List of Tables

List of Figures

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.

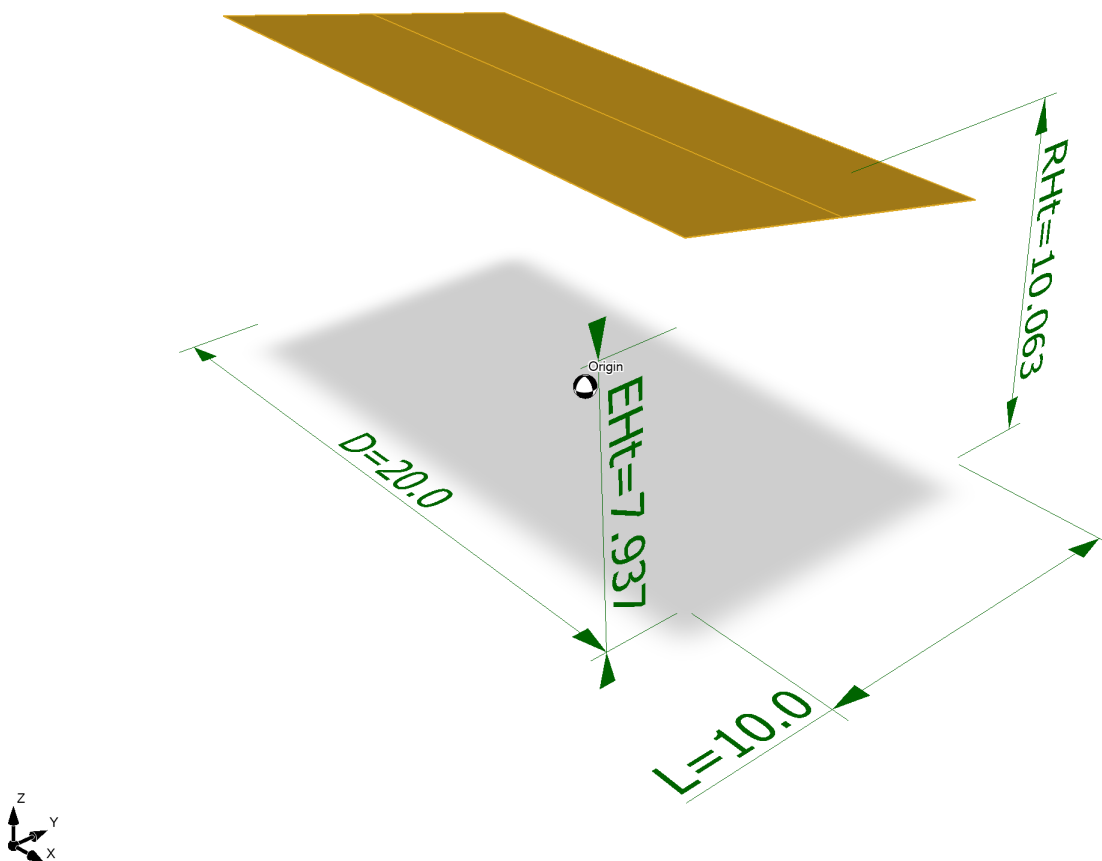The report is divided into the following three divisions:

