

May 14, 2021
BKF No.: 20180823-11



Mr. Alan Katz
Brookwood Advisors
One Embarcadero Center, Suite 500
San Francisco, CA 94111

**Subject: Hydrology and Hydraulics Technical Memorandum
Jefferson Union High School District – Precise Plan Project
699 Serramonte Boulevard**

Dear Mr. Katz:

OVERVIEW

The Jefferson Union High School Precise Plan Project is located at 699 Serramonte Boulevard in Daly City, California (former Serramonte Del Rey High School). The proposed development includes subdividing the lot into six residential lots and multiple lots for roadway purposes. The residential lots will house multistory high density residential buildings, open space areas, park areas, paths, driveways, and landscape areas. The existing school building, modular buildings, surface parking lots, and portions of hardscape and landscape areas will be demolished to accommodate the new construction.

The campus is comprised of a single 22.3-acre lot which currently houses multiple uses. The current uses on the campus include a bus yard, district offices, churches, child day care facilities, a Comcast building, and the Workforce Housing Project currently under construction. The Workforce Housing Project (including the apartment building, car barn, and surface parking lot located at the northern portion of the existing campus) and the Comcast building will remain operational throughout and after construction of the Precise Plan.

The scope of this memo is to calculate the existing and proposed stormwater flows for the 19.2-acre area impacted by the Precise Plan Project to determine if retention is required.

EXISTING CONDITIONS

The site is bound by Serramonte Boulevard to the north, Callan Boulevard to the east, Campus Drive to the south and residential buildings on St. Francis Boulevard to the west as shown in hydrology figure HYD-1. The Workforce Housing Project is under construction and the building, surface parking lot and area immediately adjacent to the building is to remain and has been excluded from the scope of this memo. The driveway just to the south of the Workforce Housing Project will be replaced and is included in this study.

The existing site consists of landscape areas, planters, concrete walkways, asphalt driveways, asphalt parking areas, existing embankment slopes, existing school building and existing modular buildings. The existing ground coverage consists of approximately 413,505 sf of impervious area and 415,450 sf of pervious area (49.9% impervious). Site elevations vary from approximately elevation 495 feet to the west and 465 to the northeast. Stormwater onsite is collected in area drains or inlets and conveyed in below grade pipes to the storm drain outfall located in the existing parking lot near the main vehicular entrance at Serramonte Boulevard. The outfall discharges to an existing 24" storm drain main in Serramonte Boulevard that flows to the east. The remaining east hillside sheet flows out to Callan Boulevard.

PROPOSED CONDITIONS

The Project consists of open space, park areas, landscape areas, concrete paths, private roadways, asphalt drives, asphalt parking lots, and multi-story apartment buildings. The Project proposes to maintain the existing drainage patterns and replace the existing drainage system on-site. Refer to hydrology figure HYD-2 for the proposed site.

The proposed ground coverage consists of approximately 502,050 sf of impervious area and 332,340 sf of pervious area (60.2% impervious). The Project will increase the amount of impervious surface from the existing condition by approximately 39,245 sf and will require retention to control the peak flow and volume leaving the site. The Project proposes to satisfy the retention requirement with a Master Plan approach that will allow one parcel to overcompensate and accrue credits that can be applied to other parcels that will have more difficulty meeting the requirement.

The proposed drainage system will consist of area drains, drop inlets, manholes, stormwater treatment areas with overflow structures, and below grade pipes. The drainage system will convey runoff to the existing outfall located near the main vehicular entrance at Serramonte Boulevard.

STORMWATER REQUIREMENTS

Per direction given by the City, the Project shall not increase the flow or volume from the 10-year storm for a duration of 2 hours. If a Project increases the imperviousness of the site, stormwater retention will be required to retain the increased flow and volume. For the purposes of calculating the retention flow and volume, a time of concentration of 2 hours (or 120 minutes) shall be used to determine the rainfall intensity.

