Appendix J – Hydrology Analysis Memorandum

MEMORANDUM

Date: June 3, 2022
BKF No.: 202100283-10
To: Martin Quan, City of Burlingame

From: Tim Heffernan, BKF

Cc: Jeremy Liu, One Vassar
Karen Kuklin, DGA

Subject: 620 Airport Blvd – Hydrology Analysis Memorandum

Purpose

The purpose of this memorandum is to provide a preliminary hydrology analysis for the redevelopment of 620 Airport Blvd in Burlingame, California. This analysis will estimate peak stormwater runoff from the site in both the existing and redeveloped conditions.

Background

The project consists of two separate areas, On-Ste (~ 3.7 acres) and the Trail (~ 1.2 acres). The sites are currently occupied by an asphalt trail, a surface parking lot, with public access provided along Airport Boulevard and landscape areas. The site is bounded by Airport Blvd to the south, State Lands to the west and north, and a hotel to the east. The trail area improvements are located between the building site and Anza Lagoon along the western and northern property frontages.

The site is served by a 24-inch RCP Storm Drain main in Airport Boulevard that drains by gravity to Sanchez Creek Channel. The site drains to the 24-inch RCP via a 10" PVC lateral that connects to the existing curb inlet in Airport Blvd near the southwest corner of the site. Runoff generated onsite is collected by local drop inlets and conveyed in closed conduits to a sump pump at the southwest corner of the parking lot and pumped through the 10-inch PVC to the city's storm drain system. Attachment A includes the City base maps showing the existing facilities in the project vicinity. Runoff generated in the trail area sheet flows directly to Anza Lagoon.

The proposed condition for the trail area will remain the same with similar surface coverage and drainage pattern and the On-Site conditions will consist of a podium style building with flowthrough planters, green roof areas and a sump pump at grade to pick up drainage from the low end of the site. The drainage from the low end of site will be pump to the city's existing storm drain system in Airport Blvd. Refer to Figures 1 and 2 for the existing and proposed drainage areas respectively. The areas for the existing and proposed conditions are tabulated in Tables 1 and 2.

TABLE 1. EXISTING SITE

	Pervious/ Impervious	Coverage	Area (sf)
ON-SITE	Imperv	Roof	75
	Imperv	Impervious	1,020
	Imperv	Parking	122,122
	Perv	Landscape	37,906
		SUB-TOTAL	161,123
TRAIL	Imperv	Hardscape	24,335
	Perv	Landscape	28,891
		SUB-TOTAL	53,226
		TOTAL	214,349

TABLE 2. PROPOSED SITE

Lot	Pervious/ Impervious	Coverage	Area (sf)
ON-SITE	Imperv	Roof	69,050
	Imperv	Roof - Podium	43,510
	Imperv	Roof - Irrigated	28,539
	Imperv	Hardscape	12,150
	Perv	Landscaping	7,874
		SUB-TOTAL	161,123
TRAIL	Imperv	Hardscape	24,330
	Perv	Landscape	28,896
		SUB-TOTAL	53,226
		TOTAL	214,349

Methodology

This preliminary hydrology memorandum analyzes peak stormwater runoff from the site using the Rational Method for both the 10-year and 100-year storms in the existing and proposed conditions.

The Rational Method is defined by the formula:

Q = C I A, where:

Q = peak flow (cfs)

C = runoff coefficient factor (unitless)

I = rainfall intensity (in/hr) at the time of concentration

A = area (acres)

This analysis uses runoff coefficients (C) as documented in figures 819.2A and 819.2B of the Caltrans Highway Design Manual and the rainfall intensities for the 10-year and 100-year design storm are determined using IDF (intensity-duration-frequency) Table: NOAA Atlas 14, Volume 6, and Version 2 for San Francisco International Airport, California. The rainfall intensity is based on the time of concentration (T_c), or the total time it takes rainfall to reach the analysis point along the longest path of travel. To simplify this preliminary analysis the time of concentration was conservatively set to be 10 minutes.

