

TECHNICAL REPORT FOR PROJECT STRUCTURE

PREFAB STEEL FOR USE OFFICES - mobility

units' individual at one level

CLIENT – TF JACKSON PORTABLE ACCOMMODATION LTD

PLACE ASSEMBLY STRUCTURE

AREA SUBJECT TO WIND SPEED '

EQUAL TO 160 KM / H AND A SEISMIC ACTION EQUAL TO

MAGNITUDE 8.0 RICHTER SCALE

Genoa 21/05/2010

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INTRODUCTION

This report relates to the calculation of static design of a structure metal for residential office, consisting of a piece that will go mounted in the state of Haiti. The works referred to in question are subject to the rules and regulations in force in matter.

This test is conducted using as benchmarks for the wind action with reference speed of 160 km / h as earthquake an event with a magnitude of 8.0 on the Richter scale.

It is then supposed to check the engine block using the rules Italian (Technical Standards for Construction 2008) and by requiring a reference speed of 160 km / h with a return period of 50 years and a seismic zoning corresponding to common class 1 (to simulate actions comparable to those induced by the event with a magnitude of 8.0 scale Richter).

This report does not fit on the dimensioning and verification of the foundation structures that must therefore be evaluated separately using a suitable geological geotechnical expertise.

The discussion deals exclusively with the breakthrough design and verification of the supporting structure and the vertical and horizontal panels, analysis of all direct and induced loads on the structures mentioned, the evaluation the extent of the seismic force to consider in sizing and verification the vertical bearing elements as well as the major points of attack and interconnection of the structural elements used.

1. KEY REFERENCE STANDARDS (by ITALIAN CODES).

- Framework Act 5 November 1971 No. 1086 "Regulations for the discipline of the works of reinforced concrete and prestressed structure and metal "its amendments and additions.

- July 4, 1996 Circular No. 156. Instructions for the application of the "Rules techniques on the general criteria for the verification of safety constructions, loads and overloads "in DM January 16, 1996.

- Ministerial Decree January 9, 1996 "Technical standards for calculation, execution and testing of structures in reinforced concrete and prestressed and for metal structures. "

- October 15, 1996 Circular No. 252. Instructions for the application of the "Rules techniques for the calculation, construction and testing of concrete structures

reinforced and prestressed and metal structures "in DM 9 January 1996.

- Norma CNR - UNI 10022/85 "Cold formed sections: instructions for use in the construction. "
- Norma CNR - UNI 10012 "hypothesis of load on buildings."
- Norma CNR - UNI 10011/85 "Steel constructions: instructions for the calculation, construction, testing and maintenance. "
- UNI - ENV 1993-1-1 June 1994, Eurocode 3 - "Design of steel structures. " - Part 1-1: "General rules and rules for buildings."
- Order of D.P.C. 20 March 2003 n ° 3274
- Technical Standards for Construction 2008

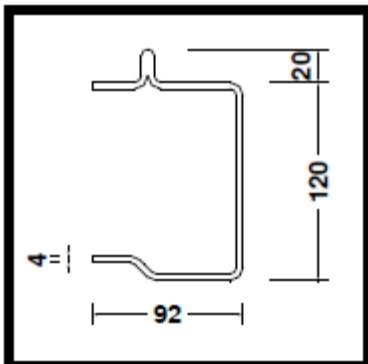
2. DIMENSIONS AND DESCRIPTION

Prefabricated.

The structure of the reporting will be 'made from a single block of planimetric dimensions of 6055x2435 mm rectangular in shape, which is develops an internal height of 2490 mm. The ground floor and the floor covering will consist of two blocks pre-assembled, formed by four bodies corner on which are welded profiles perimeter.

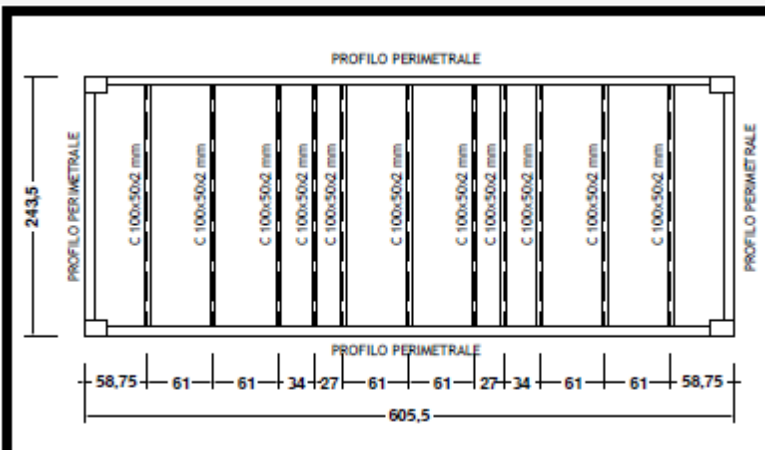
For the flooring, the perimeter profiles will be made of sections having the following form, with a thickness of 4 mm.

PROFILE PERIMETER GROUND FLOOR



On these profiles, at a distance of about 60 cm, will be welded in the form of current C having dimensions of 100x50x2 mm, as represented in the plan slab attached below.

GROUND FLOOR PLAN

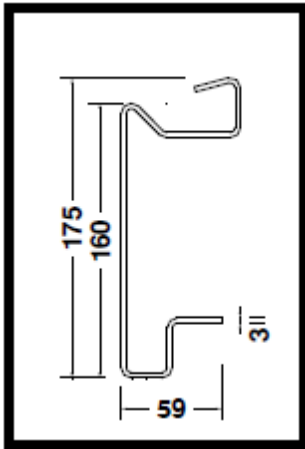


The flooring will consist of chipboard having a total weight of about 400 daN.

The coverage will follow the same pattern of the pavement, with profiles

perimeter welded corner blocks; these profiles perimeter will have the following section, with a thickness of 3 mm.

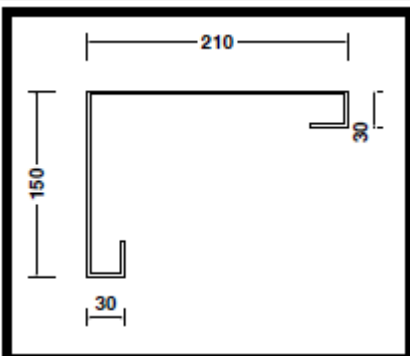
PERIMETER PROFILE COVER



To support the roof covering, they are willing No. 11 wooden slats parallel to the short side of the structure, connected to the perimeter beam through a suitable angle. The total weight of the supported coverage is approximately 300 daN.

The roofing and flooring are joined together by four pillars having the following section (thickness 3 mm) and arranged on the 4 corner blocks.

PROFILES PILLARS



The flooring is anchored to the ground in the four corner points and centerlines of the long sides of the engine block, for a total of n ° 6 supports.

The skeleton of the structure is then buffered by panels can have two different types:

- Panel 1, consisting of two steel plates having a thickness of 5/10 mm and separated by insulating material, for a total thickness of 6 cm.
- Panel 2, consisting of a steel foil having a thickness of 5/10 mm and from a sheet of chipboard having a thickness 9 mm separated by insulating, for a total thickness of 7 cm.

The paneling is connected to the perimeter beams of the floor with a guide Shaped steel and the roof beams with a suitable system of screws fixing.

It features the following characteristics - typological construction:

- Coverage consists of 4 perimeter beams having a thickness of 3 mm connected to corner blocks;
- Roof covering consists of wood joists with paneling of covering chipboard
- Corner pillars thickness 3 mm;
- Flooring consisting of 4 perimeter beams having a thickness of 4 mm connected with corner blocks;

- Mantle of flooring consists of chipboard supported by profiles steel with a cross section 100x50x2 mm arranged at a distance of 60 cm;

- Brushing perimeter of two types of collision.

Such structures have physical-mechanical characteristics declared and certified by the manufacturer.

3. PRESCRIPTION FOR STEEL STRUCTURES

METAL BEARING.

The materials to be used in these types of structures must comply with the requirements contained in Chapter 11 of the technical standards for construction 2008.

The steel to be used, general-purpose hot-rolled, in sections, rods, universal plates, sheets and hollow profiles (also welded pipes from tape hot rolled) must be of the type S235JR EN 10025 (ex Fe 360 B)

The materials used are:

- Having rolled steel Fe 360
- Voltage (unit load) ultimate tensile strength $\geq 360 \text{ N/mm}^2$ ftk
- Voltage (unit load) fyk yield strength $\geq 235 \text{ N/mm}^2$
- Modulus of elasticity $E = 210000 \text{ N/mm}^2$
- Shear modulus $G = 81000 \text{ N/mm}^2$
- Coefficient of thermal expansion $\alpha = 1.2 \times 10^{-5} \text{ }^\circ \text{C}^{-1}$

4. STRUCTURAL ANALYSIS

To verify the structure, it was assumed to check the skeleton of the block formed by perimeter beams and floor covering and united by vertical pillars, and to verify separately the panels subjected to the action of the wind.

The verification of the skeleton of the structure is carried out considering the structure loaded by the weight of the structural elements, by its own weight the floor and the roof, by the wind and the action seismic overload accidental use of the structure.

It is assumed as a connecting node between the structure and the foundation of the bond of the joint; nodes between the beam and the beam and beam and pillar are summarized by interlocking.

The tightening given by the panels is shown by the diagram on shell, which allows to simulate the stiffening of the structure due to the presence of the side panels.

For the static scheme of verification of the two types of panel, it is supposed a strip of panel unit width of 100 cm, stuck in the head and the base, and subjected to wind loads.

The verification of the elements that make up the prefabricated structure is carried out in the following chapters:

- Chapter 6: Verify supporting frame
- Chapter 7: Test panels.

5. ANALYSIS OF LOADS

It is considered that the loads and overloads act on the structure statically and that their distribution is uniformly distributed on the building blocks.

At the end of the calculation they are divided into permanent and accidental.

