



Tipo Documento: Relazione Tecnica

Codice documento: SFP-CSC-100040-CCGT

Rev. 1

Pagina 1 di 57

Centrale di San Filippo del Mela
Progetto definitivo per l'installazione di un nuovo ciclo combinato a gas
Note di calcolo - Sala Macchine

APPLICA

A2A/DGE/BGT/GEN/ING

LISTA DI DISTRIBUZIONE

A2A/DGE/BGT/GEN/ING
AEF/AMD/ISF



LOGO E CODIFICA DEL FORNITORE

TECHINT
Engineering & Construction

0421-TITA-C-CA-000-005

EMISSIONE					
1	10/12/2019	FU = Per Uso	C. Bettoni	D. Morgera	P. Coletti
0	27/11/2019	FA = Per Approvazione	L. Agostino	C. Bettoni	G. Ricci
REV	DATA	DESCRIZIONE	REDAZIONE	VERIFICA	APPROVAZIONE

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1 SCOPO

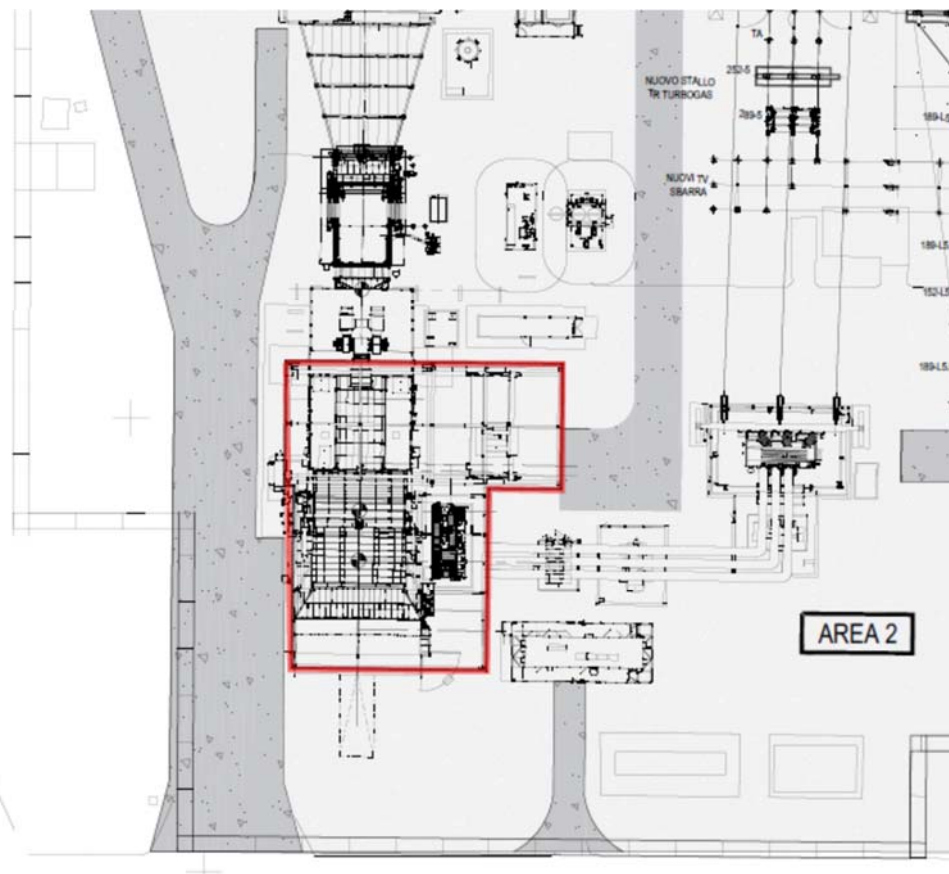
L'ambito di applicazione del presente documento include l'analisi strutturale e la progettazione della seguente struttura in acciaio:

→ edificio GTG

Tale edificio è costituito da due diverse strutture: una per il sostegno dell'Air Intake e l'altra relativa al carroponete necessario alla manutenzione e gestione del turboalternatore.

Tale report riguarda il predimensionamento della sola struttura a sostegno del carroponete, in quanto sarà onere e cura del Vendor la definizione della struttura di sostegno dell'Air Intake.

Nell'impianto è collocato nella seguente area:



2 PARAMETRI DI PROGETTAZIONE

2.1 DOCUMENTI DI RIFERIMENTO

NORMATIVE

- 1 Decreto ministeriale 17 gennaio 2018 - AGGIORNAMENTO "Norme tecniche per le costruzioni".
- 2 Circolare 21 gennaio 2019, nr. 7 - "Istruzioni per l'applicazione dell'aggiornamento delle Norme tecniche per le costruzioni".
- 3 UNI EN 1992-1: Eurocodice 2 – Progettazione delle strutture di calcestruzzo - Parte 1-1: Regole generali e regole per gli edifici

RELAZIONI E SPECIFICHE TECNICHE

- 4 SFP-RTC-100004-CCGT-00 Relazione Sismica
- 5 SFP-RTC-100005-CCGT-00 Relazione Geotecnica

2.2 SOFTWARE

STAAD.Pro Advanced – 2017 Bentley Systems.

2.3 MATERIALI

2.3.1 ACCIAIO STRUTTURALE

S275

- $f_{yk} = 275 \text{ N/mm}^2$
- $f_{tk} = 370\text{-}530 \text{ N/mm}^2$
- $E_s = 2.1 \times 10^5 \text{ N/mm}^2$

2.3.2 CALCESTRUZZO

C 35/45

- | | | | |
|--|-------------|-------|-----|
| • resistenza caratteristica cilindrica | $f_{ck} =$ | 35 | MPa |
| • resistenza caratteristica cubica | $R_{ck} =$ | 45 | MPa |
| • resistenza media a compressione | $f_{cm} =$ | 43 | MPa |
| • resistenza media a trazione | $f_{ctm} =$ | 3.20 | MPa |
| • modulo di elasticità secante | $E_{cm} =$ | 34077 | MPa |

2.3.3 ACCIAIO D'ARMATURA

Barre ad aderenza migliorata, saldabile, tipo **B450C** dotato delle seguenti caratteristiche meccaniche:

- | | |
|--|----------------------------|
| • modulo elastico | $E_s = 210000 \text{ MPa}$ |
| • Tensione caratteristica di snervamento | $f_{yk} = 450 \text{ MPa}$ |
| • Tensione caratteristica di rottura | $f_{tk} = 540 \text{ MPa}$ |

2.4 PARAMETRI AZIONE DELLA NEVE

- $q_{sk} = 0.6 \text{ KN/m}^2$ (si veda Fig. 3.4.1 di [1])
- $C_e = 1$
- $C_t = 1$
- $\mu_1 = 0.8$
- $q_s = 0.48 = \text{KN/m}^2$

2.5 PARAMETRI AZIONE DEL VENTO

Considerando zona 4 (si veda Tab. 3.3.I di [1]):

- $v_{b,0} = 28 \text{ m/s}$
- $a_0 = 500 \text{ m}$
- $k_s = 0.36$

Essendo il sito situato a circa 89 m slm, la velocità base di riferimento sarà pari a:

$$v_b = C_a v_{b,0} = 1 * 28 \text{ m/s} = 28 \text{ m/s.}$$

La velocità di riferimento sarà pari a: $v_r = v_b C_r = 28 * 1 = 28 \text{ m/s.}$

Considerando una categoria di esposizione II (si veda Tab. 3.3.II di [1]):

- $k_r = 0.19$
- $z_0 = 0.05 \text{ m}$
- $z_{min} = 4 \text{ m}$

Per tanto, la pressione del vento sarà data dalla seguente espressione:

$$p = q_r C_e C_p C_d$$

dove:

- $q_r = 490 \text{ N/m}^2$
- $C_d = 1$
- $C_t = 1$
- $C_e(z)$: coefficiente di esposizione.
- C_p : coeff. di pressione (si veda [2])

2.6 PARAMETRI AZIONE SISMICA

- si veda [4]:

		ag (g)	F0	Tc* (sec)
SLO	30	0.053	2.415	0.277
SLD	50	0.066	2.423	0.301
SLV	476	0.159	2.527	0.374
SLC	976	0.201	2.567	0.404

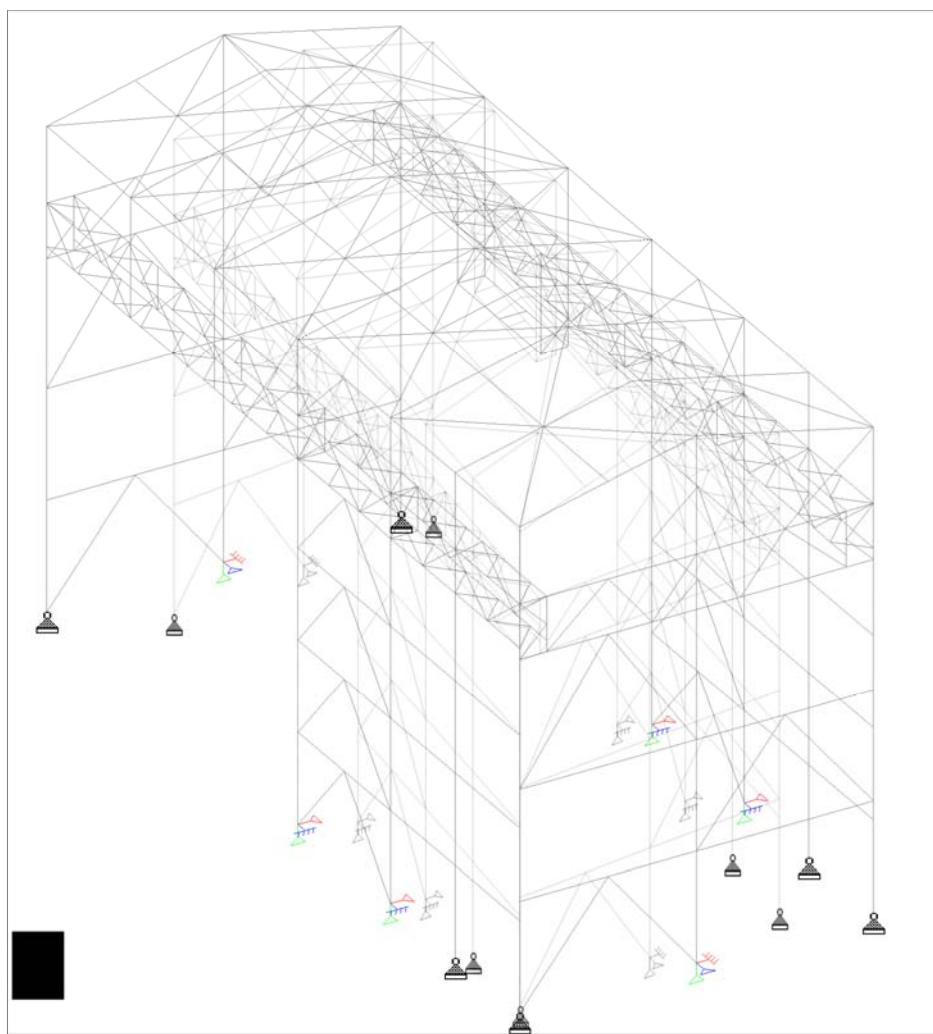
- **Categoria di sottosuolo C:** Depositi di terreni a grana grossa mediamente addensati o terreni a grana fina mediamente consistenti, a cui corrisponde un coefficiente d'amplificazione stratigrafica (S_s) pari a 1.50
- **Categoria topografica T1:** superficie pianeggiante, a cui corrisponde un coefficiente di amplificazione topografica (S_T) pari a 1.00.

3 EDIFICIO GTG

3.1 MODELLO STRUTTURALE

La struttura del carro ponte della turbina a gas supporta un carro ponte della capacità di 130 Ton (in base all'esperienza su strutture simili in progetti già realizzati). La struttura è adiacente alla struttura di Air Intake, infatti alcune fondazioni delle due strutture sono combinate.

La lunghezza totale della struttura è pari a 34,7m lungo la direzione est-ovest e la larghezza è pari a 15m lungo la direzione nord-sud.



Vista 3D

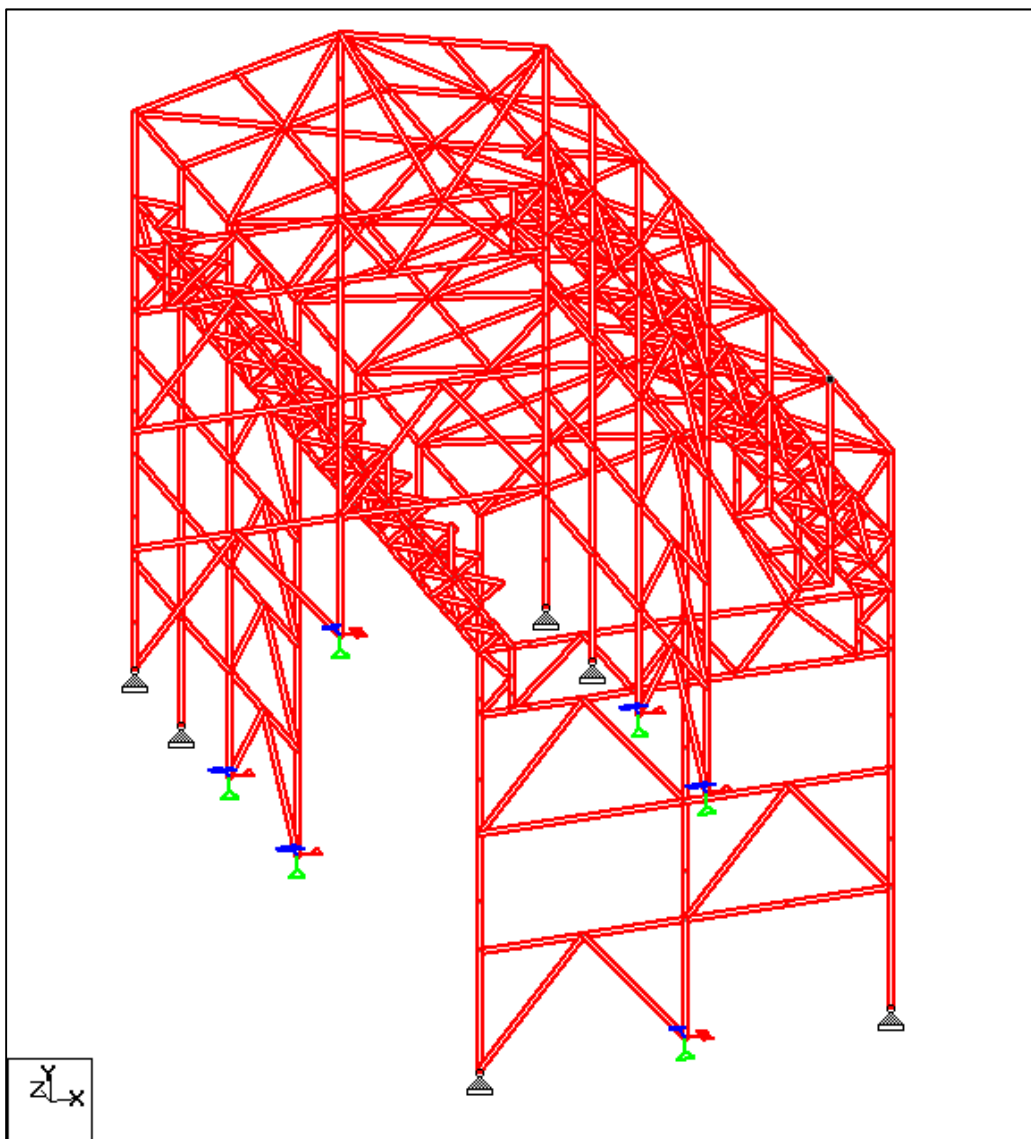
3.2 CARICHI CARATTERISTICI

3.2.1 CARICHI PERMANENTI (DL)

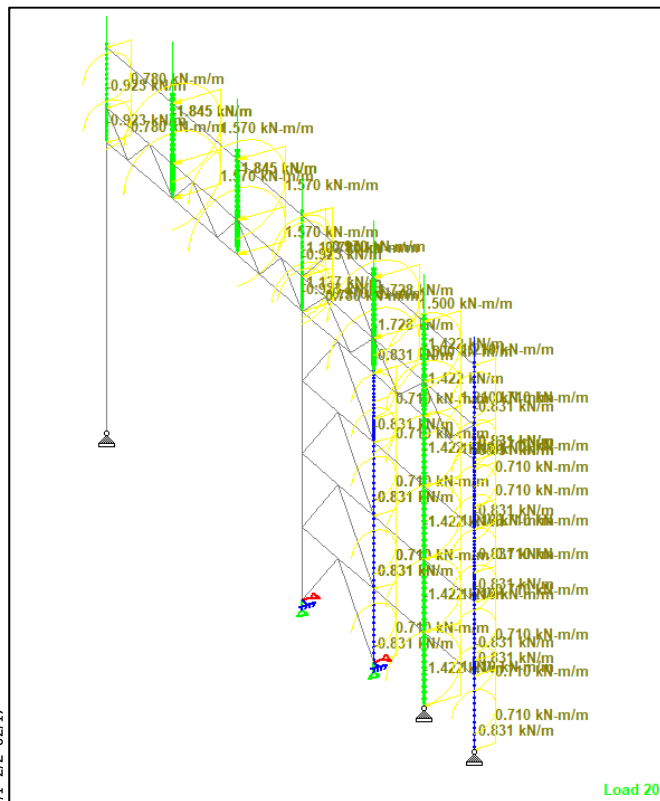
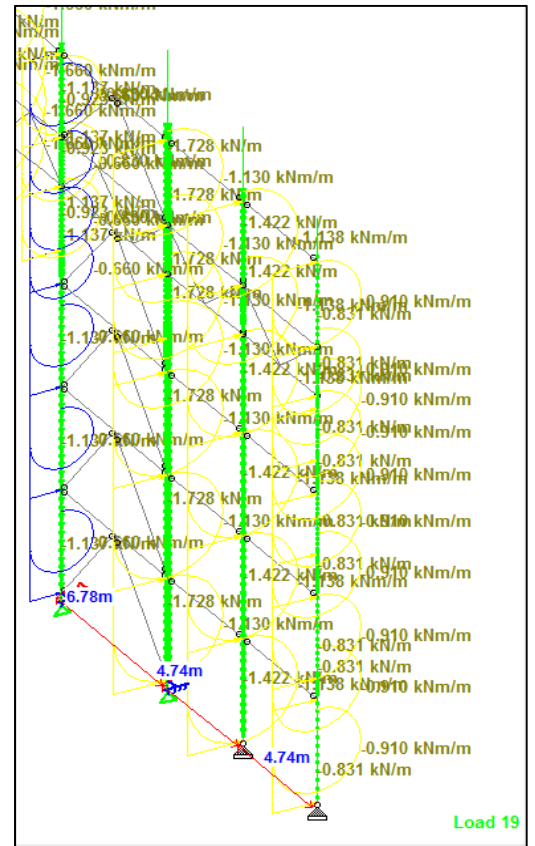
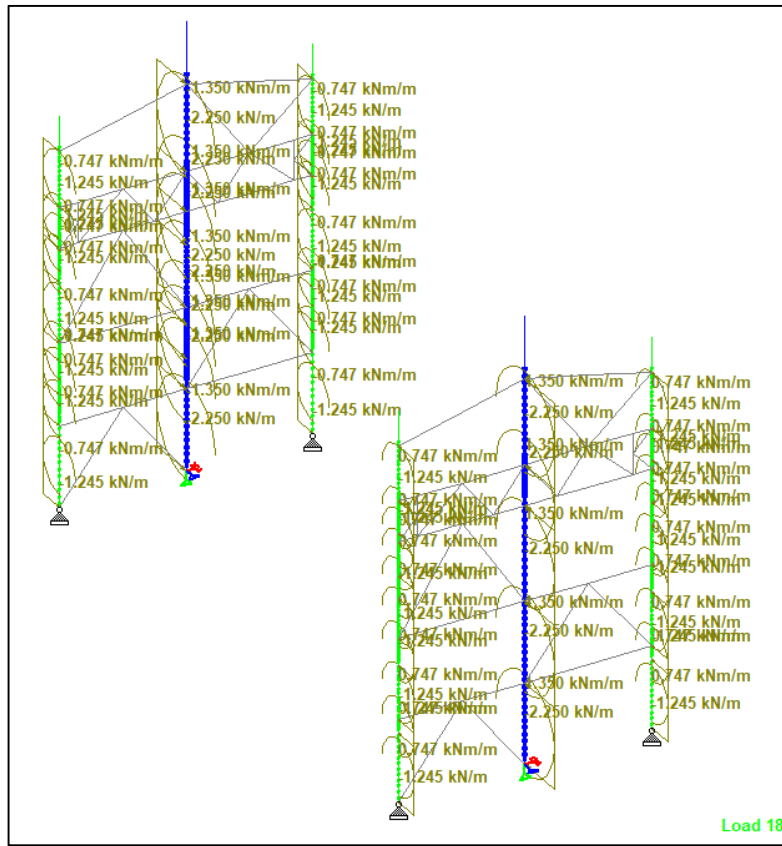
Sono inclusi:

- Il peso della struttura in acciaio stessa.
- Il rivestimento laterale + la copertura.

