

HONEY EXPORTER

By: DX Arquitectos + DEL SANTE Arquitectos

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Content

Overview

Material and Components

Structural System

Load Transfer

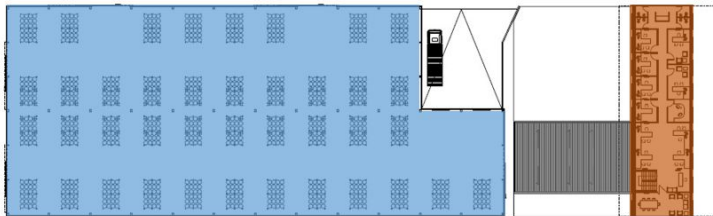
Foundation System

Soil Analysis

Static Analysis

Overview

- Location: Santiago Metropolitan Region, Chile
- Project year: 2008 - 2009
- Construction year: 2009 - 2011
- Land Area: 12,475 m²
- Built Area: 2,037 m²
- Located adjacent to the Warehouse



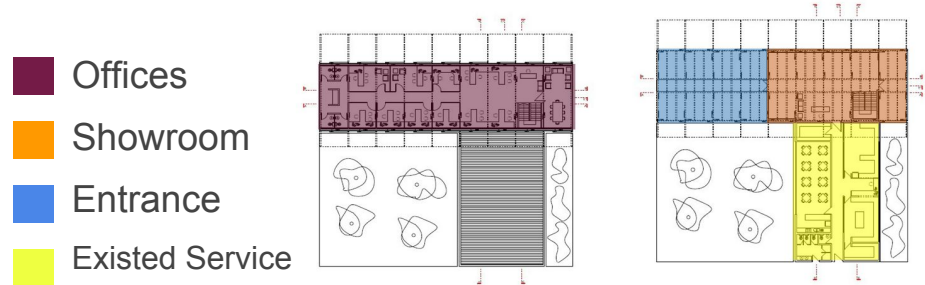
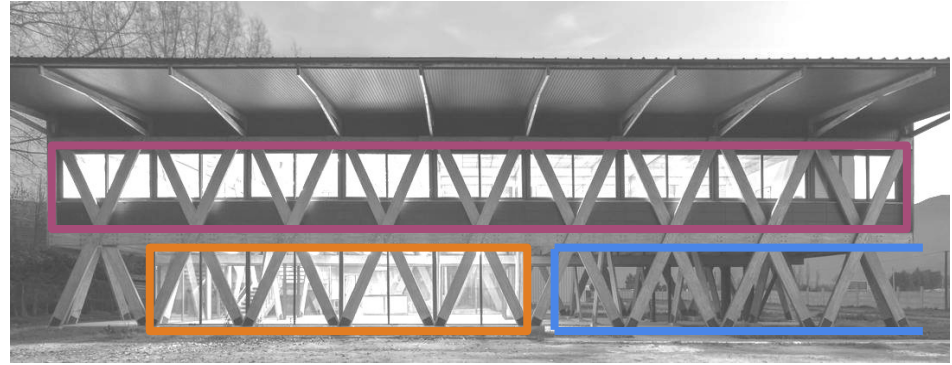
Warehouse

Office building



Overview

- This building is designed as an office building and adjacent showroom for a warehouse in Chile.
- Traditional wood aesthetic
- The expression of building is defined primarily by its structure. The enclosing elements, windows and walls, remain behind the structure, leaving it exposed.
- The main office program raises a floor to catch the distant views, generating access to the building and the program corresponding to the show room of the company on the first floor.



Materials

- Structural Material
 - Prefabricated Structure
 - laminated pine wood
 - Beam
 - X-braces
 - Roof trusses
 - Bolt, screw and nail, connections
 - Steel columns and beams
 - Concrete Foundation + Piers

Precast reinforced concrete pier with post attached above grade



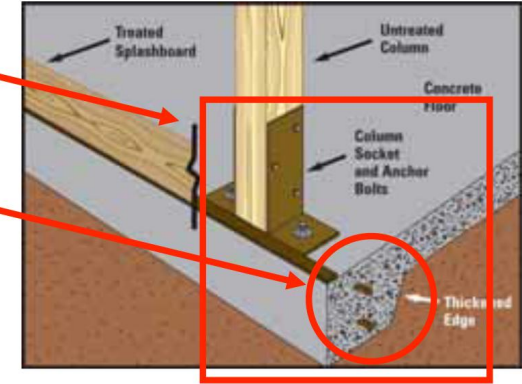
Materials

- Wood features
 - Embedded wood post or concrete piers serve as building foundation
 - Attached wall and roof sheathing/cladding form structural shear wall/structural diaphragm system for lateral loads

Schematic of typical connection details

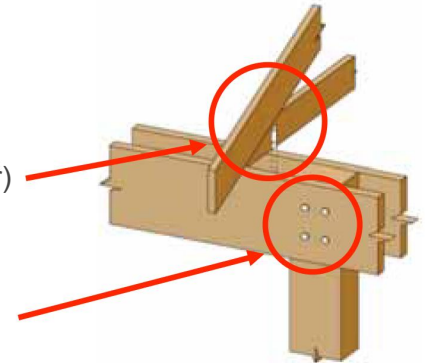
Post set on thickened edge of a concrete floor slab

Thickened portion of slab reinforced



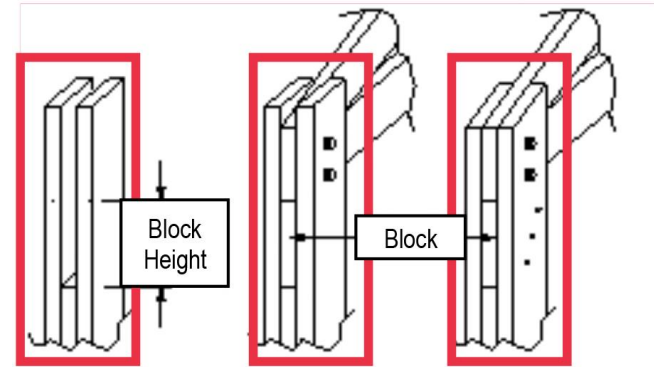
Truss to header (girder)

Header (girder) to X-brace



Materials

- Wood features
 - Embedded wood post or concrete piers serve as building foundation
 - Attached wall and roof sheathing/cladding form structural shear wall/structural diaphragm system for lateral loads



nail-laminated post-to-truss connection

Pinned Connection

Materials

- Non-structural Material
 - PVC Sliding Windows
 - Fiberglass Insulation
 - Metallic partition wall with plaster cladding
 - Floor Metal Deck



