AUTORITÀ PORTUALE DI SAVONA
PORTO DI VADO LIGURE

PROJECT FINANCING PER:

PROGETTAZIONE DEFINITIVA ED ESECUTIVA, ESECUZIONE DEI LAVORI DELLA NUOVA PIASTRA MULTIFUNZIONALE DEL PORTO DI VADO LIGURE E GESTIONE DELLA PARTE RELATIVA AL TERMINAL CONTENITORI

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PROGETTO ESECUTIVO - FASE 2
E CONTESTUALE PERIZIA DI VARIANTE DELLA FASE 1

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RELAZIONE DI CALCOLO

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1. INTRODUZIONE GENERALE

Oggetto della presente relazione è la verifica del cemento armato dei cassoni a giorno lato banchina container, seconda e terza fila, per la piattaforma a giorno per la realizzazione del terminal container di Maersk a Vado Ligure (vedere Fig. 1 per planimetria).

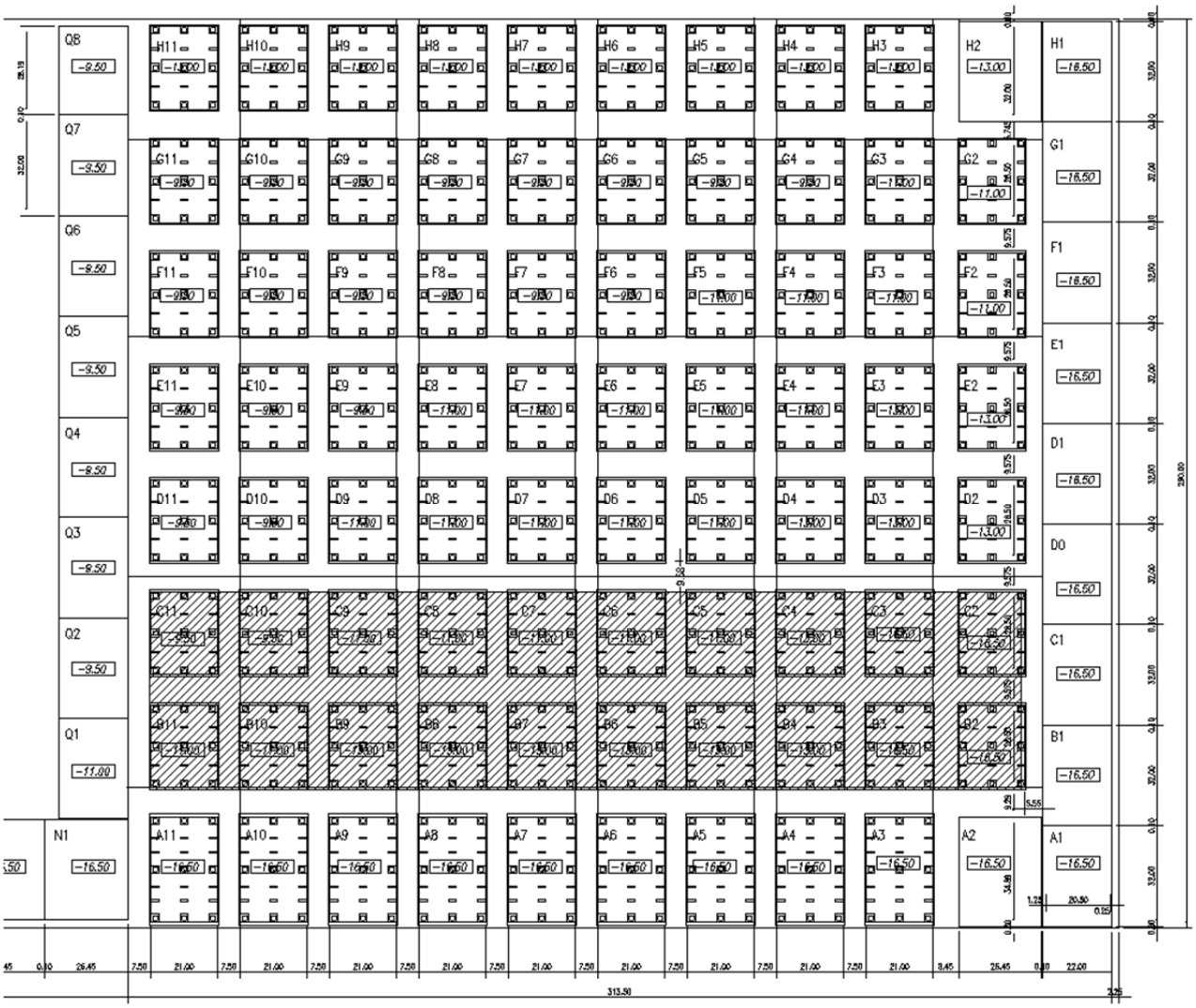


FIG. 1.1 - PLANIMETRIA CASSONI A GIORNO

I cassoni hanno le seguenti dimensioni:

- Cassone solettone 22x27m con fusto 21x26.5m con altezze di 18.17m/14.67m/12.67m/11.17m

I cassoni sono composti da una parte bassa piena ed una parte alta a pilastro.

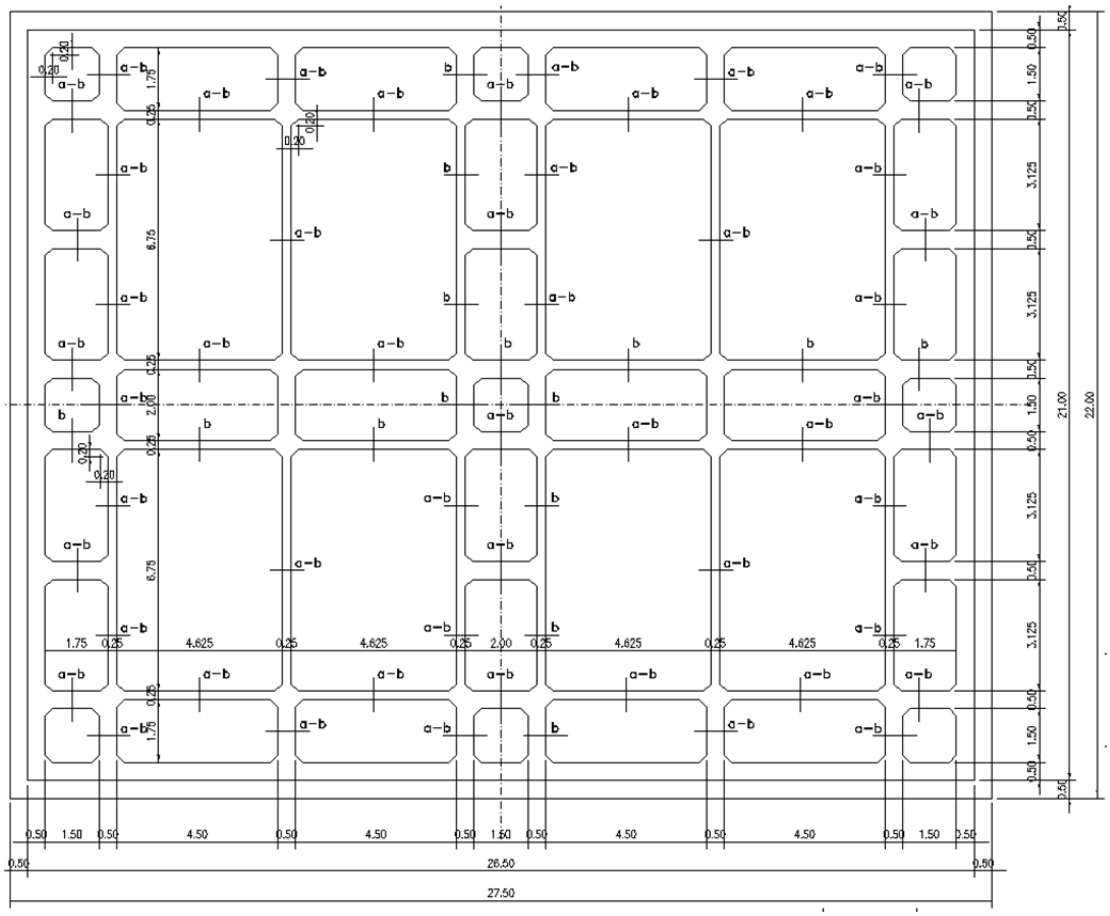


FIG. 1.2 - PIANTA CASSONI FUSTO BASSO CASSONE DA 21X26.5M

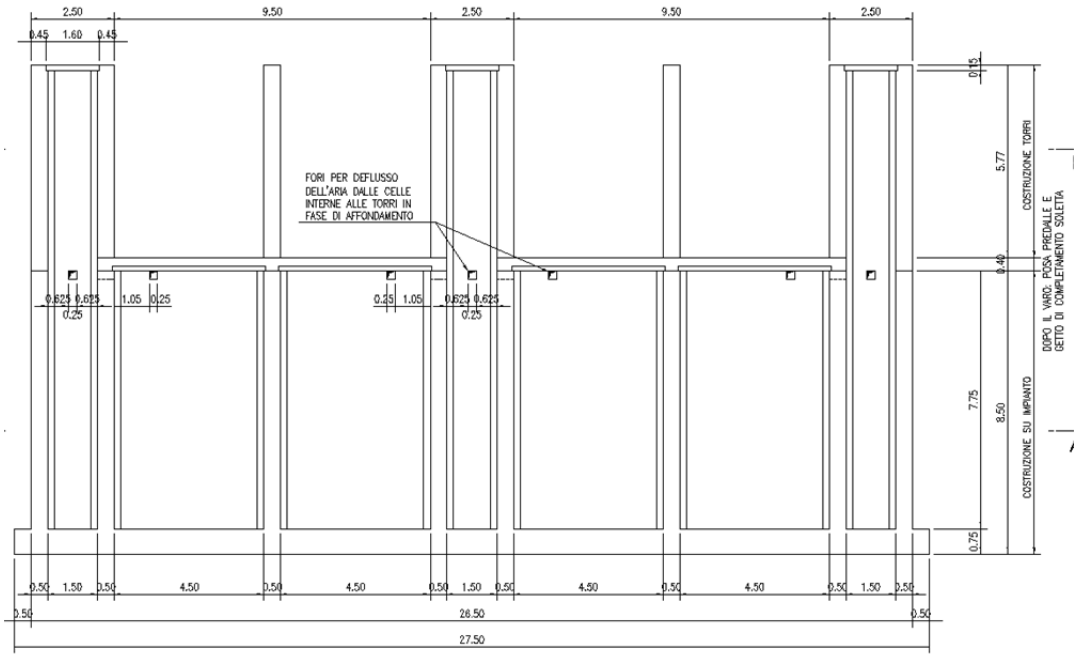


FIG. 1.3 - SEZIONE VERTICALE TIPO

I sovraccarichi sull'impalcato sono di 2/4/9.4 T/m^2 (vedi Fig. sottostante)

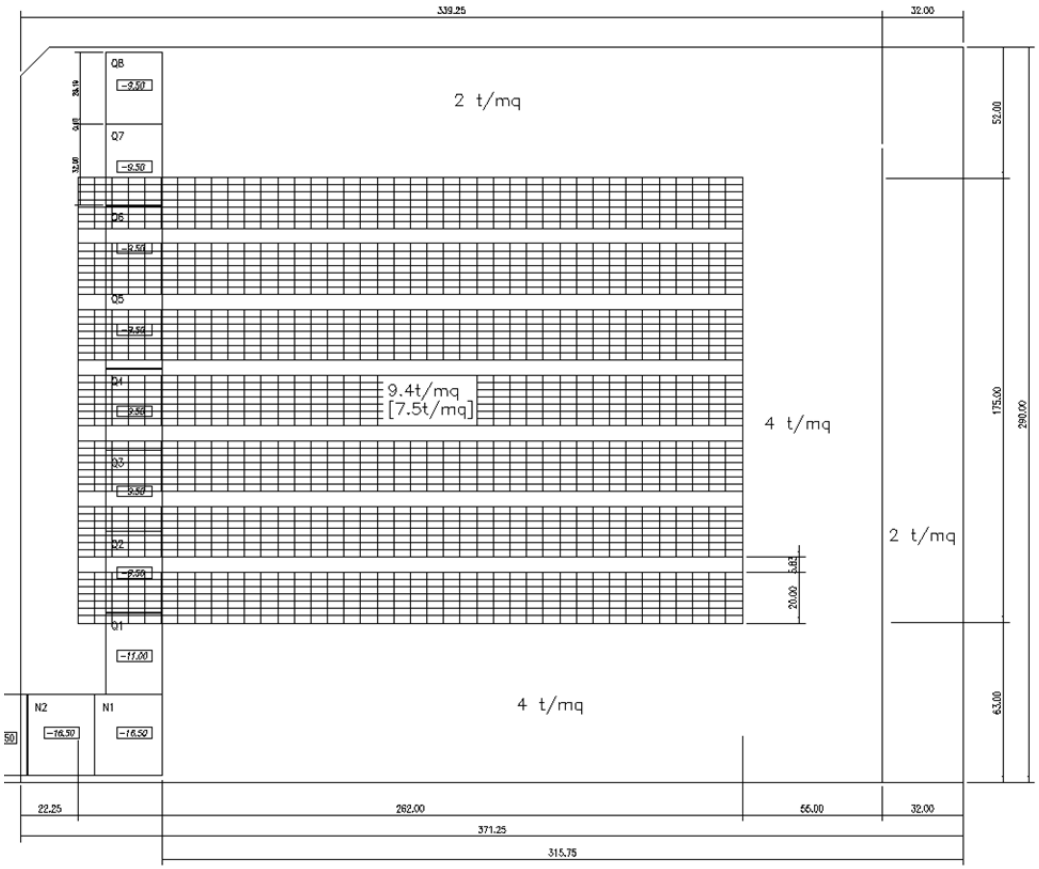


FIG. 1.4 - SOVRACCARICHI ZONA A GIORNO

Da cui i carichi sui cassoni sono come da Fig. sottostante

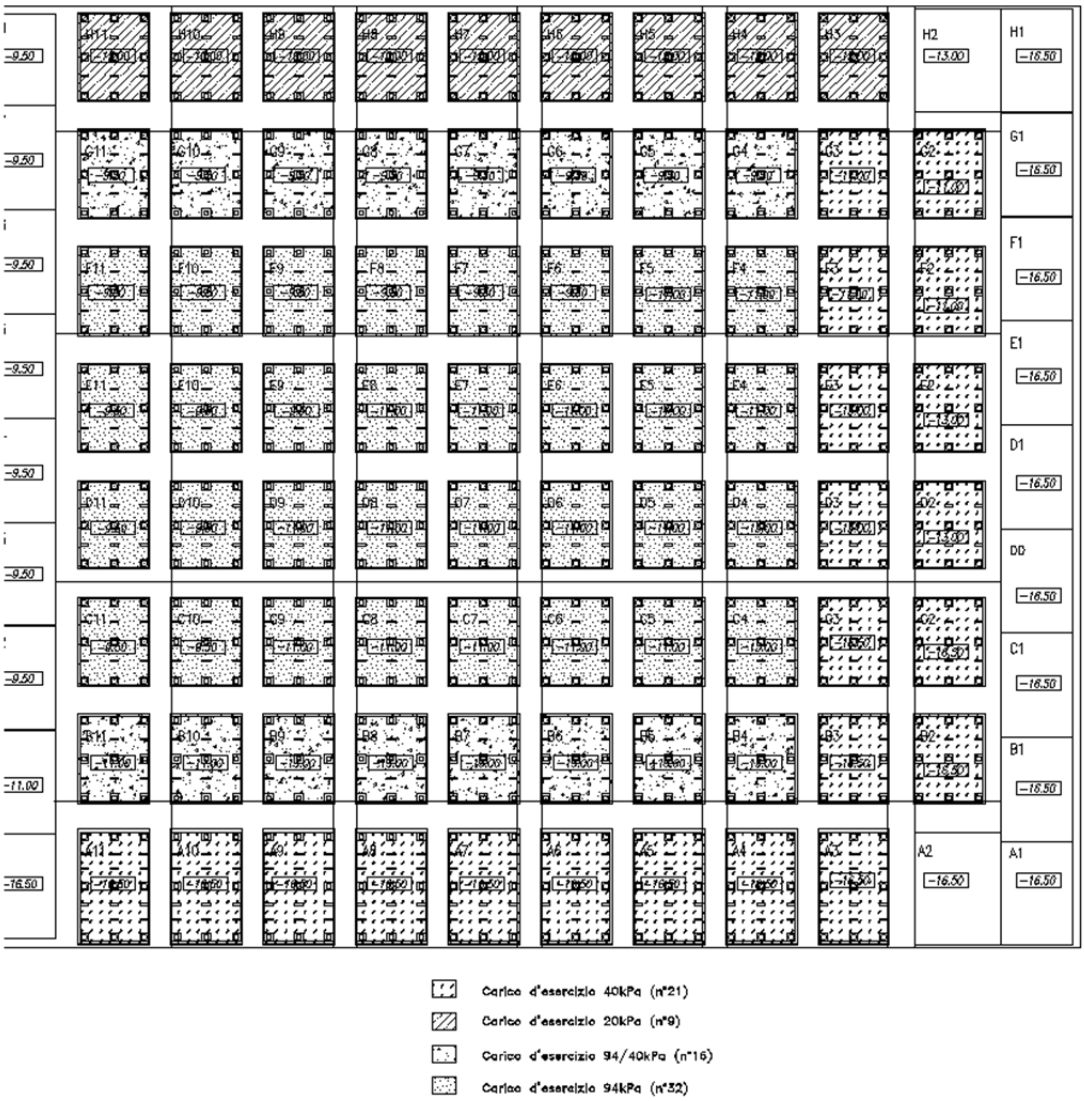


FIG. 1.5 - CASSONI A GIORNO - SOVRACCARICHI

1.1 Programma di verifica

Di seguito si riportano le verifiche per le varie fasi di costruzioni dei cassoni.

Le verifiche sono state raggruppate nei capitoli della presente relazione come segue:

Cap. 2 - Verifica di galleggiamento cassoni

Cap. 3 - Verifica di stabilità cassoni in fase provvisionale

Cap. 4 - Verifica di stabilità cassoni in fase definitiva

Cap. 5 - Verifica di cemento armato cassoni

1.2 Documenti di riferimento

I pesi specifici e i dati di calcolo utilizzati sono stati tratti dal Progetto Definitivo presentato al Consiglio Superiore per i Lavori Pubblici di Marzo 2010 nonché dal Progetto Esecutivo Fase 1 di Luglio 2012.

In particolare si fa riferimento alle seguenti relazioni:

Progetto Defintivo		
MI010P-PD-G-Z-R-1001-C4	Marzo 2010	Relazione Descrittiva Generale
MI010P-PD-G-G-R-1121-C3	Gennaio 2010	Rapporto Geotecnico - Calcolo dei Cedimenti e della stabilità delle opere - Verifiche Normative
MI010P-PD-S-C-R-1001-C2	Giugno 2009	Area a giorno - Cassoni di reggispinta - Relazione di calcolo
MI010P-PD-G-L-R-1109-C2	Giugno 2009	Relazione Meteomarina
MI010P-PD-G-Z-R-1111-C3	29/01/2010	Valutazione della pericolosità sismica e verifica di liquefazione
MI010P-PD-G-N-R-1115-C2	Giugno 2009	Dimensionamento delle strutture di accosto e verifica degli schemi di ormeggio
Progetto Esecutivo - Fase 1		
MI010P-PD-G-Z-R-1001-C1	Luglio 2012	Relazione Descrittiva Generale
MI010P-PD-G-L-R-1101-C0	Luglio 2012	Relazione Meteomarina

Dati Opera (DM 14/01/2008; Cap.2)

- Vita Nominale del opera V_N — 50 Anni
- Classe d'uso — II
- Periodo di riferimento per l'azione sismica Stato Limite di Salvaguardia della Vita (SLV) con probabilità di superamento del 10% nel periodo di riferimento — 475 Anni

Pesi materiali

- Peso calcestruzzo armato cassone — 25.00 kN/m^3
- Peso calcestruzzo sovrastruttura — 24.50 kN/m^3
- Peso pavimentazione — 20.00 kN/m^3
- Peso acqua di mare — 10.10 kN/m^3

Caratteristiche geotecniche materiali di scanno

- Angolo d'attrito rinfianco ρ'k	34	°
- Angolo d'attrito scanno d'imbasamento	45	°
- Angolo d'attrito scanno-cassone 2/3 ρ'k	30	°

Quote

- Quota di sommità sovrastruttura fase definitiva	+4.50	
- Quota d'imbasamento cassone fase definitiva	-9.50/	
	-11/	
	-16.50	
- Quota superiore cassone	+1.67	

Livelli mare

- Marea massima	+0.50	m
- Marea minima	-0.33	m
- Livello mare considerate per verifiche cassone nella fase di esercizio (1.5xMarea)	-0.50/	m
	+0.00/	m
	+0.75	m

Onde

- Altezza d'onda di calcolo fase di cresta $H_{1/20}$	1.40 H_S	
- Altezza d'onda di calcolo fase di cavo $H_{1/100}$	1.67 H_S	

Sovraccarichi

- Sovraccarico zona stoccaggio container per verifiche c.a. cassone	9.4	t/m^2
- Sovraccarico zona stoccaggio container per verifiche geotecniche (fondazioni)	7.5	t/m^2
- Sovraccarico zona movimentazione container per verifiche c.a. cassone	4.0	t/m^2
- Sovraccarico zona movimentazione container per verifiche geotecniche (fondazioni)	4.0	t/m^2

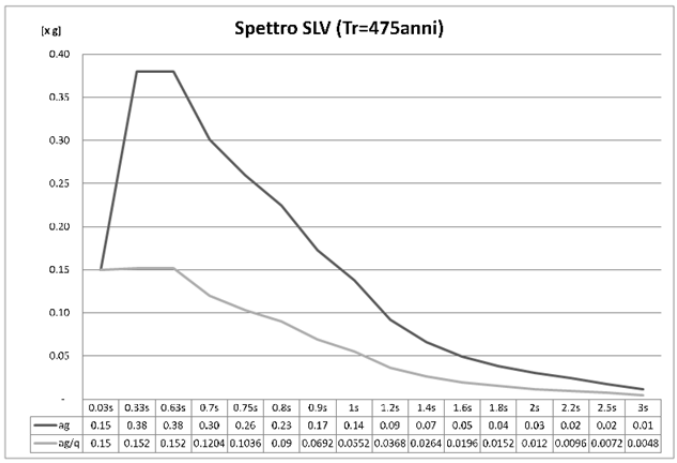
Gru piazzali RMG (banchina container)

- Interasse rotaie 22.5 m
- Numero ruote / carrello 4
- Interasse fra ruote 1.2 m
- Interasse fra assi carrelli 10 m
- Carico verticale (420kN/ruota x 4ruote / 5.6m) 300 kN/m
- Carico orizzontale (260kN/angolo / 5.6m) 46.5 kN/m

Sisma

- Sisma limite di salvaguardia della vita (SLV) Tr=475anni a_g 0.15g
- Sisma utilizzato per le verifiche in fase sismica 0.15g
- Fattore di struttura utilizzato per verifiche agli SLV q 2.5
- Coefficiente sismico verticale verifiche sismiche k_v=0.5x k_h 0.075g

Per quanto riguarda il sisma si è considerato il seguente spettro di risposta per SLV ridotto con il fattore q.



1.3 Legislazione di riferimento

Nell'ambito della presente relazione si è applicata la seguente normativa:

Legge 05/11/1971 n. 1086 - Norme per la disciplina delle opere di conglomerato cementizio armato, normale e precompresso ed a struttura metallica

Circolare Min. LL.PP. 14/02/1974 n. - Istruzioni per l'applicazione delle "Norme per la disciplina delle

11951		opere di conglomerato cementizio armato, normale e precompresso ed a struttura metallica"
Circolare Min. LL.PP. 1996	-	Istruzioni tecniche per la progettazione delle dighe marittime
D.M. 14/1/2008	-	Norme Tecniche per le Costruzioni
Circolare n°617 2/2/2009 CS.LL.PP	-	Istruzioni per l'applicazione delle "Norme Tecniche per le costruzioni di cui al D.M. 14 gennaio 2008"
Eurocodici		
EAU 2004	-	Recommendations of the Committee for Waterfront Structures Harbours and Waterways

Di seguito si riportano le dimensioni del cassone con le verifiche di galleggiamento per le varie fasi di costruzione:

1. Costruzione parte bassa
2. Posa predalles e getto di completamento parte bassa
3. Costruzione pilastri

	quotà d'imbasamento - cassoni 21x26,5			
	-16.5	-13	-11	-9.5
Vcls[MC] con solette	2176	1876	1737	1641
altezza pt bassa	10.20	8.90	8.25	7.85
altezza pilastri	7.97	5.77	4.42	3.32
altezza totale	18.17	14.67	12.67	11.17
imm[M]	9.59	8.27	7.66	7.21
w[M]	1.42	2.56	3.19	3.67
franco basso [M]	0.61	0.63	0.58	0.64

TAB. 1-1 - DATI RELATIVI A FASE 3

2. VERIFICA STABILITA CASSONI

Si riportano le verifiche di stabilità generale delle sezioni tipo riportate di seguito.

Verifiche a s.l.u.

In conformità con quanto previsto dal DM 14/1/2008, per la verifica della struttura si sono utilizzati i seguenti approcci:

Approccio	*Combinazione*
1 o 2	A1+M1+R1 e A2+M2+R2 o A1+M1+R3
EQU	EQU+M2

Per quanto riguarda i coefficienti parziali da utilizzare per le azioni e per i parametri del terreno nelle verifiche, si rimanda alle tabelle riportate di seguito.

Coefficienti parziali

		γ_F	EQU	A1	A2
Carichi permanenti	favorevoli	γ_{G1}	0.90	1.00	1.00
	sfavorevoli		1.10	1.30	1.00
Carichi permanenti non strutturali	favorevoli	γ_{G2}	0.00	0.00	0.00
	sfavorevoli		1.50	1.50	1.30
Carichi variabili	favorevoli	γ_{Qi}	0.00	0.00	0.00
	sfavorevoli		1.50	1.50	1.30

		γ_M	M1	M2
Tangente dell'angolo di resistenza al taglio	tan ϕ'	$\gamma_{\phi'}$	1.00	1.25

Combinazioni di carico

In ciascuna combinazione le azioni variabili sono ridotte per tener conto della probabilità della contemporaneità degli eventi.

Nel seguito sono riportati i valori utilizzati nel calcolo, tenendo presente che:

- ψ_{0i} è il coefficiente di combinazione applicato ai carichi variabili secondari nelle combinazioni a s.l.u. e nelle combinazioni rare, moltiplicato rispettivamente per γ_{Qi} e per 1.0;
- ψ_{1i} è il coefficiente di combinazione applicato al carico variabile principale nelle combinazioni frequenti;

- ψ_{2i} è il coefficiente di combinazione applicato ai carichi variabili secondari nelle combinazioni frequenti, a tutti i carichi variabili nelle combinazioni quasi permanenti e ai carichi variabili in combinazione sismica.

	ψ_{0i}	ψ_{1i}	ψ_{2i}
Sovraccarico	1.0	0.9	0.8
Tiro bitta/ Parabordo	0.6	0.2	0
Onde	0.6	0.2	0
Variazioni termiche	0.6	0.5	0
Gru	0.7	0.7	0.6

Per la verifica di stabilità in fase sismica si considera soltanto il sovraccarico.

Per quanto riguarda l'attrito fra manufatto e scanno d'imbasamento:

Combinazioni A1-M1:

$\mu=\tan(0.67\times45°) = 0.577$, si assume il valore 0.58

Combinazioni A2-M2:

$\varphi= \arctan(\tan(45°)/1.25) = 38.66°$

$\mu=\tan(0.67\times38.66°) = 0.486$, si assume il valore 0.48

2.1 EQU - Fattori parziali

Fattori parziali per azioni γ_F

Azione	**Valore**
Permanente	
Destabilizzante $\gamma_{G;dst}$	1.1
Stabilizzante $\gamma_{G;stb}$	0.9
Variabile	
Destabilizzante $\gamma_{Q;dst}$	1.5
Stabilizzante $\gamma_{Q;stb}$	0.0

Fattori parziali per terreno γ_M

Parametro terreno	**Valore**
Angolo d'attrito $\gamma_{\varphi'}$ (da applicare a tg(φ'))	1.25
Coesione Stabilizzante $\gamma_{c'}$	1.25
Resistenza a taglio non drenata γ_{cu}	1.40
Resistenza non confinata γ_{qu}	1.40
Peso γ_γ	1.00

2.2 STR & GEO - Fattori parziali

Per le verifiche per SLU STR e GEO bisogna applicare set A1-M1 e A2-M2 con valori come esposti qui di seguito:

Fattori parziali per azioni γ_F

Azione	**Set**	
	A1	**A2**
Permanente		
Destabilizzante γ_G	1.30	1.00
Stabilizzante γ_G	1.00	1.00
Variabile		
Destabilizzante γ_Q	1.50	1.30
Stabilizzante γ_Q	0.00	0.00

Fattori parziali per terreno γ_M

Parametro terreno	**M1**	**M2**
Angolo d'attrito $\gamma_{\varphi'}$ (da applicare a tg(φ'))	1.00	1.25
Coesione Stabilizzante $\gamma_{c'}$	1.00	1.25
Resistenza a taglio non drenata γ_{cu}	1.00	1.40
Resistenza non confinata γ_{qu}	1.00	1.40
Peso γ_γ	1.00	1.00

Resistenza	**set**		
	R1	**R2**	**R3**
Portanza $\gamma_{R;v}$	1.0	1.0	1.4
Scorrimento $\gamma_{R;h}$	1.0	1.0	1.1
Resistenza terreno stabilità globale $\gamma_{R;e}$	1.0	1.0	1.4

Fattori parziali per terreno γ_M

Parametro terreno	**Set**	
	M1	**M2**
Angolo d'attrito $\gamma_{\varphi'}$ (da applicare a tg(φ'))	1.00	1.25
Coesione Stabilizzante $\gamma_{c'}$	1.00	1.25
Resistenza a taglio non drenata γ_{cu}	1.00	1.40
Resistenza non confinata γ_{qu}	1.00	1.40
Peso γ_γ	1.00	1.00

3. VERIFICA DI STABILITA' IN FASE PROVVISIONALE / DEFINITIVA

Per le verifiche di stabilità si considerano tre o configurazioni:

1. Cassone affondato non riempito senza impalcato, in fase provvisianale, con onda (cresta) con periodo di ritorno di 5 anni;
2. Cassone affondato e riempito con impalcato con onda (cresta) con periodo di ritorno di 250 anni;
3. Cassone affondato e riempito con impalcato con evento sismico.

Per la fase definitiva (periodo di ritorno dell'onda di 250anni) si distingue fra le prime tre file di cassoni lato banchina container (più esposte) e oltre la terza fila (più protette).

In questa relazione si esegue la verifica per la seconda e terza fila (più esposte).

Per l'onda con periodo di ritorno di 5 anni si prevede una protezione provvisoria dei cassoni a giorno con i cassoni tradizionali come riportato nella planimetria di seguito.

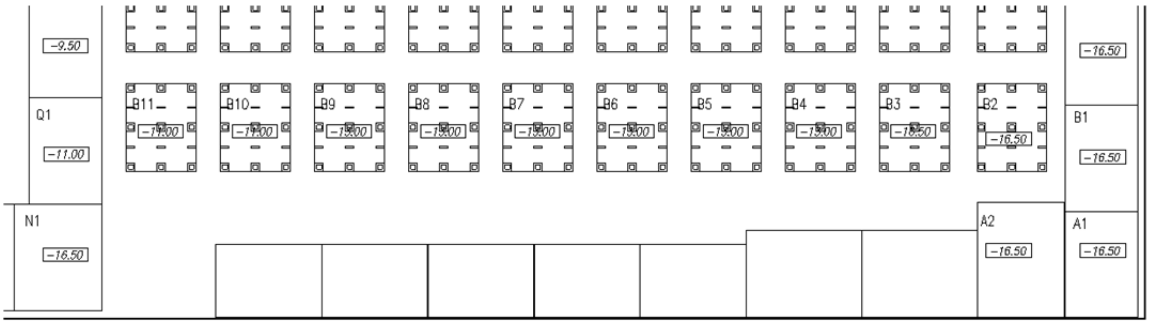


FIG. 3.1 - PROTEZIONE TEMPORANEA CASSONE A GIORNO DURANTE LA COSTRUZIONE

Si omettono le verifiche in cavo d'onda in quanto meno significative

3.1 Cassone a q.ta-9.50

3.1.1 Condizioni d'esercizio

Il cassone definitivo a q.ta.- 9.50 ha la parte bassa alta fino a q.ta-1.65. Infatti da -1.65 a +1.67 ci sono i pilastri. Si considera il cassone riempito d'acqua fino a q.ta +0.00

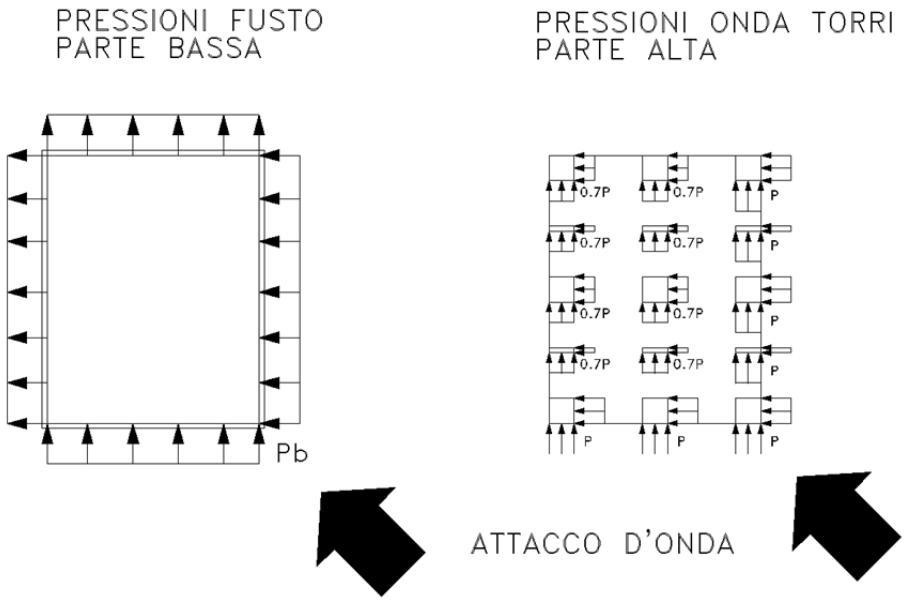


FIG. 3.2 - CASSONE A GIORNO - ATTACCO D'ONDA OBLIQUO - AZIONI

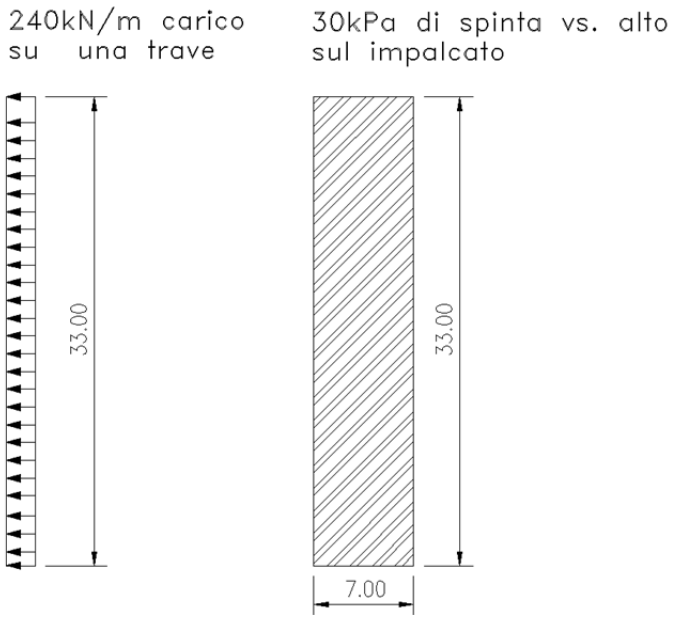


FIG. 3.3 - CASSONE A GIORNO - ATTACCO D'ONDA OBLIQUO-AZIONI SU TRAVE E IMPALCATO - PRIME TRE FILE

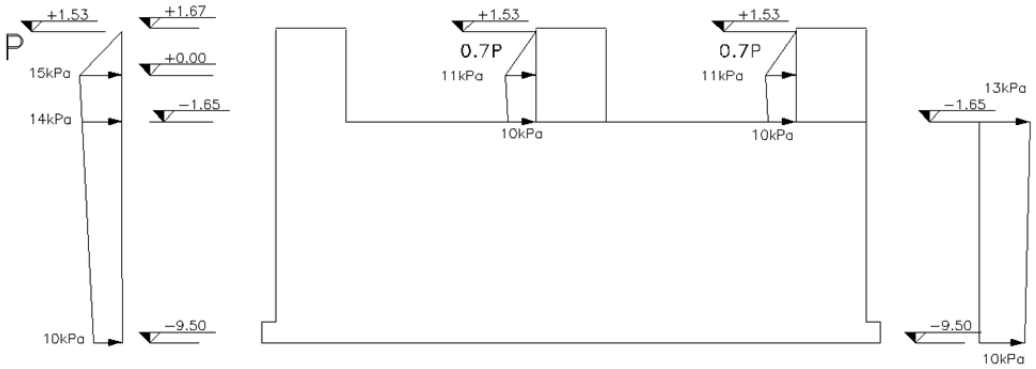


FIG. 3.4 - CASSONE A Q.TA-9.50 - DIAGRAMMA DI SPINTA IN FASE DI CRESTA. (ONDA TR=5ANNI)

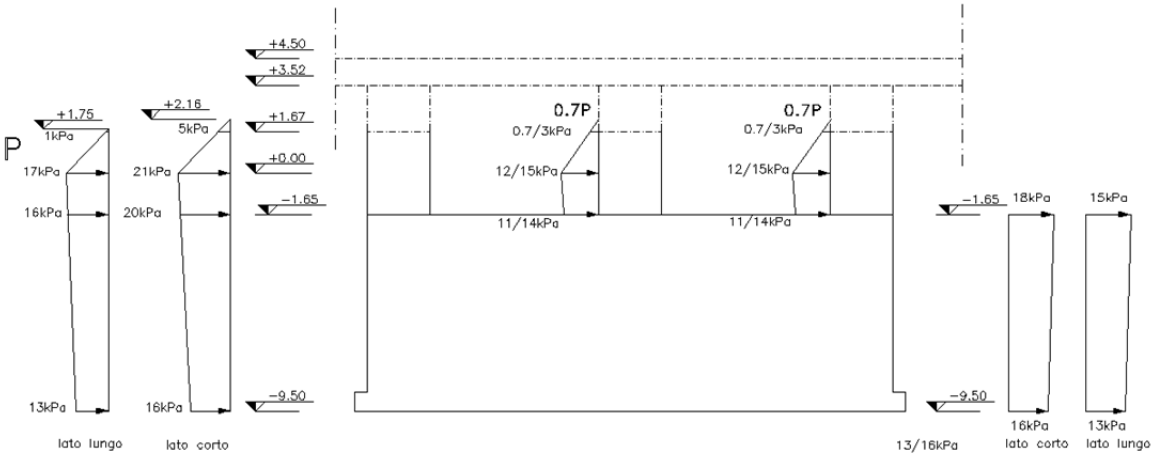


FIG. 3.5 - CASSONE A Q.TA-9.50 - DIAGRAMMA DI SPINTA IN FASE DI CRESTA. (ONDA TR=250ANNI)

Di seguito si riporta una Tab. con il calcolo del peso del cassone gravante compreso di travi e di impalcato.

	Peso	Pscanno
1) Peso cassone riempito d'acqua sottospintato	**25431kN**	**42.0Pa (27.5x22m)**
2) Travi n°3 L=(26.5+9.575) 36m/cad	7628kN	
3) Impalcato 80cm 0.8x25x(28.5x36)	20520kN	
4) Pavimentazione 18cm 0.18x20x1026	3694kN	
Totale impalcato	**31842kN**	**52.6kPa**
Totale con impalcato	**57273kN**	**94.7kPa**

Si trascura l'azione verticale dell'onda.

Verifica cassone a giorno a q.-9.50 soggetto ad onda obliquo 45°- senza impalcato con cresta d'onda con periodo di ritorno di 5anni

Verifiche				
Peso netto cassone senza impalcato	N=	25431	kN	
Peso cassone sottospintato senza impalcato		**25431**	**kN**	
Verifica stabilità cassone		Lato 21/22m	L 26.5/27.5m	
Spinta Onda Pt bassa da -9.50 a -1.65 - cresta	94kN/m	1974	2491	kN
Spinta Onda Pt bassa da -9.50 a -1.65 - cavo	90kN/m	1890	2385	kN

Spinta pilastri interni(0.7P) da -1.65 a +1.67; 64kN/t x 4	256kN/lato	256	256	kN
Spinta pilastri esterni (P) da -1.65 a +1.67;89kN/t x 5	445kN/lato	445	445	kN
Sp. pilastrini int. (0.7P) da -1.65 a +1.67; 64kN/p x 4	256kN	256	-	kN
Spinta pilastrini int.(0.7P) da -1.65 a +1.67;16kN/p x 4	64kN	-	64	kN
Sp. pilastrini esterni (P) da -1.65 a +1.67;18kN/p x2	36kN		36	kN
Sp. pilastrini esterni (P) da -1.65 a +1.67;89kN/p x 2	178kN	178	-	kN
	Spinta totale sul cassone	**4999**	**5677**	**kN**
	N totale	**25431**		**kN**
VERIFICHE DI SCORRIMENTO 1.0PP+1.5Cresta d'onda (A1-M1-R3)				
Ff = $1.5x(4999^2+5677^2)^{0.5}$	1.5x7564		11346	kN
N = 1.0xpp	1.0x25431		25431	kN
Scorrimento FS=0.58xN/Ff	0.58x25431/11346		**1.30**	**>1.1**

Verifica cassone a giorno a q.-9.50 soggetto ad onda obliquo 45°- con impalcato con cresta d'onda con periodo di ritorno di 250anni - prime tre file

Verifiche				
Peso netto cassone senza impalcato	N=	25431	kN	
Peso impalcato	N=	31842	kN	
	Peso cassone sottospintato con impalcato	**57573**	**kN**	
	Riempimento cassone 434m^3/m **x 0.5m** x 9kN/m^3	1953	kN	
	Peso cassone sottospintato con impalcato con riempimento	**59526**	**kN**	
Verifica stabilità cassone		Lato 21/22m	L 26.5/27.5m	
Spinta Onda Pt bassa da -9.50 a -1.65 - cresta	141/114kN/m	2961	3021	kN
Spinta Onda Pt bassa da -9.50 a -1.65 - cavo	133/110kN/m	2793	2915	kN
Spinta pilastri int.(0.7P) da -1.65 a +1.67; 100/74kN/t x 4	400/296kN/lato	400	296	kN
Spinta pilastri est. (P) da -1.65 a +1.67;141/105kN/t x 5	705/525kN/lato	705	525	kN
Sp. pilastrini int. (0.7P) da -1.65 a a +1.67; 100kN/p x 4	400kN	400	-	kN
Spinta pilastrini int.(0.7P) da -1.65 a +1.67;15kN/p x 4	60kN	-	60	kN
Sp. pilastrini esterni (P) da -1.65 a +1.67;21kN/p x2	42kN		42	kN
Sp. pilastrini esterni (P) da -1.65 a +1.67;141kN/p x 2	282kN	282	-	kN
	Spinta sul solo cassone	**7550**	**6859**	kN
Sforzo orizzontale sulle travi risultante	240kN/mx33m		7920	kN
	Spinta totale sul cassone	**7550**	**14779**	**kN**
Sottospinta verticale su impalcato	30kPax7x33m	-6930		kN
Risultante verticale a q.ta-1.65	90%x835kN	752		kN

VERIFICHE DI SCORRIMENTO 1.0PP+1.5Cresta d'onda (A1-M1-R3)			
$Ff = 1.5x(7550^2+14779^2)^{0.5}$	1.5x16596	24894	kN
N =	1.0x59526-1.5x(6930-752)	50259	kN
Scorrimento FS=0.58xN/Ff	0.58x50259/24894	**1.17**	**≥1.1**

3.1.2 Condizioni sismiche

La verifica di stabilità in fase sismica è stata valutata con il metodo pseudo statico utilizzando una accelerazione orizzontale di 0.15g ed una verticale di 0.075g. Oltre le masse sono state applicate le pressioni idrodinamiche dovute alla spinta dell'acqua nonché le masse addizionali per quanto riguarda i pilastri in accordo con quanto prescritto dalla EC8:Pt2:Ponti. In favore di sicurezza si trascura il peso del riempimento del cassone.

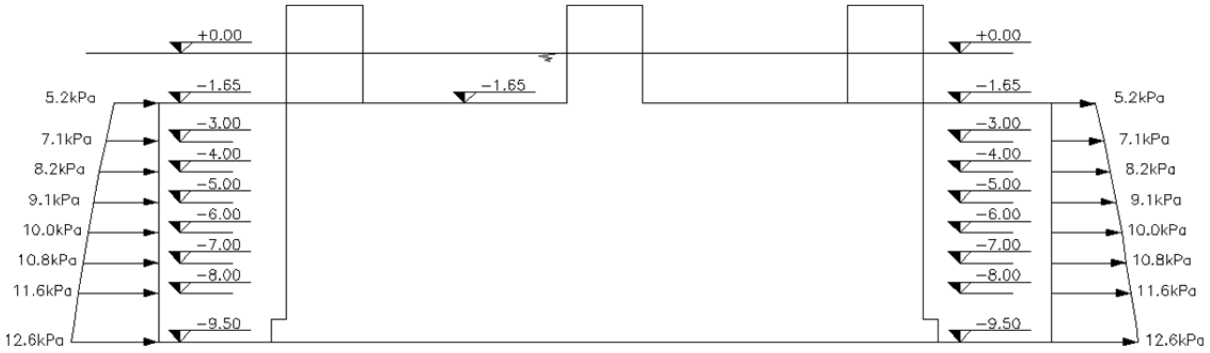


FIG. 3.6 - CASSONE A Q.TA-9.50 - DIAGRAMMA DI SPINTA IN FASE SISMICA WESTERGAARD

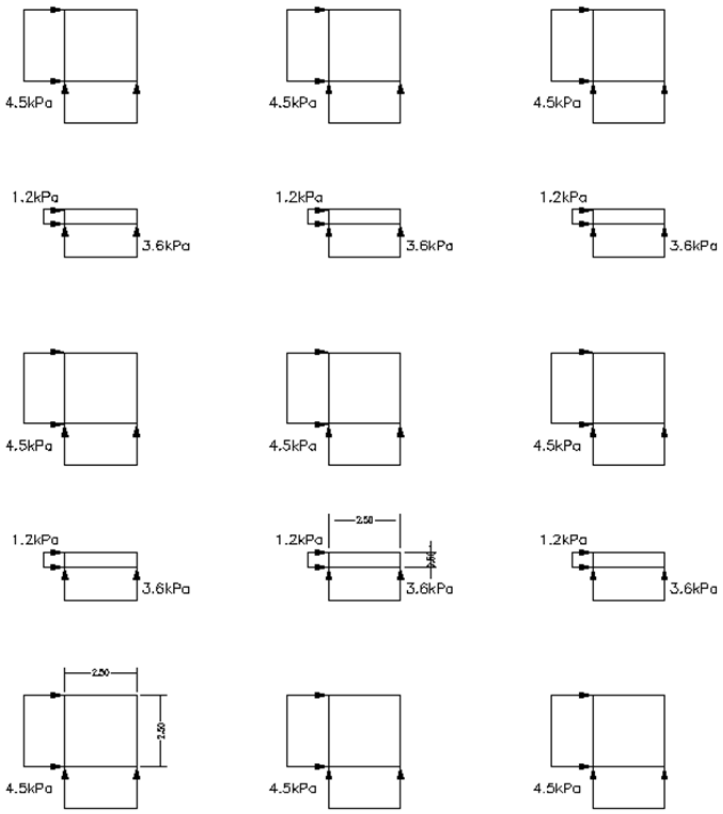


FIG. 3.7 - CASSONE A Q.TA-9.50 - SPINTE MASSE AGGIUNTE PILASTRI

Verifica cassone a giorno a q.-9.50 in fase sismica

Masse		**I_o (x0.15)**	**I_v(x0.075)**	
Peso cassone 1640.64m^3 x 25kN/m^3	41016kN	6152kN	3076kN	
Peso acqua celle 2950.6m^3 x 10.1kN/m^3	29801kN	4470kN	2235kN	
Sottospinta acqua solettone 10.1kN/m^3 x (27.5x22x0.75)m^3	-4416kN			
Sottospinta acqua fusto 10.1x(26.5x21x7.1)	-39907kN			
Sottospinta pilastri da -1.65 a 0.0;10.1x(9x2.5x2.5+6x2.5x0.5)x1.65	-1063kN			
Peso cassone sottospintato riempito d'acqua	**25431kN**			
Peso impalcato	**31842kN**	10622	5311	kN
Peso cassone sottospintato con impalcato	**57273kN**			
Spinta sismica or/Sp. Sismica verticale		**10622**	**5311**	**kN**
Spinte orizzontali Westergaard e masse aggiunte		Lato 21m	L 26.5m	
Westergaard -9.5 a -1.65; 0.15x7/12x10.1x(9.5^2-9.5$^{1/2}$x1.65$^{3/2}$)	74kN/m	1554	1961	kN
Spinta Westerg. lato opposta da -9.5 a -1.65	74kN/m	1554	1961	kN
Spinta massa agg. pilastri n°2.5x2.5m;da -1.65 a 0.00; 9x11.2x1.65	166.3kN/lato	166	166	kN
Spinta massa agg. pilastri 0.5x2.5;-1.65 a 0.00;6x0.6x1.65	5.9kN/lato	-	6	kN
Spinta massa agg. pilastri 2.5x0.5;da -1.65 a 0.00;6x9x1.65	89kN/lato	89	-	kN
Spinta orizzontale		**3363**	**4094**	**kN**
VERIFICHE DI SCORRIMENTO 1.0PP+EQ(kv+) (A2-M2-R2)		Lato 21m	Lato 26.5m	
Ff =3363/4094+10622		13985	14716	kN
Sforzo vertical netto N; 57573-5311 =		52262	52262	kN
Scorrimento FS=0.48xN/Ff=		1.79	1.70	≥ 1.0

3.2 Cassoni a q.ta-11.00

3.2.1 Condizioni d'esercizio

Il cassone definitivo a q.ta.- 11.00 ha la parte bassa alta fino a q.ta -2.75. Infatti da -2.75 a +1.67 ci sono i pilastri. Si considera il cassone riempito d'acqua fino a q.ta +0.00

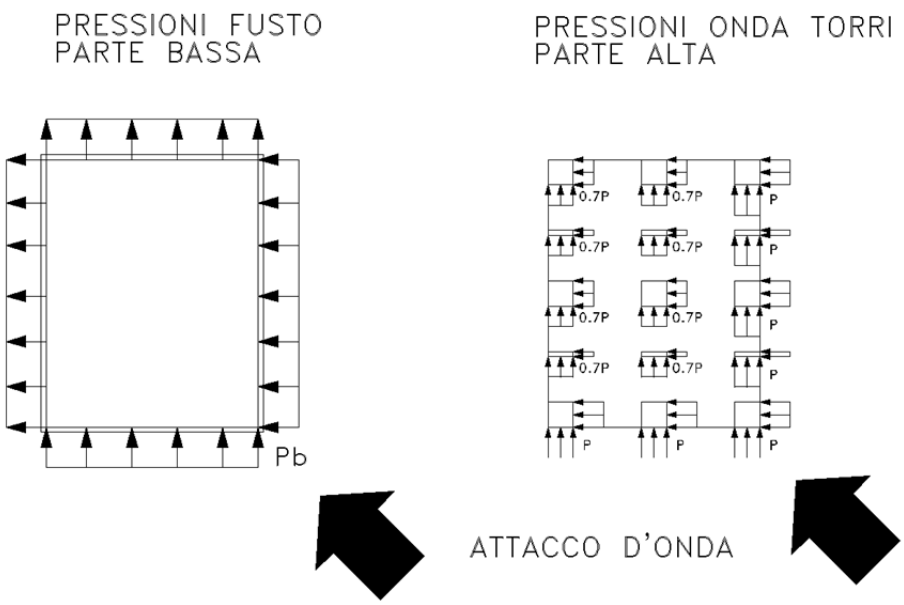


FIG. 3.8 - CASSONE A GIORNO - ATTACCO D'ONDA OBLIQUO - AZIONI

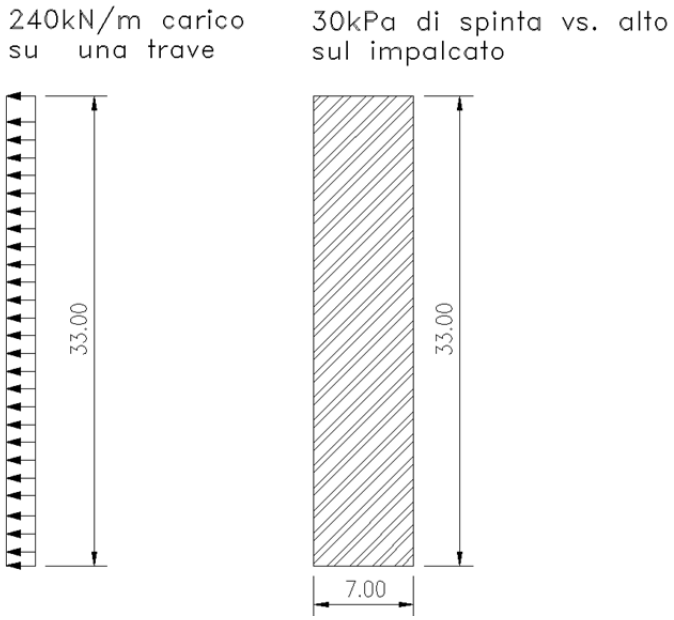


FIG. 3.9 - CASSONE A GIORNO - ATTACCO D'ONDA OBLIQUO-AZIONI SU TRAVE E IMPALCATO TR=250ANNI - PRIME 3 FILE

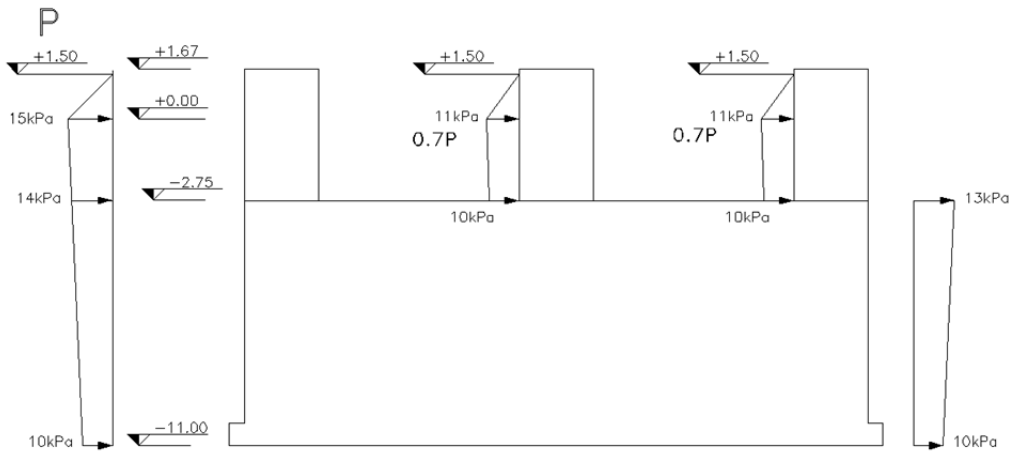


FIG. 3.10 - CASSONE A Q.TA-11.00 - DIAGRAMMA DI SPINTA IN FASE DI CRESTA(TR=5ANNI)

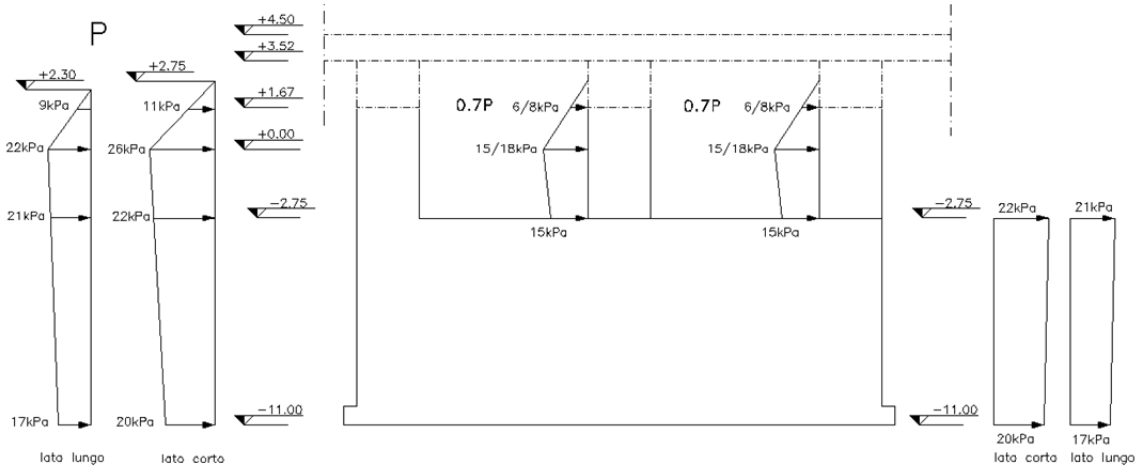


FIG. 3.11 - CASSONE A Q.TA-11.00 - DIAGRAMMA DI SPINTA IN FASE DI CRESTA(TR=250ANNI)-PRIME TRE FILE

Di seguito si riporta una Tab. con il calcolo del peso del cassone gravante compreso di travi e di impalcato

	Peso	Pscanno
Peso cassone riempito d'acqua sottospintato	**26679kN**	**44.1kPa (27.5x22)**
Travi n°3 L=36m/cad	7628kN	
Impalcato 80cm 0.8x25x(28.5x36)	20520kN	
Pavimentazione 18cm 0.18x20x1026	3694kN	
Totale impalcato	**31842kN**	**52.6kPa**
Totale cassone con impalcato	**58521kN**	**96.7kPa**

TAB. 3-1 - CASSONE A GIORNO Q.-11.00 - CARICHI VERTICALI

Si trascura l'azione verticale dell'onda.

Verifica cassone a giorno a q.-11.00 soggetto ad onda obliquo 45°- senza impalcato con cresta d'onda con periodo di ritorno di 5anni

Verifiche				
Peso netto cassone senza impalcato	N=	26679	kN	
Peso cassone sottospintato senza impalcato		**26679**	**kN**	
Verifica stabilità cassone		Lato 21/22m	L 26.5/27.5m	
Spinta Onda Pt bassa da -11.0 a -2.75 - cresta	99kN/m	2079	2624	kN
Spinta Onda Pt bassa da -11.0 a -2.75 - cavo	95kN/m	1995	2518	kN
Spinta pilastri interni(0.7P) -2.75 +1.5; 93kN/t x 4	372kN/lato	372	372	kN
Spinta pilastri esterni (P) -2.75 a +1.5;128kN/t x 5	640kN/lato	640	640	kN
Sp. pilastrini int. (0.7P) -2.75 a +1.5; 93kN/p x 4	372kN	372	-	kN
Spinta pilastrini int.(0.7P) -2.75 a +1.5; 19kN/p x 4	76kN	-	76	kN
Sp. pilastrini esterni (P) -2.75 a +1.5;26kN/p x2	52kN	52	-	kN
Sp. pilastrini esterni (P) -2.75 a +1.5;128kN/p x 2	256kN	-	256	kN
	Spinta totale sul cassone	**5510**	**6486**	kN
	N totale	**26679**		**kN**
VERIFICHE DI SCORRIMENTO 1.0PP+1.5Cresta d'onda (A1-M1-R3)				
Ff = $1.5x(5510^2+6486^2)^{0.5}$	1.5x8510		12765	kN
N = 1.0xpp	1.0x26679		26679	kN
Scorrimento FS=0.58xN/Ff	0.58x26679 /12765		**1.21**	**>1.1**

Verifica cassone a giorno a q.-11.00 soggetto ad onda obliquo 45°- con impalcato con cresta d'onda con periodo di ritorno di 250anni - prime tre file

Verifiche				
Peso netto cassone senza impalcato	N=	26679	kN	
	Impalcato	31842	kN	
Peso cassone sottospintato con impalcato		**58521**	**kN**	

Riempimento cassone 434m^3/m x **3m** x 9kN/m^3		11718	kN	
Peso cassone sottospintato con impalcato con riempimento		**70239**	**kN**	
Verifica stabilità cassone		Lato 21/22m	L 26.5/27.5m	
Spinta Onda Pt bassa da -11.0 a -2.75 cresta	173/157kN/m	3633	4134	kN
Spinta Onda Pt bassa da -11.0 a -2.75 cavo	173/157kN/m	3633	3949	kN
Spinta pilastri int.(0.7P) da-2.75 +1.67; 168/148kN/t x 4	672/592kN/lato	672	592	kN
Spinta pilastri est. (P) da -2.75 a +1.67;242/211kN/t x 5	1210/1055kN/lato	1210	1055	kN
Sp. pilastrini int. (0.7P) da -2.75 a +1.67; 168kN/p x 4	672kN	672	-	kN
Spinta pilastrini int.(0.7P) da -2.75 a +1.67;30kN/p x 4	120kN	-	120	kN
Sp. pilastrini esterni (P) da -2.75 a +1.67;48kN/p x2	96kN	96	-	kN
Sp. pilastrini esterni (P) da -2.75 a +1.67;211kN/p x 2	422kN	-	422	kN
	Spinta sul solo cassone	**9916**	**10272**	kN
Sforzo orizzontale sulle travi risultante	240kN/mx33m		7920	kN
	Spinta totale sul cassone	**9916**	**18192**	**kN**
Sottospinta verticale su impalcato	30kPax7x33m	-6930		kN
VERIFICHE DI SCORRIMENTO 1.0PP+1.5Cresta d'onda (A1-M1-R3)				
Ff = 1.5x((9916^2+18192^2)$^{0.5}$		1.5x20719	31079	kN
N =		N = 1.0x70239-1.5x6930	59844	kN
Scorrimento FS=0.58xN/Ff		0.58x59844/31079	**1.12**	**≥1.1**

3.2.2 Condizioni sismiche

La verifica di stabilità in fase sismica è statao valutata con il metodo pseudo statico utilizzando una accelerazione orizzontale di 0.15g ed una verticale di 0.075g. Oltre le masse sono state applicate le pressioni idrodinamiche dovute alla spinta dell'acqua nonché le masse addizionali per quanto riguarda i pilastri in accordo con quanto prescritto dalla EC8:Pt2:Ponti. In favore di sicurezza si trascura il peso del riempimento del cassone.

In favore di sicurezza si trascura il peso del riempimento del cassone.

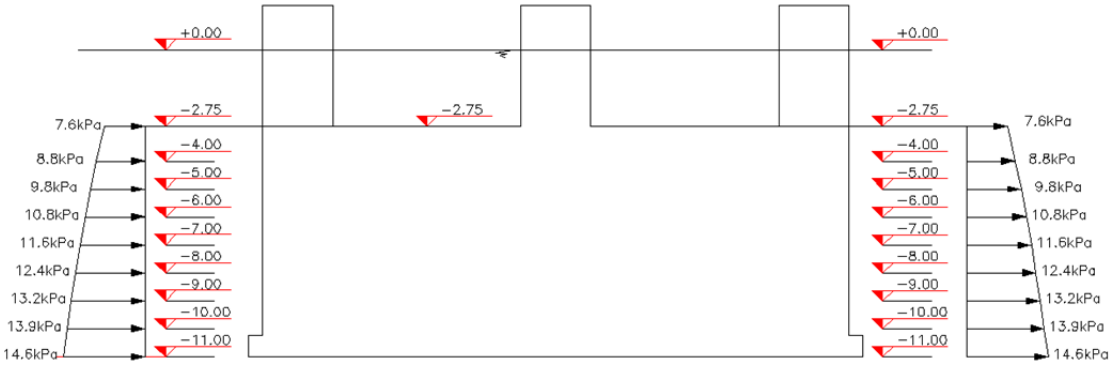


FIG. 3.12 - CASSONE A Q.TA-11.00 - DIAGRAMMA DI SPINTA IN FASE SISMICA WESTERGAARD

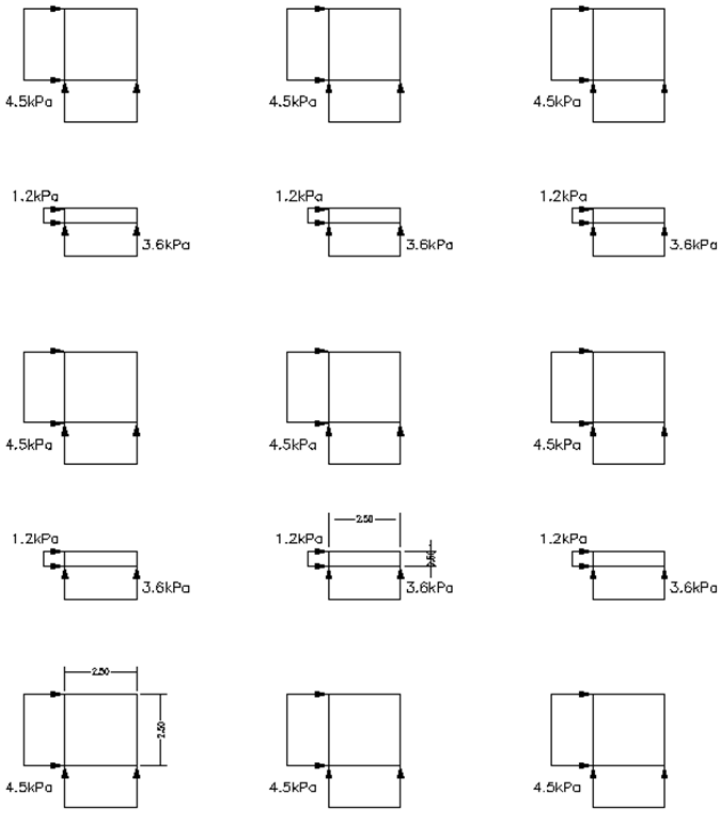


FIG. 3.13 - CASSONE A Q.TA-11.00 - SPINTE MASSE AGGIUNTE PILASTRI

Verifica cassone a giorno a q.-11.00 in fase sismica

Masse		**I_o (x0.15)**	**I_v(x0.075)**	
Peso cassone 1738.12m^3 x 25kN/m^3	43453kN	6518kN	3259kN	
Peso acqua celle 3125.5m^3 x 10.1kN/m^3	31568kN	4735kN	2368kN	
Sottospinta acqua solettone 10.1kN/m^3 x (27.5x22x0.75)m^3	-4416kN			
Sottospinta acqua fusto 10.1x(26.5x21x7.5)	-42155kN			
Sottospinta pilastri da -2.75 a 0.00 10.1x(9x2.5x2.5+6x2.5x0.5)x2.75	-1771kN			
Peso cassone sottospintato riempito d'acqua	**26679kN**	11253kN	5627	kN
Peso impalcato	**31842kN**	4776kN	2388	kN
Peso cassone sottospintanto impalcato	**58521kN**			
Spinta sismica or./Sp. Sismica verticale		**16029**	**8015**	**kN**
Spinte orizzontali Westergaard e masse aggiunte		Lato 21m	L 26.5m	
Westerg. -11.0 a -2.75; 0.15x7/12x10.1x(11^2-11$^{1/2}$x2.75$^{3/2}$)	93.6kN/m	1966	2480	kN
Spinta Westerg. lato opposta -11.0 a -2.75	93.6kN/m	1966	2480	kN
Spinta massa agg. pilastri n°2.5x2.5m;da -2.75 a 0.00; 9x11.2x2.75	277.2kN/lato	277	277	kN
Spinta massa agg. pilastri 0.5x2.5; da-2.75 a 0.00;6x0.6x2.75	9.9kN/lato	-	10	kN
Spinta massa agg. pilastri 2.5x0.5; da-2.75 a 0.00;6x9x2.75	148.5kN/lato	149	-	kN
Spinta orizzontale		**4358**	**5247**	**kN**
VERIFICHE DI SCORRIMENTO 1.0PP+EQ(kv+) (A2-M2-R2)		Lato 21m	Lato 26.5m	
Ff =4358/5247+16028		20386	21275	kN
Sforzo vertical netto N; 58521-8015 =		50506	50506	kN
Scorrimento FS=0.48xN/Ff=		1.19	1.14	≥ 1.0

3.3 Cassoni a q.ta-13.00

3.3.1 Condizioni d'esercizio

Il cassone definitivo a q.ta.-13.00 ha la parte bassa alta fino a q.ta-4.10. Infatti da -4.10 a +1.67 ci sono i pilastri. Si considera il cassone riempito d'acqua fino a q.ta +0.00.

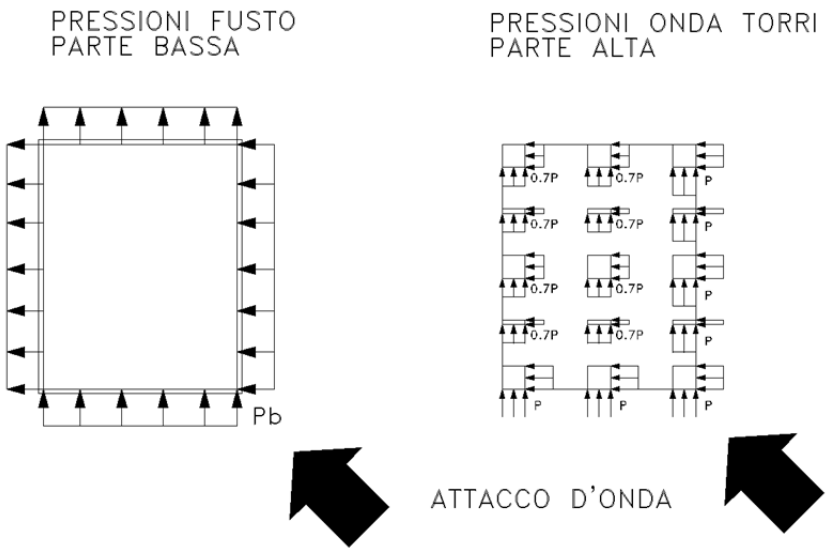


FIG. 3.14 - CASSONE A GIORNO - ATTACCO D'ONDA OBLIQUO - AZIONI

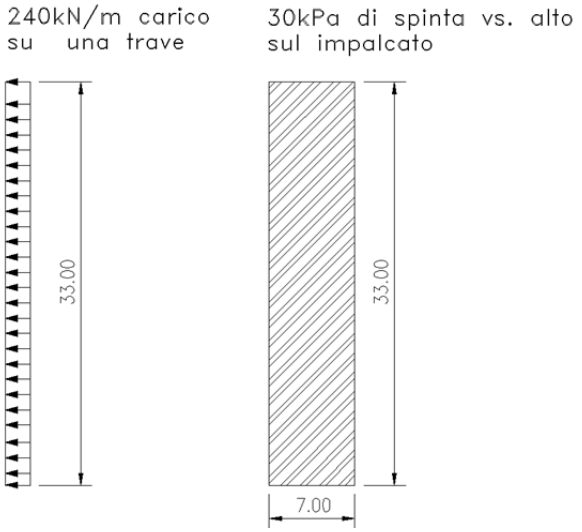


FIG. 3.15 - CASSONE A GIORNO - ATTACCO D'ONDA OBLIQUO-AZIONI SU TRAVE E IMPALCATO PRIME TRE FILE

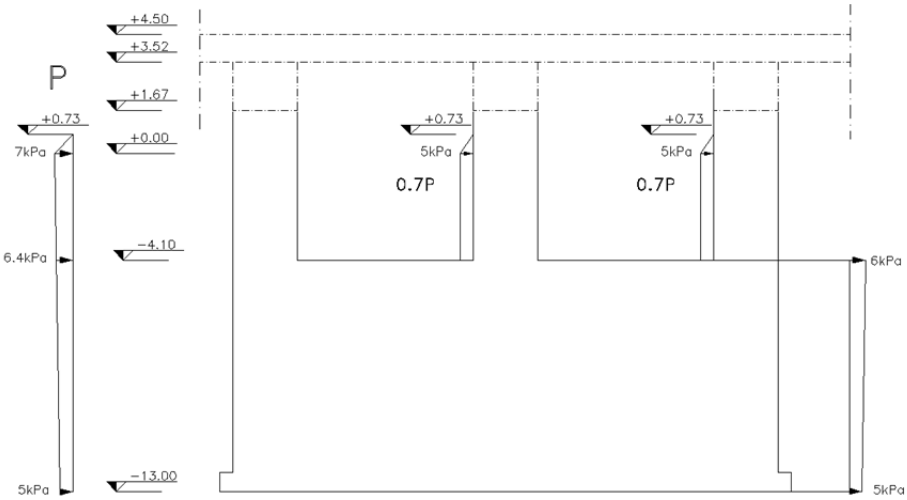


FIG. 3.16 - CASSONE A Q.TA-13.00 - DIAGRAMMA DI SPINTA IN FASE DI CRESTA(TR=5ANNI)

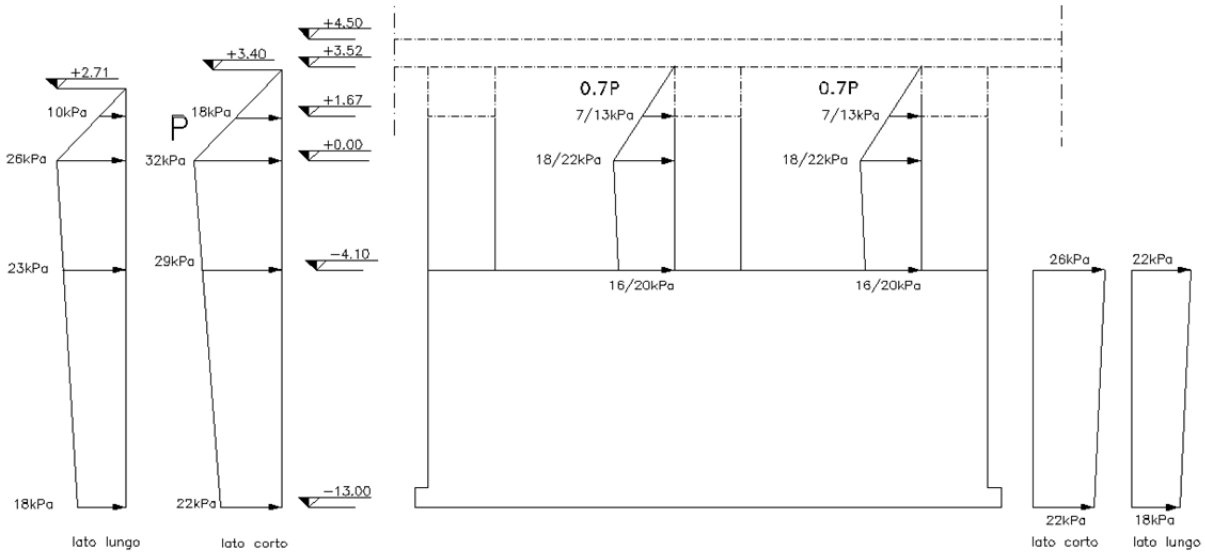


FIG. 3.17 - CASSONE A Q.TA-13.00 - DIAGRAMMA DI SPINTA IN FASE DI CRESTA(TR=250ANNI)-PRIME 3 FILE

Di seguito si riporta una Tab. con il calcolo del peso del cassone gravante compreso di travi e di impalcato.

	Peso	Pscanno
Peso cassone riempito d'acqua sottospintato	**28750kN**	**47.5kPa (27.5x22)**
Travi n°3 L=36m/cad	7628kN	
Impalcato 80cm 0.8x25x(28.5x36)	20520kN	
Pavimentazione 18cm 0.18x20x1026	3694kN	
Totale impalcato	**31842kN**	**52.6kPa**
Totale cassone con impalcato	**60592kN**	**100.1kPa**

TAB. 3-2 - CASSONE A GIORNO Q.-13.00 - CARICHI VERTICALI

Si trascura l'asse verticale dell'onda.

Verifica cassone a giorno a q.-13.00 soggetto ad onda obliquo 45°- senza impalcato con cresta d'onda con periodo di ritorno di 5 anni

Verifiche				
Peso netto cassone senza impalcato	N=	28750	kN	
Peso cassone sottospintato senza impalcato		**28750**	**kN**	
Verifica stabilità cassone		Lato 21/22m	L 26.5/27.5m	
Spinta Onda Pt bassa da -13.0 a -4.10 - cresta	51kN/m	1071	1352	kN
Spinta Onda Pt bassa da -13.0 a -4.10 - cavo	49kN/m	1029	1299	kN
Spinta pilastri interni(0.7P) -4.10 +0.73; 53kN/t x 4	212kN/lato	212	212	kN
Spinta pilastri esterni (P) -4.10 a +0.73;75kN/t x 5	375kN/lato	375	375	kN
Sp. pilastrini int. (0.7P) -4.10 a +0.73; 53kN/p x 4	212kN/lato	212	-	kN
Spinta pilastrini int.(0.7P) -4.10 a +0.73; 11kN/p x4	44kN/lato	-	44	kN
Sp. pilastrini esterni (P) -4.10 a +0.73;75kN/p x2	150kN	150	-	kN
Sp. pilastrini esterni (P) -4.10 a +1.5;15kN/p x 2	30kN	-	30	kN
	Spinta totale sul cassone	**3049**	**3312**	kN
	N totale	**28750**		**kN**
VERIFICHE DI SCORRIMENTO 1.0PP+1.5Cresta d'onda (A1-M1-R3)				
Ff = $1.5x(3049^2+3312^2)^{0.5}$	1.5x4501		6752	kN
N = 1.0xpp	1.0x28750		28780	kN
Scorrimento FS=0.58xN/Ff	0.58x28780 /6752		**2.47**	**>1.1**

Verifica cassone a giorno a q.-13.00 soggetto ad onda obliquo 45°- con impalcato con cresta d'onda con periodo di ritorno di 250anni - prime tre file

Verifiche				
Peso netto cassone senza impalcato	N=	28750	kN	
	Impalcato	31842	kN	
	Peso cassone sottospintato con impalcato	**60592**	**kN**	
Riempimento cassone 434m^3/m x **5.5m** x 9kN/m^3		21483	kN	
	Peso cassone sottospintato con impalcato con riempimento	**82075**	**kN**	
Verifica stabilità cassone		Lato 21/22m	L 26.5/27.5m	
Spinta Onda Pt bassa da -13.0 a -4.10 - cresta	227/182kN/m	4767	4823	kN
Spinta Onda Pt bassa da -13.0 a -4.10 - cavo	214/178kN/m	4494	4717	kN
Spinta pilastri int.(0.7P) da -4.10 a +1.67; 288/226kN/t x 4	1152/904kN/lato	1152	904	kN
Spinta pilastri est. (P) da -4.10 a +1.67;417/326kN/t x 5	2085/1630kN/lato	2085	1630	kN
Sp. pilastrini int. (0.7P) da -4.10 a +1.67; 288kN/p x 4	1152kN	1152	-	kN
Spinta pilastrini int.(0.7P) da-4.10 a +1.67;45kN/p x 4	180kN	-	180	kN
Sp. pilastrini esterni (P) da -4.10 a +1.67;65kN/p x2	130kN		130	kN
Sp. pilastrini esterni (P) da -4.10 a +1.67;417kN/p x 2	834kN	834	-	kN
	Spinta sul solo cassone	**14484**	**12384**	kN
Sforzo orizzontale sulle travi risultante	240kN/mx33m		**7920**	kN
	Spinta totale sul cassone	**14484**	**20304**	**kN**
Sottospinta verticale su impalcato	30kPax7x33m	-6930		kN
Risultante sp. verticali a q.ta-4.10 al netto delle pilastri	1113kNx90%	1002		kN
VERIFICHE DI SCORRIMENTO 1.0PP+1.5Cresta d'onda (A1-M1-R3)				
Ff = 1.5x(14484^2+20304^2)$^{0.5}$	1.5x24941	37412	kN	
N =	1.0x82075-1.5x(6930-1002)	73183	kN	
Scorrimento FS=0.58xN/Ff	0.58x73183/37412	**1.13**	**≥1.1**	

3.3.2 Condizioni sismiche

La verifica di stabilità in fase sismica è stato valutatao con il metodo pseudo statico utilizzando una accelerazione orizzontale di 0.15g ed una verticale di 0.075g. Oltre le masse sono state applicate le pressioni idrodinamiche dovute alla spinta dell'acqua nonché le masse addizionali per quanto riguarda i pilastri in accordo con quanto prescritto dalla EC8:Pt2:Ponti. In favore di sicurezza si trascura il peso del riempimento del cassone.

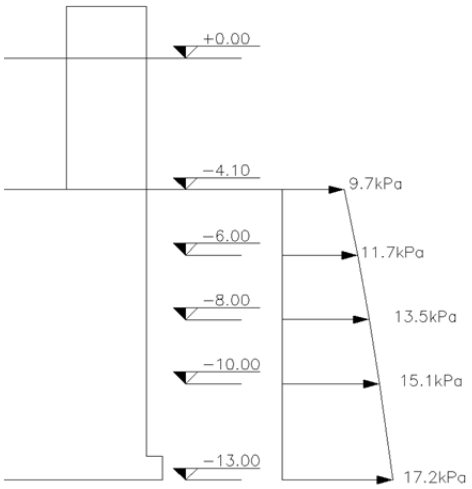


FIG. 3.18 - CASSONE A Q.TA-13.00 - DIAGRAMMA DI SPINTA IN FASE SISMICA WESTERGAARD

Masse		**I_o (x0.15)**	**I_v(x0.075)**	
Peso cassone 1879.17m^3 x 25kN/m^3	46979kN	7047kN	3524kN	
Peso acqua celle 3429.2m^3 x 10.1kN/m^3	34635kN	5195kN	2598kN	
Sottospinta acqua solettone 10.1kN/m^3 x (27.5x22x0.75)m^3	-4416kN			
Sottospinta acqua fusto 10.1x(26.5x21x8.15)	-45808kN			
Sottosp. pilastri da -4.10 a 0.00 10.1x(9x2.5x2.5+6x2.5x0.5)x4.10	-2640kN			
Peso cassone sottospintato riempito d'acqua	**28750kN**	12242	6122	kN
Peso impalcato	**31842kN**	4776	2388	kN
Peso cassone sottospintanto impalcato	**60592kN**			
Spinta sismica or./Sp. Sismica verticale		**17018**	**8510**	**kN**
Spinte orizzontali Westergaard e masse aggiunte		Lato 21m	L 26.5m	
Westerg. -13.0 a -4.1; 0.15x7/12x10.1x(13^2-13$^{1/2}$x4.1$^{3/2}$)	122.9kN/m	2581	3257	kN
Spinta Westerg. lato opposta da -13.0 a -4.1	122.9kN/m	2581	3257	kN
Spinta massa agg. pilastri n°2.5x2.5m; da -4.10 a 0.00; 9x11.2x4.1	410kN/lato	410	410	kN
Spinta massa agg. pilastri 0.5x2.5; da -4.10 a 0.00;6x0.6x4.1	14.8kN/lato	-	15	kN
Spinta massa agg. pilastri 2.5x0.5; da -4.10 a 0.00;6x9x4.1	221.4kN/lato	221	-	kN
Spinta orizzontale		5793	6939	kN
VERIFICHE DI SCORRIMENTO 1.0PP+EQ(kv+) (A2-M2-R2)		Lato 21m	Lato 26.5m	
Ff =5793/6939+17018		22811	23957	kN
Sforzo vertical netto N; 60592-8510 =		52082	52082	kN
Scorrimento FS=0.48xN/Ff=		1.09	1.04	≥ 1.0

3.4 Cassoni a q.ta-16.50 - cassoni di piattaforma(B2-B3,C2-C3)

3.4.1 Condizioni d'esercizio

Il cassone definitivo a q.ta.-16.50 ha la parte bassa alta fino a q.ta-6.30. In fatti da -6.30 a +1.67 ci sono *i pilastri. Si considera il cassone riempito d'acqua fino a q.ta +0.00.*

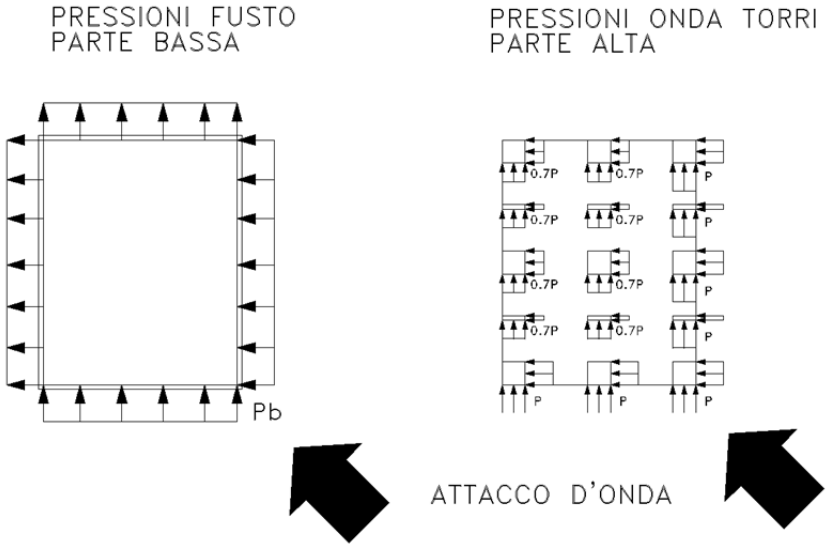


FIG. 3.19 - CASSONE A GIORNO - ATTACCO D'ONDA OBLIQUO - AZIONI

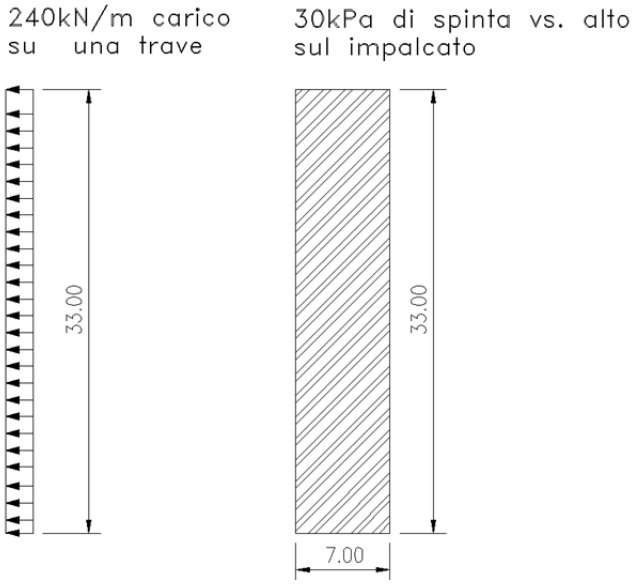


FIG. 3.20 - CASSONE A GIORNO - ATTACCO D'ONDA OBLIQUO-AZIONI SU TRAVE E IMPALCATO - PRIME TRE FILE

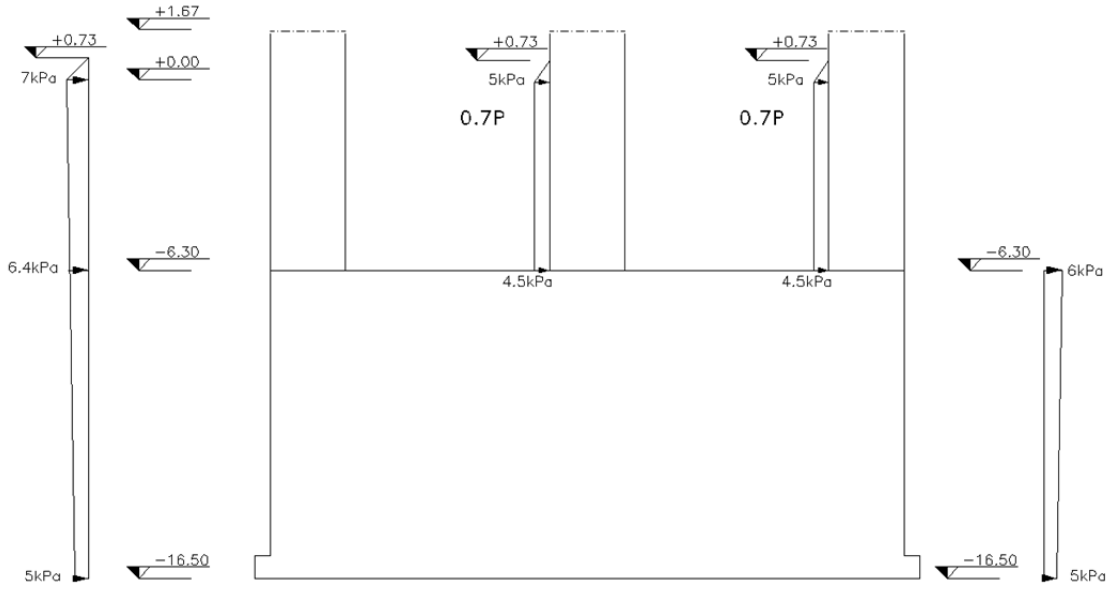


FIG. 3.21 - CASSONE A Q.TA-16.50 - DIAGRAMMA DI SPINTA IN FASE DI CRESTA(TR=5ANNI)

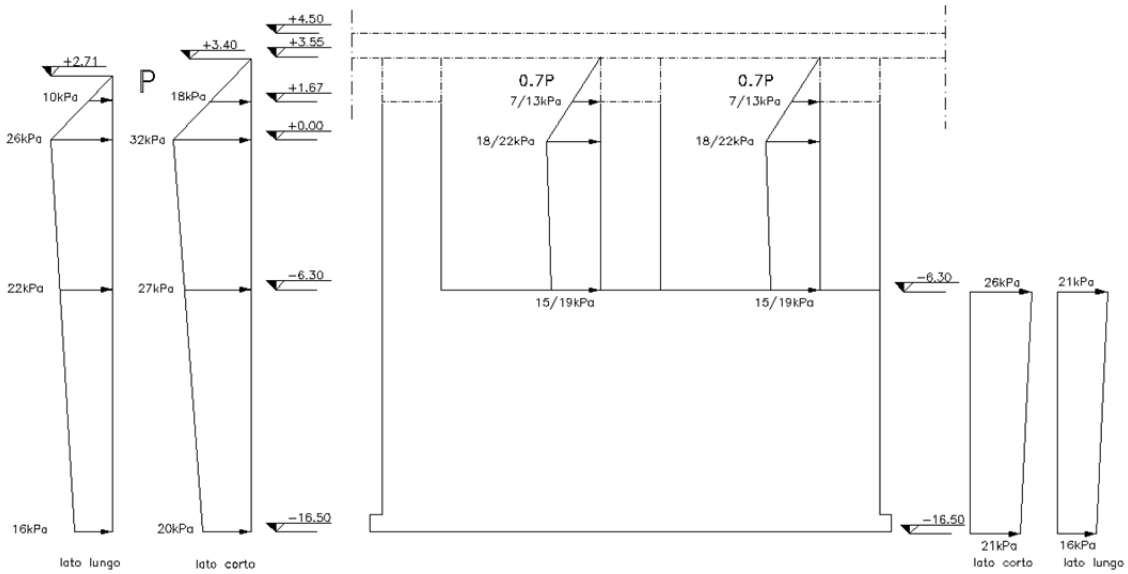


FIG. 3.22 - CASSONE A Q.TA-16.50 - DIAGRAMMA DI SPINTA IN FASE DI CRESTA(TR=250ANNI)

Di seguito si riporta una Tab. con il calcolo del peso del cassone gravante compreso di travi e di impalcato.

	Peso	Pscanno
Peso cassone riempito d'acqua sottospintato	**33197kN**	**54.9kPa (22x27.5)**
Travi n°3 L=36m/cad	7628kN	
Impalcato 80cm 0.8x25x(28.5x36)	20520kN	
Pavimentazione 18cm 0.18x20x1026	3694kN	
Totale impalcato	**31842kN**	**52.6kPa**
Totale cassone con impalcato	**65039kN**	**107.5kPa**

TAB. 3-3 - CASSONE A GIORNO Q.-16.50 - CARICHI VERTICALI

Si trascura l'azione verticale dell'onda.

Verifica cassone a giorno a q.-16.50 soggetto ad onda obliquo - senza impalcato con cresta d'onda con periodo di ritorno di 5anni

Verifiche				
Peso netto cassone senza impalcato	N=	33197	kN	
Peso cassone sottospintato senza impalcato		**33197**	**kN**	
Verifica stabilità cassone		Lato 21/22m	L 26.5/27.5m	
Spinta Onda Pt bassa da -16.5 a -6.30 - cresta	58 kN/m	1218	1537	kN
Spinta Onda Pt bassa da -16.5 a -6.40 - cavo	56kN/m	1176	1484	kN
Spinta pilastri int.(0.7P) -6.40 +1.67; 88kN/t x 4	352kN/lato	352	352	kN
Spinta pilastri esterni (P) -6.40 a +1.67;123kN/t x 5	615kN/lato	615	615	kN
Sp. pilastrini int. (0.7P) -6.40 a +1.67; 88kN/p x 4	352kN/lato	352	-	kN
Spinta pilastrini int.(0.7P) -6.40 a +1.67; 88kN/p x4	352kN/lato	-	352	kN
Sp. pilastrini esterni (P) -6.40 a +1.67;123kN/p x2	246kN	246	-	kN
Sp. pilastrini esterni (P) -6.40 a +1.67;123kN/p x 2	246kN	-	246	kN
	Spinta totale sul cassone	**3959**	**4586**	kN
	N totale	**33197**		**kN**
VERIFICHE DI SCORRIMENTO 1.0PP+1.5Cresta d'onda (A1-M1-R3)				
Ff = $1.5x(3959^2+4586^2)^{0.5}$	1.5x6058		9088	kN
N = 1.0xpp	1.0x33197		33197	kN
Scorrimento FS=0.58xN/Ff	0.58x33197 /9088		**2.12**	**≥1.1**

Verifica cassone a giorno a q.-16.50 soggetto ad onda obliquo 45°- con impalcato con cresta d'onda con periodo di ritorno di 250anni

Verifiche				
Peso netto cassone senza impalcato	N=	33197	kN	
	Impalcato	31842	kN	
Peso cassone sottospintato con impalcato riempimento		**65039**	**kN**	
Riempimento cassone (434m^3/m x **6.5m**) x 9kN/m^3		25389	kN	
Peso cassone sottospintato con impalcato con riempimento		**90428**	**kN**	
Verifica stabilità cassone		Lato 21/22m	L 26.5/27.5m	
Spinta Onda Pt bassa da -16.5 a -6.30 - cresta	240/194kN/m	5040	5141	kN
Spinta Onda Pt bassa da -16.5 a -6.30 - cavo	240/189kN/m	5040	5009	kN
Spinta pilastri int.(0.7P) -6.30 +1.67; 396/312kN/t x4	1584/1248kN/lato	1584	1248	kN
Spinta pilastri est. (P) -6.30 a +1.67;569/453kN/t x 5	2845/2265kN/lato	2845	2265	kN
Sp. pilastrini int. (0.7P) -6.30 a +1.67; 396kN/p x 4	1584kN	1584	-	kN
Spinta pilastrini int.(0.7P) -6.30 a +1.67;62kN/p x 4	248kN	-	248	kN
Sp. pilastrini esterni (P) -6.30 a +1.67;91kN/p x2	182kN		182	kN
Sp. pilastrini esterni (P) -6.30 a +1.67;569kN/p x 2	1138kN	1138	-	kN
	Spinta sul solo cassone	**17231**	**14093**	kN
Sforzo orizzontale sulle travi risultante	240kN/mx33m		**7920**	kN
	Spinta totale sul cassone	**17231**	**22013**	**kN**
Sottospinta verticale su impalcato	30kPax7x33m	-6930		kN
Risultante sp. verticali a q.ta-6.30 al netto delle pilastri	557kNx90%	501		kN
VERIFICHE DI SCORRIMENTO 1.0PP+1.5Cresta d'onda (A1-M1-R3)				
Ff = 1.5x(17231^2+22013^2)$^{0.5}$	1.5x27955		41933	kN
N =	1.0x90428-1.5x(6930-501)		80785	kN
Scorrimento FS=0.58xN/Ff	0.58x80785/41933		**1.12**	**≥1.1**

3.4.2 Condizioni sismiche

Le spinte di Westergaard sono calcolate dalla quota di imbasamento fino alla quotà -6.30m mentre le pressioni dovute alle masse aggiunte sono come riportato in precedenza per i cassoni a q.ta. -9.50 e -11.00.

In favore di sicurezza si trascura il peso del riempimento del cassone.

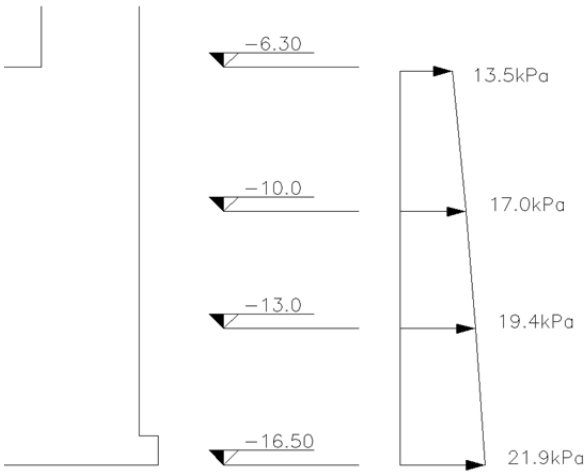


FIG. 3.23 - CASSONE A Q.TA-16.50 - DIAGRAMMA DI SPINTA IN FASE SISMICA WESTERGAARD

Masse		**I_o (x0.15)**	**I_v(x0.075)**	
Peso cassone 2176m^3 x 25kN/m^3	54400kN	8160kN	4080kN	
Peso acqua celle 3888m^3 x 10.1kN/m^3	39269kN	5890kN	2945kN	
Sottospinta acqua solettone 10.1kN/m^3 x (27.5x22x0.75)m^3	-4416kN			
Sottospinta acqua fusto 10.1x(26.5x21x9.45)	-53115kN			
Sottosp. pilastri da -6.30 a 0.00 10.1x(9x2.5x2.5+6x2.5x0.5)x6.3	-4057kN			
Peso cassone sottospintato riempito d'acqua	**32081kN**	14050	7025	kN
Peso impalcato	**31842kN**	4776	2388	kN
Peso cassone impalcato sottospintato	**63923kN**			
Spinta sismica orr/Sp. Sismica verticale		**18826**	**9413**	**kN**
Spinte orizzontali Westergaard e masse aggiunte		Lato 21m	L 26.5m	
Westerg. -16.5 a -6.3; 0.15x7/12x10.1x(16.5^2-16.5$^{1/2}$x6.3$^{3/2}$)	184kN/m	3864	4876	kN
Spinta Westerg. lato opposta -16.5 a -6.3	184kN/m	3864	4876	kN
Spinta massa agg. pilastri n°2.5x2.5m;-6.30 a 0.00; 9x11.2x6.3	635kN/lato	635	635	kN
Spinta massa agg. pilastri 0.5x2.5;-6.3 a 0.00;6x0.6x6.3	22.7kN/lato	-	23	kN
Spinta massa agg. pilastri 2.5x0.5;-6.3 a 0.00;6x9x6.3	340kN/lato	340	-	kN
Spinta orizzontale		**8703**	**10410**	**kN**
VERIFICHE DI SCORRIMENTO 1.0PP+EQ(kv+) (A2-M2-R2)		Lato 21m	Lato 26.5m	
Ff =8703/10410+18826		22811	23957	kN
Sforzo vertical netto N; 63923-9413 =		54510	54510	kN
Scorrimento FS=0.48xN/Ff=		1.15	1.09	≥ 1.0

3.5 Cassoni a giorno - riepilogo zavorramento cassoni verifiche di stabilità

Di seguito si riepiloga il fabbisogno di zavorra per i cassoni a giorno per le prime tre file

Cassoni prime tre file			**Zavorra* /% di riempimento per singolo cassone**		**Zavorra* totale**	
q.ta	cassoni	N°	Onda Tr=5anni	Onda Tr=250anni	Onda Tr=5anni	Onda Tr=250anni
-9.50	C10-C11	2	-	2000kN/8%	-	4000kN
-11.00	B10-B11,C5-C9	7	-	12000kN/42%	-	84000kN
-13.00	B4-B9,C4	7	-	21500kN/69%	-	150500kN
-16.50	B2-B3,C2-C3	4	-	25400kN/70%	-	101600kN
	Totale cassoni	**29**		**Totale zavorra**		**340100kN**

*Peso zavorra sottospintato / **Necessità riempimento con gamma medio >9kN/m^3

4. VERIFICA DEL CEMENTO ARMATO DEI CASSONI MODULO B7-B8(Q.-13)/C7-C8 Q.(-11)

4.1 Dati per le verifiche delle strutture in cemento armato

4.1.1 Materiali

Per tutte le opere a progetto saranno utilizzati i seguenti materiali:

- calcestruzzo classe C35/45 confezionato con cemento pozzolanico o d'altoforno;
- classe d'esposizione parte immersa: XS2
- classe d'esposizione parte emersa: XS3
- armatura metallica in barre nervate ad aderenza migliorata tipo B450C (FeB44K).

Le resistenze caratteristiche dei materiali sono le seguenti:

- Resistenza caratteristica a compressione del calcestruzzo:
  f_{ck} = 35 N/mm^2
- Resistenza caratteristica a trazione semplice del calcestruzzo:
  f_{ctk} = 2.2 N/mm^2
- Resistenza caratteristica di snervamento dell'acciaio:
  f_{yk} = 450 N/mm^2

In conformità con quanto previsto dalla vigente normativa, nel calcolo si sono assunti i seguenti coefficienti riduttori delle resistenze caratteristiche dei materiali:

- Coefficiente di sicurezza del calcestruzzo nei calcoli allo s.l.u.: γ_c= 1.50
- Coefficiente di sicurezza dell'acciaio nei calcoli allo s.l.u.: γ_s= 1.15

4.1.2 Copriferro

Avendo l'opera una vita nominale di 50 anni ed essendo in ambiente molto aggressivo utilizzando una classe di calcestruzzo C35/45 e barre poco sensibili alla corrosione, la normativa vigente prescrive un copriferro minimo di 40mm per elementi a piastra e 45mm per gli altri elementi.

A tale valore va aggiunta una tolleranza di posa.

Pertanto per le sezioni resistenti si è osservato un copriferro di 50 mm per il cassone.

Si considera di seguito il modulo formato dai cassoni B7-B8-C7-C8 (come più rappresentativi) uniti fra loro tramite l'impalcato divisi come segue:

5.2- Verifica c.a. solettone

5.3- Verifica c.a. fusto cassoni B7-B8 (q. -13)

5.4 - Verifica c.a. fusto cassoni C7-C8 (q. -11)

5.5 - Verifica pilastri

L'impalcato sovrastante i cassoni hanno dimensioni reali di 49.50x67.3625m (2x21+7.5; 2x26.5+9.575+9.575/2).

L'impalcato modellato ha dimensioni 49.5x67.5m.

Di seguito si riporta una Fig. con le dimensioni considerati

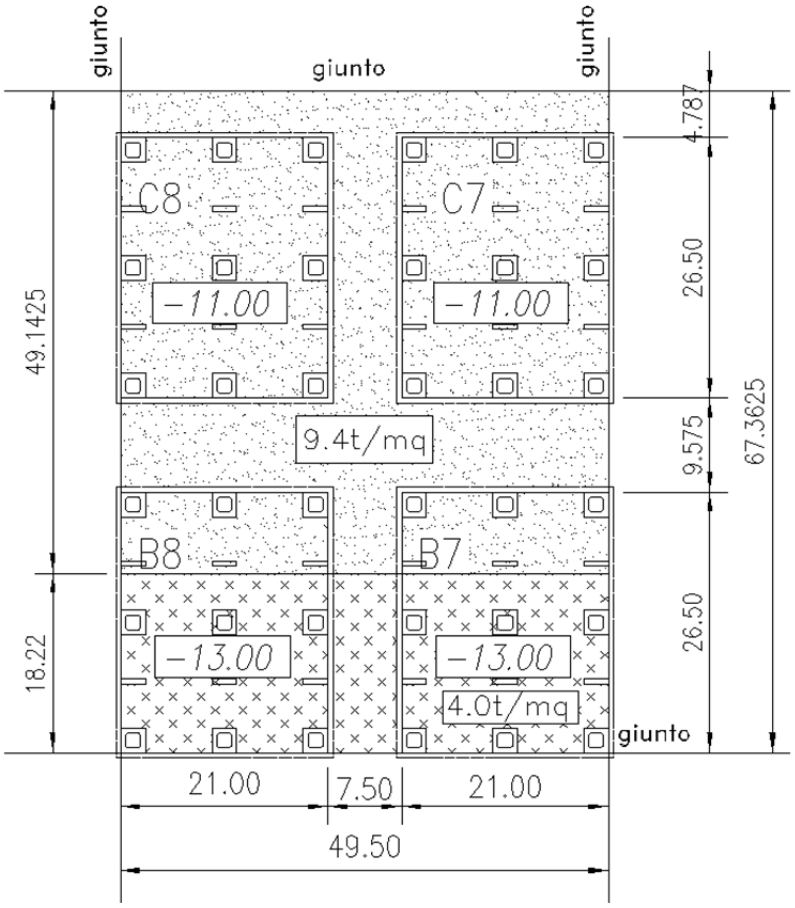


FIG. 4.1 - CASSONI B7-B8-C7-C8 CON GIUNTI E SOVRACCARICO

Si prende in considerazione sia la redistribuzione fra cassoni contigui dovuto all'impalcato continuo sia il fatto che il terreno ha un comportamento elastico (molle tipo Winkler).

Per quanto riguarda le molle si utilizzano i valori del Progetto Definitivo (Relazione di calcolo MI010P-PD-S-C-R-1001-C2-Allegato B- giugno 2009)

Molle Winkler verticali:

Perimetro per larghezza 5m: 13000kN/m^3

Parte centrale cassone: 8000kN/m^3

Per le molle orizzontali si assume 50% del valore verticale:

Si simula un modulo intero di piattaforma completo di impalcato e giunti come di seguito riportato:

I carichi variabili che gravano sull'impalcato in fase d'esercizio sono:

- Carico distribuito zona stocc. container : 92.214 kPa
- Carico distribuito zona mov. container : 4.0x9.81 : 39.24 kPa
- Variazione termica applicata all'impalcato e travi deltaT : +20°C
- Variazione termica applicata all'impalcato e travi deltaT : -8°C

Si considerano i diagrammi di spinta del moto ondoso riportato nel capitolo 3.

Il carico sul'impalcato in fase di cresta viene applicato su una trave alla volta, o la trave di bordo o la trave centrale del cassone. La pressione distribuita per la combinazione di solo cresta viene assunta vs su mentre per le combinazioni con il sovraccarico si ipotizza sia vs. su sia vs. giù.

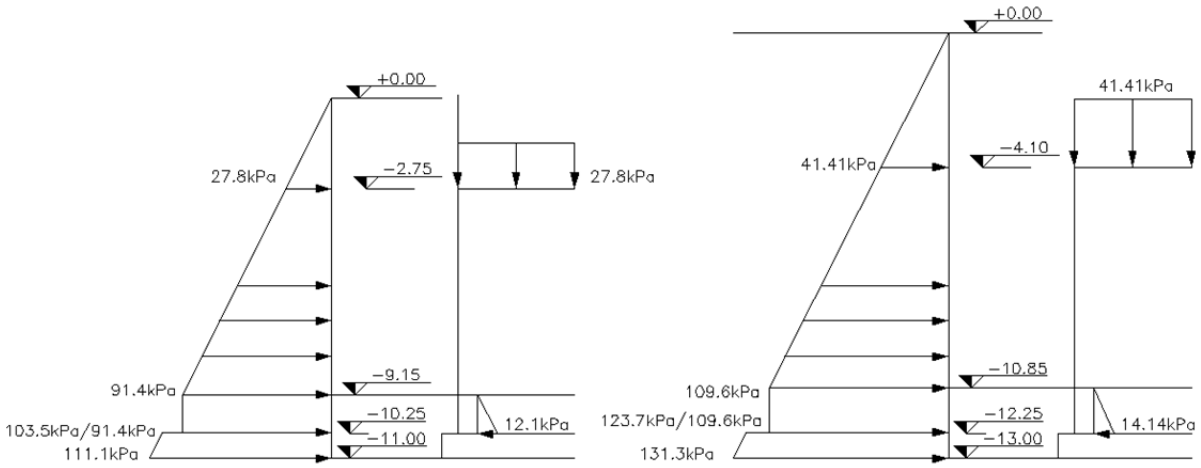


FIG. 4.2 - SPINTA IN FASE DI GALLEGGIAMENTO E AFFONDAMENTO CASSONI C7-C8 (Q.TA-11.00)/B7-B8 (Q.TA-13.00)

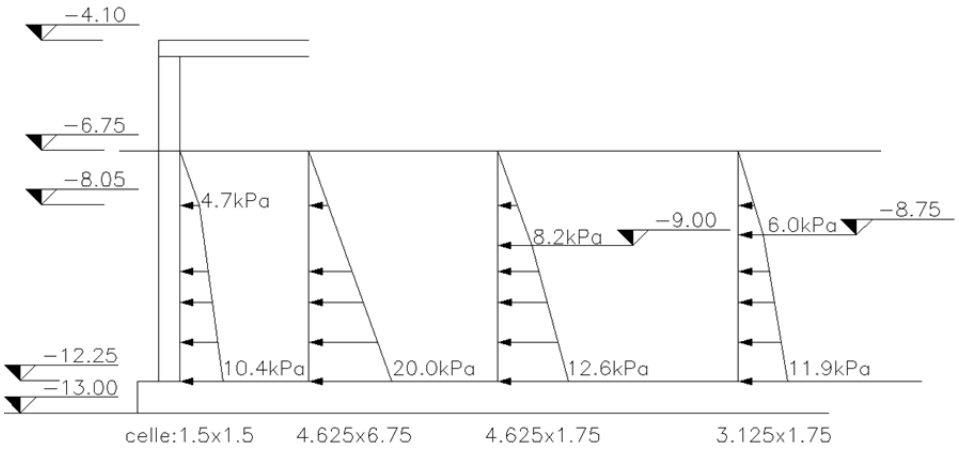


FIG. 4.3 - SPINTA SILOS A1-M1 CASSONI B7-B8 (Q.TA-13.00)

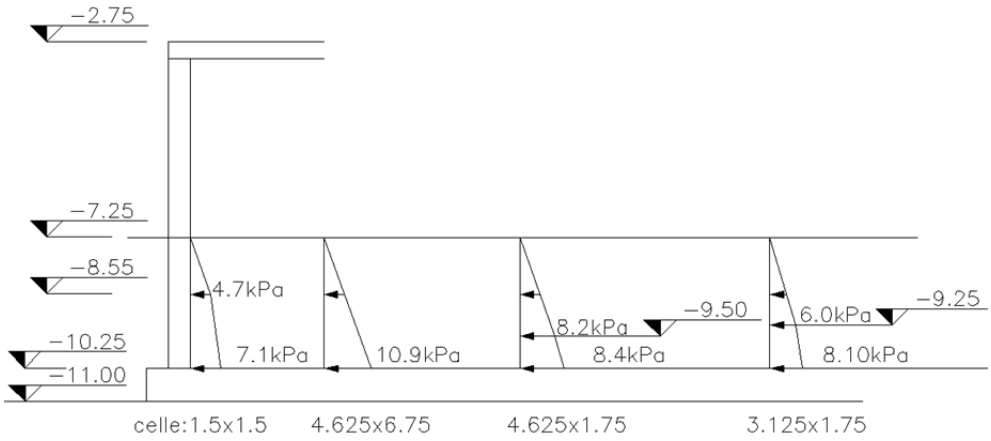


FIG. 4.4 - SPINTA SILOS A1-M1 CASSONI C7-C8 (Q.TA-11.00)

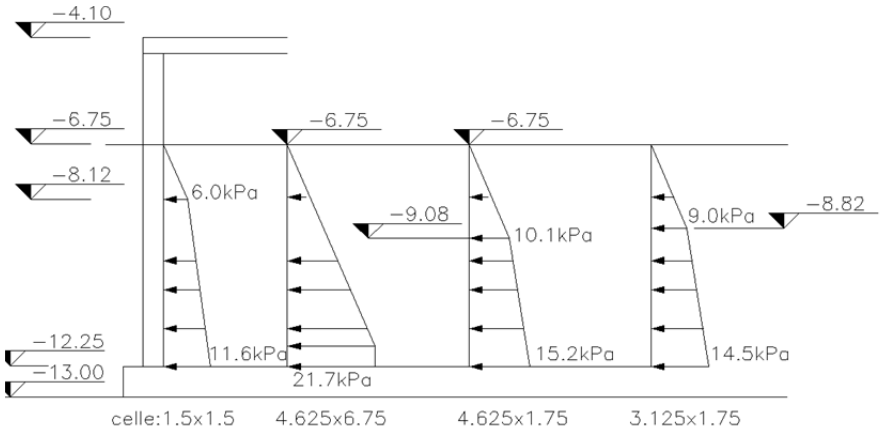
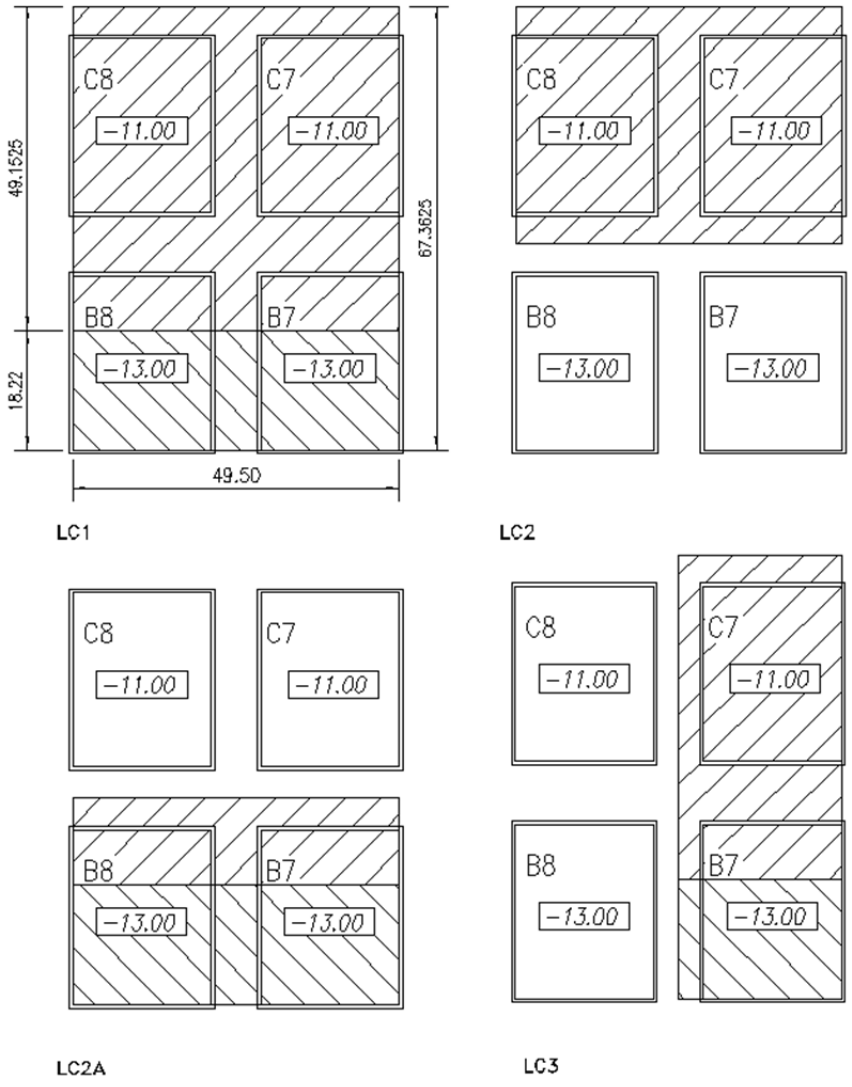
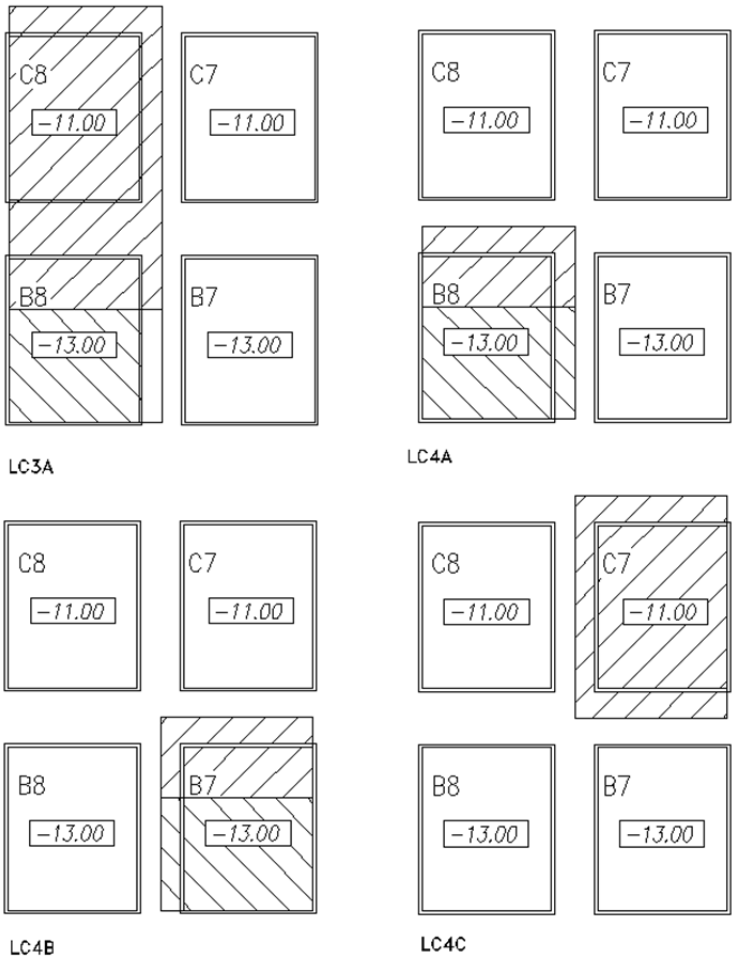
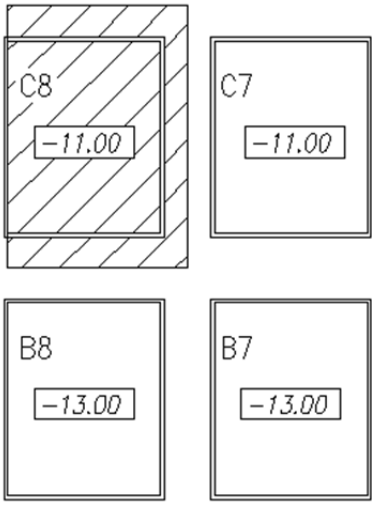


FIG. 4.5 - SPINTA SILOS A2-M2 CASSONI B7-B8 (Q.TA-13.00)

Per quanto riguarda il sovraccarico gravante di container (ScG) si sono considerate le seguenti posizioni di carico sui moduli con la stessa denominazione della relazione di calcolo dell'impalcato:




C8
−11.00
C7
−11.00
B8
−13.00
B7
−13.00
LC3A
C8
−11.00
C7
−11.00
B8
−13.00
B7
−13.00
LC4A
C8
−11.00
C7
−11.00
B8
−13.00
B7
−13.00
LC4B
C8
−11.00
C7
−11.00
B8
−13.00
B7
−13.00
LC4C



LC4D

I carichi variabili vanno combinati opportunamente secondo la normativa vigente.

Si considera agli Stati Limite Ultimo (SLU) e agli Stati Limiti d'Esercizio (SLE) per ogni posizione del sovraccarico (LC1,LC2,LC2A,LC3,LC3A,LC4A,LC4B,LC4C,LC4D) riportati sopra.

Combinazioni agli Stati Limiti Ultimi (SLU)

1. 1.0pp+1.5ScG
2. 1.3pp+1.5ScG
3. 1.0pp+1.5dT(+20°C)+1.5x1xScG
4. 1.0pp+1.5dT(-8°C)+1.5x1xScG
5. 1.3pp+1.5dT(+20°C)+1.5x1xScG
6. 1.3pp+1.5dT(-8°C)+1.5x1xScG
7. 1.0pp+1.5Cr(carico su 1°trave/trave centrale/3°trave)
8. 1.3pp+1.5Cr+1.5x1xScG
9. 1.0pp+1.5Cr+1.5x0.6xdT(+20°C)+1.5x1xScG
10. 1.0pp+1.5Cr+1.5x0.6xdT(-8°C)+1.5x1xScG
11. 1.3pp+1.5Cr+1.5x0.6xdT(+20°C)+1.5x1xScG
12. 1.3pp+1.5Cr+1.5x0.6xdT(-8°C)+1.5x1xScG
13. 1.3Galleggiamento e affondamento

Per le combinazioni con sovraccarico (1-6,8-12) si aggiunge il loadcase 1.5RMG

Combinazioni agli Stati Limiti Ultimi (SLU) - combinazioni sismiche

14. EQ - 1.0pp+EQ(dirX)+0.3EQ(dirY)+0.8ScG+0.6RMG
15. EQ - 1.0pp+EQ(dirY)+0.3EQ(dirX)+0.8ScG+0.6RMG

Combinazioni agli Stati Limiti d'Esercizio (SLE) - combinazioni frequenti

1. 1.0pp+0.5dT(+20°C)+0.8ScG
2. 1.0pp+0.5dT(-8°C)+0.8ScG
3. 1.0pp+0.9ScG
4. 1.0pp+0.2Cr+0.8ScG
5. 1.0pp+0.5dT(+20°C)+0.8ScG+0.6RMG
6. 1.0pp+0.5dT(-8°C)+0.8ScG+0.6RMG
7. 1.0pp+0.9ScG+0.6RMG
8. 1.0pp+0.2Cr+0.8ScG+0.6RMG

Combinazioni agli Stati Limiti d'Esercizio (SLE) - combinazioni rare

1. 1.0pp+1.0ScG
2. 1.0pp+1.0dT(+20°C)+1.0ScG
3. 1.0pp+1.0dT(-8°C)+1.0ScG
4. 1.0pp+1.0Cr
5. 1.0pp+1.0Cr+1.0ScG
6. 1.0pp+1.0Cr+0.6dT(+20°C)+1.0ScG
7. 1.0pp+1.0Cr+0.6dT(-8°C)+1.0ScG
8. 1.0pp+1.0ScG+1.0RMG
9. 1.0pp+1.0dT(+20°C)+1.0ScG+1.0RMG
10. 1.0pp+1.0dT(-8°C)+1.0ScG+1.0RMG
11. 1.0pp+1.0Cr
12. 1.0pp+1.0Cr+1.0ScG+1.0RMG
13. 1.0pp+1.0Cr+0.6dT(+20°C)+1.0ScG+1.0RMG
14. 1.0pp+1.0Cr+0.6dT(-8°C)+1.0ScG+1.0RMG

4.2 Cassoni modulo B7-B8-C7-C8 - Solettone

4.2.1 Verifiche agli SLU B7-B8 q.ta-13.00 - (escluso sisma)

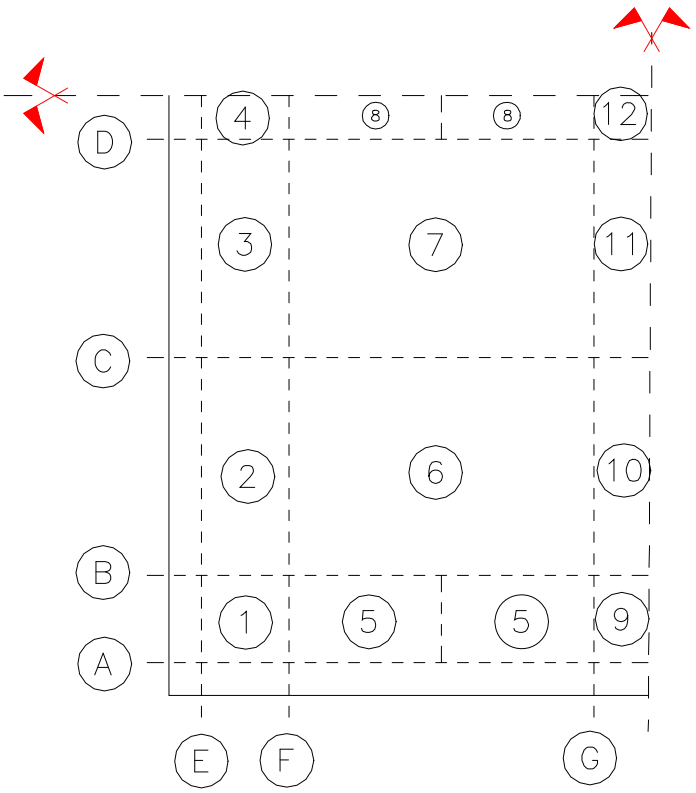


FIG. 4.6 - NUMERAZIONE CELLE E SETTI PER VERIFICHE SOLETTONE

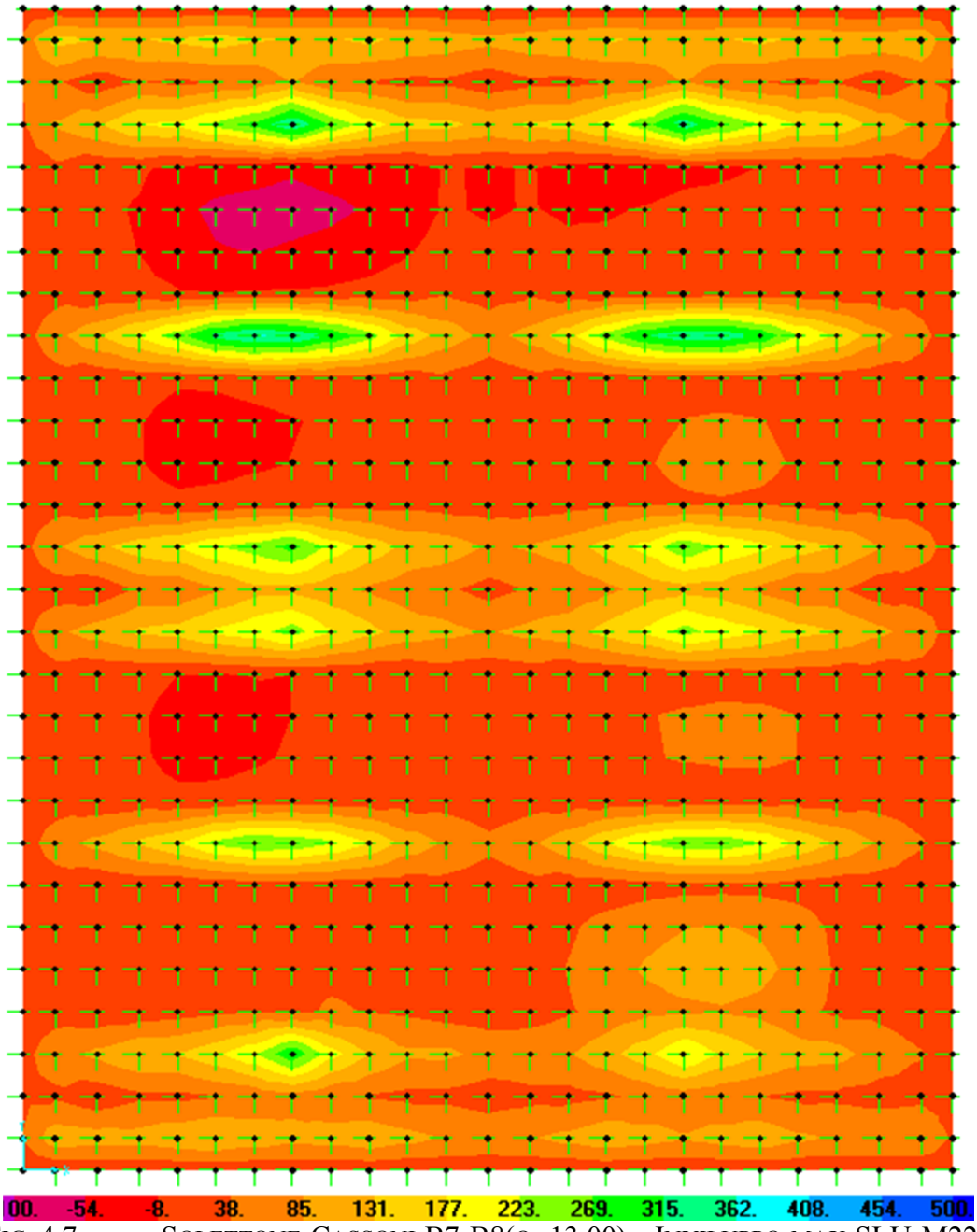


FIG. 4.7 - SOLETTONE CASSONI B7-B8(Q.-13.00) - INVILUPPO MAX SLU-M22(ESCLUSO SISMA)

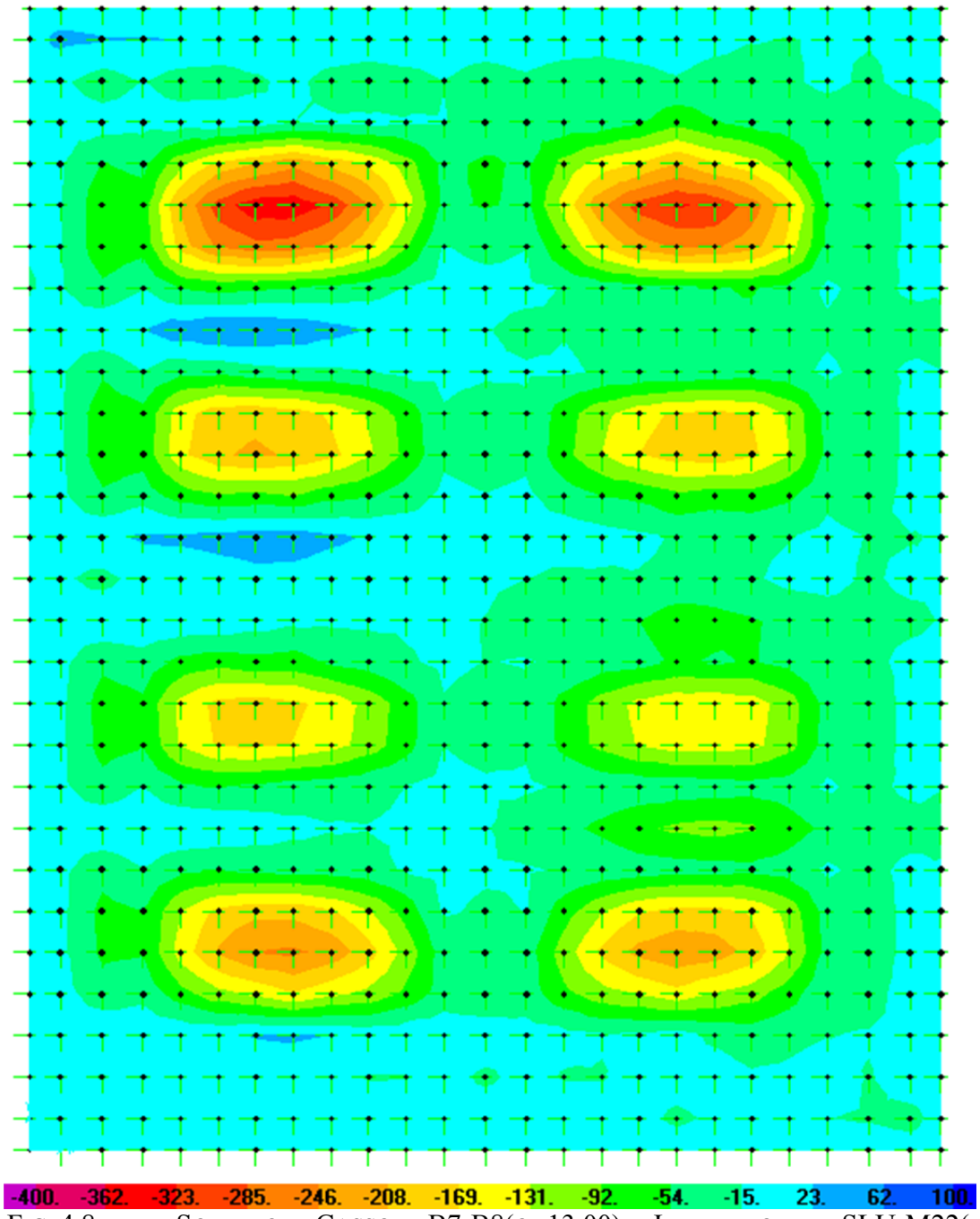


FIG. 4.8 - SOLETTONI CASSONI B7-B8(Q.-13.00) - INVILUPPO MIN SLU-M22(ESCLUSO SISMA)

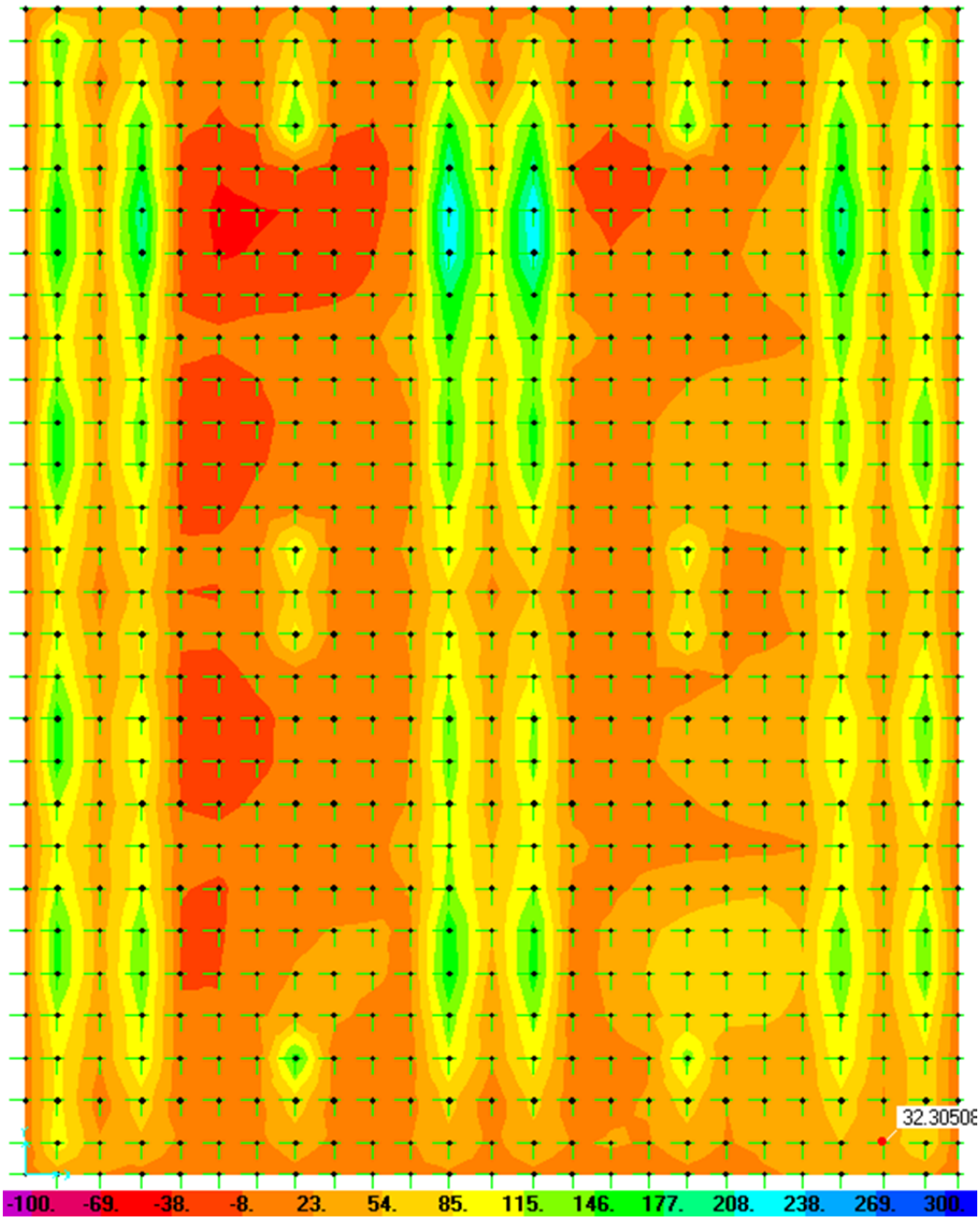


FIG. 4.9 - SOLETTONI CASSONI B7-B8(Q.-13.00) - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

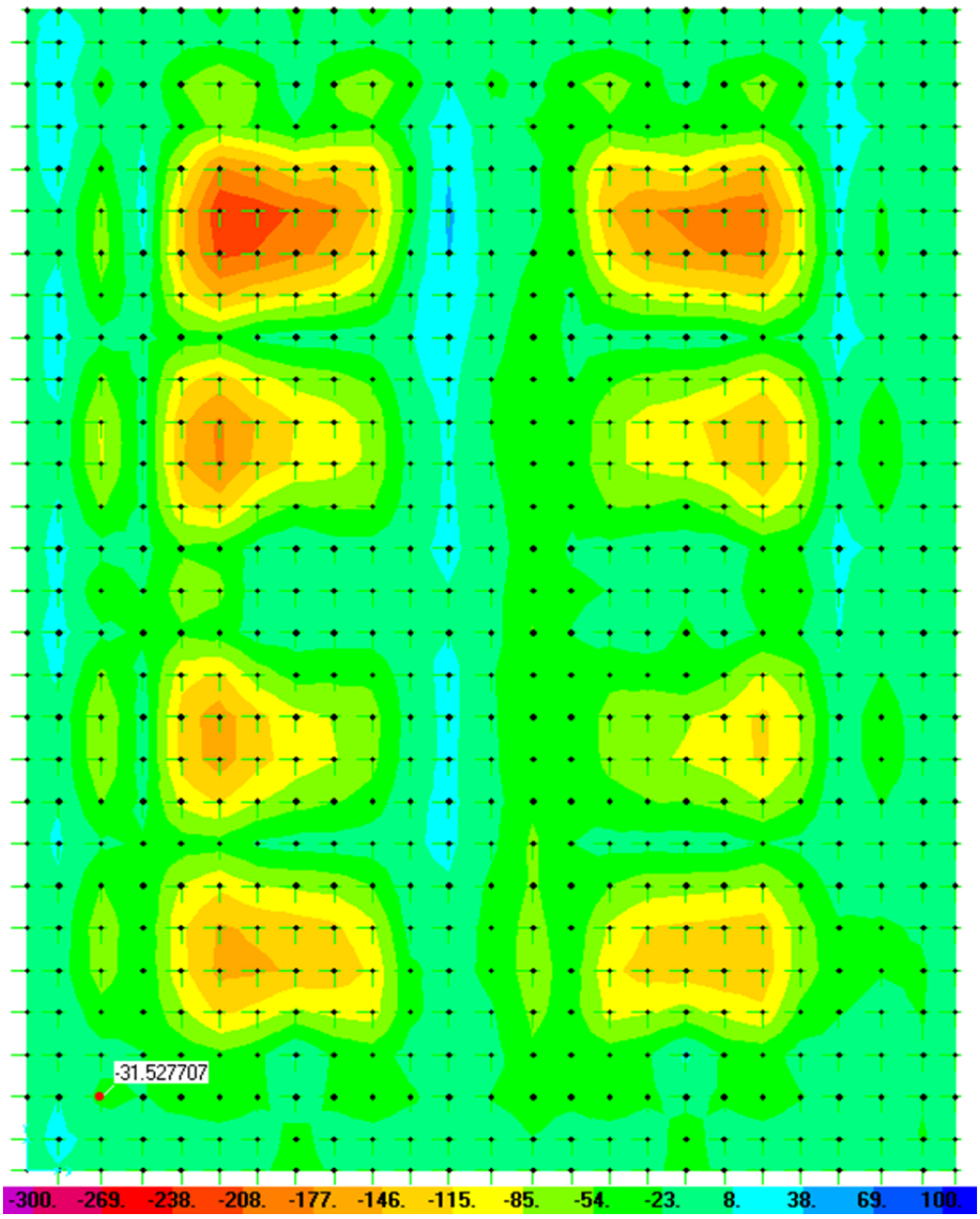


FIG. 4.10 - SOLETTONI CASSONI B7-B8(Q.-13.00) - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

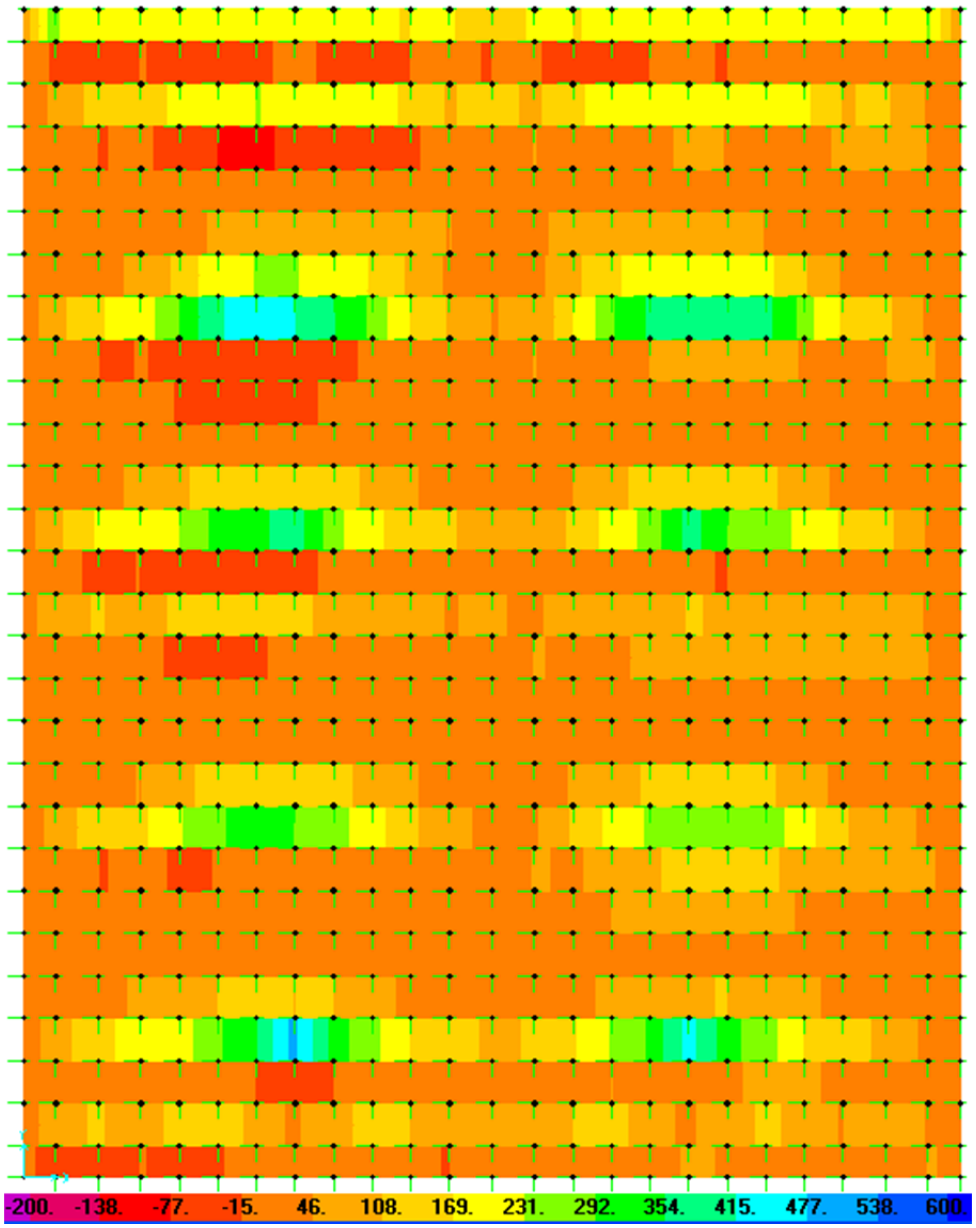


FIG. 4.11 - SOLETTONI CASSONI B7-B8(Q.-13.00) - INVILUPPO MAX SLU-V23(ESCLUSO SISMA)

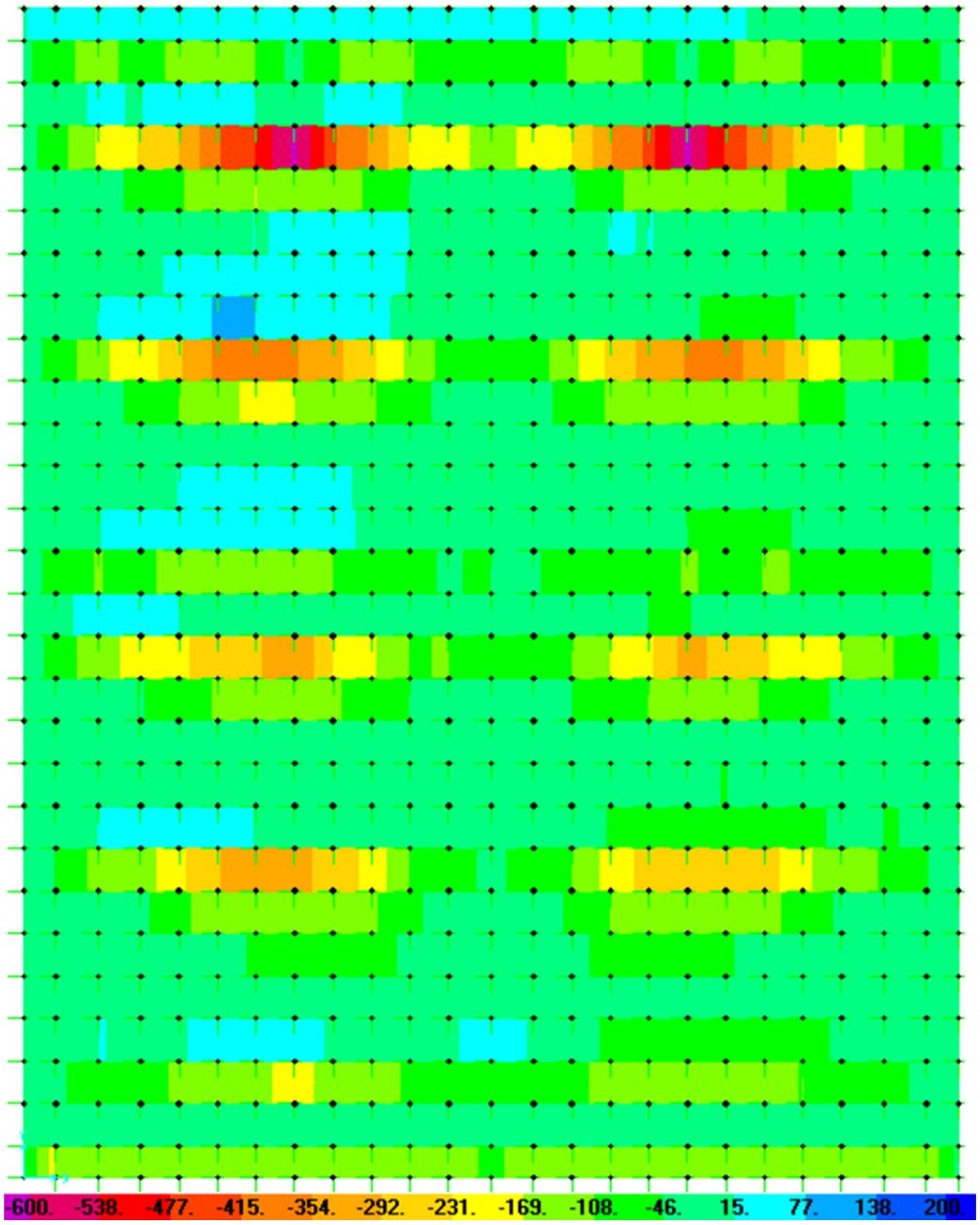


FIG. 4.12 - SOLETTONI CASSONI B7-B8(Q.-13.00) - INVILUPPO MIN SLU-V23(ESCLUSO SISMA)

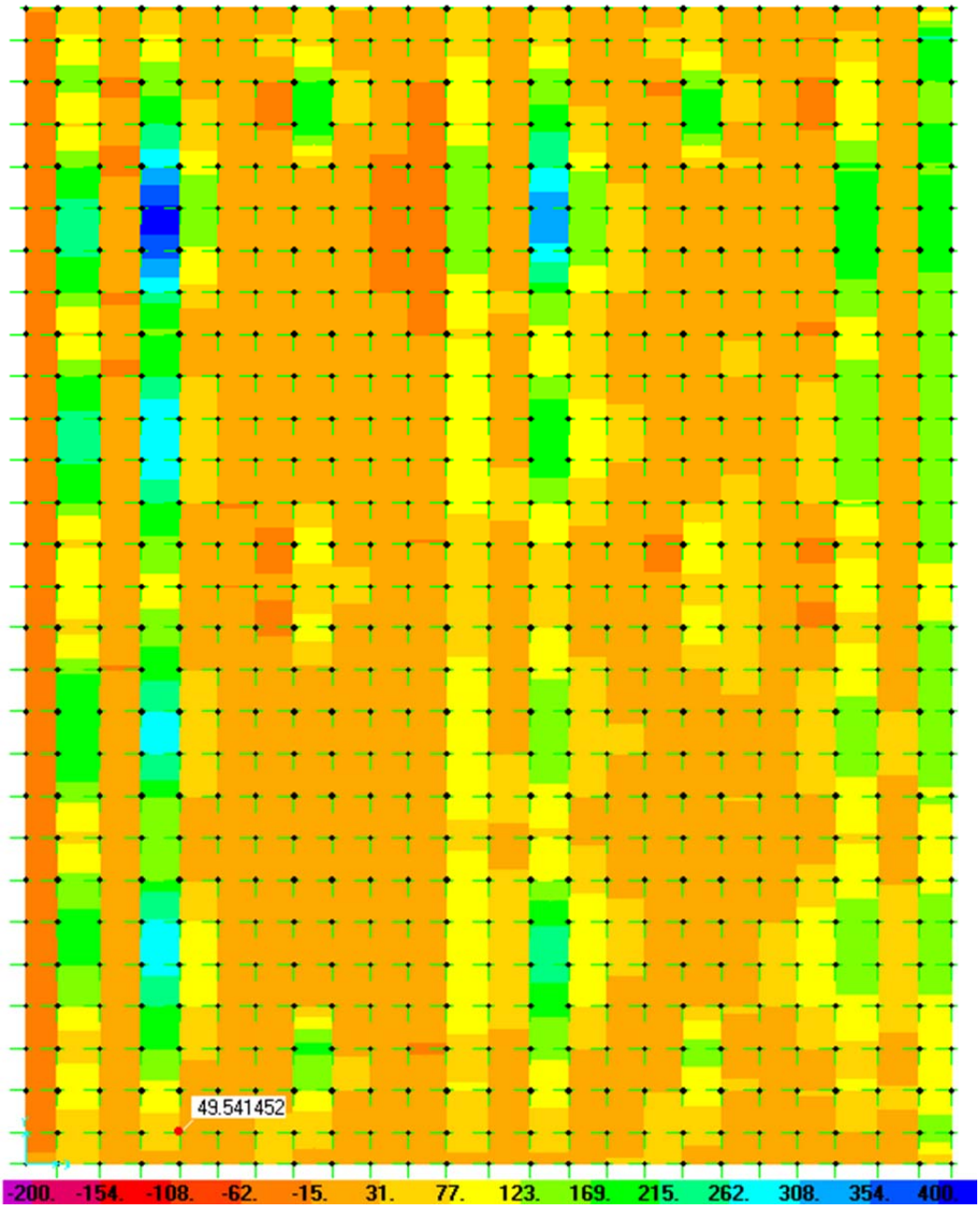


FIG. 4.13 - SOLETTONI CASSONI B7-B8(Q.-13.00) - INVILUPPO MAX SLU-V13(ESCLUSO SISMA)

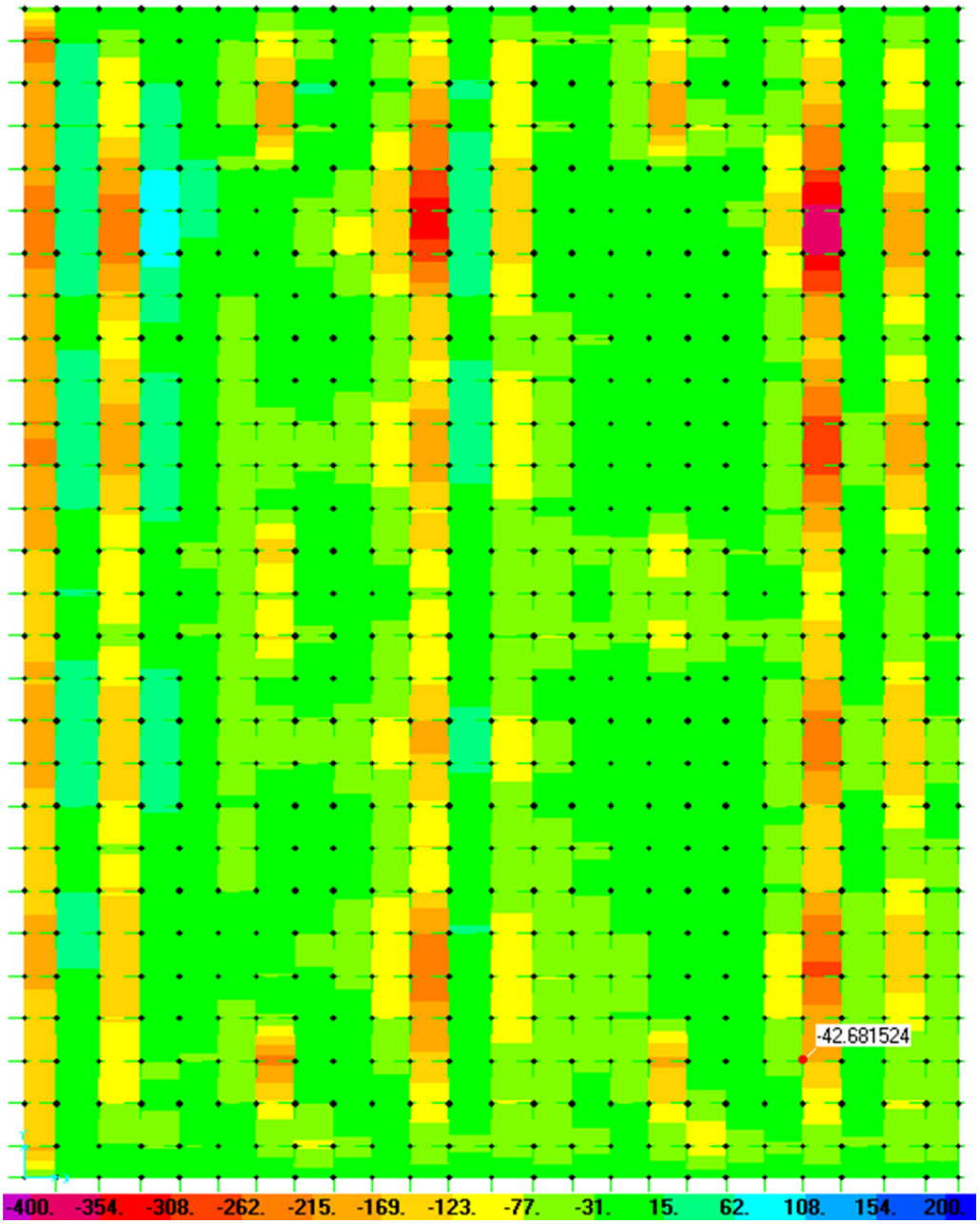


FIG. 4.14 - SOLETTONI CASSONI B7-B8(Q.-13.00) - INVILUPPO MIN SLU-V13(ESCLUSO SISMA)

Sezione	Sollecitazioni		Sezione		Armatura		Copriferro netto		Mom. Resist.	FS
	M_{sd} [kNm]		b	H	Inf	Sup	Inf	Sup		
			[m]	[m]			[cm]	[cm]	M_{rd}	M_{rd}/M_{sd}
M22-Parete A	M+	+165	1.0	0.75	5Ø18	5Ø18	5	5	+344	2.08
M22-Cella 1-5-9	M+	+110	1.0	0.75	5Ø18	5Ø18	5	5	+344	3.13
M22-Parete B-celle5-6 (5m centrali cella)	M+	+352	1.0	0.75	5Ø22	5Ø18	5	5	+500	1.42
M22-Parete B-celle 1-2	M+	+165	1.0	0.75	5Ø18	5Ø18	5	5	+344	2.08
M22-Cella 6 (5m centrali cella)	M-	-385	1.0	0.75	5Ø22	5Ø22	5	5	-500	1.30
M22-Cella 2-10	M-	-83	1.0	0.75	5Ø18	5Ø18	5	5	-344	4.14
M22-Parete C celle 6-7 (5m centrali cella)	M+	+385	1.0	0.75	5Ø22	5Ø22	5	5	+500	1.29
M22-Parete C celle 2-3	M+	+176	1.0	0.75	5Ø18	5Ø18	5	5	+344	1.95
M22-Cella 7	M-	-231	1.0	0.75	5Ø22	5Ø22	5	5	-500	2.16
M22-Parete D	M+	+275	1.0	0.75	5Ø22	5Ø22	5	5	+500	1.82
M22-Cella 8-12	M+	+176	1.0	0.75	5Ø22	5Ø22	5	5	+500	2.84
M11-Parete E	M+	+187	1.0	0.75	5Ø18	5Ø18	6.8	6.8	+344	1.78
M11-Celle 1-2-3-4	M-	-93	1.0	0.75	5Ø18	5Ø18	6.8	6.8	-344	3.69
M11-Parete F	M+	+203	1.0	0.75	5Ø18	5Ø18	6.8	6.8	+344	1.69
M11-Cella 6-7	M-	-248	1.0	0.75	5Ø18	5Ø18	7.2	7.2	-344	1.39
M11-Cella 5-8	M-	-77	1.0	0.75	5Ø18	5Ø18	7.2	7.2	-344	4.45
M11-Parete G	M+	+253	1.0	0.75	5Ø20	5Ø18	6.8	6.8	+414	1.64

NB: I momenti positivi tendono le fibre inferiori, i momenti negativi tendono le fibre superiori.

