

S.S. 38 - LOTTO 4: VARIANTE DI TIRANO DALLO SVINCOLO DI STAZZONA (COMPRESO) ALLO SVINCOLO DI LORETO (CON COLLEGAMENTO ALLA DOGANA DI POSCHIAVO)

**S.S. 38 - LOTTO 4: NODO DI TIRANO -
TRATTA "A" (SVINCOLO DI BIANZONE - SVINCOLO LA GANDA)
E TRATTA "B" (SVINCOLO LA GANDA - CAMPONE IN TIRANO)**

PROGETTO ESECUTIVO

 STUDIO CORONA Ing. Renato Vaira (Ordine degli Ingg. di Torino e Provincia n° 4863 W)	 Ingegneria del Territorio s.r.l. Ing. Valerio Bajetti Ordine degli Ingg. di Roma e provincia n° A-28211	ING. RENATO DEL PRETE Ing. Renato Del Prete Ordine degli Ingg. di Bari e provincia n° 5073	 ECOPLAN Arch. Nicoletta Frattini Ordine degli Arch. di Torino e provincia n° A-8433	 E&G Engineering & Graphics S.r.l. Ing. Gabriele Incecchi Ordine degli Ingg. di Roma e provincia n° A-12102
	Prof. Ing. Matteo Ranieri Ordine degli Ingg. di Bari e provincia n° 1137	 SETAC Srl Servizi & Engineering Trasporti Ambiente Costruzioni Prof. Ing. Luigi Monterisi Ordine degli Ingg. di Bari e provincia n° 1771	 ARKE' INGEGNERIA S.r.l. Ing. Gioacchino Angarano Ordine degli Ingg. di Bari e provincia n° 5970	DOTT. GEOL. DANILLO GALLO Dott. Geol. Danilo Gallo Ordine dei Geologi della Regione Puglia n° 588

VISTO: IL RESPONSABILE DEL PROCEDIMENTO

RESPONSABILE DELL'INTEGRAZIONE DELLE PRESTAZIONI SPECIALISTICHE

GEOLOGO

IL COORDINATORE DELLA SICUREZZA IN FASE DI PROGETTAZIONE

Dott. Ing. Giancarlo LUONGO

Ing. Valerio BAJETTI

Dott. Geol. Francesco AMANTIA SCUDERI

Ing. Gaetano RANIERI

H - PROGETTO STRUTTURALE OPERE PRINCIPALI

HF04

**HF – GA01 GALLERIA ARTIFICIALE: IL DOSSO 1
OPERE PROVVISORIALI PARATIA ALLA PK.4786,12-4867.78
RELAZIONE DI CALCOLO**

CODICE PROGETTO PROGETTO LIV. PROG. N. PROG. M I 3 2 4 E 1 8 0 1		NOME FILE HF04_P01GA01STRRE04_A.dwg		REVISIONE A	SCALA: -----
CODICE ELAB. P 0 1 G A 0 1 S T R R E 0 4					
C					
B					
A	EMISSIONE	FEBBRAIO 2019	ING. GIANFRANCO SODERO	ING. FABRIZIO BAJETTI	ING. VALERIO BAJETTI
REV.	DESCRIZIONE	DATA	REDATTO	VERIFICATO	APPROVATO

SOMMARIO

1	PREMESSA	4
2	NORMATIVA DI RIFERIMENTO	5
3	CARATTERISTICHE DEI MATERIALI	5
3.1	Calcestruzzo cordolo di testa	5
3.2	Acciaio ordinario per armature c.a.	5
3.3	Acciaio strutturale micropali	5
3.4	Acciaio strutturale travi di ripartizione tiranti	6
3.5	Acciaio in trefoli per tiranti	6
4	CARATTERIZZAZIONE GEOTECNICA	6
5	INQUADRAMENTO SISMICO DELL'OPERA	6
6	APPROCCI DI PROGETTO	7
6.1	Verifiche strutturali (STR)	7
6.2	Altre verifiche	7
6.2.1	Verifiche di stabilità del fondo scavo (GEO)	7
6.2.2	Verifica del carico limite del bulbo di ancoraggio dei tiranti (GEO)	8
6.2.3	Instabilità globale dell'insieme terreno-opera (GEO)	9
6.2.4	Verifiche agli stati limite di esercizio (SLE)	9
7	GENERALITA' SULLA MODELLAZIONE STRUTTURALE	10
8	ANALISI PARATIA	14
8.1	Fasi esecutive di calcolo	14
8.2	Risultati grafici	19
8.2.1	Deformate	19
8.2.2	Reazioni (tiranti)	20
8.2.3	Momenti flettenti sui micropali	20
8.2.4	Sforzi di taglio sui micropali	21
8.2.5	Pressioni orizzontali terreno	21
8.3	Verifiche allo Stato Limite Ultimo	21
8.3.1	Verifiche strutturali micropali: Verifiche a flessione e taglio	22
8.3.2	Verifiche geotecniche: Verifica di stabilità del fondo scavo	25
8.3.3	Micropali inclinati: Verifica strutturale e allo sfilamento dell'ancoraggio	25
8.3.4	Tiranti attivi : Verifica strutturale e allo sfilamento dell'ancoraggio	26
8.3.5	Travi di ripartizione - Verifica strutturale a flessione e taglio	27
8.3.6	Cordolo di testa - Verifica strutturale a flessione e taglio	27
8.3.7	Verifica di stabilità globale dell'insieme terreno-struttura	29
8.4	Valutazione dei danni potenziali agli edifici	30
8.4.1	Premesse	30
8.4.2	Risultati dell'analisi della valutazione del danno	34
8.4.3	Conclusioni sui risultati ottenuti	35
9	ANALISI PARATIE DI RISVOLTO	35
9.1	Fasi esecutive di calcolo	35
9.2	Risultati grafici	36
9.3	Verifiche allo Stato Limite Ultimo	39
9.3.1	Verifiche strutturali micropali: Verifiche a flessione e taglio	39
9.3.2	Verifiche geotecniche: Verifica di stabilità del fondo scavo	40
9.3.3	Micropali inclinati: Verifica strutturale e allo sfilamento dell'ancoraggio	40

10	TABULATI ALLEGATI	41
10.1	Paratia frontale	41
	<i>Descrizione Pareti</i>	42
	<i>Fasi di Calcolo</i>	43
	<i>Descrizione Coefficienti Design Assumption</i>	63
	Risultati SLE (Rara)	64
	Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 1	64
	Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 1	66
	Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 2	68
	Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 2	70
	Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 3	72
	Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 3	74
	Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 4	76
	Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 4	78
	Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 5	80
	Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 5	82
	Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 6	84
	Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 6	86
	Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 7	88
	Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 7	90
	Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 8	92
	Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 8	94
	Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 9	96
	Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 9	98
	Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 10	100
	Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 10	102
	Risultati Elementi strutturali - SLE (Rara)	104
	Risultati A1+M1+R1	109
	Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 1	109
	Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 2	111
	Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 3	113
	Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 4	115
	Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 5	117
	Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 6	119
	Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 7	121
	Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 8	123
	Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 9	125
	Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 10	127
	Risultati Elementi strutturali - A1+M1+R1	129
	Risultati A2+M2+R1	134
	Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 1	134
	Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 2	136
	Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 3	138
	Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 4	140
	Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 5	142

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 6	144
Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 7	146
Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 8	148
Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 9	150
Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 10	152
Risultati Elementi strutturali - A2+M2+R1	154
Allegati	159
Design Assumption : Nominal - File di Paratie - File di input (.d)	159
Design Assumption : SLE (Rara) - File di Paratie - File di input (.d)	161
Design Assumption : A1+M1+R1 - File di Paratie - File di input (.d)	163
Design Assumption : A2+M2+R1 - File di Paratie - File di input (.d)	165
10.2 Paratia di risvolto	167
Descrizione della Stratigrafia e degli Strati di Terreno	167
Descrizione Pareti	167
Fasi di Calcolo	168
Descrizione Coefficienti Design Assumption	170
Risultati SLE (Rara)	171
Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 1	171
Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 1	172
Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 2	173
Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 2	174
Risultati Elementi strutturali - SLE (Rara)	175
Risultati A1+M1+R1	176
Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 1	176
Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 2	177
Risultati Elementi strutturali - A1+M1+R1	178
Risultati A2+M2+R1	179
Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 1	179
Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 2	180
Risultati Elementi strutturali - A2+M2+R1	181
Allegati	182
Design Assumption : Nominal - File di Paratie - File di input (.d)	182
Design Assumption : SLE (Rara) - File di Paratie - File di input (.d)	183
Design Assumption : A1+M1+R1 - File di Paratie - File di input (.d)	184
Design Assumption : A2+M2+R1 - File di Paratie - File di input (.d)	185

1 PREMESSA

La presente relazione è inserita nell'ambito del Progetto Esecutivo della progettazione della "SS 38 Lotto 4 Nodo di Tirano, Tratta A (Svincolo di Bianzone - Svincolo La Ganda) e Tratta B (Svincolo La Ganda - Campone in Tirano).

La galleria artificiale "Il Dosso 1" è ubicata a SE del Comune di Tirano al piede del versante orografico sinistro del Fiume Adda.

Nel presente documento si affrontano le problematiche progettuali connesse al dimensionamento ed alla verifica della paratia provvisoria di micropali, compresa tra le progressive 4+786.12 e 4+867.78, realizzata allo scopo di proteggere alcuni edifici durante le fasi di scavo per la realizzazione della galleria artificiale, in particolare quelli denominati "Edificio 8" e "Edificio 9".

Per limitare al minimo i cedimenti in direzione trasversale sugli edifici, la paratia ha una elevata rigidità e viene risvoltata ai lati con tratti di lunghezza adeguata in modo da poter trascurare i cedimenti in direzione longitudinale.

La paratia di micropali in oggetto è costituita da una singola fila di micropali armati con tubo in acciaio S 355 H, disposti ad interasse di 40 cm, collegati in testa da un cordolo in c.a. sul quale sono impostati dei tiranti passivi consistenti in micropali aventi le stesse caratteristiche, inclinati di 30°; al di sotto ci sono fino a 4 ordini di tiranti attivi provvisori.

I tratti di risvolto sono analogamente costituiti ma, onde evitare interferenze nelle perforazioni, presentano solamente i tiranti passivi impostati sul cordolo.

L'azione di contrasto dei tiranti è distribuita sui micropali dalle travi di collegamento e ripartizione previste lungo ciascun ordine e costituite da un doppio profilato in acciaio S 275 della serie HE 220 A, collegate da calastrelli disposti con interasse di 2.4 m. Gli stessi tiranti saranno ancorati a suddette travi tramite apposite piastre di ripartizione che garantiscono la stabilità e la ripartizione necessaria a trasferire gli elevati carichi concentrati dei tiranti al sistema di travi di contrasto.

La paratia sarà protetta mediante uno strato di betoncino proiettato di spessore 10 cm, armato con rete elettrosaldata Ø 5, passo 20x20 cm.

Micropali paratia: verticali

diametro del tubo: 177.8 mm

spessore del tubo: 10 mm

interasse: 0.40 m

diametro perforazione: 240 mm

lunghezza micropali: variabile da 6 m a 20 m

Tiranti passivi: inclinati di 30° sulla verticale

diametro del tubo: 177.8 mm

spessore del tubo: 10 mm

interasse: 2.40 m

diametro perforazione: 240 mm

lunghezza: variabile da 10 m a 15 m

iniezione a gravità con malta cementizia

Tiranti attivi: inclinati di 20° sull'orizzontale

composizione: 4 trefoli da 0.6" standard ($A = 4 \times 139 = 556 \text{ mm}^2$)

lunghezza totale: variabile da 21 m a 24 m

interasse: 2.40 m

lunghezza bulbo: 12 m

diametro di perforazione: 160 mm

iniezione bulbo: malta cementizia ad alta pressione con iniezioni ripetute e selettive (IRS).

tensione di tesatura: 120 kN/trefolo (480 kN/tirante)

tensione di collaudo: $1.2 \times 120 = 144$ kN/trefolo (576 kN/tirante)

Il cordolo in c.a. di collegamento di testa dei micropali ha dimensioni pari a 50x70 cm.

Nel seguito si eseguono i calcoli per la sezione trasversale Pk. 4+834, ritenuta la più significativa in quanto si ha la distanza minima della paratia dagli edifici (circa 2 m); le verifiche ottenute si considerano valide per l'intera opera.

Seguono i calcoli anche per la sezione di risvolto maggiormente sollecitata alla Pk. 4+853.15

2 NORMATIVA DI RIFERIMENTO

La presente relazione è stata redatta in osservanza delle seguenti Normative:

- **Legge 05/01/1971 n.1086** → Norme per la disciplina delle opere in conglomerato cementizio armato, normale e precompresso ed a struttura metallica
- **Legge 02/02/1974 n. 64** → Provvedimenti per le costruzioni con particolari prescrizioni per le zone sismiche
- **DM 17/01/2018** → Aggiornamento delle "Norme Tecniche per le Costruzioni"
- **Circolare 02/02/2009 n. 617, C.S. LL.PP.** → Istruzioni per l'applicazione delle "Norme Tecniche per le Costruzioni" di cui al DM 14/01/2008

3 CARATTERISTICHE DEI MATERIALI

Con riferimento alle normative citate, le strutture sono state verificate utilizzando il metodo di calcolo agli stati limite, adottando i seguenti parametri di resistenza dei materiali:

3.1 CALCESTRUZZO CORDOLO DI TESTA

- Classe calcestruzzo: C25/30
- resistenza cilindrica caratteristica: $f_{ck} \geq 25$ N/mm²
- resistenza di calcolo a compressione: $f_{cd} = \alpha_{cc} f_{ck} / \gamma_c = 0.85 \times 25 / 1.5 = 14.17$ N/mm²
- modulo di elasticità: $E_{cm} = 22000 [(f_{ck}+8)/10]^{0.3} = 31476$ N/mm²

3.2 ACCIAIO ORDINARIO PER ARMATURE C.A.

Tipo B450C controllato in stabilimento, di tipo saldabile.

- tensione caratteristica di rottura: $f_{tk} = 540$ N/mm²
- tensione caratteristica di snervamento: $f_{yk} = 450$ N/mm²
- resistenza di calcolo: $f_{yd} = f_{yk} / \gamma_s = 450 / 1.15 = 391$ N/mm²
- modulo di elasticità: $E_s = 210000$ N/mm²

3.3 ACCIAIO STRUTTURALE MICROPALI

Classificazione acciaio (UNI EN 10210-1): S 355 H

- Tensione caratteristica di snervamento: $f_{yk} = 355$ N/mm²
- Tensione caratteristica di rottura: $f_{tk} = 510$ N/mm²
- Tensione limite di calcolo a trazione: $f_{yd} = f_{yk} / \gamma_{M0} = 355 / 1.05 = 338.0$ N/mm²
- Modulo elastico: $E = 210000$ N/mm²

3.4 ACCIAIO STRUTTURALE TRAVI DI RIPARTIZIONE TIRANTI

Classificazione acciaio (UNI EN 10025-2): S 275

- Tensione caratteristica di snervamento: $f_{yk} = 275 \text{ N/mm}^2$
- Tensione caratteristica di rottura: $f_{tk} = 430 \text{ N/mm}^2$
- Tensione limite di calcolo a trazione: $f_{yd} = f_{yk} / \gamma_{M0} = 275 / 1.05 = 262.0 \text{ N/mm}^2$
- Modulo elastico: $E = 210000 \text{ N/mm}^2$

3.5 ACCIAIO IN TREFOLI PER TIRANTI

Tipo acciaio armonico: 170/190

- tensione caratteristica di rottura: $f_{ptk} = 1860 \text{ N/mm}^2$
- tensione caratteristica all' 1% di def. totale: $f_{p(1)k} = 1670 \text{ N/mm}^2$
- resistenza di calcolo: $f_{yd} = f_{pyk} / \gamma_s = 1670 / 1.15 = 1452 \text{ N/mm}^2$
- modulo di elasticità: $E_s = 200000 \text{ N/mm}^2$

4 CARATTERIZZAZIONE GEOTECNICA

I parametri necessari a definire le caratteristiche del terreno ai fini del calcolo delle strutture sono ricavati dagli elaborati geologici e geotecnici.

L'intera struttura ricade nello strato denominato "Morena": depositi caotici misti a detrito di versante costituiti da un accumulo caotico di diverse facies granulometriche rappresentate da sabbie, ghiaie e trovanti di dimensioni variabili in matrice limo-sabbiosa" per cui si assumono i seguenti parametri geotecnici caratteristici:

- peso specifico apparente: $\gamma = 20 \text{ kN/m}^3$
- angolo di attrito interno: $\phi = 34^\circ$
- coesione drenata: $c' = 0 \text{ kN/m}^2$
- modulo di deformazione: $E = 21000 \text{ kN/m}^2$

Le tensioni limite di aderenza secondo Bustamante-Doix risultano per terreno ghiaioso/sabbioso, $N_{SPT} = 30$:

- iniezione a gravità o bassa pressione: $\tau_{lim} = 84 \text{ kN/m}^2 \quad \alpha = 1$
- iniezione ripetuta ad alta pressione da una valvola di fondo: $\tau_{lim} = 118 \text{ kN/m}^2 \quad \alpha = 1.2$
- iniezione ripetuta ad alta pressione da più valvole ($i \leq 1 \text{ m}$): $\tau_{lim} = 179 \text{ kN/m}^2 \quad \alpha = 1.4$

La falda si trova a una profondità tale da non interessare l'opera in oggetto.

5 INQUADRAMENTO SISMICO DELL'OPERA

La vita nominale di un'opera strutturale, così come definita al punto 2.4.1 del DM 17/01/2018, è intesa come il numero di anni nel quale la struttura, purché soggetta alla manutenzione ordinaria, deve poter essere usata per lo scopo al quale è destinata.

Nel caso in oggetto, l'opera ricade nella definizione di Tipo 1: "Costruzioni temporanee o provvisorie" e si assume che la condizione di utilizzo permanga per meno di 2 anni.

Si omettono quindi le verifiche sismiche relative.

6 APPROCCI DI PROGETTO

6.1 VERIFICHE STRUTTURALI (STR)

Si fa riferimento al paragrafo 2.5.3, 6.2.3.1.1, 6.5.3.1.1 e 7.11.6.2.2 delle NTC 2018.

Per le verifiche strutturali della paratia e dei tiranti si considerano i seguenti stati limite:

SLU STR (A1+M1+R1): Verifiche allo stato limite ultimo delle strutture, caso statico (2.6.1)

Nella tabella seguente si riportano i coefficienti parziali relativi alle azioni A1, o per il loro effetto, per le combinazioni di carico previste; si omettono i coefficienti parziali relativi al terreno (γ_M) e alle resistenze (γ_R), tutti unitari.

Si intende che le azioni del terreno (spinte attive e passive) e dell'acqua sono carichi permanenti strutturali, così come le azioni dei tiranti.

Si nota che l'azione del terreno sarebbe contemporaneamente "sfavorevole" (spinta attiva da monte) e "favorevole" (spinta passiva di valle); essendo le azioni originate da una fonte unica, si considera per entrambe lo stesso coefficiente parziale.

CASO	Permanenti strutturali γ_{G1}		Altri permanenti: γ_{G2}		Variabili: γ_{Qki}	
	Sfavorevoli	Favorevoli	Sfavorevoli	Favorevoli	Sfavorevoli	Favorevoli
SLU (STR)	1.3	1.0	1.5	0	1.5	0

TABELLA N.6.1- COEFFICIENTI PARZIALI AZIONI – CASO A1

6.2 ALTRE VERIFICHE

Si fa riferimento al paragrafo 6.5.3.1.2 delle NTC 2008 considerando gli stati limite ultimi pertinenti; si escludono stati limite di tipo idraulico (UPL e HYD) in quanto la falda non interferisce con l'opera.

6.2.1 VERIFICHE DI STABILITÀ DEL FONDO SCAVO (GEO)

Si verifica che la spinta passiva mobilitata a valle della paratia sia inferiore alla spinta passiva disponibile.

SLU GEO (A2+M2+R1): Verifiche allo stato limite ultimo, caso statico

Nelle tabelle seguenti si riportano i coefficienti parziali relativi alle azioni A2, o per il loro effetto, e ai parametri geotecnici M2 per le combinazioni di carico previste; si omettono i coefficienti parziali relativi alle resistenze (γ_R), tutti unitari.

CASO	Permanenti strutturali γ_{G1}		Altri permanenti: γ_{G2}		Variabili: γ_{Qki}	
	Sfavorevoli	Favorevoli	Sfavorevoli	Favorevoli	Sfavorevoli	Favorevoli
SLU (GEO)	1	1	1.3	0	1.3	0

TABELLA N.6.2- COEFFICIENTI PARZIALI AZIONI – CASO A2

Parametro geotecnico	Coefficiente parziale	(M1)	(M2)
Tangente dell'angolo di resistenza al taglio	$\gamma_{\phi'}$	1	1.25
Coesione efficace	$\gamma_{c'}$	1	1.25
Resistenza non drenata	γ_{cu}	1	1.4
Peso dell'unità di volume	γ_Y	1	1

TABELLA N.6.3- COEFFICIENTI PARZIALI PARAMETRI GEOTECNICI

6.2.2 VERIFICA DEL CARICO LIMITE DEL BULBO DI ANCORAGGIO DEI TIRANTI (GEO)

Si verifica lo stato limite di sfilamento della fondazione dell'ancoraggio.

SLU GEO (A1+M1+R3): Verifica geotecnica ancoraggio tiranti

La verifica a sfilamento della fondazione dell'ancoraggio si esegue confrontando la massima azione di progetto E_d con la resistenza di progetto R_{ad} , determinata applicando alla resistenza caratteristica R_{ak} i coefficienti parziali γ_R riportati nella Tab. 6.6.I seguente.

	Simbolo	Coefficiente parziale
Temporanei	γ_R	1.1
Permanenti	γ_R	1.2

TABELLA N.6.6.I- COEFFICIENTI PARZIALI PER LA RESISTENZA DEGLI ANCORAGGI

Il valore caratteristico della resistenza allo sfilamento dell'ancoraggio R_{ak} si determina con metodo di calcolo analitico dai valori caratteristici dei parametri geotecnici e applicando i fattori di correlazione ξ_{a3} e ξ_{a4} riportati nella Tab. 6.6.III seguente.

Numero di profili di indagine	1	2	3	4	≥ 5
ξ_{a3}	1.80	1.75	1.70	1.65	1.60
ξ_{a4}	1.80	1.70	1.65	1.60	1.55

TABELLA N.6.6.III- FATTORI DI CORRELAZIONE PER DERIVARE LA RESISTENZA CARATTERISTICA DALLE PROVE GEOTECNICHE, IN FUNZIONE DEL NUMERO DI PROFILI DI INDAGINE

Nel caso in esame si assumono: $\gamma_R = 1.1$ (tiranti temporanei) e $\xi_{a3} = \xi_{a4} = 1.80$ (1 profilo).

6.2.3 INSTABILITÀ GLOBALE DELL'INSIEME TERRENO-OPERA (GEO)

Nelle verifiche agli stati limite ultimi per la verifica dell'instabilità globale dell'insieme terreno-opera l'analisi sarà condotta con riferimento alla **Combinazione 2: (A2+M2+R2)**, nella quale i parametri di resistenza del terreno sono ridotti tramite i coefficienti parziali del gruppo M2, i coefficienti sulla resistenza globale (R2) sono riportati in Tabella 6.8.I seguente e le sole azioni variabili sono amplificate con i coefficienti del gruppo A2. I parametri di resistenza di progetto sono perciò inferiori a quelli caratteristici. In linea generale, per la Combinazione in oggetto, essendo i coefficienti parziali amplificativi delle azioni permanenti pari ad 1.0 e dei variabili pari ad 1.3 (gruppo A2), si opererà applicando in fase di calcolo un coefficiente moltiplicativo ai carichi variabili pari a $\gamma_Q=1.3$.

COEFFICIENTE	R2
γ_R	1.1

TABELLA N.6.8.I- COEFFICIENTI PARZIALI PER LE VERIFICHE DI SICUREZZA DI OPERE DI MATERIALI SCIOLTI E DI FRONTI DI SCAVO

6.2.4 VERIFICHE AGLI STATI LIMITE DI ESERCIZIO (SLE)

Nello specifico si valuteranno le deformazioni dell'opera e delle costruzioni circostanti per consentire di verificare la compatibilità con le funzionalità attese.

7 GENERALITA' SULLA MODELLAZIONE STRUTTURALE

I micropali vengono schematizzati come un' asta infissa in suolo avente caratteristiche elasto-plastiche nelle varie fasi di costruzione.

L' analisi viene condotta con l' impiego del programma "ParatiePlus" (ver. 18.1) della Ce.A.S. Srl di Milano.

Tale programma opera mediante la simulazione di uno scavo sostenuto da elementi flessibili con il metodo degli elementi finiti, permettendo così l'analisi dell'interazione terreno – struttura.

La schematizzazione del fenomeno fisico è del tipo "trave su suolo elastico", con i micropali rappresentati da elementi trave aventi comportamento flessionale definito da EJ, e il terreno da elementi elastoplastici monodirezionali connessi agli elementi trave. Viene così trascurata, con limitate ripercussioni sulla bontà dei risultati, l'interazione tra porzioni di terreno adiacenti.

La paratia viene discretizzata con elementi finiti tipo "beam". si tratta di elementi mono-dimensionali con comportamento elastico e sezione di inerzia equivalente a quella effettiva.

Il terreno a monte e a valle della paratia viene schematizzato attraverso elementi "soil": si tratta di elementi elasto-plastici il cui comportamento è così definito:

- ACTIVE: l'elemento non ha rigidezza (fase plastica) e reagisce con una forza pari alla spinta attiva.
- PASSIVE: l'elemento non ha rigidezza (fase plastica) e reagisce con una forza pari alla spinta passiva.
- V-C; UL-RL: l'elemento è soggetto a una compressione minore della spinta passiva; il comportamento è elastico con una rigidezza direttamente proporzionale ai moduli elastici E_{vc} (in compressione vergine, V-C), oppure E_{ur} (in scarico-ricarico, UL-RL).

Si assume un rapporto: $\frac{E_{ur}}{E_{vc}} = 1.6$ per i terreni sabbiosi; $\frac{E_{ur}}{E_{vc}} = 3$ per i terreni limosi/argillosi;

$\frac{E_{ur}}{E_{vc}} = 1$ per i terreni rocciosi.

Nelle fasi elastiche la rigidezza dell'elemento terreno è data da:

$$K = \frac{E \times \Delta}{L}$$

in cui: Δ = distanza (passo) tra due elementi "molla" successivi

L = lunghezza fittizia dell'elemento "molla".

Il valore di L è fissato automaticamente dal programma; esso rappresenta una grandezza caratteristica che è diversa a monte e a valle della paratia perché diversa è la zona di terreno coinvolta dal movimento in zona attiva e passiva.

Il programma valuta, in zona attiva: $L_a = \frac{2}{3} \times Z_a \times \tan^2\left(45^\circ - \frac{\varphi}{2}\right)$

in zona passiva: $L_p = \frac{2}{3} \times Z_p \times \tan^2\left(45^\circ + \frac{\varphi}{2}\right)$

ove Z_a e Z_p sono rispettivamente uguali a:

$$Z_a = \text{Min}(T, 2H) \qquad Z_p = \text{Min}(T - H, H)$$

con: T = altezza totale paratia
 H = altezza corrente dello scavo.

La logica di questa scelta è illustrata in: Becci B., Nova R. (1987) "Un metodo di calcolo automatico per il progetto di paratie", Rivista Italiana di Geotecnica, 1,33-47.

I coefficienti di spinta dei terreni a monte e a valle della paratia sono calcolati tenendo conto dell'angolo di attrito paratia/terreno, assunto pari a $\delta = 2\Phi/3$ e dell'inclinazione equivalente del piano di campagna a monte e a valle; si considera il terreno in scavo come orizzontale.

Si nota che i coefficienti di spinta utilizzati dal programma sono relativi alle sole componenti orizzontali degli stessi.

Nella fase geostatica si considera il coefficiente di spinta "a riposo" calcolato con l'usuale formula di Jaky, valida per terreni normal-consolidati con piano di campagna inclinato:

$$\lambda_0 = (1 - \text{sen } \varphi) \times (1 + \text{sen } \varepsilon_m) = (1 - \text{sen } 34) \times (1 + \text{sen } 0) = 0.441$$

con direzione parallela all'inclinazione del piano di campagna; la componente orizzontale, utilizzata nel calcolo, vale quindi:

$$\lambda_{0h} = \lambda_0 \times \cos 0 = 0.441$$

I coefficienti di spinta attiva sono calcolati con le formule di Müller-Breslau, basate sulla teoria di Coulomb:

$$\lambda_a = \frac{\text{sen}^2(\beta - \phi)}{\text{sen}^2\beta \times \text{sen}(\beta + \delta) \times \left[1 + \sqrt{\frac{\text{sin}(\delta + \phi) \times \text{sin}(\phi - \varepsilon)}{\text{sen}(\beta + \delta) \times \text{sen}(\beta - \varepsilon)}} \right]^2}$$

dove: ϕ = angolo d'attrito del terreno

ε = Inclinazione del piano campagna rispetto al piano orizzontale, positiva se verso l'alto

$\delta < (\beta - \phi - \varepsilon)$ = angolo d'attrito terreno-parete

β = Inclinazione della parete interna rispetto al piano orizzontale passante per il piede

Rif.: Müller-Breslau: "Erddruck anf Stuetzmannern", ed. Kroener, 1906

I coefficienti di spinta passiva sono calcolati secondo Caquot-Kerisel, formulazione che tiene conto della curvatura delle superfici di scorrimento, come da figura seguente.

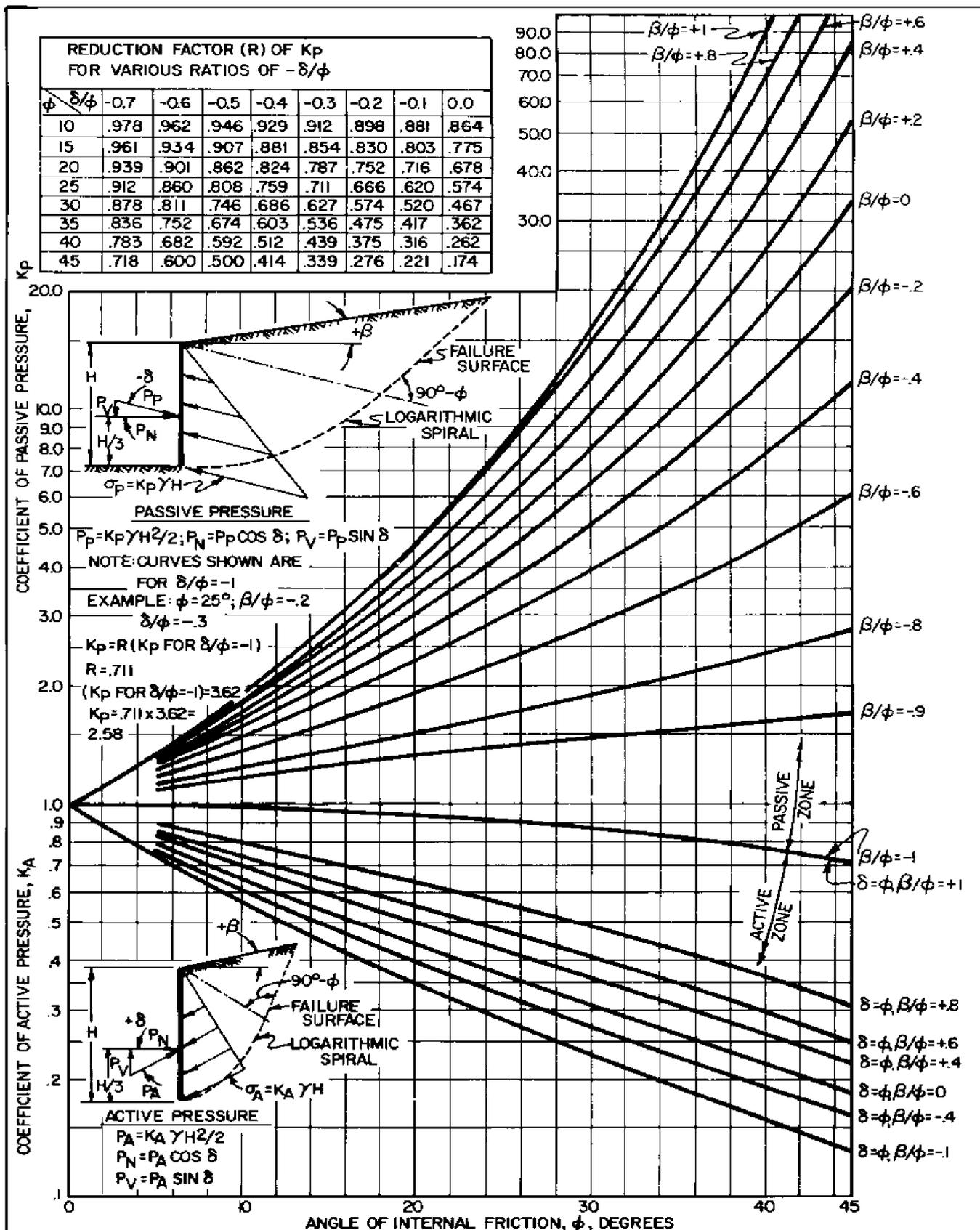


FIGURE 6
 Active and Passive Coefficients with Wall Friction
 (Sloping Backfill)

REF.: NAVFAC DESIGN MANUAL 7.02, "FOUNDATION & EARTH STRUCTURES", 1986

Nelle fasi sismiche si assume che la paratia abbia deformazioni apprezzabili e quindi si considera l'incremento di spinta da monte calcolato secondo Mononobe-Okabe:

$$K_{as} = \frac{\sin^2(\alpha + \varphi - \vartheta)}{\cos \vartheta \cdot \sin^2 \alpha \cdot \sin(\alpha - \vartheta - \delta) \left[1 - \frac{\sqrt{\sin(\varphi + \delta) \sin(\varphi - \beta - \vartheta)}}{\sqrt{\sin(\alpha - \vartheta - \delta) \sin(\alpha + \beta)}} \right]^2}$$

Dove (terreno sopra falda): $\vartheta = \arctan \frac{k_h}{1 \pm k_v}$

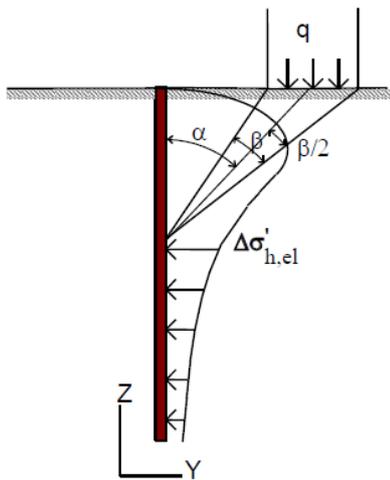
In accordo a quanto indicato nelle NTC (paragrafo n.7.11.6.2.1) si assume che l'incremento di spinta attiva dovuto al sisma agisca nello stesso punto di quella statica.

Rif: Mononobe N., "Earthquake-Proof Construction of Masonry Dams", Proc. World Engineering Conference, vol.9, 1929.

Segue riassunto dei coefficienti di spinta adottati nel programma di calcolo.

Terreno	Combinazione	A Monte		A Valle	
		K_{ah} ($\delta/\phi=0.66$)	K_{ph} ($\delta/\phi=0.66$)	K_{ah} ($\delta/\phi=0.66$)	K_{ph} ($\delta/\phi=0.66$)
Morene	M1	0.234	6.072	0.234	6.072
	M2	0.300	4.180	0.300	4.180

La presenza dell'edificio viene schematizzata con un sovraccarico di 200 kN/m², esteso da 2 m a 13 m di distanza dalla paratia; gli incrementi di tensione orizzontale e verticale sulla paratia sono valutati secondo la Teoria del semispazio elastico omogeneo di Boussinesq, considerando un angolo di diffusione $\alpha = 45^\circ$.



$$\Delta \sigma'_{h,el} = \frac{q}{\pi} (\beta - \text{sen} \beta \cos 2\alpha)$$

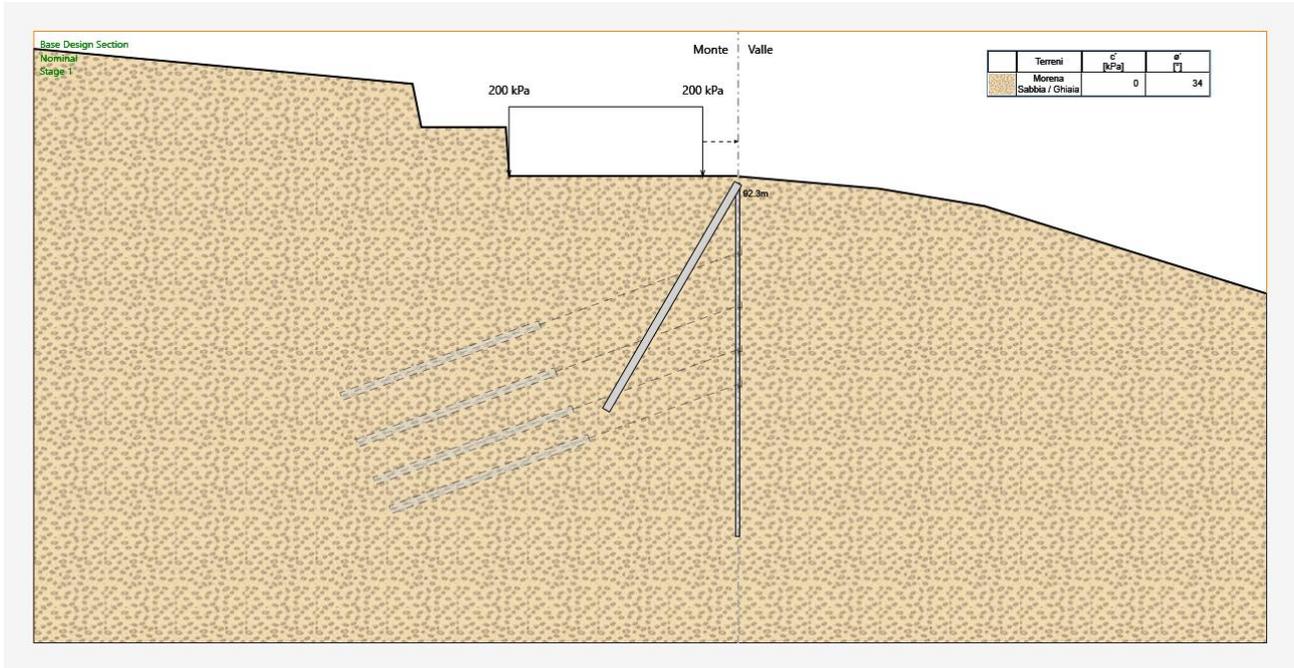
$$\Delta \sigma'_{v,el} = \frac{q}{\pi} (\beta + \text{sen} \beta \cos 2\alpha)$$

Tutti i calcoli sono svolti per una profondità di 1 metro.

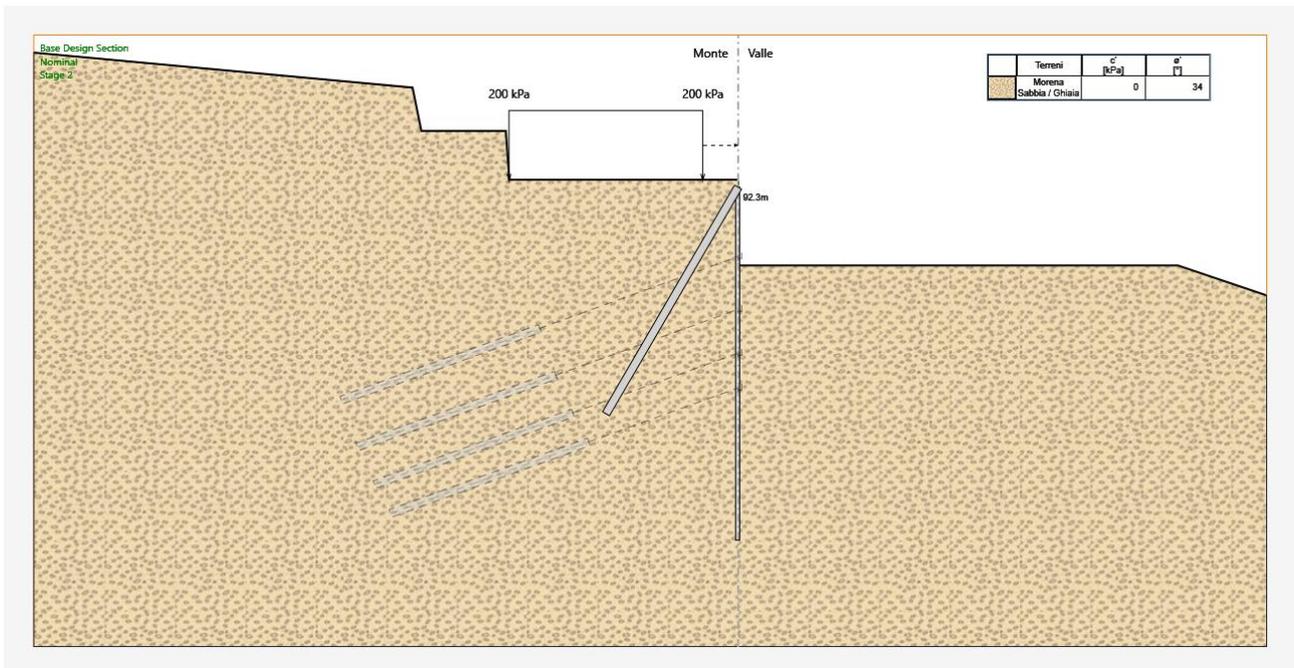
8 ANALISI PARATIA

8.1 FASI ESECUTIVE DI CALCOLO

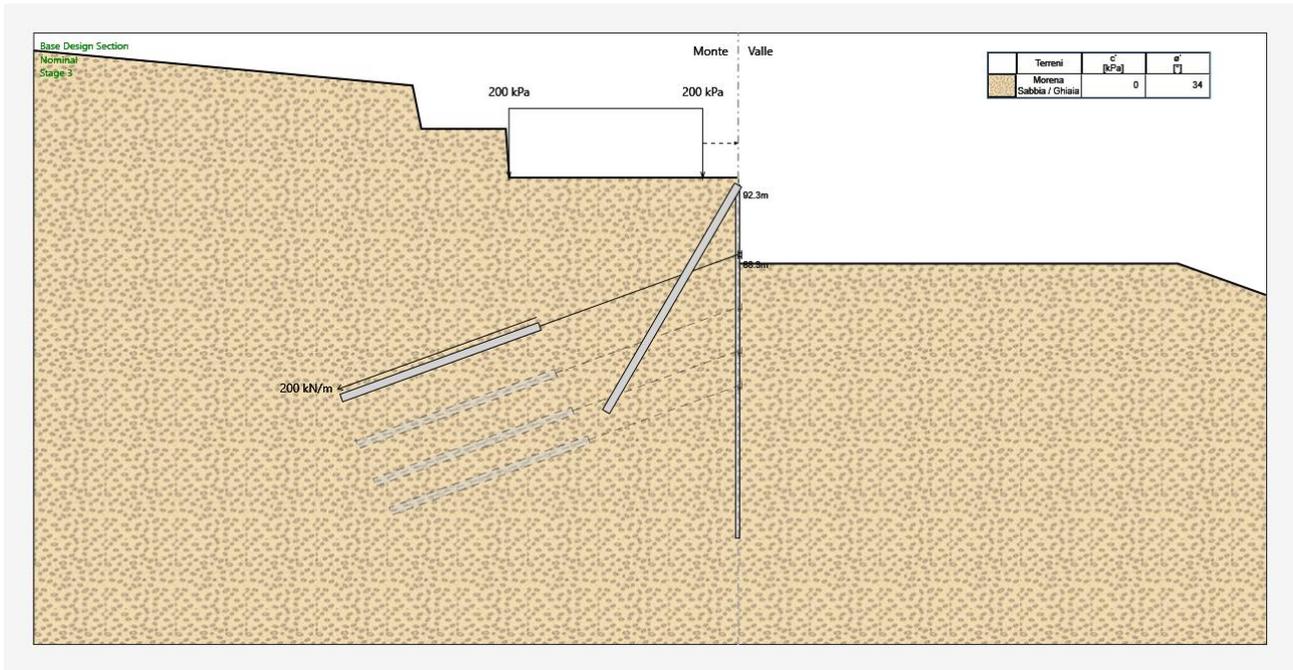
Seguono gli schemi grafici di ogni fase di calcolo del programma "ParatiePlus".



