








S.S. N. 9 "VIA EMILIA"

VARIANTE DI CASALPUSTERLENGO ED ELIMINAZIONE PASSAGGIO A LIVELLO SULLA S.P. EX S.S. N.234

PROGETTO ESECUTIVO

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VISTO: IL RESP. DEL PROCEDIMENTO

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HB02

H - PROGETTO STRUTTURALE OPERE PRINCIPALI

VI02 - VIADOTTO SU ROTATORIA SVINCOLO DI ZORLESCO

RELAZIONE DI CALCOLO IMPALCATO

CODICE PROGETTO PROGETTO LIV. PROG. N. PROG. <div style="display: flex; justify-content: space-around;"> COMI E 1701 </div>	NOME FILE HB02-P00VI02STRRE02_B.dwg CODICE ELAB. P 0 0 V I 0 2 S T R R E 0 2	REVISIONE <div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 0 auto;">B</div>	SCALA:
C			
B	EMISSIONE A SEGUITO ISTRUTTORIA	LUGLIO 2018	ARCH. MAURO SASSO
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REV.	DESCRIZIONE	DATA	REDATTO
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1 GENERALITÀ

1.1 PREMESSE

La presente relazione riporta i calcoli statici relativi alla progettazione esecutiva del Viadotto sulla rotatoria RO.01, svincolo Casalpusterlengo Nord Zorlesco, tra le Pk. 0+834.537 e Pk. 0+934.537 della Variante di Casalpusterlengo alla S.S. n. 9 "Via Emilia". L'opera in oggetto presenta uno schema statico di trave continua su tre campate aventi luci tra gli assi di appoggio pari a 31+38+31 m.

L'impalcato è composto, per ogni via di corsa, da quattro travi continue in acciaio a doppio T ad altezza variabile sostenenti la soletta di scorrimento stradale in calcestruzzo armato ordinario.

In riguardo agli aspetti sismici, l'impalcato è isolato alla sommità delle pile e spalle mediante isolatori elastomerici armati.

Dimensioni dell'impalcato:

Larghezza marciapiede esterno	= 1.90 m	(larghezza utile 1.20 m)
Larghezza cordolo interno	= 0.80 m	
Larghezza carreggiata, categoria B	= 9.75 m	
Larghezza totale soletta	= 12.45 m	
Numero delle travi	= 4	
Interasse travi	= 3.20 m	
Altezza delle travi (variabile)	= 1.00÷2.00 m	
Spessore soletta	= 30 cm	(lastra 6 cm + getto 24 cm)

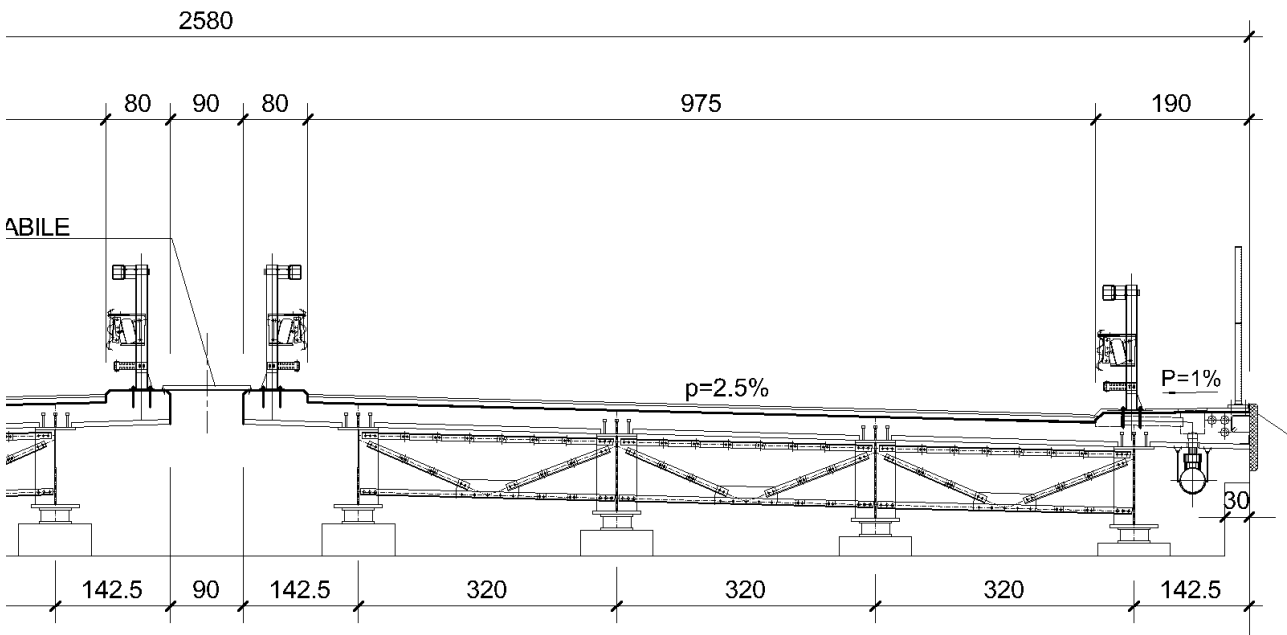


FIGURA 1 - SEZIONE TIPICA IMPALCATO (SU SPALLA)

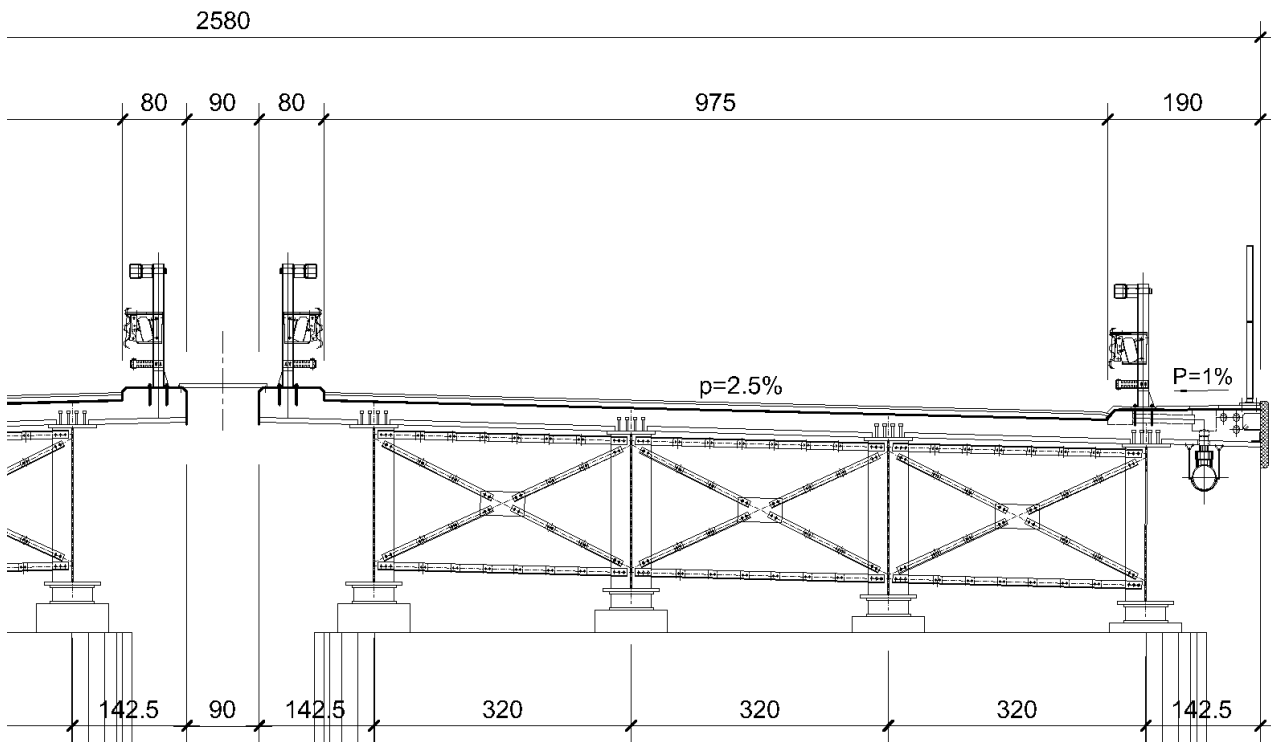


FIGURA 2- SEZIONE IMPALCATO (SU PILA)

1.2 NORMATIVA

Nella redazione dei calcoli statici ci si è attenuti alle prescrizioni della Normativa vigente; in particolare:

- **Legge n°1086 del 05/11/1971**
 “Norme per la disciplina delle opere in conglomerato cementizio armato, normale e precompresso ed a struttura metallica”
- **Legge n°64 del 02/02/1974**
 “Provvedimenti per le costruzioni con particolari prescrizioni per le zone sismiche”
- **Decreto Ministeriale 14/01/2008**
 “Norme tecniche per le costruzioni”
- **Circolare Min. 02/02/2009, n° 617**
 “Istruzioni per l’applicazione delle Norme tecniche per le costruzioni di cui al D.M. 14/01/2008”
- **UNI EN 1993-1-1:2005**
 “Eurocodice 3 – Progettazione delle strutture in acciaio – Parte 1-1: Regole generali e regole per gli edifici”
- **UNI EN 1993-1-5:2007**
 “Eurocodice 3 - Progettazione delle strutture in acciaio – Parte 1-5: Elementi strutturali a lastra”
- **UNI EN 1993-1-9:2005**
 “Eurocodice 3 - Progettazione delle strutture in acciaio – Parte 1-9: Fatica”
- **UNI EN 1993-1-10:2005**

“Eurocodice 3 - Progettazione delle strutture in acciaio – Parte 1-10: Resilienza del materiale e proprietà attraverso lo spessore”

- UNI EN 1993-2:2007

“Eurocodice 3 - Progettazione delle strutture in acciaio – Parte 2: Ponti in acciaio”

- UNI EN 1994-1-1:2005

“Eurocodice 4 - Progettazione delle strutture composte acciaio-calcestruzzo – Parte 1-1: Regole generali e regole per gli edifici”

- UNI EN 1994-2:2006

“Eurocodice 4 - Progettazione delle strutture composte acciaio-calcestruzzo – Parte 2: Regole generali e regole per i ponti”

1.3 MATERIALI

I materiali di previsto impiego sono elencati nelle seguenti tabelle:

Calcestruzzo (rif. par. 11.2.10 DM 14.01.2008)		
Resistenza caratteristica cubica a 28 gg del calcestruzzo Rck	40	N/mm ²
Resistenza caratteristica cilindrica	32	N/mm ²
Resistenza cilindrica media fcm = fck+8	40.00	N/mm ²
Resistenza media a trazione semplice assiale fctm = 0,30*fck^(2/3)	3.02	N/mm ²
Resistenza caratteristica a trazione semplice assiale fctk = 0,7*fctm	2.12	N/mm ²
Resistenza media a trazione per flessione fcfm = 1,2*fctm	3.63	N/mm ²
Modulo elastico secante tra 0 e 0,40 fcm Ecm = 22000 (fcm/10)^0,3	33346	N/mm ²
Coefficiente di Poisson (cls fessurato/non fessurato)	0/0,2	
Coefficiente di dilatazione termica α	1.0E-5	1/C°
Coefficiente riduttivo per le resistenze di lunga durata αcc	0.85	
Coefficiente parziale di sicurezza relativo al calcestruzzo γc	1.5	
Resistenza di calcolo a compressione del calcestruzzo fcd = αcc fck/ γc (per spessori > 50 mm)	18.13	N/mm ²
Resistenza di calcolo a compressione del calcestruzzo fcd = 0.8 αcc fck/ γc (per spessori ≤ 50 mm)	14.51	N/mm ²
Resistenza di calcolo a trazione del calcestruzzo fctd = fctk/ γc (per spessori > 50 mm)	1.41	N/mm ²
Resistenza di calcolo a trazione del calcestruzzo fctd = 0.8 fctk/ γc (per spessori ≤ 50 mm)	1.13	N/mm ²
Stati Limite di Esercizio: Tensione massima di compressione per combinazioni caratteristiche σc = 0.6 fck	19.20	N/mm ²
Stati Limite di Esercizio: Tensione massima di compressione per combinazioni quasi permanenti σc = 0.45 fck	14.40	N/mm ²
Tensione tangenziale di aderenza caratteristica acciaio-calcestruzzo fbk = 2,25 η fctk (η =1)	4.76	N/mm ²
Tensione tangenziale di aderenza di calcolo acciaio-calcestruzzo fbd = fbk/ γc	3.18	N/mm ²
Acciaio per cemento armato B450C (rif. par. 11.3.2.1 DM 14.01.2008)		
Valore nominale della tensione caratteristica di snervamento fy,nom	450	N/mm ²
Valore nominale della tensione caratteristica di rottura ft,nom	540	N/mm ²
Coefficiente parziale di sicurezza relativo all'acciaio γs	1.15	
Resistenza di calcolo dell'acciaio fyd = fyk/ γs	391.3	N/mm ²
Stati Limite di Esercizio: Tensione massima per combinazioni caratteristiche σs = 0.8 fyk	360.0	N/mm ²

Acciaio per strutture (rif. par. 11.3.4 DM 14.01.2008)		
Tipo acciaio	S 355 W	
Modulo elastico E	210000	N/mm ²
Coefficiente di Poisson v	0.3	
Modulo di elasticità trasversale G	80769	N/mm ²
Coefficiente di dilatazione termica α	1.2E-05	1/C°
Tensione caratteristica di snervamento f_{yk} (spessore ≤ 40 mm)	355	N/mm ²
Tensione caratteristica di rottura f_{tk} (spessore ≤ 40 mm)	510	N/mm ²
Tensione caratteristica di snervamento f_{yk} (40 mm < spessore ≤ 80 mm)	335	N/mm ²
Tensione caratteristica di rottura f_{tk} (40 mm < spessore ≤ 80 mm)	490	N/mm ²

Coefficienti di omogeneizzazione:

- sezioni composte acciaio/cls: $m = E_s / E_c = 210000 / 33346 = 6.3$
- sezioni in cls. armato: $m = 15$

Acciaio connettori trave/soletta tipo "Nelson" tipo: S 235 J2+C450
 tensione caratteristica di snervamento $f_{yk} \geq 350 \text{ N/mm}^2$
 tensione caratteristica di rottura: $f_{tk} \geq 450 \text{ N/mm}^2$

2 MODELLAZIONE STRUTTURALE

Il viadotto è stato schematizzato in un modello ad elementi finiti di tipo "trave" (beam), risolto mediante il programma di calcolo "MIDAS/Civil 2015", versione 1.2, realizzato da "MIDAS Information Technology, Co., Ltd.; Areum B/D 4° floor, 258-1 Seohyeon-dong, Bundang-gu, Seongnam, Gyeonggi-do, 463-824, Korea"; distribuito in Italia da "CSPFea s.c., via Zuccherificio 5/D, 35042 Este (PD)".

L'affidabilità del codice di calcolo è assicurata da una vasta documentazione teorica e di supporto e da una serie di esempi di verifica in cui i risultati ottenuti sono confrontati con risultati teorici tratti dalla letteratura specialistica o, in mancanza, con risultati di altri codici di calcolo indipendenti.

Il programma, ancorché utilizzabile come codice agli "elementi finiti" di tipo generale, è stato scelto perché volto soprattutto al calcolo di ponti (semplici, continui, strallati, sospesi, ecc.) consentendo tra l'altro la gestione di fasi costruttive successive, l'introduzione di cavi di precompressione, il calcolo delle relative perdite immediate (attrito) e differite (ritiro, fluage, rilassamento) e una gestione semi-automatica di ricerca degli effetti massimi e minimi dovuti ai carichi mobili, nonché la possibilità di effettuare analisi dinamiche lineari con spettro di risposta o dinamiche non lineari (time-history).

La modellazione è stata estesa all'impalcato e ai fusti delle pile, la base dei fusti è considerata incastrata; le spalle sono solamente descritte con un vincolo di incastro.

L'analisi globale della struttura è condotta secondo il metodo "Elastico"; tutti gli elementi strutturali sono considerati indefinitamente elastici.

Viene condotta un'analisi statica per le condizioni di carico relative a permanenti, carichi mobili, frenamento, vento, carichi termici, e un'analisi dinamica lineare per gli effetti delle azioni sismiche.

Si allegano i dati della modellazione strutturale e la spiegazione delle convenzioni usate nei files di dati del programma.

L'impalcato segue longitudinalmente l'asse coordinato X (da sinistra verso destra), le pile seguono l'asse Z (dall'alto verso il basso); l'asse Y (trasversale) forma con i precedenti una terna destrorsa.

I nodi degli elementi strutturali sono posizionati secondo la disposizione reale; quando necessario sono tra loro collegati da "vincoli rigidi".

La numerazione degli elementi è la seguente (xxx: numeri variabili):

- travi principali: da 101÷401 a 140÷440 ordinati per X crescente (+1) e quindi per Y crescente (+100 per ogni trave)
- trasversi intermedi: 1xxx, ordinati per Y, Z e X crescenti
- trasversi su pile: 2xxx, ordinati per Y, Z, e X crescenti

- controventi: 3xxx, ordinati per X, Y e Z crescenti
- pile: 4xxx, ordinati per Z crescente e quindi per X crescente

Per la ripartizione trasversale dei carichi si sono inoltre schematizzati elementi trasversali fittizi rappresentanti la soletta.

La soletta considerata nelle sezioni composte è limitata alla parte gettata in opera, esclusa quindi la lastra prefabbricata inferiore, di 6 cm di spessore.

Si è assunta un'accelerazione gravitazionale pari a $g = 9,806 \text{ m/s}^2$.

Le unità di misura utilizzate sono coerenti con il Sistema Internazionale:

lunghezze:	m	(metri)
masse:	t	(tonnellate)
forze	kN	(kilo-Newton)

I materiali usati nella modellazione hanno le caratteristiche di calcolo seguenti:

a) calcestruzzo soletta impalcato (C32/40):

- modulo di elasticità: $E = 33345 \text{ N/mm}^2$
- coefficiente di Poisson: $\nu = 0,20$
- coefficiente di dilatazione termica: $\alpha = 0.00001 \text{ C}^{-1}$
- peso specifico: $\gamma = 25 \text{ kN/m}^3$
- massa specifica: $m = 2.55 \text{ t/m}^3$

b) acciaio strutturale viadotto (S355W):

- modulo di elasticità: $E = 210000 \text{ N/mm}^2$
- coefficiente di Poisson: $\nu = 0.30$
- coefficiente di dilatazione termica: $\alpha = 0.000012 \text{ C}^{-1}$
- peso specifico(*): $\gamma = 88.6 \text{ kN/m}^3$
- massa specifica(*): $m = 9.03 \text{ t/m}^3$

NOTA (*): le caratteristiche volumiche dell'acciaio son aumentate del 15% per tener conto degli elementi non schematizzati nel modello (irrigidimenti, piastre, bulloni, saldature, connettori).

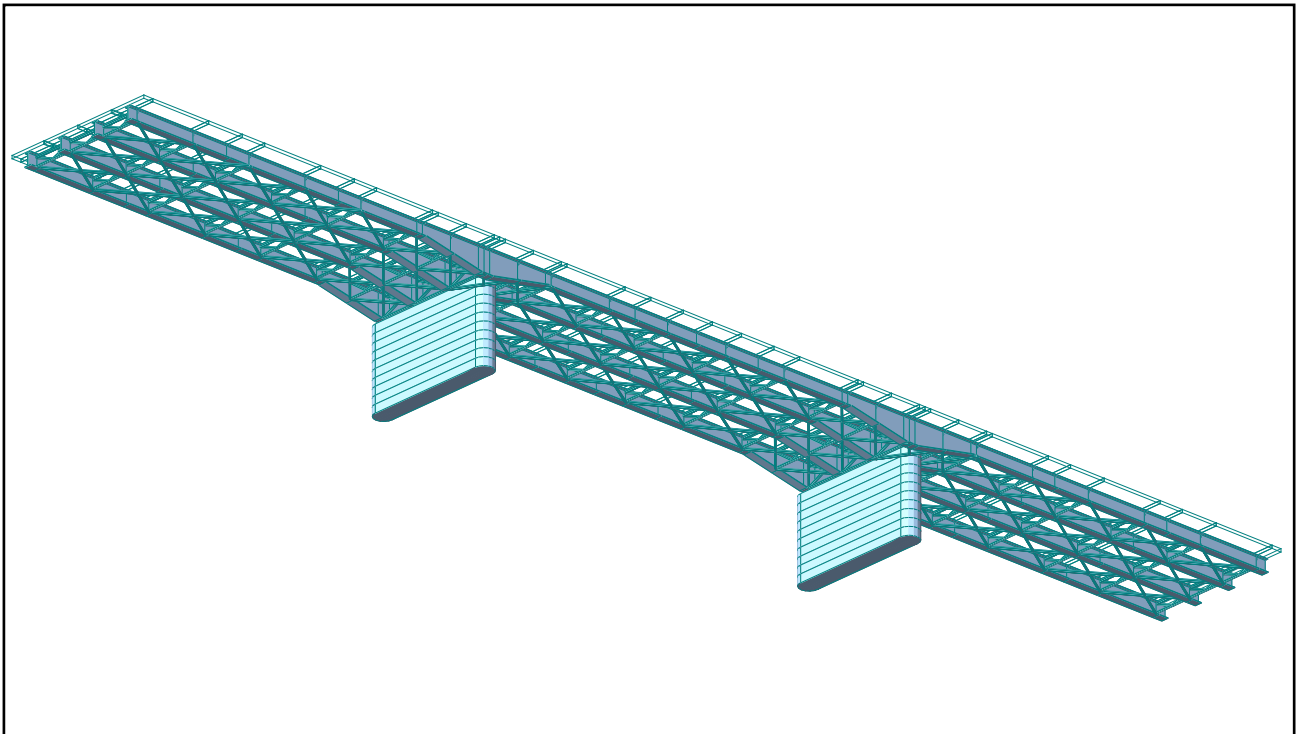


FIGURA 3 - SCHEMA DI CALCOLO – ASSONOMETRIA

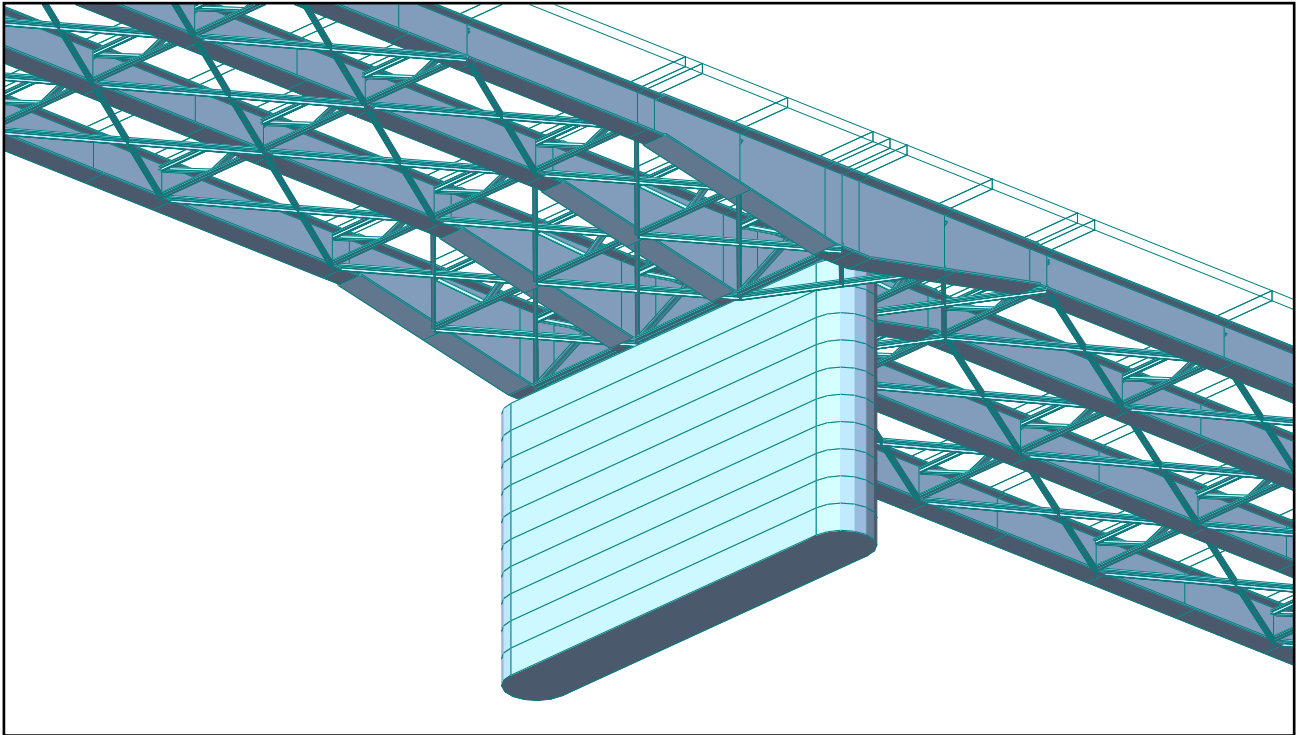
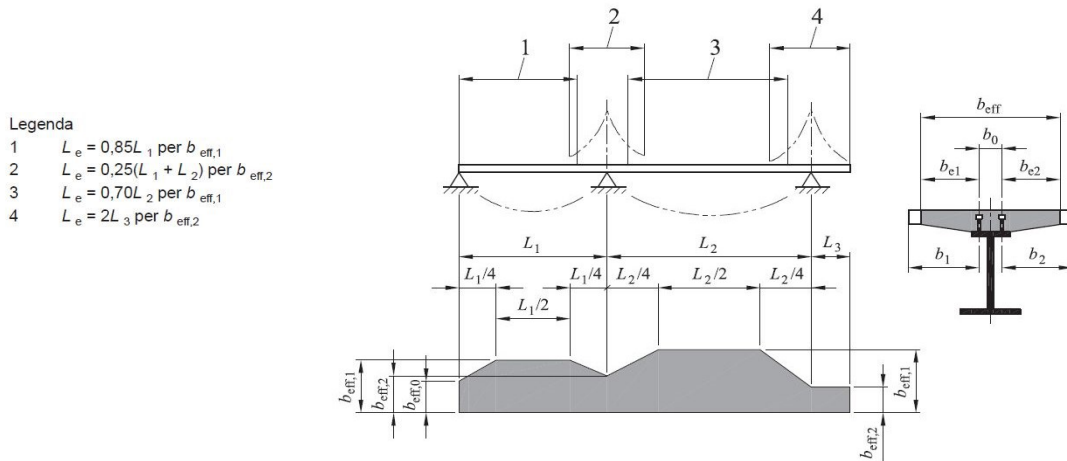


FIGURA 4 - SCHEMA DI CALCOLO – PARTICOLARE SU PILA

2.1 LARGHEZZE “EFFICACI” DI SOLETTA COLLABORANTE

Nel calcolo delle sezioni composte si tiene conto di una larghezza di soletta collaborante determinata secondo NTC 2008 # 4.3.2.3; il calcolo è riassunto nella seguente tabella.

TRAVE CONTINUA - CALCOLO DELLE LARGHEZZE EFFICACI DI SOLETTA COLLABORANTE - NTC 2008, § 4.3.2.3.



- Legenda
- 1 $L_e = 0,85L_1$ per $b_{eff,1}$
 - 2 $L_e = 0,25(L_1 + L_2)$ per $b_{eff,2}$
 - 3 $L_e = 0,70L_2$ per $b_{eff,1}$
 - 4 $L_e = 2L_3$ per $b_{eff,2}$

VIADOTTI SU ROTATORIE TRAVI ESTERNE	Appoggio / Campata	Estremità / Intermedio	Luce (m)	b_0 (m)	b_1 (m)	b_2 (m)	L_e (m)	$L_e / 8$ (m)	b_{e1} (m)	b_{e2} (m)	β_1	β_2	b_{eff} (m)
Spalla 1	Appoggio	Estremità		0.300	1.450	1.275	26.350	3.294	1.450	1.275	1.000	1.000	3.025
	Campata	Estremità	31.000	0.300	1.450	1.275	26.350	3.294	1.450	1.275	1.000	1.000	3.025
Pila 1	Appoggio	Intermedio		0.300	1.450	1.275	17.250	2.156	1.450	1.275	1.000	1.000	3.025
	Campata	Intermedio	38.000	0.300	1.450	1.275	26.600	3.325	1.450	1.275	1.000	1.000	3.025
Pila 2	Appoggio	Intermedio		0.300	1.450	1.275	17.250	2.156	1.450	1.275	1.000	1.000	3.025
	Campata	Estremità	31.000	0.300	1.450	1.275	26.350	3.294	1.450	1.275	1.000	1.000	3.025
Spalla 2	Appoggio	Estremità		0.300	1.450	1.275	26.350	3.294	1.450	1.275	1.000	1.000	3.025

VIADOTTI SU ROTATORIE TRAVI INTERNE	Appoggio / Campata	Estremità / Intermedio	Luce (m)	b_0 (m)	b_1 (m)	b_2 (m)	L_e (m)	$L_e / 8$ (m)	b_{e1} (m)	b_{e2} (m)	β_1	β_2	b_{eff} (m)
Spalla 1	Appoggio	Estremità		0.300	1.450	1.450	26.350	3.294	1.450	1.450	1.000	1.000	3.200
	Campata	Estremità	31.000	0.300	1.450	1.450	26.350	3.294	1.450	1.450	1.000	1.000	3.200
Pila 1	Appoggio	Intermedio		0.300	1.450	1.450	17.250	2.156	1.450	1.450	1.000	1.000	3.200
	Campata	Intermedio	38.000	0.300	1.450	1.450	26.600	3.325	1.450	1.450	1.000	1.000	3.200
Pila 2	Appoggio	Intermedio		0.300	1.450	1.450	17.250	2.156	1.450	1.450	1.000	1.000	3.200
	Campata	Estremità	31.000	0.300	1.450	1.450	26.350	3.294	1.450	1.450	1.000	1.000	3.200
Spalla 2	Appoggio	Estremità		0.300	1.450	1.450	26.350	3.294	1.450	1.450	1.000	1.000	3.200

3 DISPOSITIVI DI APPOGGIO E ISOLAMENTO

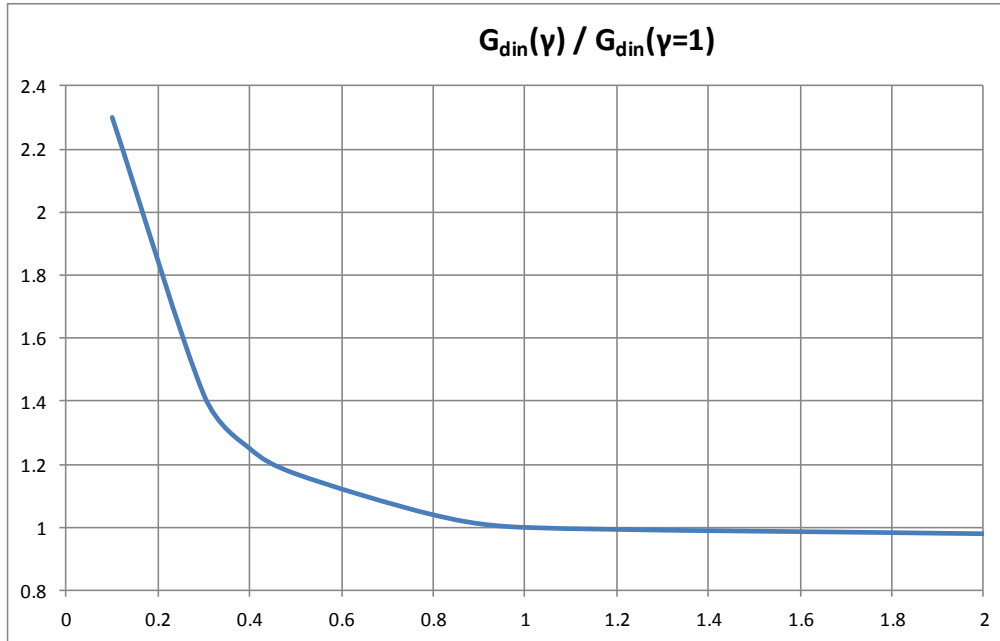
Alla sommità delle pile e spalle sono disposti apparecchi di appoggio antisismici costituiti da isolatori elastomerici armati, costituiti da strati alternati di lamiere di acciaio ed elastomero, collegati mediante vulcanizzazione.

Gli isolatori sono caratterizzati da una elevata rigidità verticale, una ridotta rigidità orizzontale e una modesta capacità dissipativa; queste caratteristiche consentono, rispettivamente, di sostenere i carichi verticali senza apprezzabili cedimenti, di contenere gli spostamenti sismici orizzontali dell'impalcato e aumentare i periodi di vibrazione dell'impalcato in modo da limitare le forze dinamiche orizzontali trasmesse dall'impalcato alle pile/spalle.

Le caratteristiche di progetto degli isolatori sono riportate nella seguente tabella

Caratteristiche di progetto isolatore		SPALLE	PILE
Diametro elastomero	$\varnothing g =$	300	450 mm
Spessore totale elastomero	$te =$	76	78 mm
Altezza totale escluse piastre di ancoraggio	$h =$	152	154 mm
Altezza totale comprese piastre di ancoraggio	$H =$	202	204 mm
Lato piastre di ancoraggio	$Z =$	350	500 mm
Modulo di elasticità tang. dinamico elastomero ($\gamma = d/te = 1$)	$G(din) =$	1.4	1.4 N/mmq
Deformazione massima statica di progetto SLU/SLD ($d/te \leq 1$)	$du =$	76	78 mm
Deformazione massima sismica di progetto SLC ($d/te \leq 2$)	$dc =$	152	156 mm
Rigidità orizzontale equivalente ($\gamma = d/te = 1$)	$Ke =$	1.30	2.85 kN/mm
Rigidità verticale	$Kv =$	768	1794 kN/mm

Il modulo tangenziale dinamico e quindi la rigidità orizzontale equivalente sono definiti per una deformazione di taglio $\gamma = \frac{\Delta}{t_e} = 1$; G_{din} varia molto nel campo $\gamma < 1$ mentre per valori $1 < \gamma < 2$ risulta pressoché costante; la variazione media del modulo dinamico tangenziale in funzione della deformazione di taglio è rappresentata nel seguente grafico.



4 ANALISI DEI CARICHI

Qui di seguito si riporta l'analisi dei carichi eseguita distinguendo tra carichi permanenti ed accidentali.

4.1 CARICHI PERMANENTI

a) calcestruzzo pile:

- peso specifico: $\gamma = 25 \text{ kN/m}^3$
- massa specifica: $m = 2.55 \text{ t/m}^3$

b) acciaio strutturale: si definisce un incremento forfetario del 15% per tener conto degli elementi non rappresentati nel modello (piastrame, bulloneria, saldature, ecc.):

- peso specifico: $\gamma = 88.6 \text{ kN/m}^3$
- massa specifica: $m = 9.03 \text{ t/m}^3$

c) peso soletta: il peso viene assegnato sulle singole travi (sezione reagente solo acciaio):

- travi esterne: $g_1 = 25 \times 0.30 \times (1.425 + 1.60) = 22.69 \text{ kN/m}$
- travi interne: $g_1 = 25 \times 0.30 \times 3.20 = 24 \text{ kN/m}$

4.2 SOVRACCARICHI PERMANENTI (FINITURE)

Le finiture vengono assegnate sulle singole travi (con soletta collaborante) con la loro eccentricità Y rispetto all'asse trave:

- trave esterna dx:

- pavimentazione: $g_2 = 2.5 \times 1.125 = 2.81 \text{ kN/m}$ $e = +1.04 \text{ m}$

- cordolo:	$g_2 = 25 \times 0.15 \times 1.90 = 7.13 \text{ kN/m}$	$e = -0.48 \text{ m}$
- veletta:	$g_2 = 25 \times 0.1 \times 0.8 = 2 \text{ kN/m}$	$e = -1.475 \text{ m}$
- sicurvia:	$g_2 = 0.8 \text{ kN/m}$	$e = +0.225 \text{ m}$
- parapetto:	$g_2 = 0.5 \text{ kN/m}$	$e = -1.225 \text{ m}$
- Totale finiture:	$g_2 = 13.24 \text{ kN/m}$	$e = -0.29 \text{ m}$

- trave esterna sx:

- pavimentazione:	$g_2 = 2.5 \times (0.625 + 1.6) = 5.56 \text{ kN/m}$	$e = -0.49 \text{ m}$
- cordolo:	$g_2 = 25 \times 0.15 \times 0.80 = 3 \text{ kN/m}$	$e = +1.025 \text{ m}$
- sicurvia:	$g_2 = 0.8 \text{ kN/m}$	$e = +0.225 \text{ m}$
- Totale finiture:	$g_2 = 9.36 \text{ kN/m}$	$e = +0.06 \text{ m}$

- travi interne: - pavimentazione: $g_2 = 2.5 \times 3.2 = 8 \text{ kN/m}$ $e = 0$

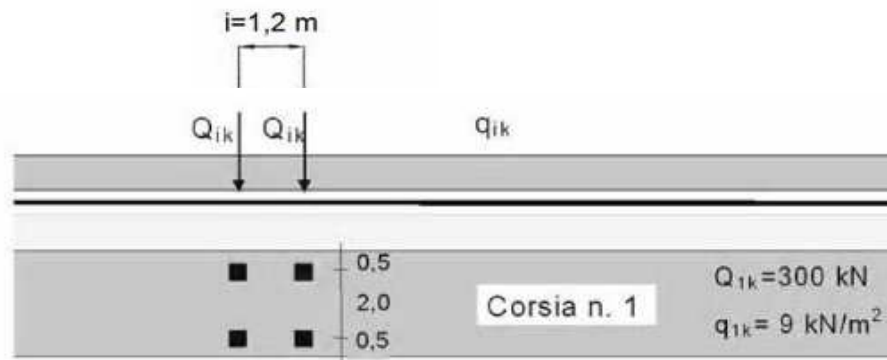
4.3 CARICHI MOBILI DI ESERCIZIO

L'impalcato si considera caricato secondo lo schema di carico 1 previsto dal D.M. 14/02/2008:

- una colonna di carico costituita da:

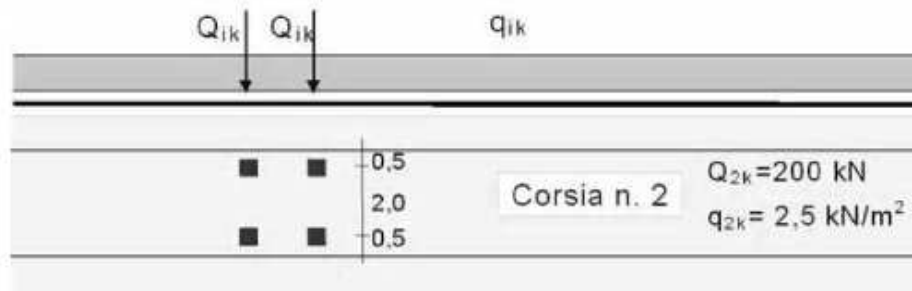
- Q_{1k} mezzo convenzionale da 600 kN a due assi
- q_{1k} carico ripartito pari a 9 kN/m^2 (27 kN/m)

Lo schema longitudinale della colonna è il seguente:



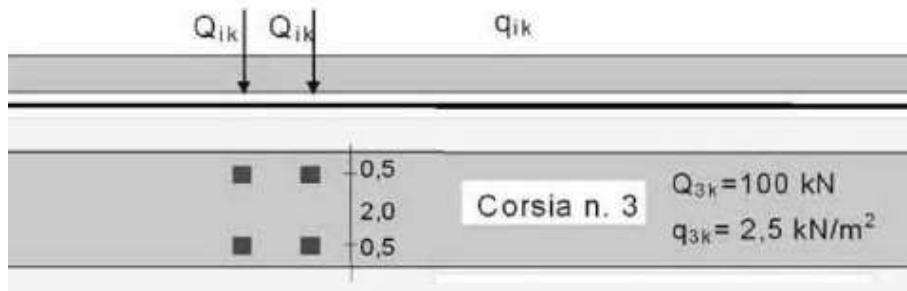
- una seconda colonna di carico analoga alla precedente ma con carichi pari a:

- Q_{2k} mezzo convenzionale da 400 kN a due assi
- q_{2k} carico ripartito pari a 2.5 kN/m^2 (7.5 kN/m)



- una terza colonna di carico analoga alla precedente ma con valori pari a:

- Q_{3k} mezzo convenzionale da 200 kN a due assi
- q_{3k} carico ripartito pari a 2.5 kN/m^2 (7.5 kN/m)



L'area rimanente viene caricata con un carico q_{rk} pari a 2.5 kN/m².

Sul marciapiede si assume lo schema di carico 5, pari a 5.0 kN/m² che, in combinazione con i precedenti, assume il valore di 2.5 kN/m².

Lo schema complessivo di carico è rappresentato nelle seguenti figure, fermo restando che le corsie di carico possono essere scambiate o non caricate se più gravose per l'elemento considerato.

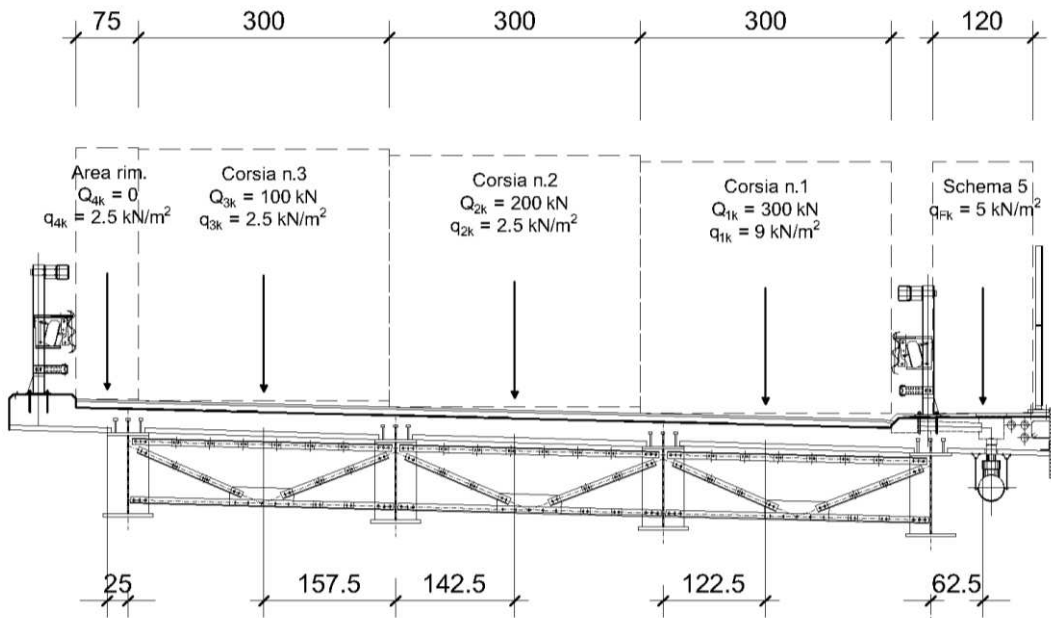


FIGURA 5 – CARICHI VARIABILI – DISPOSIZIONE A DX

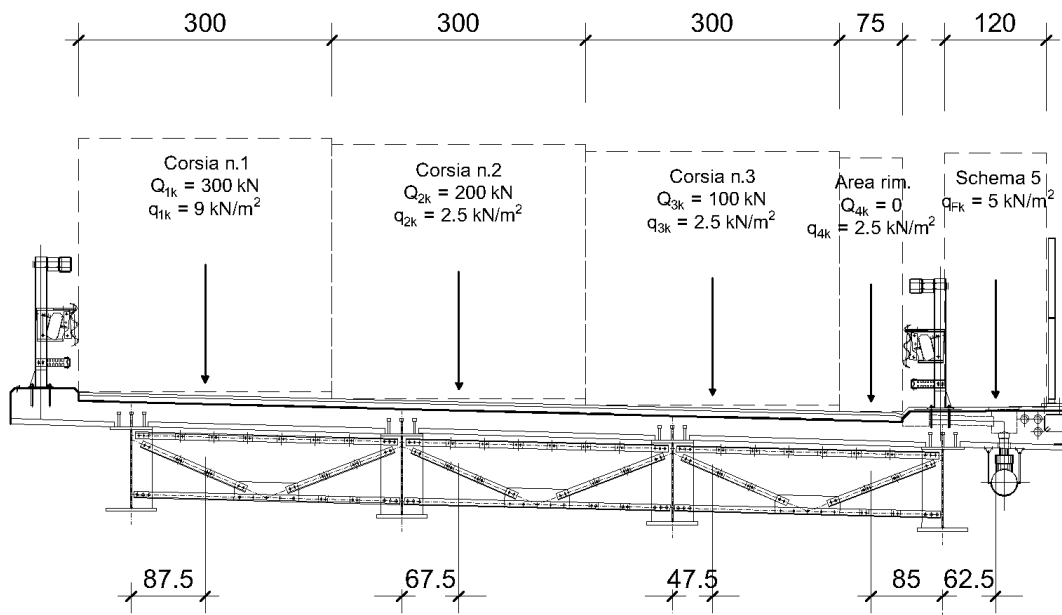


FIGURA 6 – CARICHI VARIABILI – DISPOSIZIONE A SX

Il D.M. del 2008, in accordo con quanto previsto dagli eurocodici, considera il coefficiente dinamico già compreso nel valore dei carichi mobili. La disposizione longitudinale e trasversale più gravosa dei carichi viene determinata automaticamente dal programma di calcolo per ogni sezione e componente di sollecitazione massima e minima.

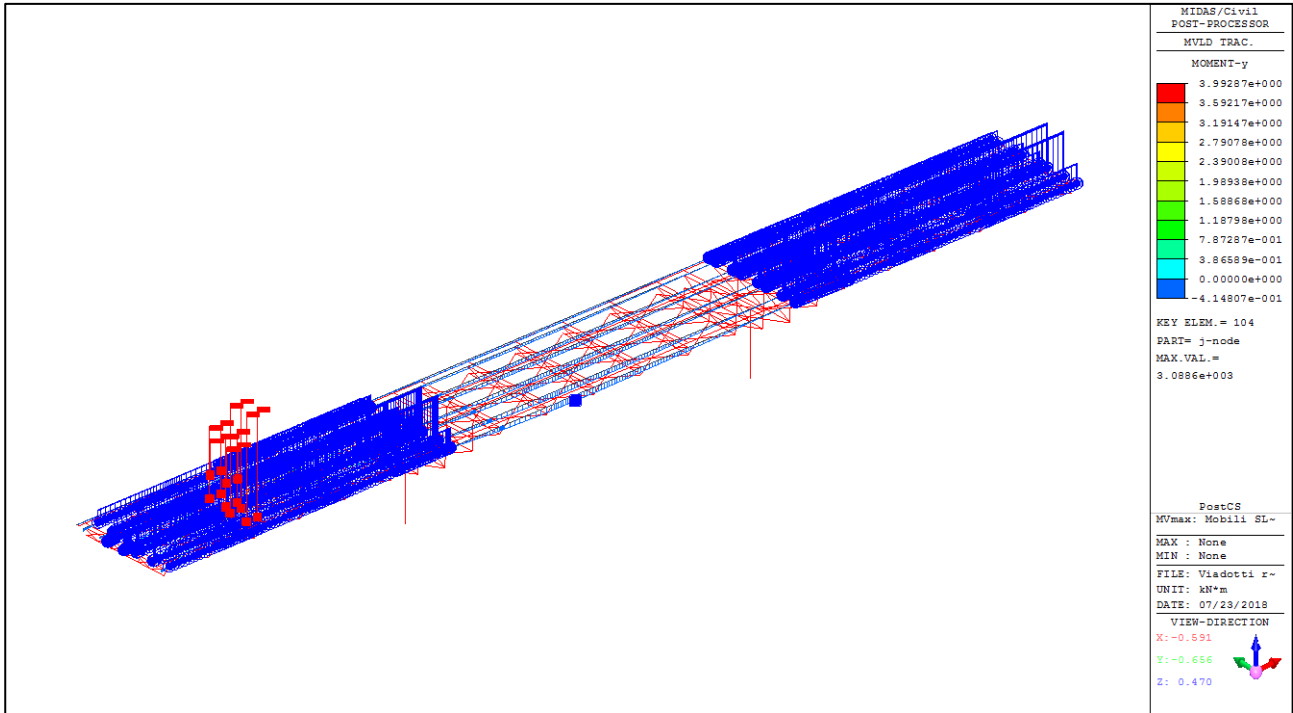
Per la valutazione degli effetti dei carichi mobili agli stati limite di esercizio si applicano ai carichi i coefficienti di combinazione (NTC2008):

- Carichi tandem: $\psi_0 = 0.75$ $\psi_1 = 0.75$ $\psi_2 = 0$
- Carichi distribuiti: $\psi_0 = 0.4$ $\psi_1 = 0.4$ $\psi_2 = 0$

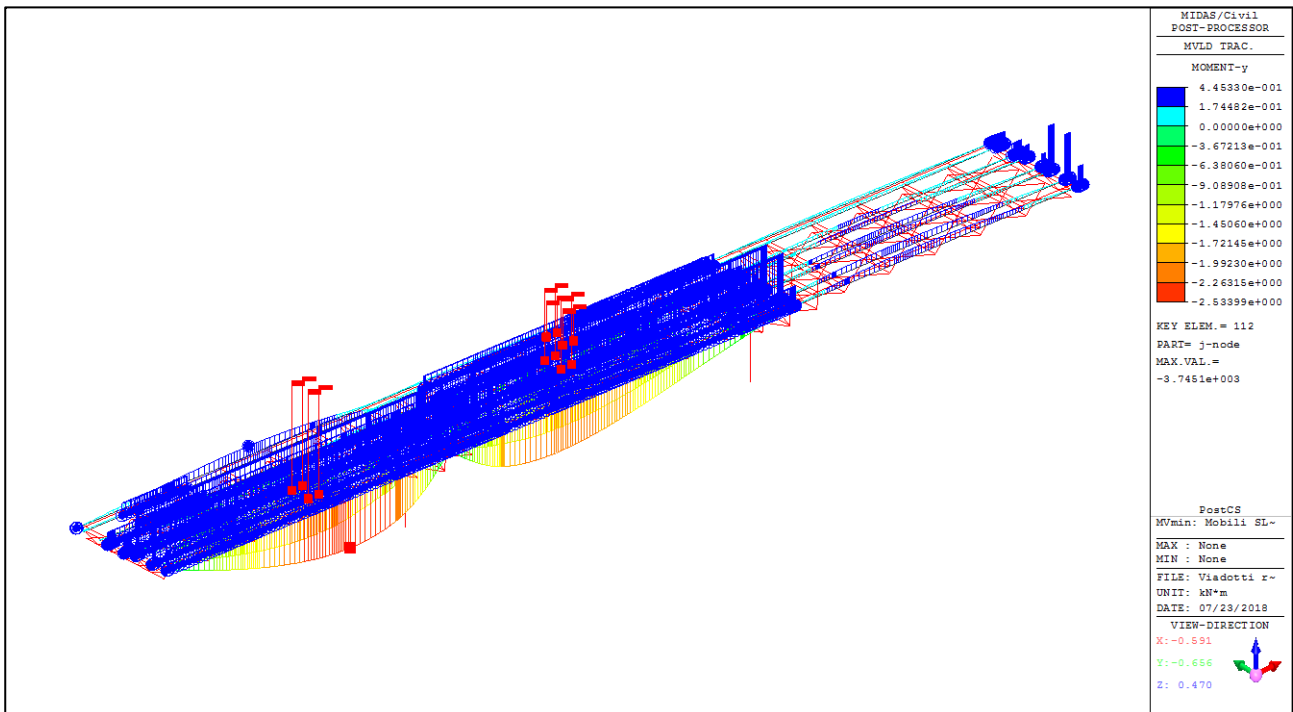
L'applicazione dei carichi mobili al modello strutturale è composta dei seguenti passi:

- definizione delle corsie di carico (Traffic Line Lanes) come sequenza di elementi (travi composte), caricate con la effettiva eccentricità trasversale;
- definizione degli schemi di carico transitanti sulle corsie e/o marciapiedi (Vehicles)
- definizione dei casi di carico (Moving Load Cases); per ognuno di essi si definiscono le corsie da caricare e gli schemi di carico transitanti e se considerare i coefficienti ψ (SLE) o no (SLU);
- definizione della discretizzazione dei punti di carico, assunto pari a 1/10 della lunghezza del singolo elemento caricato, nel presente caso quindi 25+50 cm.

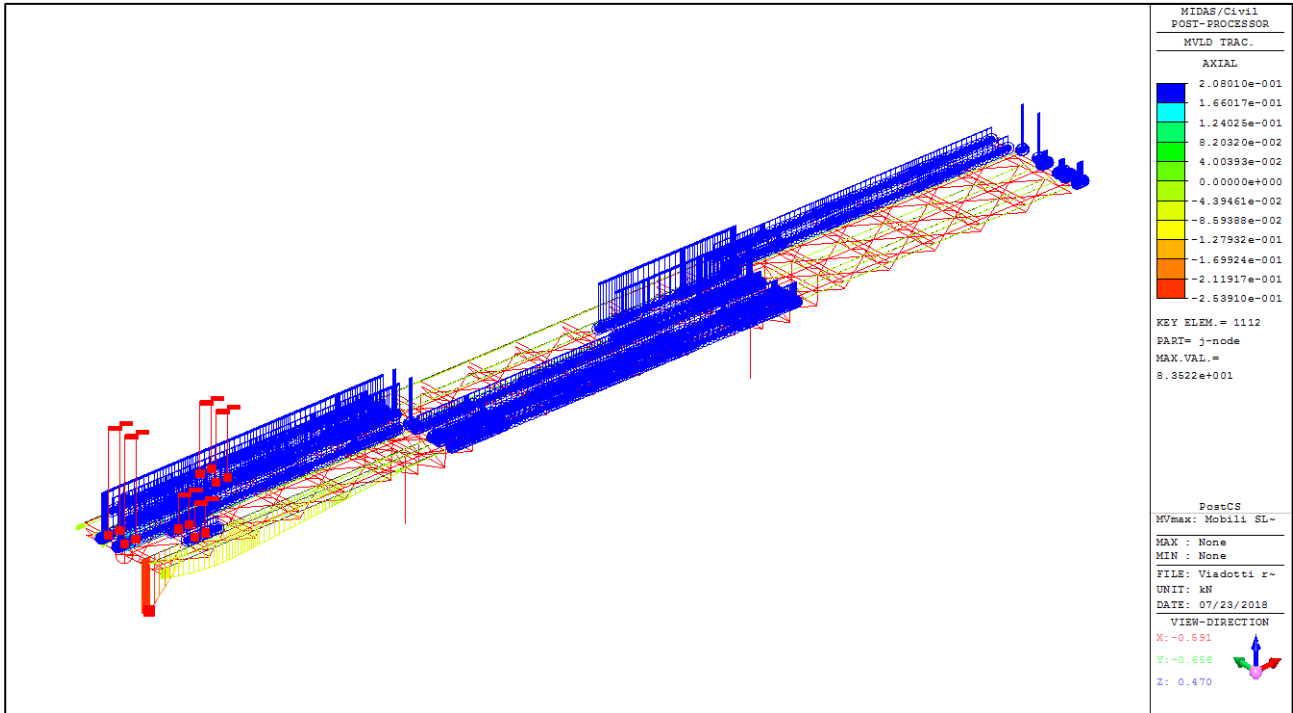
Nel calcolo vengono quindi generate le linee d'influenza per ogni colonna di carico, ognuna delle quali provoca il massimo o il minimo di una singola componente di sforzo (N, Vy, Vz, Mx, My, Mz) per un nodo di un elemento del modello; ciò è esteso a tutti i nodi ed elementi presenti nel modello di calcolo; ovviamente se viene ricercato il massimo vengono caricati solo i tratti aventi linea d'influenza positiva e viceversa per i minimi. Seguono alcuni esempi grafici.



CARICHI MOBILI SLU A DX - DISPOSIZIONE MASSIMO My ELEMENTO 104, NODO FINALE (TRAVE ESTERNA CAMPATA LATERALE)



CARICHI MOBILI SLU A DX - DISPOSIZIONE MINIMO My ELEMENTO 112, NODO FINALE (TRAVE ESTERNA, ASSE PILA)



CARICHI MOBILI SLU A SX - DISPOSIZIONE MASSIMO Fx ELEMENTO 1112, NODO FINALE (CORR. INFERIORE TRASVERSO SPALLA)

4.4 CARICHI MOBILI PER VERIFICHE A FATICA

4.4.1 VERIFICHE PER VITA ILLIMITATA

Le verifiche a fatica per vita illimitata (NTC 5.1.4.3) vengono eseguite per le anime e le saldature delle travi. L'impalcato si considera caricato secondo il modello di carico a fatica 2, applicato sulla corsia lenta; il veicolo più gravoso è risultato essere il 3°: semirimorchio a 5 assi per un peso complessivo di 630 kN.

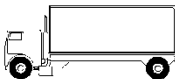

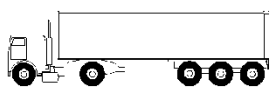

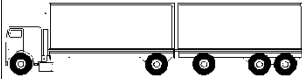
SAGOMA del VEICOLO		Distanza tra gli assi (m)	Carico frequente per asse (kN)	Tipo di ruota (Tab. 5.1.IX)
		4,5	90 190	A B
		4,20 1,30	80 140 140	A B B
		3,20	90	A
		5,20	180	B
		1,30	120	C
		1,30	120 120	C C
		3,40	90	A
		6,00	190	B
		1,80	140 140	B B
		4,80	90	A
		3,60	180	B
		4,40	120	C
		1,30	110 110	C C

FIGURA 7 – MODELLO DI CARICO AI FATICA N. 2

4.4.2 VERIFICHE A DANNEGGIAMENTO

Le verifiche a danneggiamento si effettuano per i connettori trave/soletta (pioli Nelson).

L'impalcato si considera caricato secondo il modello di carico a fatica 3, applicato sulla corsia lenta; il modello consiste in 4 assi di 120 kN di peso (480 kN totali).

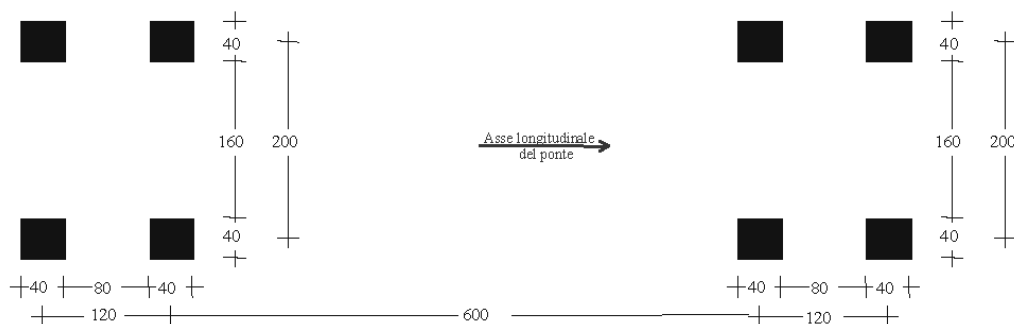


FIGURA 8 – MODELLO DI CARICO AI FATICA N.3

4.5 AZIONE DEL VENTO TRASVERSALE

Nel D.M. 2008 si valuta l'azione del vento in base alla zona considerata e non ad un valore convenzionale; l'opera si trova in zona 1) Valle d'Aosta, Piemonte, Lombardia, Trentino Alto Adige, Veneto, Friuli Venezia Giulia (con l'eccezione della provincia di Trieste).



NTC 2008 - Figura 3.3.1

La pressione esterna è definita da:

$$p = q \cdot C_e \cdot C_p \cdot C_d$$

La pressione cinetica di riferimento q (in N/m^2) in zona 1 è data dall'espressione:

$$q_b = \frac{1}{2} \cdot \rho \cdot v_b^2 = \frac{1}{2} \cdot 1.25 \cdot 25^2 = 391 \text{ N/m}^2 \text{ (0.391 kN/m}^2\text{)}$$

dove:

$\rho = 1.25 \text{ kg/m}^3$ densità dell'aria, assunta costante

$v_b(T_R)$ è la velocità di riferimento del vento (in m/s)

$v_{b,0} = 25 \text{ m/s}$ ($a_s < a_0$)

considerando un'altitudine sul livello del mare del sito: $a_s = 80 \text{ m}$ e un periodo di ritorno di 50 anni.

C_e è il coefficiente di esposizione; avendo una classe di rugosità D

Classi di rugosità del terreno

Classe di rugosità del terreno	Descrizione
A	Aree urbane in cui almeno il 15% della superficie sia coperto da edifici la cui altezza media superi i 15 m
B	Aree urbane (non di classe A), suburbane, industriali e boschive
C	Aree con ostacoli diffusi (alberi, case, muri, recinzioni); aree con rugosità non riconducibile alle classi A, B, D
D	Aree prive di ostacoli (aperta campagna, aeroporti, aree agricole, pascoli, zone paludose o sabbiose, superfici innevate o ghiacciate, mare, laghi,....)

in zona 1, si ottiene una categoria di esposizione II

ZONE 1,2,3,4,5						
	costa		500m		750m	
	mare					
	2 km	10 km	30 km			
A	--	IV	IV	V	V	V
B	--	III	III	IV	IV	IV
C	--	*	III	III	IV	IV
D	I	II	II	II	III	**
* Categoria II in zona 1,2,3,4 Categoria III in zona 5						
** Categoria III in zona 2,3,4,5 Categoria IV in zona 1						

a cui corrispondono i seguenti parametri per la definizione del coefficiente di esposizione

Parametri per la definizione del coefficiente di esposizione

Categoria di esposizione del sito	k_r	Z_0 (m)	Z_{min} (m)
I	0,17	0,01	2
II	0,19	0,05	4
III	0,20	0,10	5
IV	0,22	0,30	8
V	0,23	0,70	12

Con l'opera in costruzione avente altezza massima sul terreno (compresi carichi mobili):

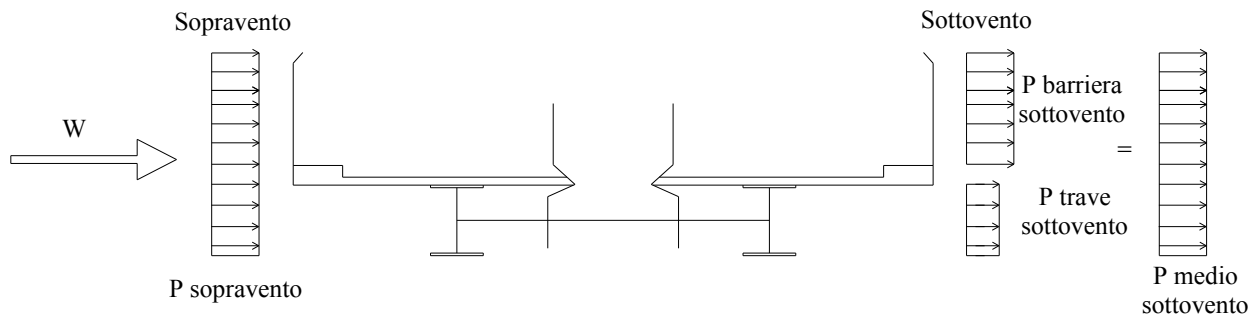
$$z \approx 12 \text{ m} > z_{min} = 4 \text{ m}$$

$$c_e(z) = k_r^2 \cdot c_t \cdot \alpha \cdot [7 + c_t \cdot \alpha] = 0.19^2 \cdot 68.4 = 2.47$$

dove $\alpha = \ln(z/z_0) = \ln(12/0.05) = 5.48$; $c_t = 1$

c_d è il coefficiente dinamico; posto pari ad uno

c_p è il coefficiente di forma; nel caso di travi multiple (Circ. 02/02/2009, C3.3.10.4) si ha, per i vari elementi:



- travi principali, altezza $h = 1 \text{ m}$, distanza reciproca media $d = 3.2 \text{ m}$:

a) lato sopravvento: $c_{p1} = 1.4$

b) lato sottovento: $d / h = 3.2 / 1 = 3.2 \quad (2 < d/h < 5)$

$$\mu = 0.52$$

$$c_{p2} = 1.4 \times (0.52 + 0.52^2 + 0.52^3 + 0.52^4) = 1.41$$

- travi principali, altezza $h = 2$ m, distanza reciproca media $d = 3.2$ m:

a) lato sopravvento: $c_{p1} = 1.4$

b) lato sottovento: $d / h = 3.2 / 2 = 1.6 \quad (d/h < 2)$

$$\mu = 0.2$$

$$c_{p2} = 1.4 \times (0.2 + 0.2^2 + 0.2^3 + 0.2^4) = 0.35$$

- soletta, cordolo, sicurvia: per il solo lato sopravvento si ha:

$$c_p = 1.2$$

La pressione esterna sulle strutture è quindi definita dalle espressioni seguenti:

a) impalcato con travi $h = 1$ m:

a1) lato sopravvento: $p = q \cdot c_e \cdot c_p \cdot c_d = 0.391 \cdot 2.47 \cdot (1.4 \cdot 1.0 + 1.2 \cdot 1.45) =$
 $= 1.35 + 1.68 = 3.03 \text{ kN/m}$

con eccentricità rispetto al piano stradale di riferimento:

$$e_z = (-1.35 \cdot 0.90 + 1.68 \cdot 0.27) / 3.03 = -0.25 \text{ m}$$

a2) lato sottovento: $p = q \cdot c_e \cdot c_p \cdot c_d = 0.391 \cdot 2.47 \cdot (1.41 \cdot 1.0 + 1.2 \cdot 1.15) =$
 $= 1.36 + 1.33 = 2.69 \text{ kN/m}$

con eccentricità rispetto al piano stradale:

$$e_z = (-1.36 \cdot 0.90 + 1.33 \cdot 1.15) / 2.69 = +0.11 \text{ m}$$

b) impalcato con travi $h = 2$ m:

b1) lato sopravvento: $p = q \cdot c_e \cdot c_p \cdot c_d = 0.391 \cdot 2.47 \cdot (1.4 \cdot 2.0 + 1.2 \cdot 1.45) =$
 $= 2.70 + 1.68 = 4.38 \text{ kN/m}$

con eccentricità rispetto al piano stradale di riferimento:

$$e_z = (-2.70 \cdot 1.40 + 1.68 \cdot 0.27) / 4.38 = -0.76 \text{ m}$$

b2) lato sottovento: $p = q \cdot c_e \cdot c_p \cdot c_d = 0.391 \cdot 2.47 \cdot (0.35 \cdot 2.0 + 1.2 \cdot 1.15) =$
 $= 0.68 + 1.33 = 2.01 \text{ kN/m}$

con eccentricità rispetto al piano stradale:

$$e_z = (-0.68 \cdot 1.40 + 1.33 \cdot 1.15) / 2.01 = +0.29 \text{ m}$$

Sulle pile si ha: $p = 0.391 \cdot 2.47 \cdot 1.50 = 1.45 \text{ kN/m}$

La pressione dovuta ai carichi mobili, per l'altezza pari a 2.0 vale:

$$p = 0.391 \cdot 2.47 \cdot 1.2 \cdot 2.00 = 2.32 \text{ kN/m}$$

con eccentricità rispetto al piano stradale:

$$e_z = 1 + 2.00 / 2 = +2.00 \text{ m}$$

Vento su pile: $0.391 \times 1.2 \times 2.47 \times 1.5 = 1.74 \text{ kN/m}$

4.6 AZIONE DI FRENAMENTO

L'azione di frenamento è funzione del carico verticale totale agente sulla corsia convenzionale n. 1 ed è uguale

a:

$$F_f = 0.6 \times (2xQ_{1k}) + 0.10q_{1k} \times w_1 \times L =$$

$$= 0.6 \times (2 \times 300) + 0.10 \times 9 \times 3 \times 101.60 = 634.3 \text{ kN} \quad (180 \text{ kN} \leq F_f \leq 900 \text{ kN})$$

L'azione si considera uniformemente distribuita sulle travi principali:

$$q_x = \frac{634.3}{4 \times 101.6} = 1.56 \text{ kN/m/trave}$$

4.7 DILATAZIONE TERMICA DIFFERENZIALE

Si assume che le travi dell'impalcato (sezioni miste acciaio/cls.) siano soggette alla variazione termica differenziale: $\Delta T/H = \pm 5^\circ$.

4.8 DILATAZIONE TERMICA UNIFORME

Si assume che le travi dell'impalcato (sezioni miste acciaio/cls.) siano soggette alla variazione termica uniforme: $\Delta T = \pm 15^\circ$.

4.9 AZIONI SISMICHE

La stima dei parametri spettrali necessari per la definizione dell'azione sismica è stata effettuata utilizzando le informazioni disponibili nel reticolo di riferimento (tabella 1 – Allegato B – D.M. 14 gennaio 2008).

Considerando l'ubicazione del sito in oggetto (Lat: 45.2049; Long: 9.6117) ed ipotizzando una costruzione caratterizzata da:

- una vita nominale di 50 anni, ricadente in classe d'uso pari a IV (ponti di importanza critica per il mantenimento delle vie di comunicazione...);
- una categoria topografica T1;
- una categoria C per il sottosuolo;

Si hanno i seguenti valori dei **parametri spettrali**:

STATO LIMITE	T_R [anni]	a_g [g]	F_o [-]	T_C^* [s]
SLO	60	0.0369	2.573	0.223
SLD	101	0.0449	2.541	0.256
SLV	949	0.0974	2.555	0.297
SLC	1950	0.1230	2.545	0.305

Le espressioni dello spettro elastico S_e di risposta secondo le NTC-08 sono le seguenti:

$$0 \leq T < T_B \quad S_e(T) = a_g \cdot S \cdot \eta \cdot F_o \cdot \left[\frac{T}{T_B} + \frac{1}{\eta \cdot F_o} \left(1 - \frac{T}{T_B} \right) \right]$$

$$T_B \leq T < T_C \quad S_e(T) = a_g \cdot S \cdot \eta \cdot F_o$$

$$T_C \leq T < T_D \quad S_e(T) = a_g \cdot S \cdot \eta \cdot F_o \cdot \left(\frac{T_C}{T} \right)$$

$$T_D \leq T \quad S_e(T) = a_g \cdot S \cdot \eta \cdot F_o \cdot \left(\frac{T_C T_D}{T^2} \right)$$

Trattandosi di struttura sismicamente isolata si assume:

- coefficiente di smorzamento viscoso convenzionale: $\xi = 5 \%$
- fattore di smorzamento viscoso: $\eta = \sqrt{\frac{10}{5 + \xi}} = 1$
- fattore di struttura: $q = 1$

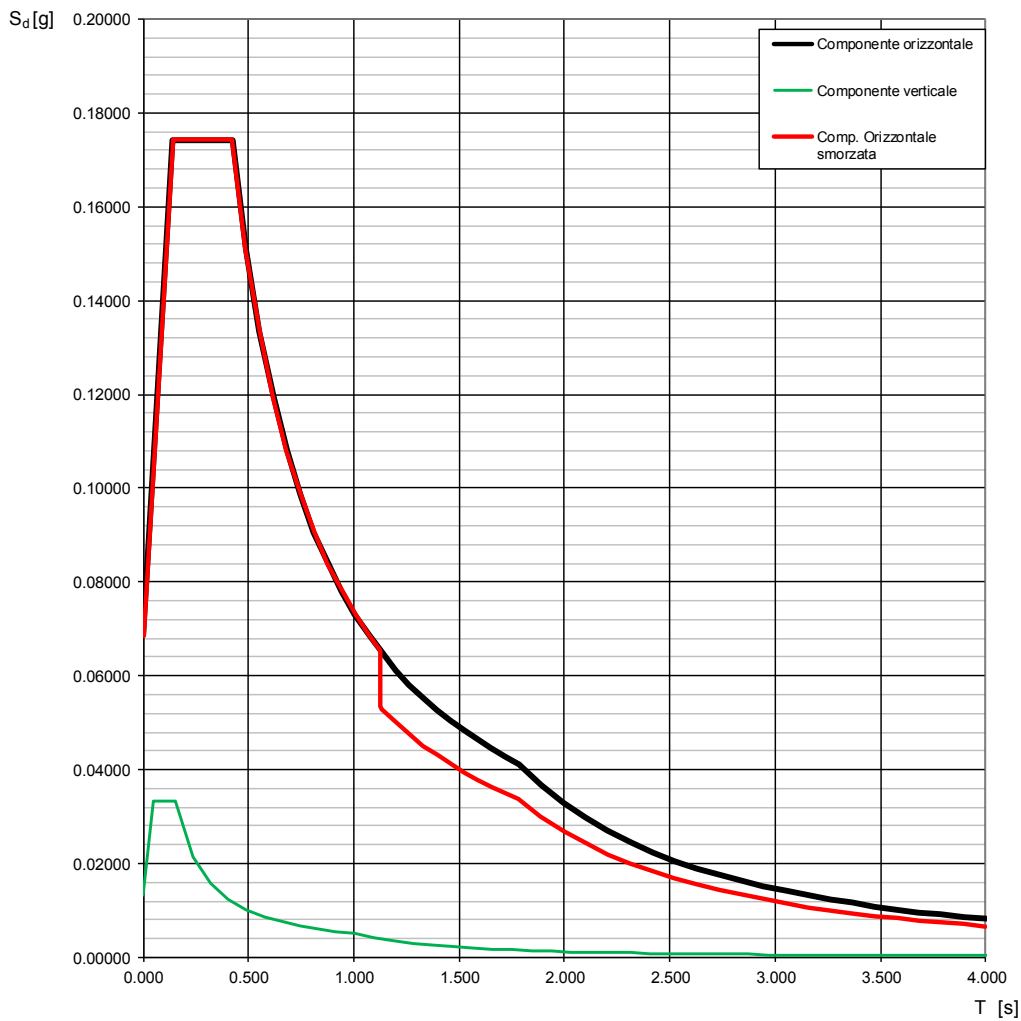
Lo spettro elastico definito viene ridotto per tutto il campo di periodi $T \geq 0,8T_{is}$, assumendo:

- periodo di vibrazione struttura isolata: $T_{is} = 1.404$ s
- coefficiente di smorzamento viscoso isolatori: $\xi = 10$ %

-coefficiente riduttivo $\eta = \sqrt{\frac{10}{5+\xi}} = \sqrt{\frac{10}{5+10}} = 0.816$ (≥ 0.55).

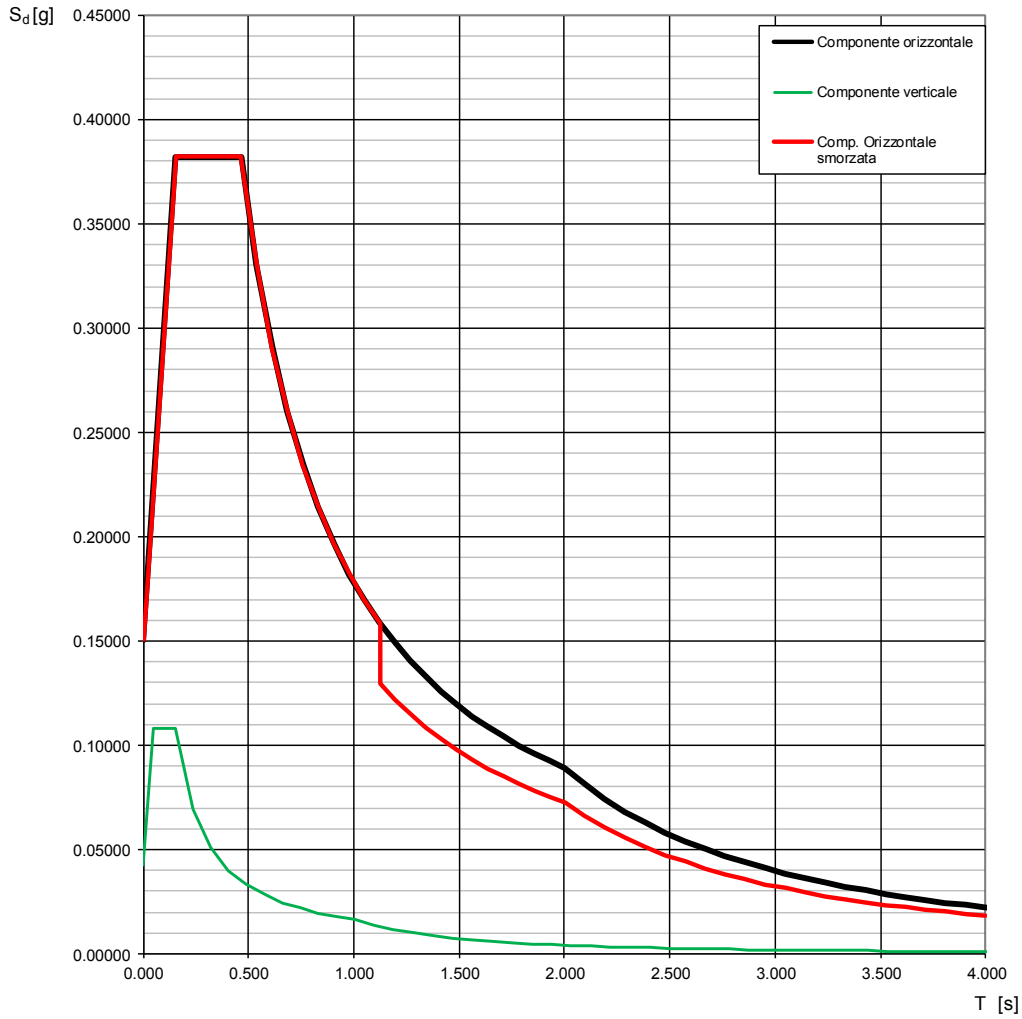
Si ottengono i seguenti andamenti degli spettri. Noto il periodo (ascissa) si ricava il relativo coefficiente sismico (ordinata).

Spettri di risposta elastici (componenti orizz. e vert.) per lo stato limite: SLD



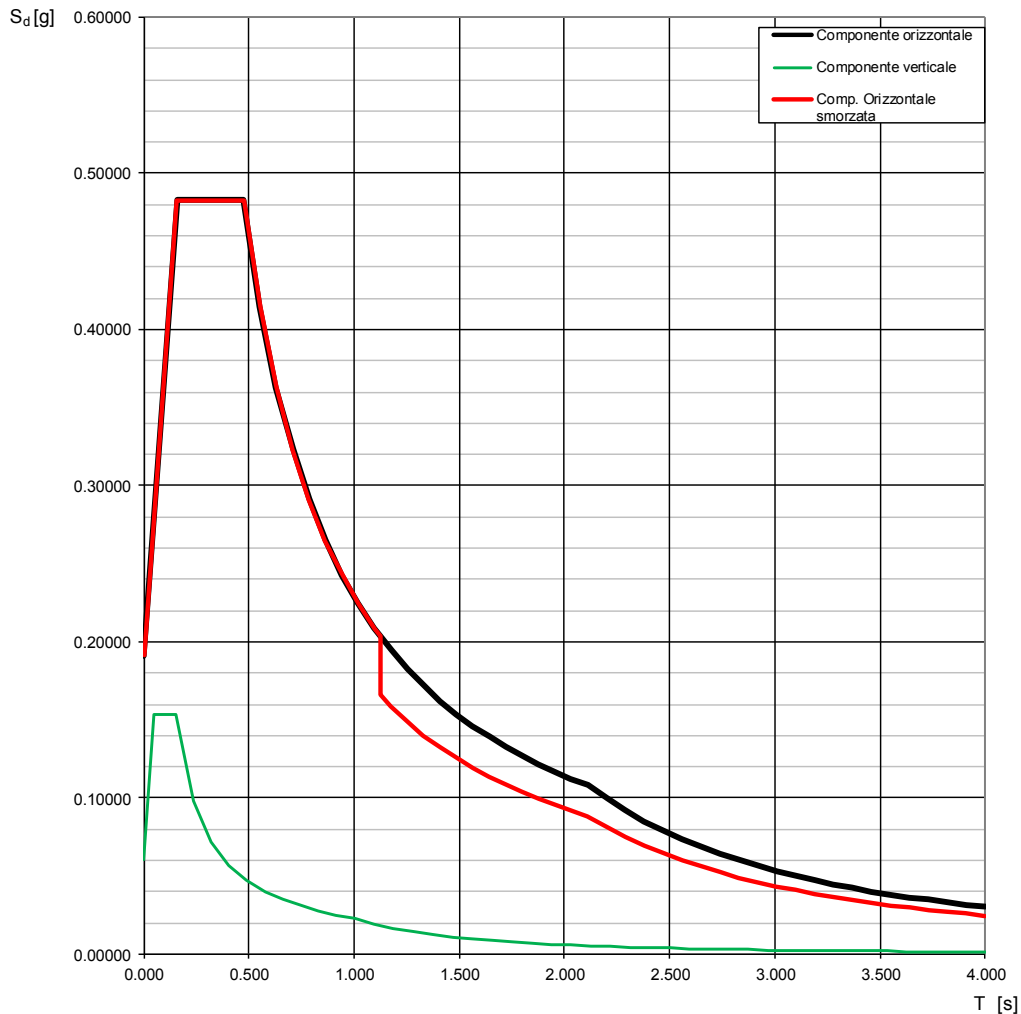
Spettri di risposta elastici e smorzati SLD

Spettri di risposta elastici (componenti orizz. e vert.) per lo stato limite: **SLV**



Spettri di risposta elastici e smorzati SLV

Spettri di risposta elastici (componenti orizz. e vert.) per lo stato limite: SLC



Spettri di risposta elastici e smorzati SLC

4.10 FENOMENI DEFORMATIVI LENTI DELLA SOLETTA IN CALCESTRUZZO

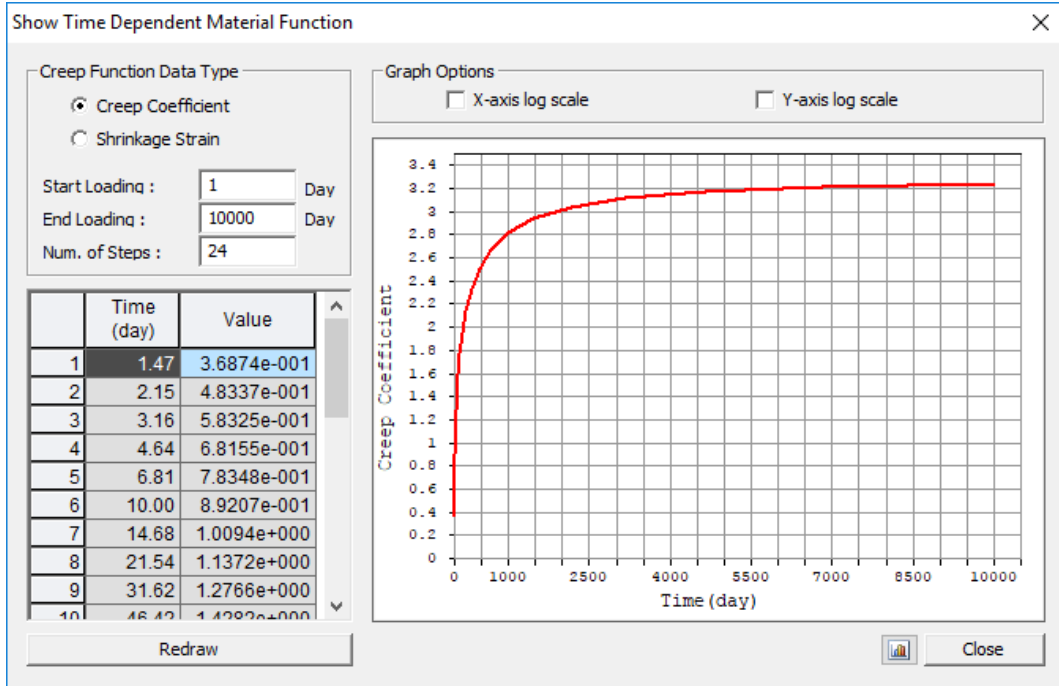
Come già detto, l'influenza di ritiro e fluage della soletta sulla struttura metallica viene considerata automaticamente dal programma di calcolo sulla base delle relazioni stabilite dal codice EN 1992-2 con i seguenti dati:

- resistenza caratteristica cilindrica a 28 gg: $f_{ck} = 32 \text{ N/mm}^2$
- umidità relativa ambiente: 70 %
- perimetro esposto all'atmosfera: $h = 2 \times A_c / u = 0.30 \text{ m}$
- calcestruzzo a indurimento normale: N
- età del calcestruzzo iniziale per il ritiro: 1 gg

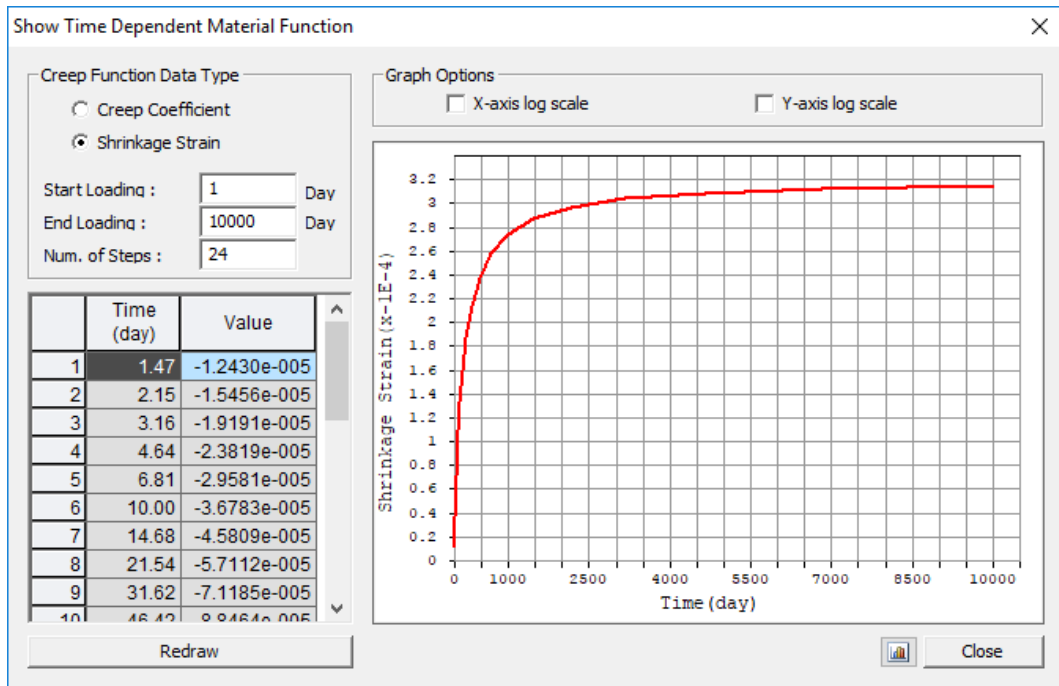
La variazione della resistenza caratteristica del calcestruzzo nel tempo viene determinata con la formula:

$$f_c(t) = f_{ck} \times e^{0,25 \times \left[1 - \left(\frac{28}{t} \right)^{0,5} \right]}$$

Si ottengono i seguenti diagrammi di fluage e ritiro:



CREEP (FLUAGE)



SHRINKAGE (RITIRO)

5 COMBINAZIONI DI CARICO

I coefficienti moltiplicativi delle singole azioni sono riassunti nelle tabelle seguenti, per le condizioni di carico statiche e sismiche.

Nelle seguenti tabelle i carichi permanenti (pesi e finiture) non appaiono esplicitamente in combinazione perché il loro contributo alle sollecitazioni deriva dagli schemi statici in fase costruttiva (diversi che nella fase di esercizio) e sono quindi accumulati nei "Dead Load" e "Erection Load 1".

Le combinazioni di carico "GEN" (general) sono utilizzate per le reazioni, gli appoggi e comunque tutto ciò che non è di acciaio e/o composto acciaio/cls.

Le combinazioni di carico "ST" sono viceversa utilizzate per le strutture in acciaio e/o acciaio/cls.

Ogni combinazione di verifica viene generata in rispetto dei par. 2.5.3, 5.1.3.12 e 7.3.5 delle NTC 2008; segue una descrizione dettagliata di esempio.

Combinazione: "ST SLU Mobili": combinazione di verifica strutturale allo SLU in cui i "Carichi Mobili" sono il carico variabile dominante mentre gli altri (Vento, Frenamento, Termici) sono assunti attraverso i coefficienti di combinazione ψ_0 .

Preliminarmente per i carichi variabili che possono avere segno opposto si generano le combinazioni "negative" che vengono poi involuppate in modo da ottenere i massimi e i minimi.

- 1) "Termico unif. -15°": combinazione: "Termico unif. +15°" x (-1)
- 2) "Termico diff. -5°/H": combinazione: "Termico diff. +5°/H" x (-1)
- 6) "Termico unif. INV": involuppo delle comb. "Termico unif. +15°" e "Termico unif. -15°"
- 7) "Termico diff. INV": involuppo delle comb. "Termico diff. +5°/H" e "Termico diff. -5°/H"

Analogamente si involuppano le condizioni dei carichi mobili disposti "a sinistra" e "a destra":

- 11) "Mobili SLU INV": involuppo delle comb. "Mobili SLU Dx" e "Mobili SLU Sx"

La generazione della combinazione di cui sopra comprende quindi la somma dei seguenti casi di carico (riferimento alle tabelle NTC 2008):

- "Dead Load" x 1.35: pesi strutturali permanenti (tab. 5.1.V)
- "Erection Load 1" x 1.5: peso finiture (permanenti non strutturali), (tab. 5.1.V)
- "Creep secondary" x 1.2: parte reale (iperstatica) dell'effetto del fluage della soletta in cls. (tab. 5.1.V)
- "Shrinkage secondary" x 1.2: parte reale (iperstatica) del ritiro della soletta in cls. (tab. 5.1.V)
- "Mobili SLU INV" x 1.35: involuppo carichi mobili; carico variabile dominante (tab. 5.1.V)
- "Vento strutture" x (1.5 x 0.6) = 0.9: carico variabile (tab. 5.1.V e tab. 5.1.VI)
- "Vento Mobili" x (1.5 x 0.6) = 0.9: carico variabile (tab. 5.1.V e tab. 5.1.VI)
- "Termico unif. INV" x (1.2 x 0.6) = 0.72: carico variabile (tab. 5.1.V e tab. 5.1.VI)
- "Termico diff. INV" x (1.2 x 0.6) = 0.72: carico variabile (tab. 5.1.V e tab. 5.1.VI)

La combinazione così composta è di tipo "Strength/Stress", utilizzata per le verifiche allo SLU; le altre combinazioni dello stesso tipo sono ottenute per rotazione del carico variabile dominante.

6 CALCOLO DELLE SOLLECITAZIONI

Le travi composte acciaio-calcestruzzo vengono analizzate dal programma secondo le fasi di costruzione (construction stage):

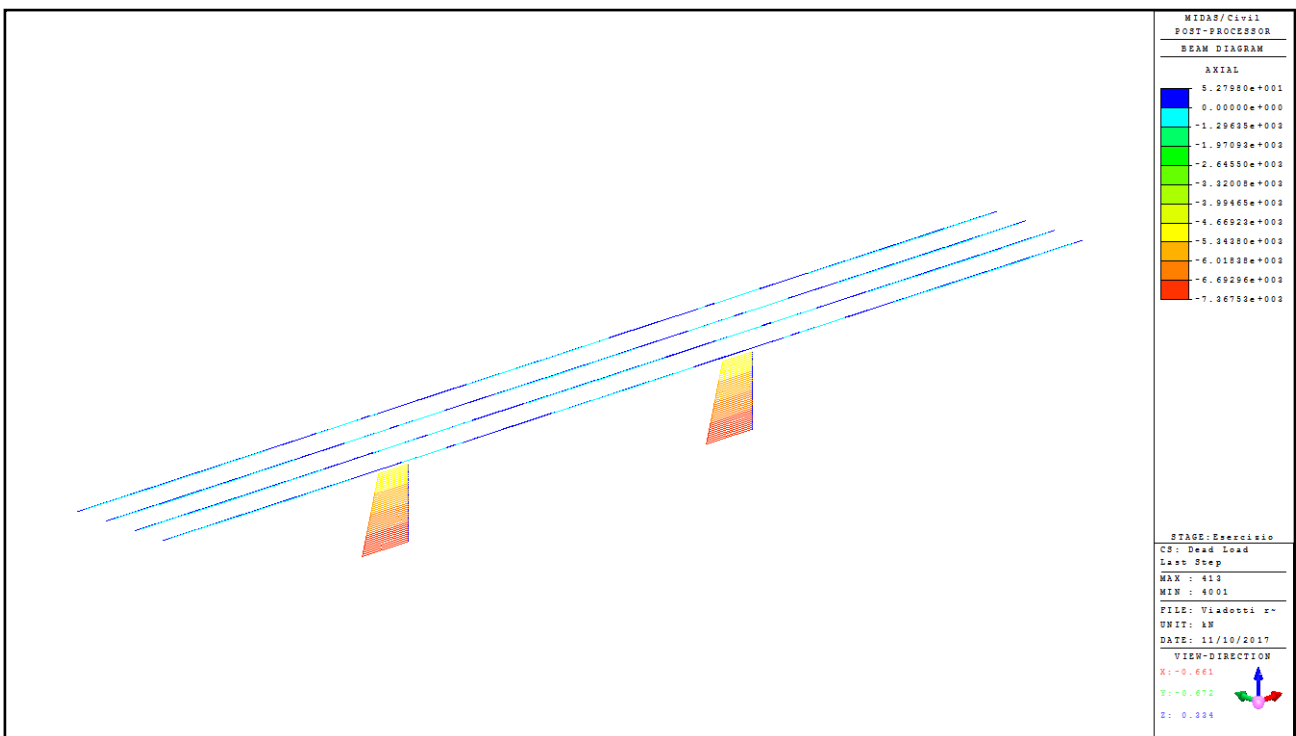
- fase 1: corrisponde alla fase costruttiva fino al getto della soletta (30 giorni):
 - sezione reagente: trave di acciaio (soletta non reagente)
 - carichi applicati: peso strutture acciaio e peso soletta
- fase 2: corrisponde a una fase costruttiva di lunga durata (10000 giorni) in cui la soletta ha caratteristiche elastiche variabili nel tempo e si tiene conto dei fenomeni di interazione lenti di ritiro e fluage, valutati secondo gli schemi EN 1992-2:
 - sezione reagente: trave di acciaio e soletta (con modulo variabile)
 - carichi applicati: finiture, ritiro, fluage della soletta
- fase 3: corrisponde alla fase di esercizio:
 - sezione reagente: trave acciaio + soletta (modulo costante)
 - carichi applicati: carichi di esercizio (vento, carichi mobili, termici, frenamento, sisma)

Si è assunta un'accelerazione gravitazionale pari a $g = 9,806 \text{ m/s}^2$.

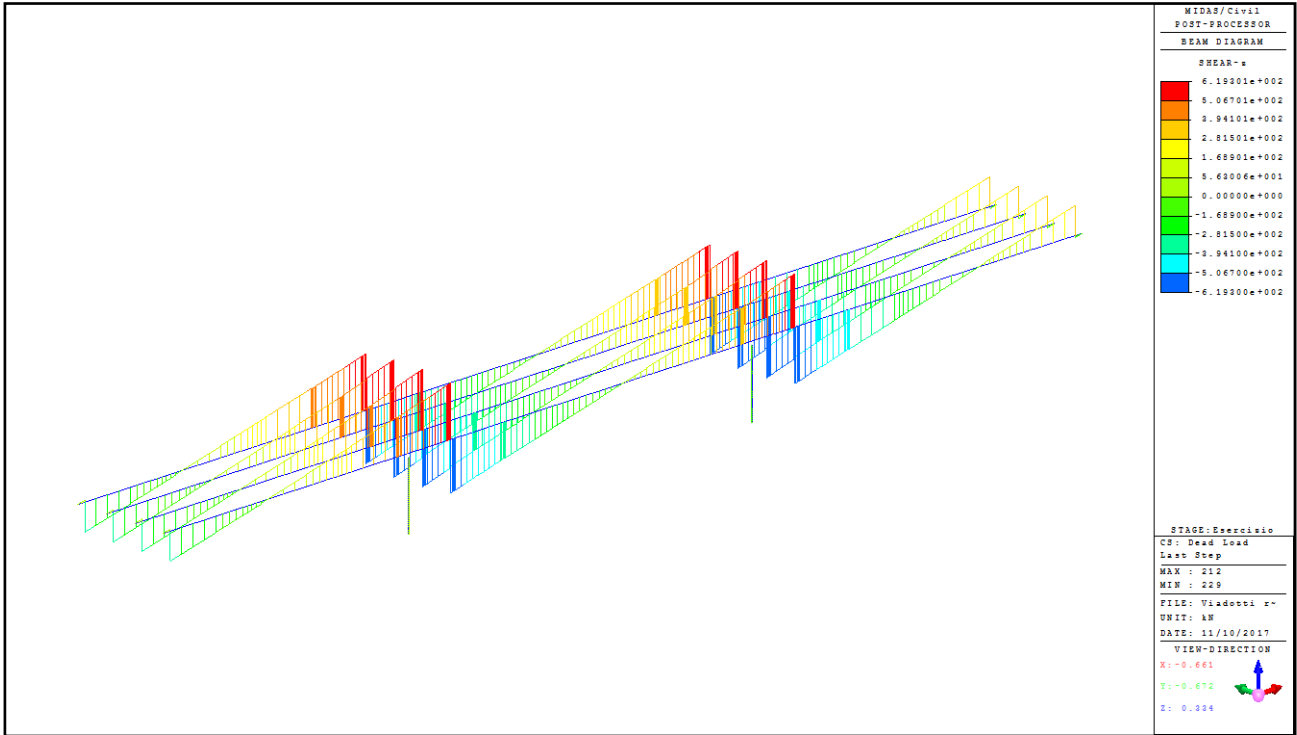
Le unità di misura utilizzate sono coerenti con il Sistema Internazionale:

lunghezze: m (metri)
 masse: t (tonnellate)
 forze: kN (kilo-Newton)

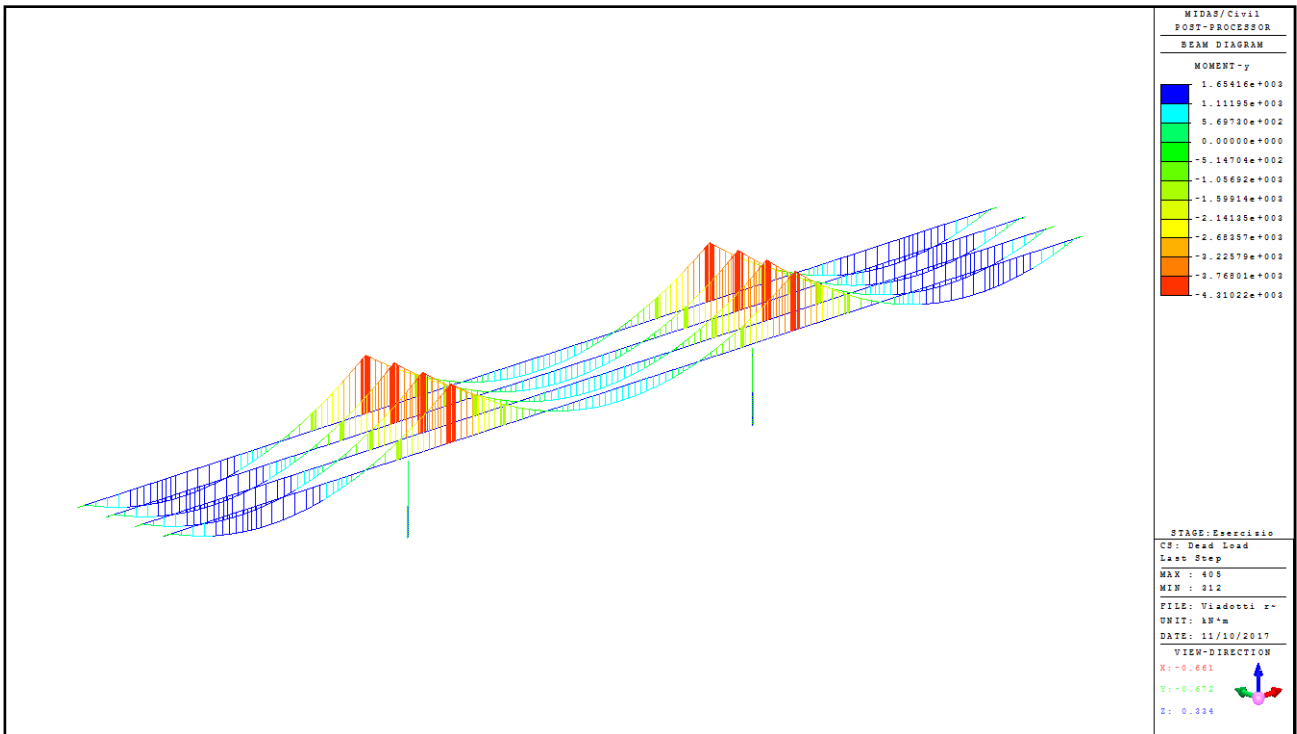
Seguono diagrammi delle azioni calcolate sulle travi composte dell'impalcato e le pile per le singole condizioni di carico (variabili involuppati \pm).



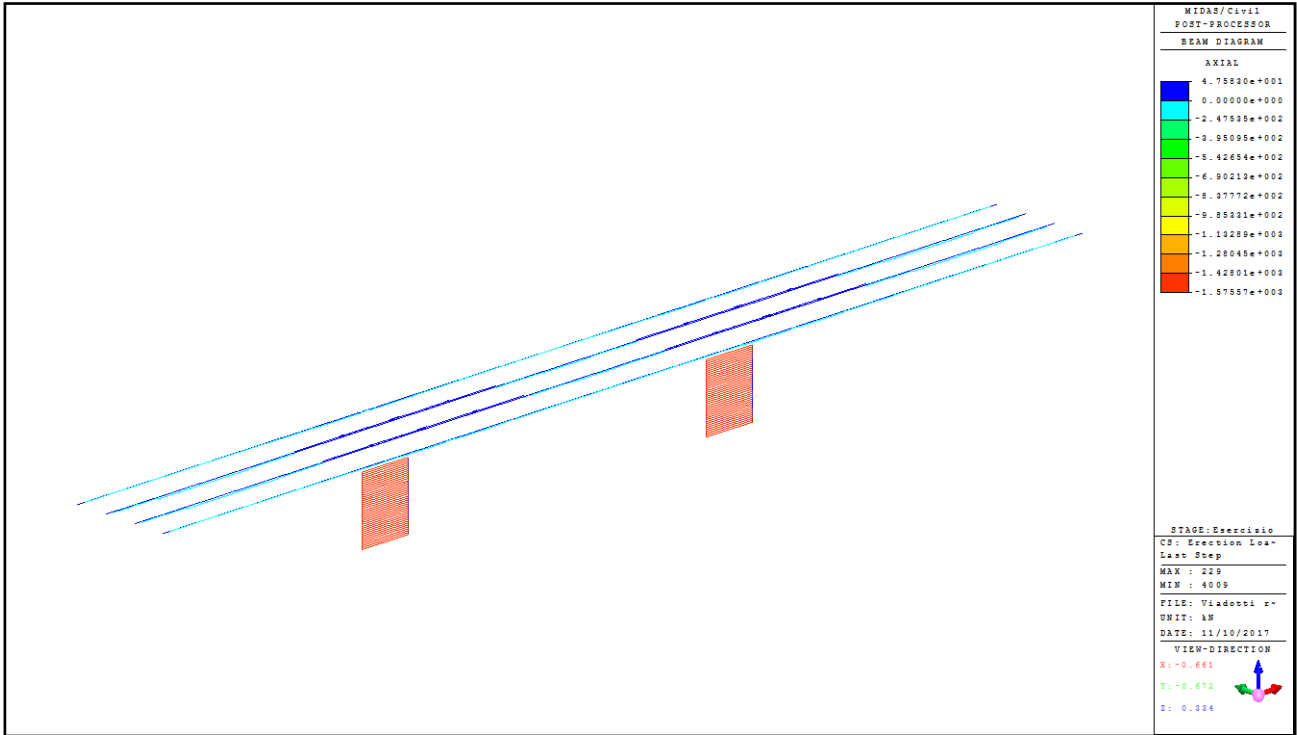
Peso travi e soletta (dead loads) - Diagramma sforzi assiali



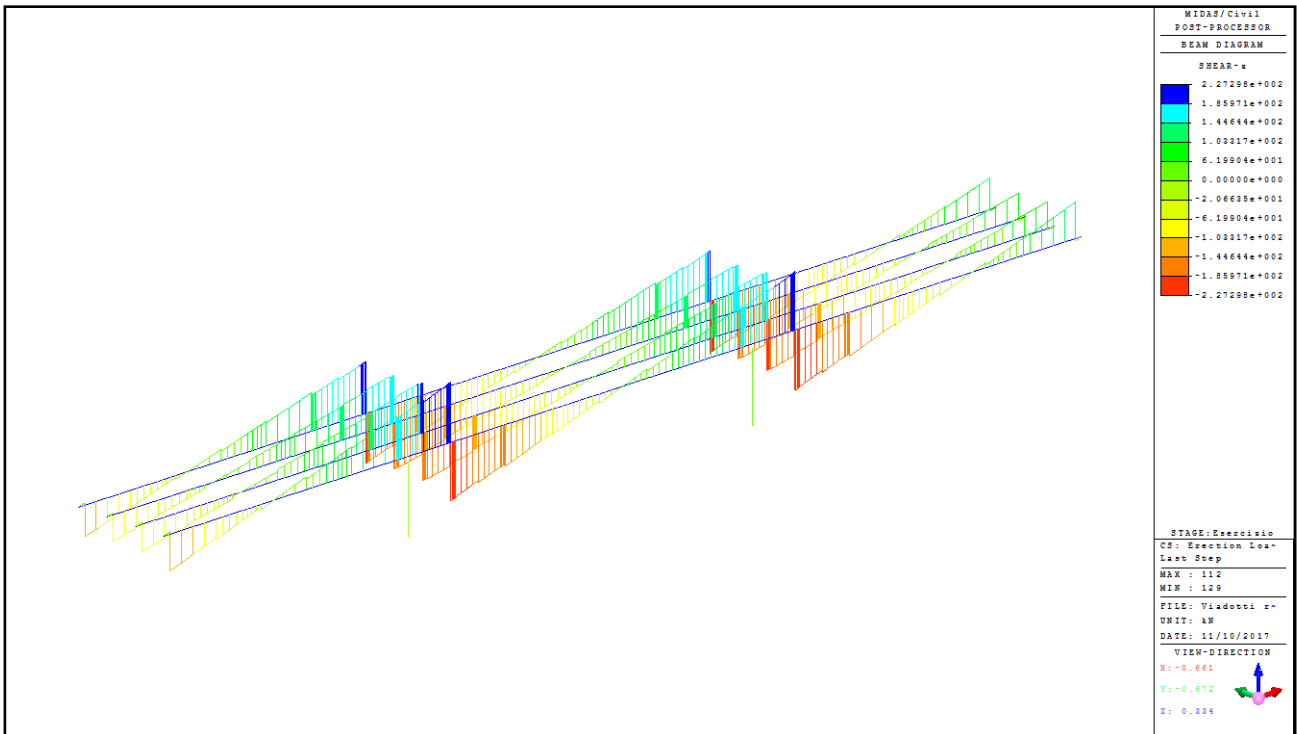
Peso travi e soletta (dead loads)- Diagramma sforzi taglienti



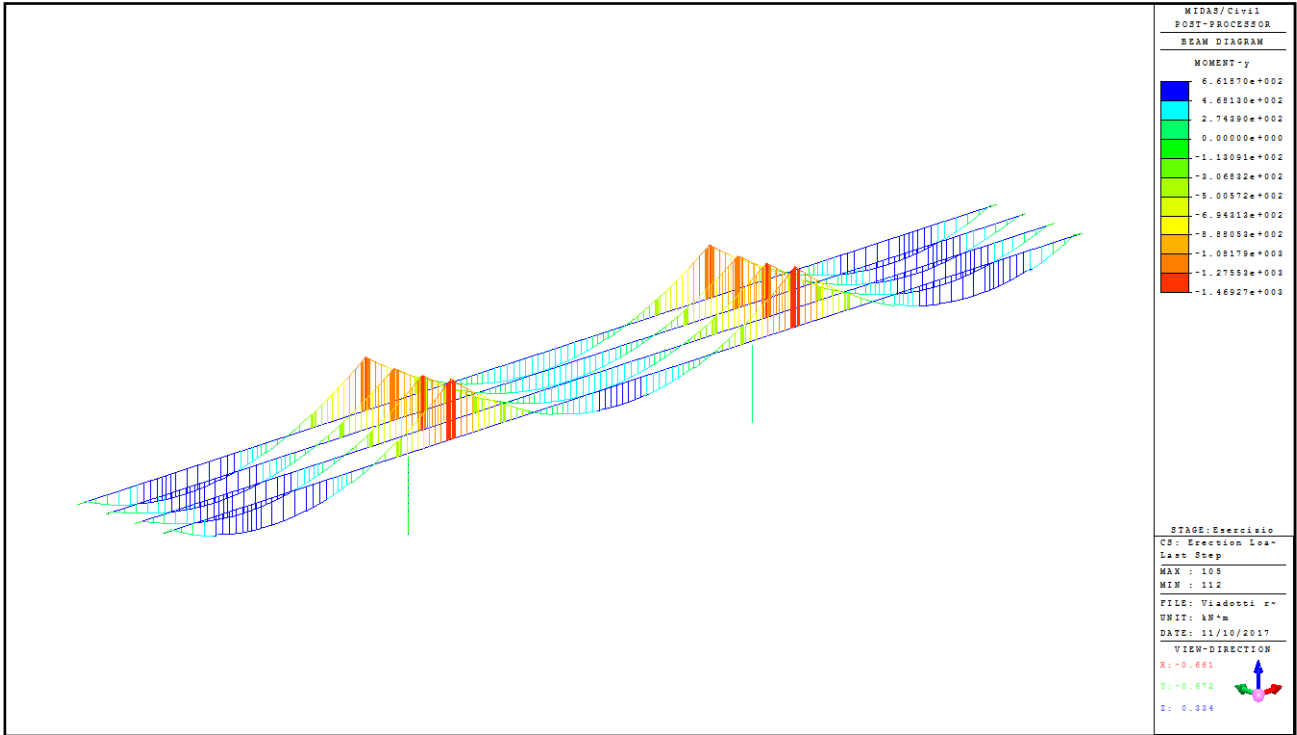
Peso travi e soletta (dead loads) - Diagramma momenti flettenti



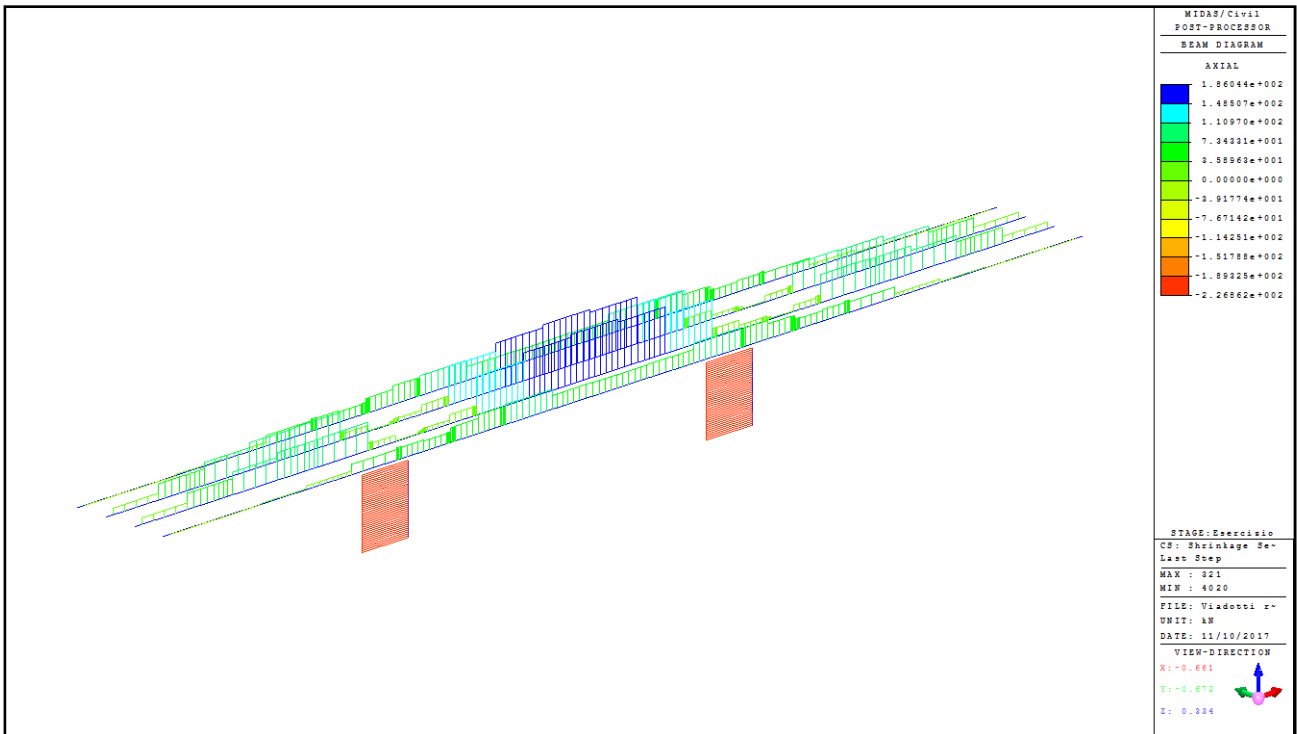
Finiture – Diagramma sforzi assiali



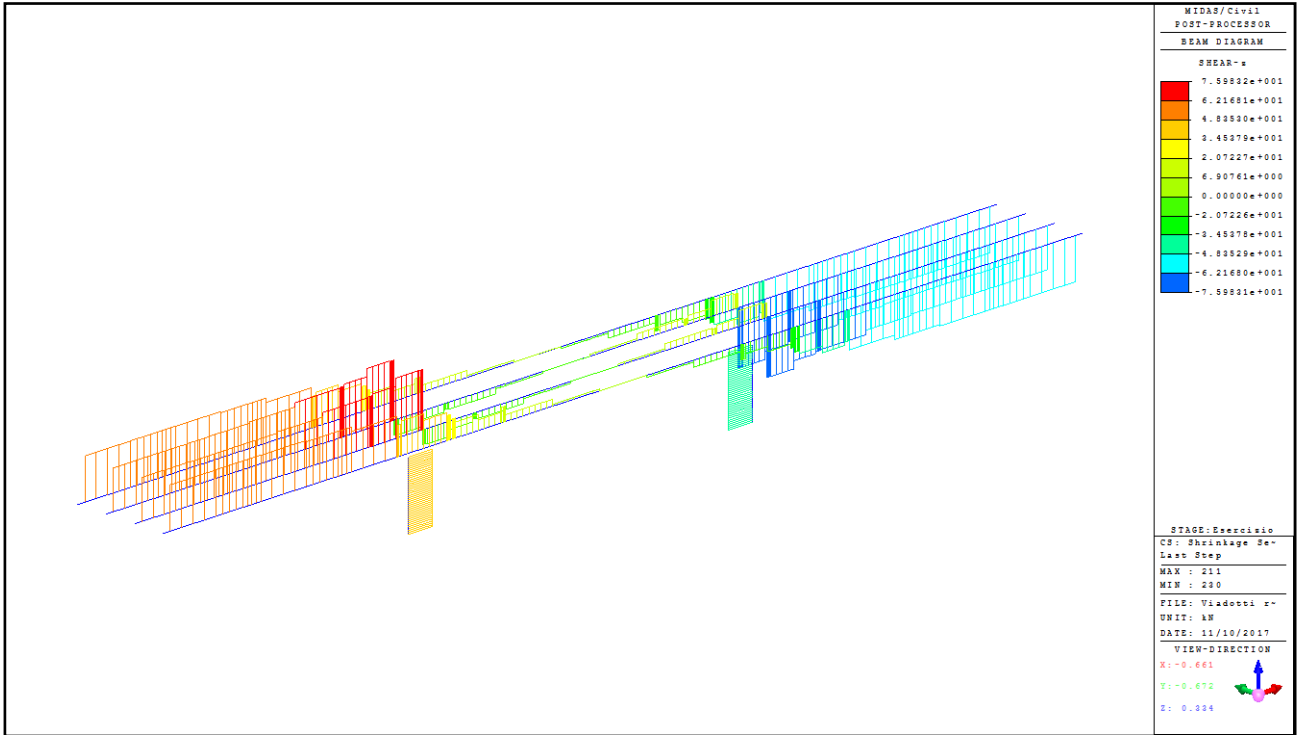
Finiture – Diagramma sforzi taglianti



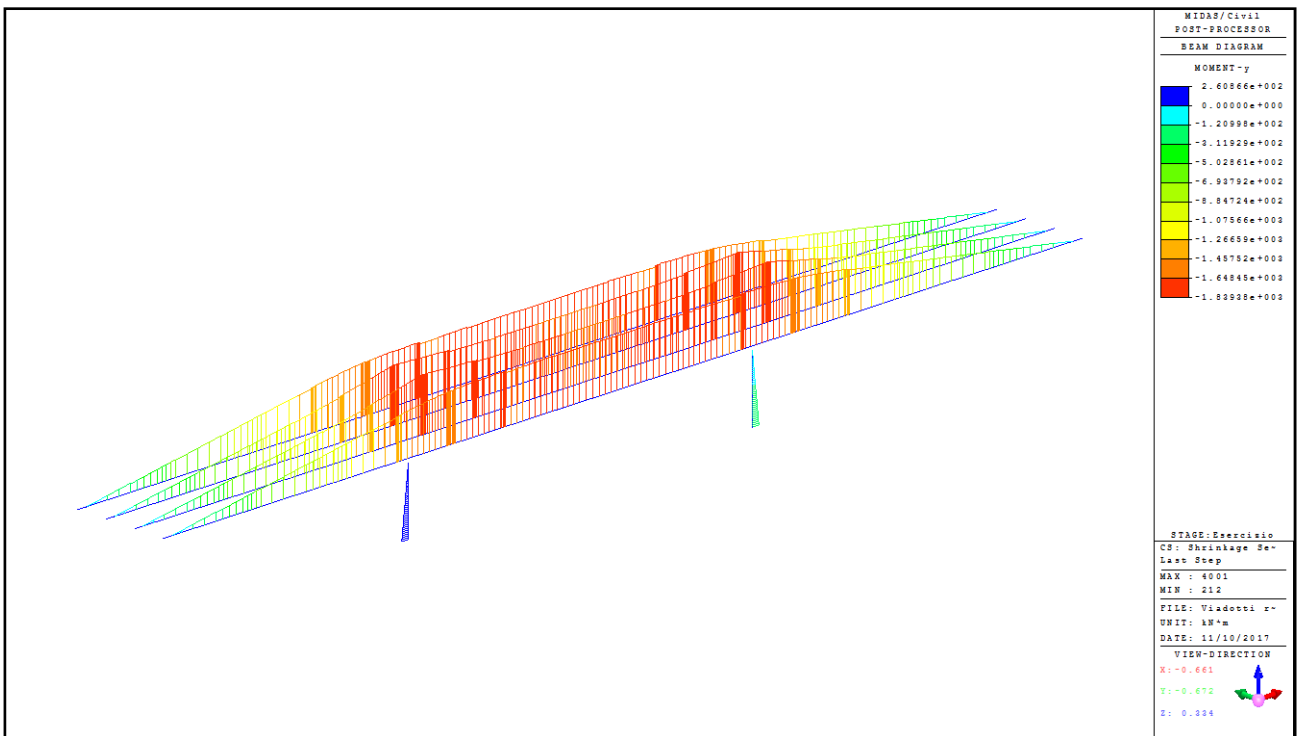
Finiture – Diagramma momenti flettenti



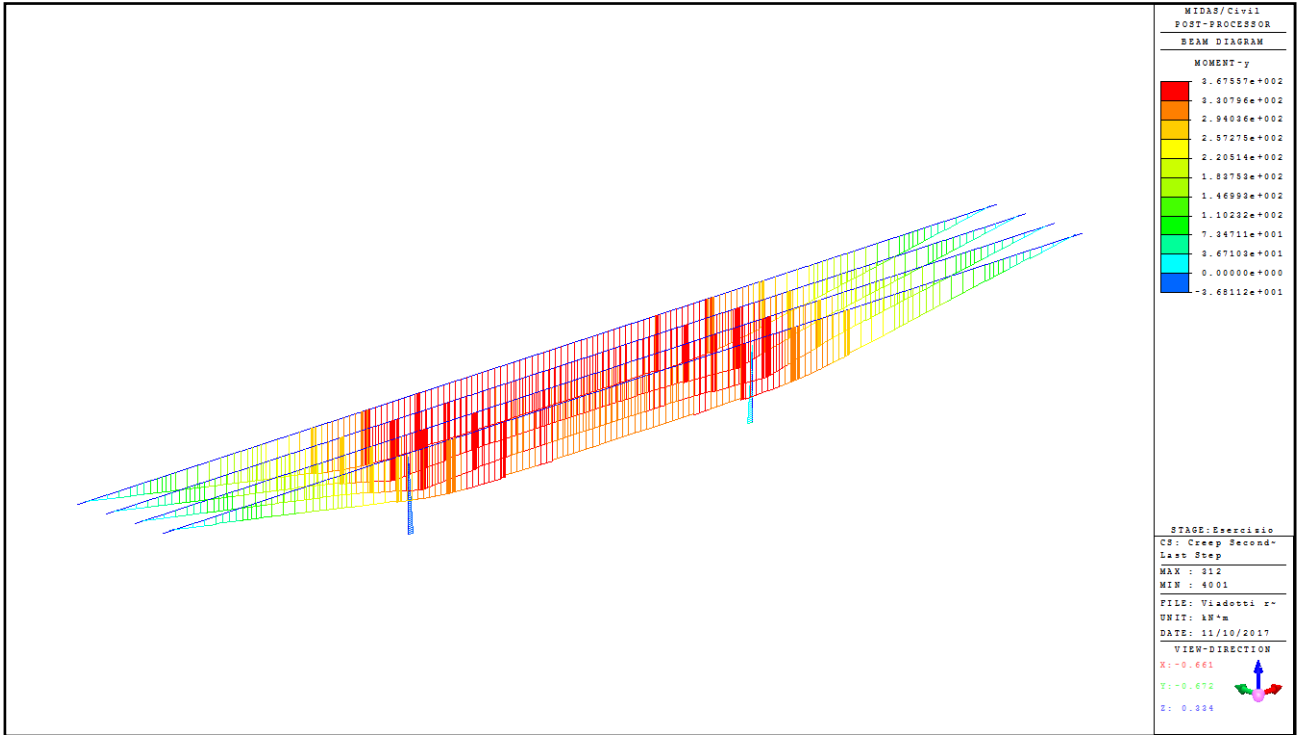
Ritiro soletta - Diagramma sforzi assiali



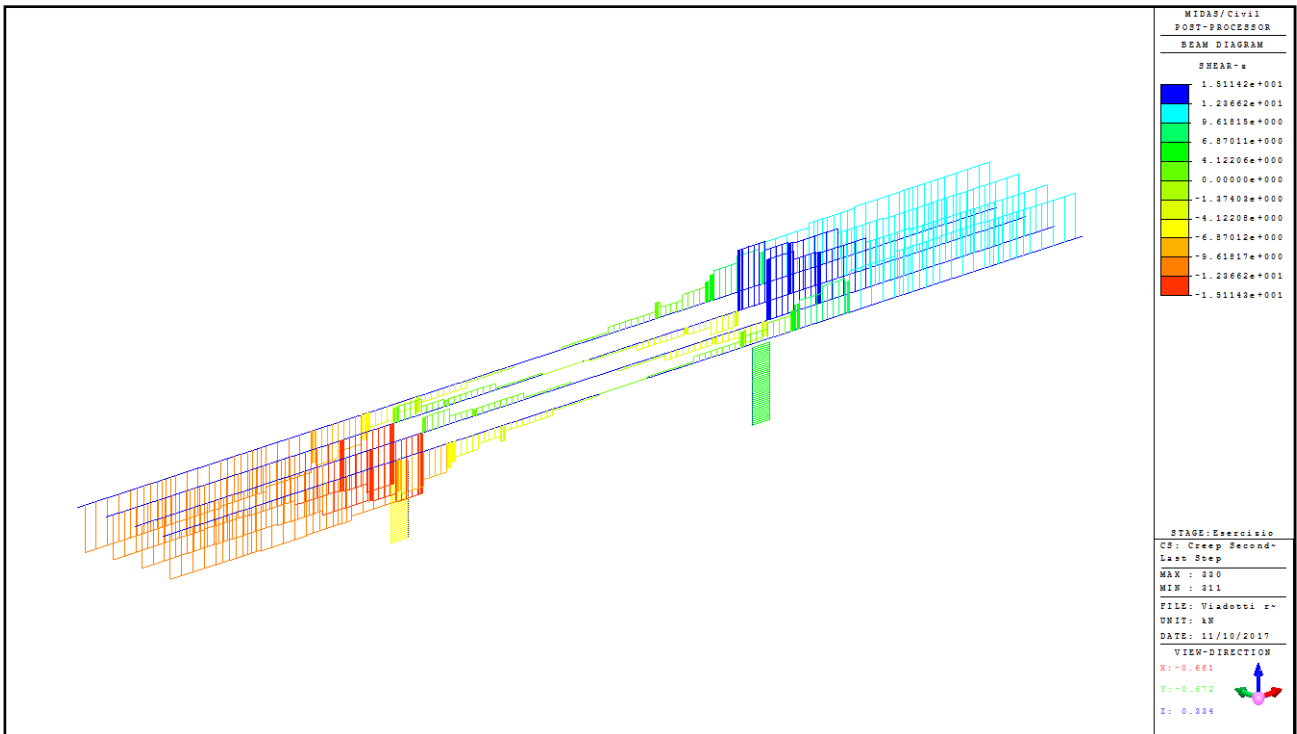
Ritiro soletta - Diagramma sforzi taglianti



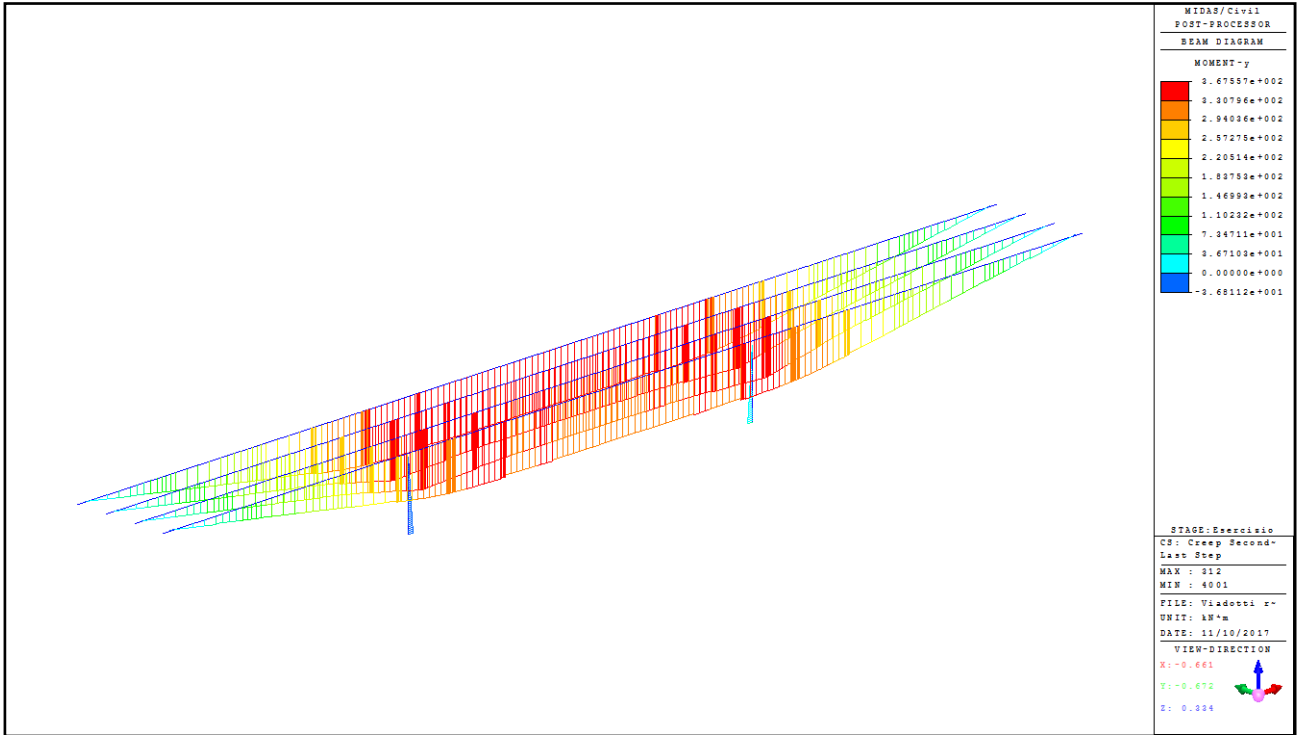
Ritiro soletta - Diagramma momenti flettenti



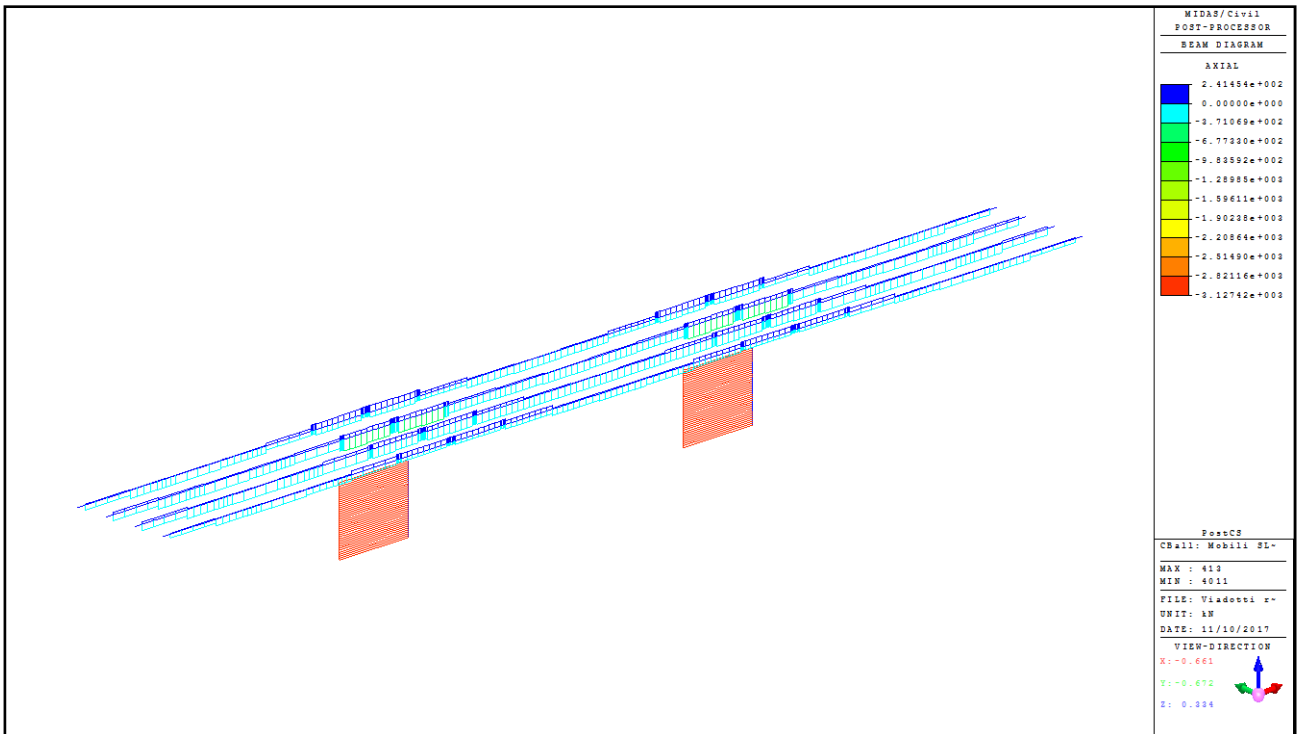
Fluage soletta - Diagramma sforzi assiali



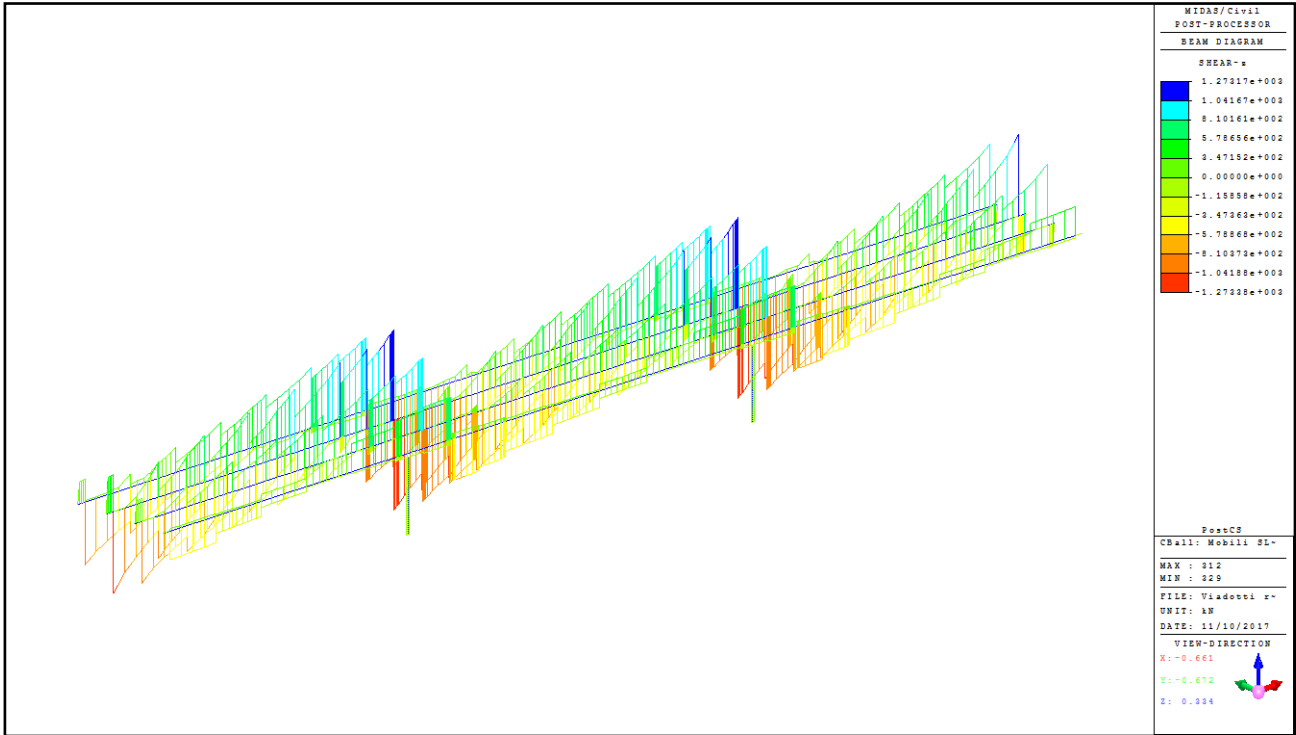
Fluage soletta - Diagramma sforzi taglianti



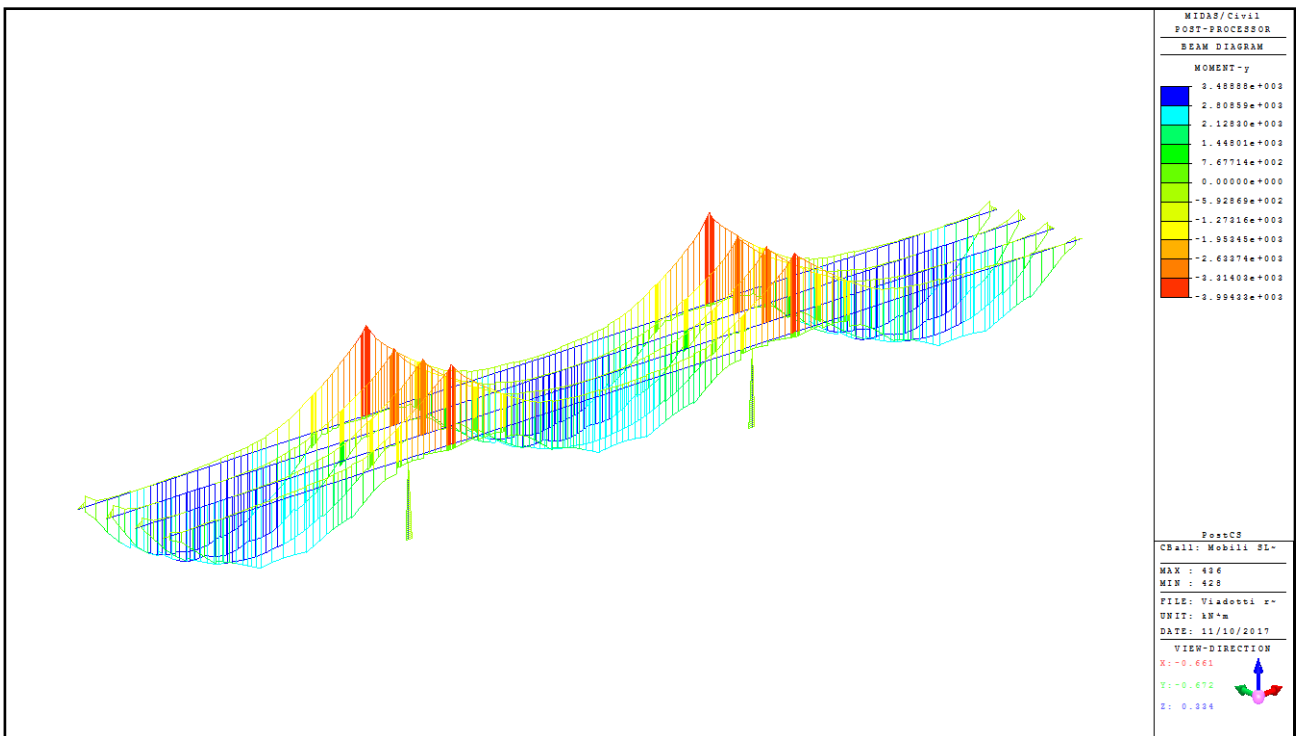
Fluage soletta - Diagramma momenti flettenti



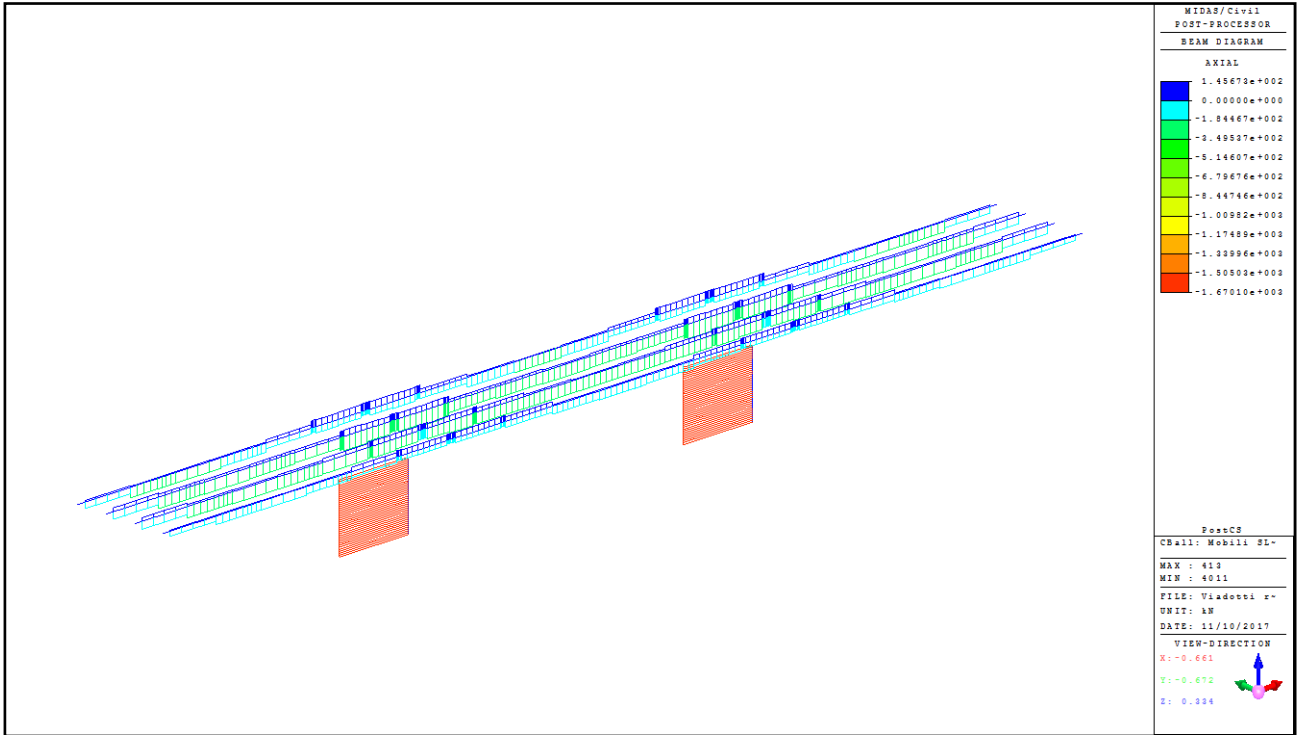
Inviluppo carichi mobili SLU - Diagramma sforzi assiali



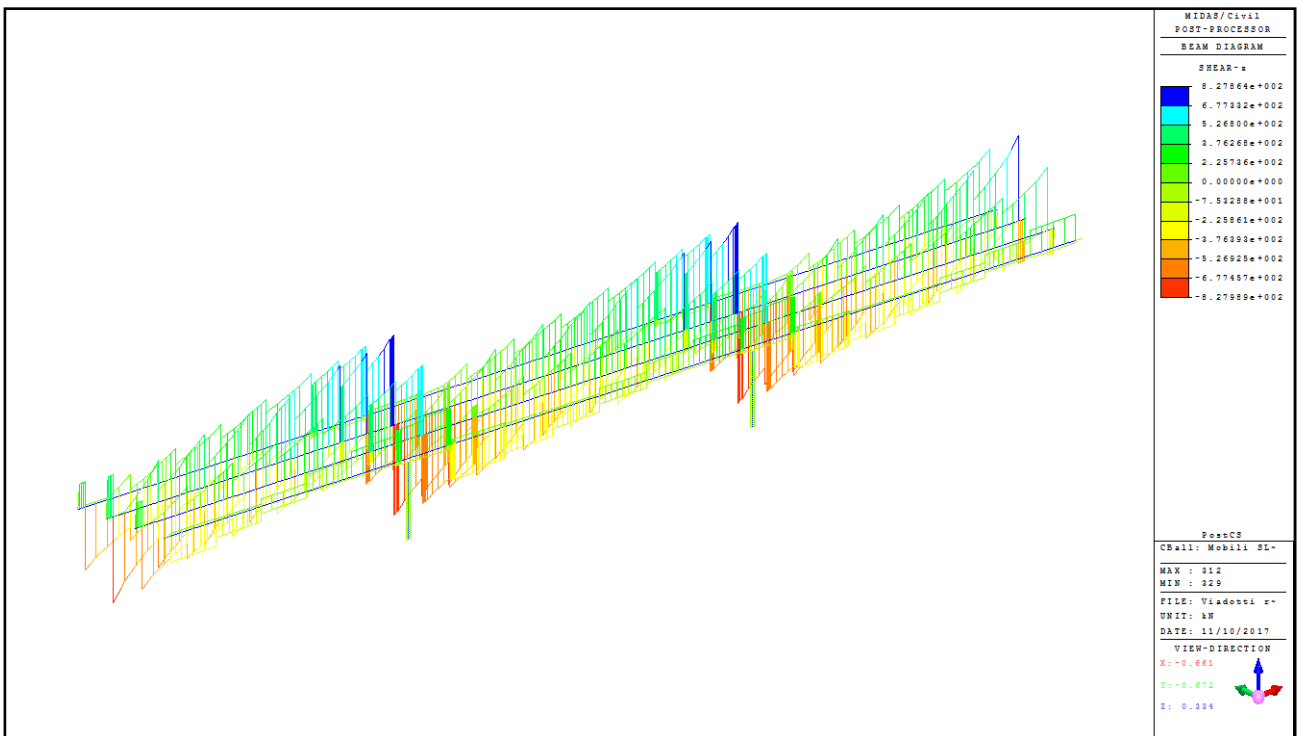
Inviluppo carichi mobili SLU - Diagramma sforzi taglianti



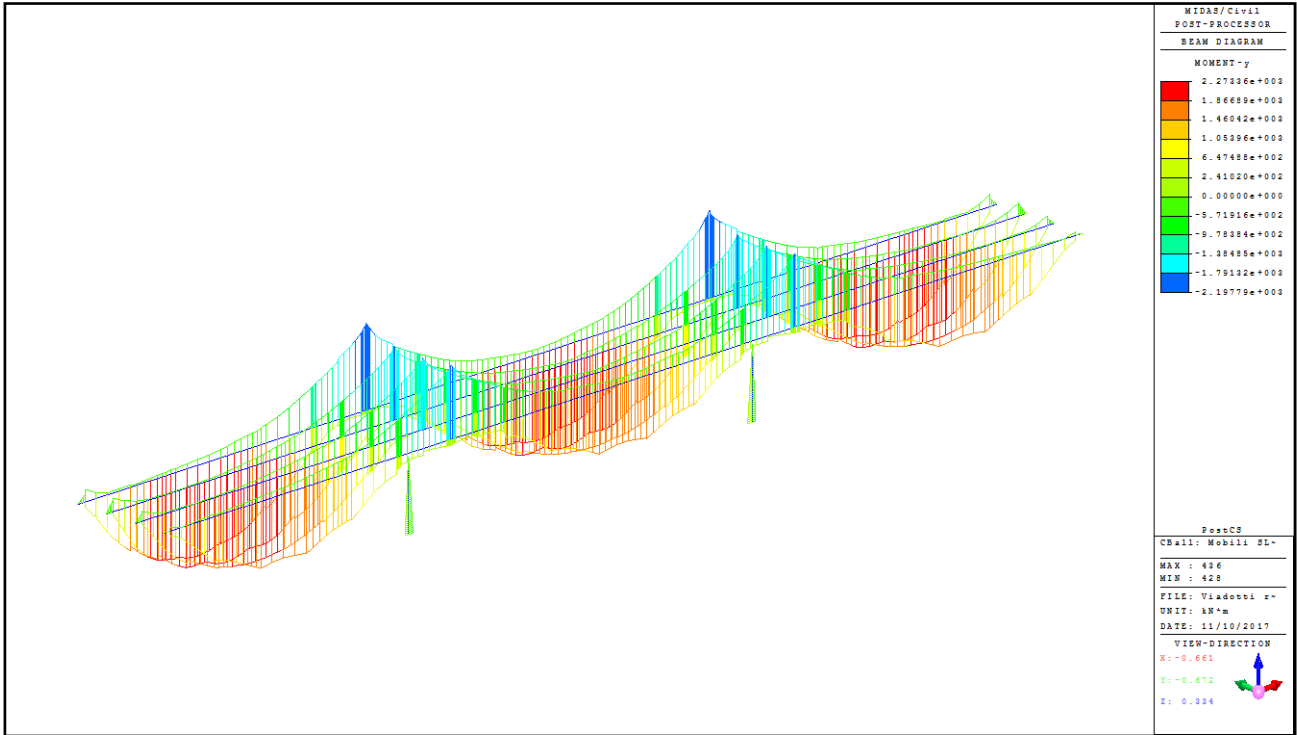
Inviluppo carichi mobili SLU - Diagramma momenti flettenti



