APPENDIX F

HYDROLOGY AND HYDRAULICS TECHNICAL MEMORANDUM

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August 30, 2019

Mr. Ken Klebanoff
Brookwood Advisors
One Embarcadero Center, Suite 500
San Francisco, CA 94111

Subject: Hydrology and Hydraulics Technical Memorandum
Jefferson Union High School District – Workforce Housing Project
699 Serramonte Boulevard

Dear Mr. Klebanoff:

OVERVIEW

The Jefferson Union High School – Workforce Housing project at 699 Serramonte Boulevard in Daly City is located on the campus of the former Serramonte High School Campus. The proposed development includes the construction of an apartment building, car barn, and surface parking lot located at the northern portion of the existing campus. Existing surface parking areas, hardscape areas, softscape areas and portable buildings will be removed to accommodate the proposed development.

The campus is comprised of a single 22.3-acre lot which currently houses multiple uses. The current uses on the campus are assumed to remain operational during and after construction of the Workforce Housing project. Current uses include the school district bus yard, district offices, churches, child day care facilities, and a Comcast building.

The scope of this memo is to calculate the existing and proposed stormwater flows for the 3.9-acre area directly impacted by the Workforce Housing 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 to the west as shown in hydrology figure HYD-1. The portion of the campus undergoing renovations is located in the northwestern portion of the property extending from the existing school building to Serramonte Boulevard and the main entrance road to the west.

The existing site consists of landscape areas, planters, concrete walkways, asphalt driveways, asphalt parking areas, and existing embankment slopes. The existing buildings located to the south will remain. The existing ground coverage consists of approximately 108,830 sf impervious and 59,440 sf pervious (64.7% impervious). Site elevations vary from approximately elevation 495 feet to the west and 480 at the main parking lot near the entrance to the site. 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. The outfall discharges to an existing 24" storm drain main in Serramonte Boulevard that flows to the east.

PROPOSED CONDITIONS

The proposed project consist of asphalt drives, asphalt parking lots, concrete paths, landscaping, a car barn, and a multi-story apartment building. The project proposes to maintain the existing drainage patterns and intercept the existing drainage system at various points. Refer to hydrology figure HYD-2 for the proposed site.

The proposed ground coverage consists of approximately 120,300 sf impervious and 47,970 sf pervious (71.5% impervious). The project will increase the amount of impervious surface from the existing condition and will require retention to control the peak flow and volume leaving the site. Overall, the proposed condition will increase the site's impervious footprint by approximately 11,470 sf and will therefore require stormwater retention.

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.

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. Tables 1A and 2A illustrate the calculations for the weighted "C" factor. Tables 1B and 2B illustrate the calculations for the anticipated flow. 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*i*A*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 map)

TABLE 1A – EXISTING

WEIGHTED C FACTOR				
OUTFALL	**SURFACE TYPE**	**AREA (SF)**	**C FACTOR**	**WEIGHTED C**
1	IMPERVIOUS	108,830	0.90	0.69
	PERVIOUS	59,440	0.30	
	TOTAL	**168,270**		

Note, artificial turf and decomposed granite are considered impervious

TABLE 1B – EXISTING

HYDROLOGY					
OUTFALL	**WEIGHTED C**	**AREA (Acres)**	**i (intensity in/hr)**	**F (intensity factor)**	**Q (cfs)**
1	0.69	3.86	0.56	1.1	1.64
				TOTAL	**1.64**

TABLE 2A – PROPOSED

WEIGHTED C FACTOR				
OUTFALL	**SURFACE TYPE**	**AREA (SF)**	**C FACTOR**	**WEIGHTED C**
1	IMPERVIOUS	120,300	0.90	0.73
	PERVIOUS	47,970	0.30	
	TOTAL	**168,270**		

Note, artificial turf and decomposed granite are considered impervious

TABLE 2B – PROPOSED

HYDROLOGY					
OUTFALL	**WEIGHTED C**	**AREA (Acres)**	**i (intensity in/hr)**	**F (intensity factor)**	**Q (cfs)**
1	0.73	3.86	0.56	1.1	1.74
				TOTAL	**1.74**

