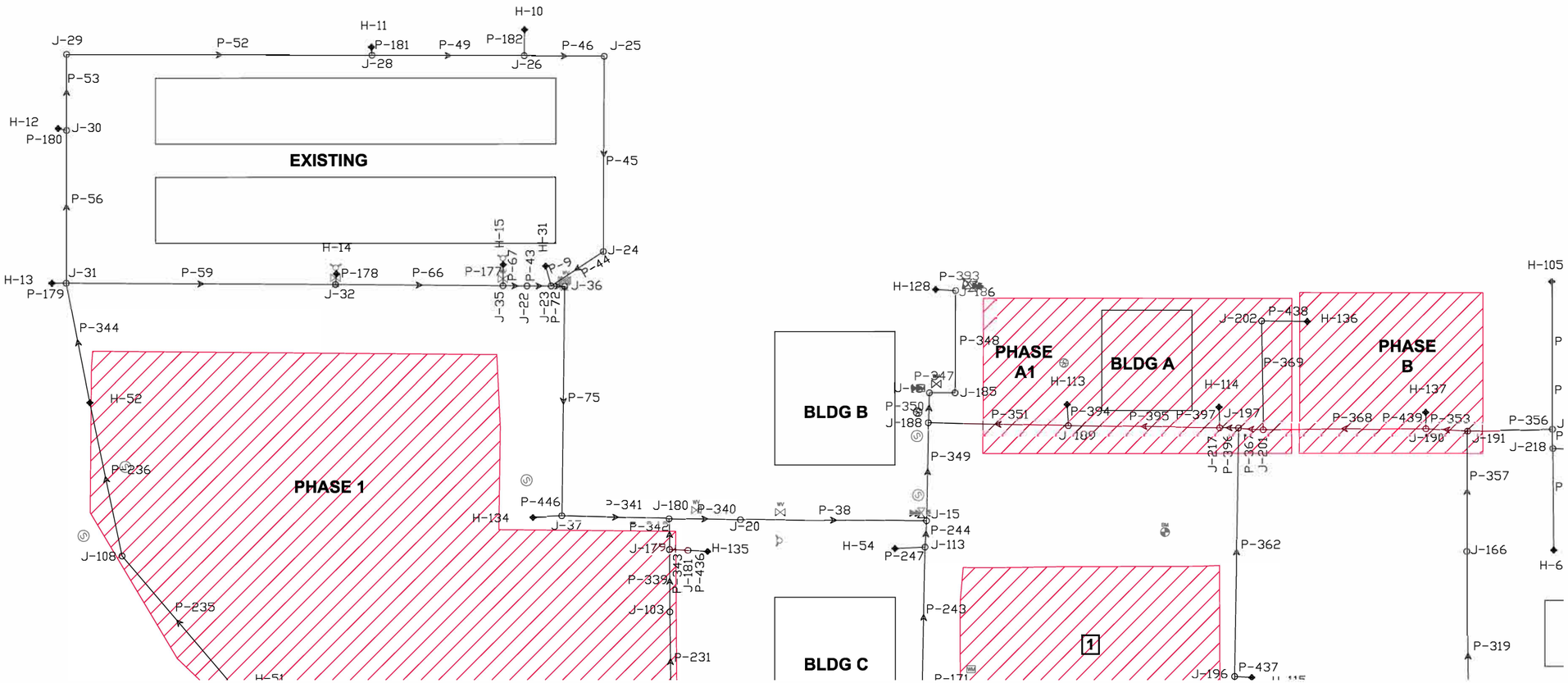
DATE: 4/21/18

SCALE: AS NOTED

JOB NO. 6112A3

LEGEND

▨	NEW DEVELOPMENT AREA
P-149	WATER CALCULATION DATA POINTS
PHASE X	DEVELOPMENT PHASES (AERONAUTICAL)
1	ANCILLARY DEVELOPMENT AREAS (COMMERCIAL/LIGHT-INDUSTRIAL)



1 — PROPOSED UTILITY LAYOUT – SHEET A2

1" = 60' 0 60' 120'

KITCHELL
2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

APPENDIX A

PROPOSED WATER LAYOUT MODEL

SHEET:	A2
DATE:	4/21/18
SCALE:	AS NOTED
JOB NO.	6112A3

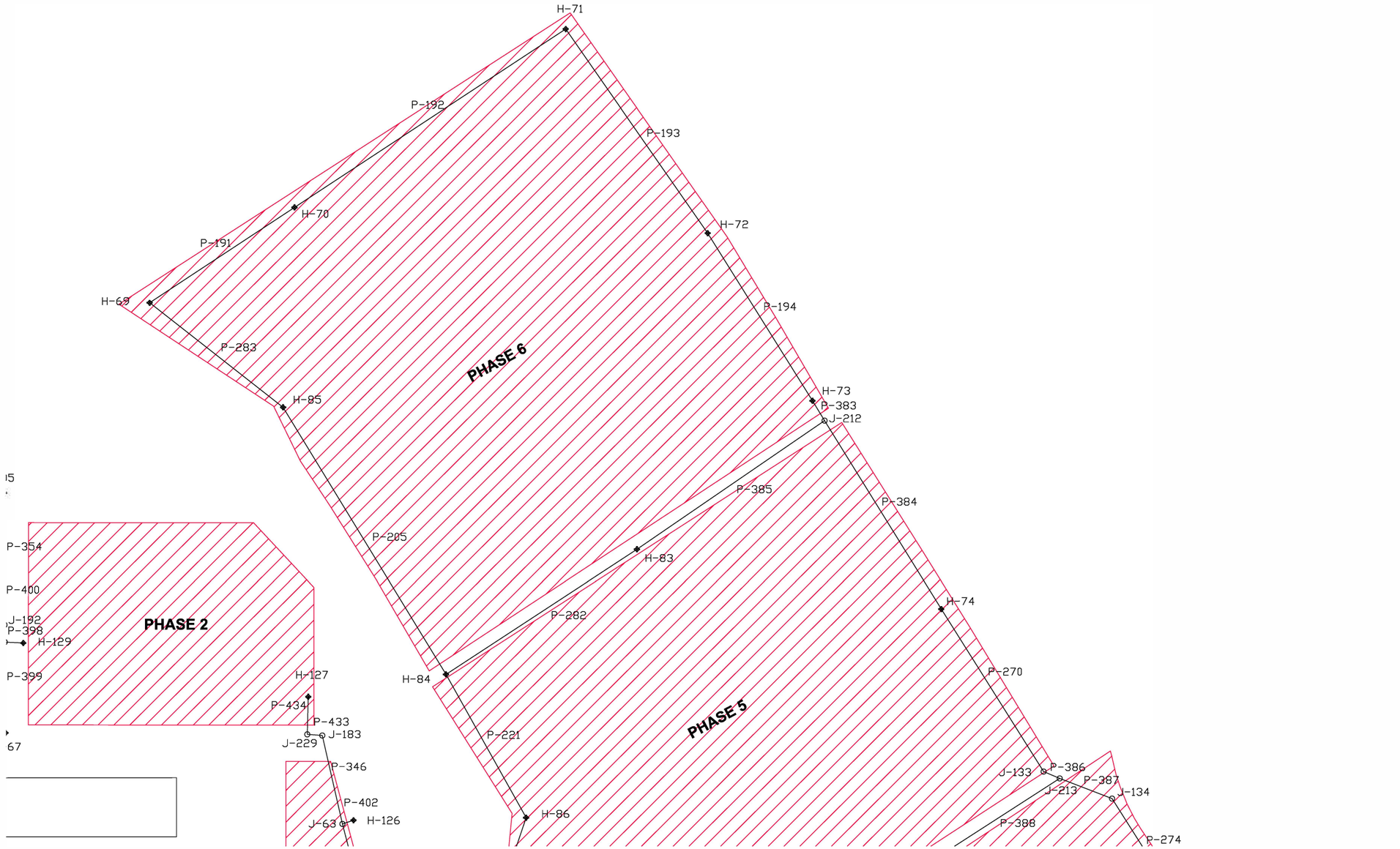
LEGEND

NEW DEVELOPMENT AREA

P-149 WATER CALCULATION DATA POINTS

PHASE X DEVELOPMENT PHASES (AERONAUTICAL)

1 ANCILLARY DEVELOPMENT AREAS (COMMERCIAL/LIGHT-INDUSTRIAL)



1 PROPOSED UTILITY LAYOUT – SHEET A3

1" = 60' 0 60' 120'

KITCHELL
2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

APPENDIX A

PROPOSED WATER LAYOUT MODEL

SHEET: A3

DATE: 4/21/18

SCALE: AS NOTED

JOB NO. 6112A3

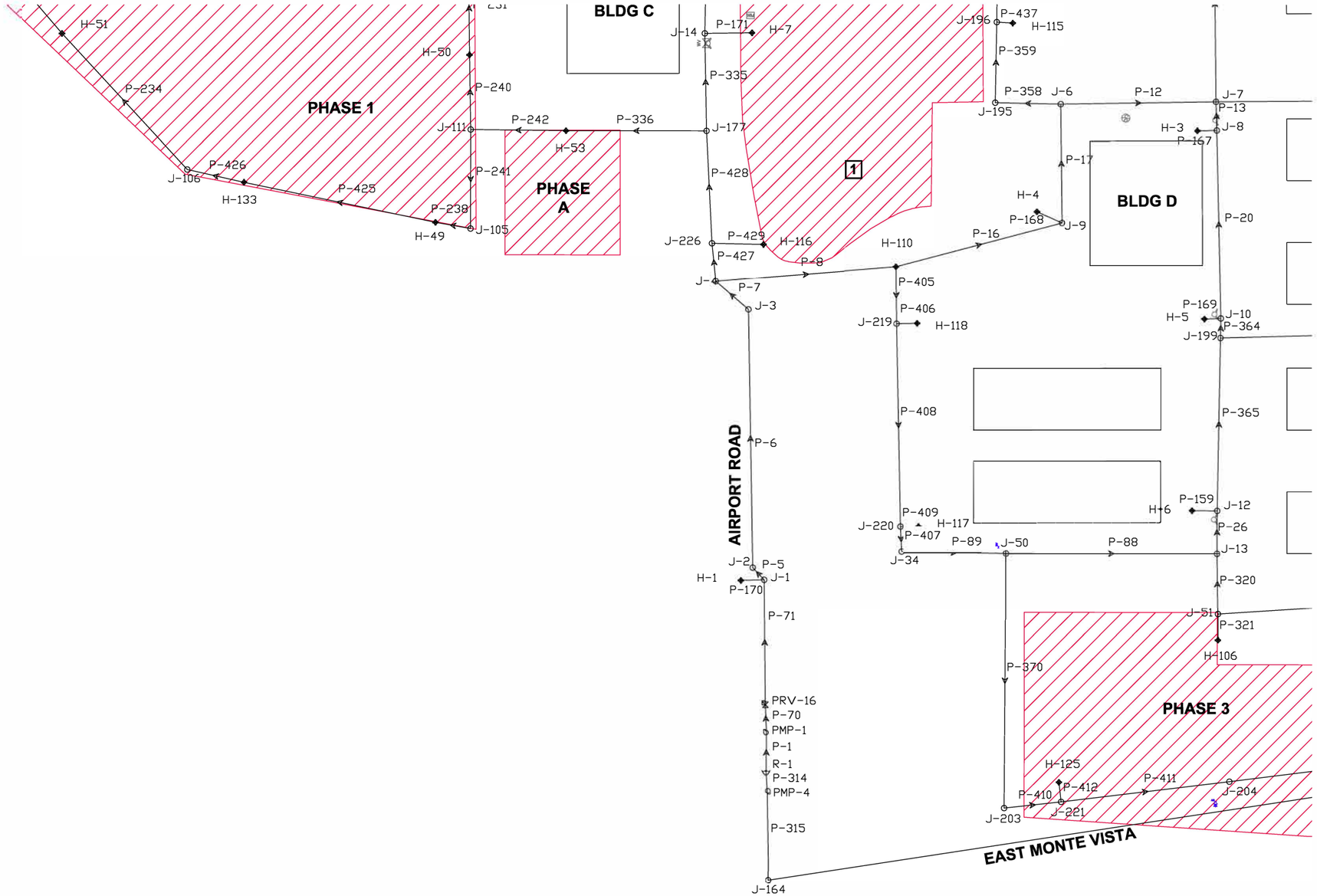
LEGEND

NEW DEVELOPMENT AREA

P-149 WATER CALCULATION DATA POINTS

PHASE X DEVELOPMENT PHASES (AERONAUTICAL)

1 ANCILLARY DEVELOPMENT AREAS (COMMERCIAL/LIGHT-INDUSTRIAL)



1 PROPOSED UTILITY LAYOUT – SHEET A4

1" = 60' 0 60' 120'

KITCHELL
2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

APPENDIX A

PROPOSED WATER LAYOUT MODEL

SHEET:	A4
DATE:	4/21/18
SCALE:	AS NOTED
JOB NO.	6112A3

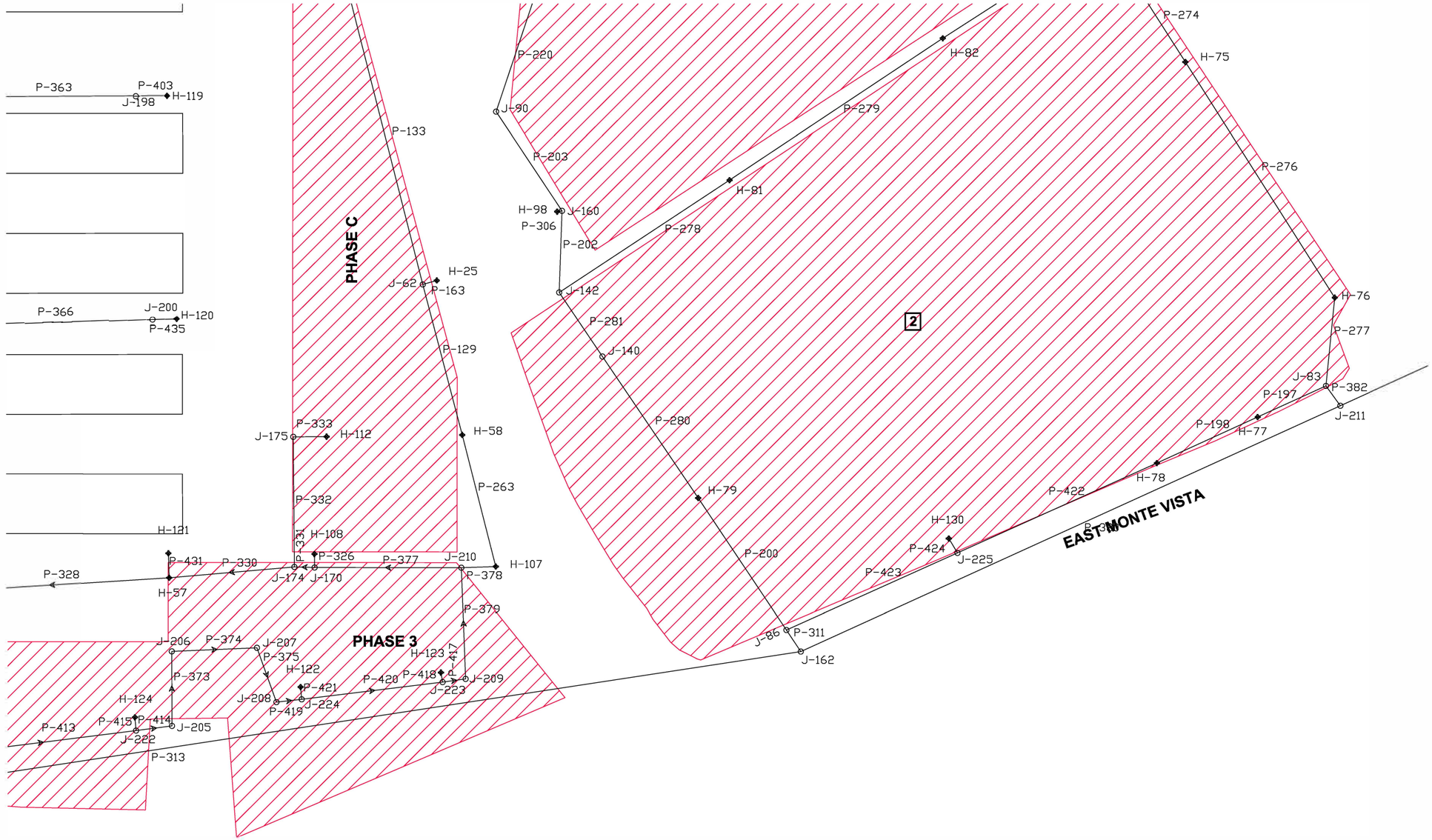
LEGEND

NEW DEVELOPMENT AREA

P-149 WATER CALCULATION DATA POINTS

PHASE X DEVELOPMENT PHASES (AERONAUTICAL)

1 ANCILLARY DEVELOPMENT AREAS (COMMERCIAL/LIGHT-INDUSTRIAL)



1 PROPOSED UTILITY LAYOUT – SHEET A5

1" = 60' 0 60' 120'

KITCHELL
2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

APPENDIX A

PROPOSED WATER LAYOUT MODEL

SHEET: A5

DATE: 4/21/18

SCALE: AS NOTED

JOB NO. 6112A3

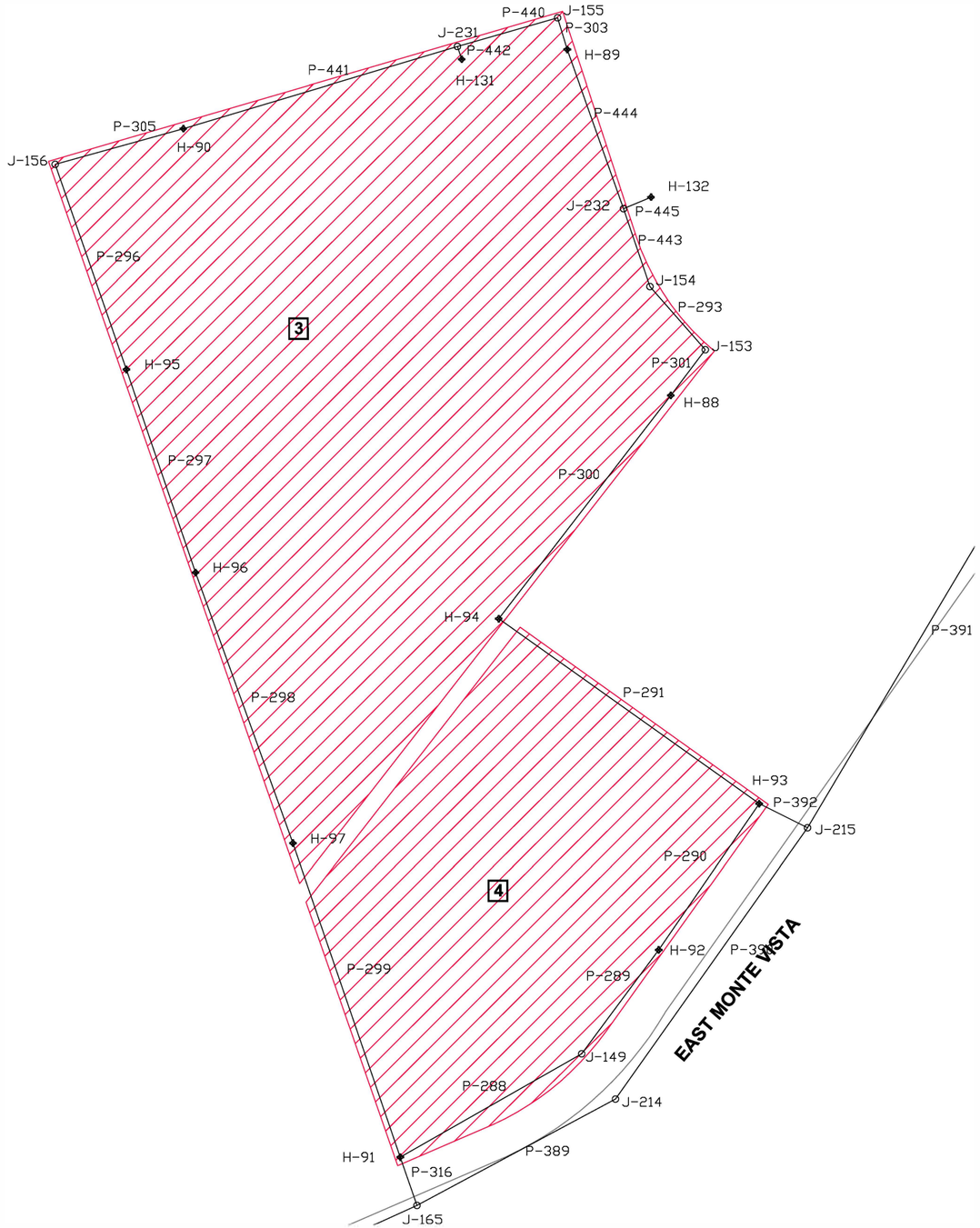
LEGEND

NEW DEVELOPMENT AREA

P-149 WATER CALCULATION DATA POINTS

PHASE X DEVELOPMENT PHASES (AERONAUTICAL)

1 ANCILLARY DEVELOPMENT AREAS (COMMERCIAL/LIGHT-INDUSTRIAL)



1 — PROPOSED UTILITY LAYOUT – SHEET A6

1" = 60'

0 60' 120'

