

VDL Penthouse  
by Dion & Richard Neutra

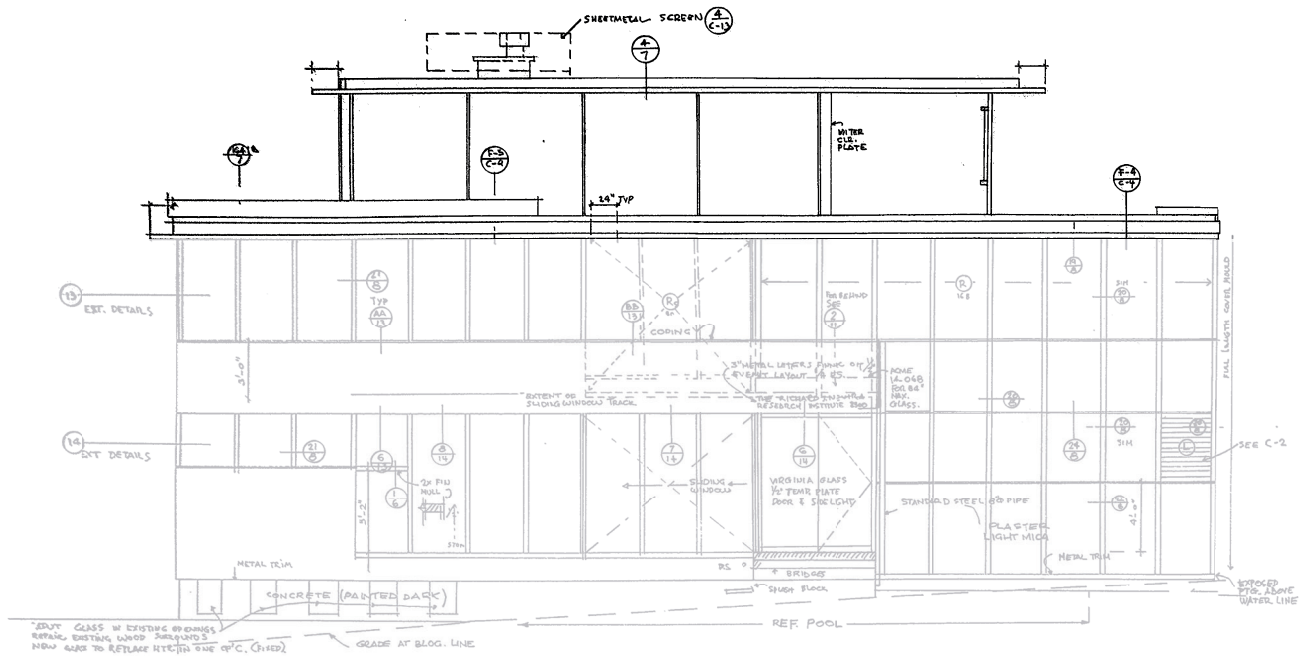
**kettal**

# VDL Penthouse

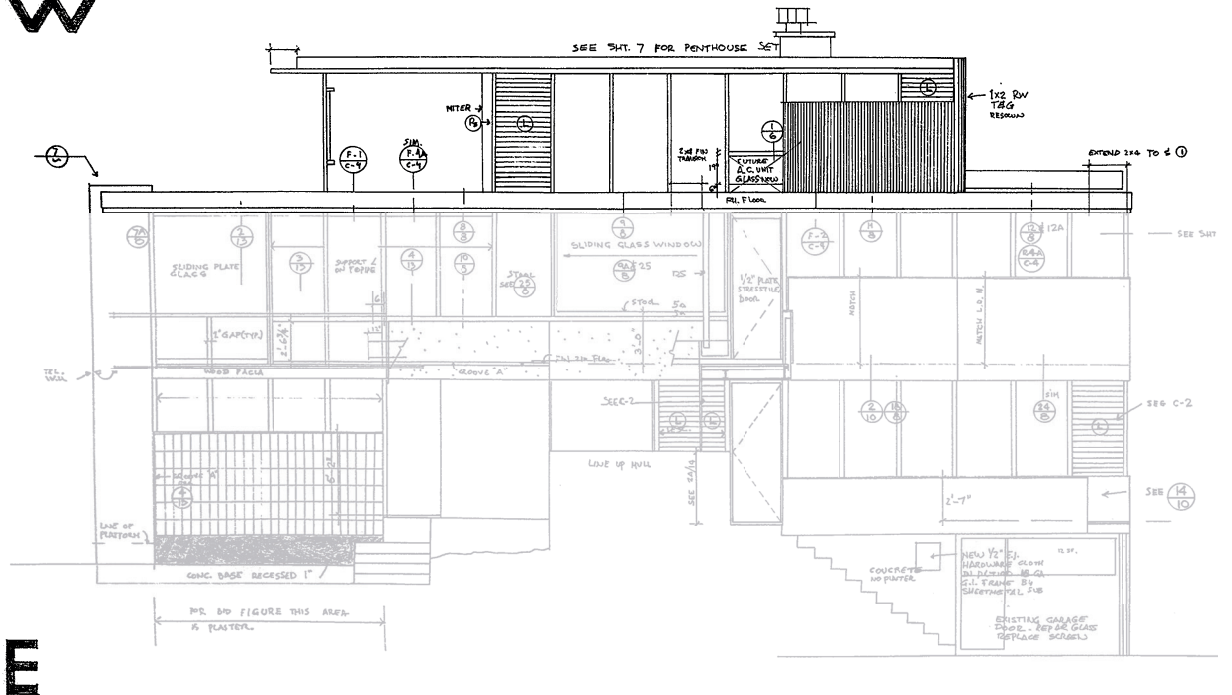
Designers  
Dion & Richard Neutra

Collection  
VDL

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**W**



**E**

# VDL Penthouse

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Designed by Dion and Richard Neutra

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Kettal has replicated the design by Dion and Richard Neutra, while updating the materials and construction techniques. All the structural details, as defined by its creators, have been adhered to.