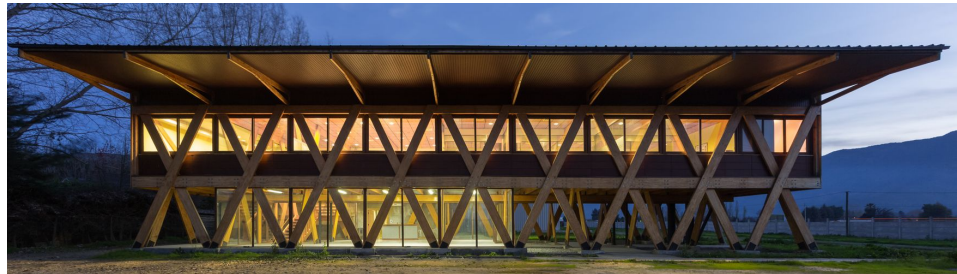
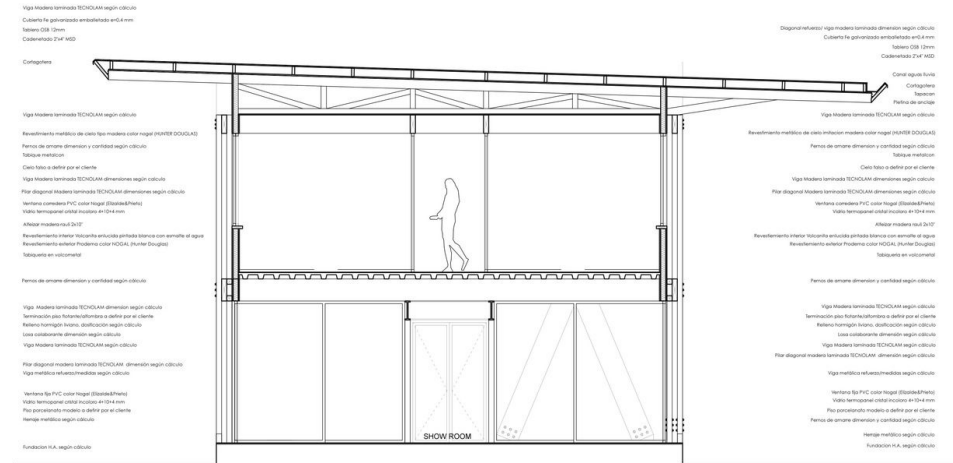
Component

- Overhanging roof for protecting roof and interior part from sun light
- Two open façade (North & South)
 - structural wooden X-brace
 - Windows
- Two blind façade (East and West)
 - with vertical wood stripe panel



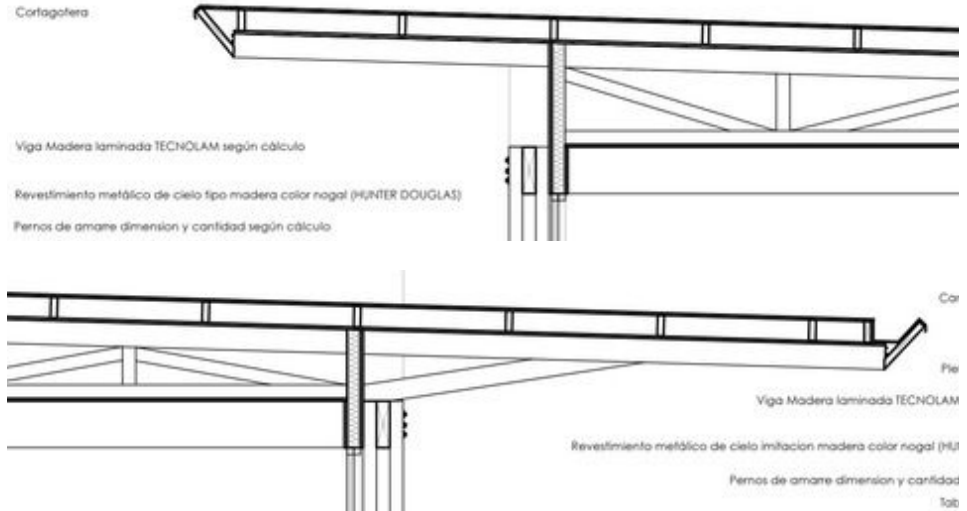
Structural System

- Glulam timber construction
- Form
 - X-form diagonal brace - diagrid
 - Horizontal beams
- Structure expresses form
 - Envelope behind structure
 - Second level elevated - views + open space
- Structural Design Concerns
 - Seismic + wind
 - Wood - ductile
 - Pinned connections



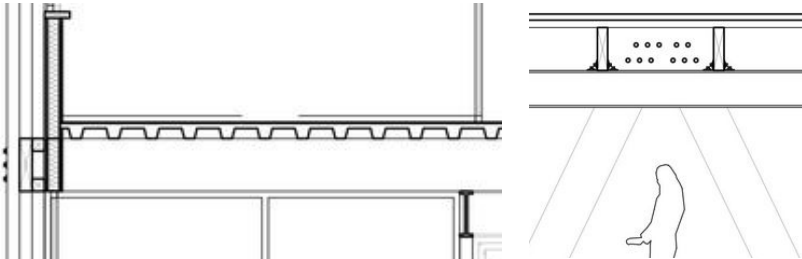
Structural System - Connections - Upper

- Roof decking
 - Cantilevered on upper chord of truss
- Truss
- Transfer beam
- X-brace



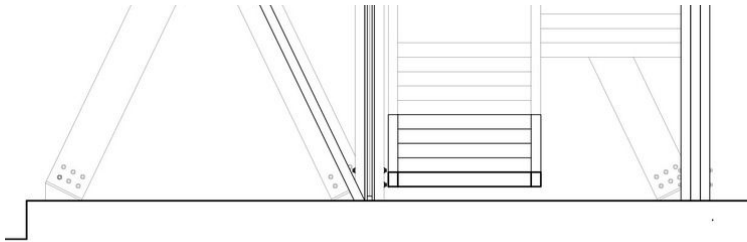
Structural System - Connections - Middle

- X-brace
- Horizontal beams
 - Longitudinal
 - Steel w-section
 - Steel column to ground
 - Decking support
 - Load transfer to both series of x's
- Floor decking
- Lateral bracing
 - X-bracing - both directions
 - Horizontal beams - both directions



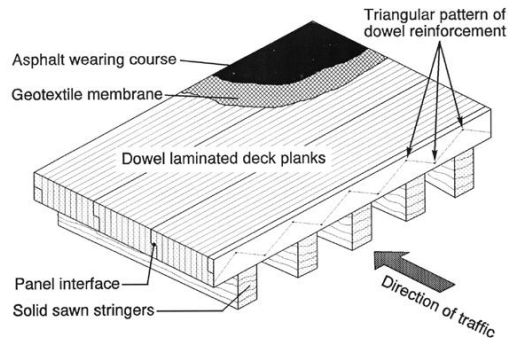
Structural System - Connections - Lower

- X-brace
- Longitudinal beams
- Footings



Loads & Structural System

- light timber framing
 - Useful for light occupancy loads
 - Modest span
 - House similar constructions
 - Load bearing vertical support system
 - Restricted to three or four story height



Deck detail
Reference: google.com



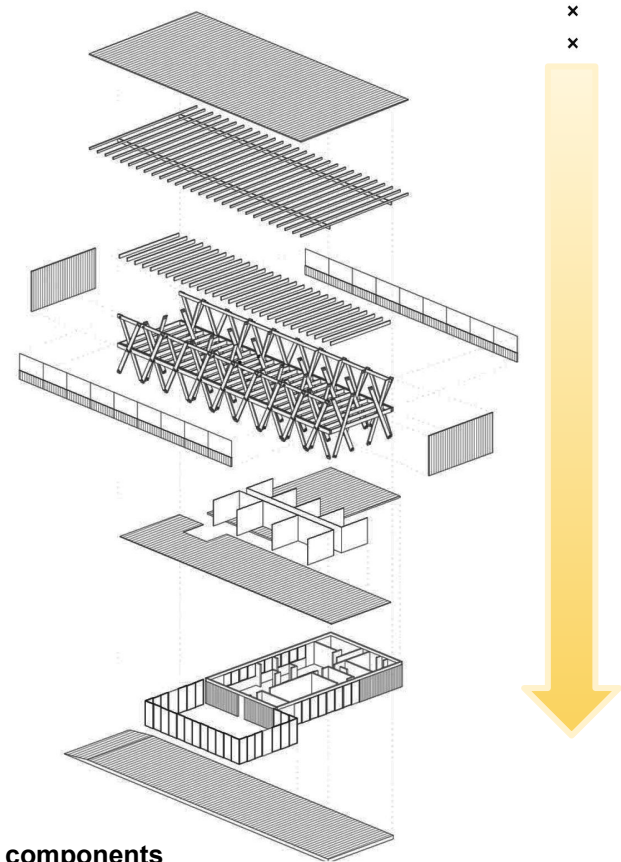
Interior Space timber structure
Reference: <http://archdaily.com>

Description of Loads: LL & DL

- This building includes 535 m² of office space and 2037 m² warehouse on a plot of 12475 m².
 - This volume contains pre-fabricated laminate timber as well as structural steel, glass, floors and wall partitions. These loads are considered as deadloads.