TAB. 4-1 - CASSONI B7-B8 (Q.-13.00) - VERIFICHE AGLI SLU

Verifiche a taglio

Il taglio massimo si trova nei setti intorno alle celle grandi ed è pari a per il setto A a 200kN/m (V23) per il setto B a 550kN/m (V23) e per il setto C e D a 430kN/m (V23) . Il taglio massimo in corrispondenza del setto E è pari a 230kN/m (V13) e per la F è pari a 400kN/m (V13) e per la G é pari a 320kN/m (V13) .

Il taglio massimo è localizzato al centro della cella per una larghezza di 2.5-3.0m.

Come si evince dalla Tab. sottostante, la resistenza della sezione non armata a taglio è pari a 273 kN/m.

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	Fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	**VRD**
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
Solettone	0	750	690	1570	60	1570	0	0,12	1.54	0.0023	35	19,8	0	0,15	0.40	254	273	**273**

Orditura a Taglio cassone

Si considera cot(θ)=1 dove θ è l'angolo dei puntoni di calcestruzzo rispetto all'asse della sezione.
Si dispone orditura a taglio nelle seguenti sezioni:

- Parete A in corrispondenza cella grande:

V_{23Sd} = 200kN/m

Nessuna orditura di taglio

- Setto B in corrispondenza cella grande:

V_{23Sd} = 550kN/m

Si dispongono ferri a taglio piegati a 45° **ϕ22/400** n°3 a distanza 500mm in modo di coprire 1.5m.

Zona taglio :(750-2*50-20+0.9*690*cot45°)=1251mm

Zona interessata dal taglio:1250mm

V_{Rd} =381*2.5*391*(1250/500)*sen(45°)/1000

V_{Rd}=372kN*2.50*sen(45°)=372*2.5*0.707=658 kN/m

- Setto C e D in corrispondenza cella grande:

V_{23Sd} = 430kN/m

Si dispongono ferri a taglio piegati a 45° **ϕ20/400** n°3 a distanza 500mm

V_{Rd} =314*2.5*391*2.5*sen(45°)/1000=543 kN/m

- Setto E:

V_{12Sd} = 230kN/m

Nessuna orditura di taglio

- Setto F e G in corrispondenza cella grande:

V_{12Sd} = 390/320kN/m

Si dispongono ferri a taglio piegati a 45° **ϕ18/400** n°2 a distanza 500mm

Zona taglio :(750-2*50-2*22-18+0.9*669*cot45°)=1190mm

V_{Rd} =254*2.5*391*(1190/500)*sen(45°)/1000

V_{Rd}=248kN*2.38*sen(45°)=418kN/m

4.2.2 Verifiche agli SLU fase sismica cassoni B7-B8 (q.-13.00)

L'analisi sismica è stata valutata tramite un analisi modale utilizzando lo spettro di risposta di progetto con il periodo di ritorno di 475anni. Di seguito si riportano le sollecitazioni del solettone per le combinazioni in fase sismica.

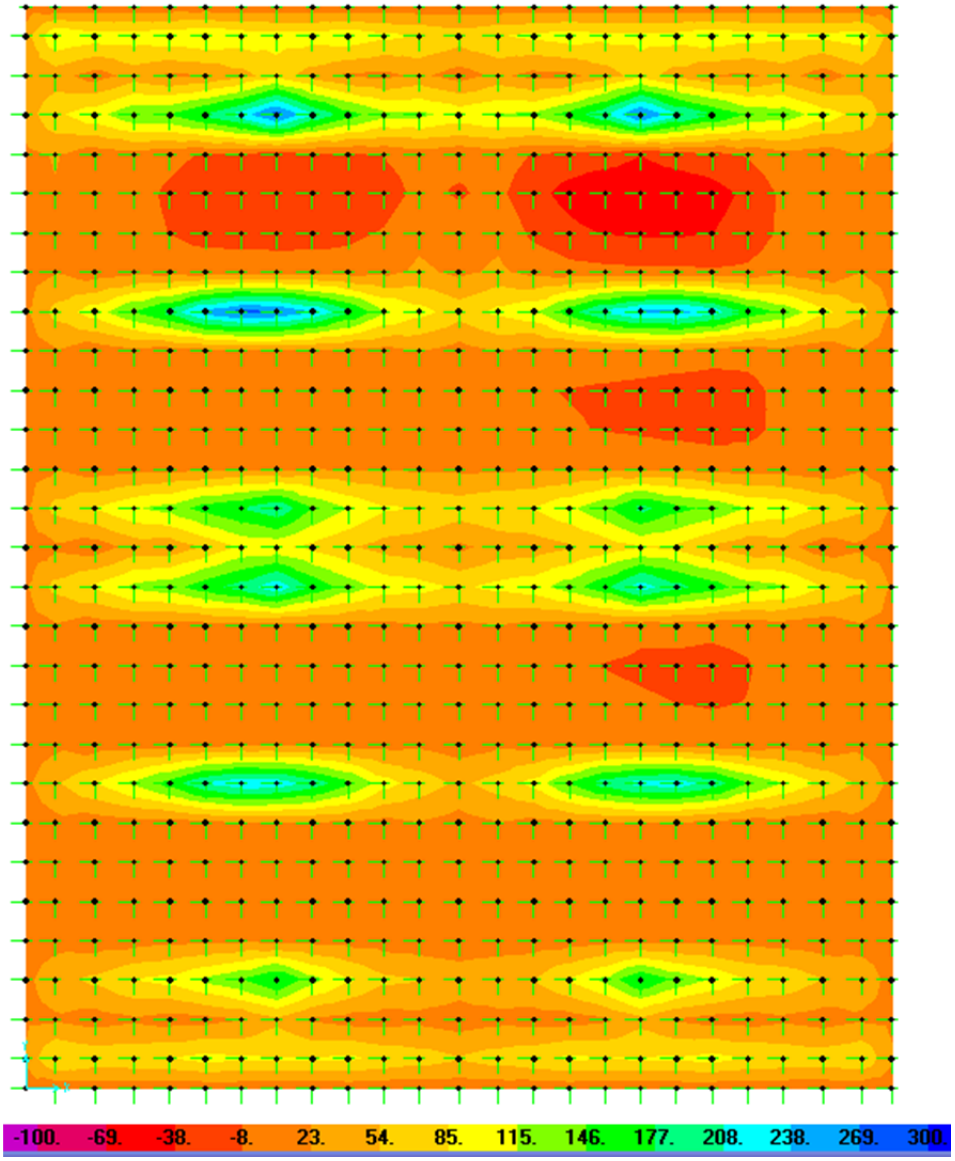


FIG. 4.15 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MAX SLU SISMA-M22

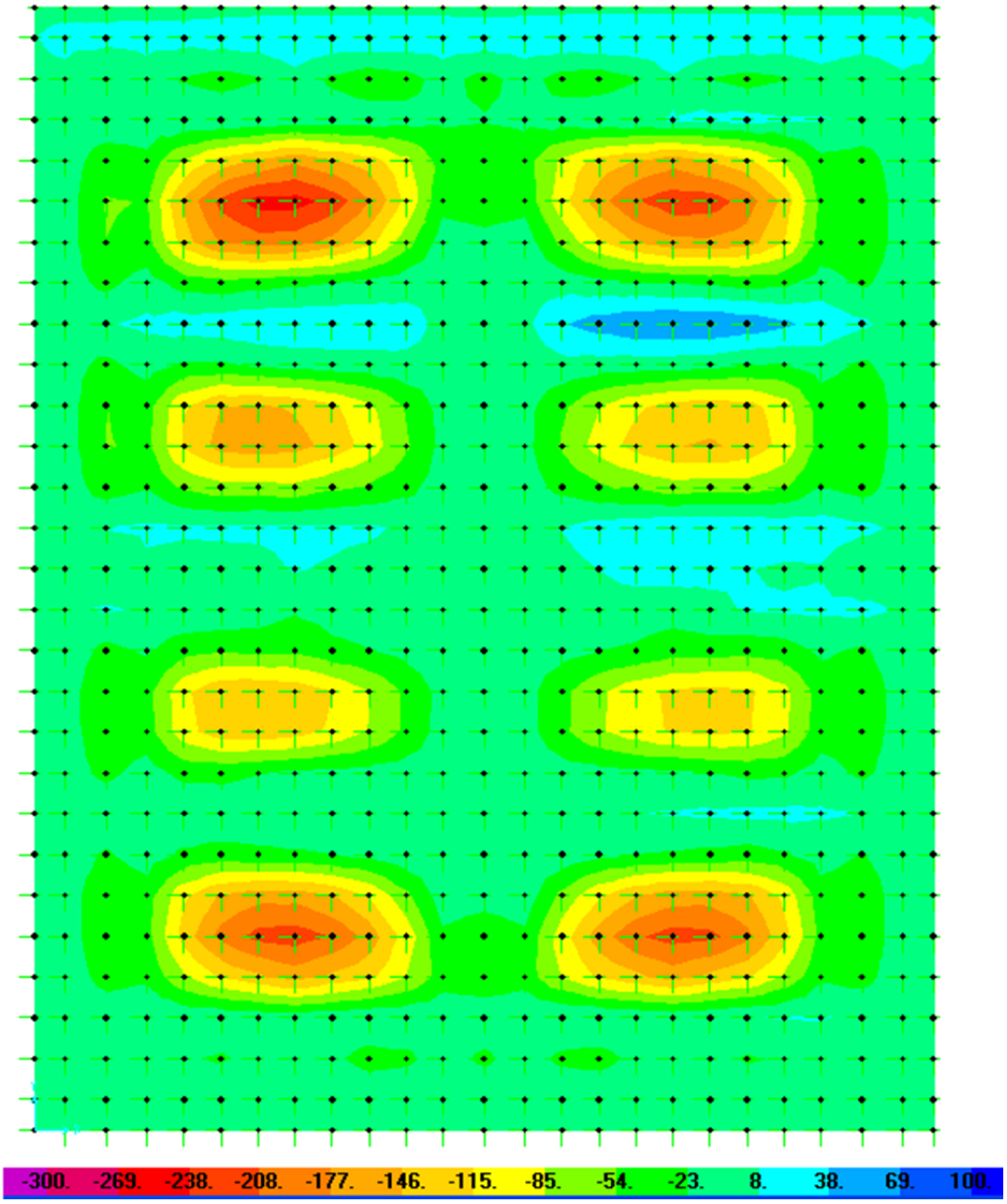


FIG. 4.16 - SOLETTONI CASSONI B7-B8(Q.-13.00) - INVILUPPO MIN SLU SISMA-M22

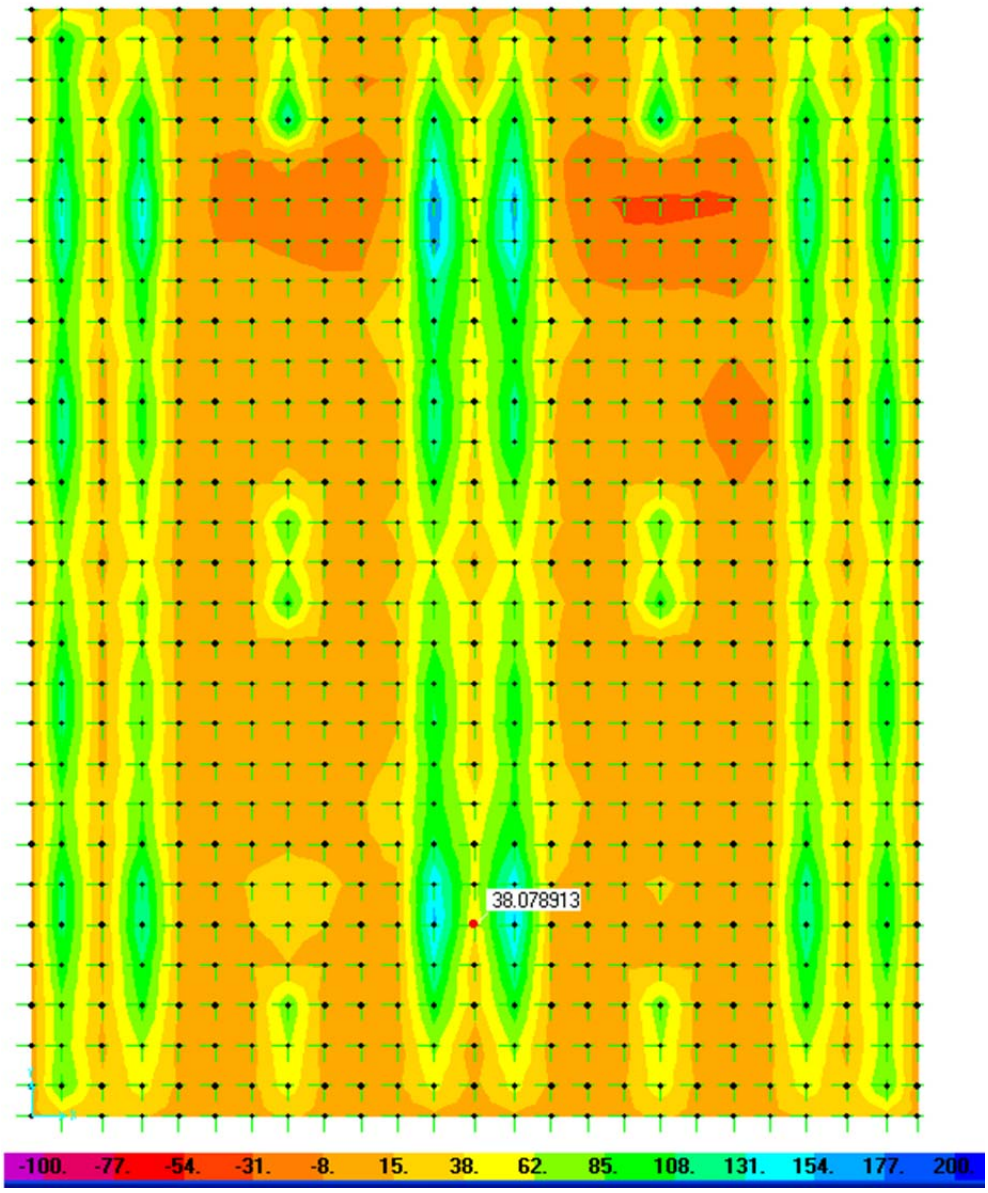


FIG. 4.17 - SOLETTONI CASSONI B7-B8(Q.-13.00) - INVILUPPO MAX SLU SISMA-M11

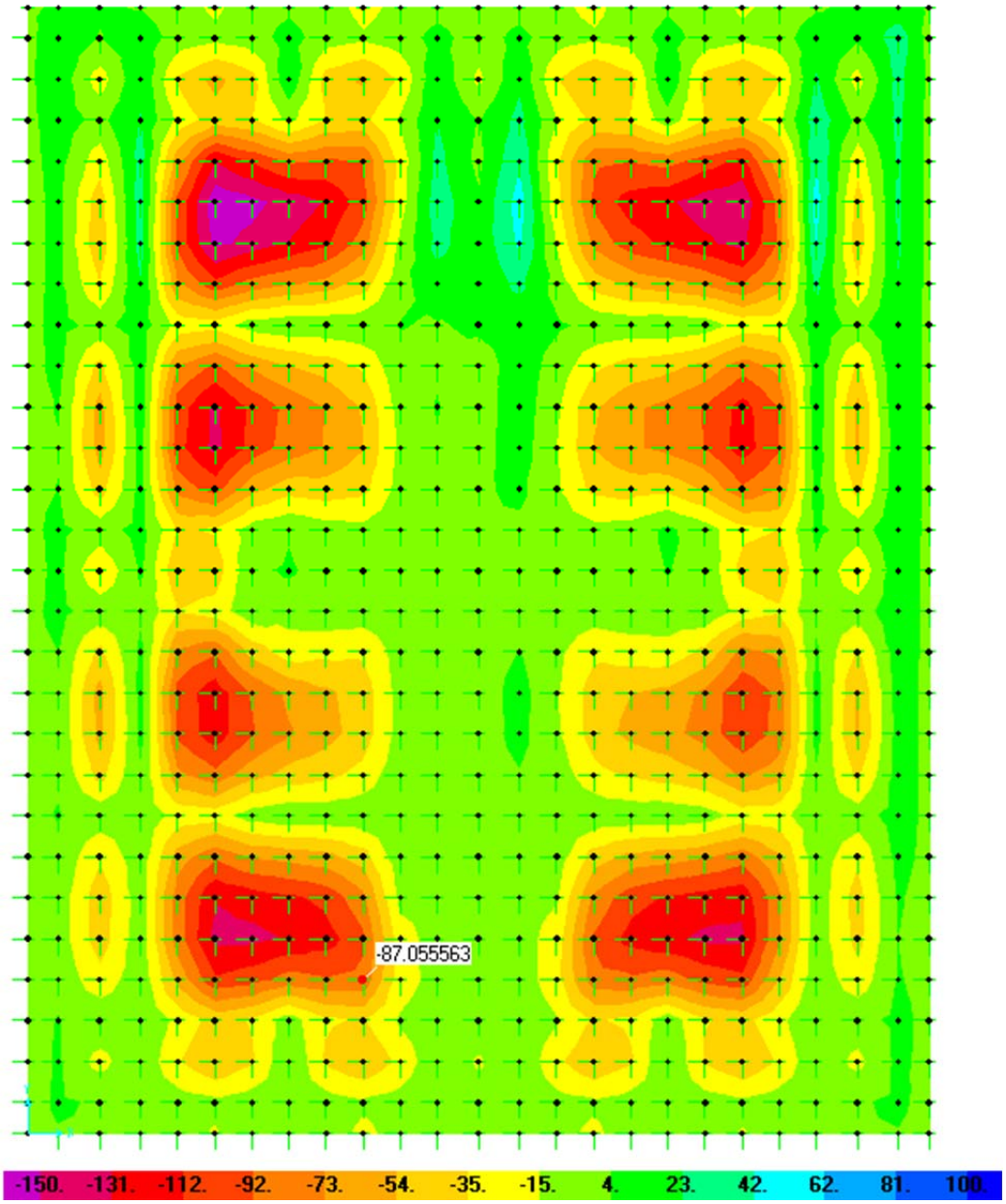


FIG. 4.18 - SOLETTONI CASSONI B7-B8(Q.-13.00) - INVILUPPO MIN SLU SISMA-M11

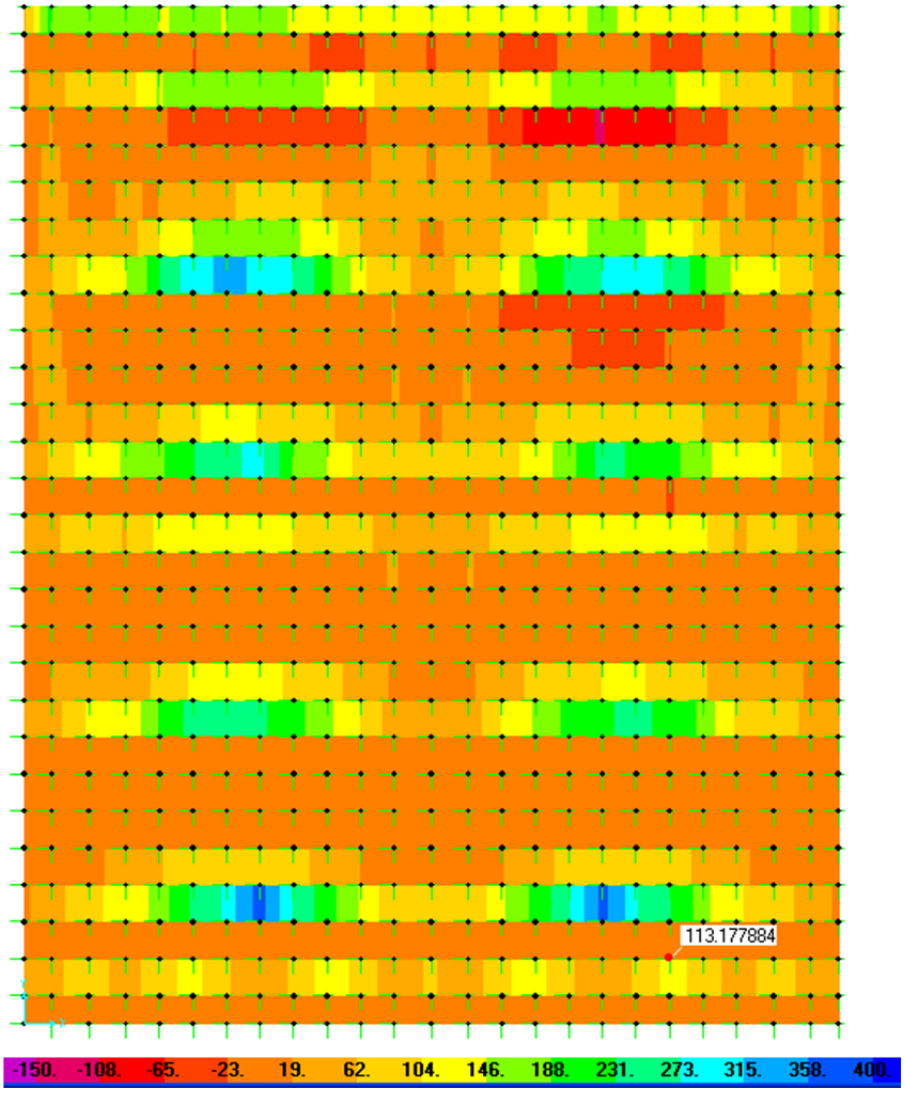


FIG. 4.19 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MAX SLU SISMA-V23

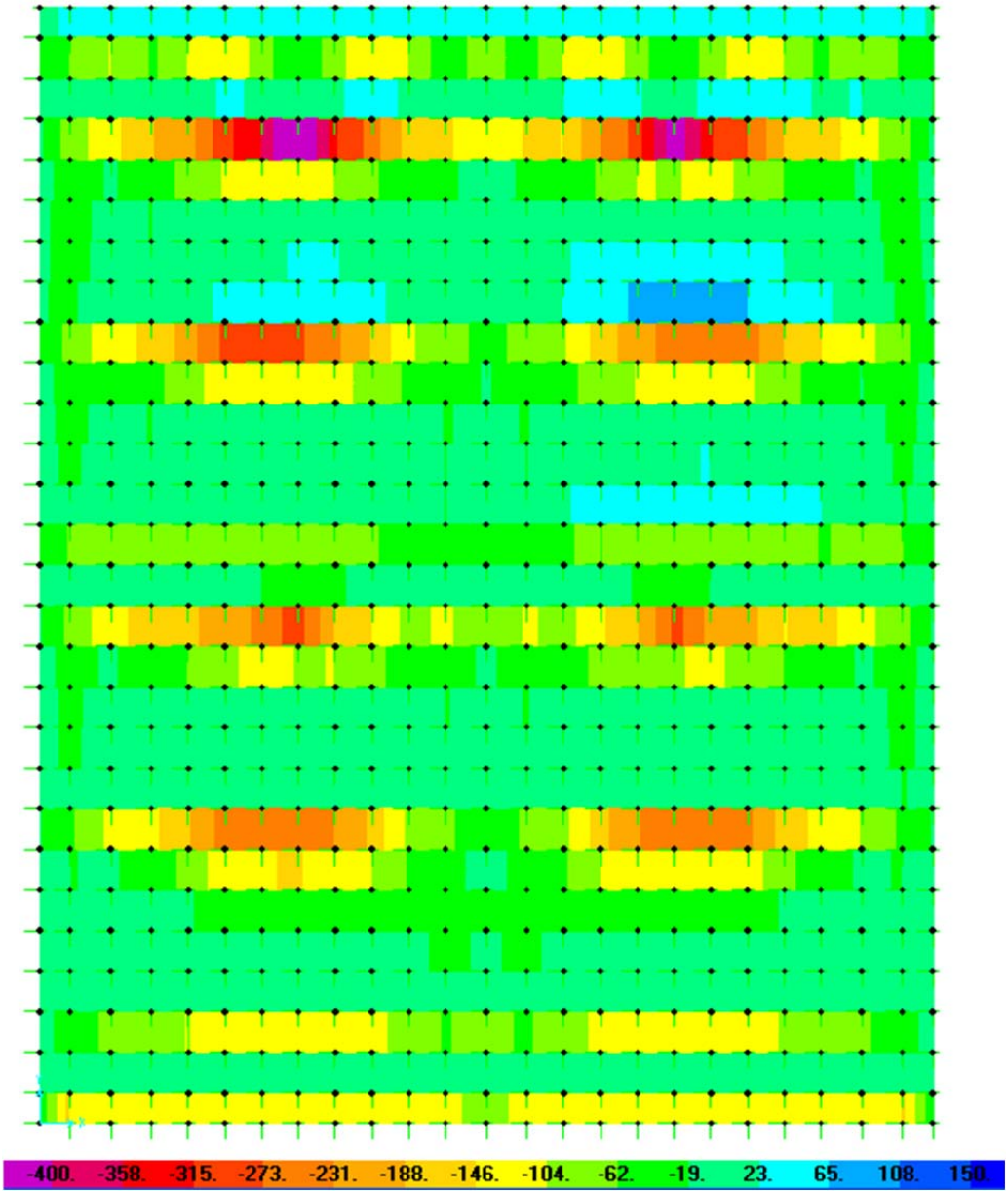


FIG. 4.20 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MIN SLU SISMA-V23

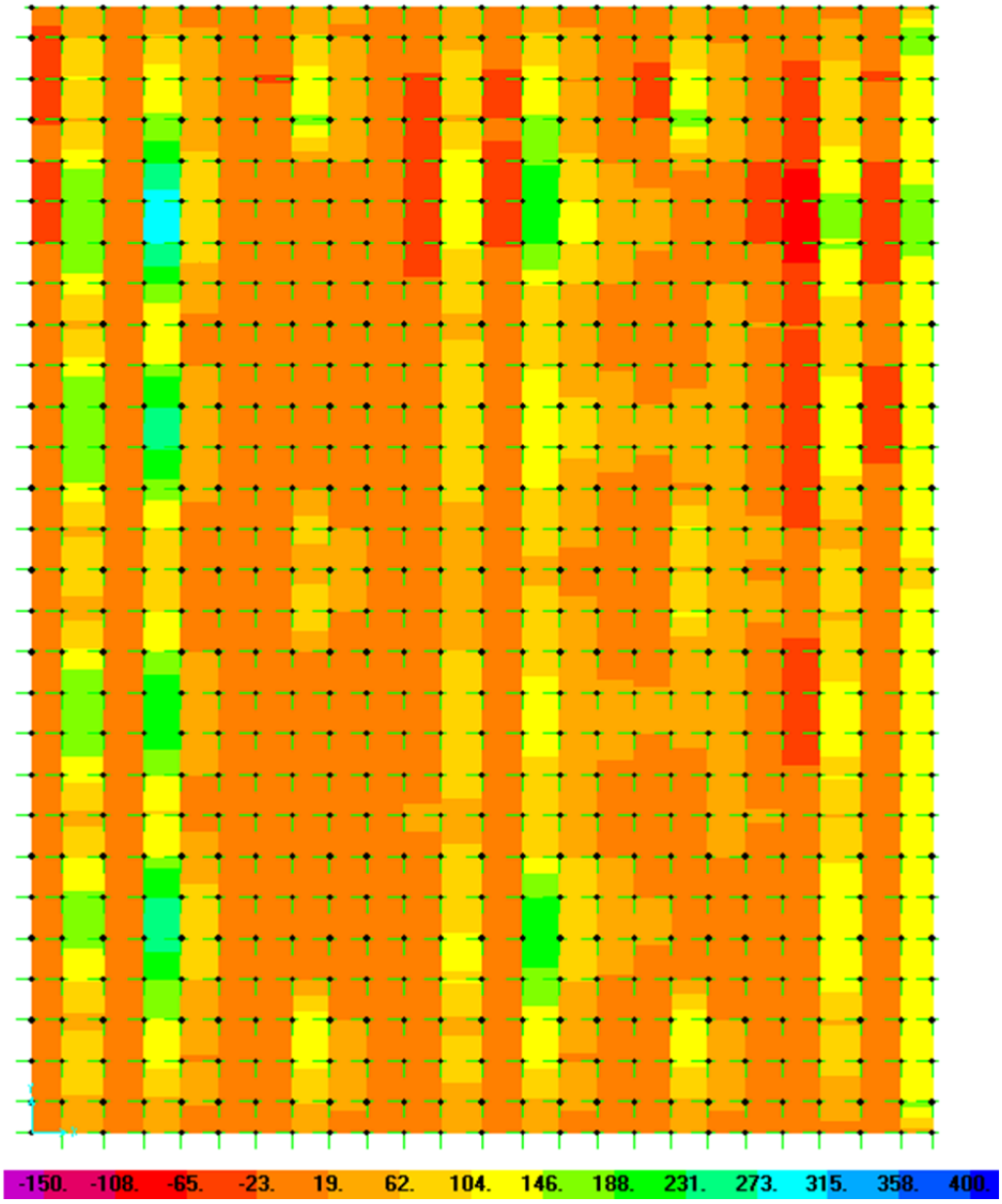


FIG. 4.21 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MAX SLU SISMA-V13

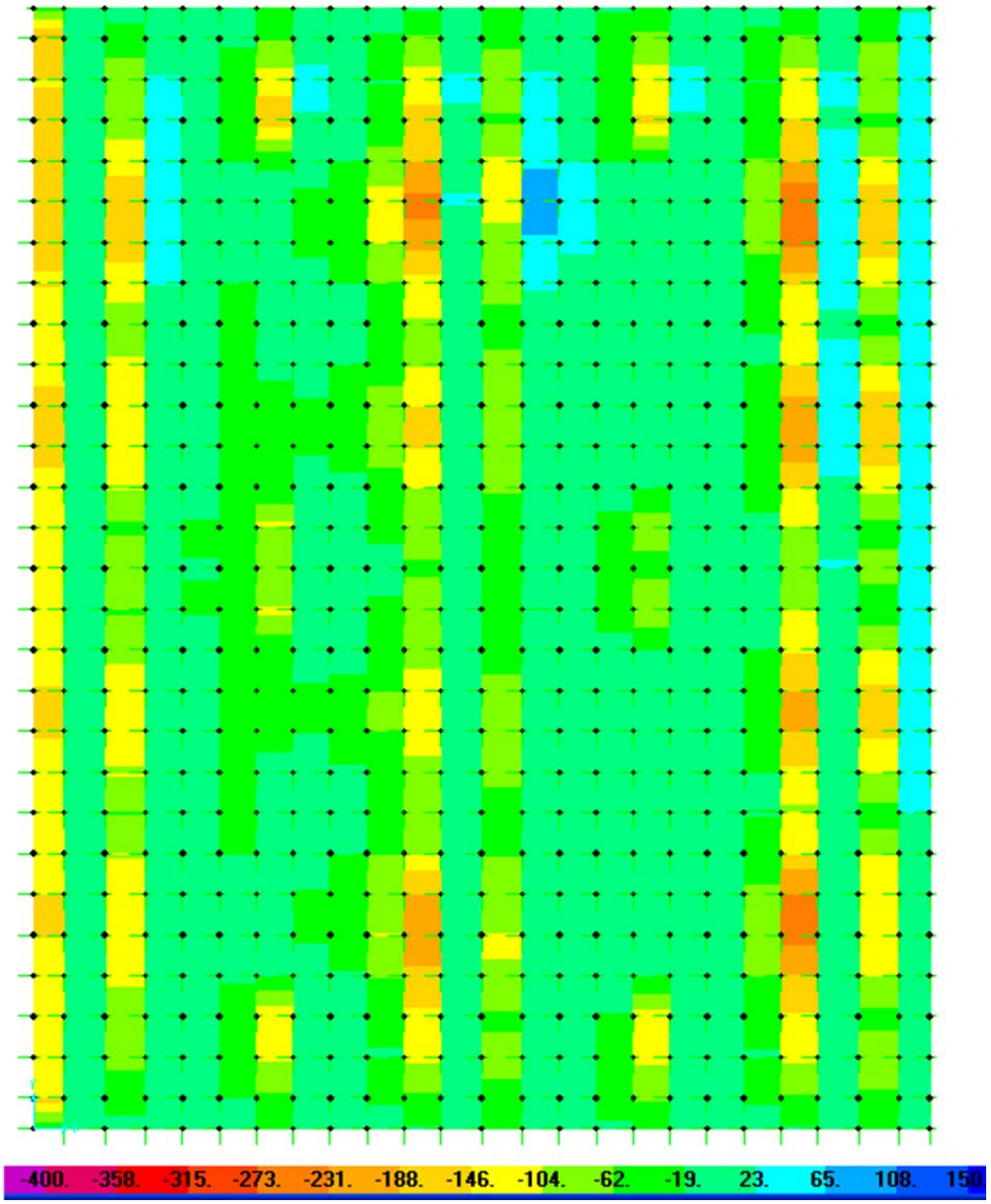


FIG. 4.22 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MIN SLU SISMA-V13

Sezione	Sollecitazioni		Sezione		Armatura		Copriferro netto		Mom. Resist.	FS
	M_{sd}[kNm]		b	H	Inf	Sup	Inf	Sup		
			[m]	[m]			[cm]	[cm]	M_{rd}	M_{rd}/M_{sd}
M22-Parete A	M+	+95	1.0	0.75	5Ø18	5Ø18	5	5	+344	3.62
M22-Cella 1-5-9	M+	+70	1.0	0.75	5Ø18	5Ø18	5	5	+344	4.91
M22-Parete B-celle5-6 (5m centrali cella)	M+	+250	1.0	0.75	5Ø22	5Ø18	5	5	+500	2.00
M22-Parete B-celle 1-2	M+	+120	1.0	0.75	5Ø18	5Ø18	5	5	+344	2.87
M22-Cella 6 (5m centrali cella)	M-	-250	1.0	0.75	5Ø22	5Ø22	5	5	-500	2.00
M22-Cella 2-10	M-	-60	1.0	0.75	5Ø18	5Ø18	5	5	-344	5.73
M22-Parete C celle 6-7 (5m centrali cella)	M+	+250	1.0	0.75	5Ø22	5Ø22	5	5	+500	2.50
M22-Parete C celle 2-3	M+	+120	1.0	0.75	5Ø18	5Ø18	5	5	+344	2.87
M22-Cella 7	M-	-160	1.0	0.75	5Ø22	5Ø22	5	5	-500	3.13
M22-Parete D	M+	+200	1.0	0.75	5Ø22	5Ø22	5	5	+500	2.50
M22-Cella 8-12	M+	+176	1.0	0.75	5Ø22	5Ø22	5	5	+500	2.84
M11-Parete E	M+	+120	1.0	0.75	5Ø18	5Ø18	6.8	6.8	+344	2.87
M11-Celle 1-2-3-4	M-	-60	1.0	0.75	5Ø18	5Ø18	6.8	6.8	-344	5.73
M11-Parete F	M+	+130	1.0	0.75	5Ø18	5Ø18	6.8	6.8	+344	2.65
M11-Cella 6-7	M-	-160	1.0	0.75	5Ø18	5Ø18	7.2	7.2	-344	2.15
M11-Cella 5-8	M-	-60	1.0	0.75	5Ø18	5Ø18	7.2	7.2	-344	5.73
M11-Parete G	M+	+175	1.0	0.75	5Ø20	5Ø18	6.8	6.8	+414	2.37

NB: I momenti positivi tendono le fibre inferiori, i momenti negativi tendono le fibre superiori.

TAB. 4-2 - CASSONI B7-B8 (Q.-13.00) - VERIFICHE AGLI SLU

Si deduce che l'orditura a flessione già verificata per le combinazioni escluso sisma è adeguata anche per le azioni sismiche. Per quanto riguarda il taglio:

Sezione	Sollecitazioni SLU (escl. Sisma) V_{sd} [kNm]		Sollecitazioni SLU Sisma V_{sd} [kNm]
Parete A	V_{23}	+200	+150
Setto B-celle5-6 (cella grande)	V_{23}	+550	-411
Setto C/D (cella grande)	V_{23}	+430	+310
Parete E	V_{13}	+230	+180
Setto F	V_{13}	+400	+290
Setto G	V_{13}	+320	-232

Si deduce che l'orditura a taglio già verificata per le combinazioni agli SLU in assenza di sisma è adeguata anche per le azioni sismiche.

4.2.3 Verifiche agli SLE B7-B8(q.-13) (Combinazioni frequenti e rare)

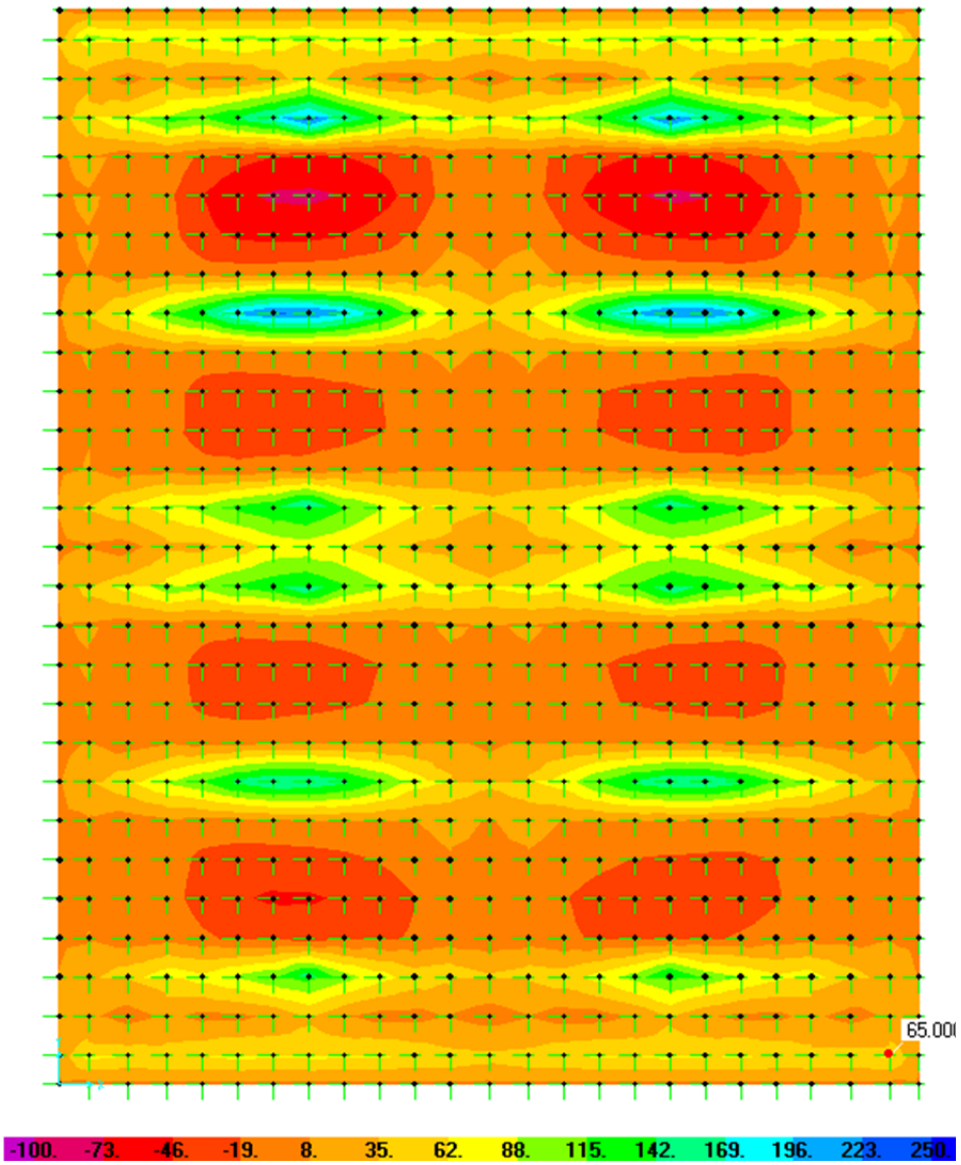


FIG. 4.23 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MAX SLE(FREQ.)-M22

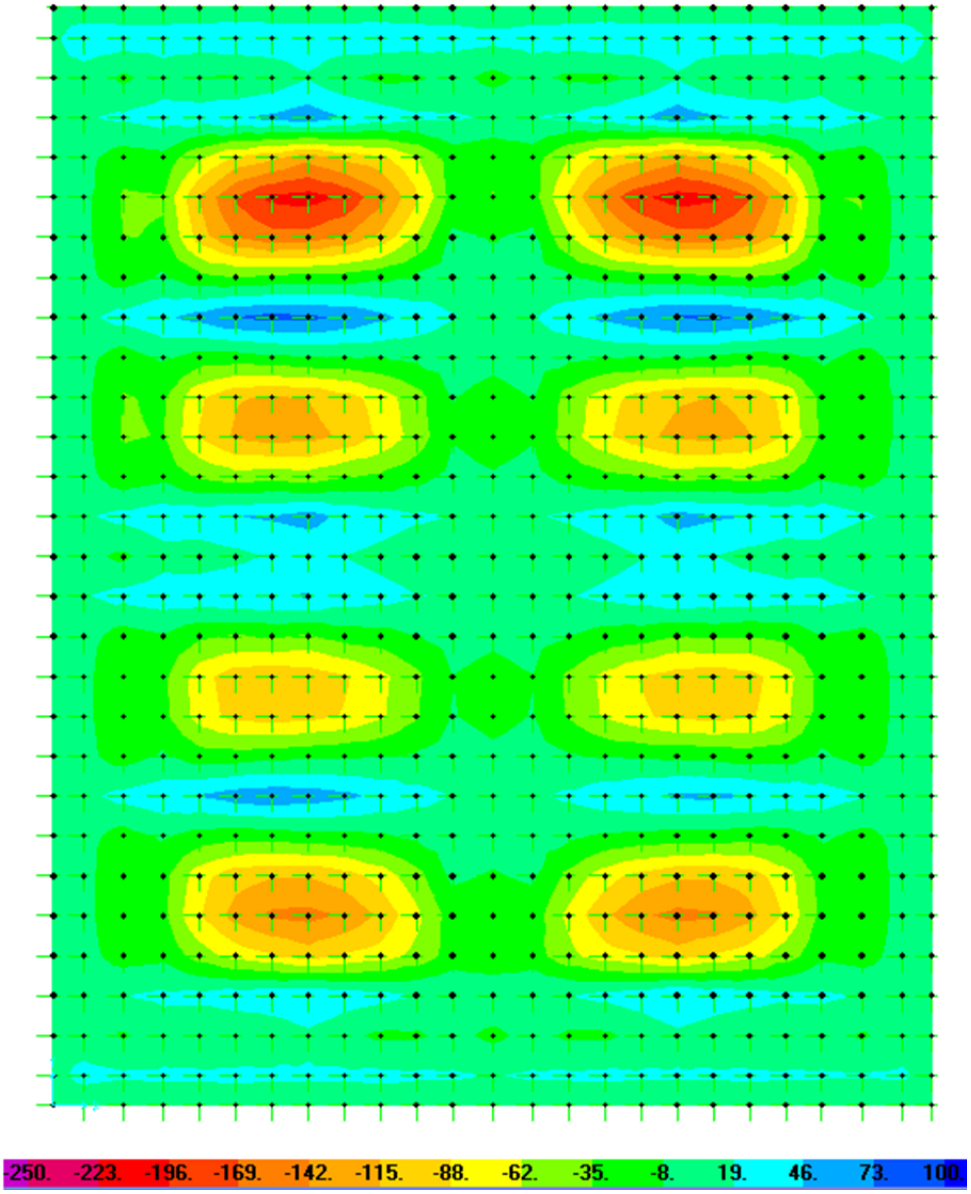


FIG. 4.24 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MIN SLE(FREQ.)-M22

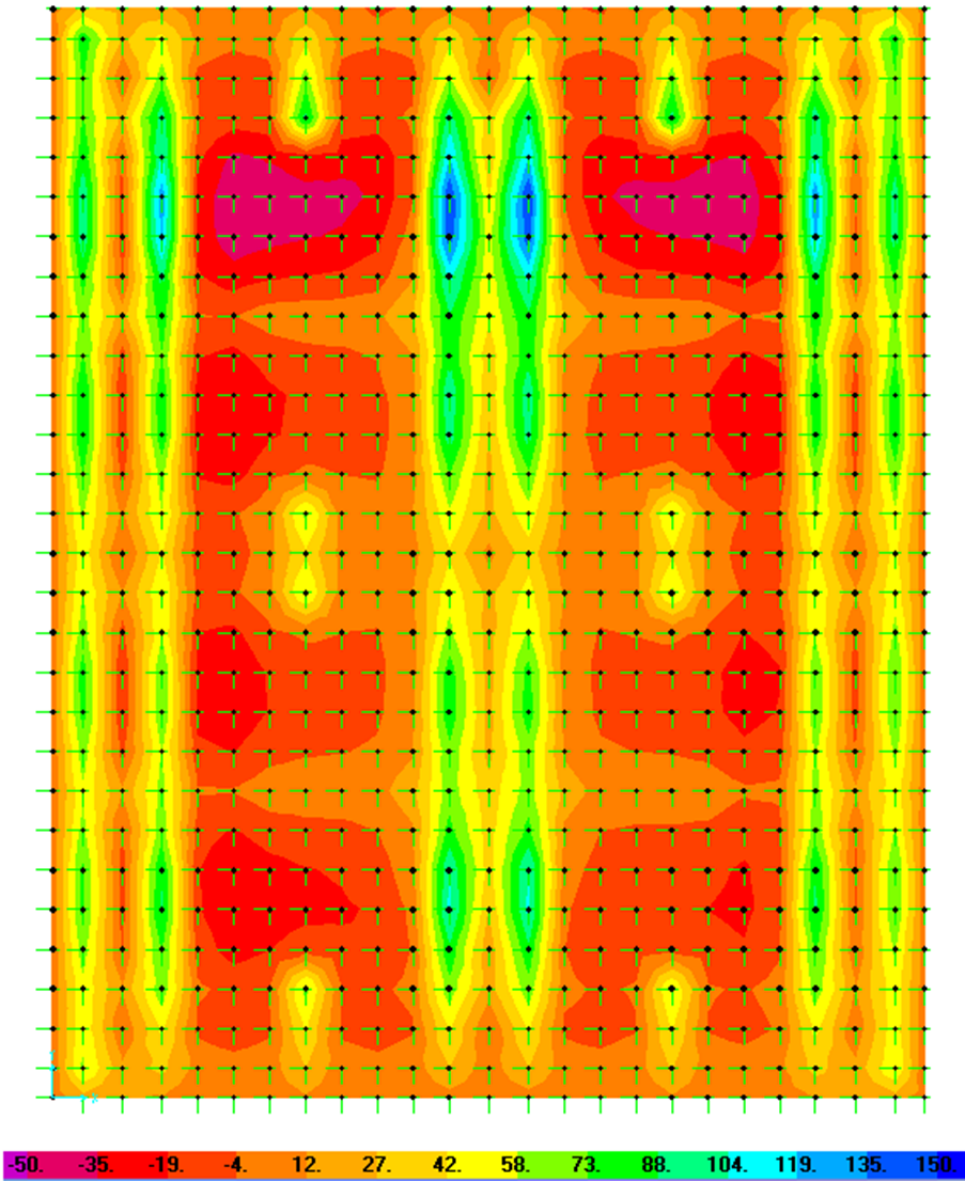


FIG. 4.25 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MAX SLE(FREQ.)-M11

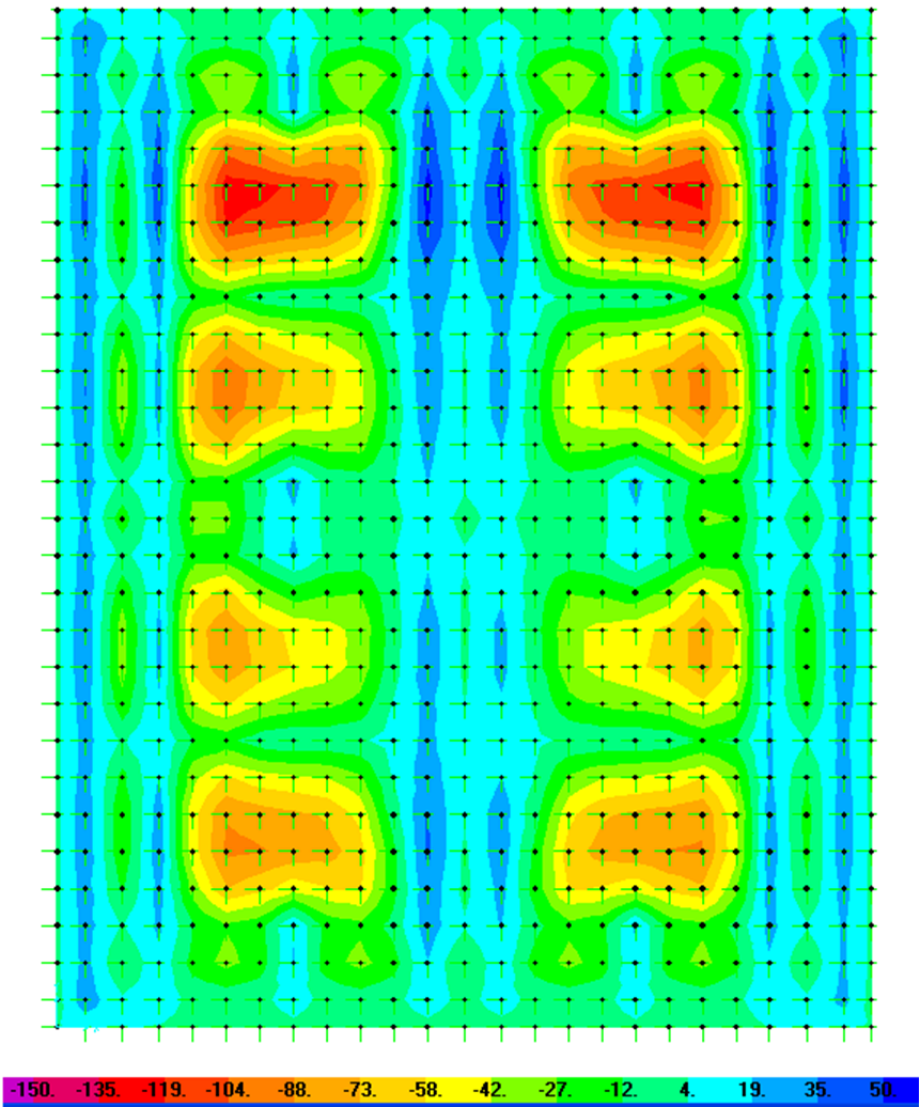


FIG. 4.26 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MIN SLE(FREQ.)-M11

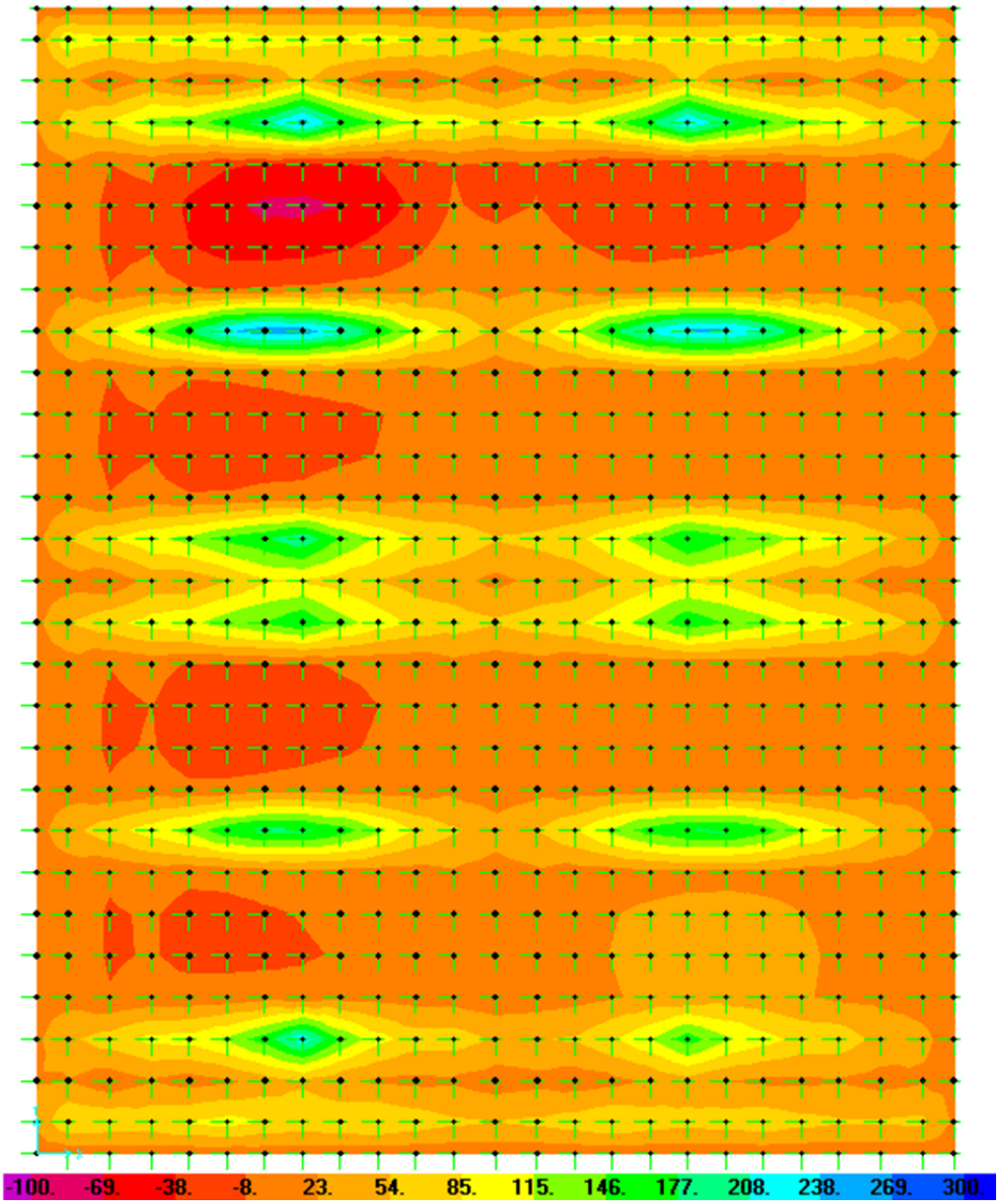


FIG. 4.27 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MAX SLE(RARE.)-M22

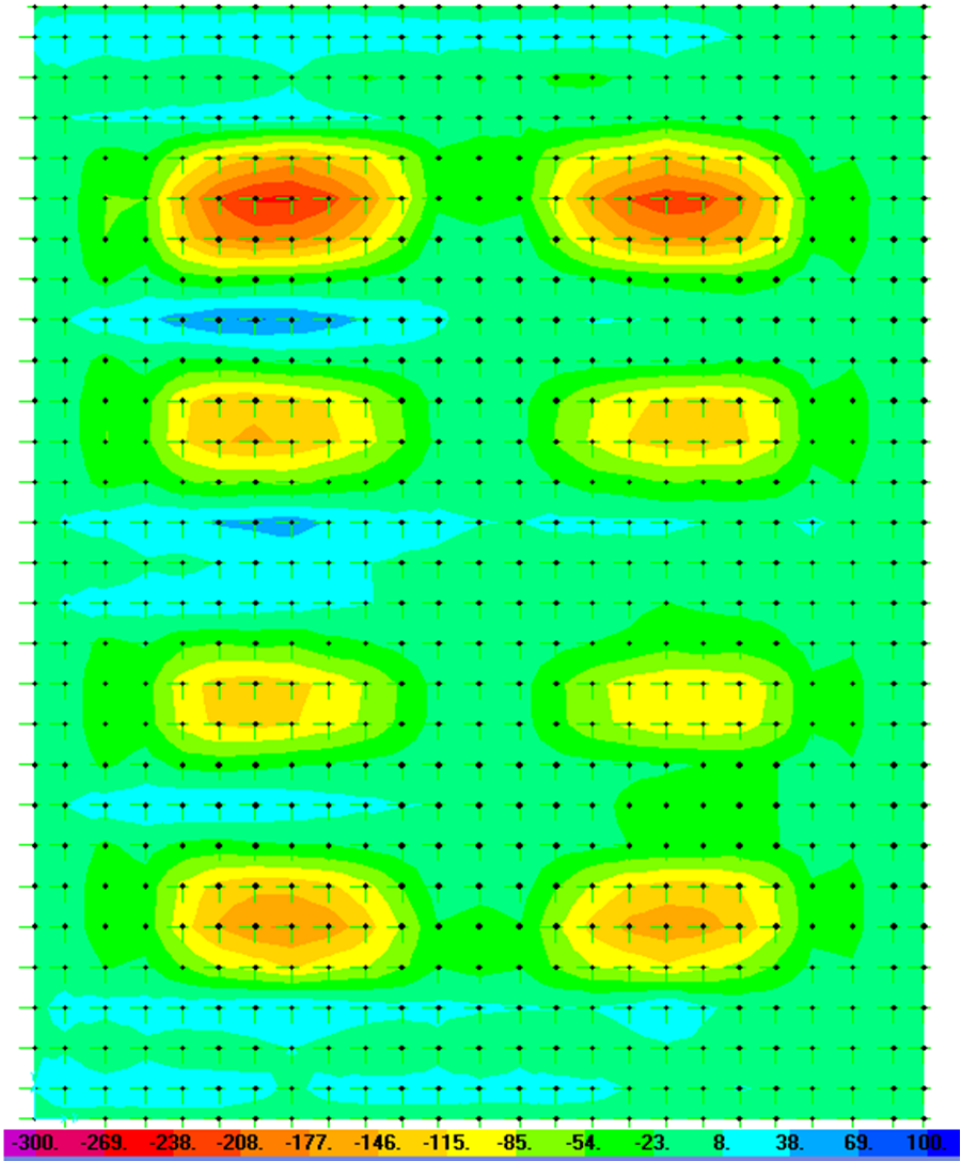


FIG. 4.28 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MIN SLE(RARE.)-M22

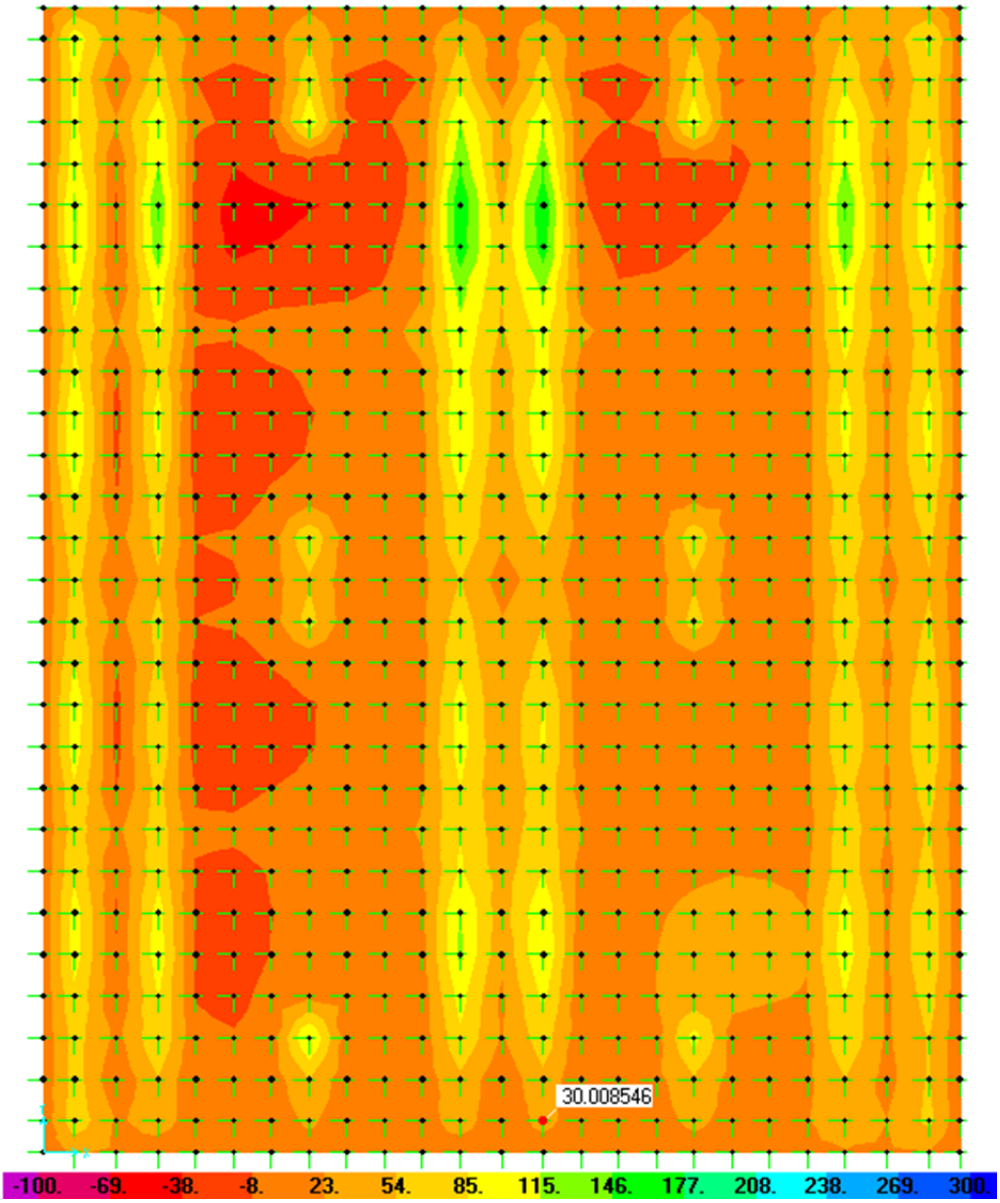


FIG. 4.29 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MAX SLE(RARE.)-M11

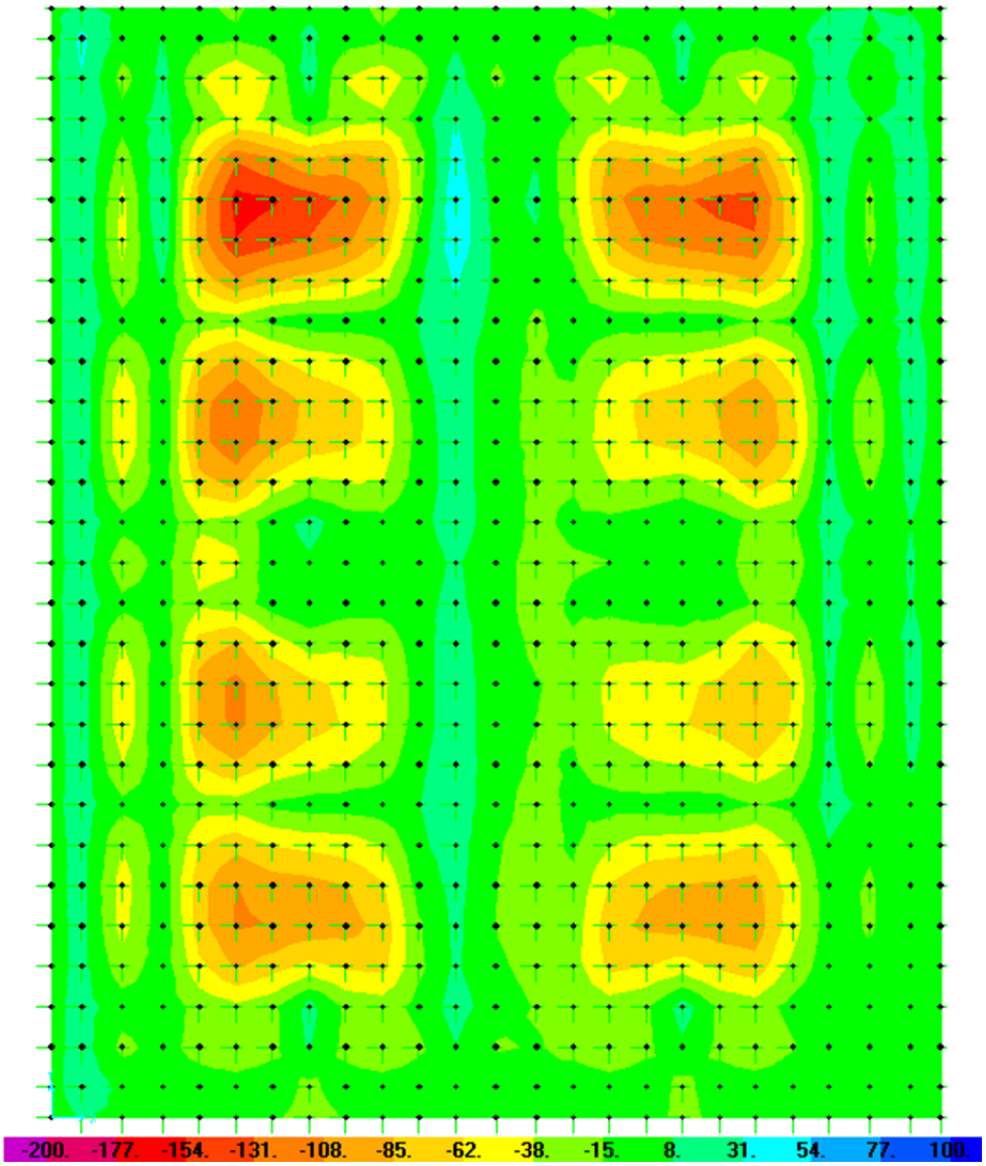


FIG. 4.30 - SOLETTONI CASSONI B7-B8(Q.-13) - INVILUPPO MIN SLE(RARE.)-M11

Sezione	Sollecitazioni		Sezione		Armatura		Copriferro netto		Sigma		
	M_{sd} [kNm]		B	H	Inf	Sup	Inf	Sup	σ_a	σ_c	w
			[m]	[m]			[cm]	[cm]	[MPa]	[MPa]	[mm]
M22-Parete A	M+	+102	1.0	0.75	5Ø18	5Ø18	5	5	123	2.0	0.110
M22-Cella 1-5-9	M+	+55	1.0	0.75	5Ø18	5Ø18	5	5	66	1.1	0.059
M22-Parete B-celle5-6 (5m centrali cella)	M+	+214	1.0	0.75	5Ø22	5Ø18	5	5	174	3.7	0.152
M22-Parete B-celle 1-2	M+	+86	1.0	0.75	5Ø18	5Ø18	5	5	103	1.7	0.092
M22-Cella 6 (5m centrali cella)	M-	-225	1.0	0.75	5Ø22	5Ø22	5	5	191	3.9	0.167
M22-Cella 2-10	M-	-32	1.0	0.75	5Ø18	5Ø18	5	5	36	0.6	0.033
M22-Parete C celle 6-7 (5m centrali cella)	M+	+235	1.0	0.75	5Ø22	5Ø22	5	5	178	3.6	0.156
M22-Parete C celle 2-3	M+	+118	1.0	0.75	5Ø18	5Ø18	5	5	142	2.3	0.127
M22-Cella 7	M-	-134	1.0	0.75	5Ø22	5Ø22	5	5	109	2.2	0.095
M22-Parete D	M+	+187	1.0	0.75	5Ø22	5Ø22	5	5	152	3.1	0.133
M22-Cella 8-12	M+	+86	1.0	0.75	5Ø22	5Ø22	5	5	70	1.4	0.061
M11-Parete E	M+	+86	1.0	0.75	5Ø18	5Ø18	6.8	6.8	106	1.8	0.112
M11-Celle 1-2-3-4	M-	-60	1.0	0.75	5Ø18	5Ø18	6.8	6.8	46	0.8	0.048
M11-Parete F	M+	+134	1.0	0.75	5Ø18	5Ø18	6.8	6.8	166	2.8	0.175
M11-Cella 6-7	M-	-155	1.0	0.75	5Ø18	5Ø18	7.2	7.2	164	2.8	0.179
M11-Cella 5-8	M-	-50	1.0	0.75	5Ø18	5Ø18	7.2	7.2	40	0.7	0.043
M11-Parete G	M+	+139	1.0	0.75	5Ø20	5Ø18	7.2	7.2	141	2.7	0.152

NB: I momenti positivi tendono le fibre inferiori, i momenti negativi tendono le fibre superiori

TAB. 4-3 - CASSONI B7-B8(Q.-13) - VERIFICHE AGLI SLE - COMBINAZIONI FREQUENTI

Sezione	Sollecitazioni		Sezione		Armatura		Copriferro netto		Sigma	
	M_{sd}^* [kNm]		B	H	Inf	Sup	Inf	Sup	σ_a	σ_c
			[m]	[m]			[cm]	[cm]	[MPa]	[MPa]
M22-Parete A	M+	+105	1.0	0.75	5Ø18	5Ø18	5	5	126	2.1
M22-Cella 1-5-9	M+	+70	1.0	0.75	5Ø18	5Ø18	5	5	84	1.4
M22-Parete B-celle5-6 (5m centrali cella)	M+	+225	1.0	0.75	5Ø22	5Ø18	5	5	183	3.8
M22-Parete B-celle 1-2	M+	+125	1.0	0.75	5Ø18	5Ø18	5	5	103	1.7
M22-Cella 6 (5m centrali cella)	M-	-245	1.0	0.75	5Ø22	5Ø22	5	5	199	4.0
M22-Cella 2-10	M-	-55	1.0	0.75	5Ø18	5Ø18	5	5	38	0.6
M22-Parete C celle 6-7 (5m centrali cella)	M+	+250	1.0	0.75	5Ø22	5Ø22	5	5	203	4.1
M22-Parete C celle 2-3	M+	+130	1.0	0.75	5Ø18	5Ø18	5	5	156	2.6
M22-Cella 7	M-	-150	1.0	0.75	5Ø22	5Ø22	5	5	122	2.5
M22-Parete D	M+	+195	1.0	0.75	5Ø22	5Ø22	5	5	158	3.2
M22-Cella 8-12	M+	+110	1.0	0.75	5Ø22	5Ø22	5	5	70	1.4
M11-Parete E	M+	+120	1.0	0.75	5Ø18	5Ø18	6.8	6.8	149	2.6
M11-Celle 1-2-3-4	M-	-37	1.0	0.75	5Ø18	5Ø18	6.8	6.8	46	0.8
M11-Parete F	M+	+140	1.0	0.75	5Ø18	5Ø18	6.8	6.8	173	3.0
M11-Cella 6-7	M-	-132	1.0	0.75	5Ø18	5Ø18	7.2	7.2	164	2.8
M11-Cella 5-8	M-	-32	1.0	0.75	5Ø18	5Ø18	7.2	7.2	40	0.7
M11-Parete G	M+	+170	1.0	0.75	5Ø20	5Ø18	7.2	7.2	173	3.3

NB: I momenti positivi tendono le fibre inferiori, i momenti negativi tendono le fibre superiori

TAB. 4-4 - CASSONI B7-B8(Q.-13) - VERIFICHE AGLI SLE - COMBINAZIONI RARE

4.2.4 Verifiche agli SLU C7-C8 q.ta-11.00 - (escluso sisma)

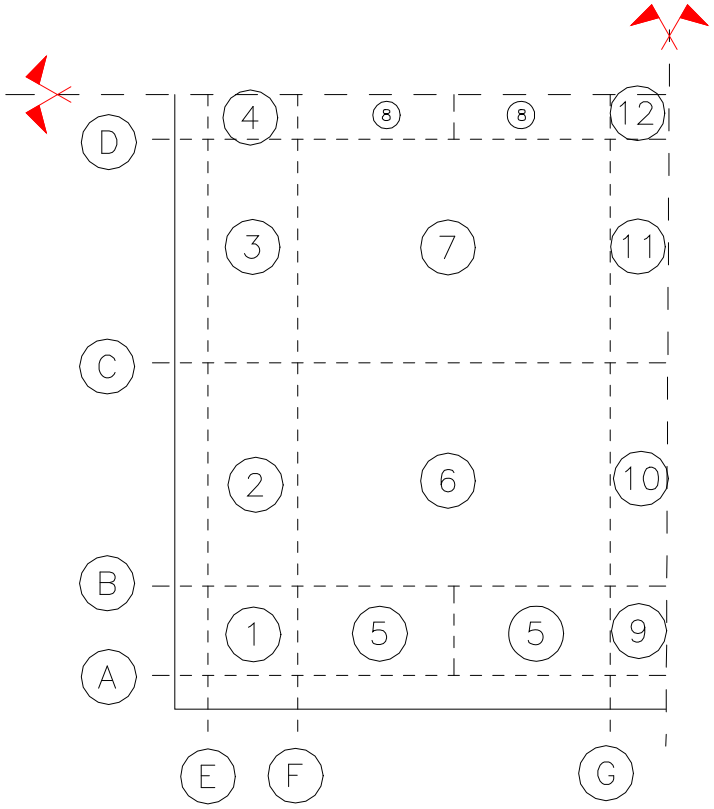


FIG. 4.31 - NUMERAZIONE CELLE E SETTI PER VERIFICHE SOLETTONE

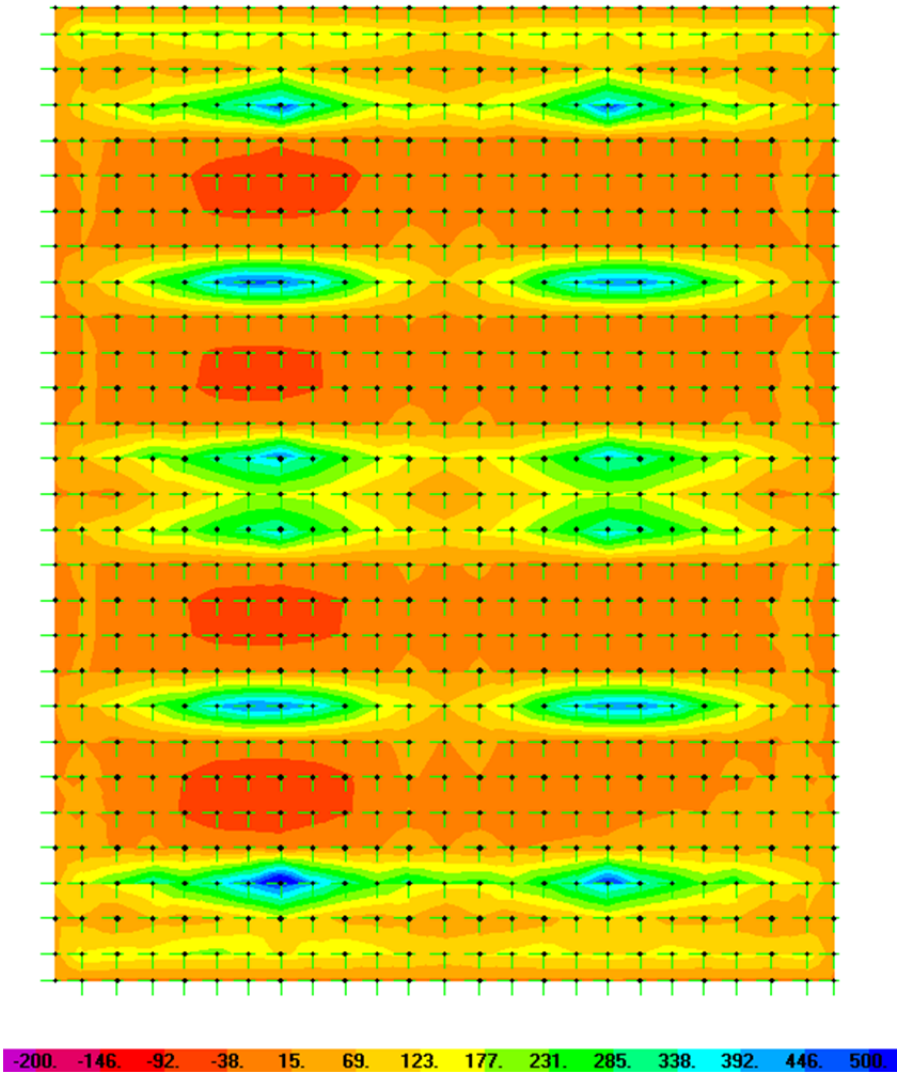


FIG. 4.32 - SOLETTONE CASSONI C7-C8(Q.-11.00) - INVILUPPO MAX SLU-M22(ESCLUSO SISMA)

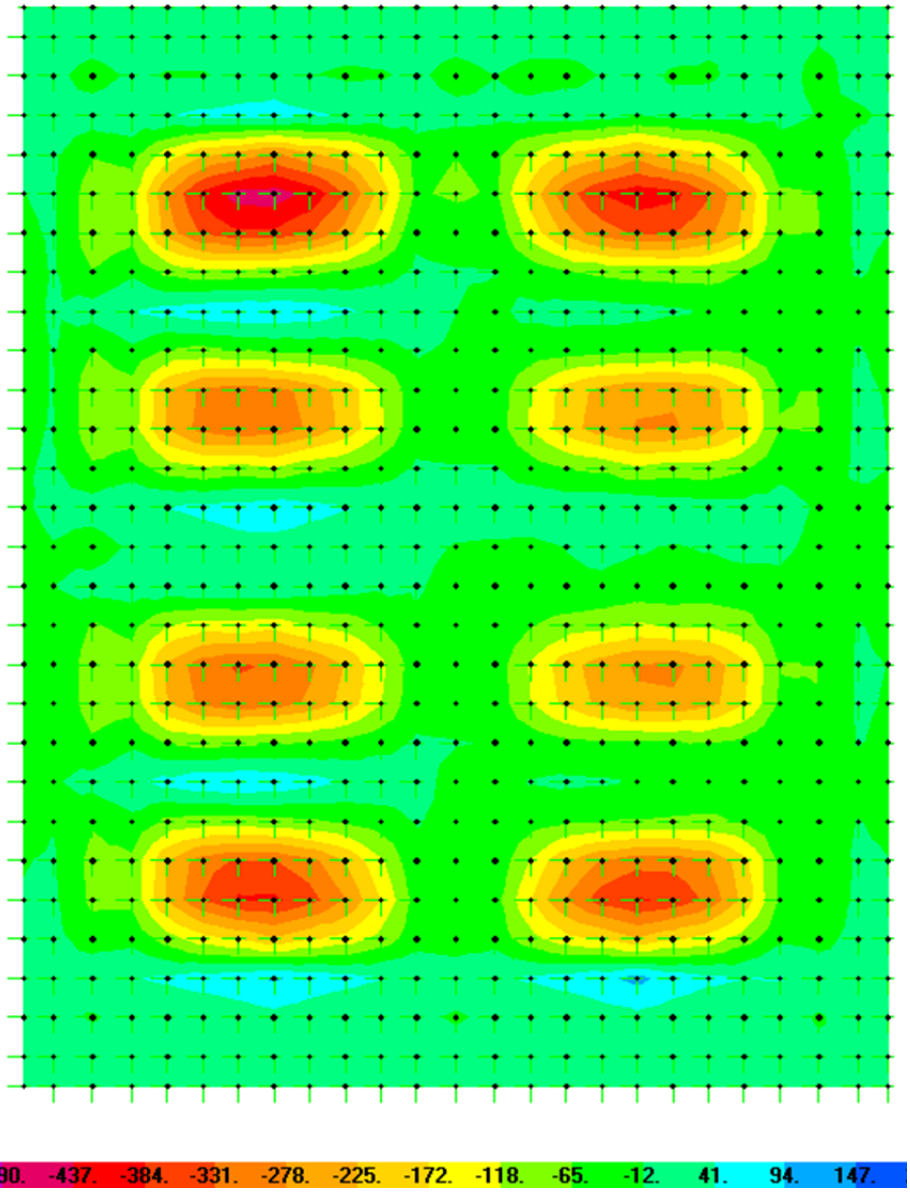


FIG. 4.33 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MIN SLU-M22(ESCLUSO SISMA)

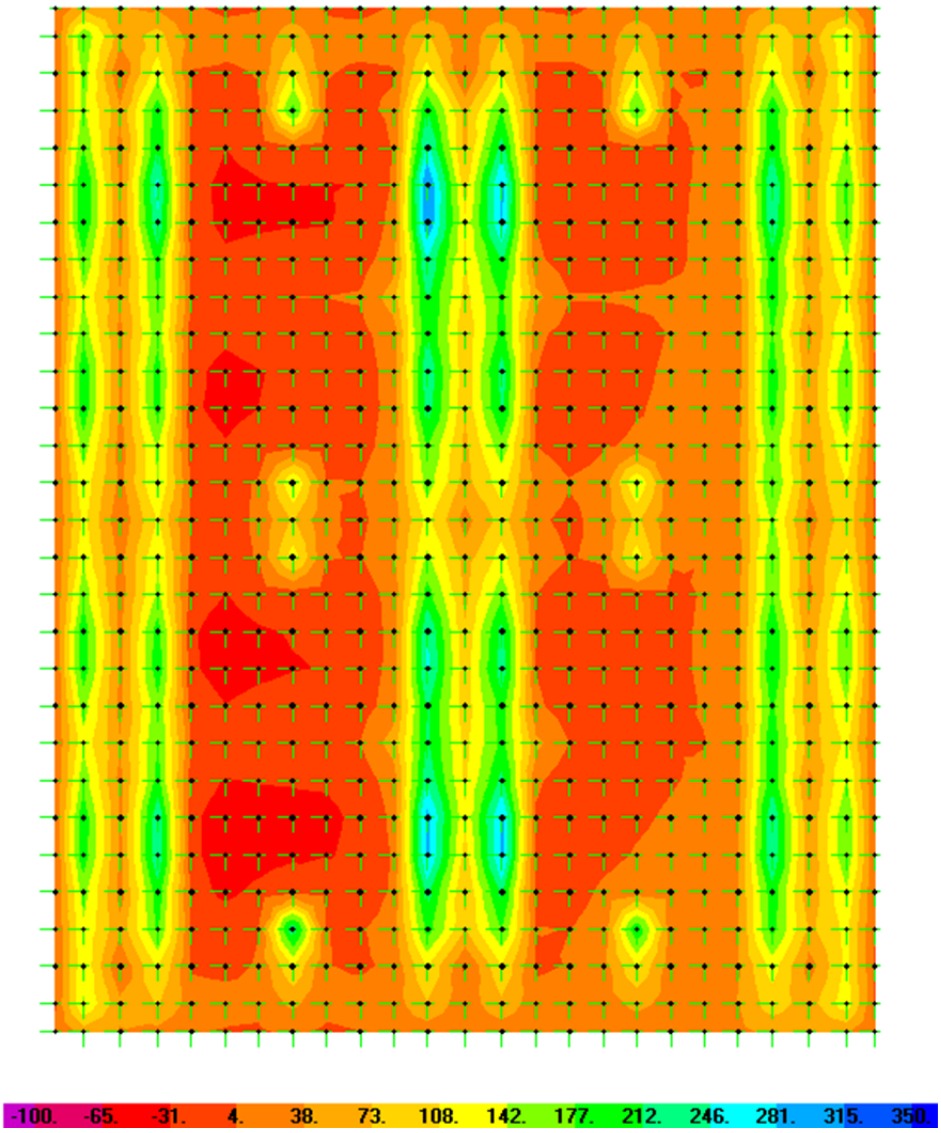


FIG. 4.34 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

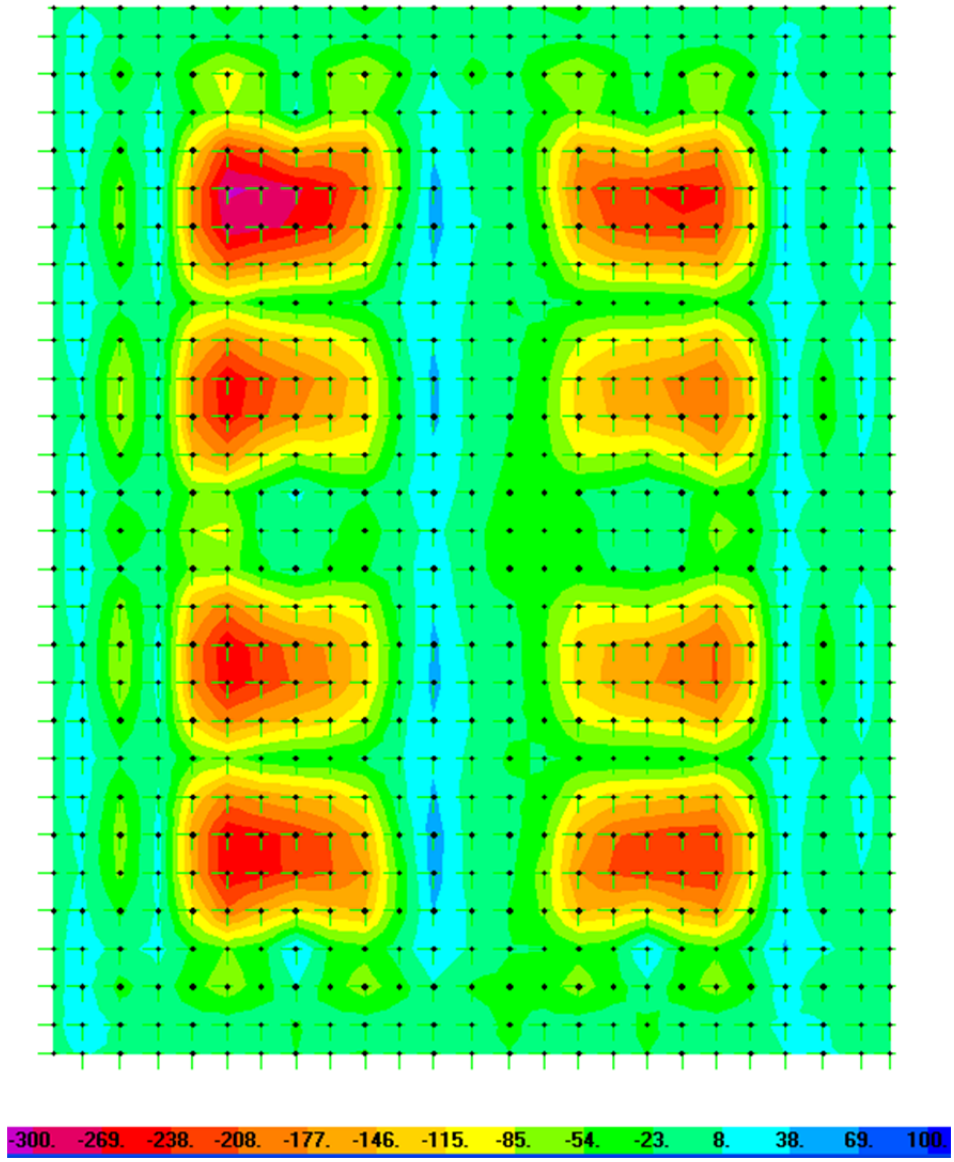


FIG. 4.35 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

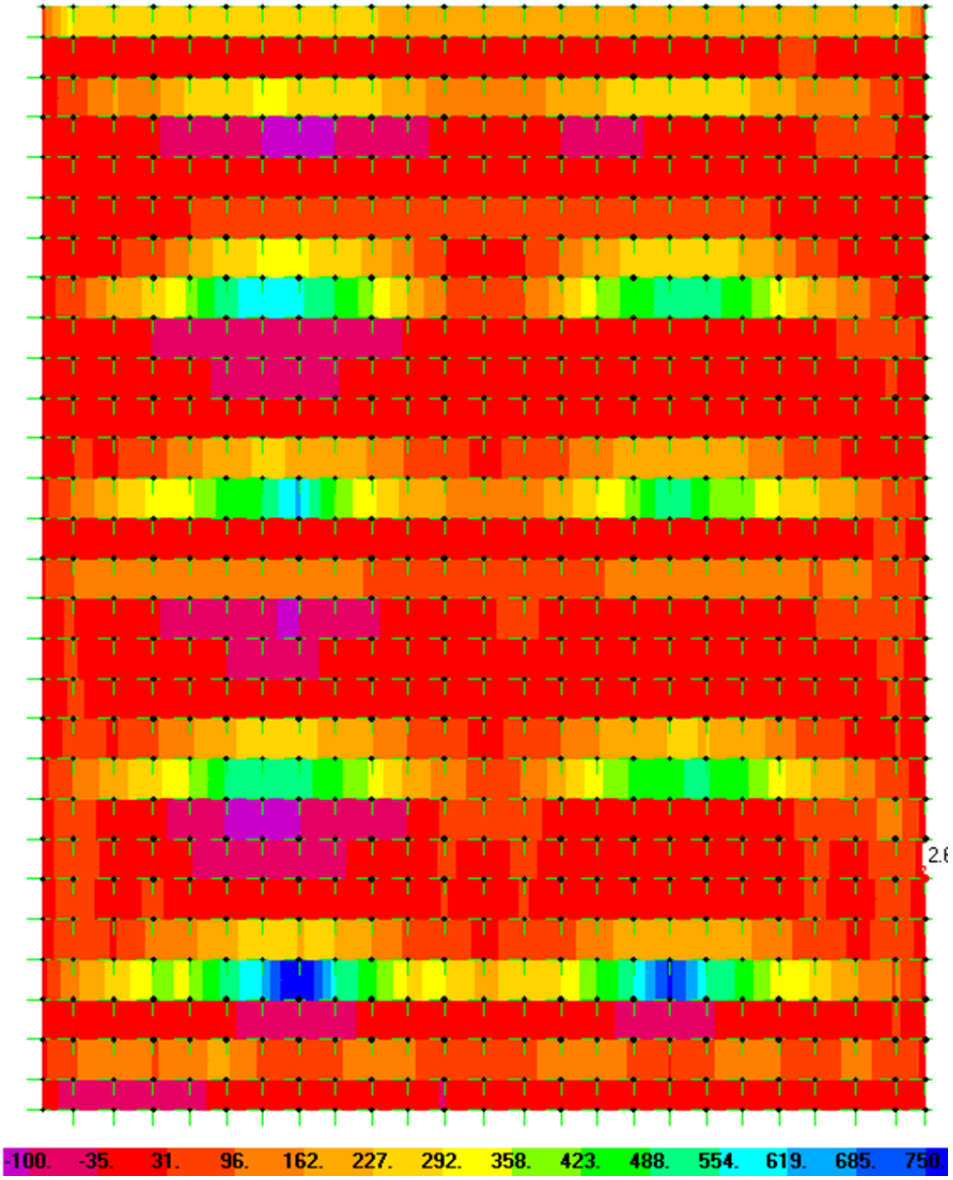


FIG. 4.36 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MAX SLU-V23(ESCLUSO SISMA)

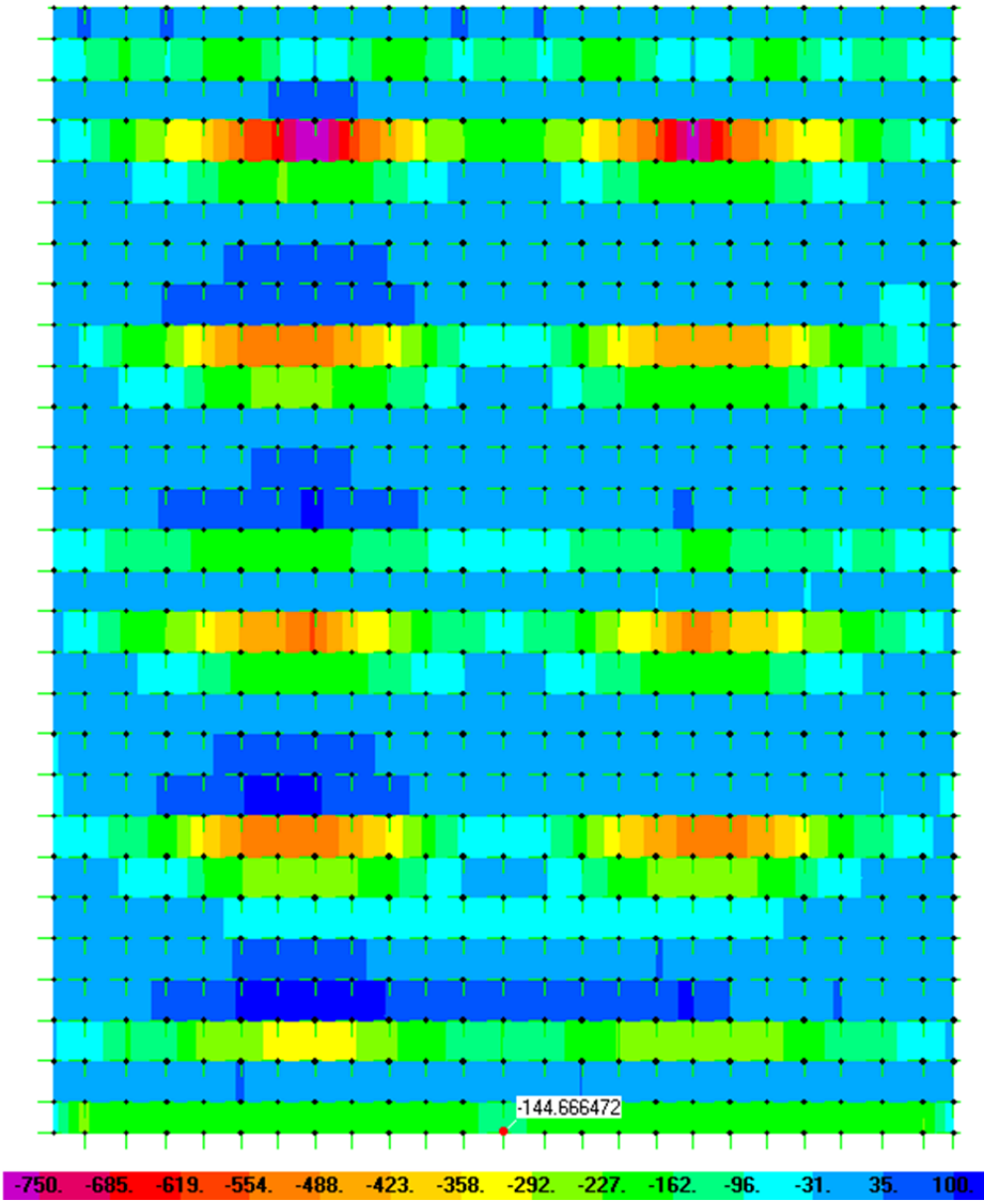


FIG. 4.37 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MIN SLU-V23(ESCLUSO SISMA)

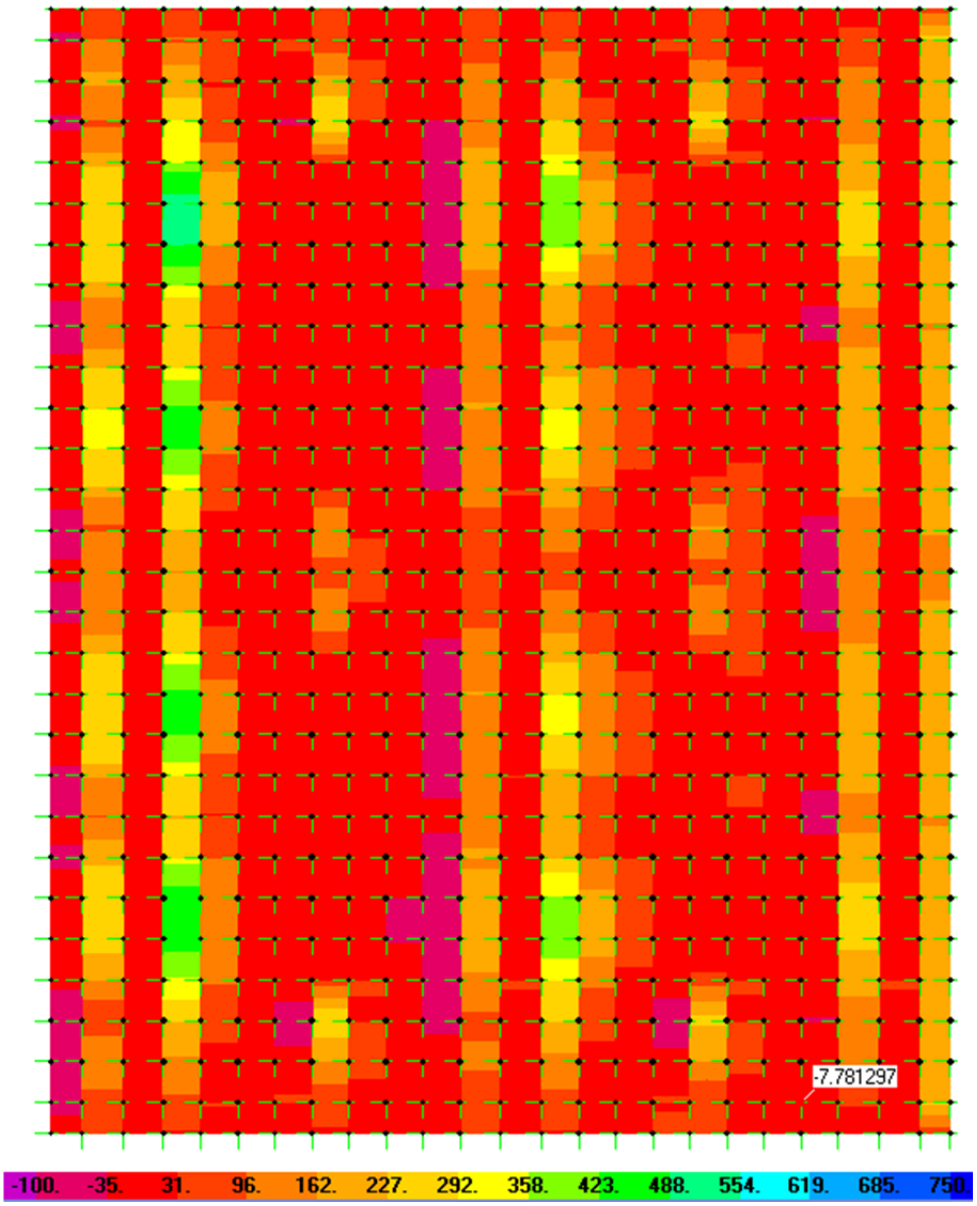


FIG. 4.38 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MAX SLU-V13(ESCLUSO SISMA)

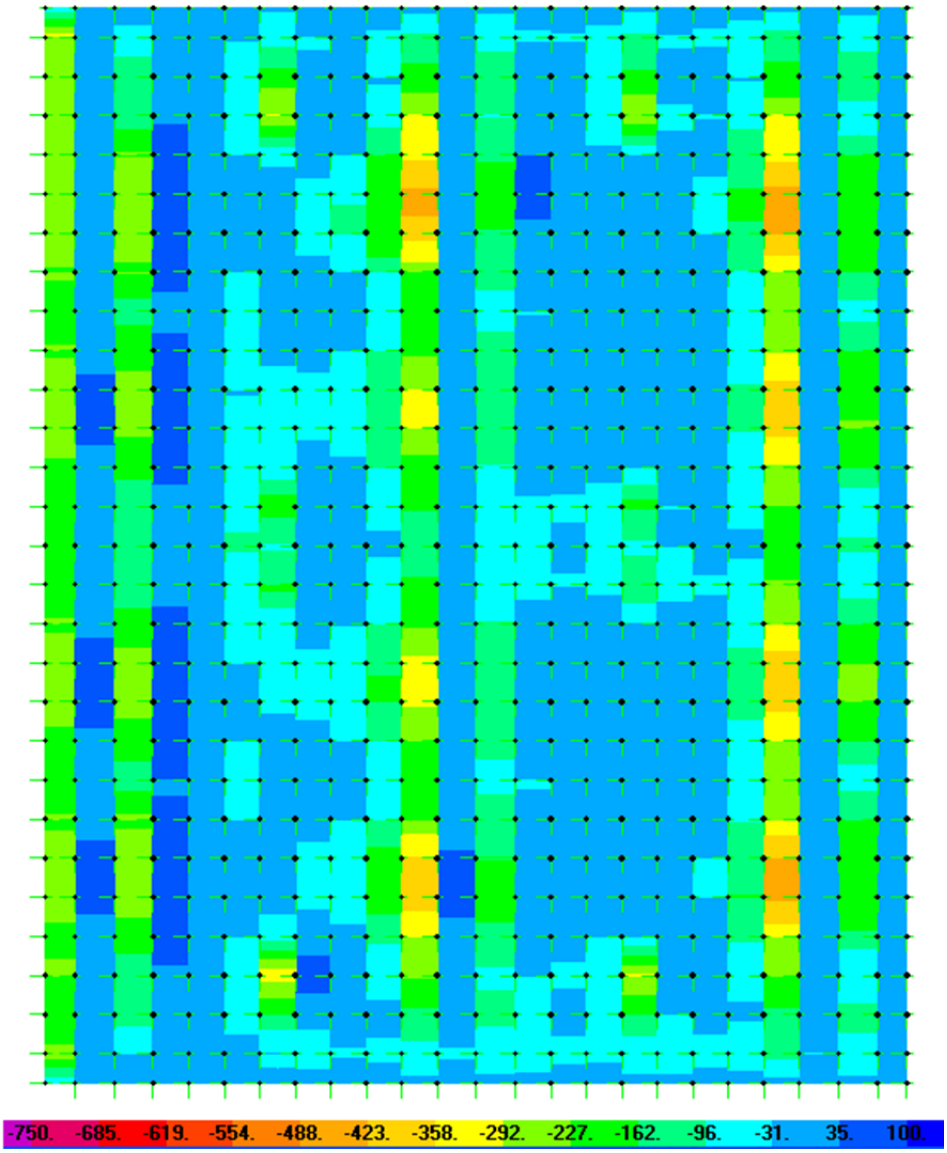


FIG. 4.39 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MIN SLU-V13(ESCLUSO SISMA)

Sezione	Sollecitazioni		Sezione		Armatura		Copriferro netto		Mom. Resist.	FS
	M_{sd}[kNm]		b	H	Inf.	Sup.	Inf	Sup		
			[m]	[m]	Tipo1	Tipo1	[cm]	[cm]	M_{rd}	M_{rd}/M_{sd}
M22-Parete A	M+	+187	1.0	0.75	5Ø20	5Ø20	5	5	+419	2.24
M22-Cella 1-5-9	M+	+110	1.0	0.75	5Ø20	5Ø20	5	5	+419	3.81
M22-Parete B-celle5-6 (5m centrali cella)	M+	+495	1.0	0.75	5Ø24	5Ø20	5	5	+589	1.19
M22-Parete B-celle 1-2	M+	+275	1.0	0.75	5Ø20	5Ø20	5	5	+419	1.52
M22-Cella 6 (5m centrali cella)	M-	-495	1.0	0.75	5Ø24	5Ø24	5	5	-589	1.31
M22-Cella 2-10	M-	-82	1.0	0.75	5Ø20	5Ø20	5	5	-419	5.08
M22-Parete C celle 6-7 (5m centrali cella)	M+	+473	1.0	0.75	5Ø24	5Ø24	5	5	+589	1.25
M22-Parete C celle 2-3	M+	+209	1.0	0.75	5Ø20	5Ø20	5	5	+419	2.00
M22-Cella 7	M-	-352	1.0	0.75	5Ø24	5Ø24	5	5	-589	1.67
M22-Parete D	M+	+429	1.0	0.75	5Ø24	5Ø24	5	5	+589	1.37
M22-Cella 8-12	M+	+242	1.0	0.75	5Ø24	5Ø24	5	5	+589	2.43
M11-Parete E	M+	+220	1.0	0.75	5Ø20	5Ø20	7	7	+416	1.89
M11-Celle 1-2-3-4	M-	-100	1.0	0.75	5Ø20	5Ø20	7	7	-416	4.16
M11-Parete F	M+	+275	1.0	0.75	5Ø20	5Ø20	7	7	+416	1.51
M11-Cella 6-7	M-	-319	1.0	0.75	5Ø20	5Ø20	7.4	7.4	-416	1.30
M11-Cella 5-8	M-	-100	1.0	0.75	5Ø20	5Ø20	7.4	7.4	-416	4.16
M11-Parete G	M+	+330	1.0	0.75	5Ø20	5Ø20	7.4	7.4	+416	1.26

NB: I momenti positivi tendono le fibre inferiori, i momenti negativi tendono le fibre superiori.

TAB. 4-5 - CASSONI C7-C8 (Q.-11.00) - VERIFICHE AGLI SLU

Verifiche a taglio

Il taglio massimo si trova nei setti intorno alle celle grandi ed è pari a, per il setto A, a 250kN/m (V23), per il setto B, a 750kN/m (V23) e per il setto C e D a 580kN/m (V23). Il taglio massimo in corrispondenza del setto E è pari a 280kN/m (V13) e per quello F è pari a 520kN/m (V13) e per il setto G é pari a 430kN/m (V13) .

Il taglio massimo è localizzato al centro della cella per una larghezza di 2.5-3.0m.

Come si evince dalla Tab. sottostante, la resistenza della sezione non armata a taglio è pari a 273 kN/m.

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	Fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	**VRD**
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
Solettone	0	750	690	1570	60	1570	0	0,12	1.54	0.0023	35	19,8	0	0,15	0.40	254	273	**273**

Orditura a Taglio cassone

Si considera cot(θ)=1 dove θ è l'angolo dei puntoni di calcestruzzo rispetto all'asse della sezione.
Si dispone orditura a taglio nelle seguenti sezioni:

- Parete A in corrispondenza cella grande:

V_{23Sd} = 250kN/m

Nessuna orditura di taglio

- Setto B in corrispondenza cella grande:

V_{23Sd} = 750kN/m

Si dispongono ferri a taglio piegati a 45° **ϕ24/400** n°3 a distanza 500mm in modo di coprire 1.5m.

Zona taglio :(750-2*50-26+0.9*690*cot45°)=1245mm

Zona interessata dal taglio:1245mm

V_{Rd} =452*2.5*391*(1245/500)*sen(45°)/1000

V_{Rd}=442kN*2.49*sen(45°)=442*2.49*0.707=778 kN/m

- Setto C e D in corrispondenza cella grande:

V_{23Sd} = 580kN/m

Si dispongono ferri a taglio piegati a 45° **ϕ22/400** n°3 a distanza 500mm

V_{Rd} =381*2.5*391*2.49*sen(45°)/1000=656 kN/m

- Setto E:

Nessuna orditura di taglio

- Setto F e G in corrispondenza cella grande:

V_{12Sd} = 450/430kN/m

Si dispongono ferri a taglio piegati a 45° **ϕ22/400** n°2 a distanza 500mm

Zona taglio :(750-2*50-2*20-20+0.9*690*cot45°)=1211mm

V_{Rd} =381*2.5*391*(1211/500)*sen(45°)/1000

V_{Rd}=372kN*(2.42=2)*sen(45°)=372*2*0.707=526kN/m

4.2.5 Verifiche agli SLU C7-C8 (q.ta-11) - (sisma)

L'analisi sismica è stata valutata tramite un analis modale utilizzando lo spettro di risposta di progetto con il periodo di ritorno di 475anni. Di seguito si riportano le sollecitazioni del solettone per le combinazioni in fase sismica.

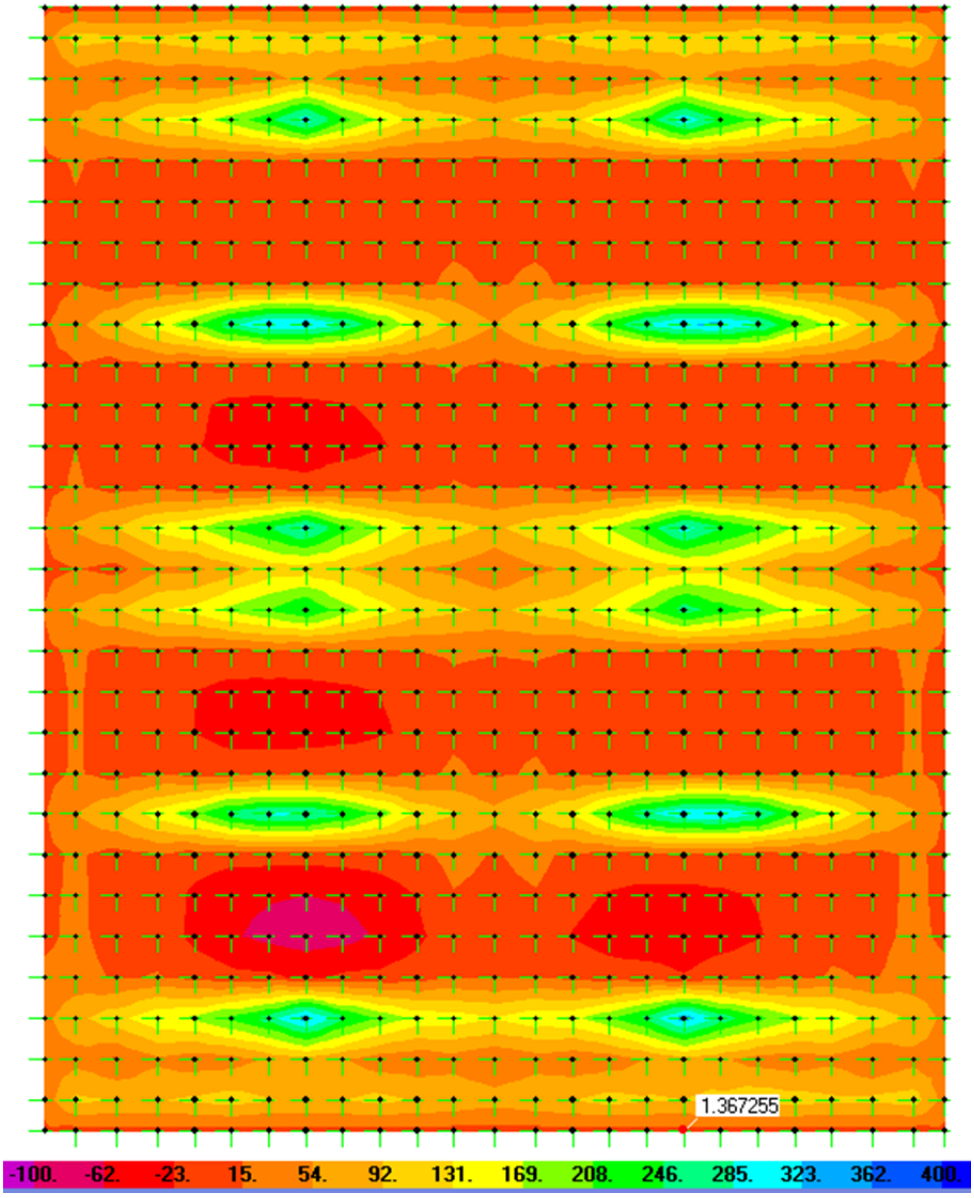


FIG. 4.40 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MAX SLU SISMA-M22

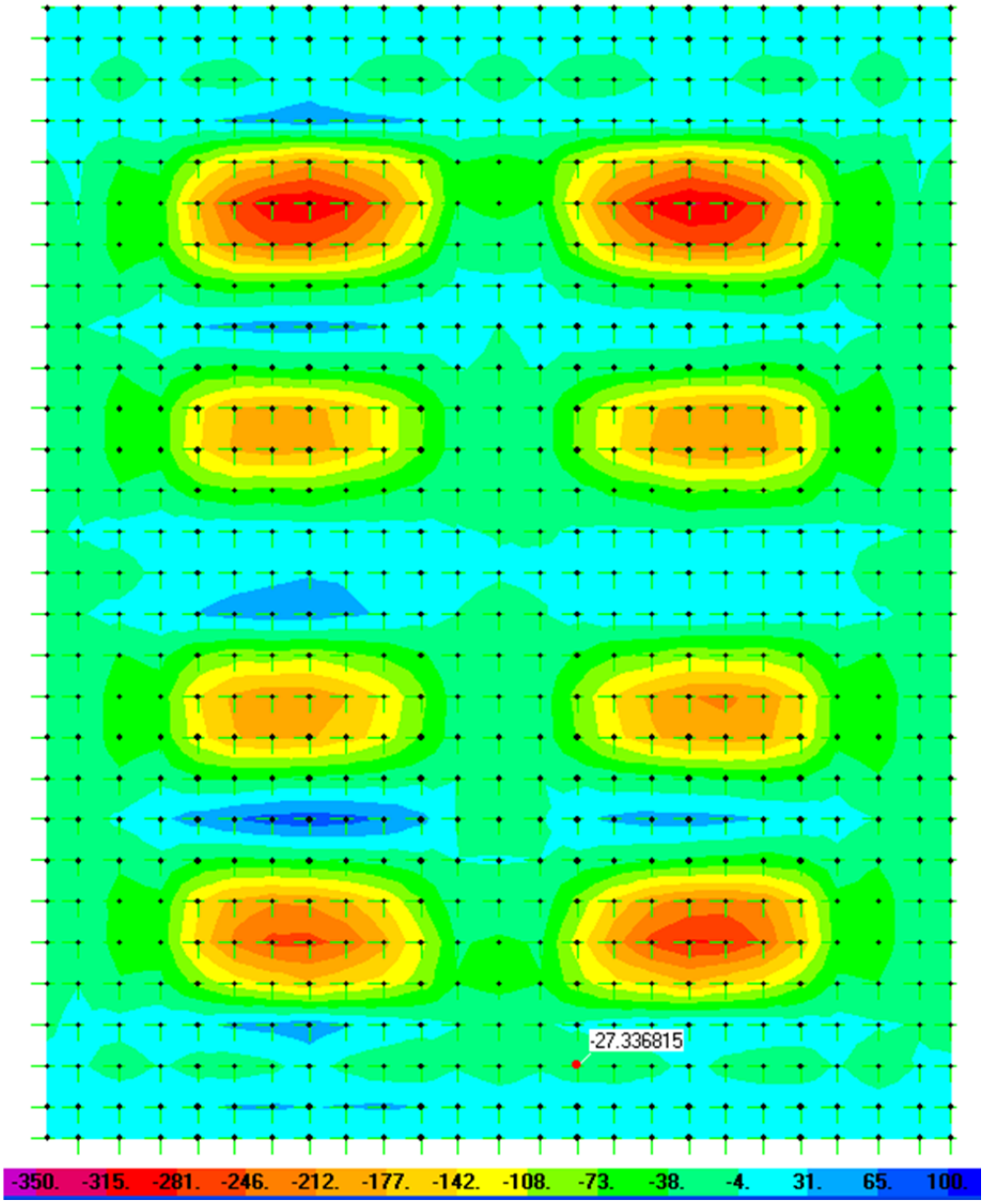


FIG. 4.41 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MIN SLU SISMA-M22

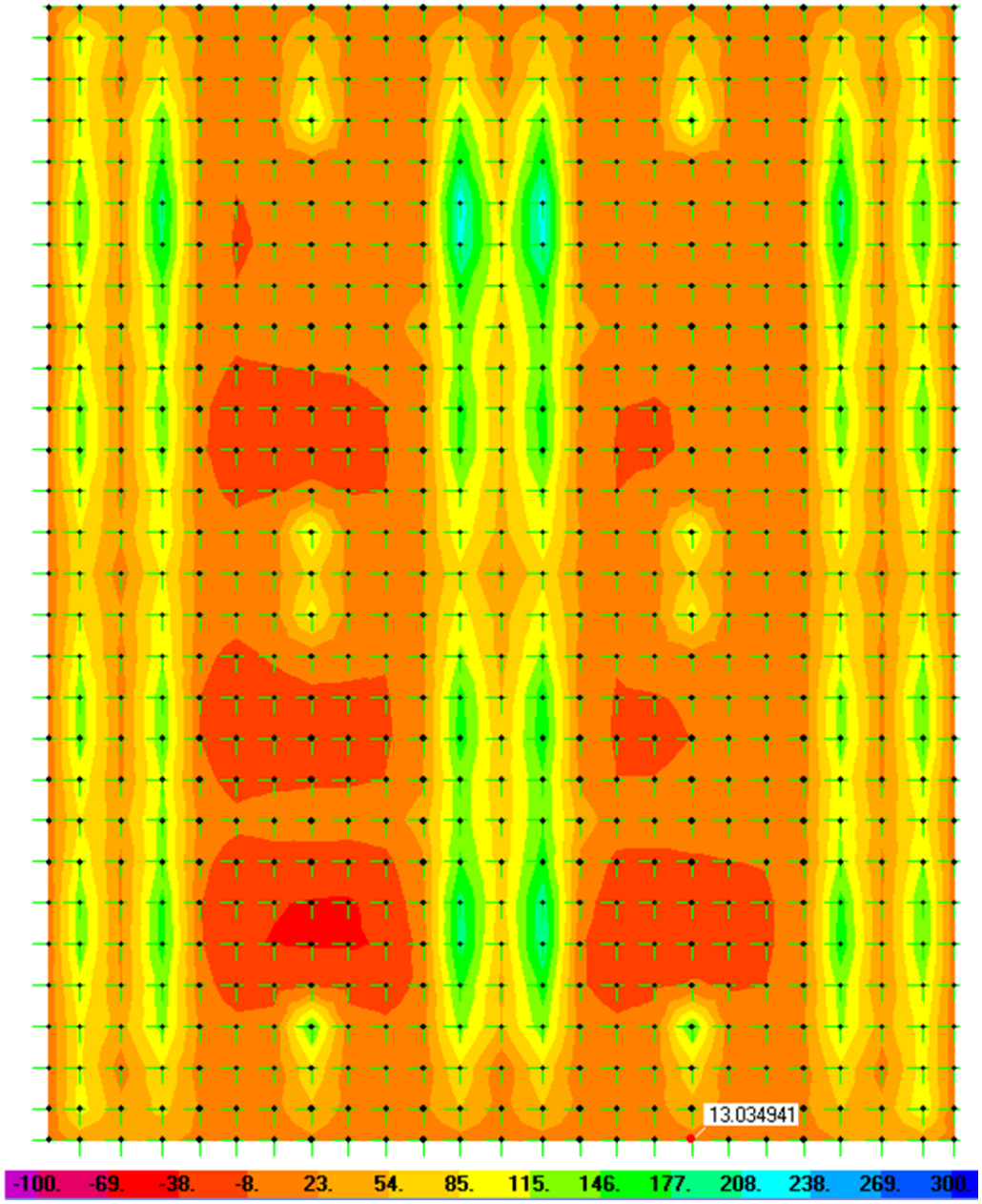


FIG. 4.42 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MAX SLU SISMA-M11

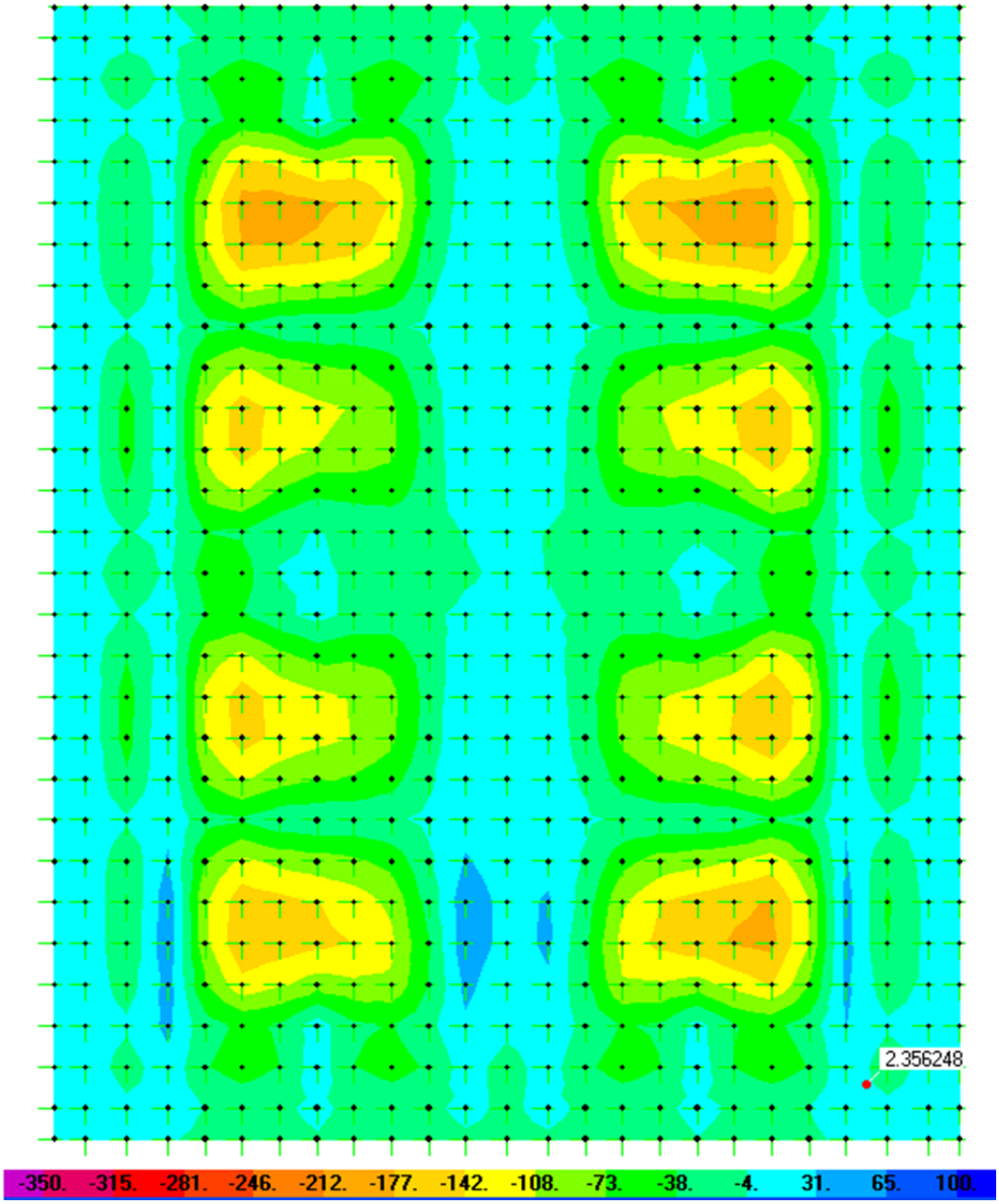


FIG. 4.43 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MIN SLU SISMA-M11

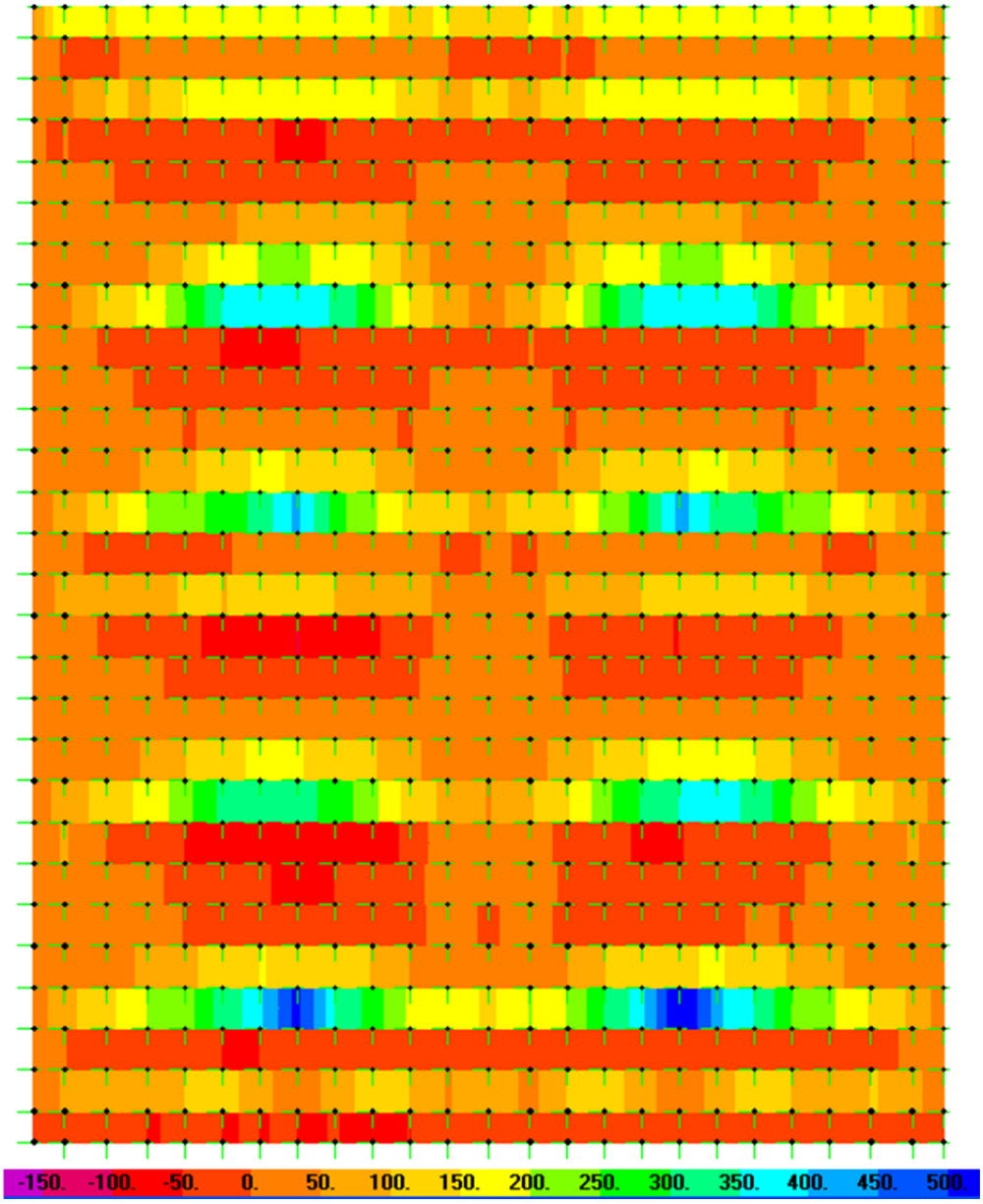


FIG. 4.44 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MAX SLU SISMA-V23

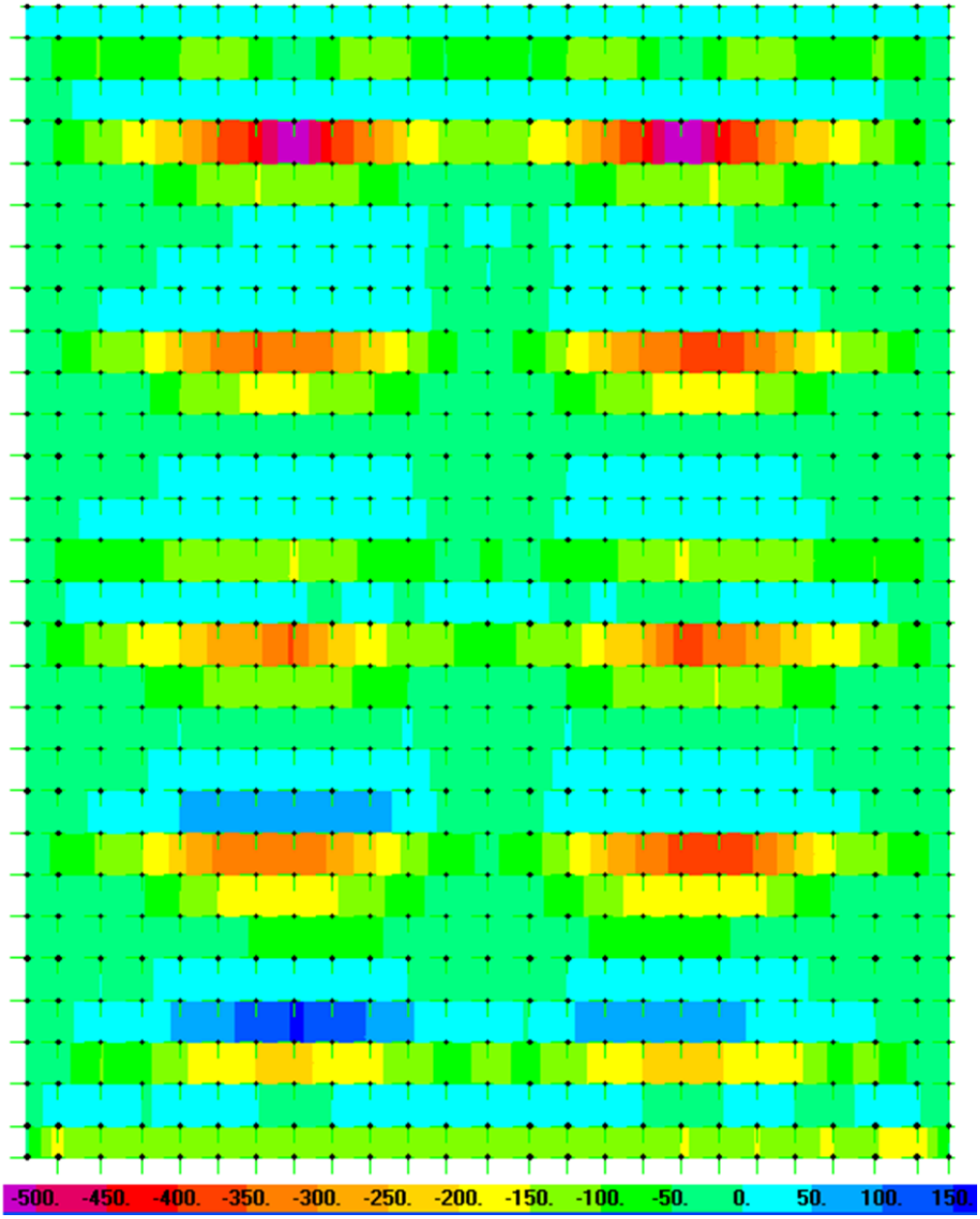


FIG. 4.45 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MIN SLU SISMA-V23

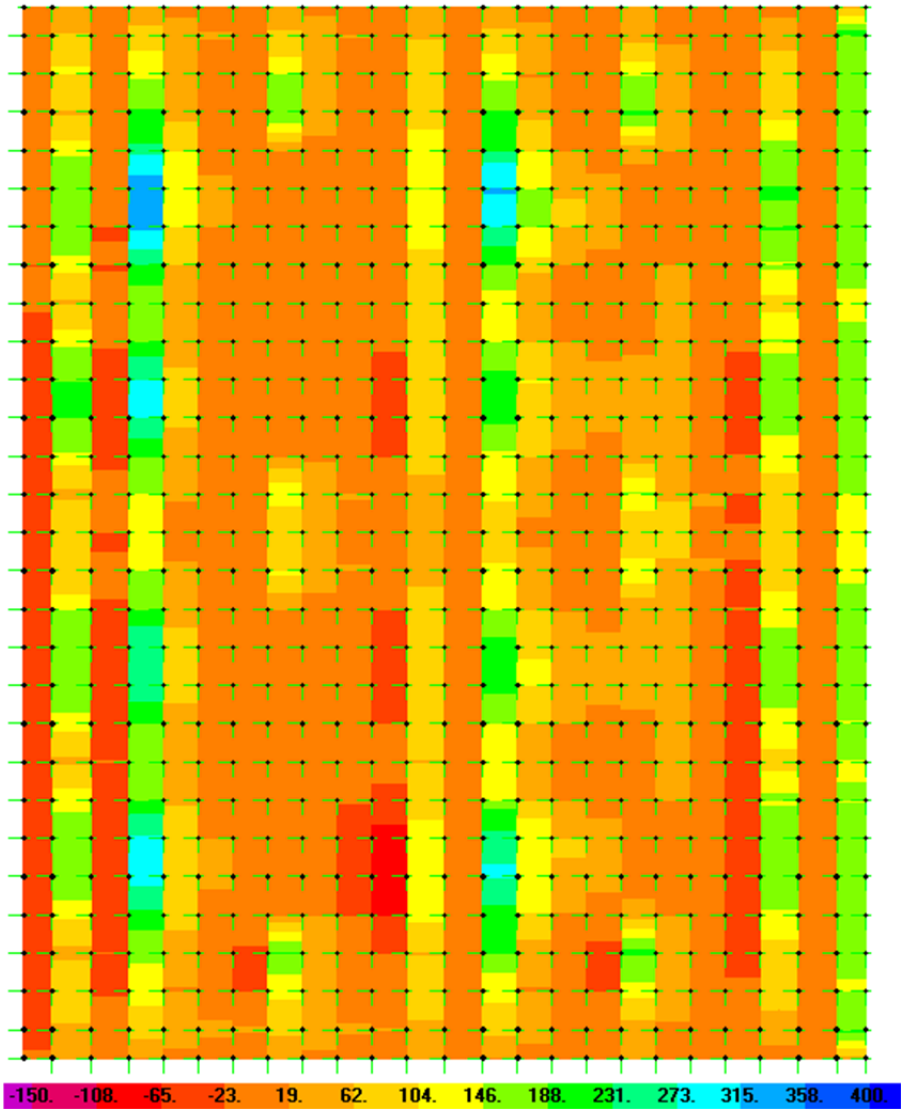


FIG. 4.46 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MAX SLU SISMA-V13

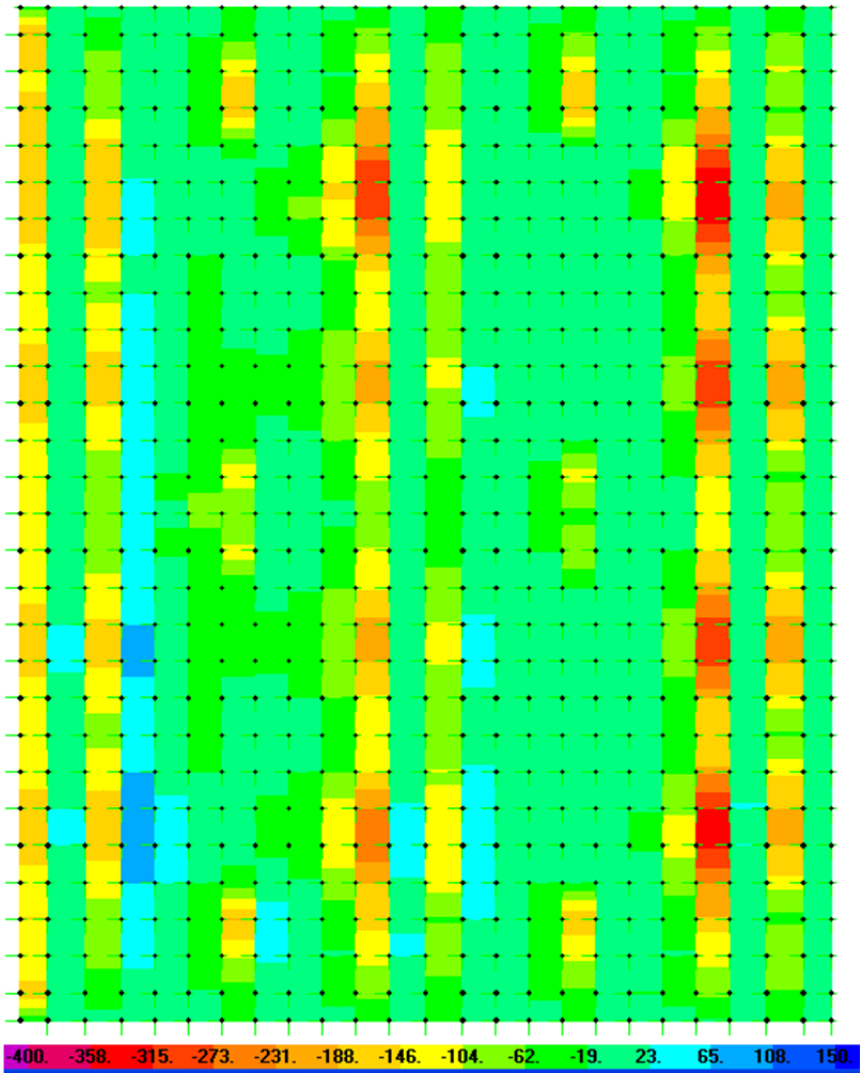


FIG. 4.47 - SOLETTONI CASSONI C7-C8(Q.-11.00) - INVILUPPO MIN SLU SISMA-V13

Sezione	Sollecitazioni		Sezione		Armatura		Copriferro netto		Momento Resist.	FS
	M_{sd} [kNm]		b	H	Inf	Sup	Inf	Sup		
			[m]	[m]			[cm]	[cm]	M_{rd}	M_{rd}/M_{sd}
M22-Parete A	M+	+110	1.0	0.75	5Ø20	5Ø20	5	5	+419	3.81
M22-Cella 1-5-9	M+	+80	1.0	0.75	5Ø20	5Ø20	5	5	+419	5.23
M22-Parete B-celle5-6 (5m centrali cella)	M+	+300	1.0	0.75	5Ø26	5Ø20	5	5	+685	2.28
M22-Parete B-celle 1-2	M+	+110	1.0	0.75	5Ø20	5Ø20	5	5	+419	3.81
M22-Cella 6 (5m centrali cella)	M-	-320	1.0	0.75	5Ø26	5Ø26	5	5	-686	2.14
M22-Cella 2-10	M-	-60	1.0	0.75	5Ø20	5Ø20	5	5	-419	6.98
M22-Parete C celle 6-7 (5m centrali cella)	M+	+285	1.0	0.75	5Ø26	5Ø26	5	5	+686	2.41
M22-Parete C celle 2-3	M+	+90	1.0	0.75	5Ø20	5Ø20	5	5	+419	4.66
M22-Cella 7	M-	-210	1.0	0.75	5Ø26	5Ø26	5	5	-686	3.27
M22-Parete D	M+	+275	1.0	0.75	5Ø26	5Ø26	5	5	+686	2.50
M22-Cella 8-12	M+	+200	1.0	0.75	5Ø26	5Ø26	5	5	+686	3.43
M11-Parete E	M+	+150	1.0	0.75	5Ø20	5Ø20	7	7	+416	2.78
M11-Celle 1-2-3-4	M-	-60	1.0	0.75	5Ø20	5Ø20	7	7	-416	6.93
M11-Parete F	M+	+190	1.0	0.75	5Ø20	5Ø20	7	7	+416	2.19
M11-Cella 6-7	M-	-190	1.0	0.75	5Ø20	5Ø20	7.6	7.6	-416	2.19
M11-Cella 5-8	M-	-50	1.0	0.75	5Ø20	5Ø20	7.6	7.6	-416	8.32
M11-Parete G	M+	+215	1.0	0.75	5Ø20	5Ø20	7	7	+416	1.93

NB: I momenti positivi tendono le fibre inferiori, i momenti negativi tendono le fibre superiori.

