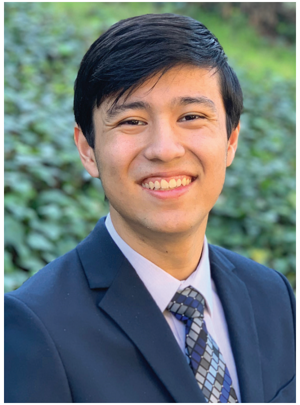
ARCE 415 // ARCH 452 Portfolio

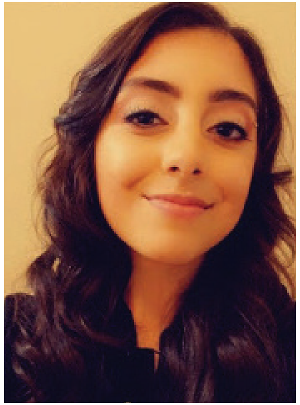
Studio Saliklis

California Polytechnic State University
San Luis Obispo
Winter Quarter 2021

The Team



Alexander Ameri
4th Year ARCE Student



Destiny Calderon
4th Year ARCE Student

Jake Baldauf
4th Year ARCH Student

Joseph Guzman
5th Year ARCE Student

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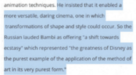
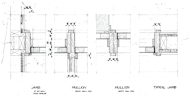
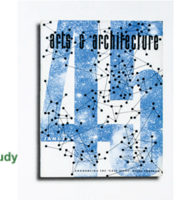
Timeline

A timeline investigating the history of glass use in architecture both as a medium and metaphoric device since the mid 19th century.

Concepts of our redesigned 50x50 house arose from turning points in previous structures where social and structural aspects of glass buildings first became introduced. This extensive background of buildings played a key contribution in the development of the 50x50 House.


animation techniques. He insisted that it enabled a more versatile, daring cinema, one in which transformations of shape and style could occur. So the Russian lauded Bambi as offering "a shift towards ecstasy" which represented "the greatness of Disney as the purest example of the application of the method of art in its very purest form."





18th Century Panopticon by Jeremy Benthem

1914 Bruno Taut builds the Glass Pavilion, made of concrete and glass.

1921 Yevgeny Zamyatin finishes writing *We*

1930-1933 Mies runs the Bauhaus in Germany, an important proponent to 20th century modernism.

Early 1930s Eisenstein meets with Walt Disney and praises his work in art and animation

1947-1949 Philip Johnson builds the Glass House, believed to have been derived from the Farnswoth house.

1945 John Entenza (Arts&Architecture) announces Case Study house Program

1851 Joseph Paxton's Crystal Palace to house the Great Exhibition

1914 Paul Scheerbart writes Glass Architecture

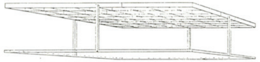
1921 Ludwig Mies van der Rohe imagines *Friedrichstrasse Skyscraper Project, Berlin-Mitte, Germany.*

1927 Eisenstein visits Fritz Lang on the set of *Metropolis*, a futuristic urban dystopia

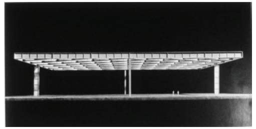
1930 Sergei Eisenstein writes the script of *The Glass House*, a satire of the United States loosely based on *We*. Discusses film with Chaplin and Paramount

1945-1951 Mies designs the Farnsworth House

1951 Mies imagines 50 x 50 House (House with Four Columns)



1945-1949 CSH #8, Eames House designed and constructed in the Pacific Palisades



1999/2000 Iñigo Manglano-Ovalle films *Le Basier/The Kiss* at Farnsworth House

2006 Manglano-Ovalle films *Always After (The Glass House)*, acts as a spiritual successor to *Gravity is a Force to be Reckoned With*

2015-2016 Steven Ehrlichs EYRC designs Kruezer Shroeder residence

1959-1960 CSH #21, Pierre Koenig House designed and constructed in West Hollywood

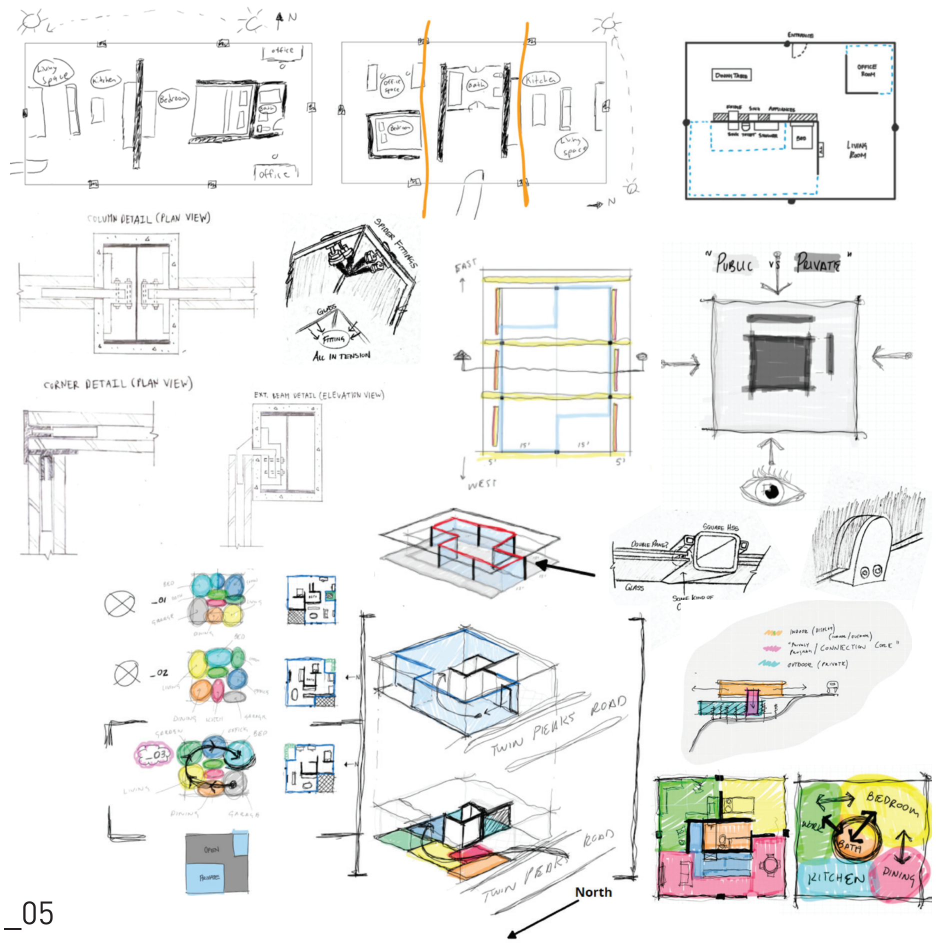
1959-1960 CSH #22, Stahl House designed and constructed in West Hollywood

1964 World's Fair model by Meiji Watanabe

2009 Manglano-Ovalle and Bill Baker collaborate to create *Gravity is a Force to be Reckoned With* to be exhibited at MASS MoCA

2021 Anderson Anderson Architects design the Napa Glass House inspired by Mies Van der Rohe.

Initital Concept Drawings



From a structural perspective, I hope I am able to engineer a solution to fulfilling the vision of the Glass House while still allowing up to withstand the high seismic loads anticipated for this project. I actually really enjoyed reading 1984 in high school, and it seems that this class focuses on similar ideas. Because of this, I am excited from an architectural perspective to create my own artistic vision of a utopian/dystopian world from a fresh and more mature perspective. -Alex

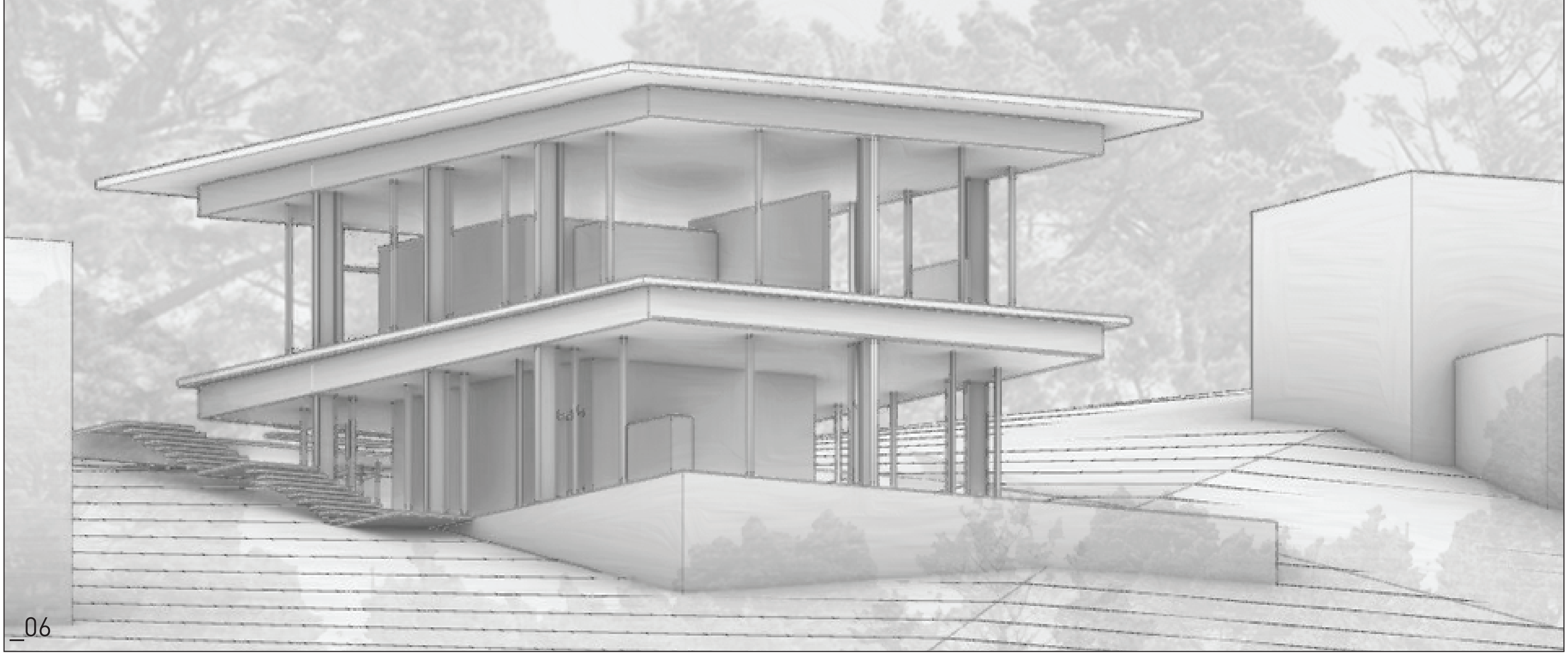
By the end of this class, I hope to gain experience collaborating with architects and develop efficient communication skills through drawings and presentations. Although this project will be a pain to figure out, I personally appreciate huge glass structures, so I am excited. -Destiny