Roof DL=14.0 psf

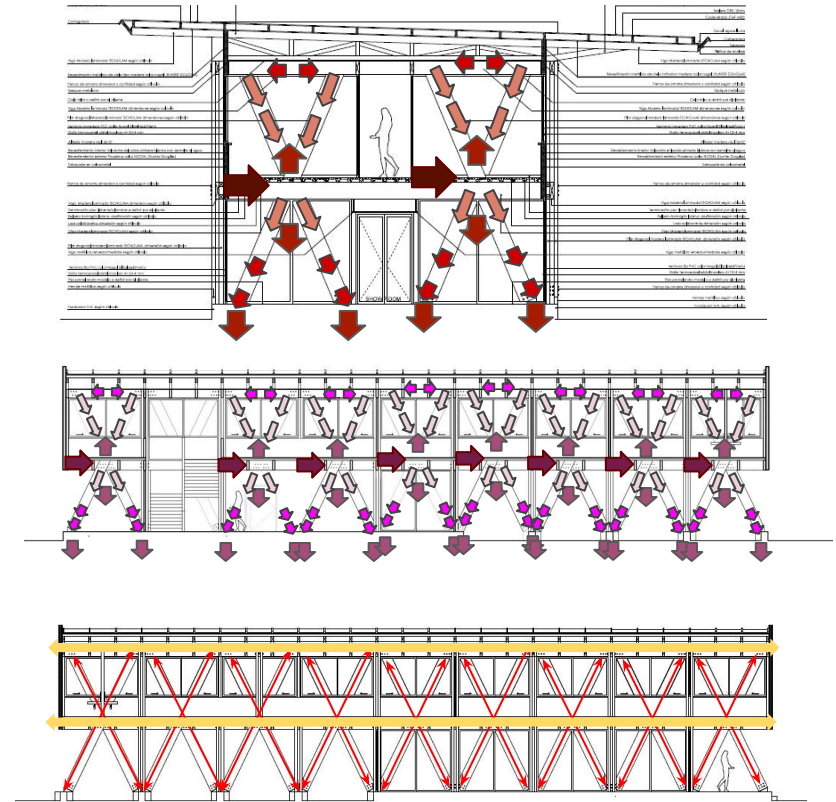
- The weight of live objects and movable parts such as furniture, wind load and seismic load (lateral loads which we will discuss it in our report) are considered live load.



Dead Loads components
Reference: <http://arqa.com>

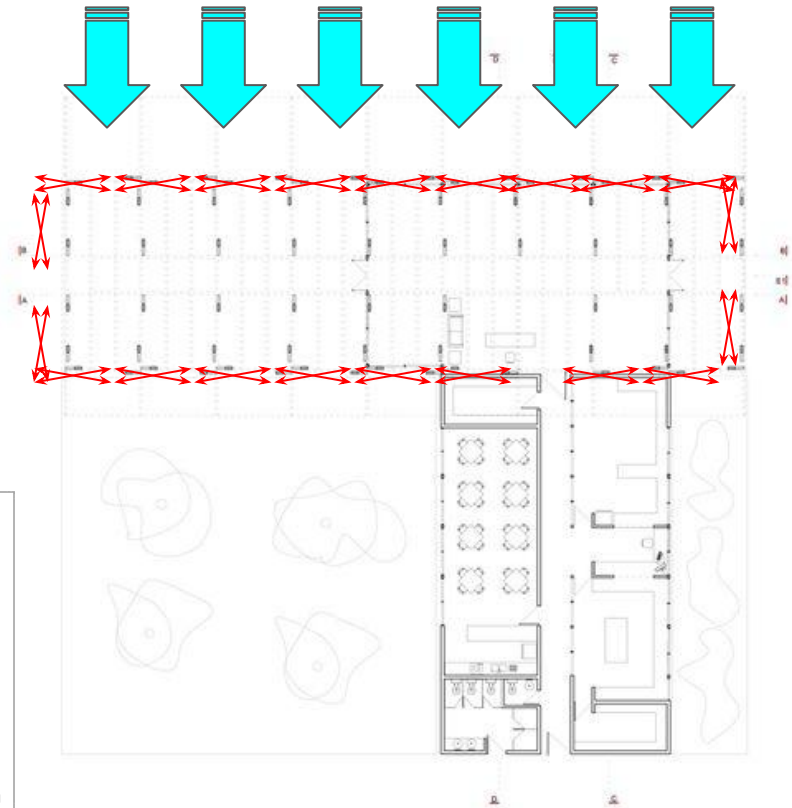
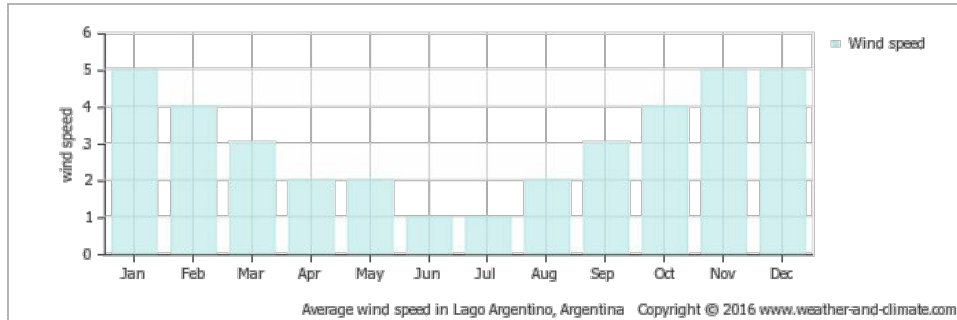
Description of Loads: Seismic Load

Regional Seismicity : The entire length of the Chile lies along a major subduction zone constituting the southwest rim of the Pacific Ring of Fire.



Description of Loads: Wind Load

The most important wind is from north and north west side and It makes to structural design for wind load resistance in this direction.