TAB. 4-6 - CASSONI C7-C8(Q.-11.00) - VERIFICHE SLU SISMA

Si deduce che l'orditura a flessione già verificata per le combinazioni escluso sisma è adeguato anche per le azioni sismiche. Per quanto riguarda il taglio:

Sezione	Sollecitazioni SLU (escl. Sisma)		Sollecitazioni SLU Sisma
	V_{sd} [kNm]		V_{sd} [kNm]
Parete A	V_{23}	+250	+170
Setto B-celle5-6 (cella grande)	V_{23}	+750	-490
Setto C/D (cella grande)	V_{23}	+580	+370
Parete E	V_{13}	+280	-190
Setto F	V_{13}	+520	-350
Setto G	V_{13}	+430	+305

Si deduce che l'orditura a taglio già verificata per le combinazioni agli SLU in assenza di sisma è adeguata anche per le azioni sismiche.

4.2.6 Verifiche agli SLE C7-C8 (q.-11) (Combinazioni frequenti e rare)

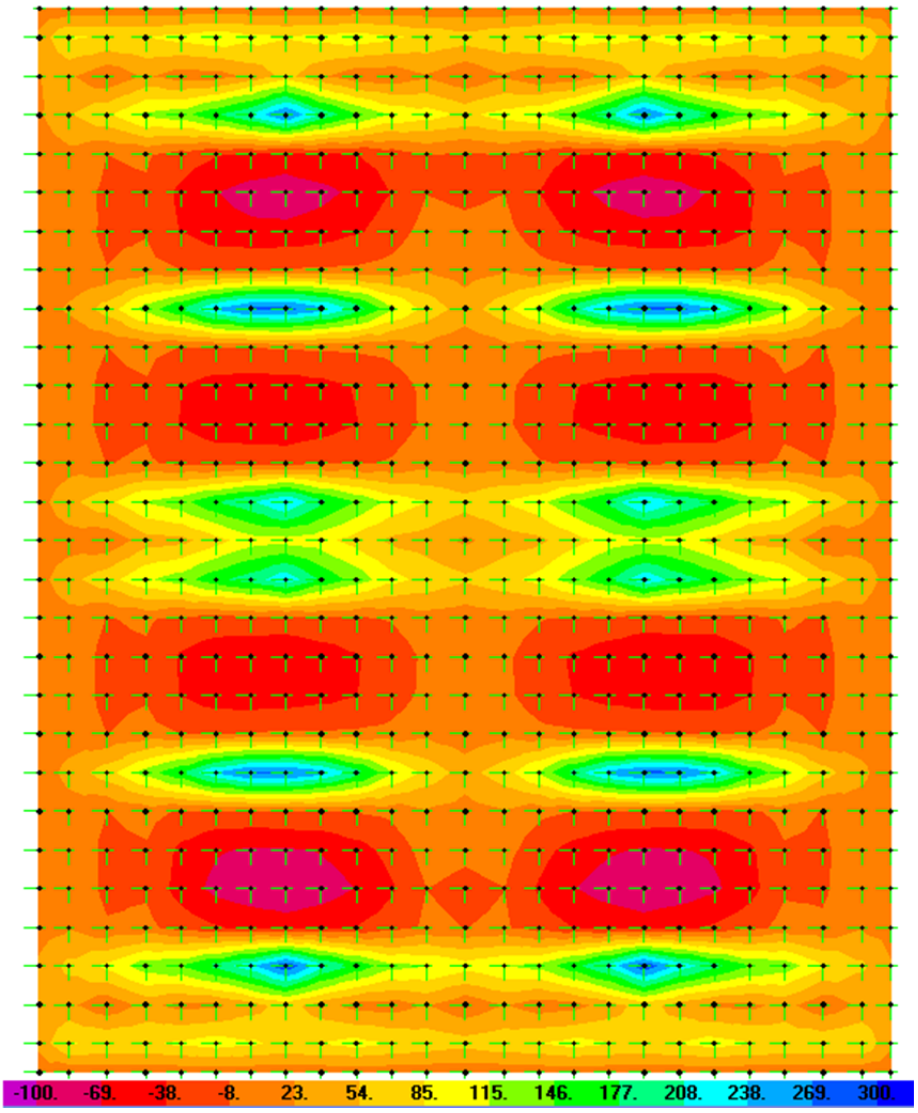


FIG. 4.48 - SOLETTONI CASSONI C7-C8(Q.-11) - INVILUPPO MAX SLE(FREQ.)-M22

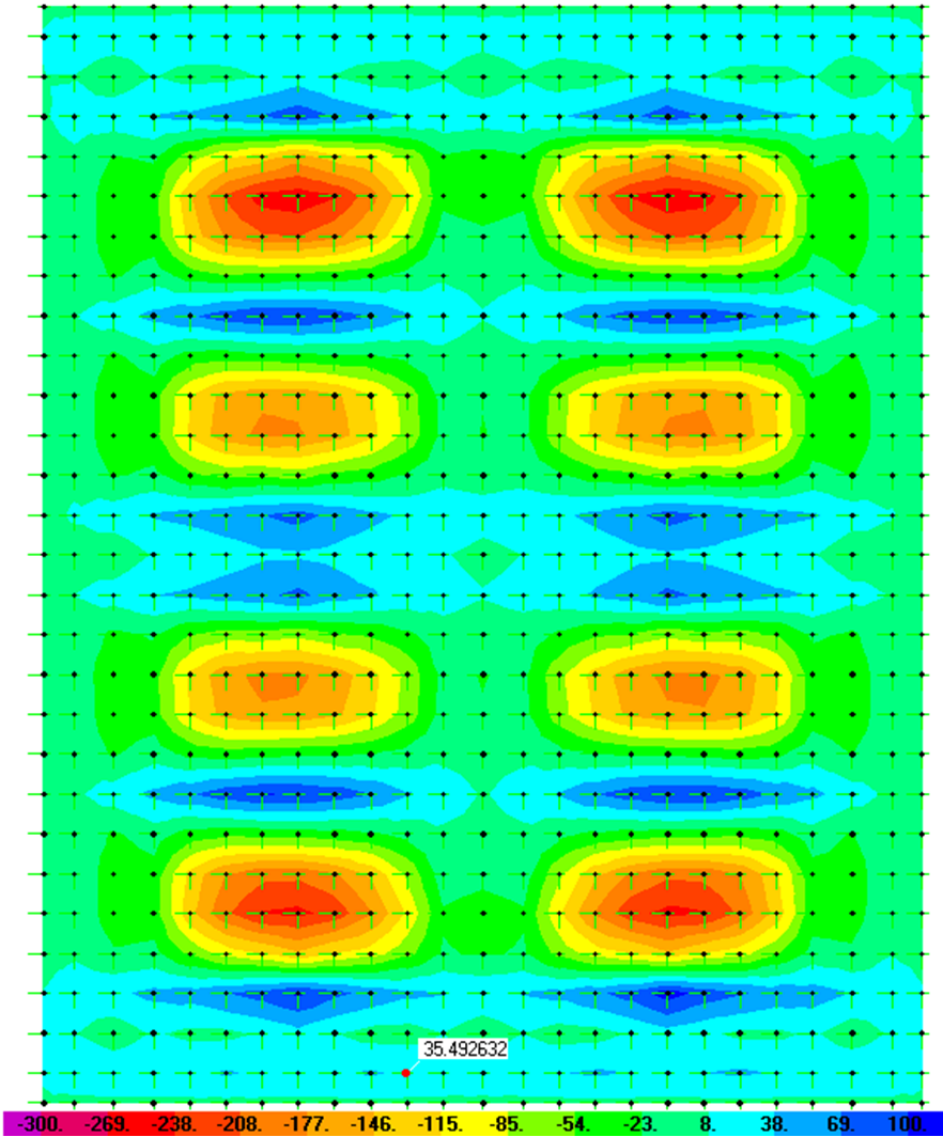


FIG. 4.49 - SOLETTONI CASSONI C7-C8(Q.-11) - INVILUPPO MIN SLE(FREQ.)-M22

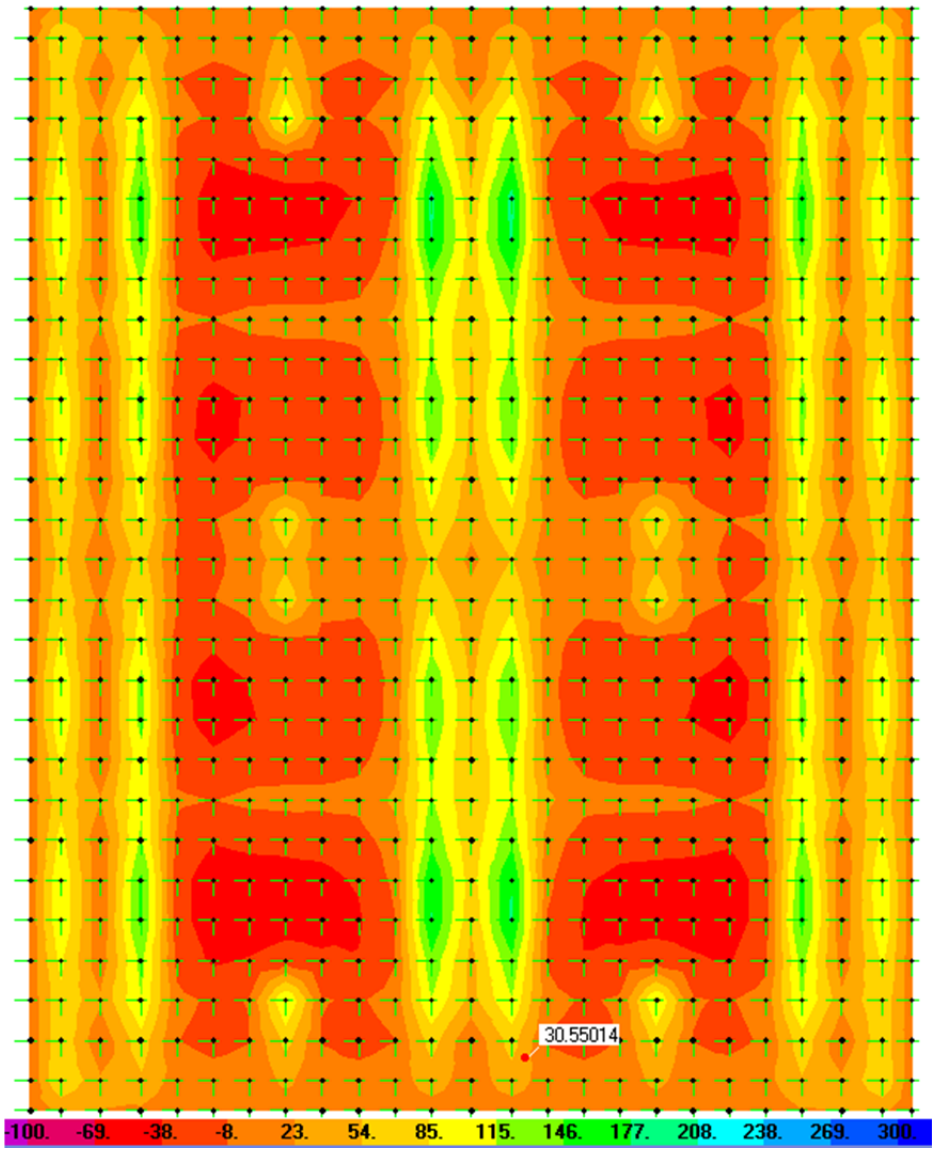


FIG. 4.50 - SOLETTONI CASSONI C7-C8(Q.-11) - INVILUPPO MAX SLE(FREQ.)-M11

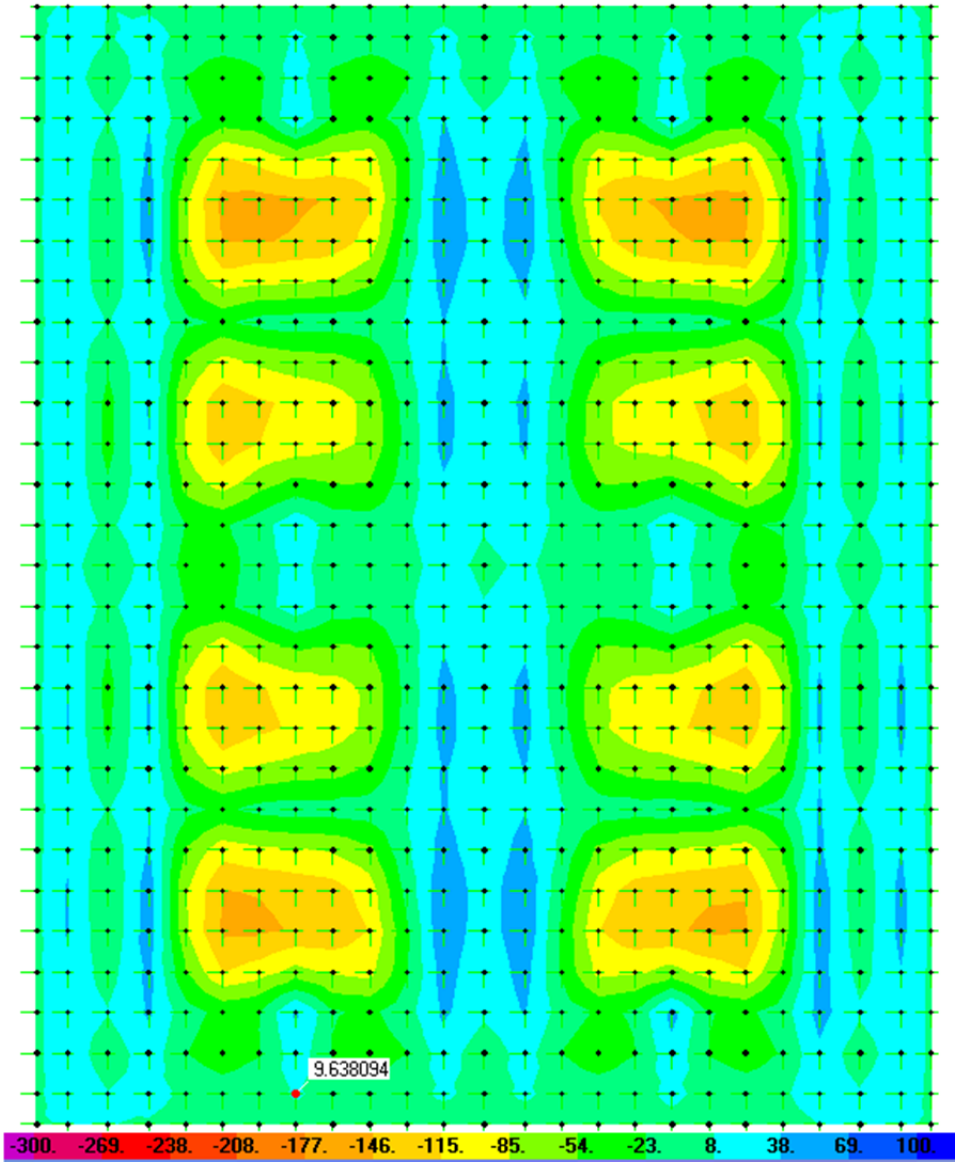


FIG. 4.51 - SOLETTONI CASSONI C7-C8(Q.-11) - INVILUPPO MIN SLE(FREQ.)-M11

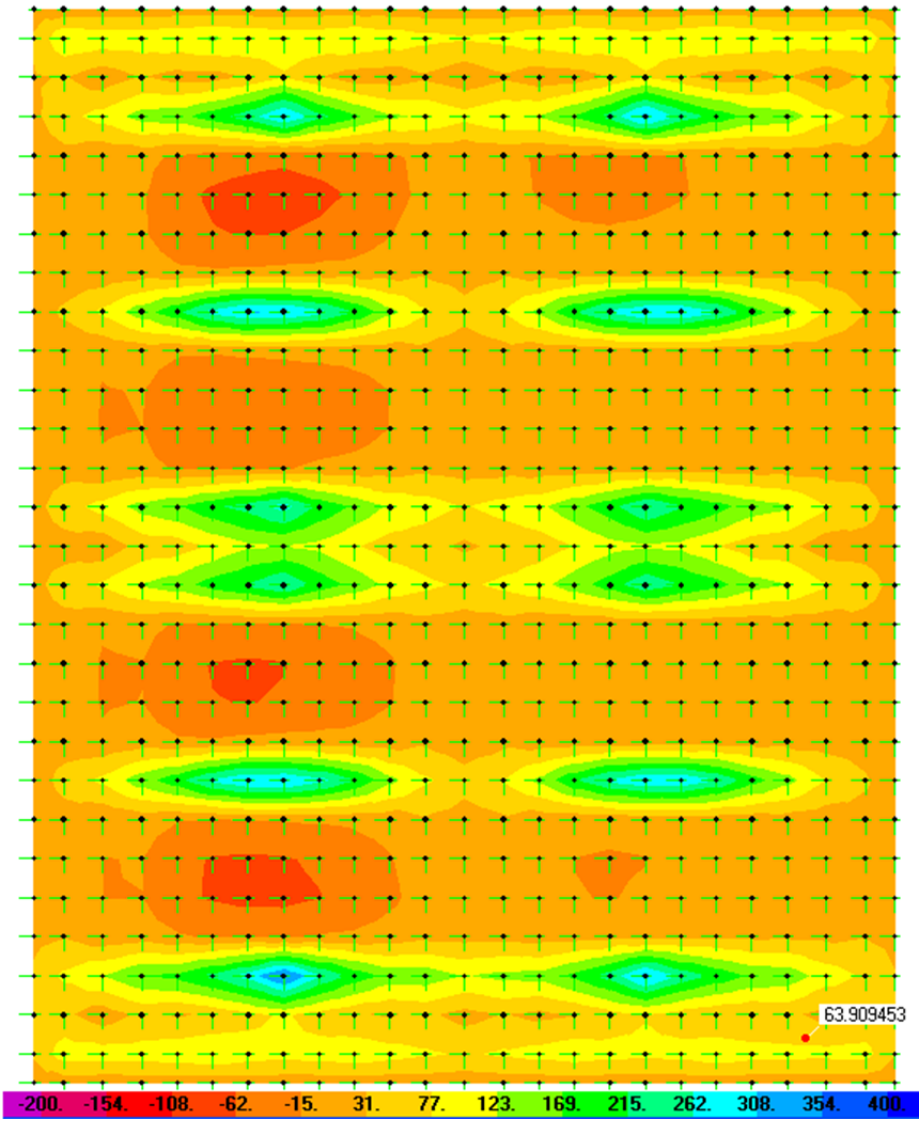


FIG. 4.52 - SOLETTONI CASSONI C7-C8(Q.-11) - INVILUPPO MAX SLE(RARE)-M22

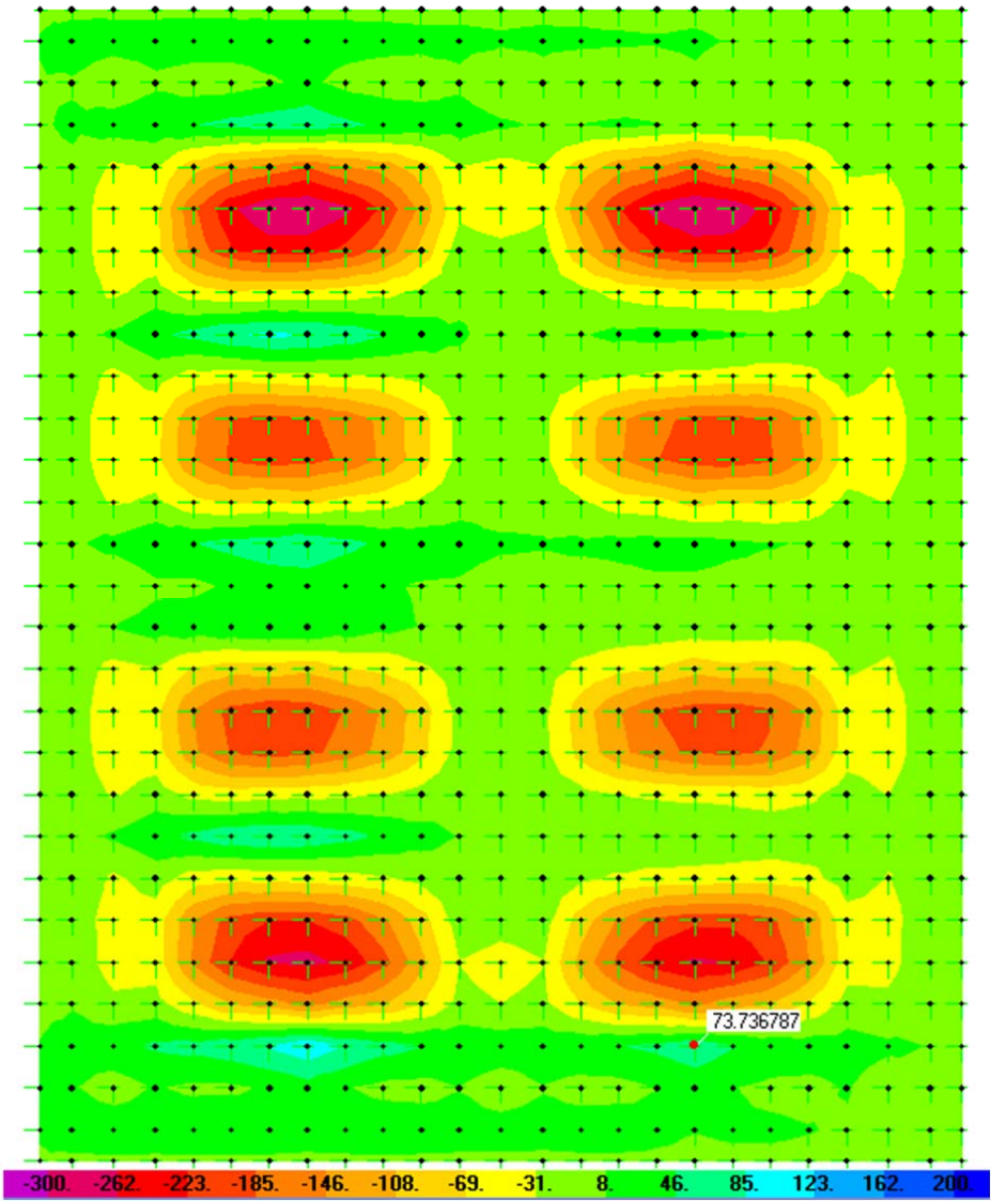


FIG. 4.53 - SOLETTONI CASSONI C7-C8(Q.-11) - INVILUPPO MIN SLE(RARE)-M22

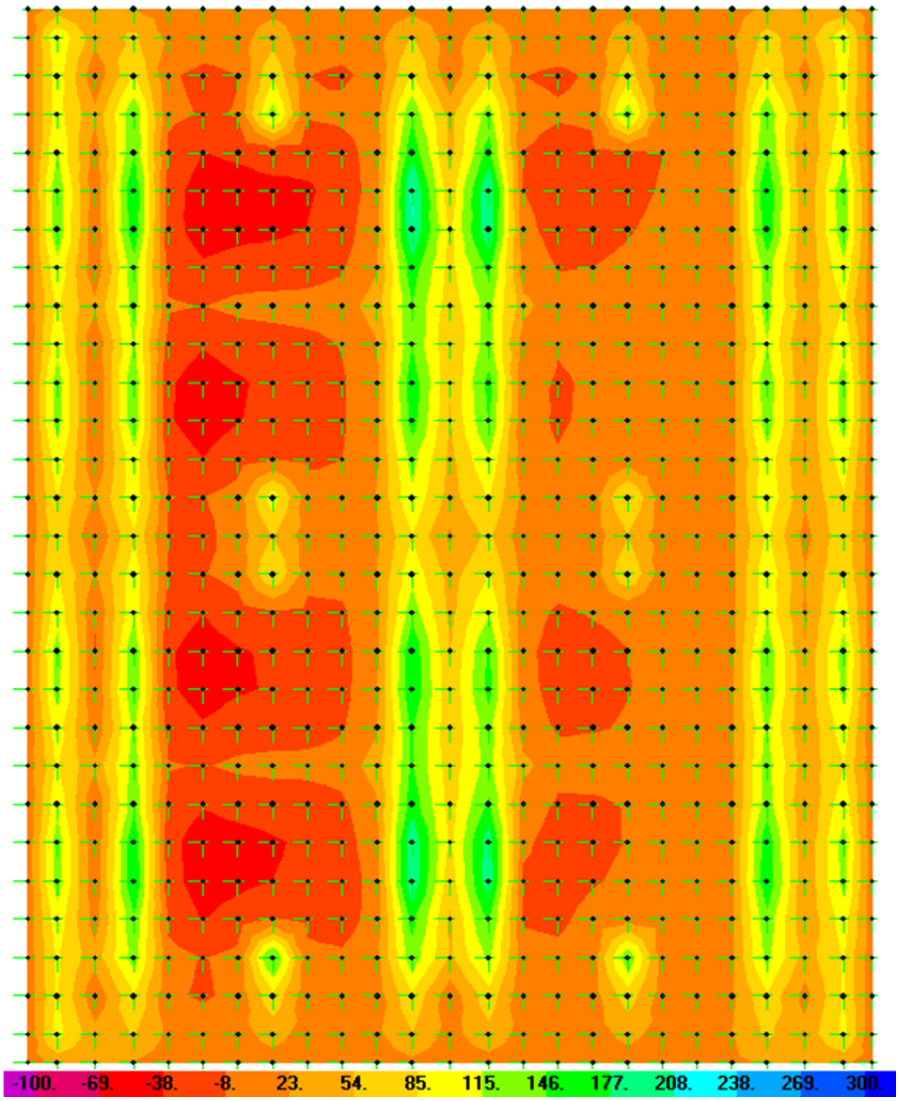


FIG. 4.54 - SOLETTONI CASSONI C7-C8(Q.-11) - INVILUPPO MAX SLE(RARE)-M11

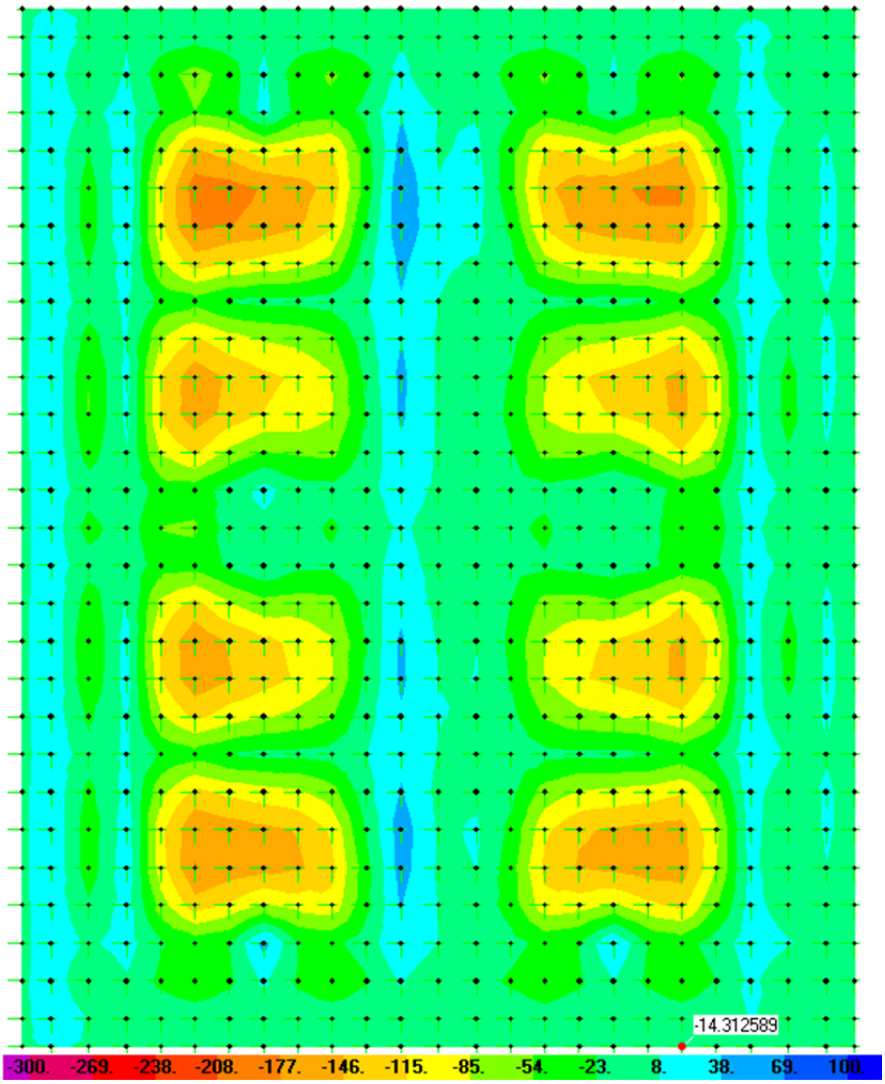


FIG. 4.55 - SOLETTONI CASSONI C7-C8(Q.-11) - INVILUPPO MIN SLE(RARE)-M11

Sezione	Sollecitazioni		Sezione		Armatura		Copriferro netto		Sigma		
	M_{sd} [kNm]		B	H	Inf	Sup	Inf	Sup	σ_a	σ_c	w
			[m]	[m]			[cm]	[cm]	[MPa]	[MPa]	[mm]
M22-Parete A	M+	+107	1.0	0.75	5Ø20	5Ø20	5	5	105	1.9	0.092
M22-Cella 1-5-9	M+	+72	1.0	0.75	5Ø20	5Ø20	5	5	70	1.3	0.062
M22-Parete B-celle5-6 (5m centrali cella)	M+	+225	1.0	0.75	5Ø24	5Ø20	5	5	155	3.5	0.134
M22-Parete B-celle 1-2	M+	+128	1.0	0.75	5Ø20	5Ø20	5	5	125	2.3	0.110
M22-Cella 6 (5m centrali cella)	M-	-260	1.0	0.75	5Ø24	5Ø24	5	5	179	3.9	0.155
M22-Cella 2-10	M-	-40	1.0	0.75	5Ø20	5Ø20	5	5	39	0.7	0.035
M22-Parete C celle 6-7 (5m centrali cella)	M+	+275	1.0	0.75	5Ø24	5Ø24	5	5	189	4.1	0.164
M22-Parete C celle 2-3	M+	+128	1.0	0.75	5Ø20	5Ø20	5	5	125	2.3	0.110
M22-Cella 7	M-	-185	1.0	0.75	5Ø24	5Ø24	5	5	127	2.8	0.110
M22-Parete D	M+	+230	1.0	0.75	5Ø24	5Ø24	5	5	158	3.5	0.137
M22-Cella 8-12	M+	+107	1.0	0.75	5Ø24	5Ø24	5	5	74	1.6	0.064
M11-Parete E	M+	+100	1.0	0.75	5Ø20	5Ø20	7	7	101	1.9	0.107
M11-Celle 1-2-3-4	M-	-30	1.0	0.75	5Ø20	5Ø20	7	7	30	0.6	0.032
M11-Parete F	M+	+160	1.0	0.75	5Ø20	5Ø20	7	7	162	3.1	0.171
M11-Cella 6-7	M-	-160	1.0	0.75	5Ø20	5Ø20	7.4	7.4	163	3.1	0.178
M11-Cella 5-8	M-	-100	1.0	0.75	5Ø20	5Ø20	7.4	7.4	102	2.0	0.111
M11-Parete G	M+	+175	1.0	0.75	5Ø20	5Ø20	7.4	7.4	178	3.4	0.195

NB: I momenti positivi tendono le fibre inferiori, i momenti negativi tendono le fibre superiori

TAB. 4-7 - CASSONI C7-C8(Q.-11) - VERIFICHE AGLI SLE - COMBINAZIONI FREQUENTI

Sezione	Sollecitazioni		Sezione		Armatura		Copriferro netto		Sigma	
	M_{sd}[kNm]		B	H	Inf	Sup	Inf	Sup	σ_a	σ_c
			[m]	[m]			[cm]	[cm]	[MPa]	[MPa]
M22-Parete A	M+	+125	1.0	0.75	5Ø20	5Ø20	5	5	122	2.3
M22-Cella 1-5-9	M+	+85	1.0	0.75	5Ø20	5Ø20	5	5	83	1.5
M22-Parete B-celle5-6 (5m centrali cella)	M+	+310	1.0	0.75	5Ø24	5Ø20	5	5	214	4.9
M22-Parete B-celle 1-2	M+	+140	1.0	0.75	5Ø20	5Ø20	5	5	137	2.5
M22-Cella 6 (5m centrali cella)	M-	-300	1.0	0.75	5Ø24	5Ø24	5	5	207	4.6
M22-Cella 2-10	M-	-65	1.0	0.75	5Ø20	5Ø20	5	5	64	1.2
M22-Parete C celle 6-7 (5m centrali cella)	M+	+310	1.0	0.75	5Ø24	5Ø24	5	5	214	4.7
M22-Parete C celle 2-3	M+	+130	1.0	0.75	5Ø20	5Ø20	5	5	127	2.3
M22-Cella 7	M-	-200	1.0	0.75	5Ø24	5Ø24	5	5	138	3.1
M22-Parete D	M+	+260	1.0	0.75	5Ø24	5Ø24	5	5	179	3.9
M22-Cella 8-12	M+	+180	1.0	0.75	5Ø24	5Ø24	5	5	124	2.7
M11-Parete E	M+	+135	1.0	0.75	5Ø20	5Ø20	7	7	137	2.6
M11-Celle 1-2-3-4	M-	-45	1.0	0.75	5Ø20	5Ø20	7	7	46	0.9
M11-Parete F	M+	+170	1.0	0.75	5Ø20	5Ø20	7	7	172	3.3
M11-Cella 6-7	M-	-190	1.0	0.75	5Ø20	5Ø20	7.4	7.4	194	3.7
M11-Cella 5-8	M-	-65	1.0	0.75	5Ø20	5Ø20	7.4	7.4	66	1.3
M11-Parete G	M+	+210	1.0	0.75	5Ø20	5Ø20	7.4	7.4	214	4.1

NB: I momenti positivi tendono le fibre inferiori, i momenti negativi tendono le fibre superiori

TAB. 4-8 - CASSONI C7-C8(Q.-11) - VERIFICHE AGLI SLE - COMBINAZIONI RARE

4.3 Cassoni modulo B7-B8-C7-C8 - Fusto B7-B8(q.-13)

4.3.1 Verifiche ferri orizzontali agli SLU cassone B7-B8(q.-13.00)

Di seguito si riportano le verifiche del cemento armato del fusto del cassone per gli stati limiti ultimi.

Per la verifica dell'orditura orizzontale del fusto si considerano le combinazioni di carico d'esercizio riportati in precedenza.

Di seguito si riportano gli inviluppi dei momenti delle pareti e dei setti.

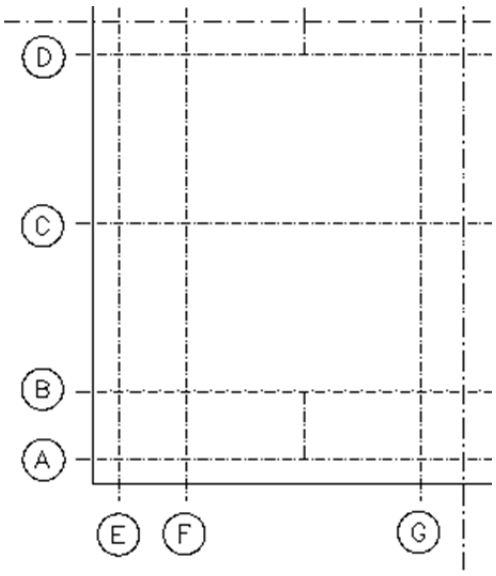


FIG. 4.56 - PIANTA CHIAVE PARETI E SETTI

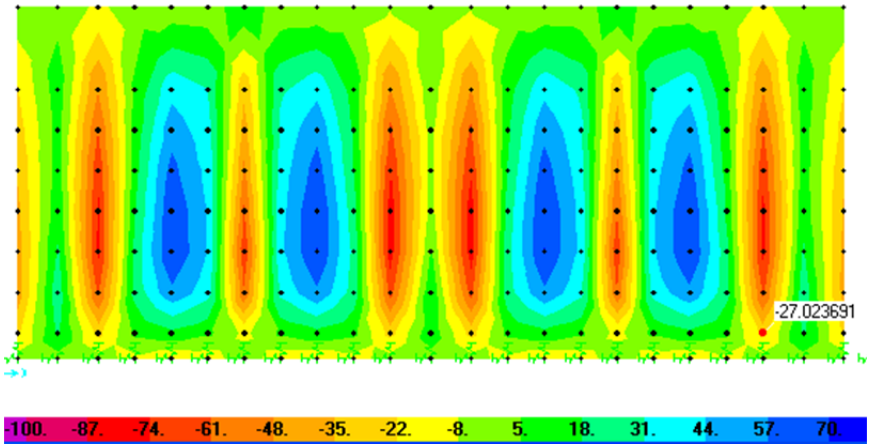


FIG. 4.57 - B7-B8(Q-13)- PARETE FILO A - GALLEGGIAMENTO & AFFONDAMENTO SLU-M11

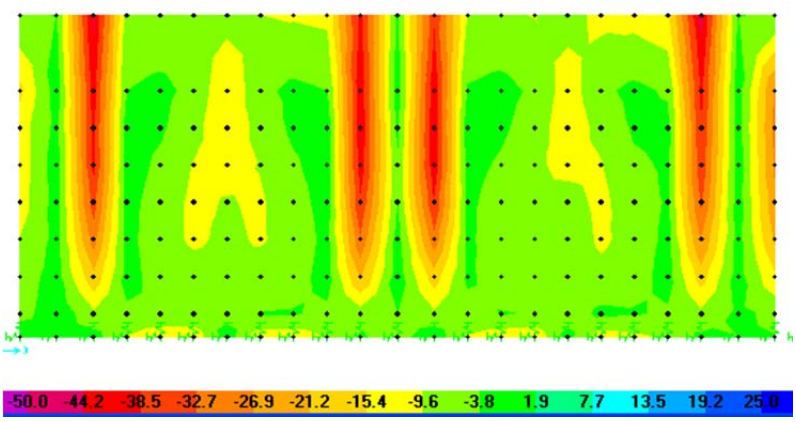


FIG. 4.58 - B7-B8(Q-13)-.PARETE FILO A - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

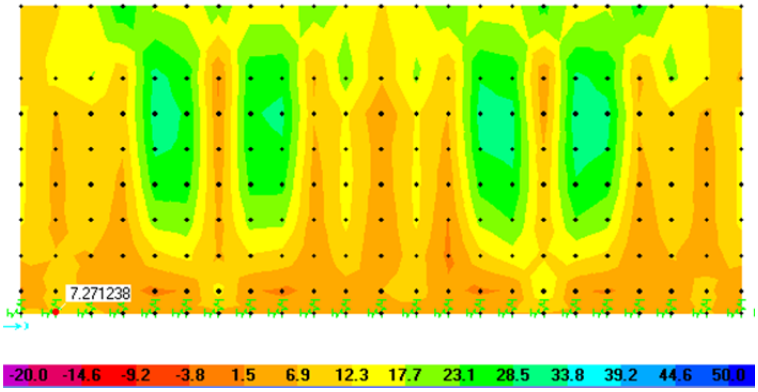


FIG. 4.59 - B7-B8(Q-13)-.PARETE FILO A - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

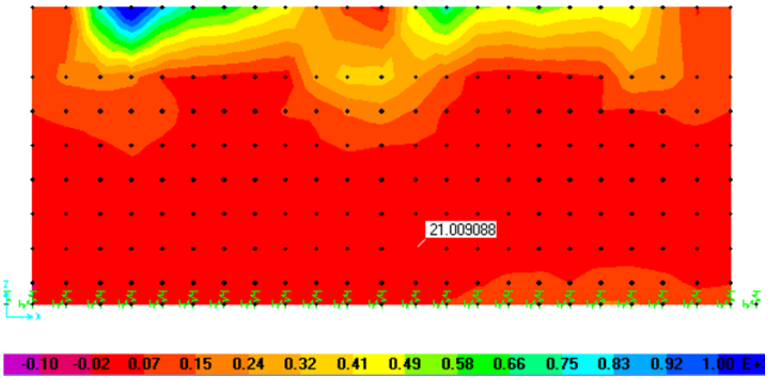


FIG. 4.60 - B7-B8(Q-13)-PARETE FILO A - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

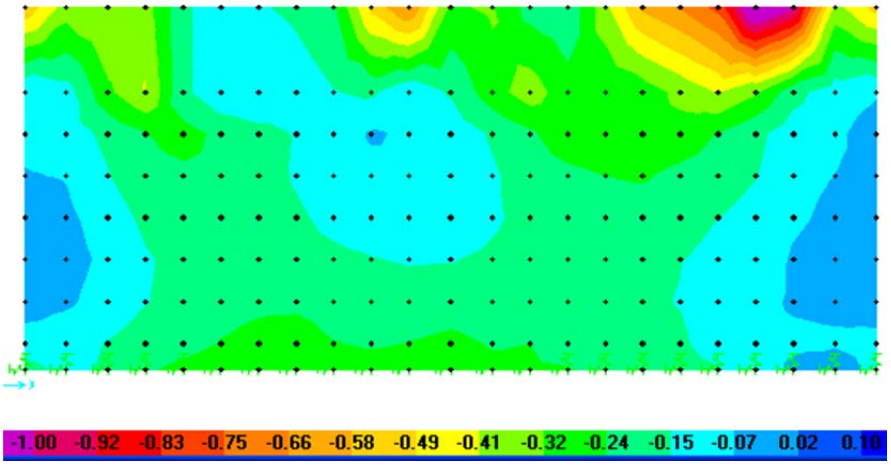


FIG. 4.61 - B7-B8(Q-13)-PARETE FILO A - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

B7-B8(q-13)-Parete A - ferri orizzontali - Verifiche agli SLU				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}	-160kN(aff/gall)	-81kNm	-179kNm	**2.20**
N_{max}/M_{min}	+270kN(tens.)	-45kNm	-51kNm	**1.13**
N_{max}/M_{max}	+270kNm	+29kNm	+51kNm	**1.75**
N_{min}	-100kN(comp)	-45kNm	-136kNm	**3.02**
Da +6.00				
B=1.0m,H=0.5m,A1=A2=1829mm^2(θ22/250+ θ14/500), H1=0.439m, H2=0.061m				
N_{max}	+950kN(tens.)	-45kNm	-114kNm	**2.53**

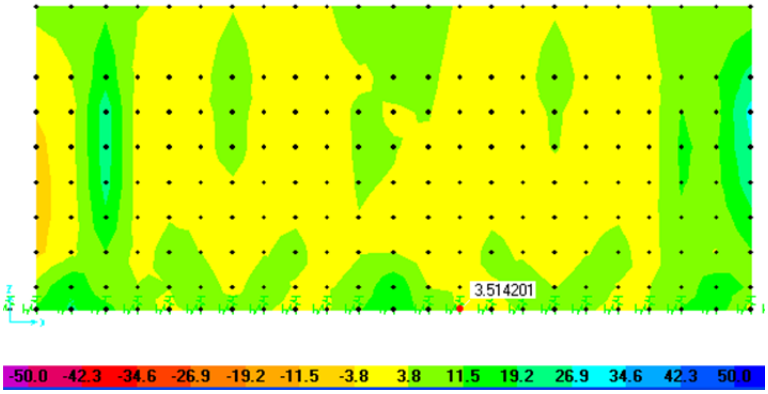


FIG. 4.62 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

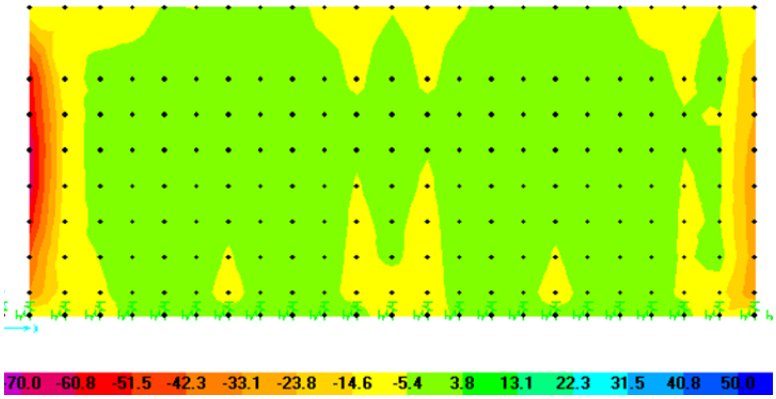


FIG. 4.63 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

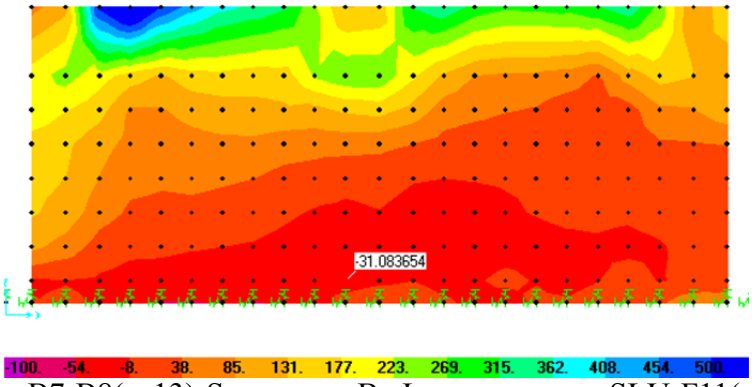


FIG. 4.64 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

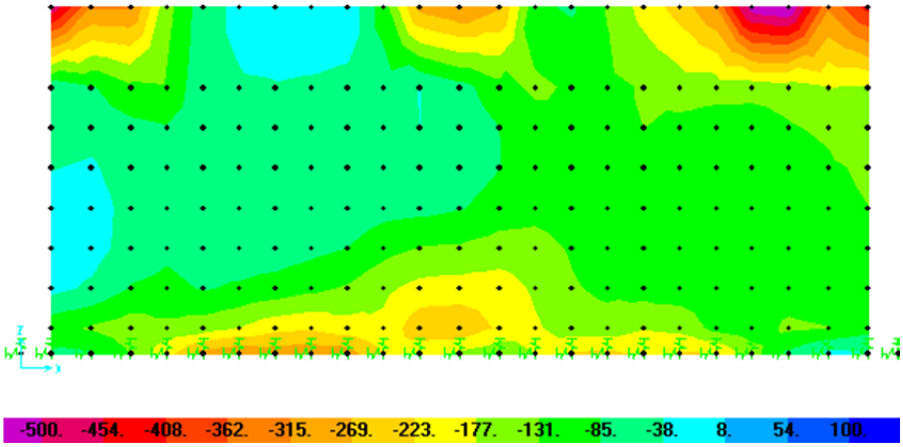


FIG. 4.65 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

B7-B8(q-13)-Setto B - ferri orizzontali - Verifiche agli SLU				
da 0 a +6.00				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max}/ M_{min}	+250kN(tens)	-10kNm	-42kNm	**5.5**
N_{max}/ M_{max}	+250kN	+30kNm	+42kNm	**1.97**
N_{min}	-300kN(comp.)	-30kNm	-91kNm	**3.03**
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
M_{min}	+200kN	-60kNm	-67kNm	**1.12**
da +6.00				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m				
N_{max}	+500kN	-50kNm	-71kNm	**1.42**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+500kN	+20kNm	+35kNm	**1.75**

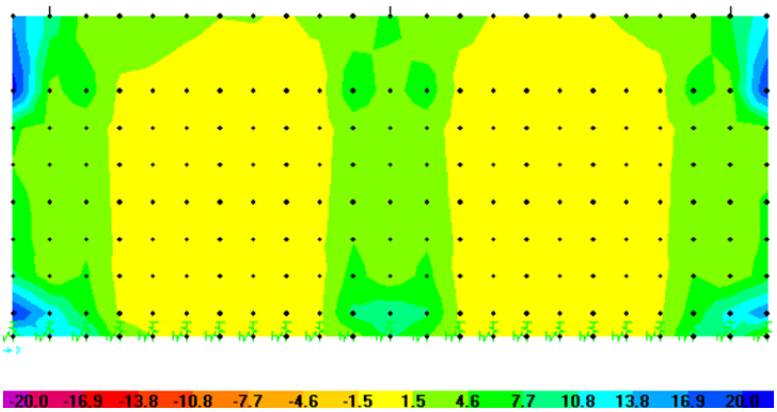


FIG. 4.66 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

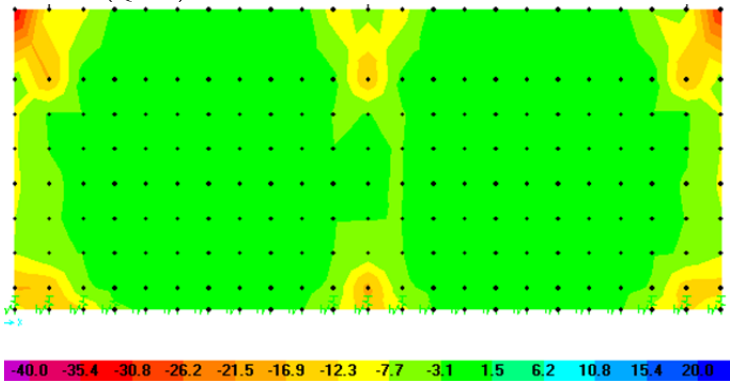


FIG. 4.67 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

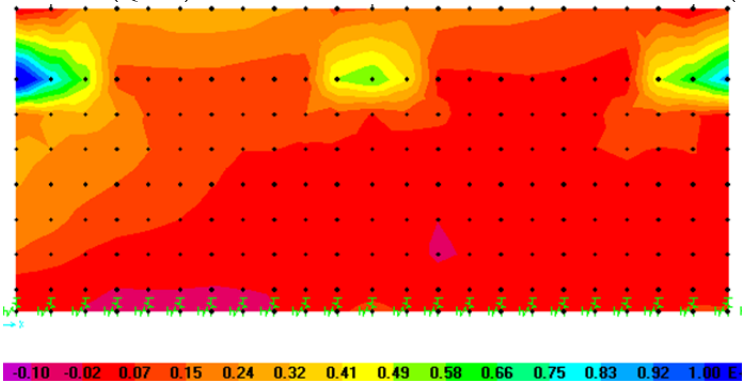


FIG. 4.68 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

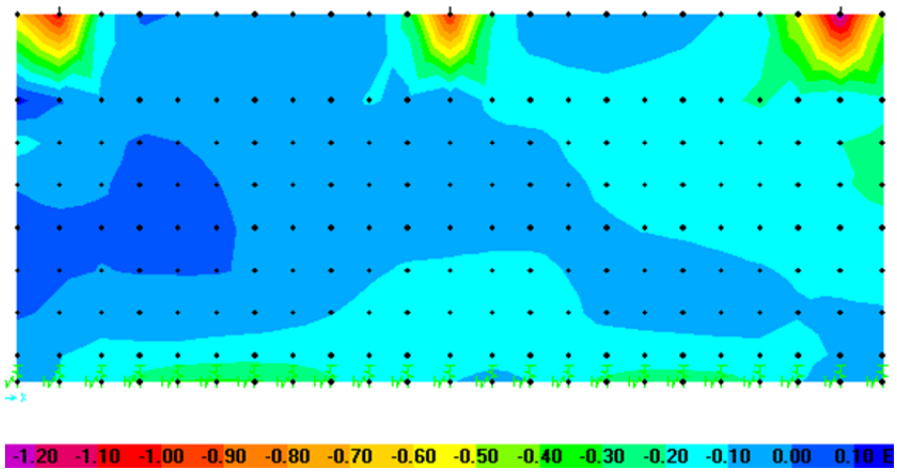


FIG. 4.69 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

B7-B8(q-13)-Setto C - ferri orizzontali - Verifiche agli SLU				
da 0 a +6.00				
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250mm), H1=0.189m, H2=0.061m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{sd}**
M_{min}	-20kN(comp.)	-5kNm	-110kNm	**22.0**
M_{max}	-20kN	+20kNm	+110kNm	**5.50**
N_{max}	+200kN	+5kNm	+94kNm	**18.8**
N_{min}	-370kN(comp.)	-5kNm	-134kNm	**26.8**
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
N_{max}	+250kN	+5kNm	-56kNm	**11.2**
da +6.00				
B=1.0m,H=0.5m,A1=A2=1524mm^2(θ22/250), H1=0.439m, H2=0.061m				
N_{max}	+1000kN	-35kNm	-46kNm	**1.31**
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250), H1=0.189m, H2=0.061m				
N_{max}	+550kN	-10kNm	-69kNm	**6.9**

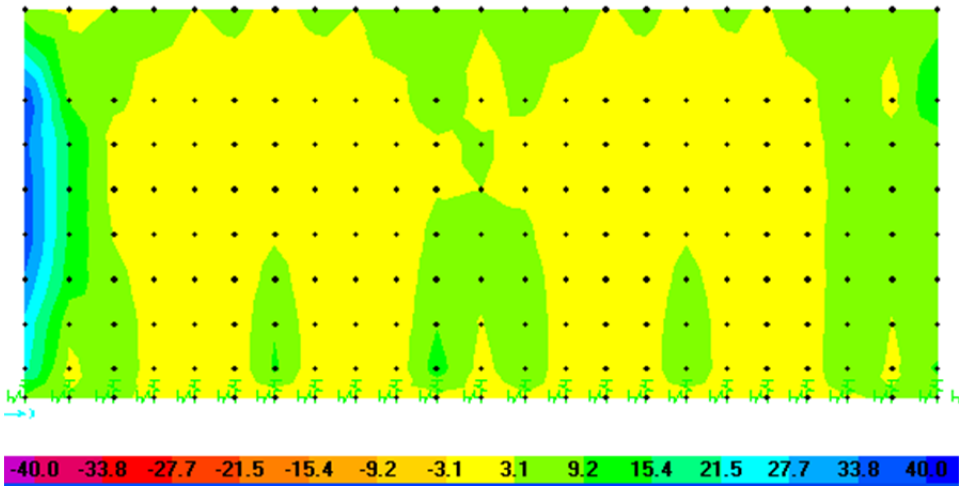


FIG. 4.70 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

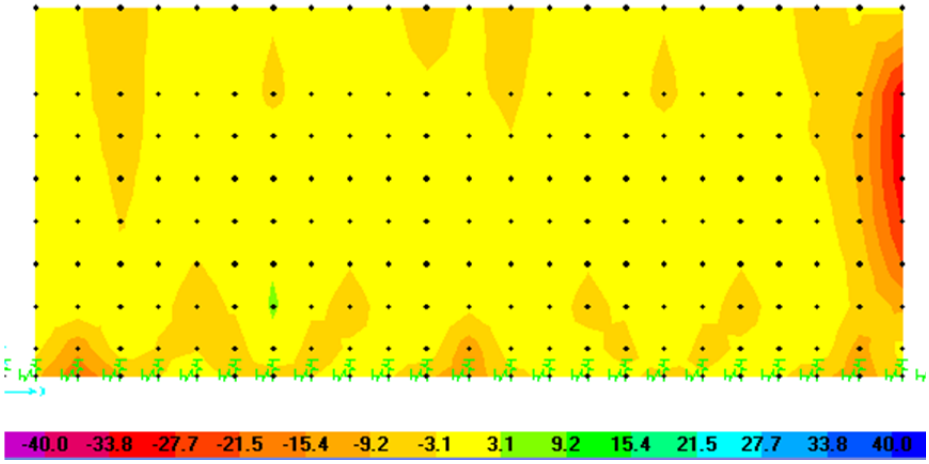


FIG. 4.71 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

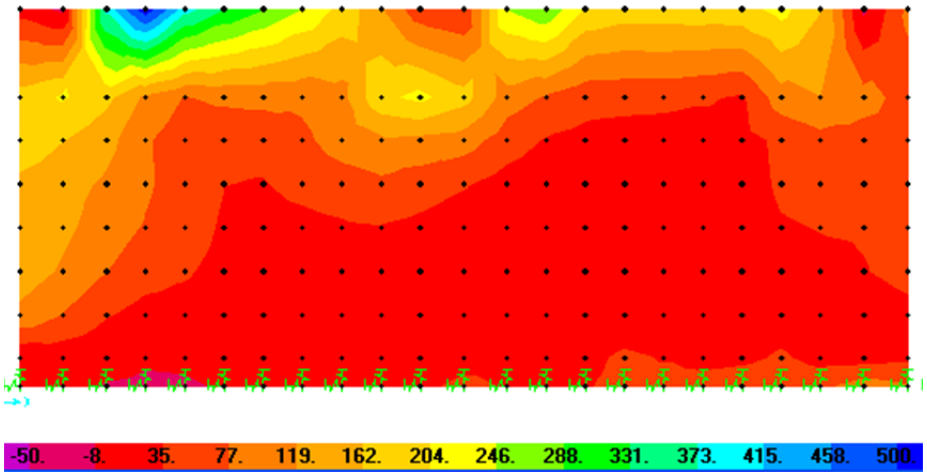


FIG. 4.72 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

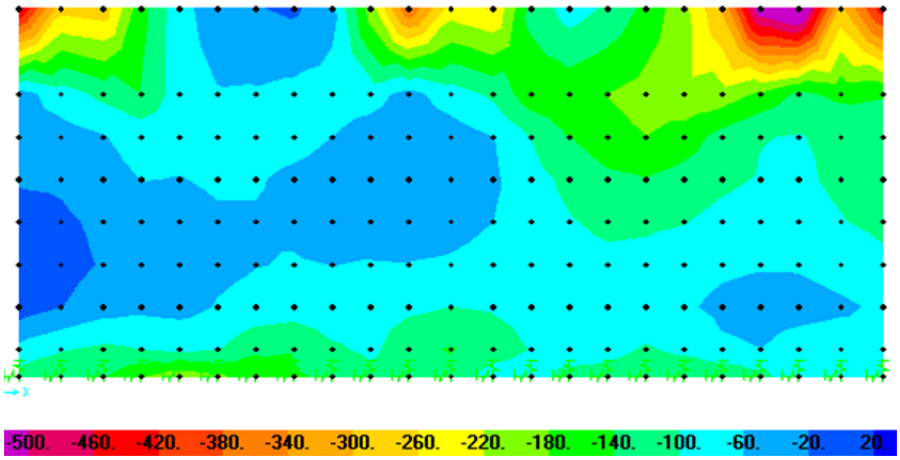


FIG. 4.73 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

B7-B8(q-13)-Setto D - ferri orizzontali - Verifiche agli SLU				
da 0 a +6.00				
B=1.0m,H=0.25m,A1=A2=534mm^2(θ12/500mm+ θ14/500mm), H1=0.193m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}	-100kN(comp.)	+20kNm	+58kNm	**2.90**
M_{max}	+110kN(tens.)	+20kNm	+36kNm	**1.80**
N_{max}	+110kN	-5kNm	-36kNm	**7.20**
N_{min}	-100kN	+20kNm	+58kNm	**3.33**
B=1.0m H=0.5m A1=A2=710mm^2(θ16/500mm+ θ14/500mm), H1=0.442m, H2=0.058m in corrispondenza di parete E				
M_{min}	+150kN	-35kNm	-92kNm	**2.63**
M_{max}	+150kN	+35kNm	+92kNm	**2.63**
da +6.00				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m				
N_{max}	+170kN	+15kNm	+146kNm	**9.73**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+400kN	+10kNm	-45kNm	**4.50**

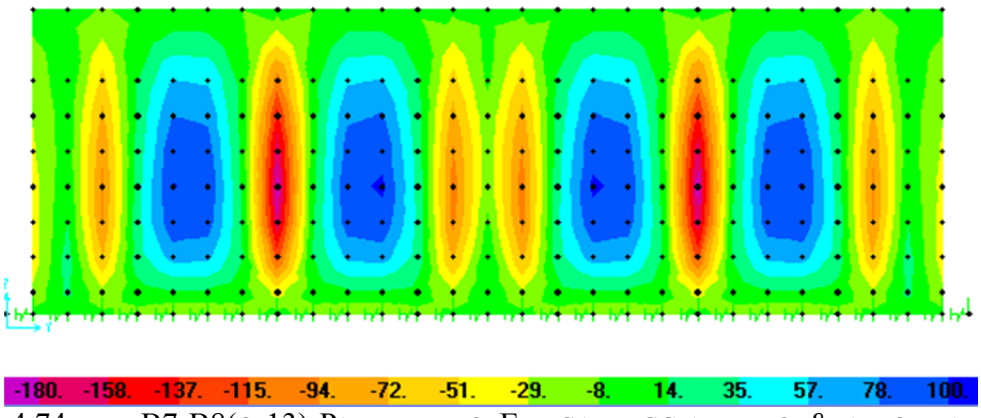


FIG. 4.74 - B7-B8(Q-13)-PARETE FILO E - GALLEGGIAMENTO & AFFONDAMENTO SLU-M11

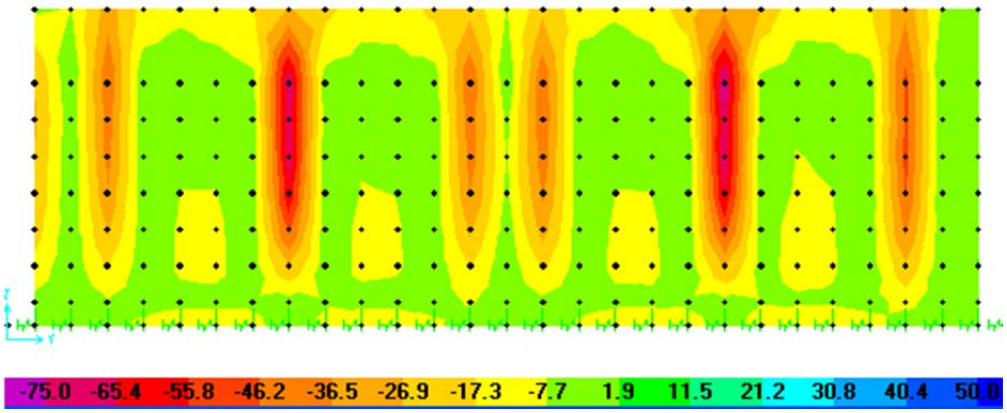


FIG. 4.75 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

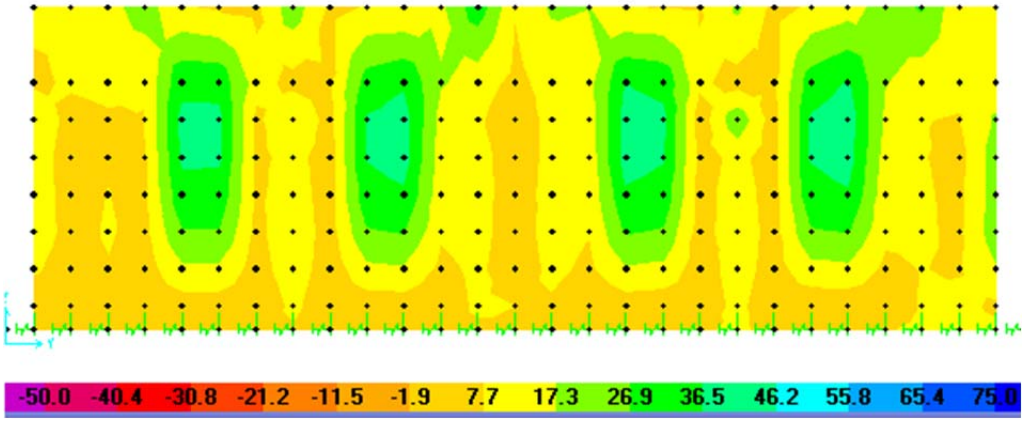


FIG. 4.76 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

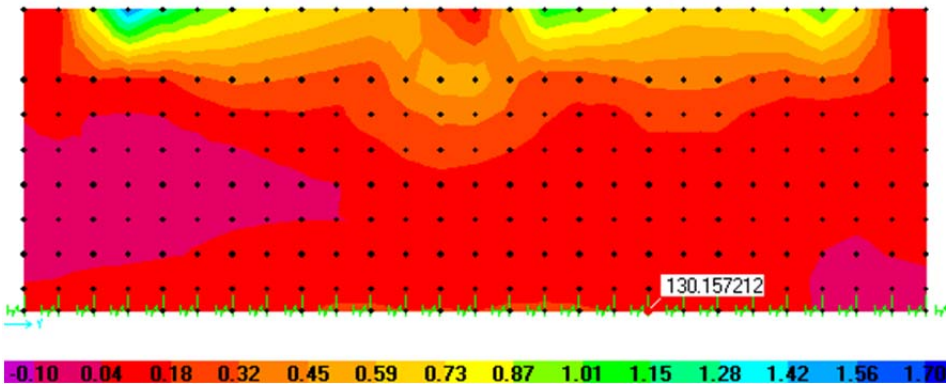


FIG. 4.77 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

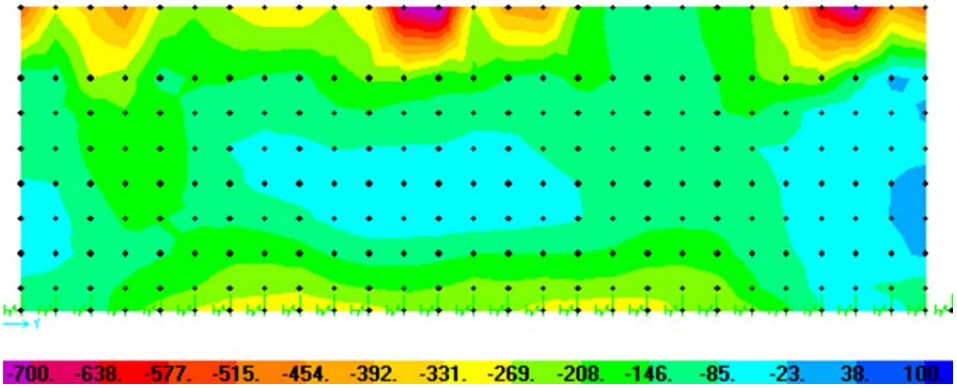


FIG. 4.78 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

B7-B8(q-13)-Parete E - ferri orizzontali - Verifiche agli SLU				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m				
Combinazione	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}(gall&aff)	-160kN	-180kNm	-212kNm	**1.18**
M_{min}	+20kN(tens.)	-75kNm	-176kNm	**2.35**
M_{max}	+300kN	+39kNm	+118kNm	**3.02**
N_{min}	-400kN	-75kNm	+260kNm	**3.47**
Da +6.00				
B=1.0m,H=0.5m,A1=A2=1884mm^2(θ20/250+ θ20/500mm), H1=0.440m, H2=0.06m				
N_{max}	+1200kN	-50kNm	-67kNm	**1.34**

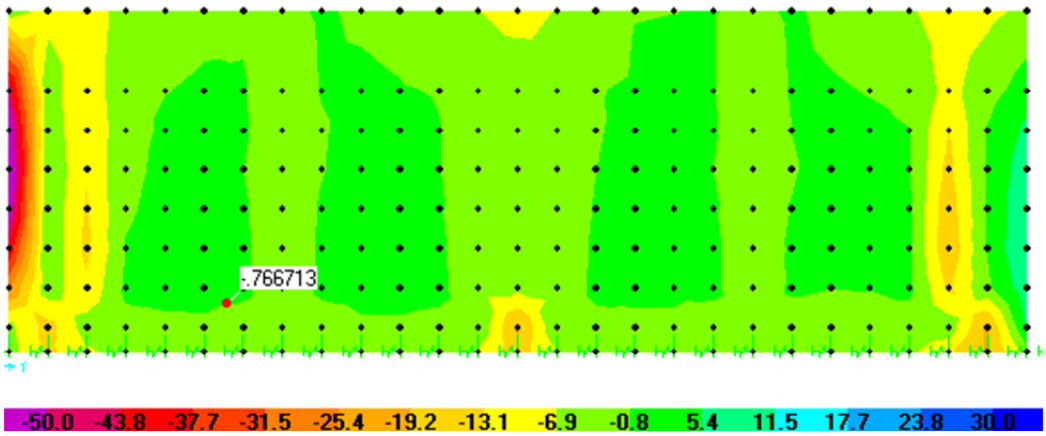


FIG. 4.79 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

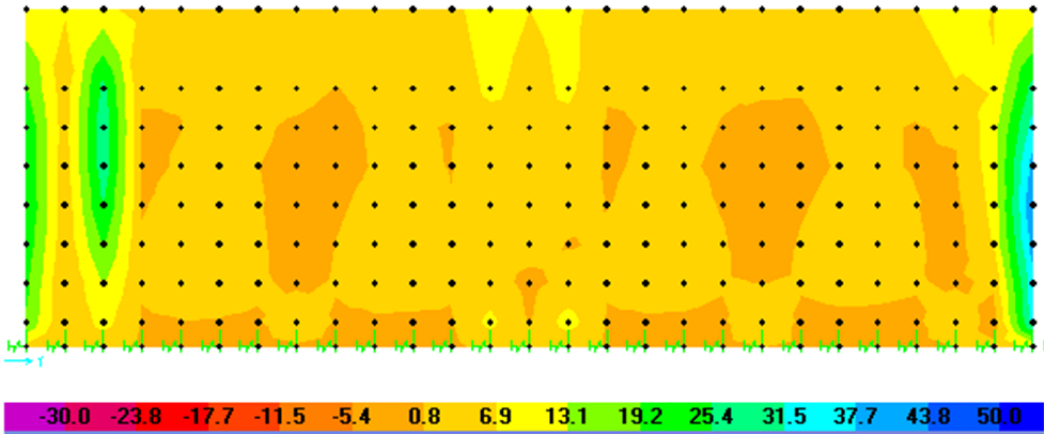


FIG. 4.80 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

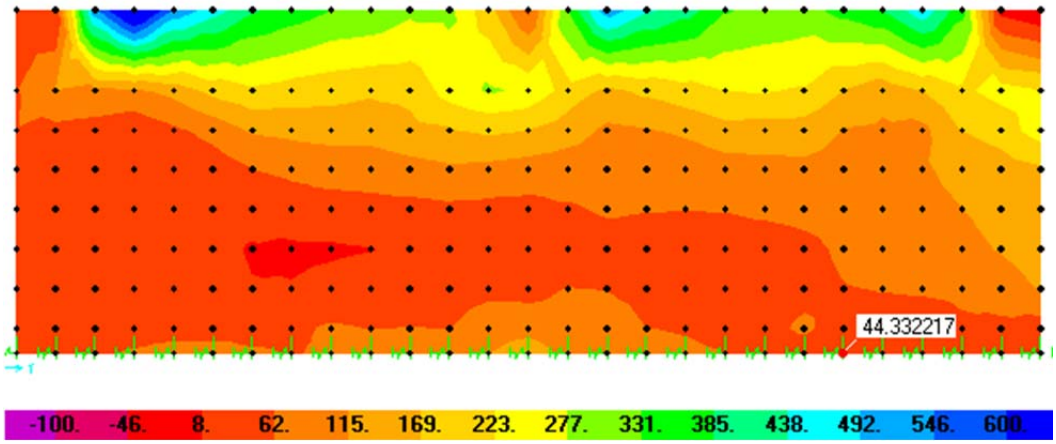


FIG. 4.81 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

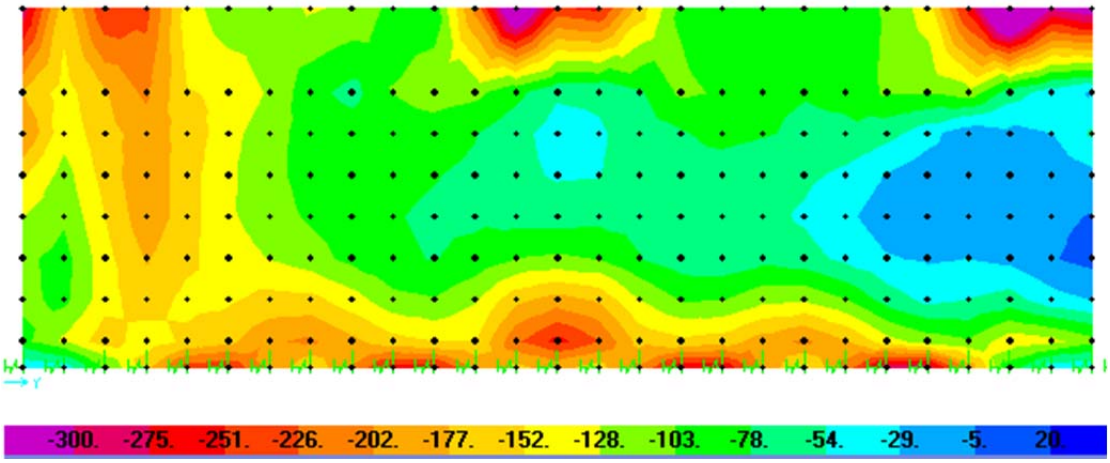


FIG. 4.82 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

B7-B8(q-13)-Setto F - ferri orizzontali - Verifiche agli SLU				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m in corrispondenza della parete A				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
N_{max}/M_{min}	+125kN	-44kNm	-86kNm	**1.95**
N_{max}/M_{max}	+125kN	+50kNm	+86kNm	**1.72**
N_{min}	-225kN	-20kNm	-162kNm	**8.10**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
N_{max} /M_{min}	+125kN	-14kNm	-41kNm	**2.93**
N_{max} /M_{max}	+125kN	+30kNm	+41kNm	**1.37**
N_{min}	-225kN	-20kNm	-162kNm	**8.10**
da +6.00				
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+550kN	-8kNm	-29kNm	**3.63**

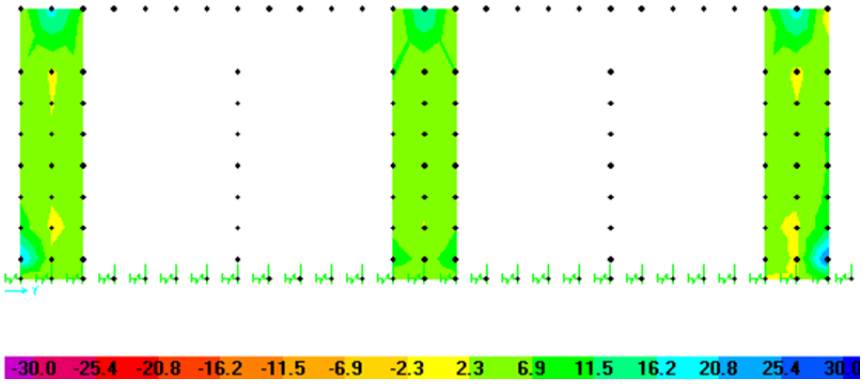


FIG. 4.83 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

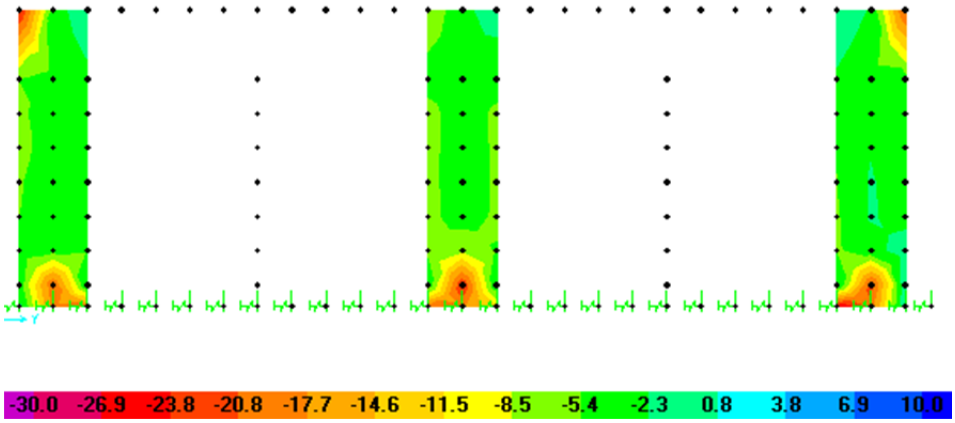


FIG. 4.84 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

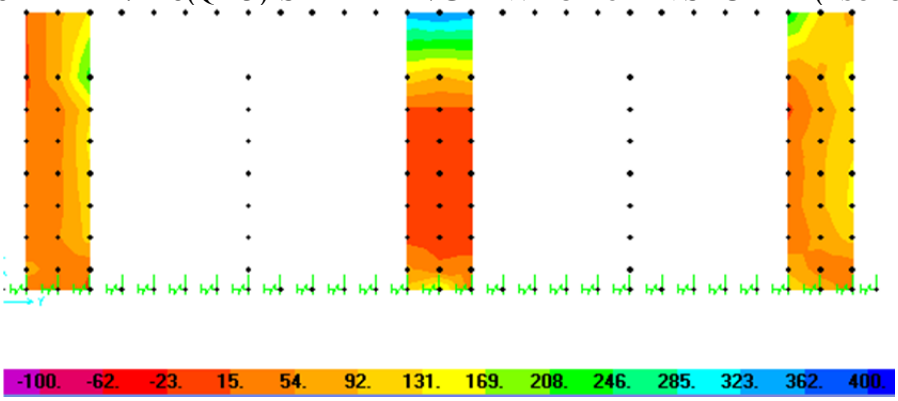


FIG. 4.85 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

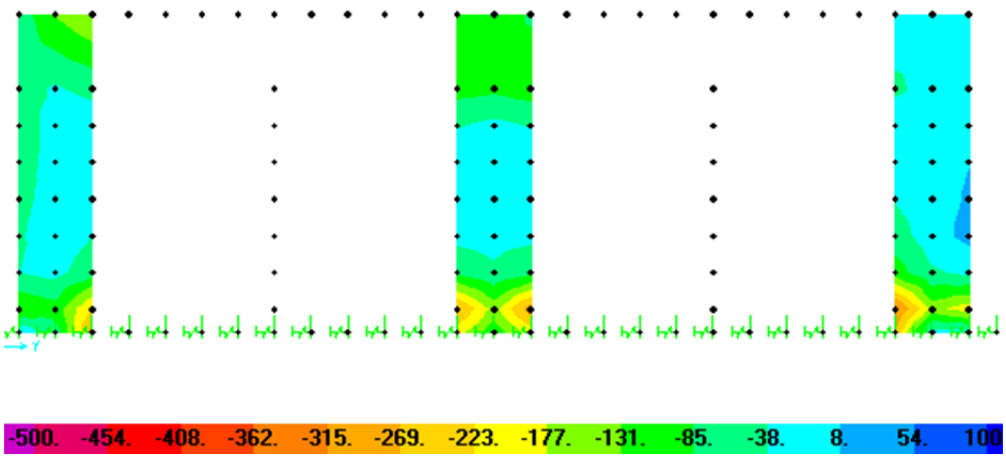


FIG. 4.86 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

B7-B8(q-13)-Setti fra F/G - ferri orizzontali - Verifiche agli SLU				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=452mm^2(θ12/250mm), H1=0.444m, H2=0.056m in corrispondenza della parete A				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
M_{min}	+110kN	-24kNm	-59kNm	**2.45**
M_{max}	+110kN	+25kNm	+59kNm	**2.36**
N_{max}	+110kN	-10kNm	-59kNm	**10.8**
N_{min}	-340kN	-24kNm	-160kNm	**6.67**
Da +6.00				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
N_{max}	+300kN	+15kNm	+45kNm	**3.00**

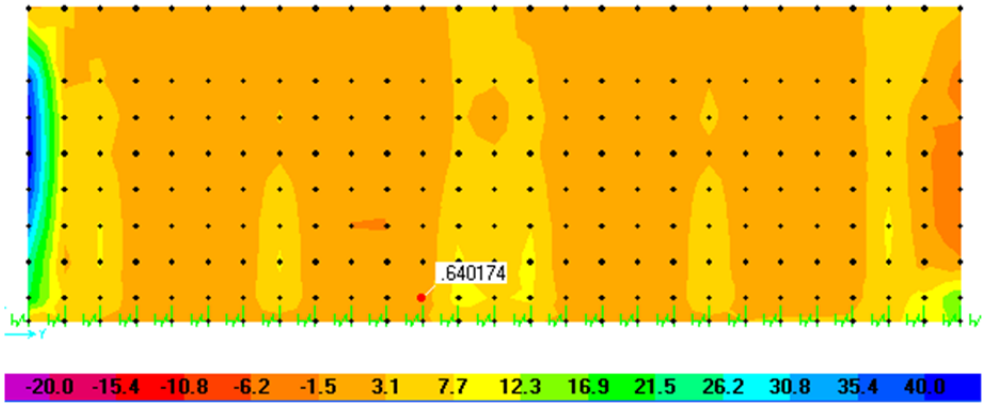


FIG. 4.87 - B7-B8(Q-13)-SETTO G - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

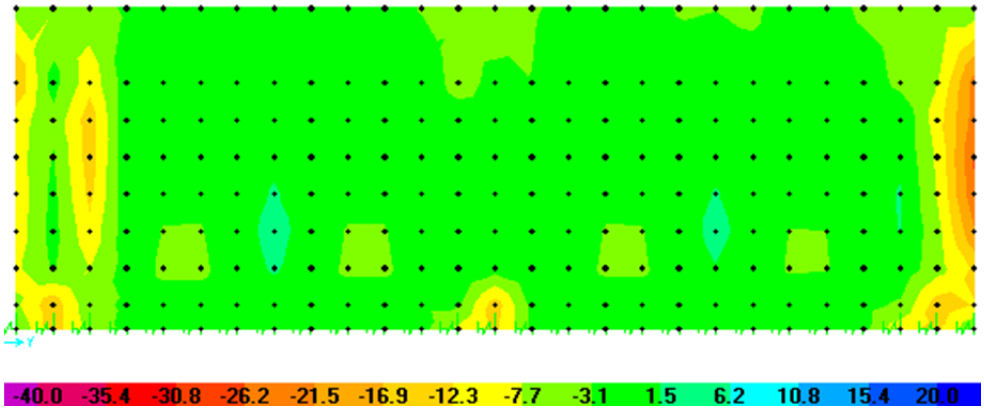


FIG. 4.88 - B7-B8(Q-13)-SETTO G - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

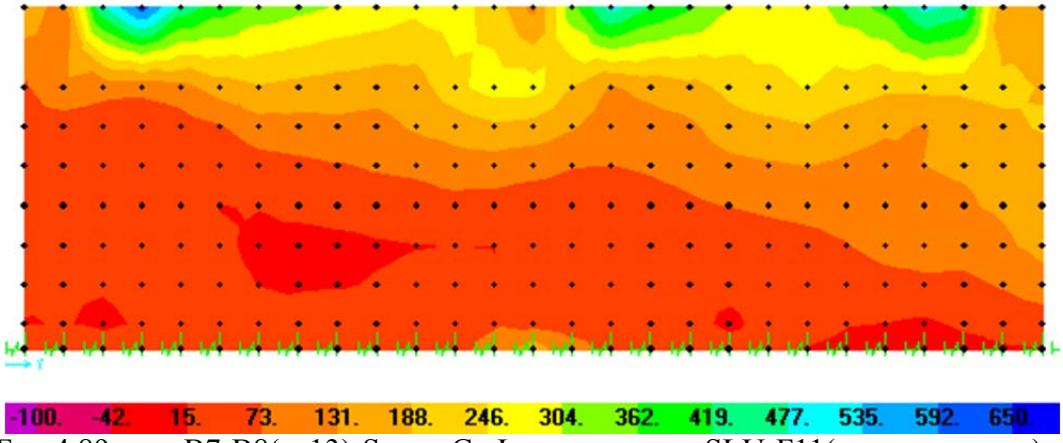


FIG. 4.89 - B7-B8(Q-13)-SETTO G - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

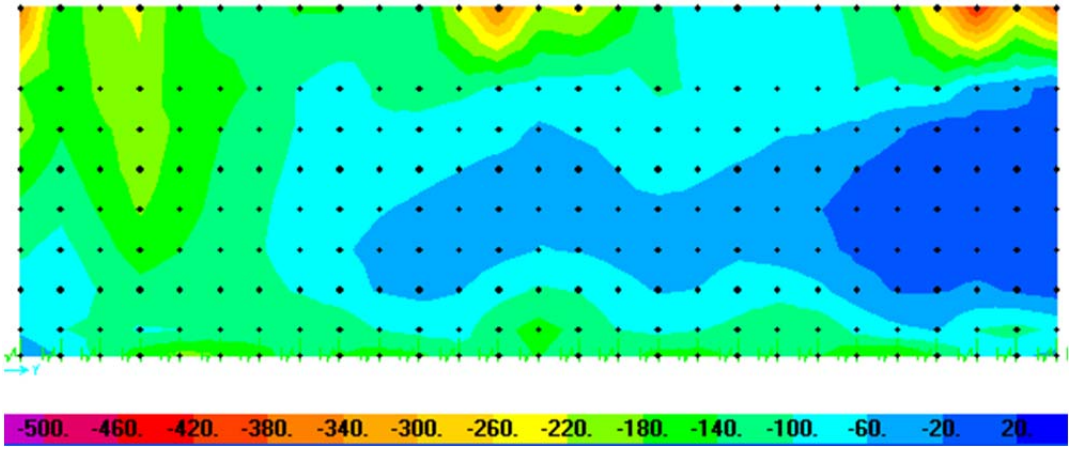


FIG. 4.90 - B7-B8(Q-13)-SETTO G - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

B7-B8(q-13)- Setto G - ferri orizzontali - Verifiche agli SLU
Da 0 a +6.00
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m

Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}	+150kN	-25kNm	-80kNm	**3.20**
M_{max}	+150kN	+40kNm	+80kNm	**2.00**
N_{min}	-170kN	+40kNm	+150kNm	**3.75**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
M_{min}	+130kN	-14kNm	-41kNm	**2.93**
M_{max}	+130kN	+6kNm	+41kNm	**6.83**
N_{min}	-170kN	+13kNm	+69kNm	**5.31**
Da +6.00				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
N_{max}	+520kN	-5kNm	-13kNm	**2.60**

4.3.2 Verifiche a taglio fusto B7-B8(q-13)

Di seguito si riportano i diagrammi di taglio per le pareti. Per quanto riguarda i setti si esegue una verifica per la fase di affondamento dove si prevede un dislivello d'acqua fra celle contigue di 1m

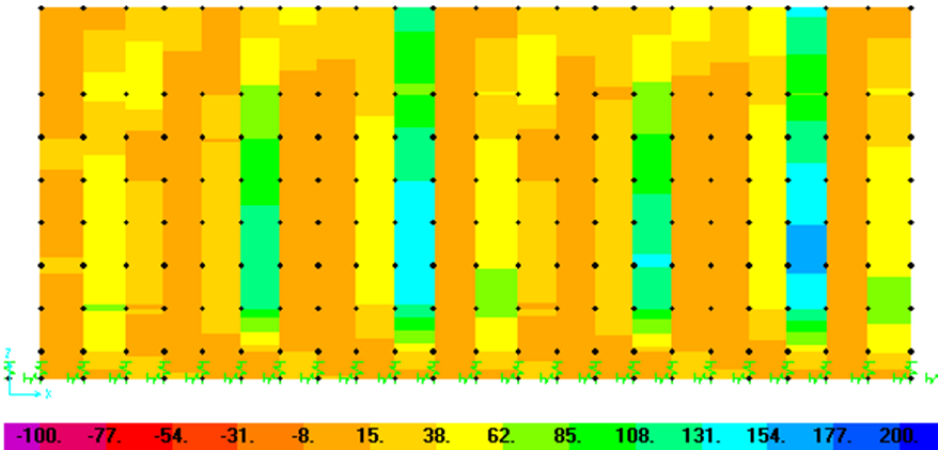


FIG. 4.91 - B7-B8(Q-13)-PARETE A - INVILUPPO MAX SLU-V13(ESCLUSO SISMA)

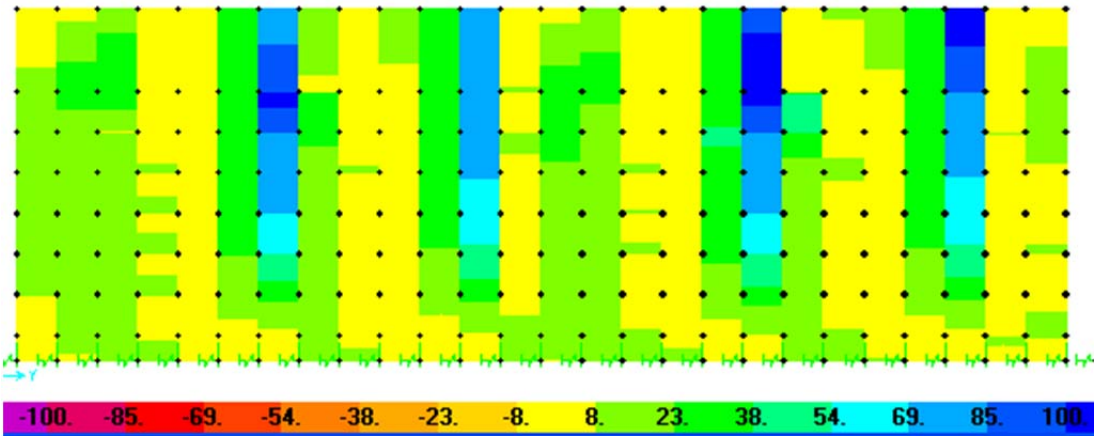


FIG. 4.92 - B7-B8(Q-13)-PARETE E - INVILUPPO MAX SLU-V13(ESCLUSO SISMA)

Il taglio massimo è pari a 160kN/m. Si considera in favore di sicurezza uno sforzo di trazione di 55kN/m.

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	**VRD**
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
Parete E	-55	500	443	616	57	616	160	0.12	1.67	0.0014	35	19.8	-0.11	0.15	0.45	143	190.99	**191**

Per quanto riguarda i setti interni si considera un dislivello di 1m di acqua fra celle contigue non comunicati in fase di affondamento del cassone.

Il caso peggiore sarebbe per il setto C che ha una luce netta di 6.6m ed uno spessore di 25cm per cui il taglio agli SLU è pari a:

V_{Sd}=1.3x10.1x6.6/2=43kN/m circa

con uno sforzo di trazione pari a:

N_{Sd}=1.3x10.1x4.6=+60kN/m circa

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	**VRD**
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
Setto C	-60	250	192	804	58	804	43	0.12	2.00	0.0032	35	19.8	-0.24	0.15	0.59	97	106.08	**106**

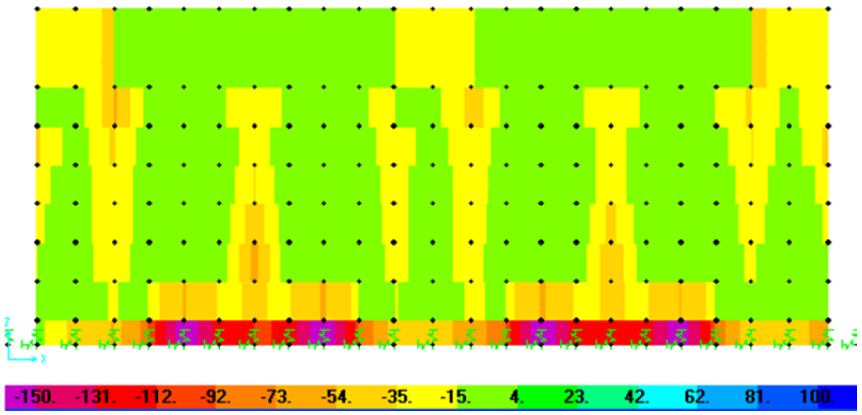


FIG. 4.93 - B7-B8(Q-13)-PARETE A - INVILUPPO MAX SLU-V23(ESCLUSO SISMA)

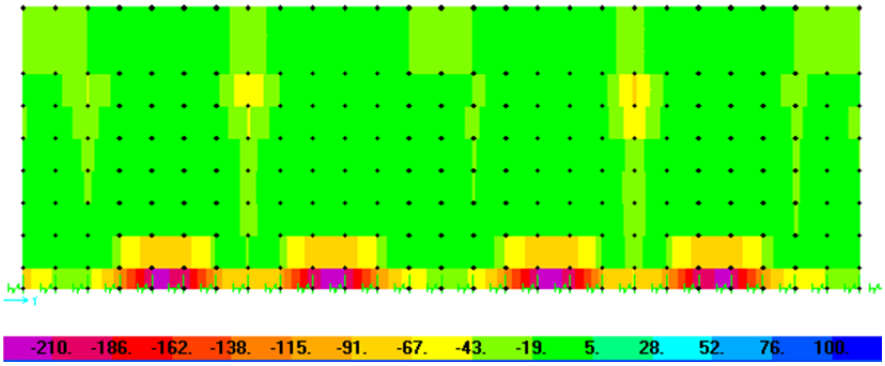


FIG. 4.94 - B7-B8(Q-13)-PARETE E - INVILUPPO MAX SLU-V23(ESCLUSO SISMA)

Il taglio massimo è pari a 200kN/m. Si considera uno sforzo normale di compressione di 102kN/m pari al peso proprio della parete.

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	**VRD**
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
Parete E V23	102	500	425	770	75	770	200	0.12	1.69	0.0018	35	19.8	0.2	0.15	0.45	172	206	**206**

Si prevede per la parete E un infittimento degli spilli diametro 10mm passo 200x200 nella parte centrale della cella

	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	**Vres [kN]**
Legature	200	157	2.5	0	1.00	382.5	391.0	1	0.5	294	1,350	294

Per il setto C si considera in favore di sicurezza che il taglio è pari a:

V_{Sd}=1.3x10.1x7.65=100kN/m

In presenza di uno sforzo normale di compressione pari a 49kN/m.

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	**VRD**
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
Parete C V23	49	250	179	452	74	452	100	0.12	2.00	0.0034	35	19.8	0.2	0.15	0.59	104	110	**110**

4.3.3 Monconi di ripresa e ferri verticali fusto - SLU - B7-B8(q-13)

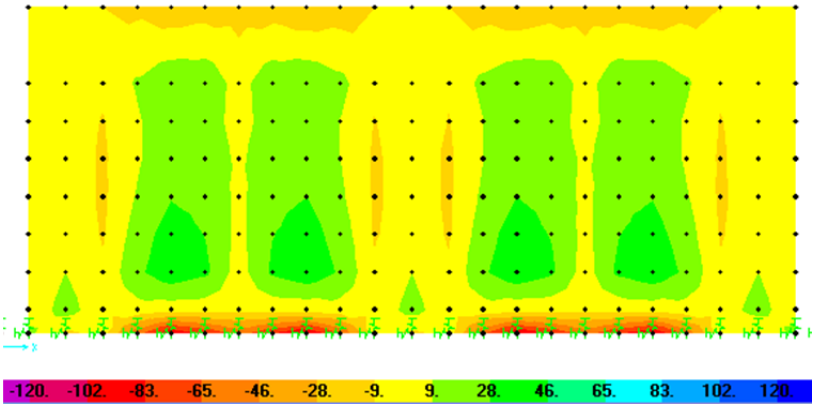


FIG. 4.95 - B7-B8(Q-13)-PARETE A -GALLEGGIAMENTO & AFFONDAMENTO SLU-M22

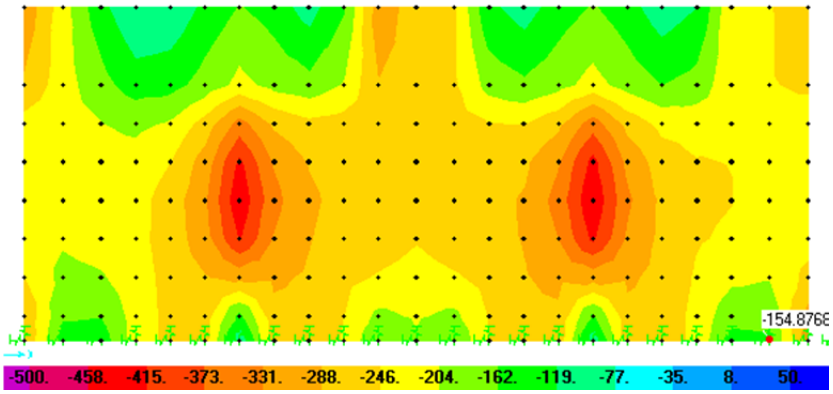


FIG. 4.96 - B7-B8(Q-13)-PARETE A -GALLEGGIAMENTO & AFFONDAMENTO SLU-F22

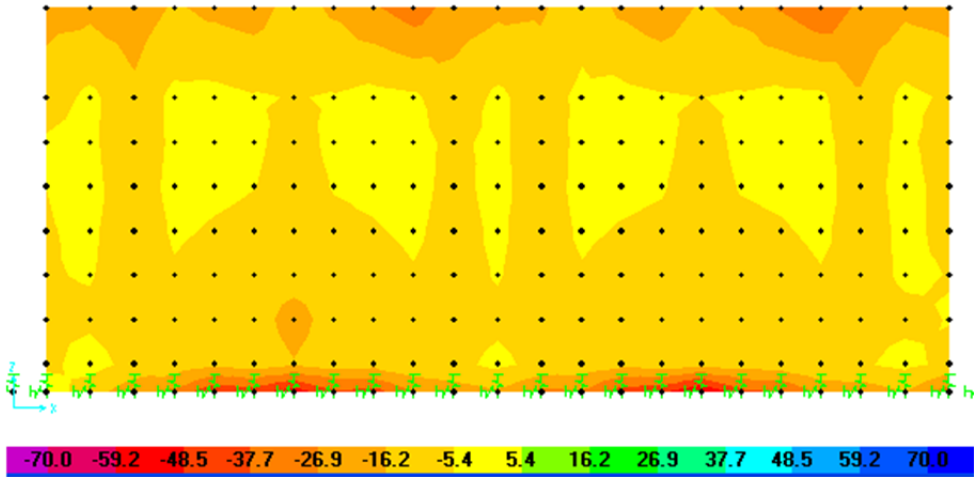


FIG. 4.97 - B7-B8(Q-13)-.PARETE A - INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

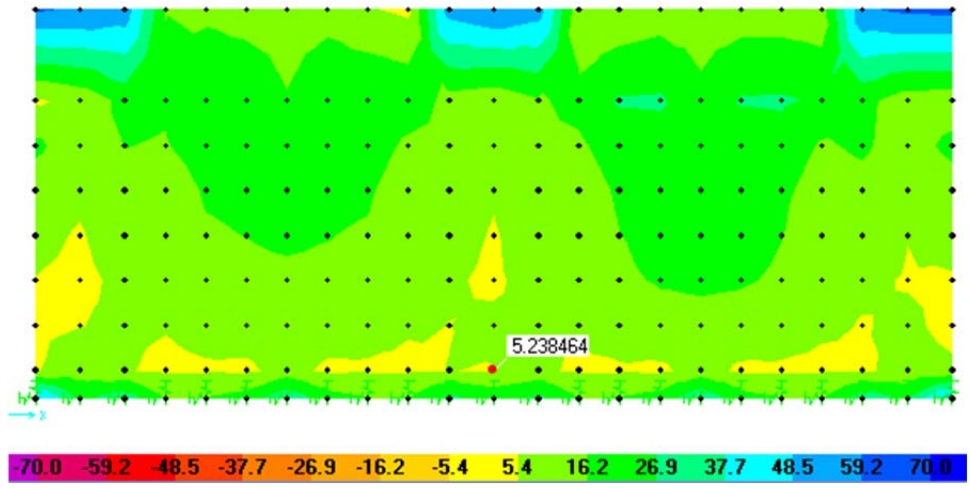


FIG. 4.98 - B7-B8(Q-13)-.PARETE A - INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

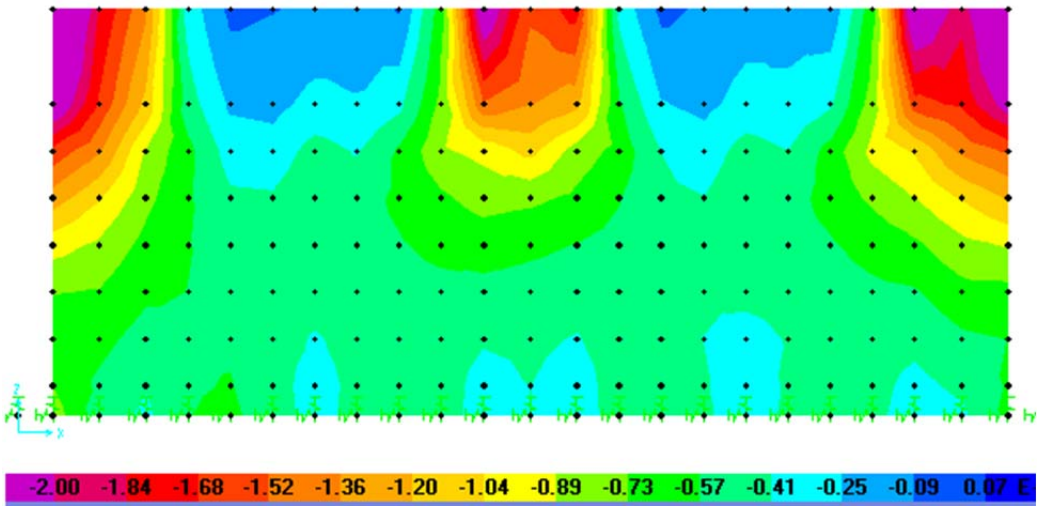


FIG. 4.99 - B7-B8(Q-13)-.PARETE A - INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

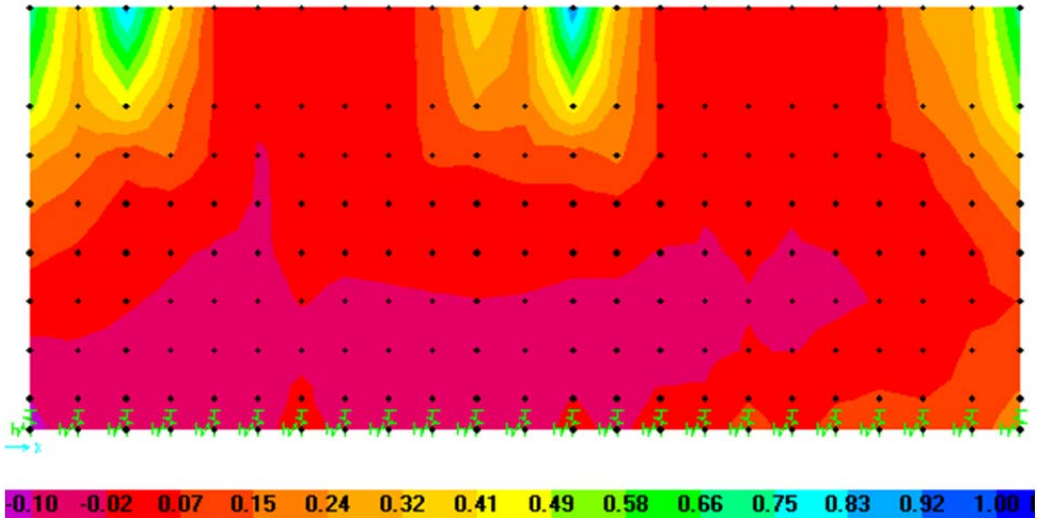


FIG. 4.100 - B7-B8(Q-13)-PARETE A- INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

B7-B8(q-13)-Parete A - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m				
B=1.0m H=0.5m A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N/M (aff/gall)	-140kN	-104kNm	-165kNm	**1.59**
M_{min}/N_{max}	+117kN	-60kNm	-107kNm	**1.78**
M_{max}/N_{max}	+117kN	+35kNm	+54kNm	**1.54**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+200kN	-20kNm	**-25kNm**	**1.25**
M_{max}/N_{max}	+200kN	+11kNm	**+25kNm**	**2.28**

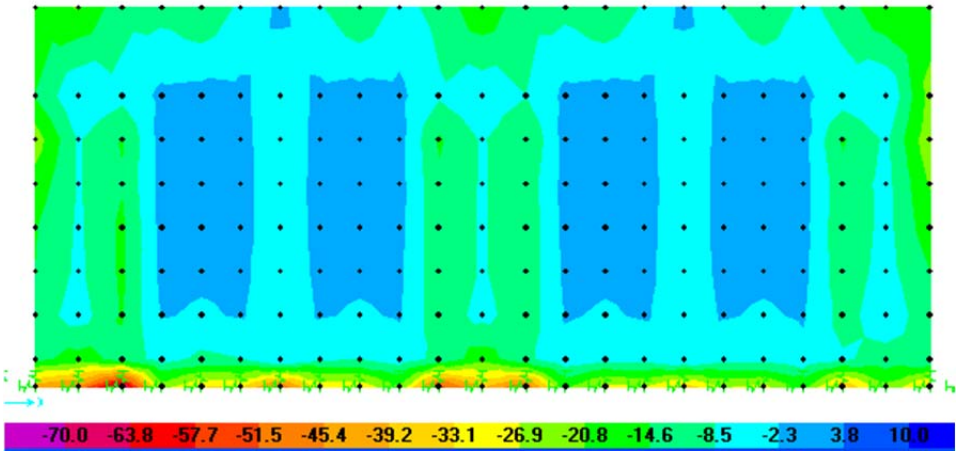


FIG. 4.101 - B7-B8(Q-13)-SETTO B- INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

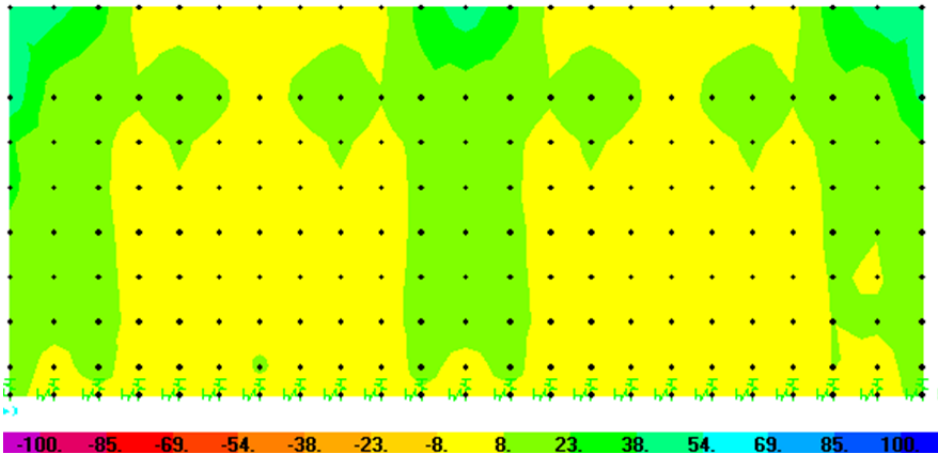


FIG. 4.102 - B7-B8(Q-13)-SETTO B- INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

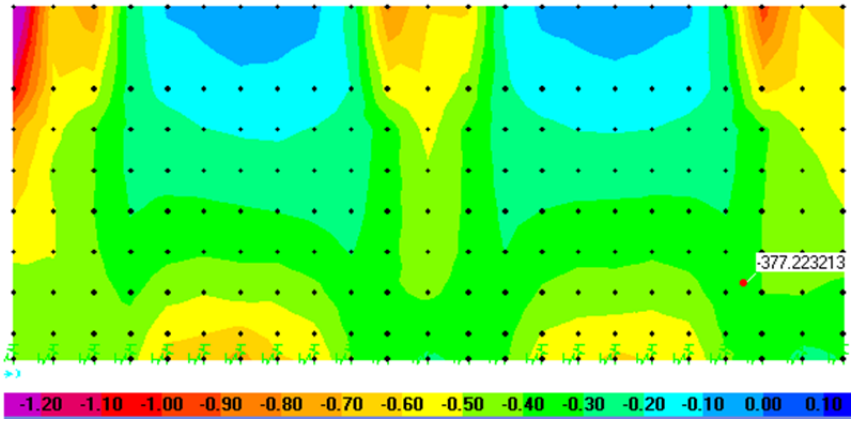


FIG. 4.103 - B7-B8(Q-13)-SETTO B- INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

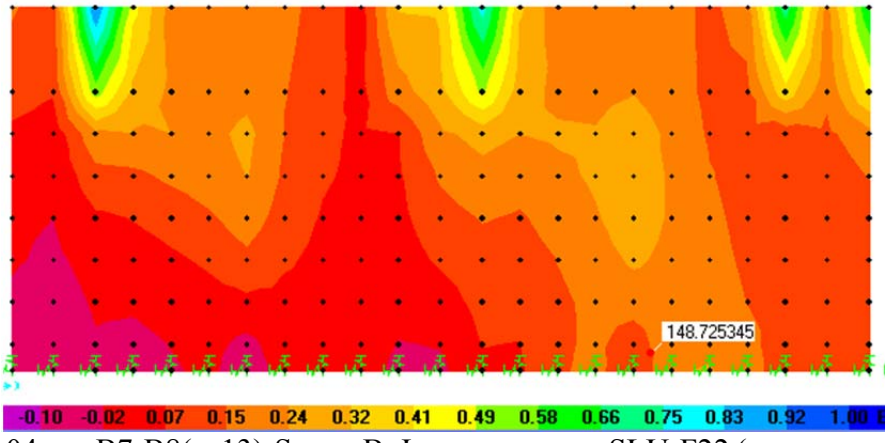


FIG. 4.104 - B7-B8(Q-13)-SETTO B- INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

B7-B8(q-13)-Setto B - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
M_{min}/N_{max}	+65kN	-36kNm	-59kNm	**1.64**
M_{max}/N_{max}	+65kN	+3kNm	+59kNm	**19.7**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M/N_{max}	+120kN	-70kNm	-114kNm	**1.63**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+260kN	-10kNm	-22kNm	**2.20**
M_{max}/N_{max}	+260kN	+16kNm	+22kNm	**1.38**

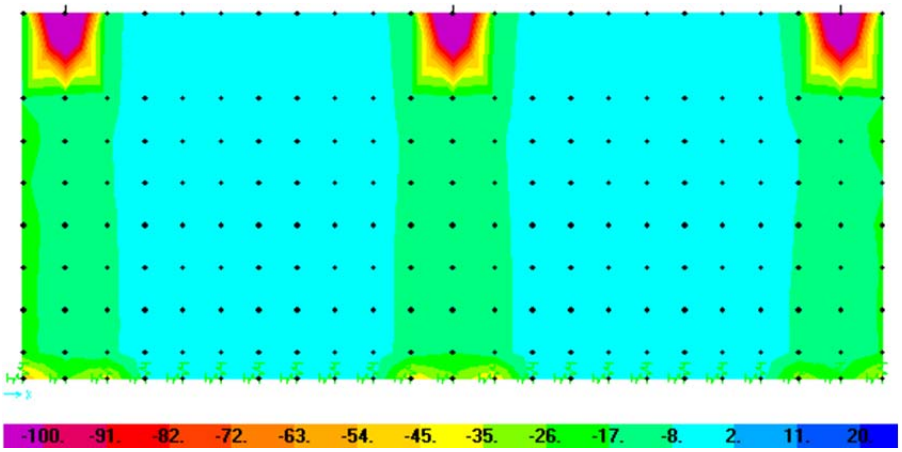


FIG. 4.105 - B7-B8(Q-13)-SETTO C- INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

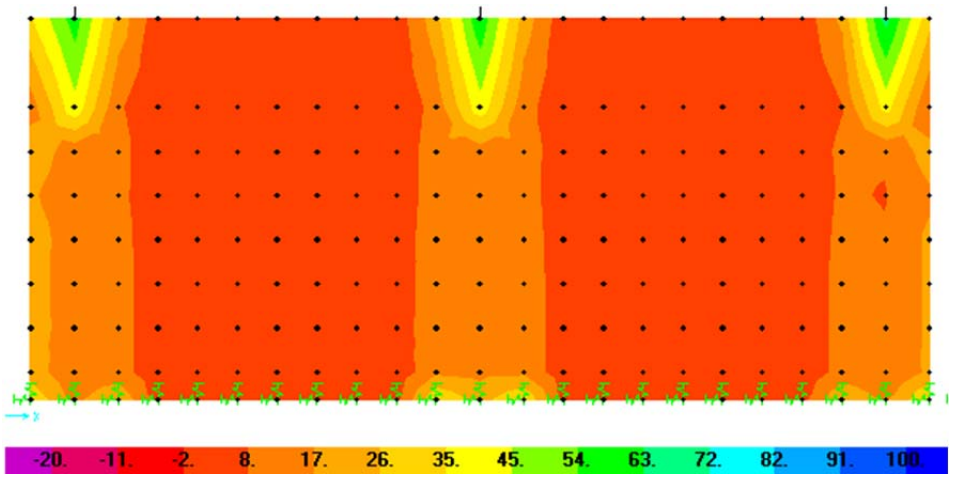


FIG. 4.106 - B7-B8(Q-13)-SETTO C- INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

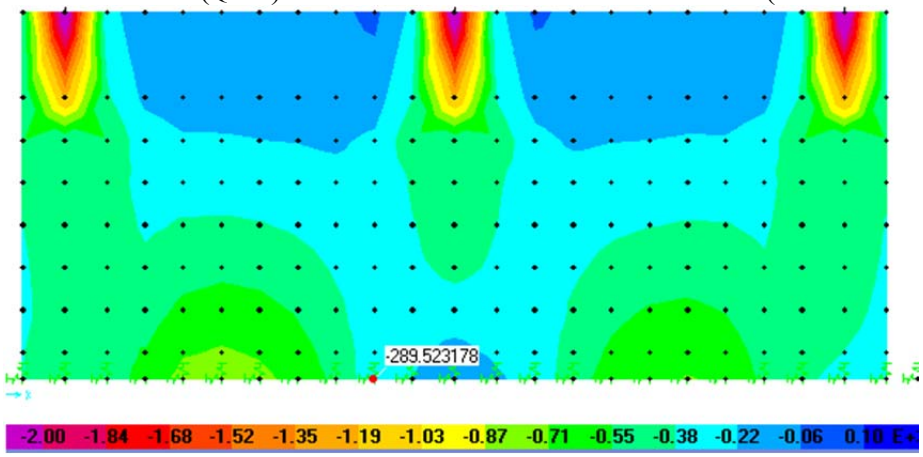


FIG. 4.107 - B7-B8(Q-13)-SETTO C- INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

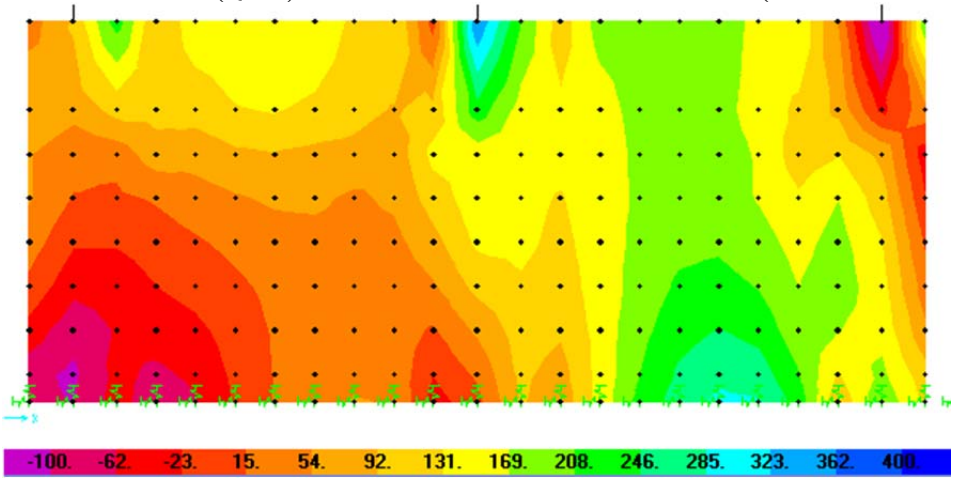


FIG. 4.108 - B7-B8(Q-13)-SETTO C- INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

B7-B8(q-13)-Setto C - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.171m, H2=0.079m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}/N_{max}	+290kN	-15kNm	-36kNm	**2.40**
M_{max}/N_{max}	+290kN	+15kNm	+36kNm	**2.40**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+150kN	+34kNm	-108kNm	**3.18**
Verticali correnti (esclusi pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.178m, H2=0.072m				
M_{min}/N_{max}	+200kN	-14kNm	-28kNm	**2.00**
M_{max}/N_{max}	+200kN	+12kNm	+28kNm	**2.33**

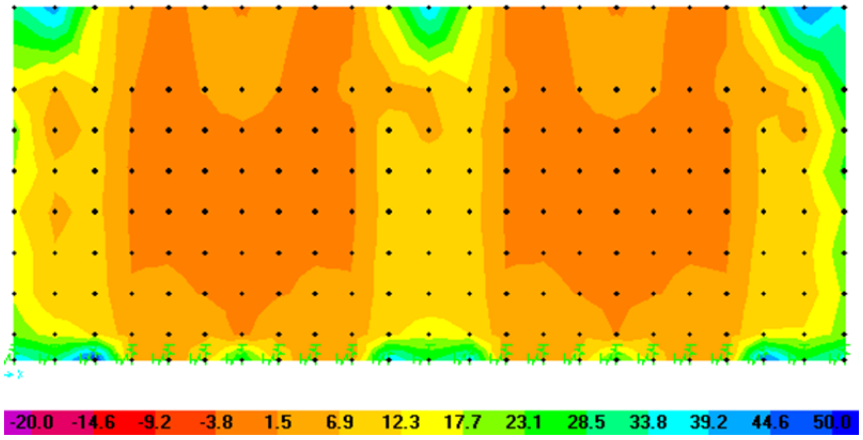


FIG. 4.109 - B7-B8(Q-13)-SETTO D- INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

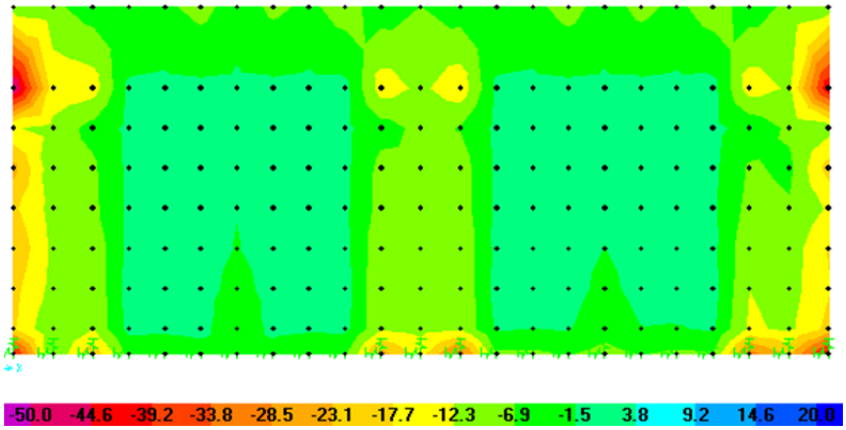


FIG. 4.110 - B7-B8(Q-13)-SETTO D- INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

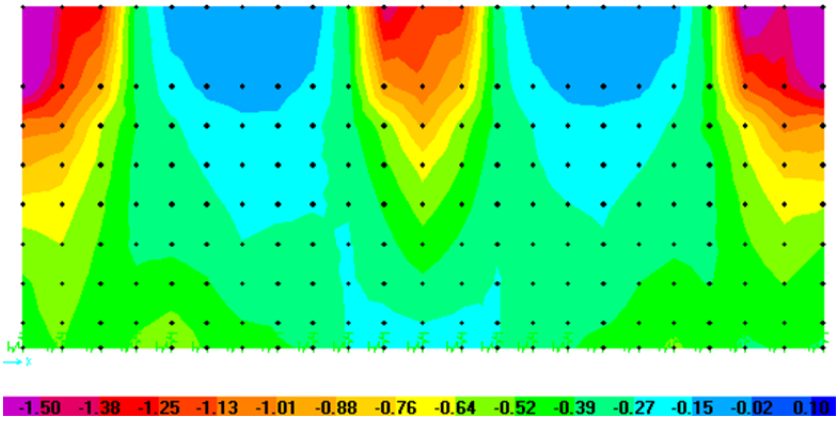


FIG. 4.111 - B7-B8(Q-13)-SETTO D- INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

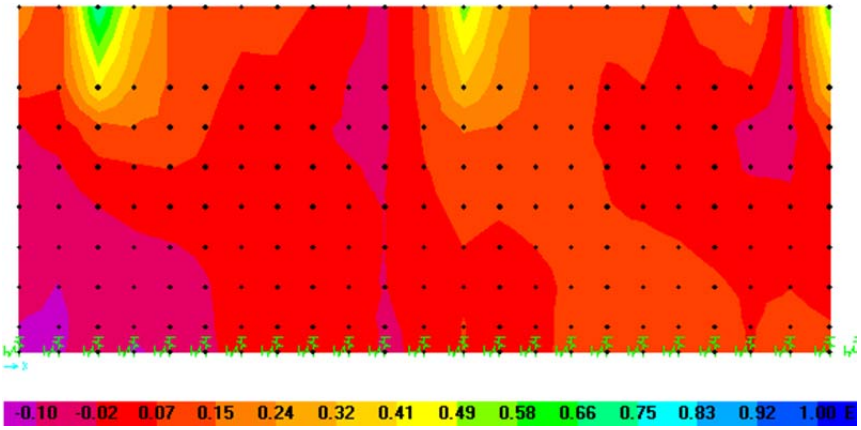


FIG. 4.112 - B7-B8(Q-13)-SETTO D- INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

B7-B8(q-13)-Setto D - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=565mm^2(θ12/200mm), H1=0.18m, H2=0.07m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd} / M_{Sd}**
M_{min}/N_{max}	+124kN	-20kNm	-37kNm	**1.85**
M_{max}/N_{max}	+124kN	+25kNm	+37kNm	**1.48**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{max}/N_{max}	+140kN	+50kNm	+110kNm	**2.20**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+200kN	-8kNm	-28kNm	**7.00**
M_{max}/N_{max}	+200kN	+10kNm	+28kNm	**2.80**

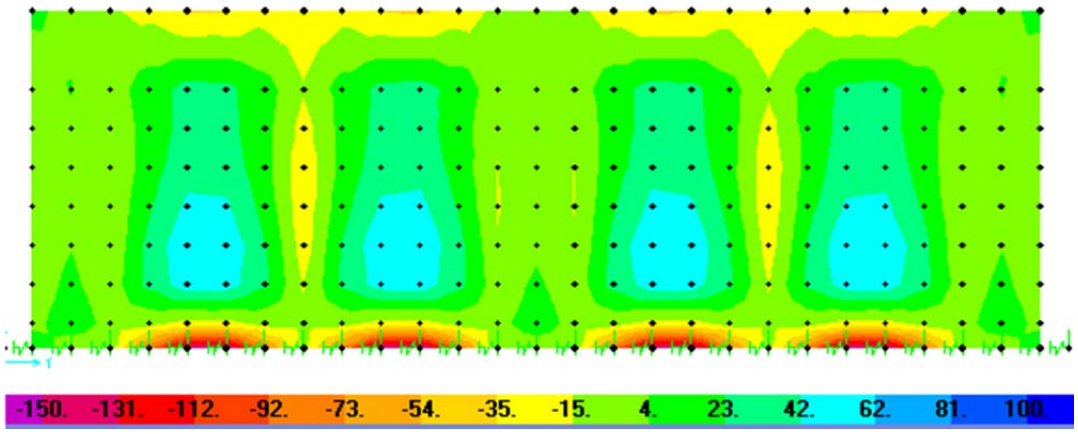


FIG. 4.113 - B7-B8(Q-13)-PARETE E- GALLEGGIAMENTO & AFFONDAMENTO SLU-M22

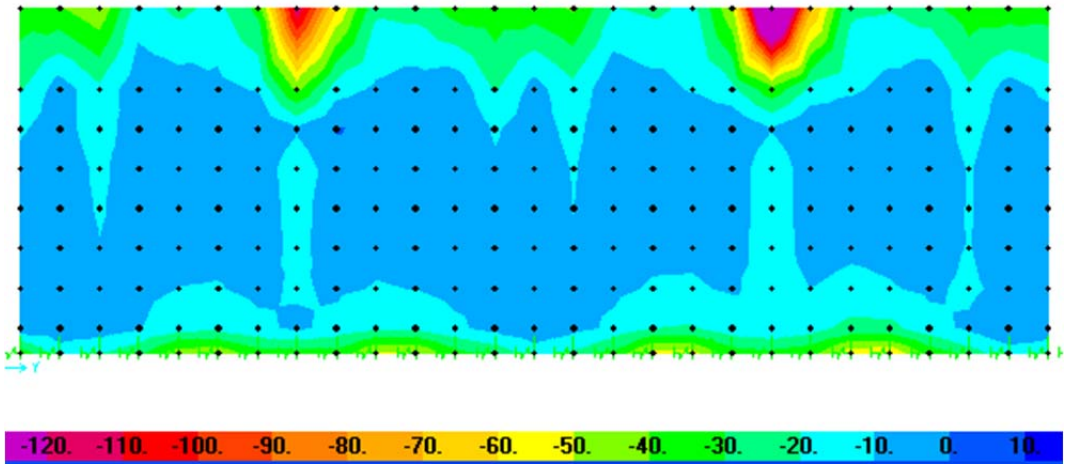


FIG. 4.114 - B7-B8(Q-13)-PARETE E- INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

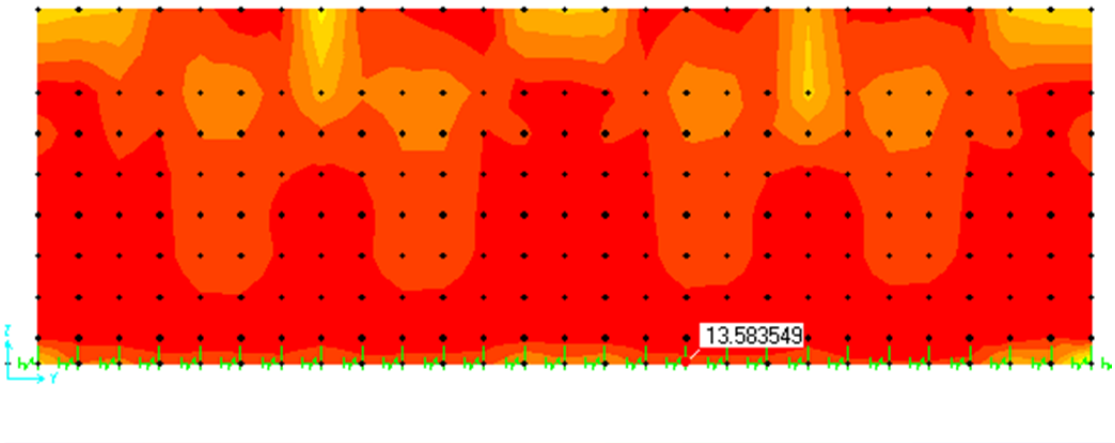


FIG. 4.115 - B7-B8(Q-13)-PARETE E - INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

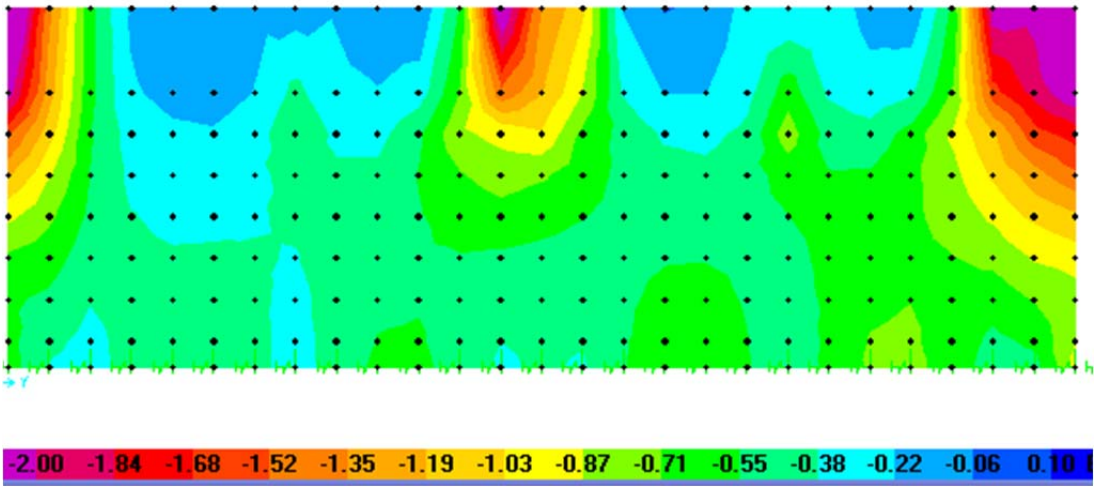


FIG. 4.116 - B7-B8(Q-13)-PARETE E - INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

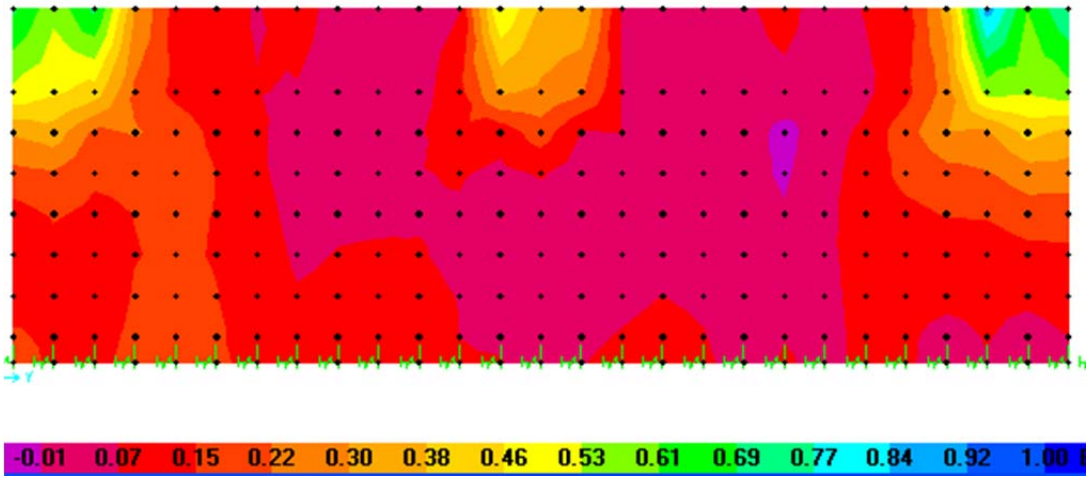


FIG. 4.117 - B7-B8(Q-13)-PARETE E - INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

B7-B8(q-13)-Parete E - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m				
B=1.0m,H=0.5m,A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.425m, H2=0.075m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N/M gall.&aff.	-270kN	-150kNm	-193kNm	**1.29**
M_{min}/N_{max}	+185kN	-52kNm	-91kNm	**1.75**
M_{max}/N_{max}	+185kN	+30kNm	+38kNm	**1.27**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.425m, H2=0.075m				
M_{min}/N_{max}	+200kN	-15kNm	**-25kNm**	**1.7**
M_{max}/N_{max}	+200kN	+15kNm	**+25kNm**	**1.7**

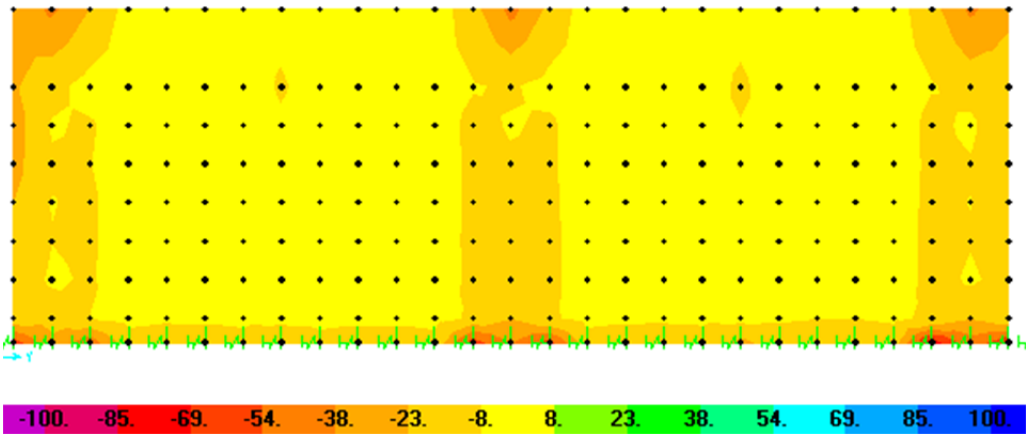


FIG. 4.118 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

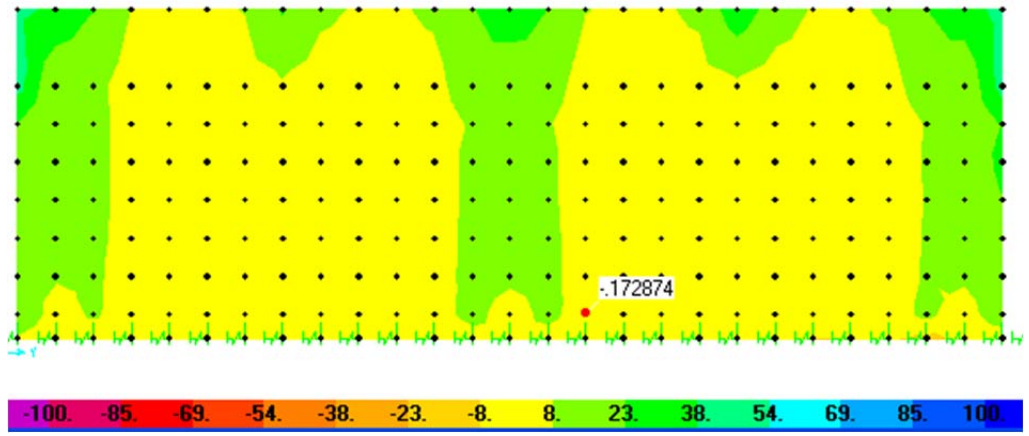


FIG. 4.119 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

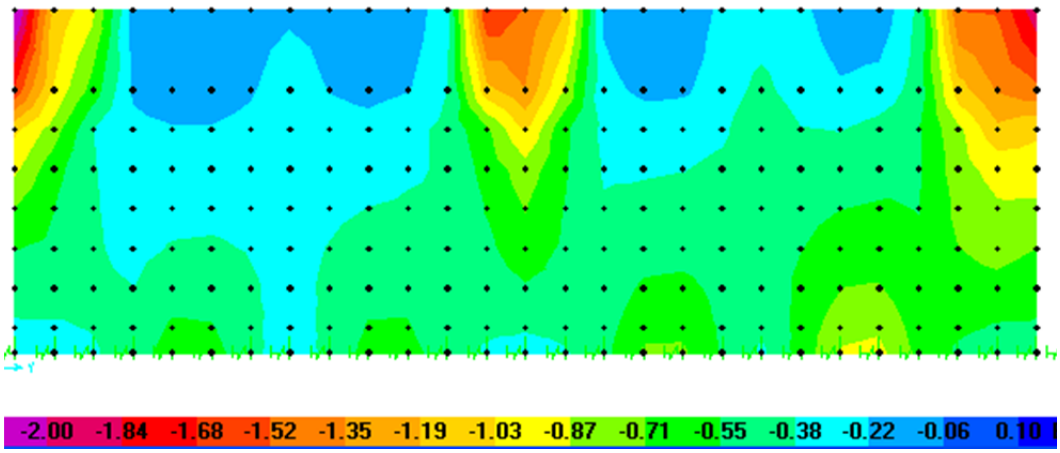


FIG. 4.120 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

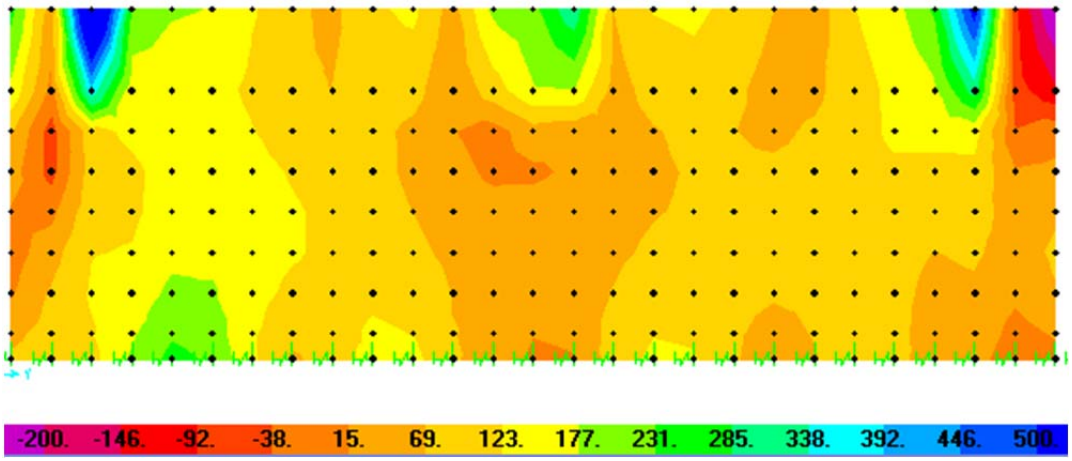


FIG. 4.121 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

B7-B8(q-13)-Setto F - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
M_{min}/N_{max}	+200kN	-40kNm	-46kNm	**1.15**
M_{max}/N_{max}	+200kN	+7kNm	+46kNm	**6.57**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m,H=0.50m,A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{max}/N_{max}	+92kN	+7kNm	+121kNm	**17.3**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+200kN	-12kNm	-29kNm	**2.42**
M_{max}/N_{max}	+200kN	+24kNm	+29kNm	**1.21**

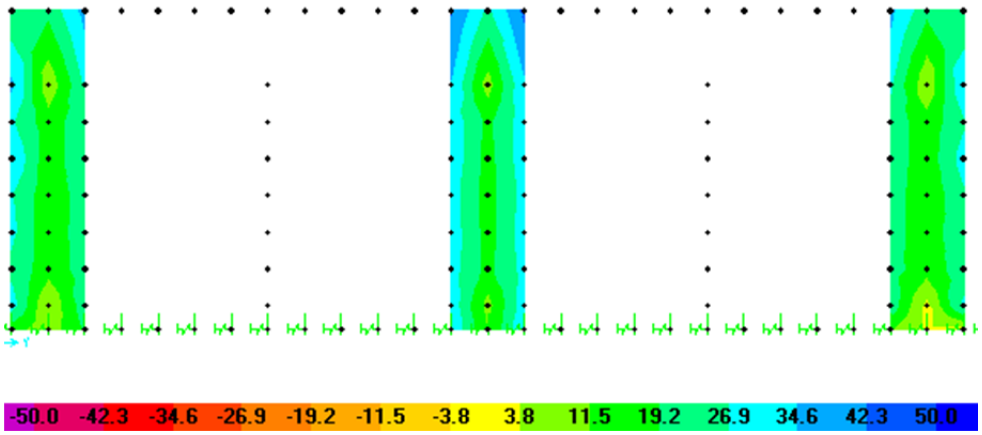


FIG. 4.122 - B7-B8(Q-13)-SETTI F/G - INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

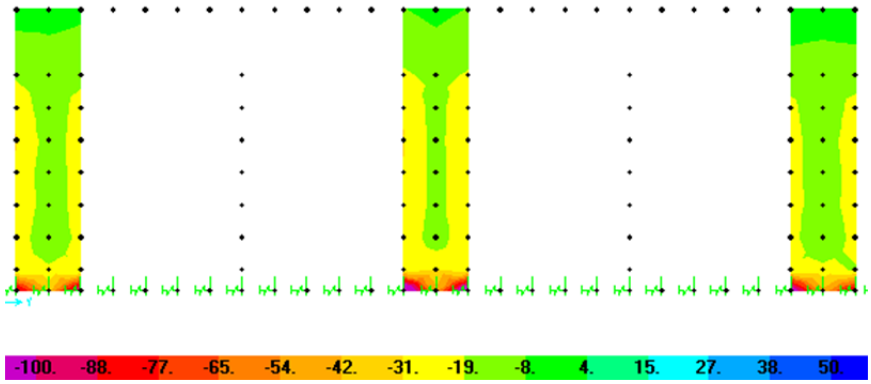


FIG. 4.123 - B7-B8(Q-13)-SETTI F/G - INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

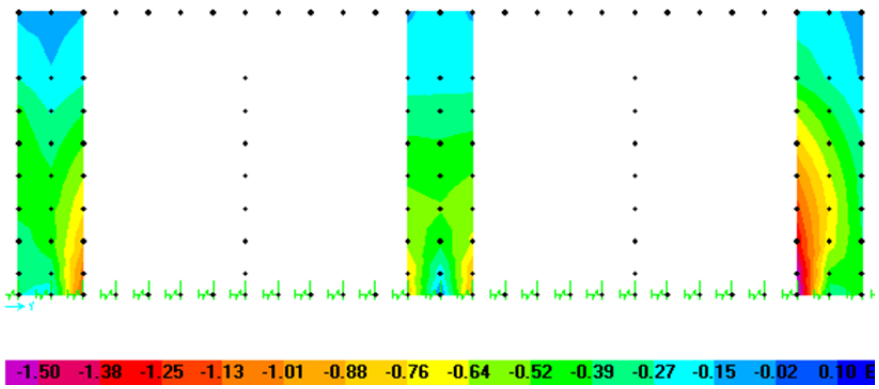


FIG. 4.124 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

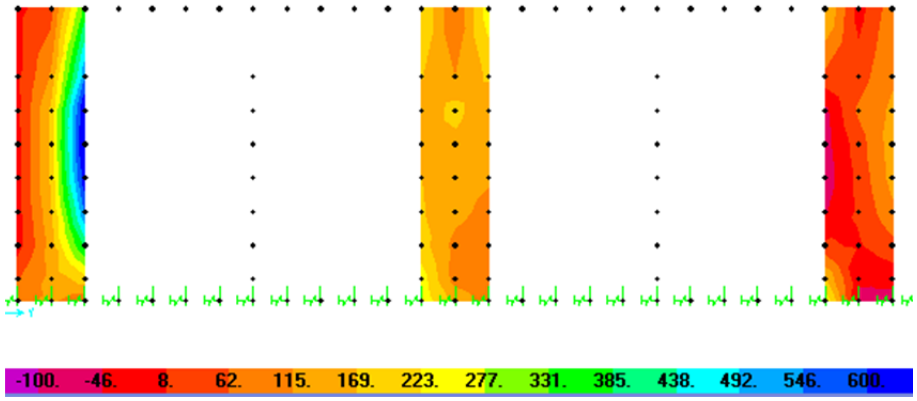


FIG. 4.125 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

B7-B8(q-13)-Setti fra F/G - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.431m, H2=0.069m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}/N_{max}	+170kN	-80kNm	-103kNm	**1.29**
M_{min}/N_{max}	+400kN	-20kNm	-50kNm	**2.50**
M_{max}/N_{max}	+400kN	+35kNm	+50kNm	**1.43**

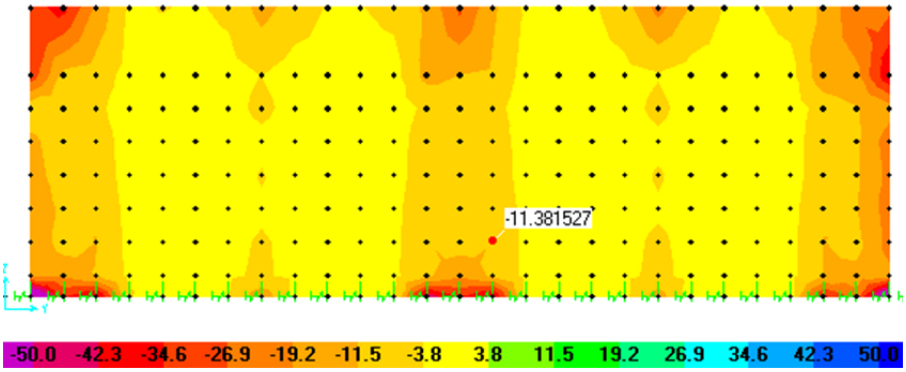


FIG. 4.126 - B7-B8(Q-13)-SETTI G - INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

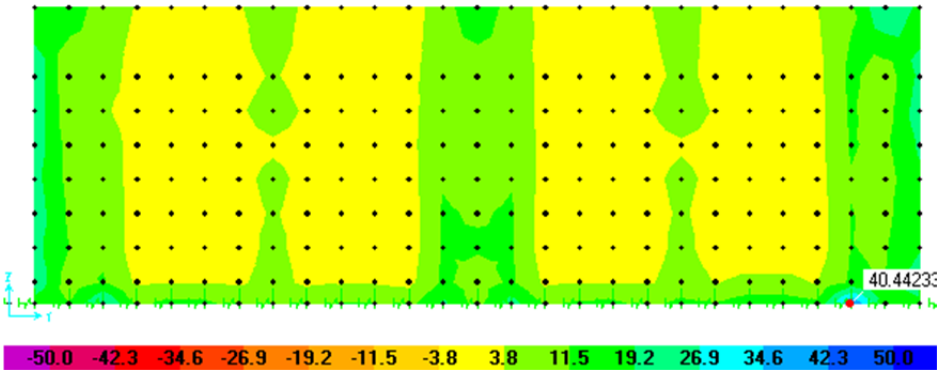


FIG. 4.127 - B7-B8(Q-13)-SETTI G - INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

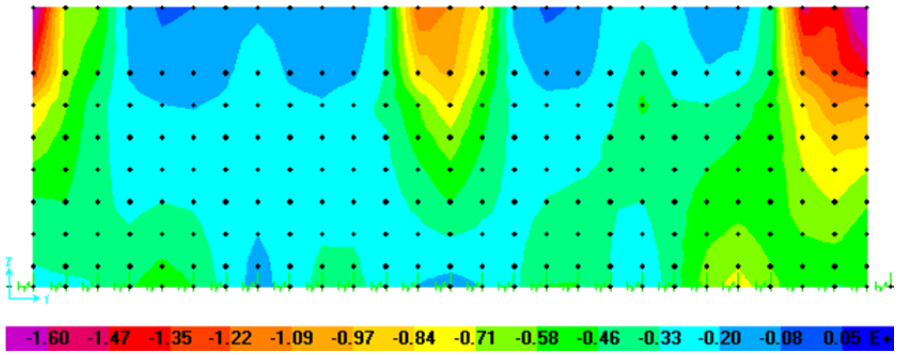


FIG. 4.128 - B7-B8(Q-13)-SETTI G - INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

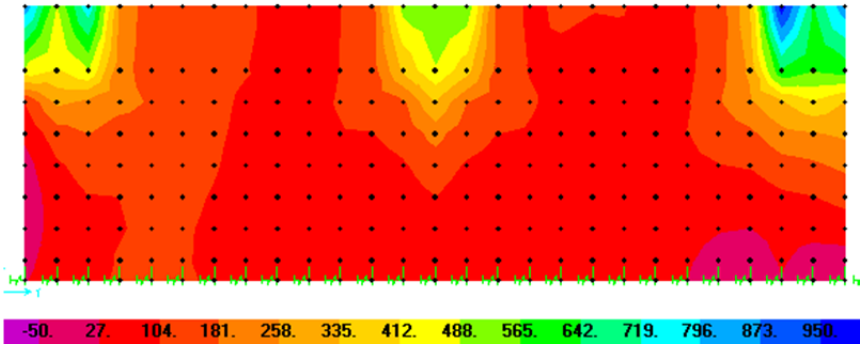


FIG. 4.129 - B7-B8(Q-13)-SETTI G - INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

B7-B8(q-13)-Setto G - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd} / M_{Rd}**
N_{max}/M_{min}	+180kN	-25kNm	-48kNm	**1.92**
N_{max}/M_{max}	+180kN	+40kNm	+48kNm	**1.20**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
N_{max}/M_{min}	+74kN	-50kNm	-134kNm	**2.68**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
N_{max}/M_{min}	+130kN	-14kNm	-36kNm	**2.57**
N_{max}/M_{max}	+130kN	+15kNm	+36kNm	**2.40**

Verifiche SLU orditura orizzontale setti interni B7-B8(q-13):

Fase d'affondamento

In fase di affondamento si considera un dislivello d'acqua di un metro fra celle non in comunicazione fra di loro.
Non si considera il setto C essendo parte dello stesso pilastro d'affondamento e di conseguenza le celle sono in comunicazione fra di loro.