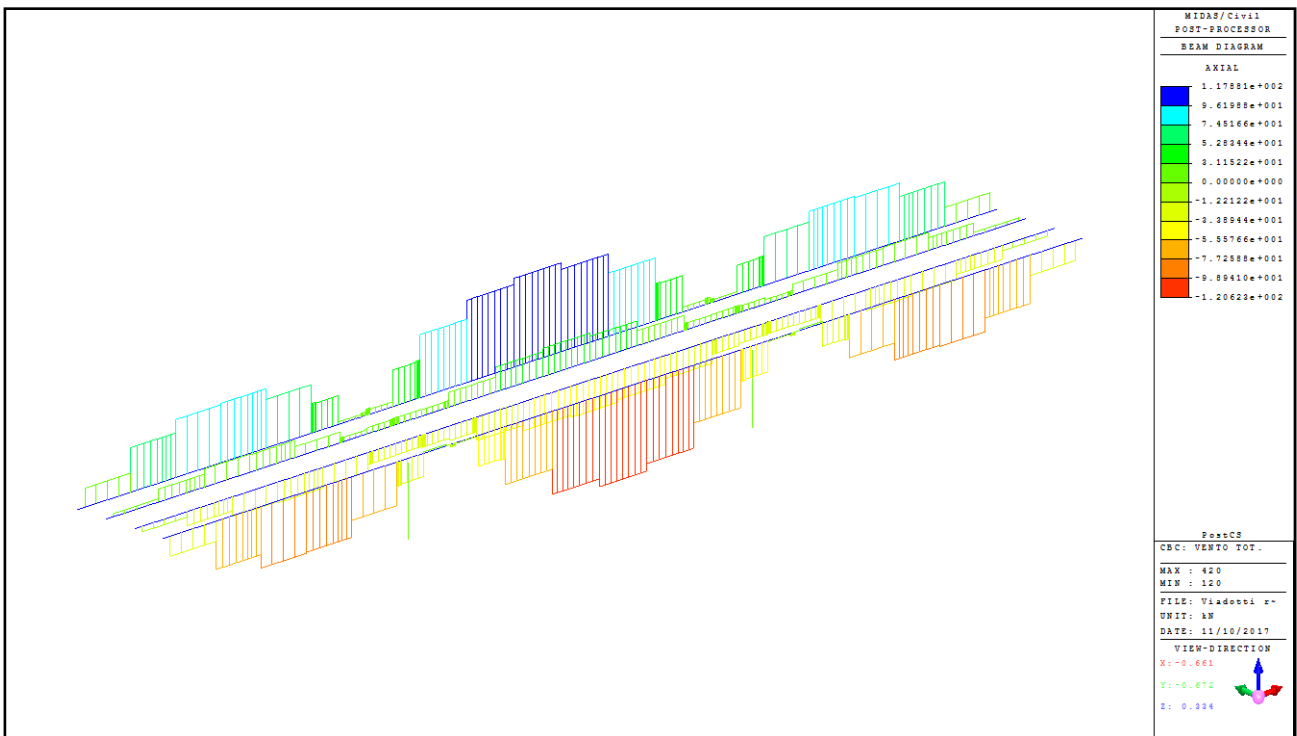
Inviluppo carichi mobili SLE - Diagramma sforzi assiali



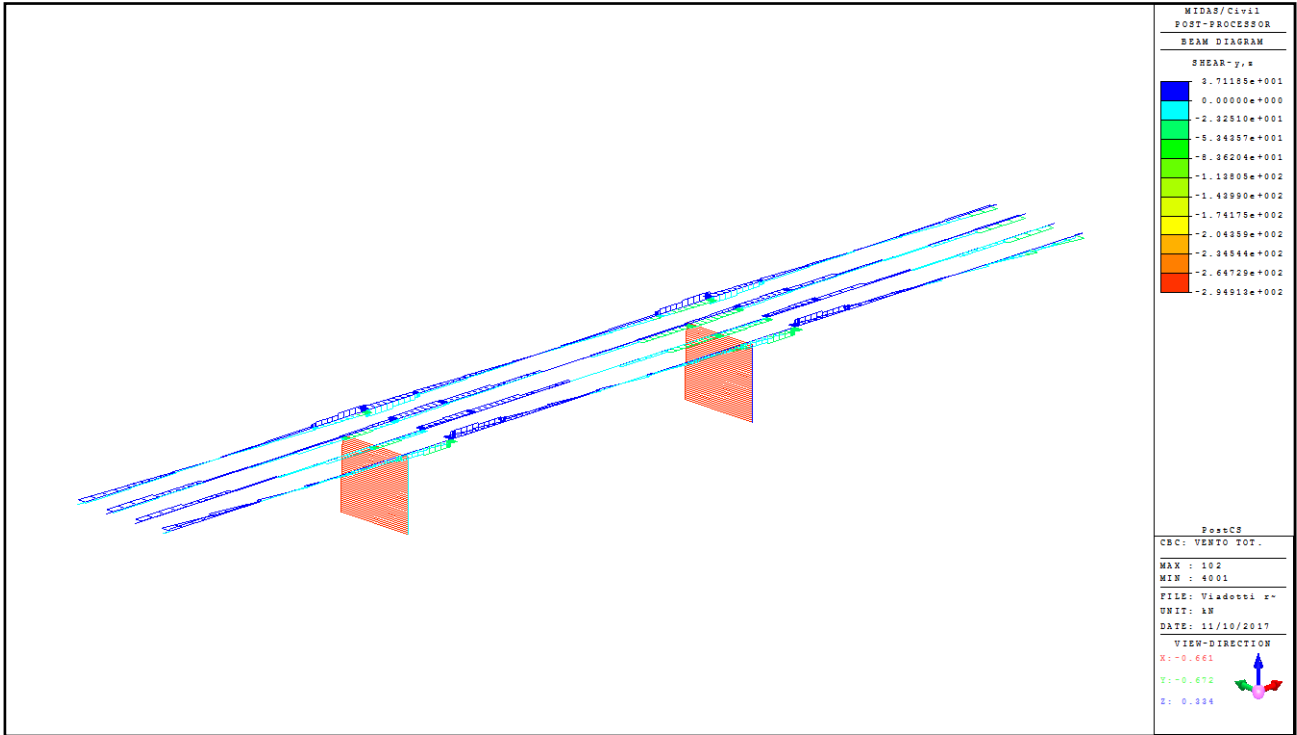
Inviluppo carichi mobili SLE - Diagramma sforzi taglianti



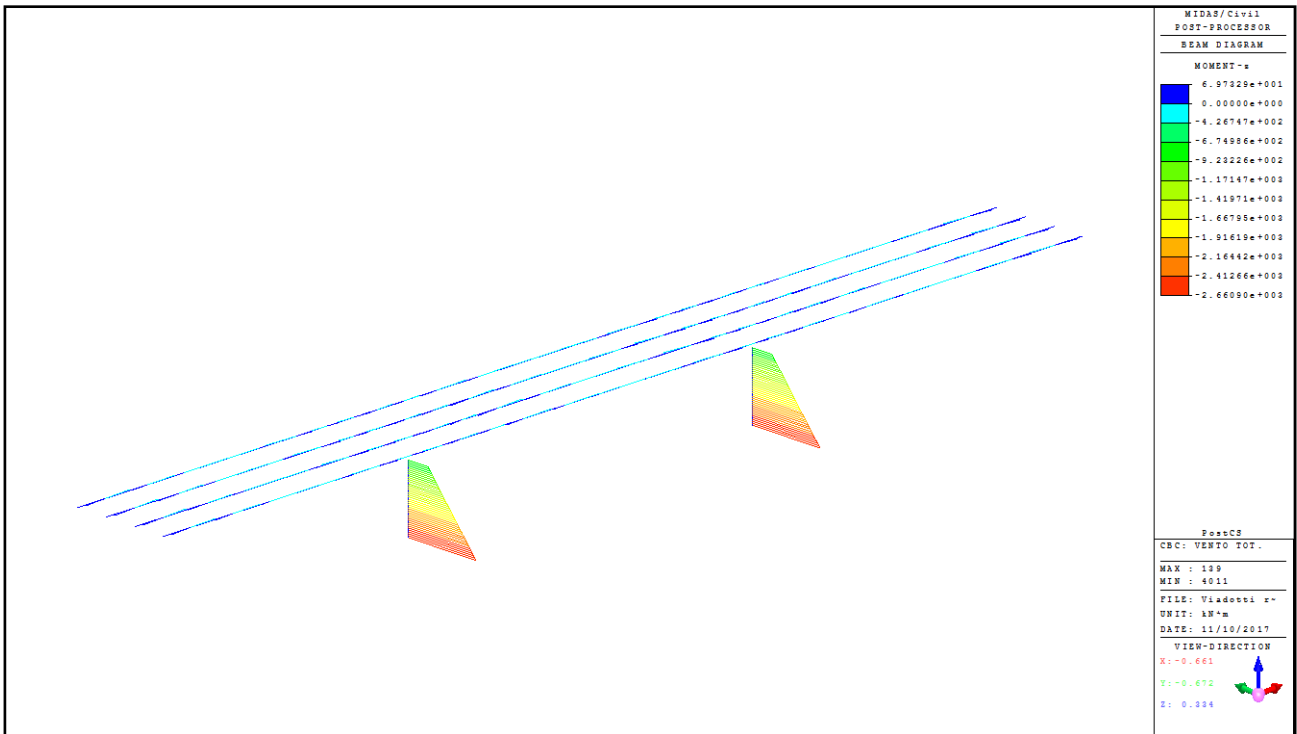
Inviluppo carichi mobili SLE - Diagramma momenti flettenti



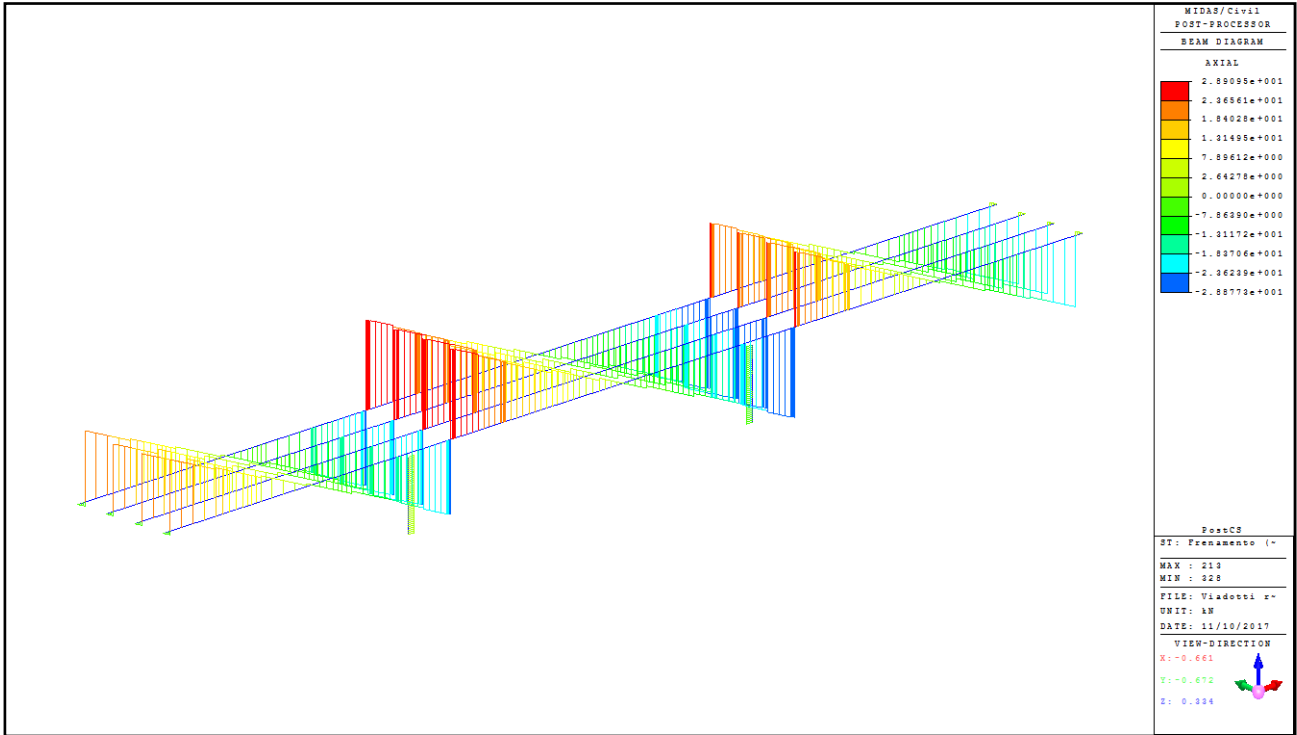
Vento trasversale (strutture e mobili) - Diagramma sforzi assiali



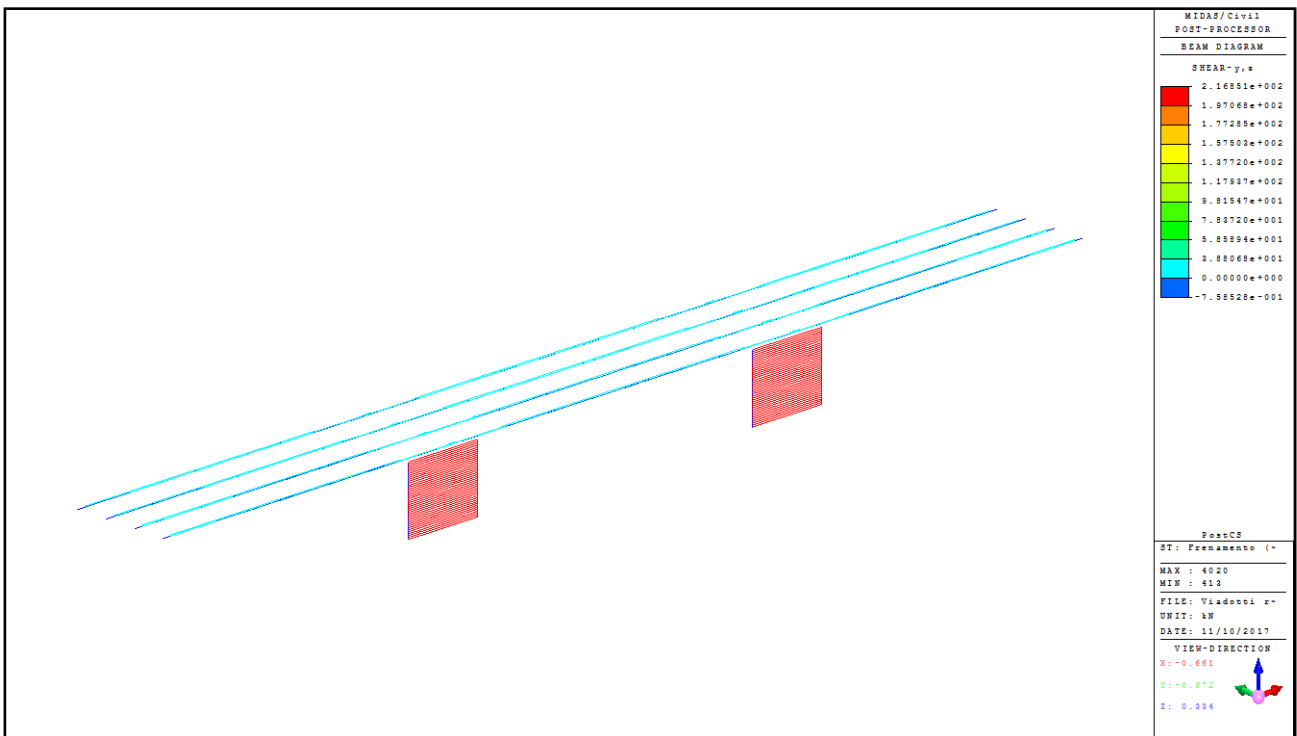
Vento trasversale (strutture e mobili) - Diagramma sforzi taglienti



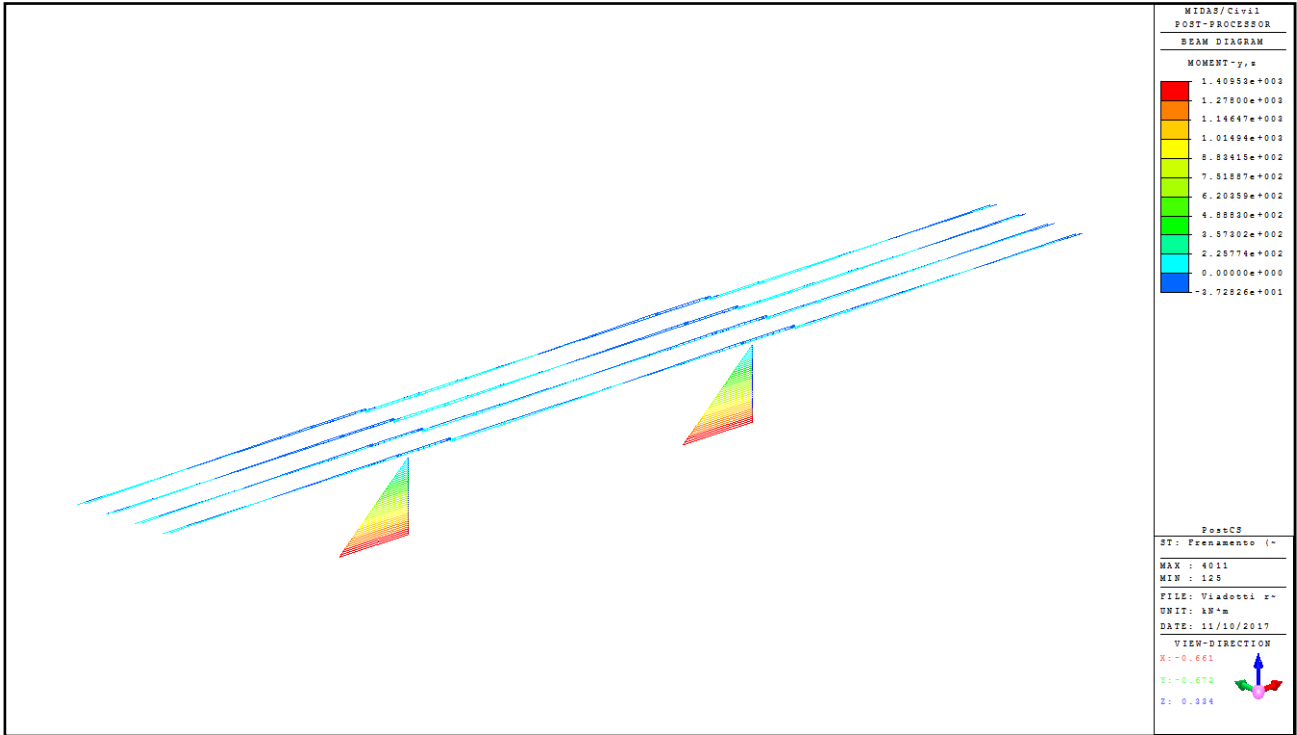
Vento trasversale (strutture e mobili) - Diagramma momenti flettenti



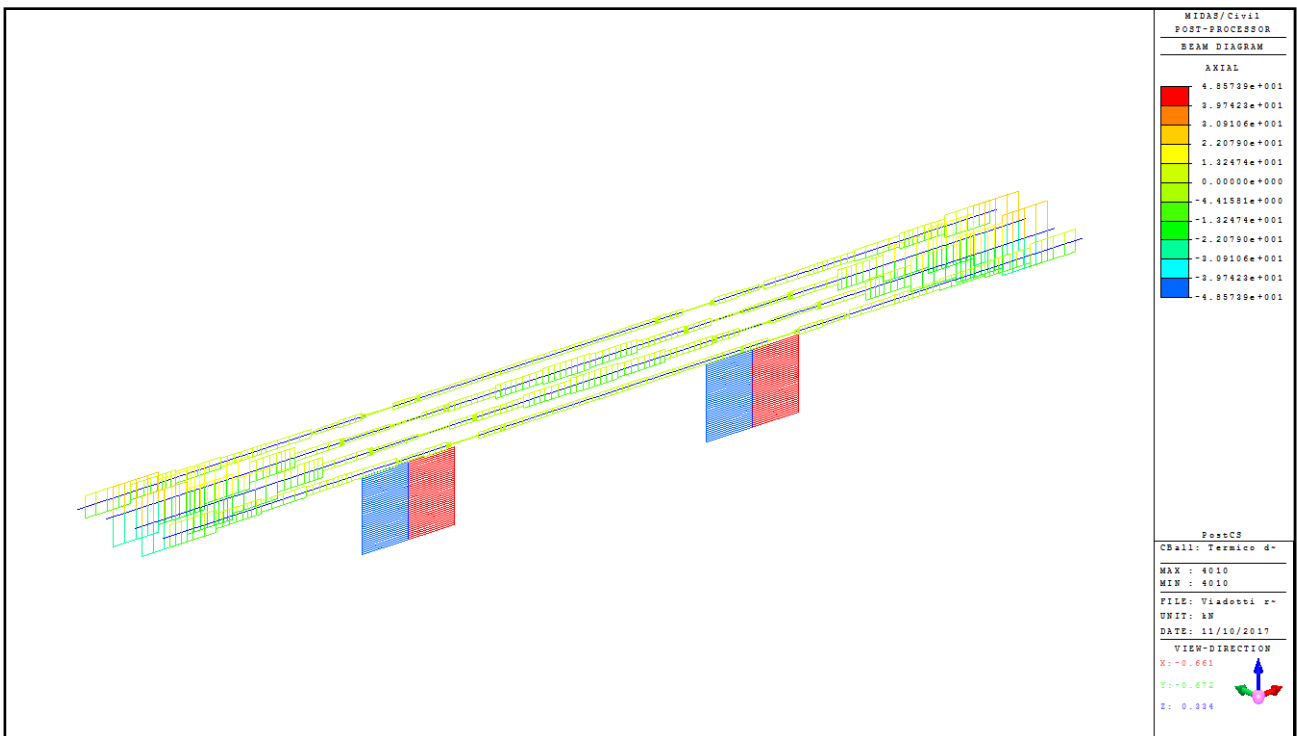
Frenamento - Diagramma sforzi assiali



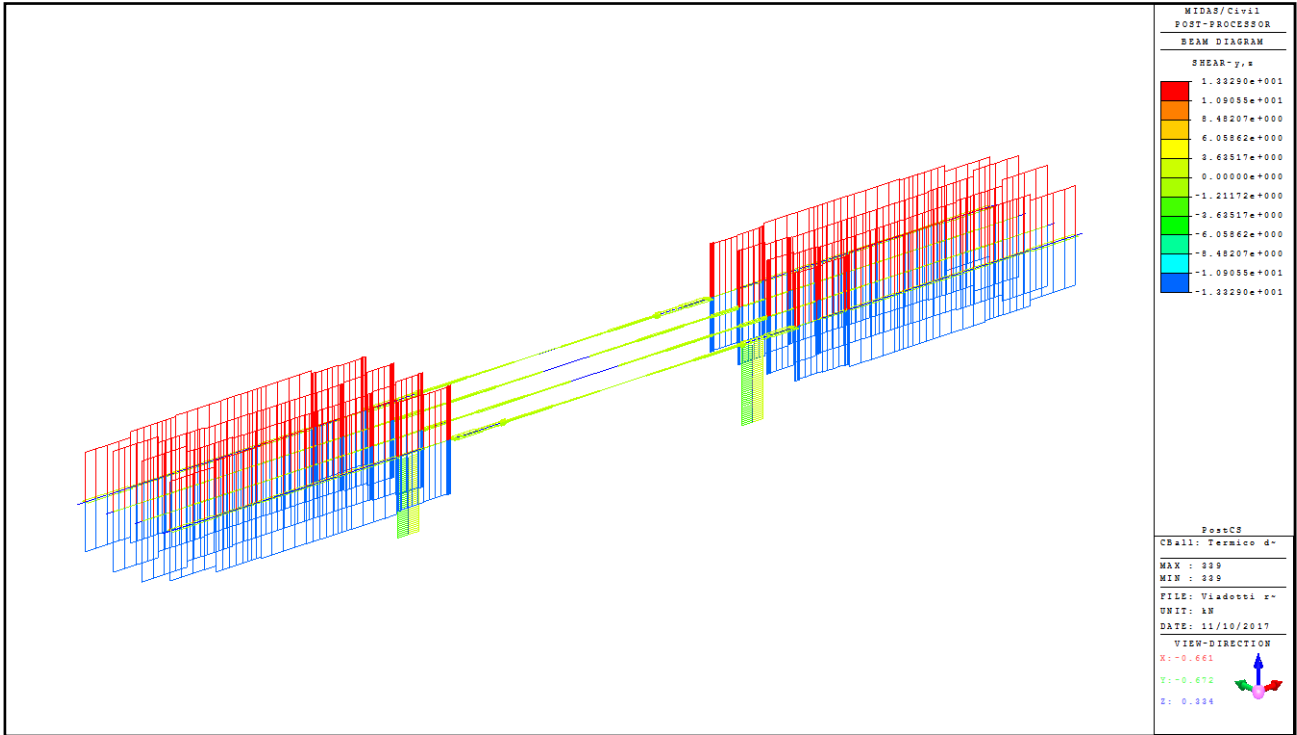
Frenamento - Diagramma sforzi taglianti



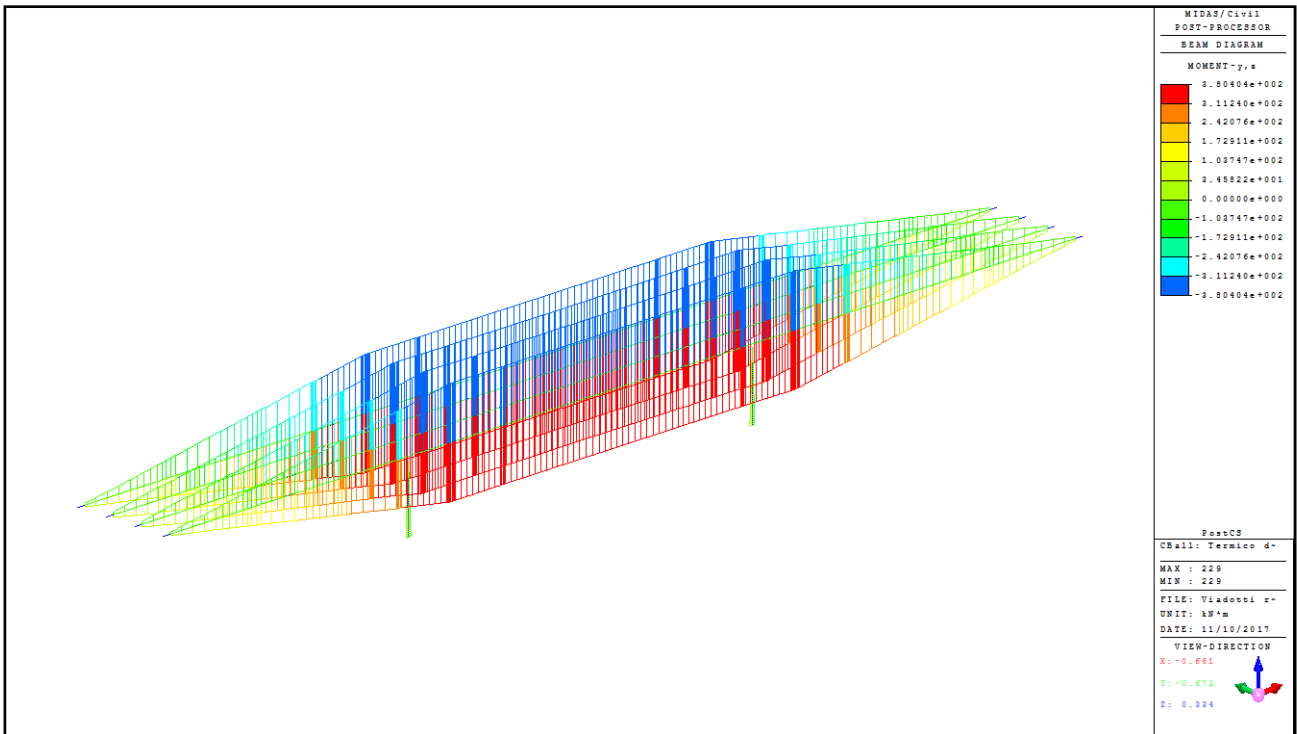
Frenamento - Diagramma momenti flettenti



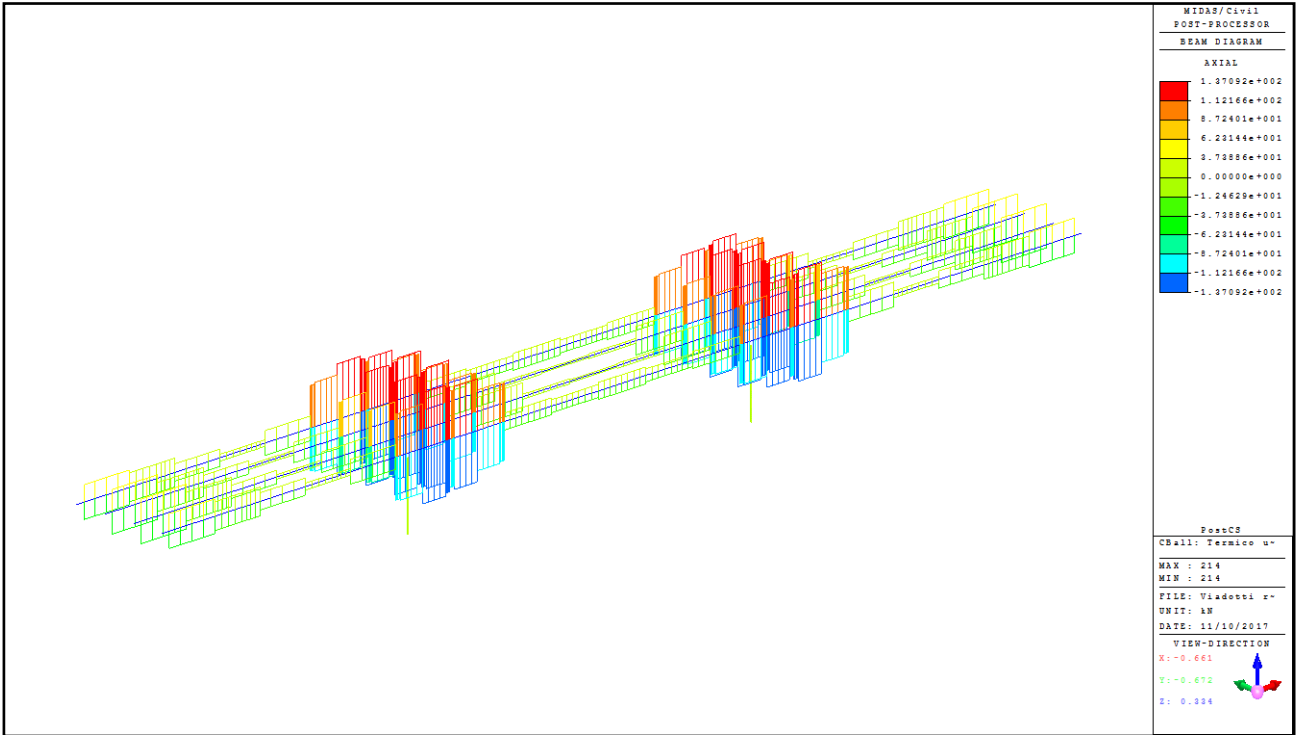
Inviluppo differenziale termico $\pm 5^\circ/H$ - Diagramma sforzi assiali



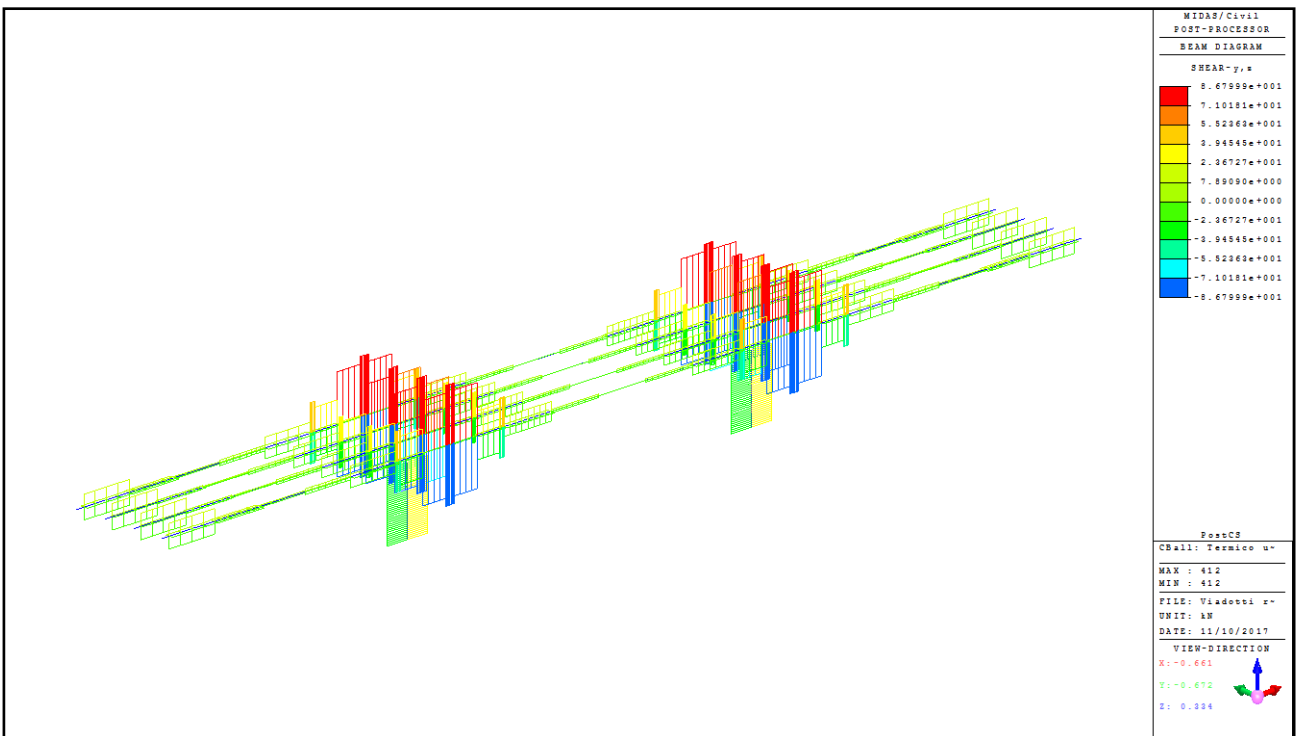
Involuppo differenziale termico $\pm 5^\circ/H$ - Diagramma sforzi taglianti



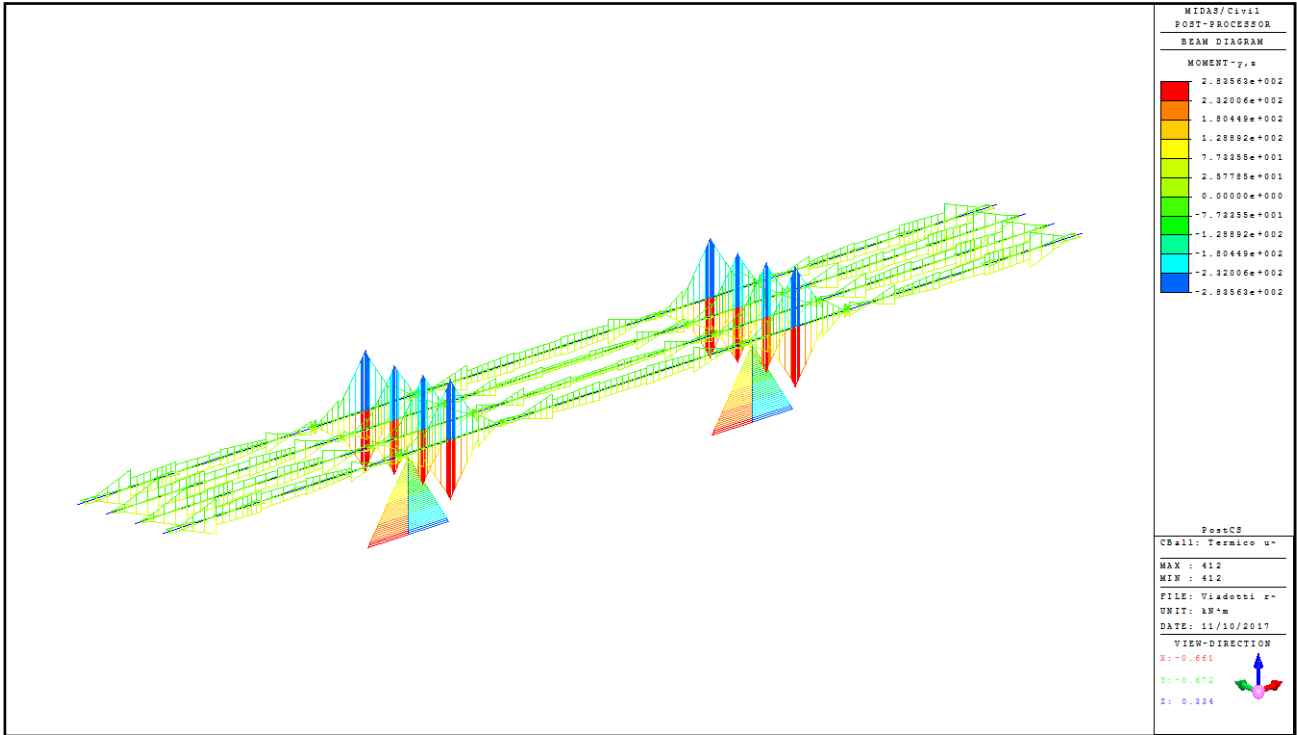
Involuppo differenziale termico $\pm 5^\circ/H$ - Diagramma momenti flettenti



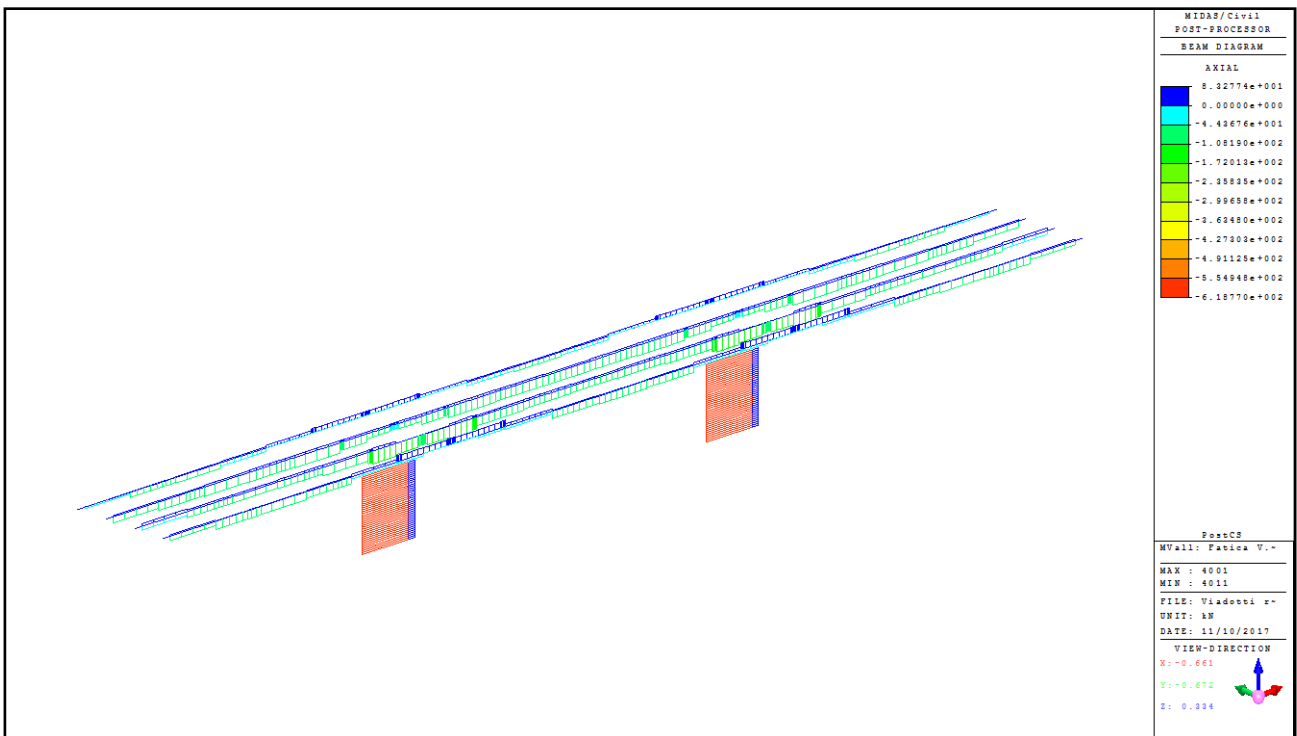
Inviluppo termico uniforme $\pm 15^\circ$ - Diagramma sforzi assiali



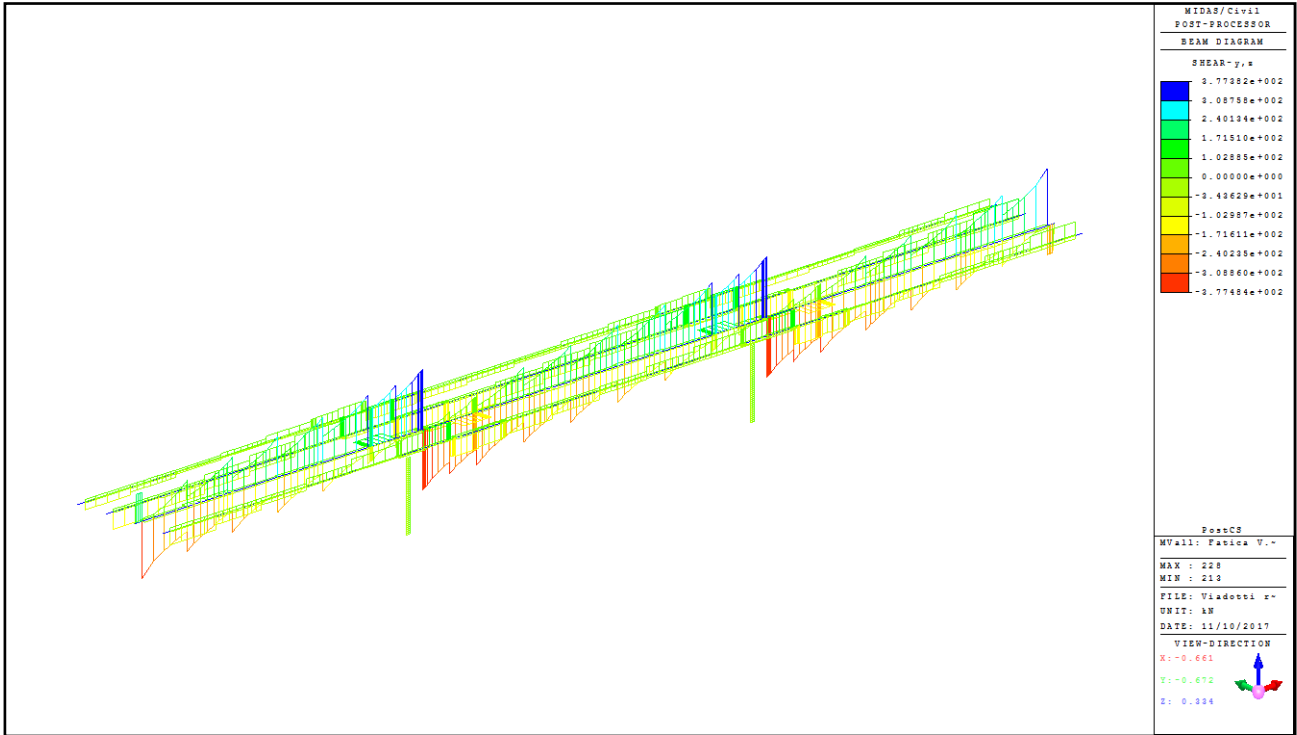
Inviluppo termico uniforme $\pm 15^\circ$ - Diagramma sforzi taglianti



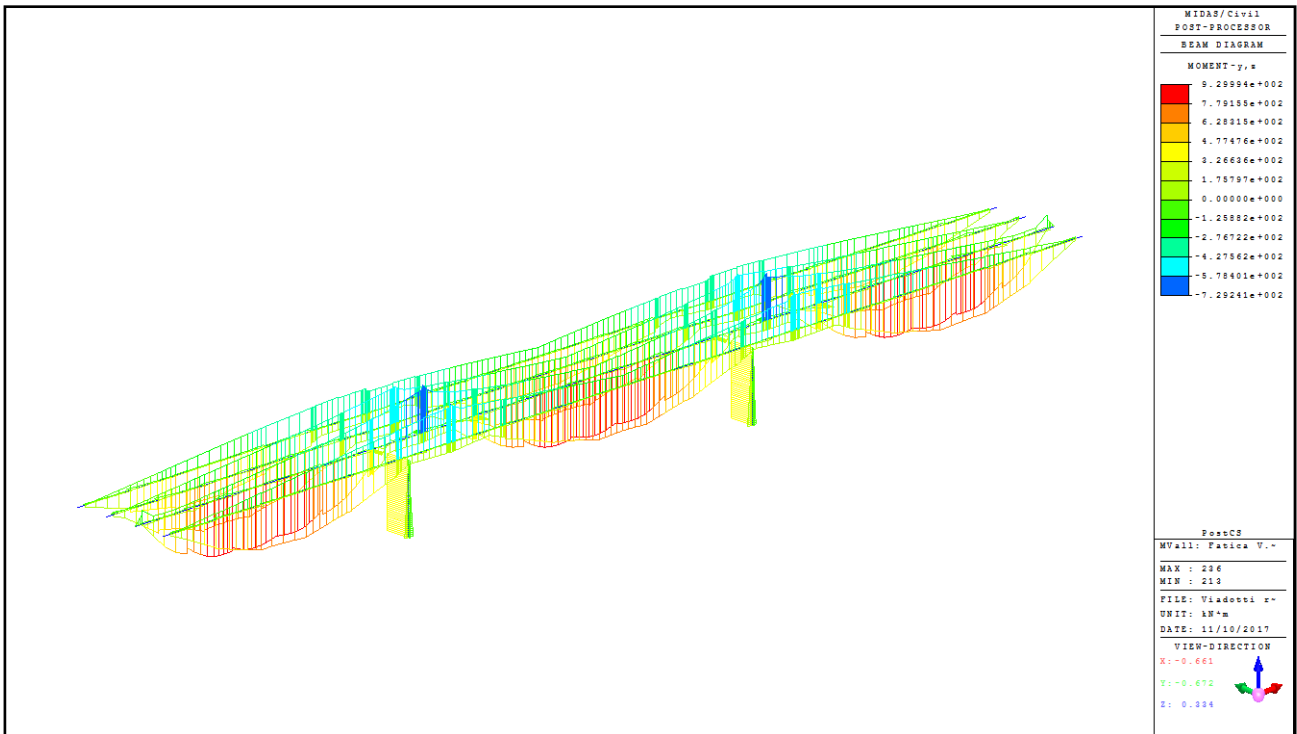
Involuppo termico uniforme $\pm 15^\circ$ - Diagramma momenti flettenti



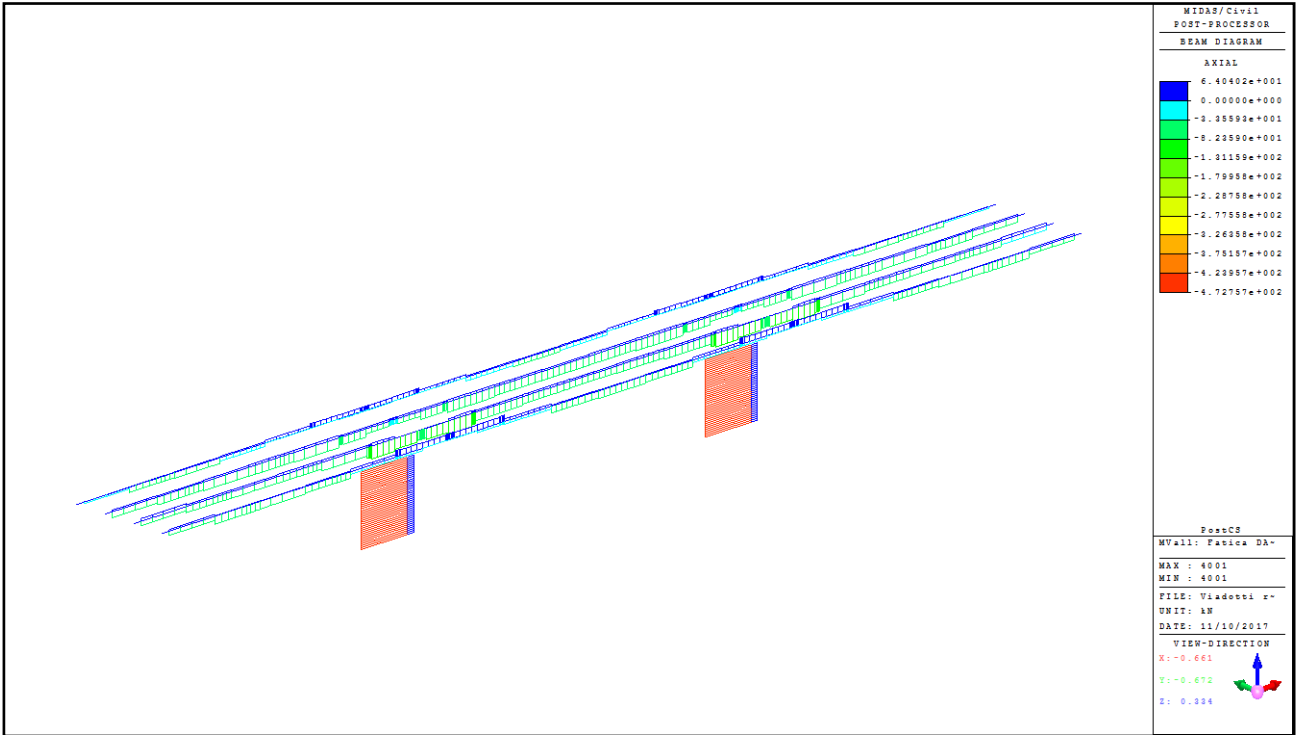
Carichi mobili fatica schema 2 (vita ill.) - Diagramma sforzi assiali



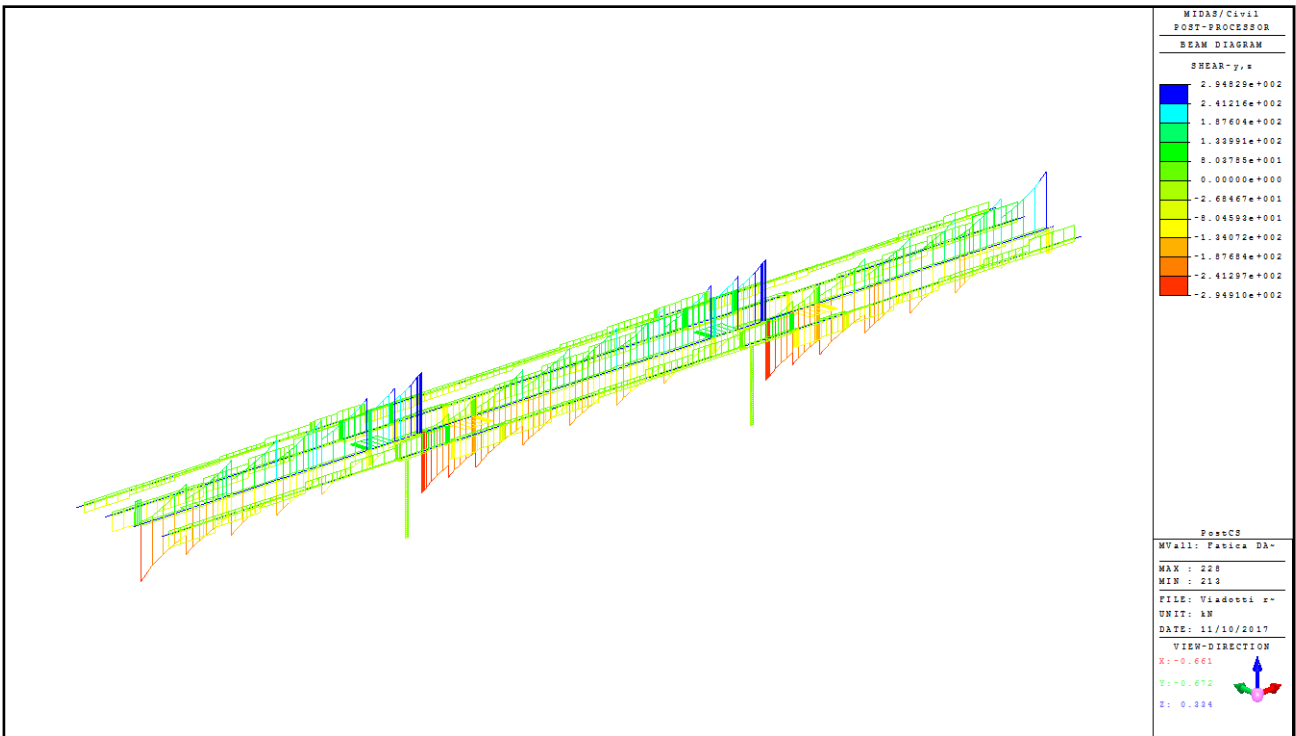
Carichi mobili fatica schema 2 (vita ill.) - Diagramma sforzi taglianti



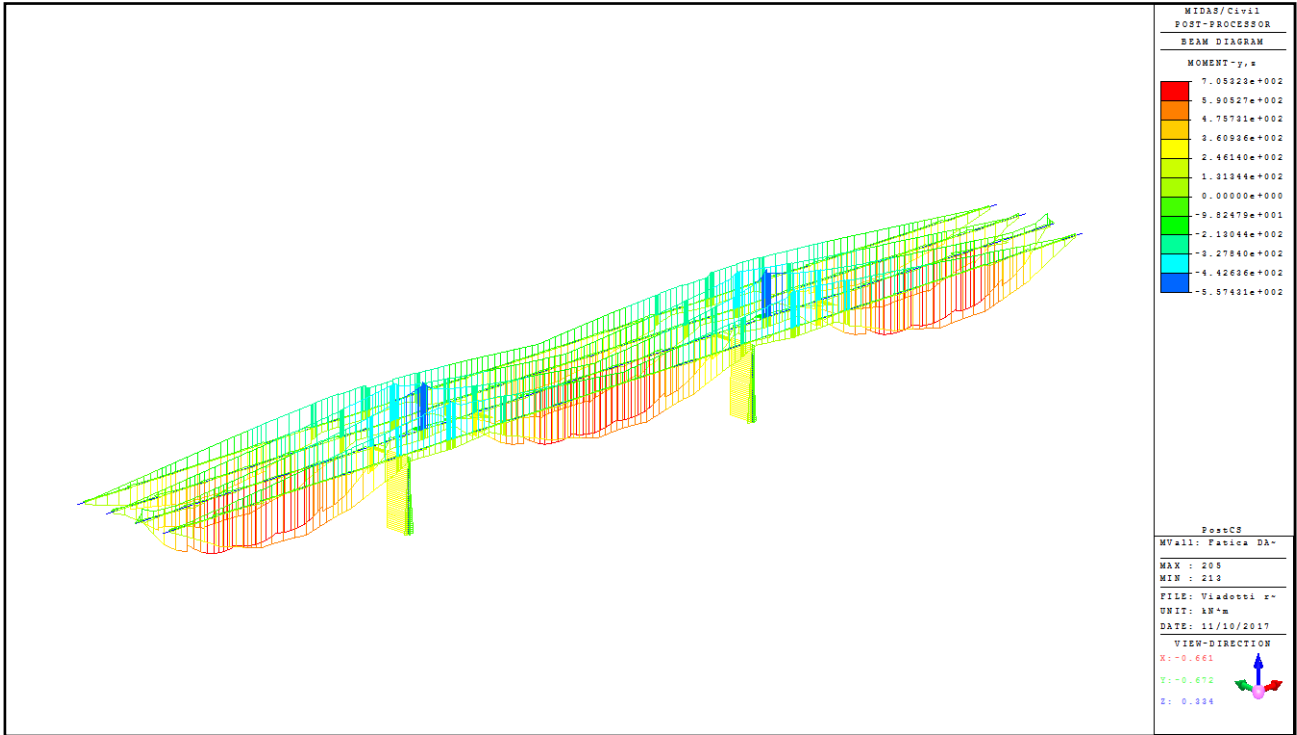
Carichi mobili fatica schema 2 (vita ill.) - Diagramma momenti flettenti



Involuppo carichi mobili fatica schema 3 (dann.) - Diagramma sforzi assiali



Involuppo carichi mobili fatica schema 3 (dann.) - Diagramma sforzi taglianti



Inviluppo carichi mobili fatica schema 3 (dann.) - Diagramma momenti flettenti

7 RISPOSTA SISMICA DELLA STRUTTURA

Sono stati determinati 40 modi di vibrazione con il metodo "Ritz Vectors"; i periodi determinati variano da 1.404 s a 0.0040 s; le masse eccitate risultano:

- dir. X: 98.26 %
- dir. Y: 98.40 %
- dir. Z: 89.91 %

Seguono schermate programma di calcolo.

EIGENVALUE ANALYSIS				
Mode No	Frequency		Period	Tolerance
	(rad/sec)	(cycle/sec)	(sec)	
1	4.473728	0.712016	1.404463	0.0000e+000
2	4.475377	0.712278	1.403945	0.0000e+000
3	4.924462	0.783752	1.275913	0.0000e+000
4	11.373651	1.810173	0.552433	0.0000e+000
5	16.400479	2.610217	0.383110	0.0000e+000
6	17.205722	2.738376	0.365180	0.0000e+000
7	20.679036	3.291171	0.303843	0.0000e+000
8	22.193297	3.532173	0.283112	0.0000e+000
9	22.745445	3.620050	0.276239	0.0000e+000
10	27.635606	4.398343	0.227358	0.0000e+000
11	43.179955	6.872303	0.145512	0.0000e+000
12	43.601347	6.939370	0.144105	0.0000e+000
13	50.709526	8.070672	0.123905	0.0000e+000
14	56.310691	8.962125	0.111581	0.0000e+000
15	60.202594	9.581540	0.104367	0.0000e+000
16	62.350864	9.923448	0.100771	0.0000e+000
17	67.157251	10.688408	0.093559	0.0000e+000
18	68.758815	10.943305	0.091380	0.0000e+000
19	69.588207	11.075307	0.090291	0.0000e+000
20	75.777996	12.060443	0.082916	0.0000e+000
21	83.524328	13.293310	0.075226	0.0000e+000
22	89.591766	14.258972	0.070131	0.0000e+000
23	92.448797	14.713683	0.067964	0.0000e+000
24	94.306874	15.009405	0.066625	0.0000e+000
25	100.535497	16.000721	0.062497	0.0000e+000
26	105.192500	16.741906	0.059730	0.0000e+000
27	119.116656	18.958005	0.052748	0.0000e+000
28	121.643410	19.360150	0.051652	0.0000e+000
29	123.156945	19.601037	0.051018	0.0000e+000
30	125.236539	19.932014	0.050171	0.0000e+000
31	127.836310	20.345781	0.049150	0.0000e+000
32	188.239989	29.959325	0.033379	0.0000e+000
33	193.216021	30.751285	0.032519	0.0000e+000
34	220.594285	35.108671	0.028483	0.0000e+000
35	289.671995	46.102730	0.021691	0.0000e+000
36	448.734580	71.418326	0.014002	0.0000e+000
37	498.598536	79.354422	0.012602	0.0000e+000
38	643.906655	102.480927	0.009758	0.0000e+000
39	716.612148	114.052366	0.008768	0.0000e+000
40	1558.992358	248.121340	0.004030	0.0000e+000

Element Number : 222

Position Informator : J

1 Design Condition

1.1 Design Parameters

- Partial factors

γ_C for concrete	1.50	γ_V for headed stud	1.25
γ_S for reinforcing steel	1.15	γ_{Ff} for equivalent constant Amplitude stress range	1.00
γ_{M0} for structural steel	1.05	γ_{Mf} for fatigue strength	1.15
γ_{M1} for structural steel	1.10	$\gamma_{Mf,s}$ for fatigue strength of studs in shear	1.00

1.2 Material Information

- Structural steel

$$f_{sk} = 355.000 \text{ MPa} , E_s = 210000.000 \text{ MPa}$$

- Concrete

$$f_{ck} = 32.000 \text{ MPa} , E_{cm} = 33000.000 \text{ MPa}$$

- Reinforcement

$$f_{yk} = 450.000 \text{ MPa} , E_r = 210000.000 \text{ MPa}$$

1.3 Sectional Information

Slab

B_c	3200.000	mm	t_c	240.000	mm	H_h	60.000	mm
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Girder

H_w	930.000	mm	B_1	500.000	mm	B_2	600.000	mm
t_w	12.000	mm	t_{f1}	30.000	mm	t_{f2}	40.000	mm

Before

A_a	50160.000	mm ²
$I_{y,a}$	9517067645.933	mm ⁴
$I_{z,a}$	1032633920.000	mm ⁴
$C_{y,a}$	300.000	mm
$C_{z,a}$	416.483	mm

After

A_c	172107.347	mm ²
$I_{y,c}$	30821358497.915	mm ⁴
$I_{z,c}$	105094369764.263	mm ⁴
$C_{y,c}$	1600.000	mm
$C_{z,c}$	957.476	mm

Crack

A_c	56592.000	mm ²
$I_{y,c}$	12757764255.667	mm ⁴
$I_{z,c}$	6499936863.708	mm ⁴
$C_{y,c}$	1600.000	mm
$C_{z,c}$	501.556	mm

2 Bending Resistance

2.1 Positive Moment

- Design load

Load combination name : ST SLU Mobili

$$\begin{aligned}
 N_{a,Ed} &= -74.029 \text{ kN} \\
 N_{c,Ed} &= -93.585 \text{ kN} \\
 M_{a,Ed} &= 765.743 \text{ kN} \cdot \text{m} \\
 M_{c,Ed} &= 2369.288 \text{ kN} \cdot \text{m}
 \end{aligned}$$

- Stress

Top Flange

Left	y ₁	-250.000	mm	z ₁	42.524	mm	σ ₁	-52.353	MPa
	y ₂	-6.000	mm	z ₂	42.524	mm	σ ₂	-52.241	MPa
Right	y ₁	250.000	mm	z ₁	42.524	mm	σ ₁	-52.123	MPa
	y ₂	6.000	mm	z ₂	42.524	mm	σ ₂	-52.235	MPa

Bottom Flange

Left	y ₁	-300.000	mm	z ₁	-957.476	mm	σ ₁	104.955	MPa
	y ₂	-6.000	mm	z ₂	-957.476	mm	σ ₂	105.091	MPa
Right	y ₁	300.000	mm	z ₁	-957.476	mm	σ ₁	105.231	MPa
	y ₂	6.000	mm	z ₂	-957.476	mm	σ ₂	105.096	MPa

Web

Right	y ₁	0.000	mm	z ₁	12.524	mm	σ ₁	-47.518	MPa
	y ₂	0.000	mm	z ₂	-917.476	mm	σ ₂	98.800	MPa

- Classification of sections

Part	Class
Top flange	1
Web	1
Bottom flange	1
Section	1

- Plastic resistance moment, $M_{pl,Rd}$

$$\text{Plastic NA} = 991.031 \text{ mm}$$

$$\begin{aligned}
 N_{slab} &= 13926.400 \text{ kN} \\
 N_{g,top} &= 1516.229 \text{ kN} \quad (\text{Upper side of PNA}) \\
 N_{g,bot} &= 15442.629 \text{ kN} \quad (\text{Lower side of PNA})
 \end{aligned}$$

$$\begin{aligned}
 M_{pl,Rd} &= 12388.930 \text{ kN} \cdot \text{m} \\
 x_{pl} &= 308.969 \text{ mm} \\
 M_{Rd} &= \beta M_{pl,Rd} = 12388.930 \text{ kN} \cdot \text{m} \\
 \text{here, } \beta &= 1.000
 \end{aligned}$$

$$M_{Rd} = 12388.930 \text{ kN} \cdot \text{m} > M_{Ed} = 3135.031 \text{ kN} \cdot \text{m} \quad \dots \text{OK}$$

2 Bending Resistance

2.2 Negative Moment

- Design load

Load combination name : ST SLU Termico

$$N_{a,Ed} = -74.029 \text{ kN}$$

$$N_{c,Ed} = 112.580 \text{ kN}$$

$$M_{a,Ed} = 765.743 \text{ kN} \cdot \text{m}$$

$$M_{c,Ed} = -1929.552 \text{ kN} \cdot \text{m}$$

- Stress

Top Flange

Left	y ₁	-250.000	mm	z ₁	498.444	mm	σ ₁	28.862	MPa
	y ₂	-6.000	mm	z ₂	498.444	mm	σ ₂	28.949	MPa
Right	y ₁	250.000	mm	z ₁	498.444	mm	σ ₁	29.040	MPa
	y ₂	6.000	mm	z ₂	498.444	mm	σ ₂	28.953	MPa

Bottom Flange

Left	y ₁	-300.000	mm	z ₁	-501.556	mm	σ ₁	-41.941	MPa
	y ₂	-6.000	mm	z ₂	-501.556	mm	σ ₂	-41.836	MPa
Right	y ₁	300.000	mm	z ₁	-501.556	mm	σ ₁	-41.728	MPa
	y ₂	6.000	mm	z ₂	-501.556	mm	σ ₂	-41.832	MPa

Web

Right	y ₁	0.000	mm	z ₁	468.444	mm	σ ₁	26.827	MPa
	y ₂	0.000	mm	z ₂	-461.556	mm	σ ₂	-39.003	MPa

- Classification of sections

Part	Class
Top flange	1
Web	2
Bottom flange	2
Section	2

- Plastic resistance moment, $M_{pl,Rd}$

$$\text{Plastic NA} = 440.178 \text{ mm}$$

$$N_{slab} = 0.000 \text{ kN}$$

$$N_{rebar} = 2516.870 \text{ kN}$$

$$N_{g,top} = 7220.994 \text{ kN} \quad (\text{Upper side of PNA})$$

$$N_{g,bot} = 9737.863 \text{ kN} \quad (\text{Lower side of PNA})$$

$$M_{pl,Rd} = 8891.056 \text{ kN} \cdot \text{m}$$

$$M_{Rd} = M_{pl,Rd} = 8891.056 \text{ kN} \cdot \text{m}$$

$$M_{Rd} = 8891.056 \text{ kN} \cdot \text{m} > M_{Ed} = -1163.809 \text{ kN} \cdot \text{m} \quad \dots \text{OK}$$

3 Resistance to Vertical Shear

- Design load

Load combination name : ST SLU Mobili

$N_{Ed} = 20.138 \text{ kN}$

$M_{a,Ed} = 765.743 \text{ kN} \cdot \text{m}$

$M_{c,Ed} = 2219.671 \text{ kN} \cdot \text{m}$

$V_{Ed,a} = 210.721 \text{ kN}$

$V_{Ed,c} = 731.489 \text{ kN}$

$V_{Ed} = 942.210 \text{ kN}$

- Stress

Top Flange

Left	y ₁	-250.000	mm	z ₁	42.524	mm	σ ₁	-51.627	MPa
	y ₂	-6.000	mm	z ₂	42.524	mm	σ ₂	-51.377	MPa
Right	y ₁	250.000	mm	z ₁	42.524	mm	σ ₁	-51.115	MPa
	y ₂	6.000	mm	z ₂	42.524	mm	σ ₂	-51.365	MPa

Bottom Flange

Left	y ₁	-300.000	mm	z ₁	-957.476	mm	σ ₁	100.799	MPa
	y ₂	-6.000	mm	z ₂	-957.476	mm	σ ₂	101.100	MPa
Right	y ₁	300.000	mm	z ₁	-957.476	mm	σ ₁	101.414	MPa
	y ₂	6.000	mm	z ₂	-957.476	mm	σ ₂	101.112	MPa

Web

Right	y ₁	0.000	mm	z ₁	12.524	mm	σ ₁	-46.797	MPa
	y ₂	0.000	mm	z ₂	-917.476	mm	σ ₂	95.007	MPa

- Classification of sections

Part	Class
Top flange	1
Web	1
Bottom flange	1
Section	1

- Plastic resistance moment, $M_{pl,Rd}$

Plastic NA = 991.031 mm

$N_{slab} = 13926.400$ kN

$N_{g,top} = 1516.229$ kN

$N_{g,bot} = 15442.629$ kN

$M_{pl,Rd} = 12388.930$ kN · m

- Calculation. $V_{bw,Rd}$

Web

$k_{\tau} = 5.34 + 4.00 \cdot (h_w/a)^2 + k_{\tau st} = 5.468$ when $a/h_w = 5.591 \geq 1$

where, $h_w = 930.000$ mm

$2.1/t \cdot (I_{sl}/h_w)^{1/3} = 0.000$

$k_{\tau st} = 9 \cdot (h_w/a)^2 \cdot ((I_{sl} / (t^3 \cdot h_w))^3)^{1/4} > 2.1/t \cdot (I_{sl}/h_w)^{1/3} = 0.000$

$I_{sl} = 0.000$ mm⁴

$t = 12.000$ mm

$\lambda_w = h_w / (37.4 \cdot t \cdot \varepsilon \cdot \sqrt{k}) = 1.089$

Contribution from the web

$X_w = 1.37 / (0.7 + \lambda_w) = 0.766$ $\lambda_w \geq 1.08$

$V_{bw,Rd} = \frac{X_w \cdot f_{yw} \cdot h_w \cdot t}{\sqrt{3} \cdot \gamma_{M1}} = 1592.233$ kN

$V_{Rd} = 1592.233$ kN

$V_{Edi} = V_{Ed} / \text{Num. of Web} = 942.210$ kN

$\eta_3 = V_{Edi} / V_{bw,Rd} = 0.592 \leq 1.0$

Contribution from the flange

$M_{f,Rd0} = 10485.655$ kN · m

$M_{f,Rd0}$ is calculated as $M_{pl,Rd}$ but neglecting the web contribution.

Reduction factor for $N_{Ed} = 1 - \frac{N_{Ed}}{(A_{f1} + A_{f2}) \cdot f_{yf} / \gamma_{M0}} = 1.000$

$M_{f,Rd} = \text{Reduction factor for } N_{Ed} \cdot M_{f,Rd0} = 10485.655$ kN · m

$V_{bf,Rd} = \frac{b_f \cdot t_f^2 \cdot f_{yf}}{c \cdot \gamma_{M1}} \left(1 - \left(\frac{M_{Ed}}{M_{f,Rd}} \right)^2 \right) = 0.000$ kN

where, $M_{f,Rd} = 10485.655$ kN · m

$M_{Ed} = 37233.771$ kN · m (Taken as the greatest value of $(\sum \sigma_i)W$)

$c = a \cdot \left(0.25 + \frac{1.6 \cdot b_f \cdot t_f^2 \cdot f_{yf}}{t \cdot h_w^2 \cdot f_{yw}} \right) = 1660.735$

$V_{Edi} / (V_{bw,Rd} + V_{bf,Rd}) = 0.592 \leq 1.0$... OK

4 Resistance to Lateral Torsional Buckling

- Design load

Load combination name : ST SLU Termico

$$\begin{aligned}
 N_{Ed} &= 38.551 \text{ kN} \\
 M_{Ed} &= -1929.552 \text{ kN} \cdot \text{m} \\
 V_1 &= 185.566 \text{ kN} \\
 V_2 &= 343.510 \text{ kN} \\
 M_1 &= -395.800 \text{ kN} \cdot \text{m} \\
 M_2 &= -1163.809 \text{ kN} \cdot \text{m} \\
 M_{pl,Rd} &= 8891.056 \text{ kN} \cdot \text{m} \\
 M_{el,Rd} &= 5904.323 \text{ kN} \cdot \text{m}
 \end{aligned}$$

- $M_{b,Rd}$ Buckling resistance moment

$$\begin{aligned}
 L &= 2900.000 \text{ m} \\
 c &= C_d / I = 0.000 \\
 \gamma &= c \cdot L^4 / (E \cdot I) = 0.000 \\
 \mu &= V_2 / V_1 = 0.540 \\
 \Phi &= 2 \cdot (1 - M_2 / M_1) / (1 + \mu) = 0.857 \\
 m_1 &= 1 + 0.44 \cdot (1 + \mu) \cdot \Phi^{1.5} + (3 + 2 \cdot \Phi) \cdot \gamma / (350 - 50 \cdot \mu) = 1.538 \\
 m_2 &= 1 + 0.44 \cdot (1 + \mu) \cdot \Phi^{1.5} + (0.195 + (0.05 + \mu / 100) \cdot \Phi) \cdot \gamma^{0.5} = 1.538 \\
 m &= \text{Min}(m_1, m_2) = 1.538 \\
 \alpha_{LT} &= 0.490 \\
 \lambda_{LT} &= 1.103 \cdot L / b \cdot \sqrt{(f_y / E_m)} \cdot \sqrt{(1 + A_{wc} / (3 \cdot I))} = 0.183 \\
 \Phi_{LT} &= 0.5 \cdot (1 + \alpha_{LT} \cdot (\lambda_{LT} - 0.2) + \lambda_{LT}^2) = 0.513 \\
 X_{LT} &= \frac{1}{\Phi_{LT} + \sqrt{(\Phi_{LT}^2 - \lambda_{LT}^2)}} = 1 \\
 M_{Rd} &= 8891.056 \text{ kN} \cdot \text{m} \\
 M_{b,Rd} &= X_{LT} \cdot M_{Rd} = 8891.056 \text{ kN} \cdot \text{m}
 \end{aligned}$$

- $N_{b,Rd}$ Buckling resistance moment

$$\begin{aligned}
 X_{LT,N} &= 0.982 \\
 N_{b,Rd} &= X_{LT} \cdot \text{Area} \cdot f_{yd} = 18787.180 \text{ kN}
 \end{aligned}$$

$$\text{Combined Ratio} = \frac{N_{Ed}}{N_{b,Rd}} + \frac{M_{Ed}}{M_{b,Rd}} = 0.219073732$$

5 Resistance to Longitudinal Shear

- Design load

Load combination name : ST SLU Mobili

$$\begin{aligned}
 N_{c,el} &= 8543.054 \text{ kN} \\
 N_{c,f} &= 13926.400 \text{ kN} \\
 M_{Ed} &= 2985.414 \text{ kN} \cdot \text{m} \\
 V_{Ed} &= 731.489 \text{ kN} \\
 M_{pl,Rd} &= 12388.930 \text{ kN} \cdot \text{m} \\
 M_{el,Rd} &= 10570.399 \text{ kN} \cdot \text{m}
 \end{aligned}$$

- Shear resistance of a single connector

$$\begin{aligned}
 P_{Rd,1} &= 0.8 \cdot f_u \cdot \pi \cdot d^2 / 4 / \gamma_V = 111.478 \text{ kN} \\
 P_{Rd,2} &= 0.29 \cdot \alpha \cdot d^2 \cdot \sqrt{f_{ck} \cdot E_{cm}} / \gamma_V = 117.497 \text{ kN} \\
 P_{Rd} &= \text{Min}(P_{Rd,1}, P_{Rd,2}) = 111.478 \text{ kN}
 \end{aligned}$$

where, $f_u = 450.000 \text{ MPa}$

$$\begin{aligned}
 \alpha &= 1 && \text{for } h_{sc}/d > 4 \\
 \text{Num.} &= 3 \\
 d &= 22.200 \text{ mm} \\
 h_{sc} &= 175.000 \text{ mm} \\
 \text{Space} &= 200.000 \text{ mm}
 \end{aligned}$$

- Verification

$$\begin{aligned}
 V_{L,Ed} &= V_{Ed} \cdot (A \cdot z / I) = 645.480 \text{ kN/m} \\
 V_{L,Rd} &= P_{Rd} \cdot \text{Num.}/\text{Space} = 1672.167 \text{ kN/m} \\
 V_{L,Ed} &\leq V_{L,Rd} \quad \dots \text{ OK}
 \end{aligned}$$

6 Stress Limitation

- In the structural steel

Characteristic load combination name : ST RARA Mobili

$$\sigma_{Ed,ser} = -73.251 \text{ MPa} \quad (\text{Bottom-right fiber in the flange})$$

$$T_{Ed,ser} = 56.228 \text{ MPa} \quad (\text{Neutral axis in the web})$$

$$\sigma_{Ed,ser} \leq f_y / \gamma_{M,ser}$$

$$-73.251 \text{ MPa} \leq 355.000 \text{ MPa} \quad \dots \text{ OK}$$

$$T_{Ed,ser} \leq f_y / (\sqrt{3} \cdot \gamma_{M,ser})$$

$$56.228 \text{ MPa} \leq 204.959 \text{ MPa} \quad \dots \text{ OK}$$

$$\sqrt{(\sigma_{Ed,ser})^2 + 3(T_{Ed,ser})^2} \leq f_y / \gamma_{M,ser}$$

$$121.862 \text{ MPa} \leq 355.000 \text{ MPa} \quad \dots \text{ OK}$$

- In the concrete of the slab

Characteristic load combination name : ST RARA Mobili

$$\sigma_c \leq k_1 f_{ck}$$

$$2.864 \text{ MPa} \leq 19.200 \text{ MPa} \quad \dots \text{ OK}$$

- In the reinforcement

Load combination name : ST RARA Termico

$$\sigma_s \leq k_3 f_{yk}$$

$$99.043 \text{ MPa} \leq 360.000 \text{ MPa} \quad \dots \text{ OK}$$

7 Longitudinal Shear for SLS(Serviceability limit state)

- Shear resistance of a single connector

Load combination name : ST RARA Mobili

$$P_{Rd,1} = 0.8 \cdot f_u \cdot \pi \cdot d^2 / 4 / \gamma_V = 111.478 \text{ kN}$$

$$P_{Rd,2} = 0.29 \cdot \alpha \cdot d^2 \cdot \sqrt{f_{ck} \cdot E_{cm}} / \gamma_V = 117.497 \text{ kN}$$

$$P_{Rd} = \text{Min}(P_{Rd,1}, P_{Rd,2}) = 111.478 \text{ kN}$$

$$P_{Rd,ser} = k_s \cdot P_{Rd} = 66.887 \text{ kN}$$

where, $f_u = 450.000 \text{ MPa}$

$$\alpha = 1 \quad \text{for } h_{sc}/d > 4$$

$$\text{Num.} = 3$$

$$d = 22.200 \text{ mm}$$

$$h_{sc} = 175.000 \text{ mm}$$

$$\text{Space} = 200.000 \text{ mm}$$

$$k_s = 0.600$$

- Verification

$$V_{L,Ed} = V_{Ed} \cdot (A \cdot z / I) = 473.323 \text{ kN/m}$$

$$V_{L,Rd} = P_{Rd,ser} \cdot \text{Num.}/\text{Space} = 1003.300 \text{ kN/m}$$

$$V_{L,Ed} \leq V_{L,Rd} \quad \dots \text{ OK}$$

8 Resistance to Fatigue

- Design load

Load combination name : ST FATICA DANN.ACC.

$$M_y = 224.468 \text{ kN} \cdot \text{m}$$

- Shear stress range for the connector

$$\Delta\tau = F_{sc} / A_{sc} = 35.044 \text{ MPa}$$

$$\text{where, } F_{sc} = v_{L,Ed} \cdot \text{space of stud} / \text{number of stud} = 13.565 \text{ kN}$$

$$A_{sc} = 387.076 \text{ mm}^2$$

- Damage equivalent factor

$$\lambda_v = \lambda_{v,1} \cdot \lambda_{v,2} \cdot \lambda_{v,3} \cdot \lambda_{v,4} = 1.484$$

$$\text{where, } \lambda_{v,1} = 1.550$$

$$\lambda_{v,2} = 1.100$$

$$\lambda_{v,3} = 0.871$$

$$\lambda_{v,4} = 1.000$$

- Equivalent constant amplitude range of shear stress related to 2 million cycles

$$\Delta\tau_{E,2} = \lambda_v \cdot \Delta\tau = 52.016 \text{ MPa}$$

- Verification

$$Y_{Ff} \cdot \Delta\tau_{E,2} / (\Delta\tau_c / \gamma_{Mf,s}) = 0.578 \leq 1$$

8.1 VERIFICHE DI RESISTENZA A FLESSIONE ALLO SLU

Si riportano le verifiche allo stato limite ultimo per flessione delle sezioni composte travi-soletta.

I coefficienti parziali per SLU assunti sono i seguenti:

$$\gamma_C = 1.5 \quad \text{materiale calcestruzzo}$$

$$\gamma_S = 1.15 \quad \text{acciaio armature soletta}$$

$$\gamma_{M0} = 1.05 \quad \text{acciaio strutturale: resistenza sezioni}$$

Seguono i tabulati di calcolo per ogni asta considerata, per le combinazioni di carichi positiva e negativa più gravose.

Dati tabulati:

Elem Property: nome delle caratteristiche geometriche dell'elemento

Elem: numero dell'elemento

Position: nodo iniziale (I) o finale (J) dell'elemento

Lcom: combinazione di carico positivo o negativo più gravosa

Type: sollecitazione (massima o minima)

Top class: classificazione flangia superiore

Bot class: classificazione flangia inferiore

Web class: classificazione anima

Sect. class: classificazione complessiva sezione

Ma,Ed: momento di calcolo applicato alla trave in acciaio isolata

Mc,Ed: momento di calcolo applicato alla sezione composta

Mpl,Rd: momento resistente plastico, per sezioni di classe 1 e 2

Mel,Rd: momento resistente elastico, per sezioni di classe 3, efficace per classe 4

M_Rd: momento resistente effettivo della sezione

Concio 1	438	J[880]	Neg	-	-	-	-	-	-	-	-	-	-	-	0.000
Concio 1	438	J[880]	Pos	ST SLU Mobili	MY-MAX	1	1	1	1	1565.49	3477.34	10812.47	8408.54	10812.47	0.466
Concio 1	439	I[880]	Neg	-	-	-	-	-	-	-	-	-	-	-	0.000
Concio 1	439	I[880]	Pos	ST SLU Mobili	MY-MAX	1	1	1	1	1584.13	3842.85	10812.47	8400.30	10812.47	0.502
Concio 1	439	J[881]	Neg	ST SLU Mobili	MY-MIN	1	3	3	3	-30.21	-681.28	8011.39	6380.26	6380.26	0.112
Concio 1	439	J[881]	Pos	ST SLU Mobili	MY-MAX	1	1	1	1	-30.21	279.58	10812.47	9113.27	10812.47	0.023
Concio 1	440	I[881]	Neg	ST SLU Mobili	MY-MIN	1	3	3	3	-11.60	-341.11	8011.39	6361.65	6361.65	0.055
Concio 1	440	I[881]	Pos	-	-	-	-	-	-	-	-	-	-	-	0.000
Concio 1	440	J[882]	Neg	ST SLV Long	FX-MIN	2	3	4	4	0.00	-0.71	8011.39	6350.05	6350.05	0.000
Concio 1	440	J[882]	Pos	ST SLV Long	FX-MAX	1	1	1	1	0.00	0.71	10812.47	9099.92	10812.47	0.000

8.2 VERIFICHE DI RESISTENZA AL TAGLIO VERTICALE ALLO SLU

Si effettuano le verifiche allo stato limite ultimo per taglio verticale delle sezioni composte travi-soletta. Seguono i tabulati di calcolo per ogni asta considerata, per le combinazioni di carichi più gravose.

Dati tabulati:

- Elem Property: nome delle caratteristiche geometriche dell'elemento
- Elem: numero dell'elemento
- Position: nodo iniziale (I) o finale (J) dell'elemento
- Lcom: combinazione di carico My positivo o negativo più gravosa
- Type: sollecitazione (massima o minima)
- Top class: classificazione flangia superiore
- Bot class: classificazione flangia inferiore
- Web class: classificazione anima
- Sect. class: classificazione complessiva sezione
- N_Ed: sforzo assiale di calcolo
- M_Ed: momento di calcolo
- V_Ed: sforzo tagliante di calcolo
- Vpl,Rd: resistenza al taglio della sezione di acciaio ($\geq V_{Ed}$)
- Vb,Rd: resistenza all'instabilità per taglio dell'anima di acciaio ($\geq V_{Ed}$)

La condizione di verifica della sezione è la seguente:

$$\text{Verification ratio: } \frac{V_{Ed}}{\min(V_{pl,Rd}, V_{b,Rd})} \leq 1$$

Elem property	Elem number	Position	Lcom	Type	Top Class	Bot Class	Web Class	Sect. Class	N_Ed (kN)	M_Ed (kN*m)	V_Ed (kN)	Vpl,Rd (kN)	Vb,Rd (kN)	Verif. Ratio
Concio 1	101	I[719]	ST SLV Vert	FX-MAX	1	1	1	1	1.06	6.19	1.56	3302.77	2574.42	0.001
Concio 1	101	J[720]	ST SLU Mobili	FZ-MAX	1	3	3	3	0.00	27.49	53.40	3302.77	2574.41	0.021
Concio 1	102	I[720]	ST SLU Mobili	FZ-MIN	3	3	4	4	-186.80	329.68	-1120.75	3302.77	2574.15	0.435
Concio 1	102	J[721]	ST SLU Mobili	FZ-MIN	1	1	1	1	-186.80	101266.22	-799.65	3302.77	2478.97	0.323
Concio 1	103	I[721]	ST SLU Mobili	FZ-MIN	1	1	1	1	-285.94	101605.46	-615.28	3302.77	2478.97	0.248
Concio 1	103	J[722]	ST SLU Mobili	FZ-MIN	1	1	1	1	-285.94	133042.10	-422.62	3302.77	2478.97	0.170
Concio 2	104	I[722]	ST SLU Mobili	FZ-MIN	1	1	1	1	-285.94	70759.49	-422.62	3267.64	2478.30	0.171
Concio 2	104	J[723]	ST SLU Mobili	FZ-MIN	1	1	1	1	-285.94	76071.06	-292.78	3267.64	2478.30	0.118
Concio 2	105	I[723]	ST SLU Mobili	FZ-MAX	1	1	1	1	-174.86	74775.45	144.53	3267.64	2478.30	0.058
Concio 2	105	J[724]	ST SLU Mobili	FZ-MAX	1	1	1	1	-170.14	63616.21	453.97	3267.64	2478.30	0.183
Concio 2	106	I[724]	ST SLU Mobili	FZ-MAX	1	1	1	1	-226.17	65222.90	622.30	3267.64	2478.30	0.251
Concio 2	106	J[725]	ST SLU Mobili	FZ-MAX	1	1	1	1	-226.17	42537.60	817.06	3267.64	2478.30	0.330
Concio 3	107	I[725]	ST SLU Mobili	FZ-MAX	1	1	1	1	-226.17	35453.07	817.06	4356.85	4158.81	0.196
Concio 3	107	J[726]	ST SLU Mobili	FZ-MAX	1	1	1	1	-226.17	17844.28	948.01	4356.85	4158.81	0.228
Concio 3	108	I[726]	ST SLU Mobili	FZ-MAX	1	1	1	1	-81.21	18034.59	1103.66	4356.85	4158.81	0.265
Concio 3	108	J[727]	ST SLU Mobili	FZ-MAX	1	1	1	1	-81.21	4988.75	1431.04	4356.85	4158.81	0.344
Concio 3	109	I[727]	ST SLU Mobili	FZ-MAX	1	1	1	1	172.65	4692.94	1516.21	4356.85	4158.81	0.365
Concio 3	109	J[728]	ST SLU Mobili	FZ-MAX	1	1	1	1	172.65	5626.50	1548.95	4356.85	4158.81	0.372
Concio 4 H=var	110	I[728]	ST SLU Mobili	FZ-MAX	1	3	3	3	91.54	6371.33	1549.95	4310.00	4114.09	0.377
Concio 4 H=var	110	J[729]	ST SLU Mobili	FZ-MAX	1	3	3	3	87.49	11073.18	1723.96	6652.39	4870.46	0.354
Concio 4 H=var	111	I[729]	ST SLU Mobili	FZ-MAX	1	3	3	3	151.58	10786.68	1789.02	6652.39	4880.10	0.367
Concio 4 H=var	111	J[730]	ST SLU Mobili	FZ-MAX	1	3	4	4	147.20	14128.57	1965.93	8994.79	5365.62	0.366
Concio 4 H=200	112	I[730]	ST SLU Mobili	FZ-MAX	1	3	4	4	244.91	14244.14	1962.45	8994.79	5362.49	0.366
Concio 4 H=200	112	J[731]	ST SLU Mobili	FZ-MAX	1	3	4	4	244.91	15300.68	1998.13	8994.79	5332.71	0.375

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Concio 4 H=200	413	I[854]	ST SLU Mobili	FZ-MIN	1	3	4	4	83.29	15673.89	-2446.90	8994.79	5321.69	0.460
Concio 4 H=200	413	J[855]	ST SLU Mobili	FZ-MIN	1	3	4	4	106.46	14551.74	-2365.41	8994.79	5354.04	0.442
Concio 4 H=var	414	I[855]	ST SLU Mobili	FZ-MIN	1	3	4	4	-37.28	14386.33	-2372.44	8994.79	5357.76	0.443
Concio 4 H=var	414	J[856]	ST SLU Mobili	FZ-MIN	1	3	3	3	-119.79	10990.34	-1964.65	6652.39	4870.71	0.403
Concio 4 H=var	415	I[856]	ST SLU Mobili	FZ-MIN	1	3	3	3	4.10	11400.69	-2125.05	6652.39	4859.13	0.437
Concio 4 H=var	415	J[857]	ST SLU Mobili	FZ-MIN	1	3	3	3	-86.93	6882.56	-1712.65	4310.00	4114.09	0.416
Concio 5	416	I[857]	ST SLU Mobili	FZ-MIN	1	1	1	1	5.99	6109.13	-1711.68	4356.85	4158.81	0.412
Concio 5	416	J[858]	ST SLU Mobili	FZ-MIN	1	1	1	1	15.62	5280.21	-1629.31	4356.85	4158.81	0.392
Concio 5	417	I[858]	ST SLU Mobili	FZ-MIN	1	1	1	1	114.94	5710.01	-1854.47	4356.85	4158.81	0.446
Concio 5	417	J[859]	ST SLU Mobili	FZ-MIN	1	1	1	1	54.48	5530.68	-1079.89	4356.85	4158.81	0.260
Concio 5	418	I[859]	ST SLU Mobili	FZ-MIN	1	1	1	1	59.33	5145.03	-1329.07	4356.85	4158.81	0.320
Concio 5	418	J[860]	ST SLU Mobili	FZ-MIN	1	1	1	1	76.91	21675.65	-973.21	4356.85	4158.81	0.234
Concio 6	419	I[860]	ST SLU Mobili	FZ-MIN	1	1	1	1	76.91	29457.75	-973.21	2614.11	1592.23	0.611
Concio 6	419	J[861]	ST SLU Mobili	FZ-MIN	1	1	1	1	29.77	47110.49	-546.96	2614.11	1592.23	0.344
Concio 6	420	I[861]	ST SLU Mobili	FZ-MIN	1	1	1	1	57.04	46515.55	-805.91	2614.11	1592.23	0.506
Concio 6	420	J[862]	ST SLU Mobili	FZ-MIN	1	1	1	1	75.90	51463.01	-402.56	2614.11	1592.23	0.253
Concio 6	421	I[862]	ST SLU Mobili	FZ-MIN	1	1	1	1	75.90	51463.01	-402.56	2614.11	1592.23	0.253
Concio 6	421	J[863]	ST SLU Mobili	FZ-MAX	1	1	1	1	110.26	46876.16	805.77	2614.11	1592.23	0.506
Concio 6	422	I[863]	ST SLU Mobili	FZ-MAX	1	1	1	1	63.30	47591.61	546.87	2614.11	1592.23	0.343
Concio 6	422	J[864]	ST SLU Mobili	FZ-MAX	1	1	1	1	110.44	29926.69	973.06	2614.11	1592.23	0.611
Concio 5	423	I[864]	ST SLU Mobili	FZ-MAX	1	1	1	1	110.44	22175.03	973.06	4356.85	4158.81	0.234
Concio 5	423	J[865]	ST SLU Mobili	FZ-MAX	1	1	1	1	92.89	5634.96	1328.95	4356.85	4158.81	0.320
Concio 5	424	I[865]	ST SLU Mobili	FZ-MAX	1	1	1	1	78.62	6089.64	1079.78	4356.85	4158.81	0.260
Concio 5	424	J[866]	ST SLU Mobili	FZ-MAX	1	1	1	1	139.10	5160.26	1854.23	4356.85	4158.81	0.446
Concio 5	425	I[866]	ST SLU Mobili	FZ-MAX	1	1	1	1	143.22	4760.94	1629.13	4356.85	4158.81	0.392
Concio 5	425	J[867]	ST SLU Mobili	FZ-MAX	1	1	1	1	144.38	5576.85	1711.50	4356.85	4158.81	0.412
Concio 4 H=var	426	I[867]	ST SLU Mobili	FZ-MAX	1	3	3	3	71.61	6373.65	1712.45	4310.00	4114.09	0.416
Concio 4 H=var	426	J[868]	ST SLU Mobili	FZ-MAX	1	3	3	3	158.46	10811.44	2124.85	6652.39	4879.28	0.435
Concio 4 H=var	427	I[868]	ST SLU Mobili	FZ-MAX	1	3	3	3	72.56	10468.61	1964.43	6652.39	4890.50	0.402
Concio 4 H=var	427	J[869]	ST SLU Mobili	FZ-MAX	1	3	4	4	162.32	13613.59	2372.18	8994.79	5379.24	0.441
Concio 4 H=200	428	I[869]	ST SLU Mobili	FZ-MAX	1	3	4	4	272.52	13728.19	2365.18	8994.79	5376.25	0.440
Concio 4 H=200	428	J[870]	ST SLU Mobili	FZ-MAX	1	3	4	4	241.90	14782.79	2446.67	8994.79	5347.57	0.458
Concio 4 H=200	429	I[870]	ST SLU Mobili	FZ-MIN	1	3	4	4	60.75	15634.44	-2577.23	8994.79	5322.87	0.484
Concio 4 H=200	429	J[871]	ST SLU Mobili	FZ-MIN	1	3	4	4	84.54	14437.68	-2495.74	8994.79	5357.19	0.466
Concio 4 H=var	430	I[871]	ST SLU Mobili	FZ-MIN	1	3	4	4	-62.95	14235.16	-2499.65	8994.79	5361.34	0.466
Concio 4 H=var	430	J[872]	ST SLU Mobili	FZ-MIN	1	3	3	3	-141.21	10433.56	-2092.39	6652.39	4888.91	0.428
Concio 4 H=var	431	I[872]	ST SLU Mobili	FZ-MIN	1	3	3	3	-31.33	10827.91	-2255.82	6652.39	4878.08	0.462
Concio 4 H=var	431	J[873]	ST SLU Mobili	FZ-MIN	1	3	3	3	-125.48	5782.47	-1843.15	4310.00	4114.09	0.448
Concio 3	432	I[873]	ST SLU Mobili	FZ-MIN	1	1	1	1	-19.36	5132.16	-1847.09	4356.85	4158.81	0.444
Concio 3	432	J[874]	ST SLU Mobili	FZ-MIN	1	1	1	1	-11.92	4203.40	-1764.67	4356.85	4158.81	0.424
Concio 3	433	I[874]	ST SLU Mobili	FZ-MIN	1	1	1	1	59.02	4652.08	-1987.84	4356.85	4158.81	0.478
Concio 3	433	J[875]	ST SLU Mobili	FZ-MIN	1	1	1	1	8.02	18249.10	-1236.78	4356.85	4158.81	0.297
Concio 3	434	I[875]	ST SLU Mobili	FZ-MIN	1	1	1	1	20.19	17861.22	-1475.75	4356.85	4158.81	0.355
Concio 3	434	J[876]	ST SLU Mobili	FZ-MIN	1	1	1	1	40.59	35651.90	-1162.73	4356.85	4158.81	0.280
Concio 2	435	I[876]	ST SLU Mobili	FZ-MIN	1	1	1	1	40.59	42606.16	-1162.73	3267.64	2478.30	0.469
Concio 2	435	J[877]	ST SLU Mobili	FZ-MIN	1	1	1	1	-2.12	65026.81	-714.46	3267.64	2478.30	0.288
Concio 2	436	I[877]	ST SLU Mobili	FZ-MIN	1	1	1	1	16.31	64450.62	-965.80	3267.64	2478.30	0.390
Concio 2	436	J[878]	ST SLU Mobili	FZ-MAX	1	1	1	1	50.43	75669.93	635.56	3267.64	2478.30	0.256
Concio 2	437	I[878]	ST SLU Mobili	FZ-MIN	1	1	1	1	23.61	74773.36	-485.83	3267.64	2478.30	0.196
Concio 2	437	J[879]	ST SLU Mobili	FZ-MAX	1	1	1	1	38.13	71123.45	674.04	3267.64	2478.30	0.272
Concio 1	438	I[879]	ST SLU Mobili	FZ-MAX	1	1	1	1	38.13	132440.63	674.04	3302.77	2478.97	0.272
Concio 1	438	J[880]	ST SLU Mobili	FZ-MAX	1	1	1	1	24.25	100695.17	1156.38	3302.77	2478.97	0.466
Concio 1	439	I[880]	ST SLU Mobili	FZ-MAX	1	1	1	1	17.07	101057.36	934.70	3302.77	2478.97	0.377
Concio 1	439	J[881]	ST SLU Mobili	FZ-MAX	1	3	3	3	-23.82	369.98	1751.68	3302.77	2574.09	0.681
Concio 1	440	I[881]	ST SLU Mobili	MY-MIN	1	3	3	3	0.00	358.83	-476.80	3302.77	2574.11	0.185
Concio 1	440	J[882]	ST SLV Vert	FX-MAX	1	1	1	1	0.96	5.63	1.53	3302.77	2574.42	0.001

8.3 VERIFICHE ALL'INSTABILITÀ FLESSO-TORSIONALE DELL'ANIMA

Si effettuano le verifiche allo stato limite ultimo per instabilità flessio-torsionale delle sezioni composte travi-soletta secondo lo schema ad U invertita (Circ. 02/02/2009, C4.3.4.4).

I coefficienti parziali per SLU assunti sono i seguenti:

$$\gamma_{M1} = 1.10 \quad \text{acciaio strutturale: resistenza all'instabilità (ponti)}$$

Seguono i tabulati di calcolo per ogni asta considerata, per le combinazione di carichi più gravose.

Dati tabulati:

- Elem Property: nome delle caratteristiche geometriche dell'elemento
- Elem: numero dell'elemento
- Position: nodo iniziale (I) o finale (J) dell'elemento
- Lcom: combinazione di carico positivo o negativo più gravosa

Type: sollecitazione (massima o minima)
 Sect. class: classificazione complessiva sezione
 N_Ed: sforzo assiale di calcolo
 M_Ed: momento di calcolo
 Nb,Rd: sforzo assiale resistente all'instabilità del corrente compresso
 Mb,Rd: momento resistente all'instabilità
 Mcr: momento critico

Interaction ratio: condizione di verifica:
$$\frac{N_{Ed}}{N_{b,Rd}} + \frac{M_{Ed}}{M_{b,Rd}} \leq 1$$

Elem property	Elem number	Position	Lcom	Type	Sect. Class	N_Ed (kN)	M_Ed (kN*m)	Nb,Rd (kN)	Mb,Rd (kN*m)	Mcr (kN*m)	Interaction Ratio
Concio 1	101	I[719]	ST SLV Long	FX-MIN	4	-2.43	-0.75	17963.00	6350.05	108.50	0.000
Concio 1	101	J[720]	ST SLU Mobili	MZ-MIN	3	0.00	-9.76	17963.00	6361.65	111.97	0.002
Concio 1	102	I[720]	ST SLU Mobili	MY-MIN	3	-165.45	-253.30	15885.38	6125.52	22.20	0.052
Concio 1	102	J[721]	ST SLU Mobili	MY-MAX	1	-181.55	3050.63	47687.39	10088.86	45.48	0.306
Concio 1	103	I[721]	ST SLU Mobili	MY-MAX	1	-449.80	2870.46	52887.34	10486.12	45.49	0.282
Concio 1	103	J[722]	ST SLU Mobili	MY-MAX	1	-441.85	3684.63	52887.34	10486.12	45.49	0.360
Concio 2	104	I[722]	ST SLU Mobili	MY-MAX	1	-441.85	3694.45	56656.08	12699.18	90.25	0.299
Concio 2	104	J[723]	ST SLU Mobili	MY-MAX	1	-400.09	4221.86	56656.08	12699.18	90.25	0.340
Concio 2	105	I[723]	ST SLU Mobili	MY-MAX	1	-456.89	4185.56	47337.43	11080.70	38.78	0.387
Concio 2	105	J[724]	ST SLU Mobili	MY-MAX	1	-454.35	3770.94	47337.43	11080.70	38.78	0.350
Concio 2	106	I[724]	ST SLU Mobili	MY-MAX	1	-369.21	3864.34	53652.58	12365.29	69.62	0.319
Concio 2	106	J[725]	ST SLU Mobili	MY-MAX	1	-420.20	2585.48	53652.58	12365.29	69.62	0.217
Concio 3	107	I[725]	ST SLU Mobili	MY-MAX	1	-420.20	2588.19	57983.01	13451.70	111.66	0.200
Concio 3	107	J[726]	ST SLU Termico	MY-MIN	1	-182.06	-1595.58	22659.14	10249.33	80.04	0.164
Concio 3	108	I[726]	ST SLU Termico	MY-MIN	1	-18.60	-1597.54	20044.03	9686.17	29.80	0.166
Concio 3	108	J[727]	ST SLU Mobili	MY-MIN	1	-38.42	-4034.01	20044.03	9709.12	30.25	0.417
Concio 3	109	I[727]	ST SLU Mobili	MY-MIN	1	42.09	-4002.56	22659.14	10249.33	168.84	0.392
Concio 3	109	J[728]	ST SLU Mobili	MY-MIN	1	42.09	-4345.32	22659.14	10249.33	168.84	0.426
Concio 4 H=var	110	I[728]	ST SLU Mobili	MY-MIN	3	-77.23	-4344.04	30171.62	10843.83	78.21	0.403
Concio 4 H=var	110	J[729]	ST SLU Mobili	MY-MIN	3	-88.68	-6167.23	33552.57	17026.89	78.00	0.365
Concio 4 H=var	111	I[729]	ST SLU Mobili	MY-MIN	3	-65.06	-6183.01	33552.57	17027.11	75.15	0.365
Concio 4 H=var	111	J[730]	ST SLU Mobili	MY-MIN	4	-82.83	-8288.76	36933.52	23287.79	75.78	0.358
Concio 4 H=200	112	I[730]	ST SLU Mobili	MY-MIN	4	74.88	-8288.76	36933.52	23287.55	331.09	0.358
Concio 4 H=200	112	J[731]	ST SLU Mobili	MY-MIN	4	104.41	-8826.35	36933.52	23252.41	331.09	0.382
Concio 4 H=200	113	I[731]	ST SLU Mobili	MY-MIN	4	110.48	-8854.18	36933.52	23253.09	330.70	0.384
Concio 4 H=200	113	J[732]	ST SLU Mobili	MY-MIN	4	105.25	-8322.44	36933.52	23286.13	330.70	0.360
Concio 4 H=var	114	I[732]	ST SLU Mobili	MY-MIN	4	-63.78	-8322.44	36933.52	23286.17	75.17	0.359
Concio 4 H=var	114	J[733]	ST SLU Mobili	MY-MIN	3	-13.33	-6272.52	33552.57	17009.09	74.54	0.369
Concio 4 H=var	115	I[733]	ST SLU Mobili	MY-MIN	3	-33.35	-6243.50	33552.57	17009.42	75.98	0.368
Concio 4 H=var	115	J[734]	ST SLU Mobili	MY-MIN	3	-20.17	-4669.95	30171.62	10800.19	76.19	0.433
Concio 5	116	I[734]	ST SLU Mobili	MY-MIN	1	84.24	-4642.79	22659.14	10249.33	167.01	0.457
Concio 5	116	J[735]	ST SLU Mobili	MY-MIN	1	84.56	-4357.23	22659.14	10249.33	167.01	0.429
Concio 5	117	I[735]	ST SLU Mobili	MY-MIN	1	20.63	-4348.77	19837.42	9534.36	26.50	0.457
Concio 5	117	J[736]	ST SLU Termico	MY-MIN	1	49.90	-2373.01	19837.42	9493.55	25.82	0.253
Concio 5	118	I[736]	ST SLU Termico	MY-MIN	1	-145.05	-2333.24	22659.14	10249.33	46.00	0.234
Concio 5	118	J[737]	ST SLU Termico	MY-MIN	1	-118.94	-1974.58	22659.14	10249.33	46.00	0.198
Concio 6	119	I[737]	ST SLU Termico	MY-MIN	2	-118.94	-1975.76	18653.73	8775.51	33.55	0.232
Concio 6	119	J[738]	ST SLU Mobili	MY-MAX	1	-334.50	2749.22	53265.19	11992.93	70.34	0.236
Concio 6	120	I[738]	ST SLU Mobili	MY-MAX	1	-432.57	2681.51	54129.95	12018.11	64.20	0.231
Concio 6	120	J[739]	ST SLU Mobili	MY-MAX	1	-471.14	2608.59	54129.95	12018.11	64.20	0.226
Concio 6	121	I[739]	ST SLU Mobili	MY-MAX	1	-471.14	2608.59	54129.95	12018.10	64.20	0.226
Concio 6	121	J[740]	ST SLU Mobili	MY-MAX	1	-432.61	2681.56	54129.95	12018.10	64.20	0.231
Concio 6	122	I[740]	ST SLU Mobili	MY-MAX	1	-334.44	2749.25	53265.19	11992.86	70.34	0.236
Concio 6	122	J[741]	ST SLU Termico	MY-MIN	2	-118.98	-1975.61	18653.73	8775.51	33.55	0.232
Concio 5	123	I[741]	ST SLU Termico	MY-MIN	1	-118.98	-1974.43	22659.14	10249.33	46.00	0.198
Concio 5	123	J[742]	ST SLU Termico	MY-MIN	1	-145.09	-2332.98	22659.14	10249.33	46.00	0.234
Concio 5	124	I[742]	ST SLU Termico	MY-MIN	1	49.78	-2372.81	19837.42	9495.24	25.82	0.252
Concio 5	124	J[743]	ST SLU Mobili	MY-MIN	1	20.47	-4348.34	19837.42	9535.50	26.50	0.457
Concio 5	125	I[743]	ST SLU Mobili	MY-MIN	1	84.54	-4356.84	22659.14	10249.33	167.01	0.429
Concio 5	125	J[744]	ST SLU Mobili	MY-MIN	1	84.22	-4642.35	22659.14	10249.33	167.01	0.457
Concio 4 H=var	126	I[744]	ST SLU Mobili	MY-MIN	3	-20.20	-4669.50	30171.62	10800.19	76.19	0.433
Concio 4 H=var	126	J[745]	ST SLU Mobili	MY-MIN	3	-33.37	-6243.05	33552.57	17009.42	75.98	0.368
Concio 4 H=var	127	I[745]	ST SLU Mobili	MY-MIN	3	-13.37	-6272.20	33552.57	17009.09	74.54	0.369
Concio 4 H=var	127	J[746]	ST SLU Mobili	MY-MIN	4	-63.88	-8322.40	36933.52	23286.17	75.17	0.359
Concio 4 H=200	128	I[746]	ST SLU Mobili	MY-MIN	4	105.17	-8322.40	36933.52	23286.13	330.70	0.360
Concio 4 H=200	128	J[747]	ST SLU Mobili	MY-MIN	4	110.39	-8854.21	36933.52	23253.09	330.70	0.384
Concio 4 H=200	129	I[747]	ST SLU Mobili	MY-MIN	4	104.48	-8826.26	36933.52	23252.41	331.08	0.382
Concio 4 H=200	129	J[748]	ST SLU Mobili	MY-MIN	4	74.91	-8288.79	36933.52	23287.55	331.08	0.358
Concio 4 H=var	130	I[748]	ST SLU Mobili	MY-MIN	4	-82.77	-8288.79	36933.52	23287.79	75.78	0.358
Concio 4 H=var	130	J[749]	ST SLU Mobili	MY-MIN	3	-64.99	-6183.59	33552.57	17027.11	75.15	0.365
Concio 4 H=var	131	I[749]	ST SLU Mobili	MY-MIN	3	-88.64	-6167.61	33552.57	17026.89	78.00	0.365
Concio 4 H=var	131	J[750]	ST SLU Mobili	MY-MIN	3	-77.19	-4344.45	30171.62	10843.83	78.21	0.403

Concio 3	432	I[873]	ST SLU Mobili	MY-MIN	1	26.16	-4510.27	22659.14	10249.33	168.64	0.441
Concio 3	432	J[874]	ST SLU Mobili	MY-MIN	1	26.51	-4164.82	22659.14	10249.33	168.64	0.408
Concio 3	433	I[874]	ST SLU Mobili	MY-MIN	1	65.61	-4238.38	20044.03	9712.12	30.30	0.440
Concio 3	433	J[875]	ST SLU Mobili	MY-MAX	1	51.80	2791.32	47977.96	12581.15	109.28	0.223
Concio 3	434	I[875]	ST SLU Mobili	MY-MAX	1	-155.39	2478.63	57983.01	13451.70	112.83	0.187
Concio 3	434	J[876]	ST SLU Mobili	MY-MAX	1	-110.78	3724.52	57983.01	13451.70	112.83	0.279
Concio 2	435	I[876]	ST SLU Mobili	MY-MAX	1	-110.78	3724.24	53652.58	12328.13	65.78	0.304
Concio 2	435	J[877]	ST SLU Mobili	MY-MAX	1	-144.07	4643.63	53652.58	12328.13	65.78	0.379
Concio 2	436	I[877]	ST SLU Mobili	MY-MAX	1	-206.20	4522.70	47337.43	11069.90	38.45	0.413
Concio 2	436	J[878]	ST SLU Mobili	MY-MAX	1	-188.97	4909.07	47337.43	11069.90	38.45	0.448
Concio 2	437	I[878]	ST SLU Mobili	MY-MAX	1	-154.05	5027.77	56656.08	12699.18	87.60	0.399
Concio 2	437	J[879]	ST SLU Mobili	MY-MAX	1	-159.63	4803.92	56656.08	12699.18	87.60	0.381
Concio 1	438	I[879]	ST SLU Mobili	MY-MAX	1	-159.63	4803.15	52887.34	10508.35	46.44	0.460
Concio 1	438	J[880]	ST SLU Mobili	MY-MAX	1	-192.94	3477.34	52887.34	10508.35	46.44	0.335
Concio 1	439	I[880]	ST SLU Mobili	MY-MAX	1	-45.25	3842.85	47687.39	10096.85	45.35	0.382
Concio 1	439	J[881]	ST SLU Mobili	MY-MIN	3	-144.81	-681.28	15885.38	6134.28	25.21	0.120
Concio 1	440	I[881]	ST SLU Mobili	MY-MIN	3	0.00	-341.11	17963.00	6361.65	111.97	0.054
Concio 1	440	J[882]	ST SLV Long	FX-MIN	4	-2.29	-0.71	17963.00	6350.05	108.54	0.000

8.4 VERIFICA DELLE TENSIONI IN ESERCIZIO

Si effettuano le verifiche allo stato limite di esercizio (SLE) delle tensioni massime nell'acciaio delle travi, nel calcestruzzo della soletta e nelle armature della soletta.

Seguono i tabulati di calcolo per ogni asta considerata, per le combinazioni di carichi più gravose.

Dati tabulati:

- Elem: numero dell'elemento
- Position: nodo iniziale (I) o finale (J) dell'elemento
- Lcom: combinazione di carico più gravosa
- Type: tipo combinazione (caratteristica, frequente, quasi permanente)

Flange travi in acciaio:

- Sigma_Ed_ser: tensione assiale massima
- Tau_Ed_ser: tensione tangenziale massima
- SQRT(sigma^2+3 tau^2): tensione ideale
- ALW = $f_{yk} / \gamma_{M,ser}$: tensione limite

Soletta in calcestruzzo:

- Sigma_c: tensione assiale massima
- k*fck: tensione limite (comb. caratteristica: $k_1 = 0.6$; quasi perm.: $k_2 = 0.45$)

Armatura soletta:

- Sigma_s: tensione assiale massima
- k*fsk: tensione limite (comb. caratteristica: $k_3 = 0.8$)

Table with columns for Concio, number, code, description, characteristic, and values. The table lists 229 rows of data for various concios, detailing their characteristics and associated numerical values.

8.5 VERIFICHE A FATICA

Si effettuano le verifiche allo stato limite di fatica per vita illimitata dei profilati metallici e delle saldature anima/piattabanda.

L'impalcato si considera caricato secondo il modello di carico a fatica 2, applicato sulla corsia lenta; il veicolo più gravoso è risultato essere il 3°: semirimorchio a 5 assi per un peso complessivo di 630 kN (ved. 3.4.1).

Si assume che le strutture siano sensibili alla rottura per fatica e che essa produca conseguenze significative; il coefficiente parziale di sicurezza per le verifiche è quindi pari a: $\gamma_{Mf} = 1.35$.

Le caratteristiche resistenti (elastiche) tengono conto del contributo del calcestruzzo della soletta se compressa, se tesa tengono conto solamente dell'armatura.

La verifica viene eseguita per ogni tipologia di trave (concio) per:

- a) profilato metallico: tensioni normali: $\Delta\sigma_C = 112\text{N/mm}^2$
- b) profilato metallico: tensioni tangenziali: $\Delta\tau_C = 100\text{N/mm}^2$
- c) saldature: tensioni tangenziali: $\Delta\tau_C = 80\text{N/mm}^2$

Seguono le verifiche eseguite per ogni tipologia di sezione all'interno della quale si sono individuate le condizioni:

- 1) ΔM massimo e ΔT associato (per verifica a)
- 2) ΔT massimo e ΔM associato (per verifiche b, c)

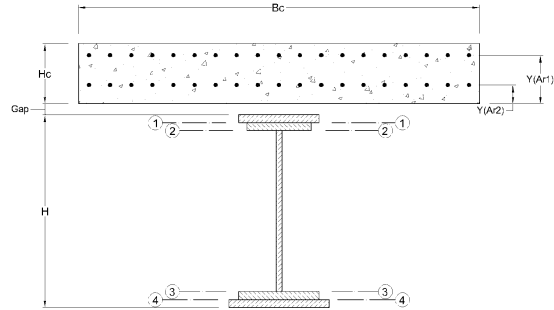
VERIFICA ALLO STATO LIMITE DI FATICA (VERIFICA PER VITA ILLIMITATA):

CONCI C1

Legenda

- As Area profilo metallico
- Yg_inf(s) Baricentro profilo metallico
- H Altezza profilo metallico
- Yg_inf Baricentro della sezione composta
- Jc Momento d'inerzia della sezione composta
- Sc_max Momento statico massimo della sezione del profilo
- Sp Spessore anima in corrispondenza della sezione con momento statico massimo Sc_max
- b Larghezza dei piatti (piattabande, anime, ecc.)
- t Spessore dei piatti (piattabande, anime, ecc.)
- A Sezione resistente dei piatti (piattabande, anime, ecc.)
- Z Distanza baricentro dei piatti (piattabande, anime, ecc.) dal baricentro della sezione composta
- S_i Momento statico della sezione i-esima di attacco dei piatti in esame (piattabande, anime, ecc.)
- $\Delta\tau$ e $\Delta\sigma$ Delta di tensione tangenziale e normale degli elementi da verificare
- C.ANG Saldatura a cordone d'angolo
- a Larghezza della gola del cordone d'angolo (somma)
- P.PEN Saldatura a piena penetrazione (spessore resistente= spessore anima)
- $\gamma_{M,s}$ 1.35 (coeff. di sicurezza a fatica)
- Es/Ec 6.30 (coeff. di omogeneizzazione acciai/cls.)
- Bc 320 cm (base efficace soletta in cls.)
- Hc 24 cm (altezza soletta in cls.)
- Gap 6 cm (distanza tra profilo metallico e soletta)
- Ar1 32.16 cm² (area di armatura soletta)
- Y(Ar1) 20 cm (distanza dal lembo inferiore della soletta dell'armatura Ar1)
- Ar2 32.16 cm² (area di armatura soletta)
- Y(Ar2) 2 cm (distanza dal lembo inferiore della soletta dell'armatura Ar2)
- Ar_compr? SI (considerare o no le armature della soletta se in compressione)

SCHEMA SEZIONE COMPOSTA



Caratteristiche geometriche

STATO	As	Sp	Yg_inf(s)	Jc	H	Yg_inf	Jc	Wsup	Winf	Sc_max	Jc/Sc_max	DESCRIZIONE
CLS	cm ²	cm	cm	cm ⁴	cm	cm	cm ⁴	cm ³	cm ³	cm ³	m	
Compr.	471.0	1.5	46.91	875818	100.0	98.88	2678605	-2396436	27089	24421.6	1.097	CLS in compressione
Teso	471.0	1.5	46.91	875818	100.0	55.33	1159041	-25948	20947	11743.6	0.987	CLS in trazione

Caratteristiche con sezione avente il CLS totalmente o parzialmente in compressione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez_max	94.0	1.5	141.0	48.88				0.0	ANIMA
sez 1	0.0	0.0	0.0	-1.12	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	50.0	3.0	150.0	0.38	24421.2	1.097	C.ANG.	14.1	ANIMA-PIATTABANDA SUP. (2 SALD. 10x10 mm)
sez 3	60.0	3.0	180.0	97.38	17528.8	1.528	C.ANG.	14.1	ANIMA-PIATTABANDA INF. (2 SALD. 10x10 mm)
sez 4	0.0	0.0	0.0	98.88	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Caratteristiche con sezione avente il CLS totalmente in trazione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez_max	94.0	1.5	141.0	5.33				0.0	ANIMA
sez 1	0.0	0.0	0.0	-44.67	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	50.0	3.0	150.0	-43.17	10441.4	1.110	C.ANG.	14.1	ANIMA-PIATTABANDA SUP.
sez 3	60.0	3.0	180.0	53.83	9689.7	1.196	C.ANG.	14.1	ANIMA-PIATTABANDA INF.
sez 4	0.0	0.0	0.0	55.33	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Sollecitazioni flettenti e taglianti associate (con segno)

TIPO DI	M(max)	M(min)	V(max)	V(min)	Elemento
COMBINAZIONE	kNm	kNm	kN	kN	m ²
DM(max)-DT(ass)	2573.8	1559.3	-45.8	-49.7	203
DM(ass)-DT(max)	-129.3	-21.2	721.5	344.8	239

VERIFICA (tensioni normali) DEL PROFILATO METALLICO

POSIZ.	σ inf(+)	σ inf(-)	$\Delta\sigma$	$\Delta\sigma_c$	$\Delta\sigma D/\gamma_{Mf,s}$	$\Delta\sigma < \Delta\sigma D/\gamma_{Mf,s}$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez_max	95.0	57.6	37.45	112.0	61.14	VERIFICATO

<-Tab. C.4.2.XIV (3) $\Delta\sigma_c=112$; Tab. C.4.2.XV (2) $\Delta\sigma_c=112$

VERIFICA (tensioni tangenziali) DEL PROFILATO E DEI COLLEGAMENTI SALDATI

POSIZ.	τ (+)	τ (-)	$\Delta\tau$	$\Delta\tau_c$	$\Delta\tau D/\gamma_{Mf,s}$	$\Delta\tau < \Delta\tau D/\gamma_{Mf,s}$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez_max	48.74	23.29	25.45	100.0	33.85	VERIFICATO
sez 1	0.00	0.00	0.00	80.0	27.08	VERIFICATO
sez 2	45.96	21.97	24.00	80.0	27.08	VERIFICATO
sez 3	42.65	20.38	22.27	80.0	27.08	VERIFICATO
sez 4	0.00	0.00	0.00	80.0	27.08	VERIFICATO

<-Tab. C.4.2.XIib (6) $\Delta\tau_c=100$
 <-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$
 <-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$
 <-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$
 <-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

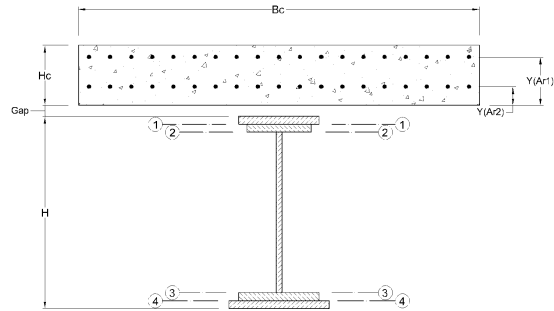
VERIFICA ALLO STATO LIMITE DI FATICA (VERIFICA PER VITA ILLIMITATA):

CONCI C2

Legenda

- As Area profilo metallico
- Yg_inf(s) Baricentro profilo metallico
- H Altezza profilo metallico
- Yg_inf Baricentro della sezione composta
- Jc Momento d'inerzia della sezione composta
- Sc_max Momento statico massimo della sezione del profilo
- Sp Spessore anima in corrispondenza della sezione con momento statico massimo Sc_max
- b Larghezza dei piatti (piattabande, anime, ecc.)
- t Spessore dei piatti (piattabande, anime, ecc.)
- A Sezione resistente dei piatti (piattabande, anime, ecc.)
- Z Distanza baricentro dei piatti (piattabande, anime, ecc.) dal baricentro della sezione composta
- S_i Momento statico della sezione i-esima di attacco dei piatti in esame (piattabande, anime, ecc.)
- $\Delta\tau$ e $\Delta\sigma$ Delta di tensione tangenziale e normale degli elementi da verificare
- C.ANG Saldatura a cordone d'angolo
- a Larghezza della gola del cordone d'angolo (somma)
- P.PEN Saldatura a piena penetrazione (spessore resistente= spessore anima)
- $\gamma_{M,s}$ 1.35 (coeff. di sicurezza a fatica)
- Es/Ec 6.30 (coeff. di omogeneizzazione acciaio/clc.)
- Bc 320 cm (base efficace soletta in cls.)
- Hc 24 cm (altezza soletta in cls.)
- Gap 6 cm (distanza tra profilo metallico e soletta)
- Ar1 32.16 cm² (area di armatura soletta)
- Y(Ar1) 20 cm (distanza dal lembo inferiore della soletta dell'armatura Ar1)
- Ar2 32.16 cm² (area di armatura soletta)
- Y(Ar2) 2 cm (distanza dal lembo inferiore della soletta dell'armatura Ar2)
- Ar_compr? SI (considerare o no le armature della soletta se in compressione)

SCHEMA SEZIONE COMPOSTA



Caratteristiche geometriche

STATO	As	Sp	Yg_inf(s)	Jc	H	Yg_inf	Jc	Wsup	Winf	Sc_max	Jc/Sc_max	DESCRIZIONE
CLS	cm ²	cm	cm	cm ⁴	cm	cm	cm ⁴	cm ³	cm ³	cm ³	m	
Compr.	529.5	1.5	42.11	973886	100.0	95.80	3193890	-761155	33338	28833.9	1.108	CLS in compressione
Teso	529.5	1.5	42.11	973886	100.0	50.22	1300762	-26131	25900	13175.6	0.987	CLS in trazione

Caratteristiche con sezione avente il CLS totalmente o parzialmente in compressione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez.max.	93.0	1.5	139.5	45.30					ANIMA
sez 1	0.0	0.0	0.0	-4.20	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	50.0	3.0	150.0	-48.28	28832.8	1.108	C.ANG.	14.1	ANIMA-PIATTABANDA SUP. (2 SALD 10x10 mm)
sez 3	60.0	4.0	240.0	93.80	22512.9	1.419	C.ANG.	14.1	ANIMA-PIATTABANDA INF. (2 SALD 10x10 mm)
sez 4	0.0	0.0	0.0	95.80	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Caratteristiche con sezione avente il CLS totalmente in trazione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez.max.	93.0	1.5	139.5	-0.28					ANIMA
sez 1	0.0	0.0	0.0	-49.78	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	50.0	3.0	150.0	-48.28	11534.4	1.128	C.ANG.	14.1	ANIMA-PIATTABANDA SUP.
sez 3	60.0	4.0	240.0	48.22	11573.2	1.124	C.ANG.	14.1	ANIMA-PIATTABANDA INF.
sez 4	0.0	0.0	0.0	50.22	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Sollecitazioni flettenti e taglianti associate (con segno)

TIPO DI COMBINAZIONE	M(max) kNm	M(min) kNm	V(max) kN	V(min) kN	Elemento
DM(max) - DT(ass)	1379.1	173.3	449.3	336.6	206
DM(ass) - DT(max)	2069.9	2270.6	-99.8	-407.8	236

VERIFICA (tensioni normali) DEL PROFILATO METALLICO

POSIZ.	σ inf(+)	σ inf(-)	$\Delta\sigma$	$\Delta\sigma_c$	$\Delta\sigma D/\gamma M_f s$	$\Delta\sigma \leq \Delta\sigma D/\gamma M_f s$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez.max	41.4	5.2	36.17	112.0	61.14	VERIFICATO

<-Tab. C.4.2.XIV (3) $\Delta\sigma_c=112$; Tab. C.4.2.XV (2) $\Delta\sigma_c=112$

VERIFICA (tensioni tangenziali) DEL PROFILATO E DEI COLLEGAMENTI SALDATI

POSIZ.	τ (+)	τ (-)	$\Delta\tau$	$\Delta\tau_c$	$\Delta\tau D/\gamma M_f s$	$\Delta\tau < \Delta\tau D/\gamma M_f s$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez.max	-6.00	-24.54	18.54	100.0	33.85	VERIFICATO
sez 1	0.00	0.00	0.00	80.0	27.08	VERIFICATO
sez 2	-6.37	-26.03	19.66	80.0	27.08	VERIFICATO
sez 3	-4.97	-20.32	15.35	80.0	27.08	VERIFICATO
sez 4	0.00	0.00	0.00	80.0	27.08	VERIFICATO

<-Tab. C.4.2.XIib (6) $\Delta\tau_c=100$
 <-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$
 <-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$
 <-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$
 <-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

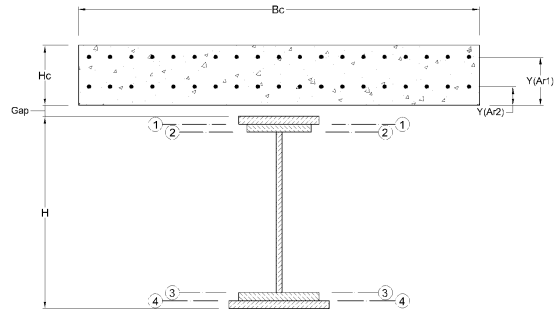
VERIFICA ALLO STATO LIMITE DI FATICA (VERIFICA PER VITA ILLIMITATA):

CONCI C3

Legenda

- As Area profilo metallico
- Yg_inf(s) Baricentro profilo metallico
- H Altezza profilo metallico
- Yg_inf Baricentro della sezione composta
- Jc Momento d'inerzia della sezione composta
- Sc_max Momento statico massimo della sezione del profilo
- Sp Spessore anima in corrispondenza della sezione con momento statico massimo Sc_max
- b Larghezza dei piatti (piattabande, anime, ecc.)
- t Spessore dei piatti (piattabande, anime, ecc.)
- A Sezione resistente dei piatti (piattabande, anime, ecc.)
- Z Distanza baricentro dei piatti (piattabande, anime, ecc.) dal baricentro della sezione composta
- S_i Momento statico della sezione i-esima di attacco dei piatti in esame (piattabande, anime, ecc.)
- $\Delta\tau$ e $\Delta\sigma$ Delta di tensione tangenziale e normale degli elementi da verificare
- C.ANG Saldatura a cordone d'angolo
- a Larghezza della gola del cordone d'angolo (somma)
- P.PEN Saldatura a piena penetrazione (spessore resistente= spessore anima)
- $\gamma_{M,s}$ 1.35 (coeff. di sicurezza a fatica)
- Es/Ec 6.30 (coeff. di omogeneizzazione acciaio/cis.)
- Bc 320 cm (base efficace soletta in cls.)
- Hc 24 cm (altezza soletta in cls.)
- Gap 6 cm (distanza tra profilo metallico e soletta)
- Ar1 32.16 cm² (area di armatura soletta)
- Y(Ar1) 20 cm (distanza dal lembo inferiore della soletta dell'armatura Ar1)
- Ar2 32.16 cm² (area di armatura soletta)
- Y(Ar2) 2 cm (distanza dal lembo inferiore della soletta dell'armatura Ar2)
- Ar_compr? SI (considerare o no le armature della soletta se in compressione)

SCHEMA SEZIONE COMPOSTA



Caratteristiche geometriche

STATO	As	Sp	Yg_inf(s)	Jc	H	Yg_inf	Jc	Wsup	Winf	Sc_max	Jc/Sc_max	DESCRIZIONE
CLS	cm ²	cm	cm	cm ⁴	cm	cm	cm ⁴	cm ³	cm ³	cm ³	m	
Compr.	576.0	2.0	42.79	1010400	100.0	94.67	3320287	-623177	35071	30462.7	1.090	CLS in compressione
Teso	576.0	2.0	42.79	1010400	100.0	50.24	1334247	-26816	26555	13717.2	0.973	CLS in trazione

Caratteristiche con sezione avente il CLS totalmente o parzialmente in compressione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez.max.	93.0	2.0	186.0	44.17					ANIMA
sez 1	0.0	0.0	0.0	-5.33	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	50.0	3.0	150.0	-3.83	30457.3	1.090	C.ANG.	14.1	ANIMA-PIATTABANDA SUP. (2 SALD 10x10 mm)
sez 3	60.0	4.0	240.0	92.67	22241.3	1.493	C.ANG.	14.1	ANIMA-PIATTABANDA INF. (2 SALD 10x10 mm)
sez 4	0.0	0.0	0.0	94.67	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Caratteristiche con sezione avente il CLS totalmente in trazione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez.max.	93.0	2.0	186.0	-0.26					ANIMA
sez 1	0.0	0.0	0.0	-49.76	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	50.0	3.0	150.0	-48.26	11531.1	1.157	C.ANG.	14.1	ANIMA-PIATTABANDA SUP.
sez 3	60.0	4.0	240.0	48.24	11578.7	1.152	C.ANG.	14.1	ANIMA-PIATTABANDA INF.
sez 4	0.0	0.0	0.0	50.24	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Sollecitazioni flettenti e taglianti associate (con segno)

TIPO DI COMBINAZIONE	M(max) kNm	M(min) kNm	V(max) kN	V(min) kN	Elemento
DM(max)-DT(ass)	1378.4	172.2	449.3	336.6	207
DM(ass)-DT(max)	-2384.0	-2246.3	-551.2	-894.1	233

VERIFICA (tensioni normali) DEL PROFILATO METALLICO

POSIZ.	σ inf(+)	σ inf(-)	$\Delta\sigma$	$\Delta\sigma_c$	$\Delta\sigma D/\gamma_{Mf,s}$	$\Delta\sigma \leq \Delta\sigma D/\gamma_{Mf,s}$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez.max	39.3	4.9	34.39	112.0	61.14	VERIFICATO

<-Tab. C.4.2.XIV (3) $\Delta\sigma_c=112$; Tab. C.4.2.XV (2) $\Delta\sigma_c=112$

VERIFICA (tensioni tangenziali) DEL PROFILATO E DEI COLLEGAMENTI SALDATI

POSIZ.	τ (+)	τ (-)	$\Delta\tau$	$\Delta\tau_c$	$\Delta\tau D/\gamma_{Mf,s}$	$\Delta\tau < \Delta\tau D/\gamma_{Mf,s}$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez.max	-28.34	-45.96	17.63	100.0	33.85	VERIFICATO
sez 1	0.00	0.00	0.00	80.0	27.08	VERIFICATO
sez 2	-33.69	-54.64	20.95	80.0	27.08	VERIFICATO
sez 3	-33.83	-54.87	21.04	80.0	27.08	VERIFICATO
sez 4	0.00	0.00	0.00	80.0	27.08	VERIFICATO

<-Tab. C.4.2.XIib (6) $\Delta\tau_c=100$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

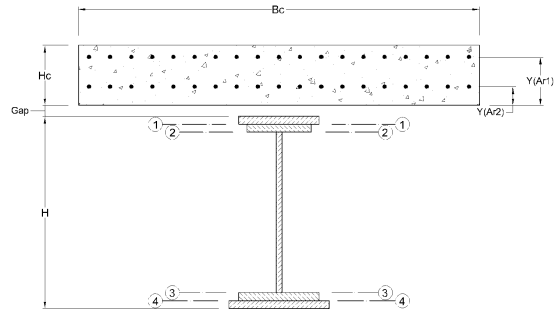
VERIFICA ALLO STATO LIMITE DI FATICA (VERIFICA PER VITA ILLIMITATA):

CONCI C4

Legenda

- As Area profilo metallico
- Yg_inf(s) Baricentro profilo metallico
- H Altezza profilo metallico
- Yg_inf Baricentro della sezione composta
- Jc Momento d'inerzia della sezione composta
- Sc_max Momento statico massimo della sezione del profilo
- Sp Spessore anima in corrispondenza della sezione con momento statico massimo Sc_max
- b Larghezza dei piatti (piattabande, anime, ecc.)
- t Spessore dei piatti (piattabande, anime, ecc.)
- A Sezione resistente dei piatti (piattabande, anime, ecc.)
- Z Distanza baricentro dei piatti (piattabande, anime, ecc.) dal baricentro della sezione composta
- S_i Momento statico della sezione i-esima di attacco dei piatti in esame (piattabande, anime, ecc.)
- $\Delta\tau$ e $\Delta\sigma$ Delta di tensione tangenziale e normale degli elementi da verificare
- C.ANG Saldatura a cordone d'angolo
- a Larghezza della gola del cordone d'angolo (somma)
- P.PEN Saldatura a piena penetrazione (spessore resistente= spessore anima)
- $\gamma_{M,s}$ 1.35 (coeff. di sicurezza a fatica)
- Es/Ec 6.30 (coeff. di omogeneizzazione acciaio/cis.)
- Bc 320 cm (base efficace soletta in cls.)
- Hc 24 cm (altezza soletta in cls.)
- Gap 6 cm (distanza tra profilo metallico e soletta)
- Ar1 100.48 cm² (area di armatura soletta)
- Y(Ar1) 20 cm (distanza dal lembo inferiore della soletta dell'armatura Ar1)
- Ar2 100.48 cm² (area di armatura soletta)
- Y(Ar2) 2 cm (distanza dal lembo inferiore della soletta dell'armatura Ar2)
- Ar_compr? SI (considerare o no le armature della soletta se in compressione)

SCHEMA SEZIONE COMPOSTA



Caratteristiche geometriche

STATO	As	Sp	Yg_inf(s)	Jc	H	Yg_inf	Jc	Wsup	Winf	Sc_max	Jc/Sc_max	DESCRIZIONE
CLS	cm ²	cm	cm	cm ⁴	cm	cm	cm ⁴	cm ³	cm ³	cm ³	m	
Compr.	904.0	2.0	95.66	6157420	200.0	170.33	14481460	-488151	85018	74800.6	1.936	CLS in compressione
Teso	904.0	2.0	95.66	6157420	200.0	117.73	8594389	-104463	73002	45338.0	1.896	CLS in trazione

Caratteristiche con sezione avente il CLS totalmente o parzialmente in compressione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez.max.	192.0	2.0	384.0	70.33					ANIMA
sez 1	0.0	0.0	0.0	-29.67	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	60.0	4.0	240.0	-27.67	74141.8	1.953	C.ANG.	14.1	ANIMA-PIATTABANDA SUP. (2 SALD. 10x10 mm)
sez 3	70.0	4.0	280.0	168.33	47133.5	3.072	C.ANG.	14.1	ANIMA-PIATTABANDA INF. (2 SALD. 10x10 mm)
sez 4	0.0	0.0	0.0	170.33	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Caratteristiche con sezione avente il CLS totalmente in trazione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez.max.	192.0	2.0	384.0	17.73					ANIMA
sez 1	0.0	0.0	0.0	-82.27	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	60.0	4.0	240.0	-80.27	39211.5	2.192	C.ANG.	14.1	ANIMA-PIATTABANDA SUP.
sez 3	70.0	4.0	280.0	115.73	32403.9	2.652	C.ANG.	14.1	ANIMA-PIATTABANDA INF.
sez 4	0.0	0.0	0.0	117.73	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Sollecitazioni flettenti e taglianti associate (con segno)

TIPO DI COMBINAZIONE	M(max) kNm	M(min) kNm	V(max) kN	V(min) kN	Elemento
DM(max) - DT(ass)	-6944.3	-7971.4	-762.2	-1039.3	213
DM(ass) - DT(max)	-7566.6	-6925.6	1162.2	760.0	228

VERIFICA (tensioni normali) DEL PROFILATO METALLICO

POSIZ.	σ inf(+)	σ inf(-)	$\Delta\sigma$	$\Delta\sigma_c$	$\Delta\sigma D/\gamma M_f.s$	$\Delta\sigma \leq \Delta\sigma D/\gamma M_f.s$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez.max	-95.1	-109.2	14.07	112.0	61.14	VERIFICATO

<-Tab. C.4.2.XIV (3) $\Delta\sigma_c=112$; Tab. C.4.2.XV (2) $\Delta\sigma_c=112$

VERIFICA (tensioni tangenziali) DEL PROFILATO E DEI COLLEGAMENTI SALDATI

POSIZ.	τ (+)	τ (-)	$\Delta\tau$	$\Delta\tau_c$	$\Delta\tau D/\gamma M_f.s$	$\Delta\tau < \Delta\tau D/\gamma M_f.s$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez.max	30.65	20.05	10.61	100.0	33.85	VERIFICATO
sez 1	0.00	0.00	0.00	80.0	27.08	VERIFICATO
sez 2	37.49	24.52	12.97	80.0	27.08	VERIFICATO
sez 3	30.98	20.26	10.72	80.0	27.08	VERIFICATO
sez 4	0.00	0.00	0.00	80.0	27.08	VERIFICATO

<-Tab. C.4.2.XIib (6) $\Delta\tau_c=100$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

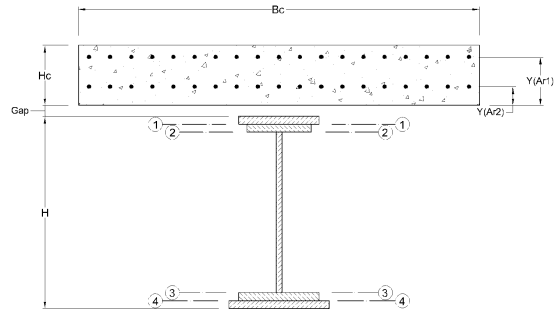
VERIFICA ALLO STATO LIMITE DI FATICA (VERIFICA PER VITA ILLIMITATA):

CONCI C5

Legenda

- As Area profilo metallico
- Yg_inf(s) Baricentro profilo metallico
- H Altezza profilo metallico
- Yg_inf Baricentro della sezione composta
- Jc Momento d'inerzia della sezione composta
- Sc_max Momento statico massimo della sezione del profilo
- Sp Spessore anima in corrispondenza della sezione con momento statico massimo Sc_max
- b Larghezza dei piatti (piattabande, anime, ecc.)
- t Spessore dei piatti (piattabande, anime, ecc.)
- A Sezione resistente dei piatti (piattabande, anime, ecc.)
- Z Distanza baricentro dei piatti (piattabande, anime, ecc.) dal baricentro della sezione composta
- S_i Momento statico della sezione i-esima di attacco dei piatti in esame (piattabande, anime, ecc.)
- $\Delta\tau$ e $\Delta\sigma$ Delta di tensione tangenziale e normale degli elementi da verificare
- C.ANG Saldatura a cordone d'angolo
- a Larghezza della gola del cordone d'angolo (somma)
- P.PEN Saldatura a piena penetrazione (spessore resistente= spessore anima)
- $\gamma_{M,s}$ 1.35 (coeff. di sicurezza a fatica)
- Es/Ec 6.30 (coeff. di omogeneizzazione acciaio/clc.)
- Bc 320 cm (base efficace soletta in cls.)
- Hc 24 cm (altezza soletta in cls.)
- Gap 6 cm (distanza tra profilo metallico e soletta)
- Ar1 32.16 cm² (area di armatura soletta)
- Y(Ar1) 20 cm (distanza dal lembo inferiore della soletta dell'armatura Ar1)
- Ar2 32.16 cm² (area di armatura soletta)
- Y(Ar2) 2 cm (distanza dal lembo inferiore della soletta dell'armatura Ar2)
- Ar_compr? SI (considerare o no le armature della soletta se in compressione)

SCHEMA SEZIONE COMPOSTA



Caratteristiche geometriche

STATO	As	Sp	Yg_inf(s)	Jc	H	Yg_inf	Jc	Wsup	Winf	Sc_max	Jc/Sc_max	DESCRIZIONE
CLS	cm ²	cm	cm	cm ⁴	cm	cm	cm ⁴	cm ³	cm ³	cm ³	m	
Compr.	576.0	2.0	42.79	1010407	100.0	94.67	3320294	-623178	35072	30462.7	1.090	CLS in compressione
Teso	576.0	2.0	42.79	1010407	100.0	50.24	1334254	-26816	26555	13717.2	0.973	CLS in trazione

Caratteristiche con sezione avente il CLS totalmente o parzialmente in compressione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez.max.	93.0	2.0	186.0	44.17					ANIMA
sez 1	0.0	0.0	0.0	-5.33	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	50.0	3.0	150.0	-3.83	30457.3	1.090	C.ANG.	14.1	ANIMA-PIATTABANDA SUP. (2 SALD. 10x10 mm)
sez 3	60.0	4.0	240.0	92.67	22241.3	1.493	C.ANG.	14.1	ANIMA-PIATTABANDA INF. (2 SALD. 10x10 mm)
sez 4	0.0	0.0	0.0	94.67	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Caratteristiche con sezione avente il CLS totalmente in trazione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez.max.	93.0	2.0	186.0	-0.26					ANIMA
sez 1	0.0	0.0	0.0	-49.76	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	50.0	3.0	150.0	-48.26	11531.1	1.157	C.ANG.	14.1	ANIMA-PIATTABANDA SUP.
sez 3	60.0	4.0	240.0	48.24	11578.7	1.152	C.ANG.	14.1	ANIMA-PIATTABANDA INF.
sez 4	0.0	0.0	0.0	50.24	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Sollecitazioni flettenti e taglianti associate (con segno)

TIPO DI COMBINAZIONE	M(max) kNm	M(min) kNm	V(max) kN	V(min) kN	Elemento n°
DM(max) - DT(ass)	389.5	-736.0	338.8	232.1	223
DM(ass) - DT(max)	-2888.4	-2791.5	-468.1	-813.4	217

VERIFICA (tensioni normali) DEL PROFILATO METALLICO

POSIZ.	σ inf(+)	σ inf(-)	$\Delta\sigma$	$\Delta\sigma_c$	$\Delta\sigma D/\gamma_{Mf,s}$	$\Delta\sigma \leq \Delta\sigma D/\gamma_{Mf,s}$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez.max	11.1	-27.7	38.82	112.0	61.14	VERIFICATO

<-Tab. C.4.2.XIV (3) $\Delta\sigma_c=112$; Tab. C.4.2.XV (2) $\Delta\sigma_c=112$

VERIFICA (tensioni tangenziali) DEL PROFILATO E DEI COLLEGAMENTI SALDATI

POSIZ.	τ (+)	τ (-)	$\Delta\tau$	$\Delta\tau_c$	$\Delta\tau D/\gamma_{Mf,s}$	$\Delta\tau < \Delta\tau D/\gamma_{Mf,s}$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez.max	-24.06	-41.81	17.75	100.0	33.85	VERIFICATO
sez 1	0.00	0.00	0.00	80.0	27.08	VERIFICATO
sez 2	-28.60	-49.71	21.10	80.0	27.08	VERIFICATO
sez 3	-28.72	-49.91	21.19	80.0	27.08	VERIFICATO
sez 4	0.00	0.00	0.00	80.0	27.08	VERIFICATO

<-Tab. C.4.2.XIib (6) $\Delta\tau_c=100$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

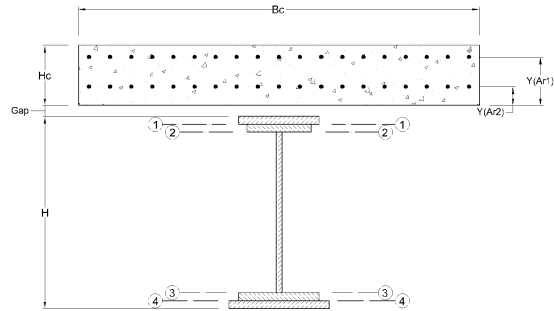
VERIFICA ALLO STATO LIMITE DI FATICA (VERIFICA PER VITA ILLIMITATA):

CONCI C6

Legenda

- As Area profilo metallico
- Yg_inf(s) Baricentro profilo metallico
- H Altezza profilo metallico
- Yg_inf Baricentro della sezione composta
- Jc Momento d'inerzia della sezione composta
- Sc_max Momento statico massimo della sezione del profilo
- Sp Spessore anima in corrispondenza della sezione con momento statico massimo Sc_max
- b Larghezza dei piatti (piattabande, anime, ecc.)
- t Spessore dei piatti (piattabande, anime, ecc.)
- A Sezione resistente dei piatti (piattabande, anime, ecc.)
- Z Distanza baricentro dei piatti (piattabande, anime, ecc.) dal baricentro della sezione composta
- S_i Momento statico della sezione i-esima di attacco dei piatti in esame (piattabande, anime, ecc.)
- $\Delta\tau$ e $\Delta\sigma$ Delta di tensione tangenziale e normale degli elementi da verificare
- C.ANG Saldatura a cordone d'angolo
- a Larghezza della gola del cordone d'angolo (somma)
- P.PEN Saldatura a piena penetrazione (spessore resistente= spessore anima)
- $\gamma_{M,s}$ 1.35 (coeff. di sicurezza a fatica)
- Es/Ec 6.30 (coeff. di omogeneizzazione acciaio/clc.)
- Bc 320 cm (base efficace soletta in cls.)
- Hc 24 cm (altezza soletta in cls.)
- Gap 6 cm (distanza tra profilo metallico e soletta)
- Ar1 32.16 cm² (area di armatura soletta)
- Y(Ar1) 20 cm (distanza dal lembo inferiore della soletta dell'armatura Ar1)
- Ar2 32.16 cm² (area di armatura soletta)
- Y(Ar2) 2 cm (distanza dal lembo inferiore della soletta dell'armatura Ar2)
- Ar_compr? SI (considerare o no le armature della soletta se in compressione)

SCHEMA SEZIONE COMPOSTA



Caratteristiche geometriche

STATO	As	Sp	Yg_inf(s)	Jc	H	Yg_inf	Jc	Wsup	Winf	Sc_max	Jc/Sc_max	DESCRIZIONE
CLS	cm ²	cm	cm	cm ⁴	cm	cm	cm ⁴	cm ³	cm ³	cm ³	m	
Compr.	501.6	1.2	41.65	951707	100.0	96.51	3115259	-893577	32278	27818.6	1.120	CLS in compressione
Teso	501.6	1.2	41.65	951707	100.0	50.21	1280596	-25722	25503	12852.8	0.996	CLS in trazione

Caratteristiche con sezione avente il CLS totalmente o parzialmente in compressione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez.max.	93.0	1.2	111.6	46.01					ANIMA
sez 1	0.0	0.0	0.0	-3.49	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	50.0	3.0	150.0	-1.99	27818.4	1.120	C.ANG.	14.1	ANIMA-PIATTABANDA SUP. (2 SALD 10x10 mm)
sez 3	60.0	4.0	240.0	94.51	22683.3	1.373	C.ANG.	14.1	ANIMA-PIATTABANDA INF. (2 SALD 10x10 mm)
sez 4	0.0	0.0	0.0	96.51	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Caratteristiche con sezione avente il CLS totalmente in trazione

POSIZ.	b	t	A	Z	S_i	Jc/S_i	TIPO	a	DESCRIZIONE
	cm	cm	cm ²	cm	cm ³	m	SALDAT.	mm	
sez.max.	93.0	1.2	111.6	-0.29					ANIMA
sez 1	0.0	0.0	0.0	-49.79	0.0		C.ANG.	0.0	PIATTO RINFORZO SUP.
sez 2	50.0	3.0	150.0	-48.29	11539.4	1.110	C.ANG.	14.1	ANIMA-PIATTABANDA SUP.
sez 3	60.0	4.0	240.0	48.21	11571.3	1.107	C.ANG.	14.1	ANIMA-PIATTABANDA INF.
sez 4	0.0	0.0	0.0	50.21	0.0		C.ANG.	0.0	PIATTO RINFORZO INF.