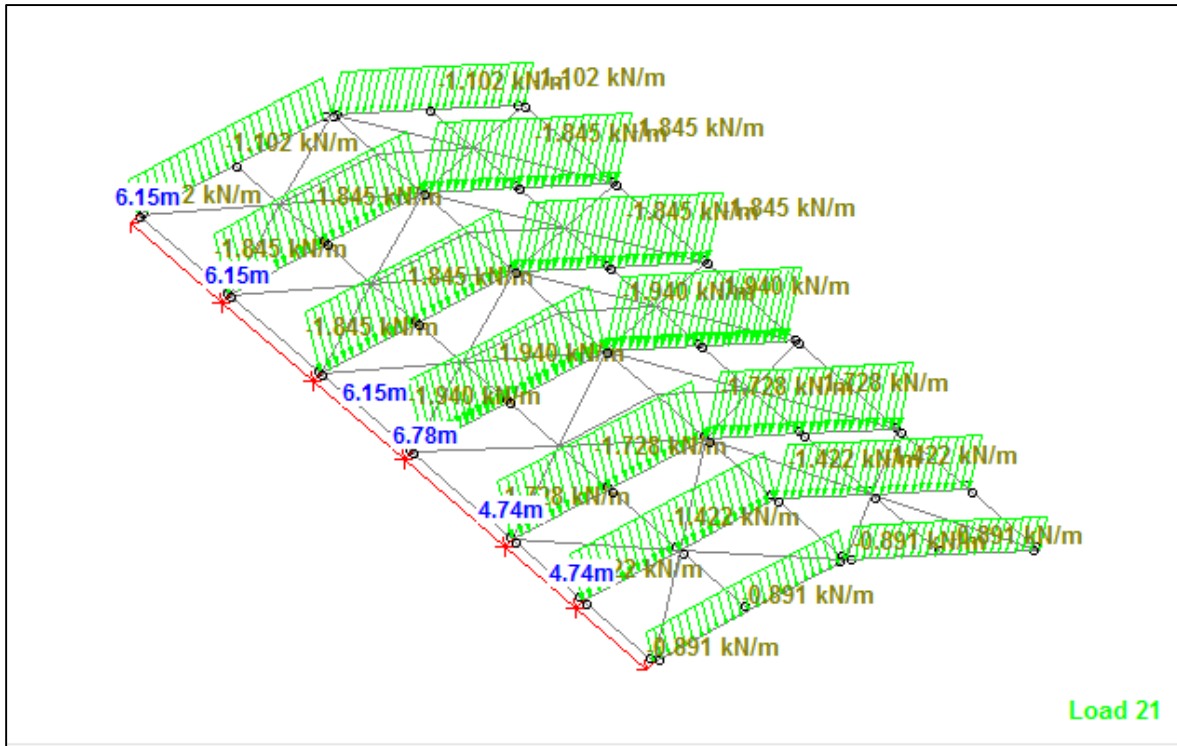
Si assume che il peso del rivestimento laterale e della copertura sia pari a $0,3 \text{ kN/m}^2$, ($0,1 \text{ kN/m}^2$ per pannello + $0,2 \text{ kN/m}^2$ per baraccatura).



Peso proprio struttura



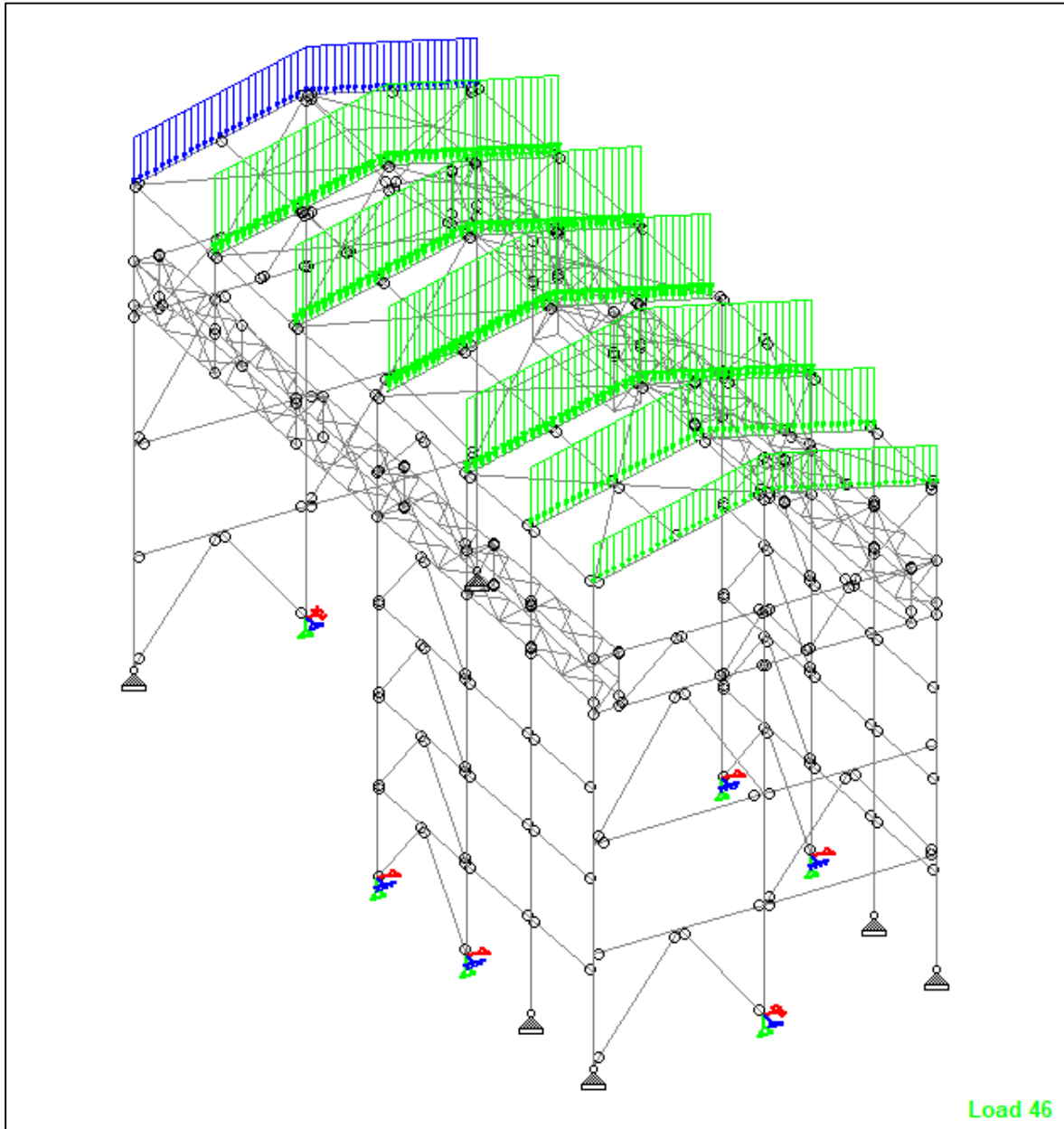
Peso proprio pannellatura e baraccatura



Peso proprio pannellatura e baraccatura - Copertura

3.2.2 CARICO DELLA NEVE (SL)

Condizione di carico - 21



3.2.3 CARICHI DEL CARROPONTE

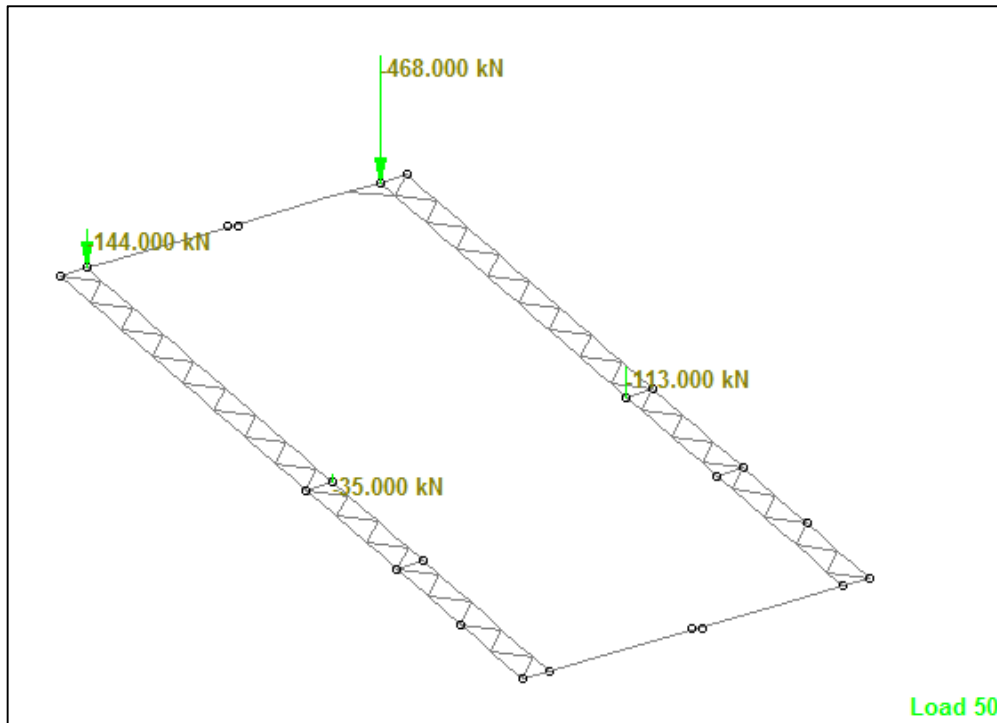
Carichi permanenti-Unloaded Crane (condizione di carico - da 50 a 53)

Questi sono i carichi del carroponte a vuoto con il carrello il più vicino possibile all'allineamento A.

- Carico massimo per ruota (gru scarica) =153 kN
- Carico minimo per ruota (gru scarica) =37 kN

Quindi, per proporzione, partendo dall'esempio riportato nella pagina seguente:

- Reazione ad A1= $153/519*1588=468$ kN
- Reazione a C1= $153*4-468=144$ kN
- Reazione ad A2= $37/63*193=113$ kN
- Reazione a C2= $37/63*59=35$ kN

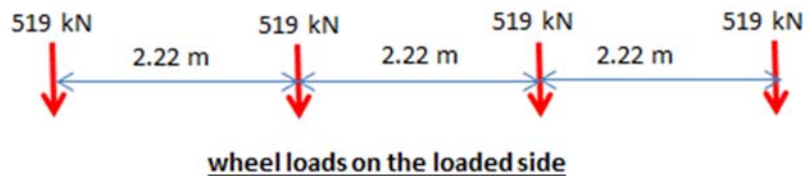


Carico operativo della gru (condizione di carico da 22 a 25)

Questi sono relativi ai carichi verticali della gru caricata quando la prima ruota si trova su un allineamento o vicino ad esso.

- a) Carico massimo per ruota (gru carica) =519 kN
- b) Carico minimo per ruota (gru carica) =63 kN

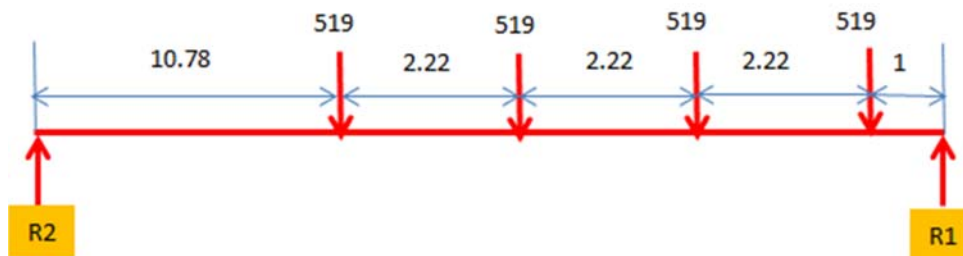
a) Ad es. per caso di carico 22:



Distanza fra allineamento 1 e 2=18,44 m

Si considera la prima ruota ad 1m dall'allineamento 1 (non può trovarsi sull'allineamento a causa del fine corsa).

Le reazioni agli allineamenti 1 e 2 sul lato di carico sono calcolate di seguito:



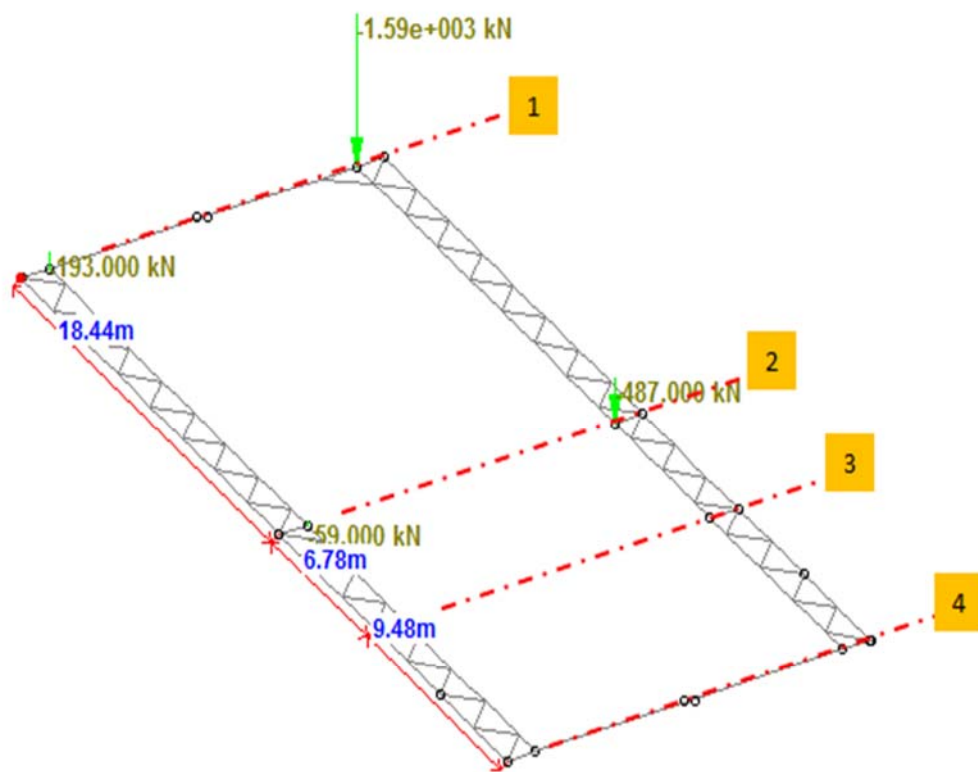
$$R1 = 519 \cdot (10,78 + 10,78 + 2,22 + 10,78 + 2,22 \cdot 2 + 10,78 + 2,22 \cdot 3) / 18,44 = 1588 \text{ kN}$$

$$R2 = 519 \cdot 4 - 1588 = 487 \text{ kN}$$

b) Le reazioni pro-rata date dal carico minimo sono:

$$\text{Allineamento 1} = 63 / 519 \cdot 487 = 193 \text{ kN}$$

$$\text{Allineamento 2} = 63 / 519 \cdot 487 = 59 \text{ kN}$$



Load 22

I casi di carico 23,24,25 sono simili: nel 23, la ruota si trova sull'allineamento 2; nel 24, la ruota si trova all'allineamento 3 e nel 25, la ruota si trova ad 1 metro dall'allineamento 5 (la ruota non può trovarsi sull'allineamento 5 a causa dei fine corsa).

Carichi orizzontali (carico da 26 a 29)**2.7.5 Horizontal loads $H_{T,3}$ caused by acceleration or deceleration of the crab**

(1) The horizontal load $H_{T,3}$ caused by acceleration or deceleration of the crab or trolley may be assumed to be covered by the horizontal load $H_{B,2}$ given in 2.11.2.

Carico utile= 1300 kN

Peso del ragno, del paranco, delle funi etc=460 kN

Totale=1760 kN

Totale HT3 carico=0,1*1760=176 kN

Il carico è considerato distribuito su tutte le ruote in modo uguale:

Carico per ruota=176/8=22 kN.

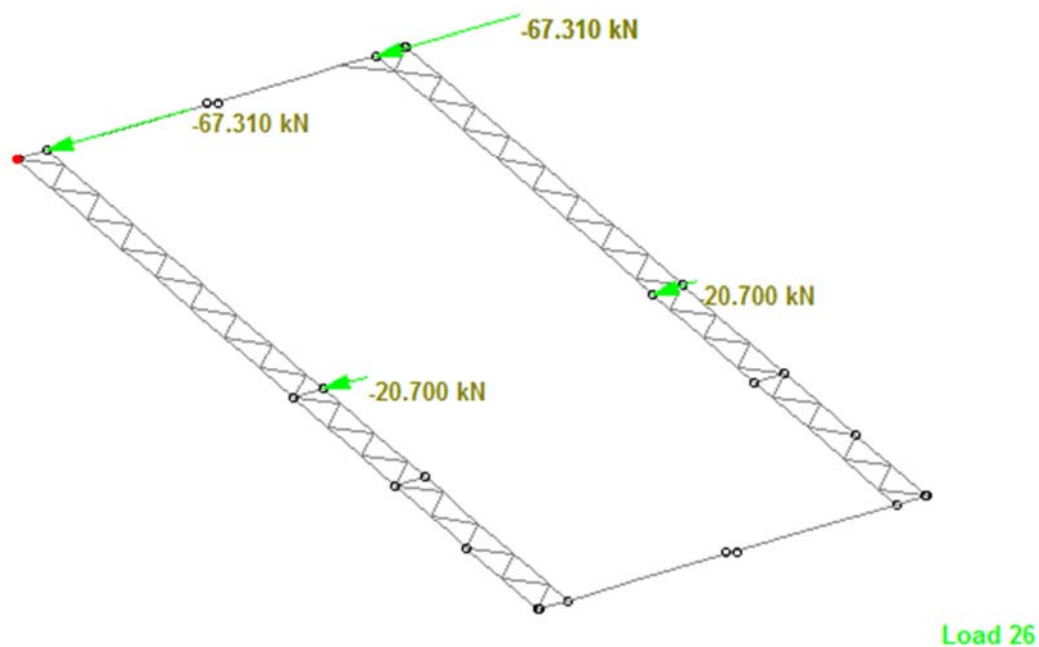
Si indica come esempio il carico di carico 26:

Reazioni definite in proporzione al caso di carico 22

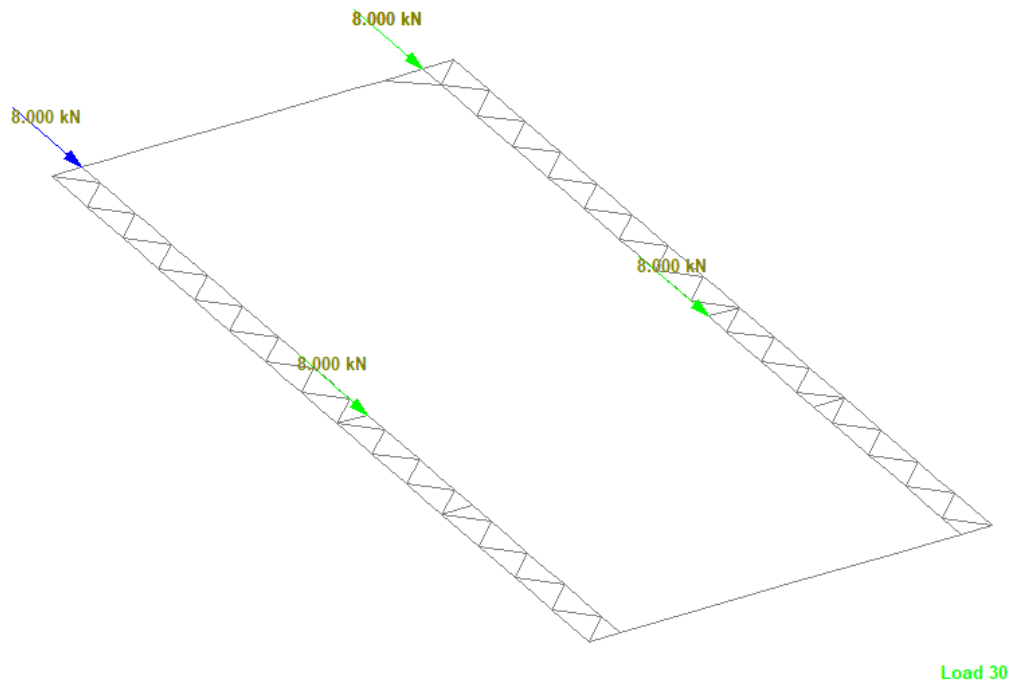
Carico laterale (GX) allineamento 1 = $22/519 \cdot 1588 = 67,31$ kN (su entrambe le colonne di allineamento 1)

Carico laterale (GX) allineamento 2 = $22/519 \cdot 487 = 20,7$ kN (su entrambe le colonne dell'allineamento 2)

I casi di carico da 28 a 29 possono essere definiti in modo analogo.