Setto D:
Luce netta di 3.125m.

M_{Sd}=1.5 x 10.1 x 3.125^2 / 10 = 14.8 kNm/m

B=1.0m H=0.25m A1=A2=534mm^2(θ12/500+ θ14/500), H1=0.193m, H2=0.057m

M_{Rd}=47kNm/m

Setto G:
Luce netta di 4.6m.

M_{Sd}=1.5 x 10.1 x 4.6^2 / 10 = 32.1 kNm/m

B=1.0m H=0.25m A1=A2=452mm^2(θ14/250mm), H1=0.193m, H2=0.057m

M_{Rd}=54kNm/m

4.3.4 Verifiche agli SLU azioni sismiche B7-B8(q-13)

4.3.4.1 Orditura orizzontale

Di seguito si riportano le verifiche del cemento armato del fusto del cassone per gli stati limiti ultimi per le combinazioni sismiche.

Di seguito si riportano gli inviluppi degli momenti degli pareti e setti.

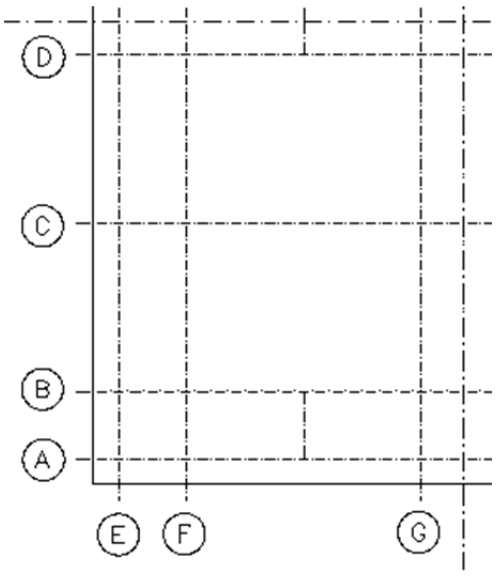


FIG. 4.130 - PIANTA CHIAVE PARETI E SETTI

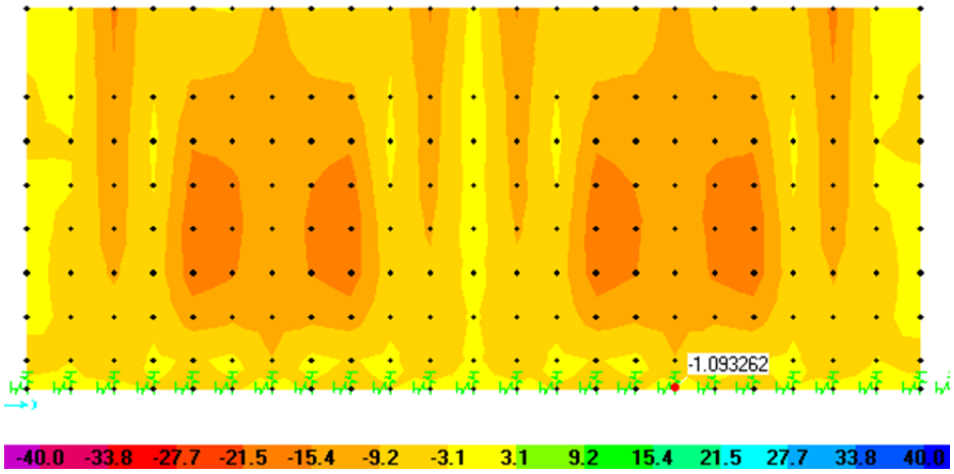


FIG. 4.131 - B7-B8(Q-13)-.PARETE FILO A - INVILUPPO MIN SLU-M11(SISMA)

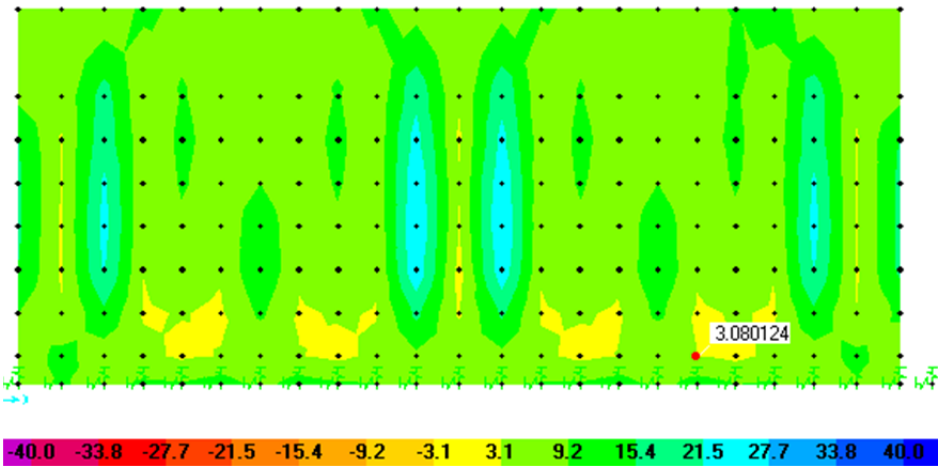


FIG. 4.132 - B7-B8(Q-13)-.PARETE FILO A - INVILUPPO MAX SLU-M11(SISMA)

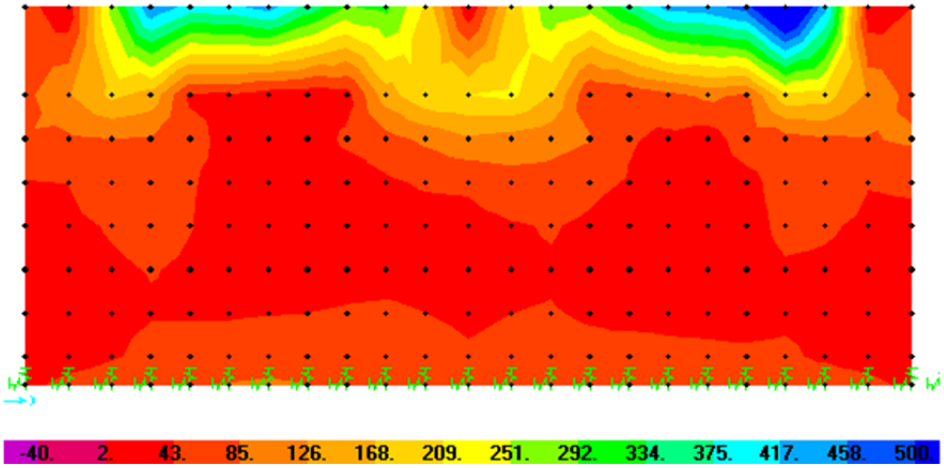


FIG. 4.133 - B7-B8(Q-13)-.PARETE FILO A - INVILUPPO MAX SLU-F11(SISMA)

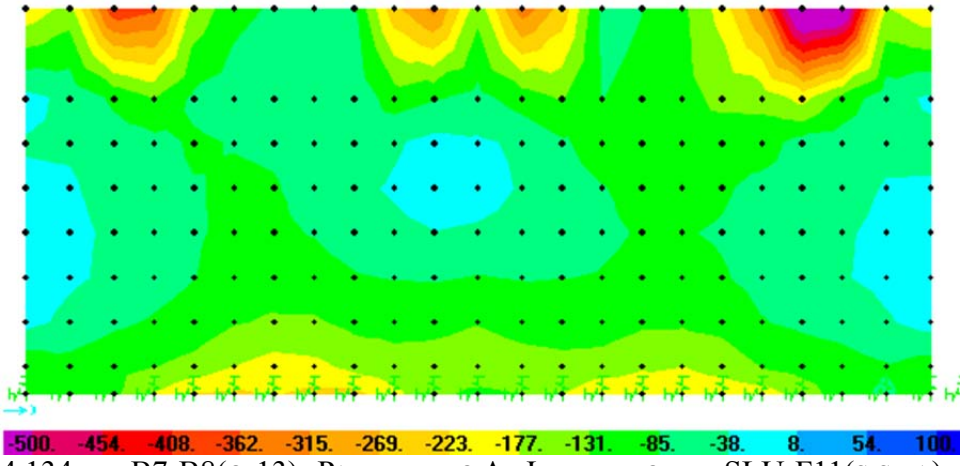


FIG. 4.134 - B7-B8(Q-13)-.PARETE FILO A - INVILUPPO MIN SLU-F11(SISMA)

B7-B8(q-13)-Parete A - ferri orizzontali - Verifiche agli SLU sisma				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max}/ M_{min}	+200kN(tens)	-20kNm	-68kNm	**3.40**
N_{max}/ M_{max}	+200kN(tens.)	+25kNm	+68kNm	**2.72**
Da +6.00				
B=1.0m,H=0.5m,A1=A2=1829mm^2(θ22/250+ θ14/500), H1=0.439m, H2=0.061m				
N_{max}/M_{max}	+520kN(tens.)	+20kNm	+202kNm	**10.10**

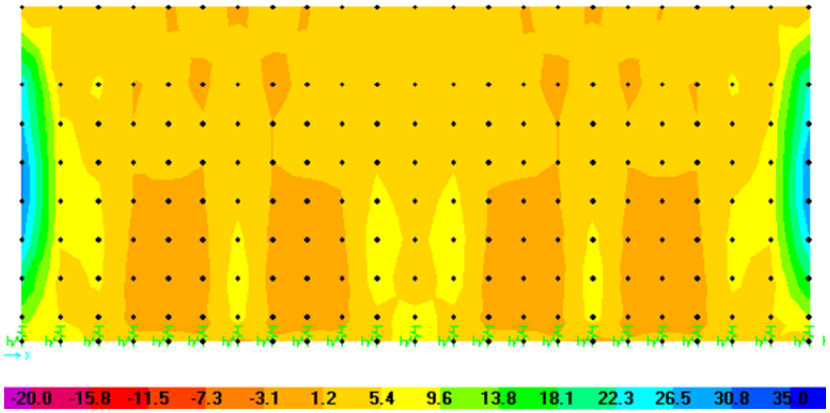


FIG. 4.135 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MAX SLU-M11(SISMA)

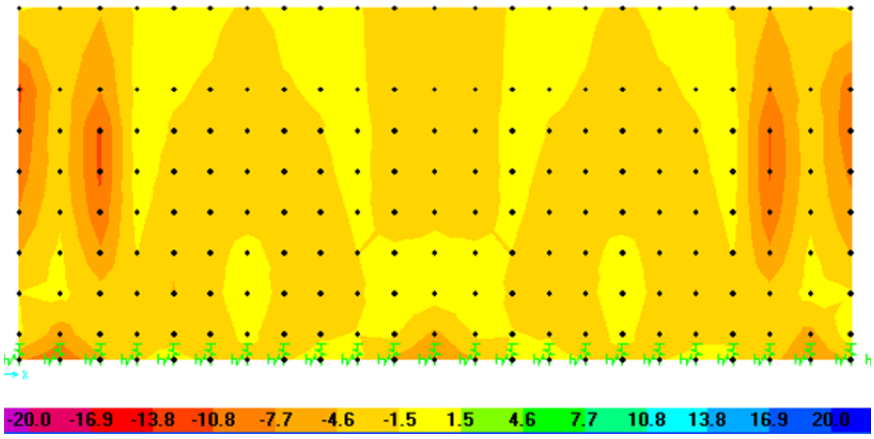


FIG. 4.136 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MIN SLU-M11(SISMA)

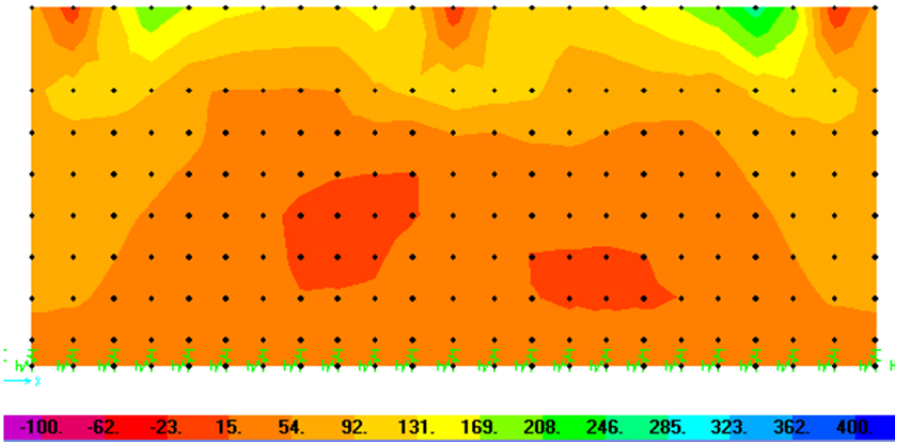


FIG. 4.137 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MAX SLU-F11(SISMA)

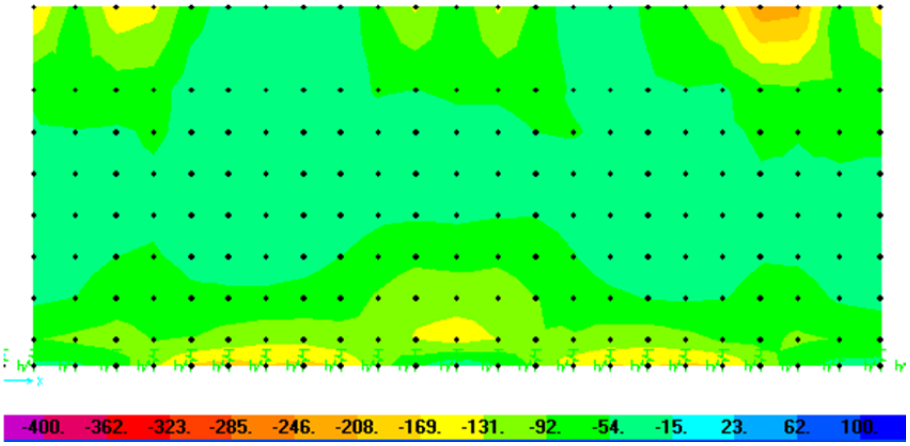


FIG. 4.138 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MIN SLU-F11(SISMA)

B7-B8(q-13)-.Setto B - ferri orizzontali - Verifiche agli SLU sisma				
da 0 a +6.00				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max}/M_{min}	+60kN(tens)	-12kNm	-62kNm	**5.17**
N_{max}/M_{max}	+60kN	+7kNm	+62kNm	**8.86**
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
M_{min}	+60kN	+30kNm	+100kNm	**3.33**
da +6.00				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m				
N_{max}/M_{max}	+220kN	+30kNm	+135kNm	**4.50**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+220kN	-12kNm	-135kNm	**11.25**

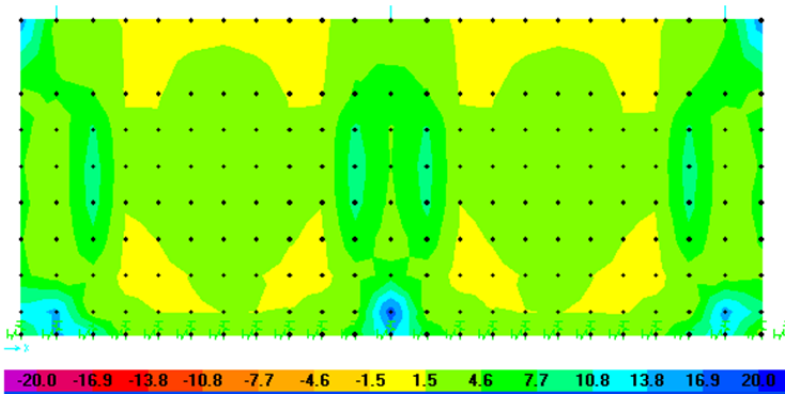


FIG. 4.139 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MAX SLU-M11(SISMA)

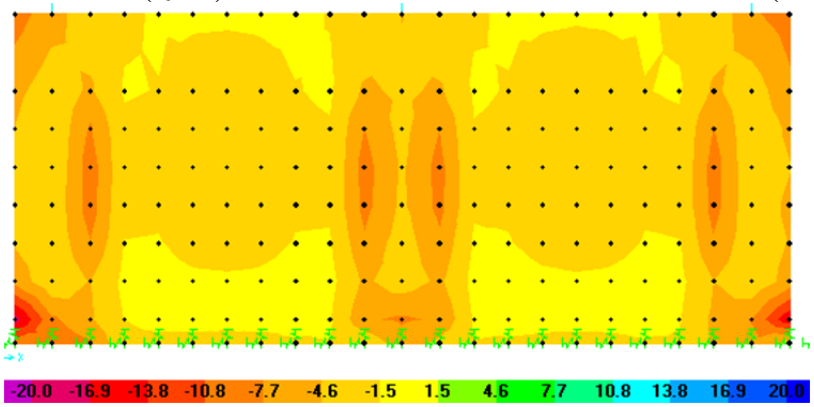


FIG. 4.140 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MIN SLU-M11(SISMA)

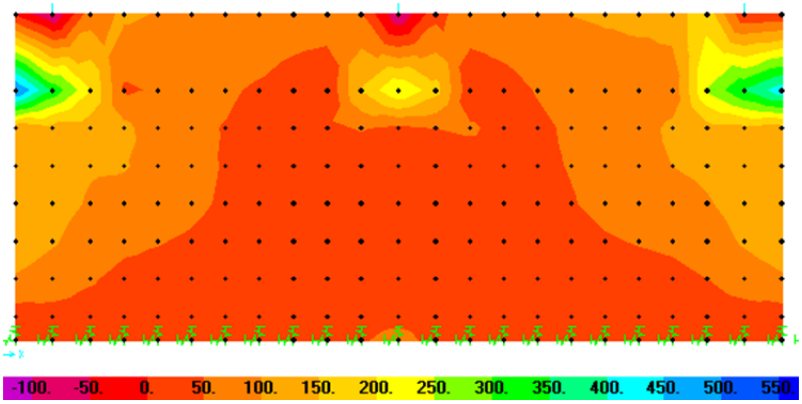


FIG. 4.141 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MAX SLU-F11(SISMA)

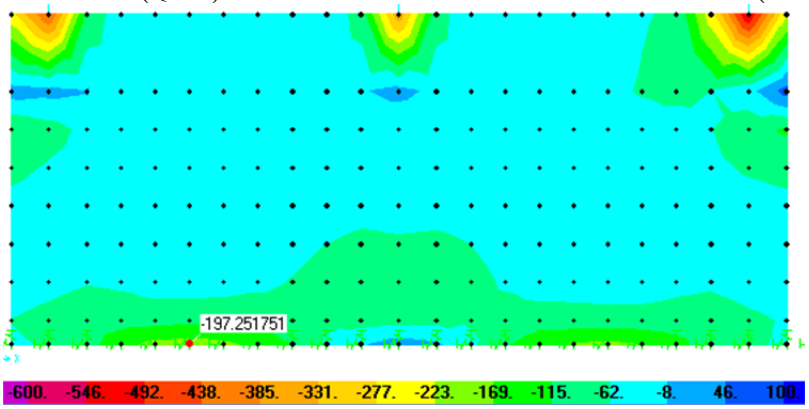


FIG. 4.142 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MIN SLU-F11(SISMA)

B7-B8(q-13)-Setto C - ferri orizzontali - Verifiche agli SLU sisma				
da 0 a +6.00				
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250mm), H1=0.189m, H2=0.061m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{sd}**
N_{max}/M_{min}	+170kN	-20kNm	-51kNm	**2.55**
N_{max}/M_{max}	+170kN	+15kNm	+51kNm	**3.40**
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
N_{max}/M_{min}	+250kN	-8kNm	-56kNm	**7.00**
da +6.00				
B=1.0m,H=0.5m,A1=A2=1524mm^2(θ22/250), H1=0.439m, H2=0.061m				
N_{max}/M_{max}	+430kN	+15kNm	+173kNm	**11.5**
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250), H1=0.189m, H2=0.061m				
N_{max}/M_{max}	+220kN	+15kNm	+92kNm	**6.13**

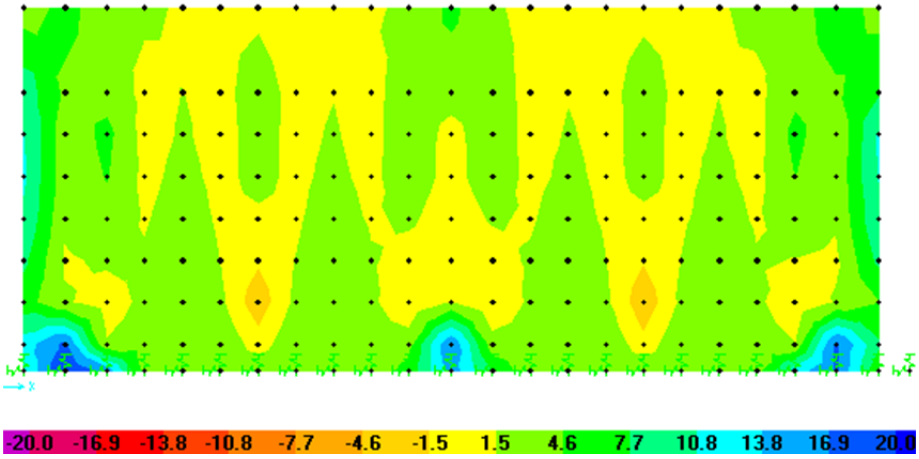


FIG. 4.143 - B7-B8(Q-13)-.SETTO FILO D - INVILUPPO MAX SLU-M11(SISMA)

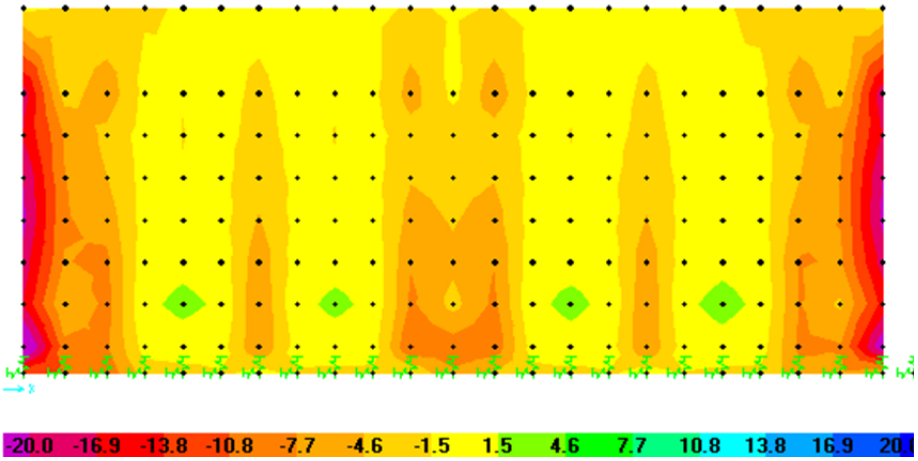


FIG. 4.144 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MIN SLU-M11(SISMA)

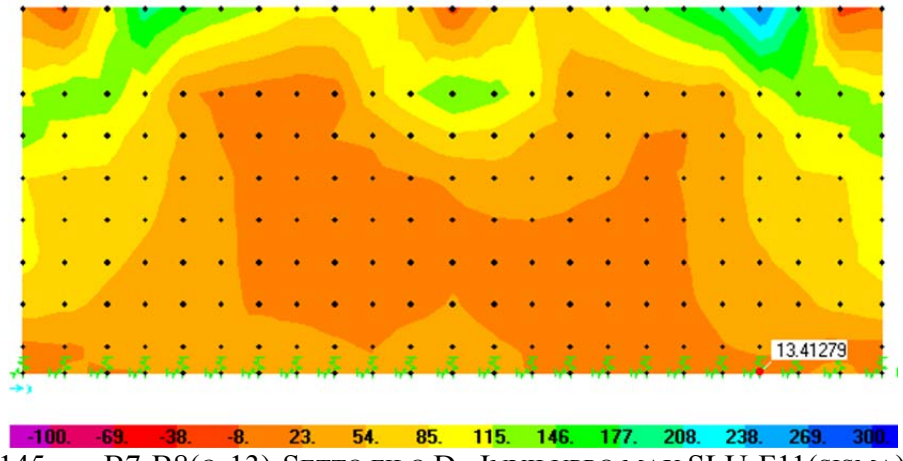


FIG. 4.145 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MAX SLU-F11(SISMA)

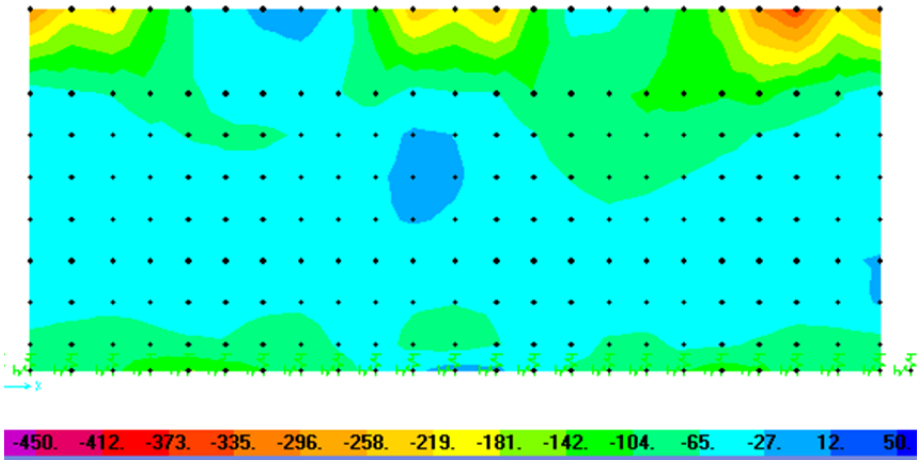


FIG. 4.146 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MIN SLU-F11(SISMA)

B7-B8(q-13)-Setto D - ferri orizzontali - Verifiche agli SLU sisma				
da 0 a +6.00				
B=1.0m,H=0.25m,A1=A2=534mm^2(θ12/500mm+ θ14/500mm), H1=0.193m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max} /M_{min}	+130kN	+10kNm	+34kNm	**3.40**
N_{max} / M_{max}	+130kN(tens.)	+10kNm	+34kNm	**3.40**
B=1.0m H=0.5m A1=A2=710mm^2(θ16/500mm+ θ14/500mm), H1=0.442m, H2=0.058m in corrispondenza di parete E				
N_{max} /M_{min}	+130kN	-20kNm	-101kNm	**5.05**
N_{max} /M_{max}	+130kN	+20kNm	+101kNm	**5.05**
da +6.00				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m, solo in corrispondenza di parete E				
N_{max} / M_{min}	+200kN	-20kNm	-140kNm	**7.00**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max} / M_{min}	+280kN	-20kNm	-57kNm	**2.85**

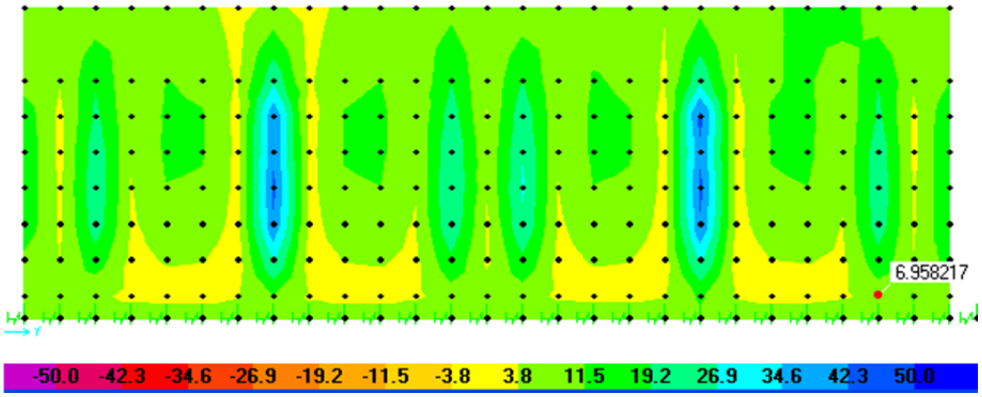


FIG. 4.147 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MAX SLU-M11(SISMA)

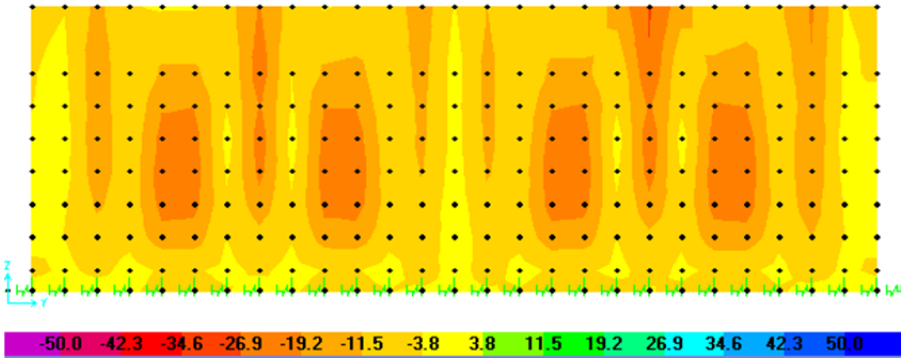


FIG. 4.148 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MIN SLU-M11(SISMA)

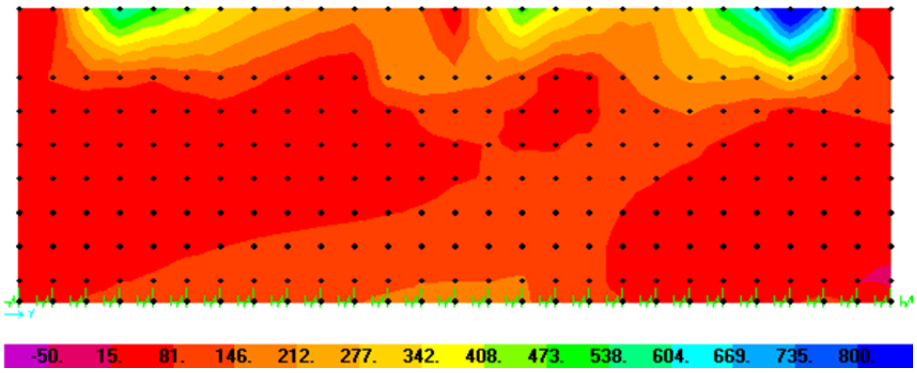


FIG. 4.149 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MAX SLU-F11(SISMA)

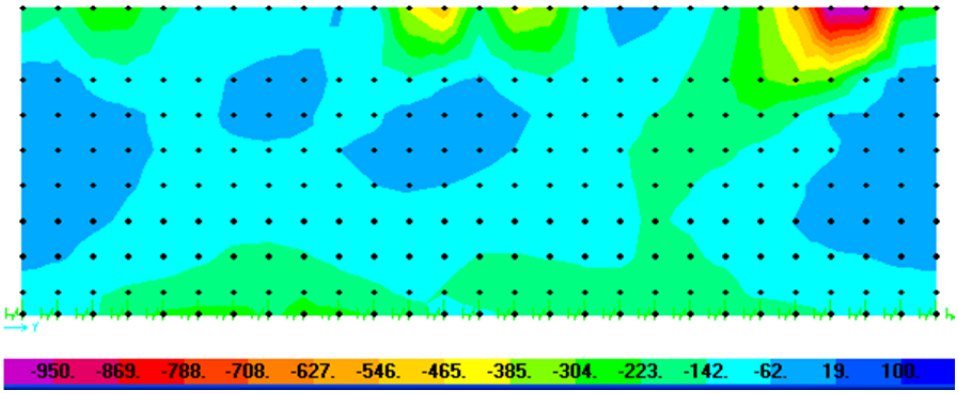


FIG. 4.150 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MIN SLU-F11(SISMA)

B7-B8(q-13)-Parete E - ferri orizzontali - Verifiche agli SLU sisma				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max}/ M_{min}	+280kN(tens)	-20kNm	-122kNm	**6.10**
M_{max}	+280kN(tens.)	+50kNm	+122kNm	**2.44**
Da +6.00				
B=1.0m,H=0.5m,A1=A2=1884mm^2(θ20/250+ θ20/500mm), H1=0.440m, H2=0.06m				
N_{max}	+760kN(tens.)	+25kNm	+163kNm	**6.54**

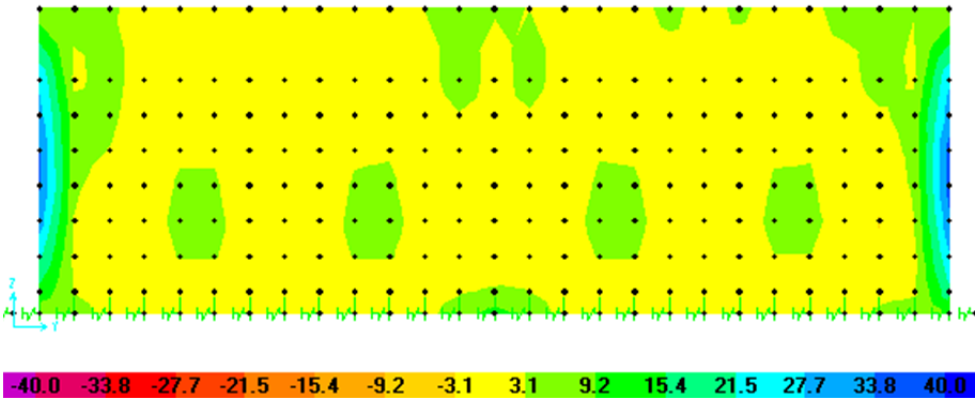


FIG. 4.151 - B7-B8(Q-13)-SETTO FILO F - INVILUPPO MAX SLU-M11(SISMA)

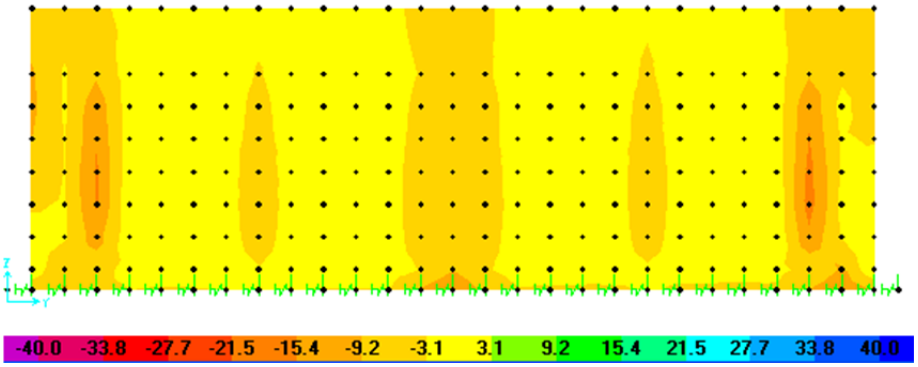


FIG. 4.152 - B7-B8(Q-13)-SETTO FILO F - INVILUPPO MIN SLU-M11(SISMA)

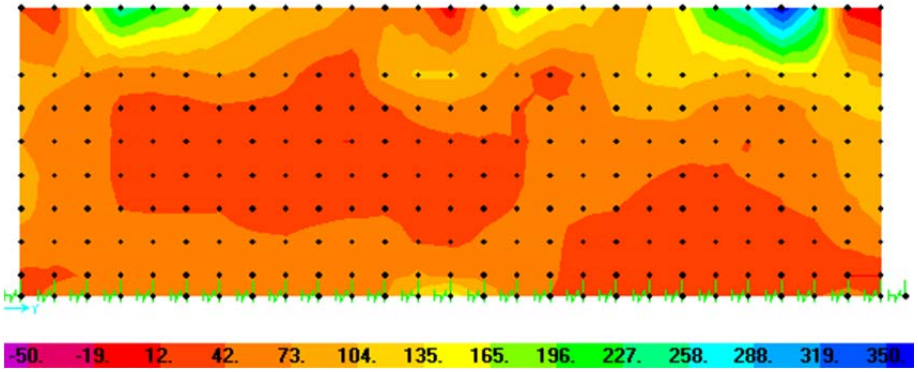


FIG. 4.153 - B7-B8(Q-13)-SETTO FILO F - INVILUPPO MAX SLU-F11(SISMA)

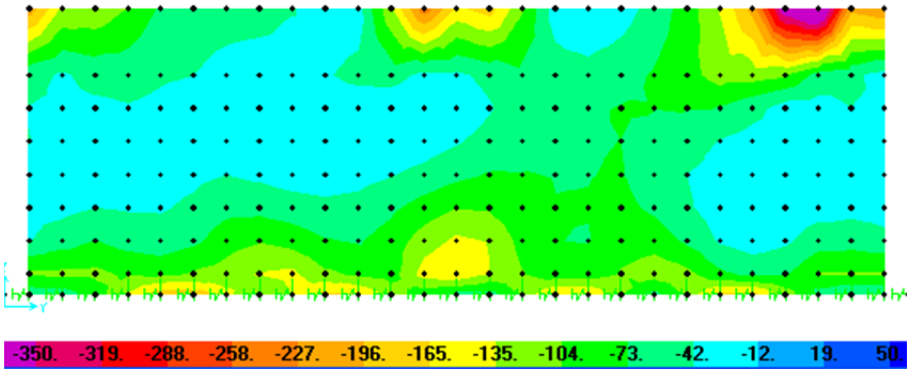


FIG. 4.154 - B7-B8(Q-13)-SETTO FILO F - INVILUPPO MIN SLU-F11(SISMA)

B7-B8(q-13)-Setto F - ferri orizzontali - Verifiche agli SLU sisma				
da 0 a +6.00				
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max}/M_{min}	+120kN(tens)	-20kNm	-41kNm	**2.05**
N_{max}/M_{max}	+120kN	+10kNm	+41kNm	**4.10**
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
N_{max} /M_{min}	+120kN	+32kNm	+87kNm	**2.72**
da +6.00				
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+330kN	+25kNm	+53kNm	**2.12**

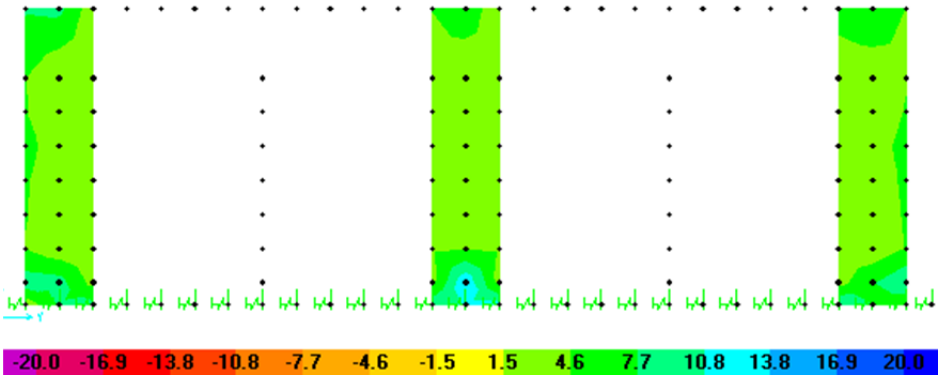


FIG. 4.155 - B7-B8(Q-13)-.SETTO FILO F/G - INVILUPPO MAX SLU-M11(SISMA)

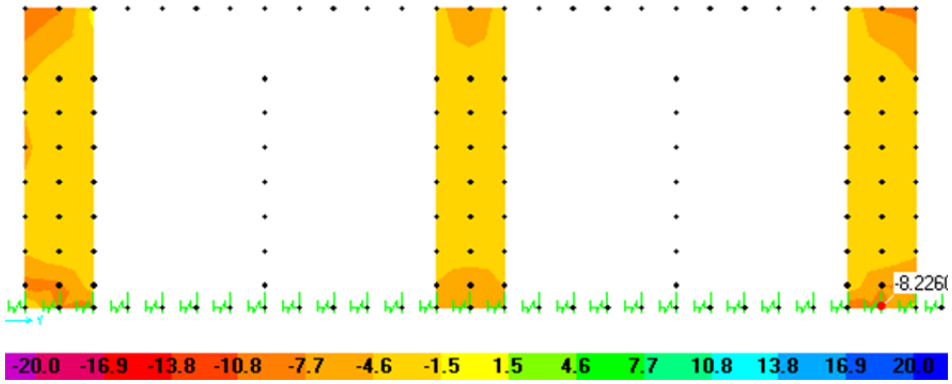


FIG. 4.156 - B7-B8(Q-13)-.SETTO FILO F/G - INVILUPPO MIN SLU-M11(SISMA)

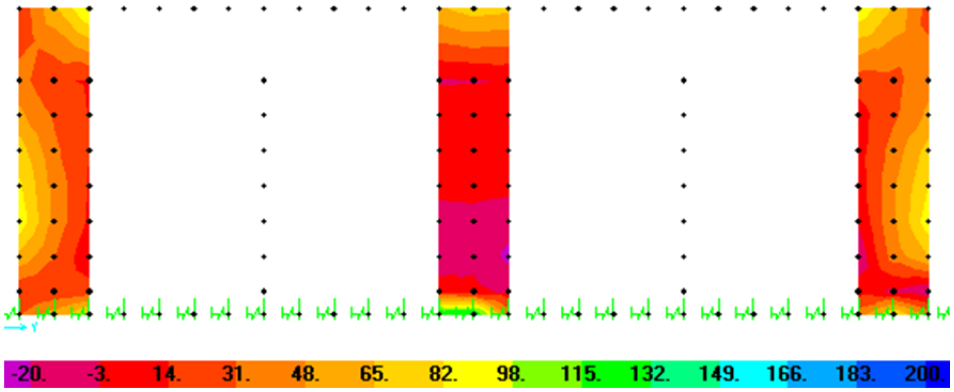


FIG. 4.157 - B7-B8(Q-13)-.SETTO FILO F/G - INVILUPPO MAX SLU-F11(SISMA)

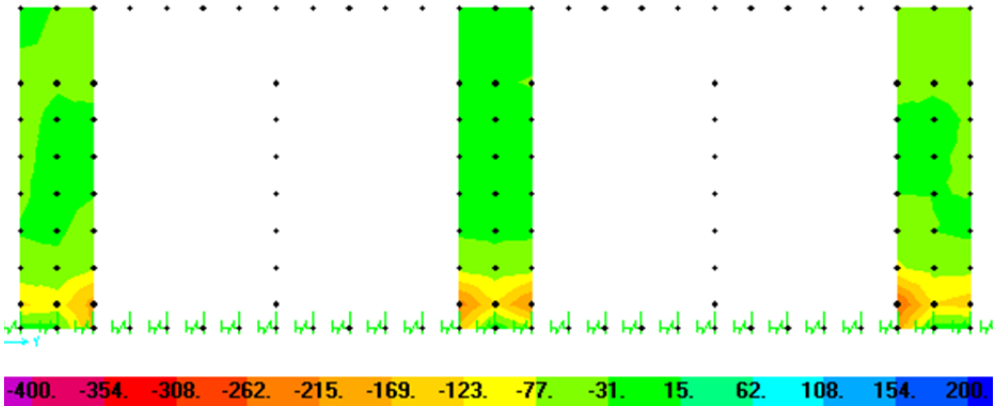


FIG. 4.158 - B7-B8(Q-13)-SETTO FILO F/G - INVILUPPO MIN SLU-F11(SISMA)

B7-B8(q-13)-Setti fra F/G - ferri orizzontali - Verifiche agli SLU sisma				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=452mm^2(θ12/250mm), H1=0.444m, H2=0.056m in corrispondenza della parete A				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
N_{max} /M_{min}	+90kN	-8kNm	-64kNm	**8.0**
N_{max} /M_{max}	+90kN	+13kN	+64kNm	**4.92**
da +6.00				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
N_{max}	+50kN	-8kNm	-103kNm	**12.9**

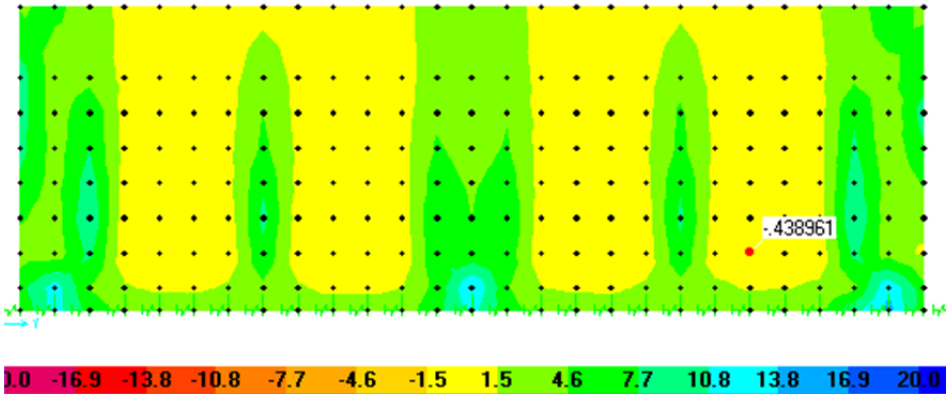


FIG. 4.159 - B7-B8(Q-13)-.SETTO G - INVILUPPO MAX SLU-M11(SISMA)

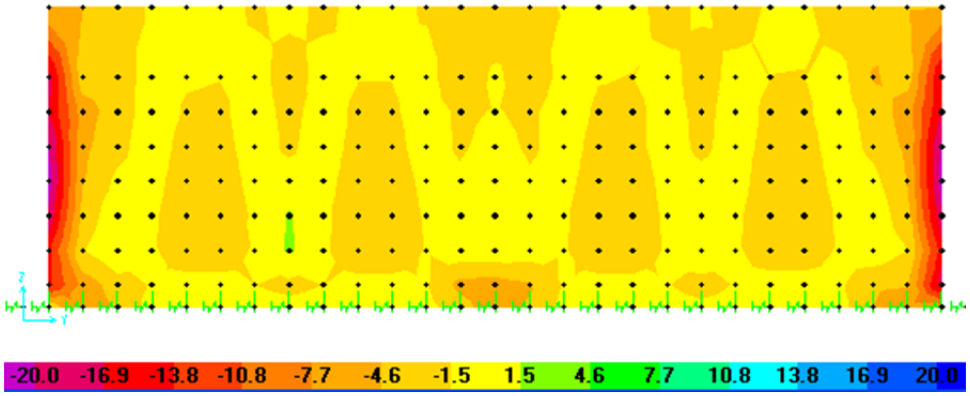


FIG. 4.160 - B7-B8(Q-13)-SETTO G - INVILUPPO MIN SLU-M11(SISMA)

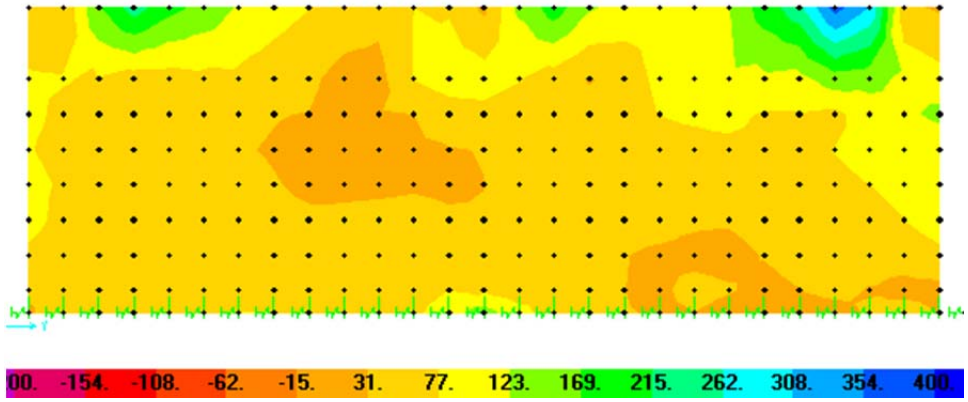


FIG. 4.161 - B7-B8(Q-13)-SETTO G - INVILUPPO MAX SLU-F11(SISMA)

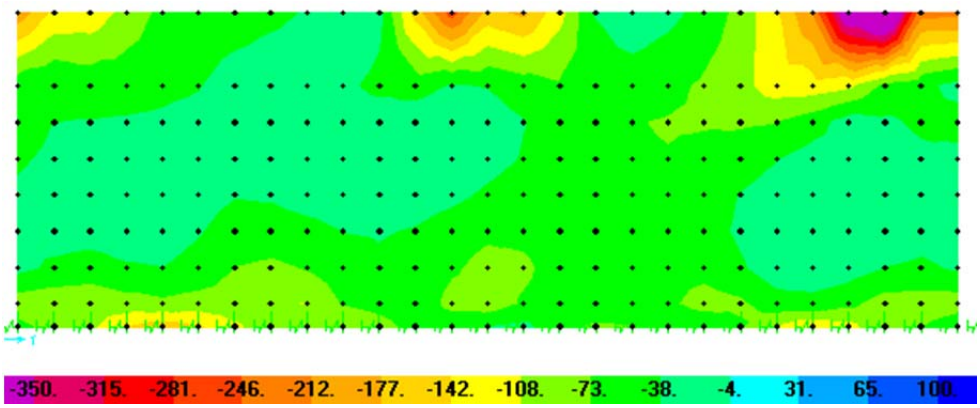


FIG. 4.162 - B7-B8(Q-13)-.SETTO G - INVILUPPO MIN SLU-F11(SISMA)

B7-B8(q-13)- Setto G - ferri orizzontali - Verifiche agli SLU sisma				
Da 0 a +6.00				
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max}/M_{min}	+140kN	-21kNm	-82kNm	**5.47**
N_{max}/M_{max}	+140kN	+15kNm	+82kNm	**5.47**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
N_{max}/M_{min}	+140kN	-3kNm	-40kNm	**13.3**
N_{max}/M_{max}	+140kN	+15kNm	+40kNm	**2.67**
da +6.00				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
N_{max}	+290kN	-15kNm	-39kNm	**2.60**

4.3.4.2 Verifica a taglio - fase sismica B7-B8(q-13)

Di seguito si riportano i diagrammi di taglio per le pareti e setti in fase sismica

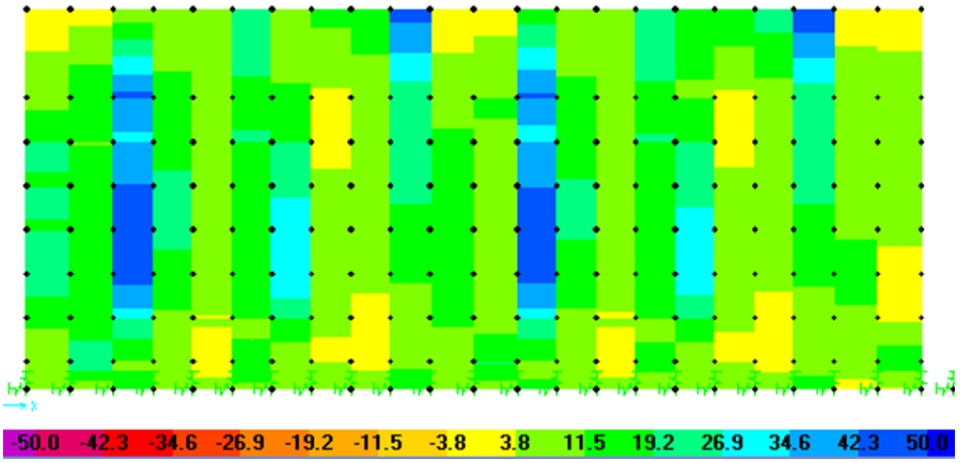


FIG. 4.163 - B7-B8(Q-13)-PARETE A - INVILUPPO SLU-V13(SISMA)

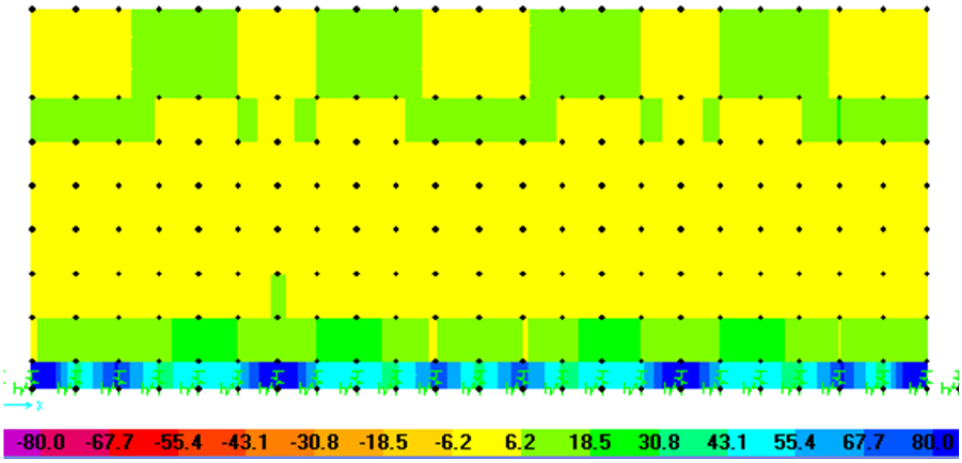


FIG. 4.164 - B7-B8(Q-13)-PARETE A - INVILUPPO MAX SLU-V23(SISMA)

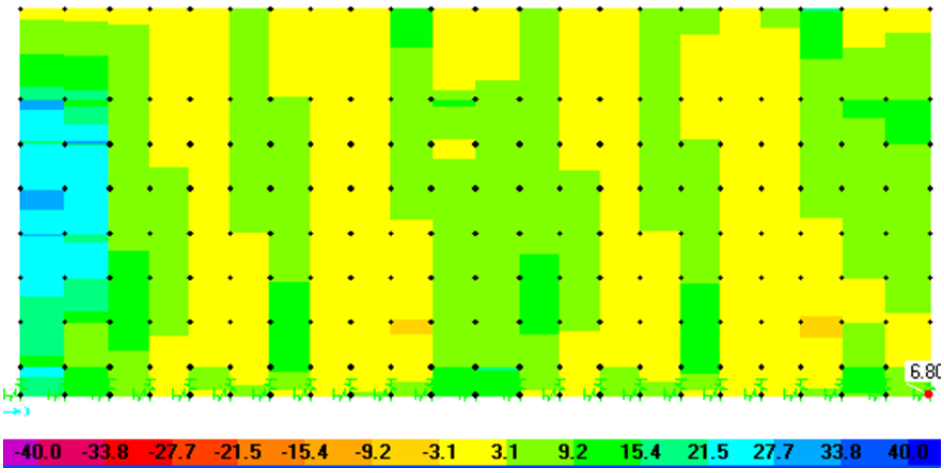


FIG. 4.165 - B7-B8(Q-13)-PARETE B - INVILUPPO SLU-V13(SISMA)

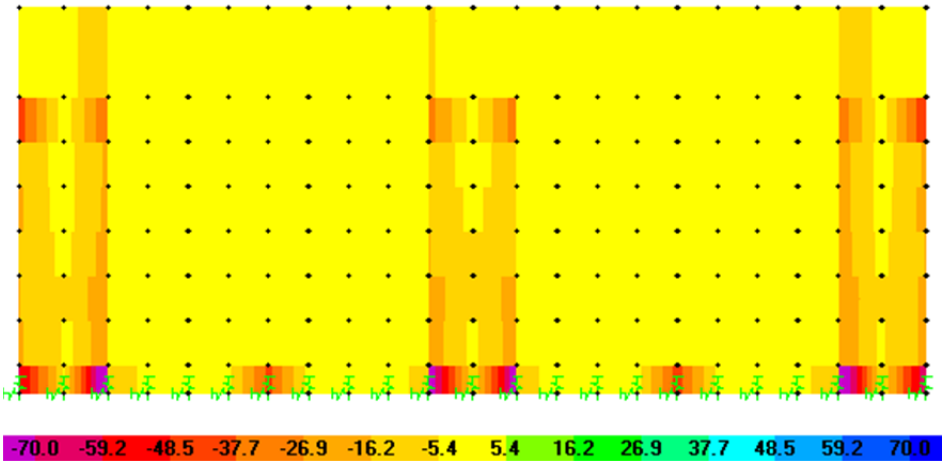


FIG. 4.166 - B7-B8(Q-13)-PARETE B - INVILUPPO SLU-V23(SISMA)

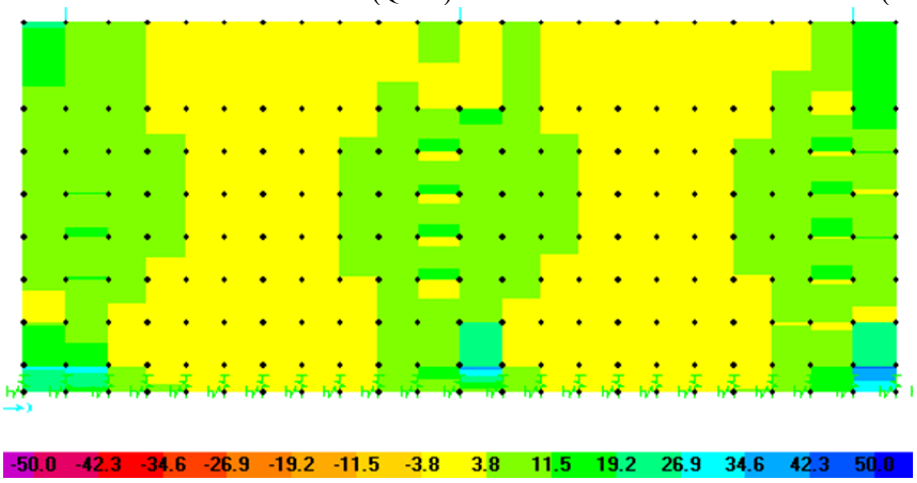


FIG. 4.167 - B7-B8(Q-13)-PARETE C - INVILUPPO SLU-V13(SISMA)

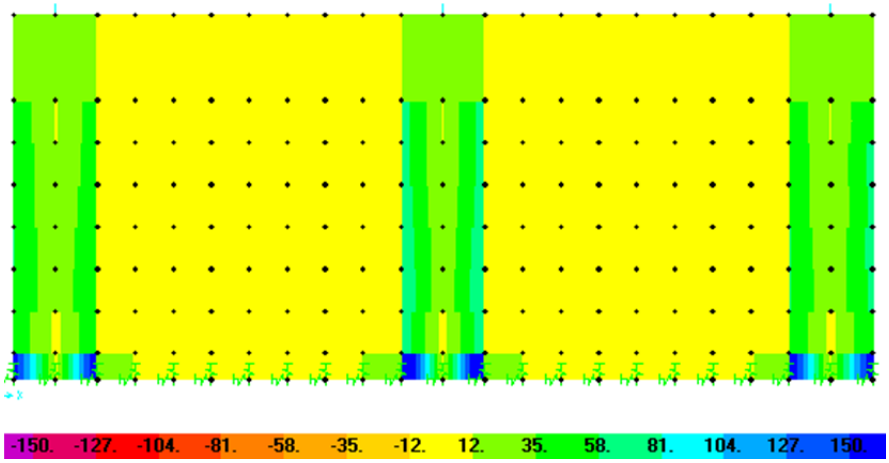


FIG. 4.168 - B7-B8(Q-13)-PARETE C - INVILUPPO SLU-V23(SISMA)

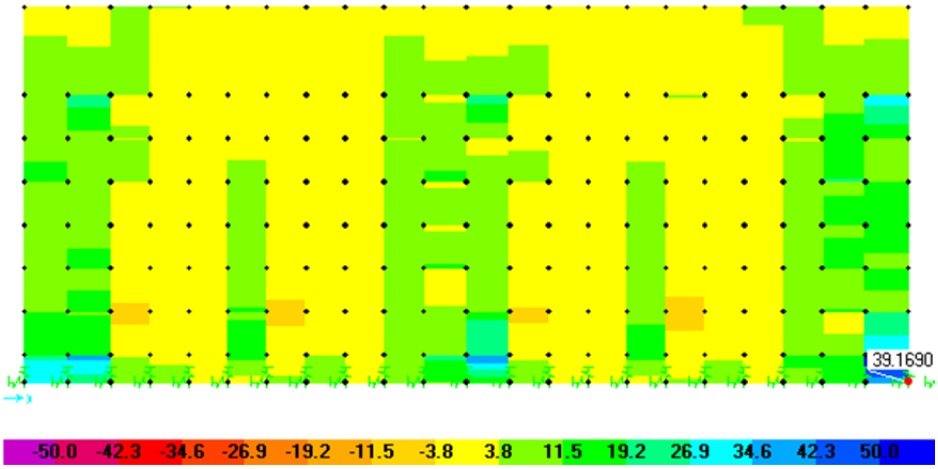


FIG. 4.169 - B7-B8(Q-13)-PARETE D - INVILUPPOSLU-V13(SISMA)

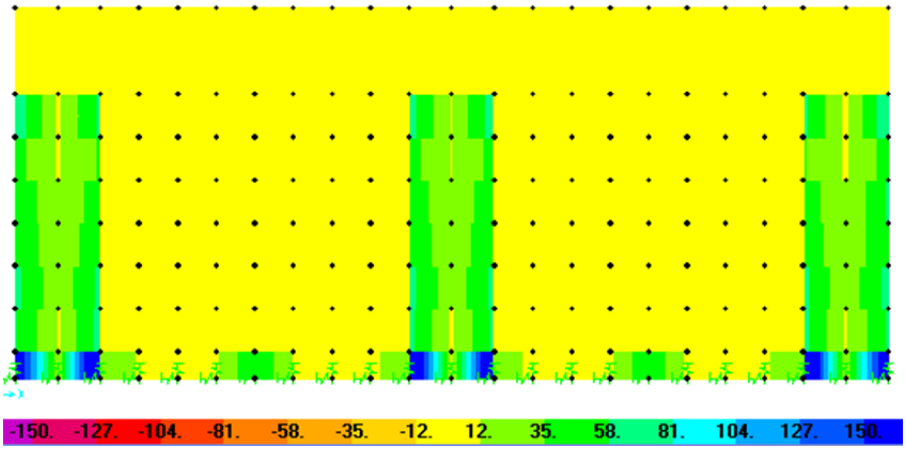


FIG. 4.170 - B7-B8(Q-13)-PARETE D - INVILUPPO SLU-V23(SISMA)

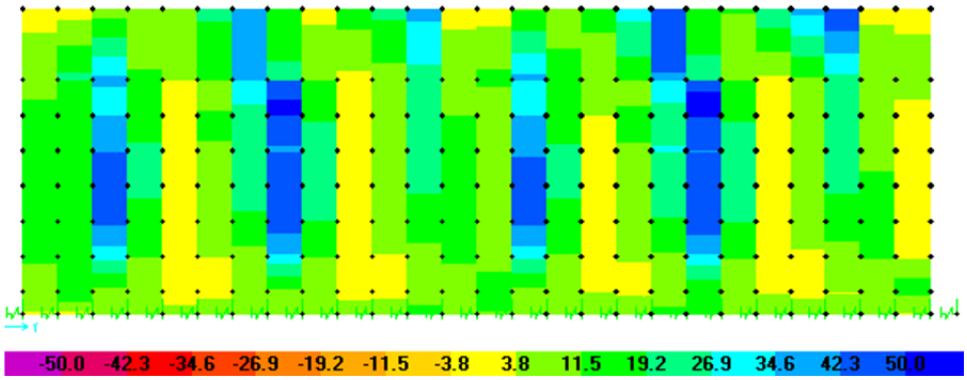


FIG. 4.171 - B7-B8(Q-13)-PARETE E - INVILUPPO SLU-V13(SISMA)

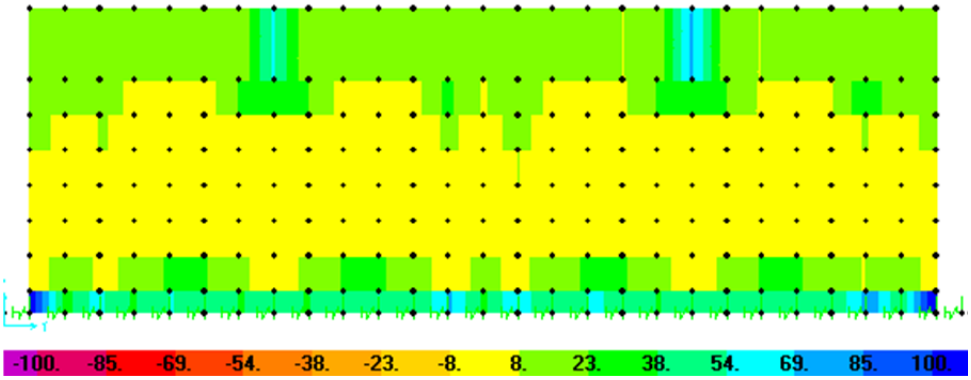


FIG. 4.172 - B7-B8(Q-13)-PARETE E - INVILUPPO SLU-V23(SISMA)

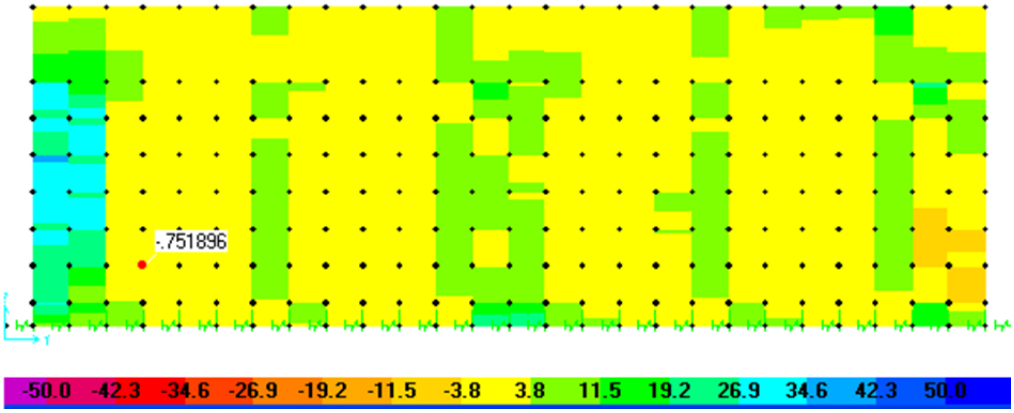


FIG. 4.173 - B7-B8(Q-13)-PARETE F - INVILUPPO SLU-V13(SISMA)

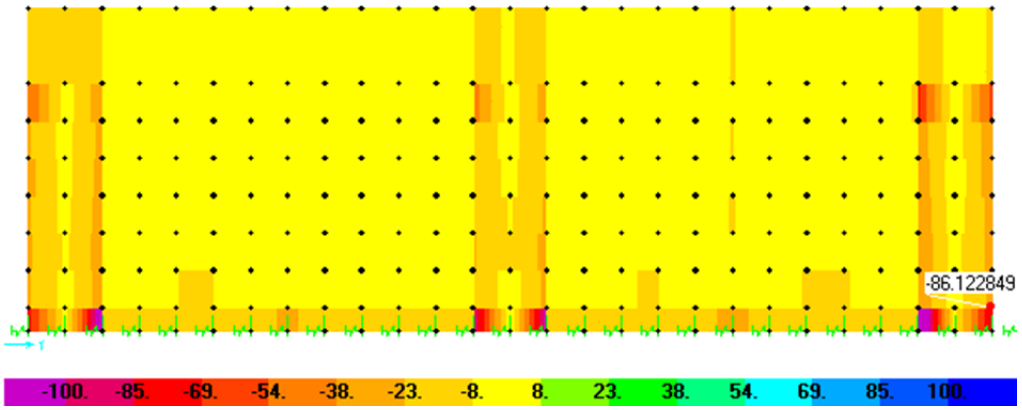


FIG. 4.174 - B7-B8(Q-13)-PARETE F - INVILUPPO SLU-V23(SISMA)

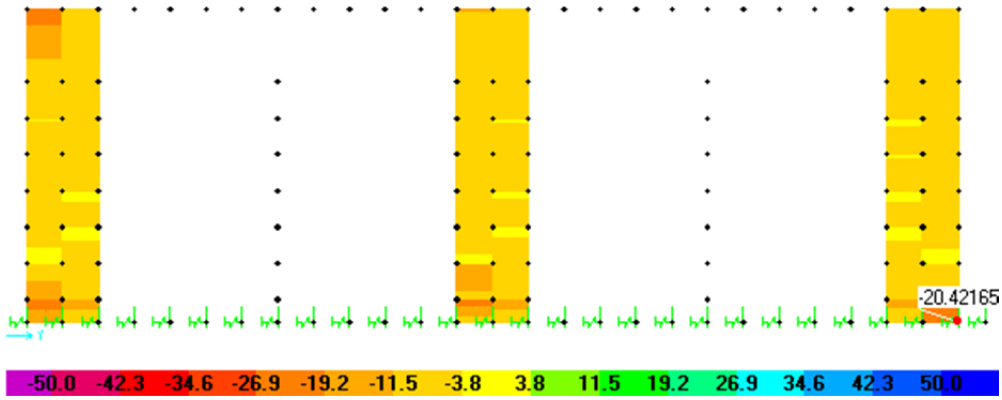


FIG. 4.175 - B7-B8(Q-13)-.PARETE F/G - INVILUPPO SLU-V13(SISMA)

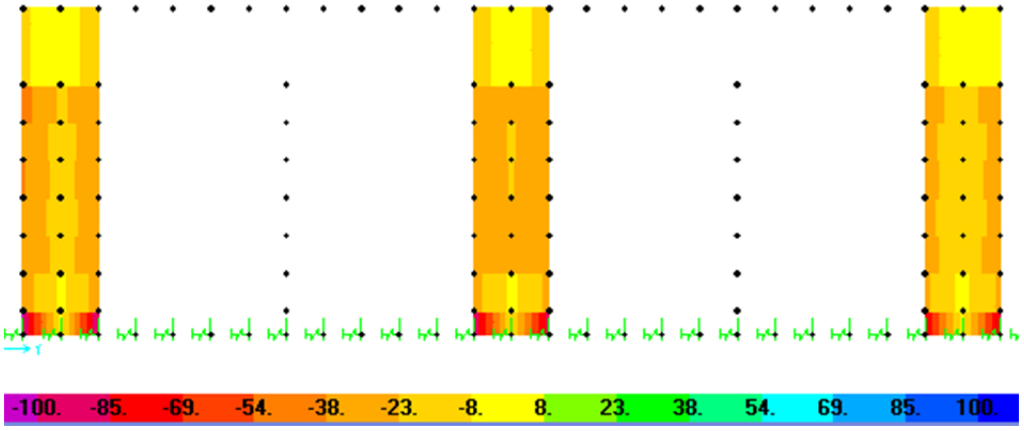


FIG. 4.176 - B7-B8(Q-13)-.PARETE F/G - INVILUPPO SLU-V23(SISMA)

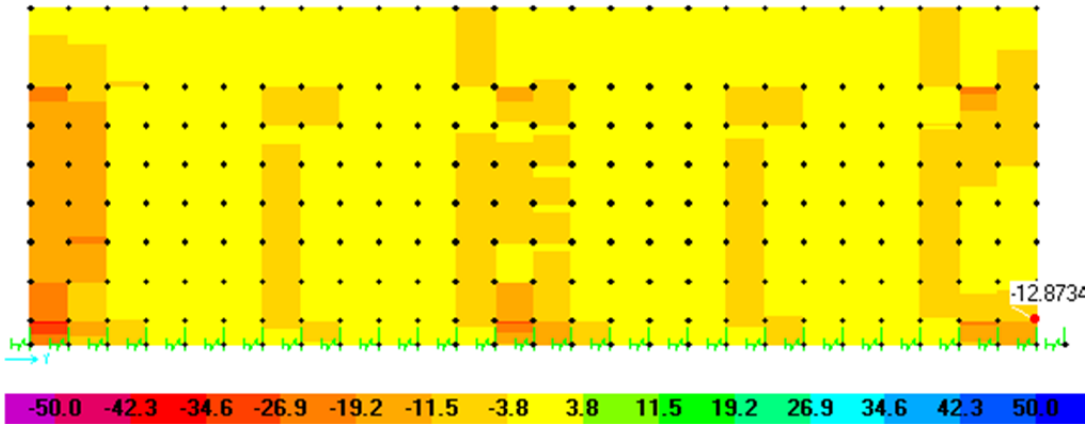


FIG. 4.177 - B7-B8(Q-13)-.PARETE G - INVILUPPO SLU-V13(SISMA)

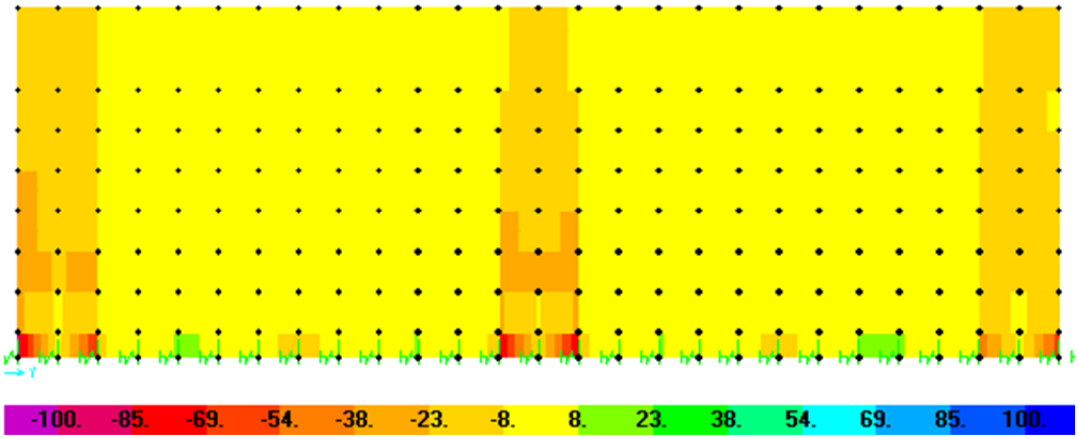


FIG. 4.178 - B7-B8(Q-13)-.PARETE G - INVILUPPO SLU-V23(SISMA)

Il taglio massimo è pari a 50kN/m(sp.25cm) e 100kN/m (sp.50cm), valori al di sotto della resistenza a taglio del calcestruzzo non ordito a taglio sia per la parete dello spessore di 50cm (V_{Rd}≈190kN/m) sia per i setti interno dello spessore di 25cm (V_{Rd}≈100kN/m) .

4.3.4.3 Verifica setti interni in fase sismica B7-B8(q-13)

Di seguito si esegue una verifica ulteriore per verificare l'adeguatezza dell'orditura dei setti interni in fase sismica.

I due setti più sollecitati in fase sismica sono i setti C (per luce), setto D (per orditura) e i setti G (per sforzi)

Setto C:
Luce netta di 6.75m.

Spinta orizzontale in fase sismica:
con inerte:
0.15x[0.25x25(setto)+2x4.625x19(acqua+riempimento)]=
0.15x182=27.3kN/m (con inerte)

Verifica orditura orizzontale:
M_{Sd}=27.3 x 6.75^2 / 12 = 103.6 kNm/m
B=1.0m H=0.25m A1=A2=1524mm^2(θ22/250), H1=0.189m, H2=0.061m
M_{Rd}=108.6kNm/m

Verifica orditura verticale (lastra 7.75/6.75=1.15 incastro quattro lati):
M_{Sd}=27.3 x 6.75^2 / 18.58 = 67 kNm/m
N_{Sd}=0.25x7.75x25=48.4kN/m(compression)
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200), H1=0.171m, H2=0.079m
M_{Rd}=70kNm/m

Verifica a taglio:
V_{Sd}=27.3 x 6.75 / 2 = 92.1 kNm/m

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	VRD
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	(kN)
Taglio setto	0	250	192	804	58	804	48	0.12	2.00	0.0042	35	19.8	0	0.15	0.59	113	112.45	113

Setto D:
Luce netta di 3.125m.

Spinta orizzontale in fase sismica:
con inerte e acqua:
0.15x[0.25x25(setto)+(4.625+2)x19(acqua+inerte)]=
0.15x132.1=19.8kN/m (con inerte)

Verifica orditura orizzontale:
M_{Sd}=19.8 x 3.125^2 / 12 = 16.1 kNm/m
B=1.0m H=0.25m A1=A2=534mm^2(θ14/500+θ12/500), H1=0.193m, H2=0.057m
M_{Rd}=47.7kNm/m

Verifica orditura verticale (lastra 7.75/3.125=2.48 incastro quattro lati):
M_{Sd}=19.8 x 3.125^2 / 18.58 = 10.4 kNm/m

N_{Sd}=0.25x7.75x25=48.4kN/m(compression)
B=1.0m H=0.25m A1=A2=565mm^2(θ12/200), H1=0.18m, H2=0.07m
M_{Rd}=55kNm/m

Verifica a taglio:
Già verificato per setto D

Setto G:

Luce netta di 4.625m.

Spinta orizzontale in fase sismica:
con inerte e acqua:
0.15x[0.25x25(setto)+(6.75+2)x19(acqua+inerte)]=
0.15x172.5=25.875kN/m (con inerte)

Verifica orditura orizzontale:
M_{Sd}= 25.9x4.625^2/12 = 46.2 kNm/m
B=1.0m H=0.25m A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m
M_{Rd}=54kNm/m

Verifica orditura verticale (lastra 7.75/4.63=1.67 incastro quattro lati):
M_{Sd}=25.9 x 4.625^2 / 17.50 = 31.7 kNm/m
N_{Sd}=0.25x7.75x25=48.4kN/m(compression)
B=1.0m H=0.25m A1=A2=565mm^2(θ12/200), H1=0.18m, H2=0.07m
M_{Rd}=55kNm/m

Verifica a taglio:
Già verificato per setto D

4.3.4.4 Monconi di ripresa e ferri verticali - fase sismica B7-B8(q-13)

Di seguito si riportano gli inviluppi degli sforzi agli SLU per le combinazioni sismiche e le relative verifiche dell'orditura:

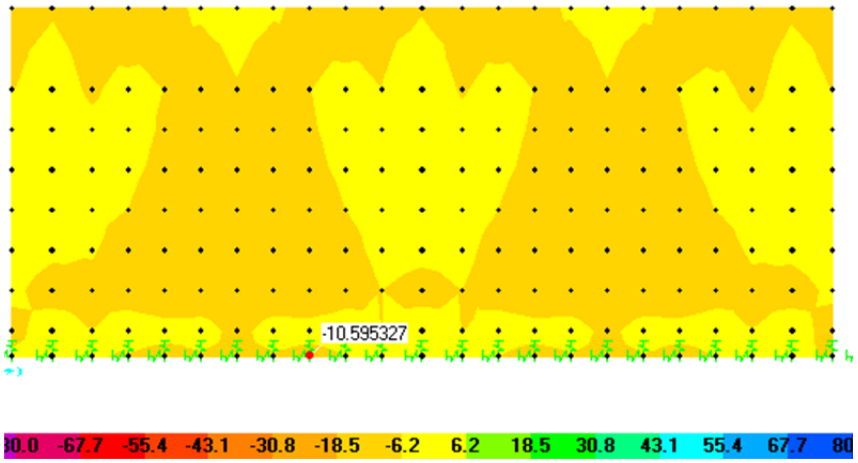


FIG. 4.179 - B7-B8(Q-13)-PARETE A - INVILUPPO MIN SLU-M22 (SISMA)

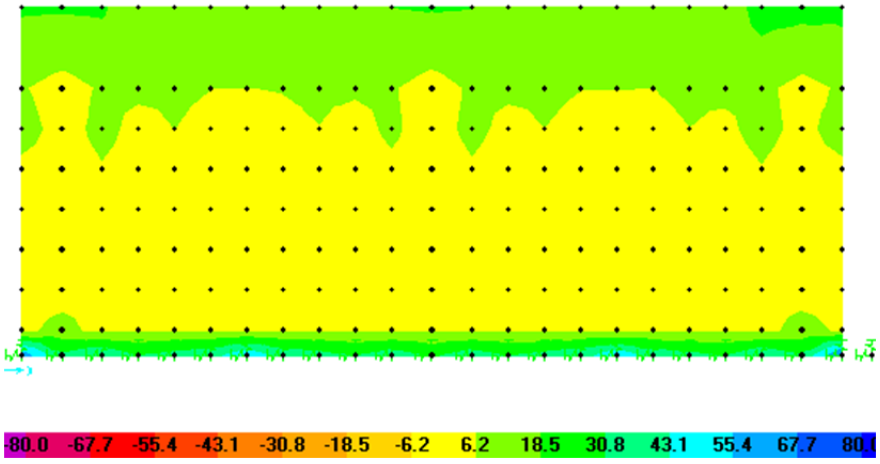


FIG. 4.180 - B7-B8(Q-13)-PARETE A - INVILUPPO MAX SLU-M22 (SISMA)

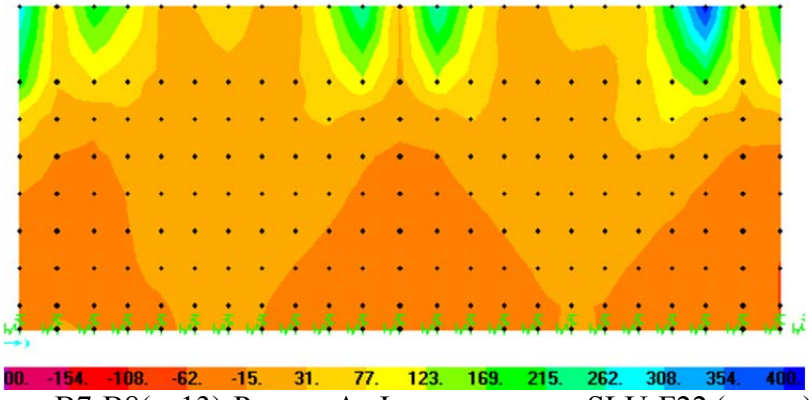


FIG. 4.181 - B7-B8(Q-13)-PARETE A - INVILUPPO MAX SLU-F22 (SISMA)

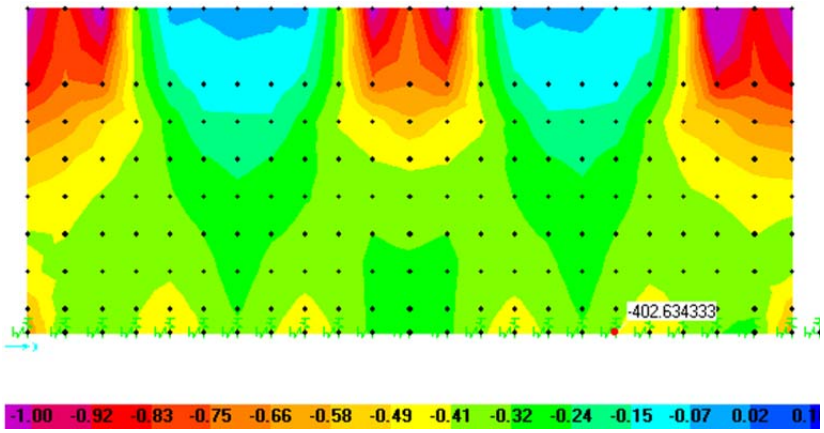


FIG. 4.182 - B7-B8(Q-13)-PARETE A- INVILUPPO MIN SLU-F22 (SISMA)

B7-B8(q-13)-Parete A - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m				
B=1.0m H=0.5m A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}/N_{max}	-10kN	-10kNm	-83kNm	**8.3**
M_{max}/N_{max}	-10kN	+50kNm	+136kNm	**2.72**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+195kN	-15kNm	-26kNm	**1.73**
M_{max}/N_{max}	+195kN	+20kNm	+26kNm	**1.30**

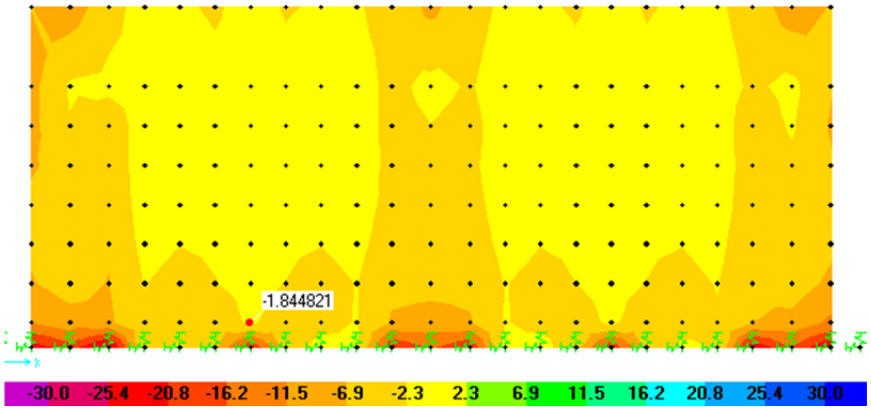


FIG. 4.183 - B7-B8(Q-13)-SETTO B- INVILUPPO MIN SLU-M22 (SISMA)

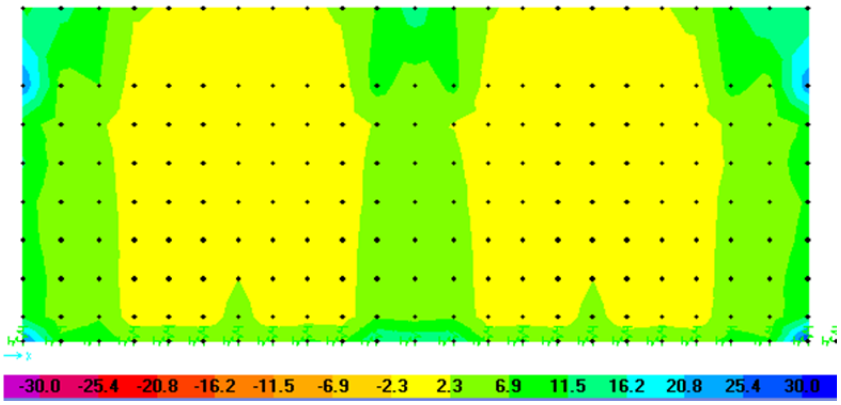


FIG. 4.184 - B7-B8(Q-13)-SETTO B- INVILUPPO MAX SLU-M22 (SISMA)

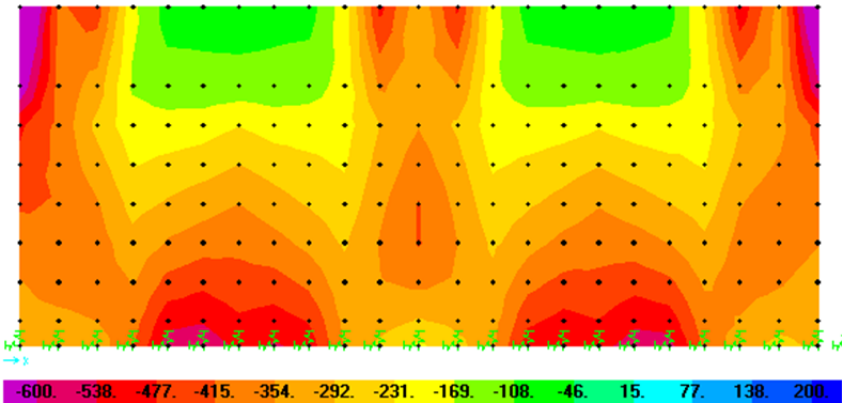


FIG. 4.185 - B7-B8(Q-13)-SETTO B- INVILUPPO MIN SLU-F22 (SISMA)

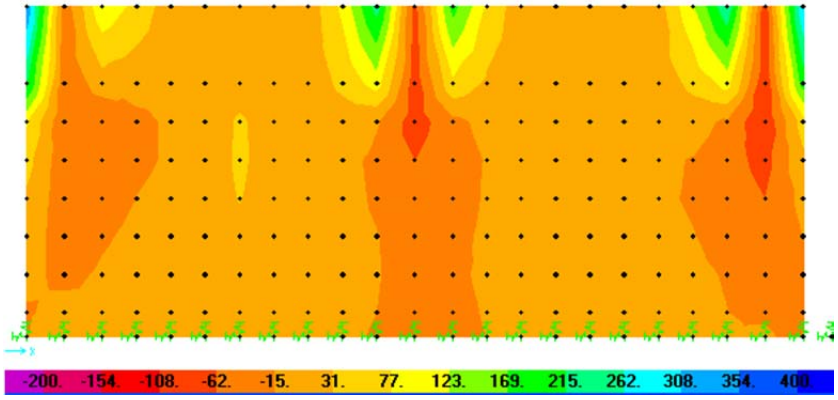


FIG. 4.186 - B7-B8(Q-13)-SETTO B- INVILUPPO MAX SLU-F22 (SISMA)

B7-B8(q-13)-Setto B - ferri verticali - Verifiche agli SLU - sisma				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
M_{min}/N_{max}	+13kN	-10kNm	-64kNm	**6.4**
M_{max}/N_{max}	+13kN	+5kNm	+64kNm	**4.9**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+13kN	+30kNm	-138kNm	**4.6**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+180kN	-3kNm	-31kNm	**10.3**
M_{max}/N_{max}	+180kN	+5kNm	+31kNm	**6.2**

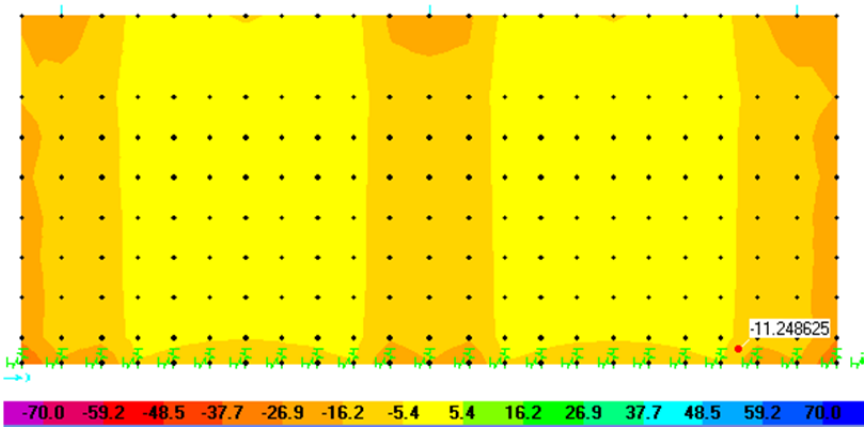


FIG. 4.187 - B7-B8(Q-13)-SETTO C- INVILUPPO MIN SLU-M22 (SISMA)

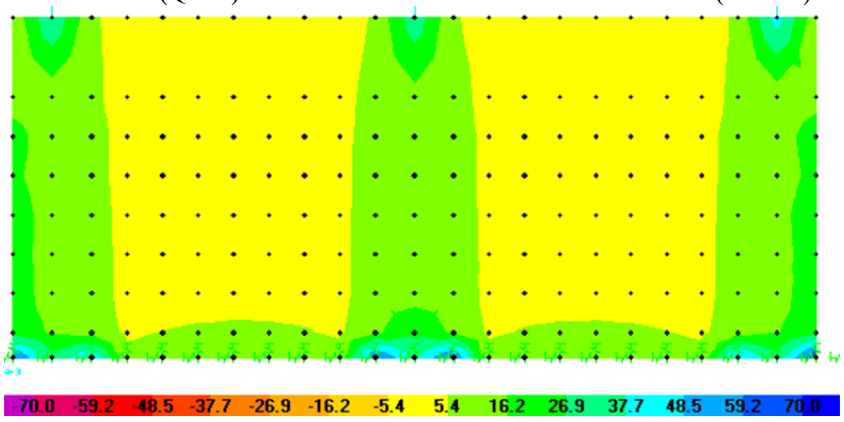


FIG. 4.188 - B7-B8(Q-13)-SETTO C- INVILUPPO MAX SLU-M22 (SISMA)

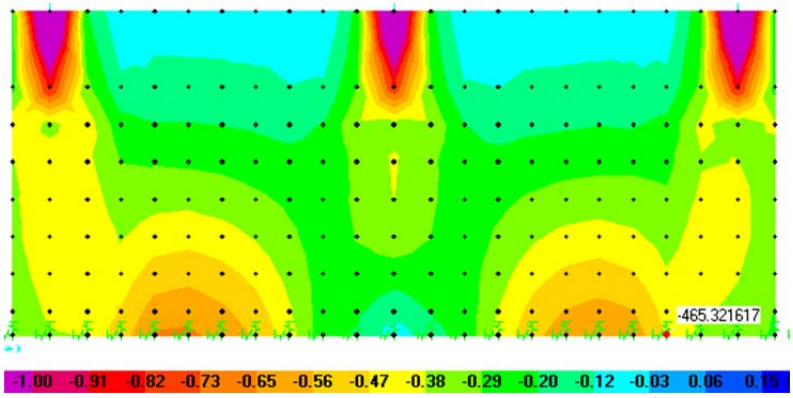


FIG. 4.189 - B7-B8(Q-13)-SETTO C- INVILUPPO MIN SLU-F22 (SISMA)

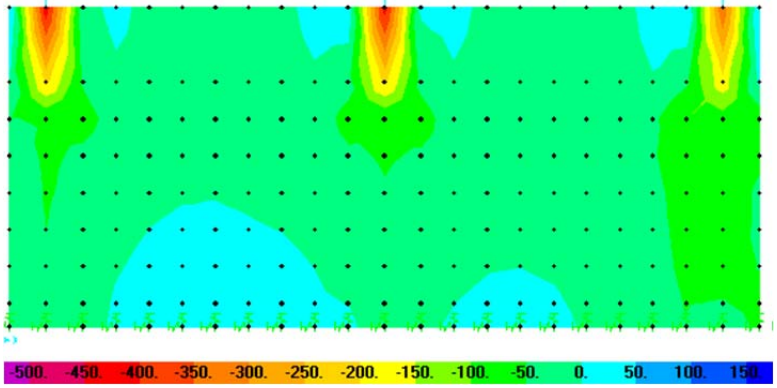


FIG. 4.190 - B7-B8(Q-13)-SETTO C- INVILUPPO MAX SLU-F22 (SISMA)

B7-B8(q-13)-Setto C - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=565mm^2(θ12/200mm), H1=0.18m, H2=0.07m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}/N_{max}	+26kN	-10kNm	-47kNm	**4.7**
M_{max}/N_{max}	+26kN	+12kNm	+47kNm	**3.9**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	-3kN	+60kNm	+106kNm	**1.77**
Verticali correnti				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+40kN	-15kNm	-46kNm	**3.1**
M_{max}/N_{max}	+40kN	+7kNm	+46kNm	**6.6**

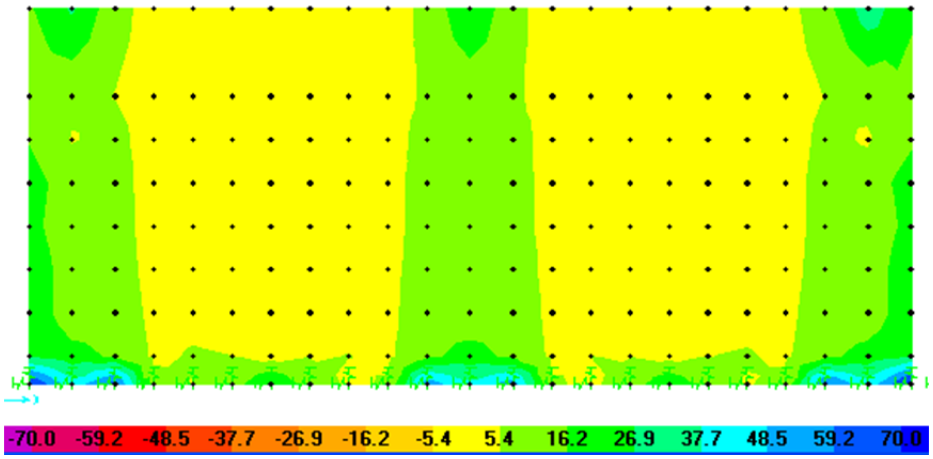


FIG. 4.191 - B7-B8(Q-13)-.SETTO D- INVILUPPO MAX SLU-M22 (SISMA)

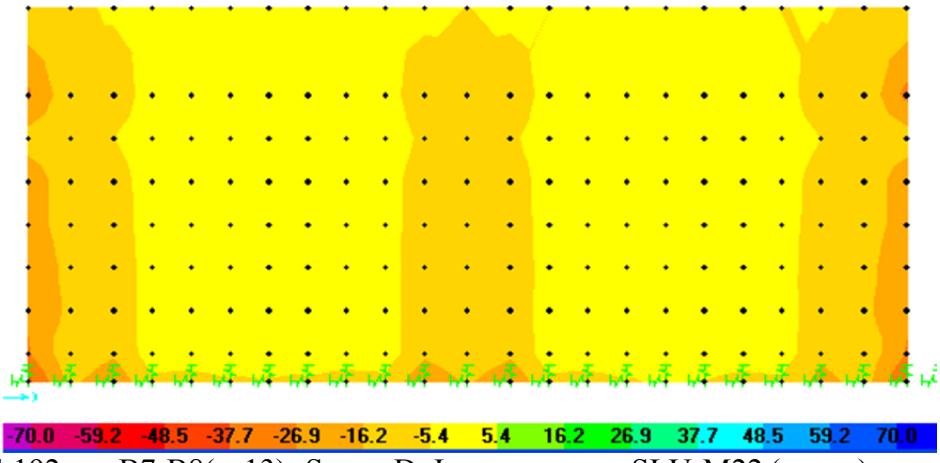


FIG. 4.192 - B7-B8(Q-13)-.SETTO D- INVILUPPO MIN SLU-M22 (SISMA)

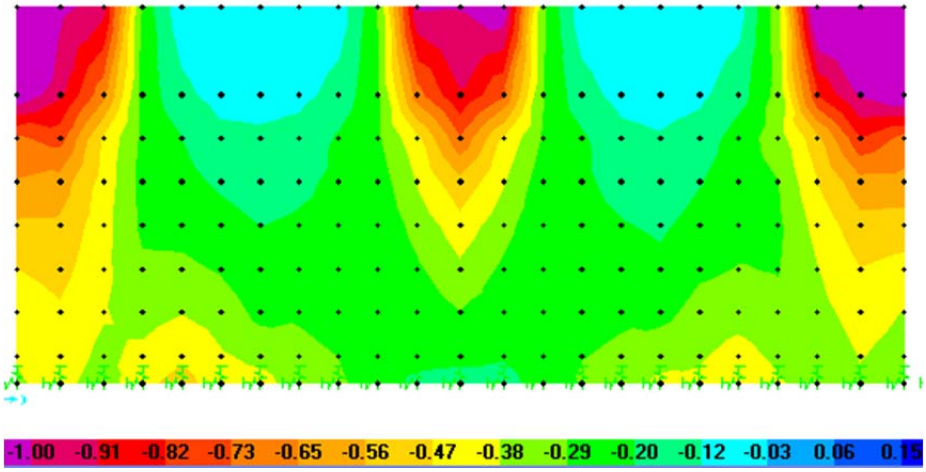


FIG. 4.193 - B7-B8(Q-13)-SETTO D- INVILUPPO MIN SLU-F22 (SISMA)

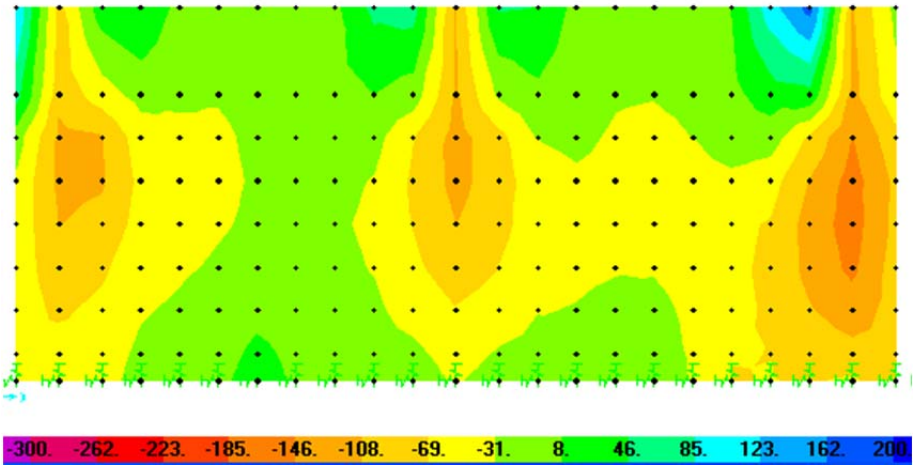


FIG. 4.194 - B7-B8(Q-13)-SETTO D- INVILUPPO MAX SLU-F22 (SISMA)

B7-B8(q-13)-Setto D - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=565mm^2(θ12/200mm), H1=0.18m, H2=0.07m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd} / M_{Sd}**
M_{min}/N_{max}	+30kN	-20kNm	-47kNm	**2.35**
M_{max}/N_{max}	+30kN	+25kNm	+47kNm	**1.88**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{max}/N_{max}	-30kN	+60kNm	+148kNm	**2.47**
Verticali correnti				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+180kN	-4kNm	-31kNm	**7.8**
M_{max}/N_{max}	+180kN	+12kNm	+31kNm	**2.58**

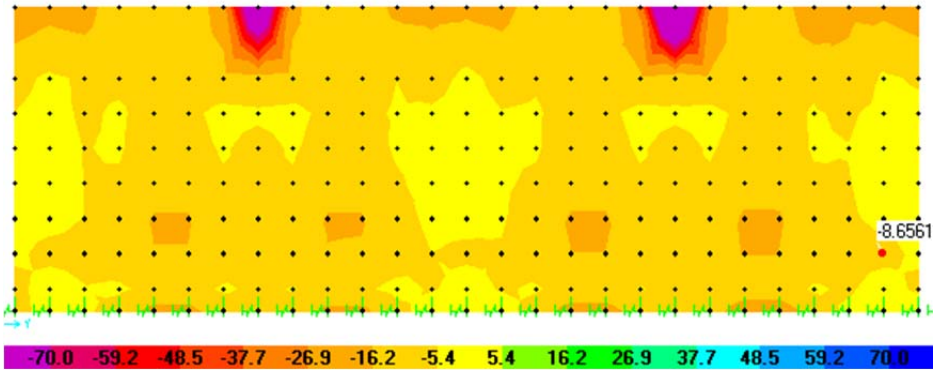


FIG. 4.195 - B7-B8(Q-13)-PARETE E- INVILUPPO MIN SLU-M22 (SISMA)

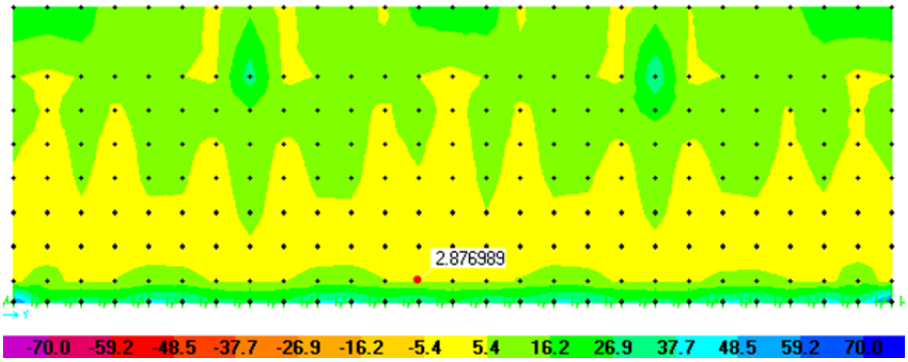


FIG. 4.196 - B7-B8(Q-13)-PARETE E - INVILUPPO MAX SLU-M22 (SISMA)

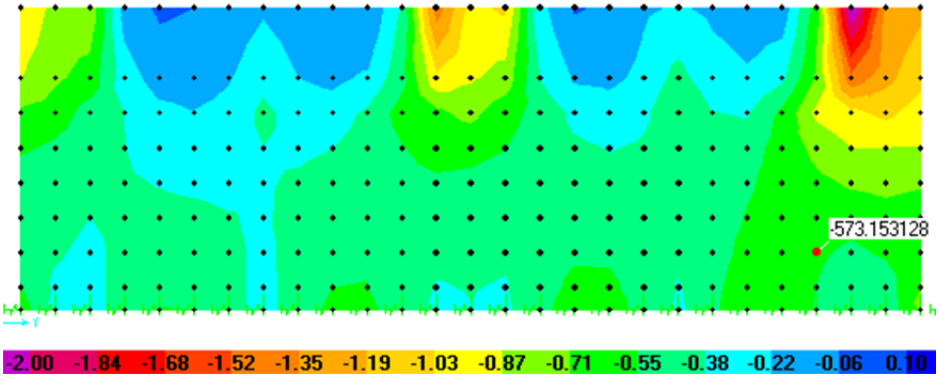


FIG. 4.197 - B7-B8(Q-13)-PARETE E - INVILUPPO MIN SLU-F22 (SISMA)

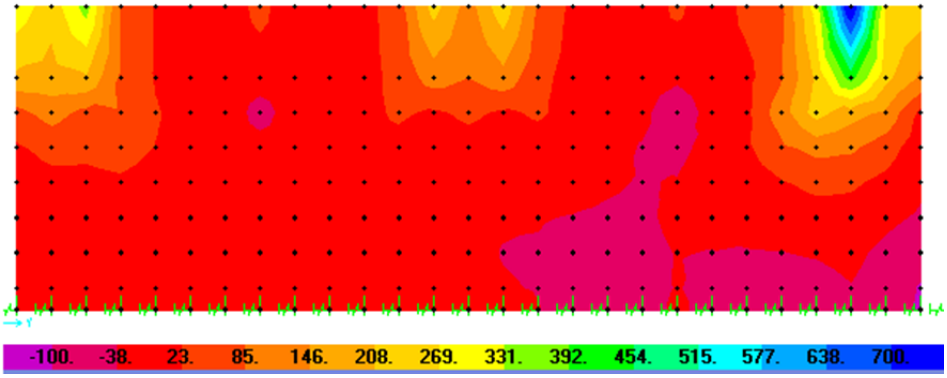


FIG. 4.198 - B7-B8(Q-13)-PARETE E - INVILUPPO MAX SLU-F22 (SISMA)

B7-B8(q-13)-Parete E - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m				
B=1.0m,H=0.5m,A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.425m, H2=0.075m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}/N_{max}	-10kN	-23kNm	-136kNm	**5.91**
M_{max}/N_{max}	-10kN	+40kNm	+84kNm	**2.10**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=452mm^2(θ14/400mm), H1=0.425m, H2=0.075m				
M_{min}/N_{max}	+200kN	-20kNm	**-25kNm**	**1.25**
M_{max}/N_{max}	+200kN	+20kNm	**+25kNm**	**1.25**

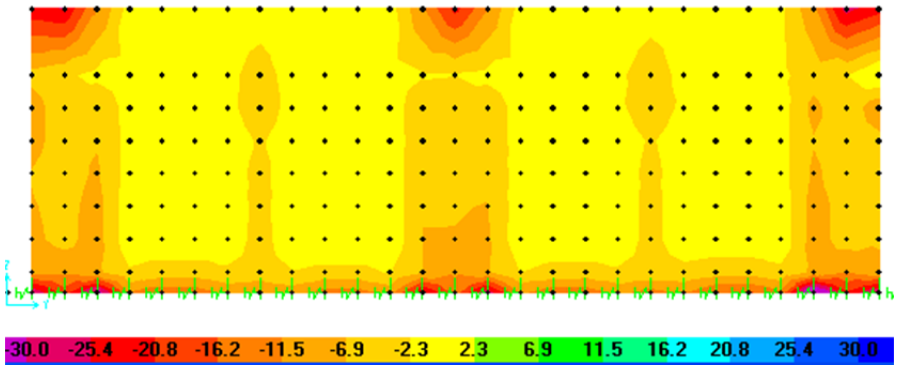


FIG. 4.199 - B7-B8(Q-13)-SETTO F- INVILUPPO MIN SLU-M22 (SISMA)

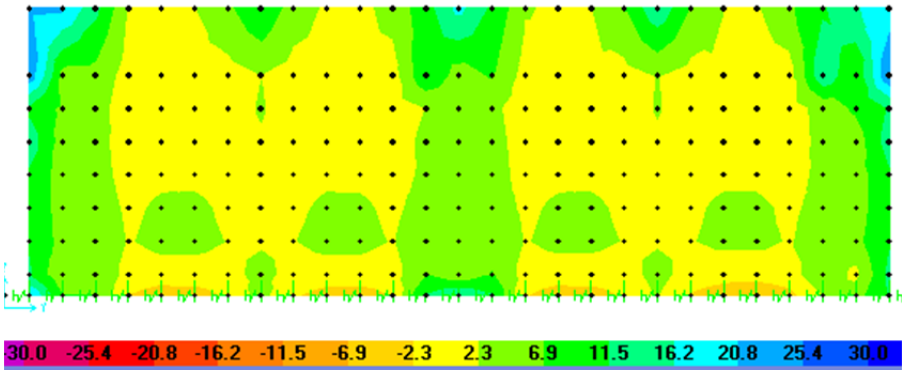


FIG. 4.200 - B7-B8(Q-13)-SETTO F- INVILUPPO MAX SLU-M22 (SISMA)

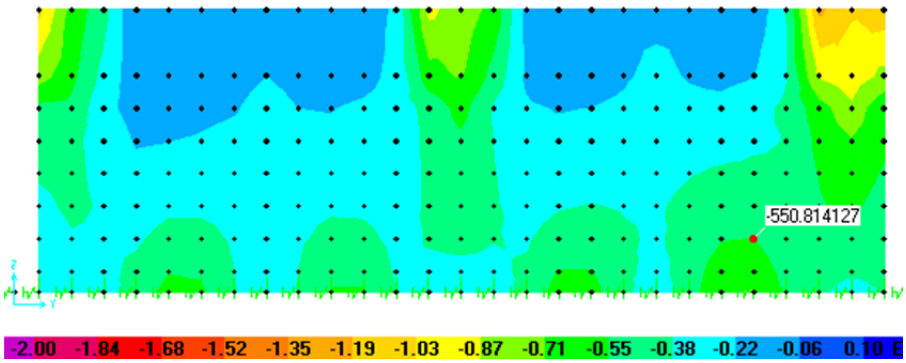


FIG. 4.201 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLU-F22 (SISMA)

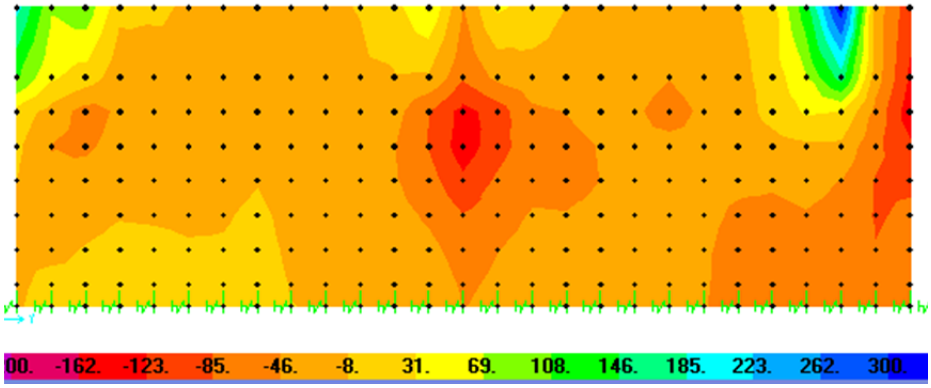


FIG. 4.202 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLU-F22 (SISMA)

B7-B8(q-13)-Setto F - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
M_{min}/N_{max}	+5kN	-16kNm	-65kNm	**4.06**
M_{max}/N_{max}	+5kN	+20kNm	+65kNm	**3.25**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m,H=0.50m,A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{max}/N_{max}	+5kN	-40kNm	+138kNm	**3.83**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+150kN	-5kNm	-34kNm	**6.8**
M_{max}/N_{max}	+150kN	+8kNm	+34kNm	**4.25**

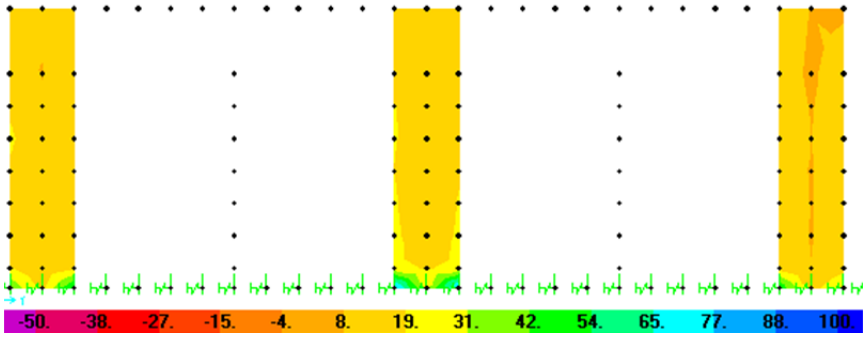


FIG. 4.203 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MAX SLU-M22 (SISMA)

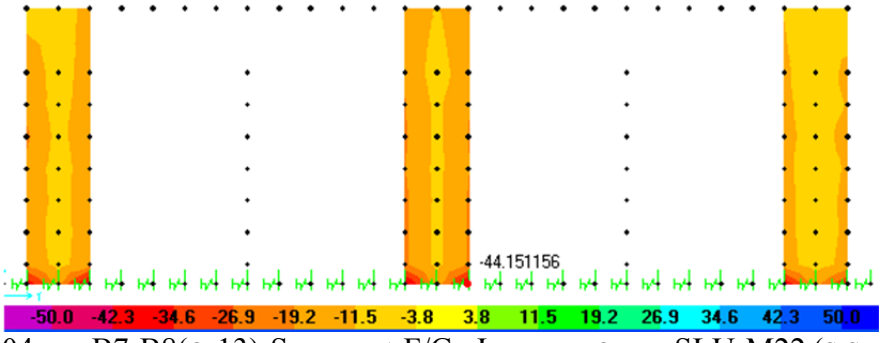


FIG. 4.204 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLU-M22 (SISMA)

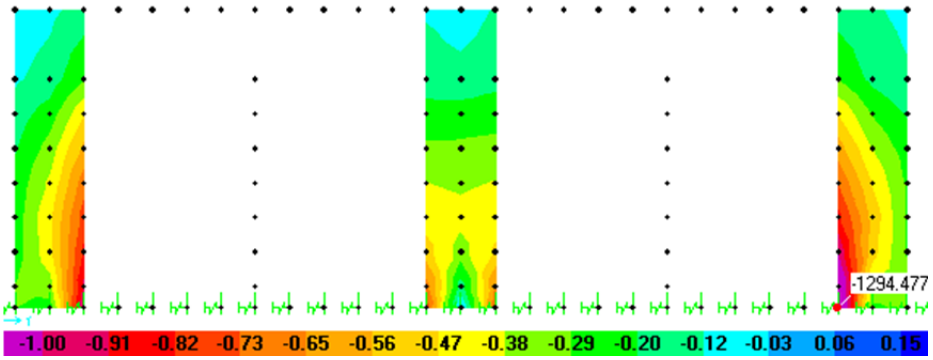


FIG. 4.205 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLU-F22 (SISMA)

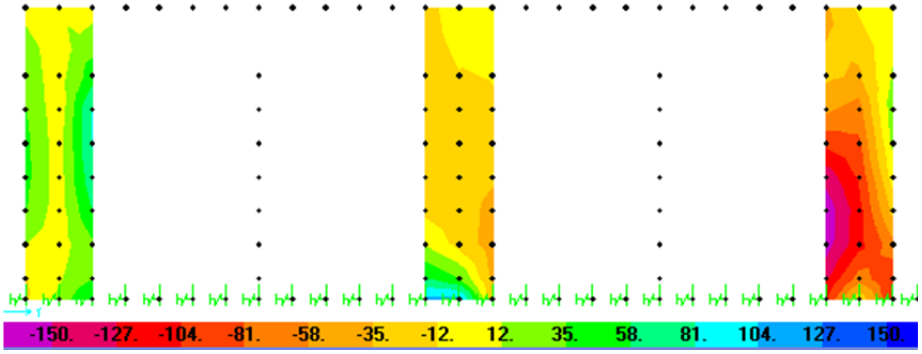


FIG. 4.206 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MAX SLU-F22 (SISMA)

B7-B8(q-13)-Setti fra F/G - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m - setti 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.431m, H2=0.069m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}/N_{max}	+100kN	-45kNm	-119kNm	**2.64**
M_{max}/N_{max}	+100kN	+55kNm	+119kNm	**2.16**

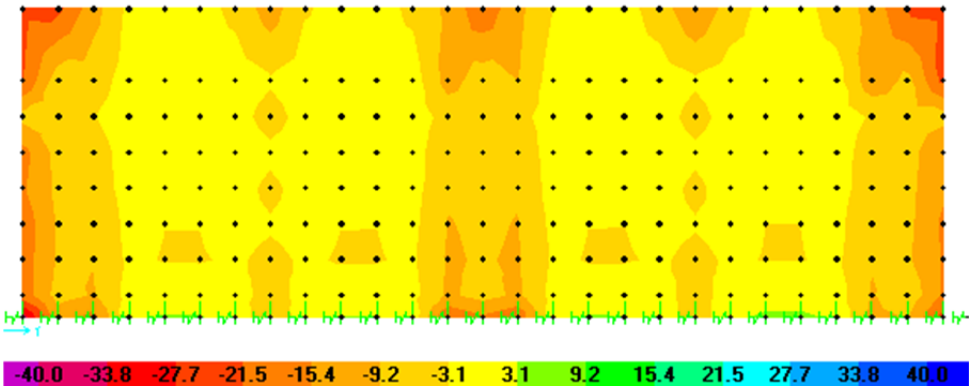


FIG. 4.207 - B7-B8(Q-13)-SETTI G - INVILUPPO MIN SLU-M22 (SISMA)

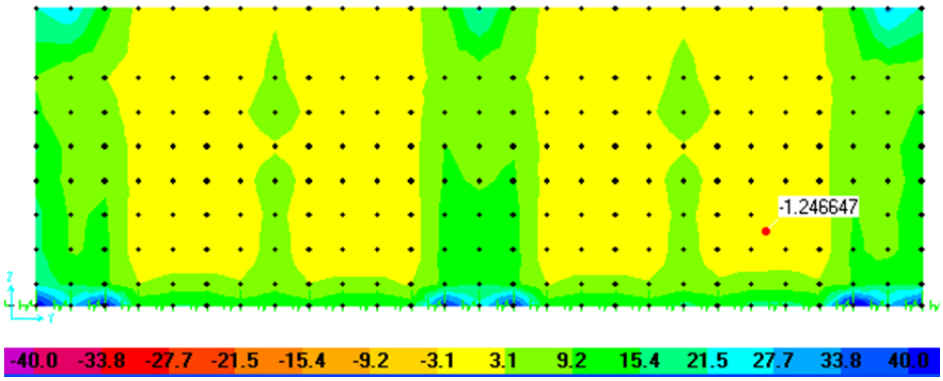


FIG. 4.208 - B7-B8(Q-13)-SETTI G - INVILUPPO MAX SLU-M22 (SISMA)

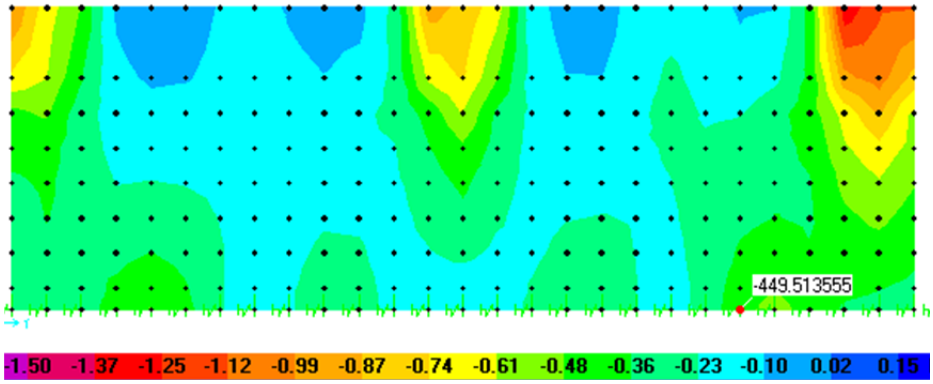


FIG. 4.209 - B7-B8(Q-13)-SETTI G - INVILUPPO MIN SLU-F22 (SISMA)

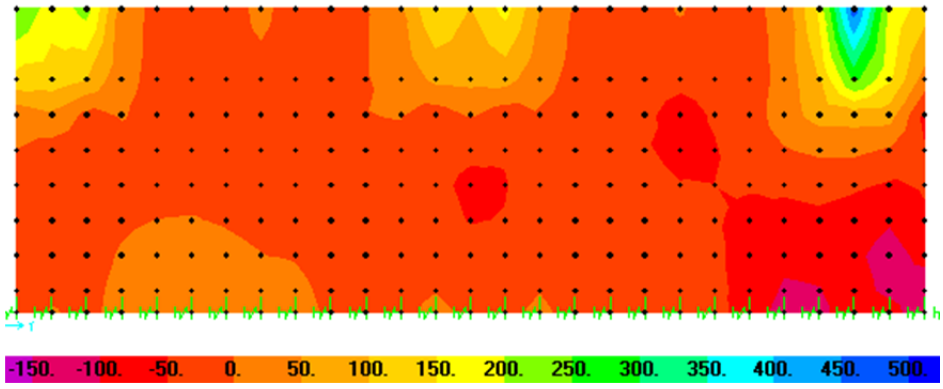


FIG. 4.210 - B7-B8(Q-13)-SETTI G - INVILUPPO MAX SLU-F22 (SISMA)

B7-B8(q-13)-Setto G - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd} / M_{Rd}**
N_{max}/M_{min}	+25kN	-16kNm	-64kNm	**4.0**
N_{max}/M_{max}	+25kN	+15kNm	+64kNm	**4.3**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
N_{max}/M_{min}	+0kN	-35kNm	-139kNm	**3.09**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
N_{max}/M_{min}	+110kN	-12kNm	-38kNm	**3.2**
N_{max}/M_{max}	+110kN	+10kNm	+38kNm	**3.8**

4.3.5 Verifiche ferri orizzontali agli SLE (combinazioni frequenti) B7-B8(q-13)

Di seguito si riportano le verifiche del cemento armato del fusto del cassone per gli stati limiti d'esercizio combinazioni frequenti.

Per la verifica dell'orditura orizzontale del fusto si considerano le combinazioni di carico d'esercizio riportate in precedenza.

Di seguito si riportano gli inviluppi dei momenti dele pareti e dei setti.

