COMMITTENTE:

RFI RETE FERROVIARIA ITALIANA
GRUPPO FERROVIE DELLO STATO ITALIANE

PROGETTAZIONE:

ITALFERR
GRUPPO FERROVIE DELLO STATO ITALIANE

U.O. INFRASTRUTTURE NORD

PROGETTO DEFINITIVO

DIRETTRICE FERROVIARIA MESSINA – CATANIA – PALERMO
NUOVO COLLEGAMENTO PALERMO – CATANIA

RADDOPPIO TRATTA FIUME TORTO – LERCARA DIRAMAZIONE LOTTO 1 + 2

FABBRICATI STAZIONE

FV03 - Stazione di Lercara dir - km 29+147

Relazione di calcolo strutturale fondazioni pile ponte pedonale

SCALA: -

COMMESSA	LOTTO	FASE	ENTE	TIPO DOC.	OPERA/DISCIPLINA	PROGR.	REV.
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Rev.	Descrizione	Redatto	Data	Verificato	Data	Approvato	Data	Autorizzato Data
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B	1° AGG. A CONSEGNA CSLLPP	C. INTEGRA	Maggio 2020	F.COPPINI	Maggio 2020	A. BARRECA	Maggio 2020	

ITALFERR - U.O. INFRASTRUTTURE NORD
Dott. Ing. Francesco Sacchi
Ordine degli Ingegneri della Provincia di Roma n. 23172 Sez. A

File: RS3Z00D26FV0300009B		n. Elab.:

INDICE

1 PREMESSA 1

2 NORMATIVE DI RIFERIMENTO 2

3 CARATTERISTICHE DEI MATERIALI 3

4 PARAMETRI GEOTECNICI DEL SITO 4

5 UBICAZIONE DELL'INTERVENTO 4

6 ANALISI DEI CARICHI 4

7 COMBINAZIONI DI CARICO 4

8 MODELLAZIONE STRUTTURALE 4

9 VERIFICHE STRUTTURALI DELLE OPERE DI FONDAZIONE 5

9.1 SOLLECITAZIONI DI CALCOLO 5

9.2 VERIFICHE STRUTTURALI SUI PALI DI FONDAZIONE 9

9.3 VERIFICHE A PRESSOFLESSIONE SUI PALI 26

9.4 VERIFICHE STRUTTURALI SULLA PLATEA DI FONDAZIONE 30

1 PREMESSA

L'oggetto della presente relazione è la struttura di collegamento ed accesso ai diversi binari della stazione di Lercara (PA).

Si tratta di una struttura metallica mono-piano di lunghezza complessiva pari a circa 44,05 m e larghezza 9,45 m appoggiata su:

- 4 pile in c.a. di altezza pari a 7.85 m, con sezione cava, posizionate su 2 allineamenti fondati su pali;
- pareti in c.a che costituiscono il fabbricato viaggiatori (non trattate in questo documento, di cui si tiene conto tramite il sistema di vincoli adottato).

La struttura metallica è composta da 2 travi principali continue, disposte longitudinalmente alla struttura, di tipo laminato a caldo con altezza pari a 800 mm e piattabanda di larghezza 300 mm. Su tali travi si innestano perpendicolarmente delle travi secondarie IPE 500, anche esse con schema statico di trave continua. Le travi secondarie sono, infine, collegate a profili tubolari di dimensione 500x300x6 mm che realizzano i portali trasversali che costituiscono la copertura.

In questo documento sono riportate le verifiche strutturali delle fondazioni delle pile.

2 NORMATIVE DI RIFERIMENTO

La progettazione è conforme alle normative vigenti nonché alle Istruzioni dell'Ente FF.SS.

I calcoli e le disposizioni esecutive sono conformi alle norme attualmente in vigore e di seguito elencate:

- Decreto Ministeriale 17 gennaio 2018: Aggiornamento delle Norme tecniche per le costruzioni;
- Circolare 21 gennaio 2019, n.7 C.S.LL.PP.: Istruzioni per l'applicazione dell'"Aggiornamento delle Norme tecniche per le costruzioni di cui al D.M. 17 gennaio 2018;
- Circolare 15 ottobre 1996, n.252 AA.GG./S.T.C..: Istruzioni per l'applicazione delle "Nuove norme tecniche per il calcolo, l'esecuzione ed il collaudo delle opere in cemento armato normale e precompresso e per le strutture metalliche" di cui al decreto ministeriale 9 gennaio 1996;
- RFI DTC SI MA IFS 001 B: "Manuale di progettazione delle opere civili" del 22/12/2017.
- RFI DTC SI PS MA IFS 001 B: Sezione 2 – Ponti e Strutture
- RFI DTC SI CS MA IFS 002 B: Manuale di Progettazione delle Opere Civili - Parte II - Sezione 5 – Prescrizioni per marciapiedi e pensiline delle stazioni ferroviarie a servizio dei viaggiatori
- Regolamento (UE) N.1299/2014 della Commissione del 18 novembre 2014 relativo alle specifiche tecniche di interoperabilità per il sottosistema "infrastruttura" del sistema ferroviario dell'Unione europea
- Eurocodice 3: Progettazione delle strutture di acciaio – Parte 1.1: Regole generali e regole per gli edifici
- UNI EN 11104 marzo 2004: "Calcestruzzo: specificazione. prestazione. produzione e conformità" Istruzioni complementari per l'applicazione delle EN 206-1
- UNI EN 206-1 ottobre 2006: "Calcestruzzo: specificazione. prestazione. produzione e conformità"
- UNI EN 1992-1-1 (Eurocodice 2) novembre 2005: "Progettazione delle strutture di calcestruzzo Parte 1: Regole generali e regole per edifici"
- UNI EN 1998-5 (Eurocodice 8) gennaio 2005: "Progettazione delle strutture per la resistenza sismica – Parte 5: Fondazioni. strutture di contenimento ed aspetti geotecnici"
- UIC CODE 777-2:2002: Structures built over raylways lines – Construction requirements in the track zone.

Riferimenti STI:

- Regolamento (UE) N. 1299/2014 della Commissione del 18 novembre 2014 relativo alle specifiche tecniche di interoperabilità per il sottosistema "infrastruttura" del sistema ferroviario dell'Unione europea, modificato dal Regolamento di esecuzione (UE) N° 2019/776 della Commissione del 16 maggio 2019.

3 CARATTERISTICHE DEI MATERIALI

- CALCESTRUZZO PER STRUTTURE DI FONDAZIONE (PALI E PLATEE): C25/30

Rck 30			= classe di resistenza
f_{ck} =	24.9	MPa	= resistenza cilindrica caratteristica a compressione
α_{cc} =	**0.85**		= coefficiente riduttivo per le resistenze di lunga durata
γ_c =	**1.5**		= coefficiente parziale di sicurezza
$f_{cd} = \alpha_{cc} f_{ck} / \gamma_c$ =	14.11	MPa	= resistenza cilindrica di calcolo a compressione
$f_{cm} = f_{ck} + 8$ =	32.9	MPa	= resistenza cilindrica media a compressione
$f_{ctm} = 0{,}30\ f_{ck}^{2/3}$ per classi ≤ C50/60 $f_{ctm} = 2{,}12\ \ln[1+f_{cm}/10]$ per classi > C50/60	2.56	MPa	= resistenza media a trazione
$f_{ctk} = 0{,}7\ f_{ctm}$ =	1.79	MPa	= resistenza caratteristica a trazione
$f_{ctd} = f_{ctk} / \gamma_c$ =	1.19	MPa	= resistenzadi calcolo a trazione
$E_c = 22000\ [(f_{ck}+8)/10]^{0,3}$ =	31447	MPa	= modulo elastico

- ACCIAIO PER CEMENTO ARMATO: B450C

B450C			
$f_{tk} \geq$	540	MPa	= tensione caratteristica di rottura
$f_{yk} \geq$	450	MPa	= tensione caratteristica di snervamento
γ_s =	**1.15**		= coefficiente parziale di sicurezza
$f_{yd} = f_{yk} / \gamma_s$ =	391.3	MPa	= resistenza di calcolo
E_s =	**200000**	MPa	= modulo elastico

4 PARAMETRI GEOTECNICI DEL SITO

Contenuta nel documento RS3Z00D26CLFV0300006.

5 UBICAZIONE DELL'INTERVENTO

Contenuta nel documento RS3Z00D26CLFV0300006.

6 ANALISI DEI CARICHI

Contenuta nel documento RS3Z00D26CLFV0300006.

7 COMBINAZIONI DI CARICO

Contenuta nel documento RS3Z00D26CLFV0300006.

8 MODELLAZIONE STRUTTURALE

Contenuta nel documento RS3Z00D26CLFV0300006.

9 VERIFICHE STRUTTURALI DELLE OPERE DI FONDAZIONE

Nel presente paragrafo sono riportate le verifiche strutturali dei plinti di fondazione e dei pali.

9.1 Sollecitazioni di calcolo

Al fine di dimensionare le opere di fondazione, sono state estrapolate dal modello di calcolo le sollecitazioni alla base delle pile, ovvero le reazioni vincolari d'incastro, e sono state ripartite in modo rigido sui pali di fondazione.

Di seguito viene riportata una vista del modello di calcolo dalla quale si possono evincere i nomi dei nodi di interesse e la tabella con le reazioni vincolari in detti nodi.

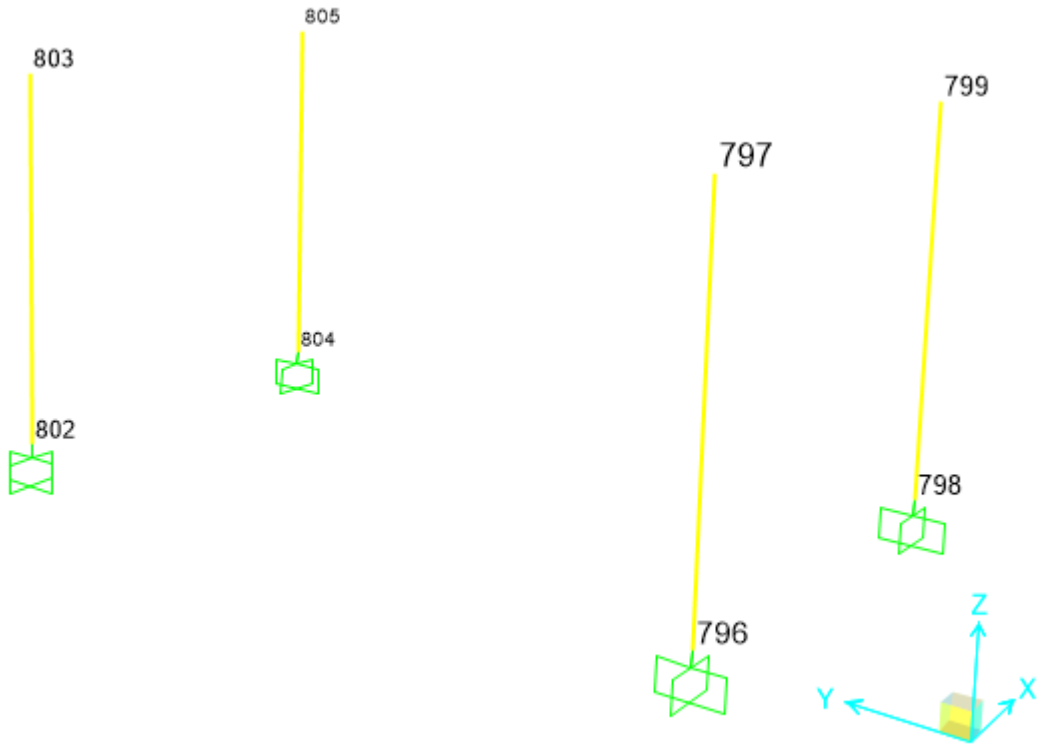


Figura 1: Joints labels

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m
796	SLU (q1)	Combination		-36.5	0.0	2367.3	0.0	-1058.6	0.0
796	SLU (q2)	Combination		36.5	0.0	2454.8	0.0	-860.6	0.0
796	SLU (q3)	Combination		0.0	-43.5	2418.3	167.6	-966.5	0.0
796	SLU (q4)	Combination		0.0	43.5	2474.7	-167.5	-1020.0	0.0
796	SLU (n1)	Combination		-36.5	0.0	1973.6	0.0	-684.6	0.0
796	SLU (n2)	Combination		36.5	0.0	2061.2	0.0	-486.6	0.0
796	SLU (n3)	Combination		0.0	-43.5	2024.6	167.6	-592.5	0.0
796	SLU (n4)	Combination		0.0	43.5	2081.0	-167.5	-646.0	0.0
796	SLU (v1)	Combination		-60.9	0.0	1863.8	0.0	-674.0	0.0
796	SLU (v2)	Combination		60.9	0.0	2009.7	0.0	-344.0	0.0
796	SLU (v3)	Combination		0.0	-72.5	1948.8	279.3	-520.5	0.0
796	SLU (v4)	Combination		0.0	72.5	2042.9	-279.3	-609.8	0.0
796	SLU (T1)	Combination		-36.5	0.0	1935.2	0.0	-648.1	0.0
796	SLU (T2)	Combination		36.5	0.0	2022.8	0.0	-450.1	0.0
796	SLU (T3)	Combination		0.0	-43.5	1986.3	167.6	-556.0	0.0
796	SLU (T4)	Combination		0.0	43.5	2042.7	-167.5	-609.6	0.0
796	SLU_URTO X	Combination		0.0	0.0	1501.5	0.0	-402.6	0.0
796	SLU_URTO Y	Combination		0.0	0.0	1501.0	0.0	-402.2	0.0
796	Comb. SLVx (q=1)	Combination	Max	112.6	34.0	1608.9	262.2	490.8	2.5
796	Comb. SLVx (q=1)	Combination	Min	-112.6	-34.1	1393.4	-262.2	-1295.3	-2.5
796	Comb. SLVy (q=1)	Combination	Max	35.4	113.5	1589.1	873.9	-69.7	8.4
796	Comb. SLVy (q=1)	Combination	Min	-35.4	-113.5	1413.2	-873.9	-734.8	-8.4
798	SLU (q1)	Combination		-117.0	0.0	2453.6	0.0	203.1	0.0
798	SLU (q2)	Combination		155.5	0.0	2366.2	0.0	2026.9	0.0
798	SLU (q3)	Combination		22.0	-43.5	2417.3	167.6	1145.1	0.0
798	SLU (q4)	Combination		20.5	43.5	2473.8	-167.5	1186.6	0.0
798	SLU (n1)	Combination		-126.9	0.0	2060.3	0.0	-250.7	0.0
798	SLU (n2)	Combination		145.6	0.0	1973.0	0.0	1573.1	0.0
798	SLU (n3)	Combination		12.2	-43.5	2024.1	167.6	691.3	0.0
798	SLU (n4)	Combination		10.7	43.5	2080.6	-167.5	732.8	0.0
798	SLU (v1)	Combination		-219.8	0.0	2008.7	0.0	-952.2	0.0
798	SLU (v2)	Combination		234.4	0.0	1863.1	0.0	2087.5	0.0
798	SLU (v3)	Combination		12.0	-72.5	1948.3	279.3	617.8	0.0
798	SLU (v4)	Combination		9.5	72.5	2042.4	-279.2	686.9	0.0
798	SLU (T1)	Combination		-132.7	0.0	2021.8	0.0	-334.9	0.0
798	SLU (T2)	Combination		139.8	0.0	1934.5	0.0	1488.8	0.0