KITCHELL

2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

APPENDIX A

PROPOSED WATER LAYOUT MODEL

SHEET:	A6
DATE:	4/21/18
SCALE:	AS NOTED
JOB NO.	6112A3

Appendix A
Corresponding Model Data

Source: Bentley Systems Water CAD

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
H-1	Zone - 2	2	TRUE	1500	8000	1500	8000	30	47	30	56	J-29	(N/A)	56	J-29	TRUE
H-3	Zone - 2	4	TRUE	1500	4668	1500	4668	30	30	30	34	J-8	(N/A)	34	J-8	TRUE
H-4	Zone - 2	4	TRUE	1500	5987	1500	5987	30	30	30	35	J-9	(N/A)	35	J-9	TRUE
H-5	Zone - 2	3	TRUE	1500	3875	1500	3875	30	30	30	33	J-10	(N/A)	33	J-10	TRUE
H-6	Zone - 2	3	TRUE	1500	3846	1500	3846	30	30	30	33	J-12	(N/A)	33	J-12	TRUE
H-7	Zone - 2	2	TRUE	3000	7500	3000	7500	30	37	30	46	J-29	(N/A)	46	J-29	TRUE
H-10	Zone - 2	3	TRUE	1500	3671	1500	3671	30	30	30	33	J-26	(N/A)	33	J-26	TRUE
H-11	Zone - 2	3	TRUE	1500	3345	1500	3345	30	30	30	32	J-28	(N/A)	32	J-28	TRUE
H-12	Zone - 2	3	TRUE	1500	3489	1500	3489	30	30	30	32	J-30	(N/A)	32	J-30	TRUE
H-13	Zone - 2	4	TRUE	1500	4188	1500	4188	30	30	30	33	J-31	(N/A)	33	J-31	TRUE
H-14	Zone - 2	3	TRUE	1500	3843	1500	3843	30	30	30	33	J-32	(N/A)	33	J-32	TRUE
H-15	Zone - 2	4	TRUE	1500	4431	1500	4431	30	30	30	34	J-35	(N/A)	34	J-35	TRUE
H-25	Zone - 2	3	TRUE	1500	1871	1500	1871	30	30	30	32	J-63	(N/A)	32	J-63	TRUE
H-31	Zone - 2	4	TRUE	1500	5847	1500	5847	30	30	30	36	J-23	(N/A)	36	J-23	TRUE
H-49	Zone - 2	3	TRUE	3000	5239	3000	5239	30	30	30	35	J-106	(N/A)	33	H-133	TRUE
H-50	Zone - 2	4	TRUE	1500	5564	1500	5564	30	30	30	39	J-103	(N/A)	39	J-103	TRUE
H-51	Zone - 2	3	TRUE	1500	4610	1500	4610	30	30	30	32	J-106	(N/A)	32	J-106	TRUE
H-52	Zone - 2	3	TRUE	1500	4516	1500	4516	30	30	30	32	J-108	(N/A)	32	J-108	TRUE
H-53	Zone - 2	2	TRUE	3000	7500	3000	7500	30	32	30	37	J-111	(N/A)	37	J-111	TRUE
H-54	Zone - 2	3	TRUE	3000	5804	3000	5804	30	30	30	49	J-29	(N/A)	49	J-29	TRUE
H-57	Zone - 2	5	TRUE	1500	3123	1500	3123	30	31	30	30	H-108	(N/A)	30	H-108	TRUE
H-58	Zone - 2	4	TRUE	1500	2203	1500	2203	30	30	30	30	H-25	(N/A)	30	H-25	TRUE
H-67	Zone - 2	3	TRUE	1500	2292	1500	2292	30	30	30	33	H-105	(N/A)	31	J-218	TRUE
H-69	Zone - 3	6	TRUE	1500	5891	1500	5891	30	30	30	39	H-70	(N/A)	39	H-70	TRUE
H-70	Zone - 3	6	TRUE	1500	5785	1500	5785	30	30	30	43	H-71	(N/A)	43	H-71	TRUE
H-71	Zone - 3	6	TRUE	1500	5846	1500	5846	30	30	30	38	H-70	(N/A)	38	H-70	TRUE
H-72	Zone - 3	6	TRUE	1500	6021	1500	6021	30	30	30	38	H-71	(N/A)	38	H-71	TRUE
H-73	Zone - 3	6	TRUE	1500	6478	1500	6478	30	30	30	33	H-72	(N/A)	33	H-72	TRUE
H-74	Zone - 3	7	TRUE	1500	7989	1500	7989	30	30	30	33	H-83	(N/A)	33	H-83	TRUE
H-75	Zone - 3	3	TRUE	3000	7500	3000	7500	30	76	30	76	H-83	(N/A)	58	J-29	TRUE
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H-78	Zone - 3	4	TRUE	3000	7500	3000	7500	30	65	30	78	H-77	(N/A)	58	J-29	TRUE
H-79	Zone - 3	3	TRUE	3000	7500	3000	7500	30	84	30	82	H-83	(N/A)	58	J-29	TRUE
H-81	Zone - 3	4	TRUE	3000	7500	3000	7500	30	54	30	69	H-82	(N/A)	58	J-29	TRUE
H-82	Zone - 3	4	TRUE	3000	7500	3000	7500	30	53	30	69	H-81	(N/A)	58	J-29	TRUE
H-83	Zone - 3	6	TRUE	1500	6498	1500	6498	30	30	30	46	H-84	(N/A)	46	H-84	TRUE
H-84	Zone - 3	6	TRUE	1500	6613	1500	6613	30	30	30	35	H-85	(N/A)	35	H-85	TRUE
H-85	Zone - 3	6	TRUE	1500	6085	1500	6085	30	30	30	33	H-69	(N/A)	33	H-69	TRUE
H-86	Zone - 3	6	TRUE	1500	6183	1500	6183	30	30	30	60	J-90	(N/A)	58	J-29	TRUE
H-88	Zone - 4	24	TRUE	3000	4449	3000	4449	30	30	30	30	J-153	(N/A)	30	J-153	TRUE
H-89	Zone - 4	5	TRUE	3000	4367	3000	4367	30	30	30	35	J-155	(N/A)	35	J-155	TRUE
H-90	Zone - 4	5	TRUE	3000	4583	3000	4583	30	30	30	52	J-155	(N/A)	46	J-231	TRUE
H-91	Zone - 4	4	TRUE	3000	7500	3000	7500	30	46	30	43	J-156	(N/A)	43	J-156	TRUE
H-92	Zone - 4	5	TRUE	3000	5821	3000	5821	30	30	30	50	J-149	(N/A)	50	J-149	TRUE
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H-94	Zone - 4	5	TRUE	3000	4793	3000	4793	30	30	30	48	J-153	(N/A)	48	J-153	TRUE
H-95	Zone - 4	5	TRUE	3000	5465	3000	5465	30	30	30	35	J-156	(N/A)	35	J-156	TRUE
H-96	Zone - 4	5	TRUE	3000	5955	3000	5955	30	30	30	31	H-95	(N/A)	31	H-95	TRUE
H-97	Zone - 4	6	TRUE	3000	6561	3000	6561	30	30	30	31	H-96	(N/A)	31	H-96	TRUE
H-98	Zone - 3	6	TRUE	1500	6572	1500	6572	30	30	30	51	J-160	(N/A)	51	J-160	TRUE
H-105	Zone - 2	3	TRUE	1500	2203	1500	2203	30	30	30	36	H-67	(N/A)	35	J-192	TRUE
H-106	Zone - 2	3	TRUE	1500	2071	1500	2071	30	30	30	50	H-108	(N/A)	50	H-108	TRUE
H-107	Zone - 2	5	TRUE	1500	2624	1500	2624	30	32	30	30	H-25	(N/A)	30	H-25	TRUE

Appendix A
Corresponding Model Data

Source: Bentley Systems Water CAD

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
H-108	Zone - 2	3	TRUE	1500	1992	1500	1992	30	30	30	45	H-25	(N/A)	45	H-25	TRUE
H-110	Zone - 2	2	TRUE	1500	8000	1500	8000	30	46	30	46	H-108	(N/A)	46	H-108	TRUE
H-112	<None>	5	TRUE	1500	3009	1500	3009	30	64	30	30	J-174	(N/A)	28	H-108	TRUE
H-113	<None>	3	TRUE	1500	6006	1500	6006	30	30	30	41	J-192	(N/A)	40	H-105	TRUE
H-114	<None>	5	TRUE	1500	5652	1500	5652	30	36	30	30	J-192	(N/A)	29	H-105	TRUE
H-115	<None>	3	TRUE	1500	5409	1500	5409	30	30	30	36	J-192	(N/A)	35	H-105	TRUE
H-116	<None>	3	TRUE	1500	7282	1500	7282	30	30	30	54	J-188	(N/A)	53	J-30	TRUE
H-117	<None>	5	TRUE	1500	5156	1500	5156	30	62	30	30	J-220	(N/A)	30	J-220	TRUE
H-118	<None>	4	TRUE	1500	7629	1500	7629	30	45	30	30	J-219	(N/A)	30	J-219	TRUE
H-119	<None>	3	TRUE	1500	3026	1500	3026	30	30	30	39	J-198	(N/A)	39	J-198	TRUE
H-120	<None>	3	TRUE	1500	2853	1500	2853	30	30	30	36	J-200	(N/A)	36	J-200	TRUE
H-121	<None>	5	TRUE	1500	3239	1500	3239	30	66	30	30	J-174	(N/A)	28	H-108	TRUE
H-122	<None>	5	TRUE	1500	3244	1500	3244	30	35	30	30	J-210	(N/A)	28	H-25	TRUE
H-123	<None>	5	TRUE	1500	3035	1500	3035	30	53	30	30	J-210	(N/A)	28	H-25	TRUE
H-124	<None>	3	TRUE	1500	3205	1500	3205	30	30	30	34	J-222	(N/A)	34	J-222	TRUE
H-125	<None>	3	TRUE	1500	3531	1500	3531	30	30	30	37	J-221	(N/A)	37	J-221	TRUE
H-126	<None>	5	TRUE	1500	2121	1500	2121	30	66	30	30	J-229	(N/A)	23	J-63	TRUE
H-127	<None>	5	TRUE	1500	2015	1500	2015	30	63	30	30	J-229	(N/A)	26	J-63	TRUE
H-128	<None>	3	TRUE	1500	4193	1500	4193	30	30	30	39	J-186	(N/A)	39	J-186	TRUE
H-129	<None>	5	TRUE	1500	2340	1500	2340	30	72	30	30	J-218	(N/A)	30	J-218	TRUE
H-130	<None>	4	TRUE	1500	8000	1500	8000	30	76	30	59	J-188	(N/A)	58	J-29	TRUE
H-131	<None>	14	TRUE	1500	4397	1500	4397	30	70	30	30	J-231	(N/A)	30	J-231	TRUE
H-132	<None>	13	TRUE	1500	4357	1500	4357	30	62	30	30	J-232	(N/A)	30	J-232	TRUE
H-133	<None>	3	TRUE	1500	4719	1500	4719	30	30	30	52	J-180	(N/A)	32	J-106	TRUE
H-134	<None>	2	TRUE	1500	8000	1500	8000	30	31	30	32	J-180	(N/A)	28	J-36	TRUE
H-135	<None>	3	TRUE	1500	6597	1500	6597	30	30	30	42	J-180	(N/A)	31	J-103	TRUE
H-136	<None>	3	TRUE	1500	4521	1500	4521	30	30	30	36	J-192	(N/A)	35	H-105	TRUE
H-137	<None>	5	TRUE	1500	3780	1500	3780	30	65	30	30	J-192	(N/A)	29	H-105	TRUE
J-1	Zone - 2	2	TRUE	1500	8000	1501	8001	30	59	30	56	J-29	(N/A)	56	J-29	TRUE
J-2	Zone - 2	2	TRUE	1500	8000	1500	8000	30	58	30	56	J-29	(N/A)	56	J-29	TRUE
J-3	Zone - 2	2	TRUE	1500	8000	1500	8000	30	56	30	54	J-29	(N/A)	54	J-29	TRUE
J-4	Zone - 2	2	TRUE	3000	7500	3000	7500	30	56	30	54	J-29	(N/A)	54	J-29	TRUE
J-6	Zone - 2	3	TRUE	1500	5974	1500	5974	30	30	30	34	J-7	(N/A)	34	J-7	TRUE
J-7	Zone - 2	3	TRUE	1500	5287	1500	5287	30	30	30	31	J-8	(N/A)	31	J-8	TRUE
J-8	Zone - 2	3	TRUE	1500	5039	1500	5039	30	30	30	30	H-3	(N/A)	30	H-3	TRUE
J-9	Zone - 2	4	TRUE	1500	6608	1500	6609	30	30	30	30	H-4	(N/A)	30	H-4	TRUE
J-10	Zone - 2	3	TRUE	1500	4081	1500	4081	30	30	30	30	H-5	(N/A)	30	H-5	TRUE
J-12	Zone - 2	3	TRUE	1500	4044	1500	4044	30	30	30	30	H-6	(N/A)	30	H-6	TRUE
J-13	Zone - 2	4	TRUE	1500	4033	1500	4033	30	31	30	30	H-108	(N/A)	30	H-108	TRUE
J-14	Zone - 2	2	TRUE	3000	7500	3000	7500	30	47	30	46	J-29	(N/A)	46	J-29	TRUE
J-15	Zone - 2	2	TRUE	3000	7500	3000	7500	30	42	30	42	J-16	(N/A)	42	J-16	TRUE
J-16	Zone - 2	2	TRUE	3000	7500	3003	7503	30	36	30	43	J-36	(N/A)	38	J-188	TRUE
J-20	Zone - 2	2	TRUE	1500	8000	1500	8000	30	32	30	32	J-36	(N/A)	32	J-36	TRUE
J-22	Zone - 2	4	TRUE	1500	5786	1500	5786	30	30	30	31	J-35	(N/A)	31	J-35	TRUE
J-23	Zone - 2	4	TRUE	1500	6651	1500	6651	30	30	30	30	H-31	(N/A)	30	H-31	TRUE
J-24	Zone - 2	4	TRUE	1500	5680	1500	5680	30	30	30	31	J-25	(N/A)	31	J-25	TRUE
J-25	Zone - 2	3	TRUE	1500	4339	1500	4339	30	30	30	32	J-26	(N/A)	32	J-26	TRUE
J-26	Zone - 2	3	TRUE	1500	3857	1500	3857	30	30	30	30	H-10	(N/A)	30	H-10	TRUE
J-28	Zone - 2	3	TRUE	1500	3485	1500	3485	30	30	30	30	H-11	(N/A)	30	H-11	TRUE
J-29	Zone - 2	3	TRUE	1500	3487	1500	3487	30	30	30	35	J-30	(N/A)	35	J-30	TRUE
J-30	Zone - 2	3	TRUE	1500	3651	1500	3651	30	30	30	30	H-12	(N/A)	30	H-12	TRUE
J-31	Zone - 2	3	TRUE	1500	4468	1500	4468	30	30	30	30	H-13	(N/A)	30	H-13	TRUE
J-32	Zone - 2	3	TRUE	1500	4056	1500	4056	30	30	30	30	H-14	(N/A)	30	H-14	TRUE
J-34	Zone - 2	4	TRUE	1500	4961	1500	4961	30	30	30	31	J-50	(N/A)	31	J-50	TRUE

Appendix A
Corresponding Model Data

Source: Bentley Systems Water CAD

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
J-35	Zone - 2	4	TRUE	1500	4761	1500	4761	30	30	30	30	H-15	(N/A)	30	H-15	TRUE
J-36	Zone - 2	4	TRUE	1500	6839	1500	6839	30	30	30	30	J-23	(N/A)	30	J-23	TRUE
J-37	Zone - 2	6	TRUE	1500	7778	1500	7778	30	31	30	30	J-36	(N/A)	30	J-36	TRUE
J-50	Zone - 2	3	TRUE	1500	4680	1500	4680	30	30	30	34	H-108	(N/A)	34	H-108	TRUE
J-51	Zone - 2	5	TRUE	1500	3737	1500	3737	30	31	30	30	H-108	(N/A)	30	H-108	TRUE
J-62	Zone - 2	4	TRUE	1500	1932	1500	1932	30	30	30	30	H-25	(N/A)	30	H-25	TRUE
J-63	Zone - 2	3	TRUE	1500	1889	1500	1889	30	30	30	31	H-25	(N/A)	31	H-25	TRUE
J-83	Zone - 3	3	TRUE	3000	7500	3000	7500	30	84	30	82	H-83	(N/A)	58	J-29	TRUE
J-86	Zone - 3	3	TRUE	3000	7500	3000	7500	30	85	30	83	H-83	(N/A)	58	J-29	TRUE
J-90	Zone - 3	6	TRUE	1500	6361	1500	6361	30	30	30	52	H-86	(N/A)	52	H-86	TRUE
J-103	Zone - 2	3	TRUE	1500	5151	1500	5151	30	30	30	42	H-50	(N/A)	42	H-50	TRUE
J-105	Zone - 2	3	TRUE	3000	5667	3000	5667	30	30	30	31	H-49	(N/A)	31	H-49	TRUE
J-106	Zone - 2	3	TRUE	1500	4616	1500	4616	30	30	30	32	H-51	(N/A)	32	H-51	TRUE
J-108	Zone - 2	3	TRUE	1500	4455	1500	4455	30	30	30	34	H-52	(N/A)	34	H-52	TRUE
J-111	Zone - 2	3	TRUE	3000	6659	3000	6659	30	30	30	32	J-105	(N/A)	32	J-105	TRUE
J-113	Zone - 2	2	TRUE	3000	7500	3000	7500	30	43	30	43	J-16	(N/A)	43	J-16	TRUE
J-133	Zone - 3	4	TRUE	3000	7500	3000	7500	30	61	30	61	H-83	(N/A)	58	J-29	TRUE
J-134	Zone - 3	3	TRUE	3000	7500	3000	7500	30	74	30	74	H-83	(N/A)	58	J-29	TRUE
J-140	Zone - 3	3	TRUE	3000	7500	3000	7500	30	79	30	79	H-98	(N/A)	58	J-29	TRUE
J-142	Zone - 3	3	TRUE	3000	7500	3000	7500	30	76	30	76	H-98	(N/A)	58	J-29	TRUE
J-149	Zone - 4	5	TRUE	3000	5971	3000	5971	30	30	30	42	H-92	(N/A)	42	H-92	TRUE
J-153	Zone - 4	5	TRUE	3000	4433	3000	4433	30	30	30	32	H-88	(N/A)	32	H-88	TRUE
J-154	Zone - 4	5	TRUE	3000	4369	3000	4369	30	30	30	47	J-153	(N/A)	40	J-232	TRUE
J-155	Zone - 4	5	TRUE	3000	4362	3000	4362	30	30	30	36	H-89	(N/A)	36	H-89	TRUE
J-156	Zone - 4	5	TRUE	3000	4918	3000	4918	30	30	30	42	H-90	(N/A)	42	H-90	TRUE
J-160	Zone - 3	9	TRUE	1500	7135	1500	7135	30	31	30	30	H-98	(N/A)	30	H-98	TRUE
J-162	Zone - 3	3	TRUE	3000	7500	3000	7500	30	84	30	84	H-83	(N/A)	58	J-29	TRUE
J-164	Zone - 2	3	TRUE	3000	7500	3000	7500	30	99	30	58	J-29	(N/A)	58	J-29	TRUE
J-165	Zone - 4	4	TRUE	3000	7500	3000	7500	30	61	30	57	J-156	(N/A)	57	J-156	TRUE
J-166	Zone - 2	3	TRUE	1500	4319	1500	4319	30	30	30	34	H-105	(N/A)	34	H-105	TRUE
J-170	Zone - 2	5	TRUE	1500	2851	1500	2851	30	32	30	30	H-108	(N/A)	30	H-108	TRUE
J-174	<None>	3	TRUE	1500	3009	1500	3009	30	30	30	31	J-210	(N/A)	28	H-108	TRUE
J-175	<None>	5	TRUE	1500	3009	1500	3009	30	66	30	30	J-174	(N/A)	28	H-108	TRUE
J-177	<None>	2	TRUE	1500	8000	1500	8000	30	50	30	49	J-188	(N/A)	48	J-30	TRUE
J-179	<None>	2	TRUE	1500	8000	1500	8000	30	55	30	35	J-180	(N/A)	19	J-103	TRUE
J-180	<None>	2	TRUE	1500	8000	1500	8000	30	31	30	39	H-133	(N/A)	31	J-36	TRUE
J-181	<None>	3	TRUE	1500	7823	1500	7823	30	30	30	30	H-135	(N/A)	21	J-103	TRUE
J-183	<None>	5	TRUE	1500	2029	1500	2029	30	68	30	30	J-229	(N/A)	26	J-63	TRUE
J-185	<None>	2	TRUE	1500	8000	1500	8000	30	40	30	36	J-188	(N/A)	33	J-16	TRUE
J-186	<None>	3	TRUE	1500	4496	1500	4496	30	30	30	30	H-128	(N/A)	30	H-128	TRUE
J-188	<None>	2	TRUE	1500	8000	1500	8000	30	36	30	41	J-180	(N/A)	35	J-16	TRUE
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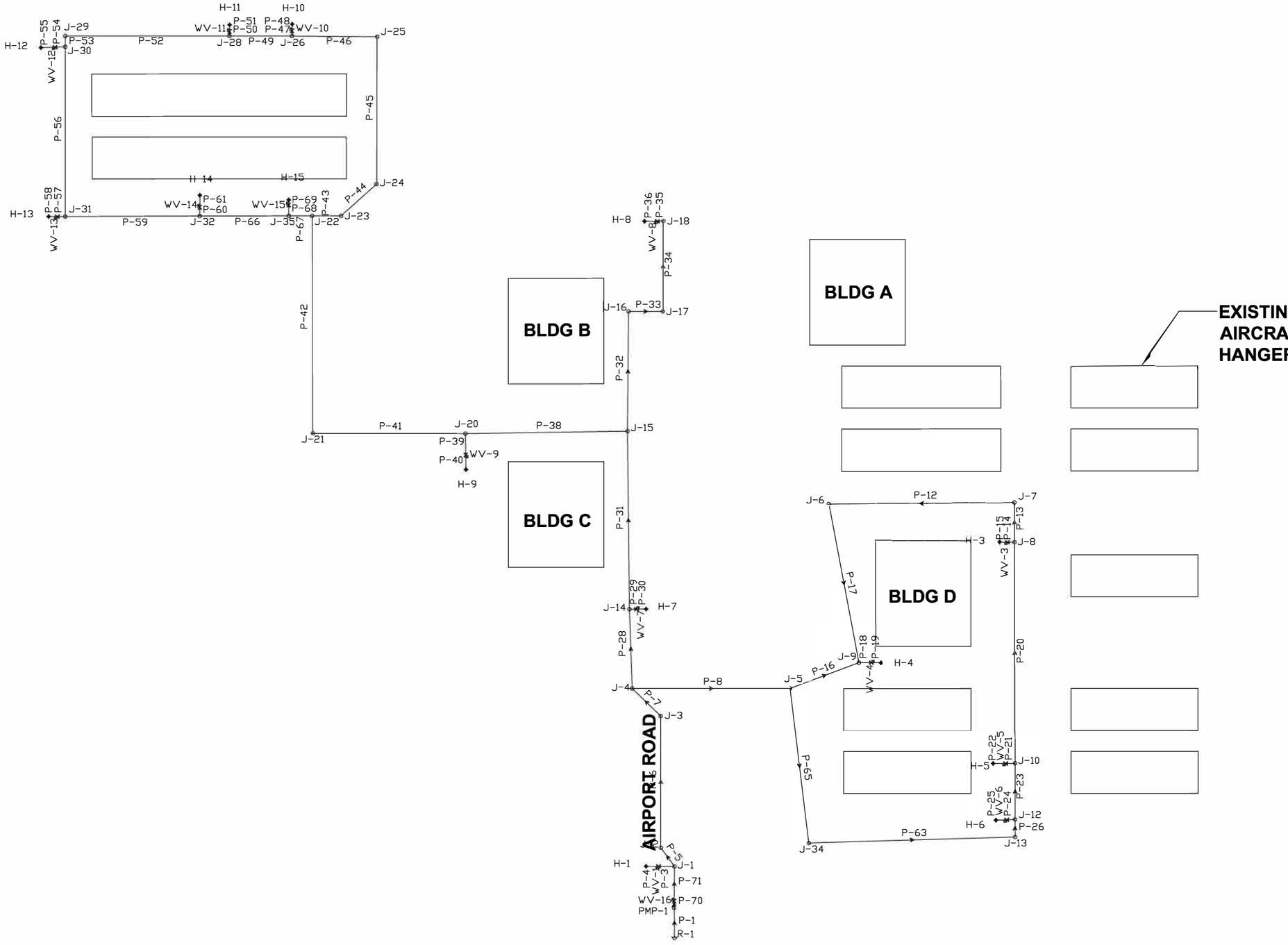
J-190	<None>	5	TRUE	1500	3780	1500	3780	30	71	30	30	J-192	(N/A)	29	H-105	TRUE
J-191	<None>	5	TRUE	1500	3547	1500	3547	30	76	30	30	J-192	(N/A)	29	H-105	TRUE
J-192	<None>	3	TRUE	1500	2462	1500	2462	30	30	30	31	J-218	(N/A)	29	H-105	TRUE
J-195	<None>	5	TRUE	1500	6357	1500	6357	30	39	30	30	J-192	(N/A)	29	H-105	TRUE
J-196	<None>	3	TRUE	1500	5967	1500	5967	30	30	30	30	H-115	(N/A)	30	H-115	TRUE
J-197	<None>	5	TRUE	1500	5457	1500	5457	30	58	30	30	J-192	(N/A)	29	H-105	TRUE
J-198	<None>	3	TRUE	1500	3230	1500	3230	30	30	30	30	H-119	(N/A)	30	H-119	TRUE
J-199	<None>	3	TRUE	1500	4036	1500	4036	30	30	30	42	J-174	(N/A)	32	J-10	TRUE
J-200	<None>	3	TRUE	1500	2984	1500	2984	30	30	30	30	H-120	(N/A)	30	H-120	TRUE
J-201	<None>	5	TRUE	1500	5110	1500	5110	30	58	30	30	J-192	(N/A)	29	H-105	TRUE
J-202	<None>	5	TRUE	1500	5110	1500	5110	30	41	30	30	J-192	(N/A)	29	H-105	TRUE
J-203	<None>	3	TRUE	1500	3904	1500	3904	30	30	30	33	H-125	(N/A)	33	H-125	TRUE

