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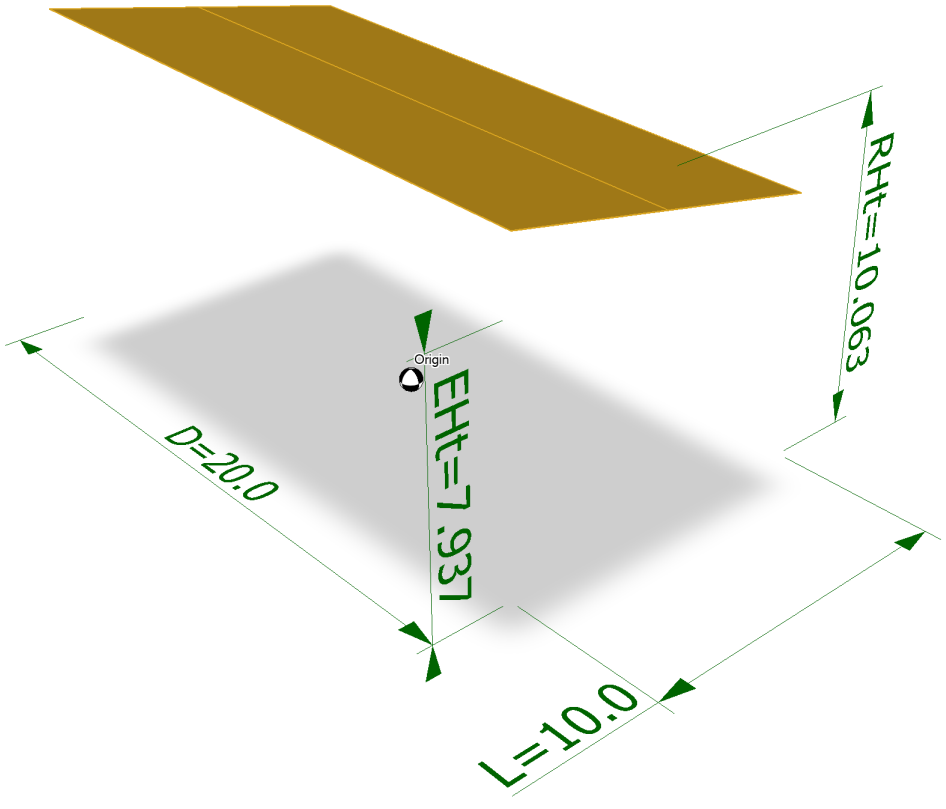
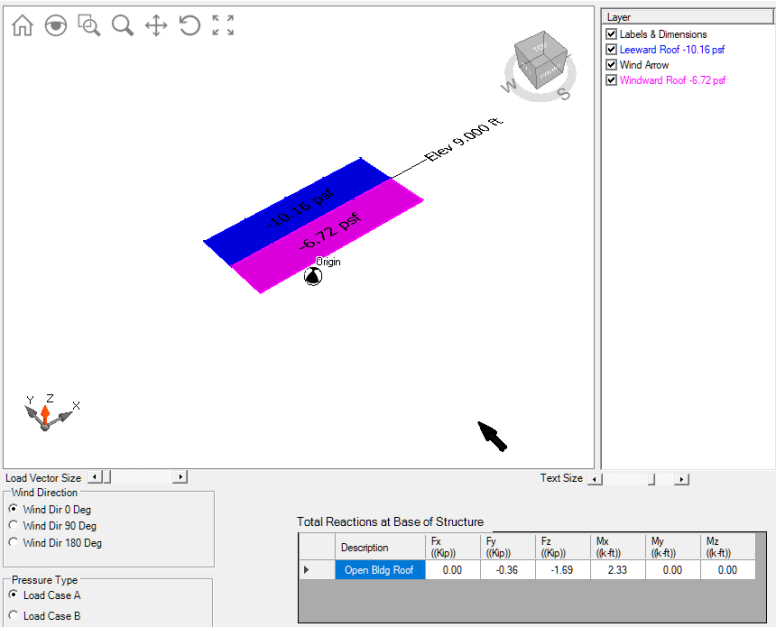
This report describes the structural design residential solar canopy in the City of Larkspur, California. It includes the design of a concrete slab, stem wall, steel tube frame, and attachments of solar panels to the frame.
The report is divided into the following three divisions:

- 01 Loads: gravity, wind and seismic
- 02 Frame: steel tubes, connections and clips
- 03 Foundation: slab and stem wall

Client:
Date:
Location:
The project is located in Larkspur, California.