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m
798	SLU (T3)	Combination		6.3	-43.5	1985.6	167.6	607.1	0.0
798	SLU (T4)	Combination		4.8	43.5	2042.1	-167.5	648.5	0.0
798	SLU_URTO X	Combination		-260.8	0.0	1500.4	0.0	-1723.8	0.0
798	SLU_URTO Y	Combination		-28.3	0.0	1501.0	0.0	171.3	0.0
798	Comb. SLVx (q=1)	Combination	Max	390.2	34.0	1606.9	262.2	3555.3	2.5
798	Comb. SLVx (q=1)	Combination	Min	-368.2	-34.1	1394.9	-262.2	-2572.6	-2.5
798	Comb. SLVy (q=1)	Combination	Max	146.9	113.5	1591.9	873.9	1605.6	8.4
798	Comb. SLVy (q=1)	Combination	Min	-125.0	-113.5	1409.9	-873.9	-623.0	-8.4
802	SLU (q1)	Combination		-36.5	-8.9	2690.8	72.7	-1366.0	-8.5
802	SLU (q2)	Combination		36.5	-31.2	2794.4	254.4	-1183.1	-29.7
802	SLU (q3)	Combination		0.0	-91.3	2825.8	556.8	-1353.6	-45.4
802	SLU (q4)	Combination		0.0	49.5	2823.9	-216.1	-1351.8	5.7
802	SLU (n1)	Combination		-36.5	-0.2	2167.2	1.5	-868.5	-0.2
802	SLU (n2)	Combination		36.5	-22.5	2270.7	183.2	-685.6	-21.4
802	SLU (n3)	Combination		0.0	-82.5	2302.1	485.5	-856.1	-37.1
802	SLU (n4)	Combination		0.0	58.2	2300.2	-287.4	-854.3	14.0
802	SLU (v1)	Combination		-60.9	9.0	2020.1	-73.5	-822.5	8.6
802	SLU (v2)	Combination		60.9	-28.1	2192.7	229.3	-517.8	-26.7
802	SLU (v3)	Combination		0.0	-128.2	2245.1	733.2	-801.9	-52.9
802	SLU (v4)	Combination		0.0	106.4	2241.9	-554.9	-798.9	32.1
802	SLU (T1)	Combination		-36.5	2.3	2087.3	-19.0	-792.6	2.2
802	SLU (T2)	Combination		36.5	-20.0	2190.8	162.7	-609.7	-19.0
802	SLU (T3)	Combination		0.0	-80.0	2222.3	465.0	-780.2	-34.7
802	SLU (T4)	Combination		0.0	60.7	2220.4	-307.9	-778.4	16.4
802	SLU_URTO X	Combination		0.0	12.3	1653.0	-99.9	-546.5	11.6
802	SLU_URTO Y	Combination		0.0	-193.0	1653.7	1572.9	-547.2	-183.3
802	Comb. SLVx (q=1)	Combination	Max	112.1	197.0	1755.9	1739.0	341.9	149.3
802	Comb. SLVx (q=1)	Combination	Min	-112.1	-215.9	1551.5	-1584.7	-1436.3	-167.3
802	Comb. SLVy (q=1)	Combination	Max	34.8	530.1	1736.3	4423.9	-222.6	406.5
802	Comb. SLVy (q=1)	Combination	Min	-34.8	-549.1	1571.0	-4269.6	-871.7	-424.5
804	SLU (q1)	Combination		-178.6	8.9	2803.4	-72.7	34.0	-8.5
804	SLU (q2)	Combination		62.7	31.2	2699.1	-254.4	1587.1	-29.7
804	SLU (q3)	Combination		-64.3	-50.4	2834.7	223.7	837.8	6.5
804	SLU (q4)	Combination		-62.1	92.2	2832.6	-564.4	854.1	-46.3
804	SLU (n1)	Combination		-150.7	0.2	2276.0	-1.5	-239.7	-0.2
804	SLU (n2)	Combination		90.6	22.5	2171.8	-183.2	1313.4	-21.4

Joint	OutputCase	CaseType	StepType	F1	F2	F3	M1	M2	M3
Text	Text	Text	Text	KN	KN	KN	KN-m	KN-m	KN-m
804	SLU (n3)	Combination		-36.4	-59.2	2307.4	295.0	564.1	14.9
804	SLU (n4)	Combination		-34.2	83.5	2305.3	-493.2	580.4	-38.0
804	SLU (v1)	Combination		-225.1	-9.0	2198.0	73.5	-815.4	8.6
804	SLU (v2)	Combination		177.0	28.1	2024.2	-229.4	1773.1	-26.7
804	SLU (v3)	Combination		-34.7	-107.9	2250.3	567.6	524.4	33.6
804	SLU (v4)	Combination		-30.9	129.8	2246.7	-746.0	551.5	-54.4
804	SLU (T1)	Combination		-136.7	-2.3	2196.3	19.0	-201.7	2.2
804	SLU (T2)	Combination		104.5	20.0	2092.0	-162.7	1351.4	-19.0
804	SLU (T3)	Combination		-22.5	-61.7	2227.6	315.5	602.1	17.2
804	SLU (T4)	Combination		-20.2	81.0	2225.5	-472.7	618.4	-35.6
804	SLU_URTO X	Combination		-3452.8	-12.3	1658.1	99.9	-10188.5	11.6
804	SLU_URTO Y	Combination		-37.7	-1307.0	1657.0	4127.1	243.1	-183.3
804	Comb. SLVx (q=1)	Combination	Max	215.6	233.8	1759.1	1669.1	2175.1	168.4
804	Comb. SLVx (q=1)	Combination	Min	-277.7	-214.9	1555.1	-1823.4	-1580.5	-186.4
804	Comb. SLVy (q=1)	Combination	Max	57.3	564.8	1749.6	4272.2	966.9	437.4
804	Comb. SLVy (q=1)	Combination	Min	-119.4	-545.9	1564.6	-4426.5	-372.3	-455.4

9.2 Verifiche Strutturali sui pali di fondazione

I pali avranno diametro pari a 600 mm ad interasse 1.8 m ed una lunghezza pari a 25 m.

Si riporta di seguito la disposizione dei pali e la numerazione adottata.

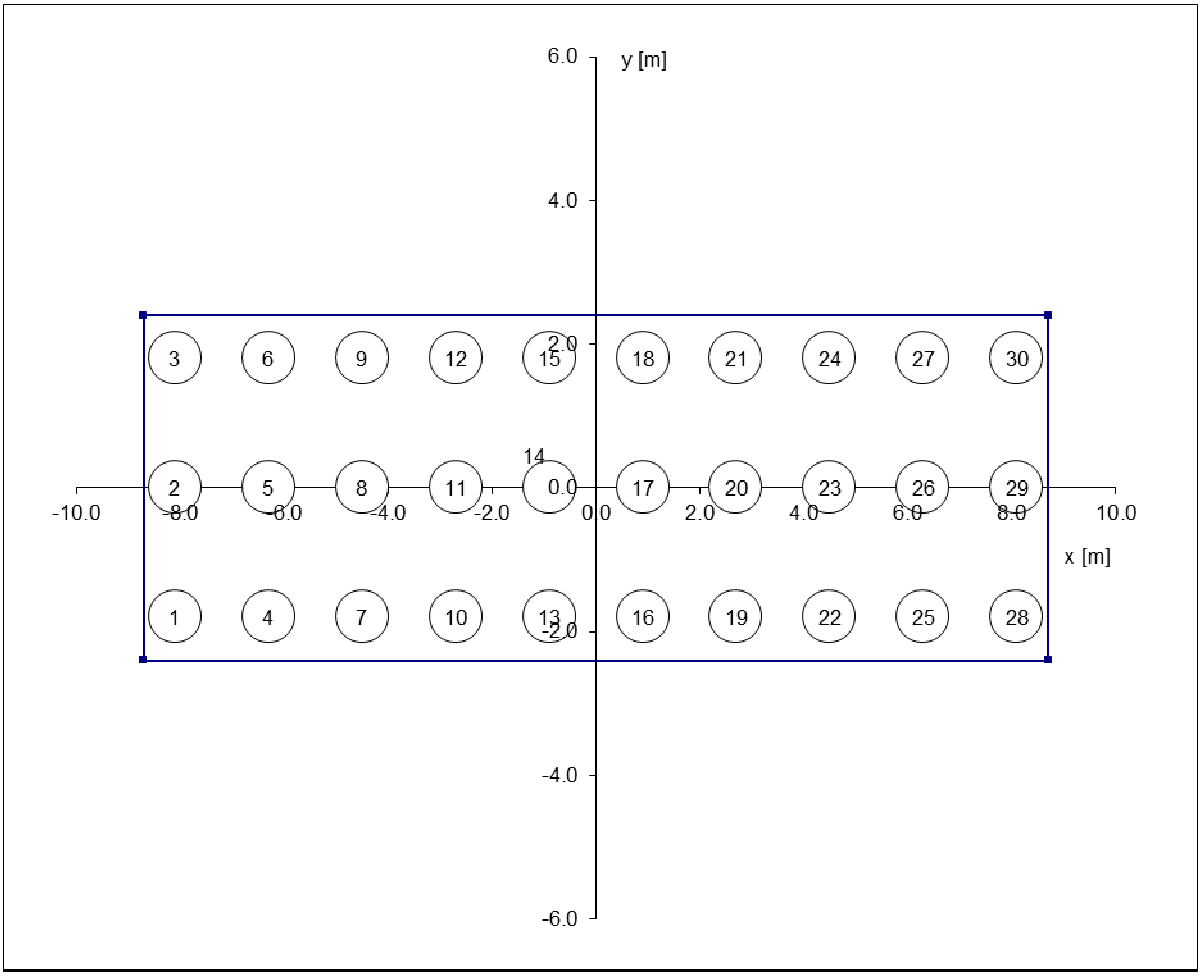


Figura 2: Schema pali

Il calcolo delle sollecitazioni agenti sul singolo palo è stato effettuato con il metodo del plinto rigido.

Il calcolo delle sollecitazioni sui singoli pali è stato effettuato assumendo le seguenti ipotesi:

- Plinto rigido;
- Vincolo di incastro tra pali e plinto;
- Pali costituenti la palificata verticali;
- Rotazione del plinto e della testa dei pali impedita.

Per un gruppo di n pali, sottoposto a forze verticali, orizzontali e di momento esterne (agenti alla quota testa pali ed in corrispondenza del baricentro della palificata) i carichi agenti alla testa di ciascun palo sono stimabili con le seguenti espressioni:

$$Q_{ti} = \frac{N}{n} \pm \frac{[M_x + M_{inc,x}] \cdot y_i}{\sum_1^n y_i^2} \pm \frac{[M_y + M_{inc,y}] \cdot x_i}{\sum_1^n x_i^2};$$

$$H_{tix} = \frac{H_x}{n};$$

$$H_{tiy} = \frac{H_y}{n};$$

essendo :

- N = forza verticale esterna;
- $M_x = M_{long}$ = momento esterno attorno all'asse x, accoppiato con H_y;
- $H_y = T_{long}$ = forza orizzontale esterna nella direzione y;
- $M_y = M_{trasv}$ = momento esterno attorno all'asse y, accoppiato con H_x;
- $H_x = T_{trasv}$ = forza orizzontale esterna nella direzione x;
- Q_{ti} = forza verticale agente alla testa del palo i-esimo;
- $H_{tix} = T_{trasv\_i}$ = forza orizzontale agente alla testa del palo i-esimo nella direzione x;
- $H_{tiy} = T_{long\_i}$ = forza orizzontale agente alla testa del palo i-esimo nella direzione y;
- $M_{inc,x} = M_{long\_inc} = \Sigma M_{tix}$ = momento di incastro risultante che i pali esercitano sul plinto per effetto del vincolo di rotazione impedita nella direzione x;
- $M_{tix} = M_{long\_inc\_i}$ = momento di incastro alla testa del palo i-esimo per effetto del vincolo di rotazione impedita nella direzione x;
- $M_{inc,y} = M_{trasv\_inc} = \Sigma M_{tiy}$ = momento di incastro risultante che i pali esercitano sul plinto per effetto del vincolo di rotazione impedita nella direzione y;

- M_{tiy} = $M_{trasv\_inc\_i}$ = momento di incastro alla testa del palo i-esimo per effetto del vincolo di rotazione impedita nella direzione y;

- y_i = distanza del palo i-esimo dall'asse baricentrico della palificata nella direzione y;

- x_i = distanza del palo i-esimo dall'asse baricentrico della palificata nella direzione x.