Appendix A
Corresponding Model Data

Source: Bentley Systems Water CAD

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
J-204	<None>	3	TRUE	1500	3415	1500	3415	30	30	30	37	J-210	(N/A)	36	H-25	TRUE
J-205	<None>	3	TRUE	1500	3303	1500	3303	30	30	30	33	H-124	(N/A)	33	H-25	TRUE
J-206	<None>	3	TRUE	1500	3323	1500	3323	30	30	30	33	J-210	(N/A)	31	H-25	TRUE
J-207	<None>	4	TRUE	1500	3360	1500	3360	30	31	30	30	J-210	(N/A)	28	H-25	TRUE
J-208	<None>	5	TRUE	1500	3279	1500	3279	30	37	30	30	J-210	(N/A)	28	H-25	TRUE
J-209	<None>	5	TRUE	1500	2999	1500	2999	30	58	30	30	J-210	(N/A)	28	H-25	TRUE
J-210	<None>	3	TRUE	1500	2809	1500	2809	30	30	30	35	J-174	(N/A)	28	H-25	TRUE
J-211	<None>	4	TRUE	1500	8000	1500	8000	30	71	30	59	J-188	(N/A)	58	J-29	TRUE
J-212	<None>	7	TRUE	1500	7044	1500	7044	30	30	30	59	J-188	(N/A)	30	H-83	TRUE
J-213	<None>	5	TRUE	1500	8000	1500	8000	30	56	30	58	J-212	(N/A)	55	H-83	TRUE
J-214	<None>	6	TRUE	1500	6721	1500	6721	30	30	30	59	J-188	(N/A)	46	H-93	TRUE
J-215	<None>	6	TRUE	1500	6553	1500	6553	30	30	30	30	J-216	(N/A)	5	H-93	TRUE
J-216	<None>	5	TRUE	1500	3693	1500	3693	30	30	30	59	J-188	(N/A)	58	J-29	TRUE
J-217	<None>	5	TRUE	1500	5652	1500	5652	30	52	30	30	J-192	(N/A)	29	H-105	TRUE
J-218	<None>	3	TRUE	1500	2340	1500	2340	30	30	30	33	J-192	(N/A)	30	H-67	TRUE
J-219	<None>	4	TRUE	1500	7629	1500	7629	30	30	30	32	J-220	(N/A)	32	J-220	TRUE
J-220	<None>	3	TRUE	1500	5156	1500	5156	30	30	30	37	J-174	(N/A)	31	J-34	TRUE
J-221	<None>	3	TRUE	1500	3721	1500	3721	30	30	30	30	H-125	(N/A)	30	H-125	TRUE
J-222	<None>	3	TRUE	1500	3303	1500	3303	30	30	30	30	H-124	(N/A)	30	H-124	TRUE
J-223	<None>	5	TRUE	1500	3035	1500	3035	30	56	30	30	J-210	(N/A)	28	H-25	TRUE
J-224	<None>	5	TRUE	1500	3244	1500	3244	30	39	30	30	J-210	(N/A)	28	H-25	TRUE
J-225	<None>	4	TRUE	1500	8000	1500	8000	30	61	30	59	J-188	(N/A)	58	J-29	TRUE
J-226	<None>	2	TRUE	1500	8000	1500	8000	30	54	30	53	J-188	(N/A)	52	J-30	TRUE
J-229	<None>	3	TRUE	1500	2015	1500	2015	30	30	30	45	J-210	(N/A)	26	J-63	TRUE
J-231	<None>	6	TRUE	1500	4398	1500	4398	30	30	30	52	J-232	(N/A)	38	J-155	TRUE
J-232	<None>	5	TRUE	1500	4357	1500	4357	30	30	30	54	J-231	(N/A)	40	J-154	TRUE

APPENDIX B – EXISTING FIRE FLOW MODEL



1 EXISTING UTILITY LAYOUT – OVERALL

KITCHELL
2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

APPENDIX B

EXISTING WATER LAYOUT

SHEET:	C1
DATE:	4/21/18
SCALE:	AS NOTED
JOB NO.	6112A3

Appendix B

Corresponding Model Data

Source: Bentley Systems Water CAD

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
H-1	Zone - 2	14	TRUE	0	6507	1500	6507	30	30	0	57	J-29	(N/A)	57	J-29	TRUE
H-3	Zone - 2	4	TRUE	1500	3084	1500	3084	30	30	0	36	J-8	(N/A)	36	J-8	TRUE
H-4	Zone - 2	4	TRUE	1500	3463	1500	3463	30	30	0	37	J-9	(N/A)	37	J-9	TRUE
H-5	Zone - 2	4	TRUE	1500	3047	1500	3047	30	30	0	35	J-10	(N/A)	35	J-10	TRUE
H-6	Zone - 2	4	TRUE	1500	3083	1500	3083	30	30	0	36	J-12	(N/A)	36	J-12	TRUE
H-7	Zone - 2	4	TRUE	4500	5809	4500	5809	30	30	0	47	J-29	(N/A)	47	J-29	TRUE
H-8	Zone - 2	3	TRUE	4500	4566	4500	4566	30	30	0	42					

APPENDIX C – FIRE FLOW REPORT

MARQUEE
FIRE PROTECTION

☒ Corporate:
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☐ Bay Area:
Phone: (925) 691-0744
Fax: (925) 691-0742

Contractor Lic #: CA 570970
OR 111387

FIRE FLOW TEST REPORT

FOR:

Nut Tree Airport
County Airport Road
County of Solano, California

March 21st , 2018

(seal)

Prepared by:

MARQUEE FIRE PROTECTION
a California corporation
C-16 contractor, Lic. 570970

Mel Davis
Lead Designer

Table of Contents

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☐ Bay Area:
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Fax: (925) 691-0742

Contractor Lic #: CA 570970
OR 111387

SUMMARY of TEST RESULTS

Nut Tree Airport
County Airport Road
County of Solano, California

TEST #1 (2)-2½" Outlets Flowing

Read Hydrant: East corner of Bldg. C
Flowing Hydrant: North Corner of Bldg C

Static (psi): = **94**
Residual (psi): = **86**
Calculated flow (gpm): = **2523**
Calculated flow (gpm) at **20** psi = **8397.6**

TEST #2 (2)-2½" Outlets Flowing

Read Hydrant: East of Bldg D, at end of Hangar Bldg C
Flowing Hydrant: East of Bldg D, at end of Hangar Bldg A

Static (psi): = **95**
Residual (psi): = **65**
Calculated flow (gpm): = **1985**
Calculated flow (gpm) at **20** psi = **3257.3**

TEST #3 (2)-2½" Outlets Flowing

Read Hydrant: East of Bldg D, at end of Hangar Bldg C
Flowing Hydrant: north corner of Bldg D

Static (psi): = **95**
Residual (psi): = **62**
Calculated flow (gpm): = **2042**
Calculated flow (gpm) at **20** psi = **3182.6**

Hydrant Flow Test Report

Test Date 03/19/18 **Test Time** 01:30 pm

Location

Nut Tree Airport
County Airport Road
County of Solano
California

Tested by

Marquee Fire Protection
710 West Stadium Lane
Sacramento, CA 95834
C-16. Lic.# 570970

Notes

Test #1
Wet Barrel Hydrant
At Bldg. C, on County Airport Road

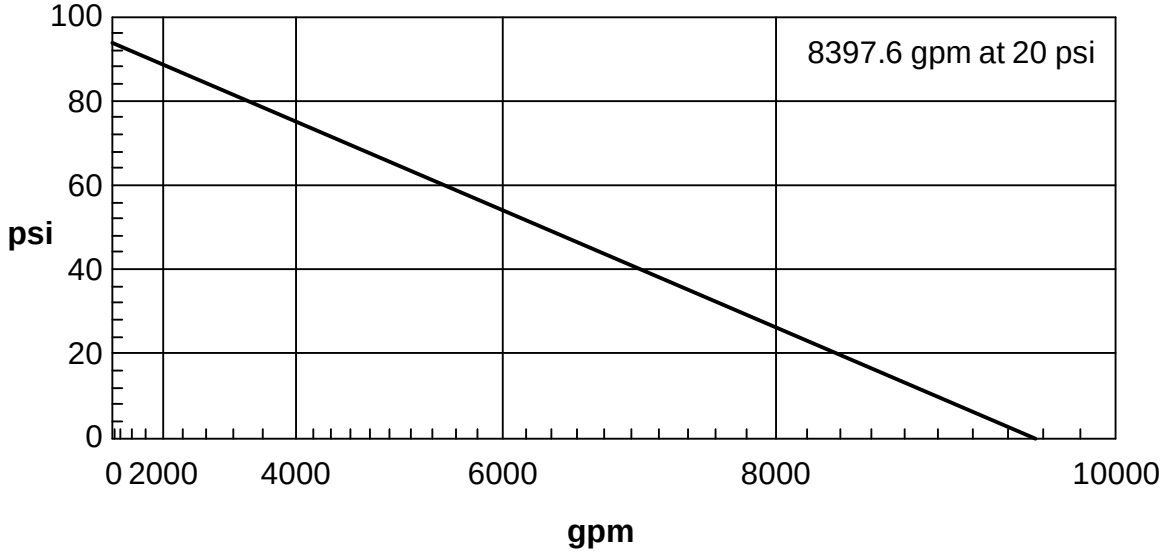
Read Hydrant

94 psi **static pressure**
86 psi **residual pressure**
108.9 ft **hydrant elevation**

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1	108.9	2.5	.9	58	1245 gpm
#2	108.9	2.5	.9	55	1278 gpm
				Total	2523 gpm

Flow Graph



HYDRANT FLOW TEST FIELD DATA REPORT

Hydrant Flow Information for:

Nut Tree Airport
County of Solano, California

Location: At Building C (TEST #1)

DATE: **03/19/2018** TIME: 1:30

Static (psi) **Before Test**	94	Static (psi) **After Test**	98	
*Residual (psi)	90	*Residual (psi) w/ 2 outlets *if required	86	
Gallons (gpm) (from Chart, see computer report for calculated flow)	>1300	†Gallons (gpm) w/ 2 outlets (from Chart, see computer report for calculated flow)	2490	
**Pitot (psi)	**75 →	**Pitots (psi) @ each outlet *if required	58	55
Outlet Size	2½	†Number of Outlets	2	
Outlet Coefficient	.9	= See page 2		

HYDRANT LOCATIONS:

Pressure Hydrant: East corner of Building C Elevation: 108.9'

Flowing Hydrant: North corner of Building C

TESTING AGENCY: Marquee Fire Protection (916) 641-7997

NAME: Mel Davis (SIGNATURE)

NAME: Steve Amand (SIGNATURE)

WITNESSED By;

(NAME) Robert Arndt (AGENCY) County of Solano

(SIGNATURE): (PHONE):

(NAME) Marvin Talkish (AGENCY) Kitchell

(SIGNATURE): (PHONE): 916.648.9700

(NAME) (AGENCY)

(SIGNATURE): (PHONE):

Footnotes:
*Achieve 25% drop, OR Flow Max. Demand (NFPA 24; C.4.3.6)
**Avoid Pitot Readings of <10 & >30, if possible (NFPA 24; C.4.6.6)
† The discharge in gpm from all hydrants shall be added together.

Reference NFPA 24;

C.4.3.6 To obtain satisfactory test results of theoretical calculation of expected flows or rated capacities, sufficient discharge should be achieved to cause a drop in pressure at the residual hydrant of at least 25 percent, or to flow the total demand necessary for fire-fighting purposes.

C.4.6.6 Pitot readings of less than 10 psi (0.7 bar) and more than 30 psi (2.0 bar) should be avoided, if possible.

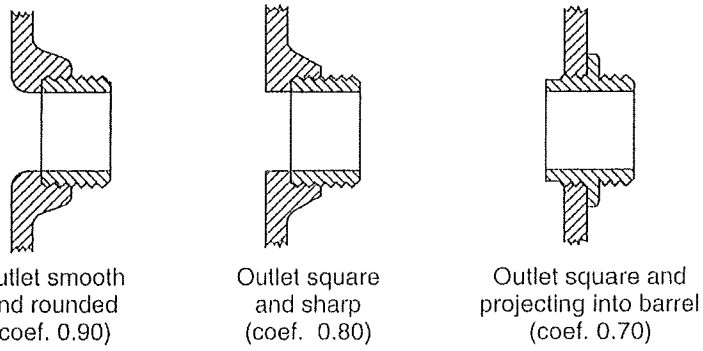
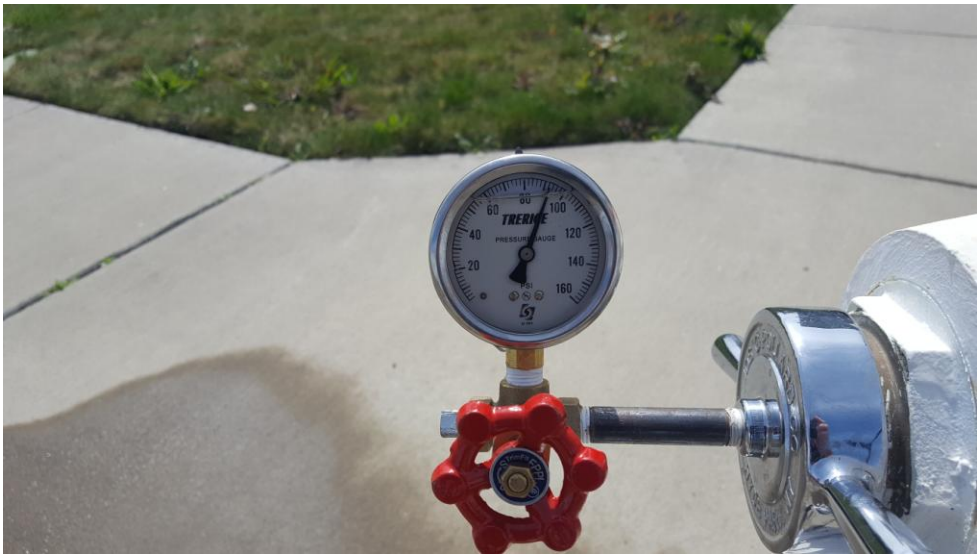


FIGURE C.4.7.1 Three General Types of Hydrant Outlets and Their Coefficients of Discharge.

Test #1: Static;

Test#1 Residual, (One outlet flowing);



Test#1 Residual, (Two outlet flowing);

Hydrant Flow Test Report

Test Date 03/19/18 **Test Time** 01:45 pm

Location

Nut Tree Airport
County Airport Road
County of Solano
California

Tested by

Marquee Fire Protection
710 West Stadium Lane
Sacramento, CA 95834
C-16. Lic.# 570970

Notes

Test #2
Wet Barrel Hydrant
Southeast of Bldg. D, At end of Hangar C
Flowing Hydrant at end of Hangar A

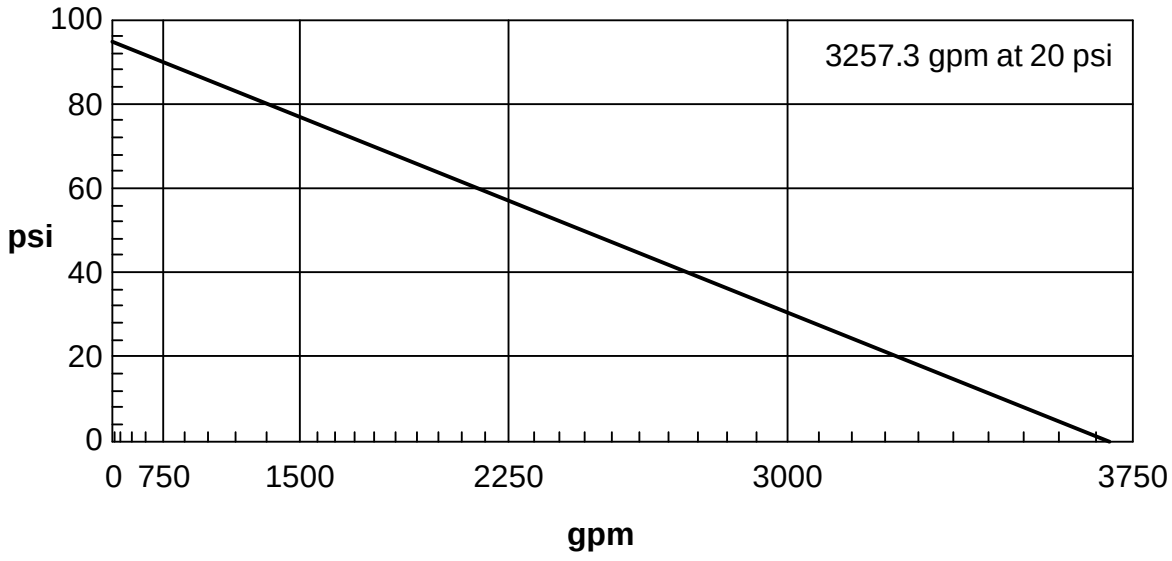
Read Hydrant

95 psi **static pressure**
65 psi **residual pressure**
109.7 ft **hydrant elevation**

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1	109.7	2.5	.9	32	1035 gpm
#2	109.7	2.5	.9	38	950 gpm
				Total	1985 gpm

Flow Graph



HYDRANT FLOW TEST FIELD DATA REPORT

Hydrant Flow Information for:

Nut Tree Airport
County of Solano, California

Location: At Hangars East of Building D (TEST #2)

DATE: **03/19/2018** TIME: 1:45

Static (psi) **Before Test**	95	Static (psi) **After Test**	100
*Residual (psi)	80	*Residual (psi) w/ 2 outlets *if required	65
Gallons (gpm) (from Chart, see computer report for calculated flow)	1278	†Gallons (gpm) w/ 2 outlets (from Chart, see computer report for calculated flow)	1986
**Pitot (psi)	**58 →	**Pitots (psi) @ each outlet *if required	32 / 38
Outlet Size	2½	†Number of Outlets	2
Outlet Coefficient	.9	= See page 2	

HYDRANT LOCATIONS:

Pressure Hydrant: East from Building D @ end of adjacent hangar bldg C Elev.: 109.7'

Flowing Hydrant: East from Building D @ end of farthest hangar bldg-A

TESTING AGENCY: Marquee Fire Protection (916) 641-7997

NAME: Mel Davis (SIGNATURE)

NAME: Steve Arnaud (SIGNATURE)

WITNESSED By;

(NAME) Robert Arndt (AGENCY) County

(SIGNATURE): (PHONE):

(NAME) Marvin Tarusik (AGENCY) Kitchell

(SIGNATURE): (PHONE): 916.648.9700

(NAME) (AGENCY)

(SIGNATURE): (PHONE):

Footnotes:
*Achieve 25% drop, OR Flow Max. Demand (NFPA 24; C.4.3.6)
**Avoid Pitot Readings of <10 & >30, if possible (NFPA 24; C.4.6.6)
† The discharge in gpm from all hydrants shall be added together.