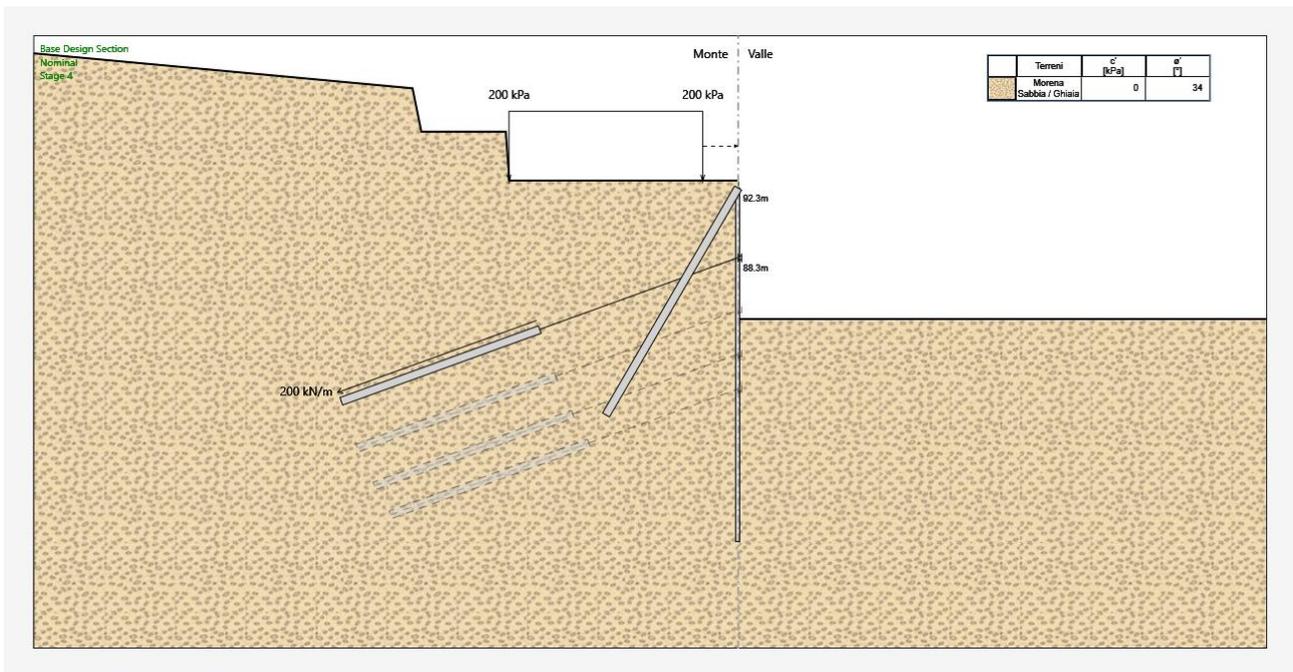
FASE 1: FASE GEOSTATICA DI INIZIALIZZAZIONE: REALIZZAZIONE MICROPALI E TIRANTI PASSIVI



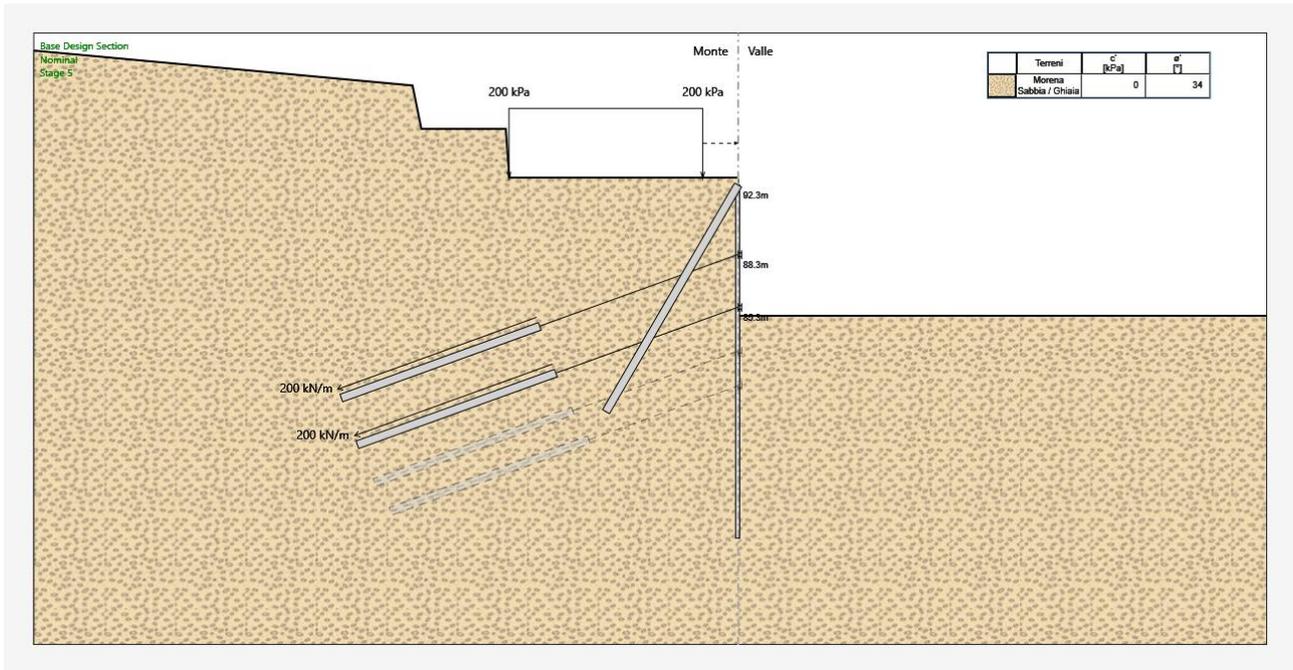
FASE 2: SCAVO FINO QUOTA -0.50 M DALLA 1° FILA DI TIRANTI



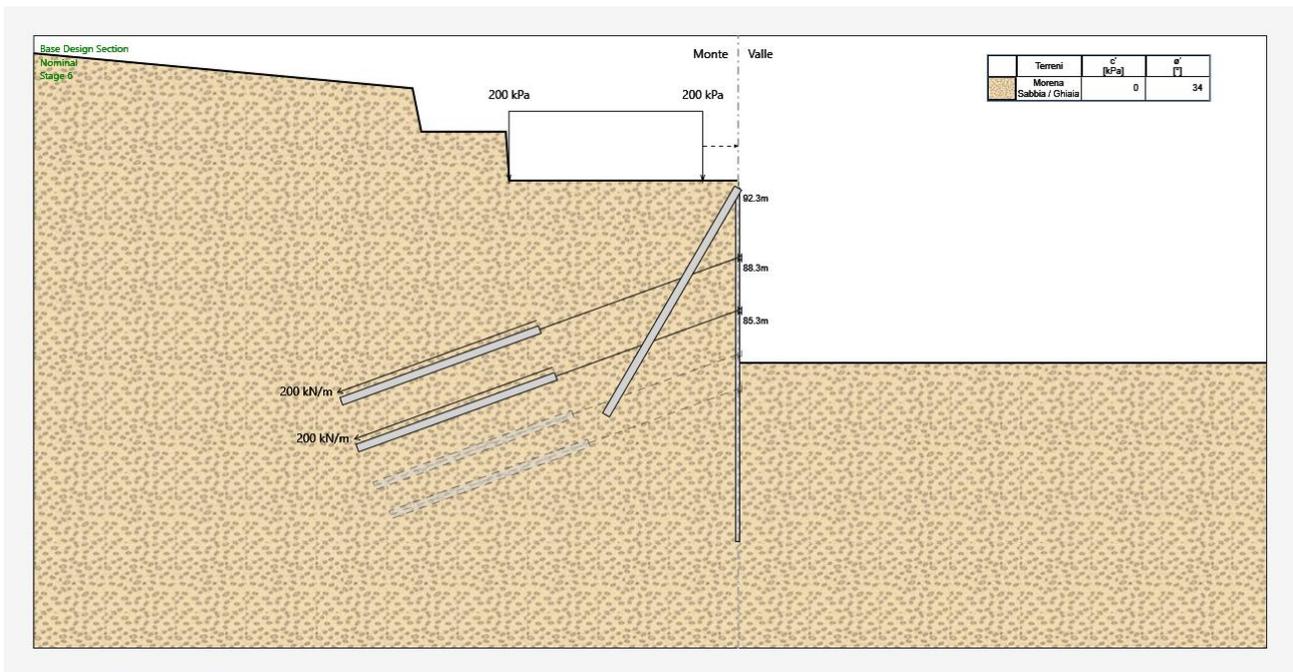
FASE 3: TESATURA DELLA 1° FILA DI TIRANTI



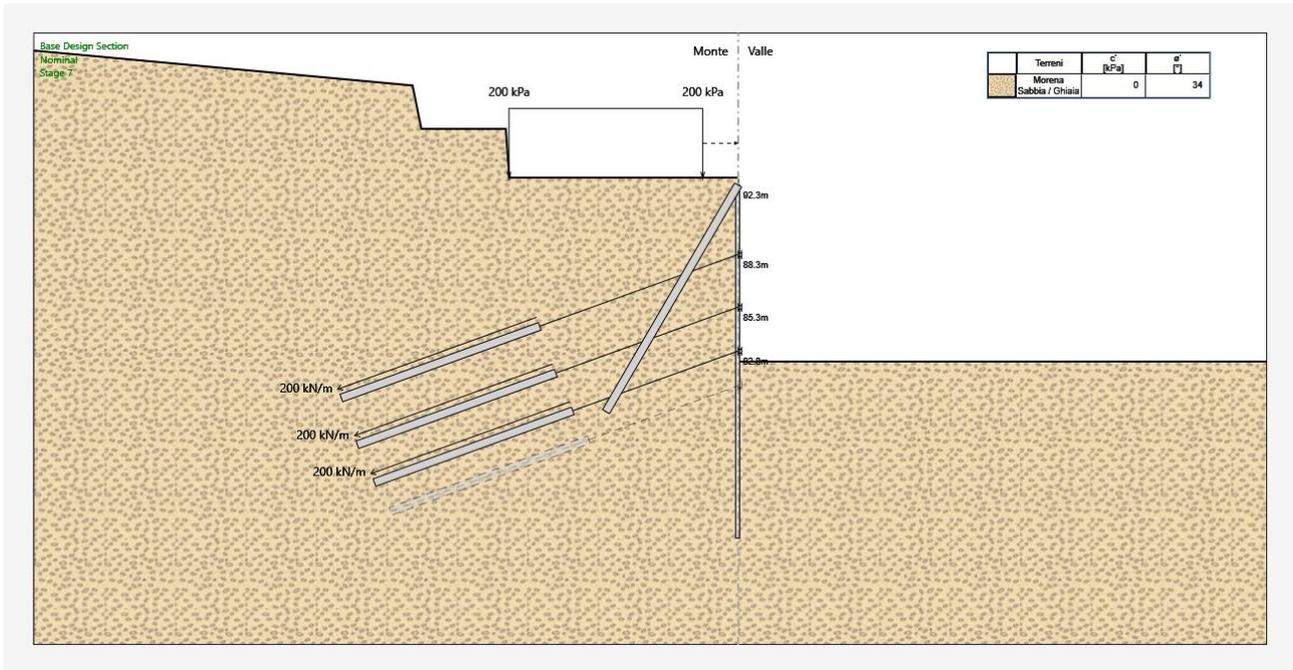
FASE 4: SCAVO FINO QUOTA -0.50 M DALLA 2° FILA DI TIRANTI



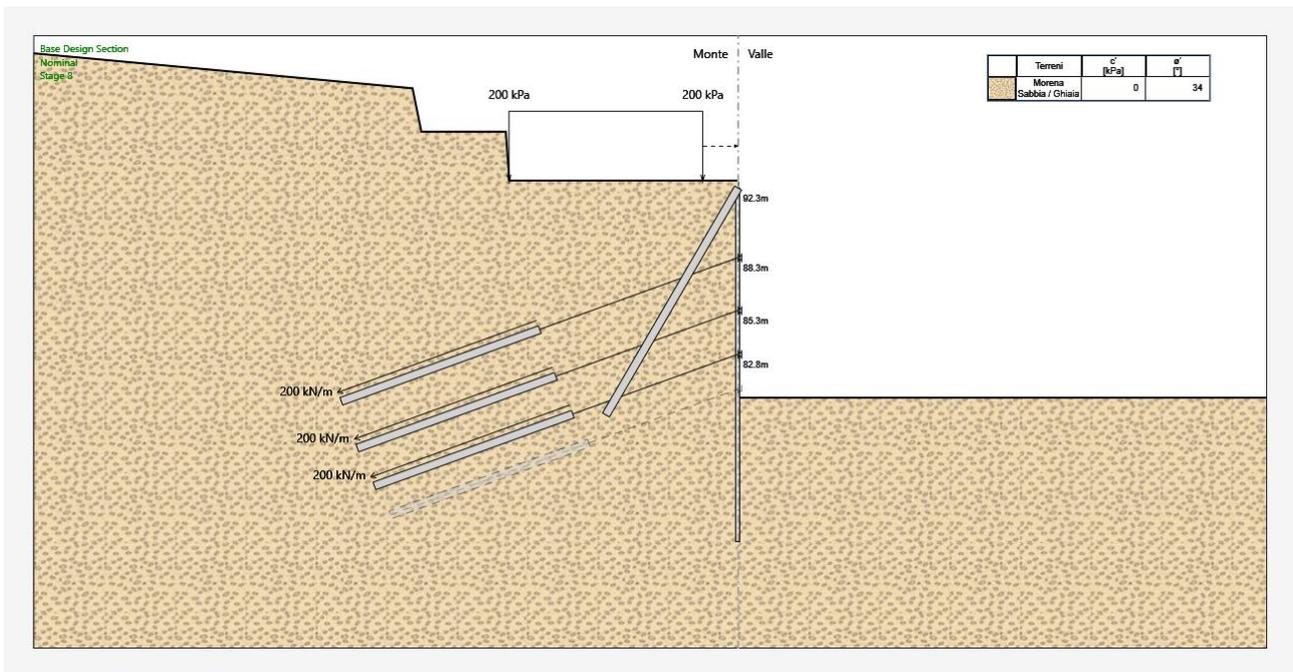
FASE 5: TESATURA DELLA 2° FILA DI TIRANTI



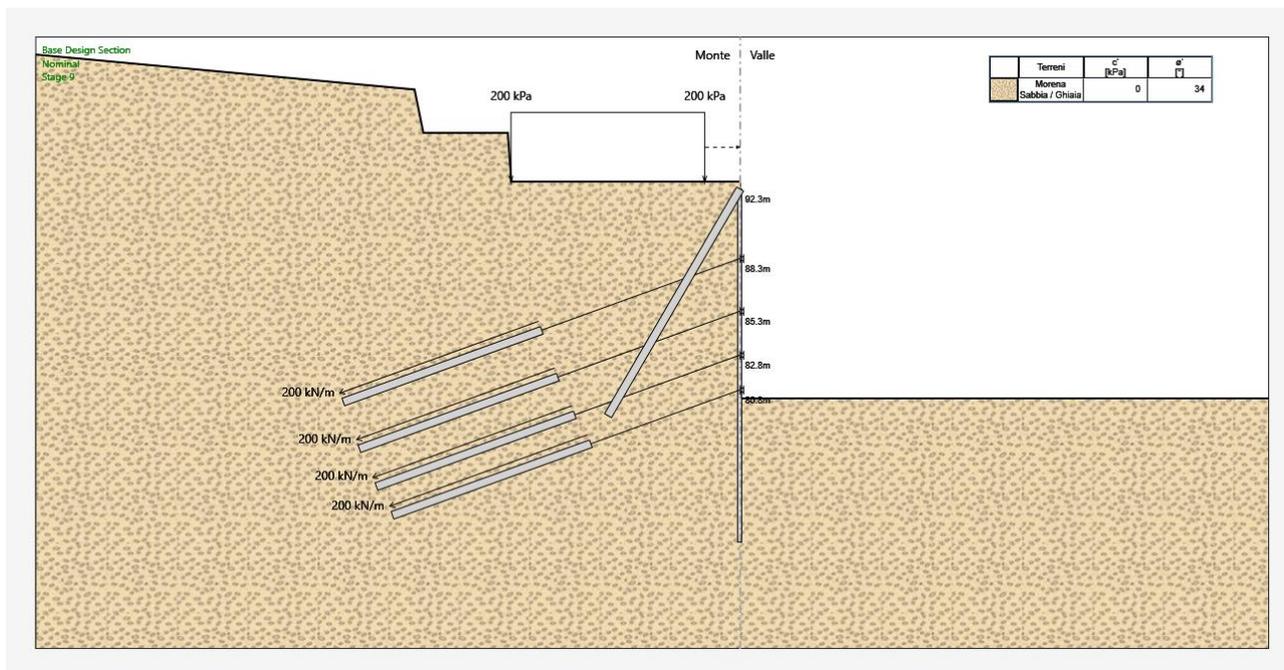
FASE 6: SCAVO FINO QUOTA -0.50 M DALLA 3° FILA DI TIRANTI



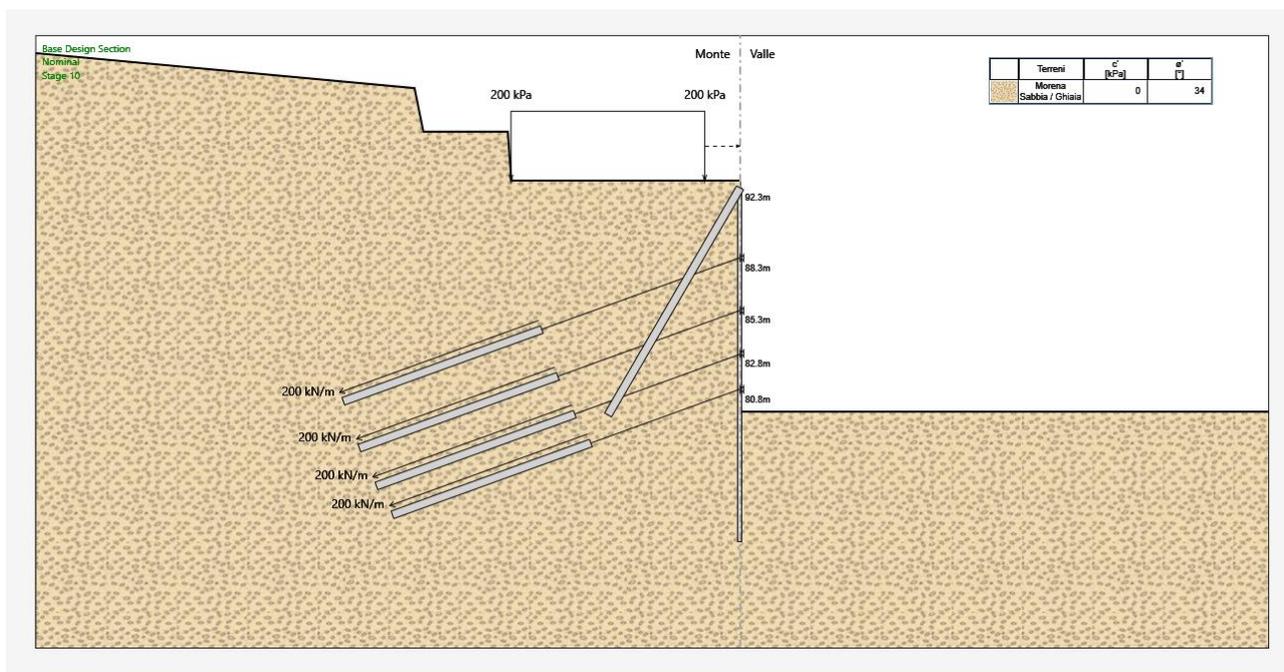
FASE 7: TESATURA DELLA 3° FILA DI TIRANTI



FASE 8: SCAVO FINO QUOTA -0.50 M DALLA 4° FILA DI TIRANTI



FASE 9: TESATURA DELLA 4° FILA DI TIRANTI



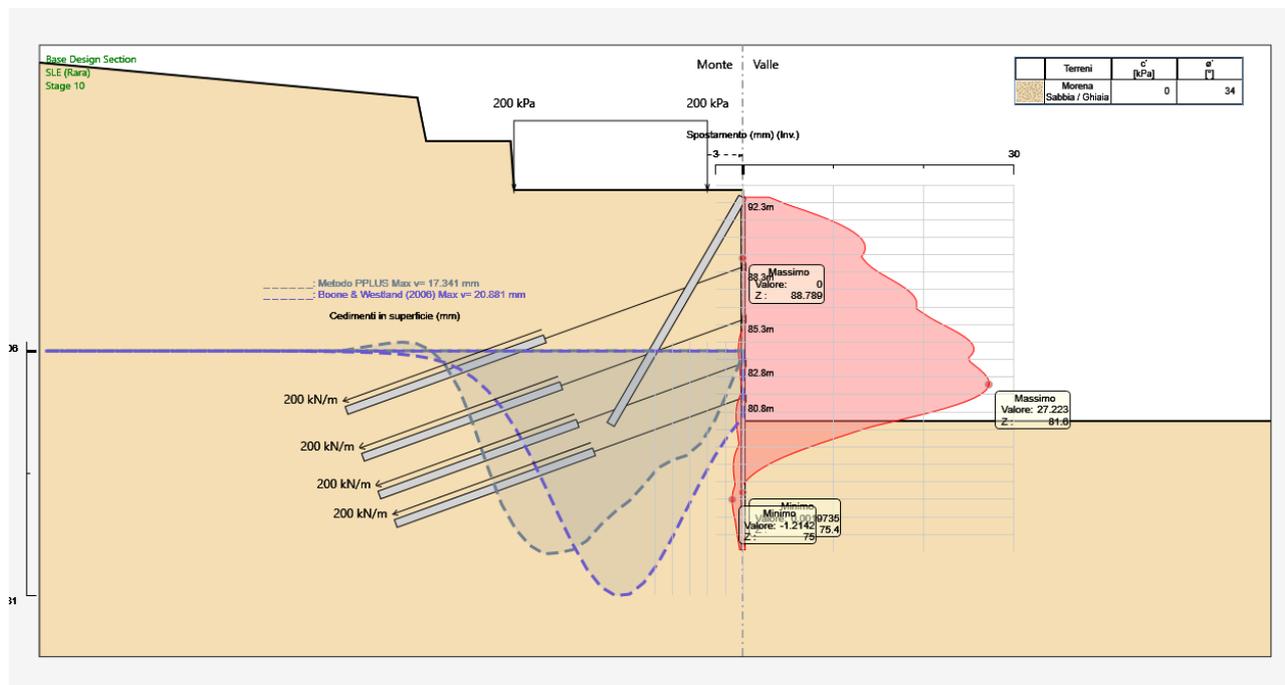
FASE 10: SCAVO FINO ALLA QUOTA DEFINITIVA PREVISTA

8.2 RISULTATI GRAFICI

8.2.1 DEFORMATE

Le deformate, espresse in mm, sono visualizzate per l'involuppo di tutte le fasi della combinazione caratteristica (rara).

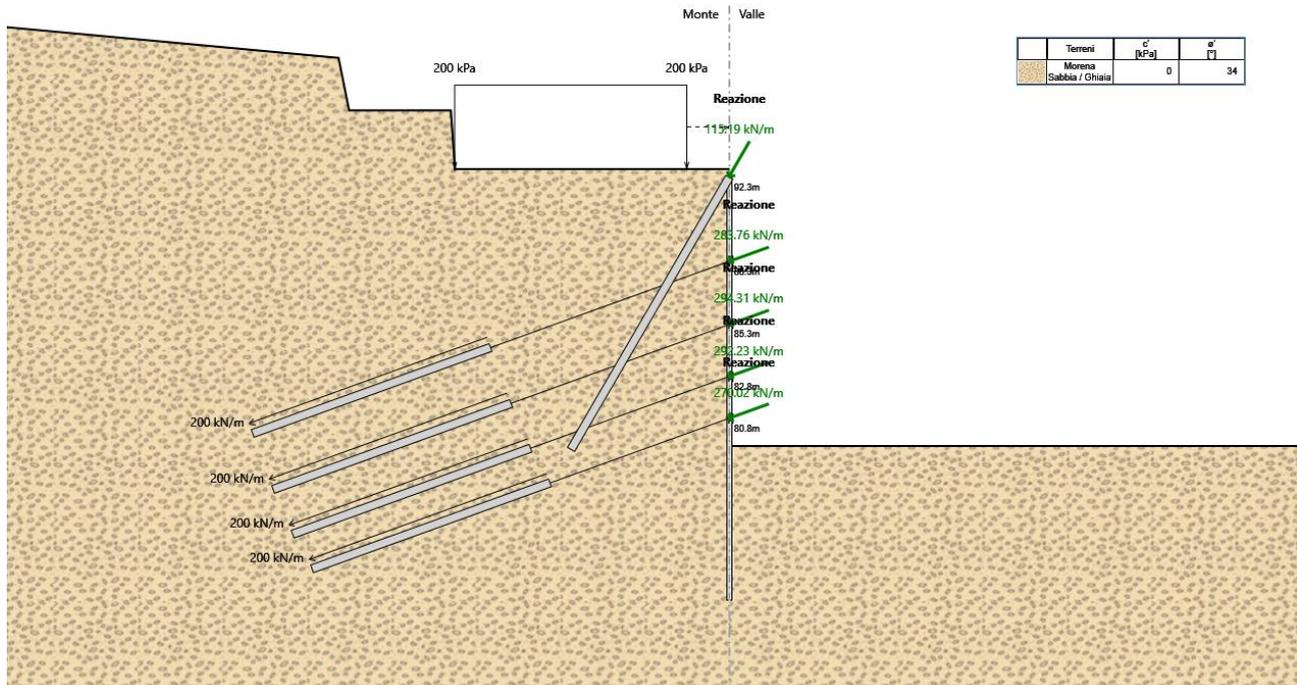
Viene riportato anche il diagramma dei cedimenti verticali, per l'ultima fase di calcolo; il calcolo dei cedimenti è effettuato sia con il metodo proprio di ParatiePlus (Nova) che con il metodo di Boone e Westland (2005).



INVILUPPO FASI 1-10: COMBINAZIONE RARA - DEFORMATA, CEDIMENTI SUPERFICIALI

8.2.2 REAZIONI (TIRANTI)

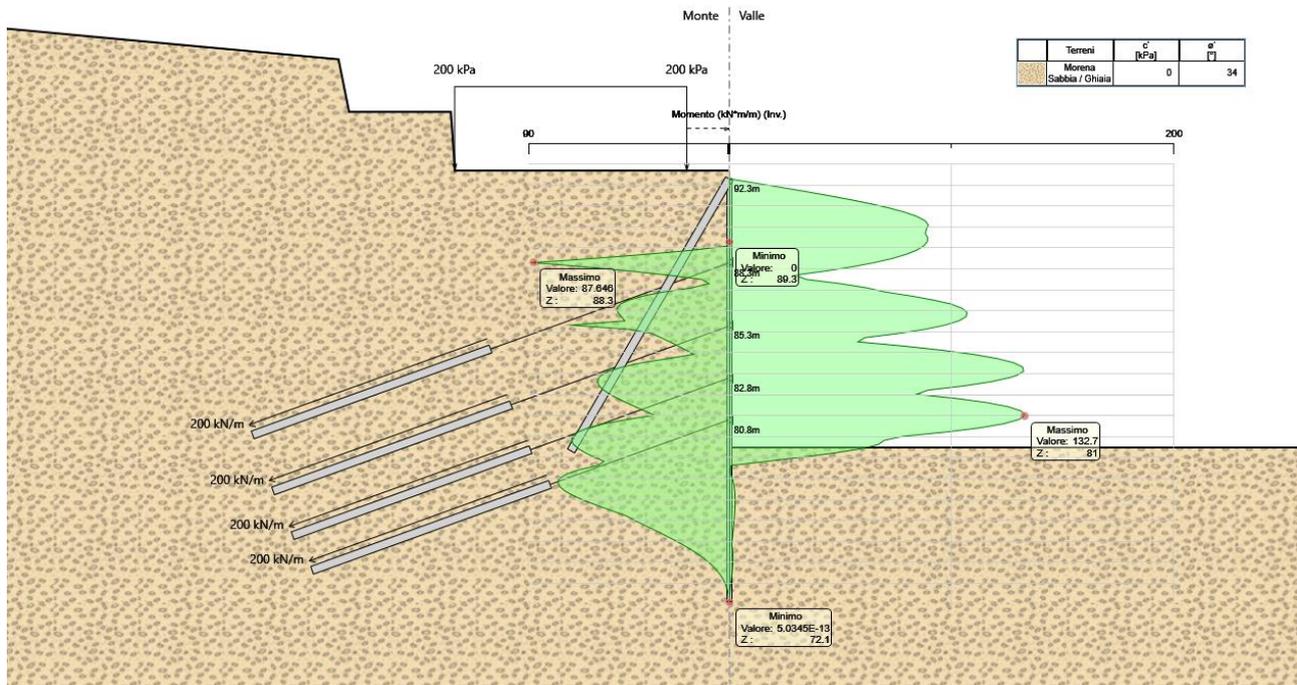
I valori delle reazioni ai tiranti sono espressi in kN/ml per gli involuppi delle combinazioni allo stato limite ultimo: STR: A1+M1+R1.



INVILUPPO FASI 1-10: COMBINAZIONE STR (A1+M1+R1) - REAZIONI TIRANTI

8.2.3 MOMENTI FLETTENTI SUI MICROPALI

I momenti flettenti sulle strutture sono espressi in kNm/ml per gli involuppi delle combinazioni allo stato limite ultimo: STR: A1+M1+R1.



INVILUPPO FASI 1-10: COMBINAZIONE STR (A1+M1+R1) - MOMENTI FLETTENTI

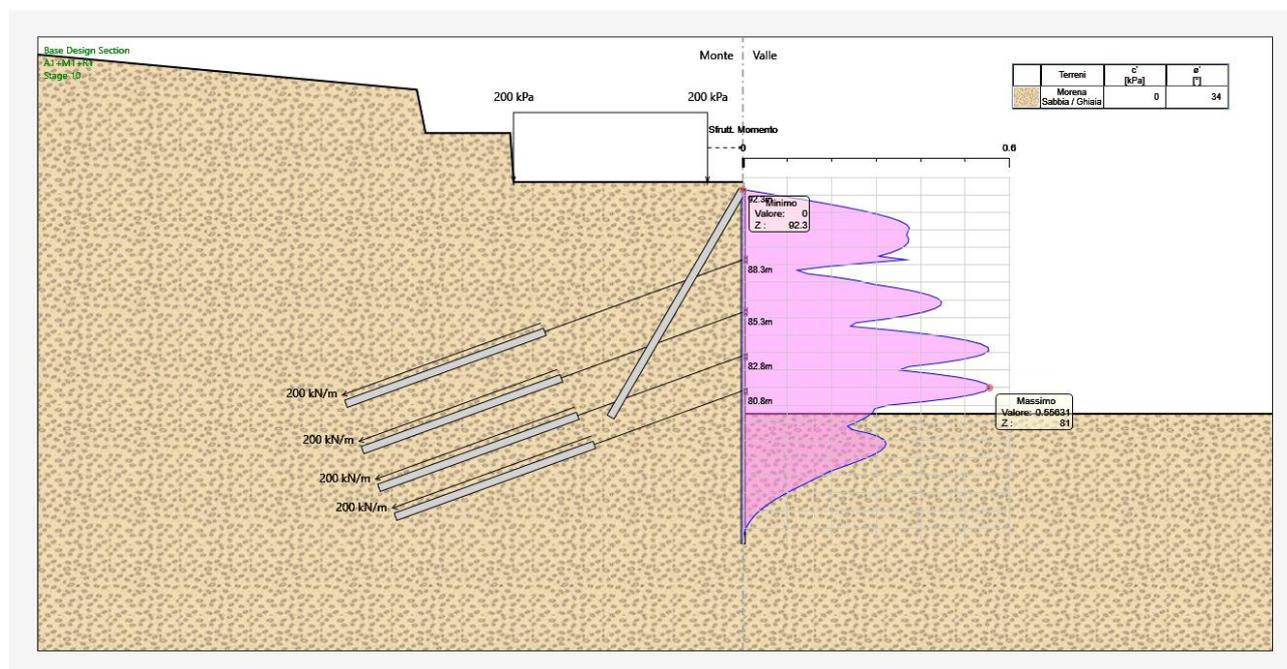
8.3.1 VERIFICHE STRUTTURALI MICROPALI: VERIFICHE A FLESSIONE E TAGLIO

Le verifiche sono svolte automaticamente dal programma di calcolo considerando le sollecitazioni statiche e sismiche derivate dalle combinazioni allo stato limite ultimo: STR: (A1+M1+R1).

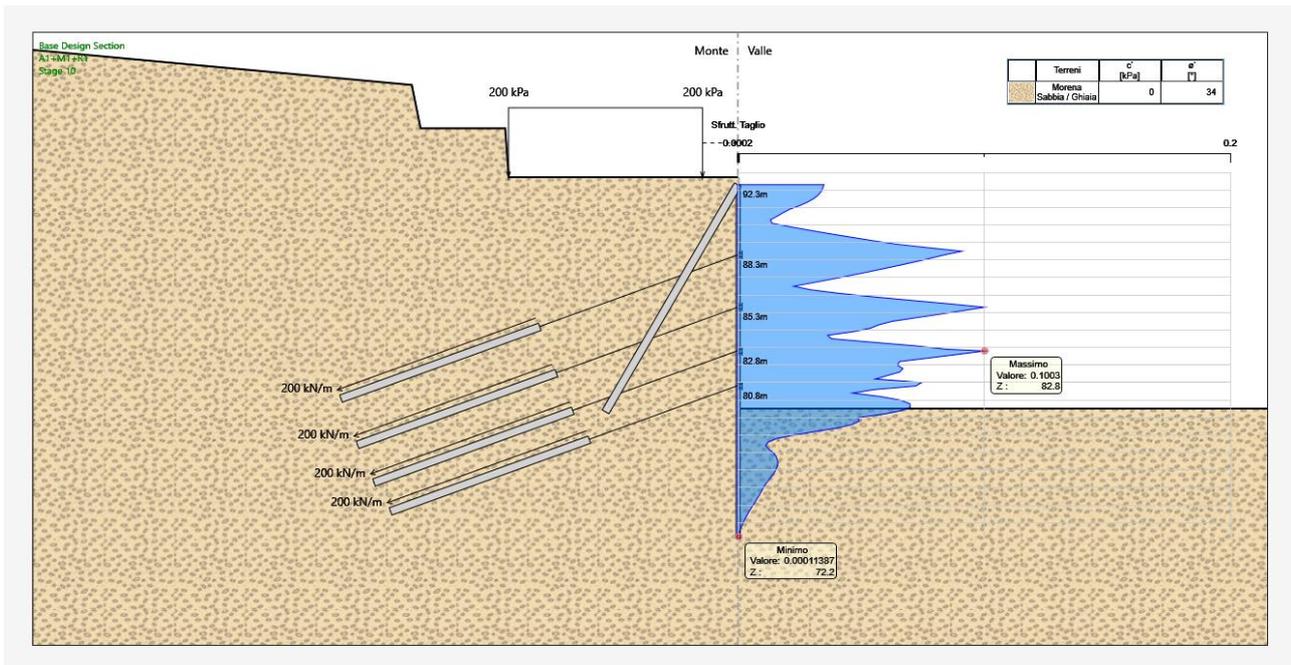
Seguono i diagrammi dei tassi di sfruttamento TS a flessione e a taglio della resistenza dei micropali metallici, per le combinazioni allo stato limite ultimo: STR: (A1+M1+R1).

Le verifiche sono soddisfatte se: $TS = \frac{\text{Sollecitazione}}{\text{Resistenza}} \leq 1$

Lo sforzo assiale viene trascurato; nel calcolo del momento resistente $M_{c,Rd}$ non viene considerata l'interazione con la forza di taglio, in quanto in tutti i casi esaminati il taglio di calcolo associato al momento flettente è sempre inferiore a metà della resistenza di calcolo a taglio $V_{c,Rd}$.



TS FLESSIONE: COMB. SLU: STR (A1+M1+R1); INVILUPPO FASI 1÷10: $TS_{MAX} = 0.556 (<1)$



TS TAGLIO: COMB. SLU: STR (A1+M1+R1); INVILUPPO FASI 1÷10: $TS_{MAX} = 0.100 (<1)$

Verifica analitica: per la combinazione STR (A1+M1+R1) si è ottenuto per il singolo palo:

- . sforzo assiale: trascurabile
- momento flettente: $M_{Ed} = 132.7 \times 0.40 = 53.08 \text{ kNm}$
- sforzo di taglio: $V_{Ed} = 164.3 \times 0.40 = 65.71 \text{ kN}$

Segue tabulato della verifica analitica realizzata con apposito foglio di calcolo.

VERIFICA DI RESISTENZA SEZIONE TUBOLARE

Fattore parziale di resistenza delle sezioni:	$\gamma_{M0} =$	1.05
Tensione caratteristica di snervamento acciaio:		
spessore $t \leq 40$ mm:	$f_{yk} =$	355.00 N/mm²
spessore $40 \text{ mm} < t \leq 80$ mm:	$f_{yk} =$	335.00 N/mm²
Diametro esterno:	$d =$	177.8 mm
Spessore nominale:	$t =$	10.0 mm
Classificazione sezione:		Classe 1 (compatta)
Massa:	$P =$	41.38 kg/m
Area sezione metallica:	$A =$	5272 mm ²
Area resistente a taglio:	$A_v =$	3356 mm ²
Momento d'inerzia elastico:	$J =$	18619818 mm ⁴
Raggio d'inerzia:	$i =$	59.4 mm
Modulo di resistenza elastico:	$W_e =$	209447 mm ³
Modulo di resistenza plastico:	$W_p =$	281893 mm ³
Resistenza di calcolo a compressione:	$N_{c,Rd} =$	1782.30 kN
Resistenza di calcolo a flessione:	$M_{c,Rd} =$	95.31 kN.m
Resistenza di calcolo a taglio:	$V_{c,Rd} =$	655.09 kN
Verifica di resistenza combinata assiale/flessione/taglio:		
Sforzo assiale di progetto:	$N_{Ed} =$	0 kN
Sforzo tagliante di progetto:	$V_{Ed} =$	65.71 kN
Momento flettente di progetto:	$M_{Ed} =$	53.08 kN.m
Tensione di snervamento ridotta per interazione tra flessione e taglio (se la sollecitazione di taglio supera il 50% della resistenza):	$f_{y,red} =$	355.00 N/mm ²
Verifica combinata assiale/flessione: $N_{Ed} / N_{c,Rd} + M_{Ed} / M_{c,Rd} \leq 1$:		0.557 (≤ 1 : VERIFICATO)

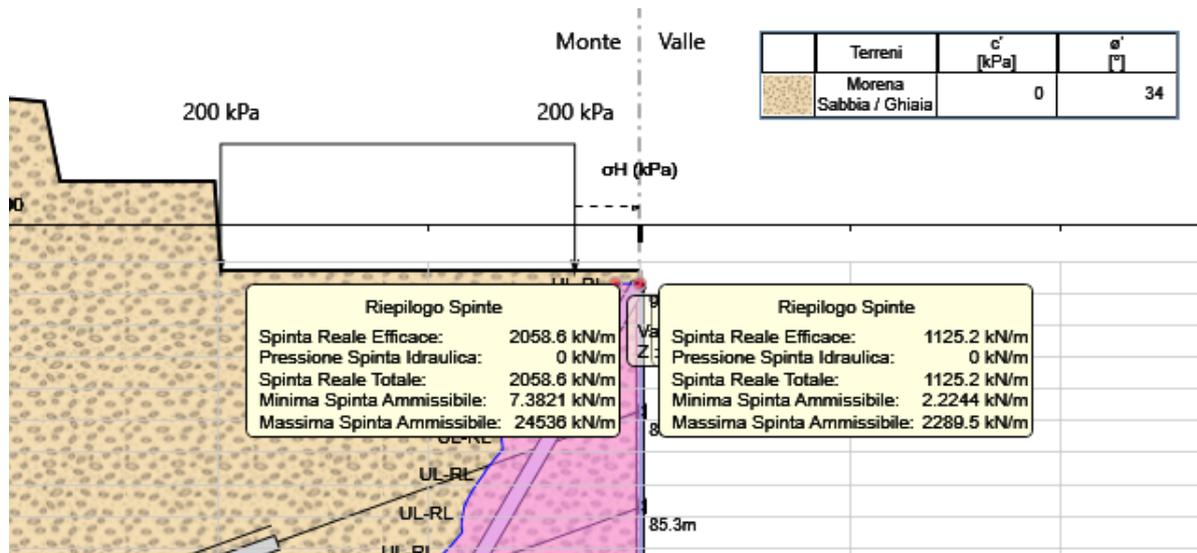
8.3.2 VERIFICHE GEOTECNICHE: VERIFICA DI STABILITÀ DEL FONDO SCAVO

La verifica di stabilità del lato a valle della paratia è effettuata considerando il rispetto dei due seguenti criteri:

- 1) Il calcolo non lineare della paratia deve convergere a una soluzione equilibrata e congruente;
- 2) Sul lato di scavo (valle) la spinta efficace mobilitata deve essere minore della spinta passiva disponibile, quindi il loro rapporto deve essere < 1 .

Dall'esame dei tabulati di calcolo, in particolare quello relativo a GEO (A2+M2+R1), combinazione più gravosa (ved. p. 8.2.5), si desume:

- 1) Il calcolo non lineare converge a una soluzione equilibrata per tutte le fasi di calcolo.
- 2) Il rapporto tra la spinta mobilitata e la spinta passiva possibile assume il massimo nella fase 10 con il valore (vedi figura seguente):



$$\frac{\text{Spinta Reale Totale}}{\text{Massima Spinta Ammissibile}} = \frac{1125.2}{2289.5} = 0.49 \quad (< 1: \text{verificato})$$

8.3.3 MICROPALI INCLINATI: VERIFICA STRUTTURALE E ALLO SFILAMENTO DELL'ANCORAGGIO

La verifica viene svolta considerando uno stato limite GEO (A1+M1+R3).

La resistenza dell'ancoraggio viene calcolata con il metodo di Bustamante-Doix (Rif. Bustamante M., Doix B. (1985): "Une méthode pour le calcul des tirants et des micropieux injectés", Bull. Liaison Lab. Ponts et Chaussées, n. 140, pagg. 75-95).

Dati geometrici:

- lunghezza micropalo: $L = 15 \text{ m}$
- diametro perforazione: $\varnothing = 240 \text{ mm}$
- sollecitazione massima (Fase 3): $N_{Ed} = 115.19 \times 2.40 = 276.5 \text{ kN}$
- resistenza assiale: $R_k = 52.7 \times 338/10 = 1781 \text{ kN}$

Per: - tipo di terreno: sabbioso/ghiaioso
 - tipo di iniezione: a gravità (bassa pressione)

si ha (Bustamante-Doix):

- resistenza unitaria limite: $q_s = 84 \text{ kN/m}^2$
- fattore di incremento del diametro: $\alpha = 1$
- coefficiente parziale resistenza caratteristica (tiranti provvisori): $\gamma_{Ra,t} = 1.1$
- fattore di correlazione (1 sondaggio): $\xi_{a3} = 1.8$

Si determina quindi:

- resistenza limite: $R_{lim} = \alpha \pi \varnothing \Sigma(L q_s) = 1 \times \pi \times 0.24 \times 15 \times 84 = 950 \text{ kN}$

- resistenza caratteristica: $R_{ck} = \frac{R_{lim}}{\xi_{a3}} = \frac{950}{1.8} = 528 \text{ kN}$

- resistenza di progetto: $R_{cd} = \frac{R_{ck}}{\gamma_{Ra,t}} = \frac{528}{1.1} = 480 \text{ kN}$

Verifica di resistenza del micropalo: $R_k > N_{Ed} : 1781 \text{ kN} > 276.5 \text{ kN} : \text{Verificato.}$

Verifica di resistenza dell'ancoraggio: $R_{cd} > N_{Ed} : 480 \text{ kN} > 276.5 \text{ kN} : \text{Verificato.}$

8.3.4 TIRANTI ATTIVI : VERIFICA STRUTTURALE E ALLO SFILAMENTO DELL'ANCORAGGIO

La verifica viene svolta considerando uno stato limite GEO di tipo A1+M1+R3.

La resistenza del bulbo di ancoraggio dei tiranti attivi viene calcolata con il metodo di Bustamante-Doix (Rif. Bustamante M., Doix B. (1985): "Une méthode pour le calcul des tirants et des micropieux injectés", Bull. Liaison Lab. Ponts et Chaussées, n. 140, pagg. 75-95).

Si verifica inoltre, nell'ottica della gerarchia delle resistenze, che la resistenza caratteristica allo snervamento del tirante sia maggiore della resistenza a sfilamento di progetto dell'ancoraggio (p. 6.6.2. NTC 2018).

Dati geometrici:

- lunghezza bulbo di ancoraggio: $L = 12 \text{ m}$

- diametro perforazione: $\varnothing = 160 \text{ mm}$

- sollecitazione massima (Tirante 2, Fase 6): $N_{Ed} = 294.3 \times 2.40 = 706 \text{ kN}$

- resistenza assiale tirante (4x0.6"): $R_k = 4 \times 139 \times 1670/10^3 = 928 \text{ kN}$

Per: - tipo di terreno: sabbioso/ghiaioso

- tipo di iniezione: ripetute e selettive ad alta pressione (IRS)

si ha (Bustamante-Doix):

resistenza unitaria limite: $q_s = 179 \text{ kN/m}^2$

- fattore di incremento del diametro: $\alpha = 1.4$

- coefficiente parziale resistenza caratteristica (tiranti provvisori): $\gamma_{Ra,t} = 1.1$

- fattore di correlazione (1 sondaggio): $\xi_{a3} = 1.8$

Si determina quindi per il bulbo di ancoraggio:

- resistenza limite: $R_{lim} = \alpha \pi \varnothing \Sigma(L q_s) = 1.4 \times \pi \times 0.16 \times 12 \times 179 = 1512 \text{ kN}$

- resistenza caratteristica: $R_{ck} = \frac{R_{lim}}{\xi_{a3}} = \frac{1512}{1.8} = 840 \text{ kN}$

- resistenza di progetto: $R_{cd} = \frac{R_{ck}}{\gamma_{Ra,t}} = \frac{840}{1.1} = 763 \text{ kN}$

Verifica di resistenza del tirante: $R_k > N_{Ed} : 928 \text{ kN} > 706 \text{ kN} : \text{Verificato.}$

Verifica di resistenza dell'ancoraggio: $R_{cd} > N_{Ed} : 763 \text{ kN} > 706 \text{ kN} : \text{Verificato.}$

Verifica della gerarchia delle resistenze: $R_k > R_{cd} : 928 \text{ kN} > 763 \text{ kN} : \text{Verificato.}$

8.3.5 TRAVI DI RIPARTIZIONE - VERIFICA STRUTTURALE A FLESSIONE E TAGLIO

Le travi di ripartizione dei tiranti sono considerate come continue su più appoggi aventi luce $L = 2.40$ m, supposte caricate uniformemente dalla reazione orizzontale del tirante.

Le sollecitazioni massime allo stato limite ultimo risultano per il singolo profilato:

- sforzo di taglio: $V_{Ed} = 294.3 \times \cos 20^\circ \times 2.40 / 4 = 165.9$ kN
- momento flettente: $M_{Ed} = 294.3 \times \cos 20^\circ \times 2.40^2 / 10 / 2 = 79.6$ kNm

Caratteristiche di resistenza del profilato HE 220 A, acciaio S275:

- profilato compatto (Classe 2)
- resistenza caratteristica: $f_{yk} = 275$ N/mm²
- area resistente a taglio: $A_{yz} = 20.67$ cm²
- modulo di resistenza plastico: $W_{pl,y} = 568.5$ cm³
- resistenza a taglio: $V_{c,Rd} = \frac{A_{yz} \cdot f_{yk}}{\sqrt{3} \cdot \gamma_{M0}} = \frac{20.67 \cdot 275}{\sqrt{3} \cdot 1.05} \cdot \frac{1}{10} = 312$ kN
- verifica di resistenza a taglio: $\frac{V_{Ed}}{V_{c,Rd}} = \frac{165.9}{312} = 0.53$ (< 1 : Verificato)

Dato che $V_{Ed} > 0.5 V_{c,Rd}$ occorre considerare l'influenza del taglio sulla resistenza a flessione:

- fattore d'influenza: $\rho = \left(\frac{2 \cdot V_{Ed}}{V_{c,Rd}} - 1 \right)^2 = 0.004$
- resistenza a flessione e taglio:

$$M_{y,V,Rd} = \frac{\left(W_{pl,y} - \frac{\rho \cdot A_{yz}^2}{4 \cdot t_w} \right) \cdot f_{yk}}{\gamma_{M0}} = \frac{\left(568.5 - \frac{0.004 \cdot 20.67^2}{4 \cdot 0.7} \right) \cdot 275}{1.05} \cdot 10^{-3} = 148.7$$
 kNm
- verifica di resistenza a flessione: $\frac{M_{Ed}}{M_{y,V,Rd}} = \frac{79.6}{148.7} = 0.535$ (< 1 : Verificato)

8.3.6 CORDOLO DI TESTA - VERIFICA STRUTTURALE A FLESSIONE E TAGLIO

Il cordolo è considerato come trave continua su più appoggi aventi luce $L = 2.40$ m, supposto caricato uniformemente dalla reazione orizzontale del tirante passivo.

Le sollecitazioni massime allo stato limite ultimo risultano:

- sforzo di taglio: $V_{Ed} = 115.2 \times \cos 60^\circ \times 2.40 / 2 = 69.1$ kN
- momento flettente: $M_{Ed} = 115.2 \times \cos 60^\circ \times 2.40^2 / 10 = 33.2$ kNm

Dati sezione: base: $b = 500$ mm
 altezza: $h = 700$ mm
 Dati armature: $2 \times 3 \text{ } \varnothing 16$ ric. = 50 mm

Verifica a flessione: momento resistente: $M_{Rd} = 149.80$ kNm ($M_{Rd} > M_{Ed}$: Verificato)

Verifica a taglio (solo cls.): taglio resistente: $V_{Rd} = 120.5$ kN ($V_{Rd} > V_{Ed}$: Verificato)

Segue tabulato della verifica eseguita con apposito foglio di calcolo.

CORDOLO DI TESTA PARATIA

Combinazioni: Momento massimo

Ordinata rispetto a cui sono calcolate le sollecitazioni ys= 350.00 [mm]
 Sforzo normale agente di calcolo Nsd= 0.00 [kN]
 Momento agente di calcolo (rispetto a y=ys) Msd(y=ys)= 33.20 [kNm]
 Momento agente di calcolo (rispetto al baricentro della sezione: yg= 350.00 mm) Msd(y=yg)= 33.20 [kNm]

DATI GEOMETRICI SEZIONE

Calcestruzzo trave: modello parabola-rettangolo

Resistenza caratteristica cilindrica del calcestruzzo trave fck= 25.00 [N/mm²]
 Coefficiente riduttivo per resistenze di lunga durata αcc= 0.85
 Coefficiente parziale di sicurezza calcestruzzo trave γc= 1.50
 Resistenza di calcolo a compressione del calcestruzzo trave fcd= 14.167 [N/mm²]
 Resistenza di calcolo a trazione del calcestruzzo trave fctd= 1.197 [N/mm²]

Elementi	b inf [mm]	h [mm]	b sup [mm]	y inf [mm]	y sup [mm]	ε inf ‰	ε sup ‰	σ inf [N/mm ²]	σ sup [N/mm ²]	NRd(y=0) [kN]	MRd(y=0) [kNm]
1	500.0	700.0	500.0	0.0	700.0	48.9927	-3.5000	0.000	-14.167	-267.63	182.15
2	0.0	0.0	0.0	700.0	700.0	0.0000	0.0000	0.000	0.000	0.00	0.00
3	0.0	0.0	0.0	700.0	700.0	0.0000	0.0000	0.000	0.000	0.00	0.00
4	0.0	0.0	0.0	700.0	700.0	0.0000	0.0000	0.000	0.000	0.00	0.00
5	0.0	0.0	0.0	700.0	700.0	0.0000	0.0000	0.000	0.000	0.00	0.00
6	0.0	0.0	0.0	700.0	700.0	0.0000	0.0000	0.000	0.000	0.00	0.00
7	0.0	0.0	0.0	700.0	700.0	0.0000	0.0000	0.000	0.000	0.00	0.00
8	0.0	0.0	0.0	700.0	700.0	0.0000	0.0000	0.000	0.000	0.00	0.00
9	0.0	0.0	0.0	700.0	700.0	0.0000	0.0000	0.000	0.000	0.00	0.00
10	0.0	0.0	0.0	700.0	700.0	0.0000	0.0000	0.000	0.000	0.00	0.00
totali		700.0		0.0	700.0					-267.63	182.15

Armatura ordinaria longitudinale: modello elastico-plastico indefinito

Modulo di elasticità acciaio Es= 210000.00 [N/mm²]
 Resistenza caratteristica acciaio ordinario fyk= 450.00 [N/mm²]
 Coefficiente parziale di sicurezza acciaio ordinario γs= 1.15
 Deformazione massima di calcolo ε ud= 67.50 ‰
 Resistenza di calcolo acciaio ordinario fyd= 391.30 [N/mm²]

Armature	Numero	Diametro [mm]	livello [mm]	area [mm ²]	ε yd ‰	ε acc ‰	σ acc [N/mm ²]	Nrd(y=0) [kN]	Mrd(y=0) [kNm]
strato	ferri								
1	3	16	50.0	603.19	1.8634	45.2432	391.30	236.03	-11.80
2	0	0	0.0	0.00	0.0000	0.0000	0.00	0.00	0.00
3	0	0	0.0	0.00	0.0000	0.0000	0.00	0.00	0.00
4	0	0	0.0	0.00	0.0000	0.0000	0.00	0.00	0.00
5	0	0	0.0	0.00	0.0000	0.0000	0.00	0.00	0.00
6	0	0	0.0	0.00	0.0000	0.0000	0.00	0.00	0.00
7	0	0	0.0	0.00	0.0000	0.0000	0.00	0.00	0.00
8	0	0	0.0	0.00	0.0000	0.0000	0.00	0.00	0.00
9	0	0	0.0	0.00	0.0000	0.0000	0.00	0.00	0.00
10	3	16	650.0	603.19	1.8634	0.2495	52.39	31.60	-20.54
totali			50.0	1206.37	1.86335	45.2432		267.63	-32.34

VERIFICA ALLO STATO LIMITE ULTIMO: MOMENTO FLETTENTE - SFORZO NORMALE

Profondità relativa dell'asse neutro (x/d) ξ= 0.0718
 Altezza totale della sezione h= 700.0 [mm]
 Copriferro armatura tesa c= 50.0 [mm]
 Altezza utile (h-c) d= 650.0 [mm]
 Profondità dell'asse neutro x= 46.7 [mm]
 Rapporto tra copriferro armatura tesa ed altezza utile (c/d) δ= 0.0769
 Braccio della coppia interna z= 559.74 [mm]
 Deformazione massima nel calcestruzzo ε cls= -3.5000 ‰ in y= 700.00 [mm]
 Deformazione massima nell'acciaio ordinario teso ε acc= 45.2432 ‰ in y= 50.00 [mm]
 Deformazione massima nell'acciaio di precompressione teso ε ap= 0.0000 ‰ in y= [mm]
 Campo di deformazione specifica λ= 3
 Parametro di deformazione λ (ε= λ + μ y) λ= 4.899E-02
 Parametro di deformazione μ (ε= λ + μ y) μ= -7.499E-05 [mm⁻¹]
 Sforzo normale resistente (rispetto alla base - y=0) Nrd(y=0)= 0.00 [kN]
 Momento resistente (rispetto alla base - y=0) Mrd(y=0)= 149.80 [kNm]
 Sforzo normale resistente (rispetto a y=ys) Nrd= 0.00 [kN]
 Momento resistente (rispetto a y=ys) Mrd= 149.80 [kNm]
Coefficiente di sicurezza allo stato limite ultimo (Nrd=cost) Mrd/Msd= 4.512

Controlli armatura ordinaria longitudinale massima e minima

Area minima armature tese As,min= 429.15 [mm²]
 Area massima armature tese o compresse As,max= 14000.00 [mm²]
 Area totale armature tese Ast= 1206.37 [mm²] (VERIFICATO: Ast >= As,min E Ast <= As,max)
 Area totale armature compresse Asc= 0.00 [mm²] (VERIFICATO: Asc <= As,max)

VERIFICA ALLO STATO LIMITE ULTIMO: SFORZO DI TAGLIO

Sforzo normale agente di calcolo (compresa precompressione) Nsd= 0.00 [kN]
 Sforzo di taglio agente (carichi esterni) Vd= 69.10 [kN]
 Carichi appesi o indiretti Cad= 0.00 [kN/m]

Distanza della sezione dal bordo di appoggio (verifica solo VRcd se: av <= d; EN 1992-1-1;6.2.1(8)) av= 999999.00 [mm]
 Sezione ad altezza variabile: Inclinazione dei lembi della membratura (p>0 per h crescente con M): p= 0.0000
 Componente di taglio dovuta all'inclinazione dei lembi della membratura Vmd= 0.00 [kN]
 Componente di taglio dovuta all'inclinazione dei cavi di precompressione Vpd= 0.00 [kN]
 Sforzo di taglio agente di calcolo: (Vsd = Vd + Vmd + Vpd) Vsd= 69.10 [kN]

Verifica elementi senza armature trasversali resistenti a taglio

Larghezza (minima) della membratura resistente a taglio bw= 500.00 [mm]
 Altezza utile sezione: d = h - c d= 579.15 [mm]
 Braccio della coppia interna z= 559.74 [mm]
 Area armature longitudinali tese Asl= 1206.37 [mm²]
 Coefficiente: k=1+(200/d)^{0.5} [<=2] k= 1.588
 Coefficiente: Vmin=0.035 * (k^{1.5}) * (fck^{0.5}) Vmin= 0.35008 [N/mm²]
 Rapporto geometrico armatura longitudinale: ρl= Asl / (bw * d) [<=0.02] ρl= 0.00417
 Tensione media di compressione nella sezione: σcp=Nsd/Ac [<=0.2 * fcd] σcp= 0.000 [N/mm²]
Sforzo di taglio resistente Vrd= 120.48 [kN]
Coefficiente di sicurezza allo stato limite ultimo (ρ>= 1; solo calcestruzzo) Vrd/Vsd= 1.744

8.3.7 VERIFICA DI STABILITÀ GLOBALE DELL'INSIEME TERRENO-STRUTTURA

La verifica di stabilità globale del pendio viene svolta facendo riferimento alla sezione più gravosa nella fase finale (10); si considera la Combinazione 2: GEO (A2+M2+R2).