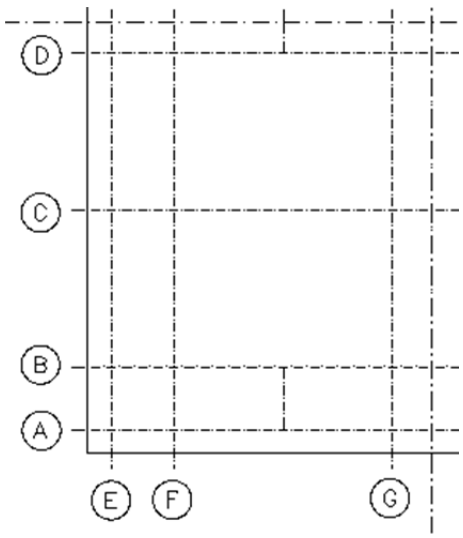


FIG. 4.211 - PIANTA CHIAVE PARETI E SETTI

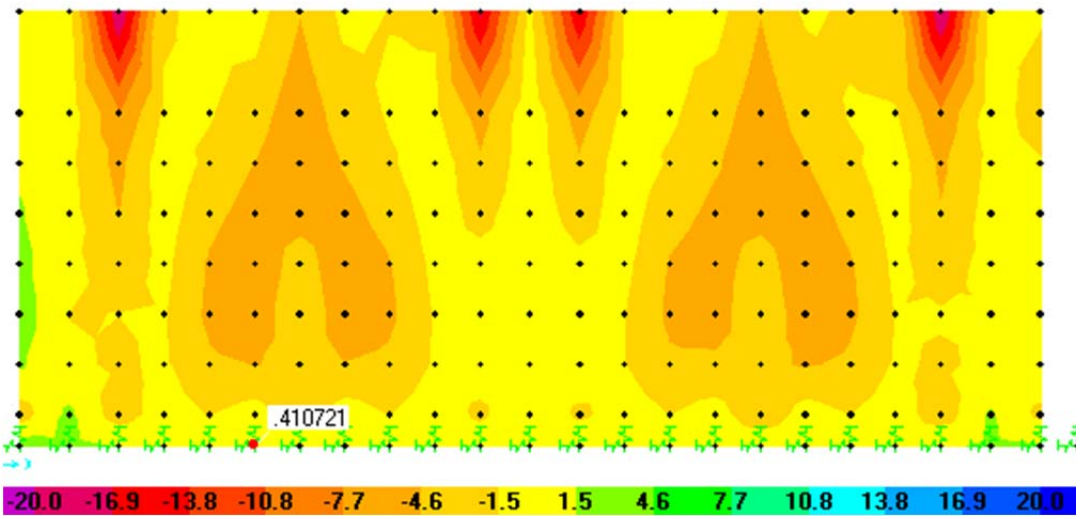


FIG. 4.212 - B7-B8(Q-13)-PARETE FILO A - INVILUPPO MIN SLE(FREQ.)-M11

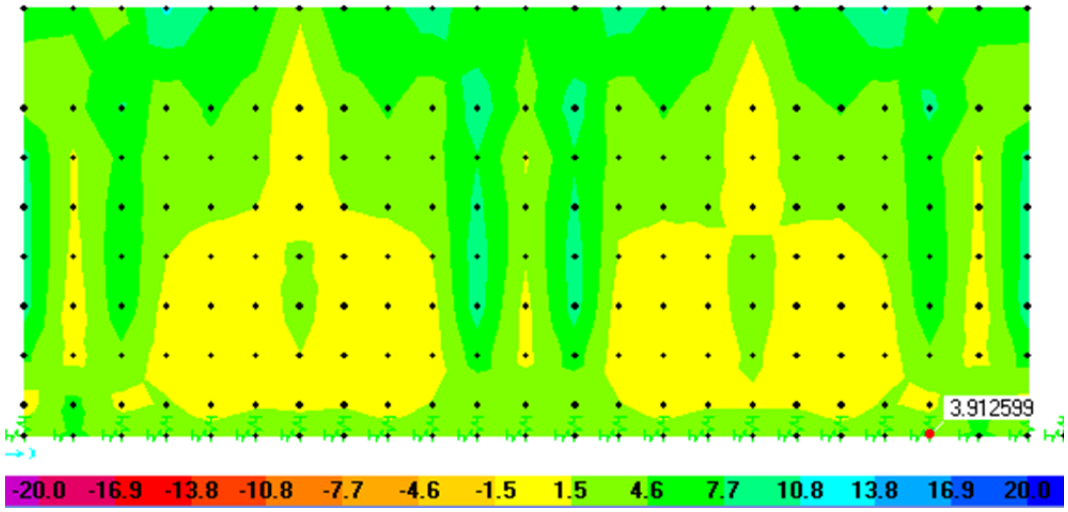


FIG. 4.213 - B7-B8(Q-13)-PARETE FILO A - INVILUPPO MAX SLE(FREQ.)-M11

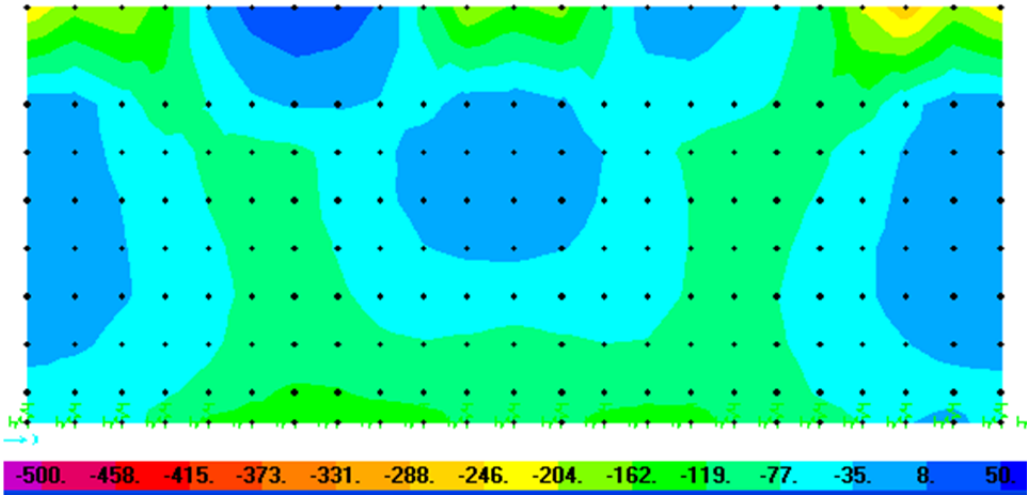


FIG. 4.214 - B7-B8(Q-13)-PARETE FILO A - INVILUPPO MIN SLE(FREQ.)-F11

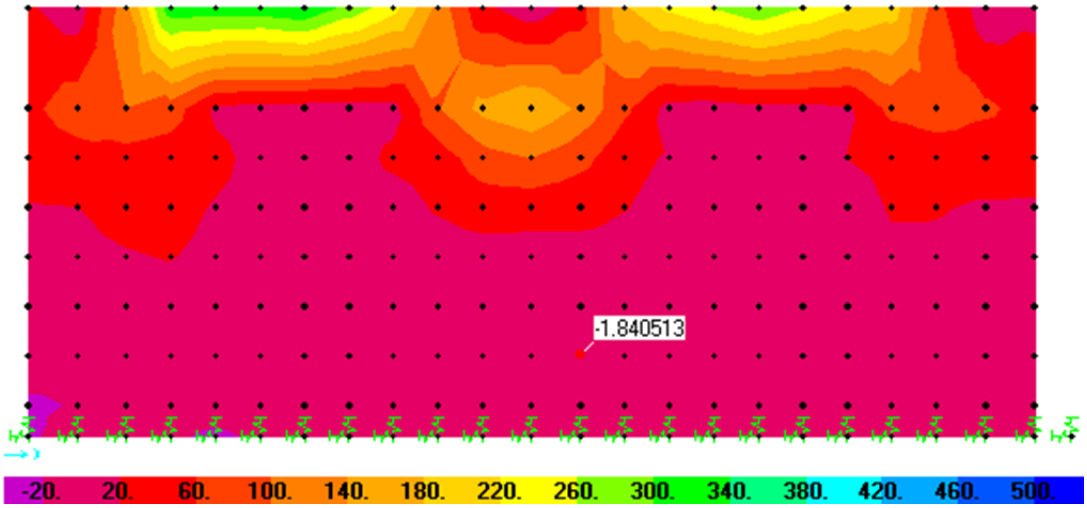


FIG. 4.215 - B7-B8(Q-13)-PARETE FILO A - INVILUPPO MAX SLE(FREQ.)-F11

B7-B8(q-13)-Parete A - ferri orizzontali - Verifiche agli SLE(comb. frequenti)					
Da 0 a +6.00					
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
M_{min}	+140kN(tens)	-7kNm	**-**	**140**	**0.145**
M_{max}	+140kN	+9kNm	**-**	**149**	**0.146**
Da +6.00					
B=1.0m,H=0.5m,A1=A2=1829mm^2(θ22/250+ θ14/500), H1=0.439m, H2=0.061m					
N_{max}	+285kN(tens.)	-20kNm	**-**	**105**	**0.102**

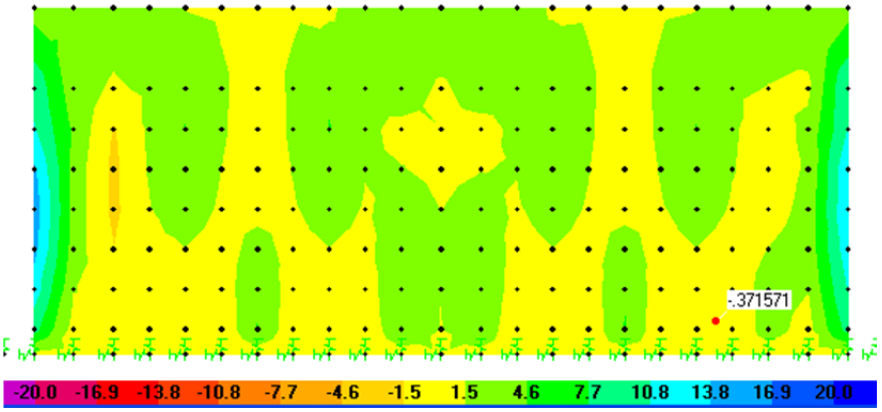


FIG. 4.216 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MAX SLE(FREQ.)-M11

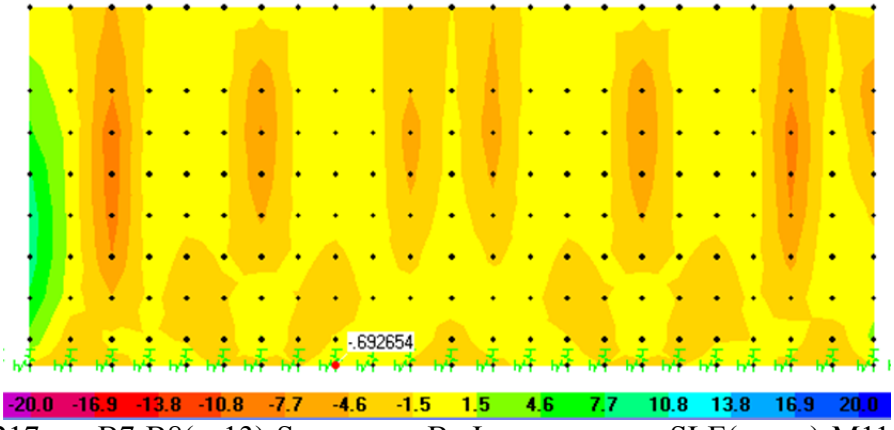


FIG. 4.217 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MIN SLE(FREQ.)-M11

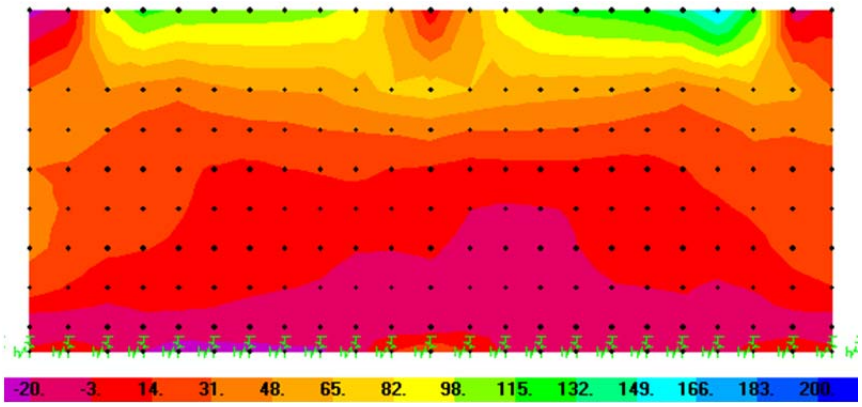


FIG. 4.218 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MAX SLE(FREQ.)-F11

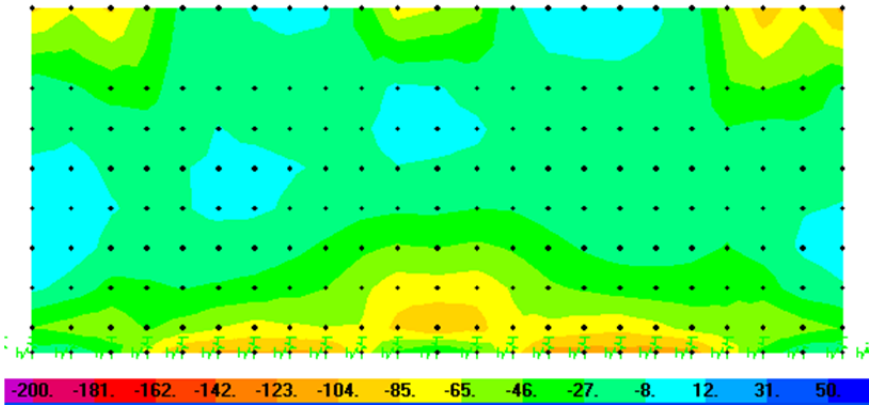


FIG. 4.219 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MIN SLE(FREQ)-F11

B7-B8 (q-13) - SettoB - ferri orizzontali - Verifiche agli SLE(comb. freq.)					
da 0 a +6.00					
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
M_{min}	+70kN(tens)	-10kNm	**2.0**	**118**	**0.093**
M_{max}	+70kN	+2kNm	**-**	**61**	**0.065**
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m					
M_{min}	+70kN	+14kNm	**0.5**	**112**	**0.103**
da +6.00					
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m					
N_{max}	+140kN	-10kNm	**-**	**93**	**0.101**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m					
N_{max}	+140kN	-10kNm	**1.3**	**160**	**0.106**

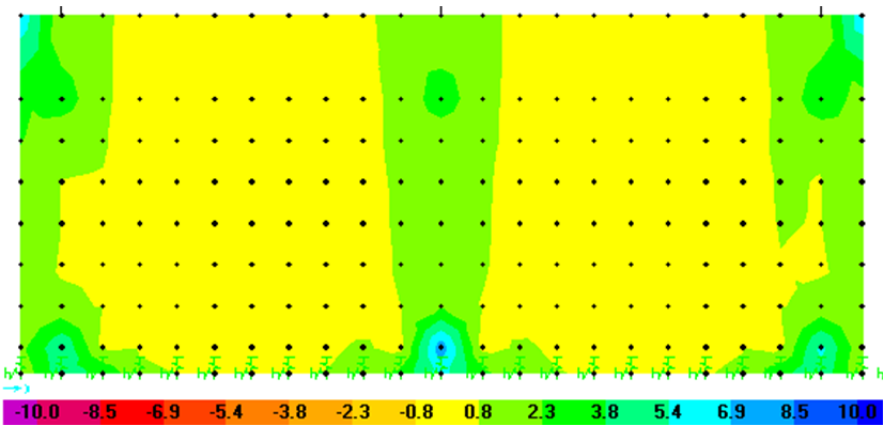


FIG. 4.220 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MAX SLE(FREQ)-M11

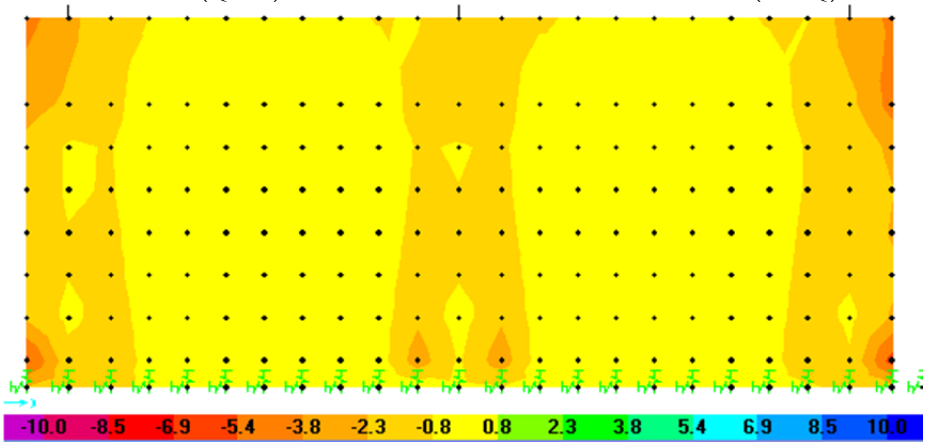


FIG. 4.221 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MIN SLE(FREQ)-M11

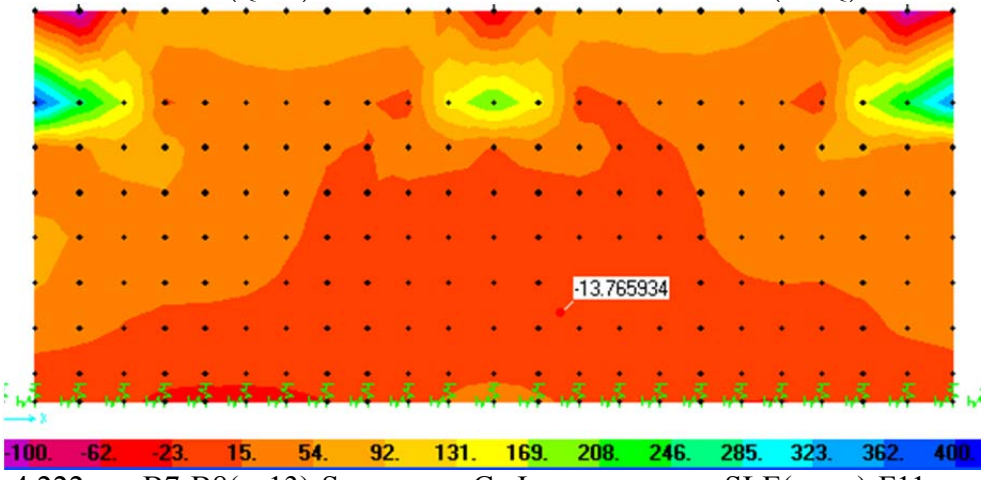


FIG. 4.222 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MAX SLE(FREQ)-F11

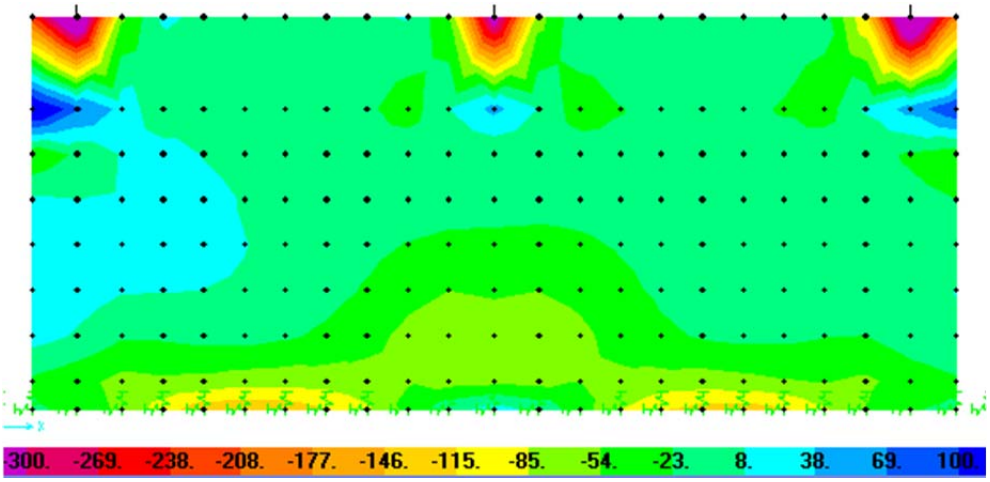


FIG. 4.223 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MIN SLE(FREQ)-F11

B7-B8(q-13)-SettoC-ferri orizzontali-Verifiche agli SLE(comb. freq.)					
da 0 a +6.00					
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250mm), H1=0.189m, H2=0.061m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	+100kN(tens.)	-6kNm	**0.7**	**60**	**0.045**
N_{max}/M_{max}	+100kN	+1kNm	**-**	**70**	**0.090**
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m					
N_{max}/M_{min}	+120kN	-6kNm	**-**	**120**	**0.125**
da +6.00					
B=1.0m,H=0.5m,A1=A2=1524mm^2(θ22/250), H1=0.439m, H2=0.061m,					
N_{max}	+360kN	-6kNm	**-**	**146**	**0.178**
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250), H1=0.189m, H2=0.061m					
N_{max}	+160kN	+5kNm	**-**	**77**	**0.082**

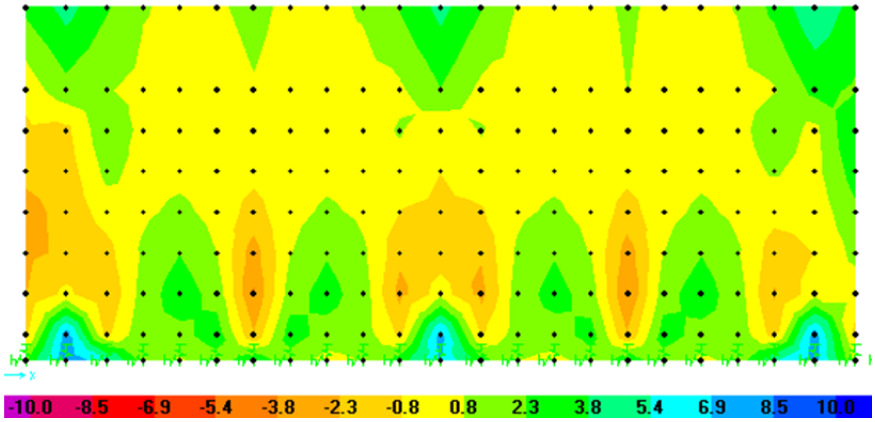


FIG. 4.224 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MAX SLE(FREQ.)-M11

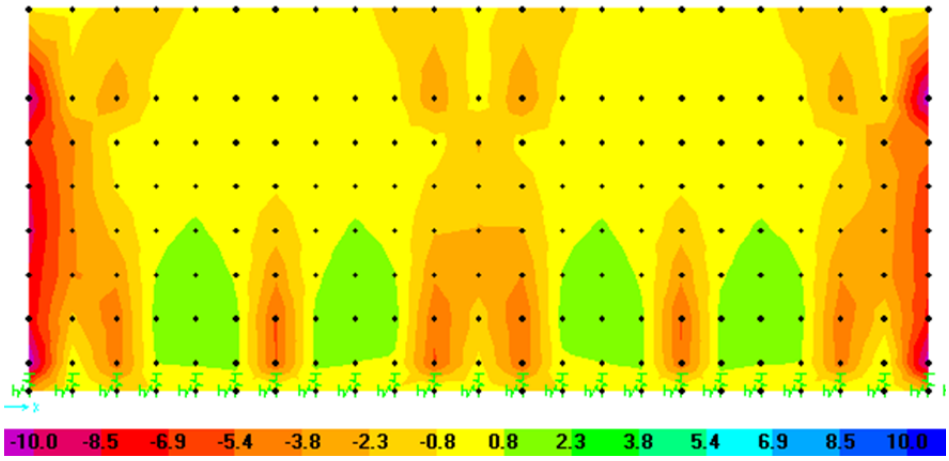


FIG. 4.225 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MIN SLE(FREQ.)-M11

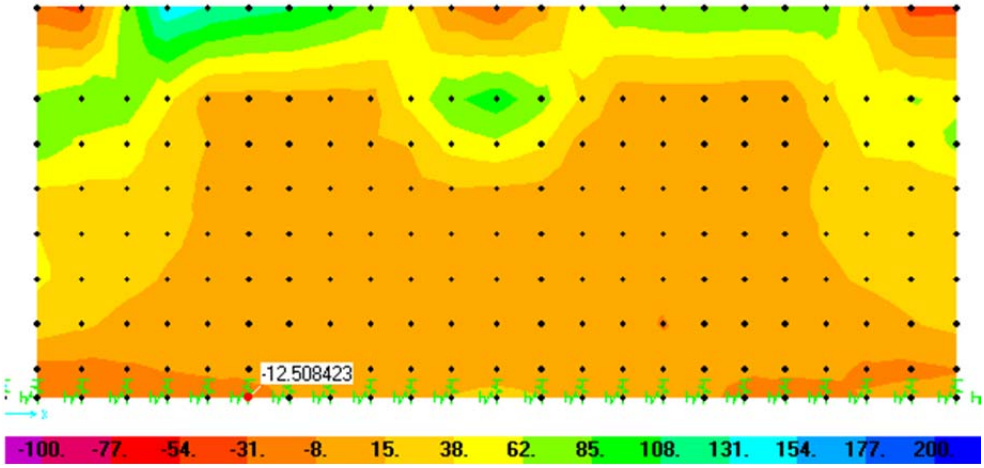


FIG. 4.226 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MAX SLE(FREQ.)-F11

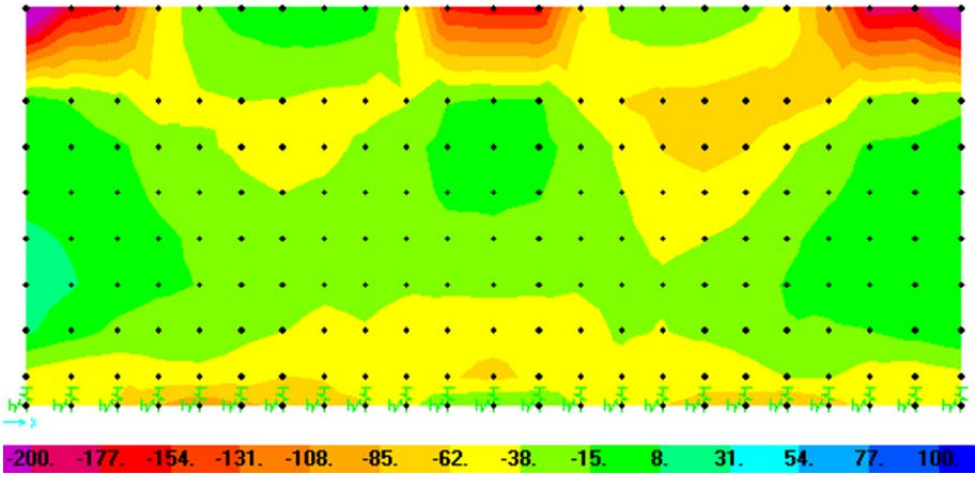


FIG. 4.227 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MIN SLE(FREQ.)-F11

B7-B8(q-13)-Setto D - ferri orizzontali - Verifiche agli SLE(comb. freq.)					
da 0 a +6.00					
B=1.0m,H=0.25m,A1=A2=534mm^2(θ12/500mm+ θ14/500mm), H1=0.193m, H2=0.057m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	+50kN(tens.)	-5kNm	**1.2**	**103**	**0.086**
N_{max}/M_{max}	+50kN	+8kNm	**1.9**	**134**	**0.110**
B=1.0m,H=0.5m,A1=A2=710mm^2(θ16/500mm+ θ14/500mm), H1=0.442m, H2=0.058m in corrispondenza di parete E					
N_{max}/M_{min}	+75kN	-11kNm	**-**	**91**	**0.095**
N_{max}/M_{max}	+75kN	+8kNm	**-**	**81**	**0.084**
da +6.00					
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m					
N_{max}/M_{min}	+120kN	-11kNm	**-**	**86**	**0.089**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m					
N_{max}/M_{max}	+120kN	+5kNm	**0.4**	**94**	**0.079**

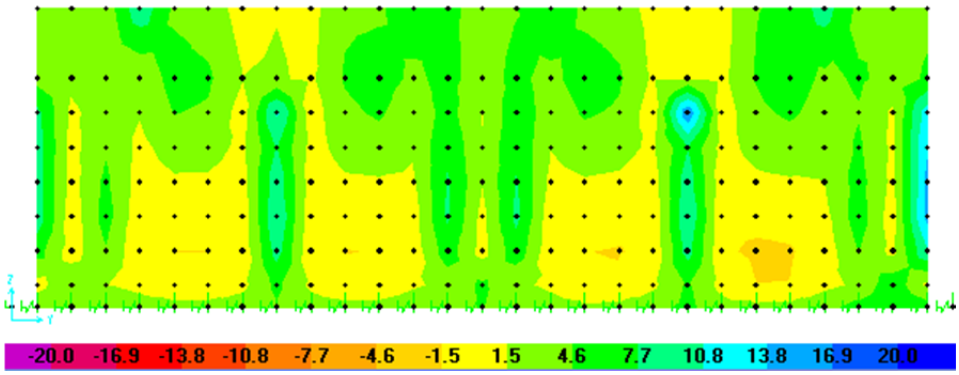


FIG. 4.228 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MAX SLE(FREQ)-M11

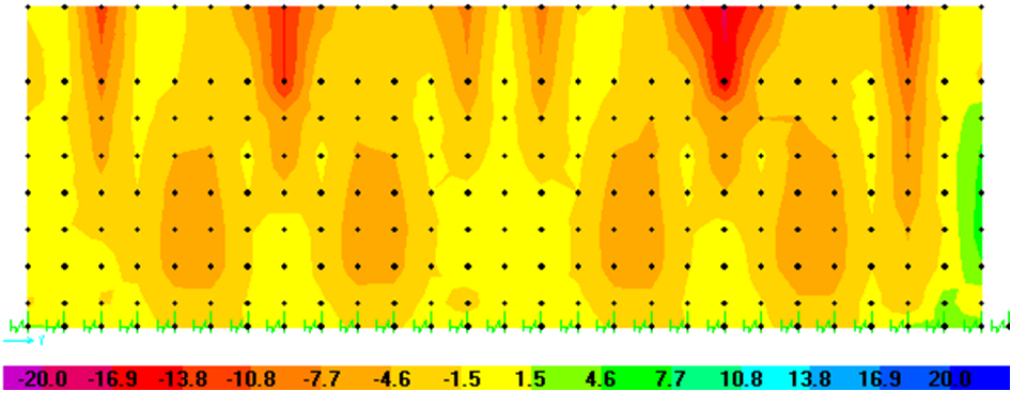


FIG. 4.229 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MIN SLE(FREQ)-M11

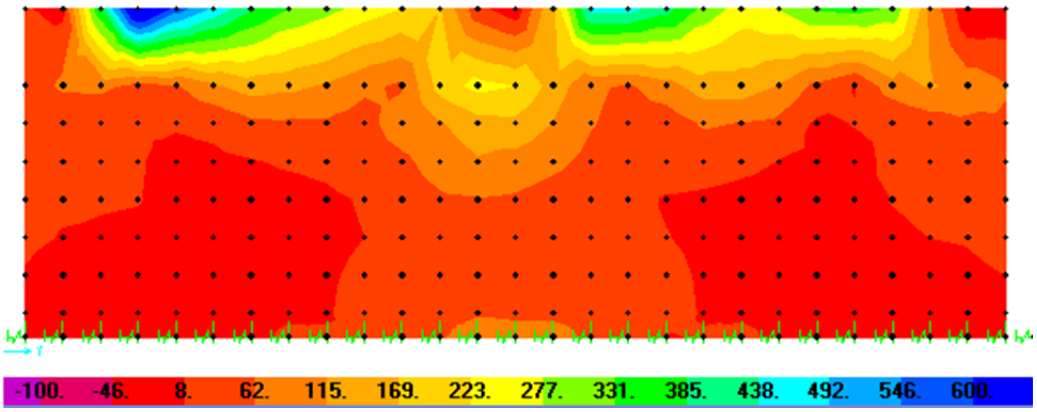


FIG. 4.230 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MAX SLE(FREQ)-F11

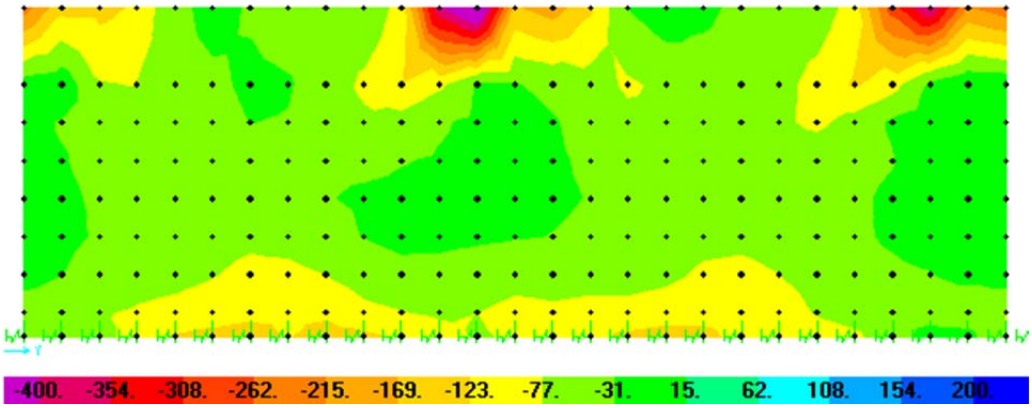


FIG. 4.231 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MIN SLE(FREQ)-F11

B7-B8(q-13)-Parete E - ferri orizzontali - Verifiche agli SLE(comb. freq.)					
Da 0 a +6.00					
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m					
Combinazione	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	+230kN	-10kNm	**-**	**136**	**0.166**
N_{max}/M_{max}	+230kN	+12kNm	**-**	**141**	**0.166**
Da +6.00					
B=1.0m,H=0.5m,A1=A2=1884mm^2(θ20/250+ θ20/500mm), H1=0.440m, H2=0.06m					
N_{max} /M_{max}	+570kN	-17kNm	**-**	**172**	**0.175**

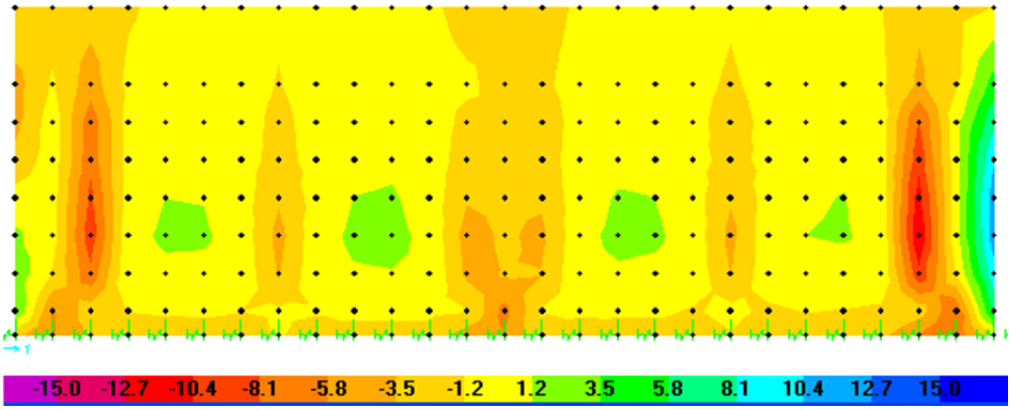


FIG. 4.232 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLE(FREQ)-M11

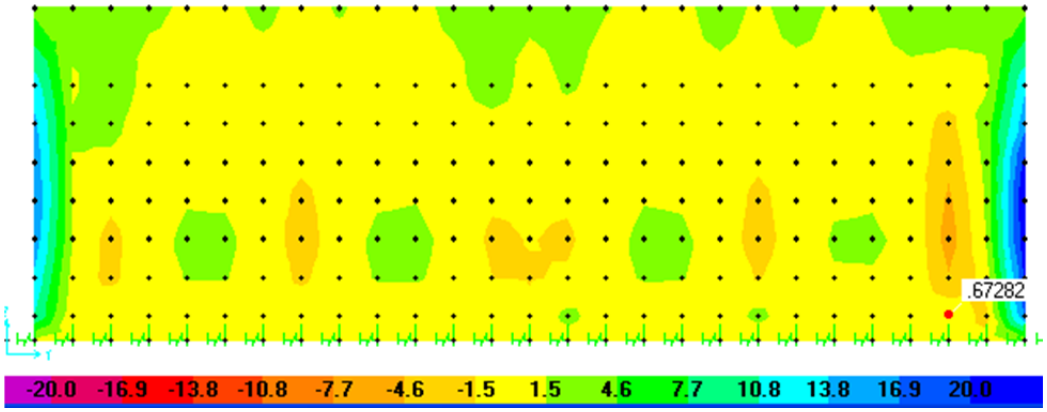


FIG. 4.233 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLE(FREQ)-M11

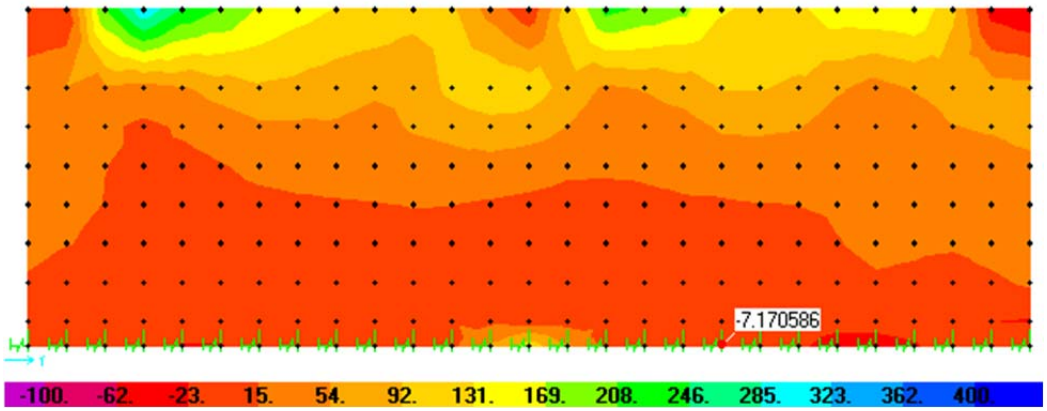


FIG. 4.234 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLE(FREQ)-F11

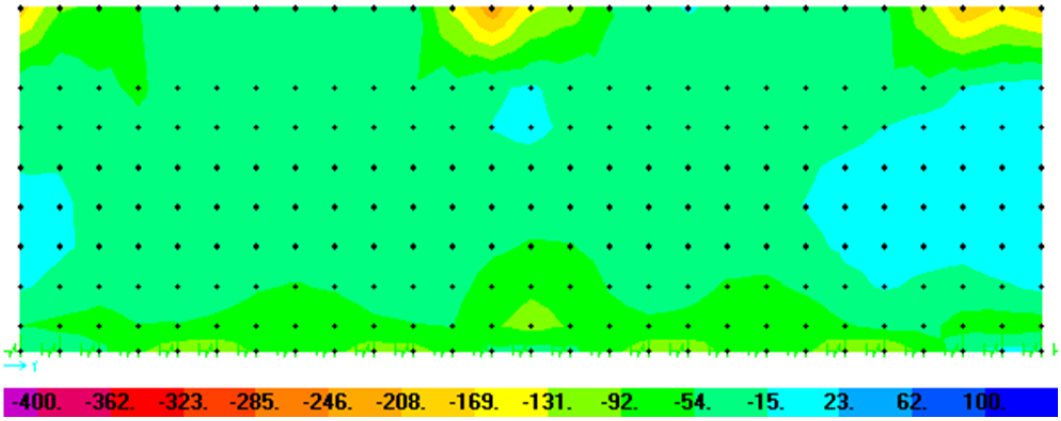


FIG. 4.235 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLE(FREQ)-F11

B7-B8(q-13)-Setto F - ferri orizzontali - Verifiche agli SLE(comb. freq.)					
Da 0 a +6.00					
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m in corrispondenza della parete A					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	+120kN	-12kNm	**-**	**145**	**0.133**
N_{max}/M_{max}	+120kN	+20kNm	**0.4**	**177**	**0.162**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m					
N_{max}/M_{min}	+120kN	-12kNm	**2.6**	**215**	**0.169**
N_{max}/M_{max}	+120kN	+12kNm	**2.6**	**215**	**0.169**
Da +6.00					
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m					
N_{max}	+200kN	-10kNm	**1.2**	**165**	**0.138**

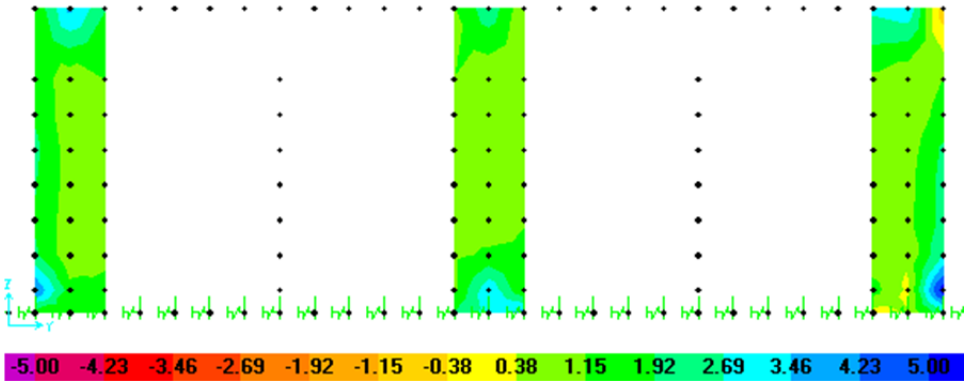


FIG. 4.236 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MAX SLE(FREQ)-M11

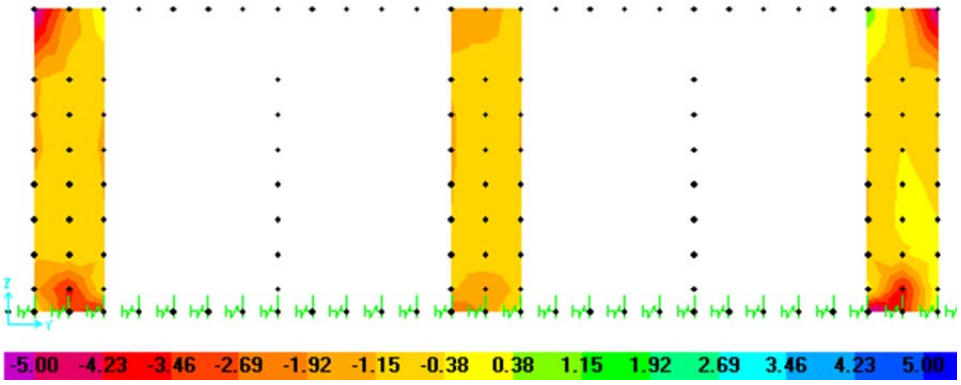


FIG. 4.237 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLE(FREQ)-M11

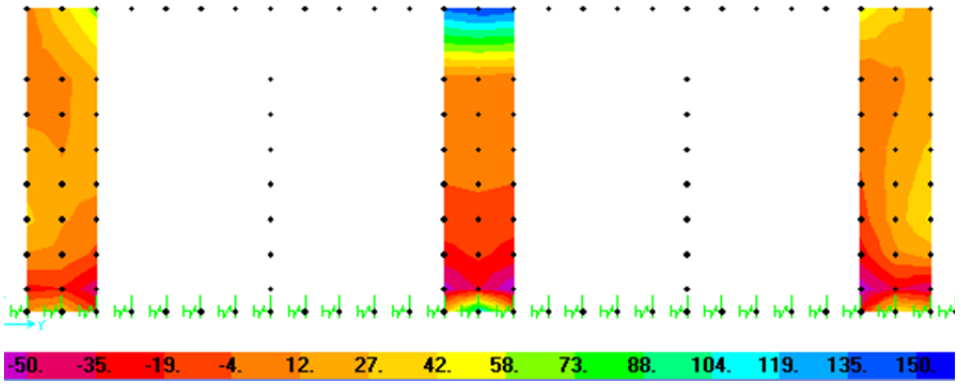


FIG. 4.238 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MAX SLE(FREQ)-F11

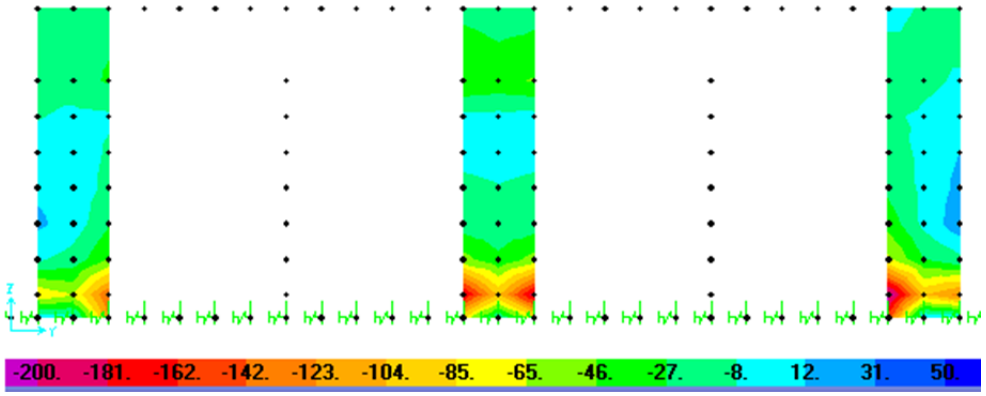


FIG. 4.239 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLE(FREQ)-F11

B7-B8(q-13)-Setti fra F/G - ferri orizzontali - Verifiche agli SLE(comb. freq.)
Da 0 a +6.00
B=1.0m,H=0.5m,A1=A2=452mm^2(θ12/250mm), H1=0.444m, H2=0.056m in

corrispondenza della parete A					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	+5kN	-4kNm	**0.3**	**26**	**0.022**
N_{max}/M_{max}	+5kN	+5kNm	**0.3**	**31**	**0.027**
Da +6.00					
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m					
N_{max}	+130kN	-4kNm	-	**120**	**0.136**

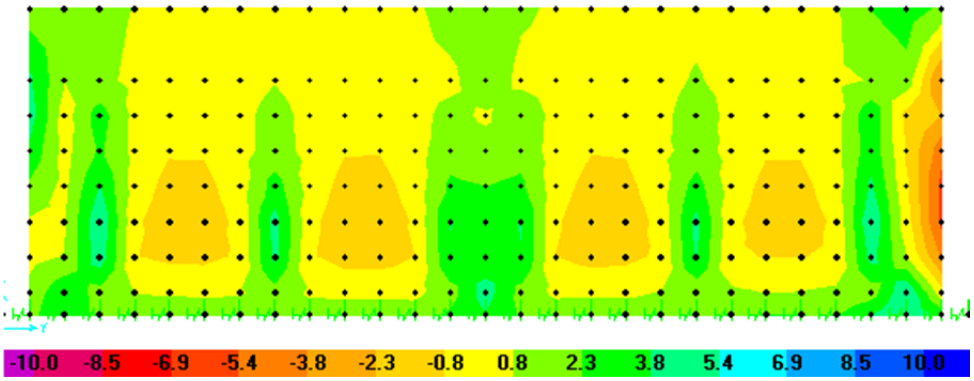


FIG. 4.240 - B7-B8(Q-13)-SETTO G - INVILUPPO MAX SLE(FREQ)-M11

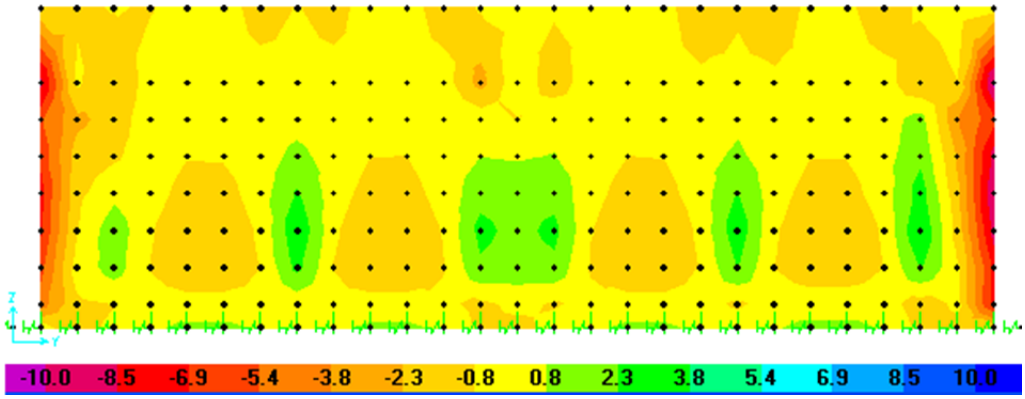


FIG. 4.241 - B7-B8(Q-13)-SETTO G - INVILUPPO MIN SLE(FREQ)-M11

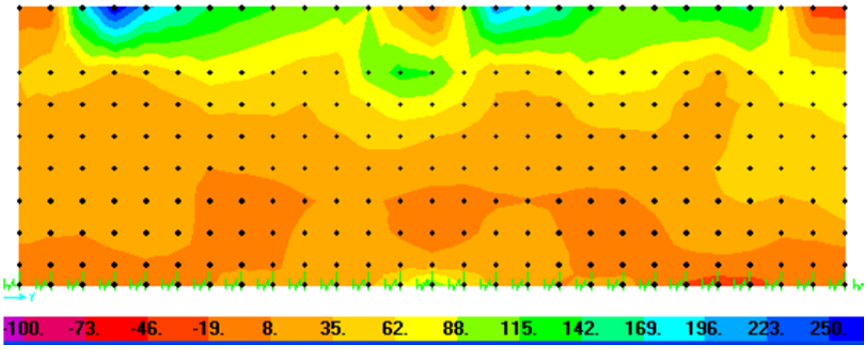


FIG. 4.242 - B7-B8(Q-13)-SETTO G - INVILUPPO MAX SLE(FREQ)-F11

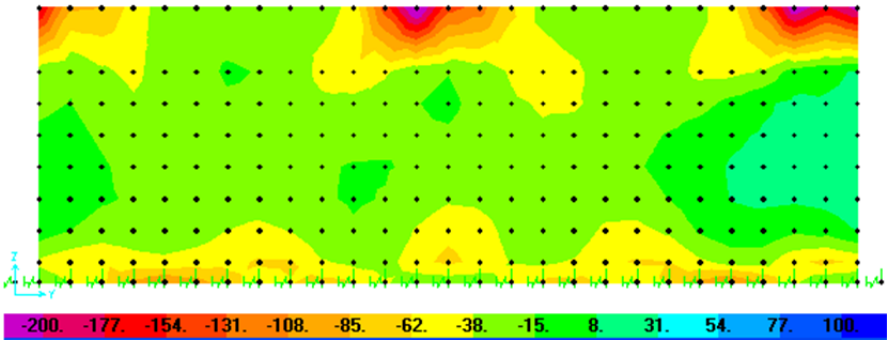


FIG. 4.243 - B7-B8(Q-13)-SETTO G - INVILUPPO MIN SLE(FREQ)-F11

B7-B8(q-13)-Setto G - ferri orizzontali - Verifiche agli SLE(comb.freq.)					
Da 0 a +6.00					
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	+100kN	-10kNm	**-**	**121**	**0.111**
N_{max}/M_{max}	+100kN	+5kNm	**-**	**100**	**0.104**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m					
N_{max}/M_{min}	+100kN	-8kNm	**1.6**	**162**	**0.128**
N_{max}/M_{max}	+100kN	+5kNm	**0.7**	**135**	**0.109**
Da +6.00					
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m					
N_{max}	+200kN	-10kNm	**1.3**	**208**	**0.171**

4.3.6 Monconi di ripresa e ferri verticali fusto agli SLE (freq.)-B7-B8(q.-13)

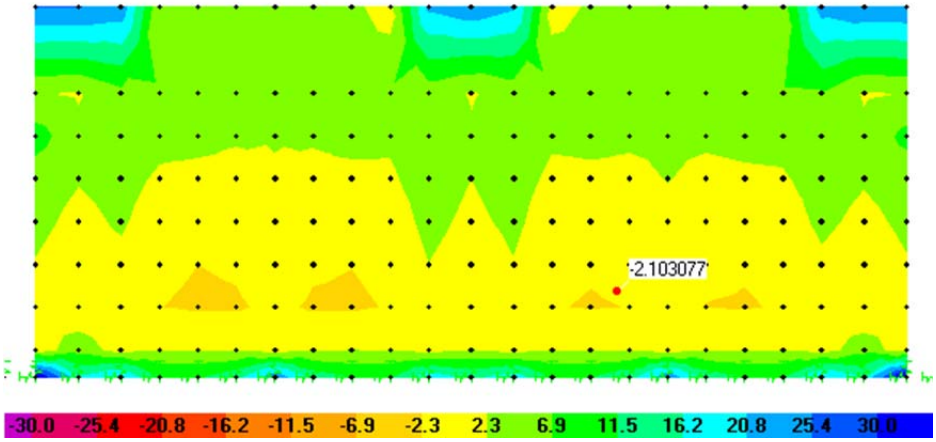


FIG. 4.244 - B7-B8(Q-13)-PARETE A - INVILUPPO MAX SLE(FREQ)-M22

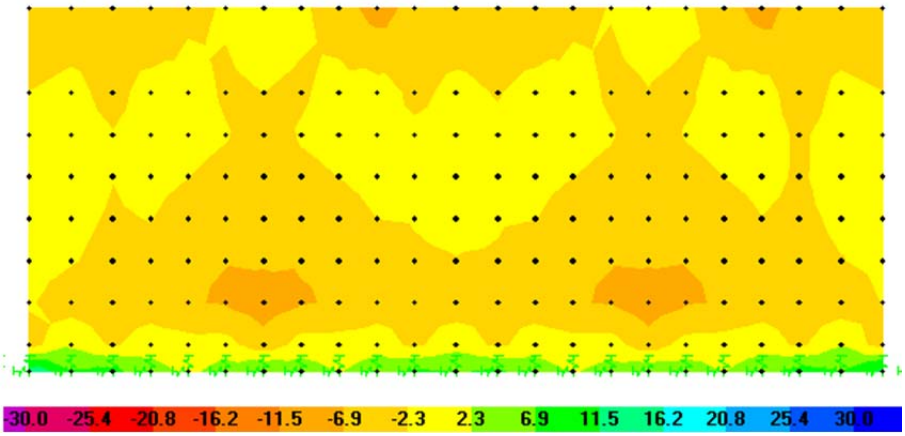


FIG. 4.245 - B7-B8(Q-13)-PARETE A - INVILUPPO MIN SLE(FREQ)-M22

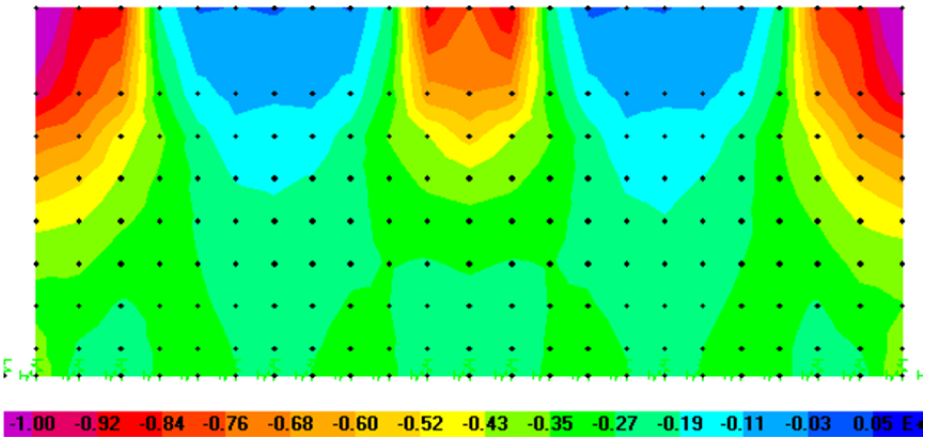


FIG. 4.246 - B7-B8(Q-13)-PARETE A - INVILUPPO MIN SLE(FREQ)-F22

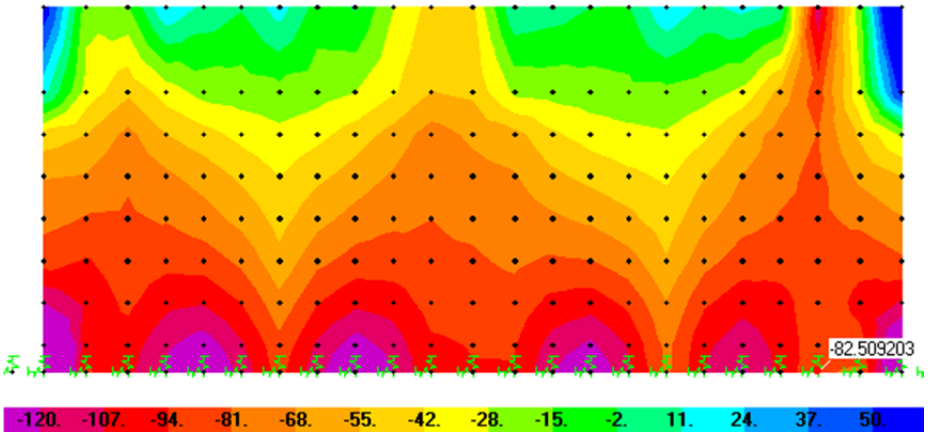


FIG. 4.247 - B7-B8(Q-13)-PARETE A- INVILUPPO MAX SLE(FREQ)-F22

B7-B8(q-13)-Parete A - ferri verticali - Verifiche agli SLE(comb. freq.)					
Monconi di ripresa - L=3.0m					
B=1.0m H=0.5m A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
M_{min}/N_{max}	-78kN	-10kNm	**0.4**	**1**	**0.001**
M_{max}/N_{max}	-78kN	+23kNm	**1.4**	**47**	**0.043**
Verticali correnti (esclusi pilastri)					
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m					
M_{min}/N_{max}	+15kN	-11kNm	**0.8**	**89**	**0.082**
M_{max}/N_{max}	+15kN	+15kNm	**1.1**	**114**	**0.104**

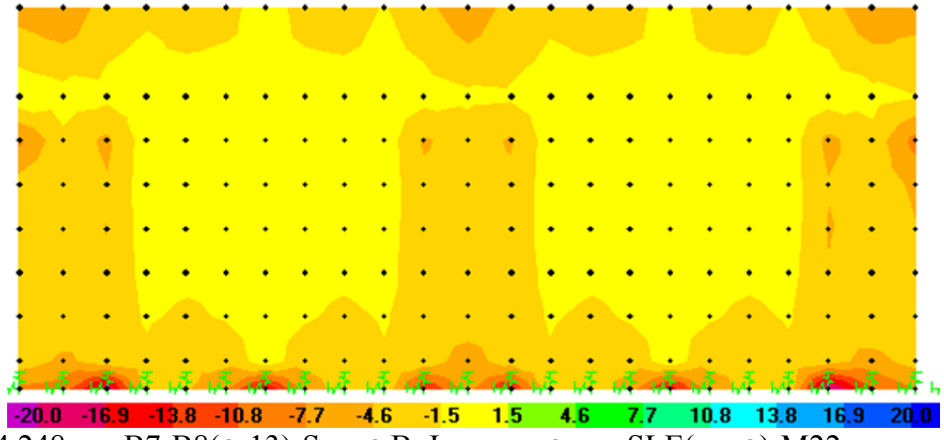


FIG. 4.248 - B7-B8(Q-13)-SETTO B- INVILUPPO MIN SLE(FREQ)-M22

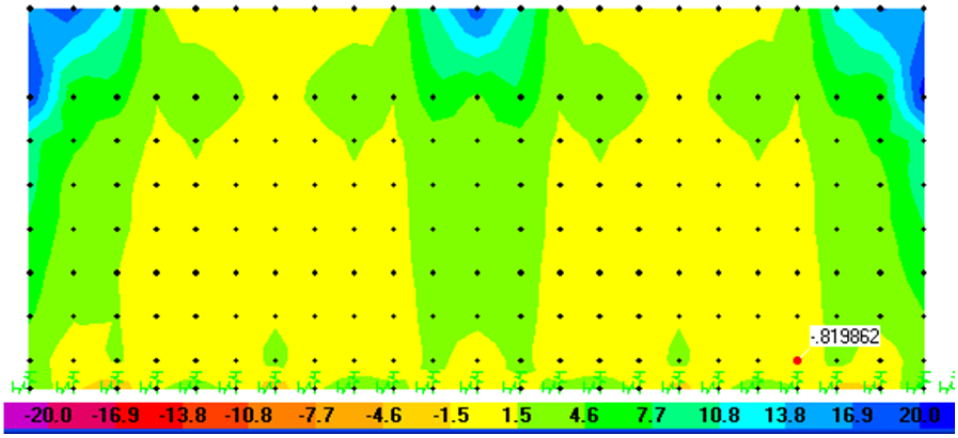


FIG. 4.249 - B7-B8(Q-13)-SETTO B- INVILUPPO MAX SLE(FREQ)-M22

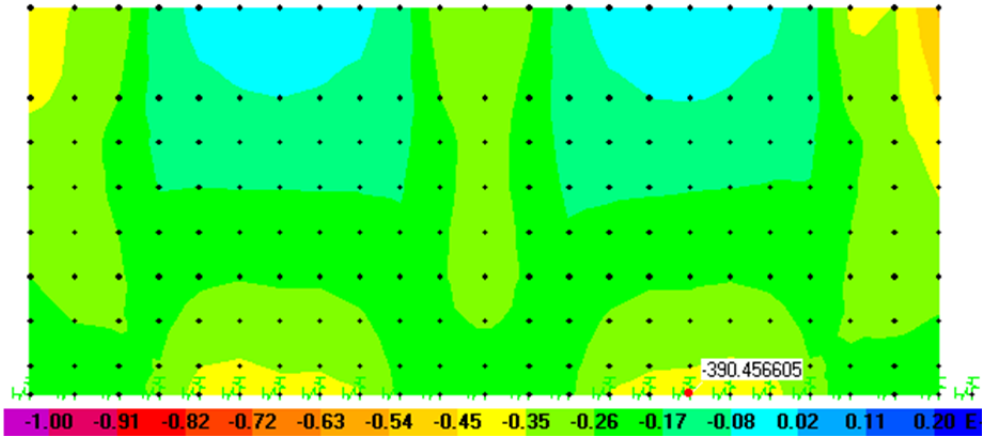


FIG. 4.250 - B7-B8(Q-13)-.SETTO B- INVILUPPO MIN SLE(FREQ)-F22

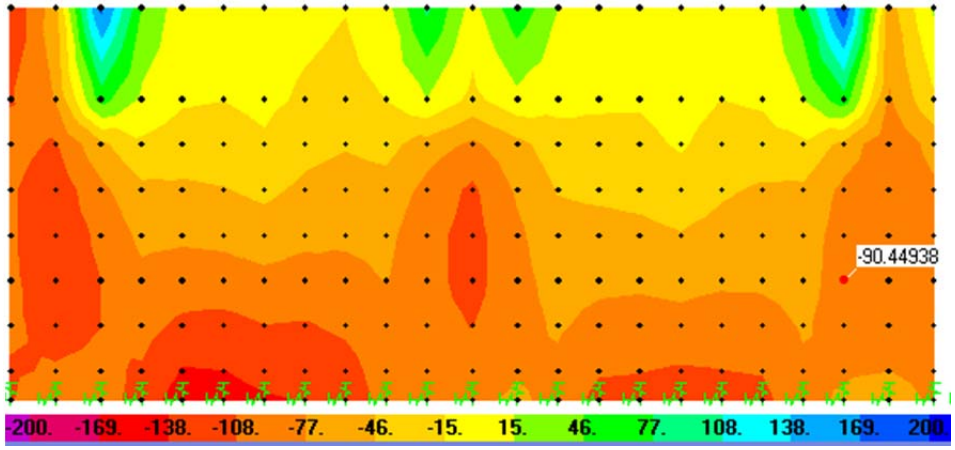


FIG. 4.251 - B7-B8(Q-13)-.SETTO B- INVILUPPO MAX SLE(FREQ)-F22

B7-B8(q-13)-Setto B - ferri verticali - Verifiche agli SLE (Comb. freq.)					
Monconi di ripresa - L=3.0m - setti 25cm					
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
M_{min}/N_{max}	-80kN	-15kNm	**3.2**	**60**	**0.048**
M_{max}/N_{max}	-80kN	+3kNm	**0.6**	-	-
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm					
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m					
M_{min}/N_{max}	-60kN	-20kNm	**1.0**	**27**	**0.029**
Verticali correnti (escluso pilastri)					
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.070m					
M_{min}/N_{max}	+80kN	-3kNm	**0.7**	**111**	**0.098**
M_{max}/N_{max}	+80kN	+6kNm	**1.7**	**141**	**0.122**

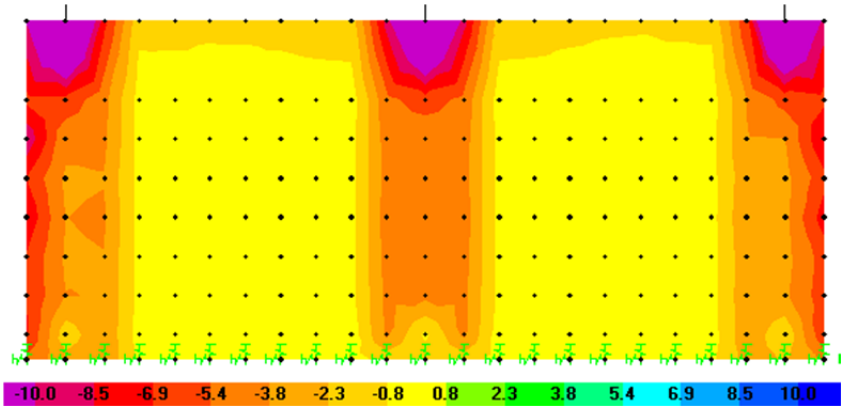


FIG. 4.252 - B7-B8(Q-13)-SETTO C- INVILUPPO MIN SLE(FREQ)-M22

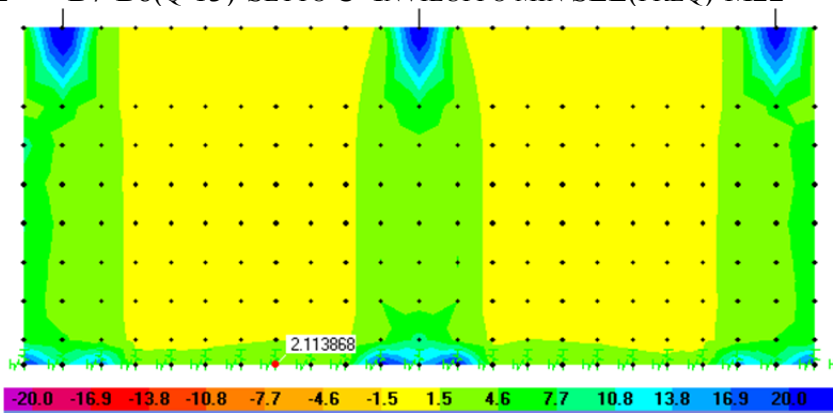


FIG. 4.253 - B7-B8(Q-13)-SETTO C- INVILUPPO MAX SLE(FREQ)-M22

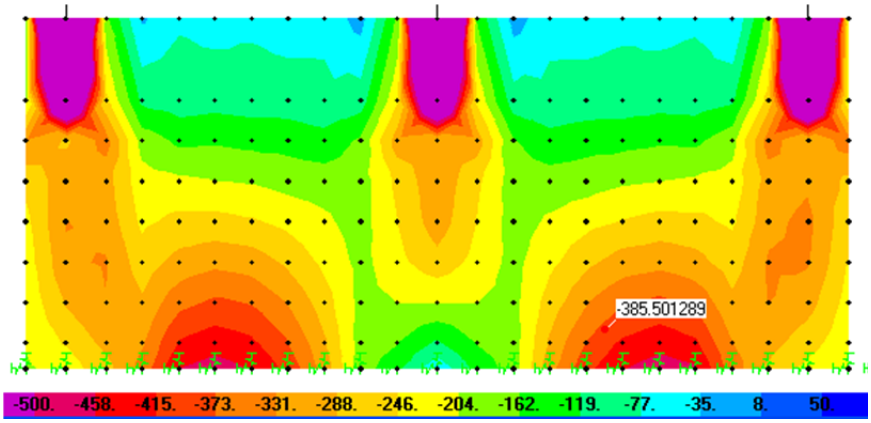


FIG. 4.254 - B7-B8(Q-13)-SETTO C- INVILUPPO MIN SLE(FREQ)-F22

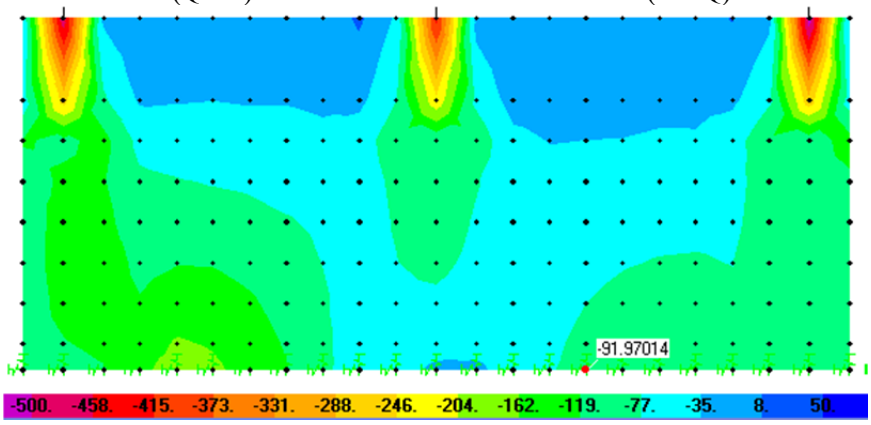


FIG. 4.255 - B7-B8(Q-13)-SETTO C- INVILUPPO MAX SLE(FREQ)-F22

B7-B8(q-13)-Setto C - ferri verticali - Verifiche agli SLE (Comb. freq.)					
Monconi di ripresa - L=3.0m - setti 25cm					
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.171m, H2=0.079m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
M_{min}/N_{max}	-90kN	-4kNm	**0.7**	**-**	**-**
M_{max}/N_{max}	-90kN	+3kNm	**0.6**	**-**	**-**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm					
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m					
M_{min}/N_{max}	-45kN	+25kNm	**1.3**	**51**	**0.054**
Verticali correnti (esclusi pilastri)					
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.178m, H2=0.072m					
M_{min}/N_{max}	-10kN	-4kNm	**1.0**	**31**	**0.032**
M_{max}/N_{max}	-10kN	+2kNm	**0.5**	**11**	**0.011**

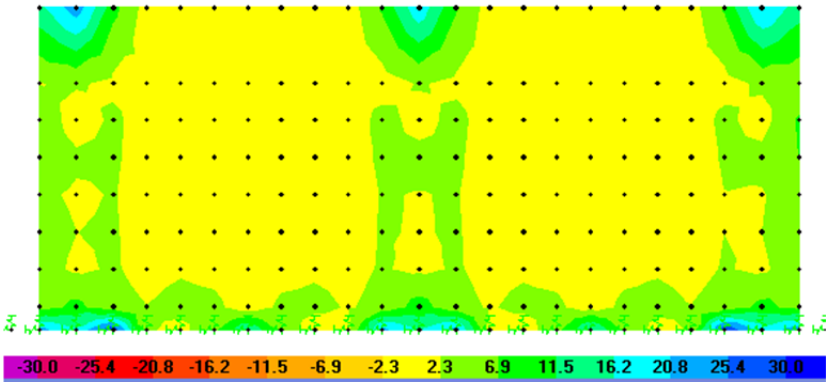


FIG. 4.256 - B7-B8(Q-13)-SETTO D- INVILUPPO MAX SLE(FREQ)-M22

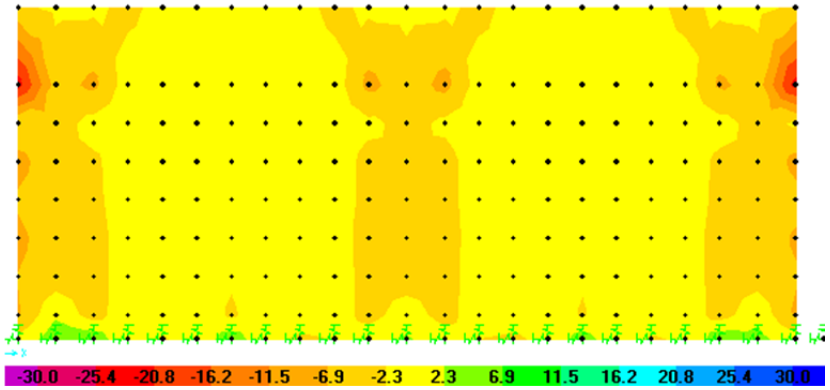


FIG. 4.257 - B7-B8(Q-13)-SETTO D- INVILUPPO MIN SLE(FREQ)-M22

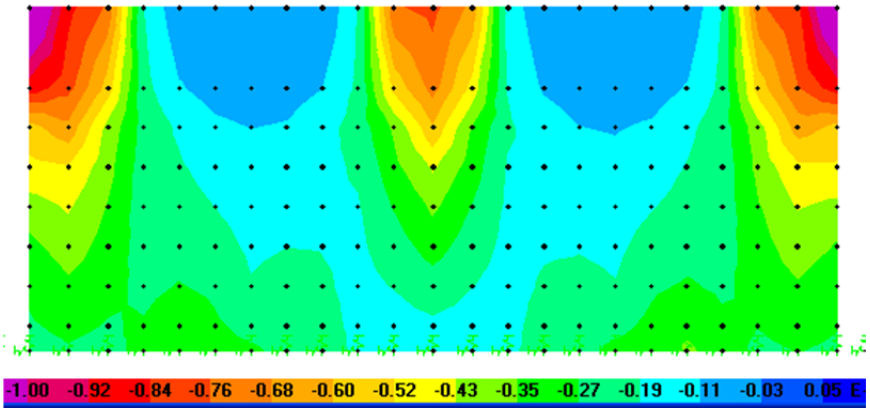


FIG. 4.258 - B7-B8(Q-13)-SETTO D- INVILUPPO MIN SLE(FREQ)-F22

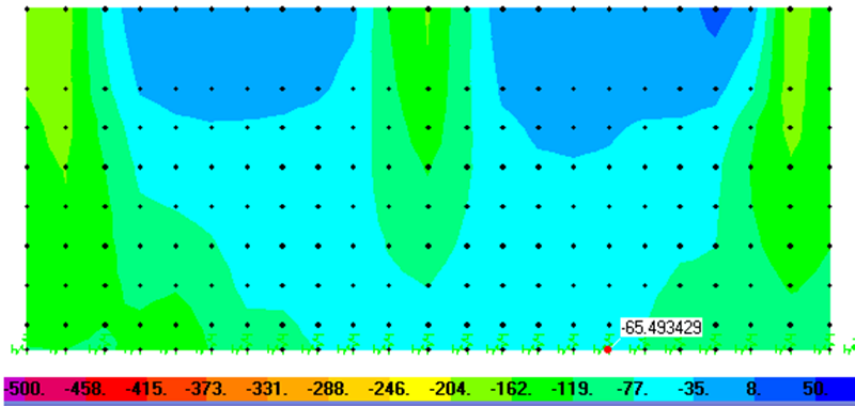


FIG. 4.259 - B7-B8(Q-13)-SETTO D- INVILUPPO MAX SLE(FREQ)-F22

B7-B8(q-13)-Setto D - ferri verticali - Verifiche agli SLE (comb. freq.)					
Monconi di ripresa - L=3.0m - setti 25cm					
B=1.0m H=0.25m A1=A2=565mm^2(θ12/200mm), H1=0.18m, H2=0.07m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
M_{min}/N_{max}	-50kN	+4kNm	**0.7**	**3**	**0.002**
M_{max}/N_{max}	-50kN	+16kNm	**4.0**	**114**	**0.093**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm					
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m					
M_{max}/N_{max}	-50kN	+28kNm	**1.5**	**58**	**0.061**
Verticali correnti					
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m					
M_{min}/N_{max}	-10kN	-3kNm	**0.7**	**21**	**0.017**
M_{max}/N_{max}	-10kN	+4kNm	**1.0**	**31**	**0.025**

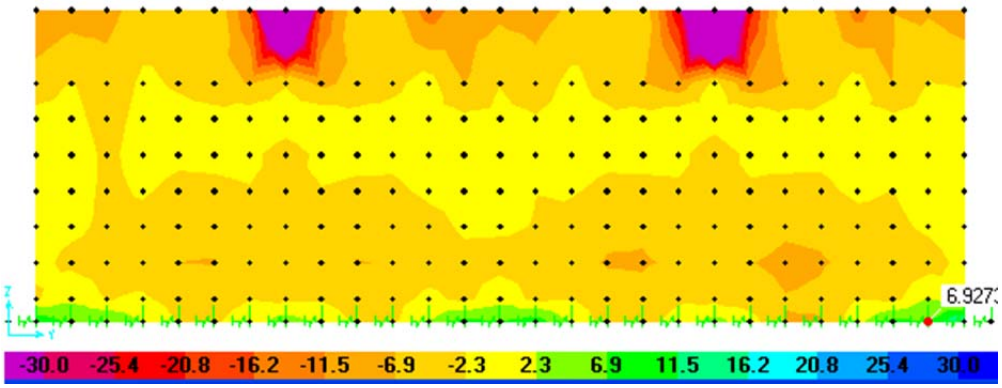


FIG. 4.260 - B7-B8(Q-13)-PARETE E- INVILUPPO MIN SLE(FREQ)-M22

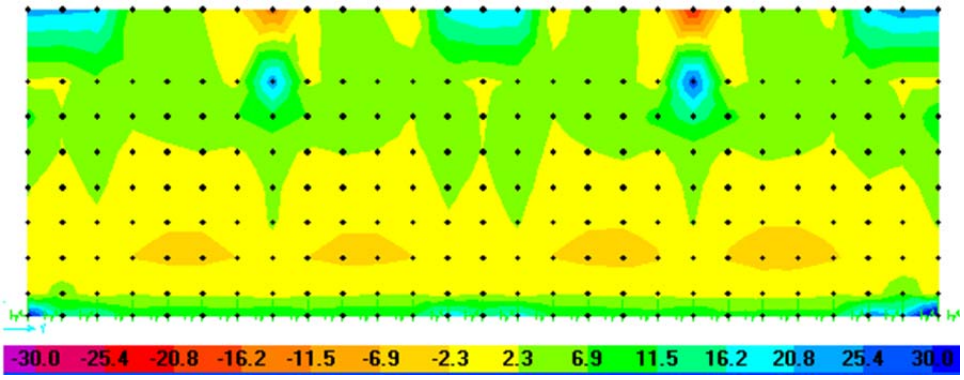


FIG. 4.261 - B7-B8(Q-13)-PARETE E - INVILUPPO MAX SLE(FREQ)-M22

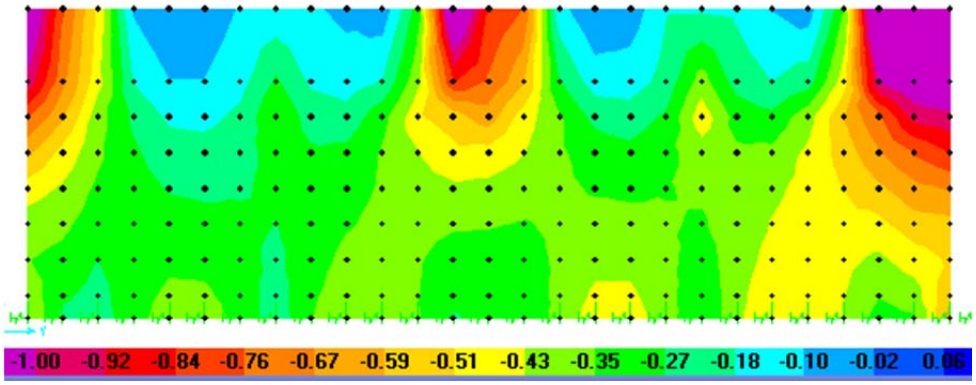


FIG. 4.262 - B7-B8(Q-13)-PARETE E - INVILUPPO MIN SLE(FREQ)-F22

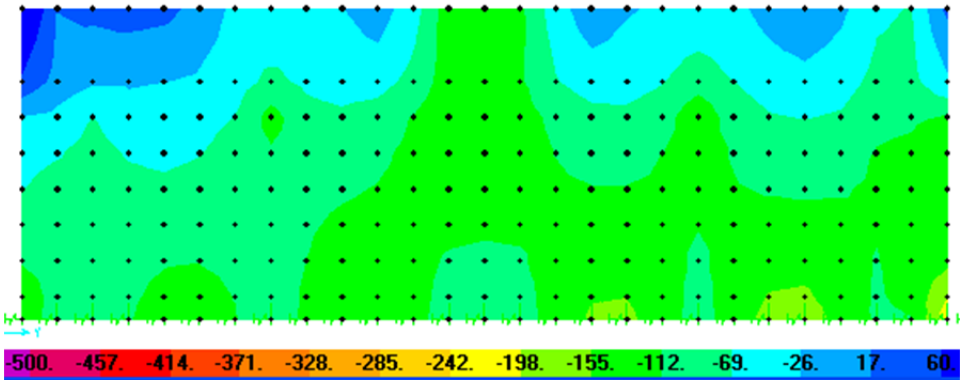


FIG. 4.263 - B7-B8(Q-13)-PARETE E - INVILUPPO MAX SLE(FREQ)-F22

B7-B8(q-13)-Parete E - ferri verticali - Verifiche agli SLE(Comb. freq.)					
Monconi di ripresa - L=3.0m					
B=1.0m,H=0.5m,A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.425m, H2=0.075m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
M_{min}/N_{max}	-90kN	+17kNm	**0.8**	**10**	**0.010**
M_{max}/N_{max}	-90kN	+25kNm	**1.5**	**46**	**0.050**
Verticali correnti (escluso pilastri)					
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.425m, H2=0.075m					
M_{min}/N_{max}	+15kN	-10kNm	**0.8**	**84**	**0.091**
M_{max}/N_{max}	+15kN	+10kNm	**0.8**	**84**	**0.091**

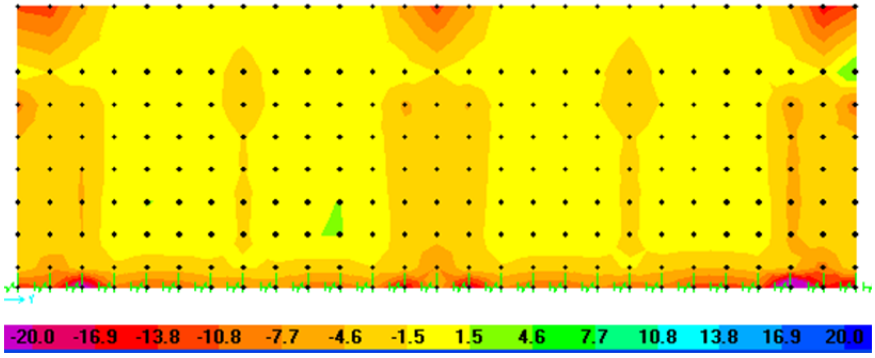


FIG. 4.264 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLE(FREQ.)-M22

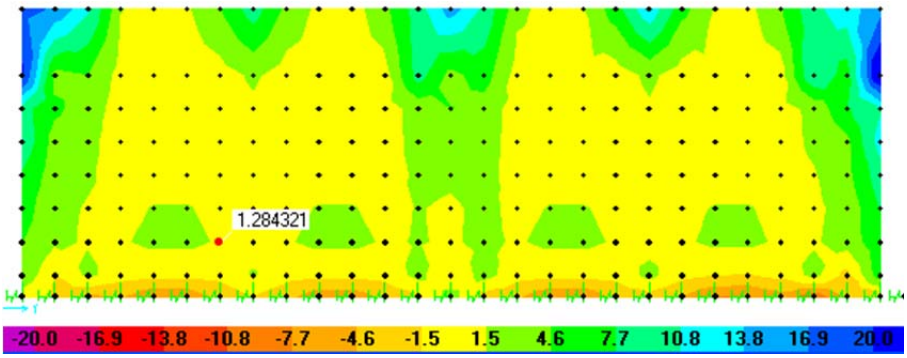


FIG. 4.265 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLE(FREQ)-M22

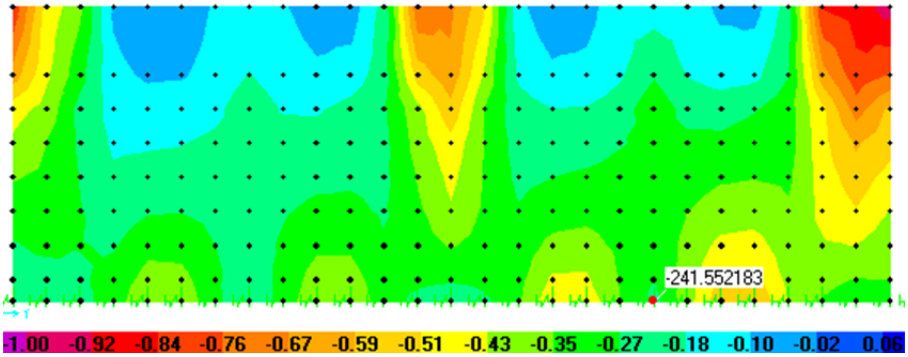


FIG. 4.266 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLE(FREQ)-F22

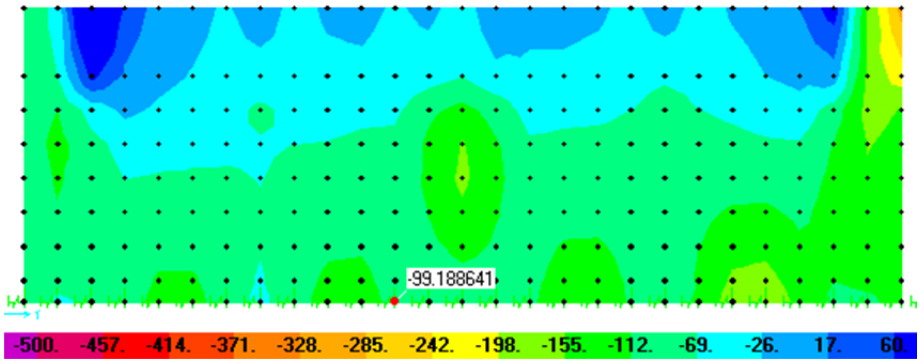


FIG. 4.267 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLE(FREQ)-F22

B7-B8(q-13)-Setto F - ferri verticali - Verifiche agli SLE (comb. freq.)					
Monconi di ripresa - L=3.0m - setti 25cm					
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
M_{min}/N_{max}	-80kN	-10kNm	**1.9**	**24**	**0.019**
M_{max}/N_{max}	-80kN	-4kNm	**0.7**	**-**	**-**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm					
B=1.0m,H=0.50m,A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m					
M_{max}/N_{max}	-80kN	-30kNm	**1.5**	**47**	**0.049**
Verticali correnti (escluso pilastri)					
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m					
M_{min}/N_{max}	+60kN	-4kNm	**1.1**	**101**	**0.087**
M_{max}/N_{max}	+60kN	+7kNm	**2.0**	**131**	**0.112**

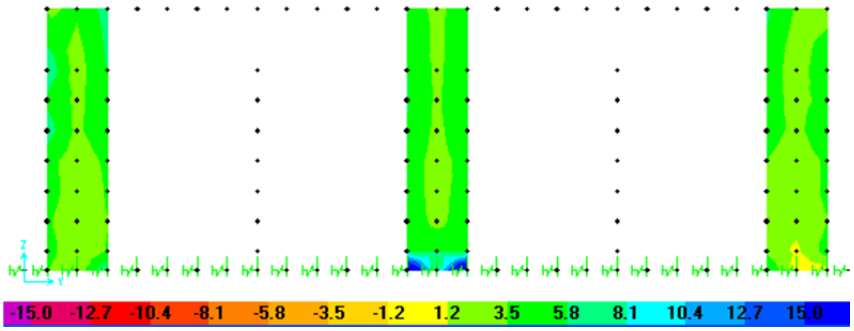


FIG. 4.268 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MAX SLE(FREQ)-M22

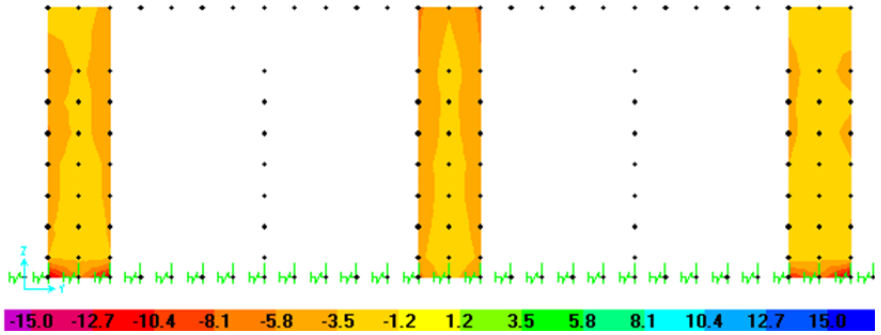


FIG. 4.269 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLE(FREQ)-M22

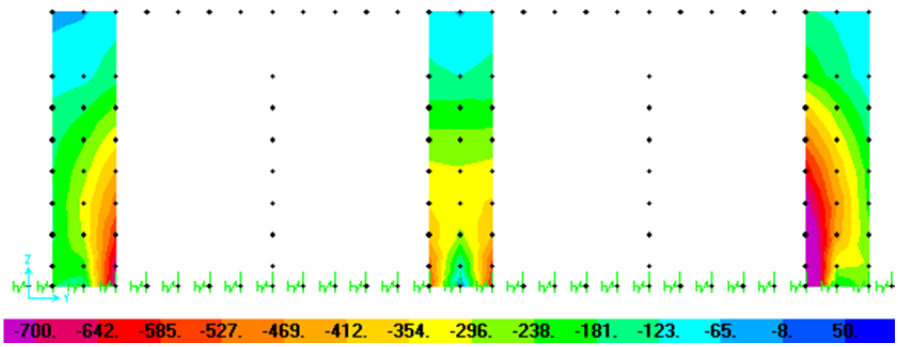


FIG. 4.270 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLE(FREQ)-F22

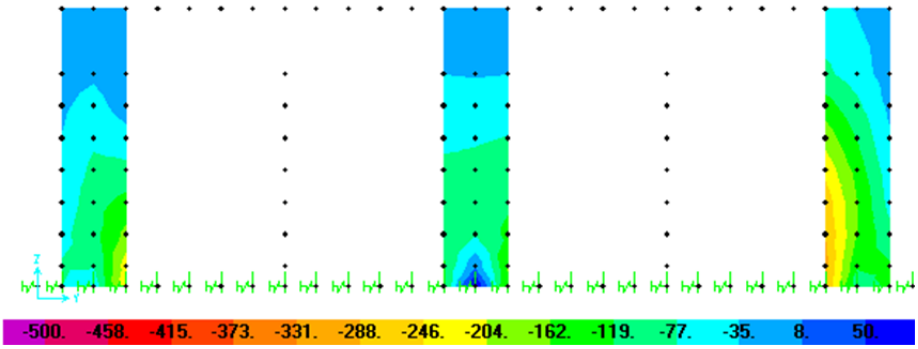


FIG. 4.271 - B7-B8(Q-13)-SETTI F/G - INVILUPPO MAX SLE(FREQ)-F22

B7-B8(q-13)-Setti fra F/G - ferri verticali - Verifiche agli SLE(comb. freq.)					
Monconi di ripresa - L=3.0m - setti 50cm					
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.431m, H2=0.069m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
M_{min}/N_{max}	-50kN	-15kNm	**0.8**	**23**	**0.022**
M_{max}/N_{max}	-50kN	+14kNm	**0.7**	**19**	**0.018**

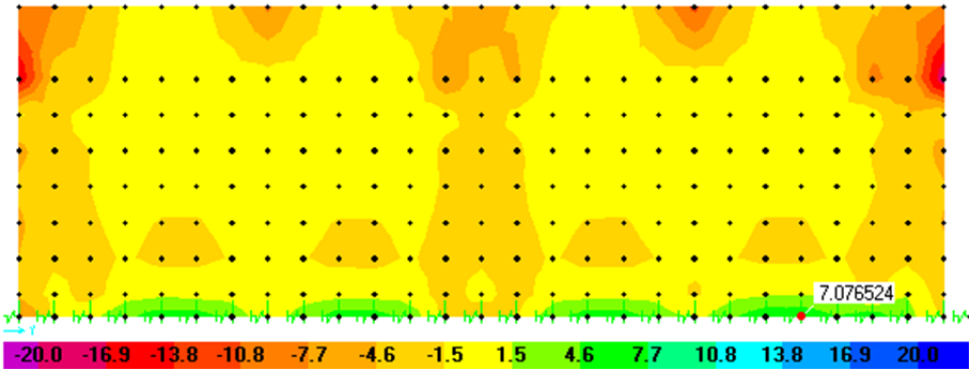


FIG. 4.272 - B7-B8(Q-13)-SETTI G - INVILUPPO MIN SLE(FREQ)-M22

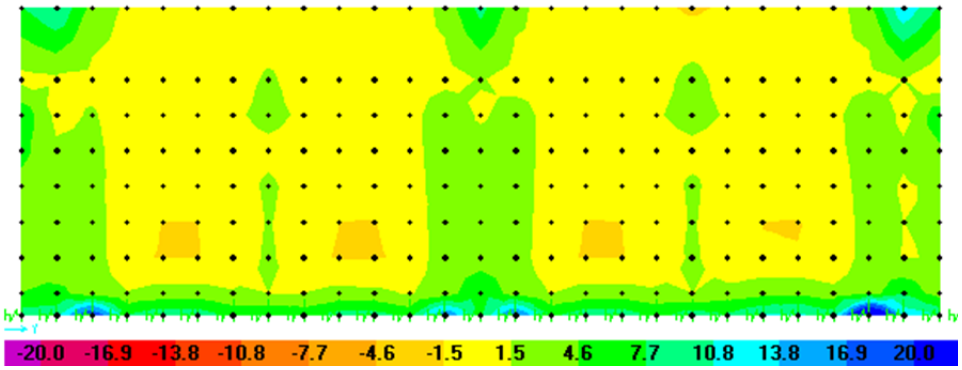


FIG. 4.273 - B7-B8(Q-13)-SETTI G - INVILUPPO MAX SLE(FREQ)-M22

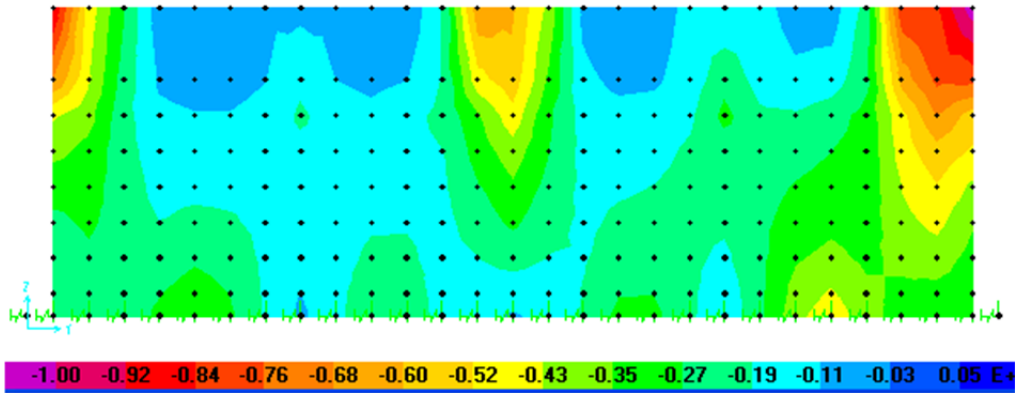


FIG. 4.274 - B7-B8(Q-13)-SETTI G - INVILUPPO MIN SLE(FREQ)-F22

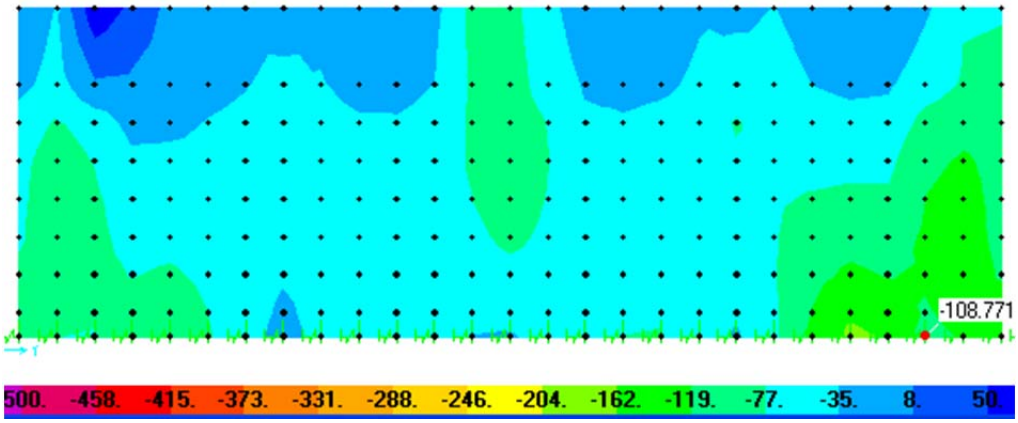


FIG. 4.275 - B7-B8(Q-13)-SETTI G - INVILUPPO MAX SLE(FREQ)-F22

B7-B8(q-13)-Setto G - ferri verticali - Verifiche agli SLE(comb. freq.)					
Monconi di ripresa - L=3.0m - setti 25cm					
B=1.0m H=0.25m	A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	-50kN	+3kNm	**0.5**	**-**	**-**
N_{max}/M_{max}	-50kN	+10kNm	**2.1**	**42**	**0.034**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm					
B=1.0m H=0.50m	A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
N_{max}/M_{max}	-50kN	+18kNm	**0.9**	**27**	**0.028**
Verticali correnti (escluso pilastri)					
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m					
N_{max}/M_{min}	+20kN	-7kNm	**2.0**	**91**	**0.076**
N_{max}/M_{max}	+20kN	+2kNm	**0.6**	**40**	**0.034**

4.3.7 Verifiche ferri orizzontali agli SLE (combinazioni rare) - B7-B8(q.-13)

Di seguito si riportano le verifiche del cemento armato del fusto del cassone per gli stati limiti d'esercizio combinazioni rare.

Per la verifica dell'orditura orizzontale del fusto si considerano le combinazioni di carico d'esercizio riportate in precedenza.

Di seguito si riportano gli inviluppi dei momenti delle pareti e dei setti.

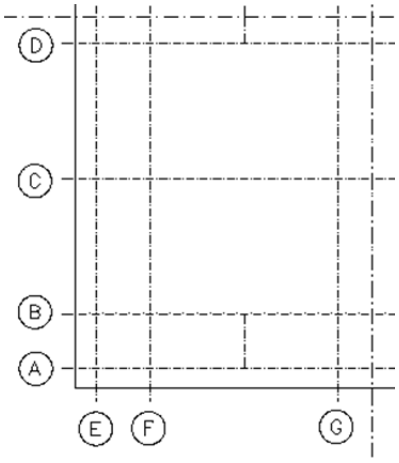


FIG. 4.276 - PIANTA CHIAVE PARETI E SETTI

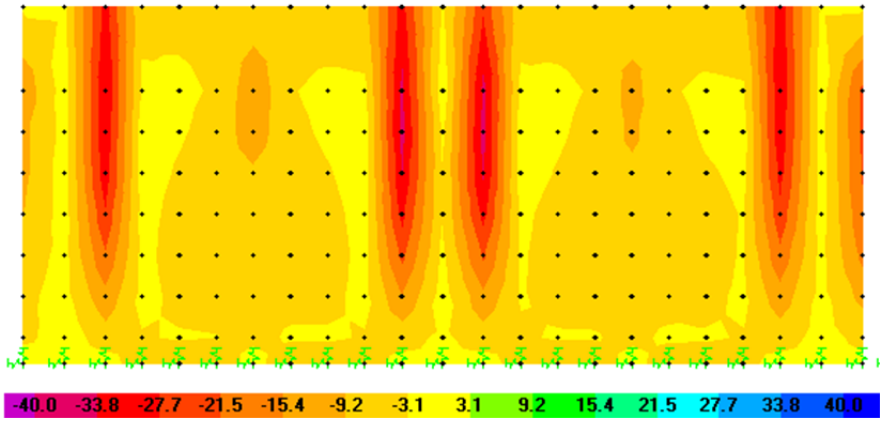


FIG. 4.277 - B7-B8(Q-13)-PARETE FILO A - INVILUPPO MIN SLE(RARE.)-M11

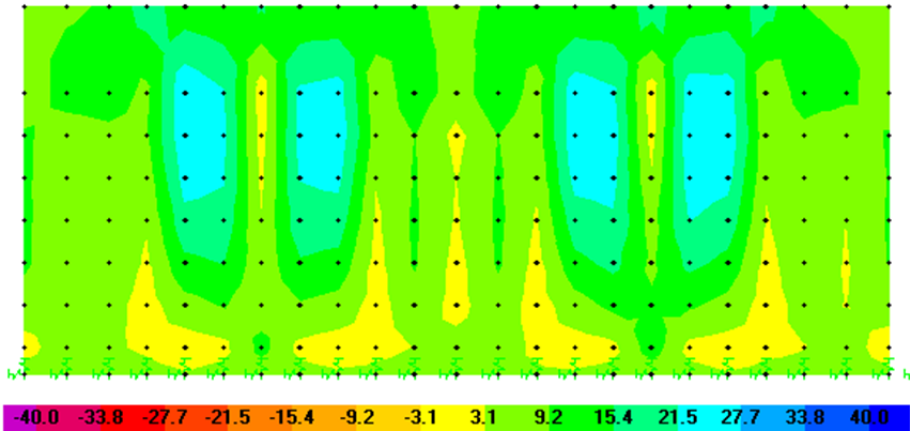


FIG. 4.278 - B7-B8(Q-13)-PARETE FILO A - INVILUPPO MAX SLE(RARE)-M11

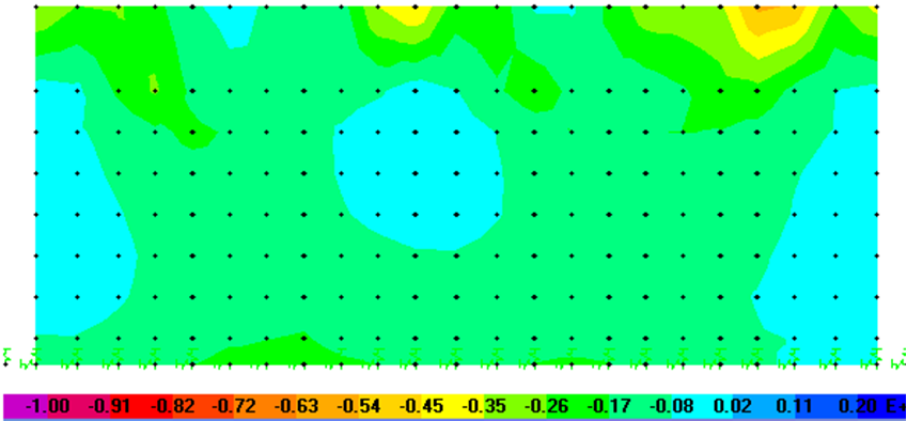


FIG. 4.279 - B7-B8(Q-13)-PARETE FILO A - INVILUPPO MIN SLE(RARE)-F11

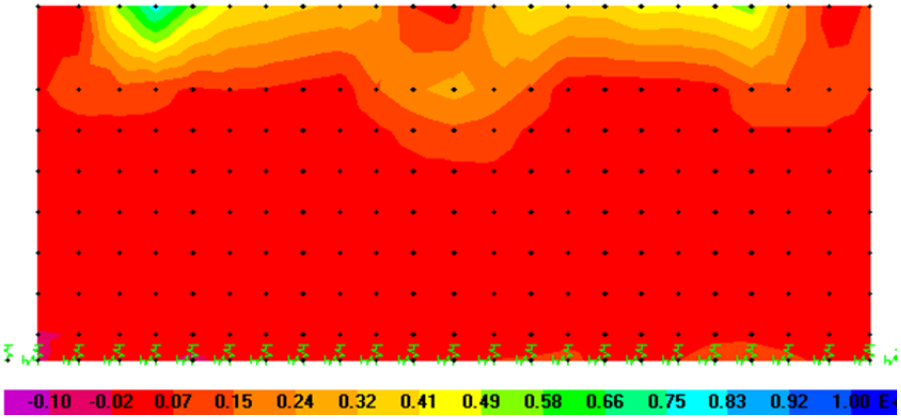


FIG. 4.280 - B7-B8(Q-13)-PARETE FILO A - INVILUPPO MAX SLE(RARE)-F11

B7-B8(q-13)-Parete A - ferri orizzontali - Verifiche agli SLE(comb. rare)				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max}/ M_{min}	+220kN(tens)	-34kNm	**0.3**	**315**
N_{max}/ M_{max}	+220kN	+25kNm	**-**	**278**
Da +6.00				
B=1.0m,H=0.5m,A1=A2=1829mm^2(θ22/250+ θ14/500mm), H1=0.439m, H2=0.061m				
N_{max}	+430kN(tens.)	-34kNm	**-**	**164**

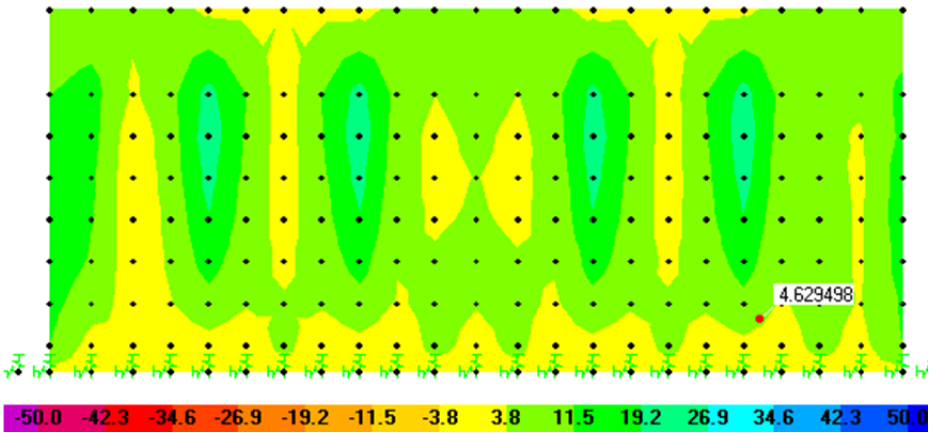


FIG. 4.281 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MAX SLE(RARE)-M11

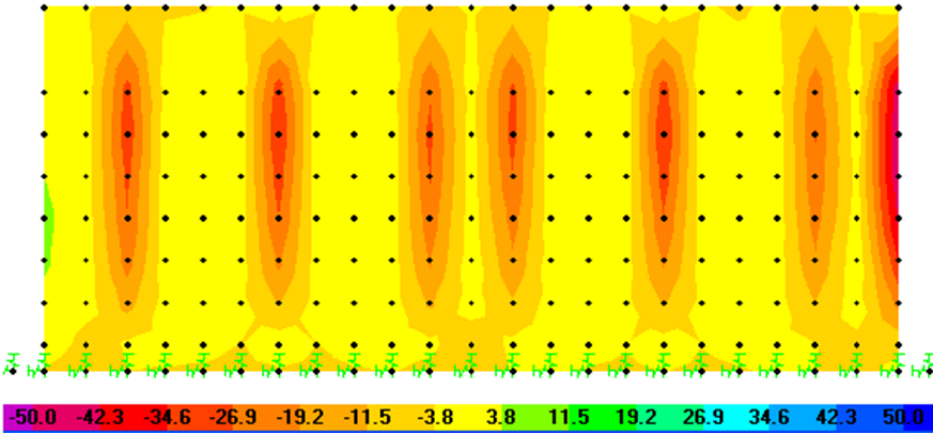


FIG. 4.282 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MIN SLE(RARE)-M11

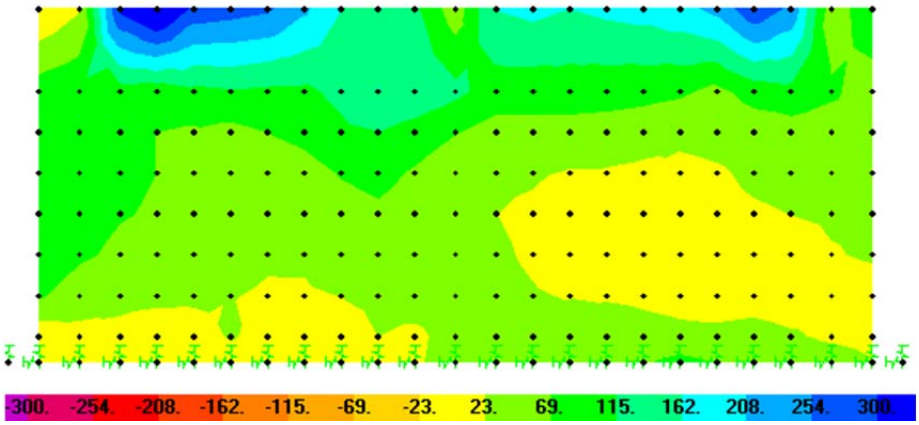


FIG. 4.283 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MAX SLE(RARE)-F11

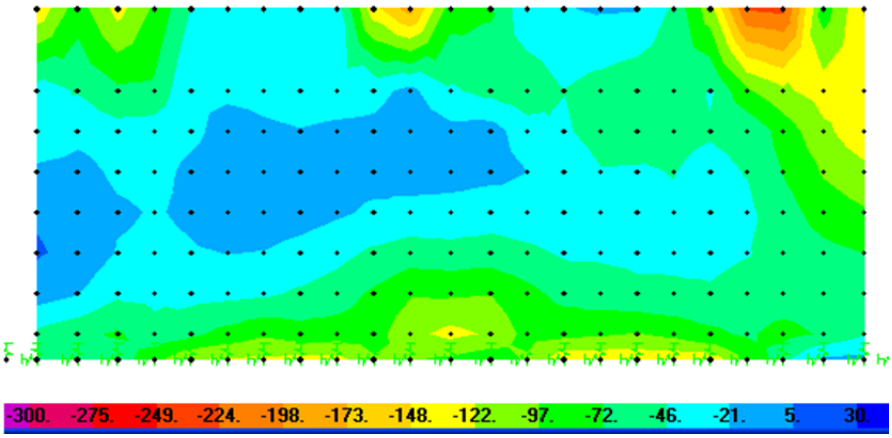


FIG. 4.284 - B7-B8(Q-13)-SETTO FILO B - INVILUPPO MIN SLE(RARE)-F11

B7-B8(q-13)-Setto B - ferri orizzontali - Verifiche agli SLE(comb.rare)				
da 0 a +6.00				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max}/ M_{min}	+150kN(tens)	-35kNm	**7.2**	**347**
N_{max}/ M_{max}	+150kN	+23kNm	**4.6**	**263**
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
M_{max}	+160kN	-48kNm	**2.2**	**317**
da +6.00				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m				
N_{max}	+300kN	-48kNm	**0.6**	**266**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+300kN	-31kNm	**5.5**	**337**

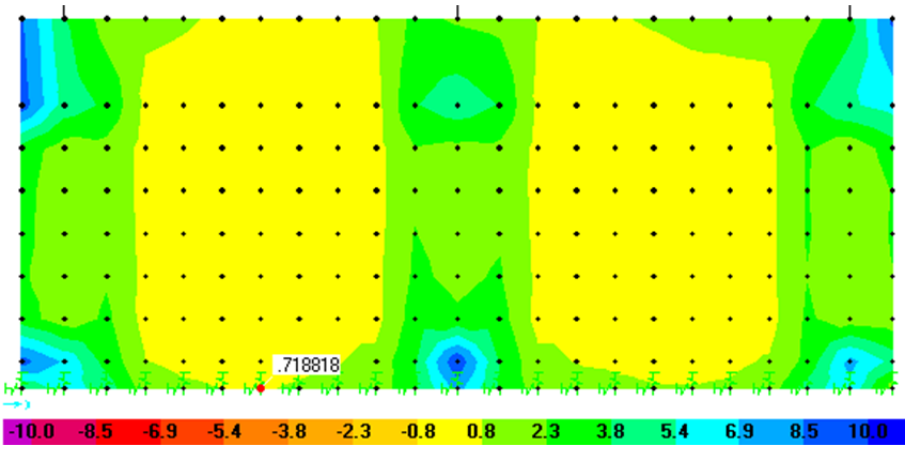


FIG. 4.285 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MAX SLE(RARE)-M11

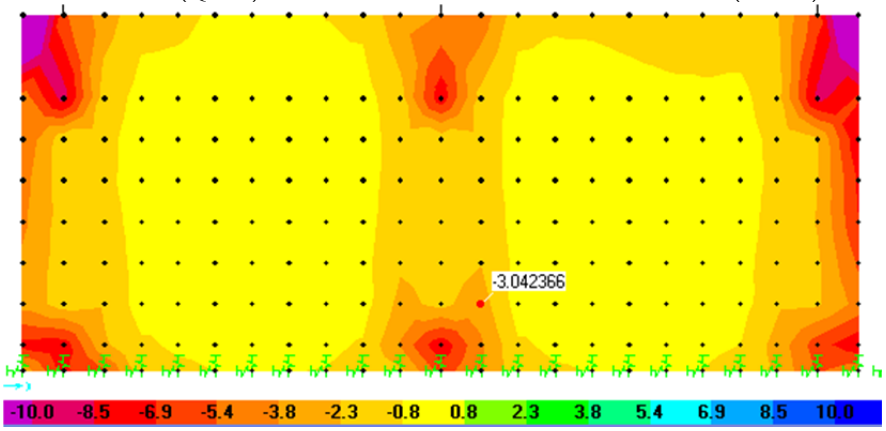


FIG. 4.286 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MIN SLE(RARE)-M11

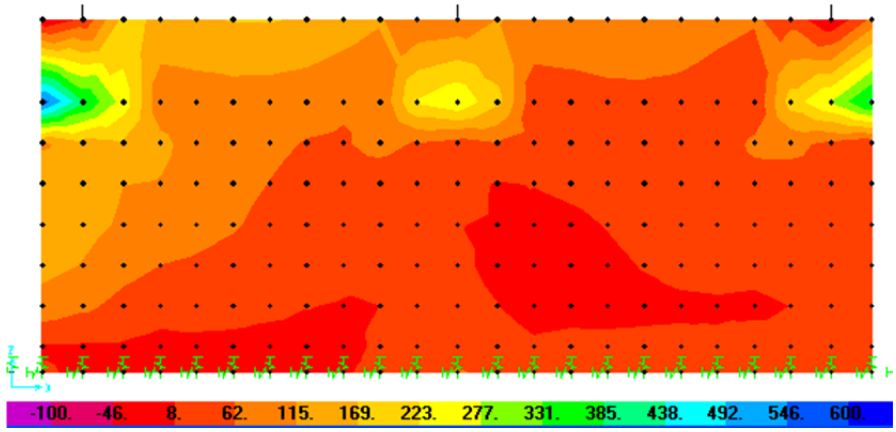


FIG. 4.287 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MAX SLE(RARE)-F11

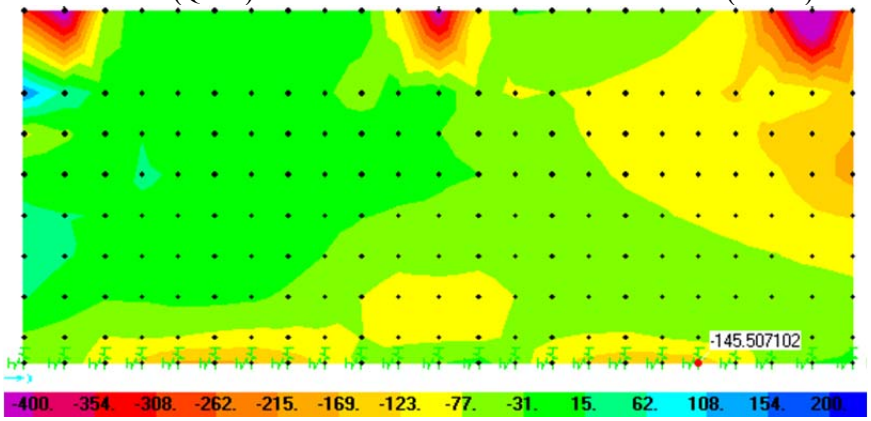


FIG. 4.288 - B7-B8(Q-13)-SETTO FILO C - INVILUPPO MIN SLE(RARE)-F11

B7-B8(q-13)- Setto C - ferri orizzontali - Verifiche agli SLE(comb. rare)				
da 0 a +6.00				
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250mm), H1=0.189m, H2=0.061m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max} /M_{min}	+200kN(tens.)	-2kNm	-	**74**
N_{max} /M_{max}	+200kN	+3kNm	-	**79**
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
M_{min}	+200kN	+3kNm	-	**172**
da +6.00				
B=1.0m,H=0.5m,A1=A2=1524mm^2(θ22/250), H1=0.439m, H2=0.061m				
N_{max}	+300kN	-13kNm	-	**119**
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250mm), H1=0.189m, H2=0.061m				
N_{max}	+230kN	+3kNm	-	**89**

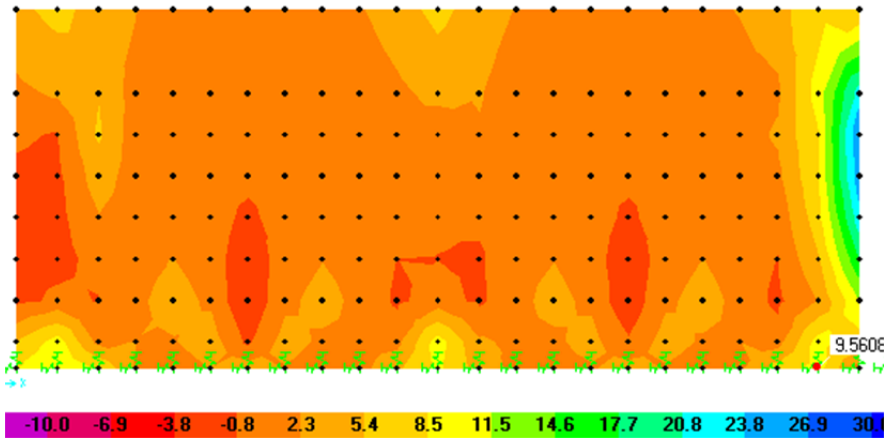


FIG. 4.289 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MAX SLE(RARE)-M11

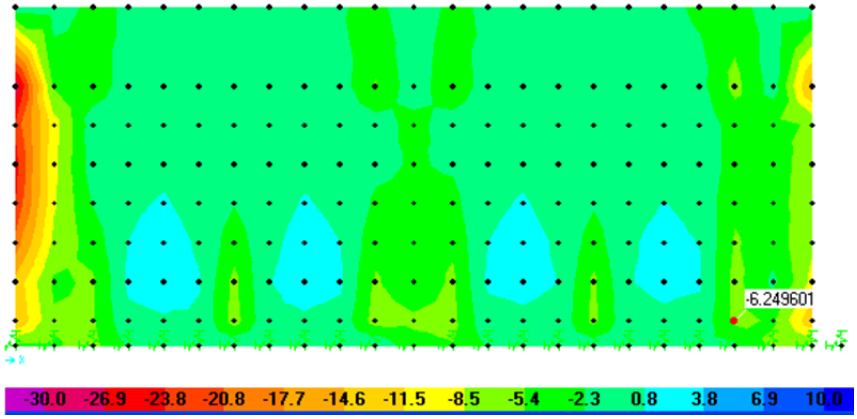


FIG. 4.290 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MIN SLE(RARE)-M11

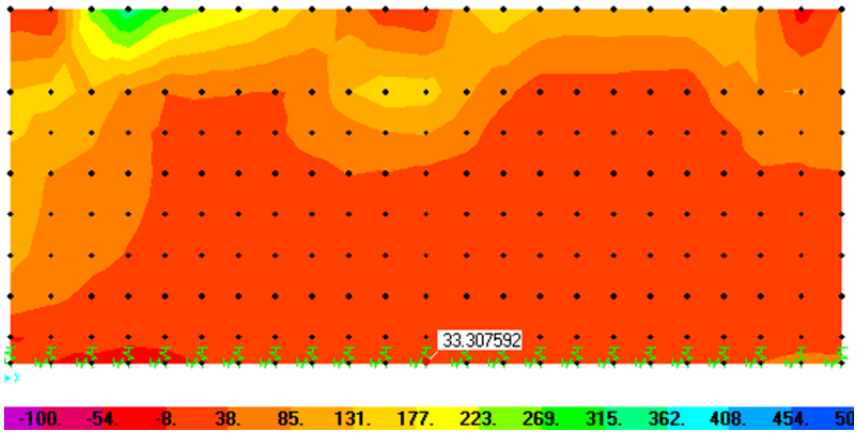


FIG. 4.291 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MAX SLE(RARE)-F11

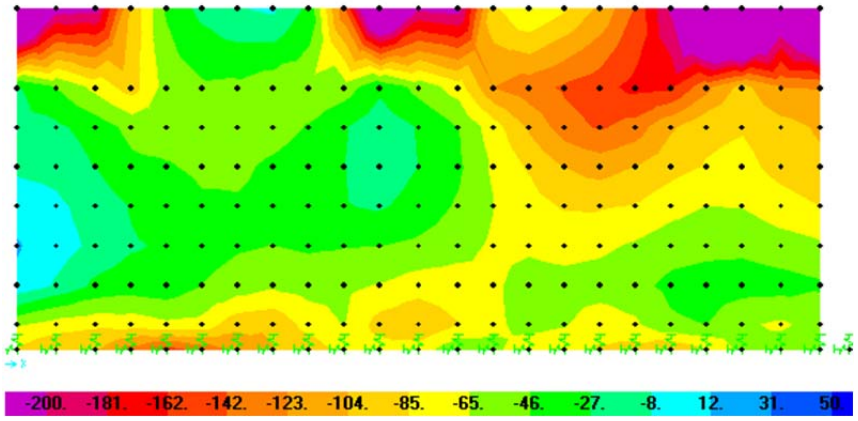


FIG. 4.292 - B7-B8(Q-13)-SETTO FILO D - INVILUPPO MIN SLE(RARE)-F11

B7-B8(q-13)-Setto D - ferri orizzontali - Verifiche agli SLE(comb. rare)				
da 0 a +6.00				
B=1.0m,H=0.25m,A1=A2=534mm^2(θ12/500mm+ θ14/500mm), H1=0.193m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max}/M_{min}	+90kN(tens.)	-4kNm	**0.5**	**135**
N_{max}/M_{max}	+90kN	+3kNm	**-**	**123**
B=1.0m,H=0.5m,A1=A2=710mm^2(θ16/500mm+ θ14/500mm), H1=0.442m, H2=0.058m in corrispondenza di parete E				
N_{max} /M_{min}	+120kN	-23kNm	**0.7**	**164**
N_{max} /M_{max}	+120kN	+22kNm	**0.6**	**161**
da +6.00				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m solo in corrispondenza di parete E				
N_{max}	+240kN	-22kNm	**-**	**171**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+275kN	-6kNm	**-**	**177**

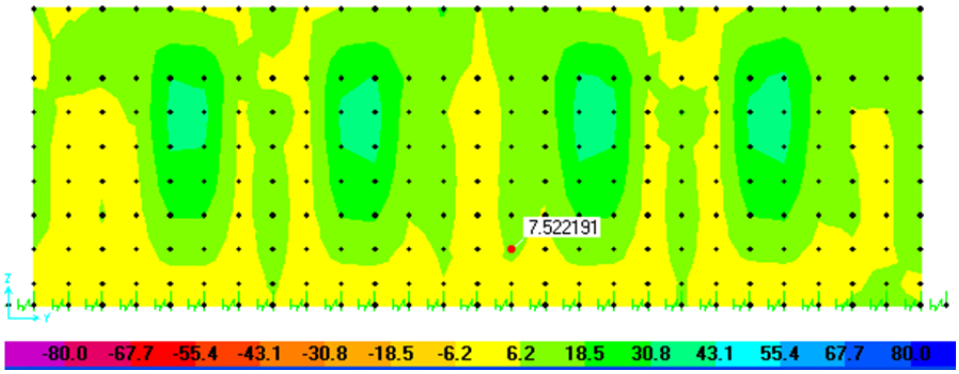


FIG. 4.293 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MAX SLE(RARA)-M11

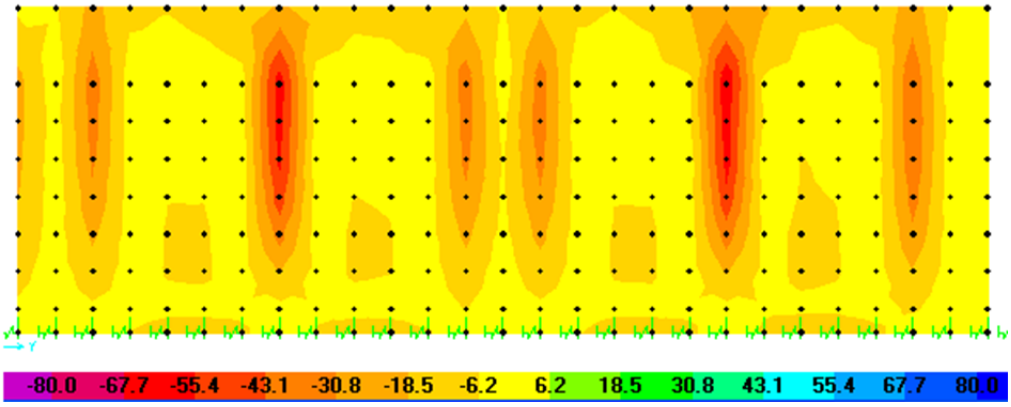


FIG. 4.294 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MIN SLE(RARA)-M11

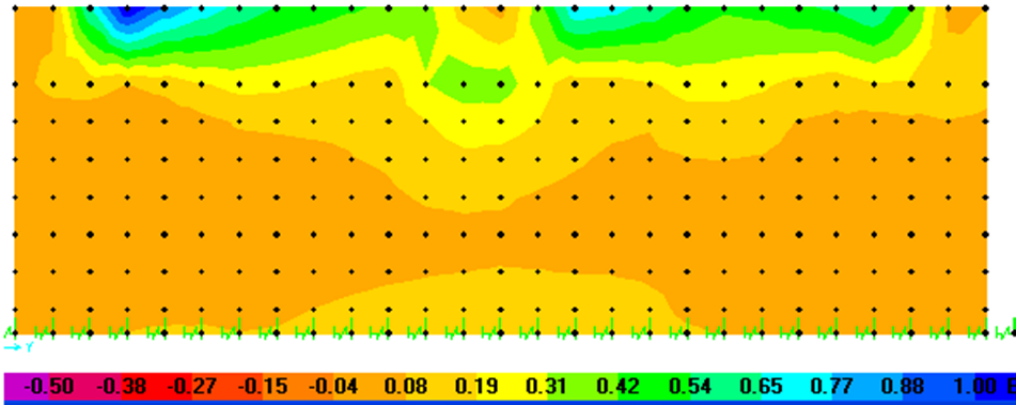


FIG. 4.295 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MAX SLE(RARA)-F11

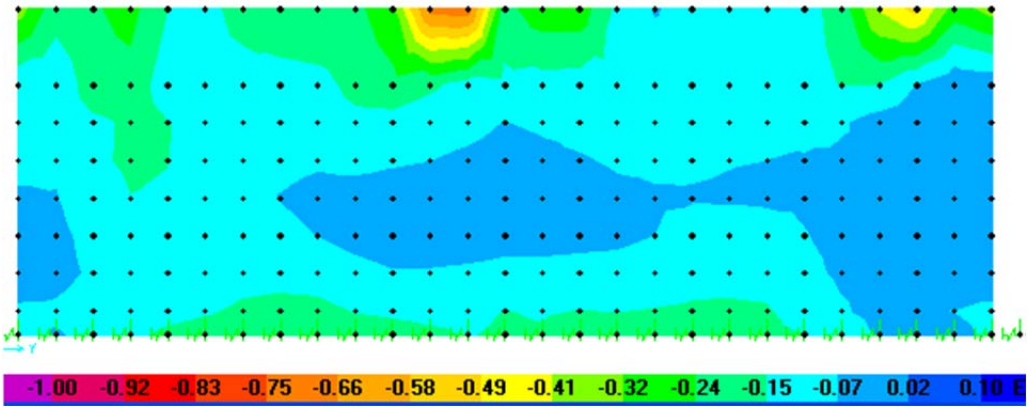


FIG. 4.296 - B7-B8(Q-13)-PARETE FILO E - INVILUPPO MIN SLE(RARA)-F11

B7-B8(q-13)-Parete E - ferri orizzontali - Verifiche agli SLE(comb. rare)				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m				
Combinazione	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max}/M_{min}	+280kN(tens)	-65kNm	**2.0**	**295**
N_{max}/M_{max}	+280kN	+32kNm	**-**	**216**
Da +6.00				
B=1.0m,H=0.5m,A1=A2=1884mm^2(θ20/250+ θ20/500mm), H1=0.440m, H2=0.06m				
N_{max}	+700kN	-65kNm	**-**	**271**

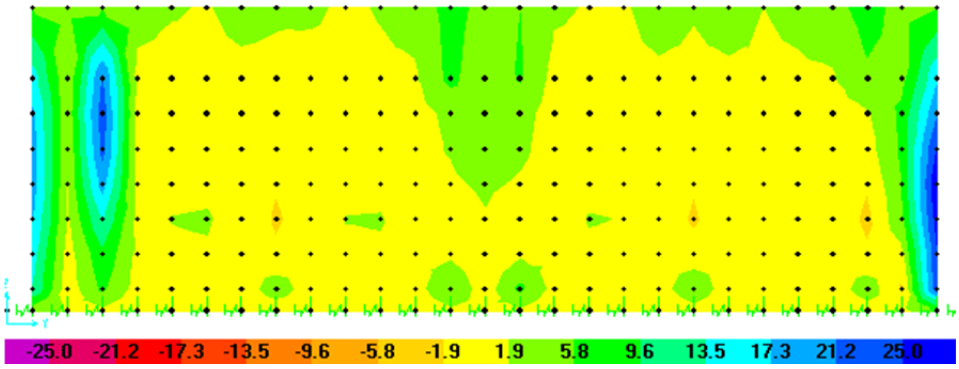


FIG. 4.297 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLE(RARE)-M11

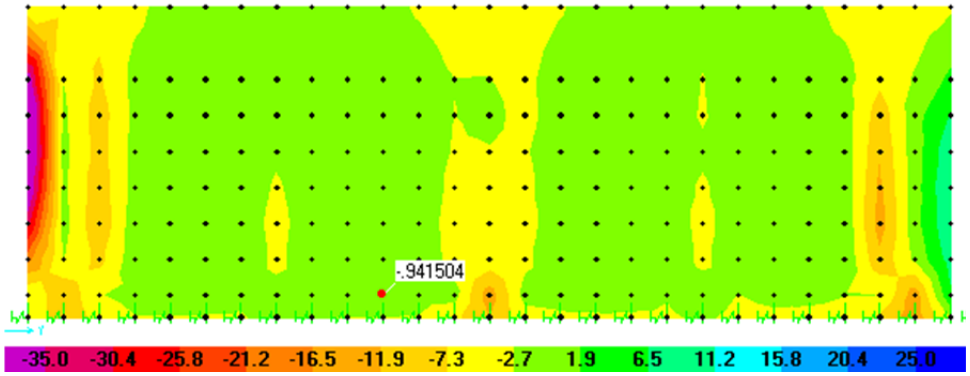


FIG. 4.298 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLE(RARE)-M11

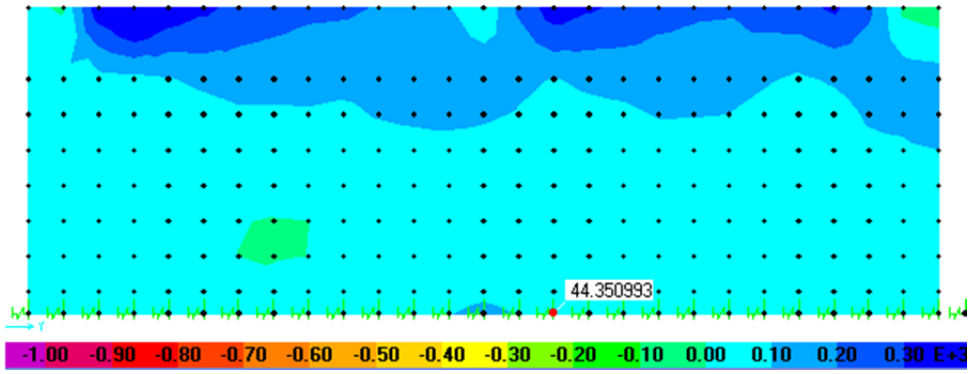


FIG. 4.299 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLE(RARE)-F11

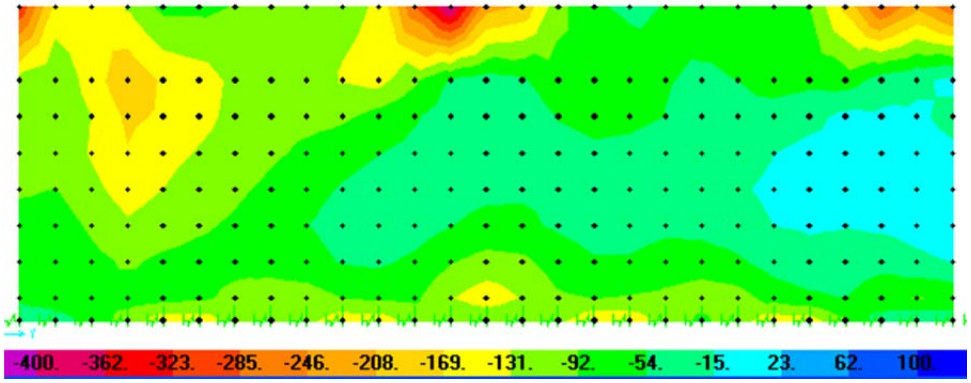


FIG. 4.300 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLE(RARE)-F11

B7-B8(q-13)-Setto F - ferri orizzontali - Verifiche agli SLE(comb. rare)				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m in corrispondenza della parete A				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max} M_{min}	+160kN	-35kNm	**1.3**	**268**
N_{max} M_{max}	+160kN	+25kNm	**0.3**	**230**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
N_{max} /M_{min}	+160kN	-10kNm	**1.8**	**234**
N_{max} /M_{max}	+160kN	+20kNm	**4.5**	**322**
Da +6.00				
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+360kN	+20kNm	**2.7**	**309**

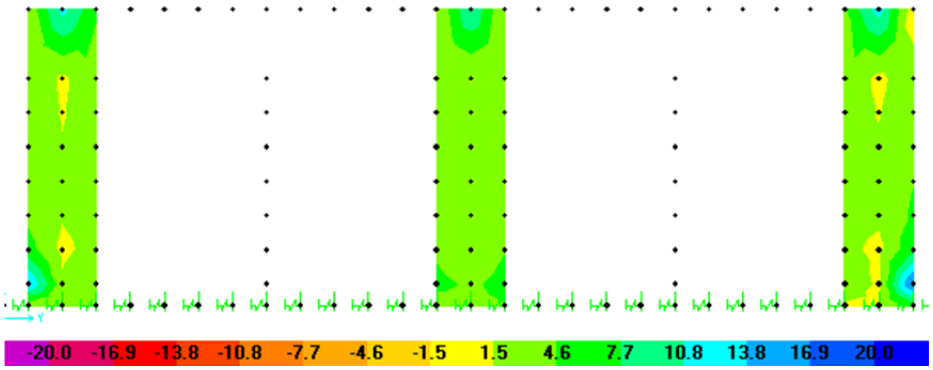


FIG. 4.301 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MAX SLE(RARE)-M11

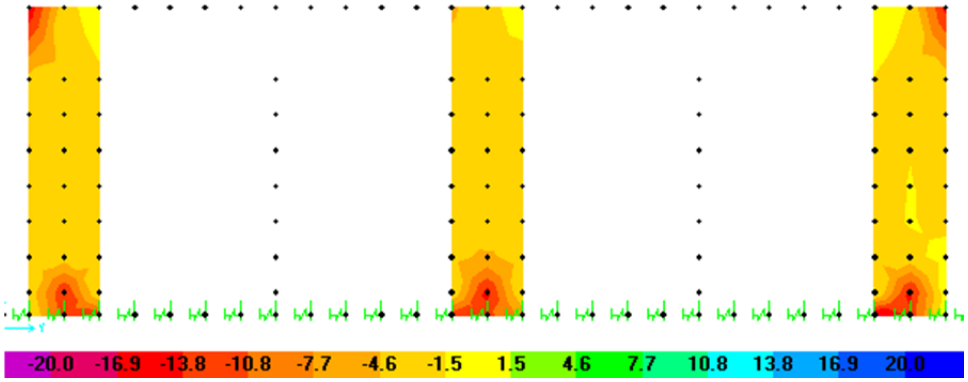


FIG. 4.302 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLE(RARE)-M11

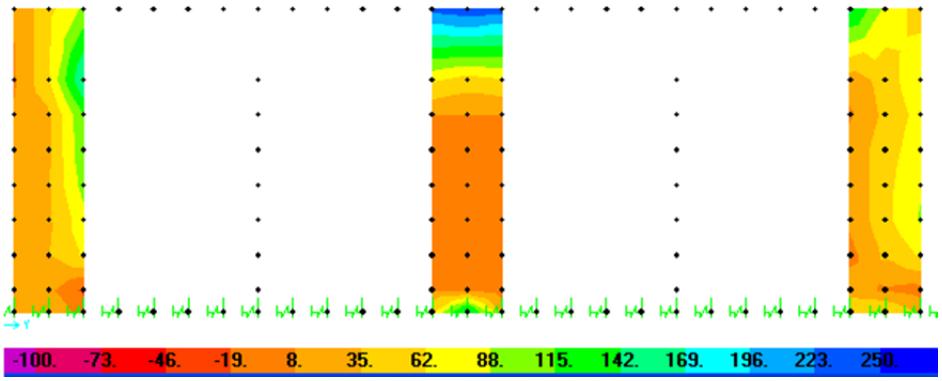


FIG. 4.303 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MAX SLE(RARE)-F11

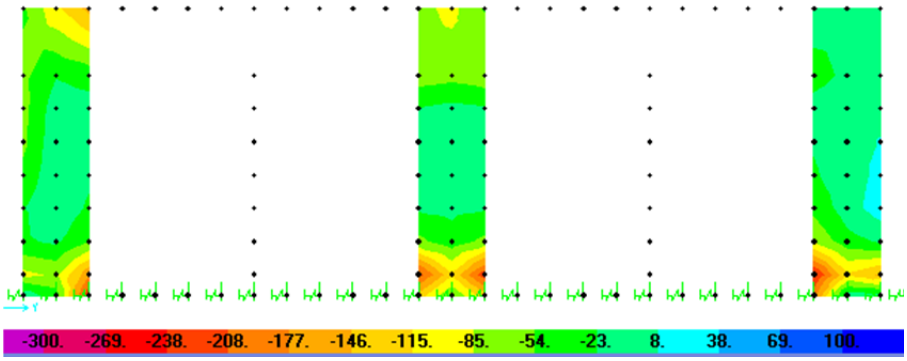


FIG. 4.304 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLE(RARE)-F11

B7-B8(q-13)-Setti fra F/G - ferri orizzontali - Verifiche agli SLE(comb. rare)				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=452mm^2(θ12/250mm), H1=0.444m, H2=0.056m in corrispondenza della parete A				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max}/M_{min}	+65kN	-10kNm	**0.1**	**126**
N_{max}/M_{max}	+65kN	+17kNm	**0.9**	**162**
Da +6.00				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
N_{max}	+210kN	+10kNm	-	**208**

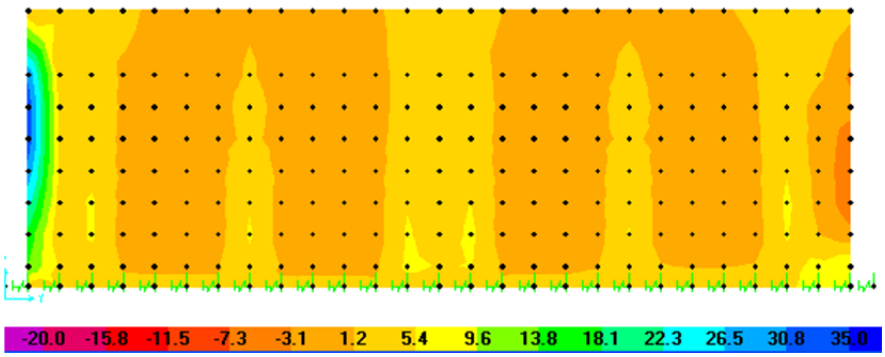


FIG. 4.305 - B7-B8(Q-13)-SETTO G - INVILUPPO MAX SLE(RARA)-M11

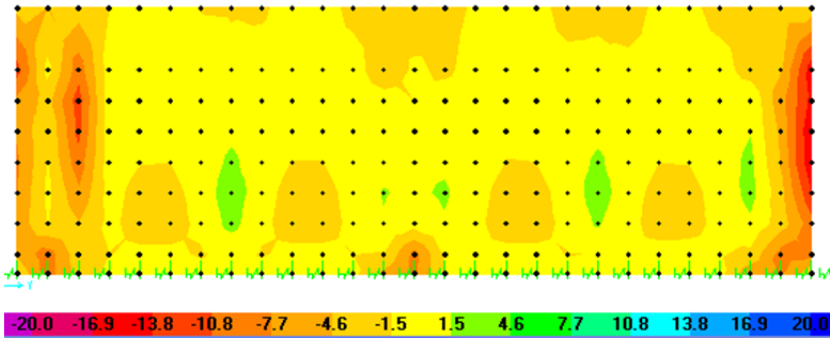


FIG. 4.306 - B7-B8(Q-13)-SETTO G - INVILUPPO MIN SLE(RARA)-M11

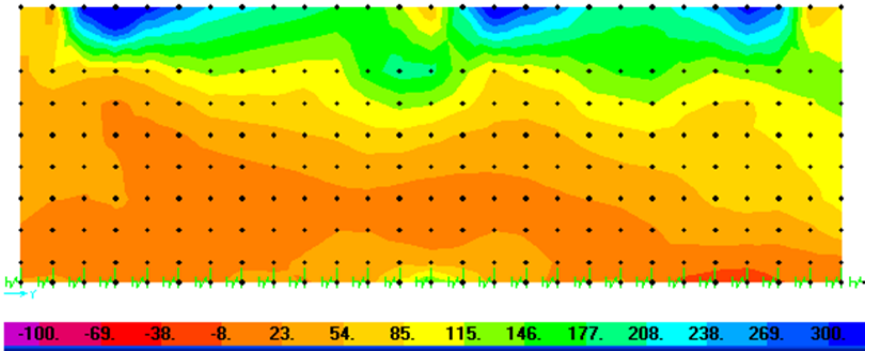


FIG. 4.307 - B7-B8(Q-13)-SETTO G - INVILUPPO MAX SLE(RARA)-F11

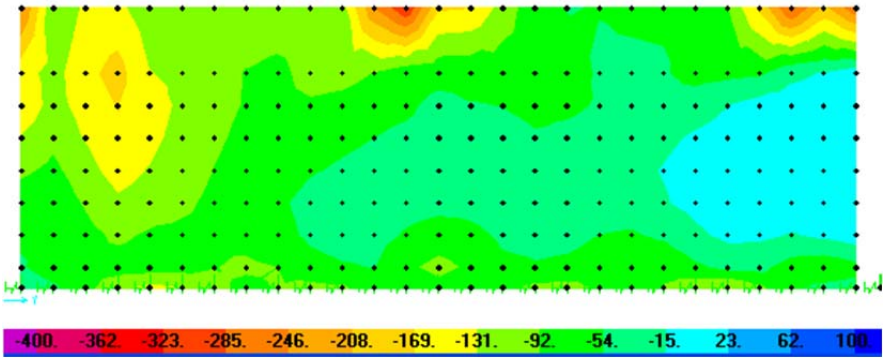


FIG. 4.308 - B7-B8(Q-13)-SETTO G - INVILUPPO MIN SLE(RARA)-F11

B7-B8(q-13)-Setto G - ferri orizzontali - Verifiche agli SLE(comb. rare)				
Da 0 a +6.00				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max}/M_{min}	+170kN	-15kNm	**-**	**197**
N_{max}/M_{max}	+170kN	+35kNm	**1.2**	**277**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
N_{max}/M_{min}	+170kN	-12kNm	**2.3**	**260**
N_{max}/M_{max}	+170kN	+6kNm	**-**	**206**
Da +6.00				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
N_{max}	+310kN	-15kNm	**1.9**	**319**