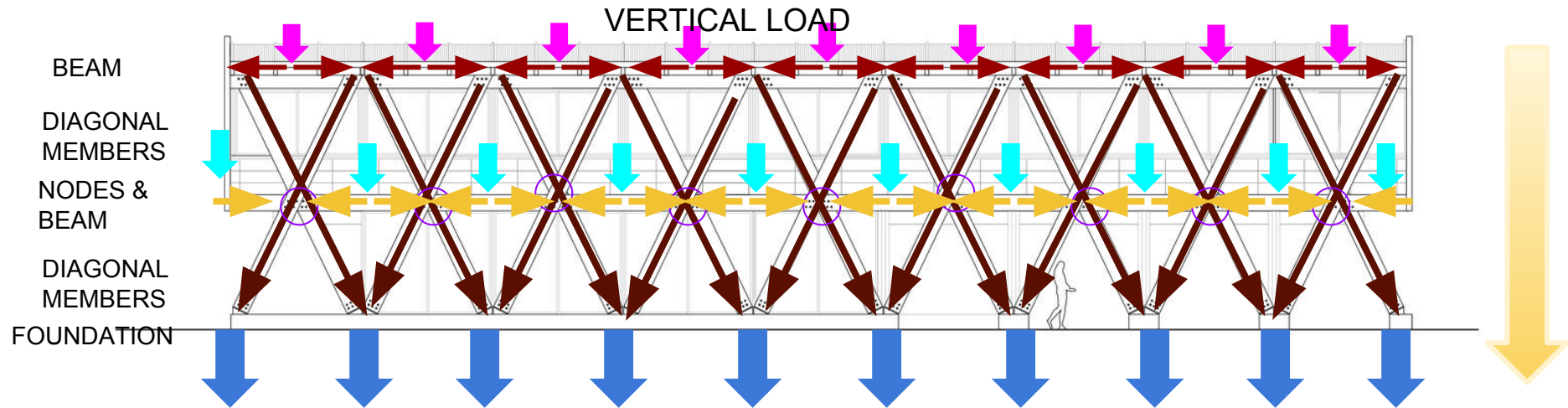
Load Transfer Mechanism

- The building is placed like a strip of 8m deep and 30m long on the east–west axis.
- Diagonal braces in an 'X' form by joining with the horizontal beams assemble the floors and roof. These members convert the whole structure to a vertical triangular structure (truss) which is the most sustain one initially.



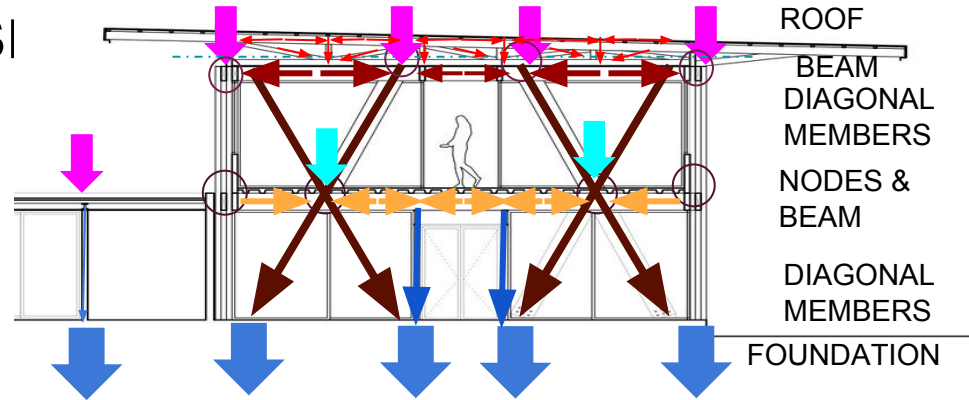
Load Transfer Mechanism

- The building is composed of a vertical wooden / diagonal structure.
- This structure is combined with straight steel / vertical braces and metal beams as reinforcing structural elements.



Load Transfer Mechanism

- Overhanging Roof : protects the wooden structure and deters direct sunlight from entering into the interior office space.

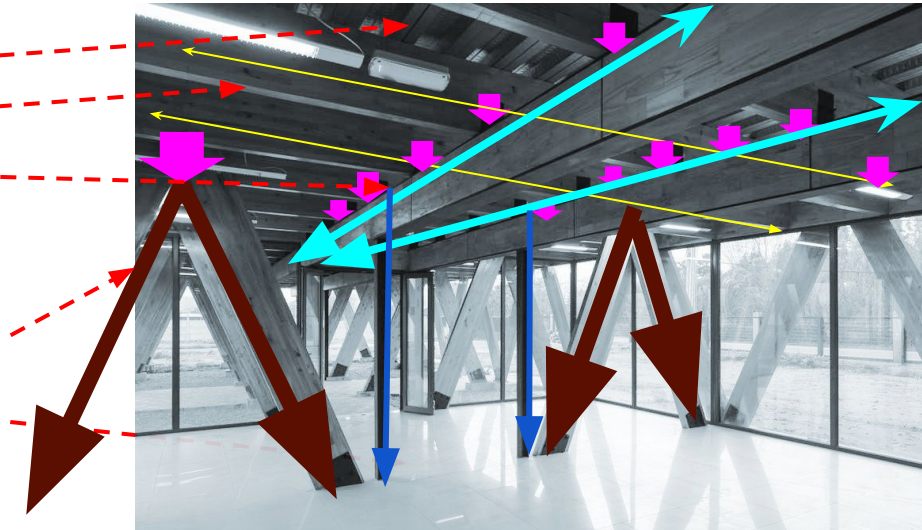


- Beams:

1. Glulam beam
2. Timber wooden Beam
3. Reinforcing metal beam
4. Wooden Roof Truss

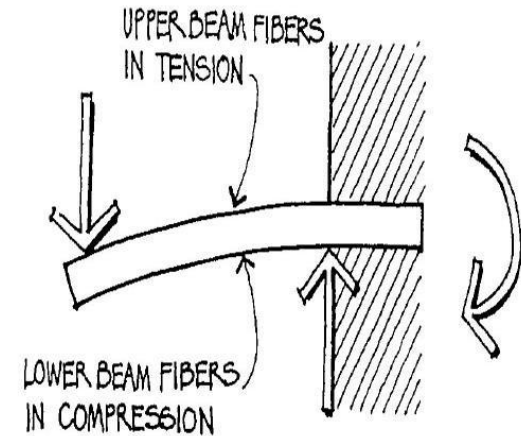
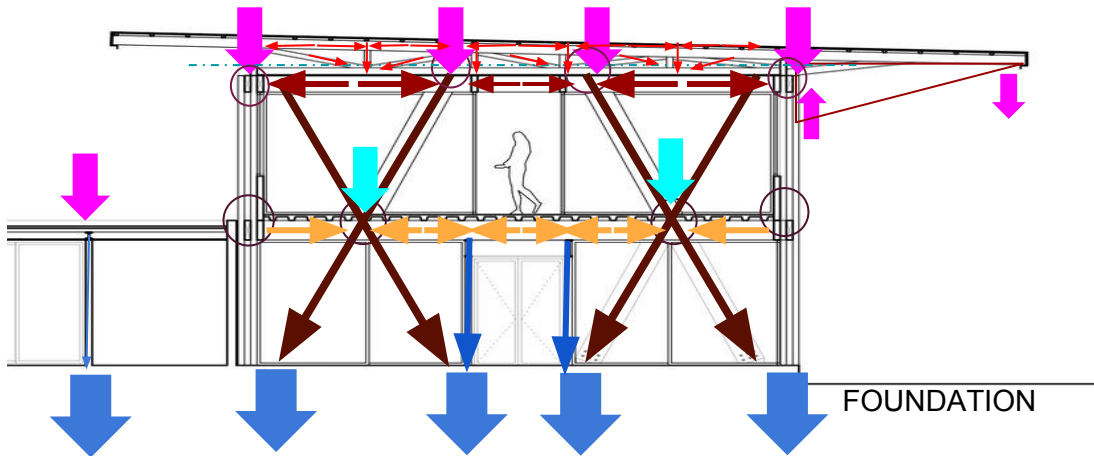
- X-Brace