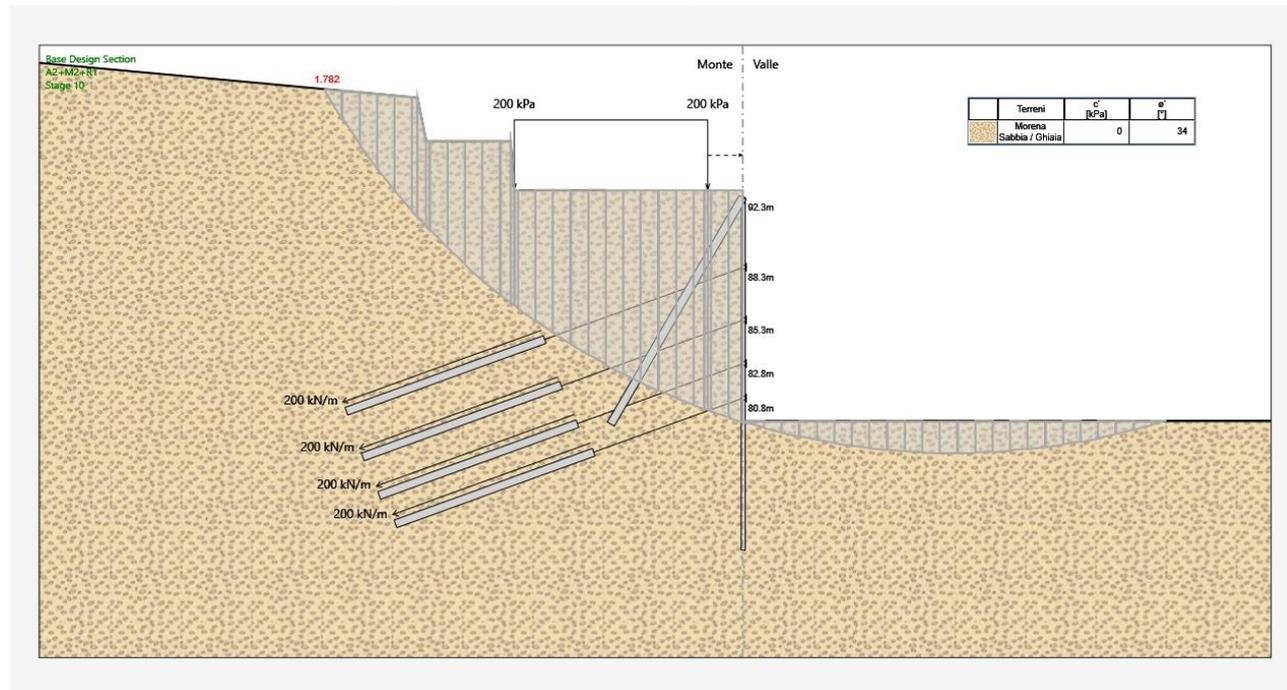
L'analisi viene svolta utilizzando il programma Paratie Plus della Ceas software di Milano.

Nella fattispecie è stato utilizzato il metodo di Bishop semplificato con una generazione semi-automatica di superfici di scorrimento circolari..

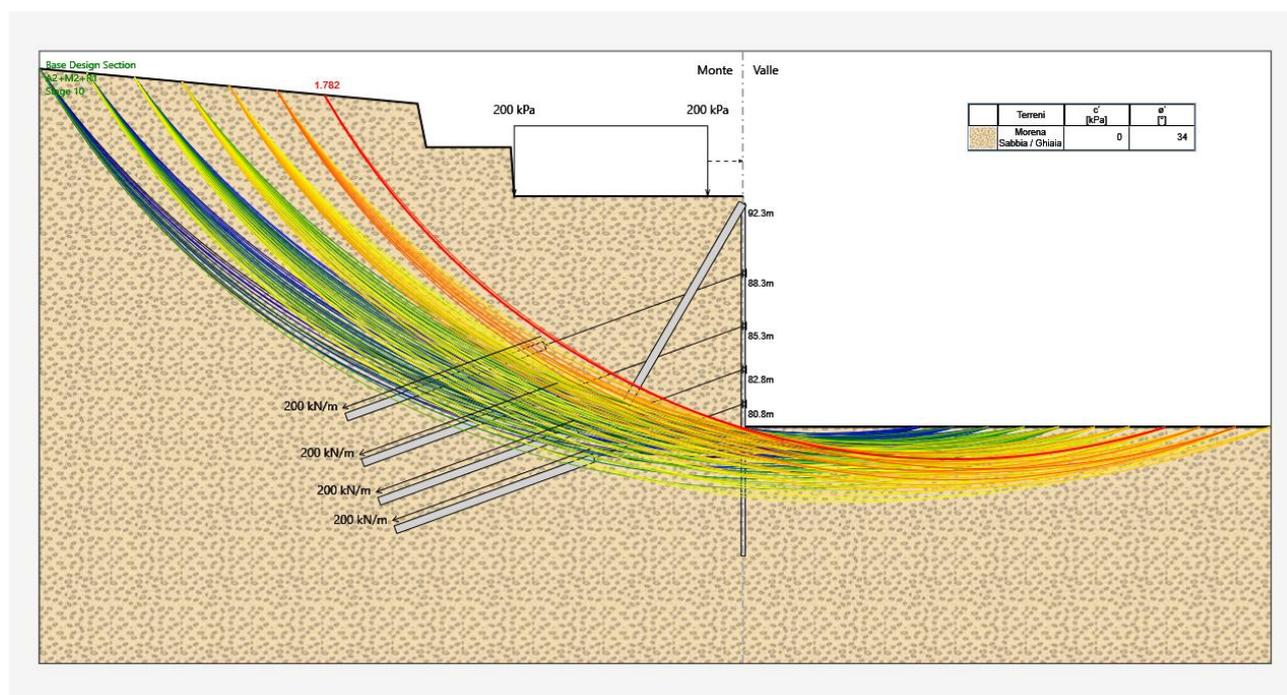
A favore della sicurezza si trascura nel calcolo il contributo della paratia.

Seguono gli schemi grafici del calcolo svolto; il coefficiente di sicurezza minimo risulta:

$$FS_{\min} = 1.782 \quad (FS_{\min} > 1.1: \text{Verificato})$$



VERIFICA DI STABILITÀ GLOBALE - SUPERFICIE CRITICA



VERIFICA DI STABILITÀ GLOBALE - TUTTE LE SUPERFICIE GENERATE.

8.4 VALUTAZIONE DEI DANNI POTENZIALI AGLI EDIFICI

8.4.1 PREMESSE

Per la paratia in oggetto si effettua la valutazione dei cedimenti verticali e degli spostamenti orizzontali a cui saranno soggetti gli edifici interferiti, in particolare l'edificio n° 9 che risulta essere il più vicino allo scavo, a cui segue la valutazione dei danni potenziali e la stima delle categorie di danneggiamento.

A favore di sicurezza per la valutazione del danneggiamento, l'analisi viene eseguita in condizioni di "green field" trascurando cioè la rigidità dell'edificio. La presenza dell'edificio viene tenuta in considerazione mediante un sovraccarico distribuito permanente pari a 200 kN/m² applicato sull'impronta dell'edificio (da 2 m a 13 m di distanza dalla paratia).

Il calcolo dei cedimenti è effettuato con il metodo di Boone e Westland (2005).

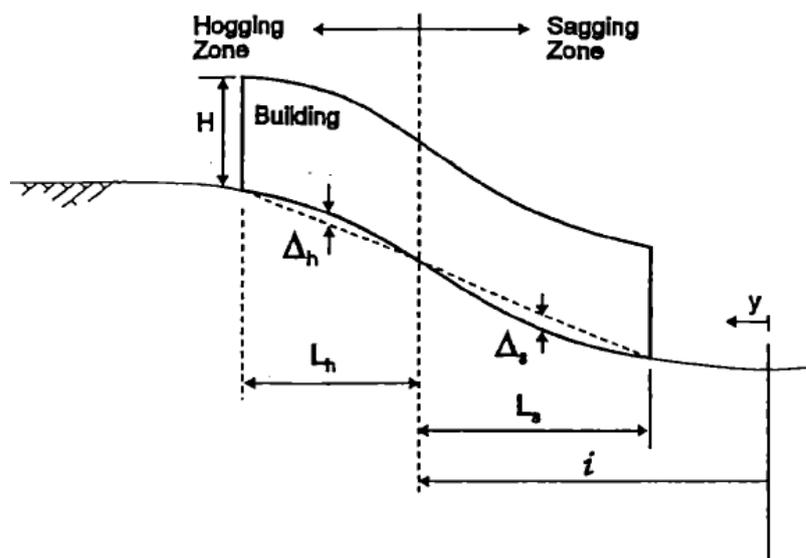
Dall'analisi numerica si possono estrapolare i valori dei cedimenti verticali e degli spostamenti orizzontali massimi in corrispondenza della zona occupata dall'edificio e sulla base di tali valori si effettua un'analisi del danno con il metodo descritto in: "Mair R.J., Taylor R.N., Burland J.B. (1996): *Prediction of Ground Movements and Assessment of Risk of Building Damage due to Bored Tunnelling*; Geotechnical Aspects of Underground Construction in Soft Ground, London", che permette di classificare l'edificio secondo una delle classi di danneggiamento che vanno da 0 a 5. Segue una breve descrizione del metodo di valutazione del danneggiamento subito dall'edificio.

- Schematizzazione dei fabbricati interferiti

I fabbricati interferiti vengono schematizzati come semplici travi elastiche e prive di peso aventi altezza H e lunghezza L pari a quelle della sezione dell'edificio analizzato (Burland, 1997).

- Deformazioni indotte sui fabbricati interferiti

La curva dei cedimenti si suddivide in due zone:



- Una zona con concavità verso il basso – zona "hogging", dove le strutture che poggiano sul p.c. sono sottoposte a trazione, per la presenza di deformazioni superficiali di estensione e per il contributo della curvatura del p.c.

- Una zona con concavità verso l'alto – zona "sagging", dove le strutture che poggiano sul p.c. sono sottoposte a compressione, per la presenza di deformazioni superficiali di compressione oltre che per il contributo della curvatura del p.c.

Determinata la curva dei cedimenti dall'analisi numerica, la nuova configurazione della trave (equivalente all'edificio) implica la mobilitazione di sollecitazioni flessionali e di taglio e corrispondenti deformazioni. Le deformazioni unitarie indotte si calcolano mediante le seguenti equazioni:

$$\varepsilon_f = \frac{\Delta/L_i}{\left[\frac{L_i}{12t} + \frac{3IE}{2tL_iHG} \right]}$$

$$\varepsilon_t = \frac{\Delta/L_i}{\left[1 + \frac{HL_i^2G}{18IE} \right]}$$

dove:

ε_f = deformazione flessionale;

ε_t = deformazione di taglio;

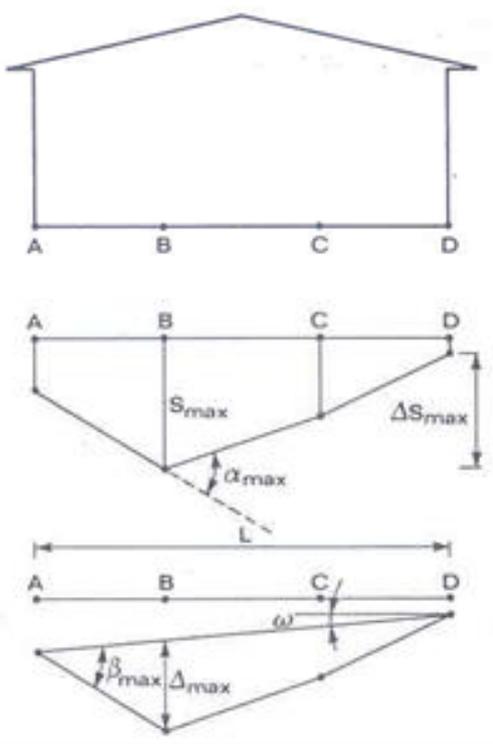
Δ/L_i = rapporto di inflessione;

L_i = porzione ($\leq L$ = lunghezza edificio) di edificio ricadente nella zona analizzata;

I = modulo di inerzia ($H^3/12$ in zona sagging ; $H^3/3$ in zona hogging);

E/G = rapporto tra il modulo di elasticità longitudinale e tangenziale (12.5 per fabbricati in c.a. e 2.6 per fabbricati in muratura);

t = distanza dell'asse neutro dal bordo teso della trave ($H/2$ in zona sagging; H in zona hogging).



S = CEDIMENTO ω = ROTAZIONE RIGIDA
 ΔS = CEDIMENTO DIFFERENZIALE
 β = ROTAZIONE RELATIVA
 α = DEFORMAZIONE ANGOLARE
 Δ = INFLESSIONE
 Δ/L = RAPPORTO DI INFLESSIONE
 (CURVATURA)

RAPPORTO D'INFLESSIONE

Oltre alle deformazioni indotte dai cedimenti verticali (riportate in precedenza), si deve tenere conto degli effetti delle deformazioni orizzontali ε_y del terreno. Il valore di ε_y è ricavabile dalla seguente equazione:

$$\varepsilon_y = \frac{\Delta S_h}{L_i}$$

dove:

ΔS_h = spostamento orizzontale medio tra i limiti della zona considerata L_i ; secondo He & Kane (1966) si può mettere in relazione l'area totale del profilo di spostamento orizzontale con l'area totale del profilo di spostamento verticale attraverso il coefficiente di Poisson μ ; si ottiene:

$$\Delta S_h = \frac{1-\mu}{\mu} \Delta S_v$$

I campi di deformazione vengono composti, per ogni campo deformativo (hogging o sagging), secondo le seguenti equazioni:

$$\varepsilon_{totale} = \varepsilon_y + \varepsilon_f \quad \text{(condizione di flessione)}$$

$$\varepsilon_{totale} = 0.35 \cdot \varepsilon_y + \left[(0.65 \cdot \varepsilon_y)^2 + \varepsilon_t^2 \right]^{0.5} \quad \text{(condizione di taglio, } \mu = 0.3)$$

In zona di "hogging" le deformazioni indotte dai cedimenti verticali (deformazioni in estensione) si sommano alle deformazioni indotte dagli spostamenti orizzontali (deformazioni in estensione), mentre in zona di "sagging" alle deformazioni indotte dai cedimenti verticali (deformazioni in estensione) si sottraggono le deformazioni indotte dagli spostamenti orizzontali (deformazioni in compressione).

Definizione delle categorie di danno

Il sistema di classificazione del danno indotto sulle strutture è basato sulla "facilità di riparazione", prendendo in considerazione alcuni aspetti quali l'apertura delle fessure, l'inclinazione, i danni ai servizi.

A tale sistema di classificazione, composto da sei classi di danno (da 0 a 5), Boscardin & Cording (1989) fanno corrispondere dei valori limite di deformazione a trazione, riportati e descritti nelle seguenti tabelle.

Categoria di danno	Intensità del danno*	Deformazione limite di allungamento ε_{lim} (%)
0	Trascurabile	0.00 ÷ 0.05
1	Molto lieve	0.05 ÷ 0.075
2	Lieve	0.075 ÷ 0.15
3	Moderata	0.15 ÷ 0.30
4 a 5	Da severa a molto severa	> 0.30

CATEGORIE DI DANNO E CORRISPONDENTI DEFORMAZIONI LIMITE (M.D. BOSCARDIN & E.G. CORDING, 1989).

Categoria di danno	Descrizione
0	Fessure capillari con apertura ≤ 0.1 mm
1	Fessure sottili cui si rimedia facilmente con lavori di tinteggiatura. Il danno in genere è limitato agli intonaci delle pareti interne. Fessure alle pareti esterne rilevabili con attento esame. Tipica apertura delle lesioni ≤ 1 mm
2	Fessure facilmente stuccabili, tinteggiatura necessaria. Le fessure ricorrenti possono essere mascherate con opportuni rivestimenti. Fessure visibili anche all'esterno: può essere necessaria qualche ripresa della stillatura per garantire l'impermeabilità. Possibili difficoltà nell'apertura di porte e finestre. Tipica apertura delle lesioni ≤ 5 mm
3	Le fessure richiedono cucì e scuci della muratura. Anche all'esterno sono necessari interventi sulla muratura. Possibile blocco di porte e finestre. Rottura di tubazioni. Spesso l'impermeabilità non è garantita. Tipica apertura delle lesioni $5 \div 15$ mm oppure numero elevato di lesioni con apertura ≤ 3 mm
4	Necessarie importanti riparazioni, compresa demolizione e ricostruzione di parti di muri, specie al di sopra di porte e di finestre. I telai di porte e di finestre si distorcono: percepibile pendenza dei pavimenti. Muri inclinati o spanciati; qualche perdita d'appoggio di travi. Tubazioni distrutte. Tipica apertura delle lesioni $15 \div 25$ mm, dipendente anche dal numero delle lesioni
5	Richiesti importanti lavori con parziale o totale demolizione e ricostruzione. Le travi perdono l'appoggio, i muri si inclinano fortemente e richiedono puntellatura. Pericolo di instabilità. Tipica apertura delle lesioni ≥ 25 mm, dipendente anche dal numero delle lesioni

DESCRIZIONE DEI DANNI E DEGLI EFFETTI ASSOCIATI

Osservazioni sul metodo di calcolo

Il metodo di calcolo utilizzato è basato sulle seguenti ipotesi:

- gli spostamenti e le deformazioni indotte sugli edifici sono assunti pari a quelle corrispondenti alla condizione "green field";
- la rigidità degli edifici analizzati è considerata nulla, mentre in realtà le opere di fondazioni interagiscono con il terreno riducendo il rapporto di inflessione e le deformazioni orizzontali ottenute nella condizione "green field";
- nessuna distinzione tra fondazioni su plinti, su trave e su platea che presentano chiaramente comportamenti differenti soprattutto nei confronti degli spostamenti orizzontali;
- gli edifici vengono considerati come disposti perpendicolarmente all'asse della paratia (configurazione che determina per uno stesso edificio le condizioni peggiori in termini di entità di deformazione).

Tenendo conto delle suddette ipotesi si può affermare che tale approccio risulta molto conservativo ed i risultati ottenuti si riferiscono alla peggiore configurazione di danno possibile.

8.4.2 RISULTATI DELL'ANALISI DELLA VALUTAZIONE DEL DANNO

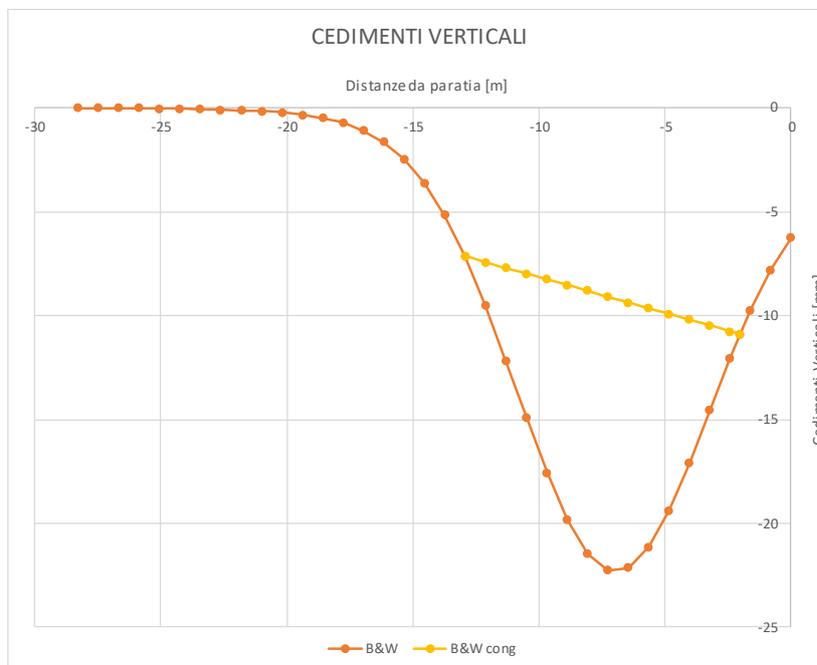
I cedimenti massimi si ottengono nella fase 8; si analizza la combinazione rara.

L'edificio ha larghezza pari a circa 11 m e, come evidenziato dal diagramma seguente, ricade circa completamente nella zona "sagging"; secondo quanto in precedenza descritto in questa zona si può trascurare l'effetto degli spostamenti orizzontali.

Stage 8 - Combinazione Rara - Cedimenti secondo Boone & Westland

Distanza (m)	Cedimento (mm)	Congiungente (mm)	Delta (mm)
-28.28	0		
-27.472	0		
-26.664	-0.001		
-25.856	-0.007		
-25.048	-0.016		
-24.24	-0.031		
-23.432	-0.051		
-22.624	-0.077		
-21.816	-0.111		
-21.008	-0.157		
-20.2	-0.223		
-19.392	-0.321		
-18.584	-0.472		
-17.776	-0.709		
-16.968	-1.078		
-16.16	-1.638		
-15.352	-2.461		
-14.544	-3.617		
-13.736	-5.167		
-12.928	-7.136	-7.136	0.000
-12.12	-9.495	-7.414	-2.081
-11.312	-12.147	-7.692	-4.455
-10.504	-14.918	-7.970	-6.948
-9.696	-17.571	-8.249	-9.322
-8.888	-19.839	-8.527	-11.312
-8.08	-21.468	-8.805	-12.663
-7.272	-22.265	-9.083	-13.182
-6.464	-22.142	-9.361	-12.781
-5.656	-21.127	-9.639	-11.488
-4.848	-19.367	-9.917	-9.450
-4.04	-17.09	-10.196	-6.894
-3.232	-14.564	-10.474	-4.090
-2.424	-12.044	-10.752	-1.292
-2.020	-10.891	-10.891	0.000
-1.616	-9.738		
-0.808	-7.783		
0	-6.242		

LIMITI EDIFICIO



Seguono i calcoli effettuati.

- inflessione massima: $\Delta = 13.18 \text{ mm}$
- porzione di edificio ricadente nella zona analizzata: $L_i = 11 \text{ m}$
- altezza di calcolo edificio: $H = 8 \text{ m}$
- modulo d'inerzia dell'edificio: $I = H^3 / 12 = 8^3 / 12 = 42.7 \text{ m}^3$
- rapporto tra i moduli di elasticità (fabbricato in c.a.): $E / G = 12.5$
- distanza dell'asse neutro dal bordo teso della trave: $t = H / 2 = 8 / 2 = 4 \text{ m}$

Applicando le formule si determinano le deformazioni unitarie e le relative categorie di danneggiamento.

- deformazione flessionale massima: $\epsilon_f = 0.0478 \%$ ($0 < \epsilon_f < 0.05$: categoria di danno: 0)
- deformazione di taglio massima: $\epsilon_t = 0.1088 \%$ ($0.075 < \epsilon_t < 0.15$: categoria di danno: 2)

8.4.3 CONCLUSIONI SUI RISULTATI OTTENUTI

Le analisi eseguite hanno mostrato che l'edificio n°9 è classificato, in base alle valutazioni di danno eseguite, in una Categoria di danno 2 (corrispondente a danni lievi).

In base a tali risultati si possono trarre le seguenti conclusioni:

Edificio n°9: potrebbero verificarsi locali fessurazioni e lesioni provocate dalla realizzazione della paratia berlinese prevista a sostegno dello scavo per la successiva costruzione della galleria artificiale. A tal proposito sarà cura intervenire in seguito alla realizzazione del manufatto per predisporre eventuali interventi di ripristino.

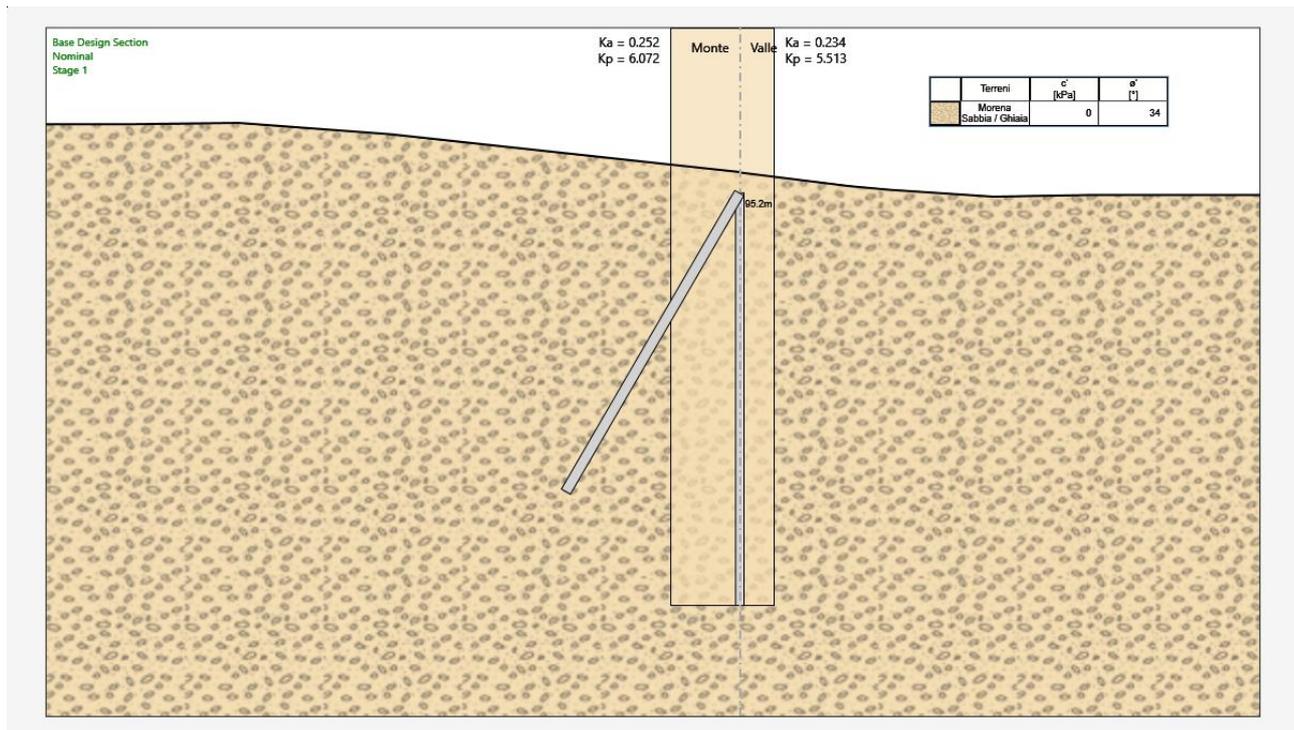
Edificio n°8: A favore della sicurezza si possono estendere le stesse considerazioni.

9 ANALISI PARATIE DI RISVOLTO

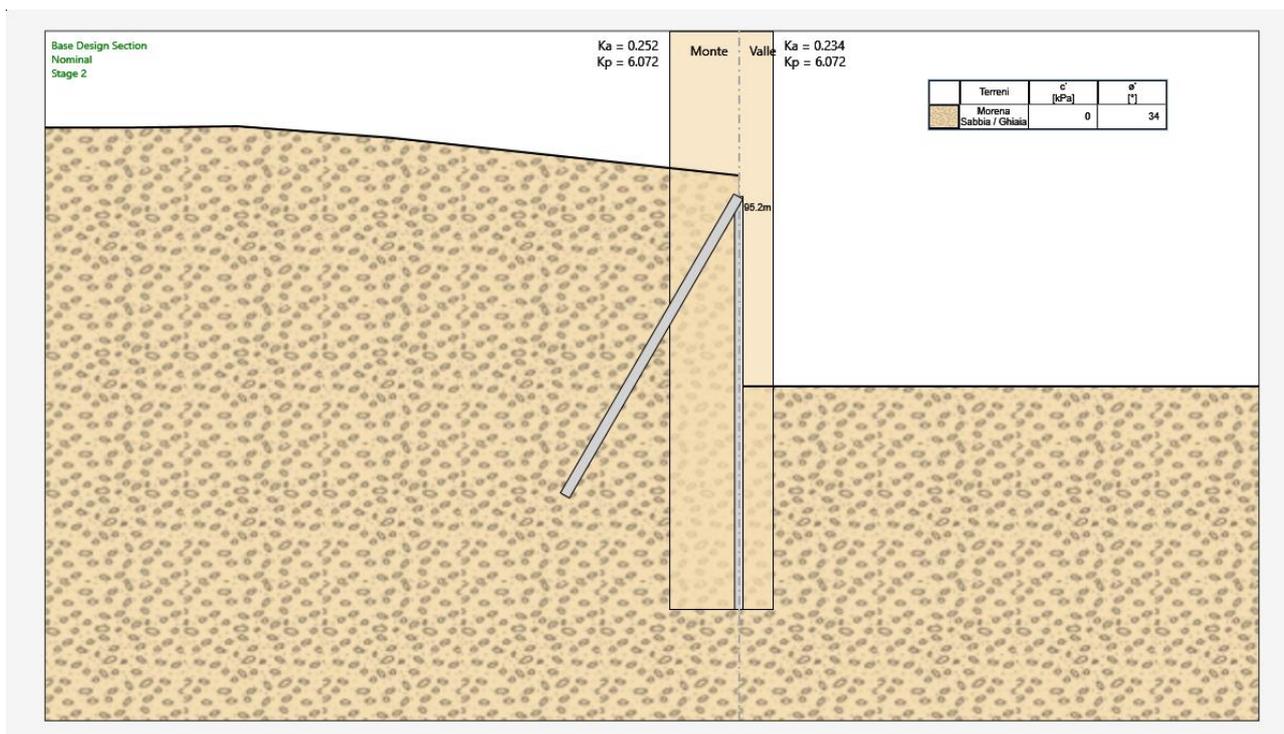
Si considera per il calcolo la sezione più gravosa alla Pk. 4+853.15 in cui si ha la massima altezza di scavo (5.50 m).

9.1 FASI ESECUTIVE DI CALCOLO

Seguono gli schemi grafici di ogni fase di calcolo del programma "ParatiePlus".

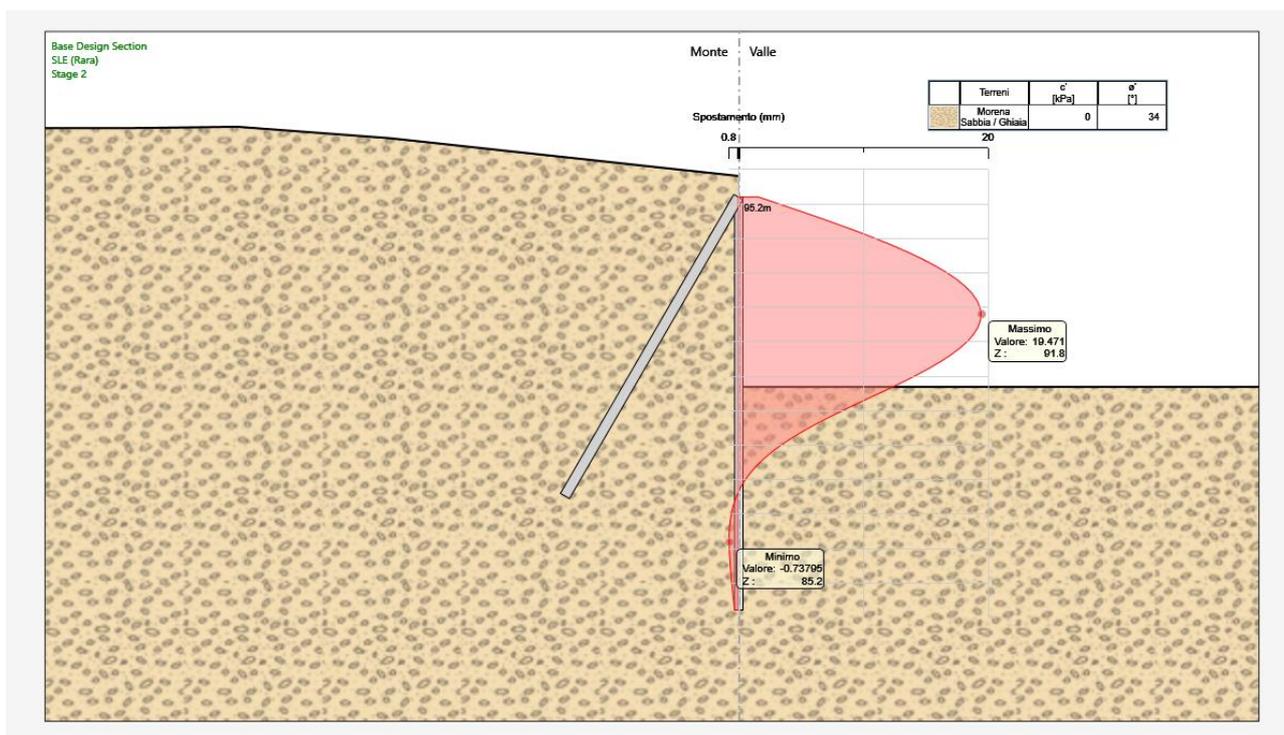


FASE 1: FASE GEOSTATICA DI INIZIALIZZAZIONE: REALIZZAZIONE MICROPALI E TIRANTI PASSIVI

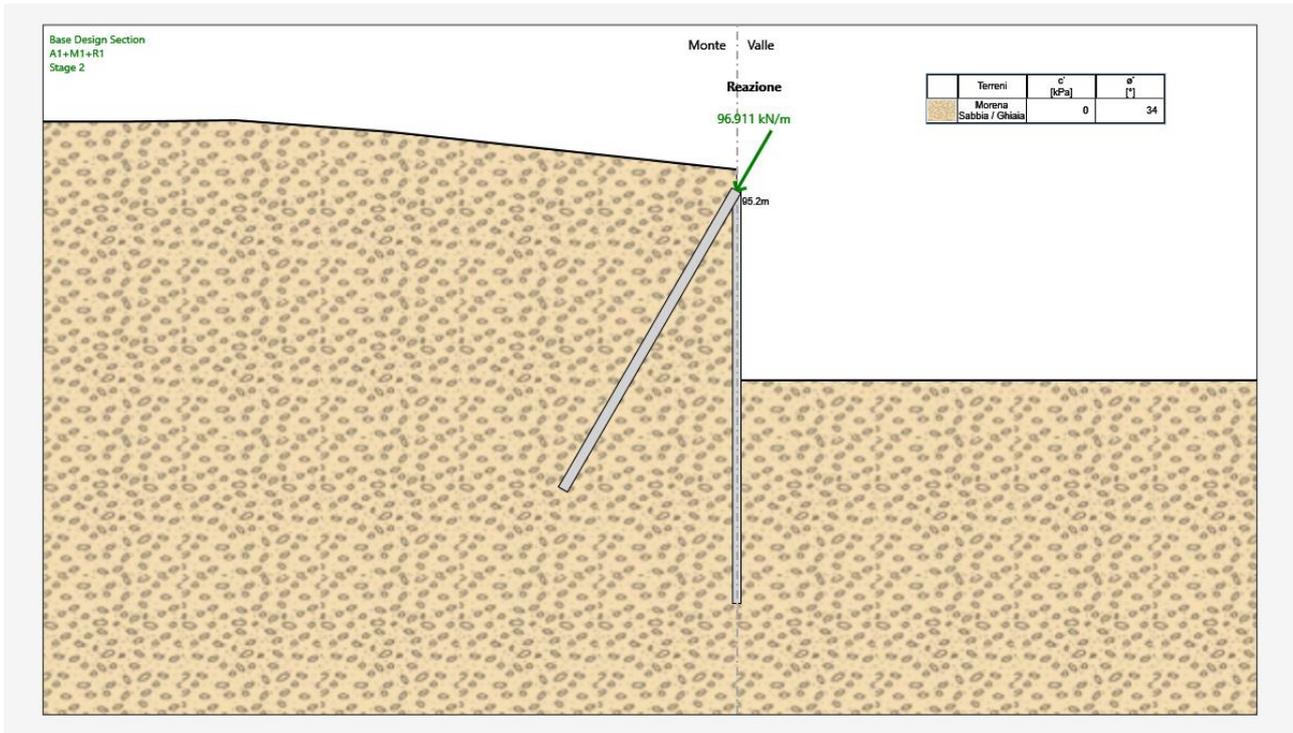


FASE 2: SCAVO FINO ALLA QUOTA DEFINITIVA PREVISTA (H = 5.50 M)

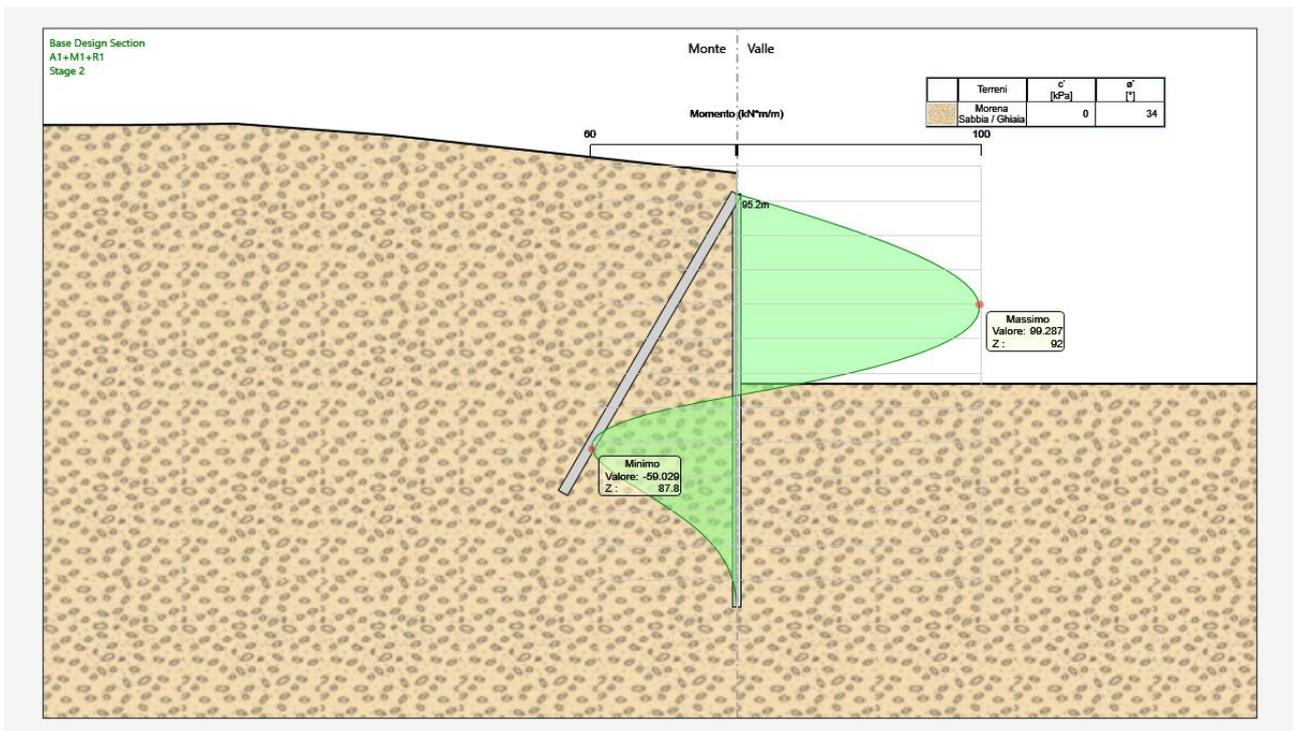
9.2 RISULTATI GRAFICI



COMBINAZIONE RARA - DEFORMATA



COMBINAZIONE STR (A1+M1+R1) - REAZIONI TIRANTE PASSIVO



COMBINAZIONE STR (A1+M1+R1) - MOMENTI FLETTENTI

9.3 VERIFICHE ALLO STATO LIMITE ULTIMO

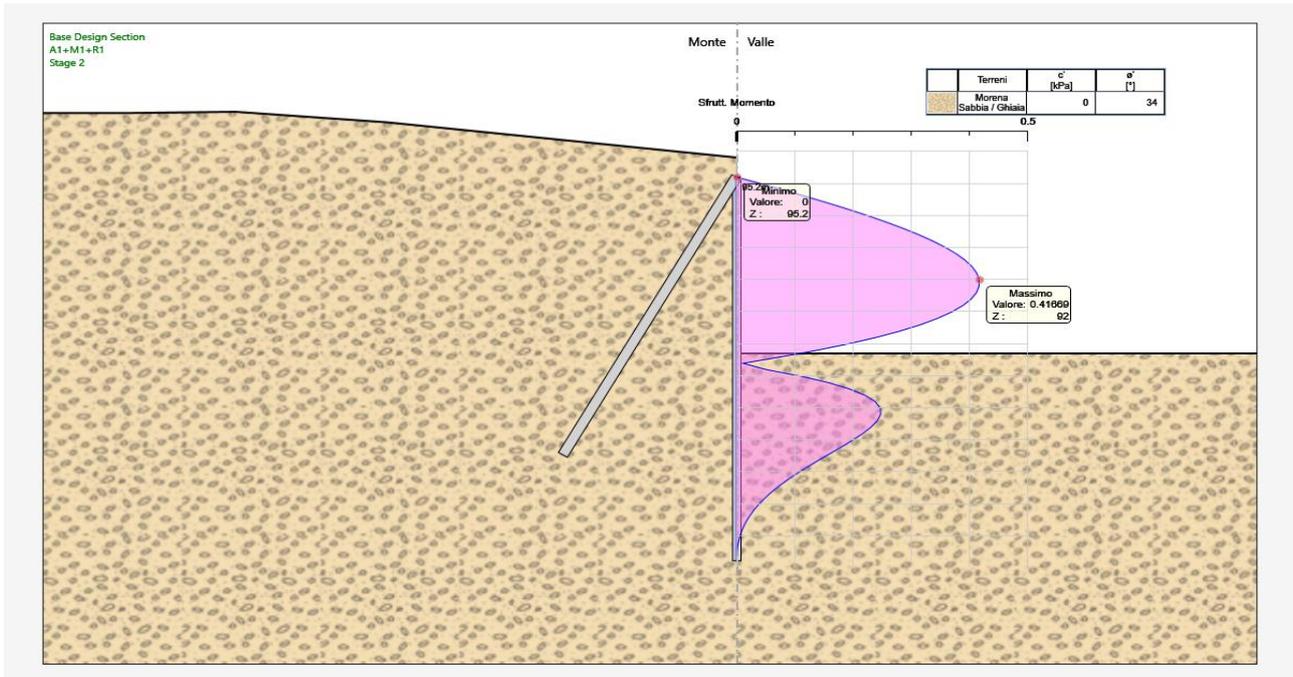
9.3.1 VERIFICHE STRUTTURALI MICROPALI: VERIFICHE A FLESSIONE E TAGLIO

Le verifiche sono svolte automaticamente dal programma di calcolo considerando le sollecitazioni statiche e sismiche derivate dalle combinazioni allo stato limite ultimo: STR: (A1+M1+R1).

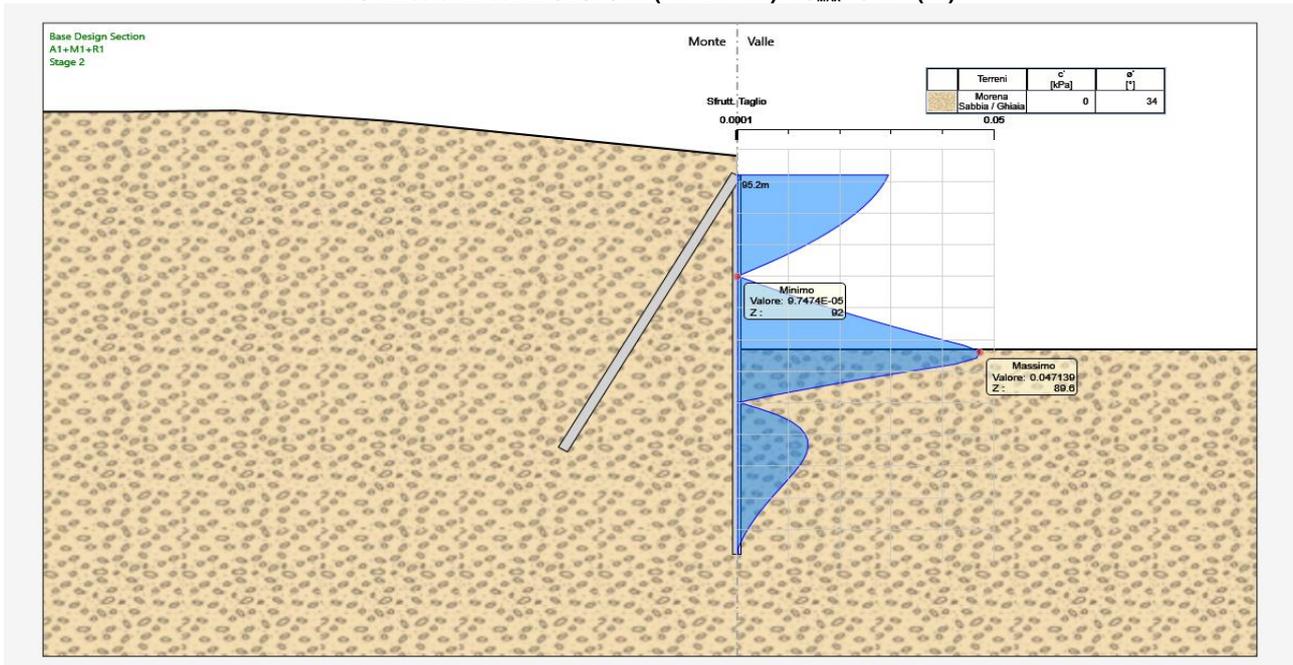
Seguono i diagrammi dei tassi di sfruttamento TS a flessione e a taglio della resistenza dei micropali metallici, per le combinazioni allo stato limite ultimo: STR: (A1+M1+R1).

Le verifiche sono soddisfatte se: $TS = \frac{\text{Sollecitazione}}{\text{Resistenza}} \leq 1$

Lo sforzo assiale viene trascurato; nel calcolo del momento resistente $M_{c,Rd}$ non viene considerata l'interazione con la forza di taglio, in quanto in tutti i casi esaminati il taglio di calcolo associato al momento flettente è sempre inferiore a metà della resistenza di calcolo a taglio $V_{c,Rd}$.



TS FLESSIONE: COMB. SLU: STR (A1+M1+R1): $TS_{MAX} = 0.417 (<1)$



TS TAGLIO: COMB. SLU: STR (A1+M1+R1): $TS_{MAX} = 0.047 (<1)$

9.3.2 VERIFICHE GEOTECNICHE: VERIFICA DI STABILITÀ DEL FONDO SCAVO

La verifica di stabilità del lato a valle della paratia è effettuata considerando il rispetto dei due seguenti criteri:

- 1) Il calcolo non lineare della paratia deve convergere a una soluzione equilibrata e congruente;
- 2) Sul lato di scavo (valle) la spinta efficace mobilitata deve essere minore della spinta passiva disponibile, quindi il loro rapporto deve essere < 1 .