4.3.8 Monconi di ripresa e ferri verticali agli SLE (comb. rare) -B7-B8(q.-13)

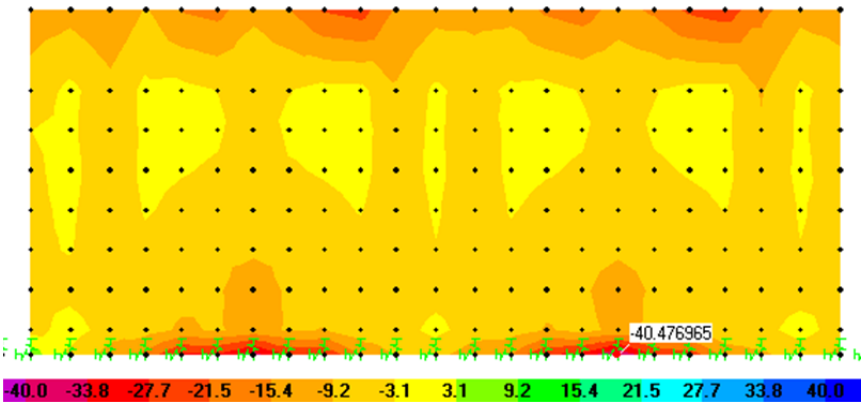


FIG. 4.309 - B7-B8(Q-13)-PARETE A - INVILUPPO MIN SLE(RARE)-M22

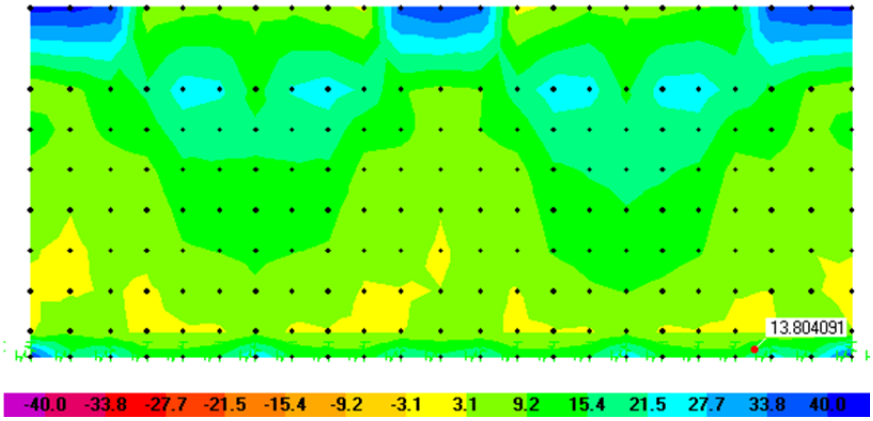


FIG. 4.310 - B7-B8(Q-13)-PARETE A - INVILUPPO MAX SLE(RARE)-M22

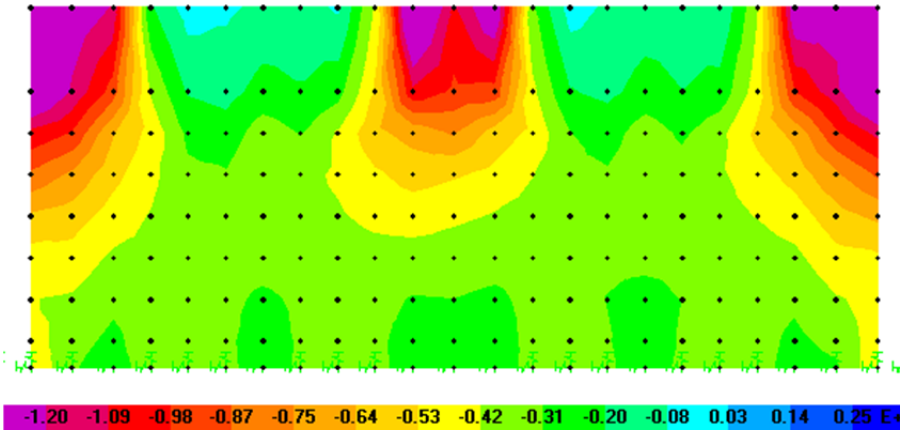


FIG. 4.311 - B7-B8(Q-13)-PARETE A - INVILUPPO MIN SLE(RARE)-F22

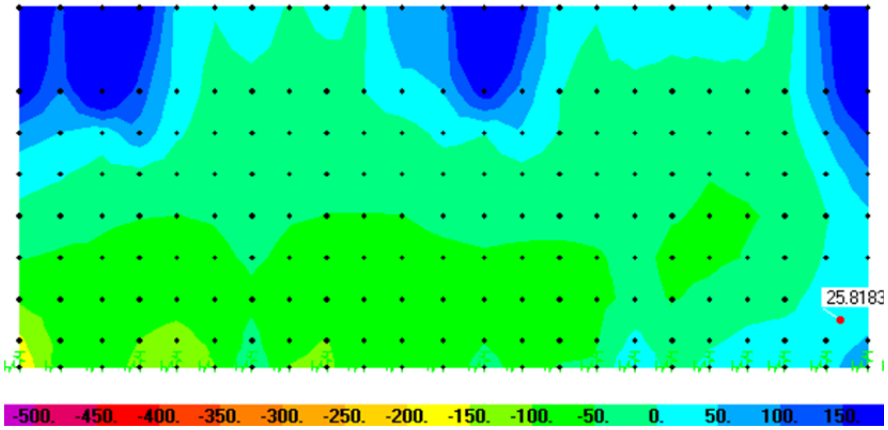


FIG. 4.312 - B7-B8(Q-13)-PARETE A- INVILUPPO MAX SLE(RARE)-F22

B7-B8(q-13)-Parete A - ferri verticali - Verifiche agli SLE (comb. rare)				
Monconi di ripresa - L=3.0m				
B=1.0m H=0.5m A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	+30kN	-40kNm	**2.2**	**148**
M_{max}/N_{max}	+30kN	+25kNm	**2.0**	**196**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+160kN	-15kNm	-	**311**
M_{max}/N_{max}	+160kN	+15kNm	-	**311**

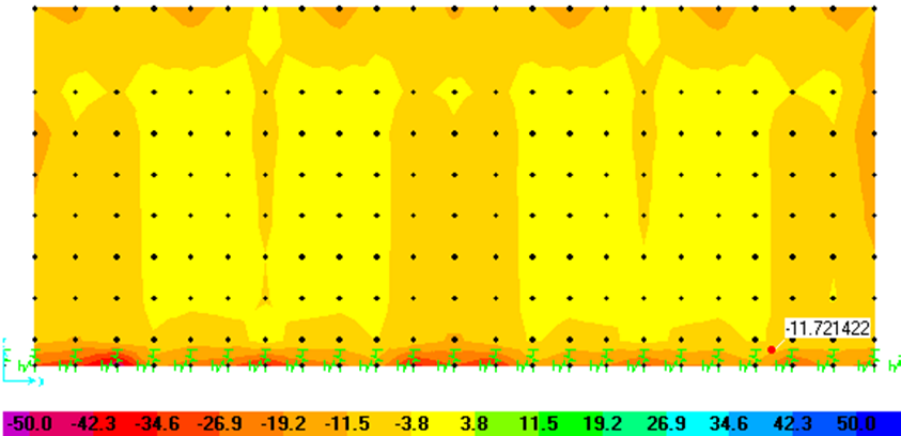


FIG. 4.313 - B7-B8(Q-13)-SETTO B- INVILUPPO MIN SLE(RARE)-M22

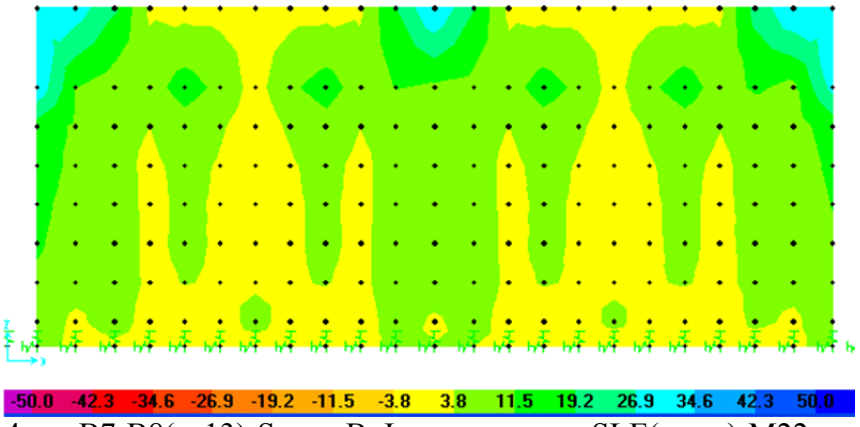


FIG. 4.314 - B7-B8(Q-13)-SETTO B- INVILUPPO MAX SLE(RARE)-M22

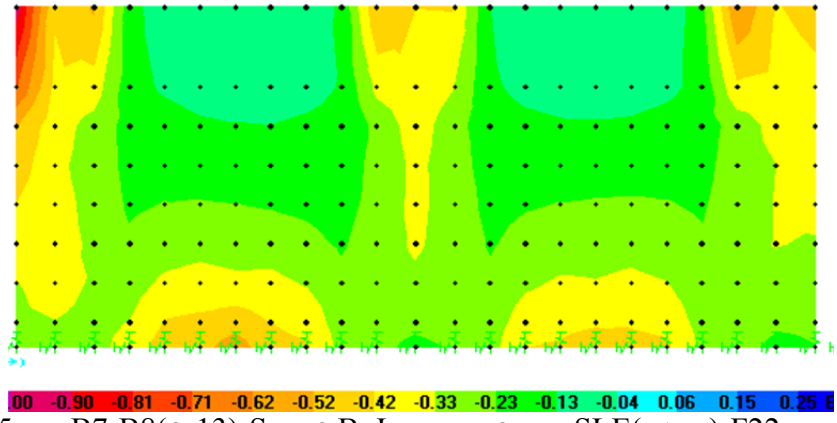


FIG. 4.315 - B7-B8(Q-13)-SETTO B- INVILUPPO MIN SLE(RARE)-F22

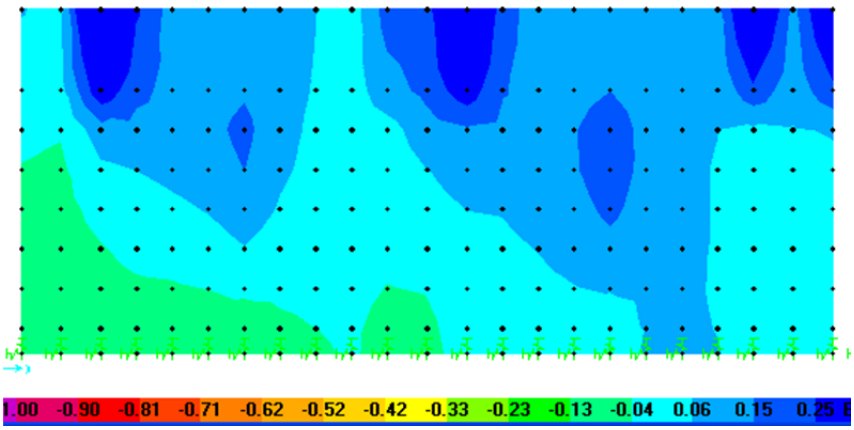


FIG. 4.316 - B7-B8(Q-13)-SETTO B- INVILUPPO MAX SLE(RARE)-F22

B7-B8(q-13)-Setto B - ferri verticali - Verifiche agli SLE (comb. rare)				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	+80kN	-50kNm	**11.4**	**298**
M_{max}/N_{max}	+80kN	+8kNm	**1.3**	**1**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+30kN	-40kNm	**3.8**	**166**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.070m				
M_{min}/N_{max}	+200kN	-8kNm	**1.7**	**157**
M_{max}/N_{max}	+200kN	+8kNm	**5.7**	**298**

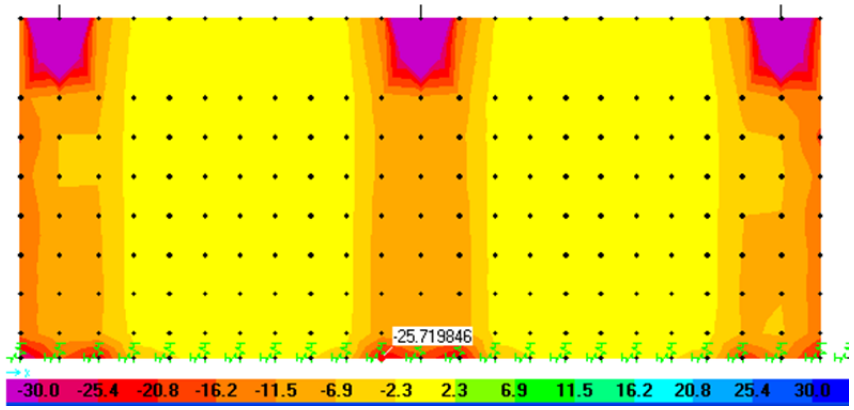


FIG. 4.317 - B7-B8(Q-13)-SETTO C- INVILUPPO MIN SLE(RARE)-M22

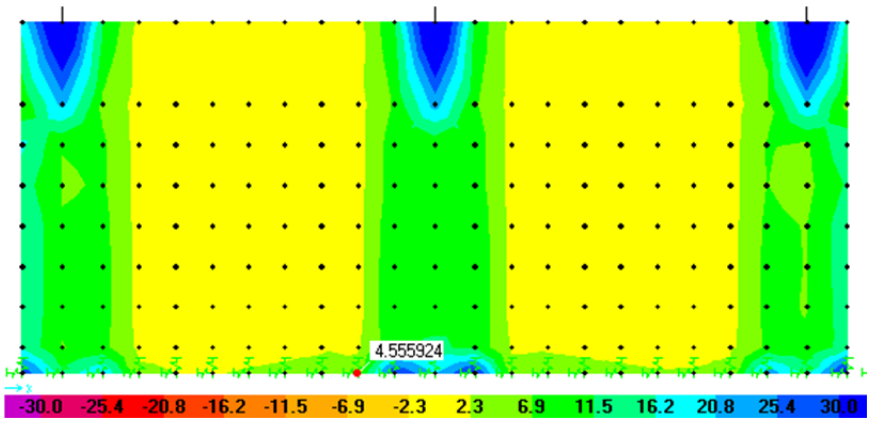


FIG. 4.318 - B7-B8(Q-13)-SETTO C- INVILUPPO MAX SLE(RARE)-M22

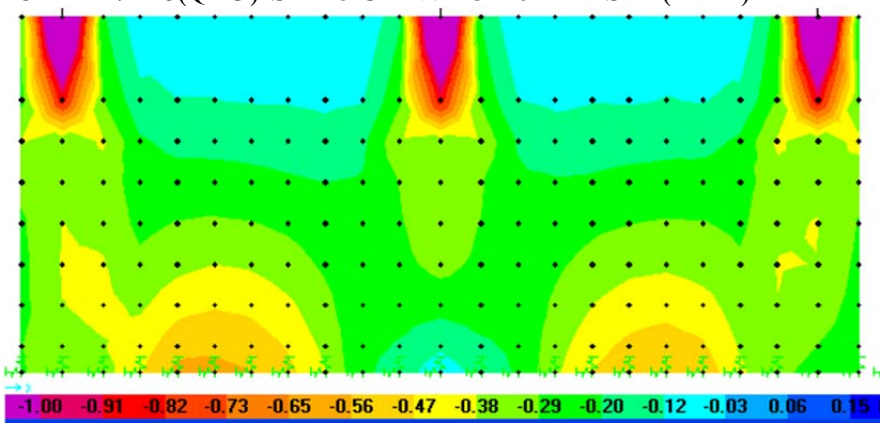


FIG. 4.319 - B7-B8(Q-13)-SETTO C- INVILUPPO MIN SLE(RARE)-F22

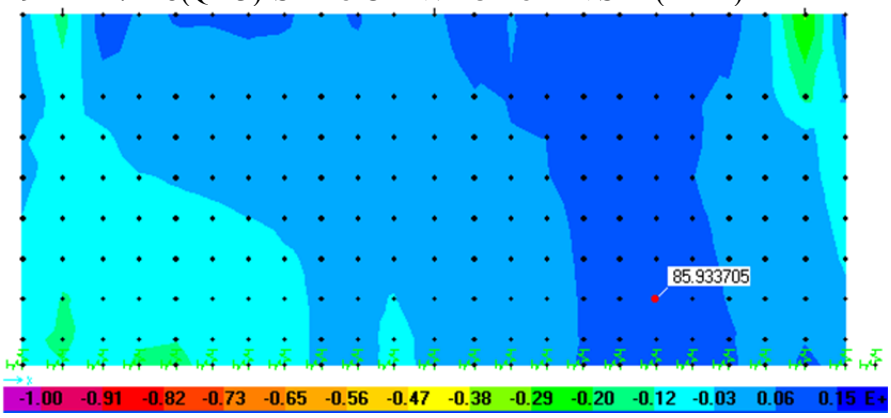


FIG. 4.320 - B7-B8(Q-13)-SETTO C- INVILUPPO MAX SLE(RARE)-F22

B7-B8(q-13)-Setto C - ferri verticali - Verifiche agli SLE (comb. rare)				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.171m, H2=0.079m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	+100kN	-4kNm	**1.2**	**105**
M_{max}/N_{max}	+100kN	+5kNm	**1.5**	**113**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+75kN	-25kNm	**1.2**	**131**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.178m, H2=0.072m				
M_{min}/N_{max}	+100kN	-4kNm	**1.1**	**142**
M_{max}/N_{max}	+100kN	+1kNm	-	**103**

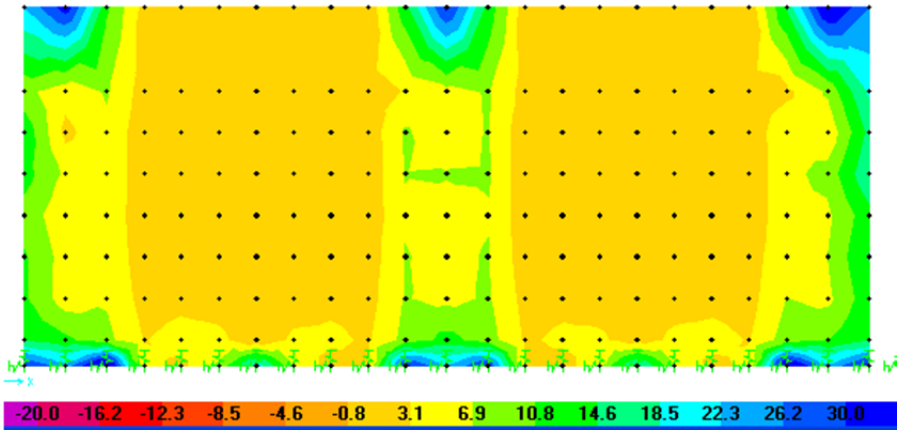


FIG. 4.321 - B7-B8(Q-13)-SETTO D- INVILUPPO MAX SLE(RARE)-M22

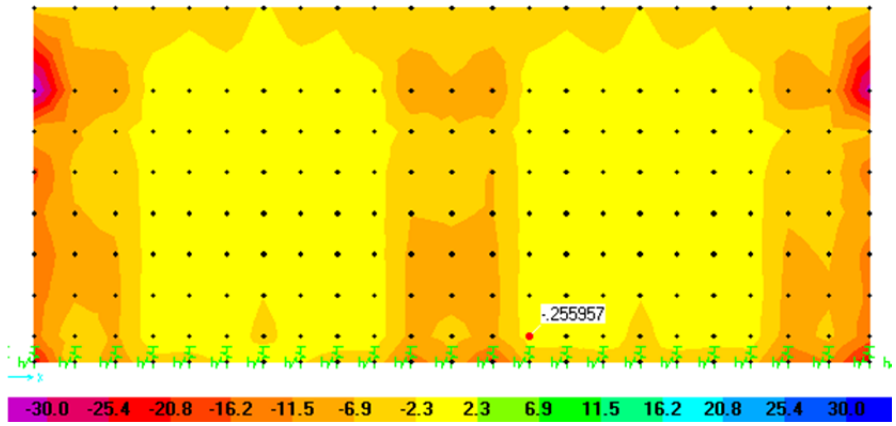


FIG. 4.322 - B7-B8(Q-13)-SETTO D- INVILUPPO MIN SLE(RARE)-M22

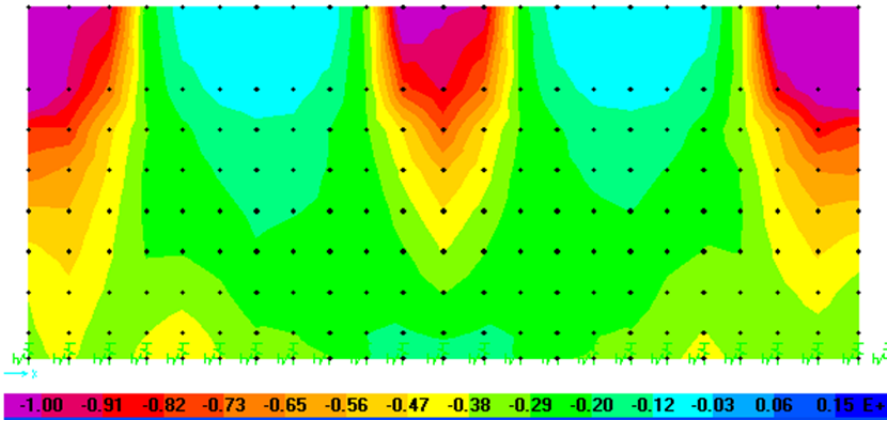


FIG. 4.323 - B7-B8(Q-13)-SETTO D- INVILUPPO MIN SLE(RARE)-F22

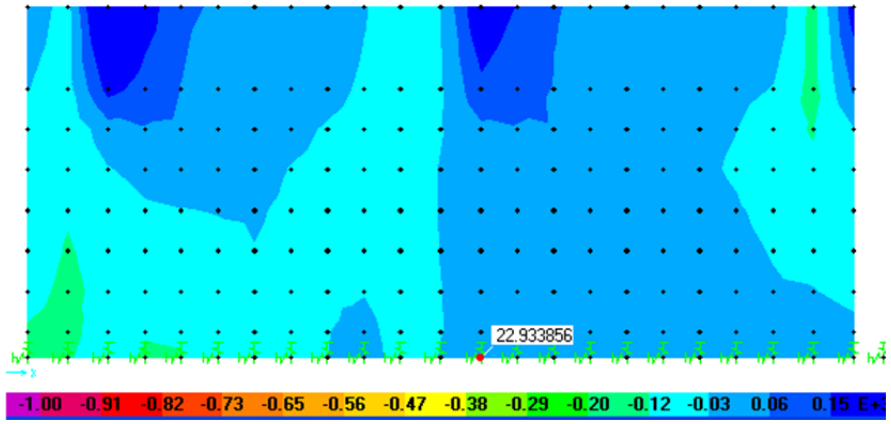


FIG. 4.324 - B7-B8(Q-13)-SETTO D- INVILUPPO MAX SLE(RARE)-F22

B7-B8(q-13)-Setto D - ferri verticali - Verifiche agli SLE (comb. rare)				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=565mm^2(θ12/200mm), H1=0.18m, H2=0.07m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	+30kN	-3kNm	**0.9**	**60**
M_{max}/N_{max}	+30kN	+20kNm	**5.5**	**232**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{max}/N_{max}	+30kN	+30kNm	**1.6**	**116**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+100kN	-5kNm	**1.4**	**152**
M_{max}/N_{max}	+100kN	+10kNm	**2.9**	**201**

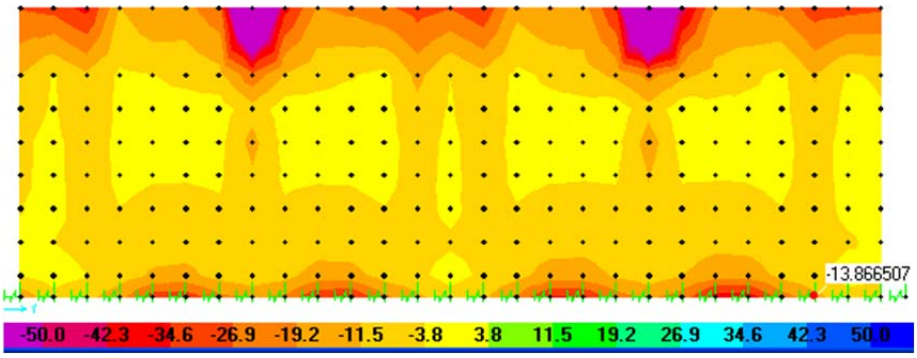


FIG. 4.325 - B7-B8(Q-13)-PARETE E- INVILUPPO MIN SLE(RARA)-M22

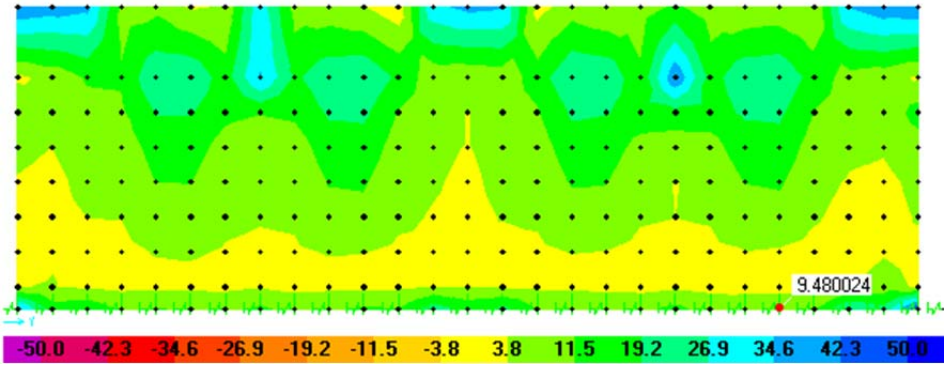


FIG. 4.326 - B7-B8(Q-13)-PARETE E - INVILUPPO MAX SLE(RARA)-M22

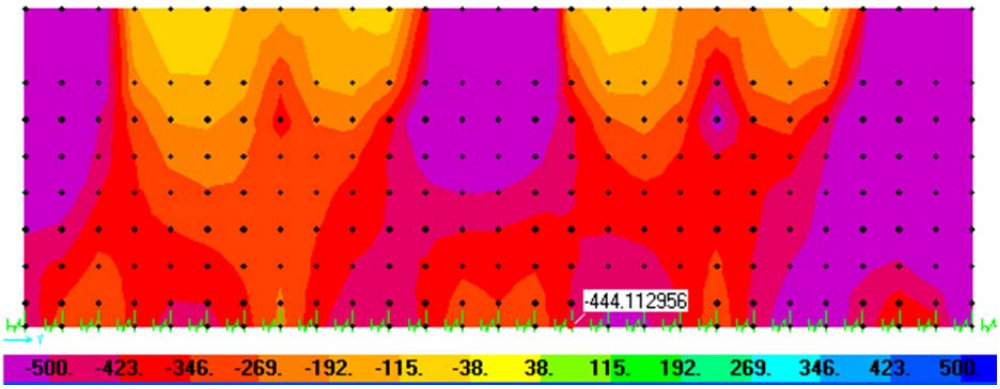


FIG. 4.327 - B7-B8(Q-13)-PARETE E - INVILUPPO MIN SLE(RARA)-F22

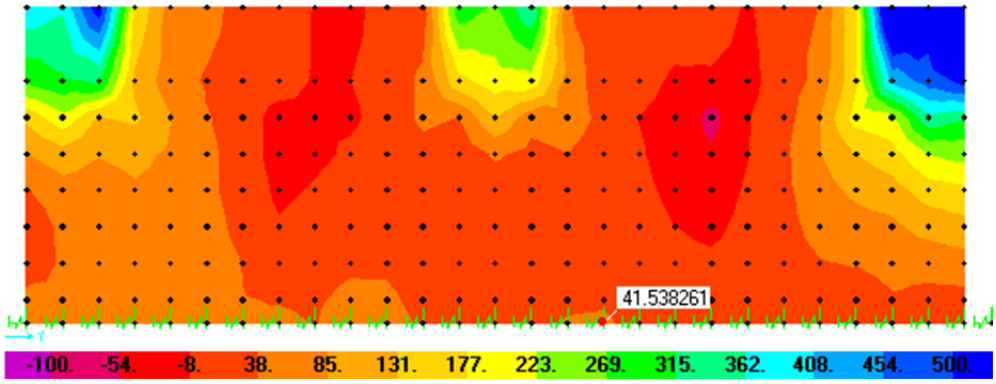


FIG. 4.328 - B7-B8(Q-13)-PARETE E - INVILUPPO MAX SLE(RARA)-F22

B7-B8(q-13)-Parete E - ferri verticali - Verifiche agli SLE (comb. rare)				
Monconi di ripresa - L=3.0m				
B=1.0m,H=0.5m,A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	+80kN	-40kNm	**2.3**	**295**
M_{max}/N_{max}	+80kN	+22kNm	**-**	**94**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=452mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+120kN	-20kNm	**-**	**188**
M_{max}/N_{max}	+120kN	+22kNm	**-**	**203**

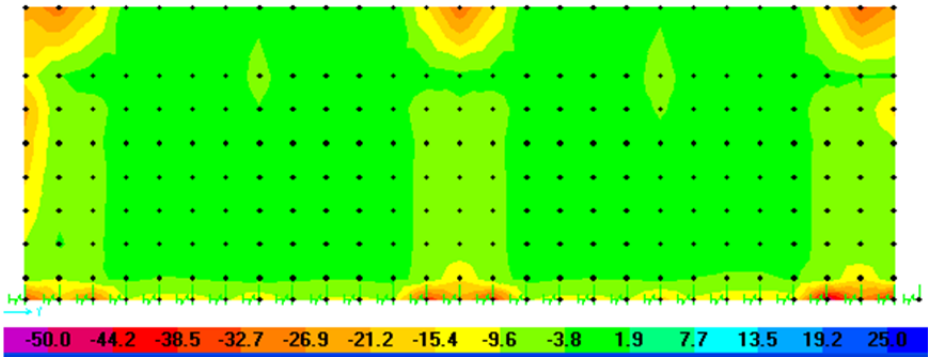


FIG. 4.329 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLE(RARE)-M22

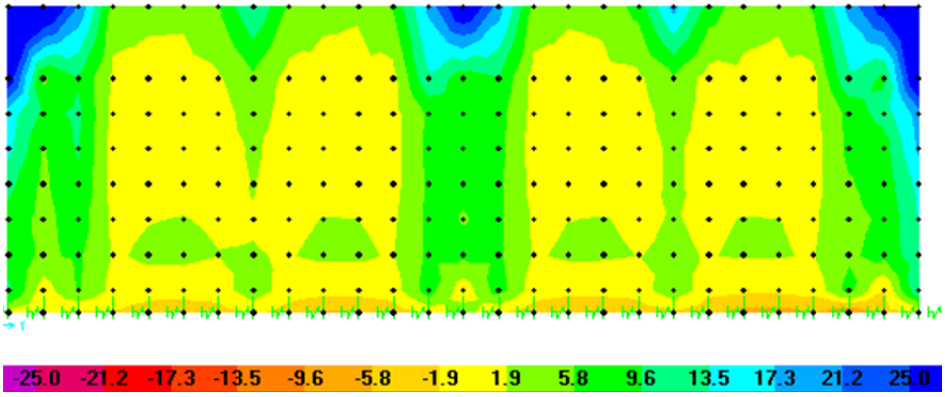


FIG. 4.330 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLE(RARE)-M22

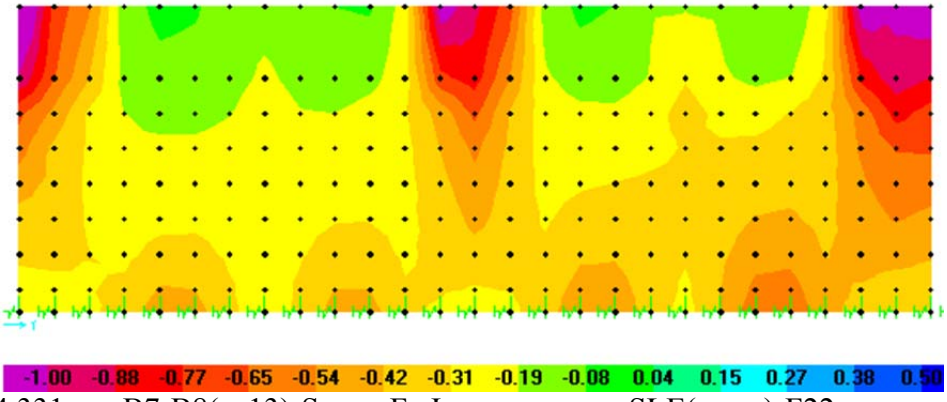


FIG. 4.331 - B7-B8(Q-13)-SETTO F - INVILUPPO MIN SLE(RARE)-F22

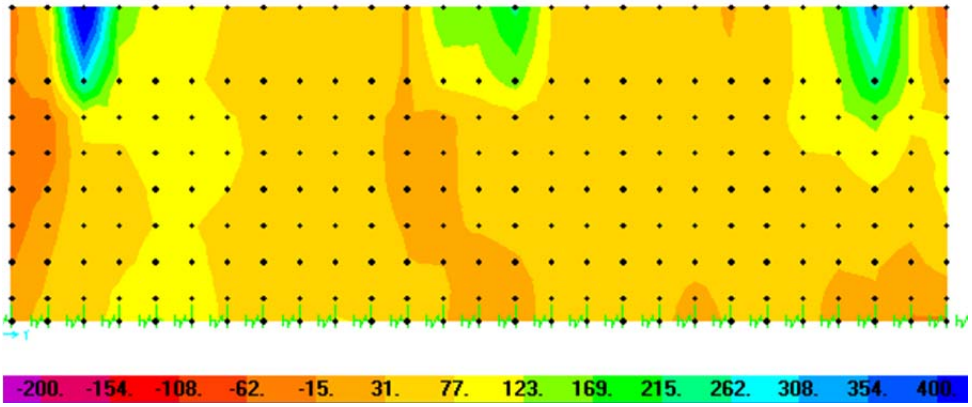


FIG. 4.332 - B7-B8(Q-13)-SETTO F - INVILUPPO MAX SLE(RARE)-F22

B7-B8(q-13)-Setto F - ferri verticali - Verifiche agli SLE(comb. rare)				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	-100kN	-10kNm	**1.8**	**15**
M_{max}/N_{max}	-100kN	+15kNm	**3.0**	**48**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m,H=0.50m,A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M/N_{max}	+100kN	-35kNm	**1.8**	**179**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+100kN	-10kNm	**2.9**	**201**
M_{max}/N_{max}	+100kN	+12kNm	**3.5**	**221**

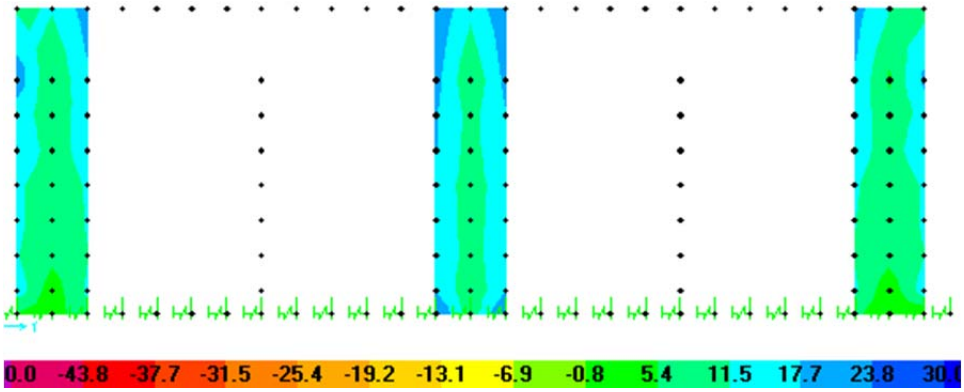


FIG. 4.333 - B7-B8(Q-13)-SETTI F/G - INVILUPPO MAX SLE(RARA)-M22

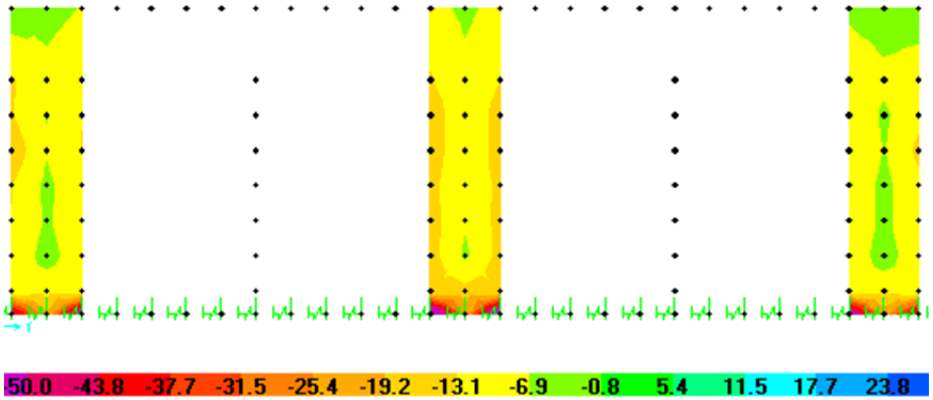


FIG. 4.334 - B7-B8(Q-13)-SETTI F/G - INVILUPPO MIN SLE(RARA)-M22

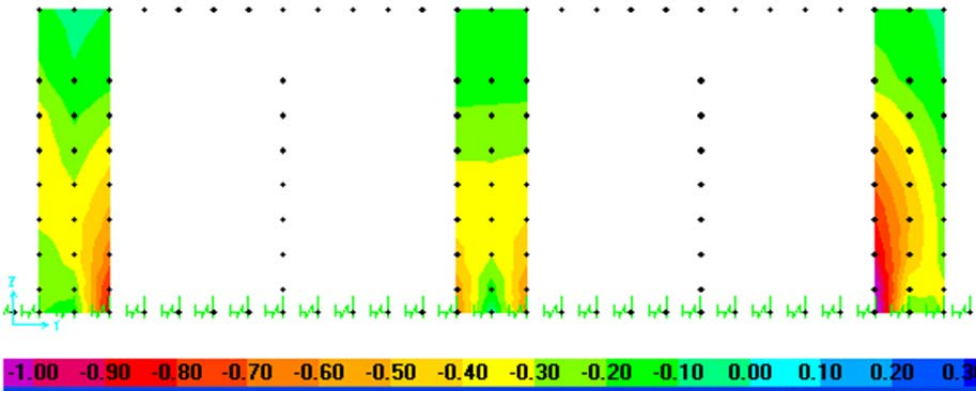


FIG. 4.335 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MIN SLE(RARA)-F22

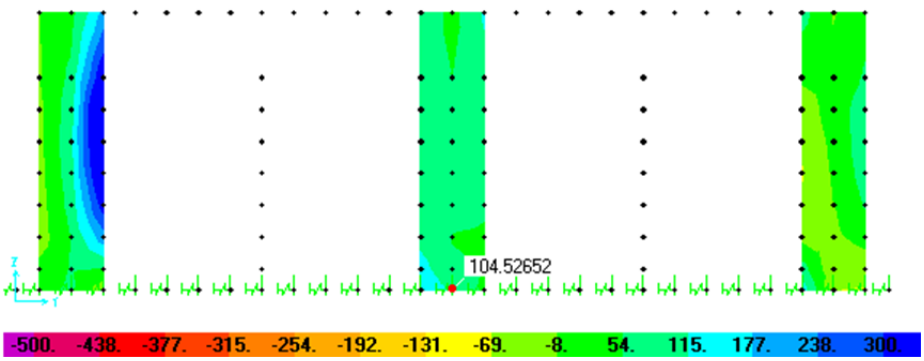


FIG. 4.336 - B7-B8(Q-13)-SETTI FRA F/G - INVILUPPO MAX SLE(RARA)-F22

B7-B8(q-13)-Setti fra F/G - ferri verticali - Verifiche agli SLE (comb. rara)				
Monconi di ripresa - L=3.0m - setti 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.431m, H2=0.069m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	+160kN	-40kNm	**1.8**	**235**
M_{max}/N_{max}	+160kN	+8kNm	**-**	**130**

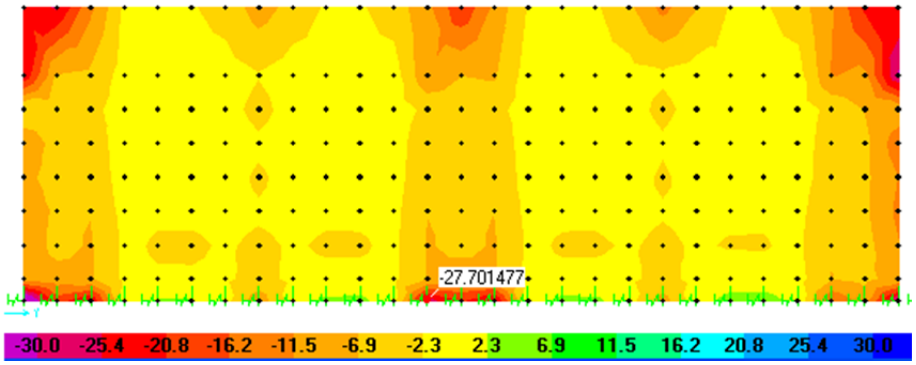


FIG. 4.337 - B7-B8(Q-13)-SETTI G - INVILUPPO MIN SLE(RARA)-M22

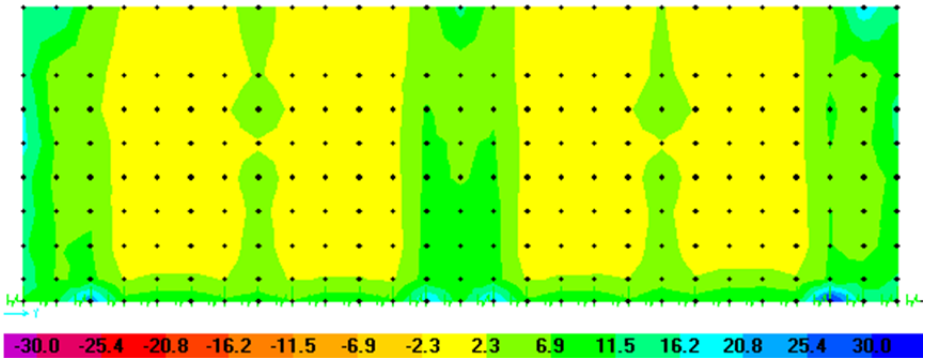


FIG. 4.338 - B7-B8(Q-13)-SETTI G - INVILUPPO MAX SLE(RARA)-M22

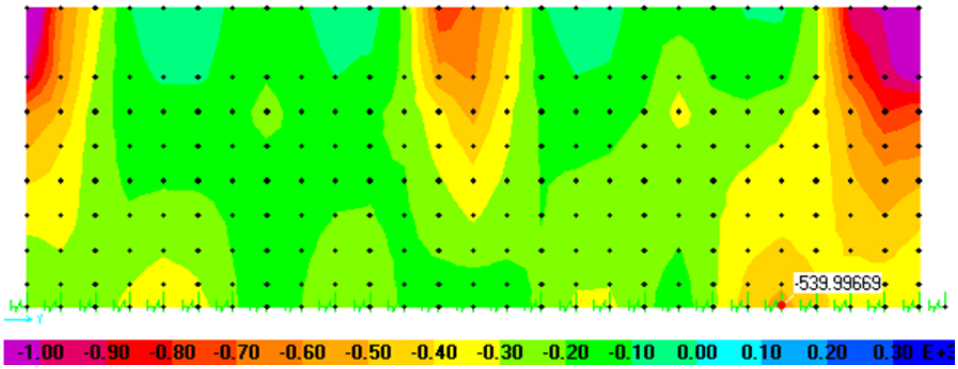


FIG. 4.339 - B7-B8(Q-13)-SETTI G - INVILUPPO MIN SLE(RARA)-F22

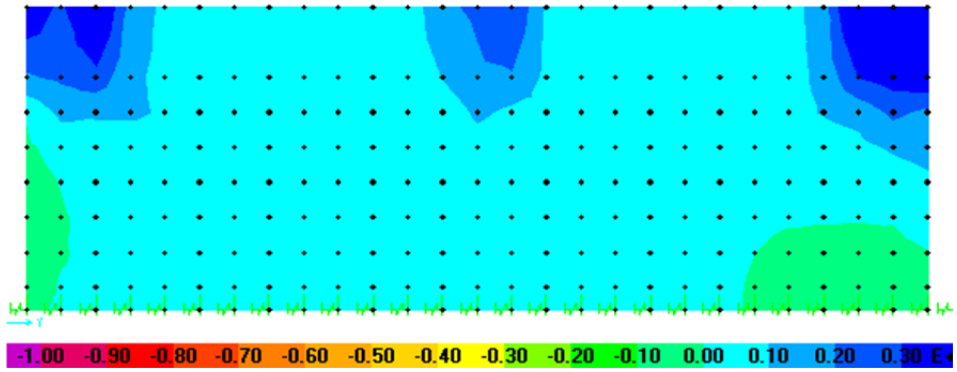


FIG. 4.340 - B7-B8(Q-13)-SETTI G - INVILUPPO MAX SLE(RARA)-F22

B7-B8(q-13)-Setto G - ferri verticali - Verifiche agli SLE (comb. rara)				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max}/M_{min}	+40kN	-7kNm	**1.8**	**83**
N_{max}/M_{max}	+40kN	+13kNm	**3.2**	**128**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
N_{max}/M_{max}	+10kN	+23kNm	**1.3**	**80**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
N_{max}/M_{min}	+130kN	-7kNm	**1.9**	**202**
N_{max}/M_{max}	+130kN	+3kNm	**1.1**	**1**

4.4 Cassoni modulo B7-B8-C7-C8 - Fusto C7-C8(q.11)

4.4.1 Verifiche ferri orizzontali agli SLU cassone C7-C8(q.-11)

Di seguito si riportano le verifiche del cemento armato del fusto del cassone per gli stati limiti ultimi.

Per la verifica dell'orditura orizzontale del fusto si considerano le combinazioni di carico d'esercizio riportate in precedenza.

Di seguito si riportano gli inviluppi dei momenti delle pareti e dei setti.

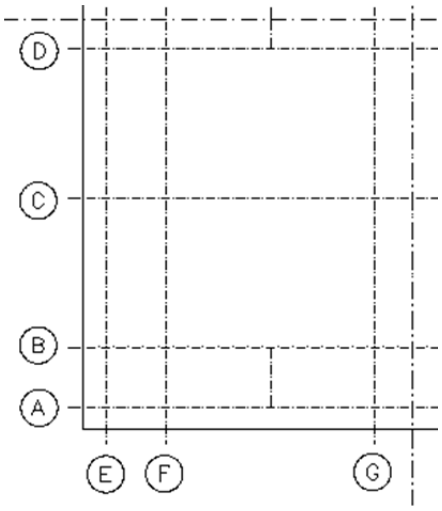


FIG. 4.341 - PIANTA CHIAVE PARETI E SETTI

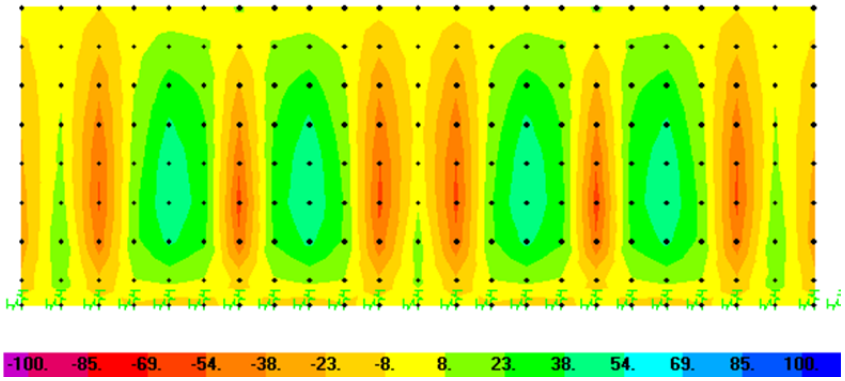


FIG. 4.342 - C7-C8(Q-11)-PARETE FILO A - GALLEGGIAMENTO E AFFONDAMENTO SLU-M11

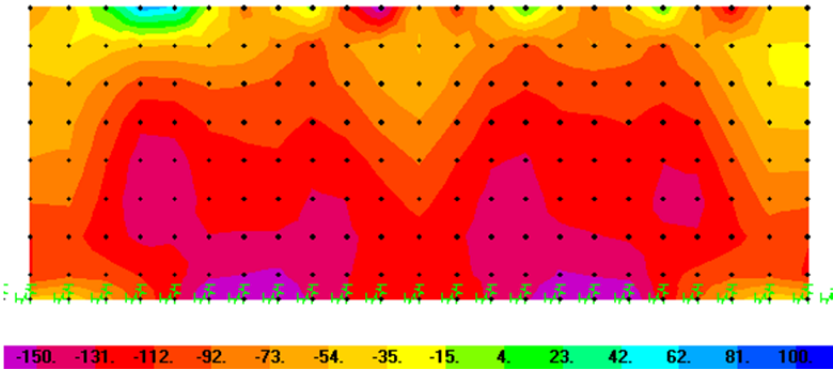


FIG. 4.343 - C7-C8(Q-11)-PARETE FILO A - GALLEGGIAMENTO E AFFONDAMENTO SLU-F11

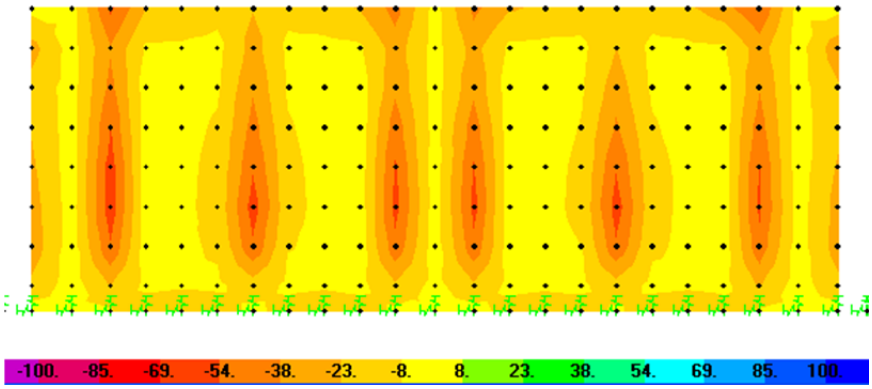


FIG. 4.344 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

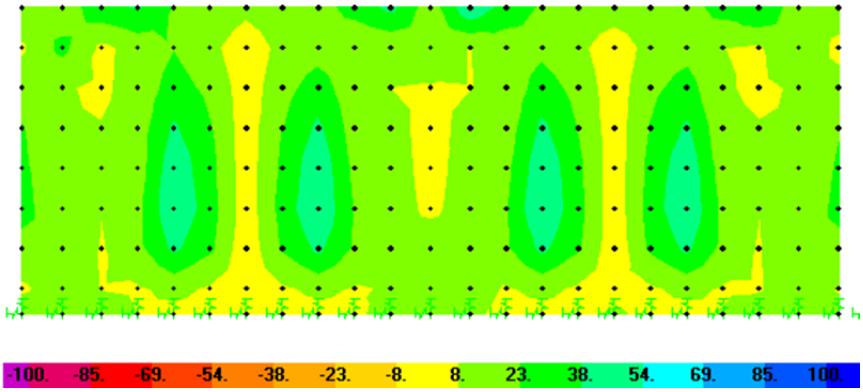


FIG. 4.345 - C7-C8(Q.-11) - PARETE FILO A - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

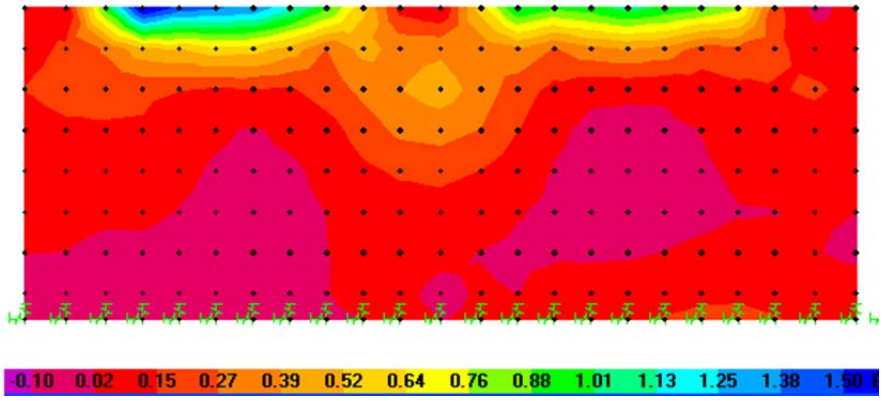


FIG. 4.346 - C7-C8(Q.-11) - PARETE FILO A - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

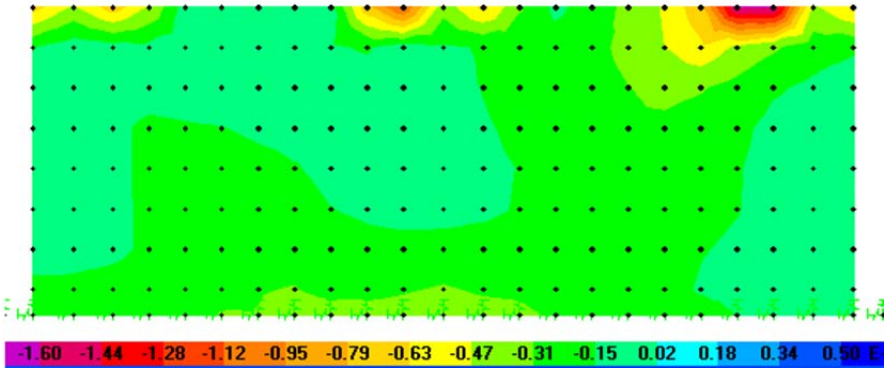


FIG. 4.347 - C7-C8(Q.-11) - PARETE FILO A - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

C7-C8(q.-11) - Parete A - ferri orizzontali - Verifiche agli SLU				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
Aff/gall	-130kN(aff/gall)	-60kNm	-143kNm	**2.38**
N_{max} /M_{min}	+0kN	-63kNm	-114kNm	**1.81**
N_{max} /M_{max}	+0kN	+50kNm	+114kNm	**2.25**
Da +5.50				
B=1.0m,H=0.5m,A1=A2=1829mm^2(θ22/250+ θ14/500), H1=0.439m, H2=0.061m				
N_{max}	+1200kN(tens.)	-40kNm	-56kNm	**1.40**

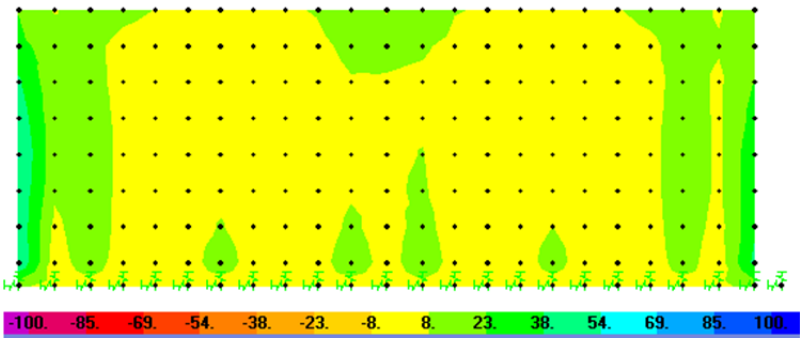


FIG. 4.348 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

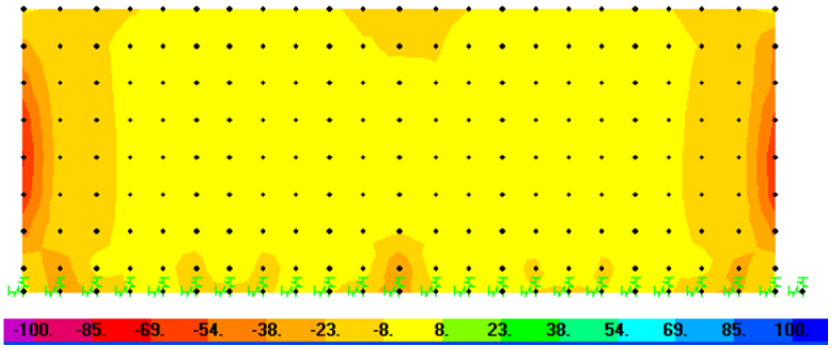


FIG. 4.349 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

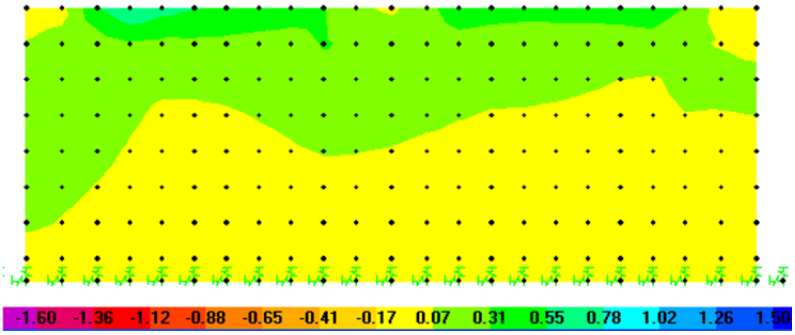


FIG. 4.350 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

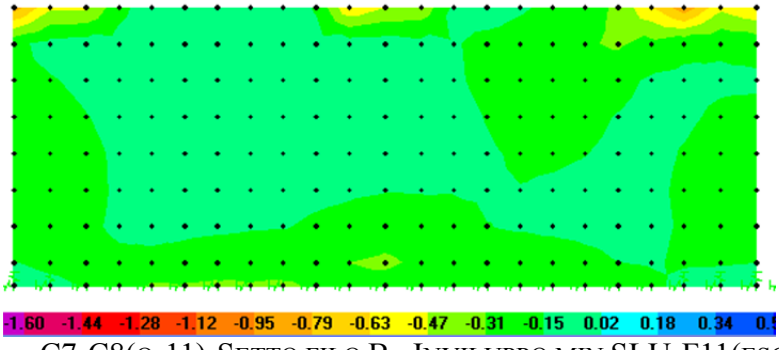


FIG. 4.351 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

C7-C8(q-11)-Setto B - ferri orizzontali - Verifiche agli SLU				
da 0 a +5.50				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max} /M_{min}	+200kN(tens)	-17kNm	-49kNm	**2.88**
N_{max} /M_{max}	+200kN	+20kNm	+49kNm	**2.45**
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
N_{max}/M_{min}	+150kN	-69kNm	-80kNm	**1.15**
da +5.50				
B=1.0m,H=0.5m,A1=A2=1257mm^2(θ18/250mm), H1=0.441m, H2=0.059m				
N_{max}	+400kN	-13kNm	-95kNm	**7.3**
B=1.0m,H=0.25m,A1=A2=1257mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+450kN	+15kNm	+40kNm	**2.67**

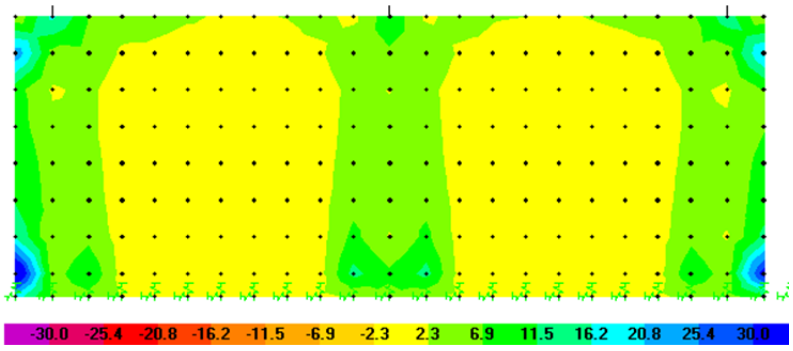


FIG. 4.352 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

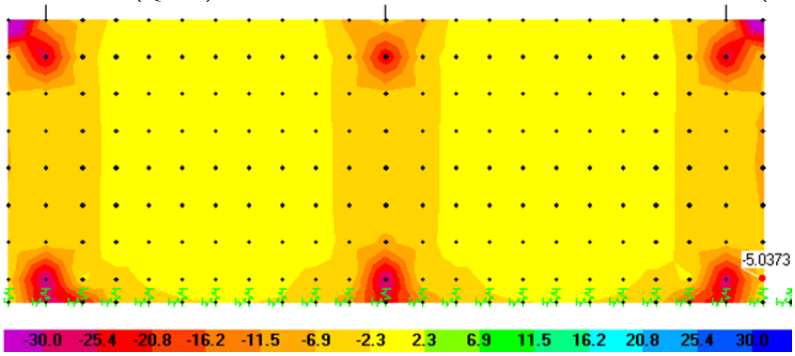


FIG. 4.353 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

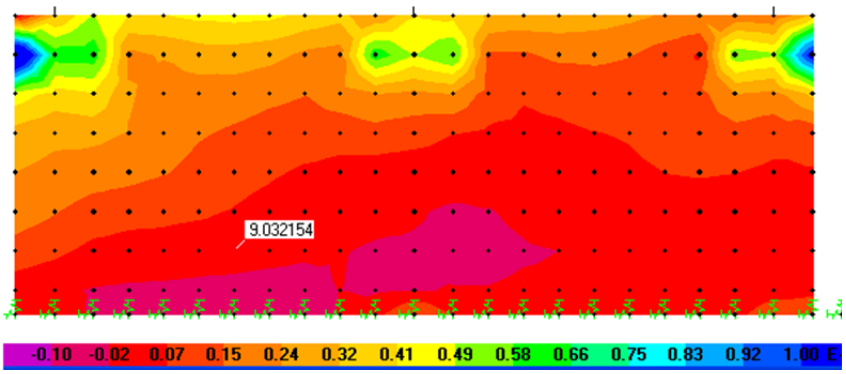


FIG. 4.354 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

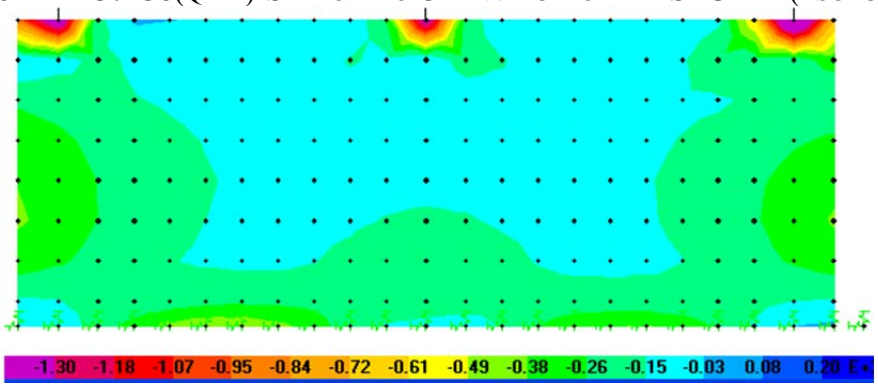


FIG. 4.355 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

C7-C8(q-11)-Setto C - ferri orizzontali - Verifiche agli SLU				
da 0 a +5.50				
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250mm), H1=0.189m, H2=0.061m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{sd}**
N_{max}/M_{min}	+330kN	-7kNm	+85kNm	**12**
N_{max}/M_{max}	+330kN	+5kNm	-85kNm	**17**
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
M_{min}	+330kN	+30kNm	+37kNm	**1.23**
da +5.50				
B=1.0m,H=0.5m,A1=A2=1524mm^2(θ22/250), H1=0.439m, H2=0.061m				
N_{max}	+900kN	-26kNm	-70kNm	**2.69**
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250), H1=0.189m, H2=0.061m				
N_{max}	+600kN	-5kNm	-65kNm	**13.0**

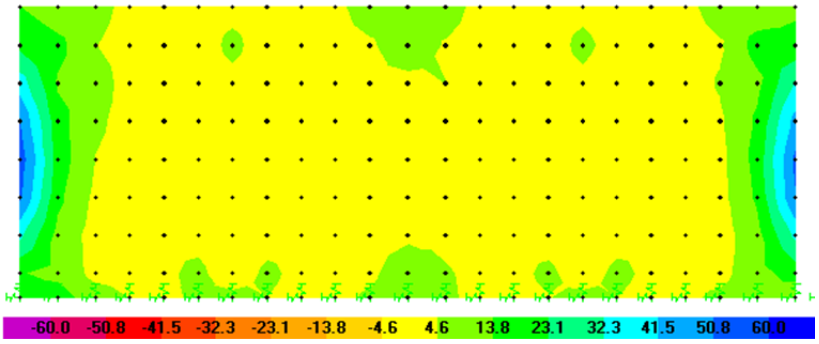


FIG. 4.356 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

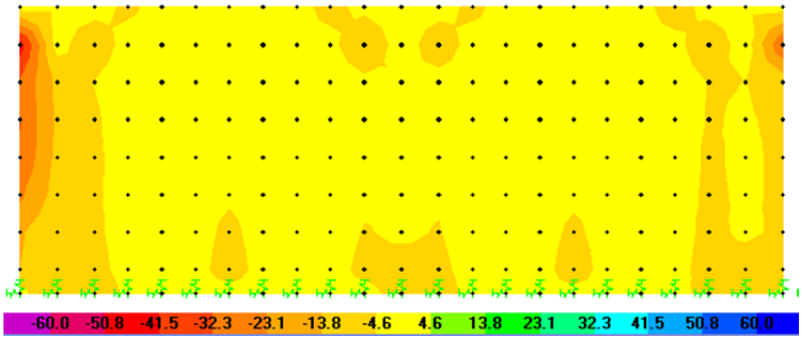


FIG. 4.357 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

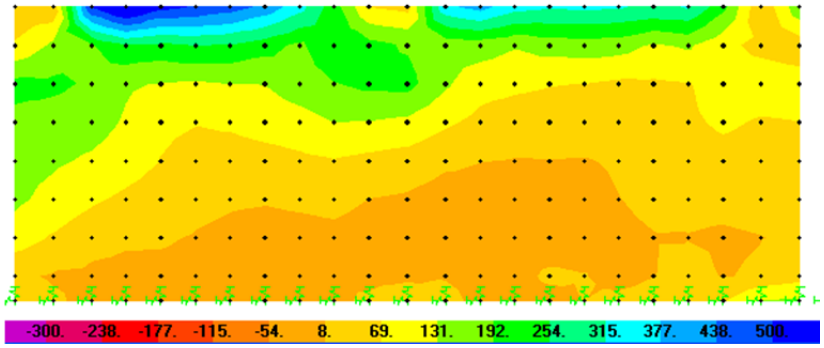


FIG. 4.358 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

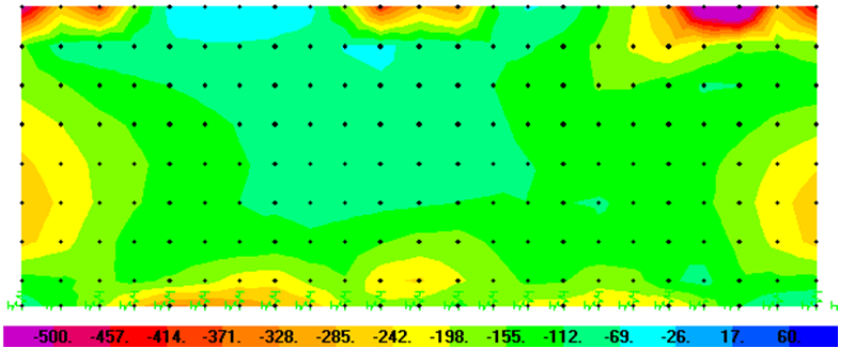


FIG. 4.359 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

C7-C8(q-11)-Setto D - ferri orizzontali - Verifiche agli SLU				
da 0 a +5.50				
B=1.0m,H=0.25m,A1=A2=534mm^2(θ12/500mm+ θ14/500mm), H1=0.193m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max}/M_{min}	+160kN(tens)	-7kNm	-30kNm	**4.3**
N_{max}/M_{max}	+160kN	+10kNm	+30kNm	**3.00**
B=1.0m H=0.5m A1=A2=710mm^2(θ16/500mm+ θ14/500mm), H1=0.442m, H2=0.058m in corrispondenza di parete E				
N_{max}/M_{min}	+190kN	-46kNm	-88kNm	**1.91**
N_{max}/M_{max}	+190kN	+55kNm	+88kNm	**1.60**
da +5.50				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m, solo in corrispondenza di parete E				
N_{max}	+400kN	-37kNm	-95kNm	**2.56**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+400kN	+10kNm	+45kNm	**4.5**

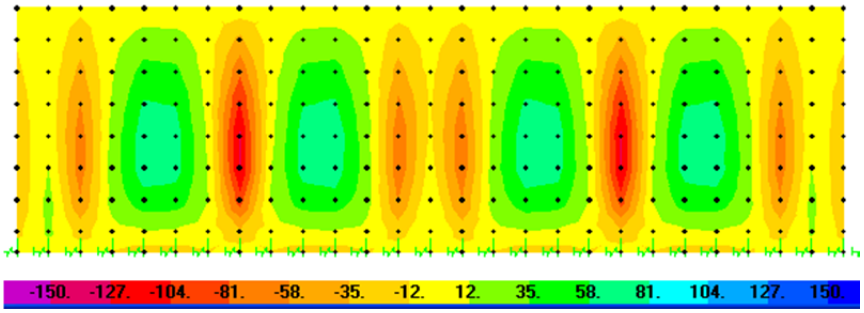


FIG. 4.360 - C7-C8(Q-11)-PARETE FILO E - AFF. & GALL. SLU-M11

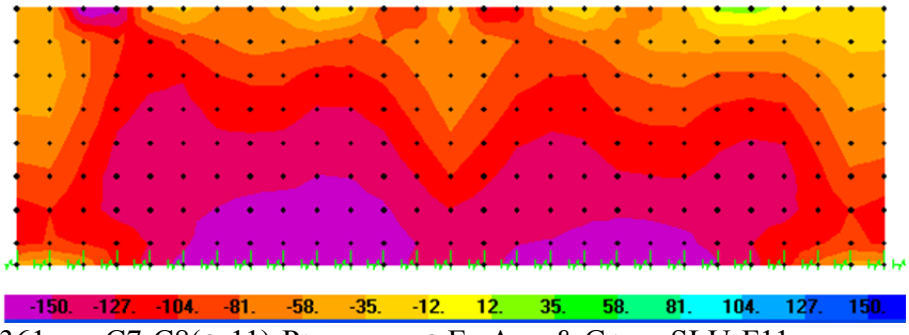


FIG. 4.361 - C7-C8(Q-11)-PARETE FILO E - AFF. & GALL. SLU-F11

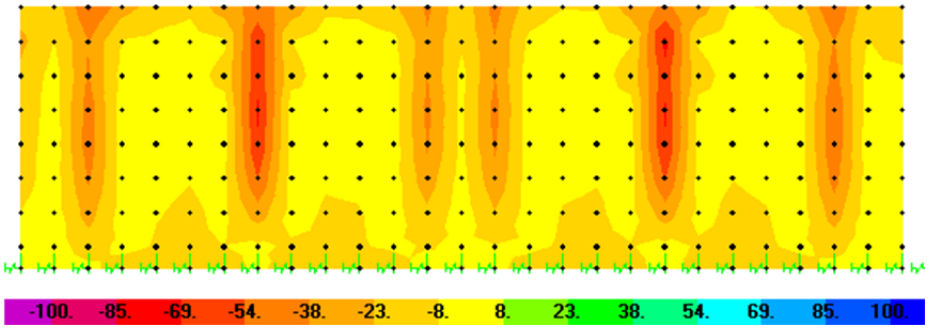


FIG. 4.362 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

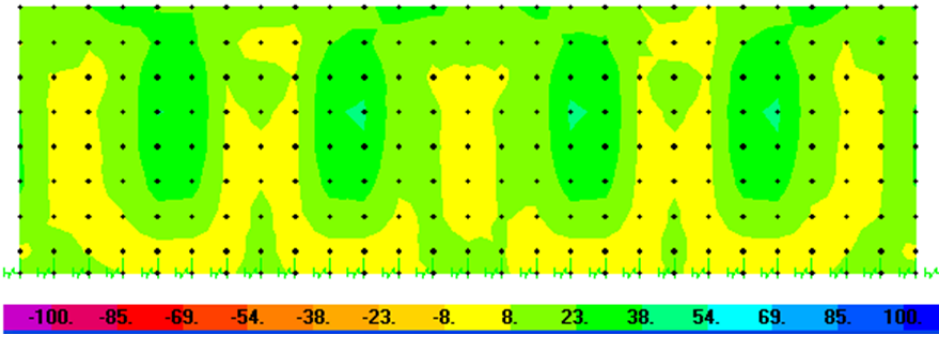


FIG. 4.363 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

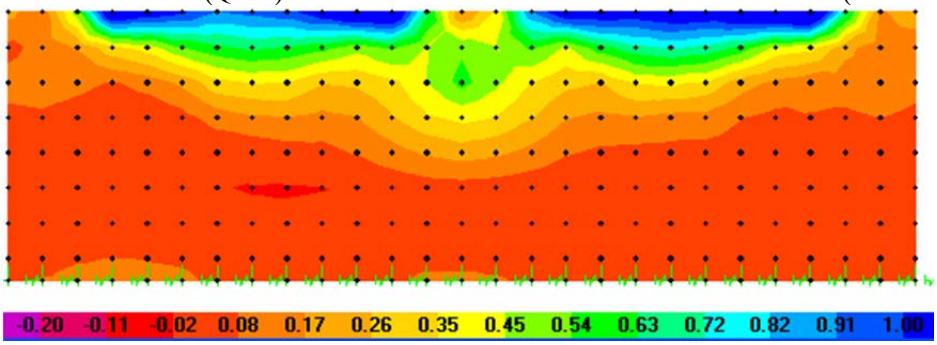


FIG. 4.364 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

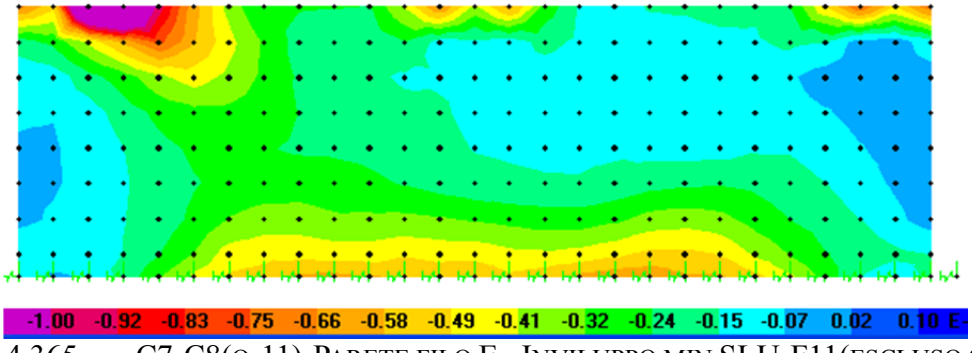


FIG. 4.365 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

C7-C8(q-11)-Parete E - ferri orizzontali - Verifiche agli SLU				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=804mm^2(θ16/250mm), H1=0.442m, H2=0.058m				
Combinazione	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
Aff / Gall	-100kN	-130kNm	-166kNm	**1.28**
N_{max}/M_{min}	+350kN(tens.)	-60kNm	-68kNm	**1.13**
N_{max}/M_{max}	+350kN	+37kNm	+68kNm	**1.84**
Da +5.50				
B=1.0m,H=0.5m,A1=A2=1884mm^2(θ20/250+ θ20/500mm), H1=0.440m, H2=0.06m				
N_{max}	+950kN	+37kNm	+124kNm	**3.35**

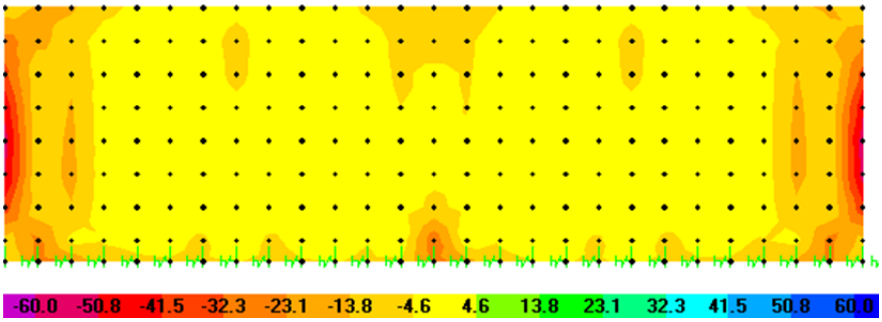


FIG. 4.366 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

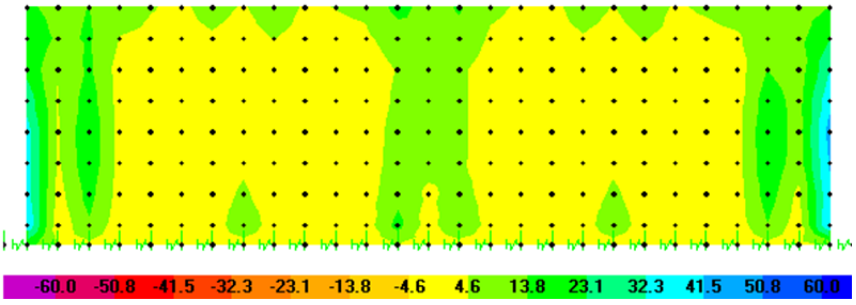


FIG. 4.367 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

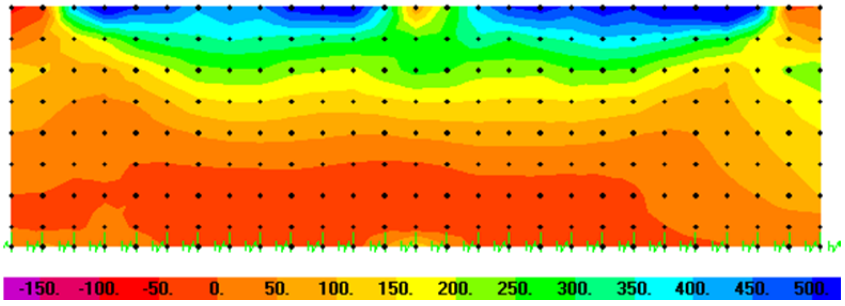


FIG. 4.368 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

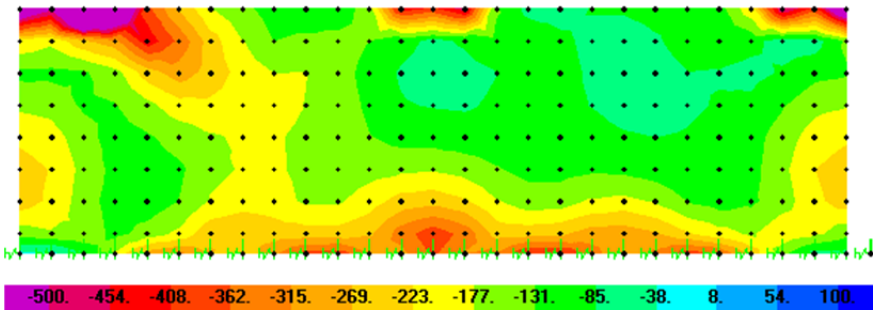


FIG. 4.369 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

C7-C8(q-11)-Setto F - ferri orizzontali - Verifiche agli SLU				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m in corrispondenza della parete A				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
N_{max}/M_{min}	+200kN	-50kNm	-68kNm	**1.36**
N_{max}/M_{max}	+200kN	+40kNm	+68kNm	**1.7**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
N_{max}/M_{min}	+200kN	-20kNm	-33kNm	**1.65**
N_{max}/M_{max}	+200kN	+20kNm	+33kNm	**1.65**
Da +5.50				
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+480kN	+20kNm	+37kNm	**1.85**

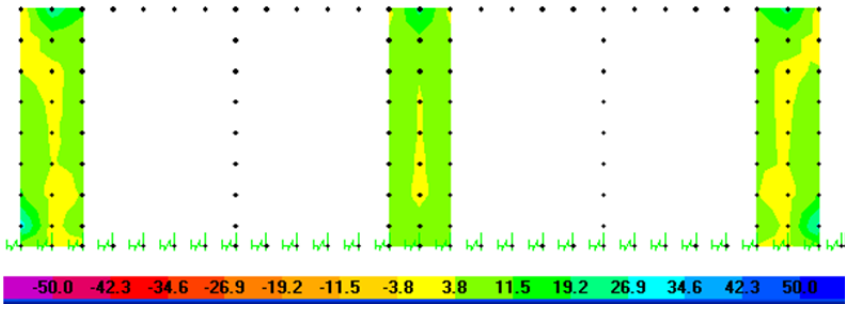


FIG. 4.370 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

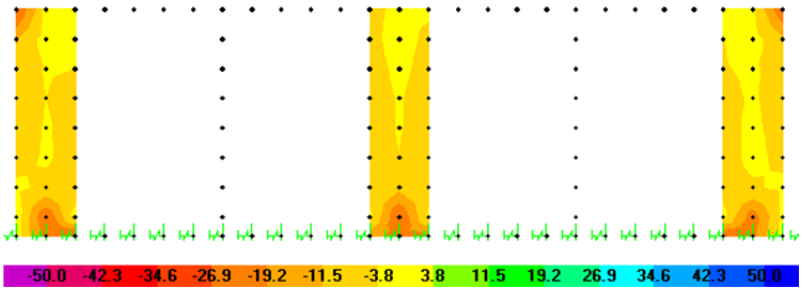


FIG. 4.371 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

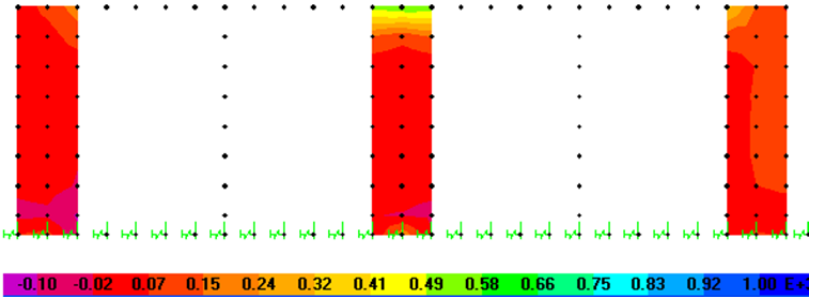


FIG. 4.372 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

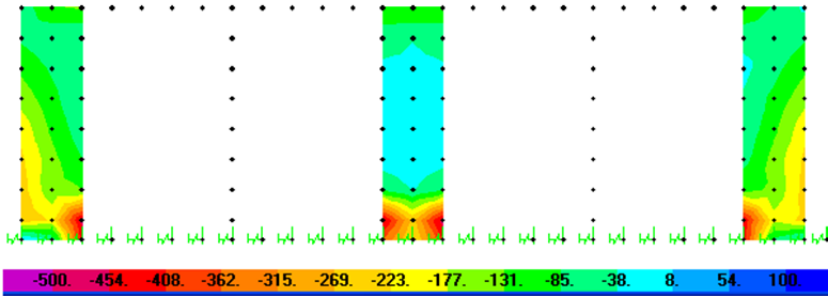


FIG. 4.373 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

C7-C8(q-11)-Setti fra F/G - ferri orizzontali - Verifiche agli SLU				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=452mm^2(θ12/250mm), H1=0.444m, H2=0.056m in corrispondenza della parete A				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
N_{max} /M_{min}	+120kN	-24kNm	-57kNm	**2.38**
N_{max} /M_{max}	+120kN	+28kN	+57kNm	**2.04**
Da +5.50				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
N_{max}	+330kN	+15kNm	+37kNm	**2.47**

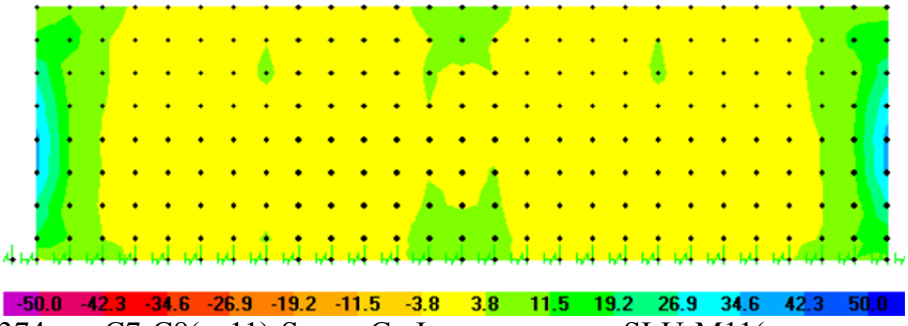


FIG. 4.374 - C7-C8(Q-11)-SETTO G - INVILUPPO MAX SLU-M11(ESCLUSO SISMA)

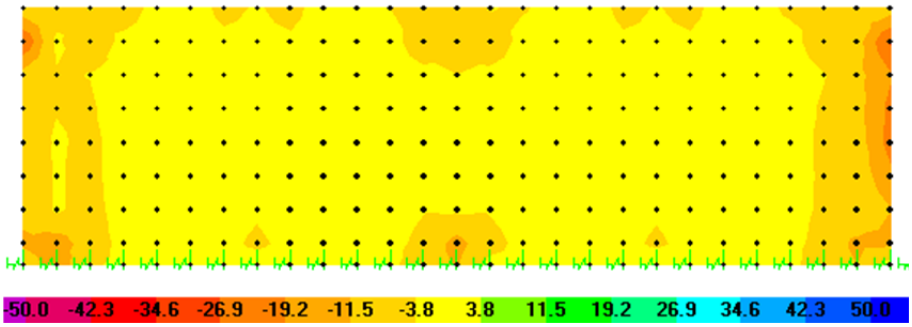


FIG. 4.375 - C7-C8(Q-11)-SETTO G - INVILUPPO MIN SLU-M11(ESCLUSO SISMA)

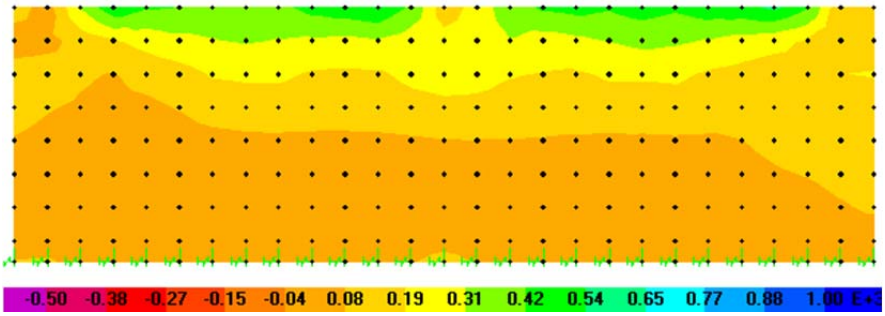


FIG. 4.376 - C7-C8(Q-11)-SETTO G - INVILUPPO MAX SLU-F11(ESCLUSO SISMA)

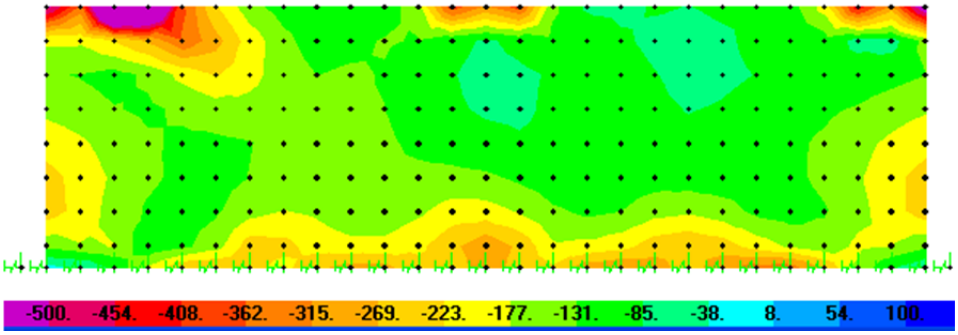


FIG. 4.377 - C7-C8(Q-11)-SETTO G - INVILUPPO MIN SLU-F11(ESCLUSO SISMA)

C7-C8(q-11)-Setto G - ferri orizzontali - Verifiche agli SLU				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max}/M_{min}	+130kN	-21kNm	-85kNm	**4.05**
N_{max}/M_{max}	+130kN	+34kNm	+85kNm	**2.50**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
N_{max}/M_{min}	+100kN	-5kNm	-44kNm	**8.8**
N_{max}/M_{max}	+100kN	+6kNm	+44kNm	**7.3**
Da +5.50				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
N_{max}	+400kN	+11kNm	+27kNm	**2.45**

4.4.2 Verifiche a taglio fusto C7-C8(q-11)

Di seguito si riportano i diagrammi di taglio per le pareti. Per quanto riguarda i setti si esegue una verifica per la fase di affondamento dove si prevede un dislivello d'acqua fra celle contigue di 1m.

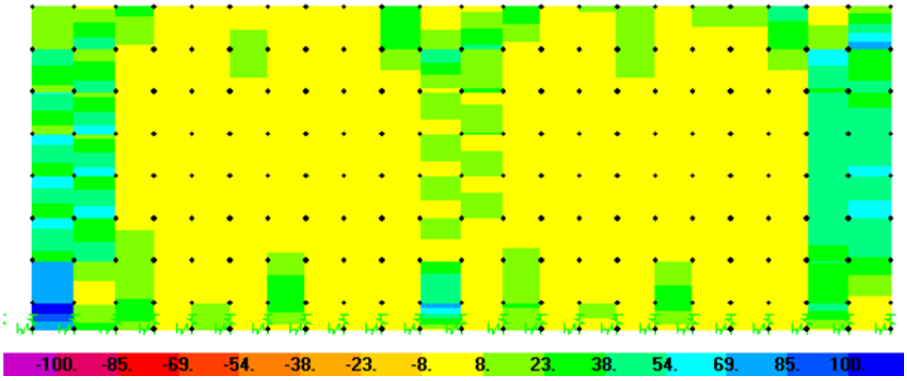


FIG. 4.378 - C7-C8(Q-11)-PARETE A - INVILUPPO MAX SLU-V13(ESCLUSO SISMA)

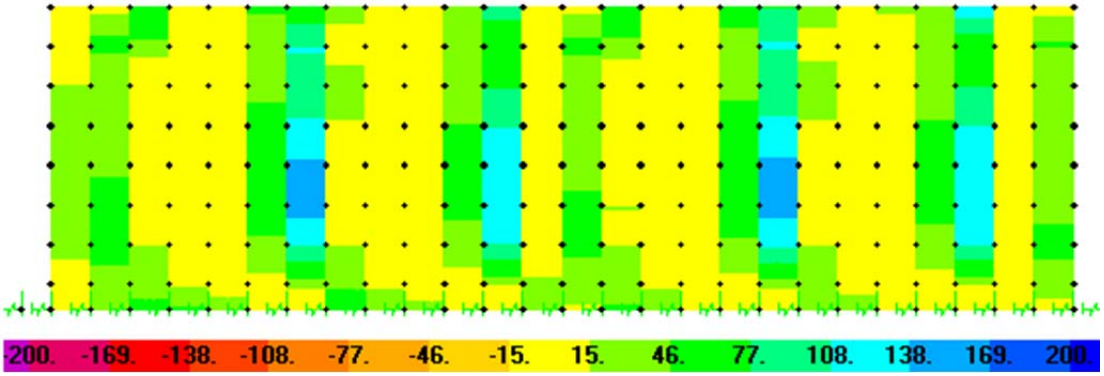


FIG. 4.379 - C7-C8(Q-11)-PARETE E - INVILUPPO MAX SLU-V13(ESCLUSO SISMA)

Il taglio massimo è pari a 140kN/m. Si considera in favore di sicurezza uno sforzo di trazione di 55kN/m.

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	**VRD**
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
Parete E	-55	500	443	616	57	616	140	0.12	1.67	0.0014	35	19.8	-0.11	0.15	0.45	143	190.99	**191**

Per quanto riguarda i setti interni si considera un dislivello di 1m di acqua fra celle contigue non comunicati in fase di affondamento del cassone.

Il caso peggiore sarebbe per il setto C che ha una luce netta di 6.6m ed uno spessore di 25cm per cui il taglio agli SLU è pari a:

V_{Sd}=1.3x10.1x6.6/2=43kN/m circa

con uno sforzo di trazione pari a:

N_{Sd}=1.3x10.1x4.6=+60kN/m circa

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	**VRD**
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
Setto C	-60	250	193	616	57	616	43	0.12	2.00	0.0032	35	19.8	-0.24	0.15	0.59	97	106.08	**106**

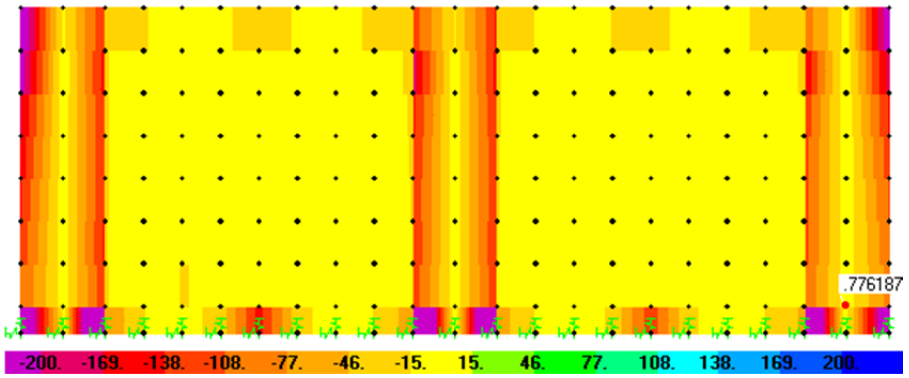


FIG. 4.380 - C7-C8(Q-11)-PARETE A - INVILUPPO MAX SLU-V23(ESCLUSO SISMA)

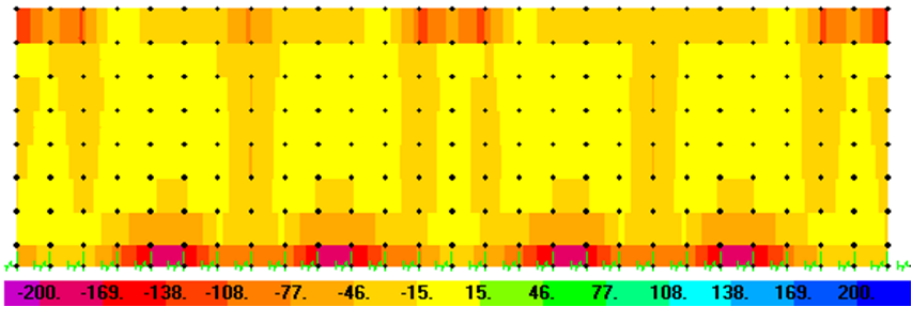


FIG. 4.381 - C7-C8(Q-11)-PARETE E - INVILUPPO MAX SLU-V23(ESCLUSO SISMA)

Il taglio massimo è pari a 190kN/m. Si considera uno sforzo normale di compressione di 98kN/m pari al peso proprio della parete.

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	**VRD**
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
Parete E V23	98	500	429	616	74	616	190	0.12	1.68	0.0014	35	19.8	0.2	0.15	0.45	161	207	**207**

Per il setto C si considera in favore di sicurezza che il taglio è pari a:

V_{Sd}=1.3x10.1x7.65=100kN/m

In presenza di uno sforzo normale di compressione pari a 49kN/m.

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	**VRD**
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
Parete C V23	49	250	179	452	74	452	100	0.12	2.00	0.0034	35	19.8	0.2	0.15	0.59	104	110	**110**

4.4.3 Monconi di ripresa e ferri verticali fusto - SLU C7-C8(q-11)

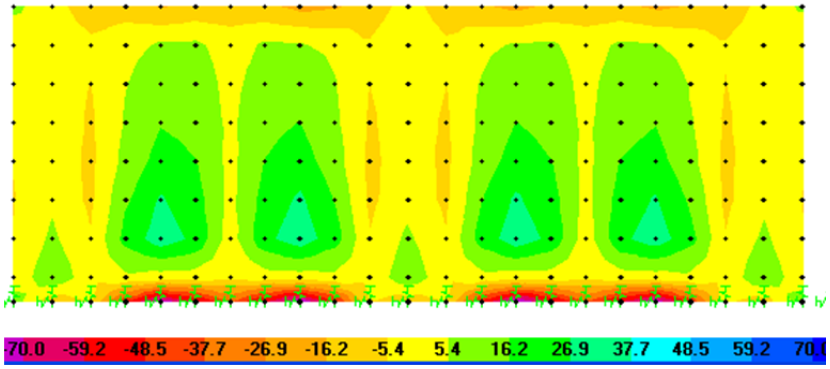


FIG. 4.382 - C7-C8(Q-11)-PARETE A - GALL. & AFF. SLU-M22

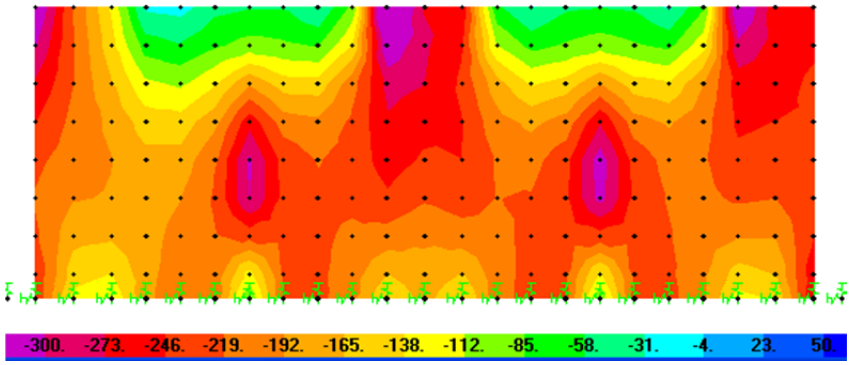


FIG. 4.383 - C7-C8(Q-11)-PARETE A - GALL. & AFFONDAMENTO SLU-F22

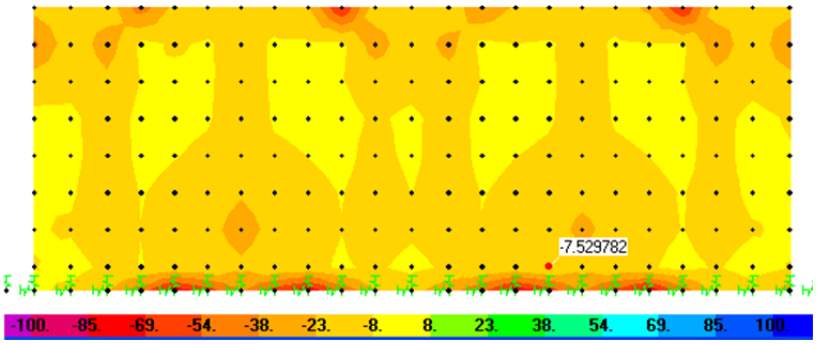


FIG. 4.384 - C7-C8(Q-11)-PARETE A - INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

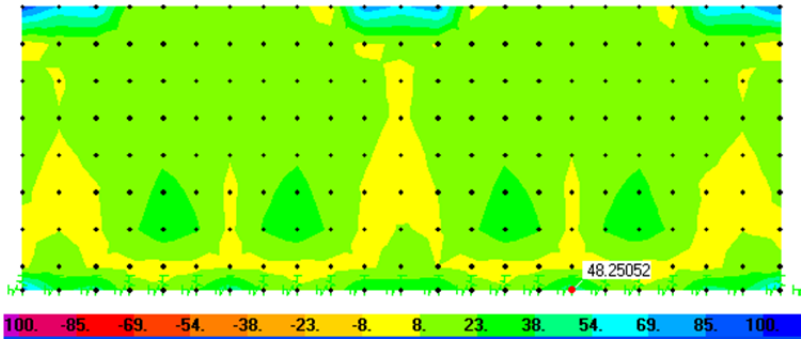


FIG. 4.385 - C7-C8(Q-11)-PARETE A - INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

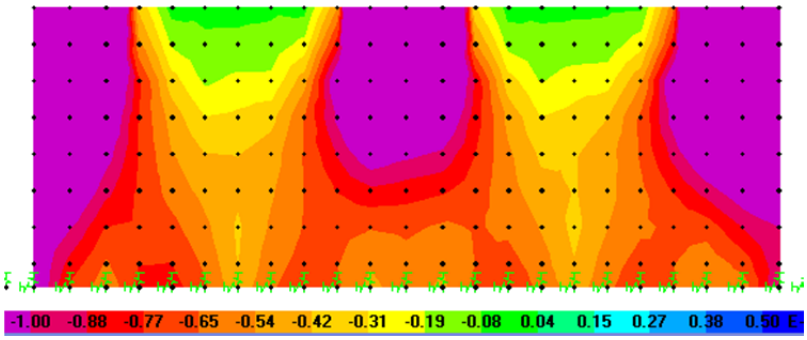


FIG. 4.386 - C7-C8(Q-11)-PARETE A - INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

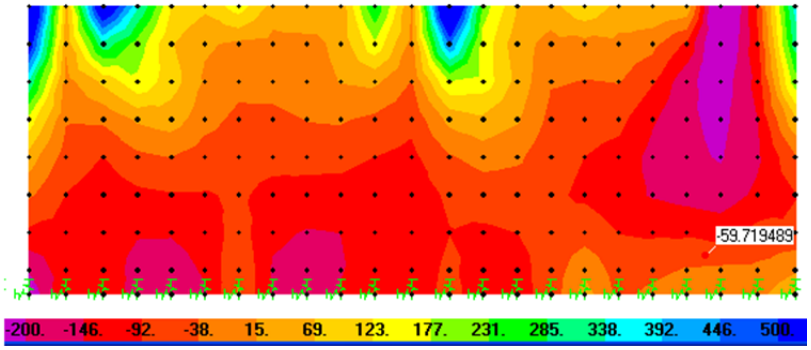


FIG. 4.387 - C7-C8(Q-11)-PARETE A- INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

C7-C8(q-11)-Parete A - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m				
B=1.0m H=0.5m A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N/M (gall/aff)	-130kN	-70kNm	-163kNm	**2.22**
M_{min}/N_{max}	+30kN	-80kNm	-128kNm	**1.60**
M_{max}/N_{max}	+30kN	+50kNm	+74kNm	**1.48**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+180kN	-20kNm	**-28kNm**	**1.40**
M_{max}/N_{max}	+180kN	+20kNm	**+28kNm**	**1.40**

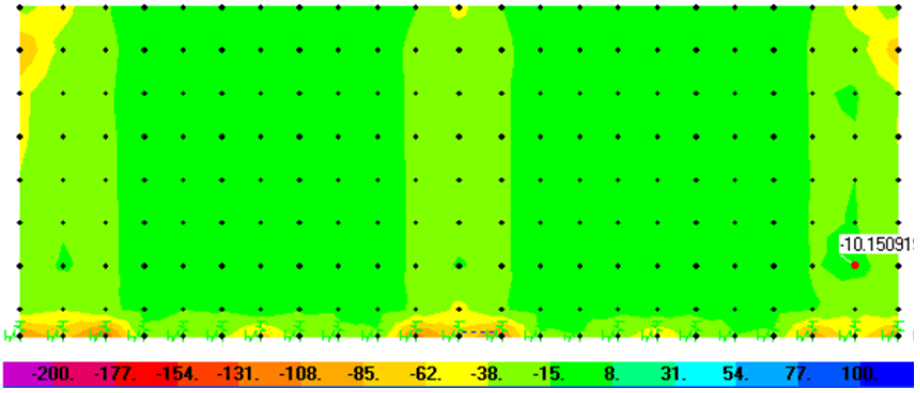


FIG. 4.388 - C7-C8(Q-11)-SETTO B- INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

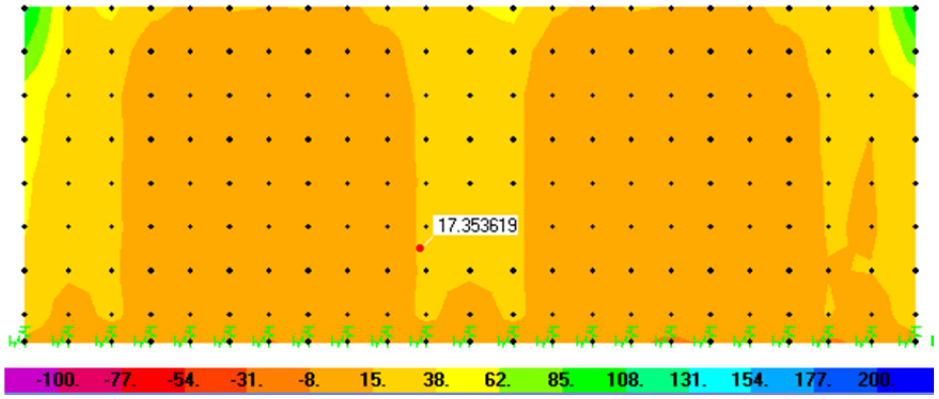


FIG. 4.389 - C7-C8(Q-11)-SETTO B- INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

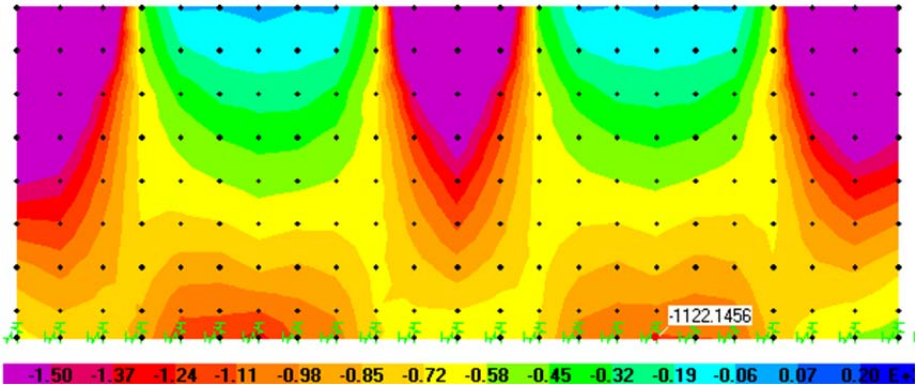


FIG. 4.390 - C7-C8(Q-11)-SETTO B- INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

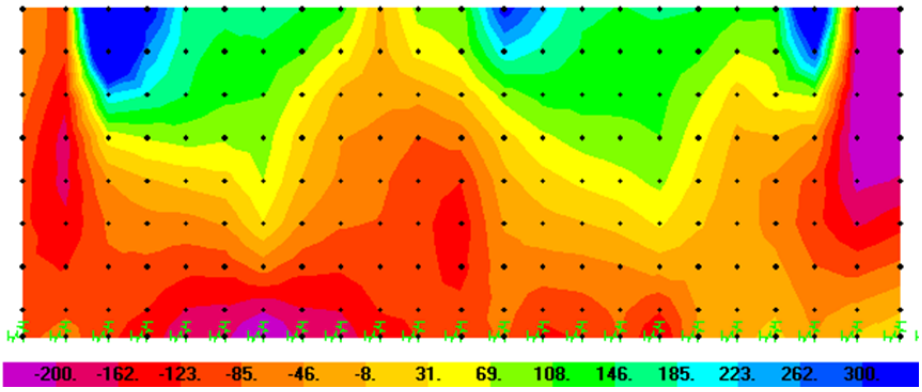


FIG. 4.391 - C7-C8(Q-11)-SETTO B- INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

C7-C8(q-11)-Setto B - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
M_{min}/N_{max}	-20kN	-40kNm	-68kNm	**1.7**
M_{max}/N_{max}	-20kN	+4kNm	+68kNm	**17**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	-20kN	-80kNm	-146kNm	**1.83**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+100kN	-20kNm	-40kNm	**2.0**
M_{max}/N_{max}	+100kN	+30kNm	+40kNm	**1.33**

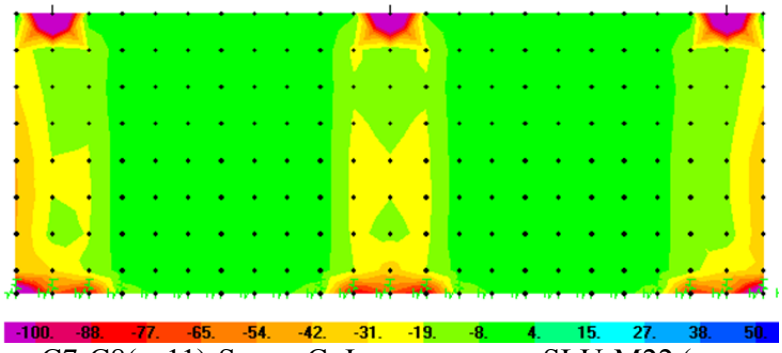


FIG. 4.392 - C7-C8(Q-11)-SETTO C- INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

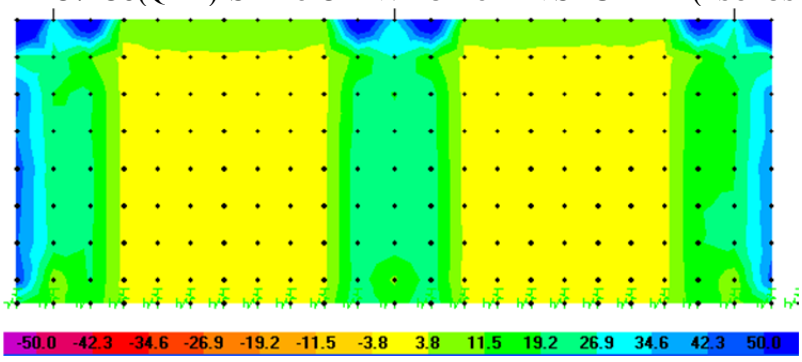


FIG. 4.393 - C7-C8(Q-11)-SETTO C- INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

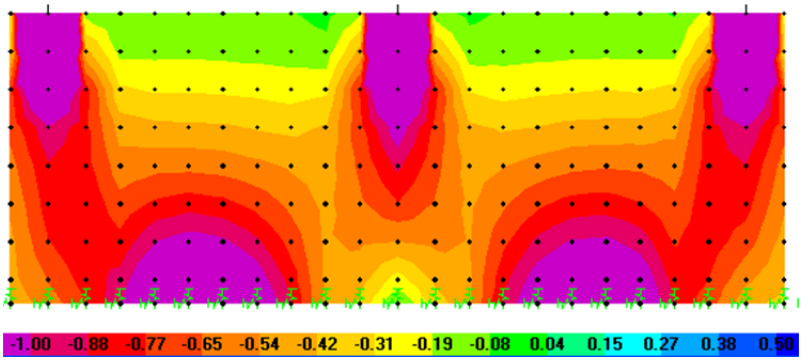


FIG. 4.394 - C7-C8(Q-11)-SETTO C- INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

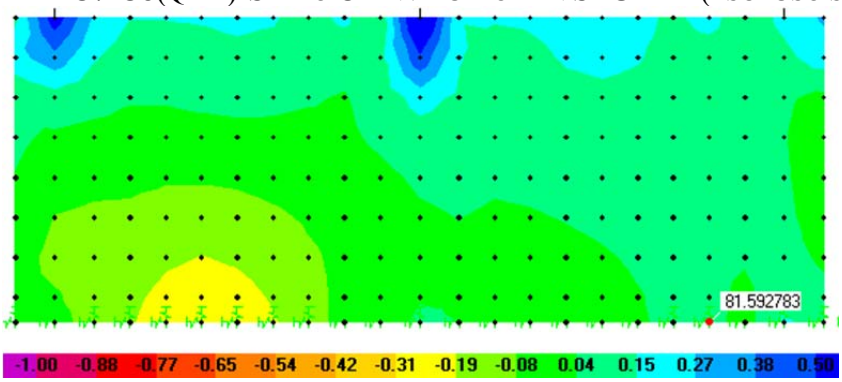


FIG. 4.395 - C7-C8(Q-11)-SETTO C- INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

C7-C8(q-11)-Setto C - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m,H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.171m, H2=0.079m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}/N_{max}	+80kN	-10kNm	-58kNm	**5.8**
M_{max}/N_{max}	+80kN	+5kNm	+58kNm	**11.6**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+160kN	-70kNm	-105kNm	**1.50**
Verticali correnti (esclusi pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.178m, H2=0.072m				
M_{min}/N_{max}	+180kN	-10kNm	-31kNm	**3.1**
M_{max}/N_{max}	+180kN	+10kNm	+31kNm	**3.1**

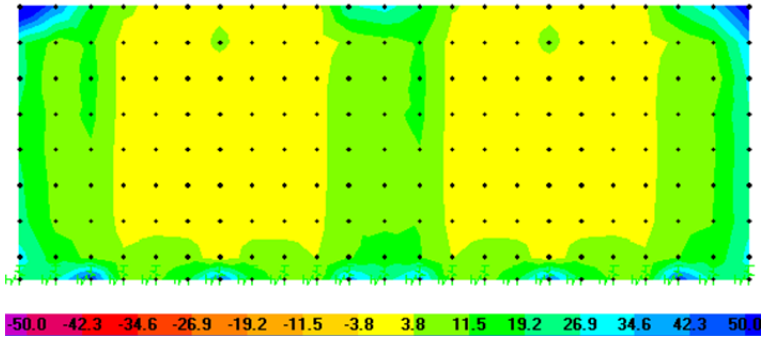


FIG. 4.396 - C7-C8(Q-11)-SETTO D- INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

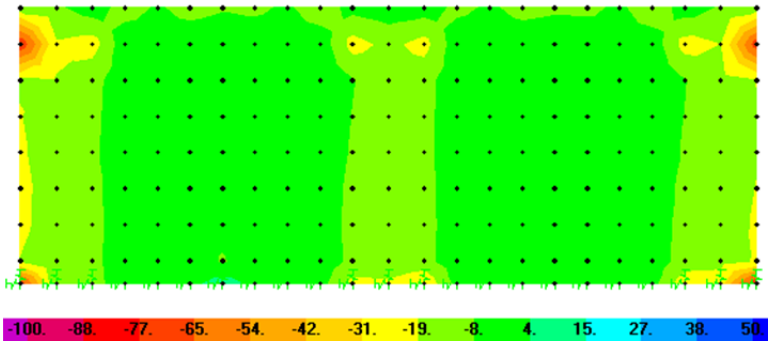


FIG. 4.397 - C7-C8(Q-11)-SETTO D- INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

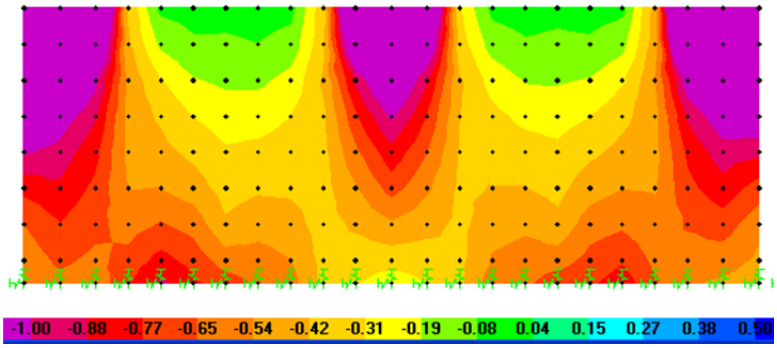


FIG. 4.398 - C7-C8(Q-11)-SETTO D- INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

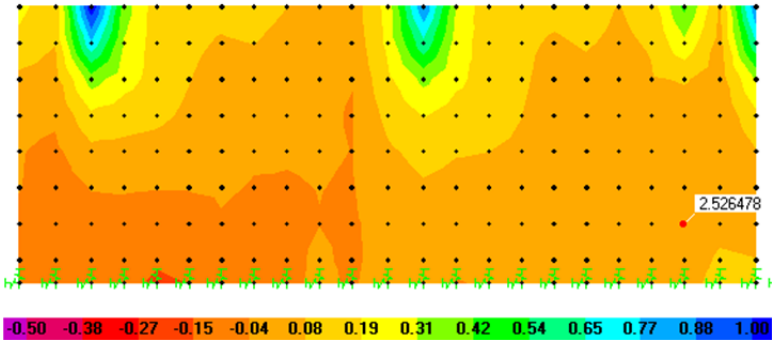


FIG. 4.399 - C7-C8(Q-11)-SETTO D- INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

C7-C8(q-11)-Setto D - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=565mm^2(θ12/200mm), H1=0.18m, H2=0.07m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd} / M_{Sd}**
M_{min}/N_{max}	+70kN	-12kNm	-41kNm	**3.42**
M_{max}/N_{max}	+70kN	+25kNm	+41kNm	**1.64**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{max}/N_{max}	+135kN	-50kNm	-111kNm	**2.22**
Verticali correnti				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+250kN	-10kNm	-23kNm	**2.3**
M_{max}/N_{max}	+250kN	+16kNm	+23kNm	**1.44**

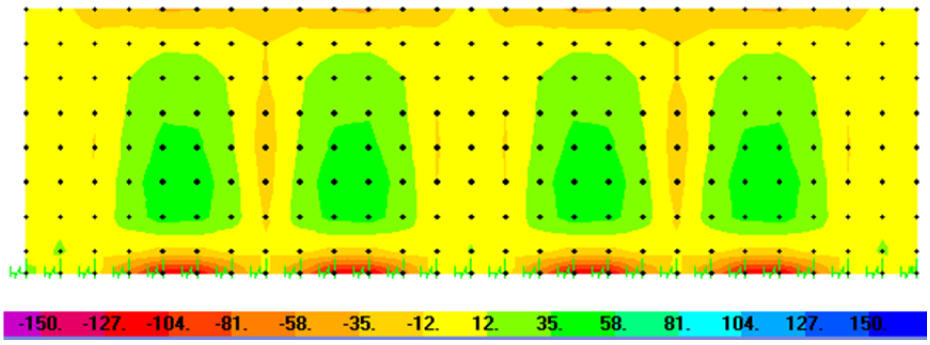


FIG. 4.400 - C7-C8(Q-11)-PARETE E- GALLEGGIAMENTO E AFFONDAMENTO SLU-M22

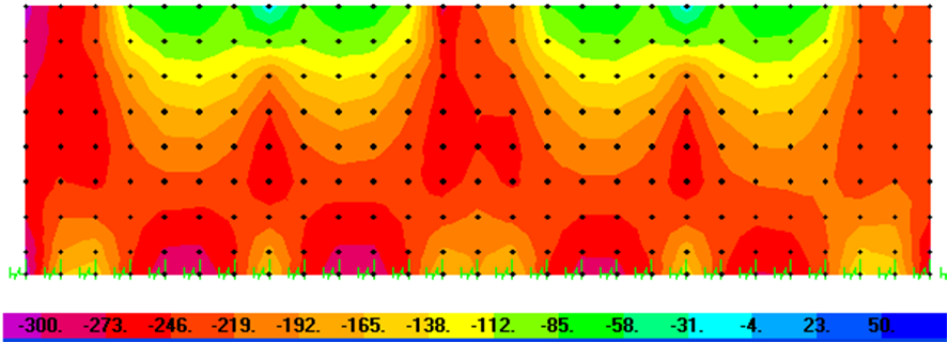


FIG. 4.401 - C7-C8(Q-11)-PARETE E- GALLEGGIAMENTO E AFFONDAMENTO SLU-F22

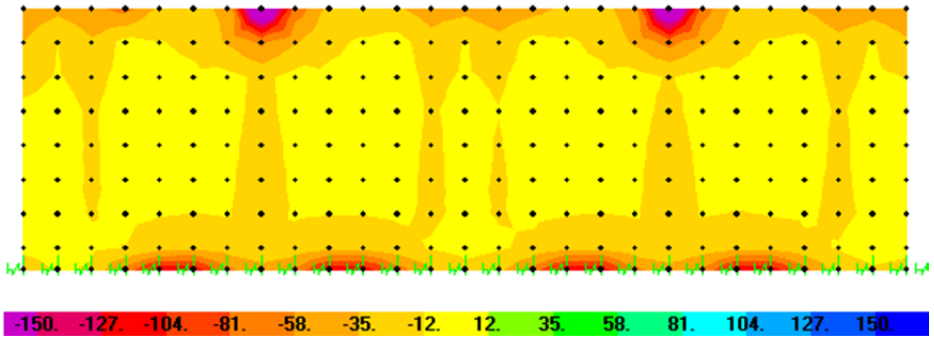


FIG. 4.402 - C7-C8(Q-11)-PARETE E- INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

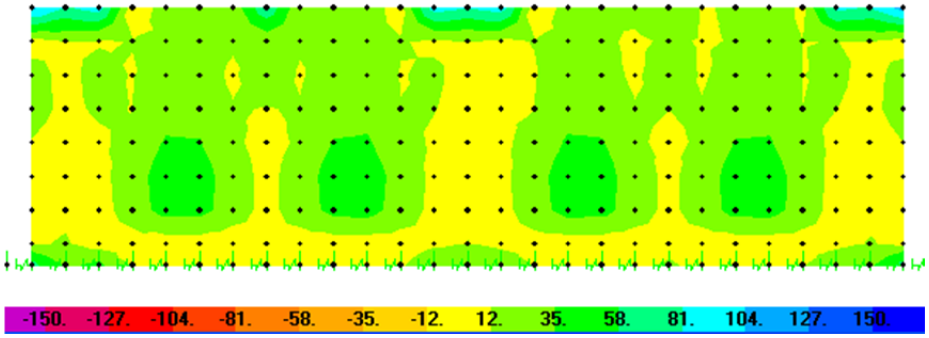


FIG. 4.403 - C7-C8(Q-11)-PARETE E - INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

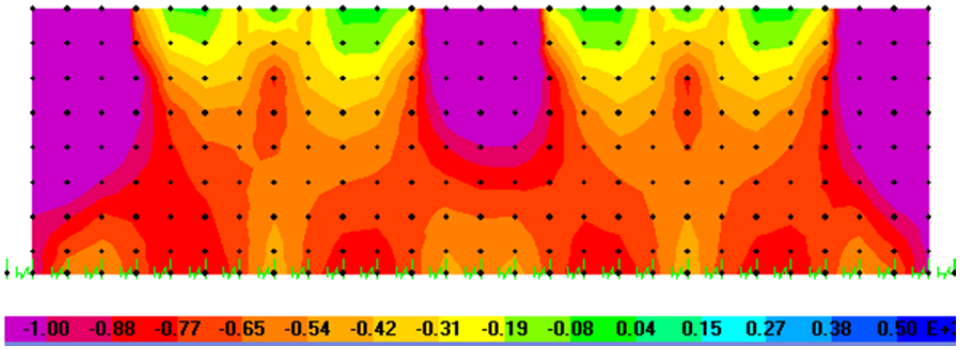


FIG. 4.404 - C7-C8(Q-11)-PARETE E - INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

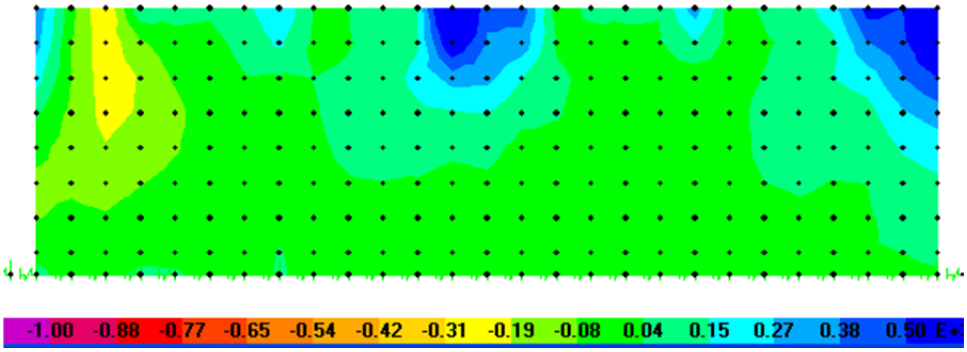


FIG. 4.405 - C7-C8(Q-11)-PARETE E - INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

C7-C8(q-11)-Parete E - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m				
B=1.0m,H=0.5m,A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
Aff.&Gall	-160kN	-110kNm	-170kNm	**1.54**
M_{min}/N_{max}	+35kN	-25kNm	-127kNm	**5.08**
M_{max}/N_{max}	+35kN	+26kNm	+73kNm	**2.81**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+120kN	-20kNm	**-44kNm**	**2.2**
M_{max}/N_{max}	+120kN	+13kNm	**+44kNm**	**3.4**

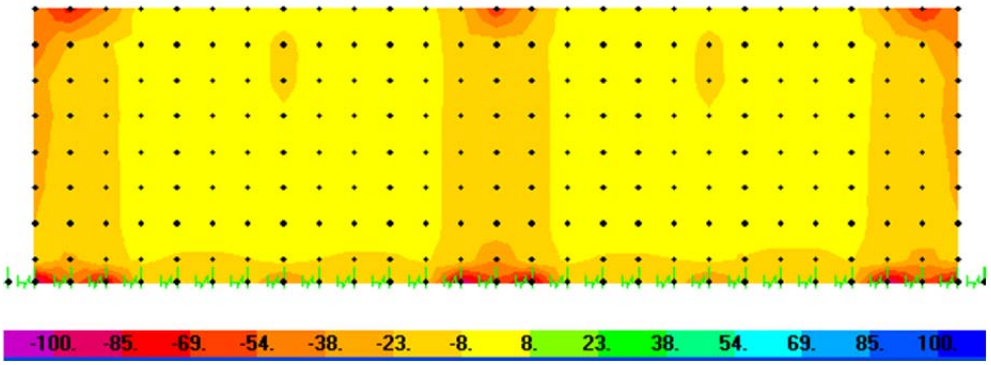


FIG. 4.406 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

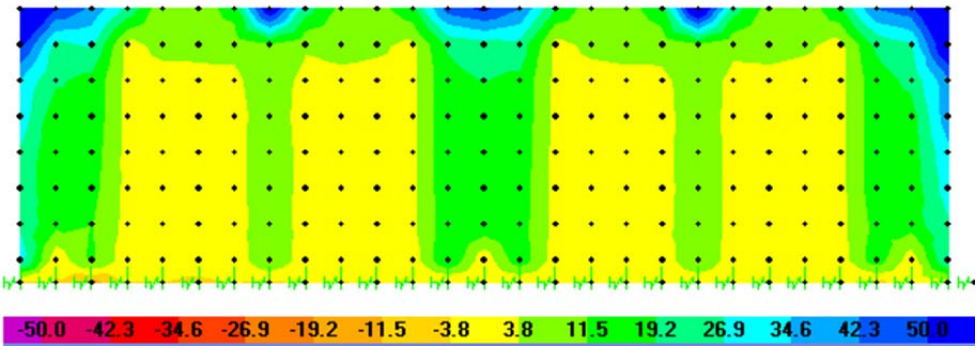


FIG. 4.407 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

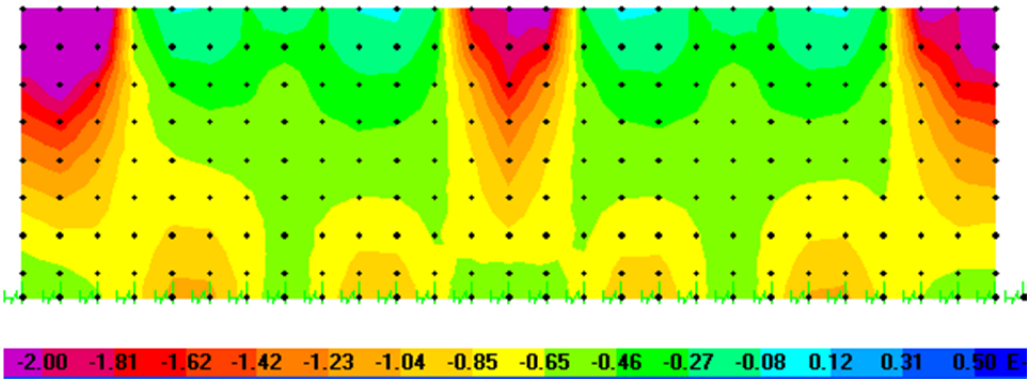


FIG. 4.408 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

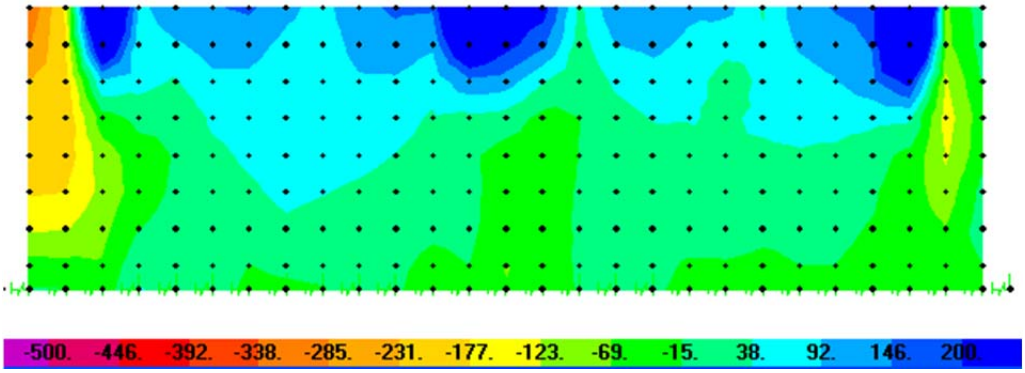


FIG. 4.409 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

C7-C8(q-11)-Setto F - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
M_{min}/N_{max}	-20kN	-16kNm	-68kNm	**4.25**
M_{max}/N_{max}	-20kN	-3kNm	+68kNm	**22.7**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m,H=0.50m,A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{max}/N_{max}	-30kN	-65kNm	-147kNm	**2.26**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+120kN	-3kNm	-37kNm	**12.3**
M_{max}/N_{max}	+120kN	+25kNm	+37kNm	**1.48**

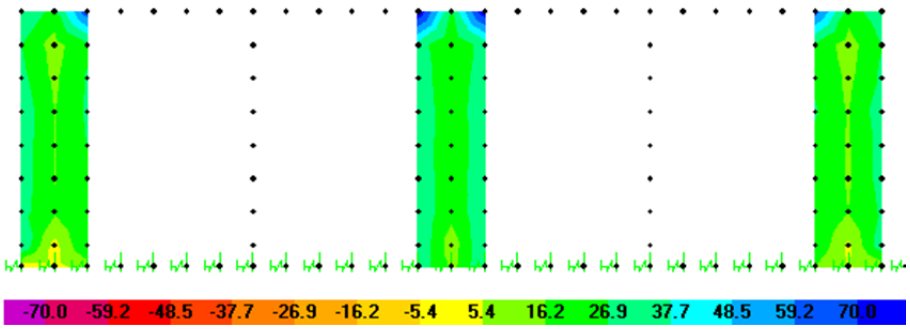


FIG. 4.410 - C7-C8(Q-11)-SETTI F/G - INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

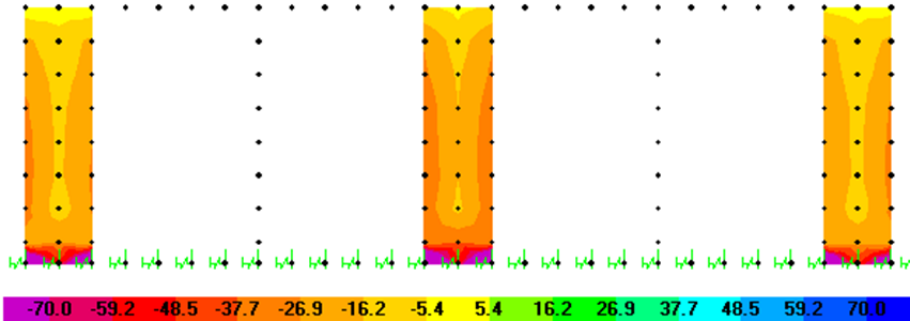


FIG. 4.411 - C7-C8(Q-11)-SETTI F/G - INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

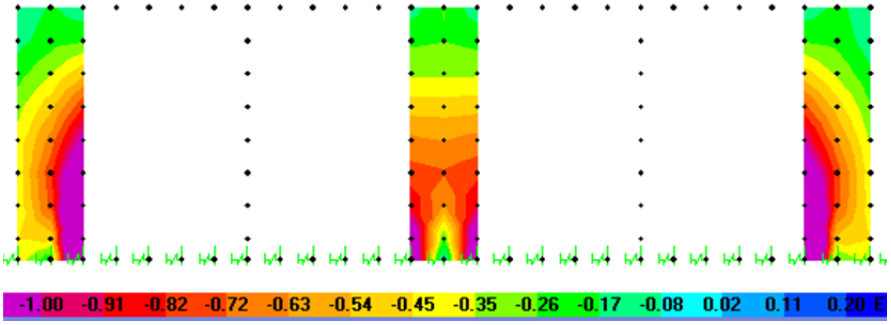


FIG. 4.412 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

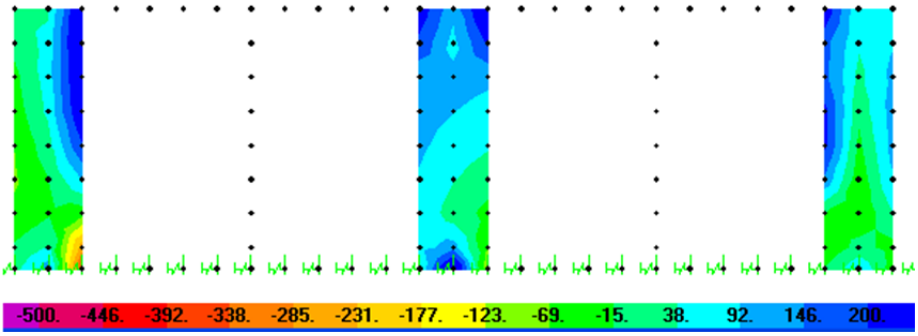


FIG. 4.413 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

C7-C8(q-11)-Setti fra F/G - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 50cm				
B=1.0m H=0.50m A1=A2=565mm^2(θ12/200mm), H1=0.430m, H2=0.07m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}/N_{max}	+100kN	-70kNm	-82kNm	**1.17**
M_{max}/N_{max}	+100kN	+70kNm	+82kNm	**1.17**

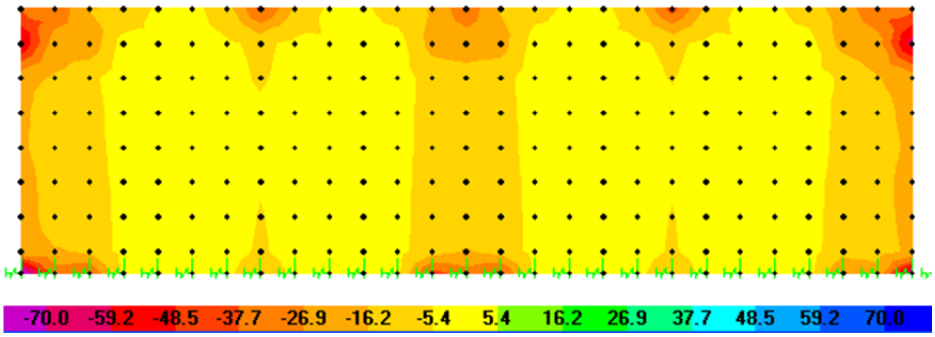


FIG. 4.414 - C7-C8(Q-11)-SETTI G - INVILUPPO MIN SLU-M22 (ESCLUSO SISMA)

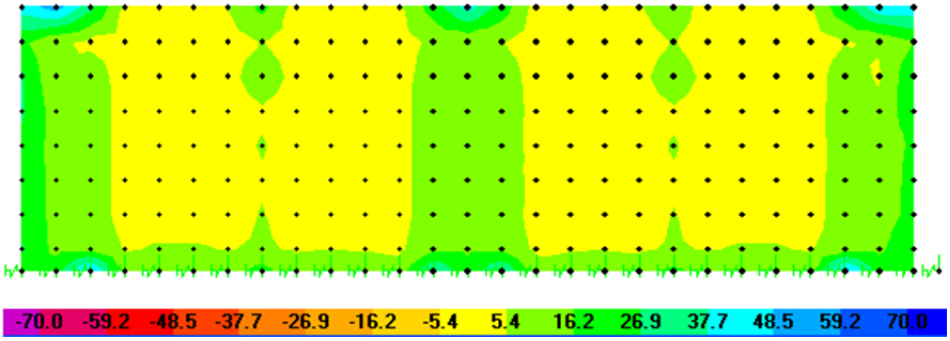


FIG. 4.415 - C7-C8(Q-11)-SETTI G - INVILUPPO MAX SLU-M22 (ESCLUSO SISMA)

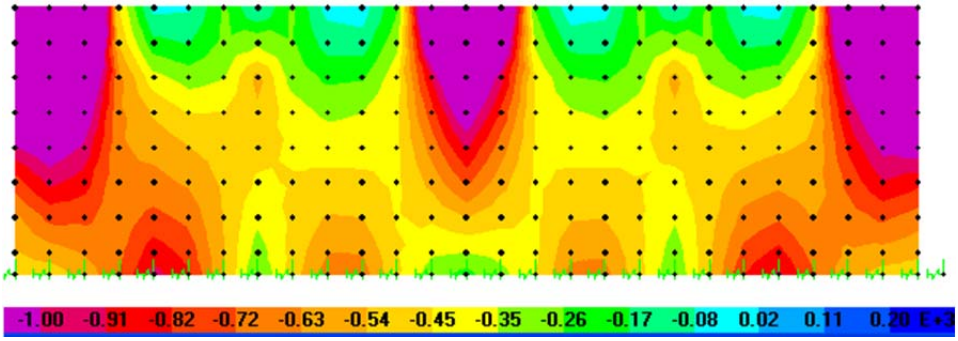


FIG. 4.416 - C7-C8(Q-11)-SETTI G - INVILUPPO MIN SLU-F22 (ESCLUSO SISMA)

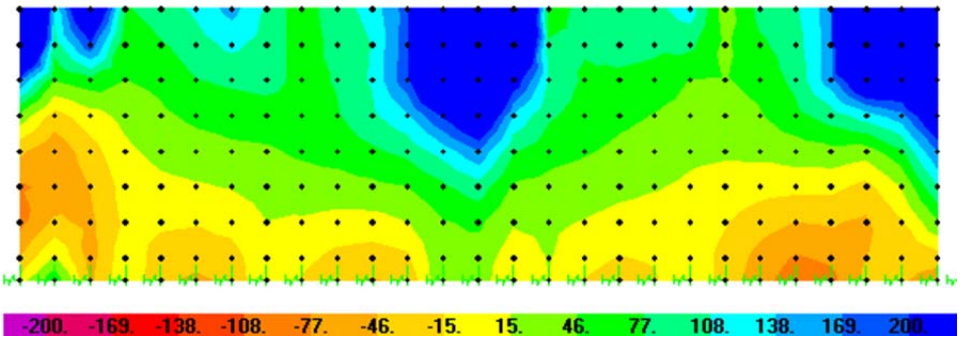


FIG. 4.417 - C7-C8(Q-11)-SETTI G - INVILUPPO MAX SLU-F22 (ESCLUSO SISMA)

C7-C8(q-11)-Setto G - ferri verticali - Verifiche agli SLU				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd} / M_{Rd}**
N_{max}/M_{min}	+3kN	-20kNm	-65kNm	**3.25**
N_{max}/M_{max}	+3kN	+10kNm	+65kNm	**6.5**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
N_{max}/M_{min}	+10kN	+21kNm	+139kNm	**6.62**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
N_{max}/M_{min}	+100kN	-13kNm	-39kNm	**13**
N_{max}/M_{max}	+100kN	+10kNm	+47kNm	**3.9**

Verifiche SLU orditura orizzontale setti interni C7-C8(q-11):

Fase d'affondamento

In fase di affondamento si considera un dislivello d'acqua di un metro fra celle non in comunicazione fra di loro.

Non si considera il setto C essendo parte dello stesso pilastro d'affondamento e di conseguenza le celle sono in comunicazione fra di loro.

Setto D:

Luce netta di 3.125m.

M_{Sd}=1.5 x 10.1 x 3.125^2 / 10 = 14.8 kNm/m

B=1.0m H=0.25m A1=A2=534mm^2(θ12/500+ θ14/500), H1=0.193m, H2=0.057m

M_{Rd}=47kNm/m

Setto G:

Luce netta di 4.6m.

M_{Sd}=1.5 x 10.1 x 4.6^2 / 10 = 32.1 kNm/m

B=1.0m H=0.25m A1=A2=452mm^2(θ14/250mm), H1=0.193m, H2=0.057m

M_{Rd}=54kNm/m

4.4.4 Verifiche agli SLU azioni sismiche C7-C8(q-11)

4.4.4.1 Orditura orizzontale

Di seguito si riportano le verifiche del cemento armato del fusto del cassone per gli stati limiti ultimi per le combinazioni sismiche.

Di seguito si riportano gli inviluppi dei momenti delle pareti e dei setti.