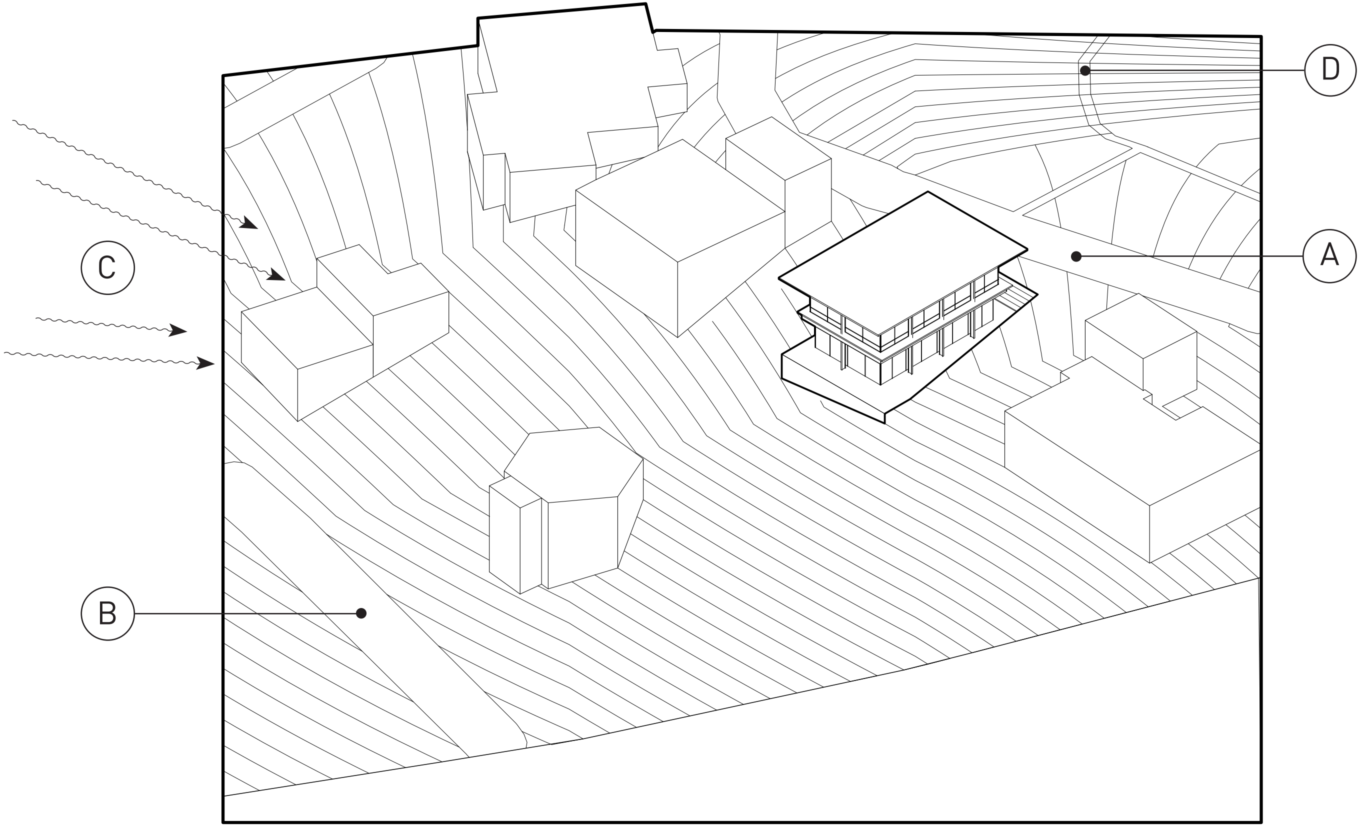
I am looking forward to learning more in depth about the architecture side of this studio. Understanding what goes through a designer's mind. Is there a process? Maybe no process at all? Where do you even begin? The site? The theme? The client? -Joseph

I am looking forward to a "pragmatic" approach to architectural design; that is, one where the architect designs with the strucutral engineer close by their side as they make adjustments based on one anothers demands through the entirety of the design process. I hope to gain a better understanding of the structural criteria of a glass house, including but not limited to glass details, concrete footings, and siesmic structural systems. -Jake

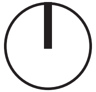
Summit Road Glass House

In choosing where to locate the various spaces within our building, we took inspiration from the parallels between panopticon's and the virtual interactions we have today. Over the course of this pandemic, we have adapted to interact mostly through technology, the most common for us being through Zoom conference calls. In a time where we are physically isolated more than ever before, we simultaneously feel more surveilled than ever before in this virtual social space. In essence, we engage in our most public activities from our most private places at home. With this thinking, we decided to place our living spaces on the public entry level and our office and gym spaces on the private lower level, mirroring the swap between public and private spaces we've experienced over the past year.





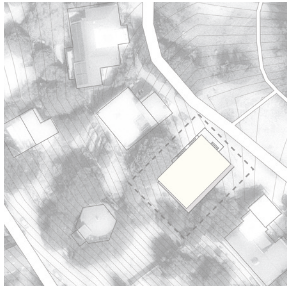
Ⓐ Summit Road Ⓑ Hill Road Ⓒ Prevailing Winds Ⓓ Shelby Trail



Site: N Berkeley, CA

37*53'12*N 122*14'56* W
1310 Summit Rd, Berkeley, CA 94708

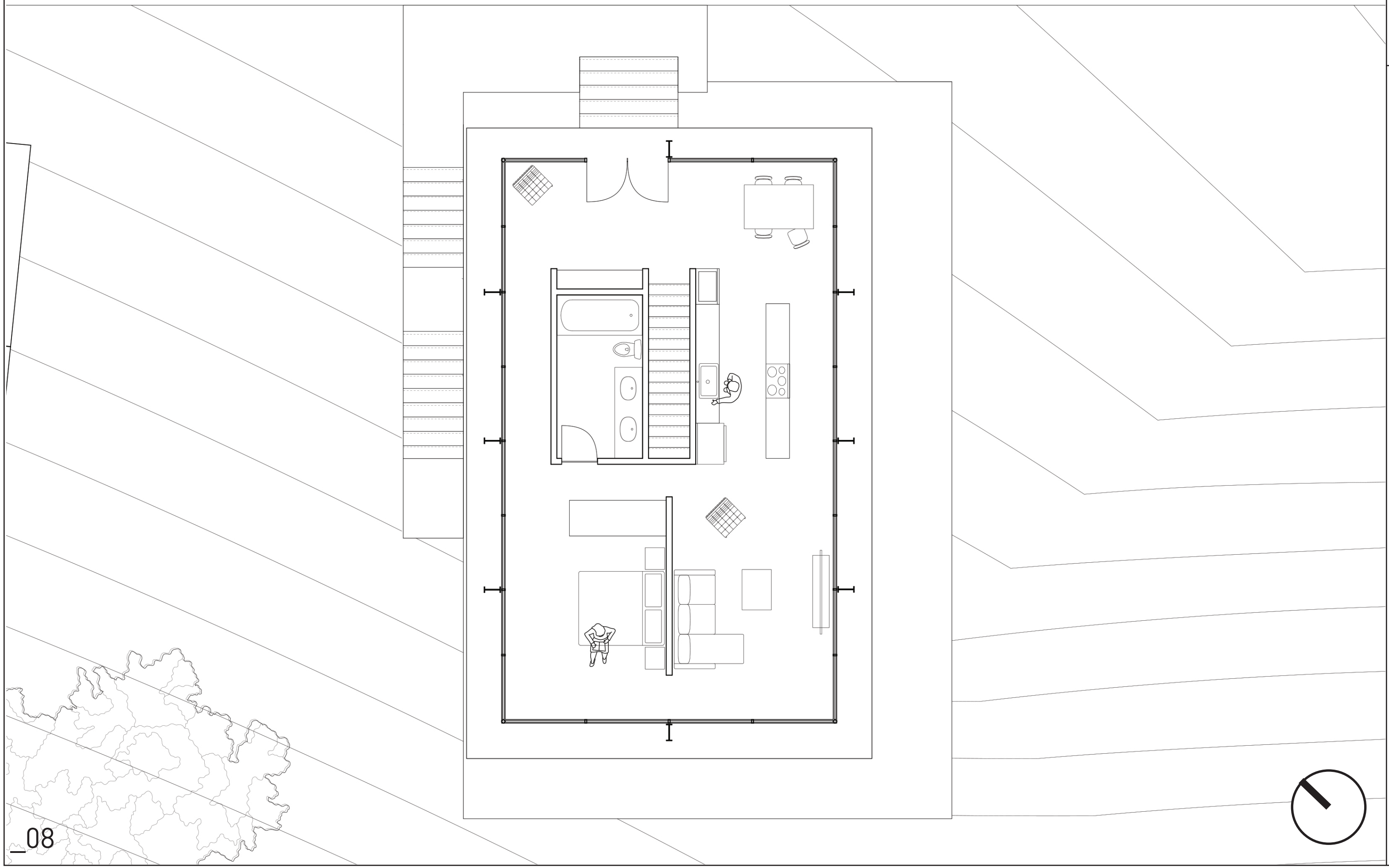
Scale 1/4" = 3'



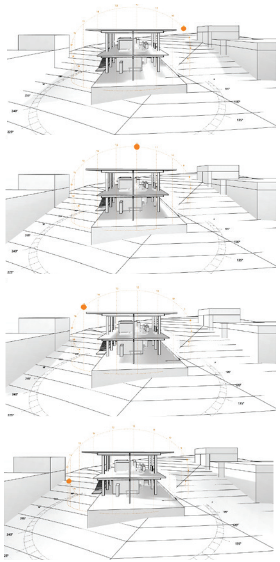
Plan_01

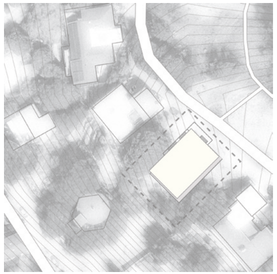
37*53'12*N 122*14'56* W
1310 Summit Rd, Berkeley, CA 94708