5.1. Permanent loads

For the analysis of the loads you are considered the weights of its constituent structures

the structure. It takes the following weight to the structural supporting elements:

- Weight perimeter beam coverage: $7850 \times 0.001068 = 8.4 \text{ daN / m}$;
- Weight perimeter beam floor: $0.0013 \times 7850 = 10.3 \text{ daN / m}$;
- Weight profile "C" floor: $0.00039 \times 7850 = 3.1 \text{ daN / m}$;
- Weight derives its pillars: $0.001395 \times 7850 = 11.0 \text{ daN / m}$.

The weights of the profiles are calculated automatically by the computer program and are indicated by G1.

There is also the permanent weights due to the coverage and the flooring:

- Weight roofing: $300 / (6.06 \times 2.44) = 20.3 \text{ N/m}^2$;
- Flooring weight: $400 / (6.06 \times 2.44) = 27.0 \text{ N/m}^2$.

The weights are indicated with permanent G2 (non-structural weight).

5.2. Variable loads

5.2.1 Overloading variables

Are shown below overloads due to the use of the structure, wind and seismic action.

5.2.2 Overload due to the use of the structure

It is assumed on the plane of the flooring a distributed load equal to 300 daN/m^2 (Target structure: uffci).

This load is called QK1.

5.2.3 Wind load

The building is supposed to then located in zone 8 at an altitude as $m = 2$, so

$$V_{ref} = 160 \text{ Km / h} = 44.5 \text{ m / s}$$

Reference kinetic pressure:

$$q_{ref} = V_{ref}^2$$

$$2 / 1.6 = 44.52 / 1.6 = 123.8 \text{ daN/m}^2$$

It is considered roughness class D in the area of location and distance from the coast of about 0.1 km, from which exposure category II.

It is assumed as building height $z = 3.00 \text{ ml}$.

Topographic coefficient $C_t = 1$

Exposure coefficient $C_e = 1.80$

Dynamic coefficient $C_d = 1$

By calculating the windowed areas compared to the total areas, the building presents the case of

construction is not waterproof, so it uses the following coefficients

Pressure:

$EPC = 0.8$ for elements over

$C_{pe} = -0.4$ for elements SOTTOVENTI

$C_{pi} = \pm 0.2$

It is estimated the wind pressure:

- Upper wall

$$q_{ref} \times C_e \times C_d \times (EPC + ICC) = 123.8 \times 1.80 \times 1 \times (0.8 + 0.2) = 223 \text{ daN/m}^2$$

- Leeward wall

$$q_{ref} \times C_e \times C_d \times (EPC + ICC) = 123.8 \times 1.80 \times 1 \times (0.4 + 0.2) =$$

$$134 \text{ daN/m}^2$$

- Cover (the action of the wind causes a component of depression)

$$q_{ref} \times C_e \times C_d \times (EPC + ICC) = 123.8 \times 1.80 \times 1 \times (0.4 + 0.2) =$$

$$134 \text{ daN/m}^2$$

The action of the wind blowing in the X direction is indicated with QK2X, the action of wind dying in the Y direction is indicated by QK2Y while the action of the wind of depression on the cover is indicated by QK2C.

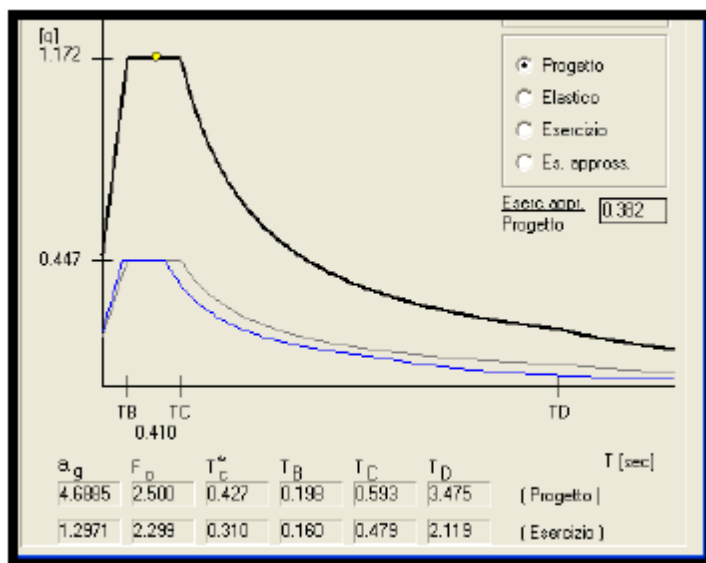
5.2.4 Action due to the earthquake

The following table shows the parameters used for the calculation of the seismic imposed on the structure, which is performed with the calculation program DOLMEN WIN 09.

- Nominal life of the building VN = 50 years;
- Level of use: IV (buildings with public functions or important strategic, with reference to the management of civil protection in the event of a disaster).
- Period of reference VR = VN = CU x 50 x 2 = 100 years;
- Latitude and longitude of the site: 38.1000 - 15.6500;
- Category soil: C;
- Category topographic T1;
- Structure factor q = 1 (steel non dissipative);
- Probability of exceedance for the ultimate limit state (SLC): PVR = 5%

The table below shows the elastic design spectrum (indicated by the black line) used to test the ultimate limit state of collapse, the set of forces earthquake is indicated by E.

SPECTRUM BAND PROJECT



5.2.5 Load combinations.

For the verification of the main frame, performs the following combinations of load:

- Fundamental combination with SLU main live load and wind

Y direction and wind secondary coverage:

$$F_d = \gamma_{g1} \times G_1 + G_2 + \gamma_{Q1} \gamma_{g2} x + x QK1 \gamma_{Q2} \psi_{02} x x x \gamma_{Q2} QK2Y + \psi_{02} x QK2C$$

Assuming $\gamma_{g1} = 1.3$, $\gamma_{g2} = 1.5$, $\gamma_{Q1} = 1.5$, $\gamma_{Q2} = 1.5$, $\psi_{02} = 0.6$ is obtained:

$$F_d = 1.3 \times 1.5 \times G_1 + G_2 + + QK1 1.5 \times 0.9 \times 0.9 \times QK2Y + QK2C$$

- SLU fundamental combination with wind load and wind direction Y primary and secondary coverage live load:

$$F_d = \gamma_{g1} \times G_1 + G_2 + \gamma_{Q1} \gamma_{g2} x x x QK1 \psi_{02} + \gamma_{Q2} QK2Y x + x \gamma_{Q2} QK2C$$

Assuming $\gamma_{g1} = 1.3$, $\gamma_{g2} = 1.5$, $\gamma_{Q1} = 1.5$, $\gamma_{Q2} = 1.5$, $\psi_{02} = 0.9$ is obtained:

$$F_d = 1.3 \times G_1 + G_2 + 1.5 \times 1.05 \times 1.5 \times QK2Y QK1 + + 1.5 \times QK2C$$

- SLU fundamental combination with the X-direction wind load and wind primary and secondary coverage live load:

$$F_d = \gamma_{G1} \times G_1 + G_2 + \gamma_{Q1} \gamma_{G2} \times \dots \times Q_{K1} \psi_{02} + \gamma_{Q2} Q_{K2X} \times \dots + \gamma_{Q2} Q_{K2C}$$

Assuming $\gamma_{G1} = 1.3, \gamma_{G2} = 1.5, \gamma_{Q1} = 1.5, \gamma_{Q2} = 1.5, \psi_{02} = 0.9$ is obtained:

$$F_d = 1.3 \times G_1 + G_2 + 1.5 \times 1.05 \times 1.5 \times Q_{K2X} + 1.5 \times Q_{K2C}$$

- Fundamental combination with SLU main live load and wind

X direction and wind secondary coverage:

$$F_d = \gamma_{G1} \times G_1 + G_2 + \gamma_{Q1} \gamma_{G2} \times \dots \times Q_{K1} \gamma_{Q2} \psi_{02} \times \dots + \gamma_{Q2} Q_{K2X} + \psi_{02} \times Q_{K2C}$$

Assuming $\gamma_{G1} = 1.3, \gamma_{G2} = 1.5, \gamma_{Q1} = 1.5, \gamma_{Q2} = 1.5, \psi_{02} = 0.6$ is obtained:

$$F_d = 1.3 \times 1.5 \times G_1 + G_2 + \dots + Q_{K1} 1.5 \times 0.9 \times 0.9 \times Q_{K2X} + Q_{K2C}$$

- Seismic combination:

$$F_d = G_1 + G_2 + \psi_{01} Q_{K1} \times 1.0 \times 0.3 \times E_X + E_Y$$

Assuming $\psi_{01} = 0.3$ is obtained:

$$F_d = G_1 + G_2 + Q_{K1} + 1.0 \times 0.3 \times 0.3 \times E_X + E_Y$$

- Seismic combination:

$$F_d = G_1 + G_2 + \psi_{01} Q_{K1} \times 1.0 \times 0.3 \times E_X + E_Y$$

Assuming $\psi_{01} = 0.3$ is obtained:

$$F_d = G_1 + G_2 + Q_{K1} + 1.0 \times 0.3 \times 0.3 \times E_X + E_Y$$

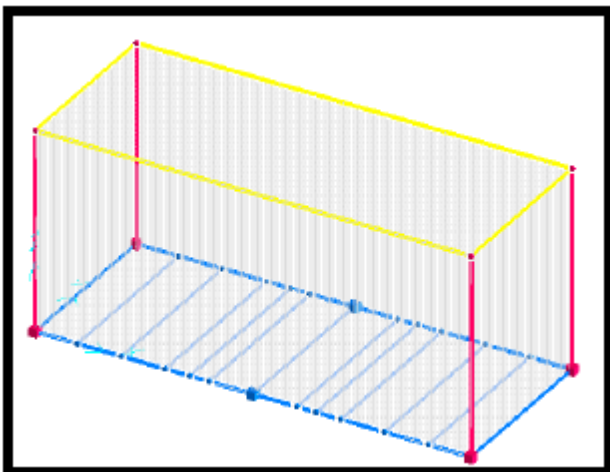
6. CHECK FRAME CARRIER

The verification of the frame is carried out with the program of finite elements calculation Dolmen - WIN.