STORMWATER FLOWS

Stormwater runoff is calculated using the Rational Method as outlined in the San Mateo County Drainage Policy. Refer to Tables 1A and 2A for the existing and proposed weighted "C" factors, respectively. Refer to Tables 1B and 2B for the existing and proposed anticipated peak flow (cfs), respectively. The intensity is taken from the San Mateo County Rainfall Runoff Data and uses the Time of Concentration (Tc) of 120-minutes based on City requirements. The Tc of 120 minutes is used for the pre and post construction conditions.

$$Q = C \cdot i \cdot A \cdot F$$

Where:

Q = Quantity of Run-off (cubic feet per second, cfs)

C = Run-off Coefficient

i = Rainfall intensity (inches per hour, in/hr)

A = Drainage Area, tributary to the point under consideration (acres)

F = Intensity Factor (= 1.1, from IDF map)



TABLE 1A - EXISTING WEIGHTED C FACTOR

OUTFALL	SURFACE TYPE	AREA (sf)	C FACTOR	WEIGHTED C
1	IMPERVIOUS	413,505	0.90	0.67
	PERVIOUS	263,000	0.30	
	TOTAL	676,505		
2	IMPERVIOUS	0	0.90	0.30
	PERVIOUS	152,450	0.30	
	TOTAL	152,450		

TABLE 2A - PROPOSED WEIGHTED C FACTOR

OUTFALL	SURFACE TYPE	AREA (sf)	C FACTOR	WEIGHTED C
1	IMPERVIOUS	502,050	0.90	0.72
	PERVIOUS	213,700	0.30	
	TOTAL	715,750		
2	IMPERVIOUS	0	0.90	0.30
	PERVIOUS	118,640	0.30	
	TOTAL	118,640		

TABLE 1B - EXISTING PEAK FLOW

Outfall	Total Area (acre)	Weighted "C"	Intensity (in/hr)	Intensity Factor	Flow, 10-Year (cfs)
1	15.53	0.67	0.56	1.1	6.38
2	3.50	0.30	0.56	1.1	0.65
TOTAL	19.03				7.03

TABLE 2B - PROPOSED PEAK FLOW

Outfall	Total Area (acre)	Weighted "C"	Intensity (in/hr)	Intensity Factor	Flow, 10-Year (cfs)
1	16.43	0.72	0.56	1.1	7.30
2	2.72	0.30	0.56	1.1	0.50
TOTAL	19.15				7.80



STORMWATER RETENTION

The required retention volume by the project is calculated based on the increase between the pre-construction and post-construction flows and volumes over a period of 2-hours. Refer to Chart 1 for the runoff volume. The volume of runoff generated for the pre-construction and post-construction condition is calculated as the area under the respective curves. This approved method assumes the rainfall intensity (I) occurs over the entire 120 minute time period regardless of site size or topography of the drainage area. The retention volume calculations shall not be used for hydraulics or determining pipe sizes. Refer to Table 3 for a summary of required retention volume.

$$V = (Q_{\text{post}} - Q_{\text{pre}}) * T_d * 60$$

$$V_{\text{pre}} = T_d * Q_{\text{pre}}$$

$$V_{\text{post}} = T_d * Q_{\text{post}}$$

Where:

V = Volume (cubic feet, cf)

V_{pre} = Pre construction runoff volume (cf)

V_{post} = Post construction runoff volume (cf)