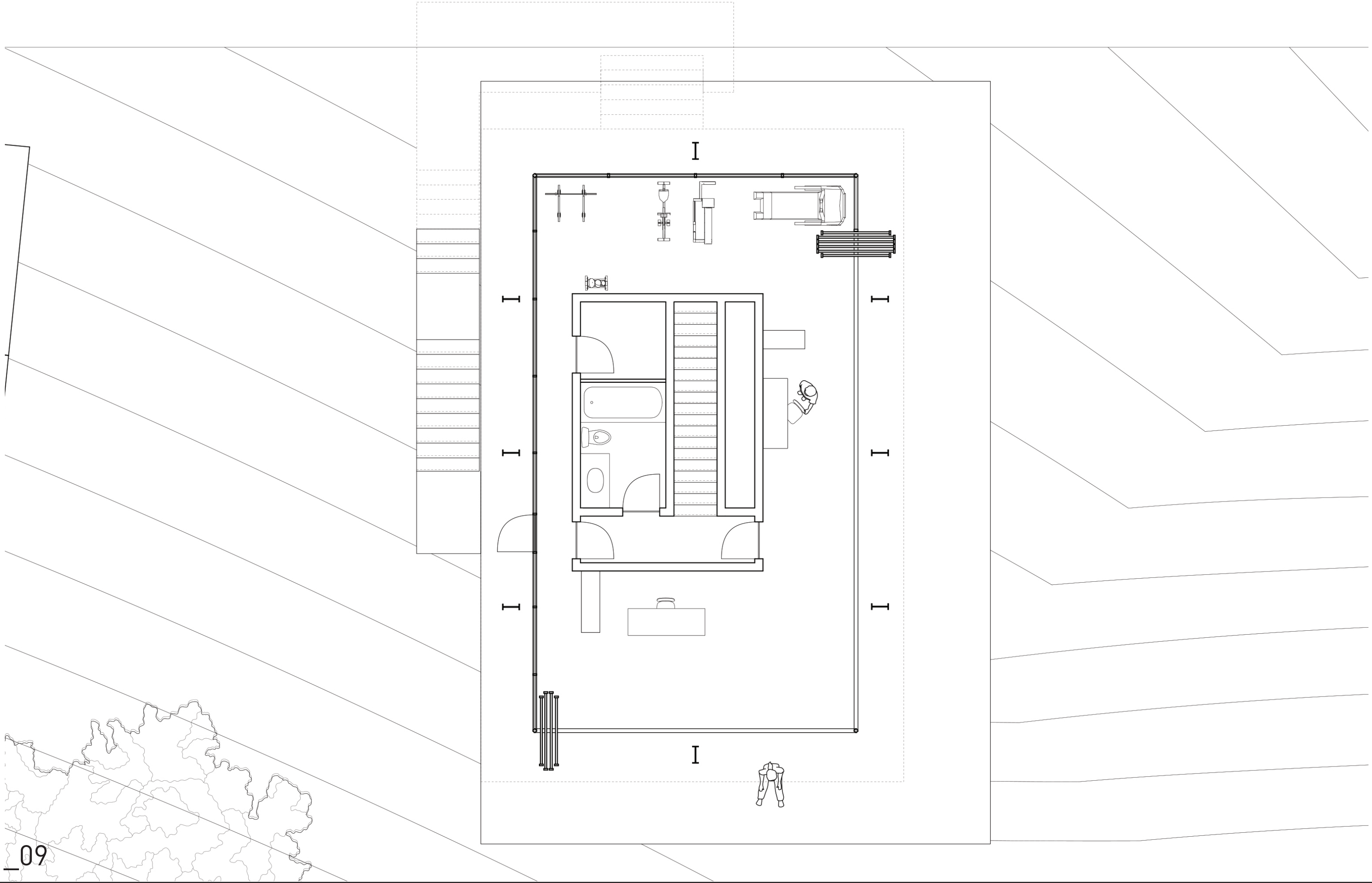
Scale 1/4" = 3'



Summer Solstice





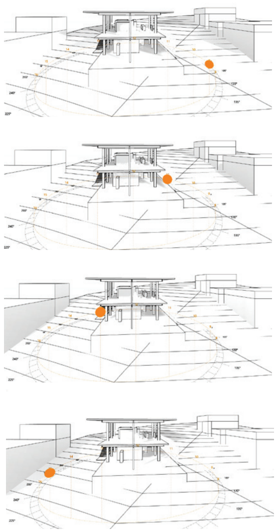


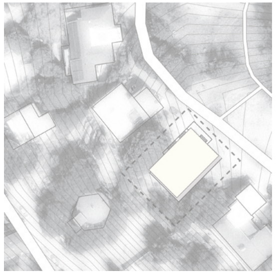
Plan_02

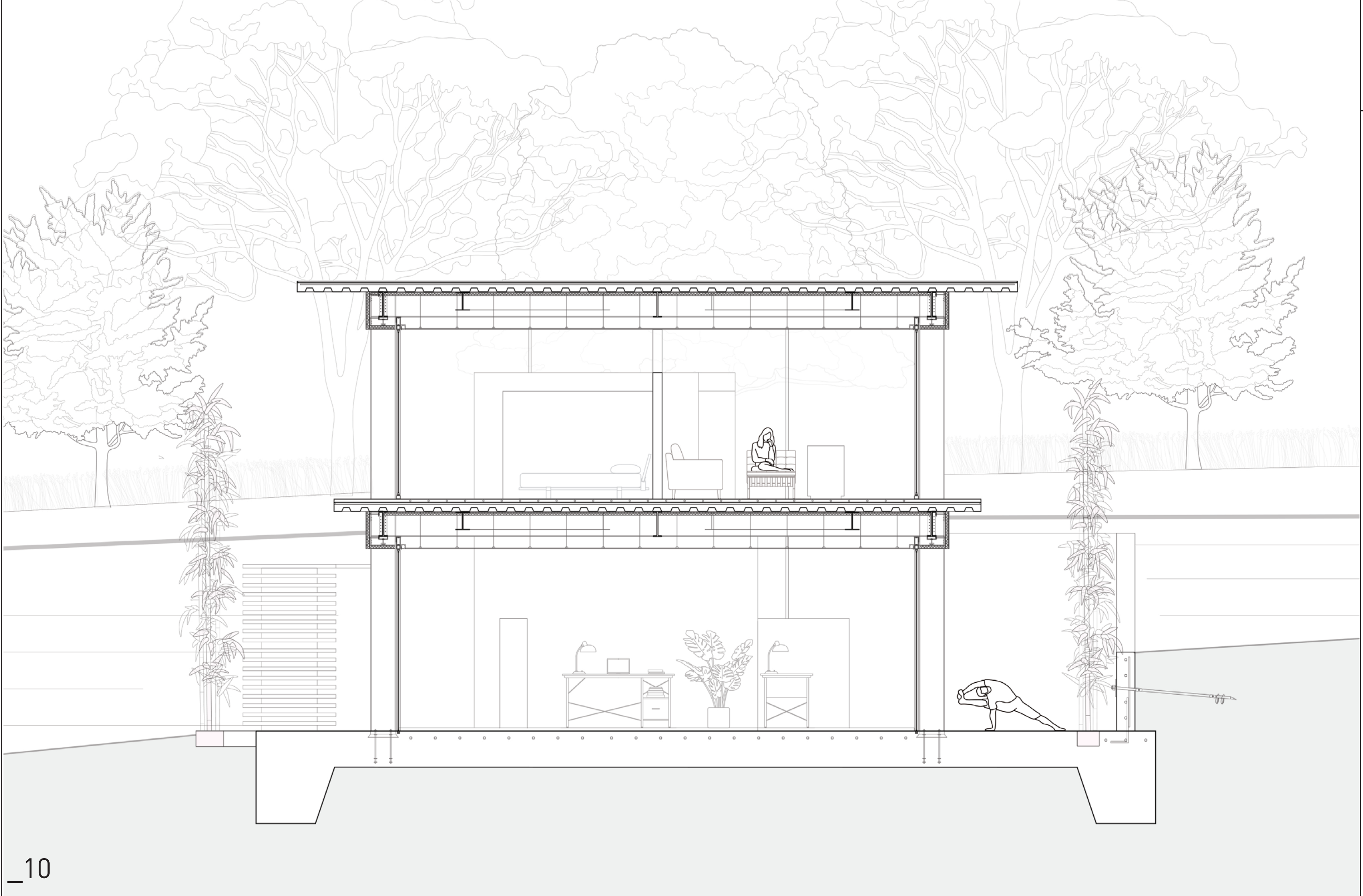
37*53'12*N 122*14'56* W
1310 Summit Rd, Berkeley, CA 94708

Scale 1/4" = 3'

Winter Solstice





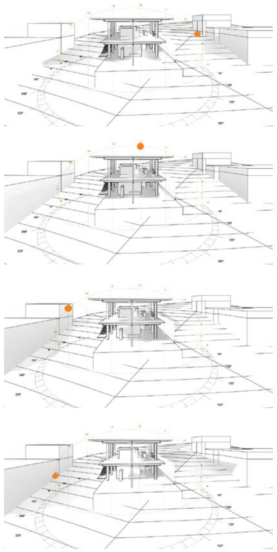


Section_01

37*53'12*N 122*14'56* W
1310 Summit Rd, Berkeley, CA 94708

Scale 1/4" = 3'