Carico orizzontale (caso di carico - da 30 a 33)



Carichi trasversali provocati dall'accelerazione del ponte (condizione di carico - da 34 a 37)

$$\varphi_5 = 2$$

C COMPUTE VARIOUS WHEEL LOADS

where:

- $Q_{r,max}$ is the maximum load per wheel of the loaded crane
- $Q_{r(max)}$ is the accompanying load per wheel of the loaded crane
- $\Sigma Q_{r,max}$ is the sum of the maximum loads $Q_{r,max}$ per runway of the loaded crane
- $\Sigma Q_{r(max)}$ is the sum of the accompanying maximum loads $Q_{r(max)}$ per runway of the loaded crane
- $Q_{r,min}$ is the minimum load per wheel of the unloaded crane
- $Q_{r,(min)}$ is the accompanying load per wheel of the unloaded crane
- $\Sigma Q_{r,min}$ is the sum of the minimum loads $Q_{r,min}$ per runway of the unloaded crane
- $\Sigma Q_{r,(min)}$ is the sum of the accompanying minimum loads $Q_{r,(min)}$ per runway of the unloaded crane
- $Q_{h,nom}$ is the nominal hoist load

C1 compute $Q_{r,max}$

this is the maximum wheel load of a loaded crane and has been given by the vendor

$$Q_{r,max} := 519.3 \text{ kN} \quad \text{Vendor}$$

C2 compute $Q_r(max)$

this is the lesser wheel load corresponding to $Q_{r,max}$ and can be assumed equal to (weight of bridge+trollyes+main payload+hooks+rope-4*max sheel load 519.3)/4

$$Q_{r,max_acc} := \frac{Q_c + Q_{hook_rope_all_hoits} + payload_{main} - N_{wheels_oneside} \cdot Q_{r,max}}{N_{wheels_oneside}} = 62.332 \text{ kN}$$

C3 compute Q_{r,min}

We can only get an approximate value of this. Reasonable value=max wheel load of 519.3-contribution of main payload to the wheel loads.

$$\text{hook}_{\text{approach_main_payload}} := 1.45\text{m}$$

$$\text{contr}_{\text{main_payload_to_Q}_{r,\text{max}}} := \frac{\text{span} - \text{hook}_{\text{approach_main_payload}}}{\text{span}} \cdot \text{payload}_{\text{main}} \cdot \frac{1}{N_{\text{wheels_oneside}}}$$

$$\text{contr}_{\text{main_payload_to_Q}_{r,\text{max}}} = 3.664 \times 10^5 \text{ N} \quad \text{contribution of main payload}$$

$$Q_{r,\text{min_acc}} := Q_{r,\text{max}} - \text{contr}_{\text{main_payload_to_Q}_{r,\text{max}}} = 152.888\text{-kN}$$

C4 compute Q_{r,min}

$$Q_{r,\text{min}} := \frac{Q_c + Q_{\text{hook_rope_all_hoits}} - 4 \cdot Q_{r,\text{min_acc}}}{N_{\text{wheels_oneside}}} = 36.479\text{-kN}$$

C5 compute $\Sigma Q_{r,\text{min}}$ and $\Sigma Q_{r,\text{min}}$

$$\Sigma Q_{r,\text{min}} := N_{\text{wheels_oneside}} \cdot Q_{r,\text{min}} = 145.914\text{-kN}$$

$$\Sigma Q_{r,\text{min_acc}} := N_{\text{wheels_oneside}} \cdot Q_{r,\text{min_acc}} = 611.552\text{-kN}$$

$$\frac{\Sigma Q_{r,\text{min}} + \Sigma Q_{r,\text{min_acc}} - Q_{\text{hook_rope_all_hoits}}}{Q_c} = 1 \quad \text{check ok}$$

D. COMPUTE LONGITUDINAL CRANE LOADS**2.7.4 Horizontal loads $H_{S,i,j,k}$ and the guide force S caused by skewing of the crane**

(1) The guide force S and the transverse forces $H_{S,i,j,k}$ caused by skewing may be obtained from:

$$S = f \times \lambda_{s,j} \times \Sigma Q_r \quad (2.6)$$

$$H_{S,1,j,L} = f \times \lambda_{s,1,j,L} \times \Sigma Q_r \quad (\text{index } j \text{ indicates the driven wheel pair}) \quad (2.7)$$

$$H_{S,2,j,L} = f \times \lambda_{s,2,j,L} \times \Sigma Q_r \quad (\text{index } j \text{ indicates the driven wheel pair}) \quad (2.8)$$

$$H_{S,1,j,T} = f \times \lambda_{s,1,j,T} \times \Sigma Q_r \quad (2.9)$$

$$H_{S,2,j,T} = f \times \lambda_{s,2,j,T} \times \Sigma Q_r \quad (2.10)$$

2.7.3 Drive force K

- (1) The drive force K on a driven wheel should be taken such that wheel spin is prevented.
- (2) The drive force K should be given by the crane supplier.
- (3) Where no wheel controlled system is applied, the drive force K may be calculated as follows:

$$K = K_1 + K_2 = \mu \sum Q_{r,\min}^* \quad (2.5)$$

where:

- μ is the friction factor, see (3);
 - for single wheel drive: $\sum Q_{r,\min}^* = m_w Q_{r,\min}$, with m_w = number of single wheel drives;
 - for central wheel drive: $\sum Q_{r,\min}^* = Q_{r,\min} + Q_{r,(min)}$;

assume single wheel drive for a modern crane as code says "modern cranes usually dont have central wheel drive"

- (4) The friction factor : may be taken as:

- $\mu = 0,2$ for steel - steel;
- $\mu = 0,5$ for steel - rubber.

$\mu := 0.2$ steel to steel

$$K_{\text{drive_force}} := \mu \cdot N_{\text{single_wheel_drives}} \cdot Q_{r,\min} = 14.591 \cdot \text{kN}$$

$$H_{L_1} := \varphi_5 \cdot K_{\text{drive_force}} \cdot \frac{1}{n_r} = 14.591 \cdot \text{kN} \quad \text{on rail 1}$$

$$H_{L_2} := \varphi_5 \cdot K_{\text{drive_force}} \cdot \frac{1}{n_r} = 14.591 \cdot \text{kN} \quad \text{on rail 2}$$

E COMPUTE LATERAL LOADS CAUSED BY THE LONGITUDINAL LOADS

- (3) The moment M resulting from the drive force which should be applied at the centre of mass is equilibrated by transverse horizontal loads $H_{T,1}$ and $H_{T,2}$, see Figure 2.6. The horizontal loads may be obtained as follows:

$$H_{T,1} = \varphi_5 \xi_2 \frac{M}{a} \quad (2.3)$$

$$H_{T,2} = \varphi_5 \xi_1 \frac{M}{a} \quad (2.4)$$

where:

- $$\xi_1 = \frac{\sum Q_{r,max}}{\sum Q_r}$$
- $$\xi_2 = 1 - \xi_1;$$
- $$\sum Q_r = \sum Q_{r,max} + \sum Q_{r(max)};$$
- $$\sum Q_{r,max} \text{ see Figure 2.1;}$$
- $$\sum Q_{r(max)} \text{ see Figure 2.1;}$$
- a is the spacing of the guide rollers or the flanged wheels ;
- $$M = K \times l_s;$$
- $$l_s = (\xi_1 - 0,5) \times l ;$$
- l is the span of the crane bridge;
- φ_3 is the dynamic factor, see Table 2.6;
- K is the drive force, see 2.7.3.

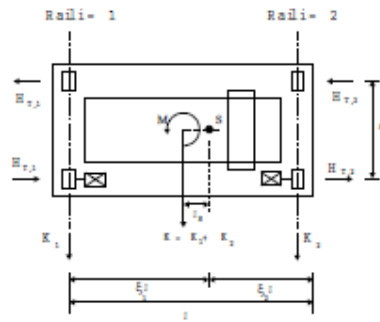


Figure 2.6: Definition of the transverse loads $H_{T,i}$

$$\sum Q_{r_max} := Q_{r_max} \cdot N_{wheels_oneside} = 2.077 \times 10^6 \text{ N}$$

$$\sum Q_{r_max_acc} := Q_{r_max_acc} \cdot N_{wheels_oneside} = 2.493 \times 10^5 \text{ N}$$

$$\xi_1 := \frac{\sum Q_{r_max}}{\sum Q_{r_max_acc} + \sum Q_{r_max}} = 0.893$$

$$\xi_2 := 1 - \xi_1 = 0.107$$

as for the definition of a , the code shows 2 wheels on one side but there are actually 4 on each side. We assume all are flanged.

$$\text{wheel_base_1} := 2.22\text{m} \quad \text{wheel_base_2} := 2.12\text{m} \quad \text{wheel_base_3} := 2.22\text{m}$$

Vendor

$$L_1 := \frac{\text{wheel_base_2}}{2} = 1.06\text{m}$$

$$L_2 := L_1 + \text{wheel_base_1} = 3.28\text{m}$$

$$l_s := (\xi_1 - 0.5) \cdot \text{span} = 8.642\text{m}$$

$$M := K_{\text{drive_force}} \cdot l_s = 126.103 \cdot \text{kN} \cdot \text{m}$$

$$H_{T_1_alt1} := \varphi_5 \cdot \xi_2 \cdot \frac{M}{2 \cdot (L_2 + L_1)} = 3.114 \cdot \text{kN}$$

alt1 means same load at all wheels

$$H_{T_2_alt1} := \varphi_5 \cdot \xi_1 \cdot \frac{M}{2 \cdot (L_2 + L_1)} = 25.942 \cdot \text{kN}$$

$$K_1 := \frac{\varphi_5 \cdot \xi_2 \cdot M}{2 \cdot L_2^2 + 2 \cdot L_1^2} = 1.137 \times 10^3 \frac{\text{kg}}{\text{s}^2}$$

$$K_2 := \frac{\varphi_5 \cdot \xi_1 \cdot M}{2 \cdot L_2^2 + 2 \cdot L_1^2} = 9.476 \times 10^3 \frac{\text{kg}}{\text{s}^2}$$

$$H_{T_1_outer_alt2} := K_1 \cdot L_2 = 3.731 \cdot \text{kN}$$

$$H_{T_1_inner_alt2} := K_1 \cdot L_1 = 1.206 \cdot \text{kN}$$

these are wheel loads assuming that wheel load is proportional to distance of the wheel from centre of wheel frame

$$H_{T_2_outer_alt2} := K_2 \cdot L_2 = 31.08 \cdot \text{kN}$$

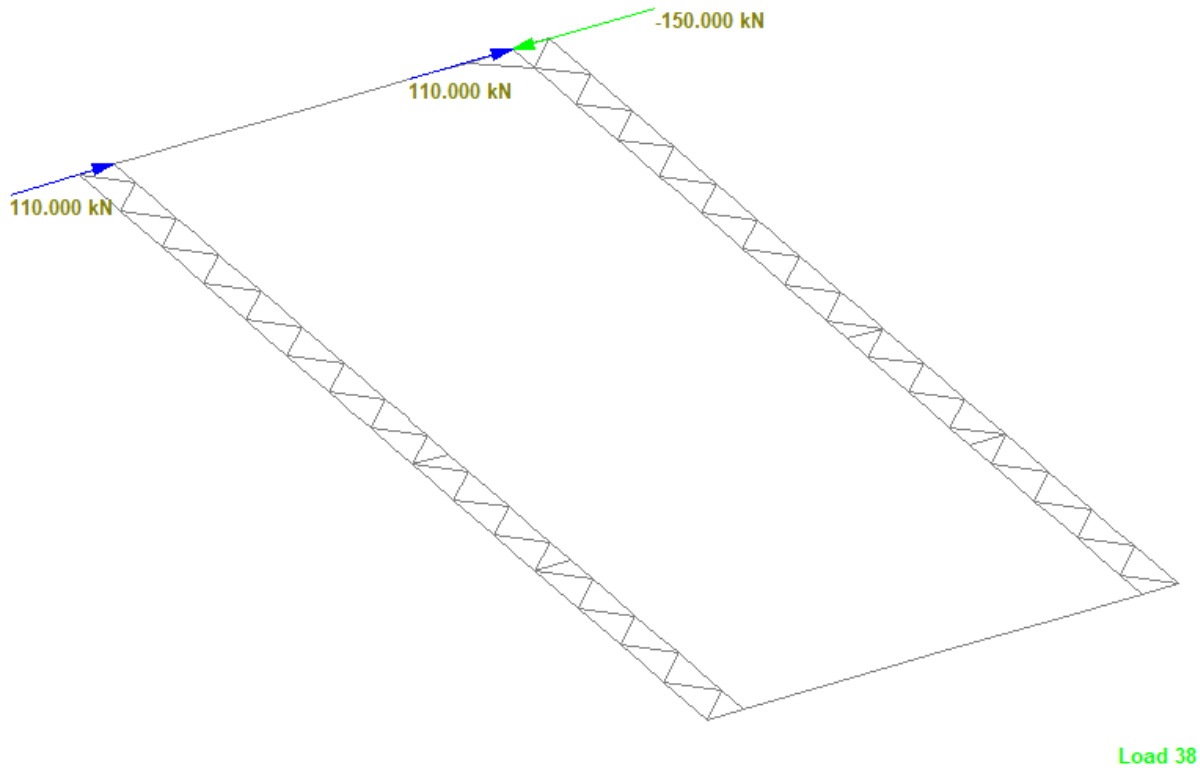
$$H_{T_2_inner_alt2} := K_2 \cdot L_1 = 10.044 \cdot \text{kN}$$

$$\text{Moment}_{\text{load_side}} := \varphi_5 \cdot \xi_1 \cdot M = 225.178 \cdot \text{kN} \cdot \text{m}$$

these moments will be converted into couple= moment/columns span and applied in SAP

$$\text{Moment}_{\text{other_side}} := \varphi_5 \cdot \xi_2 \cdot M = 27.029 \cdot \text{kN} \cdot \text{m}$$

Carichi di disallineamento (casi di carico - da 38 a 41)



3.2.4 CARICHI DEL VENTO (WX/WZ)

Carichi del vento esterno -X+Z e -Z (condizione di carico - 42,43,44)

Il carico di vento viene generato in staad utilizzando intensità del vento nel modo seguente:

Intensity		
Select Type:	Custom	
Intensity vs. Height		
	Int (kN/m ²)	Height (m)
1	0.879999995	0
2	0.879999995	5
3	1.149999976	10
4	1.279999971	15
5	1.379999995	20
6	1.450000047	25
7	1.519999980	30
8		

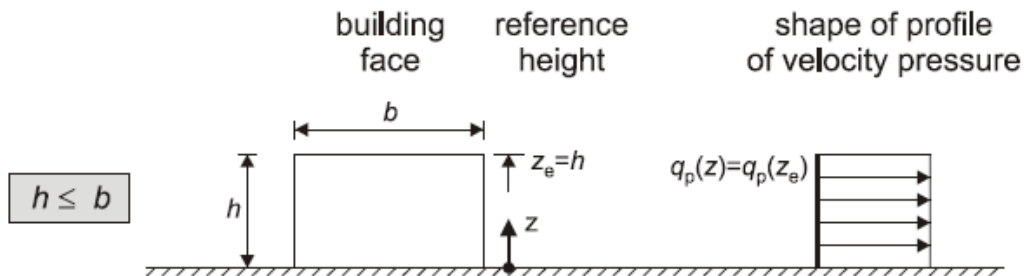
Non abbiamo considerato il vento lungo +X poiché l'area di sopravento per questa la direzione del vento è inferiore alla direzione del vento -X per la presenza della struttura di supporto dell'Air Intake.

Per il vento in direzione -X, la dimensione del vento laterale $b = 18,44 + 6,78 + 4,74 * 2 + 0,6 * 2$ (sporgenza) = 35,9 m

$d = 7,5 + 7,5 + 0,6 * 2$ (sporgenza) = 16,2 m

$h = 23$ m (cresta ovvero il punto più alto del tetto)

in modo che si applichi $h \leq b$



Altezza di riferimento = $Z_E = h = 23$ m (utilizzare 25 m come approssimazione)

$h/d = 23/16,2 = 1,42$

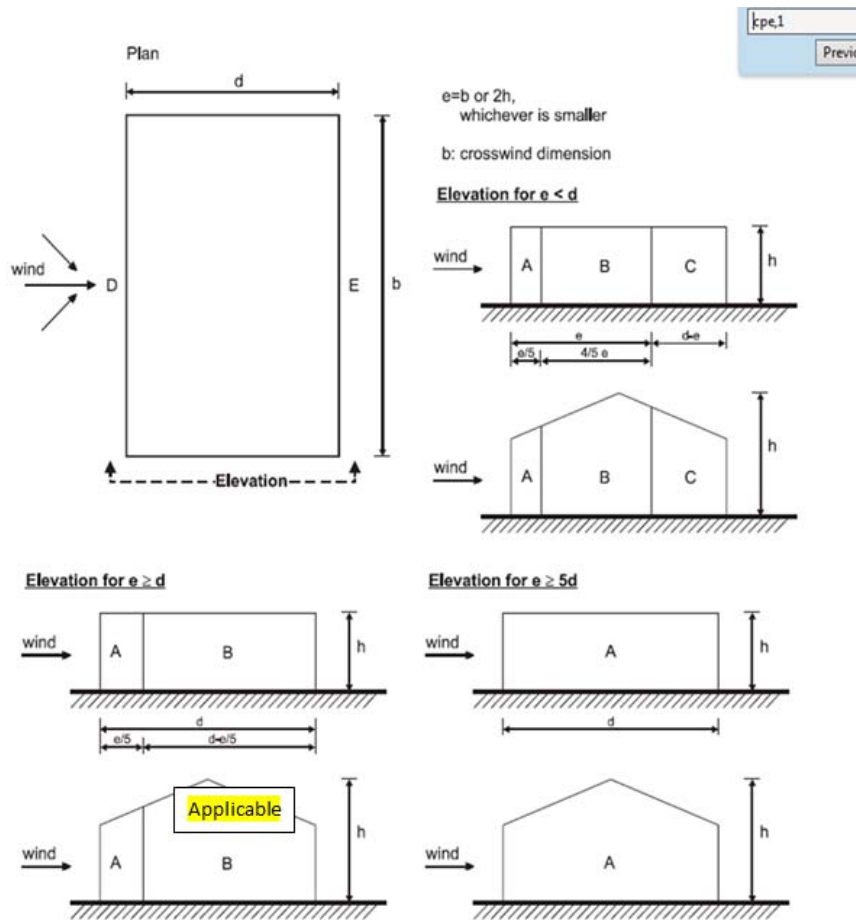
$e = \min(b, 2h) = \min(35,9, 2 \cdot 23) = 35,9$ m $e > d$

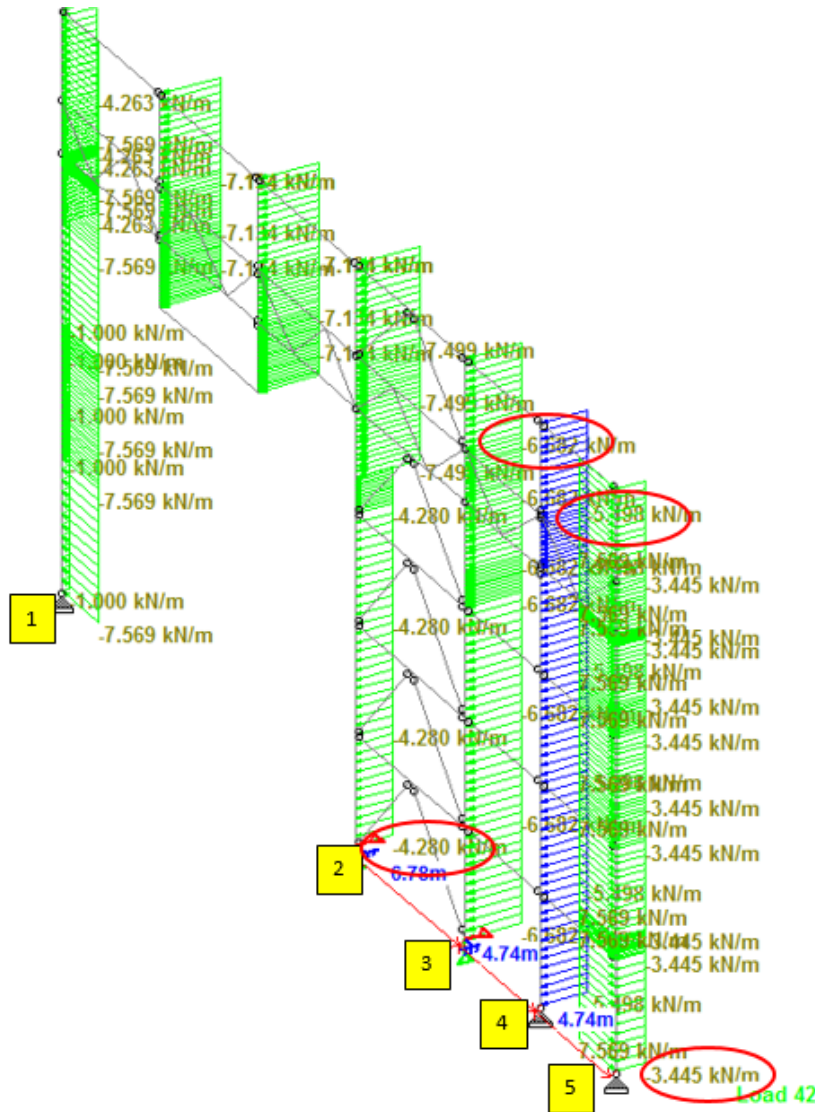
Table 7.1 — Recommended values of external pressure coefficients for vertical walls of rectangular plan buildings

Zone	A		B		C		D		E	
	$C_{pe,10}$	$C_{pe,1}$	$C_{pe,10}$	$C_{pe,1}$	$C_{pe,10}$	$C_{pe,1}$	$C_{pe,10}$	$C_{pe,1}$	$C_{pe,10}$	$C_{pe,1}$
5	-1,2	-1,4	-0,8	-1,1	-0,5		+0,8	+1,0		-0,7
1	-1,2	-1,4	-0,8	-1,1	-0,5		+0,8	+1,0		-0,5
$\leq 0,25$	-1,2	-1,4	-0,8	-1,1	-0,5		+0,7	+1,0		-0,3

Rispetto alla figura riportata sul foglio successivo, la faccia sopravvento è D

Per $h/d =$ da 1 a 5, $C_{pe,10}$ per faccia D = 0,8 (per la progettazione globale usiamo $C_{pe,10}$)





$P_z (25\text{ m}) = 1,45\text{ kN/m}^2$

$C_{pe} = 0,8$

Sulla colonna C5 carico $= (0,6 + 4,74 * 0,5) * 1,45 * 0,8 = 3,445\text{ kN/m}$ (0,6= sporgenza rivestimento oltre l'allineamento 5)

Sulla colonna C4 $= 4,74 * 1,45 * 0,8 = 5,4984\text{ kN/m}$

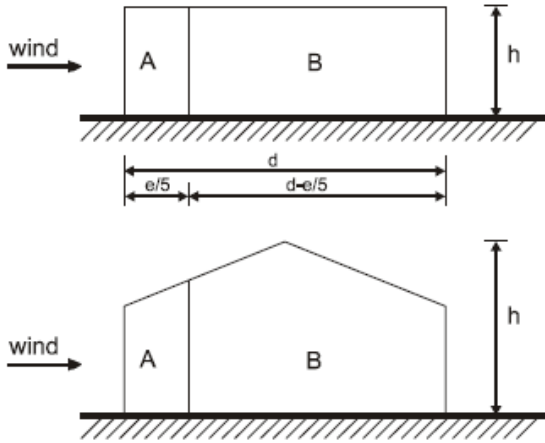
Sulla colonna C3 $= (4,74 + 6,78) / 2 * 1,45 * 0,8 = 6,682\text{ kN/m}$

Sulla colonna C2 per la parte in basso $= (0,3 + 6,78 * 2) * 0,8 * 1,45 = 4,28\text{ kN/m}$ (0,3= sporgenza del rivestimento)

I valori ottenuti sopra sono cerchiati nella grafica STAAD.