Dall'esame dei tabulati di calcolo, in particolare quello relativo a GEO (A2+M2+R1), combinazione sismica più gravosa (ved. p. 8.2.5), si desume:

- 1) Il calcolo non lineare converge a una soluzione equilibrata per tutte le fasi di calcolo.
- 2) Il rapporto tra la spinta mobilitata e la spinta passiva possibile assume il massimo nella fase 2 con il valore:

$$\frac{\text{Spinta Reale Totale}}{\text{Massima Spinta Ammissibile}} = \frac{540.2}{2566.1} = 0.21 \quad (< 1: \text{verificato})$$

9.3.3 MICROPALI INCLINATI: VERIFICA STRUTTURALE E ALLO SFILAMENTO DELL'ANCORAGGIO

La verifica viene svolta considerando uno stato limite GEO (A1+M1+R3).

La resistenza dell'ancoraggio viene calcolata con il metodo di Bustamante-Doix (Rif. Bustamante M., Doix B. (1985): "Une méthode pour le calcul des tirants et des micropieux injectés", Bull. Liaison Lab. Ponts et Chaussées, n. 140, pagg. 75-95).

Dati geometrici:

- lunghezza micropalo: $L = 10 \text{ m}$
- diametro perforazione: $\varnothing = 240 \text{ mm}$
- sollecitazione massima (Fase 2): $N_{Ed} = 96.9 \times 2.40 = 232.6 \text{ kN}$
- resistenza assiale: $R_k = 52.7 \times 338/10 = 1781 \text{ kN}$

- Per:
- tipo di terreno: sabbioso/ghiaioso
 - tipo di iniezione: a gravità (bassa pressione)

si ha (Bustamante-Doix):

- resistenza unitaria limite: $q_s = 84 \text{ kN/m}^2$
- fattore di incremento del diametro: $\alpha = 1$
- coefficiente parziale resistenza caratteristica (tiranti provvisori): $\gamma_{Ra,t} = 1.1$
- fattore di correlazione (1 sondaggio): $\xi_{a3} = 1.8$

Si determina quindi:

- resistenza limite: $R_{lim} = \alpha \pi \varnothing \sum(L q_s) = 1 \times \pi \times 0.24 \times 10 \times 84 = 633 \text{ kN}$
- resistenza caratteristica: $R_{ck} = \frac{R_{lim}}{\xi_{a3}} = \frac{633}{1.8} = 352 \text{ kN}$
- resistenza di progetto: $R_{cd} = \frac{R_{ck}}{\gamma_{Ra,t}} = \frac{352}{1.1} = 320 \text{ kN}$

Verifica di resistenza del micropalo: $R_k > N_{Ed} : 1781 \text{ kN} > 232.6 \text{ kN} : \text{Verificato.}$

Verifica di resistenza dell'ancoraggio: $R_{cd} > N_{Ed} : 320 \text{ kN} > 232.6 \text{ kN} : \text{Verificato.}$

10 TABULATI ALLEGATI

Seguono i tabulati di Report del programma Paratie Plus.

10.1 PARATIA FRONTALE



Report di Calcolo

Nome Progetto: PARATIA PK. 4+834 V_3

Autore: Ing. Renato Vaira

Jobname: D:\Documenti_Lavori\A832 - Tirano\Paratia Pk 4799,52-4867,69\PARATIA PK. 4+834 V_3.pplus

Data: 22/01/2019 14:16:57

Design Section: Base Design Section

Descrizione della Stratigrafia e degli Strati di Terreno

Tipo : HORIZONTAL

Quota : 100 m

OCR : 1

Strato di Terreno	Terreno	γ dry	γ sat	ϕ'	ϕ	c	c'	Su	Modulo	Elastico	Eu	Evc	Eur	Ah	Av	exp	Pa	Rur/Rvc	Rvc	Ku	Kvc	Kur	
		kN/m ³	kN/m ³	°	°	kPa	kPa	kPa				kPa	kPa				kPa		kPa	kN/m ³	kN/m ³	kN/m ³	
1	Morena	20	21	34		0		Constant				21000	33600										

Descrizione Pareti

X : 0 m

Quota in alto : 92.3 m

Quota di fondo : 72.1 m

Muro di sinistra

Sezione : Berlinese

Area equivalente : 0.0272 m

Inerzia equivalente : 0.0001 m⁴/m

Materiale calcestruzzo : C32/40

Tipo sezione : Tangent

Spaziatura : 0.4 m

Diametro : 0.24 m

Efficacia : 0.9

Materiale acciaio : S355

Sezione : CHS177.8*10

Tipo sezione : O

Spaziatura : 0.4 m

Spessore : 0.01 m

Diametro : 0.1778 m

Fasi di Calcolo

Stage 1

Scavo

Muro di sinistra

Lato monte : 92.7 m

Lato valle : 92.7 m

Linea di scavo di sinistra (Irregolare)

(-40;100)

(-18.5;98)

(-18;95.5)

(-13.2;95.5)

(-13;92.7)

(-2.2;92.7)

(0;92.7)

Linea di scavo di destra (Irregolare)

(0;92.7)

(8;92)

(14;91)

(30;86)

Carichi

Carico lineare in superficie : Edificio_9

X iniziale : -13 m

X finale : -2 m

Pressione iniziale : 200 kPa

Pressione finale : 200 kPa

Elementi strutturali

Paratia : Berlinese

X : 0 m

Quota in alto : 92.3 m

Quota di fondo : 72.1 m

Sezione : Berlinese

Tirante : Cavalletto

X : 0 m

Z : 92.3 m

Lunghezza bulbo : 15 m

Diametro bulbo : 0.24 m

Lunghezza libera : 0 m

Spaziatura orizzontale : 2.4 m

Precarico : 0 kN

Angolo : 60 °

Sezione : D177.8_S10

Area : 0.00527 m²

Stage 2

Scavo

Muro di sinistra

Lato monte : 92.7 m

Lato valle : 87.8 m

Linea di scavo di sinistra (Irregolare)

(-40;100)

(-18.5;98)

(-18;95.5)

(-13.2;95.5)

(-13;92.7)

(-2.2;92.7)

(0;92.7)

Linea di scavo di destra (Irregolare)

(0;87.8)

(25;87.8)

(30;86.1)

Carichi

Carico lineare in superficie : Edificio_9

X iniziale : -13 m

X finale : -2 m

Pressione iniziale : 200 kPa

Pressione finale : 200 kPa

Elementi strutturali

Paratia : Berlinese

X : 0 m

Quota in alto : 92.3 m

Quota di fondo : 72.1 m

Sezione : Berlinese

Tirante : Cavalletto

X : 0 m

Z : 92.3 m

Lunghezza bulbo : 15 m

Diametro bulbo : 0.24 m

Lunghezza libera : 0 m

Spaziatura orizzontale : 2.4 m

Precarico : 0 kN

Angolo : 60 °

Sezione : D177.8_S10

Area : 0.00527 m²

Stage 3

Scavo

Muro di sinistra

Lato monte : 92.7 m

Lato valle : 87.8 m

Linea di scavo di sinistra (Irregolare)

(-40;100)

(-18.5;98)

(-18;95.5)

(-13.2;95.5)

(-13;92.7)

(-2.2;92.7)

(0;92.7)

Linea di scavo di destra (Irregolare)

(0;87.8)

(25;87.8)

(30;86)

Carichi

Carico lineare in superficie : Edificio_9

X iniziale : -13 m

X finale : -2 m

Pressione iniziale : 200 kPa

Pressione finale : 200 kPa

Elementi strutturali

Tirante : Tir-A1

X : 0 m

Z : 88.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 12 m

Spaziatura orizzontale : 2.4 m

Precarico : 480 kN

Angolo : 20 °

Sezione : 4 strands

Tipo di barre : Barre trefoli

Numero di barre : 4

Diametro : 0.01331 m

Area : 0.000556 m²

Trave di Ripartizione : Default Waler

Sezione : Waler Section 2 steel

HE 220A

Materiale : S275

Paratia : Berlinese

X : 0 m

Quota in alto : 92.3 m

Quota di fondo : 72.1 m
Sezione : Berlinese
Tirante : Cavalletto
X : 0 m
Z : 92.3 m
Lunghezza bulbo : 15 m
Diametro bulbo : 0.24 m
Lunghezza libera : 0 m
Spaziatura orizzontale : 2.4 m
Precarico : 0 kN
Angolo : 60 °
Sezione : D177.8_S10
Area : 0.00527 m²

Stage 4

Scavo

Muro di sinistra

Lato monte : 92.7 m

Lato valle : 84.8 m

Linea di scavo di sinistra (Irregolare)

(-40;100)

(-18.5;98)

(-18;95.5)

(-13.2;95.5)

(-13;92.7)

(-2.2;92.7)

(0;92.7)

Linea di scavo di destra (Orizzontale)

84.8 m

Carichi

Carico lineare in superficie : Edificio_9

X iniziale : -13 m

X finale : -2 m

Pressione iniziale : 200 kPa

Pressione finale : 200 kPa

Elementi strutturali

Tirante : Tir-A1

X : 0 m

Z : 88.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 12 m

Spaziatura orizzontale : 2.4 m

Precarico : 480 kN

Angolo : 20 °

Sezione : 4 strands

Tipo di barre : Barre trefoli

Numero di barre : 4

Diametro : 0.01331 m

Area : 0.000556 m²

Trave di Ripartizione : Default Waler

Sezione : Waler Section 2 steel

HE 220A

Materiale : S275

Paratia : Berlinese

X : 0 m

Quota in alto : 92.3 m

Quota di fondo : 72.1 m

Sezione : Berlinese

Tirante : Cavalletto

X : 0 m

Z : 92.3 m

Lunghezza bulbo : 15 m

Diametro bulbo : 0.24 m

Lunghezza libera : 0 m

Spaziatura orizzontale : 2.4 m

Precarico : 0 kN

Angolo : 60 °

Sezione : D177.8_S10

Area : 0.00527 m²

Stage 5

Scavo

Muro di sinistra

Lato monte : 92.7 m

Lato valle : 84.8 m

Linea di scavo di sinistra (Irregolare)

(-40;100)

(-18.5;98)

(-18;95.5)

(-13.2;95.5)

(-13;92.7)

(-2.2;92.7)

(0;92.7)

Linea di scavo di destra (Orizzontale)

84.8 m

Carichi

Carico lineare in superficie : Edificio_9

X iniziale : -13 m

X finale : -2 m

Pressione iniziale : 200 kPa

Pressione finale : 200 kPa

Elementi strutturali

Tirante : Tir-A1

X : 0 m

Z : 88.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 12 m

Spaziatura orizzontale : 2.4 m

Precarico : 480 kN

Angolo : 20 °

Sezione : 4 strands

Tipo di barre : Barre trefoli

Numero di barre : 4

Diametro : 0.01331 m

Area : 0.000556 m²

Trave di Ripartizione : Default Waler

Sezione : Waler Section 2 steel

HE 220A

Materiale : S275

Tirante : Tir-B1

X : 0 m

Z : 85.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 11 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 480 kN
 Angolo : 20 °
 Sezione : 4 strands
 Tipo di barre : Barre trefoli
 Numero di barre : 4
 Diametro : 0.01331 m
 Area : 0.000556 m²

Trave di Ripartizione : Default Waler
 Sezione : Waler Section 2 steel
 HE 220A
 Materiale : S275

Paratia : Berlinese
 X : 0 m
 Quota in alto : 92.3 m
 Quota di fondo : 72.1 m
 Sezione : Berlinese

Tirante : Cavalletto
 X : 0 m
 Z : 92.3 m
 Lunghezza bulbo : 15 m
 Diametro bulbo : 0.24 m
 Lunghezza libera : 0 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 0 kN
 Angolo : 60 °
 Sezione : D177.8_S10
 Area : 0.00527 m²

Stage 6

Scavo

Muro di sinistra

Lato monte : 92.7 m

Lato valle : 82.3 m

Linea di scavo di sinistra (Irregolare)

(-40;100)

(-18.5;98)

(-18;95.5)

(-13.2;95.5)

(-13;92.7)

(-2.2;92.7)

(0;92.7)

Linea di scavo di destra (Orizzontale)

82.3 m

Carichi

Carico lineare in superficie : Edificio_9

X iniziale : -13 m

X finale : -2 m

Pressione iniziale : 200 kPa

Pressione finale : 200 kPa

Elementi strutturali

Tirante : Tir-A1

X : 0 m

Z : 88.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 12 m

Spaziatura orizzontale : 2.4 m

Precarico : 480 kN

Angolo : 20 °

Sezione : 4 strands

Tipo di barre : Barre trefoli

Numero di barre : 4

Diametro : 0.01331 m

Area : 0.000556 m²

Trave di Ripartizione : Default Waler

Sezione : Waler Section 2 steel

HE 220A

Materiale : S275

Tirante : Tir-B1

X : 0 m

Z : 85.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 11 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 480 kN
 Angolo : 20 °
 Sezione : 4 strands
 Tipo di barre : Barre trefoli
 Numero di barre : 4
 Diametro : 0.01331 m
 Area : 0.000556 m²

Trave di Ripartizione : Default Waler
 Sezione : Waler Section 2 steel
 HE 220A
 Materiale : S275

Paratia : Berlinese
 X : 0 m
 Quota in alto : 92.3 m
 Quota di fondo : 72.1 m
 Sezione : Berlinese

Tirante : Cavalletto
 X : 0 m
 Z : 92.3 m
 Lunghezza bulbo : 15 m
 Diametro bulbo : 0.24 m
 Lunghezza libera : 0 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 0 kN
 Angolo : 60 °
 Sezione : D177.8_S10
 Area : 0.00527 m²

Stage 7

Scavo

Muro di sinistra

Lato monte : 92.7 m

Lato valle : 82.2 m

Linea di scavo di sinistra (Irregolare)

(-40;100)

(-18.5;98)

(-18;95.5)

(-13.2;95.5)

(-13;92.7)

(-2.2;92.7)

(0;92.7)

Linea di scavo di destra (Orizzontale)

82.2 m

Carichi

Carico lineare in superficie : Edificio_9

X iniziale : -13 m

X finale : -2 m

Pressione iniziale : 200 kPa

Pressione finale : 200 kPa

Elementi strutturali

Tirante : Tir-A1

X : 0 m

Z : 88.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 12 m

Spaziatura orizzontale : 2.4 m

Precarico : 480 kN

Angolo : 20 °

Sezione : 4 strands

Tipo di barre : Barre trefoli

Numero di barre : 4

Diametro : 0.01331 m

Area : 0.000556 m²

Trave di Ripartizione : Default Waler

Sezione : Waler Section 2 steel

HE 220A

Materiale : S275

Tirante : Tir-B1

X : 0 m

Z : 85.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 11 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 480 kN
 Angolo : 20 °
 Sezione : 4 strands
 Tipo di barre : Barre trefoli
 Numero di barre : 4
 Diametro : 0.01331 m
 Area : 0.000556 m²

Trave di Ripartizione : Default Waler
 Sezione : Waler Section 2 steel
 HE 220A
 Materiale : S275

Tirante : Tir-C1
 X : 0 m
 Z : 82.8 m
 Lunghezza bulbo : 12 m
 Diametro bulbo : 0.16 m
 Lunghezza libera : 10 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 480 kN
 Angolo : 20 °
 Sezione : 4 strands
 Tipo di barre : Barre trefoli
 Numero di barre : 4
 Diametro : 0.01331 m
 Area : 0.000556 m²

Trave di Ripartizione : Default Waler
 Sezione : Waler Section 2 steel
 HE 220A
 Materiale : S275

Paratia : Berlinese
 X : 0 m
 Quota in alto : 92.3 m
 Quota di fondo : 72.1 m
 Sezione : Berlinese

Tirante : Cavalletto
 X : 0 m
 Z : 92.3 m
 Lunghezza bulbo : 15 m
 Diametro bulbo : 0.24 m
 Lunghezza libera : 0 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 0 kN
 Angolo : 60 °
 Sezione : D177.8_S10
 Area : 0.00527 m²

Stage 8

Scavo

Muro di sinistra

Lato monte : 92.7 m

Lato valle : 80.3 m

Linea di scavo di sinistra (Irregolare)

(-40;100)

(-18.5;98)

(-18;95.5)

(-13.2;95.5)

(-13;92.7)

(-2.2;92.7)

(0;92.7)

Linea di scavo di destra (Orizzontale)

80.3 m

Carichi

Carico lineare in superficie : Edificio_9

X iniziale : -13 m

X finale : -2 m

Pressione iniziale : 200 kPa

Pressione finale : 200 kPa

Elementi strutturali

Tirante : Tir-A1

X : 0 m

Z : 88.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 12 m

Spaziatura orizzontale : 2.4 m

Precarico : 480 kN

Angolo : 20 °

Sezione : 4 strands

Tipo di barre : Barre trefoli

Numero di barre : 4

Diametro : 0.01331 m

Area : 0.000556 m²

Trave di Ripartizione : Default Waler

Sezione : Waler Section 2 steel

HE 220A

Materiale : S275

Tirante : Tir-B1

X : 0 m

Z : 85.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 11 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 480 kN
 Angolo : 20 °
 Sezione : 4 strands
 Tipo di barre : Barre trefoli
 Numero di barre : 4
 Diametro : 0.01331 m
 Area : 0.000556 m²

Trave di Ripartizione : Default Waler
 Sezione : Waler Section 2 steel
 HE 220A
 Materiale : S275

Tirante : Tir-C1
 X : 0 m
 Z : 82.8 m
 Lunghezza bulbo : 12 m
 Diametro bulbo : 0.16 m
 Lunghezza libera : 10 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 480 kN
 Angolo : 20 °
 Sezione : 4 strands
 Tipo di barre : Barre trefoli
 Numero di barre : 4
 Diametro : 0.01331 m
 Area : 0.000556 m²

Trave di Ripartizione : Default Waler
 Sezione : Waler Section 2 steel
 HE 220A
 Materiale : S275

Paratia : Berlinese
 X : 0 m
 Quota in alto : 92.3 m
 Quota di fondo : 72.1 m
 Sezione : Berlinese

Tirante : Cavalletto
 X : 0 m
 Z : 92.3 m
 Lunghezza bulbo : 15 m
 Diametro bulbo : 0.24 m
 Lunghezza libera : 0 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 0 kN
 Angolo : 60 °
 Sezione : D177.8_S10
 Area : 0.00527 m²

Stage 9

Scavo

Muro di sinistra

Lato monte : 92.7 m

Lato valle : 80.3 m

Linea di scavo di sinistra (Irregolare)

(-40;100)

(-18.5;98)

(-18;95.5)

(-13.2;95.5)

(-13;92.7)

(-2.2;92.7)

(0;92.7)

Linea di scavo di destra (Orizzontale)

80.3 m

Carichi

Carico lineare in superficie : Edificio_9

X iniziale : -13 m

X finale : -2 m

Pressione iniziale : 200 kPa

Pressione finale : 200 kPa

Elementi strutturali

Tirante : Tir-A1

X : 0 m

Z : 88.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 12 m

Spaziatura orizzontale : 2.4 m

Precarico : 480 kN

Angolo : 20 °

Sezione : 4 strands

Tipo di barre : Barre trefoli

Numero di barre : 4

Diametro : 0.01331 m

Area : 0.000556 m²

Trave di Ripartizione : Default Waler

Sezione : Waler Section 2 steel

HE 220A

Materiale : S275

Tirante : Tir-B1

X : 0 m

Z : 85.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 11 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 480 kN
 Angolo : 20 °
 Sezione : 4 strands
 Tipo di barre : Barre trefoli
 Numero di barre : 4
 Diametro : 0.01331 m
 Area : 0.000556 m²

Trave di Ripartizione : Default Waler
 Sezione : Waler Section 2 steel
 HE 220A
 Materiale : S275

Tirante : Tir-C1
 X : 0 m
 Z : 82.8 m
 Lunghezza bulbo : 12 m
 Diametro bulbo : 0.16 m
 Lunghezza libera : 10 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 480 kN
 Angolo : 20 °
 Sezione : 4 strands
 Tipo di barre : Barre trefoli
 Numero di barre : 4
 Diametro : 0.01331 m
 Area : 0.000556 m²

Trave di Ripartizione : Default Waler
 Sezione : Waler Section 2 steel
 HE 220A
 Materiale : S275

Paratia : Berlinese
 X : 0 m
 Quota in alto : 92.3 m
 Quota di fondo : 72.1 m
 Sezione : Berlinese

Tirante : Cavalletto
 X : 0 m
 Z : 92.3 m
 Lunghezza bulbo : 15 m
 Diametro bulbo : 0.24 m
 Lunghezza libera : 0 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 0 kN
 Angolo : 60 °
 Sezione : D177.8_S10
 Area : 0.00527 m²

Tirante : Tir-D1
 X : 0 m
 Z : 80.8 m
 Lunghezza bulbo : 12 m
 Diametro bulbo : 0.16 m

Lunghezza libera : 9 m

Spaziatura orizzontale : 2.4 m

Precarico : 480 kN

Angolo : 20 °

Sezione : 4 strands

Tipo di barre : Barre trefoli

Numero di barre : 4

Diametro : 0.01331 m

Area : 0.000556 m²

Trave di Ripartizione : Default Waler

Sezione : Waler Section 2 steel

HE 220A

Materiale : S275

Stage 10

Scavo

Muro di sinistra

Lato monte : 92.7 m

Lato valle : 79.5 m

Linea di scavo di sinistra (Irregolare)

(-40;100)

(-18.5;98)

(-18;95.5)

(-13.2;95.5)

(-13;92.7)

(-2.2;92.7)

(0;92.7)

Linea di scavo di destra (Orizzontale)

79.5 m

Carichi

Carico lineare in superficie : Edificio_9

X iniziale : -13 m

X finale : -2 m

Pressione iniziale : 200 kPa

Pressione finale : 200 kPa

Elementi strutturali

Tirante : Tir-A1

X : 0 m

Z : 88.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 12 m

Spaziatura orizzontale : 2.4 m

Precarico : 480 kN

Angolo : 20 °

Sezione : 4 strands

Tipo di barre : Barre trefoli

Numero di barre : 4

Diametro : 0.01331 m

Area : 0.000556 m²

Trave di Ripartizione : Default Waler

Sezione : Waler Section 2 steel

HE 220A

Materiale : S275

Tirante : Tir-B1

X : 0 m

Z : 85.3 m

Lunghezza bulbo : 12 m

Diametro bulbo : 0.16 m

Lunghezza libera : 11 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 480 kN
 Angolo : 20 °
 Sezione : 4 strands
 Tipo di barre : Barre trefoli
 Numero di barre : 4
 Diametro : 0.01331 m
 Area : 0.000556 m²

Trave di Ripartizione : Default Waler
 Sezione : Waler Section 2 steel
 HE 220A
 Materiale : S275

Tirante : Tir-C1
 X : 0 m
 Z : 82.8 m
 Lunghezza bulbo : 12 m
 Diametro bulbo : 0.16 m
 Lunghezza libera : 10 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 480 kN
 Angolo : 20 °
 Sezione : 4 strands
 Tipo di barre : Barre trefoli
 Numero di barre : 4
 Diametro : 0.01331 m
 Area : 0.000556 m²

Trave di Ripartizione : Default Waler
 Sezione : Waler Section 2 steel
 HE 220A
 Materiale : S275

Paratia : Berlinese
 X : 0 m
 Quota in alto : 92.3 m
 Quota di fondo : 72.1 m
 Sezione : Berlinese

Tirante : Cavalletto
 X : 0 m
 Z : 92.3 m
 Lunghezza bulbo : 15 m
 Diametro bulbo : 0.24 m
 Lunghezza libera : 0 m
 Spaziatura orizzontale : 2.4 m
 Precarico : 0 kN
 Angolo : 60 °
 Sezione : D177.8_S10
 Area : 0.00527 m²

Tirante : Tir-D1
 X : 0 m
 Z : 80.8 m
 Lunghezza bulbo : 12 m
 Diametro bulbo : 0.16 m

Lunghezza libera : 9 m

Spaziatura orizzontale : 2.4 m

Precarico : 480 kN

Angolo : 20 °

Sezione : 4 strands

Tipo di barre : Barre trefoli

Numero di barre : 4

Diametro : 0.01331 m

Area : 0.000556 m²

Trave di Ripartizione : Default Waler

Sezione : Waler Section 2 steel

HE 220A

Materiale : S275

Risultati SLE (Rara)

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 1

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento		Muro: LEFT
Stage	Z (m)	Spostamento (mm)
Stage 1	92.3	0
Stage 1	92.1	0
Stage 1	91.9	0
Stage 1	91.7	0
Stage 1	91.5	0
Stage 1	91.3	0
Stage 1	91.1	0
Stage 1	90.9	0
Stage 1	90.7	0
Stage 1	90.5	0
Stage 1	90.3	0
Stage 1	90.1	0
Stage 1	89.9	0
Stage 1	89.7	0
Stage 1	89.5	0
Stage 1	89.3	0
Stage 1	89.1	0
Stage 1	88.9	0
Stage 1	88.7	0
Stage 1	88.5	0
Stage 1	88.3	0
Stage 1	88.1	0
Stage 1	87.9	0
Stage 1	87.7	0
Stage 1	87.5	0
Stage 1	87.3	0
Stage 1	87.1	0
Stage 1	86.9	0
Stage 1	86.7	0
Stage 1	86.5	0
Stage 1	86.3	0
Stage 1	86.1	0
Stage 1	85.9	0
Stage 1	85.7	0
Stage 1	85.5	0
Stage 1	85.3	0
Stage 1	85.1	0
Stage 1	84.9	0
Stage 1	84.7	0
Stage 1	84.5	0
Stage 1	84.3	0
Stage 1	84.1	0
Stage 1	83.9	0
Stage 1	83.7	0
Stage 1	83.5	0
Stage 1	83.3	0
Stage 1	83.1	0
Stage 1	82.9	0
Stage 1	82.8	0
Stage 1	82.6	0
Stage 1	82.4	0
Stage 1	82.2	0
Stage 1	82	0
Stage 1	81.8	0
Stage 1	81.6	0
Stage 1	81.4	0
Stage 1	81.2	0
Stage 1	81	0
Stage 1	80.8	0
Stage 1	80.6	0
Stage 1	80.4	0
Stage 1	80.2	0
Stage 1	80	0
Stage 1	79.8	0

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 1	79.6 0
Stage 1	79.4 0
Stage 1	79.2 0
Stage 1	79 0
Stage 1	78.8 0
Stage 1	78.6 0
Stage 1	78.4 0
Stage 1	78.2 0
Stage 1	78 0
Stage 1	77.8 0
Stage 1	77.6 0
Stage 1	77.4 0
Stage 1	77.2 0
Stage 1	77 0
Stage 1	76.8 0
Stage 1	76.6 0
Stage 1	76.4 0
Stage 1	76.2 0
Stage 1	76 0
Stage 1	75.8 0
Stage 1	75.6 0
Stage 1	75.4 0
Stage 1	75.2 0
Stage 1	75 0
Stage 1	74.8 0
Stage 1	74.6 0
Stage 1	74.4 0
Stage 1	74.2 0
Stage 1	74 0
Stage 1	73.8 0
Stage 1	73.6 0
Stage 1	73.4 0
Stage 1	73.2 0
Stage 1	73 0
Stage 1	72.8 0
Stage 1	72.6 0
Stage 1	72.4 0
Stage 1	72.2 0
Stage 1	72.1 0

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 1

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 1	92.3	0	0
Stage 1	92.1	0	0
Stage 1	91.9	0	0
Stage 1	91.7	0	0
Stage 1	91.5	0	0
Stage 1	91.3	0	0
Stage 1	91.1	0	0
Stage 1	90.9	0	0
Stage 1	90.7	0	0
Stage 1	90.5	0	0
Stage 1	90.3	0	0
Stage 1	90.1	0	0
Stage 1	89.9	0	0
Stage 1	89.7	0	0
Stage 1	89.5	0	0
Stage 1	89.3	0	0
Stage 1	89.1	0	0
Stage 1	88.9	0	0
Stage 1	88.7	0	0
Stage 1	88.5	0	0
Stage 1	88.3	0	0
Stage 1	88.1	0	0
Stage 1	87.9	0	0
Stage 1	87.7	0	0
Stage 1	87.5	0	0
Stage 1	87.3	0	0
Stage 1	87.1	0	0
Stage 1	86.9	0	0
Stage 1	86.7	0	0
Stage 1	86.5	0	0
Stage 1	86.3	0	0
Stage 1	86.1	0	0
Stage 1	85.9	0	0
Stage 1	85.7	0	0
Stage 1	85.5	0	0
Stage 1	85.3	0	0
Stage 1	85.1	0	0
Stage 1	84.9	0	0
Stage 1	84.7	0	0
Stage 1	84.5	0	0
Stage 1	84.3	0	0
Stage 1	84.1	0	0
Stage 1	83.9	0	0
Stage 1	83.7	0	0
Stage 1	83.5	0	0
Stage 1	83.3	0	0
Stage 1	83.1	0	0
Stage 1	82.9	0	0
Stage 1	82.8	0	0
Stage 1	82.6	0	0
Stage 1	82.4	0	0
Stage 1	82.2	0	0
Stage 1	82	0	0
Stage 1	81.8	0	0
Stage 1	81.6	0	0
Stage 1	81.4	0	0
Stage 1	81.2	0	0
Stage 1	81	0	0
Stage 1	80.8	0	0
Stage 1	80.6	0	0
Stage 1	80.4	0	0
Stage 1	80.2	0	0
Stage 1	80	0	0
Stage 1	79.8	0	0
Stage 1	79.6	0	0
Stage 1	79.4	0	0
Stage 1	79.2	0	0

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 1	79	0	0
Stage 1	78.8	0	0
Stage 1	78.6	0	0
Stage 1	78.4	0	0
Stage 1	78.2	0	0
Stage 1	78	0	0
Stage 1	77.8	0	0
Stage 1	77.6	0	0
Stage 1	77.4	0	0
Stage 1	77.2	0	0
Stage 1	77	0	0
Stage 1	76.8	0	0
Stage 1	76.6	0	0
Stage 1	76.4	0	0
Stage 1	76.2	0	0
Stage 1	76	0	0
Stage 1	75.8	0	0
Stage 1	75.6	0	0
Stage 1	75.4	0	0
Stage 1	75.2	0	0
Stage 1	75	0	0
Stage 1	74.8	0	0
Stage 1	74.6	0	0
Stage 1	74.4	0	0
Stage 1	74.2	0	0
Stage 1	74	0	0
Stage 1	73.8	0	0
Stage 1	73.6	0	0
Stage 1	73.4	0	0
Stage 1	73.2	0	0
Stage 1	73	0	0
Stage 1	72.8	0	0
Stage 1	72.6	0	0
Stage 1	72.4	0	0
Stage 1	72.2	0	0
Stage 1	72.1	0	0

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 2

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 2	92.3 2.36
Stage 2	92.1 3.57
Stage 2	91.9 4.77
Stage 2	91.7 5.94
Stage 2	91.5 7.07
Stage 2	91.3 8.15
Stage 2	91.1 9.16
Stage 2	90.9 10.09
Stage 2	90.7 10.93
Stage 2	90.5 11.67
Stage 2	90.3 12.3
Stage 2	90.1 12.82
Stage 2	89.9 13.21
Stage 2	89.7 13.47
Stage 2	89.5 13.6
Stage 2	89.3 13.6
Stage 2	89.1 13.46
Stage 2	88.9 13.19
Stage 2	88.7 12.8
Stage 2	88.5 12.28
Stage 2	88.3 11.66
Stage 2	88.1 10.94
Stage 2	87.9 10.14
Stage 2	87.7 9.27
Stage 2	87.5 8.36
Stage 2	87.3 7.43
Stage 2	87.1 6.5
Stage 2	86.9 5.6
Stage 2	86.7 4.74
Stage 2	86.5 3.94
Stage 2	86.3 3.2
Stage 2	86.1 2.54
Stage 2	85.9 1.96
Stage 2	85.7 1.44
Stage 2	85.5 1.01
Stage 2	85.3 0.64
Stage 2	85.1 0.33
Stage 2	84.9 0.08
Stage 2	84.7 -0.12
Stage 2	84.5 -0.27
Stage 2	84.3 -0.38
Stage 2	84.1 -0.46
Stage 2	83.9 -0.5
Stage 2	83.7 -0.53
Stage 2	83.5 -0.53
Stage 2	83.3 -0.52
Stage 2	83.1 -0.5
Stage 2	82.9 -0.47
Stage 2	82.8 -0.45
Stage 2	82.6 -0.41
Stage 2	82.4 -0.37
Stage 2	82.2 -0.33
Stage 2	82 -0.29
Stage 2	81.8 -0.25
Stage 2	81.6 -0.21
Stage 2	81.4 -0.18
Stage 2	81.2 -0.14
Stage 2	81 -0.11
Stage 2	80.8 -0.09
Stage 2	80.6 -0.07
Stage 2	80.4 -0.05
Stage 2	80.2 -0.03
Stage 2	80 -0.02
Stage 2	79.8 -0.01
Stage 2	79.6 0
Stage 2	79.4 0.01
Stage 2	79.2 0.01

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 2	79 0.02
Stage 2	78.8 0.02
Stage 2	78.6 0.02
Stage 2	78.4 0.02
Stage 2	78.2 0.02
Stage 2	78 0.02
Stage 2	77.8 0.02
Stage 2	77.6 0.02
Stage 2	77.4 0.02
Stage 2	77.2 0.01
Stage 2	77 0.01
Stage 2	76.8 0.01
Stage 2	76.6 0.01
Stage 2	76.4 0.01
Stage 2	76.2 0.01
Stage 2	76 0
Stage 2	75.8 0
Stage 2	75.6 0
Stage 2	75.4 0
Stage 2	75.2 0
Stage 2	75 0
Stage 2	74.8 0
Stage 2	74.6 0
Stage 2	74.4 0
Stage 2	74.2 0
Stage 2	74 0
Stage 2	73.8 0
Stage 2	73.6 0
Stage 2	73.4 0
Stage 2	73.2 0
Stage 2	73 0
Stage 2	72.8 0
Stage 2	72.6 0
Stage 2	72.4 0
Stage 2	72.2 0
Stage 2	72.1 0

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 2

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 2	92.3	0	36.05
Stage 2	92.1	7.21	36.05
Stage 2	91.9	14.3	35.44
Stage 2	91.7	21.22	34.59
Stage 2	91.5	27.91	33.46
Stage 2	91.3	34.32	32.05
Stage 2	91.1	40.38	30.32
Stage 2	90.9	46.03	28.27
Stage 2	90.7	51.21	25.89
Stage 2	90.5	55.85	23.17
Stage 2	90.3	59.87	20.12
Stage 2	90.1	63.22	16.74
Stage 2	89.9	65.83	13.04
Stage 2	89.7	67.6	8.86
Stage 2	89.5	68.44	4.21
Stage 2	89.3	68.29	-0.73
Stage 2	89.1	67.07	-6.09
Stage 2	88.9	64.7	-11.86
Stage 2	88.7	61.1	-18.01
Stage 2	88.5	56.2	-24.53
Stage 2	88.3	49.94	-31.28
Stage 2	88.1	42.27	-38.38
Stage 2	87.9	33.1	-45.81
Stage 2	87.7	22.39	-53.57
Stage 2	87.5	10.55	-59.23
Stage 2	87.3	-1.53	-60.39
Stage 2	87.1	-12.92	-56.94
Stage 2	86.9	-22.71	-48.97
Stage 2	86.7	-30.01	-36.47
Stage 2	86.5	-34.82	-24.06
Stage 2	86.3	-37.57	-13.76
Stage 2	86.1	-38.65	-5.37
Stage 2	85.9	-38.39	1.28
Stage 2	85.7	-37.11	6.4
Stage 2	85.5	-35.07	10.18
Stage 2	85.3	-32.51	12.82
Stage 2	85.1	-29.61	14.48
Stage 2	84.9	-26.54	15.34
Stage 2	84.7	-23.43	15.55
Stage 2	84.5	-20.37	15.29
Stage 2	84.3	-17.44	14.67
Stage 2	84.1	-14.68	13.8
Stage 2	83.9	-12.13	12.75
Stage 2	83.7	-9.81	11.59
Stage 2	83.5	-7.74	10.38
Stage 2	83.3	-5.91	9.15
Stage 2	83.1	-4.32	7.95
Stage 2	82.9	-2.96	6.79
Stage 2	82.8	-2.36	5.98
Stage 2	82.6	-1.32	5.2
Stage 2	82.4	-0.47	4.25
Stage 2	82.2	0.21	3.39
Stage 2	82	0.73	2.62
Stage 2	81.8	1.12	1.96
Stage 2	81.6	1.4	1.38
Stage 2	81.4	1.58	0.9
Stage 2	81.2	1.68	0.49
Stage 2	81	1.71	0.16
Stage 2	80.8	1.69	-0.1
Stage 2	80.6	1.63	-0.3
Stage 2	80.4	1.54	-0.45
Stage 2	80.2	1.43	-0.56
Stage 2	80	1.3	-0.63
Stage 2	79.8	1.17	-0.67
Stage 2	79.6	1.03	-0.68
Stage 2	79.4	0.9	-0.68
Stage 2	79.2	0.76	-0.65

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 2	79	0.64	-0.61
Stage 2	78.8	0.53	-0.57
Stage 2	78.6	0.43	-0.51
Stage 2	78.4	0.33	-0.46
Stage 2	78.2	0.25	-0.4
Stage 2	78	0.18	-0.35
Stage 2	77.8	0.12	-0.3
Stage 2	77.6	0.07	-0.25
Stage 2	77.4	0.03	-0.2
Stage 2	77.2	0	-0.16
Stage 2	77	-0.02	-0.13
Stage 2	76.8	-0.04	-0.09
Stage 2	76.6	-0.06	-0.07
Stage 2	76.4	-0.06	-0.04
Stage 2	76.2	-0.07	-0.02
Stage 2	76	-0.07	-0.01
Stage 2	75.8	-0.07	0
Stage 2	75.6	-0.07	0.01
Stage 2	75.4	-0.06	0.02
Stage 2	75.2	-0.06	0.03
Stage 2	75	-0.05	0.03
Stage 2	74.8	-0.05	0.03
Stage 2	74.6	-0.04	0.03
Stage 2	74.4	-0.04	0.03
Stage 2	74.2	-0.03	0.03
Stage 2	74	-0.02	0.03
Stage 2	73.8	-0.02	0.02
Stage 2	73.6	-0.02	0.02
Stage 2	73.4	-0.01	0.02
Stage 2	73.2	-0.01	0.02
Stage 2	73	-0.01	0.01
Stage 2	72.8	0	0.01
Stage 2	72.6	0	0.01
Stage 2	72.4	0	0.01
Stage 2	72.2	0	0
Stage 2	72.1	0	0

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 3

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 3	92.3 2.88
Stage 3	92.1 3.85
Stage 3	91.9 4.81
Stage 3	91.7 5.73
Stage 3	91.5 6.6
Stage 3	91.3 7.4
Stage 3	91.1 8.12
Stage 3	90.9 8.75
Stage 3	90.7 9.26
Stage 3	90.5 9.66
Stage 3	90.3 9.93
Stage 3	90.1 10.07
Stage 3	89.9 10.08
Stage 3	89.7 9.95
Stage 3	89.5 9.7
Stage 3	89.3 9.32
Stage 3	89.1 8.85
Stage 3	88.9 8.29
Stage 3	88.7 7.68
Stage 3	88.5 7.04
Stage 3	88.3 6.41
Stage 3	88.1 5.83
Stage 3	87.9 5.29
Stage 3	87.7 4.77
Stage 3	87.5 4.26
Stage 3	87.3 3.76
Stage 3	87.1 3.27
Stage 3	86.9 2.81
Stage 3	86.7 2.37
Stage 3	86.5 1.97
Stage 3	86.3 1.59
Stage 3	86.1 1.26
Stage 3	85.9 0.97
Stage 3	85.7 0.71
Stage 3	85.5 0.49
Stage 3	85.3 0.3
Stage 3	85.1 0.15
Stage 3	84.9 0.02
Stage 3	84.7 -0.08
Stage 3	84.5 -0.16
Stage 3	84.3 -0.22
Stage 3	84.1 -0.26
Stage 3	83.9 -0.29
Stage 3	83.7 -0.3
Stage 3	83.5 -0.31
Stage 3	83.3 -0.3
Stage 3	83.1 -0.29
Stage 3	82.9 -0.28
Stage 3	82.8 -0.27
Stage 3	82.6 -0.25
Stage 3	82.4 -0.23
Stage 3	82.2 -0.2
Stage 3	82 -0.18
Stage 3	81.8 -0.16
Stage 3	81.6 -0.13
Stage 3	81.4 -0.11
Stage 3	81.2 -0.1
Stage 3	81 -0.08
Stage 3	80.8 -0.06
Stage 3	80.6 -0.05
Stage 3	80.4 -0.04
Stage 3	80.2 -0.03
Stage 3	80 -0.02
Stage 3	79.8 -0.01
Stage 3	79.6 0
Stage 3	79.4 0
Stage 3	79.2 0.01

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento		Muro: LEFT
Stage	Z (m)	Spostamento (mm)
Stage 3	79	0.01
Stage 3	78.8	0.01
Stage 3	78.6	0.01
Stage 3	78.4	0.01
Stage 3	78.2	0.01
Stage 3	78	0.01
Stage 3	77.8	0.01
Stage 3	77.6	0.01
Stage 3	77.4	0.01
Stage 3	77.2	0.01
Stage 3	77	0.01
Stage 3	76.8	0.01
Stage 3	76.6	0.01
Stage 3	76.4	0.01
Stage 3	76.2	0
Stage 3	76	0
Stage 3	75.8	0
Stage 3	75.6	0
Stage 3	75.4	0
Stage 3	75.2	0
Stage 3	75	0
Stage 3	74.8	0
Stage 3	74.6	0
Stage 3	74.4	0
Stage 3	74.2	0
Stage 3	74	0
Stage 3	73.8	0
Stage 3	73.6	0
Stage 3	73.4	0
Stage 3	73.2	0
Stage 3	73	0
Stage 3	72.8	0
Stage 3	72.6	0
Stage 3	72.4	0
Stage 3	72.2	0
Stage 3	72.1	0

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 3

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 3	92.3	0	44.11
Stage 3	92.1	8.82	44.11
Stage 3	91.9	17.52	43.5
Stage 3	91.7	26.05	42.65
Stage 3	91.5	34.27	41.11
Stage 3	91.3	42.03	38.77
Stage 3	91.1	49.15	35.6
Stage 3	90.9	55.46	31.54
Stage 3	90.7	60.77	26.56
Stage 3	90.5	64.89	20.62
Stage 3	90.3	67.63	13.69
Stage 3	90.1	68.78	5.73
Stage 3	89.9	68.12	-3.29
Stage 3	89.7	65.42	-13.52
Stage 3	89.5	60.42	-24.98
Stage 3	89.3	52.93	-37.46
Stage 3	89.1	42.71	-51.09
Stage 3	88.9	29.56	-65.77
Stage 3	88.7	13.28	-81.4
Stage 3	88.5	-6.29	-97.83
Stage 3	88.3	-29.24	-114.73
Stage 3	88.1	-18.05	55.96
Stage 3	87.9	-10.32	38.64
Stage 3	87.7	-6.02	21.51
Stage 3	87.5	-5.06	4.82
Stage 3	87.3	-6.81	-8.77
Stage 3	87.1	-10.1	-16.44
Stage 3	86.9	-13.74	-18.24
Stage 3	86.7	-16.58	-14.19
Stage 3	86.5	-18.37	-8.95
Stage 3	86.3	-19.3	-4.62
Stage 3	86.1	-19.52	-1.1
Stage 3	85.9	-19.18	1.68
Stage 3	85.7	-18.42	3.81
Stage 3	85.5	-17.35	5.37
Stage 3	85.3	-16.06	6.44
Stage 3	85.1	-14.64	7.09
Stage 3	84.9	-13.16	7.4
Stage 3	84.7	-11.68	7.42
Stage 3	84.5	-10.23	7.26
Stage 3	84.3	-8.83	6.96
Stage 3	84.1	-7.52	6.57
Stage 3	83.9	-6.3	6.11
Stage 3	83.7	-5.18	5.6
Stage 3	83.5	-4.16	5.07
Stage 3	83.3	-3.26	4.53
Stage 3	83.1	-2.46	3.99
Stage 3	82.9	-1.77	3.47
Stage 3	82.8	-1.46	3.1
Stage 3	82.6	-0.91	2.74
Stage 3	82.4	-0.45	2.29
Stage 3	82.2	-0.07	1.88
Stage 3	82	0.23	1.51
Stage 3	81.8	0.46	1.17
Stage 3	81.6	0.64	0.88
Stage 3	81.4	0.76	0.63
Stage 3	81.2	0.84	0.41
Stage 3	81	0.89	0.22
Stage 3	80.8	0.9	0.07
Stage 3	80.6	0.89	-0.05
Stage 3	80.4	0.86	-0.15
Stage 3	80.2	0.82	-0.23
Stage 3	80	0.76	-0.28
Stage 3	79.8	0.7	-0.32
Stage 3	79.6	0.63	-0.34
Stage 3	79.4	0.56	-0.35
Stage 3	79.2	0.49	-0.35

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 3	79	0.42	-0.34
Stage 3	78.8	0.35	-0.32
Stage 3	78.6	0.29	-0.3
Stage 3	78.4	0.24	-0.28
Stage 3	78.2	0.19	-0.25
Stage 3	78	0.15	-0.22
Stage 3	77.8	0.11	-0.19
Stage 3	77.6	0.07	-0.16
Stage 3	77.4	0.05	-0.14
Stage 3	77.2	0.02	-0.11
Stage 3	77	0.01	-0.09
Stage 3	76.8	-0.01	-0.07
Stage 3	76.6	-0.02	-0.06
Stage 3	76.4	-0.03	-0.04
Stage 3	76.2	-0.03	-0.03
Stage 3	76	-0.04	-0.02
Stage 3	75.8	-0.04	-0.01
Stage 3	75.6	-0.04	0
Stage 3	75.4	-0.04	0.01
Stage 3	75.2	-0.04	0.01
Stage 3	75	-0.03	0.01
Stage 3	74.8	-0.03	0.02
Stage 3	74.6	-0.03	0.02
Stage 3	74.4	-0.02	0.02
Stage 3	74.2	-0.02	0.02
Stage 3	74	-0.02	0.02
Stage 3	73.8	-0.01	0.02
Stage 3	73.6	-0.01	0.01
Stage 3	73.4	-0.01	0.01
Stage 3	73.2	-0.01	0.01
Stage 3	73	0	0.01
Stage 3	72.8	0	0.01
Stage 3	72.6	0	0.01
Stage 3	72.4	0	0
Stage 3	72.2	0	0
Stage 3	72.1	0	0

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 4

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 4	92.3 2.09
Stage 4	92.1 3.12
Stage 4	91.9 4.14
Stage 4	91.7 5.13
Stage 4	91.5 6.09
Stage 4	91.3 7.01
Stage 4	91.1 7.87
Stage 4	90.9 8.67
Stage 4	90.7 9.4
Stage 4	90.5 10.06
Stage 4	90.3 10.65
Stage 4	90.1 11.16
Stage 4	89.9 11.61
Stage 4	89.7 12
Stage 4	89.5 12.33
Stage 4	89.3 12.62
Stage 4	89.1 12.9
Stage 4	88.9 13.17
Stage 4	88.7 13.47
Stage 4	88.5 13.82
Stage 4	88.3 14.26
Stage 4	88.1 14.81
Stage 4	87.9 15.43
Stage 4	87.7 16.1
Stage 4	87.5 16.77
Stage 4	87.3 17.41
Stage 4	87.1 18
Stage 4	86.9 18.5
Stage 4	86.7 18.9
Stage 4	86.5 19.18
Stage 4	86.3 19.32
Stage 4	86.1 19.31
Stage 4	85.9 19.15
Stage 4	85.7 18.82
Stage 4	85.5 18.34
Stage 4	85.3 17.7
Stage 4	85.1 16.92
Stage 4	84.9 16
Stage 4	84.7 14.97
Stage 4	84.5 13.85
Stage 4	84.3 12.67
Stage 4	84.1 11.45
Stage 4	83.9 10.22
Stage 4	83.7 9.01
Stage 4	83.5 7.84
Stage 4	83.3 6.72
Stage 4	83.1 5.68
Stage 4	82.9 4.72
Stage 4	82.8 4.27
Stage 4	82.6 3.44
Stage 4	82.4 2.7
Stage 4	82.2 2.04
Stage 4	82 1.47
Stage 4	81.8 0.98
Stage 4	81.6 0.57
Stage 4	81.4 0.22
Stage 4	81.2 -0.06
Stage 4	81 -0.29
Stage 4	80.8 -0.46
Stage 4	80.6 -0.59
Stage 4	80.4 -0.69
Stage 4	80.2 -0.75
Stage 4	80 -0.78
Stage 4	79.8 -0.79
Stage 4	79.6 -0.78
Stage 4	79.4 -0.76
Stage 4	79.2 -0.72

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento		
Stage	Z (m)	Muro: LEFT Spostamento (mm)
Stage 4	79	-0.68
Stage 4	78.8	-0.63
Stage 4	78.6	-0.58
Stage 4	78.4	-0.52
Stage 4	78.2	-0.47
Stage 4	78	-0.41
Stage 4	77.8	-0.36
Stage 4	77.6	-0.31
Stage 4	77.4	-0.26
Stage 4	77.2	-0.22
Stage 4	77	-0.18
Stage 4	76.8	-0.15
Stage 4	76.6	-0.11
Stage 4	76.4	-0.09
Stage 4	76.2	-0.06
Stage 4	76	-0.04
Stage 4	75.8	-0.02
Stage 4	75.6	-0.01
Stage 4	75.4	0
Stage 4	75.2	0.01
Stage 4	75	0.02
Stage 4	74.8	0.02
Stage 4	74.6	0.03
Stage 4	74.4	0.03
Stage 4	74.2	0.03
Stage 4	74	0.03
Stage 4	73.8	0.03
Stage 4	73.6	0.03
Stage 4	73.4	0.03
Stage 4	73.2	0.03
Stage 4	73	0.03
Stage 4	72.8	0.03
Stage 4	72.6	0.02
Stage 4	72.4	0.02
Stage 4	72.2	0.02
Stage 4	72.1	0.02