Reference NFPA 24;

C.4.3.6 To obtain satisfactory test results of theoretical calculation of expected flows or rated capacities, sufficient discharge should be achieved to cause a drop in pressure at the residual hydrant of at least 25 percent, or to flow the total demand necessary for fire-fighting purposes.

C.4.6.6 Pitot readings of less than 10 psi (0.7 bar) and more than 30 psi (2.0 bar) should be avoided, if possible.

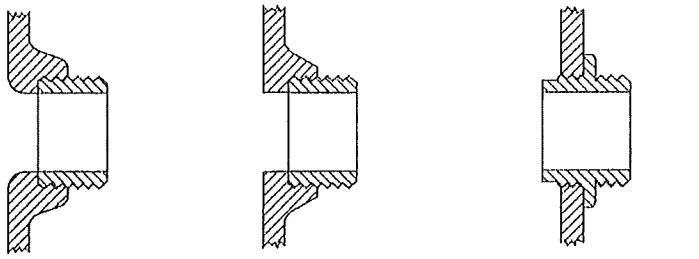
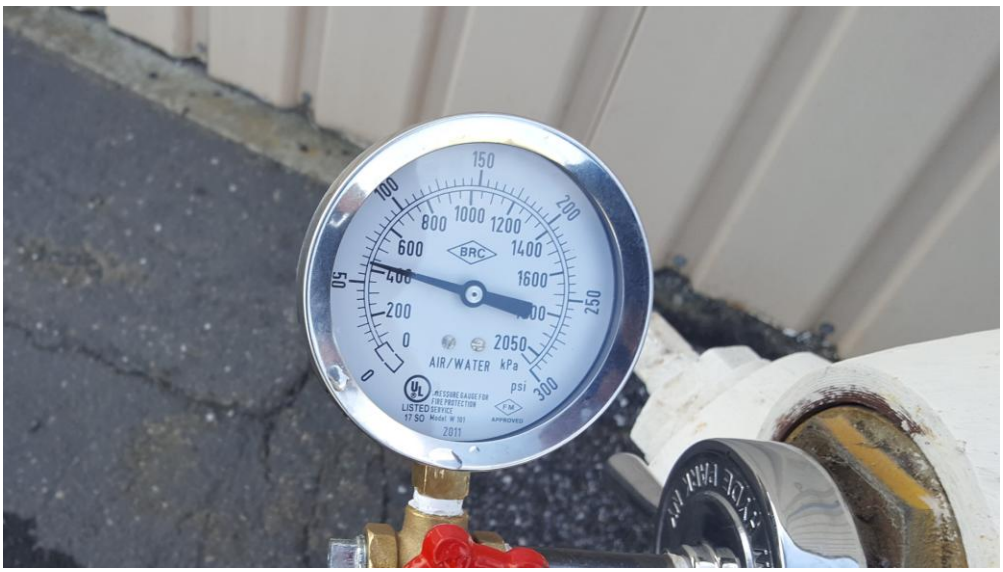


FIGURE C.4.7.1 Three General Types of Hydrant Outlets and Their Coefficients of Discharge.

Test #2: Static;

Test #2 Residual, (One outlet flowing);

Test #2 Residual, (Two outlets flowing);



Hydrant Flow Test Report

Test Date 03/19/18 **Test Time** 02:05 pm

Location

Nut Tree Airport
County Airport Road
County of Solano
California

Tested by

Marquee Fire Protection
710 West Stadium Lane
Sacramento, CA 95834
C-16. Lic.# 570970

Notes

Test #3
Wet Barrel Hydrant
Southeast of Bldg. D, At end of Hangar C
Flowing Hydrant at Bldg D

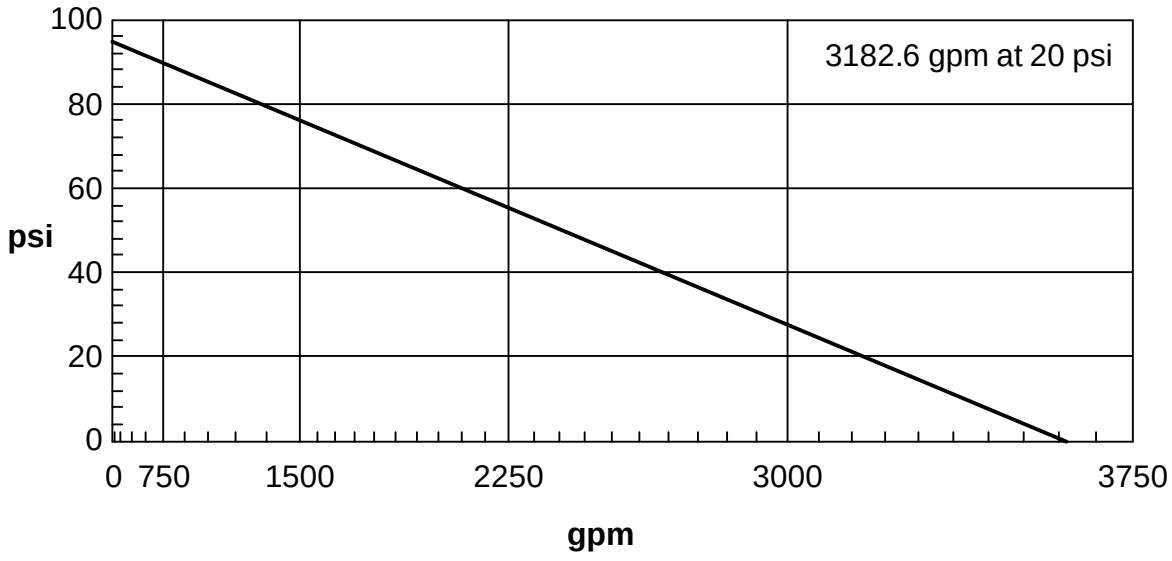
Read Hydrant

95 psi **static pressure**
62 psi **residual pressure**
109.7 ft **hydrant elevation**

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1	109.7	2.5	.9	37	1021 gpm
#2	109.7	2.5	.9	37	1021 gpm
				Total	2042 gpm

Flow Graph



HYDRANT FLOW TEST FIELD DATA REPORT

Hydrant Flow Information for:

Nut Tree Airport
County of Solano, California

Location: At Hangars East of Building D (TEST #3)

DATE: **03/19/2018** TIME: 2:05

Static (psi) **Before Test**	95	Static (psi) **After Test**	100	
*Residual (psi)	00	*Residual (psi) w/ 2 outlets *if required	62	
Gallons (gpm) (from Chart, see computer report for calculated flow)	>1300	†Gallons (gpm) w/ 2 outlets (from Chart, see computer report for calculated flow)	2016	
**Pitot (psi)	**64 →	**Pitots (psi) @ each outlet *if required	37	37
Outlet Size	2½	†Number of Outlets	2	
Outlet Coefficient	.9	= See page 2		

HYDRANT LOCATIONS:

Pressure Hydrant: East from Building D @ end of adjacent hangar bldg C Elev.: 109.7'

Flowing Hyd.: North corner of Building D

TESTING AGENCY: Marquee Fire Protection (916) 641-7997

NAME: Mel Davis (SIGNATURE)

NAME: Steve Arnaud (SIGNATURE)

WITNESSED By;

(NAME) Robert Arndt (AGENCY) County of Solano

(SIGNATURE): (PHONE):

(NAME) Marvin Jarusik (AGENCY) Kitchell

(SIGNATURE): (PHONE): 916.648.9700

(NAME) (AGENCY)

(SIGNATURE): (PHONE):

Footnotes:
*Achieve 25% drop, OR Flow Max. Demand (NFPA 24; C.4.3.6)
**Avoid Pitot Readings of <10 & >30, if possible (NFPA 24; C.4.6.6)
† The discharge in gpm from all hydrants shall be added together.

Reference NFPA 24;

C.4.3.6 To obtain satisfactory test results of theoretical calculation of expected flows or rated capacities, sufficient discharge should be achieved to cause a drop in pressure at the residual hydrant of at least 25 percent, or to flow the total demand necessary for fire-fighting purposes.

C.4.6.6 Pitot readings of less than 10 psi (0.7 bar) and more than 30 psi (2.0 bar) should be avoided, if possible.

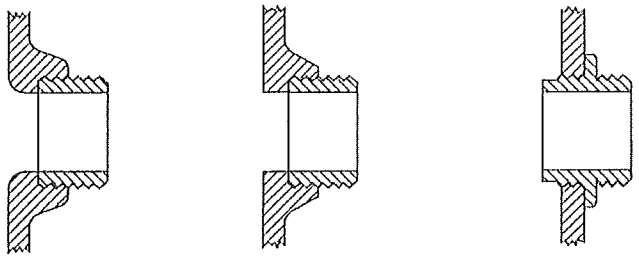
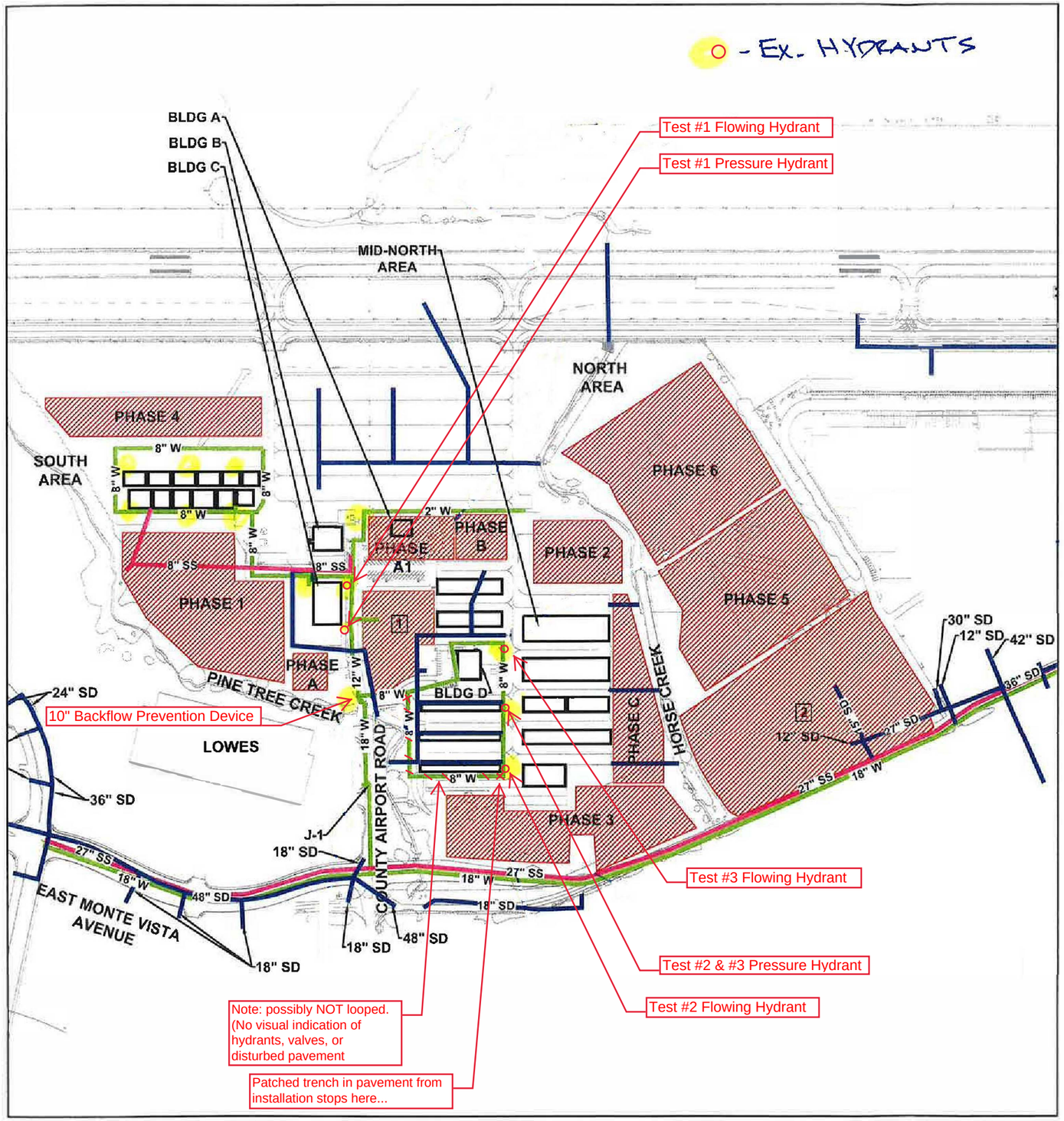


FIGURE C.4.7.1 Three General Types of Hydrant Outlets and Their Coefficients of Discharge.

Test #3: Static;

Test #3 Residual, (One outlet flowing);

Test #3 Residual, (Two outlets flowing);

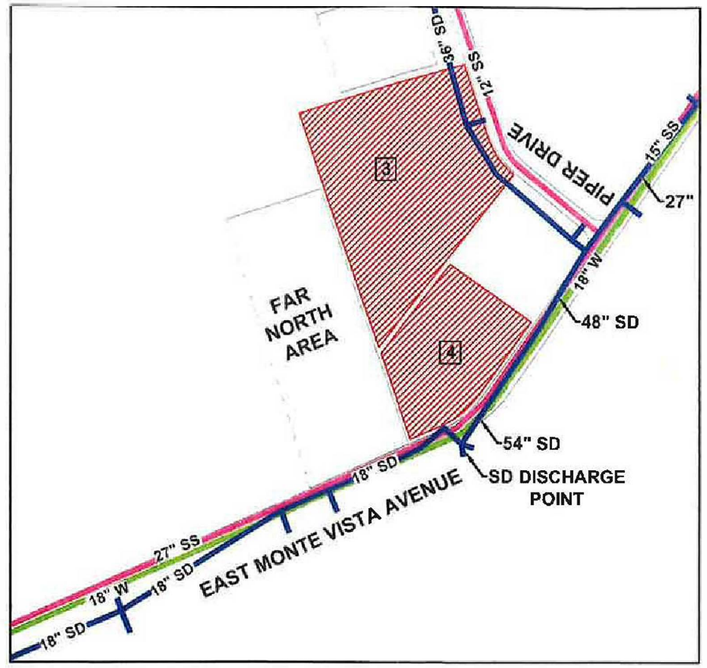


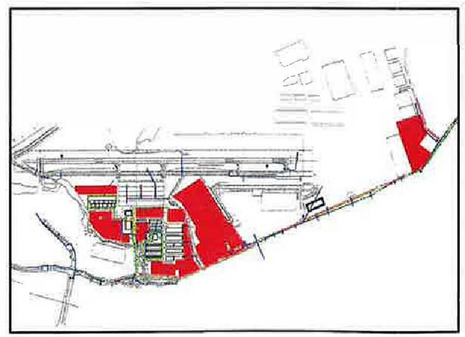
LEGEND

- EXISTING WATERLINE
- EXISTING SEWERLINE
- EXISTING STORM DRAIN LINE
- EXISTING BUILDING
- FUTURE DEVELOPMENT

PHASE X DEVELOPMENT PHASES (AERONAUTICAL)

[1] ANCILLARY DEVELOPMENT AREAS (COMMERCIAL/LIGHT-INDUSTRIAL)





NTS

200 100 0 200 400

SCALE: 1" = 200

KITCHELL
2450 VENTURE OAKS WAY,
SUITE 500
SACRAMENTO, CA 95833

NUT TREE AIRPORT

UTILITY MASTER PLAN

FIGURE 2
SITE PLAN (AIRPORT)
EXISTING FACILITIES

NUT TREE AIRPORT
COUNTY OF SOLANO
CALIFORNIA

SHEET:

DATE: 8/1/17

SCALE:

JOB NO. 6112A3

APPENDIX D – CITY OF VACAVILLE RESOLUTION NO. 1998-152

RESOLUTION NO. 1998-152

RESOLUTION TO FORM THE EAST MONTE VISTA TRUNK SEWER BENEFIT DISTRICT

WHEREAS, the sewer master plan for the Northeast Sector calls for a new trunk sewer on East Monte Vista Avenue; and

WHEREAS, the Redevelopment Agency will be constructing said trunk sewer, and providing the initial funding for that sewer; and

WHEREAS, it has been found that the properties who use that trunk sewer should pay their share of those costs; and

WHEREAS, an Engineers Report has been prepared which explains the scope of the project, the cost of the work, how the properties in the Benefit District will benefit from the project, the rules of the Benefit District, which parcels are in the district; and

WHEREAS, the intent to form the district has been advertised and the City Engineer has met with the property owners in the district; and;

WHEREAS, the project involved the establishment of a funding mechanism and has no potential for causing a significant impact to the environment and qualifies as an exemption to the California Environment Quality Act (CEQA) per 1506(b)(3) of the CEQA guidelines; and,

NOW, THEREFORE, BE IT RESOLVED that it is the policy of the City Council to require as a prerequisite for the issuance of a new building permit, or the usage of additional sewer capacity, the payment of fees as outlined in the Engineer's Report on file in the City Engineer's office. It is also noted that the fees, as outlined, will increase annually, and can also be adjusted from time to time, by the action of the City Council.

I HEREBY CERTIFY that the foregoing resolution was introduced and passed at a regular meeting of the City Council of the City of Vacaville, held on the 8th day of December, 1998, by the following vote:

AYES: Council members Augustine, Clancy, Slade, Vice-Mayor Wood and Mayor Fleming

NOES: None

ABSENT: None

ATTEST:

Kathleen M. Andronico

Kathleen M. Andronico, City Clerk

g/dev_eng/ccres/mvsewerbd.doc

EAST MONTE VISTA SEWER BENEFIT DISTRICT

ENGINEER'S REPORT

October 1998

Purpose

This Benefit District is based on the Northeast Sector Sewer Master Plan dated July 31, 1998, which was approved by the City Council on Aug. 11, 1998. Section 4 of that Master Plan describes the East Monte Vista area, and is attached as Exhibit A. That section includes the key assumptions, estimates, and allocations pertinent to parcels in this Benefit District. In summary, that section of the Master Plan makes two major determinations regarding sewer planning in the area called the Monte Vista Plan Area:

It determines the sewer capacity allocated to properties within this planning area (both existing and future).

It shows that sewage from this area is to be assigned to a trunk sewer on East Monte Vista Avenue

The Master Plan shows that to serve the properties in that area, at the flow rates projected, a new trunk sewer and pump station need to be constructed on East Monte Vista Avenue. It is proposed that this new trunk system be constructed in the near future by the City, using Redevelopment Agency funds, and an EDA grant. However, since that new sewer has the potential to benefit all of the properties in that area, it is proposed that those properties which will receive benefit from the project pay their share of the cost of the project which is not funded by the EDA grant. This Benefit District is proposed to provide a mechanism for collecting that fair share as properties develop.

Description of the projects

Exhibit B (which is a portion of Figure 3 in the Master Plan) and Table 4-2 of the Sewer Master Plan (see Exhibit A) present the proposed East Monte Vista System, which is summarized below:

Replace Pine Tree Creek Lift Station

Replace pipelines on East Monte Vista Avenue from Nut Tree Road to Piper Drive

Replace or parallel the pipeline on Piper Drive at East Monte Vista Avenue

Construct a new gravity sewer from the current lift station location to a new location if relocating the lift station is determined in pre-design to be cost effective

Cost of Project

An estimate of the cost of the East Monte Vista sewer system improvements is shown in Table 4-2 (Exhibit A). The total cost of the project is estimated at $ 3,749,000. As noted in the Master Plan, this amount includes engineering, construction, land acquisition, and contingencies.

Note:

The costs shown herein are based on rough estimates. From time to time the City Council may modify the calculations shown in this report to reflect actual costs, and modify the fees accordingly. Properties which have paid their Benefit District fees will not be subject to those changes, and will not be required to pay an additional amount, nor get a refund.

Establishment of Benefit

Currently, as shown in the Northeast Sector Sewer Master Plan, the properties in the Monte Vista system are limited in capacity. Most properties are limited to only 465 gallons per acre per day. Properties in the Vacaville Business Park (Area G) have even less (205 gpad). Chiron has a capacity of 125,000 gallons per day.

After the construction of the proposed system all properties will have a minimum capacity of 2,000 gallons per acre per day, and Chiron will be able to increase its sewer flow. Therefore, it is clear that the project will benefit the properties in this district, in that they will have significantly more sewer capacity.

District Boundaries

The district boundaries are shown on the attached Benefit District Diagram, and include all parcels which could reasonably be expected to use this sewer main project.

Method of Spread of Costs

A general explanation of the cost allocation assumptions is given on Exhibit C (which consists of a portion of page ES-2 of the Master Plan). The first general principal is that the costs for the improvements are spread to the properties which will benefit from the improvement.

The basis for the Benefit District fee is explained on page 4-5 of Exhibit A, and is shown on Table 4-3 of Exhibit A.