I valori di N, T ed M esterni considerati sono quelli ottenuti dal modello allo spiccato delle fondazioni.

In tutte le tabelle di seguito riportate le unità di misura sono i kN per sforzi normali e tagli e i kN×m per i momenti.

Gli sforzi normali positivi si intendono di compressione mentre i momenti positivi seguono la regola della mano destra.

Le tensioni positive sono di compressione e quelle negative di trazione.

In base alle convenzioni sui segni su indicate, per ogni palo sono riportati i massimi e i minimi sforzi assiali e la condizione di carico N–M più gravosa in termini di massima tensione nel calcestruzzo e di minima tensione nelle armature. Per le tensioni tangenziali è stato considerato il taglio massimo T agente in sommità del palo (anche non contemporaneo ad N-M).

Di seguito vengono riportate le sollecitazioni agenti sui pali, calcolate a partire dalle reazioni vincolari alla base delle pile sommando, ai momenti sollecitanti, i momenti calcolati in accordo alla teoria elastica di Matlock e Reese utilizzando la relazione:

$$M = C_M H \lambda,$$

in cui:
$H = T$ = taglio agente;
C_M = coefficiente funzione di L/λ;
$\lambda = (E_p J / n_h)^{1/5}$;
$n_h = E_{MR}/D$, ove:
per i **terreni coesivi**: $E_{MR} = \xi$ cu, con $\xi = 300 \div 450$ assunto, nel caso specifico, pari a 450

n_h	E_{MR}	E_{cls}	J_{palo}
(kN/m^3)	(kPa)	(kPa)	(m^4)
75000.00	45000.00	31447000.00	0.01

ID	Nodo	Combinazione	N	Mt	Ml	Tt	Tl	n
-	-	-	[kN]	[kNm]	[kNm]	[kN]	[kN]	[-]
1	796	SLU (q1)	2367.3	0.0	-1057.2	0.0	-36.5	30
2	796	SLU (q2)	2454.8	0.0	-861.9	0.0	36.5	30
3	796	SLU (q3)	2418.3	-165.9	-966.5	-43.5	0.0	30
4	796	SLU (q4)	2474.7	165.9	-1020.0	43.5	0.0	30
5	796	SLU (n1)	1973.6	0.0	-683.2	0.0	-36.5	30
6	796	SLU (n2)	2061.2	0.0	-487.9	0.0	36.5	30
7	796	SLU (n3)	2024.6	-165.9	-592.5	-43.5	0.0	30
8	796	SLU (n4)	2081.0	165.9	-646.0	43.5	0.0	30
9	796	SLU (v1)	1863.8	0.0	-671.7	0.0	-60.9	30
10	796	SLU (v2)	2009.7	0.0	-346.3	0.0	60.9	30
11	796	SLU (v3)	1948.8	-276.5	-520.5	-72.5	0.0	30
12	796	SLU (v4)	2042.9	276.5	-609.8	72.5	0.0	30
13	796	SLU (T1)	1935.2	0.0	-646.7	0.0	-36.5	30
14	796	SLU (T2)	2022.8	0.0	-451.5	0.0	36.5	30
15	796	SLU (T3)	1986.3	-165.9	-556.0	-43.5	0.0	30
16	796	SLU (T4)	2042.7	165.9	-609.6	43.5	0.0	30
17	796	SLU_URTO X	1501.5	0.0	-402.6	0.0	0.0	30
18	796	SLU_URTO Y	1501.0	0.0	-402.2	0.0	0.0	30
19	796	Comb. SLVx (q=1)	1608.9	-263.5	486.5	34.0	112.6	30
20	796	Comb. SLVx (q=1)	1393.4	263.5	-1291.1	-34.1	-112.6	30
21	796	Comb. SLVy (q=1)	1589.1	-878.2	-71.1	113.5	35.4	30
22	796	Comb. SLVy (q=1)	1413.2	878.2	-733.5	-113.5	-35.4	30
23	798	SLU (q1)	2453.6	0.0	207.5	0.0	-117.0	30
24	798	SLU (q2)	2366.2	0.0	2021.0	0.0	155.5	30
25	798	SLU (q3)	2417.3	-165.9	1144.3	-43.5	22.0	30
26	798	SLU (q4)	2473.8	165.9	1185.8	43.5	20.5	30
27	798	SLU (n1)	2060.3	0.0	-245.9	0.0	-126.9	30
28	798	SLU (n2)	1973.0	0.0	1567.6	0.0	145.6	30
29	798	SLU (n3)	2024.1	-165.9	690.9	-43.5	12.2	30
30	798	SLU (n4)	2080.6	165.9	732.4	43.5	10.7	30
31	798	SLU (v1)	2008.7	0.0	-943.9	0.0	-219.8	30
32	798	SLU (v2)	1863.1	0.0	2078.6	0.0	234.4	30
33	798	SLU (v3)	1948.3	-276.5	617.4	-72.5	12.0	30
34	798	SLU (v4)	2042.4	276.5	686.6	72.5	9.5	30
35	798	SLU (T1)	2021.8	0.0	-329.9	0.0	-132.7	30
36	798	SLU (T2)	1934.5	0.0	1483.6	0.0	139.8	30
37	798	SLU (T3)	1985.6	-165.9	606.8	-43.5	6.3	30
38	798	SLU (T4)	2042.1	165.9	648.3	43.5	4.8	30
39	798	SLU_URTO X	1500.4	0.0	-1714.0	0.0	-260.8	30
40	798	SLU_URTO Y	1501.0	0.0	172.4	0.0	-28.3	30

ID	Nodo	Combinazione	N	Mt	Ml	Tt	Tl	n
-	-	-	[kN]	[kNm]	[kNm]	[kN]	[kN]	[-]
41	798	Comb. SLVx (q=1)	1606.9	-263.5	3540.6	34.0	390.2	30
42	798	Comb. SLVx (q=1)	1394.9	263.5	-2558.7	-34.1	-368.2	30
43	798	Comb. SLVy (q=1)	1591.9	-878.2	1600.1	113.5	146.9	30
44	798	Comb. SLVy (q=1)	1409.9	878.2	-618.2	-113.5	-125.0	30
45	802	SLU (q1)	2690.8	-72.4	-1364.6	-8.9	-36.5	30
46	802	SLU (q2)	2794.4	-253.2	-1184.5	-31.2	36.5	30
47	802	SLU (q3)	2825.8	-553.3	-1353.6	-91.3	0.0	30
48	802	SLU (q4)	2823.9	214.3	-1351.8	49.5	0.0	30
49	802	SLU (n1)	2167.2	-1.5	-867.1	-0.2	-36.5	30
50	802	SLU (n2)	2270.7	-182.4	-687.0	-22.5	36.5	30
51	802	SLU (n3)	2302.1	-482.4	-856.1	-82.5	0.0	30
52	802	SLU (n4)	2300.2	285.2	-854.3	58.2	0.0	30
53	802	SLU (v1)	2020.1	73.2	-820.2	9.0	-60.9	30
54	802	SLU (v2)	2192.7	-228.3	-520.1	-28.1	60.9	30
55	802	SLU (v3)	2245.1	-728.4	-801.9	-128.2	0.0	30
56	802	SLU (v4)	2241.9	550.9	-798.9	106.4	0.0	30
57	802	SLU (T1)	2087.3	18.9	-791.2	2.3	-36.5	30
58	802	SLU (T2)	2190.8	-161.9	-611.1	-20.0	36.5	30
59	802	SLU (T3)	2222.3	-462.0	-780.2	-80.0	0.0	30
60	802	SLU (T4)	2220.4	305.6	-778.4	60.7	0.0	30
61	802	SLU_URTO X	1653.0	99.4	-546.5	12.3	0.0	30
62	802	SLU_URTO Y	1653.7	-1565.7	-547.2	-193.0	0.0	30
63	802	Comb. SLVx (q=1)	1755.9	-1746.4	337.7	197.0	112.1	30
64	802	Comb. SLVx (q=1)	1551.5	1592.8	-1432.1	-215.9	-112.1	30
65	802	Comb. SLVy (q=1)	1736.3	-4443.9	-223.9	530.1	34.8	30
66	802	Comb. SLVy (q=1)	1571.0	4290.3	-870.4	-549.1	-34.8	30
67	804	SLU (q1)	2803.4	72.4	40.7	8.9	-178.6	30
68	804	SLU (q2)	2699.1	253.3	1584.7	31.2	62.7	30
69	804	SLU (q3)	2834.7	-221.8	840.3	-50.4	-64.3	30
70	804	SLU (q4)	2832.6	560.9	856.5	92.2	-62.1	30
71	804	SLU (n1)	2276.0	1.5	-234.0	0.2	-150.7	30
72	804	SLU (n2)	2171.8	182.4	1310.0	22.5	90.6	30
73	804	SLU (n3)	2307.4	-292.7	565.5	-59.2	-36.4	30
74	804	SLU (n4)	2305.3	490.0	581.7	83.5	-34.2	30
75	804	SLU (v1)	2198.0	-73.2	-806.9	-9.0	-225.1	30
76	804	SLU (v2)	2024.2	228.3	1766.4	28.1	177.0	30
77	804	SLU (v3)	2250.3	-563.6	525.7	-107.9	-34.7	30
78	804	SLU (v4)	2246.7	741.1	552.7	129.8	-30.9	30
79	804	SLU (T1)	2196.3	-18.9	-196.5	-2.3	-136.7	30
80	804	SLU (T2)	2092.0	161.9	1347.4	20.0	104.5	30
81	804	SLU (T3)	2227.6	-313.2	603.0	-61.7	-22.5	30
82	804	SLU (T4)	2225.5	469.6	619.2	81.0	-20.2	30

ID	Nodo	Combinazione	N	Mt	Ml	Tt	Tl	n
-	-	-	[kN]	[kNm]	[kNm]	[kN]	[kN]	[-]
83	804	SLU_URTO X	1658.1	-99.4	-10058.3	-12.3	-3452.8	30
84	804	SLU_URTO Y	1657.0	-4077.8	244.5	-1307.0	-37.7	30
85	804	Comb. SLVx (q=1)	1759.1	-1677.9	2167.0	233.8	215.6	30
86	804	Comb. SLVx (q=1)	1555.1	1831.5	-1570.0	-214.9	-277.7	30
87	804	Comb. SLVy (q=1)	1749.6	-4293.5	964.7	564.8	57.3	30
88	804	Comb. SLVy (q=1)	1564.6	4447.1	-367.8	-545.9	-119.4	30

Palo1		Palo2		Palo3		Palo4		Palo5		Palo6		Palo7		Palo8		Palo9	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
89.6	1.2	89.6	1.2	89.6	1.2	87.2	1.2	87.2	1.2	87.2	1.2	84.8	1.2	84.8	1.2	84.8	1.2
90.5	1.2	90.5	1.2	90.5	1.2	88.6	1.2	88.6	1.2	88.6	1.2	86.7	1.2	86.7	1.2	86.7	1.2
95.0	1.5	90.4	1.5	85.8	1.5	92.8	1.5	88.2	1.5	83.6	1.5	90.6	1.5	86.0	1.5	81.4	1.5
88.2	1.5	92.8	1.5	97.4	1.5	85.9	1.5	90.5	1.5	95.1	1.5	83.6	1.5	88.2	1.5	92.8	1.5
72.7	1.2	72.7	1.2	72.7	1.2	71.2	1.2	71.2	1.2	71.2	1.2	69.6	1.2	69.6	1.2	69.6	1.2
73.6	1.2	73.6	1.2	73.6	1.2	72.5	1.2	72.5	1.2	72.5	1.2	71.4	1.2	71.4	1.2	71.4	1.2
78.1	1.5	73.5	1.5	68.9	1.5	76.8	1.5	72.1	1.5	67.5	1.5	75.4	1.5	70.8	1.5	66.2	1.5
71.3	1.5	75.9	1.5	80.5	1.5	69.8	1.5	74.4	1.5	79.1	1.5	68.4	1.5	73.0	1.5	77.6	1.5
68.9	2.0	68.9	2.0	68.9	2.0	67.4	2.0	67.4	2.0	67.4	2.0	65.9	2.0	65.9	2.0	65.9	2.0
70.5	2.0	70.5	2.0	70.5	2.0	69.7	2.0	69.7	2.0	69.7	2.0	68.9	2.0	68.9	2.0	68.9	2.0
77.9	2.4	70.2	2.4	62.5	2.4	76.7	2.4	69.1	2.4	61.4	2.4	75.6	2.4	67.9	2.4	60.2	2.4
66.6	2.4	74.3	2.4	81.9	2.4	65.2	2.4	72.9	2.4	80.6	2.4	63.8	2.4	71.5	2.4	79.2	2.4
71.0	1.2	71.0	1.2	71.0	1.2	69.6	1.2	69.6	1.2	69.6	1.2	68.1	1.2	68.1	1.2	68.1	1.2
72.0	1.2	72.0	1.2	72.0	1.2	71.0	1.2	71.0	1.2	71.0	1.2	70.0	1.2	70.0	1.2	70.0	1.2
76.4	1.5	71.8	1.5	67.2	1.5	75.2	1.5	70.6	1.5	66.0	1.5	73.9	1.5	69.3	1.5	64.7	1.5
69.6	1.5	74.2	1.5	78.9	1.5	68.3	1.5	72.9	1.5	77.5	1.5	66.9	1.5	71.5	1.5	76.1	1.5
54.1	0.0	54.1	0.0	54.1	0.0	53.2	0.0	53.2	0.0	53.2	0.0	52.3	0.0	52.3	0.0	52.3	0.0
54.1	0.0	54.1	0.0	54.1	0.0	53.2	0.0	53.2	0.0	53.2	0.0	52.3	0.0	52.3	0.0	52.3	0.0
56.0	3.9	48.7	3.9	41.4	3.9	57.1	3.9	49.8	3.9	42.5	3.9	58.2	3.9	50.9	3.9	43.6	3.9
52.2	3.9	59.5	3.9	66.8	3.9	49.3	3.9	56.6	3.9	63.9	3.9	46.4	3.9	53.7	3.9	61.0	3.9
78.1	4.0	53.7	4.0	29.3	4.0	77.9	4.0	53.5	4.0	29.1	4.0	77.8	4.0	53.4	4.0	29.0	4.0
30.1	4.0	54.5	4.0	78.9	4.0	28.5	4.0	52.9	4.0	77.3	4.0	26.8	4.0	51.2	4.0	75.6	4.0
79.7	3.9	79.7	3.9	79.7	3.9	80.2	3.9	80.2	3.9	80.2	3.9	80.6	3.9	80.6	3.9	80.6	3.9
58.5	5.2	58.5	5.2	58.5	5.2	63.0	5.2	63.0	5.2	63.0	5.2	67.5	5.2	67.5	5.2	67.5	5.2
73.6	1.6	69.0	1.6	64.4	1.6	76.2	1.6	71.6	1.6	67.0	1.6	78.8	1.6	74.2	1.6	69.5	1.6
65.9	1.6	70.5	1.6	75.1	1.6	68.5	1.6	73.1	1.6	77.8	1.6	71.2	1.6	75.8	1.6	80.4	1.6
71.2	4.2	71.2	4.2	71.2	4.2	70.6	4.2	70.6	4.2	70.6	4.2	70.1	4.2	70.1	4.2	70.1	4.2
49.9	4.9	49.9	4.9	49.9	4.9	53.5	4.9	53.4	4.9	53.4	4.9	57.0	4.9	57.0	4.9	57.0	4.9
65.1	1.5	60.5	1.5	55.9	1.5	66.7	1.5	62.0	1.5	57.4	1.5	68.2	1.5	63.6	1.5	59.0	1.5
57.3	1.5	62.0	1.5	66.6	1.5	59.0	1.5	63.6	1.5	68.2	1.5	60.6	1.5	65.2	1.5	69.9	1.5
76.5	7.3	76.5	7.3	76.5	7.3	74.4	7.3	74.4	7.3	74.4	7.3	72.3	7.3	72.3	7.3	72.3	7.3