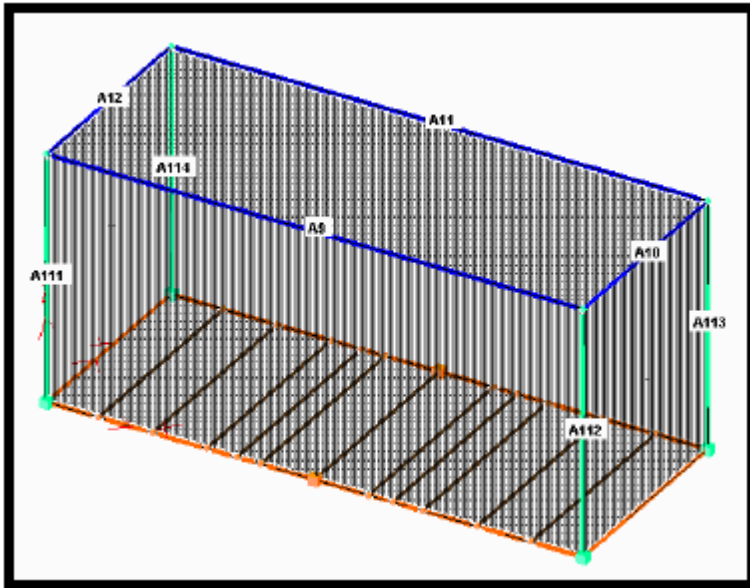
The following table shows the numbering of the rods of the floor plan, the plan coverage and columns with its nodes.

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OVERVIEW STRUCTURE

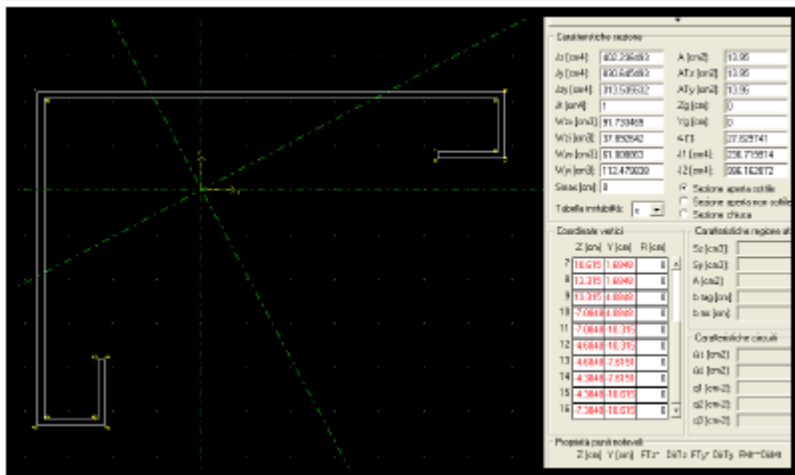


NUMBERING BEAMS COVER AND PILLARS

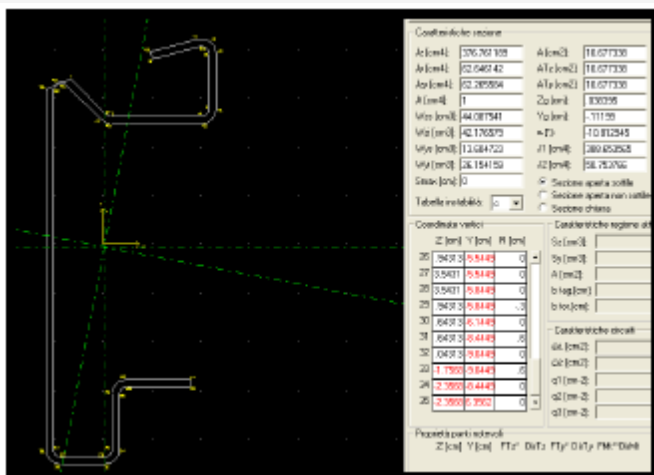


The beams A111, A112, A113 and A114 are the pillars, which have the following inertial characteristics, while the beams A9, A10, A11 and A12 represent the beams coverage perimeter of which are explained below the characteristics inertial.

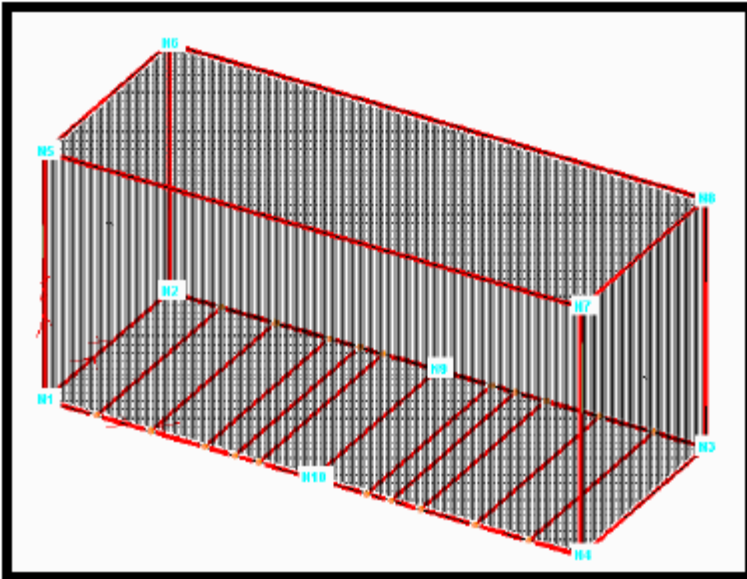
CORNER POST PROFILE



TOP RAIL PROFILE

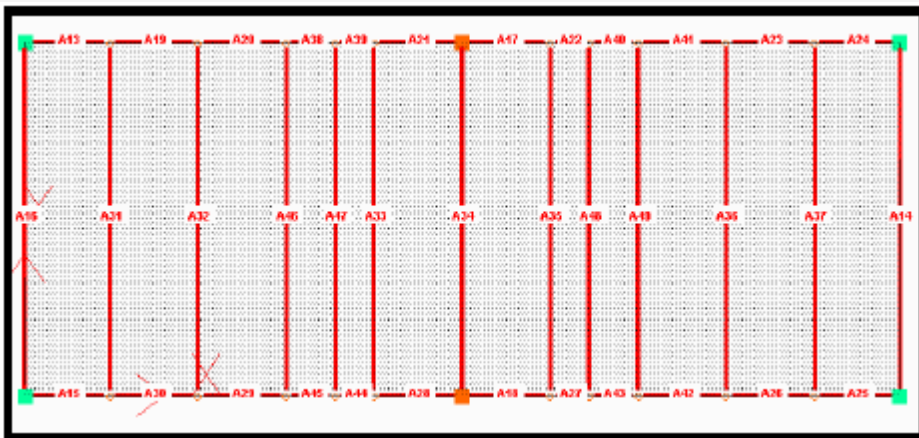


NUMBERING NODES BEAMS COVER AND PILLARS



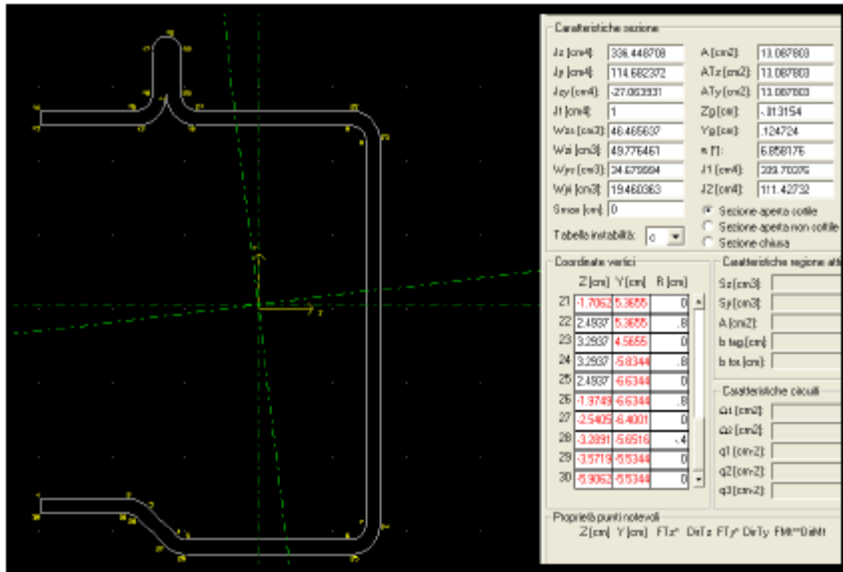
nodes N1, N2, N3, N4, N9 and N10 are the hooks of the structure to the ground (Constraint of the joint) while nodes N5, N6, N7, N8 represent the connections between the beams covering the perimeter and the bodies corner (welding is summarized as joint).

NUMBERING PLAN FLOOR BEAMS

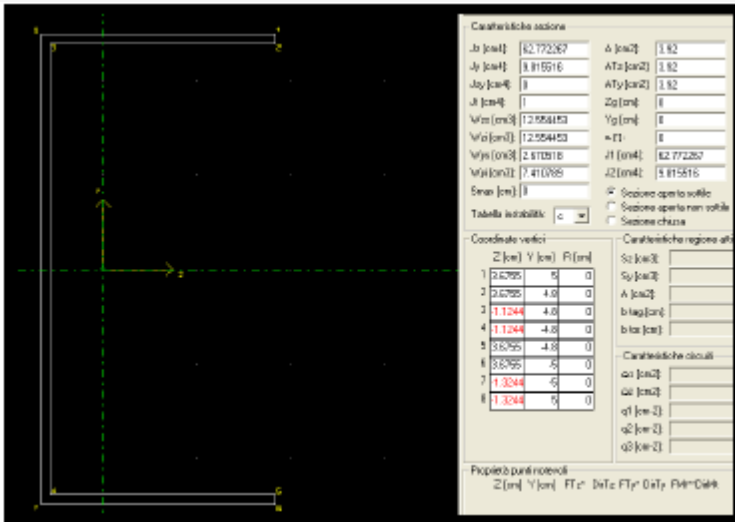


The rods perimeter of the floor of paving correspond to the profile of Following rappresentato, with the inertial characteristics.