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 4

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 4	92.3	0	31.43
Stage 4	92.1	6.29	31.43
Stage 4	91.9	12.27	29.94
Stage 4	91.7	17.93	28.28
Stage 4	91.5	23.14	26.03
Stage 4	91.3	27.76	23.09
Stage 4	91.1	31.64	19.44
Stage 4	90.9	34.66	15.08
Stage 4	90.7	36.66	10.01
Stage 4	90.5	37.51	4.24
Stage 4	90.3	37.07	-2.22
Stage 4	90.1	35.2	-9.32
Stage 4	89.9	31.8	-17.03
Stage 4	89.7	26.71	-25.42
Stage 4	89.5	19.83	-34.42
Stage 4	89.3	11.08	-43.75
Stage 4	89.1	0.4	-53.41
Stage 4	88.9	-12.25	-63.24
Stage 4	88.7	-26.85	-73.01
Stage 4	88.5	-43.35	-82.48
Stage 4	88.3	-61.6	-91.24
Stage 4	88.1	-40.38	106.1
Stage 4	87.9	-20.65	98.67
Stage 4	87.7	-2.47	90.91
Stage 4	87.5	14.1	82.84
Stage 4	87.3	28.99	74.46
Stage 4	87.1	42.17	65.88
Stage 4	86.9	53.57	57.01
Stage 4	86.7	63.14	47.85
Stage 4	86.5	70.82	38.4
Stage 4	86.3	76.56	28.68
Stage 4	86.1	80.31	18.77
Stage 4	85.9	82.03	8.59
Stage 4	85.7	81.66	-1.86
Stage 4	85.5	79.15	-12.56
Stage 4	85.3	74.44	-23.53
Stage 4	85.1	67.49	-34.75
Stage 4	84.9	58.26	-46.15
Stage 4	84.7	46.7	-57.8
Stage 4	84.5	33.25	-67.27
Stage 4	84.3	18.82	-72.12
Stage 4	84.1	4.35	-72.36
Stage 4	83.9	-9.23	-67.92
Stage 4	83.7	-21	-58.86
Stage 4	83.5	-30.21	-46.04
Stage 4	83.3	-36.96	-33.76
Stage 4	83.1	-41.52	-22.77
Stage 4	82.9	-44.21	-13.47
Stage 4	82.8	-44.98	-7.68
Stage 4	82.6	-45.47	-2.43
Stage 4	82.4	-44.83	3.21
Stage 4	82.2	-43.3	7.63
Stage 4	82	-41.1	10.99
Stage 4	81.8	-38.42	13.41
Stage 4	81.6	-35.41	15.03
Stage 4	81.4	-32.22	15.96
Stage 4	81.2	-28.95	16.34
Stage 4	81	-25.71	16.22
Stage 4	80.8	-22.56	15.76
Stage 4	80.6	-19.55	15.06
Stage 4	80.4	-16.71	14.17
Stage 4	80.2	-14.08	13.16
Stage 4	80	-11.67	12.06
Stage 4	79.8	-9.48	10.94
Stage 4	79.6	-7.52	9.8
Stage 4	79.4	-5.79	8.68
Stage 4	79.2	-4.27	7.59

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 4	79	-2.96	6.56
Stage 4	78.8	-1.84	5.59
Stage 4	78.6	-0.9	4.69
Stage 4	78.4	-0.13	3.87
Stage 4	78.2	0.5	3.13
Stage 4	78	0.99	2.46
Stage 4	77.8	1.37	1.87
Stage 4	77.6	1.64	1.36
Stage 4	77.4	1.82	0.92
Stage 4	77.2	1.93	0.55
Stage 4	77	1.98	0.24
Stage 4	76.8	1.98	-0.02
Stage 4	76.6	1.93	-0.23
Stage 4	76.4	1.85	-0.39
Stage 4	76.2	1.75	-0.51
Stage 4	76	1.63	-0.6
Stage 4	75.8	1.5	-0.66
Stage 4	75.6	1.36	-0.69
Stage 4	75.4	1.22	-0.71
Stage 4	75.2	1.08	-0.71
Stage 4	75	0.94	-0.69
Stage 4	74.8	0.81	-0.66
Stage 4	74.6	0.69	-0.62
Stage 4	74.4	0.57	-0.57
Stage 4	74.2	0.47	-0.52
Stage 4	74	0.38	-0.46
Stage 4	73.8	0.29	-0.41
Stage 4	73.6	0.22	-0.35
Stage 4	73.4	0.16	-0.3
Stage 4	73.2	0.11	-0.25
Stage 4	73	0.07	-0.2
Stage 4	72.8	0.04	-0.15
Stage 4	72.6	0.02	-0.11
Stage 4	72.4	0.01	-0.07
Stage 4	72.2	0	-0.03
Stage 4	72.1	0	-0.01

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 5

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 5	92.3 2.28
Stage 5	92.1 3.33
Stage 5	91.9 4.37
Stage 5	91.7 5.39
Stage 5	91.5 6.36
Stage 5	91.3 7.29
Stage 5	91.1 8.16
Stage 5	90.9 8.95
Stage 5	90.7 9.67
Stage 5	90.5 10.3
Stage 5	90.3 10.84
Stage 5	90.1 11.3
Stage 5	89.9 11.67
Stage 5	89.7 11.95
Stage 5	89.5 12.16
Stage 5	89.3 12.3
Stage 5	89.1 12.39
Stage 5	88.9 12.46
Stage 5	88.7 12.51
Stage 5	88.5 12.58
Stage 5	88.3 12.7
Stage 5	88.1 12.9
Stage 5	87.9 13.13
Stage 5	87.7 13.38
Stage 5	87.5 13.6
Stage 5	87.3 13.77
Stage 5	87.1 13.87
Stage 5	86.9 13.87
Stage 5	86.7 13.77
Stage 5	86.5 13.56
Stage 5	86.3 13.24
Stage 5	86.1 12.81
Stage 5	85.9 12.29
Stage 5	85.7 11.7
Stage 5	85.5 11.06
Stage 5	85.3 10.41
Stage 5	85.1 9.78
Stage 5	84.9 9.15
Stage 5	84.7 8.51
Stage 5	84.5 7.86
Stage 5	84.3 7.19
Stage 5	84.1 6.51
Stage 5	83.9 5.83
Stage 5	83.7 5.16
Stage 5	83.5 4.51
Stage 5	83.3 3.88
Stage 5	83.1 3.3
Stage 5	82.9 2.76
Stage 5	82.8 2.51
Stage 5	82.6 2.04
Stage 5	82.4 1.61
Stage 5	82.2 1.24
Stage 5	82 0.91
Stage 5	81.8 0.62
Stage 5	81.6 0.38
Stage 5	81.4 0.17
Stage 5	81.2 0
Stage 5	81 -0.14
Stage 5	80.8 -0.25
Stage 5	80.6 -0.33
Stage 5	80.4 -0.4
Stage 5	80.2 -0.44
Stage 5	80 -0.47
Stage 5	79.8 -0.48
Stage 5	79.6 -0.48
Stage 5	79.4 -0.47
Stage 5	79.2 -0.45

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento		
Stage	Z (m)	Muro: LEFT Spostamento (mm)
Stage 5	79	-0.43
Stage 5	78.8	-0.41
Stage 5	78.6	-0.38
Stage 5	78.4	-0.34
Stage 5	78.2	-0.31
Stage 5	78	-0.28
Stage 5	77.8	-0.25
Stage 5	77.6	-0.22
Stage 5	77.4	-0.19
Stage 5	77.2	-0.16
Stage 5	77	-0.14
Stage 5	76.8	-0.11
Stage 5	76.6	-0.09
Stage 5	76.4	-0.07
Stage 5	76.2	-0.06
Stage 5	76	-0.04
Stage 5	75.8	-0.03
Stage 5	75.6	-0.02
Stage 5	75.4	-0.01
Stage 5	75.2	0
Stage 5	75	0.01
Stage 5	74.8	0.01
Stage 5	74.6	0.01
Stage 5	74.4	0.02
Stage 5	74.2	0.02
Stage 5	74	0.02
Stage 5	73.8	0.02
Stage 5	73.6	0.02
Stage 5	73.4	0.02
Stage 5	73.2	0.02
Stage 5	73	0.02
Stage 5	72.8	0.02
Stage 5	72.6	0.02
Stage 5	72.4	0.02
Stage 5	72.2	0.02
Stage 5	72.1	0.02

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 5

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 5	92.3	0	34.43
Stage 5	92.1	6.89	34.43
Stage 5	91.9	13.52	33.19
Stage 5	91.7	19.89	31.81
Stage 5	91.5	25.86	29.87
Stage 5	91.3	31.31	27.25
Stage 5	91.1	36.1	23.94
Stage 5	90.9	40.08	19.92
Stage 5	90.7	43.12	15.19
Stage 5	90.5	45.06	9.73
Stage 5	90.3	45.78	3.56
Stage 5	90.1	45.11	-3.31
Stage 5	89.9	42.94	-10.85
Stage 5	89.7	39.11	-19.18
Stage 5	89.5	33.46	-28.23
Stage 5	89.3	25.91	-37.76
Stage 5	89.1	16.35	-47.82
Stage 5	88.9	4.7	-58.25
Stage 5	88.7	-9.08	-68.88
Stage 5	88.5	-24.98	-79.5
Stage 5	88.3	-42.93	-89.75
Stage 5	88.1	-22.47	102.3
Stage 5	87.9	-3.96	92.58
Stage 5	87.7	12.45	82.06
Stage 5	87.5	26.6	70.73
Stage 5	87.3	38.31	58.56
Stage 5	87.1	47.43	45.61
Stage 5	86.9	53.79	31.79
Stage 5	86.7	57.21	17.07
Stage 5	86.5	57.5	1.47
Stage 5	86.3	54.5	-14.99
Stage 5	86.1	48.06	-32.2
Stage 5	85.9	38.02	-50.18
Stage 5	85.7	24.25	-68.85
Stage 5	85.5	6.63	-88.11
Stage 5	85.3	-14.93	-107.8
Stage 5	85.1	-2.9	60.17
Stage 5	84.9	5.14	40.2
Stage 5	84.7	9.2	20.33
Stage 5	84.5	9.36	0.77
Stage 5	84.3	6.29	-15.33
Stage 5	84.1	1.12	-25.86
Stage 5	83.9	-5.02	-30.69
Stage 5	83.7	-10.99	-29.88
Stage 5	83.5	-15.85	-24.28
Stage 5	83.3	-19.5	-18.27
Stage 5	83.1	-22.02	-12.6
Stage 5	82.9	-23.58	-7.77
Stage 5	82.8	-24.05	-4.73
Stage 5	82.6	-24.45	-1.97
Stage 5	82.4	-24.24	1.04
Stage 5	82.2	-23.55	3.43
Stage 5	82	-22.5	5.27
Stage 5	81.8	-21.17	6.64
Stage 5	81.6	-19.65	7.58
Stage 5	81.4	-18.02	8.16
Stage 5	81.2	-16.33	8.44
Stage 5	81	-14.65	8.44
Stage 5	80.8	-12.99	8.27
Stage 5	80.6	-11.4	7.97
Stage 5	80.4	-9.89	7.57
Stage 5	80.2	-8.47	7.1
Stage 5	80	-7.15	6.59
Stage 5	79.8	-5.94	6.05
Stage 5	79.6	-4.84	5.5
Stage 5	79.4	-3.85	4.95
Stage 5	79.2	-2.97	4.41

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 5	79	-2.19	3.88
Stage 5	78.8	-1.52	3.37
Stage 5	78.6	-0.94	2.9
Stage 5	78.4	-0.45	2.45
Stage 5	78.2	-0.04	2.04
Stage 5	78	0.3	1.67
Stage 5	77.8	0.56	1.33
Stage 5	77.6	0.77	1.03
Stage 5	77.4	0.92	0.76
Stage 5	77.2	1.03	0.53
Stage 5	77	1.09	0.33
Stage 5	76.8	1.12	0.16
Stage 5	76.6	1.13	0.02
Stage 5	76.4	1.11	-0.1
Stage 5	76.2	1.07	-0.19
Stage 5	76	1.02	-0.27
Stage 5	75.8	0.95	-0.32
Stage 5	75.6	0.88	-0.36
Stage 5	75.4	0.8	-0.39
Stage 5	75.2	0.72	-0.4
Stage 5	75	0.64	-0.41
Stage 5	74.8	0.56	-0.4
Stage 5	74.6	0.48	-0.39
Stage 5	74.4	0.41	-0.37
Stage 5	74.2	0.34	-0.34
Stage 5	74	0.28	-0.31
Stage 5	73.8	0.22	-0.28
Stage 5	73.6	0.17	-0.25
Stage 5	73.4	0.13	-0.22
Stage 5	73.2	0.09	-0.19
Stage 5	73	0.06	-0.15
Stage 5	72.8	0.04	-0.12
Stage 5	72.6	0.02	-0.09
Stage 5	72.4	0.01	-0.06
Stage 5	72.2	0	-0.03
Stage 5	72.1	0	-0.01

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 6

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 6	92.3 2.22
Stage 6	92.1 3.18
Stage 6	91.9 4.14
Stage 6	91.7 5.06
Stage 6	91.5 5.95
Stage 6	91.3 6.8
Stage 6	91.1 7.58
Stage 6	90.9 8.3
Stage 6	90.7 8.94
Stage 6	90.5 9.51
Stage 6	90.3 9.99
Stage 6	90.1 10.4
Stage 6	89.9 10.73
Stage 6	89.7 10.99
Stage 6	89.5 11.2
Stage 6	89.3 11.36
Stage 6	89.1 11.49
Stage 6	88.9 11.63
Stage 6	88.7 11.79
Stage 6	88.5 12
Stage 6	88.3 12.31
Stage 6	88.1 12.73
Stage 6	87.9 13.26
Stage 6	87.7 13.85
Stage 6	87.5 14.48
Stage 6	87.3 15.13
Stage 6	87.1 15.79
Stage 6	86.9 16.43
Stage 6	86.7 17.05
Stage 6	86.5 17.64
Stage 6	86.3 18.22
Stage 6	86.1 18.77
Stage 6	85.9 19.32
Stage 6	85.7 19.88
Stage 6	85.5 20.47
Stage 6	85.3 21.12
Stage 6	85.1 21.84
Stage 6	84.9 22.59
Stage 6	84.7 23.34
Stage 6	84.5 24.03
Stage 6	84.3 24.64
Stage 6	84.1 25.13
Stage 6	83.9 25.48
Stage 6	83.7 25.67
Stage 6	83.5 25.67
Stage 6	83.3 25.49
Stage 6	83.1 25.11
Stage 6	82.9 24.53
Stage 6	82.8 24.16
Stage 6	82.6 23.3
Stage 6	82.4 22.25
Stage 6	82.2 21.05
Stage 6	82 19.72
Stage 6	81.8 18.28
Stage 6	81.6 16.77
Stage 6	81.4 15.22
Stage 6	81.2 13.66
Stage 6	81 12.13
Stage 6	80.8 10.64
Stage 6	80.6 9.21
Stage 6	80.4 7.87
Stage 6	80.2 6.63
Stage 6	80 5.49
Stage 6	79.8 4.45
Stage 6	79.6 3.52
Stage 6	79.4 2.69
Stage 6	79.2 1.97

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento		
Stage	Z (m)	Muro: LEFT Spostamento (mm)
Stage 6	79	1.34
Stage 6	78.8	0.8
Stage 6	78.6	0.35
Stage 6	78.4	-0.03
Stage 6	78.2	-0.33
Stage 6	78	-0.57
Stage 6	77.8	-0.76
Stage 6	77.6	-0.9
Stage 6	77.4	-1
Stage 6	77.2	-1.06
Stage 6	77	-1.09
Stage 6	76.8	-1.09
Stage 6	76.6	-1.07
Stage 6	76.4	-1.04
Stage 6	76.2	-0.99
Stage 6	76	-0.94
Stage 6	75.8	-0.87
Stage 6	75.6	-0.8
Stage 6	75.4	-0.73
Stage 6	75.2	-0.66
Stage 6	75	-0.59
Stage 6	74.8	-0.52
Stage 6	74.6	-0.45
Stage 6	74.4	-0.38
Stage 6	74.2	-0.31
Stage 6	74	-0.25
Stage 6	73.8	-0.19
Stage 6	73.6	-0.13
Stage 6	73.4	-0.08
Stage 6	73.2	-0.02
Stage 6	73	0.03
Stage 6	72.8	0.08
Stage 6	72.6	0.14
Stage 6	72.4	0.19
Stage 6	72.2	0.24
Stage 6	72.1	0.26

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 6

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 6	92.3	0	33.48
Stage 6	92.1	6.7	33.48
Stage 6	91.9	13.12	32.1
Stage 6	91.7	19.22	30.5
Stage 6	91.5	24.86	28.25
Stage 6	91.3	29.91	25.25
Stage 6	91.1	34.21	21.47
Stage 6	90.9	37.59	16.92
Stage 6	90.7	39.9	11.57
Stage 6	90.5	40.99	5.43
Stage 6	90.3	40.69	-1.49
Stage 6	90.1	38.86	-9.15
Stage 6	89.9	35.36	-17.54
Stage 6	89.7	30.01	-26.74
Stage 6	89.5	22.67	-36.7
Stage 6	89.3	13.24	-47.13
Stage 6	89.1	1.63	-58.07
Stage 6	88.9	-12.24	-69.34
Stage 6	88.7	-28.39	-80.75
Stage 6	88.5	-46.8	-92.05
Stage 6	88.3	-67.38	-102.84
Stage 6	88.1	-49.78	87.97
Stage 6	87.9	-34.17	78.09
Stage 6	87.7	-20.63	67.69
Stage 6	87.5	-9.27	56.81
Stage 6	87.3	-0.17	45.46
Stage 6	87.1	6.59	33.8
Stage 6	86.9	10.94	21.77
Stage 6	86.7	12.83	9.45
Stage 6	86.5	12.21	-3.08
Stage 6	86.3	9.07	-15.71
Stage 6	86.1	3.42	-28.25
Stage 6	85.9	-4.7	-40.64
Stage 6	85.7	-15.25	-52.71
Stage 6	85.5	-28.1	-64.28
Stage 6	85.3	-43.16	-75.25
Stage 6	85.1	-17.89	126.36
Stage 6	84.9	5.11	114.95
Stage 6	84.7	25.77	103.3
Stage 6	84.5	44.05	91.41
Stage 6	84.3	59.9	79.27
Stage 6	84.1	73.28	66.88
Stage 6	83.9	84.14	54.32
Stage 6	83.7	92.45	41.52
Stage 6	83.5	98.14	28.49
Stage 6	83.3	101.19	15.22
Stage 6	83.1	101.53	1.71
Stage 6	82.9	99.12	-12.02
Stage 6	82.8	96.88	-22.45
Stage 6	82.6	90.28	-32.97
Stage 6	82.4	80.84	-47.22
Stage 6	82.2	68.5	-61.7
Stage 6	82	53.71	-73.97
Stage 6	81.8	37.38	-81.61
Stage 6	81.6	20.47	-84.57
Stage 6	81.4	3.89	-82.89
Stage 6	81.2	-11.43	-76.58
Stage 6	81	-24.55	-65.63
Stage 6	80.8	-35.06	-52.56
Stage 6	80.6	-43.05	-39.95
Stage 6	80.4	-48.66	-28.03
Stage 6	80.2	-52.22	-17.8
Stage 6	80	-54.05	-9.14
Stage 6	79.8	-54.44	-1.94
Stage 6	79.6	-53.65	3.94
Stage 6	79.4	-51.92	8.63
Stage 6	79.2	-49.47	12.26

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 6	79	-46.48	14.96
Stage 6	78.8	-43.11	16.84
Stage 6	78.6	-39.51	18.02
Stage 6	78.4	-35.79	18.6
Stage 6	78.2	-32.05	18.66
Stage 6	78	-28.4	18.26
Stage 6	77.8	-24.89	17.55
Stage 6	77.6	-21.57	16.62
Stage 6	77.4	-18.46	15.54
Stage 6	77.2	-15.59	14.35
Stage 6	77	-12.97	13.11
Stage 6	76.8	-10.6	11.84
Stage 6	76.6	-8.48	10.58
Stage 6	76.4	-6.62	9.34
Stage 6	76.2	-4.99	8.14
Stage 6	76	-3.59	7
Stage 6	75.8	-2.4	5.93
Stage 6	75.6	-1.42	4.93
Stage 6	75.4	-0.61	4.01
Stage 6	75.2	0.02	3.18
Stage 6	75	0.51	2.42
Stage 6	74.8	0.86	1.75
Stage 6	74.6	1.09	1.16
Stage 6	74.4	1.22	0.66
Stage 6	74.2	1.26	0.22
Stage 6	74	1.24	-0.14
Stage 6	73.8	1.15	-0.42
Stage 6	73.6	1.02	-0.64
Stage 6	73.4	0.87	-0.79
Stage 6	73.2	0.69	-0.88
Stage 6	73	0.51	-0.91
Stage 6	72.8	0.34	-0.86
Stage 6	72.6	0.19	-0.75
Stage 6	72.4	0.07	-0.57
Stage 6	72.2	0.01	-0.32
Stage 6	72.1	0	-0.09

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 7

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 7	92.3 2.22
Stage 7	92.1 3.21
Stage 7	91.9 4.2
Stage 7	91.7 5.15
Stage 7	91.5 6.08
Stage 7	91.3 6.95
Stage 7	91.1 7.76
Stage 7	90.9 8.51
Stage 7	90.7 9.18
Stage 7	90.5 9.77
Stage 7	90.3 10.28
Stage 7	90.1 10.71
Stage 7	89.9 11.07
Stage 7	89.7 11.35
Stage 7	89.5 11.57
Stage 7	89.3 11.74
Stage 7	89.1 11.88
Stage 7	88.9 12
Stage 7	88.7 12.15
Stage 7	88.5 12.34
Stage 7	88.3 12.61
Stage 7	88.1 12.99
Stage 7	87.9 13.44
Stage 7	87.7 13.95
Stage 7	87.5 14.48
Stage 7	87.3 15
Stage 7	87.1 15.5
Stage 7	86.9 15.97
Stage 7	86.7 16.38
Stage 7	86.5 16.73
Stage 7	86.3 17.03
Stage 7	86.1 17.27
Stage 7	85.9 17.47
Stage 7	85.7 17.65
Stage 7	85.5 17.82
Stage 7	85.3 18.02
Stage 7	85.1 18.25
Stage 7	84.9 18.48
Stage 7	84.7 18.7
Stage 7	84.5 18.84
Stage 7	84.3 18.91
Stage 7	84.1 18.87
Stage 7	83.9 18.71
Stage 7	83.7 18.43
Stage 7	83.5 18.04
Stage 7	83.3 17.54
Stage 7	83.1 16.95
Stage 7	82.9 16.3
Stage 7	82.8 15.96
Stage 7	82.6 15.28
Stage 7	82.4 14.57
Stage 7	82.2 13.81
Stage 7	82 12.99
Stage 7	81.8 12.12
Stage 7	81.6 11.21
Stage 7	81.4 10.25
Stage 7	81.2 9.28
Stage 7	81 8.31
Stage 7	80.8 7.36
Stage 7	80.6 6.44
Stage 7	80.4 5.57
Stage 7	80.2 4.75
Stage 7	80 3.98
Stage 7	79.8 3.28
Stage 7	79.6 2.65
Stage 7	79.4 2.08
Stage 7	79.2 1.57

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 7	79 1.13
Stage 7	78.8 0.74
Stage 7	78.6 0.42
Stage 7	78.4 0.14
Stage 7	78.2 -0.09
Stage 7	78 -0.28
Stage 7	77.8 -0.43
Stage 7	77.6 -0.54
Stage 7	77.4 -0.63
Stage 7	77.2 -0.69
Stage 7	77 -0.72
Stage 7	76.8 -0.74
Stage 7	76.6 -0.74
Stage 7	76.4 -0.73
Stage 7	76.2 -0.71
Stage 7	76 -0.67
Stage 7	75.8 -0.64
Stage 7	75.6 -0.59
Stage 7	75.4 -0.55
Stage 7	75.2 -0.5
Stage 7	75 -0.45
Stage 7	74.8 -0.4
Stage 7	74.6 -0.35
Stage 7	74.4 -0.3
Stage 7	74.2 -0.26
Stage 7	74 -0.21
Stage 7	73.8 -0.16
Stage 7	73.6 -0.12
Stage 7	73.4 -0.08
Stage 7	73.2 -0.04
Stage 7	73 0
Stage 7	72.8 0.04
Stage 7	72.6 0.08
Stage 7	72.4 0.12
Stage 7	72.2 0.16
Stage 7	72.1 0.18

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 7

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 7	92.3	0	33.5
Stage 7	92.1	6.7	33.5
Stage 7	91.9	13.13	32.15
Stage 7	91.7	19.25	30.61
Stage 7	91.5	24.94	28.44
Stage 7	91.3	30.05	25.55
Stage 7	91.1	34.43	21.92
Stage 7	90.9	37.94	17.53
Stage 7	90.7	40.41	12.38
Stage 7	90.5	41.71	6.47
Stage 7	90.3	41.67	-0.2
Stage 7	90.1	40.15	-7.59
Stage 7	89.9	37.01	-15.68
Stage 7	89.7	32.1	-24.57
Stage 7	89.5	25.26	-34.2
Stage 7	89.3	16.4	-44.28
Stage 7	89.1	5.43	-54.86
Stage 7	88.9	-7.73	-65.78
Stage 7	88.7	-23.09	-76.83
Stage 7	88.5	-40.65	-87.8
Stage 7	88.3	-60.31	-98.27
Stage 7	88.1	-41.62	93.49
Stage 7	87.9	-24.85	83.85
Stage 7	87.7	-10.12	73.63
Stage 7	87.5	2.44	62.84
Stage 7	87.3	12.74	51.49
Stage 7	87.1	20.68	39.7
Stage 7	86.9	26.16	27.41
Stage 7	86.7	29.09	14.65
Stage 7	86.5	29.39	1.49
Stage 7	86.3	26.99	-12
Stage 7	86.1	21.86	-25.65
Stage 7	85.9	13.97	-39.45
Stage 7	85.7	3.32	-53.26
Stage 7	85.5	-10.06	-66.93
Stage 7	85.3	-26.14	-80.38
Stage 7	85.1	-3.93	111.09
Stage 7	84.9	15.34	96.32
Stage 7	84.7	31.5	80.82
Stage 7	84.5	44.41	64.56
Stage 7	84.3	53.92	47.56
Stage 7	84.1	59.88	29.79
Stage 7	83.9	62.15	11.35
Stage 7	83.7	60.59	-7.8
Stage 7	83.5	55.07	-27.63
Stage 7	83.3	45.46	-48.06
Stage 7	83.1	31.65	-69.03
Stage 7	82.9	13.57	-90.42
Stage 7	82.8	2.9	-106.64
Stage 7	82.6	15.9	65.01
Stage 7	82.4	24.55	43.24
Stage 7	82.2	28.86	21.55
Stage 7	82	28.87	0.04
Stage 7	81.8	24.86	-20.06
Stage 7	81.6	17.93	-34.63
Stage 7	81.4	9.19	-43.68
Stage 7	81.2	-0.25	-47.2
Stage 7	81	-9.29	-45.21
Stage 7	80.8	-16.86	-37.83
Stage 7	80.6	-22.87	-30.09
Stage 7	80.4	-27.33	-22.31
Stage 7	80.2	-30.44	-15.52
Stage 7	80	-32.37	-9.67
Stage 7	79.8	-33.31	-4.71
Stage 7	79.6	-33.43	-0.57
Stage 7	79.4	-32.86	2.82
Stage 7	79.2	-31.76	5.53

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 7	79	-30.23	7.64
Stage 7	78.8	-28.39	9.2
Stage 7	78.6	-26.33	10.29
Stage 7	78.4	-24.14	10.98
Stage 7	78.2	-21.88	11.28
Stage 7	78	-19.63	11.24
Stage 7	77.8	-17.44	10.96
Stage 7	77.6	-15.33	10.53
Stage 7	77.4	-13.34	9.99
Stage 7	77.2	-11.47	9.35
Stage 7	77	-9.73	8.66
Stage 7	76.8	-8.15	7.94
Stage 7	76.6	-6.71	7.19
Stage 7	76.4	-5.42	6.45
Stage 7	76.2	-4.28	5.71
Stage 7	76	-3.27	5
Stage 7	75.8	-2.41	4.32
Stage 7	75.6	-1.67	3.68
Stage 7	75.4	-1.06	3.08
Stage 7	75.2	-0.56	2.52
Stage 7	75	-0.16	2
Stage 7	74.8	0.15	1.54
Stage 7	74.6	0.38	1.12
Stage 7	74.4	0.53	0.76
Stage 7	74.2	0.62	0.44
Stage 7	74	0.65	0.16
Stage 7	73.8	0.63	-0.06
Stage 7	73.6	0.59	-0.24
Stage 7	73.4	0.51	-0.38
Stage 7	73.2	0.42	-0.47
Stage 7	73	0.31	-0.52
Stage 7	72.8	0.21	-0.51
Stage 7	72.6	0.12	-0.46
Stage 7	72.4	0.05	-0.36
Stage 7	72.2	0.01	-0.2
Stage 7	72.1	0	-0.06

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 8

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento		
Stage	Z (m)	Muro: LEFT Spostamento (mm)
Stage 8	92.3	2.27
Stage 8	92.1	3.25
Stage 8	91.9	4.21
Stage 8	91.7	5.15
Stage 8	91.5	6.06
Stage 8	91.3	6.91
Stage 8	91.1	7.7
Stage 8	90.9	8.42
Stage 8	90.7	9.07
Stage 8	90.5	9.64
Stage 8	90.3	10.12
Stage 8	90.1	10.52
Stage 8	89.9	10.84
Stage 8	89.7	11.08
Stage 8	89.5	11.26
Stage 8	89.3	11.38
Stage 8	89.1	11.48
Stage 8	88.9	11.56
Stage 8	88.7	11.65
Stage 8	88.5	11.79
Stage 8	88.3	12.01
Stage 8	88.1	12.34
Stage 8	87.9	12.75
Stage 8	87.7	13.22
Stage 8	87.5	13.72
Stage 8	87.3	14.22
Stage 8	87.1	14.71
Stage 8	86.9	15.17
Stage 8	86.7	15.61
Stage 8	86.5	16.01
Stage 8	86.3	16.39
Stage 8	86.1	16.74
Stage 8	85.9	17.09
Stage 8	85.7	17.45
Stage 8	85.5	17.85
Stage 8	85.3	18.32
Stage 8	85.1	18.89
Stage 8	84.9	19.53
Stage 8	84.7	20.2
Stage 8	84.5	20.88
Stage 8	84.3	21.54
Stage 8	84.1	22.18
Stage 8	83.9	22.77
Stage 8	83.7	23.32
Stage 8	83.5	23.83
Stage 8	83.3	24.3
Stage 8	83.1	24.75
Stage 8	82.9	25.2
Stage 8	82.8	25.44
Stage 8	82.6	25.92
Stage 8	82.4	26.39
Stage 8	82.2	26.81
Stage 8	82	27.14
Stage 8	81.8	27.34
Stage 8	81.6	27.39
Stage 8	81.4	27.26
Stage 8	81.2	26.95
Stage 8	81	26.44
Stage 8	80.8	25.73
Stage 8	80.6	24.83
Stage 8	80.4	23.74
Stage 8	80.2	22.49
Stage 8	80	21.09
Stage 8	79.8	19.57
Stage 8	79.6	17.97
Stage 8	79.4	16.32
Stage 8	79.2	14.65

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 8	79 13
Stage 8	78.8 11.39
Stage 8	78.6 9.85
Stage 8	78.4 8.4
Stage 8	78.2 7.06
Stage 8	78 5.82
Stage 8	77.8 4.69
Stage 8	77.6 3.68
Stage 8	77.4 2.79
Stage 8	77.2 2
Stage 8	77 1.32
Stage 8	76.8 0.74
Stage 8	76.6 0.26
Stage 8	76.4 -0.14
Stage 8	76.2 -0.47
Stage 8	76 -0.72
Stage 8	75.8 -0.92
Stage 8	75.6 -1.06
Stage 8	75.4 -1.15
Stage 8	75.2 -1.2
Stage 8	75 -1.22
Stage 8	74.8 -1.21
Stage 8	74.6 -1.18
Stage 8	74.4 -1.13
Stage 8	74.2 -1.06
Stage 8	74 -0.99
Stage 8	73.8 -0.9
Stage 8	73.6 -0.81
Stage 8	73.4 -0.71
Stage 8	73.2 -0.61
Stage 8	73 -0.51
Stage 8	72.8 -0.4
Stage 8	72.6 -0.3
Stage 8	72.4 -0.19
Stage 8	72.2 -0.09
Stage 8	72.1 -0.04

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 8

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 8	92.3	0	34.27
Stage 8	92.1	6.85	34.27
Stage 8	91.9	13.44	32.95
Stage 8	91.7	19.73	31.42
Stage 8	91.5	25.58	29.26
Stage 8	91.3	30.85	26.35
Stage 8	91.1	35.39	22.68
Stage 8	90.9	39.03	18.24
Stage 8	90.7	41.64	13.01
Stage 8	90.5	43.04	7
Stage 8	90.3	43.08	0.21
Stage 8	90.1	41.61	-7.34
Stage 8	89.9	38.49	-15.61
Stage 8	89.7	33.54	-24.72
Stage 8	89.5	26.63	-34.59
Stage 8	89.3	17.63	-44.97
Stage 8	89.1	6.45	-55.88
Stage 8	88.9	-6.98	-67.17
Stage 8	88.7	-22.71	-78.65
Stage 8	88.5	-40.73	-90.08
Stage 8	88.3	-60.95	-101.07
Stage 8	88.1	-43.18	88.82
Stage 8	87.9	-27.47	78.57
Stage 8	87.7	-13.93	67.7
Stage 8	87.5	-2.68	56.22
Stage 8	87.3	6.15	44.16
Stage 8	87.1	12.47	31.63
Stage 8	86.9	16.19	18.59
Stage 8	86.7	17.21	5.09
Stage 8	86.5	15.45	-8.79
Stage 8	86.3	10.86	-22.95
Stage 8	86.1	3.42	-37.21
Stage 8	85.9	-6.88	-51.5
Stage 8	85.7	-20.02	-65.68
Stage 8	85.5	-35.92	-79.53
Stage 8	85.3	-54.52	-92.96
Stage 8	85.1	-34.61	99.52
Stage 8	84.9	-17.54	85.36
Stage 8	84.7	-3.38	70.83
Stage 8	84.5	7.82	55.99
Stage 8	84.3	16	40.89
Stage 8	84.1	21.12	25.6
Stage 8	83.9	23.17	10.27
Stage 8	83.7	22.16	-5.07
Stage 8	83.5	18.1	-20.31
Stage 8	83.3	11.03	-35.32
Stage 8	83.1	1.05	-49.93
Stage 8	82.9	-11.75	-64
Stage 8	82.8	-19.2	-74.43
Stage 8	82.6	6.07	126.36
Stage 8	82.4	28.5	112.11
Stage 8	82.2	48.02	97.63
Stage 8	82	64.61	82.93
Stage 8	81.8	78.21	68
Stage 8	81.6	88.79	52.9
Stage 8	81.4	96.3	37.58
Stage 8	81.2	100.71	22.04
Stage 8	81	101.97	6.27
Stage 8	80.8	100.02	-9.71
Stage 8	80.6	94.85	-25.87
Stage 8	80.4	86.4	-42.24
Stage 8	80.2	74.63	-58.83
Stage 8	80	59.99	-73.21
Stage 8	79.8	43.4	-82.94
Stage 8	79.6	25.8	-88.04
Stage 8	79.4	8.12	-88.4
Stage 8	79.2	-8.69	-84.05

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 8	79	-23.69	-74.98
Stage 8	78.8	-35.93	-61.18
Stage 8	78.6	-45.24	-46.59
Stage 8	78.4	-51.84	-33.01
Stage 8	78.2	-56.12	-21.4
Stage 8	78	-58.45	-11.62
Stage 8	77.8	-59.14	-3.48
Stage 8	77.6	-58.5	3.2
Stage 8	77.4	-56.79	8.56
Stage 8	77.2	-54.24	12.74
Stage 8	77	-51.07	15.88
Stage 8	76.8	-47.45	18.1
Stage 8	76.6	-43.54	19.55
Stage 8	76.4	-39.47	20.32
Stage 8	76.2	-35.37	20.54
Stage 8	76	-31.32	20.21
Stage 8	75.8	-27.43	19.45
Stage 8	75.6	-23.76	18.38
Stage 8	75.4	-20.33	17.12
Stage 8	75.2	-17.19	15.73
Stage 8	75	-14.33	14.27
Stage 8	74.8	-11.78	12.77
Stage 8	74.6	-9.52	11.28
Stage 8	74.4	-7.56	9.83
Stage 8	74.2	-5.87	8.43
Stage 8	74	-4.45	7.11
Stage 8	73.8	-3.28	5.88
Stage 8	73.6	-2.32	4.75
Stage 8	73.4	-1.58	3.74
Stage 8	73.2	-1.01	2.85
Stage 8	73	-0.59	2.07
Stage 8	72.8	-0.31	1.42
Stage 8	72.6	-0.13	0.89
Stage 8	72.4	-0.04	0.47
Stage 8	72.2	0	0.17
Stage 8	72.1	0	0.03

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 9

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 9	92.3 2.24
Stage 9	92.1 3.23
Stage 9	91.9 4.2
Stage 9	91.7 5.15
Stage 9	91.5 6.06
Stage 9	91.3 6.92
Stage 9	91.1 7.73
Stage 9	90.9 8.46
Stage 9	90.7 9.12
Stage 9	90.5 9.7
Stage 9	90.3 10.19
Stage 9	90.1 10.6
Stage 9	89.9 10.94
Stage 9	89.7 11.2
Stage 9	89.5 11.39
Stage 9	89.3 11.54
Stage 9	89.1 11.65
Stage 9	88.9 11.76
Stage 9	88.7 11.88
Stage 9	88.5 12.04
Stage 9	88.3 12.28
Stage 9	88.1 12.64
Stage 9	87.9 13.07
Stage 9	87.7 13.56
Stage 9	87.5 14.07
Stage 9	87.3 14.58
Stage 9	87.1 15.08
Stage 9	86.9 15.55
Stage 9	86.7 15.98
Stage 9	86.5 16.36
Stage 9	86.3 16.7
Stage 9	86.1 17.01
Stage 9	85.9 17.3
Stage 9	85.7 17.58
Stage 9	85.5 17.88
Stage 9	85.3 18.23
Stage 9	85.1 18.65
Stage 9	84.9 19.12
Stage 9	84.7 19.58
Stage 9	84.5 20.02
Stage 9	84.3 20.42
Stage 9	84.1 20.75
Stage 9	83.9 21.01
Stage 9	83.7 21.18
Stage 9	83.5 21.28
Stage 9	83.3 21.3
Stage 9	83.1 21.28
Stage 9	82.9 21.22
Stage 9	82.8 21.19
Stage 9	82.6 21.13
Stage 9	82.4 21.04
Stage 9	82.2 20.9
Stage 9	82 20.69
Stage 9	81.8 20.37
Stage 9	81.6 19.96
Stage 9	81.4 19.45
Stage 9	81.2 18.84
Stage 9	81 18.16
Stage 9	80.8 17.44
Stage 9	80.6 16.69
Stage 9	80.4 15.91
Stage 9	80.2 15.07
Stage 9	80 14.17
Stage 9	79.8 13.21
Stage 9	79.6 12.2
Stage 9	79.4 11.15
Stage 9	79.2 10.08

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento		
Stage	Z (m)	Muro: LEFT Spostamento (mm)
Stage 9	79	9
Stage 9	78.8	7.95
Stage 9	78.6	6.93
Stage 9	78.4	5.97
Stage 9	78.2	5.06
Stage 9	78	4.21
Stage 9	77.8	3.44
Stage 9	77.6	2.74
Stage 9	77.4	2.12
Stage 9	77.2	1.56
Stage 9	77	1.08
Stage 9	76.8	0.66
Stage 9	76.6	0.31
Stage 9	76.4	0.01
Stage 9	76.2	-0.23
Stage 9	76	-0.43
Stage 9	75.8	-0.58
Stage 9	75.6	-0.7
Stage 9	75.4	-0.78
Stage 9	75.2	-0.83
Stage 9	75	-0.85
Stage 9	74.8	-0.86
Stage 9	74.6	-0.85
Stage 9	74.4	-0.82
Stage 9	74.2	-0.78
Stage 9	74	-0.73
Stage 9	73.8	-0.68
Stage 9	73.6	-0.61
Stage 9	73.4	-0.55
Stage 9	73.2	-0.48
Stage 9	73	-0.41
Stage 9	72.8	-0.34
Stage 9	72.6	-0.27
Stage 9	72.4	-0.2
Stage 9	72.2	-0.13
Stage 9	72.1	-0.09

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 9

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 9	92.3	0	33.91
Stage 9	92.1	6.78	33.91
Stage 9	91.9	13.3	32.58
Stage 9	91.7	19.51	31.04
Stage 9	91.5	25.28	28.88
Stage 9	91.3	30.48	25.98
Stage 9	91.1	34.94	22.32
Stage 9	90.9	38.52	17.9
Stage 9	90.7	41.06	12.7
Stage 9	90.5	42.41	6.73
Stage 9	90.3	42.41	0
Stage 9	90.1	40.91	-7.49
Stage 9	89.9	37.77	-15.68
Stage 9	89.7	32.84	-24.69
Stage 9	89.5	25.95	-34.45
Stage 9	89.3	17.01	-44.7
Stage 9	89.1	5.91	-55.47
Stage 9	88.9	-7.4	-66.59
Stage 9	88.7	-22.98	-77.88
Stage 9	88.5	-40.8	-89.1
Stage 9	88.3	-60.77	-99.85
Stage 9	88.1	-42.6	90.89
Stage 9	87.9	-26.41	80.92
Stage 9	87.7	-12.34	70.35
Stage 9	87.5	-0.51	59.19
Stage 9	87.3	8.98	47.45
Stage 9	87.1	16.04	35.27
Stage 9	86.9	20.55	22.58
Stage 9	86.7	22.44	9.44
Stage 9	86.5	21.62	-4.1
Stage 9	86.3	18.03	-17.93
Stage 9	86.1	11.65	-31.89
Stage 9	85.9	2.47	-45.93
Stage 9	85.7	-9.51	-59.91
Stage 9	85.5	-24.24	-73.64
Stage 9	85.3	-41.65	-87.04
Stage 9	85.1	-20.62	105.15
Stage 9	84.9	-2.47	90.76
Stage 9	84.7	12.7	75.85
Stage 9	84.5	24.78	60.43
Stage 9	84.3	33.69	44.53
Stage 9	84.1	39.33	28.19
Stage 9	83.9	41.63	11.51
Stage 9	83.7	40.53	-5.49
Stage 9	83.5	35.99	-22.74
Stage 9	83.3	27.96	-40.14
Stage 9	83.1	16.45	-57.57
Stage 9	82.9	1.47	-74.9
Stage 9	82.8	-7.35	-88.14
Stage 9	82.6	12.48	99.18
Stage 9	82.4	28.57	80.42
Stage 9	82.2	40.75	60.92
Stage 9	82	48.89	40.67
Stage 9	81.8	52.82	19.69
Stage 9	81.6	52.43	-1.95
Stage 9	81.4	47.59	-24.24
Stage 9	81.2	38.16	-47.12
Stage 9	81	24.07	-70.49
Stage 9	80.8	5.22	-94.24
Stage 9	80.6	19.17	69.76
Stage 9	80.4	28.32	45.75
Stage 9	80.2	32.68	21.8
Stage 9	80	32.3	-1.87
Stage 9	79.8	27.74	-22.84
Stage 9	79.6	20.08	-38.26
Stage 9	79.4	10.48	-48.01
Stage 9	79.2	0.07	-52.05

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 9	79	-10.01	-50.41
Stage 9	78.8	-18.63	-43.11
Stage 9	78.6	-25.45	-34.1
Stage 9	78.4	-30.51	-25.27
Stage 9	78.2	-34.03	-17.62
Stage 9	78	-36.25	-11.1
Stage 9	77.8	-37.36	-5.56
Stage 9	77.6	-37.54	-0.91
Stage 9	77.4	-36.96	2.92
Stage 9	77.2	-35.76	6.01
Stage 9	77	-34.07	8.44
Stage 9	76.8	-32.02	10.27
Stage 9	76.6	-29.7	11.58
Stage 9	76.4	-27.22	12.42
Stage 9	76.2	-24.65	12.85
Stage 9	76	-22.07	12.91
Stage 9	75.8	-19.54	12.62
Stage 9	75.6	-17.12	12.09
Stage 9	75.4	-14.84	11.42
Stage 9	75.2	-12.71	10.63
Stage 9	75	-10.76	9.78
Stage 9	74.8	-8.98	8.88
Stage 9	74.6	-7.39	7.97
Stage 9	74.4	-5.98	7.05
Stage 9	74.2	-4.75	6.16
Stage 9	74	-3.69	5.3
Stage 9	73.8	-2.79	4.49
Stage 9	73.6	-2.04	3.72
Stage 9	73.4	-1.44	3.02
Stage 9	73.2	-0.96	2.39
Stage 9	73	-0.6	1.82
Stage 9	72.8	-0.33	1.32
Stage 9	72.6	-0.15	0.89
Stage 9	72.4	-0.05	0.52
Stage 9	72.2	0	0.22
Stage 9	72.1	0	0.05

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 10

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 10	92.3 2.25
Stage 10	92.1 3.24
Stage 10	91.9 4.21
Stage 10	91.7 5.16
Stage 10	91.5 6.07
Stage 10	91.3 6.93
Stage 10	91.1 7.73
Stage 10	90.9 8.46
Stage 10	90.7 9.12
Stage 10	90.5 9.7
Stage 10	90.3 10.19
Stage 10	90.1 10.6
Stage 10	89.9 10.94
Stage 10	89.7 11.19
Stage 10	89.5 11.39
Stage 10	89.3 11.53
Stage 10	89.1 11.64
Stage 10	88.9 11.73
Stage 10	88.7 11.85
Stage 10	88.5 12
Stage 10	88.3 12.24
Stage 10	88.1 12.58
Stage 10	87.9 13
Stage 10	87.7 13.48
Stage 10	87.5 13.98
Stage 10	87.3 14.48
Stage 10	87.1 14.97
Stage 10	86.9 15.42
Stage 10	86.7 15.84
Stage 10	86.5 16.21
Stage 10	86.3 16.54
Stage 10	86.1 16.84
Stage 10	85.9 17.12
Stage 10	85.7 17.39
Stage 10	85.5 17.69
Stage 10	85.3 18.04
Stage 10	85.1 18.46
Stage 10	84.9 18.93
Stage 10	84.7 19.41
Stage 10	84.5 19.88
Stage 10	84.3 20.3
Stage 10	84.1 20.67
Stage 10	83.9 20.97
Stage 10	83.7 21.21
Stage 10	83.5 21.38
Stage 10	83.3 21.49
Stage 10	83.1 21.57
Stage 10	82.9 21.64
Stage 10	82.8 21.67
Stage 10	82.6 21.76
Stage 10	82.4 21.84
Stage 10	82.2 21.89
Stage 10	82 21.88
Stage 10	81.8 21.79
Stage 10	81.6 21.62
Stage 10	81.4 21.36
Stage 10	81.2 21.03
Stage 10	81 20.63
Stage 10	80.8 20.19
Stage 10	80.6 19.74
Stage 10	80.4 19.24
Stage 10	80.2 18.68
Stage 10	80 18.02
Stage 10	79.8 17.27
Stage 10	79.6 16.41
Stage 10	79.4 15.46
Stage 10	79.2 14.41

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento		
Stage	Z (m)	Muro: LEFT Spostamento (mm)
Stage 10	79	13.3
Stage 10	78.8	12.14
Stage 10	78.6	10.95
Stage 10	78.4	9.76
Stage 10	78.2	8.59
Stage 10	78	7.46
Stage 10	77.8	6.39
Stage 10	77.6	5.39
Stage 10	77.4	4.47
Stage 10	77.2	3.62
Stage 10	77	2.86
Stage 10	76.8	2.18
Stage 10	76.6	1.58
Stage 10	76.4	1.06
Stage 10	76.2	0.62
Stage 10	76	0.24
Stage 10	75.8	-0.07
Stage 10	75.6	-0.32
Stage 10	75.4	-0.52
Stage 10	75.2	-0.68
Stage 10	75	-0.79
Stage 10	74.8	-0.86
Stage 10	74.6	-0.91
Stage 10	74.4	-0.93
Stage 10	74.2	-0.93
Stage 10	74	-0.91
Stage 10	73.8	-0.88
Stage 10	73.6	-0.84
Stage 10	73.4	-0.79
Stage 10	73.2	-0.73
Stage 10	73	-0.67
Stage 10	72.8	-0.6
Stage 10	72.6	-0.54
Stage 10	72.4	-0.47
Stage 10	72.2	-0.41
Stage 10	72.1	-0.37