Palo1		Palo2		Palo3		Palo4		Palo5		Palo6		Palo7		Palo8		Palo9	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
41.1	7.8	41.1	7.8	41.1	7.8	45.8	7.8	45.8	7.8	45.8	7.8	50.4	7.8	50.4	7.8	50.4	7.8
66.4	2.5	58.7	2.5	51.0	2.5	67.8	2.5	60.1	2.5	52.4	2.5	69.2	2.5	61.5	2.5	53.8	2.5
53.5	2.4	61.1	2.4	68.8	2.4	55.0	2.4	62.7	2.4	70.4	2.4	56.5	2.4	64.2	2.4	71.9	2.4
70.7	4.4	70.7	4.4	70.7	4.4	70.0	4.4	70.0	4.4	70.0	4.4	69.2	4.4	69.2	4.4	69.2	4.4
49.5	4.7	49.5	4.7	49.5	4.7	52.8	4.7	52.8	4.7	52.8	4.7	56.2	4.7	56.2	4.7	56.2	4.7
64.7	1.5	60.1	1.5	55.4	1.5	66.0	1.5	61.4	1.5	56.8	1.5	67.4	1.5	62.8	1.5	58.2	1.5
56.9	1.5	61.5	1.5	66.1	1.5	58.4	1.5	63.0	1.5	67.6	1.5	59.8	1.5	64.4	1.5	69.0	1.5
67.3	8.7	67.3	8.7	67.3	8.7	63.5	8.7	63.5	8.7	63.5	8.7	59.6	8.7	59.6	8.7	59.6	8.7
48.3	0.9	48.3	0.9	48.3	0.9	48.7	0.9	48.7	0.9	48.7	0.9	49.1	0.9	49.1	0.9	49.1	0.9
25.1	13.1	17.8	13.1	10.5	13.1	33.1	13.1	25.7	13.1	18.4	13.1	41.0	13.1	33.7	13.1	26.4	13.1
65.0	12.3	72.3	12.3	79.7	12.3	59.3	12.3	66.6	12.3	73.9	12.3	53.5	12.3	60.9	12.3	68.2	12.3
61.3	6.2	36.9	6.2	12.5	6.2	64.9	6.2	40.5	6.2	16.1	6.2	68.5	6.2	44.1	6.2	19.7	6.2
28.8	5.6	53.2	5.6	77.6	5.6	27.5	5.6	51.9	5.6	76.2	5.6	26.1	5.6	50.5	5.6	74.9	5.6
105.5	1.3	103.5	1.3	101.5	1.3	102.4	1.3	100.4	1.3	98.4	1.3	99.4	1.3	97.4	1.3	95.3	1.3
112.1	1.6	105.1	1.6	98.1	1.6	109.5	1.6	102.5	1.6	95.4	1.6	106.8	1.6	99.8	1.6	92.8	1.6
123.2	3.0	107.9	3.0	92.5	3.0	120.2	3.0	104.8	3.0	89.5	3.0	117.2	3.0	101.8	3.0	86.4	3.0
101.8	1.6	107.8	1.6	113.7	1.6	98.8	1.6	104.7	1.6	110.7	1.6	95.8	1.6	101.7	1.6	107.7	1.6
81.0	1.2	81.0	1.2	81.0	1.2	79.1	1.2	79.1	1.2	79.0	1.2	77.1	1.2	77.1	1.2	77.1	1.2
87.7	1.4	82.6	1.4	77.6	1.4	86.2	1.4	81.1	1.4	76.0	1.4	84.6	1.4	79.5	1.4	74.5	1.4
98.8	2.8	85.4	2.8	72.0	2.8	96.9	2.8	83.5	2.8	70.1	2.8	94.9	2.8	81.5	2.8	68.1	2.8
77.4	1.9	85.3	1.9	93.2	1.9	75.5	1.9	83.4	1.9	91.3	1.9	73.5	1.9	81.5	1.9	89.4	1.9
73.6	2.1	75.6	2.1	77.7	2.1	71.7	2.1	73.8	2.1	75.8	2.1	69.9	2.1	71.9	2.1	74.0	2.1
84.7	2.2	78.3	2.2	72.0	2.2	83.5	2.2	77.2	2.2	70.8	2.2	82.3	2.2	76.0	2.2	69.7	2.2
103.2	4.3	82.9	4.3	62.7	4.3	101.4	4.3	81.1	4.3	60.9	4.3	99.6	4.3	79.3	4.3	59.1	4.3
67.5	3.5	82.8	3.5	98.1	3.5	65.7	3.5	81.0	3.5	96.3	3.5	63.9	3.5	79.2	3.5	94.5	3.5
77.0	1.2	77.6	1.2	78.1	1.2	75.3	1.2	75.8	1.2	76.3	1.2	73.5	1.2	74.0	1.2	74.5	1.2
83.7	1.4	79.2	1.4	74.7	1.4	82.3	1.4	77.8	1.4	73.3	1.4	81.0	1.4	76.5	1.4	72.0	1.4
94.8	2.7	82.0	2.7	69.1	2.7	93.0	2.7	80.2	2.7	67.4	2.7	91.3	2.7	78.5	2.7	65.6	2.7
73.4	2.0	81.9	2.0	90.4	2.0	71.6	2.0	80.1	2.0	88.6	2.0	69.9	2.0	78.4	2.0	86.9	2.0
57.9	0.4	60.6	0.4	63.4	0.4	56.6	0.4	59.4	0.4	62.2	0.4	55.4	0.4	58.2	0.4	60.9	0.4
104.1	6.4	60.7	6.4	17.2	6.4	102.9	6.4	59.4	6.4	15.9	6.4	101.7	6.4	58.2	6.4	14.7	6.4
103.6	7.6	55.1	7.6	6.6	7.6	104.4	7.6	55.9	7.6	7.4	7.6	105.1	7.6	56.6	7.6	8.1	7.6
21.9	8.1	66.2	8.1	110.4	8.1	18.7	8.1	63.0	8.1	107.2	8.1	15.5	8.1	59.8	8.1	104.0	8.1
183.6	17.7	60.1	17.7	-63.3	17.7	183.1	17.7	59.6	17.7	-63.8	17.7	182.6	17.7	59.1	17.7	-64.3	17.7
-58.0	18.3	61.2	18.3	180.3	18.3	-60.0	18.3	59.2	18.3	178.4	18.3	-61.9	18.3	57.3	18.3	176.4	18.3
91.0	6.0	93.0	6.0	95.0	6.0	91.1	6.0	93.1	6.0	95.1	6.0	91.2	6.0	93.2	6.0	95.2	6.0
66.9	2.3	74.0	2.3	81.0	2.3	70.5	2.3	77.5	2.3	84.6	2.3	74.0	2.3	81.1	2.3	88.1	2.3
92.2	2.7	86.0	2.7	79.8	2.7	94.1	2.7	87.9	2.7	81.7	2.7	95.9	2.7	89.8	2.7	83.6	2.7
70.2	3.7	85.8	3.7	101.3	3.7	72.1	3.7	87.7	3.7	103.3	3.7	74.0	3.7	89.6	3.7	105.2	3.7
78.2	5.0	78.2	5.0	78.3	5.0	77.7	5.0	77.7	5.0	77.7	5.0	77.1	5.0	77.2	5.0	77.2	5.0
54.1	3.1	59.2	3.1	64.2	3.1	57.0	3.1	62.1	3.1	67.2	3.1	60.0	3.1	65.0	3.1	70.1	3.1

Palo1		Palo2		Palo3		Palo4		Palo5		Palo6		Palo7		Palo8		Palo9	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
79.3	2.3	71.2	2.3	63.1	2.3	80.6	2.3	72.5	2.3	64.3	2.3	81.9	2.3	73.7	2.3	65.6	2.3
57.4	3.0	71.0	3.0	84.6	3.0	58.7	3.0	72.3	3.0	85.9	3.0	60.0	3.0	73.6	3.0	87.2	3.0
83.4	7.5	81.4	7.5	79.4	7.5	81.6	7.5	79.6	7.5	77.6	7.5	79.8	7.5	77.8	7.5	75.8	7.5
43.3	6.0	49.6	6.0	56.0	6.0	47.3	6.0	53.6	6.0	59.9	6.0	51.2	6.0	57.6	6.0	63.9	6.0
85.4	3.8	69.7	3.8	54.0	3.8	86.5	3.8	70.9	3.8	55.2	3.8	87.7	3.8	72.1	3.8	56.4	3.8
48.7	4.4	69.3	4.4	89.9	4.4	50.0	4.4	70.5	4.4	91.1	4.4	51.2	4.4	71.8	4.4	92.4	4.4
75.7	4.6	75.2	4.6	74.7	4.6	75.3	4.6	74.8	4.6	74.2	4.6	74.8	4.6	74.3	4.6	73.8	4.6
51.6	3.5	56.1	3.5	60.6	3.5	54.6	3.5	59.1	3.5	63.6	3.5	57.7	3.5	62.2	3.5	66.7	3.5
76.9	2.2	68.2	2.2	59.5	2.2	78.2	2.2	69.5	2.2	60.8	2.2	79.6	2.2	70.9	2.2	62.2	2.2
54.9	2.8	67.9	2.8	81.0	2.8	56.3	2.8	69.3	2.8	82.4	2.8	57.7	2.8	70.7	2.8	83.8	2.8
159.6	115.1	156.9	115.1	154.1	115.1	137.1	115.1	134.3	115.1	131.5	115.1	114.5	115.1	111.7	115.1	109.0	115.1
166.0	43.6	52.8	43.6	-60.5	43.6	166.6	43.6	53.3	43.6	-60.0	43.6	167.1	43.6	53.9	43.6	-59.4	43.6
83.4	10.6	36.7	10.6	-9.9	10.6	88.2	10.6	41.6	10.6	-5.0	10.6	93.1	10.6	46.5	10.6	-0.1	10.6
16.8	11.7	67.7	11.7	118.6	11.7	13.3	11.7	64.2	11.7	115.0	11.7	9.8	11.7	60.6	11.7	111.5	11.7
167.8	18.9	48.6	18.9	-70.7	18.9	170.0	18.9	50.7	18.9	-68.5	18.9	172.2	18.9	52.9	18.9	-66.4	18.9
-67.7	18.6	55.9	18.6	179.4	18.6	-68.5	18.6	55.0	18.6	178.6	18.6	-69.3	18.6	54.2	18.6	177.7	18.6