- 01 Loads: gravity, wind and seismic

- 02 Frame: steel tubes, connections and clips

- 03 Foundation: slab and stem wall

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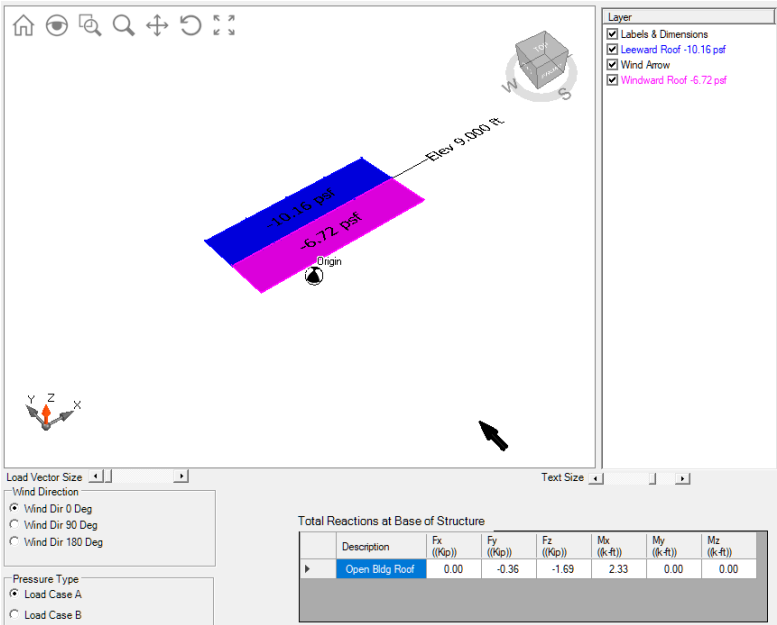Location:
The project is located in Larkspur, California.

**Fig. 02 - **Wind load 1   F02 - 02

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**Fig. 03 - **Wind load 2   F03 - 02

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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	$1.2(D + F) + 1.6(L + H) + 0.5(L$
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	$1.2(D + F) + 1.0E + f1L + 1.6H + f2S$
Equation 16-6	$0.9D + 1.0W + 1.6H$
Equation 16-7	$0.9(D + F) + 1.0E + 1.6H$

Some filler text

**Table 02 - ******Roof unit dead loads   T02 - 03

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> line 145
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>
> ```
>     ==========  =======  =========  ================================
>     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
>     ==========  =======  =========  ================================
> ```
> backrefs:

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**Table 03 - ******Floor unit dead loads   T03 - 03

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```
==========  ========  =========  ==========================
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
==========  ========  =========  ==========================
```
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**Table 04 - **Interior wall unit dead loads   T04 - 03

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line 168

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========== ======= ========= ============================
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
========== ======= ========= ============================
```

backrefs:

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**Table 05 - **Exterior wall unit dead loads   T05 - 03

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     ==========  =======  =========  =============================
     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
     ==========  =======  =========  =============================
```

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**Table 06 - **Areas   T06 - 03

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**Equ. 02 - **Roof weight   E02 - 03

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**Equ. 02 - ******rfwt1 = arearf1 * roofdl1   E02 - 03

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**Equ. 03 - ******Floor weight   E03 - 03

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**Equ. 03 - ******flrwt1 = areaflr1 * floordl1   E03 - 03

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**Equ. 04 - ******Partition weight   E04 - 03

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**Equ. 04 - ******partwt1 = htwall1 * lenwall1 * intwalldl1   E04 - 03

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**Equ. 05 - ******Exterior wall weight   E05 - 03

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**Equ. 05 - ******exwallwt1 = htwall1 * lenwall2 * extwalldl1   E05 - 03

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**Equ. 06 - **Total building weight   E06 - 03

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**Equ. 06 - **totwt1 = rfwt1 + flrwt1 + partwt1 + exwallwt1   E06 - 03

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**Table 07 - **Weights   T07 - 03

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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.

**Equ. 07 - **Effective model floor load   E07 - 04

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**Equ. 07 - **eflrdl1 = (flrwt1 + partwt1)/(areaflr1)   E07 - 04

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**Equ. 08 - **Effective model floor density   E08 - 04

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**Equ. 08 - **eflrdens1 = eflrdl1/(0.5*IN)   E08 - 04

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**Equ. 09 - ******Effective model roof density   E09 - 04

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**Equ. 09 - ******erfdens1 = roofdl1/(1.5*IN)   E09 - 04

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**Equ. 10 - ******Effective model wall density   E10 - 04

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**Equ. 10 - ******ewalldens1 = extwalldl1/(0.5*IN)   E10 - 04

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**Table 08 - ******Model loads   T08 - 04

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