Carichi del vento sulle facce ad angolo retto rispetto alle facce sopravvento

Elevation for $e \geq d$



Lunghezza della zona A = $e/5 = 35,9/5 = 7,18$ m

Assumere che la lunghezza della zona A si estenda fino all'allineamento B

$C_{pe,10}(A) = 1,2$

$C_{pe,10}(B) = 0,8$

Carico su colonne A1/A5 (-Z e +Z) = $(7,5 * 0,5 + 0,6) * 1,2 * 1,45 = 7,569$ kN/m

Carico sulle colonne B1/B5 (-Z e +Z) = $(7,5/2 * 0,8 + 7,5/2 * 1,2) * 1,45 = 10,875$ kN/m

Carico sulle colonne C1/C5 = $(7,5 * 0,5 + 0,6) * 0,8 * 1,45 = 5,046$ kN/m



Carichi del vento sulla faccia sottovento

Dalla tabella 7,1 questa è la faccia E

$C_{pe,10}=0,5$

Carico sulla colonna C5 $= (0,6 + 4,74 * 0,5) * 1,45 * 0,5 = 2,153 \text{ kN/m}$

Carico sulla colonna C4 $= 4,74 * 1,45 * 0,5 = 3,4365 \text{ kN/m}$

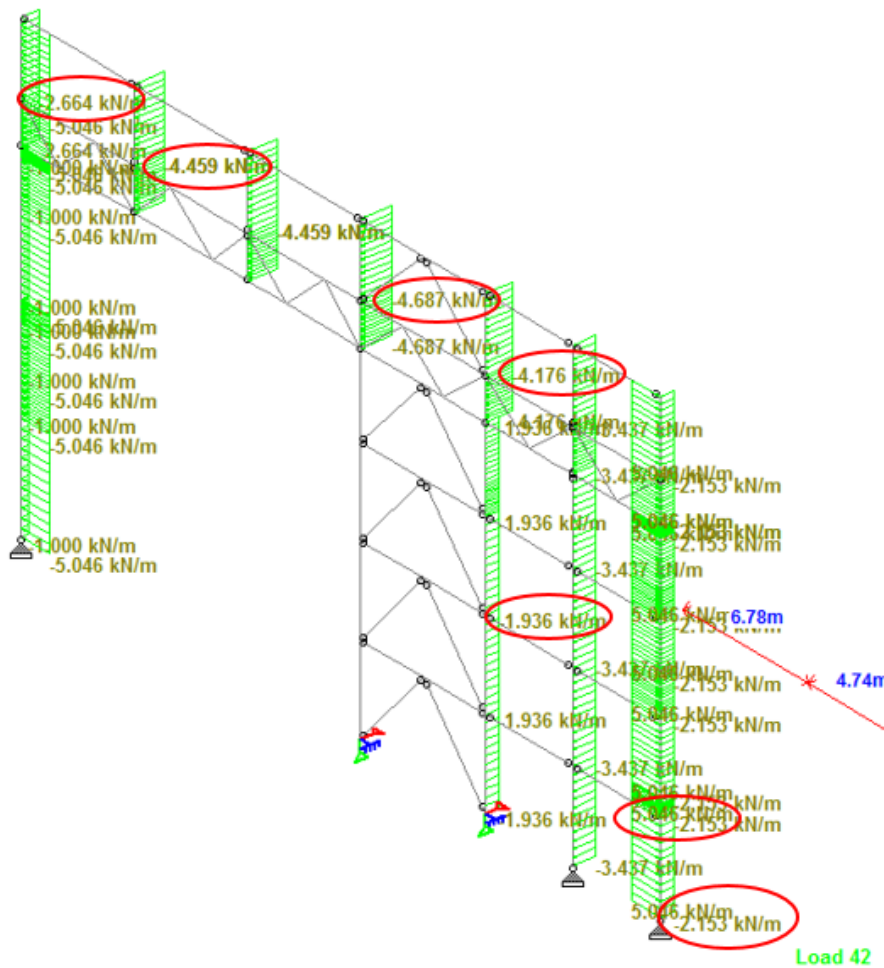
Carico sulla colonna C3 $= (4,74/2 + 0,3) * 0,5 * 1,45 = 1,935 \text{ kN/m}$ fino a 16 m
 $= (4,74/2 + 6,78/2) * 0,5 * 1,45 = 4,176 \text{ kN/m}$ sopra

Carico sulla colonna C2 (sopra EL16) $= (6,78 + 6,15) / 2 * 1,45 * 0,5 = 4,687 \text{ kN/m}$

Carico su montanti tra C1/C5 $= 6,15 * 0,5 * 1,45 = 4,459 \text{ kN/m}$

Carico sulla C1 $= (6,15/2 + 0,6) * 1,45 * 0,5 = 2,664 \text{ kN/m}$

Questi valori sono cerchiati nella grafica riportata sul foglio successivo:



Carichi del vento sul tetto

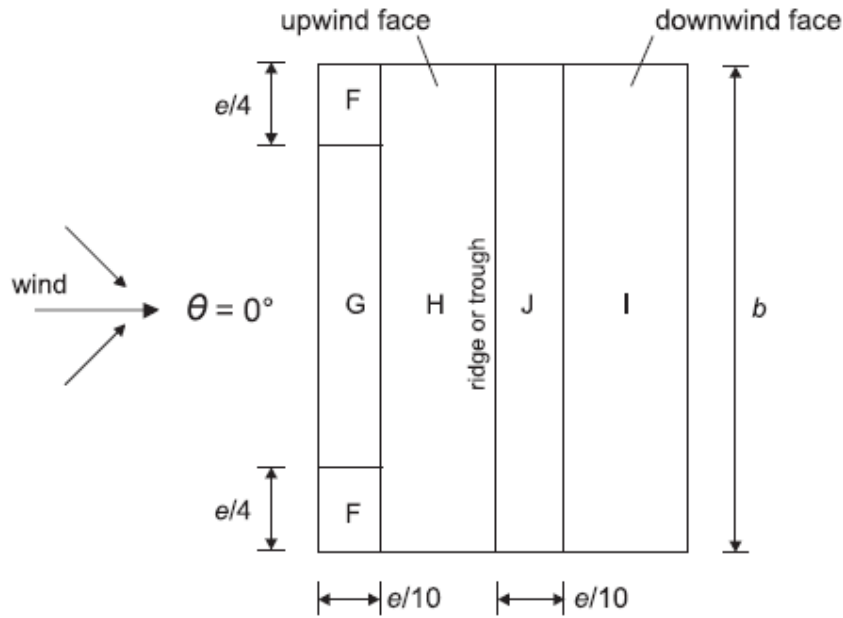


Table 7.4a — External pressure coefficients for duopitch roofs

Pitch Angle α	Zone for wind direction $\theta = 0^\circ$									
	F		G		H		I		J	
	C _{pe,10}	C _{pe,1}	C _{pe,10}	C _{pe,1}	C _{pe,10}	C _{pe,1}	C _{pe,10}	C _{pe,1}	C _{pe,10}	C _{pe,1}
-45°	-0,6		-0,6		-0,8		-0,7		-1,0	-1,5
-30°	-1,1	-2,0	-0,8	-1,5	-0,8		-0,6		-0,8	-1,4
-15°	-2,5	-2,8	-1,3	-2,0	-0,9	-1,2	-0,5		-0,7	-1,2
-5°	-2,3	-2,5	-1,2	-2,0	-0,8	-1,2	+0,2		+0,2	
							-0,6		-0,6	
5°	-1,7	-2,5	-1,2	-2,0	-0,6	-1,2	-0,6		+0,2	
	+0,0		+0,0		+0,0				-0,6	
15°	-0,9	-2,0	-0,8	-1,5	-0,3		-0,4		-1,0	-1,5
	+0,2		+0,2		+0,2		+0,0		+0,0	+0,0

Pendenza della copertura =10°

$$Cpe_{10}(F) = (-1.7-0.9) / 2 = -1.3$$

$$Cpe_{10}(G) = (-1.2-0.8) / 2 = -1$$

$$Cpe_{10}(H) = (-0.6-0.3) / 2 = -0.45$$

$$Cpe_{10}(I) = (-0.6-0.4) / 2 = -0.5$$

$$Cpe_{10}(J) = (-0.6-1) / 2 = -0.8$$

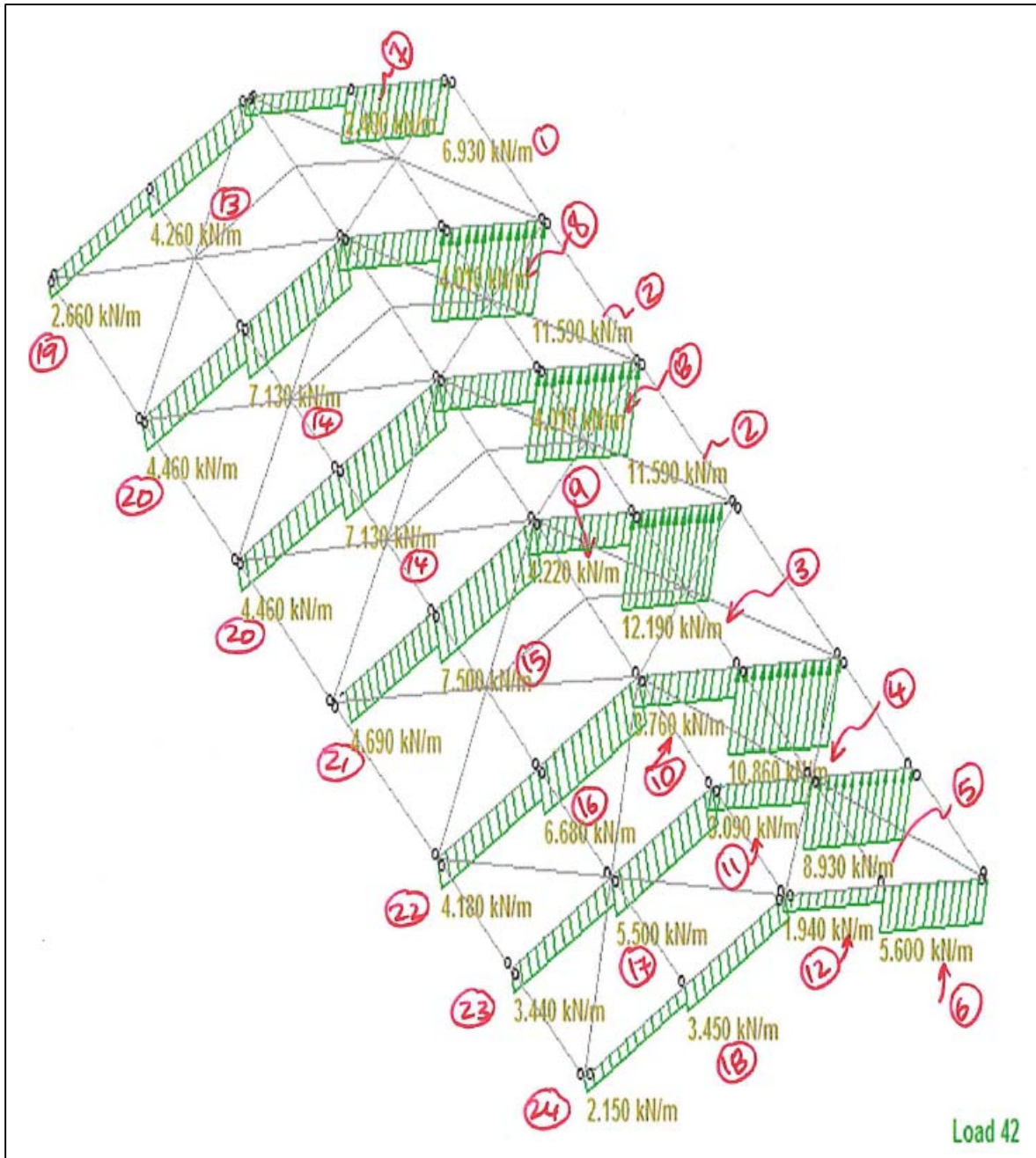
$$e/10 = 35.9/10 = 3.59 \text{ m}$$

Assumere che le zone F/G e J occupino la metà della metà della pendenza del tetto.

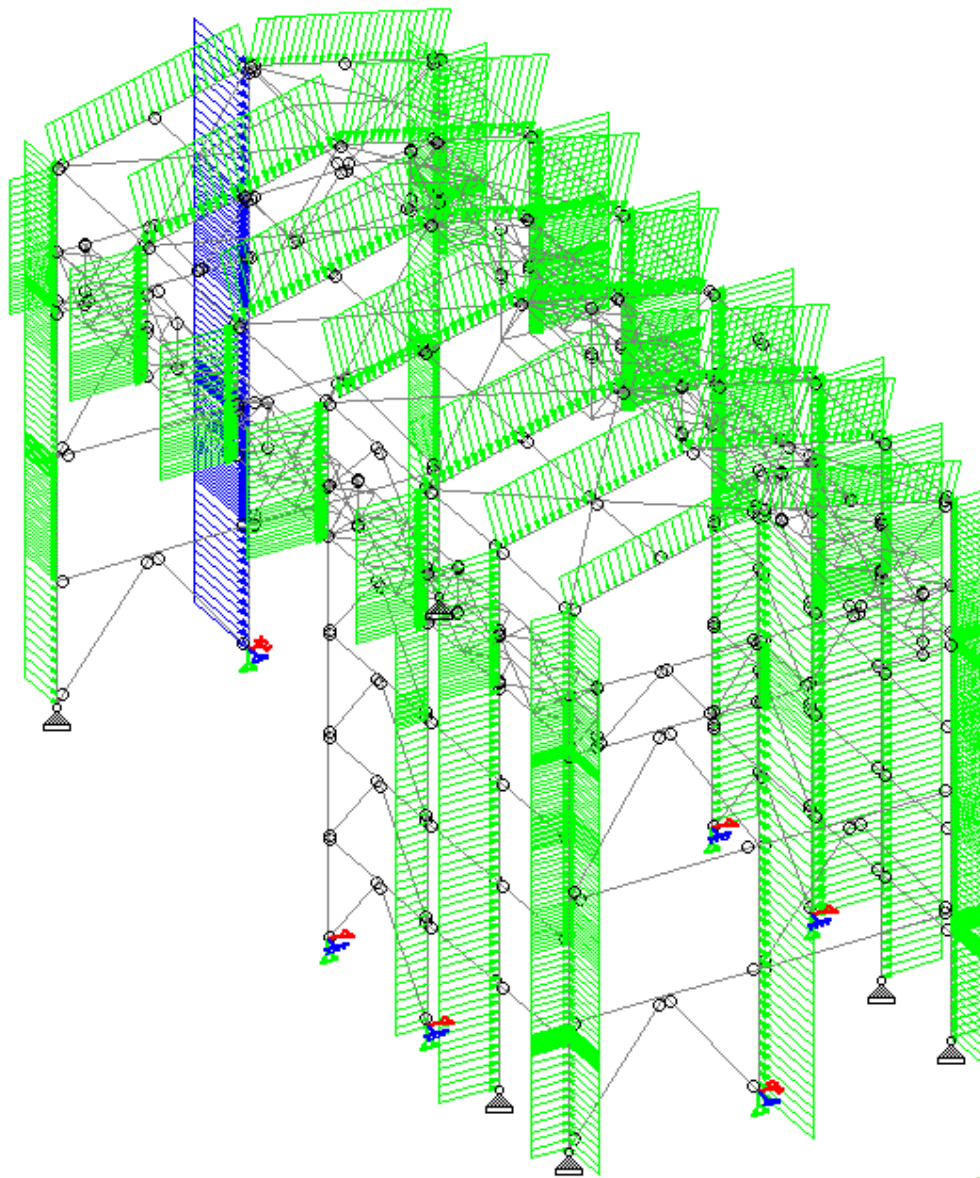
Considerando la piccola differenza tra il Cpe10 (F) e il Cpe10 (G) assumere che -1,3= Cpe10 per F+G

Così i carichi sono giustificati nel modo seguente:

alignment	zone	Cpe	tributary		overhang	load	mark
			west	east			
1	F	-1.3	0	6.15	0.6	-6.93	1
betn 1/2	F	-1.3	6.15	6.15	0	-11.59	2
2	F	-1.3	6.15	6.78	0	-12.19	3
3	F	-1.3	6.78	4.74	0	-10.86	4
4	F	-1.3	4.74	4.74	0	-8.93	5
5	F	-1.3	4.74	0	0.6	-5.60	6
1	H	-0.45	0	6.15	0.6	-2.40	7
betn 1/2	H	-0.45	6.15	6.15	0	-4.01	8
2	H	-0.45	6.15	6.78	0	-4.22	9
3	H	-0.45	6.78	4.74	0	-3.76	10
4	H	-0.45	4.74	4.74	0	-3.09	11
5	H	-0.45	4.74	0	0.6	-1.94	12
1	J	-0.8	0	6.15	0.6	-4.26	13
betn 1/2	J	-0.8	6.15	6.15	0	-7.13	14
2	J	-0.8	6.15	6.78	0	-7.50	15
3	J	-0.8	6.78	4.74	0	-6.68	16
4	J	-0.8	4.74	4.74	0	-5.50	17
5	J	-0.8	4.74	0	0.6	-3.45	18
1	I	-0.5	0	6.15	0.6	-2.66	19
betn 1/2	I	-0.5	6.15	6.15	0	-4.46	20
2	I	-0.5	6.15	6.78	0	-4.69	21
3	I	-0.5	6.78	4.74	0	-4.18	22
4	I	-0.5	4.74	4.74	0	-3.44	23
5	I	-0.5	4.74	0	0.6	-2.15	24