Palo10		Palo11		Palo12		Palo13		Palo14		Palo15		Palo16		Palo17		Palo18	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
82.5	1.2	82.5	1.2	82.5	1.2	80.1	1.2	80.1	1.2	80.1	1.2	77.7	1.2	77.7	1.2	77.7	1.2
84.7	1.2	84.7	1.2	84.7	1.2	82.8	1.2	82.8	1.2	82.8	1.2	80.9	1.2	80.9	1.2	80.9	1.2
88.5	1.5	83.9	1.5	79.3	1.5	86.3	1.5	81.7	1.5	77.1	1.5	84.1	1.5	79.5	1.5	74.9	1.5
81.3	1.5	85.9	1.5	90.5	1.5	79.0	1.5	83.6	1.5	88.2	1.5	76.7	1.5	81.3	1.5	86.0	1.5
68.1	1.2	68.1	1.2	68.1	1.2	66.6	1.2	66.6	1.2	66.6	1.2	65.0	1.2	65.0	1.2	65.0	1.2
70.3	1.2	70.3	1.2	70.3	1.2	69.3	1.2	69.3	1.2	69.3	1.2	68.2	1.2	68.2	1.2	68.2	1.2
74.1	1.5	69.5	1.5	64.9	1.5	72.8	1.5	68.2	1.5	63.5	1.5	71.4	1.5	66.8	1.5	62.2	1.5
66.9	1.5	71.5	1.5	76.2	1.5	65.5	1.5	70.1	1.5	74.7	1.5	64.0	1.5	68.6	1.5	73.3	1.5
64.4	2.0	64.4	2.0	64.4	2.0	62.9	2.0	62.9	2.0	62.9	2.0	61.4	2.0	61.4	2.0	61.4	2.0
68.2	2.0	68.2	2.0	68.2	2.0	67.4	2.0	67.4	2.0	67.4	2.0	66.6	2.0	66.6	2.0	66.6	2.0
74.4	2.4	66.7	2.4	59.0	2.4	73.2	2.4	65.5	2.4	57.9	2.4	72.1	2.4	64.4	2.4	56.7	2.4
62.5	2.4	70.1	2.4	77.8	2.4	61.1	2.4	68.8	2.4	76.5	2.4	59.7	2.4	67.4	2.4	75.1	2.4
66.7	1.2	66.7	1.2	66.7	1.2	65.2	1.2	65.2	1.2	65.2	1.2	63.8	1.2	63.8	1.2	63.8	1.2
68.9	1.2	68.9	1.2	68.9	1.2	67.9	1.2	67.9	1.2	67.9	1.2	66.9	1.2	66.9	1.2	66.9	1.2
72.7	1.5	68.1	1.5	63.5	1.5	71.4	1.5	66.8	1.5	62.2	1.5	70.2	1.5	65.6	1.5	61.0	1.5
65.5	1.5	70.1	1.5	74.7	1.5	64.2	1.5	68.8	1.5	73.4	1.5	62.8	1.5	67.4	1.5	72.0	1.5
51.4	0.0	51.4	0.0	51.4	0.0	50.5	0.0	50.5	0.0	50.5	0.0	49.6	0.0	49.6	0.0	49.6	0.0
51.4	0.0	51.4	0.0	51.4	0.0	50.5	0.0	50.5	0.0	50.5	0.0	49.6	0.0	49.6	0.0	49.6	0.0
59.3	3.9	52.0	3.9	44.7	3.9	60.4	3.9	53.1	3.9	45.8	3.9	61.5	3.9	54.2	3.9	46.9	3.9
43.5	3.9	50.8	3.9	58.1	3.9	40.6	3.9	47.9	3.9	55.2	3.9	37.7	3.9	45.0	3.9	52.3	3.9

Palo10		Palo11		Palo12		Palo13		Palo14		Palo15		Palo16		Palo17		Palo18	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
77.6	4.0	53.2	4.0	28.8	4.0	77.4	4.0	53.0	4.0	28.7	4.0	77.3	4.0	52.9	4.0	28.5	4.0
25.2	4.0	49.6	4.0	74.0	4.0	23.5	4.0	47.9	4.0	72.3	4.0	21.9	4.0	46.3	4.0	70.7	4.0
81.1	3.9	81.1	3.9	81.1	3.9	81.6	3.9	81.6	3.9	81.6	3.9	82.0	3.9	82.0	3.9	82.0	3.9
72.1	5.2	72.1	5.2	72.1	5.2	76.6	5.2	76.6	5.2	76.6	5.2	81.1	5.2	81.1	5.2	81.1	5.2
81.3	1.6	76.7	1.6	72.1	1.6	83.9	1.6	79.3	1.6	74.7	1.6	86.5	1.6	81.9	1.6	77.3	1.6
73.9	1.6	78.5	1.6	83.1	1.6	76.5	1.6	81.1	1.6	85.7	1.6	79.2	1.6	83.8	1.6	88.4	1.6
69.5	4.2	69.5	4.2	69.5	4.2	69.0	4.2	69.0	4.2	69.0	4.2	68.4	4.2	68.4	4.2	68.4	4.2
60.5	4.9	60.5	4.9	60.5	4.9	64.0	4.9	64.0	4.9	64.0	4.9	67.5	4.9	67.5	4.9	67.5	4.9
69.8	1.5	65.1	1.5	60.5	1.5	71.3	1.5	66.7	1.5	62.1	1.5	72.9	1.5	68.2	1.5	63.6	1.5
62.3	1.5	66.9	1.5	71.5	1.5	63.9	1.5	68.5	1.5	73.1	1.5	65.6	1.5	70.2	1.5	74.8	1.5
70.1	7.3	70.1	7.3	70.1	7.3	68.0	7.3	68.0	7.3	68.0	7.3	65.9	7.3	65.9	7.3	65.9	7.3
55.1	7.8	55.1	7.8	55.1	7.8	59.8	7.8	59.8	7.8	59.8	7.8	64.4	7.8	64.4	7.8	64.4	7.8
70.5	2.5	62.9	2.5	55.2	2.5	71.9	2.5	64.2	2.5	56.6	2.5	73.3	2.5	65.6	2.5	58.0	2.5
58.1	2.4	65.8	2.4	73.4	2.4	59.6	2.4	67.3	2.4	75.0	2.4	61.2	2.4	68.9	2.4	76.5	2.4
68.5	4.4	68.5	4.4	68.5	4.4	67.8	4.4	67.8	4.4	67.8	4.4	67.0	4.4	67.0	4.4	67.0	4.4
59.5	4.7	59.5	4.7	59.5	4.7	62.8	4.7	62.8	4.7	62.8	4.7	66.1	4.7	66.1	4.7	66.1	4.7
68.8	1.5	64.1	1.5	59.5	1.5	70.1	1.5	65.5	1.5	60.9	1.5	71.5	1.5	66.9	1.5	62.3	1.5
61.3	1.5	65.9	1.5	70.5	1.5	62.7	1.5	67.3	1.5	71.9	1.5	64.2	1.5	68.8	1.5	73.4	1.5
55.8	8.7	55.8	8.7	55.8	8.7	51.9	8.7	51.9	8.7	51.9	8.7	48.1	8.7	48.1	8.7	48.1	8.7
49.5	0.9	49.5	0.9	49.5	0.9	49.8	0.9	49.8	0.9	49.8	0.9	50.2	0.9	50.2	0.9	50.2	0.9
49.0	13.1	41.6	13.1	34.3	13.1	56.9	13.1	49.6	13.1	42.3	13.1	64.9	13.1	57.5	13.1	50.2	13.1
47.8	12.3	55.1	12.3	62.4	12.3	42.0	12.3	49.4	12.3	56.7	12.3	36.3	12.3	43.6	12.3	50.9	12.3
72.1	6.2	47.7	6.2	23.3	6.2	75.7	6.2	51.3	6.2	26.9	6.2	79.3	6.2	54.9	6.2	30.5	6.2
24.7	5.6	49.1	5.6	73.5	5.6	23.3	5.6	47.7	5.6	72.1	5.6	21.9	5.6	46.3	5.6	70.7	5.6
96.3	1.3	94.3	1.3	92.3	1.3	93.2	1.3	91.2	1.3	89.2	1.3	90.2	1.3	88.2	1.3	86.2	1.3
104.2	1.6	97.1	1.6	90.1	1.6	101.5	1.6	94.5	1.6	87.4	1.6	98.9	1.6	91.8	1.6	84.8	1.6
114.1	3.0	98.8	3.0	83.4	3.0	111.1	3.0	95.7	3.0	80.3	3.0	108.0	3.0	92.7	3.0	77.3	3.0
92.7	1.6	98.7	1.6	104.6	1.6	89.7	1.6	95.6	1.6	101.6	1.6	86.7	1.6	92.6	1.6	98.6	1.6
75.2	1.2	75.2	1.2	75.1	1.2	73.3	1.2	73.2	1.2	73.2	1.2	71.3	1.2	71.3	1.2	71.2	1.2
83.1	1.4	78.0	1.4	72.9	1.4	81.5	1.4	76.5	1.4	71.4	1.4	80.0	1.4	74.9	1.4	69.9	1.4
93.0	2.8	79.6	2.8	66.2	2.8	91.1	2.8	77.7	2.8	64.3	2.8	89.2	2.8	75.8	2.8	62.4	2.8
71.6	1.9	79.6	1.9	87.5	1.9	69.7	1.9	77.6	1.9	85.6	1.9	67.8	1.9	75.7	1.9	83.6	1.9
68.1	2.1	70.1	2.1	72.1	2.1	66.2	2.1	68.3	2.1	70.3	2.1	64.4	2.1	66.4	2.1	68.4	2.1
81.2	2.2	74.8	2.2	68.5	2.2	80.0	2.2	73.7	2.2	67.3	2.2	78.8	2.2	72.5	2.2	66.2	2.2
97.8	4.3	77.5	4.3	57.3	4.3	96.0	4.3	75.7	4.3	55.5	4.3	94.2	4.3	73.9	4.3	53.7	4.3
62.1	3.5	77.4	3.5	92.7	3.5	60.3	3.5	75.6	3.5	90.9	3.5	58.5	3.5	73.8	3.5	89.1	3.5
71.7	1.2	72.2	1.2	72.8	1.2	69.9	1.2	70.5	1.2	71.0	1.2	68.2	1.2	68.7	1.2	69.2	1.2
79.6	1.4	75.1	1.4	70.6	1.4	78.2	1.4	73.7	1.4	69.2	1.4	76.8	1.4	72.3	1.4	67.8	1.4
89.5	2.7	76.7	2.7	63.9	2.7	87.8	2.7	75.0	2.7	62.1	2.7	86.0	2.7	73.2	2.7	60.4	2.7
68.1	2.0	76.6	2.0	85.1	2.0	66.4	2.0	74.9	2.0	83.4	2.0	64.6	2.0	73.1	2.0	81.6	2.0
54.2	0.4	56.9	0.4	59.7	0.4	53.0	0.4	55.7	0.4	58.5	0.4	51.7	0.4	54.5	0.4	57.2	0.4

Palo10		Palo11		Palo12		Palo13		Palo14		Palo15		Palo16		Palo17		Palo18	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
100.5	6.4	57.0	6.4	13.5	6.4	99.2	6.4	55.7	6.4	12.2	6.4	98.0	6.4	54.5	6.4	11.0	6.4
105.9	7.6	57.4	7.6	8.9	7.6	106.7	7.6	58.1	7.6	9.6	7.6	107.4	7.6	58.9	7.6	10.4	7.6
12.3	8.1	56.5	8.1	100.8	8.1	9.1	8.1	53.3	8.1	97.6	8.1	5.9	8.1	50.1	8.1	94.4	8.1
182.1	17.7	58.6	17.7	-64.8	17.7	181.6	17.7	58.1	17.7	-65.3	17.7	181.1	17.7	57.6	17.7	-65.8	17.7
-63.9	18.3	55.3	18.3	174.5	18.3	-65.8	18.3	53.3	18.3	172.5	18.3	-67.8	18.3	51.4	18.3	170.6	18.3
91.3	6.0	93.3	6.0	95.3	6.0	91.4	6.0	93.4	6.0	95.4	6.0	91.5	6.0	93.5	6.0	95.5	6.0
77.6	2.3	84.6	2.3	91.7	2.3	81.2	2.3	88.2	2.3	95.2	2.3	84.7	2.3	91.7	2.3	98.8	2.3
97.8	2.7	91.7	2.7	85.5	2.7	99.7	2.7	93.5	2.7	87.4	2.7	101.6	2.7	95.4	2.7	89.3	2.7
76.0	3.7	91.5	3.7	107.1	3.7	77.9	3.7	93.5	3.7	109.0	3.7	79.8	3.7	95.4	3.7	111.0	3.7
76.6	5.0	76.7	5.0	76.7	5.0	76.1	5.0	76.1	5.0	76.2	5.0	75.6	5.0	75.6	5.0	75.6	5.0
62.9	3.1	68.0	3.1	73.0	3.1	65.9	3.1	70.9	3.1	76.0	3.1	68.8	3.1	73.9	3.1	78.9	3.1
83.1	2.3	75.0	2.3	66.9	2.3	84.4	2.3	76.3	2.3	68.1	2.3	85.7	2.3	77.5	2.3	69.4	2.3
61.3	3.0	74.9	3.0	88.5	3.0	62.6	3.0	76.2	3.0	89.8	3.0	63.9	3.0	77.5	3.0	91.1	3.0
78.0	7.5	76.0	7.5	74.0	7.5	76.2	7.5	74.2	7.5	72.1	7.5	74.4	7.5	72.4	7.5	70.3	7.5
55.2	6.0	61.5	6.0	67.9	6.0	59.1	6.0	65.5	6.0	71.8	6.0	63.1	6.0	69.5	6.0	75.8	6.0
88.9	3.8	73.2	3.8	57.6	3.8	90.1	3.8	74.4	3.8	58.8	3.8	91.3	3.8	75.6	3.8	59.9	3.8
52.4	4.4	73.0	4.4	93.6	4.4	53.7	4.4	74.3	4.4	94.9	4.4	54.9	4.4	75.5	4.4	96.1	4.4
74.4	4.6	73.9	4.6	73.3	4.6	74.0	4.6	73.4	4.6	72.9	4.6	73.5	4.6	73.0	4.6	72.5	4.6
60.7	3.5	65.2	3.5	69.7	3.5	63.7	3.5	68.2	3.5	72.7	3.5	66.7	3.5	71.2	3.5	75.7	3.5
80.9	2.2	72.2	2.2	63.5	2.2	82.3	2.2	73.6	2.2	64.9	2.2	83.6	2.2	74.9	2.2	66.2	2.2
59.1	2.8	72.1	2.8	85.1	2.8	60.4	2.8	73.5	2.8	86.5	2.8	61.8	2.8	74.9	2.8	87.9	2.8
91.9	115.1	89.1	115.1	86.4	115.1	69.3	115.1	66.6	115.1	63.8	115.1	46.7	115.1	44.0	115.1	41.2	115.1
167.7	43.6	54.4	43.6	-58.9	43.6	168.2	43.6	55.0	43.6	-58.3	43.6	168.8	43.6	55.5	43.6	-57.8	43.6
97.9	10.6	51.3	10.6	4.7	10.6	102.8	10.6	56.2	10.6	9.6	10.6	107.7	10.6	61.1	10.6	14.5	10.6
6.2	11.7	57.1	11.7	108.0	11.7	2.7	11.7	53.6	11.7	104.5	11.7	-0.8	11.7	50.1	11.7	100.9	11.7
174.3	18.9	55.1	18.9	-64.2	18.9	176.5	18.9	57.2	18.9	-62.0	18.9	178.7	18.9	59.4	18.9	-59.9	18.9
-70.1	18.6	53.4	18.6	176.9	18.6	-71.0	18.6	52.6	18.6	176.1	18.6	-71.8	18.6	51.7	18.6	175.3	18.6