“This house – in its free relation to the ground, the trees, the sea – with constant proximity to the whole vast order of nature, acts as a re-orientator and ‘shock absorber’ and should provide the needed relaxations from the complications arising from daily problems.”

The most outstanding morphological traits are:

1 > Predominantly horizontal lines, emphasised by the wooden strips running across the structure, protruding 500 mm at the ends. Richard Neutra himself referred to them in various texts, as:

“Traditional Japanese architecture is horizontal; space is exclusively horizontal. Without a defined centre or axis, it extends as an aggregate of rooms of equal value, none of which is complete except in relation to the others. The space is flexible and transferable, without a fixed function. The use of the rooms varies over the course of the day and throughout the year.”

2 > The columns are set back 100 mm to give full prominence to the roof. In addition, the columns are understated and the roof is slightly oversized. In spite of its formal strength, to some extent it seems as if the roof is floating lightly over the shell of the house.

3 > The characteristic chimney on the roof has been maintained, which houses the light sensors, air-conditioning unit and a small weather station. The technology used by the architect in this project is still quite astonishing even today, evidenced by the complex electrical installation, the special lighting systems, the telephone installation, the projectors, the electric stoves, the radio, the signage system and the temperature control device. This whole technological deployment has been updated with the development of a specific smart system to control everything in the house: air-conditioning, central heating, lighting, etc.

4 > The trellis structure continues beyond the roof to create an open space that can be used for different activities, while at the same time, accentuating the horizontal nature of the building.

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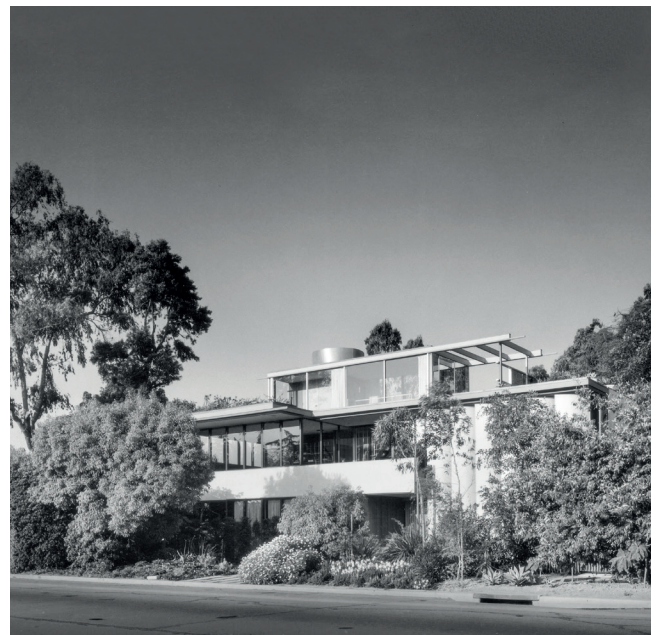
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## VDL Research House history

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In 1932, Richard Neutra built his house thanks to a donation from the Dutch philanthropist Dr Van Der Leeuw (hence the acronym VDL). This house is a particularly important example of Richard Neutra's work because it encapsulates all the architectural theories that he first posited in his book *Wie Baut amerika?*, 1927 and later on in his more philosophical reflections *Survival Through Design*, 1953. Seven years later, when the family had grown, he built an annex in the garden. In 1963, the house was devastated by fire, leaving only the annex standing. At that time, Richard Neutra and his son and colleague Dion Neutra rebuilt the house and added a solarium/atrium on top of the original structure. He incorporated everything he had learned over the years in this reconstruction: modularity, natural climate control, water roofs, interaction with the natural environment, technological advances, etc.



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Apart from being his home, the VDL Research House was also his office. In this building, over 30 years, he designed hundreds of international projects. Some of the most representative architects from the Modern American movement also spent time in his practice as apprentices. The house was also a meeting point for the cultural milieu of those times, with visitors such as Julius Shulman, Frank Lloyd Wright, Alvar Aalto, Charles and Ray Eames, Jørn Utzon and László Moholy-Nagy. In 1990, on the death of Dione Neutra, Richard Neutra's wife and Dion's mother, the house was donated to the California State Polytechnic University, Pomona.