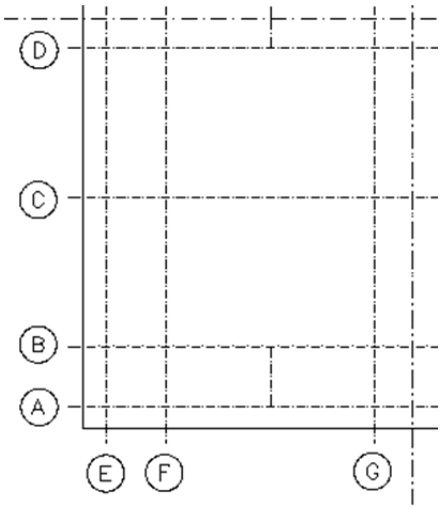


FIG. 4.418 - PIANTA CHIAVE PARETI E SETTI

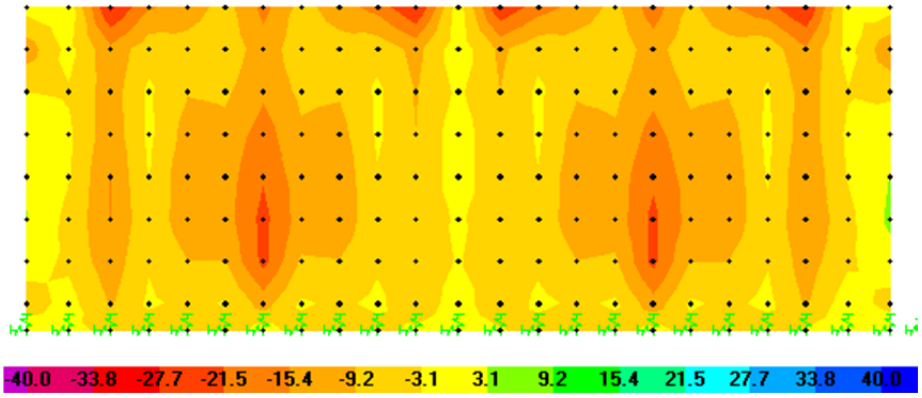


FIG. 4.419 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MIN SLU-M11(SISMA)

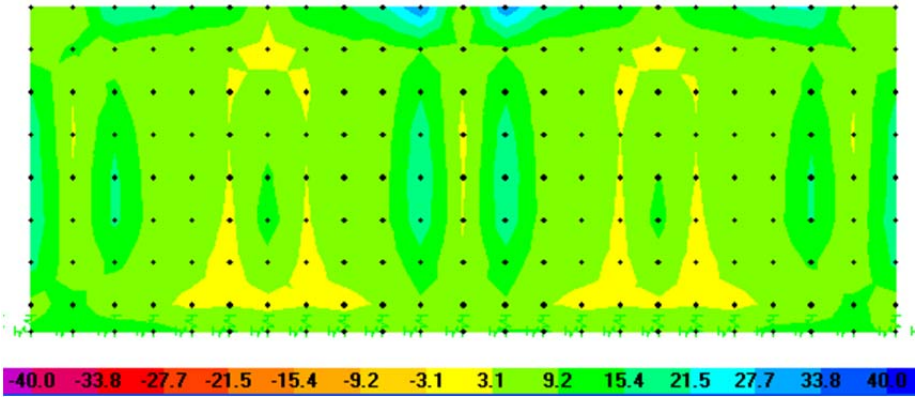


FIG. 4.420 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MAX SLU-M11(SISMA)

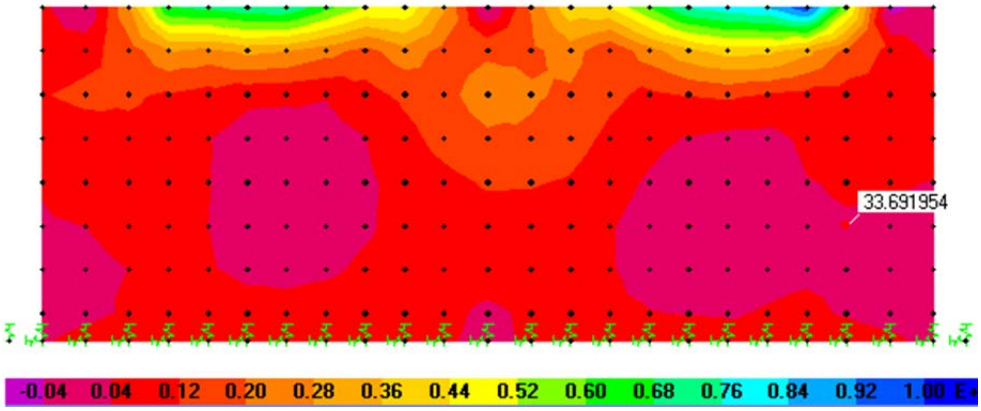


FIG. 4.421 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MAX SLU-F11(SISMA)

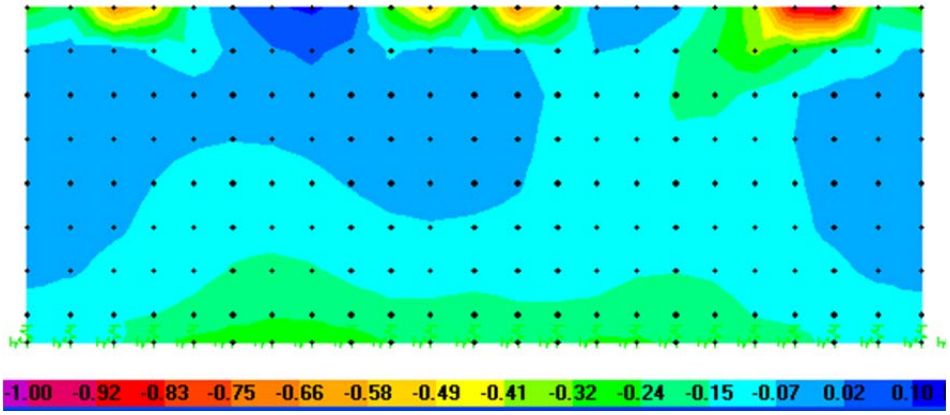


FIG. 4.422 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MIN SLU-F11(SISMA)

C7-C8(q-11)-Parete A - ferri orizzontali - Verifiche agli SLU sisma				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max} /M_{min}	+200kN(tens)	-23kNm	-68kNm	**2.96**
N_{max} /M_{max}	+200kN(tens.)	+20kN	+68kNm	**3.40**
N_{min}	-260kN(comp)	-23kNm	-169kNm	**7.35**
da +5.50				
B=1.0m,H=0.5m,A1=A2=1829mm^2(θ22/250+ θ14/500), H1=0.439m, H2=0.061m				
N_{max}	+600kN(tens.)	-18kNm	-186kNm	**10.3**

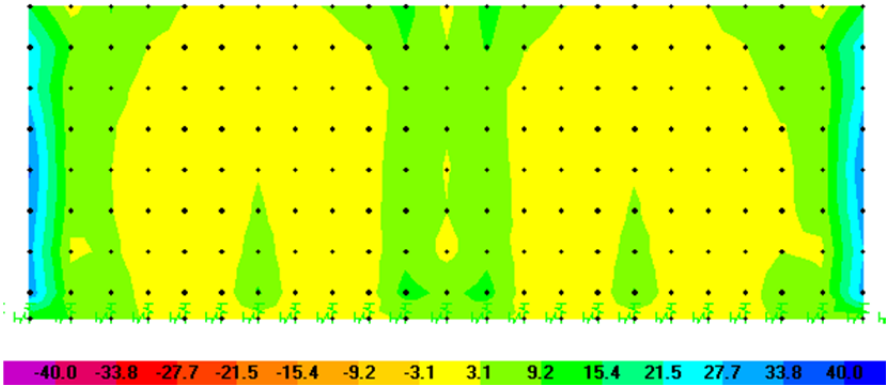


FIG. 4.423 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MAX SLU-M11(SISMA)

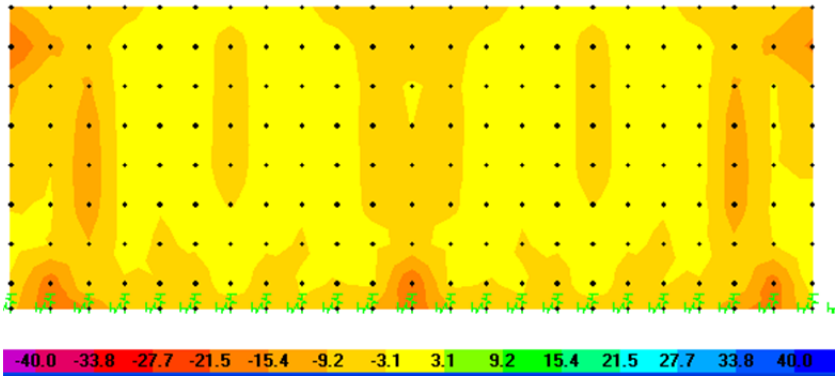


FIG. 4.424 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MIN SLU-M11(SISMA)

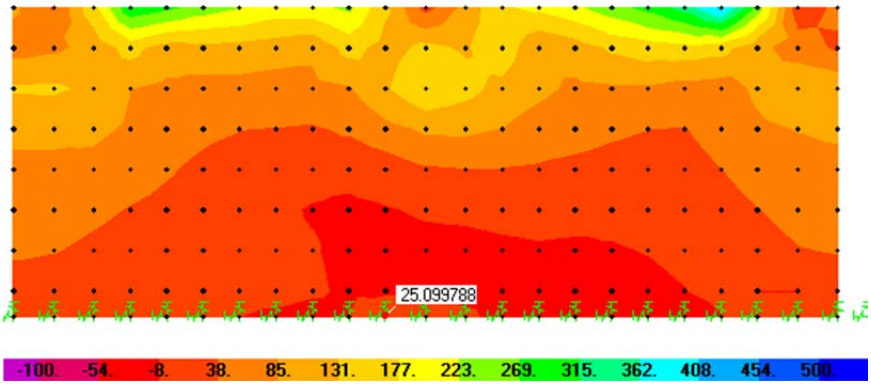


FIG. 4.425 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MAX SLU-F11(SISMA)

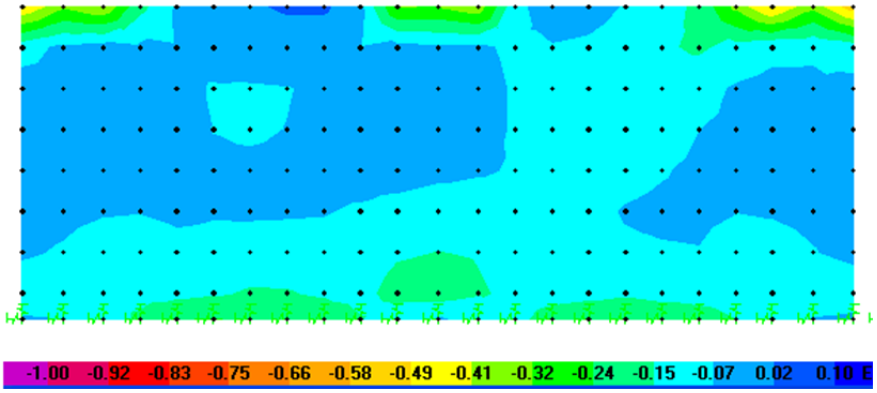


FIG. 4.426 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MIN SLU-F11(SISMA)

C7-C8(q-11)-Setto B - ferri orizzontali - Verifiche agli SLU sisma				
da 0 a +5.50				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
M_{min}	+150kN(tens)	-15kNm	-54kNm	**3.6**
M_{max}	+150kN	+5kNm	+54kNm	**10.8**
N_{min}	-200kN(comp.)	-15kNm	-83kNm	**5.53**
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
M_{min}	+150kN	+30kNm	-80kNm	**2.67**
da +5.50				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m				
N_{max}	+270kN	+25kNm	+124kNm	**4.96**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+270kN	+5kNm	+124kNm	**24.8**

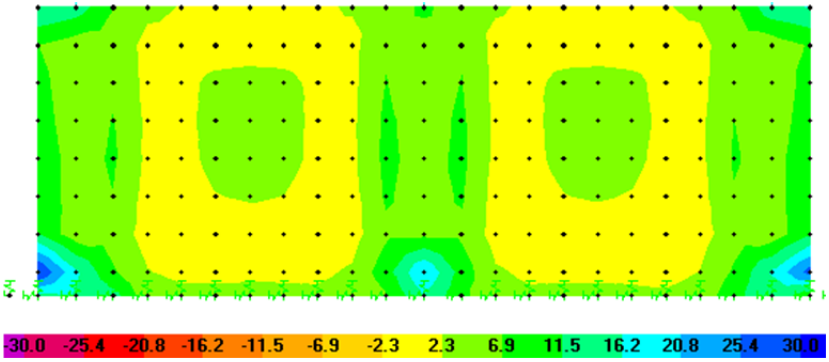


FIG. 4.427 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MAX SLU-M11(SISMA)

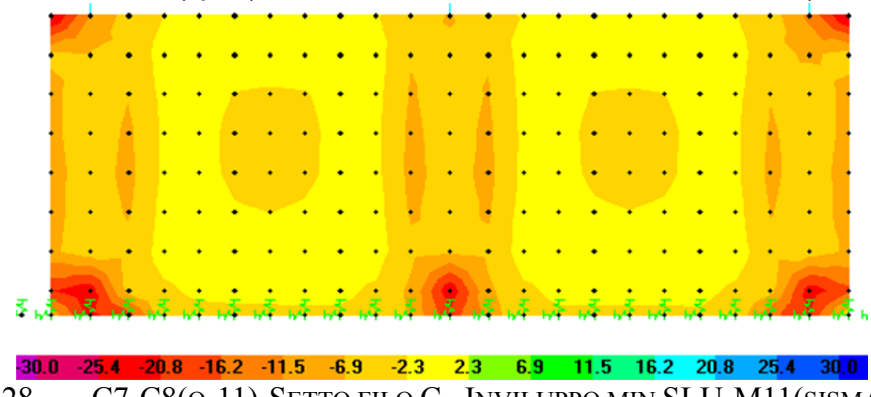


FIG. 4.428 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MIN SLU-M11(SISMA)

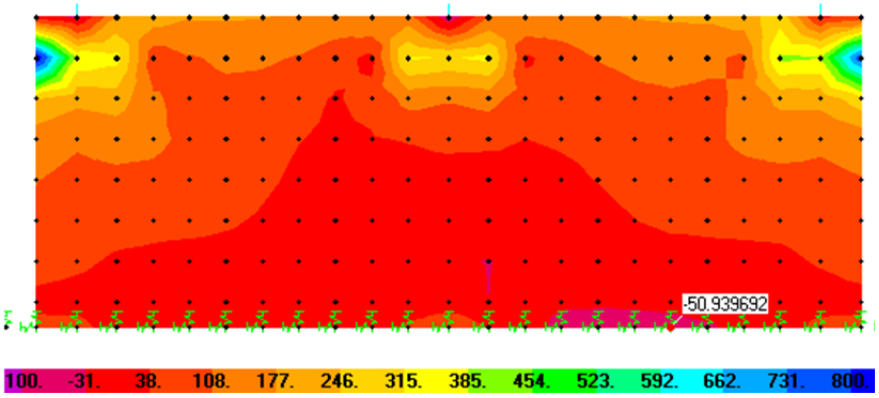


FIG. 4.429 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MAX SLU-F11(SISMA)

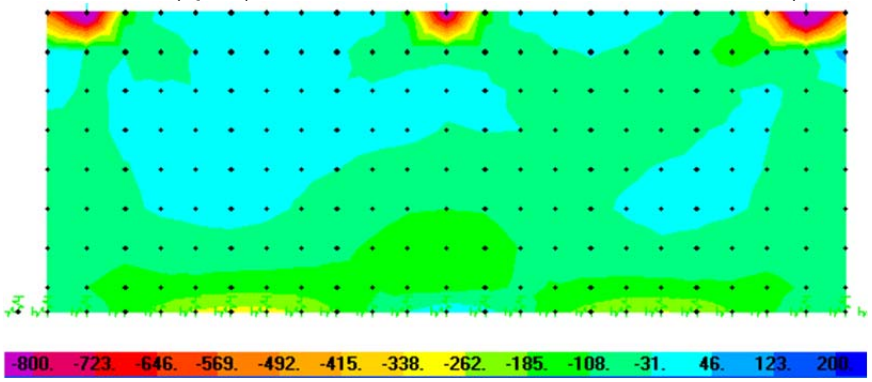


FIG. 4.430 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MIN SLU-F11(SISMA)

C7-C8(q-11)-Setto C - ferri orizzontali - Verifiche agli SLU sisma				
da 0 a +5.50				
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250mm), H1=0.189m, H2=0.061m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{sd}**
N_{max}/M_{min}	+200kN(ten.)	-8kNm	-94kNm	**11.75**
N_{max}/M_{max}	+200kN(ten.)	+8kNm	+94kNm	**11.75**
N_{min}	-270kN(comp.)	-8kNm	-127kNm	**15.9**
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
N_{max}/M_{min}	+290kN	+30kNm	-196kNm	**9.80**
da +5.50				
B=1.0m,H=0.5m,A1=A2=1524mm^2(θ22/250), H1=0.439m, H2=0.061m				
N_{max}	+750kN	-25kNm	-105kNm	**4.20**
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250), H1=0.189m, H2=0.061m				
N_{max}	+400kN	-8kNm	-80kNm	**8.00**

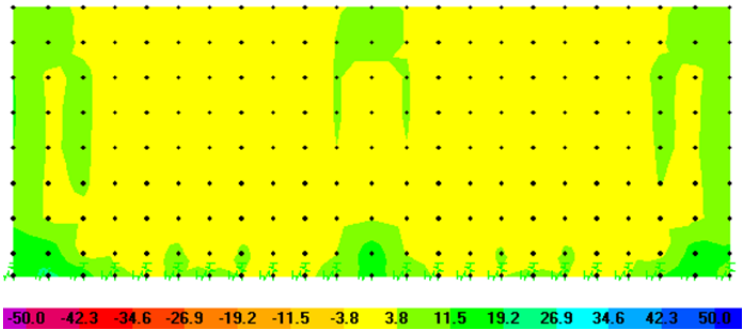


FIG. 4.431 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MAX SLU-M11(SISMA)

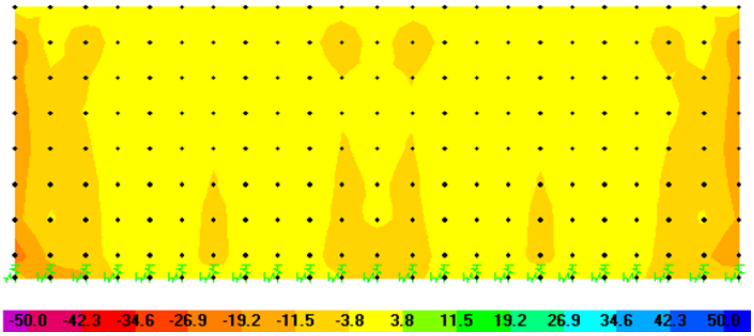


FIG. 4.432 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MIN SLU-M11(SISMA)

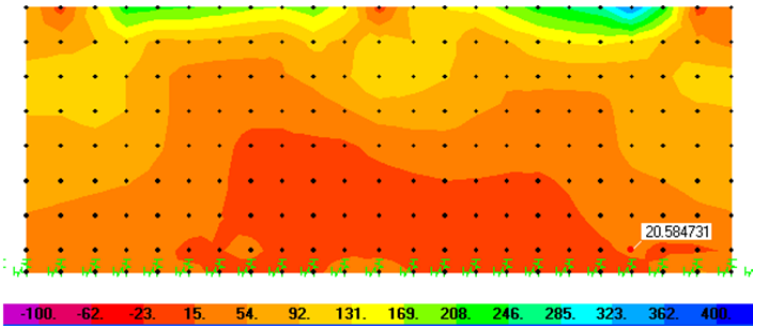


FIG. 4.433 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MAX SLU-F11(SISMA)

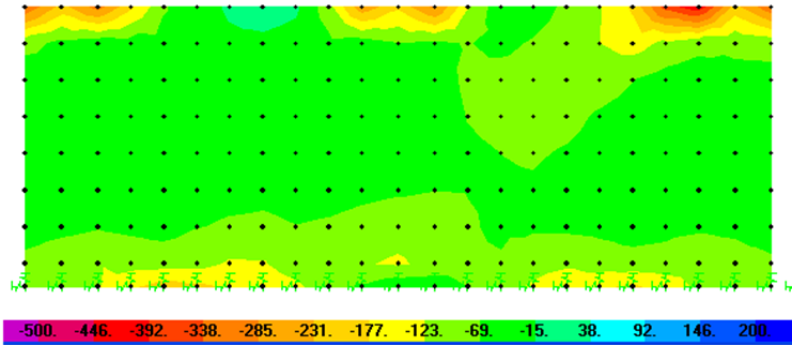


FIG. 4.434 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MIN SLU-F11(SISMA)

C7-C8(q-11)-Setto D - ferri orizzontali - Verifiche agli SLU				
da 0 a +5.50				
B=1.0m,H=0.25m,A1=A2=534mm^2(θ12/500mm+ θ14/500mm), H1=0.193m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max}/M_{min}	-100kN(comp.)	-20kNm	-58kNm	**2.90**
N_{max}/M_{max}	+110kN(tens.)	+15kNm	+36kNm	**2.40**
N_{min}	-200kN	20kNm	-67kNm	**3.35**
B=1.0m H=0.5m A1=A2=710mm^2(θ16/500mm+ θ14/500mm), H1=0.442m, H2=0.058m in corrispondenza di parete E				
N_{max}/M_{min}	+110kN	-25kNm	-106kNm	**4.24**
N_{max}/M_{max}	+110kN	+17kNm	+106kNm	**6.24**
da +5.50				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m, solo in corrispondenza di parete E				
N_{max}	+160kN	-7kNm	-148kNm	**21**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+220kN	-7kNm	-63kNm	**9.0**

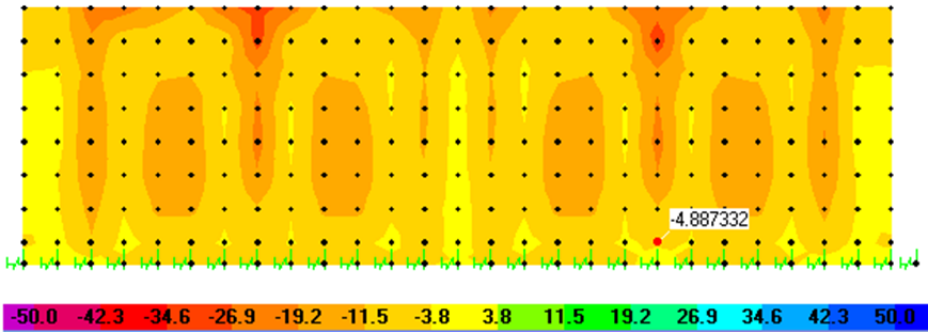


FIG. 4.435 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MIN SLU-M11(SISMA)

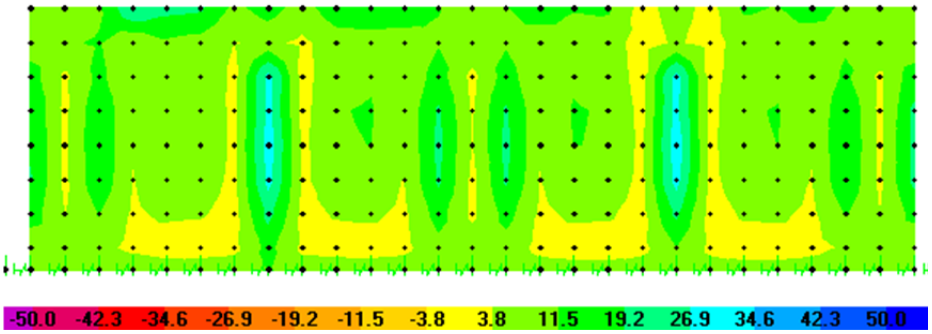


FIG. 4.436 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MAX SLU-M11(SISMA)

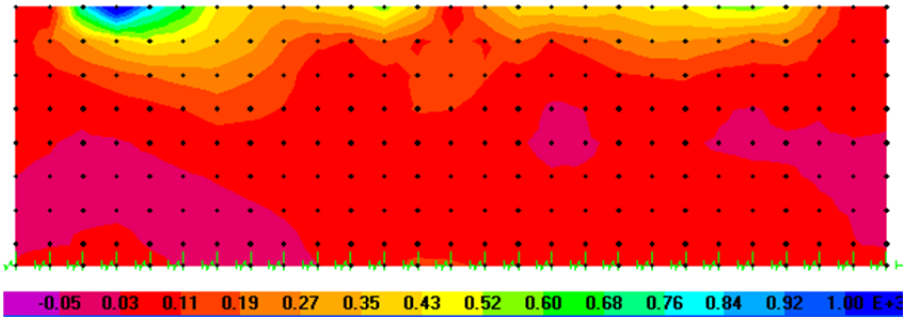


FIG. 4.437 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MAX SLU-F11(SISMA)

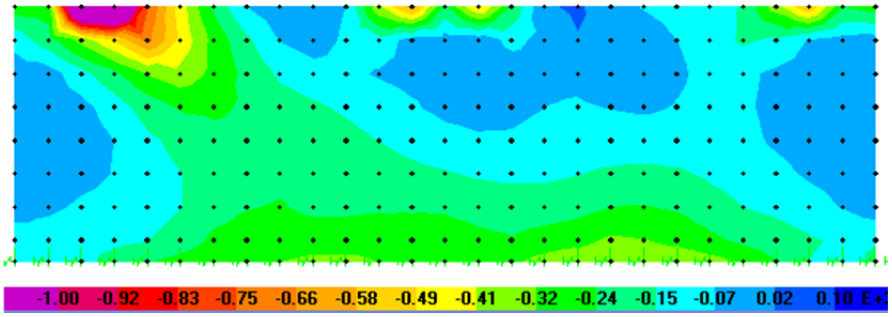


FIG. 4.438 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MIN SLU-F11(SISMA)

C7-C8(q-11)-Parete E - ferri orizzontali - Verifiche agli SLU sisma				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=804mm^2(θ16/250mm), H1=0.442m, H2=0.058m				
Combinazione	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max} /M_{min}	+225kN(tens.)	-20kNm	-97kNm	**4.85**
N_{max} /M_{max}	+225kN	+30kNm	+97kNm	**3.23**
N_{min}	-350kN	+30kNm	+217kNm	**7.23**
Da +5.50				
B=1.0m,H=0.5m,A1=A2=1884mm^2(θ20/250+ θ20/500mm), H1=0.440m, H2=0.06m				
N_{max}	+750kN	-30kNm	-165kNm	**5.50**

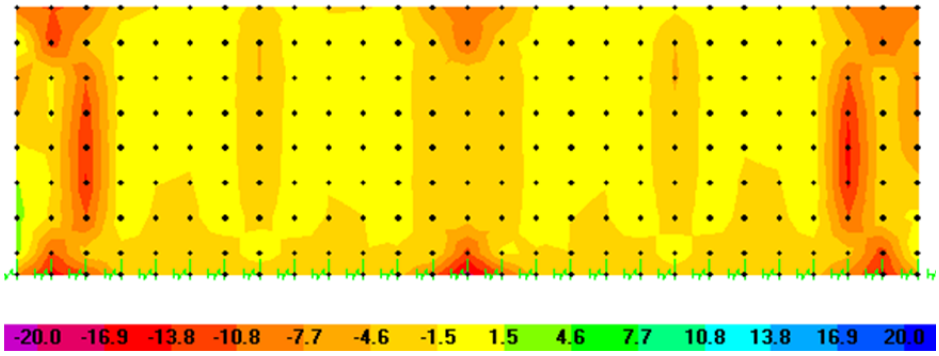


FIG. 4.439 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLU-M11(SISMA)

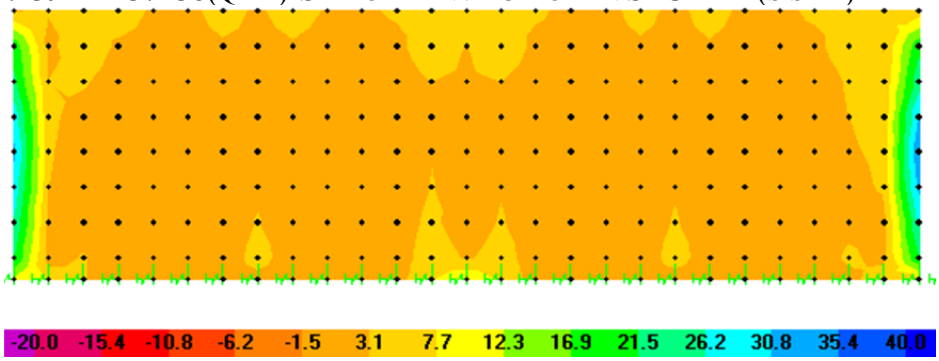


FIG. 4.440 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLU-M11(SISMA)

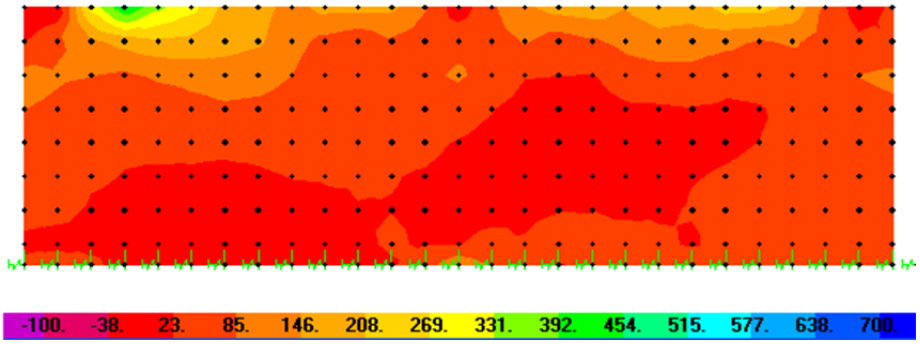


FIG. 4.441 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLU-F11(SISMA)

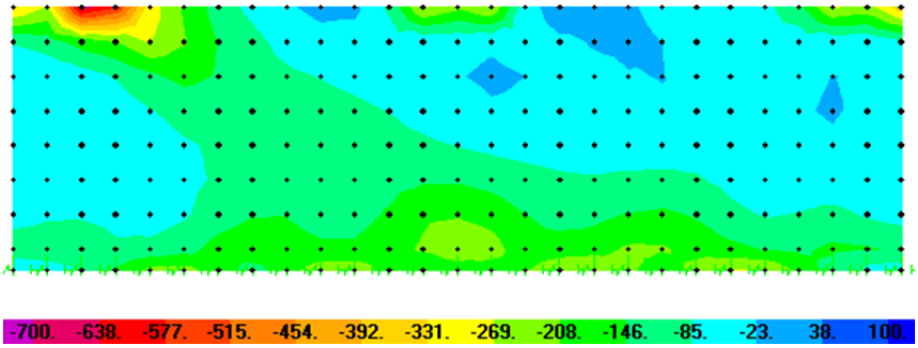


FIG. 4.442 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLU-F11(SISMA)

C7-C8(q-11)-Setto F - ferri orizzontali - Verifiche agli SLU sisma				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m in corrispondenza della parete A				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
N_{max}/M_{min}	+110kN	-15kNm	-89kNm	**5.93**
N_{max}/M_{max}	+110kN	+30kNm	+89kNm	**2.97**
N_{min}	-200kN	+30kNm	+157kNm	**5.23**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
N_{max}/M_{min}	+110kN	-15kNm	-43kNm	**2.87**
N_{max}/M_{max}	+110kN	+5kNm	+43kNm	**8.6**
N_{min}	-250kN	-15kNm	-76kNm	**5.1**
da +5.50				
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+300kN	-20kNm	-56kNm	**2.80**

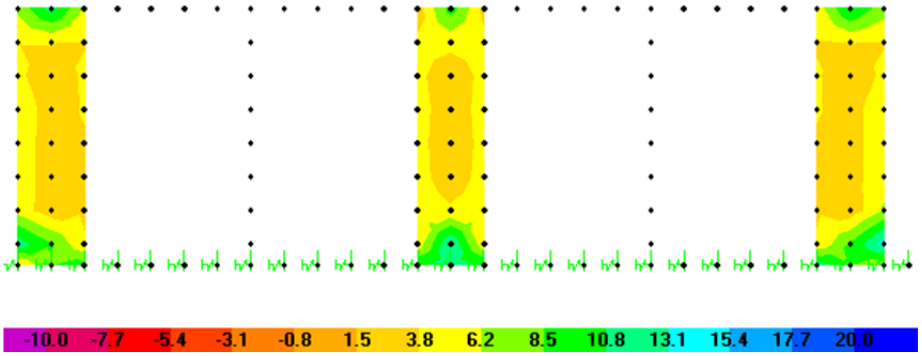


FIG. 4.443 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MAX SLU-M11(SISMA)

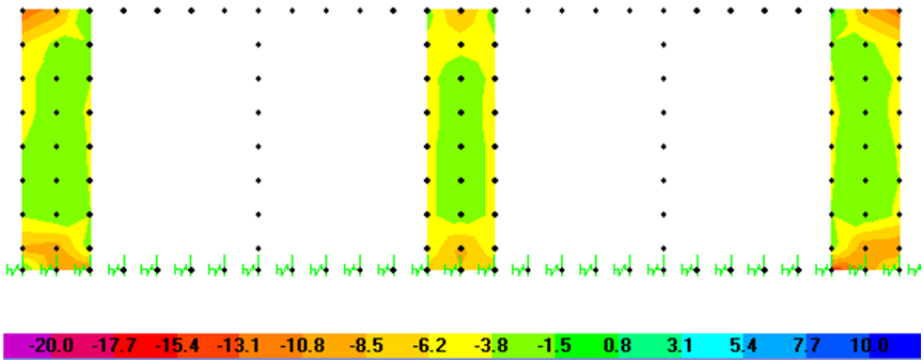


FIG. 4.444 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLU-M11(SISMA)

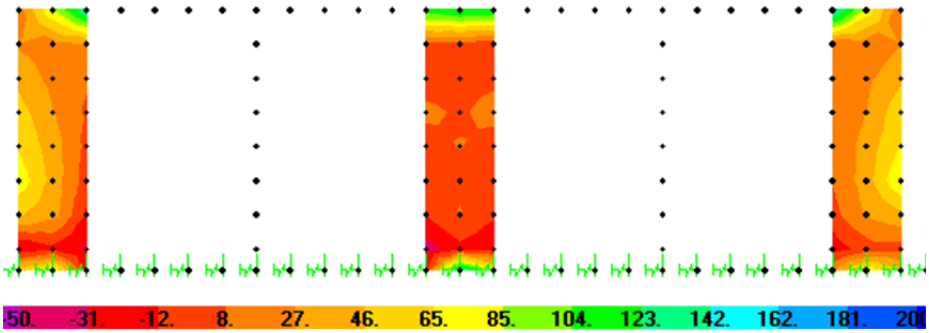


FIG. 4.445 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MAX SLU-F11(SISMA)

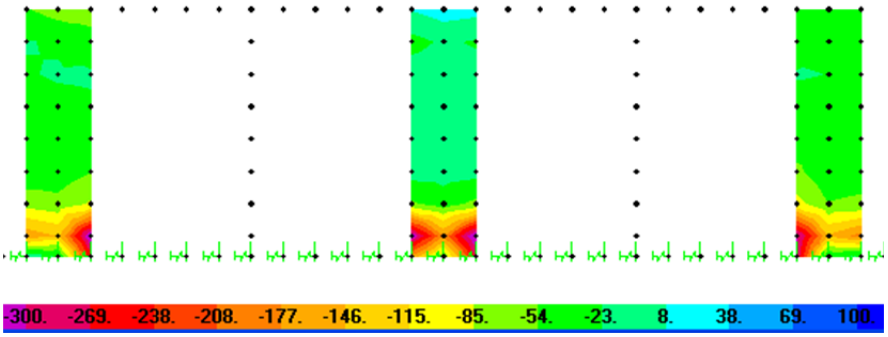


FIG. 4.446 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLU-F11(SISMA)

C7-C8(q-11)-Setti fra F/G - ferri orizzontali - Verifiche agli SLU sisma				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=452mm^2(θ12/250mm), H1=0.444m, H2=0.056m in corrispondenza della parete A				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
N_{max}/M_{min}	+60kN	-10kNm	-70kNm	**7**
N_{max}/M_{max}	+60kN	+14kNm	+70kNm	**5**
N_{min}	-280kN	+14kNm	+147kNm	**10.5**
Da +5.50				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
N_{max}	+100kN	+14kNm	+91kNm	**6.5**

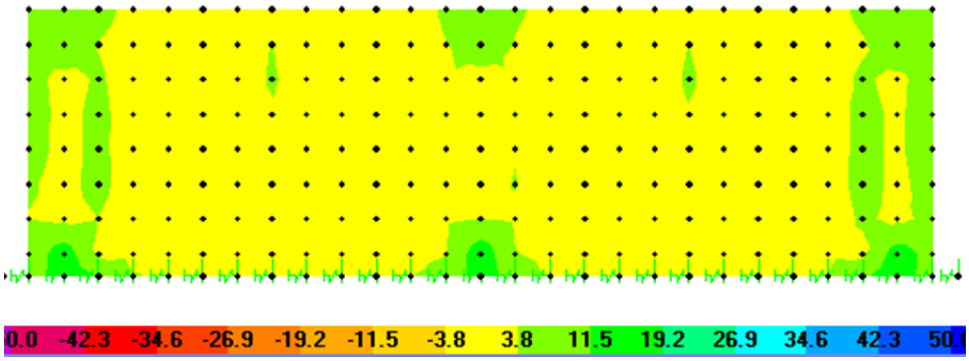


FIG. 4.447 - C7-C8(Q-11)-SETTO G - INVILUPPO MAX SLU-M11(SISMA)

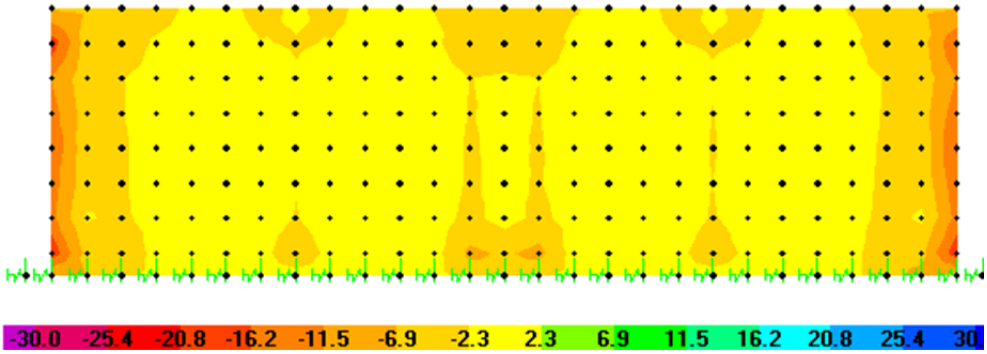


FIG. 4.448 - C7-C8(Q-11)-SETTO G - INVILUPPO MIN SLU-M11(SISMA)

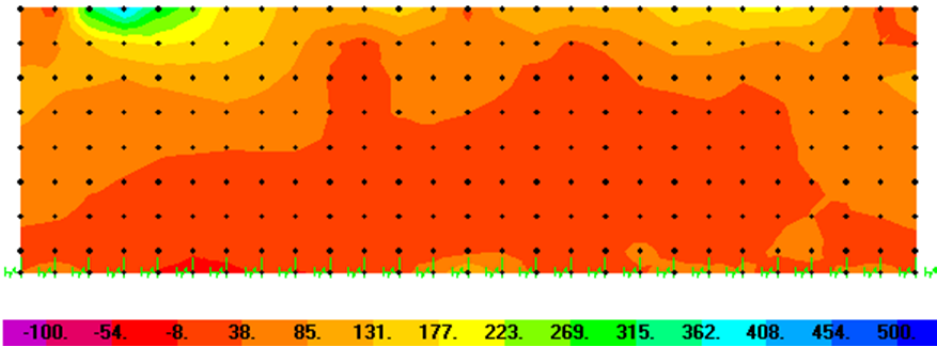


FIG. 4.449 - C7-C8(Q-11)-SETTO G - INVILUPPO MAX SLU-F11(SISMA)

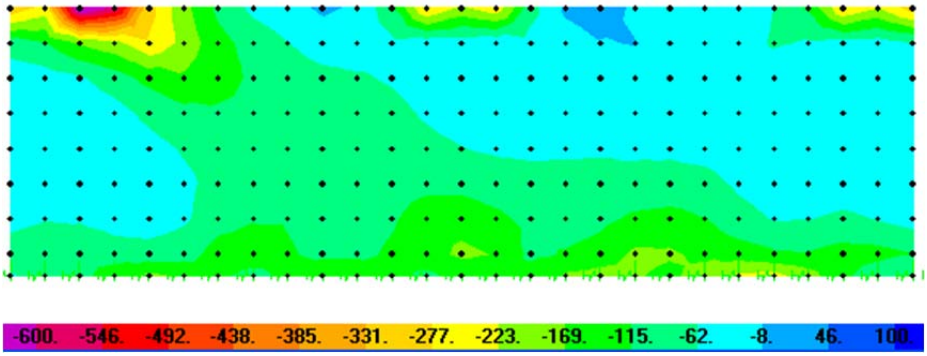


FIG. 4.450 - C7-C8(Q-11)-SETTO G - INVILUPPO MIN SLU-F11(SISMA)

C7-C8(q-11)-Setto G - ferri orizzontali - Verifiche agli SLU sisma				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{max}/M_{min}	+100kN	-20kNm	-91kNm	**4.55**
N_{max}/M_{max}	+100kN	+15kNm	+91kNm	**6.07**
N_{min}	-180kN	+15kNm	+153kNm	**10.2**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
N_{max}/M_{min}	+100kN	-5kNm	-44kNm	**8.8**
N_{max}/M_{max}	+100kN	+15kNm	+44kNm	**2.93**
N_{min}	-150kN	+15kNm	+68kNm	**4.53**
Da +5.50				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
N_{max}	+300kN	+15kNm	+38kNm	**2.53**

4.4.4.2 Verifica a taglio - fase sismica C7-C8(q-11)

Di seguito si riportano i diagrammi di taglio per le pareti e i setti in fase sismica

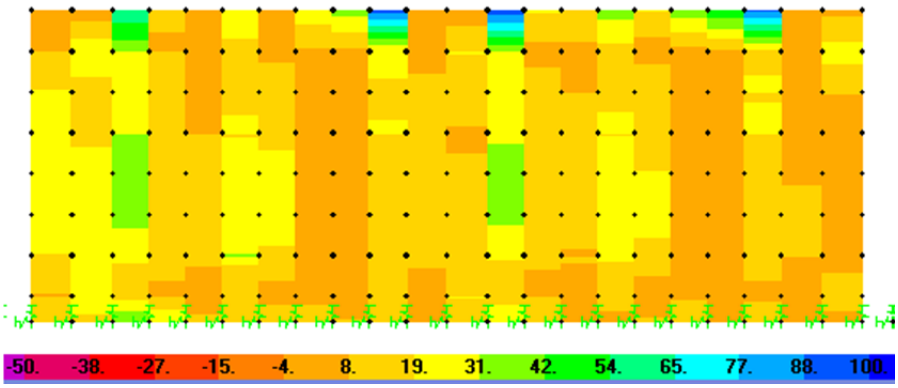


FIG. 4.451 - C7-C8(Q-11)-.PARETE A - INVILUPPO SLU-V13(SISMA)

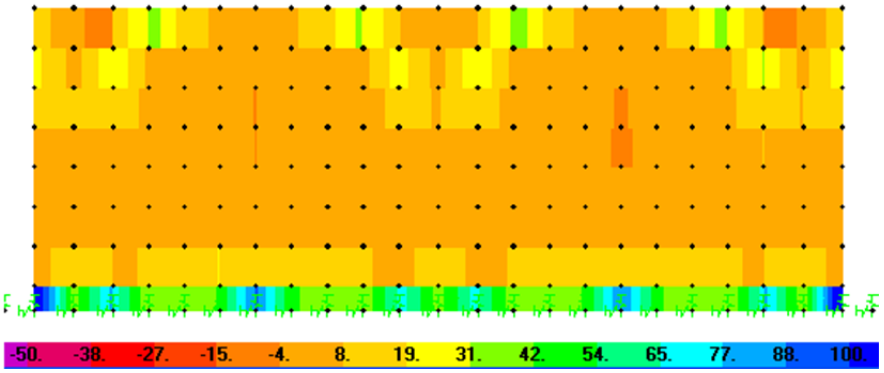


FIG. 4.452 - C7-C8(Q-11)-.)-PARETE A - INVILUPPO SLU-V23(SISMA)

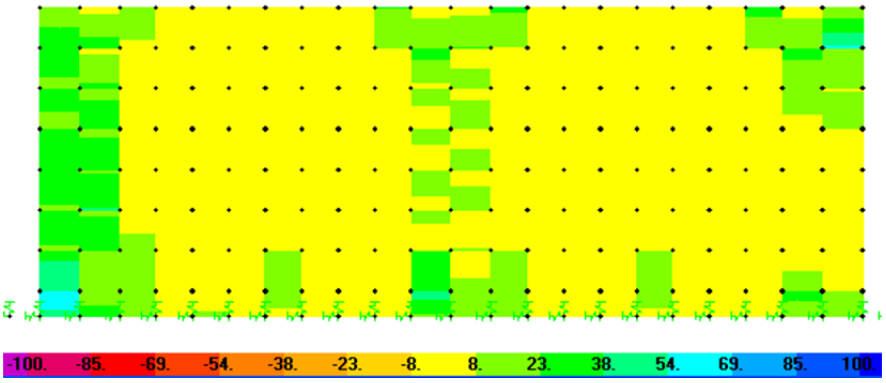


FIG. 4.453 - C7-C8(Q-11))-SETTO B - INVILUPPO SLU-V13(SISMA)

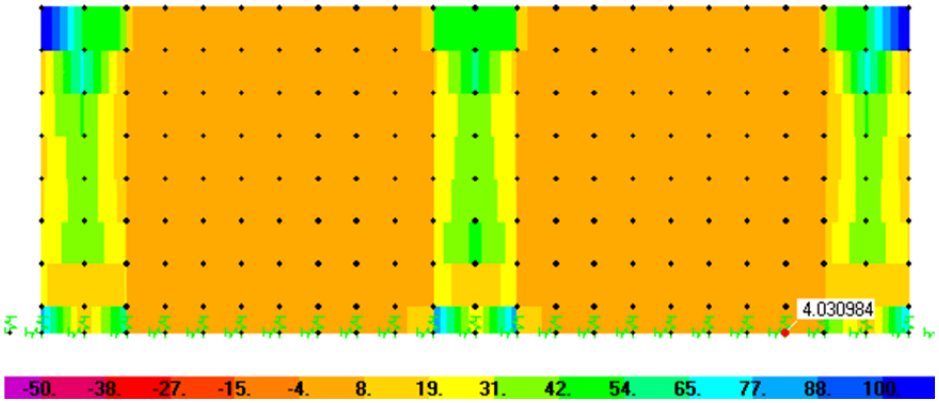


FIG. 4.454 - C7-C8(Q-11)-SETTO B - INVILUPPO SLU-V23(SISMA)

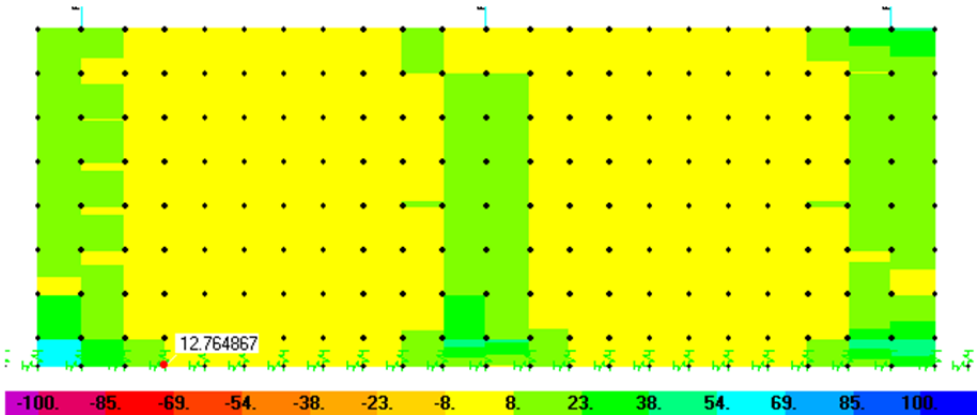


FIG. 4.455 - C7-C8(Q-11)-SETTO C - INVILUPPO SLU-V13(SISMA)

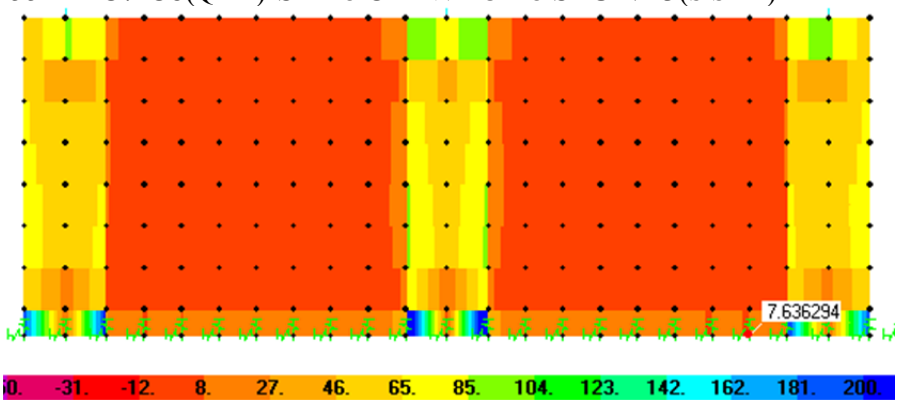


FIG. 4.456 - C7-C8(Q-11)-SETTO C - INVILUPPO SLU-V23(SISMA)

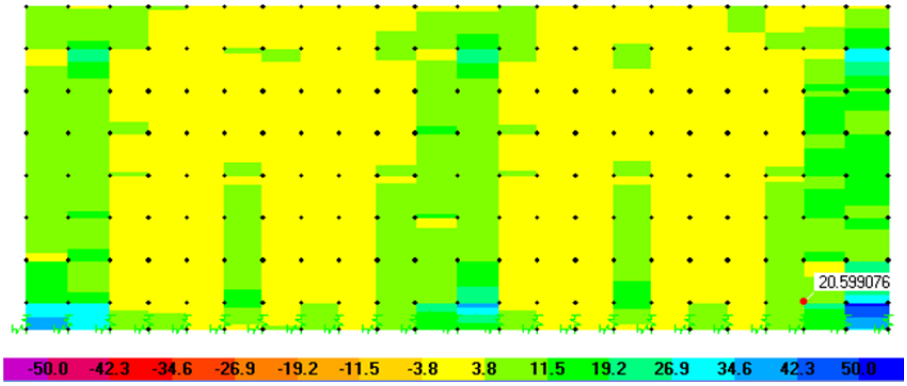


FIG. 4.457 - C7-C8(Q-11)-SETTO D - INVILUPPOSLU-V13(SISMA)

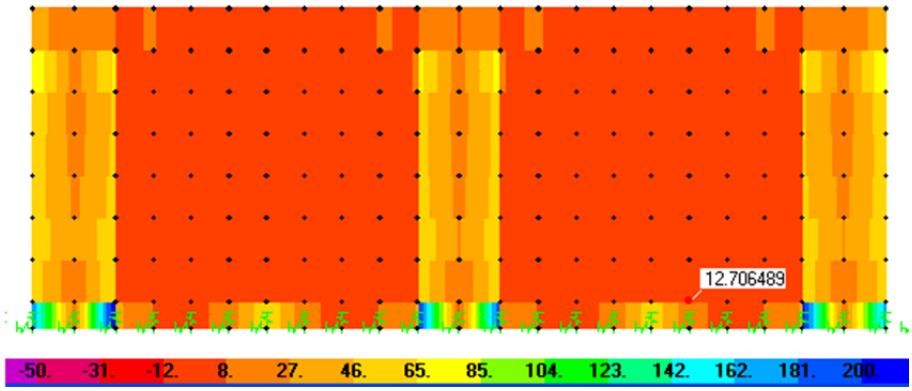


FIG. 4.458 - C7-C8(Q-11)-SETTO D - INVILUPPO SLU-V23(SISMA)

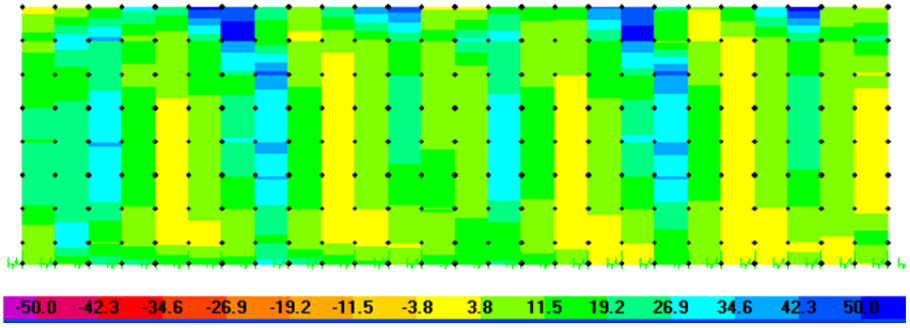


FIG. 4.459 - C7-C8(Q-11)-SETTO E - INVILUPPO SLU-V13(SISMA)

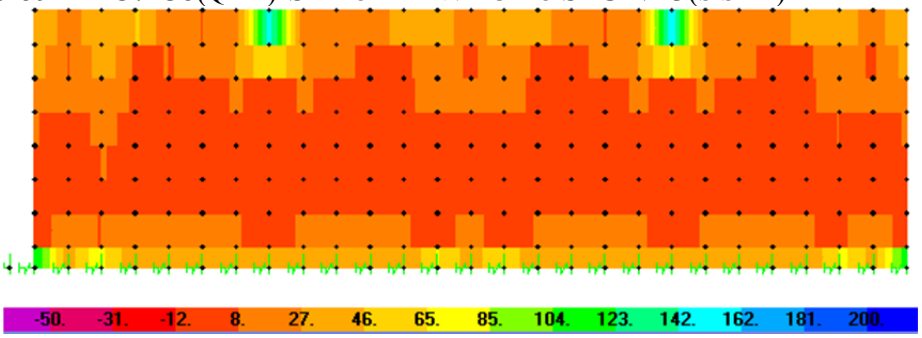


FIG. 4.460 - C7-C8(Q-11)-SETTO E - INVILUPPO SLU-V23(SISMA)

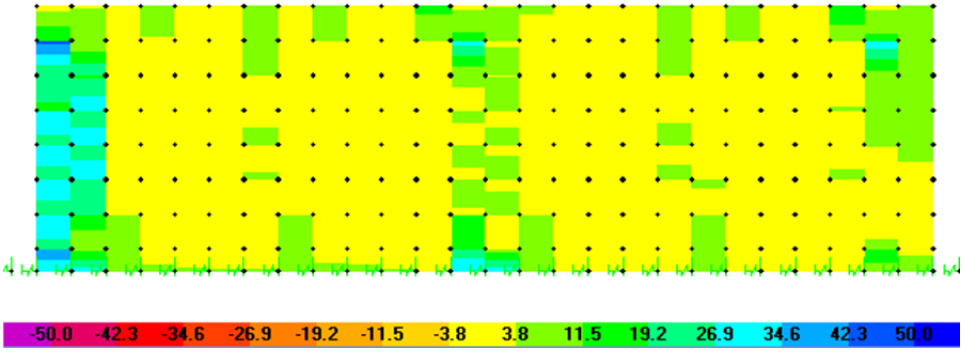


FIG. 4.461 - C7-C8(Q-11)-SETTO F - INVILUPPO SLU-V13(SISMA)

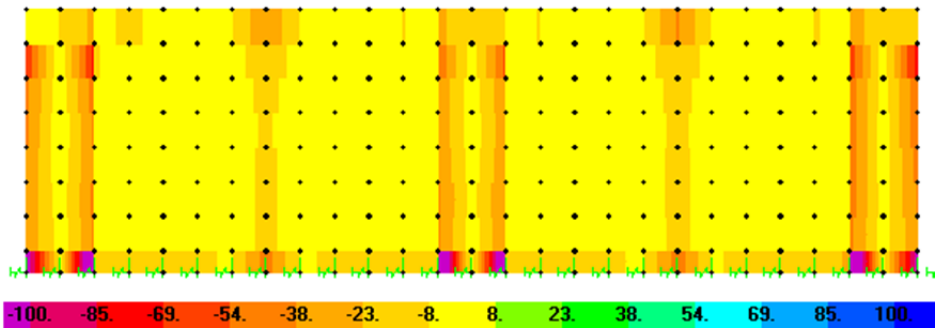


FIG. 4.462 - C7-C8(Q-11)-SETTO F - INVILUPPO SLU-V23(SISMA)

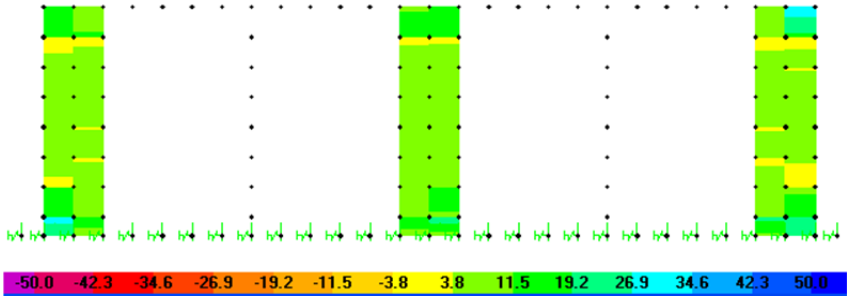


FIG. 4.463 - C7-C8(Q-11)-SETTO F/G - INVILUPPO SLU-V13(SISMA)

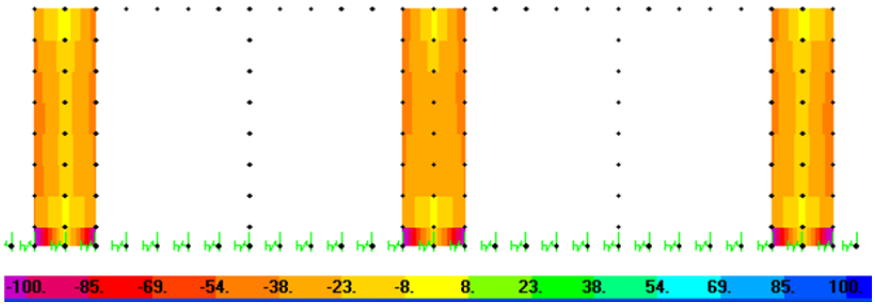


FIG. 4.464 - C7-C8(Q-11)-SETTO F/G - INVILUPPO SLU-V23(SISMA)

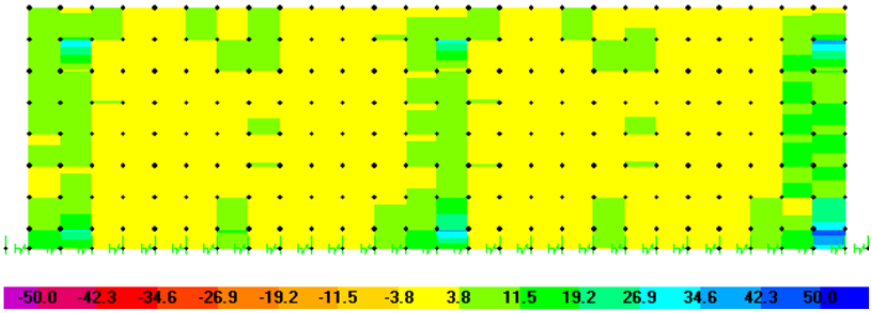


FIG. 4.465 - C7-C8(Q-11)-SETTO G - INVILUPPO SLU-V13(SISMA)

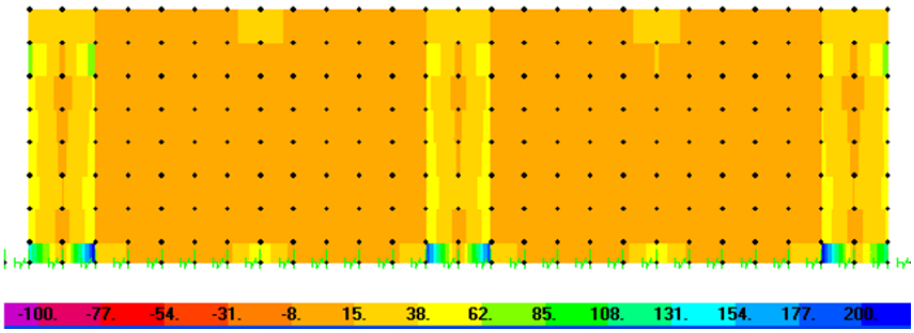


FIG. 4.466 - C7-C8(Q-11)-SETTO G - INVILUPPO SLU-V23(SISMA)

Il taglio massimo è pari a 50kN/m(sp.25cm) e 150kN/m (sp.50cm), valori al di sotto della resistenza a taglio del calcestruzzo non ordito a taglio sia per la parete dello spessore 50cm (V_{Rd}≈190kN/m) sia per i setti interni dello spessore di 25cm (V_{Rd}≈100kN/m), in assenza di sforzo normale di compressione.

4.4.4.3 Verifica setti interni in fase sismica C7-C8(q-11)

Di seguito si esegue una verifica ulteriore per verificare l'adeguatezza dell'orditura dei setti interni in fase sismica.

I due setti più sollecitati in fase sismica sono i setti C (per luce),setto D (per orditura) e i setti G (per sforzi). Per le verifiche si fa riferimento a quelle per il cassone C7-C8 nel paragrafo 4.2.4.3 essendo gli sforzi e l'orditura uguale.

4.4.4.4 Monconi di ripresa e ferri verticali - fase sismica C7-C8(q-11)

Di seguito si riportano gli inviluppi degli sforzi agli SLU per le combinazioni sismiche e le relative verifiche dell'orditura:

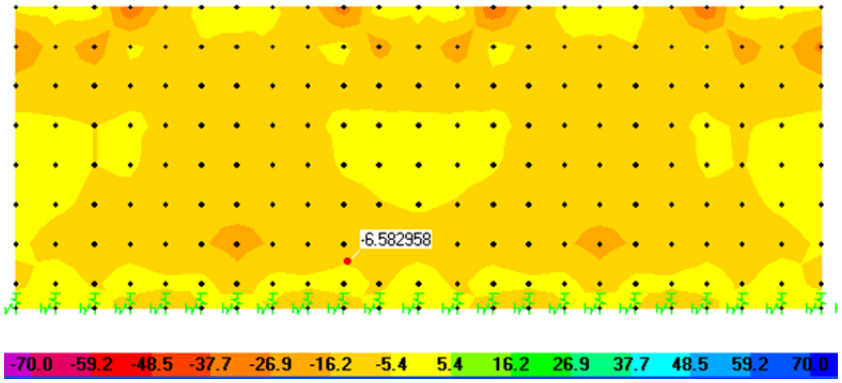


FIG. 4.467 - C7-C8(Q-11)-PARETE A - INVILUPPO MIN SLU-M22 (SISMA)

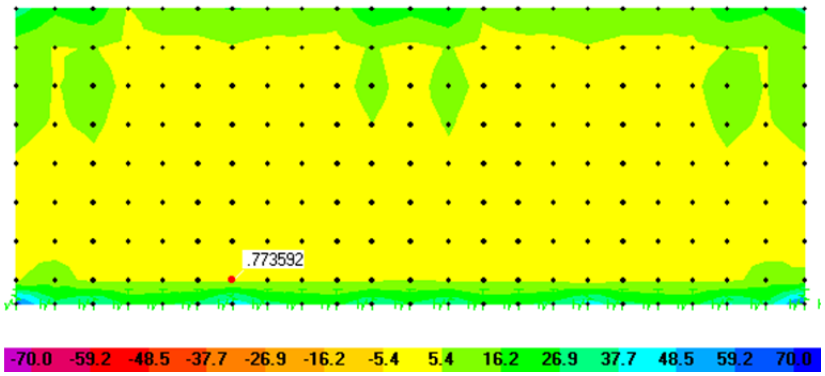


FIG. 4.468 - C7-C8(Q-11)-PARETE A - INVILUPPO MAX SLU-M22 (SISMA)

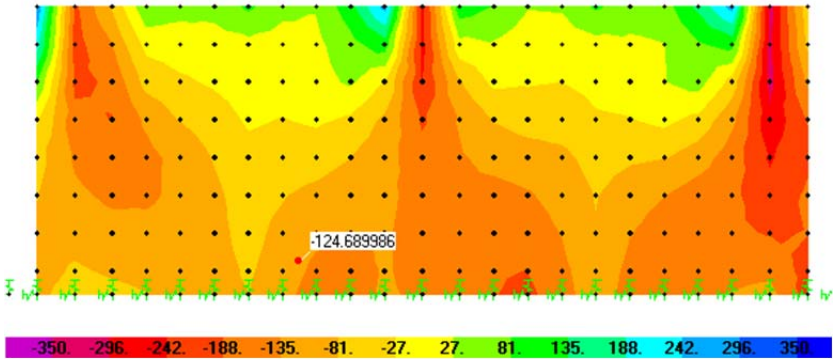


FIG. 4.469 - C7-C8(Q-11)-.)-.PARETE A - INVILUPPO MAX SLU-F22 (SISMA)

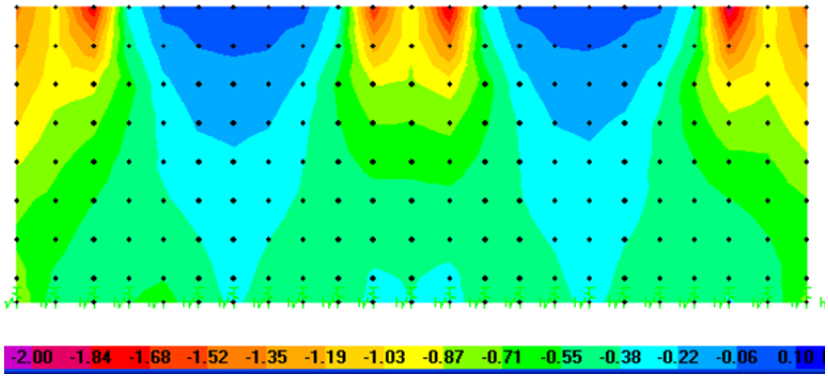


FIG. 4.470 - C7-C8(Q-11)-PARETE A- INVILUPPO MIN SLU-F22 (SISMA)

C7-C8(q-11)-Parete A - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m				
B=1.0m H=0.5m A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{min}	-630kN	+60kNm	-294kNm	**4.2**
M_{min}/N_{max}	-70kN	-16kNm	-136kNm	**1.94**
M_{max}/N_{max}	-70kN	+60kNm	+82kNm	**4.1**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
N_{min}	-25kN	-20kNm	**-80kNm**	**4.0**
M_{min}/N_{max}	+40kN	-20kNm	**-36kNm**	**1.8**
M_{max}/N_{max}	+40kN	+15kNm	**+36kNm**	**1.8**

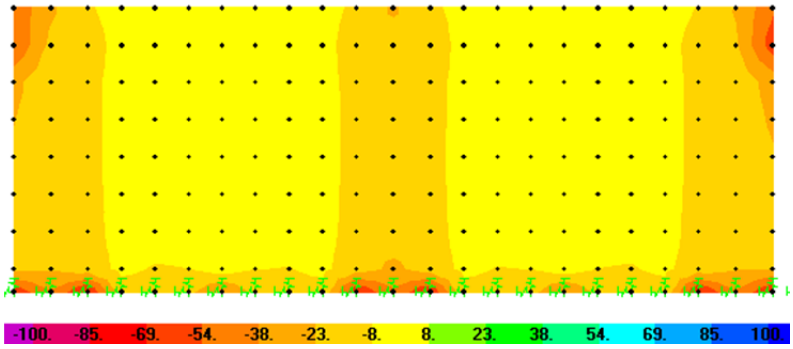


FIG. 4.471 - C7-C8(Q-11)-SETTO B- INVILUPPO MIN SLU-M22 (SISMA)

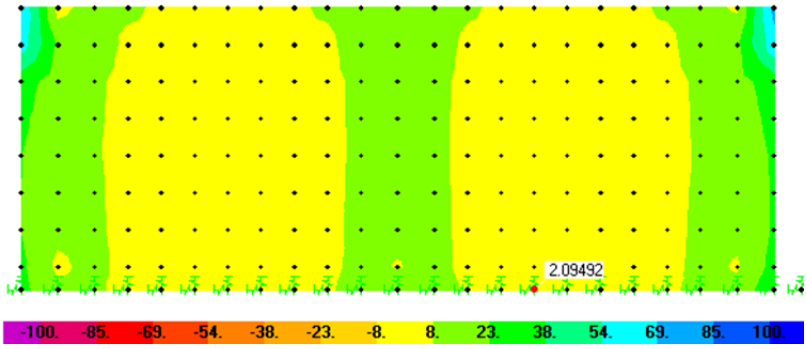


FIG. 4.472 - C7-C8(Q-11)-SETTO B- INVILUPPO MAX SLU-M22 (SISMA)

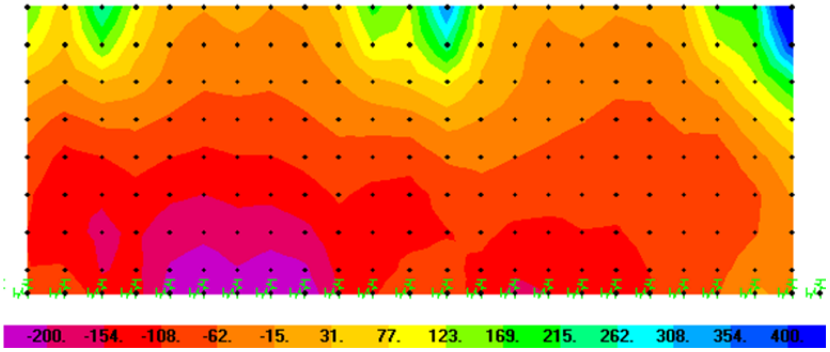


FIG. 4.473 - C7-C8(Q-11)-.SETTO B- INVILUPPO MAX SLU-F22 (SISMA)

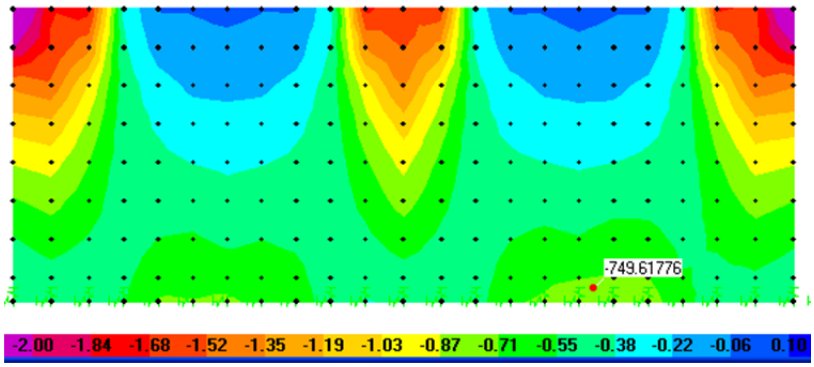


FIG. 4.474 - C7-C8(Q-11)-.SETTO B- INVILUPPO MIN SLU-F22 (SISMA)

C7-C8(q-11)-Setto B - ferri verticali - Verifiche agli SLU - sisma				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
N_{min}	-780kN	-40kNm	-121kNm	**3.0**
M_{min}/N_{max}	-8kN	-40kNm	-67kNm	**1.68**
M_{max}/N_{max}	-8kN	+20kNm	+67kNm	**3.35**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	-10kN	-70kNm	-143kNm	**2.04**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
N_{min}	-30kN	-20kNm	**-53kNm**	**2.65**
M_{min}/N_{max}	+150kN	-20kNm	**-34kNm**	**1.7**
M_{max}/N_{max}	+150kN	+20kNm	**+34kNm**	**1.7**

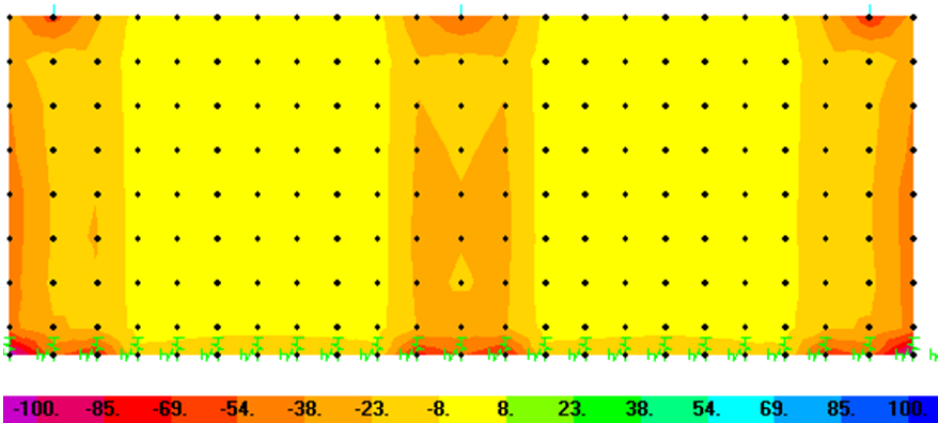


FIG. 4.475 - C7-C8(Q-11)-.SETTO C- INVILUPPO MIN SLU-M22 (SISMA)

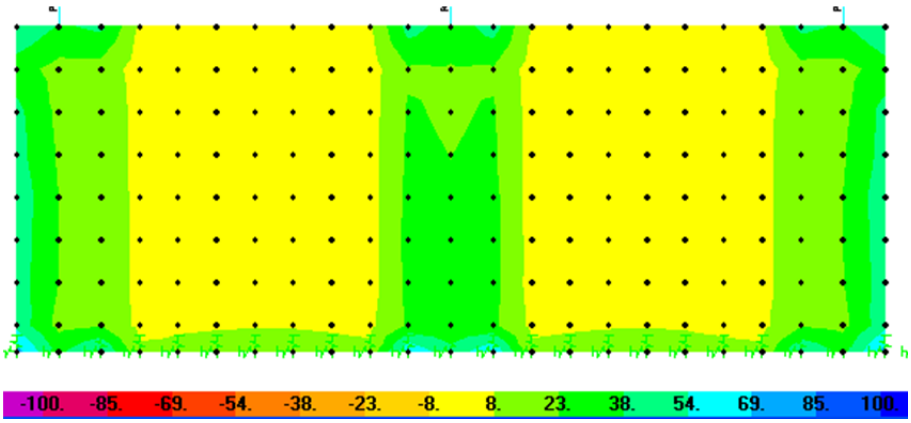


FIG. 4.476 - C7-C8(Q-11)-SETTO C- INVILUPPO MAX SLU-M22 (SISMA)

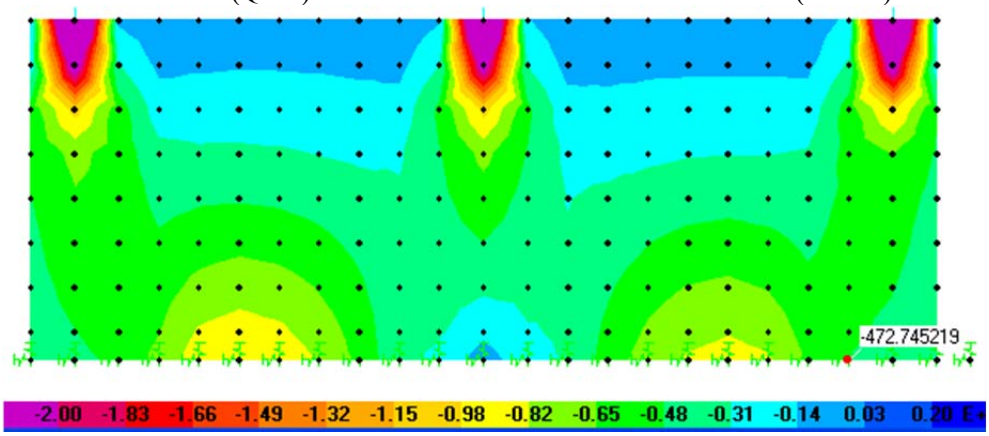


FIG. 4.477 - C7-C8(Q-11)-SETTO C- INVILUPPO MIN SLU-F22 (SISMA)

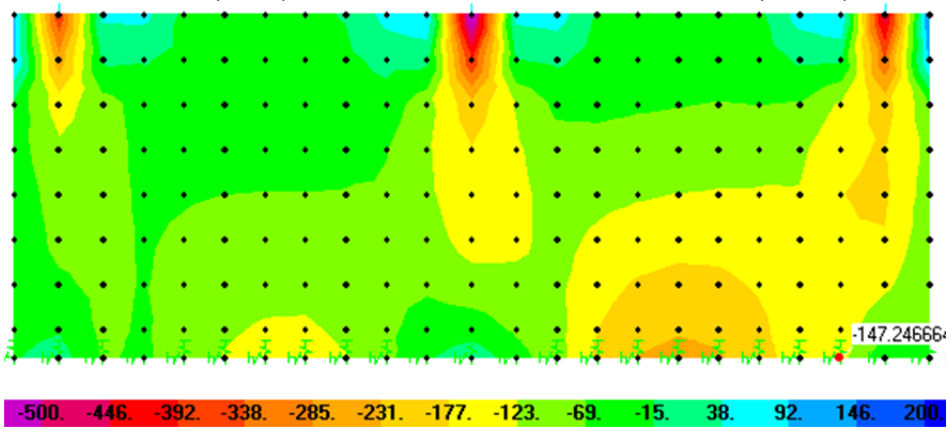


FIG. 4.478 - C7-C8(Q-11)-SETTO C- INVILUPPO MAX SLU-F22 (SISMA)

C7-C8(q-11)-Setto C - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.171m, H2=0.079m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{min}	-1000kN	-12kNm	-132kNm	**11**
M_{min}/N_{max}	-50kN	-12kNm	-70kNm	**5.8**
M_{max}/N_{max}	-50kN	+13kNm	+70kNm	**5.4**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+20kN	-70kNm	-136kNm	**1.94**
Verticali correnti (esclusi pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
N_{min}	-200kN	-13kNm	+69kNm	**5.3**
M_{min}/N_{max}	+100kN	-13kNm	-40kNm	**3.08**
M_{max}/N_{max}	+100kN	+20kNm	+40kNm	**2.0**

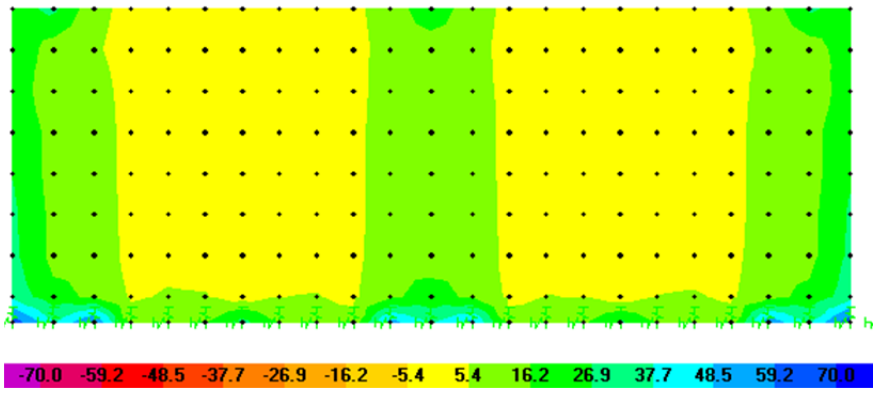


FIG. 4.479 - C7-C8(Q-11)-SETTO D- INVILUPPO MAX SLU-M22 (SISMA)

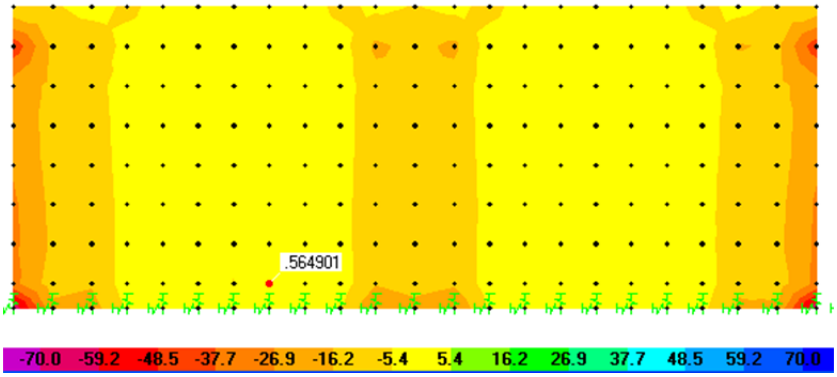


FIG. 4.480 - C7-C8(Q-11)-SETTO D- INVILUPPO MIN SLU-M22 (SISMA)

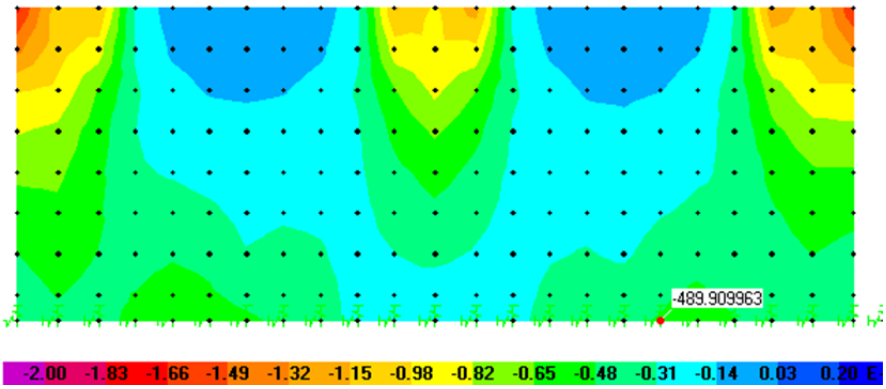


FIG. 4.481 - C7-C8(Q-11)-SETTO D- INVILUPPO MIN SLU-F22 (SISMA)

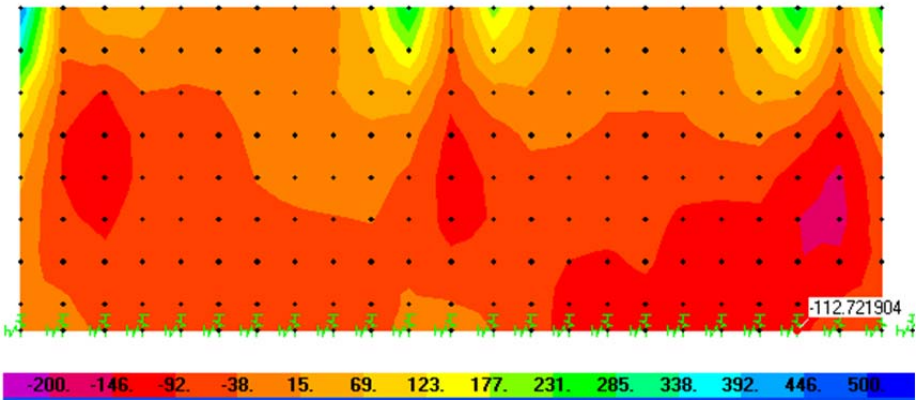


FIG. 4.482 - C7-C8(Q-11)-SETTO D- INVILUPPO MAX SLU-F22 (SISMA)

C7-C8(q-11)-Setto D - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=565mm^2(θ12/200mm), H1=0.18m, H2=0.07m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd} / M_{Sd}**
N_{min}	-630kN	+30kNm	+96kNm	**3.84**
M_{min}/N_{max}	-20kN	-30kNm	+53kNm	**4.08**
M_{max}/N_{max}	-20kN	+30kNm	+53kNm	**2.12**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{max}/N_{max}	+0kN	+55kNm	+139kNm	**3.09**
Verticali correnti				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
N_{min}	-70kN	+10kNm	+65kNm	**5.41**
M_{min}/N_{max}	+100kN	-10kNm	-31kNm	**3.88**
M_{max}/N_{max}	+100kN	+10kNm	+42kNm	**3.50**

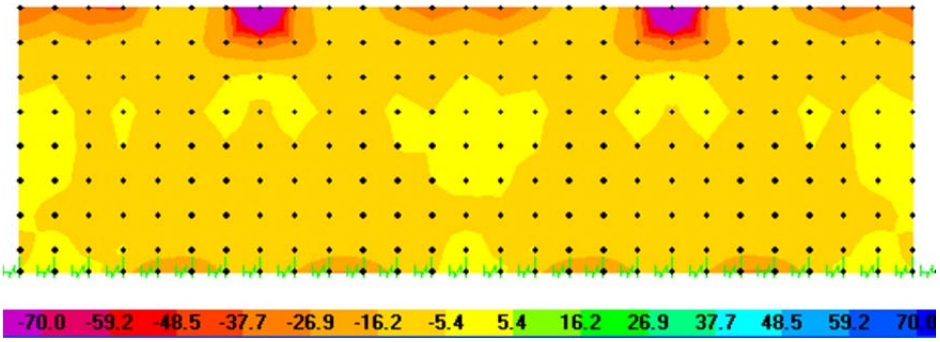


FIG. 4.483 - C7-C8(Q-11)-PARETE E- INVILUPPO MIN SLU-M22 (SISMA)

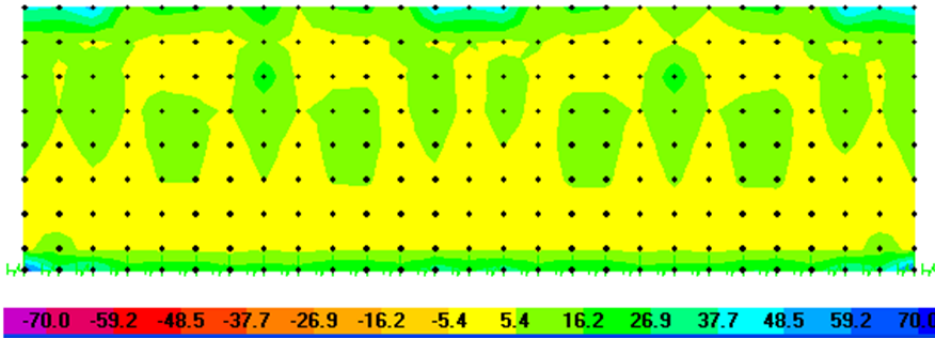


FIG. 4.484 - C7-C8(Q-11)-PARETE E - INVILUPPO MAX SLU-M22 (SISMA)

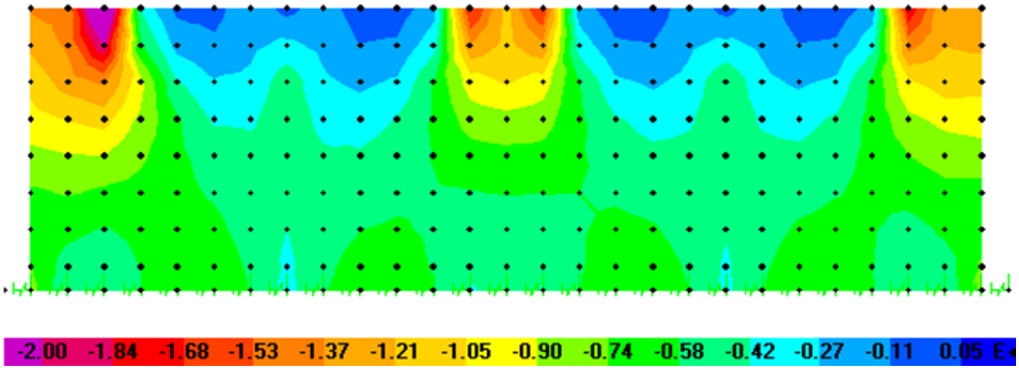


FIG. 4.485 - C7-C8(Q-11)-PARETE E - INVILUPPO MIN SLU-F22 (SISMA)

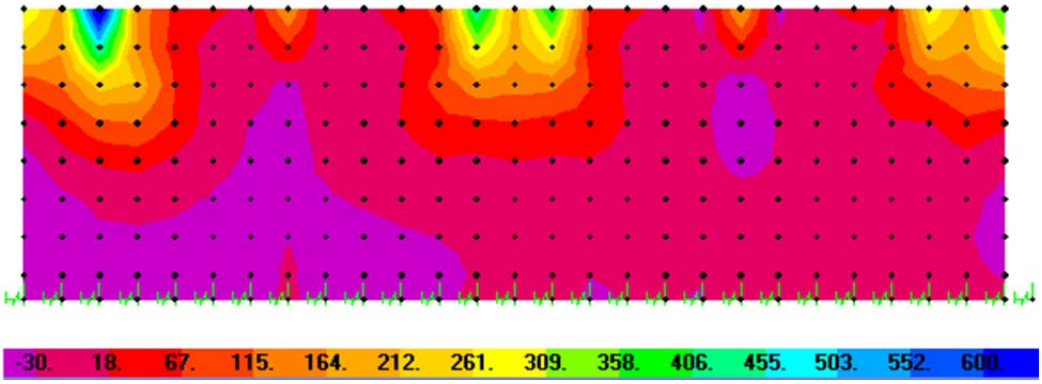


FIG. 4.486 - C7-C8(Q-11)-PARETE E - INVILUPPO MAX SLU-F22 (SISMA)

ù

C7-C8(q-11)-Parete E - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m				
B=1.0m,H=0.5m,A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{min}	-680kN	-20kNm	-275kNm	**13.75**
M_{min}/N_{max}	-30kN	-20kNm	-141kNm	**7.05**
M_{max}/N_{max}	-30kN	+20kNm	+87kNm	**4.35**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
N_{min}	-86kN	+20kNm	**+92kNm**	**4.60**
M_{min}/N_{max}	+100kN	-20kNm	**-49kNm**	**2.5**
M_{max}/N_{max}	+100kN	+20kNm	**+49kNm**	**2.5**

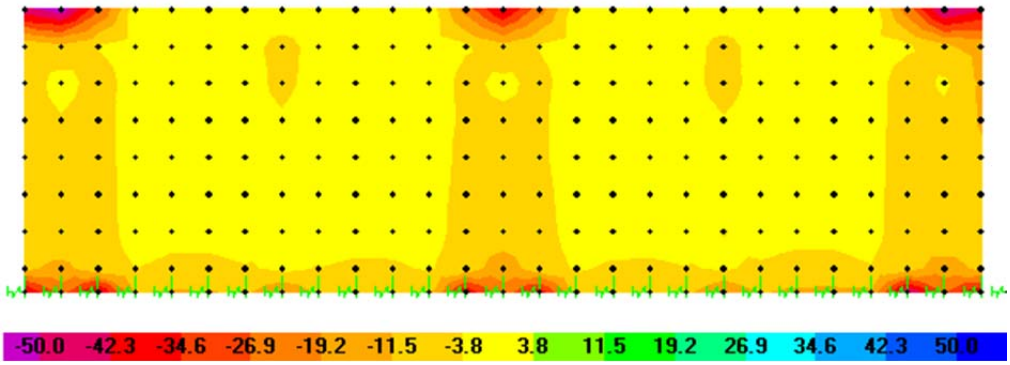


FIG. 4.487 - C7-BC(Q-11)-SETTO F- INVILUPPO MIN SLU-M22 (SISMA)

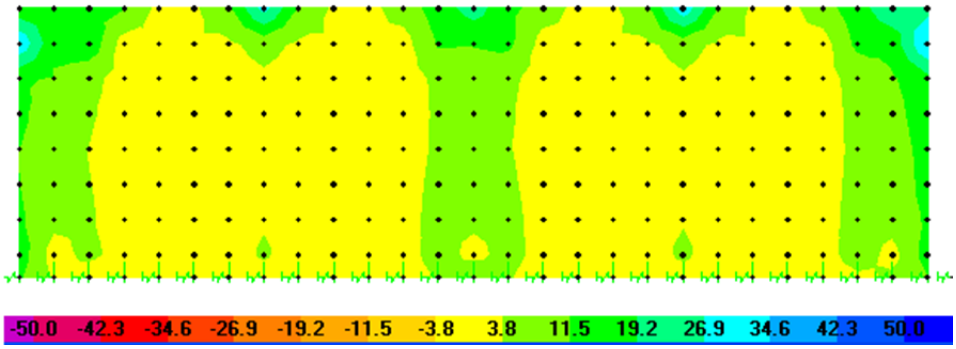


FIG. 4.488 - C7-C8(Q-11)-SETTO F- INVILUPPO MAX SLU-M22 (SISMA)

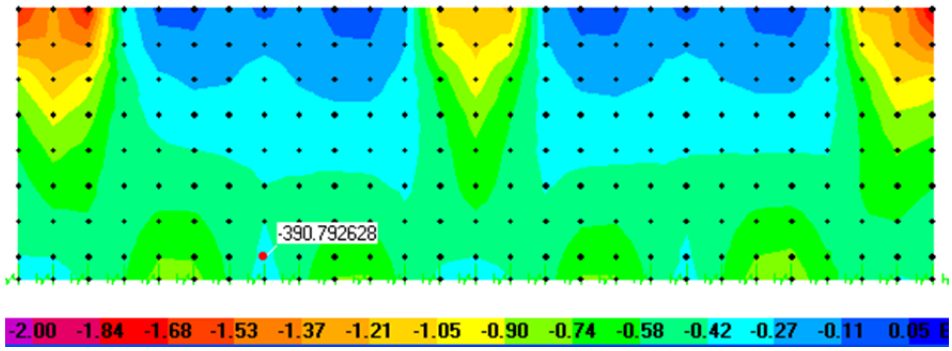


FIG. 4.489 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLU-F22 (SISMA)

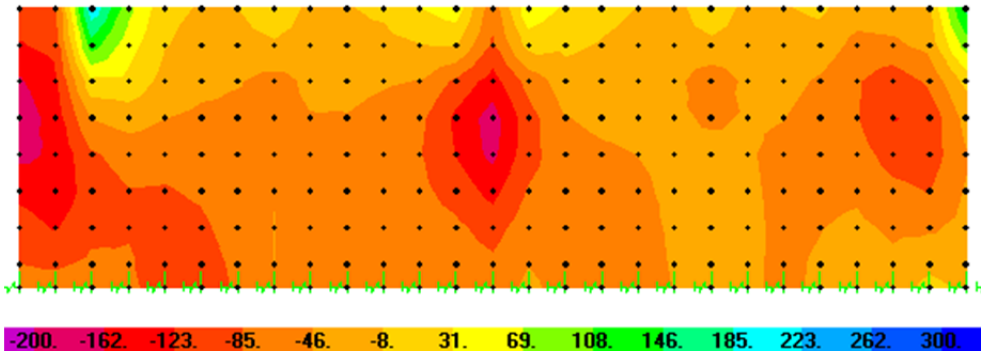


FIG. 4.490 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLU-F22 (SISMA)

C7-C8(q-11)-Setto F - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/M_{Sd}**
N_{min}	-800kN	+20kNm	+122kNm	**6.10**
M_{min}/N_{max}	-25kN	-15kNm	-68kNm	**4.53**
M_{max}/N_{max}	-25kN	+1kNm	+68kNm	**68**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m,H=0.50m,A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M/N_{max}	+30kN	-40kNm	-63kNm	**1.58**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
N_{min}	-900kN	+6kNm	+120kNm	**20**
M_{min}/N_{max}	+100kN	-7kNm	-40kNm	**5.7**
M_{max}/N_{max}	+100kN	+6kNm	+40kNm	**6.7**

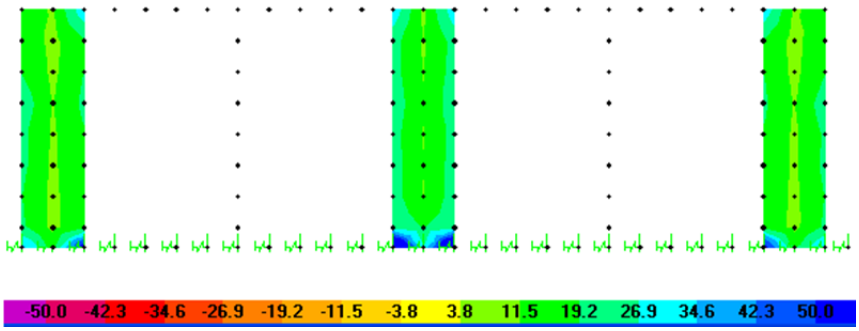


FIG. 4.491 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MAX SLU-M22 (SISMA)

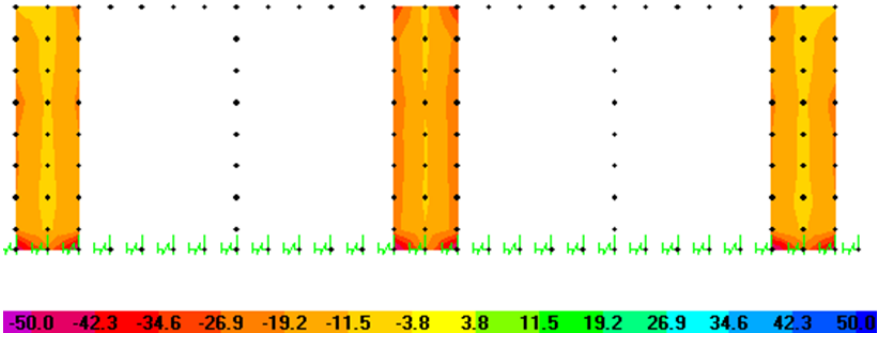


FIG. 4.492 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLU-M22 (SISMA)

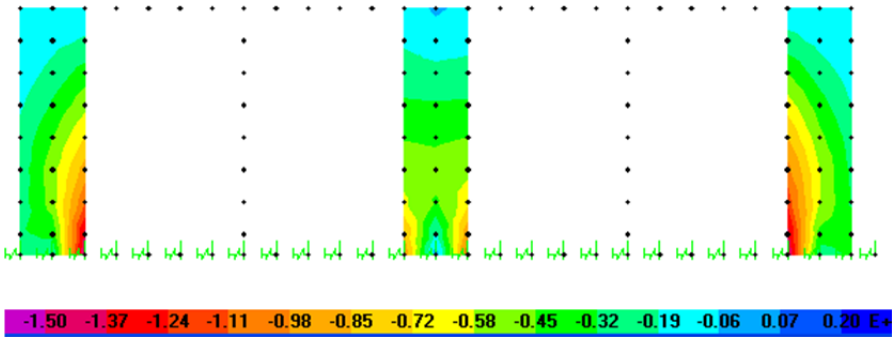


FIG. 4.493 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLU-F22 (SISMA)

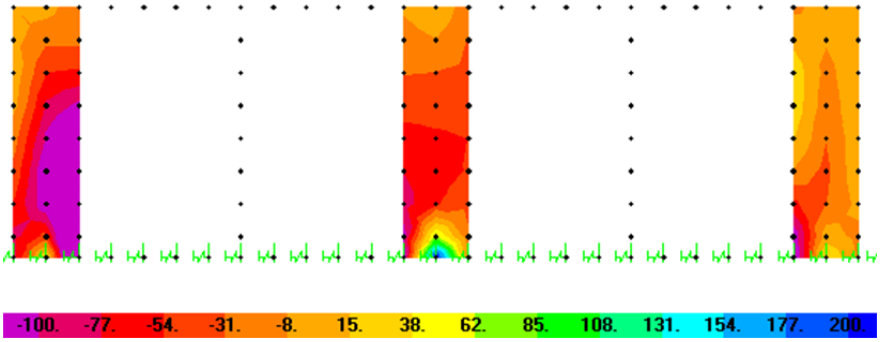


FIG. 4.494 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MAX SLU-F22 (SISMA)

C7-C8(q-11)-Setti fra F/G - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m - setti 50cm				
B=1.0m H=0.50m A1=A2=565mm^2(θ12/200mm), H1=0.430m, H2=0.07m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd}/ M_{Sd}**
N_{min}	-450kN	-35kNm	-200kNm	**5.71**
M_{min}/N_{max}	+100kN	-35kNm	-82kNm	**2.34**
M_{max}/N_{max}	+100kN	+50kNm	+82kNm	**1.64**

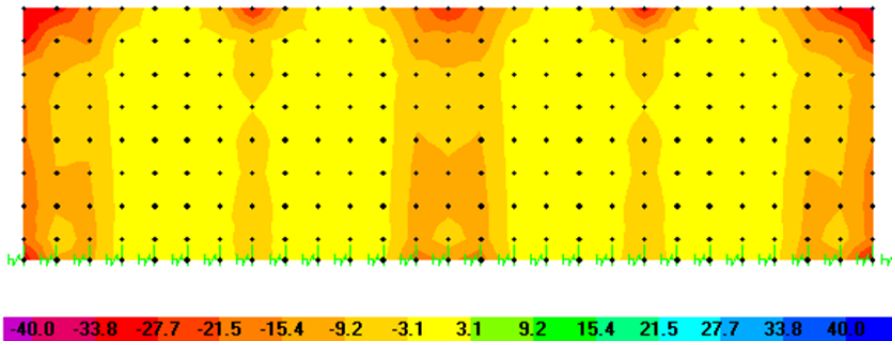


FIG. 4.495 - C7-C8(Q-11)-SETTI G - INVILUPPO MIN SLU-M22 (SISMA)

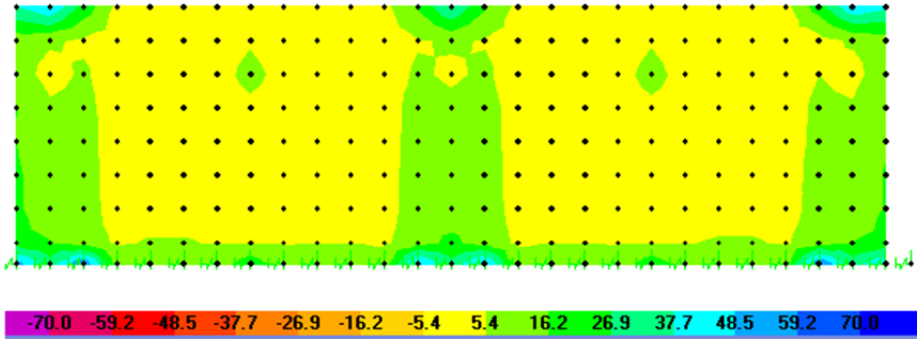


FIG. 4.496 - C7-C8(Q-11)-SETTI G - INVILUPPO MAX SLU-M22 (SISMA)

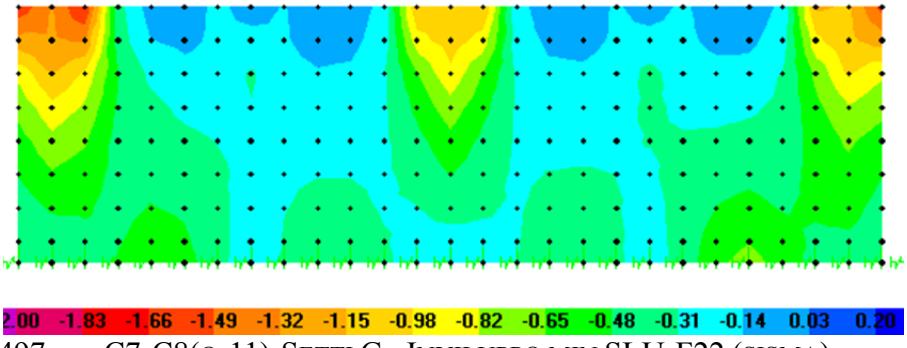


FIG. 4.497 - C7-C8(Q-11)-SETTI G - INVILUPPO MIN SLU-F22 (SISMA)

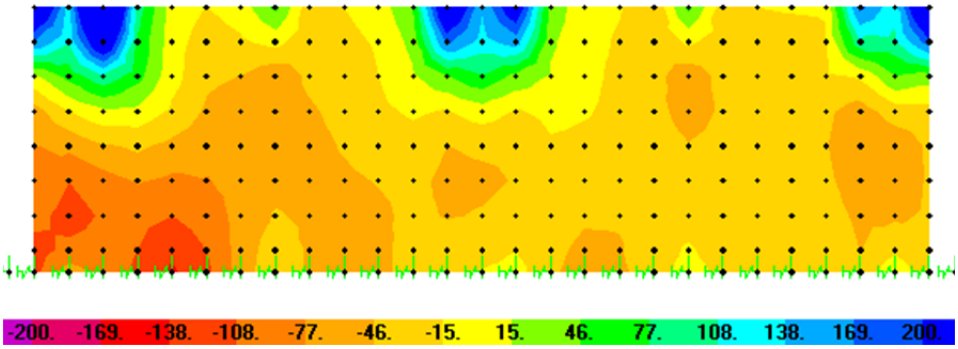


FIG. 4.498 - C7-C8(Q-11)-SETTI G - INVILUPPO MAX SLU-F22 (SISMA)

C7-C8(q-11)-Setto G - ferri verticali - Verifiche agli SLU sisma				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	M_{Rd}	**M_{Rd} / M_{Rd}**
N_{min}	-650kN	+25kNm	+113kNm	**4.52**
N_{max}/M_{min}	-10kN	-15kNm	-66kNm	**4.40**
N_{max}/M_{max}	-10kN	+25kNm	+66kNm	**2.64**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
N_{max}/M_{min}	-10kN	+40kNm	+143kNm	**3.58**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
N_{min}	-700kN	+15kNm	+106kNm	**7.1**
N_{max}/M_{min}	+100kN	-10kNm	-39kNm	**3.9**
N_{max}/M_{max}	+100kN	+15kNm	+39kNm	**2.6**

4.4.5 Verifiche agli SLE (comb.freq.) C7-C8(q-11)

Di seguito si riportano le verifiche del cemento armato del fusto del cassone per gli stati limiti d'esercizio combinazioni frequenti.

Per la verifica dell'orditura orizzontale del fusto si considerano le combinazioni di carico d'esercizio riportati in precedenza.

Di seguito si riportano gli inviluppi dei momenti delle pareti e dei setti.

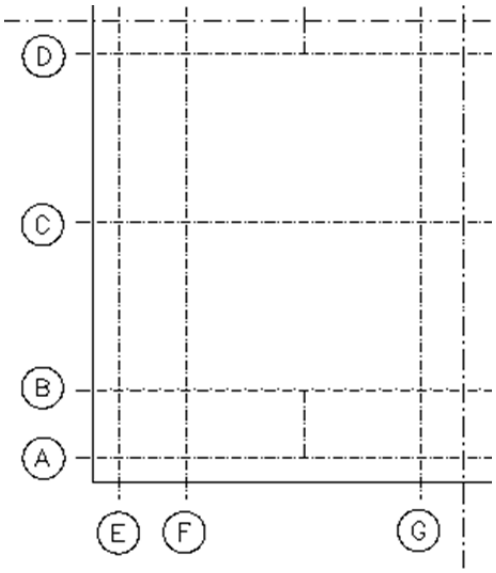


FIG. 4.499 - PIANTA CHIAVE PARETI E SETTI

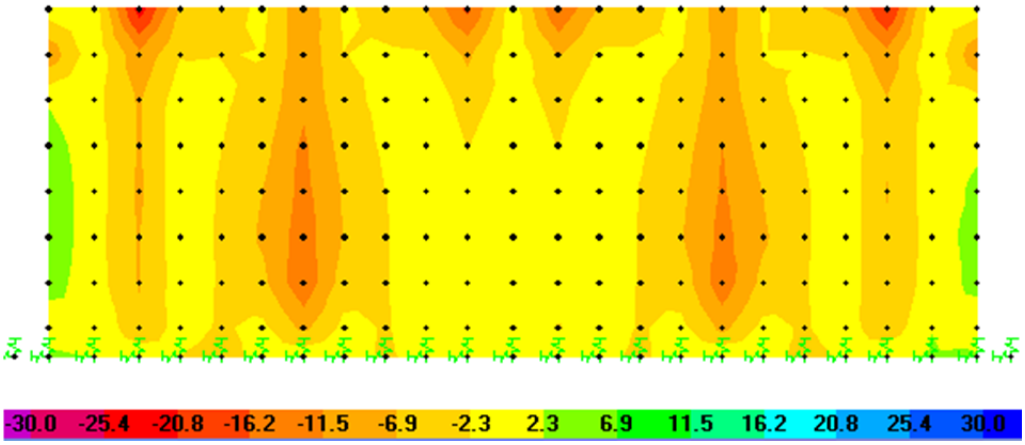


FIG. 4.500 - C7-C8(Q-11)-.PARETE FILO A - INVILUPPO MIN SLE(FREQ.)-M11

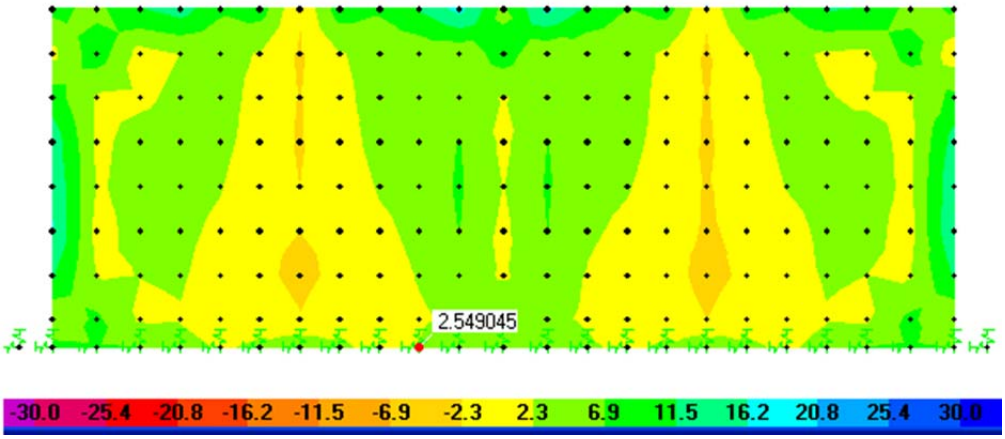


FIG. 4.501 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MAX SLE(FREQ.)-M11

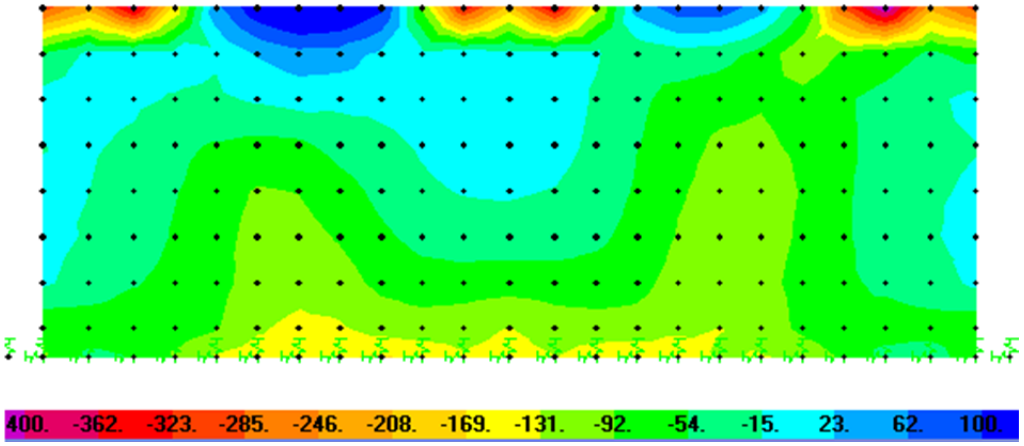


FIG. 4.502 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MIN SLE(FREQ.)-F11

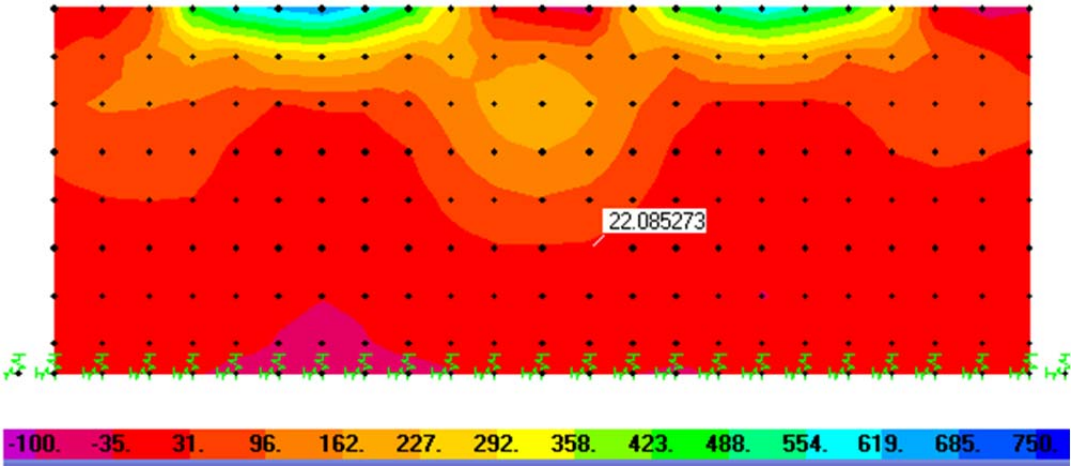


FIG. 4.503 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MAX SLE(FREQ.)-F11

C7-C8(q-11)-Parete A - ferri orizzontali - Verifiche agli SLE(comb. frequenti)					
Da 0 a +5.50					
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
M_{min}	+180kN(tens)	-16kNm	**-**	**192**	**0.192**
M_{max}	+180kN	+16kNm	**-**	**192**	**0.192**
N_{min}	-140kN	+10kNm	**0.5**	**-**	**-**
Da +5.50					
B=1.0m,H=0.5m,A1=A2=1829mm^2(θ22/250+ θ14/500), H1=0.439m, H2=0.061m					
N_{max}	+500kN(tens.)	-10kNm	**-**	**148**	**0.177**

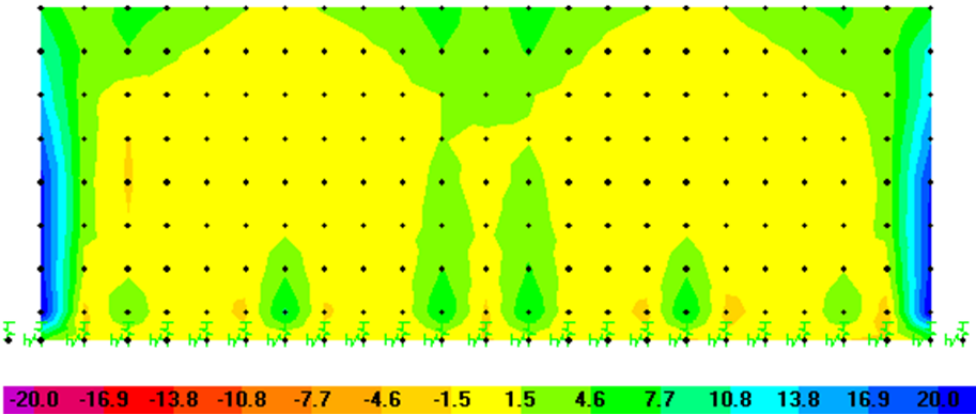


FIG. 4.504 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MAX SLE(FREQ.)-M11

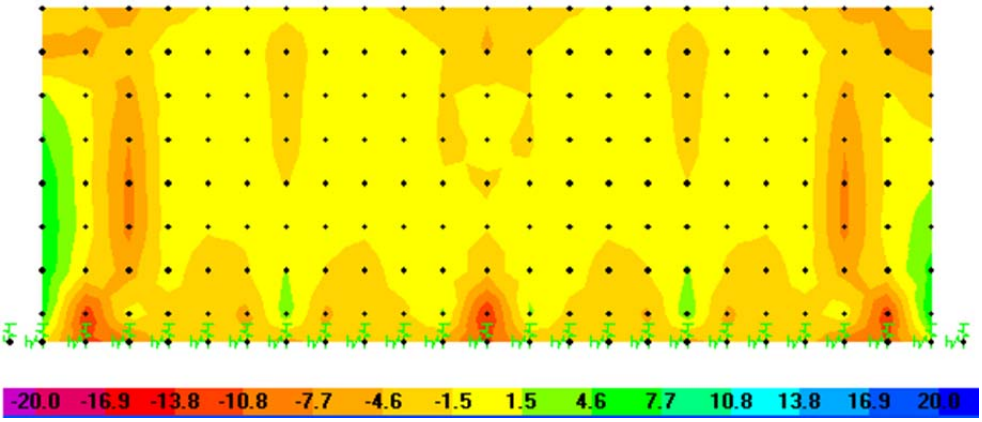


FIG. 4.505 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MIN SLE(FREQ.)-M11

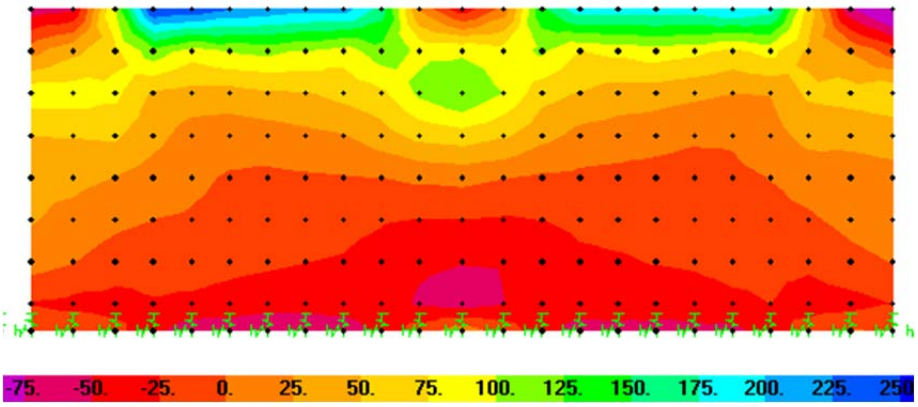


FIG. 4.506 - C7-C8(Q-11)-.SETTO FILO B - INVILUPPO MAX SLE(FREQ.)-F11

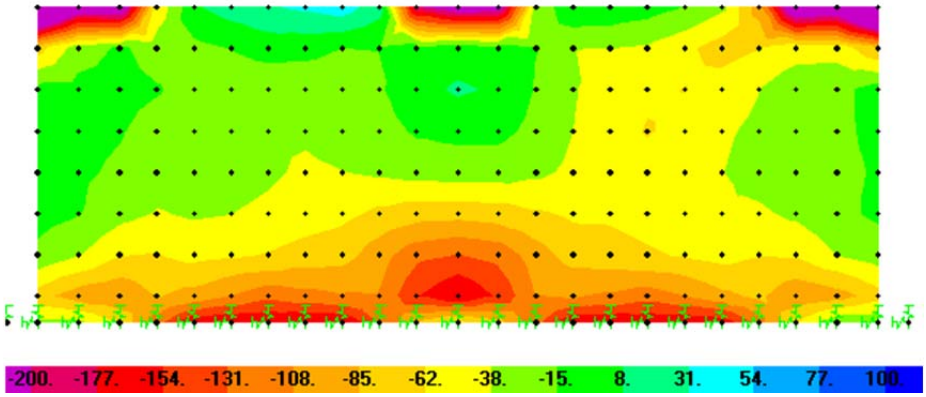


FIG. 4.507 - C7-C8(Q-11)-.SETTO FILO B - INVILUPPO MIN SLE(FREQ)-F11

C7-C8(q-11)-Setto B - ferri orizz. - Verifiche agli SLE(comb. Freq.)					
da 0 a +5.50					
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
M_{min}	+100kN(tens)	-10kNm	**1.9**	**139**	**0.110**
M_{max}	+100kN	+7kNm	**1.2**	**118**	**0.095**
N_{min}	-180kN(comp.)	-10kNm	**1.6**	**-**	**-**
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m					
M_{min}	+100kN	+20kNm	**0.7**	**160**	**0.147**
da +5.50					
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m					
N_{max}	+105kN	+13kNm	**-**	**84**	**0.087**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m					
N_{max}	+210kN	+7kNm	**-**	**153**	**0.167**

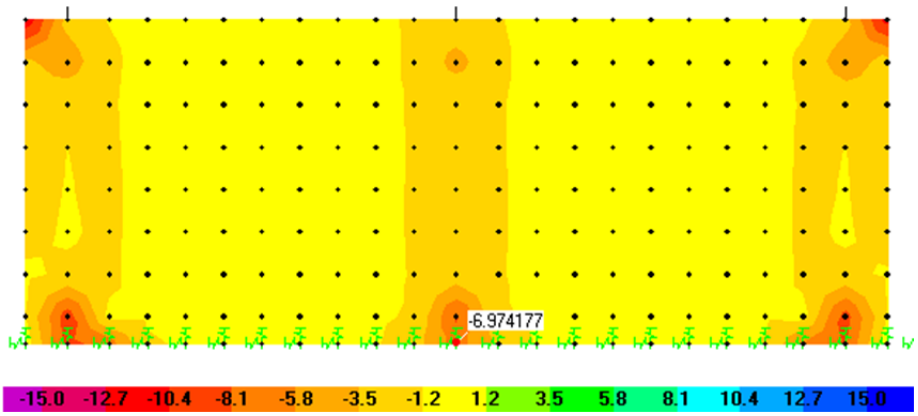


FIG. 4.508 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MAX SLE(FREQ)-M11

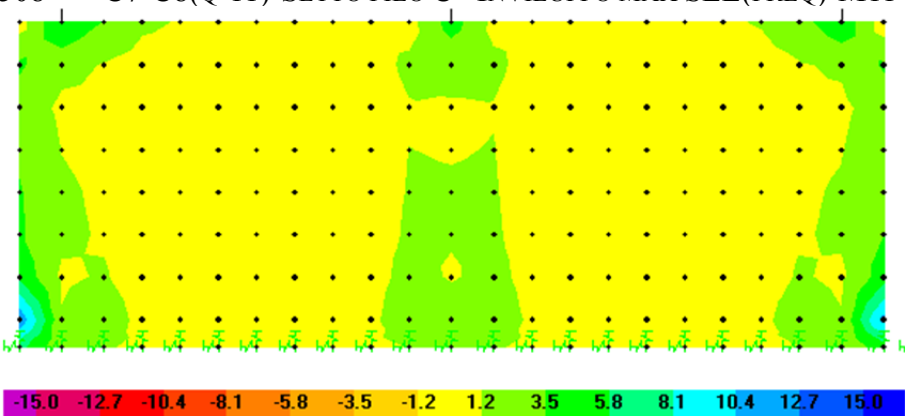


FIG. 4.509 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MIN SLE(FREQ)-M11

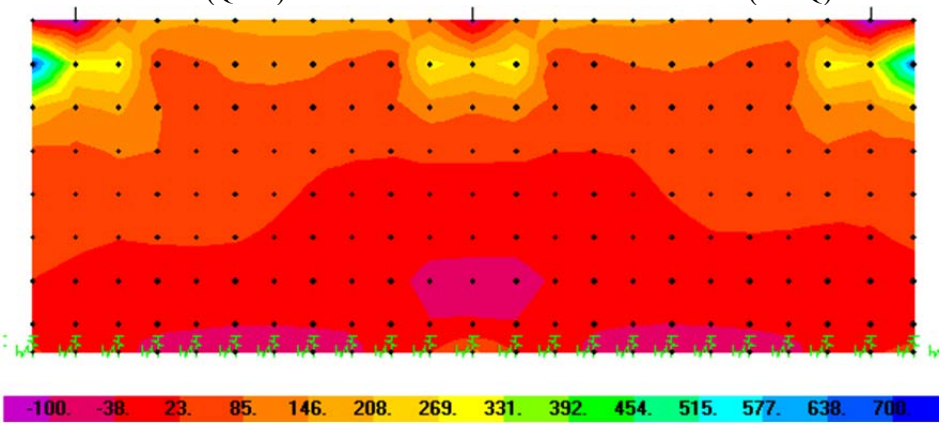


FIG. 4.510 - C7-C8(Q-11)-.SETTO FILO C - INVILUPPO MAX SLE(FREQ)-F11

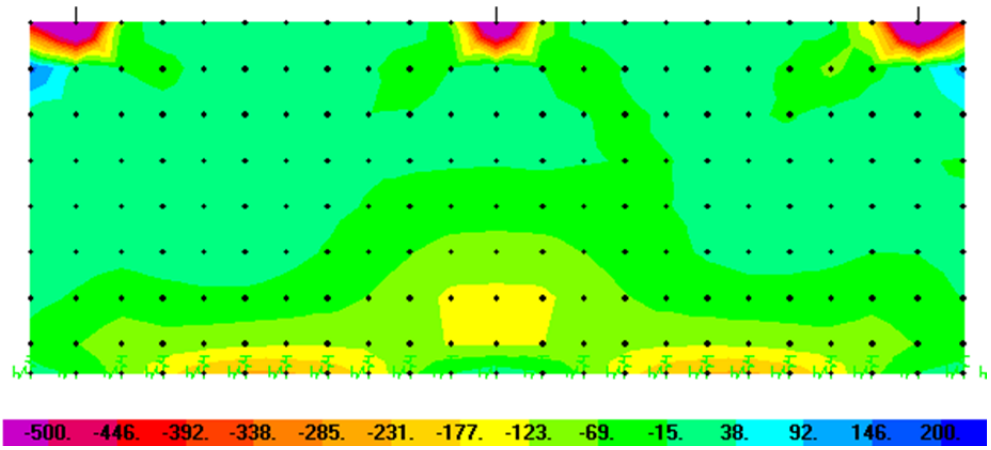


FIG. 4.511 - C7-C8(Q-11)-.SETTO FILO C - INVILUPPO MIN SLE(FREQ)-F11

C7-C8(q-11)-Setto C - ferri orizzontali - Verifiche agli SLE(comb. freq.)					
da 0 a +5.50					
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250mm), H1=0.189m, H2=0.061m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	+160kN(tens.)	-3kNm	**-**	**67**	**0.080**
N_{max}/M_{max}	+160kN	+3kNm	**-**	**67**	**0.080**
N_{min}	-230kN(comp.)	-3kNm	**1.0**	**-**	**-**
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m					
M_{min}	+160kN	+6kNm	**-**	**152**	**0.166**
da +5.50					
B=1.0m,H=0.5m,A1=A2=1524mm^2(θ22/250), H1=0.439m, H2=0.061m					
N_{max}	+400kN	-9kNm	**-**	**144**	**0.189**
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250), H1=0.189m, H2=0.061m					
N_{max}	+300kN	+3kNm	**-**	**112**	**0.147**

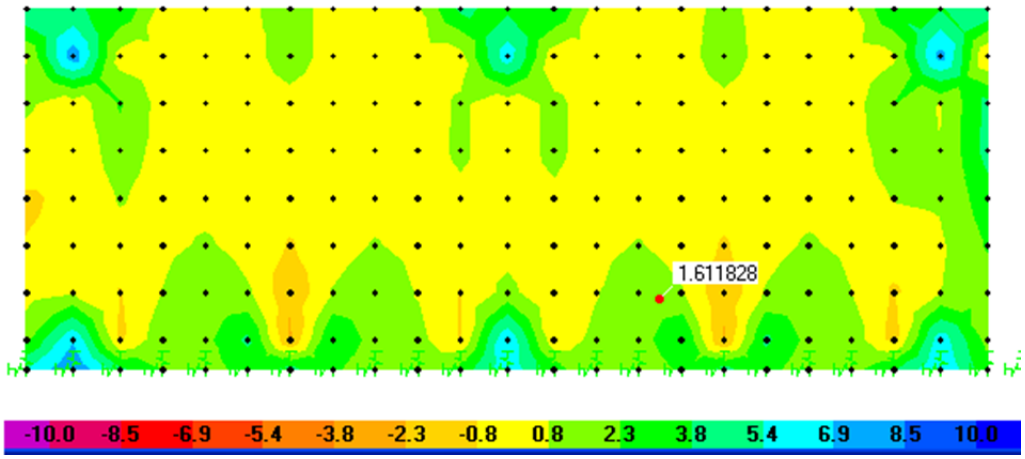


FIG. 4.512 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MAX SLE(FREQ.)-M11

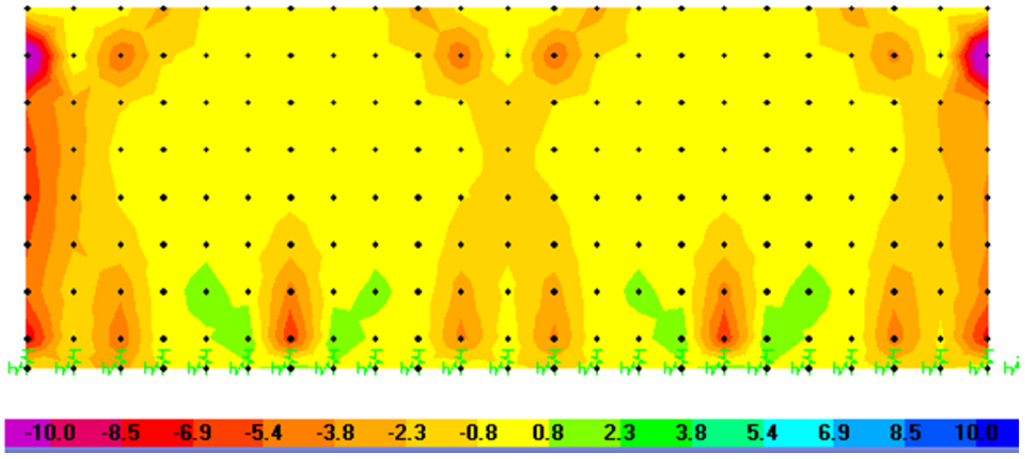


FIG. 4.513 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MIN SLE(FREQ.)-M11

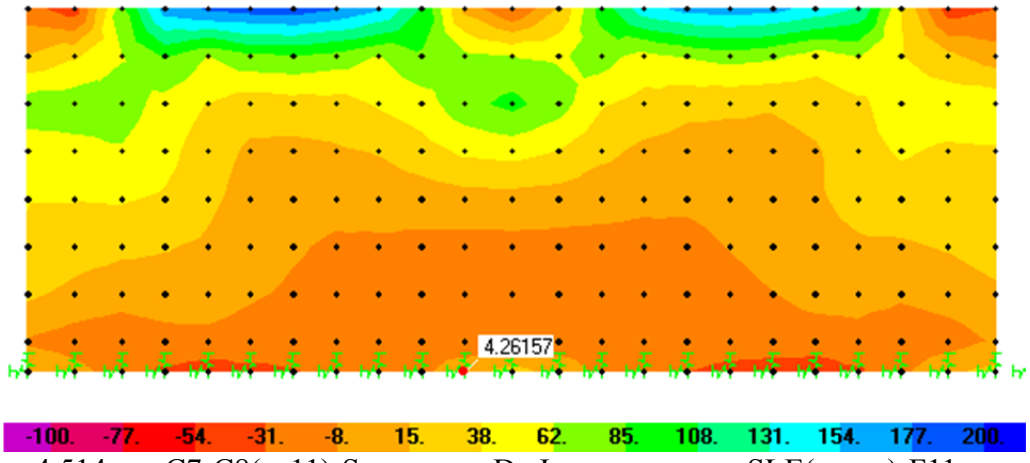


FIG. 4.514 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MAX SLE(FREQ.)-F11

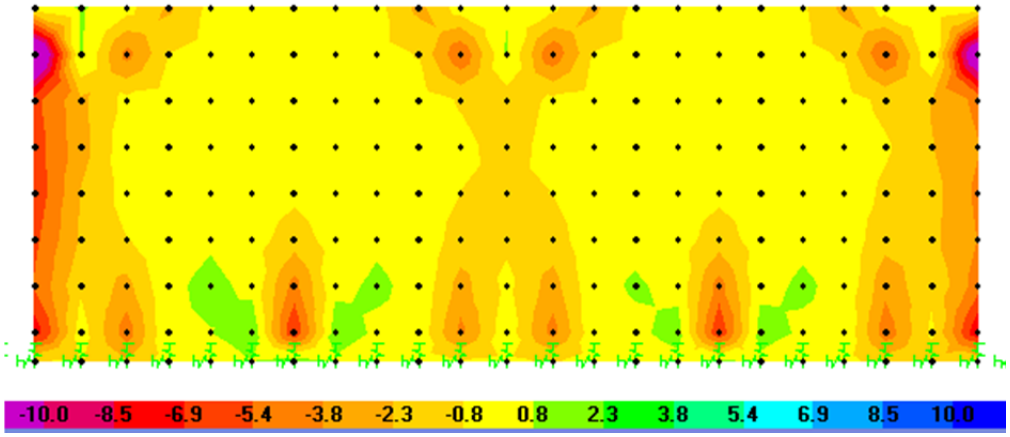


FIG. 4.515 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MIN SLE(FREQ.)-F11

C7-C8(q-11)-Setto D - ferri orizzontali - Verifiche agli SLE(comb. freq.)					
da 0 a +5.50					
B=1.0m,H=0.25m,A1=A2=534mm^2(θ12/500mm+ θ14/500mm), H1=0.193m, H2=0.057m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	+70kN(tens.)	-8kNm	**1.9**	**154**	**0.129**
N_{max}/M_{max}	+70kN	+7kNm	**1.6**	**144**	**0.121**
N_{min}	-150kN	-8kNm	**1.3**	**-**	**-**
B=1.0m,H=0.5m,A1=A2=710mm^2(θ16/500mm+ θ14/500mm), H1=0.442m, H2=0.058m in corrispondenza di parete E					
N_{max}/M_{min}	+90kN	-8kNm	**-**	**91**	**0.095**
N_{max}/M_{max}	+90kN	+7kNm	**-**	**87**	**0.094**
da +5.50					
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m solo in corrispondenza di parete E					
N_{max}	+90kN	-14kNm	**0.1**	**79**	**0.082**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m					
N_{max}	+190kN	+7kNm	**0.3**	**143**	**0.122**

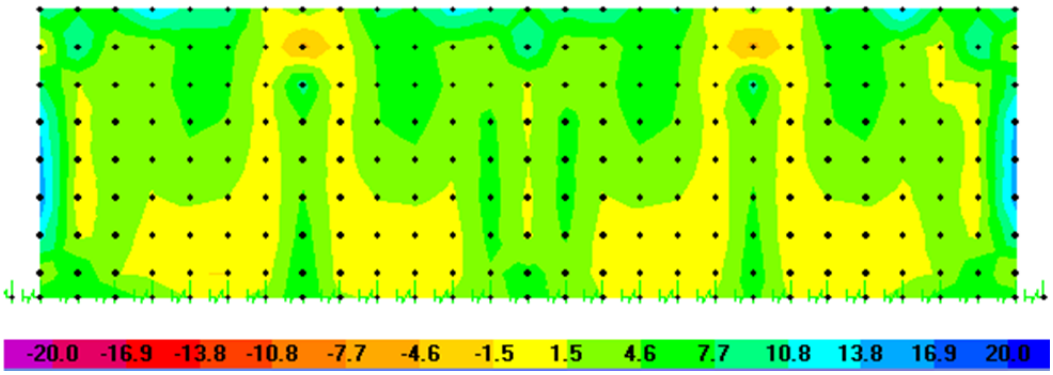


FIG. 4.516 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MAX SLE(FREQ)-M11

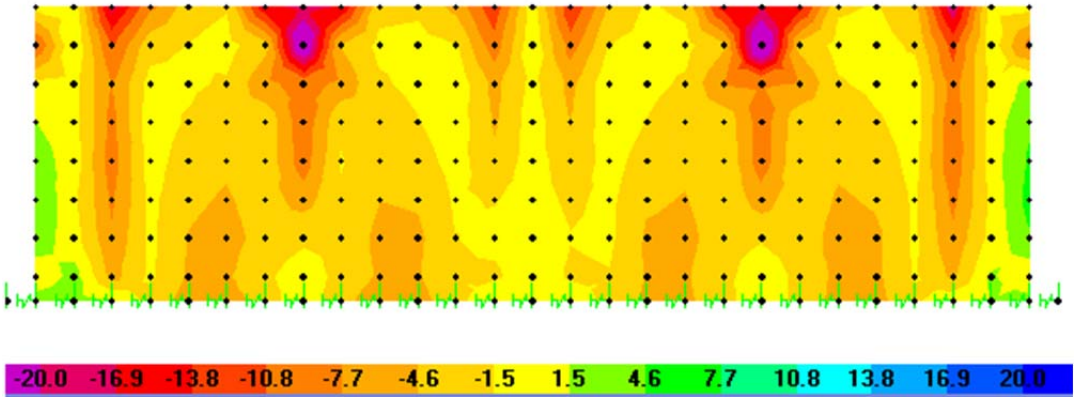


FIG. 4.517 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MIN SLE(FREQ)-M11

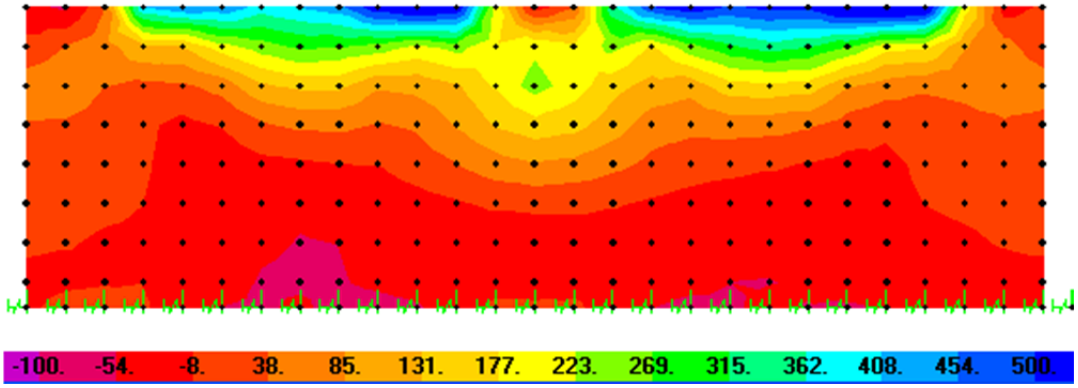


FIG. 4.518 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MAX SLE(FREQ)-F11

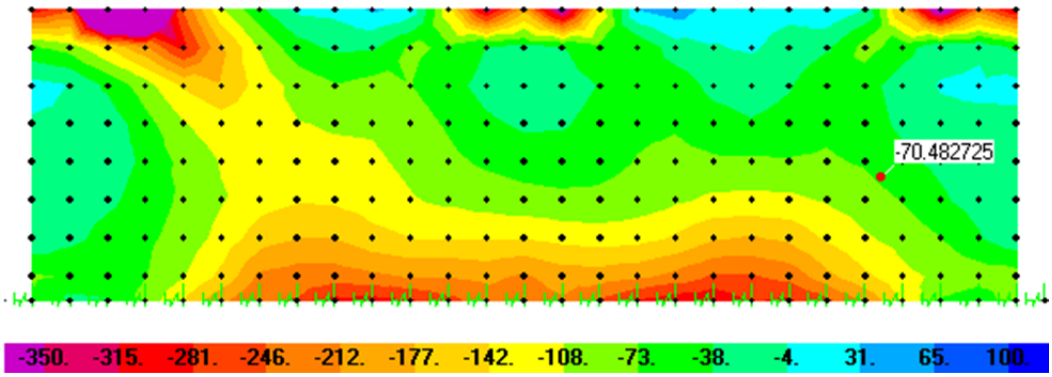


FIG. 4.519 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MIN SLE(FREQ)-F11

C7-C8(q-11)-Parete E - ferri orizzontali - Verifiche agli SLE(comb. frequenti)					
Da 0 a +5.50					
B=1.0m,H=0.5m,A1=A2=804mm^2(θ16/250mm), H1=0.442m, H2=0.058m					
Combinazione	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max} /M_{min}	+150kN	-10kNm	**-**	**123**	**0.156**
N_{max} /M_{max}	+150kN	+14kNm	**-**	**136**	**0.160**
N_{min}	-300kN	-10kNm	**0.8**	**-**	**-**
Da +5.50					
B=1.0m,H=0.5m,A1=A2=1884mm^2(θ20/250+ θ20/500mm), H1=0.440m, H2=0.06m					
N_{max}	+550kN	-24kNm	**-**	**176**	**0.170**