Palo19		Palo20		Palo21		Palo22		Palo23		Palo24		Palo25		Palo26		Palo27	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
75.3	1.2	75.3	1.2	75.3	1.2	73.0	1.2	73.0	1.2	73.0	1.2	70.6	1.2	70.6	1.2	70.6	1.2
78.9	1.2	78.9	1.2	78.9	1.2	77.0	1.2	77.0	1.2	77.0	1.2	75.1	1.2	75.1	1.2	75.1	1.2
82.0	1.5	77.4	1.5	72.7	1.5	79.8	1.5	75.2	1.5	70.6	1.5	77.6	1.5	73.0	1.5	68.4	1.5
74.4	1.5	79.1	1.5	83.7	1.5	72.2	1.5	76.8	1.5	81.4	1.5	69.9	1.5	74.5	1.5	79.1	1.5
63.5	1.2	63.5	1.2	63.5	1.2	62.0	1.2	62.0	1.2	62.0	1.2	60.4	1.2	60.4	1.2	60.4	1.2
67.1	1.2	67.1	1.2	67.1	1.2	66.0	1.2	66.0	1.2	66.0	1.2	64.9	1.2	64.9	1.2	64.9	1.2
70.1	1.5	65.5	1.5	60.9	1.5	68.8	1.5	64.2	1.5	59.6	1.5	67.4	1.5	62.8	1.5	58.2	1.5

Palo19		Palo20		Palo21		Palo22		Palo23		Palo24		Palo25		Palo26		Palo27	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
62.6	1.5	67.2	1.5	71.8	1.5	61.1	1.5	65.7	1.5	70.4	1.5	59.7	1.5	64.3	1.5	68.9	1.5
59.9	2.0	59.9	2.0	59.9	2.0	58.4	2.0	58.4	2.0	58.4	2.0	56.8	2.0	56.8	2.0	56.8	2.0
65.8	2.0	65.8	2.0	65.8	2.0	65.0	2.0	65.0	2.0	65.0	2.0	64.3	2.0	64.3	2.0	64.3	2.0
70.9	2.4	63.2	2.4	55.5	2.4	69.7	2.4	62.0	2.4	54.4	2.4	68.6	2.4	60.9	2.4	53.2	2.4
58.4	2.4	66.0	2.4	73.7	2.4	57.0	2.4	64.7	2.4	72.4	2.4	55.6	2.4	63.3	2.4	71.0	2.4
62.3	1.2	62.3	1.2	62.3	1.2	60.9	1.2	60.9	1.2	60.9	1.2	59.4	1.2	59.4	1.2	59.4	1.2
65.9	1.2	65.9	1.2	65.9	1.2	64.9	1.2	64.9	1.2	64.9	1.2	63.9	1.2	63.9	1.2	63.9	1.2
68.9	1.5	64.3	1.5	59.7	1.5	67.7	1.5	63.1	1.5	58.5	1.5	66.4	1.5	61.8	1.5	57.2	1.5
61.4	1.5	66.0	1.5	70.6	1.5	60.1	1.5	64.7	1.5	69.3	1.5	58.7	1.5	63.3	1.5	67.9	1.5
48.7	0.0	48.7	0.0	48.7	0.0	47.8	0.0	47.8	0.0	47.8	0.0	46.9	0.0	46.9	0.0	46.9	0.0
48.7	0.0	48.7	0.0	48.7	0.0	47.8	0.0	47.8	0.0	47.8	0.0	46.9	0.0	46.9	0.0	46.9	0.0
62.6	3.9	55.3	3.9	47.9	3.9	63.7	3.9	56.4	3.9	49.0	3.9	64.8	3.9	57.5	3.9	50.1	3.9
34.8	3.9	42.1	3.9	49.4	3.9	31.9	3.9	39.2	3.9	46.5	3.9	29.0	3.9	36.3	3.9	43.6	3.9
77.1	4.0	52.7	4.0	28.3	4.0	77.0	4.0	52.6	4.0	28.2	4.0	76.8	4.0	52.4	4.0	28.0	4.0
20.2	4.0	44.6	4.0	69.0	4.0	18.6	4.0	43.0	4.0	67.4	4.0	16.9	4.0	41.3	4.0	65.7	4.0
82.5	3.9	82.5	3.9	82.5	3.9	83.0	3.9	83.0	3.9	83.0	3.9	83.4	3.9	83.4	3.9	83.4	3.9
85.7	5.2	85.7	5.2	85.7	5.2	90.2	5.2	90.2	5.2	90.2	5.2	94.8	5.2	94.8	5.2	94.8	5.2
89.0	1.6	84.4	1.6	79.8	1.6	91.6	1.6	87.0	1.6	82.4	1.6	94.2	1.6	89.6	1.6	85.0	1.6
81.8	1.6	86.5	1.6	91.1	1.6	84.5	1.6	89.1	1.6	93.7	1.6	87.2	1.6	91.8	1.6	96.4	1.6
67.9	4.2	67.8	4.2	67.8	4.2	67.3	4.2	67.3	4.2	67.3	4.2	66.7	4.2	66.7	4.2	66.7	4.2
71.0	4.9	71.0	4.9	71.0	4.9	74.6	4.9	74.6	4.9	74.6	4.9	78.1	4.9	78.1	4.9	78.1	4.9
74.4	1.5	69.8	1.5	65.2	1.5	76.0	1.5	71.3	1.5	66.7	1.5	77.5	1.5	72.9	1.5	68.3	1.5
67.2	1.5	71.8	1.5	76.4	1.5	68.9	1.5	73.5	1.5	78.1	1.5	70.5	1.5	75.1	1.5	79.7	1.5
63.8	7.3	63.8	7.3	63.8	7.3	61.7	7.3	61.7	7.3	61.7	7.3	59.5	7.3	59.5	7.3	59.5	7.3
69.1	7.8	69.1	7.8	69.1	7.8	73.8	7.8	73.8	7.8	73.8	7.8	78.4	7.8	78.4	7.8	78.4	7.8
74.7	2.5	67.0	2.5	59.3	2.5	76.1	2.5	68.4	2.5	60.7	2.5	77.5	2.5	69.8	2.5	62.1	2.5
62.7	2.4	70.4	2.4	78.1	2.4	64.3	2.4	71.9	2.4	79.6	2.4	65.8	2.4	73.5	2.4	81.2	2.4
66.3	4.4	66.3	4.4	66.3	4.4	65.5	4.4	65.5	4.4	65.5	4.4	64.8	4.4	64.8	4.4	64.8	4.4
69.5	4.7	69.5	4.7	69.5	4.7	72.8	4.7	72.8	4.7	72.8	4.7	76.1	4.7	76.1	4.7	76.1	4.7
72.8	1.5	68.2	1.5	63.6	1.5	74.2	1.5	69.6	1.5	65.0	1.5	75.6	1.5	71.0	1.5	66.3	1.5
65.6	1.5	70.3	1.5	74.9	1.5	67.1	1.5	71.7	1.5	76.3	1.5	68.6	1.5	73.2	1.5	77.8	1.5
44.2	8.7	44.2	8.7	44.2	8.7	40.4	8.7	40.4	8.7	40.4	8.7	36.5	8.7	36.5	8.7	36.5	8.7
50.6	0.9	50.6	0.9	50.6	0.9	51.0	0.9	51.0	0.9	51.0	0.9	51.4	0.9	51.4	0.9	51.4	0.9
72.8	13.1	65.5	13.1	58.2	13.1	80.7	13.1	73.4	13.1	66.1	13.1	88.7	13.1	81.4	13.1	74.1	13.1
30.6	12.3	37.9	12.3	45.2	12.3	24.8	12.3	32.1	12.3	39.5	12.3	19.1	12.3	26.4	12.3	33.7	12.3
82.8	6.2	58.4	6.2	34.1	6.2	86.4	6.2	62.0	6.2	37.6	6.2	90.0	6.2	65.6	6.2	41.2	6.2
20.5	5.6	44.9	5.6	69.3	5.6	19.1	5.6	43.5	5.6	67.9	5.6	17.7	5.6	42.1	5.6	66.5	5.6
87.1	1.3	85.1	1.3	83.1	1.3	84.0	1.3	82.0	1.3	80.0	1.3	81.0	1.3	79.0	1.3	77.0	1.3
96.2	1.6	89.2	1.6	82.1	1.6	93.5	1.6	86.5	1.6	79.5	1.6	90.9	1.6	83.8	1.6	76.8	1.6
105.0	3.0	89.6	3.0	74.3	3.0	102.0	3.0	86.6	3.0	71.2	3.0	98.9	3.0	83.6	3.0	68.2	3.0
83.6	1.6	89.6	1.6	95.5	1.6	80.6	1.6	86.5	1.6	92.5	1.6	77.6	1.6	83.5	1.6	89.5	1.6

Palo19		Palo20		Palo21		Palo22		Palo23		Palo24		Palo25		Palo26		Palo27	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
69.4	1.2	69.3	1.2	69.3	1.2	67.4	1.2	67.4	1.2	67.3	1.2	65.5	1.2	65.4	1.2	65.4	1.2
78.4	1.4	73.4	1.4	68.3	1.4	76.9	1.4	71.8	1.4	66.8	1.4	75.4	1.4	70.3	1.4	65.2	1.4
87.3	2.8	73.9	2.8	60.5	2.8	85.3	2.8	71.9	2.8	58.5	2.8	83.4	2.8	70.0	2.8	56.6	2.8
65.9	1.9	73.8	1.9	81.7	1.9	64.0	1.9	71.9	1.9	79.8	1.9	62.0	1.9	70.0	1.9	77.9	1.9
62.5	2.1	64.6	2.1	66.6	2.1	60.7	2.1	62.7	2.1	64.8	2.1	58.9	2.1	60.9	2.1	62.9	2.1
77.7	2.2	71.3	2.2	65.0	2.2	76.5	2.2	70.2	2.2	63.8	2.2	75.3	2.2	69.0	2.2	62.7	2.2
92.4	4.3	72.1	4.3	51.9	4.3	90.6	4.3	70.3	4.3	50.1	4.3	88.8	4.3	68.5	4.3	48.3	4.3
56.7	3.5	72.0	3.5	87.3	3.5	54.9	3.5	70.2	3.5	85.6	3.5	53.2	3.5	68.5	3.5	83.8	3.5
66.4	1.2	66.9	1.2	67.4	1.2	64.6	1.2	65.1	1.2	65.7	1.2	62.8	1.2	63.4	1.2	63.9	1.2
75.5	1.4	71.0	1.4	66.5	1.4	74.1	1.4	69.6	1.4	65.1	1.4	72.7	1.4	68.2	1.4	63.7	1.4
84.3	2.7	71.4	2.7	58.6	2.7	82.5	2.7	69.7	2.7	56.9	2.7	80.8	2.7	67.9	2.7	55.1	2.7
62.9	2.0	71.4	2.0	79.9	2.0	61.2	2.0	69.6	2.0	78.1	2.0	59.4	2.0	67.9	2.0	76.4	2.0
50.5	0.4	53.3	0.4	56.0	0.4	49.3	0.4	52.0	0.4	54.8	0.4	48.0	0.4	50.8	0.4	53.6	0.4
96.8	6.4	53.3	6.4	9.8	6.4	95.5	6.4	52.1	6.4	8.6	6.4	94.3	6.4	50.8	6.4	7.3	6.4
108.2	7.6	59.7	7.6	11.2	7.6	108.9	7.6	60.4	7.6	11.9	7.6	109.7	7.6	61.2	7.6	12.7	7.6
2.6	8.1	46.9	8.1	91.1	8.1	-0.6	8.1	43.7	8.1	87.9	8.1	-3.8	8.1	40.5	8.1	84.7	8.1
180.6	17.7	57.1	17.7	-66.3	17.7	180.1	17.7	56.6	17.7	-66.8	17.7	179.6	17.7	56.1	17.7	-67.3	17.7
-69.7	18.3	49.4	18.3	168.6	18.3	-71.7	18.3	47.5	18.3	166.7	18.3	-73.6	18.3	45.5	18.3	164.7	18.3
91.6	6.0	93.6	6.0	95.6	6.0	91.7	6.0	93.7	6.0	95.7	6.0	91.8	6.0	93.8	6.0	95.8	6.0
88.3	2.3	95.3	2.3	102.3	2.3	91.8	2.3	98.9	2.3	105.9	2.3	95.4	2.3	102.4	2.3	109.5	2.3
103.5	2.7	97.3	2.7	91.2	2.7	105.4	2.7	99.2	2.7	93.0	2.7	107.3	2.7	101.1	2.7	94.9	2.7
81.7	3.7	97.3	3.7	112.9	3.7	83.6	3.7	99.2	3.7	114.8	3.7	85.6	3.7	101.1	3.7	116.7	3.7
75.0	5.0	75.1	5.0	75.1	5.0	74.5	5.0	74.6	5.0	74.6	5.0	74.0	5.0	74.0	5.0	74.1	5.0
71.7	3.1	76.8	3.1	81.9	3.1	74.7	3.1	79.7	3.1	84.8	3.1	77.6	3.1	82.7	3.1	87.7	3.1
86.9	2.3	78.8	2.3	70.7	2.3	88.2	2.3	80.1	2.3	72.0	2.3	89.5	2.3	81.4	2.3	73.2	2.3
65.2	3.0	78.8	3.0	92.4	3.0	66.5	3.0	80.1	3.0	93.7	3.0	67.8	3.0	81.4	3.0	95.0	3.0
72.6	7.5	70.5	7.5	68.5	7.5	70.8	7.5	68.7	7.5	66.7	7.5	69.0	7.5	66.9	7.5	64.9	7.5
67.1	6.0	73.4	6.0	79.8	6.0	71.0	6.0	77.4	6.0	83.7	6.0	75.0	6.0	81.4	6.0	87.7	6.0
92.4	3.8	76.8	3.8	61.1	3.8	93.6	3.8	78.0	3.8	62.3	3.8	94.8	3.8	79.1	3.8	63.5	3.8
56.2	4.4	76.8	4.4	97.3	4.4	57.4	4.4	78.0	4.4	98.6	4.4	58.6	4.4	79.2	4.4	99.8	4.4
73.1	4.6	72.5	4.6	72.0	4.6	72.6	4.6	72.1	4.6	71.6	4.6	72.2	4.6	71.7	4.6	71.1	4.6
69.8	3.5	74.3	3.5	78.8	3.5	72.8	3.5	77.3	3.5	81.8	3.5	75.8	3.5	80.3	3.5	84.8	3.5
85.0	2.2	76.3	2.2	67.6	2.2	86.3	2.2	77.6	2.2	68.9	2.2	87.7	2.2	79.0	2.2	70.3	2.2
63.2	2.8	76.3	2.8	89.3	2.8	64.6	2.8	77.7	2.8	90.7	2.8	66.0	2.8	79.0	2.8	92.1	2.8
24.2	115.1	21.4	115.1	18.6	115.1	1.6	115.1	-1.2	115.1	-3.9	115.1	-21.0	115.1	-23.8	115.1	-26.5	115.1
169.3	43.6	56.1	43.6	-57.2	43.6	169.9	43.6	56.6	43.6	-56.7	43.6	170.4	43.6	57.2	43.6	-56.1	43.6
112.5	10.6	65.9	10.6	19.3	10.6	117.4	10.6	70.8	10.6	24.2	10.6	122.3	10.6	75.7	10.6	29.1	10.6
-4.3	11.7	46.5	11.7	97.4	11.7	-7.9	11.7	43.0	11.7	93.9	11.7	-11.4	11.7	39.5	11.7	90.4	11.7
180.8	18.9	61.6	18.9	-57.7	18.9	183.0	18.9	63.7	18.9	-55.5	18.9	185.2	18.9	65.9	18.9	-53.4	18.9
-72.6	18.6	50.9	18.6	174.4	18.6	-73.4	18.6	50.1	18.6	173.6	18.6	-74.3	18.6	49.3	18.6	172.8	18.6