Sollecitazioni flettenti e taglianti associate (con segno)

TIPO DI COMBINAZIONE	M(max) kNm	M(min) kNm	V(max) kN	V(min) kN	Elemento n°
DM(max) - DT(ass)	391.5	-733.3	338.8	232.1	222
DM(ass) - DT(max)	754.8	968.7	0.3	-314.9	220

VERIFICA (tensioni normali) DEL PROFILATO METALLICO

POSIZ.	σ inf(+)	σ inf(-)	$\Delta\sigma$	$\Delta\sigma_c$	$\Delta\sigma D/\gamma M_f.s$	$\Delta\sigma \leq \Delta\sigma D/\gamma M_f.s$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez.max	12.1	-28.8	40.88	112.0	61.14	VERIFICATO

<-Tab. C.4.2.XIV (3) $\Delta\sigma_c=112$; Tab. C.4.2.XV (2) $\Delta\sigma_c=112$

VERIFICA (tensioni tangenziali) DEL PROFILATO E DEI COLLEGAMENTI SALDATI

POSIZ.	τ (+)	τ (-)	$\Delta\tau$	$\Delta\tau_c$	$\Delta\tau D/\gamma M_f.s$	$\Delta\tau < \Delta\tau D/\gamma M_f.s$
	N/mm ²	N/mm ²	N/mm ²	N/mm ²	N/mm ²	
sez.max	0.02	-23.43	23.45	100.0	33.85	VERIFICATO
sez 1	0.00	0.00	0.00	80.0	27.08	VERIFICATO
sez 2	0.02	-19.88	19.90	80.0	27.08	VERIFICATO
sez 3	0.02	-16.21	16.23	80.0	27.08	VERIFICATO
sez 4	0.00	0.00	0.00	80.0	27.08	VERIFICATO

<-Tab. C.4.2.XIib (6) $\Delta\tau_c=100$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

<-Tab. C.4.2.XVIIb (8) $\Delta\tau_c=80$

9 VERIFICHE DEI CONNETTORI "NELSON"

Dati connettori:

numero per fila:	3 (C2, C6); 4 (C1, C3, C4, C5)
interasse file:	0.20 m
diametro:	22 mm (7/8")
altezza:	175 mm
resistenza a rottura:	450 N/mm ²

9.1 STATO LIMITE ULTIMO – RESISTENZA AL TAGLIO LONGITUDINALE

Si effettuano le verifiche allo stato limite ultimo per taglio longitudinale dei connettori trave-soletta. I coefficienti parziali per SLU assunti sono i seguenti:

$$\gamma_v = 1.25: \quad \text{connettori: resistenza allo SLU}$$

Seguono i tabulati di calcolo per ogni asta considerata, per le combinazioni di carichi più gravose.

Dati tabulati:

Elem property:	nome delle caratteristiche geometriche dell'elemento
Elem:	numero dell'elemento
Position:	nodo iniziale (I) o finale (J) dell'elemento
Lcom:	combinazione di carico più gravosa
Type:	sollecitazione (massima o minima)
V_L,Ed:	sforzo di taglio longitudinale agente sulla larghezza della regione inelastica
v_L,Ed:	sforzo di taglio longitudinale di calcolo per unità di lunghezza (m) all'interfaccia trave-soletta
P_Rd:	resistenza al taglio del singolo connettore "Nelson"
v_L,Rd:	resistenza al taglio longitudinale per trave e per unità di lunghezza
$v_{Ed} = \frac{v_{L,Ed}}{2 \times t_c} \quad (t_c = \text{spessore della soletta})$	

Condizione di verifica: Verification Ratio: $\frac{v_{L,Ed}}{v_{L,Rd}} \leq 1$

Elem property	Elem number	Position	Lcom	Type	V_L,Ed (kN)	v_L,Ed (kN/m)	P_Rd (kN)	v_L,Rd (kN/m)	Verif. Ratio
Concio 1	101	I[719]	ST SLV Vert	FX-MAX	1.56	1.41	111.48	2229.56	0.001
Concio 1	101	J[720]	ST SLU Mobili	FZ-MAX	24.39	22.14	111.48	2229.56	0.010
Concio 1	102	I[720]	ST SLU Mobili	FZ-MIN	-707.23	641.93	111.48	2229.56	0.288
Concio 1	102	J[721]	ST SLU Mobili	FZ-MIN	-567.43	515.04	111.48	2229.56	0.231
Concio 1	103	I[721]	ST SLU Mobili	FZ-MIN	-393.53	357.19	111.48	2229.56	0.160
Concio 1	103	J[722]	ST SLU Mobili	FZ-MIN	-309.65	281.06	111.48	2229.56	0.126
Concio 2	104	I[722]	ST SLU Mobili	FZ-MIN	-309.65	274.72	111.48	1672.17	0.164
Concio 2	104	J[723]	ST SLU Mobili	FZ-MIN	-253.73	225.10	111.48	1672.17	0.135
Concio 2	105	I[723]	ST SLU Mobili	FZ-MAX	170.98	151.69	111.48	1672.17	0.091
Concio 2	105	J[724]	ST SLU Mobili	FZ-MAX	295.62	262.27	111.48	1672.17	0.157
Concio 2	106	I[724]	ST SLU Mobili	FZ-MAX	452.80	401.72	111.48	1672.17	0.240
Concio 2	106	J[725]	ST SLU Mobili	FZ-MAX	536.68	476.13	111.48	1672.17	0.285
Concio 3	107	I[725]	ST SLU Mobili	FZ-MAX	536.68	481.65	111.48	2229.56	0.216
Concio 3	107	J[726]	ST SLU Mobili	FZ-MAX	592.60	531.83	111.48	2229.56	0.239
Concio 3	108	I[726]	ST SLU Mobili	FZ-MAX	742.21	666.10	111.48	2229.56	0.299
Concio 3	108	J[727]	ST SLU Mobili	FZ-MAX	882.01	791.57	111.48	2229.56	0.355
Concio 3	109	I[727]	ST SLU Mobili	FZ-MAX	975.66	875.61	111.48	2229.56	0.393
Concio 3	109	J[728]	ST SLU Mobili	FZ-MAX	989.64	888.16	111.48	2229.56	0.398
Concio 4 H=var	110	I[728]	ST SLU Mobili	FZ-MAX	988.39	866.71	111.48	2229.56	0.389
Concio 4 H=var	110	J[729]	ST SLU Mobili	FZ-MAX	1063.20	643.36	111.48	2229.56	0.289

Concio 4 H=var	111	I[729]	ST SLU Mobili	FZ-MAX	1137.32	688.21	111.48	2229.56	0.309
Concio 4 H=var	111	J[730]	ST SLU Mobili	FZ-MAX	1212.11	558.24	111.48	2229.56	0.250
Concio 4 H=200	112	I[730]	ST SLU Mobili	FZ-MAX	1211.01	557.73	111.48	2229.56	0.250
Concio 4 H=200	112	J[731]	ST SLU Mobili	FZ-MAX	1225.96	564.62	111.48	2229.56	0.253
Concio 4 H=200	113	I[731]	ST SLU Mobili	FZ-MIN	-1136.35	523.35	111.48	2229.56	0.235
Concio 4 H=200	113	J[732]	ST SLU Mobili	FZ-MIN	-1121.39	516.46	111.48	2229.56	0.232
Concio 4 H=var	114	I[732]	ST SLU Mobili	FZ-MIN	-1123.98	517.65	111.48	2229.56	0.232
Concio 4 H=var	114	J[733]	ST SLU Mobili	FZ-MIN	-1049.18	634.88	111.48	2229.56	0.285
Concio 4 H=var	115	I[733]	ST SLU Mobili	FZ-MIN	-973.41	589.03	111.48	2229.56	0.264
Concio 4 H=var	115	J[734]	ST SLU Mobili	FZ-MIN	-898.60	787.98	111.48	2229.56	0.353
Concio 5	116	I[734]	ST SLU Mobili	FZ-MIN	-899.01	806.82	111.48	2229.56	0.362
Concio 5	116	J[735]	ST SLU Mobili	FZ-MIN	-885.03	794.27	111.48	2229.56	0.356
Concio 5	117	I[735]	ST SLU Mobili	FZ-MIN	-791.75	710.56	111.48	2229.56	0.319
Concio 5	117	J[736]	ST SLU Mobili	FZ-MIN	-646.36	580.08	111.48	2229.56	0.260
Concio 5	118	I[736]	ST SLU Mobili	FZ-MIN	-498.65	447.51	111.48	2229.56	0.201
Concio 5	118	J[737]	ST SLU Mobili	FZ-MIN	-434.34	389.80	111.48	2229.56	0.175
Concio 6	119	I[737]	ST SLU Mobili	FZ-MIN	-434.34	382.25	111.48	1672.17	0.229
Concio 6	119	J[738]	ST SLU Mobili	FZ-MIN	-353.26	310.89	111.48	1672.17	0.186
Concio 6	120	I[738]	ST SLU Mobili	FZ-MIN	-198.04	174.29	111.48	1672.17	0.104
Concio 6	120	J[739]	ST SLU Mobili	FZ-MIN	-125.34	110.31	111.48	1672.17	0.066
Concio 6	121	I[739]	ST SLU Mobili	FZ-MIN	-125.34	110.31	111.48	1672.17	0.066
Concio 6	121	J[740]	ST SLU Mobili	FZ-MAX	197.97	174.23	111.48	1672.17	0.104
Concio 6	122	I[740]	ST SLU Mobili	FZ-MAX	353.19	310.83	111.48	1672.17	0.186
Concio 6	122	J[741]	ST SLU Mobili	FZ-MAX	434.27	382.19	111.48	1672.17	0.229
Concio 5	123	I[741]	ST SLU Mobili	FZ-MAX	434.27	389.74	111.48	2229.56	0.175
Concio 5	123	J[742]	ST SLU Mobili	FZ-MAX	498.58	447.45	111.48	2229.56	0.201
Concio 5	124	I[742]	ST SLU Mobili	FZ-MAX	646.28	580.01	111.48	2229.56	0.260
Concio 5	124	J[743]	ST SLU Mobili	FZ-MAX	791.68	710.49	111.48	2229.56	0.319
Concio 5	125	I[743]	ST SLU Mobili	FZ-MAX	885.02	794.26	111.48	2229.56	0.356
Concio 5	125	J[744]	ST SLU Mobili	FZ-MAX	899.00	806.81	111.48	2229.56	0.362
Concio 4 H=var	126	I[744]	ST SLU Mobili	FZ-MAX	898.58	787.96	111.48	2229.56	0.353
Concio 4 H=var	126	J[745]	ST SLU Mobili	FZ-MAX	973.40	589.02	111.48	2229.56	0.264
Concio 4 H=var	127	I[745]	ST SLU Mobili	FZ-MAX	1049.38	635.00	111.48	2229.56	0.285
Concio 4 H=var	127	J[746]	ST SLU Mobili	FZ-MAX	1124.17	517.74	111.48	2229.56	0.232
Concio 4 H=200	128	I[746]	ST SLU Mobili	FZ-MAX	1121.60	516.55	111.48	2229.56	0.232
Concio 4 H=200	128	J[747]	ST SLU Mobili	FZ-MAX	1136.56	523.44	111.48	2229.56	0.235
Concio 4 H=200	129	I[747]	ST SLU Mobili	FZ-MIN	-1225.76	564.53	111.48	2229.56	0.253
Concio 4 H=200	129	J[748]	ST SLU Mobili	FZ-MIN	-1210.80	557.64	111.48	2229.56	0.250
Concio 4 H=var	130	I[748]	ST SLU Mobili	FZ-MIN	-1211.91	558.15	111.48	2229.56	0.250
Concio 4 H=var	130	J[749]	ST SLU Mobili	FZ-MIN	-1137.11	688.08	111.48	2229.56	0.309
Concio 4 H=var	131	I[749]	ST SLU Mobili	FZ-MIN	-1063.21	643.37	111.48	2229.56	0.289
Concio 4 H=var	131	J[750]	ST SLU Mobili	FZ-MIN	-988.40	866.72	111.48	2229.56	0.389
Concio 3	132	I[750]	ST SLU Mobili	FZ-MIN	-989.65	888.17	111.48	2229.56	0.398
Concio 3	132	J[751]	ST SLU Mobili	FZ-MIN	-975.67	875.62	111.48	2229.56	0.393
Concio 3	133	I[751]	ST SLU Mobili	FZ-MIN	-882.09	791.64	111.48	2229.56	0.355
Concio 3	133	J[752]	ST SLU Mobili	FZ-MIN	-742.29	666.18	111.48	2229.56	0.299
Concio 3	134	I[752]	ST SLU Mobili	FZ-MIN	-592.65	531.88	111.48	2229.56	0.239
Concio 3	134	J[753]	ST SLU Mobili	FZ-MIN	-536.73	481.69	111.48	2229.56	0.216
Concio 2	135	I[753]	ST SLU Mobili	FZ-MIN	-536.73	476.18	111.48	1672.17	0.285
Concio 2	135	J[754]	ST SLU Mobili	FZ-MIN	-452.85	401.76	111.48	1672.17	0.240
Concio 2	136	I[754]	ST SLU Mobili	FZ-MIN	-295.52	262.18	111.48	1672.17	0.157
Concio 2	136	J[755]	ST SLU Mobili	FZ-MIN	-170.85	151.58	111.48	1672.17	0.091
Concio 2	137	I[755]	ST SLU Mobili	FZ-MAX	253.70	225.08	111.48	1672.17	0.135
Concio 2	137	J[756]	ST SLU Mobili	FZ-MAX	309.62	274.69	111.48	1672.17	0.164
Concio 1	138	I[756]	ST SLU Mobili	FZ-MAX	309.62	281.03	111.48	2229.56	0.126
Concio 1	138	J[757]	ST SLU Mobili	FZ-MAX	393.50	357.17	111.48	2229.56	0.160
Concio 1	139	I[757]	ST SLU Mobili	FZ-MAX	567.40	515.01	111.48	2229.56	0.231
Concio 1	139	J[758]	ST SLU Mobili	FZ-MAX	707.20	641.90	111.48	2229.56	0.288
Concio 1	140	I[758]	ST SLU Mobili	FZ-MIN	-24.39	22.14	111.48	2229.56	0.010

Concio 1	140	J[759]	ST SLV Vert	FX-MAX	1.53	1.38	111.48	2229.56	0.001
Concio 1	201	I[760]	ST SLV Vert	FX-MAX	1.41	1.28	111.48	2229.56	0.001
Concio 1	201	J[761]	ST SLU Mobili	FZ-MAX	443.76	403.87	111.48	2229.56	0.181
Concio 1	202	I[761]	ST SLU Mobili	FZ-MIN	-1294.47	1178.09	111.48	2229.56	0.528
Concio 1	202	J[762]	ST SLU Mobili	FZ-MIN	-629.33	572.75	111.48	2229.56	0.257
Concio 1	203	I[762]	ST SLU Mobili	FZ-MIN	-892.58	812.34	111.48	2229.56	0.364
Concio 1	203	J[763]	ST SLU Mobili	FZ-MIN	-541.60	492.91	111.48	2229.56	0.221
Concio 2	204	I[763]	ST SLU Mobili	FZ-MIN	-541.60	481.89	111.48	1672.17	0.288
Concio 2	204	J[764]	ST SLU Mobili	FZ-MAX	604.00	537.41	111.48	1672.17	0.321
Concio 2	205	I[764]	ST SLU Mobili	FZ-MIN	-647.39	576.01	111.48	1672.17	0.344
Concio 2	205	J[765]	ST SLU Mobili	FZ-MAX	829.53	738.07	111.48	1672.17	0.441
Concio 2	206	I[765]	ST SLU Mobili	FZ-MAX	522.42	464.82	111.48	1672.17	0.278
Concio 2	206	J[766]	ST SLU Mobili	FZ-MAX	848.73	755.17	111.48	1672.17	0.452
Concio 3	207	I[766]	ST SLU Mobili	FZ-MAX	848.73	764.19	111.48	2229.56	0.343
Concio 3	207	J[767]	ST SLU Mobili	FZ-MAX	1075.51	968.37	111.48	2229.56	0.434
Concio 3	208	I[767]	ST SLU Mobili	FZ-MAX	814.78	733.61	111.48	2229.56	0.329
Concio 3	208	J[768]	ST SLU Mobili	FZ-MAX	1372.92	1236.15	111.48	2229.56	0.554
Concio 3	209	I[768]	ST SLU Mobili	FZ-MAX	1174.90	1057.86	111.48	2229.56	0.474
Concio 3	209	J[769]	ST SLU Mobili	FZ-MAX	1227.23	1104.98	111.48	2229.56	0.496
Concio 4 H=var	210	I[769]	ST SLU Mobili	FZ-MAX	1215.85	1071.60	111.48	2229.56	0.481
Concio 4 H=var	210	J[770]	ST SLU Mobili	FZ-MAX	1531.38	933.17	111.48	2229.56	0.419
Concio 4 H=var	211	I[770]	ST SLU Mobili	FZ-MAX	1427.78	870.04	111.48	2229.56	0.390
Concio 4 H=var	211	J[771]	ST SLU Mobili	FZ-MAX	1751.11	813.24	111.48	2229.56	0.365
Concio 4 H=200	212	I[771]	ST SLU Mobili	FZ-MAX	1753.45	814.33	111.48	2229.56	0.365
Concio 4 H=200	212	J[772]	ST SLU Mobili	FZ-MAX	1815.35	843.08	111.48	2229.56	0.378
Concio 4 H=200	213	I[772]	ST SLU Mobili	FZ-MIN	-1728.25	802.63	111.48	2229.56	0.360
Concio 4 H=200	213	J[773]	ST SLU Mobili	FZ-MIN	-1666.41	773.91	111.48	2229.56	0.347
Concio 4 H=var	214	I[773]	ST SLU Mobili	FZ-MIN	-1663.63	772.62	111.48	2229.56	0.347
Concio 4 H=var	214	J[774]	ST SLU Mobili	FZ-MIN	-1340.30	816.73	111.48	2229.56	0.366
Concio 4 H=var	215	I[774]	ST SLU Mobili	FZ-MIN	-1445.51	880.85	111.48	2229.56	0.395
Concio 4 H=var	215	J[775]	ST SLU Mobili	FZ-MIN	-1130.87	996.70	111.48	2229.56	0.447
Concio 5	216	I[775]	ST SLU Mobili	FZ-MIN	-1143.32	1029.43	111.48	2229.56	0.462
Concio 5	216	J[776]	ST SLU Mobili	FZ-MIN	-1091.15	982.45	111.48	2229.56	0.441
Concio 5	217	I[776]	ST SLU Mobili	FZ-MIN	-1296.63	1167.47	111.48	2229.56	0.524
Concio 5	217	J[777]	ST SLU Mobili	FZ-MIN	-718.93	647.31	111.48	2229.56	0.290
Concio 5	218	I[777]	ST SLU Mobili	FZ-MIN	-992.00	893.18	111.48	2229.56	0.401
Concio 5	218	J[778]	ST SLU Mobili	FZ-MIN	-731.91	659.00	111.48	2229.56	0.296
Concio 6	219	I[778]	ST SLU Mobili	FZ-MIN	-731.91	645.86	111.48	1672.17	0.386
Concio 6	219	J[779]	ST SLU Mobili	FZ-MAX	514.32	453.84	111.48	1672.17	0.271
Concio 6	220	I[779]	ST SLU Mobili	FZ-MIN	-741.81	654.58	111.48	1672.17	0.391
Concio 6	220	J[780]	ST SLU Mobili	FZ-MIN	-445.91	393.48	111.48	1672.17	0.235
Concio 6	221	I[780]	ST SLU Mobili	FZ-MIN	-445.91	393.48	111.48	1672.17	0.235
Concio 6	221	J[781]	ST SLU Mobili	FZ-MAX	741.62	654.42	111.48	1672.17	0.391
Concio 6	222	I[781]	ST SLU Mobili	FZ-MIN	-514.51	454.02	111.48	1672.17	0.272
Concio 6	222	J[782]	ST SLU Mobili	FZ-MAX	731.72	645.68	111.48	1672.17	0.386
Concio 5	223	I[782]	ST SLU Mobili	FZ-MAX	731.72	658.83	111.48	2229.56	0.295
Concio 5	223	J[783]	ST SLU Mobili	FZ-MAX	991.82	893.02	111.48	2229.56	0.401
Concio 5	224	I[783]	ST SLU Mobili	FZ-MAX	718.81	647.20	111.48	2229.56	0.290
Concio 5	224	J[784]	ST SLU Mobili	FZ-MAX	1296.40	1167.26	111.48	2229.56	0.524
Concio 5	225	I[784]	ST SLU Mobili	FZ-MAX	1090.91	982.23	111.48	2229.56	0.441
Concio 5	225	J[785]	ST SLU Mobili	FZ-MAX	1143.07	1029.21	111.48	2229.56	0.462
Concio 4 H=var	226	I[785]	ST SLU Mobili	FZ-MAX	1130.63	996.49	111.48	2229.56	0.447
Concio 4 H=var	226	J[786]	ST SLU Mobili	FZ-MAX	1445.34	880.74	111.48	2229.56	0.395
Concio 4 H=var	227	I[786]	ST SLU Mobili	FZ-MAX	1340.01	816.56	111.48	2229.56	0.366
Concio 4 H=var	227	J[787]	ST SLU Mobili	FZ-MAX	1663.32	772.47	111.48	2229.56	0.346
Concio 4 H=200	228	I[787]	ST SLU Mobili	FZ-MAX	1666.09	773.76	111.48	2229.56	0.347
Concio 4 H=200	228	J[788]	ST SLU Mobili	FZ-MAX	1727.93	802.48	111.48	2229.56	0.360
Concio 4 H=200	229	I[788]	ST SLU Mobili	FZ-MIN	-1815.68	843.23	111.48	2229.56	0.378
Concio 4 H=200	229	J[789]	ST SLU Mobili	FZ-MIN	-1753.79	814.49	111.48	2229.56	0.365

Concio 4 H=var	230	I[789]	ST SLU Mobili	FZ-MIN	-1751.42	813.39	111.48	2229.56	0.365
Concio 4 H=var	230	J[790]	ST SLU Mobili	FZ-MIN	-1428.07	870.22	111.48	2229.56	0.390
Concio 4 H=var	231	I[790]	ST SLU Mobili	FZ-MIN	-1531.57	933.29	111.48	2229.56	0.419
Concio 4 H=var	231	J[791]	ST SLU Mobili	FZ-MIN	-1216.10	1071.81	111.48	2229.56	0.481
Concio 3	232	I[791]	ST SLU Mobili	FZ-MIN	-1227.48	1105.21	111.48	2229.56	0.496
Concio 3	232	J[792]	ST SLU Mobili	FZ-MIN	-1175.14	1058.08	111.48	2229.56	0.475
Concio 3	233	I[792]	ST SLU Mobili	FZ-MIN	-1373.16	1236.37	111.48	2229.56	0.555
Concio 3	233	J[793]	ST SLU Mobili	FZ-MIN	-814.91	733.73	111.48	2229.56	0.329
Concio 3	234	I[793]	ST SLU Mobili	FZ-MIN	-1075.69	968.54	111.48	2229.56	0.434
Concio 3	234	J[794]	ST SLU Mobili	FZ-MIN	-848.96	764.39	111.48	2229.56	0.343
Concio 2	235	I[794]	ST SLU Mobili	FZ-MIN	-848.96	755.36	111.48	1672.17	0.452
Concio 2	235	J[795]	ST SLU Mobili	FZ-MIN	-522.64	465.02	111.48	1672.17	0.278
Concio 2	236	I[795]	ST SLU Mobili	FZ-MIN	-829.82	738.34	111.48	1672.17	0.442
Concio 2	236	J[796]	ST SLU Mobili	FZ-MAX	647.09	575.75	111.48	1672.17	0.344
Concio 2	237	I[796]	ST SLU Mobili	FZ-MIN	-604.19	537.58	111.48	1672.17	0.321
Concio 2	237	J[797]	ST SLU Mobili	FZ-MAX	541.42	481.73	111.48	1672.17	0.288
Concio 1	238	I[797]	ST SLU Mobili	FZ-MAX	541.42	492.75	111.48	2229.56	0.221
Concio 1	238	J[798]	ST SLU Mobili	FZ-MAX	892.36	812.13	111.48	2229.56	0.364
Concio 1	239	I[798]	ST SLU Mobili	MY-MAX	629.11	572.55	111.48	2229.56	0.257
Concio 1	239	J[799]	ST SLU Mobili	FZ-MAX	1294.08	1177.74	111.48	2229.56	0.528
Concio 1	240	I[799]	ST SLU Mobili	FZ-MIN	-443.76	403.86	111.48	2229.56	0.181
Concio 1	240	J[800]	ST SLV Vert	FX-MAX	1.38	1.26	111.48	2229.56	0.001
Concio 1	301	I[801]	ST SLV Vert	FX-MAX	1.44	1.31	111.48	2229.56	0.001
Concio 1	301	J[802]	ST SLU Mobili	FZ-MAX	721.86	656.96	111.48	2229.56	0.295
Concio 1	302	I[802]	ST SLU Mobili	FZ-MIN	-1678.75	1527.83	111.48	2229.56	0.685
Concio 1	302	J[803]	ST SLU Mobili	FZ-MIN	-679.10	618.05	111.48	2229.56	0.277
Concio 1	303	I[803]	ST SLU Mobili	FZ-MIN	-1205.24	1096.89	111.48	2229.56	0.492
Concio 1	303	J[804]	ST SLU Mobili	FZ-MIN	-686.26	624.56	111.48	2229.56	0.280
Concio 2	304	I[804]	ST SLU Mobili	FZ-MIN	-686.26	610.60	111.48	1672.17	0.365
Concio 2	304	J[805]	ST SLU Mobili	FZ-MAX	929.34	826.88	111.48	1672.17	0.494
Concio 2	305	I[805]	ST SLU Mobili	FZ-MIN	-961.58	855.57	111.48	1672.17	0.512
Concio 2	305	J[806]	ST SLU Mobili	FZ-MAX	1143.04	1017.02	111.48	1672.17	0.608
Concio 2	306	I[806]	ST SLU Mobili	FZ-MIN	-744.47	662.40	111.48	1672.17	0.396
Concio 2	306	J[807]	ST SLU Mobili	FZ-MAX	1049.98	934.22	111.48	1672.17	0.559
Concio 3	307	I[807]	ST SLU Mobili	FZ-MAX	1049.98	945.39	111.48	2229.56	0.424
Concio 3	307	J[808]	ST SLU Mobili	FZ-MAX	1383.78	1245.94	111.48	2229.56	0.559
Concio 3	308	I[808]	ST SLU Mobili	FZ-MAX	871.67	784.84	111.48	2229.56	0.352
Concio 3	308	J[809]	ST SLU Mobili	FZ-MAX	1691.05	1522.60	111.48	2229.56	0.683
Concio 3	309	I[809]	ST SLU Mobili	FZ-MAX	1313.64	1182.78	111.48	2229.56	0.531
Concio 3	309	J[810]	ST SLU Mobili	FZ-MAX	1390.49	1251.98	111.48	2229.56	0.562
Concio 4 H=var	310	I[810]	ST SLU Mobili	FZ-MAX	1379.14	1215.51	111.48	2229.56	0.545
Concio 4 H=var	310	J[811]	ST SLU Mobili	FZ-MAX	1845.88	1124.82	111.48	2229.56	0.505
Concio 4 H=var	311	I[811]	ST SLU Mobili	FZ-MAX	1601.91	976.15	111.48	2229.56	0.438
Concio 4 H=var	311	J[812]	ST SLU Mobili	FZ-MAX	2083.03	967.39	111.48	2229.56	0.434
Concio 4 H=200	312	I[812]	ST SLU Mobili	FZ-MAX	2080.83	966.37	111.48	2229.56	0.433
Concio 4 H=200	312	J[813]	ST SLU Mobili	FZ-MAX	2172.05	1008.73	111.48	2229.56	0.452
Concio 4 H=200	313	I[813]	ST SLU Mobili	FZ-MIN	-2085.54	968.56	111.48	2229.56	0.434
Concio 4 H=200	313	J[814]	ST SLU Mobili	FZ-MIN	-1994.42	926.24	111.48	2229.56	0.415
Concio 4 H=var	314	I[814]	ST SLU Mobili	FZ-MIN	-1996.36	927.14	111.48	2229.56	0.416
Concio 4 H=var	314	J[815]	ST SLU Mobili	FZ-MIN	-1515.31	923.38	111.48	2229.56	0.414
Concio 4 H=var	315	I[815]	ST SLU Mobili	FZ-MIN	-1761.86	1073.62	111.48	2229.56	0.482
Concio 4 H=var	315	J[816]	ST SLU Mobili	FZ-MIN	-1296.63	1142.80	111.48	2229.56	0.513
Concio 5	316	I[816]	ST SLU Mobili	FZ-MIN	-1308.53	1178.18	111.48	2229.56	0.528
Concio 5	316	J[817]	ST SLU Mobili	FZ-MIN	-1231.91	1109.19	111.48	2229.56	0.497
Concio 5	317	I[817]	ST SLU Mobili	FZ-MIN	-1617.42	1456.30	111.48	2229.56	0.653
Concio 5	317	J[818]	ST SLU Mobili	FZ-MIN	-769.68	693.01	111.48	2229.56	0.311
Concio 5	318	I[818]	ST SLU Mobili	FZ-MIN	-1302.87	1173.09	111.48	2229.56	0.526
Concio 5	318	J[819]	ST SLU Mobili	FZ-MIN	-920.15	828.49	111.48	2229.56	0.372
Concio 6	319	I[819]	ST SLU Mobili	FZ-MIN	-920.15	811.96	111.48	1672.17	0.486

Concio 6	319	J[820]	ST SLU Mobili	FZ-MAX	833.93	735.88	111.48	1672.17	0.440
Concio 6	320	I[820]	ST SLU Mobili	FZ-MIN	-1057.09	932.80	111.48	1672.17	0.558
Concio 6	320	J[821]	ST SLU Mobili	FZ-MIN	-621.55	548.47	111.48	1672.17	0.328
Concio 6	321	I[821]	ST SLU Mobili	FZ-MIN	-621.55	548.47	111.48	1672.17	0.328
Concio 6	321	J[822]	ST SLU Mobili	FZ-MAX	1056.85	932.59	111.48	1672.17	0.558
Concio 6	322	I[822]	ST SLU Mobili	FZ-MIN	-834.20	736.11	111.48	1672.17	0.440
Concio 6	322	J[823]	ST SLU Mobili	FZ-MAX	919.89	811.73	111.48	1672.17	0.485
Concio 5	323	I[823]	ST SLU Mobili	FZ-MAX	919.89	828.26	111.48	2229.56	0.371
Concio 5	323	J[824]	ST SLU Mobili	FZ-MAX	1302.65	1172.89	111.48	2229.56	0.526
Concio 5	324	I[824]	ST SLU Mobili	FZ-MAX	769.46	692.81	111.48	2229.56	0.311
Concio 5	324	J[825]	ST SLU Mobili	FZ-MAX	1617.02	1455.94	111.48	2229.56	0.653
Concio 5	325	I[825]	ST SLU Mobili	FZ-MAX	1231.54	1108.86	111.48	2229.56	0.497
Concio 5	325	J[826]	ST SLU Mobili	FZ-MAX	1308.15	1177.84	111.48	2229.56	0.528
Concio 4 H=var	326	I[826]	ST SLU Mobili	FZ-MAX	1296.23	1142.44	111.48	2229.56	0.512
Concio 4 H=var	326	J[827]	ST SLU Mobili	FZ-MAX	1761.56	1073.44	111.48	2229.56	0.481
Concio 4 H=var	327	I[827]	ST SLU Mobili	FZ-MAX	1515.02	923.21	111.48	2229.56	0.414
Concio 4 H=var	327	J[828]	ST SLU Mobili	FZ-MAX	1996.03	926.99	111.48	2229.56	0.416
Concio 4 H=200	328	I[828]	ST SLU Mobili	FZ-MAX	1994.09	926.09	111.48	2229.56	0.415
Concio 4 H=200	328	J[829]	ST SLU Mobili	FZ-MAX	2085.22	968.41	111.48	2229.56	0.434
Concio 4 H=200	329	I[829]	ST SLU Mobili	FZ-MIN	-2172.40	1008.90	111.48	2229.56	0.453
Concio 4 H=200	329	J[830]	ST SLU Mobili	FZ-MIN	-2081.19	966.54	111.48	2229.56	0.434
Concio 4 H=var	330	I[830]	ST SLU Mobili	FZ-MIN	-2083.39	967.56	111.48	2229.56	0.434
Concio 4 H=var	330	J[831]	ST SLU Mobili	FZ-MIN	-1602.23	976.34	111.48	2229.56	0.438
Concio 4 H=var	331	I[831]	ST SLU Mobili	FZ-MIN	-1846.19	1125.01	111.48	2229.56	0.505
Concio 4 H=var	331	J[832]	ST SLU Mobili	FZ-MIN	-1379.54	1215.87	111.48	2229.56	0.545
Concio 3	332	I[832]	ST SLU Mobili	FZ-MIN	-1390.90	1252.34	111.48	2229.56	0.562
Concio 3	332	J[833]	ST SLU Mobili	FZ-MIN	-1314.04	1183.14	111.48	2229.56	0.531
Concio 3	333	I[833]	ST SLU Mobili	FZ-MIN	-1691.47	1522.98	111.48	2229.56	0.683
Concio 3	333	J[834]	ST SLU Mobili	FZ-MIN	-871.90	785.05	111.48	2229.56	0.352
Concio 3	334	I[834]	ST SLU Mobili	FZ-MIN	-1384.03	1246.16	111.48	2229.56	0.559
Concio 3	334	J[835]	ST SLU Mobili	FZ-MIN	-1050.29	945.67	111.48	2229.56	0.424
Concio 2	335	I[835]	ST SLU Mobili	FZ-MIN	-1050.29	934.50	111.48	1672.17	0.559
Concio 2	335	J[836]	ST SLU Mobili	FZ-MAX	744.16	662.12	111.48	1672.17	0.396
Concio 2	336	I[836]	ST SLU Mobili	FZ-MIN	-1143.49	1017.43	111.48	1672.17	0.608
Concio 2	336	J[837]	ST SLU Mobili	FZ-MAX	961.11	855.15	111.48	1672.17	0.511
Concio 2	337	I[837]	ST SLU Mobili	FZ-MIN	-929.63	827.14	111.48	1672.17	0.495
Concio 2	337	J[838]	ST SLU Mobili	FZ-MAX	685.99	610.37	111.48	1672.17	0.365
Concio 1	338	I[838]	ST SLU Mobili	FZ-MAX	685.99	624.32	111.48	2229.56	0.280
Concio 1	338	J[839]	ST SLU Mobili	FZ-MAX	1204.91	1096.59	111.48	2229.56	0.492
Concio 1	339	I[839]	ST SLU Mobili	FZ-MAX	678.80	617.78	111.48	2229.56	0.277
Concio 1	339	J[840]	ST SLU Mobili	FZ-MAX	1678.17	1527.30	111.48	2229.56	0.685
Concio 1	340	I[840]	ST SLU Mobili	FZ-MIN	-721.86	656.96	111.48	2229.56	0.295
Concio 1	340	J[841]	ST SLV Vert	FX-MAX	1.40	1.28	111.48	2229.56	0.001
Concio 1	401	I[842]	ST SLV Vert	FX-MAX	1.57	1.43	111.48	2229.56	0.001
Concio 1	401	J[843]	ST SLU Mobili	FZ-MAX	447.79	406.44	111.48	2229.56	0.182
Concio 1	402	I[843]	ST SLU Mobili	FZ-MIN	-1338.49	1214.90	111.48	2229.56	0.545
Concio 1	402	J[844]	ST SLU Mobili	FZ-MIN	-702.66	637.77	111.48	2229.56	0.286
Concio 1	403	I[844]	ST SLU Mobili	FZ-MIN	-934.87	848.55	111.48	2229.56	0.381
Concio 1	403	J[845]	ST SLU Mobili	FZ-MIN	-561.27	509.45	111.48	2229.56	0.228
Concio 2	404	I[845]	ST SLU Mobili	FZ-MIN	-561.27	497.95	111.48	1672.17	0.298
Concio 2	404	J[846]	ST SLU Mobili	FZ-MAX	524.67	465.48	111.48	1672.17	0.278
Concio 2	405	I[846]	ST SLU Mobili	FZ-MIN	-609.41	540.65	111.48	1672.17	0.323
Concio 2	405	J[847]	ST SLU Mobili	FZ-MAX	807.16	716.10	111.48	1672.17	0.428
Concio 2	406	I[847]	ST SLU Mobili	FZ-MAX	544.76	483.30	111.48	1672.17	0.289
Concio 2	406	J[848]	ST SLU Mobili	FZ-MAX	882.11	782.60	111.48	1672.17	0.468
Concio 3	407	I[848]	ST SLU Mobili	FZ-MAX	882.11	791.66	111.48	2229.56	0.355
Concio 3	407	J[849]	ST SLU Mobili	FZ-MAX	1120.14	1005.27	111.48	2229.56	0.451
Concio 3	408	I[849]	ST SLU Mobili	FZ-MAX	875.14	785.40	111.48	2229.56	0.352
Concio 3	408	J[850]	ST SLU Mobili	FZ-MAX	1438.50	1290.99	111.48	2229.56	0.579

Concio 3	409	I[850]	ST SLU Mobili	FZ-MAX	1223.91	1098.41	111.48	2229.56	0.493
Concio 3	409	J[851]	ST SLU Mobili	FZ-MAX	1287.56	1155.53	111.48	2229.56	0.518
Concio 4 H=var	410	I[851]	ST SLU Mobili	FZ-MAX	1281.33	1123.60	111.48	2229.56	0.504
Concio 4 H=var	410	J[852]	ST SLU Mobili	FZ-MAX	1594.81	965.05	111.48	2229.56	0.433
Concio 4 H=var	411	I[852]	ST SLU Mobili	FZ-MAX	1440.39	871.60	111.48	2229.56	0.391
Concio 4 H=var	411	J[853]	ST SLU Mobili	FZ-MAX	1745.49	803.89	111.48	2229.56	0.361
Concio 4 H=200	412	I[853]	ST SLU Mobili	FZ-MAX	1743.98	803.19	111.48	2229.56	0.360
Concio 4 H=200	412	J[854]	ST SLU Mobili	FZ-MAX	1804.74	831.18	111.48	2229.56	0.373
Concio 4 H=200	413	I[854]	ST SLU Mobili	FZ-MIN	-1720.23	792.26	111.48	2229.56	0.355
Concio 4 H=200	413	J[855]	ST SLU Mobili	FZ-MIN	-1659.45	764.26	111.48	2229.56	0.343
Concio 4 H=var	414	I[855]	ST SLU Mobili	FZ-MIN	-1663.04	765.92	111.48	2229.56	0.344
Concio 4 H=var	414	J[856]	ST SLU Mobili	FZ-MIN	-1357.38	821.37	111.48	2229.56	0.368
Concio 4 H=var	415	I[856]	ST SLU Mobili	FZ-MIN	-1510.25	913.87	111.48	2229.56	0.410
Concio 4 H=var	415	J[857]	ST SLU Mobili	FZ-MIN	-1197.04	1049.68	111.48	2229.56	0.471
Concio 5	416	I[857]	ST SLU Mobili	FZ-MIN	-1200.16	1077.09	111.48	2229.56	0.483
Concio 5	416	J[858]	ST SLU Mobili	FZ-MIN	-1136.54	1019.99	111.48	2229.56	0.457
Concio 5	417	I[858]	ST SLU Mobili	FZ-MIN	-1353.71	1214.90	111.48	2229.56	0.545
Concio 5	417	J[859]	ST SLU Mobili	FZ-MIN	-774.21	694.82	111.48	2229.56	0.312
Concio 5	418	I[859]	ST SLU Mobili	FZ-MIN	-1029.71	924.12	111.48	2229.56	0.414
Concio 5	418	J[860]	ST SLU Mobili	FZ-MIN	-760.13	682.18	111.48	2229.56	0.306
Concio 6	419	I[860]	ST SLU Mobili	FZ-MIN	-760.13	668.96	111.48	1672.17	0.400
Concio 6	419	J[861]	ST SLU Mobili	FZ-MIN	-440.10	387.31	111.48	1672.17	0.232
Concio 6	420	I[861]	ST SLU Mobili	FZ-MIN	-710.68	625.45	111.48	1672.17	0.374
Concio 6	420	J[862]	ST SLU Mobili	FZ-MIN	-402.56	354.28	111.48	1672.17	0.212
Concio 6	421	I[862]	ST SLU Mobili	FZ-MIN	-402.56	354.28	111.48	1672.17	0.212
Concio 6	421	J[863]	ST SLU Mobili	FZ-MAX	710.54	625.33	111.48	1672.17	0.374
Concio 6	422	I[863]	ST SLU Mobili	FZ-MAX	440.01	387.24	111.48	1672.17	0.232
Concio 6	422	J[864]	ST SLU Mobili	FZ-MAX	759.98	668.83	111.48	1672.17	0.400
Concio 5	423	I[864]	ST SLU Mobili	FZ-MAX	759.98	682.05	111.48	2229.56	0.306
Concio 5	423	J[865]	ST SLU Mobili	FZ-MAX	1029.58	924.00	111.48	2229.56	0.414
Concio 5	424	I[865]	ST SLU Mobili	FZ-MAX	774.10	694.72	111.48	2229.56	0.312
Concio 5	424	J[866]	ST SLU Mobili	FZ-MAX	1353.47	1214.68	111.48	2229.56	0.545
Concio 5	425	I[866]	ST SLU Mobili	FZ-MAX	1136.37	1019.84	111.48	2229.56	0.457
Concio 5	425	J[867]	ST SLU Mobili	FZ-MAX	1199.98	1076.93	111.48	2229.56	0.483
Concio 4 H=var	426	I[867]	ST SLU Mobili	FZ-MAX	1196.84	1049.51	111.48	2229.56	0.471
Concio 4 H=var	426	J[868]	ST SLU Mobili	FZ-MAX	1510.05	913.75	111.48	2229.56	0.410
Concio 4 H=var	427	I[868]	ST SLU Mobili	FZ-MAX	1357.15	821.23	111.48	2229.56	0.368
Concio 4 H=var	427	J[869]	ST SLU Mobili	FZ-MAX	1662.78	765.80	111.48	2229.56	0.343
Concio 4 H=200	428	I[869]	ST SLU Mobili	FZ-MAX	1659.22	764.16	111.48	2229.56	0.343
Concio 4 H=200	428	J[870]	ST SLU Mobili	FZ-MAX	1720.00	792.15	111.48	2229.56	0.355
Concio 4 H=200	429	I[870]	ST SLU Mobili	FZ-MIN	-1805.06	831.33	111.48	2229.56	0.373
Concio 4 H=200	429	J[871]	ST SLU Mobili	FZ-MIN	-1744.30	803.34	111.48	2229.56	0.360
Concio 4 H=var	430	I[871]	ST SLU Mobili	FZ-MIN	-1745.83	804.04	111.48	2229.56	0.361
Concio 4 H=var	430	J[872]	ST SLU Mobili	FZ-MIN	-1440.69	871.78	111.48	2229.56	0.391
Concio 4 H=var	431	I[872]	ST SLU Mobili	FZ-MIN	-1595.06	965.20	111.48	2229.56	0.433
Concio 4 H=var	431	J[873]	ST SLU Mobili	FZ-MIN	-1281.58	1123.82	111.48	2229.56	0.504
Concio 3	432	I[873]	ST SLU Mobili	FZ-MIN	-1287.78	1155.73	111.48	2229.56	0.518
Concio 3	432	J[874]	ST SLU Mobili	FZ-MIN	-1224.13	1098.60	111.48	2229.56	0.493
Concio 3	433	I[874]	ST SLU Mobili	FZ-MIN	-1438.81	1291.27	111.48	2229.56	0.579
Concio 3	433	J[875]	ST SLU Mobili	FZ-MIN	-875.33	785.57	111.48	2229.56	0.352
Concio 3	434	I[875]	ST SLU Mobili	FZ-MIN	-1120.34	1005.45	111.48	2229.56	0.451
Concio 3	434	J[876]	ST SLU Mobili	FZ-MIN	-882.35	791.87	111.48	2229.56	0.355
Concio 2	435	I[876]	ST SLU Mobili	FZ-MIN	-882.35	782.80	111.48	1672.17	0.468
Concio 2	435	J[877]	ST SLU Mobili	FZ-MIN	-544.96	483.48	111.48	1672.17	0.289
Concio 2	436	I[877]	ST SLU Mobili	FZ-MIN	-807.45	716.36	111.48	1672.17	0.428
Concio 2	436	J[878]	ST SLU Mobili	FZ-MAX	609.11	540.39	111.48	1672.17	0.323
Concio 2	437	I[878]	ST SLU Mobili	FZ-MIN	-524.88	465.66	111.48	1672.17	0.278
Concio 2	437	J[879]	ST SLU Mobili	FZ-MAX	561.07	497.77	111.48	1672.17	0.298
Concio 1	438	I[879]	ST SLU Mobili	FZ-MAX	561.07	509.26	111.48	2229.56	0.228

Concio 1	438	J[880]	ST SLU Mobili	FZ-MAX	934.63	848.33	111.48	2229.56	0.380
Concio 1	439	I[880]	ST SLU Mobili	FZ-MAX	702.49	637.62	111.48	2229.56	0.286
Concio 1	439	J[881]	ST SLU Mobili	FZ-MAX	1338.16	1214.60	111.48	2229.56	0.545
Concio 1	440	I[881]	ST SLU Mobili	FZ-MIN	-447.79	406.44	111.48	2229.56	0.182
Concio 1	440	J[882]	ST SLV Vert	FX-MAX	1.53	1.39	111.48	2229.56	0.001

9.2 STATO LIMITE DI ESERCIZIO – RESISTENZA AL TAGLIO LONGITUDINALE

Si effettuano le verifiche allo stato limite di esercizio per taglio longitudinale dei connettori trave-soletta.

I coefficienti parziali per SLE assunti sono i seguenti:

$$k_s = 0.60 \quad \text{connettori: resistenza allo SLE}$$

Seguono i tabulati di calcolo per ogni asta considerata, per le combinazione di carichi più gravose.

Dati tabulati:

Elem property: nome delle caratteristiche geometriche dell'elemento

Elem: numero dell'elemento

Position: nodo iniziale (I) o finale (J) dell'elemento

Lcom: combinazione di carico più gravosa

Type: tipo combinazione (caratteristica, frequente, quasi permanente)

V_c,Ed: sforzo di taglio longitudinale agente sulla larghezza della regione inelastica

v_L,Ed: sforzo di taglio longitudinale di calcolo per unità di lunghezza (m) all'interfaccia trave-soletta

P_Rd,ser: resistenza al taglio (SLE) del singolo connettore "Nelson"

v_L,Rd: resistenza al taglio longitudinale per trave e per unità di lunghezza

Condizione di verifica: Verification Ratio: $\frac{v_{L,Ed}}{v_{L,Rd}} \leq 1$

Elem property	Elem number	Position	Lcom	Type	V_c,Ed (kN)	v_L,Ed (kN/m)	P_Rd_ser (kN)	v_L,Rd (kN/m)	Verif. Ratio
Concio 1	101	I[719]	ST RARA Mobili	Characteristic	0.00	0.00	66.89	1337.73	0.000
Concio 1	101	J[720]	ST RARA Mobili	Characteristic	16.89	15.33	66.89	1337.73	0.011
Concio 1	102	I[720]	ST RARA Mobili	Characteristic	-505.85	459.15	66.89	1337.73	0.343
Concio 1	102	J[721]	ST RARA Mobili	Characteristic	-409.65	371.83	66.89	1337.73	0.278
Concio 1	103	I[721]	ST RARA Mobili	Characteristic	-278.97	253.21	66.89	1337.73	0.189
Concio 1	103	J[722]	ST RARA Mobili	Characteristic	-221.25	200.82	66.89	1337.73	0.150
Concio 2	104	I[722]	ST RARA Mobili	Characteristic	-221.25	196.29	66.89	1003.30	0.196
Concio 2	104	J[723]	ST RARA Mobili	Characteristic	-182.77	162.15	66.89	1003.30	0.162
Concio 2	105	I[723]	ST RARA Mobili	Characteristic	134.81	119.60	66.89	1003.30	0.119
Concio 2	105	J[724]	ST RARA Mobili	Characteristic	219.78	194.99	66.89	1003.30	0.194
Concio 2	106	I[724]	ST RARA Mobili	Characteristic	337.45	299.38	66.89	1003.30	0.298
Concio 2	106	J[725]	ST RARA Mobili	Characteristic	395.17	350.59	66.89	1003.30	0.349
Concio 3	107	I[725]	ST RARA Mobili	Characteristic	395.17	354.65	66.89	1337.73	0.265
Concio 3	107	J[726]	ST RARA Mobili	Characteristic	433.65	389.18	66.89	1337.73	0.291
Concio 3	108	I[726]	ST RARA Mobili	Characteristic	545.78	489.81	66.89	1337.73	0.366
Concio 3	108	J[727]	ST RARA Mobili	Characteristic	641.98	576.15	66.89	1337.73	0.431
Concio 3	109	I[727]	ST RARA Mobili	Characteristic	713.78	640.59	66.89	1337.73	0.479
Concio 3	109	J[728]	ST RARA Mobili	Characteristic	723.40	649.22	66.89	1337.73	0.485
Concio 4 H=var	110	I[728]	ST RARA Mobili	Characteristic	722.81	633.83	66.89	1337.73	0.474
Concio 4 H=var	110	J[729]	ST RARA Mobili	Characteristic	774.55	468.69	66.89	1337.73	0.350
Concio 4 H=var	111	I[729]	ST RARA Mobili	Characteristic	832.68	503.87	66.89	1337.73	0.377
Concio 4 H=var	111	J[730]	ST RARA Mobili	Characteristic	884.40	407.31	66.89	1337.73	0.304
Concio 4 H=200	112	I[730]	ST RARA Mobili	Characteristic	883.63	406.96	66.89	1337.73	0.304
Concio 4 H=200	112	J[731]	ST RARA Mobili	Characteristic	893.98	411.72	66.89	1337.73	0.308
Concio 4 H=200	113	I[731]	ST RARA Mobili	Characteristic	-822.82	378.95	66.89	1337.73	0.283
Concio 4 H=200	113	J[732]	ST RARA Mobili	Characteristic	-812.48	374.19	66.89	1337.73	0.280

Concio 4 H=var	114	I[732]	ST RARA Mobili	Characteristic	-814.61	375.17	66.89	1337.73	0.280
Concio 4 H=var	114	J[733]	ST RARA Mobili	Characteristic	-762.89	461.63	66.89	1337.73	0.345
Concio 4 H=var	115	I[733]	ST RARA Mobili	Characteristic	-703.35	425.61	66.89	1337.73	0.318
Concio 4 H=var	115	J[734]	ST RARA Mobili	Characteristic	-651.61	571.40	66.89	1337.73	0.427
Concio 5	116	I[734]	ST RARA Mobili	Characteristic	-651.22	584.44	66.89	1337.73	0.437
Concio 5	116	J[735]	ST RARA Mobili	Characteristic	-641.60	575.81	66.89	1337.73	0.430
Concio 5	117	I[735]	ST RARA Mobili	Characteristic	-569.81	511.38	66.89	1337.73	0.382
Concio 5	117	J[736]	ST RARA Mobili	Characteristic	-469.76	421.59	66.89	1337.73	0.315
Concio 5	118	I[736]	ST RARA Mobili	Characteristic	-359.07	322.25	66.89	1337.73	0.241
Concio 5	118	J[737]	ST RARA Mobili	Characteristic	-314.82	282.54	66.89	1337.73	0.211
Concio 6	119	I[737]	ST RARA Mobili	Characteristic	-314.82	277.06	66.89	1003.30	0.276
Concio 6	119	J[738]	ST RARA Mobili	Characteristic	-259.03	227.96	66.89	1003.30	0.227
Concio 6	120	I[738]	ST RARA Mobili	Characteristic	-142.87	125.73	66.89	1003.30	0.125
Concio 6	120	J[739]	ST RARA Mobili	Characteristic	-92.84	81.71	66.89	1003.30	0.081
Concio 6	121	I[739]	ST RARA Mobili	Characteristic	-92.84	81.71	66.89	1003.30	0.081
Concio 6	121	J[740]	ST RARA Mobili	Characteristic	142.82	125.69	66.89	1003.30	0.125
Concio 6	122	I[740]	ST RARA Mobili	Characteristic	258.98	227.92	66.89	1003.30	0.227
Concio 6	122	J[741]	ST RARA Mobili	Characteristic	314.77	277.02	66.89	1003.30	0.276
Concio 5	123	I[741]	ST RARA Mobili	Characteristic	314.77	282.50	66.89	1337.73	0.211
Concio 5	123	J[742]	ST RARA Mobili	Characteristic	359.03	322.21	66.89	1337.73	0.241
Concio 5	124	I[742]	ST RARA Mobili	Characteristic	469.71	421.54	66.89	1337.73	0.315
Concio 5	124	J[743]	ST RARA Mobili	Characteristic	569.75	511.33	66.89	1337.73	0.382
Concio 5	125	I[743]	ST RARA Mobili	Characteristic	641.59	575.80	66.89	1337.73	0.430
Concio 5	125	J[744]	ST RARA Mobili	Characteristic	651.21	584.44	66.89	1337.73	0.437
Concio 4 H=var	126	I[744]	ST RARA Mobili	Characteristic	651.60	571.39	66.89	1337.73	0.427
Concio 4 H=var	126	J[745]	ST RARA Mobili	Characteristic	703.34	425.60	66.89	1337.73	0.318
Concio 4 H=var	127	I[745]	ST RARA Mobili	Characteristic	763.02	461.71	66.89	1337.73	0.345
Concio 4 H=var	127	J[746]	ST RARA Mobili	Characteristic	814.74	375.23	66.89	1337.73	0.280
Concio 4 H=200	128	I[746]	ST RARA Mobili	Characteristic	812.61	374.25	66.89	1337.73	0.280
Concio 4 H=200	128	J[747]	ST RARA Mobili	Characteristic	822.96	379.01	66.89	1337.73	0.283
Concio 4 H=200	129	I[747]	ST RARA Mobili	Characteristic	-893.85	411.66	66.89	1337.73	0.308
Concio 4 H=200	129	J[748]	ST RARA Mobili	Characteristic	-883.50	406.90	66.89	1337.73	0.304
Concio 4 H=var	130	I[748]	ST RARA Mobili	Characteristic	-884.27	407.25	66.89	1337.73	0.304
Concio 4 H=var	130	J[749]	ST RARA Mobili	Characteristic	-832.55	503.79	66.89	1337.73	0.377
Concio 4 H=var	131	I[749]	ST RARA Mobili	Characteristic	-774.56	468.70	66.89	1337.73	0.350
Concio 4 H=var	131	J[750]	ST RARA Mobili	Characteristic	-722.82	633.84	66.89	1337.73	0.474
Concio 3	132	I[750]	ST RARA Mobili	Characteristic	-723.41	649.23	66.89	1337.73	0.485
Concio 3	132	J[751]	ST RARA Mobili	Characteristic	-713.79	640.59	66.89	1337.73	0.479
Concio 3	133	I[751]	ST RARA Mobili	Characteristic	-642.03	576.20	66.89	1337.73	0.431
Concio 3	133	J[752]	ST RARA Mobili	Characteristic	-545.83	489.86	66.89	1337.73	0.366
Concio 3	134	I[752]	ST RARA Mobili	Characteristic	-433.68	389.21	66.89	1337.73	0.291
Concio 3	134	J[753]	ST RARA Mobili	Characteristic	-395.20	354.68	66.89	1337.73	0.265
Concio 2	135	I[753]	ST RARA Mobili	Characteristic	-395.20	350.62	66.89	1003.30	0.349
Concio 2	135	J[754]	ST RARA Mobili	Characteristic	-337.48	299.41	66.89	1003.30	0.298
Concio 2	136	I[754]	ST RARA Mobili	Characteristic	-219.71	194.92	66.89	1003.30	0.194
Concio 2	136	J[755]	ST RARA Mobili	Characteristic	-134.72	119.52	66.89	1003.30	0.119
Concio 2	137	I[755]	ST RARA Mobili	Characteristic	182.75	162.13	66.89	1003.30	0.162
Concio 2	137	J[756]	ST RARA Mobili	Characteristic	221.23	196.27	66.89	1003.30	0.196
Concio 1	138	I[756]	ST RARA Mobili	Characteristic	221.23	200.80	66.89	1337.73	0.150
Concio 1	138	J[757]	ST RARA Mobili	Characteristic	278.95	253.19	66.89	1337.73	0.189
Concio 1	139	I[757]	ST RARA Mobili	Characteristic	409.63	371.81	66.89	1337.73	0.278
Concio 1	139	J[758]	ST RARA Mobili	Characteristic	505.83	459.13	66.89	1337.73	0.343
Concio 1	140	I[758]	ST RARA Mobili	Characteristic	-16.89	15.33	66.89	1337.73	0.011
Concio 1	140	J[759]	ST RARA Mobili	Characteristic	0.00	0.00	66.89	1337.73	0.000
Concio 1	201	I[760]	ST RARA Mobili	Characteristic	0.00	0.00	66.89	1337.73	0.000
Concio 1	201	J[761]	ST RARA Mobili	Characteristic	328.00	298.51	66.89	1337.73	0.223
Concio 1	202	I[761]	ST RARA Mobili	Characteristic	-945.00	860.05	66.89	1337.73	0.643
Concio 1	202	J[762]	ST RARA Mobili	Characteristic	-456.76	415.69	66.89	1337.73	0.311
Concio 1	203	I[762]	ST RARA Mobili	Characteristic	-651.03	592.50	66.89	1337.73	0.443

Concio 1	203	J[763]	ST RARA Mobili	Characteristic	-393.72	358.32	66.89	1337.73	0.268
Concio 2	204	I[763]	ST RARA Mobili	Characteristic	-393.72	350.31	66.89	1003.30	0.349
Concio 2	204	J[764]	ST RARA Mobili	Characteristic	455.07	404.90	66.89	1003.30	0.404
Concio 2	205	I[764]	ST RARA Mobili	Characteristic	-474.54	422.23	66.89	1003.30	0.421
Concio 2	205	J[765]	ST RARA Mobili	Characteristic	616.66	548.67	66.89	1003.30	0.547
Concio 2	206	I[765]	ST RARA Mobili	Characteristic	388.55	345.72	66.89	1003.30	0.345
Concio 2	206	J[766]	ST RARA Mobili	Characteristic	627.60	558.41	66.89	1003.30	0.557
Concio 3	207	I[766]	ST RARA Mobili	Characteristic	627.60	565.08	66.89	1337.73	0.422
Concio 3	207	J[767]	ST RARA Mobili	Characteristic	793.81	714.73	66.89	1337.73	0.534
Concio 3	208	I[767]	ST RARA Mobili	Characteristic	601.20	541.31	66.89	1337.73	0.405
Concio 3	208	J[768]	ST RARA Mobili	Characteristic	1010.19	909.56	66.89	1337.73	0.680
Concio 3	209	I[768]	ST RARA Mobili	Characteristic	864.65	778.52	66.89	1337.73	0.582
Concio 3	209	J[769]	ST RARA Mobili	Characteristic	902.97	813.02	66.89	1337.73	0.608
Concio 4 H=var	210	I[769]	ST RARA Mobili	Characteristic	894.00	787.94	66.89	1337.73	0.589
Concio 4 H=var	210	J[770]	ST RARA Mobili	Characteristic	1125.50	685.84	66.89	1337.73	0.513
Concio 4 H=var	211	I[770]	ST RARA Mobili	Characteristic	1051.97	641.03	66.89	1337.73	0.479
Concio 4 H=var	211	J[771]	ST RARA Mobili	Characteristic	1289.25	598.75	66.89	1337.73	0.448
Concio 4 H=200	212	I[771]	ST RARA Mobili	Characteristic	1291.98	600.02	66.89	1337.73	0.449
Concio 4 H=200	212	J[772]	ST RARA Mobili	Characteristic	1337.38	621.10	66.89	1337.73	0.464
Concio 4 H=200	213	I[772]	ST RARA Mobili	Characteristic	-1267.91	588.84	66.89	1337.73	0.440
Concio 4 H=200	213	J[773]	ST RARA Mobili	Characteristic	-1222.55	567.77	66.89	1337.73	0.424
Concio 4 H=var	214	I[773]	ST RARA Mobili	Characteristic	-1219.54	566.37	66.89	1337.73	0.423
Concio 4 H=var	214	J[774]	ST RARA Mobili	Characteristic	-982.26	598.56	66.89	1337.73	0.447
Concio 4 H=var	215	I[774]	ST RARA Mobili	Characteristic	-1057.07	644.15	66.89	1337.73	0.482
Concio 4 H=var	215	J[775]	ST RARA Mobili	Characteristic	-826.23	728.20	66.89	1337.73	0.544
Concio 5	216	I[775]	ST RARA Mobili	Characteristic	-835.95	752.68	66.89	1337.73	0.563
Concio 5	216	J[776]	ST RARA Mobili	Characteristic	-797.75	718.28	66.89	1337.73	0.537
Concio 5	217	I[776]	ST RARA Mobili	Characteristic	-948.94	854.41	66.89	1337.73	0.639
Concio 5	217	J[777]	ST RARA Mobili	Characteristic	-525.64	473.28	66.89	1337.73	0.354
Concio 5	218	I[777]	ST RARA Mobili	Characteristic	-727.32	654.87	66.89	1337.73	0.490
Concio 5	218	J[778]	ST RARA Mobili	Characteristic	-536.72	483.25	66.89	1337.73	0.361
Concio 6	219	I[778]	ST RARA Mobili	Characteristic	-536.72	473.61	66.89	1003.30	0.472
Concio 6	219	J[779]	ST RARA Mobili	Characteristic	384.22	339.04	66.89	1003.30	0.338
Concio 6	220	I[779]	ST RARA Mobili	Characteristic	-547.17	482.84	66.89	1003.30	0.481
Concio 6	220	J[780]	ST RARA Mobili	Characteristic	-330.31	291.47	66.89	1003.30	0.291
Concio 6	221	I[780]	ST RARA Mobili	Characteristic	-330.31	291.47	66.89	1003.30	0.291
Concio 6	221	J[781]	ST RARA Mobili	Characteristic	547.04	482.72	66.89	1003.30	0.481
Concio 6	222	I[781]	ST RARA Mobili	Characteristic	-384.37	339.17	66.89	1003.30	0.338
Concio 6	222	J[782]	ST RARA Mobili	Characteristic	536.57	473.48	66.89	1003.30	0.472
Concio 5	223	I[782]	ST RARA Mobili	Characteristic	536.57	483.12	66.89	1337.73	0.361
Concio 5	223	J[783]	ST RARA Mobili	Characteristic	727.20	654.76	66.89	1337.73	0.489
Concio 5	224	I[783]	ST RARA Mobili	Characteristic	525.54	473.19	66.89	1337.73	0.354
Concio 5	224	J[784]	ST RARA Mobili	Characteristic	948.77	854.26	66.89	1337.73	0.639
Concio 5	225	I[784]	ST RARA Mobili	Characteristic	797.57	718.12	66.89	1337.73	0.537
Concio 5	225	J[785]	ST RARA Mobili	Characteristic	835.77	752.51	66.89	1337.73	0.563
Concio 4 H=var	226	I[785]	ST RARA Mobili	Characteristic	826.06	728.05	66.89	1337.73	0.544
Concio 4 H=var	226	J[786]	ST RARA Mobili	Characteristic	1056.94	644.07	66.89	1337.73	0.481
Concio 4 H=var	227	I[786]	ST RARA Mobili	Characteristic	982.06	598.43	66.89	1337.73	0.447
Concio 4 H=var	227	J[787]	ST RARA Mobili	Characteristic	1219.32	566.27	66.89	1337.73	0.423
Concio 4 H=200	228	I[787]	ST RARA Mobili	Characteristic	1222.32	567.66	66.89	1337.73	0.424
Concio 4 H=200	228	J[788]	ST RARA Mobili	Characteristic	1267.68	588.73	66.89	1337.73	0.440
Concio 4 H=200	229	I[788]	ST RARA Mobili	Characteristic	-1337.62	621.21	66.89	1337.73	0.464
Concio 4 H=200	229	J[789]	ST RARA Mobili	Characteristic	-1292.22	600.13	66.89	1337.73	0.449
Concio 4 H=var	230	I[789]	ST RARA Mobili	Characteristic	-1289.47	598.85	66.89	1337.73	0.448
Concio 4 H=var	230	J[790]	ST RARA Mobili	Characteristic	-1052.17	641.16	66.89	1337.73	0.479
Concio 4 H=var	231	I[790]	ST RARA Mobili	Characteristic	-1125.64	685.93	66.89	1337.73	0.513
Concio 4 H=var	231	J[791]	ST RARA Mobili	Characteristic	-894.19	788.10	66.89	1337.73	0.589
Concio 3	232	I[791]	ST RARA Mobili	Characteristic	-903.16	813.19	66.89	1337.73	0.608
Concio 3	232	J[792]	ST RARA Mobili	Characteristic	-864.83	778.68	66.89	1337.73	0.582

Concio 3	233	I[792]	ST RARA Mobili	Characteristic	-1010.38	909.73	66.89	1337.73	0.680
Concio 3	233	J[793]	ST RARA Mobili	Characteristic	-601.30	541.40	66.89	1337.73	0.405
Concio 3	234	I[793]	ST RARA Mobili	Characteristic	-793.95	714.86	66.89	1337.73	0.534
Concio 3	234	J[794]	ST RARA Mobili	Characteristic	-627.77	565.23	66.89	1337.73	0.423
Concio 2	235	I[794]	ST RARA Mobili	Characteristic	-627.77	558.56	66.89	1003.30	0.557
Concio 2	235	J[795]	ST RARA Mobili	Characteristic	-388.72	345.87	66.89	1003.30	0.345
Concio 2	236	I[795]	ST RARA Mobili	Characteristic	-616.88	548.87	66.89	1003.30	0.547
Concio 2	236	J[796]	ST RARA Mobili	Characteristic	474.32	422.03	66.89	1003.30	0.421
Concio 2	237	I[796]	ST RARA Mobili	Characteristic	-455.22	405.03	66.89	1003.30	0.404
Concio 2	237	J[797]	ST RARA Mobili	Characteristic	393.58	350.19	66.89	1003.30	0.349
Concio 1	238	I[797]	ST RARA Mobili	Characteristic	393.58	358.20	66.89	1337.73	0.268
Concio 1	238	J[798]	ST RARA Mobili	Characteristic	650.87	592.35	66.89	1337.73	0.443
Concio 1	239	I[798]	ST RARA Mobili	Characteristic	456.59	415.54	66.89	1337.73	0.311
Concio 1	239	J[799]	ST RARA Mobili	Characteristic	944.72	859.78	66.89	1337.73	0.643
Concio 1	240	I[799]	ST RARA Mobili	Characteristic	-328.00	298.51	66.89	1337.73	0.223
Concio 1	240	J[800]	ST RARA Mobili	Characteristic	0.00	0.00	66.89	1337.73	0.000
Concio 1	301	I[801]	ST RARA Mobili	Characteristic	0.00	0.00	66.89	1337.73	0.000
Concio 1	301	J[802]	ST RARA Mobili	Characteristic	534.00	485.99	66.89	1337.73	0.363
Concio 1	302	I[802]	ST RARA Mobili	Characteristic	-1229.75	1119.20	66.89	1337.73	0.837
Concio 1	302	J[803]	ST RARA Mobili	Characteristic	498.25	453.45	66.89	1337.73	0.339
Concio 1	303	I[803]	ST RARA Mobili	Characteristic	-882.66	803.31	66.89	1337.73	0.601
Concio 1	303	J[804]	ST RARA Mobili	Characteristic	-500.90	455.86	66.89	1337.73	0.341
Concio 2	304	I[804]	ST RARA Mobili	Characteristic	-500.90	445.67	66.89	1003.30	0.444
Concio 2	304	J[805]	ST RARA Mobili	Characteristic	696.04	619.30	66.89	1003.30	0.617
Concio 2	305	I[805]	ST RARA Mobili	Characteristic	-707.24	629.27	66.89	1003.30	0.627
Concio 2	305	J[806]	ST RARA Mobili	Characteristic	848.93	755.34	66.89	1003.30	0.753
Concio 2	306	I[806]	ST RARA Mobili	Characteristic	-551.74	490.91	66.89	1003.30	0.489
Concio 2	306	J[807]	ST RARA Mobili	Characteristic	776.82	691.18	66.89	1003.30	0.689
Concio 3	307	I[807]	ST RARA Mobili	Characteristic	776.82	699.44	66.89	1337.73	0.523
Concio 3	307	J[808]	ST RARA Mobili	Characteristic	1022.31	920.47	66.89	1337.73	0.688
Concio 3	308	I[808]	ST RARA Mobili	Characteristic	643.66	579.54	66.89	1337.73	0.433
Concio 3	308	J[809]	ST RARA Mobili	Characteristic	1246.17	1122.03	66.89	1337.73	0.839
Concio 3	309	I[809]	ST RARA Mobili	Characteristic	967.80	871.39	66.89	1337.73	0.651
Concio 3	309	J[810]	ST RARA Mobili	Characteristic	1024.29	922.25	66.89	1337.73	0.689
Concio 4 H=var	310	I[810]	ST RARA Mobili	Characteristic	1015.10	894.67	66.89	1337.73	0.669
Concio 4 H=var	310	J[811]	ST RARA Mobili	Characteristic	1358.62	827.90	66.89	1337.73	0.619
Concio 4 H=var	311	I[811]	ST RARA Mobili	Characteristic	1181.05	719.69	66.89	1337.73	0.538
Concio 4 H=var	311	J[812]	ST RARA Mobili	Characteristic	1535.22	712.98	66.89	1337.73	0.533
Concio 4 H=200	312	I[812]	ST RARA Mobili	Characteristic	1534.84	712.80	66.89	1337.73	0.533
Concio 4 H=200	312	J[813]	ST RARA Mobili	Characteristic	1601.96	743.98	66.89	1337.73	0.556
Concio 4 H=200	313	I[813]	ST RARA Mobili	Characteristic	-1532.87	711.89	66.89	1337.73	0.532
Concio 4 H=200	313	J[814]	ST RARA Mobili	Characteristic	-1465.82	680.75	66.89	1337.73	0.509
Concio 4 H=var	314	I[814]	ST RARA Mobili	Characteristic	-1466.04	680.85	66.89	1337.73	0.509
Concio 4 H=var	314	J[815]	ST RARA Mobili	Characteristic	-1111.93	677.58	66.89	1337.73	0.507
Concio 4 H=var	315	I[815]	ST RARA Mobili	Characteristic	-1291.47	786.98	66.89	1337.73	0.588
Concio 4 H=var	315	J[816]	ST RARA Mobili	Characteristic	-949.08	836.48	66.89	1337.73	0.625
Concio 5	316	I[816]	ST RARA Mobili	Characteristic	-958.67	863.17	66.89	1337.73	0.645
Concio 5	316	J[817]	ST RARA Mobili	Characteristic	-902.35	812.47	66.89	1337.73	0.607
Concio 5	317	I[817]	ST RARA Mobili	Characteristic	-1186.86	1068.63	66.89	1337.73	0.799
Concio 5	317	J[818]	ST RARA Mobili	Characteristic	-563.52	507.38	66.89	1337.73	0.379
Concio 5	318	I[818]	ST RARA Mobili	Characteristic	-957.72	862.32	66.89	1337.73	0.645
Concio 5	318	J[819]	ST RARA Mobili	Characteristic	-676.27	608.91	66.89	1337.73	0.455
Concio 6	319	I[819]	ST RARA Mobili	Characteristic	-676.27	596.76	66.89	1003.30	0.595
Concio 6	319	J[820]	ST RARA Mobili	Characteristic	620.85	547.85	66.89	1003.30	0.546
Concio 6	320	I[820]	ST RARA Mobili	Characteristic	-780.72	688.92	66.89	1003.30	0.687
Concio 6	320	J[821]	ST RARA Mobili	Characteristic	-460.41	406.27	66.89	1003.30	0.405
Concio 6	321	I[821]	ST RARA Mobili	Characteristic	-460.41	406.27	66.89	1003.30	0.405
Concio 6	321	J[822]	ST RARA Mobili	Characteristic	780.54	688.77	66.89	1003.30	0.686
Concio 6	322	I[822]	ST RARA Mobili	Characteristic	-621.05	548.03	66.89	1003.30	0.546

Concio 6	322	J[823]	ST RARA Mobili	Characteristic	676.08	596.58	66.89	1003.30	0.595
Concio 5	323	I[823]	ST RARA Mobili	Characteristic	676.08	608.73	66.89	1337.73	0.455
Concio 5	323	J[824]	ST RARA Mobili	Characteristic	957.56	862.17	66.89	1337.73	0.645
Concio 5	324	I[824]	ST RARA Mobili	Characteristic	563.36	507.24	66.89	1337.73	0.379
Concio 5	324	J[825]	ST RARA Mobili	Characteristic	1186.56	1068.36	66.89	1337.73	0.799
Concio 5	325	I[825]	ST RARA Mobili	Characteristic	902.08	812.22	66.89	1337.73	0.607
Concio 5	325	J[826]	ST RARA Mobili	Characteristic	958.39	862.92	66.89	1337.73	0.645
Concio 4 H=var	326	I[826]	ST RARA Mobili	Characteristic	948.78	836.22	66.89	1337.73	0.625
Concio 4 H=var	326	J[827]	ST RARA Mobili	Characteristic	1291.25	786.85	66.89	1337.73	0.588
Concio 4 H=var	327	I[827]	ST RARA Mobili	Characteristic	1111.72	677.45	66.89	1337.73	0.506
Concio 4 H=var	327	J[828]	ST RARA Mobili	Characteristic	1465.80	680.74	66.89	1337.73	0.509
Concio 4 H=200	328	I[828]	ST RARA Mobili	Characteristic	1465.57	680.64	66.89	1337.73	0.509
Concio 4 H=200	328	J[829]	ST RARA Mobili	Characteristic	1532.63	711.78	66.89	1337.73	0.532
Concio 4 H=200	329	I[829]	ST RARA Mobili	Characteristic	-1602.21	744.09	66.89	1337.73	0.556
Concio 4 H=200	329	J[830]	ST RARA Mobili	Characteristic	-1535.10	712.92	66.89	1337.73	0.533
Concio 4 H=var	330	I[830]	ST RARA Mobili	Characteristic	-1535.48	713.10	66.89	1337.73	0.533
Concio 4 H=var	330	J[831]	ST RARA Mobili	Characteristic	-1181.29	719.84	66.89	1337.73	0.538
Concio 4 H=var	331	I[831]	ST RARA Mobili	Characteristic	-1358.85	828.04	66.89	1337.73	0.619
Concio 4 H=var	331	J[832]	ST RARA Mobili	Characteristic	-1015.40	894.93	66.89	1337.73	0.669
Concio 3	332	I[832]	ST RARA Mobili	Characteristic	-1024.58	922.52	66.89	1337.73	0.690
Concio 3	332	J[833]	ST RARA Mobili	Characteristic	-968.10	871.66	66.89	1337.73	0.652
Concio 3	333	I[833]	ST RARA Mobili	Characteristic	-1246.48	1122.31	66.89	1337.73	0.839
Concio 3	333	J[834]	ST RARA Mobili	Characteristic	-643.84	579.70	66.89	1337.73	0.433
Concio 3	334	I[834]	ST RARA Mobili	Characteristic	-1022.50	920.64	66.89	1337.73	0.688
Concio 3	334	J[835]	ST RARA Mobili	Characteristic	-777.06	699.65	66.89	1337.73	0.523
Concio 2	335	I[835]	ST RARA Mobili	Characteristic	-777.06	691.39	66.89	1003.30	0.689
Concio 2	335	J[836]	ST RARA Mobili	Characteristic	551.50	490.70	66.89	1003.30	0.489
Concio 2	336	I[836]	ST RARA Mobili	Characteristic	-849.27	755.64	66.89	1003.30	0.753
Concio 2	336	J[837]	ST RARA Mobili	Characteristic	706.88	628.95	66.89	1003.30	0.627
Concio 2	337	I[837]	ST RARA Mobili	Characteristic	-696.25	619.49	66.89	1003.30	0.617
Concio 2	337	J[838]	ST RARA Mobili	Characteristic	500.70	445.50	66.89	1003.30	0.444
Concio 1	338	I[838]	ST RARA Mobili	Characteristic	500.70	455.69	66.89	1337.73	0.341
Concio 1	338	J[839]	ST RARA Mobili	Characteristic	882.42	803.09	66.89	1337.73	0.600
Concio 1	339	I[839]	ST RARA Mobili	Characteristic	-498.64	453.81	66.89	1337.73	0.339
Concio 1	339	J[840]	ST RARA Mobili	Characteristic	1229.32	1118.80	66.89	1337.73	0.836
Concio 1	340	I[840]	ST RARA Mobili	Characteristic	-534.00	485.99	66.89	1337.73	0.363
Concio 1	340	J[841]	ST RARA Mobili	Characteristic	0.00	0.00	66.89	1337.73	0.000
Concio 1	401	I[842]	ST RARA Mobili	Characteristic	0.00	0.00	66.89	1337.73	0.000
Concio 1	401	J[843]	ST RARA Mobili	Characteristic	330.69	300.15	66.89	1337.73	0.224
Concio 1	402	I[843]	ST RARA Mobili	Characteristic	-974.73	884.73	66.89	1337.73	0.661
Concio 1	402	J[844]	ST RARA Mobili	Characteristic	-510.06	462.96	66.89	1337.73	0.346
Concio 1	403	I[844]	ST RARA Mobili	Characteristic	-680.85	617.98	66.89	1337.73	0.462
Concio 1	403	J[845]	ST RARA Mobili	Characteristic	-407.90	370.23	66.89	1337.73	0.277
Concio 2	404	I[845]	ST RARA Mobili	Characteristic	-407.90	361.88	66.89	1003.30	0.361
Concio 2	404	J[846]	ST RARA Mobili	Characteristic	395.85	351.19	66.89	1003.30	0.350
Concio 2	405	I[846]	ST RARA Mobili	Characteristic	-445.55	395.29	66.89	1003.30	0.394
Concio 2	405	J[847]	ST RARA Mobili	Characteristic	599.34	531.72	66.89	1003.30	0.530
Concio 2	406	I[847]	ST RARA Mobili	Characteristic	405.60	359.84	66.89	1003.30	0.359
Concio 2	406	J[848]	ST RARA Mobili	Characteristic	651.71	578.18	66.89	1003.30	0.576
Concio 3	407	I[848]	ST RARA Mobili	Characteristic	651.71	584.88	66.89	1337.73	0.437
Concio 3	407	J[849]	ST RARA Mobili	Characteristic	825.50	740.85	66.89	1337.73	0.554
Concio 3	408	I[849]	ST RARA Mobili	Characteristic	644.70	578.59	66.89	1337.73	0.433
Concio 3	408	J[850]	ST RARA Mobili	Characteristic	1055.69	947.44	66.89	1337.73	0.708
Concio 3	409	I[850]	ST RARA Mobili	Characteristic	898.22	806.11	66.89	1337.73	0.603
Concio 3	409	J[851]	ST RARA Mobili	Characteristic	944.74	847.86	66.89	1337.73	0.634
Concio 4 H=var	410	I[851]	ST RARA Mobili	Characteristic	939.73	824.05	66.89	1337.73	0.616
Concio 4 H=var	410	J[852]	ST RARA Mobili	Characteristic	1168.78	707.25	66.89	1337.73	0.529
Concio 4 H=var	411	I[852]	ST RARA Mobili	Characteristic	1056.90	639.54	66.89	1337.73	0.478
Concio 4 H=var	411	J[853]	ST RARA Mobili	Characteristic	1279.74	589.39	66.89	1337.73	0.441

Concio 4 H=200	412	I[853]	ST RARA Mobili	Characteristic	1279.05	589.07	66.89	1337.73	0.440
Concio 4 H=200	412	J[854]	ST RARA Mobili	Characteristic	1323.43	609.51	66.89	1337.73	0.456
Concio 4 H=200	413	I[854]	ST RARA Mobili	Characteristic	-1255.68	578.30	66.89	1337.73	0.432
Concio 4 H=200	413	J[855]	ST RARA Mobili	Characteristic	-1211.29	557.86	66.89	1337.73	0.417
Concio 4 H=var	414	I[855]	ST RARA Mobili	Characteristic	-1213.72	558.98	66.89	1337.73	0.418
Concio 4 H=var	414	J[856]	ST RARA Mobili	Characteristic	-990.47	599.35	66.89	1337.73	0.448
Concio 4 H=var	415	I[856]	ST RARA Mobili	Characteristic	-1101.05	666.26	66.89	1337.73	0.498
Concio 4 H=var	415	J[857]	ST RARA Mobili	Characteristic	-872.20	764.83	66.89	1337.73	0.572
Concio 5	416	I[857]	ST RARA Mobili	Characteristic	-874.72	785.02	66.89	1337.73	0.587
Concio 5	416	J[858]	ST RARA Mobili	Characteristic	-828.23	743.30	66.89	1337.73	0.556
Concio 5	417	I[858]	ST RARA Mobili	Characteristic	-987.54	886.28	66.89	1337.73	0.663
Concio 5	417	J[859]	ST RARA Mobili	Characteristic	-564.85	506.93	66.89	1337.73	0.379
Concio 5	418	I[859]	ST RARA Mobili	Characteristic	-753.48	676.21	66.89	1337.73	0.505
Concio 5	418	J[860]	ST RARA Mobili	Characteristic	-556.69	499.60	66.89	1337.73	0.373
Concio 6	419	I[860]	ST RARA Mobili	Characteristic	-556.69	489.92	66.89	1003.30	0.488
Concio 6	419	J[861]	ST RARA Mobili	Characteristic	-323.29	284.52	66.89	1003.30	0.284
Concio 6	420	I[861]	ST RARA Mobili	Characteristic	-523.15	460.41	66.89	1003.30	0.459
Concio 6	420	J[862]	ST RARA Mobili	Characteristic	-298.19	262.43	66.89	1003.30	0.262
Concio 6	421	I[862]	ST RARA Mobili	Characteristic	-298.19	262.43	66.89	1003.30	0.262
Concio 6	421	J[863]	ST RARA Mobili	Characteristic	523.04	460.31	66.89	1003.30	0.459
Concio 6	422	I[863]	ST RARA Mobili	Characteristic	323.22	284.46	66.89	1003.30	0.284
Concio 6	422	J[864]	ST RARA Mobili	Characteristic	556.58	489.82	66.89	1003.30	0.488
Concio 5	423	I[864]	ST RARA Mobili	Characteristic	556.58	499.50	66.89	1337.73	0.373
Concio 5	423	J[865]	ST RARA Mobili	Characteristic	753.38	676.12	66.89	1337.73	0.505
Concio 5	424	I[865]	ST RARA Mobili	Characteristic	564.76	506.85	66.89	1337.73	0.379
Concio 5	424	J[866]	ST RARA Mobili	Characteristic	987.36	886.12	66.89	1337.73	0.662
Concio 5	425	I[866]	ST RARA Mobili	Characteristic	828.10	743.18	66.89	1337.73	0.556
Concio 5	425	J[867]	ST RARA Mobili	Characteristic	874.59	784.91	66.89	1337.73	0.587
Concio 4 H=var	426	I[867]	ST RARA Mobili	Characteristic	872.06	764.70	66.89	1337.73	0.572
Concio 4 H=var	426	J[868]	ST RARA Mobili	Characteristic	1100.90	666.17	66.89	1337.73	0.498
Concio 4 H=var	427	I[868]	ST RARA Mobili	Characteristic	990.31	599.25	66.89	1337.73	0.448
Concio 4 H=var	427	J[869]	ST RARA Mobili	Characteristic	1213.54	558.90	66.89	1337.73	0.418
Concio 4 H=200	428	I[869]	ST RARA Mobili	Characteristic	1211.12	557.79	66.89	1337.73	0.417
Concio 4 H=200	428	J[870]	ST RARA Mobili	Characteristic	1255.51	578.23	66.89	1337.73	0.432
Concio 4 H=200	429	I[870]	ST RARA Mobili	Characteristic	-1323.66	609.62	66.89	1337.73	0.456
Concio 4 H=200	429	J[871]	ST RARA Mobili	Characteristic	-1279.28	589.18	66.89	1337.73	0.440
Concio 4 H=var	430	I[871]	ST RARA Mobili	Characteristic	-1279.98	589.50	66.89	1337.73	0.441
Concio 4 H=var	430	J[872]	ST RARA Mobili	Characteristic	-1057.12	639.68	66.89	1337.73	0.478
Concio 4 H=var	431	I[872]	ST RARA Mobili	Characteristic	-1168.96	707.36	66.89	1337.73	0.529
Concio 4 H=var	431	J[873]	ST RARA Mobili	Characteristic	-939.91	824.21	66.89	1337.73	0.616
Concio 3	432	I[873]	ST RARA Mobili	Characteristic	-944.90	848.01	66.89	1337.73	0.634
Concio 3	432	J[874]	ST RARA Mobili	Characteristic	-898.38	806.26	66.89	1337.73	0.603
Concio 3	433	I[874]	ST RARA Mobili	Characteristic	-1055.92	947.65	66.89	1337.73	0.708
Concio 3	433	J[875]	ST RARA Mobili	Characteristic	-644.84	578.72	66.89	1337.73	0.433
Concio 3	434	I[875]	ST RARA Mobili	Characteristic	-825.64	740.98	66.89	1337.73	0.554
Concio 3	434	J[876]	ST RARA Mobili	Characteristic	-651.88	585.04	66.89	1337.73	0.437
Concio 2	435	I[876]	ST RARA Mobili	Characteristic	-651.88	578.34	66.89	1003.30	0.576
Concio 2	435	J[877]	ST RARA Mobili	Characteristic	-405.75	359.97	66.89	1003.30	0.359
Concio 2	436	I[877]	ST RARA Mobili	Characteristic	-599.55	531.91	66.89	1003.30	0.530
Concio 2	436	J[878]	ST RARA Mobili	Characteristic	445.33	395.09	66.89	1003.30	0.394
Concio 2	437	I[878]	ST RARA Mobili	Characteristic	-396.00	351.33	66.89	1003.30	0.350
Concio 2	437	J[879]	ST RARA Mobili	Characteristic	407.74	361.74	66.89	1003.30	0.361
Concio 1	438	I[879]	ST RARA Mobili	Characteristic	407.74	370.10	66.89	1337.73	0.277
Concio 1	438	J[880]	ST RARA Mobili	Characteristic	680.67	617.82	66.89	1337.73	0.462
Concio 1	439	I[880]	ST RARA Mobili	Characteristic	509.93	462.85	66.89	1337.73	0.346
Concio 1	439	J[881]	ST RARA Mobili	Characteristic	974.49	884.51	66.89	1337.73	0.661
Concio 1	440	I[881]	ST RARA Mobili	Characteristic	-330.69	300.15	66.89	1337.73	0.224
Concio 1	440	J[882]	ST RARA Mobili	Characteristic	0.00	0.00	66.89	1337.73	0.000

9.3 STATO LIMITE ULTIMO DI FATICA – RESISTENZA AL TAGLIO LONGITUDINALE

Si effettuano le verifiche allo stato limite ultimo per fatica a “danneggiamento accettabile” dei connettori trave-soletta.

L’impalcato si considera caricato secondo il modello di carico a fatica 3, applicato sulla corsia lenta (ved. 3.4.2). Il coefficiente parziale di sicurezza per le verifiche dei connettori è pari a:

$$\gamma_{Mf,s} = 1 \quad \text{EN 1994-1-1:2005; § 6.8.2}$$

I coefficienti di equivalenza assumono i seguenti valori:

$$\lambda_{v1} = 1.55: \quad \text{EN 1994-2:2005, § 6.8.6.2(4)}$$

$$\lambda_{v2} = \frac{Q_{M1}}{Q_0} \left(\frac{N_{obs}}{N_0} \right)^{1/8} = 1.10: \quad \text{EN 1993-2, § 9.5.2}$$

$Q_{M1} = 440 \text{ kN}$: massa complessiva a pieno carico autotreno o autoarticolato a 5 assi

$Q_0 = 480 \text{ kN}$

$N_{obs} = 2 \times 10^6$: flusso annuo di veicoli pesanti sulla corsia lenta per strade ed autostrade caratterizzate da intenso traffico pesante.

$N_0 = 2 \times 10^6$

$$\lambda_{v3} = \left(\frac{t_{ld}}{100} \right)^{1/8} = 0.871$$

$t_{ld} = 50$ anni: vita di progetto del ponte

$$\lambda_{v4} = 1: \text{fattore per traffico pesante sulle altre corsie}$$

$$\lambda_v = \lambda_{v1} \cdot \lambda_{v2} \cdot \lambda_{v3} \cdot \lambda_{v4} = 1.484$$

Seguono i tabulati di calcolo per ogni asta considerata, per le combinazioni di carichi più gravose.

Dati tabulati:

Elem property: nome delle caratteristiche geometriche dell’elemento

Elem: numero dell’elemento

Position: nodo iniziale (I) o finale (J) dell’elemento

Lcom: combinazione di carico più gravosa

Type: sollecitazione (massima o minima)

Lamda_v: coefficienti di danno equivalente

Delta_Tau: ampiezza delle tensioni tangenziali per il carico da fatica

Delta_Tau_E_2 = Lamda_v x Delta_Tau: ampiezza costante delle tensioni tangenziali relative a 2×10^6 cicli di carico all’anno

Delta_Tau_c: tensione tangenziale limite (resistenza a fatica connettori a piolo)

$$\text{Verification Ratio} = \gamma_{Mf,s} \frac{\text{Delta_Tau_E_2}}{\text{Delta_Tau_c}} \quad \text{verificato se } \leq 1$$

Elem property	Elem number	Position	Lcom	Type	Lamda_v	Delta_Tau (kN/m ²)	Delta_Tau_E_2 (kN/m ²)	Delta_Tau_c (kN/m ²)	Verif. Ratio
Concio 1	101	I[719]	ST FATICA DANN.ACC.	FX-MAX	1.484	0.000	0.000	90000.000	0.000
Concio 1	101	J[720]	ST FATICA DANN.ACC.	FX-MAX	1.484	1241.872	1843.297	90000.000	0.021
Concio 1	102	I[720]	ST FATICA DANN.ACC.	FZ-MIN	1.484	20274.847	30093.726	90000.000	0.334
Concio 1	102	J[721]	ST FATICA DANN.ACC.	FZ-MIN	1.484	12513.146	18573.122	90000.000	0.206
Concio 1	103	I[721]	ST FATICA DANN.ACC.	FZ-MIN	1.484	9395.867	13946.179	90000.000	0.155
Concio 1	103	J[722]	ST FATICA DANN.ACC.	MZ-MIN	1.484	4799.287	7123.527	90000.000	0.079
Concio 2	104	I[722]	ST FATICA DANN.ACC.	MZ-MIN	1.484	6254.656	9283.715	90000.000	0.103
Concio 2	104	J[723]	ST FATICA DANN.ACC.	MY-MIN	1.484	8556.676	12700.577	90000.000	0.141
Concio 2	105	I[723]	ST FATICA DANN.ACC.	MY-MIN	1.484	7183.643	10662.600	90000.000	0.119

Concio 2	105	J[724]	ST FATICA DANN.ACC.	MY-MIN	1.484	17299.055	25676.793	90000.000	0.285
Concio 2	106	I[724]	ST FATICA DANN.ACC.	FX-MIN	1.484	19708.489	29253.088	90000.000	0.325
Concio 2	106	J[725]	ST FATICA DANN.ACC.	FX-MIN	1.484	25777.736	38261.603	90000.000	0.425
Concio 3	107	I[725]	ST FATICA DANN.ACC.	FX-MIN	1.484	19557.189	29028.515	90000.000	0.323
Concio 3	107	J[726]	ST FATICA DANN.ACC.	FX-MIN	1.484	22626.955	33584.934	90000.000	0.373
Concio 3	108	I[726]	ST FATICA DANN.ACC.	FZ-MAX	1.484	23058.456	34225.406	90000.000	0.380
Concio 3	108	J[727]	ST FATICA DANN.ACC.	MZ-MIN	1.484	31222.464	46343.151	90000.000	0.515
Concio 3	109	I[727]	ST FATICA DANN.ACC.	FZ-MAX	1.484	30188.388	44808.284	90000.000	0.498
Concio 3	109	J[728]	ST FATICA DANN.ACC.	FZ-MAX	1.484	30955.830	45947.388	90000.000	0.511
Concio 4 H=var	110	I[728]	ST FATICA DANN.ACC.	FZ-MAX	1.484	30787.442	45697.452	90000.000	0.508
Concio 4 H=var	110	J[729]	ST FATICA DANN.ACC.	MZ-MIN	1.484	25423.533	37735.863	90000.000	0.419
Concio 4 H=var	111	I[729]	ST FATICA DANN.ACC.	FZ-MAX	1.484	23695.781	35171.380	90000.000	0.391
Concio 4 H=var	111	J[730]	ST FATICA DANN.ACC.	FZ-MAX	1.484	20220.852	30013.582	90000.000	0.334
Concio 4 H=200	112	I[730]	ST FATICA DANN.ACC.	MX-MIN	1.484	20461.707	30371.081	90000.000	0.338
Concio 4 H=200	112	J[731]	ST FATICA DANN.ACC.	MX-MIN	1.484	20898.681	31019.676	90000.000	0.345
Concio 4 H=200	113	I[731]	ST FATICA DANN.ACC.	FZ-MIN	1.484	18434.405	27361.980	90000.000	0.304
Concio 4 H=200	113	J[732]	ST FATICA DANN.ACC.	FZ-MIN	1.484	17997.432	26713.385	90000.000	0.297
Concio 4 H=var	114	I[732]	ST FATICA DANN.ACC.	FZ-MIN	1.484	18410.987	27327.221	90000.000	0.304
Concio 4 H=var	114	J[733]	ST FATICA DANN.ACC.	FZ-MIN	1.484	21317.818	31641.797	90000.000	0.352
Concio 4 H=var	115	I[733]	ST FATICA DANN.ACC.	FY-MIN	1.484	21541.647	31974.024	90000.000	0.355
Concio 4 H=var	115	J[734]	ST FATICA DANN.ACC.	FY-MIN	1.484	27053.341	40154.969	90000.000	0.446
Concio 5	116	I[734]	ST FATICA DANN.ACC.	FY-MIN	1.484	26779.311	39748.229	90000.000	0.442
Concio 5	116	J[735]	ST FATICA DANN.ACC.	FY-MIN	1.484	26011.870	38609.125	90000.000	0.429
Concio 5	117	I[735]	ST FATICA DANN.ACC.	FZ-MIN	1.484	26348.829	39109.269	90000.000	0.435
Concio 5	117	J[736]	ST FATICA DANN.ACC.	FZ-MIN	1.484	18367.438	27262.580	90000.000	0.303
Concio 5	118	I[736]	ST FATICA DANN.ACC.	FZ-MIN	1.484	16751.934	24864.707	90000.000	0.276
Concio 5	118	J[737]	ST FATICA DANN.ACC.	MZ-MIN	1.484	13227.218	19633.011	90000.000	0.218
Concio 6	119	I[737]	ST FATICA DANN.ACC.	MZ-MIN	1.484	17294.578	25670.146	90000.000	0.285
Concio 6	119	J[738]	ST FATICA DANN.ACC.	FZ-MIN	1.484	11467.478	17021.049	90000.000	0.189
Concio 6	120	I[738]	ST FATICA DANN.ACC.	MZ-MIN	1.484	8978.463	13326.631	90000.000	0.148
Concio 6	120	J[739]	ST FATICA DANN.ACC.	FZ-MIN	1.484	3737.386	5547.360	90000.000	0.062
Concio 6	121	I[739]	ST FATICA DANN.ACC.	FZ-MIN	1.484	3737.386	5547.360	90000.000	0.062
Concio 6	121	J[740]	ST FATICA DANN.ACC.	MZ-MIN	1.484	8462.823	12561.272	90000.000	0.140
Concio 6	122	I[740]	ST FATICA DANN.ACC.	FX-MIN	1.484	10703.112	15886.508	90000.000	0.177
Concio 6	122	J[741]	ST FATICA DANN.ACC.	MZ-MIN	1.484	16596.215	24633.574	90000.000	0.274
Concio 5	123	I[741]	ST FATICA DANN.ACC.	MZ-MIN	1.484	12693.097	18840.220	90000.000	0.209
Concio 5	123	J[742]	ST FATICA DANN.ACC.	FX-MIN	1.484	16167.332	23996.989	90000.000	0.267
Concio 5	124	I[742]	ST FATICA DANN.ACC.	FZ-MAX	1.484	16534.644	24542.185	90000.000	0.273
Concio 5	124	J[743]	ST FATICA DANN.ACC.	MZ-MIN	1.484	25602.530	38001.547	90000.000	0.422
Concio 5	125	I[743]	ST FATICA DANN.ACC.	FZ-MAX	1.484	23810.969	35342.352	90000.000	0.393
Concio 5	125	J[744]	ST FATICA DANN.ACC.	FZ-MAX	1.484	24578.410	36481.457	90000.000	0.405
Concio 4 H=var	126	I[744]	ST FATICA DANN.ACC.	FZ-MAX	1.484	24771.072	36767.423	90000.000	0.409
Concio 4 H=var	126	J[745]	ST FATICA DANN.ACC.	MZ-MIN	1.484	21315.784	31638.777	90000.000	0.352
Concio 4 H=var	127	I[745]	ST FATICA DANN.ACC.	FZ-MAX	1.484	19614.731	29113.924	90000.000	0.324
Concio 4 H=var	127	J[746]	ST FATICA DANN.ACC.	MY-MIN	1.484	17485.607	25953.688	90000.000	0.288
Concio 4 H=200	128	I[746]	ST FATICA DANN.ACC.	MX-MIN	1.484	17289.204	25662.170	90000.000	0.285
Concio 4 H=200	128	J[747]	ST FATICA DANN.ACC.	MZ-MIN	1.484	18320.565	27193.008	90000.000	0.302
Concio 4 H=200	129	I[747]	ST FATICA DANN.ACC.	FZ-MIN	1.484	21614.866	32082.701	90000.000	0.357
Concio 4 H=200	129	J[748]	ST FATICA DANN.ACC.	FZ-MIN	1.484	21177.892	31434.107	90000.000	0.349
Concio 4 H=var	130	I[748]	ST FATICA DANN.ACC.	FZ-MIN	1.484	21507.316	31923.067	90000.000	0.355
Concio 4 H=var	130	J[749]	ST FATICA DANN.ACC.	FZ-MIN	1.484	25386.054	37680.233	90000.000	0.419
Concio 4 H=var	131	I[749]	ST FATICA DANN.ACC.	FY-MIN	1.484	25689.703	38130.937	90000.000	0.424
Concio 4 H=var	131	J[750]	ST FATICA DANN.ACC.	FY-MIN	1.484	33064.463	49077.209	90000.000	0.545
Concio 3	132	I[750]	ST FATICA DANN.ACC.	FY-MIN	1.484	33147.214	49200.036	90000.000	0.547
Concio 3	132	J[751]	ST FATICA DANN.ACC.	FY-MIN	1.484	32379.773	48060.931	90000.000	0.534
Concio 3	133	I[751]	ST FATICA DANN.ACC.	FZ-MIN	1.484	32491.423	48226.652	90000.000	0.536
Concio 3	133	J[752]	ST FATICA DANN.ACC.	FZ-MIN	1.484	24817.008	36835.605	90000.000	0.409
Concio 3	134	I[752]	ST FATICA DANN.ACC.	FZ-MIN	1.484	22690.642	33679.464	90000.000	0.374
Concio 3	134	J[753]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19620.876	29123.045	90000.000	0.324

Concio 2	135	I[753]	ST FATICA DANN.ACC.	FZ-MIN	1.484	25861.681	38386.201	90000.000	0.427
Concio 2	135	J[754]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19792.433	29377.685	90000.000	0.326
Concio 2	136	I[754]	ST FATICA DANN.ACC.	FZ-MIN	1.484	17288.001	25660.384	90000.000	0.285
Concio 2	136	J[755]	ST FATICA DANN.ACC.	FZ-MIN	1.484	7172.588	10646.191	90000.000	0.118
Concio 2	137	I[755]	ST FATICA DANN.ACC.	FZ-MIN	1.484	8544.699	12682.801	90000.000	0.141
Concio 2	137	J[756]	ST FATICA DANN.ACC.	FX-MIN	1.484	6053.954	8985.816	90000.000	0.100
Concio 1	138	I[756]	ST FATICA DANN.ACC.	FX-MIN	1.484	4645.286	6894.945	90000.000	0.077
Concio 1	138	J[757]	ST FATICA DANN.ACC.	MZ-MIN	1.484	9319.347	13832.601	90000.000	0.154
Concio 1	139	I[757]	ST FATICA DANN.ACC.	FX-MIN	1.484	11652.751	17296.047	90000.000	0.192
Concio 1	139	J[758]	ST FATICA DANN.ACC.	FX-MIN	1.484	19414.452	28816.652	90000.000	0.320
Concio 1	140	I[758]	ST FATICA DANN.ACC.	FX-MAX	1.484	1241.872	1843.297	90000.000	0.021
Concio 1	140	J[759]	ST FATICA DANN.ACC.	FX-MAX	1.484	0.000	0.000	90000.000	0.000
Concio 1	201	I[760]	ST FATICA DANN.ACC.	FX-MAX	1.484	0.000	0.000	90000.000	0.000
Concio 1	201	J[761]	ST FATICA DANN.ACC.	FZ-MAX	1.484	14859.676	22056.049	90000.000	0.245
Concio 1	202	I[761]	ST FATICA DANN.ACC.	FZ-MIN	1.484	39291.739	58320.285	90000.000	0.648
Concio 1	202	J[762]	ST FATICA DANN.ACC.	FZ-MAX	1.484	12761.813	18942.215	90000.000	0.211
Concio 1	203	I[762]	ST FATICA DANN.ACC.	FZ-MIN	1.484	23666.629	35128.111	90000.000	0.390
Concio 1	203	J[763]	ST FATICA DANN.ACC.	MZ-MIN	1.484	15357.028	22794.263	90000.000	0.253
Concio 2	204	I[763]	ST FATICA DANN.ACC.	MZ-MIN	1.484	20018.338	29712.994	90000.000	0.330
Concio 2	204	J[764]	ST FATICA DANN.ACC.	FZ-MAX	1.484	30090.644	44663.203	90000.000	0.496
Concio 2	205	I[764]	ST FATICA DANN.ACC.	FZ-MIN	1.484	18915.603	28076.216	90000.000	0.312
Concio 2	205	J[765]	ST FATICA DANN.ACC.	FZ-MAX	1.484	41612.973	61765.666	90000.000	0.686
Concio 2	206	I[765]	ST FATICA DANN.ACC.	FZ-MAX	1.484	27923.380	41446.358	90000.000	0.461
Concio 2	206	J[766]	ST FATICA DANN.ACC.	FZ-MAX	1.484	42168.475	62590.192	90000.000	0.695
Concio 3	207	I[766]	ST FATICA DANN.ACC.	FZ-MAX	1.484	32004.189	47503.457	90000.000	0.528
Concio 3	207	J[767]	ST FATICA DANN.ACC.	FZ-MAX	1.484	40208.193	59680.568	90000.000	0.663
Concio 3	208	I[767]	ST FATICA DANN.ACC.	FY-MAX	1.484	30747.944	45638.826	90000.000	0.507
Concio 3	208	J[768]	ST FATICA DANN.ACC.	FZ-MAX	1.484	50174.395	74473.288	90000.000	0.828
Concio 3	209	I[768]	ST FATICA DANN.ACC.	FZ-MAX	1.484	42219.892	62666.509	90000.000	0.696
Concio 3	209	J[769]	ST FATICA DANN.ACC.	FZ-MAX	1.484	44041.925	65370.932	90000.000	0.726
Concio 4 H=var	210	I[769]	ST FATICA DANN.ACC.	FZ-MAX	1.484	43003.642	63829.820	90000.000	0.709
Concio 4 H=var	210	J[770]	ST FATICA DANN.ACC.	FZ-MAX	1.484	37463.719	55606.975	90000.000	0.618
Concio 4 H=var	211	I[770]	ST FATICA DANN.ACC.	FZ-MAX	1.484	34228.491	50804.963	90000.000	0.565
Concio 4 H=var	211	J[771]	ST FATICA DANN.ACC.	MZ-MIN	1.484	34226.992	50802.737	90000.000	0.565
Concio 4 H=200	212	I[771]	ST FATICA DANN.ACC.	MZ-MIN	1.484	34321.560	50943.103	90000.000	0.566
Concio 4 H=200	212	J[772]	ST FATICA DANN.ACC.	MZ-MIN	1.484	34607.925	51368.152	90000.000	0.571
Concio 4 H=200	213	I[772]	ST FATICA DANN.ACC.	MZ-MIN	1.484	35706.562	52998.847	90000.000	0.589
Concio 4 H=200	213	J[773]	ST FATICA DANN.ACC.	FY-MIN	1.484	33515.122	49746.118	90000.000	0.553
Concio 4 H=var	214	I[773]	ST FATICA DANN.ACC.	FY-MIN	1.484	33670.876	49977.301	90000.000	0.555
Concio 4 H=var	214	J[774]	ST FATICA DANN.ACC.	FX-MIN	1.484	27963.630	41506.101	90000.000	0.461
Concio 4 H=var	215	I[774]	ST FATICA DANN.ACC.	FY-MIN	1.484	37324.512	55400.351	90000.000	0.616
Concio 4 H=var	215	J[775]	ST FATICA DANN.ACC.	FX-MIN	1.484	37917.703	56280.819	90000.000	0.625
Concio 5	216	I[775]	ST FATICA DANN.ACC.	FX-MIN	1.484	39173.788	58145.211	90000.000	0.646
Concio 5	216	J[776]	ST FATICA DANN.ACC.	FX-MIN	1.484	38708.564	57454.684	90000.000	0.638
Concio 5	217	I[776]	ST FATICA DANN.ACC.	FZ-MIN	1.484	42104.764	62495.626	90000.000	0.694
Concio 5	217	J[777]	ST FATICA DANN.ACC.	FX-MIN	1.484	26904.319	39933.777	90000.000	0.444
Concio 5	218	I[777]	ST FATICA DANN.ACC.	FY-MIN	1.484	35151.491	52174.962	90000.000	0.580
Concio 5	218	J[778]	ST FATICA DANN.ACC.	FY-MIN	1.484	19054.743	28282.739	90000.000	0.314
Concio 6	219	I[778]	ST FATICA DANN.ACC.	FY-MIN	1.484	24899.398	36957.896	90000.000	0.411
Concio 6	219	J[779]	ST FATICA DANN.ACC.	FZ-MAX	1.484	22101.187	32804.542	90000.000	0.365
Concio 6	220	I[779]	ST FATICA DANN.ACC.	FZ-MIN	1.484	28112.171	41726.578	90000.000	0.464
Concio 6	220	J[780]	ST FATICA DANN.ACC.	FZ-MAX	1.484	19925.848	29575.711	90000.000	0.329
Concio 6	221	I[780]	ST FATICA DANN.ACC.	FZ-MAX	1.484	19925.848	29575.711	90000.000	0.329
Concio 6	221	J[781]	ST FATICA DANN.ACC.	FZ-MAX	1.484	33521.827	49756.069	90000.000	0.553
Concio 6	222	I[781]	ST FATICA DANN.ACC.	FZ-MAX	1.484	19504.404	28950.167	90000.000	0.322
Concio 6	222	J[782]	ST FATICA DANN.ACC.	MZ-MIN	1.484	35047.947	52021.271	90000.000	0.578
Concio 5	223	I[782]	ST FATICA DANN.ACC.	MZ-MIN	1.484	26821.114	39810.277	90000.000	0.442
Concio 5	223	J[783]	ST FATICA DANN.ACC.	FZ-MAX	1.484	34284.651	50888.320	90000.000	0.565
Concio 5	224	I[783]	ST FATICA DANN.ACC.	FY-MAX	1.484	24534.112	36415.706	90000.000	0.405

Concio 5	224	J[784]	ST FATICA DANN.ACC.	FZ-MAX	1.484	44516.983	66076.055	90000.000	0.734
Concio 5	225	I[784]	ST FATICA DANN.ACC.	FZ-MAX	1.484	36234.526	53782.498	90000.000	0.598
Concio 5	225	J[785]	ST FATICA DANN.ACC.	FZ-MAX	1.484	38048.983	56475.676	90000.000	0.628
Concio 4 H=var	226	I[785]	ST FATICA DANN.ACC.	FZ-MAX	1.484	37201.110	55217.188	90000.000	0.614
Concio 4 H=var	226	J[786]	ST FATICA DANN.ACC.	FZ-MAX	1.484	33430.109	49619.933	90000.000	0.551
Concio 4 H=var	227	I[786]	ST FATICA DANN.ACC.	FZ-MAX	1.484	30095.220	44669.996	90000.000	0.496
Concio 4 H=var	227	J[787]	ST FATICA DANN.ACC.	MZ-MIN	1.484	31075.458	46124.952	90000.000	0.513
Concio 4 H=200	228	I[787]	ST FATICA DANN.ACC.	MZ-MIN	1.484	31136.937	46216.203	90000.000	0.514
Concio 4 H=200	228	J[788]	ST FATICA DANN.ACC.	MZ-MIN	1.484	31423.302	46641.252	90000.000	0.518
Concio 4 H=200	229	I[788]	ST FATICA DANN.ACC.	FY-MIN	1.484	38901.171	57740.569	90000.000	0.642
Concio 4 H=200	229	J[789]	ST FATICA DANN.ACC.	FY-MIN	1.484	31415.962	46630.357	90000.000	0.518
Concio 4 H=var	230	I[789]	ST FATICA DANN.ACC.	FY-MIN	1.484	31546.332	46823.865	90000.000	0.520
Concio 4 H=var	230	J[790]	ST FATICA DANN.ACC.	FX-MIN	1.484	32168.881	47747.906	90000.000	0.531
Concio 4 H=var	231	I[790]	ST FATICA DANN.ACC.	FY-MIN	1.484	41343.442	61365.605	90000.000	0.682
Concio 4 H=var	231	J[791]	ST FATICA DANN.ACC.	FX-MIN	1.484	43729.507	64907.214	90000.000	0.721
Concio 3	232	I[791]	ST FATICA DANN.ACC.	FX-MIN	1.484	45295.685	67231.874	90000.000	0.747
Concio 3	232	J[792]	ST FATICA DANN.ACC.	FX-MIN	1.484	44830.461	66541.348	90000.000	0.739
Concio 3	233	I[792]	ST FATICA DANN.ACC.	FZ-MIN	1.484	47706.689	70810.500	90000.000	0.787
Concio 3	233	J[793]	ST FATICA DANN.ACC.	FX-MIN	1.484	33477.790	49690.706	90000.000	0.552
Concio 3	234	I[793]	ST FATICA DANN.ACC.	FZ-MIN	1.484	36679.546	54443.035	90000.000	0.605
Concio 3	234	J[794]	ST FATICA DANN.ACC.	FY-MIN	1.484	32953.522	48912.540	90000.000	0.544
Concio 2	235	I[794]	ST FATICA DANN.ACC.	FY-MIN	1.484	43419.308	64446.789	90000.000	0.716
Concio 2	235	J[795]	ST FATICA DANN.ACC.	FX-MIN	1.484	27409.465	40683.559	90000.000	0.452
Concio 2	236	I[795]	ST FATICA DANN.ACC.	FZ-MIN	1.484	36100.211	53583.135	90000.000	0.595
Concio 2	236	J[796]	ST FATICA DANN.ACC.	FZ-MAX	1.484	24468.056	36317.659	90000.000	0.404
Concio 2	237	I[796]	ST FATICA DANN.ACC.	FY-MIN	1.484	30021.374	44560.386	90000.000	0.495
Concio 2	237	J[797]	ST FATICA DANN.ACC.	FZ-MAX	1.484	19170.676	28454.818	90000.000	0.316
Concio 1	238	I[797]	ST FATICA DANN.ACC.	FZ-MAX	1.484	14706.745	21829.056	90000.000	0.243
Concio 1	238	J[798]	ST FATICA DANN.ACC.	FZ-MAX	1.484	27135.289	40276.603	90000.000	0.448
Concio 1	239	I[798]	ST FATICA DANN.ACC.	FY-MAX	1.484	16359.371	24282.029	90000.000	0.270
Concio 1	239	J[799]	ST FATICA DANN.ACC.	FZ-MAX	1.484	39586.085	58757.179	90000.000	0.653
Concio 1	240	I[799]	ST FATICA DANN.ACC.	FZ-MIN	1.484	14859.676	22056.049	90000.000	0.245
Concio 1	240	J[800]	ST FATICA DANN.ACC.	FX-MAX	1.484	0.000	0.000	90000.000	0.000
Concio 1	301	I[801]	ST FATICA DANN.ACC.	FX-MAX	1.484	0.000	0.000	90000.000	0.000
Concio 1	301	J[802]	ST FATICA DANN.ACC.	FX-MAX	1.484	752.389	1116.762	90000.000	0.012
Concio 1	302	I[802]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19169.177	28452.592	90000.000	0.316
Concio 1	302	J[803]	ST FATICA DANN.ACC.	FZ-MIN	1.484	14466.747	21472.830	90000.000	0.239
Concio 1	303	I[803]	ST FATICA DANN.ACC.	FZ-MIN	1.484	10070.232	14947.132	90000.000	0.166
Concio 1	303	J[804]	ST FATICA DANN.ACC.	FZ-MIN	1.484	7248.775	10759.275	90000.000	0.120
Concio 2	304	I[804]	ST FATICA DANN.ACC.	FZ-MIN	1.484	9448.992	14025.031	90000.000	0.156
Concio 2	304	J[805]	ST FATICA DANN.ACC.	FZ-MIN	1.484	6997.090	10385.701	90000.000	0.115
Concio 2	305	I[805]	ST FATICA DANN.ACC.	MZ-MIN	1.484	11148.929	16548.230	90000.000	0.184
Concio 2	305	J[806]	ST FATICA DANN.ACC.	FY-MIN	1.484	17226.120	25568.536	90000.000	0.284
Concio 2	306	I[806]	ST FATICA DANN.ACC.	FY-MIN	1.484	22958.582	34077.164	90000.000	0.379
Concio 2	306	J[807]	ST FATICA DANN.ACC.	FY-MIN	1.484	26636.435	39536.160	90000.000	0.439
Concio 3	307	I[807]	ST FATICA DANN.ACC.	FY-MIN	1.484	20215.991	30006.367	90000.000	0.333
Concio 3	307	J[808]	ST FATICA DANN.ACC.	FY-MIN	1.484	22076.887	32768.474	90000.000	0.364
Concio 3	308	I[808]	ST FATICA DANN.ACC.	FY-MIN	1.484	26502.878	39337.923	90000.000	0.437
Concio 3	308	J[809]	ST FATICA DANN.ACC.	FY-MIN	1.484	31155.118	46243.190	90000.000	0.514
Concio 3	309	I[809]	ST FATICA DANN.ACC.	MX-MIN	1.484	32575.179	48350.970	90000.000	0.537
Concio 3	309	J[810]	ST FATICA DANN.ACC.	MX-MIN	1.484	33040.403	49041.497	90000.000	0.545
Concio 4 H=var	310	I[810]	ST FATICA DANN.ACC.	MZ-MIN	1.484	32389.133	48074.824	90000.000	0.534
Concio 4 H=var	310	J[811]	ST FATICA DANN.ACC.	FZ-MAX	1.484	23754.184	35258.067	90000.000	0.392
Concio 4 H=var	311	I[811]	ST FATICA DANN.ACC.	MX-MIN	1.484	27345.383	40588.443	90000.000	0.451
Concio 4 H=var	311	J[812]	ST FATICA DANN.ACC.	MX-MIN	1.484	22272.937	33059.469	90000.000	0.367
Concio 4 H=200	312	I[812]	ST FATICA DANN.ACC.	MX-MIN	1.484	21347.670	31686.106	90000.000	0.352
Concio 4 H=200	312	J[813]	ST FATICA DANN.ACC.	MX-MIN	1.484	21634.035	32111.154	90000.000	0.357
Concio 4 H=200	313	I[813]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19449.670	28868.926	90000.000	0.321
Concio 4 H=200	313	J[814]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19163.305	28443.877	90000.000	0.316

Concio 4 H=var	314	I[814]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19531.035	28989.695	90000.000	0.322
Concio 4 H=var	314	J[815]	ST FATICA DANN.ACC.	FZ-MIN	1.484	23747.692	35248.431	90000.000	0.392
Concio 4 H=var	315	I[815]	ST FATICA DANN.ACC.	FZ-MIN	1.484	21561.253	32003.124	90000.000	0.356
Concio 4 H=var	315	J[816]	ST FATICA DANN.ACC.	FZ-MIN	1.484	28466.138	42251.967	90000.000	0.470
Concio 5	316	I[816]	ST FATICA DANN.ACC.	FZ-MIN	1.484	28792.396	42736.229	90000.000	0.475
Concio 5	316	J[817]	ST FATICA DANN.ACC.	FZ-MIN	1.484	28327.172	42045.702	90000.000	0.467
Concio 5	317	I[817]	ST FATICA DANN.ACC.	FZ-MIN	1.484	26287.041	39017.557	90000.000	0.434
Concio 5	317	J[818]	ST FATICA DANN.ACC.	FZ-MIN	1.484	21448.712	31836.081	90000.000	0.354
Concio 5	318	I[818]	ST FATICA DANN.ACC.	FZ-MIN	1.484	17115.391	25404.182	90000.000	0.282
Concio 5	318	J[819]	ST FATICA DANN.ACC.	FZ-MIN	1.484	14975.361	22227.759	90000.000	0.247
Concio 6	319	I[819]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19568.749	29045.673	90000.000	0.323
Concio 6	319	J[820]	ST FATICA DANN.ACC.	FZ-MIN	1.484	16042.802	23812.150	90000.000	0.265
Concio 6	320	I[820]	ST FATICA DANN.ACC.	FZ-MIN	1.484	11146.943	16545.282	90000.000	0.184
Concio 6	320	J[821]	ST FATICA DANN.ACC.	FZ-MIN	1.484	7985.749	11853.157	90000.000	0.132
Concio 6	321	I[821]	ST FATICA DANN.ACC.	FZ-MIN	1.484	7985.749	11853.157	90000.000	0.132
Concio 6	321	J[822]	ST FATICA DANN.ACC.	FY-MIN	1.484	10282.434	15262.100	90000.000	0.170
Concio 6	322	I[822]	ST FATICA DANN.ACC.	MX-MIN	1.484	15086.990	22393.449	90000.000	0.249
Concio 6	322	J[823]	ST FATICA DANN.ACC.	MX-MIN	1.484	18612.937	27626.972	90000.000	0.307
Concio 5	323	I[823]	ST FATICA DANN.ACC.	MX-MIN	1.484	14156.115	21011.761	90000.000	0.234
Concio 5	323	J[824]	ST FATICA DANN.ACC.	MX-MIN	1.484	16296.145	24188.183	90000.000	0.269
Concio 5	324	I[824]	ST FATICA DANN.ACC.	FY-MIN	1.484	20661.294	30667.326	90000.000	0.341
Concio 5	324	J[825]	ST FATICA DANN.ACC.	FY-MIN	1.484	25499.623	37848.803	90000.000	0.421
Concio 5	325	I[825]	ST FATICA DANN.ACC.	MX-MIN	1.484	26513.279	39353.361	90000.000	0.437
Concio 5	325	J[826]	ST FATICA DANN.ACC.	MX-MIN	1.484	26978.503	40043.887	90000.000	0.445
Concio 4 H=var	326	I[826]	ST FATICA DANN.ACC.	MX-MIN	1.484	26810.855	39795.050	90000.000	0.442
Concio 4 H=var	326	J[827]	ST FATICA DANN.ACC.	MX-MIN	1.484	20416.794	30304.417	90000.000	0.337
Concio 4 H=var	327	I[827]	ST FATICA DANN.ACC.	MX-MIN	1.484	23259.699	34524.109	90000.000	0.384
Concio 4 H=var	327	J[828]	ST FATICA DANN.ACC.	MX-MIN	1.484	19159.122	28437.669	90000.000	0.316
Concio 4 H=200	328	I[828]	ST FATICA DANN.ACC.	MX-MIN	1.484	18177.220	26980.243	90000.000	0.300
Concio 4 H=200	328	J[829]	ST FATICA DANN.ACC.	MX-MIN	1.484	18463.585	27405.291	90000.000	0.305
Concio 4 H=200	329	I[829]	ST FATICA DANN.ACC.	FZ-MIN	1.484	22628.564	33587.322	90000.000	0.373
Concio 4 H=200	329	J[830]	ST FATICA DANN.ACC.	FZ-MIN	1.484	22342.199	33162.273	90000.000	0.369
Concio 4 H=var	330	I[830]	ST FATICA DANN.ACC.	FZ-MIN	1.484	22646.781	33614.361	90000.000	0.374
Concio 4 H=var	330	J[831]	ST FATICA DANN.ACC.	FZ-MIN	1.484	27835.909	41316.525	90000.000	0.459
Concio 4 H=var	331	I[831]	ST FATICA DANN.ACC.	FZ-MIN	1.484	25579.483	37967.339	90000.000	0.422
Concio 4 H=var	331	J[832]	ST FATICA DANN.ACC.	FZ-MIN	1.484	34277.887	50878.280	90000.000	0.565
Concio 3	332	I[832]	ST FATICA DANN.ACC.	FZ-MIN	1.484	34838.215	51709.969	90000.000	0.575
Concio 3	332	J[833]	ST FATICA DANN.ACC.	FZ-MIN	1.484	34372.991	51019.442	90000.000	0.567
Concio 3	333	I[833]	ST FATICA DANN.ACC.	FZ-MIN	1.484	31976.883	47462.926	90000.000	0.527
Concio 3	333	J[834]	ST FATICA DANN.ACC.	FZ-MIN	1.484	27324.644	40557.660	90000.000	0.451
Concio 3	334	I[834]	ST FATICA DANN.ACC.	FZ-MIN	1.484	22924.475	34026.540	90000.000	0.378
Concio 3	334	J[835]	ST FATICA DANN.ACC.	FZ-MIN	1.484	21063.580	31264.433	90000.000	0.347
Concio 2	335	I[835]	ST FATICA DANN.ACC.	FZ-MIN	1.484	27753.212	41193.779	90000.000	0.458
Concio 2	335	J[836]	ST FATICA DANN.ACC.	FZ-MIN	1.484	24075.359	35734.783	90000.000	0.397
Concio 2	336	I[836]	ST FATICA DANN.ACC.	FZ-MIN	1.484	18487.917	27441.407	90000.000	0.305
Concio 2	336	J[837]	ST FATICA DANN.ACC.	FZ-MIN	1.484	12358.162	18343.080	90000.000	0.204
Concio 2	337	I[837]	ST FATICA DANN.ACC.	FZ-MIN	1.484	6831.781	10140.335	90000.000	0.113
Concio 2	337	J[838]	ST FATICA DANN.ACC.	MX-MIN	1.484	8422.462	12501.365	90000.000	0.139
Concio 1	338	I[838]	ST FATICA DANN.ACC.	FY-MIN	1.484	6448.124	9570.878	90000.000	0.106
Concio 1	338	J[839]	ST FATICA DANN.ACC.	FY-MIN	1.484	9269.582	13758.735	90000.000	0.153
Concio 1	339	I[839]	ST FATICA DANN.ACC.	MX-MIN	1.484	13273.323	19701.443	90000.000	0.219
Concio 1	339	J[840]	ST FATICA DANN.ACC.	MX-MIN	1.484	17975.752	26681.205	90000.000	0.297
Concio 1	340	I[840]	ST FATICA DANN.ACC.	FX-MAX	1.484	752.389	1116.762	90000.000	0.012
Concio 1	340	J[841]	ST FATICA DANN.ACC.	FX-MAX	1.484	0.000	0.000	90000.000	0.000
Concio 1	401	I[842]	ST FATICA DANN.ACC.	FX-MAX	1.484	0.000	0.000	90000.000	0.000
Concio 1	401	J[843]	ST FATICA DANN.ACC.	FX-MAX	1.484	1065.534	1581.560	90000.000	0.018
Concio 1	402	I[843]	ST FATICA DANN.ACC.	FZ-MIN	1.484	13981.153	20752.068	90000.000	0.231
Concio 1	402	J[844]	ST FATICA DANN.ACC.	FZ-MIN	1.484	7321.567	10867.320	90000.000	0.121
Concio 1	403	I[844]	ST FATICA DANN.ACC.	FZ-MIN	1.484	5572.673	8271.455	90000.000	0.092

Concio 1	403	J[845]	ST FATICA DANN.ACC.	MY-MIN	1.484	3564.546	5290.816	90000.000	0.059
Concio 2	404	I[845]	ST FATICA DANN.ACC.	MY-MIN	1.484	4645.484	6895.239	90000.000	0.077
Concio 2	404	J[846]	ST FATICA DANN.ACC.	MY-MIN	1.484	8119.589	12051.815	90000.000	0.134
Concio 2	405	I[846]	ST FATICA DANN.ACC.	MY-MIN	1.484	7076.926	10504.201	90000.000	0.117
Concio 2	405	J[847]	ST FATICA DANN.ACC.	MY-MIN	1.484	15759.648	23391.868	90000.000	0.260
Concio 2	406	I[847]	ST FATICA DANN.ACC.	MX-MIN	1.484	15989.610	23733.198	90000.000	0.264
Concio 2	406	J[848]	ST FATICA DANN.ACC.	MX-MIN	1.484	21197.061	31462.559	90000.000	0.350
Concio 3	407	I[848]	ST FATICA DANN.ACC.	MX-MIN	1.484	16068.203	23849.852	90000.000	0.265
Concio 3	407	J[849]	ST FATICA DANN.ACC.	MX-MIN	1.484	18702.080	27759.287	90000.000	0.308
Concio 3	408	I[849]	ST FATICA DANN.ACC.	MX-MIN	1.484	19494.013	28934.743	90000.000	0.322
Concio 3	408	J[850]	ST FATICA DANN.ACC.	MX-MIN	1.484	26078.707	38708.330	90000.000	0.430
Concio 3	409	I[850]	ST FATICA DANN.ACC.	MX-MIN	1.484	24697.060	36657.568	90000.000	0.407
Concio 3	409	J[851]	ST FATICA DANN.ACC.	MX-MIN	1.484	25355.530	37634.926	90000.000	0.418
Concio 4 H=var	410	I[851]	ST FATICA DANN.ACC.	MX-MIN	1.484	25824.720	38331.340	90000.000	0.426
Concio 4 H=var	410	J[852]	ST FATICA DANN.ACC.	MX-MIN	1.484	20325.935	30169.556	90000.000	0.335
Concio 4 H=var	411	I[852]	ST FATICA DANN.ACC.	MX-MIN	1.484	19538.500	29000.775	90000.000	0.322
Concio 4 H=var	411	J[853]	ST FATICA DANN.ACC.	MX-MIN	1.484	16776.849	24901.688	90000.000	0.277
Concio 4 H=200	412	I[853]	ST FATICA DANN.ACC.	MX-MIN	1.484	16602.913	24643.516	90000.000	0.274
Concio 4 H=200	412	J[854]	ST FATICA DANN.ACC.	MX-MIN	1.484	16983.964	25209.106	90000.000	0.280
Concio 4 H=200	413	I[854]	ST FATICA DANN.ACC.	FZ-MIN	1.484	13855.515	20565.585	90000.000	0.229
Concio 4 H=200	413	J[855]	ST FATICA DANN.ACC.	FZ-MIN	1.484	13474.463	19999.994	90000.000	0.222
Concio 4 H=var	414	I[855]	ST FATICA DANN.ACC.	FZ-MIN	1.484	13830.111	20527.878	90000.000	0.228
Concio 4 H=var	414	J[856]	ST FATICA DANN.ACC.	FZ-MIN	1.484	15666.812	23254.071	90000.000	0.258
Concio 4 H=var	415	I[856]	ST FATICA DANN.ACC.	FZ-MIN	1.484	16202.819	24049.661	90000.000	0.267
Concio 4 H=var	415	J[857]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19849.739	29462.743	90000.000	0.327
Concio 5	416	I[857]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19543.544	29008.261	90000.000	0.322
Concio 5	416	J[858]	ST FATICA DANN.ACC.	FZ-MIN	1.484	18885.074	28030.902	90000.000	0.312
Concio 5	417	I[858]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19895.709	29530.976	90000.000	0.328
Concio 5	417	J[859]	ST FATICA DANN.ACC.	FZ-MIN	1.484	13047.627	19366.445	90000.000	0.215
Concio 5	418	I[859]	ST FATICA DANN.ACC.	FZ-MIN	1.484	12596.295	18696.538	90000.000	0.208
Concio 5	418	J[860]	ST FATICA DANN.ACC.	FZ-MIN	1.484	9567.335	14200.688	90000.000	0.158
Concio 6	419	I[860]	ST FATICA DANN.ACC.	FZ-MIN	1.484	12509.284	18567.389	90000.000	0.206
Concio 6	419	J[861]	ST FATICA DANN.ACC.	FZ-MIN	1.484	7515.784	11155.593	90000.000	0.124
Concio 6	420	I[861]	ST FATICA DANN.ACC.	MY-MIN	1.484	6570.349	9752.295	90000.000	0.108
Concio 6	420	J[862]	ST FATICA DANN.ACC.	MY-MIN	1.484	2097.682	3113.566	90000.000	0.035
Concio 6	421	I[862]	ST FATICA DANN.ACC.	MY-MIN	1.484	2097.682	3113.566	90000.000	0.035
Concio 6	421	J[863]	ST FATICA DANN.ACC.	MY-MIN	1.484	6572.569	9755.590	90000.000	0.108
Concio 6	422	I[863]	ST FATICA DANN.ACC.	MX-MIN	1.484	7498.084	11129.321	90000.000	0.124
Concio 6	422	J[864]	ST FATICA DANN.ACC.	MX-MIN	1.484	12491.584	18541.117	90000.000	0.206
Concio 5	423	I[864]	ST FATICA DANN.ACC.	MX-MIN	1.484	9556.230	14184.204	90000.000	0.158
Concio 5	423	J[865]	ST FATICA DANN.ACC.	MX-MIN	1.484	12585.189	18680.054	90000.000	0.208
Concio 5	424	I[865]	ST FATICA DANN.ACC.	MX-MIN	1.484	12866.893	19098.184	90000.000	0.212
Concio 5	424	J[866]	ST FATICA DANN.ACC.	MX-MIN	1.484	19714.975	29262.715	90000.000	0.325
Concio 5	425	I[866]	ST FATICA DANN.ACC.	MX-MIN	1.484	18147.777	26936.540	90000.000	0.299
Concio 5	425	J[867]	ST FATICA DANN.ACC.	MX-MIN	1.484	18806.246	27913.899	90000.000	0.310
Concio 4 H=var	426	I[867]	ST FATICA DANN.ACC.	MX-MIN	1.484	19851.247	29464.982	90000.000	0.327
Concio 4 H=var	426	J[868]	ST FATICA DANN.ACC.	MX-MIN	1.484	16203.859	24051.205	90000.000	0.267
Concio 4 H=var	427	I[868]	ST FATICA DANN.ACC.	MX-MIN	1.484	15423.088	22892.316	90000.000	0.254
Concio 4 H=var	427	J[869]	ST FATICA DANN.ACC.	MX-MIN	1.484	13644.614	20252.546	90000.000	0.225
Concio 4 H=200	428	I[869]	ST FATICA DANN.ACC.	MX-MIN	1.484	13391.993	19877.585	90000.000	0.221
Concio 4 H=200	428	J[870]	ST FATICA DANN.ACC.	MX-MIN	1.484	13773.045	20443.175	90000.000	0.227
Concio 4 H=200	429	I[870]	ST FATICA DANN.ACC.	FZ-MIN	1.484	17036.296	25286.782	90000.000	0.281
Concio 4 H=200	429	J[871]	ST FATICA DANN.ACC.	FZ-MIN	1.484	16655.244	24721.191	90000.000	0.275
Concio 4 H=var	430	I[871]	ST FATICA DANN.ACC.	FZ-MIN	1.484	16924.817	25121.315	90000.000	0.279
Concio 4 H=var	430	J[872]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19732.914	29289.342	90000.000	0.325
Concio 4 H=var	431	I[872]	ST FATICA DANN.ACC.	FZ-MIN	1.484	20325.844	30169.421	90000.000	0.335
Concio 4 H=var	431	J[873]	ST FATICA DANN.ACC.	FZ-MIN	1.484	25824.588	38331.144	90000.000	0.426
Concio 3	432	I[873]	ST FATICA DANN.ACC.	FZ-MIN	1.484	25960.538	38532.934	90000.000	0.428
Concio 3	432	J[874]	ST FATICA DANN.ACC.	FZ-MIN	1.484	25302.069	37555.575	90000.000	0.417

Concio 3	433	I[874]	ST FATICA DANN.ACC.	FZ-MIN	1.484	26093.876	38730.846	90000.000	0.430
Concio 3	433	J[875]	ST FATICA DANN.ACC.	FZ-MIN	1.484	19509.182	28957.259	90000.000	0.322
Concio 3	434	I[875]	ST FATICA DANN.ACC.	FZ-MIN	1.484	18710.236	27771.392	90000.000	0.309
Concio 3	434	J[876]	ST FATICA DANN.ACC.	FZ-MIN	1.484	16076.359	23861.958	90000.000	0.265
Concio 2	435	I[876]	ST FATICA DANN.ACC.	FZ-MIN	1.484	21189.760	31451.721	90000.000	0.350
Concio 2	435	J[877]	ST FATICA DANN.ACC.	FZ-MIN	1.484	15982.309	23722.360	90000.000	0.264
Concio 2	436	I[877]	ST FATICA DANN.ACC.	MY-MIN	1.484	15766.915	23402.653	90000.000	0.260
Concio 2	436	J[878]	ST FATICA DANN.ACC.	MY-MIN	1.484	7088.785	10521.803	90000.000	0.117
Concio 2	437	I[878]	ST FATICA DANN.ACC.	MY-MIN	1.484	8119.858	12052.213	90000.000	0.134
Concio 2	437	J[879]	ST FATICA DANN.ACC.	MY-MIN	1.484	4648.455	6899.650	90000.000	0.077
Concio 1	438	I[879]	ST FATICA DANN.ACC.	MY-MIN	1.484	3566.826	5294.200	90000.000	0.059
Concio 1	438	J[880]	ST FATICA DANN.ACC.	MX-MIN	1.484	5613.968	8332.749	90000.000	0.093
Concio 1	439	I[880]	ST FATICA DANN.ACC.	MX-MIN	1.484	7123.054	10572.668	90000.000	0.118
Concio 1	439	J[881]	ST FATICA DANN.ACC.	MX-MIN	1.484	13782.640	20457.416	90000.000	0.227
Concio 1	440	I[881]	ST FATICA DANN.ACC.	FX-MAX	1.484	1065.534	1581.560	90000.000	0.018
Concio 1	440	J[882]	ST FATICA DANN.ACC.	FX-MAX	1.484	0.000	0.000	90000.000	0.000

10 VERIFICHE DI RESISTENZA DEI PROFILATI IN ACCIAIO ALLO S.L.U.

Si effettuano le verifiche di resistenza dei diaframmi e dei controventi allo stato limite ultimo; seguono gli schemi grafici e i tabulati di calcolo degli elementi maggiormente sollecitati.

10.1 DIAFRAMMI SU SPALLE E INTEREDI – TRASVERSI INFERIORI

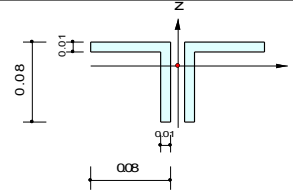


Steel Checking Result

	Company	Project Title	CASALPULSTERLENGO
	Author	File Name	D:\...Viadotti rotatorie V_1.mcb
Renato Vaira			

1. Design Information

Design Code : Eurocode3-2:05
 Unit System : kN, m
 Member No : 1249
 Material : S355W (No:1)
 (Fy = 355000, Es = 210000000)
 Section Name : HINF_CORR 2L80x10d15 (No:18)
 (Built-up Section).
 Member Length : 1.60000



2. Member Forces

Axial Force Fxx = -436.06 (LCB: 13-, POS:J)
 Bending Moments My = -1.9719, Mz = -0.9103
 End Moments Myi = -1.4530, Myj = -1.9719 (for Lb)
 Myi = -1.4530, Myj = -1.9719 (for Ly)
 Mzi = -0.2626, Mzj = -0.9103 (for Lz)
 Shear Forces Fyy = 0.73167 (LCB: 13+, POS:I)
 Fzz = -2.6095 (LCB: 13-, POS:J)

Depth	0.08000	Web Thick	0.01000
Flg Width	0.08000	Flg Thick	0.01000
BTB Spacing	0.01500		
Area	0.00300	Asz	0.00133
Cyb	0.00159	Czb	0.00320
Iyy	0.00000	Izz	0.00000
Ybar	0.06750	Zbar	0.05633
Wely	0.00003	Welz	0.00005
ry	0.02436	rz	0.03955

3. Design Parameters

Unbraced Lengths Ly = 1.60000, Lz = 1.60000, Lb = 1.60000
 Effective Length Factors Ky = 0.65, Kz = 1.30
 Equivalent Uniform Moment Factors CmY = 1.00, Cmz = 1.00, CmLT = 1.00

4. Checking Results

Axial Resistance
 $N_{Ed}/\text{MIN}[N_{c,Rd}, N_{b,Rd}] = 436.064/765.182 = 0.570 < 1.000 \dots\dots\dots \text{O.K}$

Bending Resistance
 $M_{Edy}/M_{Rdy} = 1.9719/19.2503 = 0.102 < 1.000 \dots\dots\dots \text{O.K}$
 $M_{Edz}/M_{Rdz} = 0.9103/31.6119 = 0.029 < 1.000 \dots\dots\dots \text{O.K}$

Combined Resistance
 $R_{NRd} = \text{MAX}[M_{Edy}/M_{Ny,Rd}, M_{Edz}/M_{Nz,Rd}]$
 $R_{max1} = (M_{Edy}/M_{Ny,Rd})^{\text{Alpha}} + (M_{Edz}/M_{Nz,Rd})^{\text{Beta}}$
 $R_{000} = N_{Ed}/(A \cdot f_y / \text{Gamma}_{M0}), R_{bend} = M_{Edy}/M_{y,Rd} + M_{Edz}/M_{z,Rd}$
 $R_{c_LT1} = N_{Ed}/(X_{iy} \cdot A \cdot f_y / \text{Gamma}_{M1})$
 $R_{b_LT1} = (k_{yy} \cdot M_{Edy}) / (X_{i_LT} \cdot W_{ply} \cdot f_y / \text{Gamma}_{M1}) + (k_{yz} \cdot M_{sdz}) / (W_{plz} \cdot f_y / \text{Gamma}_{M1})$
 $R_{c_LT2} = N_{Ed}/(X_{iz} \cdot A \cdot f_y / \text{Gamma}_{M1})$
 $R_{b_LT2} = (K_{zy} \cdot M_{Edy}) / (X_{i_LT} \cdot W_{ply} \cdot f_y / \text{Gamma}_{M1}) + (K_{zz} \cdot M_{sdz}) / (W_{plz} \cdot f_y / \text{Gamma}_{M1})$
 $R_{max} = \text{MAX}[R_{NRd}, R_{max1}, (R_{000} + R_{bend}), \text{MAX}(R_{c_LT1} + R_{b_LT1}, R_{c_LT2} + R_{b_LT2})] = 0.667 < 1.000 \dots\dots\dots \text{O.K}$

Shear Resistance
 $V_{Edy}/V_{y,Rd} = 0.002 < 1.000 \dots\dots\dots \text{O.K}$
 $V_{Edz}/V_{z,Rd} = 0.008 < 1.000 \dots\dots\dots \text{O.K}$

16+	1	Vento strutture (Y+) (0.900) +Vento mobili (Y+) (0.900) +	Dead Load (
1.350)			
		+Erection Load 1(1.500) +Creep Secondary(1.200) +Shrinkage Secondary(
1.200)			
		+Termico unif. INV(1.200) +Termico diff. INV(1.200) +Mobili SLE INV(
1.350)			
16-	1	Vento strutture (Y+) (0.900) +Vento mobili (Y+) (0.900) +	Dead Load (
1.350)			
		+Erection Load 1(1.500) +Creep Secondary(1.200) +Shrinkage Secondary(
1.200)			
		+Termico unif. INV(1.200) +Termico diff. INV(1.200) +Mobili SLE INV(
1.350)			

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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
=====
=
17+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 1.000) + SLV Trasv INV( 0.300) + SLV Vert INV( 0.300)
17- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 1.000) + SLV Trasv INV( 0.300) + SLV Vert INV( 0.300)
18+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 1.000) + SLV Vert INV( 0.300)
18- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 1.000) + SLV Vert INV( 0.300)
19+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 0.300) + SLV Vert INV( 1.000)
19- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 0.300) + SLV Vert INV( 1.000)
22+ 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLU INV(
1.000)
22- 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLU INV(
1.000)
23+ 2      Vento strutture (Y+)( 1.000) +Vento mobili (Y+)( 1.000) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLE INV(
1.000)
23- 2      Vento strutture (Y+)( 1.000) +Vento mobili (Y+)( 1.000) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLE INV(
1.000)
24+ 2      Frenamento (X+)( 1.000) +      Summation( 1.000) +Termico unif. INV( 0.600)
      +Termico diff. INV( 0.600) +Mobili SLE INV( 1.000)
24- 2      Frenamento (X+)( 1.000) +      Summation( 1.000) +Termico unif. INV( 0.600)
      +Termico diff. INV( 0.600) +Mobili SLE INV( 1.000)
25+ 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 1.000) +Termico diff. INV( 1.000) +Mobili SLE INV(
1.000)
25- 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 1.000) +Termico diff. INV( 1.000) +Mobili SLE INV(
1.000)
26+ 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      +Mobili SLE INV( 1.000)
26- 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      +Mobili SLE INV( 1.000)
27+ 2      Vento strutture (Y+)( 0.200) +Vento mobili (Y+)( 0.200) +      Summation(
1.000)
      +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
27- 2      Vento strutture (Y+)( 0.200) +Vento mobili (Y+)( 0.200) +      Summation(
1.000)
      +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
28+ 2      Summation( 1.000) +Termico unif. INV( 0.600) +Termico diff. INV( 0.600)
28- 2      Summation( 1.000) +Termico unif. INV( 0.600) +Termico diff. INV( 0.600)
29+ 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
29- 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
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 MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
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 =

```

*. PROJECT      : CASALPUSTERLENGO
*. MEMBER NO   = 1249, ELEMENT TYPE = Beam
*. LOADCOMB NO = 13-, MATERIAL NO  = 1, SECTION NO = 18
*. UNIT SYSTEM : kN, m

*. SECTION PROPERTIES : Designation = HINF_CORR 2L80x10d15
  Shape      = 2L - Section. (Built-up)
  Depth     = 0.080, Flg Width  = 0.080, BTB Spacing = 0.015
  Web Thick = 0.010, Flg Thick = 0.010

  Area = 3.00000e-003, Avy = 1.60000e-003, Avz = 1.60000e-003
  Ybar = 8.75000e-002, Zbar = 5.63333e-002, Qyb = 1.58672e-003, Qzb = 3.20000e-
003
  Wely = 3.15917e-005, Welz = 5.36429e-005, Wply = 5.69375e-005, Wplz = 9.35000e-
005

  Iyy = 1.77967e-006, Izz = 4.69375e-006, Iyz = 0.00000e+000
  iy  = 2.43562e-002, iz  = 3.95548e-002
  J   = 1.00000e-007, Cwp = 4.24931e-011

*. DESIGN PARAMETERS FOR STRENGTH EVALUATION :
  Ly = 1.60000e+000, Lz = 1.60000e+000, Lu = 1.60000e+000
  Ky = 6.50000e-001, Kz = 1.30000e+000

*. MATERIAL PROPERTIES :
  Fy = 3.55000e+005, Es = 2.10000e+008, MATERIAL NAME = S355W

*. FORCES AND MOMENTS AT (J) POINT :
  Axial Force      Fxx =-4.36064e+002
  Shear Forces     Fyy =-7.07103e-001, Fzz =-2.60952e+000
  Bending Moments    My =-1.97190e+000, Mz =-9.10305e-001
  End Moments        Myi =-1.45297e+000, Myj =-1.97190e+000 (for Lb)
                   Myi =-1.45297e+000, Myj =-1.97190e+000 (for Ly)
                   Mzi =-2.62640e-001, Mzj =-9.10305e-001 (for Lz)

*. Sign conventions for stress and axial force.
  - Stress : Compression positive.
  - Axial force: Tension positive.
  
```

=====
 [[[*]]] CLASSIFY LEFT FLANGE OF SECTION (BTR).
 =====

```

( ). Determine classification of compression flanges(Double angle).
  [ Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5 ]
  -. e = SQRT( 235/fy ) = 0.81
  -. b/t = BTR = 7.00
  -. sigma1 = 136101.434 KPa.
  -. sigma2 = 120586.254 KPa.
  -. BTR < 9*e ( Class 1 : Plastic ).
  