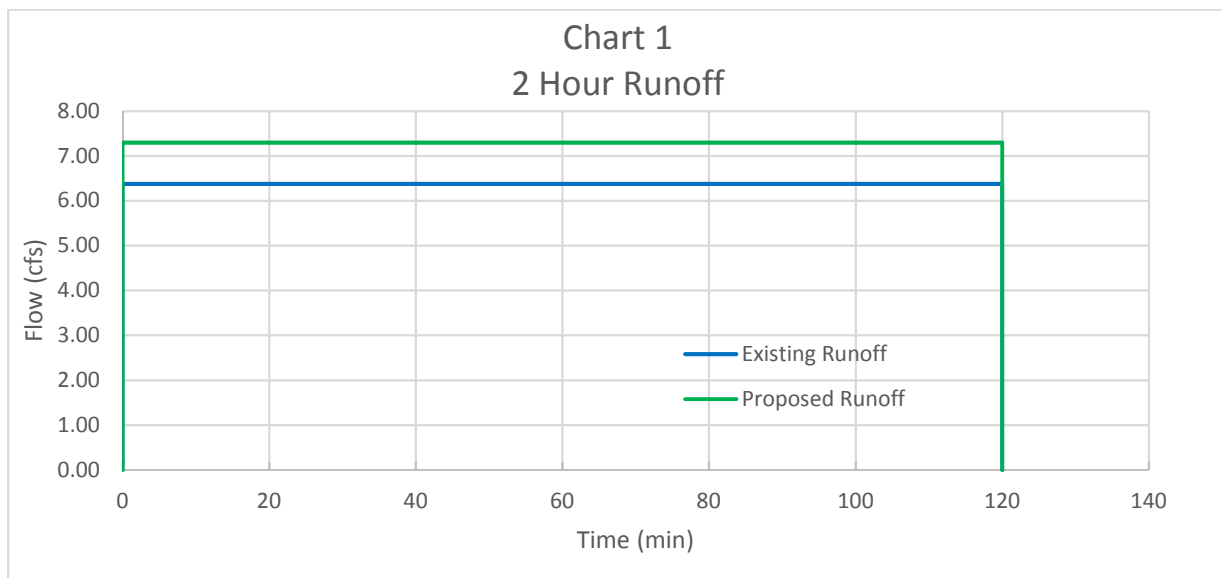
Q_{post} = Post Construction Quantity of Run-off (cubic feet per second, cfs)

Q_{pre} = Pre Construction Quantity of Run-off (cubic feet per second, cfs)

T_d = Time (duration) (min)

TABLE 3 – REQUIRED RETENTION

OUTFALL	Q _{Pre} (cfs)	Q _{Post} (cfs)	T _d (min)	V _{Pre} (cf)	V _{Post} (cf)	V(cf)
1	6.38	7.30	120	45,936	52,560	6,624
2	0.65	0.50	120	4,680	3,600	-1,080
TOTAL	7.03	7.80	120	50,616	56,160	5,544



The proposed retention system consists of a series of underground perforated pipes, wrapped with drain rock and filter fabric. The retention system is sized to store the required retention volume inside the pipes and release to the ground by infiltration. Overflow outlet will be provided to allow larger flow to bypass. The retention system is located in Parcel B in the middle of a landscaped public space away from buildings, slopes and utilities and has sufficient size to store and infiltrate the required retention volume of runoff. Refer to Table 4 for a summary of the available stormwater retention volume for the Project.

TABLE 4A - AVAILABLE RETENTION

RETENTION STRUCTURE	DIAMETER (ft)	TOTAL LENGTH OF PIPE (ft)	RETENTION VOLUME REQ'D (cf)	RETENTION VOLUME PROVIDED (cf)
Parcel B	5	338	6,624	6,637

***For planning purposes, gravel storage volume not used.**

In order to ensure the required storage volume would be retained, the drainage area tributary to the Parcel B retention system was studied. The areas tributary to the retention structure are depicted in the Stormwater Management Plan attached at the end of this memo and include areas from DMAs 2, 4, 8, 9, 12, 13, and 15. The hydrology associated with the Parcel B retention system is summarized in Table 5.