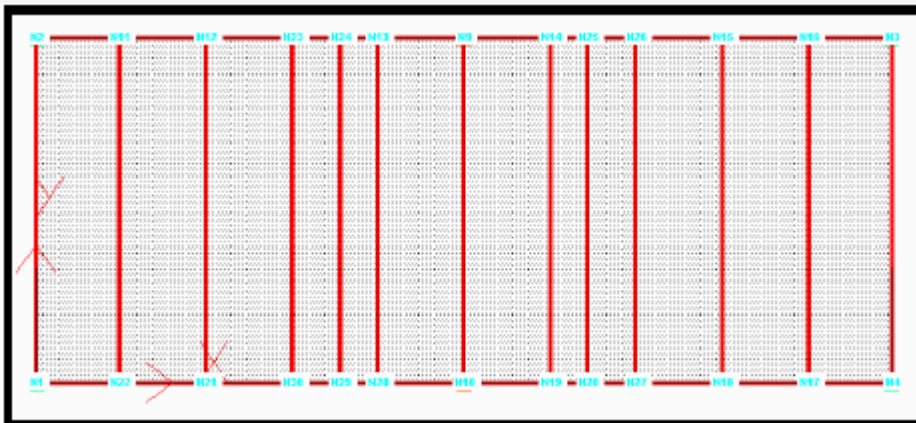
BOTTOM RAIL PROFILE



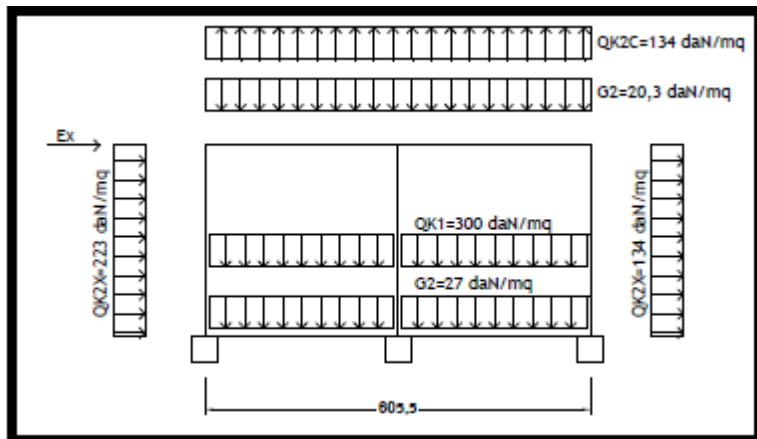
The joists interior parallel to the short side corresponds to a C-profile that has the following inertial characteristics.
INTERNAL BEAM PROFILE



NUMBERING PLAN NODES BEAMS FLOORING



We report the structural scheme used, imagining to see the structure along the side of greater length.
STRUCTURAL SCHEME



It finally shows the numbering of the nodes, the BEAM and loads used in the calculation program DOLMENWIN 09 for the development of stresses.

DATA STRUCTURE:

DATA STRUCTURE ***

Measuring unit:

LENGTH: cm

SURFACES: cm²

SECTIONAL DATA: cm

CORNERS: degrees

FORCES: daN

MOMENTS: daNcm

LINEAR LOADS: daN / cm

LOADS surfaces': DaN/m²

TENSION: daN/cm²

WEIGHTS OF VOLUME: daN/cm³

COEFFICIENT. OF WINKLER: daN/cm³

STIFFNESS impose upon.: DaN / cm - daNcm / rad

NODES - | ----- | ----- | ----- | ----- | ----- | num. = 30

Name Coord. X Coord. Y Coord. Z

1 0,111 0,000 0,000

2 0,111 244,000 0,000

3 606,111 244,000 0,000

4 606 111 0,000 0,000

5 0,111 0,000 280,000

6 0,111 244,000 280,000

7 606,111 0,000 280,000

8 606,111 244,000 280,000

9 303,111 244,000 0,000

10 303 111 0,000 0,000

11 59,111 244,000 0,000

12 120,111 244,000 0,000

13 242,111 244,000 0,000

14 364,111 244,000 0,000

15 486,111 244,000 0,000

16 547,111 244,000 0,000

17 547 111 0,000 0,000

18 486 111 0,000 0,000

19 364 111 0,000 0,000

20 242,111 0.000 0.000
21 120 111 0.000 0.000
22 59.111 0.000 0.000
23 181,111 244,000 0,000
24 215,111 244,000 0,000
25 391,111 244,000 0,000
26 425,111 244,000 0,000
27 425 111 0.000 0.000
28 391 111 0.000 0.000
29 215 111 0.000 0.000
30 181 111 0.000 0.000

BEAMS - | ----- | ----- | ----- | ----- | ----- | num. = 45

Property name `Node Init. Node fin. Releases in. Releases since. Orient.

9 2 5 7 0.0
10 2 7 8 0.0
11 2 6 8 0.0
12 2 5 6 0.0
13 3 2 11 0.0
14 3 4 3 0.0
15 3 1 22 0.0
16 3 1 2 0.0
17 3 9 14 0.0
18 3 10 19 0.0
19 3 11 12 0.0
20 3 12 23 0.0
21 3 13 9 0.0
22 3 14 25 0.0
23 3 15 16 0.0
24 3 16 3 0.0
25 3 17 4 0.0
26 3 18 17 0.0
27 3 19 28 0.0
28 3 20 10 0.0
29 3 21 30 0.0
30 3 22 21 0.0
4 31 22 11 0.0
4 32 21 12 0.0
4 33 20 13 0.0
34 4 10 9 0.0
4 35 19 14 0.0
4 36 18 15 0.0
4 37 17 16 0.0
38 3 23 24 0.0
39 3 24 13 0.0
40 3 25 26 0.0
41 3 26 15 0.0
42 3 27 18 0.0
43 3 28 27 0.0
44 3 29 20 0.0
45 3 30 29 0.0
4 46 30 23 0.0

```

4 47 29 24 0.0
4 48 28 25 0.0
4 49 27 26 0.0
111 1 1 5 0.0
112 1 4 7 0.0
113 1 3 8 0.0
114 1 2 6 0.0
SHELL RECTANGULAR | ----- | ----- | ----- | ----- | num. = 4
Property name `Node 1 Node 2 Node 3 Node 4
1 1 1 5 7 4
2 1 6 2 3 8
3 1 6 5 1 2
4 1 7 8 3 4
PROPERTY BEAMS --- | ----- | ----- | ----- | ----- | num. = 4
Name Material Width Length Area Area tags. Y Area tags. Z
Kw vertic. Kw hor. J tors. J and f. Y J and f. Z
1 2 21:00 15:00 1.39500E +01 1.39500E +01 1.39500E +01
0.000000 0.000000 1.00000E +00 8.30645E +02 4.02236E +02
17:48 2 2 7.00 1.06773E +01 1.06773E +01 1.06773E +01
0.000000 0.000000 1.00000E +00 6.26461E +01 3.76761E +02
14:00 3 2 9.20 1.30878E +01 1.30878E +01 1.30878E +01
0.000000 0.000000 1.00000E +00 1.14682E +02 3.36449E +02
4 2 5.00 10.00 3.92000E +00 2.00000E +00 2.00000E +00
0.000000 0.000000 5.12583E -02 9.81552E +00 6.27723E +01
PROPERTY SHELLS - | ----- | ----- | ----- | ----- | num. = 1
Material Name Sp.membr. Sp.plate Kw
1 2 0.05 0.05 0.000000
MATERIALS ----- | ----- | ----- | ----- | --- | num. = 1
Name Mod elast. Coeff. Mod nu tang. Weight spec. Dil. yourself.
2 2.10000E +06 3.00000E -01 8.50000E +05 7.85000E -03 1.00000E -05
CONSTRAINTS ----- | ----- | ----- | ----- | - | no. = 6
Rigid node. X Rigid. Y Rigid. Z Rigid. RX Rigid. RY Rigid. RZ
1 stuck stuck stuck stuck stuck stuck
2 stuck stuck stuck stuck stuck stuck
4 stuck stuck stuck stuck stuck stuck
3 stuck stuck stuck stuck stuck stuck

9 stuck stuck stuck stuck stuck stuck
10 stuck stuck stuck stuck stuck stuck
LOADS NODES ----- | ----- | ----- | ----- | ----- | num. = 16
Node Name, Management Intensity `
1-8: Seismic Forces Analysis (Simplified)
9-16: Transmitting torque Additional
LOADS OF FLOOR- | ----- | ----- | ----- | ----- | no. = 4
Name Cos Cos X Y Z Cos Cond Ref. Intens. Height
1 0.0000 1.0000 0.0000 2 280.00 -19.9 glob
2 4 1.0000 0.0000 0.0000 -294.2 glob 00:00
3 3 1.0000 0.0000 0.0000 -26.5 glob 00:00
4 0.0000 1.0000 0.0000 134.0 280.00 7 glob
LOADS BEAMS ----- | ----- | ----- | ----- | ----- | num. = 75
Name BEAM Dir Tip REF Parameter 1 Parameter 2 Parameter 3 Parameter 4