Certain aspects of that table need to be further explained:

a. Certain "Mission Land Company" parcels in Area E (which are identified on page 4-1 of the Master Plan, and on the Benefit District Diagram) will not pay anything in this district due to a transfer of capacity.

   The existing capacity of Mission owned properties west of the Putah South Canal (West Village) has been transferred to these specific Mission owned properties in Area E, resulting in these Mission owned Area E properties having an "existing allocation" in excess of 2,000 gpad. Having that capacity, those parcels do not need any new capacity, and will therefore not need to pay into this Benefit District. Those parcels will be exempt from payments into this district even if they are sold by Mission to someone else.

b. The rate (cost/acre) for any property is shown in the last column on Table 4-3. It is determined by dividing the amount in the cost column for that category (column four) by the total acres in that category (column two). For example, for the rate for the "other" vacant properties in area E is derived by dividing $161,000 by 57.78 acres = $2,800/acre.

c. The acreages shown in this report and in the Master Plan are based on the Solano County Assessor's Maps. For that reason, the acreages may not be exact in some cases. When properties develop and are charged the fee, exact acreages will be used.

d. The existing users with flows more than 2,000 gpad are shown in the Benefit District Diagram.

e. The costs for the Vacaville Business Park are less than the costs for properties in other categories because of the tri-party agreement in that area.

Value Adjustment

In accordance with the provisions of section 14.194.010 of the Benefit District Ordinance, on January 1 of each year following the approval of this district, a value adjustment shall be made to the amounts shown in this report. The value adjustment is equal to the interest rate on a one year U.S. Treasury Bill.

Method and Timing of Payment

The filing of a map, or the changing of property lines, will not cause the payment of these Benefit District fees.

Payment of the fees required by this Benefit District will be required as follows:

Vacant land - When any building permit is issued

Non vacant land -

For a parcel having an "existing use" of less than 2,000 gpad, any increase of the sewer use beyond 1,000 gpad will trigger the fee.

Chiron - any increase above the existing allocated sewer use (125,000 gpd) will trigger the fee.

Other parcels having an "existing use" of more than 2,000 gpad will not be allowed to increase their sewer use.

Note: Certain parcels in Area E owned by Mission in April 1998, (see page 4-1 of Exhibit A) are exempt from payment into this district. Those parcels are limited to the capacities shown in the Master Plan.

Notes:

a. A determination of how much existing sewer use a property has, and how much it is being increased, will be determined by the City Engineer, and will normally require calculations to be submitted by the developer.

b. If a property only develops a portion of its area, (i.e. leaves a portion of the parcel vacant) it will pay fees only for the portion of the property developed.

Example: A vacant parcel in the East Monte Vista system contains 10 acres, but only 5 acres is proposed for development, the other 5 acres being left vacant for the moment. The Benefit District fee would only be applied to the 5 acres. When the remaining 5 acres is developed, the remainder of the fee would be collected.

c. If a property develops its entire area, the entire fee will be due, whether or not its full sewer allocation is used. If the development uses less than the allocation for that parcel, the parcel would be eligible to increase its flow up to its full allocation at a later date, without paying any additional Benefit District fee.

Example: In the theoretical development described in the previous section, the developer would pay $2,800 for each of the 5 acres being developed, whether the new building is generating 100 gpad, or 2,000 gpad.

d. For sites where there is an existing building or use, any increase in the sewer flow beyond 1,000 gpad will require the full payment of the appropriate Benefit District fee.

Distribution of Payments:

Payments for this system will be transferred to the Redevelopment Agency as soon as practical after receipt.

Transfers of Capacity

The master plan states that no transfers of capacity will be allowed except where the remaining capacity allocated to the contributing parcel is a minimum of 2,000 gpd/ac after the transfer. Following that policy, the only vacant parcels that would qualify to be capacity contributors would be the Mission owned parcels in Area E, and parcels owned by Chiron.

Transferred capacity would not be subject to the payment of a Benefit District fee since that transferred capacity would be exempt from the fee (being from a Mission owned parcel).

Transferred capacity from Chiron would be subject to payment of a Benefit District fee on the basis of equivalent acres as defined in Exhibit A, at the rate applicable to the contributor.

Beneficiary of the Benefit District

The beneficiary of this portion of the Benefit District will be the City of Vacaville Redevelopment Agency.

Term of the Benefit District

The Benefit District shall remain in effect for twenty (20) years from the date of approval of the District.

Waiver of Benefit District Fee

The City Council reserves the right to waive the payment of the Benefit District fee, if it finds that it is in the best interest of the City to do so.

Current Owners of Parcels in the Benefit District

The current owners of the properties within this Benefit District are shown on the Benefit District Diagram.

Exhibit 9

SECTION 4. EAST MONTE VISTA PLAN AREA

This section presents the existing and proposed sewer facilities which serve the East Monte Vista Plan Area shown on Figure 1 (presented in Section 1).

EXISTING CONDITIONS

Land Use

This area consists of subareas E, F, G, H, and I, shown on Figure 2 (presented in Section 1). Area E includes the portion of the Interchange Business Park not tributary to Eubanks Drive Lift Station, and a considerable amount of existing development. Chiron owns 51.3 acres in Area F but existing buildings are limited to a single 29-acre parcel. Area G is all the vacant portion of Vacaville Business Park. Areas H and I make up the remainder of the area tributary to the Pine Creek Lift Station. These areas are planned for business park or industrial development. Area I includes a small portion of the Nut Tree Airport will be served by the east Monte Vista Avenue improvements. The portion of Nut Tree Airport to be served is limited to 10 acres not currently connected to the collection system, and consists of portions of Assessor's Parcels 129-240-020 and 129-240-090.

Estimated Flows

Flow is currently produced by development in areas E, F, and H. The total current estimated average flow from the East Monte Vista Plan Area is estimated to be just over 200,000 gpd. Most existing flow (about 158,000 gpd) comes from Area E, with the remainder coming from Area F (Chiron), and Moore Business Forms in Area H. Existing capacity in the East Monte Vista trunk sewer is allocated based on total available pipeline capacity and existing agreements.

A portion of existing capacity was previously allocated to Area M, west of Putah South Canal. Area M is not and will not be served by the East Monte Vista trunk sewer system, so this capacity has been reallocated to areas east of Putah South Canal that can use the available capacity. Areas M's share of capacity is equal to an average flow of 63,500 gpd, based on its share of currently unused capacity. Because Area M is owned by Mission Land Company, this amount of capacity was re-allocated to selected parcels in Area E which are currently owned by Mission. The parcels designated by Mission to receive the transferred capacity include:

APN 133-020-20	2.01 acres
APN 133-020-21	2.11 acres
APN 133-020-22	4.52 acres
APN 133-030-03	10.19 acres
APN 133-201-14	5.74 acres
Total	**24.57 acres**

The re-allocation represents an additional 2,584 gpd/acre of capacity. This capacity, in addition to the 465 gpd/acre available to all growth areas in the East Monte Vista Plan Area, brings the total allocation for Mission's designated 24.57 acres in Area E to about 3,050 gpd/acre.

There is a tri-party agreement between Chiron, Vacaville Business Park, and the City of Vacaville which permits an average flow of 125,000 gpd from Chiron. The agreement also provides that flow from the remainder of Vacaville Business Park (Area G) will be limited such that the overall flow from the Business Park and Chiron does not exceed pipe capacity in the East Monte Vista Avenue trunk sewer. As shown on Figure 2, this limits capacity available in Area G to 205 gpd/ac.

Table 4-1 presents the summary of the flow allocations for each of the subareas in the East Monte Vista Plan Area.

Table 4-1. Summary Of Subarea Flow Allocations

	Allocated ADWF Capacity, gpd					
	Existing Conditions			Master Plan		
Subarea	Existing Development	Growth	Total	Existing Development	Growth	Total
E-Mission	—	75,000	75,000	—	75,000	75,000
E-other	158,000	27,000	185,000	286,000	116,000	402,000
F	55,000	70,000	125,000	218,000	167,000	385,000
G	—	47,000	47,000	—	459,000	459,000
H	8,100	8,000	16,000	16,000	33,000	49,000
I	23,200	22,000	45,000	46,000	94,000	140,000

NE Sector Sewer Service.xls SubareaSum

Facilities

The effective available capacity in the East Monte Vista Avenue trunk is controlled by the segment between Piper Drive and the Pine Creek Lift Station (Nodes 155 and 152 on Figure 1). This pipeline segment has a capacity of 1.59 mgd, based on a diameter of 15 inches. In order to realize full use of this pipeline capacity, Pine Creek Lift Station would need to be upgraded by installation of new pumps and controls; however, a replacement lift station with an expanded capacity may be completed before an upgrade to the existing station is necessary.

MASTER PLAN CONDITIONS

Projected Flows

Under the Master Plan all areas will be provided at least 2,000 gpd/ac, including existing development. Existing development known or allowed to produce higher flows is modeled at the known higher rate. The use of 2,000 gpd/ac represents a departure from previous modeling which was based on lower unit flow factors for existing development. This slightly more conservative

approach reflects the uncertainty in projecting future flow rates for industrial uses. Of all land use categories, the industrial land use is most likely to exhibit significant changes in flows from individual parcels after initial development occurs. The Pine Creek Lift Station service area includes the "industrial" category exclusively (other than Nut Tree Airport), so flow projections for this system are more sensitive to the variability of industrial flows than projections for other areas would be. Even at 2,000 gpd/ac, the collection system would generally not have capacity to accommodate large, high-water use industries.

In order to provide some additional sewer capacity for one or more large water users, new facilities will have enough additional capacity to accommodate an additional point load of 1.5 mgd with a peaking factor of 2.15 (the ratio of peak hour to average flow). It is assumed that this point load would be located somewhere upstream of Node 155, which is located on East Monte Vista Avenue at Piper Drive. The Master Plan does not include any pipeline extensions which might be necessary upstream of this location because the alignment, size, and cost of such facilities would be highly dependent on the actual location of the additional point load(s).

Increased capacity is also allocated specifically to Chiron. Under the Master Plan, the flow allocation for Chiron (Area F) is increased to 385,000 gpd, or about 7,500 gpd/ac. This increase reflects the possibility that Chiron may ultimately require more flow capacity than the current agreement provides. The cost allocation to Chiron is based on the flow currently permitted by agreement, 125,000 gpd, with growth to 385,000 gpd expressed in terms of equivalent acres. One equivalent acre is equal to a flow increase of 2,000 gpd above 125,000 gpd. See Table 4-1 for a summary of the master plan subarea flow allocations.

Proposed Facilities

Figure 3 and Table 4-2 present the proposed East Monte Vista facility improvements. The proposed modifications to be funded by the East Monte Vista Plan Area and (possibly) users of the point load capacity are summarized below:

- Replace Pine Creek Lift Station
- Replace pipelines on East Monte Vista Avenue from Nut Tree Road to Piper Drive
- Replace or parallel the pipeline on Piper Drive at East Monte Vista Avenue
- Construct a new gravity sewer from the current lift station location to a new location if relocating the lift station is determined in pre-design to be cost effective

As shown on Figure 3, additional downstream improvements are also necessary. These improvements will be funded through Development Impact Fees. Other facilities within Vacaville Business Park (Area G) will be constructed by the developer as development occurs. The facilities and costs listed in Table 4-2 are based on limited field information. They are subject to change through the normal development review process. It may be cost effective to relocate the lift station one to two thousand feet north along East Monte Vista Avenue. Regardless of where the larger station is located, the City will need to acquire land for either an expansion or relocation. A location farther north will permit the lift station and gravity trunk sewer to be constructed at shallower depths and lower cost. A force main would then be constructed from the new lift station location to the south side of Pine Tree Creek. The force

Table 4-2. Master Plan Improvements For East Monte Vista Plan Area

Description	Node		Improved Length, feet	Modeling Results		Estimated Cost,[b, c] $1,000s
	Up	Down		Required Capacity,[a] mgd	Improvement Sizing, inches or mgd	
Collectors - Vacaville Business Park (Improvement descriptions subject to change through development review)						
Cessna - South (proposed)	PIP13	PIP11	2,000	0.26	10	245
Beechcraft - South (prop.)	PIP12	PIP11	1,860	0.17	8	255
Beechcraft - Central (prop.)	PIP11	PIP10	1,730	0.59	12	263
Beechcraft - North (prop.)	PIP10	PIP10A	630	0.81	12	96
Beechcraft - North	BCHLS	PIP10B	517	0.81	12	69
Beechcraft - North	PIP10B	PIP1	55	0.81	12	7
Total, VBP (Area G) Collectors-Developer Funded						935
East Monte Vista Trunk						
Piper - East	PIP1	155	508	1.80	15	118
Gravity trunk sewer, E. Monte Vista	--	--	6,100	6.8 - 7.2	27	1,697
8" gravity sewer extension to lift sta.	—	—	2,000	—	8	209
Pine Creek Lift Station (relocated)	—	—	—	7.10	7.1 mgd	1,358
Force main to cross Pine Tree Creek	—	—	2,100	7.10	18	317
Subtotal, E. Monte Vista Trunk Design, Construction & Contingency[d]						3,699
Land Acquisition (allowance)						50
Benefit District Administration						0
Total Project Cost						3,749

(a) Based on Model NEALT 4A (2/28/97), which used a peaking factor of 2.5 within Vacaville Business Park.
(b) Estimated costs include 40% to estimate capital costs. Excludes financing.
(c) ENR CCI = 5880 (May 1998), 20-cities average
(d) Piper-East sewer cost based on rough planning level estimate. Other costs based on draft predesign report for East Monte Vista Improvements.

main could also be constructed at a lower cost than a deep gravity sewer. The savings in moving the lift station and constructing the force main are partially offset by the need to construct a small diameter gravity sewer to serve lands adjacent to the force main, and to convey flows from the vicinity of Nut Tree Airport to the lift station.

ALLOCATION OF COSTS

In general, cost are allocated based on benefit in terms of the relative share of new capacity in the improvements. A portion of project costs will be funded through a federal grant which reduces the cost to be spread to users. The City will fund construction of the trunk sewer and lift station improvements, and a special fee (the East Monte Vista Sewer Capacity Fee) will be established to reimburse the City as development occurs.

Economic Development Administration Grant

The City has applied for grant funding from the federal Economic Development Administration (EDA) to cover a portion of the cost of the trunk sewer improvements serving the East Monte Vista Plan Area. The requested grant amount is $1.9 million. Upon award of the grant to the City, it will be used first to offset the cost of including the point load capacity, and then to reduce the amount of the East Monte Vista Sewer Capacity Fee.

East Monte Vista Sewer Capacity Fee

Costs have been allocated to each subarea and are expressed as a dollars/acre sewer capacity fee. Table 4-3 defines the current and future (design) capacity allocation in terms of gpd/ac assigned to each subarea within the plan area. The capacity increases (and therefore the cost spread) were based on the following two levels of planned use:

1. Existing Flow—No additional fees will be assessed for maintaining existing flows. Existing flow is defined as 1,000 gpd/ac for all users not currently discharging at a rate higher than 2,000 gpd/ac. It is recognized that some existing users may be discharging at a rate higher or lower than 1,000 gpd/ac; however, these flows are not routinely monitored and the impact of the variations on facilities and costs is minimal. The basis of design for the original assessment district facilities currently in use was 1,000 gpd/ac.
2. Growth Flow—Growth flow comprises three components, a) new development, b) flow increases from existing users, and c) Chiron. New development will pay a pro-rata share of the distributed cost based on the increased capacity needed to achieve 2,000 gpd/ac. Existing users wishing to upgrade will be charged a pro-rata share of the distributed cost based on an increase in allowed flow from 1,000 gpd/ac to 2,000 gpd/ac. Chiron will pay for additional capacity in the East Monte Vista facilities according to increases in equivalent acres. The number of acres will be determined based on Chiron's increase over their baseline allotment of 125,000 gpd divided by the 2,000 gpd value per acre. For example, if Chiron wants to discharge 385,000 gpd, they would pay on the basis of 130 equivalent acres at the rate established for Area F ([385,000 gpd - 125,000 gpd] ÷ 2,000 gpd/equiv. ac = 130 equiv. ac).

The share of capacity increase was calculated for each subarea as a percentage of the total capacity increase based on the increase in allocated flow per acre. These percentages were used as shown in Table 4-4 to distribute the cost of the improvements to the areas which will receive an increase in capacity. The sewer capacity fee is based on actual parcel acreage in all subareas except Area F (Chiron). The fee for Area F is based on equivalent acres. The cost allocation is calculated for funding a portion of the improvements with the EDA grant. Without the grant initial City funding is not feasible.

Table 4-3 shows the estimated allocation of costs. The East Monte Vista Sewer Capacity Fee will be established using the Master Plan methodology and a formal spread based on verified assessed acres.

Table 4-3. Cost Allocation for East Monte Vista Plan Area

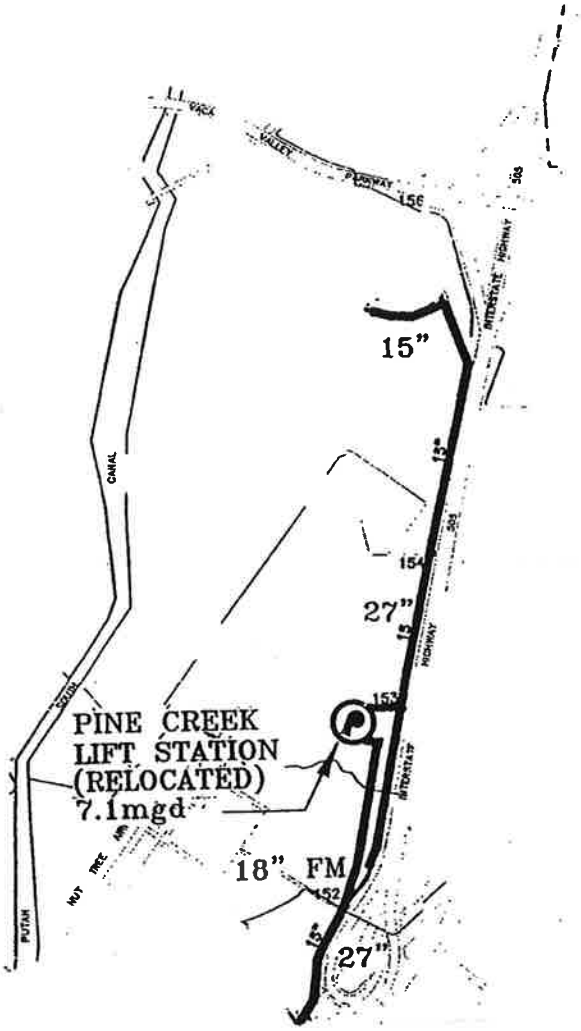
Area	Acreage	Distributed Share of Increase, %	Distributed Share of Costs,[a] $1,000s	Capacity Fee,[b] dollars/acre
Area B				
Vacant				
Mission Land Co.	135.59	0.0	0	—
Other	27.57	0.0	0	—
Existing User				
Liquid Carbonics	3.94	0.0	0	—
Area E				
Vacant				
Mission Land - selected parcels	24.57	0.0	0	—
Other	57.78	8.7	161	2,800
Existing Users				
Flow > 2,000 gpd/ac	12.09	0.0	0	0
Remainder	128.04	12.6	233	1,800
Area F				
Chiron[c]	130 eq. ac	25.6	473	3,600
Area G				
Vacaville Business Park	229.31	29.8	550	2,400
Area H				
Vacant	16.29	2.5	45	2,800
Existing Users	8.05	0.8	15	1,800
Area I				
Vacant	47.20	7.1	132	2,800
Existing Users	23.19	2.3	42	1,800
TOTAL, Sewer Benefit District Funding			1,651	
Economic Development Administration Grant			1,900	
Redevelopment Agency Share - Chiron Agreement			198	
TOTAL, Project Cost			3,749	

(a) Costs are based on ENR CCI = 5880 (May 1998), 20-cities average.

(b) Rounded to the nearest $100/ac.

(c) Cost per acre is estimated based on $/equivalent acre. There are 130 equivalent acres assigned to Area F. (Actual acreage is 51.3 ac.)

