Civil West Engineering Services, Inc.

South Coast Office
486 E Street
Coos Bay, OR 97420

Willamette Valley Office
213 Water Ave. NW, Suite 100
Albany, OR 97321

Rogue Valley Office
830 O'Hare Parkway, Suite 102
Medford , OR 97504

North Coast Office
609 SW Hurbert Street
Newport, OR 97365

Tel (541)266-8601

·MEMORANDUM·

TO	**City of Port Orford Planning Commission** **555 W. 20th St.** **PO Box 310** **Port Orford, Oregon 97465**	DATE **11/22/2023**	JOB NO.: **2204-229**
		ATTN	**Planning Commission**
		RE	**David Clark RV Park Project – Drainage Report**

Dear Planning Commission,

This report has been generated per the staff recommended conditions of approval for a complete application submittal for the proposed RV Park Project to be located at 510 Madrona Avenue. It describes an engineering drainage analysis of the proposed development and subsequent storm water detention sizing.

Following the review comments, runoff calculations have been completed for both expected pre-construction and post-construction topography. Peak runoff flows were calculated using the Rational Method based upon the 25-year, 24 hour return storm event. ODOT's manual was referenced for hydraulic coefficients and charts necessary to complete this evaluation:

https://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/docs/Hydraulics/Hydraulics%20Manual/CHAPTER_07_appendix_F.pdf

Per engineering design standards, detention areas will be designed to capture runoff created by post-construction topographical changes and thereby, result in no impact to the current volume of runoff from the site or pre-construction runoff. The findings in this report were utilized in generating the site design and layout.

Calculation of peak flow for this report, following the Rational Method, was completed by use of the following equation:

$$Q = C * i * A * C_f$$

Where:
Q = Peak flow (cfs)
C = Runoff coefficient
i = Rainfall intensity (in/hr)
A = Drainage area (acre)
C_f = Adjustment factor = 1.1 for a 25 year recurrence interval

Due to the small area under analysis and short hydraulic lengths of drainage, the Rational Method is appropriate for use in determining surface runoff for this site. The site's drainage area will comprise an area totaling 0.56 acres. Drainage paths were calculated for both pre-construction and post-construction storm flows. The longest hydraulic flow path (from the point of highest elevation on the western side of the north lot, following natural drainage paths going southeast around the existing building towards the existing drainage area located west adjacent of Highway 101) within the drainage area for both pre-construction and post-construction were determined to be 195 feet over an average slope of 6.15% with a Manning's Roughness Cooefficient, n, being 0.2. This is used to calculate or determine the time of concentration, rainfall intensities and composite runoff coefficients.

Utilizing prescribed coefficients for different terrain classifications; a runoff coefficient was calculated for pre-construction conditions:

Table 1 Pre-Construction Coefficient

Cover Description	C	Area (acres)	C x Area
Building + Concrete	0.9	0.03	0.03
Asphalt Concrete	0.9	0.01	0.01
Gravel	0.85	0.47	0.40
Raw Landscape	0.2	0.05	0.01
	∑	0.56	0.45
		Composite C	**0.80**

For post-construction, the runoff coefficient was calculated as follows:

Table 2 Post-Construction Coefficient

Cover Description	C	Area (acres)	C x Area
Building + Concrete + RV's + Tables	0.9	0.06	0.05
Asphalt Pavement	0.9	0.01	0.01
Gravel	0.85	0.43	0.37
Developed Landscape	0.2	0.06	0.01
	∑	0.56	0.44
		Composite C	**0.79**

The proposed RV Park development falls within Zone 1 per the Oregon Rainfall IDR Curve Zone Map. From these curves, rainfall duration can be iteratively selected based upon the time of concentration needed for a drop of water to take the longest path of flow from the site; either as overland sheet flow, shallow concentrated flow, or a combination of the two. Utilizing the 25-year, 24-hour storm curve the following rainfall intensities and times of concentration have been determined for pre-construction and post-construction site characteristics:

Table 3 Rainfall Intensity Determination

	Time of Concentration	Rainfall Intensity
Pre-Construction	2.8 min	**4.0 in/hr**
Post-Construction	2.8 min	**4.0 in/hr**

Since the site's post-development topography will remain mostly unchanged from pre-development conditions, the corresponding times of concentration and rainfall intensities remain the same; therefore, the approximated value of 4 in./hr for the 25 year storm will be appropriate here.

Tabulation of results for peak flow are presented below:

Table 4 Peak Flow

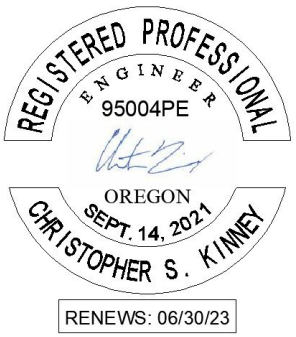
	C	I (in/hr)	A (acre)	Cf	Q (cfs)	Q (gpm)
Pre-Construction	0.797	4.0	0.56	1.1	1.96	**14.66**
Post-Construction	0.786	4.0	0.56	1.1	1.94	**14.48**
					Extra Flow	**-0.18**

Since the calculated post-construction flows are just below pre-construction flows, there is no concern for increased flows to be generated as a result of development. We still can, however, design for the detention of the calculated storm event by installing slightly depressed and heavily mulched infiltration swales (see plans attached). The Web Soil Survey as provided by the NRCS have interpolated the soils within the site area to be half Hebo Silty Clar Loam and half Bullars-Bandon-Wadecreek Complex. The infiltration rate through the most limiting drainage layer for each of these profiles were estimated to be 0.06 in./hr and 1.98 in./hr, respectively. If we were to only use the conservative value of 0.06 in./hr for the whole site, and by taking the post development flow rate of 1.94 cfs at the calculated time of concentration of 2.8 minutes, the runoff storage volume to be detained and percolated is calculated to be 78 cubic feet. Therefore, the proposed Site Drainage Plan calls for 2,080 square feet of detention area at a minimum depth of 6" filled with mulch and the appropriate landscaping as described in the plans. This design will handle the worst assumed case that may result from the 25-year, 24-hour storm event.

Please reach out if you have any further questions.

Respectfully,

Christopher Kinney, PE



Civil West Engineering Services

Copy To: File