```

```

17 S001-peso_copertura 9 FT Z glo -0243 -0243 0.000 0.000
18 S001-11 peso_copertura Z FT glo -0243 -0243 0.000 0.000
19 S002-14 peso_solaio Z FT glo -0.078 -0.078 0.000 0.000
20 S002-16 peso_solaio Z FT glo -0.078 -0.078 0.000 0.000
21 S002-31 peso_solaio Z FT glo -0159 -0159 0.000 0.000
22 S002-32 peso_solaio Z FT glo -0162 -0162 0.000 0.000
23 S002-33 peso_solaio Z FT glo -0.117 -0.117 0.000 0.000
24 S002-34 peso_solaio Z FT glo -0162 -0162 0.000 0.000
25 S002-35 peso_solaio Z FT glo -0.117 -0.117 0.000 0.000
26 S002-36 peso_solaio Z FT glo -0162 -0162 0.000 0.000
27 S002-37 peso_solaio Z FT glo -0159 -0159 0.000 0.000
28 S002-46 peso_solaio Z FT glo -0126 -0126 0.000 0.000
29 S002-47 peso_solaio Z FT glo -0081 -0081 0.000 0.000
30 S002-48 peso_solaio Z FT glo -0081 -0081 0.000 0.000
31 S002-49 peso_solaio Z FT glo -0126 -0126 0.000 0.000
32 S002-14 Z accidental FT glo -0868 -0868 0.000 0.000
33 S002-16 Z accidental FT glo -0868 -0868 0.000 0.000
34 S002-31 Z accidental FT glo -1765 -1765 0.000 0.000
35 S002-32 Z accidental FT glo -1795 -1795 0.000 0.000
36 S002-33 Z accidental FT glo -1294 -1294 0.000 0.000
37 S002-34 Z accidental FT glo -1795 -1795 0.000 0.000
38 S002-35 Z accidental FT glo -1294 -1294 0.000 0.000
39 S002-36 Z accidental FT glo -1795 -1795 0.000 0.000
40 S002-37 Z accidental FT glo -1765 -1765 0.000 0.000
41 S002-46 Z accidental FT glo -1397 -1397 0.000 0.000
42 S002-47 Z accidental FT glo -0897 -0897 0.000 0.000
43 S002-48 Z accidental FT glo -0897 -0897 0.000 0.000
44 S002-49 Z accidental FT glo -1397 -1397 0.000 0.000
45 S001-vento_depressio 9 FT Z glo 1.635 1.635 0.000 0.000
46 S001-11 vento_depressio Z FT glo 1.635 1.635 0.000 0.000
WEIGHTS OWN BEAMS - | ----- | ----- | ----- | ----- | ----- |
Loads Cond Name BEAMS
1 47-91 9-49, 111-114
LOADS OF LINE | ----- | ----- | ----- | ----- | no. = 0
number coordinated Intensity
Name start end Visual Direction. Description start end
LOADS SHELLS ----- | ----- | ----- | ----- | ----- | num. = 4
Name Shell Dir Tip RIF intensity `
92 Wind 1 Y FD glo 223.0
93 ventoy2 2 Y FD glo 134.0
Ventox1 3 X 94 FD glo 223.0
95 ventox2 4 X 134.0 FD glo
LOADING CONDITIONS ----- | ----- | ----- | ----- | num. = 11
Name
1 Peso_proprio_____ N. loads: 45
List loads: 47-91
2 peso_copertura N. loads: 2
List loads: 17-18
3 peso_solaio N. loads: 13
List loads: 19-31
4 N. accidental loads: 13

```

List loads: 32-44
5 vento_Y N. loads: 2
List loads: 92-93
6 vento_x N. loads: 2
List loads: 94-95
7 N. vento_depressione loads: 2
List loads: 45-46
8 N. Sisma_X loads: 4
List loads: 1-4
9 N. Sisma_Y loads: 4
List loads: 5-8
10 N. Torcente_add._X loads: 4
List loads: 9-12

11 N. Torcente_add._Y loads: 4
List loads: 13-16

RESULT OF LOADS (application point at the origin):

cond. FX FY FZ MX MY MZ

1 0.000000e +00 0.000000e +00 -5.223863E +02 -6.373112E +04 1.583410E +05
0.000000e +00
2 0.000000e +00 0.000000e +00 -2.943972E +02 -3.591646E +04 8.923504E +04
0.000000e +00
3 0.000000e +00 0.000000e +00 -3.915439E +02 -4.776835E +04 1.186813E +05
0.000000e +00
4 0.000000e +00 0.000000e +00 -4.350159E +03 -5.307194E +05 1.318581E +06
0.000000e +00
5 0.000000e +00 6.057576E +03 8.480606E +05 -0.000000e +00 0.000000e +00
1.836118E +06
6 2.439024E +03 0.000000e +00 0.000000e +00 0.000000e +00 3.414634E +05 -
2.975609E +05
7 0.000000e +00 0.000000e +00 1.981378E +03 2.417281E +05 6.005773E +05 -
0.000000e +00
8 8.029526E +02 0.000000e +00 0.000000e +00 0.000000e +00 2.248267E +05 -
9.796022E +04
9 8.029526E +02 0.000000e +00 0.000000e +00 -0.000000e +00 2.248267E +05
2.433838E +05
10 0.000000e +00 0.000000e +00 0.000000e +00 0.000000e +00 0.000000e +00 -
9.796022E +03
11 0.000000e +00 0.000000e +00 0.000000e +00 0.000000e +00 0.000000e +00
2.432946E +04

The following is the analysis of the seismic force and stress analysis.

For BEAMS that are part of the structure using the following convention for local axes of the individual BEAMS.

The resistance of the members is performed with the following formula (field elastic):

σ_x, E_d

$2 + \sigma_z, E_d$

$2 - \sigma z, E_d$

$2 \times \sigma x, E_d$

$2 + 3 \tau E_d < (f_{yk} / \gamma M_0)^2$

The verification is performed by the computer program, using:

$f_{yk} = 2350 \text{ daN/cm}^2$

$\gamma M_0 = 1.05$

Below is the listing of calculation.

100

CHECK IN STEEL RODS:

CHECK IN STEEL RODS

SUMMARY OF BEAMS VERIFIED WITH THE LAST Calculated

BEAM 111 - sez. 1 - U_pilastro - Yes 58% of the limit.

BEAM 112 - sez. 1 - U_pilastro - Yes 56% of the limit.

BEAM 113 - sez. 1 - U_pilastro - Yes 59% of the limit.

BEAM 114 - sez. 1 - U_pilastro - Yes 58% of the limit.

BEAM 9 - sect. 2 - U_profilo_tetto - Yes 51% of the limit.

BEAM 10 - sez. 2 - U_profilo_tetto - 5% of Ss limit.

BEAM 11 - sez. 2 - U_profilo_tetto - Yes 51% of the limit.

BEAM 12 - sez. 2 - U_profilo_tetto - 5% of Ss limit.

BEAM 13 - sez. 3 - U_profilo_pavimento - 42% is the limit.

BEAM 14 - sez. 3 - U_profilo_pavimento - 8% of Yes limit.

BEAM 15 - sez. 3 - U_profilo_pavimento - 42% is the limit.

BEAM 16 - sez. 3 - U_profilo_pavimento - 8% of Yes limit.

BEAM 17 - sez. 3 - U_profilo_pavimento - 42% is the limit.

BEAM 18 - sez. 3 - U_profilo_pavimento - 42% is the limit.

BEAM 19 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 20 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 21 - sect. 3 - U_profilo_pavimento - 42% is the limit.

BEAM 22 - sez. 3 - U_profilo_pavimento - Yes 12% of the limit.

BEAM 23 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 24 - sez. 3 - U_profilo_pavimento - 42% is the limit.

BEAM 25 - sez. 3 - U_profilo_pavimento - 42% is the limit.

BEAM 26 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 27 - sez. 3 - U_profilo_pavimento - Yes 12% of the limit.

BEAM 28 - sez. 3 - U_profilo_pavimento - 42% is the limit.

BEAM 29 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 30 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 38 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 39 - sez. 3 - U_profilo_pavimento - Yes 12% of the limit.

BEAM 40 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 41 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 42 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 43 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 44 - sez. 3 - U_profilo_pavimento - Yes 12% of the limit.

BEAM 45 - sez. 3 - U_profilo_pavimento - 21% is the limit.

BEAM 31 - sez. 4 - SEZIONE_a_C_S004 - Yes 74% of the limit.

BEAM 32 - sez. 4 - SEZIONE_a_C_S004 - Yes 75% of the limit.

BEAM 33 - sez. 4 - SEZIONE_a_C_S004 - Yes 54% of the limit.

BEAM 34 - sez. 4 - SEZIONE_a_C_S004 - Yes 52% of the limit.

BEAM 35 - sez. 4 - SEZIONE_a_C_S004 - Yes 54% of the limit.

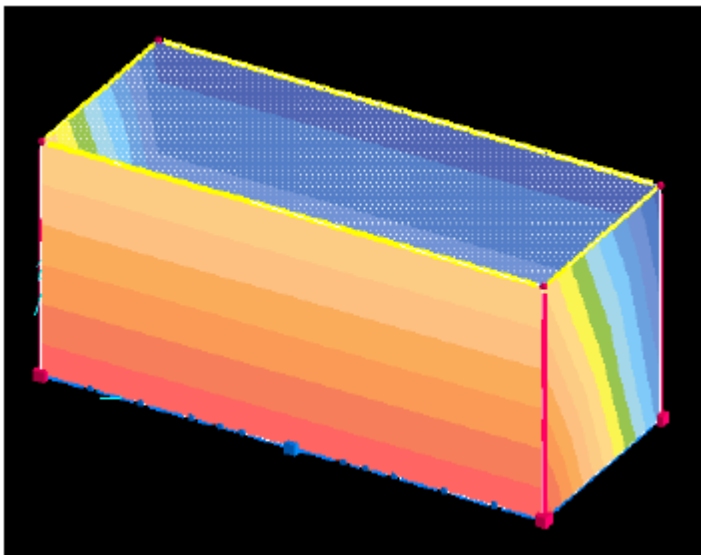
BEAM 36 - sez. 4 - SEZIONE_a_C_S004 - Yes 75% of the limit.

BEAM 37 - sez. 4 - SEZIONE_a_C_S004 - Yes 74% of the limit.
 BEAM 46 - sez. 4 - SEZIONE_a_C_S004 - Yes 59% of the limit.
 BEAM 47 - sez. 4 - SEZIONE_a_C_S004 - Yes 39% of the limit.
 BEAM 48 - sez. 4 - SEZIONE_a_C_S004 - Yes 39% of the limit.
 BEAM 49 - sez. 4 - SEZIONE_a_C_S004 - Yes 59% of the limit.

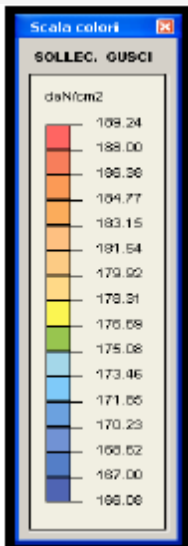
7. CHECK panels

Below are the graphs of the stresses imposed on the panels external perimeter, which are considered in the modeling of the structure such as shells.