Wind load 1 Fig. 02 [02]



Wind load 2 Fig. 04 [02]

The permit approval is under the jurisdiction of the City of Larkspur, California which adopted the 2019 California Building Code [CBC] and the 2019 California Residential Code [CRC] as the basis for permiting requirements of the CBC.

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Category	Standard	Year
Loading	ASCE-7	2016
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

Basic loads and load combinations are derived from the California Building and Residential Codes.

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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

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CBC 2019 reference	Equation
Equation 16-1	1.4(D +F)
Equation 16-2	1.2(D + F) + l.6(L + H) + 0.5(L
Equation 16-3	1.2(D + F) + l.6(Lr or S or R) + l.6H + (f1L or 0.5W)
Equation 16-4	1.2(D + F) + 1.0W + f1L +1.6H + 0.5(Lr or S or R)
Equation 16-5	1.2(D + F) + 1.0E + f1L + l.6H + f2S
Equation 16-6	0.9D+ l.0W+ l.6H
Equation 16-7	0.9(D + F) + 1.0E+ l.6H

Some filler text
** Table: 02 [03]** Table: 02 [03] ========== ======= ========= ================================= variable value [value] description ========== ======= ========= ================================= ld1 2.0 psf 0.10 KPa Urethane foam (4 inch thick) ld2 1.0 psf 0.05 KPa Three-ply roofing ld3 5.0 psf 0.24 KPa Doug Fir decking 2-in. ld4 1.0 psf 0.05 KPa Doug Fir beams 4x12 at 12 ft o.c. —— —— —— —— roofdl1 9.0 psf 0.43 KPa Total roof unit load ========== ======= ========= =================================
** Table: 04 [03]** Table: 04 [03] ========== ======== ========= ========================== variable value [value] description ========== ======== ========= ========================== ld1 3.0 psf 0.14 KPa 3/4 in. hardwood flooring ld2 2.0 psf 0.10 KPa 1/2 in. plywood subfloor ld3 4.0 psf 0.19 KPa 2x10 joists at 16 in. o.c. ld4 1.5 psf 0.07 KPa fixtures —— —— —— —— floordl1 10.5 psf 0.50 KPa Total floor unit load ========== ======== ========= ========================== ** Table: 06 [03]** Table: 06 [03] ========== ======= ========= ============================= variable value [value] description ========== ======= ========= ============================= ld1 5.5 psf 0.26 KPa 5/8" sheet rock (2) ld2 2 psf 0.10 KPa 2x4 studs at 16" o.c. ld3 1.5 psf 0.07 KPa fixtures —— —— —— —— intwalldl1 9 psf 0.43 KPa Total interior wall unit load ========== ======= ========= ============================= ** Table: 08 [03]** Table: 08 [03] ========== ======= ========= ============================= variable value [value] description ========== ======= ========= ============================= ld1 2.0 psf 0.10 KPa 1/2 in plywood sheathing ld2 2.0 psf 0.10 KPa 2x4 studs at 16 in o.c. ld3 3.0 psf 0.14 KPa 5/8 in sheet rock ld4 1.5 psf 0.07 KPa fixtures —— —— —— —— extwalldl1 8.5 psf 0.41 KPa Total exterior wall unit load ========== ======= ========= =============================
** Table: 10 [03]** Table: 10 [03]

Roof weight Equ. 02 [03]

rfwt1 = arearf1 * roofdl1 Equ. 03 [03]

Floor weight Equ. 05 [03]

flrwt1 = areaflr1 * floordl1 Equ. 06 [03]

Partition weight Equ. 08 [03]

partwt1 = htwall1 * lenwall1 * intwalldl1 Equ. 09 [03]

Exterior wall weight Equ. 11 [03]

exwallwt1 = htwall1 * lenwall2 * extwalldl1 Equ. 12 [03]

Total building weight Equ. 14 [03]

totwt1 = rfwt1 + flrwt1 + partwt1 + exwallwt1 Equ. 15 [03]

** Table: 12 [03]** Table: 12 [03]

Because the T&G roof is relatively more flexible, the effective floor load for seismic models is calculated as the sum of the floor and all of the partition weight.

Effective model floor load Equ. 17 [04]

eflrdl1 = (flrwt1 + partwt1)/(areaflr1) Equ. 18 [04]

Effective model floor density Equ. 20 [04]

eflrdens1 = eflrdl1/(0.5*IN) Equ. 21 [04]

Effective model roof density Equ. 23 [04]

erfdens1 = roofdl1/(1.5*IN) Equ. 24 [04]

Effective model wall density Equ. 26 [04]

ewalldens1 = extwalldl1/(0.5*IN) Equ. 27 [04]

** Table: 14 [04]** Table: 14 [04] .. raw:: latex