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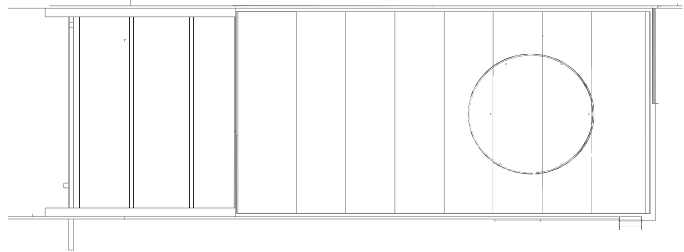
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m/ft

4,5/14,7

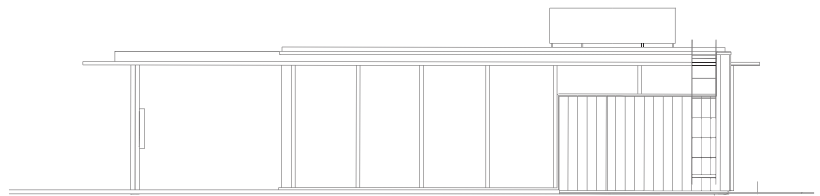


m/ft

4/13,1

10/32,8

2,8/9,18



Kettal Structures seek to bring order, form and structure to outdoor areas, although functionally they are designed to provide shelter: to shade and cool or protect from the rain and wind.

VDL Penthouse is a rectangular building of 63m<sup>2</sup> of which 45m<sup>2</sup> are covered and 18m<sup>2</sup> of terrace, exterior dimensions 14x4.5x2.8m.