STRESS ANALYSIS OF SHELLS

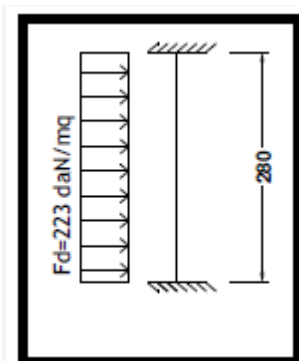


STRESS SCALE GRAPHICS



For the verification of the panel, we consider a strip of unitary width equal to 100 cm, subject to the maximum load of the wind is assumed as static scheme a rod of length 280 cm wedged at both ends.

STATIC OUTLINE PANEL



We obtain then:

$l = \text{beam length} = 280 \text{ cm}$

$F_d = \text{maximum wind load} = 223 \text{ N/m}^2$

From which the following maximum stresses (shear and moment V_{Ed} M_{Ed}):

$M_{Ed} =$

12

$F_d \cdot l = 2$

12

$223 \cdot 1.5 \cdot 2.82 = 21855 \text{ daNcm}$

$V_{Ed} =$

2

$F_d \cdot l =$

2

$223 \cdot 1.5 \cdot 2.8 = 470 \text{ daN}$

Check the panel type 1

The type of this panel is constituted by two steel plates having thickness 5/10 mm and separated by insulation, for a total thickness of 6 cm.

The following table shows the inertial characteristics of the panel.

n b h distance x-axis areas

time

Static

moments

inertia

moments

partial inertia

1 100 0.05 0,025 5 0,125 0.0010416 44.25416667

2 100 0.05 5,975 5 29,875 0.0010416 44.25416667

0 0 0 0 0 0 0

0 0 0 0.00 0 0 0 0

103

tot 10 30 88.50833333

yg 3:00

ry 2,975

Wx 29.5

The resistance to flexion applies:

c Rd

And

M

M

,

<1

Where $M_c, R_d =$

M_0

$eI W f_{yk}$

g

*

They have taken the values $f_{yk} = 2350 \text{ daN/cm}^2$, $\gamma_{M0} W_{el} = 1.05$ and $= 29.5 \text{ cm}^3$.

Then:

$M_c, R_d =$

1.05

$29.5 * 2350 = 66023 \text{ daNcm}$

$c R_d$

And

M

M

,

=

66023

21855

$= 0.33 < 1$

Check the cut

The cutting resistance applies:

$c R_d$

And

V

V

,

< 1

Where $V_c, R_d =$

$3.0 *$

*

M

$A_v f_{yk}$

g

Assuming:

$A_v = 10.0 \text{ cm}^2$

They have taken the values $f_{yk} = 2350 \text{ daN/cm}^2$, $\gamma_{M0} = 1.05$

Then:

$V_c, R_d =$

$1.05 * 3$

$10.0 * 2350$

*

$= 12920 \text{ daN}$

$c R_d$

And

V

V

,

=

12920

470

$= 0.04 < 1$

Check the panel type 2

104

The type of this panel is constituted by a steel having thickness 5/10 mm and a lamina of chipboard having a thickness 9 mm separated by insulating material, for a total thickness of 7 cm.

The following table shows the inertial characteristics of the panel to the part steel.

n b h

reach

x-axis

areas

time

Static

moments

inertia

dist ^ 2 times

inertia

partial

1 100 0.05 0,025 5 0,125 0.001041667 38.21192 191.0606331

2 100 0.9 6.55 90 589.5 6,075 0.117938 16.68942175

0 0 0 0 0 0 0 38.52162 0

0 0 0 0.00 0 0 0 38.52162 0

tot 95 589,625 207.7500 548

yg 6.21

ry 1:48

Wx 33.5

The resistance to flexion applies:

c Rd

And

M

M

,

<1

Where Mc, Rd =

M 0

el W f yk

g

*

They have taken the values $f_{yk} = 2350 \text{ daN/cm}^2$, $\gamma_{M0} = 1.05$ and $W_{el} = 33.5 \text{ cm}^3$.

Then:

Mc, Rd =

1.05

$33.5 * 2350 = 74975 \text{ daNcm}$

c Rd

And

M

M

,

=

74975

21855

= 0.33 < 1

The following table shows the inertial characteristics of the panel to the part wood.

n b h

reach

x-axis

areas

time

Static

moments

inertia

dist ^ 2 times

inertia

partial

1 100 0.05 0,025 5 0,125 0.001041667 38.21192 191.0606331

2 100 0.9 6.55 90 589.5 6,075 0.117938 16.68942175

0 0 0 0 0 0 0 38.52162 0

0 0 0 0.00 0 0 0 38.52162 0

tot 95 589,625 207.7500 548

105

yg 6.21

ry 1:48

Wx 263

The resistance to flexion applies:

c Rd

And

M

M

,

< 1

Where $M_c, R_d = W_{el} \times X_d$

$X_d =$

M

$X_k K$

g

* Mod

You are hired:

$K_{mod} = 0.80$ (particle board - class load duration instantaneous)

$X_k = 180$ daN/cm² (class of solid wood C18)

$Y_M = 1.50$ (particle board or fiber)

then:

$X_d =$

M

$X_k K$

g

* Mod =

1.50

$0.80 * 180 = 96$ daN/cm²

$M_c, R_d = 96 * 263 = 25248$ daNcm

c Rd

And

M

M

,

=

25248

21855

= 0.87 < 1

Check the cut

The cutting resistance applies:

$c R_d$

And

V

V

,

< 1

Where $V_c, R_d =$

$30 *$

*

M

$A_v f_{yk}$

g

Assuming:

$A_v = 5.0 \text{ cm}^2$ (whichever is safe as resistant to shear only sheet metal part steel)

They have taken the values $f_{yk} = 2350 \text{ daN/cm}^2$, $\gamma_{M0} = 1.05$

Then:

$V_c, R_d =$

$1.05 \cdot 3$

$5.0 \cdot 2350$

*

$* = 6460 \text{ daN}$

106

$c R_d$

And

V

V

,

=

6460

470

= 0.08 < 1

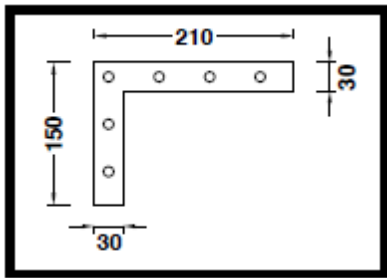
8. CHECK LOCAL CONNECTION

Connection corner block-pillar

The connection between the pillar and the corner block is done by bolts M 6 10 4.6 class coming together through a plate thickness of 20 mm welded the pillar at the corner block.

The table below shows the layout of the plate.

PLAN PLATE



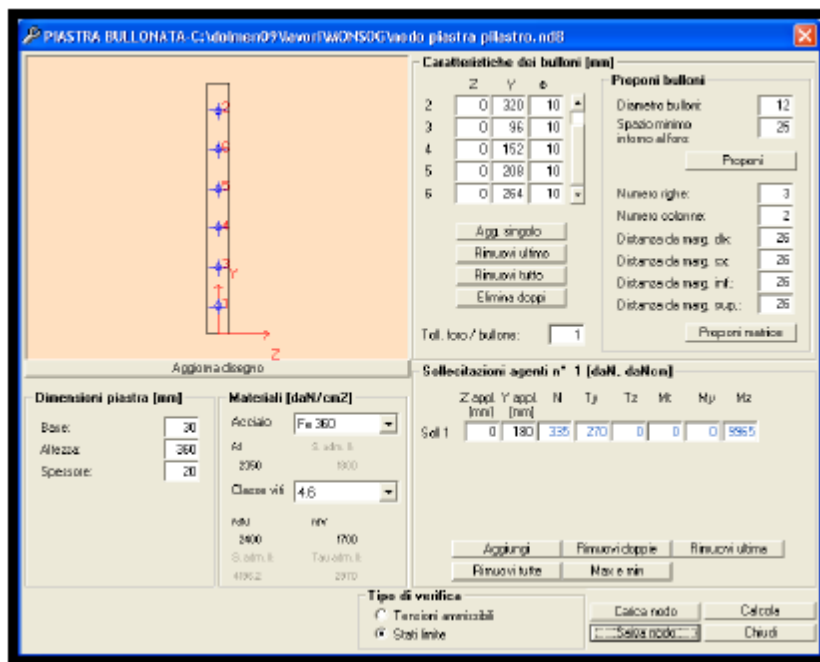
Whereas the Y axis parallel to the side length of 210 mm and the Z axis parallel to the side of length 150 mm, maximum stresses are obtained as follows imposed on the connection, which correspond to the case of load n° 2 (wind load y main and secondary accidental overload).

$N = 335 \text{ daN}$

$T_y = 270 \text{ daN}$

$M_z = 49965 \text{ daNcm}$

Below is the link verification carried out with the program calculation, assuming the straight plate of width 30 mm and length $210 + 150 = 360 \text{ mm}$.



CHECK stress BOLT - METHOD OF LIMIT STATES

UNITA 'MEASUREMENT:

FORCES: daN

MOMENTS: daNcm

TENSION: daN/cm²

DIMENSIONS: mm

Plate

B H P

30 360 20

BOLTS

No. X Y Fi

1 0 40 10

2 0 320 10

3 0 96 10

4 0 152 10

5 0208 10

6 0 264 10

MATERIALS

Steel Fe 360, fd class 4.6 screws

sp <sp = 40mm> 40mm FDN FDV

108

2350 2100 2400 1700

AGENTS AND STRESS stress state

Combination of stresses acting Soll 1

$N = 335 = 270$ Ty Tz = 0, Mt = 0 My = 0 Mz = 49965

Bolts

FDN screws screws FDV fd Ref Pias

2400 1700 5875

No. Sigma Tau coefficient SigRifPias Ver

1 1389.2 75.9 0.34 22.5 YES '

2 -59.9 0 75.9 22.5 YES '

3 1099.4 75.9 0.21 22.5 YES '

4 809.5 75.9 0.12 22.5 YES '

5 519.7 75.9 0.05 22.5 YES '

6 229.9 75.9 0.01 22.5 YES '

Connection panel - perimeter beam coverage

The connection between the cladding panel and the perimeter beam of cover is done via 4 bolts M 8 8.8 class who join the flap bottom of the beam itself.