Exhibit B



SCALE:1"=2000'
(APPROXIMATE)

Exhibit C

Cost Allocation Assumptions

1. The cost of each improvement will be allocated to the parcels which will benefit from the improvement.

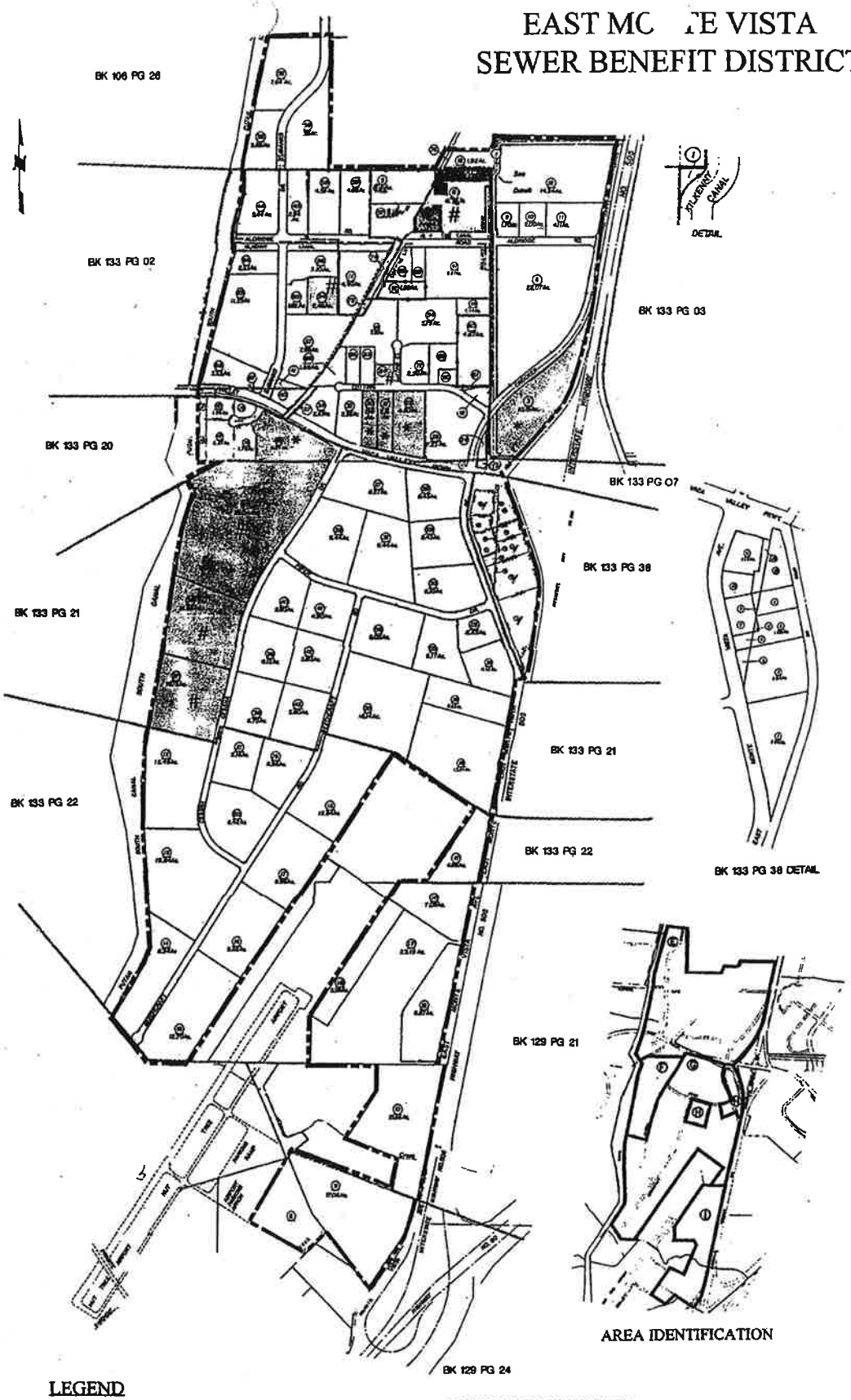
2. The City will initially pay for a portion of the trunk sewer and pump station improvements in the East Monte Vista Plan Area. The proposed trunk sewer will extend from I-80 to the intersection of East Monte Vista Avenue and Piper Drive. A short segment on Piper Drive at Leisure Town Road may be needed later, but is not part of the initial construction project. Additional infrastructure necessary to convey sewage from individual parcels to the trunk sewer is the responsibility of the landowner or developer.

   As the properties develop, benefiting landowners shall reimburse the portion of costs paid by the City by way of a one time "East Monte Vista Area Sewer Capacity Fee" assessed when vacant land is developed, or when existing users increase their flows. The landowners currently using the existing collection system will be connected to the new system when it is constructed, and will not be charged to maintain their current flow rate. Once the new facilities are in place, some existing collection system pipelines will be abandoned and the unused capacity in these pipelines will become unavailable. Therefore, no property will have any further unused allocation in those abandoned pipelines. The new pipelines and the lift station will be sized to convey currently allowed flow, plus planned increases from both developed and undeveloped properties.

3. Parcels currently allocated a capacity of 2,000 gpd/acre or greater will be allocated cost on the basis of their anticipated flow increase (if any) in terms of equivalent acres. One equivalent acre is equal to a flow increase of 2,000 gpd above the parcel's current allocation.

4. The City will rely on grant funding for a portion of the cost of the East Monte Vista Avenue facilities mentioned above. Grant funds will be used first to cover the cost of upsizing the trunk sewer to provide service for a future (unknown) heavy water user (a point load), and second, to reduce the costs to be spread to other users. Property owners will not bear any additional cost as a result of providing service for the undesignated point load.

EAST MC E VISTA
SEWER BENEFIT DISTRICT



LEGEND

DISTRICT BOUNDARY

APN BOOK PAGE BREAK

PARCELS CURRENTLY USING OVER 2000 GPD/AC (Identified with a "A")

SPRIG CIRCUITS	133-020-040
VIKING WINDOWS	133-020-080
CHIRON	133-210-570
VACAVILLE LODGE	133-020-040

PARCELS OWNED BY MISSION LAND IN AREA F (Identified with an "*")

133-020-200	133-201-140
133-020-210	
133-020-230	
133-030-030	

SEWER BENEFIT DISTRICT DIAGRAM

APPENDIX E – SEWER CALCS

Nut Tree Airport Sewer Design:

1- Determine if the existing 8" line is sufficienlty sized to meet current ande proposed future demands.

Given:

8" Sewer line currently servicing airport

Current Demand (from Airport Business Plan, pg. 69): **3,500gpd**

Capacity:

*Per "City of Vacaville Sanitary Sewer Systems Design Standards"

Table DS 6-2. "Allowable Utilization of Capacity in New Sewers":

- 8" Diameter Pipe @ Minimum Slope (0.0035 ft/ft)

Q_d = 0.33 mgd = 330,000 gpd (available capacity in 8" pipe)

* Per "Nut Tree Airport Master Plan Update EIR"

Table 3.11-1 "Wastewater Generation Calculations for the Proposed Project"

Average Dry Weather Flow, Q_a = 26,731 gpd

Design Flow, Qd = Q_{pdwf} + I (per City of Vacaville Design Standards)

Q_{pdwf} = Peak Dry Weather Flow

Q_{pdwf} = Q_a x 2.5

Q_{pdwf} = 26,731 x 2.5

Q_{pdwf} = 66,828 gpd

I = 1,000 gallons per day per acre

Total Acreage = 26.34 Acres (per Table 3.11-1)

I = (1,000) (26.34)

I = 26,340 gpd

Q_d = 66,828 + 26,340

Q_d = 93,168 gpd (proposed)

93,168 gpd < 330,000 gpd

* 8" Sewer Line has Sufficient Capacity

Capacity based on slope determined from "333446-EXH-009 Utility Survey" CAD file obtained from Client:

Slope=rise/run= (105.66-100.79)/851.57=**0.00572=0.572%**

Use Manning's equation: $Q=(1.49/n)A(R_h)^{2/3}S^{1/2}$

n=0.015

$A = \pi r^2$ **0.349**

r=4in=**0.333333**ft

R_h= $A/P=\pi r^2/2\pi r=r/2=(4/12)/2=$ **0.167**

$P=2\pi r$ **2.094**

Q= **0.792** cfs

= **511930.41** gpd

Allowable Capacity:

Previous: **20,000 gpd**

Additional Capacity obtained through purchase of additional property: **78,000 gpd**

Total Allowable Capacity: **97,660 gpd**

Determine Increased Sewer Demand:

Average Sewage Generation per restroom:

Number of restrooms: 12 (pg. 3.11-2 of the NE Sewer Sector Master Plan)

Current Demand: 3,500 gpd

Average Sewage Generation per restroom=3500/12=**291.67 gpd per restroom -> round up to 300 gpd**

a) Phase 1 Demand: (6 restrooms)(300 gpd per restroom)=	**1800**	gpd
c) Phase AI Demand: (2 restrooms)(300 gpd per restroom)=	**600**	gpd
d) Phase A Demand: (1 restrooms)(300 gpd per restroom)=	**300**	gpd
e) Phase B Demand: (2 restrooms)(300 gpd per restroom)=	**600**	gpd
f) Area 1 Demand:		
78,000 ft^2 office Bldg.		
rate: 1500 gpd/Acre (pg. 3.11-8 pf the NE Sewer Sector Master Plan)		
Demand=(78000ft^2/43560 ft2/Acre)(1500gpd/Acre)=	**2685.95**	gpd
Total Demand:	**5985.95**	gpd

Determine Total Sewer Demand with Proposed Improvements:

=3500gpd+5986.95gpd= **9485.95** gpd

Determine if existing line has sufficient capacity by comparing proposed demand to current capacity:

9,485.95 gpd<330,000 gpd<511,930 gpd, therefore the existing 8" line has sufficient capacity to meet the proposed demands.

2-Determine size of proposed pipes for each Development and Ancillary Phase: See Table 1 below.

Development Phases:

Nut Tree Airport - Sewer Calculations

Development Phase	Area, ac	Area, ft^2	Bathrooms	Proposed Q, gpd	Pipe Name	Proposed Pipe gpd	Proposed Pipe Size
1	-	-	6	1800		2100	6"
5	-	-	6	1800		3600	6"
6	-	-	6	1800		1800	6"
A	-	-	1	300		300	6"
A1	-	-	2	600		1200	6"
B	-	-	2	600		600	6"
Ancillary Phase							
1	1.79	78000	-	2686		2686	6"
2	9.30	405116	-	13950		17550	8"
3	5.76	250734	-	8634		8634	8"

Table 1: Proposed Sewer Pipe Sizes by Phase 32170

Assumptions:

Average Bathroom Sewage Generation= 300 gpd

Generation Rate for Acres: 1500 gpd/Acre

Use Manning's equation: $Q=(1.49/n)A(R_h)^{2/3}S^{1/2}$

n= 0.015

$A = \pi r^2$ 0.349 ft^2

r=4in=**0.333333**ft

R_h= $A/P=\pi r^2/2\pi r=r/2=(4/12)/2=$ 0.167

$P=2\pi r$ 2.094

S= 0.0035 minimum

Pipe Type: PVC for pipes 8"-12"

VCP for pipes greater than 12" and up to 42"

Assumptions

Existing pipe sizes are unknown and are assumed, based on the areas they appear to drain.

Pipe Capacities:			V=Q/A (fps)
2" PVC @ 0.35%: Min =	9900	gpd	1.17
4" PVC @ 0.35%: Min =	63100	gpd	1.86
6" PVC @ 0.35%: Min =	185900	gpd	2.44
8" PVC @ 0.35%: Min =	400400	gpd	2.96
10" PVC @ 0.35%: Min =	725900	gpd	3.43
12" PVC @ 0.35%: Min =	1180500	gpd	3.88

Minimum 6" for commercial or industrial services per DS 6-02 of the City of Vacaville Sanitary Sewer System Design Standards.

The following sizes are allowed in the City Sanitary Sewer system:

1. **Service Lateral** – 4 inch and larger. See Section DS 6.03B, "Sanitary Sewer Appurtenances, Services" of these Design Standards.

2. **Collection Main** - 8 & 10 inch

3. **Trunk Sewer** - 12 inch and larger

B. DESIGN FLOW: Design flow **(Qd)** is defined as peak wet weather flow at buildout for the service area. **Qd** is calculated by summing the peak dry weather flow **(Qpdwf)** and infiltration and inflow **(I)**.

The design flow for a Trunk Sewer is determined by the Department of Public Works using the City's sewer computer model through master planning or special study per Section DS 6-01 D of these Design Standards.

The design flow for a Collection Main shall be computed by the Developer using the following formula and criteria:

Qd = Qpdwf + I

Qd is the design flow in gallons per day

Qpdwf is the peak dry weather flow in gal. per day

I is the infiltration and inflow in gallons per day.

The infiltration and inflow component ***(I)*** shall be 1,000 gallons/acre/day applied to the gross acreage of the service area.

The peak dry weather flow **(Qpdwf)** for Collection Mains is calculated by multiplying the average dry weather flow **(Qa)** based on the factors given in **Table DS 6-1** times a peaking factor of 2.5. This method may also be used to calculate a preliminary Qpdwf for Trunk Sewers until modeling has been performed.

Qpdwf = Qa x 2.5

Table DS 6-1

Average Dry Weather Sanitary Sewer Flow Criteria (Qa)

Description	Residential, gpd/du [(a)]	Schools, gpd/student	Non-Residential, gpd/acre [(a)]	Non-Residential, gpd/ft^2
Residential – One Bedroom [(b)]	120	–	–	–
Residential – Two Bedroom [(b)]	160	–	–	–
Residential – Three Bedroom [(b)]	200	–	–	–
Residential – Four (or more) Bedroom	240	–	–	–
Residential [(c)]	240			
Office	–	–	1,500	0.115
Business Park	–	–	2,000	0.153
Industrial [(d)]	–	–	2,000	0.153
Retail Sales	–	–	1,900	0.145
Downtown Commercial	–	–	5,000	0.383
Highway Commercial	–	–	5,000	0.383
Service Commercial	–	–	1,900	0.145
Public - Low Water Use	–	–	0	0
Public - Medium Water Use	–	–	1,500	0.115
Public - High Water Use	–	–	1,500	0.115
Park	–	–	0	0
Private Recreation [(e)]	–	–	1,500	0.115
Elementary School	–	25	–	–
Secondary School	–	30	–	–
School Acreage	–	–	0	0
Open Space	–	–	0	0
Hospitals and Medical offices [(f)]	–	–	4,000	0.306
Places of Worship			1900	0.145
Agriculture	–	–	0	0

(a) gpd = gallons per day; du = dwelling unit

(b) Applicable only where the actual allowable dwelling unit and bedroom count is known and subject to no further changes by virtue of an executed development agreement or similar instrument. Where an executed development agreement or approved subdivision map applies to the sewer service area, the number of dwelling units shall be equal to the maximum allowed under such documents.

(c) This factor shall be applied where only an approximate dwelling unit count is available, and for predicted future growth in the service area.

(d) Applies only to dry industries. Design flows for industrial developments with the potential to produce above average flows must be computed on a case-by-case basis.

(e) Factor is not applied to golf course areas of play

(f) Qa shall be based upon project-specific flow projection with a minimum of 4,000 gpd/acre.

NOTE: Table DS 6-1 *is subject to periodic revisions based upon updated wastewater flow monitoring studies and master planning.*

1. **Minimum Slope:** Minimum slopes and other design criteria for various pipe diameters are shown in **Table DS 6-2**.

Table DS 6-2. Allowable Utilization of Capacity in New Sewers

Pipe Diameter, Inches	Maximum Allowable Utilization of Capacity		Minimum Slope [(a)], ft/ft	Equivalent Maximum Allowable Flow Qd at Minimum Slope[(a)], mgd
	As Percent of Full Pipe Gravity Flow Capacity	As Depth to Diameter Ratio, d/D		
8	70	0.62	0.0035	0.33
10	70	0.62	0.0025	0.50
12	80	0.68	0.0019	0.80
15	80	0.68	0.0015	1.29
18	80	0.68	0.0011	1.80
21	90	0.74	0.0010	2.77
24	90	0.74	0.0009	3.72
27	90	0.74	0.0009	4.77
30	90	0.74	0.0009	5.85
33	90	0.74	0.0009	6.88
36	90	0.74	0.0009	8.68
42 & up	90	0.74	0.0009	11.7 (42”)

[(a)] A slope greater than minimum may be required for Trunk Sewers where the projected flows do not produce the required minimum velocity and/or where higher allowable flows are required. See Section DS 6.02.D.2 for the minimum Trunk Sewer velocity requirements.

2. **Minimum Velocity:** Additionally, the minimum velocity in new Trunk Sewers is two (2) feet per second (fps) at **Qpdwf**. **Qpdwf** is equal to **Qd** excluding Infiltration (I). The minimum velocity standard is independent of the minimum slope requirement. Special consideration shall be given in instances where predicted peak flows will not achieve a velocity of two (2) fps for more than the first five (5) years of the life of the pipeline. Steeper slopes, manhole liners, or other modification to these City Standards may be required by the Director of Public Works to prevent odor and corrosion problems where low flows are anticipated.

3. **Maximum Velocity:** A maximum velocity of ten (10) fps is allowed at design flow.

does include the expansion of the existing arrival/departure facility, which would include a restaurant. Expansion of this facility to include a restaurant could increase wastewater generation by 7,000 gpd; resulting in a total project increase of 26,731 gpd of wastewater above baseline conditions. The estimated increase of 26,731 gpd of wastewater associated with the full build-out of the Proposed Project would not result in an increase of SBF beyond WWTP's current capacity (15 mgd). Furthermore, all wastewater diverted to WWTP would be treated according to all applicable state and federal regulations. Therefore, impacts associated with a potential exceedance of wastewater treatment requirements as a result of the Proposed Project are considered to be less than significant.

TABLE 3.11-1
WASTEWATER GENERATION CALCULATIONS FOR THE PROPOSED PROJECT

Facility/Project	Total Acreage	Generation Rate[1]	Qa Generation[2]
Baseline Condition			
Administration Building	0.17	1,500 gpd/acre[3]	248
Hangar Offices	0.05	1,500 gpd/acre[3]	73
Corporate Hangars	2.3	30 gpd/person[4]	240
Subtotal			*561*
Phase I			
Professional Office	1.3	1,500 gpd/acre[3]	1,950
General Commercial/Light Industrial	5.5	2,000 gpd/acre[5]	11,000
General Commercial/Light Industrial	2.75	2,000 gpd/acre[5]	5,500
South Corporate Hangar	5.75	30 gpd/person[4]	240
Subtotal			*18,690*
Phase II			
North Hangar Expansion and East Corporate Hangars	4.46	30 gpd/person[4]	240
Expansion of Existing Administration Building	1.4	5,000 gpd/acre[6]	7,000
Subtotal			*7,240*
Phase III			
East Hangar Expansion	2.66	30 gpd/person[4]	240
Subtotal			*240*
Baseline + Project Total			
			26,731

1 Generation rates derived from the City of Vacaville's Sanitary Sewer System Design Standards, Table DS 6-1.
2 Qa = Average dry weather flow.
3 Generation rate for office uses.
4 Generation rate based on rates used for secondary schools (gpd/student), which is comparative as a daytime public use facility.
5 Generation rate for an industrial use.
6 Generation rate for highway commercial use.

SOURCE: ESA Airports, 2013.

Mitigation Measures: None required.

APPENDIX F – STORM DRAIN CALCS

Nut Tree Airport - Storm Drain Calculations

Sub-region Name	Area, ac	I, (in/hr)	C, proposed	Existing Q, cfs	Proposed Q, cfs	Pipe Name	Existing Pipe cfs	Existing Pipe Capacity	Proposed Pipe cfs	Existing Pipe size	Proposed Pipe Size
A-1A*	1.09	3.16	0.9	3.1	3.10	SD-1A	None	None	3.1	None	15"
A-1B*	0.67	3.16	0.9	1.9	1.91	SD-1B	None	None	5.0	None	15"
A-2	0.56	3.16	0.9	1.6	1.59	SD-2	1.6	52%	6.6	12"	18"
A-3	0.75	3.16	0.9	2.1	2.14	SD-3	3.7	41%	8.7	18"	18"
A-4	0.68	3.16	0.9	1.9	1.94	SD-4	5.7	62%	10.7	18"	21"
A-5*	1.80	3.16	0.9	2.3	5.11	SD-5	None	None	15.8	None	24"
A-6	1.28	3.16	0.9	3.6	3.64	SD-6	3.6	18%	19.4	24"	24"
A-7	0.78	3.16	0.9	2.2	2.21	SD-7	5.8	42%	21.6	24"	27"
A-8	0.86	3.16	0.9	2.4	2.44	SD-8	8.2	42%	24.1	24"	27"
A-9	0.95	3.16	0.9	2.7	2.70	SD-9	11.0	56%	26.8	24"	30"
A-10A*	4.09	3.16	0.9	5.2	11.63	SD-10A	None	None	11.6	None	21"
A-12	1.83	3.16	0.9	5.2	5.19	SD-12	5.2	57%	5.2	15"	15"
A-13	1.96	3.16	0.9	5.6	5.57	SD-13	5.6	61%	5.6	18"	18"
A-14A*	5.10	3.16	0.9	6.4	14.50	SD-14A	None	None	14.5	None	24"
A-14B*	0.37	3.16	0.9	0.5	1.07	SD-14B	None	None	1.1	None	12"
A-16A*	6.61	3.16	0.9	8.4	18.81	SD-16A	None	None	18.8	None	24"
A-16B*	6.09	3.16	0.9	7.7	17.32	SD-16B	None	None	17.3	None	24"
A-16C	9.30	3.16	0.9	11.8	26.45	SD-16C	11.8	44%	26.5	27"	27"
A-17	5.76	3.16	0.9	7.3	16.37	SD-17	7.3	13%	16.4	36"	36"
A-18*	2.50	3.16	0.9	3.2	7.10	SD-18	None	None	7.1	None	18"
								Avg. = 60%			

* No existing storm drain exists for these areas.

Assumptions:
Existing C = 0.4
Proposed C = 0.9
I_{10}, (in/hr) = 3.16
$Q = C \cdot I \cdot A$

Storm Drain Pipe Capacities:

12" RCP @ 1%: Max =	3.09	cfs
15" RCP @ 1%: Max =	5.60	cfs
18" RCP @ 1%: Max =	9.10	cfs
21" RCP @ 1%: Max =	13.73	cfs
24" RCP @ 1%: Max =	19.60	cfs
27" RCP @ 1%: Max =	26.84	cfs
30" RCP @ 1%: Max =	35.54	cfs
36" RCP @ 1%: Max =	57.80	cfs

Assumptions

Existing pipe sizes are unknown and are assumed, based on the areas the appear to drain.

d. Rainfall Intensity (I_{10})

The rainfall intensity is based on the assumption that the peak runoff occurs when the storm duration is equal to the time of concentration. The rainfall intensity can be determined either from the Table 3-4B in the *SCWA Hydrology Manual* (latest edition) or from the following equation.

$$I_{10} = \frac{10.257 \bullet MAP \bullet \left(\frac{t_c}{1440}\right)^{0.42908}}{t_c}$$

Where:

I_{10}	=	10-year rainfall intensity, in/hr
MAP	=	Mean Annual Precipitation (Figure 2-2, SCWA Hydrology Manual)
t_c	=	time of concentration, minutes

(Note: The equation for I_{10} is based on the *SCWA Hydrology Manual*, June 1999 edition which is subject to change.)

To calculate rainfall intensity using Table 3-4B from the *SCWA Hydrology Manual*, the mean annual precipitation (MAP) is determined from Figure 2-2 of the *SCWA Hydrology Manual*, the storm duration is set equal to the time of concentration (t_c), and rainfall depth is read/interpolated from Table 3-4B. The rainfall intensity is calculated by dividing the rainfall depth (from Table 3-4B) by the duration of the design storm (in hours).

e. Tributary Area (A)

This is the area tributary to the computation point and shall include all areas that will contribute runoff to the drainage system, regardless of the land area limits of the particular development.

