0101-[1] Project Summary
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0101-[2] Overview and Codes

This report describes the structural design of a solar canopy covering a
residential patio located in the City of Larkspur, California. It includes the
design of a concrete slab and stem wall, steel tube frame, and clip attachments
of solar panels to the frame.

Fig. Wind Load 1 : ins01\rivt01.png

Fig. Wind Load 2 : ins01\site01.png

$$wt_2 = \frac{a_2 \cdot dl_2}{2}$$

Building Codes and Jurisdiction

- City of Larkspur, California
- 2019 California Building Code [CBC]
- 2019 California Residential Code [CRC]

Table 1 - Loading

Category	Standard	Year
Loading	ASCE-7	2016

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Concrete                                      ACI-318      2014
Wood-National Design Specifications           AWC-NDS      2018
Wood-Special Design Provisions for Wind and Seismic  AWC-SDPWS  2015
Wood Frame Construction Manual                     AWC-WFCM  2018
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[values read from file: ins01/cbc2019A_stds.csv]
Design loads for the project are from the California Building and
Residential Codes and are summarized in the following tables.

Sym	Load Effect	Notes
D	Dead load	See IBC 1606 and Chapter 3 of this publication
E	Combined effect of horizontal and vertical earthquake-induced forces as defined in ASCE/SEI 12.4.2	See IBC 1613, ASCE/SEI 12.4.2 and Chapter 6 of this publication
Em	Maximum seismic load effect of horizontal and vertical forces as set forth in ASCE/SEI 12.4.3	See IBC 1613, ASCE/SEI 12.4.3 and Chapter 6 of this publication
H	Load due to lateral earth pressures, ground water pressure or pressure of bulk materials	See IBC 1610 for soil lateral loads
L	Live load, except roof live load, including any permitted live load reduction	See IBC 1607 and Chapter 3 of this publication
Li	Roof live load including any permitted live load reduction	See IBC 1607 and Chapter 3 of this publication
R	Rain load	See IBC 1611 and Chapter 3 of this publication
W	Load due to wind pressure	See IBC 1609 and Chapter 5 of this publication

[values read from file: ins01/load_types01.csv]

Table 2 - Load Combinations

CBC 2019 reference	Equation
Equation 16-1	$1.4(D + F)$
Equation 16-2	$1.2(D + F) + 1.6(L + H) + 0.5(L \text{ or } S \text{ or } R)$
Equation 16-3	$1.2(D + F) + 1.6(Lr \text{ or } S \text{ or } R) + 1.6H + (f1L \text{ or } 0.5W)$
Equation 16-4	$1.2(D + F) + 1.0W + f1L + 1.6H + 0.5(Lr \text{ or } S \text{ or } R)$
Equation 16-5	$1.2(D + F) + 1.0E + f1L + 1.6H + f2S$

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    Equation 16-6                          0.9D+ l.0W+ l.6H
    Equation 16-7                       0.9(D + F) + 1.0E+ l.6H
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[values read from file: ins01/asce7_load_comb.csv]

0101-[3] Gravity Loads and Seismic Mass

Test values block   Eq-01

variable	value	[value]	description
area1	10700.00 sf	994.06 SM	roof area
area2	100000.00 sf	9290.30 SM	floor area
area3	25.00 sf	2.32 SM	floor area
ht1	9.00 ft	2.74 m	wall height
len1	110.00 ft	33.53 m	interior wall length
len2	155.00 ft	47.24 m	exterior wall length
udl1	12.20 psf	584.14 Pa	description

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variable	value	[value]	description
floordl1	50.00 psf	2394.01 Pa	interior wall length
floordl2	10.00 psf	478.80 Pa	exterior wall length

[values read from file: val01/test1.csv]

Equation for floor area   Eq-02

                                                                     ACI-315-05

$$wt_2 = area_2 \cdot floordl_1$$

wt2	area2	floordl1
5000.00 kips	100000.00 ft²	50.00 psf
22241108.00 N	100000.00 ft²	50.00 psf

Equation for wall area Eq-03

$$wt_3 = area_3 \cdot floordl_2 \cdot 0.1$$

wt3	area3	floordl2
25.0 lbs	25.00 ft²	10.00 psf
111.2 N	25.00 ft²	10.00 psf

Exterior wall - total area load   Eq-04

variable	value	[value]	description
len1	410.00 ft	124.97 m	interior wall length
len2	455.00 ft	138.68 m	exterior wall length

[values read from file: val01/test2.csv]