```



```
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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
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```

```
=====
[[[*]]] CLASSIFY RIGHT FLANGE OF SECTION (BTR).
=====
```

- ```
(). Determine classification of compression flanges(Double angle).
[Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5]
-. e = SQRT(235/fy) = 0.81
-. b/t = BTR = 7.00
-. sigma1 = 117677.158 KPa.
-. sigma2 = 102161.978 KPa.
-. BTR < 9*e (Class 1 : Plastic).
```

```
=====
[[[*]]] CLASSIFY WEB OF SECTION (HTR).
=====
```

- ```
( ). Determine classification of compression element(Double angles).
[ Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5 ]
-. e      = SQRT( 235/fy ) =    0.81
-. d/t    = HTR =    8.00
-. sigma1 = 211167.042 KPa.
-. sigma2 = 133605.825 KPa.
-. HTR < 10*e ( Class 2 : Compact ).
```

```
=====
[[[*]]] APPLIED FACTORS.
=====
```

- ```
(). Calculate equivalent uniform moment factors (Cmy,Cmz,CmLT).
[Eurocode3:05 Annex A. Table A.1, A.2]
-. Cmy,0 = 0.872
-. Cmz,0 = 0.806
-. Cmy (Default or User Defined Value) = 1.000
-. Cmz (Default or User Defined Value) = 1.000
-. CmLT (Default or User Defined Value) = 1.000

(). Partial Factors (Gamma_Mi).
[Eurocode3:05 6.1]
-. Gamma_M0 = 1.05
-. Gamma_M1 = 1.10
-. Gamma_M2 = 1.25
```

```
=====
[[[*]]] CHECK AXIAL RESISTANCE.
=====
```

- ```
( ). Check slenderness ratio of axial compression member (Kl/i).
[ Eurocode3:05 6.3.1 ]
-. Kl/i = 52.6 < 200.0 ---> O.K.
```

 - MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
 =====
 =

- (). Calculate axial compressive resistance (Nc_Rd).
 [Eurocode3:05 6.1, 6.2.4]
 -. Nc_Rd = fy * Area / Gamma_M0 = 1014.29 kN.
- (). Check ratio of axial resistance (N_Ed/Nc_Rd).

$$\frac{N_{Ed}}{Nc_{Rd}} = \frac{436.06}{1014.29} = 0.430 < 1.000 \text{ ---> O.K.}$$
- (). Calculate buckling resistance of compression member (Nb_Rdy, Nb_Rdz).
 [Eurocode3:05 6.3.1.1, 6.3.1.2]
 -. Beta_A = Aeff / Area = 1.000
 -. Lambda_d1 = Pi * SQRT(Es/fy) = 76.409
 -. Lambda_by = {(KLy/iy)/Lambda_d1} * SQRT(Beta_A) = 0.559
 -. Ncry = Pi^2*Es*Ryy / KLy^2 = 3410.29 kN.
 -. Lambda_by > 0.2 and N_Ed/Ncry > 0.04 --> Need to check.
 -. Alphas = 0.340
 -. Phi_y = 0.5 * [1 + Alphas*(Lambda_by-0.2) + Lambda_by^2] = 0.717
 -. Xiy = MIN [1 / [Phi_y + SQRT(Phi_y^2 - Lambda_by^2)], 1.0] = 0.857
 -. Nb_Rdy = Xiy*Beta_A*Area*fy / Gamma_M1 = 829.92 kN.
- . Lambda_bz = {(KLz/iz)/Lambda_d1} * SQRT(Beta_A) = 0.688
 -. Ncrz = Pi^2*Es*Rzz / KLz^2 = 2248.60 kN.
 -. Lambda_bz > 0.2 and N_Ed/Ncrz > 0.04 --> Need to check.
 -. Alphas = 0.340
 -. Phi_z = 0.5 * [1 + Alphas*(Lambda_bz-0.2) + Lambda_bz^2] = 0.820
 -. Xiz = MIN [1 / [Phi_z + SQRT(Phi_z^2 - Lambda_bz^2)], 1.0] = 0.790
 -. Nb_Rdz = Xiz*Beta_A*Area*fy / Gamma_M1 = 765.18 kN.
- (). Check ratio of buckling resistance (N_Ed/Nb_Rd).
 -. Nb_Rd = MIN[Nb_Rdy, Nb_Rdz] = 765.18 kN.

$$\frac{N_{Ed}}{Nb_{Rd}} = \frac{436.06}{765.18} = 0.570 < 1.000 \text{ ---> O.K.}$$

=====
 [[[*]]] CHECK SHEAR RESISTANCE.
 =====

- (). Calculate shear area.
 [Eurocode3:05 6.2.6, EN1993-1-5:04 5.1 NOTE 2]
 -. Avy = 2*B*tf = 0.0016 m^2.
 -. Avz = 2*h*tw = 0.0016 m^2.
- (). Calculate plastic shear resistance in local-y direction (Vpl_Rdy).
 [Eurocode3:05 6.1, 6.2.6]
 -. Vpl_Rdy = [Avy*fy/SQRT(3)] / Gamma_M0 = 312.32 kN.

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 =====
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(). Check ratio of shear resistance (V_Edy/Vpl_Rdy).
 (LCB = 13+, POS = J)
 -. Applied shear force : V_Edy = 0.73 kN.

$$\frac{V_{Edy}}{V_{pl_Rdy}} = \frac{0.73}{312.32} = 0.002 < 1.000 \text{ ---> O.K.}$$

(). Calculate plastic shear resistance in local-z direction (Vpl_Rdz).
 [Eurocode3:05 6.1, 6.2.6]
 -. Vpl_Rdz = [Avz*fy/SQRT(3)] / Gamma_M0 = 312.32 kN.

(). Shear Buckling Check.
 [Eurocode3:05 6.2.6]
 -. HTR < 72*e/Eta ---> No need to check!

(). Check ratio of shear resistance (V_Edz/Vpl_Rdz).
 (LCB = 13-, POS = J)
 -. Applied shear force : V_Edz = 2.61 kN.

$$\frac{V_{Edz}}{V_{pl_Rdz}} = \frac{2.61}{312.32} = 0.008 < 1.000 \text{ ---> O.K.}$$

=====
 [[[*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MAJOR AXIS.
 =====

(). Calculate plastic resistance moment about major axis.
 [Eurocode3:05 6.1, 6.2.5]
 -. Wply = 5.6938e-005 m^3.
 -. Mc_Rdy = Wply * fy / Gamma_M0 = 19.25 kN-m.

(). Check ratio of moment resistance (M_Edy/Mc_Rdy).

$$\frac{M_{Edy}}{Mc_{Rdy}} = \frac{1.97}{19.25} = 0.102 < 1.000 \text{ ---> O.K.}$$

=====
 [[[*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MINOR AXIS.
 =====

(). Calculate plastic resistance moment about minor axis.
 [Eurocode3:05 6.1, 6.2.5]
 -. Wplz = 9.3500e-005 m^3.
 -. Mc_Rdz = Wplz * fy / Gamma_M0 = 31.61 kN-m.

(). Check ratio of moment resistance (M_Edz/Mc_Rdz).

$$\frac{M_{Edz}}{Mc_{Rdz}} = \frac{0.91}{31.61} = 0.029 < 1.000 \text{ ---> O.K.}$$

 - MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
 =====
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=====
 [[[*]]] CHECK INTERACTION OF COMBINED RESISTANCE.
 =====

- (). Calculate Major reduced design resistance of bending and shear.
 [Eurocode3:05 6.2.8 (6.30)]
 -. In case of $V_{Edz} / V_{pl,Rdz} < 0.5$
 -. $M_{y,Rd} = M_{c,Rdy} = 19.25$ kN-m.

- (). Calculate Minor reduced design resistance of bending and shear.
 [Eurocode3:05 6.2.8 (6.30)]
 -. In case of $V_{Edy} / V_{pl,Rdy} < 0.5$
 -. $M_{z,Rd} = M_{c,Rdz} = 31.61$ kN-m.

- (). Check general interaction ratio.
 [Eurocode3:05 6.2.1 (6.2)] - Class1 or Class2

$$R_{max1} = \frac{N_{Ed}}{N_{Rd}} + \frac{M_{Edy}}{M_{y,Rd}} + \frac{M_{Edz}}{M_{z,Rd}}$$

$$= 0.561 < 1.000 \text{ ---> O.K.}$$

- (). Check interaction ratio of bending and axial force member.
 [Eurocode3:05 6.2.9 (6.31 ~ 6.41)] - Class1 or Class2
 -. $n = N_{Ed} / N_{pl,Rd} = 0.430$
 -. $a = \text{MIN}[(Area-2b*tf)/Area, 0.5] = 0.500$
 -. $\alpha = 2.000$
 -. $\beta = \text{MAX}[5*n, 1.0] = 2.150$
 -. $M_{ny,Rd} = \text{MIN}[M_{ply,Rd}*(1-n)/(1-0.5*a), M_{ply,Rd}] = 14.63$ kN-m.
 -. $R_{maxy} = M_{Edy} / M_{ny,Rd} = 0.135 < 1.000 \text{ ---> O.K.}$

 -. In case of $n < a$
 -. $M_{nz,Rd} = M_{plz,Rd} = 31.61$ kN-m.
 -. $R_{maxz} = M_{Edz} / M_{nz,Rd} = 0.029 < 1.000 \text{ ---> O.K.}$

$$R_{max2} = \left[\frac{M_{Edy}}{M_{ny,Rd}} \right]^{\alpha} + \left[\frac{M_{Edz}}{M_{nz,Rd}} \right]^{\beta}$$

$$= 0.019 < 1.000 \text{ ---> O.K.}$$

 -
 MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
 =====
 =

(). Check interaction ratio of bending and axial compression member.
 [Eurocode3:05 6.3.1, 6.2.9.3 (6.61, 6.62), Annex A]

- . N_Ed = -436.06 kN.
- . M_Edy = -1.97 kN-m.
- . M_Edz = -0.91 kN-m.
- . k_{yy} = 0.959
- . k_{yz} = 0.587
- . k_{zy} = 0.524
- . k_{zz} = 1.100
- . X_{iy} = 0.857
- . X_{iz} = 0.790
- . X_{iLT} = 0.879
- . N_Rk = A*fy = 1065.00 kN.
- . M_{y_Rk} = W_{p1y}*fy = 20.21 kN-m.
- . M_{z_Rk} = W_{p1z}*fy = 33.19 kN-m.
- . N_Ed*e_{Ny} = 0.0 (Not Slender)
- . N_Ed*e_{Nz} = 0.0 (Not Slender)

$$\begin{aligned}
 & \text{N_Ed*eNz} & \text{M_Edy} + \text{N_Ed*eNy} & \text{M_Edz} + \\
 \text{-----} & & & \\
 \text{-----} & \text{-----} + k_{yy} * \text{-----} + k_{yz} * \text{-----} & & \\
 & \text{Xiy*N_Rk/Gamma_M1} & & \text{XiLT*My_Rk/Gamma_M1} \\
 \text{Mz_Rk/Gamma_M1} & & & \\
 & = 0.660 < 1.000 \text{ ----> O.K.} & & \\
 & \text{N_Ed} & \text{M_Edy} + \text{N_Ed*eNy} & \text{M_Edz} + \\
 \text{-----} & & & \\
 \text{-----} & \text{-----} + k_{zy} * \text{-----} + k_{zz} * \text{-----} & & \\
 & \text{Xiz*N_Rk/Gamma_M1} & & \text{XiLT*My_Rk/Gamma_M1} \\
 \text{Mz_Rk/Gamma_M1} & & & \\
 & = 0.667 < 1.000 \text{ ----> O.K.} & & \\
 & & & \\
 \text{-----> O.K.} & \text{-----} & \text{-----} & \text{-----} \\
 & \text{Rmax} = \text{MAX} [\text{MAX} (\text{Rmax1}, \text{Rmax2}), \text{MAX} (\text{Rmax_LT1}, \text{Rmax_LT2})] = 0.667 < 1.000
 \end{aligned}$$

10.2 DIAFRAMMI SU SPALLE E INTEREDI – TRASVERSI SUPERIORI

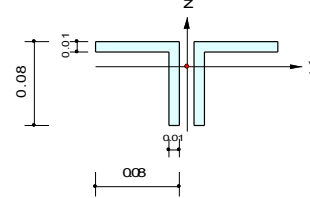


Steel Checking Result

Company		Project Title	CASALPUSTERLENCO
Author	Renato Vaira	File Name	D:\...\Viadotti rotatorie V_1.mcb

1. Design Information

Design Code : Eurocode3-2:05
 Unit System : kN, m
 Member No : 1431
 Material : S355W (No:1)
 (Fy = 355000, Es = 210000000)
 Section Name : HSUP_CORR 2L80x10d15 (No:17)
 (Built-up Section).
 Member Length : 3.20000



2. Member Forces

Axial Force Fxx = -203.16 (LCB: 16-, POS:I)
 Bending Moments My = -0.7633, Mz = -0.1447
 End Moments Myi = -0.7633, Myj = -0.6911 (for Lb)
 Mzi = -0.7633, Mzj = -0.6911 (for Ly)
 Mzi = -0.1447, Mzj = -0.1503 (for Lz)
 Shear Forces Fyy = 0.14421 (LCB: 13+, POS:I)
 Fzz = -1.0327 (LCB: 13-, POS:I)

Depth	0.08000	Web Thick	0.01000
Flg Width	0.08000	Flg Thick	0.01000
BTB Spacing	0.01500		
Area	0.00300	Asz	0.00133
Cyb	0.00159	Czb	0.00320
Iyy	0.00000	Izz	0.00000
Ybar	0.08750	Zbar	0.05633
Wely	0.00003	Welz	0.00005
ry	0.02436	rz	0.03955

3. Design Parameters

Unbraced Lengths Ly = 3.20000, Lz = 3.20000, Lb = 3.20000
 Effective Length Factors Ky = 0.65, Kz = 0.65
 Equivalent Uniform Moment Factors Cmy = 1.00, Cmz = 1.00, CmLT = 1.00

4. Checking Results

Axial Resistance

$$N_{Ed}/\text{MIN}[N_{c,Rd}, N_{b,Rd}] = 203.163/508.054 = 0.400 < 1.000 \dots\dots\dots \text{O.K}$$

Bending Resistance

$$M_{Edy}/M_{Rdy} = 0.7633/19.2503 = 0.040 < 1.000 \dots\dots\dots \text{O.K}$$

$$M_{Edz}/M_{Rdz} = 0.1447/31.6119 = 0.005 < 1.000 \dots\dots\dots \text{O.K}$$

Combined Resistance

$$R_{NRd} = \text{MAX}[M_{Edy}/M_{ny,Rd}, M_{Edz}/M_{nz,Rd}]$$

$$R_{max1} = (M_{Edy}/M_{ny,Rd})^{\text{Alpha}} + (M_{Edz}/M_{nz,Rd})^{\text{Beta}}$$

$$R_{oom} = N_{Ed}/(A \cdot f_y / \text{Gamma}_{M0}), R_{bend} = M_{Edy}/M_{y,Rd} + M_{Edz}/M_{z,Rd}$$

$$R_{c_LT1} = N_{Ed}/(X_{iy} \cdot A \cdot f_y / \text{Gamma}_{M1})$$

$$R_{b_LT1} = (k_{yy} \cdot M_{Edy}) / (X_{i_LT} \cdot W_{ply} \cdot f_y / \text{Gamma}_{M1}) + (k_{yz} \cdot M_{sdz}) / (W_{plz} \cdot f_y / \text{Gamma}_{M1})$$

$$R_{c_LT2} = N_{Ed}/(X_{iz} \cdot A \cdot f_y / \text{Gamma}_{M1})$$

$$R_{b_LT2} = (k_{zy} \cdot M_{Edy}) / (X_{i_LT} \cdot W_{ply} \cdot f_y / \text{Gamma}_{M1}) + (k_{zz} \cdot M_{sdz}) / (W_{plz} \cdot f_y / \text{Gamma}_{M1})$$

$$R_{max} = \text{MAX}[R_{NRd}, R_{max1}, (R_{oom} + R_{bend}), \text{MAX}(R_{c_LT1} + R_{b_LT1}, R_{c_LT2} + R_{b_LT2})] = 0.468 < 1.000 \dots\dots \text{O.K}$$

Shear Resistance

$$V_{Edy}/V_{y,Rd} = 0.000 < 1.000 \dots\dots\dots \text{O.K}$$

$$V_{Edz}/V_{z,Rd} = 0.003 < 1.000 \dots\dots\dots \text{O.K}$$

16+	1	Vento strutture (Y+) (0.900) +Vento mobili (Y+) (0.900) + Dead Load (1.350) +Erection Load 1(1.500) +Creep Secondary(1.200) +Shrinkage Secondary(1.200) +Termico unif. INV(1.200) +Termico diff. INV(1.200) +Mobili SLE INV(1.350)
16-	1	Vento strutture (Y+) (0.900) +Vento mobili (Y+) (0.900) + Dead Load (1.350) +Erection Load 1(1.500) +Creep Secondary(1.200) +Shrinkage Secondary(1.200) +Termico unif. INV(1.200) +Termico diff. INV(1.200) +Mobili SLE INV(1.350)


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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
=====
=
17+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 1.000) + SLV Trasv INV( 0.300) + SLV Vert INV( 0.300)
17- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 1.000) + SLV Trasv INV( 0.300) + SLV Vert INV( 0.300)
18+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 1.000) + SLV Vert INV( 0.300)
18- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 1.000) + SLV Vert INV( 0.300)
19+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 0.300) + SLV Vert INV( 1.000)
19- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 0.300) + SLV Vert INV( 1.000)
22+ 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLU INV(
1.000)
22- 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLU INV(
1.000)
23+ 2      Vento strutture (Y+)( 1.000) +Vento mobili (Y+)( 1.000) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLE INV(
1.000)
23- 2      Vento strutture (Y+)( 1.000) +Vento mobili (Y+)( 1.000) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLE INV(
1.000)
24+ 2      Frenamento (X+)( 1.000) +      Summation( 1.000) +Termico unif. INV( 0.600)
      +Termico diff. INV( 0.600) +Mobili SLE INV( 1.000)
24- 2      Frenamento (X+)( 1.000) +      Summation( 1.000) +Termico unif. INV( 0.600)
      +Termico diff. INV( 0.600) +Mobili SLE INV( 1.000)
25+ 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 1.000) +Termico diff. INV( 1.000) +Mobili SLE INV(
1.000)
25- 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 1.000) +Termico diff. INV( 1.000) +Mobili SLE INV(
1.000)
26+ 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      +Mobili SLE INV( 1.000)
26- 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      +Mobili SLE INV( 1.000)
27+ 2      Vento strutture (Y+)( 0.200) +Vento mobili (Y+)( 0.200) +      Summation(
1.000)
      +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
27- 2      Vento strutture (Y+)( 0.200) +Vento mobili (Y+)( 0.200) +      Summation(
1.000)
      +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
28+ 2      Summation( 1.000) +Termico unif. INV( 0.600) +Termico diff. INV( 0.600)
28- 2      Summation( 1.000) +Termico unif. INV( 0.600) +Termico diff. INV( 0.600)
29+ 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
29- 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
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 MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
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* . PROJECT      : CASALPUSTERLENGO
* . MEMBER NO   = 1431, ELEMENT TYPE = Beam
* . LOADCOMB NO = 16-, MATERIAL NO = 1, SECTION NO = 17
* . UNIT SYSTEM : kN, m

* . SECTION PROPERTIES : Designation = HSUP_CORR 2L80x10d15
  Shape      = 2L - Section. (Built-up)
  Depth     = 0.080, Flg Width = 0.080, BTB Spacing = 0.015
  Web Thick = 0.010, Flg Thick = 0.010

  Area = 3.00000e-003, Avy = 1.60000e-003, Avz = 1.60000e-003
  Ybar = 8.75000e-002, Zbar = 5.63333e-002, Qyb = 1.58672e-003, Qzb = 3.20000e-
003
  Wely = 3.15917e-005, Welz = 5.36429e-005, Wply = 5.69375e-005, Wplz = 9.35000e-
005

  Iyy = 1.77967e-006, Izz = 4.69375e-006, Iyz = 0.00000e+000
  iy  = 2.43562e-002, iz  = 3.95548e-002
  J   = 1.00000e-007, Cwp = 4.24931e-011

* . DESIGN PARAMETERS FOR STRENGTH EVALUATION :
  Ly = 3.20000e+000, Lz = 3.20000e+000, Lu = 3.20000e+000
  Ky = 6.50000e-001, Kz = 6.50000e-001

* . MATERIAL PROPERTIES :
  Fy = 3.55000e+005, Es = 2.10000e+008, MATERIAL NAME = S355W

* . FORCES AND MOMENTS AT (I) POINT :
  Axial Force      Fxx =-2.03163e+002
  Shear Forces     Fyy =-8.70124e-002, Fzz =-8.84697e-001
  Bending Moments    My =-7.63295e-001, Mz =-1.44671e-001
  End Moments        Myi =-7.63295e-001, Myj =-6.91057e-001 (for Lb)
                   Myi =-7.63295e-001, Myj =-6.91057e-001 (for Ly)
                   Mzi =-1.44671e-001, Mzj =-1.50349e-001 (for Lz)

* . Sign conventions for stress and axial force.
  - Stress : Compression positive.
  - Axial force: Tension positive.
  
```

=====
 [[[*]]] CLASSIFY LEFT FLANGE OF SECTION (BTR).
 =====

```

( ). Determine classification of compression flanges(Double angle).
  [ Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5 ]
  -. e = SQRT( 235/fy ) = 0.81
  -. b/t = BTR = 7.00
  -. sigma1 = 60267.409 KPa.
  -. sigma2 = 57801.637 KPa.
  -. BTR < 9*e ( Class 1 : Plastic ).
  
```

```
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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
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```
-----
[[[*]]] CLASSIFY RIGHT FLANGE OF SECTION (BTR).
=====
```

- ```
(). Determine classification of compression flanges(Double angle).
[Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5]
-. e = SQRT(235/fy) = 0.81
-. b/t = BTR = 7.00
-. sigma1 = 57339.304 KPa.
-. sigma2 = 54873.532 KPa.
-. BTR < 9*e (Class 1 : Plastic).
```

```

[[[*]]] CLASSIFY WEB OF SECTION (HTR).
=====
```

- ```
( ). Determine classification of compression element(Double angles).
[ Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5 ]
-. e      = SQRT( 235/fy ) =    0.81
-. d/t    = HTR =    8.00
-. sigma1 = 92421.667 KPa.
-. sigma2 = 62398.834 KPa.
-. HTR < 10*e ( Class 2 : Compact ).
```

```
-----
[[[*]]] APPLIED FACTORS.
=====
```

- ```
(). Calculate equivalent uniform moment factors (Cmy,Cmz,CmLT).
[Eurocode3:05 Annex A. Table A.1, A.2]
-. Cmy,0 = 0.762
-. Cmz,0 = 0.910
-. Cmy (Default or User Defined Value) = 1.000
-. Cmz (Default or User Defined Value) = 1.000
-. CmLT (Default or User Defined Value) = 1.000

(). Partial Factors (Gamma_Mi).
[Eurocode3:05 6.1]
-. Gamma_M0 = 1.05
-. Gamma_M1 = 1.10
-. Gamma_M2 = 1.25
```

```

[[[*]]] CHECK AXIAL RESISTANCE.
=====
```

- ```
( ). Check slenderness ratio of axial compression member (Kl/i).
[ Eurocode3:05 6.3.1 ]
-. Kl/i = 85.4 < 200.0 ---> O.K.
```

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- (). Calculate axial compressive resistance (Nc_Rd).
 [Eurocode3:05 6.1, 6.2.4]
 -. Nc_Rd = $f_y \cdot Area / \Gamma_{M0}$ = 1014.29 kN.
- (). Check ratio of axial resistance (N_Ed/Nc_Rd).
 $\frac{N_{Ed}}{Nc_{Rd}} = \frac{203.16}{1014.29} = 0.200 < 1.000 \rightarrow$ O.K.
- (). Calculate buckling resistance of compression member (Nb_Rdy, Nb_Rdz).
 [Eurocode3:05 6.3.1.1, 6.3.1.2]
 -. Beta_A = $A_{eff} / Area$ = 1.000
 -. Lambda_d1 = $\pi \cdot \sqrt{Es/fy}$ = 76.409
 -. Lambda_by = $\{(KLy/iy)/\Lambda_{d1}\} \cdot \sqrt{Beta_A}$ = 1.118
 -. Ncry = $\pi^2 \cdot Es \cdot R_{yy} / KLy^2$ = 852.57 kN.
 -. Lambda_by > 0.2 and N_Ed/Ncry > 0.04 --> Need to check.
 -. Alphas = 0.340
 -. Phi_y = $0.5 \cdot [1 + \alpha \cdot (\Lambda_{by} - 0.2) + \Lambda_{by}^2]$ = 1.281
 -. Xiy = $\text{MIN} [1 / [\Phi_y + \sqrt{\Phi_y^2 - \Lambda_{by}^2}], 1.0]$ = 0.525
 -. Nb_Rdy = $Xiy \cdot Beta_A \cdot Area \cdot f_y / \Gamma_{M1}$ = 508.05 kN.
- . Lambda_bz = $\{(KLz/iz)/\Lambda_{d1}\} \cdot \sqrt{Beta_A}$ = 0.688
 -. Ncrz = $\pi^2 \cdot Es \cdot R_{zz} / KLz^2$ = 2248.60 kN.
 -. Lambda_bz > 0.2 and N_Ed/Ncrz > 0.04 --> Need to check.
 -. Alphas = 0.340
 -. Phi_z = $0.5 \cdot [1 + \alpha \cdot (\Lambda_{bz} - 0.2) + \Lambda_{bz}^2]$ = 0.820
 -. Xiz = $\text{MIN} [1 / [\Phi_z + \sqrt{\Phi_z^2 - \Lambda_{bz}^2}], 1.0]$ = 0.790
 -. Nb_Rdz = $Xiz \cdot Beta_A \cdot Area \cdot f_y / \Gamma_{M1}$ = 765.18 kN.
- (). Check ratio of buckling resistance (N_Ed/Nb_Rd).
 -. Nb_Rd = $\text{MIN}[Nb_{Rdy}, Nb_{Rdz}]$ = 508.05 kN.
 $\frac{N_{Ed}}{Nb_{Rd}} = \frac{203.16}{508.05} = 0.400 < 1.000 \rightarrow$ O.K.

=====
 [[[*]]] CHECK SHEAR RESISTANCE.
 =====

- (). Calculate shear area.
 [Eurocode3:05 6.2.6, EN1993-1-5:04 5.1 NOTE 2]
 -. Avy = $2 \cdot B \cdot t_f$ = 0.0016 m².
 -. Avz = $2 \cdot h \cdot t_w$ = 0.0016 m².
- (). Calculate plastic shear resistance in local-y direction (Vpl_Rdy).
 [Eurocode3:05 6.1, 6.2.6]
 -. Vpl_Rdy = $[Avy \cdot f_y / \sqrt{3}] / \Gamma_{M0}$ = 312.32 kN.

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- (). Check ratio of shear resistance (V_Edy/Vpl_Rdy).
 (LCB = 13+, POS = J)
 -. Applied shear force : V_Edy = 0.14 kN.

$$\frac{V_{Edy}}{V_{pl_Rdy}} = \frac{0.14}{312.32} = 4.617e-004 < 1.000 \text{ ---> O.K.}$$
- (). Calculate plastic shear resistance in local-z direction (Vpl_Rdz).
 [Eurocode3:05 6.1, 6.2.6]
 -. Vpl_Rdz = [Avz*fy/SQRT(3)] / Gamma_M0 = 312.32 kN.
- (). Shear Buckling Check.
 [Eurocode3:05 6.2.6]
 -. HTR < 72*e/Eta ---> No need to check!
- (). Check ratio of shear resistance (V_Edz/Vpl_Rdz).
 (LCB = 13-, POS = I)
 -. Applied shear force : V_Edz = 1.03 kN.

$$\frac{V_{Edz}}{V_{pl_Rdz}} = \frac{1.03}{312.32} = 0.003 < 1.000 \text{ ---> O.K.}$$

=====
 [[[*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MAJOR AXIS.
 =====

- (). Calculate plastic resistance moment about major axis.
 [Eurocode3:05 6.1, 6.2.5]
 -. Wply = 5.6938e-005 m^3.
 -. Mc_Rdy = Wply * fy / Gamma_M0 = 19.25 kN-m.
- (). Check ratio of moment resistance (M_Edy/Mc_Rdy).

$$\frac{M_{Edy}}{Mc_{Rdy}} = \frac{0.76}{19.25} = 0.040 < 1.000 \text{ ---> O.K.}$$

=====
 [[[*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MINOR AXIS.
 =====

- (). Calculate plastic resistance moment about minor axis.
 [Eurocode3:05 6.1, 6.2.5]
 -. Wplz = 9.3500e-005 m^3.
 -. Mc_Rdz = Wplz * fy / Gamma_M0 = 31.61 kN-m.
- (). Check ratio of moment resistance (M_Edz/Mc_Rdz).

$$\frac{M_{Edz}}{Mc_{Rdz}} = \frac{0.14}{31.61} = 0.005 < 1.000 \text{ ---> O.K.}$$

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 =

=====
 [[[*]]] CHECK INTERACTION OF COMBINED RESISTANCE.
 =====

- (). Calculate Major reduced design resistance of bending and shear.
 [Eurocode3:05 6.2.8 (6.30)]
 -. In case of $V_{Edz} / V_{pl,Rdz} < 0.5$
 -. $M_{y,Rd} = M_{c,Rdy} = 19.25$ kN-m.

- (). Calculate Minor reduced design resistance of bending and shear.
 [Eurocode3:05 6.2.8 (6.30)]
 -. In case of $V_{Edy} / V_{pl,Rdy} < 0.5$
 -. $M_{z,Rd} = M_{c,Rdz} = 31.61$ kN-m.

- (). Check general interaction ratio.
 [Eurocode3:05 6.2.1 (6.2)] - Class1 or Class2

$$R_{max1} = \frac{N_{Ed}}{N_{Rd}} + \frac{M_{Edy}}{M_{y,Rd}} + \frac{M_{Edz}}{M_{z,Rd}}$$

$$= 0.245 < 1.000 \text{ ---> O.K.}$$

- (). Check interaction ratio of bending and axial force member.
 [Eurocode3:05 6.2.9 (6.31 ~ 6.41)] - Class1 or Class2
 -. $n = N_{Ed} / N_{pl,Rd} = 0.200$
 -. $a = \text{MIN}[(Area - 2b \cdot t_f) / Area, 0.5] = 0.500$
 -. $\alpha = 2.000$
 -. $\beta = \text{MAX}[5 \cdot n, 1.0] = 1.002$
 -. $M_{ny,Rd} = \text{MIN}[M_{ply,Rd} \cdot (1-n) / (1-0.5 \cdot a), M_{ply,Rd}] = 19.25$ kN-m.
 -. $R_{maxy} = M_{Edy} / M_{ny,Rd} = 0.040 < 1.000 \text{ ---> O.K.}$

 -. In case of $n < a$
 -. $M_{nz,Rd} = M_{plz,Rd} = 31.61$ kN-m.
 -. $R_{maxz} = M_{Edz} / M_{nz,Rd} = 0.005 < 1.000 \text{ ---> O.K.}$

$$R_{max2} = \left[\frac{M_{Edy}}{M_{ny,Rd}} \right]^{\alpha} + \left[\frac{M_{Edz}}{M_{nz,Rd}} \right]^{\beta}$$

$$= 0.006 < 1.000 \text{ ---> O.K.}$$

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 =====
 =

(). Check interaction ratio of bending and axial compression member.
 [Eurocode3:05 6.3.1, 6.2.9.3 (6.61, 6.62), Annex A]

- . N_Ed = -203.16 kN.
- . M_Edy = -0.76 kN-m.
- . M_Edz = -0.14 kN-m.
- . kyy = 1.210
- . kyz = 0.600
- . kzy = 0.797
- . kzz = 1.218
- . Xiy = 0.525
- . Xiz = 0.790
- . XiLT = 0.772
- . N_Rk = A*fy = 1065.00 kN.
- . My_Rk = Wply*fy = 20.21 kN-m.
- . Mz_Rk = Wplz*fy = 33.19 kN-m.
- . N_Ed*eNy = 0.0 (Not Slender)
- . N_Ed*eNz = 0.0 (Not Slender)

$$\begin{aligned}
 & \text{N_Ed*eNz} && \text{N_Ed} && \text{M_Edy} + \text{N_Ed*eNy} && \text{M_Edz} + \\
 \text{-----} & \text{-----} & \text{+ kyy *} & \text{-----} & \text{+ kyz *} & \text{-----} \\
 & \text{Xiy*N_Rk/Gamma_M1} & & & \text{XiLT*My_Rk/Gamma_M1} & \\
 \text{Mz_Rk/Gamma_M1} & & & & & \\
 & = 0.468 < 1.000 \text{ ----> O.K.} & & & & \\
 & \text{N_Ed} & & \text{M_Edy} + \text{N_Ed*eNy} & & \text{M_Edz} + \\
 & \text{-----} & & \text{-----} & & \text{-----} \\
 & \text{Xiz*N_Rk/Gamma_M1} & & & \text{XiLT*My_Rk/Gamma_M1} & \\
 \text{Mz_Rk/Gamma_M1} & & & & & \\
 & = 0.314 < 1.000 \text{ ----> O.K.} & & & & \\
 & \text{-----} & & & & \\
 & \text{-. Rmax} = \text{MAX[MAX(Rmax1, Rmax2), MAX(Rmax_LT1, Rmax_LT2)]} = 0.468 < 1.000 \\
 & \text{----> O.K.} & & & &
 \end{aligned}$$

10.3 DIAFRAMMI SU SPALLE E INTEREDI – DIAGONALI

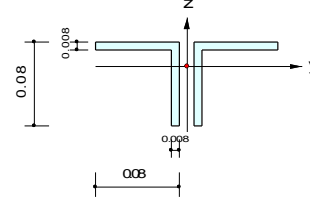


Steel Checking Result

Company		Project Title	CASALPUSTERLENCO
Author	Renato Vaira	File Name	D:\...Viadotti rotatorie V_1.mcb

1. Design Information

Design Code : Eurocode3-2:05
 Unit System : kN, m
 Member No : 1290
 Material : S355W (No:1)
 (Fy = 355000, Es = 210000000)
 Section Name : DIAG_CORR 2L80x8d15 (No:64)
 (Built-up Section).
 Member Length : 1.70880



2. Member Forces

Axial Force Fxx = -123.87 (LCB: 13-, POS:I)
 Bending Moments My = -1.4617, Mz = -0.4983
 End Moments Myi = -1.4617, Myj = -0.6559 (for Lb)
 Myi = -1.4617, Myj = -0.6559 (for Ly)
 Mzi = -0.4983, Mzj = -0.3407 (for Lz)
 Shear Forces Fyy = -0.0923 (LCB: 13-, POS:I)
 Fzz = -1.5332 (LCB: 13-, POS:J)

Depth	0.08000	Web Thick	0.00800
Flg Width	0.08000	Flg Thick	0.00800
BTB Spacing	0.01500		
Area	0.00243	Asz	0.00107
Cyb	0.00163	Czb	0.00320
Iyy	0.00000	Izz	0.00000
Ybar	0.08750	Zbar	0.05705
Wely	0.00003	Wetz	0.00004
ry	0.02462	rz	0.03916

3. Design Parameters

Unbraced Lengths Ly = 1.70880, Lz = 1.70880, Lb = 1.70880
 Effective Length Factors Ky = 0.65, Kz = 1.30
 Equivalent Uniform Moment Factors Cmy = 1.00, Cmz = 1.00, CmLT = 1.00

4. Checking Results

Axial Resistance

$$N_{Ed}/\text{MIN}[N_{c,Rd}, N_{b,Rd}] = 123.872/595.881 = 0.208 < 1.000 \dots\dots\dots \text{O.K}$$

Bending Resistance

$$M_{Edy}/M_{Rdy} = 1.4617/8.34129 = 0.175 < 1.000 \dots\dots\dots \text{O.K}$$

$$M_{Edz}/M_{Rdz} = 0.4983/11.6551 = 0.043 < 1.000 \dots\dots\dots \text{O.K}$$

Combined Resistance

$$R_{oom} = N_{Ed}/(A_{eff}f_y/\Gamma_{M0}), R_{bend} = (M_{Edy}+N_{Ed}e_{Ny})/M_{y,Rd} + (M_{Edz}+N_{Ed}e_{Nz})/M_{z,Rd}$$

$$R_{c_LT1} = N_{Ed}/(X_{iy}A_{eff}f_y/\Gamma_{M1})$$

$$R_{b_LT1} = k_{yy}(M_{Edy}+N_{Ed}e_{Ny})/(X_{i_LT}W_{effy}f_y/\Gamma_{M1}) + k_{yz}(M_{Edz}+N_{Ed}e_{Nz})/(W_{effz}f_y/\Gamma_{M1})$$

$$R_{c_LT2} = N_{Ed}/(X_{iz}A_{eff}f_y/\Gamma_{M1})$$

$$R_{b_LT2} = k_{zy}(M_{Edz}+N_{Ed}e_{Nz})/(X_{i_LT}W_{effy}f_y/\Gamma_{M1}) + k_{zz}(M_{Edz}+N_{Ed}e_{Nz})/(W_{effz}f_y/\Gamma_{M1})$$

$$R_{max} = \text{MAX}[R_{oom}+R_{bend}, \text{MAX}(R_{c_LT1}+R_{b_LT1}, R_{c_LT2}+R_{b_LT2})] = 0.451 < 1.000 \dots\dots \text{O.K}$$

Shear Resistance

$$V_{Edy}/V_{y,Rd} = 0.000 < 1.000 \dots\dots\dots \text{O.K}$$

$$V_{Edz}/V_{z,Rd} = 0.006 < 1.000 \dots\dots\dots \text{O.K}$$

16+	1	Vento strutture (Y+) (0.900) +Vento mobili (Y+) (0.900) +	Dead Load (
1.350)			
		+Erection Load 1(1.500) +Creep Secondary(1.200) +Shrinkage Secondary(
1.200)			
		+Termico unif. INV(1.200) +Termico diff. INV(1.200) +Mobili SLE INV(
1.350)			
16-	1	Vento strutture (Y+) (0.900) +Vento mobili (Y+) (0.900) +	Dead Load (
1.350)			
		+Erection Load 1(1.500) +Creep Secondary(1.200) +Shrinkage Secondary(
1.200)			
		+Termico unif. INV(1.200) +Termico diff. INV(1.200) +Mobili SLE INV(
1.350)			

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=
17+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 1.000) + SLV Trasv INV( 0.300) + SLV Vert INV( 0.300)
17- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 1.000) + SLV Trasv INV( 0.300) + SLV Vert INV( 0.300)
18+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 1.000) + SLV Vert INV( 0.300)
18- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 1.000) + SLV Vert INV( 0.300)
19+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 0.300) + SLV Vert INV( 1.000)
19- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 0.300) + SLV Vert INV( 1.000)
22+ 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLU INV(
1.000)
22- 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLU INV(
1.000)
23+ 2      Vento strutture (Y+)( 1.000) +Vento mobili (Y+)( 1.000) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLE INV(
1.000)
23- 2      Vento strutture (Y+)( 1.000) +Vento mobili (Y+)( 1.000) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLE INV(
1.000)
24+ 2      Frenamento (X+)( 1.000) +      Summation( 1.000) +Termico unif. INV( 0.600)
      +Termico diff. INV( 0.600) +Mobili SLE INV( 1.000)
24- 2      Frenamento (X+)( 1.000) +      Summation( 1.000) +Termico unif. INV( 0.600)
      +Termico diff. INV( 0.600) +Mobili SLE INV( 1.000)
25+ 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 1.000) +Termico diff. INV( 1.000) +Mobili SLE INV(
1.000)
25- 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 1.000) +Termico diff. INV( 1.000) +Mobili SLE INV(
1.000)
26+ 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      +Mobili SLE INV( 1.000)
26- 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      +Mobili SLE INV( 1.000)
27+ 2      Vento strutture (Y+)( 0.200) +Vento mobili (Y+)( 0.200) +      Summation(
1.000)
      +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
27- 2      Vento strutture (Y+)( 0.200) +Vento mobili (Y+)( 0.200) +      Summation(
1.000)
      +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
28+ 2      Summation( 1.000) +Termico unif. INV( 0.600) +Termico diff. INV( 0.600)
28- 2      Summation( 1.000) +Termico unif. INV( 0.600) +Termico diff. INV( 0.600)
29+ 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
29- 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
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 MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
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```

*. PROJECT      : CASALPUSTERLENGO
*. MEMBER NO   = 1290, ELEMENT TYPE = Beam
*. LOADCOMB NO = 13-, MATERIAL NO  = 1, SECTION NO  = 64
*. UNIT SYSTEM : kN, m

*. SECTION PROPERTIES : Designation = DIAG_CORR 2L80x8d15
  Shape        = 2L - Section. (Built-up)
  Depth        = 0.080, Flg Width  = 0.080, BTB Spacing = 0.015
  Web Thick    = 0.008, Flg Thick  = 0.008

  Area = 2.43200e-003, Avy = 1.28000e-003, Avz = 1.28000e-003
  Ybar = 8.75000e-002, Zbar = 5.70526e-002, Qyb = 1.62750e-003, Qzb = 3.20000e-
003
  Wely = 2.58462e-005, Welz = 4.26190e-005, Wply = 4.65664e-005, Wplz = 7.40480e-
005

  Iyy = 1.47460e-006, Izz = 3.72916e-006, Iyz = 0.00000e+000
  iy  = 2.46238e-002, iz  = 3.91583e-002
  J   = 5.18827e-008, Cwp = 2.31033e-011

*. DESIGN PARAMETERS FOR STRENGTH EVALUATION :
  Ly = 1.70880e+000, Lz = 1.70880e+000, Lu = 1.70880e+000
  Ky = 6.50000e-001, Kz = 1.30000e+000

*. MATERIAL PROPERTIES :
  Fy = 3.55000e+005, Es = 2.10000e+008, MATERIAL NAME = S355W

*. FORCES AND MOMENTS AT (I) POINT :
  Axial Force      Fxx = -1.23872e+002
  Shear Forces     Fyy = -9.22757e-002, Fzz = -1.06815e+000
  Bending Moments    My = -1.46171e+000, Mz = -4.98279e-001
  End Moments        Myi = -1.46171e+000, Myj = -6.55937e-001 (for Lb)
                   Myi = -1.46171e+000, Myj = -6.55937e-001 (for Ly)
                   Mzi = -4.98279e-001, Mzj = -3.40680e-001 (for Lz)

*. Sign conventions for stress and axial force.
  - Stress : Compression positive.
  - Axial force: Tension positive.
  
```

=====
 [[[*]]] CLASSIFY LEFT FLANGE OF SECTION (BTR).
 =====

```

( ). Determine classification of compression flanges(Double angle).
  [ Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5 ]
  -. e = SQRT( 235/fy ) = 0.81
  -. b/t = BTR = 9.00
  -. sigma1 = 39878.951 KPa.
  -. sigma2 = 29189.598 KPa.
  -. BTR_L = (H+B) / (2*tf) = 10.00
  -. BTR > 15*e or BTR_L > 11.5*e ( Class 4 : Slender ).
  
```

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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
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```
-----
[[[*]]] CLASSIFY RIGHT FLANGE OF SECTION (BTR).
=====
```

- (). Determine classification of compression flanges(Double angle).
 [Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5]
- . e = SQRT(235/fy) = 0.81
 - . b/t = BTR = 9.00
 - . sigma1 = 27185.344 KPa.
 - . sigma2 = 16495.991 KPa.
 - . BTR_L = (H+B) / (2*tf) = 10.00
 - . BTR > 15*e or BTR_L > 11.5*e (Class 4 : Slender).

```
-----
[[[*]]] CLASSIFY WEB OF SECTION (HTR).
=====
```

- (). Determine classification of compression element(Double angles).
 [Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5]
- . e = SQRT(235/fy) = 0.81
 - . d/t = HTR = 10.00
 - . sigma1 = 109559.378 KPa.
 - . sigma2 = 38188.618 KPa.
 - . HTR_L = (h+B) / (2*tw) = 10.00
 - . HTR > 15*e or HTR_L > 11.5*e (Class 4 : Slender).

```
-----
[[[*]]] CALCULATE EFFECTIVE AREA.
=====
```

- (). Calculate buckling factor of outstand compression element.
 [Eurocode3 Part 1-5 4.4, Table 4.2]
- . In case of Psi = 1.0
 - . k_sigma = 0.4300
- (). Calculate effective cross-section properties of left flange flange of Class 4 (Outstand element).
 [Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
- . RatT = 9.0000
 - . Lambda_p = RatT / [28.4*Eps*SQRT(k_sigma)] = 0.5940
 - . Rho = 1.0
 - . sigma_max = MAX(sigma1, sigma2) = 50934.292 KPa.
 - . sigma_min = MIN(sigma1, sigma2) = 50934.292 KPa.
 - . r = 0.000 m.
 - . bc = 0.080 m.
 - . beff = Rho*bc + r = 0.080 m.
 - . Aeff = beff * tf = 6.400e-004 m^2.
 - . yeff = beff/2 = 0.040 m.
- (). Calculate buckling factor of outstand compression element.
 [Eurocode3 Part 1-5 4.4, Table 4.2]

```

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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
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-. In case of Psi = 1.0
-. k_sigma = 0.4300

( ). Calculate effective cross-section properties of right flange flange of Class 4
(Outstand element).
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. RatT      = 9.0000
-. Lambda_p  = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.5940
-. Rho       = 1.0
-. sigma_max = MAX( sigma1, sigma2 ) = 50934.292 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = 50934.292 KPa.
-. r         = 0.000 m.
-. bc       = 0.080 m.
-. beff     = Rho*bc + r = 0.080 m.
-. Aeff     = beff * tf = 6.400e-004 m^2.
-. yeff     = beff/2 = 0.040 m.

( ). Calculate buckling factor of outstand compression element.
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
-. In case of Psi = 1.0
-. k_sigma = 0.4300

( ). Calculate effective cross-section properties of left web of Class 4 (Internal
element).
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. RatT      = 10.0000
-. Lambda_p  = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.6600
-. Rho       = 1.0
-. sigma_max = MAX( sigma1, sigma2 ) = 50934.292 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = 50934.292 KPa.
-. r         = 0.000 m.
-. Ar        = 0.000 m^2.
-. dc       = 0.072 m.
-. deff1    = 2*(Rho*dc) / [ 5 - sigma_min/sigma_max ] + r = 0.036 m.
-. Aeff1    = deff1 * tw + 2*Ar = 2.880e-004 m^2.
-. zeff1    = deff1/2 + tf = 0.018 m.
-. deff2    = (Rho*dc) - deff1 + r = 0.036 m.
-. Aeff2    = deff2 * tw + 2*Ar = 2.880e-004 m^2.
-. zeff2    = (h+2*r) - deff2/2 + tf = 0.054 m.

( ). Calculate buckling factor of outstand compression element.
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
-. In case of Psi = 1.0
-. k_sigma = 0.4300

( ). Calculate effective cross-section properties of right web of Class 4 (Internal
element).
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. RatT      = 10.0000
-. Lambda_p  = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.6600
-. Rho       = 1.0

```

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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
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```

```
-. sigma_max = MAX( sigma1, sigma2 ) = 50934.292 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = 50934.292 KPa.
-. r = 0.000 m.
-. Ar = 0.000 m^2.
-. dc = 0.072 m.
-. deff1 = 2*(Rho*dc) / [ 5 - sigma_min/sigma_max ] + r = 0.036 m.
-. Aeff1 = deff1 * tw + 2*Ar = 2.880e-004 m^2.
-. zeff1 = deff1/2 + tf = 0.018 m.
-. deff2 = (Rho*dc) - deff1 + r = 0.036 m.
-. Aeff2 = deff2 * tw + 2*Ar = 2.880e-004 m^2.
-. zeff2 = (h+2*r) - deff2/2 + tf = 0.054 m.
```

```
=====[[*]] CALCULATE EFFECTIVE SECTION MODULUS ABOUT MAJOR AXIS.=====[[*]]
```

(). Calculate effective cross-section properties of left flange flange of Class 4 (Outstand element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. Rho = 1.0 (Only tensile stresses).
-. sigma_max = MAX( sigma1, sigma2 ) = -22746.821 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = -22746.821 KPa.
-. r = 0.000 m.
-. bc = 0.080 m.
-. beff = Rho*bc + r = 0.080 m.
-. Aeff = beff * tf = 6.400e-004 m^2.
-. yeff = beff/2 = 0.040 m.
```

(). Calculate effective cross-section properties of right flange flange of Class 4 (Outstand element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. Rho = 1.0 (Only tensile stresses).
-. sigma_max = MAX( sigma1, sigma2 ) = -22746.821 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = -22746.821 KPa.
-. r = 0.000 m.
-. bc = 0.080 m.
-. beff = Rho*bc + r = 0.080 m.
-. Aeff = beff * tf = 6.400e-004 m^2.
-. yeff = beff/2 = 0.040 m.
```

(). Calculate buckling factor of outstand compression element.

```
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
-. k_sigma = 0.57 - 0.21*Psi + 0.07*Psi^2 = 0.6298
```

(). Calculate effective cross-section properties of left web of Class 4 (Internal element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. RatT = 10.0000
-. Lambda_p = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.5453
-. Rho = 1.0
```

```
-----
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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
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=
```

```
-. sigma_max = MAX( sigma1, sigma2 ) = 56554.023 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = -14816.737 KPa.
-. r          = 0.000 m.
-. Ar         = 0.000 m^2.
-. dc        = (h*sigma_max) / (sigma_max-sigma_min) = 0.057 m.
-. deff1     = 0.4*Rho*dc + r = 0.023 m.
-. Aeff1     = deff1 * tw + 2*Ar = 1.826e-004 m^2.
-. zeff1     = deff1/2 + tf = 0.011 m.
-. deff2     = 0.6*Rho*dc + (h-dc) + r = 0.049 m.
-. Aeff2     = deff2 * tw + 2*Ar = 3.934e-004 m^2.
-. zeff2     = (h+2*r) - deff2/2 + tf = 0.047 m.
```

```
( ). Calculate buckling factor of outstand compression element.
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
-. k_sigma = 0.57 - 0.21*Psi + 0.07*Psi^2 = 0.6298
```

```
( ). Calculate effective cross-section properties of right web of Class 4 (Internal element).
```

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. RatT     = 10.0000
-. Lambda_p = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.5453
-. Rho      = 1.0
-. sigma_max = MAX( sigma1, sigma2 ) = 56554.023 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = -14816.737 KPa.
-. r        = 0.000 m.
-. Ar       = 0.000 m^2.
-. dc      = (h*sigma_max) / (sigma_max-sigma_min) = 0.057 m.
-. deff1   = 0.4*Rho*dc + r = 0.023 m.
-. Aeff1   = deff1 * tw + 2*Ar = 1.826e-004 m^2.
-. zeff1   = deff1/2 + tf = 0.011 m.
-. deff2   = 0.6*Rho*dc + (h-dc) + r = 0.049 m.
-. Aeff2   = deff2 * tw + 2*Ar = 3.934e-004 m^2.
-. zeff2   = (h+2*r) - deff2/2 + tf = 0.047 m.
```

```
=====  

[[[*]]] CALCULATE EFFECTIVE SECTION MODULUS ABOUT MINOR AXIS.  

=====
```

```
( ). Calculate buckling factor of outstand compression element.
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
-. k_sigma = 0.57 - 0.21*Psi + 0.07*Psi^2 = 0.5525
```

```
( ). Calculate effective cross-section properties of left flange flange of Class 4 (Outstand element).
```

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. RatT     = 9.0000
-. Lambda_p = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.5240
-. Rho      = 1.0
```



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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
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```
-. sigma_max = MAX( sigma1, sigma2 ) = 11691.480 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = 1002.127 KPa.
-. r = 0.000 m.
-. bc = 0.080 m.
-. beff = Rho*bc + r = 0.080 m.
-. Aeff = beff * tf = 6.400e-004 m^2.
-. yeff = beff/2 = 0.040 m.
```

(). Calculate effective cross-section properties of right flange of Class 4 (Outstand element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. Rho = 1.0 (Only tensile stresses).
-. sigma_max = MAX( sigma1, sigma2 ) = -1002.127 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = -11691.480 KPa.
-. r = 0.000 m.
-. bc = 0.080 m.
-. beff = Rho*bc + r = 0.080 m.
-. Aeff = beff * tf = 6.400e-004 m^2.
-. yeff = beff/2 = 0.040 m.
```

(). Calculate buckling factor of outstand compression element.

```
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
-. In case of Psi = 1.0
-. k_sigma = 0.4300
```

(). Calculate effective cross-section properties of left web of Class 4 (Internal element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. RatT = 10.0000
-. Lambda_p = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.6600
-. Rho = 1.0
-. sigma_max = MAX( sigma1, sigma2 ) = 2071.062 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = 2071.062 KPa.
-. r = 0.000 m.
-. Ar = 0.000 m^2.
-. dc = 0.072 m.
-. deff1 = 2*(Rho*dc) / [ 5 - sigma_min/sigma_max ] + r = 0.036 m.
-. Aeff1 = deff1 * tw + 2*Ar = 2.880e-004 m^2.
-. zeff1 = deff1/2 + tf = 0.018 m.
-. deff2 = (Rho*dc) - deff1 + r = 0.036 m.
-. Aeff2 = deff2 * tw + 2*Ar = 2.880e-004 m^2.
-. zeff2 = (h+2*r) - deff2/2 + tf = 0.054 m.
```

(). Calculate effective cross-section properties of right web of Class 4 (Internal element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. Rho = 1.0 (Only tensile stresses).
-. sigma_max = MAX( sigma1, sigma2 ) = -2071.062 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = -2071.062 KPa.
-. r = 0.000 m.
-. Ar = 0.000 m^2.
-. dc = 0.072 m.
-. deff = dc + r = 0.072 m.
-. Aeff = deff * tw + 4*Ar = 5.760e-004 m^2.
-. zeff = (h+2*r) - deff/2 = 0.036 m.
```

```
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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
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```

```
=====
[[[*]]]   EFFECTIVE SECTION PPERTIES.
=====
```

- ```
(). Calculated effective cross-section properties of Class4 cross-section.
-. Aeff = 0.0024 m^2. (for calculating axial resistance)
-. Aeffy = 0.0024 m^2.
-. Weffy = 2.5846e-005 m^3.
-. Aeffz = 0.0024 m^2.
-. Weffz = 3.6115e-005 m^3.
-. eNy = 1.4211e-017 m.
-. eNz = 0.0000 m.
```

```
=====
[[[*]]] APPLIED FACTORS.
=====
```

- ```
( ). Calculate equivalent uniform moment factors (Cmy,Cmz,CmLT).
[ Eurocode3:05 Annex A. Table A.1, A.2 ]
-. Cmy,0 = 0.950
-. Cmz,0 = 0.944
-. Cmy (Default or User Defined Value) = 1.000
-. Cmz (Default or User Defined Value) = 1.000
-. CmLT (Default or User Defined Value) = 1.000

( ). Partial Factors (Gamma_Mi).
[ Eurocode3:05 6.1 ]
-. Gamma_M0 = 1.05
-. Gamma_M1 = 1.10
-. Gamma_M2 = 1.25
```

```
=====
[[[*]]]   CHECK AXIAL RESISTANCE.
=====
```

- ```
(). Check slenderness ratio of axial compression member (Kl/i).
[Eurocode3:05 6.3.1]
-. Kl/i = 56.7 < 200.0 ---> O.K.

(). Calculate axial compressive resistance (Nc_Rd).
[Eurocode3:05 6.1, 6.2.4]
-. Nc_Rd = fy * Aeff / Gamma_M0 = 822.25 kN.

(). Check ratio of axial resistance (N_Ed/Nc_Rd).
-. N_Ed / Nc_Rd = 123.87 / 822.25 = 0.151 < 1.000 ---> O.K.
```

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 -  
 MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ] Version 8.3.5  
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( ). Calculate buckling resistance of compression member (Nb\_Rdy, Nb\_Rdz).  
 [ Eurocode3:05 6.3.1.1, 6.3.1.2 ]  
 -. Beta\_A = Aeff / Area = 1.000  
 -. Lambdal = Pi \* SQRT(Es/fy) = 76.409  
 -. Lambda\_by = { (KLy/iy)/Lambdal } \* SQRT(Beta\_A) = 0.590  
 -. Ncry = Pi^2\*Es\*Ryy / KLy^2 = 2477.32 kN.  
 -. Lambda\_by > 0.2 and N\_Ed/Ncry > 0.04 --> Need to check.  
 -. Alphay = 0.340  
 -. Phiy = 0.5 \* [ 1 + Alphay\*(Lambda\_by-0.2) + Lambda\_by^2 ] = 0.741  
 -. Xiy = MIN [ 1 / [Phiy + SQRT(Phiy^2 - Lambda\_by^2)], 1.0 ] = 0.842  
 -. Nb\_Rdy = Xiy\*Beta\_A\*Area\*fy / Gamma\_M1 = 660.77 kN.  
  
 -. Lambda\_bz = { (KLz/iz)/Lambdal } \* SQRT(Beta\_A) = 0.742  
 -. Ncrz = Pi^2\*Es\*Rzz / KLz^2 = 1566.25 kN.  
 -. Lambda\_bz > 0.2 and N\_Ed/Ncrz > 0.04 --> Need to check.  
 -. Alphaz = 0.340  
 -. Phiz = 0.5 \* [ 1 + Alphaz\*(Lambda\_bz-0.2) + Lambda\_bz^2 ] = 0.868  
 -. Xiz = MIN [ 1 / [Phiz + SQRT(Phiz^2 - Lambda\_bz^2)], 1.0 ] = 0.759  
 -. Nb\_Rdz = Xiz\*Beta\_A\*Area\*fy / Gamma\_M1 = 595.88 kN.  
  
 ( ). Check ratio of buckling resistance (N\_Ed/Nb\_Rd).  
 -. Nb\_Rd = MIN[ Nb\_Rdy, Nb\_Rdz ] = 595.88 kN.  
 N\_Ed = 123.87  
 -. ----- = ----- = 0.208 < 1.000 ----> O.K.  
 Nb\_Rd = 595.88

=====  
 [[[\*]]] CHECK SHEAR RESISTANCE.  
 =====

( ). Calculate shear area.  
 [ Eurocode3:05 6.2.6, EN1993-1-5:04 5.1 NOTE 2 ]  
 -. Avy = 2\*B\*tf = 0.0013 m^2.  
 -. Avz = 2\*h\*tw = 0.0013 m^2.  
  
 ( ). Calculate plastic shear resistance in local-y direction (Vpl\_Rdy).  
 [ Eurocode3:05 6.1, 6.2.6 ]  
 -. Vpl\_Rdy = [ Avy\*fy/SQRT(3) ] / Gamma\_M0 = 249.86 kN.  
  
 ( ). Check ratio of shear resistance (V\_Edy/Vpl\_Rdy).  
 ( LCB = 13-, POS = I )  
 -. Applied shear force : V\_Edy = 0.09 kN.  
 V\_Edy = 0.09  
 -. ----- = ----- = 3.693e-004 < 1.000 ----> O.K.  
 Vpl\_Rdy = 249.86  
  
 ( ). Calculate plastic shear resistance in local-z direction (Vpl\_Rdz).  
 [ Eurocode3:05 6.1, 6.2.6 ]  
 -. Vpl\_Rdz = [ Avz\*fy/SQRT(3) ] / Gamma\_M0 = 249.86 kN.

```

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MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
=====
=
```

- ( ). Shear Buckling Check.
  - [ Eurocode3:05 6.2.6 ]
  - .  $HTR < 72 \cdot e / \eta$  ---> No need to check!
- ( ). Check ratio of shear resistance ( $V_{Edz} / V_{pl,Rdz}$ ).
  - ( LCB = 13-, POS = J )
  - . Applied shear force :  $V_{Edz} = 1.53$  kN.
  - .  $\frac{V_{Edz}}{V_{pl,Rdz}} = \frac{1.53}{249.86} = 0.006 < 1.000$  ---> O.K.

```
=====

[[[*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MAJOR AXIS.

=====
```

- ( ). Calculate local buckling resistance moment about major axis.
  - [ Eurocode3:05 6.1, 6.2.5 ]
  - .  $W_{effy} = 2.5846e-005$  m<sup>3</sup>.
  - .  $Mc_{Rdy} = W_{effy} \cdot f_y / \gamma_{M1} = 8.34$  kN-m.
- ( ). Check ratio of moment resistance ( $M_{Edy} / Mc_{Rdy}$ ).
  - .  $\frac{M_{Edy}}{Mc_{Rdy}} = \frac{1.46}{8.34} = 0.175 < 1.000$  ---> O.K.

```
=====

[[[*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MINOR AXIS.

=====
```

- ( ). Calculate local buckling resistance moment about minor axis.
  - [ Eurocode3:05 6.1, 6.2.5 ]
  - .  $W_{effz} = 3.6115e-005$  m<sup>3</sup>.
  - .  $Mc_{Rdz} = W_{effz} \cdot f_y / \gamma_{M1} = 11.66$  kN-m.
- ( ). Check ratio of moment resistance ( $M_{Edz} / Mc_{Rdz}$ ).
  - .  $\frac{M_{Edz}}{Mc_{Rdz}} = \frac{0.50}{11.66} = 0.043 < 1.000$  ---> O.K.

```
=====

[[[*]]] CHECK INTERACTION OF COMBINED RESISTANCE.

=====
```

- ( ). Calculate Major reduced design resistance of bending and shear.
  - [ Eurocode3:05 6.2.8 (6.30) ]
  - . In case of  $V_{Edz} / V_{pl,Rdz} < 0.5$
  - .  $My_{Rd} = Mc_{Rdy} = 8.34$  kN-m.

-----  
 - MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ] Version 8.3.5  
 =====  
 =

( ). Calculate Minor reduced design resistance of bending and shear.  
 [ Eurocode3:05 6.2.8 (6.30) ]  
 -. In case of  $V_{Edy} / V_{pl,Rdy} < 0.5$   
 -.  $Mz_{Rd} = Mc_{Rdz} = 11.66$  kN-m.

( ). Check interaction ratio of bending and axial force.  
 [ Eurocode3:05 6.2.9.3 (6.44) ] - Class4  

$$R_{max1} = \frac{N_{Ed}}{A_{eff} \cdot f_y / \gamma_{M0}} + \frac{M_{Edy} + N_{Ed} \cdot e_{Nz}}{M_{y,Rd}} + \frac{M_{Edz} + N_{Ed} \cdot e_{Ny}}{M_{z,Rd}}$$
 = 0.369 < 1.000 ----> O.K.

( ). Check interaction ratio of bending and axial compression member.  
 [ Eurocode3:05 6.3.1, 6.2.9.3 (6.61, 6.62), Annex A ]

-.  $N_{Ed} = -123.87$  kN.  
 -.  $M_{Edy} = -1.46$  kN-m.  
 -.  $M_{Edz} = -0.50$  kN-m.  
 -.  $k_{yy} = 1.044$   
 -.  $k_{yz} = 1.077$   
 -.  $k_{zy} = 1.031$   
 -.  $k_{zz} = 1.064$   
 -.  $X_{iy} = 0.842$   
 -.  $X_{iz} = 0.759$   
 -.  $X_{iLT} = 0.913$   
 -.  $A_{eff} = 0.0024$  m<sup>2</sup>.  
 -.  $W_{effy} = 2.5846e-005$  m<sup>3</sup>.  
 -.  $W_{effz} = 3.6115e-005$  m<sup>3</sup>.  
 -.  $e_{Ny} = 1.4211e-017$  m.  
 -.  $e_{Nz} = 0.0000$  m.  
 -.  $N_{Rk} = A_{eff} \cdot f_y = 863.36$  kN.  
 -.  $My_{Rk} = W_{effy} \cdot f_y = 9.18$  kN-m.  
 -.  $Mz_{Rk} = W_{effz} \cdot f_y = 12.82$  kN-m.  
 -.  $N_{Ed} \cdot e_{Ny} = 1.76e-015$  kN-m.  
 -.  $N_{Ed} \cdot e_{Nz} = 0.00$  kN-m.

$$R_{max\_LT1} = \frac{N_{Ed} \cdot e_{Nz}}{Mz_{Rk} / \gamma_{M1}} + k_{yy} \cdot \frac{M_{Edy} + N_{Ed} \cdot e_{Ny}}{My_{Rk} / \gamma_{M1}} + k_{yz} \cdot \frac{M_{Edz} + N_{Ed} \cdot e_{Nz}}{X_{iLT} \cdot My_{Rk} / \gamma_{M1}}$$
 = 0.434 < 1.000 ----> O.K.

$$R_{max\_LT2} = \frac{N_{Ed} \cdot e_{Nz}}{Mz_{Rk} / \gamma_{M1}} + k_{zy} \cdot \frac{M_{Edy} + N_{Ed} \cdot e_{Ny}}{X_{iz} \cdot N_{Rk} / \gamma_{M1}} + k_{zz} \cdot \frac{M_{Edz} + N_{Ed} \cdot e_{Nz}}{X_{iLT} \cdot My_{Rk} / \gamma_{M1}}$$
 = 0.451 < 1.000 ----> O.K.

-.  $R_{max} = \text{MAX}[ R_{max1}, \text{MAX}(R_{max\_LT1}, R_{max\_LT2}) ] = 0.451 < 1.000 ----> O.K.$

## 10.4 DIAFRAMMI SU PILE – TRASVERSI INFERIORI

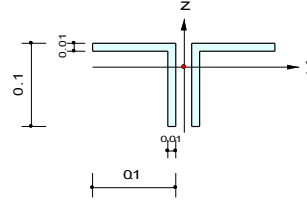


### Steel Checking Result

|                |              |                      |                                   |
|----------------|--------------|----------------------|-----------------------------------|
| <b>Company</b> |              | <b>Project Title</b> | CASALPUSTERLENGO                  |
| <b>Author</b>  | Renato Vaira | <b>File Name</b>     | D:\...\Viadotti rotatorie V_1.mcb |

#### 1. Design Information

Design Code : Eurocode3-2:05  
 Unit System : kN, m  
 Member No : 2006  
 Material : S355W (No:1)  
 (Fy = 355000, Es = 210000000)  
 Section Name : HINF\_PILE 2L100x10d20 (No:65)  
 (Built-up Section).  
 Member Length : 3.20000



#### 2. Member Forces

Axial Force Fxx = 283.753 (LCB: 13+, POS:I)  
 Bending Moments My = 0.87067, Mz = 1.13441  
 End Moments Myi = 0.87067, Myj = 0.79181 (for Lb)  
 Myi = 0.87067, Myj = 0.79181 (for Ly)  
 Mzi = 1.13441, Mzj = 1.09776 (for Lz)  
 Shear Forces Fyy = 0.70898 (LCB: 13+, POS:I)  
 Fzz = 1.06358 (LCB: 13+, POS:I)

|             |         |           |         |
|-------------|---------|-----------|---------|
| Depth       | 0.10000 | Web Thick | 0.01000 |
| Flg Width   | 0.10000 | Flg Thick | 0.01000 |
| BTB Spacing | 0.02000 |           |         |
| Area        | 0.00380 | Asz       | 0.00167 |
| Cyb         | 0.00254 | Czb       | 0.00500 |
| Iyy         | 0.00000 | Izz       | 0.00001 |
| Ybar        | 0.11000 | Zbar      | 0.07132 |
| Wely        | 0.00005 | Wetz      | 0.00008 |
| ry          | 0.03078 | rz        | 0.04944 |

#### 3. Design Parameters

Unbraced Lengths Ly = 3.20000, Lz = 3.20000, Lb = 3.20000  
 Effective Length Factors Ky = 0.65, Kz = 0.65  
 Equivalent Uniform Moment Factors Cmy = 1.00, Cmz = 1.00, CmLT = 1.00

#### 4. Checking Results

Axial Resistance  
 $N_{Ed}/N_{t,Rd} = 283.75/1284.76 = 0.221 < 1.000$  ..... O.K

Bending Resistance  
 $M_{Edy}/M_{Rdy} = 0.8707/30.7498 = 0.028 < 1.000$  ..... O.K  
 $M_{Edz}/M_{Rdz} = 1.1344/49.7000 = 0.023 < 1.000$  ..... O.K

Combined Resistance  
 $R_{NRd} = \text{MAX}[ M_{Edy}/M_{ny,Rd}, M_{Edz}/M_{nz,Rd} ]$   
 $R_{max1} = (M_{Edy}/M_{ny,Rd})^{\text{Alpha}} + (M_{Edz}/M_{nz,Rd})^{\text{Beta}}$   
 $R_{000} = N_{Ed}/(A \cdot f_y / \text{Gamma}_{M0}), R_{bend} = M_{Edy}/M_{y,Rd} + M_{Edz}/M_{z,Rd}$   
 $R_{max} = \text{MAX}[ R_{NRd}, R_{max1}, (R_{000} + R_{bend}) ] = 0.272 < 1.000$  ..... O.K

Shear Resistance  
 $V_{Edy}/V_{y,Rd} = 0.002 < 1.000$  ..... O.K  
 $V_{Edz}/V_{z,Rd} = 0.003 < 1.000$  ..... O.K



|     |   |                                                                                                                                                                                                                                                                                                               |
|-----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16+ | 1 | +Termico diff. INV( 0.720) +Mobili SLE INV( 1.350)<br>Vento strutture (Y+)( 0.900) +Vento mobili (Y+)( 0.900) + Dead Load(<br>1.350)<br>+Erection Load 1( 1.500) +Creep Secondary( 1.200) +Shrinkage Secondary(<br>1.200)<br>+Termico unif. INV( 1.200) +Termico diff. INV( 1.200) +Mobili SLE INV(<br>1.350) |
| 16- | 1 | Vento strutture (Y+)( 0.900) +Vento mobili (Y+)( 0.900) + Dead Load(<br>1.350)<br>+Erection Load 1( 1.500) +Creep Secondary( 1.200) +Shrinkage Secondary(<br>1.200)<br>+Termico unif. INV( 1.200) +Termico diff. INV( 1.200) +Mobili SLE INV(<br>1.350)                                                       |



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=====
=
17+ 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(1.000) + SLV Trasv INV(0.300) + SLV Vert INV(0.300)
17- 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(1.000) + SLV Trasv INV(0.300) + SLV Vert INV(0.300)
18+ 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(1.000) + SLV Vert INV(0.300)
18- 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(1.000) + SLV Vert INV(0.300)
19+ 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(0.300) + SLV Vert INV(1.000)
19- 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(0.300) + SLV Vert INV(1.000)
22+ 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLU INV(
1.000)
22- 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLU INV(
1.000)
23+ 2 Vento strutture (Y+)(1.000) +Vento mobili (Y+)(1.000) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLE INV(
1.000)
23- 2 Vento strutture (Y+)(1.000) +Vento mobili (Y+)(1.000) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLE INV(
1.000)
24+ 2 Frenamento (X+)(1.000) + Summation(1.000) +Termico unif. INV(0.600)
 +Termico diff. INV(0.600) +Mobili SLE INV(1.000)
24- 2 Frenamento (X+)(1.000) + Summation(1.000) +Termico unif. INV(0.600)
 +Termico diff. INV(0.600) +Mobili SLE INV(1.000)
25+ 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(1.000) +Termico diff. INV(1.000) +Mobili SLE INV(
1.000)
25- 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(1.000) +Termico diff. INV(1.000) +Mobili SLE INV(
1.000)
26+ 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 +Mobili SLE INV(1.000)
26- 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 +Mobili SLE INV(1.000)
27+ 2 Vento strutture (Y+)(0.200) +Vento mobili (Y+)(0.200) + Summation(
1.000)
 +Termico unif. INV(0.500) +Termico diff. INV(0.500)
27- 2 Vento strutture (Y+)(0.200) +Vento mobili (Y+)(0.200) + Summation(
1.000)
 +Termico unif. INV(0.500) +Termico diff. INV(0.500)
28+ 2 Summation(1.000) +Termico unif. INV(0.600) +Termico diff. INV(0.600)
28- 2 Summation(1.000) +Termico unif. INV(0.600) +Termico diff. INV(0.600)
29+ 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
29- 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)

```

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 -  
 MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ] Version 8.3.5  
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```

* . PROJECT : CASALPUSTERLENCO
* . MEMBER NO = 2006, ELEMENT TYPE = Beam
* . LOADCOMB NO = 13+, MATERIAL NO = 1, SECTION NO = 65
* . UNIT SYSTEM : kN, m

* . SECTION PROPERTIES : Designation = HINF_PILE 2L100x10d20
 Shape = 2L - Section. (Built-up)
 Depth = 0.100, Flg Width = 0.100, BTB Spacing = 0.020
 Web Thick = 0.010, Flg Thick = 0.010

 Area = 3.80000e-003, Avy = 2.00000e-003, Avz = 2.00000e-003
 Ybar = 1.10000e-001, Zbar = 7.13158e-002, Qyb = 2.54297e-003, Qzb = 5.00000e-
003
 Wely = 5.04809e-005, Welz = 8.44242e-005, Wply = 9.09500e-005, Wplz = 1.47000e-
004

 Iyy = 3.60009e-006, Izz = 9.28667e-006, Iyz = 0.00000e+000
 iy = 3.07797e-002, iz = 4.94354e-002
 J = 1.26667e-007, Cwp = 8.81319e-011

* . DESIGN PARAMETERS FOR STRENGTH EVALUATION :
 Ly = 3.20000e+000, Lz = 3.20000e+000, Lu = 3.20000e+000
 Ky = 6.50000e-001, Kz = 6.50000e-001

* . MATERIAL PROPERTIES :
 Fy = 3.55000e+005, Es = 2.10000e+008, MATERIAL NAME = S355W

* . FORCES AND MOMENTS AT (I) POINT :
 Axial Force Fxx = 2.83753e+002
 Shear Forces Fyy = 7.08982e-001, Fzz = 1.06358e+000
 Bending Moments My = 8.70670e-001, Mz = 1.13441e+000
 End Moments Myi = 8.70670e-001, Myj = 7.91805e-001 (for Lb)
 Myi = 8.70670e-001, Myj = 7.91805e-001 (for Ly)
 Mzi = 1.13441e+000, Mzj = 1.09776e+000 (for Lz)

* . Sign conventions for stress and axial force.
 - Stress : Compression positive.
 - Axial force: Tension positive.

```

=====  
 [[[\*]]] CLASSIFY LEFT FLANGE OF SECTION (BTR).  
 =====

- ( ). Determine classification of tension flanges(double angle).  
 -. Not Checking the Section Classification.
- ( ). Determine classification of tension flanges(double angle).  
 -. Not Checking the Section Classification.

=====  
 [[[\*]]] CLASSIFY WEB OF SECTION (HTR).  
 =====

```

-
MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
=====
=
```

- ( ). Determine classification of tension elements(Double angle).
  - . Not Checking the Section Classification.

```
=====
[[[*]]] APPLIED FACTORS.
=====
```

- ( ). Calculate equivalent uniform moment factors (Cmy,Cmz,CmLT).
  - [ Eurocode3:05 Annex A. Table A.1, A.2 ]
  - . Cmy,0 = 0.835
  - . Cmz,0 = 0.936
  - . Cmy (Default or User Defined Value) = 1.000
  - . Cmz (Default or User Defined Value) = 1.000
  - . CmLT (Default or User Defined Value) = 1.000
- ( ). Partial Factors (Gamma\_Mi).
  - [ Eurocode3:05 6.1 ]
  - . Gamma\_M0 = 1.05
  - . Gamma\_M1 = 1.10
  - . Gamma\_M2 = 1.25

```
=====
[[[*]]] CHECK AXIAL RESISTANCE.
=====
```

- ( ). Check slenderness ratio of axial tension member (l/i).
  - [ Eurocode3:05 6.3.1 ]
  - . l/i = 104.0 < 300.0 ---> O.K.
- ( ). Calculate parameters for combined resistance.
  - . Lambdal = Pi \* SQRT(Es/fy) = 76.409
  - . Lambda\_bz = (KLz/iz) / Lambdal = 0.847
- ( ). Calculate axial tensile resistance (Nt\_Rd).
  - [ Eurocode3:05 6.2.3 ]
  - . Nt\_Rd = fy \* Area / Gamma\_M0 = 1284.76 kN.
- ( ). Check ratio of axial resistance (N\_Ed/Nt\_Rd).
  - .  $\frac{N_{Ed}}{Nt_{Rd}} = \frac{283.75}{1284.76} = 0.221 < 1.000 \text{ ---> O.K.}$

```
=====
[[[*]]] CHECK SHEAR RESISTANCE.
=====
```

- ( ). Calculate shear area.
  - [ Eurocode3:05 6.2.6, EN1993-1-5:04 5.1 NOTE 2 ]
  - . Avy = 2\*B\*tf = 0.0020 m^2.
  - . Avz = 2\*h\*tw = 0.0020 m^2.

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 =====  
 =

- ( ). Calculate plastic shear resistance in local-y direction (Vpl\_Rdy).  
 [ Eurocode3:05 6.1, 6.2.6 ]  
 -.  $V_{pl\_Rdy} = [ A_{vy} \cdot f_y / \sqrt{3} ] / \Gamma_{M0} = 390.40 \text{ kN.}$
- ( ). Check ratio of shear resistance (V\_Edy/Vpl\_Rdy).  
 ( LCB = 13+, POS = I )  
 -. Applied shear force :  $V_{Edy} = 0.71 \text{ kN.}$   

$$\frac{V_{Edy}}{V_{pl\_Rdy}} = \frac{0.71}{390.40} = 0.002 < 1.000 \text{ ---> O.K.}$$
- ( ). Calculate plastic shear resistance in local-z direction (Vpl\_Rdz).  
 [ Eurocode3:05 6.1, 6.2.6 ]  
 -.  $V_{pl\_Rdz} = [ A_{vz} \cdot f_y / \sqrt{3} ] / \Gamma_{M0} = 390.40 \text{ kN.}$
- ( ). Shear Buckling Check.  
 [ Eurocode3:05 6.2.6 ]  
 -.  $HTR < 72 \cdot e / \eta \text{ ---> No need to check!}$
- ( ). Check ratio of shear resistance (V\_Edz/Vpl\_Rdz).  
 ( LCB = 13+, POS = I )  
 -. Applied shear force :  $V_{Edz} = 1.06 \text{ kN.}$   

$$\frac{V_{Edz}}{V_{pl\_Rdz}} = \frac{1.06}{390.40} = 0.003 < 1.000 \text{ ---> O.K.}$$

=====  
 [[[\*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MAJOR AXIS.  
 =====

- ( ). Calculate plastic resistance moment about major axis.  
 [ Eurocode3:05 6.1, 6.2.5 ]  
 -.  $W_{ply} = 9.0950e-005 \text{ m}^3.$   
 -.  $M_{c\_Rdy} = W_{ply} \cdot f_y / \Gamma_{M0} = 30.75 \text{ kN-m.}$
- ( ). Check ratio of moment resistance (M\_Edy/Mc\_Rdy).  

$$\frac{M_{Edy}}{M_{c\_Rdy}} = \frac{0.87}{30.75} = 0.028 < 1.000 \text{ ---> O.K.}$$

=====  
 [[[\*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MINOR AXIS.  
 =====

- ( ). Calculate plastic resistance moment about minor axis.  
 [ Eurocode3:05 6.1, 6.2.5 ]  
 -.  $W_{plz} = 0.0001 \text{ m}^3.$   
 -.  $M_{c\_Rdz} = W_{plz} \cdot f_y / \Gamma_{M0} = 49.70 \text{ kN-m.}$

-----  
 - MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ] Version 8.3.5  
 =====  
 =

( ). Check ratio of moment resistance (M\_Edz/Mc\_Rdz).  

$$\frac{M\_Edz}{Mc\_Rdz} = \frac{1.13}{49.70} = 0.023 < 1.000 \text{ ---> O.K.}$$

=====  
 [[[\*]]] CHECK INTERACTION OF COMBINED RESISTANCE.  
 =====

( ). Calculate Major reduced design resistance of bending and shear.  
 [ Eurocode3:05 6.2.8 (6.30) ]  
 -. In case of V\_Edz / Vpl\_Rdz < 0.5  
 -. My\_Rd = Mc\_Rdy = 30.75 kN-m.

( ). Calculate Minor reduced design resistance of bending and shear.  
 [ Eurocode3:05 6.2.8 (6.30) ]  
 -. In case of V\_Edy / Vpl\_Rdy < 0.5  
 -. Mz\_Rd = Mc\_Rdz = 49.70 kN-m.

( ). Check general interaction ratio.  
 [ Eurocode3:05 6.2.1 (6.2) ] - Class1 or Class2  

$$R_{max1} = \frac{N\_Ed}{N\_Rd} + \frac{M\_Edy}{My\_Rd} + \frac{M\_Edz}{Mz\_Rd}$$

$$= 0.272 < 1.000 \text{ ---> O.K.}$$

( ). Check interaction ratio of bending and axial force member.  
 [ Eurocode3:05 6.2.9 (6.31 ~ 6.41) ] - Class1 or Class2  
 -. n = N\_Ed / Npl\_Rd = 0.221  
 -. a = MIN[ (Area-2b\*tf)/Area, 0.5 ] = 0.500  
 -. Alpha = 2.000  
 -. Beta = MAX[ 5\*n, 1.0 ] = 1.104  
 -. Mny\_Rd = MIN[ Mply\_Rd\*(1-n)/(1-0.5\*a), Mply\_Rd ] = 30.75 kN-m.  
 -. Rmaxy = M\_Edy / Mny\_Rd = 0.028 < 1.000 ---> O.K.  
 -. In case of n < a  
 -. Mnz\_Rd = Mplz\_Rd = 49.70 kN-m.  
 -. Rmaxz = M\_Edz / Mnz\_Rd = 0.023 < 1.000 ---> O.K.  

$$R_{max2} = \left[ \frac{M\_Edy}{Mny\_Rd} \right]^{Alpha} + \left[ \frac{M\_Edz}{Mnz\_Rd} \right]^{Beta}$$

$$= 0.016 < 1.000 \text{ ---> O.K.}$$
 -. Rmax = MAX[ Rmax1, Rmax2 ] = 0.272 < 1.000 ---> O.K.

## 10.5 DIAFRAMMI SU PILE – TRASVERSI SUPERIORI

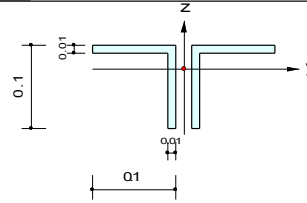


### Steel Checking Result

|                |              |                      |                                   |
|----------------|--------------|----------------------|-----------------------------------|
| <b>Company</b> |              | <b>Project Title</b> | CASALPUSTERLENGO                  |
| <b>Author</b>  | Renato Vaira | <b>File Name</b>     | D:\...\Viadotti rotatorie V_1.mcb |

#### 1. Design Information

Design Code : Eurocode3-2:05  
 Unit System : kN, m  
 Member No : 2047  
 Material : S355W (No:1)  
 (Fy = 355000, Es = 210000000)  
 Section Name : HSUP\_PILE 2L100x10d20 (No:19)  
 (Built-up Section).  
 Member Length : 3.20000



#### 2. Member Forces

Axial Force Fxx = -136.50 (LCB: 16-, POS:I)  
 Bending Moments My = -0.9528, Mz = -0.1496  
 End Moments Myi = -0.9528, Mj = -0.9055 (for Lb)  
 Myi = -0.9528, Mj = -0.9055 (for Ly)  
 Mzi = -0.1496, Mzj = -0.0940 (for Lz)  
 Shear Forces Fyy = -0.1164 (LCB: 13-, POS:I)  
 Fzz = -1.2107 (LCB: 13-, POS:I)

|             |         |           |         |
|-------------|---------|-----------|---------|
| Depth       | 0.10000 | Web Thick | 0.01000 |
| Flg Width   | 0.10000 | Flg Thick | 0.01000 |
| BTB Spacing | 0.02000 |           |         |
| Area        | 0.00380 | Asz       | 0.00167 |
| Cyb         | 0.00254 | Czb       | 0.00500 |
| Iyy         | 0.00000 | Izz       | 0.00001 |
| Ybar        | 0.11000 | Zbar      | 0.07132 |
| Wely        | 0.00005 | Wetz      | 0.00008 |
| ry          | 0.03078 | rz        | 0.04944 |

#### 3. Design Parameters

Unbraced Lengths Ly = 3.20000, Lz = 3.20000, Lb = 3.20000  
 Effective Length Factors Ky = 0.65, Kz = 0.65  
 Equivalent Uniform Moment Factors Cmy = 1.00, Cmz = 1.00, CmLT = 1.00

#### 4. Checking Results

##### Axial Resistance

$$N_{Ed}/\text{MIN}[N_{c,Rd}, N_{b,Rd}] = 136.497/823.126 = 0.166 < 1.000 \dots\dots\dots \text{O.K}$$

##### Bending Resistance

$$M_{Edy}/M_{Rdy} = 0.9528/16.2916 = 0.058 < 1.000 \dots\dots\dots \text{O.K}$$

$$M_{Edz}/M_{Rdz} = 0.1496/22.8706 = 0.007 < 1.000 \dots\dots\dots \text{O.K}$$

##### Combined Resistance

$$R_{com} = N_{Ed}/(A_{eff}f_y/\Gamma_{M0}), R_{bend} = (M_{Edy}+N_{Ed}e_{Ny})/M_{y,Rd} + (M_{Edz}+N_{Ed}e_{Nz})/M_{z,Rd}$$

$$R_{c\_LT1} = N_{Ed}/(X_{iy}A_{eff}f_y/\Gamma_{M1})$$

$$R_{b\_LT1} = k_{yy}(M_{Edy}+N_{Ed}e_{Ny})/(X_{i\_LT}W_{effy}f_y/\Gamma_{M1}) + k_{yz}(M_{Edz}+N_{Ed}e_{Nz})/(W_{effz}f_y/\Gamma_{M1})$$

$$R_{c\_LT2} = N_{Ed}/(X_{iz}A_{eff}f_y/\Gamma_{M1})$$

$$R_{b\_LT2} = k_{zy}(M_{Edz}+N_{Ed}e_{Nz})/(X_{i\_LT}W_{effy}f_y/\Gamma_{M1}) + k_{zz}(M_{Edz}+N_{Ed}e_{Nz})/(W_{effz}f_y/\Gamma_{M1})$$

$$R_{max} = \text{MAX}[R_{com}+R_{bend}, \text{MAX}(R_{c\_LT1}+R_{b\_LT1}, R_{c\_LT2}+R_{b\_LT2})] = 0.244 < 1.000 \dots\dots \text{O.K}$$

##### Shear Resistance

$$V_{Edy}/V_{y,Rd} = 0.000 < 1.000 \dots\dots\dots \text{O.K}$$

$$V_{Edz}/V_{z,Rd} = 0.003 < 1.000 \dots\dots\dots \text{O.K}$$



|     |   |                                                                                                                                                                                                                                                                                                               |
|-----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16+ | 1 | +Termico diff. INV( 0.720) +Mobili SLE INV( 1.350)<br>Vento strutture (Y+)( 0.900) +Vento mobili (Y+)( 0.900) + Dead Load(<br>1.350)<br>+Erection Load 1( 1.500) +Creep Secondary( 1.200) +Shrinkage Secondary(<br>1.200)<br>+Termico unif. INV( 1.200) +Termico diff. INV( 1.200) +Mobili SLE INV(<br>1.350) |
| 16- | 1 | Vento strutture (Y+)( 0.900) +Vento mobili (Y+)( 0.900) + Dead Load(<br>1.350)<br>+Erection Load 1( 1.500) +Creep Secondary( 1.200) +Shrinkage Secondary(<br>1.200)<br>+Termico unif. INV( 1.200) +Termico diff. INV( 1.200) +Mobili SLE INV(<br>1.350)                                                       |



```

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=====
=
17+ 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(1.000) + SLV Trasv INV(0.300) + SLV Vert INV(0.300)
17- 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(1.000) + SLV Trasv INV(0.300) + SLV Vert INV(0.300)
18+ 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(1.000) + SLV Vert INV(0.300)
18- 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(1.000) + SLV Vert INV(0.300)
19+ 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(0.300) + SLV Vert INV(1.000)
19- 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(0.300) + SLV Vert INV(1.000)
22+ 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLU INV(
1.000)
22- 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLU INV(
1.000)
23+ 2 Vento strutture (Y+)(1.000) +Vento mobili (Y+)(1.000) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLE INV(
1.000)
23- 2 Vento strutture (Y+)(1.000) +Vento mobili (Y+)(1.000) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLE INV(
1.000)
24+ 2 Frenamento (X+)(1.000) + Summation(1.000) +Termico unif. INV(0.600)
 +Termico diff. INV(0.600) +Mobili SLE INV(1.000)
24- 2 Frenamento (X+)(1.000) + Summation(1.000) +Termico unif. INV(0.600)
 +Termico diff. INV(0.600) +Mobili SLE INV(1.000)
25+ 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(1.000) +Termico diff. INV(1.000) +Mobili SLE INV(
1.000)
25- 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(1.000) +Termico diff. INV(1.000) +Mobili SLE INV(
1.000)
26+ 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 +Mobili SLE INV(1.000)
26- 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 +Mobili SLE INV(1.000)
27+ 2 Vento strutture (Y+)(0.200) +Vento mobili (Y+)(0.200) + Summation(
1.000)
 +Termico unif. INV(0.500) +Termico diff. INV(0.500)
27- 2 Vento strutture (Y+)(0.200) +Vento mobili (Y+)(0.200) + Summation(
1.000)
 +Termico unif. INV(0.500) +Termico diff. INV(0.500)
28+ 2 Summation(1.000) +Termico unif. INV(0.600) +Termico diff. INV(0.600)
28- 2 Summation(1.000) +Termico unif. INV(0.600) +Termico diff. INV(0.600)
29+ 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
29- 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)

```

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 MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ] Version 8.3.5  
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```

* . PROJECT : CASALPUSTERLENGO
* . MEMBER NO = 2047, ELEMENT TYPE = Beam
* . LOADCOMB NO = 16-, MATERIAL NO = 1, SECTION NO = 19
* . UNIT SYSTEM : kN, m

* . SECTION PROPERTIES : Designation = HSUP_PILE 2L100x10d20
 Shape = 2L - Section. (Built-up)
 Depth = 0.100, Flg Width = 0.100, BTB Spacing = 0.020
 Web Thick = 0.010, Flg Thick = 0.010

 Area = 3.80000e-003, Avy = 2.00000e-003, Avz = 2.00000e-003
 Ybar = 1.10000e-001, Zbar = 7.13158e-002, Qyb = 2.54297e-003, Qzb = 5.00000e-
003
 Wely = 5.04809e-005, Welz = 8.44242e-005, Wply = 9.09500e-005, Wplz = 1.47000e-
004

 Iyy = 3.60009e-006, Izz = 9.28667e-006, Iyz = 0.00000e+000
 iy = 3.07797e-002, iz = 4.94354e-002
 J = 1.26667e-007, Cwp = 8.81319e-011

* . DESIGN PARAMETERS FOR STRENGTH EVALUATION :
 Ly = 3.20000e+000, Lz = 3.20000e+000, Lu = 3.20000e+000
 Ky = 6.50000e-001, Kz = 6.50000e-001

* . MATERIAL PROPERTIES :
 Fy = 3.55000e+005, Es = 2.10000e+008, MATERIAL NAME = S355W

* . FORCES AND MOMENTS AT (I) POINT :
 Axial Force Fxx =-1.36497e+002
 Shear Forces Fyy =-9.14125e-002, Fzz =-1.18824e+000
 Bending Moments My =-9.52799e-001, Mz =-1.49636e-001
 End Moments Myi =-9.52799e-001, Myj =-9.05541e-001 (for Lb)
 Myi =-9.52799e-001, Myj =-9.05541e-001 (for Ly)
 Mzi =-1.49636e-001, Mzj =-9.39597e-002 (for Lz)

* . Sign conventions for stress and axial force.
 - Stress : Compression positive.
 - Axial force: Tension positive.

```

=====  
 [[[\*]]] CLASSIFY LEFT FLANGE OF SECTION (BTR).  
 =====

```

(). Determine classification of compression flanges(Double angle).
 [Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5]
 -. e = SQRT(235/fy) = 0.81
 -. b/t = BTR = 9.00
 -. sigma1 = 30101.248 KPa.
 -. sigma2 = 28489.952 KPa.
 -. BTR_L = (H+B) / (2*tf) = 10.00
 -. BTR > 15*e or BTR_L > 11.5*e (Class 4 : Slender).

```

```

-
MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
=====
=
```

```
=====

[[[*]]] CLASSIFY RIGHT FLANGE OF SECTION (BTR).

=====
```

```
(). Determine classification of compression flanges(Double angle).

[Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5]

-. e = SQRT(235/fy) = 0.81

-. b/t = BTR = 9.00

-. sigma1 = 28167.692 KPa.

-. sigma2 = 26556.395 KPa.

-. BTR_L = (H+B) / (2*tf) = 10.00

-. BTR > 15*e or BTR_L > 11.5*e (Class 4 : Slender).
```

```
=====

[[[*]]] CLASSIFY WEB OF SECTION (HTR).

=====
```

```
(). Determine classification of compression element(Double angles).

[Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5]

-. e = SQRT(235/fy) = 0.81

-. d/t = HTR = 10.00

-. sigma1 = 55117.072 KPa.

-. sigma2 = 31297.680 KPa.

-. HTR_L = (h+B) / (2*tw) = 10.00

-. HTR > 15*e or HTR_L > 11.5*e (Class 4 : Slender).
```

```
=====

[[[*]]] CALCULATE EFFECTIVE AREA.

=====
```

```
(). Calculate buckling factor of outstand compression element.

[Eurocode3 Part 1-5 4.4, Table 4.2]

-. In case of Psi = 1.0

-. k_sigma = 0.4300
```

```
(). Calculate effective cross-section properties of left flange flange of Class 4

(Outstand element).
```

```
[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]

-. RatT = 9.0000

-. Lambda_p = RatT / [28.4*Eps*SQRT(k_sigma)] = 0.5940

-. Rho = 1.0

-. sigma_max = MAX(sigma1, sigma2) = 35920.382 KPa.

-. sigma_min = MIN(sigma1, sigma2) = 35920.382 KPa.

-. r = 0.000 m.

-. bc = 0.100 m.

-. beff = Rho*bc + r = 0.100 m.

-. Aeff = beff * tf = 0.001 m^2.

-. yeff = beff/2 = 0.050 m.
```

```
(). Calculate buckling factor of outstand compression element.

[Eurocode3 Part 1-5 4.4, Table 4.2]
```

```

-
MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
=====
=
```

```
- . In case of Psi = 1.0
- . k_sigma = 0.4300
```

( ). Calculate effective cross-section properties of right flange flange of Class 4 (Outstand element).

```
[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
- . RatT = 9.0000
- . Lambda_p = RatT / [28.4*Eps*SQRT(k_sigma)] = 0.5940
- . Rho = 1.0
- . sigma_max = MAX(sigma1, sigma2) = 35920.382 KPa.
- . sigma_min = MIN(sigma1, sigma2) = 35920.382 KPa.
- . r = 0.000 m.
- . bc = 0.100 m.
- . beff = Rho*bc + r = 0.100 m.
- . Aeff = beff * tf = 0.001 m^2.
- . yeff = beff/2 = 0.050 m.
```

( ). Calculate buckling factor of outstand compression element.

```
[Eurocode3 Part 1-5 4.4, Table 4.2]
- . In case of Psi = 1.0
- . k_sigma = 0.4300
```

( ). Calculate effective cross-section properties of left web of Class 4 (Internal element).

```
[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
- . RatT = 10.0000
- . Lambda_p = RatT / [28.4*Eps*SQRT(k_sigma)] = 0.6600
- . Rho = 1.0
- . sigma_max = MAX(sigma1, sigma2) = 35920.382 KPa.
- . sigma_min = MIN(sigma1, sigma2) = 35920.382 KPa.
- . r = 0.000 m.
- . Ar = 0.000 m^2.
- . dc = 0.090 m.
- . deff1 = 2*(Rho*dc) / [5 - sigma_min/sigma_max] + r = 0.045 m.
- . Aeff1 = deff1 * tw + 2*Ar = 4.500e-004 m^2.
- . zeff1 = deff1/2 + tf = 0.022 m.
- . deff2 = (Rho*dc) - deff1 + r = 0.045 m.
- . Aeff2 = deff2 * tw + 2*Ar = 4.500e-004 m^2.
- . zeff2 = (h+2*r) - deff2/2 + tf = 0.068 m.
```

( ). Calculate buckling factor of outstand compression element.

```
[Eurocode3 Part 1-5 4.4, Table 4.2]
- . In case of Psi = 1.0
- . k_sigma = 0.4300
```

( ). Calculate effective cross-section properties of right web of Class 4 (Internal element).

```
[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
- . RatT = 10.0000
- . Lambda_p = RatT / [28.4*Eps*SQRT(k_sigma)] = 0.6600
- . Rho = 1.0
```

```

-
MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
=====
=
```

```
-. sigma_max = MAX(sigma1, sigma2) = 35920.382 KPa.
-. sigma_min = MIN(sigma1, sigma2) = 35920.382 KPa.
-. r = 0.000 m.
-. Ar = 0.000 m^2.
-. dc = 0.090 m.
-. deff1 = 2*(Rho*dc) / [5 - sigma_min/sigma_max] + r = 0.045 m.
-. Aeff1 = deff1 * tw + 2*Ar = 4.500e-004 m^2.
-. zeff1 = deff1/2 + tf = 0.022 m.
-. deff2 = (Rho*dc) - deff1 + r = 0.045 m.
-. Aeff2 = deff2 * tw + 2*Ar = 4.500e-004 m^2.
-. zeff2 = (h+2*r) - deff2/2 + tf = 0.068 m.
```

```
=====
[[[*]]] CALCULATE EFFECTIVE SECTION MODULUS ABOUT MAJOR AXIS.
=====
```

( ). Calculate effective cross-section properties of left flange flange of Class 4 (Outstand element).

```
[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
-. Rho = 1.0 (Only tensile stresses).
-. sigma_max = MAX(sigma1, sigma2) = -7591.561 KPa.
-. sigma_min = MIN(sigma1, sigma2) = -7591.561 KPa.
-. r = 0.000 m.
-. bc = 0.100 m.
-. beff = Rho*bc + r = 0.100 m.
-. Aeff = beff * tf = 0.001 m^2.
-. yeff = beff/2 = 0.050 m.
```

( ). Calculate effective cross-section properties of right flange flange of Class 4 (Outstand element).

```
[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
-. Rho = 1.0 (Only tensile stresses).
-. sigma_max = MAX(sigma1, sigma2) = -7591.561 KPa.
-. sigma_min = MIN(sigma1, sigma2) = -7591.561 KPa.
-. r = 0.000 m.
-. bc = 0.100 m.
-. beff = Rho*bc + r = 0.100 m.
-. Aeff = beff * tf = 0.001 m^2.
-. yeff = beff/2 = 0.050 m.
```

( ). Calculate buckling factor of outstand compression element.

```
[Eurocode3 Part 1-5 4.4, Table 4.2]
-. k_sigma = 0.57 - 0.21*Psi + 0.07*Psi^2 = 0.6298
```

( ). Calculate effective cross-section properties of left web of Class 4 (Internal element).

```
[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
-. RatT = 10.0000
-. Lambda_p = RatT / [28.4*Eps*SQRT(k_sigma)] = 0.5453
-. Rho = 1.0
```

```

-
MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
=====
=
```

```
-. sigma_max = MAX(sigma1, sigma2) = 18874.430 KPa.
-. sigma_min = MIN(sigma1, sigma2) = -4944.961 KPa.
-. r = 0.000 m.
-. Ar = 0.000 m^2.
-. dc = (h*sigma_max) / (sigma_max-sigma_min) = 0.071 m.
-. deff1 = 0.4*Rho*dc + r = 0.029 m.
-. Aeff1 = deff1 * tw + 2*Ar = 2.853e-004 m^2.
-. zeff1 = deff1/2 + tf = 0.014 m.
-. deff2 = 0.6*Rho*dc + (h-dc) + r = 0.061 m.
-. Aeff2 = deff2 * tw + 2*Ar = 6.147e-004 m^2.
-. zeff2 = (h+2*r) - deff2/2 + tf = 0.059 m.
```

```
(). Calculate buckling factor of outstand compression element.
[Eurocode3 Part 1-5 4.4, Table 4.2]
-. k_sigma = 0.57 - 0.21*Psi + 0.07*Psi^2 = 0.6298
```

```
(). Calculate effective cross-section properties of right web of Class 4 (Internal element).
```

```
[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
-. RatT = 10.0000
-. Lambda_p = RatT / [28.4*Eps*SQRT(k_sigma)] = 0.5453
-. Rho = 1.0
-. sigma_max = MAX(sigma1, sigma2) = 18874.430 KPa.
-. sigma_min = MIN(sigma1, sigma2) = -4944.961 KPa.
-. r = 0.000 m.
-. Ar = 0.000 m^2.
-. dc = (h*sigma_max) / (sigma_max-sigma_min) = 0.071 m.
-. deff1 = 0.4*Rho*dc + r = 0.029 m.
-. Aeff1 = deff1 * tw + 2*Ar = 2.853e-004 m^2.
-. zeff1 = deff1/2 + tf = 0.014 m.
-. deff2 = 0.6*Rho*dc + (h-dc) + r = 0.061 m.
-. Aeff2 = deff2 * tw + 2*Ar = 6.147e-004 m^2.
-. zeff2 = (h+2*r) - deff2/2 + tf = 0.059 m.
```

```
=====

[[[*]]] CALCULATE EFFECTIVE SECTION MODULUS ABOUT MINOR AXIS.

=====
```

```
(). Calculate buckling factor of outstand compression element.
[Eurocode3 Part 1-5 4.4, Table 4.2]
-. k_sigma = 0.57 - 0.21*Psi + 0.07*Psi^2 = 0.5515
```

```
(). Calculate effective cross-section properties of left flange flange of Class 4 (Outstand element).
```

```
[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
-. RatT = 9.0000
-. Lambda_p = RatT / [28.4*Eps*SQRT(k_sigma)] = 0.5245
-. Rho = 1.0
```

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 MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ] Version 8.3.5  
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-. sigma_max = MAX(sigma1, sigma2) = 1772.427 KPa.
-. sigma_min = MIN(sigma1, sigma2) = 161.130 KPa.
-. r = 0.000 m.
-. bc = 0.100 m.
-. beff = Rho*bc + r = 0.100 m.
-. Aeff = beff * tf = 0.001 m^2.
-. yeff = beff/2 = 0.050 m.

```

( ). Calculate effective cross-section properties of right flange of Class 4 (Outstand element).

```

[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
-. Rho = 1.0 (Only tensile stresses).
-. sigma_max = MAX(sigma1, sigma2) = -161.130 KPa.
-. sigma_min = MIN(sigma1, sigma2) = -1772.427 KPa.
-. r = 0.000 m.
-. bc = 0.100 m.
-. beff = Rho*bc + r = 0.100 m.
-. Aeff = beff * tf = 0.001 m^2.
-. yeff = beff/2 = 0.050 m.

```

( ). Calculate buckling factor of outstand compression element.

```

[Eurocode3 Part 1-5 4.4, Table 4.2]
-. In case of Psi = 1.0
-. k_sigma = 0.4300

```

( ). Calculate effective cross-section properties of left web of Class 4 (Internal element).

```

[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
-. RatT = 10.0000
-. Lambda_p = RatT / [28.4*Eps*SQRT(k_sigma)] = 0.6600
-. Rho = 1.0
-. sigma_max = MAX(sigma1, sigma2) = 322.259 KPa.
-. sigma_min = MIN(sigma1, sigma2) = 322.259 KPa.
-. r = 0.000 m.
-. Ar = 0.000 m^2.
-. dc = 0.090 m.
-. deff1 = 2*(Rho*dc) / [5 - sigma_min/sigma_max] + r = 0.045 m.
-. Aeff1 = deff1 * tw + 2*Ar = 4.500e-004 m^2.
-. zeff1 = deff1/2 + tf = 0.022 m.
-. deff2 = (Rho*dc) - deff1 + r = 0.045 m.
-. Aeff2 = deff2 * tw + 2*Ar = 4.500e-004 m^2.
-. zeff2 = (h+2*r) - deff2/2 + tf = 0.068 m.

```

( ). Calculate effective cross-section properties of right web of Class 4 (Internal element).

```

[Eurocode3 Part 1-5 4.4, Table 4.1, 4.2]
-. Rho = 1.0 (Only tensile stresses).
-. sigma_max = MAX(sigma1, sigma2) = -322.259 KPa.
-. sigma_min = MIN(sigma1, sigma2) = -322.259 KPa.
-. r = 0.000 m.
-. Ar = 0.000 m^2.
-. dc = 0.090 m.
-. deff = dc + r = 0.090 m.
-. Aeff = deff * tw + 4*Ar = 9.000e-004 m^2.
-. zeff = (h+2*r) - deff/2 = 0.045 m.

```

```

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```

```
=====
[[[*]]] EFFECTIVE SECTION PPOPERTIES.
=====
```

- ```
( ). Calculated effective cross-section properties of Class4 cross-section.
-. Aeff = 0.0038 m^2. (for calculating axial resistance)
-. Aeffy = 0.0038 m^2.
-. Weffy = 5.0481e-005 m^3.
-. Aeffz = 0.0038 m^2.
-. Weffz = 7.0867e-005 m^3.
-. eNy = 0.0000 m.
-. eNz = 0.0000 m.
```

```
=====
[[[*]]]   APPLIED FACTORS.
=====
```

- ```
(). Calculate equivalent uniform moment factors (Cmy,Cmz,CmLT).
[Eurocode3:05 Annex A. Table A.1, A.2]
-. Cmy,0 = 0.921
-. Cmz,0 = 0.969
-. Cmy (Default or User Defined Value) = 1.000
-. Cmz (Default or User Defined Value) = 1.000
-. CmLT (Default or User Defined Value) = 1.000

(). Partial Factors (Gamma_Mi).
[Eurocode3:05 6.1]
-. Gamma_M0 = 1.05
-. Gamma_M1 = 1.10
-. Gamma_M2 = 1.25
```

```
=====
[[[*]]] CHECK AXIAL RESISTANCE.
=====
```

- ```
( ). Check slenderness ratio of axial compression member (Kl/i).
[ Eurocode3:05 6.3.1 ]
-. Kl/i = 67.6 < 200.0 ---> O.K.

( ). Calculate axial compressive resistance (Nc_Rd).
[ Eurocode3:05 6.1, 6.2.4 ]
-. Nc_Rd = fy * Aeff / Gamma_M0 = 1284.76 kN.

( ). Check ratio of axial resistance (N_Ed/Nc_Rd).
N_Ed 136.50
-. ---- = ----- = 0.106 < 1.000 ---> O.K.
Nc_Rd 1284.76
```

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 =

(). Calculate buckling resistance of compression member (Nb_Rdy, Nb_Rdz).
 [Eurocode3:05 6.3.1.1, 6.3.1.2]
 -. Beta_A = Aeff / Area = 1.000
 -. Lambdal = Pi * SQRT(Es/fy) = 76.409
 -. Lambda_by = { (KLy/iy)/Lambdal } * SQRT(Beta_A) = 0.884
 -. Ncry = Pi^2*Es*Ryy / KLy^2 = 1724.67 kN.
 -. Lambda_by > 0.2 and N_Ed/Ncry > 0.04 --> Need to check.
 -. Alphay = 0.340
 -. Phiy = 0.5 * [1 + Alphay*(Lambda_by-0.2) + Lambda_by^2] = 1.007
 -. Xiy = MIN [1 / [Phiy + SQRT(Phiy^2 - Lambda_by^2)], 1.0] = 0.671
 -. Nb_Rdy = Xiy*Beta_A*Area*fy / Gamma_M1 = 823.13 kN.

 -. Lambda_bz = { (KLz/iz)/Lambdal } * SQRT(Beta_A) = 0.551
 -. Ncrz = Pi^2*Es*Rzz / KLz^2 = 4448.90 kN.
 -. Lambda_bz < 0.2 or N_Ed/Ncrz < 0.04 --> No need to check.

 (). Check ratio of buckling resistance (N_Ed/Nb_Rd).
 -. Nb_Rd = MIN[Nb_Rdy, Nb_Rdz] = 823.13 kN.
 N_Ed 136.50
 -. ----- = ----- = 0.166 < 1.000 ---> O.K.
 Nb_Rd 823.13

=====
 [[[*]]] CHECK SHEAR RESISTANCE.
 =====

(). Calculate shear area.
 [Eurocode3:05 6.2.6, EN1993-1-5:04 5.1 NOTE 2]
 -. Avy = 2*B*tf = 0.0020 m^2.
 -. Avz = 2*h*tw = 0.0020 m^2.

 (). Calculate plastic shear resistance in local-y direction (Vpl_Rdy).
 [Eurocode3:05 6.1, 6.2.6]
 -. Vpl_Rdy = [Avy*fy/SQRT(3)] / Gamma_M0 = 390.40 kN.

 (). Check ratio of shear resistance (V_Edy/Vpl_Rdy).
 (LCB = 13-, POS = J)
 -. Applied shear force : V_Edy = 0.12 kN.
 V_Edy 0.12
 -. ----- = ----- = 2.982e-004 < 1.000 ---> O.K.
 Vpl_Rdy 390.40

 (). Calculate plastic shear resistance in local-z direction (Vpl_Rdz).
 [Eurocode3:05 6.1, 6.2.6]
 -. Vpl_Rdz = [Avz*fy/SQRT(3)] / Gamma_M0 = 390.40 kN.

 (). Shear Buckling Check.
 [Eurocode3:05 6.2.6]
 -. HTR < 72*e/Eta ---> No need to check!

```
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```
( ). Check ratio of shear resistance (V_Edz/Vpl_Rdz).
( LCB = 13-, POS = I )
-. Applied shear force : V_Edz = 1.21 kN.
   V_Edz = 1.21
-. ----- = ----- = 0.003 < 1.000 ---> O.K.
   Vpl_Rdz = 390.40
```

```
=====  

[[[*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MAJOR AXIS.  

=====
```

```
( ). Calculate local buckling resistance moment about major axis.
[ Eurocode3:05 6.1, 6.2.5 ]
-. Weffy = 5.0481e-005 m^3.
-. Mc_Rdy = Weffy * fy / Gamma_M1 = 16.29 kN-m.

( ). Check ratio of moment resistance (M_Edy/Mc_Rdy).
   M_Edy = 0.95
-. ----- = ----- = 0.058 < 1.000 ---> O.K.
   Mc_Rdy = 16.29
```

```
=====  

[[[*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MINOR AXIS.  

=====
```

```
( ). Calculate local buckling resistance moment about minor axis.
[ Eurocode3:05 6.1, 6.2.5 ]
-. Weffz = 7.0867e-005 m^3.
-. Mc_Rdz = Weffz * fy / Gamma_M1 = 22.87 kN-m.

( ). Check ratio of moment resistance (M_Edz/Mc_Rdz).
   M_Edz = 0.15
-. ----- = ----- = 0.007 < 1.000 ---> O.K.
   Mc_Rdz = 22.87
```

```
=====  

[[[*]]] CHECK INTERACTION OF COMBINED RESISTANCE.  

=====
```

```
( ). Calculate Major reduced design resistance of bending and shear.
[ Eurocode3:05 6.2.8 (6.30) ]
-. In case of V_Edz / Vpl_Rdz < 0.5
-. My_Rd = Mc_Rdy = 16.29 kN-m.

( ). Calculate Minor reduced design resistance of bending and shear.
[ Eurocode3:05 6.2.8 (6.30) ]
-. In case of V_Edy / Vpl_Rdy < 0.5
-. Mz_Rd = Mc_Rdz = 22.87 kN-m.
```

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(). Check interaction ratio of bending and axial force.
 [Eurocode3:05 6.2.9.3 (6.44)] - Class4

$$\begin{aligned}
 \text{-. Rmax1} &= \frac{N_{Ed}}{A_{eff} \cdot f_y / \Gamma_{M0}} + \frac{M_{Edy} + N_{Ed} \cdot e_{Nz}}{M_{y,Rd}} + \frac{M_{Edz} + N_{Ed} \cdot e_{Ny}}{M_{z,Rd}} \\
 &= 0.171 < 1.000 \text{ ---> O.K.}
 \end{aligned}$$

(). Check interaction ratio of bending and axial compression member.
 [Eurocode3:05 6.3.1, 6.2.9.3 (6.61, 6.62), Annex A]

-. N_Ed = -136.50 kN.
 -. M_Edy = -0.95 kN-m.
 -. M_Edz = -0.15 kN-m.
 -. k_yy = 1.056
 -. k_yz = 1.003
 -. k_zy = 1.081
 -. k_zz = 1.027
 -. Xiy = 0.671
 -. Xiz = 0.861
 -. XiLT = 0.863
 -. A_eff = 0.0038 m^2.
 -. W_effy = 5.0481e-005 m^3.
 -. W_effz = 7.0867e-005 m^3.
 -. e_Ny = 0.0000 m.
 -. e_Nz = 0.0000 m.
 -. N_Rk = A_eff * f_y = 1349.00 kN.
 -. M_y_Rk = W_effy * f_y = 17.92 kN-m.
 -. M_z_Rk = W_effz * f_y = 25.16 kN-m.
 -. N_Ed * e_Ny = 0.00 kN-m.
 -. N_Ed * e_Nz = 0.00 kN-m.

$$\begin{aligned}
 \text{N_Ed} \cdot \text{eNz} &= \frac{N_{Ed}}{N_{Rk}} + k_{yy} \cdot \frac{M_{Edy} + N_{Ed} \cdot e_{Ny}}{M_{y,Rk} / \Gamma_{M1}} + k_{yz} \cdot \frac{M_{Edz} + N_{Ed} \cdot e_{Ny}}{M_{z,Rk} / \Gamma_{M1}} \\
 \text{-. Rmax_LT1} &= \frac{X_{iy} \cdot N_{Rk} / \Gamma_{M1}}{N_{Ed}} + k_{yy} \cdot \frac{M_{Edy} + N_{Ed} \cdot e_{Ny}}{M_{y,Rk} / \Gamma_{M1}} + k_{yz} \cdot \frac{M_{Edz} + N_{Ed} \cdot e_{Ny}}{M_{z,Rk} / \Gamma_{M1}} \\
 &= 0.244 < 1.000 \text{ ---> O.K.}
 \end{aligned}$$

$$\begin{aligned}
 \text{N_Ed} \cdot \text{eNy} &= \frac{N_{Ed}}{N_{Rk}} + k_{zy} \cdot \frac{M_{Edy} + N_{Ed} \cdot e_{Ny}}{M_{y,Rk} / \Gamma_{M1}} + k_{zz} \cdot \frac{M_{Edz} + N_{Ed} \cdot e_{Ny}}{M_{z,Rk} / \Gamma_{M1}} \\
 \text{-. Rmax_LT2} &= \frac{X_{iz} \cdot N_{Rk} / \Gamma_{M1}}{N_{Ed}} + k_{zy} \cdot \frac{M_{Edy} + N_{Ed} \cdot e_{Ny}}{M_{y,Rk} / \Gamma_{M1}} + k_{zz} \cdot \frac{M_{Edz} + N_{Ed} \cdot e_{Ny}}{M_{z,Rk} / \Gamma_{M1}} \\
 &= 0.209 < 1.000 \text{ ---> O.K.}
 \end{aligned}$$

-. Rmax = MAX[Rmax1, MAX(Rmax_LT1, Rmax_LT2)] = 0.244 < 1.000 ---> O.K.

10.6 DIAFRAMMI SU PILE – DIAGONALI

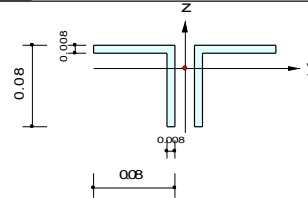


Steel Checking Result

Company		Project Title	CASALPUSTERLENCO
Author	Renato Vaira	File Name	D:\...\Viadotti rotatorie V_1.mcb

1. Design Information

Design Code : Eurocode3-2:05
 Unit System : kN, m
 Member No : 2013
 Material : S355W (No:1)
 (Fy = 355000, Es = 210000000)
 Section Name : DIAG_PILE 2L80x8d20 (No:20)
 (Built-up Section).
 Member Length : 1.78220



2. Member Forces

Axial Force Fxx = -139.91 (LCB: 16-, POS:J)
 Bending Moments My = -0.3044, Mz = -0.1743
 End Moments Myi = -0.0832, Myj = -0.3044 (for Lb)
 Myi = -0.0832, Myj = -0.3044 (for Ly)
 Mzi = -0.2442, Mzj = -0.1743 (for Lz)
 Shear Forces Fyy = 0.31359 (LCB: 13+, POS:I)
 Fzz = 0.69085 (LCB: 16+, POS:I)

Depth	0.08000	Web Thick	0.00800
Flg Width	0.08000	Flg Thick	0.00800
BTB Spacing	0.02000		
Area	0.00243	Asz	0.00107
Cyb	0.00163	Czb	0.00320
Iyy	0.00000	Izz	0.00000
Ybar	0.09000	Zbar	0.05705
Wely	0.00003	Wetz	0.00005
ry	0.02462	rz	0.04113

3. Design Parameters

Unbraced Lengths Ly = 1.78220, Lz = 1.78220, Lb = 1.78220
 Effective Length Factors Ky = 0.65, Kz = 1.30
 Equivalent Uniform Moment Factors Cmy = 1.00, Cmz = 1.00, CmLT = 1.00

4. Checking Results

Axial Resistance

$$N_{Ed}/\text{MIN}[N_{c,Rd}, N_{b,Rd}] = 139.910/598.313 = 0.234 < 1.000 \dots\dots\dots \text{O.K}$$

Bending Resistance

$$M_{Edy}/M_{Rdy} = 0.30437/8.34129 = 0.036 < 1.000 \dots\dots\dots \text{O.K}$$

$$M_{Edz}/M_{Rdz} = 0.1743/11.9514 = 0.015 < 1.000 \dots\dots\dots \text{O.K}$$

Combined Resistance

$$R_{com} = N_{Ed}/(A_{eff}f_y/\Gamma_{M0}), R_{bend} = (M_{Edy}+N_{Ed}e_{Ny})/M_{y,Rd} + (M_{Edz}+N_{Ed}e_{Nz})/M_{z,Rd}$$

$$R_{c_LT1} = N_{Ed}/(X_{iy}A_{eff}f_y/\Gamma_{M1})$$

$$R_{b_LT1} = k_{yy}(M_{Edy}+N_{Ed}e_{Ny})/(X_{i_LT}W_{effy}f_y/\Gamma_{M1}) + k_{yz}(M_{Edz}+N_{Ed}e_{Nz})/(W_{effz}f_y/\Gamma_{M1})$$

$$R_{c_LT2} = N_{Ed}/(X_{iz}A_{eff}f_y/\Gamma_{M1})$$

$$R_{b_LT2} = k_{zy}(M_{Edz}+N_{Ed}e_{Nz})/(X_{i_LT}W_{effy}f_y/\Gamma_{M1}) + k_{zz}(M_{Edz}+N_{Ed}e_{Nz})/(W_{effz}f_y/\Gamma_{M1})$$

$$R_{max} = \text{MAX}[R_{com}+R_{bend}, \text{MAX}(R_{c_LT1}+R_{b_LT1}, R_{c_LT2}+R_{b_LT2})] = 0.291 < 1.000 \dots\dots \text{O.K}$$

Shear Resistance

$$V_{Edy}/V_{y,Rd} = 0.001 < 1.000 \dots\dots\dots \text{O.K}$$

$$V_{Edz}/V_{z,Rd} = 0.003 < 1.000 \dots\dots\dots \text{O.K}$$

16+	1	+Termico diff. INV(0.720) +Mobili SLE INV(1.350) Vento strutture (Y+)(0.900) +Vento mobili (Y+)(0.900) + Dead Load(1.350) +Erection Load 1(1.500) +Creep Secondary(1.200) +Shrinkage Secondary(1.200) +Termico unif. INV(1.200) +Termico diff. INV(1.200) +Mobili SLE INV(1.350)
16-	1	Vento strutture (Y+)(0.900) +Vento mobili (Y+)(0.900) + Dead Load(1.350) +Erection Load 1(1.500) +Creep Secondary(1.200) +Shrinkage Secondary(1.200) +Termico unif. INV(1.200) +Termico diff. INV(1.200) +Mobili SLE INV(1.350)

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=
17+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 1.000) + SLV Trasv INV( 0.300) + SLV Vert INV( 0.300)
17- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 1.000) + SLV Trasv INV( 0.300) + SLV Vert INV( 0.300)
18+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 1.000) + SLV Vert INV( 0.300)
18- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 1.000) + SLV Vert INV( 0.300)
19+ 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 0.300) + SLV Vert INV( 1.000)
19- 1      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      + SLV Long INV( 0.300) + SLV Trasv INV( 0.300) + SLV Vert INV( 1.000)
22+ 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLU INV(
1.000)
22- 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLU INV(
1.000)
23+ 2      Vento strutture (Y+)( 1.000) +Vento mobili (Y+)( 1.000) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLE INV(
1.000)
23- 2      Vento strutture (Y+)( 1.000) +Vento mobili (Y+)( 1.000) +      Summation(
1.000)
      +Termico unif. INV( 0.600) +Termico diff. INV( 0.600) +Mobili SLE INV(
1.000)
24+ 2      Frenamento (X+)( 1.000) +      Summation( 1.000) +Termico unif. INV( 0.600)
      +Termico diff. INV( 0.600) +Mobili SLE INV( 1.000)
24- 2      Frenamento (X+)( 1.000) +      Summation( 1.000) +Termico unif. INV( 0.600)
      +Termico diff. INV( 0.600) +Mobili SLE INV( 1.000)
25+ 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 1.000) +Termico diff. INV( 1.000) +Mobili SLE INV(
1.000)
25- 2      Vento strutture (Y+)( 0.600) +Vento mobili (Y+)( 0.600) +      Summation(
1.000)
      +Termico unif. INV( 1.000) +Termico diff. INV( 1.000) +Mobili SLE INV(
1.000)
26+ 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      +Mobili SLE INV( 1.000)
26- 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
      +Mobili SLE INV( 1.000)
27+ 2      Vento strutture (Y+)( 0.200) +Vento mobili (Y+)( 0.200) +      Summation(
1.000)
      +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
27- 2      Vento strutture (Y+)( 0.200) +Vento mobili (Y+)( 0.200) +      Summation(
1.000)
      +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
28+ 2      Summation( 1.000) +Termico unif. INV( 0.600) +Termico diff. INV( 0.600)
28- 2      Summation( 1.000) +Termico unif. INV( 0.600) +Termico diff. INV( 0.600)
29+ 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
29- 2      Summation( 1.000) +Termico unif. INV( 0.500) +Termico diff. INV( 0.500)
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 MIDAS/Civil - Steel Code Checking[Eurocode3-2:05] Version 8.3.5
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* . PROJECT      : CASALPUSTERLENGO
* . MEMBER NO   = 2013, ELEMENT TYPE = Beam
* . LOADCOMB NO = 16-, MATERIAL NO  = 1, SECTION NO  = 20
* . UNIT SYSTEM : kN, m

* . SECTION PROPERTIES : Designation = DIAG_PILE 2L80x8d20
  Shape      = 2L - Section. (Built-up)
  Depth      = 0.080, Flg Width  = 0.080, BTB Spacing = 0.020
  Web Thick  = 0.008, Flg Thick  = 0.008

  Area = 2.43200e-003, Avy = 1.28000e-003, Avz = 1.28000e-003
  Ybar = 9.00000e-002, Zbar = 5.70526e-002, Qyb = 1.62750e-003, Qzb = 3.20000e-
003
  Wely = 2.58462e-005, Welz = 4.57178e-005, Wply = 4.65664e-005, Wplz = 8.01280e-
005

  Iyy = 1.47460e-006, Izz = 4.11460e-006, Iyz = 0.00000e+000
  iy  = 2.46238e-002, iz  = 4.11322e-002
  J   = 5.18827e-008, Cwp = 2.31033e-011

* . DESIGN PARAMETERS FOR STRENGTH EVALUATION :
  Ly = 1.78220e+000, Lz = 1.78220e+000, Lu = 1.78220e+000
  Ky = 6.50000e-001, Kz = 1.30000e+000

* . MATERIAL PROPERTIES :
  Fy = 3.55000e+005, Es = 2.10000e+008, MATERIAL NAME = S355W

* . FORCES AND MOMENTS AT (J) POINT :
  Axial Force      Fxx =-1.39910e+002
  Shear Forces     Fyy =-2.22180e-001, Fzz =-3.28857e-001
  Bending Moments   My =-3.04369e-001, Mz =-1.74323e-001
  End Moments       Myi =-8.31560e-002, Myj =-3.04369e-001 (for Lb)
                  Myi =-8.31560e-002, Myj =-3.04369e-001 (for Ly)
                  Mzi =-2.44231e-001, Mzj =-1.74323e-001 (for Lz)

* . Sign conventions for stress and axial force.
  - Stress : Compression positive.
  - Axial force: Tension positive.
  
```

=====
 [[[*]]] CLASSIFY LEFT FLANGE OF SECTION (BTR).
 =====

```

( ). Determine classification of compression flanges(Double angle).
  [ Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5 ]
  -. e      = SQRT( 235/fy ) = 0.81
  -. b/t    = BTR = 9.00
  -. sigma1 = 56605.429 KPa.
  -. sigma2 = 53216.071 KPa.
  -. BTR_L = (H+B) / (2*tf) = 10.00
  -. BTR > 15*e or BTR_L > 11.5*e ( Class 4 : Slender ).
  
```



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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
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[[[*]]] CLASSIFY RIGHT FLANGE OF SECTION (BTR).  

=====
```

```
( ). Determine classification of compression flanges(Double angle).  

[ Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5 ]  

-. e      = SQRT( 235/fy ) =    0.81  

-. b/t    = BTR =    9.00  

-. sigma1 =    52368.732 KPa.  

-. sigma2 =    48979.374 KPa.  

-. BTR_L = (H+B) / (2*tf) =    10.00  

-. BTR > 15*e or BTR_L > 11.5*e ( Class 4 : Slender ).
```

```
=====  

[[[*]]] CLASSIFY WEB OF SECTION (HTR).  

=====
```

```
( ). Determine classification of compression element(Double angles).  

[ Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5 ]  

-. e      = SQRT( 235/fy ) =    0.81  

-. d/t    = HTR =   10.00  

-. sigma1 =    70067.686 KPa.  

-. sigma2 =    55206.275 KPa.  

-. HTR_L = (h+B) / (2*tw) =    10.00  

-. HTR > 15*e or HTR_L > 11.5*e ( Class 4 : Slender ).
```

```
=====  

[[[*]]] CALCULATE EFFECTIVE AREA.  

=====
```

```
( ). Calculate buckling factor of outstand compression element.  

[ Eurocode3 Part 1-5 4.4, Table 4.2 ]  

-. In case of Psi = 1.0  

-. k_sigma = 0.4300
```

```
( ). Calculate effective cross-section properties of left flange flange of Class 4  

(Outstand element).
```

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]  

-. RatT    = 9.0000  

-. Lambda_p = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.5940  

-. Rho     = 1.0  

-. sigma_max = MAX( sigma1, sigma2 ) = 57528.933 KPa.  

-. sigma_min = MIN( sigma1, sigma2 ) = 57528.933 KPa.  

-. r       = 0.000 m.  

-. bc     = 0.080 m.  

-. beff = Rho*bc + r = 0.080 m.  

-. Aeff = beff * tf = 6.400e-004 m^2.  

-. yeff = beff/2 = 0.040 m.
```

```
( ). Calculate buckling factor of outstand compression element.  

[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
```

```
-----
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```

```
- . In case of Psi = 1.0
- . k_sigma = 0.4300
```

(). Calculate effective cross-section properties of right flange flange of Class 4 (Outstand element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
- . RatT      = 9.0000
- . Lambda_p = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.5940
- . Rho      = 1.0
- . sigma_max = MAX( sigma1, sigma2 ) = 57528.933 KPa.
- . sigma_min = MIN( sigma1, sigma2 ) = 57528.933 KPa.
- . r        = 0.000 m.
- . bc      = 0.080 m.
- . beff    = Rho*bc + r = 0.080 m.
- . Aeff    = beff * tf = 6.400e-004 m^2.
- . yeff    = beff/2 = 0.040 m.
```

(). Calculate buckling factor of outstand compression element.

```
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
- . In case of Psi = 1.0
- . k_sigma = 0.4300
```

(). Calculate effective cross-section properties of left web of Class 4 (Internal element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
- . RatT      = 10.0000
- . Lambda_p = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.6600
- . Rho      = 1.0
- . sigma_max = MAX( sigma1, sigma2 ) = 57528.933 KPa.
- . sigma_min = MIN( sigma1, sigma2 ) = 57528.933 KPa.
- . r        = 0.000 m.
- . Ar      = 0.000 m^2.
- . dc      = 0.072 m.
- . deff1    = 2*(Rho*dc) / [ 5 - sigma_min/sigma_max ] + r = 0.036 m.
- . Aeff1    = deff1 * tw + 2*Ar = 2.880e-004 m^2.
- . zeff1    = deff1/2 + tf = 0.018 m.
- . deff2    = (Rho*dc) - deff1 + r = 0.036 m.
- . Aeff2    = deff2 * tw + 2*Ar = 2.880e-004 m^2.
- . zeff2    = (h+2*r) - deff2/2 + tf = 0.054 m.
```

(). Calculate buckling factor of outstand compression element.

```
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
- . In case of Psi = 1.0
- . k_sigma = 0.4300
```

(). Calculate effective cross-section properties of right web of Class 4 (Internal element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
- . RatT      = 10.0000
- . Lambda_p = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.6600
- . Rho      = 1.0
```

```
-----
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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
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```

```
-. sigma_max = MAX( sigma1, sigma2 ) = 57528.933 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = 57528.933 KPa.
-. r = 0.000 m.
-. Ar = 0.000 m^2.
-. dc = 0.072 m.
-. deff1 = 2*(Rho*dc) / [ 5 - sigma_min/sigma_max ] + r = 0.036 m.
-. Aeff1 = deff1 * tw + 2*Ar = 2.880e-004 m^2.
-. zeff1 = deff1/2 + tf = 0.018 m.
-. deff2 = (Rho*dc) - deff1 + r = 0.036 m.
-. Aeff2 = deff2 * tw + 2*Ar = 2.880e-004 m^2.
-. zeff2 = (h+2*r) - deff2/2 + tf = 0.054 m.
```

```
=====  

[[[*]]] CALCULATE EFFECTIVE SECTION MODULUS ABOUT MAJOR AXIS.  

=====
```

(). Calculate effective cross-section properties of left flange flange of Class 4 (Outstand element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. Rho = 1.0 (Only tensile stresses).
-. sigma_max = MAX( sigma1, sigma2 ) = -4736.531 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = -4736.531 KPa.
-. r = 0.000 m.
-. bc = 0.080 m.
-. beff = Rho*bc + r = 0.080 m.
-. Aeff = beff * tf = 6.400e-004 m^2.
-. yeff = beff/2 = 0.040 m.
```

(). Calculate effective cross-section properties of right flange flange of Class 4 (Outstand element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. Rho = 1.0 (Only tensile stresses).
-. sigma_max = MAX( sigma1, sigma2 ) = -4736.531 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = -4736.531 KPa.
-. r = 0.000 m.
-. bc = 0.080 m.
-. beff = Rho*bc + r = 0.080 m.
-. Aeff = beff * tf = 6.400e-004 m^2.
-. yeff = beff/2 = 0.040 m.
```

(). Calculate buckling factor of outstand compression element.

```
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
-. k_sigma = 0.57 - 0.21*Psi + 0.07*Psi^2 = 0.6298
```

(). Calculate effective cross-section properties of left web of Class 4 (Internal element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. RatT = 10.0000
-. Lambda_p = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.5453
-. Rho = 1.0
```

```
-----
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MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ]                               Version 8.3.5
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=
```

```
-. sigma_max = MAX( sigma1, sigma2 ) = 11776.147 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = -3085.264 KPa.
-. r          = 0.000 m.
-. Ar         = 0.000 m^2.
-. dc        = (h*sigma_max) / (sigma_max-sigma_min) = 0.057 m.
-. deff1     = 0.4*Rho*dc + r = 0.023 m.
-. Aeff1     = deff1 * tw + 2*Ar = 1.826e-004 m^2.
-. zeff1     = deff1/2 + tf = 0.011 m.
-. deff2     = 0.6*Rho*dc + (h-dc) + r = 0.049 m.
-. Aeff2     = deff2 * tw + 2*Ar = 3.934e-004 m^2.
-. zeff2     = (h+2*r) - deff2/2 + tf = 0.047 m.
```

```
( ). Calculate buckling factor of outstand compression element.
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
-. k_sigma = 0.57 - 0.21*Psi + 0.07*Psi^2 = 0.6298
```

```
( ). Calculate effective cross-section properties of right web of Class 4 (Internal element).
```

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. RatT     = 10.0000
-. Lambda_p = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.5453
-. Rho      = 1.0
-. sigma_max = MAX( sigma1, sigma2 ) = 11776.147 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) = -3085.264 KPa.
-. r         = 0.000 m.
-. Ar        = 0.000 m^2.
-. dc        = (h*sigma_max) / (sigma_max-sigma_min) = 0.057 m.
-. deff1     = 0.4*Rho*dc + r = 0.023 m.
-. Aeff1     = deff1 * tw + 2*Ar = 1.826e-004 m^2.
-. zeff1     = deff1/2 + tf = 0.011 m.
-. deff2     = 0.6*Rho*dc + (h-dc) + r = 0.049 m.
-. Aeff2     = deff2 * tw + 2*Ar = 3.934e-004 m^2.
-. zeff2     = (h+2*r) - deff2/2 + tf = 0.047 m.
```

```
=====  

[[[*]]] CALCULATE EFFECTIVE SECTION MODULUS ABOUT MINOR AXIS.  

=====
```

```
( ). Calculate buckling factor of outstand compression element.
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
-. k_sigma = 0.57 - 0.21*Psi + 0.07*Psi^2 = 0.5475
```

```
( ). Calculate effective cross-section properties of left flange flange of Class 4 (Outstand element).
```

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. RatT     = 9.0000
-. Lambda_p = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.5264
-. Rho      = 1.0
```

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```

```
-. sigma_max = MAX( sigma1, sigma2 ) =      3813.028 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) =      423.670 KPa.
-. r          =      0.000 m.
-. bc         =      0.080 m.
-. beff = Rho*bc + r =      0.080 m.
-. Aeff = beff * tf = 6.400e-004 m^2.
-. yeff = beff/2    =      0.040 m.
```

(). Calculate effective cross-section properties of right flange of Class 4 (Outstand element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. Rho          = 1.0 (Only tensile stresses).
-. sigma_max = MAX( sigma1, sigma2 ) =     -423.670 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) =    -3813.028 KPa.
-. r          =      0.000 m.
-. bc         =      0.080 m.
-. beff = Rho*bc + r =      0.080 m.
-. Aeff = beff * tf = 6.400e-004 m^2.
-. yeff = beff/2    =      0.040 m.
```

(). Calculate buckling factor of outstand compression element.

```
[ Eurocode3 Part 1-5 4.4, Table 4.2 ]
-. In case of Psi = 1.0
-. k_sigma = 0.4300
```

(). Calculate effective cross-section properties of left web of Class 4 (Internal element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. RatT          = 10.0000
-. Lambda_p     = RatT / [ 28.4*Eps*SQRT(k_sigma) ] = 0.6600
-. Rho          = 1.0
-. sigma_max = MAX( sigma1, sigma2 ) =      762.606 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) =      762.606 KPa.
-. r          =      0.000 m.
-. Ar         =      0.000 m^2.
-. dc         =      0.072 m.
-. deff1 = 2*(Rho*dc) / [ 5 - sigma_min/sigma_max ] + r =      0.036 m.
-. Aeff1 = deff1 * tw + 2*Ar = 2.880e-004 m^2.
-. zeff1 = deff1/2 + tf =      0.018 m.
-. deff2 = (Rho*dc) - deff1 + r =      0.036 m.
-. Aeff2 = deff2 * tw + 2*Ar = 2.880e-004 m^2.
-. zeff2 = (h+2*r) - deff2/2 + tf =      0.054 m.
```

(). Calculate effective cross-section properties of right web of Class 4 (Internal element).

```
[ Eurocode3 Part 1-5 4.4, Table 4.1, 4.2 ]
-. Rho          = 1.0 (Only tensile stresses).
-. sigma_max = MAX( sigma1, sigma2 ) =     -762.606 KPa.
-. sigma_min = MIN( sigma1, sigma2 ) =     -762.606 KPa.
-. r          =      0.000 m.
-. Ar         =      0.000 m^2.
-. dc         =      0.072 m.
-. deff = dc + r =      0.072 m.
-. Aeff = deff * tw + 4*Ar = 5.760e-004 m^2.
-. zeff = (h+2*r) - deff/2 =      0.036 m.
```

```
-----
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```

```
=====
[[[*]]]   EFFECTIVE SECTION PPOPERTIES.
=====
```

- ```
(). Calculated effective cross-section properties of Class4 cross-section.
-. Aeff = 0.0024 m^2. (for calculating axial resistance)
-. Aeffy = 0.0024 m^2.
-. Weffy = 2.5846e-005 m^3.
-. Aeffz = 0.0024 m^2.
-. Weffz = 3.7033e-005 m^3.
-. eNy = 0.0000 m.
-. eNz = 0.0000 m.
```

```
=====
[[[*]]] APPLIED FACTORS.
=====
```

- ```
( ). Calculate equivalent uniform moment factors (Cmy,Cmz,CmLT).
[ Eurocode3:05 Annex A. Table A.1, A.2 ]
-. Cmy,0 = 0.939
-. Cmz,0 = 0.912
-. Cmy (Default or User Defined Value) = 1.000
-. Cmz (Default or User Defined Value) = 1.000
-. CmLT (Default or User Defined Value) = 1.000

( ). Partial Factors (Gamma_Mi).
[ Eurocode3:05 6.1 ]
-. Gamma_M0 = 1.05
-. Gamma_M1 = 1.10
-. Gamma_M2 = 1.25
```

```
=====
[[[*]]]   CHECK AXIAL RESISTANCE.
=====
```

- ```
(). Check slenderness ratio of axial compression member (Kl/i).
[Eurocode3:05 6.3.1]
-. Kl/i = 56.3 < 200.0 ---> O.K.

(). Calculate axial compressive resistance (Nc_Rd).
[Eurocode3:05 6.1, 6.2.4]
-. Nc_Rd = fy * Aeff / Gamma_M0 = 822.25 kN.

(). Check ratio of axial resistance (N_Ed/Nc_Rd).
N_Ed 139.91
-. ---- = ----- = 0.170 < 1.000 ---> O.K.
Nc_Rd 822.25
```

-----  
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 =====  
 =

( ). Calculate buckling resistance of compression member (Nb\_Rdy, Nb\_Rdz).  
 [ Eurocode3:05 6.3.1.1, 6.3.1.2 ]  
 -. Beta\_A = Aeff / Area = 1.000  
 -. Lambdal = Pi \* SQRT(Es/fy) = 76.409  
 -. Lambda\_by = { (KLy/iy)/Lambdal } \* SQRT(Beta\_A) = 0.616  
 -. Ncry = Pi^2\*Es\*Ryy / KLy^2 = 2277.48 kN.  
 -. Lambda\_by > 0.2 and N\_Ed/Ncry > 0.04 --> Need to check.  
 -. Alphay = 0.340  
 -. Phiy = 0.5 \* [ 1 + Alphay\*(Lambda\_by-0.2) + Lambda\_by^2 ] = 0.760  
 -. Xiy = MIN [ 1 / [Phiy + SQRT(Phiy^2 - Lambda\_by^2)], 1.0 ] = 0.829  
 -. Nb\_Rdy = Xiy\*Beta\_A\*Area\*fy / Gamma\_M1 = 650.74 kN.  
  
 -. Lambda\_bz = { (KLz/iz)/Lambdal } \* SQRT(Beta\_A) = 0.737  
 -. Ncrz = Pi^2\*Es\*Rzz / KLz^2 = 1588.73 kN.  
 -. Lambda\_bz > 0.2 and N\_Ed/Ncrz > 0.04 --> Need to check.  
 -. Alphaz = 0.340  
 -. Phiz = 0.5 \* [ 1 + Alphaz\*(Lambda\_bz-0.2) + Lambda\_bz^2 ] = 0.863  
 -. Xiz = MIN [ 1 / [Phiz + SQRT(Phiz^2 - Lambda\_bz^2)], 1.0 ] = 0.762  
 -. Nb\_Rdz = Xiz\*Beta\_A\*Area\*fy / Gamma\_M1 = 598.31 kN.  
  
 ( ). Check ratio of buckling resistance (N\_Ed/Nb\_Rd).  
 -. Nb\_Rd = MIN[ Nb\_Rdy, Nb\_Rdz ] = 598.31 kN.  
 N\_Ed = 139.91  
 -. ----- = ----- = 0.234 < 1.000 ----> O.K.  
 Nb\_Rd = 598.31

=====  
 [[[\*]]] CHECK SHEAR RESISTANCE.  
 =====

( ). Calculate shear area.  
 [ Eurocode3:05 6.2.6, EN1993-1-5:04 5.1 NOTE 2 ]  
 -. Avy = 2\*B\*tf = 0.0013 m^2.  
 -. Avz = 2\*h\*tw = 0.0013 m^2.  
  
 ( ). Calculate plastic shear resistance in local-y direction (Vpl\_Rdy).  
 [ Eurocode3:05 6.1, 6.2.6 ]  
 -. Vpl\_Rdy = [ Avy\*fy/SQRT(3) ] / Gamma\_M0 = 249.86 kN.  
  
 ( ). Check ratio of shear resistance (V\_Edy/Vpl\_Rdy).  
 ( LCB = 13+, POS = J )  
 -. Applied shear force : V\_Edy = 0.31 kN.  
 V\_Edy = 0.31  
 -. ----- = ----- = 0.001 < 1.000 ----> O.K.  
 Vpl\_Rdy = 249.86  
  
 ( ). Calculate plastic shear resistance in local-z direction (Vpl\_Rdz).  
 [ Eurocode3:05 6.1, 6.2.6 ]  
 -. Vpl\_Rdz = [ Avz\*fy/SQRT(3) ] / Gamma\_M0 = 249.86 kN.

```

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```

- ( ). Shear Buckling Check.  
 [ Eurocode3:05 6.2.6 ]  
 -.  $HTR < 72 \cdot e / \eta$  ---> No need to check!
- ( ). Check ratio of shear resistance ( $V_{Edz} / V_{pl,Rdz}$ ).  
 ( LCB = 16+, POS = I )  
 -. Applied shear force :  $V_{Edz} = 0.69$  kN.  

$$\frac{V_{Edz}}{V_{pl,Rdz}} = \frac{0.69}{249.86} = 0.003 < 1.000 \text{ ---> O.K.}$$

```
=====

[[[*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MAJOR AXIS.

=====
```

- ( ). Calculate local buckling resistance moment about major axis.  
 [ Eurocode3:05 6.1, 6.2.5 ]  
 -.  $W_{effy} = 2.5846e-005 \text{ m}^3$ .  
 -.  $Mc_{Rdy} = W_{effy} \cdot f_y / \gamma_{M1} = 8.34$  kN-m.
- ( ). Check ratio of moment resistance ( $M_{Edy} / Mc_{Rdy}$ ).  

$$\frac{M_{Edy}}{Mc_{Rdy}} = \frac{0.30}{8.34} = 0.036 < 1.000 \text{ ---> O.K.}$$

```
=====

[[[*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MINOR AXIS.

=====
```

- ( ). Calculate local buckling resistance moment about minor axis.  
 [ Eurocode3:05 6.1, 6.2.5 ]  
 -.  $W_{effz} = 3.7033e-005 \text{ m}^3$ .  
 -.  $Mc_{Rdz} = W_{effz} \cdot f_y / \gamma_{M1} = 11.95$  kN-m.
- ( ). Check ratio of moment resistance ( $M_{Edz} / Mc_{Rdz}$ ).  

$$\frac{M_{Edz}}{Mc_{Rdz}} = \frac{0.17}{11.95} = 0.015 < 1.000 \text{ ---> O.K.}$$

```
=====

[[[*]]] CHECK INTERACTION OF COMBINED RESISTANCE.

=====
```

- ( ). Calculate Major reduced design resistance of bending and shear.  
 [ Eurocode3:05 6.2.8 (6.30) ]  
 -. In case of  $V_{Edz} / V_{pl,Rdz} < 0.5$   
 -.  $My_{Rd} = Mc_{Rdy} = 8.34$  kN-m.



-----  
 - MIDAS/Civil - Steel Code Checking[ Eurocode3-2:05 ] Version 8.3.5  
 =====  
 =

( ). Calculate Minor reduced design resistance of bending and shear.  
 [ Eurocode3:05 6.2.8 (6.30) ]  
 -. In case of  $V_{Edy} / V_{pl,Rdy} < 0.5$   
 -.  $Mz_{Rd} = Mc_{Rdz} = 11.95$  kN-m.

( ). Check interaction ratio of bending and axial force.  
 [ Eurocode3:05 6.2.9.3 (6.44) ] - Class4

$$R_{max1} = \frac{N_{Ed}}{A_{eff} \cdot f_y / \gamma_{M0}} + \frac{M_{Edy} + N_{Ed} \cdot e_{Nz}}{M_{y,Rd}} + \frac{M_{Edz} + N_{Ed} \cdot e_{Ny}}{M_{z,Rd}}$$

= 0.221 < 1.000 ----> O.K.

( ). Check interaction ratio of bending and axial compression member.  
 [ Eurocode3:05 6.3.1, 6.2.9.3 (6.61, 6.62), Annex A ]

-.  $N_{Ed} = -139.91$  kN.  
 -.  $M_{Edy} = -0.30$  kN-m.  
 -.  $M_{Edz} = -0.17$  kN-m.  
 -.  $k_{yy} = 1.054$   
 -.  $k_{yz} = 1.084$   
 -.  $k_{zy} = 1.042$   
 -.  $k_{zz} = 1.072$   
 -.  $X_{iy} = 0.829$   
 -.  $X_{iz} = 0.762$   
 -.  $X_{iLT} = 0.914$   
 -.  $A_{eff} = 0.0024$  m<sup>2</sup>.  
 -.  $W_{effy} = 2.5846e-005$  m<sup>3</sup>.  
 -.  $W_{effz} = 3.7033e-005$  m<sup>3</sup>.  
 -.  $e_{Ny} = 0.0000$  m.  
 -.  $e_{Nz} = 0.0000$  m.  
 -.  $N_{Rk} = A_{eff} \cdot f_y = 863.36$  kN.  
 -.  $My_{Rk} = W_{effy} \cdot f_y = 9.18$  kN-m.  
 -.  $Mz_{Rk} = W_{effz} \cdot f_y = 13.15$  kN-m.  
 -.  $N_{Ed} \cdot e_{Ny} = 0.00$  kN-m.  
 -.  $N_{Ed} \cdot e_{Nz} = 0.00$  kN-m.

$$R_{max\_LT1} = \frac{N_{Ed} \cdot e_{Nz}}{Mz_{Rk} / \gamma_{M1}} + k_{yy} \cdot \frac{M_{Edy} + N_{Ed} \cdot e_{Ny}}{M_{y,Rk} / \gamma_{M1}} + k_{yz} \cdot \frac{M_{Edz} + N_{Ed} \cdot e_{Nz}}{M_{z,Rk} / \gamma_{M1}}$$

= 0.273 < 1.000 ----> O.K.

$$R_{max\_LT2} = \frac{N_{Ed} \cdot e_{Nz}}{Mz_{Rk} / \gamma_{M1}} + k_{zy} \cdot \frac{M_{Edy} + N_{Ed} \cdot e_{Ny}}{M_{y,Rk} / \gamma_{M1}} + k_{zz} \cdot \frac{M_{Edz} + N_{Ed} \cdot e_{Nz}}{M_{z,Rk} / \gamma_{M1}}$$

= 0.291 < 1.000 ----> O.K.