1. Glulam 115x418 mm
2. Steel connections

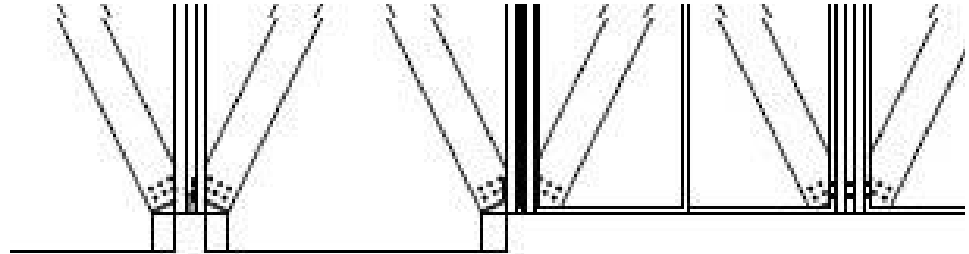
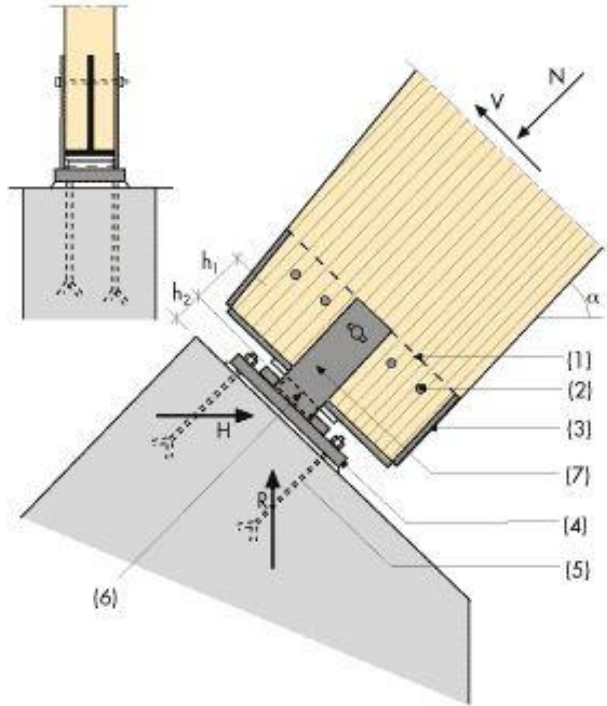


Load Transfer Mechanism

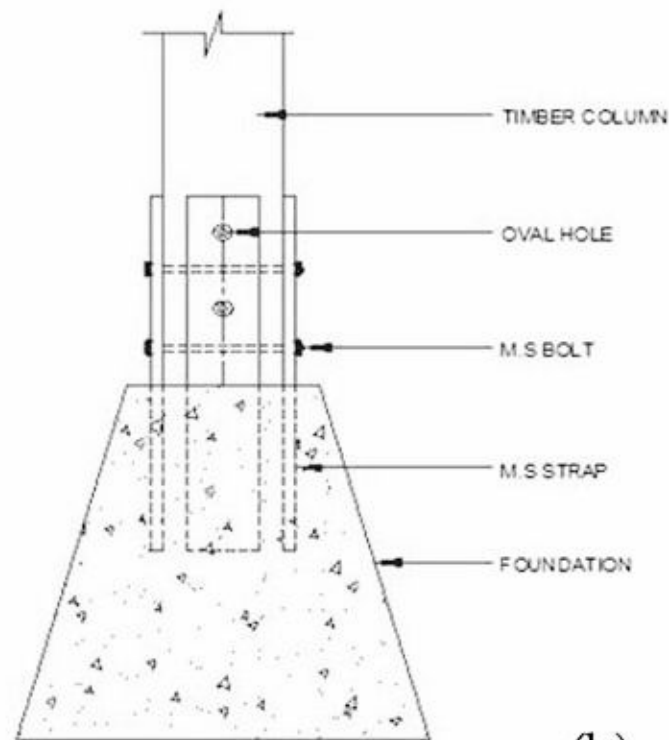
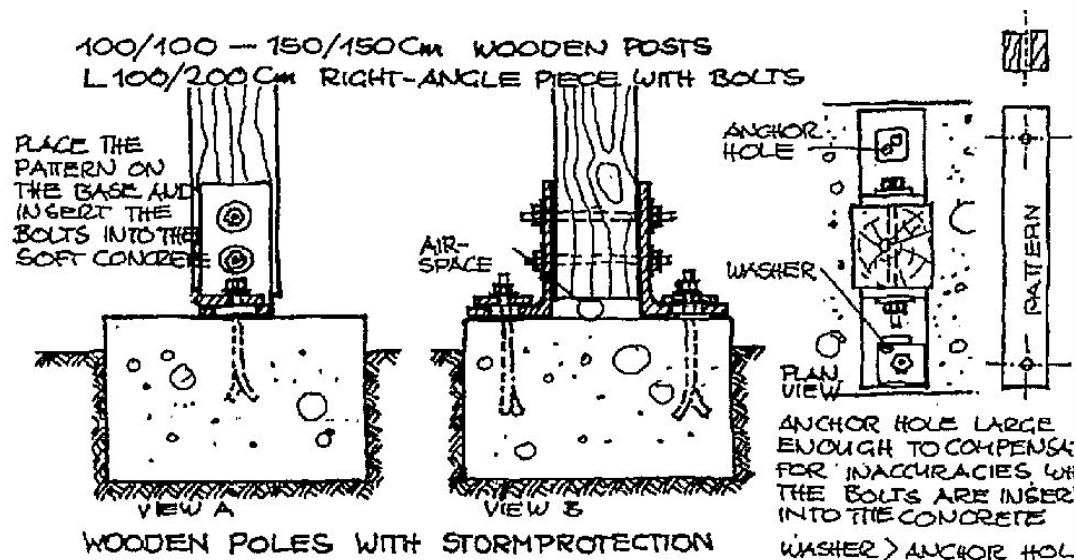
Cantilever



Foundation System



Foundation Footing System



(b)

Soil Analysis

- Soil Type :Mediterranean soils
(They are variously called Terra Rossa -on hard limestone- and Red Mediterranean Soils).
- They are further subdivided at Great Group level on the basis of characteristics (like color, etc.) or diagnostic horizons (like the presence of a hard impermeable layer, etc.).



Figure 1. Extension of Mediterranean soils (adapted from FAO, 1991).

Soil Analysis

- Soil Xerafals are Alfisols, i.e. well developed soils with a clay illuviation (argillic, natric or kandic) horizon, high base saturation, and an epipedon that is both massive and hard when dry.
- They are relatively extensive in Mediterranean regions of the USA, Chile, South Africa and around the Mediterranean Sea.

Multiframe Values

Live Load Office: 55 psf -> 2.633 kN/m²

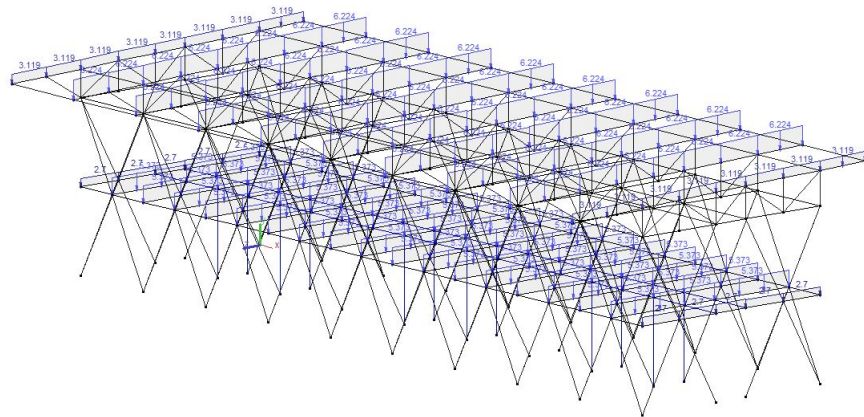
Lightweight Roof Load: 14 psf -> 0.67 kN/m²