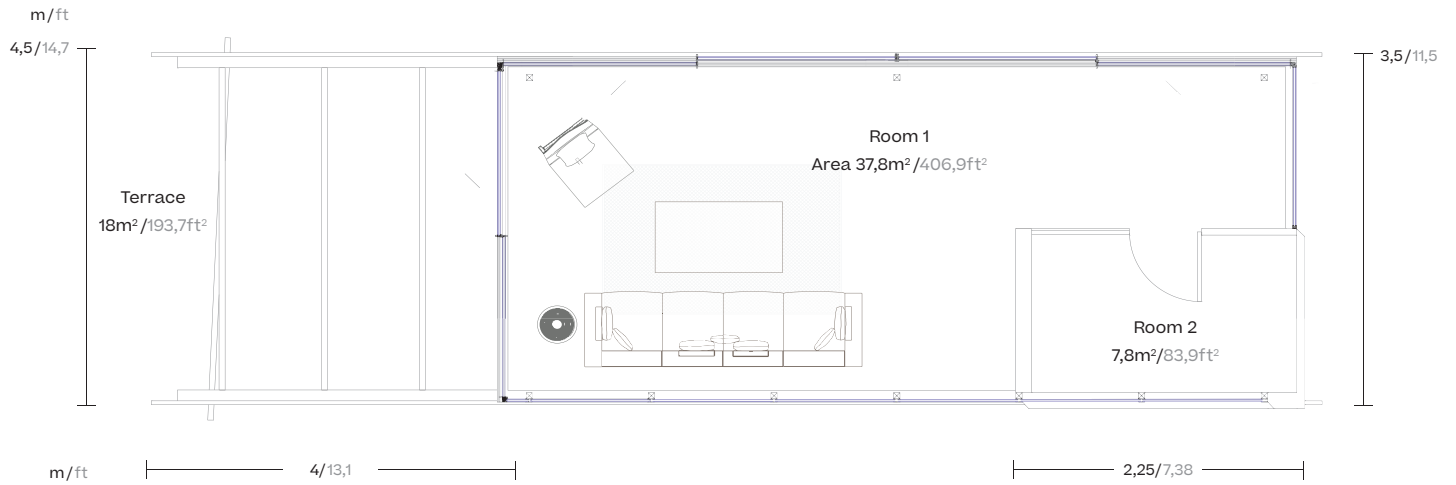
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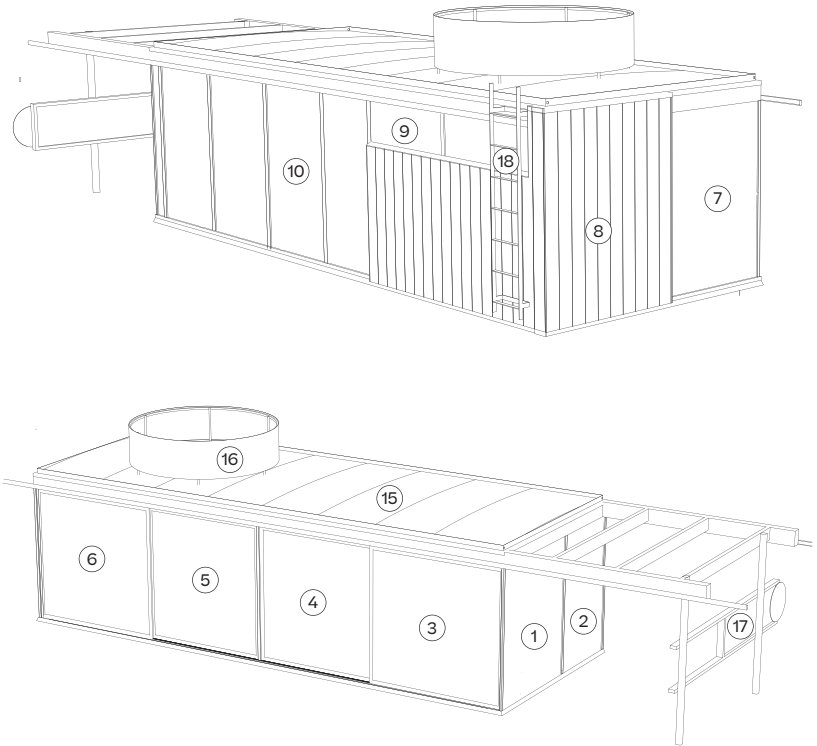
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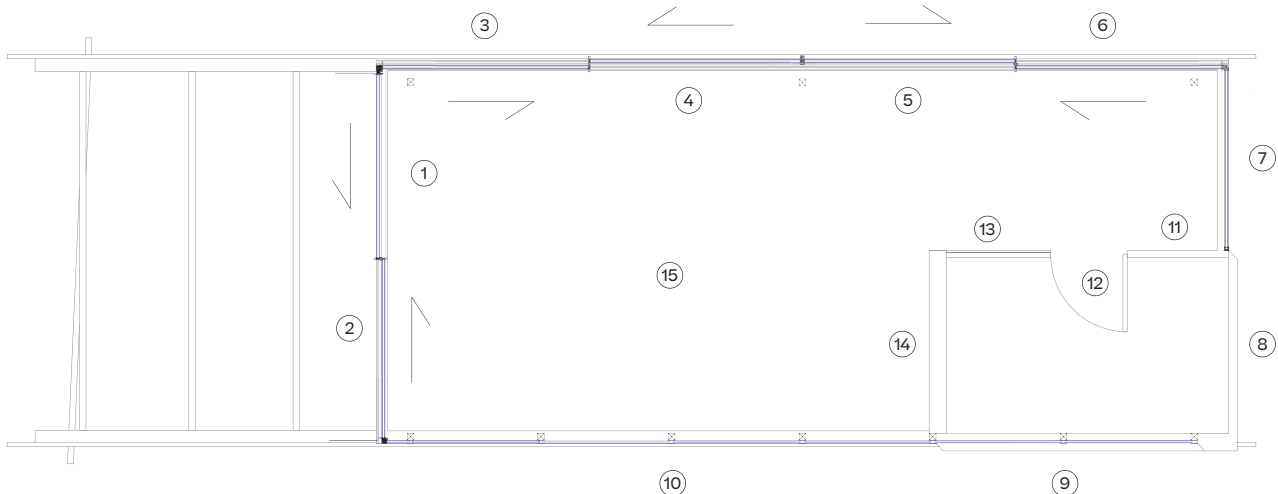
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1. Sliding glass door (2400x2270mm/94,5x89,4in) built with aluminum profiles and 8+8mm tempered glass with 20mm chamber.
2. Sliding glass door (2400x2175mm/94,5x85,6in) built with aluminum profiles and 8+8mm tempered glass with 20mm chamber.
3. Sliding glass door (2400x2500mm/94,5x98,4in) built with aluminum profiles and 8+8mm tempered glass with 20mm chamber.
4. Sliding glass door (2400x2500mm/94,5x98,4in) built with aluminum profiles and 8+8mm tempered glass with 20mm chamber.
5. Sliding glass door (2400x2500mm/94,5x98,4in) built with aluminum profiles and 8+8mm tempered glass with 20mm chamber.
6. Sliding glass door (2400x2500mm/94,5x98,4in) built with aluminum profiles and 8+8mm (0,31+0,31in) tempered glass with 20mm (0,78in) chamber.
7. Fixed glass panel size (2400x2130mm/94,5x83,8in) built with aluminium profiles and 8+8mm (0,31+0,31in) tempered glass with 20mm (0,78in) chamber.
8. Wall system designed by Kettal, with a high degree of thermal insulation built with 200mm (7,87in) wide profiles and aluminum EN AW 6005A T6 and can be attached Cedar wood slats.
9. Windows with tow slidings glass doors
10. Curtain wall glazing with five glass panels, fourth to 2400x1530mm (94,5x60x2in) and one to 2400x340mm (94,5x13,4in) , all panels with 8+8 mm (0,31+0,31in) tempered glass and 20mm (0,78in) chamber.
11. Natural oak imitation melamine panel partition (2400x1140mm/94,5x44,9in).
12. Natural oak imitation melamine panel door (2400x900mm/94,5x35,4in).



13. Mirror panel 2400x1425mm/94,5x56,1in.
14. Natural oak imitation melamine panel 2400x2230mm/94,5x87,8in with space for air outlet and some facilities.
15. The roof is formed by a 30mm (1,18in) thick aluminum sandwich panel supported by structural belts.
16. Circular aluminum structure of 2000mm (78,7in) diameter and 550mm (21,6in) high, its function is to hide the service machinery.
17. Parasol structure in the shape of a flag, iconic piece of richard neutra's vdl, built in aluminum and 8mm (0,31in) tempered glass.
18. Aluminium ladder for one-person walkable roof access