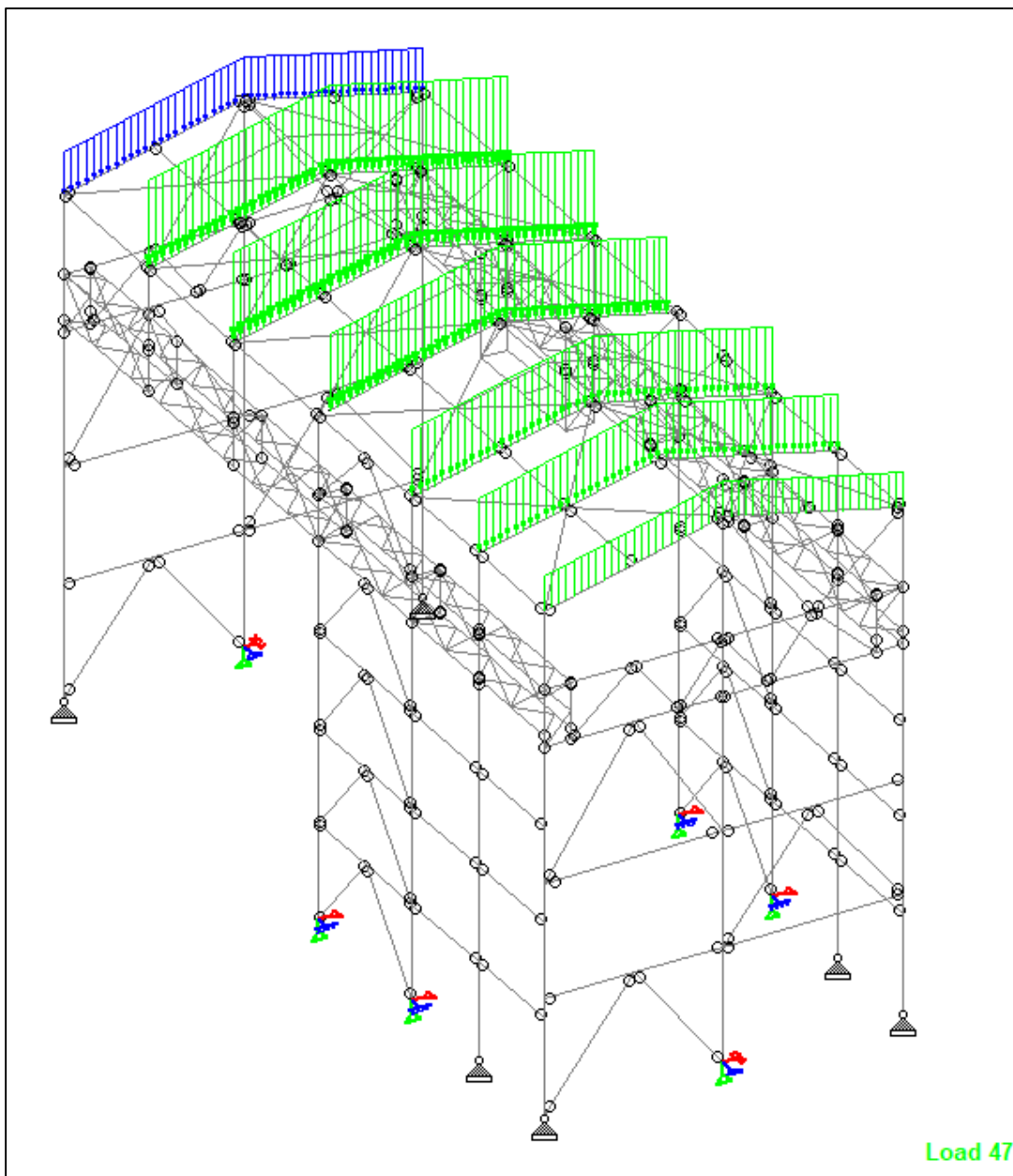
Carico di vento interno (condizione di carico - 45)



Load 45

3.2.5 CARICHI VARIABILI (LL)

Carico variabile sul tetto (condizione di carico - 47)



3.3 COMBINAZIONI DI CARICO

La struttura è progettata e analizzata per le seguenti combinazioni di carico.

LOAD 100: INCLUDE SELF-WEIGHT OF STRUCTURE AND WEIGHT OF SHEETING'S (SLS)

LOAD 101 TO 106: INTERNAL + EXTERNAL WINDS (SERVICE I.E. DURING CRANE OPERATION)

LOAD 107 TO 118: INCLUDE LOAD 100 + SNOW \pm TEMPERATURE + WIND (CRANE OPERATION)

LOAD 119 TO 120: INCLUDE LOAD 101 TO 106 WITH THE NORMAL WIND CONDITION (EXCLUDING CRANE OPERATION)

LOAD 207 TO 218: ULS FOR LOAD 107 TO 118

LOAD 219 TO 230: INCLUDE LOAD 107 TO 118 WITH THE NORMAL WIND CONDITION (EXCLUDING CRANE OPERATION)

LOAD 231 TO 242: ULS FOR LOAD 219 TO 230

LOAD COMB 1000 TO 1015 SEISMIC X/Z + DL+ SNOW + CRANE (UNLOADED) IN EACH BAY

LOAD COMB 1100 TO 1147 DL + SNOW \pm TEMP + WIND (OPERATING) COMBINED WITH BRIDGE ACCELERATION

LOAD COMB 1148 TO 1195 DL + SNOW \pm TEMP + WIND (OPERATING) COMBINED WITH CRANE SKEWING LOAD

LOAD COMB 1196 TO 1243 DL + SNOW \pm TEMP + WIND (OPERATING) +ACCELERATION OF CRAB

LOAD COMB 1300 TO 1347 DL + SNOW \pm TEMP + WIND (CRANE NOT OPERATING) + UNLOADED CRANE

LOAD COMB 2000 TO 2015 ULS CORRESPONDING TO LOAD COMB 1000 TO 1015

LOAD COMB 2100 TO 2147 ULS CORRESPONDING TO LOAD COMB 1100 TO 1147

LOAD COMB 2148 TO 2195 ULS CORRESPONDING TO LOAD COMB 1148 TO 1195

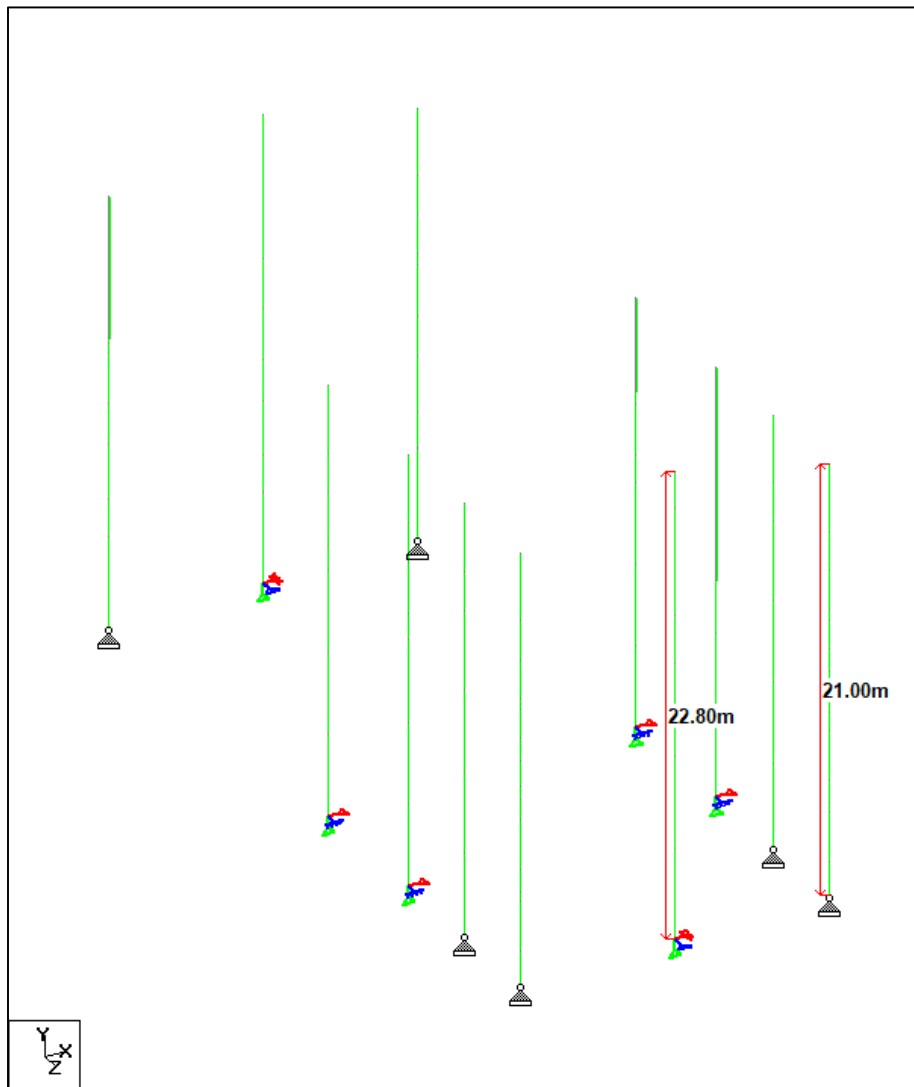
LOAD COMB 2196 TO 2243 ULS CORRESPONDING TO LOAD COMB 1196 TO 1243

LOAD COMB 2244 TO 2291 ULS CORRESPONDING TO LOAD COMB 1300 TO 1347

3.4 CONTROLLO DEGLI SPOSTAMENTI

Questo controllo viene effettuato per combinazioni di carico di servizio.

3.4.1 COLONNE



La seguente tabella mostra gli spostamenti delle colonne da 21m riportate nell'immagine qui sopra:

	Node	L/C	Horizontal X mm	Vertical Y mm	Horizontal Z mm
Max X	18	1001	15.858	0.528	4.143
Min X	3	1008	-16.486	-1.134	-2.505
Max Y	39	1336	-9.738	5.895	1.117
Min Y	7	1107	-0.131	-8.639	0.871
Max Z	39	1005	-2.411	-0.420	14.756
Min Z	7	1014	2.312	-0.898	-15.480

La seguente tabella mostra gli spostamenti delle colonne da 22.8 m riportate nell'immagine qui sopra:

			Horizontal	Vertical	Horizontal
	Node	L/C	X mm	Y mm	Z mm
Max X	4	1001	15.756	-0.172	3.755
Min X	4	1008	-16.230	-0.527	-1.304
Max Y	4	1305	2.491	4.284	2.507
Min Y	4	1154	-4.400	-5.856	3.056
Max Z	4	1005	-1.657	-0.395	14.732
Min Z	38	1014	3.434	-0.084	-15.054

Dalla tabella riportata sopra:

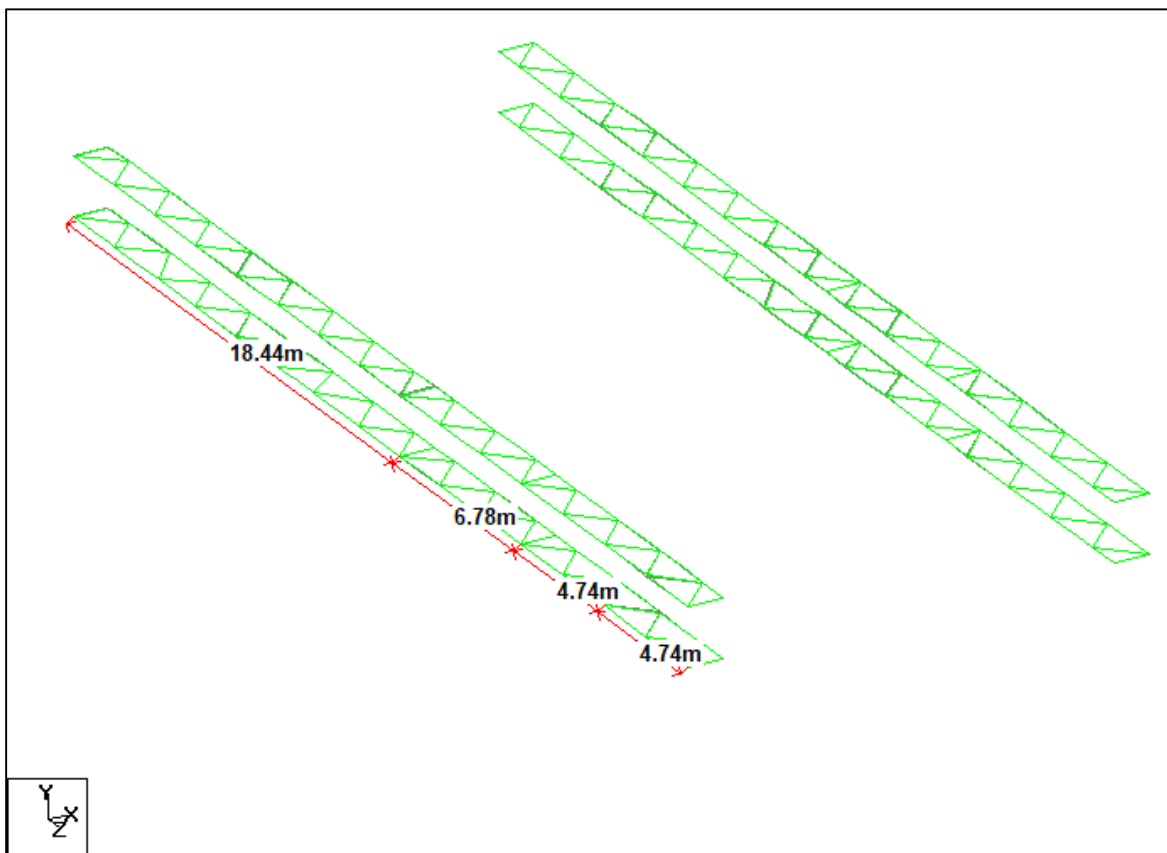
Massimo spostamento orizzontale per colonne da 21m= 16,5 mm

Spostamento consentito = $H/700 = 21000/700 = 30\text{mm} > 16,5 \text{ mm} \dots \text{OK}$

Massimo spostamento orizzontale per colonne da 22,8m= 16,5 mm

Spostamento consentito = $H/700 = 22800/300 = 32,6\text{mm} > 16,5 \text{ mm} \dots \text{OK}$

3.4.2 TRAVI



La seguente tabella mostra gli spostamenti delle travi riportate nell'immagine qui sopra:

			Horizontal	Vertical	Horizontal
	Node	L/C	X mm	Y mm	Z mm
Max X	230	1002	18.477	-4.472	2.255
Min X	69	1318	-26.376	-1.827	2.295
Max Y	201	1312	-16.174	7.675	-0.152
Min Y	201	1218	3.389	-22.193	-4.337
Max Z	198	1005	-1.929	-0.299	13.913
Min Z	424	1014	2.699	-2.349	-14.790

Dalla tabella riportata sopra:

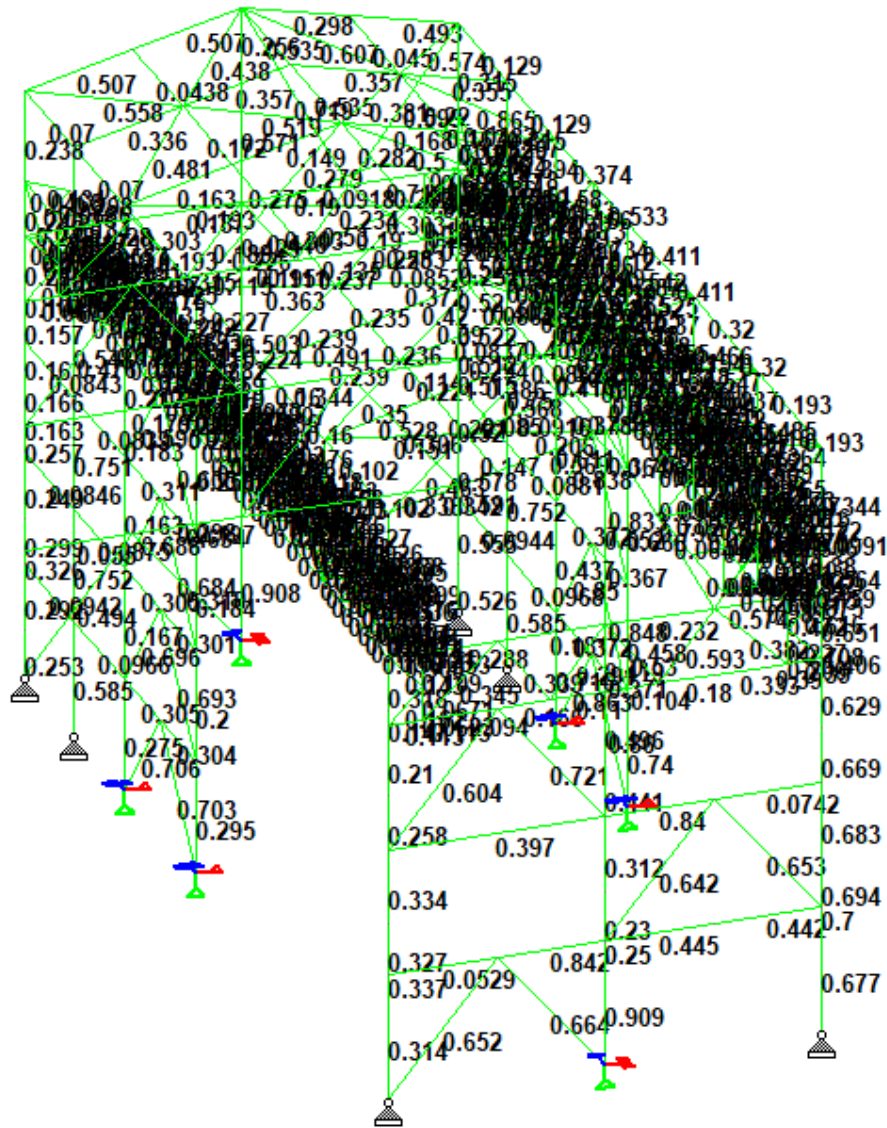
Lo spostamento verticale massimo è per il giunto 173 = $26,37 - 0,5 (9+20)$ mm (Combo 1318)
= 11,87 mm

Lunghezza totale della trave avente lo spostamento riportato sopra = 18,44m

Spostamento consentito = $L/700 = 18440/700 = 26,3\text{mm} > 18,44\text{mm} \dots \text{OK}$

3.5 CONTROLLO ELEMENTI IN ACCIAIO

Tutti i componenti sono progettati per le combinazioni di carico definite nella progettazione. L'immagine seguente evidenzia il tasso di lavoro di tutti i componenti.