Spring Equinox



Section_02

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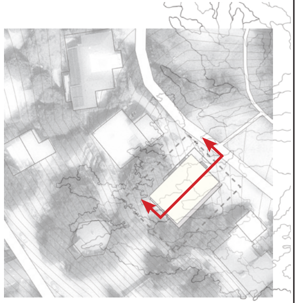
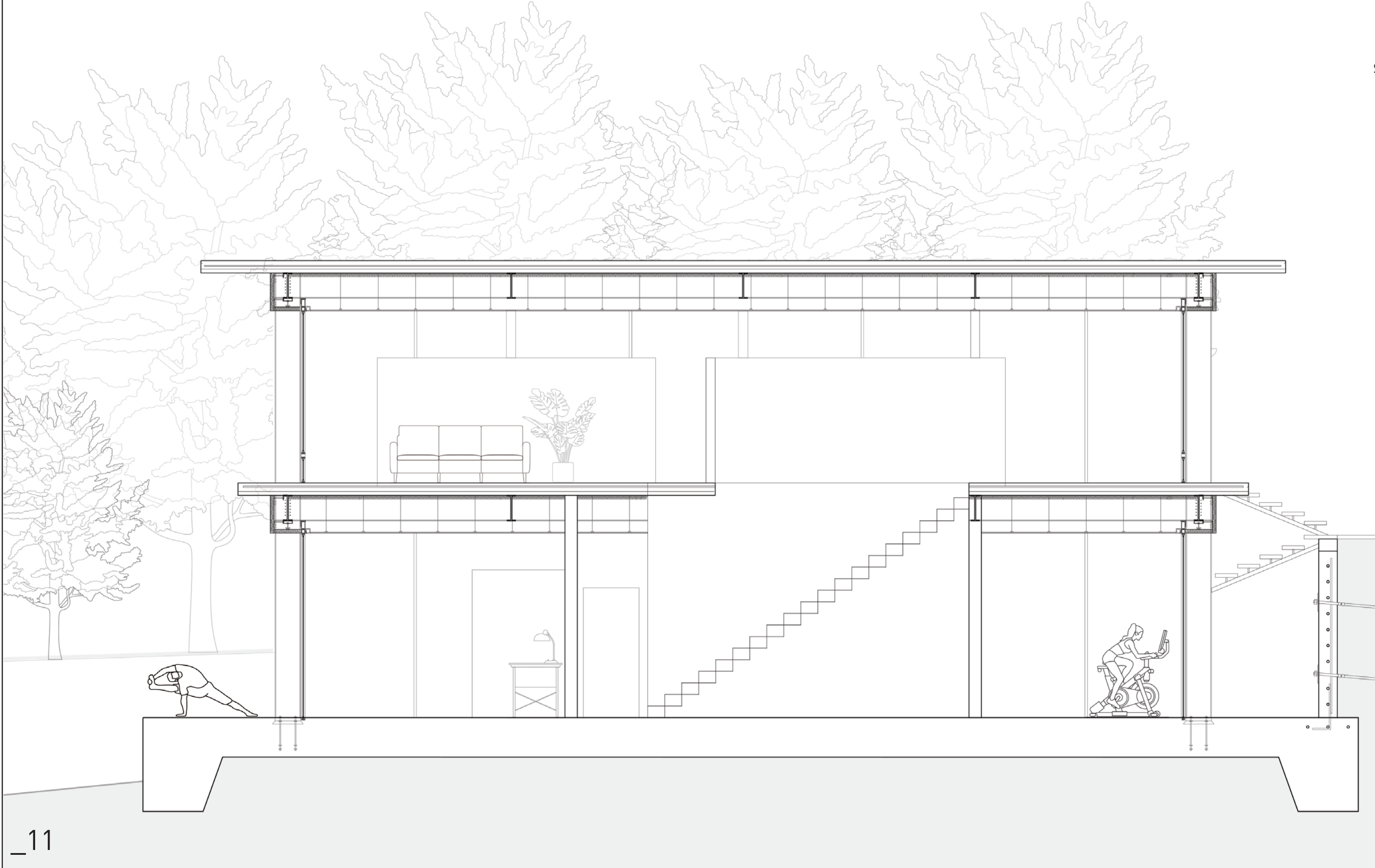
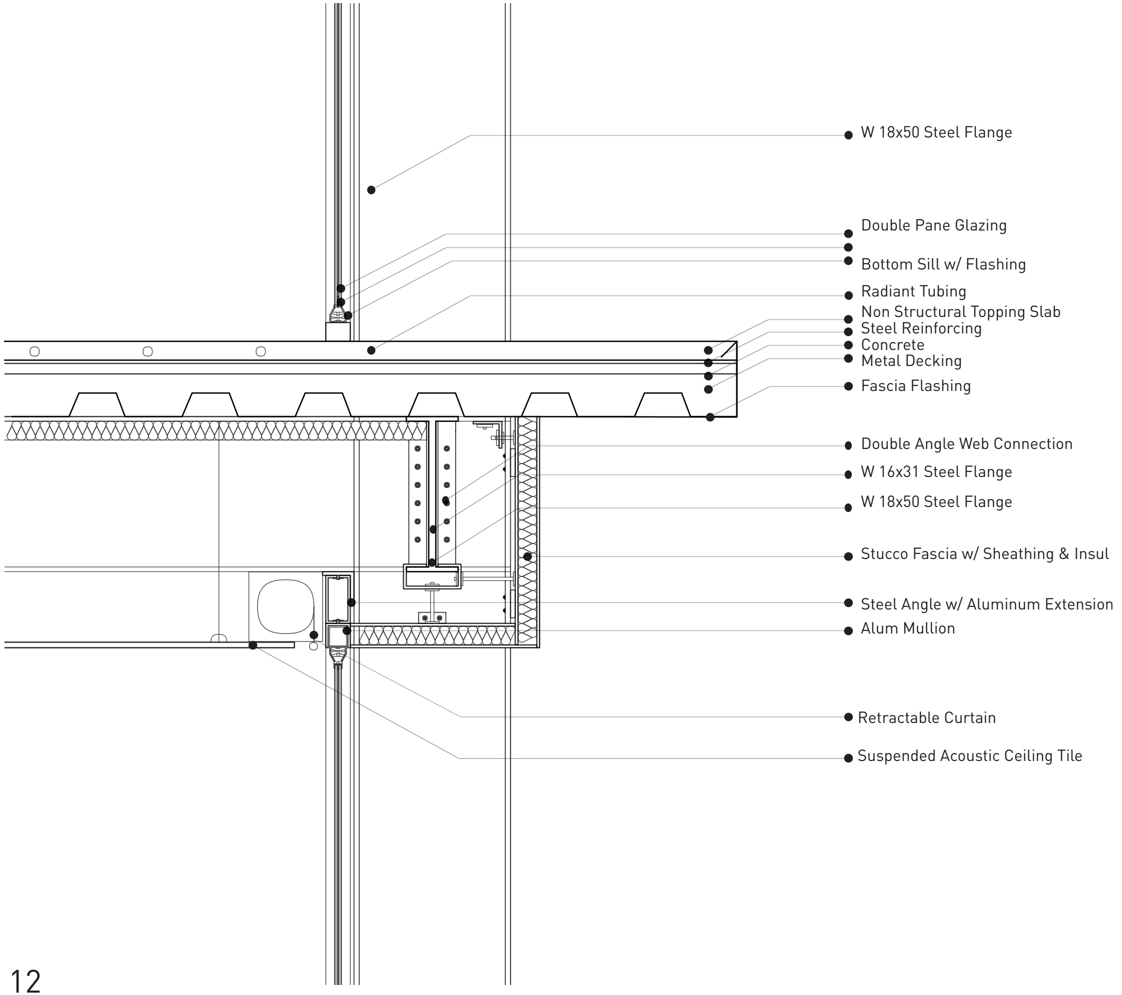
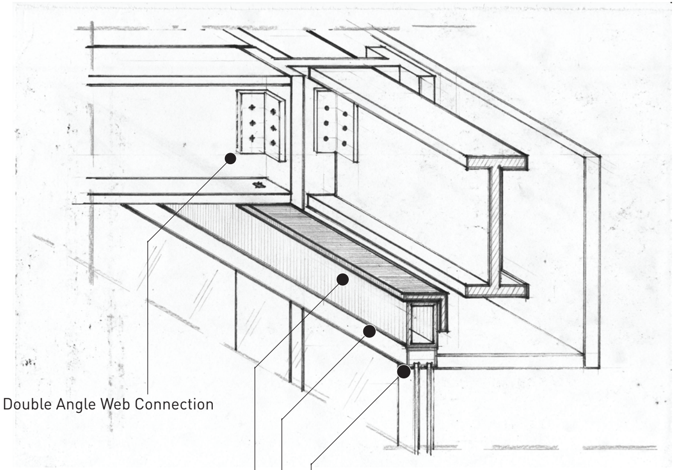




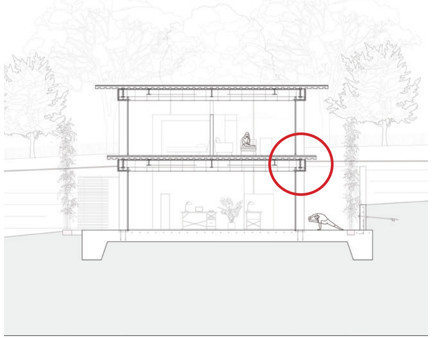




Detail_01 + Draft

37*53'12*N 122*14'56* W
1310 Summit Rd, Berkeley, CA 94708

Scale 1" = 8" (Left Image)
No Scale (Right Image)



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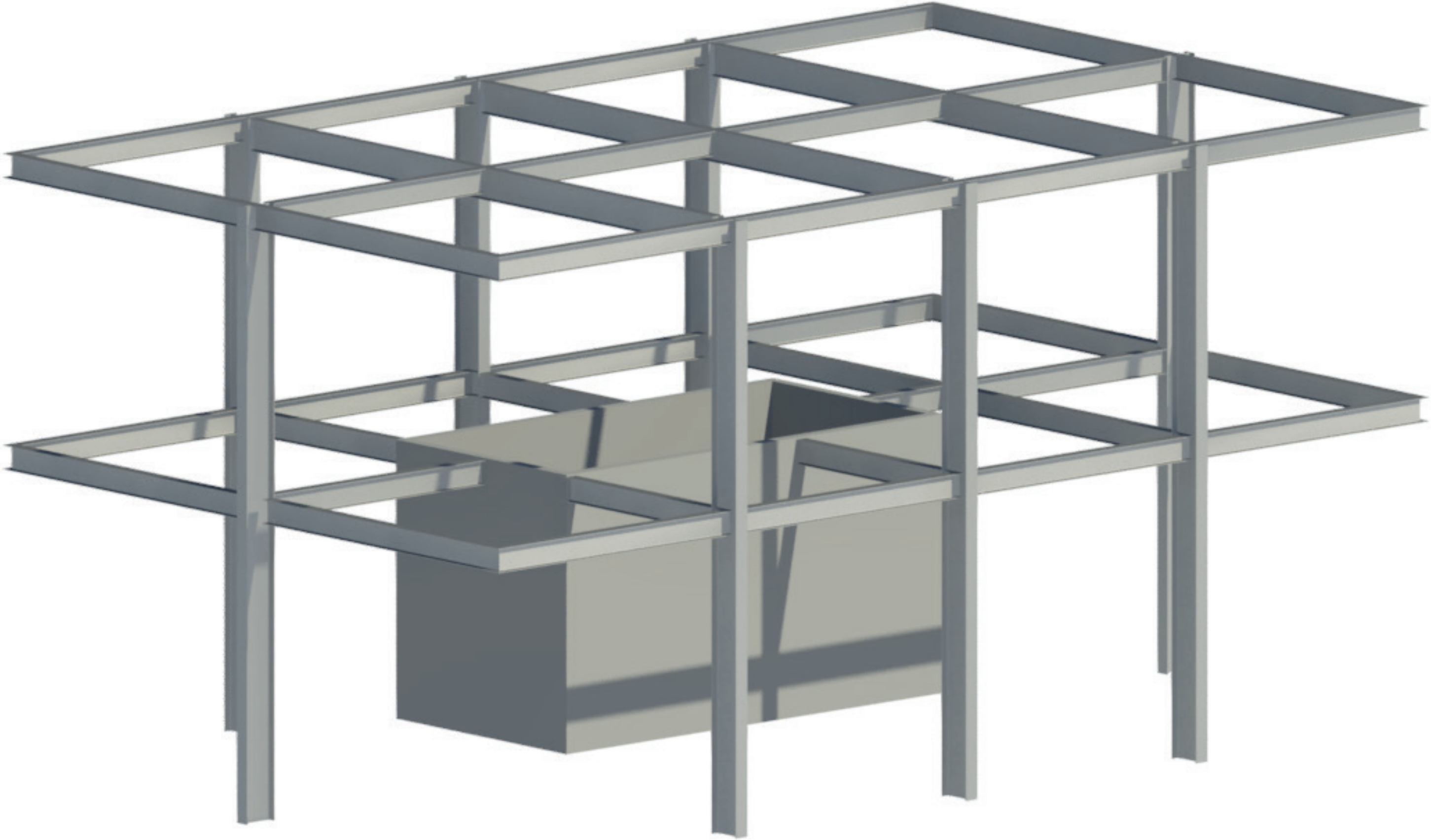
Structural System Criteria