Door opening described with arrows



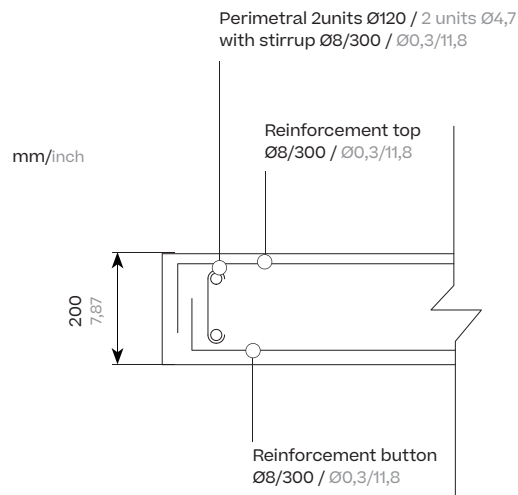
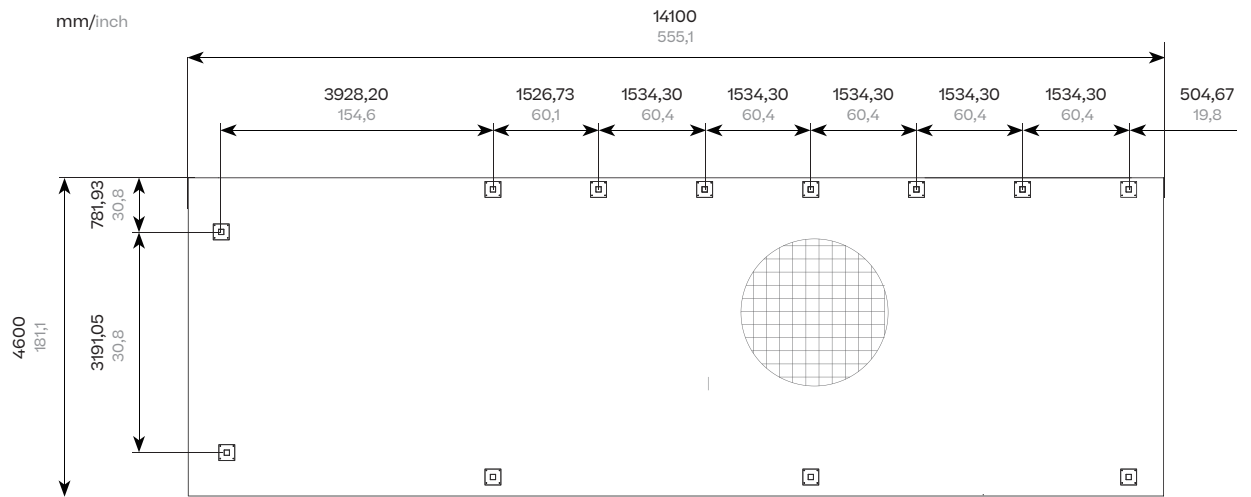
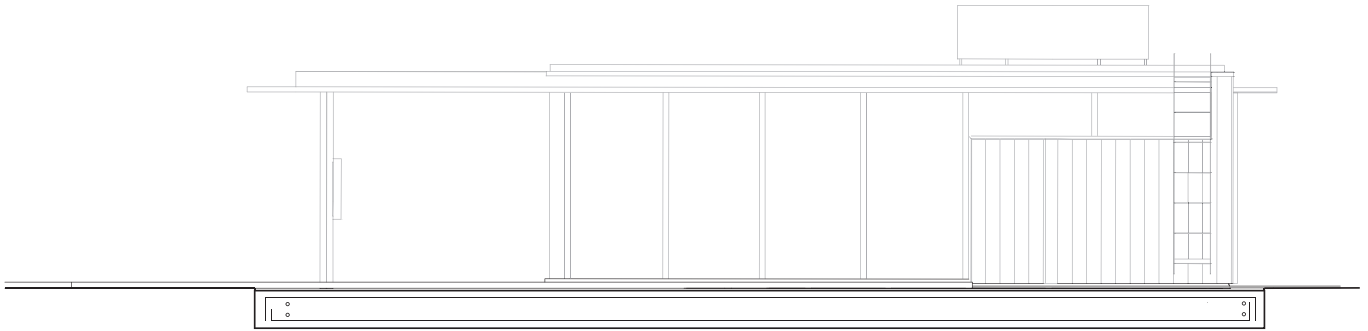
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## Slab Foundation



