COUNTY OF SAN MATEO - PLANNING AND BUILDING DEPARTMENT

ATTACHMENT K

Sigma Prime Geosciences, Inc.
Effective Solutions

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DRAINAGE REPORT

Li Residence
Sunshine Valley Road
Moss Beach, CA
APN 037-156-130
Sigma Prime Job #: 18-159

May 14, 2019

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Appendices

1.0 SITE SPECIFIC DATA

Impervious Surface Areas:

Description	Area, SF
Roof	877
Driveway, walkways, patio	681
Total	1558

Slope of Development:

The average slope across the site is 14.4 percent. The house site is very flat, with an up-slope at the rear of the property, and an incised creek at the front of the property.

Watershed Information:

The property is in the Dean Creek watershed. The watershed covers an area of about 200 acres that drains to the ocean.

FEMA Designation:

The FEMA map designation is X, with a 1% annual probability of flooding.

Floodway/Floodplain:

The site is not in an area that has been identified as a floodplain. Dean Creek is not known to have risen above the level of its incised channel. We performed a hydrologic analysis to estimate the likelihood for the stream to overflow from its banks. We estimate that the channel can accommodate about 52 cubic feet per second (cfs) of flow. Using the rational method, we estimate a peak flow during a 100-year storm of almost 5 cfs. This value appears to be too low.

There are two 36-inch culverts under the driveway next door. The total area of the two culverts is about 14 square feet. The cross-sectional area of the natural channel just upstream is about 108 square feet. We performed a culvert sizing calculation to estimate the necessary size of a culvert and obtained a diameter of 19 inches, for a cross-sectional area of 2 square feet. The calculations using the rational method appear to be underestimating runoff. In any case, the incised channel and the culverts appear to be sufficiently large given the relatively small watershed area. Also, the floor elevation of the proposed house will be about 1 foot above the surrounding grades. Even if the culverts were to clog, the water in Dean Creek is unlikely to rise up to the level of the lower floor of the proposed house.

Existing Drainage Courses:

The property drains to Dean Creek.

2.0 Hydrologic Analysis

Proposed Calculation Method:
The Rational Method was used to estimate runoff to size a detention basin. The detention basin will be connected to a sump pump that pumps runoff to the street. The detention basin has a 1-inch orifice connected to a 2-inch outflow to the sump pump. This will slow down runoff from the site and allow the detention basin to empty between storms.

Existing and Proposed Surface Runoff Volumes:
The pre-construction is runoff is estimated to be 0.075 cubic feet per second (CFS). The post-construction runoff is estimated to be 0.122 CFS, for an increase of 0.047 CFS. These values are for the case where there are no runoff mitigation measures such as a flow-through planter. The proposed drainage system is meant to minimize an increase of runoff from the property. Our runoff calculations are attached.

Data Input and Output:
The data are provided on our spread sheet used for sizing the detention basin. The time of concentration for the pre-construction condition is 15 minutes, for sheet flow across undeveloped land. The time of concentration for the post-construction condition is 10 minutes, for flow from the roof.

3.0 Hydraulic Analysis

One detention basin, 2 feet in diameter and 12.4 feet long, is proposed. It is sized based on the Rational Method. The major conveyance device is 4-inch PVC pipes from the downspouts. The calculations for sizing the system are attached.

4.0 Provisions to Control Flow into Neighboring Lots

The proposed detention basin system will prevent an increase in runoff to neighboring properties.

5.0 Maintenance

The operation and maintenance of the drainage facilities is the responsibility of the homeowner. The homeowner should regularly maintain the facilities to ensure functionality throughout the lifetime of the residence. This maintenance should include:

- The clearing of debris and sediment build-up from the roof gutters, downspouts, area drains and drainage lines
- Annual inspection the detention basin, looking for buildup or organic and soil matter in the pipe.

Continual refinement of surface grading, including clearing/re-finishing of slopes, to: minimize ponding, provide positive drainage away from structures, and protect against erosion.

Average Slope Calculation

Job: Li
No.: 18-159
Date 2/13/2019
by: CMK

Contour Interval (I): 1 ft
Area of Lot (A): 0.1148 Acres

CONTOUR	L
106	102.7
107	106
108	254.1
109	120.9
110	91.9
111	48

total lengths of contours (L): 723.6 ft

Equation:
S=(0.00229(IL))/A
where:
I= contour interval in feet
L=total lengths of contours
A= area of lot in acres

S= **14.43** percent

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Rational Method / Detention Basin Sizing

Job: Li
No.: 18-159
Date 5/14/2019
by: CMK

Rational Method to Estimate Storm Runoff

$Q_p = CIA_d$

Area, A_d (sf):	877			
Area, A_d (acres):	0.02013			
C_{10}:	0.3	pre-project	0.9	post-project

Time of Concentration, t_c:

Pre-Development:	15	min
Post-Development:	10	min

I (rainfall intensity): from NOAA Atlas 14 Dataset

I_{10}=	2.18	in/hr	(Post-Development)
I_{15}=	1.76	in/hr	(Pre-Development)

Pre-Project:

Q=CIA: 0.011 CFS

Post-Project:

Q=CIA: 0.040 CFS

ΔQ= **0.0289** CFS

Detention Size (for 15-min duration):

10-yr Storm:	**25.98**	CF
FS = 1.5:	**38.98**	CF

Size Pipes for 10-year event:

Pipe Diam. (ft)	Pipe Area (sf)	Pipe Length ft
1	0.79	49.6
1.5	1.77	22.1
2	3.14	12.4
2.5	4.91	7.9
3	7.07	5.5

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Runoff Comparison

Job: LI
No.: 18-159
Date 5/14/2019
by: CMK

Rational Method to Estimate Storm Runoff

$Q_p=CIA_d$

Lot Area (sf):	5000	
Pre-Construction:		
Pervious Area (sf):	5000	
Impervious Area (sf):	0	
Total Area, A_d (sf):	5000	
Area, A_d (acres):	0.115	
Pervious C_{10}:	0.3	
Impervious C_{10}:	0.9	
Weighted C_{10}:	0.3	
Time of Concentration, t_c:	10	minutes
I (rainfall intensity):	From NOAA Atlas 14	
I_{10}=	2.18	in/hr
Q=CIA:	0.075	CFS
Post-Construction:		
Pervious Area (sf):	3442	
Impervious Area (sf):	1558	
Total Area, A_d (sf):	5000	
Area, A_d (acres):	0.115	
Pervious C_{10}:	0.3	
Impervious C_{10}:	0.9	
Weighted C_{10}:	0.49	
Time of Concentration, t_c:	10	minutes
I (rainfall intensity):	From NOAA Atlas 14	
I_{10}=	2.18	in/hr
Q=CIA:	0.122	CFS
Difference:	**0.047**	**CFS**