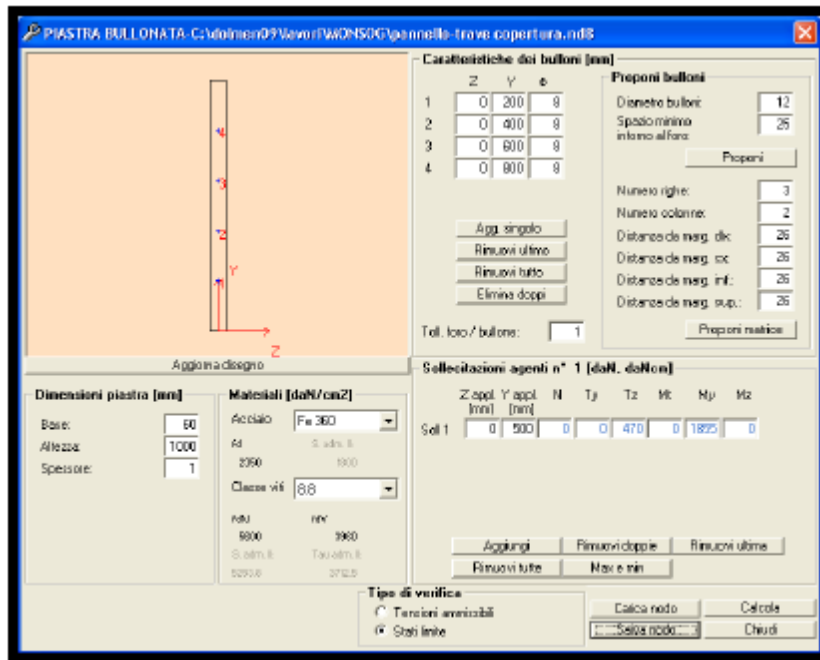
Considering the unitary strip of width 100 cm panel, it is considered Y axis as the axis parallel to the unit length, and as the Z axis parallel to the width of the panel (6 or 7 cm depending on the type).

With these conventions, the analysis of the stresses indicated in Chapter 7 (Test panels) produces the following stresses:

$T_z = 470$ daN

$M_y = 21855$ daNcm

Below is the link verification carried out with the program calculation.



CHECK stress BOLT - METHOD OF LIMIT STATES

UNITA 'MEASUREMENT:

FORCES: daN

MOMENTS: daNcm

TENSION: daN/cm2

DIMENSIONS: mm

Plate

B H P

60 1000 1

BOLTS

No. X Y Fi

1 0 200 8

2 0 400 8

3 0 600 8

4 0 800 8

MATERIALS

110

Steel Fe 360, fd class 8.8 screws

sp <sp = 40mm> 40mm FDN FDV

2350 2100 5600 3960

AGENTS AND STRESS stress state

Combination of stresses acting Soll 1

N = 0 Ty = Tz = 0 470 21855 Mt = 0 My = Mz = 0

Bolts

FDN screws screws FDV fd Ref Pias

5600 3960 5875

No. Sigma Tau coefficient SigRifPias Ver

1 5044.4 315.2 0.82 1468.8 YES '

2 5044.4 315.2 0.82 1468.8 YES '

3 5044.4 315.2 0.82 1468.8 YES '

4 5044.4 315.2 0.82 1468.8 YES '

Connecting perimeter beam of the floor - corner block

The connection between the beam perimeter of the floor and the corner block takes place by welding a thickness of 4 mm of the beam on said corner block.

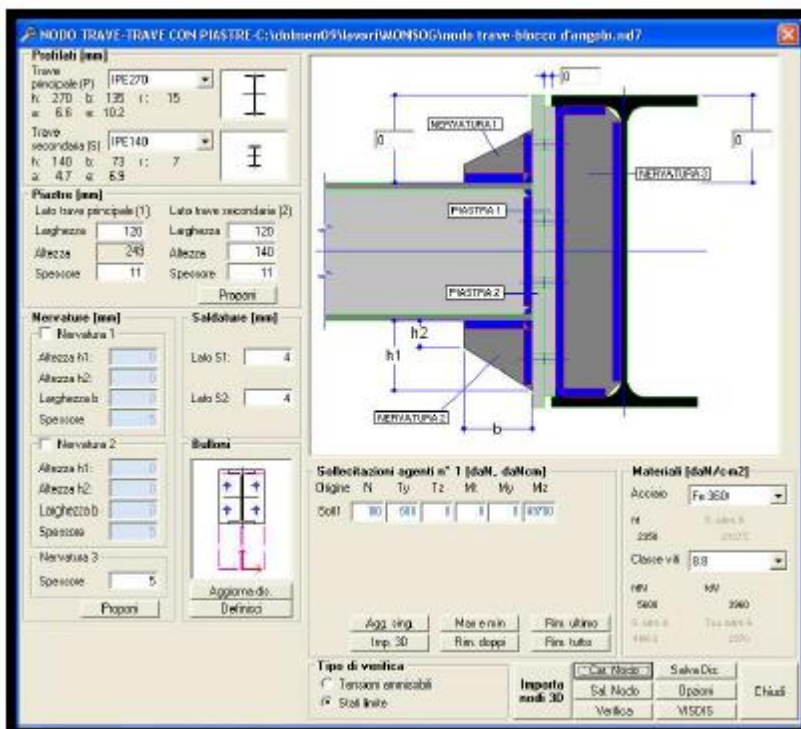
Assuming the Y axis parallel to the soul of the perimeter beam and the Z axis parallel to the short sides of the beam, are obtained the following maximum stresses corresponding to the load case n ° 3:

$N = 180 \text{ daN}$

$T_y = 600 \text{ daN}$

$M_z = 49900 \text{ daNcm}$

Below is the link verification carried out with the program calculation, it was assumed to be used in place of the profile corresponding to the beam perimeter of the flooring section IPE 140, which has the same perimeter welding.



CHECK stress NODES: 5 - METHOD OF LIMIT STATES

UNITA 'MEASUREMENT:

FORCES: daN

MOMENTS: daNcm

TENSION: daN/cm²

DIMENSIONS: mm

GEOMETRY NODE

Profiles used

Type prof. h e r b a

IPE270 270 135 6.6 10.2 15

IPE140 140 73 7 4.7 6.9

WELDING

Solder side of plate 1: 4

Solder side of plate 2: 4

AGENTS AND STRESS stress state

Combination of stresses acting Soll 1

112

$N = 180 = 600$ Ty Tz = 0, Mt = 0 My = 0 Mz = 49700

Welding

fd sald

1997.5

Descr.Sigma TauPa taupe Ver

s1 1544.3 94.7 0 SI '

s1 '1544.3 94.7 0 SI'

s2 1699.4 0 0 SI '

s2 '1699.4 0 0 SI'

s3 1737.7 0 0 SI '

s3 '1737.7 0 0 SI'

Connecting beams paving block below - foundation

The connection between the beams of the floor perimeter of the cylinder block and bottom the foundation will be done through plate having dimensions 120x70x14 mm, arranged with the long side of 120 mm parallel to the long side of the structure, anchored the foundation block with bolt M22 grade 10.9.

Assuming the X axis parallel to the side of the plate having a length of 120 mm and the Y-axis parallel to the short side having a length of 70 mm, are obtained from the analysis

stress the following maximum values:

CASE 1 - y wind

N = 14354 daN

Tx = 1058 daN

Ty = 4969 daN

Mx = 8105 daNcm

My = 24131 daNcm

113

CASE 2 - x wind

N = 3719 daN

Tx = 2275 daN

Ty = 205 daN

Mx = 5604 daNcm

My = 25927 daNcm

CASE 3 - y wind

N = 11031 daN

Tx = 392 daN

Ty = 5338 daN

Mx = 3598 daNcm

My = 25246 daNcm

CASE 4 - x slu

N = 3981 daN

Tx = 1624 daN

Ty = 213 daN

Mx = 7589 daNcm

My = 35175 daNcm

Below is the link verification carried out with the program calculation.

114

CHECK stress BOLT - METHOD OF LIMIT STATES

UNITA 'MEASUREMENT:

FORCES: daN

MOMENTS: daNcm
TENSION: daN/cm2
DIMENSIONS: mm

Plate

B H P

70 120 14

BOLTS

No. X Y Fi

1 0 60 22

MATERIALS

Steel Fe 360, fd Class 10.9 screws

sp <sp = 40mm> 40mm FDN FDV

2350 2100 7000 4950

AGENTS AND STRESS stress state

Combination of stresses acting Soll 1

N = 14354 Ty Tz = 1058 = 4969 Mt = 0 My = Mz = 8105 24131

Bolts

FDN screws screws FDV fd Ref Pias

7000 4950 3576.1

No. Sigma Tau coefficient SigRifPias Ver

1 6271.4 1703.4 0.92 1649.5 YES '

Maximum compression plate

fd Smax Ver

2350 -2201.7 YES '

NODE VERIFIED ACCORDING TO COMB. AGENTS OF STRESS Soll 1

Combination of stresses acting Soll 2

115

N = 3719 Ty Tz = 2275 = 205 Mt = 0 My = Mz = 5604 25927

Bolts

FDN screws screws FDV fd Ref Pias

7000 4950 3576.1

No. Sigma Tau coefficient SigRifPias Ver

1 2844.5 765.9 0.19 741.6 YES '

Maximum compression plate

fd Smax Ver

2350 -1360.9 YES '

NODE VERIFIED ACCORDING TO COMB. AGENTS OF STRESS Soll 2

Combination of stresses acting Soll 3

N = 392 = 11031 Ty Tz = 5338 Mt = 0 My = Mz = 3598 25246

Bolts

FDN screws screws FDV fd Ref Pias

7000 4950 3576.1

No. Sigma Tau coefficient SigRifPias Ver

1 5207.3 1794.6 0.68 1737.8 YES '

Maximum compression plate

fd Smax Ver

2350 -1550.5 YES '

NODE VERIFIED ACCORDING TO COMB. AGENTS OF STRESS Soll 3

Combination of stresses acting Soll 4

N = 3981 Ty Tz = 1624 = 213 Mt = 0 My = Mz = 7589 35175

Bolts

FDN screws screws FDV fd Ref Pias

7000 4950 3576.1

No. Sigma Tau coefficient SigRifPias Ver

1 3511.5 549.2 0.26 531.8 YES '

Maximum compression plate

fd Smax Ver

2350 -1773.6 YES '

NODE VERIFIED ACCORDING TO COMB. AGENTS OF STRESS Soll 4
ADDITIONS

9. TABLE OF MAXIMUM VALUES USED TO
SIZING OF PLATES OF ENGAGEMENT
BLOCK FOUNDATIONS MADE TO WORK.

Below is the numbering of the nodes of the foundation, with the convention taken as the axis X of the axis that joins the nodes N1 and N10, and how to positive from node to node N1 to N10, Y-axis as the axis that connects the nodes N1 and N2 and the positive direction as the direction from node N1 to node N2, such as Z-axis

the axis perpendicular to the plane formed by the axes X and Y as described above and towards the positive toward the node N1 to the top.