-.  $R_{max} = \text{MAX}[ R_{max1}, \text{MAX}(R_{max\_LT1}, R_{max\_LT2}) ] = 0.291 < 1.000 ----> O.K.$

## 10.7 CONTROVENTI

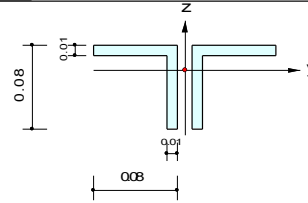


### Steel Checking Result

|                |              |                      |                                   |
|----------------|--------------|----------------------|-----------------------------------|
| <b>Company</b> |              | <b>Project Title</b> | CASALPUSTERLENGO                  |
| <b>Author</b>  | Renato Vaira | <b>File Name</b>     | D:\...\Viadotti rotatorie V_1.mcb |

#### 1. Design Information

Design Code : Eurocode3-2:05  
 Unit System : kN, m  
 Member No : 3149  
 Material : S355W (No:1)  
 (Fy = 355000, Es = 210000000)  
 Section Name : CONTROV 2L80x10d15 (No:15)  
 (Built-up Section).  
 Member Length : 3.05287



#### 2. Member Forces

Axial Force Fxx = -256.15 (LCB: 13-, POS:I)  
 Bending Moments My = -0.2696, Mz = -2.4545  
 End Moments Myi = -0.2696, Mj = 0.00157 (for Lb)  
 Myi = -0.2696, Mj = 0.00157 (for Ly)  
 Mzi = -2.4545, Mzj = -0.0149 (for Lz)  
 Shear Forces Fyy = -1.5122 (LCB: 13-, POS:I)  
 Fzz = -0.1744 (LCB: 13-, POS:I)

|             |         |           |         |
|-------------|---------|-----------|---------|
| Depth       | 0.08000 | Web Thick | 0.01000 |
| Flg Width   | 0.08000 | Flg Thick | 0.01000 |
| BTB Spacing | 0.01500 |           |         |
| Area        | 0.00300 | Asz       | 0.00133 |
| Cyb         | 0.00159 | Czb       | 0.00320 |
| Iyy         | 0.00000 | Izz       | 0.00000 |
| Ybar        | 0.08750 | Zbar      | 0.06633 |
| Wely        | 0.00003 | Welz      | 0.00005 |
| ry          | 0.02436 | rz        | 0.03965 |

#### 3. Design Parameters

Unbraced Lengths Ly = 3.05287, Lz = 3.05287, Lb = 3.05287  
 Effective Length Factors Ky = 0.65, Kz = 1.30  
 Equivalent Uniform Moment Factors Cmy = 1.00, Cmz = 1.00, CmLT = 1.00

#### 4. Checking Results

##### Axial Resistance

$$N_{Ed}/\text{MIN}[N_c, R_d, N_b, R_d] = 256.153/407.225 = 0.629 < 1.000 \dots\dots\dots \text{O.K}$$

##### Bending Resistance

$$M_{Edy}/M_{Rdy} = 0.2696/19.2503 = 0.014 < 1.000 \dots\dots\dots \text{O.K}$$

$$M_{Edz}/M_{Rdz} = 2.4545/31.6119 = 0.078 < 1.000 \dots\dots\dots \text{O.K}$$

##### Combined Resistance

$$R_{NRd} = \text{MAX}[M_{Edy}/M_{ny, Rd}, M_{Edz}/M_{nz, Rd}]$$

$$R_{max1} = (M_{Edy}/M_{ny, Rd})^{\text{Alpha}} + (M_{Edz}/M_{nz, Rd})^{\text{Beta}}$$

$$R_{com} = N_{Ed}/(A \cdot f_y / \text{Gamma}_{M0}), R_{bend} = M_{Edy}/M_{y, Rd} + M_{Edz}/M_{z, Rd}$$

$$R_{c\_LT1} = N_{Ed}/(X_{iy} \cdot A \cdot f_y / \text{Gamma}_{M1})$$

$$R_{b\_LT1} = (k_{yy} \cdot M_{Edy}) / (X_{i\_LT} \cdot W_{ply} \cdot f_y / \text{Gamma}_{M1}) + (k_{yz} \cdot M_{sdz}) / (W_{plz} \cdot f_y / \text{Gamma}_{M1})$$

$$R_{c\_LT2} = N_{Ed}/(X_{iz} \cdot A \cdot f_y / \text{Gamma}_{M1})$$

$$R_{b\_LT2} = (K_{zy} \cdot M_{Edy}) / (X_{i\_LT} \cdot W_{ply} \cdot f_y / \text{Gamma}_{M1}) + (K_{zz} \cdot M_{sdz}) / (W_{plz} \cdot f_y / \text{Gamma}_{M1})$$

$$R_{max} = \text{MAX}[R_{NRd}, R_{max1}, (R_{com} + R_{bend}), \text{MAX}[R_{c\_LT1} + R_{b\_LT1}, R_{c\_LT2} + R_{b\_LT2}]] = 0.760 < 1.000 \dots\dots \text{O.K}$$

##### Shear Resistance

$$V_{Edy}/V_{y, Rd} = 0.005 < 1.000 \dots\dots\dots \text{O.K}$$

$$V_{Edz}/V_{z, Rd} = 0.001 < 1.000 \dots\dots\dots \text{O.K}$$



|     |   |                                                                                                                                                                                                                                                                                                               |
|-----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16+ | 1 | +Termico diff. INV( 0.720) +Mobili SLE INV( 1.350)<br>Vento strutture (Y+)( 0.900) +Vento mobili (Y+)( 0.900) + Dead Load(<br>1.350)<br>+Erection Load 1( 1.500) +Creep Secondary( 1.200) +Shrinkage Secondary(<br>1.200)<br>+Termico unif. INV( 1.200) +Termico diff. INV( 1.200) +Mobili SLE INV(<br>1.350) |
| 16- | 1 | Vento strutture (Y+)( 0.900) +Vento mobili (Y+)( 0.900) + Dead Load(<br>1.350)<br>+Erection Load 1( 1.500) +Creep Secondary( 1.200) +Shrinkage Secondary(<br>1.200)<br>+Termico unif. INV( 1.200) +Termico diff. INV( 1.200) +Mobili SLE INV(<br>1.350)                                                       |

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=
17+ 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(1.000) + SLV Trasv INV(0.300) + SLV Vert INV(0.300)
17- 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(1.000) + SLV Trasv INV(0.300) + SLV Vert INV(0.300)
18+ 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(1.000) + SLV Vert INV(0.300)
18- 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(1.000) + SLV Vert INV(0.300)
19+ 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(0.300) + SLV Vert INV(1.000)
19- 1 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 + SLV Long INV(0.300) + SLV Trasv INV(0.300) + SLV Vert INV(1.000)
22+ 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLU INV(
1.000)
22- 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLU INV(
1.000)
23+ 2 Vento strutture (Y+)(1.000) +Vento mobili (Y+)(1.000) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLE INV(
1.000)
23- 2 Vento strutture (Y+)(1.000) +Vento mobili (Y+)(1.000) + Summation(
1.000)
 +Termico unif. INV(0.600) +Termico diff. INV(0.600) +Mobili SLE INV(
1.000)
24+ 2 Frenamento (X+)(1.000) + Summation(1.000) +Termico unif. INV(0.600)
 +Termico diff. INV(0.600) +Mobili SLE INV(1.000)
24- 2 Frenamento (X+)(1.000) + Summation(1.000) +Termico unif. INV(0.600)
 +Termico diff. INV(0.600) +Mobili SLE INV(1.000)
25+ 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(1.000) +Termico diff. INV(1.000) +Mobili SLE INV(
1.000)
25- 2 Vento strutture (Y+)(0.600) +Vento mobili (Y+)(0.600) + Summation(
1.000)
 +Termico unif. INV(1.000) +Termico diff. INV(1.000) +Mobili SLE INV(
1.000)
26+ 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 +Mobili SLE INV(1.000)
26- 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
 +Mobili SLE INV(1.000)
27+ 2 Vento strutture (Y+)(0.200) +Vento mobili (Y+)(0.200) + Summation(
1.000)
 +Termico unif. INV(0.500) +Termico diff. INV(0.500)
27- 2 Vento strutture (Y+)(0.200) +Vento mobili (Y+)(0.200) + Summation(
1.000)
 +Termico unif. INV(0.500) +Termico diff. INV(0.500)
28+ 2 Summation(1.000) +Termico unif. INV(0.600) +Termico diff. INV(0.600)
28- 2 Summation(1.000) +Termico unif. INV(0.600) +Termico diff. INV(0.600)
29+ 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)
29- 2 Summation(1.000) +Termico unif. INV(0.500) +Termico diff. INV(0.500)

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* . PROJECT : CASALPUSTERLENGO
* . MEMBER NO = 3149, ELEMENT TYPE = Beam
* . LOADCOMB NO = 13-, MATERIAL NO = 1, SECTION NO = 15
* . UNIT SYSTEM : kN, m

* . SECTION PROPERTIES : Designation = CONTROV 2L80x10d15
 Shape = 2L - Section. (Built-up)
 Depth = 0.080, Flg Width = 0.080, BTB Spacing = 0.015
 Web Thick = 0.010, Flg Thick = 0.010

 Area = 3.00000e-003, Avy = 1.60000e-003, Avz = 1.60000e-003
 Ybar = 8.75000e-002, Zbar = 5.63333e-002, Qyb = 1.58672e-003, Qzb = 3.20000e-
003
 Wely = 3.15917e-005, Welz = 5.36429e-005, Wply = 5.69375e-005, Wplz = 9.35000e-
005

 Iyy = 1.77967e-006, Izz = 4.69375e-006, Iyz = 0.00000e+000
 iy = 2.43562e-002, iz = 3.95548e-002
 J = 1.00000e-007, Cwp = 4.24931e-011

* . DESIGN PARAMETERS FOR STRENGTH EVALUATION :
 Ly = 3.05287e+000, Lz = 3.05287e+000, Lu = 3.05287e+000
 Ky = 6.50000e-001, Kz = 1.30000e+000

* . MATERIAL PROPERTIES :
 Fy = 3.55000e+005, Es = 2.10000e+008, MATERIAL NAME = S355W

* . FORCES AND MOMENTS AT (I) POINT :
 Axial Force Fxx =-2.56153e+002
 Shear Forces Fyy =-1.51223e+000, Fzz =-1.74428e-001
 Bending Moments My =-2.69608e-001, Mz =-2.45447e+000
 End Moments Myi =-2.69608e-001, Myj = 1.56986e-003 (for Lb)
 Myi =-2.69608e-001, Myj = 1.56986e-003 (for Ly)
 Mzi =-2.45447e+000, Mzj =-1.48871e-002 (for Lz)

* . Sign conventions for stress and axial force.
 - Stress : Compression positive.
 - Axial force: Tension positive.

```

=====  
 [[[\*]]] CLASSIFY LEFT FLANGE OF SECTION (BTR).  
 =====

```

(). Determine classification of compression flanges(Double angle).
 [Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5]
 -. e = SQRT(235/fy) = 0.81
 -. b/t = BTR = 7.00
 -. sigma1 = 127554.581 KPa.
 -. sigma2 = 85720.821 KPa.
 -. BTR < 9*e (Class 1 : Plastic).

```

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[[[*]]] CLASSIFY RIGHT FLANGE OF SECTION (BTR).
=====
```

- ( ). Determine classification of compression flanges(Double angle).
  - [ Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5 ]
  - . e = SQRT( 235/fy ) = 0.81
  - . b/t = BTR = 7.00
  - . sigma1 = 77876.991 KPa.
  - . sigma2 = 36043.231 KPa.
  - . BTR < 9\*e ( Class 1 : Plastic ).

```

[[[*]]] CLASSIFY WEB OF SECTION (HTR).
=====
```

- ( ). Determine classification of compression element(Double angles).
  - [ Eurocode3:05 Table 5.2 (Sheet 3 of 3), EN 1993-1-5 ]
  - . e = SQRT( 235/fy ) = 0.81
  - . d/t = HTR = 8.00
  - . sigma1 = 103069.528 KPa.
  - . sigma2 = 92464.977 KPa.
  - . HTR < 10\*e ( Class 2 : Compact ).

```

[[[*]]] APPLIED FACTORS.
=====
```

- ( ). Calculate equivalent uniform moment factors (Cmy,Cmz,CmLT).
  - [ Eurocode3:05 Annex A. Table A.1, A.2 ]
  - . Cmy,0 = 0.727
  - . Cmz,0 = 0.585
  - . Cmy (Default or User Defined Value) = 1.000
  - . Cmz (Default or User Defined Value) = 1.000
  - . CmLT (Default or User Defined Value) = 1.000
- ( ). Partial Factors (Gamma\_Mi).
  - [ Eurocode3:05 6.1 ]
  - . Gamma\_M0 = 1.05
  - . Gamma\_M1 = 1.10
  - . Gamma\_M2 = 1.25

```

[[[*]]] CHECK AXIAL RESISTANCE.
=====
```

- ( ). Check slenderness ratio of axial compression member (Kl/i).
  - [ Eurocode3:05 6.3.1 ]
  - . Kl/i = 100.3 < 200.0 ---> O.K.

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- ( ). Calculate axial compressive resistance (Nc\_Rd).  
 [ Eurocode3:05 6.1, 6.2.4 ]  
 -. Nc\_Rd = fy \* Area / Gamma\_M0 = 1014.29 kN.
- ( ). Check ratio of axial resistance (N\_Ed/Nc\_Rd).  

$$\frac{N_{Ed}}{Nc_{Rd}} = \frac{256.15}{1014.29} = 0.253 < 1.000 \text{ ---> O.K.}$$
- ( ). Calculate buckling resistance of compression member (Nb\_Rdy, Nb\_Rdz).  
 [ Eurocode3:05 6.3.1.1, 6.3.1.2 ]  
 -. Beta\_A = Aeff / Area = 1.000  
 -. Lambda\_d1 = Pi \* SQRT(Es/fy) = 76.409  
 -. Lambda\_by = {(KLy/iy)/Lambda\_d1} \* SQRT(Beta\_A) = 1.066  
 -. Ncry = Pi^2\*Es\*Ryy / KLy^2 = 936.73 kN.  
 -. Lambda\_by > 0.2 and N\_Ed/Ncry > 0.04 --> Need to check.  
 -. Alphas = 0.340  
 -. Phi\_y = 0.5 \* [ 1 + Alphas\*(Lambda\_by-0.2) + Lambda\_by^2 ] = 1.216  
 -. Xiy = MIN [ 1 / [Phi\_y + SQRT(Phi\_y^2 - Lambda\_by^2)], 1.0 ] = 0.556  
 -. Nb\_Rdy = Xiy\*Beta\_A\*Area\*fy / Gamma\_M1 = 537.95 kN.
- . Lambda\_bz = {(KLz/iz)/Lambda\_d1} \* SQRT(Beta\_A) = 1.313  
 -. Ncrz = Pi^2\*Es\*Rzz / KLz^2 = 617.64 kN.  
 -. Lambda\_bz > 0.2 and N\_Ed/Ncrz > 0.04 --> Need to check.  
 -. Alphas = 0.340  
 -. Phi\_z = 0.5 \* [ 1 + Alphas\*(Lambda\_bz-0.2) + Lambda\_bz^2 ] = 1.551  
 -. Xiz = MIN [ 1 / [Phi\_z + SQRT(Phi\_z^2 - Lambda\_bz^2)], 1.0 ] = 0.421  
 -. Nb\_Rdz = Xiz\*Beta\_A\*Area\*fy / Gamma\_M1 = 407.23 kN.
- ( ). Check ratio of buckling resistance (N\_Ed/Nb\_Rd).  
 -. Nb\_Rd = MIN[ Nb\_Rdy, Nb\_Rdz ] = 407.23 kN.  

$$\frac{N_{Ed}}{Nb_{Rd}} = \frac{256.15}{407.23} = 0.629 < 1.000 \text{ ---> O.K.}$$

=====  
 [[[\*]]] CHECK SHEAR RESISTANCE.  
 =====

- ( ). Calculate shear area.  
 [ Eurocode3:05 6.2.6, EN1993-1-5:04 5.1 NOTE 2 ]  
 -. Avy = 2\*B\*tf = 0.0016 m^2.  
 -. Avz = 2\*h\*tw = 0.0016 m^2.
- ( ). Calculate plastic shear resistance in local-y direction (Vpl\_Rdy).  
 [ Eurocode3:05 6.1, 6.2.6 ]  
 -. Vpl\_Rdy = [ Avy\*fy/SQRT(3) ] / Gamma\_M0 = 312.32 kN.



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( ). Check ratio of shear resistance (V\_Edy/Vpl\_Rdy).  
 ( LCB = 13-, POS = I )  
 -. Applied shear force : V\_Edy = 1.51 kN.  

$$\frac{V_{Edy}}{V_{pl\_Rdy}} = \frac{1.51}{312.32} = 0.005 < 1.000 \text{ ---> O.K.}$$

( ). Calculate plastic shear resistance in local-z direction (Vpl\_Rdz).  
 [ Eurocode3:05 6.1, 6.2.6 ]  
 -. Vpl\_Rdz = [ Avz\*fy/SQRT(3) ] / Gamma\_M0 = 312.32 kN.

( ). Shear Buckling Check.  
 [ Eurocode3:05 6.2.6 ]  
 -. HTR < 72\*e/Eta ---> No need to check!

( ). Check ratio of shear resistance (V\_Edz/Vpl\_Rdz).  
 ( LCB = 13-, POS = I )  
 -. Applied shear force : V\_Edz = 0.17 kN.  

$$\frac{V_{Edz}}{V_{pl\_Rdz}} = \frac{0.17}{312.32} = 5.585e-004 < 1.000 \text{ ---> O.K.}$$

=====  
 [[[\*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MAJOR AXIS.  
 =====

( ). Calculate plastic resistance moment about major axis.  
 [ Eurocode3:05 6.1, 6.2.5 ]  
 -. Wply = 5.6938e-005 m^3.  
 -. Mc\_Rdy = Wply \* fy / Gamma\_M0 = 19.25 kN-m.

( ). Check ratio of moment resistance (M\_Edy/Mc\_Rdy).  

$$\frac{M_{Edy}}{Mc_{Rdy}} = \frac{0.27}{19.25} = 0.014 < 1.000 \text{ ---> O.K.}$$

=====  
 [[[\*]]] CHECK BENDING MOMENT RESISTANCE ABOUT MINOR AXIS.  
 =====

( ). Calculate plastic resistance moment about minor axis.  
 [ Eurocode3:05 6.1, 6.2.5 ]  
 -. Wplz = 9.3500e-005 m^3.  
 -. Mc\_Rdz = Wplz \* fy / Gamma\_M0 = 31.61 kN-m.

( ). Check ratio of moment resistance (M\_Edz/Mc\_Rdz).  

$$\frac{M_{Edz}}{Mc_{Rdz}} = \frac{2.45}{31.61} = 0.078 < 1.000 \text{ ---> O.K.}$$

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=====  
 [[[\*]]] CHECK INTERACTION OF COMBINED RESISTANCE.  
 =====

- ( ). Calculate Major reduced design resistance of bending and shear.  
 [ Eurocode3:05 6.2.8 (6.30) ]  
 -. In case of  $V_{Edz} / V_{pl,Rdz} < 0.5$   
 -.  $M_{y,Rd} = M_{c,Rdy} = 19.25$  kN-m.
  
- ( ). Calculate Minor reduced design resistance of bending and shear.  
 [ Eurocode3:05 6.2.8 (6.30) ]  
 -. In case of  $V_{Edy} / V_{pl,Rdy} < 0.5$   
 -.  $M_{z,Rd} = M_{c,Rdz} = 31.61$  kN-m.
  
- ( ). Check general interaction ratio.  
 [ Eurocode3:05 6.2.1 (6.2) ] - Class1 or Class2  

$$R_{max1} = \frac{N_{Ed}}{N_{Rd}} + \frac{M_{Edy}}{M_{y,Rd}} + \frac{M_{Edz}}{M_{z,Rd}}$$

$$= 0.344 < 1.000 \text{ ---> O.K.}$$
  
- ( ). Check interaction ratio of bending and axial force member.  
 [ Eurocode3:05 6.2.9 (6.31 ~ 6.41) ] - Class1 or Class2  
 -.  $n = N_{Ed} / N_{pl,Rd} = 0.253$   
 -.  $a = \text{MIN}[(Area - 2b \cdot t_f) / Area, 0.5] = 0.500$   
 -.  $\alpha = 2.000$   
 -.  $\beta = \text{MAX}[5 \cdot n, 1.0] = 1.263$   
 -.  $M_{ny,Rd} = \text{MIN}[M_{ply,Rd} \cdot (1-n) / (1-0.5 \cdot a), M_{ply,Rd}] = 19.18$  kN-m.  
 -.  $R_{maxy} = M_{Edy} / M_{ny,Rd} = 0.014 < 1.000 \text{ ---> O.K.}$   
  
 -. In case of  $n < a$   
 -.  $M_{nz,Rd} = M_{plz,Rd} = 31.61$  kN-m.  
 -.  $R_{maxz} = M_{Edz} / M_{nz,Rd} = 0.078 < 1.000 \text{ ---> O.K.}$   
  

$$R_{max2} = \left[ \left| \frac{M_{Edy}}{M_{ny,Rd}} \right|^{\alpha} + \left| \frac{M_{Edz}}{M_{nz,Rd}} \right|^{\beta} \right]$$

$$= 0.040 < 1.000 \text{ ---> O.K.}$$

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( ). Check interaction ratio of bending and axial compression member.  
 [ Eurocode3:05 6.3.1, 6.2.9.3 (6.61, 6.62), Annex A ]

- . N\_Ed = -256.15 kN.
- . M\_Edy = -0.27 kN-m.
- . M\_Edz = -2.45 kN-m.
- . k<sub>yy</sub> = 1.411
- . k<sub>yz</sub> = 1.043
- . k<sub>zy</sub> = 0.694
- . k<sub>zz</sub> = 1.453
- . X<sub>iy</sub> = 0.556
- . X<sub>iz</sub> = 0.421
- . X<sub>iLT</sub> = 0.780
- . N\_Rk = A\*fy = 1065.00 kN.
- . M<sub>y\_Rk</sub> = W<sub>ply</sub>\*fy = 20.21 kN-m.
- . M<sub>z\_Rk</sub> = W<sub>plz</sub>\*fy = 33.19 kN-m.
- . N\_Ed\*e<sub>Ny</sub> = 0.0 (Not Slender)
- . N\_Ed\*e<sub>Nz</sub> = 0.0 (Not Slender)

$$\begin{aligned}
 & \frac{N_{Ed} \cdot e_{Nz}}{N_{Ed}} + k_{yy} \cdot \frac{M_{Edy} + N_{Ed} \cdot e_{Ny}}{N_{Ed}} + k_{yz} \cdot \frac{M_{Edz} + M_{z\_Rk} / \Gamma_{M1}}{N_{Ed}} \\
 & \text{-----} \\
 & \text{-----} \\
 & \frac{M_{z\_Rk} / \Gamma_{M1}}{N_{Ed}} = 0.588 < 1.000 \text{ ----> O.K.} \\
 & \frac{N_{Ed} \cdot e_{Nz}}{N_{Ed}} + k_{zy} \cdot \frac{M_{Edy} + N_{Ed} \cdot e_{Ny}}{N_{Ed}} + k_{zz} \cdot \frac{M_{Edz} + M_{z\_Rk} / \Gamma_{M1}}{N_{Ed}} \\
 & \text{-----} \\
 & \text{-----} \\
 & \frac{M_{z\_Rk} / \Gamma_{M1}}{N_{Ed}} = 0.760 < 1.000 \text{ ----> O.K.} \\
 & \text{-----} \\
 & \text{----> O.K.} \quad - . R_{max} = \text{MAX} [ \text{MAX} (R_{max1}, R_{max2}), \text{MAX} (R_{max\_LT1}, R_{max\_LT2}) ] = 0.760 < 1.000
 \end{aligned}$$

## 11 VERIFICA DEI COLLEGAMENTI SALDATI

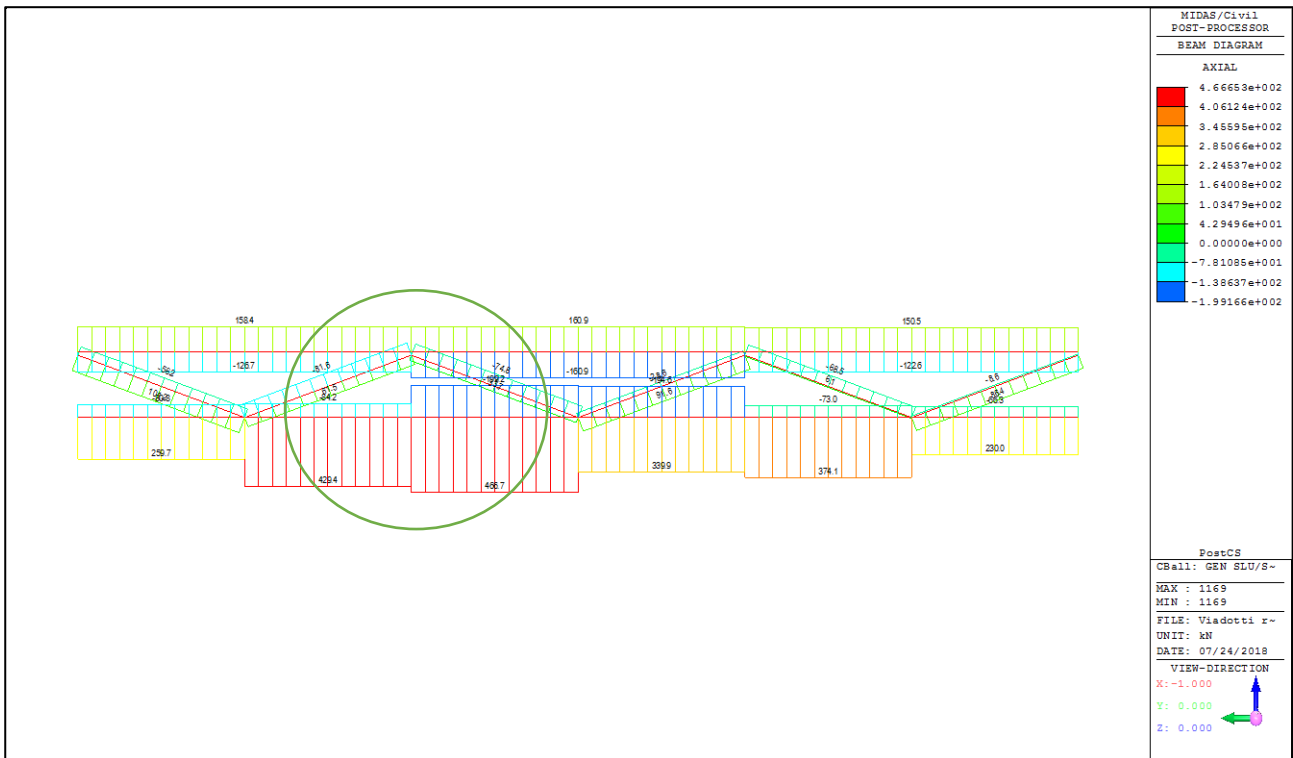
### 11.1 TRAVI PRINCIPALI - GIUNTI TRA I CONCI

I vari conci sono uniti con saldature di testa a piena penetrazione; supponendo che il materiale di saldatura abbia caratteristiche resistenti maggiori delle travi si omettono ulteriori verifiche.

### 11.2 TRAVI PRINCIPALI - SALDATURE PIASTRE DIAFRAMMI - VERIFICA SLU

I piatti su cui sono imbullonati i profilati dei diaframmi sono saldati alle travi con doppi cordoni di 8 mm di lato; si verifica il piatto collegato al diaframma più sollecitato.

Le sollecitazioni massime a cui sono sottoposte le saldature sono ricercate, a favore della sicurezza, nella combinazione involuppo di tutte le SLU statiche e SLV sismiche, componendo le azioni assiali di trazione dei traversi inferiori, superiori e diagonali.



COMBINAZIONE INVILUPPO SLU/SLV - MASSIMI SFORZI ASSIALI DIAFRAMMA INTERMEDIO

Componendo le azioni e trascurando la componente verticale dei diagonali (di compressione), rispetto alla base della piastra si ha:

$$F_x = 160.9 + 33.7 \times \cos 22.1 + 466.7 = 658.8 \text{ kN}$$

$$M_z = -160.9 \times 0.86 - 31.2 \times 0.81 - 466.7 \times 0.16 = -238.32 \text{ kNm}$$

I cordoni di saldatura hanno lato  $2 \times 8 = 16 \text{ mm}$  (altezza totale di gola  $11.3 \text{ mm}$ ) e lunghezza, dedotte le lunette di scarico:

$$\text{- alle ali della trave: } 240 - 30 = 210 \text{ mm}$$

$$\text{- all' anima della trave: } 930 - 2 \times 30 = 870 \text{ mm}$$

La tensione ideale di resistenza vale:  $\sigma_{w,Rd} = f_{tk} / (\beta_w \gamma_{M2}) = 510 / (0.9 \times 1.25) = 453.33 \text{ N/mm}^2$

Verifica: la tensione ideale risulta nei 3 cordoni:

$$\text{- inferiore: } \sigma_{w,Ed} = 128.64 \text{ N/mm}^2 \quad (\sigma_{w,Rd} < \text{verificato})$$

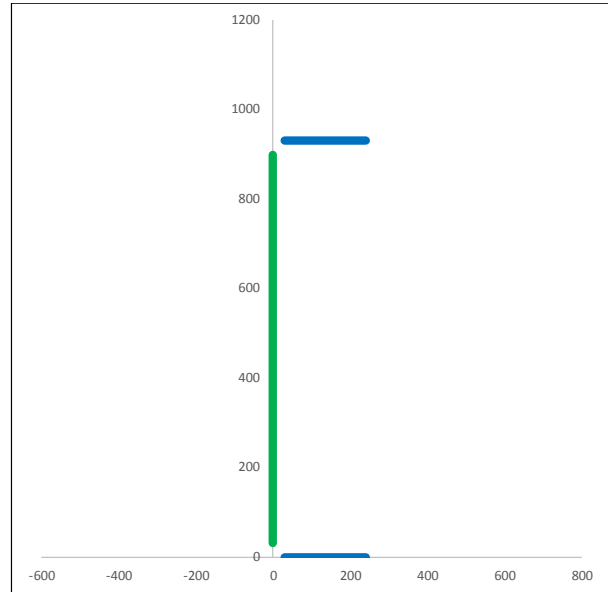
$$\text{- superiore: } \sigma_{w,Ed} = 27.73 \text{ N/mm}^2 \quad (\sigma_{w,Rd} < \text{verificato})$$

- anima:  $\sigma_{w,Ed} = 78.33 \text{ N/mm}^2$  ( $\sigma_{w,Rd} < \text{verificato}$ )

Segue tabulato foglio di calcolo.

**VERIFICA DI RESISTENZA SALDATURE A CORDONE D'ANGOLO**  
 NTC 2008, § 4.2.8.2.4, FORMULA (4.2.75)

|                                                         |                                                                                          |           |                   |
|---------------------------------------------------------|------------------------------------------------------------------------------------------|-----------|-------------------|
| Coefficiente di sicurezza saldature                     | $\gamma_{M2}$                                                                            | 1.25      |                   |
| Spessore nominale massimo:                              | t                                                                                        | 15        | mm                |
| Classe Acciaio:                                         |                                                                                          | S355 W    |                   |
| Tensione di snervamento:                                | $f_{yk}$                                                                                 | 355       | N/mm <sup>2</sup> |
| Tensione di rottura:                                    | $f_{tk}$                                                                                 | 510       | N/mm <sup>2</sup> |
| Coefficiente:                                           | $\beta_w$                                                                                | 0.9       |                   |
| Resistenza (tensione ideale):                           | $\sigma_{w,Rd} = f_{tk}/(\beta \cdot \gamma_{M2})$                                       | 453.33    | N/mm <sup>2</sup> |
| Sollecitazione (tensione ideale):                       | $\sigma_{w,Ed} = [ \sigma_{\perp}^2 + 3 ( \tau_{\perp}^2 + \tau_{\parallel}^2 ) ]^{0.5}$ |           |                   |
| Punto di applicazione sollecitazioni (vuoto=baricentro) | X=                                                                                       | 0         | mm                |
|                                                         | Y=                                                                                       | 0         | mm                |
| Sollecitazioni: (terna destrorsa)                       | FX =                                                                                     | 658800    | N                 |
|                                                         | FY =                                                                                     | 0         | N                 |
|                                                         | FZ =                                                                                     | 0         | N                 |
|                                                         | MX =                                                                                     | 0         | N mm              |
|                                                         | MY =                                                                                     | 0         | N mm              |
|                                                         | MZ =                                                                                     | -23832000 | N mm              |



Cordoni paralleli asse X

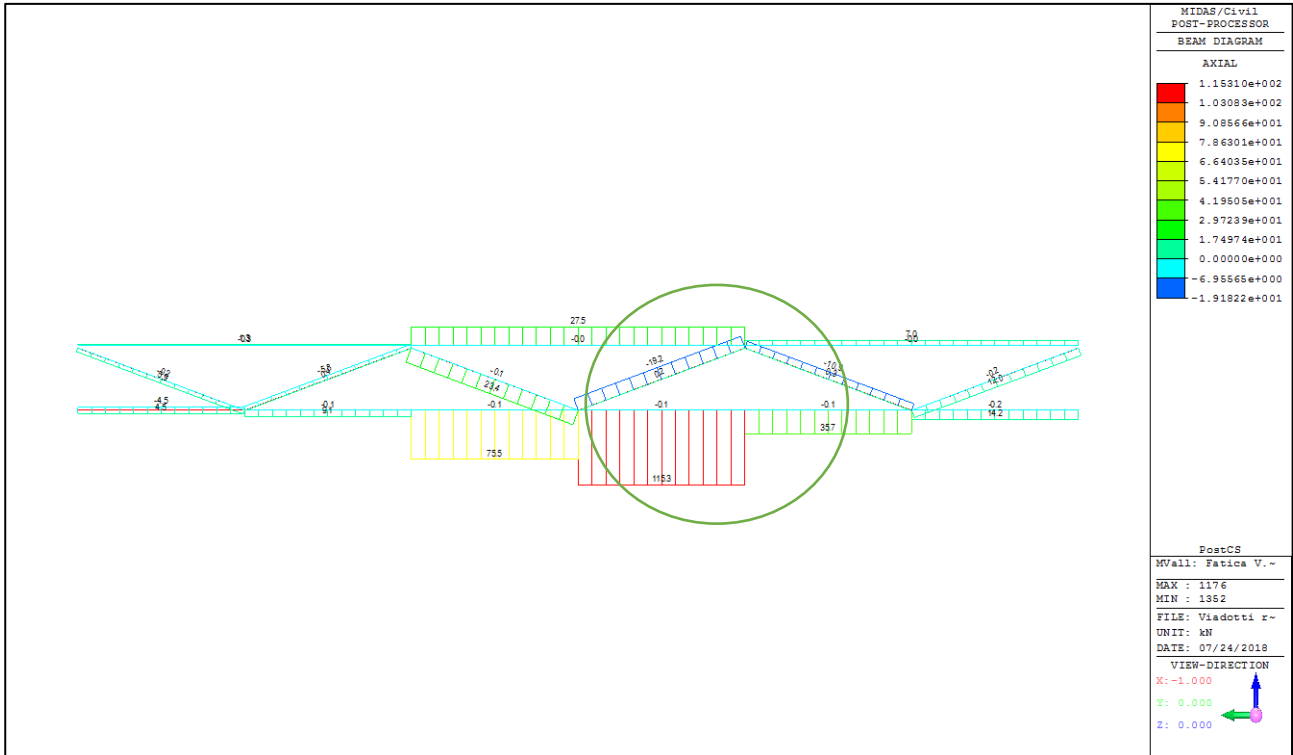
| N° | Y   | Xini | Xfin | bx | ax    | $\sigma_{w,Ed}$ | Verifica: $\sigma_{w,Ed} / \sigma_{w,Rd} \leq 1$ |
|----|-----|------|------|----|-------|-----------------|--------------------------------------------------|
| 1  | 0   | 30   | 240  | 16 | 11.31 | 128.638         | 0.284                                            |
| 2  | 930 | 30   | 240  | 16 | 11.31 | 27.731          | 0.061                                            |
| 3  |     |      |      |    | 0.00  |                 |                                                  |
| 4  |     |      |      |    | 0.00  |                 |                                                  |
| 5  |     |      |      |    | 0.00  |                 |                                                  |
| 6  |     |      |      |    | 0.00  |                 |                                                  |
| 7  |     |      |      |    | 0.00  |                 |                                                  |
| 8  |     |      |      |    | 0.00  |                 |                                                  |
| 9  |     |      |      |    | 0.00  |                 |                                                  |
| 10 |     |      |      |    | 0.00  |                 |                                                  |

Cordoni paralleli asse Y

| N° | X | Yini | Yfin | by | ay    | $\sigma_{w,Ed}$ | Verifica: $\sigma_{w,Ed} / \sigma_{w,Rd} \leq 1$ |
|----|---|------|------|----|-------|-----------------|--------------------------------------------------|
| 1  | 0 | 30   | 900  | 16 | 11.31 | 78.330          | 0.173                                            |
| 2  |   |      |      |    | 0.00  |                 |                                                  |
| 3  |   |      |      |    | 0.00  |                 |                                                  |
| 4  |   |      |      |    | 0.00  |                 |                                                  |
| 5  |   |      |      |    | 0.00  |                 |                                                  |
| 6  |   |      |      |    | 0.00  |                 |                                                  |
| 7  |   |      |      |    | 0.00  |                 |                                                  |
| 8  |   |      |      |    | 0.00  |                 |                                                  |
| 9  |   |      |      |    | 0.00  |                 |                                                  |
| 10 |   |      |      |    | 0.00  |                 |                                                  |

### 11.3 TRAVI PRINCIPALI - SALDATURE PIASTRE DIAFRAMMI - VERIFICA A FATICA

Le sollecitazioni massime a cui sono sottoposte le saldature sono ricercate nella condizione di carico mobile "Fatica V.I.LL.", componendo le azioni assiali di trazione dei traversi inferiori, superiori e diagonali.



**CONDIZIONE DI CARICO FATICA V.I.L.L. - MASSIMI SFORZI ASSIALI DIAFRAMMA INTERMEDIO**

Componendo le azioni e trascurando la componente verticale dei diagonali (di compressione), rispetto alla base della piastra si ha:

$$F_x = 27.5 + 0.2 \times \cos 22.1 + 115.3 = 143.0 \text{ kN}$$

$$M_z = -27.5 \times 0.86 - 0.16 \times 0.81 - 115.3 \times 0.16 = -42.228 \text{ kNm}$$

I cordoni di saldatura hanno lato  $2 \times 8 = 16 \text{ mm}$  (altezza di gola  $11.3 \text{ mm}$ ) e lunghezza, dedotte le lunette di scarico:

- alle ali della trave:  $240 - 30 = 210 \text{ mm}$
- all' anima della trave:  $930 - 2 \times 30 = 870 \text{ mm}$

Caratteristiche di resistenza:

- classe del dettaglio:  $\Delta\sigma_c = 80 \text{ N/mm}^2$  (Tabella C.4.2.XVI, part. 7)
- limite di fatica ad ampiezza costante:  $\Delta\sigma_D = 0.737 \times 80 = 58.96 \text{ N/mm}^2$
- coefficiente di sicurezza a fatica:  $\gamma_{Mf,s} = 1.35$

La tensione ideale di resistenza per lo stato limite di fatica vale:  $\sigma_{w,Rd} = \Delta\sigma_D / \gamma_{Mf,s} = 43.67 \text{ N/mm}^2$

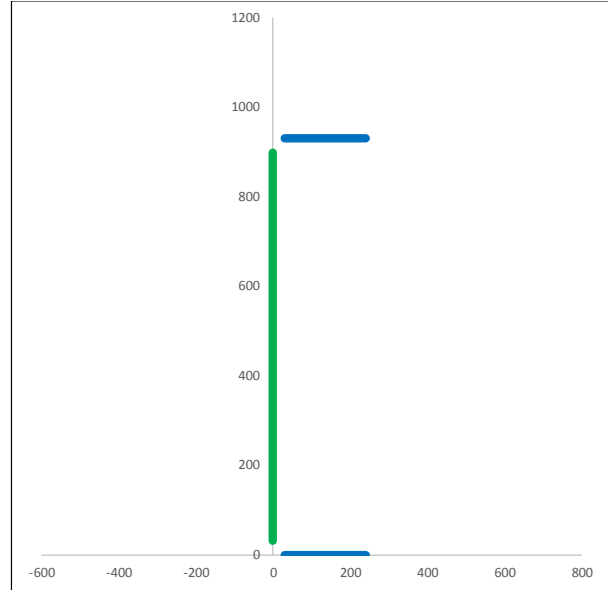
Verifica: la tensione ideale risulta nei 3 cordoni:

- inferiore:  $\sigma_{w,Ed} = 34.97 \text{ N/mm}^2$  ( $\sigma_{w,Rd} < \text{verificato}$ )
- superiore:  $\sigma_{w,Ed} = 1.03 \text{ N/mm}^2$  ( $\sigma_{w,Rd} < \text{verificato}$ )
- anima:  $\sigma_{w,Ed} = 17.06 \text{ N/mm}^2$  ( $\sigma_{w,Rd} < \text{verificato}$ )

Segue tabulato foglio di calcolo.

**VERIFICA DI RESISTENZA SALDATURE A CORDONE D'ANGOLO**  
 NTC 2008, § 4.2.8.2.4, FORMULA (4.2.75)

|                                                         |                                                                                          |               |                   |
|---------------------------------------------------------|------------------------------------------------------------------------------------------|---------------|-------------------|
| Coefficiente di sicurezza saldature                     | $\gamma_{M2}$                                                                            | 1.25          |                   |
| Spessore nominale massimo:                              | t                                                                                        | 15            | mm                |
| Classe Acciaio:                                         |                                                                                          | S355 W        |                   |
| Tensione di snervamento:                                | $f_{yk}$                                                                                 | 355           | N/mm <sup>2</sup> |
| Tensione di rottura:                                    | $f_{tk}$                                                                                 | 510           | N/mm <sup>2</sup> |
| Coefficiente:                                           | $\beta_w$                                                                                | 0.9           |                   |
| Resistenza (tensione ideale):                           | $\sigma_{w,Rd} = f_{tk} / (\beta \cdot \gamma_{M2})$                                     | 453.33        | N/mm <sup>2</sup> |
| Sollecitazione (tensione ideale):                       | $\sigma_{w,Ed} = [ \sigma_{\perp}^2 + 3 ( \tau_{\perp}^2 + \tau_{\parallel}^2 ) ]^{0.5}$ |               |                   |
| Punto di applicazione sollecitazioni (vuoto=baricentro) | X=                                                                                       | 0 mm          |                   |
|                                                         | Y=                                                                                       | 0 mm          |                   |
| Sollecitazioni: (terna destrorsa)                       | FX =                                                                                     | 143000 N      |                   |
|                                                         | FY =                                                                                     | 0 N           |                   |
|                                                         | FZ =                                                                                     | 0 N           |                   |
|                                                         | MX =                                                                                     | 0 N mm        |                   |
|                                                         | MY =                                                                                     | 0 N mm        |                   |
|                                                         | MZ =                                                                                     | -4222800 N mm |                   |



Cordoni paralleli asse X

| N° | Y   | Xini | Xfin | bx | ax    | $\sigma_{w,Ed}$ | Verifica: $\sigma_{w,Ed} / \sigma_{w,Rd} \leq 1$ |
|----|-----|------|------|----|-------|-----------------|--------------------------------------------------|
| 1  | 0   | 30   | 240  | 16 | 11.31 | 34.970          | 0.077                                            |
| 2  | 930 | 30   | 240  | 16 | 11.31 | 1.029           | 0.002                                            |
| 3  |     |      |      |    |       | 0.00            |                                                  |
| 4  |     |      |      |    |       | 0.00            |                                                  |
| 5  |     |      |      |    |       | 0.00            |                                                  |
| 6  |     |      |      |    |       | 0.00            |                                                  |
| 7  |     |      |      |    |       | 0.00            |                                                  |
| 8  |     |      |      |    |       | 0.00            |                                                  |
| 9  |     |      |      |    |       | 0.00            |                                                  |
| 10 |     |      |      |    |       | 0.00            |                                                  |

Cordoni paralleli asse Y

| N° | X | Yini | Yfin | by | ay    | $\sigma_{w,Ed}$ | Verifica: $\sigma_{w,Ed} / \sigma_{w,Rd} \leq 1$ |
|----|---|------|------|----|-------|-----------------|--------------------------------------------------|
| 1  | 0 | 30   | 900  | 16 | 11.31 | 17.056          | 0.038                                            |
| 2  |   |      |      |    |       | 0.00            |                                                  |
| 3  |   |      |      |    |       | 0.00            |                                                  |
| 4  |   |      |      |    |       | 0.00            |                                                  |
| 5  |   |      |      |    |       | 0.00            |                                                  |
| 6  |   |      |      |    |       | 0.00            |                                                  |
| 7  |   |      |      |    |       | 0.00            |                                                  |
| 8  |   |      |      |    |       | 0.00            |                                                  |
| 9  |   |      |      |    |       | 0.00            |                                                  |
| 10 |   |      |      |    |       | 0.00            |                                                  |

## 12 VERIFICA DEI COLLEGAMENTI BULLONATI

Si verificano a taglio e rifollamento le unioni bullonate dei trasversi e dei controventi.

Si utilizzano bulloni di classe 10.9; si suppone che il piano di taglio interessi la parte filettata del bullone e si considera quindi l'area resistente efficace.

Seguono i dati generali, comuni a tutti i collegamenti.

Qualità acciaio:

| Tipo      | Classe | Spessore $t \leq 40$ mm       |                               | Spessore $40 \text{ mm} < t \leq 80$ mm |                               |
|-----------|--------|-------------------------------|-------------------------------|-----------------------------------------|-------------------------------|
|           |        | $f_{yk}$ [N/mm <sup>2</sup> ] | $f_{tk}$ [N/mm <sup>2</sup> ] | $f_{yk}$ [N/mm <sup>2</sup> ]           | $f_{tk}$ [N/mm <sup>2</sup> ] |
| Profilati | S355 W | 355                           | 510                           | 335                                     | 490                           |
| Lamiere   | S355 W | 355                           | 510                           | 335                                     | 490                           |

Coefficienti parziali di sicurezza per la verifica delle unioni (NTC 2008; Tab. 4.2.XII):

Resistenza dei bulloni e delle sezioni tese, indebolite dai fori:  $\gamma_{M2} = 1.25$

Resistenza allo scorrimento allo SLU:  $\gamma_{M3} = 1.25$

Resistenza allo scorrimento allo SLE:  $\gamma_{M3} = 1.10$

Precarico bulloni ad alta resistenza (classe 8.8 o 10.9):  $\gamma_{M7} = 1.10$

Dati meccanici e geometrici dei bulloni classe 10.9.

Resistenza di snervamento:  $f_{yb} = 900 \text{ N/mm}^2$

Resistenza di rottura:  $f_{tb} = 1000 \text{ N/mm}^2$

Coefficiente di attrito:  $\mu = 0.30$

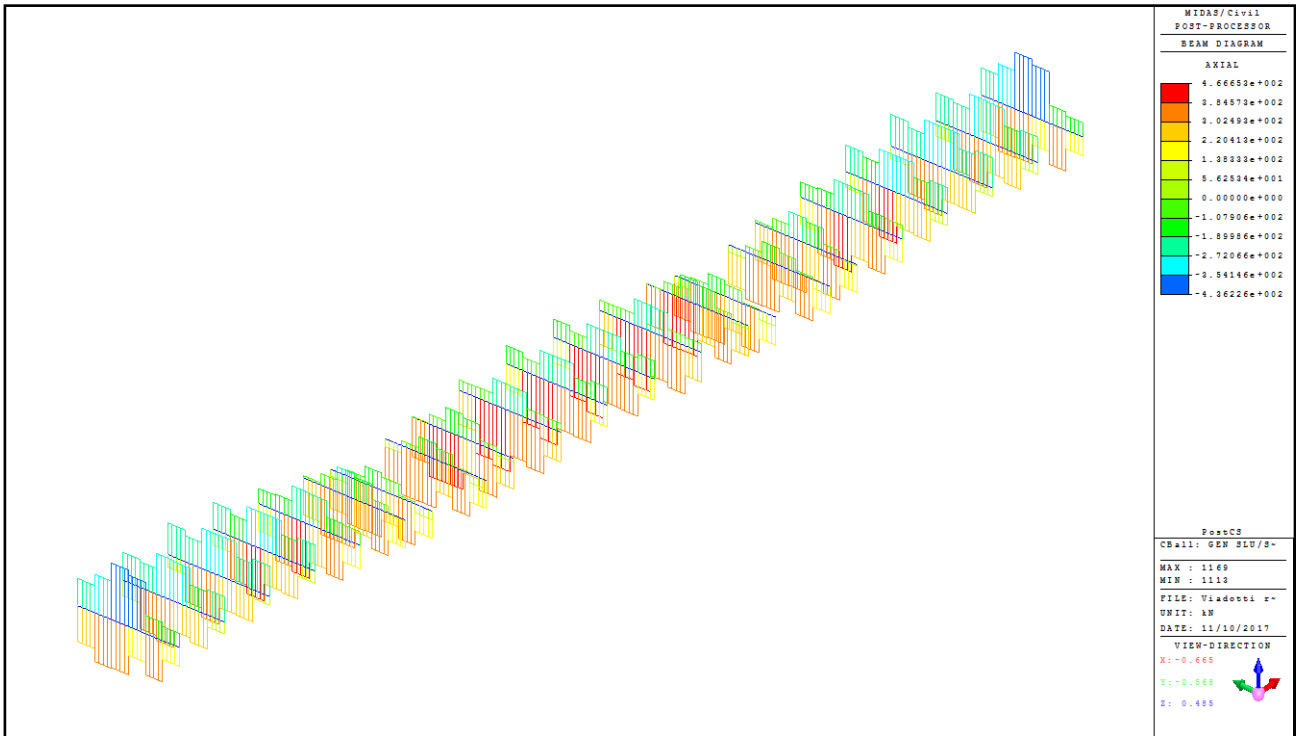
Tipo di serraggio: Controllato

Tutti i nodi bullonati sono verificati a rifollamento e ad attrito allo SLE; si ammette come ipotesi di progetto che possano non essere verificati ad attrito allo SLU; corrispondono quindi alla Categoria B o C (EN 1993-1-8; § 3.4).

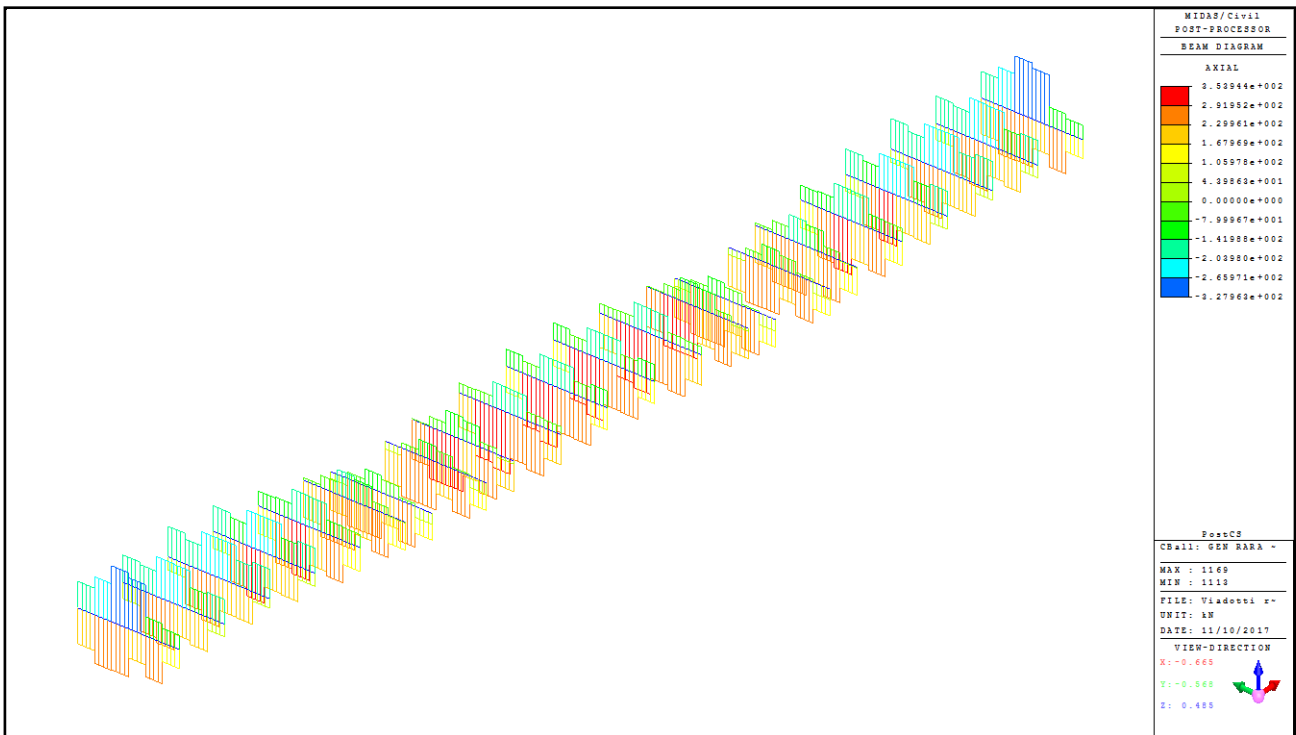
| Diametro nominale                 | d [mm]                       | M16   | M20   | M24   | M27   |
|-----------------------------------|------------------------------|-------|-------|-------|-------|
| Diametro fori (normali)           | $d_0$ [mm]                   | 17    | 21    | 25.5  | 28.5  |
| Area nominale                     | A [mm <sup>2</sup> ]         | 201   | 314   | 452   | 573   |
| Area resistente (gambo filettato) | $A_{res}$ [mm <sup>2</sup> ] | 157   | 245   | 353   | 459   |
| Resistenza a taglio SLU           | $F_{v,Rd}$ [kN]              | 62.7  | 97.9  | 141   | 183.8 |
| Forza di precarico                | $F_{p,Cd}$ [kN]              | 109.7 | 171.3 | 246.7 | 321.6 |
| Resistenza a scorrimento SLU      | $F_{s,Rd}$ [kN]              | 26.3  | 41.1  | 59.2  | 77.2  |
| Resistenza a scorrimento SLE      | $F_{s,Rd,es}$ [kN]           | 29.9  | 46.7  | 67.3  | 87.7  |



## 12.1 DIAFRAMMI SU SPALLE E INTEREDI - TRASVERSI INFERIORI



TRASVERSI INFERIORI CORRENTI – SFORZO ASSIALE – INVILUPPO SLU/SLV

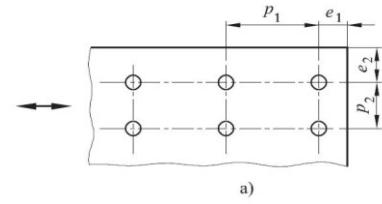


TRASVERSI INFERIORI CORRENTI – SFORZO ASSIALE – INVILUPPO SLE

**VERIFICA CONNESSIONE BULLONATA A TAGLIO: TRASVERSI IN CAMPATA - CORRENTI INFERIORI (2 L 80x10)**

Coefficienti di sicurezza per la verifica delle unioni (NTC 2008; Tab. 4.2.XII):  
 Resistenza dei bulloni e delle sezioni tese (indebolite dai fori)  
 Resistenza a scorrimento allo SLU  
 Resistenza a scorrimento allo SLE  
 Precarico dei bulloni ad alta resistenza (classe 8.8 o 10.9)

$\gamma_{M2} = 1.25$   
 $\gamma_{M3} = 1.25$   
 $\gamma_{M3} = 1.10$   
 $\gamma_{M7} = 1.10$



Dati geometrici bulloni: Diametro nominale: **d = 27 mm**  
 Tipo fori: accoppiamento **normale**  
 Area nominale gambo non filettato: **A = 573 mm<sup>2</sup>**  
 Area resistente gambo filettato: **A<sub>res</sub> = 459 mm<sup>2</sup>**  
 Classe bulloni: **10.9**  
 $f_{yb} = 900.00 \text{ N/mm}^2$   
 $f_{tb} = 1000.00 \text{ N/mm}^2$

Resistenza a taglio: il piano di taglio interessa la parte: **filettata**  
 resistenza allo SLU (per piano di taglio): **F<sub>v,Rd</sub> = 183.76 kN**  
 Resistenza a scorrimento: coefficiente di attrito:  $\mu = 0.30$  (tutte le superfici)  
 (solo classi 8.8 o 10.9) tipo di serraggio: **controllato**  
 forza di precarico: **F<sub>p,Cd</sub> = 321.58 kN**  
 resistenza allo SLU (per piano di scorrimento): **F<sub>s,Rd</sub> = 77.18 kN**  
 resistenza allo SLE (per piano di scorrimento): **F<sub>s,Rd,es</sub> = 87.70 kN**

Dati profili e lamiere: Spessore nominale dell'elemento  
 $t \leq 40 \text{ mm}$   $40 \text{ mm} < t \leq 80 \text{ mm}$   
 $f_{yk}$   $f_{tk}$   $f_{yk}$   $f_{tk}$   
 [N/mm<sup>2</sup>] [N/mm<sup>2</sup>] [N/mm<sup>2</sup>] [N/mm<sup>2</sup>]

Qualità acciaio profilati: **S 355 W** 355 510 335 490 **UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica**  
 Qualità acciaio lamiera / coprigiunti: **S 355 W** 355 510 335 490 **UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica**

Dati geometrici bulloni: Numero file di bulloni: **1**  
 Numero bulloni: **3**  
 Numero superfici di taglio: **2**  
 Interassi:  $p_1 = 70 \text{ mm}$   
 (per fila singola porre:  $p_2 = 0$ )  $p_2 = 0 \text{ mm}$   
 Limiti massimi e minimi  
 Min. Max.  
 62.7 175 mm **Entro limiti: Verificato**  
 0 0 mm **Entro limiti: Verificato**

Dati geometrici profilati: Numero profilati: **2**  
 Spessore flangia bullonata: **15 mm**  
 Area sezione singolo profilato: **1510 mm<sup>2</sup>**  
 Distanze bulloni dal bordo:  $e_1 = 40 \text{ mm}$   
 $e_2 = 40 \text{ mm}$   
 Limiti massimi e minimi  
 Min. Max.  
 34.2 125 mm **Entro limiti: Verificato**  
 34.2 125 mm **Entro limiti: Verificato**

Dati geometrici lamiere / coprigiunti: Numero lamiera: **1**  
 Spessore: **15 mm**  
 Distanze bulloni dal bordo:  $e_1 = 40 \text{ mm}$   
 $e_2 = 40 \text{ mm}$   
 Limiti massimi e minimi  
 Min. Max.  
 34.2 125 mm **Entro limiti: Verificato**  
 34.2 125 mm **Entro limiti: Verificato**

Sollecitazioni di progetto (trazione > 0): S.L.U.  $N_{Ed} = 466.60 \text{ kN}$   
 S.L.E.  $N_{Ed,es} = 353.90 \text{ kN}$

S.L.U. Verifica di resistenza a taglio bullone, singola superficie:  $F_{v,Ed} = 77.77 \text{ kN}$   
 Verifica:  $\frac{F_{v,Ed}}{F_{v,Rd}} = \frac{77.77}{183.76} = 0.423 \leq 1$ : **Verificato**

S.L.U. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed} = 77.77 \text{ kN}$   
 Verifica:  $\frac{F_{v,Ed}}{F_{s,Rd}} = \frac{77.77}{77.18} = 1.008 > 1$ : **NON Verificato**

S.L.E. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed,es} = 58.98 \text{ kN}$   
 Verifica:  $\frac{F_{v,Ed,es}}{F_{s,Rd,es}} = \frac{58.98}{87.70} = 0.673 \leq 1$ : **Verificato**

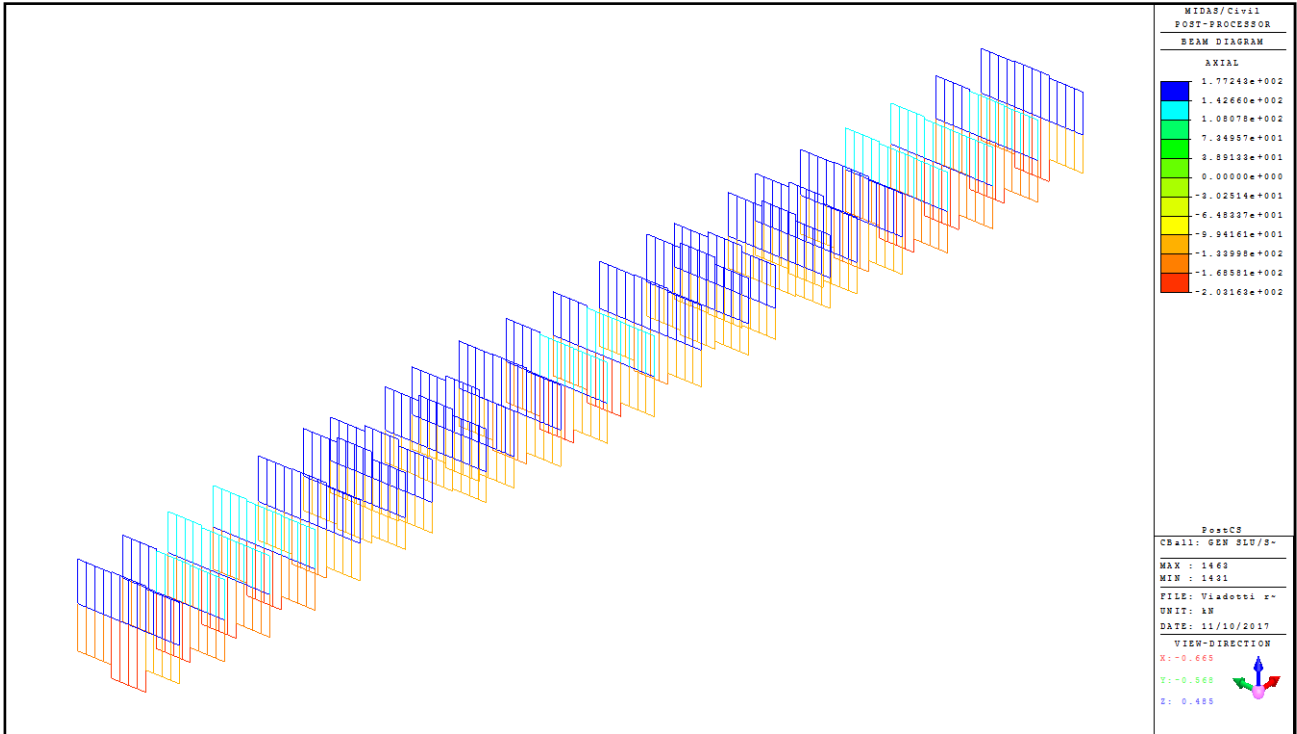
S.L.U. Verifica al rifollamento profilato:  $F_{b,Ed} = 77.77 \text{ kN}$   
 coefficienti:  $k1 = 2.230$   
 $\alpha_b = 0.468$   
 Resistenza al rifollamento:  $F_{b,Rd} = 172.4 \text{ kN}$   
 Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{77.77}{172.38} = 0.451 \leq 1$ : **Verificato**

S.L.U. Verifica al rifollamento lamiera:  $F_{b,Ed} = 155.53 \text{ kN}$   
 coefficienti:  $k1 = 2.230$   
 $\alpha_b = 0.468$   
 Resistenza al rifollamento:  $F_{b,Rd} = 172.4 \text{ kN}$   
 Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{155.53}{172.38} = 0.902 \leq 1$ : **Verificato**

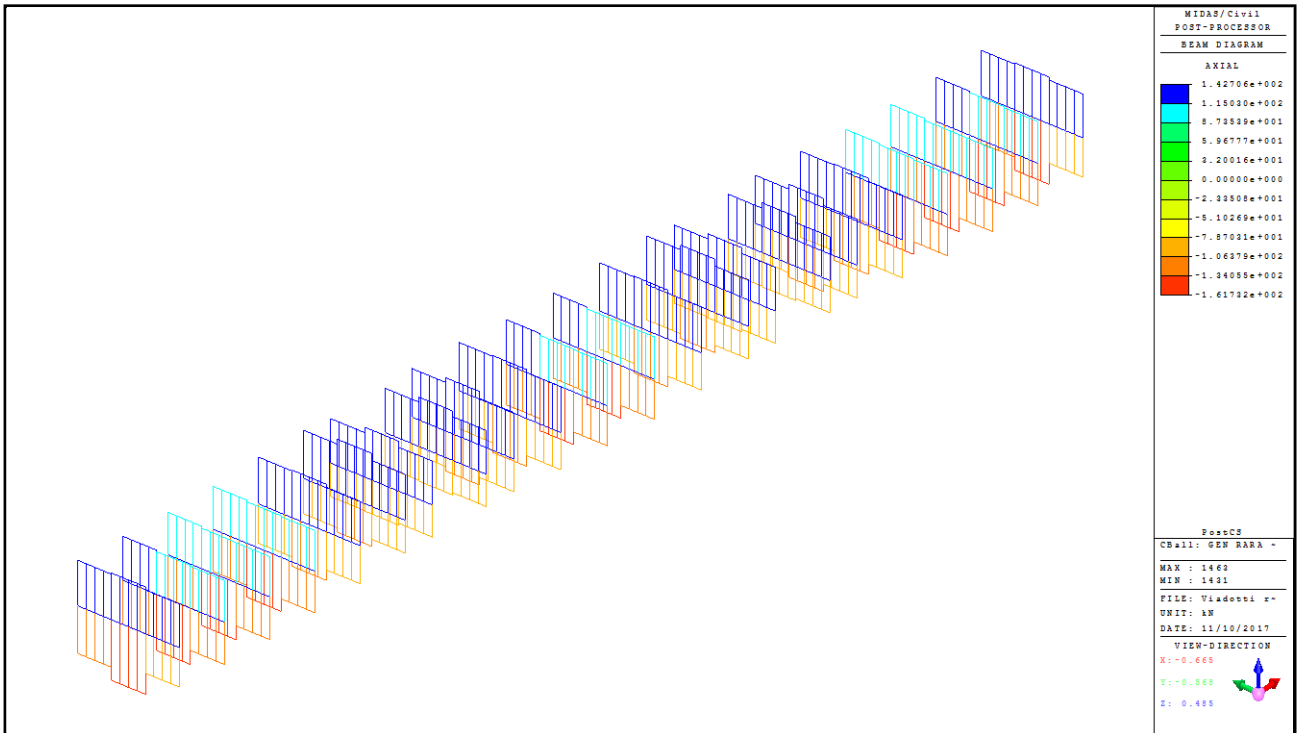
S.L.U. Verifica a trazione del profilato indebolito dai fori: Area netta:  $A_{net} = 2165 \text{ mm}^2$   
 Resistenza della sezione netta:  $N_{u,Rd} = 794.99 \text{ kN}$   
 Verifica:  $\frac{N_{Ed}}{N_{u,Rd}} = \frac{466.60}{794.99} = 0.587 \leq 1$ : **Verificato**

Categoria (verificata) di connessione bullonata a taglio (EN1993-1-8:2005 § 3.4): **Categoria B: connessioni ad attrito allo S.L.E.**

## 12.2 DIAFRAMMI SU SPALLE E INTERMEDI - TRASVERSI SUPERIORI



TRASVERSI SUPERIORI CORRENTI – SFORZO ASSIALE – INVILUPPO SLU



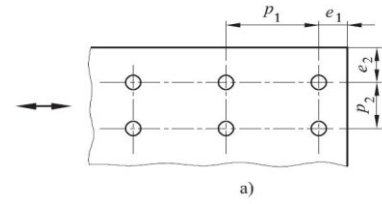
TRASVERSI SUPERIORI CORRENTI – SFORZO ASSIALE – INVILUPPO SLE

**VERIFICA CONNESSIONE BULLONATA A TAGLIO: TRASVERSI IN CAMPATA - CORRENTI SUPERIORI (2 L 80x10)**

Coefficienti di sicurezza per la verifica delle unioni (NTC 2008; Tab. 4.2.XII):  
 Resistenza dei bulloni e delle sezioni tese (indebolite dai fori)  
 Resistenza a scorrimento allo SLU  
 Resistenza a scorrimento allo SLE  
 Precarico dei bulloni ad alta resistenza (classe 8.8 o 10.9)

$\gamma_{M2} = 1.25$   
 $\gamma_{M3} = 1.25$   
 $\gamma_{M3} = 1.10$   
 $\gamma_{M7} = 1.10$

Dati geometrici bulloni: Diametro nominale:  $d = 20$  mm  
 Tipo fori: accoppiamento **normale**  
 Area nominale gambo non filettato:  $A = 314$  mm<sup>2</sup>  
 Area resistente gambo filettato:  $A_{res} = 245$  mm<sup>2</sup>  
 Classe bulloni: **10.9**  
 $f_{yb} = 900.00$  N/mm<sup>2</sup>  
 $f_{tb} = 1000.00$  N/mm<sup>2</sup>



Resistenza a taglio: il piano di taglio interessa la parte: **filettata**  
 resistenza allo SLU (per piano di taglio):  $F_{v,Rd} = 97.92$  kN  
 Resistenza a scorrimento: coefficiente di attrito:  $\mu = 0.30$  (tutte le superfici)  
 (solo classi 8.8 o 10.9) tipo di serraggio: **controllato**  
 forza di precarico:  $F_{p,Cd} = 171.36$  kN  
 resistenza allo SLU (per piano di scorrimento):  $F_{s,Rd} = 41.13$  kN  
 resistenza allo SLE (per piano di scorrimento):  $F_{s,Rd,es} = 46.73$  kN

Dati profili e lamiere: Spessore nominale dell'elemento  
 $t \leq 40$  mm       $40$  mm  $< t \leq 80$  mm  
 $f_{yk}$        $f_{tk}$        $f_{yk}$        $f_{tk}$   
 [N/mm<sup>2</sup>]      [N/mm<sup>2</sup>]      [N/mm<sup>2</sup>]      [N/mm<sup>2</sup>]

Qualità acciaio profilati: **S 355 W**      355      510      335      490      UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica  
 Qualità acciaio lamiera / coprigiunti: **S 355 W**      355      510      335      490      UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica

Dati geometrici bulloni: Numero file di bulloni: **1**  
 Numero bulloni: **3**  
 Numero superfici di taglio: **2**  
 Interassi:  $p_1 = 60$  mm  
 (per fila singola porre:  $p_2 = 0$ )       $p_2 = 0$  mm  
 Limiti massimi e minimi  
 Min.      Max.  
 46.2      140 mm  
 0      0 mm  
 Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici profilati: Numero profilati: **2**  
 Spessore flangia bullonata: **10** mm  
 Area sezione singolo profilato: **1510** mm<sup>2</sup>  
 Distanze bulloni dal bordo:  $e_1 = 40$  mm  
 $e_2 = 40$  mm  
 Limiti massimi e minimi  
 Min.      Max.  
 25.2      125 mm  
 25.2      125 mm  
 Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici lamiere / coprigiunti: Numero lamiera: **1**  
 Spessore: **15** mm  
 Distanze bulloni dal bordo:  $e_1 = 40$  mm  
 $e_2 = 40$  mm  
 Limiti massimi e minimi  
 Min.      Max.  
 25.2      125 mm  
 25.2      125 mm  
 Entro limiti: Verificato  
 Entro limiti: Verificato

Sollecitazioni di progetto (trazione > 0): S.L.U.       $N_{Ed} = -203.20$  kN  
 S.L.E.       $N_{Ed,es} = -161.70$  kN

S.L.U. Verifica di resistenza a taglio bullone, singola superficie:  $F_{v,Ed} = 33.87$  kN  
 Verifica:  $\frac{F_{v,Ed}}{F_{v,Rd}} = \frac{33.87}{97.92} = 0.346 \leq 1$ : Verificato

S.L.U. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed} = 33.87$  kN  
 Verifica:  $\frac{F_{v,Ed}}{F_{s,Rd}} = \frac{33.87}{41.13} = 0.823 \leq 1$ : Verificato

S.L.E. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed,es} = 26.95$  kN  
 Verifica:  $\frac{F_{v,Ed,es}}{F_{s,Rd,es}} = \frac{26.95}{46.73} = 0.577 \leq 1$ : Verificato

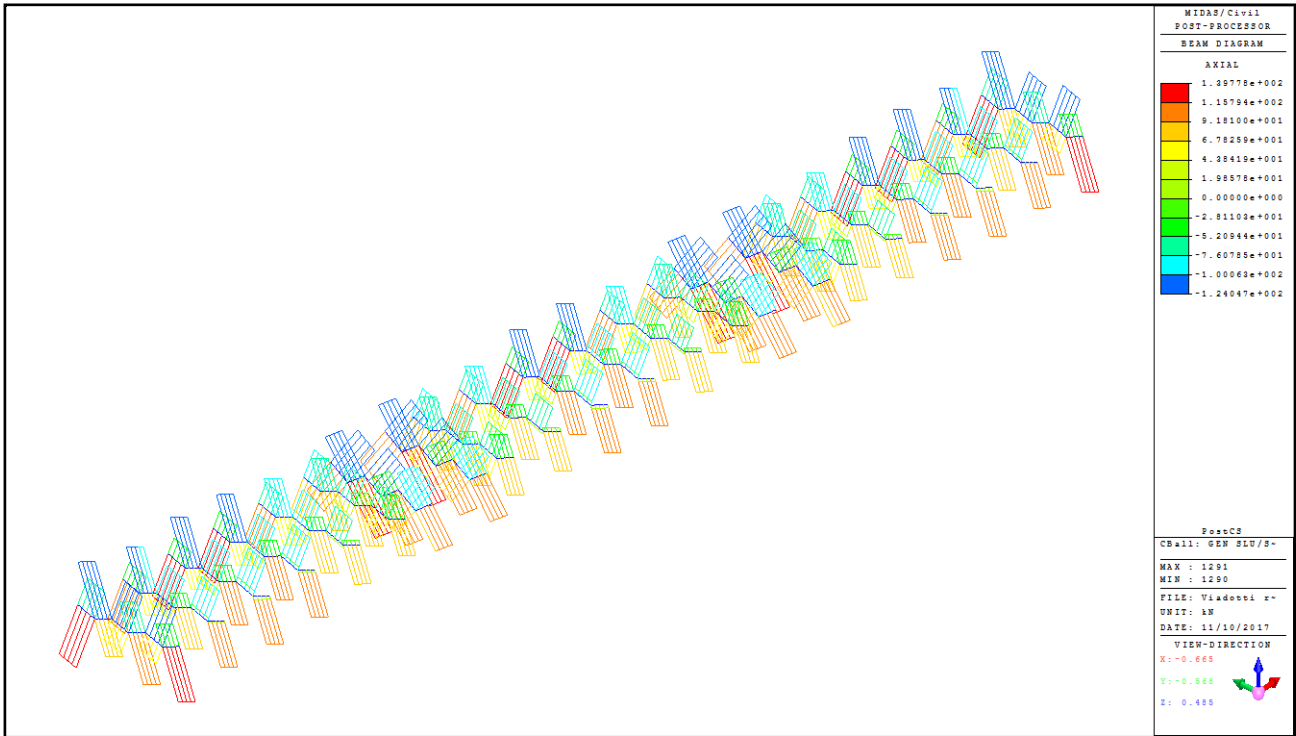
S.L.U. Verifica al rifollamento profilato:  $F_{b,Ed} = 33.87$  kN  
 coefficienti:  $k1 = 2.500$   
 $\alpha_b = 0.635$   
 Resistenza al rifollamento:  $F_{b,Rd} = 129.5$  kN  
 Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{33.87}{129.52} = 0.261 \leq 1$ : Verificato

S.L.U. Verifica al rifollamento lamiera:  $F_{b,Ed} = 67.73$  kN  
 coefficienti:  $k1 = 2.500$   
 $\alpha_b = 0.635$   
 Resistenza al rifollamento:  $F_{b,Rd} = 194.3$  kN  
 Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{67.73}{194.29} = 0.349 \leq 1$ : Verificato

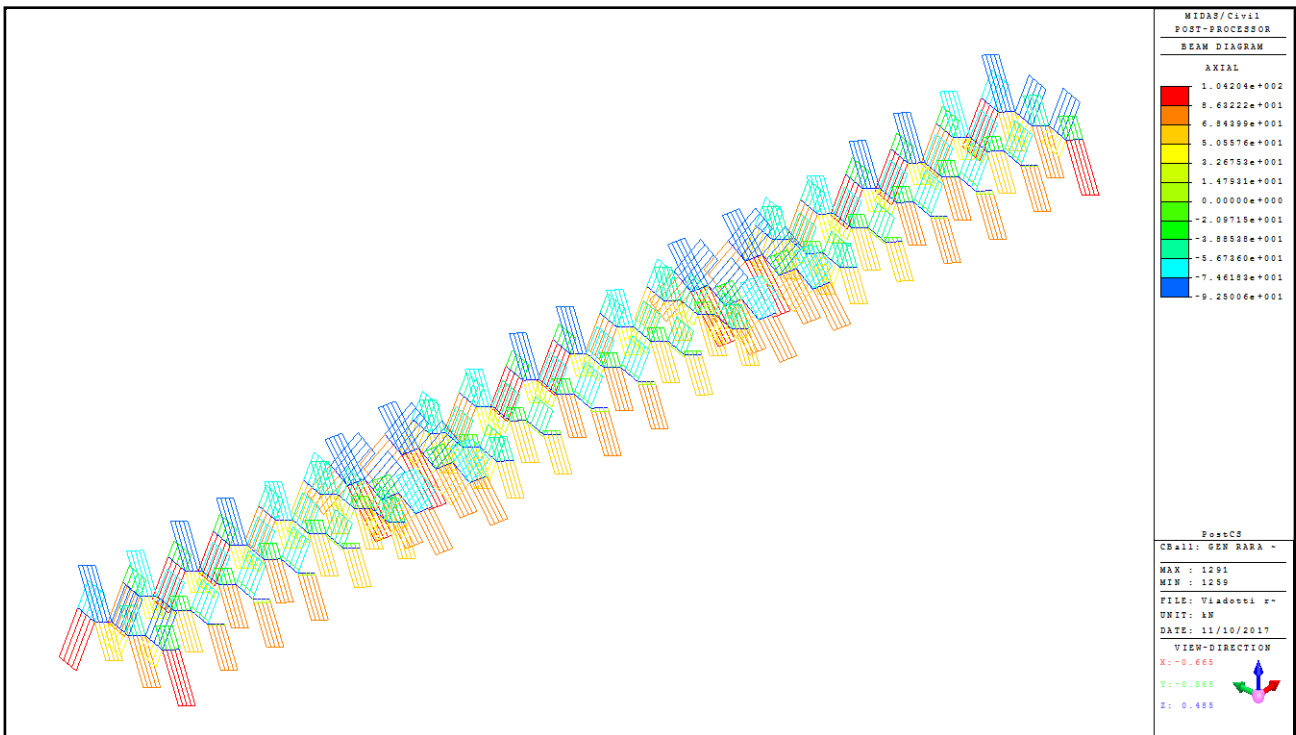
S.L.U. Verifica a trazione del profilato indebolito dai fori: Area netta:  $A_{net} = 2600$  mm<sup>2</sup>  
 Resistenza della sezione netta:  $N_{u,Rd} = 954.72$  kN  
 Verifica:  $\frac{N_{Ed}}{N_{u,Rd}} = \frac{0.00}{954.72} = 0.000$  N.A.

Categoria (verificata) di connessione bullonata a taglio (EN1993-1-8:2005 § 3.4):      Categoria C: connessioni ad attrito allo S.L.U.

### 12.3 DIAFRAMMI SU SPALLE E INTEREDI - DIAGONALI



DIAGONALI CORRENTI – SFORZO ASSIALE – INVILUPPO SLU



DIAGONALI CORRENTI – SFORZO ASSIALE – INVILUPPO SLE

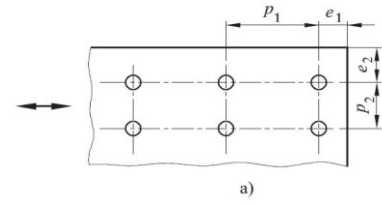
**VERIFICA CONNESSIONE BULLONATA A TAGLIO: TRASVERSI IN CAMPATA - DIAGONALI (2 L 80x8)**

Coefficienti di sicurezza per la verifica delle unioni (NTC 2008; Tab. 4.2.XII):  
 Resistenza dei bulloni e delle sezioni tese (indebolite dai fori)  
 Resistenza a scorrimento allo SLU  
 Resistenza a scorrimento allo SLE  
 Precarico dei bulloni ad alta resistenza (classe 8.8 o 10.9)

$\gamma_{M2} = 1.25$   
 $\gamma_{M3} = 1.25$   
 $\gamma_{M3} = 1.10$   
 $\gamma_{M7} = 1.10$

Dati geometrici bulloni: Diametro nominale:  $d = 20$  mm  
 Tipo fori: accoppiamento **normale**  
 Area nominale gambo non filettato:  $A = 314$  mm<sup>2</sup>  
 Area resistente gambo filettato:  $A_{res} = 245$  mm<sup>2</sup>  
 Classe bulloni: **10.9**

$f_{yk} = 900.00$  N/mm<sup>2</sup>  
 $f_{yb} = 1000.00$  N/mm<sup>2</sup>  
**filettata**



Resistenza a taglio: il piano di taglio interessa la parte:  
 resistenza allo SLU (per piano di taglio):  $F_{v,Rd} = 97.92$  kN  
 Resistenza a scorrimento: coefficiente di attrito:  $\mu = 0.30$  (tutte le superfici)  
 (solo classi 8.8 o 10.9) tipo di serraggio: **controllato**  
 forza di precarico:  $F_{p,Cd} = 171.36$  kN  
 resistenza allo SLU (per piano di scorrimento):  $F_{s,Rd} = 41.13$  kN  
 resistenza allo SLE (per piano di scorrimento):  $F_{s,Rd,es} = 46.73$  kN

Dati profili e lamiere: Spessore nominale dell'elemento  
 $t \leq 40$  mm  $40$  mm  $< t \leq 80$  mm  
 $f_{yk}$   $f_{tk}$   $f_{yk}$   $f_{tk}$   
 [N/mm<sup>2</sup>] [N/mm<sup>2</sup>] [N/mm<sup>2</sup>] [N/mm<sup>2</sup>]

Qualità acciaio profilati: **S 355 W** 355 510 335 490  
 Qualità acciaio lamiera / coprigiunti: **S 355 W** 355 510 335 490

UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica  
 UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica

Dati geometrici bulloni: Numero file di bulloni: **1**  
 Numero bulloni: **2**  
 Numero superfici di taglio: **2**  
 Interassi:  $p_1 = 60$  mm  
 (per fila singola porre:  $p_2 = 0$ )  $p_2 = 0$  mm

Limiti massimi e minimi  
 Min. Max.  
 46.2 112 mm  
 0 0 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici profilati: Numero profilati: **2**  
 Spessore flangia bullonata: **8** mm  
 Area sezione singolo profilato: **1230** mm<sup>2</sup>  
 Distanze bulloni dal bordo:  $e_1 = 40$  mm  
 $e_2 = 40$  mm

Limiti massimi e minimi  
 Min. Max.  
 25.2 125 mm  
 25.2 125 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici lamiere / coprigiunti: Numero lamiera: **1**  
 Spessore: **15** mm  
 Distanze bulloni dal bordo:  $e_1 = 40$  mm  
 $e_2 = 40$  mm

Limiti massimi e minimi  
 Min. Max.  
 25.2 125 mm  
 25.2 125 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Sollecitazioni di progetto (trazione > 0): S.L.U.  $N_{Ed} = 139.80$  kN  
 S.L.E.  $N_{Ed,es} = 104.20$  kN

S.L.U. Verifica di resistenza a taglio bullone, singola superficie:  $F_{v,Ed} = 34.95$  kN

Verifica:  $\frac{F_{v,Ed}}{F_{v,Rd}} = \frac{34.95}{97.92} = 0.357 \leq 1$ : Verificato

S.L.U. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed} = 34.95$  kN

Verifica:  $\frac{F_{v,Ed}}{F_{s,Rd}} = \frac{34.95}{41.13} = 0.850 \leq 1$ : Verificato

S.L.E. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed,es} = 26.05$  kN

Verifica:  $\frac{F_{v,Ed,es}}{F_{s,Rd,es}} = \frac{26.05}{46.73} = 0.557 \leq 1$ : Verificato

S.L.U. Verifica al rifollamento profilato:  $F_{b,Ed} = 34.95$  kN

coefficienti:  $k_1 = 2.500$   
 $\alpha_b = 0.635$

Resistenza al rifollamento:  $F_{b,Rd} = 103.6$  kN

Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{34.95}{103.62} = 0.337 \leq 1$ : Verificato

S.L.U. Verifica al rifollamento lamiera:  $F_{b,Ed} = 69.90$  kN

coefficienti:  $k_1 = 2.500$   
 $\alpha_b = 0.635$

Resistenza al rifollamento:  $F_{b,Rd} = 194.3$  kN

Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{69.90}{194.29} = 0.360 \leq 1$ : Verificato

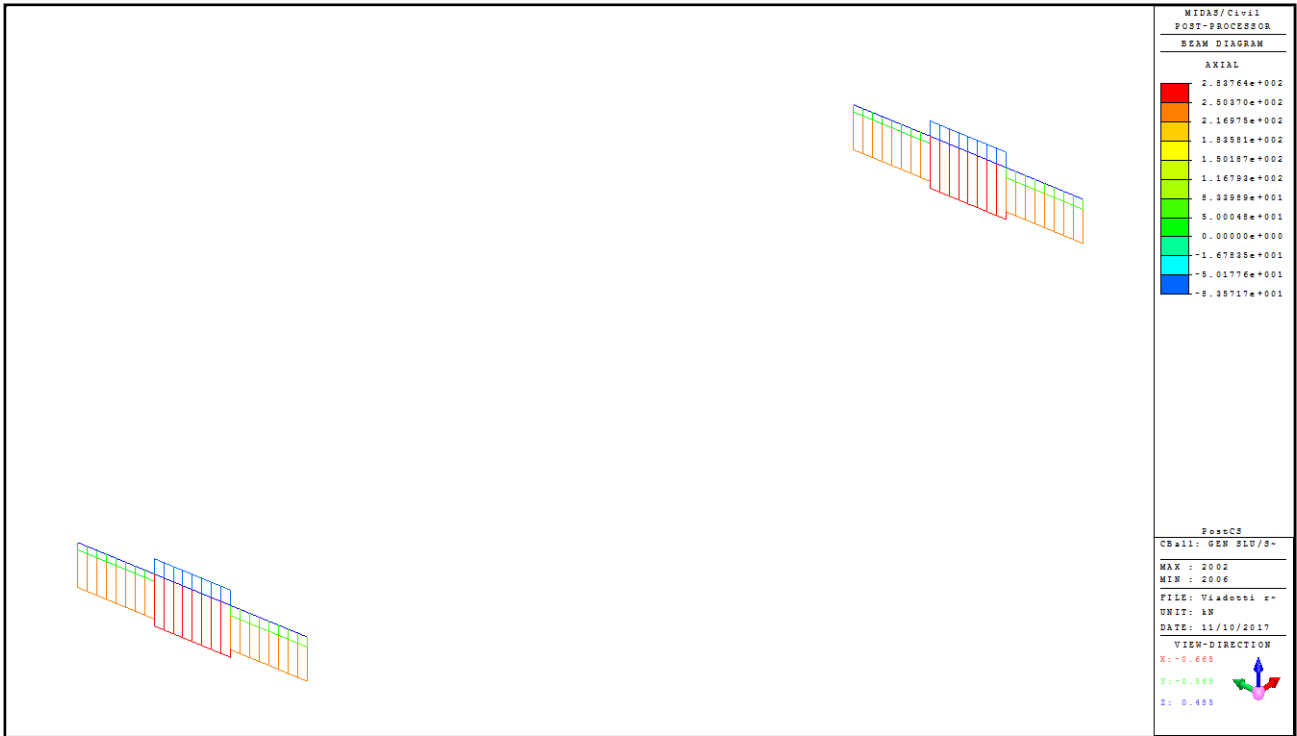
S.L.U. Verifica a trazione del profilato indebolito dai fori: Area netta:  $A_{net} = 2124$  mm<sup>2</sup>  
 Resistenza della sezione netta:  $N_{u,Rd} = 779.93$  kN

Verifica:  $\frac{N_{Ed}}{N_{u,Rd}} = \frac{139.80}{779.93} = 0.179 \leq 1$ : Verificato

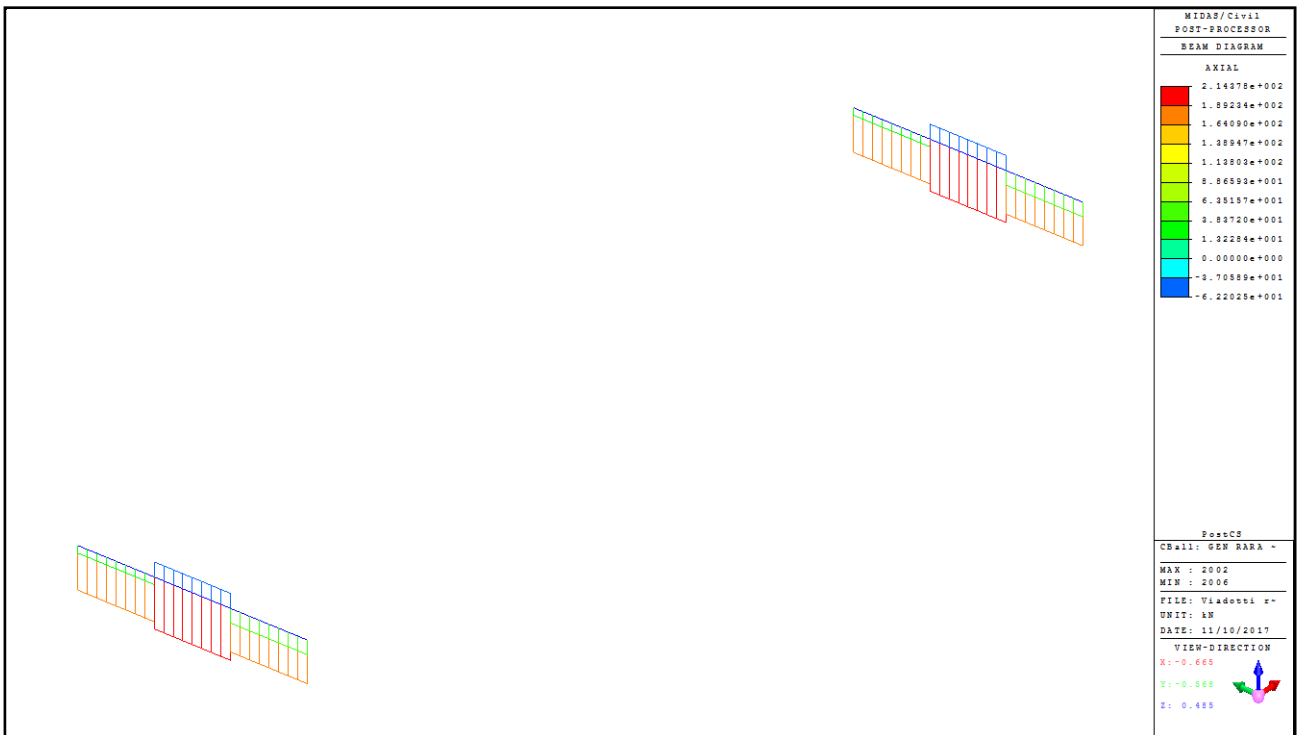
Categoria (verificata) di connessione bullonata a taglio (EN1993-1-8:2005 § 3.4):

Categoria C: connessioni ad attrito allo S.L.U.

## 12.4 DIAFRAMMI SU PILE – TRASVERSI INFERIORI



TRASVERSI INFERIORI PILE – SFORZO ASSIALE – INVILUPPO SLU



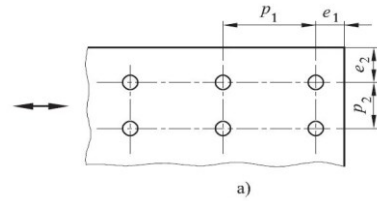
TRASVERSI INFERIORI PILE – SFORZO ASSIALE – INVILUPPO SLE

**VERIFICA CONNESSIONE BULLONATA A TAGLIO: TRASVERSI SU PILA - CORRENTI INFERIORI (2 L 100x10)**

Coefficienti di sicurezza per la verifica delle unioni (NTC 2008; Tab. 4.2.XII):  
 Resistenza dei bulloni e delle sezioni tese (indebolite dai fori)  
 Resistenza a scorrimento allo SLU  
 Resistenza a scorrimento allo SLE  
 Precarico dei bulloni ad alta resistenza (classe 8.8 o 10.9)

$\gamma_{M2} = 1.25$   
 $\gamma_{M3} = 1.25$   
 $\gamma_{M3} = 1.10$   
 $\gamma_{M7} = 1.10$

Dati geometrici bulloni: Diametro nominale:  $d = 24$  mm  
 Tipo fori: accoppiamento **normale**  
 Area nominale gambo non filettato:  $A = 452$  mm<sup>2</sup>  
 Area resistente gambo filettato:  $A_{res} = 353$  mm<sup>2</sup>  
 Classe bulloni: **10.9**  
 $f_{yb} = 900.00$  N/mm<sup>2</sup>  
 $f_{tb} = 1000.00$  N/mm<sup>2</sup>



Resistenza a taglio: il piano di taglio interessa la parte: **filettata**  
 resistenza allo SLU (per piano di taglio):  $F_{v,Rd} = 141.00$  kN  
 Resistenza a scorrimento: coefficiente di attrito:  $\mu = 0.30$  (tutte le superfici)  
 (solo classi 8.8 o 10.9) tipo di serraggio: **controllato**  
 forza di precarico:  $F_{p,Cd} = 246.75$  kN  
 resistenza allo SLU (per piano di scorrimento):  $F_{s,Rd} = 59.22$  kN  
 resistenza allo SLE (per piano di scorrimento):  $F_{s,Rd,es} = 67.30$  kN

Dati profili e lamiere: Spessore nominale dell'elemento  
 $t \leq 40$  mm       $40$  mm  $< t \leq 80$  mm  
 $f_{yk}$  [N/mm<sup>2</sup>]       $f_{tk}$  [N/mm<sup>2</sup>]       $f_{yk}$  [N/mm<sup>2</sup>]       $f_{tk}$  [N/mm<sup>2</sup>]

Qualità acciaio profilati: **S 355 W**      355      510      335      490  
 Qualità acciaio lamiera / coprigiunti: **S 355 W**      355      510      335      490

UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica  
 UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica

Dati geometrici bulloni: Numero file di bulloni: **1**  
 Numero bulloni: **3**  
 Numero superfici di taglio: **2**  
 Interassi:  $p_1 = 60$  mm  
 (per fila singola porre:  $p_2 = 0$ )       $p_2 = 0$  mm  
 Limiti massimi e minimi  
 Min.      Max.  
 56.1      140 mm  
 0      0 mm  
 Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici profilati: Numero profilati: **2**  
 Spessore flangia bullonata: **10** mm  
 Area sezione singolo profilato: **1920** mm<sup>2</sup>  
 Distanze bulloni dal bordo:  $e_1 = 40$  mm  
 $e_2 = 50$  mm  
 Limiti massimi e minimi  
 Min.      Max.  
 30.6      125 mm  
 30.6      125 mm  
 Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici lamiere / coprigiunti: Numero lamiera: **1**  
 Spessore: **20** mm  
 Distanze bulloni dal bordo:  $e_1 = 40$  mm  
 $e_2 = 50$  mm  
 Limiti massimi e minimi  
 Min.      Max.  
 30.6      160 mm  
 30.6      160 mm  
 Entro limiti: Verificato  
 Entro limiti: Verificato

Sollecitazioni di progetto (trazione > 0): S.L.U.       $N_{Ed} = 283.80$  kN  
 S.L.E.       $N_{Ed,es} = 214.40$  kN

S.L.U. Verifica di resistenza a taglio bullone, singola superficie:  $F_{v,Ed} = 47.30$  kN  
 Verifica:  $\frac{F_{v,Ed}}{F_{v,Rd}} = \frac{47.30}{141.00} = 0.335 \leq 1$ : Verificato

S.L.U. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed} = 47.30$  kN  
 Verifica:  $\frac{F_{v,Ed}}{F_{s,Rd}} = \frac{47.30}{59.22} = 0.799 \leq 1$ : Verificato

S.L.E. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed,es} = 35.73$  kN  
 Verifica:  $\frac{F_{v,Ed,es}}{F_{s,Rd,es}} = \frac{35.73}{67.30} = 0.531 \leq 1$ : Verificato

S.L.U. Verifica al rifollamento profilato:  $F_{b,Ed} = 47.30$  kN  
 coefficienti:  $k1 = 2.500$   
 $\alpha_b = 0.523$   
 Resistenza al rifollamento:  $F_{b,Rd} = 128.00$  kN  
 Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{47.30}{128.00} = 0.370 \leq 1$ : Verificato

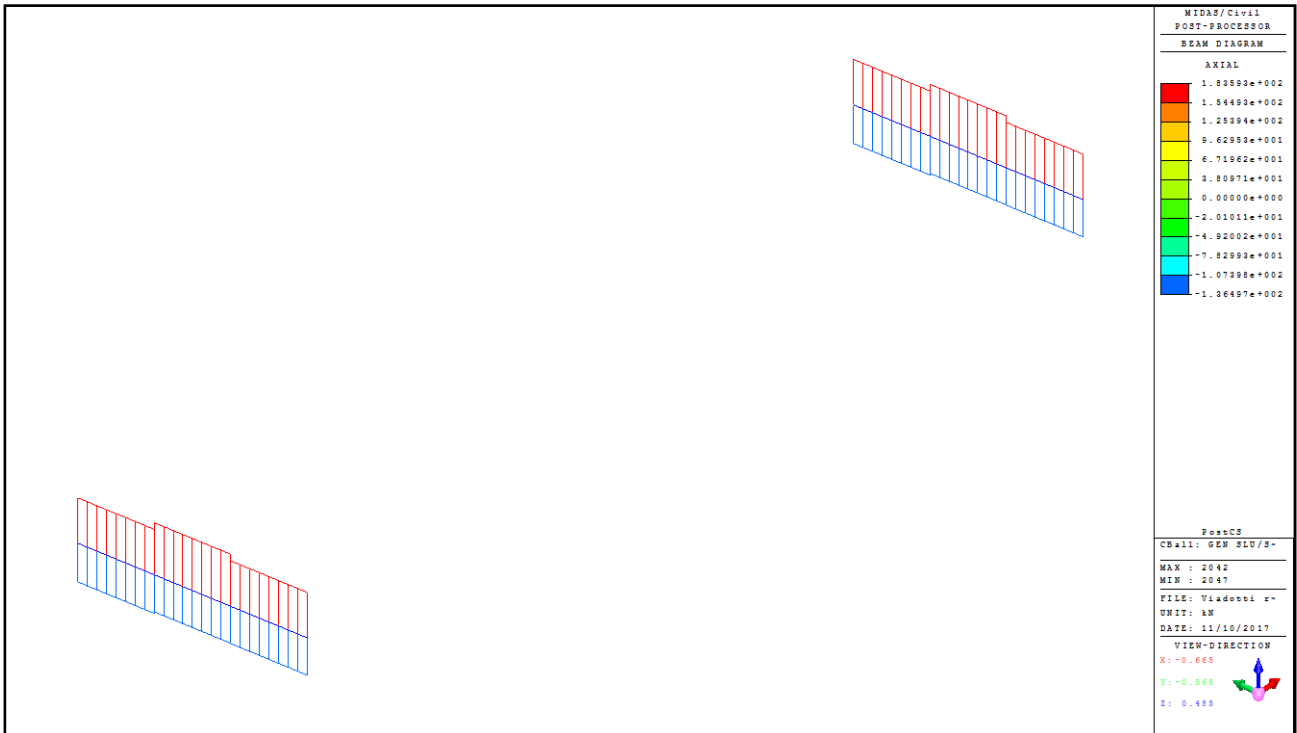
S.L.U. Verifica al rifollamento lamiera:  $F_{b,Ed} = 94.60$  kN  
 coefficienti:  $k1 = 2.500$   
 $\alpha_b = 0.523$   
 Resistenza al rifollamento:  $F_{b,Rd} = 256.00$  kN  
 Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{94.60}{256.00} = 0.370 \leq 1$ : Verificato

S.L.U. Verifica a trazione del profilato indebolito dai fori: Area netta:  $A_{net} = 3330$  mm<sup>2</sup>  
 Resistenza della sezione netta:  $N_{u,Rd} = 1222.78$  kN  
 Verifica:  $\frac{N_{Ed}}{N_{u,Rd}} = \frac{283.80}{1222.78} = 0.232 \leq 1$ : Verificato

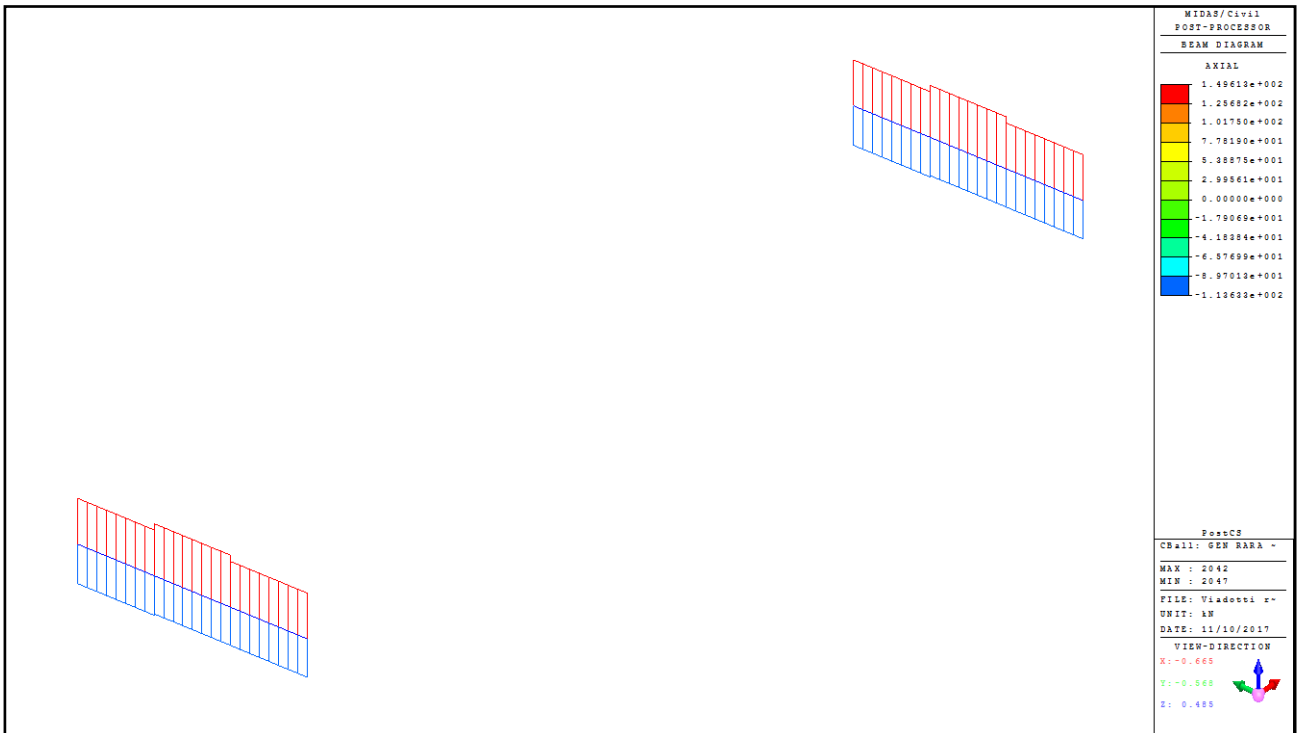
Categoria (verificata) di connessione bullonata a taglio (EN1993-1-8:2005 § 3.4):      Categoria C: connessioni ad attrito allo S.L.U.



## 12.5 DIAFRAMMI SU PILE – TRASVERSI SUPERIORI



TRASVERSI SUPERIORI PILE – SFORZO ASSIALE – INVILUPPO SLU



TRASVERSI SUPERIORI PILE – SFORZO ASSIALE – INVILUPPO SLE

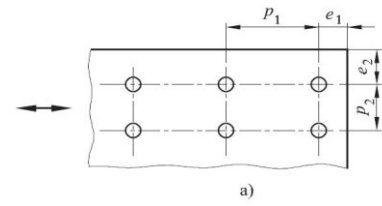
**VERIFICA CONNESSIONE BULLONATA A TAGLIO: TRASVERSI SU PILA - CORRENTI SUPERIORI (2 L 100x10)**

Coefficienti di sicurezza per la verifica delle unioni (NTC 2008; Tab. 4.2.XII):  
 Resistenza dei bulloni e delle sezioni tese (indebolite dai fori)  
 Resistenza a scorrimento allo SLU  
 Resistenza a scorrimento allo SLE  
 Precarico dei bulloni ad alta resistenza (classe 8.8 o 10.9)

$\gamma_{M2} = 1.25$   
 $\gamma_{M3} = 1.25$   
 $\gamma_{M3} = 1.10$   
 $\gamma_{M7} = 1.10$

Dati geometrici bulloni: Diametro nominale: **d = 20 mm**  
 Tipo fori: accoppiamento **di precisione**  
 Area nominale gambo non filettato: **A = 314 mm<sup>2</sup>**  
 Area resistente gambo filettato: **A<sub>res</sub> = 245 mm<sup>2</sup>**  
 Classe bulloni: **10.9**

**d = 20 mm**  
**d<sub>0</sub> = 20.3 mm**  
**A = 314 mm<sup>2</sup>**  
**A<sub>res</sub> = 245 mm<sup>2</sup>**  
**f<sub>yb</sub> = 900.00 N/mm<sup>2</sup>**  
**f<sub>tb</sub> = 1000.00 N/mm<sup>2</sup>**



Resistenza a taglio: il piano di taglio interessa la parte:  
 resistenza allo SLU (per piano di taglio): **F<sub>v,Rd</sub> = 97.92 kN**  
 Resistenza a scorrimento: coefficiente di attrito: **μ = 0.30** (tutte le superfici)  
 (solo classi 8.8 o 10.9) tipo di serraggio: **controllato**  
 forza di precarico: **F<sub>p,Cd</sub> = 171.36 kN**  
 resistenza allo SLU (per piano di scorrimento): **F<sub>s,Rd</sub> = 41.13 kN**  
 resistenza allo SLE (per piano di scorrimento): **F<sub>s,Rd,es</sub> = 46.73 kN**

Dati profili e lamiere: Spessore nominale dell'elemento  
 t ≤ 40 mm      40 mm < t ≤ 80 mm  
 f<sub>yk</sub>      f<sub>tk</sub>      f<sub>yk</sub>      f<sub>tk</sub>  
 [N/mm<sup>2</sup>]      [N/mm<sup>2</sup>]      [N/mm<sup>2</sup>]      [N/mm<sup>2</sup>]

Qualità acciaio profilati: **S 355 W**      355      510      335      490  
 Qualità acciaio lamiera / coprigiunti: **S 355 W**      355      510      335      490

UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica  
 UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica

Dati geometrici bulloni: Numero file di bulloni: **1**  
 Numero bulloni: **3**  
 Numero superfici di taglio: **2**  
 Interassi: **p<sub>1</sub> = 60 mm**  
 (per fila singola porre: **p<sub>2</sub> = 0 mm**)  
 Limiti massimi e minimi  
 Min.      Max.  
 44.66      140 mm  
 0      0 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici profilati: Numero profilati: **2**  
 Spessore flangia bullonata: **10 mm**  
 Area sezione singolo profilato: **1920 mm<sup>2</sup>**  
 Distanze bulloni dal bordo: **e<sub>1</sub> = 40 mm**  
**e<sub>2</sub> = 50 mm**  
 Limiti massimi e minimi  
 Min.      Max.  
 24.36      125 mm  
 24.36      125 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici lamiere / coprigiunti: Numero lamiera: **1**  
 Spessore: **20 mm**  
 Distanze bulloni dal bordo: **e<sub>1</sub> = 40 mm**  
**e<sub>2</sub> = 50 mm**  
 Limiti massimi e minimi  
 Min.      Max.  
 24.36      160 mm  
 24.36      160 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Sollecitazioni di progetto (trazione > 0): S.L.U. **N<sub>Ed</sub> = 183.60 kN**  
 S.L.E. **N<sub>Ed,es</sub> = 149.60 kN**

S.L.U. Verifica di resistenza a taglio bullone, singola superficie: **F<sub>v,Ed</sub> = 30.60 kN**  
 Verifica:  $\frac{F_{v,Ed}}{F_{v,Rd}} = \frac{30.60}{97.92} = 0.313 \leq 1$ : Verificato

S.L.U. Verifica di resistenza a scorrimento bullone, singola superficie: **F<sub>v,Ed</sub> = 30.60 kN**  
 Verifica:  $\frac{F_{v,Ed}}{F_{s,Rd}} = \frac{30.60}{41.13} = 0.744 \leq 1$ : Verificato

S.L.E. Verifica di resistenza a scorrimento bullone, singola superficie: **F<sub>v,Ed,es</sub> = 24.93 kN**  
 Verifica:  $\frac{F_{v,Ed,es}}{F_{s,Rd,es}} = \frac{24.93}{46.73} = 0.534 \leq 1$ : Verificato

S.L.U. Verifica al rifollamento profilato: **F<sub>b,Ed</sub> = 30.60 kN**  
 coefficienti: **k<sub>1</sub> = 2.500**  
**α<sub>b</sub> = 0.657**  
 Resistenza al rifollamento: **F<sub>b,Rd</sub> = 134.0 kN**  
 Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{30.60}{133.99} = 0.228 \leq 1$ : Verificato

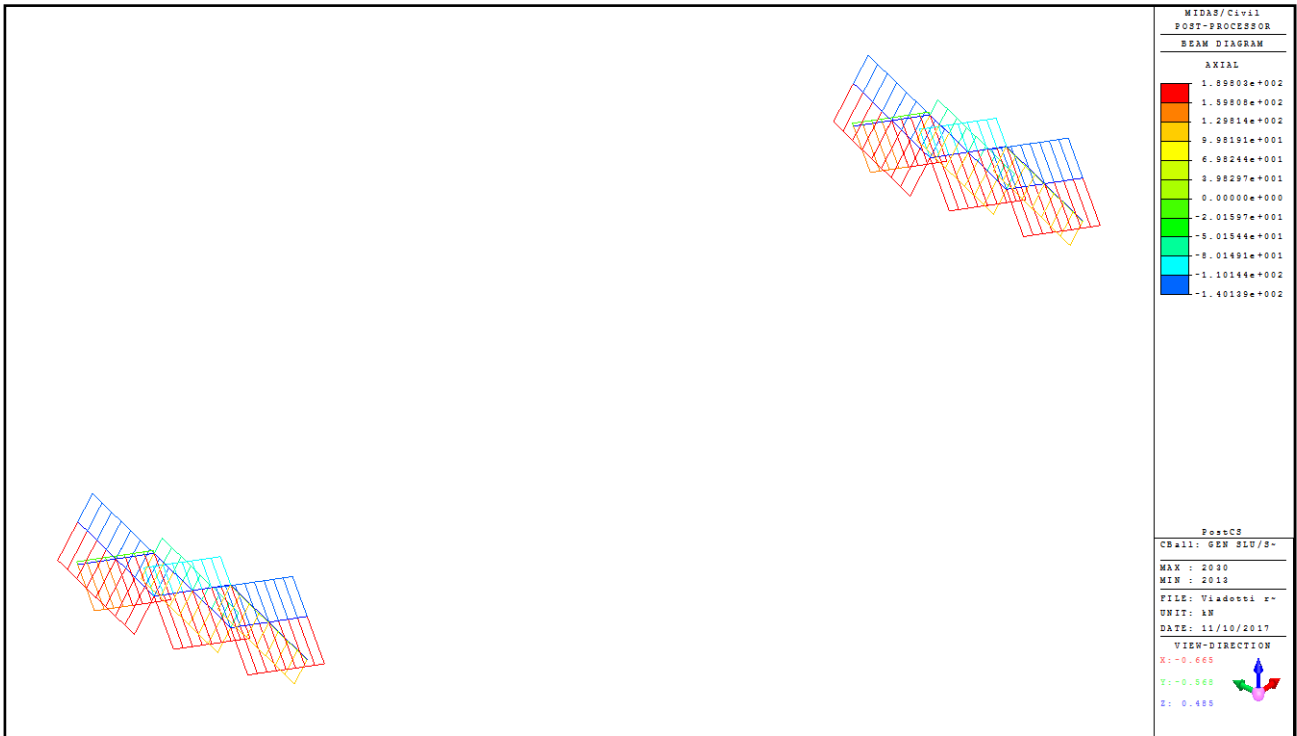
S.L.U. Verifica al rifollamento lamiera: **F<sub>b,Ed</sub> = 61.20 kN**  
 coefficienti: **k<sub>1</sub> = 2.500**  
**α<sub>b</sub> = 0.657**  
 Resistenza al rifollamento: **F<sub>b,Rd</sub> = 268.0 kN**  
 Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{61.20}{267.98} = 0.228 \leq 1$ : Verificato

S.L.U. Verifica a trazione del profilato indebolito dai fori: Area netta: **A<sub>net</sub> = 3434 mm<sup>2</sup>**  
 Resistenza della sezione netta: **N<sub>u,Rd</sub> = 1260.96 kN**  
 Verifica:  $\frac{N_{Ed}}{N_{u,Rd}} = \frac{183.60}{1260.96} = 0.146 \leq 1$ : Verificato

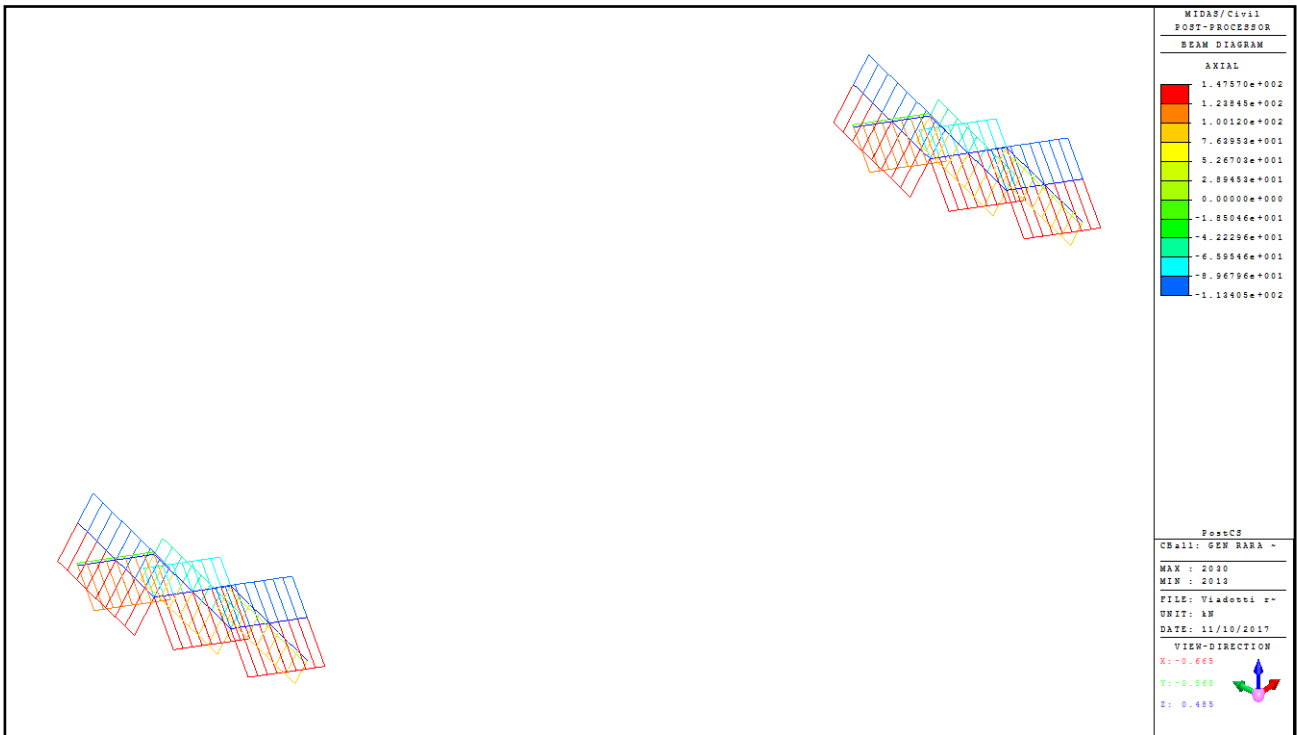
Categoria (verificata) di connessione bullonata a taglio (EN1993-1-8:2005 § 3.4):

Categoria C: connessioni ad attrito allo S.L.U.

## 12.6 DIAFRAMMI SU PILE – DIAGONALI



DIAGONALI TRASVERSI SU PILE – SFORZO ASSIALE – INVILUPPO SLU



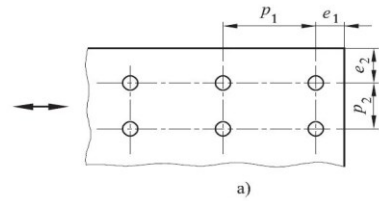
DIAGONALI TRASVERSI SU PILE – SFORZO ASSIALE – INVILUPPO SLE

**VERIFICA CONNESSIONE BULLONATA A TAGLIO: TRASVERSI SU PILA - DIAGONALI (2 L 80x8)**

Coefficienti di sicurezza per la verifica delle unioni (NTC 2008; Tab. 4.2.XII):  
 Resistenza dei bulloni e delle sezioni tese (indebolite dai fori)  
 Resistenza a scorrimento allo SLU  
 Resistenza a scorrimento allo SLE  
 Precarico dei bulloni ad alta resistenza (classe 8.8 o 10.9)

$\gamma_{M2} = 1.25$   
 $\gamma_{M3} = 1.25$   
 $\gamma_{M3} = 1.10$   
 $\gamma_{M7} = 1.10$

Dati geometrici bulloni: Diametro nominale:  $d = 24$  mm  
 Tipo fori: accoppiamento **normale**  
 Area nominale gambo non filettato:  $A = 452$  mm<sup>2</sup>  
 Area resistente gambo filettato:  $A_{res} = 353$  mm<sup>2</sup>  
 Classe bulloni: **10.9**  
 $f_{yb} = 900.00$  N/mm<sup>2</sup>  
 $f_{tb} = 1000.00$  N/mm<sup>2</sup>



Resistenza a taglio: il piano di taglio interessa la parte: **filettata**  
 resistenza allo SLU (per piano di taglio):  $F_{v,Rd} = 141.00$  kN  
 Resistenza a scorrimento: coefficiente di attrito:  $\mu = 0.30$  (tutte le superfici)  
 (solo classi 8.8 o 10.9) tipo di serraggio: **controllato**  
 forza di precarico:  $F_{p,Cd} = 246.75$  kN  
 resistenza allo SLU (per piano di scorrimento):  $F_{s,Rd} = 59.22$  kN  
 resistenza allo SLE (per piano di scorrimento):  $F_{s,Rd,es} = 67.30$  kN

Dati profili e lamiere: Spessore nominale dell'elemento  
 $t \leq 40$  mm       $40$  mm  $< t \leq 80$  mm  
 $f_{yk}$        $f_{tk}$        $f_{yk}$        $f_{tk}$   
 [N/mm<sup>2</sup>]      [N/mm<sup>2</sup>]      [N/mm<sup>2</sup>]      [N/mm<sup>2</sup>]

Qualità acciaio profilati: **S 355 W**      355      510      335      490  
 Qualità acciaio lamiera / coprigiunti: **S 355 W**      355      510      335      490

UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica  
 UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica

Dati geometrici bulloni: Numero file di bulloni: **1**  
 Numero bulloni: **2**  
 Numero superfici di taglio: **2**  
 Interassi:  $p_1 = 60$  mm  
 (per fila singola porre:  $p_2 = 0$ )       $p_2 = 0$  mm  
 Limiti massimi e minimi  
 Min.      Max.  
 56.1      112 mm  
 0      0 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici profilati: Numero profilati: **2**  
 Spessore flangia bullonata: **8** mm  
 Area sezione singolo profilato: **1230** mm<sup>2</sup>  
 Distanze bulloni dal bordo:  $e_1 = 40$  mm  
 $e_2 = 40$  mm  
 Limiti massimi e minimi  
 Min.      Max.  
 30.6      125 mm  
 30.6      125 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici lamiera / coprigiunti: Numero lamiera: **1**  
 Spessore: **20** mm  
 Distanze bulloni dal bordo:  $e_1 = 40$  mm  
 $e_2 = 40$  mm  
 Limiti massimi e minimi  
 Min.      Max.  
 30.6      160 mm  
 30.6      160 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Sollecitazioni di progetto (trazione > 0): S.L.U.  $N_{Ed} = 189.80$  kN  
 S.L.E.  $N_{Ed,es} = 145.70$  kN

S.L.U. Verifica di resistenza a taglio bullone, singola superficie:  $F_{v,Ed} = 47.45$  kN  
 Verifica:  $\frac{F_{v,Ed}}{F_{v,Rd}} = \frac{47.45}{141.00} = 0.337 \leq 1$ : Verificato

S.L.U. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed} = 47.45$  kN  
 Verifica:  $\frac{F_{v,Ed}}{F_{s,Rd}} = \frac{47.45}{59.22} = 0.801 \leq 1$ : Verificato

S.L.E. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed,es} = 36.43$  kN  
 Verifica:  $\frac{F_{v,Ed,es}}{F_{s,Rd,es}} = \frac{36.43}{67.30} = 0.541 \leq 1$ : Verificato

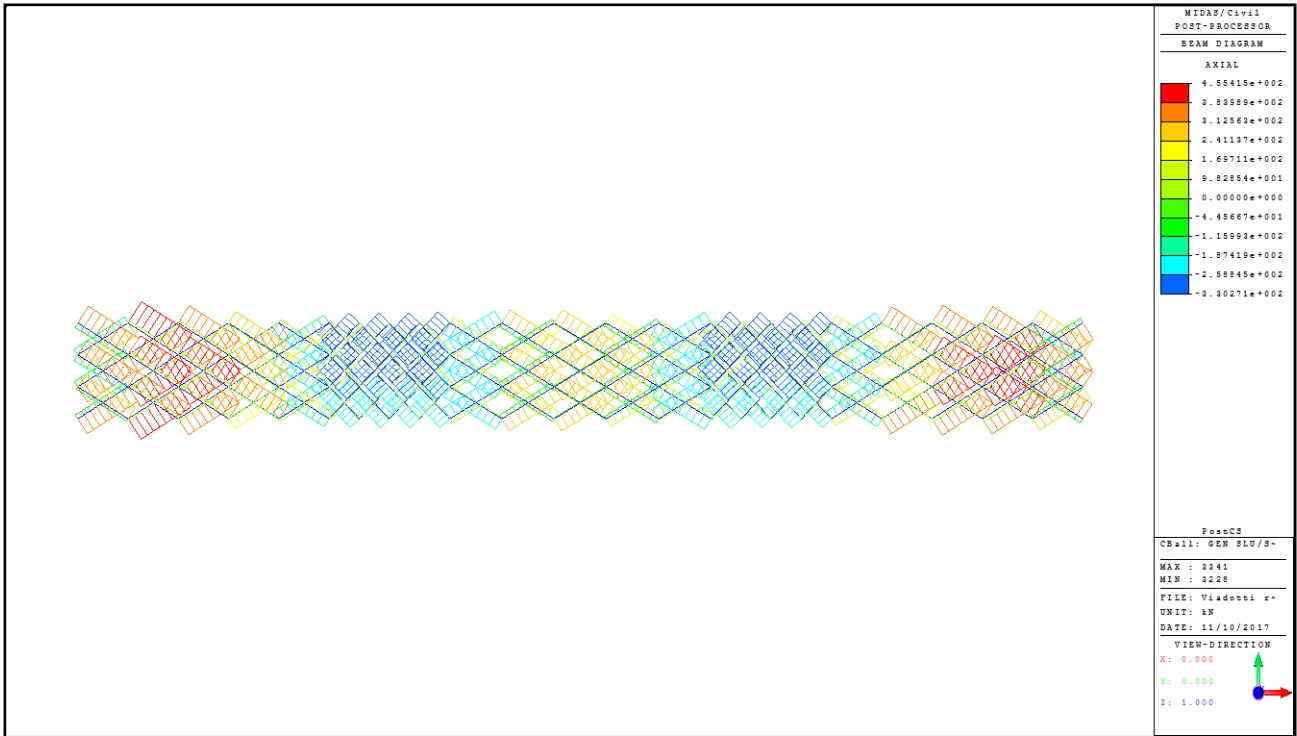
S.L.U. Verifica al rifollamento profilato:  $F_{b,Ed} = 47.45$  kN  
 coefficienti:  $k_1 = 2.500$   
 $\alpha_b = 0.523$   
 Resistenza al rifollamento:  $F_{b,Rd} = 102.4$  kN  
 Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{47.45}{102.4} = 0.463 \leq 1$ : Verificato

S.L.U. Verifica al rifollamento lamiera:  $F_{b,Ed} = 94.90$  kN  
 coefficienti:  $k_1 = 2.500$   
 $\alpha_b = 0.523$   
 Resistenza al rifollamento:  $F_{b,Rd} = 256.0$  kN  
 Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{94.90}{256.0} = 0.371 \leq 1$ : Verificato

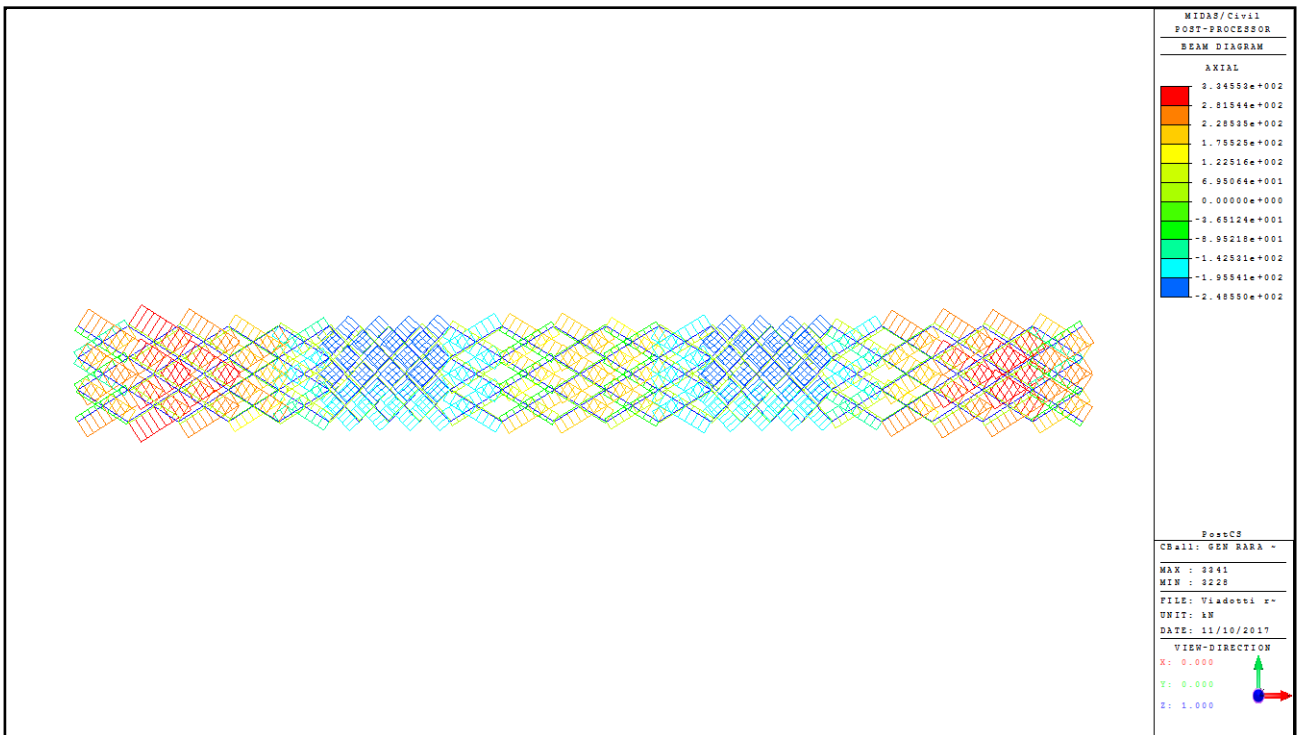
S.L.U. Verifica a trazione del profilato indebolito dai fori: Area netta:  $A_{net} = 2052$  mm<sup>2</sup>  
 Resistenza della sezione netta:  $N_{u,Rd} = 753.49$  kN  
 Verifica:  $\frac{N_{Ed}}{N_{u,Rd}} = \frac{189.80}{753.49} = 0.252 \leq 1$ : Verificato

Categoria (verificata) di connessione bullonata a taglio (EN1993-1-8:2005 § 3.4): **Categoria C: connessioni ad attrito allo S.L.U.**

## 12.7 CONTROVENTI



CONTROVENTI – SFORZO ASSIALE – INVILUPPO SLU



CONTROVENTI – SFORZO ASSIALE – INVILUPPO SLE

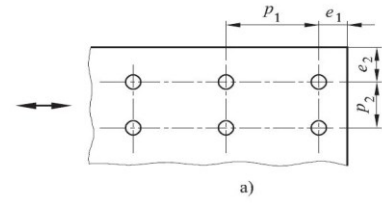
**VERIFICA CONNESSIONE BULLONATA A TAGLIO: CONTROVENTI (2 L 80x10)**

Coefficienti di sicurezza per la verifica delle unioni (NTC 2008; Tab. 4.2.XII):  
 Resistenza dei bulloni e delle sezioni tese (indebolite dai fori)  
 Resistenza a scorrimento allo SLU  
 Resistenza a scorrimento allo SLE  
 Precarico dei bulloni ad alta resistenza (classe 8.8 o 10.9)

$\gamma_{M2} = 1.25$   
 $\gamma_{M3} = 1.25$   
 $\gamma_{M3} = 1.10$   
 $\gamma_{M7} = 1.10$

Dati geometrici bulloni: Diametro nominale:  $d = 27$  mm  
 Tipo fori: accoppiamento **normale**  
 Area nominale gambo non filettato:  $A = 573$  mm<sup>2</sup>  
 Area resistente gambo filettato:  $A_{res} = 459$  mm<sup>2</sup>  
 Classe bulloni: **10.9**

$f_{yb} = 900.00$  N/mm<sup>2</sup>  
 $f_{tb} = 1000.00$  N/mm<sup>2</sup>



Resistenza a taglio: il piano di taglio interessa la parte:  
 resistenza allo SLU (per piano di taglio):  $F_{v,Rd} = 183.76$  kN  
 Resistenza a scorrimento: coefficiente di attrito:  $\mu = 0.30$  (tutte le superfici)  
 (solo classi 8.8 o 10.9) tipo di serraggio: **controllato**  
 forza di precarico:  $F_{p,Cd} = 321.58$  kN  
 resistenza allo SLU (per piano di scorrimento):  $F_{s,Rd} = 77.18$  kN  
 resistenza allo SLE (per piano di scorrimento):  $F_{s,Rd,es} = 87.70$  kN

Dati profili e lamiere: Spessore nominale dell'elemento  
 $t \leq 40$  mm       $40$  mm  $< t \leq 80$  mm  
 $f_{yk}$  [N/mm<sup>2</sup>]       $f_{tk}$  [N/mm<sup>2</sup>]       $f_{yk}$  [N/mm<sup>2</sup>]       $f_{tk}$  [N/mm<sup>2</sup>]

Qualità acciaio profilati: **S 355 W**      355      510      335      490  
 Qualità acciaio lamiera / coprigiunti: **S 355 W**      355      510      335      490

UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica  
 UNI EN 10025-5: acciai per impieghi strutturali con resistenza migliorata alla corrosione atmosferica

Dati geometrici bulloni: Numero file di bulloni: **1**  
 Numero bulloni: **3**  
 Numero superfici di taglio: **2**  
 Interassi:  $p_1 = 70$  mm  
 (per fila singola porre:  $p_2 = 0$ )       $p_2 = 0$  mm

Limiti massimi e minimi  
 Min.      Max.  
 62.7      140 mm  
 0      0 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici profilati: Numero profilati: **2**  
 Spessore flangia bullonata: **10** mm  
 Area sezione singolo profilato: **1510** mm<sup>2</sup>  
 Distanze bulloni dal bordo:  $e_1 = 40$  mm  
 $e_2 = 40$  mm

Limiti massimi e minimi  
 Min.      Max.  
 34.2      125 mm  
 34.2      125 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Dati geometrici lamiere / coprigiunti: Numero lamiera: **1**  
 Spessore: **15** mm  
 Distanze bulloni dal bordo:  $e_1 = 40$  mm  
 $e_2 = 40$  mm

Limiti massimi e minimi  
 Min.      Max.  
 34.2      125 mm  
 34.2      125 mm

Entro limiti: Verificato  
 Entro limiti: Verificato

Sollecitazioni di progetto (trazione > 0): S.L.U.  $N_{Ed} = 455.40$  kN  
 S.L.E.  $N_{Ed,es} = 334.60$  kN

S.L.U. Verifica di resistenza a taglio bullone, singola superficie:  $F_{v,Ed} = 75.90$  kN

Verifica:  $\frac{F_{v,Ed}}{F_{v,Rd}} = \frac{75.90}{183.76} = 0.413 \leq 1$ : Verificato

S.L.U. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed} = 75.90$  kN

Verifica:  $\frac{F_{v,Ed}}{F_{s,Rd}} = \frac{75.90}{77.18} = 0.983 \leq 1$ : Verificato

S.L.E. Verifica di resistenza a scorrimento bullone, singola superficie:  $F_{v,Ed,es} = 55.77$  kN

Verifica:  $\frac{F_{v,Ed,es}}{F_{s,Rd,es}} = \frac{55.77}{87.70} = 0.636 \leq 1$ : Verificato

S.L.U. Verifica al rifollamento profilato:  $F_{b,Ed} = 75.90$  kN  
 coefficienti:  $k_1 = 2.230$   
 $\alpha_b = 0.468$   
 Resistenza al rifollamento:  $F_{b,Rd} = 114.9$  kN

Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{75.90}{114.92} = 0.660 \leq 1$ : Verificato

S.L.U. Verifica al rifollamento lamiera:  $F_{b,Ed} = 151.80$  kN  
 coefficienti:  $k_1 = 2.230$   
 $\alpha_b = 0.468$   
 Resistenza al rifollamento:  $F_{b,Rd} = 172.4$  kN

Verifica:  $\frac{F_{b,Ed}}{F_{b,Rd}} = \frac{151.80}{172.38} = 0.881 \leq 1$ : Verificato

S.L.U. Verifica a trazione del profilato indebolito dai fori: Area netta:  $A_{net} = 2450$  mm<sup>2</sup>  
 Resistenza della sezione netta:  $N_{u,Rd} = 899.64$  kN

Verifica:  $\frac{N_{Ed}}{N_{u,Rd}} = \frac{455.40}{899.64} = 0.506 \leq 1$ : Verificato

Categoria (verificata) di connessione bullonata a taglio (EN1993-1-8:2005 § 3.4):

Categoria C: connessioni ad attrito allo S.L.U.

## 13 VERIFICA DEGLI ISOLATORI SISMICI

Si effettuano le verifiche allo stato limite ultimo degli isolatori elastomerici effettuate secondo EN 1337-3 per le fasi statiche e secondo OPCM 3274 (allegato 10.A) per le fasi sismiche.

### VIADOTTO SU ROTATORIA

#### VERIFICA APPOGGI ELASTOMERICI ARMATI

##### Dati di progetto:

|                                                                   | SPALLE        | PILE          |
|-------------------------------------------------------------------|---------------|---------------|
| Deformazione massima sismica di progetto SLC ( $d/h \leq 2$ )     | Dsp= 152.0 mm | Dsp= 156.0 mm |
| Deformazione massima statica di progetto SLU/SLD ( $d/h \leq 1$ ) | Dp= 76.0 mm   | Dp= 78.0 mm   |

##### Risultati da modello di calcolo

|                                                  | SPALLE                  | PILE                    |
|--------------------------------------------------|-------------------------|-------------------------|
| Carico verticale massimo statico SLU             | V(max)= -2122.0 kN      | V(max)= -4553.7 kN      |
| Carico verticale minimo statico SLU              | V(min)= -423.1 kN       | V(min)= -1691.1 kN      |
| Carico orizzontale massimo statico SLU           | H(max)= 54.0 kN         | H(max)= 117.3 kN        |
| Rotazione massima statica SLU                    | R (max)= 2.110E-02 rad  | R (max)= 5.111E-03 rad  |
| Carico verticale massimo sismico SLC             | Vs(max)= -533.3 kN      | Vs(max)= -1960.2 kN     |
| Carico verticale minimo sismico SLC              | Vs(min)= -312.5 kN      | Vs(min)= -1174.3 kN     |
| Carico orizzontale massimo sismico SLC           | Hs(max)= 97.9 kN        | Hs(max)= 209.2 kN       |
| Rotazione massima sismica SLC                    | Rs (max)= 1.192E-02 rad | Rs (max)= 2.230E-03 rad |
| Carico verticale massimo statico SLE (caratt.)   | Ve(max)= -1561.3 kN     | V(max)= -3359.0 kN      |
| Carico verticale minimo statico SLE (caratt.)    | Ve(min)= -288.3 kN      | V(min)= -1179.8 kN      |
| Carico orizzontale massimo statico SLE (caratt.) | He(max)= 39.7 kN        | H(max)= 79.9 kN         |
| Rotazione massima statica SLE (caratt.)          | Re(max)= 1.337E-02 rad  | R (max)= 3.872E-03 rad  |

##### Caratteristiche di progetto isolatore

|                                                                                 | SPALLE                           | PILE                             |
|---------------------------------------------------------------------------------|----------------------------------|----------------------------------|
| Tensione caratteristica di snervamento lamiera ( $\geq 235$ N/mm <sup>2</sup> ) | fyk= 275 N/mm <sup>2</sup>       | fyk= 275 N/mm <sup>2</sup>       |
| Modulo di elasticità volumetrica elastomero                                     | Eb= 2000 N/mm <sup>2</sup>       | Eb= 2000 N/mm <sup>2</sup>       |
| Modulo di elasticità tangenziale dinamico elastomero ( $\nu = D/te = 1$ )       | Gdin= 1.4 N/mm <sup>2</sup>      | Gdin= 1.4 N/mm <sup>2</sup>      |
| Spostamento massimo di progetto tra le due facce dell'isolatore allo SLC        | de= 152 mm                       | de= 156 mm                       |
| Diametro elastomero                                                             | Dg= 300 mm                       | Dg= 450 mm                       |
| Numero di strati di elastomero                                                  | ng= 19                           | ng= 13                           |
| Spessore singolo strato di elastomero ( $5 \text{ mm} < tg < 25 \text{ mm}$ )   | tg= 4 mm                         | tg= 6 mm                         |
| Spessore singola lamiera di acciaio interna ( $\geq 2$ mm)                      | ts= 2 mm                         | ts= 3 mm                         |
| Spessore lamiera di acciaio esterna ( $\geq 20$ mm)                             | tse= 20 mm                       | tse= 20 mm                       |
| Lato piastra di ancoraggio                                                      | Z= 350 mm                        | Z= 500 mm                        |
| Spessore piastra di ancoraggio                                                  | ta= 25 mm                        | ta= 25 mm                        |
| Ricoprimento laterale lamiera di acciaio ( $> 4$ mm)                            | rs= 10 mm                        | rs= 10 mm                        |
| Diametro lamiera di acciaio interne ( $Dg-D' > 2x4 = 8$ mm)                     | D'= 280 mm                       | D'= 430 mm                       |
| Spessore totale elastomero                                                      | te= 76 mm                        | te= 78 mm                        |
| Spessore complessivo isolatore (escluse piastre ancoraggio)                     | h= 152 mm                        | h= 154 mm                        |
| Spessore complessivo isolatore (incluse piastre ancoraggio)                     | H= 202 mm                        | H= 204 mm                        |
| Tensione di trazione massima ( $\min(1; 2 \cdot Gdin)$ )                        | Sigma_t= -1.00 N/mm <sup>2</sup> | Sigma_t= -1.00 N/mm <sup>2</sup> |
| Fattore di forma primario                                                       | S1= 17.50                        | S1= 17.92                        |
| Modulo di compressibilità assiale                                               | Fi(de)= 2.0790 rad               | Fi(de)= 2.4336 rad               |
|                                                                                 | Ec= 947.51 N/mm <sup>2</sup>     | Ec= 963.83 N/mm <sup>2</sup>     |
| Rigidezza orizzontale equivalente ( $\nu = D/te = 1$ )                          | Ke= 1302 N/mm                    | Ke= 2855 N/mm                    |
| Rigidezza verticale                                                             | Kv= 767676 N/mm                  | Kv= 1794462 N/mm                 |

**Verifiche statiche secondo EN 1337-3:2005**

|                                                    |                          |                           |
|----------------------------------------------------|--------------------------|---------------------------|
| Carico verticale massimo statico SLU               | V(max)= 2122030 N        | V(max)= 4553710 N         |
| Carico orizzontale massimo statico SLU             | H(max)= 53998 N          | H(max)= 117296 N          |
| Carico orizzontale statico a $\gamma = D/te = 1$ : | H( $\gamma=1$ )= 98960 N | H( $\gamma=1$ )= 222660 N |
| Spostamento statico totale                         | D= 36.59 mm              | D= 35.93 mm               |
| Rotazione massima statica SLU                      | R (max)= 2.110E-02 rad   | R (max)= 5.111E-03 rad    |
|                                                    | Fi(de)= 2.8971 rad       | Fi(de)= 2.9817 rad        |
| Area ridotta efficace dell'isolatore               | Ar= 52037 mmq            | Ar= 130474 mmq            |

|                                                                |                       |                       |
|----------------------------------------------------------------|-----------------------|-----------------------|
| 1. Deformazione di taglio massima<br>dovuta alla compressione: | Gamma_c= 2.4967       | Gamma_c= 2.0871       |
| dovuta allo spostamento statico tot (< 1)                      | Gamma_s= 0.4814       | Gamma_s= 0.4606       |
| dovuta alle rotazioni                                          | Gamma_alfa= 2.3428    | Gamma_alfa= 0.8292    |
| totale: (< 7)                                                  | Gamma_t= 5.3209       | Gamma_t= 3.3770       |
| 2. Spessore minimo lamiera di acciaio ( $\geq 2$ mm)           | ts(min)= 2.00 mm      | ts(min)= 2.00 mm      |
| 3. Rotazione limite:                                           |                       |                       |
| spostamento verticale massimo:                                 | Dz= 2.531 mm          | Dz= 2.311 mm          |
| spostamento dovuto alla rotazione massima                      | D_alfa= 1.970 mm      | D_alfa= 0.733 mm      |
| Verifica: (Dz - D_alfa) > 0                                    | Dz - D_alfa= 0.562 mm | Dz - D_alfa= 1.579 mm |
| 4. Verifica di instabilità: Pmax < Plim                        |                       |                       |
| pressione limite                                               | Plim= 60.175 N/mmq    | Plim= 92.187 N/mmq    |
| pressione massima: (< Plim)                                    | Pmax= 40.779 N/mmq    | Pmax= 34.901 N/mmq    |

**Pressione sulle sottostrutture**

|                                               |                     |                     |
|-----------------------------------------------|---------------------|---------------------|
| Diametro efficace di ripartizione a 60° (< Z) | De= 350 mm          | De= 500 mm          |
| Pressione massima SLU/SLC                     | P'max= 22.056 N/mmq | P'max= 23.192 N/mmq |
| Pressione minima SLU/SLC                      | P'min= 3.248 N/mmq  | P'min= 5.981 N/mmq  |

**Verifiche sismiche secondo OPCM 3274 e s.m. (Allegato 10.A)**

|                                                    |                          |                           |
|----------------------------------------------------|--------------------------|---------------------------|
| Sforzo normale massimo sull'isolatore allo SLC     | V= 533250 N              | V= 1960210 N              |
| Carico orizzontale massimo sismico SLC             | Hs(max)= 97904 N         | Hs(max)= 209220 N         |
| Carico orizzontale sismico a $\gamma = D/te = 1$ : | H( $\gamma=1$ )= 98960 N | H( $\gamma=1$ )= 222660 N |
| Spostamento sismico totale                         | Ds= 75.06 mm (< Dsp)     | Ds= 72.66 mm (< Dsp)      |
| Rotazione massima sismica SLC                      | Rs (max)= 1.192E-02 rad  | Rs (max)= 2.230E-03 rad   |
|                                                    | Fi(de)= 2.63585 rad      | Fi(de)= 2.81726 rad       |
| Area ridotta efficace dell'isolatore               | Ar= 42167 mmq            | Ar= 115497 mmq            |

|                                                                      |                       |                       |
|----------------------------------------------------------------------|-----------------------|-----------------------|
| Deformazioni di taglio dell'elastomero:<br>dovuta alla compressione: | Gamma_c= 0.7742       | Gamma_c= 1.0149       |
| dovuta allo spostamento sismico totale                               | Gamma_s= 0.9876       | Gamma_s= 0.9315       |
| dovuta alle rotazioni                                                | Gamma_alfa= 1.3233    | Gamma_alfa= 0.3618    |
| Deformazione di taglio totale di progetto dell'elastomero:           | Gamma_t= 3.0852       | Gamma_t= 2.3082       |
| Carico assiale critico                                               | Vcr= 4078023 N        | Vcr= 16713691 N       |
| 1. Tensione degli inserti in acciaio                                 |                       |                       |
| Tensione massimal amiere (<235 N/mmq)                                | Sigma_s= 65.759 N/mmq | Sigma_s= 88.254 N/mmq |
| 2. Deformazioni di taglio massime (< 7)                              | Gamma_s= 0.9876       | Gamma_s= 0.9315       |
|                                                                      | Gamma_t= 3.0852       | Gamma_t= 2.3082       |
| 3. Instabilità dell'isolatore (Vcr/2.5)                              | Vmax= 1631209 N       | Vmax= 6685476 N       |

Seguono i tabulati contenenti le reazioni massime e minime per ogni appoggio.