Palo28		Palo29		Palo30	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
68.2	1.2	68.2	1.2	68.2	1.2
73.1	1.2	73.1	1.2	73.1	1.2
75.5	1.5	70.8	1.5	66.2	1.5
67.6	1.5	72.2	1.5	76.8	1.5
58.9	1.2	58.9	1.2	58.9	1.2
63.8	1.2	63.8	1.2	63.8	1.2
66.1	1.5	61.5	1.5	56.9	1.5
58.2	1.5	62.8	1.5	67.5	1.5
55.3	2.0	55.3	2.0	55.3	2.0
63.5	2.0	63.5	2.0	63.5	2.0
67.4	2.4	59.7	2.4	52.0	2.4
54.3	2.4	61.9	2.4	69.6	2.4
58.0	1.2	58.0	1.2	58.0	1.2
62.9	1.2	62.9	1.2	62.9	1.2
65.2	1.5	60.6	1.5	56.0	1.5
57.3	1.5	61.9	1.5	66.5	1.5
46.0	0.0	46.0	0.0	46.0	0.0
46.0	0.0	46.0	0.0	46.0	0.0
65.9	3.9	58.5	3.9	51.2	3.9
26.1	3.9	33.4	3.9	40.7	3.9
76.6	4.0	52.3	4.0	27.9	4.0
15.3	4.0	39.7	4.0	64.1	4.0
83.9	3.9	83.9	3.9	83.9	3.9
99.3	5.2	99.3	5.2	99.3	5.2
96.7	1.6	92.1	1.6	87.5	1.6
89.8	1.6	94.4	1.6	99.0	1.6
66.2	4.2	66.2	4.2	66.2	4.2
81.6	4.9	81.6	4.9	81.6	4.9
79.1	1.5	74.4	1.5	69.8	1.5
72.1	1.5	76.8	1.5	81.4	1.5
57.4	7.3	57.4	7.3	57.4	7.3
83.1	7.8	83.1	7.8	83.1	7.8
78.9	2.5	71.2	2.5	63.5	2.5
67.3	2.4	75.0	2.4	82.7	2.4
64.1	4.4	64.1	4.4	64.1	4.4
79.5	4.7	79.5	4.7	79.5	4.7
76.9	1.5	72.3	1.5	67.7	1.5
70.0	1.5	74.6	1.5	79.2	1.5
32.7	8.7	32.7	8.7	32.7	8.7
51.8	0.9	51.8	0.9	51.8	0.9
96.6	13.1	89.3	13.1	82.0	13.1

Palo28		Palo29		Palo30	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
13.3	12.3	20.6	12.3	28.0	12.3
93.6	6.2	69.2	6.2	44.8	6.2
16.4	5.6	40.8	5.6	65.1	5.6
77.9	1.3	75.9	1.3	73.9	1.3
88.2	1.6	81.2	1.6	74.1	1.6
95.9	3.0	80.5	3.0	65.2	3.0
74.5	1.6	80.5	1.6	86.4	1.6
63.5	1.2	63.5	1.2	63.4	1.2
73.8	1.4	68.8	1.4	63.7	1.4
81.5	2.8	68.1	2.8	54.7	2.8
60.1	1.9	68.0	1.9	76.0	1.9
57.0	2.1	59.1	2.1	61.1	2.1
74.2	2.2	67.8	2.2	61.5	2.2
87.0	4.3	66.7	4.3	46.5	4.3
51.4	3.5	66.7	3.5	82.0	3.5
61.1	1.2	61.6	1.2	62.1	1.2
71.4	1.4	66.9	1.4	62.4	1.4
79.0	2.7	66.2	2.7	53.4	2.7
57.7	2.0	66.1	2.0	74.6	2.0
46.8	0.4	49.6	0.4	52.3	0.4
93.1	6.4	49.6	6.4	6.1	6.4
110.5	7.6	61.9	7.6	13.4	7.6
-7.0	8.1	37.3	8.1	81.5	8.1
179.1	17.7	55.6	17.7	-67.8	17.7
-75.6	18.3	43.6	18.3	162.8	18.3
91.8	6.0	93.9	6.0	95.9	6.0
98.9	2.3	106.0	2.3	113.0	2.3
109.1	2.7	103.0	2.7	96.8	2.7
87.5	3.7	103.1	3.7	118.7	3.7
73.5	5.0	73.5	5.0	73.5	5.0
80.6	3.1	85.6	3.1	90.7	3.1
90.8	2.3	82.6	2.3	74.5	2.3
69.1	3.0	82.7	3.0	96.3	3.0
67.1	7.5	65.1	7.5	63.1	7.5
79.0	6.0	85.3	6.0	91.7	6.0
96.0	3.8	80.3	3.8	64.7	3.8
59.9	4.4	80.5	4.4	101.1	4.4
71.7	4.6	71.2	4.6	70.7	4.6
78.8	3.5	83.3	3.5	87.8	3.5
89.0	2.2	80.3	2.2	71.6	2.2
67.4	2.8	80.4	2.8	93.5	2.8

Palo28		Palo29		Palo30	
Q [kN]	V [kN]	Q [kN]	V [kN]	Q [kN]	V [kN]
-43.6	115.1	-46.3	115.1	-49.1	115.1
171.0	43.6	57.7	43.6	-55.6	43.6
127.1	10.6	80.5	10.6	33.9	10.6
-14.9	11.7	36.0	11.7	86.9	11.7
187.3	18.9	68.1	18.9	-51.2	18.9
-75.1	18.6	48.4	18.6	172.0	18.6

Per ogni combinazione di calcolo e per ogni palo, sono state valutate le sollecitazioni massime e minime agenti. Nella tabella seguente sono riportati detti valori su ogni palo e la combinazione corrispondente.

Palo	Combinazione	Q_{MAX} [kN]	T [kN]	M [kN m]
1	SLVy (q=1)	183.6	17.7	-20.0
2	SLU_URTO X	156.9	115.1	-130.2
3	SLVy (q=1)	180.3	18.3	-20.8
4	SLVy (q=1)	183.1	17.7	-20.0
5	SLU_URTO X	134.3	115.1	-130.2
6	SLVy (q=1)	178.6	18.6	-21.1
7	SLVy (q=1)	182.6	17.7	-20.0
8	SLU_URTO X	111.7	115.1	-130.2
9	SLVy (q=1)	177.7	18.6	-21.1
10	SLVy (q=1)	182.1	17.7	-20.0
11	SLU (q3)	98.8	3.0	-3.4
12	SLVy (q=1)	176.9	18.6	-21.1
13	SLVy (q=1)	181.6	17.7	-20.0
14	SLU (q3)	95.7	3.0	-3.4
15	SLVy (q=1)	176.1	18.6	-21.1
16	SLVy (q=1)	181.1	17.7	-20.0
17	SLU (q3)	95.4	2.7	-3.1
18	SLVy (q=1)	175.3	18.6	-21.1
19	SLVy (q=1)	180.8	18.9	-21.4
20	SLU (q3)	97.3	2.7	-3.1
21	SLVy (q=1)	174.4	18.6	-21.1
22	SLVy (q=1)	183.0	18.9	-21.4
23	SLU (q4)	99.2	3.7	-4.2
24	SLVy (q=1)	173.6	18.6	-21.1
25	SLVy (q=1)	185.2	18.9	-21.4
26	SLU (q2)	102.4	2.3	-2.6
27	SLVy (q=1)	172.8	18.6	-21.1
28	SLVy (q=1)	187.3	18.9	-21.4
29	SLU (q2)	106.0	2.3	-2.6
30	SLVy (q=1)	172.0	18.6	-21.1

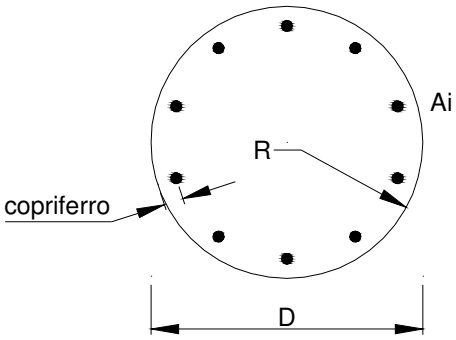
Palo	Combinazione	Q_{MIN} [kN]	T [kN]	M [kN m]
1	SLVy (q=1)	-67.7	18.6	-21.1
2	SLVx (q=1)	17.8	13.1	-14.8
3	SLVy (q=1)	-70.7	18.9	-21.4
4	SLVy (q=1)	-68.5	18.6	-21.1
5	SLVx (q=1)	25.7	13.1	-14.8
6	SLVy (q=1)	-68.5	18.9	-21.4
7	SLVy (q=1)	-69.3	18.6	-21.1
8	SLVx (q=1)	33.7	13.1	-14.8
9	SLVy (q=1)	-66.4	18.9	-21.4
10	SLVy (q=1)	-70.1	18.6	-21.1
11	SLVx (q=1)	41.6	13.1	-14.8
12	SLVy (q=1)	-64.8	17.7	-20.0
13	SLVy (q=1)	-71.0	18.6	-21.1
14	SLVy (q=1)	47.7	5.6	-6.4
15	SLVy (q=1)	-65.3	17.7	-20.0
16	SLVy (q=1)	-71.8	18.6	-21.1
17	SLVx (q=1)	43.6	12.3	-13.9
18	SLVy (q=1)	-65.8	17.7	-20.0
19	SLVy (q=1)	-72.6	18.6	-21.1
20	SLU_URTO X	21.4	115.1	-130.2
21	SLVy (q=1)	-66.3	17.7	-20.0
22	SLVy (q=1)	-73.4	18.6	-21.1
23	SLU_URTO X	-1.2	115.1	-130.2
24	SLVy (q=1)	-66.8	17.7	-20.0
25	SLVy (q=1)	-74.3	18.6	-21.1
26	SLU_URTO X	-23.8	115.1	-130.2
27	SLVy (q=1)	-67.3	17.7	-20.0
28	SLVy (q=1)	-75.6	18.3	-20.8
29	SLU_URTO X	-46.3	115.1	-130.2
30	SLVy (q=1)	-67.8	17.7	-20.0

Dimensionamento delle armature

Diametro = 600 (mm)

Raggio = 300 (mm)

Sforzo Normale = 21 (kN)



Caratteristiche dei Materiali

calcestruzzo C25/30

Rck = 30 (Mpa)
fck = 25 (Mpa)
γc = 1.5
α_{cc} = 0.85

fcd = α_{cc} fck / γc = 14.17 (Mpa)

Acciaio

tipo di acciaio B450C

fyk = 450 (Mpa)

γs = 1.15

fyd = fyk / γs = 391.3 (Mpa)

Es = 206000 (Mpa)

ε_{ys} = 0.190%
ε_{uk} = 10.000%

Armature

numero		diametro (mm)	area (mm^2)	copriferro (mm)
24	ϕ	22	9123	60
0	ϕ	0	0	120
0	ϕ	0	0	30