$t_c = 10$ min

$$I_{10} = \frac{10.257\ (26) \left[\frac{10}{1440}\right]^{0.42908}}{10}$$

$I_{10} = 3.16$ in/hr

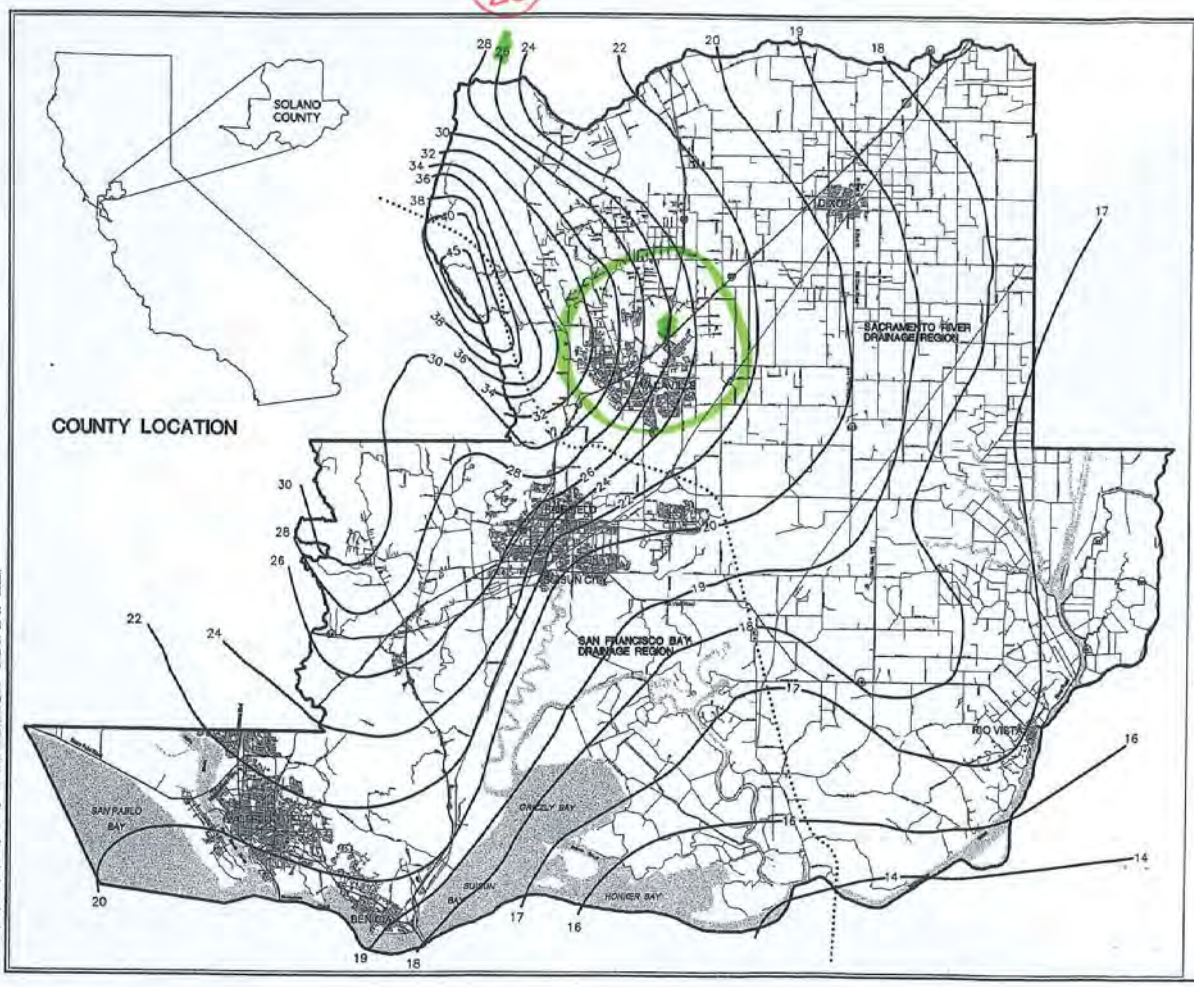


Figure 2-2

Solano County Water Agency
Hydrology Manual

ISOHYETAL MAP OF
SOLANO COUNTY
MEAN ANNUAL PRECIPITATION

N

0 10,000 20,000
SCALE IN FEET

NOTES:

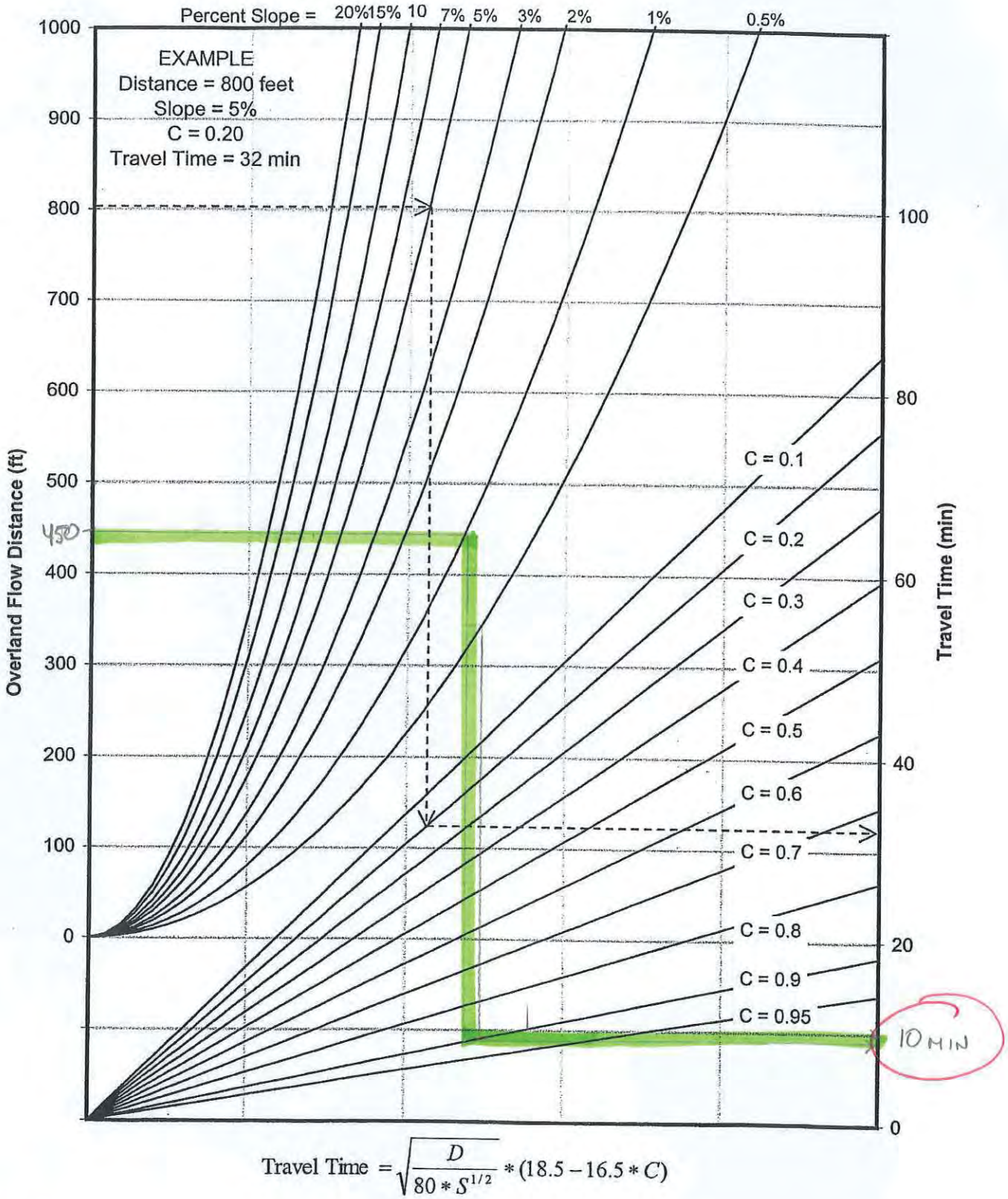
1. SOURCE OF UNDERLYING MAPPING SHOWN HEREON IS DIGITIZED USGS QUAD MAPS AS SUPPLIED BY AMERICAN DIGITAL CARTOGRAPHY.
2. BOUNDARIES ARE APPROXIMATE AND HAVE BEEN ADJUSTED TO FIT USGS QUAD MAPS.
3. BASED ON DPI CORRECTED TO THE 1931 TO 1965 BASE PERIOD.
4. ISOHYETAL LINES ARE FROM DESIGN RAINFALL FOR SOLANO COUNTY PREPARED BY JAMES G. GOODRIDGE, SEPTEMBER 5, 1996.

LEGEND:

ROADS & MINOR HIGHWAYS
MAJOR HIGHWAYS
22 ISOHYETAL LINES
DRAINAGE REGION BOUNDARY

WEST YOST & ASSOCIATES

Figure 3-2. Tavel Time for Overland Flow



$$\text{Travel Time} = \sqrt{\frac{D}{80 * S^{1/2}}} * (18.5 - 16.5 * C)$$

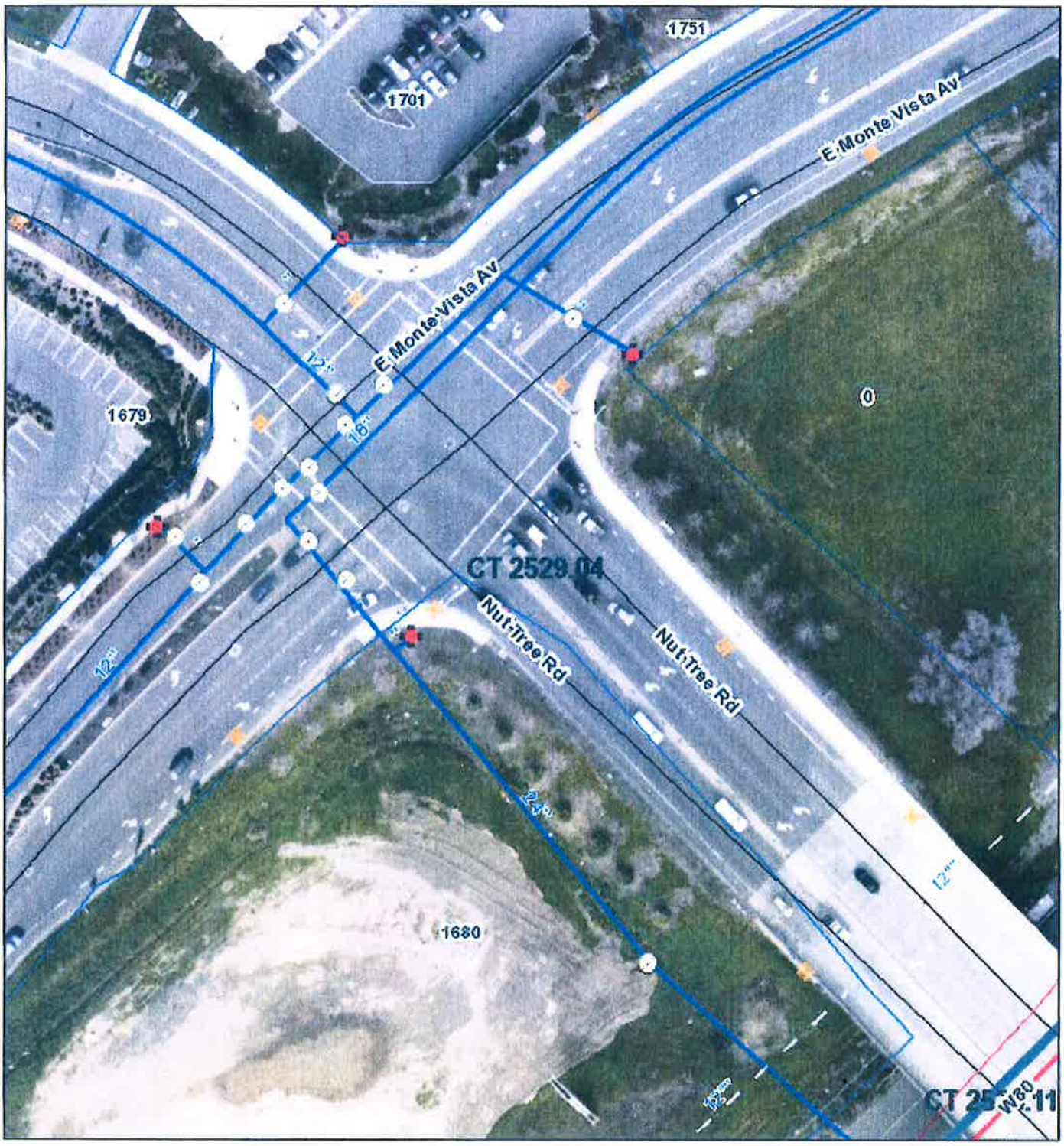
APPENDIX G – CITY OF VACAVILLE NTA SEWER CAPACITY ALLOCATION

CITY OF VACAVILLE

EXHIBIT A

NUT TREE AIRPORT SEWER CAPACITY ALLOCATION				
Parcel No. APN	Date	Allocation gpd	Status	Comments
	9/11/1979	200	sewer connedtion made	In accordance with the 1979 City-County Sewer Service Agreement (1 EDU of historical use)
0129-240-020 & 0129-240-090	9/12/2008	20,000	Sewer capacity allocation reserved	Letter dated September 12, 2008 from City Manager to Solano County Administrator The City's 1998 Northeast Sector Sewer Master Plan is a reference document
129-210-100	2006	31,260	Sewer capacity allocation reserved	County acquires 15.63 acres of property adjacent to the Nut Tree Airport with 2,000 gpd capacity
133-210-470	2008	2,700	Sewer capacity allocation reserved	County acquires 1.35 acres of property adjacent to the Nut Tree Airport with 2,000 gpd capacity
133-210-510	2008	920	Sewer capacity allocation reserved	County acquires 0.46 acres of property adjacent to the Nut Tree Airport with 2,000 gpd capacity
133-210-530	2008	10,340	Sewer capacity allocation reserved	County acquires 5.17 acres of property adjacent to the Nut Tree Airport with 2,000 gpd capacity
133-210-580	2008	5,540	Sewer capacity allocation reserved	County acquires 2.77 acres of property adjacent to the Nut Tree Airport with 2,000 gpd capacity
133-210-600	2008	26,900	Sewer capacity allocation reserved	County acquires 13.45 acres of property adjacent to the Nut Tree Airport with 2,000 gpd capacity
		97,660		

Vacaville Basemap



October 24, 2017

1:1,128

0 0.0075 0.015 0.03 mi

0 0.01 0.02 0.04 km

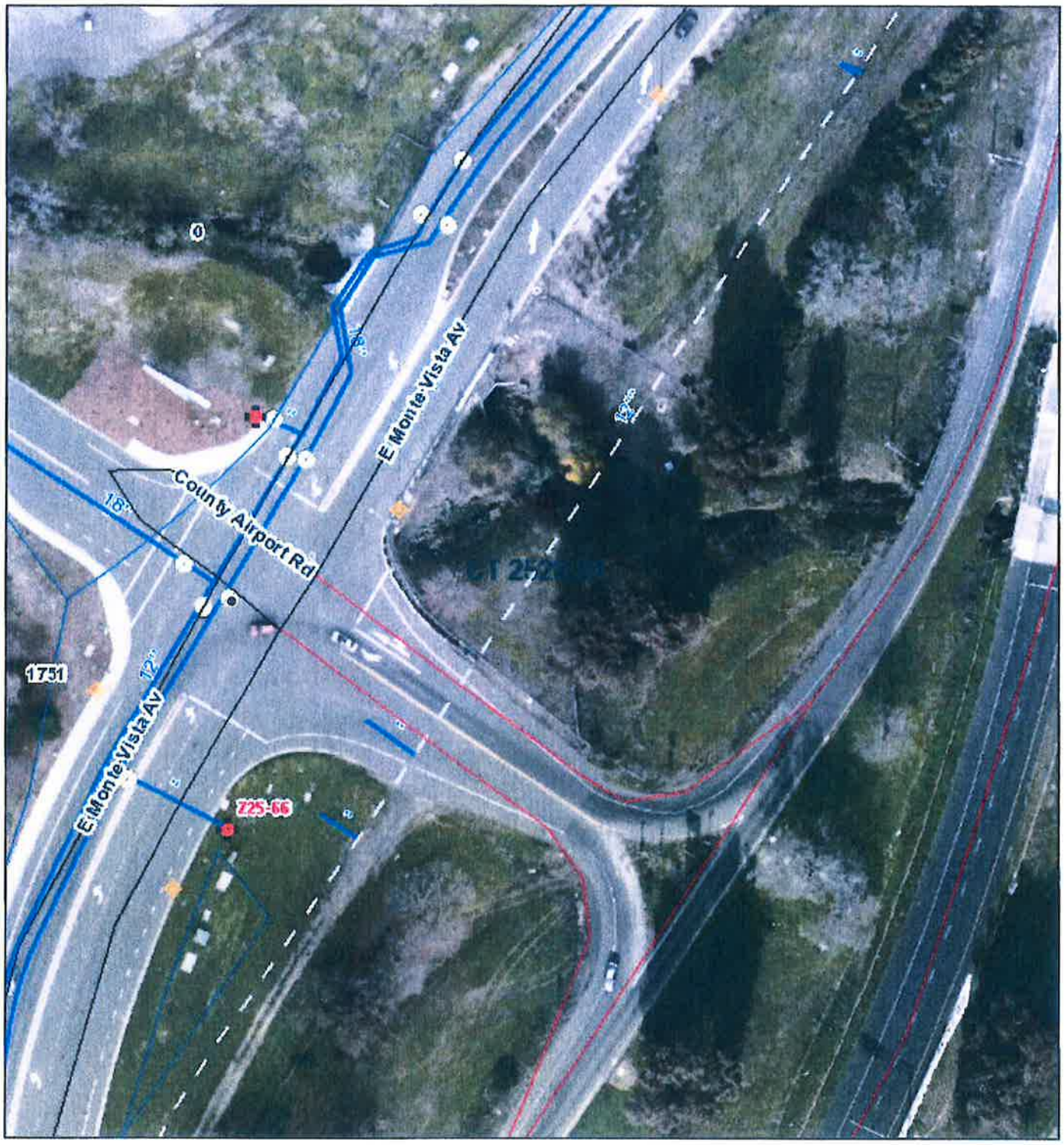
Street Centerline

- Minor Arterials
- Major Arterials
- Freeway Ramps
- Freeway
- Parcel
- Vacaville Municipal Boundary
- County Boundary
- Streetlights
- Water Abandoned Lines
- Water Hydrants

Source: U.S. Census Bureau

Source: U.S. Census Bureau | Esri., Inc. |

Vacaville Basemap



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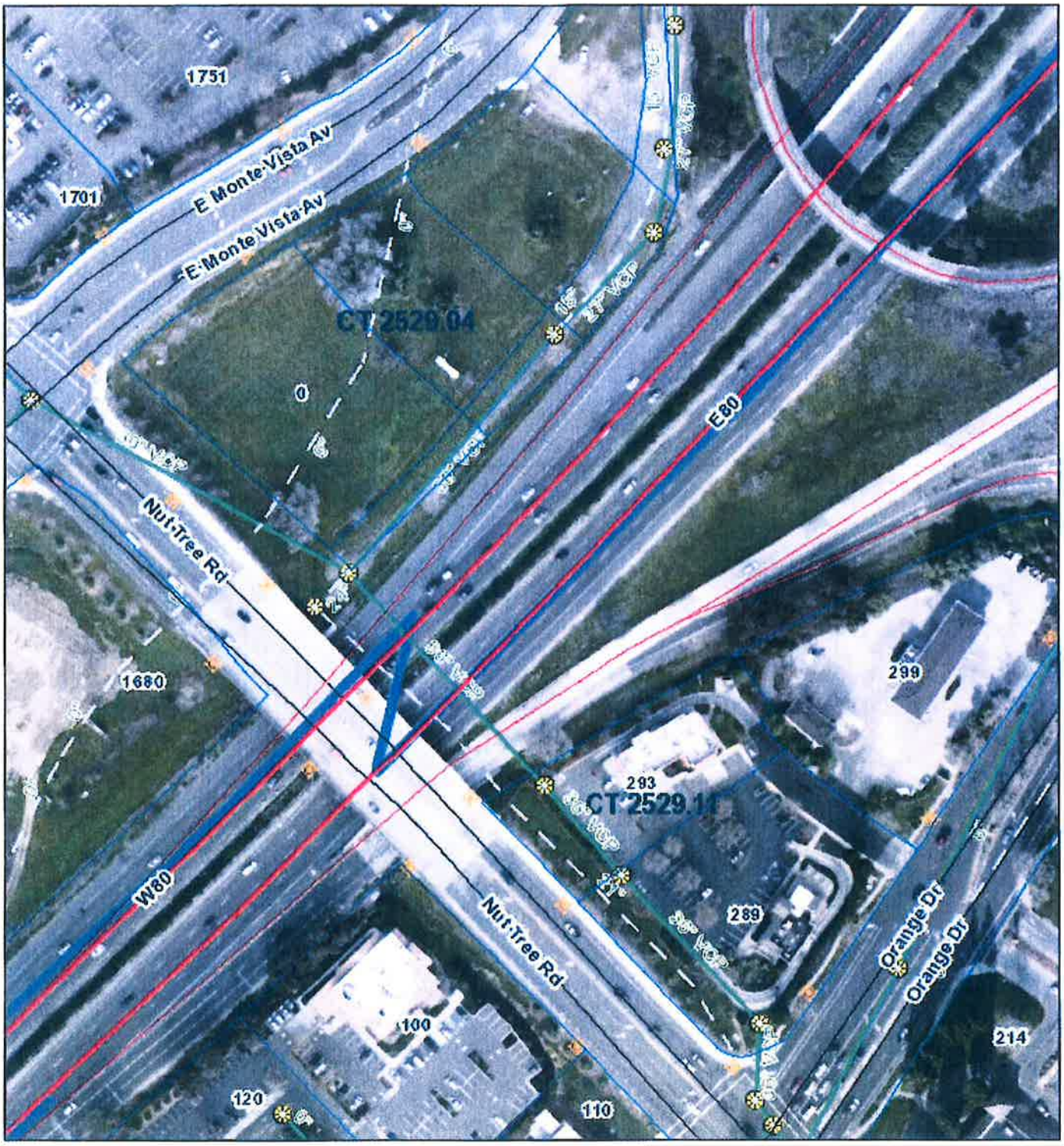
Vacaville Basemap