Intensity 10-year, 10-minute, I =	1.87	in/hr	NOAA Atlas 14, Volume 6, Version 2
Intensity 100-year, 10-minute, I =	2.96	in/hr	NOAA Atlas 14, Volume 6, Version 2
Impervious Runoff Coefficient, C =	0.90		
Pervious Runoff Coefficient, C =	0.30		
System Tc =	10	min	

Analysis

Figure 1 shows the existing site broken into On-Site and Trail areas. The Trail area sheet flows northerly or westerly and discharges directly to Anza Lagoon then to San Francisco Bay. The existing On-site area drains to a sump pump in the southwest corner of the site and is discharged to the 24-inch RCP pipe in Airport Blvd and ultimately discharges to Sanchez Creek Channel then to San Francisco Bay.

Figure 2 shows the proposed site conditions and the proposed breakdown of pervious and impervious areas. The proposed On-site improvements consist of a podium style building that takes up a majority of the site. Runoff is routed to treatment areas prior to being collected in the internal building plumbing systems and discharged to the city main in Airport Blvd, or collected at the pump station at the low end of the site which will also discharge to the storm drain main in Airport Blvd.

The Rational Method was used to calculate peak stormwater runoff from the existing site and the proposed development for 10-year and 100-year storm events. The results are summarized in Tables 3 and 4.

TABLE 3 - EXISTING PEAK FLOW

Drainage Area	Total Area (acre)	Impervious Area (acre)	Impervious (%)	Pervious Area (acre)	Pervious (%)	Weighted "C"	Flow, 10-Year	Flow, 100-Year
Trail	1.22	0.56	45.8%	0.66	54.3%	0.57	1.31	2.08
On-Site	3.70	2.83	76.5%	0.87	23.5%	0.76	5.25	8.31
TOTAL	4.92	3.39	68.8%	1.53	31.2%	0.71	6.56	10.39

TABLE 4 - PROPOSED PEAK FLOW

Drainage Area	Total Area (acre)	Impervious Area (acre)	Impervious (%)	Pervious Area (acre)	Pervious (%)	Weighted "C"	Flow, 10-Year	Flow, 100-Year
Trail	1.22	0.56	45.7%	0.66	54.3%	0.57	1.31	2.08
On-Site	3.70	3.52	95.1%	0.18	4.9%	0.87	6.02	8.31
TOTAL	4.92	4.08	82.9%	0.84	17.2%	0.80	7.33	11.61

The project will not increase or decrease the peak flow in the Trail Area. The project will increase the imperviousness of the On-site portion of the project from 76.5% to 95.1% and will increase the peak runoff from 5.25 cfs to 6.02 cfs for the 10-year event unless mitigation measures are taken. In order to offset the potential increase in runoff leaving the site we propose detention to slow the rate of water leaving the site. Using the modified hydrograph approach, assuming the peak flow occurs at 3/2 the Tc, the required detention volume is 693 cubic feet. Refer to table 5 for detention volume calculations.

$V_{Det} = 3/2\ Tc\ (Q_{post} - Q_{pre})$, where:
V_{Det} = Detention Volume (cf)
Q_{post} = Flow (cfs) proposed conditions
Q_{pre} = Flow (cfs) existing conditions

TABLE 5 - REQUIRED DETENTION

	Pre-Construction (cfs)	Post-Construction (cfs)	Tc (min)	Volume (cf)
Trail	1.31	1.31	10	0
On-Site	5.25	6.02	10	693

The project is a regulated project under section C.3 of the MRP and will implement flowthrough planters to satisfy some of the stormwater treatment requirements. We proposed to utilize the storage volume of the rock reservoir course to account for the required storage volume from the increase in imperviousness. Using the bioretention area provided in the design (3,681 sf) and the typical detail (12" drain rock section with a porosity of 0.4) the storage volume in the rock reservoir course of the bioretention area is 1,472 cubic feet.