TABLE 5 - FLOW TO RETENTION STRUCTURE

RETENTION STRUCTURE	PERVIOUS AREA (sf) (C=0.30)	IMPERVIOUS AREA (sf) (C=0.90)	WEIGHTED C	I (intensity in/hr)	F (intensity factor)	Q (cfs)	DURATION (min)	TOTAL VOLUME TO RETENTION STRUCTURE (cf)	RETAINED VOLUME (cf)
Parcel B	31,689	119,962	0.77	0.56	1.1	1.66	120	11,961	6,637

CONCLUSIONS

The Project will be required to retain water to match the pre-construction conditions. The retention structure within Parcel B provides an available storage volume of 6,637 cf. The rate of water entering the retention structure is based on the tributary area, weighted "C" factor, and duration of the design event. The volume of water entering the retention structure is 11,961 cf which is greater than the required retention volume. Therefore, the Parcel B retention structure will receive more runoff than the required retention volume for the design storm and has a retention volume greater than the 6,624 cf retention volume requirement for Outfall 1. The Project will not increase the rate or volume of runoff from the pre-construction conditions for the design storm.



TABLE 1 - EXISTING PEAK FLOW

Outfall	Total Area (acre)	Impervious Area (acre)	Impervious (%)	Pervious Area (acre)	Pervious (%)	Weighted "C"	Intensity Factor	Flow, 10-Year	Flow, 100-Year
1	15.53	9.49	61.1%	6.04	38.9%	0.67	1.1	6.38	8.28
2	3.50	0.00	0.0%	3.50	100.0%	0.30	1.1	0.65	0.84
TOTAL	19.03	9.49	49.9%	9.54	50.1%	0.60	1.1	7.03	9.12

Intensity 10-year, 120-minute, I = 0.56 in/hr

Impervious Runoff Coefficient, C = 0.90

Pervious Runoff Coefficient, C = 0.30

LEGEND

DRAINAGE BOUNDARY

STORM DRAIN LINE

ROOF

PAVEMENT

LANDSCAPE

ABBREVIATIONS

BLVD.

BOULEVARD

(E)

EXISTING

R.O.W

RIGHT OF WAY

SD

STORM DRAIN

TYP

TYPICAL

TA

TREATMENT AREA

255 SHORELINE DR

SUITE 200

REDWOOD CITY, CA 94065

650-482-6300 (FAX)

CALIFORNIA

SAN MATEO COUNTY

DAILY CITY

JHSD PRECISE PLAN
EXISTING DRAINAGE MAP

Revisions	No.	Date
	05/14/2021	
Scale: 1"=120'		
Design: TH		
Drawn: MB		
Approved: TH		
Job No: 20180823		
Drawing Number:		
HYD-1		
1 OF 2		

DRAWING NAME: K:\2018\180823-Jefferson_JHSD\ENGIN\HYDROLOGY\JHSD_PWD_EX_PP.dwg (EXISTING)
 PLOT TIME: 05-17-21 8:58am PLOTTED BY: BUCN