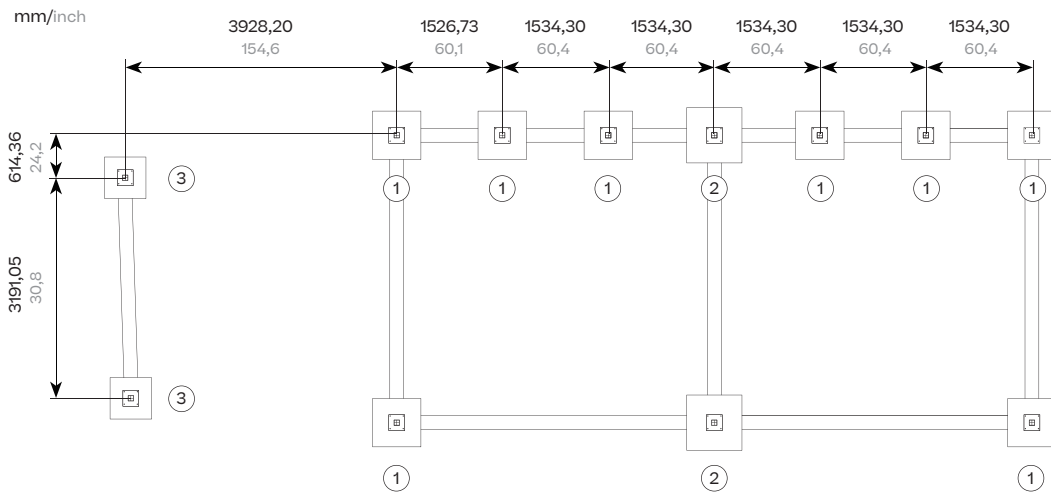
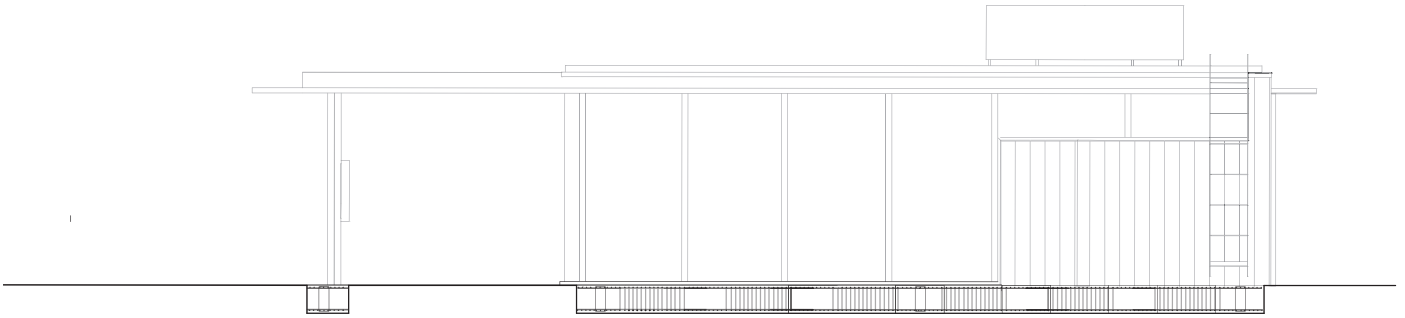
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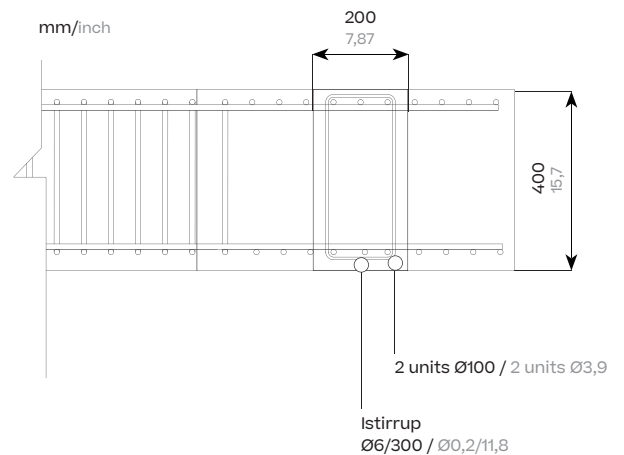
## Isolated footing



Footing	Dimensions (m/ft)	High (m/ft)	Bottom footing reinforcement (mm/in)
1	0,70 x 0,70 / 2,29 x 2,29	0,40 / 1,3	Ø12/200 / Ø0,5/7,8
2	0,80 x 0,80 / 2,62 x 2,62	0,40 / 1,3	Ø12/200 / Ø0,5/7,8
3	0,60 x 0,60 / 1,96 x 1,96	0,40 / 1,3	Ø12/200 / Ø0,5/7,8

Concrete	Type	$f_c=250\text{kg/cm}^3$ $f_c= 9031.8 \text{ lb/in}^3$
	0,70 x 0,70 / 2,29 x 2,29	0,40 / 1,3



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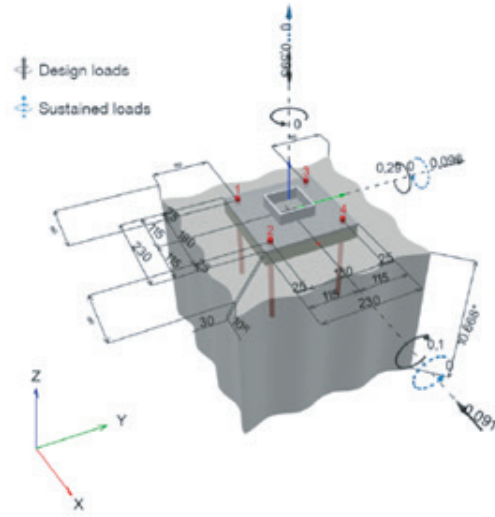
## Isolated fixation

In order to conduct a structural study with the worst conditions and combinations, the following combined loads have been taken into account:

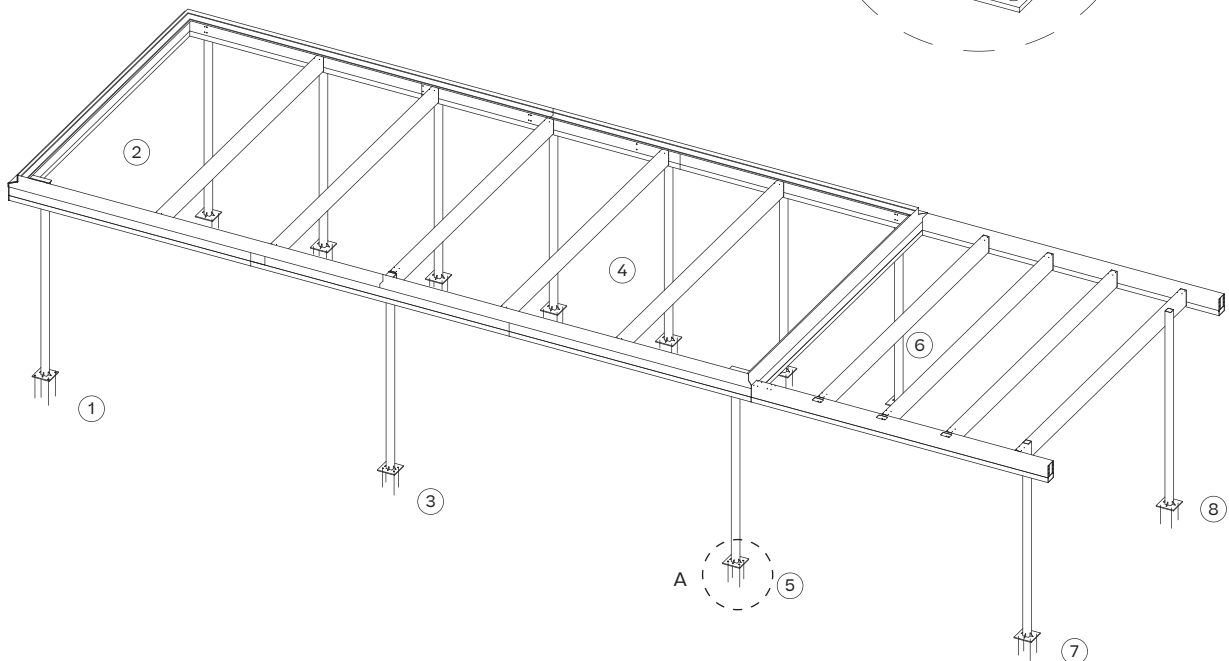
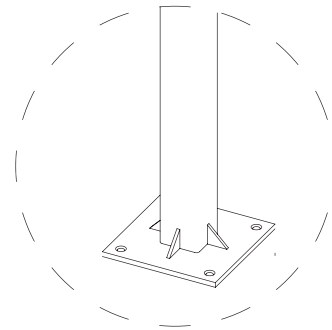
- Loads of structural profiles
- Loads of walls/side panels
- Wind Maximum wind speed in Europe according to Eurocode ENV 1991-1-4 = 25m/s = 78,7ft/s
- Snow Because the pavilion has been exposed to the outdoors, the snow load has been taken into account, assuming a generic value of 1.5kN/m<sup>2</sup> = 150Kg/m<sup>2</sup> = 3559,5lb/ft<sup>2</sup>

Maximum wind speed around 90-120km  
(55,9-74,5mi)

Maximum snow load around 150-220kg/m<sup>2</sup>  
(3559,5-5220.6lb/ft<sup>2</sup>)



Detail A



## Deformed and isovalues

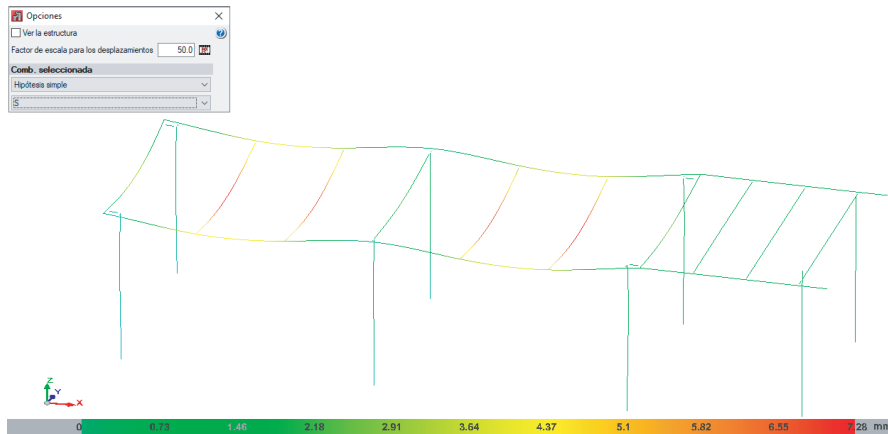


Fig. 1. Deformed and isovalues for snow load (scale x50).