Conclusion

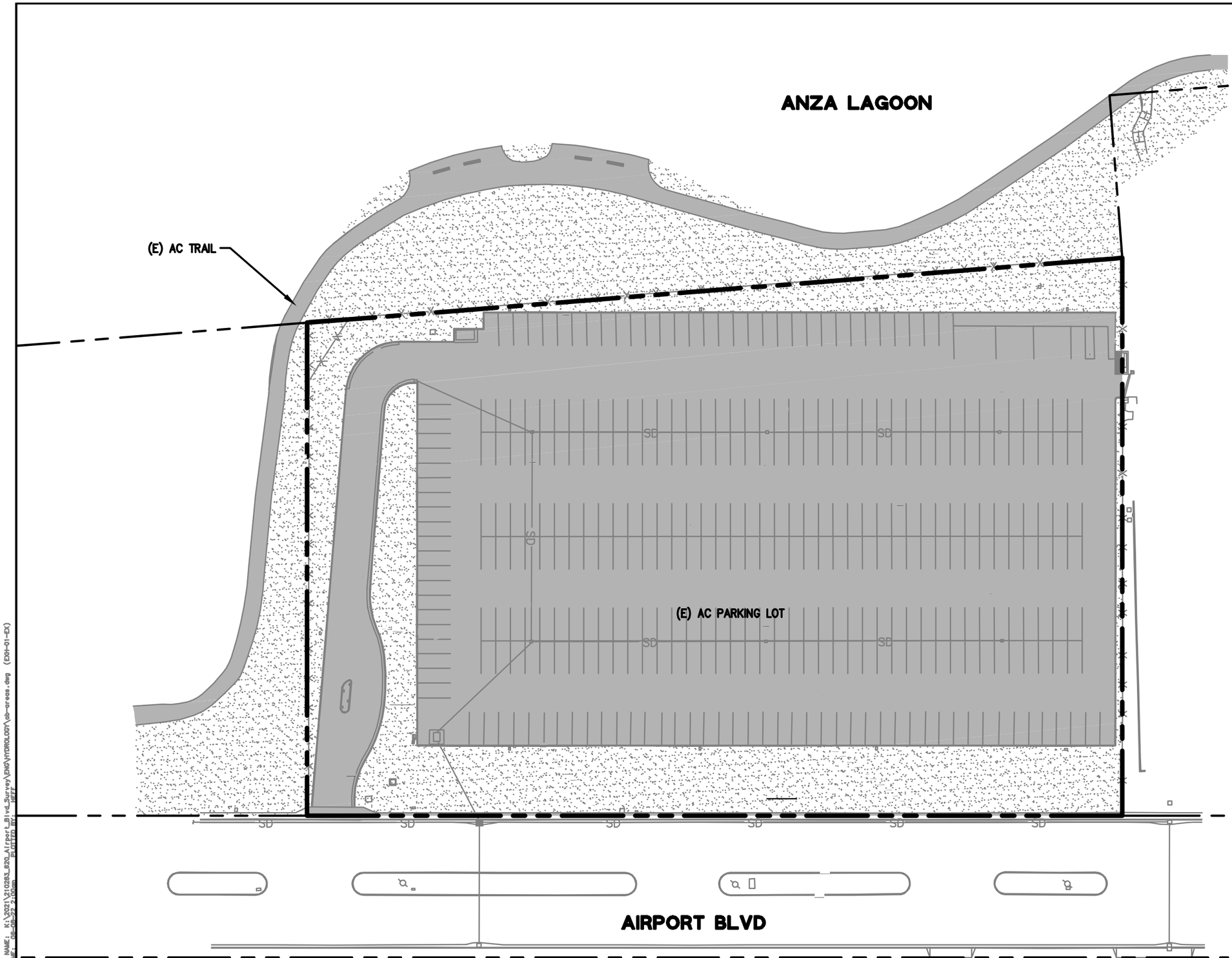
The proposed condition in the Trail area will remain unchanged from the existing condition. The On-site area will increase the peak flow unless mitigation measures are implemented. The project proposed to implement the modified hydrograhp approach to detain the peak flow leaving the site. The available storage volume in the bioretention area is larger than the required detention volume and will detain the peak flow for the 10-year design storm.