In sintesi:

Beam	Analysis Property	Actual Ratio	Allowable Ratio	Clause	L/C
1	HE600A	0.314	1.000	EC-6.3.3-662	2271
2	HE600A	0.318	1.000	EC-6.3.3-662	2277
3	IPE300	0.342	1.000	EC-6.3.3-661	2261
4	HE600A	0.677	1.000	EC-6.3.3-662	2108
5	HE600A	0.651	1.000	EC-6.3.3-662	2150
6	IPE300	0.364	1.000	EC-6.3.3-661	2259
9	HE600A	0.210	1.000	EC-6.3.3-662	2199
10	HE600A	0.629	1.000	EC-6.3.3-662	2149
11	HE1000M	0.295	1.000	EC-6.3.3-662	2209
12	HE1000M	0.258	1.000	EC-6.3.3-662	2218
13	HE1000M	0.226	1.000	EC-6.3.3-661	2218
14	HE600A	0.195	1.000	EC-6.3.2 LTB	2222
15	HE600A	0.218	1.000	EC-6.3.3-662	2240
16	HE1000M	0.740	1.000	EC-6.3.3-662	2116
17	HE1000M	0.909	1.000	EC-6.3.3-661	2116
18	HE1000M	0.778	1.000	EC-6.3.3-661	2116
21	HE900B	0.275	1.000	EC-6.3.3-662	2225
22	HE900B	0.212	1.000	EC-6.3.3-661	2224
23	HE900B	0.214	1.000	EC-6.3.3-661	2221
24	HE600A	0.163	1.000	EC-6.3.3-662	2214
25	HE600A	0.168	1.000	EC-6.3.3-662	2227
26	HE900B	0.716	1.000	EC-6.3.3-661	2129
27	HE900B	0.795	1.000	EC-6.3.3-661	2128
28	HE900B	0.814	1.000	EC-6.3.3-661	2128
31	HE400A	0.253	1.000	EC-6.3.3-662	2235
32	HE400A	0.104	1.000	EC-6.3.3-662	2187
33	HE400A	0.250	1.000	EC-6.3.3-662	2186
34	IPE300	0.507	1.000	EC-6.3.2 LTB	2248
35	IPE300	0.298	1.000	EC-6.3.2 LTB	2272
36	HE400A	0.526	1.000	EC-6.3.3-662	2143
37	HE400A	0.520	1.000	EC-6.3.3-662	2147
38	HE400A	0.462	1.000	EC-6.3.3-662	2187
41	IPE240	0.191	1.000	EC-6.3.3-662	2198
42	IPE240	0.197	1.000	EC-6.3.3-662	2106
43	IPE240	0.306	1.000	EC-6.3.3-662	2143
44	IPE240	0.125	1.000	EC-6.2.3 (T)	2253
45	IPE240	0.132	1.000	EC-6.3.3-662	2227
46	IPE240	0.082	1.000	EC-6.2.3 (T)	2272
47	IPE300	0.156	1.000	EC-6.3.3-662	2270
48	IPE300	0.224	1.000	EC-6.3.3-662	2005
49	IPE300	0.176	1.000	EC-6.3.3-662	2014
50	IPE300	0.069	1.000	EC-6.3.3-662	2274
51	IPE300	0.258	1.000	EC-6.3.3-662	2014
52	IPE300	0.217	1.000	EC-6.3.3-662	2005
53	IPE300	0.179	1.000	EC-6.2.9.1	2249
55	IPE300	0.294	1.000	EC-6.2.9.1	2256
58	IPE300	0.528	1.000	EC-6.3.2 LTB	2279
60	IPE300	0.547	1.000	EC-6.3.2 LTB	2279
62	IPE300	0.491	1.000	EC-6.3.2 LTB	2279
64	IPE300	0.525	1.000	EC-6.3.2 LTB	2279

65	HE200A	0.102	1.000	EC-6.3.3-662	2266
66	HE200A	0.160	1.000	EC-6.3.3-662	2260
67	HE200A	0.224	1.000	EC-6.3.3-662	2001
68	HE200A	0.315	1.000	EC-6.3.3-662	2005
69	IPE300	0.119	1.000	EC-6.2.3 (T)	2260
70	IPE300	0.244	1.000	EC-6.3.3-662	2268
71	HE500A	0.015	1.000	EC-6.2.6-(Y)	2248
72	IPE300	0.336	1.000	EC-6.3.2 LTB	2260
73	IPE300	0.357	1.000	EC-6.3.3-662	2174
74	HE500A	0.015	1.000	EC-6.2.6-(Y)	2248
75	HE200A	0.070	1.000	EC-6.2.3 (T)	2226
76	HE200A	0.070	1.000	EC-6.2.3 (T)	2226
77	HE200A	0.129	1.000	EC-6.3.3-662	2175
78	HE200A	0.129	1.000	EC-6.3.3-662	2175
79	HE200A	0.374	1.000	EC-6.3.3-662	2172
80	HE200A	0.411	1.000	EC-6.3.3-662	2208
81	HE200A	0.320	1.000	EC-6.3.3-662	2271
82	HE200A	0.193	1.000	EC-6.3.3-662	2253
83	IPE240	0.280	1.000	EC-6.3.3-662	2105
84	IPE240	0.259	1.000	EC-6.3.3-662	2150
85	IPE240	0.415	1.000	EC-6.3.3-662	2249
87	IPE240	0.401	1.000	EC-6.2.9.1	2256
88	IPE240	0.310	1.000	EC-6.3.3-662	2261
89	IPE240	0.286	1.000	EC-6.3.3-662	2255
90	IPE240	0.264	1.000	EC-6.3.3-662	2279
91	IPE240	0.294	1.000	EC-6.3.3-662	2267
92	IPE240	0.475	1.000	EC-6.3.3-662	2267
93	IPE240	0.399	1.000	EC-6.2.9.1	2256
95	IPE240	0.166	1.000	EC-6.3.3-662	2240
96	IPE240	0.121	1.000	EC-6.3.3-662	2108
97	IPE240	0.175	1.000	EC-6.3.3-662	2274
98	IPE240	0.078	1.000	EC-6.3.3-662	2216
99	IPE240	0.079	1.000	EC-6.3.3-662	2216
100	IPE240	0.068	1.000	EC-6.3.3-662	2264
101	IPE240	0.065	1.000	EC-6.2.3 (T)	2015
103	IPE240	0.065	1.000	EC-6.2.3 (T)	2015
104	IPE240	0.060	1.000	EC-6.2.3 (T)	2265
105	IPE240	0.060	1.000	EC-6.2.3 (T)	2265
106	IPE240	0.064	1.000	EC-6.2.3 (T)	2250
107	IPE240	0.064	1.000	EC-6.2.3 (T)	2250
110	IPE240	0.104	1.000	EC-6.2.3 (T)	2253
111	IPE240	0.104	1.000	EC-6.2.3 (T)	2253
112	IPE240	0.121	1.000	EC-6.2.3 (T)	2253
113	IPE240	0.247	1.000	EC-6.3.3-662	2130
114	IPE240	0.311	1.000	EC-6.3.3-662	2130
115	IPE240	0.467	1.000	EC-6.3.3-662	2131
116	IPE240	0.306	1.000	EC-6.3.3-662	2119
117	IPE240	0.325	1.000	EC-6.3.3-662	2143
118	IPE240	0.106	1.000	EC-6.3.3-662	2227
119	IPE240	0.136	1.000	EC-6.3.3-662	2227
120	IPE240	0.103	1.000	EC-6.3.3-662	2228
121	IPE240	0.093	1.000	EC-6.3.3-662	2228
122	IPE240	0.109	1.000	EC-6.3.3-662	2006
123	IPE240	0.363	1.000	EC-6.3.3-662	2146

124	IPE240	0.464	1.000	EC-6.3.3-662	2230
125	IPE240	0.397	1.000	EC-6.3.3-662	2230
126	IPE240	0.374	1.000	EC-6.3.3-662	2146
127	IPE240	0.184	1.000	EC-6.3.3-662	2140
128	IPE240	0.219	1.000	EC-6.3.3-662	2140
130	IPE240	0.186	1.000	EC-6.3.3-662	2260
131	IPE240	0.155	1.000	EC-6.3.3-662	2260
132	IPE240	0.334	1.000	EC-6.3.3-662	2248
133	IPE240	0.336	1.000	EC-6.3.3-662	2248
134	IPE240	0.204	1.000	EC-6.3.3-662	2254
135	IPE240	0.187	1.000	EC-6.3.3-662	2278
136	IPE240	0.129	1.000	EC-6.3.3-662	2227
137	IPE300	0.164	1.000	EC-6.3.3-662	2270
139	IPE300	0.100	1.000	EC-6.2.3 (T)	2253
141	IPE300	0.100	1.000	EC-6.2.3 (T)	2253
147	IPE300	0.128	1.000	EC-6.2.3 (T)	2214
149	IPE300	0.128	1.000	EC-6.2.3 (T)	2214
151	IPE300	0.139	1.000	EC-6.2.3 (T)	2214
153	IPE300	0.135	1.000	EC-6.2.3 (T)	2214
155	IPE300	0.148	1.000	EC-6.2.9.1	2279
161	IPE300	0.147	1.000	EC-6.3.3-662	2005
163	IPE300	0.140	1.000	EC-6.3.3-662	2005
165	IPE300	0.135	1.000	EC-6.3.3-662	2005
167	IPE300	0.228	1.000	EC-6.3.3-662	2005
169	IPE300	0.265	1.000	EC-6.3.3-662	2005
171	IPE300	0.318	1.000	EC-6.3.3-662	2014
173	IPE300	0.184	1.000	EC-6.3.3-662	2014
175	IPE300	0.182	1.000	EC-6.3.3-662	2014
177	IPE300	0.176	1.000	EC-6.3.3-662	2014
179	IPE300	0.131	1.000	EC-6.2.3 (T)	2266
181	IPE300	0.131	1.000	EC-6.2.3 (T)	2266
184	IPE300	0.119	1.000	EC-6.2.3 (T)	2260
186	IPE300	0.050	1.000	EC-6.2.3 (T)	2272
188	IPE300	0.050	1.000	EC-6.2.3 (T)	2272
192	IPE300	0.159	1.000	EC-6.2.3 (T)	2265
193	IPE300	0.127	1.000	EC-6.2.3 (T)	2262
194	IPE300	0.103	1.000	EC-6.2.3 (T)	2158
197	IPE300	0.333	1.000	EC-6.2.9.1	2273
198	IPE300	0.199	1.000	EC-6.3.3-662	2256
199	IPE300	0.194	1.000	EC-6.2.3 (T)	2218
200	IPE300	0.219	1.000	EC-6.2.3 (T)	2218
201	IPE300	0.232	1.000	EC-6.3.3-662	2256
204	IPE300	0.229	1.000	EC-6.3.3-662	2005
205	IPE300	0.224	1.000	EC-6.3.3-662	2005
206	IPE300	0.217	1.000	EC-6.3.3-662	2005
207	IPE300	0.311	1.000	EC-6.3.3-662	2005
208	IPE300	0.316	1.000	EC-6.3.3-662	2005
209	IPE300	0.348	1.000	EC-6.3.3-662	2006
210	IPE300	0.388	1.000	EC-6.3.3-662	2013
211	IPE300	0.273	1.000	EC-6.3.3-662	2014
212	IPE300	0.250	1.000	EC-6.2.3 (T)	2231
213	IPE300	0.250	1.000	EC-6.2.3 (T)	2231
214	IPE300	0.262	1.000	EC-6.3.3-662	2268
215	IPE300	0.201	1.000	EC-6.3.3-662	2274

216	IPE300	0.209	1.000	EC-6.3.3-662	2274
217	IPE300	0.076	1.000	EC-6.3.3-662	2274
218	L100X100X10	0.077	1.000	EC-6.3.1.1	2255
219	L100X100X10	0.051	1.000	EC-6.2.3 (T)	2255
220	L100X100X10	0.082	1.000	EC-6.3.1.1	2255
223	L100X100X10	0.035	1.000	EC-6.2.3 (T)	2255
224	L100X100X10	0.032	1.000	EC-6.3.1.1	2214
225	L100X100X10	0.021	1.000	EC-6.2.3 (T)	2214
226	L100X100X10	0.033	1.000	EC-6.3.1.1	2217
227	L100X100X10	0.022	1.000	EC-6.2.3 (T)	2217
228	L100X100X10	0.036	1.000	EC-6.3.1.1	2214
231	L100X100X10	0.075	1.000	EC-6.3.1.1	2261
232	L100X100X10	0.048	1.000	EC-6.2.3 (T)	2261
233	L100X100X10	0.072	1.000	EC-6.3.1.1	2261
234	L100X100X10	0.111	1.000	EC-6.3.1.1	2224
235	L100X100X10	0.096	1.000	EC-6.3.1.1	2006
236	L100X100X10	0.111	1.000	EC-6.3.1.1	2224
237	L100X100X10	0.097	1.000	EC-6.3.1.1	2006
238	L100X100X10	0.112	1.000	EC-6.3.1.1	2224
239	L100X100X10	0.097	1.000	EC-6.3.1.1	2006
240	L100X100X10	0.260	1.000	EC-6.3.1.1	2272
241	L100X100X10	0.171	1.000	EC-6.2.3 (T)	2272
242	L100X100X10	0.260	1.000	EC-6.3.1.1	2272
243	L100X100X10	0.172	1.000	EC-6.2.3 (T)	2272
244	L100X100X10	0.217	1.000	EC-6.2.3 (T)	2254
245	L100X100X10	0.328	1.000	EC-6.3.1.1	2254
246	L100X100X10	0.215	1.000	EC-6.2.3 (T)	2254
247	L100X100X10	0.327	1.000	EC-6.3.1.1	2254
250	L100X100X10	0.275	1.000	EC-6.3.1.1	2255
251	L100X100X10	0.284	1.000	EC-6.3.1.1	2256
252	L100X100X10	0.281	1.000	EC-6.3.1.1	2255
255	L100X100X10	0.111	1.000	EC-6.3.1.1	2256
256	L100X100X10	0.079	1.000	EC-6.3.1.1	2240
257	L100X100X10	0.061	1.000	EC-6.3.1.1	2261
258	L100X100X10	0.081	1.000	EC-6.3.1.1	2218
259	L100X100X10	0.058	1.000	EC-6.2.3 (T)	2214
260	L100X100X10	0.133	1.000	EC-6.3.1.1	2214
263	L100X100X10	0.292	1.000	EC-6.3.1.1	2261
264	L100X100X10	0.303	1.000	EC-6.3.1.1	2250
265	L100X100X10	0.290	1.000	EC-6.3.1.1	2261
266	L100X100X10	0.314	1.000	EC-6.3.1.1	2230
267	L100X100X10	0.274	1.000	EC-6.3.1.1	2240
268	L100X100X10	0.313	1.000	EC-6.3.1.1	2230
269	L100X100X10	0.273	1.000	EC-6.3.1.1	2240
270	L100X100X10	0.314	1.000	EC-6.3.1.1	2230
271	L100X100X10	0.274	1.000	EC-6.3.1.1	2240
272	L100X100X10	0.287	1.000	EC-6.3.1.1	2272
273	L100X100X10	0.296	1.000	EC-6.3.1.1	2226
274	L100X100X10	0.287	1.000	EC-6.3.1.1	2272
275	L100X100X10	0.295	1.000	EC-6.3.1.1	2226
276	L100X100X10	0.345	1.000	EC-6.3.1.1	2268
277	L100X100X10	0.353	1.000	EC-6.3.1.1	2266
278	L100X100X10	0.343	1.000	EC-6.3.1.1	2268
279	L100X100X10	0.352	1.000	EC-6.3.1.1	2266

280	IPE240	0.414	1.000	EC-6.3.3-662	2252
281	IPE240	0.409	1.000	EC-6.3.3-662	2192
282	IPE240	0.252	1.000	EC-6.3.3-662	2132
283	IPE240	0.282	1.000	EC-6.3.3-662	2254
284	IPE240	0.535	1.000	EC-6.3.3-662	2251
285	IPE240	0.535	1.000	EC-6.3.3-662	2251
286	HE400A	0.585	1.000	EC-6.3.3-662	2272
287	HE400A	0.585	1.000	EC-6.3.3-662	2266
288	IPE300	0.569	1.000	EC-6.3.3-662	2249
289	IPE300	0.577	1.000	EC-6.3.3-662	2261
290	IPE300	0.386	1.000	EC-6.3.2 LTB	2249
291	IPE240	0.147	1.000	EC-6.3.2 LTB	2102
292	IPE300	0.420	1.000	EC-6.3.2 LTB	2267
293	IPE240	0.221	1.000	EC-6.3.3-662	2264
294	HE600A	0.190	1.000	EC-6.3.2 LTB	2132
295	IPE240	0.235	1.000	EC-6.3.3-662	2258
296	HE600A	0.149	1.000	EC-6.3.2 LTB	2215
297	IPE240	0.303	1.000	EC-6.3.3-662	2001
298	IPE300	0.357	1.000	EC-6.3.3-662	2174
299	IPE240	0.172	1.000	EC-6.3.3-662	2269
300	IPE300	0.507	1.000	EC-6.3.2 LTB	2248
301	IPE240	0.044	1.000	EC-6.3.3-662	2012
302	IPE300	0.386	1.000	EC-6.3.2 LTB	2249
303	IPE240	0.152	1.000	EC-6.3.3-662	2114
304	IPE300	0.420	1.000	EC-6.3.2 LTB	2267
305	IPE240	0.232	1.000	EC-6.3.3-662	2216
306	HE600A	0.373	1.000	EC-6.3.3-662	2169
307	IPE240	0.301	1.000	EC-6.3.3-662	2210
308	HE600A	0.267	1.000	EC-6.3.3-662	2181
309	IPE240	0.324	1.000	EC-6.3.3-662	2216
310	IPE300	0.355	1.000	EC-6.3.2 LTB	2253
311	IPE240	0.220	1.000	EC-6.3.3-662	2209
312	IPE300	0.493	1.000	EC-6.3.2 LTB	2254
313	IPE240	0.045	1.000	EC-6.3.3-662	2012
314	IPE240	0.414	1.000	EC-6.3.3-662	2252
315	IPE240	0.409	1.000	EC-6.3.3-662	2192
316	IPE240	0.252	1.000	EC-6.3.3-662	2132
317	IPE240	0.282	1.000	EC-6.3.3-662	2254
318	IPE240	0.221	1.000	EC-6.3.3-662	2264
319	IPE240	0.236	1.000	EC-6.3.3-662	2001
320	IPE240	0.237	1.000	EC-6.3.3-662	2001
321	IPE240	0.275	1.000	EC-6.3.3-662	2002
322	IPE240	0.233	1.000	EC-6.3.3-662	2216
323	IPE240	0.299	1.000	EC-6.3.3-662	2210
324	IPE240	0.273	1.000	EC-6.3.3-662	2216
325	IPE240	0.297	1.000	EC-6.3.3-662	2209
326	L100X100X12LD	0.558	1.000	EC-6.3.1.1	2226
327	L100X100X12LD	0.519	1.000	EC-6.3.1.1	2229
328	L100X100X12LD	0.381	1.000	EC-6.3.1.1	2279
329	L100X100X12LD	0.574	1.000	EC-6.3.1.1	2002
330	L100X100X12LD	0.607	1.000	EC-6.3.1.1	2172
331	L100X100X12LD	0.865	1.000	EC-6.3.1.1	2172
332	L100X100X12LD	0.481	1.000	EC-6.3.1.1	2002
333	L100X100X12LD	0.438	1.000	EC-6.3.1.1	2002

334	L100X100X10LD	0.193	1.000	EC-6.3.1.1	2216
335	L100X100X10LD	0.234	1.000	EC-6.3.1.1	2211
336	L100X100X10LD	0.226	1.000	EC-6.3.1.1	2001
337	L100X100X10LD	0.279	1.000	EC-6.3.1.1	2001
338	L100X100X10LD	0.500	1.000	EC-6.3.1.1	2208
339	L100X100X10LD	0.513	1.000	EC-6.3.1.1	2160
340	L100X100X10LD	0.316	1.000	EC-6.3.1.1	2177
341	L100X100X10LD	0.394	1.000	EC-6.3.1.1	2183
342	L100X100X10LD	0.363	1.000	EC-6.3.1.1	2001
343	L100X100X10LD	0.372	1.000	EC-6.3.1.1	2001
344	L100X100X10LD	0.651	1.000	EC-6.3.1.1	2208
345	L100X100X10LD	0.734	1.000	EC-6.3.1.1	2208
346	L100X100X10LD	0.255	1.000	EC-6.3.1.1	2271
347	L100X100X10LD	0.239	1.000	EC-6.3.1.1	2271
348	L100X100X10LD	0.287	1.000	EC-6.3.1.1	2260
349	L100X100X10LD	0.260	1.000	EC-6.3.1.1	2248
350	L100X100X10	0.069	1.000	EC-6.3.1.1	2172
351	L100X100X10	0.064	1.000	EC-6.3.1.1	2160
352	L100X100X10LD	0.239	1.000	EC-6.3.1.1	2001
353	L100X100X10LD	0.294	1.000	EC-6.3.1.1	2001
354	L100X100X10LD	0.350	1.000	EC-6.3.1.1	2214
355	L100X100X10LD	0.390	1.000	EC-6.3.1.1	2214
356	L100X100X10LD	0.229	1.000	EC-6.3.1.1	2001
357	L100X100X10LD	0.487	1.000	EC-6.3.1.1	2208
358	L100X100X10LD	0.370	1.000	EC-6.3.1.1	2208
359	L100X100X10LD	0.194	1.000	EC-6.3.1.1	2000
360	L100X100X10	0.063	1.000	EC-6.3.1.1	2259
361	L100X100X10LD	0.151	1.000	EC-6.3.1.1	2261
362	L100X100X10LD	0.463	1.000	EC-6.3.1.1	2214
363	L100X100X10LD	0.568	1.000	EC-6.3.1.1	2214
364	L100X100X10LD	0.206	1.000	EC-6.3.1.1	2261
365	L100X100X10LD	0.441	1.000	EC-6.3.1.1	2001
366	L100X100X10LD	0.418	1.000	EC-6.3.1.1	2001
367	L100X100X10LD	0.171	1.000	EC-6.3.1.1	2211
368	L100X100X10	0.069	1.000	EC-6.3.1.1	2259
369	L100X100X10LD	0.237	1.000	EC-6.3.1.1	2271
371	HE700B	0.308	1.000	EC-6.2.9.1	2253
373	HE700B	0.875	1.000	EC-6.3.3-662	2157
374	HE1000M	0.542	1.000	EC-6.3.3-662	2166
376	HE1000M	0.125	1.000	EC-6.3.3-662	2160
378	HE900B	0.580	1.000	EC-6.3.3-662	2178
380	HE900B	0.140	1.000	EC-6.3.3-662	2178
383	HE700B	0.669	1.000	EC-6.3.3-662	2193
385	HE700B	0.318	1.000	EC-6.2.9.1	2253
392	IPE300	0.064	1.000	EC-6.3.3-662	2005
393	IPE300	0.132	1.000	EC-6.2.3 (T)	2214
394	IPE300	0.102	1.000	EC-6.2.3 (T)	2230
395	IPE300	0.048	1.000	EC-6.3.3-662	2192
396	IPE300	0.196	1.000	EC-6.2.3 (T)	2146
397	IPE300	0.180	1.000	EC-6.2.3 (T)	2106
398	IPE300	0.397	1.000	EC-6.2.9.1	2249
399	IPE300	0.321	1.000	EC-6.2.9.1	2249
400	IPE300	0.604	1.000	EC-6.3.3-662	2262
401	IPE300	0.950	1.000	EC-6.3.3-662	2262