**REAZIONI APPOGGI (ISOLATORI SISMICI ELASTOMERICI)**

**STATI LIMITE ULTIMI - STATICI**

| Tipo isolatore | Struttura Appoggio | No. | Load                    | Node | Axial (kN) | Shear-y (kN) | Shear-z (kN) | Shear-tot (kN) | Kh eq. (kN/mm) | Deform. (mm) | Rotazione (rad) |
|----------------|--------------------|-----|-------------------------|------|------------|--------------|--------------|----------------|----------------|--------------|-----------------|
| 1              | Spalla 1           | 185 | GEN SLU Mobili(max)     | 77   | -456.30    | -24.05       | 6.41         | 24.89          | 1.302          | 19.11        | 2.04E-02        |
| 1              | Spalla 1           | 185 | GEN SLU Vento(max)      | 77   | -474.83    | -45.24       | 6.30         | 45.68          | 1.302          | 35.08        | 1.85E-02        |
| 1              | Spalla 1           | 185 | GEN SLU Termico(max)    | 77   | -511.28    | 2.44         | 39.78        | 39.85          | 1.302          | 30.61        | 1.86E-02        |
| 1              | Spalla 1           | 185 | GEN SLU Termico(max)    | 77   | -457.09    | -25.85       | 11.97        | 28.49          | 1.302          | 21.88        | 1.87E-02        |
| 1              | Spalla 1           | 185 | GEN SLU Mobili(min)     | 77   | -1292.83   | -33.34       | -22.53       | 40.24          | 1.302          | 30.90        | 1.42E-02        |
| 1              | Spalla 1           | 185 | GEN SLU Vento(min)      | 77   | -1009.42   | -50.66       | -18.69       | 54.00          | 1.302          | 41.47        | 1.42E-02        |
| 1              | Spalla 1           | 185 | GEN SLU Frenamento(min) | 77   | -1045.86   | -2.98        | 14.78        | 15.08          | 1.302          | 11.58        | 1.42E-02        |
| 1              | Spalla 1           | 185 | GEN SLU Termico(min)    | 77   | -1058.99   | -31.89       | -24.66       | 40.31          | 1.302          | 30.96        | 1.40E-02        |
| 1              | Spalla 1           | 186 | GEN SLU Mobili(max)     | 79   | -468.04    | -24.18       | 5.80         | 24.87          | 1.302          | 19.10        | 1.99E-02        |
| 1              | Spalla 1           | 186 | GEN SLU Vento(max)      | 79   | -463.52    | -45.44       | 6.18         | 45.86          | 1.302          | 35.22        | 1.81E-02        |
| 1              | Spalla 1           | 186 | GEN SLU Frenamento(max) | 79   | -451.14    | 2.39         | 39.92        | 39.99          | 1.302          | 30.71        | 1.82E-02        |
| 1              | Spalla 1           | 186 | GEN SLU Termico(max)    | 79   | -423.06    | -26.26       | 12.07        | 28.90          | 1.302          | 22.20        | 1.84E-02        |



|   |          |     |                               |    |          |         |        |        |       |       |          |
|---|----------|-----|-------------------------------|----|----------|---------|--------|--------|-------|-------|----------|
| 1 | Spalla 1 | 186 | GEN SLU Mobili(min)           | 79 | -1785.40 | -32.90  | -21.41 | 39.25  | 1.302 | 30.15 | 1.44E-02 |
| 1 | Spalla 1 | 186 | GEN SLU Vento(min)<br>GEN SLU | 79 | -1395.28 | -50.18  | -18.18 | 53.37  | 1.302 | 40.99 | 1.41E-02 |
| 1 | Spalla 1 | 186 | Frenamento(min)               | 79 | -1382.90 | -2.34   | 15.55  | 15.73  | 1.302 | 12.08 | 1.42E-02 |
| 1 | Spalla 1 | 186 | GEN SLU Termico(min)          | 79 | -1429.11 | -31.10  | -24.16 | 39.38  | 1.302 | 30.24 | 1.39E-02 |
| 1 | Spalla 1 | 187 | GEN SLU Mobili(max)           | 81 | -487.64  | -23.93  | 5.50   | 24.55  | 1.302 | 18.86 | 1.99E-02 |
| 1 | Spalla 1 | 187 | GEN SLU Vento(max)<br>GEN SLU | 81 | -479.26  | -45.19  | 5.96   | 45.58  | 1.302 | 35.01 | 1.82E-02 |
| 1 | Spalla 1 | 187 | Frenamento(max)               | 81 | -473.45  | 2.66    | 39.91  | 40.00  | 1.302 | 30.72 | 1.82E-02 |
| 1 | Spalla 1 | 187 | GEN SLU Termico(max)          | 81 | -441.43  | -26.00  | 11.93  | 28.61  | 1.302 | 21.97 | 1.84E-02 |
| 1 | Spalla 1 | 187 | GEN SLU Mobili(min)           | 81 | -2122.03 | -33.35  | -21.52 | 39.69  | 1.302 | 30.48 | 1.44E-02 |
| 1 | Spalla 1 | 187 | GEN SLU Vento(min)<br>GEN SLU | 81 | -1637.72 | -50.48  | -18.43 | 53.74  | 1.302 | 41.27 | 1.42E-02 |
| 1 | Spalla 1 | 187 | Frenamento(min)               | 81 | -1631.91 | -2.63   | 15.52  | 15.74  | 1.302 | 12.09 | 1.42E-02 |
| 1 | Spalla 1 | 187 | GEN SLU Termico(min)          | 81 | -1674.17 | -31.39  | -24.32 | 39.71  | 1.302 | 30.50 | 1.40E-02 |
| 1 | Spalla 1 | 188 | GEN SLU Mobili(max)           | 83 | -440.04  | -23.38  | 5.92   | 24.12  | 1.302 | 18.52 | 2.11E-02 |
| 1 | Spalla 1 | 188 | GEN SLU Vento(max)<br>GEN SLU | 83 | -475.64  | -44.49  | 5.69   | 44.85  | 1.302 | 34.45 | 1.90E-02 |
| 1 | Spalla 1 | 188 | Frenamento(max)               | 83 | -442.30  | 3.28    | 39.86  | 39.99  | 1.302 | 30.72 | 1.89E-02 |
| 1 | Spalla 1 | 188 | GEN SLU Termico(max)          | 83 | -429.99  | -25.08  | 11.64  | 27.65  | 1.302 | 21.23 | 1.92E-02 |
| 1 | Spalla 1 | 188 | GEN SLU Mobili(min)           | 83 | -1715.48 | -32.61  | -23.55 | 40.22  | 1.302 | 30.89 | 1.43E-02 |
| 1 | Spalla 1 | 188 | GEN SLU Vento(min)<br>GEN SLU | 83 | -1346.47 | -49.92  | -19.80 | 53.70  | 1.302 | 41.24 | 1.42E-02 |
| 1 | Spalla 1 | 188 | Frenamento(min)               | 83 | -1313.13 | -2.16   | 14.36  | 14.52  | 1.302 | 11.15 | 1.41E-02 |
| 1 | Spalla 1 | 188 | GEN SLU Termico(min)          | 83 | -1368.13 | -31.13  | -25.49 | 40.23  | 1.302 | 30.90 | 1.40E-02 |
| 1 | Spalla 2 | 190 | GEN SLU Mobili(max)           | 78 | -456.28  | -24.05  | 22.53  | 32.95  | 1.302 | 25.31 | 1.43E-02 |
| 1 | Spalla 2 | 190 | GEN SLU Vento(max)<br>GEN SLU | 78 | -474.80  | -45.23  | 18.69  | 48.94  | 1.302 | 37.58 | 1.42E-02 |
| 1 | Spalla 2 | 190 | Frenamento(max)               | 78 | -517.98  | 2.45    | 52.90  | 52.96  | 1.302 | 40.67 | 1.42E-02 |
| 1 | Spalla 2 | 190 | GEN SLU Termico(max)          | 78 | -457.07  | -25.85  | 24.65  | 35.72  | 1.302 | 27.43 | 1.40E-02 |
| 1 | Spalla 2 | 190 | GEN SLU Mobili(min)           | 78 | -1292.75 | -33.34  | -6.41  | 33.95  | 1.302 | 26.07 | 2.04E-02 |
| 1 | Spalla 2 | 190 | GEN SLU Vento(min)<br>GEN SLU | 78 | -1009.36 | -50.66  | -6.30  | 51.05  | 1.302 | 39.21 | 1.84E-02 |
| 1 | Spalla 2 | 190 | Frenamento(min)               | 78 | -1052.54 | -2.97   | 27.90  | 28.06  | 1.302 | 21.55 | 1.85E-02 |
| 1 | Spalla 2 | 190 | GEN SLU Termico(min)          | 78 | -1058.95 | -31.89  | -11.97 | 34.06  | 1.302 | 26.16 | 1.87E-02 |
| 1 | Spalla 2 | 191 | GEN SLU Mobili(max)           | 80 | -468.12  | -24.18  | 21.41  | 32.30  | 1.302 | 24.80 | 1.44E-02 |
| 1 | Spalla 2 | 191 | GEN SLU Vento(max)<br>GEN SLU | 80 | -463.57  | -45.44  | 18.18  | 48.94  | 1.302 | 37.59 | 1.42E-02 |
| 1 | Spalla 2 | 191 | Frenamento(max)               | 80 | -459.38  | 2.39    | 52.13  | 52.18  | 1.302 | 40.08 | 1.42E-02 |
| 1 | Spalla 2 | 191 | GEN SLU Termico(max)          | 80 | -423.11  | -26.26  | 24.16  | 35.68  | 1.302 | 27.40 | 1.39E-02 |
| 1 | Spalla 2 | 191 | GEN SLU Mobili(min)           | 80 | -1785.11 | -32.90  | -5.80  | 33.41  | 1.302 | 25.66 | 1.99E-02 |
| 1 | Spalla 2 | 191 | GEN SLU Vento(min)<br>GEN SLU | 80 | -1395.10 | -50.18  | -6.18  | 50.56  | 1.302 | 38.83 | 1.81E-02 |
| 1 | Spalla 2 | 191 | Frenamento(min)               | 80 | -1390.91 | -2.34   | 27.77  | 27.87  | 1.302 | 21.40 | 1.81E-02 |
| 1 | Spalla 2 | 191 | GEN SLU Termico(min)          | 80 | -1428.93 | -31.09  | -12.07 | 33.35  | 1.302 | 25.61 | 1.84E-02 |
| 1 | Spalla 2 | 192 | GEN SLU Mobili(max)           | 82 | -487.64  | -23.93  | 21.52  | 32.18  | 1.302 | 24.72 | 1.44E-02 |
| 1 | Spalla 2 | 192 | GEN SLU Vento(max)<br>GEN SLU | 82 | -479.32  | -45.19  | 18.43  | 48.80  | 1.302 | 37.48 | 1.42E-02 |
| 1 | Spalla 2 | 192 | Frenamento(max)               | 82 | -481.69  | 2.66    | 52.16  | 52.23  | 1.302 | 40.11 | 1.41E-02 |
| 1 | Spalla 2 | 192 | GEN SLU Termico(max)          | 82 | -441.49  | -26.00  | 24.32  | 35.60  | 1.302 | 27.34 | 1.39E-02 |
| 1 | Spalla 2 | 192 | GEN SLU Mobili(min)           | 82 | -2121.61 | -33.35  | -5.50  | 33.80  | 1.302 | 25.96 | 2.00E-02 |
| 1 | Spalla 2 | 192 | GEN SLU Vento(min)<br>GEN SLU | 82 | -1637.46 | -50.48  | -5.96  | 50.83  | 1.302 | 39.04 | 1.82E-02 |
| 1 | Spalla 2 | 192 | Frenamento(min)               | 82 | -1639.83 | -2.63   | 27.78  | 27.90  | 1.302 | 21.43 | 1.82E-02 |
| 1 | Spalla 2 | 192 | GEN SLU Termico(min)          | 82 | -1673.91 | -31.39  | -11.93 | 33.58  | 1.302 | 25.79 | 1.84E-02 |
| 1 | Spalla 2 | 193 | GEN SLU Mobili(max)           | 84 | -440.16  | -23.38  | 23.55  | 33.18  | 1.302 | 25.49 | 1.43E-02 |
| 1 | Spalla 2 | 193 | GEN SLU Vento(max)<br>GEN SLU | 84 | -475.75  | -44.49  | 19.81  | 48.70  | 1.302 | 37.40 | 1.42E-02 |
| 1 | Spalla 2 | 193 | Frenamento(max)               | 84 | -449.07  | 3.27    | 53.32  | 53.42  | 1.302 | 41.03 | 1.41E-02 |
| 1 | Spalla 2 | 193 | GEN SLU Termico(max)          | 84 | -430.08  | -25.08  | 25.49  | 35.76  | 1.302 | 27.46 | 1.40E-02 |
| 1 | Spalla 2 | 193 | GEN SLU Mobili(min)           | 84 | -1715.34 | -32.61  | -5.92  | 33.14  | 1.302 | 25.45 | 2.11E-02 |
| 1 | Spalla 2 | 193 | GEN SLU Vento(min)<br>GEN SLU | 84 | -1346.42 | -49.92  | -5.69  | 50.24  | 1.302 | 38.59 | 1.90E-02 |
| 1 | Spalla 2 | 193 | Frenamento(min)               | 84 | -1319.74 | -2.17   | 27.82  | 27.90  | 1.302 | 21.43 | 1.89E-02 |
| 1 | Spalla 2 | 193 | GEN SLU Termico(min)          | 84 | -1368.06 | -31.13  | -11.64 | 33.24  | 1.302 | 25.52 | 1.92E-02 |
| 2 | Pila 1   | 195 | GEN SLU Mobili(max)           | 21 | -1718.23 | -55.69  | 30.60  | 63.54  | 2.855 | 22.26 | 5.17E-04 |
| 2 | Pila 1   | 195 | GEN SLU Vento(max)<br>GEN SLU | 21 | -1766.43 | -100.68 | 28.92  | 104.75 | 2.855 | 36.70 | 9.78E-04 |
| 2 | Pila 1   | 195 | Frenamento(max)               | 21 | -1888.44 | 6.27    | 101.80 | 101.99 | 2.855 | 35.73 | 9.99E-04 |
| 2 | Pila 1   | 195 | GEN SLU Termico(max)          | 21 | -1691.11 | -56.67  | 33.76  | 65.96  | 2.855 | 23.11 | 9.27E-04 |
| 2 | Pila 1   | 195 | GEN SLU Mobili(min)           | 21 | -3587.84 | -68.23  | -5.78  | 68.47  | 2.855 | 23.99 | 4.80E-03 |
| 2 | Pila 1   | 195 | GEN SLU Vento(min)<br>GEN SLU | 21 | -2898.29 | -109.13 | -1.96  | 109.15 | 2.855 | 38.24 | 4.27E-03 |
| 2 | Pila 1   | 195 | Frenamento(min)               | 21 | -3020.30 | -2.18   | 70.92  | 70.95  | 2.855 | 24.86 | 4.26E-03 |
| 2 | Pila 1   | 195 | GEN SLU Termico(min)          | 21 | -3071.76 | -67.58  | -7.04  | 67.95  | 2.855 | 23.80 | 4.37E-03 |
| 2 | Pila 1   | 196 | GEN SLU Mobili(max)           | 23 | -2173.57 | -59.23  | 29.65  | 66.24  | 2.855 | 23.20 | 7.02E-04 |
| 2 | Pila 1   | 196 | GEN SLU Vento(max)<br>GEN SLU | 23 | -2170.37 | -103.89 | 28.04  | 107.61 | 2.855 | 37.70 | 1.04E-03 |
| 2 | Pila 1   | 196 | Frenamento(max)               | 23 | -2177.34 | 3.24    | 101.13 | 101.18 | 2.855 | 35.44 | 1.08E-03 |
| 2 | Pila 1   | 196 | GEN SLU Termico(max)          | 23 | -2049.09 | -60.69  | 32.95  | 69.06  | 2.855 | 24.19 | 9.84E-04 |
| 2 | Pila 1   | 196 | GEN SLU Mobili(min)           | 23 | -4303.38 | -68.44  | -4.55  | 68.59  | 2.855 | 24.03 | 4.62E-03 |

|   |        |     |                               |     |          |         |        |        |       |       |          |
|---|--------|-----|-------------------------------|-----|----------|---------|--------|--------|-------|-------|----------|
| 2 | Pila 1 | 196 | GEN SLU Vento(min)<br>GEN SLU | 23  | -3532.15 | -109.37 | -1.29  | 109.38 | 2.855 | 38.32 | 4.10E-03 |
| 2 | Pila 1 | 196 | Frenamento(min)               | 23  | -3539.12 | -2.24   | 71.80  | 71.83  | 2.855 | 25.16 | 4.11E-03 |
| 2 | Pila 1 | 196 | GEN SLU Termico(min)          | 23  | -3659.83 | -66.86  | -6.29  | 67.16  | 2.855 | 23.53 | 4.18E-03 |
| 2 | Pila 1 | 197 | GEN SLU Mobili(max)           | 885 | -2164.40 | -60.19  | 29.84  | 67.18  | 2.855 | 23.53 | 8.10E-04 |
| 2 | Pila 1 | 197 | GEN SLU Vento(max)<br>GEN SLU | 885 | -2172.74 | -104.69 | 28.09  | 108.39 | 2.855 | 37.97 | 1.03E-03 |
| 2 | Pila 1 | 197 | Frenamento(max)               | 885 | -2150.88 | 2.47    | 101.38 | 101.41 | 2.855 | 35.52 | 1.10E-03 |
| 2 | Pila 1 | 197 | GEN SLU Termico(max)          | 885 | -2039.93 | -61.48  | 33.09  | 69.82  | 2.855 | 24.46 | 1.01E-03 |
| 2 | Pila 1 | 197 | GEN SLU Mobili(min)           | 885 | -4553.71 | -69.99  | -5.17  | 70.18  | 2.855 | 24.58 | 4.71E-03 |
| 2 | Pila 1 | 197 | GEN SLU Vento(min)<br>GEN SLU | 885 | -3724.47 | -110.74 | -1.87  | 110.76 | 2.855 | 38.80 | 4.16E-03 |
| 2 | Pila 1 | 197 | Frenamento(min)               | 885 | -3702.61 | -3.58   | 71.42  | 71.51  | 2.855 | 25.05 | 4.18E-03 |
| 2 | Pila 1 | 197 | GEN SLU Termico(min)          | 885 | -3840.61 | -68.22  | -6.79  | 68.56  | 2.855 | 24.02 | 4.24E-03 |
| 2 | Pila 1 | 198 | GEN SLU Mobili(max)           | 27  | -1775.81 | -60.53  | 31.36  | 68.17  | 2.855 | 23.88 | 9.96E-04 |
| 2 | Pila 1 | 198 | GEN SLU Vento(max)<br>GEN SLU | 27  | -1907.99 | -105.00 | 29.25  | 109.00 | 2.855 | 38.18 | 1.06E-03 |
| 2 | Pila 1 | 198 | Frenamento(max)               | 27  | -1797.65 | 2.00    | 102.73 | 102.75 | 2.855 | 35.99 | 1.17E-03 |
| 2 | Pila 1 | 198 | GEN SLU Termico(max)          | 27  | -1739.74 | -60.97  | 34.33  | 69.97  | 2.855 | 24.51 | 1.20E-03 |
| 2 | Pila 1 | 198 | GEN SLU Mobili(min)           | 27  | -4076.12 | -73.31  | -7.74  | 73.72  | 2.855 | 25.82 | 5.02E-03 |
| 2 | Pila 1 | 198 | GEN SLU Vento(min)<br>GEN SLU | 27  | -3338.08 | -113.59 | -3.74  | 113.65 | 2.855 | 39.81 | 4.41E-03 |
| 2 | Pila 1 | 198 | Frenamento(min)               | 27  | -3227.74 | -6.59   | 69.74  | 70.05  | 2.855 | 24.54 | 4.43E-03 |
| 2 | Pila 1 | 198 | GEN SLU Termico(min)          | 27  | -3418.62 | -72.02  | -8.58  | 72.53  | 2.855 | 25.41 | 4.50E-03 |
| 2 | Pila 2 | 200 | GEN SLU Mobili(max)           | 22  | -1718.21 | -55.69  | 5.78   | 55.99  | 2.855 | 19.61 | 4.70E-03 |
| 2 | Pila 2 | 200 | GEN SLU Vento(max)<br>GEN SLU | 22  | -1766.39 | -100.68 | 1.96   | 100.70 | 2.855 | 35.28 | 4.17E-03 |
| 2 | Pila 2 | 200 | Frenamento(max)               | 22  | -1889.79 | 6.27    | 75.44  | 75.70  | 2.855 | 26.52 | 4.15E-03 |
| 2 | Pila 2 | 200 | GEN SLU Termico(max)          | 22  | -1691.09 | -56.67  | 7.04   | 57.11  | 2.855 | 20.00 | 4.25E-03 |
| 2 | Pila 2 | 200 | GEN SLU Mobili(min)           | 22  | -3587.83 | -68.23  | -30.60 | 74.78  | 2.855 | 26.20 | 1.08E-03 |
| 2 | Pila 2 | 200 | GEN SLU Vento(min)<br>GEN SLU | 22  | -2898.25 | -109.13 | -28.92 | 112.90 | 2.855 | 39.55 | 1.32E-03 |
| 2 | Pila 2 | 200 | Frenamento(min)               | 22  | -3021.65 | -2.18   | 44.56  | 44.61  | 2.855 | 15.63 | 1.21E-03 |
| 2 | Pila 2 | 200 | GEN SLU Termico(min)          | 22  | -3071.75 | -67.58  | -33.76 | 75.54  | 2.855 | 26.46 | 1.37E-03 |
| 2 | Pila 2 | 201 | GEN SLU Mobili(max)           | 24  | -2173.56 | -59.23  | 4.55   | 59.40  | 2.855 | 20.81 | 4.61E-03 |
| 2 | Pila 2 | 201 | GEN SLU Vento(max)<br>GEN SLU | 24  | -2170.35 | -103.89 | 1.29   | 103.90 | 2.855 | 36.40 | 4.09E-03 |
| 2 | Pila 2 | 201 | Frenamento(max)               | 24  | -2179.40 | 3.25    | 74.58  | 74.65  | 2.855 | 26.15 | 4.07E-03 |
| 2 | Pila 2 | 201 | GEN SLU Termico(max)          | 24  | -2049.08 | -60.69  | 6.29   | 61.02  | 2.855 | 21.37 | 4.17E-03 |
| 2 | Pila 2 | 201 | GEN SLU Mobili(min)           | 24  | -4303.36 | -68.44  | -29.65 | 74.59  | 2.855 | 26.13 | 7.71E-04 |
| 2 | Pila 2 | 201 | GEN SLU Vento(min)<br>GEN SLU | 24  | -3532.12 | -109.37 | -28.04 | 112.91 | 2.855 | 39.55 | 1.10E-03 |
| 2 | Pila 2 | 201 | Frenamento(min)               | 24  | -3541.18 | -2.24   | 45.25  | 45.31  | 2.855 | 15.87 | 1.04E-03 |
| 2 | Pila 2 | 201 | GEN SLU Termico(min)          | 24  | -3659.80 | -66.86  | -32.95 | 74.54  | 2.855 | 26.11 | 1.04E-03 |
| 2 | Pila 2 | 202 | GEN SLU Mobili(max)           | 886 | -2164.41 | -60.19  | 5.17   | 60.41  | 2.855 | 21.16 | 4.72E-03 |
| 2 | Pila 2 | 202 | GEN SLU Vento(max)<br>GEN SLU | 886 | -2127.75 | -104.69 | 1.87   | 104.71 | 2.855 | 36.68 | 4.16E-03 |
| 2 | Pila 2 | 202 | Frenamento(max)               | 886 | -2152.94 | 2.47    | 74.96  | 75.00  | 2.855 | 26.27 | 4.16E-03 |
| 2 | Pila 2 | 202 | GEN SLU Termico(max)          | 886 | -2039.93 | -61.48  | 6.79   | 61.85  | 2.855 | 21.67 | 4.25E-03 |
| 2 | Pila 2 | 202 | GEN SLU Mobili(min)           | 886 | -4553.70 | -69.99  | -29.84 | 76.09  | 2.855 | 26.65 | 7.22E-04 |
| 2 | Pila 2 | 202 | GEN SLU Vento(min)<br>GEN SLU | 886 | -3724.46 | -110.74 | -28.09 | 114.25 | 2.855 | 40.02 | 1.03E-03 |
| 2 | Pila 2 | 202 | Frenamento(min)               | 886 | -3704.66 | -3.58   | 45.00  | 45.14  | 2.855 | 15.81 | 9.74E-04 |
| 2 | Pila 2 | 202 | GEN SLU Termico(min)          | 886 | -3840.60 | -68.22  | -33.09 | 75.82  | 2.855 | 26.56 | 9.66E-04 |
| 2 | Pila 2 | 203 | GEN SLU Mobili(max)           | 28  | -1775.84 | -60.53  | 7.74   | 61.02  | 2.855 | 21.38 | 5.11E-03 |
| 2 | Pila 2 | 203 | GEN SLU Vento(max)<br>GEN SLU | 28  | -1908.05 | -105.00 | 3.74   | 105.07 | 2.855 | 36.81 | 4.47E-03 |
| 2 | Pila 2 | 203 | Frenamento(max)               | 28  | -1799.01 | 2.00    | 76.63  | 76.66  | 2.855 | 26.85 | 4.48E-03 |
| 2 | Pila 2 | 203 | GEN SLU Termico(max)          | 28  | -1739.77 | -60.97  | 8.58   | 61.57  | 2.855 | 21.57 | 4.59E-03 |
| 2 | Pila 2 | 203 | GEN SLU Mobili(min)           | 28  | -4076.15 | -73.31  | -31.36 | 79.74  | 2.855 | 27.93 | 3.15E-04 |
| 2 | Pila 2 | 203 | GEN SLU Vento(min)<br>GEN SLU | 28  | -3338.13 | -113.59 | -29.25 | 117.30 | 2.855 | 41.09 | 7.66E-04 |
| 2 | Pila 2 | 203 | Frenamento(min)               | 28  | -3229.08 | -6.59   | 43.64  | 44.13  | 2.855 | 15.46 | 7.22E-04 |
| 2 | Pila 2 | 203 | GEN SLU Termico(min)          | 28  | -3418.64 | -72.02  | -34.33 | 79.78  | 2.855 | 27.95 | 7.56E-04 |

|                        |        | Axial<br>(kN) | Shear-y<br>(kN) | Shear-z<br>(kN) | Shear-<br>tot<br>(kN) | Kh eq.<br>(kN/mm) | Deform.<br>(mm) | Rotazione<br>(rad) |
|------------------------|--------|---------------|-----------------|-----------------|-----------------------|-------------------|-----------------|--------------------|
| <b>SFORZI MASSIMI:</b> | Spalle | -423.06       | 3.28            | 53.32           | 54.00                 | 1.302             | 41.47           | 2.11E-02           |
|                        | Pile   | -1691.09      | 6.27            | 102.73          | 117.30                | 2.855             | 41.09           | 5.11E-03           |
| <b>SFORZI MINIMI:</b>  | Spalle | -2122.03      | -50.66          | -25.49          |                       |                   |                 |                    |
|                        | Pile   | -4553.71      | -113.59         | -34.33          |                       |                   |                 |                    |

STATI LIMITE ULTIMI - SISMICI (SLC)

| Tipo isolatore | Struttura Appoggio | No. | Load               | Node | Axial (kN) | Shear-y (kN) | Shear-z (kN) | Shear-tot (kN) | Kh eq. (kN/mm) | Deform. (mm) | Rotazione (rad) |
|----------------|--------------------|-----|--------------------|------|------------|--------------|--------------|----------------|----------------|--------------|-----------------|
| 1              | Spalla 1           | 185 | GEN SLC Long(max)  | 77   | -372.44    | 25.97        | 88.39        | 92.13          | 1.302          | 70.75        | 1.17E-02        |
| 1              | Spalla 1           | 185 | GEN SLC Trasv(max) | 77   | -347.36    | 83.02        | 29.31        | 88.04          | 1.302          | 67.62        | 1.18E-02        |
| 1              | Spalla 1           | 185 | GEN SLC Vert(max)  | 77   | -354.30    | 25.19        | 29.35        | 38.68          | 1.302          | 29.70        | 1.19E-02        |
| 1              | Spalla 1           | 185 | GEN SLC Long(min)  | 77   | -508.17    | -26.78       | -94.17       | 97.90          | 1.302          | 75.19        | 1.10E-02        |
| 1              | Spalla 1           | 185 | GEN SLC Trasv(min) | 77   | -533.25    | -83.82       | -35.09       | 90.87          | 1.302          | 69.79        | 1.10E-02        |
| 1              | Spalla 1           | 185 | GEN SLC Vert(min)  | 77   | -526.31    | -26.00       | -35.13       | 43.70          | 1.302          | 33.56        | 1.08E-02        |
| 1              | Spalla 1           | 186 | GEN SLC Long(max)  | 79   | -329.88    | 25.98        | 88.57        | 92.30          | 1.302          | 70.89        | 1.16E-02        |
| 1              | Spalla 1           | 186 | GEN SLC Trasv(max) | 79   | -334.24    | 83.12        | 29.28        | 88.13          | 1.302          | 67.68        | 1.16E-02        |
| 1              | Spalla 1           | 186 | GEN SLC Vert(max)  | 79   | -316.19    | 25.20        | 29.55        | 38.84          | 1.302          | 29.83        | 1.17E-02        |
| 1              | Spalla 1           | 186 | GEN SLC Long(min)  | 79   | -449.90    | -26.33       | -93.95       | 97.57          | 1.302          | 74.93        | 1.09E-02        |
| 1              | Spalla 1           | 186 | GEN SLC Trasv(min) | 79   | -445.54    | -83.47       | -34.65       | 90.38          | 1.302          | 69.41        | 1.09E-02        |
| 1              | Spalla 1           | 186 | GEN SLC Vert(min)  | 79   | -463.59    | -25.55       | -34.92       | 43.27          | 1.302          | 33.23        | 1.07E-02        |
| 1              | Spalla 1           | 187 | GEN SLC Long(max)  | 81   | -326.15    | 26.18        | 88.58        | 92.37          | 1.302          | 70.94        | 1.15E-02        |
| 1              | Spalla 1           | 187 | GEN SLC Trasv(max) | 81   | -330.32    | 83.31        | 29.32        | 88.32          | 1.302          | 67.83        | 1.15E-02        |
| 1              | Spalla 1           | 187 | GEN SLC Vert(max)  | 81   | -312.52    | 25.40        | 29.59        | 39.00          | 1.302          | 29.95        | 1.17E-02        |
| 1              | Spalla 1           | 187 | GEN SLC Long(min)  | 81   | -446.00    | -26.14       | -93.85       | 97.42          | 1.302          | 74.82        | 1.08E-02        |
| 1              | Spalla 1           | 187 | GEN SLC Trasv(min) | 81   | -441.82    | -83.28       | -34.59       | 90.18          | 1.302          | 69.26        | 1.08E-02        |
| 1              | Spalla 1           | 187 | GEN SLC Vert(min)  | 81   | -459.62    | -25.36       | -34.86       | 43.11          | 1.302          | 33.11        | 1.07E-02        |
| 1              | Spalla 1           | 188 | GEN SLC Long(max)  | 83   | -350.52    | 26.64        | 88.41        | 92.34          | 1.302          | 70.91        | 1.16E-02        |
| 1              | Spalla 1           | 188 | GEN SLC Trasv(max) | 83   | -325.79    | 83.67        | 29.42        | 88.69          | 1.302          | 68.11        | 1.17E-02        |
| 1              | Spalla 1           | 188 | GEN SLC Vert(max)  | 83   | -333.76    | 25.86        | 29.47        | 39.21          | 1.302          | 30.11        | 1.18E-02        |
| 1              | Spalla 1           | 188 | GEN SLC Long(min)  | 83   | -486.39    | -26.15       | -93.90       | 97.47          | 1.302          | 74.86        | 1.09E-02        |
| 1              | Spalla 1           | 188 | GEN SLC Trasv(min) | 83   | -511.11    | -83.18       | -34.90       | 90.20          | 1.302          | 69.28        | 1.09E-02        |
| 1              | Spalla 1           | 188 | GEN SLC Vert(min)  | 83   | -503.14    | -25.37       | -34.95       | 43.19          | 1.302          | 33.17        | 1.07E-02        |
| 1              | Spalla 2           | 190 | GEN SLC Long(max)  | 78   | -372.43    | 25.97        | 94.17        | 97.69          | 1.302          | 75.02        | 1.10E-02        |
| 1              | Spalla 2           | 190 | GEN SLC Trasv(max) | 78   | -347.39    | 83.02        | 35.09        | 90.13          | 1.302          | 69.22        | 1.10E-02        |
| 1              | Spalla 2           | 190 | GEN SLC Vert(max)  | 78   | -354.35    | 25.19        | 35.13        | 43.23          | 1.302          | 33.20        | 1.08E-02        |
| 1              | Spalla 2           | 190 | GEN SLC Long(min)  | 78   | -508.18    | -26.78       | -88.39       | 92.36          | 1.302          | 70.93        | 1.17E-02        |
| 1              | Spalla 2           | 190 | GEN SLC Trasv(min) | 78   | -533.22    | -83.82       | -29.31       | 88.80          | 1.302          | 68.19        | 1.18E-02        |
| 1              | Spalla 2           | 190 | GEN SLC Vert(min)  | 78   | -526.26    | -26.00       | -29.35       | 39.21          | 1.302          | 30.11        | 1.19E-02        |
| 1              | Spalla 2           | 191 | GEN SLC Long(max)  | 80   | -329.99    | 25.98        | 93.95        | 97.48          | 1.302          | 74.86        | 1.09E-02        |
| 1              | Spalla 2           | 191 | GEN SLC Trasv(max) | 80   | -334.44    | 83.12        | 34.65        | 90.05          | 1.302          | 69.16        | 1.09E-02        |
| 1              | Spalla 2           | 191 | GEN SLC Vert(max)  | 80   | -316.47    | 25.20        | 34.92        | 43.06          | 1.302          | 33.07        | 1.07E-02        |
| 1              | Spalla 2           | 191 | GEN SLC Long(min)  | 80   | -449.79    | -26.33       | -88.57       | 92.40          | 1.302          | 70.96        | 1.16E-02        |
| 1              | Spalla 2           | 191 | GEN SLC Trasv(min) | 80   | -445.34    | -83.47       | -29.28       | 88.46          | 1.302          | 67.93        | 1.16E-02        |
| 1              | Spalla 2           | 191 | GEN SLC Vert(min)  | 80   | -463.31    | -25.55       | -29.55       | 39.06          | 1.302          | 30.00        | 1.17E-02        |
| 1              | Spalla 2           | 192 | GEN SLC Long(max)  | 82   | -326.28    | 26.18        | 93.85        | 97.43          | 1.302          | 74.83        | 1.08E-02        |
| 1              | Spalla 2           | 192 | GEN SLC Trasv(max) | 82   | -330.59    | 83.31        | 34.59        | 90.21          | 1.302          | 69.28        | 1.08E-02        |
| 1              | Spalla 2           | 192 | GEN SLC Vert(max)  | 82   | -312.81    | 25.40        | 34.86        | 43.13          | 1.302          | 33.12        | 1.07E-02        |
| 1              | Spalla 2           | 192 | GEN SLC Long(min)  | 82   | -445.87    | -26.14       | -88.58       | 92.36          | 1.302          | 70.93        | 1.15E-02        |
| 1              | Spalla 2           | 192 | GEN SLC Trasv(min) | 82   | -441.55    | -83.28       | -29.32       | 88.29          | 1.302          | 67.81        | 1.15E-02        |
| 1              | Spalla 2           | 192 | GEN SLC Vert(min)  | 82   | -459.33    | -25.36       | -29.59       | 38.97          | 1.302          | 29.93        | 1.17E-02        |
| 1              | Spalla 2           | 193 | GEN SLC Long(max)  | 84   | -350.49    | 26.64        | 93.90        | 97.61          | 1.302          | 74.96        | 1.09E-02        |
| 1              | Spalla 2           | 193 | GEN SLC Trasv(max) | 84   | -325.79    | 83.67        | 34.90        | 90.66          | 1.302          | 69.62        | 1.08E-02        |
| 1              | Spalla 2           | 193 | GEN SLC Vert(max)  | 84   | -333.58    | 25.86        | 34.95        | 43.48          | 1.302          | 33.39        | 1.07E-02        |
| 1              | Spalla 2           | 193 | GEN SLC Long(min)  | 84   | -486.41    | -26.15       | -88.41       | 92.20          | 1.302          | 70.81        | 1.16E-02        |
| 1              | Spalla 2           | 193 | GEN SLC Trasv(min) | 84   | -511.12    | -83.18       | -29.42       | 88.23          | 1.302          | 67.76        | 1.17E-02        |
| 1              | Spalla 2           | 193 | GEN SLC Vert(min)  | 84   | -503.33    | -25.37       | -29.47       | 38.89          | 1.302          | 29.86        | 1.18E-02        |
| 2              | Pila 1             | 195 | GEN SLC Long(max)  | 21   | -1353.62   | 59.30        | 200.64       | 209.22         | 2.855          | 73.29        | 1.79E-03        |
| 2              | Pila 1             | 195 | GEN SLC Trasv(max) | 21   | -1235.71   | 188.12       | 72.55        | 201.62         | 2.855          | 70.63        | 1.86E-03        |
| 2              | Pila 1             | 195 | GEN SLC Vert(max)  | 21   | -1289.17   | 58.64        | 72.36        | 93.14          | 2.855          | 32.63        | 1.85E-03        |
| 2              | Pila 1             | 195 | GEN SLC Long(min)  | 21   | -1786.43   | -56.34       | -177.21      | 185.95         | 2.855          | 65.14        | 2.23E-03        |
| 2              | Pila 1             | 195 | GEN SLC Trasv(min) | 21   | -1904.34   | -185.15      | -49.12       | 191.55         | 2.855          | 67.10        | 2.22E-03        |
| 2              | Pila 1             | 195 | GEN SLC Vert(min)  | 21   | -1850.88   | -55.67       | -48.93       | 74.12          | 2.855          | 25.96        | 2.18E-03        |
| 2              | Pila 1             | 196 | GEN SLC Long(max)  | 23   | -1547.65   | 57.48        | 200.41       | 208.49         | 2.855          | 73.04        | 1.78E-03        |
| 2              | Pila 1             | 196 | GEN SLC Trasv(max) | 23   | -1537.02   | 186.51       | 72.12        | 199.97         | 2.855          | 70.05        | 1.85E-03        |
| 2              | Pila 1             | 196 | GEN SLC Vert(max)  | 23   | -1479.34   | 56.82        | 72.19        | 91.87          | 2.855          | 32.18        | 1.83E-03        |
| 2              | Pila 1             | 196 | GEN SLC Long(min)  | 23   | -1891.30   | -56.51       | -177.06      | 185.86         | 2.855          | 65.11        | 2.15E-03        |
| 2              | Pila 1             | 196 | GEN SLC Trasv(min) | 23   | -1901.93   | -185.54      | -48.78       | 191.85         | 2.855          | 67.21        | 2.10E-03        |
| 2              | Pila 1             | 196 | GEN SLC Vert(min)  | 23   | -1959.61   | -55.85       | -48.84       | 74.19          | 2.855          | 25.99        | 2.09E-03        |
| 2              | Pila 1             | 197 | GEN SLC Long(max)  | 885  | -1530.94   | 56.67        | 200.33       | 208.19         | 2.855          | 72.93        | 1.78E-03        |
| 2              | Pila 1             | 197 | GEN SLC Trasv(max) | 885  | -1520.45   | 185.69       | 72.11        | 199.20         | 2.855          | 69.78        | 1.86E-03        |
| 2              | Pila 1             | 197 | GEN SLC Vert(max)  | 885  | -1464.11   | 56.02        | 72.18        | 91.37          | 2.855          | 32.01        | 1.84E-03        |
| 2              | Pila 1             | 197 | GEN SLC Long(min)  | 885  | -1872.73   | -57.34       | -176.95      | 186.01         | 2.855          | 65.16        | 2.15E-03        |
| 2              | Pila 1             | 197 | GEN SLC Trasv(min) | 885  | -1883.22   | -186.37      | -48.73       | 192.64         | 2.855          | 67.48        | 2.09E-03        |
| 2              | Pila 1             | 197 | GEN SLC Vert(min)  | 885  | -1939.56   | -56.70       | -48.80       | 74.81          | 2.855          | 26.21        | 2.09E-03        |
| 2              | Pila 1             | 198 | GEN SLC Long(max)  | 27   | -1292.27   | 56.53        | 200.40       | 208.22         | 2.855          | 72.94        | 1.86E-03        |
| 2              | Pila 1             | 198 | GEN SLC Trasv(max) | 27   | -1174.42   | 185.34       | 72.51        | 199.02         | 2.855          | 69.72        | 1.96E-03        |
| 2              | Pila 1             | 198 | GEN SLC Vert(max)  | 27   | -1232.46   | 55.91        | 72.34        | 91.43          | 2.855          | 32.03        | 1.92E-03        |
| 2              | Pila 1             | 198 | GEN SLC Long(min)  | 27   | -1719.88   | -59.16       | -176.88      | 186.51         | 2.855          | 65.34        | 2.17E-03        |
| 2              | Pila 1             | 198 | GEN SLC Trasv(min) | 27   | -1837.73   | -187.98      | -48.99       | 194.26         | 2.855          | 68.05        | 2.13E-03        |
| 2              | Pila 1             | 198 | GEN SLC Vert(min)  | 27   | -1779.68   | -58.54       | -48.82       | 76.23          | 2.855          | 26.70        | 2.12E-03        |
| 2              | Pila 2             | 200 | GEN SLC Long(max)  | 22   | -1352.75   | 59.30        | 177.21       | 186.87         | 2.855          | 65.46        | 2.17E-03        |
| 2              | Pila 2             | 200 | GEN SLC Trasv(max) | 22   | -1235.07   | 188.12       | 49.12        | 194.43         | 2.855          | 68.11        | 2.13E-03        |

|   |        |     |                    |     |          |         |         |        |       |       |          |
|---|--------|-----|--------------------|-----|----------|---------|---------|--------|-------|-------|----------|
| 2 | Pila 2 | 200 | GEN SLC Vert(max)  | 22  | -1286.88 | 58.64   | 48.93   | 76.37  | 2.855 | 26.75 | 2.12E-03 |
| 2 | Pila 2 | 200 | GEN SLC Long(min)  | 22  | -1787.30 | -56.34  | -200.64 | 208.40 | 2.855 | 73.00 | 1.86E-03 |
| 2 | Pila 2 | 200 | GEN SLC Trasv(min) | 22  | -1904.98 | -185.15 | -72.55  | 198.86 | 2.855 | 69.66 | 1.96E-03 |
| 2 | Pila 2 | 200 | GEN SLC Vert(min)  | 22  | -1853.17 | -55.67  | -72.36  | 91.30  | 2.855 | 31.98 | 1.92E-03 |
| 2 | Pila 2 | 201 | GEN SLC Long(max)  | 24  | -1547.39 | 57.48   | 177.06  | 186.16 | 2.855 | 65.21 | 2.15E-03 |
| 2 | Pila 2 | 201 | GEN SLC Trasv(max) | 24  | -1536.95 | 186.51  | 48.78   | 192.78 | 2.855 | 67.53 | 2.09E-03 |
| 2 | Pila 2 | 201 | GEN SLC Vert(max)  | 24  | -1478.74 | 56.82   | 48.84   | 74.93  | 2.855 | 26.25 | 2.09E-03 |
| 2 | Pila 2 | 201 | GEN SLC Long(min)  | 24  | -1891.56 | -56.51  | -200.41 | 208.22 | 2.855 | 72.94 | 1.78E-03 |
| 2 | Pila 2 | 201 | GEN SLC Trasv(min) | 24  | -1902.00 | -185.54 | -72.12  | 199.06 | 2.855 | 69.73 | 1.86E-03 |
| 2 | Pila 2 | 201 | GEN SLC Vert(min)  | 24  | -1960.21 | -55.85  | -72.19  | 91.27  | 2.855 | 31.97 | 1.84E-03 |
| 2 | Pila 2 | 202 | GEN SLC Long(max)  | 886 | -1530.89 | 56.67   | 176.95  | 185.80 | 2.855 | 65.09 | 2.15E-03 |
| 2 | Pila 2 | 202 | GEN SLC Trasv(max) | 886 | -1520.28 | 185.69  | 48.73   | 191.98 | 2.855 | 67.25 | 2.10E-03 |
| 2 | Pila 2 | 202 | GEN SLC Vert(max)  | 886 | -1463.86 | 56.02   | 48.80   | 74.29  | 2.855 | 26.03 | 2.09E-03 |
| 2 | Pila 2 | 202 | GEN SLC Long(min)  | 886 | -1872.78 | -57.34  | -200.33 | 208.37 | 2.855 | 73.00 | 1.78E-03 |
| 2 | Pila 2 | 202 | GEN SLC Trasv(min) | 886 | -1883.39 | -186.37 | -72.11  | 199.83 | 2.855 | 70.00 | 1.85E-03 |
| 2 | Pila 2 | 202 | GEN SLC Vert(min)  | 886 | -1939.81 | -56.70  | -72.18  | 91.79  | 2.855 | 32.15 | 1.83E-03 |
| 2 | Pila 2 | 203 | GEN SLC Long(max)  | 28  | -1292.35 | 56.53   | 176.88  | 185.69 | 2.855 | 65.05 | 2.23E-03 |
| 2 | Pila 2 | 203 | GEN SLC Trasv(max) | 28  | -1174.27 | 185.34  | 48.99   | 191.71 | 2.855 | 67.16 | 2.22E-03 |
| 2 | Pila 2 | 203 | GEN SLC Vert(max)  | 28  | -1231.91 | 55.91   | 48.82   | 74.22  | 2.855 | 26.00 | 2.18E-03 |
| 2 | Pila 2 | 203 | GEN SLC Long(min)  | 28  | -1719.79 | -59.16  | -200.40 | 208.95 | 2.855 | 73.20 | 1.79E-03 |
| 2 | Pila 2 | 203 | GEN SLC Trasv(min) | 28  | -1837.87 | -187.98 | -72.51  | 201.48 | 2.855 | 70.58 | 1.86E-03 |
| 2 | Pila 2 | 203 | GEN SLC Vert(min)  | 28  | -1780.24 | -58.54  | -72.34  | 93.06  | 2.855 | 32.60 | 1.85E-03 |

|                        |        | Axial<br>(kN) | Shear-y<br>(kN) | Shear-z<br>(kN) | Shear-<br>tot<br>(kN) | Kh eq.<br>(kN/mm) | Deform.<br>(mm) | Rotazione<br>(rad) |
|------------------------|--------|---------------|-----------------|-----------------|-----------------------|-------------------|-----------------|--------------------|
| <b>SFORZI MASSIMI:</b> | Spalle | -312.52       | 83.67           | 94.17           | 97.90                 | 1.302             | 75.19           | 1.19E-02           |
|                        | Pile   | -1174.27      | 188.12          | 200.64          | 209.22                | 2.855             | 73.29           | 2.23E-03           |
| <b>SFORZI MINIMI:</b>  | Spalle | -533.25       | -83.82          | -94.17          |                       |                   |                 |                    |
|                        | Pile   | -1960.21      | -187.98         | -200.64         |                       |                   |                 |                    |

**STATI LIMITE ULTIMI - SISMICI (SLV)**

| Tipo isolatore | Struttura Appoggio | No. | Load               | Node | Axial<br>(kN) | Shear-y<br>(kN) | Shear-z<br>(kN) | Shear-<br>tot<br>(kN) | Kh eq.<br>(kN/mm) | Deform.<br>(mm) | Rotazione<br>(rad) |
|----------------|--------------------|-----|--------------------|------|---------------|-----------------|-----------------|-----------------------|-------------------|-----------------|--------------------|
| 1              | Spalla 1           | 185 | GEN SLV Long(max)  | 77   | -380.48       | 20.20           | 69.51           | 72.39                 | 1.302             | 55.59           | 1.17E-02           |
| 1              | Spalla 1           | 185 | GEN SLV Trasv(max) | 77   | -360.96       | 64.62           | 23.51           | 68.76                 | 1.302             | 52.81           | 1.17E-02           |
| 1              | Spalla 1           | 185 | GEN SLV Vert(max)  | 77   | -368.21       | 19.59           | 23.51           | 30.60                 | 1.302             | 23.50           | 1.18E-02           |
| 1              | Spalla 1           | 185 | GEN SLV Long(min)  | 77   | -500.12       | -21.01          | -75.29          | 78.17                 | 1.302             | 60.03           | 1.10E-02           |
| 1              | Spalla 1           | 185 | GEN SLV Trasv(min) | 77   | -519.65       | -65.42          | -29.29          | 71.68                 | 1.302             | 55.05           | 1.10E-02           |
| 1              | Spalla 1           | 185 | GEN SLV Vert(min)  | 77   | -512.40       | -20.39          | -29.29          | 35.69                 | 1.302             | 27.41           | 1.09E-02           |
| 1              | Spalla 1           | 186 | GEN SLV Long(max)  | 79   | -335.28       | 20.20           | 69.72           | 72.59                 | 1.302             | 55.75           | 1.15E-02           |
| 1              | Spalla 1           | 186 | GEN SLV Trasv(max) | 79   | -338.64       | 64.69           | 23.56           | 68.85                 | 1.302             | 52.87           | 1.15E-02           |
| 1              | Spalla 1           | 186 | GEN SLV Vert(max)  | 79   | -326.23       | 19.59           | 23.74           | 30.78                 | 1.302             | 23.64           | 1.16E-02           |
| 1              | Spalla 1           | 186 | GEN SLV Long(min)  | 79   | -444.50       | -20.55          | -75.10          | 77.86                 | 1.302             | 59.80           | 1.09E-02           |
| 1              | Spalla 1           | 186 | GEN SLV Trasv(min) | 79   | -441.14       | -65.04          | -28.93          | 71.18                 | 1.302             | 54.67           | 1.09E-02           |
| 1              | Spalla 1           | 186 | GEN SLV Vert(min)  | 79   | -453.55       | -19.93          | -29.11          | 35.28                 | 1.302             | 27.09           | 1.08E-02           |
| 1              | Spalla 1           | 187 | GEN SLV Long(max)  | 81   | -331.52       | 20.40           | 69.74           | 72.66                 | 1.302             | 55.80           | 1.15E-02           |
| 1              | Spalla 1           | 187 | GEN SLV Trasv(max) | 81   | -334.74       | 64.88           | 23.60           | 69.04                 | 1.302             | 53.02           | 1.15E-02           |
| 1              | Spalla 1           | 187 | GEN SLV Vert(max)  | 81   | -322.52       | 19.78           | 23.78           | 30.93                 | 1.302             | 23.75           | 1.16E-02           |
| 1              | Spalla 1           | 187 | GEN SLV Long(min)  | 81   | -440.63       | -20.36          | -75.02          | 77.73                 | 1.302             | 59.70           | 1.09E-02           |
| 1              | Spalla 1           | 187 | GEN SLV Trasv(min) | 81   | -437.41       | -64.84          | -28.87          | 70.98                 | 1.302             | 54.51           | 1.09E-02           |
| 1              | Spalla 1           | 187 | GEN SLV Vert(min)  | 81   | -449.63       | -19.75          | -29.05          | 35.13                 | 1.302             | 26.98           | 1.07E-02           |
| 1              | Spalla 1           | 188 | GEN SLV Long(max)  | 83   | -358.55       | 20.86           | 69.56           | 72.62                 | 1.302             | 55.77           | 1.16E-02           |
| 1              | Spalla 1           | 188 | GEN SLV Trasv(max) | 83   | -339.29       | 65.27           | 23.63           | 69.42                 | 1.302             | 53.31           | 1.16E-02           |
| 1              | Spalla 1           | 188 | GEN SLV Vert(max)  | 83   | -347.28       | 20.25           | 23.64           | 31.13                 | 1.302             | 23.91           | 1.17E-02           |
| 1              | Spalla 1           | 188 | GEN SLV Long(min)  | 83   | -478.36       | -20.37          | -75.04          | 77.76                 | 1.302             | 59.72           | 1.09E-02           |
| 1              | Spalla 1           | 188 | GEN SLV Trasv(min) | 83   | -497.61       | -64.78          | -29.11          | 71.02                 | 1.302             | 54.54           | 1.09E-02           |
| 1              | Spalla 1           | 188 | GEN SLV Vert(min)  | 83   | -489.63       | -19.76          | -29.12          | 35.19                 | 1.302             | 27.03           | 1.08E-02           |
| 1              | Spalla 2           | 190 | GEN SLV Long(max)  | 78   | -380.48       | 20.20           | 75.29           | 77.95                 | 1.302             | 59.87           | 1.10E-02           |
| 1              | Spalla 2           | 190 | GEN SLV Trasv(max) | 78   | -360.98       | 64.62           | 29.29           | 70.95                 | 1.302             | 54.49           | 1.10E-02           |
| 1              | Spalla 2           | 190 | GEN SLV Vert(max)  | 78   | -368.25       | 19.59           | 29.29           | 35.24                 | 1.302             | 27.06           | 1.09E-02           |
| 1              | Spalla 2           | 190 | GEN SLV Long(min)  | 78   | -500.13       | -21.01          | -69.51          | 72.62                 | 1.302             | 55.77           | 1.17E-02           |
| 1              | Spalla 2           | 190 | GEN SLV Trasv(min) | 78   | -519.63       | -65.42          | -23.51          | 69.52                 | 1.302             | 53.39           | 1.17E-02           |
| 1              | Spalla 2           | 190 | GEN SLV Vert(min)  | 78   | -512.36       | -20.39          | -23.51          | 31.12                 | 1.302             | 23.90           | 1.18E-02           |
| 1              | Spalla 2           | 191 | GEN SLV Long(max)  | 80   | -335.36       | 20.20           | 75.10           | 77.77                 | 1.302             | 59.73           | 1.09E-02           |
| 1              | Spalla 2           | 191 | GEN SLV Trasv(max) | 80   | -338.80       | 64.69           | 28.93           | 70.86                 | 1.302             | 54.42           | 1.09E-02           |
| 1              | Spalla 2           | 191 | GEN SLV Vert(max)  | 80   | -326.43       | 19.59           | 29.11           | 35.09                 | 1.302             | 26.95           | 1.08E-02           |
| 1              | Spalla 2           | 191 | GEN SLV Long(min)  | 80   | -444.42       | -20.55          | -69.72          | 72.69                 | 1.302             | 55.82           | 1.15E-02           |
| 1              | Spalla 2           | 191 | GEN SLV Trasv(min) | 80   | -440.98       | -65.04          | -23.56          | 69.18                 | 1.302             | 53.13           | 1.15E-02           |
| 1              | Spalla 2           | 191 | GEN SLV Vert(min)  | 80   | -453.35       | -19.93          | -23.74          | 31.00                 | 1.302             | 23.80           | 1.16E-02           |
| 1              | Spalla 2           | 192 | GEN SLV Long(max)  | 82   | -331.62       | 20.40           | 75.02           | 77.74                 | 1.302             | 59.71           | 1.09E-02           |
| 1              | Spalla 2           | 192 | GEN SLV Trasv(max) | 82   | -334.95       | 64.88           | 28.87           | 71.01                 | 1.302             | 54.54           | 1.09E-02           |
| 1              | Spalla 2           | 192 | GEN SLV Vert(max)  | 82   | -322.73       | 19.78           | 29.05           | 35.14                 | 1.302             | 26.99           | 1.07E-02           |
| 1              | Spalla 2           | 192 | GEN SLV Long(min)  | 82   | -440.53       | -20.36          | -69.74          | 72.65                 | 1.302             | 55.80           | 1.15E-02           |
| 1              | Spalla 2           | 192 | GEN SLV Trasv(min) | 82   | -437.20       | -64.84          | -23.60          | 69.00                 | 1.302             | 52.99           | 1.15E-02           |

|   |          |     |                    |     |          |         |         |        |       |       |          |
|---|----------|-----|--------------------|-----|----------|---------|---------|--------|-------|-------|----------|
| 1 | Spalla 2 | 192 | GEN SLV Vert(min)  | 82  | -449.42  | -19.75  | -23.78  | 30.91  | 1.302 | 23.74 | 1.16E-02 |
| 1 | Spalla 2 | 193 | GEN SLV Long(max)  | 84  | -358.53  | 20.86   | 75.04   | 77.89  | 1.302 | 59.81 | 1.09E-02 |
| 1 | Spalla 2 | 193 | GEN SLV Trasv(max) | 84  | -339.30  | 65.27   | 29.11   | 71.47  | 1.302 | 54.89 | 1.09E-02 |
| 1 | Spalla 2 | 193 | GEN SLV Vert(max)  | 84  | -347.15  | 20.25   | 29.12   | 35.47  | 1.302 | 27.24 | 1.08E-02 |
| 1 | Spalla 2 | 193 | GEN SLV Long(min)  | 84  | -478.37  | -20.37  | -69.56  | 72.48  | 1.302 | 55.66 | 1.16E-02 |
| 1 | Spalla 2 | 193 | GEN SLV Trasv(min) | 84  | -497.61  | -64.78  | -23.63  | 68.96  | 1.302 | 52.96 | 1.16E-02 |
| 1 | Spalla 2 | 193 | GEN SLV Vert(min)  | 84  | -489.76  | -19.76  | -23.64  | 30.81  | 1.302 | 23.66 | 1.17E-02 |
| 2 | Pila 1   | 195 | GEN SLV Long(max)  | 21  | -1375.00 | 46.79   | 159.95  | 166.65 | 2.855 | 58.38 | 1.82E-03 |
| 2 | Pila 1   | 195 | GEN SLV Trasv(max) | 21  | -1283.21 | 147.08  | 60.22   | 158.93 | 2.855 | 55.67 | 1.87E-03 |
| 2 | Pila 1   | 195 | GEN SLV Vert(max)  | 21  | -1330.03 | 46.26   | 60.06   | 75.81  | 2.855 | 26.56 | 1.86E-03 |
| 2 | Pila 1   | 195 | GEN SLV Long(min)  | 21  | -1765.05 | -43.82  | -136.52 | 143.38 | 2.855 | 50.23 | 2.20E-03 |
| 2 | Pila 1   | 195 | GEN SLV Trasv(min) | 21  | -1856.84 | -144.12 | -36.79  | 148.74 | 2.855 | 52.11 | 2.19E-03 |
| 2 | Pila 1   | 195 | GEN SLV Vert(min)  | 21  | -1810.02 | -43.30  | -36.63  | 56.72  | 2.855 | 19.87 | 2.16E-03 |
| 2 | Pila 1   | 196 | GEN SLV Long(max)  | 23  | -1559.29 | 44.94   | 159.76  | 165.96 | 2.855 | 58.14 | 1.80E-03 |
| 2 | Pila 1   | 196 | GEN SLV Trasv(max) | 23  | -1551.01 | 145.40  | 59.88   | 157.25 | 2.855 | 55.09 | 1.85E-03 |
| 2 | Pila 1   | 196 | GEN SLV Vert(max)  | 23  | -1511.57 | 44.42   | 59.91   | 74.58  | 2.855 | 26.13 | 1.85E-03 |
| 2 | Pila 1   | 196 | GEN SLV Long(min)  | 23  | -1879.67 | -43.97  | -136.41 | 143.32 | 2.855 | 50.21 | 2.13E-03 |
| 2 | Pila 1   | 196 | GEN SLV Trasv(min) | 23  | -1887.95 | -144.43 | -36.53  | 148.98 | 2.855 | 52.19 | 2.09E-03 |
| 2 | Pila 1   | 196 | GEN SLV Vert(min)  | 23  | -1927.38 | -43.45  | -36.57  | 56.79  | 2.855 | 19.89 | 2.08E-03 |
| 2 | Pila 1   | 197 | GEN SLV Long(max)  | 885 | -1542.32 | 44.12   | 159.70  | 165.68 | 2.855 | 58.04 | 1.81E-03 |
| 2 | Pila 1   | 197 | GEN SLV Trasv(max) | 885 | -1534.16 | 144.58  | 59.87   | 156.49 | 2.855 | 54.82 | 1.87E-03 |
| 2 | Pila 1   | 197 | GEN SLV Vert(max)  | 885 | -1495.64 | 43.62   | 59.91   | 74.11  | 2.855 | 25.96 | 1.85E-03 |
| 2 | Pila 1   | 197 | GEN SLV Long(min)  | 885 | -1861.34 | -44.80  | -136.32 | 143.49 | 2.855 | 50.27 | 2.12E-03 |
| 2 | Pila 1   | 197 | GEN SLV Trasv(min) | 885 | -1869.50 | -145.26 | -36.49  | 149.77 | 2.855 | 52.47 | 2.08E-03 |
| 2 | Pila 1   | 197 | GEN SLV Vert(min)  | 885 | -1908.02 | -44.29  | -36.53  | 57.41  | 2.855 | 20.11 | 2.08E-03 |
| 2 | Pila 1   | 198 | GEN SLV Long(max)  | 27  | -1312.93 | 44.00   | 159.78  | 165.73 | 2.855 | 58.06 | 1.88E-03 |
| 2 | Pila 1   | 198 | GEN SLV Trasv(max) | 27  | -1221.18 | 144.30  | 60.20   | 156.35 | 2.855 | 54.77 | 1.96E-03 |
| 2 | Pila 1   | 198 | GEN SLV Vert(max)  | 27  | -1271.19 | 43.51   | 60.05   | 74.16  | 2.855 | 25.98 | 1.93E-03 |
| 2 | Pila 1   | 198 | GEN SLV Long(min)  | 27  | -1699.22 | -46.64  | -136.26 | 144.02 | 2.855 | 50.45 | 2.15E-03 |
| 2 | Pila 1   | 198 | GEN SLV Trasv(min) | 27  | -1790.96 | -146.93 | -36.68  | 151.44 | 2.855 | 53.05 | 2.11E-03 |
| 2 | Pila 1   | 198 | GEN SLV Vert(min)  | 27  | -1740.95 | -46.15  | -36.53  | 58.86  | 2.855 | 20.62 | 2.10E-03 |
| 2 | Pila 2   | 200 | GEN SLV Long(max)  | 22  | -1374.36 | 46.79   | 136.52  | 144.32 | 2.855 | 50.56 | 2.15E-03 |
| 2 | Pila 2   | 200 | GEN SLV Trasv(max) | 22  | -1282.77 | 147.08  | 36.79   | 151.61 | 2.855 | 53.11 | 2.11E-03 |
| 2 | Pila 2   | 200 | GEN SLV Vert(max)  | 22  | -1328.41 | 46.26   | 36.63   | 59.01  | 2.855 | 20.67 | 2.10E-03 |
| 2 | Pila 2   | 200 | GEN SLV Long(min)  | 22  | -1765.69 | -43.82  | -159.95 | 165.84 | 2.855 | 58.10 | 1.88E-03 |
| 2 | Pila 2   | 200 | GEN SLV Trasv(min) | 22  | -1857.28 | -144.12 | -60.22  | 156.20 | 2.855 | 54.72 | 1.96E-03 |
| 2 | Pila 2   | 200 | GEN SLV Vert(min)  | 22  | -1811.64 | -43.30  | -60.06  | 74.04  | 2.855 | 25.94 | 1.93E-03 |
| 2 | Pila 2   | 201 | GEN SLV Long(max)  | 24  | -1559.09 | 44.94   | 136.41  | 143.62 | 2.855 | 50.31 | 2.12E-03 |
| 2 | Pila 2   | 201 | GEN SLV Trasv(max) | 24  | -1550.97 | 145.40  | 36.53   | 149.92 | 2.855 | 52.52 | 2.08E-03 |
| 2 | Pila 2   | 201 | GEN SLV Vert(max)  | 24  | -1511.15 | 44.43   | 36.57   | 57.54  | 2.855 | 20.16 | 2.08E-03 |
| 2 | Pila 2   | 201 | GEN SLV Long(min)  | 24  | -1879.86 | -43.97  | -159.76 | 165.70 | 2.855 | 58.05 | 1.80E-03 |
| 2 | Pila 2   | 201 | GEN SLV Trasv(min) | 24  | -1887.98 | -144.43 | -59.88  | 156.35 | 2.855 | 54.77 | 1.86E-03 |
| 2 | Pila 2   | 201 | GEN SLV Vert(min)  | 24  | -1927.80 | -43.45  | -59.91  | 74.01  | 2.855 | 25.93 | 1.85E-03 |
| 2 | Pila 2   | 202 | GEN SLV Long(max)  | 886 | -1542.29 | 44.12   | 136.32  | 143.28 | 2.855 | 50.19 | 2.13E-03 |
| 2 | Pila 2   | 202 | GEN SLV Trasv(max) | 886 | -1534.03 | 144.58  | 36.49   | 149.11 | 2.855 | 52.24 | 2.09E-03 |
| 2 | Pila 2   | 202 | GEN SLV Vert(max)  | 886 | -1495.46 | 43.62   | 36.53   | 56.90  | 2.855 | 19.93 | 2.08E-03 |
| 2 | Pila 2   | 202 | GEN SLV Long(min)  | 886 | -1861.37 | -44.80  | -159.70 | 165.86 | 2.855 | 58.10 | 1.80E-03 |
| 2 | Pila 2   | 202 | GEN SLV Trasv(min) | 886 | -1869.64 | -145.26 | -59.87  | 157.11 | 2.855 | 55.04 | 1.85E-03 |
| 2 | Pila 2   | 202 | GEN SLV Vert(min)  | 886 | -1908.20 | -44.29  | -59.91  | 74.50  | 2.855 | 26.10 | 1.85E-03 |
| 2 | Pila 2   | 203 | GEN SLV Long(max)  | 28  | -1313.01 | 44.00   | 136.26  | 143.19 | 2.855 | 50.16 | 2.20E-03 |
| 2 | Pila 2   | 203 | GEN SLV Trasv(max) | 28  | -1221.08 | 144.30  | 36.68   | 148.89 | 2.855 | 52.16 | 2.19E-03 |
| 2 | Pila 2   | 203 | GEN SLV Vert(max)  | 28  | -1270.81 | 43.51   | 36.53   | 56.81  | 2.855 | 19.90 | 2.16E-03 |
| 2 | Pila 2   | 203 | GEN SLV Long(min)  | 28  | -1699.13 | -46.64  | -159.78 | 166.45 | 2.855 | 58.31 | 1.82E-03 |
| 2 | Pila 2   | 203 | GEN SLV Trasv(min) | 28  | -1791.06 | -146.93 | -60.20  | 158.78 | 2.855 | 55.62 | 1.86E-03 |
| 2 | Pila 2   | 203 | GEN SLV Vert(min)  | 28  | -1741.34 | -46.15  | -60.05  | 75.74  | 2.855 | 26.53 | 1.86E-03 |

|                        |               | Axial (kN)      | Shear-y (kN)  | Shear-z (kN)  | Shear-tot (kN) | Kh eq. (kN/mm) | Deform. (mm) | Rotazione (rad) |
|------------------------|---------------|-----------------|---------------|---------------|----------------|----------------|--------------|-----------------|
| <b>SFORZI MASSIMI:</b> | <b>Spalle</b> | <b>-322.52</b>  | <b>65.27</b>  | <b>75.29</b>  | <b>78.17</b>   | <b>1.302</b>   | <b>60.03</b> | <b>1.18E-02</b> |
|                        | <b>Pila</b>   | <b>-1221.08</b> | <b>147.08</b> | <b>159.95</b> | <b>166.65</b>  | <b>2.855</b>   | <b>58.38</b> | <b>2.20E-03</b> |

|                       |               |                 |                |                |  |  |  |  |
|-----------------------|---------------|-----------------|----------------|----------------|--|--|--|--|
| <b>SFORZI MINIMI:</b> | <b>Spalle</b> | <b>-519.65</b>  | <b>-65.42</b>  | <b>-75.29</b>  |  |  |  |  |
|                       | <b>Pila</b>   | <b>-1927.80</b> | <b>-146.93</b> | <b>-159.95</b> |  |  |  |  |

**STATI LIMITE DI ESERCIZIO - COMBINAZIONI CARATTERISTICHE (RARE)**

| Tipo isolatore | Struttura Appoggio | No. | Load                  | Node | Axial (kN) | Shear-y (kN) | Shear-z (kN) | Shear-tot (kN) | Kh eq. (kN/mm) | Deform. (mm) | Rotazione (rad) |
|----------------|--------------------|-----|-----------------------|------|------------|--------------|--------------|----------------|----------------|--------------|-----------------|
| 1              | Spalla 1           | 185 | GEN RARA Mobili(max)  | 77   | -312.58    | -15.62       | 6.26         | 16.83          | 1.302          | 12.92        | 1.54E-02        |
| 1              | Spalla 1           | 185 | GEN RARA Vento(max)   | 77   | -327.49    | -29.89       | 6.17         | 30.52          | 1.302          | 23.44        | 1.39E-02        |
| 1              | Spalla 1           | 185 | GEN RARA Frenam(max)  | 77   | -351.54    | 1.89         | 30.99        | 31.05          | 1.302          | 23.84        | 1.40E-02        |
| 1              | Spalla 1           | 185 | GEN RARA Termico(max) | 77   | -310.05    | -16.92       | 10.92        | 20.14          | 1.302          | 15.47        | 1.41E-02        |

|   |          |     |                      |    |          |        |        |       |       |       |          |
|---|----------|-----|----------------------|----|----------|--------|--------|-------|-------|-------|----------|
| 1 | Spalla 1 | 185 | GEN RARA Mobili(min) | 77 | -941.59  | -22.58 | -16.80 | 28.14 | 1.302 | 21.61 | 1.07E-02 |
| 1 | Spalla 1 | 185 | GEN RARA Vento(min)  | 77 | -732.83  | -34.00 | -13.96 | 36.75 | 1.302 | 28.23 | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 185 | Frenam(min)          | 77 | -756.88  | -2.21  | 10.86  | 11.08 | 1.302 | 8.51  | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 185 | Termico(min)         | 77 | -771.49  | -21.54 | -18.91 | 28.66 | 1.302 | 22.01 | 1.05E-02 |
| 1 | Spalla 1 | 186 | GEN RARA Mobili(max) | 79 | -325.04  | -15.75 | 5.81   | 16.79 | 1.302 | 12.89 | 1.50E-02 |
| 1 | Spalla 1 | 186 | GEN RARA Vento(max)  | 79 | -321.44  | -30.08 | 6.09   | 30.69 | 1.302 | 23.57 | 1.37E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 186 | Frenam(max)          | 79 | -312.89  | 1.81   | 31.09  | 31.14 | 1.302 | 23.92 | 1.37E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 186 | Termico(max)         | 79 | -288.28  | -17.29 | 11.00  | 20.49 | 1.302 | 15.74 | 1.39E-02 |
| 1 | Spalla 1 | 186 | GEN RARA Mobili(min) | 79 | -1311.18 | -22.23 | -15.99 | 27.38 | 1.302 | 21.03 | 1.08E-02 |
| 1 | Spalla 1 | 186 | GEN RARA Vento(min)  | 79 | -1021.95 | -33.61 | -13.61 | 36.26 | 1.302 | 27.85 | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 186 | Frenam(min)          | 79 | -1013.40 | -1.72  | 11.39  | 11.52 | 1.302 | 8.85  | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 186 | Termico(min)         | 79 | -1050.70 | -20.89 | -18.58 | 27.96 | 1.302 | 21.47 | 1.05E-02 |
| 1 | Spalla 1 | 187 | GEN RARA Mobili(max) | 81 | -340.33  | -15.57 | 5.59   | 16.54 | 1.302 | 12.70 | 1.50E-02 |
| 1 | Spalla 1 | 187 | GEN RARA Vento(max)  | 81 | -334.08  | -29.91 | 5.93   | 30.49 | 1.302 | 23.42 | 1.37E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 187 | Frenam(max)          | 81 | -329.90  | 1.99   | 31.07  | 31.13 | 1.302 | 23.91 | 1.37E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 187 | Termico(max)         | 81 | -302.67  | -17.10 | 10.90  | 20.28 | 1.302 | 15.57 | 1.39E-02 |
| 1 | Spalla 1 | 187 | GEN RARA Mobili(min) | 81 | -1561.31 | -22.57 | -16.07 | 27.71 | 1.302 | 21.28 | 1.09E-02 |
| 1 | Spalla 1 | 187 | GEN RARA Vento(min)  | 81 | -1202.51 | -33.84 | -13.78 | 36.54 | 1.302 | 28.06 | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 187 | Frenam(min)          | 81 | -1198.34 | -1.94  | 11.36  | 11.52 | 1.302 | 8.85  | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 187 | Termico(min)         | 81 | -1233.01 | -21.12 | -18.69 | 28.20 | 1.302 | 21.66 | 1.05E-02 |
| 1 | Spalla 1 | 188 | GEN RARA Mobili(max) | 83 | -299.88  | -15.15 | 5.90   | 16.26 | 1.302 | 12.49 | 1.59E-02 |
| 1 | Spalla 1 | 188 | GEN RARA Vento(max)  | 83 | -325.37  | -29.37 | 5.74   | 29.93 | 1.302 | 22.98 | 1.43E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 188 | Frenam(max)          | 83 | -302.89  | 2.48   | 31.02  | 31.12 | 1.302 | 23.90 | 1.43E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 188 | Termico(max)         | 83 | -289.32  | -16.38 | 10.67  | 19.55 | 1.302 | 15.01 | 1.45E-02 |
| 1 | Spalla 1 | 188 | GEN RARA Mobili(min) | 83 | -1254.00 | -22.07 | -17.54 | 28.19 | 1.302 | 21.65 | 1.07E-02 |
| 1 | Spalla 1 | 188 | GEN RARA Vento(min)  | 83 | -979.77  | -33.48 | -14.76 | 36.59 | 1.302 | 28.10 | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 188 | Frenam(min)          | 83 | -957.29  | -1.63  | 10.52  | 10.65 | 1.302 | 8.18  | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 1 | 188 | Termico(min)         | 83 | -999.82  | -21.00 | -19.52 | 28.67 | 1.302 | 22.02 | 1.05E-02 |
| 1 | Spalla 2 | 190 | GEN RARA Mobili(max) | 78 | -312.57  | -15.61 | 16.80  | 22.93 | 1.302 | 17.61 | 1.07E-02 |
| 1 | Spalla 2 | 190 | GEN RARA Vento(max)  | 78 | -327.47  | -29.89 | 13.96  | 32.99 | 1.302 | 25.34 | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 190 | Frenam(max)          | 78 | -356.50  | 1.90   | 39.27  | 39.32 | 1.302 | 30.19 | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 190 | Termico(max)         | 78 | -310.04  | -16.92 | 18.91  | 25.37 | 1.302 | 19.49 | 1.05E-02 |
| 1 | Spalla 2 | 190 | GEN RARA Mobili(min) | 78 | -941.53  | -22.58 | -6.26  | 23.43 | 1.302 | 18.00 | 1.54E-02 |
| 1 | Spalla 2 | 190 | GEN RARA Vento(min)  | 78 | -732.79  | -34.00 | -6.17  | 34.56 | 1.302 | 26.54 | 1.39E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 190 | Frenam(min)          | 78 | -761.82  | -2.21  | 19.14  | 19.27 | 1.302 | 14.80 | 1.40E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 190 | Termico(min)         | 78 | -771.45  | -21.54 | -10.92 | 24.15 | 1.302 | 18.55 | 1.41E-02 |
| 1 | Spalla 2 | 191 | GEN RARA Mobili(max) | 80 | -325.10  | -15.75 | 15.99  | 22.44 | 1.302 | 17.24 | 1.09E-02 |
| 1 | Spalla 2 | 191 | GEN RARA Vento(max)  | 80 | -321.48  | -30.08 | 13.61  | 33.02 | 1.302 | 25.36 | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 191 | Frenam(max)          | 80 | -318.99  | 1.81   | 38.74  | 38.78 | 1.302 | 29.78 | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 191 | Termico(max)         | 80 | -288.32  | -17.28 | 18.58  | 25.37 | 1.302 | 19.49 | 1.05E-02 |
| 1 | Spalla 2 | 191 | GEN RARA Mobili(min) | 80 | -1310.97 | -22.22 | -5.81  | 22.97 | 1.302 | 17.64 | 1.50E-02 |
| 1 | Spalla 2 | 191 | GEN RARA Vento(min)  | 80 | -1021.82 | -33.61 | -6.09  | 34.16 | 1.302 | 26.23 | 1.37E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 191 | Frenam(min)          | 80 | -1019.33 | -1.71  | 19.05  | 19.13 | 1.302 | 14.69 | 1.37E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 191 | Termico(min)         | 80 | -1050.57 | -20.89 | -11.00 | 23.61 | 1.302 | 18.13 | 1.39E-02 |
| 1 | Spalla 2 | 192 | GEN RARA Mobili(max) | 82 | -340.33  | -15.57 | 16.07  | 22.38 | 1.302 | 17.18 | 1.09E-02 |
| 1 | Spalla 2 | 192 | GEN RARA Vento(max)  | 82 | -334.12  | -29.91 | 13.78  | 32.93 | 1.302 | 25.29 | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 192 | Frenam(max)          | 82 | -336.00  | 1.99   | 38.77  | 38.82 | 1.302 | 29.81 | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 192 | Termico(max)         | 82 | -302.71  | -17.10 | 18.69  | 25.33 | 1.302 | 19.45 | 1.05E-02 |
| 1 | Spalla 2 | 192 | GEN RARA Mobili(min) | 82 | -1561.00 | -22.56 | -5.59  | 23.24 | 1.302 | 17.85 | 1.50E-02 |
| 1 | Spalla 2 | 192 | GEN RARA Vento(min)  | 82 | -1202.32 | -33.84 | -5.93  | 34.36 | 1.302 | 26.38 | 1.37E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 192 | Frenam(min)          | 82 | -1204.20 | -1.94  | 19.06  | 19.16 | 1.302 | 14.71 | 1.37E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 192 | Termico(min)         | 82 | -1232.81 | -21.12 | -10.90 | 23.77 | 1.302 | 18.25 | 1.39E-02 |
| 1 | Spalla 2 | 193 | GEN RARA Mobili(max) | 84 | -299.97  | -15.15 | 17.54  | 23.18 | 1.302 | 17.80 | 1.07E-02 |
| 1 | Spalla 2 | 193 | GEN RARA Vento(max)  | 84 | -325.44  | -29.37 | 14.76  | 32.87 | 1.302 | 25.24 | 1.07E-02 |
|   |          |     | GEN RARA             |    |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 193 | Frenam(max)          | 84 | -307.90  | 2.47   | 39.61  | 39.69 | 1.302 | 30.48 | 1.06E-02 |

|   |          |     |                      |     |          |        |        |       |       |       |          |
|---|----------|-----|----------------------|-----|----------|--------|--------|-------|-------|-------|----------|
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 193 | Termico(max)         | 84  | -289.38  | -16.37 | 19.52  | 25.48 | 1.302 | 19.56 | 1.05E-02 |
| 1 | Spalla 2 | 193 | GEN RARA Mobili(min) | 84  | -1253.90 | -22.07 | -5.90  | 22.85 | 1.302 | 17.54 | 1.59E-02 |
| 1 | Spalla 2 | 193 | GEN RARA Vento(min)  | 84  | -979.73  | -33.48 | -5.74  | 33.97 | 1.302 | 26.09 | 1.43E-02 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 193 | Frenam(min)          | 84  | -962.19  | -1.64  | 19.11  | 19.18 | 1.302 | 14.73 | 1.43E-02 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 1 | Spalla 2 | 193 | Termico(min)         | 84  | -999.77  | -21.00 | -10.67 | 23.56 | 1.302 | 18.09 | 1.45E-02 |
| 2 | Pila 1   | 195 | GEN RARA Mobili(max) | 21  | -1211.40 | -36.32 | 24.34  | 43.72 | 2.855 | 15.32 | 4.46E-04 |
| 2 | Pila 1   | 195 | GEN RARA Vento(max)  | 21  | -1250.74 | -66.47 | 23.09  | 70.37 | 2.855 | 24.65 | 7.83E-04 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 195 | Frenam(max)          | 21  | -1332.03 | 4.82   | 77.10  | 77.25 | 2.855 | 27.06 | 8.01E-04 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 195 | Termico(max)         | 21  | -1179.80 | -36.93 | 27.14  | 45.83 | 2.855 | 16.05 | 7.48E-04 |
| 2 | Pila 1   | 195 | GEN RARA Mobili(min) | 21  | -2630.86 | -45.95 | -3.99  | 46.12 | 2.855 | 16.16 | 3.64E-03 |
| 2 | Pila 1   | 195 | GEN RARA Vento(min)  | 21  | -2123.71 | -73.08 | -1.17  | 73.09 | 2.855 | 25.60 | 3.24E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 195 | Frenam(min)          | 21  | -2205.00 | -1.78  | 52.85  | 52.88 | 2.855 | 18.52 | 3.24E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 195 | Termico(min)         | 21  | -2260.09 | -45.58 | -5.38  | 45.90 | 2.855 | 16.08 | 3.33E-03 |
| 2 | Pila 1   | 196 | GEN RARA Mobili(max) | 23  | -1560.68 | -39.08 | 23.64  | 45.67 | 2.855 | 16.00 | 5.74E-04 |
| 2 | Pila 1   | 196 | GEN RARA Vento(max)  | 23  | -1558.55 | -68.98 | 22.44  | 72.54 | 2.855 | 25.41 | 8.26E-04 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 196 | Frenam(max)          | 23  | -1563.12 | 2.44   | 76.59  | 76.63 | 2.855 | 26.84 | 8.58E-04 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 196 | Termico(max)         | 23  | -1456.95 | -40.12 | 26.54  | 48.10 | 2.855 | 16.85 | 7.82E-04 |
| 2 | Pila 1   | 196 | GEN RARA Mobili(min) | 23  | -3172.90 | -45.99 | -3.07  | 46.09 | 2.855 | 16.15 | 3.50E-03 |
| 2 | Pila 1   | 196 | GEN RARA Vento(min)  | 23  | -2601.86 | -73.14 | -0.66  | 73.14 | 2.855 | 25.62 | 3.12E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 196 | Frenam(min)          | 23  | -2606.43 | -1.72  | 53.49  | 53.52 | 2.855 | 18.75 | 3.13E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 196 | Termico(min)         | 23  | -2707.72 | -44.86 | -4.82  | 45.12 | 2.855 | 15.81 | 3.18E-03 |
| 2 | Pila 1   | 197 | GEN RARA Mobili(max) | 885 | -1554.57 | -39.81 | 23.78  | 46.37 | 2.855 | 16.24 | 6.47E-04 |
| 2 | Pila 1   | 197 | GEN RARA Vento(max)  | 885 | -1560.13 | -69.60 | 22.49  | 73.14 | 2.855 | 25.62 | 8.26E-04 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 197 | Frenam(max)          | 885 | -1545.48 | 1.84   | 76.77  | 76.79 | 2.855 | 26.90 | 8.71E-04 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 197 | Termico(max)         | 885 | -1450.84 | -40.74 | 26.65  | 48.68 | 2.855 | 17.05 | 8.02E-04 |
| 2 | Pila 1   | 197 | GEN RARA Mobili(min) | 885 | -3359.00 | -47.16 | -3.52  | 47.29 | 2.855 | 16.57 | 3.57E-03 |
| 2 | Pila 1   | 197 | GEN RARA Vento(min)  | 885 | -2744.14 | -74.17 | -1.08  | 74.18 | 2.855 | 25.99 | 3.16E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 197 | Frenam(min)          | 885 | -2729.49 | -2.74  | 53.20  | 53.27 | 2.855 | 18.66 | 3.17E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 197 | Termico(min)         | 885 | -2842.31 | -45.89 | -5.18  | 46.18 | 2.855 | 16.18 | 3.23E-03 |
| 2 | Pila 1   | 198 | GEN RARA Mobili(max) | 27  | -1250.81 | -39.97 | 24.92  | 47.10 | 2.855 | 16.50 | 7.87E-04 |
| 2 | Pila 1   | 198 | GEN RARA Vento(max)  | 27  | -1345.47 | -69.74 | 23.36  | 73.55 | 2.855 | 25.76 | 8.53E-04 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 198 | Frenam(max)          | 27  | -1271.86 | 1.60   | 77.77  | 77.79 | 2.855 | 27.25 | 9.29E-04 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 198 | Termico(max)         | 27  | -1212.57 | -40.18 | 27.58  | 48.73 | 2.855 | 17.07 | 9.65E-04 |
| 2 | Pila 1   | 198 | GEN RARA Mobili(min) | 27  | -2989.30 | -49.77 | -5.42  | 50.06 | 2.855 | 17.54 | 3.80E-03 |
| 2 | Pila 1   | 198 | GEN RARA Vento(min)  | 27  | -2439.35 | -76.44 | -2.45  | 76.48 | 2.855 | 26.79 | 3.35E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 198 | Frenam(min)          | 27  | -2365.74 | -5.11  | 51.96  | 52.21 | 2.855 | 18.29 | 3.36E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 1   | 198 | Termico(min)         | 27  | -2513.78 | -48.93 | -6.51  | 49.36 | 2.855 | 17.29 | 3.42E-03 |
| 2 | Pila 2   | 200 | GEN RARA Mobili(max) | 22  | -1211.39 | -36.32 | 3.99   | 36.54 | 2.855 | 12.80 | 3.56E-03 |
| 2 | Pila 2   | 200 | GEN RARA Vento(max)  | 22  | -1250.71 | -66.47 | 1.17   | 66.48 | 2.855 | 23.29 | 3.17E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 2   | 200 | Frenam(max)          | 22  | -1333.03 | 4.83   | 55.57  | 55.78 | 2.855 | 19.54 | 3.15E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 2   | 200 | Termico(max)         | 22  | -1179.78 | -36.93 | 5.38   | 37.32 | 2.855 | 13.07 | 3.24E-03 |
| 2 | Pila 2   | 200 | GEN RARA Mobili(min) | 22  | -2630.85 | -45.95 | -24.34 | 52.00 | 2.855 | 18.22 | 8.55E-04 |
| 2 | Pila 2   | 200 | GEN RARA Vento(min)  | 22  | -2123.69 | -73.08 | -23.09 | 76.64 | 2.855 | 26.85 | 1.04E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 2   | 200 | Frenam(min)          | 22  | -2206.00 | -1.78  | 31.32  | 31.37 | 2.855 | 10.99 | 9.66E-04 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 2   | 200 | Termico(min)         | 22  | -2260.08 | -45.58 | -27.14 | 53.05 | 2.855 | 18.58 | 1.08E-03 |
| 2 | Pila 2   | 201 | GEN RARA Mobili(max) | 24  | -1560.68 | -39.08 | 3.07   | 39.20 | 2.855 | 13.73 | 3.49E-03 |
| 2 | Pila 2   | 201 | GEN RARA Vento(max)  | 24  | -1558.54 | -68.98 | 0.66   | 68.98 | 2.855 | 24.17 | 3.11E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 2   | 201 | Frenam(max)          | 24  | -1564.65 | 2.44   | 54.94  | 54.99 | 2.855 | 19.26 | 3.09E-03 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 2   | 201 | Termico(max)         | 24  | -1456.95 | -40.12 | 4.82   | 40.41 | 2.855 | 14.16 | 3.17E-03 |
| 2 | Pila 2   | 201 | GEN RARA Mobili(min) | 24  | -3172.89 | -45.99 | -23.64 | 51.71 | 2.855 | 18.11 | 6.19E-04 |
| 2 | Pila 2   | 201 | GEN RARA Vento(min)  | 24  | -2601.83 | -73.14 | -22.44 | 76.50 | 2.855 | 26.80 | 8.73E-04 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 2   | 201 | Frenam(min)          | 24  | -2607.95 | -1.72  | 31.84  | 31.89 | 2.855 | 11.17 | 8.32E-04 |
|   |          |     | GEN RARA             |     |          |        |        |       |       |       |          |
| 2 | Pila 2   | 201 | Termico(min)         | 24  | -2707.70 | -44.86 | -26.54 | 52.12 | 2.855 | 18.26 | 8.20E-04 |
| 2 | Pila 2   | 202 | GEN RARA Mobili(max) | 886 | -1554.58 | -39.81 | 3.52   | 39.97 | 2.855 | 14.00 | 3.58E-03 |
| 2 | Pila 2   | 202 | GEN RARA Vento(max)  | 886 | -1560.14 | -69.60 | 1.08   | 69.61 | 2.855 | 24.38 | 3.17E-03 |

|   |        |     |                                     |     |          |        |        |       |       |       |          |
|---|--------|-----|-------------------------------------|-----|----------|--------|--------|-------|-------|-------|----------|
| 2 | Pila 2 | 202 | GEN RARA<br>Frenam(max)<br>GEN RARA | 886 | -1547.01 | 1.84   | 55.23  | 55.26 | 2.855 | 19.36 | 3.16E-03 |
| 2 | Pila 2 | 202 | Termico(max)                        | 886 | -1450.85 | -40.74 | 5.18   | 41.07 | 2.855 | 14.39 | 3.24E-03 |
| 2 | Pila 2 | 202 | GEN RARA Mobili(min)                | 886 | -3359.00 | -47.16 | -23.78 | 52.82 | 2.855 | 18.50 | 5.77E-04 |
| 2 | Pila 2 | 202 | GEN RARA Vento(min)<br>GEN RARA     | 886 | -2744.13 | -74.17 | -22.49 | 77.50 | 2.855 | 27.15 | 8.16E-04 |
| 2 | Pila 2 | 202 | Frenam(min)<br>GEN RARA             | 886 | -2731.00 | -2.74  | 31.66  | 31.78 | 2.855 | 11.13 | 7.79E-04 |
| 2 | Pila 2 | 202 | Termico(min)                        | 886 | -2842.30 | -45.89 | -26.65 | 53.07 | 2.855 | 18.59 | 7.65E-04 |
| 2 | Pila 2 | 203 | GEN RARA Mobili(max)                | 28  | -1250.83 | -39.97 | 5.42   | 40.34 | 2.855 | 14.13 | 3.87E-03 |
| 2 | Pila 2 | 203 | GEN RARA Vento(max)<br>GEN RARA     | 28  | -1345.51 | -69.74 | 2.45   | 69.78 | 2.855 | 24.45 | 3.40E-03 |
| 2 | Pila 2 | 203 | Frenam(max)<br>GEN RARA             | 28  | -1272.87 | 1.59   | 56.46  | 56.48 | 2.855 | 19.79 | 3.40E-03 |
| 2 | Pila 2 | 203 | Termico(max)                        | 28  | -1212.60 | -40.18 | 6.51   | 40.70 | 2.855 | 14.26 | 3.50E-03 |
| 2 | Pila 2 | 203 | GEN RARA Mobili(min)                | 28  | -2989.32 | -49.77 | -24.92 | 55.66 | 2.855 | 19.50 | 2.84E-04 |
| 2 | Pila 2 | 203 | GEN RARA Vento(min)<br>GEN RARA     | 28  | -2439.38 | -76.44 | -23.36 | 79.93 | 2.855 | 28.00 | 6.28E-04 |
| 2 | Pila 2 | 203 | Frenam(min)<br>GEN RARA             | 28  | -2366.74 | -5.11  | 30.65  | 31.07 | 2.855 | 10.89 | 5.96E-04 |
| 2 | Pila 2 | 203 | Termico(min)                        | 28  | -2513.79 | -48.93 | -27.58 | 56.17 | 2.855 | 19.68 | 6.23E-04 |

|                        |               | Axial<br>(kN)   | Shear-y<br>(kN) | Shear-z<br>(kN) | Shear-<br>tot<br>(kN) | Kh eq.<br>(kN/mm<br>) | Deform.<br>(mm) | Rotazion<br>e (rad) |
|------------------------|---------------|-----------------|-----------------|-----------------|-----------------------|-----------------------|-----------------|---------------------|
| <b>SFORZI MASSIMI:</b> | <b>Spalle</b> | <b>-288.28</b>  | <b>2.48</b>     | <b>39.61</b>    | <b>39.69</b>          | <b>1.302</b>          | <b>30.48</b>    | <b>1.34E-02</b>     |
|                        | <b>Pile</b>   | <b>-1179.78</b> | <b>4.83</b>     | <b>77.77</b>    | <b>79.93</b>          | <b>2.855</b>          | <b>28.00</b>    | <b>3.87E-03</b>     |
| <b>SFORZI MINIMI:</b>  | <b>Spalle</b> | <b>-1561.31</b> | <b>-34.00</b>   | <b>-19.52</b>   |                       |                       |                 |                     |
|                        | <b>Pile</b>   | <b>-3359.00</b> | <b>-76.44</b>   | <b>-27.58</b>   |                       |                       |                 |                     |

**STATI LIMITE DI ESERCIZIO - COMBINAZIONI FREQUENTI**

| Tipo<br>isolatore | Struttura<br>Appoggio | No. | Load                            | Node | Axial<br>(kN) | Shear-y<br>(kN) | Shear-z<br>(kN) | Shear-<br>tot<br>(kN) | Kh eq.<br>(kN/mm<br>) | Deform.<br>(mm) | Rotazion<br>e (rad) |
|-------------------|-----------------------|-----|---------------------------------|------|---------------|-----------------|-----------------|-----------------------|-----------------------|-----------------|---------------------|
| 1                 | Spalla 1              | 185 | GEN FREQ Mobili(max)            | 77   | -361.03       | 1.83            | 4.71            | 5.05                  | 1.302                 | 3.88            | 1.39E-02            |
| 1                 | Spalla 1              | 185 | GEN FREQ Vento(max)<br>GEN FREQ | 77   | -399.94       | -6.44           | 3.22            | 7.20                  | 1.302                 | 5.53            | 1.16E-02            |
| 1                 | Spalla 1              | 185 | Termico(max)                    | 77   | -398.23       | -0.02           | 4.38            | 4.38                  | 1.302                 | 3.36            | 1.17E-02            |
| 1                 | Spalla 1              | 185 | GEN FREQ Mobili(min)            | 77   | -752.34       | -2.14           | -12.99          | 13.17                 | 1.302                 | 10.11           | 1.08E-02            |
| 1                 | Spalla 1              | 185 | GEN FREQ Vento(min)<br>GEN FREQ | 77   | -470.06       | -7.08           | -8.90           | 11.37                 | 1.302                 | 8.73            | 1.11E-02            |
| 1                 | Spalla 1              | 185 | Termico(min)                    | 77   | -482.38       | -0.79           | -10.16          | 10.19                 | 1.302                 | 7.83            | 1.11E-02            |
| 1                 | Spalla 1              | 186 | GEN FREQ Mobili(max)            | 79   | -323.65       | 1.80            | 4.78            | 5.11                  | 1.302                 | 3.92            | 1.36E-02            |
| 1                 | Spalla 1              | 186 | GEN FREQ Vento(max)<br>GEN FREQ | 79   | -352.30       | -6.50           | 3.51            | 7.39                  | 1.302                 | 5.67            | 1.15E-02            |
| 1                 | Spalla 1              | 186 | Termico(max)                    | 79   | -343.46       | -0.11           | 4.73            | 4.73                  | 1.302                 | 3.63            | 1.15E-02            |
| 1                 | Spalla 1              | 186 | GEN FREQ Mobili(min)            | 79   | -1008.69      | -1.70           | -12.44          | 12.56                 | 1.302                 | 9.64            | 1.07E-02            |
| 1                 | Spalla 1              | 186 | GEN FREQ Vento(min)<br>GEN FREQ | 79   | -429.69       | -6.61           | -8.85           | 11.05                 | 1.302                 | 8.48            | 1.10E-02            |
| 1                 | Spalla 1              | 186 | Termico(min)                    | 79   | -436.32       | -0.24           | -10.10          | 10.10                 | 1.302                 | 7.76            | 1.09E-02            |
| 1                 | Spalla 1              | 187 | GEN FREQ Mobili(max)            | 81   | -340.67       | 1.98            | 4.77            | 5.16                  | 1.302                 | 3.97            | 1.37E-02            |
| 1                 | Spalla 1              | 187 | GEN FREQ Vento(max)<br>GEN FREQ | 81   | -347.61       | -6.31           | 3.53            | 7.23                  | 1.302                 | 5.55            | 1.14E-02            |
| 1                 | Spalla 1              | 187 | Termico(max)                    | 81   | -339.64       | 0.08            | 4.78            | 4.78                  | 1.302                 | 3.67            | 1.15E-02            |
| 1                 | Spalla 1              | 187 | GEN FREQ Mobili(min)            | 81   | -1193.63      | -1.93           | -12.47          | 12.62                 | 1.302                 | 9.69            | 1.07E-02            |
| 1                 | Spalla 1              | 187 | GEN FREQ Vento(min)<br>GEN FREQ | 81   | -424.99       | -6.41           | -8.83           | 10.91                 | 1.302                 | 8.38            | 1.09E-02            |
| 1                 | Spalla 1              | 187 | Termico(min)                    | 81   | -432.50       | -0.05           | -10.05          | 10.05                 | 1.302                 | 7.72            | 1.09E-02            |
| 1                 | Spalla 1              | 188 | GEN FREQ Mobili(max)            | 83   | -312.38       | 2.41            | 4.74            | 5.32                  | 1.302                 | 4.08            | 1.42E-02            |
| 1                 | Spalla 1              | 188 | GEN FREQ Vento(max)<br>GEN FREQ | 83   | -387.39       | -5.80           | 3.27            | 6.66                  | 1.302                 | 5.11            | 1.15E-02            |
| 1                 | Spalla 1              | 188 | Termico(max)                    | 83   | -376.38       | 0.63            | 4.53            | 4.57                  | 1.302                 | 3.51            | 1.15E-02            |
| 1                 | Spalla 1              | 188 | GEN FREQ Mobili(min)            | 83   | -952.76       | -1.57           | -13.33          | 13.42                 | 1.302                 | 10.31           | 1.07E-02            |
| 1                 | Spalla 1              | 188 | GEN FREQ Vento(min)<br>GEN FREQ | 83   | -457.51       | -6.45           | -8.84           | 10.94                 | 1.302                 | 8.40            | 1.10E-02            |
| 1                 | Spalla 1              | 188 | Termico(min)                    | 83   | -460.52       | -0.14           | -10.01          | 10.01                 | 1.302                 | 7.69            | 1.10E-02            |
| 1                 | Spalla 2              | 190 | GEN FREQ Mobili(max)            | 78   | -361.03       | 1.83            | 12.99           | 13.12                 | 1.302                 | 10.07           | 1.08E-02            |
| 1                 | Spalla 2              | 190 | GEN FREQ Vento(max)<br>GEN FREQ | 78   | -399.94       | -6.44           | 8.90            | 10.99                 | 1.302                 | 8.44            | 1.11E-02            |
| 1                 | Spalla 2              | 190 | Termico(max)                    | 78   | -398.23       | -0.02           | 10.16           | 10.16                 | 1.302                 | 7.80            | 1.11E-02            |
| 1                 | Spalla 2              | 190 | GEN FREQ Mobili(min)            | 78   | -752.33       | -2.14           | -4.71           | 5.17                  | 1.302                 | 3.97            | 1.39E-02            |
| 1                 | Spalla 2              | 190 | GEN FREQ Vento(min)<br>GEN FREQ | 78   | -470.05       | -7.08           | -3.22           | 7.78                  | 1.302                 | 5.97            | 1.16E-02            |
| 1                 | Spalla 2              | 190 | Termico(min)                    | 78   | -482.38       | -0.79           | -4.38           | 4.45                  | 1.302                 | 3.42            | 1.17E-02            |
| 1                 | Spalla 2              | 191 | GEN FREQ Mobili(max)            | 80   | -323.70       | 1.80            | 12.44           | 12.57                 | 1.302                 | 9.65            | 1.07E-02            |



|   |          |     |                                 |     |          |        |        |       |       |       |          |
|---|----------|-----|---------------------------------|-----|----------|--------|--------|-------|-------|-------|----------|
| 1 | Spalla 2 | 191 | GEN FREQ Vento(max)<br>GEN FREQ | 80  | -352.30  | -6.50  | 8.85   | 10.98 | 1.302 | 8.43  | 1.10E-02 |
| 1 | Spalla 2 | 191 | Termico(max)                    | 80  | -343.46  | -0.11  | 10.10  | 10.10 | 1.302 | 7.76  | 1.09E-02 |
| 1 | Spalla 2 | 191 | GEN FREQ Mobili(min)            | 80  | -1008.56 | -1.70  | -4.78  | 5.07  | 1.302 | 3.90  | 1.36E-02 |
| 1 | Spalla 2 | 191 | GEN FREQ Vento(min)<br>GEN FREQ | 80  | -429.69  | -6.61  | -3.51  | 7.48  | 1.302 | 5.75  | 1.15E-02 |
| 1 | Spalla 2 | 191 | Termico(min)                    | 80  | -436.32  | -0.24  | -4.73  | 4.74  | 1.302 | 3.64  | 1.15E-02 |
| 1 | Spalla 2 | 192 | GEN FREQ Mobili(max)            | 82  | -340.71  | 1.98   | 12.47  | 12.63 | 1.302 | 9.70  | 1.07E-02 |
| 1 | Spalla 2 | 192 | GEN FREQ Vento(max)<br>GEN FREQ | 82  | -347.61  | -6.31  | 8.83   | 10.85 | 1.302 | 8.33  | 1.09E-02 |
| 1 | Spalla 2 | 192 | Termico(max)                    | 82  | -339.64  | 0.08   | 10.05  | 10.05 | 1.302 | 7.72  | 1.09E-02 |
| 1 | Spalla 2 | 192 | GEN FREQ Mobili(min)            | 82  | -1193.43 | -1.93  | -4.77  | 5.15  | 1.302 | 3.95  | 1.37E-02 |
| 1 | Spalla 2 | 192 | GEN FREQ Vento(min)<br>GEN FREQ | 82  | -424.99  | -6.41  | -3.53  | 7.32  | 1.302 | 5.62  | 1.14E-02 |
| 1 | Spalla 2 | 192 | Termico(min)                    | 82  | -432.50  | -0.05  | -4.78  | 4.78  | 1.302 | 3.67  | 1.15E-02 |
| 1 | Spalla 2 | 193 | GEN FREQ Mobili(max)            | 84  | -312.43  | 2.41   | 13.33  | 13.55 | 1.302 | 10.40 | 1.07E-02 |
| 1 | Spalla 2 | 193 | GEN FREQ Vento(max)<br>GEN FREQ | 84  | -387.40  | -5.80  | 8.84   | 10.57 | 1.302 | 8.12  | 1.10E-02 |
| 1 | Spalla 2 | 193 | Termico(max)                    | 84  | -376.38  | 0.63   | 10.01  | 10.03 | 1.302 | 7.70  | 1.10E-02 |
| 1 | Spalla 2 | 193 | GEN FREQ Mobili(min)            | 84  | -952.70  | -1.57  | -4.75  | 5.00  | 1.302 | 3.84  | 1.42E-02 |
| 1 | Spalla 2 | 193 | GEN FREQ Vento(min)<br>GEN FREQ | 84  | -457.52  | -6.44  | -3.27  | 7.22  | 1.302 | 5.55  | 1.15E-02 |
| 1 | Spalla 2 | 193 | Termico(min)                    | 84  | -460.52  | -0.14  | -4.53  | 4.53  | 1.302 | 3.48  | 1.15E-02 |
| 2 | Pila 1   | 195 | GEN FREQ Mobili(max)            | 21  | -1358.46 | 4.57   | 21.85  | 22.32 | 2.855 | 7.82  | 7.98E-04 |
| 2 | Pila 1   | 195 | GEN FREQ Vento(max)<br>GEN FREQ | 21  | -1424.09 | -11.50 | 16.92  | 20.46 | 2.855 | 7.17  | 1.90E-03 |
| 2 | Pila 1   | 195 | Termico(max)                    | 21  | -1414.53 | 3.02   | 17.92  | 18.17 | 2.855 | 6.37  | 1.89E-03 |
| 2 | Pila 1   | 195 | GEN FREQ Mobili(min)            | 21  | -2179.60 | -1.52  | -0.33  | 1.56  | 2.855 | 0.54  | 3.20E-03 |
| 2 | Pila 1   | 195 | GEN FREQ Vento(min)<br>GEN FREQ | 21  | -1683.24 | -14.06 | 6.58   | 15.52 | 2.855 | 5.44  | 2.11E-03 |
| 2 | Pila 1   | 195 | Termico(min)                    | 21  | -1725.52 | -0.05  | 5.51   | 5.51  | 2.855 | 1.93  | 2.13E-03 |
| 2 | Pila 1   | 196 | GEN FREQ Mobili(max)            | 23  | -1589.81 | 2.37   | 21.34  | 21.47 | 2.855 | 7.52  | 8.54E-04 |
| 2 | Pila 1   | 196 | GEN FREQ Vento(max)<br>GEN FREQ | 23  | -1588.75 | -13.44 | 16.85  | 21.55 | 2.855 | 7.55  | 1.88E-03 |
| 2 | Pila 1   | 196 | Termico(max)                    | 23  | -1563.88 | 0.92   | 17.87  | 17.89 | 2.855 | 6.27  | 1.87E-03 |
| 2 | Pila 1   | 196 | GEN FREQ Mobili(min)            | 23  | -2581.26 | -1.65  | 0.31   | 1.68  | 2.855 | 0.59  | 3.09E-03 |
| 2 | Pila 1   | 196 | GEN FREQ Vento(min)<br>GEN FREQ | 23  | -1848.07 | -14.16 | 6.52   | 15.59 | 2.855 | 5.46  | 2.04E-03 |
| 2 | Pila 1   | 196 | Termico(min)                    | 23  | -1875.07 | 0.06   | 5.48   | 5.48  | 2.855 | 1.92  | 2.06E-03 |
| 2 | Pila 1   | 197 | GEN FREQ Mobili(max)            | 885 | -1572.17 | 1.77   | 21.52  | 21.59 | 2.855 | 7.56  | 8.66E-04 |
| 2 | Pila 1   | 197 | GEN FREQ Vento(max)<br>GEN FREQ | 885 | -1574.95 | -14.27 | 16.84  | 22.07 | 2.855 | 7.73  | 1.88E-03 |
| 2 | Pila 1   | 197 | Termico(max)                    | 885 | -1546.24 | 0.09   | 17.88  | 17.88 | 2.855 | 6.26  | 1.87E-03 |
| 2 | Pila 1   | 197 | GEN FREQ Mobili(min)            | 885 | -2704.31 | -2.67  | 0.02   | 2.67  | 2.855 | 0.94  | 3.14E-03 |
| 2 | Pila 1   | 197 | GEN FREQ Vento(min)<br>GEN FREQ | 885 | -1834.27 | -14.98 | 6.51   | 16.33 | 2.855 | 5.72  | 2.04E-03 |
| 2 | Pila 1   | 197 | Termico(min)                    | 885 | -1857.43 | -0.77  | 5.49   | 5.54  | 2.855 | 1.94  | 2.06E-03 |
| 2 | Pila 1   | 198 | GEN FREQ Mobili(max)            | 27  | -1298.29 | 1.34   | 22.53  | 22.57 | 2.855 | 7.91  | 9.00E-04 |
| 2 | Pila 1   | 198 | GEN FREQ Vento(max)<br>GEN FREQ | 27  | -1391.11 | -14.30 | 16.89  | 22.13 | 2.855 | 7.75  | 1.95E-03 |
| 2 | Pila 1   | 198 | Termico(max)                    | 27  | -1350.58 | 0.22   | 17.96  | 17.96 | 2.855 | 6.29  | 1.95E-03 |
| 2 | Pila 1   | 198 | GEN FREQ Mobili(min)            | 27  | -2340.34 | -4.85  | -1.22  | 5.00  | 2.855 | 1.75  | 3.33E-03 |
| 2 | Pila 1   | 198 | GEN FREQ Vento(min)<br>GEN FREQ | 27  | -1650.27 | -16.86 | 6.55   | 18.09 | 2.855 | 6.34  | 2.06E-03 |
| 2 | Pila 1   | 198 | Termico(min)                    | 27  | -1661.57 | -2.85  | 5.56   | 6.25  | 2.855 | 2.19  | 2.08E-03 |
| 2 | Pila 2   | 200 | GEN FREQ Mobili(max)            | 22  | -1358.46 | 4.57   | 0.33   | 4.58  | 2.855 | 1.61  | 3.15E-03 |
| 2 | Pila 2   | 200 | GEN FREQ Vento(max)<br>GEN FREQ | 22  | -1424.08 | -11.50 | -6.58  | 13.25 | 2.855 | 4.64  | 2.06E-03 |
| 2 | Pila 2   | 200 | Termico(max)                    | 22  | -1414.53 | 3.02   | -5.51  | 6.28  | 2.855 | 2.20  | 2.08E-03 |
| 2 | Pila 2   | 200 | GEN FREQ Mobili(min)            | 22  | -2179.60 | -1.52  | -21.86 | 21.91 | 2.855 | 7.68  | 9.68E-04 |
| 2 | Pila 2   | 200 | GEN FREQ Vento(min)<br>GEN FREQ | 22  | -1683.24 | -14.06 | -16.92 | 22.00 | 2.855 | 7.71  | 1.96E-03 |
| 2 | Pila 2   | 200 | Termico(min)                    | 22  | -1725.52 | -0.05  | -17.92 | 17.92 | 2.855 | 6.28  | 1.94E-03 |
| 2 | Pila 2   | 201 | GEN FREQ Mobili(max)            | 24  | -1589.81 | 2.37   | -0.31  | 2.39  | 2.855 | 0.84  | 3.09E-03 |
| 2 | Pila 2   | 201 | GEN FREQ Vento(max)<br>GEN FREQ | 24  | -1588.75 | -13.44 | -6.52  | 14.94 | 2.855 | 5.23  | 2.04E-03 |
| 2 | Pila 2   | 201 | Termico(max)                    | 24  | -1563.88 | 0.92   | -5.48  | 5.56  | 2.855 | 1.95  | 2.06E-03 |
| 2 | Pila 2   | 201 | GEN FREQ Mobili(min)            | 24  | -2581.25 | -1.65  | -21.34 | 21.40 | 2.855 | 7.50  | 8.60E-04 |
| 2 | Pila 2   | 201 | GEN FREQ Vento(min)<br>GEN FREQ | 24  | -1848.07 | -14.16 | -16.85 | 22.01 | 2.855 | 7.71  | 1.88E-03 |
| 2 | Pila 2   | 201 | Termico(min)                    | 24  | -1875.07 | 0.06   | -17.87 | 17.87 | 2.855 | 6.26  | 1.87E-03 |
| 2 | Pila 2   | 202 | GEN FREQ Mobili(max)            | 886 | -1572.17 | 1.77   | -0.02  | 1.77  | 2.855 | 0.62  | 3.16E-03 |
| 2 | Pila 2   | 202 | GEN FREQ Vento(max)<br>GEN FREQ | 886 | -1574.95 | -14.27 | -6.51  | 15.68 | 2.855 | 5.49  | 2.04E-03 |
| 2 | Pila 2   | 202 | Termico(max)                    | 886 | -1546.24 | 0.09   | -5.49  | 5.49  | 2.855 | 1.92  | 2.06E-03 |
| 2 | Pila 2   | 202 | GEN FREQ Mobili(min)            | 886 | -2704.30 | -2.67  | -21.52 | 21.69 | 2.855 | 7.60  | 8.07E-04 |
| 2 | Pila 2   | 202 | GEN FREQ Vento(min)<br>GEN FREQ | 886 | -1834.27 | -14.98 | -16.84 | 22.54 | 2.855 | 7.90  | 1.88E-03 |
| 2 | Pila 2   | 202 | Termico(min)                    | 886 | -1857.43 | -0.77  | -17.88 | 17.90 | 2.855 | 6.27  | 1.87E-03 |
| 2 | Pila 2   | 203 | GEN FREQ Mobili(max)            | 28  | -1298.30 | 1.34   | 1.22   | 1.81  | 2.855 | 0.63  | 3.39E-03 |
| 2 | Pila 2   | 203 | GEN FREQ Vento(max)             | 28  | -1391.12 | -14.30 | -6.55  | 15.73 | 2.855 | 5.51  | 2.10E-03 |

|                        |        |     |                       | Axial<br>(kN) | Shear-y<br>(kN) | Shear-z<br>(kN) | Shear-<br>tot<br>(kN) | Kh eq.<br>(kN/mm<br>) | Deform.<br>(mm) | Rotazion<br>e (rad) |                 |
|------------------------|--------|-----|-----------------------|---------------|-----------------|-----------------|-----------------------|-----------------------|-----------------|---------------------|-----------------|
| 2                      | Pila 2 | 203 | GEN FREQ Termico(max) | 28            | -1350.58        | 0.22            | -5.56                 | 5.56                  | 2.855           | 1.95                | 2.13E-03        |
| 2                      | Pila 2 | 203 | GEN FREQ Mobili(min)  | 28            | -2340.34        | -4.85           | -22.53                | 23.05                 | 2.855           | 8.07                | 6.22E-04        |
| 2                      | Pila 2 | 203 | GEN FREQ Vento(min)   | 28            | -1650.28        | -16.86          | -16.89                | 23.86                 | 2.855           | 8.36                | 1.90E-03        |
| 2                      | Pila 2 | 203 | GEN FREQ Termico(min) | 28            | -1661.57        | -2.85           | -17.96                | 18.18                 | 2.855           | 6.37                | 1.89E-03        |
| <b>SFORZI MASSIMI:</b> |        |     |                       | <b>Spalle</b> | <b>-312.38</b>  | <b>2.41</b>     | <b>13.33</b>          | <b>13.55</b>          | <b>1.302</b>    | <b>10.40</b>        | <b>1.42E-02</b> |
|                        |        |     |                       | <b>Pile</b>   | <b>-1298.29</b> | <b>4.57</b>     | <b>22.53</b>          | <b>23.86</b>          | <b>2.855</b>    | <b>8.36</b>         | <b>3.39E-03</b> |
| <b>SFORZI MINIMI:</b>  |        |     |                       | <b>Spalle</b> | <b>-1193.63</b> | <b>-7.08</b>    | <b>-13.33</b>         |                       |                 |                     |                 |
|                        |        |     |                       | <b>Pile</b>   | <b>-2704.31</b> | <b>-16.86</b>   | <b>-22.53</b>         |                       |                 |                     |                 |

**STATI LIMITE DI ESERCIZIO - COMBINAZIONI QUASI PERMANENTI**

| Tipo<br>isolatore      | Struttura<br>Appoggio | No. | Load          | Node          | Axial<br>(kN)   | Shear-y<br>(kN) | Shear-z<br>(kN) | Shear-<br>tot<br>(kN) | Kh eq.<br>(kN/mm<br>) | Deform.<br>(mm) | Rotazion<br>e (rad) |
|------------------------|-----------------------|-----|---------------|---------------|-----------------|-----------------|-----------------|-----------------------|-----------------------|-----------------|---------------------|
| 1                      | Spalla 1              | 185 | GEN Q.P.(max) | 77            | -405.25         | -0.08           | 3.17            | 3.17                  | 1.302                 | 2.44            | 1.16E-02            |
| 1                      | Spalla 1              | 185 | GEN Q.P.(min) | 77            | -475.36         | -0.72           | -8.95           | 8.98                  | 1.302                 | 6.90            | 1.11E-02            |
| 1                      | Spalla 1              | 186 | GEN Q.P.(max) | 79            | -351.20         | -0.12           | 3.49            | 3.49                  | 1.302                 | 2.68            | 1.15E-02            |
| 1                      | Spalla 1              | 186 | GEN Q.P.(min) | 79            | -428.58         | -0.23           | -8.87           | 8.87                  | 1.302                 | 6.81            | 1.10E-02            |
| 1                      | Spalla 1              | 187 | GEN Q.P.(max) | 81            | -347.38         | 0.07            | 3.54            | 3.54                  | 1.302                 | 2.72            | 1.14E-02            |
| 1                      | Spalla 1              | 187 | GEN Q.P.(min) | 81            | -424.76         | -0.04           | -8.82           | 8.82                  | 1.302                 | 6.77            | 1.09E-02            |
| 1                      | Spalla 1              | 188 | GEN Q.P.(max) | 83            | -383.39         | 0.57            | 3.32            | 3.37                  | 1.302                 | 2.59            | 1.15E-02            |
| 1                      | Spalla 1              | 188 | GEN Q.P.(min) | 83            | -453.51         | -0.08           | -8.80           | 8.80                  | 1.302                 | 6.76            | 1.10E-02            |
| 1                      | Spalla 2              | 190 | GEN Q.P.(max) | 78            | -440.25         | -0.08           | 8.95            | 8.95                  | 1.302                 | 6.87            | 1.11E-02            |
| 1                      | Spalla 2              | 190 | GEN Q.P.(min) | 78            | -475.36         | -0.72           | -3.17           | 3.25                  | 1.302                 | 2.50            | 1.16E-02            |
| 1                      | Spalla 2              | 191 | GEN Q.P.(max) | 80            | -351.20         | -0.12           | 8.87            | 8.87                  | 1.302                 | 6.81            | 1.10E-02            |
| 1                      | Spalla 2              | 191 | GEN Q.P.(min) | 80            | -428.58         | -0.23           | -3.49           | 3.50                  | 1.302                 | 2.69            | 1.15E-02            |
| 1                      | Spalla 2              | 192 | GEN Q.P.(max) | 82            | -347.38         | 0.07            | 8.82            | 8.82                  | 1.302                 | 6.77            | 1.09E-02            |
| 1                      | Spalla 2              | 192 | GEN Q.P.(min) | 82            | -424.76         | -0.04           | -3.54           | 3.54                  | 1.302                 | 2.72            | 1.14E-02            |
| 1                      | Spalla 2              | 193 | GEN Q.P.(max) | 84            | -383.39         | 0.57            | 8.80            | 8.82                  | 1.302                 | 6.77            | 1.10E-02            |
| 1                      | Spalla 2              | 193 | GEN Q.P.(min) | 84            | -453.51         | -0.08           | -3.32           | 3.32                  | 1.302                 | 2.55            | 1.15E-02            |
| 2                      | Pila 1                | 195 | GEN Q.P.(max) | 21            | -1440.45        | 2.76            | 16.88           | 17.10                 | 2.855                 | 5.99            | 1.90E-03            |
| 2                      | Pila 1                | 195 | GEN Q.P.(min) | 21            | -1699.61        | 0.20            | 6.54            | 6.54                  | 2.855                 | 2.29            | 2.11E-03            |
| 2                      | Pila 1                | 196 | GEN Q.P.(max) | 23            | -1589.81        | 0.84            | 16.84           | 16.86                 | 2.855                 | 5.91            | 1.88E-03            |
| 2                      | Pila 1                | 196 | GEN Q.P.(min) | 23            | -1849.14        | 0.13            | 6.51            | 6.51                  | 2.855                 | 2.28            | 2.04E-03            |
| 2                      | Pila 1                | 197 | GEN Q.P.(max) | 885           | -1572.17        | 0.02            | 16.85           | 16.85                 | 2.855                 | 5.90            | 1.88E-03            |
| 2                      | Pila 1                | 197 | GEN Q.P.(min) | 885           | -1831.49        | -0.70           | 6.53            | 6.57                  | 2.855                 | 2.30            | 2.04E-03            |
| 2                      | Pila 1                | 198 | GEN Q.P.(max) | 27            | -1376.49        | -0.04           | 16.93           | 16.93                 | 2.855                 | 5.93            | 1.95E-03            |
| 2                      | Pila 1                | 198 | GEN Q.P.(min) | 27            | -1635.65        | -2.60           | 6.59            | 7.08                  | 2.855                 | 2.48            | 2.06E-03            |
| 2                      | Pila 2                | 200 | GEN Q.P.(max) | 22            | -1440.45        | 2.76            | -6.54           | 7.10                  | 2.855                 | 2.49            | 2.06E-03            |
| 2                      | Pila 2                | 200 | GEN Q.P.(min) | 22            | -1699.61        | 0.20            | -16.88          | 16.88                 | 2.855                 | 5.91            | 1.95E-03            |
| 2                      | Pila 2                | 201 | GEN Q.P.(max) | 24            | -1589.81        | 0.84            | -6.51           | 6.56                  | 2.855                 | 2.30            | 2.04E-03            |
| 2                      | Pila 2                | 201 | GEN Q.P.(min) | 24            | -1849.14        | 0.13            | -16.84          | 16.84                 | 2.855                 | 5.90            | 1.88E-03            |
| 2                      | Pila 2                | 202 | GEN Q.P.(max) | 886           | -1572.17        | 0.02            | -6.53           | 6.53                  | 2.855                 | 2.29            | 2.04E-03            |
| 2                      | Pila 2                | 202 | GEN Q.P.(min) | 886           | -1831.49        | -0.70           | -16.85          | 16.86                 | 2.855                 | 5.91            | 1.88E-03            |
| 2                      | Pila 2                | 203 | GEN Q.P.(max) | 28            | -1376.49        | -0.04           | -6.59           | 6.59                  | 2.855                 | 2.31            | 2.11E-03            |
| 2                      | Pila 2                | 203 | GEN Q.P.(min) | 28            | -1635.65        | -2.60           | -16.93          | 17.13                 | 2.855                 | 6.00            | 1.90E-03            |
| <b>SFORZI MASSIMI:</b> |                       |     |               | <b>Spalle</b> | <b>-347.38</b>  | <b>0.57</b>     | <b>8.95</b>     | <b>8.98</b>           | <b>1.302</b>          | <b>6.90</b>     | <b>1.16E-02</b>     |
|                        |                       |     |               | <b>Pile</b>   | <b>-1376.49</b> | <b>2.76</b>     | <b>16.93</b>    | <b>17.13</b>          | <b>2.855</b>          | <b>6.00</b>     | <b>2.11E-03</b>     |
| <b>SFORZI MINIMI:</b>  |                       |     |               | <b>Spalle</b> | <b>-475.36</b>  | <b>-0.72</b>    | <b>-8.95</b>    |                       |                       |                 |                     |
|                        |                       |     |               | <b>Pile</b>   | <b>-1849.14</b> | <b>-2.60</b>    | <b>-16.93</b>   |                       |                       |                 |                     |

**STATI LIMITE DI ESERCIZIO - SISMICI (SLD)**

| Tipo<br>isolatore | Struttura<br>Appoggio | No. | Load               | Node | Axial<br>(kN) | Shear-y<br>(kN) | Shear-z<br>(kN) | Shear-<br>tot<br>(kN) | Kh eq.<br>(kN/mm<br>) | Deform.<br>(mm) | Rotazion<br>e (rad) |
|-------------------|-----------------------|-----|--------------------|------|---------------|-----------------|-----------------|-----------------------|-----------------------|-----------------|---------------------|
| 1                 | Spalla 1              | 185 | GEN SLD Long(max)  | 77   | -395.76       | 8.30            | 30.58           | 31.69                 | 1.302                 | 24.33           | 1.16E-02            |
| 1                 | Spalla 1              | 185 | GEN SLD Trasv(max) | 77   | -387.69       | 26.66           | 11.57           | 29.06                 | 1.302                 | 22.32           | 1.17E-02            |

|   |          |     |                    |     |          |        |        |       |       |       |          |
|---|----------|-----|--------------------|-----|----------|--------|--------|-------|-------|-------|----------|
| 1 | Spalla 1 | 185 | GEN SLD Vert(max)  | 77  | -392.51  | 8.04   | 11.54  | 14.06 | 1.302 | 10.80 | 1.17E-02 |
| 1 | Spalla 1 | 185 | GEN SLD Long(min)  | 77  | -484.85  | -9.11  | -36.36 | 37.48 | 1.302 | 28.79 | 1.11E-02 |
| 1 | Spalla 1 | 185 | GEN SLD Trasv(min) | 77  | -492.92  | -27.47 | -17.34 | 32.49 | 1.302 | 24.95 | 1.11E-02 |
| 1 | Spalla 1 | 185 | GEN SLD Vert(min)  | 77  | -488.10  | -8.85  | -17.32 | 19.45 | 1.302 | 14.94 | 1.10E-02 |
| 1 | Spalla 1 | 186 | GEN SLD Long(max)  | 79  | -345.25  | 8.28   | 30.86  | 31.95 | 1.302 | 24.54 | 1.15E-02 |
| 1 | Spalla 1 | 186 | GEN SLD Trasv(max) | 79  | -346.56  | 26.67  | 11.77  | 29.15 | 1.302 | 22.39 | 1.15E-02 |
| 1 | Spalla 1 | 186 | GEN SLD Vert(max)  | 79  | -343.09  | 8.02   | 11.82  | 14.28 | 1.302 | 10.97 | 1.15E-02 |
| 1 | Spalla 1 | 186 | GEN SLD Long(min)  | 79  | -434.53  | -8.63  | -36.23 | 37.24 | 1.302 | 28.60 | 1.09E-02 |
| 1 | Spalla 1 | 186 | GEN SLD Trasv(min) | 79  | -433.22  | -27.02 | -17.15 | 32.00 | 1.302 | 24.58 | 1.09E-02 |
| 1 | Spalla 1 | 186 | GEN SLD Vert(min)  | 79  | -436.69  | -8.37  | -17.20 | 19.13 | 1.302 | 14.69 | 1.09E-02 |
| 1 | Spalla 1 | 187 | GEN SLD Long(max)  | 81  | -341.45  | 8.47   | 30.90  | 32.04 | 1.302 | 24.61 | 1.14E-02 |
| 1 | Spalla 1 | 187 | GEN SLD Trasv(max) | 81  | -342.69  | 26.86  | 11.82  | 29.35 | 1.302 | 22.54 | 1.14E-02 |
| 1 | Spalla 1 | 187 | GEN SLD Vert(max)  | 81  | -339.30  | 8.21   | 11.87  | 14.43 | 1.302 | 11.08 | 1.15E-02 |
| 1 | Spalla 1 | 187 | GEN SLD Long(min)  | 81  | -430.70  | -8.43  | -36.17 | 37.14 | 1.302 | 28.52 | 1.09E-02 |
| 1 | Spalla 1 | 187 | GEN SLD Trasv(min) | 81  | -429.45  | -26.82 | -17.09 | 31.80 | 1.302 | 24.42 | 1.09E-02 |
| 1 | Spalla 1 | 187 | GEN SLD Vert(min)  | 81  | -432.85  | -8.18  | -17.14 | 18.99 | 1.302 | 14.59 | 1.09E-02 |
| 1 | Spalla 1 | 188 | GEN SLD Long(max)  | 83  | -373.84  | 8.95   | 30.69  | 31.97 | 1.302 | 24.55 | 1.15E-02 |
| 1 | Spalla 1 | 188 | GEN SLD Trasv(max) | 83  | -365.88  | 27.31  | 11.70  | 29.71 | 1.302 | 22.82 | 1.15E-02 |
| 1 | Spalla 1 | 188 | GEN SLD Vert(max)  | 83  | -370.92  | 8.69   | 11.68  | 14.56 | 1.302 | 11.18 | 1.16E-02 |
| 1 | Spalla 1 | 188 | GEN SLD Long(min)  | 83  | -463.06  | -8.46  | -36.17 | 37.15 | 1.302 | 28.53 | 1.10E-02 |
| 1 | Spalla 1 | 188 | GEN SLD Trasv(min) | 83  | -471.02  | -26.82 | -17.18 | 31.85 | 1.302 | 24.46 | 1.10E-02 |
| 1 | Spalla 1 | 188 | GEN SLD Vert(min)  | 83  | -465.98  | -8.21  | -17.16 | 19.02 | 1.302 | 14.61 | 1.09E-02 |
| 1 | Spalla 2 | 190 | GEN SLD Long(max)  | 78  | -395.76  | 8.30   | 36.36  | 37.30 | 1.302 | 28.64 | 1.11E-02 |
| 1 | Spalla 2 | 190 | GEN SLD Trasv(max) | 78  | -387.70  | 26.66  | 17.34  | 31.80 | 1.302 | 24.42 | 1.11E-02 |
| 1 | Spalla 2 | 190 | GEN SLD Vert(max)  | 78  | -392.52  | 8.04   | 17.32  | 19.10 | 1.302 | 14.66 | 1.10E-02 |
| 1 | Spalla 2 | 190 | GEN SLD Long(min)  | 78  | -484.85  | -9.11  | -30.58 | 31.91 | 1.302 | 24.50 | 1.16E-02 |
| 1 | Spalla 2 | 190 | GEN SLD Trasv(min) | 78  | -492.91  | -27.47 | -11.57 | 29.81 | 1.302 | 22.89 | 1.17E-02 |
| 1 | Spalla 2 | 190 | GEN SLD Vert(min)  | 78  | -488.09  | -8.85  | -11.54 | 14.54 | 1.302 | 11.17 | 1.17E-02 |
| 1 | Spalla 2 | 191 | GEN SLD Long(max)  | 80  | -345.28  | 8.28   | 36.23  | 37.16 | 1.302 | 28.54 | 1.09E-02 |
| 1 | Spalla 2 | 191 | GEN SLD Trasv(max) | 80  | -346.62  | 26.67  | 17.15  | 31.71 | 1.302 | 24.35 | 1.09E-02 |
| 1 | Spalla 2 | 191 | GEN SLD Vert(max)  | 80  | -343.16  | 8.02   | 17.20  | 18.98 | 1.302 | 14.57 | 1.09E-02 |
| 1 | Spalla 2 | 191 | GEN SLD Long(min)  | 80  | -434.50  | -8.63  | -30.86 | 32.04 | 1.302 | 24.61 | 1.15E-02 |
| 1 | Spalla 2 | 191 | GEN SLD Trasv(min) | 80  | -433.16  | -27.02 | -11.77 | 29.47 | 1.302 | 22.63 | 1.15E-02 |
| 1 | Spalla 2 | 191 | GEN SLD Vert(min)  | 80  | -436.62  | -8.37  | -11.82 | 14.48 | 1.302 | 11.12 | 1.15E-02 |
| 1 | Spalla 2 | 192 | GEN SLD Long(max)  | 82  | -341.49  | 8.47   | 36.17  | 37.15 | 1.302 | 28.53 | 1.09E-02 |
| 1 | Spalla 2 | 192 | GEN SLD Trasv(max) | 82  | -342.78  | 26.86  | 17.09  | 31.84 | 1.302 | 24.45 | 1.09E-02 |
| 1 | Spalla 2 | 192 | GEN SLD Vert(max)  | 82  | -339.37  | 8.21   | 17.14  | 19.00 | 1.302 | 14.60 | 1.09E-02 |
| 1 | Spalla 2 | 192 | GEN SLD Long(min)  | 82  | -430.66  | -8.43  | -30.90 | 32.03 | 1.302 | 24.60 | 1.14E-02 |
| 1 | Spalla 2 | 192 | GEN SLD Trasv(min) | 82  | -429.36  | -26.82 | -11.82 | 29.31 | 1.302 | 22.51 | 1.14E-02 |
| 1 | Spalla 2 | 192 | GEN SLD Vert(min)  | 82  | -432.77  | -8.18  | -11.87 | 14.42 | 1.302 | 11.07 | 1.15E-02 |
| 1 | Spalla 2 | 193 | GEN SLD Long(max)  | 84  | -373.85  | 8.95   | 36.17  | 37.26 | 1.302 | 28.62 | 1.10E-02 |
| 1 | Spalla 2 | 193 | GEN SLD Trasv(max) | 84  | -365.89  | 27.31  | 17.18  | 32.26 | 1.302 | 24.78 | 1.10E-02 |
| 1 | Spalla 2 | 193 | GEN SLD Vert(max)  | 84  | -370.89  | 8.69   | 17.16  | 19.23 | 1.302 | 14.77 | 1.09E-02 |
| 1 | Spalla 2 | 193 | GEN SLD Long(min)  | 84  | -463.06  | -8.46  | -30.69 | 31.83 | 1.302 | 24.45 | 1.15E-02 |
| 1 | Spalla 2 | 193 | GEN SLD Trasv(min) | 84  | -471.02  | -26.82 | -11.70 | 29.26 | 1.302 | 22.47 | 1.15E-02 |
| 1 | Spalla 2 | 193 | GEN SLD Vert(min)  | 84  | -466.02  | -8.21  | -11.68 | 14.28 | 1.302 | 10.96 | 1.16E-02 |
| 2 | Pila 1   | 195 | GEN SLD Long(max)  | 21  | -1415.38 | 20.96  | 76.02  | 78.86 | 2.855 | 27.62 | 1.87E-03 |
| 2 | Pila 1   | 195 | GEN SLD Trasv(max) | 21  | -1377.49 | 62.42  | 34.79  | 71.46 | 2.855 | 25.03 | 1.88E-03 |
| 2 | Pila 1   | 195 | GEN SLD Vert(max)  | 21  | -1401.95 | 20.74  | 34.71  | 40.43 | 2.855 | 14.16 | 1.89E-03 |
| 2 | Pila 1   | 195 | GEN SLD Long(min)  | 21  | -1724.67 | -17.99 | -52.59 | 55.58 | 2.855 | 19.47 | 2.15E-03 |
| 2 | Pila 1   | 195 | GEN SLD Trasv(min) | 21  | -1762.56 | -59.45 | -11.37 | 60.53 | 2.855 | 21.20 | 2.14E-03 |
| 2 | Pila 1   | 195 | GEN SLD Vert(min)  | 21  | -1738.10 | -17.77 | -11.28 | 21.05 | 2.855 | 7.37  | 2.13E-03 |
| 2 | Pila 1   | 196 | GEN SLD Long(max)  | 23  | -1579.37 | 19.07  | 75.91  | 78.27 | 2.855 | 27.42 | 1.84E-03 |
| 2 | Pila 1   | 196 | GEN SLD Trasv(max) | 23  | -1575.95 | 60.60  | 34.62  | 69.79 | 2.855 | 24.45 | 1.87E-03 |
| 2 | Pila 1   | 196 | GEN SLD Vert(max)  | 23  | -1565.04 | 18.85  | 34.62  | 39.42 | 2.855 | 13.81 | 1.87E-03 |
| 2 | Pila 1   | 196 | GEN SLD Long(min)  | 23  | -1859.58 | -18.10 | -52.57 | 55.60 | 2.855 | 19.48 | 2.08E-03 |
| 2 | Pila 1   | 196 | GEN SLD Trasv(min) | 23  | -1863.00 | -59.63 | -11.28 | 60.69 | 2.855 | 21.26 | 2.06E-03 |
| 2 | Pila 1   | 196 | GEN SLD Vert(min)  | 23  | -1873.92 | -17.88 | -11.28 | 21.14 | 2.855 | 7.41  | 2.06E-03 |
| 2 | Pila 1   | 197 | GEN SLD Long(max)  | 885 | -1561.99 | 18.25  | 75.90  | 78.06 | 2.855 | 27.35 | 1.85E-03 |
| 2 | Pila 1   | 197 | GEN SLD Trasv(max) | 885 | -1558.62 | 59.78  | 34.63  | 69.09 | 2.855 | 24.20 | 1.87E-03 |
| 2 | Pila 1   | 197 | GEN SLD Vert(max)  | 885 | -1547.95 | 18.03  | 34.63  | 39.04 | 2.855 | 13.68 | 1.87E-03 |
| 2 | Pila 1   | 197 | GEN SLD Long(min)  | 885 | -1841.68 | -18.93 | -52.52 | 55.83 | 2.855 | 19.56 | 2.08E-03 |
| 2 | Pila 1   | 197 | GEN SLD Trasv(min) | 885 | -1845.04 | -60.45 | -11.25 | 61.49 | 2.855 | 21.54 | 2.05E-03 |
| 2 | Pila 1   | 197 | GEN SLD Vert(min)  | 885 | -1855.72 | -18.71 | -11.25 | 21.83 | 2.855 | 7.65  | 2.05E-03 |
| 2 | Pila 1   | 198 | GEN SLD Long(max)  | 27  | -1352.11 | 18.17  | 75.97  | 78.11 | 2.855 | 27.36 | 1.92E-03 |
| 2 | Pila 1   | 198 | GEN SLD Trasv(max) | 27  | -1314.22 | 59.63  | 34.81  | 69.05 | 2.855 | 24.19 | 1.95E-03 |
| 2 | Pila 1   | 198 | GEN SLD Vert(max)  | 27  | -1339.62 | 17.96  | 34.73  | 39.10 | 2.855 | 13.70 | 1.94E-03 |
| 2 | Pila 1   | 198 | GEN SLD Long(min)  | 27  | -1660.03 | -20.80 | -52.45 | 56.42 | 2.855 | 19.77 | 2.10E-03 |
| 2 | Pila 1   | 198 | GEN SLD Trasv(min) | 27  | -1697.93 | -62.26 | -11.29 | 63.28 | 2.855 | 22.17 | 2.08E-03 |
| 2 | Pila 1   | 198 | GEN SLD Vert(min)  | 27  | -1672.52 | -20.59 | -11.22 | 23.45 | 2.855 | 8.21  | 2.08E-03 |
| 2 | Pila 2   | 200 | GEN SLD Long(max)  | 22  | -1415.16 | 20.96  | 52.59  | 56.61 | 2.855 | 19.83 | 2.10E-03 |
| 2 | Pila 2   | 200 | GEN SLD Trasv(max) | 22  | -1377.37 | 62.42  | 11.37  | 63.45 | 2.855 | 22.23 | 2.08E-03 |
| 2 | Pila 2   | 200 | GEN SLD Vert(max)  | 22  | -1401.45 | 20.74  | 11.28  | 23.61 | 2.855 | 8.27  | 2.08E-03 |
| 2 | Pila 2   | 200 | GEN SLD Long(min)  | 22  | -1724.89 | -17.99 | -76.02 | 78.12 | 2.855 | 27.37 | 1.92E-03 |
| 2 | Pila 2   | 200 | GEN SLD Trasv(min) | 22  | -1762.68 | -59.45 | -34.79 | 68.88 | 2.855 | 24.13 | 1.95E-03 |
| 2 | Pila 2   | 200 | GEN SLD Vert(min)  | 22  | -1738.60 | -17.77 | -34.71 | 38.99 | 2.855 | 13.66 | 1.94E-03 |
| 2 | Pila 2   | 201 | GEN SLD Long(max)  | 24  | -1579.30 | 19.07  | 52.57  | 55.92 | 2.855 | 19.59 | 2.08E-03 |

|   |        |     |                    |     |          |        |        |       |       |       |          |
|---|--------|-----|--------------------|-----|----------|--------|--------|-------|-------|-------|----------|
| 2 | Pila 2 | 201 | GEN SLD Trasv(max) | 24  | -1575.96 | 60.60  | 11.28  | 61.64 | 2.855 | 21.59 | 2.05E-03 |
| 2 | Pila 2 | 201 | GEN SLD Vert(max)  | 24  | -1564.91 | 18.85  | 11.28  | 21.97 | 2.855 | 7.70  | 2.05E-03 |
| 2 | Pila 2 | 201 | GEN SLD Long(min)  | 24  | -1859.65 | -18.10 | -75.91 | 78.04 | 2.855 | 27.34 | 1.85E-03 |
| 2 | Pila 2 | 201 | GEN SLD Trasv(min) | 24  | -1862.99 | -59.63 | -34.62 | 68.95 | 2.855 | 24.15 | 1.87E-03 |
| 2 | Pila 2 | 201 | GEN SLD Vert(min)  | 24  | -1874.04 | -17.88 | -34.62 | 38.96 | 2.855 | 13.65 | 1.87E-03 |
| 2 | Pila 2 | 202 | GEN SLD Long(max)  | 886 | -1561.98 | 18.25  | 52.52  | 55.60 | 2.855 | 19.48 | 2.08E-03 |
| 2 | Pila 2 | 202 | GEN SLD Trasv(max) | 886 | -1558.57 | 59.78  | 11.25  | 60.83 | 2.855 | 21.31 | 2.06E-03 |
| 2 | Pila 2 | 202 | GEN SLD Vert(max)  | 886 | -1547.89 | 18.03  | 11.25  | 21.25 | 2.855 | 7.44  | 2.06E-03 |
| 2 | Pila 2 | 202 | GEN SLD Long(min)  | 886 | -1841.69 | -18.93 | -75.90 | 78.23 | 2.855 | 27.40 | 1.84E-03 |
| 2 | Pila 2 | 202 | GEN SLD Trasv(min) | 886 | -1845.10 | -60.45 | -34.63 | 69.67 | 2.855 | 24.40 | 1.87E-03 |
| 2 | Pila 2 | 202 | GEN SLD Vert(min)  | 886 | -1855.78 | -18.71 | -34.63 | 39.36 | 2.855 | 13.79 | 1.87E-03 |
| 2 | Pila 2 | 203 | GEN SLD Long(max)  | 28  | -1352.17 | 18.17  | 52.45  | 55.51 | 2.855 | 19.45 | 2.15E-03 |
| 2 | Pila 2 | 203 | GEN SLD Trasv(max) | 28  | -1314.19 | 59.63  | 11.29  | 60.69 | 2.855 | 21.26 | 2.14E-03 |
| 2 | Pila 2 | 203 | GEN SLD Vert(max)  | 28  | -1339.51 | 17.96  | 11.22  | 21.18 | 2.855 | 7.42  | 2.13E-03 |
| 2 | Pila 2 | 203 | GEN SLD Long(min)  | 28  | -1659.97 | -20.80 | -75.97 | 78.77 | 2.855 | 27.59 | 1.87E-03 |
| 2 | Pila 2 | 203 | GEN SLD Trasv(min) | 28  | -1697.95 | -62.26 | -34.81 | 71.33 | 2.855 | 24.99 | 1.88E-03 |
| 2 | Pila 2 | 203 | GEN SLD Vert(min)  | 28  | -1672.63 | -20.59 | -34.73 | 40.37 | 2.855 | 14.14 | 1.89E-03 |

|                 |        | Axial (kN) | Shear-y (kN) | Shear-z (kN) | Shear-tot (kN) | Kh eq. (kN/mm) | Deform. (mm) | Rotazione (rad) |
|-----------------|--------|------------|--------------|--------------|----------------|----------------|--------------|-----------------|
| SFORZI MASSIMI: | Spalle | -339.30    | 27.31        | 36.36        | 37.48          | 1.302          | 28.79        | 1.17E-02        |
|                 | Pile   | -1314.19   | 62.42        | 76.02        | 78.86          | 2.855          | 27.62        | 2.15E-03        |
| SFORZI MINIMI:  | Spalle | -492.92    | -27.47       | -36.36       |                |                |              |                 |
|                 | Pile   | -1874.04   | -62.26       | -76.02       |                |                |              |                 |

## 14 GIUNTI DI DILATAZIONE

I giunti di dilatazione si assumono soggetti alle condizioni di carico di progetto con l'eccezione delle dilatazioni termiche che si considerano raddoppiate ( $\pm 30^\circ$ ) per tener conto dell'incertezza sulla posizione del punto fisso. Segue tabulato degli spostamenti dei nodi di estremità dell'impalcato per le condizioni di carico pertinenti.

| Node | Load                 | DX (mm)   | DY (mm)   | DZ (mm)   | RX ([rad]) | RY ([rad]) | RZ ([rad]) |
|------|----------------------|-----------|-----------|-----------|------------|------------|------------|
| 719  | Vento strutture (Y+) | 0.073055  | 17.562343 | 0.002156  | -0.000048  | -0.000015  | 0.000017   |
| 760  | Vento strutture (Y+) | 0.023122  | 17.559275 | -0.004687 | -0.000025  | -0.000006  | 0.000016   |
| 801  | Vento strutture (Y+) | -0.024781 | 17.559589 | 0.005475  | -0.000027  | 0.000004   | 0.000016   |
| 842  | Vento strutture (Y+) | -0.073382 | 17.565001 | -0.001510 | -0.000060  | 0.000019   | 0.000017   |
| 719  | Vento mobili (Y+)    | 0.038183  | 6.990484  | -0.013574 | -0.000086  | -0.000042  | 0.000009   |
| 760  | Vento mobili (Y+)    | 0.016599  | 6.975874  | -0.011110 | -0.000022  | -0.000005  | 0.000009   |
| 801  | Vento mobili (Y+)    | -0.009201 | 6.973623  | 0.006912  | -0.000014  | 0.000013   | 0.000009   |
| 842  | Vento mobili (Y+)    | -0.037788 | 6.974075  | 0.010099  | -0.000022  | 0.000025   | 0.000010   |
| 719  | Frenamento (X+)      | 19.263760 | -0.000193 | 0.010612  | 0.000002   | 0.000009   | 0.000000   |
| 760  | Frenamento (X+)      | 19.263609 | 0.000003  | 0.010482  | 0.000000   | 0.000008   | 0.000000   |
| 801  | Frenamento (X+)      | 19.263609 | -0.000003 | 0.010482  | 0.000000   | 0.000008   | 0.000000   |
| 842  | Frenamento (X+)      | 19.263760 | 0.000193  | 0.010612  | -0.000002  | 0.000009   | 0.000000   |
| 719  | Termico Unif. +15°   | -9.151338 | 0.028515  | 0.011044  | -0.000383  | -0.000086  | 0.000000   |
| 760  | Termico Unif. +15°   | -9.119119 | -0.000722 | -0.005989 | -0.000058  | 0.000093   | -0.000001  |
| 801  | Termico Unif. +15°   | -9.119119 | 0.000722  | -0.005989 | 0.000058   | 0.000093   | 0.000001   |
| 842  | Termico Unif. +15°   | -9.151338 | -0.028515 | 0.011044  | 0.000383   | -0.000086  | 0.000000   |
| 719  | Termico diff. +5°/H  | -0.128326 | 0.003229  | -0.351548 | -0.000021  | -0.000443  | 0.000000   |
| 760  | Termico diff. +5°/H  | -0.124279 | 0.000617  | -0.348241 | -0.000004  | -0.000429  | 0.000000   |
| 801  | Termico diff. +5°/H  | -0.124279 | -0.000617 | -0.348241 | 0.000004   | -0.000429  | 0.000000   |
| 842  | Termico diff. +5°/H  | -0.128326 | -0.003229 | -0.351548 | 0.000021   | -0.000443  | 0.000000   |
| 719  | SLC Long (X+)(RS)    | 65.237638 | -0.955127 | 0.029923  | 0.000008   | 0.000028   | 0.000019   |
| 760  | SLC Long (X+)(RS)    | 65.202841 | -0.954584 | 0.029440  | 0.000002   | 0.000025   | 0.000019   |
| 801  | SLC Long (X+)(RS)    | 65.168657 | -0.954554 | 0.029126  | 0.000001   | 0.000025   | 0.000019   |
| 842  | SLC Long (X+)(RS)    | 65.135141 | -0.954333 | 0.029813  | -0.000005  | 0.000027   | 0.000019   |
| 719  | SLC Trasv (Y+)(RS)   | 0.293268  | 63.717601 | 0.010941  | -0.000195  | -0.000072  | 0.000067   |
| 760  | SLC Trasv (Y+)(RS)   | 0.096090  | 63.706989 | -0.021475 | -0.000104  | -0.000022  | 0.000064   |
| 801  | SLC Trasv (Y+)(RS)   | -0.095934 | 63.706930 | 0.021539  | -0.000104  | 0.000022   | 0.000064   |
| 842  | SLC Trasv (Y+)(RS)   | -0.293218 | 63.717267 | -0.011751 | -0.000195  | 0.000072   | 0.000067   |
| 719  | SLC Vert (Z+)(RS)    | 0.078811  | 0.084760  | -0.179713 | -0.000013  | -0.000272  | -0.000004  |
| 760  | SLC Vert (Z+)(RS)    | 0.088146  | 0.083756  | -0.173298 | -0.000005  | -0.000257  | -0.000004  |
| 801  | SLC Vert (Z+)(RS)    | 0.095567  | 0.082891  | -0.171298 | 0.000003   | -0.000254  | -0.000003  |
| 842  | SLC Vert (Z+)(RS)    | 0.100776  | 0.082160  | -0.174702 | 0.000009   | -0.000262  | -0.000003  |

Ai valori determinati in direzione longitudinale si sommano 50 mm assunti come massima deformazione ammissibile delle sottostrutture, già calcolata allo SLU.

Si prevedono giunti con le seguenti caratteristiche di deformazione massime:

- escursione longitudinale:  $\Delta X = \pm 165$  mm
- escursione trasversale:  $\Delta Y = \pm 165$  mm

1) Verifica deformazioni longitudinali statiche: considerando il frenamento come carico variabile dominante si ottiene la deformazione massima allo SLU dalla seguente somma:

|                                  | $\Delta X$ | $\gamma_q$ | $\psi_0$ |                                  |
|----------------------------------|------------|------------|----------|----------------------------------|
| - Frenamento:                    | 19.3       | x 1.35     | x 1      | = 26.1 mm                        |
| - Termico unif. $\pm 30^\circ$ : | 2 x 9.2    | x 1.2      | x 0.6    | = 13.2 mm                        |
| - Deform. max sottostrutture:    |            |            |          | = 50 mm                          |
| - Deformazione totale:           |            |            |          | = 89.3 mm (< 165 mm: verificato) |

2) Verifica deformazioni trasversali statiche: considerando il vento come carico variabile dominante si ottiene la deformazione massima allo SLU dalla seguente somma:

|                         | $\Delta Y$ | $\gamma_q$ | $\psi_0$ |                                  |
|-------------------------|------------|------------|----------|----------------------------------|
| - Vento strutture:      | 17.6       | x 1.5      | x 1      | = 26.4 mm                        |
| - Vento carichi mobili: | 7.00       | x 1.5      | x 1      | = 10.5 mm                        |
| - Deformazione totale:  |            |            |          | = 36.9 mm (< 165 mm: verificato) |

3) Verifica deformazioni longitudinali sismiche: si ottiene la deformazione massima allo SLC dalla seguente somma:

|                                  | $\Delta X$ | $\gamma_q$ | $\psi_0$ |                                   |
|----------------------------------|------------|------------|----------|-----------------------------------|
| - SLV longitudinale:             | 65.2       | x 1        | x 1      | = 65.2 mm                         |
| - Termico unif. $\pm 30^\circ$ : | 2 x 9.2    | x 1        | x 0.5    | = 9.2 mm                          |
| - Deform. max sottostrutture:    |            |            |          | = 50 mm                           |
| - Deformazione totale:           |            |            |          | = 124.4 mm (< 165 mm: verificato) |

3) Verifica deformazioni trasversali sismiche: si ottiene la deformazione massima allo SLC dalla seguente somma:

|                        | $\Delta Y$ | $\gamma_q$ | $\psi_0$ |                                  |
|------------------------|------------|------------|----------|----------------------------------|
| - SLV trasversale:     | 63.7       | x 1        | x 1      | = 63.7 mm                        |
| - Deformazione totale: |            |            |          | = 63.7 mm (< 165 mm: verificato) |

## 15 VERIFICHE TRASVERSALI DELLA SOLETTA STRADALE DI SCORRIMENTO

### 15.1 VERIFICA IN FASE COSTRUTTIVA

In fase costruttiva la sezione resistente è rappresentata dai tralacci inseriti nelle lastre prefabbricate, sollecitati dal peso della soletta e dal carico accidentale previsto da EN 1991-1-6, § 4.11.2.