October 30, 2017

1:2,257

0 0.0175 0.035 0.07 mi

0 0.02 0.04 0.08 km

Street Centerline

- Minor Arterials
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- Freeway Ramps
- Freeway
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Source: U.S. Census Bureau

Source: U.S. Census Bureau | Esri., Inc. |

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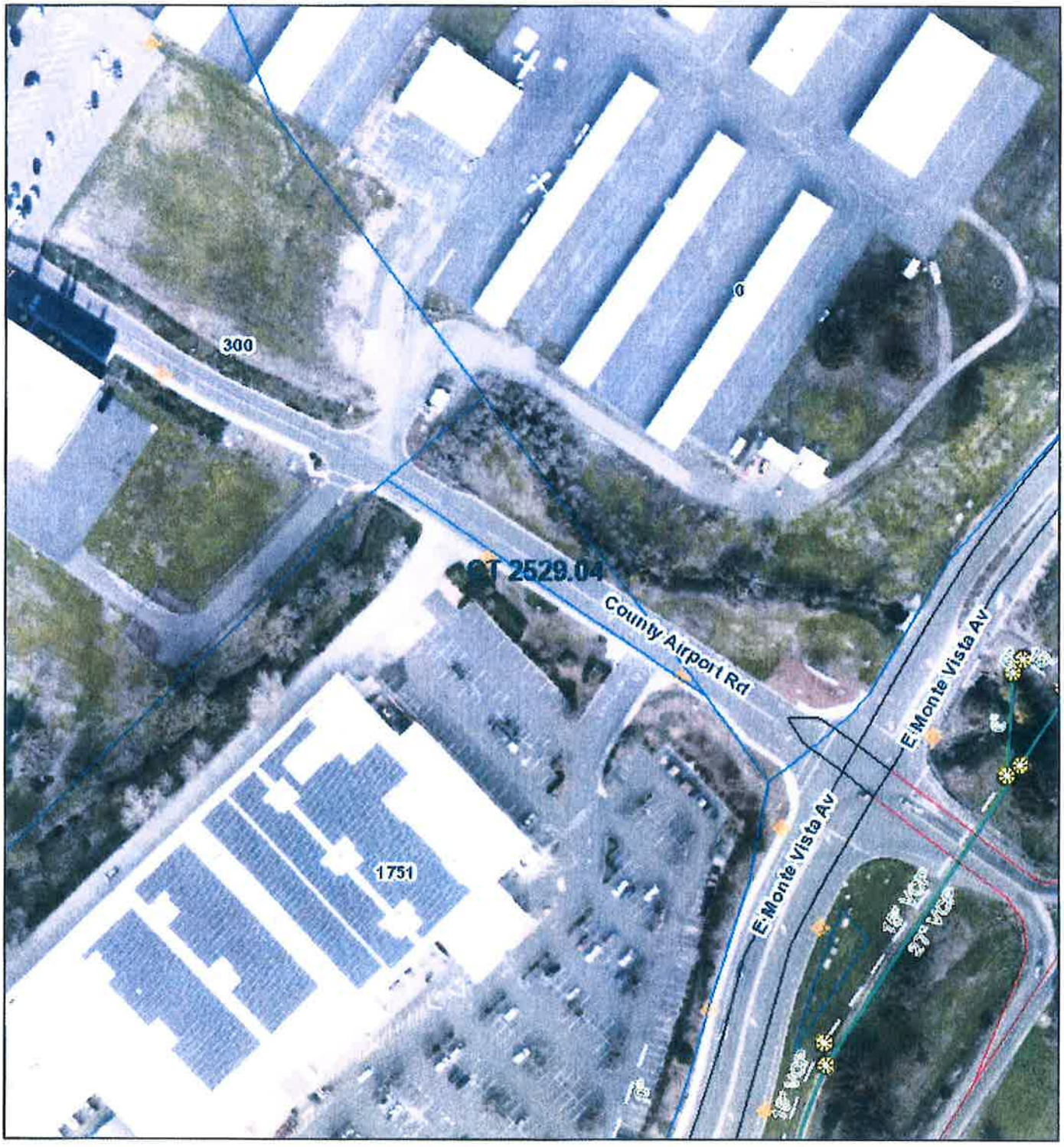
Vacaville Basemap



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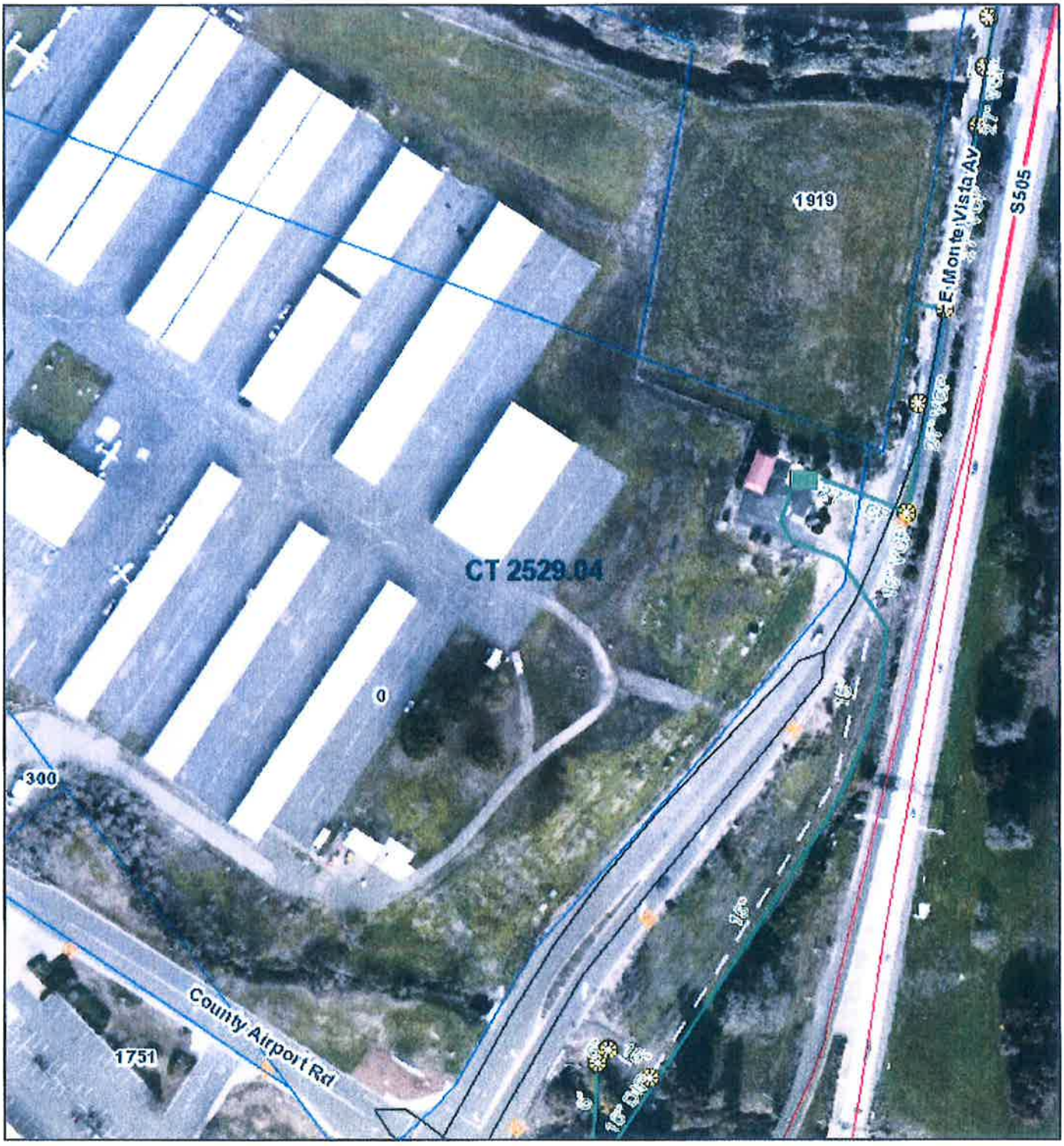

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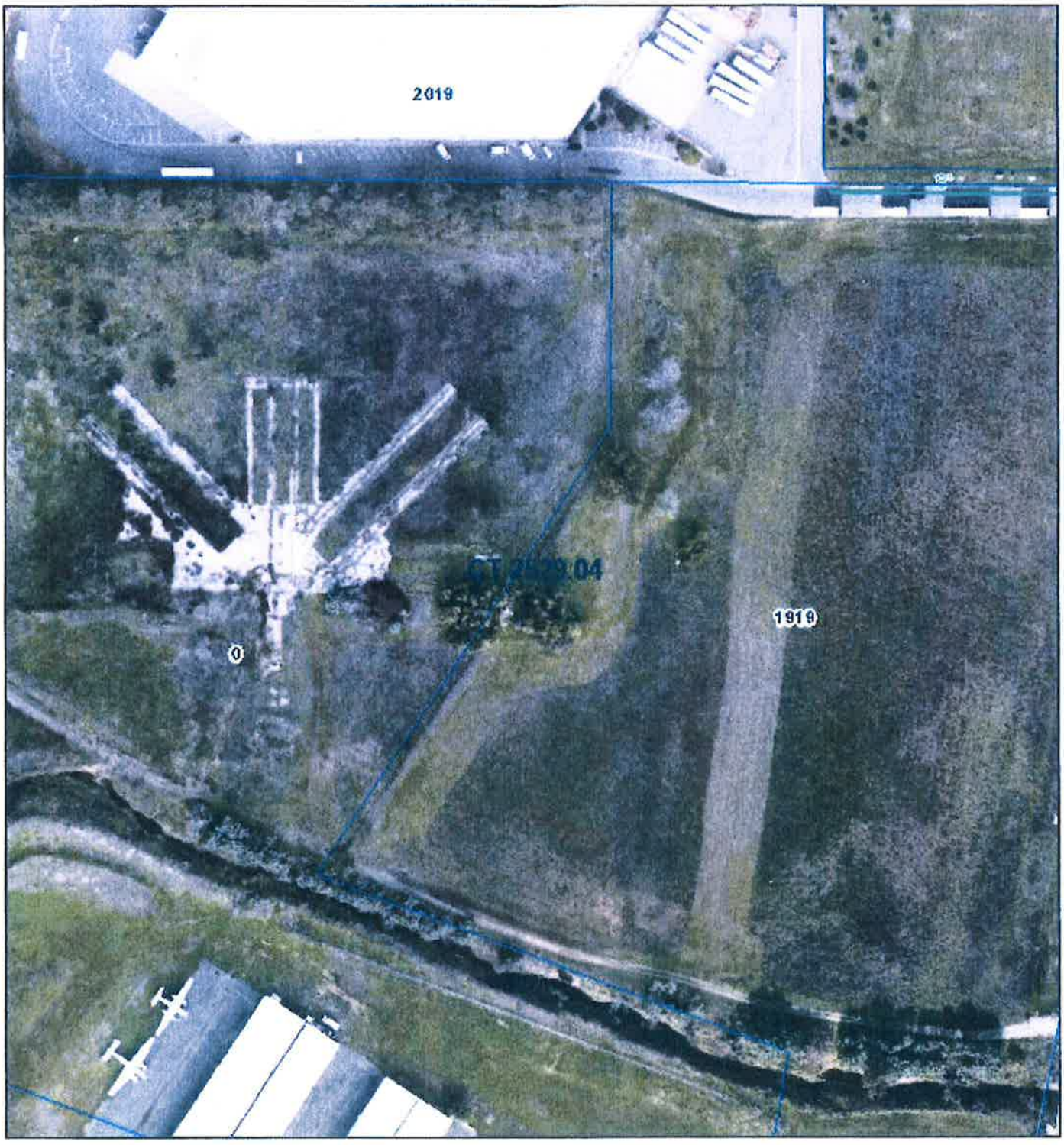

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Source: U.S. Census Bureau

Source: U.S. Census Bureau | Esri , Inc. |

APPENDIX H – CONCEPTUAL CONSTRUCTION ESTIMATES

ROM ESTIMATE WORKSHEET

SOLANO COUNTY

PROJECT: **NUT TREE AIRPORT UTILITY MASTER PLAN**

PHASE: **CONCEPTUAL**

ESTIMATE DATE **JULY 1, 2018**

BID DATE: **UNKNOWN**

PREPARED BY: T. PRECHEL

5/3/2018
10:10 AM
6112 Nut Tree Airport MP 5 3 2018.xls

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST	TOTAL COST W/ MARKS
	WATER					
	SOUTH AREA					
1	8" PVC	1,600	LF	$75.00	$120,000	
2	10" PVC	200	LF	$90.00	$18,000	
3	12" PVC	750	LF	$105.00	$78,750	
4	Hydrants	8	EA	$4,000.00	$32,000	
	SOUTH AREA TOTAL				**$248,750**	**$401,336**
	MID-NORTH AREA					
1	8" PVC	4,400	LF	$75.00	$330,000	
2	10" PVC	0	LF	$90.00	$0	
3	12" PVC	1,100	LF	$105.00	$115,500	
4	Hydrants	19	EA	$4,000.00	$76,000	
	MID- NORTH AREA TOTAL				**$521,500**	**$841,394**
	NORTH AREA					
1	8" PVC	6,000	LF	$75.00	$450,000	
2	Hydrants	18	EA	$4,000.00	$72,000	
	NORTH AREA TOTAL				**$522,000**	**$842,201**
	FAR NORTH AREA					
1	8" PVC	3,200	LF	$75.00	$240,000	
2	Hydrants	10	EA	$4,000.00	$40,000	
	FAR NORTH AREA TOTAL				**$280,000**	**$451,755**
	SUBTOTAL HARD COSTS				**$1,572,250**	**$2,536,687**
	CONTINGENCY					
	ESTIMATING CONTINGENCY	20.00%			**$314,450**	
	SUBTOTAL CONSTRUCTION COSTS				**$1,886,700**	
	MARK-UPS					
	GENERAL CONDITIONS	15.00%			$283,005	
	OVERHEAD & PROFIT	8.00%			$173,576	
	INSURANCE & BONDS	2.25%			$52,724	
	SUBTOTAL MARK-UPS				**$509,305**	
	SUBTOTAL CONSTRUCTION COSTS & MARK-UPS				**$2,396,005**	
	ESCALATION					
	ESCALATION	0.83%			**$19,887**	

ROM ESTIMATE WORKSHEET

SOLANO COUNTY

PROJECT: **NUT TREE AIRPORT UTILITY MASTER PLAN**

PHASE: **CONCEPTUAL**

ESTIMATE DATE **JULY 1, 2018**

BID DATE: **UNKNOWN**

PREPARED BY: T. PRECHEL

5/3/2018
10:10 AM
6112 Nut Tree Airport MP 5 3 2018.xls

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST	TOTAL COST W/ MARKS
	SUBTOTAL CONSTRUCTION COSTS				**$2,415,892**	
	CONSTRUCTION CONTINGENCY	5.00%			**$120,795**	
	TOTAL CONSTRUCTION COSTS				**$2,536,687**	**$2,536,687**

ROM ESTIMATE WORKSHEET

SOLANO COUNTY

PROJECT: **NUT TREE AIRPORT UTILITY MASTER PLAN**

PHASE: **CONCEPTUAL**

ESTIMATE DATE: **JULY 1, 2018**

BID DATE: **UNKNOWN**

PREPARED BY: T. PRECHEL

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST	TOTAL COST W/ MARKS
	SEWER					
	SOUTH AREA					
1	6" PVC	500	LF	$60.00	$30,000	
2	CLEANOUT	2	EA	$500.00	$1,000	
3	Manholes	2	EA	$4,000.00	$8,000	
	SOUTH AREA TOTAL				**$39,000**	**$62,923**
	MID-NORTH AREA					
1	6" PVC	275	LF	$60.00	$16,500	
2	CLEANOUT	2	EA	$500.00		
3	Manholes	3	EA	$4,000.00	$12,000	
	MID- NORTH AREA TOTAL				**$28,500**	**$45,982**
	NORTH AREA					
1	8" PVC	1,150	LF	$75.00	$86,250	
2	CLEANOUT	2	EA	$600.00		
3	Manholes	3	EA	$4,000.00	$12,000	
	NORTH AREA TOTAL				**$98,250**	**$158,518**
	FAR NORTH AREA					
1	8" PVC	350	LF	$75.00	$26,250	
2	CLEANOUT	2	EA	$600.00		
3	Manholes	3	EA	$4,000.00	$12,000	
	FAR NORTH AREA TOTAL				**$38,250**	**$61,713**
	LIFT STATION	1	LS	$50,000	$50,000	**$80,671**
	SUBTOTAL HARD COSTS				**$254,000**	**$409,807**
	CONTINGENCY					
	ESTIMATING CONTINGENCY	20.00%			**$50,800**	
	SUBTOTAL CONSTRUCTION COSTS				**$304,800**	
	MARK-UPS					
	GENERAL CONDITIONS	15.00%			$45,720	
	OVERHEAD & PROFIT	8.00%			$28,042	
	INSURANCE & BONDS	2.25%			$8,518	
	SUBTOTAL MARK-UPS				**$82,279**	
	SUBTOTAL CONSTRUCTION COSTS & MARK-UPS				**$387,079**	
	ESCALATION					
	ESCALATION	0.83%			**$3,213**	
	SUBTOTAL CONSTRUCTION COSTS				**$390,292**	

ROM ESTIMATE WORKSHEET

SOLANO COUNTY

PROJECT: **NUT TREE AIRPORT UTILITY MASTER PLAN**

PHASE: **CONCEPTUAL**

ESTIMATE DATE: **JULY 1, 2018**

BID DATE: **UNKNOWN**

PREPARED BY: T. PRECHEL

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST	TOTAL COST W/ MARKS
	CONSTRUCTION CONTINGENCY	5.00%			**$19,515**	
	TOTAL CONSTRUCTION COSTS				**$409,807**	**$409,807**

ROM ESTIMATE WORKSHEET

SOLANO COUNTY

PROJECT: **NUT TREE AIRPORT UTILITY MASTER PLAN**

PHASE: **CONCEPTUAL**

ESTIMATE DATE: **JULY 1, 2018**

BID DATE: **UNKNOWN**

PREPARED BY: T. PRECHEL

5/3/2018
10:10 AM
6112 Nut Tree Airport MP 5 3 2018.xls

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST	TOTAL COST W/ MARKS
	STORM					
	SOUTH AREA					
1	12" RCP	35	LF	$65.00	$2,275	
2	24" RCP	60	LF	$140.00	$8,400	
3	Catch Basins	4	EA	$2,500.00	$10,000	
	SOUTH AREA TOTAL				**$20,675**	**$33,357**
	MID-NORTH AREA					
1	15" RCP	300	LF	$85.00	$25,500	
2	18" RCP	200	LF	$105.00	$21,000	
3	21" RCP	550	LF	$120.00	$66,000	
4	24" RCP	75	LF	$140.00	$10,500	
5	27" RCP	275	LF	$170.00	$46,750	
6	30" RCP	125	LF	$195.00	$24,375	
7	Catch Basins	16	EA	$2,500.00	$40,000	
	MID- NORTH AREA TOTAL				**$234,125**	**$377,740**
	NORTH AREA					
1	24" RCP	125	LF	$140.00	$17,500	
2	Catch Basins	3	EA	$2,500.00	$7,500	
	NORTH AREA TOTAL				**$25,000**	**$40,335**
	FAR NORTH AREA					
1	18" RCP	65	LF	$105.00	$6,825	
2	Catch Basins	2	EA	$2,500.00	$5,000	
	FAR NORTH AREA TOTAL				**$11,825**	**$19,079**
	SUBTOTAL HARD COSTS				**$291,625**	**$470,511**
	CONTINGENCY					
	ESTIMATING CONTINGENCY	20.00%			**$58,325**	
	SUBTOTAL CONSTRUCTION COSTS				**$349,950**	
	MARK-UPS					
	GENERAL CONDITIONS	15.00%			$52,493	
	OVERHEAD & PROFIT	8.00%			$32,195	
	INSURANCE & BONDS	2.25%			$9,779	
	SUBTOTAL MARK-UPS				**$94,467**	
	SUBTOTAL CONSTRUCTION COSTS & MARK-UPS				**$444,417**	
	ESCALATION					
	ESCALATION	0.83%			**$3,689**	
	SUBTOTAL CONSTRUCTION COSTS				**$448,106**	
	CONSTRUCTION CONTINGENCY	5.00%			**$22,405**	

ROM ESTIMATE WORKSHEET

SOLANO COUNTY

PROJECT: **NUT TREE AIRPORT UTILITY MASTER PLAN**

PHASE: **CONCEPTUAL**

ESTIMATE DATE: **JULY 1, 2018**

BID DATE: **UNKNOWN**

PREPARED BY: T. PRECHEL

5/3/2018
10:10 AM
6112 Nut Tree Airport MP 5 3 2018.xls

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST	TOTAL COST W/ MARKS
	TOTAL CONSTRUCTION COSTS				**$470,511**	**$470,511**