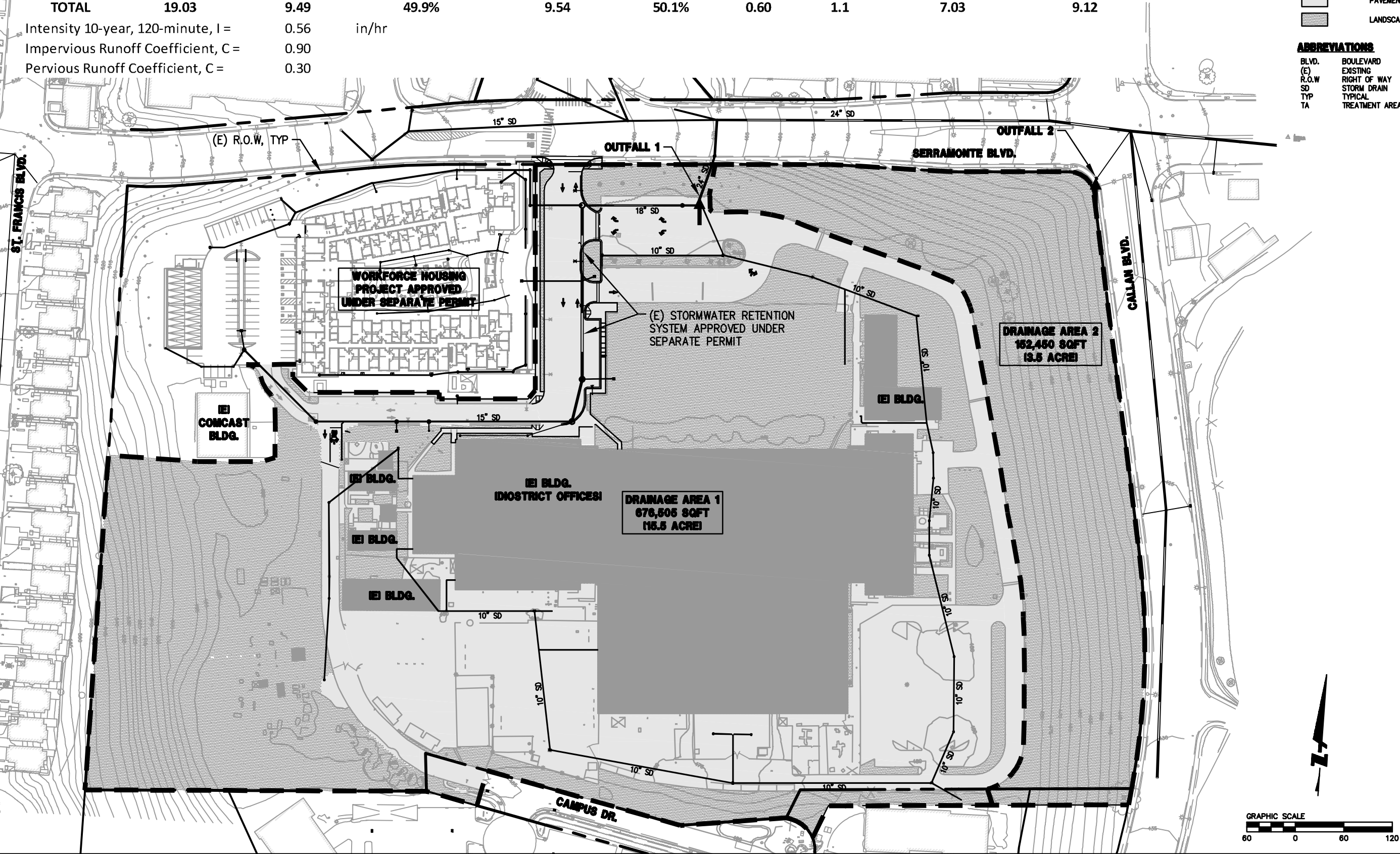


TABLE 2 - PROPOSED PEAK FLOW

Outfall	Total Area (acre)	Impervious Area (acre)	Impervious (%)	Pervious Area (acre)	Pervious (%)	Weighted "C"	Intensity Factor	Flow, 10-Year	Flow, 100-Year
1	16.43	11.53	70.1%	4.91	29.9%	0.72	1.1	7.30	9.48
2	2.72	0.00	0.0%	2.72	100.0%	0.30	1.1	0.50	0.65
TOTAL	19.15	11.53	60.2%	7.63	39.8%	0.66	1.1	7.80	10.13

Intensity 10-year, 120-minute, I = 0.56 in/hr
 Impervious Runoff Coefficient, C = 0.90
 Pervious Runoff Coefficient, C = 0.30

LEGEND

- DRAINAGE BOUNDARY
- STORM DRAIN LINE
- ROOF
- PAVEMENT
- LANDSCAPE

ABBREVIATIONS

- BLVD. BOULEVARD
- (E) EXISTING
- R.O.W RIGHT OF WAY
- SD STORM DRAIN
- TYP TYPICAL
- TA TREATMENT AREA

ST. FRANCIS BLVD.

(E) R.O.W, TYP

OUTFALL 1

SERRAMONTE BLVD.