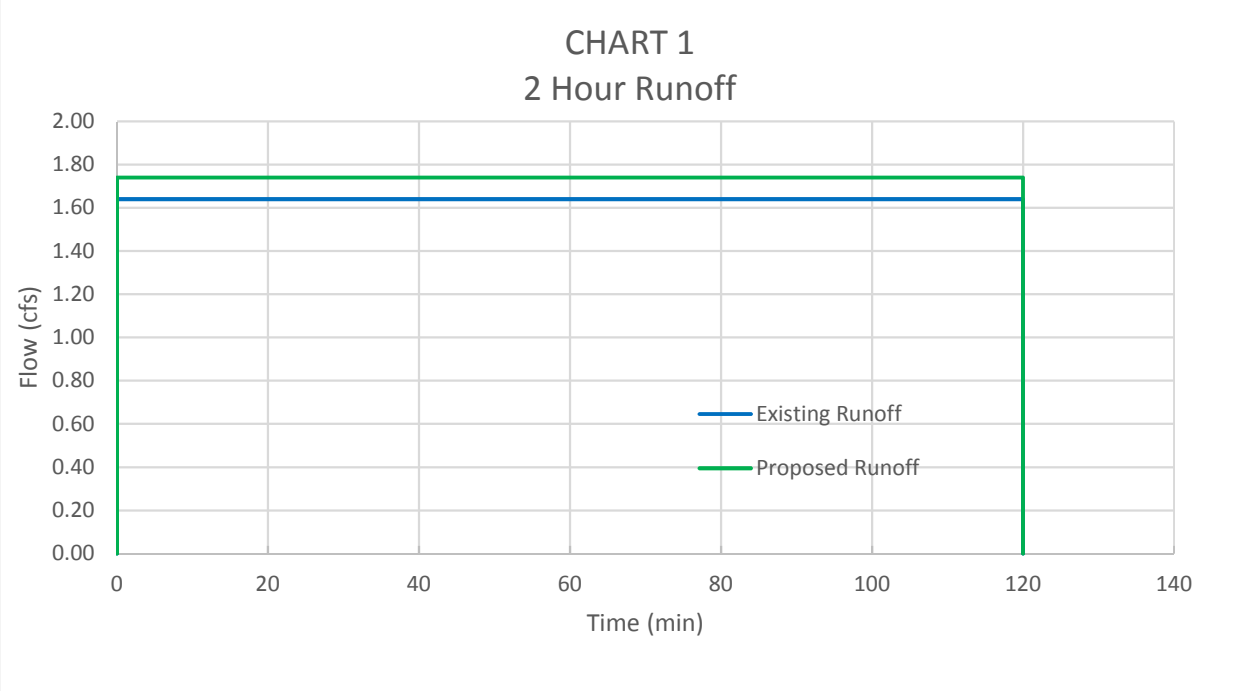
STORMWATER RETENTION

Retention calculations are 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 perspective 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 calculations shall not be used for hydraulics or determining pipe sizes. Refer to Table 3A for a summary of required retention volume.

$V = (Q_{post}-Q_{pre})*T_d$
$V_{pre} = T_d*Q_{pre}$
$V_{post} = T_d*Q_{post}$
Where:
V = Volume (cubic feet, cf)
V_{pre} = Pre construction runoff volume (cf)
V_{post} = Pre 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 3A – RETENTION

REQUIRED RETENTION						
OUTFALL	**Q_{Pre} (cfs)**	**Q_{Post} (cfs)**	**T_d (min)**	**V_{Pre} (cf)**	**V_{Post} (cf)**	**V (cf)**
1	1.64	1.74	120	11,808	12,528	720



Stormwater retention for the project will be satisfied by utilizing the Bioretention Area (BA) in the western parking lot. This bioretention area is in an acceptable location to promote infiltration and will not have a liner or underdrain but will have an overflow inlet to accommodate the larger flows. The bioretention area is located in the middle of the parking lot away from buildings, slopes and utilities and has sufficient size to store and infiltrate the required retention volume of runoff. This bioretention area is also located in an area unlikely to be affected by future development. Refer to Table 4A for a summary of the available stormwater retention volume.

TABLE 4A – RETENTION

AVAILABLE RETENTION						
BA	**AREA (sf)**	**PONDING DEPTH (ft)**	**PONDING VOLUME (cf)**	**GRAVEL STORAGE DEPTH (ft)**	**GRAVEL STORAGE VOLUME (cf)**	**TOTAL VOLUME (cf)**
5	1,435	0.5	718	1.0	588	1,306
*** Gravel storage assume a porosity of 0.41**						

In order to ensure the required storage volume would be retained the area tributary to BA 5 was studied. Hydrology associated with BA 5 is summarized in Table 5A.

TABLE 5A – FLOW TO RETENTION AREA

Bioretention Area 5								
BA	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)	Volume (cf)
5	2,050	21,880	0.85	0.56	1.1	0.29	120	2,068

CONCLUSIONS

The project will be required to retain water to match the preconstruction conditions. BA 5 includes 1,435 sf footprint with a minimum ponding depth of 6", and a minimum gravel storage depth of 12" which provides an available storage volume of 1,306 cf. The rate of water entering BA 5 is based on the tributary area, weighted "c" factor, and duration of the design event. The volume of water entering BA 5 is 2,068 cf which is greater than the required retention volume. Therefore, BA 5 will receive more runoff than the required retention volume for the design storm and has a retention volume greater than the 720 cf retention volume requirement. The project will not increase the rate or volume of runoff from the pre-construction conditions for the design storm.