116

The following table shows the reaction forces calculated for the following conditions load:

- Weight structural elements and floor
- Accidental overload of use of the structure
- Wind direction X
- Wind direction Y
- Wind depression on the cover
- Earthquake Agent X direction
- Agent X direction earthquake Torque
- Earthquake agent Y direction
- Earthquake agent Y direction Torque

It takes the wind x and y and the earthquake agents along the x and y axis in the respective positive direction.

Reaction forces:

Reaction forces

IF LOAD: 1 weight COMBINATION

N. 3 CONDITIONS STATIC ANALYSIS

1 + Peso_proprio_____ 1:00

2 + peso_copertura 1:00

3 + peso_solaio 1:00

1) +1.00 * +1.00 * c001 c002 c003 +1.00 *

Unit of measure: SX, SY, SZ [daN] RX, RY, RZ [daNcm]

Multiplicative coefficient: 1.000000

Node 1 SX SY SZ RX RY RZ

50.3 8.5 225.2 746.4 0.0 377.8

Node 2 SX SY SZ RX RY RZ

50.3 -8.5 225.2 -746.4 377.8 0.0
Node 3 SX SY SZ RX RY RZ
-50.3 -8.5 225.2 -746.4 -377.8 0.0
117
Node 4 SX SY SZ RX RY RZ
-50.3 8.5 225.2 746.4 -377.8 0.0
Node 9 SX SY SZ RX RY RZ
0.0 0.0 153.8 -972.6 0.0 0.0
10 node SX SY SZ RX RY RZ
0.0 0.0 153.8 972.6 0.0 0.0
Reaction forces
IF LOAD: 2 accidental COMBINATION
N. 1 CONDITIONS STATIC ANALYSIS
4 + 1:00 accidental
1) +1.00 * c004
Unit of measure: SX, SY, SZ [daN] RX, RY, RZ [daNcm]
Multiplicative coefficient: 1.000000
Node 1 SX SY SZ RX RY RZ
0.0 0.0 542.7 4421.2 -26361.5 0.0
Node 2 SX SY SZ RX RY RZ
0.0 0.0 542.7 -4421.2 -26361.5 0.0
Node 3 SX SY SZ RX RY RZ
0.0 0.0 542.7 -4421.2 26361.5 0.0
Node 4 SX SY SZ RX RY RZ
0.0 0.0 542.7 4421.2 26361.5 0.0
Node 9 SX SY SZ RX RY RZ
0.0 0.0 1089.7 -9066.0 0.0 0.0
10 node SX SY SZ RX RY RZ
0.0 0.0 1089.7 9066.0 0.0 0.0
Reaction forces
IF LOAD: 3 x wind COMBINATION
N. 1 CONDITIONS STATIC ANALYSIS
6 + vento_x 1:00
1) +1.00 * c006
Unit of measure: SX, SY, SZ [daN] RX, RY, RZ [daNcm]
Multiplicative coefficient: 1.000000
Node 1 SX SY SZ RX RY RZ
-1080.2 -16.8 -440.3 5.4 -535.5 0.0
Node 2 SX SY SZ RX RY RZ
-1080.2 16.8 -440.3 -5.4 -535.5 0.0
Node 3 SX SY SZ RX RY RZ
-832.7 -15.1 440.3 4.8 -465.6 0.0
Node 4 SX SY SZ RX RY RZ
-832.7 15.1 440.3 -4.8 -465.6 0.0
Node 9 SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
10 node SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
Reaction forces
IF LOAD: 4 wind y COMBINATION
N. 1 CONDITIONS STATIC ANALYSIS

5 + vento_Y 1:00
1) +1.00 * c005
Unit of measure: SX, SY, SZ [daN] RX, RY, RZ [daNcm]
Multiplicative coefficient: 1.000000
Node 1 SX SY SZ RX RY RZ
-95.1 -2638.3 -2672.5 6613.0 -26.9 0.0
Node 2 SX SY SZ RX RY RZ
92.8 -2112.8 2672.5 6444.7 26.2 0.0
118
Node 3 SX SY SZ RX RY RZ
-92.8 -2112.8 2672.5 6444.7 -26.2 0.0
Node 4 SX SY SZ RX RY RZ
95.1 -2638.3 -2672.5 6613.0 26.9 0.0
Node 9 SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
10 node SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
Reaction forces
IF LOAD: 5 wind depression COMBINATION
N. 1 CONDITIONS STATIC ANALYSIS
7 + vento_depressione 1:00
1) +1.00 * c007
Unit of measure: SX, SY, SZ [daN] RX, RY, RZ [daNcm]
Multiplicative coefficient: 1.000000
Node 1 SX SY SZ RX RY RZ
-381.7 -40.3 -776.3 12.9 -31832.9 0.0
Node 2 SX SY SZ RX RY RZ
-381.7 40.3 -776.3 -12.9 -31832.9 0.0
Node 3 SX SY SZ RX RY RZ
381.7 40.3 -776.3 -12.9 31832.9 0.0
Node 4 SX SY SZ RX RY RZ
381.7 -40.3 -776.3 12.9 31832.9 0.0
Node 9 SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
10 node SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
Reaction forces
IF LOAD: 6 x earthquake COMBINATION
N. 1 CONDITIONS STATIC ANALYSIS
Sisma_X 8 + 1:00
1) +1.00 * c008
Unit of measure: SX, SY, SZ [daN] RX, RY, RZ [daNcm]
Multiplicative coefficient: 1.000000
Node 1 SX SY SZ RX RY RZ
-200.7 -6.7 -184.8 2.1 -210.1 0.0
Node 2 SX SY SZ RX RY RZ
-200.7 6.7 -184.8 -2.1 -210.1 0.0
Node 3 SX SY SZ RX RY RZ
-200.7 -6.7 184.8 2.1 -210.1 0.0
Node 4 SX SY SZ RX RY RZ
-200.7 6.7 184.8 -2.1 -210.1 0.0

```
Node 9 SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
10 node SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
Reaction forces
IF LOAD: 7 Torque x COMBINATION
N. 1 CONDITIONS STATIC ANALYSIS
10 + 1:00 Torcente_add._X
1) +1.00 * c010
Unit of measure: SX, SY, SZ [daN] RX, RY, RZ [daNcm]
Multiplicative coefficient: 1.000000
Node 1 SX SY SZ RX RY RZ
20.0 0.0 18.4 -3.1 21.0 0.0
Node 2 SX SY SZ RX RY RZ
119
-20.0 0.0 -18.4 -3.1 -21.0 0.0
Node 3 SX SY SZ RX RY RZ
-20.0 -21.0 0.0 18.4 3.1 0.0
Node 4 SX SY SZ RX RY RZ
20.0 0.0 -18.4 3.1 21.0 0.0
Node 9 SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
10 node SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
Reaction forces
IF LOAD: 8 earthquake y COMBINATION
N. 1 CONDITIONS STATIC ANALYSIS
9 + Sisma_Y 1:00
1) +1.00 * C009
Unit of measure: SX, SY, SZ [daN] RX, RY, RZ [daNcm]
Multiplicative coefficient: 1.000000
Node 1 SX SY SZ RX RY RZ
-15.9 -200.7 -451.7 1103.4 -4.5 0.0
Node 2 SX SY SZ RX RY RZ
15.9 -200.7 451.7 1103.4 4.5 0.0
Node 3 SX SY SZ RX RY RZ
-15.9 -200.7 451.7 1103.4 -4.5 0.0
Node 4 SX SY SZ RX RY RZ
15.9 -200.7 -451.7 1103.4 4.5 0.0
Node 9 SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
10 node SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
Reaction forces
IF LOAD: 9 Torque y COMBINATION
N. 1 CONDITIONS STATIC ANALYSIS
11 + 1:00 Torcente_add._Y
1) +1.00 * C011
Unit of measure: SX, SY, SZ [daN] RX, RY, RZ [daNcm]
Multiplicative coefficient: 1.000000
Node 1 SX SY SZ RX RY RZ
```



```
0.0 20.1 45.1 -112.2 1.5 0.0
Node 2 SX SY SZ RX RY RZ
0.0 20.1 -45.1 -112.2 -1.5 0.0
Node 3 SX SY SZ RX RY RZ
0.0 -20.1 45.1 112.2 -1.5 0.0
Node 4 SX SY SZ RX RY RZ
0.0 -20.1 -45.1 112.2 1.5 0.0
Node 9 SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
10 node SX SY SZ RX RY RZ
0.0 0.0 0.0 0.0 0.0 0.0
120
```

Below is the table with the maximum loads to the foot for each type of action obtained by extrapolating the maximum values from the totality of the loading cases.