Roof Live Load: 20 psf -> 0.957 kN/m²

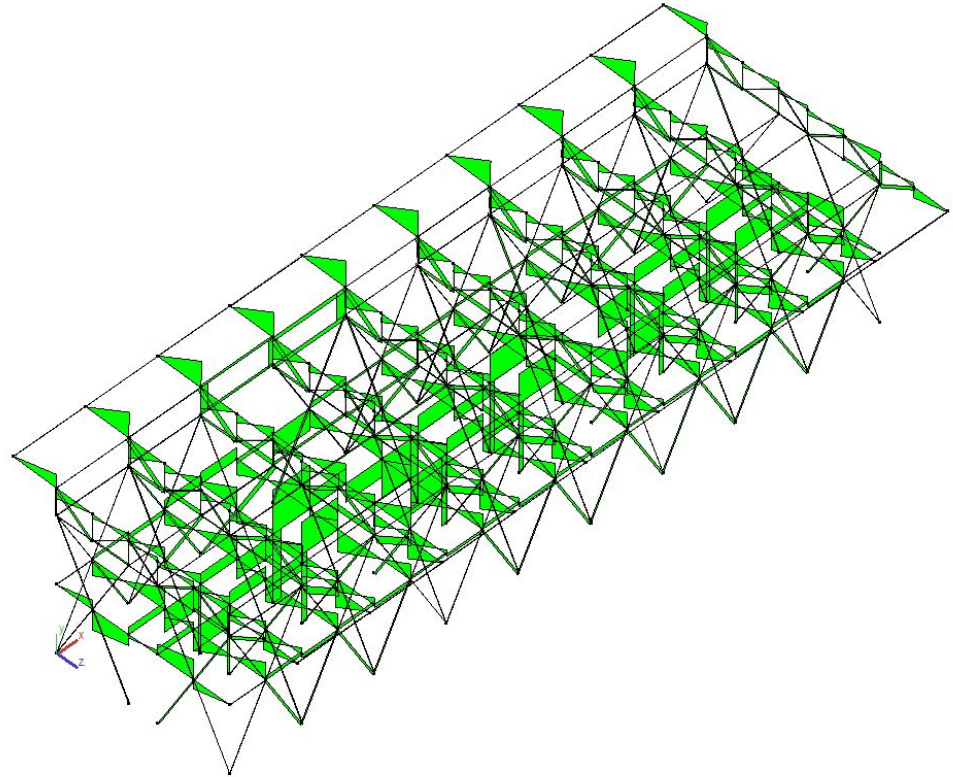
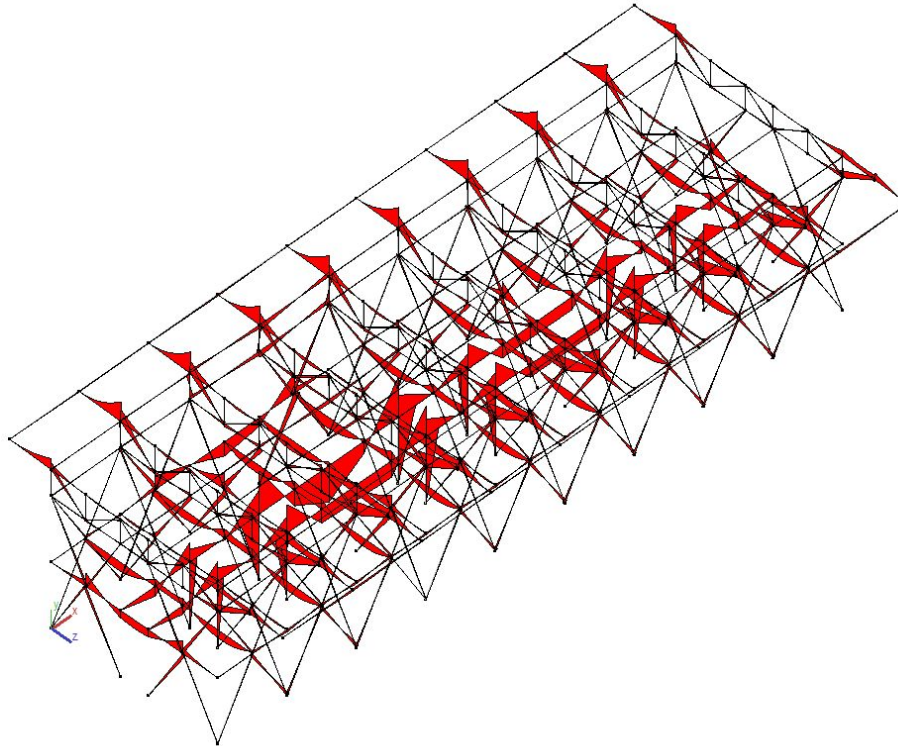
Floor Load 12 psf -> 0.574 kN/m²

Glulam Self-Weight: 0.0298 kN/m

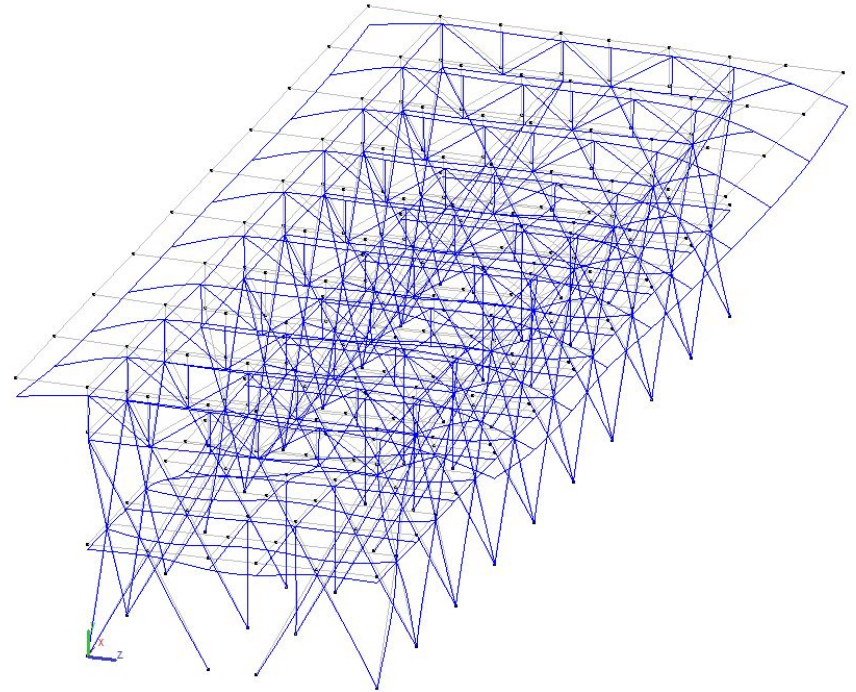
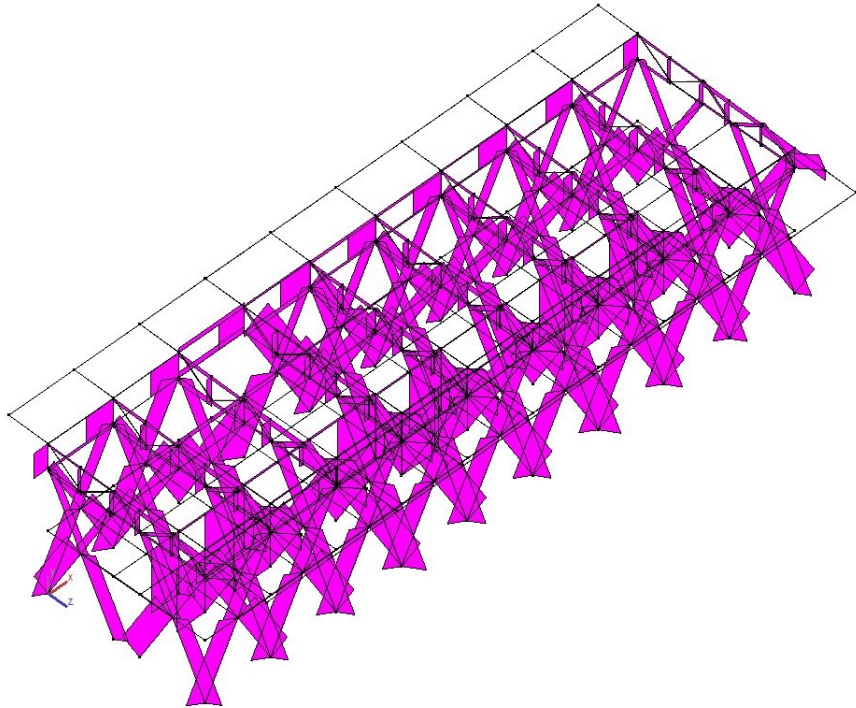
Snow Load: 5 psf -> 0.239 kN/m²