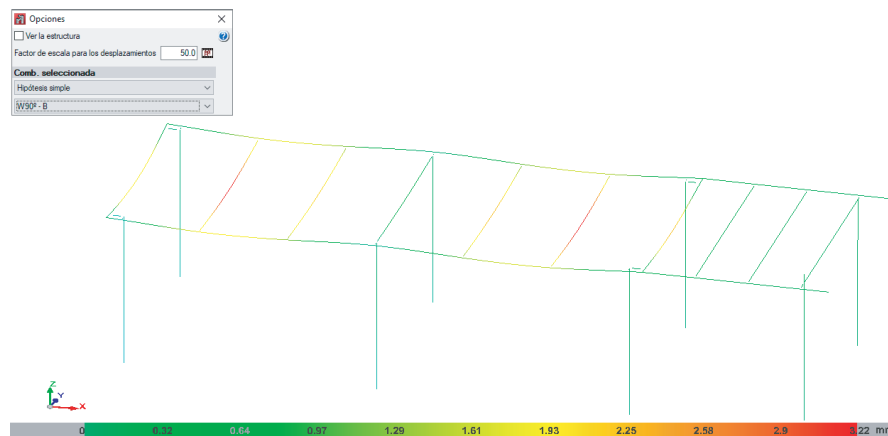


Fig. 2. Deformed and isovalues for wind 90° - B (scale x50).

## Isolated fixation study · Input data

Anchor type and diameter	HIT-HY 200 + HAS-V-36 (ASTM F1554 Gr.36) 1/2
Item number	not available (element) 2022793 HIT-HY 200R (adhesive)
Effective embedment depth	$h_{ef,opti} = 179,9\text{mm}$ $h_{ef,limit} = 254,0\text{mm}$
Material	ASTM A 1554 Grade 36
Evaluation Service Report	ESR-3187
Issued I Valid	01/04/2019 · 01/03/2020
Proof	Design Method ACI 318-14 / Chem
Stand-off installation	Without clamping (anchor); restraint level (anchor plate) 2; eb = 30 mm; t = 10 mm
Anchor plate	Hiliti Grout CB-G EG epoxy $f_{c,Grout} = 103,00\text{ N/mm}^2$ $l_x \times l_y \times t = 230\text{ mm} \times 230\text{ mm} \times 10\text{ mm}$ ; (Recommended plate thickness: not calculated)
Profile	Square HSS (AISC), HSS3-1/2X3-1/2X, 1875; (L x W x T) = 88,9 mm x 88,9 mm x 4,8 mm
Base material	Cracked concrete, 2500, $f_c' = 2,500\text{ psi}$ ; h = 19,668 mm, Temp. short/long: 0,0 °C
Installation	Hammer drilled hole, Installation condition: Dry
Reinforcement	Tension: condition B, shear: condition B; no supplemental splitting reinforcement present Edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E or F)	Tension load: yes (17,2,3,4,3 (a)) Shear load: yes (17,2,3,5,3 (a))

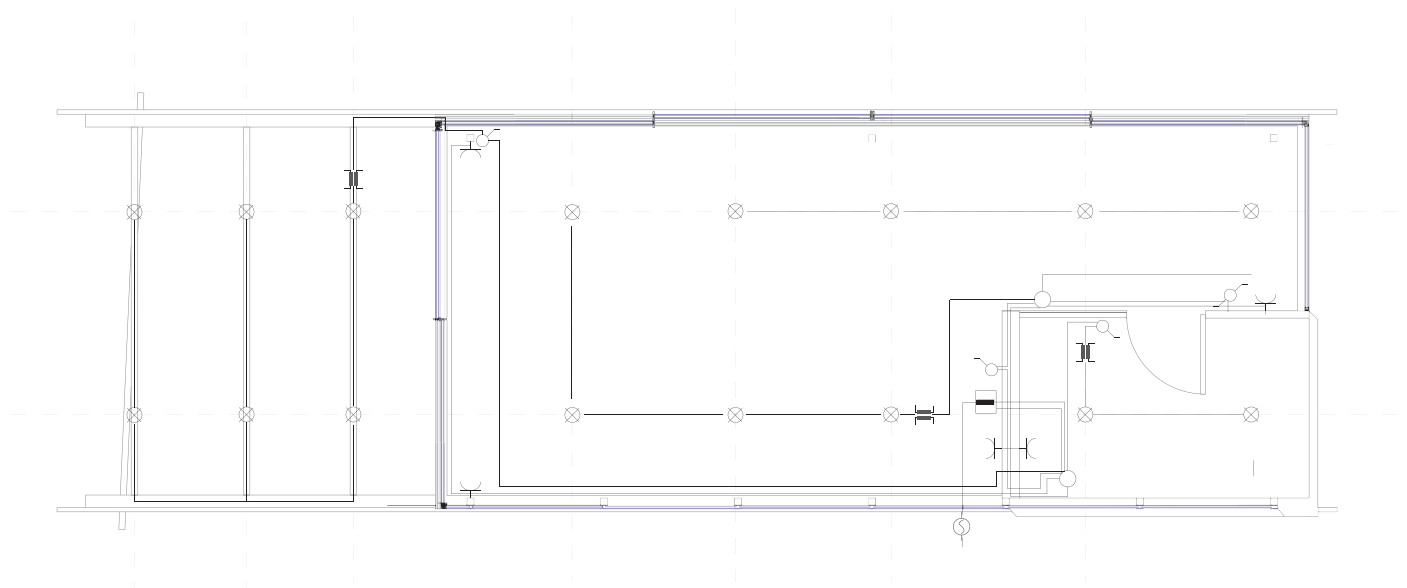
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## Electric system



- ⊗ Spotlight
- ⌋ Plug
- ⊕ Switch
- ⊖ Switch
- ▬ Driver
- ▬ Protection chart
- ⊖ Direct electric current