#### 15.1.1 FASE COSTRUTTIVA - SBALZO LATERALE

##### VERIFICA LASTRE IN C.A. TRALICCIATE PREFABBRICATE

LASTRE PREFABBRICATE VIADOTTI SU ROTATORIE - CAMPATA A SBALZO: L= 142.5 cm

##### DATI GENERALI LASTRA PREFABBRICATA.

|                                                                                    |                                            |
|------------------------------------------------------------------------------------|--------------------------------------------|
| Schema vincolare in fase costruttiva:                                              | A) Incastro - B) Estremo libero (a sbalzo) |
| Luca di calcolo della lastra:                                                      | L= 142.5 cm                                |
| Larghezza di calcolo della lastra:                                                 | B <sub>c</sub> = 240 cm                    |
| Altezza calcestruzzo lastra:                                                       | H <sub>c</sub> = 6 cm                      |
| Altezza della soletta (getto in opera):                                            | H <sub>s</sub> = 24 cm                     |
| Peso specifico calcestruzzo:                                                       | g <sub>c</sub> = 25 kN/m <sup>3</sup>      |
| Vincolo laterale armature offerto dalla lastra presente nella sezione di verifica: | NO                                         |

##### DATI TRALICCI E ARMATURA AGGIUNTIVA LASTRA PREFABBRICATA.

|                                                                           |                                            |
|---------------------------------------------------------------------------|--------------------------------------------|
| Numero tralacci per lastra:                                               | N <sub>l</sub> = 4                         |
| Altezza nominale del traliccio:                                           | H <sub>l</sub> = 20.5 cm                   |
| Altezza utile del traliccio:                                              | H <sub>u</sub> = 18.8 cm                   |
| Larghezza traliccio:                                                      | B <sub>l</sub> = 12.0 cm                   |
| Passo staffe:                                                             | P <sub>sl</sub> = 20.0 cm                  |
| Ricoprimento tralacci e armature aggiuntive (dal bordo inferiore lastra): | R <sub>l</sub> = 4.0 cm                    |
| Modulo elastico acciaio                                                   | E <sub>s</sub> = 210 000 N/mm <sup>2</sup> |
| Coefficiente parziale di sicurezza dell'acciaio armature:                 | γ <sub>s</sub> = 1.15                      |

##### DATI ARMATURA LASTRA PREFABBRICATA.

Tipo di acciaio  
 Resistenza caratteristica acciaio  
 Resistenza di calcolo acciaio  
 Diametro:  
 Numero di ferri per traliccio (Arm. agg. per lastra):  
 Area di armatura per lastra:  
 Inclinazione ferri in direzione longitudinale:  
 Inclinazione ferri in direzione trasversale:  
 Coefficiente di vincolo:  
 Lunghezza di calcolo per instabilità aste compresse  
 Lunghezza libera d'inflessione (L<sub>0</sub> = β\*L):

|                   | Singolo traliccio |                 |        | Arm. agg. | N/mm <sup>2</sup> |
|-------------------|-------------------|-----------------|--------|-----------|-------------------|
|                   | Corr. Superiore   | Corr. Inferiori | Staffe | lastra    |                   |
|                   | B450C             | B450C           | B450C  | B450C     |                   |
| f <sub>yk</sub> = | 450.00            | 450.00          | 450.00 | 450.00    | N/mm <sup>2</sup> |
| f <sub>yd</sub> = | 391.30            | 391.30          | 391.30 | 391.30    | N/mm <sup>2</sup> |
| Φ=                | 16                | 12              | 10     | 0         | mm                |
| N <sub>F</sub> =  | 1                 | 2               | 2      | 0         |                   |
| A <sub>F</sub> =  | 8.042             | 9.048           | 6.283  | 0.000     | cm <sup>2</sup>   |
| α=                | 0.00              | 0.00            | 70.97  | 0.00      | °                 |
| γ=                | 0.00              | 0.00            | 80.93  | 0.00      | °                 |
| β=                | 1                 | 1               | 1      | 1         |                   |
| L=                | 20.00             | 20.00           | 20.14  | 40.00     | cm                |
| L <sub>0</sub> =  | 20.00             | 20.00           | 20.14  | 40.00     | cm                |

##### DATI DI CARICO

NOTA: Per le azioni in fase di costruzione durante il getto di calcestruzzo ci si riferisce a: UNI EN 1991-1-6, § 4.11.2.

|                                                                         |                        |
|-------------------------------------------------------------------------|------------------------|
| Coefficiente parziale dei carichi permanenti strutturali (peso lastra): | γ <sub>g1</sub> = 1.35 |
| Coefficiente parziale dei carichi permanenti portati (getto in opera):  | γ <sub>g2</sub> = 1.5  |
| Coefficiente parziale dei carichi variabili (sovraccarichi):            | γ <sub>q</sub> = 1.5   |

|                                                                          |                                                                  |            |           |
|--------------------------------------------------------------------------|------------------------------------------------------------------|------------|-----------|
|                                                                          | Estensione del carico permanente (X1=X2 per carico concentrato): | Da X1 (cm) | A X2 (cm) |
| Peso strutturale lastra:                                                 | G <sub>1</sub> = 1.50 kN/mq                                      | 0          | 142.5     |
| Permanente portato 1: getto in opera soletta:                            | G <sub>2,1</sub> = 6.00 kN/mq                                    | 0          | 142.5     |
| Permanente portato 2:                                                    | G <sub>2,2</sub> = 0.00 kN/m                                     | 0          | 0         |
| Permanente portato 3:                                                    | G <sub>2,3</sub> = 0.00 kN/m                                     | 0          | 0         |
| Sovraccarico all'interno dell'area di lavoro di 3 m x 3 m (L se minore): | Q <sub>1</sub> = 0.75 kN/mq                                      |            |           |
| Sovraccarico all'esterno dell'area di lavoro di 3 m x 3 m (L se minore): | Q <sub>2</sub> = 0.75 kN/mq                                      |            |           |

##### SOLLECITAZIONI ALLO S.L.U. NOTA: Le sollecitazioni si intendono riferite alla larghezza della lastra.

|                                |                               |
|--------------------------------|-------------------------------|
| Momento flettente di progetto: | M <sub>sd</sub> = -29.61 KN.m |
| Sforzo di taglio di progetto:  | V <sub>sd</sub> = 41.55 KN    |

##### VERIFICA ALLO S.L.U.

Sforzi assiali nei correnti (N<sub>sd</sub>=M<sub>sd</sub>/H<sub>u</sub>)

Sforzi assiali nelle staffe (N<sub>sd</sub>=V<sub>sd</sub>/(Sen(α)\*Sen(γ)))

Carico elastico critico (N<sub>CR</sub>=p<sup>2</sup>\*E<sub>s</sub>\*J/L<sub>0</sub><sup>3</sup>)  
 Snellezza adimensionale (λ = (A<sub>r</sub> f<sub>yk</sub>/N<sub>CR</sub>)<sup>0.5</sup>)  
 Fattore di imperfezione (NTC 2008; tab. 4.2.VI)  
 Coefficiente di stabilità delle aste compresse:  
 Fattore di riduzione  
 Resistenza di calcolo a compressione (instabilità)  
 Resistenza di calcolo a trazione e compressione  
 Considerare instabilità delle aste compresse (non incluse nel cls.)  
 Resistenza di calcolo considerata (ferro singolo)  
 Sforzo assiale di calcolo (ferro singolo)  
 Coefficiente di sfruttamento (N<sub>sd</sub>/N<sub>rd</sub> < 1: verificato)

|                                    | Corr. Superiore (Teso) | Corr. Inferiori (Compresso) | Staffe (Compresso) | Arm. Agg. (Compresso) |    |
|------------------------------------|------------------------|-----------------------------|--------------------|-----------------------|----|
| N <sub>CR</sub> =                  | 166.690                | 52.742                      | 25.088             | 0.000                 | kN |
| λ=                                 | 0.737                  | 0.982                       | 1.187              | 0.000                 |    |
| α=                                 | 0.490                  | 0.490                       | 0.490              | 0.490                 |    |
| Φ=                                 | 0.903                  | 1.174                       | 1.446              | 0.451                 |    |
| χ=                                 | 0.702                  | 0.550                       | 0.440              | 1.000                 |    |
| N <sub>b,Rd</sub> =                | -55.217                | -24.352                     | -13.524            | 0.000                 | kN |
| N <sub>c,Rd</sub> =                | ±78.676                | ±44.255                     | ±30.733            | ±0.000                | kN |
| SI/NO                              | NO                     | SI                          | SI                 | SI                    |    |
| N <sub>Rd</sub> =                  | 78.676                 | -24.352                     | -13.524            | 0.000                 | kN |
| N <sub>sd</sub> =                  | 39.370                 | -19.685                     | 5.564              | 0.000                 | kN |
| N <sub>sd</sub> /N <sub>Rd</sub> = | 0.500                  | 0.808                       | 0.411              | 0.000                 |    |

### 15.1.2 FASE COSTRUTTIVA - CAMPATA TRA LE TRAVI

La lastra è semplicemente appoggiata agli estremi sulla luce di 280 cm.

#### VERIFICA LASTRE IN C.A. TRALICCIATE PREFABBRICATE

LASTRE PREFABBRICATE VIADOTTI SU ROTATORIE - TRA TRAVI: L=280 cm

##### DATI GENERALI LASTRA PREFABBRICATA.

|                                                                                    |                                       |
|------------------------------------------------------------------------------------|---------------------------------------|
| Schema vincolare in fase costruttiva:                                              | A) Appoggio - B) Appoggio             |
| Luce di calcolo della lastra:                                                      | L= 280 cm                             |
| Larghezza di calcolo della lastra:                                                 | B <sub>c</sub> = 240 cm               |
| Altezza calcestruzzo lastra:                                                       | H <sub>c</sub> = 6 cm                 |
| Altezza della soletta (getto in opera):                                            | H <sub>s</sub> = 24 cm                |
| Peso specifico calcestruzzo:                                                       | g <sub>c</sub> = 25 kN/m <sup>3</sup> |
| Vincolo laterale armature offerto dalla lastra presente nella sezione di verifica: | SI                                    |

##### DATI TRALICCI E ARMATURA AGGIUNTIVA LASTRA PREFABBRICATA.

|                                                                          |                                            |
|--------------------------------------------------------------------------|--------------------------------------------|
| Numero tralici per lastra:                                               | N <sub>T</sub> = 4                         |
| Altezza nominale del traliccio:                                          | H <sub>T</sub> = 20.5 cm                   |
| Altezza utile del traliccio:                                             | H <sub>U</sub> = 18.8 cm                   |
| Larghezza traliccio:                                                     | B <sub>T</sub> = 12.0 cm                   |
| Passo staffe:                                                            | P <sub>ST</sub> = 20.0 cm                  |
| Ricoprimento tralici e armature aggiuntive (dal bordo inferiore lastra): | R <sub>IT</sub> = 4.0 cm                   |
| Modulo elastico acciaio                                                  | E <sub>S</sub> = 210 000 N/mm <sup>2</sup> |
| Coefficiente parziale di sicurezza dell'acciaio armature:                | γ <sub>S</sub> = 1.15                      |

##### DATI ARMATURA LASTRA PREFABBRICATA.

|                                                        | Singolo traliccio        |                 |        | Arm. agg. lastra         |
|--------------------------------------------------------|--------------------------|-----------------|--------|--------------------------|
|                                                        | Corr. Superiore          | Corr. Inferiori | Staffe |                          |
| Tipo di acciaio                                        | B450C                    | B450C           | B450C  | B450C                    |
| Resistenza caratteristica acciaio                      | f <sub>yk</sub> = 450.00 | 450.00          | 450.00 | 450.00 N/mm <sup>2</sup> |
| Resistenza di calcolo acciaio                          | f <sub>yd</sub> = 391.30 | 391.30          | 391.30 | 391.30 N/mm <sup>2</sup> |
| Diametro:                                              | Φ= 16                    | 12              | 10     | 0 mm                     |
| Numero di ferri per traliccio (Arm. agg. per lastra):  | N <sub>F</sub> = 1       | 2               | 2      | 0                        |
| Area di armatura per lastra:                           | A <sub>F</sub> = 8.042   | 9.048           | 6.283  | 0.000 cm <sup>2</sup>    |
| Inclinazione ferri in direzione longitudinale:         | α= 0.00                  | 0.00            | 70.97  | 0.00°                    |
| Inclinazione ferri in direzione trasversale:           | γ= 0.00                  | 0.00            | 80.93  | 0.00°                    |
| Coefficiente di vincolo:                               | β= 1                     | 1               | 1      | 1                        |
| Lunghezza di calcolo per instabilità aste compresse    | L= 20.00                 | 20.00           | 20.14  | 40.00 cm                 |
| Lunghezza libera d'inflessione (L <sub>0</sub> = β*L): | L <sub>0</sub> = 20.00   | 20.00           | 20.14  | 40.00 cm                 |

##### DATI DI CARICO

NOTA: Per le azioni in fase di costruzione durante il getto di calcestruzzo ci si riferisce a: UNI EN 1991-1-6, § 4.11.2.

|                                                                         |                        |
|-------------------------------------------------------------------------|------------------------|
| Coefficiente parziale dei carichi permanenti strutturali (peso lastra): | γ <sub>g1</sub> = 1.35 |
| Coefficiente parziale dei carichi permanenti portati (getto in opera):  | γ <sub>g2</sub> = 1.5  |
| Coefficiente parziale dei carichi variabili (sovraccarichi):            | γ <sub>q</sub> = 1.5   |

|                                                                          |                               |            |           |
|--------------------------------------------------------------------------|-------------------------------|------------|-----------|
| Estensione del carico permanente (X1=X2 per carico concentrato):         |                               | Da X1 (cm) | A X2 (cm) |
| Peso strutturale lastra:                                                 | G <sub>1</sub> = 1.50 kN/mq   | 0          | 280       |
| Permanente portato 1: getto in opera soletta:                            | G <sub>2,1</sub> = 6.00 kN/mq | 0          | 280       |
| Permanente portato 2:                                                    | G <sub>2,2</sub> = 0.00 kN/m  | 0          | 0         |
| Permanente portato 3:                                                    | G <sub>2,3</sub> = 0.00 kN/m  | 0          | 0         |
| Sovraccarico all'interno dell'area di lavoro di 3 m x 3 m (L se minore): | Q <sub>1</sub> = 0.75 kN/mq   |            |           |
| Sovraccarico all'esterno dell'area di lavoro di 3 m x 3 m (L se minore): | Q <sub>2</sub> = 0.75 kN/mq   |            |           |

##### SOLLECITAZIONI ALLO S.L.U. NOTA: Le sollecitazioni si intendono riferite alla larghezza della lastra.

|                                |                              |
|--------------------------------|------------------------------|
| Momento flettente di progetto: | M <sub>Sd</sub> = 28.58 KN.m |
| Sforzo di taglio di progetto:  | V <sub>Sd</sub> = 40.82 KN   |

##### VERIFICA ALLO S.L.U.

Sforzi assiali nei correnti (N<sub>Sd</sub>=M<sub>Sd</sub>/H<sub>U</sub>)  
 Sforzi assiali nelle staffe (N<sub>Sd</sub>=V<sub>Sd</sub>/(Sen(α)\*Sen(γ)))

Carico elastico critico (N<sub>CR</sub>=p<sup>2</sup>\*E<sub>S</sub>\*J/L<sub>0</sub><sup>3</sup>)  
 Snellezza adimensionale (λ = (A<sub>I</sub> f<sub>yk</sub>/N<sub>CR</sub>)<sup>0.5</sup>)  
 Fattore di imperfezione (NTC 2008; tab. 4.2.VI)  
 Coefficiente di stabilità delle aste compresse:  
 Fattore di riduzione  
 Resistenza di calcolo a compressione (instabilità)  
 Resistenza di calcolo a trazione e compressione  
 Considerare instabilità delle aste compresse (non incluse nel cls.)  
 Resistenza di calcolo considerata (ferro singolo)  
 Sforzo assiale di calcolo (ferro singolo)  
 Coefficiente di sfruttamento (N<sub>Sd</sub>/N<sub>Rd</sub> < 1: verificato)

|                                    | Corr. Superiore (Compresso) | Corr. Inferiori (Teso) | Staffe (Compresso) | Arm. Agg. (Teso) |
|------------------------------------|-----------------------------|------------------------|--------------------|------------------|
| N <sub>CR</sub> =                  | 166.690                     | 52.742                 | 25.088             | 0.000 kN         |
| λ=                                 | 0.737                       | 0.982                  | 1.187              | 0.000            |
| α=                                 | 0.490                       | 0.490                  | 0.490              | 0.490            |
| Φ=                                 | 0.903                       | 1.174                  | 1.446              | 0.451            |
| χ=                                 | 0.702                       | 0.550                  | 0.440              | 1.000            |
| N <sub>b,Rd</sub> =                | -55.217                     | -24.352                | -13.524            | 0.000 kN         |
| N <sub>c,Rd</sub> =                | ±78.676                     | ±44.255                | ±30.733            | ±0.000 kN        |
| SI/NO                              | SI                          | NO                     | SI                 | NO               |
| N <sub>Rd</sub> =                  | -55.217                     | 44.255                 | -13.524            | 0.000 kN         |
| N <sub>Sd</sub> =                  | -38.001                     | 19.001                 | 5.466              | 0.000 kN         |
| N <sub>Sd</sub> /N <sub>Rd</sub> = | 0.688                       | 0.429                  | 0.404              | 0.000            |

## 15.2 VERIFICA IN ESERCIZIO - SBALZO LATERALE INTERNO (LATO CORDOLO)

La verifica viene svolta per lo sbalzo lato cordolo da 80 cm su una porzione di soletta avente una luce  $L = 1.425$  m dall'asse trave.

La determinazione delle sollecitazioni massime viene svolta con apposito foglio di calcolo considerando i carichi permanenti e tutte le possibili colonne di carico mobile, compatibilmente con lo sbalzo considerato.

Si considerano in alternativa:

- colonne di schemi di carico 1
- schema di carico 2

Inoltre si considera una combinazione eccezionale con i carichi di cui sopra (con coefficienti SLU unitari) e l'effetto di urto sul sicurvia

Le singole ruote dei carichi mobili vengono disposte in modo da ottenere o il momento flettente massimo o lo sforzo di taglio massimo alla sezione di incastro.

Verifica allo stato limite ultimo: si determina l'area di armatura minima necessaria (verifica a flessione) e l'area minima di armatura trasversale (verifica a taglio).

Verifica allo stato limite di esercizio: si effettua la verifica allo stato limite di fessurazione per via indiretta dimensionando l'armatura minima lavorante ad una definita tensione, funzione del diametro massimo delle barre e dell'apertura ammissibile delle fessure; nel presente caso si ha:

- condizioni ambientali: Molto aggressive
- apertura max fessure, combinazioni frequenti:  $w_1 = 0.2$  mm
- apertura max fessure, combinazioni quasi permanenti:  $w_1 = 0.2$  mm
- diametro massimo delle barre:  $\varnothing = 25$  mm

Dalla tabella C4.1.11 della Circ. 02/02/2009 n°617 si ottiene:

- Tensione di progetto nell'acciaio:  $\sigma_s = 160$  N/mm<sup>2</sup>



**Verifica dello sbalzo trasversale: sezione corrente**

**L= 1.425 m**

|                                                                  |                                        |         |            |         |            |  |            |  |                          |
|------------------------------------------------------------------|----------------------------------------|---------|------------|---------|------------|--|------------|--|--------------------------|
| Altezza della lastra prefabbricata                               |                                        |         |            |         |            |  |            |  | 0.060 m                  |
| Altezza totale soletta all'incastro                              |                                        |         |            |         |            |  |            |  | 0.300 m                  |
| Altezza totale soletta all'estremità libera                      |                                        |         |            |         |            |  |            |  | 0.300 m                  |
| Lunghezza di calcolo dello sbalzo                                |                                        |         |            |         |            |  |            |  | 1.425 m                  |
| Larghezza del marciapiede                                        |                                        |         |            |         |            |  |            |  | 0.800 m                  |
| Altezza del marciapiede                                          |                                        |         |            |         |            |  |            |  | 0.150 m                  |
| Peso specifico calcestruzzo armato                               |                                        |         |            |         |            |  |            |  | 25.000 kN/m <sup>3</sup> |
| Altezza della massicciata                                        |                                        |         |            |         |            |  |            |  | 0.100 m                  |
| Peso della massicciata                                           |                                        |         |            |         |            |  |            |  | 2.500 kN/m <sup>2</sup>  |
| Peso del sicurvìa                                                |                                        |         |            |         |            |  |            |  | 0.800 kN/m               |
| Distanza asse sicurvìa da incastro                               |                                        |         |            |         |            |  |            |  | 1.025 m                  |
| Peso del parapetto                                               |                                        |         |            |         |            |  |            |  | 0.000 kN/m               |
| Distanza asse parapetto da incastro                              |                                        |         |            |         |            |  |            |  | 1.425 m                  |
| Peso della veletta                                               |                                        |         |            |         |            |  |            |  | 0.000 kN/m               |
| Distanza asse veletta da incastro                                |                                        |         |            |         |            |  |            |  | 1.425 m                  |
| Carico della folla (di combinazione)                             |                                        |         |            |         |            |  |            |  | 0.000 kN/m               |
| Distanza asse folla da incastro                                  |                                        |         |            |         |            |  |            |  | 1.425 m                  |
| Coefficiente dinamico                                            |                                        |         |            |         |            |  |            |  | 1.000                    |
| Schema di carico 1:                                              | Larghezza delle colonne di carico      |         |            |         |            |  |            |  | 3.000 m                  |
|                                                                  | Interasse ruote in senso trasversale   |         |            |         |            |  |            |  | 2.000 m                  |
|                                                                  | Interasse ruote in senso longitudinale |         |            |         |            |  |            |  | 1.200 m                  |
|                                                                  | Lati dell'impronta ruota: L=           | 0.400 m |            | T=      |            |  |            |  | 0.400 m                  |
|                                                                  |                                        |         | 1° colonna |         | 2° colonna |  | 3° colonna |  |                          |
|                                                                  | Peso singola ruota                     | 150.000 |            | 100.000 |            |  |            |  | 50.000 kN                |
|                                                                  | Carico distribuito                     | 9.000   |            | 2.500   |            |  |            |  | 2.500 kN/m <sup>2</sup>  |
| Schema di carico 2:                                              | Interasse ruote in senso trasversale   |         |            |         |            |  |            |  | 2.000 m                  |
|                                                                  | Interasse ruote in senso longitudinale |         |            |         |            |  |            |  | 0.000 m                  |
|                                                                  | Lati dell'impronta ruota: L=           | 0.350 m |            | T=      |            |  |            |  | 0.600 m                  |
|                                                                  | Peso singola ruota                     |         |            |         |            |  |            |  | 200.000 kN               |
| Angolo di ripartizione verticale dei carichi nello spessore      |                                        |         |            |         |            |  |            |  | 45.000 °                 |
| Angolo di ripartizione orizzontale dei carichi (effetto piastra) |                                        |         |            |         |            |  |            |  | 45.000 °                 |

Tabella dei carichi mobili

|            |                                                    |
|------------|----------------------------------------------------|
| n° ruote = | numero ruote carico considerato                    |
| b=         | braccio del carico in esame (risultante)           |
| lrip =     | larghezza di ripartizione del carico ruote         |
| q=         | carico distribuito sulla larghezza di ripartizione |

|            | n° carico              | n° ruote | Massimo momento flettente |          |           | Massimo sforzo di taglio |          |           |
|------------|------------------------|----------|---------------------------|----------|-----------|--------------------------|----------|-----------|
|            |                        |          | bm (m)                    | lrip (m) | qm (kN/m) | bt (m)                   | lrip (m) | qt (kN/m) |
| 1° colonna | Schema 1 - distribuito |          | 0.313                     | 1.000    | 5.625     | 0.313                    | 1.000    | 5.625     |
|            | Schema 1 - 1° fila     | 1        | 0.125                     | 1.090    | 137.615   | 0.125                    | 1.090    | 137.615   |
|            | Schema 1 - 1° fila     | 2        | 0.125                     | 2.290    | 131.004   | 0.125                    | 2.290    | 131.004   |
|            | Schema 1 - 2° fila     | 2        | 0.000                     | 2.040    | 0.000     | 0.000                    | 2.040    | 0.000     |
| 2° colonna | Schema 1 - distribuito |          | 0.000                     | 1.000    | 0.000     | 0.000                    | 1.000    | 0.000     |
|            | Schema 1 - 1° fila     | 1        | 0.000                     | 0.840    | 0.000     | 0.000                    | 0.840    | 0.000     |
|            | Schema 1 - 1° fila     | 2        | 0.000                     | 2.040    | 0.000     | 0.000                    | 2.040    | 0.000     |
|            | Schema 1 - 2° fila     | 2        | 0.000                     | 2.040    | 0.000     | 0.000                    | 2.040    | 0.000     |
| 3° colonna | Schema 1 - distribuito |          | 0.000                     | 1.000    | 0.000     | 0.000                    | 1.000    | 0.000     |
|            | Schema 1 - 1° fila     | 1        | 0.000                     | 0.840    | 0.000     | 0.000                    | 0.840    | 0.000     |
|            | Schema 1 - 1° fila     | 2        | 0.000                     | 2.040    | 0.000     | 0.000                    | 2.040    | 0.000     |
|            | Schema 1 - 2° fila     | 2        | 0.000                     | 2.040    | 0.000     | 0.000                    | 2.040    | 0.000     |
|            | Schema 2 - 1° fila     | 1        | 0.325                     | 1.440    | 138.889   | 0.325                    | 1.440    | 94.039    |
|            | Schema 2 - 2° fila     | 1        | 0.000                     | 0.000    | 0.000     | 0.000                    | 0.790    | 0.000     |

|                                                  |            |
|--------------------------------------------------|------------|
| Effetto d'urto sul sicurvìa (azione eccezionale) | 100.000 kN |
| Altezza della forza d'urto da estradosso soletta | 1.150 m    |
| Larghezza di ripartizione urto                   | 3.090 m    |

**Sollecitazioni all'incastro; sezione corrente**

| Tipo di carico            | Tagli (kN/m) | Momenti (kNm/m) | Sf.norm (kN/m) |
|---------------------------|--------------|-----------------|----------------|
| Peso proprio (rettangolo) | 10.688       | -7.615          | 0.000          |
| Peso proprio (triangolo)  | 0.000        | 0.000           | 0.000          |
| Marciapiede               | 3.000        | -3.075          | 0.000          |
| Massicciata               | 1.563        | -0.488          | 0.000          |
| Sicurvia                  | 0.800        | -0.820          | 0.000          |
| Parapetto                 | 0.000        | 0.000           | 0.000          |
| Veletta                   | 0.000        | 0.000           | 0.000          |
| Folla                     | 0.000        | 0.000           | 0.000          |
| Schema 1 - distribuito    | 5.625        | -1.758          | 0.000          |
| Schema 1 (tandem max)     | 137.615      | -17.202         | 0.000          |
| Schema 2 (max)            | 94.039       | -45.139         | 0.000          |
| Urto                      | 0.000        | -42.071         | 32.362         |

| Coefficienti parziali ( $\gamma \times \psi$ ) | SLU   | SLU ECC: | SLE (rare) | SLE (frequenti) | SLE (quasi perm.) |
|------------------------------------------------|-------|----------|------------|-----------------|-------------------|
| Carichi permanenti                             | 1.350 | 1.000    | 1.000      | 1.000           | 1.000             |
| Carichi mobili - Tandem                        | 1.350 | 1.000    | 1.000      | 0.750           | 0.000             |
| Carichi mobili - Distribuiti                   | 1.350 | 1.000    | 1.000      | 0.400           | 0.000             |

**Sollecitazioni complessive all'incastro; sezione corrente**

| Tipo di carico                         | Tagli (kN/m) | Momenti (kNm/m) | Sf.norm (kN/m) |
|----------------------------------------|--------------|-----------------|----------------|
| SLU Totali perm.+ mobili               | 215.041      | -77.135         | 0.000          |
| SLU ECC. Totali perm.+ mobili + urto   | 159.290      | -99.208         | 32.362         |
| SLE (rare) Totali perm.+ mobili        | 159.290      | -57.137         | 0.000          |
| SLE (frequenti) Totali perm.+ mobili   | 121.511      | -45.852         | 0.000          |
| SLE (quasi perm.) Totali perm.+ mobili | 16.050       | -11.998         | 0.000          |

**Dimensionamento armature minime allo SLU**

|                                                     |                   |                           |
|-----------------------------------------------------|-------------------|---------------------------|
| Resistenza di calcolo calcestruzzo:                 | fc <sub>d</sub> = | 18.13 N/mm <sup>2</sup>   |
| Resistenza di calcolo armatura:                     | fs <sub>d</sub> = | 391.30 N/mm <sup>2</sup>  |
| Modulo di elasticità armatura:                      | Es=               | 210000 N/mm <sup>2</sup>  |
| Ricoprimento armature:                              | Ry=               | 60 mm                     |
| Inclinazione delle staffe (45° ≤ α ≤ 90°)           | α=                | 90.00 °                   |
| Inclinazione di calcolo dei puntoni di calcestruzzo | θ =               | 21.80 °                   |
| Altezza utile della sezione di incastro             | d=                | 24.00 cm                  |
| Altezza minima sezione reagente:                    | X=                | 2.91 cm                   |
| Area di armatura tesa minima:                       | As(sup)=          | 11.60 cm <sup>2</sup> /m  |
| Area di armatura compressa minima:                  | As(inf)=          | 0.00 cm <sup>2</sup> /m   |
| Verifica resistenza al taglio, solo cls.            | Vrd,c=            | 125.71 kN                 |
| Coefficiente di sicurezza, solo cls.                | Vrd,c/Vsd=        | 0.585 < 1: NON Verificato |
| Area di armatura trasversale necessaria per taglio: | Ast=              | 10.18 cm <sup>2</sup> /mq |

**Dimensionamento armature minime allo SLE**

|                                    |          | SLE (frequenti) | SLE (quasi perm.)       |
|------------------------------------|----------|-----------------|-------------------------|
| Valore limite di apertura fessure: | wd=      | 0.2             | 0.2 mm                  |
| Tensione di calcolo armatura:      | Sa=      | 160             | 160 N/mm <sup>2</sup>   |
| Tensione nel calcestruzzo          | Sc=      | 5.36            | 2.41 N/mm <sup>2</sup>  |
| Area di armatura tesa minima:      | As(sup)= | 13.44           | 3.33 cm <sup>2</sup> /m |

### 15.3 VERIFICA IN ESERCIZIO - SBALZO LATERALE ESTERNO (LATO MARCIAPIEDE)

La verifica viene svolta per lo sbalzo lato marciapiede da 190 cm su una porzione di soletta avente una luce L= 1.425 m dall'asse trave.

|                                                            |                                                                  |            |                          |
|------------------------------------------------------------|------------------------------------------------------------------|------------|--------------------------|
| <b>Verifica dello sbalzo trasversale: sezione corrente</b> |                                                                  | <b>L=</b>  | <b>1.425 m</b>           |
| Altezza della lastra prefabbricata                         |                                                                  |            | 0.060 m                  |
| Altezza totale soletta all'incastro                        |                                                                  |            | 0.300 m                  |
| Altezza totale soletta all'estremità libera                |                                                                  |            | 0.300 m                  |
| Lunghezza di calcolo dello sbalzo                          |                                                                  |            | 1.425 m                  |
| Larghezza del marciapiede                                  |                                                                  |            | 1.425 m                  |
| Altezza del marciapiede                                    |                                                                  |            | 0.150 m                  |
| Peso specifico calcestruzzo armato                         |                                                                  |            | 25.000 kN/m <sup>3</sup> |
| Altezza della massicciata                                  |                                                                  |            | 0.100 m                  |
| Peso della massicciata                                     |                                                                  |            | 2.500 kN/m <sup>2</sup>  |
| Peso del sicurvìa                                          |                                                                  |            | 0.800 kN/m               |
| Distanza asse sicurvìa da incastro                         |                                                                  |            | 1.025 m                  |
| Peso del parapetto                                         |                                                                  |            | 0.500 kN/m               |
| Distanza asse parapetto da incastro                        |                                                                  |            | 1.325 m                  |
| Peso della veletta                                         |                                                                  |            | 2.000 kN/m               |
| Distanza asse veletta da incastro                          |                                                                  |            | 1.475 m                  |
| Carico della folla (di combinazione)                       |                                                                  |            | 6.000 kN/m               |
| Distanza asse folla da incastro                            |                                                                  |            | 0.625 m                  |
| Coefficiente dinamico                                      |                                                                  |            | 1.000                    |
| Schema di carico 1:                                        | Larghezza delle colonne di carico                                |            | 3.000 m                  |
|                                                            | Interasse ruote in senso trasversale                             |            | 2.000 m                  |
|                                                            | Interasse ruote in senso longitudinale                           |            | 1.200 m                  |
|                                                            | Lati dell'impronta ruota: L=                                     | 0.400 m    | T= 0.400 m               |
|                                                            |                                                                  | 1° colonna | 2° colonna               |
|                                                            | Peso singola ruota                                               | 150.000    | 100.000                  |
|                                                            | Carico distribuito                                               | 9.000      | 2.500                    |
|                                                            |                                                                  |            | 3° colonna               |
|                                                            |                                                                  |            | 50.000 kN                |
| Schema di carico 2:                                        | Interasse ruote in senso trasversale                             |            | 2.000 m                  |
|                                                            | Interasse ruote in senso longitudinale                           |            | 0.000 m                  |
|                                                            | Lati dell'impronta ruota: L=                                     | 0.350 m    | T= 0.600 m               |
|                                                            | Peso singola ruota                                               |            | 200.000 kN               |
|                                                            | Angolo di ripartizione verticale dei carichi nello spessore      |            | 45.000 °                 |
|                                                            | Angolo di ripartizione orizzontale dei carichi (effetto piastra) |            | 45.000 °                 |
| Tabella dei carichi mobili                                 |                                                                  |            |                          |
| n° ruote =                                                 | numero ruote carico considerato                                  |            |                          |
| b=                                                         | braccio del carico in esame (risultante)                         |            |                          |
| lrip =                                                     | larghezza di ripartizione del carico ruote                       |            |                          |
| q=                                                         | carico distribuito sulla larghezza di ripartizione               |            |                          |

|                    | n° carico              | n° ruote | Massimo momento flettente |          |           | Massimo sforzo di taglio |          |           |
|--------------------|------------------------|----------|---------------------------|----------|-----------|--------------------------|----------|-----------|
|                    |                        |          | bm (m)                    | lrip (m) | qm (kN/m) | bt (m)                   | lrip (m) | qt (kN/m) |
| 1° colonna         | Schema 1 - distribuito |          | 0.000                     | 1.000    | 0.000     | 0.000                    | 1.000    | 0.000     |
|                    | Schema 1 - 1° fila     | 1        | 0.000                     | 0.840    | 0.000     | 0.000                    | 0.840    | 0.000     |
|                    | Schema 1 - 1° fila     | 2        | 0.000                     | 2.040    | 0.000     | 0.000                    | 2.040    | 0.000     |
|                    | Schema 1 - 2° fila     | 2        | 0.000                     | 2.040    | 0.000     | 0.000                    | 2.040    | 0.000     |
| 2° colonna         | Schema 1 - distribuito |          | 0.000                     | 1.000    | 0.000     | 0.000                    | 1.000    | 0.000     |
|                    | Schema 1 - 1° fila     | 1        | 0.000                     | 0.840    | 0.000     | 0.000                    | 0.840    | 0.000     |
|                    | Schema 1 - 1° fila     | 2        | 0.000                     | 2.040    | 0.000     | 0.000                    | 2.040    | 0.000     |
|                    | Schema 1 - 2° fila     | 2        | 0.000                     | 2.040    | 0.000     | 0.000                    | 2.040    | 0.000     |
| 3° colonna         | Schema 1 - distribuito |          | 0.000                     | 1.000    | 0.000     | 0.000                    | 1.000    | 0.000     |
|                    | Schema 1 - 1° fila     | 1        | 0.000                     | 0.840    | 0.000     | 0.000                    | 0.840    | 0.000     |
|                    | Schema 1 - 1° fila     | 2        | 0.000                     | 2.040    | 0.000     | 0.000                    | 2.040    | 0.000     |
|                    | Schema 1 - 2° fila     | 2        | 0.000                     | 2.040    | 0.000     | 0.000                    | 2.040    | 0.000     |
|                    | Schema 2 - 1° fila     | 1        | 0.000                     | 0.000    | 0.000     | 0.000                    | 0.790    | 0.000     |
| Schema 2 - 2° fila | 1                      | 0.000    | 0.000                     | 0.000    | 0.000     | 0.790                    | 0.000    |           |

|                                                  |            |
|--------------------------------------------------|------------|
| Effetto d'urto sul sicurvìa (azione eccezionale) | 100.000 kN |
| Altezza della forza d'urto da estradosso soletta | 1.150 m    |
| Larghezza di ripartizione urto                   | 3.090 m    |

**Sollecitazioni all'incastro; sezione corrente**

| Tipo di carico            | Tagli (kN/m) | Momenti (kNm/m) | Sf.norm (kN/m) |
|---------------------------|--------------|-----------------|----------------|
| Peso proprio (rettangolo) | 10.688       | -7.615          | 0.000          |
| Peso proprio (triangolo)  | 0.000        | 0.000           | 0.000          |
| Marciapiede               | 5.344        | -3.807          | 0.000          |
| Massicciata               | 0.000        | 0.000           | 0.000          |
| Sicurvia                  | 0.800        | -0.820          | 0.000          |
| Parapetto                 | 0.500        | -0.663          | 0.000          |
| Veletta                   | 2.000        | -2.950          | 0.000          |
| Folla                     | 6.000        | -3.750          | 0.000          |
| Schema 1 - distribuito    | 0.000        | 0.000           | 0.000          |
| Schema 1 (tandem max)     | 0.000        | 0.000           | 0.000          |
| Schema 2 (max)            | 0.000        | 0.000           | 0.000          |
| Urto                      | 0.000        | -42.071         | 32.362         |

| Coefficienti parziali ( $\gamma \times \psi$ ) | SLU   | SLU ECC: | SLE (rare) | SLE (frequenti) | SLE (quasi perm.) |
|------------------------------------------------|-------|----------|------------|-----------------|-------------------|
| Carichi permanenti                             | 1.350 | 1.000    | 1.000      | 1.000           | 1.000             |
| Carichi mobili - Tandem                        | 1.350 | 1.000    | 1.000      | 0.750           | 0.000             |
| Carichi mobili - Distribuiti                   | 1.350 | 1.000    | 1.000      | 0.400           | 0.000             |

**Sollecitazioni complessive all'incastro; sezione corrente**

| Tipo di carico                         | Tagli (kN/m) | Momenti (kNm/m) | Sf.norm (kN/m) |
|----------------------------------------|--------------|-----------------|----------------|
| SLU Totali perm.+ mobili               | 34.197       | -26.466         | 0.000          |
| SLU ECC. Totali perm.+ mobili + urto   | 19.331       | -57.926         | 32.362         |
| SLE (rare) Totali perm.+ mobili        | 25.331       | -19.605         | 0.000          |
| SLE (frequenti) Totali perm.+ mobili   | 21.731       | -17.355         | 0.000          |
| SLE (quasi perm.) Totali perm.+ mobili | 19.331       | -15.855         | 0.000          |

**Dimensionamento armature minime allo SLU**

|                                                     |            |                          |
|-----------------------------------------------------|------------|--------------------------|
| Resistenza di calcolo calcestruzzo:                 | fc,d=      | 18.13 N/mm <sup>2</sup>  |
| Resistenza di calcolo armatura:                     | fs,d=      | 391.30 N/mm <sup>2</sup> |
| Modulo di elasticità armatura:                      | Es=        | 210000 N/mm <sup>2</sup> |
| Ricoprimento armature (asse):                       | Ry=        | 60 mm                    |
| Inclinazione delle staffe (45° <= α <= 90°)         | α=         | 90.00 °                  |
| Inclinazione di calcolo dei puntoni di calcestruzzo | θ =        | 21.80 °                  |
| Altezza utile della sezione di incastro             | d=         | 24.00 cm                 |
| Altezza minima sezione reagente:                    | X=         | 1.62 cm                  |
| Area di armatura tesa minima:                       | As(sup)=   | 6.85 cm <sup>2</sup> /m  |
| Area di armatura compressa minima:                  | As(inf)=   | 0.00 cm <sup>2</sup> /m  |
| Verifica resistenza al taglio, solo cls.            | Vrd,c=     | 125.71 kN                |
| Coefficiente di sicurezza, solo cls.                | Vrd,c/Vsd= | 3.676 >1: Verificato     |
| Area di armatura trasversale necessaria per taglio: | Ast=       | N.D. cm <sup>2</sup> /mq |

**Dimensionamento armature minime allo SLE**

|                                    |          | SLE (frequenti) | SLE (quasi perm.)       |
|------------------------------------|----------|-----------------|-------------------------|
| Valore limite di apertura fessure: | wd=      | 0.2             | 0.2 mm                  |
| Tensione di calcolo armatura:      | Sa=      | 160             | 160 N/mm <sup>2</sup>   |
| Tensione nel calcestruzzo          | Sc=      | 2.98            | 2.83 N/mm <sup>2</sup>  |
| Area di armatura tesa minima:      | As(sup)= | 4.87            | 4.44 cm <sup>2</sup> /m |

## 15.4 VERIFICA IN ESERCIZIO - SOLETTA INTERNA TRA LE TRAVI

La soletta tra le travi si schematizza come trave semi-incastata di luce 3.20 m per una larghezza di calcolo unitaria.

|                                                                            |                                        |            |            |                          |
|----------------------------------------------------------------------------|----------------------------------------|------------|------------|--------------------------|
| <b>Verifica soletta tra le travi(o su travi a canaletta)</b>               |                                        | <b>L =</b> |            | <b>3.200 m</b>           |
| Altezza della lastra prefabbricata                                         |                                        |            |            | 0.060 m                  |
| Altezza della soletta                                                      |                                        |            |            | 0.300 m                  |
| Luce di calcolo                                                            |                                        |            |            | 3.200 m                  |
| Peso specifico calcestruzzo armato                                         |                                        |            |            | 25.000 kN/m <sup>3</sup> |
| Altezza della massicciata                                                  |                                        |            |            | 0.100 m                  |
| Peso della massicciata                                                     |                                        |            |            | 2.500 kN/m <sup>2</sup>  |
| Coefficiente dinamico                                                      |                                        |            |            | 1.000                    |
| Schema di carico 1:                                                        | Larghezza delle colonne di carico      |            |            | 3.000 m                  |
|                                                                            | Interasse ruote in senso trasversale   |            |            | 2.000 m                  |
|                                                                            | Interasse ruote in senso longitudinale |            |            | 1.200 m                  |
|                                                                            | Lati dell'impronta ruota: L=           | 0.400 m    | T=         | 0.400 m                  |
|                                                                            |                                        | 1° colonna | 2° colonna | 3° colonna               |
|                                                                            | Peso singola ruota                     | 150.000    | 100.000    | 50.000 kN                |
|                                                                            | Carico distribuito                     | 9.000      | 2.500      | 2.500 kN/m <sup>2</sup>  |
| Schema di carico 2:                                                        | Interasse ruote in senso trasversale   |            |            | 2.000 m                  |
|                                                                            | Interasse ruote in senso longitudinale |            |            | 0.000 m                  |
|                                                                            | Lati dell'impronta ruota: L=           | 0.350 m    | T=         | 0.600 m                  |
|                                                                            | Peso singola ruota                     |            |            | 200.000 kN               |
| Angolo di ripartizione verticale dei carichi nello spessore                |                                        |            |            | 45.000 °                 |
| Angolo di ripartizione orizzontale dei carichi (effetto piastra)           |                                        |            |            | 45.000 °                 |
| Efficienza minima dei vncoli di incastro (0=appoggio; 1=incastro perfetto) |                                        |            |            | 0.750                    |

Tabella dei carichi mobili

|            |                                                                              |
|------------|------------------------------------------------------------------------------|
| n° ruote = | numero ruote carico considerato                                              |
| xm =       | distanza dall'incastro del carico in esame (disposizione di momento massimo) |
| xt =       | distanza dall'incastro del carico in esame (disposizione di taglio massimo)  |
| lrip =     | larghezza di ripartizione del carico ruote                                   |
| q=         | carico distribuito sulla larghezza di ripartizione                           |

|            | n° carico              | n° ruote | Massimo momento flettente |          |           | Massimo sforzo di taglio |          |           |
|------------|------------------------|----------|---------------------------|----------|-----------|--------------------------|----------|-----------|
|            |                        |          | xm (m)                    | lrip (m) | qm (kN/m) | xt (m)                   | lrip (m) | qt (kN/m) |
| 1° colonna | Schema 1 - distribuito |          | 2.150                     | 1.000    | 18.900    | 1.500                    | 1.000    | 27.000    |
|            | Schema 1 - 1° fila     | 1        | 1.600                     | 2.440    | 61.475    | 0.500                    | 2.440    | 61.475    |
|            | Schema 1 - 1° fila     | 2        | 1.600                     | 3.640    | 82.418    | 0.500                    | 3.640    | 82.418    |
|            | Schema 1 - 2° fila     | 2        | 0.000                     | 0.000    | 0.000     | 2.500                    | 3.640    | 82.418    |
| 2° colonna | Schema 1 - distribuito |          | 1.500                     | 1.000    | 7.500     | 2.950                    | 1.000    | 1.250     |
|            | Schema 1 - 1° fila     | 1        | 0.600                     | 2.440    | 40.984    | 3.200                    | 2.440    | 40.984    |
|            | Schema 1 - 1° fila     | 2        | 0.600                     | 3.640    | 54.945    | 3.200                    | 3.640    | 54.945    |
|            | Schema 1 - 2° fila     | 2        | 0.000                     | 0.000    | 0.000     | 0.000                    | 0.000    | 0.000     |
| 3° colonna | Schema 1 - distribuito |          | 0.000                     | 1.000    | 0.000     | 0.000                    | 1.000    | 0.000     |
|            | Schema 1 - 1° fila     | 1        | 0.000                     | 0.000    | 0.000     | 0.000                    | 0.000    | 0.000     |
|            | Schema 1 - 1° fila     | 2        | 0.000                     | 0.000    | 0.000     | 0.000                    | 0.000    | 0.000     |
|            | Schema 1 - 2° fila     | 2        | 0.000                     | 0.000    | 0.000     | 0.000                    | 0.000    | 0.000     |
|            | Schema 2 - 1° fila     | 1        | 1.600                     | 2.390    | 83.682    | 0.500                    | 2.390    | 83.682    |
|            | Schema 2 - 2° fila     | 1        | 0.000                     | 0.000    | 0.000     | 2.500                    | 2.390    | 83.682    |

**Sollecitazioni massime/minime**

| Tipo di carico         | Taglio max (kN/m) | Momento max (kNm/m) | Momento min (kNm/m) |
|------------------------|-------------------|---------------------|---------------------|
| Peso soletta           | 12.000            | 4.800               | -6.400              |
| Massicciata            | 4.000             | 1.600               | -2.133              |
| Schema 1 - distribuito | 15.615            | 6.204               | -8.885              |
| Schema 1 (max/min)     | 131.895           | 39.940              | -52.522             |
| Schema 2 (max/min)     | 88.176            | 31.846              | -39.354             |

| Coefficienti parziali (γ X ψ) | SLU   | SLE (rare) | SLE (frequenti) | SLE (quasi perm.) |
|-------------------------------|-------|------------|-----------------|-------------------|
| Carichi permanenti            | 1.350 | 1.000      | 1.000           | 1.000             |
| Carichi mobili - Tandem       | 1.350 | 1.000      | 0.750           | 0.000             |
| Carichi mobili - Distribuiti  | 1.350 | 1.000      | 0.400           | 0.000             |

**Sollecitazioni compressive massime/minime**

| Tipo di carico                         | Taglio max (kN/m) | Momento max (kNm/m) | Momento min (kNm/m) |
|----------------------------------------|-------------------|---------------------|---------------------|
| SLU Totali perm.+ mobili               | 220.739           | 70.935              | -94.420             |
| SLE (rare) Totali perm.+ mobili        | 163.510           | 52.545              | -69.940             |
| SLE (frequenti) Totali perm.+ mobili   | 121.167           | 38.837              | -51.479             |
| SLE (quasi perm.) Totali perm.+ mobili | 16.000            | 6.400               | -8.533              |

**Dimensionamento armature minime allo SLU**

|                                                     |          |                 |
|-----------------------------------------------------|----------|-----------------|
| Resistenza di calcolo calcestruzzo:                 | fcd=     | 19.83 N/mmq     |
| Resistenza di calcolo armatura:                     | fsd=     | 391.30 N/mmq    |
| Modulo di elasticità armatura:                      | Es=      | 210000.00 N/mmq |
| Ricoprimento armature:                              | Ry(sup)= | 50 mm           |
|                                                     | Ry(Inf)= | 80 mm           |
| Inclinazione delle staffe (45° ≤ α ≤ 90°)           | α=       | 90.00 °         |
| Inclinazione di calcolo dei puntoni di calcestruzzo | θ =      | 21.80 °         |

|                                                | Momento max   | Momento min              |
|------------------------------------------------|---------------|--------------------------|
| Altezza utile della sezione                    | d= 22.00      | 25.00 cm                 |
| Altezza sezione reagente:                      | X= 2.11       | 2.48 cm                  |
| Area di armatura superiore minima:             | As(sup)= 0.00 | 10.05 cmq/m              |
| Area di armatura inferiore minima:             | As(Inf)= 8.57 | 0.00 cmq/m               |
| Verifica resistenza al taglio, solo cls.       | Vrd,c=        | 137.20 kN                |
| Coefficiente di sicurezza, solo cls.           | Vrd,c/Vsd=    | 0.622 <1: NON Verificato |
| Area di armatura trasversale necessaria per ta | Ast=          | 10.03 cmq/mq             |

**Dimensionamento armature minime allo SLE (frequenti)**

|                                    | Momento max | Momento min |
|------------------------------------|-------------|-------------|
| Valore limite di apertura fessure: | wd=         | 0.2         |
| Tensione di calcolo armatura:      | Sa=         | 160 N/mmq   |
| Tensione nel calcestruzzo          | Sc=         | 5.39        |
| Area di armatura superiore minima: | As(sup)=    | 0.00        |
| Area di armatura inferiore minima: | As(Inf)=    | 12.42       |

## 15.5 VERIFICA CORDOLI

Si effettua la verifica della resistenza a taglio delle armature di collegamento tra la soletta e il cordolo sotto l'effetto dell'urto sul sicurvia; per il cordolo interno (con armatura minima) si ha:

- effetto di urto sul sicurvia:  $H = 100 \text{ kN}$
- larghezza di applicazione:  $b = 0.50 \text{ m}$
- area armature:  $1 + 1 \text{ } \varnothing 16 / 20$ :  $A_1 = 2 \times 201 \times 50 / 20 = 1005 \text{ mm}^2$   
 $1 \text{ } \varnothing 12 / 20 / 40$ :  $A_2 = 113 \times 50 / 20 = 283 \text{ mm}^2$   
 $A = 1005 + 283 = 1288 \text{ mm}^2$
- resistenza tangenziale di calcolo:  $t_d = \frac{450}{1.15\sqrt{3}} = 226 \text{ N/mm}^2$
- resistenza di calcolo:  $R = 226 \times 1.288 = 291 \text{ kN}$  (Verificato:  $R > H$ )

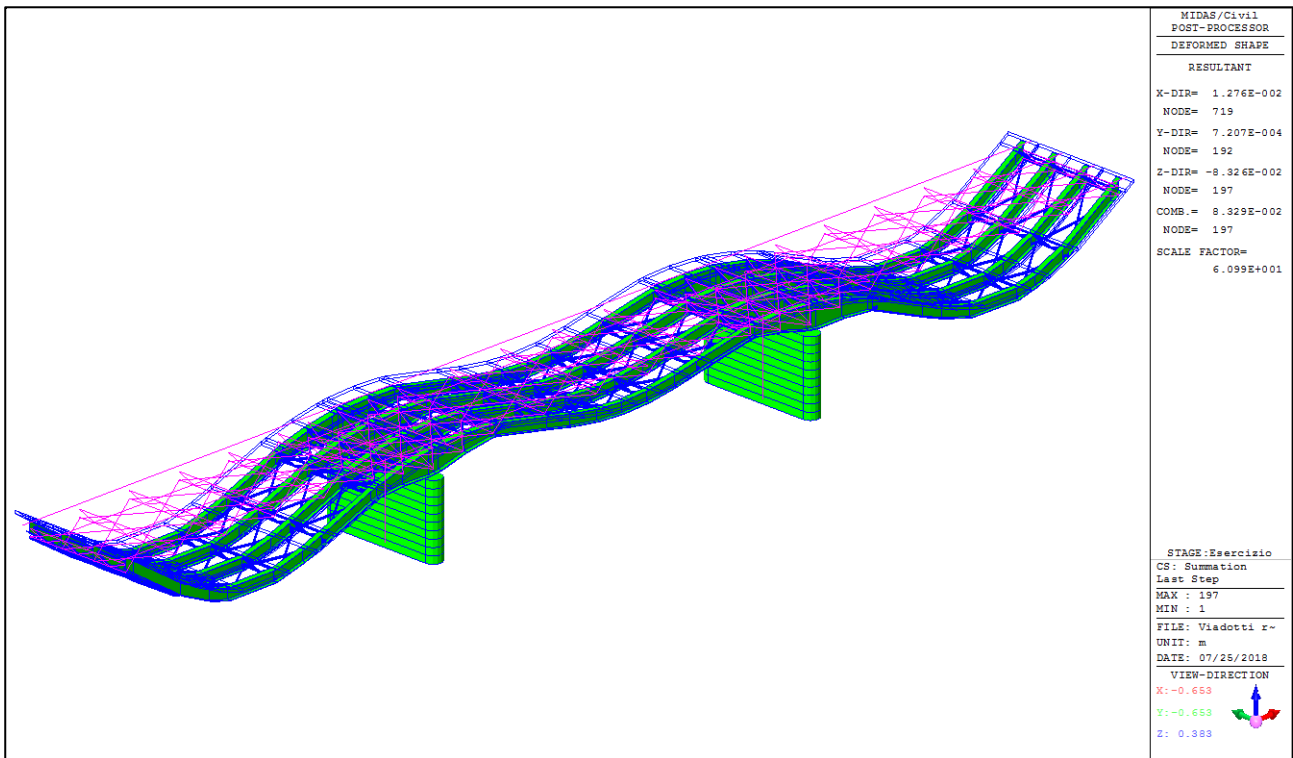
## 16 VERIFICHE DI DEFORMAZIONE TRAVI PRINCIPALI

### 16.1 DEFORMAZIONE CARICHI PERMANENTI

Si verifica che la deformata minima dovuta ai carichi permanenti sia minore di:

- campate laterali:  $\Delta Z_{lim,L} = L / 300 = 31000 / 300 = 103.3 \text{ mm.}$
- campata centrale:  $\Delta Z_{lim,C} = L / 300 = 38000 / 300 = 126.7 \text{ mm.}$

Segue diagramma delle deformazioni minime per la combinazione considerata.



DEFORMATA MINIMA CARICHI PERMANENTI

Il valore massimo (in modulo) della deformazione vale:

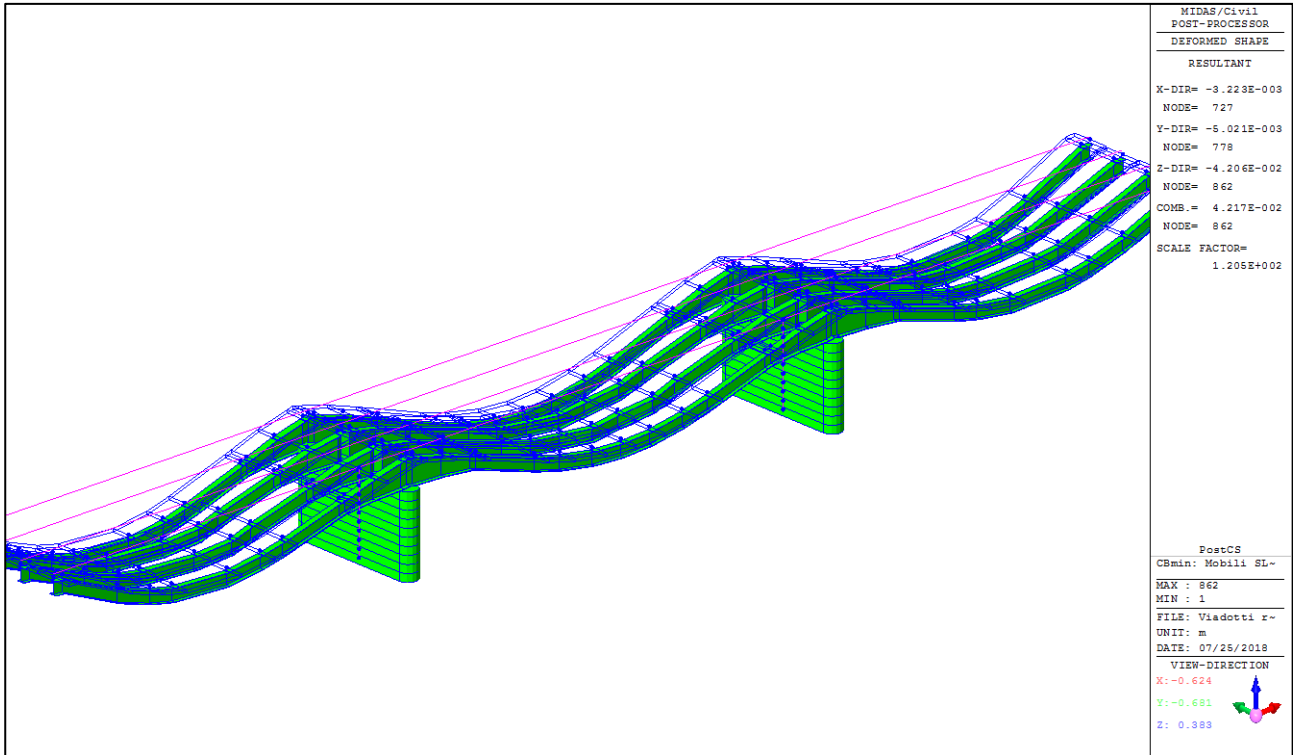
- campate laterali:  $\Delta Z = 79.8 \text{ mm, minore del valore limite } \Delta Z_{lim,L} = 103.3 \text{ mm.}$
- campata centrale:  $\Delta Z = 34.5 \text{ mm, minore del valore limite } \Delta Z_{lim,L} = 126.7 \text{ mm.}$

### 16.2 DEFORMAZIONE CARICHI VARIABILI

Si verifica che la deformata minima dei carichi variabili di progetto, nella combinazione caratteristica (rara) sia minore di:

- campate laterali:  $\Delta Z_{lim,L} = L / 700 = 31000 / 700 = 44.3 \text{ mm.}$
- campata centrale:  $\Delta Z_{lim,C} = L / 700 = 38000 / 700 = 54.3 \text{ mm.}$

Segue diagramma delle deformazioni minime per la combinazione considerata; si nota che il diagramma risulta dall'involuppo di diverse condizioni di carico mobile, quindi i valori sono corretti ma la "forma" della deformata non è significativa.



**DEFORMATA MINIMA CARICHI MOBILI (INVILUPPO MINIMI)**

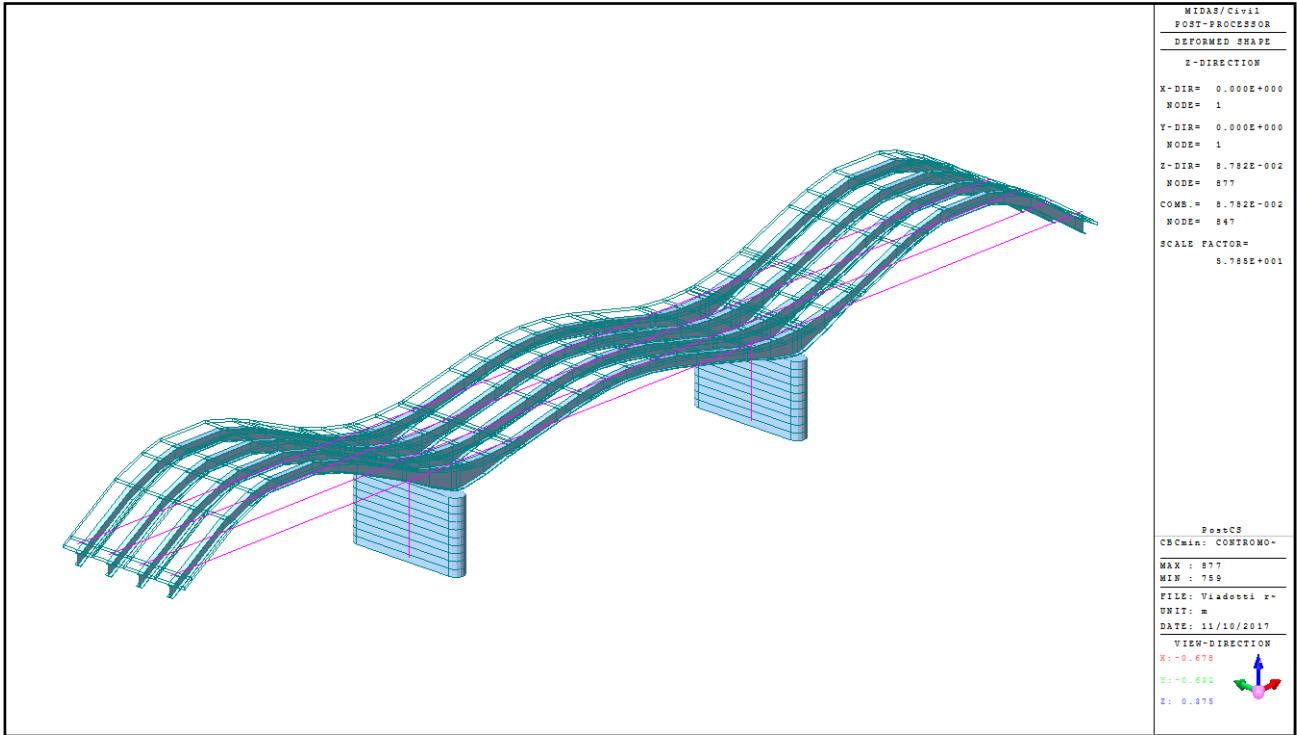
Il valore massimo (in modulo) della deformazione vale:

- campate laterali:  $\Delta Z = 36.6$  mm, minore del valore limite  $\Delta Z_{lim,L} = 44.3$  mm.
- campata centrale:  $\Delta Z = 42.1$  mm, minore del valore limite  $\Delta Z_{lim,L} = 54.3$  mm.

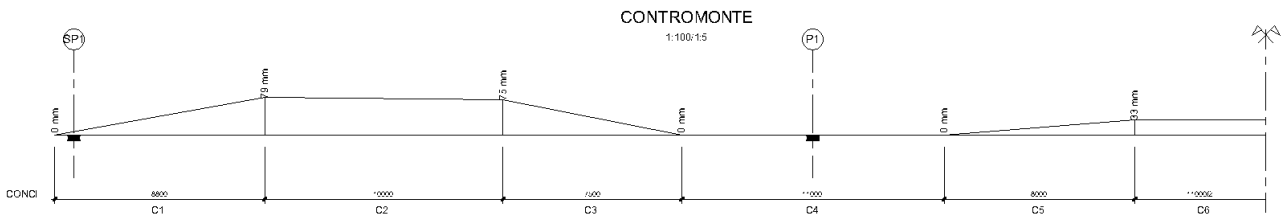
## 17 CONTROMONTE TRAVI

Le travature vengono realizzate con una controfreccia pari all'inverso delle deformazioni permanenti più il 25% dei carichi mobili, nella combinazione caratteristica; l'andamento dei singoli conci è rettilineo. Nel diagramma a pagina seguente sono evidenziate le deformazioni da ottenere.





DEFORMATA - CONTROMONTE DI PROGETTO



CONTROMONTE EFFETTIVE (1/2 IMPALCATO)

## 18 VERIFICA DEI CONTENUTI DI CUI AL PAR. 10.2 DELLE N.T.C. 2008

### 18.1 TIPO DI ANALISI SVOLTA

- Analisi strutturale condotta di tipo statico e dinamico lineare
- Metodo adottato per la risoluzione del problema strutturale: Metodo agli elementi finiti con software Midas/Civil 2015 v.1.2.
- Metodologie seguite per la verifica o per il progetto-verifica delle sezioni. Metodo semiprobabilistico agli Stati Limite
- Combinazioni di carico adottate: Le combinazioni di carico adottate sono riportate nel paragrafo 5 "Combinazioni di carico" e sono state scelte in modo da massimizzare tutte le sollecitazioni sulla struttura. L'impiego delle combinazioni adottate è esaustivo delle configurazioni studiate per la struttura in esame.

### 18.2 ORIGINE E CARATTERISTICHE DEI CODICI DI CALCOLO

Vedi paragrafo 2 "Modellazione strutturale".

### 18.3 AFFIDABILITÀ DEI CODICI UTILIZZATI

Vedi paragrafo 2 "Modellazione strutturale".

### 18.4 VALIDAZIONE DEI CODICI.

Nel caso in cui si rendesse necessaria una validazione indipendente del calcolo strutturale, i calcoli potranno essere eseguiti nuovamente da soggetto diverso da quello originario mediante programmi di calcolo diversi da quelli usati originariamente e ciò al fine di eseguire un effettivo controllo incrociato sui risultati delle elaborazioni. Al fondo della presente relazione si riporta il tabulato di input del modello strutturale con tutte le informazioni sufficienti a rendere ripercorribili tutti i calcoli effettuati.

### 18.5 MODALITÀ DI PRESENTAZIONE DEI RISULTATI.

Il percorso che ha condotto ai risultati è stato: modellazione della struttura, analisi dei carichi e disposizione degli stessi sul modello; calcolo delle sollecitazioni; verifica degli elementi ritenuti significativi. La quantità di informazioni che ha accompagnato l'utilizzo del software in input e in output è cospicua. Per non appesantire eccessivamente la relazione di calcolo, si è operata la scelta di fornire soltanto una sintesi completa ed efficace dei risultati privilegiando schemi grafici ai tabulati. E' comunque disponibile su supporto informatico l'intero sviluppo dei tabulati di output con tutte le informazioni necessarie alla eventuale riproduzione del calcolo automatico.

### 18.6 INFORMAZIONI GENERALI SULL'ELABORAZIONE.

Al termine della elaborazione sono stati svolti estesi controlli per l'esame dei risultati e per una valutazione complessiva dell'elaborazione dal punto di vista del corretto comportamento del modello.

### 18.7 GIUDIZIO MOTIVATO DI ACCETTABILITÀ DEI RISULTATI.

I risultati della elaborazione sono stati analizzati criticamente mediante confronto con calcoli di massima eseguiti manualmente; tali controlli sommari hanno portato a confermare la validità dei risultati. I risultati delle elaborazioni sono quindi stati sottoposti a controlli che ne hanno comprovato l'attendibilità. In particolare si è svolto il controllo di equilibrio tra reazioni vincolari e carichi applicati.

## 19 ALLEGATO – DATI PROGRAMMA DI CALCOLO

A seguire l'allegato con i programmi di calcolo

**20 SOTTOSCRIZIONE DELL'ELABORATO DA PARTE DEL R.T.P.**

**STUDIO CORONA S.r.l.**

---

**I.T. S.r.l.**

---

**CONSORZIO UNING**

---

**SETAC S.r.l.**

---

**DOTT. DANILO GALLO**

---

**ECOPLAN S.r.l.**

---

**E&G S.r.l.**

---

**ARKE' INGEGNERIA S.r.l.**

---

**ING. RENATO DEL PRETE**

---

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

```

;-----
; MIDAS/Civil Text (MCT) File.
; Date : 2017/11/10
;-----

```

\*VERSION  
8.3.5

\*UNIT ; Unit System  
KN , M, J, C

\*PROJINFO ; Project Information  
PROJECT=CASALPUSTERLENGO  
REVISION=1  
USER=Renato Vaira  
ADDRESS=Studio Corona  
TITLE=VIADOTTO SU ROTATORIA

\*STRUCTYPE ; Structure Type  
0, 1, 1, NO, YES, 9.806, 0, NO, NO, NO

\*REBAR-MATL-CODE ; Rebar Material Code  
UNI(RC), B450C, UNI(RC), B450C

\*NODE ; Nodes


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| 24, | 69,   | -1.6, | -2.7  |
| 25, | 31,   | 0,    | -2.7  |
| 26, | 69,   | 0,    | -2.7  |
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| 31, | 31,   | -4.8, | -2.3  |
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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |


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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

184, 42.2, -4.8, -1.13  
185, 47.4, -4.8, -1.13  
186, 52.6, -4.8, -1.13  
187, 57.8, -4.8, -1.13  
188, 63, -4.8, -1.13  
189, 75, -4.8, -1.13  
190, 80, -4.8, -1.13  
191, 85, -4.8, -1.13  
192, 90, -4.8, -1.13  
193, 95, -4.8, -1.13  
194, 100, -4.8, -1.13  
195, 2.5, -3.2, -1.13  
196, 7.5, -3.2, -1.13  
197, 12.5, -3.2, -1.13  
198, 17.5, -3.2, -1.13  
199, 22.5, -3.2, -1.13  
200, 39.6, -3.2, -1.13  
201, 44.8, -3.2, -1.13  
202, 50, -3.2, -1.13  
203, 55.2, -3.2, -1.13  
204, 60.4, -3.2, -1.13  
205, 77.5, -3.2, -1.13  
206, 82.5, -3.2, -1.13  
207, 87.5, -3.2, -1.13  
208, 92.5, -3.2, -1.13  
209, 97.5, -3.2, -1.13  
210, 0, -1.6, -1.13  
211, 5, -1.6, -1.13  
212, 10, -1.6, -1.13  
213, 15, -1.6, -1.13  
214, 20, -1.6, -1.13  
215, 25, -1.6, -1.13  
216, 37, -1.6, -1.13  
217, 42.2, -1.6, -1.13  
218, 47.4, -1.6, -1.13  
219, 52.6, -1.6, -1.13  
220, 57.8, -1.6, -1.13  
221, 63, -1.6, -1.13  
222, 75, -1.6, -1.13  
223, 80, -1.6, -1.13  
224, 85, -1.6, -1.13  
225, 90, -1.6, -1.13  
226, 95, -1.6, -1.13  
227, 100, -1.6, -1.13  
228, 2.5, 0, -1.13  
229, 7.5, 0, -1.13  
230, 12.5, 0, -1.13  
231, 17.5, 0, -1.13  
232, 22.5, 0, -1.13  
233, 39.6, 0, -1.13  
234, 44.8, 0, -1.13  
235, 50, 0, -1.13  
236, 55.2, 0, -1.13  
237, 60.4, 0, -1.13  
238, 77.5, 0, -1.13  
239, 82.5, 0, -1.13  
240, 87.5, 0, -1.13  
241, 92.5, 0, -1.13  
242, 97.5, 0, -1.13  
243, 0, 1.6, -1.13  
244, 5, 1.6, -1.13  
245, 10, 1.6, -1.13  
246, 15, 1.6, -1.13  
247, 20, 1.6, -1.13  
248, 25, 1.6, -1.13  
249, 37, 1.6, -1.13  
250, 42.2, 1.6, -1.13  
251, 47.4, 1.6, -1.13  
252, 52.6, 1.6, -1.13  
253, 57.8, 1.6, -1.13  
254, 63, 1.6, -1.13  
255, 75, 1.6, -1.13  
256, 80, 1.6, -1.13  
257, 85, 1.6, -1.13  
258, 90, 1.6, -1.13  
259, 95, 1.6, -1.13  
260, 100, 1.6, -1.13  
261, 2.5, 3.2, -1.13

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

262, 7.5, 3.2, -1.13  
 263, 12.5, 3.2, -1.13  
 264, 17.5, 3.2, -1.13  
 265, 22.5, 3.2, -1.13  
 266, 39.6, 3.2, -1.13  
 267, 44.8, 3.2, -1.13  
 268, 50, 3.2, -1.13  
 269, 55.2, 3.2, -1.13  
 270, 60.4, 3.2, -1.13  
 271, 77.5, 3.2, -1.13  
 272, 82.5, 3.2, -1.13  
 273, 87.5, 3.2, -1.13  
 274, 92.5, 3.2, -1.13  
 275, 97.5, 3.2, -1.13  
 276, 0, 4.8, -1.13  
 277, 5, 4.8, -1.13  
 278, 10, 4.8, -1.13  
 279, 15, 4.8, -1.13  
 280, 20, 4.8, -1.13  
 281, 25, 4.8, -1.13  
 282, 37, 4.8, -1.13  
 283, 42.2, 4.8, -1.13  
 284, 47.4, 4.8, -1.13  
 285, 52.6, 4.8, -1.13  
 286, 57.8, 4.8, -1.13  
 287, 63, 4.8, -1.13  
 288, 75, 4.8, -1.13  
 289, 80, 4.8, -1.13  
 290, 85, 4.8, -1.13  
 291, 90, 4.8, -1.13  
 292, 95, 4.8, -1.13  
 293, 100, 4.8, -1.13  
 327, 0, -4.8, -1.06  
 328, 5, -4.8, -1.06  
 329, 10, -4.8, -1.06  
 330, 15, -4.8, -1.06  
 331, 20, -4.8, -1.06  
 332, 25, -4.8, -1.06  
 333, 37, -4.8, -1.06  
 334, 42.2, -4.8, -1.06  
 335, 47.4, -4.8, -1.06  
 336, 52.6, -4.8, -1.06  
 337, 57.8, -4.8, -1.06  
 338, 63, -4.8, -1.06  
 339, 75, -4.8, -1.06  
 340, 80, -4.8, -1.06  
 341, 85, -4.8, -1.06  
 342, 90, -4.8, -1.06  
 343, 95, -4.8, -1.06  
 344, 100, -4.8, -1.06  
 345, 0, -3.2, -1.06  
 346, 5, -3.2, -1.06  
 347, 10, -3.2, -1.06  
 348, 15, -3.2, -1.06  
 349, 20, -3.2, -1.06  
 350, 25, -3.2, -1.06  
 351, 37, -3.2, -1.06  
 352, 42.2, -3.2, -1.06  
 353, 47.4, -3.2, -1.06  
 354, 52.6, -3.2, -1.06  
 355, 57.8, -3.2, -1.06  
 356, 63, -3.2, -1.06  
 357, 75, -3.2, -1.06  
 358, 80, -3.2, -1.06  
 359, 85, -3.2, -1.06  
 360, 90, -3.2, -1.06  
 361, 95, -3.2, -1.06  
 362, 100, -3.2, -1.06  
 363, 0, -1.6, -1.06  
 364, 5, -1.6, -1.06  
 365, 10, -1.6, -1.06  
 366, 15, -1.6, -1.06  
 367, 20, -1.6, -1.06  
 368, 25, -1.6, -1.06  
 369, 37, -1.6, -1.06  
 370, 42.2, -1.6, -1.06  
 371, 47.4, -1.6, -1.06  
 372, 52.6, -1.6, -1.06

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

373, 57.8, -1.6, -1.06  
 374, 63, -1.6, -1.06  
 375, 75, -1.6, -1.06  
 376, 80, -1.6, -1.06  
 377, 85, -1.6, -1.06  
 378, 90, -1.6, -1.06  
 379, 95, -1.6, -1.06  
 380, 100, -1.6, -1.06  
 381, 0, 0, -1.06  
 382, 5, 0, -1.06  
 383, 10, 0, -1.06  
 384, 15, 0, -1.06  
 385, 20, 0, -1.06  
 386, 25, 0, -1.06  
 387, 37, 0, -1.06  
 388, 42.2, 0, -1.06  
 389, 47.4, 0, -1.06  
 390, 52.6, 0, -1.06  
 391, 57.8, 0, -1.06  
 392, 63, 0, -1.06  
 393, 75, 0, -1.06  
 394, 80, 0, -1.06  
 395, 85, 0, -1.06  
 396, 90, 0, -1.06  
 397, 95, 0, -1.06  
 398, 100, 0, -1.06  
 399, 0, 1.6, -1.06  
 400, 5, 1.6, -1.06  
 401, 10, 1.6, -1.06  
 402, 15, 1.6, -1.06  
 403, 20, 1.6, -1.06  
 404, 25, 1.6, -1.06  
 405, 37, 1.6, -1.06  
 406, 42.2, 1.6, -1.06  
 407, 47.4, 1.6, -1.06  
 408, 52.6, 1.6, -1.06  
 409, 57.8, 1.6, -1.06  
 410, 63, 1.6, -1.06  
 411, 75, 1.6, -1.06  
 412, 80, 1.6, -1.06  
 413, 85, 1.6, -1.06  
 414, 90, 1.6, -1.06  
 415, 95, 1.6, -1.06  
 416, 100, 1.6, -1.06  
 417, 0, 3.2, -1.06  
 418, 5, 3.2, -1.06  
 419, 10, 3.2, -1.06  
 420, 15, 3.2, -1.06  
 421, 20, 3.2, -1.06  
 422, 25, 3.2, -1.06  
 423, 37, 3.2, -1.06  
 424, 42.2, 3.2, -1.06  
 425, 47.4, 3.2, -1.06  
 426, 52.6, 3.2, -1.06  
 427, 57.8, 3.2, -1.06  
 428, 63, 3.2, -1.06  
 429, 75, 3.2, -1.06  
 430, 80, 3.2, -1.06  
 431, 85, 3.2, -1.06  
 432, 90, 3.2, -1.06  
 433, 95, 3.2, -1.06  
 434, 100, 3.2, -1.06  
 435, 0, 4.8, -1.06  
 436, 5, 4.8, -1.06  
 437, 10, 4.8, -1.06  
 438, 15, 4.8, -1.06  
 439, 20, 4.8, -1.06  
 440, 25, 4.8, -1.06  
 441, 37, 4.8, -1.06  
 442, 42.2, 4.8, -1.06  
 443, 47.4, 4.8, -1.06  
 444, 52.6, 4.8, -1.06  
 445, 57.8, 4.8, -1.06  
 446, 63, 4.8, -1.06  
 447, 75, 4.8, -1.06  
 448, 80, 4.8, -1.06  
 449, 85, 4.8, -1.06  
 450, 90, 4.8, -1.06




PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |


451, 95, 4.8, -1.06  
 452, 100, 4.8, -1.06  
 489, 0, -4.8, -0.46  
 490, 5, -4.8, -0.46  
 491, 10, -4.8, -0.46  
 492, 15, -4.8, -0.46  
 493, 20, -4.8, -0.46  
 494, 25, -4.8, -0.46  
 495, 28, -4.8, -0.46  
 496, 31, -4.8, -0.46  
 497, 34, -4.8, -0.46  
 498, 37, -4.8, -0.46  
 499, 42.2, -4.8, -0.46  
 500, 47.4, -4.8, -0.46  
 501, 52.6, -4.8, -0.46  
 502, 57.8, -4.8, -0.46  
 503, 63, -4.8, -0.46  
 504, 66, -4.8, -0.46  
 505, 69, -4.8, -0.46  
 506, 72, -4.8, -0.46  
 507, 75, -4.8, -0.46  
 508, 80, -4.8, -0.46  
 509, 85, -4.8, -0.46  
 510, 90, -4.8, -0.46  
 511, 95, -4.8, -0.46  
 512, 100, -4.8, -0.46  
 513, 0, -1.6, -0.46  
 514, 5, -1.6, -0.46  
 515, 10, -1.6, -0.46  
 516, 15, -1.6, -0.46  
 517, 20, -1.6, -0.46  
 518, 25, -1.6, -0.46  
 519, 28, -1.6, -0.46  
 520, 31, -1.6, -0.46  
 521, 34, -1.6, -0.46  
 522, 37, -1.6, -0.46  
 523, 42.2, -1.6, -0.46  
 524, 47.4, -1.6, -0.46  
 525, 52.6, -1.6, -0.46  
 526, 57.8, -1.6, -0.46  
 527, 63, -1.6, -0.46  
 528, 66, -1.6, -0.46  
 529, 69, -1.6, -0.46  
 530, 72, -1.6, -0.46  
 531, 75, -1.6, -0.46  
 532, 80, -1.6, -0.46  
 533, 85, -1.6, -0.46  
 534, 90, -1.6, -0.46  
 535, 95, -1.6, -0.46  
 536, 100, -1.6, -0.46  
 537, 0, 1.6, -0.46  
 538, 5, 1.6, -0.46  
 539, 10, 1.6, -0.46  
 540, 15, 1.6, -0.46  
 541, 20, 1.6, -0.46  
 542, 25, 1.6, -0.46  
 543, 28, 1.6, -0.46  
 544, 31, 1.6, -0.46  
 545, 34, 1.6, -0.46  
 546, 37, 1.6, -0.46  
 547, 42.2, 1.6, -0.46  
 548, 47.4, 1.6, -0.46  
 549, 52.6, 1.6, -0.46  
 550, 57.8, 1.6, -0.46  
 551, 63, 1.6, -0.46  
 552, 66, 1.6, -0.46  
 553, 69, 1.6, -0.46  
 554, 72, 1.6, -0.46  
 555, 75, 1.6, -0.46  
 556, 80, 1.6, -0.46  
 557, 85, 1.6, -0.46  
 558, 90, 1.6, -0.46  
 559, 95, 1.6, -0.46  
 560, 100, 1.6, -0.46  
 561, 0, 4.8, -0.46  
 562, 5, 4.8, -0.46  
 563, 10, 4.8, -0.46  
 564, 15, 4.8, -0.46

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

565, 20, 4.8, -0.46  
566, 25, 4.8, -0.46  
567, 28, 4.8, -0.46  
568, 31, 4.8, -0.46  
569, 34, 4.8, -0.46  
570, 37, 4.8, -0.46  
571, 42.2, 4.8, -0.46  
572, 47.4, 4.8, -0.46  
573, 52.6, 4.8, -0.46  
574, 57.8, 4.8, -0.46  
575, 63, 4.8, -0.46  
576, 66, 4.8, -0.46  
577, 69, 4.8, -0.46  
578, 72, 4.8, -0.46  
579, 75, 4.8, -0.46  
580, 80, 4.8, -0.46  
581, 85, 4.8, -0.46  
582, 90, 4.8, -0.46  
583, 95, 4.8, -0.46  
584, 100, 4.8, -0.46  
609, 0, -4.8, -0.43  
610, 5, -4.8, -0.43  
611, 10, -4.8, -0.43  
612, 15, -4.8, -0.43  
613, 20, -4.8, -0.43  
614, 25, -4.8, -0.43  
615, 28, -4.8, -0.43  
616, 34, -4.8, -0.43  
617, 37, -4.8, -0.43  
618, 42.2, -4.8, -0.43  
619, 47.4, -4.8, -0.43  
620, 52.6, -4.8, -0.43  
621, 57.8, -4.8, -0.43  
622, 63, -4.8, -0.43  
623, 66, -4.8, -0.43  
624, 72, -4.8, -0.43  
625, 75, -4.8, -0.43  
626, 80, -4.8, -0.43  
627, 85, -4.8, -0.43  
628, 90, -4.8, -0.43  
629, 95, -4.8, -0.43  
630, 100, -4.8, -0.43  
631, 0, -1.6, -0.43  
632, 5, -1.6, -0.43  
633, 10, -1.6, -0.43  
634, 15, -1.6, -0.43  
635, 20, -1.6, -0.43  
636, 25, -1.6, -0.43  
637, 28, -1.6, -0.43  
638, 34, -1.6, -0.43  
639, 37, -1.6, -0.43  
640, 42.2, -1.6, -0.43  
641, 47.4, -1.6, -0.43  
642, 52.6, -1.6, -0.43  
643, 57.8, -1.6, -0.43  
644, 63, -1.6, -0.43  
645, 66, -1.6, -0.43  
646, 72, -1.6, -0.43  
647, 75, -1.6, -0.43  
648, 80, -1.6, -0.43  
649, 85, -1.6, -0.43  
650, 90, -1.6, -0.43  
651, 95, -1.6, -0.43  
652, 100, -1.6, -0.43  
653, 0, 1.6, -0.43  
654, 5, 1.6, -0.43  
655, 10, 1.6, -0.43  
656, 15, 1.6, -0.43  
657, 20, 1.6, -0.43  
658, 25, 1.6, -0.43  
659, 28, 1.6, -0.43  
660, 34, 1.6, -0.43  
661, 37, 1.6, -0.43  
662, 42.2, 1.6, -0.43  
663, 47.4, 1.6, -0.43  
664, 52.6, 1.6, -0.43  
665, 57.8, 1.6, -0.43  
666, 63, 1.6, -0.43

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

667, 66, 1.6, -0.43  
668, 72, 1.6, -0.43  
669, 75, 1.6, -0.43  
670, 80, 1.6, -0.43  
671, 85, 1.6, -0.43  
672, 90, 1.6, -0.43  
673, 95, 1.6, -0.43  
674, 100, 1.6, -0.43  
675, 0, 4.8, -0.43  
676, 5, 4.8, -0.43  
677, 10, 4.8, -0.43  
678, 15, 4.8, -0.43  
679, 20, 4.8, -0.43  
680, 25, 4.8, -0.43  
681, 28, 4.8, -0.43  
682, 34, 4.8, -0.43  
683, 37, 4.8, -0.43  
684, 42.2, 4.8, -0.43  
685, 47.4, 4.8, -0.43  
686, 52.6, 4.8, -0.43  
687, 57.8, 4.8, -0.43  
688, 63, 4.8, -0.43  
689, 66, 4.8, -0.43  
690, 72, 4.8, -0.43  
691, 75, 4.8, -0.43  
692, 80, 4.8, -0.43  
693, 85, 4.8, -0.43  
694, 90, 4.8, -0.43  
695, 95, 4.8, -0.43  
696, 100, 4.8, -0.43  
719, -0.8, -4.8, 0  
720, 0, -4.8, 0  
721, 5, -4.8, 0  
722, 8, -4.8, 0  
723, 10, -4.8, 0  
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731, 31, -4.8, 0  
732, 31.5, -4.8, 0  
733, 34, -4.8, 0  
734, 36.5, -4.8, 0  
735, 37, -4.8, 0  
736, 42.2, -4.8, 0  
737, 44.5, -4.8, 0  
738, 47.4, -4.8, 0  
739, 50, -4.8, 0  
740, 52.6, -4.8, 0  
741, 55.5, -4.8, 0  
742, 57.8, -4.8, 0  
743, 63, -4.8, 0  
744, 63.5, -4.8, 0  
745, 66, -4.8, 0  
746, 68.5, -4.8, 0  
747, 69, -4.8, 0  
748, 69.5, -4.8, 0  
749, 72, -4.8, 0  
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752, 80, -4.8, 0  
753, 82, -4.8, 0  
754, 85, -4.8, 0  
755, 90, -4.8, 0  
756, 92, -4.8, 0  
757, 95, -4.8, 0  
758, 100, -4.8, 0  
759, 100.8, -4.8, 0  
760, -0.8, -1.6, 0  
761, 0, -1.6, 0  
762, 5, -1.6, 0  
763, 8, -1.6, 0  
764, 10, -1.6, 0  
765, 15, -1.6, 0  
766, 18, -1.6, 0

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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767, 20, -1.6, 0
768, 25, -1.6, 0
769, 25.5, -1.6, 0
770, 28, -1.6, 0
771, 30.5, -1.6, 0
772, 31, -1.6, 0
773, 31.5, -1.6, 0
774, 34, -1.6, 0
775, 36.5, -1.6, 0
776, 37, -1.6, 0
777, 42.2, -1.6, 0
778, 44.5, -1.6, 0
779, 47.4, -1.6, 0
780, 50, -1.6, 0
781, 52.6, -1.6, 0
782, 55.5, -1.6, 0
783, 57.8, -1.6, 0
784, 63, -1.6, 0
785, 63.5, -1.6, 0
786, 66, -1.6, 0
787, 68.5, -1.6, 0
788, 69, -1.6, 0
789, 69.5, -1.6, 0
790, 72, -1.6, 0
791, 74.5, -1.6, 0
792, 75, -1.6, 0
793, 80, -1.6, 0
794, 82, -1.6, 0
795, 85, -1.6, 0
796, 90, -1.6, 0
797, 92, -1.6, 0
798, 95, -1.6, 0
799, 100, -1.6, 0
800, 100.8, -1.6, 0
801, -0.8, 1.6, 0
802, 0, 1.6, 0
803, 5, 1.6, 0
804, 8, 1.6, 0
805, 10, 1.6, 0
806, 15, 1.6, 0
807, 18, 1.6, 0
808, 20, 1.6, 0
809, 25, 1.6, 0
810, 25.5, 1.6, 0
811, 28, 1.6, 0
812, 30.5, 1.6, 0
813, 31, 1.6, 0
814, 31.5, 1.6, 0
815, 34, 1.6, 0
816, 36.5, 1.6, 0
817, 37, 1.6, 0
818, 42.2, 1.6, 0
819, 44.5, 1.6, 0
820, 47.4, 1.6, 0
821, 50, 1.6, 0
822, 52.6, 1.6, 0
823, 55.5, 1.6, 0
824, 57.8, 1.6, 0
825, 63, 1.6, 0
826, 63.5, 1.6, 0
827, 66, 1.6, 0
828, 68.5, 1.6, 0
829, 69, 1.6, 0
830, 69.5, 1.6, 0
831, 72, 1.6, 0
832, 74.5, 1.6, 0
833, 75, 1.6, 0
834, 80, 1.6, 0
835, 82, 1.6, 0
836, 85, 1.6, 0
837, 90, 1.6, 0
838, 92, 1.6, 0
839, 95, 1.6, 0
840, 100, 1.6, 0
841, 100.8, 1.6, 0
842, -0.8, 4.8, 0
843, 0, 4.8, 0
844, 5, 4.8, 0

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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845, 8, 4.8, 0
846, 10, 4.8, 0
847, 15, 4.8, 0
848, 18, 4.8, 0
849, 20, 4.8, 0
850, 25, 4.8, 0
851, 25.5, 4.8, 0
852, 28, 4.8, 0
853, 30.5, 4.8, 0
854, 31, 4.8, 0
855, 31.5, 4.8, 0
856, 34, 4.8, 0
857, 36.5, 4.8, 0
858, 37, 4.8, 0
859, 42.2, 4.8, 0
860, 44.5, 4.8, 0
861, 47.4, 4.8, 0
862, 50, 4.8, 0
863, 52.6, 4.8, 0
864, 55.5, 4.8, 0
865, 57.8, 4.8, 0
866, 63, 4.8, 0
867, 63.5, 4.8, 0
868, 66, 4.8, 0
869, 68.5, 4.8, 0
870, 69, 4.8, 0
871, 69.5, 4.8, 0
872, 72, 4.8, 0
873, 74.5, 4.8, 0
874, 75, 4.8, 0
875, 80, 4.8, 0
876, 82, 4.8, 0
877, 85, 4.8, 0
878, 90, 4.8, 0
879, 92, 4.8, 0
880, 95, 4.8, 0
881, 100, 4.8, 0
882, 100.8, 4.8, 0
883, 0, 0, -1.7
884, 100, 0, -1.7
885, 31, 1.6, -2.7
886, 69, 1.6, -2.7
887, 31, 0, -8.55
888, 31, 0, -7.9
889, 31, 0, -7.25
890, 31, 0, -6.6
891, 31, 0, -5.95
892, 31, 0, -5.3
893, 31, 0, -4.65
894, 31, 0, -4
895, 31, 0, -3.35
896, 69, 0, -8.55
897, 69, 0, -7.9
898, 69, 0, -7.25
899, 69, 0, -6.6
900, 69, 0, -5.95
901, 69, 0, -5.3
902, 69, 0, -4.65
903, 69, 0, -4
904, 69, 0, -3.35

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*ELEMENT ; Elements
101, BEAM , 5, 3, 719, 720, 0
102, BEAM , 5, 3, 720, 721, 0
103, BEAM , 5, 3, 721, 722, 0
104, BEAM , 5, 4, 722, 723, 0
105, BEAM , 5, 4, 723, 724, 0
106, BEAM , 5, 4, 724, 725, 0
107, BEAM , 5, 14, 725, 726, 0
108, BEAM , 5, 14, 726, 727, 0
109, BEAM , 5, 14, 727, 728, 0
110, BEAM , 5, 9, 728, 729, 0
111, BEAM , 5, 9, 729, 730, 0
112, BEAM , 5, 21, 730, 731, 0
113, BEAM , 5, 21, 731, 732, 0
114, BEAM , 5, 10, 732, 733, 0
115, BEAM , 5, 10, 733, 734, 0
116, BEAM , 5, 12, 734, 735, 0

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |


|           |   |    |     |      |      |   |
|-----------|---|----|-----|------|------|---|
| 117, BEAM | , | 5, | 12, | 735, | 736, | 0 |
| 118, BEAM | , | 5, | 12, | 736, | 737, | 0 |
| 119, BEAM | , | 5, | 13, | 737, | 738, | 0 |
| 120, BEAM | , | 5, | 13, | 738, | 739, | 0 |
| 121, BEAM | , | 5, | 13, | 739, | 740, | 0 |
| 122, BEAM | , | 5, | 13, | 740, | 741, | 0 |
| 123, BEAM | , | 5, | 12, | 741, | 742, | 0 |
| 124, BEAM | , | 5, | 12, | 742, | 743, | 0 |
| 125, BEAM | , | 5, | 12, | 743, | 744, | 0 |
| 126, BEAM | , | 5, | 9,  | 744, | 745, | 0 |
| 127, BEAM | , | 5, | 9,  | 745, | 746, | 0 |
| 128, BEAM | , | 5, | 21, | 746, | 747, | 0 |
| 129, BEAM | , | 5, | 21, | 747, | 748, | 0 |
| 130, BEAM | , | 5, | 10, | 748, | 749, | 0 |
| 131, BEAM | , | 5, | 10, | 749, | 750, | 0 |
| 132, BEAM | , | 5, | 14, | 750, | 751, | 0 |
| 133, BEAM | , | 5, | 14, | 751, | 752, | 0 |
| 134, BEAM | , | 5, | 14, | 752, | 753, | 0 |
| 135, BEAM | , | 5, | 4,  | 753, | 754, | 0 |
| 136, BEAM | , | 5, | 4,  | 754, | 755, | 0 |
| 137, BEAM | , | 5, | 4,  | 755, | 756, | 0 |
| 138, BEAM | , | 5, | 3,  | 756, | 757, | 0 |
| 139, BEAM | , | 5, | 3,  | 757, | 758, | 0 |
| 140, BEAM | , | 5, | 3,  | 758, | 759, | 0 |
| 201, BEAM | , | 5, | 1,  | 760, | 761, | 0 |
| 202, BEAM | , | 5, | 1,  | 761, | 762, | 0 |
| 203, BEAM | , | 5, | 1,  | 762, | 763, | 0 |
| 204, BEAM | , | 5, | 2,  | 763, | 764, | 0 |
| 205, BEAM | , | 5, | 2,  | 764, | 765, | 0 |
| 206, BEAM | , | 5, | 2,  | 765, | 766, | 0 |
| 207, BEAM | , | 5, | 11, | 766, | 767, | 0 |
| 208, BEAM | , | 5, | 11, | 767, | 768, | 0 |
| 209, BEAM | , | 5, | 11, | 768, | 769, | 0 |
| 210, BEAM | , | 5, | 5,  | 769, | 770, | 0 |
| 211, BEAM | , | 5, | 5,  | 770, | 771, | 0 |
| 212, BEAM | , | 5, | 16, | 771, | 772, | 0 |
| 213, BEAM | , | 5, | 16, | 772, | 773, | 0 |
| 214, BEAM | , | 5, | 6,  | 773, | 774, | 0 |
| 215, BEAM | , | 5, | 6,  | 774, | 775, | 0 |
| 216, BEAM | , | 5, | 7,  | 775, | 776, | 0 |
| 217, BEAM | , | 5, | 7,  | 776, | 777, | 0 |
| 218, BEAM | , | 5, | 7,  | 777, | 778, | 0 |
| 219, BEAM | , | 5, | 8,  | 778, | 779, | 0 |
| 220, BEAM | , | 5, | 8,  | 779, | 780, | 0 |
| 221, BEAM | , | 5, | 8,  | 780, | 781, | 0 |
| 222, BEAM | , | 5, | 8,  | 781, | 782, | 0 |
| 223, BEAM | , | 5, | 7,  | 782, | 783, | 0 |
| 224, BEAM | , | 5, | 7,  | 783, | 784, | 0 |
| 225, BEAM | , | 5, | 7,  | 784, | 785, | 0 |
| 226, BEAM | , | 5, | 5,  | 785, | 786, | 0 |
| 227, BEAM | , | 5, | 5,  | 786, | 787, | 0 |
| 228, BEAM | , | 5, | 16, | 787, | 788, | 0 |
| 229, BEAM | , | 5, | 16, | 788, | 789, | 0 |
| 230, BEAM | , | 5, | 6,  | 789, | 790, | 0 |
| 231, BEAM | , | 5, | 6,  | 790, | 791, | 0 |
| 232, BEAM | , | 5, | 11, | 791, | 792, | 0 |
| 233, BEAM | , | 5, | 11, | 792, | 793, | 0 |
| 234, BEAM | , | 5, | 11, | 793, | 794, | 0 |
| 235, BEAM | , | 5, | 2,  | 794, | 795, | 0 |
| 236, BEAM | , | 5, | 2,  | 795, | 796, | 0 |
| 237, BEAM | , | 5, | 2,  | 796, | 797, | 0 |
| 238, BEAM | , | 5, | 1,  | 797, | 798, | 0 |
| 239, BEAM | , | 5, | 1,  | 798, | 799, | 0 |
| 240, BEAM | , | 5, | 1,  | 799, | 800, | 0 |
| 301, BEAM | , | 5, | 1,  | 801, | 802, | 0 |
| 302, BEAM | , | 5, | 1,  | 802, | 803, | 0 |
| 303, BEAM | , | 5, | 1,  | 803, | 804, | 0 |
| 304, BEAM | , | 5, | 2,  | 804, | 805, | 0 |
| 305, BEAM | , | 5, | 2,  | 805, | 806, | 0 |
| 306, BEAM | , | 5, | 2,  | 806, | 807, | 0 |
| 307, BEAM | , | 5, | 11, | 807, | 808, | 0 |
| 308, BEAM | , | 5, | 11, | 808, | 809, | 0 |
| 309, BEAM | , | 5, | 11, | 809, | 810, | 0 |
| 310, BEAM | , | 5, | 5,  | 810, | 811, | 0 |
| 311, BEAM | , | 5, | 5,  | 811, | 812, | 0 |
| 312, BEAM | , | 5, | 16, | 812, | 813, | 0 |
| 313, BEAM | , | 5, | 16, | 813, | 814, | 0 |
| 314, BEAM | , | 5, | 6,  | 814, | 815, | 0 |

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |  |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|--|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona |  | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  |  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

|            |   |    |     |      |      |     |
|------------|---|----|-----|------|------|-----|
| 315, BEAM  | , | 5, | 6,  | 815, | 816, | 0   |
| 316, BEAM  | , | 5, | 7,  | 816, | 817, | 0   |
| 317, BEAM  | , | 5, | 7,  | 817, | 818, | 0   |
| 318, BEAM  | , | 5, | 7,  | 818, | 819, | 0   |
| 319, BEAM  | , | 5, | 8,  | 819, | 820, | 0   |
| 320, BEAM  | , | 5, | 8,  | 820, | 821, | 0   |
| 321, BEAM  | , | 5, | 8,  | 821, | 822, | 0   |
| 322, BEAM  | , | 5, | 8,  | 822, | 823, | 0   |
| 323, BEAM  | , | 5, | 7,  | 823, | 824, | 0   |
| 324, BEAM  | , | 5, | 7,  | 824, | 825, | 0   |
| 325, BEAM  | , | 5, | 7,  | 825, | 826, | 0   |
| 326, BEAM  | , | 5, | 5,  | 826, | 827, | 0   |
| 327, BEAM  | , | 5, | 5,  | 827, | 828, | 0   |
| 328, BEAM  | , | 5, | 16, | 828, | 829, | 0   |
| 329, BEAM  | , | 5, | 16, | 829, | 830, | 0   |
| 330, BEAM  | , | 5, | 6,  | 830, | 831, | 0   |
| 331, BEAM  | , | 5, | 6,  | 831, | 832, | 0   |
| 332, BEAM  | , | 5, | 11, | 832, | 833, | 0   |
| 333, BEAM  | , | 5, | 11, | 833, | 834, | 0   |
| 334, BEAM  | , | 5, | 11, | 834, | 835, | 0   |
| 335, BEAM  | , | 5, | 2,  | 835, | 836, | 0   |
| 336, BEAM  | , | 5, | 2,  | 836, | 837, | 0   |
| 337, BEAM  | , | 5, | 2,  | 837, | 838, | 0   |
| 338, BEAM  | , | 5, | 1,  | 838, | 839, | 0   |
| 339, BEAM  | , | 5, | 1,  | 839, | 840, | 0   |
| 340, BEAM  | , | 5, | 1,  | 840, | 841, | 0   |
| 401, BEAM  | , | 5, | 3,  | 842, | 843, | 0   |
| 402, BEAM  | , | 5, | 3,  | 843, | 844, | 0   |
| 403, BEAM  | , | 5, | 3,  | 844, | 845, | 0   |
| 404, BEAM  | , | 5, | 4,  | 845, | 846, | 0   |
| 405, BEAM  | , | 5, | 4,  | 846, | 847, | 0   |
| 406, BEAM  | , | 5, | 4,  | 847, | 848, | 0   |
| 407, BEAM  | , | 5, | 14, | 848, | 849, | 0   |
| 408, BEAM  | , | 5, | 14, | 849, | 850, | 0   |
| 409, BEAM  | , | 5, | 14, | 850, | 851, | 0   |
| 410, BEAM  | , | 5, | 9,  | 851, | 852, | 0   |
| 411, BEAM  | , | 5, | 9,  | 852, | 853, | 0   |
| 412, BEAM  | , | 5, | 21, | 853, | 854, | 0   |
| 413, BEAM  | , | 5, | 21, | 854, | 855, | 0   |
| 414, BEAM  | , | 5, | 10, | 855, | 856, | 0   |
| 415, BEAM  | , | 5, | 10, | 856, | 857, | 0   |
| 416, BEAM  | , | 5, | 12, | 857, | 858, | 0   |
| 417, BEAM  | , | 5, | 12, | 858, | 859, | 0   |
| 418, BEAM  | , | 5, | 12, | 859, | 860, | 0   |
| 419, BEAM  | , | 5, | 13, | 860, | 861, | 0   |
| 420, BEAM  | , | 5, | 13, | 861, | 862, | 0   |
| 421, BEAM  | , | 5, | 13, | 862, | 863, | 0   |
| 422, BEAM  | , | 5, | 13, | 863, | 864, | 0   |
| 423, BEAM  | , | 5, | 12, | 864, | 865, | 0   |
| 424, BEAM  | , | 5, | 12, | 865, | 866, | 0   |
| 425, BEAM  | , | 5, | 12, | 866, | 867, | 0   |
| 426, BEAM  | , | 5, | 9,  | 867, | 868, | 0   |
| 427, BEAM  | , | 5, | 9,  | 868, | 869, | 0   |
| 428, BEAM  | , | 5, | 21, | 869, | 870, | 0   |
| 429, BEAM  | , | 5, | 21, | 870, | 871, | 0   |
| 430, BEAM  | , | 5, | 10, | 871, | 872, | 0   |
| 431, BEAM  | , | 5, | 10, | 872, | 873, | 0   |
| 432, BEAM  | , | 5, | 14, | 873, | 874, | 0   |
| 433, BEAM  | , | 5, | 14, | 874, | 875, | 0   |
| 434, BEAM  | , | 5, | 14, | 875, | 876, | 0   |
| 435, BEAM  | , | 5, | 4,  | 876, | 877, | 0   |
| 436, BEAM  | , | 5, | 4,  | 877, | 878, | 0   |
| 437, BEAM  | , | 5, | 4,  | 878, | 879, | 0   |
| 438, BEAM  | , | 5, | 3,  | 879, | 880, | 0   |
| 439, BEAM  | , | 5, | 3,  | 880, | 881, | 0   |
| 440, BEAM  | , | 5, | 3,  | 881, | 882, | 0   |
| 1014, BEAM | , | 1, | 18, | 107, | 111, | 180 |
| 1015, BEAM | , | 1, | 18, | 111, | 115, | 180 |
| 1016, BEAM | , | 1, | 18, | 115, | 119, | 180 |
| 1017, BEAM | , | 1, | 18, | 119, | 123, | 180 |
| 1018, BEAM | , | 1, | 18, | 123, | 127, | 180 |
| 1019, BEAM | , | 1, | 18, | 127, | 131, | 180 |
| 1022, BEAM | , | 1, | 18, | 108, | 112, | 180 |
| 1023, BEAM | , | 1, | 18, | 112, | 116, | 180 |
| 1024, BEAM | , | 1, | 18, | 116, | 120, | 180 |
| 1025, BEAM | , | 1, | 18, | 120, | 124, | 180 |
| 1026, BEAM | , | 1, | 18, | 124, | 128, | 180 |
| 1027, BEAM | , | 1, | 18, | 128, | 132, | 180 |


PROJECT TITLE : Viadotto su rotatoria

|  | Company | Studio Corona |  |  |  | Client                     |
|-----------------------------------------------------------------------------------|---------|---------------|--|--|--|----------------------------|
|                                                                                   | Author  | Renato Vaira  |  |  |  | File Name                  |
|                                                                                   |         |               |  |  |  | Viadotti rotatorie V_1.mct |

|                                   |
|-----------------------------------|
| 1030, BEAM , 1, 18, 109, 113, 180 |
| 1031, BEAM , 1, 18, 113, 117, 180 |
| 1032, BEAM , 1, 18, 117, 121, 180 |
| 1033, BEAM , 1, 18, 121, 125, 180 |
| 1034, BEAM , 1, 18, 125, 129, 180 |
| 1035, BEAM , 1, 18, 129, 133, 180 |
| 1038, BEAM , 1, 18, 110, 114, 180 |
| 1039, BEAM , 1, 18, 114, 118, 180 |
| 1040, BEAM , 1, 18, 118, 122, 180 |
| 1041, BEAM , 1, 18, 122, 126, 180 |
| 1042, BEAM , 1, 18, 126, 130, 180 |
| 1043, BEAM , 1, 18, 130, 134, 180 |
| 1110, BEAM , 1, 18, 327, 345, 180 |
| 1111, BEAM , 1, 18, 345, 363, 180 |
| 1112, BEAM , 1, 18, 363, 381, 180 |
| 1113, BEAM , 1, 18, 381, 399, 180 |
| 1114, BEAM , 1, 18, 399, 417, 180 |
| 1115, BEAM , 1, 18, 417, 435, 180 |
| 1118, BEAM , 1, 18, 328, 346, 180 |
| 1119, BEAM , 1, 18, 346, 364, 180 |
| 1120, BEAM , 1, 18, 364, 382, 180 |
| 1121, BEAM , 1, 18, 382, 400, 180 |
| 1122, BEAM , 1, 18, 400, 418, 180 |
| 1123, BEAM , 1, 18, 418, 436, 180 |
| 1126, BEAM , 1, 18, 329, 347, 180 |
| 1127, BEAM , 1, 18, 347, 365, 180 |
| 1128, BEAM , 1, 18, 365, 383, 180 |
| 1129, BEAM , 1, 18, 383, 401, 180 |
| 1130, BEAM , 1, 18, 401, 419, 180 |
| 1131, BEAM , 1, 18, 419, 437, 180 |
| 1134, BEAM , 1, 18, 330, 348, 180 |
| 1135, BEAM , 1, 18, 348, 366, 180 |
| 1136, BEAM , 1, 18, 366, 384, 180 |
| 1137, BEAM , 1, 18, 384, 402, 180 |
| 1138, BEAM , 1, 18, 402, 420, 180 |
| 1139, BEAM , 1, 18, 420, 438, 180 |
| 1142, BEAM , 1, 18, 331, 349, 180 |
| 1143, BEAM , 1, 18, 349, 367, 180 |
| 1144, BEAM , 1, 18, 367, 385, 180 |
| 1145, BEAM , 1, 18, 385, 403, 180 |
| 1146, BEAM , 1, 18, 403, 421, 180 |
| 1147, BEAM , 1, 18, 421, 439, 180 |
| 1150, BEAM , 1, 18, 332, 350, 180 |
| 1151, BEAM , 1, 18, 350, 368, 180 |
| 1152, BEAM , 1, 18, 368, 386, 180 |
| 1153, BEAM , 1, 18, 386, 404, 180 |
| 1154, BEAM , 1, 18, 404, 422, 180 |
| 1155, BEAM , 1, 18, 422, 440, 180 |
| 1158, BEAM , 1, 18, 333, 351, 180 |
| 1159, BEAM , 1, 18, 351, 369, 180 |
| 1160, BEAM , 1, 18, 369, 387, 180 |
| 1161, BEAM , 1, 18, 387, 405, 180 |
| 1162, BEAM , 1, 18, 405, 423, 180 |
| 1163, BEAM , 1, 18, 423, 441, 180 |
| 1166, BEAM , 1, 18, 334, 352, 180 |
| 1167, BEAM , 1, 18, 352, 370, 180 |
| 1168, BEAM , 1, 18, 370, 388, 180 |
| 1169, BEAM , 1, 18, 388, 406, 180 |
| 1170, BEAM , 1, 18, 406, 424, 180 |
| 1171, BEAM , 1, 18, 424, 442, 180 |
| 1174, BEAM , 1, 18, 335, 353, 180 |
| 1175, BEAM , 1, 18, 353, 371, 180 |
| 1176, BEAM , 1, 18, 371, 389, 180 |
| 1177, BEAM , 1, 18, 389, 407, 180 |
| 1178, BEAM , 1, 18, 407, 425, 180 |
| 1179, BEAM , 1, 18, 425, 443, 180 |
| 1182, BEAM , 1, 18, 336, 354, 180 |
| 1183, BEAM , 1, 18, 354, 372, 180 |
| 1184, BEAM , 1, 18, 372, 390, 180 |
| 1185, BEAM , 1, 18, 390, 408, 180 |
| 1186, BEAM , 1, 18, 408, 426, 180 |
| 1187, BEAM , 1, 18, 426, 444, 180 |
| 1190, BEAM , 1, 18, 337, 355, 180 |
| 1191, BEAM , 1, 18, 355, 373, 180 |
| 1192, BEAM , 1, 18, 373, 391, 180 |
| 1193, BEAM , 1, 18, 391, 409, 180 |
| 1194, BEAM , 1, 18, 409, 427, 180 |
| 1195, BEAM , 1, 18, 427, 445, 180 |




PROJECT TITLE : Viadotto su rotatoria

|  | Company | Studio Corona |  |  |  |  | Client                     |
|-----------------------------------------------------------------------------------|---------|---------------|--|--|--|--|----------------------------|
|                                                                                   | Author  | Renato Vaira  |  |  |  |  | File Name                  |
|                                                                                   |         |               |  |  |  |  | Viadotti rotatorie V_1.mct |

|                                   |
|-----------------------------------|
| 1198, BEAM , 1, 18, 338, 356, 180 |
| 1199, BEAM , 1, 18, 356, 374, 180 |
| 1200, BEAM , 1, 18, 374, 392, 180 |
| 1201, BEAM , 1, 18, 392, 410, 180 |
| 1202, BEAM , 1, 18, 410, 428, 180 |
| 1203, BEAM , 1, 18, 428, 446, 180 |
| 1206, BEAM , 1, 18, 339, 357, 180 |
| 1207, BEAM , 1, 18, 357, 375, 180 |
| 1208, BEAM , 1, 18, 375, 393, 180 |
| 1209, BEAM , 1, 18, 393, 411, 180 |
| 1210, BEAM , 1, 18, 411, 429, 180 |
| 1211, BEAM , 1, 18, 429, 447, 180 |
| 1214, BEAM , 1, 18, 340, 358, 180 |
| 1215, BEAM , 1, 18, 358, 376, 180 |
| 1216, BEAM , 1, 18, 376, 394, 180 |
| 1217, BEAM , 1, 18, 394, 412, 180 |
| 1218, BEAM , 1, 18, 412, 430, 180 |
| 1219, BEAM , 1, 18, 430, 448, 180 |
| 1222, BEAM , 1, 18, 341, 359, 180 |
| 1223, BEAM , 1, 18, 359, 377, 180 |
| 1224, BEAM , 1, 18, 377, 395, 180 |
| 1225, BEAM , 1, 18, 395, 413, 180 |
| 1226, BEAM , 1, 18, 413, 431, 180 |
| 1227, BEAM , 1, 18, 431, 449, 180 |
| 1230, BEAM , 1, 18, 342, 360, 180 |
| 1231, BEAM , 1, 18, 360, 378, 180 |
| 1232, BEAM , 1, 18, 378, 396, 180 |
| 1233, BEAM , 1, 18, 396, 414, 180 |
| 1234, BEAM , 1, 18, 414, 432, 180 |
| 1235, BEAM , 1, 18, 432, 450, 180 |
| 1238, BEAM , 1, 18, 343, 361, 180 |
| 1239, BEAM , 1, 18, 361, 379, 180 |
| 1240, BEAM , 1, 18, 379, 397, 180 |
| 1241, BEAM , 1, 18, 397, 415, 180 |
| 1242, BEAM , 1, 18, 415, 433, 180 |
| 1243, BEAM , 1, 18, 433, 451, 180 |
| 1246, BEAM , 1, 18, 344, 362, 180 |
| 1247, BEAM , 1, 18, 362, 380, 180 |
| 1248, BEAM , 1, 18, 380, 398, 180 |
| 1249, BEAM , 1, 18, 398, 416, 180 |
| 1250, BEAM , 1, 18, 416, 434, 180 |
| 1251, BEAM , 1, 18, 434, 452, 180 |
| 1254, BEAM , 1, 64, 495, 111, 180 |
| 1255, BEAM , 1, 64, 111, 519, 180 |
| 1256, BEAM , 1, 64, 519, 119, 180 |
| 1257, BEAM , 1, 64, 119, 543, 180 |
| 1258, BEAM , 1, 64, 543, 127, 180 |
| 1259, BEAM , 1, 64, 127, 567, 180 |
| 1262, BEAM , 1, 64, 497, 112, 180 |
| 1263, BEAM , 1, 64, 112, 521, 180 |
| 1264, BEAM , 1, 64, 521, 120, 180 |
| 1265, BEAM , 1, 64, 120, 545, 180 |
| 1266, BEAM , 1, 64, 545, 128, 180 |
| 1267, BEAM , 1, 64, 128, 569, 180 |
| 1270, BEAM , 1, 64, 504, 113, 180 |
| 1271, BEAM , 1, 64, 113, 528, 180 |
| 1272, BEAM , 1, 64, 528, 121, 180 |
| 1273, BEAM , 1, 64, 121, 552, 180 |
| 1274, BEAM , 1, 64, 552, 129, 180 |
| 1275, BEAM , 1, 64, 129, 576, 180 |
| 1278, BEAM , 1, 64, 506, 114, 180 |
| 1279, BEAM , 1, 64, 114, 530, 180 |
| 1280, BEAM , 1, 64, 530, 122, 180 |
| 1281, BEAM , 1, 64, 122, 554, 180 |
| 1282, BEAM , 1, 64, 554, 130, 180 |
| 1283, BEAM , 1, 64, 130, 578, 180 |
| 1286, BEAM , 1, 64, 489, 345, 180 |
| 1287, BEAM , 1, 64, 345, 513, 180 |
| 1288, BEAM , 1, 64, 513, 381, 180 |
| 1289, BEAM , 1, 64, 381, 537, 180 |
| 1290, BEAM , 1, 64, 537, 417, 180 |
| 1291, BEAM , 1, 64, 417, 561, 180 |
| 1294, BEAM , 1, 64, 490, 346, 180 |
| 1295, BEAM , 1, 64, 346, 514, 180 |
| 1296, BEAM , 1, 64, 514, 382, 180 |
| 1297, BEAM , 1, 64, 382, 538, 180 |
| 1298, BEAM , 1, 64, 538, 418, 180 |
| 1299, BEAM , 1, 64, 418, 562, 180 |

PROJECT TITLE : Viadotto su rotatoria

|  | Company | Studio Corona | Client                     |
|-----------------------------------------------------------------------------------|---------|---------------|----------------------------|
|                                                                                   | Author  | Renato Vaira  | File Name                  |
|                                                                                   |         |               | Viadotti rotatorie V_1.mct |

|                                   |
|-----------------------------------|
| 1302, BEAM , 1, 64, 491, 347, 180 |
| 1303, BEAM , 1, 64, 347, 515, 180 |
| 1304, BEAM , 1, 64, 515, 383, 180 |
| 1305, BEAM , 1, 64, 383, 539, 180 |
| 1306, BEAM , 1, 64, 539, 419, 180 |
| 1307, BEAM , 1, 64, 419, 563, 180 |
| 1310, BEAM , 1, 64, 492, 348, 180 |
| 1311, BEAM , 1, 64, 348, 516, 180 |
| 1312, BEAM , 1, 64, 516, 384, 180 |
| 1313, BEAM , 1, 64, 384, 540, 180 |
| 1314, BEAM , 1, 64, 540, 420, 180 |
| 1315, BEAM , 1, 64, 420, 564, 180 |
| 1318, BEAM , 1, 64, 493, 349, 180 |
| 1319, BEAM , 1, 64, 349, 517, 180 |
| 1320, BEAM , 1, 64, 517, 385, 180 |
| 1321, BEAM , 1, 64, 385, 541, 180 |
| 1322, BEAM , 1, 64, 541, 421, 180 |
| 1323, BEAM , 1, 64, 421, 565, 180 |
| 1326, BEAM , 1, 64, 494, 350, 180 |
| 1327, BEAM , 1, 64, 350, 518, 180 |
| 1328, BEAM , 1, 64, 518, 386, 180 |
| 1329, BEAM , 1, 64, 386, 542, 180 |
| 1330, BEAM , 1, 64, 542, 422, 180 |
| 1331, BEAM , 1, 64, 422, 566, 180 |
| 1334, BEAM , 1, 64, 498, 351, 180 |
| 1335, BEAM , 1, 64, 351, 522, 180 |
| 1336, BEAM , 1, 64, 522, 387, 180 |
| 1337, BEAM , 1, 64, 387, 546, 180 |
| 1338, BEAM , 1, 64, 546, 423, 180 |
| 1339, BEAM , 1, 64, 423, 570, 180 |
| 1342, BEAM , 1, 64, 499, 352, 180 |
| 1343, BEAM , 1, 64, 352, 523, 180 |
| 1344, BEAM , 1, 64, 523, 388, 180 |
| 1345, BEAM , 1, 64, 388, 547, 180 |
| 1346, BEAM , 1, 64, 547, 424, 180 |
| 1347, BEAM , 1, 64, 424, 571, 180 |
| 1350, BEAM , 1, 64, 500, 353, 180 |
| 1351, BEAM , 1, 64, 353, 524, 180 |
| 1352, BEAM , 1, 64, 524, 389, 180 |
| 1353, BEAM , 1, 64, 389, 548, 180 |
| 1354, BEAM , 1, 64, 548, 425, 180 |
| 1355, BEAM , 1, 64, 425, 572, 180 |
| 1358, BEAM , 1, 64, 501, 354, 180 |
| 1359, BEAM , 1, 64, 354, 525, 180 |
| 1360, BEAM , 1, 64, 525, 390, 180 |
| 1361, BEAM , 1, 64, 390, 549, 180 |
| 1362, BEAM , 1, 64, 549, 426, 180 |
| 1363, BEAM , 1, 64, 426, 573, 180 |
| 1366, BEAM , 1, 64, 502, 355, 180 |
| 1367, BEAM , 1, 64, 355, 526, 180 |
| 1368, BEAM , 1, 64, 526, 391, 180 |
| 1369, BEAM , 1, 64, 391, 550, 180 |
| 1370, BEAM , 1, 64, 550, 427, 180 |
| 1371, BEAM , 1, 64, 427, 574, 180 |
| 1374, BEAM , 1, 64, 503, 356, 180 |
| 1375, BEAM , 1, 64, 356, 527, 180 |
| 1376, BEAM , 1, 64, 527, 392, 180 |
| 1377, BEAM , 1, 64, 392, 551, 180 |
| 1378, BEAM , 1, 64, 551, 428, 180 |
| 1379, BEAM , 1, 64, 428, 575, 180 |
| 1382, BEAM , 1, 64, 507, 357, 180 |
| 1383, BEAM , 1, 64, 357, 531, 180 |
| 1384, BEAM , 1, 64, 531, 393, 180 |
| 1385, BEAM , 1, 64, 393, 555, 180 |
| 1386, BEAM , 1, 64, 555, 429, 180 |
| 1387, BEAM , 1, 64, 429, 579, 180 |
| 1390, BEAM , 1, 64, 508, 358, 180 |
| 1391, BEAM , 1, 64, 358, 532, 180 |
| 1392, BEAM , 1, 64, 532, 394, 180 |
| 1393, BEAM , 1, 64, 394, 556, 180 |
| 1394, BEAM , 1, 64, 556, 430, 180 |
| 1395, BEAM , 1, 64, 430, 580, 180 |
| 1398, BEAM , 1, 64, 509, 359, 180 |
| 1399, BEAM , 1, 64, 359, 533, 180 |
| 1400, BEAM , 1, 64, 533, 395, 180 |
| 1401, BEAM , 1, 64, 395, 557, 180 |
| 1402, BEAM , 1, 64, 557, 431, 180 |
| 1403, BEAM , 1, 64, 431, 581, 180 |

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

|            |   |    |     |      |      |     |
|------------|---|----|-----|------|------|-----|
| 1406, BEAM | , | 1, | 64, | 510, | 360, | 180 |
| 1407, BEAM | , | 1, | 64, | 360, | 534, | 180 |
| 1408, BEAM | , | 1, | 64, | 534, | 396, | 180 |
| 1409, BEAM | , | 1, | 64, | 396, | 558, | 180 |
| 1410, BEAM | , | 1, | 64, | 558, | 432, | 180 |
| 1411, BEAM | , | 1, | 64, | 432, | 582, | 180 |
| 1414, BEAM | , | 1, | 64, | 511, | 361, | 180 |
| 1415, BEAM | , | 1, | 64, | 361, | 535, | 180 |
| 1416, BEAM | , | 1, | 64, | 535, | 397, | 180 |
| 1417, BEAM | , | 1, | 64, | 397, | 559, | 180 |
| 1418, BEAM | , | 1, | 64, | 559, | 433, | 180 |
| 1419, BEAM | , | 1, | 64, | 433, | 583, | 180 |
| 1422, BEAM | , | 1, | 64, | 512, | 362, | 180 |
| 1423, BEAM | , | 1, | 64, | 362, | 536, | 180 |
| 1424, BEAM | , | 1, | 64, | 536, | 398, | 180 |
| 1425, BEAM | , | 1, | 64, | 398, | 560, | 180 |
| 1426, BEAM | , | 1, | 64, | 560, | 434, | 180 |
| 1427, BEAM | , | 1, | 64, | 434, | 584, | 180 |
| 1430, BEAM | , | 1, | 17, | 609, | 631, | 0   |
| 1431, BEAM | , | 1, | 17, | 631, | 653, | 0   |
| 1432, BEAM | , | 1, | 17, | 653, | 675, | 0   |
| 1434, BEAM | , | 1, | 17, | 610, | 632, | 0   |
| 1435, BEAM | , | 1, | 17, | 632, | 654, | 0   |
| 1436, BEAM | , | 1, | 17, | 654, | 676, | 0   |
| 1438, BEAM | , | 1, | 17, | 611, | 633, | 0   |
| 1439, BEAM | , | 1, | 17, | 633, | 655, | 0   |
| 1440, BEAM | , | 1, | 17, | 655, | 677, | 0   |
| 1442, BEAM | , | 1, | 17, | 612, | 634, | 0   |
| 1443, BEAM | , | 1, | 17, | 634, | 656, | 0   |
| 1444, BEAM | , | 1, | 17, | 656, | 678, | 0   |
| 1446, BEAM | , | 1, | 17, | 613, | 635, | 0   |
| 1447, BEAM | , | 1, | 17, | 635, | 657, | 0   |
| 1448, BEAM | , | 1, | 17, | 657, | 679, | 0   |
| 1450, BEAM | , | 1, | 17, | 614, | 636, | 0   |
| 1451, BEAM | , | 1, | 17, | 636, | 658, | 0   |
| 1452, BEAM | , | 1, | 17, | 658, | 680, | 0   |
| 1454, BEAM | , | 1, | 17, | 615, | 637, | 0   |
| 1455, BEAM | , | 1, | 17, | 637, | 659, | 0   |
| 1456, BEAM | , | 1, | 17, | 659, | 681, | 0   |
| 1458, BEAM | , | 1, | 17, | 616, | 638, | 0   |
| 1459, BEAM | , | 1, | 17, | 638, | 660, | 0   |
| 1460, BEAM | , | 1, | 17, | 660, | 682, | 0   |
| 1462, BEAM | , | 1, | 17, | 617, | 639, | 0   |
| 1463, BEAM | , | 1, | 17, | 639, | 661, | 0   |
| 1464, BEAM | , | 1, | 17, | 661, | 683, | 0   |
| 1466, BEAM | , | 1, | 17, | 618, | 640, | 0   |
| 1467, BEAM | , | 1, | 17, | 640, | 662, | 0   |
| 1468, BEAM | , | 1, | 17, | 662, | 684, | 0   |
| 1470, BEAM | , | 1, | 17, | 619, | 641, | 0   |
| 1471, BEAM | , | 1, | 17, | 641, | 663, | 0   |
| 1472, BEAM | , | 1, | 17, | 663, | 685, | 0   |
| 1474, BEAM | , | 1, | 17, | 620, | 642, | 0   |
| 1475, BEAM | , | 1, | 17, | 642, | 664, | 0   |
| 1476, BEAM | , | 1, | 17, | 664, | 686, | 0   |
| 1478, BEAM | , | 1, | 17, | 621, | 643, | 0   |
| 1479, BEAM | , | 1, | 17, | 643, | 665, | 0   |
| 1480, BEAM | , | 1, | 17, | 665, | 687, | 0   |
| 1482, BEAM | , | 1, | 17, | 622, | 644, | 0   |
| 1483, BEAM | , | 1, | 17, | 644, | 666, | 0   |
| 1484, BEAM | , | 1, | 17, | 666, | 688, | 0   |
| 1486, BEAM | , | 1, | 17, | 623, | 645, | 0   |
| 1487, BEAM | , | 1, | 17, | 645, | 667, | 0   |
| 1488, BEAM | , | 1, | 17, | 667, | 689, | 0   |
| 1490, BEAM | , | 1, | 17, | 624, | 646, | 0   |
| 1491, BEAM | , | 1, | 17, | 646, | 668, | 0   |
| 1492, BEAM | , | 1, | 17, | 668, | 690, | 0   |
| 1494, BEAM | , | 1, | 17, | 625, | 647, | 0   |
| 1495, BEAM | , | 1, | 17, | 647, | 669, | 0   |
| 1496, BEAM | , | 1, | 17, | 669, | 691, | 0   |
| 1498, BEAM | , | 1, | 17, | 626, | 648, | 0   |
| 1499, BEAM | , | 1, | 17, | 648, | 670, | 0   |
| 1500, BEAM | , | 1, | 17, | 670, | 692, | 0   |
| 1502, BEAM | , | 1, | 17, | 627, | 649, | 0   |
| 1503, BEAM | , | 1, | 17, | 649, | 671, | 0   |
| 1504, BEAM | , | 1, | 17, | 671, | 693, | 0   |
| 1506, BEAM | , | 1, | 17, | 628, | 650, | 0   |
| 1507, BEAM | , | 1, | 17, | 650, | 672, | 0   |
| 1508, BEAM | , | 1, | 17, | 672, | 694, | 0   |

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |  |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|--|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona |  | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  |  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

|                                   |
|-----------------------------------|
| 1510, BEAM , 1, 17, 629, 651, 0   |
| 1511, BEAM , 1, 17, 651, 673, 0   |
| 1512, BEAM , 1, 17, 673, 695, 0   |
| 1514, BEAM , 1, 17, 630, 652, 0   |
| 1515, BEAM , 1, 17, 652, 674, 0   |
| 1516, BEAM , 1, 17, 674, 696, 0   |
| 2001, BEAM , 1, 65, 51, 53, 180   |
| 2002, BEAM , 1, 65, 53, 55, 180   |
| 2003, BEAM , 1, 65, 55, 57, 180   |
| 2005, BEAM , 1, 65, 52, 54, 180   |
| 2006, BEAM , 1, 65, 54, 56, 180   |
| 2007, BEAM , 1, 65, 56, 58, 180   |
| 2009, BEAM , 1, 20, 51, 169, 180  |
| 2010, BEAM , 1, 20, 169, 53, 180  |
| 2011, BEAM , 1, 20, 53, 171, 180  |
| 2012, BEAM , 1, 20, 171, 55, 180  |
| 2013, BEAM , 1, 20, 55, 173, 180  |
| 2014, BEAM , 1, 20, 173, 57, 180  |
| 2017, BEAM , 1, 20, 52, 170, 180  |
| 2018, BEAM , 1, 20, 170, 54, 180  |
| 2019, BEAM , 1, 20, 54, 172, 180  |
| 2020, BEAM , 1, 20, 172, 56, 180  |
| 2021, BEAM , 1, 20, 56, 174, 180  |
| 2022, BEAM , 1, 20, 174, 58, 180  |
| 2025, BEAM , 1, 20, 496, 169, 180 |
| 2026, BEAM , 1, 20, 169, 520, 180 |
| 2027, BEAM , 1, 20, 520, 171, 180 |
| 2028, BEAM , 1, 20, 171, 544, 180 |
| 2029, BEAM , 1, 20, 544, 173, 180 |
| 2030, BEAM , 1, 20, 173, 568, 180 |
| 2033, BEAM , 1, 20, 505, 170, 180 |
| 2034, BEAM , 1, 20, 170, 529, 180 |
| 2035, BEAM , 1, 20, 529, 172, 180 |
| 2036, BEAM , 1, 20, 172, 553, 180 |
| 2037, BEAM , 1, 20, 553, 174, 180 |
| 2038, BEAM , 1, 20, 174, 577, 180 |
| 2041, BEAM , 1, 19, 496, 520, 0   |
| 2042, BEAM , 1, 19, 520, 544, 0   |
| 2043, BEAM , 1, 19, 544, 568, 0   |
| 2045, BEAM , 1, 19, 505, 529, 0   |
| 2046, BEAM , 1, 19, 529, 553, 0   |
| 2047, BEAM , 1, 19, 553, 577, 0   |
| 3001, BEAM , 1, 15, 177, 195, 90  |
| 3002, BEAM , 1, 15, 195, 210, 90  |
| 3003, BEAM , 1, 15, 210, 228, 90  |
| 3004, BEAM , 1, 15, 228, 243, 90  |
| 3005, BEAM , 1, 15, 243, 261, 90  |
| 3006, BEAM , 1, 15, 261, 276, 90  |
| 3009, BEAM , 1, 15, 178, 195, 90  |
| 3010, BEAM , 1, 15, 195, 211, 90  |
| 3011, BEAM , 1, 15, 211, 228, 90  |
| 3012, BEAM , 1, 15, 228, 244, 90  |
| 3013, BEAM , 1, 15, 244, 261, 90  |
| 3014, BEAM , 1, 15, 261, 277, 90  |
| 3017, BEAM , 1, 15, 178, 196, 90  |
| 3018, BEAM , 1, 15, 196, 211, 90  |
| 3019, BEAM , 1, 15, 211, 229, 90  |
| 3020, BEAM , 1, 15, 229, 244, 90  |
| 3021, BEAM , 1, 15, 244, 262, 90  |
| 3022, BEAM , 1, 15, 262, 277, 90  |
| 3025, BEAM , 1, 15, 179, 196, 90  |
| 3026, BEAM , 1, 15, 196, 212, 90  |
| 3027, BEAM , 1, 15, 212, 229, 90  |
| 3028, BEAM , 1, 15, 229, 245, 90  |
| 3029, BEAM , 1, 15, 245, 262, 90  |
| 3030, BEAM , 1, 15, 262, 278, 90  |
| 3033, BEAM , 1, 15, 179, 197, 90  |
| 3034, BEAM , 1, 15, 197, 212, 90  |
| 3035, BEAM , 1, 15, 212, 230, 90  |
| 3036, BEAM , 1, 15, 230, 245, 90  |
| 3037, BEAM , 1, 15, 245, 263, 90  |
| 3038, BEAM , 1, 15, 263, 278, 90  |
| 3041, BEAM , 1, 15, 180, 197, 90  |
| 3042, BEAM , 1, 15, 197, 213, 90  |
| 3043, BEAM , 1, 15, 213, 230, 90  |
| 3044, BEAM , 1, 15, 230, 246, 90  |
| 3045, BEAM , 1, 15, 246, 263, 90  |
| 3046, BEAM , 1, 15, 263, 279, 90  |

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

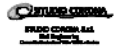
|            |   |    |     |      |      |    |
|------------|---|----|-----|------|------|----|
| 3049, BEAM | , | 1, | 15, | 180, | 198, | 90 |
| 3050, BEAM | , | 1, | 15, | 198, | 213, | 90 |
| 3051, BEAM | , | 1, | 15, | 213, | 231, | 90 |
| 3052, BEAM | , | 1, | 15, | 231, | 246, | 90 |
| 3053, BEAM | , | 1, | 15, | 246, | 264, | 90 |
| 3054, BEAM | , | 1, | 15, | 264, | 279, | 90 |
| 3057, BEAM | , | 1, | 15, | 181, | 198, | 90 |
| 3058, BEAM | , | 1, | 15, | 198, | 214, | 90 |
| 3059, BEAM | , | 1, | 15, | 214, | 231, | 90 |
| 3060, BEAM | , | 1, | 15, | 231, | 247, | 90 |
| 3061, BEAM | , | 1, | 15, | 247, | 264, | 90 |
| 3062, BEAM | , | 1, | 15, | 264, | 280, | 90 |
| 3065, BEAM | , | 1, | 15, | 181, | 199, | 90 |
| 3066, BEAM | , | 1, | 15, | 199, | 214, | 90 |
| 3067, BEAM | , | 1, | 15, | 214, | 232, | 90 |
| 3068, BEAM | , | 1, | 15, | 232, | 247, | 90 |
| 3069, BEAM | , | 1, | 15, | 247, | 265, | 90 |
| 3070, BEAM | , | 1, | 15, | 265, | 280, | 90 |
| 3073, BEAM | , | 1, | 15, | 182, | 199, | 90 |
| 3074, BEAM | , | 1, | 15, | 199, | 215, | 90 |
| 3075, BEAM | , | 1, | 15, | 215, | 232, | 90 |
| 3076, BEAM | , | 1, | 15, | 232, | 248, | 90 |
| 3077, BEAM | , | 1, | 15, | 248, | 265, | 90 |
| 3078, BEAM | , | 1, | 15, | 265, | 281, | 90 |
| 3081, BEAM | , | 1, | 15, | 182, | 143, | 90 |
| 3082, BEAM | , | 1, | 15, | 143, | 215, | 90 |
| 3083, BEAM | , | 1, | 15, | 215, | 147, | 90 |
| 3084, BEAM | , | 1, | 15, | 147, | 248, | 90 |
| 3085, BEAM | , | 1, | 15, | 248, | 151, | 90 |
| 3086, BEAM | , | 1, | 15, | 151, | 281, | 90 |
| 3089, BEAM | , | 1, | 15, | 87,  | 143, | 90 |
| 3090, BEAM | , | 1, | 15, | 143, | 91,  | 90 |
| 3091, BEAM | , | 1, | 15, | 91,  | 147, | 90 |
| 3092, BEAM | , | 1, | 15, | 147, | 95,  | 90 |
| 3093, BEAM | , | 1, | 15, | 95,  | 151, | 90 |
| 3094, BEAM | , | 1, | 15, | 151, | 99,  | 90 |
| 3097, BEAM | , | 1, | 15, | 87,  | 61,  | 90 |
| 3098, BEAM | , | 1, | 15, | 61,  | 91,  | 90 |
| 3099, BEAM | , | 1, | 15, | 91,  | 65,  | 90 |
| 3100, BEAM | , | 1, | 15, | 65,  | 95,  | 90 |
| 3101, BEAM | , | 1, | 15, | 95,  | 69,  | 90 |
| 3102, BEAM | , | 1, | 15, | 69,  | 99,  | 90 |
| 3105, BEAM | , | 1, | 15, | 41,  | 61,  | 90 |
| 3106, BEAM | , | 1, | 15, | 61,  | 43,  | 90 |
| 3107, BEAM | , | 1, | 15, | 43,  | 65,  | 90 |
| 3108, BEAM | , | 1, | 15, | 65,  | 45,  | 90 |
| 3109, BEAM | , | 1, | 15, | 45,  | 69,  | 90 |
| 3110, BEAM | , | 1, | 15, | 69,  | 47,  | 90 |
| 3113, BEAM | , | 1, | 15, | 41,  | 62,  | 90 |
| 3114, BEAM | , | 1, | 15, | 62,  | 43,  | 90 |
| 3115, BEAM | , | 1, | 15, | 43,  | 66,  | 90 |
| 3116, BEAM | , | 1, | 15, | 66,  | 45,  | 90 |
| 3117, BEAM | , | 1, | 15, | 45,  | 70,  | 90 |
| 3118, BEAM | , | 1, | 15, | 70,  | 47,  | 90 |
| 3121, BEAM | , | 1, | 15, | 88,  | 62,  | 90 |
| 3122, BEAM | , | 1, | 15, | 62,  | 92,  | 90 |
| 3123, BEAM | , | 1, | 15, | 92,  | 66,  | 90 |
| 3124, BEAM | , | 1, | 15, | 66,  | 96,  | 90 |
| 3125, BEAM | , | 1, | 15, | 96,  | 70,  | 90 |
| 3126, BEAM | , | 1, | 15, | 70,  | 100, | 90 |
| 3129, BEAM | , | 1, | 15, | 88,  | 144, | 90 |
| 3130, BEAM | , | 1, | 15, | 144, | 92,  | 90 |
| 3131, BEAM | , | 1, | 15, | 92,  | 148, | 90 |
| 3132, BEAM | , | 1, | 15, | 148, | 96,  | 90 |
| 3133, BEAM | , | 1, | 15, | 96,  | 152, | 90 |
| 3134, BEAM | , | 1, | 15, | 152, | 100, | 90 |
| 3137, BEAM | , | 1, | 15, | 183, | 144, | 90 |
| 3138, BEAM | , | 1, | 15, | 144, | 216, | 90 |
| 3139, BEAM | , | 1, | 15, | 216, | 148, | 90 |
| 3140, BEAM | , | 1, | 15, | 148, | 249, | 90 |
| 3141, BEAM | , | 1, | 15, | 249, | 152, | 90 |
| 3142, BEAM | , | 1, | 15, | 152, | 282, | 90 |
| 3145, BEAM | , | 1, | 15, | 183, | 200, | 90 |
| 3146, BEAM | , | 1, | 15, | 200, | 216, | 90 |
| 3147, BEAM | , | 1, | 15, | 216, | 233, | 90 |
| 3148, BEAM | , | 1, | 15, | 233, | 249, | 90 |
| 3149, BEAM | , | 1, | 15, | 249, | 266, | 90 |
| 3150, BEAM | , | 1, | 15, | 266, | 282, | 90 |

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

|            |   |    |     |      |      |    |
|------------|---|----|-----|------|------|----|
| 3153, BEAM | , | 1, | 15, | 184, | 200, | 90 |
| 3154, BEAM | , | 1, | 15, | 200, | 217, | 90 |
| 3155, BEAM | , | 1, | 15, | 217, | 233, | 90 |
| 3156, BEAM | , | 1, | 15, | 233, | 250, | 90 |
| 3157, BEAM | , | 1, | 15, | 250, | 266, | 90 |
| 3158, BEAM | , | 1, | 15, | 266, | 283, | 90 |
| 3161, BEAM | , | 1, | 15, | 184, | 201, | 90 |
| 3162, BEAM | , | 1, | 15, | 201, | 217, | 90 |
| 3163, BEAM | , | 1, | 15, | 217, | 234, | 90 |
| 3164, BEAM | , | 1, | 15, | 234, | 250, | 90 |
| 3165, BEAM | , | 1, | 15, | 250, | 267, | 90 |
| 3166, BEAM | , | 1, | 15, | 267, | 283, | 90 |
| 3169, BEAM | , | 1, | 15, | 185, | 201, | 90 |
| 3170, BEAM | , | 1, | 15, | 201, | 218, | 90 |
| 3171, BEAM | , | 1, | 15, | 218, | 234, | 90 |
| 3172, BEAM | , | 1, | 15, | 234, | 251, | 90 |
| 3173, BEAM | , | 1, | 15, | 251, | 267, | 90 |
| 3174, BEAM | , | 1, | 15, | 267, | 284, | 90 |
| 3177, BEAM | , | 1, | 15, | 185, | 202, | 90 |
| 3178, BEAM | , | 1, | 15, | 202, | 218, | 90 |
| 3179, BEAM | , | 1, | 15, | 218, | 235, | 90 |
| 3180, BEAM | , | 1, | 15, | 235, | 251, | 90 |
| 3181, BEAM | , | 1, | 15, | 251, | 268, | 90 |
| 3182, BEAM | , | 1, | 15, | 268, | 284, | 90 |
| 3185, BEAM | , | 1, | 15, | 186, | 202, | 90 |
| 3186, BEAM | , | 1, | 15, | 202, | 219, | 90 |
| 3187, BEAM | , | 1, | 15, | 219, | 235, | 90 |
| 3188, BEAM | , | 1, | 15, | 235, | 252, | 90 |
| 3189, BEAM | , | 1, | 15, | 252, | 268, | 90 |
| 3190, BEAM | , | 1, | 15, | 268, | 285, | 90 |
| 3193, BEAM | , | 1, | 15, | 186, | 203, | 90 |
| 3194, BEAM | , | 1, | 15, | 203, | 219, | 90 |
| 3195, BEAM | , | 1, | 15, | 219, | 236, | 90 |
| 3196, BEAM | , | 1, | 15, | 236, | 252, | 90 |
| 3197, BEAM | , | 1, | 15, | 252, | 269, | 90 |
| 3198, BEAM | , | 1, | 15, | 269, | 285, | 90 |
| 3201, BEAM | , | 1, | 15, | 187, | 203, | 90 |
| 3202, BEAM | , | 1, | 15, | 203, | 220, | 90 |
| 3203, BEAM | , | 1, | 15, | 220, | 236, | 90 |
| 3204, BEAM | , | 1, | 15, | 236, | 253, | 90 |
| 3205, BEAM | , | 1, | 15, | 253, | 269, | 90 |
| 3206, BEAM | , | 1, | 15, | 269, | 286, | 90 |
| 3209, BEAM | , | 1, | 15, | 187, | 204, | 90 |
| 3210, BEAM | , | 1, | 15, | 204, | 220, | 90 |
| 3211, BEAM | , | 1, | 15, | 220, | 237, | 90 |
| 3212, BEAM | , | 1, | 15, | 237, | 253, | 90 |
| 3213, BEAM | , | 1, | 15, | 253, | 270, | 90 |
| 3214, BEAM | , | 1, | 15, | 270, | 286, | 90 |
| 3217, BEAM | , | 1, | 15, | 188, | 204, | 90 |
| 3218, BEAM | , | 1, | 15, | 204, | 221, | 90 |
| 3219, BEAM | , | 1, | 15, | 221, | 237, | 90 |
| 3220, BEAM | , | 1, | 15, | 237, | 254, | 90 |
| 3221, BEAM | , | 1, | 15, | 254, | 270, | 90 |
| 3222, BEAM | , | 1, | 15, | 270, | 287, | 90 |
| 3225, BEAM | , | 1, | 15, | 188, | 145, | 90 |
| 3226, BEAM | , | 1, | 15, | 145, | 221, | 90 |
| 3227, BEAM | , | 1, | 15, | 221, | 149, | 90 |
| 3228, BEAM | , | 1, | 15, | 149, | 254, | 90 |
| 3229, BEAM | , | 1, | 15, | 254, | 153, | 90 |
| 3230, BEAM | , | 1, | 15, | 153, | 287, | 90 |
| 3233, BEAM | , | 1, | 15, | 89,  | 145, | 90 |
| 3234, BEAM | , | 1, | 15, | 145, | 93,  | 90 |
| 3235, BEAM | , | 1, | 15, | 93,  | 149, | 90 |
| 3236, BEAM | , | 1, | 15, | 149, | 97,  | 90 |
| 3237, BEAM | , | 1, | 15, | 97,  | 153, | 90 |
| 3238, BEAM | , | 1, | 15, | 153, | 101, | 90 |
| 3241, BEAM | , | 1, | 15, | 89,  | 63,  | 90 |
| 3242, BEAM | , | 1, | 15, | 63,  | 93,  | 90 |
| 3243, BEAM | , | 1, | 15, | 93,  | 67,  | 90 |
| 3244, BEAM | , | 1, | 15, | 67,  | 97,  | 90 |
| 3245, BEAM | , | 1, | 15, | 97,  | 71,  | 90 |
| 3246, BEAM | , | 1, | 15, | 71,  | 101, | 90 |
| 3249, BEAM | , | 1, | 15, | 42,  | 63,  | 90 |
| 3250, BEAM | , | 1, | 15, | 63,  | 44,  | 90 |
| 3251, BEAM | , | 1, | 15, | 44,  | 67,  | 90 |
| 3252, BEAM | , | 1, | 15, | 67,  | 46,  | 90 |
| 3253, BEAM | , | 1, | 15, | 46,  | 71,  | 90 |
| 3254, BEAM | , | 1, | 15, | 71,  | 48,  | 90 |