Multiframe Lateral (Bending (kN/M) and Shear (kN))

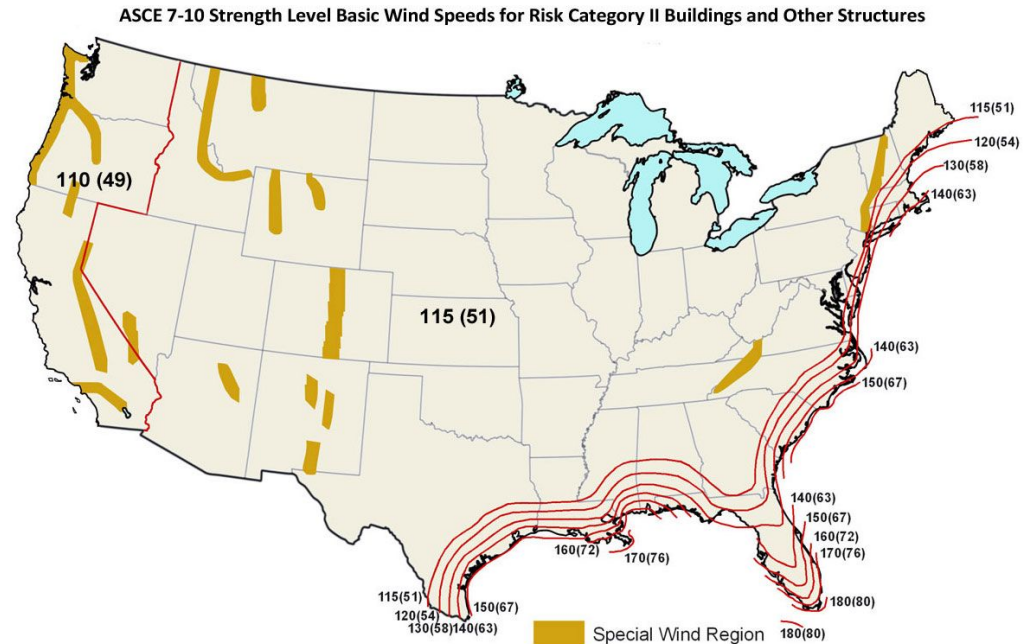
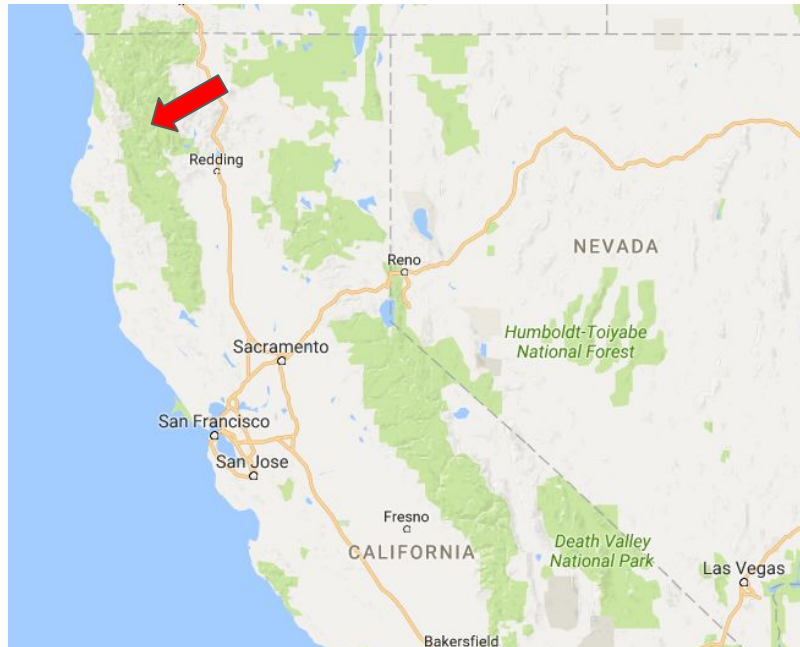


Multiframe (Axial_(kN), Deflection_(in))



Use Winds Loads

- Similar Site Location to Santiago Chile: **Clear Creek, California**

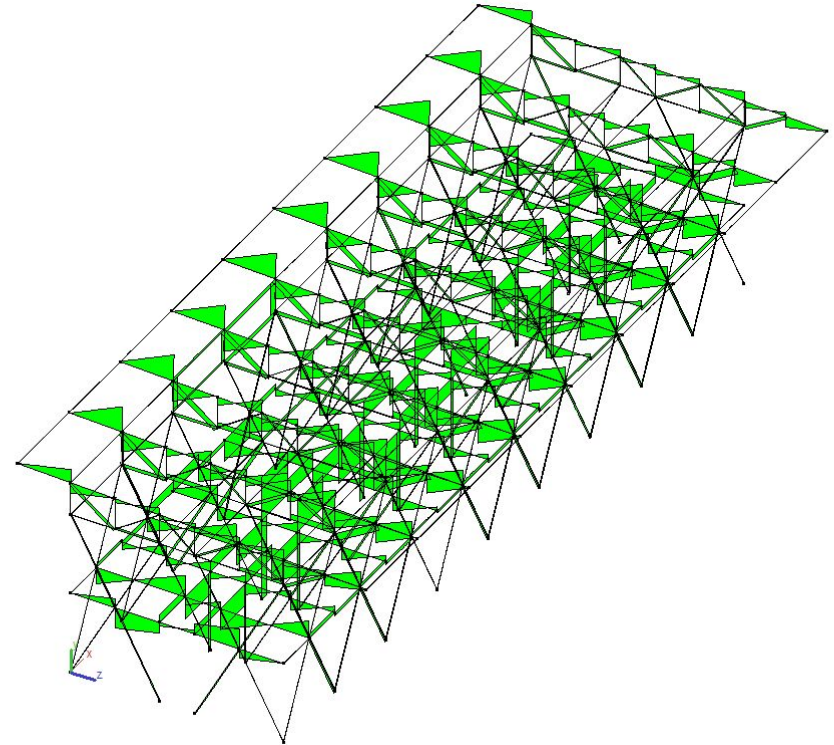
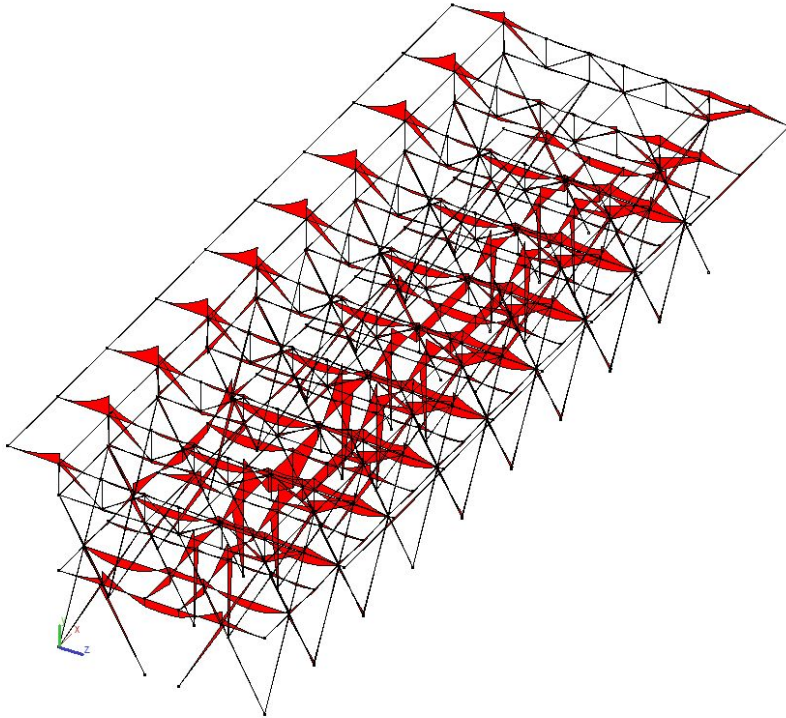