Inspired by the Miesian architecture of the 50x50 and Farnsworth Houses

No Columns or Mullions at the corners of the building

No Structural Walls or Core that connect to the roof

No Diagonal Bracing



Structural System

Typical story height: 12'
Materials: Conc, glass, steel

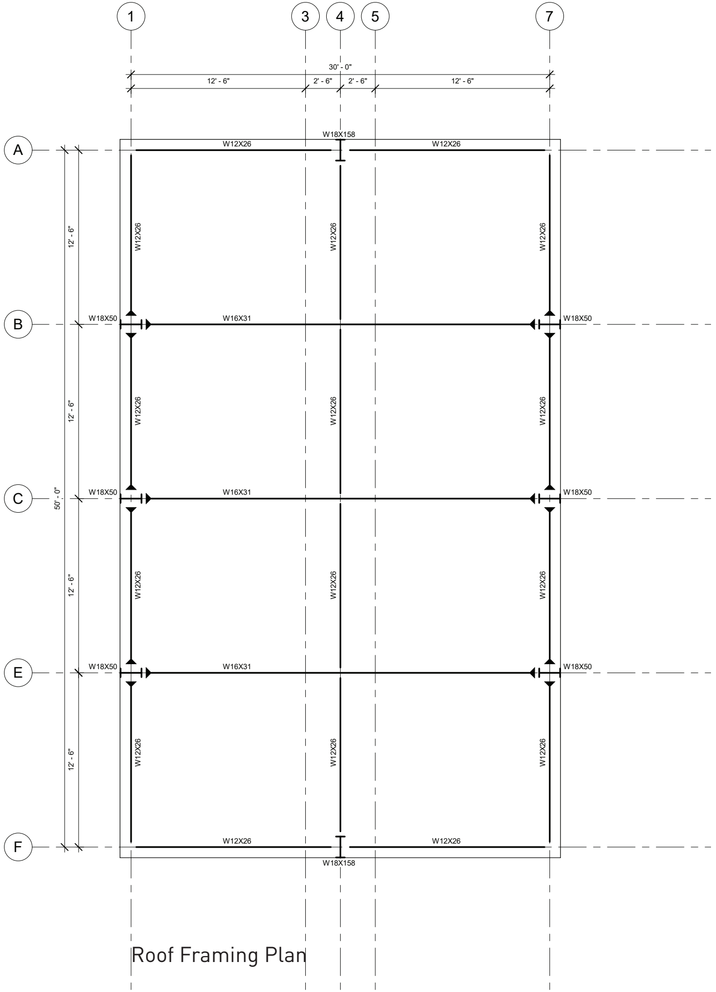
Joists: W12x26 (both floors)
Girders: W16x31 (only at roof)

Columns: W18x50 (throughout)

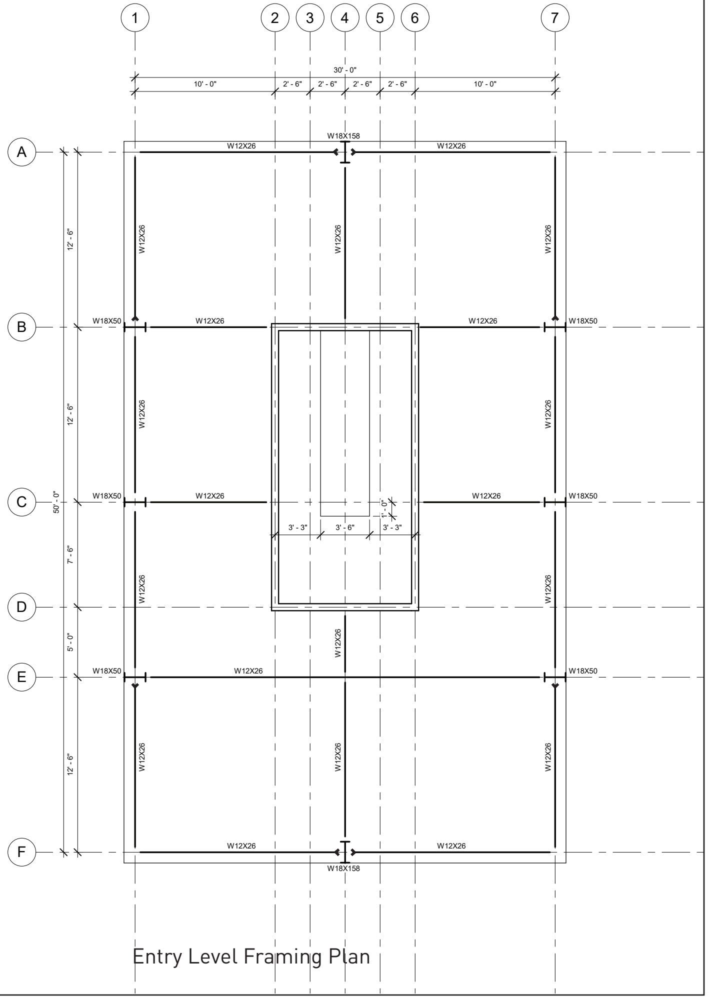
Square footage:

30'x50' (floor/roof)
40'x60' (ground level)

Conc. Slab Metal Deck:
5" (ground level)
6" (floor/roof)



Roof Framing Plan



Entry Level Framing Plan

Gravity System

Load Flow

Slab -> Aligned Beams -> Columns -> Foundation

D = 90 psf | L, floor = 40 psf | L, roof = 20 psf
See appendix 1 for Load Takeoff Calculation

Truss system below each floor
Top & bottom chords acting in tension & compression

Provides equal weight distribution
Resists overall bending

Core at the center that extends to the 2nd floor

Stiff shell

Strengthens lateral resisting system

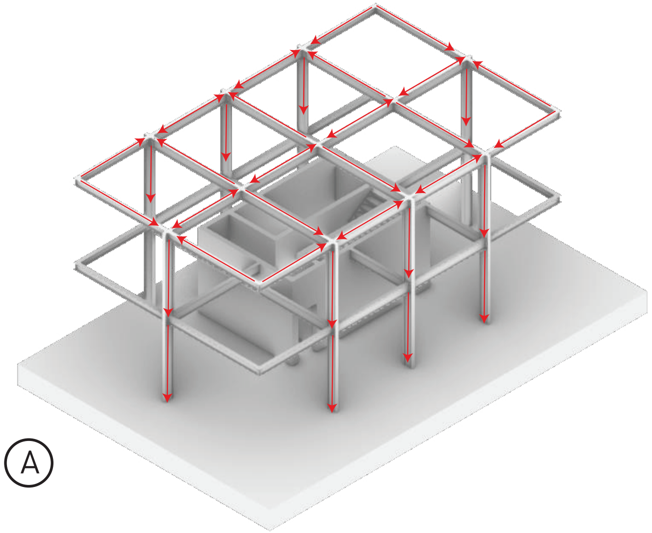
Deflections

Roof Level	Entry Level
Corner: -0.6"	Corner: -0.73"
Middle: -1.12"	Middle: 0"

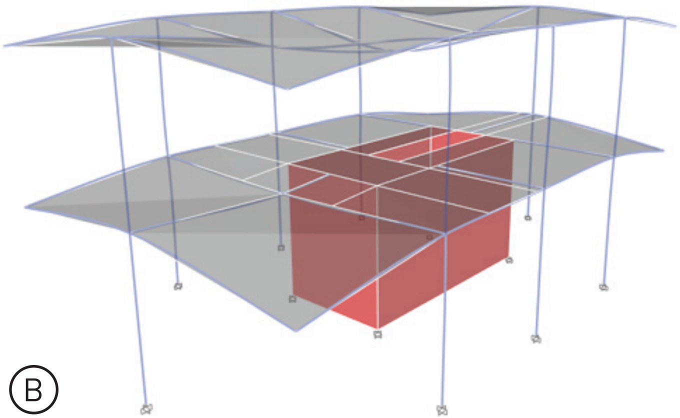
Ⓐ Gravity Load Flow

Ⓑ Deflected Shape

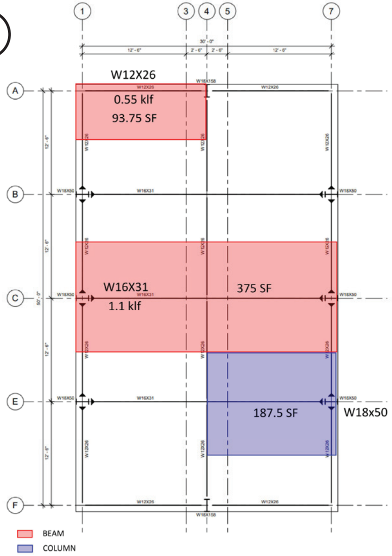
Ⓒ Tributary Area



A



B



C

Lateral System

3 MF Along Short Direction
2 MF Along Long Direction
Concrete Shear Wall Core at Entry Level

Moment Frame Sizes:
Beam - W16x31
Column - W18x50

Key Structural Decision:

Columns along Lines A & F increased to W18x158

Deflections:

X-Direction:
Roof Level: 0.54"
Entry Level: 0"

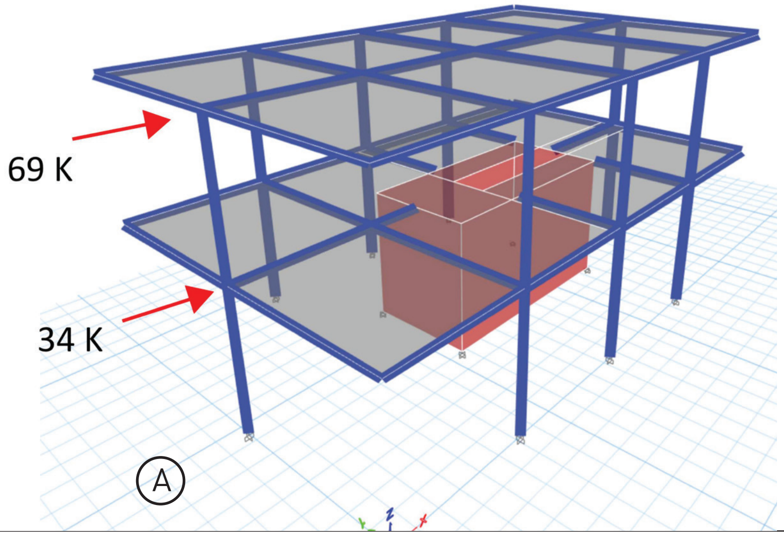
Y-Direction:
Roof Level: 0.57"
Entry Level: 0"