OUTFALL 2

CALLAN BLVD.

WORKFORCE HOUSING
PROJECT APPROVED
UNDER SEPARATE PERMIT

(E) STORMWATER RETENTION
SYSTEM APPROVED UNDER
SEPARATE PERMIT

PARCEL B

(P) STORMWATER RETENTION
SYSTEM

(P) STORMWATER
STRUCTURE

COMCAST
BLDG.

DRAINAGE AREA 1
716,750 SQFT
16.4 ACRE

DRAINAGE AREA 2
118,640 SQFT
2.7 ACRE

PARCEL F

PARCEL E

PARCEL D

PARCEL C1

PARCEL C2

CAMPUS DR.



DRAWING NAME: K:\2018\180823-Jefferson_JHSD\HYDROLOGY\JHSD_PLOT_Memo.dwg (PROPOSED)
PLOT TIME: 05-14-21 8:28am

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



JUHSD PRECISE PLAN
 PROPOSED DRAINAGE MAP

CALIFORNIA

SAN MATEO COUNTY

DALY CITY

Revisions	No.	Date
Design: TH		05/12/2021
Drawing: MB		05/12/2021
Approval: TH		05/12/2021
Job No: 20180823		
Drawing Number:		
HYD-2		
2 OF 2		

DMA	PERVIOUS				IMPERVIOUS				TREATMENT			TOTAL
	LANDSCAPE	SELF RETAINING	BIORETENTION	TOTAL PERVIOUS	PLAY AREA	ROOF/PODIUM	ROAD, PATH, S/W	TOTAL IMPERVIOUS	TYPE	REQ	PROVIDED	
01	895		414	1,309			10,200	10,200	BR	413	414	11,509
02			2,695	2,695		63,890		63,890	BR	2,566	2,695	66,585
03	2,110		428	2,538	2,440		4,212	6,652	BR	276	428	9,190
04	1,620	12,830		14,450			4,692	4,692	SR	2,346	12,830	19,142
05	2,770		1,330	4,100			21,025	21,025	BR	857	1,330	25,125
06	2,250		642	2,892			12,080	12,080	BR	495	642	14,972
07	415		223	638			5,500	5,500	BR	223	223	6,138
08	1,975		512	2,487			9,790	9,790	BR	402	512	12,277
09	555		445	1,000			9,735	9,735	BR	393	445	10,735
10	2,460		746	3,206			18,250	18,250	BR	743	746	21,456
11	3,440		2,250	5,690		51,110	1,000	52,110	BR	2,107	2,250	57,800
12		7,065		7,065			2,140	2,140	SR	1,070	7,065	9,205
13	2,610		1,015	3,625			20,785	20,785	BR	846	1,015	24,410
14	1,270		1,180	2,450		27,390	560	27,950	BR	1,128	1,180	30,400
15			367	367		1,370	7,560	8,930	BR	359	367	9,297
16	1,810		590	2,400			10,990	10,990	BR	449	590	13,390
17		5,315		5,315			3,195	3,195	SR	1,598	5,315	8,510
18		27,260		27,260			7,550	7,550	SR	3,775	27,260	34,810
19	5,845		2,780	8,625			2,190	68,490	BR	2,774	2,780	77,115
20	5,865	11,105		16,970			1,460	1,460	SR	730	11,105	18,430
21	730		383	1,113			7,500	7,500	BR	304	383	8,613
22	3,120		746	3,866			12,390	12,390	BR	511	746	16,256
23	5,280		3,150	8,430		72,260	1,180	73,440	BR	2,971	3,150	81,870
24	1,480		447	1,927			9,110	9,110	BR	372	447	11,037
25	3,745		693	4,438			12,720	12,720	BR	527	693	17,158
26	710	15,490		16,200			4,280	4,280	SR	2,140	15,490	20,480
TOTAL	50,955	79,065	21,036	151,056	2,440	282,320	200,094	484,854		30,375	100,101	635,910