Use Winds Loads

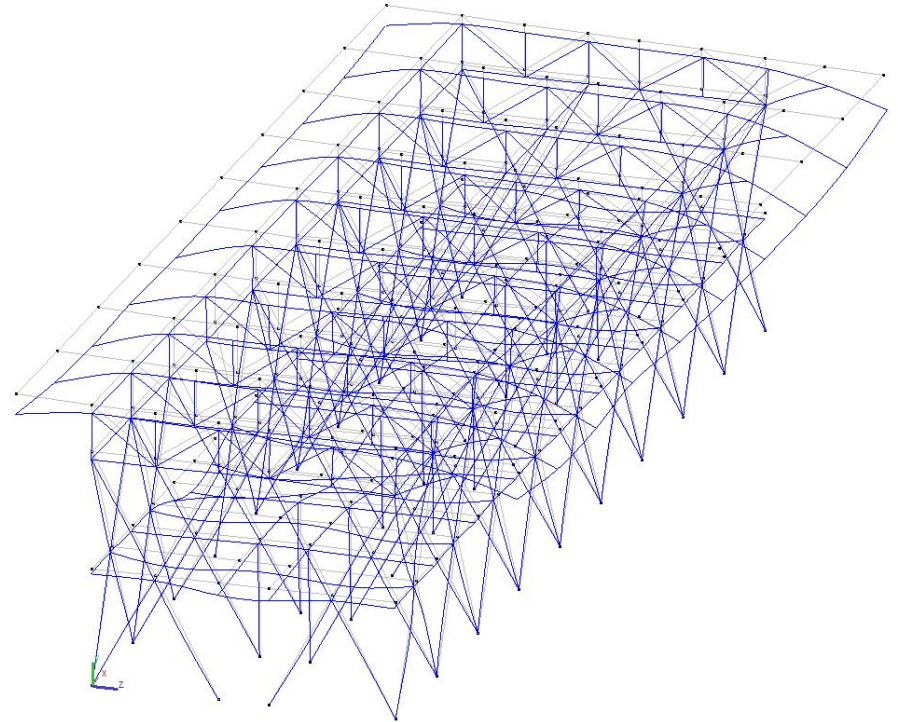
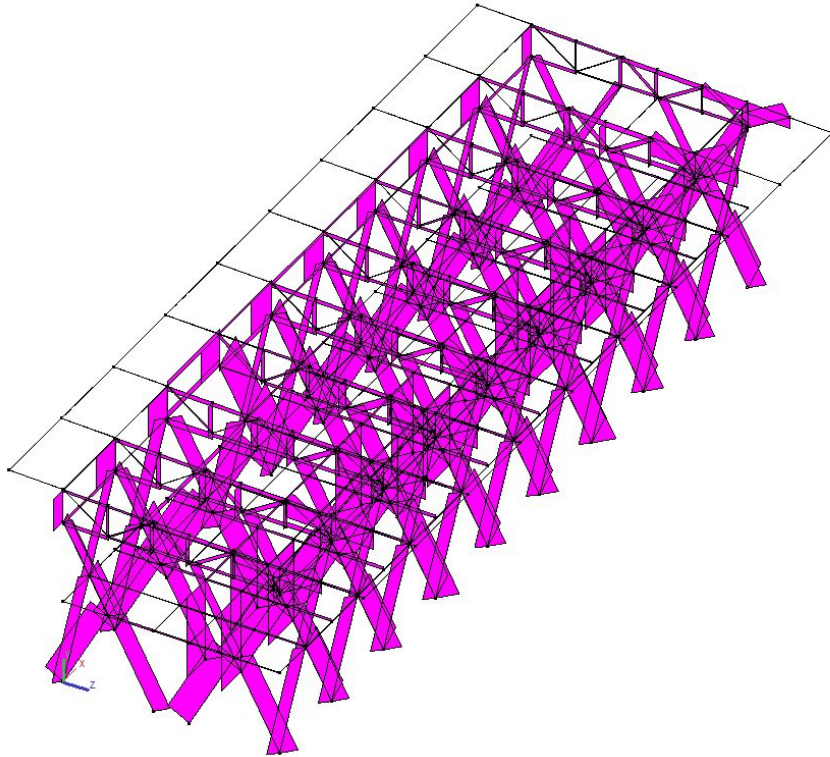
- Single-chord tributary load:
- Total Wind Pressure: 7.6 lb/ft² or 0.363 kN/m²
- Half-Tributary Load: 0.56875 kN/linear meter
- Full-Tributary Load: 1.1375 kN/linear meter

Main Wind Force Resisting System – Method 1						h ≤ 60 ft.						
Figure 6-2 (cont'd)		Design Wind Pressures				Walls & Roofs						
Enclosed Buildings												
Simplified Design Wind Pressure , p _{S30} (psf) (Exposure B at h = 30 ft. with I = 1.0)												
Basic Wind Speed (mph)	Roof Angle (degrees)	Load Case	Zones									
			Horizontal Pressures				Vertical Pressures				Overhangs	
			A	B	C	D	E	F	G	H	ECH	GCH
85	0 to 5°	1	11.5	-5.9	7.6	-3.5	-13.8	-7.8	-9.6	-6.1	-19.3	-15.1
	10°	1	12.9	-5.4	8.6	-3.1	-13.8	-8.4	-9.6	-6.5	-19.3	-15.1
	15°	1	14.4	-4.8	9.6	-2.7	-13.8	-9.0	-9.6	-6.9	-19.3	-15.1
	20°	1	15.9	-4.2	10.6	-2.3	-13.8	-9.6	-9.6	-7.3	-19.3	-15.1
	25°	1	14.4	2.3	10.4	2.4	-6.4	-8.7	-4.6	-7.0	-11.9	-10.1
		2					-2.4	-4.7	-0.7	-3.0		

Multiframe Lateral (Bending (kN/M) and Shear (kN))



Multiframe Lateral (Axial_(kN), Deflection_(in))



Sources (Information)

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