PROJECT TITLE : Viadotto su rotatoria

|  | Company | Studio Corona |  |  |  |  | Client                     |
|-----------------------------------------------------------------------------------|---------|---------------|--|--|--|--|----------------------------|
|                                                                                   | Author  | Renato Vaira  |  |  |  |  | File Name                  |
|                                                                                   |         |               |  |  |  |  | Viadotti rotatorie V_1.mct |

|            |   |    |     |      |      |    |
|------------|---|----|-----|------|------|----|
| 3257, BEAM | , | 1, | 15, | 42,  | 64,  | 90 |
| 3258, BEAM | , | 1, | 15, | 64,  | 44,  | 90 |
| 3259, BEAM | , | 1, | 15, | 44,  | 68,  | 90 |
| 3260, BEAM | , | 1, | 15, | 68,  | 46,  | 90 |
| 3261, BEAM | , | 1, | 15, | 46,  | 72,  | 90 |
| 3262, BEAM | , | 1, | 15, | 72,  | 48,  | 90 |
| 3265, BEAM | , | 1, | 15, | 90,  | 64,  | 90 |
| 3266, BEAM | , | 1, | 15, | 64,  | 94,  | 90 |
| 3267, BEAM | , | 1, | 15, | 94,  | 68,  | 90 |
| 3268, BEAM | , | 1, | 15, | 68,  | 98,  | 90 |
| 3269, BEAM | , | 1, | 15, | 98,  | 72,  | 90 |
| 3270, BEAM | , | 1, | 15, | 72,  | 102, | 90 |
| 3273, BEAM | , | 1, | 15, | 90,  | 146, | 90 |
| 3274, BEAM | , | 1, | 15, | 146, | 94,  | 90 |
| 3275, BEAM | , | 1, | 15, | 94,  | 150, | 90 |
| 3276, BEAM | , | 1, | 15, | 150, | 98,  | 90 |
| 3277, BEAM | , | 1, | 15, | 98,  | 154, | 90 |
| 3278, BEAM | , | 1, | 15, | 154, | 102, | 90 |
| 3281, BEAM | , | 1, | 15, | 189, | 146, | 90 |
| 3282, BEAM | , | 1, | 15, | 146, | 222, | 90 |
| 3283, BEAM | , | 1, | 15, | 222, | 150, | 90 |
| 3284, BEAM | , | 1, | 15, | 150, | 255, | 90 |
| 3285, BEAM | , | 1, | 15, | 255, | 154, | 90 |
| 3286, BEAM | , | 1, | 15, | 154, | 288, | 90 |
| 3289, BEAM | , | 1, | 15, | 189, | 205, | 90 |
| 3290, BEAM | , | 1, | 15, | 205, | 222, | 90 |
| 3291, BEAM | , | 1, | 15, | 222, | 238, | 90 |
| 3292, BEAM | , | 1, | 15, | 238, | 255, | 90 |
| 3293, BEAM | , | 1, | 15, | 255, | 271, | 90 |
| 3294, BEAM | , | 1, | 15, | 271, | 288, | 90 |
| 3297, BEAM | , | 1, | 15, | 190, | 205, | 90 |
| 3298, BEAM | , | 1, | 15, | 205, | 223, | 90 |
| 3299, BEAM | , | 1, | 15, | 223, | 238, | 90 |
| 3300, BEAM | , | 1, | 15, | 238, | 256, | 90 |
| 3301, BEAM | , | 1, | 15, | 256, | 271, | 90 |
| 3302, BEAM | , | 1, | 15, | 271, | 289, | 90 |
| 3305, BEAM | , | 1, | 15, | 190, | 206, | 90 |
| 3306, BEAM | , | 1, | 15, | 206, | 223, | 90 |
| 3307, BEAM | , | 1, | 15, | 223, | 239, | 90 |
| 3308, BEAM | , | 1, | 15, | 239, | 256, | 90 |
| 3309, BEAM | , | 1, | 15, | 256, | 272, | 90 |
| 3310, BEAM | , | 1, | 15, | 272, | 289, | 90 |
| 3313, BEAM | , | 1, | 15, | 191, | 206, | 90 |
| 3314, BEAM | , | 1, | 15, | 206, | 224, | 90 |
| 3315, BEAM | , | 1, | 15, | 224, | 239, | 90 |
| 3316, BEAM | , | 1, | 15, | 239, | 257, | 90 |
| 3317, BEAM | , | 1, | 15, | 257, | 272, | 90 |
| 3318, BEAM | , | 1, | 15, | 272, | 290, | 90 |
| 3321, BEAM | , | 1, | 15, | 191, | 207, | 90 |
| 3322, BEAM | , | 1, | 15, | 207, | 224, | 90 |
| 3323, BEAM | , | 1, | 15, | 224, | 240, | 90 |
| 3324, BEAM | , | 1, | 15, | 240, | 257, | 90 |
| 3325, BEAM | , | 1, | 15, | 257, | 273, | 90 |
| 3326, BEAM | , | 1, | 15, | 273, | 290, | 90 |
| 3329, BEAM | , | 1, | 15, | 192, | 207, | 90 |
| 3330, BEAM | , | 1, | 15, | 207, | 225, | 90 |
| 3331, BEAM | , | 1, | 15, | 225, | 240, | 90 |
| 3332, BEAM | , | 1, | 15, | 240, | 258, | 90 |
| 3333, BEAM | , | 1, | 15, | 258, | 273, | 90 |
| 3334, BEAM | , | 1, | 15, | 273, | 291, | 90 |
| 3337, BEAM | , | 1, | 15, | 192, | 208, | 90 |
| 3338, BEAM | , | 1, | 15, | 208, | 225, | 90 |
| 3339, BEAM | , | 1, | 15, | 225, | 241, | 90 |
| 3340, BEAM | , | 1, | 15, | 241, | 258, | 90 |
| 3341, BEAM | , | 1, | 15, | 258, | 274, | 90 |
| 3342, BEAM | , | 1, | 15, | 274, | 291, | 90 |
| 3345, BEAM | , | 1, | 15, | 193, | 208, | 90 |
| 3346, BEAM | , | 1, | 15, | 208, | 226, | 90 |
| 3347, BEAM | , | 1, | 15, | 226, | 241, | 90 |
| 3348, BEAM | , | 1, | 15, | 241, | 259, | 90 |
| 3349, BEAM | , | 1, | 15, | 259, | 274, | 90 |
| 3350, BEAM | , | 1, | 15, | 274, | 292, | 90 |
| 3353, BEAM | , | 1, | 15, | 193, | 209, | 90 |
| 3354, BEAM | , | 1, | 15, | 209, | 226, | 90 |
| 3355, BEAM | , | 1, | 15, | 226, | 242, | 90 |
| 3356, BEAM | , | 1, | 15, | 242, | 259, | 90 |
| 3357, BEAM | , | 1, | 15, | 259, | 275, | 90 |
| 3358, BEAM | , | 1, | 15, | 275, | 292, | 90 |

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |  |  |  |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|--|--|--|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona |  |  |  | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  |  |  |  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

|            |   |    |     |      |      |    |
|------------|---|----|-----|------|------|----|
| 3361, BEAM | , | 1, | 15, | 194, | 209, | 90 |
| 3362, BEAM | , | 1, | 15, | 209, | 227, | 90 |
| 3363, BEAM | , | 1, | 15, | 227, | 242, | 90 |
| 3364, BEAM | , | 1, | 15, | 242, | 260, | 90 |
| 3365, BEAM | , | 1, | 15, | 260, | 275, | 90 |
| 3366, BEAM | , | 1, | 15, | 275, | 293, | 90 |
| 4001, BEAM | , | 3, | 46, | 1,   | 887, | 0  |
| 4002, BEAM | , | 3, | 46, | 887, | 888, | 0  |
| 4003, BEAM | , | 3, | 46, | 888, | 889, | 0  |
| 4004, BEAM | , | 3, | 46, | 889, | 890, | 0  |
| 4005, BEAM | , | 3, | 46, | 890, | 891, | 0  |
| 4006, BEAM | , | 3, | 46, | 891, | 892, | 0  |
| 4007, BEAM | , | 3, | 46, | 892, | 893, | 0  |
| 4008, BEAM | , | 3, | 46, | 893, | 894, | 0  |
| 4009, BEAM | , | 3, | 46, | 894, | 895, | 0  |
| 4010, BEAM | , | 3, | 46, | 895, | 25,  | 0  |
| 4011, BEAM | , | 3, | 46, | 2,   | 896, | 0  |
| 4012, BEAM | , | 3, | 46, | 896, | 897, | 0  |
| 4013, BEAM | , | 3, | 46, | 897, | 898, | 0  |
| 4014, BEAM | , | 3, | 46, | 898, | 899, | 0  |
| 4015, BEAM | , | 3, | 46, | 899, | 900, | 0  |
| 4016, BEAM | , | 3, | 46, | 900, | 901, | 0  |
| 4017, BEAM | , | 3, | 46, | 901, | 902, | 0  |
| 4018, BEAM | , | 3, | 46, | 902, | 903, | 0  |
| 4019, BEAM | , | 3, | 46, | 903, | 904, | 0  |
| 4020, BEAM | , | 3, | 46, | 904, | 26,  | 0  |
| 5009, BEAM | , | 2, | 22, | 720, | 761, | 0  |
| 5010, BEAM | , | 2, | 22, | 761, | 802, | 0  |
| 5011, BEAM | , | 2, | 22, | 802, | 843, | 0  |
| 5013, BEAM | , | 2, | 23, | 721, | 762, | 0  |
| 5014, BEAM | , | 2, | 23, | 762, | 803, | 0  |
| 5015, BEAM | , | 2, | 23, | 803, | 844, | 0  |
| 5017, BEAM | , | 2, | 23, | 723, | 764, | 0  |
| 5018, BEAM | , | 2, | 23, | 764, | 805, | 0  |
| 5019, BEAM | , | 2, | 23, | 805, | 846, | 0  |
| 5021, BEAM | , | 2, | 23, | 724, | 765, | 0  |
| 5022, BEAM | , | 2, | 23, | 765, | 806, | 0  |
| 5023, BEAM | , | 2, | 23, | 806, | 847, | 0  |
| 5025, BEAM | , | 2, | 23, | 726, | 767, | 0  |
| 5026, BEAM | , | 2, | 23, | 767, | 808, | 0  |
| 5027, BEAM | , | 2, | 23, | 808, | 849, | 0  |
| 5029, BEAM | , | 2, | 24, | 727, | 768, | 0  |
| 5030, BEAM | , | 2, | 24, | 768, | 809, | 0  |
| 5031, BEAM | , | 2, | 24, | 809, | 850, | 0  |
| 5033, BEAM | , | 2, | 25, | 729, | 770, | 0  |
| 5034, BEAM | , | 2, | 25, | 770, | 811, | 0  |
| 5035, BEAM | , | 2, | 25, | 811, | 852, | 0  |
| 5037, BEAM | , | 2, | 25, | 731, | 772, | 0  |
| 5038, BEAM | , | 2, | 25, | 772, | 813, | 0  |
| 5039, BEAM | , | 2, | 25, | 813, | 854, | 0  |
| 5041, BEAM | , | 2, | 25, | 733, | 774, | 0  |
| 5042, BEAM | , | 2, | 25, | 774, | 815, | 0  |
| 5043, BEAM | , | 2, | 25, | 815, | 856, | 0  |
| 5045, BEAM | , | 2, | 26, | 735, | 776, | 0  |
| 5046, BEAM | , | 2, | 26, | 776, | 817, | 0  |
| 5047, BEAM | , | 2, | 26, | 817, | 858, | 0  |
| 5049, BEAM | , | 2, | 27, | 736, | 777, | 0  |
| 5050, BEAM | , | 2, | 27, | 777, | 818, | 0  |
| 5051, BEAM | , | 2, | 27, | 818, | 859, | 0  |
| 5053, BEAM | , | 2, | 27, | 738, | 779, | 0  |
| 5054, BEAM | , | 2, | 27, | 779, | 820, | 0  |
| 5055, BEAM | , | 2, | 27, | 820, | 861, | 0  |
| 5070, BEAM | , | 2, | 27, | 863, | 822, | 0  |
| 5071, BEAM | , | 2, | 27, | 822, | 781, | 0  |
| 5072, BEAM | , | 2, | 27, | 781, | 740, | 0  |
| 5074, BEAM | , | 2, | 27, | 865, | 824, | 0  |
| 5075, BEAM | , | 2, | 27, | 824, | 783, | 0  |
| 5076, BEAM | , | 2, | 27, | 783, | 742, | 0  |
| 5078, BEAM | , | 2, | 26, | 866, | 825, | 0  |
| 5079, BEAM | , | 2, | 26, | 825, | 784, | 0  |
| 5080, BEAM | , | 2, | 26, | 784, | 743, | 0  |
| 5082, BEAM | , | 2, | 25, | 868, | 827, | 0  |
| 5083, BEAM | , | 2, | 25, | 827, | 786, | 0  |
| 5084, BEAM | , | 2, | 25, | 786, | 745, | 0  |
| 5086, BEAM | , | 2, | 25, | 870, | 829, | 0  |
| 5087, BEAM | , | 2, | 25, | 829, | 788, | 0  |
| 5088, BEAM | , | 2, | 25, | 788, | 747, | 0  |
| 5090, BEAM | , | 2, | 25, | 872, | 831, | 0  |



PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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5091, BEAM , 2, 25, 831, 790, 0
5092, BEAM , 2, 25, 790, 749, 0
5094, BEAM , 2, 24, 874, 833, 0
5095, BEAM , 2, 24, 833, 792, 0
5096, BEAM , 2, 24, 792, 751, 0
5098, BEAM , 2, 23, 875, 834, 0
5099, BEAM , 2, 23, 834, 793, 0
5100, BEAM , 2, 23, 793, 752, 0
5102, BEAM , 2, 23, 877, 836, 0
5103, BEAM , 2, 23, 836, 795, 0
5104, BEAM , 2, 23, 795, 754, 0
5110, BEAM , 2, 23, 878, 837, 0
5111, BEAM , 2, 23, 837, 796, 0
5112, BEAM , 2, 23, 796, 755, 0
5114, BEAM , 2, 23, 880, 839, 0
5115, BEAM , 2, 23, 839, 798, 0
5116, BEAM , 2, 23, 798, 757, 0
5118, BEAM , 2, 22, 881, 840, 0
5119, BEAM , 2, 22, 840, 799, 0
5120, BEAM , 2, 22, 799, 758, 0

```

```

*GROUP ; Group
TRAVI PRINCIPALI, 719to882, 101to140 201to240 301to340 401to440, 0
TRASVERSI INTERMEDI, 107to134 327to452 489to495 497to504 506to519 521to528 \
530to543 545to552 554to567 569to576 578to584 609to696, 1014to1019 \
1022to1027 1030to1035 1038to1043 1110to1422by8 1111to1423by8 \
1112to1424by8 1113to1425by8 1114to1426by8 1115to1427by8 1430to1514by4 \
1431to1515by4 1432to1516by4, 0
TRASVERSI PILE, 51to58 169to174 496to568by24 505to577by24, 2001to2003 \
2005to2007 2009to2014 2017to2022 2025to2030 2033to2038 2041to2043 \
2045to2047, 0
PILE , 1 2 25 26 887to904, 4001to4020, 0
NODI , 1 2 21to28 31to38 41to48 51to58 61to72 77to84 87to102 107to134 \
143to154 159to166 169to174 177to293 327to452 489to584 609to696 719to904, \
, 0
CONTROVENTI, 41to48 61to72 87to102 143to154 177to293, 3001to3361by8 \
3002to3362by8 3003to3363by8 3004to3364by8 3005to3365by8 3006to3366by8, 0
SOLETTA FITTIZIA, , 5009to5053by4 5010to5054by4 5011to5055by4 5070to5102by4 \
5071to5103by4 5072to5104by4 5110to5112 5114to5116 5118to5120, 0

```

```

*BNDR-GROUP ; Boundary Group
RIGID LINK, 0
APPOGGI SPALLE, 0
SUPPORTI, 0
CONTR.FITTIZI SOLETTA, 0
APPOGGI PILE, 6492008

```

```

*LOAD-GROUP ; Load Group
PESO SOLETTA
PESO FINITURE
PESO ACCIAIO E PILE

```

```

*MATERIAL ; Material
1, STEEL, S355 (g x1.15) , 0, 0, , C, YES, 0.05, 2, 2.1000e+008, 0.3, 1.2000e-005, 88.53, 9.025
2, CONC , C32/40 SOL.TRASV , 0, 0, , C, YES, 0.05, 2, 3.3345e+007, 0.2, 1.0000e-005, 0, 0
3, CONC , C28/35 PILE , 0, 0, , C, NO, 0.05, 1, NTC08(RC) , , C28/35
4, CONC , C32/40 SOLETTA , 0, 0, , C, YES, 0.05, 2, 3.3345e+007, 0.2, 1.0000e-005, 0, 0
5, SRC , COMPOSITO , 0, 0, , C, YES, 0.05, 2, 2.1000e+008, 0.3, 1.2000e-005, 88.53, 9.02, \
2, 3.3345e+007, 0.2, 1.0000e-005, 0, 0

```

```

*MATL-COLOR
1, 255, 0, 0, 0, 255, 0, 0, 0, 255, NO, 0.5
2, 255, 0, 0, 0, 255, 0, 0, 0, 255, NO, 0.5
3, 255, 0, 0, 0, 255, 0, 0, 0, 255, NO, 0.5
4, 255, 0, 0, 0, 255, 0, 0, 0, 255, NO, 0.5
5, 255, 0, 0, 0, 255, 0, 0, 0, 255, NO, 0.5

```

```

*TDM-TYPE ; Time Dependent Material
NAME=SOLETTA, European, 32000, 70, 0.3, Class N, 1, 1, NO

```

```

*TDM-ELAST ; Time Dependent Material (Comp. Strength)
NAME=SOLETTA, CODE, EUROPEAN, 40000, 2

```

```

*TDM-LINK ; Time Dependent Material Link
4, SOLETTA, SOLETTA

```

```

*SECTION ; Section

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

```

1, COMPOSITE , C1 Interno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.94, 0.015, 0.5, 0.03, 0.6, 0.03
0, 0, 0, 0, 0, 0
0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
2, COMPOSITE , C2 Interno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.015, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
3, COMPOSITE , C1 Esterno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.94, 0.015, 0.5, 0.03, 0.6, 0.03
0, 0, 0, 0, 0, 0
0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
4, COMPOSITE , C2 esterno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.015, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
5, TAPERED , C4 Interno Sx , CT, 0, 0, 0, 0, 0, 0, 0, YES, CP_I, 1, 1, CMP-I
1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
3.2, 0.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
3.2, 1.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
0, 0, 0, 0, 0, 0
0
0
0
0, 0, 0, 0, 0, 0
0
0
0
6, TAPERED , C4 Interno Dx , CT, 0, 0, 0, 0, 0, 0, 0, YES, CP_I, 1, 1, CMP-I
1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
3.2, 1.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
3.2, 0.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
0, 0, 0, 0, 0, 0
0
0
0
0, 0, 0, 0, 0, 0
0
0
0
7, COMPOSITE , C5 Interno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.02, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
8, COMPOSITE , C6 Interno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.012, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
9, TAPERED , C4 Esterno Sx , CT, 0, 0, 0, 0, 0, 0, 0, YES, CP_I, 1, 1, CMP-I
1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
3.025, 0.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
3.025, 1.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
0, 0, 0, 0, 0, 0
0
0
0
0, 0, 0, 0, 0, 0
0

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

```

0
0

10, TAPERED , C4 Esterno Dx , CT, 0, 0, 0, 0, 0, 0, 0, 0, YES, CP_I, 1, 1, CMP-I
1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
3.025, 1.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
3.025, 0.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
0, 0, 0, 0, 0, 0
0
0
0
0, 0, 0, 0, 0, 0
0
0
0

11, COMPOSITE , C3 Interno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.02, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
12, COMPOSITE , C5 Esterno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.02, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
13, COMPOSITE , C6 Esterno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.012, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
14, COMPOSITE , C3 Esterno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.02, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
15, DBUSER , CONTROV 2L80x10d15, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.08, 0.08, 0.01, 0.01, 0.015, 0,
0, 0, 0, 0
16, COMPOSITE , C4 Interno Centr , CT, 0, 0, 0, 0, 0, 0, YES, I
1.92, 0.02, 0.6, 0.04, 0.7, 0.04
0, 0, 0, 0, 0, 0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
17, DBUSER , HSUP_CORR 2L80x10d15, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.08, 0.08, 0.01, 0.01, 0.015, 0
, 0, 0, 0, 0
18, DBUSER , HINF_CORR 2L80x10d15, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.08, 0.08, 0.01, 0.01, 0.015, 0
, 0, 0, 0, 0
19, DBUSER , HSUP_PILE 2L100x10d20, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.1, 0.1, 0.01, 0.01, 0.02, 0,
0, 0, 0, 0
20, DBUSER , DIAG_PILE 2L80x8d20, CC, 0, 1, 0, 0, 0, 0, YES, 2L , 2, 0.08, 0.08, 0.008, 0.008, 0.02, 0
, 0, 0, 0, 0
21, COMPOSITE , C4 Esterno Centr , CT, 0, 0, 0, 0, 0, 0, YES, I
1.92, 0.02, 0.6, 0.04, 0.7, 0.04
0, 0, 0, 0, 0, 0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
22, DBUSER , 330x30 , RT, 0, 0, 1, 0.8, 0, 0, NO, SB , 2, 0.3, 3.3, 0, 0, 0, 0, 0, 0, 0, 0
23, DBUSER , 500x30 , CT, 0, 0, 0, 0, 0, 0, NO, SB , 2, 0.3, 5, 0, 0, 0, 0, 0, 0, 0, 0
24, DBUSER , 400x30 , LT, 0, 1, 1, 1.5, 0, 0, NO, SB , 2, 0.3, 4, 0, 0, 0, 0, 0, 0, 0, 0
25, DBUSER , 300x30 , CT, 0, 0, 0, 0, 0, 0, NO, SB , 2, 0.3, 3, 0, 0, 0, 0, 0, 0, 0, 0
26, DBUSER , 400x30 dx , RT, 0, 1, 1, 1.5, 0, 0, NO, SB , 2, 0.3, 4, 0, 0, 0, 0, 0, 0, 0, 0
27, DBUSER , 520x30 , CT, 0, 0, 0, 0, 0, 0, NO, SB , 2, 0.3, 5.2, 0, 0, 0, 0, 0, 0, 0, 0
46, DBUSER , PILA , CC, 0, 0, 0, 0, 0, 0, YES, STRK, 2, 1.5, 11.1, 0, 0, 0, 0, 0, 0, 0, 0

64, DBUSER , DIAG_CORR 2L80x8d15, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.08, 0.08, 0.008, 0.008, 0.015,
0, 0, 0, 0, 0

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

65, DBUSER , HINF\_PILE 2L100x10d20, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.1, 0.1, 0.01, 0.01, 0.02, 0, 0, 0, 0, 0

\*SECT-COLOR

```

1, 255, 0, 0, 0, 255, 0, 0, 0, 255, NO, 0.5
2, 255, 0, 0, 0, 255, 0, 0, 0, 255, NO, 0.5
3, 3, 111, 0, 93, 255, 87, 3, 111, 0, NO, 0.5
4, 70, 70, 0, 192, 255, 0, 70, 70, 0, NO, 0.5
5, 255, 0, 0, 0, 255, 0, 0, 0, 255, NO, 0.5
6, 0, 13, 13, 0, 128, 128, 0, 13, 13, NO, 0.5
7, 255, 0, 0, 0, 255, 0, 0, 0, 255, NO, 0.5
8, 123, 40, 0, 255, 192, 160, 123, 40, 0, NO, 0.5
9, 3, 0, 108, 163, 160, 255, 3, 0, 108, NO, 0.5
10, 3, 111, 66, 163, 255, 160, 3, 111, 66, NO, 0.5
11, 255, 0, 0, 0, 255, 0, 0, 0, 255, NO, 0.5
12, 87, 87, 0, 192, 192, 0, 87, 87, 0, NO, 0.5
13, 0, 72, 72, 0, 192, 192, 0, 72, 72, NO, 0.5
14, 102, 69, 0, 192, 128, 0, 102, 69, 0, NO, 0.5
15, 65, 165, 65, 192, 192, 192, 65, 165, 65, NO, 0.5
16, 87, 87, 0, 192, 192, 0, 87, 87, 0, NO, 0.5
17, 87, 87, 0, 192, 192, 0, 87, 87, 0, NO, 0.5
18, 87, 87, 0, 192, 192, 0, 87, 87, 0, NO, 0.5
19, 87, 87, 0, 192, 192, 0, 87, 87, 0, NO, 0.5
20, 87, 87, 0, 192, 192, 0, 87, 87, 0, NO, 0.5
21, 87, 87, 0, 192, 192, 0, 87, 87, 0, NO, 0.5
22, 70, 70, 0, 192, 255, 0, 70, 70, 0, NO, 0.5
23, 121, 0, 91, 255, 0, 192, 121, 0, 91, NO, 0.5
24, 89, 0, 162, 212, 160, 255, 89, 0, 162, NO, 0.5
25, 0, 43, 19, 0, 128, 57, 0, 43, 19, NO, 0.5
26, 115, 0, 0, 255, 87, 87, 115, 0, 0, NO, 0.5
27, 34, 77, 0, 85, 192, 0, 34, 77, 0, NO, 0.5
46, 85, 32, 0, 192, 72, 0, 85, 32, 0, NO, 0.5
64, 85, 32, 0, 192, 72, 0, 85, 32, 0, NO, 0.5
65, 85, 32, 0, 192, 72, 0, 85, 32, 0, NO, 0.5

```

\*COMP-GEN-SECT-PSC-DESIGN ; Composite Section for PSC Design

```

1, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
2, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
3, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
4, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
6, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
7, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
8, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
9, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
10, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
11, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
12, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
13, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
14, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
16, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
21, NO, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

```

\*DGN-SECT

```

1, COMPOSITE , C1 Interno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.94, 0.015, 0.5, 0.03, 0.6, 0.03
0, 0, 0, 0, 0, 0
0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
2, COMPOSITE , C2 Interno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.015, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
3, COMPOSITE , C1 Esterno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.94, 0.015, 0.5, 0.03, 0.6, 0.03
0, 0, 0, 0, 0, 0
0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
4, COMPOSITE , C2 esterno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.015, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0

```

PROJECT TITLE : Viadotto su rotondina

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotondine V_1.mct |

```

0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
5, TAPERED , C4 Interno Sx , CT, 0, 0, 0, 0, 0, 0, 0, 0, YES, CP_I, 1, 1, CMP-I
1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
3.2, 0.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
3.2, 1.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
0, 0, 0, 0, 0, 0
0
0
0
0, 0, 0, 0, 0, 0
0
0
0

6, TAPERED , C4 Interno Dx , CT, 0, 0, 0, 0, 0, 0, 0, 0, YES, CP_I, 1, 1, CMP-I
1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
3.2, 1.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
3.2, 0.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
0, 0, 0, 0, 0, 0
0
0
0
0, 0, 0, 0, 0, 0
0
0
0


7, COMPOSITE , C5 Interno , CT, 0, 0, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.02, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
8, COMPOSITE , C6 Interno , CT, 0, 0, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.012, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
9, TAPERED , C4 Esterno Sx , CT, 0, 0, 0, 0, 0, 0, 0, 0, YES, CP_I, 1, 1, CMP-I
1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
3.025, 0.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
3.025, 1.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
0, 0, 0, 0, 0, 0
0
0
0
0, 0, 0, 0, 0, 0
0
0
0

10, TAPERED , C4 Esterno Dx , CT, 0, 0, 0, 0, 0, 0, 0, 0, YES, CP_I, 1, 1, CMP-I
1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
3.025, 1.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
3.025, 0.92, 0.02, 0.6, , 0.04, 0.7, , 0.04
0, 0, 0, 0, 0, 0
0
0
0
0, 0, 0, 0, 0, 0
0
0
0

11, COMPOSITE , C3 Interno , CT, 0, 0, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.02, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
12, COMPOSITE , C5 Esterno , CT, 0, 0, 0, 0, 0, 0, 0, 0, YES, I

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

```

0.93, 0.02, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
13, COMPOSITE , C6 Esterno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.012, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
14, COMPOSITE , C3 Esterno , CT, 0, 0, 0, 0, 0, 0, YES, I
0.93, 0.02, 0.5, 0.03, 0.6, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
15, DBUSER , CONTROV 2L80x10d15, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.08, 0.08, 0.01, 0.01, 0.015, 0,
0, 0, 0, 0
16, COMPOSITE , C4 Interno Centr , CT, 0, 0, 0, 0, 0, 0, YES, I
1.92, 0.02, 0.6, 0.04, 0.7, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.2, 1, 0, 3.2, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
17, DBUSER , HSUP_CORR 2L80x10d15, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.08, 0.08, 0.01, 0.01, 0.015, 0
, 0, 0, 0, 0
18, DBUSER , HINF_CORR 2L80x10d15, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.08, 0.08, 0.01, 0.01, 0.015, 0
, 0, 0, 0, 0
19, DBUSER , HSUP_PILE 2L100x10d20, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.1, 0.1, 0.01, 0.01, 0.02, 0,
0, 0, 0, 0
20, DBUSER , DIAG_PILE 2L80x8d20, CC, 0, 1, 0, 0, 0, 0, YES, 2L , 2, 0.08, 0.08, 0.008, 0.008, 0.02, 0
, 0, 0, 0, 0
21, COMPOSITE , C4 Esterno Centr , CT, 0, 0, 0, 0, 0, 0, YES, I
1.92, 0.02, 0.6, 0.04, 0.7, 0.04
0, 0, 0, 0, 0, 0
0
0
0
3.025, 1, 0, 3.025, 0.24, 0.06, 6.2978, 0, 0.3, 0.2, NO, ,
22, DBUSER , 330x30 , RT, 0, 0, 1, 0.8, 0, 0, NO, SB , 2, 0.3, 3.3, 0, 0, 0, 0, 0, 0, 0, 0
23, DBUSER , 500x30 , CT, 0, 0, 0, 0, 0, 0, NO, SB , 2, 0.3, 5, 0, 0, 0, 0, 0, 0, 0, 0
24, DBUSER , 400x30 , LT, 0, 1, 1, 1.5, 0, 0, NO, SB , 2, 0.3, 4, 0, 0, 0, 0, 0, 0, 0, 0
25, DBUSER , 300x30 , CT, 0, 0, 0, 0, 0, 0, NO, SB , 2, 0.3, 3, 0, 0, 0, 0, 0, 0, 0, 0
26, DBUSER , 400x30 dx , RT, 0, 1, 1, 1.5, 0, 0, NO, SB , 2, 0.3, 4, 0, 0, 0, 0, 0, 0, 0, 0
27, DBUSER , 520x30 , CT, 0, 0, 0, 0, 0, 0, NO, SB , 2, 0.3, 5.2, 0, 0, 0, 0, 0, 0, 0, 0
46, DBUSER , PILA , CC, 0, 0, 0, 0, 0, 0, YES, STRK, 2, 1.5, 11.1, 0, 0, 0, 0, 0, 0, 0, 0

64, DBUSER , DIAG_CORR 2L80x8d15, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.08, 0.08, 0.008, 0.008, 0.015,
0, 0, 0, 0, 0
65, DBUSER , HINF_PILE 2L100x10d20, CC, 0, 0, 0, 0, 0, 0, YES, 2L , 2, 0.1, 0.1, 0.01, 0.01, 0.02, 0,
0, 0, 0, 0, 0

```

```

*REBAR-PSC ; Reinforcement of Section
SECT=1, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P16, 16, 0, 0, 0, 0.05, 0.2, 2
I, P16, 16, 0, 0, 0, 0.22, 0.2, 2
J, P16, 16, 0, 0, 0, 0.05, 0.2, 2
J, P16, 16, 0, 0, 0, 0.22, 0.2, 2
SECT=2, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P16, 16, 0, 0, 0, 0.05, 0.2, 2
I, P16, 16, 0, 0, 0, 0.22, 0.2, 2
J, P16, 16, 0, 0, 0, 0.05, 0.2, 2
J, P16, 16, 0, 0, 0, 0.22, 0.2, 2
SECT=3, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P16, 15, 0, 0, 0, 0.22, 0.2, 2
I, P16, 15, 0, 0, 0, 0.05, 0.2, 2
J, P16, 15, 0, 0, 0, 0.22, 0.2, 2
J, P16, 15, 0, 0, 0, 0.05, 0.2, 2
SECT=4, YES, NO, NO

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

```

NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P16, 15, 0, 0, 0, 0.05, 0.2, 2
I, P16, 15, 0, 0, 0, 0.22, 0.2, 2
J, P16, 15, 0, 0, 0, 0.05, 0.2, 2
J, P16, 15, 0, 0, 0, 0.22, 0.2, 2
SECT=5, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P20, 32, 0, 0, 0, 0.05, 0.1, 2
I, P20, 32, 0, 0, 0, 0.22, 0.1, 2
J, P20, 32, 0, 0, 0, 0.05, 0.1, 2
J, P20, 32, 0, 0, 0, 0.22, 0.1, 2
SECT=6, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P20, 32, 0, 0, 0, 0.22, 0.1, 2
I, P20, 32, 0, 0, 0, 0.05, 0.1, 2
J, P20, 32, 0, 0, 0, 0.22, 0.1, 2
J, P20, 32, 0, 0, 0, 0.05, 0.1, 2
SECT=7, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P20, 16, 0, 0, 0, 0.22, 0.2, 2
I, P20, 16, 0, 0, 0, 0.05, 0.2, 2
J, P20, 16, 0, 0, 0, 0.22, 0.2, 2
J, P20, 16, 0, 0, 0, 0.05, 0.2, 2
SECT=8, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P16, 16, 0, 0, 0, 0.05, 0.2, 2
I, P16, 16, 0, 0, 0, 0.22, 0.2, 2
J, P16, 16, 0, 0, 0, 0.05, 0.2, 2
J, P16, 16, 0, 0, 0, 0.22, 0.2, 2
SECT=9, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P20, 30, 0, 0, 0, 0.22, 0.1, 2
I, P20, 30, 0, 0, 0, 0.05, 0.1, 2
J, P20, 30, 0, 0, 0, 0.22, 0.1, 2
J, P20, 30, 0, 0, 0, 0.05, 0.1, 2
SECT=10, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P20, 30, 0, 0, 0, 0.05, 0.1, 2
I, P20, 30, 0, 0, 0, 0.22, 0.1, 2
J, P20, 30, 0, 0, 0, 0.05, 0.1, 2
J, P20, 30, 0, 0, 0, 0.22, 0.1, 2
SECT=11, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P20, 16, 0, 0, 0, 0.05, 0.2, 2
I, P20, 16, 0, 0, 0, 0.22, 0.2, 2
J, P20, 16, 0, 0, 0, 0.05, 0.2, 2
J, P20, 16, 0, 0, 0, 0.22, 0.2, 2
SECT=12, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P20, 15, 0, 0, 0, 0.22, 0.2, 2
I, P20, 15, 0, 0, 0, 0.05, 0.2, 2
J, P20, 15, 0, 0, 0, 0.22, 0.2, 2
J, P20, 15, 0, 0, 0, 0.05, 0.2, 2
SECT=13, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P16, 15, 0, 0, 0, 0.05, 0.2, 2
I, P16, 15, 0, 0, 0, 0.22, 0.2, 2
J, P16, 15, 0, 0, 0, 0.05, 0.2, 2
J, P16, 15, 0, 0, 0, 0.22, 0.2, 2
SECT=14, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P20, 15, 0, 0, 0, 0.22, 0.2, 2
I, P20, 15, 0, 0, 0, 0.05, 0.2, 2
J, P20, 15, 0, 0, 0, 0.22, 0.2, 2
J, P20, 15, 0, 0, 0, 0.05, 0.2, 2
SECT=16, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P20, 32, 0, 0, 0, 0.05, 0.1, 2
I, P20, 32, 0, 0, 0, 0.22, 0.1, 2
J, P20, 32, 0, 0, 0, 0.05, 0.1, 2
J, P20, 32, 0, 0, 0, 0.22, 0.1, 2
SECT=21, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , , NO, ,
I, P20, 30, 0, 0, 0, 0.22, 0.1, 2
I, P20, 30, 0, 0, 0, 0.05, 0.1, 2
J, P20, 30, 0, 0, 0, 0.22, 0.1, 2
J, P20, 30, 0, 0, 0, 0.05, 0.1, 2

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

```
*TS-GROUP ; Tapered Section Group
T3 SX, 310 311, LINEAR, , , , LINEAR, , , , 0
T3 DX, 314 315, LINEAR, , , , LINEAR, , , , 0
T1 SX, 110 111, LINEAR, , , , LINEAR, , , , 0
T1 DX, 114 115, LINEAR, , , , LINEAR, , , , 0
T2 SX, 210 211, LINEAR, , , , LINEAR, , , , 0
T2 DX, 214 215, LINEAR, , , , LINEAR, , , , 0
T4 SX, 410 411, LINEAR, , , , LINEAR, , , , 0
T4 DX, 414 415, LINEAR, , , , LINEAR, , , , 0
T1 SX 2, 126 127, LINEAR, , , , LINEAR, , , , 0
T1 DX 2, 130 131, LINEAR, , , , LINEAR, , , , 0
T2 SX 2, 226 227, LINEAR, , , , LINEAR, , , , 0
T2 DX 2, 230 231, LINEAR, , , , LINEAR, , , , 0
T3 SX 2, 326 327, LINEAR, , , , LINEAR, , , , 0
T3 DX 2, 330 331, LINEAR, , , , LINEAR, , , , 0
T4 SX 2, 426 427, LINEAR, , , , LINEAR, , , , 0
T4 DX 2, 430 431, LINEAR, , , , LINEAR, , , , 0
```

```
*STLDCASE ; Static Load Cases
Peso acciaio e pile, D ,
Peso soletta, D ,
Finiture, DW,
Vento strutture (Y+), W ,
Vento mobili (Y+), WL,
Frenamento (X+), BRK,
Termico Unif. +15°, T ,
Termico diff. +5°/H, TPG,
```

```
*DGN-CTRL ; General Design Data
NO, NO, YES, , , , 0, 3D, YES, NO, NO, 0, 1, NO, 2
```

```
*DGN-STEEL ; Steel Design Code
CODE=Eurocode3-2:05, NO, 0
1.05, 1.1, 1.25, 0, 0
```

```
*CONSTRAINT ; Supports
1 2 883 884, 111111, SUPPORTI
```


```
*ELASTICLINK
185, 77, 159, GEN , 0, 767676, 1302, 1302, 1, 1, 1, NO, 0.5, 0.5, APPOGGI SPALLE
186, 79, 161, GEN , 0, 767676, 1302, 1302, 1, 1, 1, NO, 0.5, 0.5, APPOGGI SPALLE
187, 81, 163, GEN , 0, 767676, 1302, 1302, 1, 1, 1, NO, 0.5, 0.5, APPOGGI SPALLE
188, 83, 165, GEN , 0, 767676, 1302, 1302, 1, 1, 1, NO, 0.5, 0.5, APPOGGI SPALLE
190, 78, 160, GEN , 0, 767676, 1302, 1302, 1, 1, 1, NO, 0.5, 0.5, APPOGGI SPALLE
191, 80, 162, GEN , 0, 767676, 1302, 1302, 1, 1, 1, NO, 0.5, 0.5, APPOGGI SPALLE
192, 82, 164, GEN , 0, 767676, 1302, 1302, 1, 1, 1, NO, 0.5, 0.5, APPOGGI SPALLE
193, 84, 166, GEN , 0, 767676, 1302, 1302, 1, 1, 1, NO, 0.5, 0.5, APPOGGI SPALLE
195, 21, 31, GEN , 0, 1.794446e+006, 2855, 2855, 1, 1, 1, NO, 0.5, 0.5, APPOGGI PILE
196, 23, 33, GEN , 0, 1.794446e+006, 2855, 2855, 1, 1, 1, NO, 0.5, 0.5, APPOGGI PILE
197, 885, 35, GEN , 0, 1.794446e+006, 2855, 2855, 1, 1, 1, NO, 0.5, 0.5, APPOGGI PILE
198, 27, 37, GEN , 0, 1.794446e+006, 2855, 2855, 1, 1, 1, NO, 0.5, 0.5, APPOGGI PILE
200, 22, 32, GEN , 0, 1.794446e+006, 2855, 2855, 1, 1, 1, NO, 0.5, 0.5, APPOGGI PILE
201, 24, 34, GEN , 0, 1.794446e+006, 2855, 2855, 1, 1, 1, NO, 0.5, 0.5, APPOGGI PILE
202, 886, 36, GEN , 0, 1.794446e+006, 2855, 2855, 1, 1, 1, NO, 0.5, 0.5, APPOGGI PILE
203, 28, 38, GEN , 0, 1.794446e+006, 2855, 2855, 1, 1, 1, NO, 0.5, 0.5, APPOGGI PILE
```

```
*MEMBERTYPE ; Modify Member Type
1014to1019 1022to1027 1030to1035 1038to1043 1110to1422by8 , BRACE, 0
1111to1423by8 1112to1424by8 1113to1425by8 1114to1426by8 , BRACE, 0
1115to1427by8 1430to1514by4 1431to1515by4 1432to1516by4 2001to2003 , BRACE, 0
2005to2007 2009to2014 2017to2022 2025to2030 2033to2038 2041to2043 , BRACE, 0
2045to2047 3001to3361by8 3002to3362by8 3003to3363by8 3004to3364by8 , BRACE, 0
3005to3365by8 3006to3366by8, BRACE, 0
```

```
*RIGIDLINK ; Rigid Link
25, 111111, 21 23 27 885, RIGID LINK
26, 111111, 22 24 28 886, RIGID LINK
720, 111111, 159 177 327 489 609, RIGID LINK
721, 111111, 178 328 490 610, RIGID LINK
723, 111111, 179 329 491 611, RIGID LINK
724, 111111, 180 330 492 612, RIGID LINK
726, 111111, 181 331 493 613, RIGID LINK
727, 111111, 182 332 494 614, RIGID LINK
729, 111111, 87 107 495 615, RIGID LINK
731, 111111, 31 41 51 496, RIGID LINK
733, 111111, 88 108 497 616, RIGID LINK
735, 111111, 183 333 498 617, RIGID LINK
```



PROJECT TITLE : Viadotto su rotatoria

|  | Company | Studio Corona | Client    |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

736, 111111, 184 334 499 618, RIGID LINK  
738, 111111, 185 335 500 619, RIGID LINK  
740, 111111, 186 336 501 620, RIGID LINK  
742, 111111, 187 337 502 621, RIGID LINK  
743, 111111, 188 338 503 622, RIGID LINK  
745, 111111, 89 109 504 623, RIGID LINK  
747, 111111, 32 42 52 505, RIGID LINK  
749, 111111, 90 110 506 624, RIGID LINK  
751, 111111, 189 339 507 625, RIGID LINK  
752, 111111, 190 340 508 626, RIGID LINK  
754, 111111, 191 341 509 627, RIGID LINK  
755, 111111, 192 342 510 628, RIGID LINK  
757, 111111, 193 343 511 629, RIGID LINK  
758, 111111, 160 194 344 512 630, RIGID LINK  
761, 111111, 161 210 363 513 631, RIGID LINK  
762, 111111, 211 364 514 632, RIGID LINK  
764, 111111, 212 365 515 633, RIGID LINK  
765, 111111, 213 366 516 634, RIGID LINK  
767, 111111, 214 367 517 635, RIGID LINK  
768, 111111, 215 368 518 636, RIGID LINK  
770, 111111, 91 115 519 637, RIGID LINK  
772, 111111, 33 43 53 520, RIGID LINK  
774, 111111, 92 116 521 638, RIGID LINK  
776, 111111, 216 369 522 639, RIGID LINK  
777, 111111, 217 370 523 640, RIGID LINK  
779, 111111, 218 371 524 641, RIGID LINK  
781, 111111, 219 372 525 642, RIGID LINK  
783, 111111, 220 373 526 643, RIGID LINK  
784, 111111, 221 374 527 644, RIGID LINK  
786, 111111, 93 117 528 645, RIGID LINK  
788, 111111, 34 44 54 529, RIGID LINK  
790, 111111, 94 118 530 646, RIGID LINK  
792, 111111, 222 375 531 647, RIGID LINK  
793, 111111, 223 376 532 648, RIGID LINK  
795, 111111, 224 377 533 649, RIGID LINK  
796, 111111, 225 378 534 650, RIGID LINK  
798, 111111, 226 379 535 651, RIGID LINK  
799, 111111, 162 227 380 536 652, RIGID LINK  
802, 111111, 163 243 399 537 653, RIGID LINK  
803, 111111, 244 400 538 654, RIGID LINK  
805, 111111, 245 401 539 655, RIGID LINK  
806, 111111, 246 402 540 656, RIGID LINK  
808, 111111, 247 403 541 657, RIGID LINK  
809, 111111, 248 404 542 658, RIGID LINK  
811, 111111, 95 123 543 659, RIGID LINK  
813, 111111, 35 45 55 544, RIGID LINK  
815, 111111, 96 124 545 660, RIGID LINK  
817, 111111, 249 405 546 661, RIGID LINK  
818, 111111, 250 406 547 662, RIGID LINK  
820, 111111, 251 407 548 663, RIGID LINK  
822, 111111, 252 408 549 664, RIGID LINK  
824, 111111, 253 409 550 665, RIGID LINK  
825, 111111, 254 410 551 666, RIGID LINK  
827, 111111, 97 125 552 667, RIGID LINK  
829, 111111, 36 46 56 553, RIGID LINK  
831, 111111, 98 126 554 668, RIGID LINK  
833, 111111, 255 411 555 669, RIGID LINK  
834, 111111, 256 412 556 670, RIGID LINK  
836, 111111, 257 413 557 671, RIGID LINK  
837, 111111, 258 414 558 672, RIGID LINK  
839, 111111, 259 415 559 673, RIGID LINK  
840, 111111, 164 260 416 560 674, RIGID LINK  
843, 111111, 165 276 435 561 675, RIGID LINK  
844, 111111, 277 436 562 676, RIGID LINK  
846, 111111, 278 437 563 677, RIGID LINK  
847, 111111, 279 438 564 678, RIGID LINK  
849, 111111, 280 439 565 679, RIGID LINK  
850, 111111, 281 440 566 680, RIGID LINK  
852, 111111, 99 131 567 681, RIGID LINK  
854, 111111, 37 47 57 568, RIGID LINK  
856, 111111, 100 132 569 682, RIGID LINK  
858, 111111, 282 441 570 683, RIGID LINK  
859, 111111, 283 442 571 684, RIGID LINK  
861, 111111, 284 443 572 685, RIGID LINK  
863, 111111, 285 444 573 686, RIGID LINK  
865, 111111, 286 445 574 687, RIGID LINK  
866, 111111, 287 446 575 688, RIGID LINK  
868, 111111, 101 133 576 689, RIGID LINK

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

870, 111111, 38 48 58 577, RIGID LINK  
 872, 111111, 102 134 578 690, RIGID LINK  
 874, 111111, 288 447 579 691, RIGID LINK  
 875, 111111, 289 448 580 692, RIGID LINK  
 877, 111111, 290 449 581 693, RIGID LINK  
 878, 111111, 291 450 582 694, RIGID LINK  
 880, 111111, 292 451 583 695, RIGID LINK  
 881, 111111, 166 293 452 584 696, RIGID LINK  
 883, 111111, 77to83by2, RIGID LINK  
 884, 111111, 78to84by2, RIGID LINK

\*LOADTOMASS, XYZ, YES, YES, YES, YES, 9.806  
 Peso soletta, 1, Finiture, 1

\*USE-STLD, Peso acciaio e pile

\*SELEFWHEIGHT, 0, 0, -1, PESO ACCIAIO E PILE

; End of data for load case [Peso acciaio e pile] -----

\*USE-STLD, Peso soletta

\*BEAMLOAD ; Element Beam Loads

101, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 102, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 103, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 104, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 105, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 106, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 107, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 108, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 109, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 110, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 111, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 112, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 113, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 114, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 115, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 116, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 117, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 118, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 119, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 120, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 121, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 122, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 123, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 124, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 125, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 126, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 127, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,  
 0, NO  
 128, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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0, NO
129, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
130, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
131, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
132, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
133, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
134, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
135, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
136, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
137, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
138, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
139, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
140, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
201, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
202, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
203, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
204, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
205, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
206, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
207, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
208, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
209, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
210, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
211, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
212, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
213, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
214, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
215, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
216, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
217, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
218, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
219, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
220, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
221, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
222, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
223, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
224, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
225, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
226, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO
227, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

|           |                                                                                              |
|-----------|----------------------------------------------------------------------------------------------|
| 228, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 229, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 230, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 231, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 232, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 233, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 234, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 235, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 236, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 237, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 238, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 239, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 240, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 301, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 302, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 303, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 304, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 305, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 306, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 307, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 308, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 309, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 310, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 311, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 312, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 313, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 314, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 315, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 316, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 317, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 318, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 319, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 320, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 321, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 322, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 323, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 324, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 325, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |
| 326, BEAM | , UNILoad, GZ, NO, NO, aDir[1], , , , 0, -24, 1, -24, 0, 0, 0, 0, PESO SOLETTA, NO, 0, 0, NO |

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

|           |           |        |      |         |       |                                  |              |              |
|-----------|-----------|--------|------|---------|-------|----------------------------------|--------------|--------------|
| 327, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 328, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 329, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 330, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 331, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 332, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 333, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 334, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 335, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 336, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 337, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 338, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 339, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 340, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -24, 1, -24, 0, 0, 0, 0       | PESO SOLETTA | NO, 0, 0, NO |
| 401, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 402, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 403, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 404, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 405, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 406, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 407, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 408, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 409, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 410, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 411, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 412, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 413, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 414, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 415, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 416, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 417, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 418, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 419, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 420, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 421, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 422, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 423, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 424, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |
| 425, BEAM | , UNILoad | GZ, NO | , NO | aDir[1] | , , , | 0, -22.69, 1, -22.69, 0, 0, 0, 0 | PESO SOLETTA | NO, 0, 0, NO |

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

```

0, NO
426, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
427, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
428, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
429, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
430, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
431, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
432, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
433, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
434, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
435, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
436, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
437, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
438, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
439, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO
440, BEAM , UNILOAD, GZ, NO , NO, aDir[1], , , , 0, -22.69, 1, -22.69, 0, 0, 0, 0, PESO SOLETTA, NO, 0,
0, NO

```

; End of data for load case [Peso soletta] -----

\*USE-STLD, Finiture

\*BEAMLOAD ; Element Beam Loads

```

101, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
102, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
103, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
104, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
105, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
106, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
107, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
108, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
109, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
110, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
111, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
112, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
113, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
114, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
115, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
116, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
117, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
118, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
119, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
120, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI
TURE, NO, 0, 0, NO
121, BEAM , UNILOAD, GZ, NO , YES, 1, LY, -0.29, -0.29, NO, 0, -13.24, 1, -13.24, 0, 0, 0, 0, PESO FINI

```







PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

```

RE, NO, 0, 0, NO
420, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
421, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
422, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
423, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
424, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
425, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
426, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
427, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
428, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
429, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
430, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
431, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
432, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
433, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
434, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
435, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
436, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
437, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
438, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
439, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO
440, BEAM, , UNILOAD, GZ, NO, YES, 1, LY, 0.36, 0.36, NO, 0, -11.36, 1, -11.36, 0, 0, 0, 0, PESO FINITU
RE, NO, 0, 0, NO

```

; End of data for load case [Finiture] -----

\*USE-STLD, Vento strutture (Y+)


\*BEAMLOAD ; Element Beam Loads

```

O
101, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N
O
102, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N
O
103, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N
O
104, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N
O
105, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N
O
106, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N
O
107, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N
O
108, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N
O
109, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N
NO
110, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.25, -0.51, YES, 0, 3.03, 1, 3.71, 0, 0, 0, 0, , NO, 0, 0,
NO
111, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.51, -0.76, YES, 0, 3.71, 1, 4.38, 0, 0, 0, 0, , NO, 0, 0,
NO
112, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.76, -0.76, NO, 0, 4.38, 1, 4.38, 0, 0, 0, 0, , NO, 0, 0, N
O
113, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.76, -0.76, NO, 0, 4.38, 1, 4.38, 0, 0, 0, 0, , NO, 0, 0, N
O
114, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.76, -0.51, YES, 0, 4.38, 1, 3.71, 0, 0, 0, 0, , NO, 0, 0,
NO
115, BEAM, , UNILOAD, GY, NO, YES, 1, LZ, -0.51, -0.25, YES, 0, 3.71, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0,

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |


|    |           |                                                                                                |
|----|-----------|------------------------------------------------------------------------------------------------|
| NO | 116, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 117, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 118, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 119, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 120, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 121, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 122, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 123, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 124, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 125, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 126, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.51, YES, 0, 3.03, 1, 3.71, 0, 0, 0, 0, , NO, 0, 0, N |
| NO | 127, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.51, -0.76, YES, 0, 3.71, 1, 4.38, 0, 0, 0, 0, , NO, 0, 0, N |
| NO | 128, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.76, -0.76, NO, 0, 4.38, 1, 4.38, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 129, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.76, -0.76, NO, 0, 4.38, 1, 4.38, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 130, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.76, -0.51, YES, 0, 4.38, 1, 3.71, 0, 0, 0, 0, , NO, 0, 0, N |
| NO | 131, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.51, -0.25, YES, 0, 3.71, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N |
| NO | 132, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 133, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 134, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 135, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 136, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 137, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 138, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 139, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 140, BEAM | , UNILoad, GY, NO , YES, 1, LZ, -0.25, -0.25, NO, 0, 3.03, 1, 3.03, 0, 0, 0, 0, , NO, 0, 0, N  |
| O  | 401, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 402, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 403, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 404, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 405, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 406, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 407, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 408, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 409, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 410, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.2, YES, 0, 2.69, 1, 2.35, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 411, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.2, 0.29, YES, 0, 2.35, 1, 2.01, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 412, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.29, 0.29, NO, 0, 2.01, 1, 2.01, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 413, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.29, 0.29, NO, 0, 2.01, 1, 2.01, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 414, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.29, 0.2, YES, 0, 2.01, 1, 2.35, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 415, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.2, 0.11, YES, 0, 2.35, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 416, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 417, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 418, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 419, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 420, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 421, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 422, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 423, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 424, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 425, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.11, NO, 0, 2.69, 1, 2.69, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 426, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.11, 0.2, YES, 0, 2.69, 1, 2.35, 0, 0, 0, 0, , NO, 0, 0, NO   |
| O  | 427, BEAM | , UNILoad, GY, NO , YES, 1, LZ, 0.2, 0.29, YES, 0, 2.35, 1, 2.01, 0, 0, 0, 0, , NO, 0, 0, NO   |







PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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430, BEAM , UNILoad, GX, NO , YES, 1, LZ, 0, 0, NO, 0, 1.56, 1, 1.56, 0, 0, 0, 0, , NO, 0, 0, NO
431, BEAM , UNILoad, GX, NO , YES, 1, LZ, 0, 0, NO, 0, 1.56, 1, 1.56, 0, 0, 0, 0, , NO, 0, 0, NO
432, BEAM , UNILoad, GX, NO , YES, 1, LZ, 0, 0, NO, 0, 1.56, 1, 1.56, 0, 0, 0, 0, , NO, 0, 0, NO
433, BEAM , UNILoad, GX, NO , YES, 1, LZ, 0, 0, NO, 0, 1.56, 1, 1.56, 0, 0, 0, 0, , NO, 0, 0, NO
434, BEAM , UNILoad, GX, NO , YES, 1, LZ, 0, 0, NO, 0, 1.56, 1, 1.56, 0, 0, 0, 0, , NO, 0, 0, NO
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437, BEAM , UNILoad, GX, NO , YES, 1, LZ, 0, 0, NO, 0, 1.56, 1, 1.56, 0, 0, 0, 0, , NO, 0, 0, NO
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; End of data for load case [Frenamento (X+)] -----

\*USE-STLD, Termico Unif. +15°


\*ELTEMPER ; Element Temperatures

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PROJECT TITLE : Viadotto su rotatoria

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|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |


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PROJECT TITLE : Viadotto su rotatoria

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|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |


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PROJECT TITLE : Viadotto su rotatoria

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|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |


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PROJECT TITLE : Viadotto su rotatoria

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|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |


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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |


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 3106, 15,  
 3107, 15,

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |


3108, 15,  
3109, 15,  
3110, 15,  
3113, 15,  
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3115, 15,  
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3209, 15,  
3210, 15,  
3211, 15,

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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3308, 15,  
3309, 15,  
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3314, 15,  
3315, 15,

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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3317, 15,  
3318, 15,  
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3364, 15,  
3365, 15,  
3366, 15,

; End of data for load case [Termico Unif. +15°] -----

\*USE-STLD, Termico diff. +5°/H

\*THERGRAD ; Temperature Gradient

101, 1, 5, YES, 0, 0, YES, 0,  
102, 1, 5, YES, 0, 0, YES, 0,  
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133, 1, 5, YES, 0, 0, YES, 0,



PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

134, 1, 5, YES, 0, 0, YES, 0,  
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 330, 1, 5, YES, 0, 0, YES, 0,  
 331, 1, 5, YES, 0, 0, YES, 0,

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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332, 1, 5, YES, 0, 0, YES, 0,
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438, 1, 5, YES, 0, 0, YES, 0,
439, 1, 5, YES, 0, 0, YES, 0,
440, 1, 5, YES, 0, 0, YES, 0,

```

; End of data for load case [Termico diff. +5°/H] -----

\*STAGE ; Define Construction Stage

```

NAME=Costruzione, 30, YES, NO
STEP=3, 10
AELEM=TRAVI PRINCIPALI, 1, TRASVERSI INTERMEDI, 1, TRASVERSI PILE, 1, PILE, 1, NODI, 1
 CONTROVENTI, 1
ABNDR=RIGID LINK, DEFORMED, APPOGGI SPALLE, DEFORMED, SUPPORTI, DEFORMED
 APPOGGI PILE, DEFORMED
ALOAD=PESO SOLETTA, LAST, PESO ACCIAIO E PILE, FIRST
NAME=Esercizio, 10000, YES, NO
STEP=3, 10, 32, 100, 316, 1000, 3162
AELEM=SOLETTA FITTIZIA, 1
ALOAD=PESO FINITURE, FIRST

```

\*SFUNCTION ; Spectrum Function

```

FUNC=SLD Orizz, 1, 0, 1, 9.806, 0.05, , 1.000000
USER
0.000000, 0.068867, 0.140690, 0.17432
0.422070, 0.17432, 0.486880, 0.15111
0.551690, 0.13336, 0.616500, 0.11934
0.681310, 0.10799, 0.746130, 0.09861
0.810940, 0.09073, 0.875750, 0.08401
0.940560, 0.07822, 1.005370, 0.07318
1.070180, 0.06875, 1.123600, 0.06548
1.124600, 0.05342, 1.134990, 0.05293
1.199810, 0.05007, 1.264620, 0.0475
1.329430, 0.04519, 1.394240, 0.04309

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

```

1.459050, 0.04117, 1.523860, 0.03942
1.588670, 0.03781, 1.653490, 0.03633
1.718300, 0.03496, 1.783110, 0.03369
1.888680, 0.03003, 1.994240, 0.02693
2.099810, 0.02429, 2.205370, 0.02202
2.310940, 0.02006, 2.416510, 0.01834
2.522070, 0.01684, 2.627640, 0.01551
2.733210, 0.01434, 2.838770, 0.01329
2.944340, 0.01236, 3.049900, 0.01152
3.155470, 0.01076, 3.261040, 0.01007
3.366600, 0.00945, 3.472170, 0.00888
3.577740, 0.00837, 3.683300, 0.00779
3.788870, 0.00746, 3.894430, 0.00706
4.000000, 0.00669

```

FUNC=SLD Vert, 1, 0, 1, 9.806, 0.05, , 1.000000  
 USER

```

0.000000, 0.01322, 0.050000, 0.03357
0.150000, 0.03357, 0.235000, 0.02143
0.320000, 0.01573, 0.405000, 0.01243
0.490000, 0.01028, 0.575000, 0.00876
0.660000, 0.00763, 0.745000, 0.00676
0.830000, 0.00607, 0.915000, 0.00555
1.000000, 0.00504, 1.094000, 0.00421
1.188000, 0.00357, 1.281000, 0.00307
1.375000, 0.00266, 1.469000, 0.00233
1.563000, 0.00206, 1.656000, 0.00184
1.750000, 0.00164, 1.844000, 0.00148
1.938000, 0.00134, 2.031000, 0.00122
2.125000, 0.00112, 2.219000, 0.00102
2.313000, 0.00094, 2.406000, 0.00087
2.500000, 0.00081, 2.594000, 0.00075
2.688000, 0.0007, 2.781000, 0.00065
2.875000, 0.00061, 2.969000, 0.00057
3.063000, 0.00054, 3.156000, 0.00051
3.250000, 0.00048, 3.344000, 0.00045
3.438000, 0.00043, 3.531000, 0.0004
3.625000, 0.00038, 3.719000, 0.00036
3.813000, 0.00035, 3.906000, 0.00033
4.000000, 0.00031

```

FUNC=SLV Orizz, 1, 0, 1, 9.806, 0.05, , 1.000000  
 USER

```

0.000000, 0.15045, 0.155180, 0.38236
0.465530, 0.38236, 0.538660, 0.33045
0.611780, 0.29095, 0.684910, 0.25988
0.758040, 0.23481, 0.831160, 0.21415
0.904290, 0.19684, 0.977420, 0.18211
1.050550, 0.16943, 1.123600, 0.15842
1.123670, 0.12934, 1.124600, 0.12923
1.196800, 0.12144, 1.269930, 0.11444
1.343060, 0.10821, 1.416180, 0.10262
1.489310, 0.09758, 1.562440, 0.09302
1.635570, 0.08886, 1.708690, 0.08506
1.781820, 0.08156, 1.854950, 0.07835
1.928080, 0.07538, 2.001200, 0.07262
2.096380, 0.06618, 2.191570, 0.06056
2.286750, 0.05562, 2.381930, 0.05126
2.477110, 0.0474, 2.572290, 0.04396
2.667470, 0.04088, 2.762650, 0.03811
2.857830, 0.03561, 2.953010, 0.03335
3.048190, 0.0313, 3.143370, 0.02944
3.238550, 0.02773, 3.333730, 0.02617
3.428920, 0.02474, 3.524100, 0.02342
3.619280, 0.0222, 3.714460, 0.02108
3.809640, 0.02004, 3.904820, 0.01907
4.000000, 0.01818

```

FUNC=SLV Vert, 1, 0, 1, 9.806, 0.05, , 1.000000  
 USER

```

0.000000, 0.04288, 0.050000, 0.10898
0.150000, 0.10898, 0.235000, 0.06956
0.320000, 0.05109, 0.405000, 0.04036
0.490000, 0.03336, 0.575000, 0.02843
0.660000, 0.02477, 0.745000, 0.02194
0.830000, 0.0197, 0.915000, 0.01787
1.000000, 0.01635, 1.094000, 0.01367
1.188000, 0.01159, 1.281000, 0.00996
1.375000, 0.00865, 1.469000, 0.00758
1.563000, 0.0067, 1.656000, 0.00596
1.750000, 0.00534, 1.844000, 0.00481

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

```

1.938000, 0.00435, 2.031000, 0.00396
2.125000, 0.00362, 2.219000, 0.00332
2.313000, 0.00306, 2.406000, 0.00282
2.500000, 0.00262, 2.594000, 0.00243
2.688000, 0.00226, 2.781000, 0.00211
2.875000, 0.00198, 2.969000, 0.00185
3.063000, 0.00174, 3.156000, 0.00164
3.250000, 0.00155, 3.344000, 0.00146
3.438000, 0.00138, 3.531000, 0.00131
3.625000, 0.00124, 3.719000, 0.00118
3.813000, 0.00112, 3.906000, 0.00107
4.000000, 0.00102

```

FUNC=SLC Orizz, 1, 0, 1, 9.806, 0.05, , 1.000000

USER

```

0.000000, 0.19101, 0.157820, 0.48282
0.473460, 0.48282, 0.551360, 0.4146
0.629260, 0.36327, 0.707160, 0.32326
0.785060, 0.29118, 0.862960, 0.2649
0.940860, 0.24296, 1.018760, 0.22438
1.096660, 0.20845, 1.123600, 0.20345
1.124600, 0.16597, 1.174560, 0.15891
1.252460, 0.14902, 1.330360, 0.1403
1.408260, 0.13254, 1.486170, 0.12559
1.564070, 0.11933, 1.641970, 0.11367
1.719870, 0.10852, 1.797770, 0.10382
1.875670, 0.09951, 1.953570, 0.09554
2.031470, 0.09188, 2.109370, 0.08848
2.199400, 0.08139, 2.289430, 0.07511
2.379460, 0.06954, 2.469490, 0.06456
2.559520, 0.0601, 2.649550, 0.05608
2.739580, 0.05246, 2.829610, 0.04917
2.919640, 0.04619, 3.009670, 0.04346
3.099700, 0.04098, 3.189730, 0.0387
3.279760, 0.0366, 3.369790, 0.03467
3.459820, 0.03289, 3.549850, 0.03124
3.639880, 0.02972, 3.729910, 0.0283
3.819940, 0.02698, 3.909970, 0.02575
4.000000, 0.02461

```

FUNC=SLC Vert, 1, 0, 1, 9.806, 0.05, , 1.000000

USER

```

0.000000, 0.06135, 0.050000, 0.15506
0.150000, 0.15506, 0.235000, 0.09898
0.320000, 0.07269, 0.405000, 0.05743
0.490000, 0.04747, 0.575000, 0.04045
0.660000, 0.03524, 0.745000, 0.03122
0.830000, 0.02802, 0.915000, 0.02542
1.000000, 0.02326, 1.094000, 0.01944
1.188000, 0.01649, 1.281000, 0.01417
1.375000, 0.0123, 1.469000, 0.01078
1.563000, 0.00953, 1.656000, 0.00848
1.750000, 0.00759, 1.844000, 0.00684
1.938000, 0.0062, 2.031000, 0.00564
2.125000, 0.00515, 2.219000, 0.00472
2.313000, 0.00435, 2.406000, 0.00402
2.500000, 0.00372, 2.594000, 0.00346
2.688000, 0.00322, 2.781000, 0.00301
2.875000, 0.00281, 2.969000, 0.00264
3.063000, 0.00248, 3.156000, 0.00233
3.250000, 0.0022, 3.344000, 0.00208
3.438000, 0.00197, 3.531000, 0.00187
3.625000, 0.00177, 3.719000, 0.00168
3.813000, 0.0016, 3.906000, 0.00152
4.000000, 0.00145

```

\*SPLDCASE ; Spectrum Load Cases

```

NAME=SLD Long (X+), XY, 0, 1, 1, NO, NO, LOG,
CQC, YES, 0, NO
SLD Orizz
NAME=SLD Trasv (Y+), XY, 90, 1, 1, NO, NO, LOG,
CQC, YES, 0, NO
SLD Orizz
NAME=SLD Vert (Z+), Z, 0, 1, 1, NO, NO, LOG,
CQC, YES, 0, NO
SLD Vert
NAME=SLV Long (X+), XY, 0, 1, 1, NO, NO, LOG,
CQC, YES, 0, NO
SLV Orizz
NAME=SLV Trasv (Y+), XY, 90, 1, 1, NO, NO, LOG,

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |


CQC, YES, 0, NO  
 SLV Orizz  
 NAME=SLV Vert (Z+), Z, 0, 1, 1, NO, NO, LOG,  
 CQC, YES, 0, NO  
 SLV Vert  
 NAME=SLC Long (X+), XY, 0, 1, 1, NO, NO, LOG,  
 CQC, YES, 0, NO  
 SLC Orizz  
 NAME=SLC Trasv (Y+), XY, 90, 1, 1, NO, NO, LOG,  
 CQC, YES, 0, NO  
 SLC Orizz  
 NAME=SLC Vert (Z+), Z, 0, 1, 1, NO, NO, LOG,  
 CQC, YES, 0, NO  
 SLC Vert

\*MVLDCODE ; Moving Load Code  
 CODE=EUROCODE

\*LINELANE ; Traffic Line Lanes

NAME=C. LENTA, LANE, , 0, 0, BOTH, 3, 2  
 201, -0.9, 0, NO, 0, 202, -0.9, 0, NO, 0, 203, -0.9, 0, NO, 0  
 204, -0.9, 0, NO, 0, 205, -0.9, 0, NO, 0, 206, -0.9, 0, NO, 0  
 207, -0.9, 0, NO, 0, 208, -0.9, 0, NO, 0, 209, -0.9, 0, NO, 0  
 210, -0.9, 0, NO, 0, 211, -0.9, 0, NO, 0, 212, -0.9, 0, NO, 0  
 213, -0.9, 0, NO, 0, 214, -0.9, 0, NO, 0, 215, -0.9, 0, NO, 0  
 216, -0.9, 0, NO, 0, 217, -0.9, 0, NO, 0, 218, -0.9, 0, NO, 0  
 219, -0.9, 0, NO, 0, 220, -0.9, 0, NO, 0, 221, -0.9, 0, NO, 0  
 222, -0.9, 0, NO, 0, 223, -0.9, 0, NO, 0, 224, -0.9, 0, NO, 0  
 225, -0.9, 0, NO, 0, 226, -0.9, 0, NO, 0, 227, -0.9, 0, NO, 0  
 228, -0.9, 0, NO, 0, 229, -0.9, 0, NO, 0, 230, -0.9, 0, NO, 0  
 231, -0.9, 0, NO, 0, 232, -0.9, 0, NO, 0, 233, -0.9, 0, NO, 0  
 234, -0.9, 0, NO, 0, 235, -0.9, 0, NO, 0, 236, -0.9, 0, NO, 0  
 237, -0.9, 0, NO, 0, 238, -0.9, 0, NO, 0, 239, -0.9, 0, NO, 0  
 240, -0.9, 0, NO, 0  
 NAME=DX 1, LANE, , 0, 0, BOTH, 3, 2  
 201, 1.225, 0, NO, 0, 202, 1.225, 0, NO, 0, 203, 1.225, 0, NO, 0  
 204, 1.225, 0, NO, 0, 205, 1.225, 0, NO, 0, 206, 1.225, 0, NO, 0  
 207, 1.225, 0, NO, 0, 208, 1.225, 0, NO, 0, 209, 1.225, 0, NO, 0  
 210, 1.225, 0, NO, 0, 211, 1.225, 0, NO, 0, 212, 1.225, 0, NO, 0  
 213, 1.225, 0, NO, 0, 214, 1.225, 0, NO, 0, 215, 1.225, 0, NO, 0  
 216, 1.225, 0, NO, 0, 217, 1.225, 0, NO, 0, 218, 1.225, 0, NO, 0  
 219, 1.225, 0, NO, 0, 220, 1.225, 0, NO, 0, 221, 1.225, 0, NO, 0  
 222, 1.225, 0, NO, 0, 223, 1.225, 0, NO, 0, 224, 1.225, 0, NO, 0  
 225, 1.225, 0, NO, 0, 226, 1.225, 0, NO, 0, 227, 1.225, 0, NO, 0  
 228, 1.225, 0, NO, 0, 229, 1.225, 0, NO, 0, 230, 1.225, 0, NO, 0  
 231, 1.225, 0, NO, 0, 232, 1.225, 0, NO, 0, 233, 1.225, 0, NO, 0  
 234, 1.225, 0, NO, 0, 235, 1.225, 0, NO, 0, 236, 1.225, 0, NO, 0  
 237, 1.225, 0, NO, 0, 238, 1.225, 0, NO, 0, 239, 1.225, 0, NO, 0  
 240, 1.225, 0, NO, 0  
 NAME=DX 2, LANE, , 0, 0, BOTH, 3, 2  
 301, 1.425, 0, NO, 0, 302, 1.425, 0, NO, 0, 303, 1.425, 0, NO, 0  
 304, 1.425, 0, NO, 0, 305, 1.425, 0, NO, 0, 306, 1.425, 0, NO, 0  
 307, 1.425, 0, NO, 0, 308, 1.425, 0, NO, 0, 309, 1.425, 0, NO, 0  
 310, 1.425, 0, NO, 0, 311, 1.425, 0, NO, 0, 312, 1.425, 0, NO, 0  
 313, 1.425, 0, NO, 0, 314, 1.425, 0, NO, 0, 315, 1.425, 0, NO, 0  
 316, 1.425, 0, NO, 0, 317, 1.425, 0, NO, 0, 318, 1.425, 0, NO, 0  
 319, 1.425, 0, NO, 0, 320, 1.425, 0, NO, 0, 321, 1.425, 0, NO, 0  
 322, 1.425, 0, NO, 0, 323, 1.425, 0, NO, 0, 324, 1.425, 0, NO, 0  
 325, 1.425, 0, NO, 0, 326, 1.425, 0, NO, 0, 327, 1.425, 0, NO, 0  
 328, 1.425, 0, NO, 0, 329, 1.425, 0, NO, 0, 330, 1.425, 0, NO, 0  
 331, 1.425, 0, NO, 0, 332, 1.425, 0, NO, 0, 333, 1.425, 0, NO, 0  
 334, 1.425, 0, NO, 0, 335, 1.425, 0, NO, 0, 336, 1.425, 0, NO, 0  
 337, 1.425, 0, NO, 0, 338, 1.425, 0, NO, 0, 339, 1.425, 0, NO, 0  
 340, 1.425, 0, NO, 0  
 NAME=DX 3, LANE, , 0, 0, BOTH, 3, 2  
 301, -1.575, 0, NO, 0, 302, -1.575, 0, NO, 0  
 303, -1.575, 0, NO, 0, 304, -1.575, 0, NO, 0  
 305, -1.575, 0, NO, 0, 306, -1.575, 0, NO, 0  
 307, -1.575, 0, NO, 0, 308, -1.575, 0, NO, 0  
 309, -1.575, 0, NO, 0, 310, -1.575, 0, NO, 0  
 311, -1.575, 0, NO, 0, 312, -1.575, 0, NO, 0  
 313, -1.575, 0, NO, 0, 314, -1.575, 0, NO, 0  
 315, -1.575, 0, NO, 0, 316, -1.575, 0, NO, 0  
 317, -1.575, 0, NO, 0, 318, -1.575, 0, NO, 0  
 319, -1.575, 0, NO, 0, 320, -1.575, 0, NO, 0  
 321, -1.575, 0, NO, 0, 322, -1.575, 0, NO, 0  
 323, -1.575, 0, NO, 0, 324, -1.575, 0, NO, 0  
 325, -1.575, 0, NO, 0, 326, -1.575, 0, NO, 0

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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327, -1.575, 0, NO, 0, 328, -1.575, 0, NO, 0
329, -1.575, 0, NO, 0, 330, -1.575, 0, NO, 0
331, -1.575, 0, NO, 0, 332, -1.575, 0, NO, 0
333, -1.575, 0, NO, 0, 334, -1.575, 0, NO, 0
335, -1.575, 0, NO, 0, 336, -1.575, 0, NO, 0
337, -1.575, 0, NO, 0, 338, -1.575, 0, NO, 0
339, -1.575, 0, NO, 0, 340, -1.575, 0, NO, 0
NAME=DX RIM, LANE, , 0, 0, BOTH, 0.75, 0
401, -0.25, 0, NO, 0, 402, -0.25, 0, NO, 0, 403, -0.25, 0, NO, 0
404, -0.25, 0, NO, 0, 405, -0.25, 0, NO, 0, 406, -0.25, 0, NO, 0
407, -0.25, 0, NO, 0, 408, -0.25, 0, NO, 0, 409, -0.25, 0, NO, 0
410, -0.25, 0, NO, 0, 411, -0.25, 0, NO, 0, 412, -0.25, 0, NO, 0
413, -0.25, 0, NO, 0, 414, -0.25, 0, NO, 0, 415, -0.25, 0, NO, 0
416, -0.25, 0, NO, 0, 417, -0.25, 0, NO, 0, 418, -0.25, 0, NO, 0
419, -0.25, 0, NO, 0, 420, -0.25, 0, NO, 0, 421, -0.25, 0, NO, 0
422, -0.25, 0, NO, 0, 423, -0.25, 0, NO, 0, 424, -0.25, 0, NO, 0
425, -0.25, 0, NO, 0, 426, -0.25, 0, NO, 0, 427, -0.25, 0, NO, 0
428, -0.25, 0, NO, 0, 429, -0.25, 0, NO, 0, 430, -0.25, 0, NO, 0
431, -0.25, 0, NO, 0, 432, -0.25, 0, NO, 0, 433, -0.25, 0, NO, 0
434, -0.25, 0, NO, 0, 435, -0.25, 0, NO, 0, 436, -0.25, 0, NO, 0
437, -0.25, 0, NO, 0, 438, -0.25, 0, NO, 0, 439, -0.25, 0, NO, 0
440, -0.25, 0, NO, 0
NAME=MARC, LANE, , 0, 0, BOTH, 1.2, 0
101, 0.625, 0, NO, 0, 102, 0.625, 0, NO, 0, 103, 0.625, 0, NO, 0
104, 0.625, 0, NO, 0, 105, 0.625, 0, NO, 0, 106, 0.625, 0, NO, 0
107, 0.625, 0, NO, 0, 108, 0.625, 0, NO, 0, 109, 0.625, 0, NO, 0
110, 0.625, 0, NO, 0, 111, 0.625, 0, NO, 0, 112, 0.625, 0, NO, 0
113, 0.625, 0, NO, 0, 114, 0.625, 0, NO, 0, 115, 0.625, 0, NO, 0
116, 0.625, 0, NO, 0, 117, 0.625, 0, NO, 0, 118, 0.625, 0, NO, 0
119, 0.625, 0, NO, 0, 120, 0.625, 0, NO, 0, 121, 0.625, 0, NO, 0
122, 0.625, 0, NO, 0, 123, 0.625, 0, NO, 0, 124, 0.625, 0, NO, 0
125, 0.625, 0, NO, 0, 126, 0.625, 0, NO, 0, 127, 0.625, 0, NO, 0
128, 0.625, 0, NO, 0, 129, 0.625, 0, NO, 0, 130, 0.625, 0, NO, 0
131, 0.625, 0, NO, 0, 132, 0.625, 0, NO, 0, 133, 0.625, 0, NO, 0
134, 0.625, 0, NO, 0, 135, 0.625, 0, NO, 0, 136, 0.625, 0, NO, 0
137, 0.625, 0, NO, 0, 138, 0.625, 0, NO, 0, 139, 0.625, 0, NO, 0
140, 0.625, 0, NO, 0
NAME=SX 1, LANE, , 0, 0, BOTH, 3, 2
401, 0.875, 0, NO, 0, 402, 0.875, 0, NO, 0, 403, 0.875, 0, NO, 0
404, 0.875, 0, NO, 0, 405, 0.875, 0, NO, 0, 406, 0.875, 0, NO, 0
407, 0.875, 0, NO, 0, 408, 0.875, 0, NO, 0, 409, 0.875, 0, NO, 0
410, 0.875, 0, NO, 0, 411, 0.875, 0, NO, 0, 412, 0.875, 0, NO, 0
413, 0.875, 0, NO, 0, 414, 0.875, 0, NO, 0, 415, 0.875, 0, NO, 0
416, 0.875, 0, NO, 0, 417, 0.875, 0, NO, 0, 418, 0.875, 0, NO, 0
419, 0.875, 0, NO, 0, 420, 0.875, 0, NO, 0, 421, 0.875, 0, NO, 0
422, 0.875, 0, NO, 0, 423, 0.875, 0, NO, 0, 424, 0.875, 0, NO, 0
425, 0.875, 0, NO, 0, 426, 0.875, 0, NO, 0, 427, 0.875, 0, NO, 0
428, 0.875, 0, NO, 0, 429, 0.875, 0, NO, 0, 430, 0.875, 0, NO, 0
431, 0.875, 0, NO, 0, 432, 0.875, 0, NO, 0, 433, 0.875, 0, NO, 0
434, 0.875, 0, NO, 0, 435, 0.875, 0, NO, 0, 436, 0.875, 0, NO, 0
437, 0.875, 0, NO, 0, 438, 0.875, 0, NO, 0, 439, 0.875, 0, NO, 0
440, 0.875, 0, NO, 0
NAME=SX 2, LANE, , 0, 0, BOTH, 3, 2
301, 0.675, 0, NO, 0, 302, 0.675, 0, NO, 0, 303, 0.675, 0, NO, 0
304, 0.675, 0, NO, 0, 305, 0.675, 0, NO, 0, 306, 0.675, 0, NO, 0
307, 0.675, 0, NO, 0, 308, 0.675, 0, NO, 0, 309, 0.675, 0, NO, 0
310, 0.675, 0, NO, 0, 311, 0.675, 0, NO, 0, 312, 0.675, 0, NO, 0
313, 0.675, 0, NO, 0, 314, 0.675, 0, NO, 0, 315, 0.675, 0, NO, 0
316, 0.675, 0, NO, 0, 317, 0.675, 0, NO, 0, 318, 0.675, 0, NO, 0
319, 0.675, 0, NO, 0, 320, 0.675, 0, NO, 0, 321, 0.675, 0, NO, 0
322, 0.675, 0, NO, 0, 323, 0.675, 0, NO, 0, 324, 0.675, 0, NO, 0
325, 0.675, 0, NO, 0, 326, 0.675, 0, NO, 0, 327, 0.675, 0, NO, 0
328, 0.675, 0, NO, 0, 329, 0.675, 0, NO, 0, 330, 0.675, 0, NO, 0
331, 0.675, 0, NO, 0, 332, 0.675, 0, NO, 0, 333, 0.675, 0, NO, 0
334, 0.675, 0, NO, 0, 335, 0.675, 0, NO, 0, 336, 0.675, 0, NO, 0
337, 0.675, 0, NO, 0, 338, 0.675, 0, NO, 0, 339, 0.675, 0, NO, 0
340, 0.675, 0, NO, 0
NAME=SX 3, LANE, , 0, 0, BOTH, 3, 2
201, 0.475, 0, NO, 0, 202, 0.475, 0, NO, 0, 203, 0.475, 0, NO, 0
204, 0.475, 0, NO, 0, 205, 0.475, 0, NO, 0, 206, 0.475, 0, NO, 0
207, 0.475, 0, NO, 0, 208, 0.475, 0, NO, 0, 209, 0.475, 0, NO, 0
210, 0.475, 0, NO, 0, 211, 0.475, 0, NO, 0, 212, 0.475, 0, NO, 0
213, 0.475, 0, NO, 0, 214, 0.475, 0, NO, 0, 215, 0.475, 0, NO, 0
216, 0.475, 0, NO, 0, 217, 0.475, 0, NO, 0, 218, 0.475, 0, NO, 0
219, 0.475, 0, NO, 0, 220, 0.475, 0, NO, 0, 221, 0.475, 0, NO, 0
222, 0.475, 0, NO, 0, 223, 0.475, 0, NO, 0, 224, 0.475, 0, NO, 0
225, 0.475, 0, NO, 0, 226, 0.475, 0, NO, 0, 227, 0.475, 0, NO, 0
228, 0.475, 0, NO, 0, 229, 0.475, 0, NO, 0, 230, 0.475, 0, NO, 0

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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231, 0.475, 0, NO, 0, 232, 0.475, 0, NO, 0, 233, 0.475, 0, NO, 0
234, 0.475, 0, NO, 0, 235, 0.475, 0, NO, 0, 236, 0.475, 0, NO, 0
237, 0.475, 0, NO, 0, 238, 0.475, 0, NO, 0, 239, 0.475, 0, NO, 0
240, 0.475, 0, NO, 0
NAME=SX RIM, LANE, , 0, 0, BOTH, 0.75, 0
101, -0.85, 0, NO, 0, 102, -0.85, 0, NO, 0, 103, -0.85, 0, NO, 0
104, -0.85, 0, NO, 0, 105, -0.85, 0, NO, 0, 106, -0.85, 0, NO, 0
107, -0.85, 0, NO, 0, 108, -0.85, 0, NO, 0, 109, -0.85, 0, NO, 0
110, -0.85, 0, NO, 0, 111, -0.85, 0, NO, 0, 112, -0.85, 0, NO, 0
113, -0.85, 0, NO, 0, 114, -0.85, 0, NO, 0, 115, -0.85, 0, NO, 0
116, -0.85, 0, NO, 0, 117, -0.85, 0, NO, 0, 118, -0.85, 0, NO, 0
119, -0.85, 0, NO, 0, 120, -0.85, 0, NO, 0, 121, -0.85, 0, NO, 0
122, -0.85, 0, NO, 0, 123, -0.85, 0, NO, 0, 124, -0.85, 0, NO, 0
125, -0.85, 0, NO, 0, 126, -0.85, 0, NO, 0, 127, -0.85, 0, NO, 0
128, -0.85, 0, NO, 0, 129, -0.85, 0, NO, 0, 130, -0.85, 0, NO, 0
131, -0.85, 0, NO, 0, 132, -0.85, 0, NO, 0, 133, -0.85, 0, NO, 0
134, -0.85, 0, NO, 0, 135, -0.85, 0, NO, 0, 136, -0.85, 0, NO, 0
137, -0.85, 0, NO, 0, 138, -0.85, 0, NO, 0, 139, -0.85, 0, NO, 0
140, -0.85, 0, NO, 0

```

```

*VEHICLE ; Vehicles
NAME=Fatica 2, 1, 3, Fatigue Load Model 2 (630), , , 1, , ,
NAME=Fatica 3 (1 veicolo), 1, 3, Fatigue Load Model 3 (One Vehicle), , , 1, , ,
NAME=Schema 1, 1, 1, Load Model 1, 0.75, 0.4, , 1, 1, 1, 1, 1, 1
NAME=Schema 5, 1, 2, Uniform load (Road bridge footway), , , 0.4, 5,

```

```

*MVLD CASE (EURO) ; Moving Load Cases
NAME=Mobili SLU DX, 1, , Schema 1, Schema 5, YES
1, DX 1, DX 2, DX 3
2, DX RIM
3, MARC
NAME=Mobili SLU SX, 1, , Schema 1, Schema 5, YES
1, SX 1, SX 2, SX 3
2, SX RIM
3, MARC
NAME=Mobili SLE DX, 1, , Schema 1, Schema 5, NO
1, DX 1, DX 2, DX 3
2, DX RIM
3, MARC
NAME=Mobili SLE SX, 1, , Schema 1, Schema 5, NO
1, SX 1, SX 2, SX 3
2, SX RIM
3, MARC
NAME=Fatica V.ILL., 2, , 1, YES
Fatica 2, 1, 0, 1, C. LENTA
NAME=Fatica DANN.ACC., 2, , 1, YES
Fatica 3 (1 veicolo), 1, 0, 1, C. LENTA

```

```

*CPOSECT4CS ; Composite Section for Construction Stage
SEC=5, Costruzione, NORMAL, YES
1, MATL, 1, , 0, 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=11, Costruzione, NORMAL, NO
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=1, Costruzione, NORMAL, NO
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=2, Costruzione, NORMAL, NO
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=7, Costruzione, NORMAL, NO
1, MATL, 1, , 0, 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=16, Costruzione, NORMAL, NO
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=3, Costruzione, NORMAL, NO
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=4, Costruzione, NORMAL, NO
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=6, Costruzione, NORMAL, YES
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=8, Costruzione, NORMAL, NO
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 1, 0

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=9, Costruzione, NORMAL, YES
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=10, Costruzione, NORMAL, YES
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=12, Costruzione, NORMAL, NO
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=13, Costruzione, NORMAL, NO
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=14, Costruzione, NORMAL, NO
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3
SEC=21, Costruzione, NORMAL, NO
1, MATL, 1, , 1, 1, 1, 1, 1, 1, 1, 0
2, MATL, 4, Esercizio, 1, 1, 1, 1, 1, 1, 1, 1, 0.3

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*STAGE-COLOR ; Diagram Color for Construction Stage
Costruzione, 0, 157, 192
Esercizio, 255, 255, 255

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*STAGE-CTRL ; Construction Stage Analysis Control Data
YES, , INTERNAL, NO, YES, YES, NO, NO, NO, NO, NO, , , DW, W, DW, Erection Load 1, Erection Load 2, Erecti
on Load 3, YES, NO, , NO, NO
NO
NO
YES, YES, BOTH, 5, 0.01, YES, NO, YES, YES, 0, YES
NO, NO, 2, YES, 2, 5, 7, 10, 20
NO, , , 1, NO
Finiture

```


```

*LOADCOMB ; Combinations
NAME=Termico unif. -15°, GEN, INACTIVE, 0, 0, , 0, 0
ST, Termico Unif. +15°, -1
NAME=Termico diff. -5°/H, GEN, INACTIVE, 0, 0, , 0, 0
ST, Termico diff. +5°/H, -1
NAME=SLD Long (X-), GEN, INACTIVE, 0, 0, , 0, 0
RS, SLD Long (X+), -1
NAME=SLD Trasv (Y-), GEN, INACTIVE, 0, 0, , 0, 0
RS, SLD Trasv (Y+), -1
NAME=SLD Vert (Z-), GEN, INACTIVE, 0, 0, , 0, 0
RS, SLD Vert (Z+), -1
NAME=SLV Long (X-), GEN, INACTIVE, 0, 0, , 0, 0
RS, SLV Long (X+), -1
NAME=SLV Trasv (Y-), GEN, INACTIVE, 0, 0, , 0, 0
RS, SLV Trasv (Y+), -1
NAME=SLV Vert (Z-), GEN, INACTIVE, 0, 0, , 0, 0
RS, SLV Vert (Z+), -1
NAME=SLC Long (X-), GEN, INACTIVE, 0, 0, , 0, 0
RS, SLC Long (X+), -1
NAME=SLC Trasv (Y-), GEN, INACTIVE, 0, 0, , 0, 0
RS, SLC Trasv (Y+), -1
NAME=SLC Vert (Z-), GEN, INACTIVE, 0, 0, , 0, 0
RS, SLC Vert (Z+), -1
NAME=Termico unif. INV, GEN, ACTIVE, 0, 1, , 0, 0
ST, Termico Unif. +15°, 1, CB, Termico unif. -15°, 1
NAME=Termico diff. INV, GEN, ACTIVE, 0, 1, , 0, 0
ST, Termico diff. +5°/H, 1, CB, Termico diff. -5°/H, 1
NAME=SLD Long INV, GEN, INACTIVE, 0, 1, , 0, 0
RS, SLD Long (X+), 1, CB, SLD Long (X-), 1
NAME=SLD Trasv INV, GEN, INACTIVE, 0, 1, , 0, 0
RS, SLD Trasv (Y+), 1, CB, SLD Trasv (Y-), 1
NAME=SLD Vert INV, GEN, INACTIVE, 0, 1, , 0, 0
RS, SLD Vert (Z+), 1, CB, SLD Vert (Z-), 1
NAME=SLV Long INV, GEN, INACTIVE, 0, 1, , 0, 0
RS, SLV Long (X+), 1, CB, SLV Long (X-), 1
NAME=SLV Trasv INV, GEN, INACTIVE, 0, 1, , 0, 0
RS, SLV Trasv (Y+), 1, CB, SLV Trasv (Y-), 1
NAME=SLV Vert INV, GEN, INACTIVE, 0, 1, , 0, 0
RS, SLV Vert (Z+), 1, CB, SLV Vert (Z-), 1
NAME=SLC Long INV, GEN, INACTIVE, 0, 1, , 0, 0
RS, SLC Long (X+), 1, CB, SLC Long (X-), 1
NAME=SLC Trasv INV, GEN, INACTIVE, 0, 1, , 0, 0
RS, SLC Trasv (Y+), 1, CB, SLC Trasv (Y-), 1
NAME=SLC Vert INV, GEN, INACTIVE, 0, 1, , 0, 0

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PROJECT TITLE : Viadotto su rotatoria

|  Company | Studio Corona | Client    |                            |
|-------------------------------------------------------------------------------------------|---------------|-----------|----------------------------|
| Author                                                                                    | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

RS, SLC Vert (Z+), 1, CB, SLC Vert (Z-), 1  
NAME=Mobili SLU INV, GEN, ACTIVE, 0, 1, , 0, 0  
MV, Mobili SLU DX, 1, MV, Mobili SLU SX, 1  
NAME=Mobili SLE INV, GEN, ACTIVE, 0, 1, , 0, 0  
MV, Mobili SLE DX, 1, MV, Mobili SLE SX, 1  
NAME=GEN SLU Mobili, GEN, ACTIVE, 0, 0, , 0, 0  
ST, Vento strutture (Y+), 0.9, ST, Vento mobili (Y+), 0.9  
CS, Dead Load, 1.35, CS, Erection Load 1, 1.5, CS, Creep Secondary, 1.2  
CS, Shrinkage Secondary, 1.2, CB, Termico unif. INV, 0.72  
CB, Termico diff. INV, 0.72, CB, Mobili SLU INV, 1.35  
NAME=GEN SLU Vento, GEN, ACTIVE, 0, 0, , 0, 0  
ST, Vento strutture (Y+), 1.5, ST, Vento mobili (Y+), 1.5  
CS, Dead Load, 1.35, CS, Erection Load 1, 1.5, CS, Creep Secondary, 1.2  
CS, Shrinkage Secondary, 1.2, CB, Termico unif. INV, 0.72  
CB, Termico diff. INV, 0.72, CB, Mobili SLE INV, 1.35  
NAME=GEN SLU Frenamento, GEN, ACTIVE, 0, 0, , 0, 0  
ST, Frenamento (X+), 1.35, CS, Dead Load, 1.35  
CS, Erection Load 1, 1.5, CS, Creep Secondary, 1.2  
CS, Shrinkage Secondary, 1.2, CB, Termico unif. INV, 0.72  
CB, Termico diff. INV, 0.72, CB, Mobili SLE INV, 1.35  
NAME=GEN SLU Termico, GEN, ACTIVE, 0, 0, , 0, 0  
ST, Vento strutture (Y+), 0.9, ST, Vento mobili (Y+), 0.9  
CS, Dead Load, 1.35, CS, Erection Load 1, 1.5, CS, Creep Secondary, 1.2  
CS, Shrinkage Secondary, 1.2, CB, Termico unif. INV, 1.2  
CB, Termico diff. INV, 1.2, CB, Mobili SLE INV, 1.35  
NAME=GEN SLD Long, GEN, ACTIVE, 0, 0, , 0, 0  
CS, Summation, 1, CB, Termico unif. INV, 0.5  
CB, Termico diff. INV, 0.5, CB, SLD Long INV, 1, CB, SLD Trasv INV, 0.3  
CB, SLD Vert INV, 0.3  
NAME=GEN SLD Trasv, GEN, ACTIVE, 0, 0, , 0, 0  
CS, Summation, 1, CB, Termico unif. INV, 0.5  
CB, Termico diff. INV, 0.5, CB, SLD Long INV, 0.3, CB, SLD Trasv INV, 1  
CB, SLD Vert INV, 0.3  
NAME=GEN SLD Vert, GEN, ACTIVE, 0, 0, , 0, 0  
CS, Summation, 1, CB, Termico unif. INV, 0.5  
CB, Termico diff. INV, 0.5, CB, SLD Long INV, 0.3  
CB, SLD Trasv INV, 0.3, CB, SLD Vert INV, 1  
NAME=GEN SLV Long, GEN, ACTIVE, 0, 0, , 0, 0  
CS, Summation, 1, CB, Termico unif. INV, 0.5  
CB, Termico diff. INV, 0.5, CB, SLV Long INV, 1, CB, SLV Trasv INV, 0.3  
CB, SLV Vert INV, 0.3  
NAME=GEN SLV Trasv, GEN, ACTIVE, 0, 0, , 0, 0  
CS, Summation, 1, CB, Termico unif. INV, 0.5  
CB, Termico diff. INV, 0.5, CB, SLV Long INV, 0.3, CB, SLV Trasv INV, 1  
CB, SLV Vert INV, 0.3  
NAME=GEN SLV Vert, GEN, ACTIVE, 0, 0, , 0, 0  
CS, Summation, 1, CB, Termico unif. INV, 0.5  
CB, Termico diff. INV, 0.5, CB, SLV Long INV, 0.3  
CB, SLV Trasv INV, 0.3, CB, SLV Vert INV, 1  
NAME=GEN SLC Long, GEN, ACTIVE, 0, 0, , 0, 0  
CS, Summation, 1, CB, Termico unif. INV, 0.5  
CB, Termico diff. INV, 0.5, CB, SLC Long INV, 1, CB, SLC Trasv INV, 0.3  
CB, SLC Vert INV, 0.3  
NAME=GEN SLC Trasv, GEN, ACTIVE, 0, 0, , 0, 0  
CS, Summation, 1, CB, Termico unif. INV, 0.5  
CB, Termico diff. INV, 0.5, CB, SLC Long INV, 0.3, CB, SLC Trasv INV, 1  
CB, SLC Vert INV, 0.3  
NAME=GEN SLC Vert, GEN, ACTIVE, 0, 0, , 0, 0  
CS, Summation, 1, CB, Termico unif. INV, 0.5  
CB, Termico diff. INV, 0.5, CB, SLC Long INV, 0.3  
CB, SLC Trasv INV, 0.3, CB, SLC Vert INV, 1  
NAME=GEN RARA Mobili, GEN, ACTIVE, 0, 0, , 0, 0  
ST, Vento strutture (Y+), 0.6, ST, Vento mobili (Y+), 0.6  
CS, Summation, 1, CB, Termico unif. INV, 0.6  
CB, Termico diff. INV, 0.6, CB, Mobili SLU INV, 1  
NAME=GEN RARA Vento, GEN, ACTIVE, 0, 0, , 0, 0  
ST, Vento strutture (Y+), 1, ST, Vento mobili (Y+), 1, CS, Summation, 1  
CB, Termico unif. INV, 0.6, CB, Termico diff. INV, 0.6  
CB, Mobili SLE INV, 1  
NAME=GEN RARA Frenam, GEN, ACTIVE, 0, 0, , 0, 0  
ST, Frenamento (X+), 1, CS, Summation, 1, CB, Termico unif. INV, 0.6  
CB, Termico diff. INV, 0.6, CB, Mobili SLE INV, 1  
NAME=GEN RARA Termico, GEN, ACTIVE, 0, 0, , 0, 0  
ST, Vento strutture (Y+), 0.6, ST, Vento mobili (Y+), 0.6  
CS, Summation, 1, CB, Termico unif. INV, 1, CB, Termico diff. INV, 1  
CB, Mobili SLE INV, 1  
NAME=GEN FREQ Mobili, GEN, ACTIVE, 0, 0, , 0, 0  
CS, Summation, 1, CB, Termico unif. INV, 0.5

PROJECT TITLE : Viadotto su rotatoria

|  | Company | Studio Corona | Client    |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

CB, Termico diff. INV, 0.5, CB, Mobili SLE INV, 1  
 NAME=GEN FREQ Vento, GEN, ACTIVE, 0, 0, , 0, 0  
 ST, Vento strutture (Y+), 0.2, ST, Vento mobili (Y+), 0.2  
 CS, Summation, 1, CB, Termico unif. INV, 0.5  
 CB, Termico diff. INV, 0.5  
 NAME=GEN FREQ Termico, GEN, ACTIVE, 0, 0, , 0, 0  
 CS, Summation, 1, CB, Termico unif. INV, 0.6  
 CB, Termico diff. INV, 0.6  
 NAME=GEN Q.P., GEN, ACTIVE, 0, 0, , 0, 0  
 CS, Summation, 1, CB, Termico unif. INV, 0.5  
 CB, Termico diff. INV, 0.5  
 NAME=GEN SLU INV, GEN, ACTIVE, 0, 1, , 0, 0  
 CB, GEN SLU Mobili, 1, CB, GEN SLU Vento, 1, CB, GEN SLU Frenamento, 1  
 CB, GEN SLU Termico, 1  
 NAME=GEN SLD INV, GEN, ACTIVE, 0, 1, , 0, 0  
 CB, GEN SLD Long, 1, CB, GEN SLD Trasv, 1, CB, GEN SLD Vert, 1  
 NAME=GEN SLV INV, GEN, ACTIVE, 0, 1, , 0, 0  
 CB, GEN SLV Long, 1, CB, GEN SLV Trasv, 1, CB, GEN SLV Vert, 1  
 NAME=GEN SLC INV, GEN, ACTIVE, 0, 1, , 0, 0  
 CB, GEN SLC Long, 1, CB, GEN SLC Trasv, 1, CB, GEN SLC Vert, 1  
 NAME=GEN RARA INV, GEN, ACTIVE, 0, 1, , 0, 0  
 CB, GEN RARA Mobili, 1, CB, GEN RARA Vento, 1, CB, GEN RARA Frenam, 1  
 CB, GEN RARA Termico, 1  
 NAME=GEN FREQ INV, GEN, ACTIVE, 0, 1, , 0, 0  
 CB, GEN FREQ Mobili, 1, CB, GEN FREQ Vento, 1, CB, GEN FREQ Termico, 1  
 NAME=GEN SLU/SLV INV, GEN, ACTIVE, 0, 1, , 0, 0  
 CB, GEN SLU Mobili, 1, CB, GEN SLU Vento, 1, CB, GEN SLU Frenamento, 1  
 CB, GEN SLU Termico, 1, CB, GEN SLV Long, 1, CB, GEN SLV Trasv, 1  
 CB, GEN SLV Vert, 1  
 NAME=Termico unif. -15°, STEEL, INACTIVE, 0, 0, , 0, 0  
 ST, Termico Unif. +15°, -1  
 NAME=Termico diff. -5°/H, STEEL, INACTIVE, 0, 0, , 0, 0  
 ST, Termico diff. +5°/H, -1  
 NAME=SLV Long (X-), STEEL, INACTIVE, 0, 0, , 0, 0  
 RS, SLV Long (X+), -1  
 NAME=SLV Trasv (Y-), STEEL, INACTIVE, 0, 0, , 0, 0  
 RS, SLV Trasv (Y+), -1  
 NAME=SLV Vert (Z-), STEEL, INACTIVE, 0, 0, , 0, 0  
 RS, SLV Vert (Z+), -1  
 NAME=Termico unif. INV, STEEL, INACTIVE, 0, 1, , 0, 0  
 ST, Termico Unif. +15°, 1, CBS, Termico unif. -15°, 1  
 NAME=Termico diff. INV, STEEL, INACTIVE, 0, 1, , 0, 0  
 ST, Termico diff. +5°/H, 1, CBS, Termico diff. -5°/H, 1  
 NAME=SLV Long INV, STEEL, INACTIVE, 0, 1, , 0, 0  
 RS, SLV Long (X+), 1, CBS, SLV Long (X-), 1  
 NAME=SLV Trasv INV, STEEL, INACTIVE, 0, 1, , 0, 0  
 RS, SLV Trasv (Y+), 1, CBS, SLV Trasv (Y-), 1  
 NAME=SLV Vert INV, STEEL, INACTIVE, 0, 1, , 0, 0  
 RS, SLV Vert (Z+), 1, CBS, SLV Vert (Z-), 1  
 NAME=Mobili SLU INV, STEEL, INACTIVE, 0, 1, , 0, 0  
 MV, Mobili SLU DX, 1, MV, Mobili SLU SX, 1  
 NAME=Mobili SLE INV, STEEL, INACTIVE, 0, 1, , 0, 0  
 MV, Mobili SLE DX, 1, MV, Mobili SLE SX, 1  
 NAME=ST SLU Mobili, STEEL, SERVICE, 0, 0, , 0, 0  
 ST, Vento strutture (Y+), 0.9, ST, Vento mobili (Y+), 0.9  
 CS, Dead Load, 1.35, CS, Erection Load 1, 1.5, CS, Creep Secondary, 1.2  
 CS, Shrinkage Secondary, 1.2, CBS, Termico unif. INV, 0.72  
 CBS, Termico diff. INV, 0.72, CBS, Mobili SLU INV, 1.35  
 NAME=ST SLU Vento, STEEL, SERVICE, 0, 0, , 0, 0  
 ST, Vento strutture (Y+), 1.5, ST, Vento mobili (Y+), 1.5  
 CS, Dead Load, 1.35, CS, Erection Load 1, 1.5, CS, Creep Secondary, 1.2  
 CS, Shrinkage Secondary, 1.2, CBS, Termico unif. INV, 0.72  
 CBS, Termico diff. INV, 0.72, CBS, Mobili SLE INV, 1.35  
 NAME=ST SLU Frenamento, STEEL, SERVICE, 0, 0, , 0, 0  
 ST, Frenamento (X+), 1.35, CS, Dead Load, 1.35  
 CS, Erection Load 1, 1.5, CS, Creep Secondary, 1.2  
 CS, Shrinkage Secondary, 1.2, CBS, Termico unif. INV, 0.72  
 CBS, Termico diff. INV, 0.72, CBS, Mobili SLE INV, 1.35  
 NAME=ST SLU Termico, STEEL, SERVICE, 0, 0, , 0, 0  
 ST, Vento strutture (Y+), 0.9, ST, Vento mobili (Y+), 0.9  
 CS, Dead Load, 1.35, CS, Erection Load 1, 1.5, CS, Creep Secondary, 1.2  
 CS, Shrinkage Secondary, 1.2, CBS, Termico unif. INV, 1.2  
 CBS, Termico diff. INV, 1.2, CBS, Mobili SLE INV, 1.35  
 NAME=ST SLV Long, STEEL, SERVICE, 0, 0, , 0, 0  
 CS, Summation, 1, CBS, Termico unif. INV, 0.5  
 CBS, Termico diff. INV, 0.5, CBS, SLV Long INV, 1  
 CBS, SLV Trasv INV, 0.3, CBS, SLV Vert INV, 0.3  
 NAME=ST SLV Trasv, STEEL, SERVICE, 0, 0, , 0, 0


PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

CS, Summation, 1, CBS, Termico unif. INV, 0.5  
 CBS, Termico diff. INV, 0.5, CBS, SLV Long INV, 0.3  
 CBS, SLV Trasv INV, 1, CBS, SLV Vert INV, 0.3  
 NAME=ST SLV Vert, STEEL, SERVICE, 0, 0, , 0, 0  
 CS, Summation, 1, CBS, Termico unif. INV, 0.5  
 CBS, Termico diff. INV, 0.5, CBS, SLV Long INV, 0.3  
 CBS, SLV Trasv INV, 0.3, CBS, SLV Vert INV, 1  
 NAME=ST FATICA VITA ILL., STEEL, SERVICE, 0, 0, , 0, 0  
 MV, Fatica V.ILL., 1, CS, Summation, 1  
 NAME=ST FATICA DANN.ACC., STEEL, STRENGTH, 0, 0, , 0, 0  
 MV, Fatica DANN.ACC., 1, CS, Summation, 1  
 NAME=ST RARA Mobili, STEEL, SERVICE, 0, 0, , 3, 0  
 ST, Vento strutture (Y+), 0.6, ST, Vento mobili (Y+), 0.6  
 CS, Summation, 1, CBS, Termico unif. INV, 0.6  
 CBS, Termico diff. INV, 0.6, CBS, Mobili SLU INV, 1  
 NAME=ST RARA Vento, STEEL, SERVICE, 0, 0, , 3, 0  
 ST, Vento strutture (Y+), 1, ST, Vento mobili (Y+), 1, CS, Summation, 1  
 CBS, Termico unif. INV, 0.6, CBS, Termico diff. INV, 0.6  
 CBS, Mobili SLE INV, 1  
 NAME=ST RARA Frenamento, STEEL, SERVICE, 0, 0, , 3, 0  
 ST, Frenamento (X+), 1, CS, Summation, 1, CBS, Termico unif. INV, 0.6  
 CBS, Termico diff. INV, 0.6, CBS, Mobili SLE INV, 1  
 NAME=ST RARA Termico, STEEL, SERVICE, 0, 0, , 3, 0  
 ST, Vento strutture (Y+), 0.6, ST, Vento mobili (Y+), 0.6  
 CS, Summation, 1, CBS, Termico unif. INV, 1, CBS, Termico diff. INV, 1  
 CBS, Mobili SLE INV, 1  
 NAME=ST FREQ Mobili, STEEL, SERVICE, 0, 0, , 2, 0  
 CS, Summation, 1, CBS, Termico unif. INV, 0.5  
 CBS, Termico diff. INV, 0.5, CBS, Mobili SLE INV, 1  
 NAME=ST FREQ Vento, STEEL, SERVICE, 0, 0, , 2, 0  
 ST, Vento strutture (Y+), 0.2, ST, Vento mobili (Y+), 0.2  
 CS, Summation, 1, CBS, Termico unif. INV, 0.5  
 CBS, Termico diff. INV, 0.5  
 NAME=ST FREQ Termico, STEEL, SERVICE, 0, 0, , 2, 0  
 CS, Summation, 1, CBS, Termico unif. INV, 0.6  
 CBS, Termico diff. INV, 0.6  
 NAME=ST Q.P., STEEL, SERVICE, 0, 0, , 1, 0  
 CS, Summation, 1, CBS, Termico unif. INV, 0.5  
 CBS, Termico diff. INV, 0.5  
 NAME=FATICA VITA ILL., CONC, STRENGTH, 0, 0, , 0, 0  
 CS, Summation, 1, MV, Fatica V.ILL., 1  
 NAME=VENTO TOT., CONC, STRENGTH, 0, 0, , 0, 0  
 ST, Vento strutture (Y+), 1, ST, Vento mobili (Y+), 1  
 NAME=Mobili SLU INV, CONC, INACTIVE, 0, 1, , 0, 0  
 MV, Mobili SLU DX, 1, MV, Mobili SLU SX, 1  
 NAME=CONTROMONTE, CONC, STRENGTH, 0, 0, , 0, 0  
 CS, Summation, -1, CBS, Mobili SLU INV, -0.25

\*LC-COLOR ; Diagram Color for Load Case  
 ST, Peso acciaio e pile, 0, 192, 128, 255, 0, 192, 192, 192, 192, 0  
 ST, Peso soletta, 0, 128, 255, 255, 255, 87, 192, 0, 128  
 ST, Finiture, 255, 128, 0, 192, 192, 192, 192, 192, 192  
 ST, Vento strutture (Y+), 255, 0, 128, 0, 128, 57, 192, 0, 192  
 ST, Vento mobili (Y+), 0, 192, 128, 255, 0, 192, 212, 160, 255  
 ST, Frenamento (X+), 255, 128, 0, 85, 0, 192, 160, 255, 255  
 ST, Termico Unif. +15°, 192, 0, 192, 0, 128, 57, 255, 87, 128  
 MV, Mobili SLU DX, 85, 192, 0, 163, 255, 160, 192, 192, 0  
 CS, Dead Load, 192, 128, 0, 255, 255, 255, 255, 160, 255  
 CS, Tendon Secondary, 163, 160, 255, 148, 87, 255, 255, 0, 192  
 CS, Creep Primary, 192, 0, 192, 163, 160, 255, 255, 0, 192  
 CS, Creep Secondary, 78, 0, 255, 255, 0, 192, 160, 192, 255  
 CS, Shrinkage Primary, 0, 192, 192, 192, 0, 192, 160, 192, 255  
 CS, Shrinkage Secondary, 0, 192, 192, 255, 255, 255, 210, 210, 210  
 CS, Summation, 0, 192, 128, 160, 255, 255, 192, 192, 0  
 RS, SLD Long (X+), 0, 128, 57, 255, 0, 192, 255, 87, 128  
 RS, SLD Trasv (Y+), 255, 0, 192, 192, 192, 192, 255, 255, 255  
 RS, SLD Vert (Z+), 192, 0, 128, 255, 192, 87, 0, 128, 57  
 RS, SLV Long (X+), 85, 0, 192, 192, 192, 0, 255, 192, 87  
 RS, SLV Trasv (Y+), 192, 72, 0, 192, 192, 0, 255, 0, 192  
 RS, SLV Vert (Z+), 192, 192, 192, 255, 192, 87, 210, 210, 210  
 RS, SLC Long (X+), 0, 128, 128, 85, 0, 192, 192, 192, 0  
 RS, SLC Trasv (Y+), 192, 0, 128, 255, 0, 192, 255, 0, 128  
 RS, SLC Vert (Z+), 255, 0, 128, 0, 157, 192, 192, 72, 0  
 ST, Termico diff. +5°/H, 0, 128, 192, 78, 0, 255, 0, 192, 128  
 MV, Mobili SLU SX, 160, 255, 255, 192, 72, 0, 192, 72, 0  
 MV, Mobili SLE DX, 78, 0, 255, 160, 255, 255, 255, 87, 87  
 CB, Termico unif. -15°, 0, 128, 255, 163, 255, 160, 212, 160, 255  
 CB, Termico diff. -5°/H, 255, 255, 255, 192, 192, 192, 255, 255, 255


PROJECT TITLE : Viadotto su rotatoria

|  | Company | Studio Corona | Client    |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

MV, Mobili SLE SX, 85, 192, 0, 163, 160, 255, 0, 192, 192  
 CB, SLD Long (X-), 163, 255, 160, 128, 192, 0, 255, 87, 128  
 CB, SLD Trasv (Y-), 0, 157, 192, 255, 0, 192, 85, 192, 0  
 CB, SLD Vert (Z-), 192, 0, 128, 255, 192, 87, 192, 0, 128  
 CB, SLV Long (X-), 255, 0, 192, 0, 157, 192, 163, 255, 160  
 CB, SLV Trasv (Y-), 255, 87, 87, 160, 192, 255, 255, 0, 192  
 CB, SLV Vert (Z-), 255, 0, 128, 160, 192, 255, 255, 255, 255  
 CB, SLC Long (X-), 78, 0, 255, 0, 128, 255, 192, 192, 0  
 CB, SLC Trasv (Y-), 85, 0, 192, 192, 128, 0, 163, 160, 255  
 CB, SLC Vert (Z-), 93, 255, 87, 255, 0, 128, 78, 0, 255  
 CB, Termico unif. INV, 0, 192, 128, 192, 192, 0, 255, 0, 128  
 CB, Termico diff. INV, 0, 128, 57, 192, 192, 192, 93, 255, 87  
 CB, SLD Long INV, 192, 0, 128, 212, 160, 255, 146, 0, 255  
 CB, SLD Trasv INV, 0, 128, 192, 0, 157, 192, 0, 128, 255  
 CB, SLD Vert INV, 0, 128, 57, 128, 192, 0, 255, 87, 128  
 CB, SLV Long INV, 255, 160, 255, 192, 128, 0, 255, 192, 87  
 CB, SLV Trasv INV, 146, 0, 255, 0, 192, 192, 255, 87, 87  
 CB, SLV Vert INV, 0, 128, 255, 255, 192, 87, 146, 0, 255  
 CB, SLC Long INV, 255, 87, 128, 192, 192, 0, 0, 128, 255  
 CB, SLC Trasv INV, 192, 0, 192, 128, 192, 0, 148, 87, 255  
 CB, SLC Vert INV, 148, 87, 255, 0, 128, 192, 192, 192, 192  
 CB, Mobili SLU INV, 255, 192, 160, 163, 160, 255, 78, 0, 255  
 CB, Mobili SLE INV, 93, 255, 87, 85, 192, 0, 255, 160, 255  
 CB, GEN SLU Mobili, 255, 0, 192, 210, 210, 210, 255, 192, 87  
 CB, GEN SLU Vento, 192, 72, 0, 160, 255, 255, 192, 128, 0  
 CB, GEN SLU Frenamento, 192, 192, 192, 210, 210, 210, 255, 192, 160  
 MV, Fatica V.ILL., 255, 87, 87, 255, 87, 87, 255, 255, 87  
 MV, Fatica DANN.ACC., 0, 157, 192, 148, 87, 255, 85, 0, 192  
 CB, GEN SLU Termico, 160, 255, 255, 128, 192, 0, 160, 192, 255  
 CB, GEN SLD Long, 148, 87, 255, 192, 0, 192, 160, 255, 255  
 CB, GEN SLD Trasv, 255, 0, 128, 192, 72, 0, 255, 255, 87  
 CB, GEN SLD Vert, 0, 192, 128, 0, 157, 192, 255, 255, 255  
 CB, GEN SLV Long, 255, 192, 87, 192, 192, 0, 163, 160, 255  
 CB, GEN SLV Trasv, 93, 255, 87, 78, 0, 255, 192, 72, 0  
 CB, GEN SLV Vert, 0, 192, 192, 128, 192, 0, 255, 255, 255  
 CB, GEN SLC Long, 128, 192, 0, 0, 128, 57, 255, 160, 255  
 CB, GEN SLC Trasv, 255, 0, 128, 85, 192, 0, 255, 192, 160  
 CB, GEN SLC Vert, 0, 157, 192, 160, 192, 255, 212, 160, 255  
 CB, GEN RARA Mobili, 0, 128, 192, 192, 0, 192, 255, 160, 255  
 CB, GEN RARA Vento, 0, 157, 192, 163, 160, 255, 78, 0, 255  
 CB, GEN RARA Frenam, 160, 192, 255, 192, 192, 192, 192, 0  
 CB, GEN RARA Termico, 255, 128, 0, 160, 255, 255, 255, 255, 87  
 CB, GEN FREQ Mobili, 0, 192, 192, 93, 255, 87, 255, 0, 192  
 CB, GEN FREQ Vento, 192, 128, 0, 255, 192, 160, 255, 0, 128  
 CB, GEN FREQ Termico, 255, 160, 255, 85, 192, 0, 255, 87, 87  
 CB, GEN Q.P., 255, 160, 255, 0, 128, 57, 0, 157, 192  
 CB, GEN SLU INV, 0, 128, 57, 0, 128, 255, 160, 192, 255  
 CB, GEN SLD INV, 0, 128, 57, 160, 255, 255, 192, 0, 192  
 CB, GEN SLV INV, 255, 0, 128, 0, 128, 255, 0, 128, 255  
 CB, GEN SLC INV, 255, 192, 160, 146, 0, 255, 255, 255, 255  
 CB, GEN RARA INV, 255, 0, 192, 255, 0, 128, 160, 255, 255  
 CB, GEN FREQ INV, 192, 128, 0, 255, 160, 255, 255, 192, 160  
 CBS, Termico unif. -15°, 163, 160, 255, 128, 192, 0, 192, 192, 192  
 CBS, Termico diff. -5°/H, 148, 87, 255, 192, 0, 128, 0, 128, 192  
 CBS, SLV Long (X-), 255, 0, 192, 212, 160, 255, 163, 160, 255  
 CBS, SLV Trasv (Y-), 0, 128, 57, 160, 255, 255, 212, 160, 255  
 CBS, SLV Vert (Z-), 0, 192, 192, 192, 0, 192, 0, 128, 255  
 CBS, Termico unif. INV, 255, 0, 128, 192, 72, 0, 192, 72, 0  
 CBS, Termico diff. INV, 192, 192, 192, 160, 192, 255, 163, 160, 255  
 CBS, SLV Long INV, 160, 192, 255, 192, 0, 128, 0, 128, 128  
 CBS, SLV Trasv INV, 85, 0, 192, 255, 160, 255, 212, 160, 255  
 CBS, SLV Vert INV, 255, 255, 255, 0, 192, 128, 255, 87, 87  
 CBS, Mobili SLU INV, 192, 192, 192, 160, 255, 255, 0, 157, 192  
 CBS, Mobili SLE INV, 163, 160, 255, 163, 255, 160, 0, 192, 128  
 CBS, ST SLU Mobili, 160, 255, 255, 0, 128, 192, 163, 160, 255  
 CBS, ST SLU Vento, 85, 0, 192, 0, 157, 192, 163, 255, 160  
 CBS, ST SLU Frenamento, 0, 192, 192, 93, 255, 87, 255, 192, 160  
 CBS, ST SLU Termico, 255, 255, 87, 0, 192, 128, 255, 87, 128  
 CBS, ST SLV Long, 0, 128, 128, 255, 192, 160, 93, 255, 87  
 CBS, ST SLV Trasv, 0, 192, 128, 255, 255, 87, 255, 160, 255  
 CBS, ST SLV Vert, 255, 255, 87, 255, 192, 87, 192, 0, 192  
 CBS, ST FATICA VITA ILL., 192, 128, 0, 255, 87, 87, 0, 192, 192  
 CBS, ST FATICA DANN.ACC., 0, 192, 128, 0, 128, 255, 160, 192, 255  
 CBS, ST RARA Mobili, 255, 0, 192, 192, 72, 0, 212, 160, 255  
 CBS, ST RARA Vento, 192, 72, 0, 78, 0, 255, 212, 160, 255  
 CBS, ST RARA Frenamento, 192, 192, 0, 192, 192, 0, 0, 192, 192  
 CBS, ST RARA Termico, 255, 160, 255, 255, 160, 255, 255, 255, 255  
 CBS, ST FREQ Mobili, 163, 255, 160, 192, 192, 0, 255, 128, 0



PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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SECT=5, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P20, 32, 0, 0, 0, 0.05, 0.1, 2
I, P20, 32, 0, 0, 0, 0.22, 0.1, 2
J, P20, 32, 0, 0, 0, 0.05, 0.1, 2
J, P20, 32, 0, 0, 0, 0.22, 0.1, 2
SECT=6, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P20, 32, 0, 0, 0, 0.22, 0.1, 2
I, P20, 32, 0, 0, 0, 0.05, 0.1, 2
J, P20, 32, 0, 0, 0, 0.22, 0.1, 2
J, P20, 32, 0, 0, 0, 0.05, 0.1, 2
SECT=7, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P20, 16, 0, 0, 0, 0.22, 0.2, 2
I, P20, 16, 0, 0, 0, 0.05, 0.2, 2
J, P20, 16, 0, 0, 0, 0.22, 0.2, 2
J, P20, 16, 0, 0, 0, 0.05, 0.2, 2
SECT=8, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P16, 16, 0, 0, 0, 0.05, 0.2, 2
I, P16, 16, 0, 0, 0, 0.22, 0.2, 2
J, P16, 16, 0, 0, 0, 0.05, 0.2, 2
J, P16, 16, 0, 0, 0, 0.22, 0.2, 2
SECT=9, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P20, 30, 0, 0, 0, 0.22, 0.1, 2
I, P20, 30, 0, 0, 0, 0.05, 0.1, 2
J, P20, 30, 0, 0, 0, 0.22, 0.1, 2
J, P20, 30, 0, 0, 0, 0.05, 0.1, 2
SECT=10, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P20, 30, 0, 0, 0, 0.05, 0.1, 2
I, P20, 30, 0, 0, 0, 0.22, 0.1, 2
J, P20, 30, 0, 0, 0, 0.05, 0.1, 2
J, P20, 30, 0, 0, 0, 0.22, 0.1, 2
SECT=11, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P20, 16, 0, 0, 0, 0.05, 0.2, 2
I, P20, 16, 0, 0, 0, 0.22, 0.2, 2
J, P20, 16, 0, 0, 0, 0.05, 0.2, 2
J, P20, 16, 0, 0, 0, 0.22, 0.2, 2
SECT=12, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P20, 15, 0, 0, 0, 0.22, 0.2, 2
I, P20, 15, 0, 0, 0, 0.05, 0.2, 2
J, P20, 15, 0, 0, 0, 0.22, 0.2, 2
J, P20, 15, 0, 0, 0, 0.05, 0.2, 2
SECT=13, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P16, 15, 0, 0, 0, 0.05, 0.2, 2
I, P16, 15, 0, 0, 0, 0.22, 0.2, 2
J, P16, 15, 0, 0, 0, 0.05, 0.2, 2
J, P16, 15, 0, 0, 0, 0.22, 0.2, 2
SECT=14, YES, NO, NO
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P20, 15, 0, 0, 0, 0.22, 0.2, 2
I, P20, 15, 0, 0, 0, 0.05, 0.2, 2
J, P20, 15, 0, 0, 0, 0.22, 0.2, 2
J, P20, 15, 0, 0, 0, 0.05, 0.2, 2
SECT=16, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P20, 32, 0, 0, 0, 0.05, 0.1, 2
I, P20, 32, 0, 0, 0, 0.22, 0.1, 2
J, P20, 32, 0, 0, 0, 0.05, 0.1, 2
J, P20, 32, 0, 0, 0, 0.22, 0.1, 2
SECT=21, YES, NO, YES
NO, , , NO, , , , NO, , , NO, , NO, ,
I, P20, 30, 0, 0, 0, 0.22, 0.1, 2
I, P20, 30, 0, 0, 0, 0.05, 0.1, 2
J, P20, 30, 0, 0, 0, 0.22, 0.1, 2
J, P20, 30, 0, 0, 0, 0.05, 0.1, 2

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*DGN-TRANS_STIFFENER ; Transverse Stiffener of Element
ELEM=101, YES
I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=102, YES
I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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ELEM=103, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=104, YES
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ELEM=105, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=106, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=107, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=108, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=109, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=110, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 3, 0, 0
ELEM=111, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 3, 0, 0
ELEM=112, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 3, 0, 0
ELEM=113, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 3, 0, 0
ELEM=114, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 3, 0, 0
ELEM=115, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 3, 0, 0
ELEM=116, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5.2, 0, 0
ELEM=117, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5.2, 0, 0
ELEM=118, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5.2, 0, 0
ELEM=119, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5.2, 0, 0
ELEM=120, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5.2, 0, 0
ELEM=121, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5.2, 0, 0
ELEM=122, YES
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ELEM=123, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5.2, 0, 0
ELEM=124, YES
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ELEM=125, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5.2, 0, 0
ELEM=126, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 3, 0, 0
ELEM=127, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 3, 0, 0
ELEM=128, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 3, 0, 0
ELEM=129, YES
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ELEM=130, YES
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ELEM=131, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 3, 0, 0
ELEM=132, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=133, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=134, YES
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ELEM=135, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=136, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=137, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=138, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=139, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=140, YES
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0
ELEM=201, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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ELEM=202, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=203, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=204, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=205, YES
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ELEM=206, YES
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ELEM=207, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=208, YES
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ELEM=209, YES
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ELEM=210, YES
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ELEM=211, YES
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ELEM=212, YES
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ELEM=213, YES
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ELEM=214, YES
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ELEM=215, YES
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ELEM=216, YES
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ELEM=217, YES
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ELEM=218, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5.2, 0, 0
ELEM=219, YES
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ELEM=220, YES
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ELEM=221, YES
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ELEM=222, YES
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ELEM=226, YES
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ELEM=228, YES
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ELEM=229, YES
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ELEM=230, YES
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ELEM=232, YES
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ELEM=233, YES
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ELEM=234, YES
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ELEM=235, YES
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ELEM=236, YES
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ELEM=237, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=238, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=239, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=240, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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ELEM=301, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=302, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=303, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=304, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=305, YES
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ELEM=306, YES
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ELEM=307, YES
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ELEM=308, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 5, 0, 0
ELEM=309, YES
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ELEM=310, YES
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ELEM=311, YES
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ELEM=312, YES
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ELEM=319, YES
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ELEM=320, YES
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ELEM=321, YES
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ELEM=322, YES
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ELEM=323, YES
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ELEM=324, YES
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ELEM=325, YES
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ELEM=326, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 3, 0, 0
ELEM=327, YES
 I, YES, NO, NO, 1, 0.2, 0.015, 3, 0, 0
ELEM=328, YES
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ELEM=329, YES
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ELEM=339, YES
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```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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ELEM=406, YES
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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

ELEM=439, YES  
 I, YES, NO, NO, 0, 0.2, 0.015, 5, 0, 0  
 ELEM=440, YES  
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\*DGN-SHEAR\_CONNECTOR ; Shear Connector of Element

ELEM=101, YES  
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 ELEM=102, YES  
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 ELEM=136, YES  
 I, YES, 3, 450000, 0.0222, 0.175, 0.15, 0.2

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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ELEM=235, YES
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```

PROJECT TITLE : Viadotto su rotatoria


|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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ELEM=334, YES
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```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

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ELEM=335, YES
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```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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ELEM=434, YES
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 I, YES, 4, 450000, 0.0222, 0.175, 0.1, 0.2

```

\*DGN-POSITION ; Design Position of Element  
 101to140 201to240 301to340 401to440, 2

\*DGN-DESIGN OUTPUT ; Composite Position for Design Output  
 222, 1

\*DGN-PLATEGIRDER ; Composite Plate Girder Design  
 1901, YES, YES, YES, YES, YES, NO, YES, YES, \  
 1.5, 1.15, 1.05, 1.1, 1.25, 1, 1.15, 1, 50, 1, 0.6, 0.45, 0.8, 0.6, 0.95, 0.8, 0.9, 1, 1, 0.85, 1, 1.25,  
 1.25, 1.25, 1.25, 1.25, 1, 0, YES, YES, YES, YES, YES, YES, YES, YES, 0, NO, YES, NO, NO

\*DGN-PLATE-LT-BUCKLING ; Composite Girder Lateral-Torsional Buckling

```

ELEM=101, YES
 I, YES, 0.1, 0.01, 2, 3.2
ELEM=102, YES
 I, YES, 0.1, 0.01, 2, 3.2
ELEM=103, YES
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ELEM=104, YES
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ELEM=123, YES
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ELEM=124, YES
 I, YES, 0.1, 0.01, 2, 3.2
ELEM=125, YES
 I, YES, 0.1, 0.01, 2, 3.2
ELEM=126, YES

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

```

I, YES, 0.1, 0.01, 2, 3.2
ELEM=127, YES
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ELEM=224, YES
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ELEM=225, YES

```



PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

I, YES, 0.1, 0.01, 3, 3.2  
 ELEM=226, YES  
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 ELEM=229, YES  
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 ELEM=230, YES  
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 I, YES, 0.1, 0.01, 3, 3.2  
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 I, YES, 0.1, 0.01, 3, 3.2  
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 I, YES, 0.1, 0.01, 3, 3.2  
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 ELEM=318, YES  
 I, YES, 0.1, 0.01, 3, 3.2  
 ELEM=319, YES  
 I, YES, 0.1, 0.01, 3, 3.2  
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 I, YES, 0.1, 0.01, 3, 3.2  
 ELEM=321, YES  
 I, YES, 0.1, 0.01, 3, 3.2  
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 I, YES, 0.1, 0.01, 3, 3.2  
 ELEM=323, YES  
 I, YES, 0.1, 0.01, 3, 3.2  
 ELEM=324, YES

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

```

I, YES, 0.1, 0.01, 3, 3.2
ELEM=325, YES
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ELEM=327, YES
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ELEM=402, YES
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I, YES, 0.1, 0.01, 2, 3.2
ELEM=416, YES
I, YES, 0.1, 0.01, 2, 3.2
ELEM=417, YES
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ELEM=418, YES
I, YES, 0.1, 0.01, 2, 3.2
ELEM=419, YES
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ELEM=420, YES
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ELEM=421, YES
I, YES, 0.1, 0.01, 2, 3.2
ELEM=422, YES
I, YES, 0.1, 0.01, 2, 3.2
ELEM=423, YES

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

```

I, YES, 0.1, 0.01, 2, 3.2
ELEM=424, YES
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ELEM=427, YES
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I, YES, 0.1, 0.01, 2, 3.2
ELEM=430, YES
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ELEM=431, YES
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ELEM=433, YES
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ELEM=434, YES
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ELEM=436, YES
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ELEM=437, YES
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ELEM=438, YES
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ELEM=439, YES
I, YES, 0.1, 0.01, 2, 3.2
ELEM=440, YES
I, YES, 0.1, 0.01, 2, 3.2

```

\*DGN-PLATE-FTG ; Composite Girder Fatigue Resistance

```

ELEM=101, YES
I, YES, 1.1, 1
ELEM=102, YES
I, YES, 1.1, 1
ELEM=103, YES
I, YES, 1.1, 1
ELEM=104, YES
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ELEM=115, YES
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ELEM=116, YES
I, YES, 1.1, 1
ELEM=117, YES
I, YES, 1.1, 1
ELEM=118, YES
I, YES, 1.1, 1
ELEM=119, YES
I, YES, 1.1, 1
ELEM=120, YES
I, YES, 1.1, 1
ELEM=121, YES

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

```

I, YES, 1.1, 1
ELEM=122, YES
I, YES, 1.1, 1
ELEM=123, YES
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ELEM=124, YES
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ELEM=125, YES
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ELEM=126, YES
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ELEM=127, YES
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ELEM=128, YES
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ELEM=129, YES
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ELEM=130, YES
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ELEM=131, YES
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ELEM=132, YES
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ELEM=220, YES

```

PROJECT TITLE : Viadotto su rotatoria


|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

```

I, YES, 1.1, 1
ELEM=221, YES
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ELEM=225, YES
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ELEM=227, YES
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ELEM=228, YES
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ELEM=230, YES
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ELEM=317, YES
I, YES, 1.1, 1
ELEM=318, YES
I, YES, 1.1, 1
ELEM=319, YES

```

PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

```

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I, YES, 1.1, 1
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I, YES, 1.1, 1
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I, YES, 1.1, 1
ELEM=416, YES
I, YES, 1.1, 1
ELEM=417, YES
I, YES, 1.1, 1
ELEM=418, YES

```







PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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*SECTION MANAGER-REBAR ; Section Manager - Reinforcement
 SECT=1, YES, YES, NO
 2, 2
 1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
 -1.5, 0.268069, 0, 0, 1.5, 0.268069, 0
 1, 0, 0
 1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
 -1.5, 0.0980688, 0, 0, 1.5, 0.0980688, 0
 1, 0, 0
 1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
 -1.5, 0.268069, 0, 0, 1.5, 0.268069, 0
 1, 0, 0
 1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
 -1.5, 0.0980688, 0, 0, 1.5, 0.0980688, 0
 1, 0, 0
 NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
 NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
 SECT=2, YES, YES, NO
 2, 2
 1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
 -1.5, 0.299742, 0, 6.16954e-007, 1.5, 0.299742, 0
 1, 1.61, 0.990523
 1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
 -1.5, 0.129742, 0, 6.16954e-007, 1.5, 0.129742, 0
 1, 1.61, 0.990523
 1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
 -1.5, 0.299742, 0, 6.16954e-007, 1.5, 0.299742, 0
 1, 1.61, 0.990523
 1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
 -1.5, 0.129742, 0, 6.16954e-007, 1.5, 0.129742, 0
 1, 1.61, 0.990523
 NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
 NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
 SECT=3, YES, YES, NO
 2, 2
 1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
 -1.4, 0.106204, 0, 6.16954e-007, 1.4, 0.106204, 0
 1, 1.61, 0.990523
 1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
 -1.4, 0.276204, 0, 6.16954e-007, 1.4, 0.276204, 0
 1, 1.61, 0.990523
 1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
 -1.4, 0.106204, 0, 6.16954e-007, 1.4, 0.106204, 0
 1, 1.61, 0.990523
 1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
 -1.4, 0.276204, 0, 6.16954e-007, 1.4, 0.276204, 0
 1, 1.61, 0.990523
 NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
 NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
 SECT=4, YES, YES, NO
 2, 2
 1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
 -1.4, 0.308849, 0, 6.16954e-007, 1.4, 0.308849, 0
 1, 1.61, 0.990523
 1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
 -1.4, 0.138849, 0, 6.16954e-007, 1.4, 0.138849, 0
 1, 1.61, 0.990523
 1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
 -1.4, 0.308849, 0, 6.16954e-007, 1.4, 0.308849, 0
 1, 1.61, 0.990523
 1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
 -1.4, 0.138849, 0, 6.16954e-007, 1.4, 0.138849, 0
 1, 1.61, 0.990523
 NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
 NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
 SECT=5, YES, YES, YES
 2, 2
 1, 1, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.1
 -1.55, 0.328865, 0, 0, 1.55, 0.328865, 0
 1, 0, 0
 1, 1, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.1
 -1.55, 0.158865, 0, 0, 1.55, 0.158865, 0
 1, 0, 0
 1, 1, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.1
 -1.55, 0.590807, 0, 0.261942, 1.55, 0.590807, 0
 1, 0, 0.261942
 1, 1, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.1

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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-1.55, 0.420807, 0, 0.261942, 1.55, 0.420807, 0
1, 0, 0.261942
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=6, YES, YES, YES
2, 2
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.55, 0.420807, 0, 0, 1.55, 0.420807, 0
1, 0, 0
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.55, 0.590807, 0, 0, 1.55, 0.590807, 0
1, 0, 0
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.55, 0.158865, 0, -0.261942, 1.55, 0.158865, 0
1, 0, -0.261942
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.55, 0.328865, 0, -0.261942, 1.55, 0.328865, 0
1, 0, -0.261942
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=7, YES, YES, NO
2, 2
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.141273, 0, 0, 1.5, 0.141273, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.311273, 0, 0, 1.5, 0.311273, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.141273, 0, 0, 1.5, 0.141273, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.311273, 0, 0, 1.5, 0.311273, 0
1, 0, 0
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=8, YES, YES, NO
2, 2
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.292524, 0, 0, 1.5, 0.292524, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.122524, 0, 0, 1.5, 0.122524, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.292524, 0, 0, 1.5, 0.292524, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.122524, 0, 0, 1.5, 0.122524, 0
1, 0, 0
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=9, YES, YES, YES
2, 2
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.168163, 0, 0, 1.45, 0.168163, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.338163, 0, 0, 1.45, 0.338163, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.437694, 0, 0.269531, 1.45, 0.437694, 0
1, 0, 0.269531
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.607694, 0, 0.269531, 1.45, 0.607694, 0
1, 0, 0.269531
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=10, YES, YES, YES
2, 2
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.607694, 0, 0, 1.45, 0.607694, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.437694, 0, 0, 1.45, 0.437694, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.338163, 0, -0.269531, 1.45, 0.338163, 0

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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1, 0, -0.269531
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.168163, 0, -0.269531, 1.45, 0.168163, 0
1, 0, -0.269531
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=11, YES, YES, NO
2, 2
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.311273, 0, -6.65975e-007, 1.5, 0.311273, 0
1, 1.61, 2.02956
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.141273, 0, -6.65975e-007, 1.5, 0.141273, 0
1, 1.61, 2.02956
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.311273, 0, -6.65975e-007, 1.5, 0.311273, 0
1, 1.61, 2.02956
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.141273, 0, -6.65975e-007, 1.5, 0.141273, 0
1, 1.61, 2.02956
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=12, YES, YES, NO
2, 2
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.150581, 0, -6.65975e-007, 1.4, 0.150581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.320581, 0, -6.65975e-007, 1.4, 0.320581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.150581, 0, -6.65975e-007, 1.4, 0.150581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.320581, 0, -6.65975e-007, 1.4, 0.320581, 0
1, 1.61, 2.02956
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=13, YES, YES, NO
2, 2
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.301494, 0, -6.65975e-007, 1.4, 0.301494, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.131494, 0, -6.65975e-007, 1.4, 0.131494, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.301494, 0, -6.65975e-007, 1.4, 0.301494, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.131494, 0, -6.65975e-007, 1.4, 0.131494, 0
1, 1.61, 2.02956
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=14, YES, YES, NO
2, 2
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.150581, 0, -6.65975e-007, 1.4, 0.150581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.320581, 0, -6.65975e-007, 1.4, 0.320581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.150581, 0, -6.65975e-007, 1.4, 0.150581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.320581, 0, -6.65975e-007, 1.4, 0.320581, 0
1, 1.61, 2.02956
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=16, YES, YES, YES
2, 2
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.1
-1.55, 0.590807, 0, 0, 1.55, 0.590807, 0
1, 0, 0
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.1
-1.55, 0.420807, 0, 0, 1.55, 0.420807, 0
1, 0, 0

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.55, 0.590807, 0, 0, 1.55, 0.590807, 0
1, 0, 0
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.55, 0.420807, 0, 0, 1.55, 0.420807, 0
1, 0, 0
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=21, YES, YES, YES
2, 2
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.437694, 0, 0, 1.45, 0.437694, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.607694, 0, 0, 1.45, 0.607694, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.437694, 0, 0, 1.45, 0.437694, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.607694, 0, 0, 1.45, 0.607694, 0
1, 0, 0
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO

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\*SECTION MANAGER-REBAR DESIGN ; Section Manager - Reinforcement Design

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SECT=1, YES, YES, NO
2, 2
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.268069, 0, 0, 1.5, 0.268069, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.0980688, 0, 0, 1.5, 0.0980688, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.268069, 0, 0, 1.5, 0.268069, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.0980688, 0, 0, 1.5, 0.0980688, 0
1, 0, 0
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=2, YES, YES, NO
2, 2
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.299742, 0, 6.16954e-007, 1.5, 0.299742, 0
1, 1.61, 0.990523
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.129742, 0, 6.16954e-007, 1.5, 0.129742, 0
1, 1.61, 0.990523
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.299742, 0, 6.16954e-007, 1.5, 0.299742, 0
1, 1.61, 0.990523
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.129742, 0, 6.16954e-007, 1.5, 0.129742, 0
1, 1.61, 0.990523
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=3, YES, YES, NO
2, 2
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.106204, 0, 6.16954e-007, 1.4, 0.106204, 0
1, 1.61, 0.990523
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.276204, 0, 6.16954e-007, 1.4, 0.276204, 0
1, 1.61, 0.990523
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.106204, 0, 6.16954e-007, 1.4, 0.106204, 0
1, 1.61, 0.990523
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.276204, 0, 6.16954e-007, 1.4, 0.276204, 0
1, 1.61, 0.990523
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=4, YES, YES, NO
2, 2
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.308849, 0, 6.16954e-007, 1.4, 0.308849, 0

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PROJECT TITLE : Viadotto su rotatoria


|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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1, 1.61, 0.990523
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.138849, 0, 6.16954e-007, 1.4, 0.138849, 0
1, 1.61, 0.990523
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.308849, 0, 6.16954e-007, 1.4, 0.308849, 0
1, 1.61, 0.990523
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.138849, 0, 6.16954e-007, 1.4, 0.138849, 0
1, 1.61, 0.990523
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=5, YES, YES, YES
2, 2
1, 1, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.55, 0.328865, 0, 0, 1.55, 0.328865, 0
1, 0, 0
1, 1, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.55, 0.158865, 0, 0, 1.55, 0.158865, 0
1, 0, 0
1, 1, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.55, 0.590807, 0, 0.261942, 1.55, 0.590807, 0
1, 0, 0.261942
1, 1, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.55, 0.420807, 0, 0.261942, 1.55, 0.420807, 0
1, 0, 0.261942
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=6, YES, YES, YES
2, 2
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.55, 0.420807, 0, 0, 1.55, 0.420807, 0
1, 0, 0
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.55, 0.590807, 0, 0, 1.55, 0.590807, 0
1, 0, 0
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.55, 0.158865, 0, -0.261942, 1.55, 0.158865, 0
1, 0, -0.261942
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.55, 0.328865, 0, -0.261942, 1.55, 0.328865, 0
1, 0, -0.261942
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=7, YES, YES, NO
2, 2
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.141273, 0, 0, 1.5, 0.141273, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.311273, 0, 0, 1.5, 0.311273, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.141273, 0, 0, 1.5, 0.141273, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.311273, 0, 0, 1.5, 0.311273, 0
1, 0, 0
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=8, YES, YES, NO
2, 2
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.292524, 0, 0, 1.5, 0.292524, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.122524, 0, 0, 1.5, 0.122524, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.292524, 0, 0, 1.5, 0.292524, 0
1, 0, 0
1, 0, 0, 0, 16, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.122524, 0, 0, 1.5, 0.122524, 0
1, 0, 0
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=9, YES, YES, YES
2, 2

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.168163, 0, 0, 1.45, 0.168163, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.338163, 0, 0, 1.45, 0.338163, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.437694, 0, 0.269531, 1.45, 0.437694, 0
1, 0, 0.269531
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.607694, 0, 0.269531, 1.45, 0.607694, 0
1, 0, 0.269531
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=10, YES, YES, YES
2, 2
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.607694, 0, 0, 1.45, 0.607694, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.437694, 0, 0, 1.45, 0.437694, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.338163, 0, -0.269531, 1.45, 0.338163, 0
1, 0, -0.269531
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.168163, 0, -0.269531, 1.45, 0.168163, 0
1, 0, -0.269531
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=11, YES, YES, NO
2, 2
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.311273, 0, -6.65975e-007, 1.5, 0.311273, 0
1, 1.61, 2.02956
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.141273, 0, -6.65975e-007, 1.5, 0.141273, 0
1, 1.61, 2.02956
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.5, 0.311273, 0, -6.65975e-007, 1.5, 0.311273, 0
1, 1.61, 2.02956
1, 0, 0, 0, 16, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.5, 0.141273, 0, -6.65975e-007, 1.5, 0.141273, 0
1, 1.61, 2.02956
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=12, YES, YES, NO
2, 2
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.150581, 0, -6.65975e-007, 1.4, 0.150581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.320581, 0, -6.65975e-007, 1.4, 0.320581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.150581, 0, -6.65975e-007, 1.4, 0.150581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.320581, 0, -6.65975e-007, 1.4, 0.320581, 0
1, 1.61, 2.02956
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=13, YES, YES, NO
2, 2
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.301494, 0, -6.65975e-007, 1.4, 0.301494, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.131494, 0, -6.65975e-007, 1.4, 0.131494, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.301494, 0, -6.65975e-007, 1.4, 0.301494, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P16, 0, 2, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.131494, 0, -6.65975e-007, 1.4, 0.131494, 0
1, 1.61, 2.02956
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |         |               |           |                            |
|-----------------------------------------------------------------------------------|---------|---------------|-----------|----------------------------|
|  | Company | Studio Corona | Client    |                            |
|                                                                                   | Author  | Renato Vaira  | File Name | Viadotti rotatorie V_1.mct |

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SECT=14, YES, YES, NO
2, 2
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.150581, 0, -6.65975e-007, 1.4, 0.150581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.320581, 0, -6.65975e-007, 1.4, 0.320581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.2
-1.4, 0.150581, 0, -6.65975e-007, 1.4, 0.150581, 0
1, 1.61, 2.02956
1, 0, 0, 0, 15, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.2
-1.4, 0.320581, 0, -6.65975e-007, 1.4, 0.320581, 0
1, 1.61, 2.02956
NO, 0, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=16, YES, YES, YES
2, 2
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.1
-1.55, 0.590807, 0, 0, 1.55, 0.590807, 0
1, 0, 0
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.1
-1.55, 0.420807, 0, 0, 1.55, 0.420807, 0
1, 0, 0
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.1
-1.55, 0.590807, 0, 0, 1.55, 0.590807, 0
1, 0, 0
1, 0, 0, 0, 32, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.1
-1.55, 0.420807, 0, 0, 1.55, 0.420807, 0
1, 0, 0
NO, 0, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
SECT=21, YES, YES, YES
2, 2
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.437694, 0, 0, 1.45, 0.437694, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.607694, 0, 0, 1.45, 0.607694, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.22, 0.1
-1.45, 0.437694, 0, 0, 1.45, 0.437694, 0
1, 0, 0
1, 0, 0, 0, 30, 0, YES, P20, 0, 2, 0, 0, 0, 0, 0, 0.05, 0.1
-1.45, 0.607694, 0, 0, 1.45, 0.607694, 0
1, 0, 0
NO, 0, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO
NO, 0, 0, 0, 0, NO, 0, 90, 0, 0, 1, NO, 0, 0, 0, NO, 0, 0, NO, 0, NO

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\*SECTION MANAGER-GROUP & PART ; Section Manager - Group & Part

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SECT=1, YES
0, 0, 0, 0
SECT=2, YES
0, 0, 0, 0
SECT=3, YES
0, 0, 0, 0
SECT=4, YES
0, 0, 0, 0
SECT=5, YES
0, 0, 0, 0
SECT=6, YES
0, 0, 0, 0
SECT=7, YES
0, 0, 0, 0
SECT=8, YES
0, 0, 0, 0
SECT=9, YES
0, 0, 0, 0
SECT=10, YES
0, 0, 0, 0
SECT=11, YES
0, 0, 0, 0
SECT=12, YES
0, 0, 0, 0
SECT=13, YES
0, 0, 0, 0
SECT=14, YES
0, 0, 0, 0

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PROJECT TITLE : Viadotto su rotatoria

|                                                                                   |                |               |                  |                            |
|-----------------------------------------------------------------------------------|----------------|---------------|------------------|----------------------------|
|  | <b>Company</b> | Studio Corona | <b>Client</b>    |                            |
|                                                                                   | <b>Author</b>  | Renato Vaira  | <b>File Name</b> | Viadotti rotatorie V_1.mct |

SECT=16, YES  
0, 0, 0, 0  
SECT=21, YES  
0, 0, 0, 0

\*SECTION MANAGER-STIFFENER ; Section Manager - Stiffener

SECT=1, YES  
0, 0  
SECT=2, YES  
0, 0  
SECT=3, YES  
0, 0  
SECT=4, YES  
0, 0  
SECT=5, YES  
0, 0  
SECT=6, YES  
0, 0  
SECT=7, YES  
0, 0  
SECT=8, YES  
0, 0  
SECT=9, YES  
0, 0  
SECT=10, YES  
0, 0  
SECT=11, YES  
0, 0  
SECT=12, YES  
0, 0  
SECT=13, YES  
0, 0  
SECT=14, YES  
0, 0  
SECT=16, YES  
0, 0  
SECT=21, YES  
0, 0

\*ENDDATA