402	IPE300	0.298	1.000	EC-6.3.2 LTB	2260
403	IPE300	0.050	1.000	EC-6.2.3 (T)	2254
404	IPE300	0.315	1.000	EC-6.3.2 LTB	2253
405	IPE300	0.161	1.000	EC-6.2.3 (T)	2146
460	IPE300	0.069	1.000	EC-6.3.3-662	2267
461	IPE300	0.073	1.000	EC-6.2.3 (T)	2210
462	IPE300	0.096	1.000	EC-6.2.9.1	2249
463	IPE300	0.261	1.000	EC-6.2.9.1	2249
464	IPE300	0.396	1.000	EC-6.2.9.1	2249
465	IPE300	0.227	1.000	EC-6.2.9.1	2249
466	IPE300	0.157	1.000	EC-6.3.3-662	2001
467	IPE300	0.163	1.000	EC-6.3.3-662	2001
468	IPE300	0.197	1.000	EC-6.3.3-662	2001
469	IPE300	0.321	1.000	EC-6.2.9.1	2249
470	IPE300	0.211	1.000	EC-6.2.9.1	2249
471	IPE300	0.117	1.000	EC-6.2.9.1	2261
472	IPE300	0.065	1.000	EC-6.2.3 (T)	2219
473	IPE300	0.081	1.000	EC-6.3.3-662	2266
474	IPE300	0.140	1.000	EC-6.2.3 (T)	2214
475	IPE300	0.132	1.000	EC-6.2.3 (T)	2214
476	IPE300	0.094	1.000	EC-6.2.3 (T)	2214
477	IPE300	0.094	1.000	EC-6.2.3 (T)	2214
478	IPE300	0.110	1.000	EC-6.2.3 (T)	2227
479	IPE300	0.110	1.000	EC-6.2.3 (T)	2227
480	IPE300	0.102	1.000	EC-6.2.3 (T)	2230
481	IPE300	0.092	1.000	EC-6.2.3 (T)	2254
482	IPE300	0.092	1.000	EC-6.2.3 (T)	2254
483	IPE300	0.050	1.000	EC-6.2.3 (T)	2254
484	IPE300	0.052	1.000	EC-6.3.3-662	2185
485	IPE300	0.047	1.000	EC-6.3.3-662	2185
486	IPE300	0.099	1.000	EC-6.3.3-662	2265
487	IPE300	0.122	1.000	EC-6.3.3-662	2265
488	IPE300	0.176	1.000	EC-6.3.3-662	2265
489	IPE300	0.473	1.000	EC-6.3.3-662	2262
490	IPE300	0.565	1.000	EC-6.3.3-662	2262
491	IPE300	0.659	1.000	EC-6.3.3-662	2262
492	IPE300	0.652	1.000	EC-6.3.3-662	2262
493	IPE300	0.427	1.000	EC-6.3.3-662	2256
494	IPE300	0.436	1.000	EC-6.3.3-662	2262
495	IPE300	0.612	1.000	EC-6.3.3-662	2262
496	IPE300	0.704	1.000	EC-6.3.3-662	2244
497	IPE300	0.379	1.000	EC-6.3.3-662	2256
498	IPE300	0.318	1.000	EC-6.3.3-662	2256
499	IPE300	0.191	1.000	EC-6.3.3-662	2256
500	IPE300	0.180	1.000	EC-6.2.3 (T)	2106
501	IPE300	0.155	1.000	EC-6.2.3 (T)	2130
502	IPE300	0.155	1.000	EC-6.2.3 (T)	2130
503	IPE300	0.139	1.000	EC-6.2.3 (T)	2143
504	IPE300	0.139	1.000	EC-6.2.3 (T)	2143
505	IPE300	0.196	1.000	EC-6.2.3 (T)	2146
506	IPE300	0.209	1.000	EC-6.2.3 (T)	2146
507	IPE300	0.209	1.000	EC-6.2.3 (T)	2146
508	IPE300	0.165	1.000	EC-6.3.3-662	2268
509	IPE300	0.118	1.000	EC-6.3.3-662	2268

510	IPE300	0.124	1.000	EC-6.3.3-662	2268
511	IPE300	0.054	1.000	EC-6.3.3-662	2192
512	L100X100X10	0.176	1.000	EC-6.3.1.1	2011
513	L100X100X10	0.090	1.000	EC-6.2.3 (T)	2153
514	L100X100X10	0.143	1.000	EC-6.3.1.1	2153
515	L100X100X10	0.081	1.000	EC-6.2.3 (T)	2210
516	L100X100X10	0.093	1.000	EC-6.3.1.1	2210
517	L100X100X10	0.063	1.000	EC-6.2.3 (T)	2213
518	L100X100X10	0.036	1.000	EC-6.2.3 (T)	2267
519	L100X100X10	0.054	1.000	EC-6.3.1.1	2267
520	L100X100X10	0.046	1.000	EC-6.3.1.1	2210
521	L100X100X10	0.042	1.000	EC-6.3.1.1	2009
522	L100X100X10	0.086	1.000	EC-6.2.3 (T)	2267
523	L100X100X10	0.103	1.000	EC-6.3.1.1	2267
524	L100X100X10	0.101	1.000	EC-6.2.3 (T)	2267
525	L100X100X10	0.156	1.000	EC-6.3.1.1	2267
526	L100X100X10	0.097	1.000	EC-6.2.3 (T)	2267
527	L100X100X10	0.190	1.000	EC-6.3.1.1	2267
528	L100X100X10	0.159	1.000	EC-6.3.1.1	2267
529	L100X100X10	0.088	1.000	EC-6.2.3 (T)	2266
530	L100X100X10	0.131	1.000	EC-6.3.1.1	2266
531	L100X100X10	0.089	1.000	EC-6.2.3 (T)	2230
532	L100X100X10	0.133	1.000	EC-6.3.1.1	2230
533	L100X100X10	0.133	1.000	EC-6.2.3 (T)	2230
534	L100X100X10	0.078	1.000	EC-6.3.1.1	2175
535	L100X100X10	0.058	1.000	EC-6.3.1.1	2228
536	L100X100X10	0.065	1.000	EC-6.3.1.1	2175
537	L100X100X10	0.056	1.000	EC-6.3.1.1	2186
538	L100X100X10	0.071	1.000	EC-6.2.3 (T)	2188
539	L100X100X10	0.134	1.000	EC-6.3.1.1	2194
540	L100X100X10	0.089	1.000	EC-6.2.3 (T)	2194
541	L100X100X10	0.131	1.000	EC-6.3.1.1	2221
542	L100X100X10	0.306	1.000	EC-6.3.1.1	2003
543	L100X100X10	0.167	1.000	EC-6.3.1.1	2250
544	L100X100X10	0.208	1.000	EC-6.3.1.1	2153
545	L100X100X10	0.166	1.000	EC-6.3.1.1	2250
546	L100X100X10	0.125	1.000	EC-6.3.1.1	2150
547	L100X100X10	0.155	1.000	EC-6.3.1.1	2250
548	L100X100X10	0.067	1.000	EC-6.3.1.1	2148
549	L100X100X10	0.052	1.000	EC-6.3.1.1	2004
550	L100X100X10	0.073	1.000	EC-6.3.1.1	2150
551	L100X100X10	0.079	1.000	EC-6.3.1.1	2000
552	L100X100X10	0.122	1.000	EC-6.3.1.1	2268
553	L100X100X10	0.129	1.000	EC-6.3.1.1	2000
554	L100X100X10	0.162	1.000	EC-6.3.1.1	2268
555	L100X100X10	0.186	1.000	EC-6.3.1.1	2001
556	L100X100X10	0.129	1.000	EC-6.3.1.1	2268
557	L100X100X10	0.188	1.000	EC-6.3.1.1	2001
558	L100X100X10	0.167	1.000	EC-6.3.1.1	2141
559	L100X100X10	0.145	1.000	EC-6.3.1.1	2240
560	L100X100X10	0.193	1.000	EC-6.3.1.1	2146
561	L100X100X10	0.149	1.000	EC-6.3.1.1	2268
562	L100X100X10	0.201	1.000	EC-6.3.1.1	2146
563	L100X100X10	0.216	1.000	EC-6.2.3 (T)	2146

564	L100X100X10	0.174	1.000	EC-6.2.3 (T)	2146
565	L100X100X10	0.148	1.000	EC-6.3.1.1	2143
566	L100X100X10	0.102	1.000	EC-6.3.1.1	2014
567	L100X100X10	0.134	1.000	EC-6.3.1.1	2138
568	L100X100X10	0.187	1.000	EC-6.3.1.1	2268
569	L100X100X10	0.236	1.000	EC-6.3.1.1	2194
570	L100X100X10	0.162	1.000	EC-6.3.1.1	2268
571	L100X100X10	0.163	1.000	EC-6.3.1.1	2146
610	HE700B	0.908	1.000	EC-6.3.3-662	2259
611	HE700B	0.909	1.000	EC-6.3.3-662	2271
612	HE600A	0.700	1.000	EC-6.3.3-662	2108
613	HE700B	0.496	1.000	EC-6.3.3-662	2277
614	HE700B	0.390	1.000	EC-6.3.2 LTB	2154
615	HE700B	0.250	1.000	EC-6.3.3-661	2156
616	HE260A	0.074	1.000	EC-6.3.3-662	2202
617	HE600A	0.337	1.000	EC-6.3.3-662	2277
618	HE260A	0.397	1.000	EC-6.3.3-662	2000
619	HE700B	0.110	1.000	EC-6.3.3-662	2202
620	HE600A	0.147	1.000	EC-6.3.3-662	2198
621	HE600A	0.406	1.000	EC-6.3.3-662	2198
622	HE700B	0.419	1.000	EC-6.3.3-661	2277
623	HE600A	0.334	1.000	EC-6.3.3-662	2271
624	HE600A	0.683	1.000	EC-6.3.3-662	2103
625	HE700B	0.312	1.000	EC-6.3.3-662	2277
626	HE700B	0.441	1.000	EC-6.3.3-662	2277
627	HE600A	0.669	1.000	EC-6.3.3-662	2108
628	HE600A	0.258	1.000	EC-6.3.3-662	2271
631	HE260A	0.442	1.000	EC-6.3.3-662	2011
633	HE260A	0.842	1.000	EC-6.3.3-662	2011
634	HE700B	0.180	1.000	EC-6.3.2 LTB	2154
635	HE260A	0.840	1.000	EC-6.3.3-662	2001
636	HE260A	0.445	1.000	EC-6.3.3-662	2011
645	L100X100X10	0.272	1.000	EC-6.3.1.1	2278
646	L100X100X10	0.519	1.000	EC-6.3.1.1	2005
647	L100X100X10	0.608	1.000	EC-6.3.1.1	2014
648	L100X100X10	0.185	1.000	EC-6.2.3 (T)	2014
649	L100X100X10	0.411	1.000	EC-6.3.1.1	2015
650	L100X100X10	0.247	1.000	EC-6.3.1.1	2004
651	L100X100X10	0.420	1.000	EC-6.3.1.1	2013
660	L100X100X10	0.219	1.000	EC-6.3.1.1	2014
661	L100X100X10	0.455	1.000	EC-6.3.1.1	2005
662	L100X100X10	0.517	1.000	EC-6.3.1.1	2014
663	L100X100X10	0.202	1.000	EC-6.2.3 (T)	2014
664	L100X100X10	0.502	1.000	EC-6.3.1.1	2178
665	L100X100X10	0.324	1.000	EC-6.3.1.1	2117
666	L100X100X10	0.427	1.000	EC-6.3.1.1	2226
675	HE400A	0.332	1.000	EC-6.3.3-662	2191
676	HE700B	0.284	1.000	EC-6.3.2 LTB	2186
677	HE400A	0.512	1.000	EC-6.3.3-662	2143
678	HE260A	0.114	1.000	EC-6.3.3-662	2238
679	HE700B	0.503	1.000	EC-6.3.3-662	2253
680	HE400A	0.163	1.000	EC-6.3.3-662	2238
681	HE260A	0.179	1.000	EC-6.3.3-662	2003
682	HE700B	0.429	1.000	EC-6.3.3-661	2253

683	HE400A	0.157	1.000	EC-6.3.3-662	2241
684	HE700B	0.115	1.000	EC-6.3.3-662	2232
685	HE400A	0.578	1.000	EC-6.3.3-662	2147
686	HE260A	0.338	1.000	EC-6.3.3-662	2232
687	HE700B	0.315	1.000	EC-6.3.3-662	2253
688	HE400A	0.299	1.000	EC-6.3.3-662	2238
689	HE260A	0.634	1.000	EC-6.3.3-662	2232
690	HE700B	0.135	1.000	EC-6.3.2 LTB	2184
691	HE260A	0.344	1.000	EC-6.3.3-662	2002
692	HE260A	0.338	1.000	EC-6.3.3-662	2232
693	HE200A	0.476	1.000	EC-6.3.3-662	2232
694	HE200A	0.313	1.000	EC-6.3.3-662	2001
695	HE200A	0.476	1.000	EC-6.3.3-662	2238
696	HE200A	0.306	1.000	EC-6.2.3 (T)	2238
697	HE200A	0.494	1.000	EC-6.3.3-662	2232
698	HE200A	0.318	1.000	EC-6.2.3 (T)	2232
701	IPE300	0.468	1.000	EC-6.3.2 LTB	2279
702	IPE300	0.485	1.000	EC-6.3.2 LTB	2279
703	IPE300	0.436	1.000	EC-6.3.2 LTB	2279
704	IPE300	0.466	1.000	EC-6.3.2 LTB	2279
708	IPE240	0.022	1.000	EC-6.3.3-662	2244
710	IPE240	0.189	1.000	EC-6.2.9.1	2261
717	IPE240	0.022	1.000	EC-6.3.3-662	2244
718	IPE240	0.155	1.000	EC-6.2.9.1	2274
722	L100X100X10	0.027	1.000	EC-6.3.1.1	2244
723	L100X100X10	0.000	1.000	EC3-5: 5.5	2280
724	L100X100X10	0.027	1.000	EC-6.3.1.1	2244
729	IPE240	0.064	1.000	EC-6.2.9.1	2000
730	IPE240	0.094	1.000	EC-6.3.2 LTB	2006
731	IPE240	0.064	1.000	EC-6.2.9.1	2000
732	IPE240	0.101	1.000	EC-6.3.2 LTB	2014
735	IPE240	0.034	1.000	EC-6.3.3-662	2244
736	IPE240	0.189	1.000	EC-6.2.9.1	2261
743	IPE240	0.034	1.000	EC-6.3.2 LTB	2012
744	IPE240	0.155	1.000	EC-6.2.9.1	2274
751	L100X100X10	0.177	1.000	EC-6.3.1.1	2244
752	L100X100X10	0.033	1.000	EC-6.2.3 (T)	2244
755	L100X100X10	0.176	1.000	EC-6.3.1.1	2244
756	L100X100X10	0.033	1.000	EC-6.2.3 (T)	2244
757	HE200A	0.303	1.000	EC-6.3.3-662	2002
758	HE200A	0.242	1.000	EC-6.3.3-662	2015
759	HE200A	0.267	1.000	EC-6.3.3-662	2005
760	HE1000M	0.200	1.000	EC-6.3.3-662	2208
761	HE1000M	0.184	1.000	EC-6.3.3-662	2218
762	HE1000M	0.197	1.000	EC-6.3.3-661	2218
763	HE900B	0.183	1.000	EC-6.3.3-661	2230
764	HE200A	0.298	1.000	EC-6.3.3-662	2005
765	HE900B	0.163	1.000	EC-6.3.3-662	2231
766	HE200A	0.301	1.000	EC-6.3.3-662	2005
767	HE900B	0.167	1.000	EC-6.3.3-662	2222
768	HE200A	0.304	1.000	EC-6.3.3-662	2005
769	HE400A	0.548	1.000	EC-6.3.3-662	2254
770	HE200A	0.084	1.000	EC-6.3.3-662	2269
771	HE400A	0.751	1.000	EC-6.3.3-662	2254

772	HE200A	0.087	1.000	EC-6.3.3-662	2251
773	HE400A	0.752	1.000	EC-6.3.3-662	2254
774	HE200A	0.097	1.000	EC-6.3.3-662	2269
775	HE400A	0.292	1.000	EC-6.3.3-662	2238
776	HE200A	0.094	1.000	EC-6.3.3-662	2269
777	HE400A	0.249	1.000	EC-6.3.3-662	2238
778	HE200A	0.085	1.000	EC-6.3.3-662	2251
779	HE400A	0.166	1.000	EC-6.3.3-662	2241
780	HE200A	0.084	1.000	EC-6.3.3-662	2269
781	HE200A	0.311	1.000	EC-6.3.3-662	2014
782	HE200A	0.305	1.000	EC-6.3.3-662	2015
783	HE200A	0.305	1.000	EC-6.3.3-662	2015
784	HE200A	0.605	1.000	EC-6.3.3-662	2015
785	HE200A	0.595	1.000	EC-6.3.3-662	2005
786	HE200A	0.684	1.000	EC-6.3.3-662	2014
787	HE200A	0.688	1.000	EC-6.3.3-662	2005
788	HE200A	0.693	1.000	EC-6.3.3-662	2015
789	HE200A	0.696	1.000	EC-6.3.3-662	2005
790	HE200A	0.703	1.000	EC-6.3.3-662	2015
791	HE200A	0.706	1.000	EC-6.3.3-662	2005
792	HE200A	0.533	1.000	EC-6.3.3-662	2208
793	HE200A	0.120	1.000	EC-6.3.3-662	2176
794	HE200A	0.166	1.000	EC-6.3.3-662	2240
795	HE1000M	0.796	1.000	EC-6.3.3-661	2122
796	HE200A	0.734	1.000	EC-6.3.3-662	2013
797	HE900B	0.716	1.000	EC-6.3.3-661	2128
798	HE200A	0.725	1.000	EC-6.3.3-662	2006
799	HE1000M	0.666	1.000	EC-6.3.3-661	2218
800	HE200A	0.833	1.000	EC-6.3.3-662	2013
801	HE900B	0.611	1.000	EC-6.3.3-661	2135
802	HE200A	0.838	1.000	EC-6.3.3-662	2007
803	HE1000M	0.458	1.000	EC-6.3.3-662	2116
804	HE200A	0.848	1.000	EC-6.3.3-662	2013
805	HE900B	0.437	1.000	EC-6.3.3-661	2126
806	HE200A	0.850	1.000	EC-6.3.3-662	2007
807	HE200A	0.860	1.000	EC-6.3.3-662	2013
808	HE200A	0.863	1.000	EC-6.3.3-662	2007
809	HE200A	0.364	1.000	EC-6.3.3-662	2006
810	HE200A	0.367	1.000	EC-6.3.3-662	2007
811	HE200A	0.371	1.000	EC-6.3.3-662	2007
812	HE400A	0.550	1.000	EC-6.3.3-662	2266
813	HE200A	0.086	1.000	EC-6.3.3-662	2269
814	HE400A	0.750	1.000	EC-6.3.3-662	2254
815	HE200A	0.088	1.000	EC-6.3.3-662	2263
816	HE400A	0.752	1.000	EC-6.3.3-662	2254
817	HE200A	0.097	1.000	EC-6.3.3-662	2269
818	HE400A	0.555	1.000	EC-6.3.3-662	2147
819	HE200A	0.094	1.000	EC-6.3.3-662	2269
820	HE400A	0.520	1.000	EC-6.3.3-662	2143
821	HE200A	0.085	1.000	EC-6.3.3-662	2263
822	HE400A	0.522	1.000	EC-6.3.3-662	2143
823	HE200A	0.086	1.000	EC-6.3.3-662	2269
824	HE200A	0.378	1.000	EC-6.3.3-662	2013
825	HE200A	0.372	1.000	EC-6.3.3-662	2013