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 10

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 10	92.3	0	34
Stage 10	92.1	6.8	34
Stage 10	91.9	13.33	32.67
Stage 10	91.7	19.56	31.14
Stage 10	91.5	25.36	28.98
Stage 10	91.3	30.58	26.09
Stage 10	91.1	35.07	22.44
Stage 10	90.9	38.67	18.03
Stage 10	90.7	41.24	12.84
Stage 10	90.5	42.61	6.87
Stage 10	90.3	42.64	0.14
Stage 10	90.1	41.17	-7.34
Stage 10	89.9	38.07	-15.53
Stage 10	89.7	33.16	-24.55
Stage 10	89.5	26.3	-34.31
Stage 10	89.3	17.38	-44.57
Stage 10	89.1	6.31	-55.35
Stage 10	88.9	-6.98	-66.49
Stage 10	88.7	-22.54	-77.8
Stage 10	88.5	-40.35	-89.04
Stage 10	88.3	-60.32	-99.84
Stage 10	88.1	-42.17	90.76
Stage 10	87.9	-26.03	80.74
Stage 10	87.7	-12.01	70.1
Stage 10	87.5	-0.23	58.87
Stage 10	87.3	9.18	47.05
Stage 10	87.1	16.13	34.78
Stage 10	86.9	20.53	21.98
Stage 10	86.7	22.27	8.72
Stage 10	86.5	21.28	-4.94
Stage 10	86.3	17.5	-18.92
Stage 10	86.1	10.89	-33.03
Stage 10	85.9	1.45	-47.23
Stage 10	85.7	-10.83	-61.38
Stage 10	85.5	-25.89	-75.29
Stage 10	85.3	-43.66	-88.87
Stage 10	85.1	-23.13	102.69
Stage 10	84.9	-5.5	88.12
Stage 10	84.7	9.11	73.04
Stage 10	84.5	20.6	57.46
Stage 10	84.3	28.88	41.42
Stage 10	84.1	33.87	24.96
Stage 10	83.9	35.52	8.21
Stage 10	83.7	33.75	-8.82
Stage 10	83.5	28.55	-26.04
Stage 10	83.3	19.88	-43.34
Stage 10	83.1	7.76	-60.6
Stage 10	82.9	-7.77	-77.65
Stage 10	82.8	-16.83	-90.59
Stage 10	82.6	2.82	98.26
Stage 10	82.4	18.84	80.1
Stage 10	82.2	31.11	61.35
Stage 10	82	39.51	42.03
Stage 10	81.8	43.95	22.17
Stage 10	81.6	44.32	1.86
Stage 10	81.4	40.55	-18.87
Stage 10	81.2	32.56	-39.95
Stage 10	81	20.3	-61.27
Stage 10	80.8	3.76	-82.7
Stage 10	80.6	21.99	91.14
Stage 10	80.4	35.98	69.99
Stage 10	80.2	45.82	49.17
Stage 10	80	51.58	28.79
Stage 10	79.8	53.36	8.89
Stage 10	79.6	51.26	-10.5
Stage 10	79.4	45.39	-29.33
Stage 10	79.2	36.35	-45.21

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 10	79	25.19	-55.79
Stage 10	78.8	12.9	-61.43
Stage 10	78.6	0.44	-62.35
Stage 10	78.4	-11.27	-58.55
Stage 10	78.2	-21.43	-50.78
Stage 10	78	-29.34	-39.55
Stage 10	77.8	-35.14	-28.99
Stage 10	77.6	-39.11	-19.84
Stage 10	77.4	-41.51	-12.02
Stage 10	77.2	-42.59	-5.42
Stage 10	77	-42.59	0.03
Stage 10	76.8	-41.7	4.45
Stage 10	76.6	-40.11	7.93
Stage 10	76.4	-37.99	10.59
Stage 10	76.2	-35.49	12.51
Stage 10	76	-32.73	13.8
Stage 10	75.8	-29.82	14.55
Stage 10	75.6	-26.84	14.89
Stage 10	75.4	-23.87	14.86
Stage 10	75.2	-20.97	14.5
Stage 10	75	-18.19	13.91
Stage 10	74.8	-15.56	13.12
Stage 10	74.6	-13.12	12.2
Stage 10	74.4	-10.89	11.17
Stage 10	74.2	-8.87	10.09
Stage 10	74	-7.08	8.97
Stage 10	73.8	-5.51	7.84
Stage 10	73.6	-4.16	6.73
Stage 10	73.4	-3.03	5.66
Stage 10	73.2	-2.1	4.65
Stage 10	73	-1.36	3.71
Stage 10	72.8	-0.79	2.83
Stage 10	72.6	-0.39	2.02
Stage 10	72.4	-0.13	1.27
Stage 10	72.2	-0.01	0.6
Stage 10	72.1	0	0.14

Risultati Elementi strutturali - SLE (Rara)

Design Assumption: SLE (Rara) Sollecitazione Tir-A1

Stage	Forza (kN/m)
Stage 3	200
Stage 4	218.339
Stage 5	214.6997
Stage 6	213.777
Stage 7	214.4836
Stage 8	213.0874
Stage 9	213.7227
Stage 10	213.6141

Design Assumption: SLE (Rara) Sollecitazione Tir-B1

Stage	Forza (kN/m)
Stage 5	200
Stage 6	226.4793
Stage 7	218.8024
Stage 8	219.5677
Stage 9	219.3452
Stage 10	218.8662

Design Assumption: SLE (Rara) Sollecitazione Tir-C1

Stage	Forza (kN/m)
Stage 7	200
Stage 8	224.8739
Stage 9	213.71
Stage 10	214.9841

Design Assumption: SLE (Rara) Sollecitazione Cavalletto

Stage	Forza (kN/m)
Stage 1	-6.8393935E-16
Stage 2	72.43101
Stage 3	88.61383
Stage 4	64.20886
Stage 5	69.97338
Stage 6	68.12856
Stage 7	68.16624
Stage 8	69.66371
Stage 9	68.9686
Stage 10	69.14385

Design Assumption: SLE (Rara) Sollecitazione Tir-D1

Stage	Forza (kN/m)
Stage 9	200
Stage 10	207.7171

Risultati A1+M1+R1

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 1

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 1	92.3	0	0
Stage 1	92.1	0	0
Stage 1	91.9	0	0
Stage 1	91.7	0	0
Stage 1	91.5	0	0
Stage 1	91.3	0	0
Stage 1	91.1	0	0
Stage 1	90.9	0	0
Stage 1	90.7	0	0
Stage 1	90.5	0	0
Stage 1	90.3	0	0
Stage 1	90.1	0	0
Stage 1	89.9	0	0
Stage 1	89.7	0	0
Stage 1	89.5	0	0
Stage 1	89.3	0	0
Stage 1	89.1	0	0
Stage 1	88.9	0	0
Stage 1	88.7	0	0
Stage 1	88.5	0	0
Stage 1	88.3	0	0
Stage 1	88.1	0	0
Stage 1	87.9	0	0
Stage 1	87.7	0	0
Stage 1	87.5	0	0
Stage 1	87.3	0	0
Stage 1	87.1	0	0
Stage 1	86.9	0	0
Stage 1	86.7	0	0
Stage 1	86.5	0	0
Stage 1	86.3	0	0
Stage 1	86.1	0	0
Stage 1	85.9	0	0
Stage 1	85.7	0	0
Stage 1	85.5	0	0
Stage 1	85.3	0	0
Stage 1	85.1	0	0
Stage 1	84.9	0	0
Stage 1	84.7	0	0
Stage 1	84.5	0	0
Stage 1	84.3	0	0
Stage 1	84.1	0	0
Stage 1	83.9	0	0
Stage 1	83.7	0	0
Stage 1	83.5	0	0
Stage 1	83.3	0	0
Stage 1	83.1	0	0
Stage 1	82.9	0	0
Stage 1	82.8	0	0
Stage 1	82.6	0	0
Stage 1	82.4	0	0
Stage 1	82.2	0	0
Stage 1	82	0	0
Stage 1	81.8	0	0
Stage 1	81.6	0	0
Stage 1	81.4	0	0
Stage 1	81.2	0	0
Stage 1	81	0	0
Stage 1	80.8	0	0
Stage 1	80.6	0	0
Stage 1	80.4	0	0
Stage 1	80.2	0	0
Stage 1	80	0	0
Stage 1	79.8	0	0

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 1	79.6	0	0
Stage 1	79.4	0	0
Stage 1	79.2	0	0
Stage 1	79	0	0
Stage 1	78.8	0	0
Stage 1	78.6	0	0
Stage 1	78.4	0	0
Stage 1	78.2	0	0
Stage 1	78	0	0
Stage 1	77.8	0	0
Stage 1	77.6	0	0
Stage 1	77.4	0	0
Stage 1	77.2	0	0
Stage 1	77	0	0
Stage 1	76.8	0	0
Stage 1	76.6	0	0
Stage 1	76.4	0	0
Stage 1	76.2	0	0
Stage 1	76	0	0
Stage 1	75.8	0	0
Stage 1	75.6	0	0
Stage 1	75.4	0	0
Stage 1	75.2	0	0
Stage 1	75	0	0
Stage 1	74.8	0	0
Stage 1	74.6	0	0
Stage 1	74.4	0	0
Stage 1	74.2	0	0
Stage 1	74	0	0
Stage 1	73.8	0	0
Stage 1	73.6	0	0
Stage 1	73.4	0	0
Stage 1	73.2	0	0
Stage 1	73	0	0
Stage 1	72.8	0	0
Stage 1	72.6	0	0
Stage 1	72.4	0	0
Stage 1	72.2	0	0
Stage 1	72.1	0	0

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 2

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 2	92.3	0	46.87
Stage 2	92.1	9.37	46.87
Stage 2	91.9	18.59	46.07
Stage 2	91.7	27.58	44.96
Stage 2	91.5	36.28	43.5
Stage 2	91.3	44.61	41.66
Stage 2	91.1	52.5	39.41
Stage 2	90.9	59.84	36.75
Stage 2	90.7	66.57	33.65
Stage 2	90.5	72.6	30.12
Stage 2	90.3	77.83	26.16
Stage 2	90.1	82.18	21.77
Stage 2	89.9	85.57	16.95
Stage 2	89.7	87.88	11.51
Stage 2	89.5	88.97	5.47
Stage 2	89.3	88.78	-0.95
Stage 2	89.1	87.2	-7.92
Stage 2	88.9	84.11	-15.41
Stage 2	88.7	79.43	-23.41
Stage 2	88.5	73.06	-31.88
Stage 2	88.3	64.92	-40.66
Stage 2	88.1	54.94	-49.89
Stage 2	87.9	43.03	-59.55
Stage 2	87.7	29.11	-69.63
Stage 2	87.5	13.71	-77
Stage 2	87.3	-1.99	-78.5
Stage 2	87.1	-16.8	-74.02
Stage 2	86.9	-29.53	-63.66
Stage 2	86.7	-39.01	-47.41
Stage 2	86.5	-45.27	-31.28
Stage 2	86.3	-48.84	-17.88
Stage 2	86.1	-50.24	-6.98
Stage 2	85.9	-49.91	1.67
Stage 2	85.7	-48.24	8.32
Stage 2	85.5	-45.59	13.24
Stage 2	85.3	-42.26	16.66
Stage 2	85.1	-38.49	18.83
Stage 2	84.9	-34.51	19.95
Stage 2	84.7	-30.46	20.22
Stage 2	84.5	-26.49	19.88
Stage 2	84.3	-22.67	19.07
Stage 2	84.1	-19.08	17.94
Stage 2	83.9	-15.77	16.58
Stage 2	83.7	-12.76	15.07
Stage 2	83.5	-10.06	13.49
Stage 2	83.3	-7.68	11.89
Stage 2	83.1	-5.61	10.33
Stage 2	82.9	-3.85	8.83
Stage 2	82.8	-3.07	7.77
Stage 2	82.6	-1.72	6.76
Stage 2	82.4	-0.61	5.52
Stage 2	82.2	0.27	4.4
Stage 2	82	0.95	3.41
Stage 2	81.8	1.46	2.55
Stage 2	81.6	1.82	1.8
Stage 2	81.4	2.05	1.17
Stage 2	81.2	2.18	0.64
Stage 2	81	2.22	0.21
Stage 2	80.8	2.2	-0.13
Stage 2	80.6	2.12	-0.39
Stage 2	80.4	2	-0.59
Stage 2	80.2	1.85	-0.73
Stage 2	80	1.69	-0.82
Stage 2	79.8	1.52	-0.87
Stage 2	79.6	1.34	-0.89
Stage 2	79.4	1.16	-0.88
Stage 2	79.2	0.99	-0.85

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 2	79	0.83	-0.8
Stage 2	78.8	0.69	-0.74
Stage 2	78.6	0.55	-0.67
Stage 2	78.4	0.43	-0.6
Stage 2	78.2	0.33	-0.53
Stage 2	78	0.24	-0.45
Stage 2	77.8	0.16	-0.39
Stage 2	77.6	0.1	-0.32
Stage 2	77.4	0.04	-0.26
Stage 2	77.2	0	-0.21
Stage 2	77	-0.03	-0.16
Stage 2	76.8	-0.06	-0.12
Stage 2	76.6	-0.07	-0.09
Stage 2	76.4	-0.08	-0.06
Stage 2	76.2	-0.09	-0.03
Stage 2	76	-0.09	-0.01
Stage 2	75.8	-0.09	0
Stage 2	75.6	-0.09	0.02
Stage 2	75.4	-0.08	0.03
Stage 2	75.2	-0.08	0.03
Stage 2	75	-0.07	0.04
Stage 2	74.8	-0.06	0.04
Stage 2	74.6	-0.05	0.04
Stage 2	74.4	-0.05	0.04
Stage 2	74.2	-0.04	0.04
Stage 2	74	-0.03	0.03
Stage 2	73.8	-0.03	0.03
Stage 2	73.6	-0.02	0.03
Stage 2	73.4	-0.02	0.03
Stage 2	73.2	-0.01	0.02
Stage 2	73	-0.01	0.02
Stage 2	72.8	0	0.01
Stage 2	72.6	0	0.01
Stage 2	72.4	0	0.01
Stage 2	72.2	0	0
Stage 2	72.1	0	0

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 3

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 3	92.3	0	57.35
Stage 3	92.1	11.47	57.35
Stage 3	91.9	22.78	56.55
Stage 3	91.7	33.87	55.44
Stage 3	91.5	44.56	53.44
Stage 3	91.3	54.64	50.41
Stage 3	91.1	63.89	46.28
Stage 3	90.9	72.09	41.01
Stage 3	90.7	79	34.53
Stage 3	90.5	84.36	26.81
Stage 3	90.3	87.92	17.8
Stage 3	90.1	89.41	7.45
Stage 3	89.9	88.56	-4.27
Stage 3	89.7	85.04	-17.57
Stage 3	89.5	78.55	-32.47
Stage 3	89.3	68.81	-48.7
Stage 3	89.1	55.53	-66.42
Stage 3	88.9	38.42	-85.5
Stage 3	88.7	17.26	-105.82
Stage 3	88.5	-8.17	-127.17
Stage 3	88.3	-38.01	-149.14
Stage 3	88.1	-23.46	72.75
Stage 3	87.9	-13.42	50.24
Stage 3	87.7	-7.82	27.96
Stage 3	87.5	-6.57	6.26
Stage 3	87.3	-8.85	-11.4
Stage 3	87.1	-13.12	-21.37
Stage 3	86.9	-17.87	-23.71
Stage 3	86.7	-21.56	-18.45
Stage 3	86.5	-23.88	-11.64
Stage 3	86.3	-25.09	-6
Stage 3	86.1	-25.37	-1.43
Stage 3	85.9	-24.94	2.18
Stage 3	85.7	-23.95	4.95
Stage 3	85.5	-22.55	6.98
Stage 3	85.3	-20.88	8.37
Stage 3	85.1	-19.03	9.22
Stage 3	84.9	-17.11	9.61
Stage 3	84.7	-15.18	9.64
Stage 3	84.5	-13.29	9.44
Stage 3	84.3	-11.48	9.05
Stage 3	84.1	-9.78	8.54
Stage 3	83.9	-8.19	7.94
Stage 3	83.7	-6.73	7.28
Stage 3	83.5	-5.41	6.59
Stage 3	83.3	-4.24	5.89
Stage 3	83.1	-3.2	5.19
Stage 3	82.9	-2.3	4.51
Stage 3	82.8	-1.89	4.03
Stage 3	82.6	-1.18	3.56
Stage 3	82.4	-0.58	2.98
Stage 3	82.2	-0.1	2.44
Stage 3	82	0.3	1.96
Stage 3	81.8	0.6	1.53
Stage 3	81.6	0.83	1.15
Stage 3	81.4	0.99	0.81
Stage 3	81.2	1.1	0.53
Stage 3	81	1.16	0.29
Stage 3	80.8	1.17	0.09
Stage 3	80.6	1.16	-0.07
Stage 3	80.4	1.12	-0.2
Stage 3	80.2	1.06	-0.3
Stage 3	80	0.99	-0.37
Stage 3	79.8	0.91	-0.42
Stage 3	79.6	0.82	-0.45
Stage 3	79.4	0.72	-0.46
Stage 3	79.2	0.63	-0.46

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 3	79	0.55	-0.44
Stage 3	78.8	0.46	-0.42
Stage 3	78.6	0.38	-0.39
Stage 3	78.4	0.31	-0.36
Stage 3	78.2	0.25	-0.32
Stage 3	78	0.19	-0.29
Stage 3	77.8	0.14	-0.25
Stage 3	77.6	0.1	-0.21
Stage 3	77.4	0.06	-0.18
Stage 3	77.2	0.03	-0.15
Stage 3	77	0.01	-0.12
Stage 3	76.8	-0.01	-0.1
Stage 3	76.6	-0.03	-0.07
Stage 3	76.4	-0.04	-0.05
Stage 3	76.2	-0.04	-0.04
Stage 3	76	-0.05	-0.02
Stage 3	75.8	-0.05	-0.01
Stage 3	75.6	-0.05	0
Stage 3	75.4	-0.05	0.01
Stage 3	75.2	-0.05	0.01
Stage 3	75	-0.04	0.02
Stage 3	74.8	-0.04	0.02
Stage 3	74.6	-0.04	0.02
Stage 3	74.4	-0.03	0.02
Stage 3	74.2	-0.03	0.02
Stage 3	74	-0.02	0.02
Stage 3	73.8	-0.02	0.02
Stage 3	73.6	-0.01	0.02
Stage 3	73.4	-0.01	0.02
Stage 3	73.2	-0.01	0.02
Stage 3	73	-0.01	0.01
Stage 3	72.8	0	0.01
Stage 3	72.6	0	0.01
Stage 3	72.4	0	0.01
Stage 3	72.2	0	0
Stage 3	72.1	0	0

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 4

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 4	92.3	0	40.86
Stage 4	92.1	8.17	40.86
Stage 4	91.9	15.96	38.92
Stage 4	91.7	23.31	36.77
Stage 4	91.5	30.08	33.84
Stage 4	91.3	36.08	30.02
Stage 4	91.1	41.14	25.28
Stage 4	90.9	45.06	19.61
Stage 4	90.7	47.66	13.01
Stage 4	90.5	48.76	5.51
Stage 4	90.3	48.19	-2.89
Stage 4	90.1	45.76	-12.12
Stage 4	89.9	41.33	-22.13
Stage 4	89.7	34.73	-33.05
Stage 4	89.5	25.78	-44.75
Stage 4	89.3	14.4	-56.87
Stage 4	89.1	0.51	-69.44
Stage 4	88.9	-15.93	-82.21
Stage 4	88.7	-34.91	-94.91
Stage 4	88.5	-56.35	-107.22
Stage 4	88.3	-80.08	-118.61
Stage 4	88.1	-52.5	137.93
Stage 4	87.9	-26.84	128.27
Stage 4	87.7	-3.21	118.18
Stage 4	87.5	18.33	107.69
Stage 4	87.3	37.69	96.8
Stage 4	87.1	54.82	85.65
Stage 4	86.9	69.64	74.11
Stage 4	86.7	82.08	62.2
Stage 4	86.5	92.07	49.92
Stage 4	86.3	99.53	37.29
Stage 4	86.1	104.41	24.4
Stage 4	85.9	106.64	11.17
Stage 4	85.7	106.16	-2.41
Stage 4	85.5	102.89	-16.33
Stage 4	85.3	96.77	-30.59
Stage 4	85.1	87.74	-45.17
Stage 4	84.9	75.74	-59.99
Stage 4	84.7	60.71	-75.14
Stage 4	84.5	43.22	-87.45
Stage 4	84.3	24.47	-93.76
Stage 4	84.1	5.66	-94.07
Stage 4	83.9	-12	-88.3
Stage 4	83.7	-27.3	-76.52
Stage 4	83.5	-39.27	-59.85
Stage 4	83.3	-48.05	-43.89
Stage 4	83.1	-53.97	-29.6
Stage 4	82.9	-57.48	-17.52
Stage 4	82.8	-58.47	-9.98
Stage 4	82.6	-59.11	-3.16
Stage 4	82.4	-58.27	4.17
Stage 4	82.2	-56.29	9.92
Stage 4	82	-53.43	14.28
Stage 4	81.8	-49.95	17.43
Stage 4	81.6	-46.04	19.53
Stage 4	81.4	-41.89	20.75
Stage 4	81.2	-37.64	21.24
Stage 4	81	-33.43	21.08
Stage 4	80.8	-29.33	20.49
Stage 4	80.6	-25.41	19.58
Stage 4	80.4	-21.73	18.42
Stage 4	80.2	-18.31	17.1
Stage 4	80	-15.17	15.68
Stage 4	79.8	-12.33	14.22
Stage 4	79.6	-9.78	12.74
Stage 4	79.4	-7.52	11.28
Stage 4	79.2	-5.55	9.87

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 4	79	-3.84	8.53
Stage 4	78.8	-2.39	7.27
Stage 4	78.6	-1.17	6.1
Stage 4	78.4	-0.16	5.03
Stage 4	78.2	0.65	4.06
Stage 4	78	1.29	3.2
Stage 4	77.8	1.78	2.44
Stage 4	77.6	2.13	1.77
Stage 4	77.4	2.37	1.2
Stage 4	77.2	2.51	0.71
Stage 4	77	2.57	0.31
Stage 4	76.8	2.57	-0.03
Stage 4	76.6	2.51	-0.3
Stage 4	76.4	2.41	-0.51
Stage 4	76.2	2.27	-0.66
Stage 4	76	2.12	-0.78
Stage 4	75.8	1.95	-0.86
Stage 4	75.6	1.77	-0.9
Stage 4	75.4	1.58	-0.92
Stage 4	75.2	1.4	-0.92
Stage 4	75	1.22	-0.89
Stage 4	74.8	1.05	-0.85
Stage 4	74.6	0.89	-0.8
Stage 4	74.4	0.74	-0.74
Stage 4	74.2	0.61	-0.67
Stage 4	74	0.49	-0.6
Stage 4	73.8	0.38	-0.53
Stage 4	73.6	0.29	-0.46
Stage 4	73.4	0.21	-0.39
Stage 4	73.2	0.15	-0.32
Stage 4	73	0.1	-0.26
Stage 4	72.8	0.06	-0.2
Stage 4	72.6	0.03	-0.14
Stage 4	72.4	0.01	-0.09
Stage 4	72.2	0	-0.04
Stage 4	72.1	0	-0.01

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 5

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 5	92.3	0	44.76
Stage 5	92.1	8.95	44.76
Stage 5	91.9	17.58	43.15
Stage 5	91.7	25.85	41.36
Stage 5	91.5	33.62	38.82
Stage 5	91.3	40.7	35.42
Stage 5	91.1	46.93	31.12
Stage 5	90.9	52.1	25.9
Stage 5	90.7	56.05	19.74
Stage 5	90.5	58.58	12.65
Stage 5	90.3	59.51	4.63
Stage 5	90.1	58.65	-4.3
Stage 5	89.9	55.83	-14.1
Stage 5	89.7	50.84	-24.93
Stage 5	89.5	43.5	-36.7
Stage 5	89.3	33.68	-49.09
Stage 5	89.1	21.25	-62.16
Stage 5	88.9	6.11	-75.72
Stage 5	88.7	-11.8	-89.54
Stage 5	88.5	-32.47	-103.35
Stage 5	88.3	-55.81	-116.67
Stage 5	88.1	-29.22	132.99
Stage 5	87.9	-5.15	120.35
Stage 5	87.7	16.19	106.68
Stage 5	87.5	34.58	91.95
Stage 5	87.3	49.81	76.13
Stage 5	87.1	61.66	59.3
Stage 5	86.9	69.93	41.32
Stage 5	86.7	74.37	22.19
Stage 5	86.5	74.75	1.91
Stage 5	86.3	70.85	-19.49
Stage 5	86.1	62.48	-41.86
Stage 5	85.9	49.43	-65.24
Stage 5	85.7	31.53	-89.51
Stage 5	85.5	8.62	-114.54
Stage 5	85.3	-19.41	-140.15
Stage 5	85.1	-3.77	78.22
Stage 5	84.9	6.68	52.26
Stage 5	84.7	11.97	26.42
Stage 5	84.5	12.17	1.01
Stage 5	84.3	8.18	-19.94
Stage 5	84.1	1.46	-33.62
Stage 5	83.9	-6.52	-39.9
Stage 5	83.7	-14.29	-38.84
Stage 5	83.5	-20.61	-31.57
Stage 5	83.3	-25.35	-23.74
Stage 5	83.1	-28.63	-16.38
Stage 5	82.9	-30.65	-10.1
Stage 5	82.8	-31.27	-6.15
Stage 5	82.6	-31.78	-2.56
Stage 5	82.4	-31.51	1.35
Stage 5	82.2	-30.62	4.46
Stage 5	82	-29.25	6.86
Stage 5	81.8	-27.52	8.63
Stage 5	81.6	-25.55	9.85
Stage 5	81.4	-23.43	10.61
Stage 5	81.2	-21.23	10.97
Stage 5	81	-19.04	10.97
Stage 5	80.8	-16.89	10.75
Stage 5	80.6	-14.82	10.36
Stage 5	80.4	-12.85	9.84
Stage 5	80.2	-11.01	9.23
Stage 5	80	-9.29	8.57
Stage 5	79.8	-7.72	7.87
Stage 5	79.6	-6.29	7.15
Stage 5	79.4	-5	6.44
Stage 5	79.2	-3.85	5.73

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 5	79	-2.85	5.04
Stage 5	78.8	-1.97	4.38
Stage 5	78.6	-1.22	3.76
Stage 5	78.4	-0.58	3.19
Stage 5	78.2	-0.05	2.65
Stage 5	78	0.39	2.17
Stage 5	77.8	0.73	1.73
Stage 5	77.6	1	1.34
Stage 5	77.4	1.2	0.99
Stage 5	77.2	1.33	0.69
Stage 5	77	1.42	0.43
Stage 5	76.8	1.46	0.21
Stage 5	76.6	1.47	0.02
Stage 5	76.4	1.44	-0.13
Stage 5	76.2	1.39	-0.25
Stage 5	76	1.32	-0.35
Stage 5	75.8	1.24	-0.42
Stage 5	75.6	1.14	-0.47
Stage 5	75.4	1.04	-0.5
Stage 5	75.2	0.94	-0.52
Stage 5	75	0.83	-0.53
Stage 5	74.8	0.73	-0.52
Stage 5	74.6	0.63	-0.5
Stage 5	74.4	0.53	-0.48
Stage 5	74.2	0.44	-0.44
Stage 5	74	0.36	-0.41
Stage 5	73.8	0.29	-0.37
Stage 5	73.6	0.22	-0.33
Stage 5	73.4	0.17	-0.28
Stage 5	73.2	0.12	-0.24
Stage 5	73	0.08	-0.2
Stage 5	72.8	0.05	-0.16
Stage 5	72.6	0.02	-0.12
Stage 5	72.4	0.01	-0.08
Stage 5	72.2	0	-0.04
Stage 5	72.1	0	-0.01

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 6

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 6	92.3	0	43.52
Stage 6	92.1	8.7	43.52
Stage 6	91.9	17.05	41.73
Stage 6	91.7	24.98	39.65
Stage 6	91.5	32.32	36.72
Stage 6	91.3	38.89	32.82
Stage 6	91.1	44.47	27.92
Stage 6	90.9	48.87	21.99
Stage 6	90.7	51.88	15.04
Stage 6	90.5	53.29	7.06
Stage 6	90.3	52.9	-1.93
Stage 6	90.1	50.52	-11.9
Stage 6	89.9	45.96	-22.8
Stage 6	89.7	39.01	-34.77
Stage 6	89.5	29.47	-47.71
Stage 6	89.3	17.21	-61.27
Stage 6	89.1	2.11	-75.49
Stage 6	88.9	-15.91	-90.14
Stage 6	88.7	-36.91	-104.97
Stage 6	88.5	-60.84	-119.67
Stage 6	88.3	-87.59	-133.7
Stage 6	88.1	-64.72	114.36
Stage 6	87.9	-44.42	101.52
Stage 6	87.7	-26.81	88
Stage 6	87.5	-12.05	73.85
Stage 6	87.3	-0.23	59.1
Stage 6	87.1	8.56	43.93
Stage 6	86.9	14.22	28.3
Stage 6	86.7	16.68	12.28
Stage 6	86.5	15.88	-4
Stage 6	86.3	11.79	-20.42
Stage 6	86.1	4.45	-36.72
Stage 6	85.9	-6.12	-52.83
Stage 6	85.7	-19.82	-68.52
Stage 6	85.5	-36.53	-83.57
Stage 6	85.3	-56.1	-97.82
Stage 6	85.1	-23.25	164.26
Stage 6	84.9	6.64	149.44
Stage 6	84.7	33.5	134.3
Stage 6	84.5	57.26	118.83
Stage 6	84.3	77.87	103.05
Stage 6	84.1	95.26	86.95
Stage 6	83.9	109.38	70.62
Stage 6	83.7	120.18	53.98
Stage 6	83.5	127.59	37.03
Stage 6	83.3	131.54	19.78
Stage 6	83.1	131.99	2.23
Stage 6	82.9	128.86	-15.63
Stage 6	82.8	125.94	-29.19
Stage 6	82.6	117.37	-42.86
Stage 6	82.4	105.09	-61.39
Stage 6	82.2	89.05	-80.21
Stage 6	82	69.82	-96.17
Stage 6	81.8	48.6	-106.1
Stage 6	81.6	26.61	-109.94
Stage 6	81.4	5.06	-107.76
Stage 6	81.2	-14.85	-99.55
Stage 6	81	-31.92	-85.32
Stage 6	80.8	-45.58	-68.33
Stage 6	80.6	-55.97	-51.93
Stage 6	80.4	-63.26	-36.44
Stage 6	80.2	-67.89	-23.14
Stage 6	80	-70.26	-11.89
Stage 6	79.8	-70.77	-2.52
Stage 6	79.6	-69.74	5.13
Stage 6	79.4	-67.5	11.23
Stage 6	79.2	-64.31	15.94

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 6	79	-60.42	19.44
Stage 6	78.8	-56.04	21.89
Stage 6	78.6	-51.36	23.42
Stage 6	78.4	-46.52	24.18
Stage 6	78.2	-41.67	24.26
Stage 6	78	-36.92	23.74
Stage 6	77.8	-32.36	22.81
Stage 6	77.6	-28.04	21.61
Stage 6	77.4	-24	20.2
Stage 6	77.2	-20.27	18.66
Stage 6	77	-16.86	17.05
Stage 6	76.8	-13.78	15.4
Stage 6	76.6	-11.03	13.75
Stage 6	76.4	-8.6	12.14
Stage 6	76.2	-6.48	10.58
Stage 6	76	-4.66	9.1
Stage 6	75.8	-3.12	7.71
Stage 6	75.6	-1.84	6.41
Stage 6	75.4	-0.8	5.22
Stage 6	75.2	0.03	4.13
Stage 6	75	0.66	3.15
Stage 6	74.8	1.11	2.28
Stage 6	74.6	1.42	1.51
Stage 6	74.4	1.59	0.85
Stage 6	74.2	1.64	0.29
Stage 6	74	1.61	-0.18
Stage 6	73.8	1.5	-0.55
Stage 6	73.6	1.33	-0.83
Stage 6	73.4	1.13	-1.03
Stage 6	73.2	0.9	-1.15
Stage 6	73	0.66	-1.18
Stage 6	72.8	0.44	-1.12
Stage 6	72.6	0.24	-0.97
Stage 6	72.4	0.09	-0.74
Stage 6	72.2	0.01	-0.42
Stage 6	72.1	0	-0.11

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 7

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 7	92.3	0	43.55
Stage 7	92.1	8.71	43.55
Stage 7	91.9	17.07	41.79
Stage 7	91.7	25.03	39.79
Stage 7	91.5	32.42	36.97
Stage 7	91.3	39.06	33.22
Stage 7	91.1	44.76	28.5
Stage 7	90.9	49.32	22.79
Stage 7	90.7	52.54	16.09
Stage 7	90.5	54.22	8.41
Stage 7	90.3	54.17	-0.26
Stage 7	90.1	52.19	-9.87
Stage 7	89.9	48.12	-20.39
Stage 7	89.7	41.73	-31.95
Stage 7	89.5	32.84	-44.46
Stage 7	89.3	21.32	-57.57
Stage 7	89.1	7.06	-71.32
Stage 7	88.9	-10.04	-85.51
Stage 7	88.7	-30.02	-99.89
Stage 7	88.5	-52.85	-114.14
Stage 7	88.3	-78.41	-127.75
Stage 7	88.1	-54.1	121.53
Stage 7	87.9	-32.3	109
Stage 7	87.7	-13.16	95.71
Stage 7	87.5	3.18	81.69
Stage 7	87.3	16.56	66.93
Stage 7	87.1	26.89	51.61
Stage 7	86.9	34.01	35.63
Stage 7	86.7	37.82	19.05
Stage 7	86.5	38.21	1.94
Stage 7	86.3	35.09	-15.6
Stage 7	86.1	28.42	-33.35
Stage 7	85.9	18.16	-51.29
Stage 7	85.7	4.32	-69.24
Stage 7	85.5	-13.08	-87.01
Stage 7	85.3	-33.99	-104.49
Stage 7	85.1	-5.1	144.42
Stage 7	84.9	19.94	125.22
Stage 7	84.7	40.95	105.06
Stage 7	84.5	57.74	83.93
Stage 7	84.3	70.1	61.82
Stage 7	84.1	77.85	38.73
Stage 7	83.9	80.8	14.76
Stage 7	83.7	78.77	-10.14
Stage 7	83.5	71.59	-35.92
Stage 7	83.3	59.09	-62.48
Stage 7	83.1	41.15	-89.74
Stage 7	82.9	17.64	-117.54
Stage 7	82.8	3.77	-138.63
Stage 7	82.6	20.67	84.52
Stage 7	82.4	31.91	56.21
Stage 7	82.2	37.52	28.01
Stage 7	82	37.53	0.06
Stage 7	81.8	32.31	-26.08
Stage 7	81.6	23.31	-45.02
Stage 7	81.4	11.95	-56.79
Stage 7	81.2	-0.32	-61.36
Stage 7	81	-12.08	-58.77
Stage 7	80.8	-21.91	-49.17
Stage 7	80.6	-29.73	-39.12
Stage 7	80.4	-35.53	-29
Stage 7	80.2	-39.57	-20.17
Stage 7	80	-42.08	-12.57
Stage 7	79.8	-43.31	-6.12
Stage 7	79.6	-43.46	-0.74
Stage 7	79.4	-42.72	3.67
Stage 7	79.2	-41.28	7.19

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 7	79	-39.3	9.93
Stage 7	78.8	-36.91	11.96
Stage 7	78.6	-34.23	13.38
Stage 7	78.4	-31.38	14.27
Stage 7	78.2	-28.44	14.67
Stage 7	78	-25.52	14.61
Stage 7	77.8	-22.67	14.25
Stage 7	77.6	-19.93	13.69
Stage 7	77.4	-17.34	12.98
Stage 7	77.2	-14.91	12.16
Stage 7	77	-12.65	11.26
Stage 7	76.8	-10.59	10.32
Stage 7	76.6	-8.72	9.35
Stage 7	76.4	-7.04	8.38
Stage 7	76.2	-5.56	7.43
Stage 7	76	-4.26	6.5
Stage 7	75.8	-3.13	5.62
Stage 7	75.6	-2.18	4.78
Stage 7	75.4	-1.38	4
Stage 7	75.2	-0.72	3.27
Stage 7	75	-0.2	2.6
Stage 7	74.8	0.2	2
Stage 7	74.6	0.49	1.46
Stage 7	74.4	0.69	0.98
Stage 7	74.2	0.8	0.57
Stage 7	74	0.84	0.21
Stage 7	73.8	0.83	-0.08
Stage 7	73.6	0.76	-0.32
Stage 7	73.4	0.66	-0.49
Stage 7	73.2	0.54	-0.61
Stage 7	73	0.41	-0.67
Stage 7	72.8	0.27	-0.67
Stage 7	72.6	0.15	-0.6
Stage 7	72.4	0.06	-0.46
Stage 7	72.2	0.01	-0.27
Stage 7	72.1	0	-0.07

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 8

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 8	92.3	0	44.55
Stage 8	92.1	8.91	44.55
Stage 8	91.9	17.48	42.84
Stage 8	91.7	25.65	40.85
Stage 8	91.5	33.25	38.03
Stage 8	91.3	40.1	34.26
Stage 8	91.1	46	29.49
Stage 8	90.9	50.75	23.71
Stage 8	90.7	54.13	16.92
Stage 8	90.5	55.95	9.1
Stage 8	90.3	56	0.27
Stage 8	90.1	54.09	-9.54
Stage 8	89.9	50.03	-20.3
Stage 8	89.7	43.61	-32.13
Stage 8	89.5	34.61	-44.97
Stage 8	89.3	22.92	-58.46
Stage 8	89.1	8.39	-72.65
Stage 8	88.9	-9.07	-87.33
Stage 8	88.7	-29.52	-102.25
Stage 8	88.5	-52.94	-117.1
Stage 8	88.3	-79.23	-131.39
Stage 8	88.1	-56.14	115.46
Stage 8	87.9	-35.71	102.14
Stage 8	87.7	-18.11	88.01
Stage 8	87.5	-3.49	73.09
Stage 8	87.3	7.99	57.4
Stage 8	87.1	16.21	41.12
Stage 8	86.9	21.05	24.16
Stage 8	86.7	22.37	6.62
Stage 8	86.5	20.09	-11.42
Stage 8	86.3	14.12	-29.83
Stage 8	86.1	4.45	-48.37
Stage 8	85.9	-8.94	-66.95
Stage 8	85.7	-26.02	-85.38
Stage 8	85.5	-46.7	-103.39
Stage 8	85.3	-70.87	-120.85
Stage 8	85.1	-45	129.38
Stage 8	84.9	-22.81	110.97
Stage 8	84.7	-4.39	92.08
Stage 8	84.5	10.17	72.79
Stage 8	84.3	20.8	53.16
Stage 8	84.1	27.46	33.29
Stage 8	83.9	30.13	13.35
Stage 8	83.7	28.81	-6.6
Stage 8	83.5	23.53	-26.41
Stage 8	83.3	14.34	-45.91
Stage 8	83.1	1.36	-64.91
Stage 8	82.9	-15.28	-83.2
Stage 8	82.8	-24.96	-96.76
Stage 8	82.6	7.89	164.27
Stage 8	82.4	37.04	145.74
Stage 8	82.2	62.43	126.92
Stage 8	82	83.99	107.81
Stage 8	81.8	101.67	88.41
Stage 8	81.6	115.42	68.77
Stage 8	81.4	125.2	48.85
Stage 8	81.2	130.92	28.65
Stage 8	81	132.55	8.15
Stage 8	80.8	130.03	-12.62
Stage 8	80.6	123.3	-33.63
Stage 8	80.4	112.32	-54.91
Stage 8	80.2	97.03	-76.48
Stage 8	80	77.99	-95.17
Stage 8	79.8	56.43	-107.83
Stage 8	79.6	33.54	-114.45
Stage 8	79.4	10.55	-114.93
Stage 8	79.2	-11.3	-109.27

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 8	79	-30.79	-97.47
Stage 8	78.8	-46.7	-79.54
Stage 8	78.6	-58.82	-60.57
Stage 8	78.4	-67.4	-42.91
Stage 8	78.2	-72.96	-27.81
Stage 8	78	-75.98	-15.11
Stage 8	77.8	-76.89	-4.52
Stage 8	77.6	-76.05	4.16
Stage 8	77.4	-73.83	11.13
Stage 8	77.2	-70.52	16.56
Stage 8	77	-66.39	20.64
Stage 8	76.8	-61.68	23.54
Stage 8	76.6	-56.6	25.41
Stage 8	76.4	-51.32	26.42
Stage 8	76.2	-45.98	26.7
Stage 8	76	-40.72	26.28
Stage 8	75.8	-35.66	25.29
Stage 8	75.6	-30.88	23.89
Stage 8	75.4	-26.43	22.25
Stage 8	75.2	-22.34	20.45
Stage 8	75	-18.63	18.54
Stage 8	74.8	-15.31	16.6
Stage 8	74.6	-12.38	14.67
Stage 8	74.4	-9.83	12.77
Stage 8	74.2	-7.63	10.96
Stage 8	74	-5.79	9.24
Stage 8	73.8	-4.26	7.64
Stage 8	73.6	-3.02	6.18
Stage 8	73.4	-2.05	4.86
Stage 8	73.2	-1.31	3.7
Stage 8	73	-0.77	2.69
Stage 8	72.8	-0.4	1.85
Stage 8	72.6	-0.17	1.15
Stage 8	72.4	-0.05	0.61
Stage 8	72.2	0	0.22
Stage 8	72.1	0	0.04

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 9

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 9	92.3	0	44.08
Stage 9	92.1	8.82	44.08
Stage 9	91.9	17.29	42.35
Stage 9	91.7	25.36	40.36
Stage 9	91.5	32.87	37.54
Stage 9	91.3	39.62	33.77
Stage 9	91.1	45.42	29.02
Stage 9	90.9	50.08	23.27
Stage 9	90.7	53.38	16.52
Stage 9	90.5	55.13	8.75
Stage 9	90.3	55.13	0
Stage 9	90.1	53.18	-9.73
Stage 9	89.9	49.11	-20.38
Stage 9	89.7	42.69	-32.1
Stage 9	89.5	33.73	-44.79
Stage 9	89.3	22.11	-58.11
Stage 9	89.1	7.69	-72.11
Stage 9	88.9	-9.63	-86.57
Stage 9	88.7	-29.87	-101.24
Stage 9	88.5	-53.04	-115.82
Stage 9	88.3	-79.01	-129.81
Stage 9	88.1	-55.38	118.15
Stage 9	87.9	-34.34	105.19
Stage 9	87.7	-16.05	91.45
Stage 9	87.5	-0.66	76.94
Stage 9	87.3	11.68	61.69
Stage 9	87.1	20.85	45.85
Stage 9	86.9	26.72	29.35
Stage 9	86.7	29.17	12.27
Stage 9	86.5	28.11	-5.33
Stage 9	86.3	23.44	-23.31
Stage 9	86.1	15.15	-41.46
Stage 9	85.9	3.21	-59.71
Stage 9	85.7	-12.37	-77.88
Stage 9	85.5	-31.51	-95.73
Stage 9	85.3	-54.15	-113.15
Stage 9	85.1	-26.81	136.7
Stage 9	84.9	-3.21	117.99
Stage 9	84.7	16.51	98.61
Stage 9	84.5	32.22	78.56
Stage 9	84.3	43.8	57.89
Stage 9	84.1	51.13	36.64
Stage 9	83.9	54.12	14.97
Stage 9	83.7	52.69	-7.13
Stage 9	83.5	46.78	-29.56
Stage 9	83.3	36.35	-52.18
Stage 9	83.1	21.38	-74.84
Stage 9	82.9	1.91	-97.37
Stage 9	82.8	-9.56	-114.58
Stage 9	82.6	16.23	128.93
Stage 9	82.4	37.14	104.55
Stage 9	82.2	52.98	79.2
Stage 9	82	63.55	52.87
Stage 9	81.8	68.67	25.6
Stage 9	81.6	68.16	-2.53
Stage 9	81.4	61.86	-31.51
Stage 9	81.2	49.61	-61.25
Stage 9	81	31.29	-91.63
Stage 9	80.8	6.78	-122.51
Stage 9	80.6	24.92	90.69
Stage 9	80.4	36.81	59.47
Stage 9	80.2	42.48	28.34
Stage 9	80	41.99	-2.43
Stage 9	79.8	36.06	-29.69
Stage 9	79.6	26.11	-49.74
Stage 9	79.4	13.63	-62.41
Stage 9	79.2	0.09	-67.67

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 9	79	-13.01	-65.53
Stage 9	78.8	-24.22	-56.04
Stage 9	78.6	-33.09	-44.33
Stage 9	78.4	-39.66	-32.85
Stage 9	78.2	-44.24	-22.91
Stage 9	78	-47.12	-14.43
Stage 9	77.8	-48.57	-7.23
Stage 9	77.6	-48.81	-1.19
Stage 9	77.4	-48.05	3.79
Stage 9	77.2	-46.49	7.81
Stage 9	77	-44.29	10.97
Stage 9	76.8	-41.62	13.35
Stage 9	76.6	-38.61	15.05
Stage 9	76.4	-35.38	16.15
Stage 9	76.2	-32.04	16.71
Stage 9	76	-28.69	16.78
Stage 9	75.8	-25.4	16.41
Stage 9	75.6	-22.26	15.72
Stage 9	75.4	-19.29	14.84
Stage 9	75.2	-16.53	13.82
Stage 9	75	-13.99	12.71
Stage 9	74.8	-11.68	11.55
Stage 9	74.6	-9.61	10.36
Stage 9	74.4	-7.77	9.17
Stage 9	74.2	-6.17	8.01
Stage 9	74	-4.79	6.89
Stage 9	73.8	-3.62	5.83
Stage 9	73.6	-2.66	4.84
Stage 9	73.4	-1.87	3.93
Stage 9	73.2	-1.25	3.1
Stage 9	73	-0.78	2.37
Stage 9	72.8	-0.43	1.72
Stage 9	72.6	-0.2	1.16
Stage 9	72.4	-0.06	0.68
Stage 9	72.2	-0.01	0.28
Stage 9	72.1	0	0.06

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 10

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 10	92.3	0	44.2
Stage 10	92.1	8.84	44.2
Stage 10	91.9	17.34	42.48
Stage 10	91.7	25.43	40.49
Stage 10	91.5	32.97	37.68
Stage 10	91.3	39.75	33.92
Stage 10	91.1	45.59	29.18
Stage 10	90.9	50.27	23.44
Stage 10	90.7	53.61	16.69
Stage 10	90.5	55.4	8.93
Stage 10	90.3	55.43	0.18
Stage 10	90.1	53.53	-9.54
Stage 10	89.9	49.49	-20.19
Stage 10	89.7	43.11	-31.91
Stage 10	89.5	34.18	-44.61
Stage 10	89.3	22.6	-57.94
Stage 10	89.1	8.21	-71.95
Stage 10	88.9	-9.08	-86.43
Stage 10	88.7	-29.31	-101.13
Stage 10	88.5	-52.46	-115.76
Stage 10	88.3	-78.42	-129.79
Stage 10	88.1	-54.83	117.98
Stage 10	87.9	-33.84	104.96
Stage 10	87.7	-15.61	91.13
Stage 10	87.5	-0.3	76.53
Stage 10	87.3	11.93	61.17
Stage 10	87.1	20.97	45.21
Stage 10	86.9	26.69	28.58
Stage 10	86.7	28.95	11.33
Stage 10	86.5	27.67	-6.43
Stage 10	86.3	22.75	-24.6
Stage 10	86.1	14.16	-42.94
Stage 10	85.9	1.88	-61.41
Stage 10	85.7	-14.08	-79.79
Stage 10	85.5	-33.65	-97.88
Stage 10	85.3	-56.76	-115.52
Stage 10	85.1	-30.06	133.5
Stage 10	84.9	-7.15	114.56
Stage 10	84.7	11.84	94.95
Stage 10	84.5	26.78	74.7
Stage 10	84.3	37.55	53.85
Stage 10	84.1	44.04	32.45
Stage 10	83.9	46.17	10.68
Stage 10	83.7	43.88	-11.46
Stage 10	83.5	37.11	-33.85
Stage 10	83.3	25.84	-56.35
Stage 10	83.1	10.09	-78.77
Stage 10	82.9	-10.1	-100.94
Stage 10	82.8	-21.88	-117.77
Stage 10	82.6	3.66	127.74
Stage 10	82.4	24.49	104.13
Stage 10	82.2	40.44	79.76
Stage 10	82	51.37	54.64
Stage 10	81.8	57.13	28.82
Stage 10	81.6	57.62	2.42
Stage 10	81.4	52.71	-24.53
Stage 10	81.2	42.32	-51.93
Stage 10	81	26.39	-79.65
Stage 10	80.8	4.89	-107.51
Stage 10	80.6	28.58	118.48
Stage 10	80.4	46.78	90.98
Stage 10	80.2	59.56	63.93
Stage 10	80	67.05	37.43
Stage 10	79.8	69.36	11.56
Stage 10	79.6	66.63	-13.65
Stage 10	79.4	59.01	-38.13
Stage 10	79.2	47.25	-58.78

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 10	79	32.75	-72.53
Stage 10	78.8	16.78	-79.86
Stage 10	78.6	0.57	-81.05
Stage 10	78.4	-14.66	-76.11
Stage 10	78.2	-27.86	-66.02
Stage 10	78	-38.14	-51.41
Stage 10	77.8	-45.68	-37.69
Stage 10	77.6	-50.84	-25.79
Stage 10	77.4	-53.96	-15.62
Stage 10	77.2	-55.37	-7.05
Stage 10	77	-55.36	0.04
Stage 10	76.8	-54.21	5.79
Stage 10	76.6	-52.14	10.31
Stage 10	76.4	-49.39	13.76
Stage 10	76.2	-46.14	16.26
Stage 10	76	-42.55	17.94
Stage 10	75.8	-38.77	18.91
Stage 10	75.6	-34.89	19.36
Stage 10	75.4	-31.03	19.31
Stage 10	75.2	-27.26	18.86
Stage 10	75	-23.64	18.08
Stage 10	74.8	-20.23	17.06
Stage 10	74.6	-17.06	15.86
Stage 10	74.4	-14.16	14.53
Stage 10	74.2	-11.53	13.11
Stage 10	74	-9.2	11.66
Stage 10	73.8	-7.16	10.2
Stage 10	73.6	-5.41	8.75
Stage 10	73.4	-3.94	7.36
Stage 10	73.2	-2.73	6.05
Stage 10	73	-1.77	4.82
Stage 10	72.8	-1.03	3.68
Stage 10	72.6	-0.51	2.62
Stage 10	72.4	-0.17	1.66
Stage 10	72.2	-0.02	0.78
Stage 10	72.1	0	0.19

Risultati Elementi strutturali - A1+M1+R1

Design Assumption: A1+M1+R1 Sollecitazione Tir-A1

Stage	Forza (kN/m)
Stage 3	260
Stage 4	283.8407
Stage 5	279.10961
Stage 6	277.9101
Stage 7	278.82868
Stage 8	277.01362
Stage 9	277.83951
Stage 10	277.69833