Calcolo

Momento di Plasticizzazione

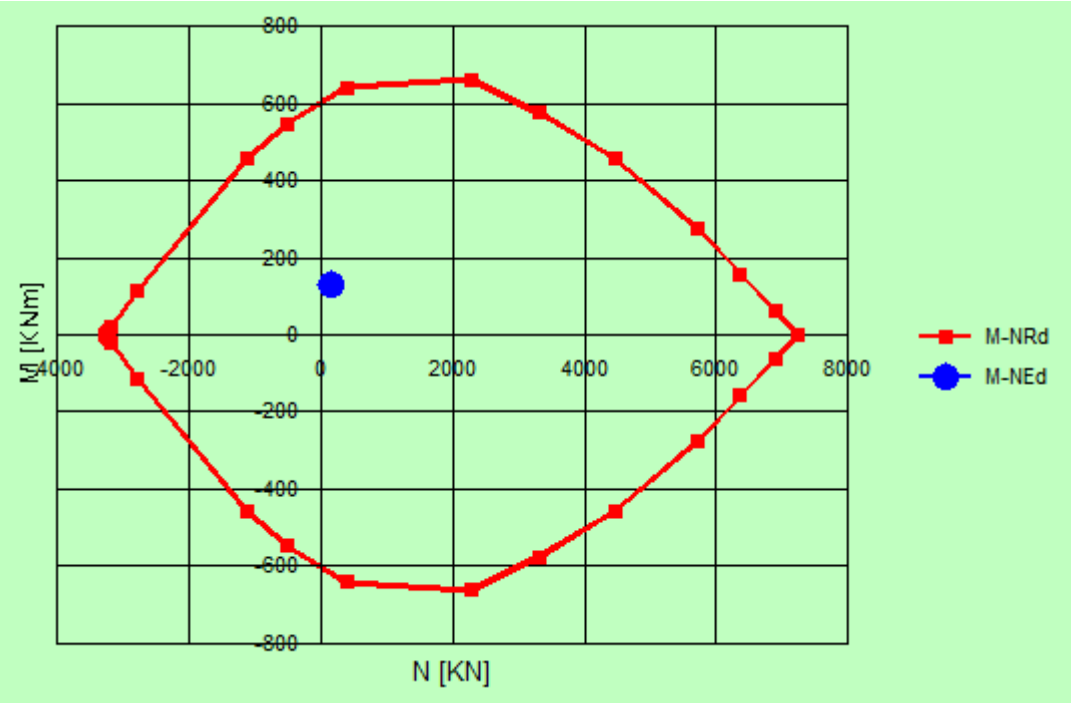
My = 660.9 (kN m)

Inserisci

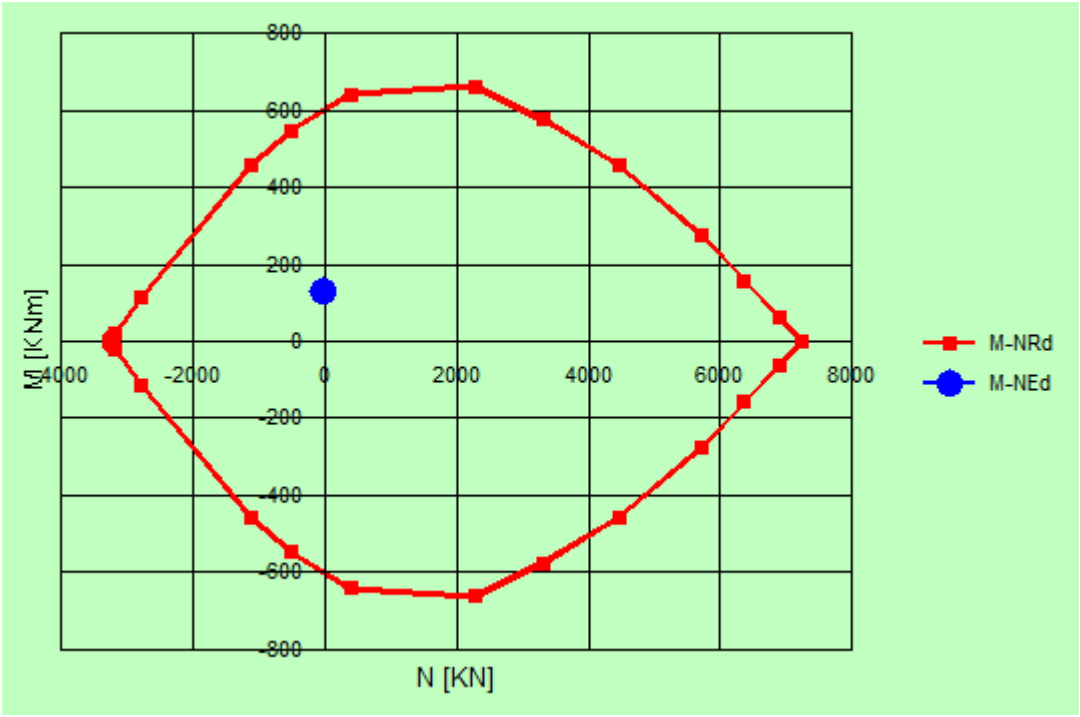
9.3 Verifiche a pressoflessione sui Pali

Si riportano di seguito le sollecitazioni adottate per il calcolo strutturale dei pali e le verifiche a pressoflessione eseguite tramite l'applicativo VcaSlu.

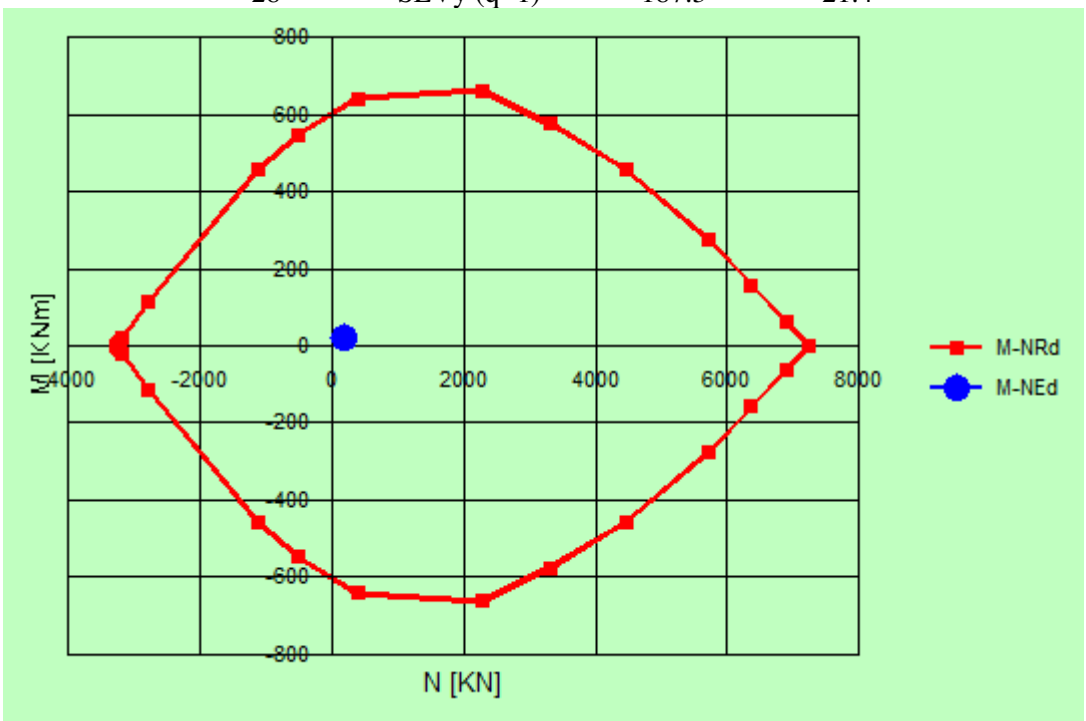
Palo	Combinazione	Q [kN]	M [kN m]
2	SLU_URTO X	156.9	-130.2



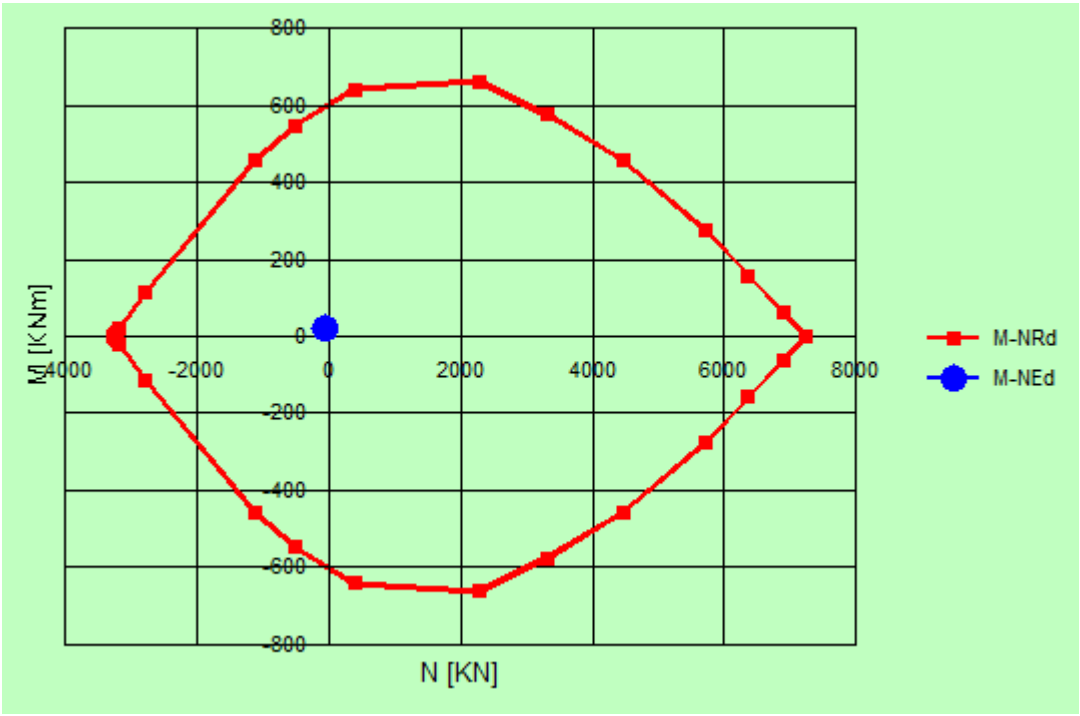
Palo	Combinazione	Q [kN]	M [kN m]
29	SLU_URTO X	-46.3	-130.2



Palo	Combinazione	Q [kN]	M [kN m]
28	SLVy (q=1)	187.3	-21.4



Palo	Combinazione	Q [kN]	M [kN m]
28	SLVy (q=1)	-75.6	-20.8



Verifiche a taglio SLU sui pali

$V_{Ed} = T_{SLU}$	115.1	kN
$V_{Ed} = T_{SLU}$	115100	N
ϕ	12	mm
A_{φ}	113.0973	mm^2
bracci	2	-
A_{sw}	226.1947	mm^2
s	200	mm
$f_{y\,wd}$	391.3043	MPa
cot θ	1	-
α_c	1	-
z = 0.9d	394.3318	mm
ν	0.54024	-
$\mathbf{V_{Rd,s}}$	174513.4	N
$\mathbf{V_{Rd,s\ max}}$	894298.4	N
$\mathbf{V_{Rd,c\ effettivo}}$	**174513.4**	**N**
Verifica	**OK**	
T.S.	0.6595	
C.S.	1.51619	

La verifica a taglio risulta soddisfatta per armatura fi 12 con passo 200 mm.

9.4 Verifiche Strutturali sulla platea di fondazione

In base alle azioni di calcolo riportate nei paragrafi precedenti, è stata eseguita la verifica della platea assumendo l'ipotesi di mensola tozza.

Direzione lunga

Dimensioni mensola		
hc	1.2	m
b	4.8	m
copriferro netto	0.055	m
ac	1.2	m
d	1.125	m

Azione di calcolo		
Ped	474.56	kN

l	1425.00	[mm]	
λ	1.41	[mm]	
P_{Rs}	2096.31	TS	**0.86**
c	1.5		
P_{Rc}	21558.00	check	**OK**

Armatura verticale posizionata		
Φ	n	As (mm2)
20	24	7539.822

AICAP pag286 se ac>hc/2		
Verifica meccanismo	**ac>hc/2**	**Si**
z	0.900	m
(6.60 EC2)		
σRd2	16.46	Mpa
σRd1	13.99	Mpa
x2	0.01	m
a	1.20	m
Ft	634.33	kN
As estradosso	1621.07	mm2
Verifica ferri estradosso	**Si**	
Fwd	264.70	kN
As staffe vert	676.46	mm2

Armatura orizzontale posizionata		
Φ	n	As (mm2)
20	24	7539.82
0	0	0
0	0	0
	As tot (mm2)	7539.82

Armatura verticale posizionata			
Φ	n	n bracci	As (mm2)
20	7	2	4398.23
			0

Verifica staffe vert	**Si**			0	0	0	0
						As tot (mm2)	4398.23
y2	0.23	m					
σ2	0.29	MPa				Limitazione armatura	
Verifica nodo 2	**Si**		**0.02**			As staffe>0.5 As	**Si**
σ1	0.26	MPa					
Verifica nodo 1	**Si**		**0.08**				

Direzione corta

Dimensioni mensola		
hc	1.2	m
b	17.4	m
copriferro netto	0.055	m
ac	1.2	m
d	1.123	m

Azione di calcolo		
Ped	1807.63	kN

l	1424.60	[mm]	
λ	1.41	[mm]	
P_{Rs}	3265.35	TS	**0.55**
c	1.5		
P_{Rc}	77853.54	check	**OK**

Armatura verticale posizionata		
Φ	n	As (mm2)
24	26	7539.822

AICAP pag286 se ac>hc/2		
Verifica meccanismo	**ac>hc/2**	**Si**

z	0.898	m
(6.60 EC2)		
σRd2	16.46	Mpa
σRd1	13.99	Mpa
x2	0.01	m
a	1.20	m
Ft	2420.81	kN

Armatura orizzontale posizionata		
Φ	n	As (mm2)
20	87	27331.86
0	0	0
0	0	0
	As tot (mm2)	27331.86

As estradosso	6186.53	mm2						
Verifica ferri estradosso	**Si**			Armatura verticale posizionata				
				Φ	n	n bracci	As (mm2)	
Fwd	1011.33	kN		20	7	2	4398.23	
As staffe vert	2584.52	mm2					0	
Verifica staffe vert	**Si**			0	0	0	0	
						As tot (mm2)	4398.23	
y2	0.22	m						
σ2	0.31	MPa				Limitazione armatura		
Verifica nodo 2	**Si**		**0.02**			As staffe>0.5 As	**Si**	
σ1	0.30	MPa						
Verifica nodo 1	**Si**		**0.02**					