826	HE200A	0.372	1.000	EC-6.3.3-662	2013
827	IPE160	0.380	1.000	EC-6.3.2 LTB	2249
828	IPE160	0.326	1.000	EC-6.3.2 LTB	2249
830	IPE240	0.507	1.000	EC-6.3.3-662	2261
832	IPE240	0.113	1.000	EC-6.3.3-662	2270
833	IPE240	0.073	1.000	EC-6.3.3-662	2249
835	IPE300	0.179	1.000	EC-6.2.9.1	2249
836	IPE300	0.413	1.000	EC-6.3.3-662	2256
837	IPE300	0.232	1.000	EC-6.2.9.1	2273
839	IPE240	0.312	1.000	EC-6.3.3-662	2279
841	IPE240	0.065	1.000	EC-6.2.3 (T)	2015
843	IPE300	0.146	1.000	EC-6.2.3 (T)	2214
844	IPE300	0.163	1.000	EC-6.3.3-662	2261
845	IPE300	0.403	1.000	EC-6.3.3-662	2256
846	IPE300	0.138	1.000	EC-6.3.3-662	2005
847	IPE300	0.140	1.000	EC-6.2.3 (T)	2214
848	IPE300	0.154	1.000	EC-6.3.3-662	2005
849	IPE300	0.079	1.000	EC-6.2.9.1	2261
850	L100X100X10	0.647	1.000	EC-6.3.1.1	2142
851	L100X100X10	0.204	1.000	EC-6.2.3 (T)	2142
852	L100X100X10	0.593	1.000	EC-6.3.1.1	2142
853	L100X100X10	0.107	1.000	EC-6.3.1.1	2015
854	L100X100X10	0.256	1.000	EC-6.3.1.1	2005
855	L100X100X10	0.206	1.000	EC-6.3.1.1	2015
856	IPE300	0.078	1.000	EC-6.3.3-662	2267
857	IPE300	0.100	1.000	EC-6.2.3 (T)	2253
861	IPE300	0.149	1.000	EC-6.3.3-662	2001
863	IPE300	0.083	1.000	EC-6.2.3 (T)	2265
865	L100X100X10	0.246	1.000	EC-6.3.1.1	2265
866	L100X100X10	0.547	1.000	EC-6.3.1.1	2209
867	L100X100X10	0.205	1.000	EC-6.3.1.1	2265
868	IPE160	0.380	1.000	EC-6.3.2 LTB	2249
869	IPE160	0.406	1.000	EC-6.3.3-662	2279
870	IPE300	0.155	1.000	EC-6.3.3-662	2256
871	L100X100X10	0.791	1.000	EC-6.3.1.1	2130
872	IPE300	0.249	1.000	EC-6.2.3 (T)	2215
873	L100X100X10	0.326	1.000	EC-6.2.3 (T)	2130
874	L100X100X10	0.755	1.000	EC-6.3.1.1	2226
875	L100X100X10	0.106	1.000	EC-6.2.3 (T)	2133
876	L100X100X10	0.249	1.000	EC-6.3.1.1	2229
877	L100X100X10	0.181	1.000	EC-6.3.1.1	2014
878	IPE300	0.247	1.000	EC-6.3.3-662	2262
879	L100X100X10	0.402	1.000	EC-6.3.1.1	2255
880	IPE300	0.169	1.000	EC-6.3.3-662	2246
881	L100X100X10	0.573	1.000	EC-6.3.1.1	2148
882	L100X100X10	0.380	1.000	EC-6.3.1.1	2255
884	IPE160	0.009	1.000	EC-6.3.1.1	2247
886	IPE160	0.005	1.000	EC-6.2.3 (T)	2210
889	IPE240	0.061	1.000	EC-6.2.3 (T)	2015
897	IPE240	0.114	1.000	EC-6.3.3-662	2246
901	IPE160	0.172	1.000	EC-6.3.1.1	2244
903	IPE160	0.186	1.000	EC-6.3.1.1	2256
906	IPE240	0.239	1.000	EC-6.3.3-662	2267
914	IPE240	0.260	1.000	EC-6.3.3-661	2150

917	HE260A	0.053	1.000	EC-6.3.2 LTB	2196
920	HE260A	0.055	1.000	EC-6.3.2 LTB	2232
931	L100X100X10LD	0.001	1.000	EC-6.2.3 (T)	2100
937	HE700B	0.571	1.000	EC-6.3.3-662	2247
938	HE700B	0.046	1.000	EC-6.3.3-662	2138
939	HE700B	0.317	1.000	EC-6.2.9.1	2253
941	HE700B	0.187	1.000	EC-6.2.9.1	2253
943	HE700B	0.190	1.000	EC-6.3.3-662	2193
944	HE200A	0.719	1.000	EC-6.3.3-662	2003
945	HE200A	0.599	1.000	EC-6.3.3-662	2220
946	HE700B	0.283	1.000	EC-6.3.2 LTB	2186
947	HE700B	0.125	1.000	EC-6.3.3-662	2232
948	HE700B	0.111	1.000	EC-6.3.3-662	2232
949	HE700B	0.068	1.000	EC-6.3.3-662	2138
951	HE160A	0.231	1.000	EC-6.3.3-662	2280
952	HE160A	0.193	1.000	EC-6.3.3-662	2195
953	HE160A	0.189	1.000	EC-6.3.3-662	2280
954	HE160A	0.446	1.000	EC-6.2.3 (T)	2232
955	HE160A	0.530	1.000	EC-6.3.3-662	2232
956	HE160A	0.303	1.000	EC-6.2.3 (T)	2232
958	HE700B	0.068	1.000	EC-6.3.2 LTB	2186
962	HE700B	0.719	1.000	EC-6.3.3-662	2193
964	HE700B	0.280	1.000	EC-6.2.9.1	2253
966	HE700B	0.094	1.000	EC-6.3.3-662	2001
967	HE200A	0.604	1.000	EC-6.3.3-662	2011
968	HE200A	0.721	1.000	EC-6.3.3-662	2001
969	HE200A	0.642	1.000	EC-6.3.3-662	2011
970	HE200A	0.653	1.000	EC-6.3.3-662	2001
971	HE200A	0.652	1.000	EC-6.3.3-662	2011
972	HE200A	0.664	1.000	EC-6.3.3-662	2001
973	HE200A	0.798	1.000	EC-6.3.3-662	2000
974	HE200A	0.479	1.000	EC-6.3.3-662	2208
975	HE700B	0.353	1.000	EC-6.3.3-662	2157
976	HE700B	0.989	1.000	EC-6.3.3-662	2157
977	HE700B	0.552	1.000	EC-6.3.3-662	2277
978	HE700B	0.181	1.000	EC-6.2.9.1	2253
979	HE700B	0.232	1.000	EC-6.3.3-662	2157
980	HE700B	0.113	1.000	EC-6.3.2 LTB	2155
982	HE160A	0.345	1.000	EC-6.3.3-662	2008
983	HE700B	0.166	1.000	EC-6.3.3-662	2011
984	HE160A	0.339	1.000	EC-6.3.3-662	2002
985	HE160A	0.291	1.000	EC-6.3.3-662	2008
986	HE700B	0.104	1.000	EC-6.3.3-662	2196
987	HE160A	0.530	1.000	EC-6.2.3 (T)	2202
988	HE160A	0.593	1.000	EC-6.3.3-662	2196
989	HE700B	0.333	1.000	EC-6.3.2 LTB	2154
990	HE160A	0.382	1.000	EC-6.3.3-662	2000
992	HE700B	0.113	1.000	EC-6.3.2 LTB	2155
994	HE700B	0.390	1.000	EC-6.3.2 LTB	2154
996	HE700B	0.574	1.000	EC-6.3.3-662	2157
998	HE700B	0.288	1.000	EC-6.3.3-662	2157
1001	HE180A	0.405	1.000	EC-6.2.3 (T)	2146
1002	HE180A	0.473	1.000	EC-6.3.1.1	2146
1005	HE180A	0.119	1.000	EC-6.2.3 (T)	2223

1006	HE180A	0.136	1.000	EC-6.3.1.1	2220
1008	IPE240	0.097	1.000	EC-6.2.3 (T)	2253
1011	HE180A	0.616	1.000	EC-6.2.3 (T)	2158
1012	HE180A	0.708	1.000	EC-6.3.1.1	2158
1015	HE180A	0.143	1.000	EC-6.2.3 (T)	2154
1016	HE180A	0.162	1.000	EC-6.3.1.1	2154
1018	HE400A	0.043	1.000	EC-6.3.3-662	2186
1019	HE400A	0.049	1.000	EC-6.3.3-662	2186
1020	HE400A	0.063	1.000	EC-6.3.3-662	2232
1021	HE400A	0.159	1.000	EC-6.3.3-662	2232
1022	HE400A	0.180	1.000	EC-6.3.3-662	2186
1023	HE400A	0.336	1.000	EC-6.3.3-662	2147
1024	HE400A	0.062	1.000	EC-6.3.3-662	2002
1025	HE400A	0.067	1.000	EC-6.3.3-662	2002
1026	HE400A	0.109	1.000	EC-6.3.3-662	2154
1027	HE400A	0.206	1.000	EC-6.3.3-662	2154
1028	HE400A	0.227	1.000	EC-6.3.3-662	2154
1029	HE400A	0.472	1.000	EC-6.3.3-662	2155
1030	IPE240	0.202	1.000	EC-6.3.3-662	2219
1031	IPE300	0.159	1.000	EC-6.2.3 (T)	2214
1032	IPE300	0.231	1.000	EC-6.2.3 (T)	2218
1033	IPE240	0.061	1.000	EC-6.2.3 (T)	2015
1034	L100X100X10	0.056	1.000	EC-6.2.3 (T)	2261
1035	L100X100X10	0.041	1.000	EC-6.3.1.1	2261
1036	L100X100X10	0.409	1.000	EC-6.3.1.1	2250
1037	L100X100X10	0.211	1.000	EC-6.3.1.1	2261
1038	IPE300	0.117	1.000	EC-6.2.3 (T)	2253
1039	L100X100X10	0.042	1.000	EC-6.3.1.1	2255
1040	L100X100X10	0.061	1.000	EC-6.2.3 (T)	2255
1041	IPE300	0.110	1.000	EC-6.2.9.1	2261
1042	L100X100X10	0.247	1.000	EC-6.3.1.1	2255
1043	L100X100X10	0.310	1.000	EC-6.3.1.1	2256
1045	HE200A	0.102	1.000	EC-6.3.3-662	2266
1046	HE200A	0.160	1.000	EC-6.3.3-662	2260
1047	HE200A	0.227	1.000	EC-6.3.3-662	2001
1048	HE200A	0.411	1.000	EC-6.3.3-662	2208
1049	HE200A	0.320	1.000	EC-6.3.3-662	2271
1050	HE200A	0.193	1.000	EC-6.3.3-662	2253
1059	L100X100X10	0.092	1.000	EC-6.3.1.1	2259
1060	L100X100X10	0.084	1.000	EC-6.3.1.1	2259
1061	L100X100X10	0.085	1.000	EC-6.3.1.1	2160
1062	L100X100X10	0.092	1.000	EC-6.3.1.1	2172
1066	HE600A	0.694	1.000	EC-6.3.3-662	2108
1067	HE700B	0.230	1.000	EC-6.3.3-662	2156
1068	HE600A	0.327	1.000	EC-6.3.3-662	2271
1069	HE600A	0.302	1.000	EC-6.3.3-662	2253
1072	HE600A	0.564	1.000	EC-6.3.3-662	2002
1075	HE600A	0.205	1.000	EC-6.3.3-662	2148
1076	HE600A	0.344	1.000	EC-6.2.9.1	2148
1077	HE400A	0.591	1.000	EC-6.3.3-662	2147
1079	HE400A	0.515	1.000	EC-6.3.3-662	2141
1081	HE400A	0.524	1.000	EC-6.3.3-662	2194
1082	HE400A	0.315	1.000	EC-6.3.2 LTB	2184
1084	HE400A	0.320	1.000	EC-6.3.3-662	2192

1085	HE400A	0.160	1.000	EC-6.3.3-662	2241
1087	HE400A	0.257	1.000	EC-6.3.3-662	2238
1089	HE400A	0.326	1.000	EC-6.3.3-662	2241
1090	HE400A	0.238	1.000	EC-6.3.3-662	2184
1092	HE400A	0.246	1.000	EC-6.3.3-662	2184
1093	HE700B	0.256	1.000	EC-6.3.3-662	2247

3.6 PROGETTAZIONE DI PALI

La progettazione dei pali descritta qui di seguito indica il numero minimo di pali necessari.

Per il gruppo di pali con 8 pali

Reazioni:

	Node	L/C	Horizontal	Vertical	Horizontal	Moment		
			Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
Max Fx	1	2011	356.928	1191.711	-1.678	0.000	0.000	0.000
Min Fx	1	2001	-359.208	-802.578	1.922	0.000	0.000	0.000
Max Fy	16	2215	-171.060	3108.497	49.921	0.000	0.000	940.488
Min Fy	16	2005	28.188	-1607.701	-316.119	0.000	0.000	-184.135
Max Fz	16	2013	-7.925	1364.114	328.263	0.000	0.000	111.505
Min Fz	29	2007	5.419	1531.876	-329.438	0.000	0.000	-38.062
Max Mx	1	2000	-355.082	-862.447	2.016	0.000	0.000	0.000
Min Mx	1	2000	-355.082	-862.447	2.016	0.000	0.000	0.000
Max My	1	2000	-355.082	-862.447	2.016	0.000	0.000	0.000
Min My	1	2000	-355.082	-862.447	2.016	0.000	0.000	0.000
Max Mz	16	2116	-242.358	2903.589	19.402	0.000	0.000	1396.039
Min Mz	16	2262	226.924	-259.550	-16.398	0.000	0.000	-1336.515

Calcolo:

Check for Pile Group System :

Column MKD :

Total no. of pile = Nos c/c dist bet piles (m) =
 C/c Dist bet extreme piles along -z = m diam of pile (m) =
 C/c Dist bet extreme piles along -x = m

Pile configuration : about 0,0 as c.g. of pile system

	X-Coor	Z-Coor	X'	Z'		X-Coor	Z-Coor	X'	Z'
Pile 1	-2.700	0.900	7.290	0.810					
Pile 2	-0.900	0.900	0.810	0.810					
Pile 3	0.900	0.900	0.810	0.810					
Pile 4	2.700	0.900	7.290	0.810					
Pile 5	2.700	-0.900	7.290	0.810					
Pile 6	0.900	-0.900	0.810	0.810					
Pile 7	-0.900	-0.900	0.810	0.810					
Pile 8	-2.700	-0.900	7.290	0.810					

Z-axis

X-axis

Z-axis

Zx of Pile System = 7.200 m³ Ix = 6.48
 Zz of Pile System = 12.00 m³ Iz = 32.4

Pile Cap and soil weight calculation

Column Size Dcx = <input type="text" value="0"/> m	Pile Cap bottom from GL = <input type="text" value="2.1"/> m	Pedestal Self Weight = 86.25 kN
Column Size Dcz = <input type="text" value="0"/> m	Pile Cap Edge Dist. along X = <input type="text" value="0.6"/> m	Pile Cap Self weight = 495.00 kN
	Pile Cap Edge Dist. along Z = <input type="text" value="0.6"/> m	Soil Weight = 308.62 kN
Pedestal Size Dpx = <input type="text" value="2"/> m	Pile Cap Length Lx = 6.60 m	DL from GF(stab) = 0.00 kN
Pedestal Size Dpz = <input type="text" value="1.5"/> m	Pile Cap Width Lz = 3.00 m	Surcharge = <input type="text" value="0.00"/> kN
Pedestal height = <input type="text" value="1.15"/> m	Depth of Pile Cap assume D = <input type="text" value="1"/> m	Buyoancy pressure = <input type="text" value="0"/> kN/m2
Wall length = <input type="text" value="0"/> m	Grade slab thickness if any = <input type="text" value="0"/> m	Total DL on Pile cap = 889.87 kN
Wall height = <input type="text" value="0"/> m		

Load From SAP Output

Critical Load Case : <input type="text" value="2209"/> Max Comp	Critical Load Case : <input type="text" value="2013"/> Max Shear	Pile capacity as per geotechnical report
Max Comp. Load : <input type="text" value="625.58"/> OK	Max Shear Load : <input type="text" value="41.04"/> OK	Compression = <input type="text" value="2040"/> kN 0.31
Critical Load : <input type="text" value="2005"/> Max Tension		Tension = <input type="text" value="1197"/> kN 0.12
Max Tensil : <input type="text" value="-141.63"/> OK		Shear = <input type="text" value="104"/> kN 0.39

Moments Clockwise Positive
 Distance Between Forces at support & Pile Bottom = m

Load From SAP Output			2005	forces from SAP											
Column MKD	Distance From C.G. Of System		Joint No (Support)	LC	FX	FY	FZ	MX	MY	MZ	P (Tot)	MX	MZ	Mxvert due to P	Mzvert due to P
	X - Dir	Z - Dir			kN	kN	kN	kN-m	kN-m	kN-m	kN	kN-m	kN-m		
-	0.00	0.00	16	2005	28.19	-1607.70	-316.12	0.00	0.00	-184.14	-1607.70	-727.07	-119.30	0.00	0.0
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				$\Sigma =$	28.19	-1607.70	-316.12	0.00	0.00	-184.14	-1607.70	-727.07	-119.30	0.00	0.0

Load At C.G. of Pile System Group

Total Vertical Load ; P = -717.84 kN

Total Moment @ X - Dir ; Mx = -302.07 kN-m **Additional moment on column due to eccentricity of dead load of L-beam**

Total Moment @ Z - Dir ; Mz = -119.30 kN-m

Max Compressive load per pile = -37.83 kN

Max Tensile load per pile = -141.63 kN

Max Shear Force on pile $\Sigma Fx = 28.19$ kN

$\Sigma Fz = -316.12$ kN

Resultant shear on pile = 39.67 kN

Per il gruppo di pali con 4 pali -

Reazioni:

			Horizontal	Vertical	Horizontal	Moment		
	Node	L/C	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
Max Fx	324	2011	353.191	29.629	3.122	34.009	0.000	0.000
Min Fx	324	2001	-365.666	440.848	-6.398	-41.948	0.000	0.000
Max Fy	324	2155	31.637	880.414	-7.618	-29.197	0.000	0.000
Min Fy	324	2008	350.124	-90.992	3.083	32.178	0.000	0.000
Max Fz	324	2271	154.739	129.403	312.208	1421.352	0.000	0.000
Min Fz	325	2259	205.610	130.569	-311.187	-1404.960	0.000	0.000
Max Mx	324	2271	154.739	129.403	312.208	1421.352	0.000	0.000
Min Mx	325	2259	205.610	130.569	-311.187	-1404.960	0.000	0.000
Max My	168	2000	-6.268	48.902	-0.031	0.000	0.000	0.000
Min My	168	2000	-6.268	48.902	-0.031	0.000	0.000	0.000
Max Mz	168	2000	-6.268	48.902	-0.031	0.000	0.000	0.000
Min Mz	168	2000	-6.268	48.902	-0.031	0.000	0.000	0.000

Calcolo:

Check for Pile Group System :

Column MKD : -

Total no of pile = 4 Nos c/c dist bet piles (m) = 1.8
 C/c Dist bet extreme piles along -z = 1.80 m diam of pile (m) = 0.6
 C/c Dist bet extreme piles along -x = 1.80 m Select Pile cap

Pile configuration : about 0,0 as c.g. of pile system

	X-Coor	Z-Coor	X ²	Z ²		X-Coor	Z-Coor	X ²	Z ²
Pile 1	-0.900	0.900	0.810	0.810					
Pile 2	0.900	0.900	0.810	0.810					
Pile 3	0.900	-0.900	0.810	0.810					
Pile 4	-0.900	-0.900	0.810	0.810					

Zx of Pile System = 3.600 m³ Zz of Pile System = 3.60 m³
 lx = 3.24 lz = 3.24

Pile Cap and soil weight calculation

Column Size Dcx = 0 m	Pile Cap bottom from GL = 2.1 m	Pedestal Self Weight = 28.75 kN
Column Size Dcz = 0 m	Pile Cap Edge Dist. along X = 0.6 m	Pile Cap Self weight = 225.00 kN
	Pile Cap Edge Dist. along Z = 0.6 m	Soil Weight = 146.96 kN
Pedestal Size Dpx = 1 m	Pile Cap Length Lx = 3.00 m	DL from GF(slab) = 0.00 kN
Pedestal Size Dpz = 1 m	Pile Cap Width Lz = 3.00 m	Surcharge = 0.00 kN
Pedestal height = 1.15 m	Depth of Pile Cap assume D = 1 m	Buyoancy pressure = 0 kN/m ²
Wall length = 0 m	Grade slab thickness if any = 0 m	Total DL on Pile cap = 400.71 kN
Wall height = 0 m		

Load From SAP Output															
Critical Load Case :	2283	Max Comp	Critical Load Case :	2001	Max Shear	Pile capacity as per geotechnical report									
Max Comp. Load :	943.77	OK	Max Shear Load :	91.43	OK	Compression =	2040 kN	0.46							
Critical Load :	2247	Max Tension													
Max Tensile :	-720.61	OK													
Moments Clockwise Positive															
Distance Between Forces at support & Pile Bottom = 2.3 m															
Load From SAP Output 2247															
forces from SAP															
Column MKD	Distance From C.G. Of System		Joint No (Support)	LC	FX kN	FY kN	FZ kN	MX kN-m	MY kN-m	MZ kN-m	P (Tot) kN	MX kN-m	MZ kN-m	Mxvert due to P	Mzvert due to P
	X - Dir	Z - Dir													
-	0.00	0.00	324	2247	151.57	-51.50	312.07	1417.12	0.00	0.00	-51.50	2134.87	348.62	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
					Σ =	151.57	-51.50	312.07	1417.12	0.00	0.00	-51.50	2134.87	348.62	0.00
Load At C.G. of Pile System Group															
Total Vertical Load ; P					=	349.21 kN									
Total Moment @ X - Dir ; Mx					=	2559.87 kN-m	Additional moment on column due to eccentricity of dead load of L-beam								
Total Moment @ Z - Dir ; Mz					=	348.62 kN-m									
Max Compressive load per pile					=	895.22 kN									
Max Tensile load per pile					=	-720.61 kN									
Max Shear Force on pile					Σ Fx	=	151.57 kN								
					Σ Fz	=	312.07 kN								
Resultant shear on pile					=	86.73 kN									