ATTACHMENTS:

Figure 1 – Existing Site Coverage

Figure 2 – Proposed Site Coverage

Attachment A – City of Burlingame Storm System Facilities Map



LEGEND

- LANDSCAPING
- IMPERVIOUS (ROAD, PATH, S/W)
- ROOF

EXISTING AREAS (ON-SITE)

ROOF	75
CONC PAVING	1,020
AC PAVING	122,122
GRAVEL	0
LANDSCAPING	37,906
TOTAL	161,123

EXISTING AREAS (TRAIL)

ROOF	0
CONC PAVING	0
AC PAVING	10,419
GRAVEL	0
LANDSCAPING	42,807
TOTAL	53,226

255 SHORELINE DR
SUITE 200
REDWOOD CITY, CA 94065
650-482-6300
650-482-6399 (FAX)
BKF Engineers | Surveyors | Planners

620 AIRPORT BOULEVARD
EXISTING SITE COVERAGE

BURLINGAME SAN MATEO CALIFORNIA

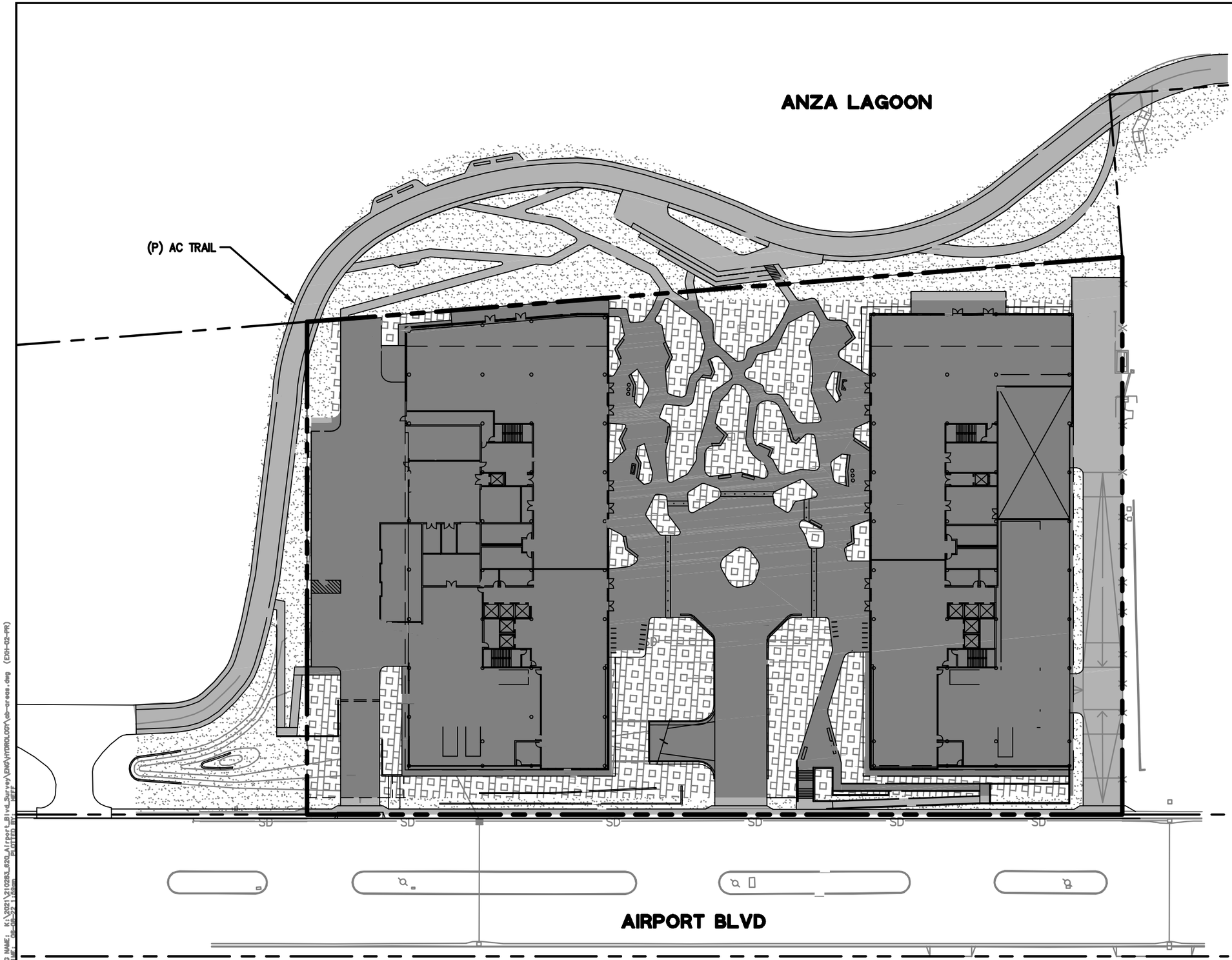
No.	Revisions

Date: 06/03/2022
Scale: 1"=40'
Design:
Drawn:
Approved:
Job No: 20210283

Drawing Number:

FIGURE 1

OF



LEGEND

- LANDSCAPING (SELF TREATING)
- STORMWATER TREATMENT AREA (BIORETENTION)
- GREEN ROOF
- IMPERVIOUS (ROAD, PATH, S/W)
- ROOF

PROPOSED AREAS (ON-SITE)	
ROOF	69,050 SF
ROOF-PODIUM	43,510 SF
ROOF-IRRIGATED	28,539 SF
IMPERVIOUS	12,150 SF
LANDSCAPING	7,874 SF
TOTAL	161,123 SF

PROPOSED AREAS (TRAIL)	
ROOF	0 SF
IMPERVIOUS	24,330 SF
AC PAVING	0 SF
GRAVEL	0 SF
LANDSCAPING	28,896 SF
TOTAL	53,226 SF

BKF
255 SHORELINE DR
SUITE 200
REDWOOD CITY, CA 94065
650-482-6300