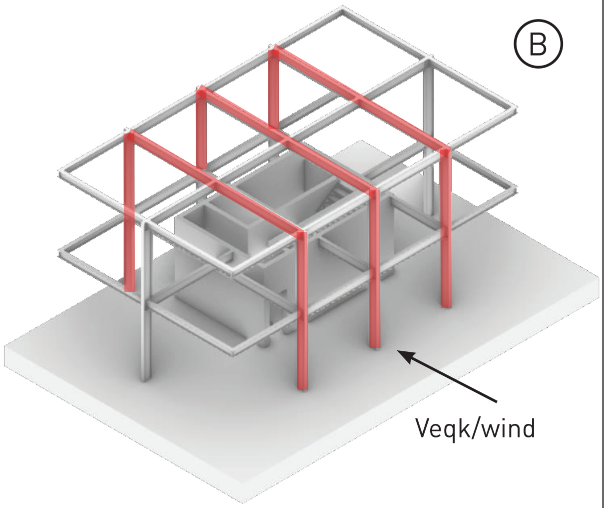
(A) Lateral System Loading

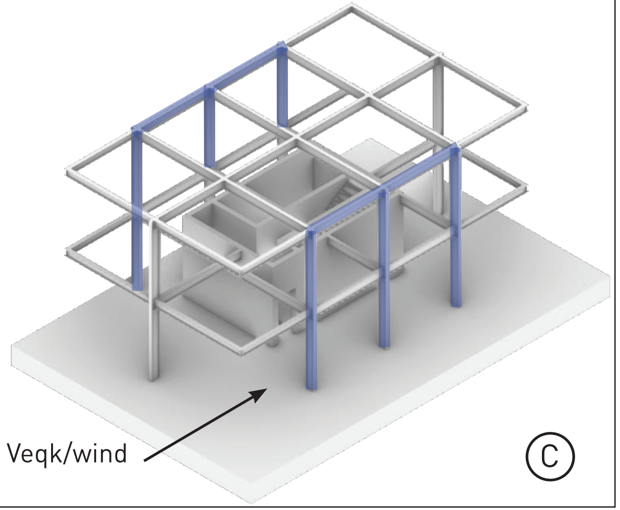
(B) SE/NW Moment Frames

(C) SW/NE Moment Frames

See appendix 2 for calculations

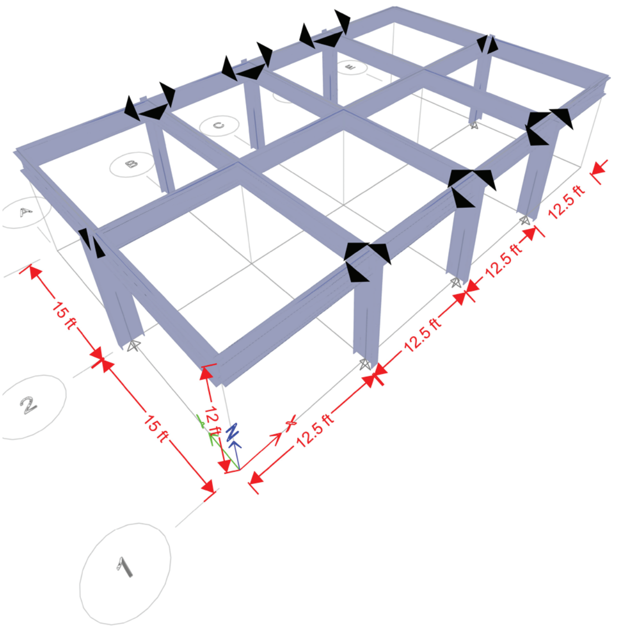




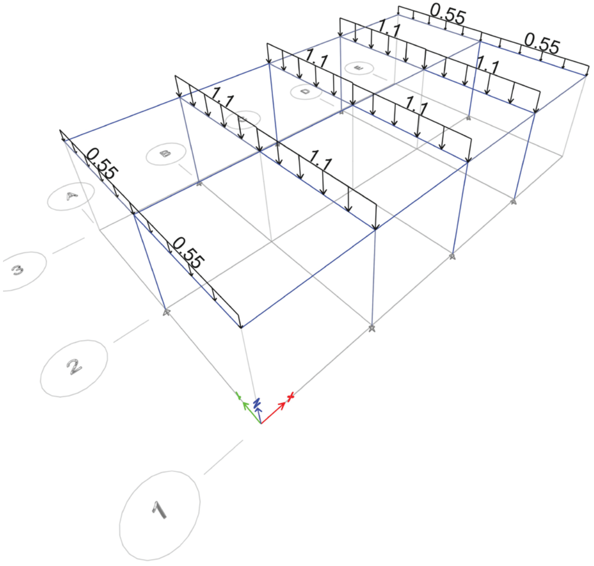


Loading Diagrams

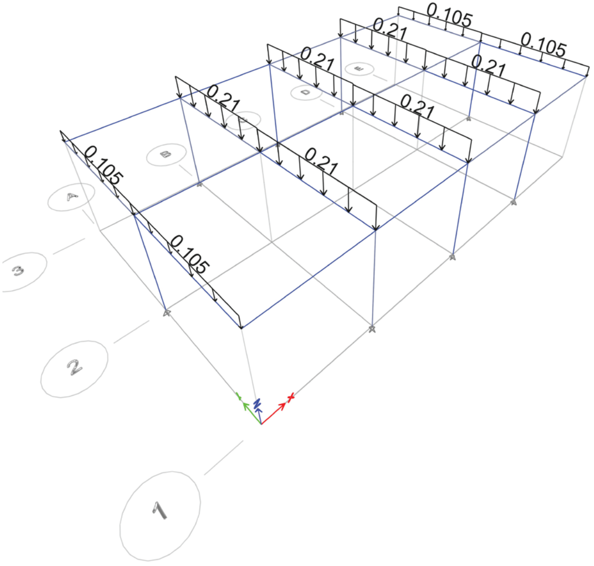
See appendix 1 for Distributed Load Calculations



Simple Loading Model



Frame Span Loads (Dead)



Frame Span Loads (Live)

Artifact_01

Jake Baldauf

"A Cage in the Zoo"

1960's National Geographic
on Paper

11"x17"

The collage shown represets the Parti Diagram from our Summit Road Glass House.

The diagram itself consists of two stacked rectangular boxes, the top one representing the living spaces of a house that are easily visible to the public passer-by which could be understood as a sort of "display case." This level is represented by the black and white images that create a defined rectangular "case" that translates to the non-operable glass windows of the entry living floor of the Glass House.

The lower, seemingly sub terrainian, level serves a more private function and is represented by the pro-jecting walls that release the inhabitant into nature, freeing them from the confines of their glass display case.

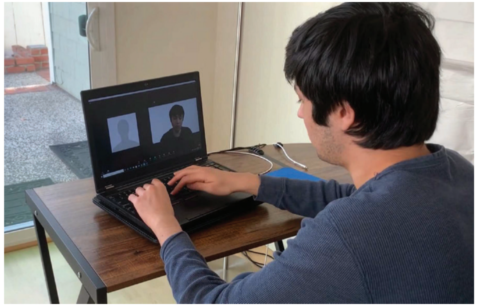
Artifact_02

Alexander Ameri

link:

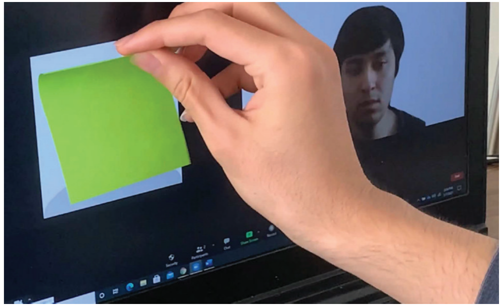
https://youtu.be/-_93l1d99DM

Searching
Nothing moves
Watching beyond from a perch unseen.
Pupils in perfect circles
Unblinking, wired like caffeine.



Connecting
Invisible yet tangible
A world unknown and out of mind.
Lines of light dance between
A divide that seeks to blind.

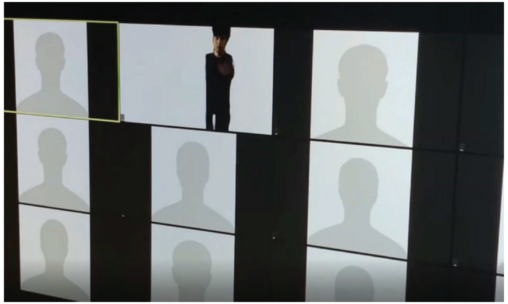
Escaping
Solo societies
Respite from the silent drone.
Overflowing with eyes
In a space so utterly alone.



Touching
Slowly and delicately
Hearts with warmth and solace.
No more cold stares
From a pixelated palace.

Hoping
For a new horizon
Beyond an unplugged light.
Freed from a prison
To fly unguided.

Neverending
I see with closed eyes
I speak with silent noise
I love with promised lies
I think with what destroys.



DISTORTION

Doors shut, lights off, silence
As I make this home my cell

Trapped
Behind these walls I've created
There is no escape
Enslaved to your power
I do not live
I survive

By night
Your eyes fill the surface
As I fear to close my own
Arguing softly with the faint whispers in my head
I hear the sound of my beating chest
And watch flashes of silhouettes dance around me

By day
The sunlight invades your translucent barrier
The trees themselves mock as they freely sway
I can hear the wind knocking
As it impatiently demands to be let in

So powerful
Your deception has left me vulnerable
Yet so honest and pure I remain
You are the lie to my sanity

Tortured
I can no longer endure
I must confess
Your beauty is unrecognizable
For my greatest enemy lies within

Artifact_03

Destiny Calderon

Artifact_04

Joseph Guzman

- Inspired by the privacy challenges that arise with glass houses

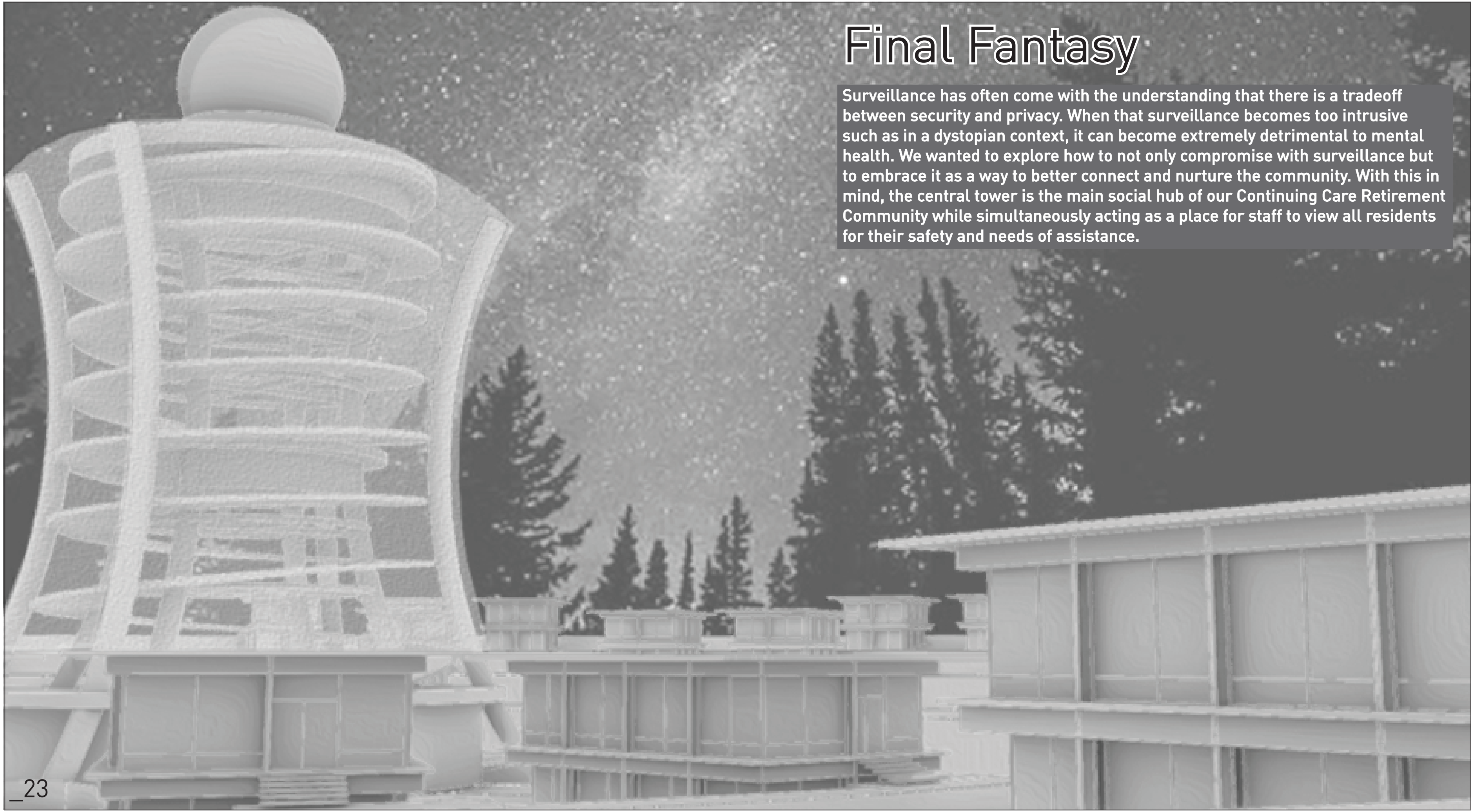
- Portrays the idea of surveillance and its relationship with day and night

- Laptop, iPhone, neighbor

Link: https://youtu.be/F6O72QMe25g

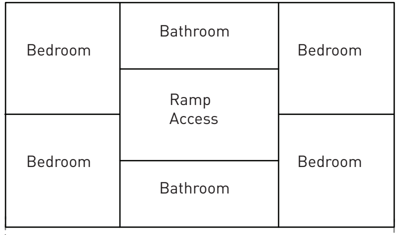
Final Fantasy

Surveillance has often come with the understanding that there is a tradeoff between security and privacy. When that surveillance becomes too intrusive such as in a dystopian context, it can become extremely detrimental to mental health. We wanted to explore how to not only compromise with surveillance but to embrace it as a way to better connect and nurture the community. With this in mind, the central tower is the main social hub of our Continuing Care Retirement Community while simultaneously acting as a place for staff to view all residents for their safety and needs of assistance.