Design Assumption: A1+M1+R1 Sollecitazione Tir-B1

Stage	Forza (kN/m)
Stage 5	260
Stage 6	294.42309
Stage 7	284.44312
Stage 8	285.43801
Stage 9	285.14876
Stage 10	284.52606

Design Assumption: A1+M1+R1 Sollecitazione Tir-C1

Stage	Forza (kN/m)
Stage 7	260
Stage 8	292.33607
Stage 9	277.823
Stage 10	279.47933

Design Assumption: A1+M1+R1 Sollecitazione Cavalletto

Stage	Forza (kN/m)
Stage 1	-8.89121155E-16
Stage 2	94.160313
Stage 3	115.197979
Stage 4	83.471518
Stage 5	90.965394
Stage 6	88.567128
Stage 7	88.616112
Stage 8	90.562823
Stage 9	89.65918
Stage 10	89.887005

Design Assumption: A1+M1+R1 Sollecitazione Tir-D1

Stage	Forza (kN/m)
Stage 9	260
Stage 10	270.03223

Risultati A2+M2+R1

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 1

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 1	92.3	0	0
Stage 1	92.1	0	0
Stage 1	91.9	0	0
Stage 1	91.7	0	0
Stage 1	91.5	0	0
Stage 1	91.3	0	0
Stage 1	91.1	0	0
Stage 1	90.9	0	0
Stage 1	90.7	0	0
Stage 1	90.5	0	0
Stage 1	90.3	0	0
Stage 1	90.1	0	0
Stage 1	89.9	0	0
Stage 1	89.7	0	0
Stage 1	89.5	0	0
Stage 1	89.3	0	0
Stage 1	89.1	0	0
Stage 1	88.9	0	0
Stage 1	88.7	0	0
Stage 1	88.5	0	0
Stage 1	88.3	0	0
Stage 1	88.1	0	0
Stage 1	87.9	0	0
Stage 1	87.7	0	0
Stage 1	87.5	0	0
Stage 1	87.3	0	0
Stage 1	87.1	0	0
Stage 1	86.9	0	0
Stage 1	86.7	0	0
Stage 1	86.5	0	0
Stage 1	86.3	0	0
Stage 1	86.1	0	0
Stage 1	85.9	0	0
Stage 1	85.7	0	0
Stage 1	85.5	0	0
Stage 1	85.3	0	0
Stage 1	85.1	0	0
Stage 1	84.9	0	0
Stage 1	84.7	0	0
Stage 1	84.5	0	0
Stage 1	84.3	0	0
Stage 1	84.1	0	0
Stage 1	83.9	0	0
Stage 1	83.7	0	0
Stage 1	83.5	0	0
Stage 1	83.3	0	0
Stage 1	83.1	0	0
Stage 1	82.9	0	0
Stage 1	82.8	0	0
Stage 1	82.6	0	0
Stage 1	82.4	0	0
Stage 1	82.2	0	0
Stage 1	82	0	0
Stage 1	81.8	0	0
Stage 1	81.6	0	0
Stage 1	81.4	0	0
Stage 1	81.2	0	0
Stage 1	81	0	0
Stage 1	80.8	0	0
Stage 1	80.6	0	0
Stage 1	80.4	0	0
Stage 1	80.2	0	0
Stage 1	80	0	0
Stage 1	79.8	0	0

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 1	79.6	0	0
Stage 1	79.4	0	0
Stage 1	79.2	0	0
Stage 1	79	0	0
Stage 1	78.8	0	0
Stage 1	78.6	0	0
Stage 1	78.4	0	0
Stage 1	78.2	0	0
Stage 1	78	0	0
Stage 1	77.8	0	0
Stage 1	77.6	0	0
Stage 1	77.4	0	0
Stage 1	77.2	0	0
Stage 1	77	0	0
Stage 1	76.8	0	0
Stage 1	76.6	0	0
Stage 1	76.4	0	0
Stage 1	76.2	0	0
Stage 1	76	0	0
Stage 1	75.8	0	0
Stage 1	75.6	0	0
Stage 1	75.4	0	0
Stage 1	75.2	0	0
Stage 1	75	0	0
Stage 1	74.8	0	0
Stage 1	74.6	0	0
Stage 1	74.4	0	0
Stage 1	74.2	0	0
Stage 1	74	0	0
Stage 1	73.8	0	0
Stage 1	73.6	0	0
Stage 1	73.4	0	0
Stage 1	73.2	0	0
Stage 1	73	0	0
Stage 1	72.8	0	0
Stage 1	72.6	0	0
Stage 1	72.4	0	0
Stage 1	72.2	0	0
Stage 1	72.1	0	0

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 2

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 2	92.3	0	53.58
Stage 2	92.1	10.72	53.58
Stage 2	91.9	21.28	52.8
Stage 2	91.7	31.62	51.7
Stage 2	91.5	41.67	50.26
Stage 2	91.3	51.36	48.44
Stage 2	91.1	60.6	46.23
Stage 2	90.9	69.32	43.6
Stage 2	90.7	77.43	40.55
Stage 2	90.5	84.85	37.07
Stage 2	90.3	91.48	33.16
Stage 2	90.1	97.24	28.83
Stage 2	89.9	102.06	24.08
Stage 2	89.7	105.8	18.72
Stage 2	89.5	108.35	12.75
Stage 2	89.3	109.64	6.43
Stage 2	89.1	109.55	-0.45
Stage 2	88.9	107.98	-7.84
Stage 2	88.7	104.83	-15.72
Stage 2	88.5	100.02	-24.08
Stage 2	88.3	93.47	-32.74
Stage 2	88.1	85.1	-41.84
Stage 2	87.9	74.83	-51.37
Stage 2	87.7	62.56	-61.31
Stage 2	87.5	48.57	-70
Stage 2	87.3	33.41	-75.77
Stage 2	87.1	17.72	-78.48
Stage 2	86.9	2.07	-78.25
Stage 2	86.7	-12.95	-75.07
Stage 2	86.5	-26.74	-68.94
Stage 2	86.3	-38.71	-59.85
Stage 2	86.1	-48.24	-47.69
Stage 2	85.9	-55.09	-34.21
Stage 2	85.7	-59.48	-21.97
Stage 2	85.5	-61.65	-10.86
Stage 2	85.3	-61.81	-0.8
Stage 2	85.1	-60.24	7.85
Stage 2	84.9	-57.37	14.35
Stage 2	84.7	-53.57	19
Stage 2	84.5	-49.16	22.07
Stage 2	84.3	-44.4	23.82
Stage 2	84.1	-39.47	24.61
Stage 2	83.9	-34.55	24.63
Stage 2	83.7	-29.76	23.95
Stage 2	83.5	-25.21	22.74
Stage 2	83.3	-20.98	21.15
Stage 2	83.1	-17.11	19.34
Stage 2	82.9	-13.63	17.41
Stage 2	82.8	-12.04	15.93
Stage 2	82.6	-9.15	14.45
Stage 2	82.4	-6.64	12.53
Stage 2	82.2	-4.51	10.69
Stage 2	82	-2.71	8.96
Stage 2	81.8	-1.24	7.38
Stage 2	81.6	-0.05	5.94
Stage 2	81.4	0.88	4.65
Stage 2	81.2	1.59	3.53
Stage 2	81	2.1	2.55
Stage 2	80.8	2.44	1.72
Stage 2	80.6	2.64	1.02
Stage 2	80.4	2.73	0.45
Stage 2	80.2	2.73	-0.01
Stage 2	80	2.66	-0.37
Stage 2	79.8	2.53	-0.64
Stage 2	79.6	2.36	-0.84
Stage 2	79.4	2.17	-0.97
Stage 2	79.2	1.96	-1.05

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 2	79	1.74	-1.08
Stage 2	78.8	1.52	-1.09
Stage 2	78.6	1.31	-1.06
Stage 2	78.4	1.11	-1.01
Stage 2	78.2	0.92	-0.94
Stage 2	78	0.75	-0.86
Stage 2	77.8	0.6	-0.77
Stage 2	77.6	0.46	-0.68
Stage 2	77.4	0.34	-0.59
Stage 2	77.2	0.24	-0.51
Stage 2	77	0.15	-0.43
Stage 2	76.8	0.08	-0.36
Stage 2	76.6	0.02	-0.29
Stage 2	76.4	-0.02	-0.23
Stage 2	76.2	-0.06	-0.17
Stage 2	76	-0.08	-0.13
Stage 2	75.8	-0.1	-0.09
Stage 2	75.6	-0.11	-0.05
Stage 2	75.4	-0.11	-0.02
Stage 2	75.2	-0.11	0
Stage 2	75	-0.11	0.02
Stage 2	74.8	-0.1	0.03
Stage 2	74.6	-0.09	0.04
Stage 2	74.4	-0.09	0.05
Stage 2	74.2	-0.07	0.05
Stage 2	74	-0.06	0.05
Stage 2	73.8	-0.05	0.05
Stage 2	73.6	-0.04	0.05
Stage 2	73.4	-0.03	0.05
Stage 2	73.2	-0.02	0.04
Stage 2	73	-0.02	0.04
Stage 2	72.8	-0.01	0.03
Stage 2	72.6	-0.01	0.03
Stage 2	72.4	0	0.02
Stage 2	72.2	0	0.01
Stage 2	72.1	0	0

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 3

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 3	92.3	0	61.52
Stage 3	92.1	12.3	61.52
Stage 3	91.9	24.45	60.74
Stage 3	91.7	36.37	59.58
Stage 3	91.5	47.88	57.58
Stage 3	91.3	58.82	54.7
Stage 3	91.1	69	50.89
Stage 3	90.9	78.22	46.12
Stage 3	90.7	86.29	40.34
Stage 3	90.5	92.99	33.52
Stage 3	90.3	98.12	25.64
Stage 3	90.1	101.46	16.67
Stage 3	89.9	102.77	6.58
Stage 3	89.7	101.81	-4.81
Stage 3	89.5	98.31	-17.51
Stage 3	89.3	92.06	-31.26
Stage 3	89.1	82.81	-46.22
Stage 3	88.9	70.35	-62.29
Stage 3	88.7	54.48	-79.36
Stage 3	88.5	35.03	-97.28
Stage 3	88.3	11.88	-115.7
Stage 3	88.1	22.56	53.39
Stage 3	87.9	29.43	34.38
Stage 3	87.7	32.52	15.44
Stage 3	87.5	31.89	-3.15
Stage 3	87.3	27.66	-21.15
Stage 3	87.1	20.55	-35.54
Stage 3	86.9	11.44	-45.59
Stage 3	86.7	1.17	-51.31
Stage 3	86.5	-9.37	-52.74
Stage 3	86.3	-19.36	-49.95
Stage 3	86.1	-27.95	-42.95
Stage 3	85.9	-34.67	-33.58
Stage 3	85.7	-39.57	-24.52
Stage 3	85.5	-42.73	-15.79
Stage 3	85.3	-44.21	-7.4
Stage 3	85.1	-44.18	0.16
Stage 3	84.9	-42.97	6.06
Stage 3	84.7	-40.87	10.49
Stage 3	84.5	-38.14	13.63
Stage 3	84.3	-35.01	15.66
Stage 3	84.1	-31.64	16.87
Stage 3	83.9	-28.15	17.45
Stage 3	83.7	-24.66	17.46
Stage 3	83.5	-21.26	16.97
Stage 3	83.3	-18.04	16.12
Stage 3	83.1	-15.03	15.03
Stage 3	82.9	-12.27	13.78
Stage 3	82.8	-10.99	12.78
Stage 3	82.6	-8.64	11.75
Stage 3	82.4	-6.57	10.37
Stage 3	82.2	-4.77	9.02
Stage 3	82	-3.22	7.71
Stage 3	81.8	-1.93	6.49
Stage 3	81.6	-0.85	5.36
Stage 3	81.4	0.01	4.33
Stage 3	81.2	0.69	3.4
Stage 3	81	1.21	2.59
Stage 3	80.8	1.59	1.88
Stage 3	80.6	1.84	1.27
Stage 3	80.4	1.99	0.76
Stage 3	80.2	2.06	0.34
Stage 3	80	2.06	-0.01
Stage 3	79.8	2	-0.27
Stage 3	79.6	1.91	-0.48
Stage 3	79.4	1.78	-0.63
Stage 3	79.2	1.64	-0.72

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 3	79	1.48	-0.78
Stage 3	78.8	1.32	-0.81
Stage 3	78.6	1.16	-0.82
Stage 3	78.4	1	-0.8
Stage 3	78.2	0.84	-0.76
Stage 3	78	0.7	-0.71
Stage 3	77.8	0.57	-0.65
Stage 3	77.6	0.46	-0.59
Stage 3	77.4	0.35	-0.52
Stage 3	77.2	0.26	-0.45
Stage 3	77	0.18	-0.39
Stage 3	76.8	0.12	-0.33
Stage 3	76.6	0.06	-0.27
Stage 3	76.4	0.02	-0.22
Stage 3	76.2	-0.02	-0.17
Stage 3	76	-0.04	-0.13
Stage 3	75.8	-0.06	-0.1
Stage 3	75.6	-0.07	-0.07
Stage 3	75.4	-0.08	-0.04
Stage 3	75.2	-0.09	-0.02
Stage 3	75	-0.09	0
Stage 3	74.8	-0.08	0.01
Stage 3	74.6	-0.08	0.03
Stage 3	74.4	-0.07	0.03
Stage 3	74.2	-0.06	0.04
Stage 3	74	-0.05	0.04
Stage 3	73.8	-0.05	0.04
Stage 3	73.6	-0.04	0.04
Stage 3	73.4	-0.03	0.04
Stage 3	73.2	-0.02	0.04
Stage 3	73	-0.02	0.03
Stage 3	72.8	-0.01	0.03
Stage 3	72.6	-0.01	0.02
Stage 3	72.4	0	0.02
Stage 3	72.2	0	0.01
Stage 3	72.1	0	0

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 4

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 4	92.3	0	32.11
Stage 4	92.1	6.42	32.11
Stage 4	91.9	12.35	29.62
Stage 4	91.7	17.75	27.02
Stage 4	91.5	22.52	23.88
Stage 4	91.3	26.56	20.2
Stage 4	91.1	29.76	15.99
Stage 4	90.9	32.02	11.27
Stage 4	90.7	33.24	6.09
Stage 4	90.5	33.34	0.51
Stage 4	90.3	32.26	-5.38
Stage 4	90.1	29.96	-11.5
Stage 4	89.9	26.42	-17.7
Stage 4	89.7	21.61	-24.06
Stage 4	89.5	15.53	-30.4
Stage 4	89.3	8.18	-36.73
Stage 4	89.1	-0.54	-43.6
Stage 4	88.9	-10.74	-51
Stage 4	88.7	-22.51	-58.88
Stage 4	88.5	-35.96	-67.24
Stage 4	88.3	-51.15	-75.9
Stage 4	88.1	-22.2	144.75
Stage 4	87.9	4.85	135.22
Stage 4	87.7	29.9	125.28
Stage 4	87.5	52.89	114.93
Stage 4	87.3	73.73	104.19
Stage 4	87.1	92.37	93.19
Stage 4	86.9	108.73	81.81
Stage 4	86.7	122.74	70.07
Stage 4	86.5	134.33	57.96
Stage 4	86.3	143.43	45.5
Stage 4	86.1	149.99	32.79
Stage 4	85.9	153.94	19.74
Stage 4	85.7	155.21	6.35
Stage 4	85.5	153.73	-7.38
Stage 4	85.3	149.44	-21.44
Stage 4	85.1	142.28	-35.82
Stage 4	84.9	132.19	-50.44
Stage 4	84.7	119.12	-65.37
Stage 4	84.5	103.33	-78.95
Stage 4	84.3	85.43	-89.5
Stage 4	84.1	66.02	-97.02
Stage 4	83.9	45.74	-101.42
Stage 4	83.7	25.18	-102.78
Stage 4	83.5	4.96	-101.1
Stage 4	83.3	-14.31	-96.38
Stage 4	83.1	-32.03	-88.61
Stage 4	82.9	-47.59	-77.8
Stage 4	82.8	-54.33	-67.35
Stage 4	82.6	-65.67	-56.7
Stage 4	82.4	-74.42	-43.75
Stage 4	82.2	-80.82	-31.99
Stage 4	82	-85.08	-21.32
Stage 4	81.8	-87.42	-11.68
Stage 4	81.6	-88	-2.9
Stage 4	81.4	-86.99	5.03
Stage 4	81.2	-84.55	12.2
Stage 4	81	-80.81	18.7
Stage 4	80.8	-76.07	23.69
Stage 4	80.6	-70.64	27.16
Stage 4	80.4	-64.77	29.36
Stage 4	80.2	-58.65	30.58
Stage 4	80	-52.45	31.01
Stage 4	79.8	-46.32	30.65
Stage 4	79.6	-40.39	29.68
Stage 4	79.4	-34.74	28.22
Stage 4	79.2	-29.46	26.41

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 4	79	-24.59	24.37
Stage 4	78.8	-20.14	22.21
Stage 4	78.6	-16.14	20
Stage 4	78.4	-12.59	17.79
Stage 4	78.2	-9.46	15.64
Stage 4	78	-6.74	13.58
Stage 4	77.8	-4.42	11.63
Stage 4	77.6	-2.45	9.82
Stage 4	77.4	-0.82	8.15
Stage 4	77.2	0.5	6.63
Stage 4	77	1.56	5.27
Stage 4	76.8	2.37	4.05
Stage 4	76.6	2.96	2.99
Stage 4	76.4	3.38	2.07
Stage 4	76.2	3.63	1.28
Stage 4	76	3.76	0.61
Stage 4	75.8	3.77	0.06
Stage 4	75.6	3.69	-0.39
Stage 4	75.4	3.54	-0.75
Stage 4	75.2	3.34	-1.02
Stage 4	75	3.09	-1.23
Stage 4	74.8	2.82	-1.37
Stage 4	74.6	2.52	-1.47
Stage 4	74.4	2.22	-1.51
Stage 4	74.2	1.91	-1.52
Stage 4	74	1.62	-1.5
Stage 4	73.8	1.33	-1.43
Stage 4	73.6	1.06	-1.34
Stage 4	73.4	0.82	-1.23
Stage 4	73.2	0.6	-1.09
Stage 4	73	0.41	-0.94
Stage 4	72.8	0.25	-0.78
Stage 4	72.6	0.13	-0.6
Stage 4	72.4	0.05	-0.41
Stage 4	72.2	0.01	-0.21
Stage 4	72.1	0	-0.05

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 5

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 5	92.3	0	35.73
Stage 5	92.1	7.15	35.73
Stage 5	91.9	13.85	33.5
Stage 5	91.7	20.08	31.19
Stage 5	91.5	25.75	28.35
Stage 5	91.3	30.75	24.99
Stage 5	91.1	34.97	21.09
Stage 5	90.9	38.31	16.69
Stage 5	90.7	40.67	11.81
Stage 5	90.5	41.97	6.5
Stage 5	90.3	42.13	0.83
Stage 5	90.1	41.11	-5.12
Stage 5	89.9	38.86	-11.24
Stage 5	89.7	35.34	-17.62
Stage 5	89.5	30.51	-24.12
Stage 5	89.3	24.36	-30.76
Stage 5	89.1	16.73	-38.14
Stage 5	88.9	7.48	-46.26
Stage 5	88.7	-3.55	-55.14
Stage 5	88.5	-16.5	-64.79
Stage 5	88.3	-31.52	-75.08
Stage 5	88.1	-3.64	139.42
Stage 5	87.9	21.85	127.46
Stage 5	87.7	44.78	114.63
Stage 5	87.5	64.95	100.89
Stage 5	87.3	82.2	86.24
Stage 5	87.1	96.36	70.78
Stage 5	86.9	107.23	54.37
Stage 5	86.7	114.64	37.02
Stage 5	86.5	118.38	18.73
Stage 5	86.3	118.29	-0.47
Stage 5	86.1	114.2	-20.43
Stage 5	85.9	106	-41.03
Stage 5	85.7	93.57	-62.13
Stage 5	85.5	76.84	-83.68
Stage 5	85.3	55.71	-105.58
Stage 5	85.1	67.75	60.2
Stage 5	84.9	75.34	37.95
Stage 5	84.7	78.47	15.66
Stage 5	84.5	77.18	-6.48
Stage 5	84.3	71.52	-28.29
Stage 5	84.1	62.19	-46.65
Stage 5	83.9	49.99	-61
Stage 5	83.7	35.75	-71.23
Stage 5	83.5	20.28	-77.33
Stage 5	83.3	4.41	-79.35
Stage 5	83.1	-11.05	-77.33
Stage 5	82.9	-25.32	-71.34
Stage 5	82.8	-31.71	-63.88
Stage 5	82.6	-42.9	-55.92
Stage 5	82.4	-52.06	-45.83
Stage 5	82.2	-59.32	-36.28
Stage 5	82	-64.77	-27.27
Stage 5	81.8	-68.53	-18.78
Stage 5	81.6	-70.68	-10.75
Stage 5	81.4	-71.32	-3.21
Stage 5	81.2	-70.55	3.85
Stage 5	81	-68.47	10.39
Stage 5	80.8	-65.35	15.63
Stage 5	80.6	-61.45	19.48
Stage 5	80.4	-57.02	22.14
Stage 5	80.2	-52.25	23.87
Stage 5	80	-47.28	24.84
Stage 5	79.8	-42.25	25.14
Stage 5	79.6	-37.29	24.82
Stage 5	79.4	-32.49	24
Stage 5	79.2	-27.93	22.79

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 5	79	-23.66	21.32
Stage 5	78.8	-19.73	19.68
Stage 5	78.6	-16.14	17.94
Stage 5	78.4	-12.91	16.16
Stage 5	78.2	-10.03	14.39
Stage 5	78	-7.5	12.65
Stage 5	77.8	-5.3	10.99
Stage 5	77.6	-3.42	9.41
Stage 5	77.4	-1.83	7.94
Stage 5	77.2	-0.52	6.59
Stage 5	77	0.55	5.35
Stage 5	76.8	1.4	4.24
Stage 5	76.6	2.05	3.25
Stage 5	76.4	2.53	2.38
Stage 5	76.2	2.85	1.62
Stage 5	76	3.05	0.98
Stage 5	75.8	3.14	0.43
Stage 5	75.6	3.13	-0.03
Stage 5	75.4	3.05	-0.4
Stage 5	75.2	2.91	-0.69
Stage 5	75	2.73	-0.92
Stage 5	74.8	2.51	-1.08
Stage 5	74.6	2.27	-1.2
Stage 5	74.4	2.02	-1.27
Stage 5	74.2	1.76	-1.31
Stage 5	74	1.49	-1.31
Stage 5	73.8	1.24	-1.28
Stage 5	73.6	0.99	-1.21
Stage 5	73.4	0.77	-1.12
Stage 5	73.2	0.57	-1.01
Stage 5	73	0.39	-0.88
Stage 5	72.8	0.24	-0.74
Stage 5	72.6	0.13	-0.58
Stage 5	72.4	0.05	-0.4
Stage 5	72.2	0.01	-0.21
Stage 5	72.1	0	-0.05

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 6

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 6	92.3	0	31.65
Stage 6	92.1	6.33	31.65
Stage 6	91.9	12.13	29.03
Stage 6	91.7	17.37	26.15
Stage 6	91.5	21.88	22.59
Stage 6	91.3	25.55	18.33
Stage 6	91.1	28.23	13.39
Stage 6	90.9	29.78	7.79
Stage 6	90.7	30.1	1.57
Stage 6	90.5	29.06	-5.2
Stage 6	90.3	26.57	-12.44
Stage 6	90.1	22.56	-20.04
Stage 6	89.9	16.99	-27.87
Stage 6	89.7	9.79	-35.99
Stage 6	89.5	0.95	-44.22
Stage 6	89.3	-9.56	-52.55
Stage 6	89.1	-21.87	-61.52
Stage 6	88.9	-36.08	-71.07
Stage 6	88.7	-52.31	-81.17
Stage 6	88.5	-70.67	-91.76
Stage 6	88.3	-91.19	-102.61
Stage 6	88.1	-68.89	111.5
Stage 6	87.9	-48.9	99.99
Stage 6	87.7	-31.25	88.26
Stage 6	87.5	-15.97	76.4
Stage 6	87.3	-3.06	64.54
Stage 6	87.1	7.52	52.89
Stage 6	86.9	15.81	41.47
Stage 6	86.7	21.76	29.72
Stage 6	86.5	25.28	17.62
Stage 6	86.3	26.31	5.15
Stage 6	86.1	24.8	-7.55
Stage 6	85.9	20.68	-20.61
Stage 6	85.7	13.88	-34
Stage 6	85.5	4.34	-47.73
Stage 6	85.3	-8.02	-61.78
Stage 6	85.1	26.63	173.29
Stage 6	84.9	58.37	158.67
Stage 6	84.7	87.11	143.73
Stage 6	84.5	112.81	128.48
Stage 6	84.3	135.39	112.92
Stage 6	84.1	154.8	97.04
Stage 6	83.9	170.99	80.94
Stage 6	83.7	183.89	64.53
Stage 6	83.5	193.46	47.81
Stage 6	83.3	199.62	30.8
Stage 6	83.1	202.31	13.49
Stage 6	82.9	201.49	-4.12
Stage 6	82.8	199.74	-17.49
Stage 6	82.6	193.55	-30.98
Stage 6	82.4	183.7	-49.25
Stage 6	82.2	170.13	-67.81
Stage 6	82	153.14	-84.99
Stage 6	81.8	133.32	-99.11
Stage 6	81.6	111.29	-110.11
Stage 6	81.4	87.68	-118.05
Stage 6	81.2	63.1	-122.93
Stage 6	81	38.15	-124.75
Stage 6	80.8	13.45	-123.5
Stage 6	80.6	-10.38	-119.14
Stage 6	80.4	-32.72	-111.71
Stage 6	80.2	-52.96	-101.21
Stage 6	80	-70.49	-87.64
Stage 6	79.8	-84.8	-71.52
Stage 6	79.6	-96.16	-56.8
Stage 6	79.4	-104.82	-43.31
Stage 6	79.2	-111.01	-30.96

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 6	79	-114.94	-19.66
Stage 6	78.8	-116.81	-9.34
Stage 6	78.6	-116.79	0.1
Stage 6	78.4	-115.04	8.75
Stage 6	78.2	-111.7	16.7
Stage 6	78	-106.89	24.05
Stage 6	77.8	-100.9	29.99
Stage 6	77.6	-94.06	34.18
Stage 6	77.4	-86.67	36.92
Stage 6	77.2	-78.99	38.43
Stage 6	77	-71.21	38.9
Stage 6	76.8	-63.52	38.46
Stage 6	76.6	-56.06	37.31
Stage 6	76.4	-48.93	35.6
Stage 6	76.2	-42.24	33.47
Stage 6	76	-36.03	31.04
Stage 6	75.8	-30.35	28.4
Stage 6	75.6	-25.22	25.65
Stage 6	75.4	-20.64	22.89
Stage 6	75.2	-16.61	20.18
Stage 6	75	-13.1	17.54
Stage 6	74.8	-10.09	15.03
Stage 6	74.6	-7.56	12.66
Stage 6	74.4	-5.47	10.47
Stage 6	74.2	-3.78	8.46
Stage 6	74	-2.45	6.64
Stage 6	73.8	-1.44	5.02
Stage 6	73.6	-0.72	3.62
Stage 6	73.4	-0.24	2.42
Stage 6	73.2	0.05	1.44
Stage 6	73	0.19	0.67
Stage 6	72.8	0.21	0.11
Stage 6	72.6	0.16	-0.25
Stage 6	72.4	0.08	-0.4
Stage 6	72.2	0.01	-0.33
Stage 6	72.1	0	-0.11

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 7

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 7	92.3	0	31.86
Stage 7	92.1	6.37	31.86
Stage 7	91.9	12.23	29.28
Stage 7	91.7	17.52	26.47
Stage 7	91.5	22.12	23.01
Stage 7	91.3	25.9	18.88
Stage 7	91.1	28.72	14.09
Stage 7	90.9	30.45	8.68
Stage 7	90.7	30.99	2.67
Stage 7	90.5	30.22	-3.86
Stage 7	90.3	28.05	-10.83
Stage 7	90.1	24.42	-18.14
Stage 7	89.9	19.29	-25.67
Stage 7	89.7	12.6	-33.46
Stage 7	89.5	4.33	-41.35
Stage 7	89.3	-5.54	-49.33
Stage 7	89.1	-17.13	-57.95
Stage 7	88.9	-30.56	-67.16
Stage 7	88.7	-45.94	-76.92
Stage 7	88.5	-63.38	-87.18
Stage 7	88.3	-82.93	-97.75
Stage 7	88.1	-59.48	117.25
Stage 7	87.9	-38.3	105.92
Stage 7	87.7	-19.43	94.31
Stage 7	87.5	-2.94	82.49
Stage 7	87.3	11.17	70.54
Stage 7	87.1	22.91	58.69
Stage 7	86.9	32.29	46.9
Stage 7	86.7	39.21	34.62
Stage 7	86.5	43.57	21.77
Stage 7	86.3	45.23	8.33
Stage 7	86.1	44.11	-5.62
Stage 7	85.9	40.07	-20.21
Stage 7	85.7	32.97	-35.46
Stage 7	85.5	22.69	-51.41
Stage 7	85.3	9.08	-68.07
Stage 7	85.1	40.19	155.58
Stage 7	84.9	67.69	137.49
Stage 7	84.7	91.41	118.62
Stage 7	84.5	111.2	98.94
Stage 7	84.3	126.89	78.47
Stage 7	84.1	138.33	57.2
Stage 7	83.9	145.38	35.22
Stage 7	83.7	147.89	12.58
Stage 7	83.5	145.77	-10.62
Stage 7	83.3	138.91	-34.31
Stage 7	83.1	127.21	-58.47
Stage 7	82.9	110.61	-83
Stage 7	82.8	100.45	-101.58
Stage 7	82.6	113.99	67.7
Stage 7	82.4	122.53	42.67
Stage 7	82.2	126.05	17.6
Stage 7	82	124.56	-7.45
Stage 7	81.8	118.12	-32.19
Stage 7	81.6	107.22	-54.48
Stage 7	81.4	92.66	-72.83
Stage 7	81.2	75.23	-87.13
Stage 7	81	55.75	-97.4
Stage 7	80.8	35.01	-103.67
Stage 7	80.6	13.83	-105.93
Stage 7	80.4	-7.03	-104.3
Stage 7	80.2	-26.8	-98.84
Stage 7	80	-44.72	-89.62
Stage 7	79.8	-60.07	-76.73
Stage 7	79.6	-72.78	-63.54
Stage 7	79.4	-83	-51.1
Stage 7	79.2	-90.88	-39.41

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 7	79	-96.57	-28.44
Stage 7	78.8	-100.2	-18.15
Stage 7	78.6	-101.93	-8.66
Stage 7	78.4	-101.91	0.09
Stage 7	78.2	-100.28	8.18
Stage 7	78	-97.14	15.69
Stage 7	77.8	-92.69	22.21
Stage 7	77.6	-87.29	27.02
Stage 7	77.4	-81.21	30.39
Stage 7	77.2	-74.71	32.53
Stage 7	77	-67.98	33.64
Stage 7	76.8	-61.2	33.9
Stage 7	76.6	-54.51	33.42
Stage 7	76.4	-48.05	32.34
Stage 7	76.2	-41.89	30.79
Stage 7	76	-36.11	28.88
Stage 7	75.8	-30.77	26.71
Stage 7	75.6	-25.89	24.39
Stage 7	75.4	-21.49	22
Stage 7	75.2	-17.57	19.6
Stage 7	75	-14.12	17.24
Stage 7	74.8	-11.13	14.96
Stage 7	74.6	-8.57	12.79
Stage 7	74.4	-6.43	10.74
Stage 7	74.2	-4.66	8.84
Stage 7	74	-3.24	7.11
Stage 7	73.8	-2.13	5.55
Stage 7	73.6	-1.29	4.17
Stage 7	73.4	-0.7	2.98
Stage 7	73.2	-0.3	1.97
Stage 7	73	-0.07	1.16
Stage 7	72.8	0.04	0.55
Stage 7	72.6	0.07	0.12
Stage 7	72.4	0.04	-0.12
Stage 7	72.2	0.01	-0.18
Stage 7	72.1	0	-0.06

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 8

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 8	92.3	0	33.56
Stage 8	92.1	6.71	33.56
Stage 8	91.9	12.92	31.03
Stage 8	91.7	18.56	28.23
Stage 8	91.5	23.51	24.73
Stage 8	91.3	27.61	20.52
Stage 8	91.1	30.73	15.6
Stage 8	90.9	32.73	10
Stage 8	90.7	33.48	3.76
Stage 8	90.5	32.87	-3.06
Stage 8	90.3	30.79	-10.39
Stage 8	90.1	27.17	-18.12
Stage 8	89.9	21.94	-26.14
Stage 8	89.7	15.04	-34.5
Stage 8	89.5	6.43	-43.04
Stage 8	89.3	-3.92	-51.74
Stage 8	89.1	-16.15	-61.18
Stage 8	88.9	-30.41	-71.29
Stage 8	88.7	-46.82	-82.05
Stage 8	88.5	-65.5	-93.4
Stage 8	88.3	-86.53	-105.14
Stage 8	88.1	-65.47	105.29
Stage 8	87.9	-46.95	92.62
Stage 8	87.7	-31.03	79.6
Stage 8	87.5	-17.77	66.31
Stage 8	87.3	-7.2	52.86
Stage 8	87.1	0.7	39.49
Stage 8	86.9	5.94	26.21
Stage 8	86.7	8.44	12.48
Stage 8	86.5	8.1	-1.71
Stage 8	86.3	4.83	-16.35
Stage 8	86.1	-1.43	-31.29
Stage 8	85.9	-10.75	-46.59
Stage 8	85.7	-23.19	-62.22
Stage 8	85.5	-38.81	-78.1
Stage 8	85.3	-57.65	-94.18
Stage 8	85.1	-30.85	134.01
Stage 8	84.9	-7.28	117.86
Stage 8	84.7	13.08	101.77
Stage 8	84.5	30.25	85.86
Stage 8	84.3	44.3	70.23
Stage 8	84.1	55.17	54.36
Stage 8	83.9	62.82	38.25
Stage 8	83.7	67.19	21.84
Stage 8	83.5	68.21	5.13
Stage 8	83.3	65.84	-11.88
Stage 8	83.1	60	-29.19
Stage 8	82.9	50.64	-46.8
Stage 8	82.8	44.62	-60.17
Stage 8	82.6	78.97	171.78
Stage 8	82.4	109.68	153.51
Stage 8	82.2	136.67	134.95
Stage 8	82	159.88	116.1
Stage 8	81.8	179.28	96.96
Stage 8	81.6	194.8	77.6
Stage 8	81.4	206.39	57.96
Stage 8	81.2	213.99	38.03
Stage 8	81	217.56	17.82
Stage 8	80.8	217.02	-2.67
Stage 8	80.6	212.35	-23.39
Stage 8	80.4	203.47	-44.38
Stage 8	80.2	190.34	-65.65
Stage 8	80	173.24	-85.52
Stage 8	79.8	152.77	-102.33
Stage 8	79.6	129.56	-116.06
Stage 8	79.4	104.23	-126.63
Stage 8	79.2	77.43	-134.02

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 8	79	49.78	-138.25
Stage 8	78.8	21.92	-139.31
Stage 8	78.6	-5.52	-137.2
Stage 8	78.4	-31.91	-131.93
Stage 8	78.2	-56.61	-123.5
Stage 8	78	-78.99	-111.9
Stage 8	77.8	-98.41	-97.14
Stage 8	77.6	-114.26	-79.22
Stage 8	77.4	-126.35	-60.47
Stage 8	77.2	-135.02	-43.36
Stage 8	77	-140.58	-27.79
Stage 8	76.8	-143.31	-13.64
Stage 8	76.6	-143.47	-0.8
Stage 8	76.4	-141.3	10.85
Stage 8	76.2	-137.01	21.45
Stage 8	76	-130.79	31.12
Stage 8	75.8	-122.98	39.02
Stage 8	75.6	-114.04	44.71
Stage 8	75.4	-104.34	48.5
Stage 8	75.2	-94.21	50.68
Stage 8	75	-83.91	51.48
Stage 8	74.8	-73.71	51.02
Stage 8	74.6	-63.81	49.48
Stage 8	74.4	-54.38	47.16
Stage 8	74.2	-45.53	44.24
Stage 8	74	-37.36	40.85
Stage 8	73.8	-29.93	37.12
Stage 8	73.6	-23.3	33.17
Stage 8	73.4	-17.48	29.08
Stage 8	73.2	-12.5	24.92
Stage 8	73	-8.35	20.73
Stage 8	72.8	-5.05	16.54
Stage 8	72.6	-2.57	12.37
Stage 8	72.4	-0.93	8.23
Stage 8	72.2	-0.1	4.11
Stage 8	72.1	0	1.03

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 9

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 9	92.3	0	33.17
Stage 9	92.1	6.63	33.17
Stage 9	91.9	12.76	30.62
Stage 9	91.7	18.32	27.82
Stage 9	91.5	23.19	24.33
Stage 9	91.3	27.21	20.13
Stage 9	91.1	30.26	15.23
Stage 9	90.9	32.19	9.67
Stage 9	90.7	32.89	3.48
Stage 9	90.5	32.23	-3.29
Stage 9	90.3	30.12	-10.55
Stage 9	90.1	26.48	-18.19
Stage 9	89.9	21.26	-26.11
Stage 9	89.7	14.39	-34.36
Stage 9	89.5	5.84	-42.76
Stage 9	89.3	-4.42	-51.31
Stage 9	89.1	-16.54	-60.57
Stage 9	88.9	-30.64	-70.5
Stage 9	88.7	-46.84	-81.04
Stage 9	88.5	-65.28	-92.16
Stage 9	88.3	-86.01	-103.64
Stage 9	88.1	-64.45	107.79
Stage 9	87.9	-45.37	95.42
Stage 9	87.7	-28.83	82.71
Stage 9	87.5	-14.88	69.75
Stage 9	87.3	-3.55	56.64
Stage 9	87.1	5.17	43.62
Stage 9	86.9	11.31	30.69
Stage 9	86.7	14.77	17.31
Stage 9	86.5	15.46	3.44
Stage 9	86.3	13.28	-10.89
Stage 9	86.1	8.17	-25.56
Stage 9	85.9	0.04	-40.65
Stage 9	85.7	-11.19	-56.12
Stage 9	85.5	-25.57	-71.94
Stage 9	85.3	-43.19	-88.06
Stage 9	85.1	-15.29	139.51
Stage 9	84.9	9.32	123.04
Stage 9	84.7	30.61	106.46
Stage 9	84.5	48.58	89.85
Stage 9	84.3	63.24	73.31
Stage 9	84.1	74.49	56.25
Stage 9	83.9	82.23	38.67
Stage 9	83.7	86.32	20.46
Stage 9	83.5	86.64	1.6
Stage 9	83.3	83.05	-17.95
Stage 9	83.1	75.41	-38.22
Stage 9	82.9	63.56	-59.22
Stage 9	82.8	56.01	-75.5
Stage 9	82.6	84.26	141.25
Stage 9	82.4	107.93	118.37
Stage 9	82.2	126.87	94.69
Stage 9	82	140.91	70.22
Stage 9	81.8	149.91	44.98
Stage 9	81.6	153.8	19.46
Stage 9	81.4	152.5	-6.49
Stage 9	81.2	145.93	-32.88
Stage 9	81	133.99	-59.67
Stage 9	80.8	116.63	-86.79
Stage 9	80.6	131.39	73.81
Stage 9	80.4	140.65	46.28
Stage 9	80.2	144.37	18.61
Stage 9	80	142.56	-9.03
Stage 9	79.8	135.27	-36.44
Stage 9	79.6	123.02	-61.27
Stage 9	79.4	106.6	-82.11
Stage 9	79.2	86.85	-98.73

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 9	79	64.63	-111.11
Stage 9	78.8	40.77	-119.29
Stage 9	78.6	16.11	-123.32
Stage 9	78.4	-8.54	-123.26
Stage 9	78.2	-32.37	-119.17
Stage 9	78	-54.6	-111.13
Stage 9	77.8	-74.44	-99.22
Stage 9	77.6	-91.15	-83.52
Stage 9	77.4	-104.43	-66.42
Stage 9	77.2	-114.53	-50.48
Stage 9	77	-121.66	-35.66
Stage 9	76.8	-126.04	-21.91
Stage 9	76.6	-127.88	-9.18
Stage 9	76.4	-127.37	2.52
Stage 9	76.2	-124.73	13.22
Stage 9	76	-120.13	23.03
Stage 9	75.8	-113.84	31.41
Stage 9	75.6	-106.32	37.64
Stage 9	75.4	-97.92	42.01
Stage 9	75.2	-88.96	44.78
Stage 9	75	-79.72	46.18
Stage 9	74.8	-70.44	46.43
Stage 9	74.6	-61.32	45.57
Stage 9	74.4	-52.54	43.9
Stage 9	74.2	-44.23	41.58
Stage 9	74	-36.48	38.74
Stage 9	73.8	-29.38	35.49
Stage 9	73.6	-22.99	31.97
Stage 9	73.4	-17.34	28.25
Stage 9	73.2	-12.46	24.4
Stage 9	73	-8.37	20.45
Stage 9	72.8	-5.08	16.44
Stage 9	72.6	-2.6	12.39
Stage 9	72.4	-0.94	8.3
Stage 9	72.2	-0.1	4.18
Stage 9	72.1	0	1.05

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 10

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 10	92.3	0	33.32
Stage 10	92.1	6.66	33.32
Stage 10	91.9	12.82	30.78
Stage 10	91.7	18.42	27.99
Stage 10	91.5	23.32	24.51
Stage 10	91.3	27.38	20.32
Stage 10	91.1	30.47	15.44
Stage 10	90.9	32.45	9.89
Stage 10	90.7	33.19	3.71
Stage 10	90.5	32.59	-3.04
Stage 10	90.3	30.53	-10.28
Stage 10	90.1	26.95	-17.91
Stage 10	89.9	21.78	-25.82
Stage 10	89.7	14.97	-34.06
Stage 10	89.5	6.48	-42.46
Stage 10	89.3	-3.72	-51.01
Stage 10	89.1	-15.78	-60.28
Stage 10	88.9	-29.82	-70.21
Stage 10	88.7	-45.97	-80.77
Stage 10	88.5	-64.36	-91.92
Stage 10	88.3	-85.05	-103.45
Stage 10	88.1	-63.5	107.79
Stage 10	87.9	-44.42	95.36
Stage 10	87.7	-27.91	82.56
Stage 10	87.5	-14.01	69.51
Stage 10	87.3	-2.75	56.28
Stage 10	87.1	5.87	43.13
Stage 10	86.9	11.88	30.04
Stage 10	86.7	15.17	16.48
Stage 10	86.5	15.66	2.41
Stage 10	86.3	13.23	-12.15
Stage 10	86.1	7.81	-27.07
Stage 10	85.9	-0.67	-42.43
Stage 10	85.7	-12.31	-58.21
Stage 10	85.5	-27.18	-74.35
Stage 10	85.3	-45.35	-90.81
Stage 10	85.1	-18.27	135.41
Stage 10	84.9	5.45	118.57
Stage 10	84.7	25.77	101.61
Stage 10	84.5	42.69	84.62
Stage 10	84.3	56.23	67.7
Stage 10	84.1	66.29	50.27
Stage 10	83.9	72.76	32.36
Stage 10	83.7	75.53	13.85
Stage 10	83.5	74.48	-5.26
Stage 10	83.3	69.48	-24.98
Stage 10	83.1	60.42	-45.32
Stage 10	82.9	47.16	-66.29
Stage 10	82.8	38.91	-82.43
Stage 10	82.6	65.96	135.26
Stage 10	82.4	88.53	112.82
Stage 10	82.2	106.48	89.79
Stage 10	82	119.72	66.21
Stage 10	81.8	128.17	42.23
Stage 10	81.6	131.81	18.19
Stage 10	81.4	130.62	-5.94
Stage 10	81.2	124.6	-30.13
Stage 10	81	113.73	-54.3
Stage 10	80.8	98.06	-78.34
Stage 10	80.6	117.46	96.99
Stage 10	80.4	132.17	73.54
Stage 10	80.2	142.26	50.48
Stage 10	80	147.84	27.88
Stage 10	79.8	149	5.82
Stage 10	79.6	145.75	-16.28
Stage 10	79.4	138.04	-38.54
Stage 10	79.2	126.18	-59.31

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 10	79	110.79	-76.92
Stage 10	78.8	92.52	-91.35
Stage 10	78.6	72	-102.62
Stage 10	78.4	49.86	-110.73
Stage 10	78.2	26.72	-115.67
Stage 10	78	3.23	-117.45
Stage 10	77.8	-19.98	-116.06
Stage 10	77.6	-42.28	-111.52
Stage 10	77.4	-63.05	-103.82
Stage 10	77.2	-81.64	-92.96
Stage 10	77	-97.42	-78.94
Stage 10	76.8	-109.78	-61.77
Stage 10	76.6	-118.73	-44.76
Stage 10	76.4	-124.57	-29.19
Stage 10	76.2	-127.56	-14.97
Stage 10	76	-127.96	-1.99
Stage 10	75.8	-125.99	9.87
Stage 10	75.6	-121.84	20.72
Stage 10	75.4	-115.72	30.63
Stage 10	75.2	-108.09	38.15
Stage 10	75	-99.38	43.56
Stage 10	74.8	-89.94	47.16
Stage 10	74.6	-80.1	49.22
Stage 10	74.4	-70.09	50.05
Stage 10	74.2	-60.16	49.66
Stage 10	74	-50.53	48.14
Stage 10	73.8	-41.4	45.67
Stage 10	73.6	-32.91	42.42
Stage 10	73.4	-25.21	38.51
Stage 10	73.2	-18.39	34.09
Stage 10	73	-12.54	29.26
Stage 10	72.8	-7.72	24.07
Stage 10	72.6	-4.02	18.55
Stage 10	72.4	-1.47	12.7
Stage 10	72.2	-0.17	6.54
Stage 10	72.1	0	1.67

Risultati Elementi strutturali - A2+M2+R1

Design Assumption: A2+M2+R1 Sollecitazione Tir-A1

Stage	Forza (kN/m)
Stage 3	200
Stage 4	244.4942
Stage 5	240.0972
Stage 6	239.7945
Stage 7	240.4784
Stage 8	236.9557
Stage 9	237.7267
Stage 10	237.5808

Design Assumption: A2+M2+R1 Sollecitazione Tir-B1

Stage	Forza (kN/m)
Stage 5	200
Stage 6	265.4622
Stage 7	256.5225
Stage 8	260.0828
Stage 9	259.5949
Stage 10	258.536

Design Assumption: A2+M2+R1 Sollecitazione Tir-C1

Stage	Forza (kN/m)
Stage 7	200
Stage 8	261.1932
Stage 9	248.2863
Stage 10	249.0919

Design Assumption: A2+M2+R1 Sollecitazione Cavalletto

Stage	Forza (kN/m)
Stage 1	-7.0477694E-16
Stage 2	107.6618
Stage 3	123.5359
Stage 4	66.69888
Stage 5	73.69716
Stage 6	65.74465
Stage 7	66.15041
Stage 8	69.46672
Stage 9	68.70378
Stage 10	68.99461

Design Assumption: A2+M2+R1 Sollecitazione Tir-D1

Stage	Forza (kN/m)
Stage 9	200
Stage 10	211.9039

Allegati

Design Assumption : Nominal - File di Paratie - File di input (.d)

```
* PARATIE ANALYSIS FOR DESIGN SECTION:Base Design Section USING ASSUMPTION: Nominal
* Time:martedì 22 gennaio 2019 13:17:09
* 1: Defining general settings
UNIT m kN
TITLE PARATIA PK. 4+834 V_3
DELTA 0.2
option param itemax 40
option control hinges 0 0.0001 0.001

* 2: Defining wall(s)
WALL LeftWall_32 0 72.1 92.3 1

* 3: Defining surfaces for wall(s)
SOIL 0_L LeftWall_32 72.1 92.3 1 0
SOIL 0_R LeftWall_32 72.1 92.3 2 180

* 4: Defining soil layers
*
* Soil Profile (Morena_2_8_L_0)
*
LDATA Morena_2_8_L_0 100 LeftWall_32
ATREST 0.441 1 1
WEIGHT 20 11 10
PERMEABILITY 0.001
RESISTANCE 0 34 0 0 0
YOUNG 2.1E+04 3.36E+04
ENDL

* 5: Defining structural materials
* Rebar material: 124 Name=acciaio armonico E=195000000 kPa
MATERIAL acciaioarmonico_124 1.95E+08
* Concrete material: 106 Name=C32/40 E=33345800 kPa
MATERIAL C3240_106 3.335E+07
* Steel material: 114 Name=S355 E=210000000 kPa
MATERIAL S355_114 2.1E+08
* Rebar material: 456061 Name=S355H E=210000000 kPa
MATERIAL S355H_456061 2.1E+08

* 6: Defining structural elements
* 6.1: Beams and combined Wall Elements
BEAM Berlinese_67970 LeftWall_32 72.1 92.3 S355_114 0.1053 00 00 0

* 6.2: Supports
WIRE Tir-A1_425 LeftWall_32 88.3 acciaioarmonico_124 1.275E-05 200 20 0 0
WIRE Tir-B1_535 LeftWall_32 85.3 acciaioarmonico_124 1.349E-05 200 20 0 0
WIRE Tir-C1_635 LeftWall_32 82.8 acciaioarmonico_124 1.433E-05 200 20 0 0
WIRE Cavalletto_456060 LeftWall_32 92.3 S355H_456061 0.0002928 0 60 0 0
WIRE Tir-D1_492899 LeftWall_32 80.8 acciaioarmonico_124 1.527E-05 200 20 0 0

* 6.3: Strips
STRIP LeftWall_32 1 10 2 11 92.7 200 45

* 7: Defining Steps
STEP Stage1_31
CHANGE Morena_2_8_L_0 U-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 D-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 U-KA=0.234 LeftWall_32
CHANGE Morena_2_8_L_0 U-KP=6.072 LeftWall_32
CHANGE Morena_2_8_L_0 D-KA=0.234 LeftWall_32
CHANGE Morena_2_8_L_0 D-KP=4.293 LeftWall_32
CHANGE Morena_2_8_L_0 U-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 U-ADHES=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-ADHES=0 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 92.7
WATER 0 0 72.1 0 0
ADD Berlinese_67970 Cavalletto_456060
ENDSTEP

STEP Stage2_492901
CHANGE Morena_2_8_L_0 D-KP=6.016 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 87.8
WATER 0 0 72.1 0 0
ENDSTEP

STEP Stage3_516692
CHANGE Morena_2_8_L_0 D-KP=6.027 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 87.8
```