650-482-6399 (FAX)

620 AIRPORT BOULEVARD PROPOSED SITE COVERAGE

BURLINGAME SAN MATEO CALIFORNIA

No.	Revisions

Date: 05/03/2022
Scale: 1"=60'
Design:
Drawn:
Approved:
Job No: 210283

Drawing Number:

FIGURE 2

OF

DRAWING NAME: K:\2021\210283_620_Airport_Blvd_Survey\CNG\HYDROLOGY\ab-areas.dwg (EXH-02-PR)
PLOT DATE: 05-03-22 | William
PLOTTED BY: Jeff

ATTACHMENT A

DATE PRINTED:
March 5, 2021

CITY OF BURLINGAME
STORM SYSTEM FACILITIES

GRAPHIC SCALE
0 100 200 300 400
FEET

	B5	
C5	**C6**	C7
D5	D6	D7

C6

C6-32021
C6-32019
C6-32022
C6-32017
C6-32016
C6-32020
C6-32018
C6-32012
C6-32013
C6-32006
C6-32001
C6-32010
C6-32011
C6-32007
C6-32009
C6-32004
C6-32005
C6-32003
C6-32015
C6-32014
C6-38001

AIRPORT BLVD
ANZA BLVD
MULTIPLE STE

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610

C7-32009

15" RCP

C7-32008

RCP

463'

BAYVIEW

C7-31

C7-3201

500

412'

24" RCP

444'

620

C7-32015

RCP

401'

C7-32001

600

C7-32011

15" RCP

AIRPORT BLVD

AIRPORT BLVD

C7-32016

C7-32012

701

615

C7-32002

577
MULTIPL UNITS

DATE PRINTED:
March 5, 2021

CITY OF BURLINGAME
STORM SYSTEM FACILITIES

GRAPHIC SCALE
0 50 100 150 200
FEET

C6-2		
C6-4	**C7-3**	C7-4
D6-2	D7-1	D7-2

C7-3

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