Site Plan + Rings

Upper Level

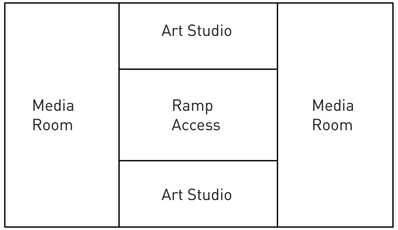


SC

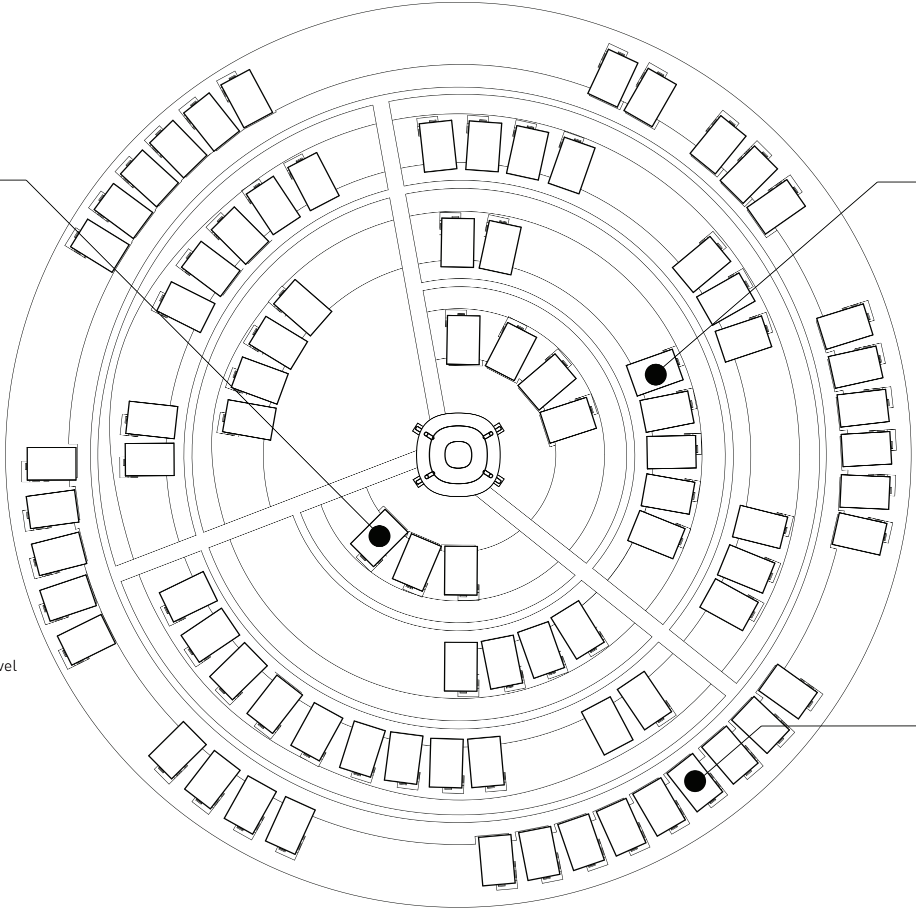
Special Care Residents in this ring will engage with activities meant to stimulate memory includes puzzles, knitting, and painting

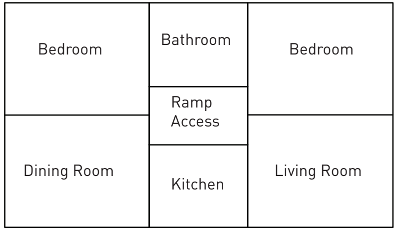
Residents all sleep on the same floor unlike other rings to have a simpler floor plan this helps create simpler circulation to prevent dementia residents from becoming lost

Special Care Unit Ring is closest to the center for quickest access to staff since these residents need the most assistance



Lower Level





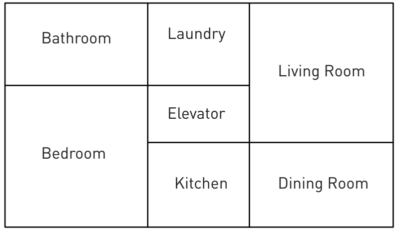
AL

Assisted Residents in this ring can primarily take care of themselves, but may need assistance with at least one of the activities of daily living.

Bathing/showering, grooming, personal hygiene, etc.
There will be four residents per house, two per floor.

This creates a mini open community within the house.

The Assisted Living Ring will be the middle ring, as they may need assistance from time to time.



IL

These communities are about lifestyle preference rather than a form of senior care which allows residents free to live life without limits.

Those who thrive in this environment tend to be those who no longer wish to live alone and are capable of daily living. Cooking, personal hygiene, managing medications, etc.

These apartment-style units are the farthest ring, since residents are not required to have frequent contact with staff and are capable of taking care of themselves.

C Canteen

In the Canteen, residents of the community gather to eat and socialize on a daily basis. The Canteen also supports some office spaces for the employees of the community.

E Exercise

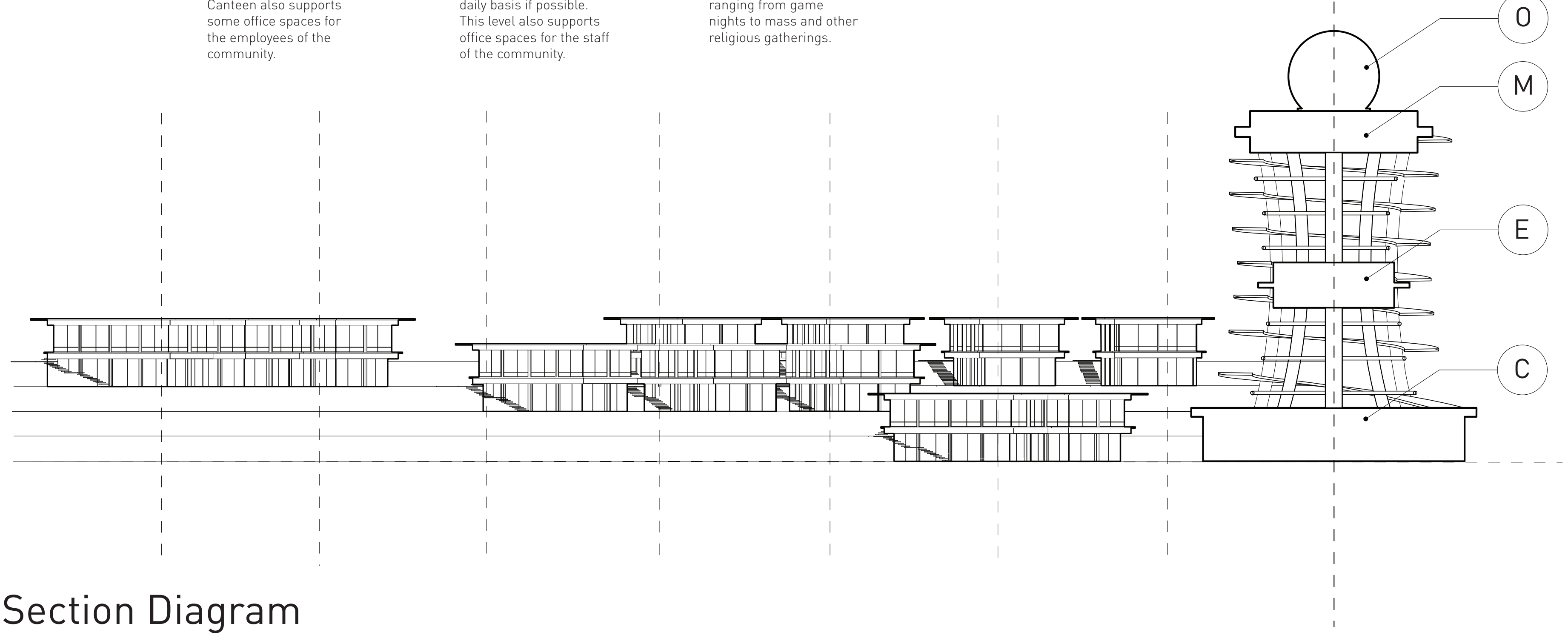
On the Exercise level, residents of the community are encouraged to exercise on a daily basis if possible. This level also supports office spaces for the staff of the community.

M Multi

On the Multipurpose level, residents gather for various events that are held in the tower ranging from game nights to mass and other religious gatherings.

O Observatory

A place for the residents to look to the stars and reflect on their journey through life.



Section Diagram

AISC Table 3-23: Case 15 (Beam Fixed at Both Ends – Uniformly Distributed Loads)

M_{max} (at ends) $= \frac{w\ell^2}{12} = \frac{(1.2w_D + 1.6w_L)\ell^2}{12}$

AISC Table 3-2

$M_u = \frac{(1.2(1.1\text{ klf}) + 1.6(0.21\text{ klf}))(30\text{ ft})^2}{12} = 124.2\text{ k-ft} < 203\text{ k-ft} = \phi M_n$ (W1

Outer Column Loading (Long Side – W18x50)

$A_{T_{roof}} = 18.75\text{ ft} \times 15\text{ ft} = 281.25\text{ ft}^2$

$R_2 = 1$

$R_1 = 1.2 - 0.001(281.25) = 0.91875$

$L_r = L_o R_1 R_2 = 20\text{ psf}(0.91875)(1) = 18.375\text{ psf}$

$A_{T_{floor}} = (5\text{ ft} \times 2.5\text{ ft}) + (10\text{ ft} \times 6.25\text{ ft}) + (15\text{ ft} \times 12.5\text{ ft}) = 262.5\text{ ft}^2$

$K_{LL} = 3$ for edge column with cantilever slab

$\rightarrow K_{LL}A_T = 3(262.5\text{ ft}^2) = 787.5\text{ ft}^2$

$L = L_o\left(0.25 + \frac{15}{\sqrt{K_{LL}A_T}}\right) = 40\text{ psf}(0.25$

$= 31.4\text{ psf}$

LOAD TAKE OFF

5" DEEP W3 FORMLOK DECK	42.3 PSF	Roof Live Load = 20 PS
20 gage deck	2.2 PSF	Floor Live Load = 40 PSI
SUSPENDED METAL LATH & GYPSUM PLASTER	10 PSF	
CERAMIC TILE, 3/4"	12 PSF	
RADIANT + MEP	10 PSF	
MISC. (15%)	11.5 PSF	
SUBTOTAL	88 PSF	

Moment Frame Beam Loading (W16x31)

$w_D = 88\text{ psf} \times 12.5\text{ ft} = \boxed{1.1\text{ klf}}$

Roof Live Load Reduction

$R_2 = 1$ for flat roof

$A_T = 12.5\text{ ft} \times 30\text{ ft} = 375\text{ ft}^2$

$R_1 = 1.2 - 0.001A_T = 1.2 - 0.001(375) = 0.825$

$L_r = L_o R_1 R_2 = 20\text{ psf}(0.825)(1) = 16.5\text{ psf}$

$w_{L_r} = 16.5\text{ psf} \times 12.5\text{ ft} \approx \boxed{0.21\text{ klf}}$

Outer Column Loading Cont.