WATER 0 0 72.1 0 0
 ADD Tir-A1_425
 ENDSTEP

STEP Stage4_493433
 CHANGE Morena_2_8_L_0 D-KP=6.072 LeftWall_32
 SETWALL LeftWall_32
 GEOM 92.7 84.8
 WATER 0 0 72.1 0 0
 ENDSTEP

STEP Stage5_517050
 SETWALL LeftWall_32
 GEOM 92.7 84.8
 WATER 0 0 72.1 0 0
 ADD Tir-B1_535
 ENDSTEP

STEP Stage6_493617
 SETWALL LeftWall_32
 GEOM 92.7 82.3
 WATER 0 0 72.1 0 0
 ENDSTEP

STEP Stage7_517408
 SETWALL LeftWall_32
 GEOM 92.7 82.2
 WATER 0 0 72.1 0 0
 ADD Tir-C1_635
 ENDSTEP

STEP Stage8_534542
 SETWALL LeftWall_32
 GEOM 92.7 80.3
 WATER 0 0 72.1 0 0
 ENDSTEP

STEP Stage9_540469
 SETWALL LeftWall_32
 GEOM 92.7 80.3
 WATER 0 0 72.1 0 0
 ADD Tir-D1_492899
 ENDSTEP

STEP Stage10_593782
 SETWALL LeftWall_32
 GEOM 92.7 79.5
 WATER 0 0 72.1 0 0
 ENDSTEP

Design Assumption : SLE (Rara) - File di Paratie - File di input (.d)

```
* PARATIE ANALYSIS FOR DESIGN SECTION:Base Design Section USING ASSUMPTION: SLE (Rara)
* Time:martedì 22 gennaio 2019 13:17:12
* 1: Defining general settings
UNIT m kN
TITLE PARATIA PK. 4+834 V_3
DELTA 0.2
option param itemax 40
option control hinges 0 0.0001 0.001

* 2: Defining wall(s)
WALL LeftWall_32 0 72.1 92.3 1

* 3: Defining surfaces for wall(s)
SOIL 0_L LeftWall_32 72.1 92.3 1 0
SOIL 0_R LeftWall_32 72.1 92.3 2 180

* 4: Defining soil layers
*
* Soil Profile (Morena_2_8_L_0)
*
LDATA Morena_2_8_L_0 100 LeftWall_32
ATREST 0.441 1 1
WEIGHT 20 11 10
PERMEABILITY 0.001
RESISTANCE 0 34 0 0 0
YOUNG 2.1E+04 3.36E+04
ENDDL

* 5: Defining structural materials
* Rebar material: 124 Name=acciaio armonico E=195000000 kPa
MATERIAL acciaioarmonico_124 1.95E+08
* Concrete material: 106 Name=C32/40 E=33345800 kPa
MATERIAL C3240_106 3.335E+07
* Steel material: 114 Name=S355 E=210000000 kPa
MATERIAL S355_114 2.1E+08
* Rebar material: 456061 Name=S355H E=210000000 kPa
MATERIAL S355H_456061 2.1E+08

* 6: Defining structural elements
* 6.1: Beams and combined Wall Elements
BEAM Berlinese_67970 LeftWall_32 72.1 92.3 S355_114 0.1053 00 00 0

* 6.2: Supports
WIRE Tir-A1_425 LeftWall_32 88.3 acciaioarmonico_124 1.275E-05 200 20 0 0
WIRE Tir-B1_535 LeftWall_32 85.3 acciaioarmonico_124 1.349E-05 200 20 0 0
WIRE Tir-C1_635 LeftWall_32 82.8 acciaioarmonico_124 1.433E-05 200 20 0 0
WIRE Cavalletto_456060 LeftWall_32 92.3 S355H_456061 0.0002928 0 60 0 0
WIRE Tir-D1_492899 LeftWall_32 80.8 acciaioarmonico_124 1.527E-05 200 20 0 0

* 6.3: Strips
STRIP LeftWall_32 1 10 2 11 92.7 200 45

* 7: Defining Steps
STEP Stage1_31
CHANGE Morena_2_8_L_0 U-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 D-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 U-KA=0.234 LeftWall_32
CHANGE Morena_2_8_L_0 U-KP=6.072 LeftWall_32
CHANGE Morena_2_8_L_0 D-KA=0.234 LeftWall_32
CHANGE Morena_2_8_L_0 D-KP=4.293 LeftWall_32
CHANGE Morena_2_8_L_0 U-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 U-ADHES=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-ADHES=0 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 92.7
WATER 0 0 72.1 0 0
ADD Berlinese_67970 Cavalletto_456060
ENDSTEP

STEP Stage2_492901
CHANGE Morena_2_8_L_0 D-KP=6.016 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 87.8
WATER 0 0 72.1 0 0
ENDSTEP

STEP Stage3_516692
CHANGE Morena_2_8_L_0 D-KP=6.027 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 87.8
WATER 0 0 72.1 0 0
ADD Tir-A1_425
ENDSTEP
```

```
STEP Stage4_493433
CHANGE Morena_2_8_L_0 D-KP=6.072 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 84.8
WATER 0 0 72.1 0 0
ENDSTEP
```

```
STEP Stage5_517050
SETWALL LeftWall_32
GEOM 92.7 84.8
WATER 0 0 72.1 0 0
ADD Tir-B1_535
ENDSTEP
```

```
STEP Stage6_493617
SETWALL LeftWall_32
GEOM 92.7 82.3
WATER 0 0 72.1 0 0
ENDSTEP
```

```
STEP Stage7_517408
SETWALL LeftWall_32
GEOM 92.7 82.2
WATER 0 0 72.1 0 0
ADD Tir-C1_635
ENDSTEP
```

```
STEP Stage8_534542
SETWALL LeftWall_32
GEOM 92.7 80.3
WATER 0 0 72.1 0 0
ENDSTEP
```

```
STEP Stage9_540469
SETWALL LeftWall_32
GEOM 92.7 80.3
WATER 0 0 72.1 0 0
ADD Tir-D1_492899
ENDSTEP
```

```
STEP Stage10_593782
SETWALL LeftWall_32
GEOM 92.7 79.5
WATER 0 0 72.1 0 0
ENDSTEP
```

Design Assumption : A1+M1+R1 - File di Paratie - File di input (.d)

```
* PARATIE ANALYSIS FOR DESIGN SECTION:Base Design Section USING ASSUMPTION: A1+M1+R1
* Time:martedì 22 gennaio 2019 13:17:15
* 1: Defining general settings
UNIT m kN
TITLE PARATIA PK. 4+834 V_3
DELTA 0.2
option param itemax 40
option control hinges 0 0.0001 0.001

* 2: Defining wall(s)
WALL LeftWall_32 0 72.1 92.3 1

* 3: Defining surfaces for wall(s)
SOIL 0_L LeftWall_32 72.1 92.3 1 0
SOIL 0_R LeftWall_32 72.1 92.3 2 180

* 4: Defining soil layers
*
* Soil Profile (Morena_2_8_L_0)
*
LDATA Morena_2_8_L_0 100 LeftWall_32
ATREST 0.441 1 1
WEIGHT 20 11 10
PERMEABILITY 0.001
RESISTANCE 0 34 0 0 0
YOUNG 2.1E+04 3.36E+04
ENDDL

* 5: Defining structural materials
* Rebar material: 124 Name=acciaio armonico E=195000000 kPa
MATERIAL acciaioarmonico_124 1.95E+08
* Concrete material: 106 Name=C32/40 E=33345800 kPa
MATERIAL C3240_106 3.335E+07
* Steel material: 114 Name=S355 E=210000000 kPa
MATERIAL S355_114 2.1E+08
* Rebar material: 456061 Name=S355H E=210000000 kPa
MATERIAL S355H_456061 2.1E+08

* 6: Defining structural elements
* 6.1: Beams and combined Wall Elements
BEAM Berlinese_67970 LeftWall_32 72.1 92.3 S355_114 0.1053 00 00 0

* 6.2: Supports
WIRE Tir-A1_425 LeftWall_32 88.3 acciaioarmonico_124 1.275E-05 200 20 0 0
WIRE Tir-B1_535 LeftWall_32 85.3 acciaioarmonico_124 1.349E-05 200 20 0 0
WIRE Tir-C1_635 LeftWall_32 82.8 acciaioarmonico_124 1.433E-05 200 20 0 0
WIRE Cavalletto_456060 LeftWall_32 92.3 S355H_456061 0.0002928 0 60 0 0
WIRE Tir-D1_492899 LeftWall_32 80.8 acciaioarmonico_124 1.527E-05 200 20 0 0

* 6.3: Strips
STRIP LeftWall_32 1 10 2 11 92.7 200 45

* 7: Defining Steps
STEP Stage1_31
CHANGE Morena_2_8_L_0 U-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 D-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 U-KA=0.234 LeftWall_32
CHANGE Morena_2_8_L_0 U-KP=6.072 LeftWall_32
CHANGE Morena_2_8_L_0 D-KA=0.234 LeftWall_32
CHANGE Morena_2_8_L_0 D-KP=4.293 LeftWall_32
CHANGE Morena_2_8_L_0 U-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 U-ADHES=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-ADHES=0 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 92.7
WATER 0 0 72.1 0 0
ADD Berlinese_67970 Cavalletto_456060
ENDSTEP

STEP Stage2_492901
CHANGE Morena_2_8_L_0 D-KP=6.016 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 87.8
WATER 0 0 72.1 0 0
ENDSTEP

STEP Stage3_516692
CHANGE Morena_2_8_L_0 D-KP=6.027 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 87.8
WATER 0 0 72.1 0 0
ADD Tir-A1_425
ENDSTEP
```

STEP Stage4_493433
 CHANGE Morena_2_8_L_0 D-KP=6.072 LeftWall_32
 SETWALL LeftWall_32
 GEOM 92.7 84.8
 WATER 0 0 72.1 0 0
 ENDSTEP

STEP Stage5_517050
 SETWALL LeftWall_32
 GEOM 92.7 84.8
 WATER 0 0 72.1 0 0
 ADD Tir-B1_535
 ENDSTEP

STEP Stage6_493617
 SETWALL LeftWall_32
 GEOM 92.7 82.3
 WATER 0 0 72.1 0 0
 ENDSTEP

STEP Stage7_517408
 SETWALL LeftWall_32
 GEOM 92.7 82.2
 WATER 0 0 72.1 0 0
 ADD Tir-C1_635
 ENDSTEP

STEP Stage8_534542
 SETWALL LeftWall_32
 GEOM 92.7 80.3
 WATER 0 0 72.1 0 0
 ENDSTEP

STEP Stage9_540469
 SETWALL LeftWall_32
 GEOM 92.7 80.3
 WATER 0 0 72.1 0 0
 ADD Tir-D1_492899
 ENDSTEP

STEP Stage10_593782
 SETWALL LeftWall_32
 GEOM 92.7 79.5
 WATER 0 0 72.1 0 0
 ENDSTEP

Design Assumption : A2+M2+R1 - File di Paratie - File di input (.d)

```
* PARATIE ANALYSIS FOR DESIGN SECTION:Base Design Section USING ASSUMPTION: A2+M2+R1
* Time:martedì 22 gennaio 2019 13:17:17
* 1: Defining general settings
UNIT m kN
TITLE PARATIA PK. 4+834 V_3
DELTA 0.2
option param itemax 40
option control hinges 0 0.0001 0.001

* 2: Defining wall(s)
WALL LeftWall_32 0 72.1 92.3 1

* 3: Defining surfaces for wall(s)
SOIL 0_L LeftWall_32 72.1 92.3 1 0
SOIL 0_R LeftWall_32 72.1 92.3 2 180

* 4: Defining soil layers
*
* Soil Profile (Morena_2_8_L_0)
*
LDATA Morena_2_8_L_0 100 LeftWall_32
ATREST 0.441 1 1
WEIGHT 20 11 10
PERMEABILITY 0.001
RESISTANCE 0 34 0 0 0
YOUNG 2.1E+04 3.36E+04
ENDDL

* 5: Defining structural materials
* Rebar material: 124 Name=acciaio armonico E=195000000 kPa
MATERIAL acciaioarmonico_124 1.95E+08
* Concrete material: 106 Name=C32/40 E=33345800 kPa
MATERIAL C3240_106 3.335E+07
* Steel material: 114 Name=S355 E=210000000 kPa
MATERIAL S355_114 2.1E+08
* Rebar material: 456061 Name=S355H E=210000000 kPa
MATERIAL S355H_456061 2.1E+08

* 6: Defining structural elements
* 6.1: Beams and combined Wall Elements
BEAM Berlinese_67970 LeftWall_32 72.1 92.3 S355_114 0.1053 00 00 0

* 6.2: Supports
WIRE Tir-A1_425 LeftWall_32 88.3 acciaioarmonico_124 1.275E-05 200 20 0 0
WIRE Tir-B1_535 LeftWall_32 85.3 acciaioarmonico_124 1.349E-05 200 20 0 0
WIRE Tir-C1_635 LeftWall_32 82.8 acciaioarmonico_124 1.433E-05 200 20 0 0
WIRE Cavalletto_456060 LeftWall_32 92.3 S355H_456061 0.0002928 0 60 0 0
WIRE Tir-D1_492899 LeftWall_32 80.8 acciaioarmonico_124 1.527E-05 200 20 0 0

* 6.3: Strips
STRIP LeftWall_32 1 10 2 11 92.7 200 45

* 7: Defining Steps
STEP Stage1_31
CHANGE Morena_2_8_L_0 U-FRICT=28.35 LeftWall_32
CHANGE Morena_2_8_L_0 D-FRICT=28.35 LeftWall_32
CHANGE Morena_2_8_L_0 U-KA=0.3 LeftWall_32
CHANGE Morena_2_8_L_0 U-KP=4.18 LeftWall_32
CHANGE Morena_2_8_L_0 D-KA=0.3 LeftWall_32
CHANGE Morena_2_8_L_0 D-KP=3.038 LeftWall_32
CHANGE Morena_2_8_L_0 U-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 U-ADHES=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-ADHES=0 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 92.7
WATER 0 0 72.1 0 0
ADD Berlinese_67970 Cavalletto_456060
ENDSTEP

STEP Stage2_492901
CHANGE Morena_2_8_L_0 D-KP=4.145 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 87.8
WATER 0 0 72.1 0 0
ENDSTEP

STEP Stage3_516692
CHANGE Morena_2_8_L_0 D-KP=4.152 LeftWall_32
SETWALL LeftWall_32
GEOM 92.7 87.8
WATER 0 0 72.1 0 0
ADD Tir-A1_425
ENDSTEP
```

STEP Stage4_493433
 CHANGE Morena_2_8_L_0 D-KP=4.18 LeftWall_32
 SETWALL LeftWall_32
 GEOM 92.7 84.8
 WATER 0 0 72.1 0 0
 ENDSTEP

STEP Stage5_517050
 SETWALL LeftWall_32
 GEOM 92.7 84.8
 WATER 0 0 72.1 0 0
 ADD Tir-B1_535
 ENDSTEP

STEP Stage6_493617
 SETWALL LeftWall_32
 GEOM 92.7 82.3
 WATER 0 0 72.1 0 0
 ENDSTEP

STEP Stage7_517408
 SETWALL LeftWall_32
 GEOM 92.7 82.2
 WATER 0 0 72.1 0 0
 ADD Tir-C1_635
 ENDSTEP

STEP Stage8_534542
 SETWALL LeftWall_32
 GEOM 92.7 80.3
 WATER 0 0 72.1 0 0
 ENDSTEP

STEP Stage9_540469
 SETWALL LeftWall_32
 GEOM 92.7 80.3
 WATER 0 0 72.1 0 0
 ADD Tir-D1_492899
 ENDSTEP

STEP Stage10_593782
 SETWALL LeftWall_32
 GEOM 92.7 79.5
 WATER 0 0 72.1 0 0
 ENDSTEP

10.2 PARATIA DI RISVOLTO



Report di Calcolo

Nome Progetto: RISVOLTO PK. 4+853.15

Autore: Ing. Renato Vaira

Jobname: D:\Documenti_Lavori\A832 - Tirano\Paratia Pk 4799,52-4867,69\RISVOLTO PK. 4+853,15.pplus

Data: 22/01/2019 14:19:18

Design Section: Base Design Section

Descrizione della Stratigrafia e degli Strati di Terreno

Tipo : HORIZONTAL

Quota : 100 m

OCR : 1

Strato di Terreno	Terreno	γ dry	γ sat	ϕ'	ϕ	c_v	c_p	Su	Modulo	Elastico	Eu	Evc	Eur	Ah	Av	exp	Pa	Rur/Rvc	Rvc	Ku	Kvc	Kur	
		kN/m ³	kN/m ³	°	°		kPa	kPa			kPa	kPa	kPa				kPa		kPa	kN/m ³	kN/m ³	kN/m ³	
1	Morena	20	21	34			0		Constant		21000	33600											

Descrizione Pareti

X : 0 m

Quota in alto : 95.2 m

Quota di fondo : 83.2 m

Muro di sinistra

Sezione : Berlinese

Area equivalente : 0.0272 m

Inerzia equivalente : 0.0001 m⁴/m

Materiale calcestruzzo : C32/40

Tipo sezione : Tangent

Spaziatura : 0.4 m

Diametro : 0.24 m

Efficacia : 0.9

Materiale acciaio : S355

Sezione : CHS177.8*10

Tipo sezione : O

Spaziatura : 0.4 m

Spessore : 0.01 m

Diametro : 0.1778 m

Fasi di Calcolo

Stage 1

Scavo

Muro di sinistra

Lato monte : 95.8 m

Lato valle : 95.8 m

Linea di scavo di sinistra (Irregolare)

(-20;97.19)

(-17.7;97.19)

(-14.45;97.23)

(-10.08;96.9)

(0;95.8)

Linea di scavo di destra (Irregolare)

(0;95.8)

(3.2;95.4)

(4.3;95.3)

(7.3;95.1)

(10;95.1465517241379)

(15;95.1465517241379)

Elementi strutturali

Paratia : Berlinese

X : 0 m

Quota in alto : 95.2 m

Quota di fondo : 83.2 m

Sezione : Berlinese

Tirante : Cavalletto

X : 0 m

Z : 95.2 m

Lunghezza bulbo : 10 m

Diametro bulbo : 0.24 m

Lunghezza libera : 0 m

Spaziatura orizzontale : 2.4 m

Precarico : 0 kN

Angolo : 60 °

Sezione : D177.8_S10

Area : 0.00527 m²

Stage 2

Scavo

Muro di sinistra

Lato monte : 95.8 m

Lato valle : 89.7 m

Linea di scavo di sinistra (Irregolare)

(-20;97.19)

(-17.7;97.19)

(-14.45;97.23)

(-10.08;96.9)

(0;95.8)

Linea di scavo di destra (Orizzontale)

89.7 m

Elementi strutturali

Paratia : Berlinese

X : 0 m

Quota in alto : 95.2 m

Quota di fondo : 83.2 m

Sezione : Berlinese

Tirante : Cavalletto

X : 0 m

Z : 95.2 m

Lunghezza bulbo : 10 m

Diametro bulbo : 0.24 m

Lunghezza libera : 0 m

Spaziatura orizzontale : 2.4 m

Precarico : 0 kN

Angolo : 60 °

Sezione : D177.8_S10

Area : 0.00527 m²

Risultati SLE (Rara)

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 1

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 1	95.2 0
Stage 1	95 0
Stage 1	94.8 0
Stage 1	94.6 0
Stage 1	94.4 0
Stage 1	94.2 0
Stage 1	94 0
Stage 1	93.8 0
Stage 1	93.6 0
Stage 1	93.4 0
Stage 1	93.2 0
Stage 1	93 0
Stage 1	92.8 0
Stage 1	92.6 0
Stage 1	92.4 0
Stage 1	92.2 0
Stage 1	92 0
Stage 1	91.8 0
Stage 1	91.6 0
Stage 1	91.4 0
Stage 1	91.2 0
Stage 1	91 0
Stage 1	90.8 0
Stage 1	90.6 0
Stage 1	90.4 0
Stage 1	90.2 0
Stage 1	90 0
Stage 1	89.8 0
Stage 1	89.6 0
Stage 1	89.4 0
Stage 1	89.2 0
Stage 1	89 0
Stage 1	88.8 0
Stage 1	88.6 0
Stage 1	88.4 0
Stage 1	88.2 0
Stage 1	88 0
Stage 1	87.8 0
Stage 1	87.6 0
Stage 1	87.4 0
Stage 1	87.2 0
Stage 1	87 0
Stage 1	86.8 0
Stage 1	86.6 0
Stage 1	86.4 0
Stage 1	86.2 0
Stage 1	86 0
Stage 1	85.8 0
Stage 1	85.6 0
Stage 1	85.4 0
Stage 1	85.2 0
Stage 1	85 0
Stage 1	84.8 0
Stage 1	84.6 0
Stage 1	84.4 0
Stage 1	84.2 0
Stage 1	84 0
Stage 1	83.8 0
Stage 1	83.6 0
Stage 1	83.4 0
Stage 1	83.2 0

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 1

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 1	95.2	0	0
Stage 1	95	0	0
Stage 1	94.8	0	0
Stage 1	94.6	0	0
Stage 1	94.4	0	0
Stage 1	94.2	0	0
Stage 1	94	0	0
Stage 1	93.8	0	0
Stage 1	93.6	0	0
Stage 1	93.4	0	0
Stage 1	93.2	0	0
Stage 1	93	0	0
Stage 1	92.8	0	0
Stage 1	92.6	0	0
Stage 1	92.4	0	0
Stage 1	92.2	0	0
Stage 1	92	0	0
Stage 1	91.8	0	0
Stage 1	91.6	0	0
Stage 1	91.4	0	0
Stage 1	91.2	0	0
Stage 1	91	0	0
Stage 1	90.8	0	0
Stage 1	90.6	0	0
Stage 1	90.4	0	0
Stage 1	90.2	0	0
Stage 1	90	0	0
Stage 1	89.8	0	0
Stage 1	89.6	0	0
Stage 1	89.4	0	0
Stage 1	89.2	0	0
Stage 1	89	0	0
Stage 1	88.8	0	0
Stage 1	88.6	0	0
Stage 1	88.4	0	0
Stage 1	88.2	0	0
Stage 1	88	0	0
Stage 1	87.8	0	0
Stage 1	87.6	0	0
Stage 1	87.4	0	0
Stage 1	87.2	0	0
Stage 1	87	0	0
Stage 1	86.8	0	0
Stage 1	86.6	0	0
Stage 1	86.4	0	0
Stage 1	86.2	0	0
Stage 1	86	0	0
Stage 1	85.8	0	0
Stage 1	85.6	0	0
Stage 1	85.4	0	0
Stage 1	85.2	0	0
Stage 1	85	0	0
Stage 1	84.8	0	0
Stage 1	84.6	0	0
Stage 1	84.4	0	0
Stage 1	84.2	0	0
Stage 1	84	0	0
Stage 1	83.8	0	0
Stage 1	83.6	0	0
Stage 1	83.4	0	0
Stage 1	83.2	0	0

Tabella Spostamento SLE (Rara) - LEFT Stage: Stage 2

Design Assumption: SLE (Rara) Tipo Risultato: Spostamento	Muro: LEFT
Stage	Z (m) Spostamento (mm)
Stage 2	95.2 1.62
Stage 2	95 3.27
Stage 2	94.8 4.91
Stage 2	94.6 6.52
Stage 2	94.4 8.09
Stage 2	94.2 9.61
Stage 2	94 11.05
Stage 2	93.8 12.42
Stage 2	93.6 13.69
Stage 2	93.4 14.86
Stage 2	93.2 15.92
Stage 2	93 16.86
Stage 2	92.8 17.67
Stage 2	92.6 18.35
Stage 2	92.4 18.88
Stage 2	92.2 19.27
Stage 2	92 19.51
Stage 2	91.8 19.6
Stage 2	91.6 19.55
Stage 2	91.4 19.34
Stage 2	91.2 18.99
Stage 2	91 18.51
Stage 2	90.8 17.89
Stage 2	90.6 17.14
Stage 2	90.4 16.29
Stage 2	90.2 15.33
Stage 2	90 14.29
Stage 2	89.8 13.18
Stage 2	89.6 12.02
Stage 2	89.4 10.84
Stage 2	89.2 9.65
Stage 2	89 8.48
Stage 2	88.8 7.35
Stage 2	88.6 6.27
Stage 2	88.4 5.27
Stage 2	88.2 4.34
Stage 2	88 3.5
Stage 2	87.8 2.75
Stage 2	87.6 2.08
Stage 2	87.4 1.5
Stage 2	87.2 1.01
Stage 2	87 0.59
Stage 2	86.8 0.24
Stage 2	86.6 -0.04
Stage 2	86.4 -0.26
Stage 2	86.2 -0.44
Stage 2	86 -0.56
Stage 2	85.8 -0.65
Stage 2	85.6 -0.71
Stage 2	85.4 -0.73
Stage 2	85.2 -0.74
Stage 2	85 -0.73
Stage 2	84.8 -0.7
Stage 2	84.6 -0.67
Stage 2	84.4 -0.62
Stage 2	84.2 -0.57
Stage 2	84 -0.52
Stage 2	83.8 -0.47
Stage 2	83.6 -0.41
Stage 2	83.4 -0.35
Stage 2	83.2 -0.3

Tabella Risultati Paratia SLE (Rara) - Left Wall - Stage: Stage 2

Design Assumption: SLE (Rara) Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 2	95.2	0	36.96
Stage 2	95	7.39	36.96
Stage 2	94.8	14.62	36.15
Stage 2	94.6	21.65	35.14
Stage 2	94.4	28.44	33.93
Stage 2	94.2	34.94	32.52
Stage 2	94	41.12	30.91
Stage 2	93.8	46.94	29.09
Stage 2	93.6	52.36	27.08
Stage 2	93.4	57.33	24.86
Stage 2	93.2	61.82	22.44
Stage 2	93	65.78	19.82
Stage 2	92.8	69.18	17
Stage 2	92.6	71.98	13.97
Stage 2	92.4	74.13	10.75
Stage 2	92.2	75.59	7.32
Stage 2	92	76.33	3.69
Stage 2	91.8	76.3	-0.14
Stage 2	91.6	75.47	-4.17
Stage 2	91.4	73.79	-8.4
Stage 2	91.2	71.22	-12.84
Stage 2	91	67.72	-17.47
Stage 2	90.8	63.26	-22.31
Stage 2	90.6	57.79	-27.35
Stage 2	90.4	51.27	-32.59
Stage 2	90.2	43.66	-38.04
Stage 2	90	34.93	-43.68
Stage 2	89.8	25.02	-49.53
Stage 2	89.6	13.91	-55.58
Stage 2	89.4	2.03	-59.4
Stage 2	89.2	-9.68	-58.57
Stage 2	89	-20.3	-53.08
Stage 2	88.8	-28.92	-43.12
Stage 2	88.6	-35.66	-33.66
Stage 2	88.4	-40.59	-24.65
Stage 2	88.2	-43.8	-16.07
Stage 2	88	-45.37	-7.86
Stage 2	87.8	-45.44	-0.34
Stage 2	87.6	-44.33	5.55
Stage 2	87.4	-42.33	10.02
Stage 2	87.2	-39.68	13.24
Stage 2	87	-36.6	15.4
Stage 2	86.8	-33.26	16.67
Stage 2	86.6	-29.81	17.29
Stage 2	86.4	-26.33	17.39
Stage 2	86.2	-22.92	17.02
Stage 2	86	-19.67	16.26
Stage 2	85.8	-16.62	15.23
Stage 2	85.6	-13.83	14
Stage 2	85.4	-11.29	12.66
Stage 2	85.2	-9.04	11.26
Stage 2	85	-7.07	9.86
Stage 2	84.8	-5.37	8.48
Stage 2	84.6	-3.95	7.14
Stage 2	84.4	-2.77	5.87
Stage 2	84.2	-1.83	4.69
Stage 2	84	-1.11	3.6
Stage 2	83.8	-0.59	2.61
Stage 2	83.6	-0.25	1.73
Stage 2	83.4	-0.06	0.95
Stage 2	83.2	0	0.28

Risultati Elementi strutturali - SLE (Rara)

Design Assumption: SLE (Rara) Sollecitazione Cavalletto

Stage	Forza (kN/m)
Stage 1	0
Stage 2	74.51848

Risultati A1+M1+R1

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 1

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 1	95.2	0	0
Stage 1	95	0	0
Stage 1	94.8	0	0
Stage 1	94.6	0	0
Stage 1	94.4	0	0
Stage 1	94.2	0	0
Stage 1	94	0	0
Stage 1	93.8	0	0
Stage 1	93.6	0	0
Stage 1	93.4	0	0
Stage 1	93.2	0	0
Stage 1	93	0	0
Stage 1	92.8	0	0
Stage 1	92.6	0	0
Stage 1	92.4	0	0
Stage 1	92.2	0	0
Stage 1	92	0	0
Stage 1	91.8	0	0
Stage 1	91.6	0	0
Stage 1	91.4	0	0
Stage 1	91.2	0	0
Stage 1	91	0	0
Stage 1	90.8	0	0
Stage 1	90.6	0	0
Stage 1	90.4	0	0
Stage 1	90.2	0	0
Stage 1	90	0	0
Stage 1	89.8	0	0
Stage 1	89.6	0	0
Stage 1	89.4	0	0
Stage 1	89.2	0	0
Stage 1	89	0	0
Stage 1	88.8	0	0
Stage 1	88.6	0	0
Stage 1	88.4	0	0
Stage 1	88.2	0	0
Stage 1	88	0	0
Stage 1	87.8	0	0
Stage 1	87.6	0	0
Stage 1	87.4	0	0
Stage 1	87.2	0	0
Stage 1	87	0	0
Stage 1	86.8	0	0
Stage 1	86.6	0	0
Stage 1	86.4	0	0
Stage 1	86.2	0	0
Stage 1	86	0	0
Stage 1	85.8	0	0
Stage 1	85.6	0	0
Stage 1	85.4	0	0
Stage 1	85.2	0	0
Stage 1	85	0	0
Stage 1	84.8	0	0
Stage 1	84.6	0	0
Stage 1	84.4	0	0
Stage 1	84.2	0	0
Stage 1	84	0	0
Stage 1	83.8	0	0
Stage 1	83.6	0	0
Stage 1	83.4	0	0
Stage 1	83.2	0	0

Tabella Risultati Paratia A1+M1+R1 - Left Wall - Stage: Stage 2

Design Assumption: A1+M1+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 2	95.2	0	48.04
Stage 2	95	9.61	48.04
Stage 2	94.8	19.01	47
Stage 2	94.6	28.14	45.69
Stage 2	94.4	36.97	44.11
Stage 2	94.2	45.42	42.28
Stage 2	94	53.46	40.18
Stage 2	93.8	61.02	37.82
Stage 2	93.6	68.06	35.2
Stage 2	93.4	74.53	32.32
Stage 2	93.2	80.36	29.17
Stage 2	93	85.52	25.77
Stage 2	92.8	89.94	22.1
Stage 2	92.6	93.57	18.17
Stage 2	92.4	96.36	13.97
Stage 2	92.2	98.27	9.52
Stage 2	92	99.23	4.8
Stage 2	91.8	99.19	-0.18
Stage 2	91.6	98.11	-5.42
Stage 2	91.4	95.92	-10.92
Stage 2	91.2	92.58	-16.69
Stage 2	91	88.04	-22.72
Stage 2	90.8	82.24	-29.01
Stage 2	90.6	75.13	-35.56
Stage 2	90.4	66.65	-42.37
Stage 2	90.2	56.76	-49.45
Stage 2	90	45.41	-56.79
Stage 2	89.8	32.53	-64.39
Stage 2	89.6	18.08	-72.25
Stage 2	89.4	2.64	-77.22
Stage 2	89.2	-12.59	-76.14
Stage 2	89	-26.39	-69
Stage 2	88.8	-37.6	-56.06
Stage 2	88.6	-46.35	-43.75
Stage 2	88.4	-52.76	-32.05
Stage 2	88.2	-56.94	-20.89
Stage 2	88	-58.98	-10.22
Stage 2	87.8	-59.07	-0.45
Stage 2	87.6	-57.63	7.22
Stage 2	87.4	-55.02	13.02
Stage 2	87.2	-51.58	17.22
Stage 2	87	-47.58	20.03
Stage 2	86.8	-43.24	21.67
Stage 2	86.6	-38.75	22.48
Stage 2	86.4	-34.22	22.61
Stage 2	86.2	-29.8	22.12
Stage 2	86	-25.57	21.14
Stage 2	85.8	-21.61	19.8
Stage 2	85.6	-17.97	18.19
Stage 2	85.4	-14.68	16.45
Stage 2	85.2	-11.75	14.64
Stage 2	85	-9.19	12.82
Stage 2	84.8	-6.99	11.02
Stage 2	84.6	-5.13	9.28
Stage 2	84.4	-3.6	7.64
Stage 2	84.2	-2.38	6.1
Stage 2	84	-1.45	4.68
Stage 2	83.8	-0.77	3.4
Stage 2	83.6	-0.32	2.25
Stage 2	83.4	-0.07	1.24
Stage 2	83.2	0	0.36

Risultati Elementi strutturali - A1+M1+R1

Design Assumption: A1+M1+R1 Sollecitazione Cavalletto

Stage	Forza (kN/m)
Stage 1	0
Stage 2	96.874024

Risultati A2+M2+R1

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 1

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 1	95.2	0	0
Stage 1	95	0	0
Stage 1	94.8	0	0
Stage 1	94.6	0	0
Stage 1	94.4	0	0
Stage 1	94.2	0	0
Stage 1	94	0	0
Stage 1	93.8	0	0
Stage 1	93.6	0	0
Stage 1	93.4	0	0
Stage 1	93.2	0	0
Stage 1	93	0	0
Stage 1	92.8	0	0
Stage 1	92.6	0	0
Stage 1	92.4	0	0
Stage 1	92.2	0	0
Stage 1	92	0	0
Stage 1	91.8	0	0
Stage 1	91.6	0	0
Stage 1	91.4	0	0
Stage 1	91.2	0	0
Stage 1	91	0	0
Stage 1	90.8	0	0
Stage 1	90.6	0	0
Stage 1	90.4	0	0
Stage 1	90.2	0	0
Stage 1	90	0	0
Stage 1	89.8	0	0
Stage 1	89.6	0	0
Stage 1	89.4	0	0
Stage 1	89.2	0	0
Stage 1	89	0	0
Stage 1	88.8	0	0
Stage 1	88.6	0	0
Stage 1	88.4	0	0
Stage 1	88.2	0	0
Stage 1	88	0	0
Stage 1	87.8	0	0
Stage 1	87.6	0	0
Stage 1	87.4	0	0
Stage 1	87.2	0	0
Stage 1	87	0	0
Stage 1	86.8	0	0
Stage 1	86.6	0	0
Stage 1	86.4	0	0
Stage 1	86.2	0	0
Stage 1	86	0	0
Stage 1	85.8	0	0
Stage 1	85.6	0	0
Stage 1	85.4	0	0
Stage 1	85.2	0	0
Stage 1	85	0	0
Stage 1	84.8	0	0
Stage 1	84.6	0	0
Stage 1	84.4	0	0
Stage 1	84.2	0	0
Stage 1	84	0	0
Stage 1	83.8	0	0
Stage 1	83.6	0	0
Stage 1	83.4	0	0
Stage 1	83.2	0	0

Tabella Risultati Paratia A2+M2+R1 - Left Wall - Stage: Stage 2

Design Assumption: A2+M2+R1 Risultati Paratia		Muro: LEFT	
Stage	Z (m)	Momento (kN*m/m)	Taglio (kN/m)
Stage 2	95.2	0	52.79
Stage 2	95	10.56	52.79
Stage 2	94.8	20.91	51.75
Stage 2	94.6	31	50.45
Stage 2	94.4	40.77	48.89
Stage 2	94.2	50.19	47.07
Stage 2	94	59.18	44.99
Stage 2	93.8	67.71	42.65
Stage 2	93.6	75.72	40.05
Stage 2	93.4	83.16	37.19
Stage 2	93.2	89.97	34.07
Stage 2	93	96.11	30.69
Stage 2	92.8	101.52	27.05
Stage 2	92.6	106.15	23.15
Stage 2	92.4	109.95	18.99
Stage 2	92.2	112.86	14.57
Stage 2	92	114.84	9.89
Stage 2	91.8	115.83	4.95
Stage 2	91.6	115.78	-0.25
Stage 2	91.4	114.63	-5.71
Stage 2	91.2	112.35	-11.43
Stage 2	91	108.86	-17.41
Stage 2	90.8	104.13	-23.65
Stage 2	90.6	98.1	-30.15
Stage 2	90.4	90.72	-36.91
Stage 2	90.2	81.93	-43.93
Stage 2	90	71.69	-51.21
Stage 2	89.8	59.94	-58.75
Stage 2	89.6	46.63	-66.55
Stage 2	89.4	32.04	-72.94
Stage 2	89.2	16.79	-76.25
Stage 2	89	1.5	-76.47
Stage 2	88.8	-13.22	-73.61
Stage 2	88.6	-26.75	-67.66
Stage 2	88.4	-38.48	-58.63
Stage 2	88.2	-47.82	-46.74
Stage 2	88	-55	-35.86
Stage 2	87.8	-60.18	-25.92
Stage 2	87.6	-63.55	-16.85
Stage 2	87.4	-65.27	-8.6
Stage 2	87.2	-65.48	-1.06
Stage 2	87	-64.31	5.83
Stage 2	86.8	-61.88	12.17
Stage 2	86.6	-58.37	17.54
Stage 2	86.4	-54.11	21.33
Stage 2	86.2	-49.34	23.85
Stage 2	86	-44.26	25.38
Stage 2	85.8	-39.04	26.08
Stage 2	85.6	-33.84	26
Stage 2	85.4	-28.8	25.25
Stage 2	85.2	-24	23.96
Stage 2	85	-19.55	22.26
Stage 2	84.8	-15.5	20.24
Stage 2	84.6	-11.89	18.05
Stage 2	84.4	-8.74	15.74
Stage 2	84.2	-6.07	13.36
Stage 2	84	-3.88	10.94
Stage 2	83.8	-2.18	8.51
Stage 2	83.6	-0.97	6.07
Stage 2	83.4	-0.24	3.63
Stage 2	83.2	0	1.21

Risultati Elementi strutturali - A2+M2+R1

Design Assumption: A2+M2+R1 Sollecitazione Cavalletto

Stage	Forza (kN/m)
Stage 1	0
Stage 2	106.3535

Allegati

Design Assumption : Nominal - File di Paratie - File di input (.d)

```

* PARATIE ANALYSIS FOR DESIGN SECTION:Base Design Section USING ASSUMPTION: Nominal
* Time:martedì 22 gennaio 2019 14:17:57
* 1: Defining general settings
UNIT m kN
TITLE RISVOLTO PK. 4+853.15
DELTA 0.2
option param itemax 40
option control hinges 0 0.0001 0.001

* 2: Defining wall(s)
WALL LeftWall_32 0 83.2 95.2 1

* 3: Defining surfaces for wall(s)
SOIL 0_L LeftWall_32 83.2 95.2 1 0
SOIL 0_R LeftWall_32 83.2 95.2 2 180

* 4: Defining soil layers
*
* Soil Profile (Morena_2_8_L_0)
*
LDATA Morena_2_8_L_0 100 LeftWall_32
ATREST 0.441 1 1
WEIGHT 20 11 10
PERMEABILITY 0.001
RESISTANCE 0 34 0 0 0
YOUNG 2.1E+04 3.36E+04
ENDL

* 5: Defining structural materials
* Steel material: 114 Name=S355 E=210000000 kPa
MATERIAL S355_114 2.1E+08
* Concrete material: 106 Name=C32/40 E=33345800 kPa
MATERIAL C3240_106 3.335E+07
* Rebar material: 456061 Name=S355H E=210000000 kPa
MATERIAL S355H_456061 2.1E+08

* 6: Defining structural elements
* 6.1: Beams and combined Wall Elements
BEAM Berlinese_67970 LeftWall_32 83.2 95.2 S355_114 0.1053 00 00 0

* 6.2: Supports
WIRE Cavalletto_456060 LeftWall_32 95.2 S355H_456061 0.0004392 0 60 0 0

* 6.3: Strips

* 7: Defining Steps
STEP Stage1_31
CHANGE Morena_2_8_L_0 U-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 D-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 U-KA=0.252 LeftWall_32
CHANGE Morena_2_8_L_0 U-KP=6.072 LeftWall_32
CHANGE Morena_2_8_L_0 D-KA=0.234 LeftWall_32
CHANGE Morena_2_8_L_0 D-KP=5.513 LeftWall_32
CHANGE Morena_2_8_L_0 U-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 U-ADHES=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-ADHES=0 LeftWall_32
SETWALL LeftWall_32
GEOM 95.8 95.8
WATER 0 0 83.2 0 0
ADD Berlinese_67970 Cavalletto_456060
ENDSTEP

STEP Stage2_597129
CHANGE Morena_2_8_L_0 D-KP=6.072 LeftWall_32
SETWALL LeftWall_32
GEOM 95.8 89.7
WATER 0 0 83.2 0 0
ENDSTEP

```

Design Assumption : SLE (Rara) - File di Paratie - File di input (.d)

```

* PARATIE ANALYSIS FOR DESIGN SECTION:Base Design Section USING ASSUMPTION: SLE (Rara)
* Time:martedì 22 gennaio 2019 14:17:58
* 1: Defining general settings
UNIT m kN
TITLE RISVOLTO PK. 4+853.15
DELTA 0.2
option param itemax 40
option control hinges 0 0.0001 0.001

* 2: Defining wall(s)
WALL LeftWall_32 0 83.2 95.2 1

* 3: Defining surfaces for wall(s)
SOIL 0_L LeftWall_32 83.2 95.2 1 0
SOIL 0_R LeftWall_32 83.2 95.2 2 180

* 4: Defining soil layers
*
* Soil Profile (Morena_2_8_L_0)
*
LDATA Morena_2_8_L_0 100 LeftWall_32
ATREST 0.441 1 1
WEIGHT 20 11 10
PERMEABILITY 0.001
RESISTANCE 0 34 0 0 0
YOUNG 2.1E+04 3.36E+04
ENDDL

* 5: Defining structural materials
* Steel material: 114 Name=S355 E=210000000 kPa
MATERIAL S355_114 2.1E+08
* Concrete material: 106 Name=C32/40 E=33345800 kPa
MATERIAL C3240_106 3.335E+07
* Rebar material: 456061 Name=S355H E=210000000 kPa
MATERIAL S355H_456061 2.1E+08

* 6: Defining structural elements
* 6.1: Beams and combined Wall Elements
BEAM Berlinese_67970 LeftWall_32 83.2 95.2 S355_114 0.1053 00 00 0

* 6.2: Supports
WIRE Cavalletto_456060 LeftWall_32 95.2 S355H_456061 0.0004392 0 60 0 0

* 6.3: Strips

* 7: Defining Steps
STEP Stage1_31
CHANGE Morena_2_8_L_0 U-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 D-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 U-KA=0.252 LeftWall_32
CHANGE Morena_2_8_L_0 U-KP=6.072 LeftWall_32
CHANGE Morena_2_8_L_0 D-KA=0.234 LeftWall_32
CHANGE Morena_2_8_L_0 D-KP=5.513 LeftWall_32
CHANGE Morena_2_8_L_0 U-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 U-ADHES=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-ADHES=0 LeftWall_32
SETWALL LeftWall_32
GEOM 95.8 95.8
WATER 0 0 83.2 0 0
ADD Berlinese_67970 Cavalletto_456060
ENDSTEP

STEP Stage2_597129
CHANGE Morena_2_8_L_0 D-KP=6.072 LeftWall_32
SETWALL LeftWall_32
GEOM 95.8 89.7
WATER 0 0 83.2 0 0
ENDSTEP

```

Design Assumption : A1+M1+R1 - File di Paratie - File di input (.d)

```
* PARATIE ANALYSIS FOR DESIGN SECTION:Base Design Section USING ASSUMPTION: A1+M1+R1
* Time:martedì 22 gennaio 2019 14:17:59
* 1: Defining general settings
UNIT m kN
TITLE RISVOLTO PK. 4+853.15
DELTA 0.2
option param itemax 40
option control hinges 0 0.0001 0.001

* 2: Defining wall(s)
WALL LeftWall_32 0 83.2 95.2 1

* 3: Defining surfaces for wall(s)
SOIL 0_L LeftWall_32 83.2 95.2 1 0
SOIL 0_R LeftWall_32 83.2 95.2 2 180

* 4: Defining soil layers
*
* Soil Profile (Morena_2_8_L_0)
*
LDATA Morena_2_8_L_0 100 LeftWall_32
ATREST 0.441 1 1
WEIGHT 20 11 10
PERMEABILITY 0.001
RESISTANCE 0 34 0 0 0
YOUNG 2.1E+04 3.36E+04
ENDL

* 5: Defining structural materials
* Steel material: 114 Name=S355 E=210000000 kPa
MATERIAL S355_114 2.1E+08
* Concrete material: 106 Name=C32/40 E=33345800 kPa
MATERIAL C3240_106 3.335E+07
* Rebar material: 456061 Name=S355H E=210000000 kPa
MATERIAL S355H_456061 2.1E+08

* 6: Defining structural elements
* 6.1: Beams and combined Wall Elements
BEAM Berlinese_67970 LeftWall_32 83.2 95.2 S355_114 0.1053 00 00 0

* 6.2: Supports
WIRE Cavalletto_456060 LeftWall_32 95.2 S355H_456061 0.0004392 0 60 0 0

* 6.3: Strips

* 7: Defining Steps
STEP Stage1_31
CHANGE Morena_2_8_L_0 U-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 D-FRICT=34 LeftWall_32
CHANGE Morena_2_8_L_0 U-KA=0.252 LeftWall_32
CHANGE Morena_2_8_L_0 U-KP=6.072 LeftWall_32
CHANGE Morena_2_8_L_0 D-KA=0.234 LeftWall_32
CHANGE Morena_2_8_L_0 D-KP=5.513 LeftWall_32
CHANGE Morena_2_8_L_0 U-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 U-ADHES=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-ADHES=0 LeftWall_32
SETWALL LeftWall_32
GEOM 95.8 95.8
WATER 0 0 83.2 0 0
ADD Berlinese_67970 Cavalletto_456060
ENDSTEP

STEP Stage2_597129
CHANGE Morena_2_8_L_0 D-KP=6.072 LeftWall_32
SETWALL LeftWall_32
GEOM 95.8 89.7
WATER 0 0 83.2 0 0
ENDSTEP
```

Design Assumption : A2+M2+R1 - File di Paratie - File di input (.d)

```

* PARATIE ANALYSIS FOR DESIGN SECTION:Base Design Section USING ASSUMPTION: A2+M2+R1
* Time:martedi 22 gennaio 2019 14:18:00
* 1: Defining general settings
UNIT m kN
TITLE RISVOLTO PK. 4+853.15
DELTA 0.2
option param itemax 40
option control hinges 0 0.0001 0.001

* 2: Defining wall(s)
WALL LeftWall_32 0 83.2 95.2 1

* 3: Defining surfaces for wall(s)
SOIL 0_L LeftWall_32 83.2 95.2 1 0
SOIL 0_R LeftWall_32 83.2 95.2 2 180

* 4: Defining soil layers
* Soil Profile (Morena_2_8_L_0)
*
LDATA Morena_2_8_L_0 100 LeftWall_32
ATREST 0.441 1 1
WEIGHT 20 11 10
PERMEABILITY 0.001
RESISTANCE 0 34 0 0 0
YOUNG 2.1E+04 3.36E+04
ENDDL

* 5: Defining structural materials
* Steel material: 114 Name=S355 E=210000000 kPa
MATERIAL S355_114 2.1E+08
* Concrete material: 106 Name=C32/40 E=33345800 kPa
MATERIAL C3240_106 3.335E+07
* Rebar material: 456061 Name=S355H E=210000000 kPa
MATERIAL S355H_456061 2.1E+08

* 6: Defining structural elements
* 6.1: Beams and combined Wall Elements
BEAM Berlinese_67970 LeftWall_32 83.2 95.2 S355_114 0.1053 00 00 0

* 6.2: Supports
WIRE Cavalletto_456060 LeftWall_32 95.2 S355H_456061 0.0004392 0 60 0 0

* 6.3: Strips

* 7: Defining Steps
STEP Stage1_31
CHANGE Morena_2_8_L_0 U-FRICT=28.35 LeftWall_32
CHANGE Morena_2_8_L_0 D-FRICT=28.35 LeftWall_32
CHANGE Morena_2_8_L_0 U-KA=0.325 LeftWall_32
CHANGE Morena_2_8_L_0 U-KP=4.18 LeftWall_32
CHANGE Morena_2_8_L_0 D-KA=0.3 LeftWall_32
CHANGE Morena_2_8_L_0 D-KP=3.832 LeftWall_32
CHANGE Morena_2_8_L_0 U-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 U-ADHES=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-COHE=0 LeftWall_32
CHANGE Morena_2_8_L_0 D-ADHES=0 LeftWall_32
SETWALL LeftWall_32
GEOM 95.8 95.8
WATER 0 0 83.2 0 0
ADD Berlinese_67970 Cavalletto_456060
ENDSTEP

STEP Stage2_597129
CHANGE Morena_2_8_L_0 D-KP=4.18 LeftWall_32
SETWALL LeftWall_32
GEOM 95.8 89.7
WATER 0 0 83.2 0 0
ENDSTEP

```