$P_u = [1.2(88\text{ psf}) + 1.6(18.375\text{ psf})]281.25\text{ ft}^2 + [1.2(88\text{ psf}) + 1.6(31.4\text{ psf})]$

$= 79\text{ k}$

Cantilever Beam Loading (W12x26)

$w_D = 88\text{ psf} \times \frac{12.5\text{ ft}}{2} = \boxed{0.55\text{ klf}}$

$A_T = 6.25\text{ ft} \times 15\text{ ft} = 93.75\text{ ft}^2 \rightarrow$ No Live Load Reduction

$w_{L_r} = 20\text{ psf} \times \frac{12.5\text{ ft}}{2} = \boxed{0.125\text{ klf}}$

AISC Table 3-23: Case 19 (Cantilevered Beam – Uniformly Distributed)

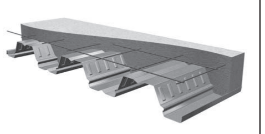
$M_{max} = \frac{w\ell^2}{2} = \frac{(1.2w_D + 1.6w_L)\ell^2}{2}$

*AISC T

$M_u = \frac{(1.2(0.55\text{ klf}) + 1.6(0.125\text{ klf}))(15\text{ ft})^2}{2} = 96.8\text{ k-ft} < 140\text{ k-ft}$

PLW3™ or W3 FORMLOK™

- 5 in. TOTAL SLAB DEPTH
- Normal Weight Concrete



Maximum Unshored Clear Span (ft-in.)

Deck Gage	Number of Deck Spans: 1	2	3
22	10'-0"	10'-7"	11'-4"
21	10'-11"	11'-8"	12'-1"
20	11'-7"	12'-4"	12'-10"
19	12'-1"	13'-9"	14'-2"
18	12'-5"	14'-10"	14'-7"
16	13'-1"	16'-4"	15'-4"

Shoring is required for spans greater than those shown above. See Footnote 1 on page 69 for required bearing.

Concrete Properties

Density (pcf)	Uniform Weight (psf)	Uniform Volume (yd^3/100 ft^2)	Compressive Strength, f'_c (psi)
145	42.3	1.080	3000

Notes:
1. Volumes and weights do not include allowance for deflection.
2. Weights are for concrete only and do not include weight of steel deck.
3. Total slab depth is nominal depth from top of concrete to bottom of steel deck.

Allowable Superimposed Loads (psf)

Deck Gage	Number of Deck Spans	Span (ft-in.) 8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"	13'-6"	14'-0"	15'-0"	16'-0"
22	1	254	229	208	190	175	120	108	97	88	79	72	65	58	48	39
	2	254	229	208	190	175	161	108	97	88	79	72	65	58	48	39
	3	254	229	208	190	175	161	108	97	88	79	72	65	58	48	39
21	1	274	248	225	206	189	174	120	108	98	89	81	73	66	55	45
	2	274	248	225	206	189	174	161	150	98	89	81	73	66	55	45
	3	274	248	225	206	189	174	161	150	140	89	81	73	66	55	45
20	1	294	265	241	220	202	187	173	160	108	98	89	81	74	61	51
	2	294	265	241	220	202	187	173	160	149	98	89	81	74	61	51
	3	294	265	241	220	202	187	173	160	149	140	89	81	74	61	51
19	1	333	301	274	250	230	212	191	172	155	116	106	97	89	75	63
	2	333	301	274	250	230	212	191	172	155	140	126	115	89	75	63
	3	333	301	274	250	230	212	191	172	155	140	126	115	104	75	63
18	1	370	334	304	278	255	232	208	187	169	134	122	112	103	88	74
	2	370	334	304	278	255	232	208	187	169	153	139	126	115	88	74
	3	370	334	304	278	255	232	208	187	169	153	139	126	115	88	74
16	1	400	400	365	333	299	268	241	217	197	178	162	143	132	113	95
	2	400	400	365	333	299	268	241	217	197	178	162	148	135	113	95
	3	400	400	365	333	299	268	241	217	197	178	162	148	135	113	95

See footnotes on page 69.

Shoring required in shaded areas to right of heavy line.

Allowable Diaphragm Shear Strengths, q (plf)

Attachment Pattern	Deck Gage		Span (ft-in.) 8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"	13'-6"	14'-0"	15'-0"	16'-0"
36/3	22	q	1606	1594	1583	1573	1565	1557	1550	1544	1538	1532	1527	1523	1518	1511	1504
	21	q	1605	1592	1580	1570	1560	1552	1544	1537	1530	1524	1519	1514	1509	1500	1493
	20	q	1608	1593	1580	1569	1559	1549	1541	1533	1526	1520	1513	1508	1503	1493	1485
	19	q	1618	1602	1587	1573	1561	1550	1540	1531	1523	1515	1508	1502	1496	1485	1475
	18	q	1634	1615	1598	1583	1569	1557	1546	1535	1526	1517	1509	1502	1495	1482	1472
	16	q	1679	1655	1633	1614	1597	1582	1568	1555	1543	1532	1522	1513	1504	1489	1475
36/4	22	q	1708	1686	1666	1648	1633	1618	1605	1593	1583	1572	1563	1555	1547	1532	1520
	21	q	1729	1704	1683	1663	1646	1630	1616	1602	1590	1579	1569	1560	1551	1535	1521
	20	q	1750	1724	1700	1679	1660	1643	1627	1613	1600	1588	1577	1567	1557	1540	1525
	19	q	1801	1770	1742	1718	1696	1675	1657	1640	1625	1611	1598	1586	1575	1555	1537
	18	q	1854	1819	1787	1759	1734	1711	1690	1671	1654	1638	1623	1609	1597	1574	1554
	16	q	1973	1929	1890	1855	1823	1795	1769	1745	1723	1703	1684	1667	1651	1623	1598

See footnotes on page 69.

Appendix_02

1320 Summit Rd, Berkeley, CA 94708, USA

Latitude, Longitude: 37.8865407, -122.2489709

Date	2/10/2021, 3:42:17 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	2.405	MCE_R ground motion. (for 0.2 second period)
S_1	0.919	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.886	Site-modified spectral acceleration value
S_{M1}	1.287	Site-modified spectral acceleration value
S_{DS}	1.924	Numeric seismic design value at 0.2 second SA
S_{D1}	0.858	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	E	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.4	Site amplification factor at 1.0 second
PGA	1.007	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	1.209	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	2.708	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	3.008	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.405	Factored deterministic acceleration value. (0.2 second)
S1RT	1.02	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	1.145	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.919	Factored deterministic acceleration value. (1.0 second)
PGAd	1.007	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.9	Mapped value of the risk coefficient at short periods
C_{R1}	0.891	Mapped value of the risk coefficient at a period of 1 s

Period (ASCE 7-16, 12.8.2.1)

$T_a = C_t h_n^x$

$= 0.028(24')^{0.8} = \underline{0.356\ sec}$

Cs Value

- $C_s = \dfrac{S_{DS}}{\left(\frac{R}{I_e}\right)} = \dfrac{1.924}{(5/1)} = \underline{0.38}$ ← choose lowest
- $C_s = \dfrac{S_{D1}}{T\left(\frac{R}{I_e}\right)} = \dfrac{0.858}{0.356\left(\frac{5}{1}\right)} = 0.48$
- $C_s > 0.044 S_{DS} I_e \geq 0.01$

$0.38 > 0.044(1.924)(1) \geq 0.01$

$0.38 > 0.0847 > 0.01$ ✓

$\therefore\ C_s = 0.38$

Base Shear

- Area: 2 floors × 1500 SF = 3000 SF
- Weight: 2 floors × 90 psf × 1500 SF = 270 k

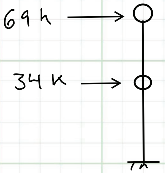
$V = C_s W = 0.38(270k) = \boxed{V = 102.6\ k}$

Vertical Distribution

- $C_{vx} = \dfrac{W_x h_x^k}{\Sigma W_i h_i^k}$

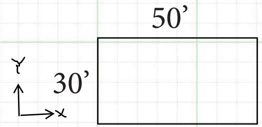
Roof = 2/3, Entry = 1/3

- $V_{Roof} = 2/3(102.6k) = \boxed{69\ k}$
- $V_{Entry} = 1/3(102.6k) = \boxed{34\ k}$

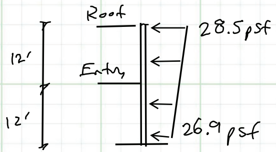


Wind Load Calculation (ASCE 7-16 27.4-1)

- SITE: Berkeley, California
- Occupancy: Residential ⇒ Risk Category II
- Basic Wind Speed = 95 mi/h
- Exposure Category: C
- K_{zt} = 1.0 (assumed)
- Use 110 mi/h for simplicity



- X-Direction:
  - $\dfrac{L}{B} = \dfrac{50'}{30'} = 1.67$, h = 24'
  - p_h = 24.6 psf
  - p_o = 22.9 psf



- Y-Direction:
  - $\dfrac{L}{B} = \dfrac{30'}{50'} = 0.6$, h = 24'
  - p_h = 28.5 psf
  - p_o = 26.9 psf

Wind Diaphragm Forces

- X-Direction:
  - F_{roof} = 24.6 psf (6')(30') = 4.4k
  - F_{entry} = 22.9 psf (12')(30') = 8.2k
- Y-Direction
  - F_{roof} = 28.5 psf (6')(50') = 8.6k
  - F_{entry} = 27.7 psf (12')(50') = 16.6k

Wind Base Shear

$V_{wind} = F_{roof} + F_{entry}$

$V_{wind,y} = \boxed{12.6\ k}$

$V_{wind,x} = \boxed{25.2\ k}$

DEFLECTION SUMMARY:

X-DIRECTION:

- ROOF LEVEL: 0.04"
- ENTRY LEVEL: 0"

Y-DIRECTION:

- ROOF LEVEL: 0.08"
- ENTRY LEVEL: 0"