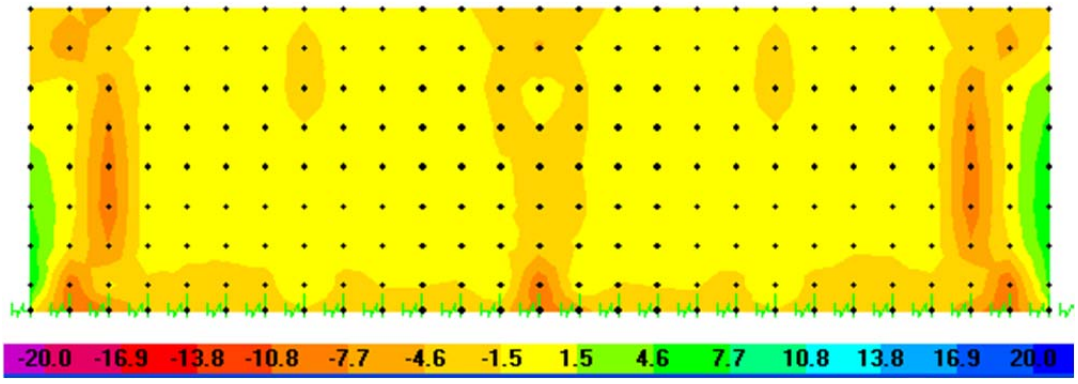


FIG. 4.520 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLE(FREQ)-M11

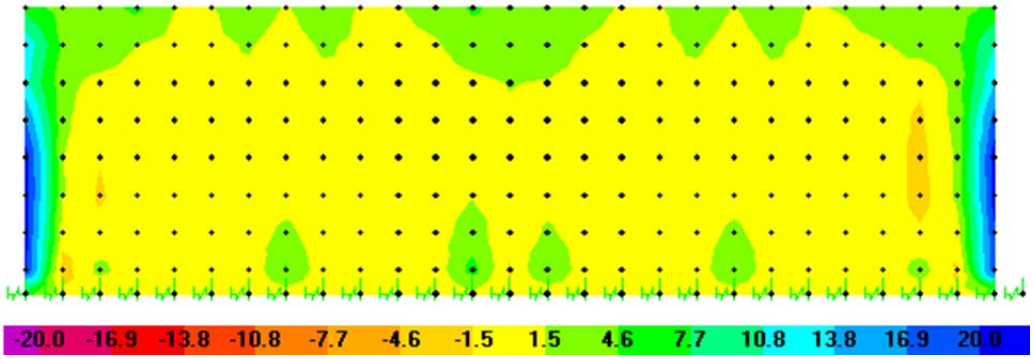


FIG. 4.521 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLE(FREQ)-M11

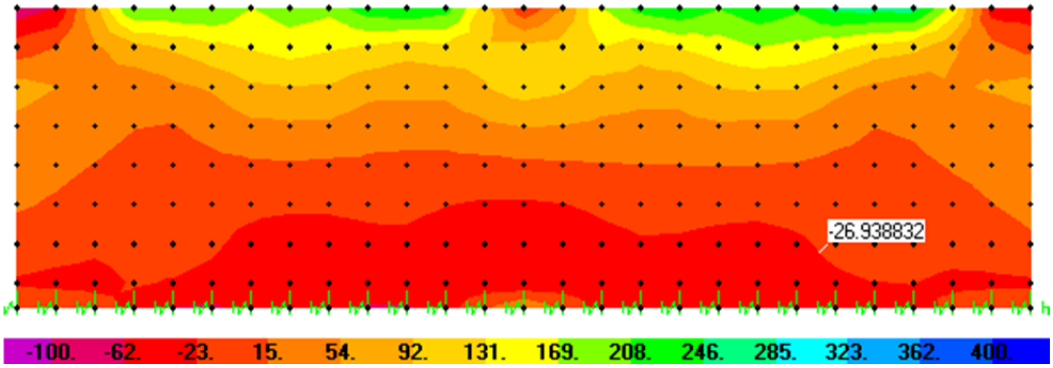


FIG. 4.522 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLE(FREQ)-F11

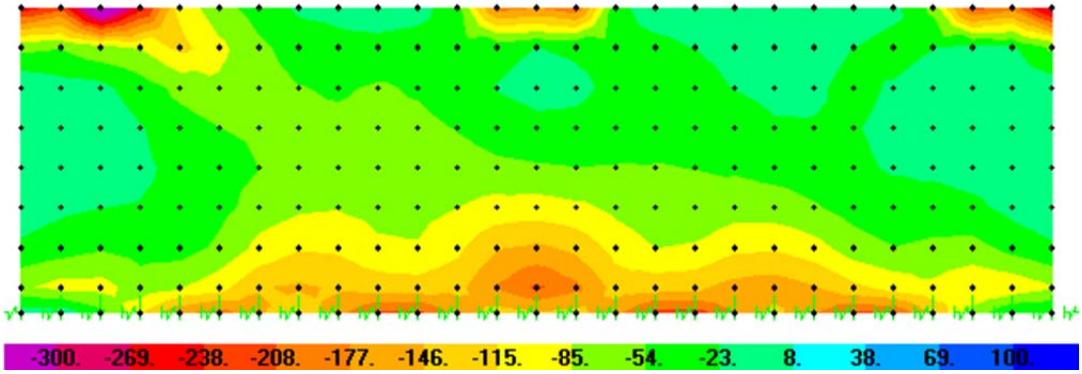


FIG. 4.523 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLE(FREQ)-F11

C7-C8(q-11)-Setto F - ferri orizzontali - Verifiche agli SLE(comb. freq.)					
Da 0 a +5.50					
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m in corrispondenza della parete A					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	+100kN	-10kNm	**-**	**121**	**0.111**
N_{max}/M_{max}	+100kN	+20kNm	**0.7**	**160**	**0.147**
N_{min}	-200kN	-10kNm	**0.6**	**-**	**-**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m					
N_{max}/M_{min}	+100kN	-6kNm	**1.1**	**144**	**0.115**
N_{max}/M_{max}	+100kN	+8kNm	**1.6**	**162**	**0.128**
N_{min}	-200kN	+10kNm	**1.7**	**-**	**-**
Da +5.50					
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m					
N_{max}	+220kN	-6kNm	**-**	**150**	**0.172**

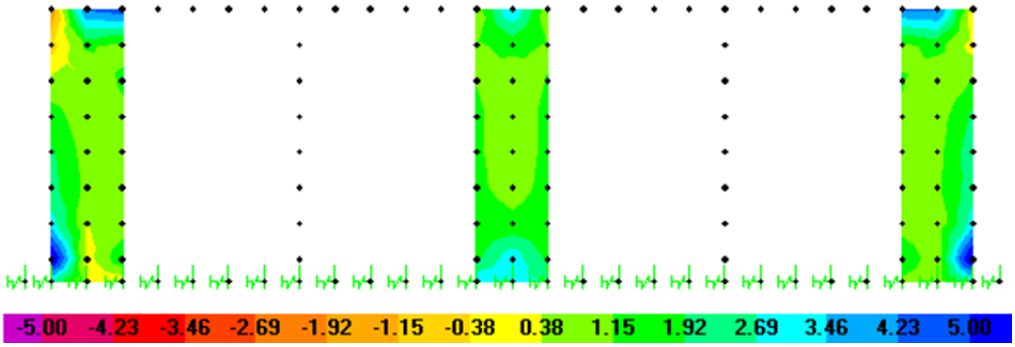


FIG. 4.524 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MAX SLE(FREQ)-M11

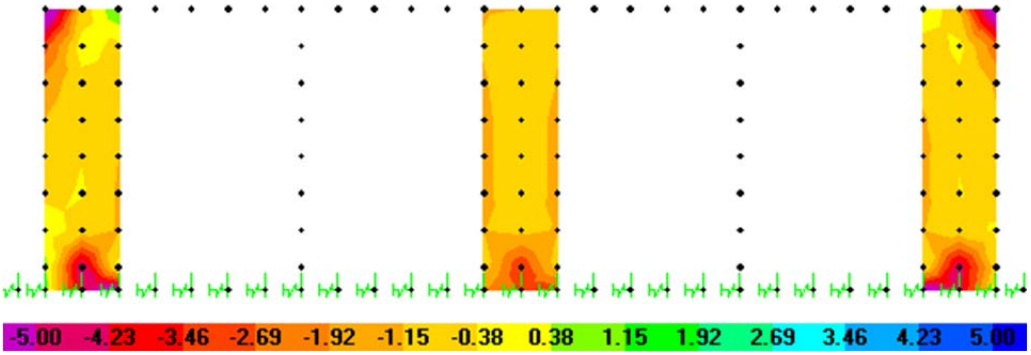


FIG. 4.525 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLE(FREQ)-M11

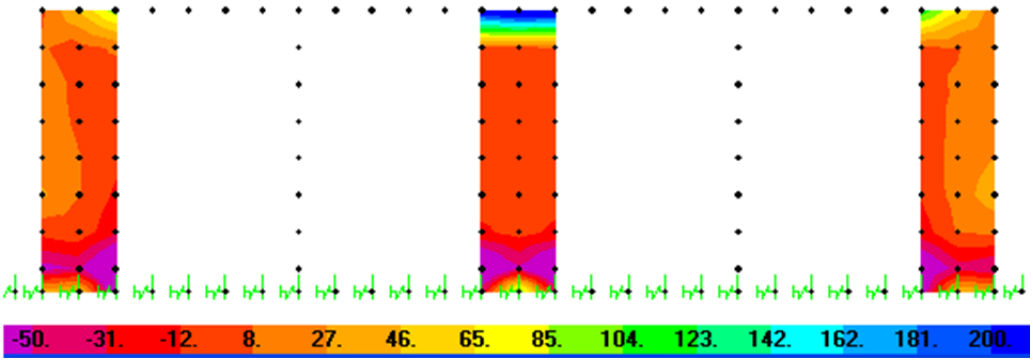


FIG. 4.526 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MAX SLE(FREQ)-F11

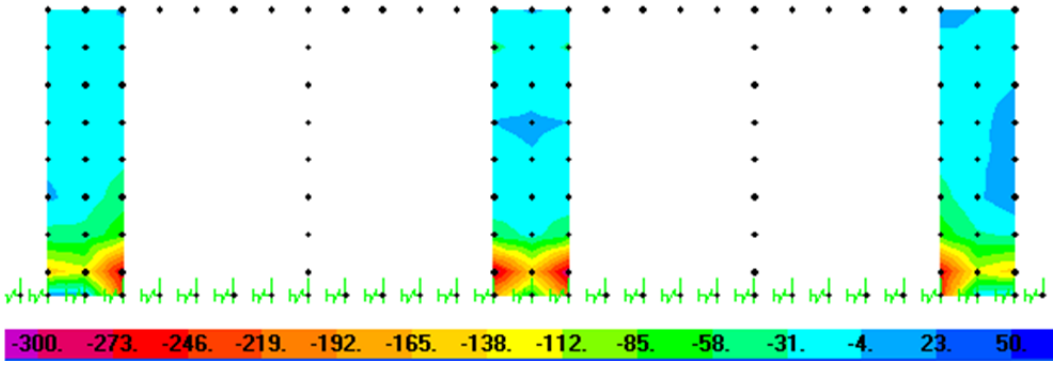


FIG. 4.527 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLE(FREQ)-F11

C7-C8(q-11)-Setti fra F/G - ferri orizzontali - Verifiche agli SLE(comb. frequenti)					
Da 0 a +5.50					
B=1.0m,H=0.5m,A1=A2=452mm^2(θ12/250mm), H1=0.444m, H2=0.056m in corrispondenza della parete A					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	+35kN	-5kNm	**-**	**66**	**0.056**
N_{max}/M_{min}	+35kN	+6kNm	**0.2**	**71**	**0.061**
N_{min}	-250kN	-5kNm	**0.6**	**-**	**-**
Da +5.50					
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m					
N_{max}	+180kN	-6kNm	**-**	**168**	**0.188**

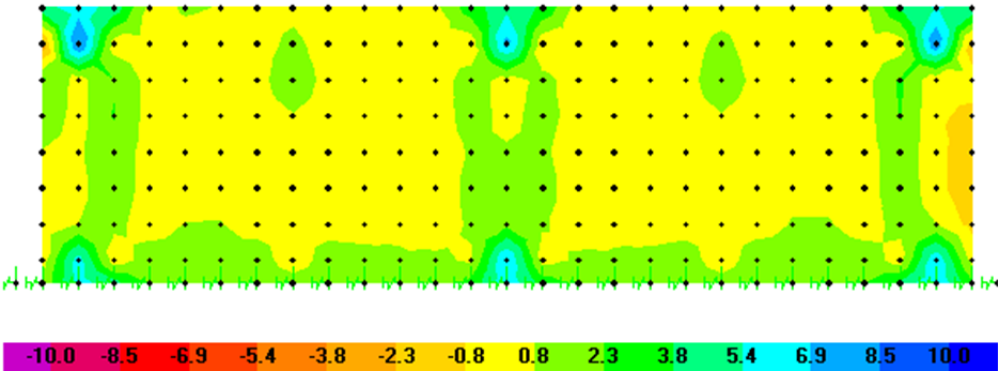


FIG. 4.528 - C7-C8(Q-11)-SETTO G - INVILUPPO MAX SLE(FREQ)-M11

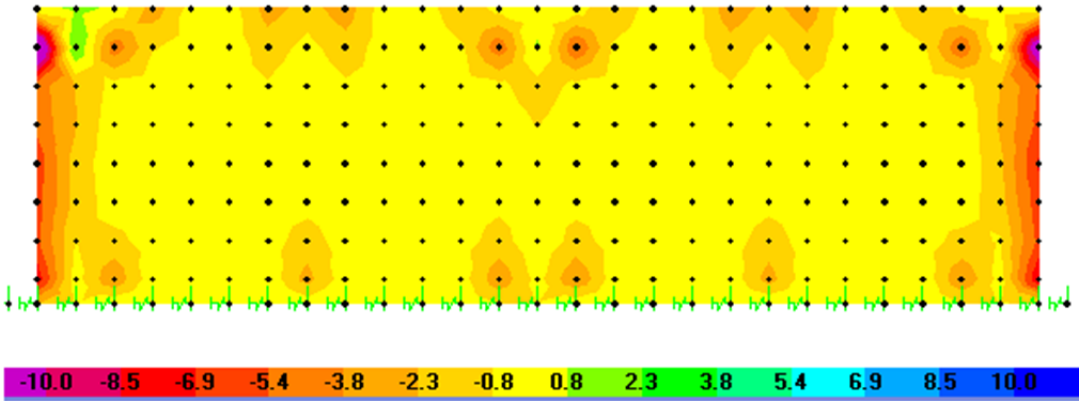


FIG. 4.529 - C7-C8(Q-11)-SETTO G - INVILUPPO MIN SLE(FREQ)-M11

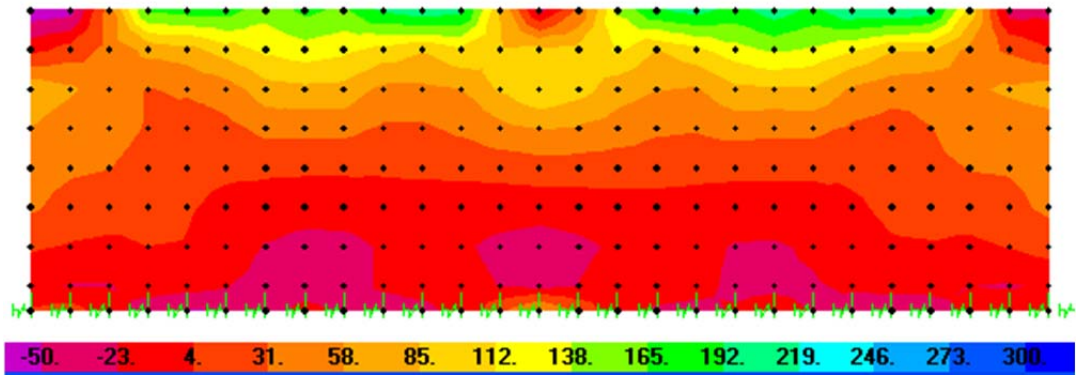


FIG. 4.530 - C7-C8(Q-11)-SETTO G - INVILUPPO MAX SLE(FREQ)-F11

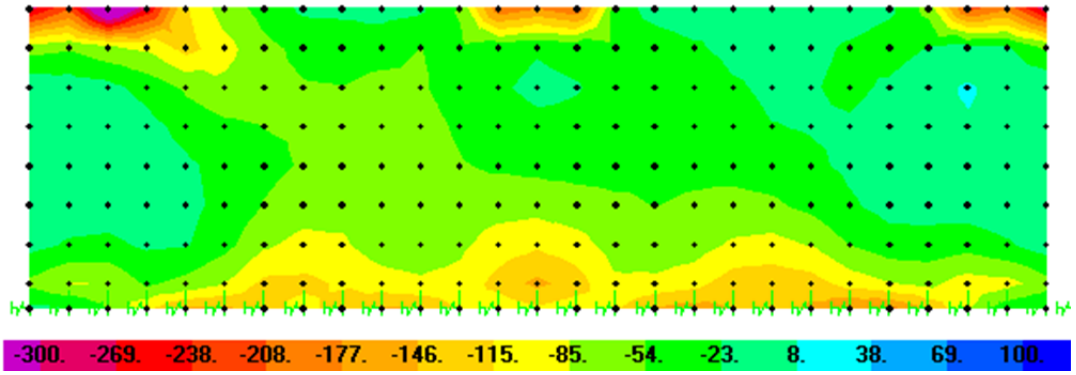


FIG. 4.531 - C7-C8(Q-11)-SETTO G - INVILUPPO MIN SLE(FREQ)-F11

C7-C8(q-11)-Setto G - ferri orizzontali - Verifiche agli SLE(comb. frequenti)					
Da 0 a +5.50					
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{max}/M_{min}	+100kN	-7kNm	**-**	**109**	**0.104**
N_{max}/M_{max}	+100kN	+7kNm	**-**	**109**	**0.104**
N_{min}	-40kN	-7kNm	**0.3**	**3**	**0.002**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m					
N_{max}/M_{min}	+90kN	-4kNm	**0.4**	**117**	**0.095**
N_{max}/M_{max}	+90kN	+3kNm	**-**	**107**	**0.103**
N_{min}	-160kN	-4kNm	**1.0**	**-**	**-**
Da +5.50					
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m					
N_{max}	+180kN	-11kNm	**1.8**	**201**	**0.163**

4.4.6 Verifiche agli SLE (frequenti) C7-C8 (q. -11)

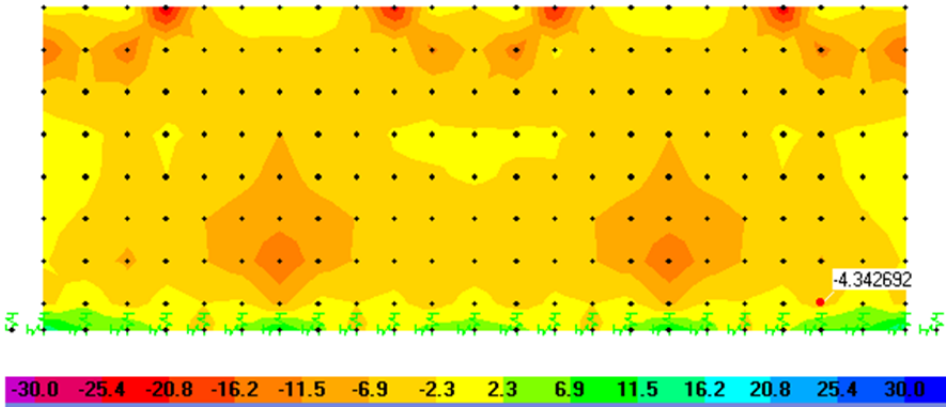


FIG. 4.532 - C7-C8(Q-11)-PARETE A - INVILUPPO MIN SLE(FREQ)-M22

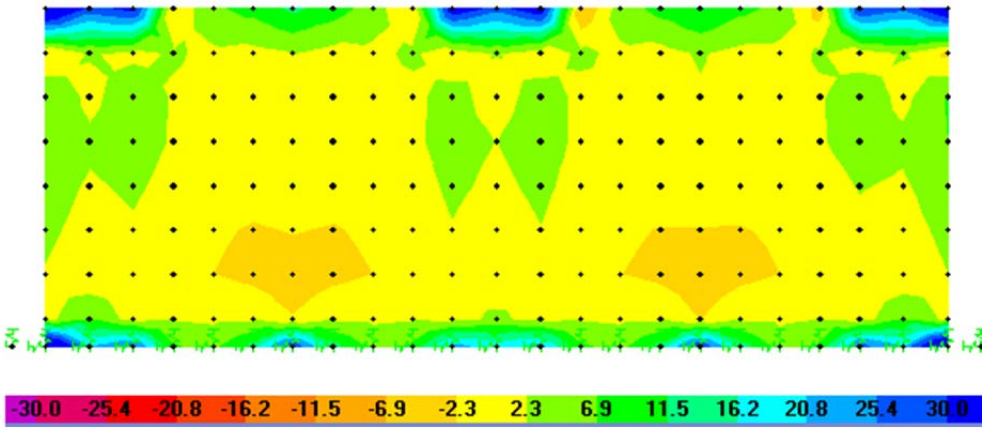


FIG. 4.533 - C7-C8(Q-11)-PARETE A - INVILUPPO MAX SLE(FREQ)-M22

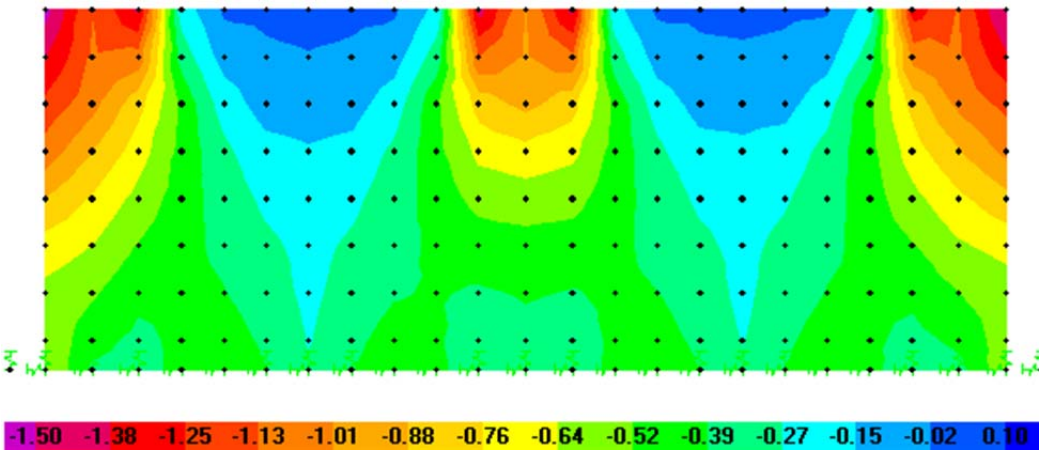


FIG. 4.534 - C7-C8(Q-11)-.PARETE A - INVILUPPO MIN SLE(FREQ)-F22

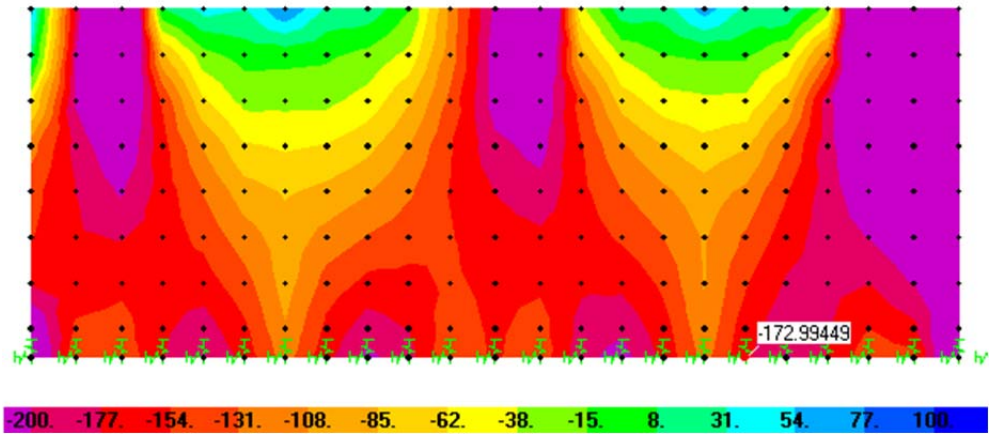


FIG. 4.535 - C7-C8(Q-11)-.PARETE A- INVILUPPO MAX SLE(FREQ)-F22

C7-C8(q-11)-Parete A - ferri verticali - Verifiche agli SLE(Combinazioni frequenti)					
Monconi di ripresa - L=3.0m					
B=1.0m H=0.5m A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{min}	-500kN	+30kNm	**1.6**	**-**	**-**
M_{min}/N_{max}	-65kN	+3kNm	**0.2**	**-**	**-**
M_{max}/N_{max}	-65kN	+30kNm	**2.0**	**103**	**0.117**
Verticali correnti (esclusi pilastri)					
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m					
N_{min}	-200kN	-34kNm	**1.5**	**13**	**0.012**
M_{min}/N_{max}	+20kN	-16kNm	**1.2**	**127**	**0.144**
M_{max}/N_{max}	+40kN	+10kNm	**0.7**	**118**	**0.133**

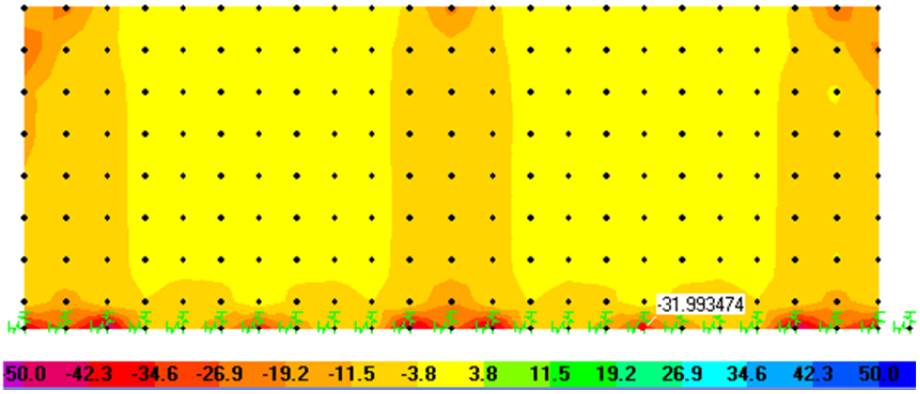


FIG. 4.536 - C7-C8(Q-11)-SETTO B- INVILUPPO MIN SLE(FREQ)-M22

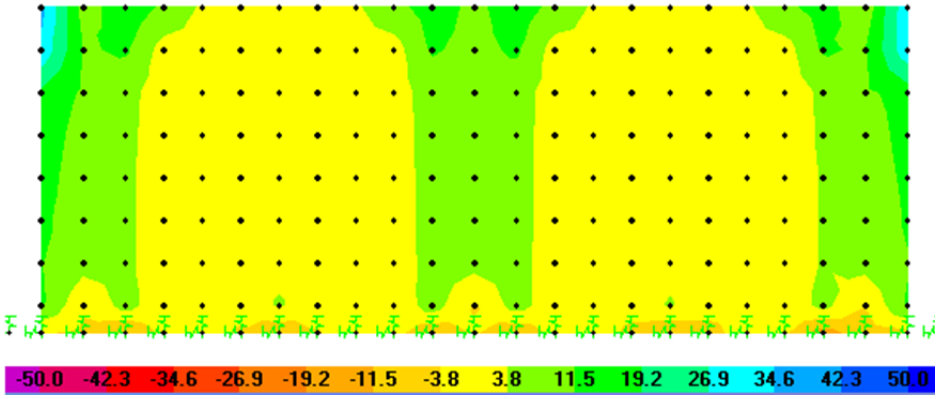


FIG. 4.537 - C7-C8(Q-11)-SETTO B- INVILUPPO MAX SLE(FREQ)-M22

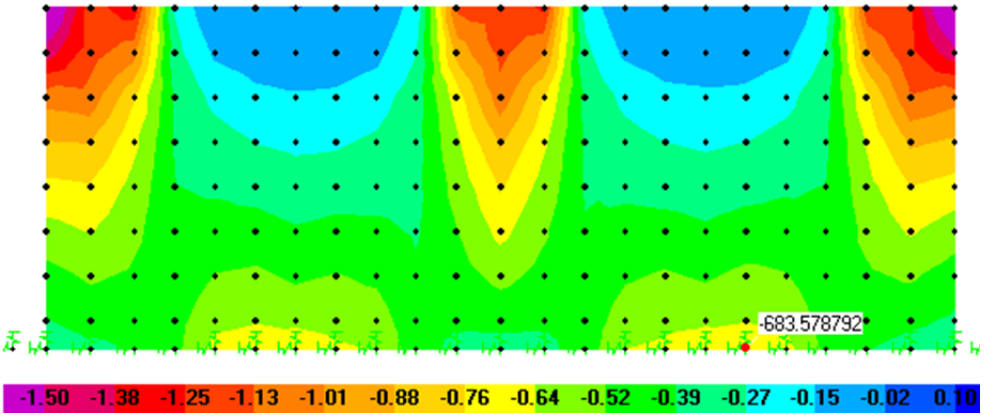


FIG. 4.538 - C7-C8(Q-11)-SETTO B- INVILUPPO MIN SLE(FREQ)-F22

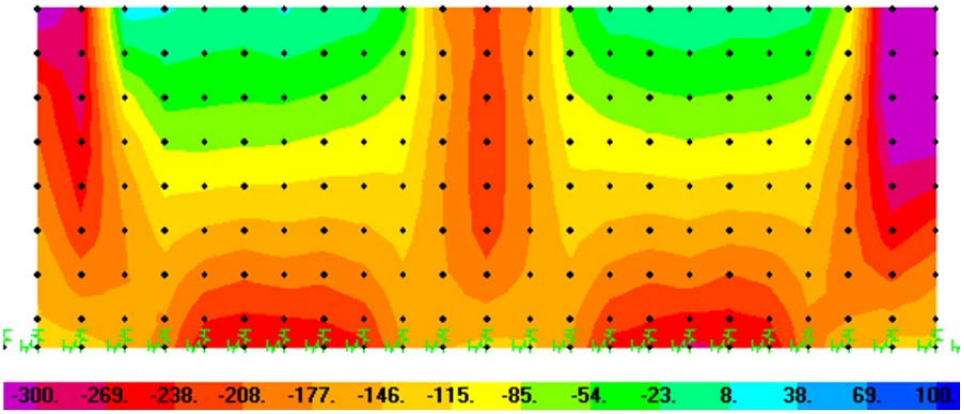


FIG. 4.539 - C7-C8(Q-11)-SETTO B- INVILUPPO MAX SLE(FREQ)-F22

C7-C8(q-11)-Setto B - ferri verticali - Verifiche agli SLE (Combinazioni frequenti)					
Monconi di ripresa - L=3.0m - setti 25cm					
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{min}	-700kN	-32kNm	**5.5**	-	-
M_{min}/N_{max}	-280kN	-32kNm	**6.0**	**65**	**0.044**
M_{max}/N_{max}	-280kN	-12kNm	**2.1**	-	-
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm					
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m					
M_{min}/N_{max}	-140kN	-50kNm	**2.5**	**74**	**0.068**
Verticali correnti (escluso pilastri)					
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.070m					
N_{min}	-400kN	+9kNm	**2.3**	-	-
M_{min}/N_{max}	+7kN	-7kNm	**1.9**	**78**	**0.058**
M_{max}/N_{max}	+7kN	+9kNm	**2.4**	**98**	**0.072**

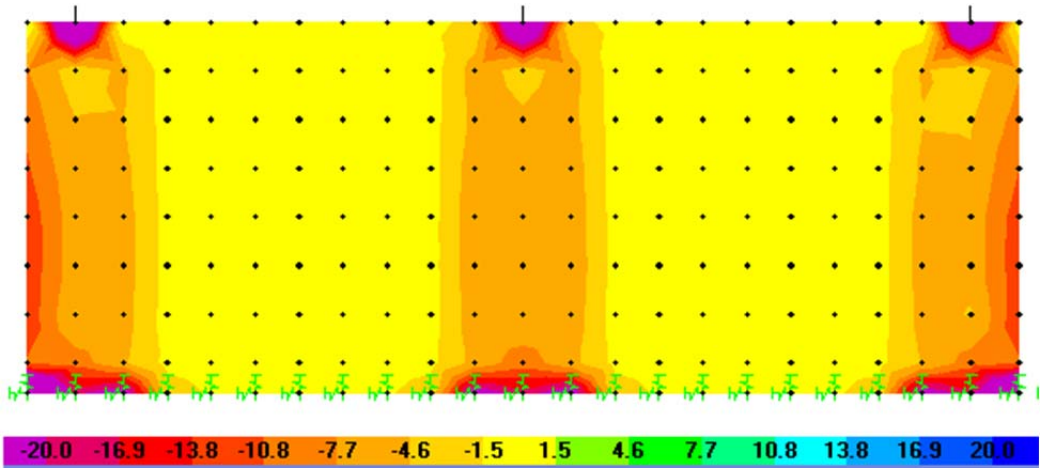


FIG. 4.540 - C7-C8(Q-11)-SETTO C- INVILUPPO MIN SLE(FREQ)-M22

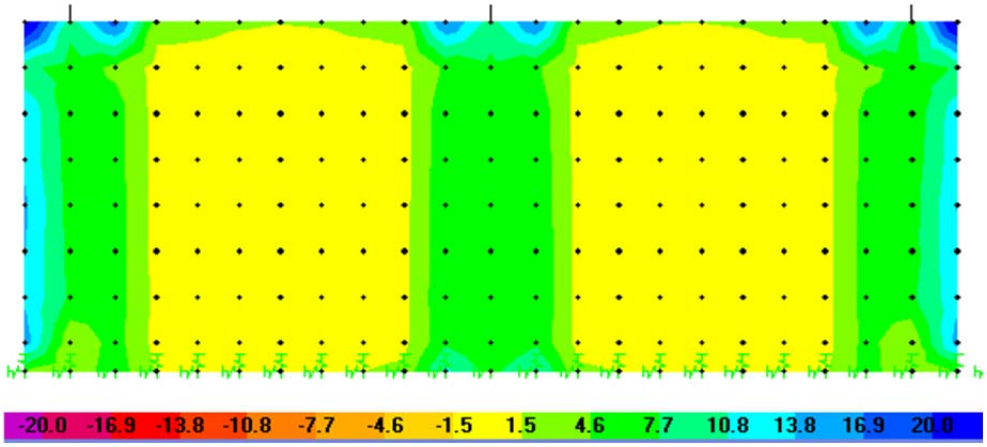


FIG. 4.541 - C7-C8(Q-11)-SETTO C- INVILUPPO MAX SLE(FREQ)-M22

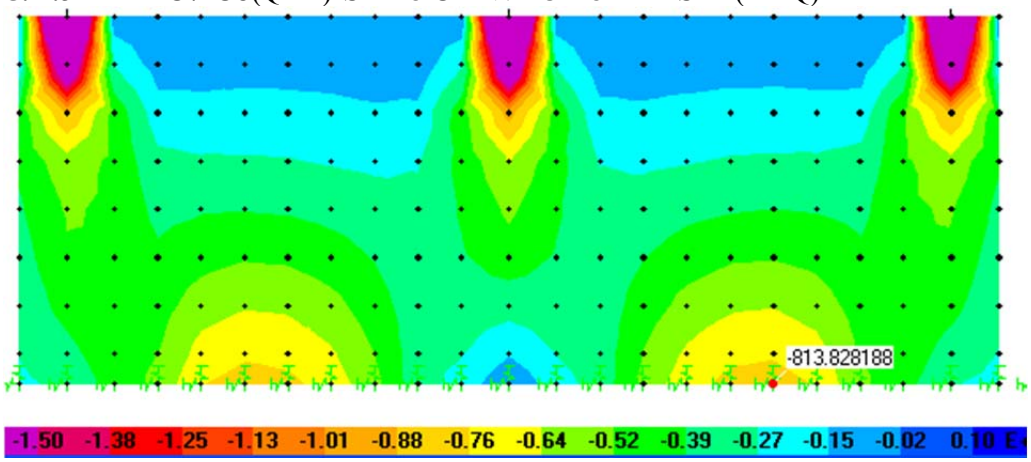


FIG. 4.542 - C7-C8(Q-11)-SETTO C- INVILUPPO MIN SLE(FREQ)-F22

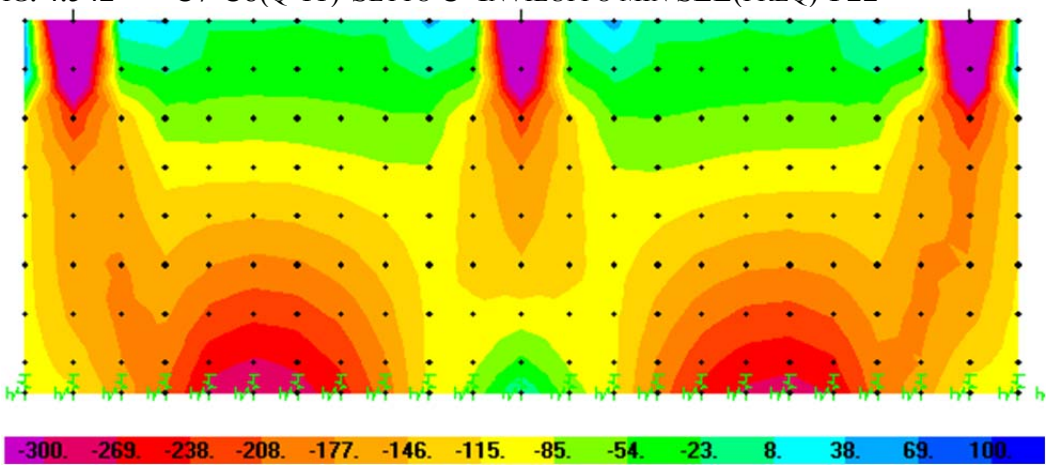


FIG. 4.543 - C7-C8(Q-11)-SETTO C- INVILUPPO MAX SLE(FREQ)-F22

C7-C8(q-11)-Setto C - ferri verticali - Verifiche agli SLE (Comb.freq.)					
Monconi di ripresa - L=3.0m - setti 25cm					
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.171m, H2=0.079m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{min}	-800kN	-15kNm	**4.3**	**-**	**-**
M_{min}/N_{max}	-100kN	-15kNm	**3.2**	**48**	**0.041**
M_{max}/N_{max}	-100kN	+2kNm	**0.6**	**-**	**-**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm					
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m					
M_{min}/N_{max}	+6kN	-48kNm	**2.6**	**158**	**0.144**
Verticali correnti (esclusi pilastri)					
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m					
N_{min}	-600kN	+2kNm	**2.4**	**-**	**-**
M_{min}/N_{max}	+50kN	-1kNm	**-**	**59**	**0.059**
M_{max}/N_{max}	+50kN	+2kNm	**0.5**	**71**	**0.056**

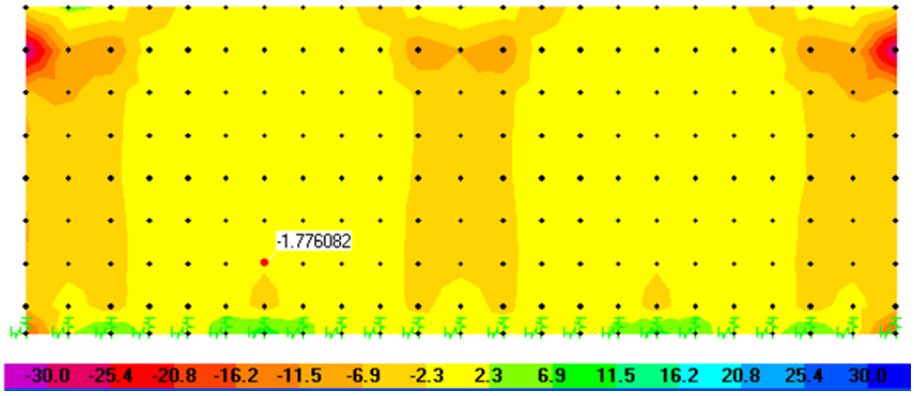


FIG. 4.544 - C7-C8(Q-11)-SETTO D- INVILUPPO MIN SLE(FREQ)-M22

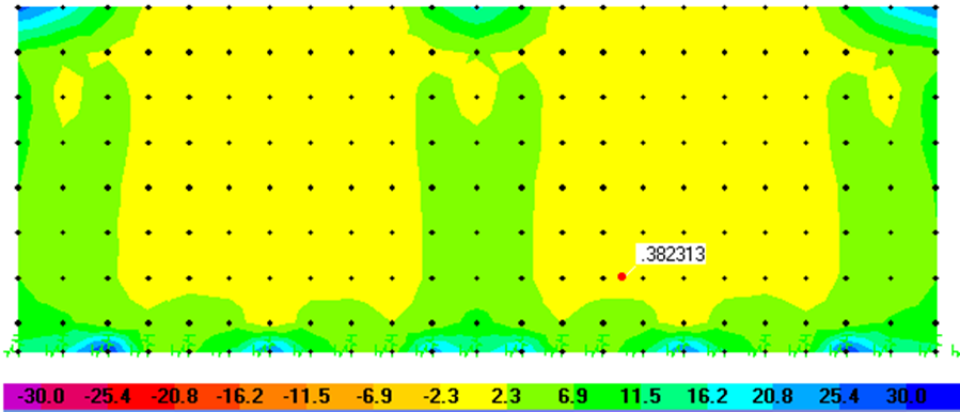


FIG. 4.545 - C7-C8(Q-11)-SETTO D- INVILUPPO MAX SLE(FREQ)-M22

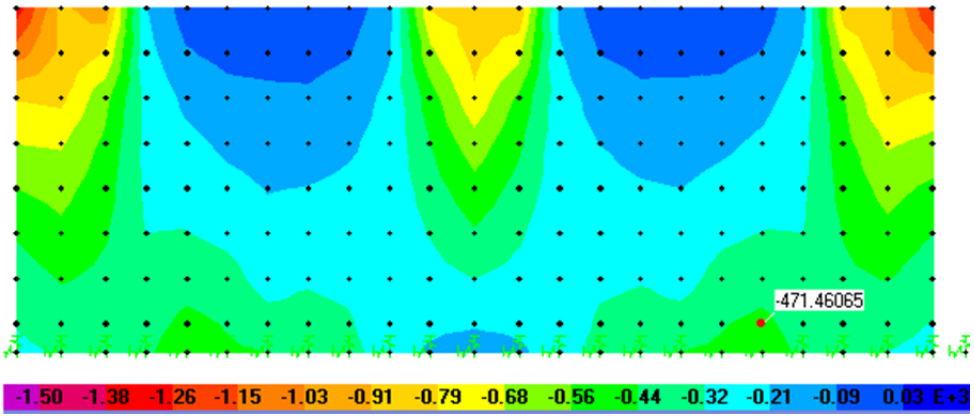


FIG. 4.546 - C7-C8(Q-11)-SETTO D- INVILUPPO MIN SLE(FREQ)-F22

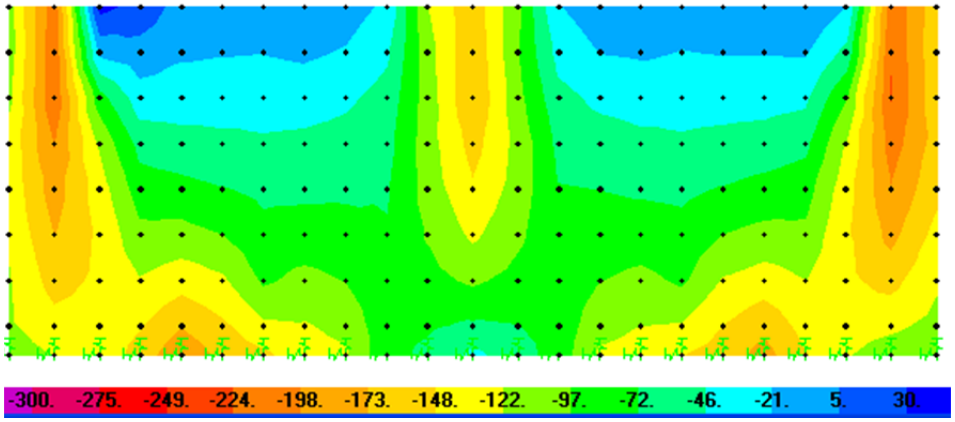


FIG. 4.547 - C7-C8(Q-11)-SETTO D- INVILUPPO MAX SLE(FREQ)-F22

C7-C8(q-11)-Setto D - ferri verticali - Verifiche agli SLE (Comb. freq.)					
Monconi di ripresa - L=3.0m - setti 25cm					
B=1.0m H=0.25m A1=A2=565mm^2(θ12/200mm), H1=0.18m, H2=0.07m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{min}	-500kN	+30kNm	**4.9**	**-**	**-**
M_{min}/N_{max}	-120kN	+9kNm	**1.5**	**4**	**0.002**
M_{max}/N_{max}	-120kN	+30kNm	**7.3**	**190**	**0.136**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm					
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m					
M_{max}/N_{max}	-40kN	+30kNm	**1.6**	**70**	**0.064**
Verticali correnti					
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m					
N_{min}	-300kN	-10kNm	**2.0**	**-**	**-**
M_{min}/N_{max}	+20kN	-10kNm	**2.8**	**121**	**0.090**
M_{max}/N_{max}	-40kN	+8kNm	**1.9**	**43**	**0.031**

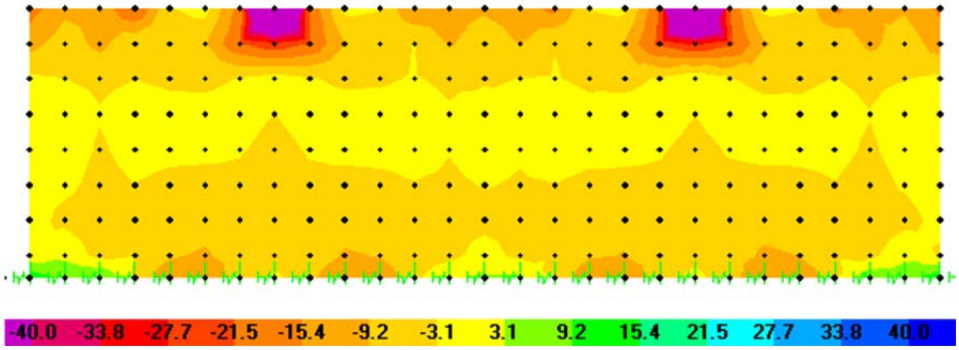


FIG. 4.548 - C7-C8(Q-11)-PARETE E- INVILUPPO MIN SLE(FREQ)-M22

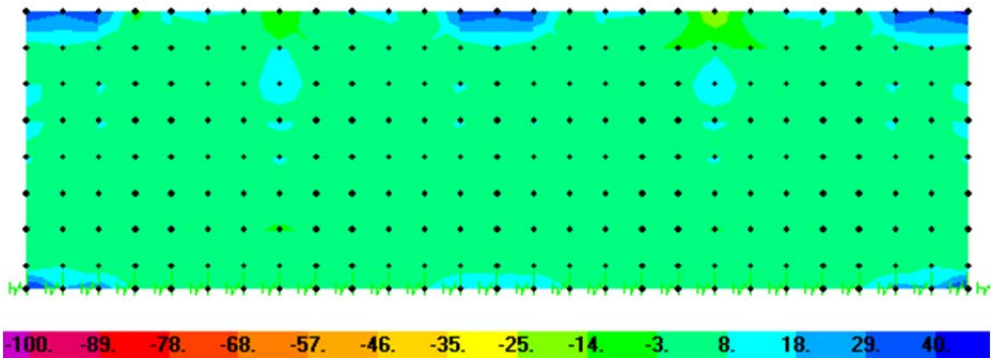


FIG. 4.549 - C7-C8(Q-11)-PARETE E - INVILUPPO MAX SLE(FREQ)-M22

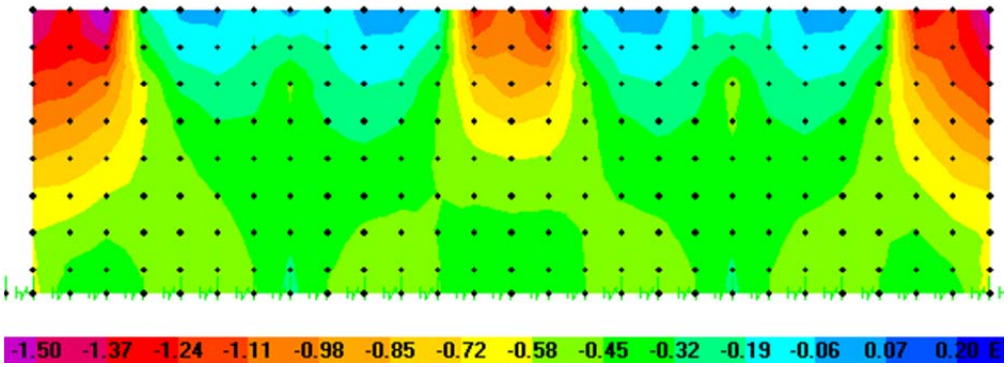


FIG. 4.550 - C7-C8(Q-11)-.PARETE E - INVILUPPO MIN SLE(FREQ)-F22

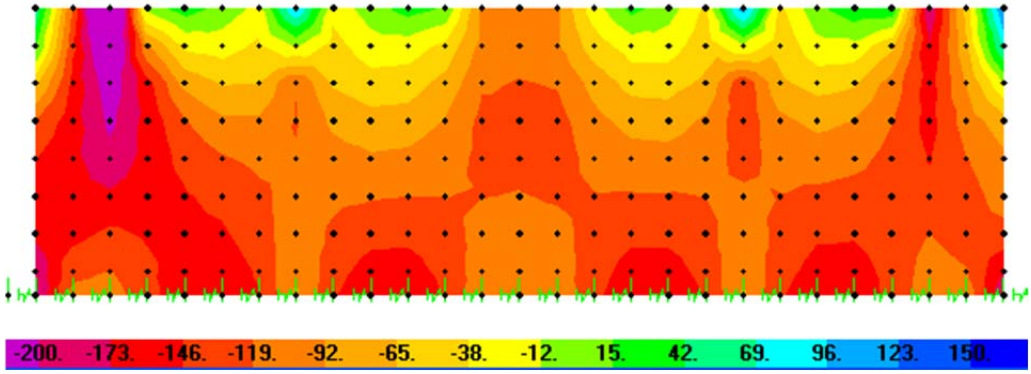


FIG. 4.551 - C7-C8(Q-11)-PARETE E - INVILUPPO MAX SLE(FREQ)-F22

C7-C8(q-11)-Parete E - ferri verticali - Verifiche agli SLE(Comb.freq.)					
Monconi di ripresa - L=3.0m					
B=1.0m,H=0.5m,A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{min}	-350kN	+30kNm	**1.4**	**-**	**-**
M_{min}/N_{max}	-100kN	-15kNm	**0.6**	**3**	**0.002**
M_{max}/N_{max}	-100kN	+30kNm	**1.5**	**36**	**0.033**
Verticali correnti (escluso pilastri)					
B=1.0m,H=0.5m,A1=A2=452mm^2(θ14/400mm), H1=0.429m, H2=0.071m					
N_{min}	-400kN	+15kNm	**1.1**	**-**	**-**
M_{min}/N_{max}	+10kN	-10kNm	**0.7**	**49**	**0.045**
M_{max}/N_{max}	+10kN	+15kNm	**1.1**	**80**	**0.074**

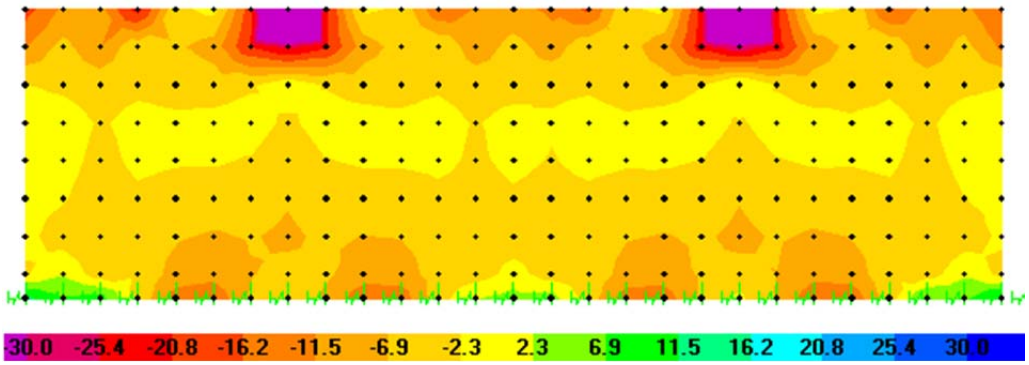


FIG. 4.552 - C7-C8(Q-11)-.SETTO F - INVILUPPO MAX SLE(FREQ.)-M22

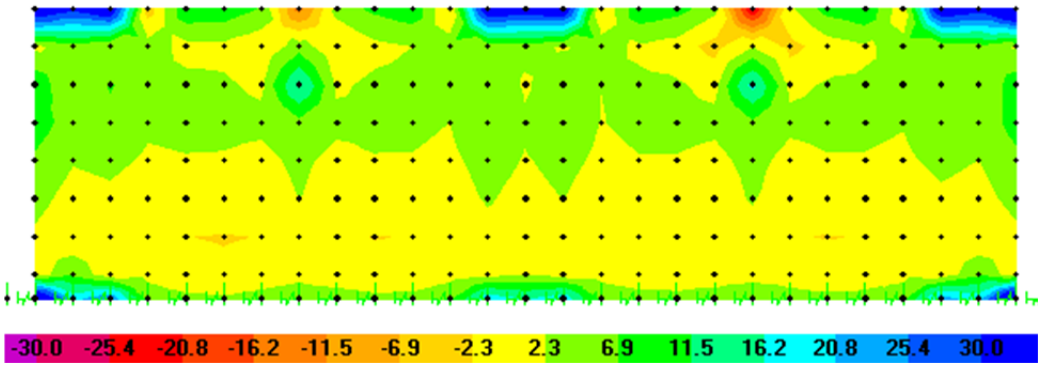


FIG. 4.553 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLE(FREQ)-M22

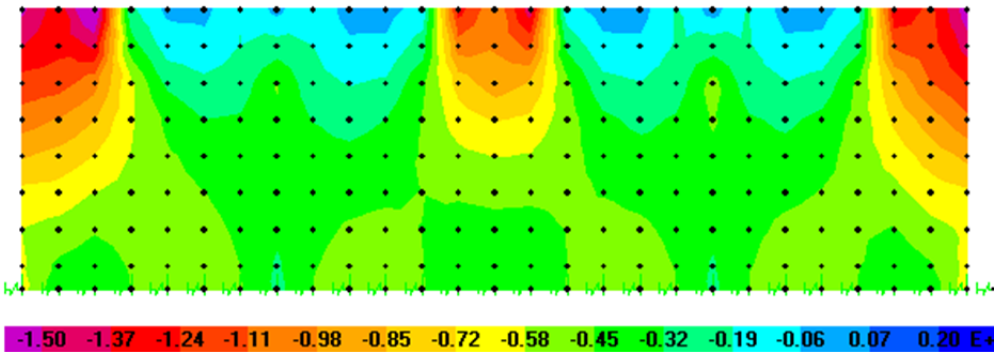


FIG. 4.554 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLE(FREQ)-F22

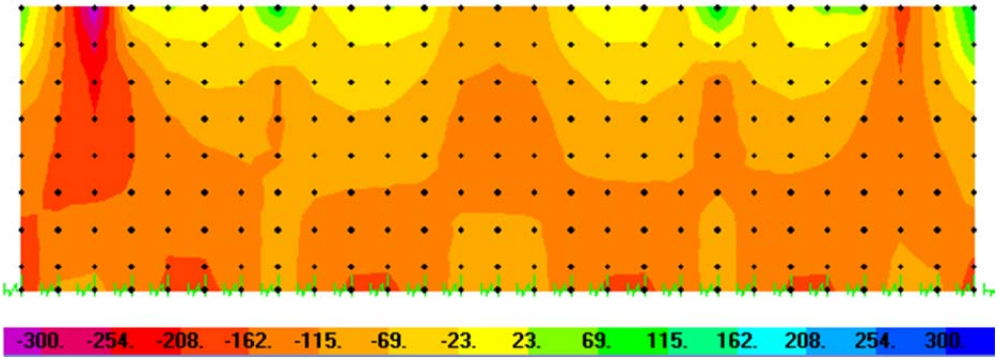


FIG. 4.555 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLE(FREQ)-F22

C7-C8(q-11)-Setto F - ferri verticali - Verifiche agli SLE(comb. freq.)					
Monconi di ripresa - L=3.0m - setti 25cm					
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{min}	-550kN	+20kNm	**3.8**	**-**	**-**
M_{min}/N_{max}	-100kN	+9kNm	**1.6**	**9**	**0.006**
M_{max}/N_{max}	-100kN	+30kNm	**6.7**	**160**	**0.116**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm					
B=1.0m,H=0.50m,A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m					
M_{max}/N_{max}	-100kN	+30kNm	**1.5**	**36**	**0.033**
Verticali correnti (escluso pilastri)					
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m					
N_{min}	-400kN	+12kNm	**2.6**	**-**	**-**
M_{min}/N_{max}	+20kN	-5kNm	**1.4**	**70**	**0.053**
M_{max}/N_{max}	+20kN	+12kNm	**3.3**	**141**	**0.105**

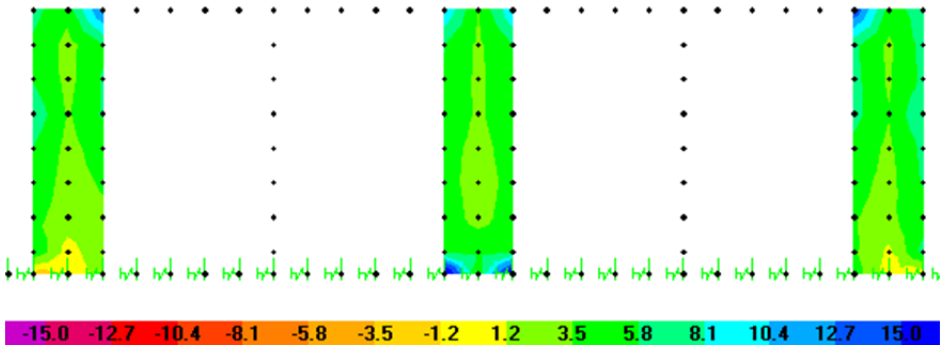


FIG. 4.556 - C7-C8(Q-11)-SETTI F/G - INVILUPPO MAX SLE(FREQ)-M22

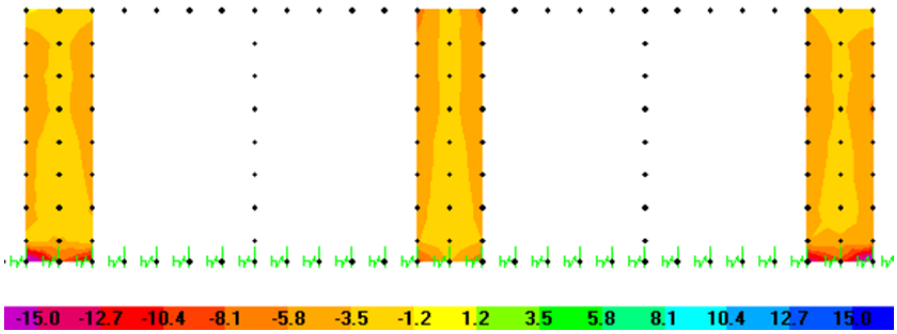


FIG. 4.557 - C7-C8(Q-11)-SETTI F/G - INVILUPPO MIN SLE(FREQ)-M22

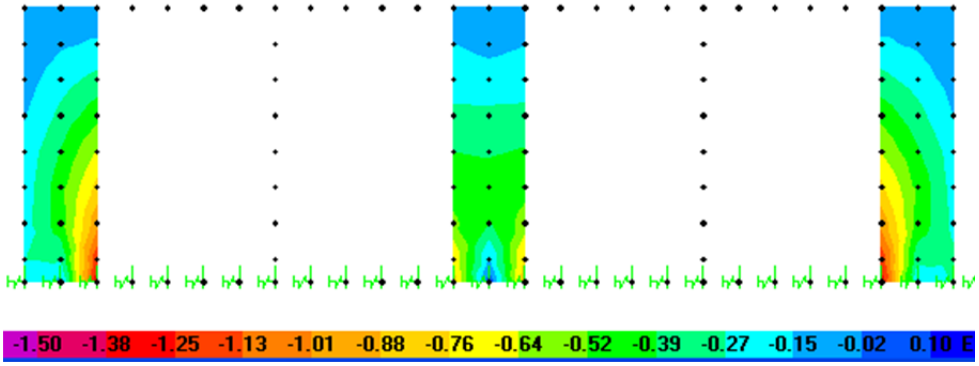


FIG. 4.558 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLE(FREQ)-F22

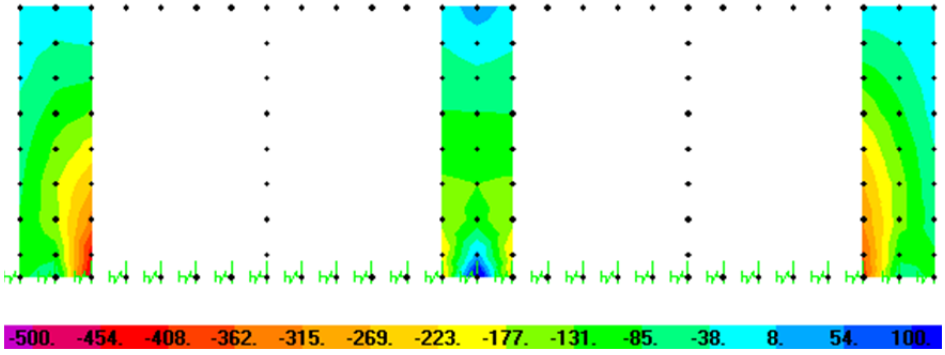


FIG. 4.559 - C7-C8(Q-11)-SETTI F/G - INVILUPPO MAX SLE(FREQ)-F22

C7-C8(q-11)-Setti fra F/G - ferri verticali - Verifiche agli SLE(comb. freq.)					
Monconi di ripresa - L=3.0m - setti 50cm					
B=1.0m H=0.50m A1=A2=565mm^2(θ12/200mm), H1=0.430m, H2=0.07m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{min}	-800kN	-15kNm	**1.9**	**-**	**-**
M_{min}/N_{max}	+74kN	-15kNm	**0.7**	**134**	**0.114**
M_{max}/N_{max}	+74kN	+12kNm	**0.4**	**121**	**0.103**

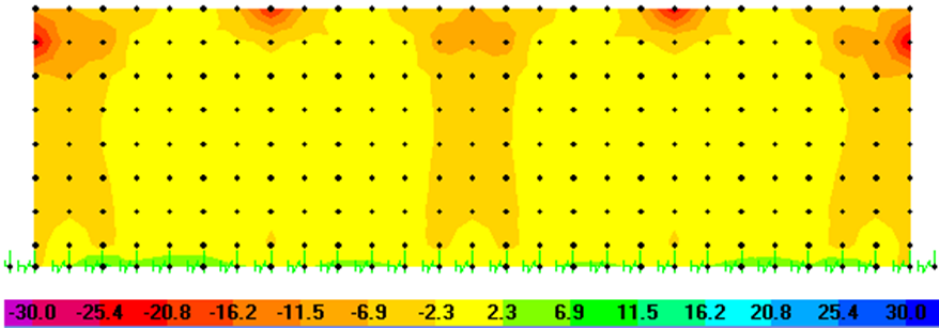


FIG. 4.560 - C7-C8(Q-11)-SETTI G - INVILUPPO MIN SLE(FREQ)-M22

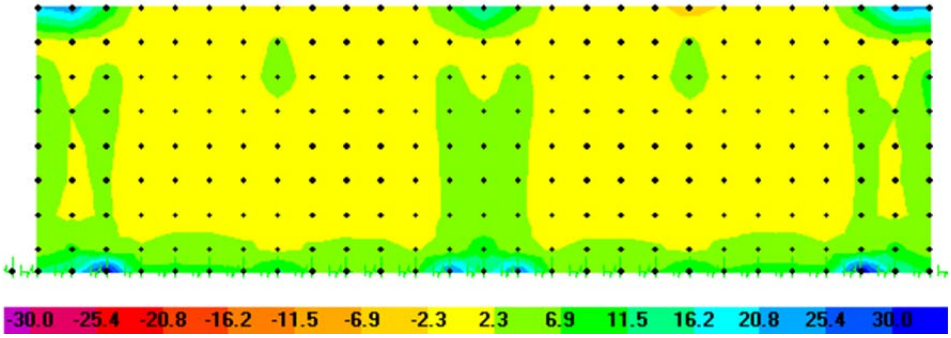


FIG. 4.561 - C7-C8(Q-11)-SETTI G - INVILUPPO MAX SLE(FREQ)-M22

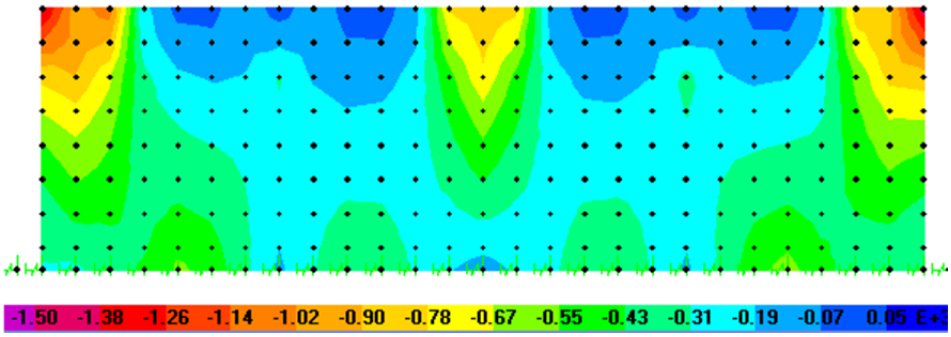


FIG. 4.562 - C7-C8(Q-11)-SETTI G - INVILUPPO MIN SLE(FREQ)-F22

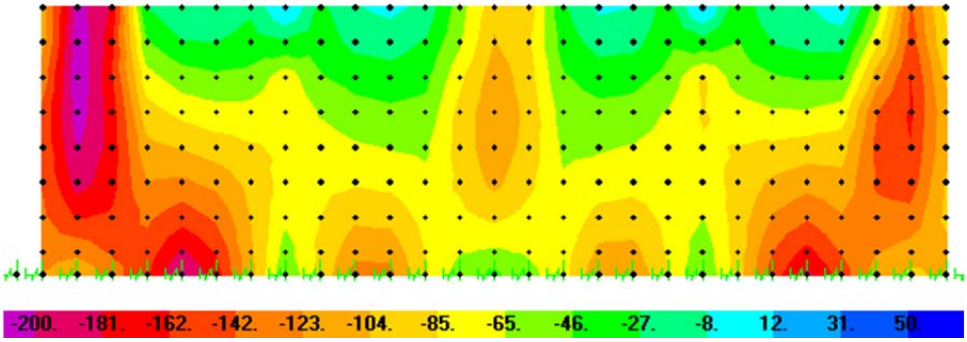


FIG. 4.563 - C7-C8(Q-11)-SETTI G - INVILUPPO MAX SLE(FREQ)-F22

C7-C8(q-11)-Setto G - ferri verticali - Verifiche agli SLE(Comb. freq.)					
Monconi di ripresa - L=3.0m - setti 25cm					
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m					
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**	**w[mm]**
N_{min}	-600kN	+10kNm	**3.1**	**-**	**-**
N_{max}/M_{min}	-60kN	+4kNm	**0.6**	**-**	**-**
N_{max}/M_{max}	-60kN	+10kNm	**2.1**	**36**	**0.025**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm					
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m					
N_{max}/M_{max}	-50kN	+25kNm	**1.3**	**48**	**0.044**
Verticali correnti (escluso pilastri)					
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m					
N_{min}	-70kN	-6kNm	**1.0**	**6**	**0.001**
N_{max}/M_{min}	-10kN	-6kNm	**1.5**	**51**	**0.037**
N_{max}/M_{max}	-10kN	+3kNm	**0.7**	**21**	**0.015**

4.4.7 Verifiche agli SLE (rare) C7-C8(q.-11)

Di seguito si riportano le verifiche del cemento armato del fusto del cassone per gli stati limiti d'esercizio combinazioni rare.

Per la verifica dell'orditura orizzontale del fusto si considerano le combinazioni di carico d'esercizio riportati in precedenza.

Di seguito si riportano gli inviluppi dei momenti delle pareti e dei setti.

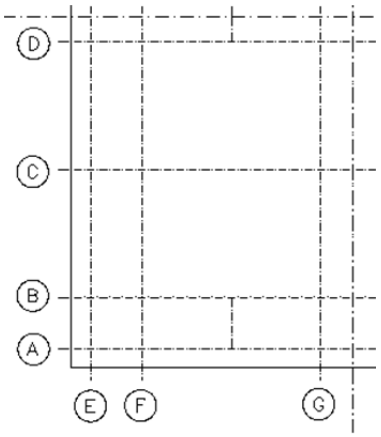


FIG. 4.564 - PIANTA CHIAVE PARETI E SETTI

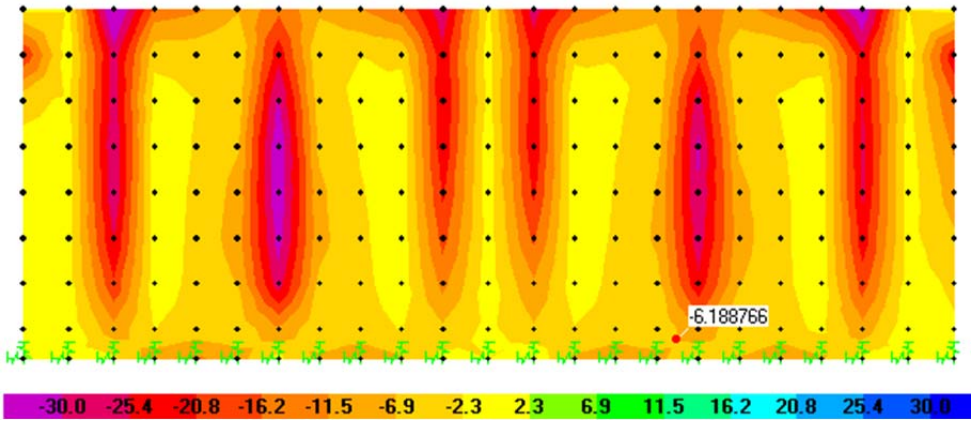


FIG. 4.565 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MIN SLE(RARE.)-M11

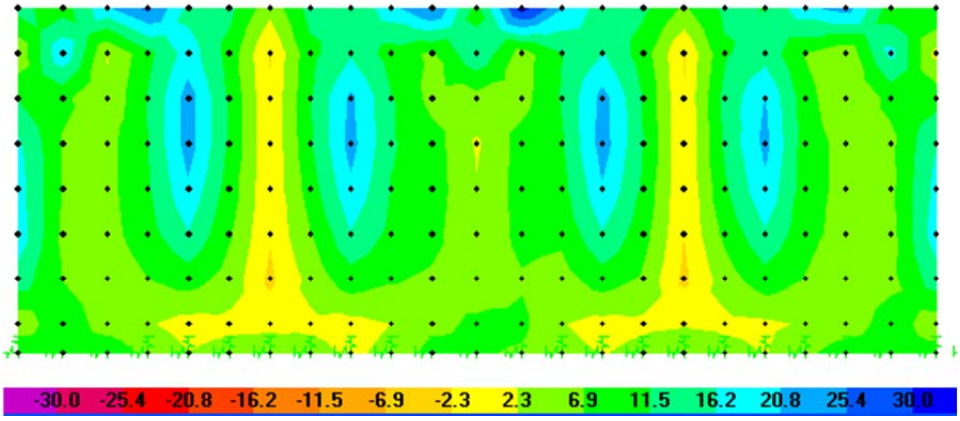


FIG. 4.566 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MAX SLE(RARE)-M11

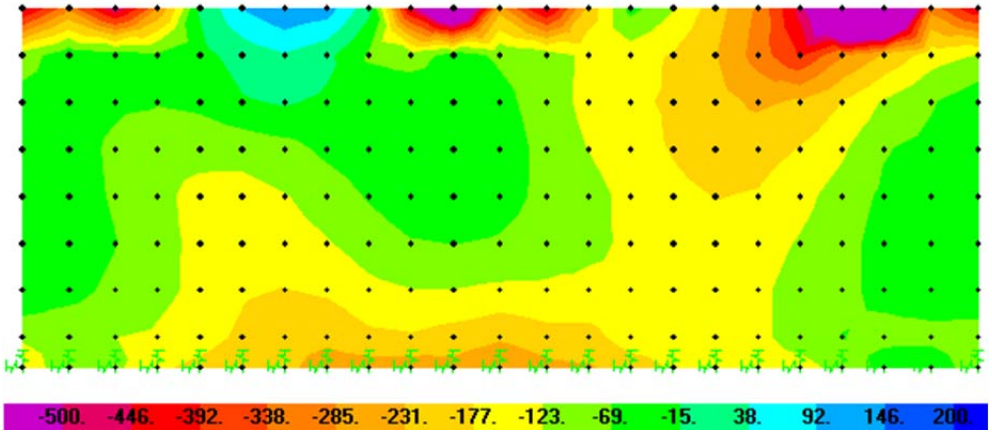


FIG. 4.567 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MIN SLE(RARE)-F11

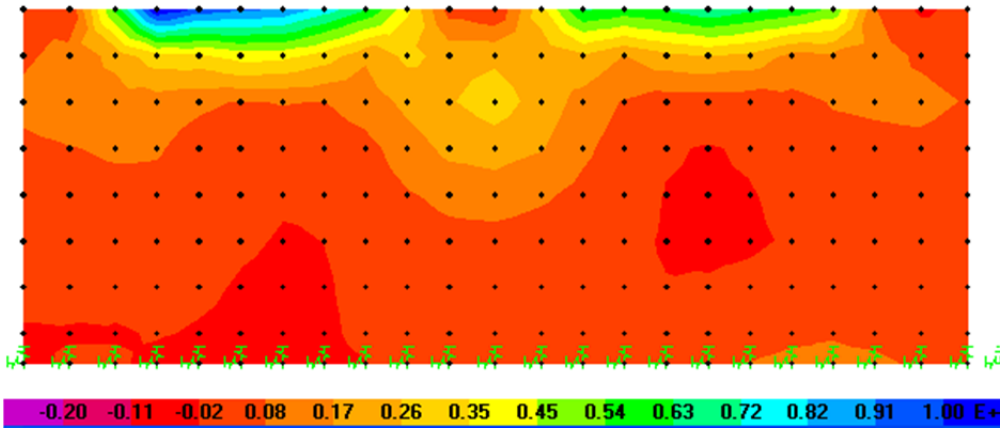


FIG. 4.568 - C7-C8(Q-11)-PARETE FILO A - INVILUPPO MAX SLE(RARE)-F11

C7-C8(q-11)-Parete A - ferri orizzontali - Verifiche agli SLE(comb. rare)				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}	+200kN(tens)	-32kNm	**0.5**	**291**
M_{max}	+200kN	+22kNm	**-**	**250**
Da +5.50				
B=1.0m,H=0.5m,A1=A2=1829mm^2(θ22/250+ θ14/500mm), H1=0.439m, H2=0.061m				
N_{max}	+685kN(tens.)	-32kNm	**-**	**229**

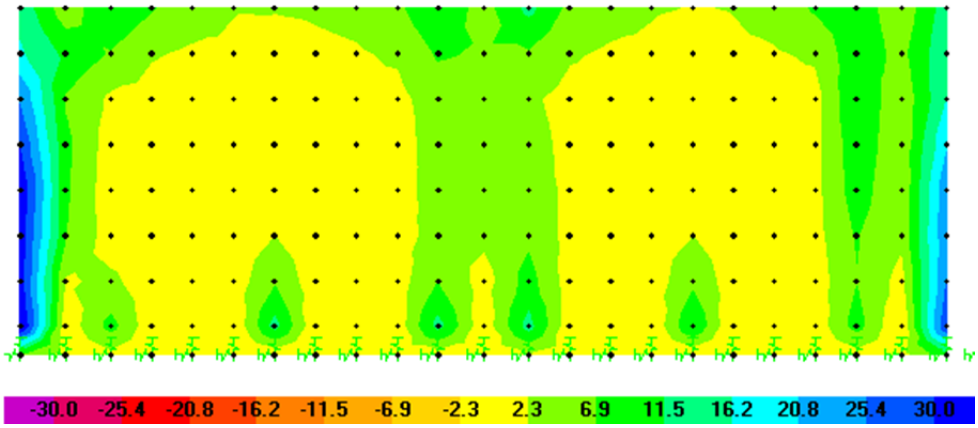


FIG. 4.569 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MAX SLE(RARE)-M11

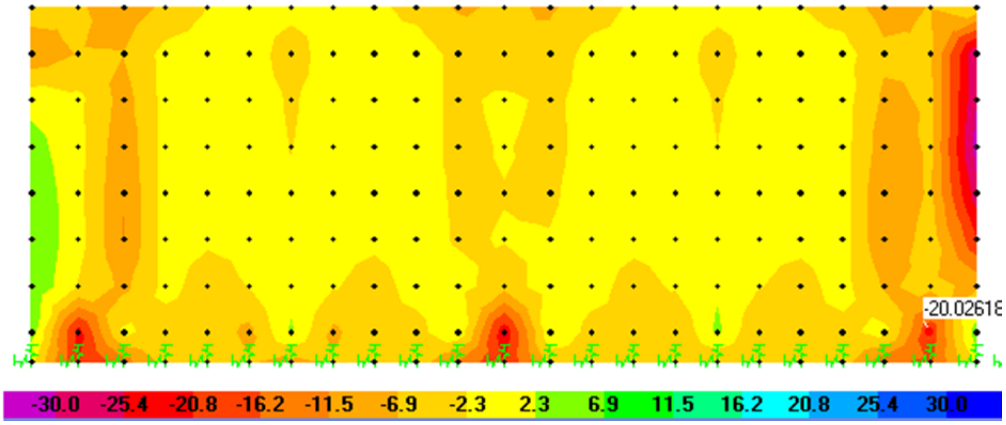


FIG. 4.570 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MIN SLE(RARE)-M11

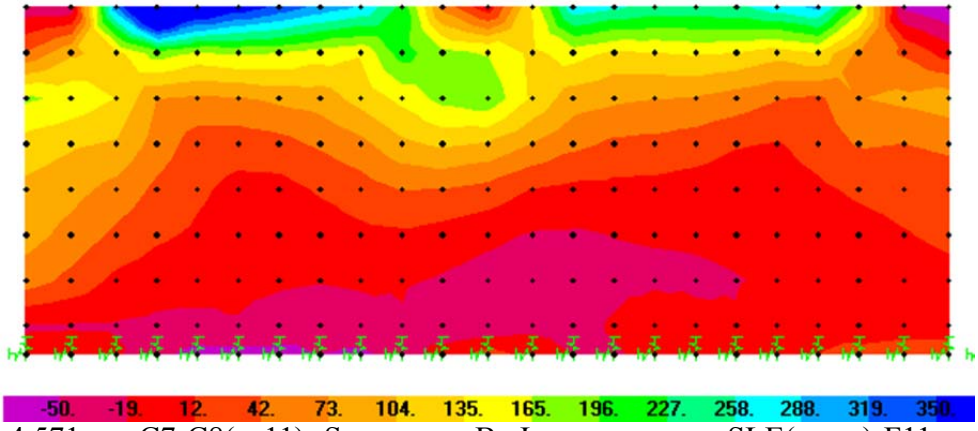


FIG. 4.571 - C7-C8(Q-11)-.SETTO FILO B - INVILUPPO MAX SLE(RARE)-F11

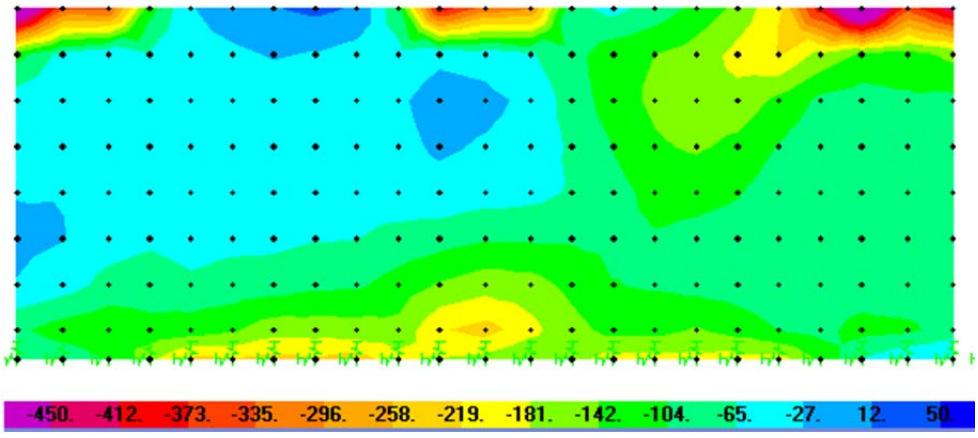


FIG. 4.572 - C7-C8(Q-11)-SETTO FILO B - INVILUPPO MIN SLE(RARE)-F11

C7-C8(q-11)-Setto B - ferri orizzontali - Verifiche agli SLE(comb. rare)				
da 0 a +5.50				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}	+150kN(tens)	-11kNm	**2.0**	**180**
M_{max}	+150kN	+12kNm	**2.2**	**187**
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
M_{max}	+150kN	-32kNm	**1.2**	**247**
da +5.50				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m				
N_{max}	+360kN	-32kNm	**-**	**255**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+360kN	-11kNm	**-**	**254**

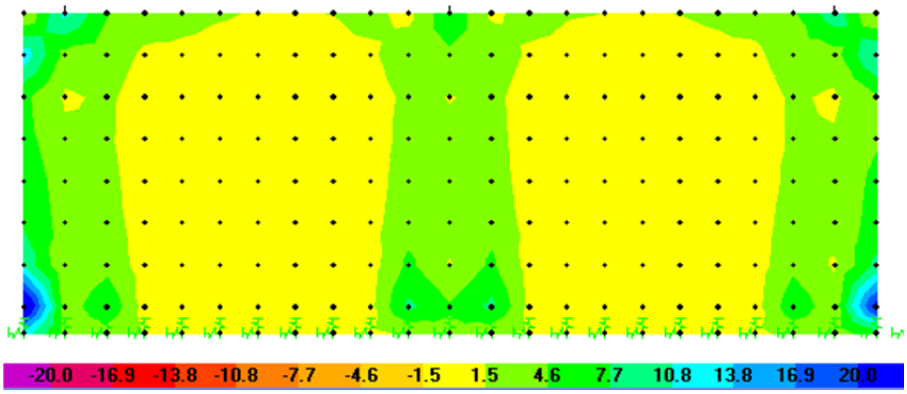


FIG. 4.573 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MAX SLE(RARE)-M11

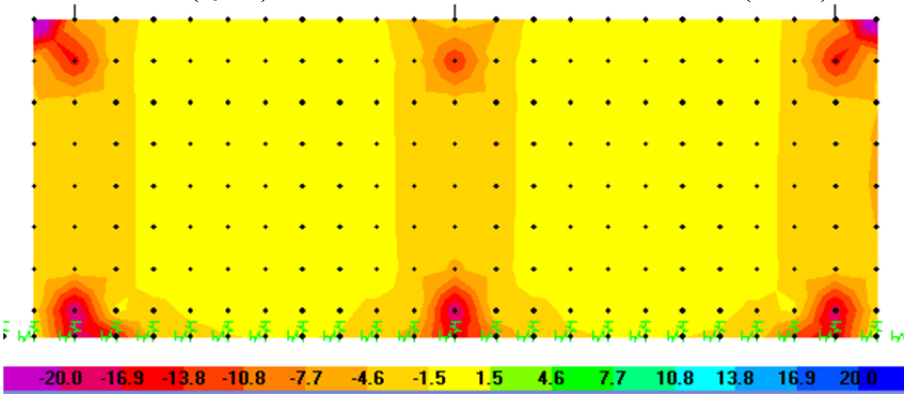


FIG. 4.574 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MIN SLE(RARE)-M11

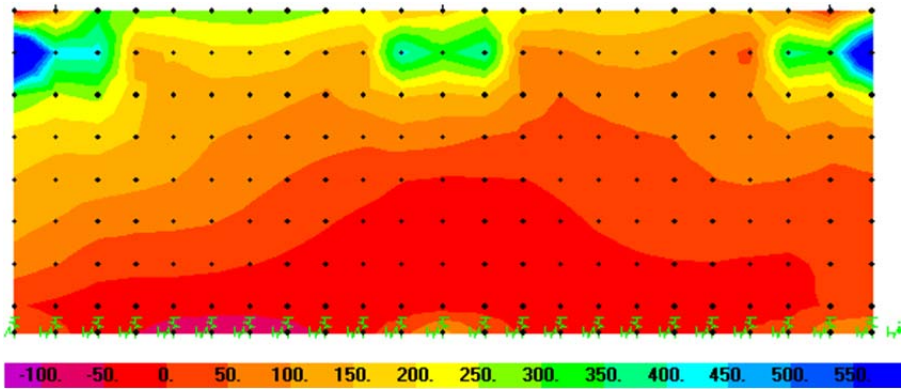


FIG. 4.575 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MAX SLE(RARE)-F11

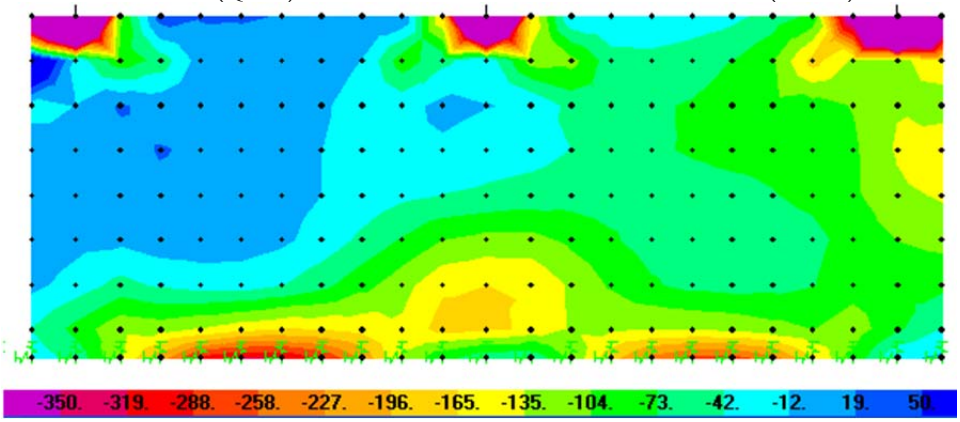


FIG. 4.576 - C7-C8(Q-11)-SETTO FILO C - INVILUPPO MIN SLE(RARE)-F11

C7-C8(q-11)-Setto C - ferri orizzontali - Verifiche agli SLE(comb. rare)				
da 0 a +5.50				
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250mm), H1=0.189m, H2=0.061m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max} /M_{min}	+200kN(tens.)	-5kNm	**-**	**90**
N_{max} /M_{max}	+200kN	+8kNm	**0.6**	**103**
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
M_{min}	+240kN	+20kNm	**-**	**274**
da +5.50				
B=1.0m,H=0.5m,A1=A2=1524mm^2(θ22/250mm), H1=0.439m, H2=0.061m				
N_{max}	+620kN	-10kNm	**-**	**217**
B=1.0m,H=0.25m,A1=A2=1524mm^2(θ22/250mm), H1=0.189m, H2=0.061m				
N_{max}	+400kN	-8kNm	**-**	**169**

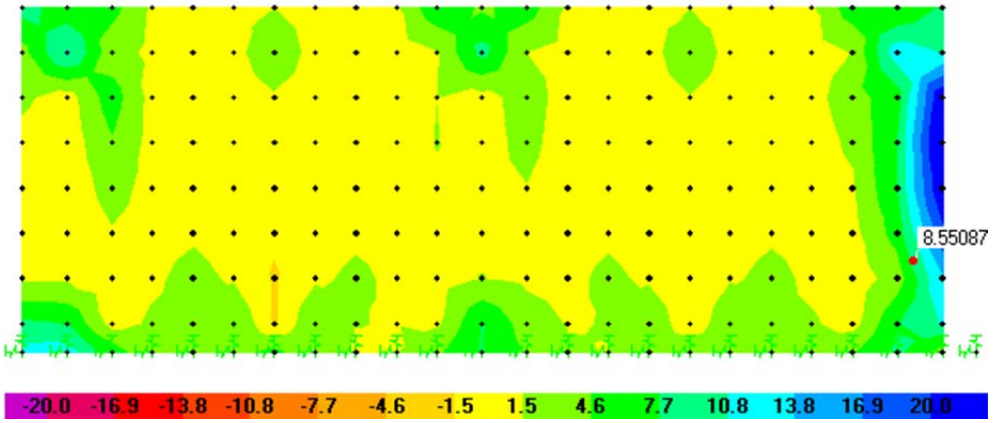


FIG. 4.577 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MAX SLE(RARE)-M11

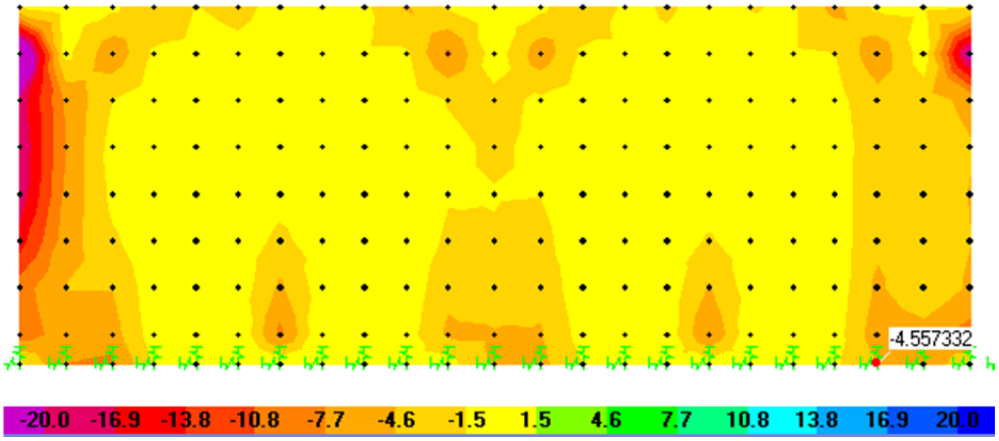


FIG. 4.578 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MIN SLE(RARE)-M11

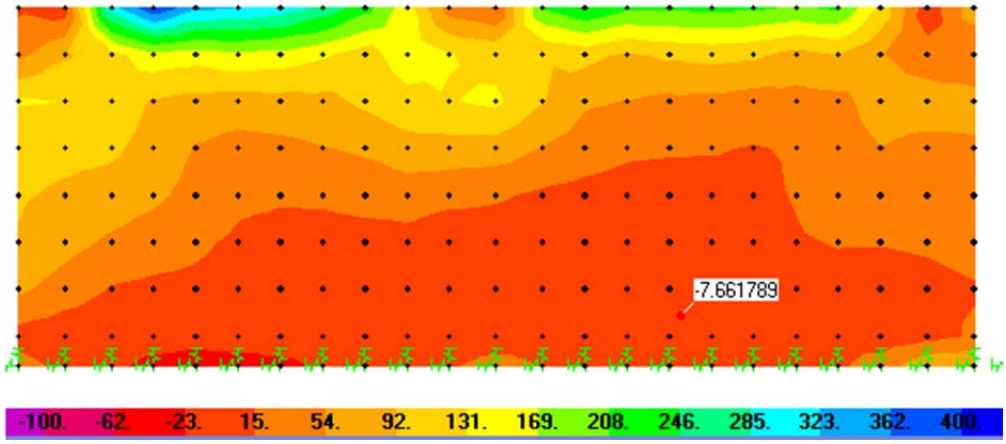


FIG. 4.579 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MAX SLE(RARE)-F11

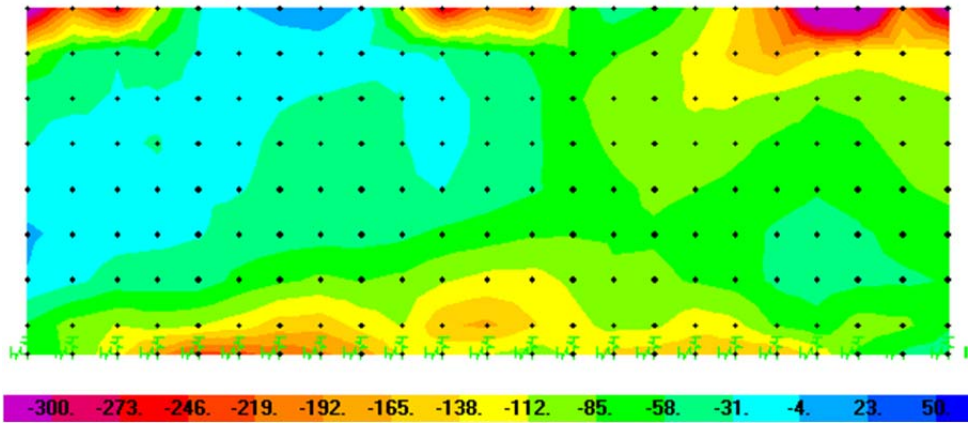


FIG. 4.580 - C7-C8(Q-11)-SETTO FILO D - INVILUPPO MIN SLE(RARE)-F11

C7-C8(q-11)-Setto D - ferri orizzontali - Verifiche agli SLE(comb. rare)				
da 0 a +5.50				
B=1.0m,H=0.25m,A1=A2=534mm^2(θ12/500mm+ θ14/500mm), H1=0.193m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max} /M_{min}	+120kN(tens.)	-7kNm	**1.3**	**197**
N_{max} /M_{max}	+120kN	+6kNm	**0.9**	**187**
B=1.0m,H=0.5m,A1=A2=710mm^2(θ16/500mm+ θ14/500mm), H1=0.442m, H2=0.058m in corrispondenza di parete E				
N_{max} /M_{min}	+120kN	-20kNm	**0.4**	**154**
N_{max} /M_{max}	+120kN	+20kNm	**0.4**	**154**
da +5.50				
B=1.0m,H=0.5m,A1=A2=1016mm^2(θ18/250mm), H1=0.441m, H2=0.059m solo in corrispondenza di parete E				
N_{max}	+220kN	-30kNm	**-**	**182**
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+240kN	-10kNm	**0.8**	**187**

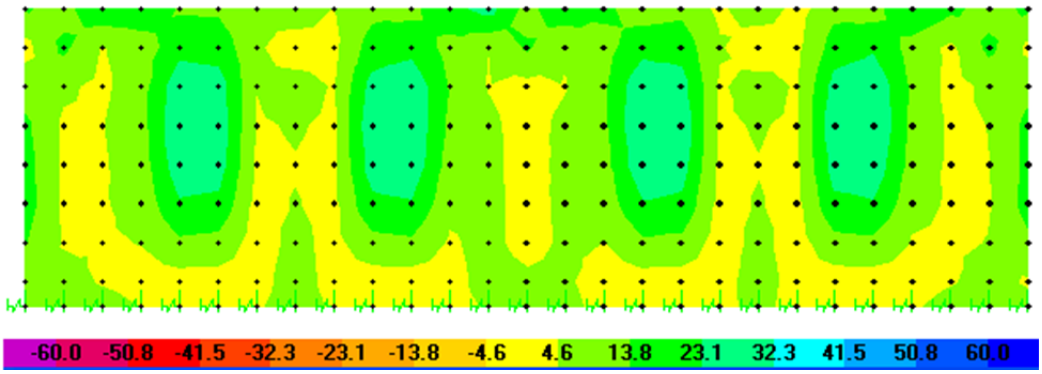


FIG. 4.581 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MAX SLE(RARA)-M11

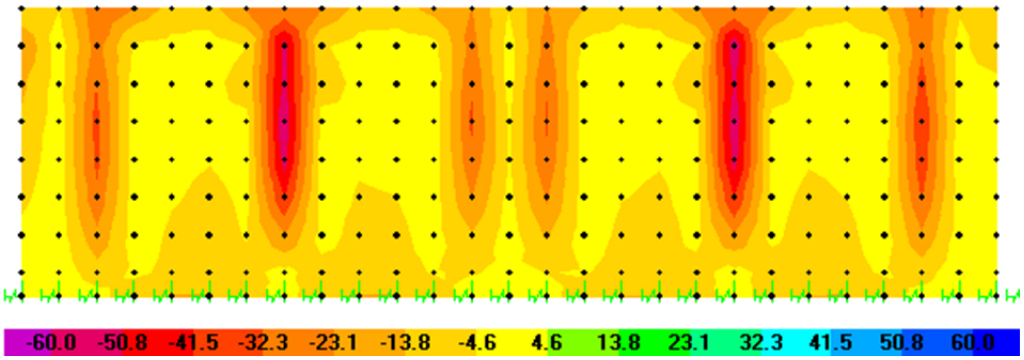


FIG. 4.582 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MIN SLE(RARA)-M11

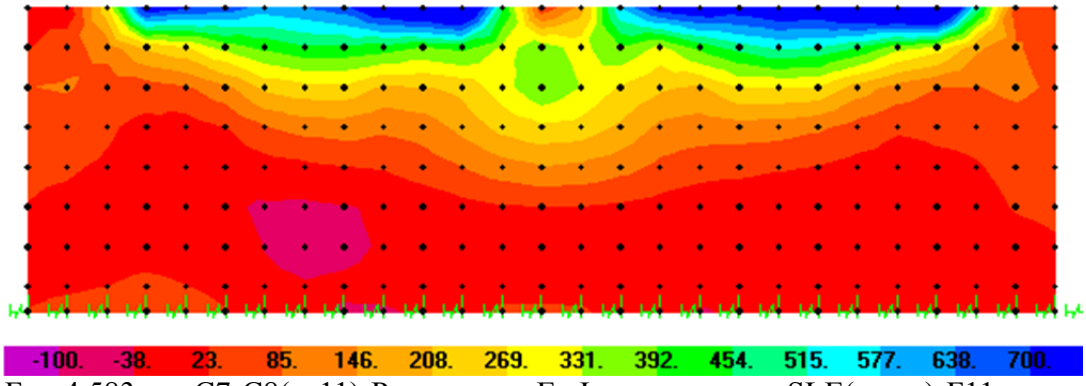


FIG. 4.583 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MAX SLE(RARA)-F11

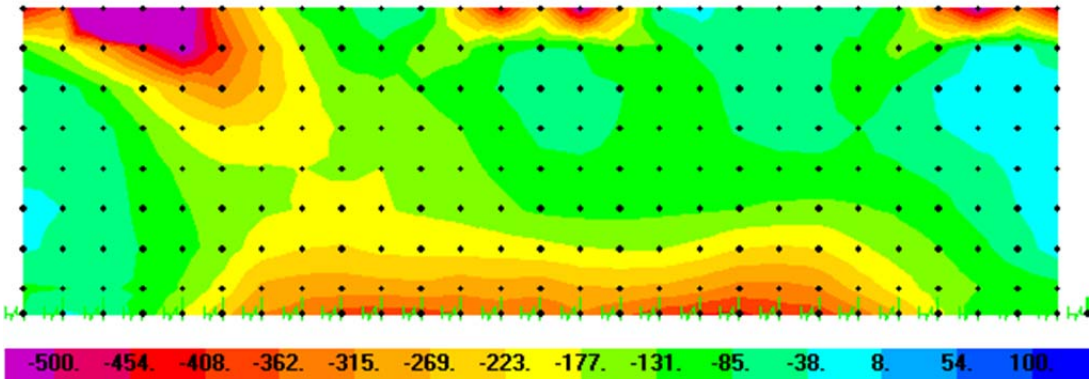


FIG. 4.584 - C7-C8(Q-11)-PARETE FILO E - INVILUPPO MIN SLE(RARA)-F11

C7-C8(q-11)-Parete E - ferri orizzontali - Verifiche agli SLE(comb. rare)				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=804mm^2(θ16/250mm), H1=0.442m, H2=0.058m				
Combinazione	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max} /M_{min}	+300kN(tens)	-50kNm	**0.9**	**341**
N_{max} /M_{max}	+300kN	+30kNm	**-**	**278**
Da +5.50				
B=1.0m,H=0.5m,A1=A2=1884mm^2(θ20/250+ θ20/500mm), H1=0.440m, H2=0.06m				
N_{max}	+700	-50kNm	**-**	**251**

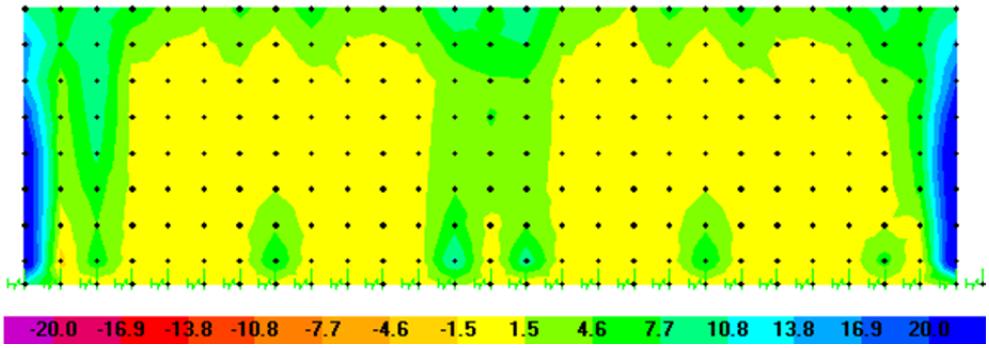


FIG. 4.585 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLE(RARE)-M11

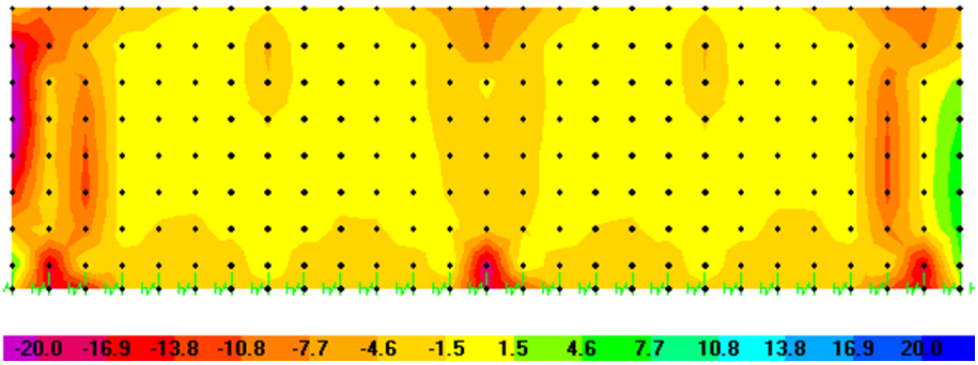


FIG. 4.586 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLE(RARE)-M11

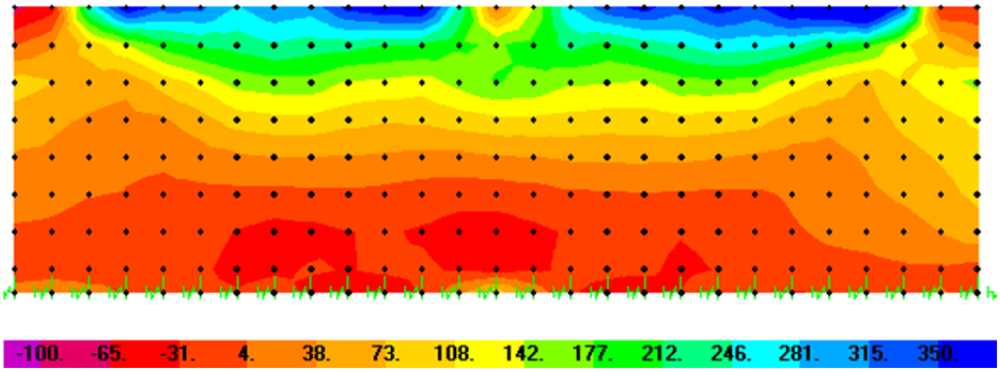


FIG. 4.587 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLE(RARE)-F11

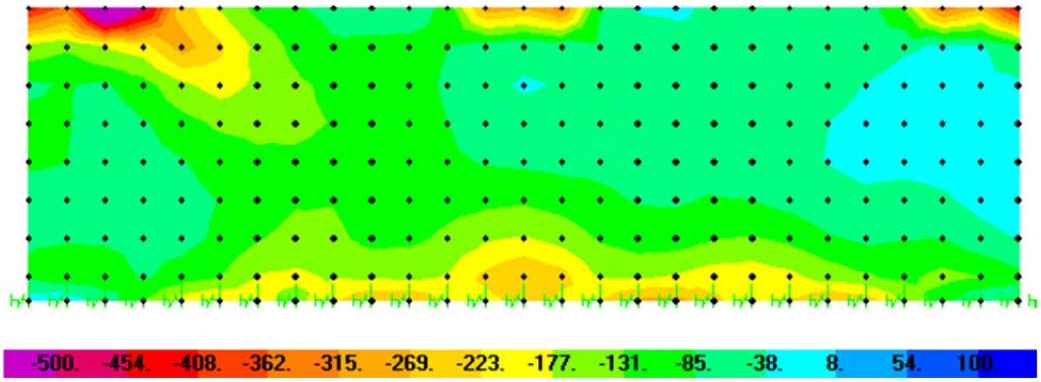


FIG. 4.588 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLE(RARE)-F11

C7-C8(q-11)-Setto F - ferri orizzontali - Verifiche agli SLE(comb. rare)				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m in corrispondenza della parete A				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max} /M_{min}	+160kN	-20kNm	**-**	**210**
N_{max} /M_{max}	+160kN	+20kNm	**-**	**210**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
N_{max} /M_{min}	+160kN	-11kNm	**2.1**	**243**
N_{max} /M_{max}	+160kN	+10kNm	**1.8**	**234**
Da +5.50				
B=1.0m,H=0.25m,A1=A2=1016mm^2(θ18/250mm), H1=0.191m, H2=0.059m				
N_{max}	+330kN	+10kNm	**-**	**232**

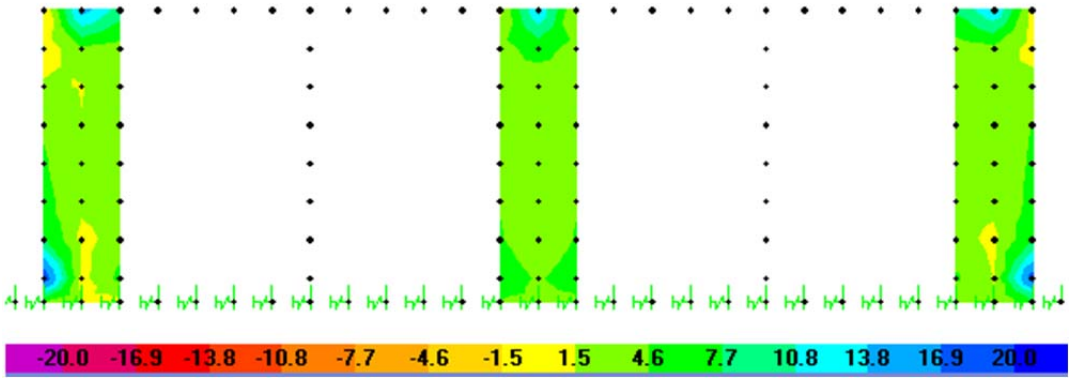


FIG. 4.589 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MAX SLE(RARE)-M11

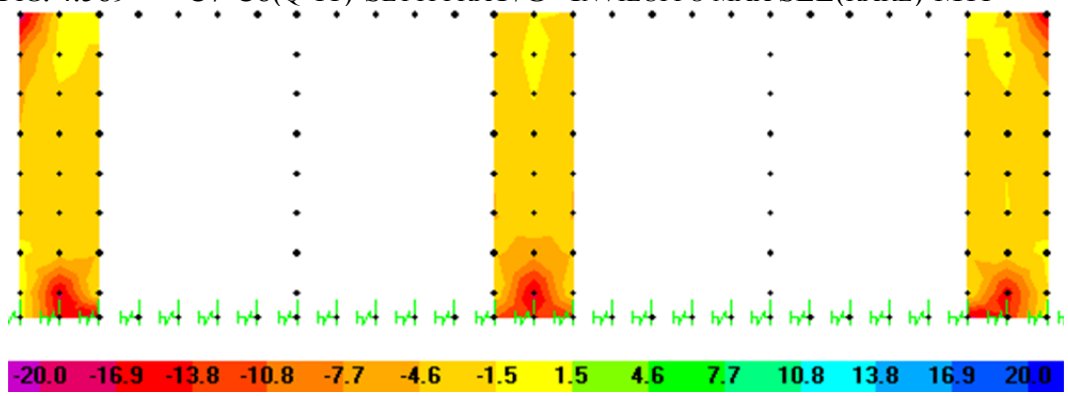


FIG. 4.590 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLE(RARE)-M11

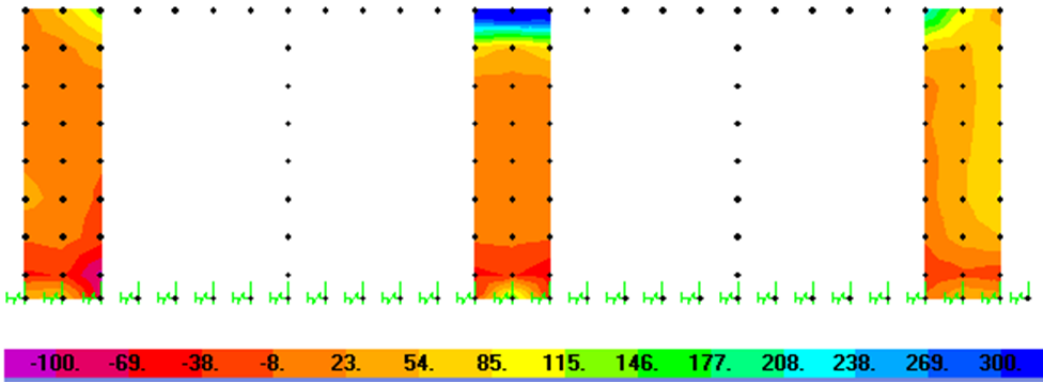


FIG. 4.591 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MAX SLE(RARE)-F11

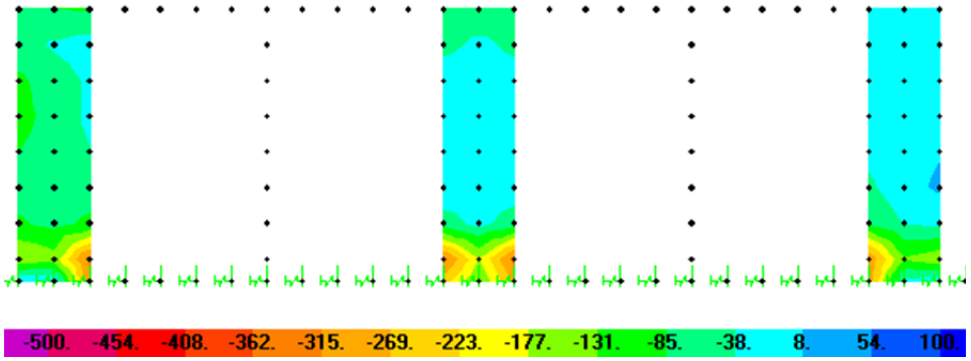


FIG. 4.592 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLE(RARE)-F11

C7-C8(q-11)-.Setti fra F/G - ferri orizzontali - Verifiche agli SLE(comb. rare)				
Da 0 a +5.50				
B=1.0m,H=0.5m,A1=A2=452mm^2(θ12/250mm), H1=0.444m, H2=0.056m in corrispondenza della parete A				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max} /M_{min}	+60kN	+15kNm	**0.7**	**146**
N_{max} /M_{max}	+60kN	-15kNm	**0.7**	**146**
Da +5.50				
B=1.0m,H=0.5m,A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
N_{max}	+224kN	+10kNm	**-**	**220**

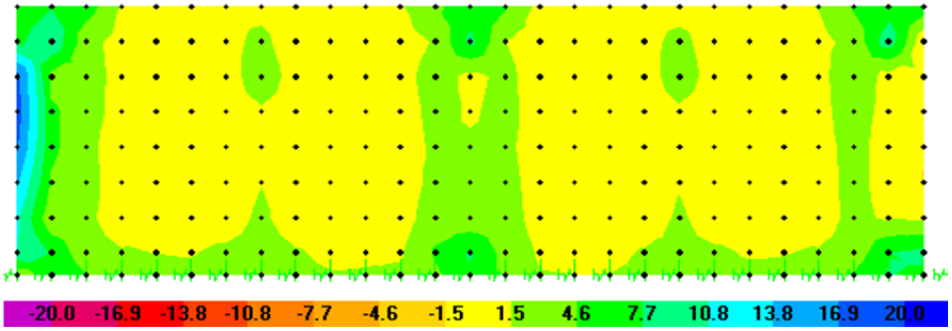


FIG. 4.593 - C7-C8(Q-11)-SETTO G - INVILUPPO MAX SLE(RARA)-M1

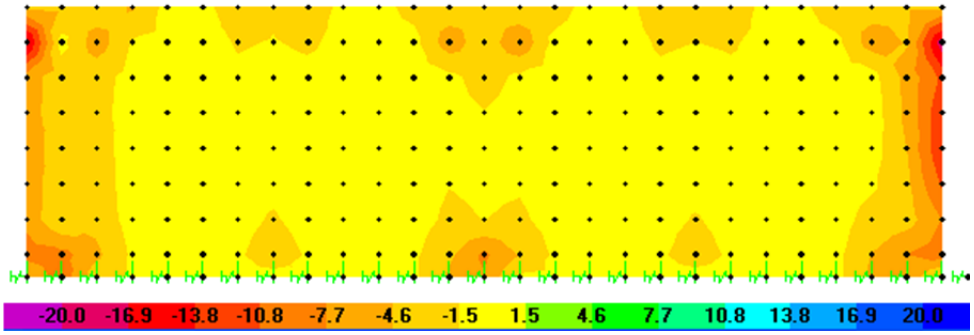


FIG. 4.594 - C7-C8(Q-11)-SETTO G - INVILUPPO MIN SLE(RARA)-M11

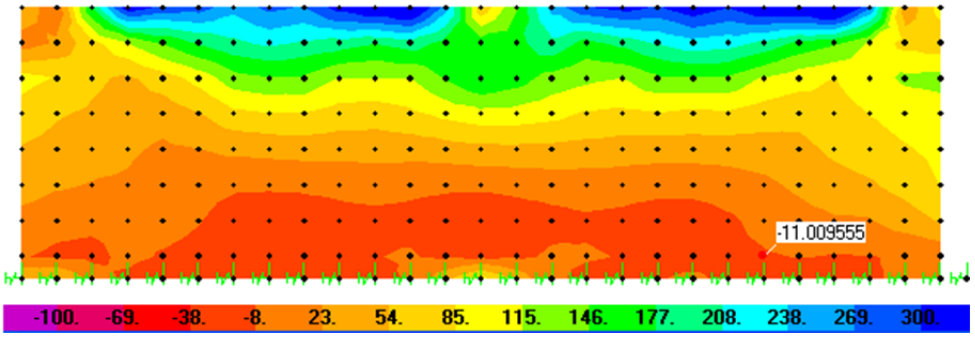


FIG. 4.595 - C7-C8(Q-11)-SETTO G - INVILUPPO MAX SLE(RARA)-F11

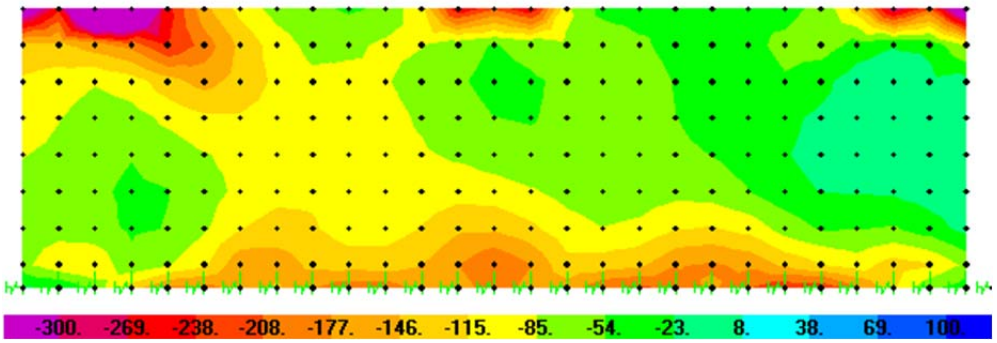


FIG. 4.596 - C7-C8(Q-11)-SETTO G - INVILUPPO MIN SLE(RARA)-F11

C7-C8(q-11)-Setto G - ferri orizzontali - Verifiche agli SLE(comb. rare)				
Da 0 a +5.50				
B=1.0m H=0.5m A1=A2=616mm^2(θ14/250mm), H1=0.443m, H2=0.057m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}	+150kN	-17kNm	**-**	**190**
M_{max}	+150kN	+17kNm	**-**	**190**
B=1.0m,H=0.25m,A1=A2=616mm^2(θ14/250mm), H1=0.193m, H2=0.057m				
M_{min}	+150kN	+2kNm	**-**	**143**
M_{max}	+150kN	+2kNm	**-**	**143**
Da +5.50				
B=1.0m,H=0.25m,A1=A2=804mm^2(θ16/250mm), H1=0.192m, H2=0.058m				
N_{max}	+280kN	+16kNm	**2.4**	**305**

4.4.8 Verifiche agli SLE (rare) C7-C8(q.-11)

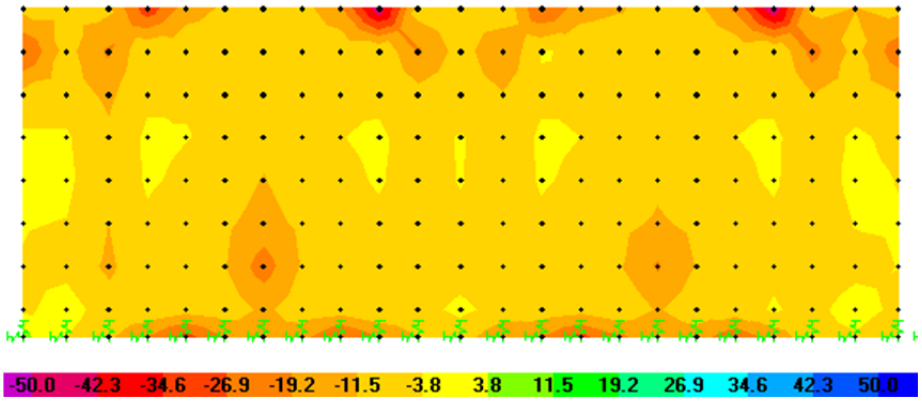


FIG. 4.597 - C7-C8(Q-11)-PARETE A - INVILUPPO MIN SLE(RARE)-M22

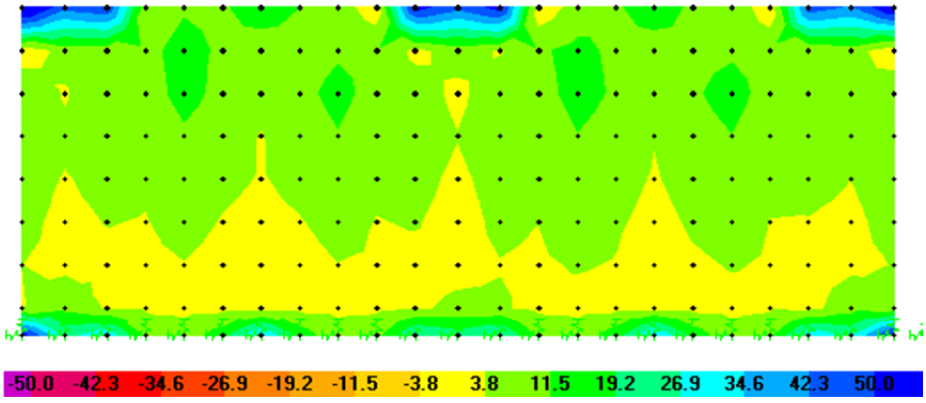


FIG. 4.598 - C7-C8(Q-11)-PARETE A - INVILUPPO MAX SLE(RARE)-M22

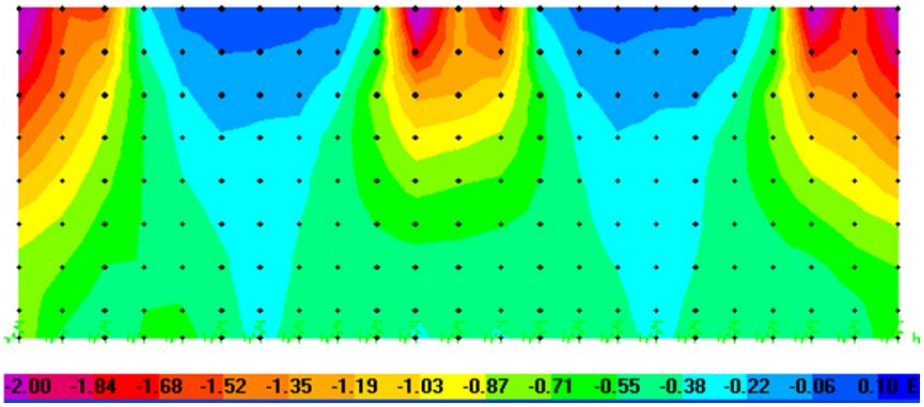


FIG. 4.599 - C7-C8(Q-11)-PARETE A - INVILUPPO MIN SLE(RARE)-F22

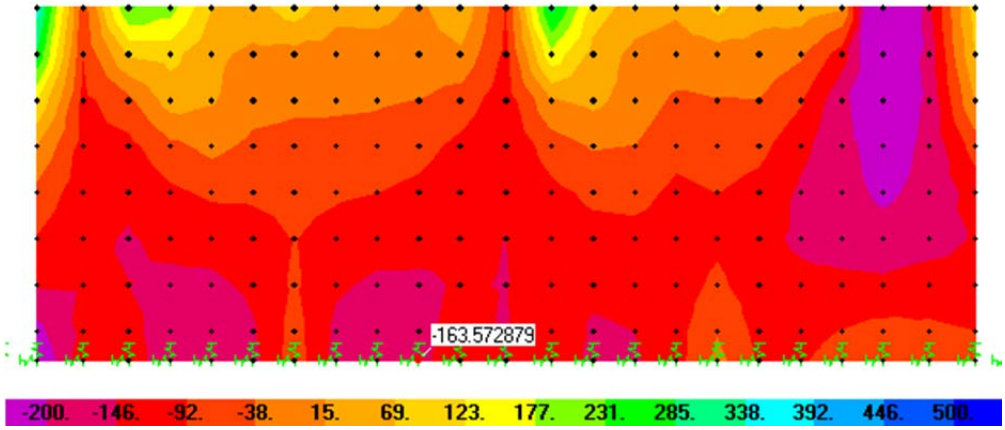


FIG. 4.600 - C7-C8(Q-11)-PARETE A- INVILUPPO MAX SLE(RARE)-F22

C7-C8(q-11)-Parete A - ferri verticali - Verifiche agli SLE (comb. rare)				
Monconi di ripresa - L=3.0m				
B=1.0m H=0.5m A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	-25kN	-30kNm	**1.7**	**80**
M_{max}/N_{max}	-25kN	+30kNm	**2.2**	**154**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+150kN	-15kNm	-	**298**
M_{max}/N_{max}	+150kN	+15kNm	-	**298**

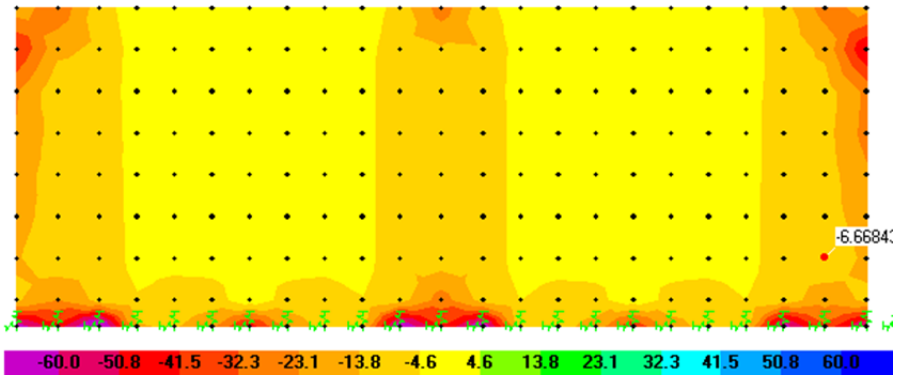


FIG. 4.601 - C7-C8(Q-11)-SETTO B- INVILUPPO MIN SLE(RARE)-M22

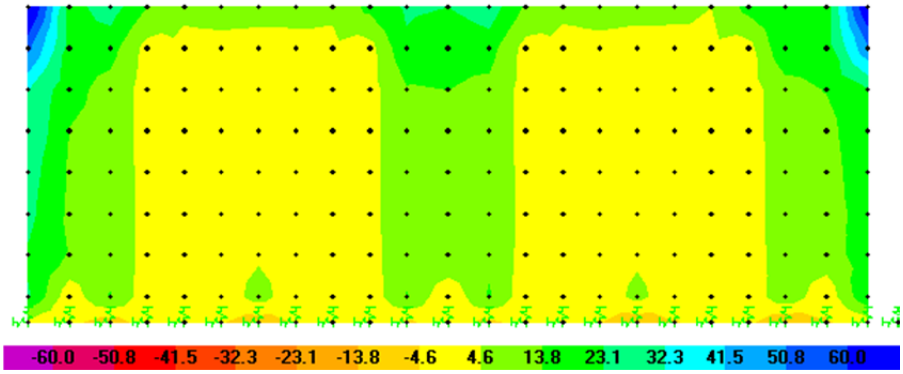


FIG. 4.602 - C7-C8(Q-11)-SETTO B- INVILUPPO MAX SLE(RARE)-M22

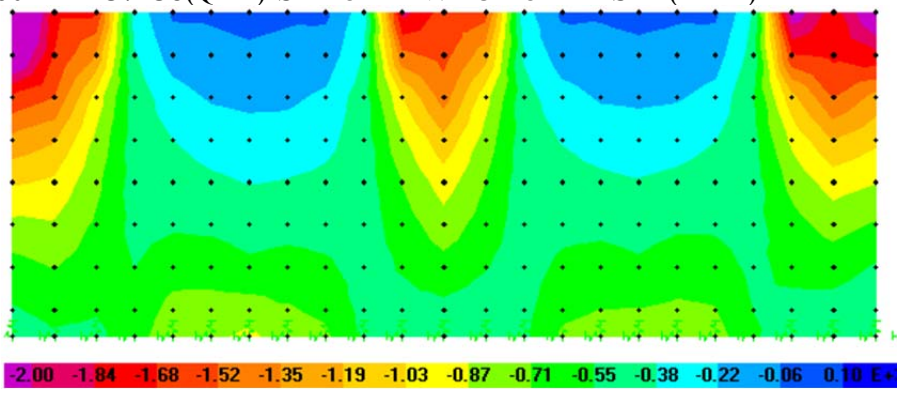


FIG. 4.603 - C7-C8(Q-11)-SETTO B- INVILUPPO MIN SLE(RARE)-F22

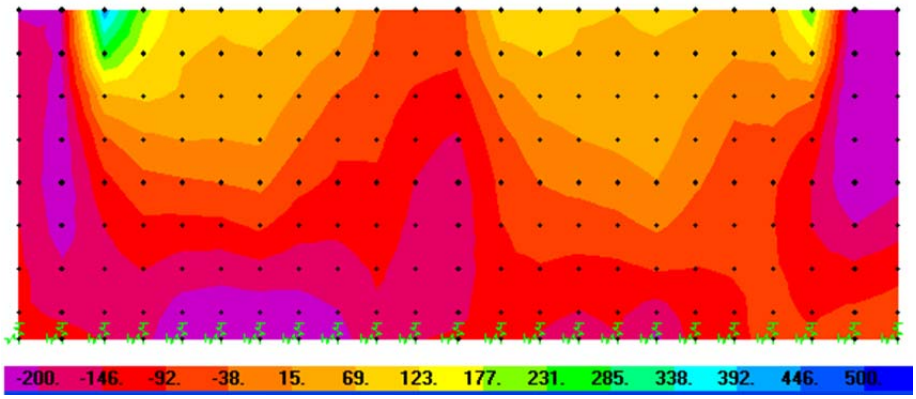


FIG. 4.604 - C7-C8(Q-11)-SETTO B- INVILUPPO MAX SLE(RARE)-F22

C7-C8(q-11)-Setto B - ferri verticali - Verifiche agli SLE (comb.rare)				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	-70kN	-50kNm	**11.5**	**337**
M_{max}/N_{max}	-70kN	-13kNm	**2.8**	**51**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	-50kN	-70kNm	**3.8**	**192**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.070m				
M_{min}/N_{max}	+96kN	-10kNm	**2.9**	**197**
M_{max}/N_{max}	+96kN	+10kNm	**2.9**	**197**

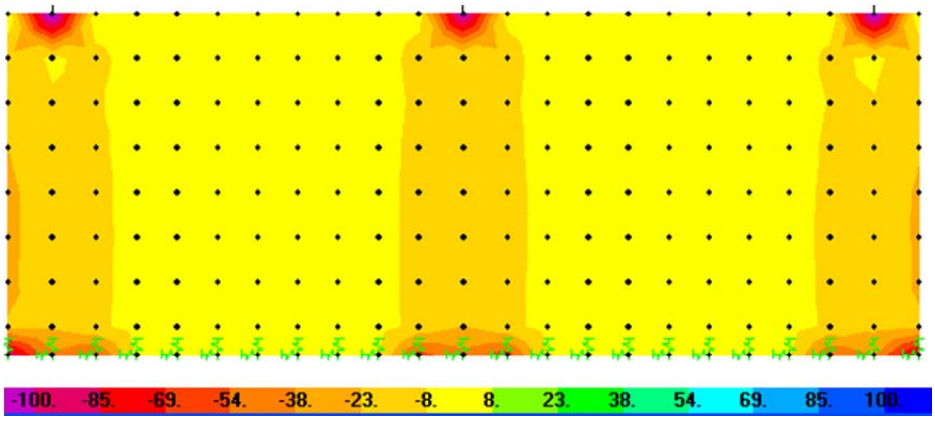


FIG. 4.605 - C7-C8(Q-11)-SETTO C- INVILUPPO MIN SLE(RARE)-M22

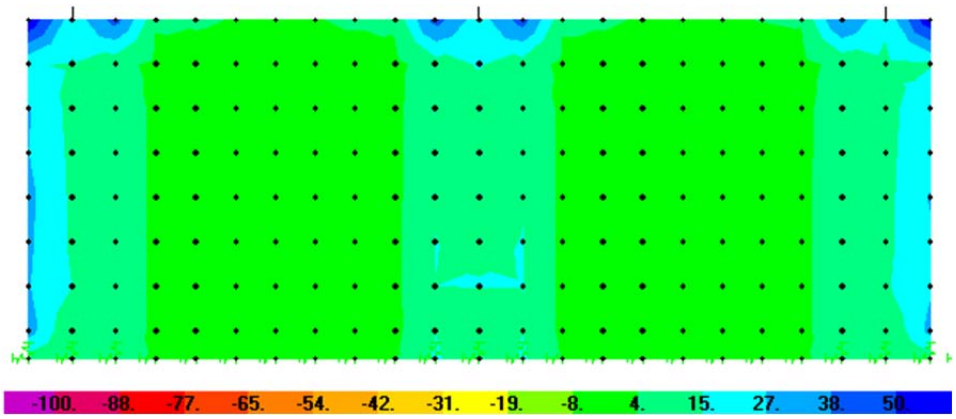


FIG. 4.606 - C7-C8(Q-11)-SETTO C- INVILUPPO MAX SLE(RARE)-M22

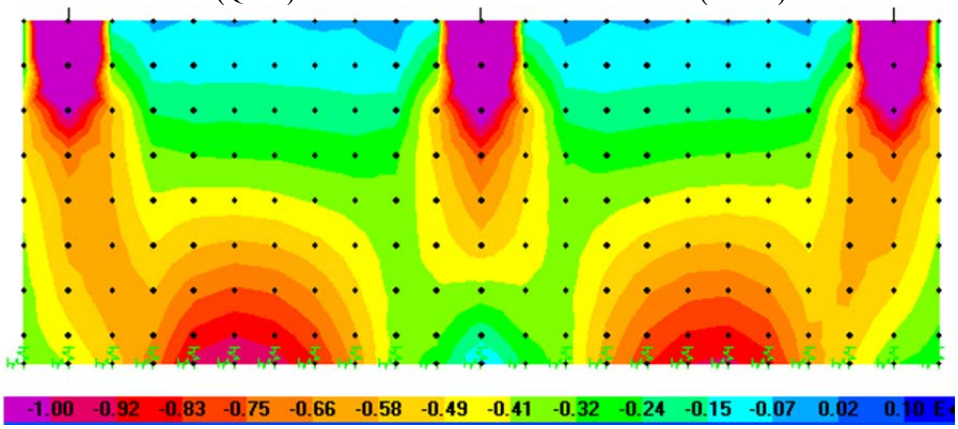


FIG. 4.607 - C7-C8(Q-11)-SETTO C- INVILUPPO MIN SLE(RARE)-F22

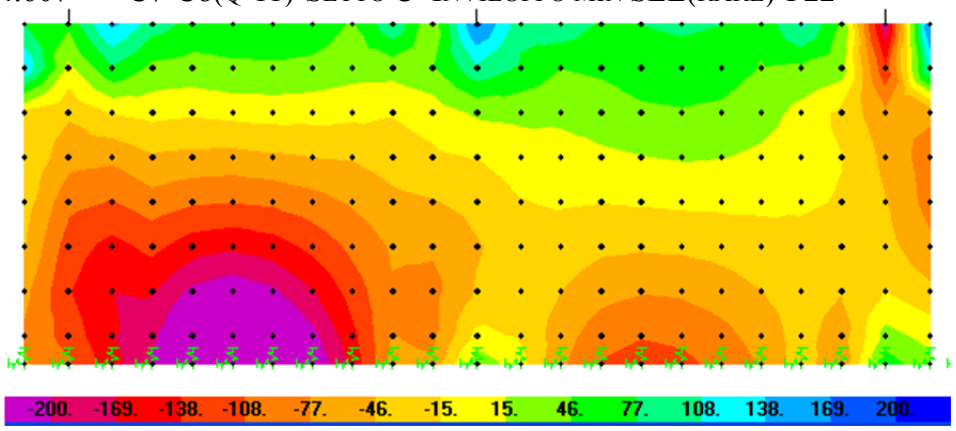


FIG. 4.608 - C7-C8(Q-11)-SETTO C- INVILUPPO MAX SLE(RARE)-F22

C7-C8(q-11)-Setto C - ferri verticali - Verifiche agli SLE (Comb. rare)				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.171m, H2=0.079m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	-30kN	-5kNm	**1.1**	**18**
M_{max}/N_{max}	-30kN	+16kNm	**4.0**	**103**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+60kN	-50kNm	**2.7**	**200**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+70kN	-2kNm	**0.3**	**91**
M_{max}/N_{max}	+70kN	+3kNm	**0.8**	**101**

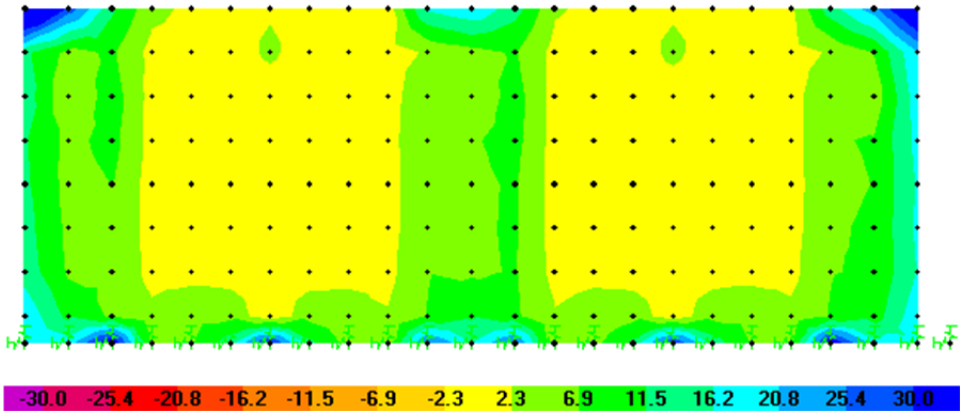


FIG. 4.609 - C7-C8(Q-11)-SETTO D- INVILUPPO MAX SLE(RARE)-M22

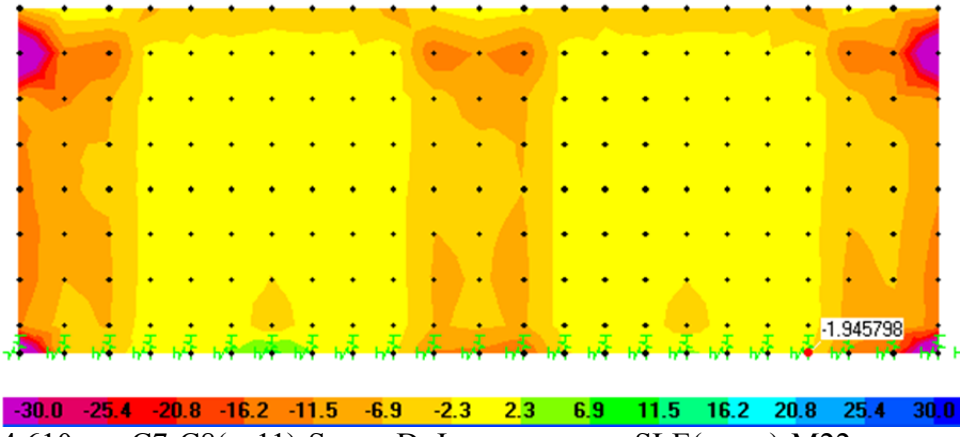


FIG. 4.610 - C7-C8(Q-11)-SETTO D- INVILUPPO MIN SLE(RARE)-M22

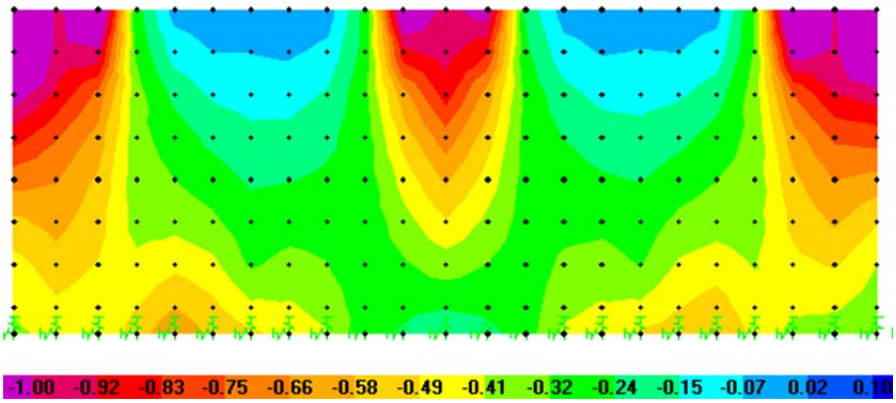


FIG. 4.611 - C7-C8(Q-11)-SETTO D- INVILUPPO MIN SLE(RARE)-F22

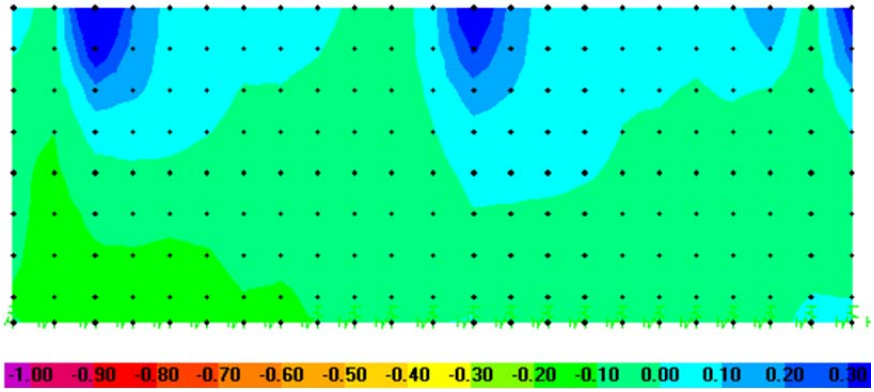


FIG. 4.612 - C7-C8(Q-11)-SETTO D- INVILUPPO MAX SLE(RARE)-F22

C7-C8(q-11)-Setto D - ferri verticali - Verifiche agli SLE (comb. rare)				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=565mm^2(θ12/200mm), H1=0.18m, H2=0.07m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	-30kN	-6kNm	**0.3**	**-**
M_{max}/N_{max}	-30kN	+20kNm	**8.7**	**305**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{max}/N_{max}	+20kN	+20kNm	**2.4**	**131**
Verticali correnti				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+200kN	-5kNm	**2.5**	**68**
M_{max}/N_{max}	+200kN	+7kNm	**3.8**	**118**

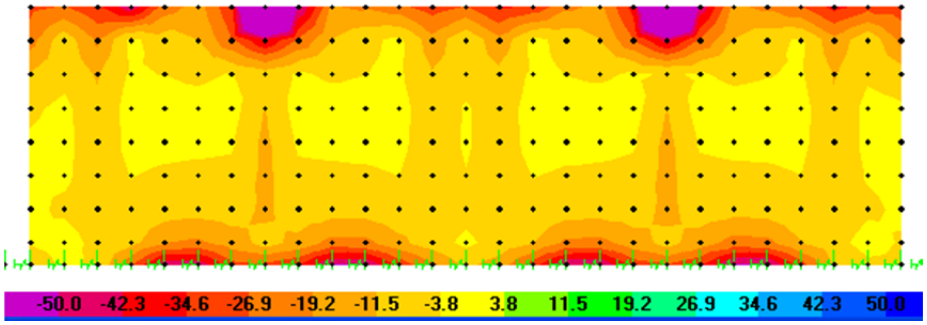


FIG. 4.613 - C7-C8(Q-11)-PARETE E- INVILUPPO MIN SLE(RARA)-M22

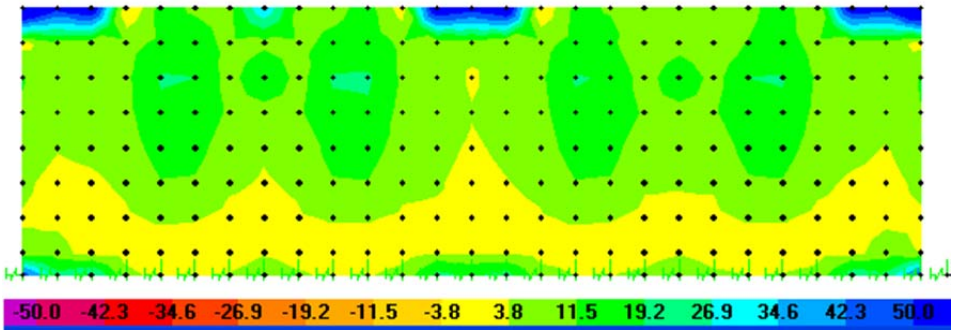


FIG. 4.614 - C7-C8(Q-11)-PARETE E - INVILUPPO MAX SLE(RARA)-M22

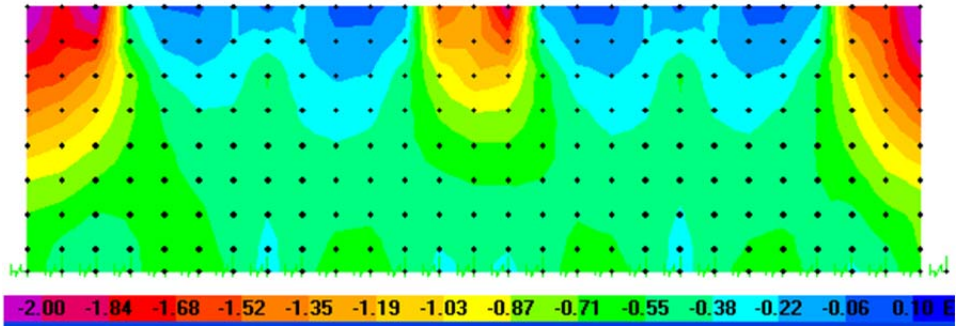


FIG. 4.615 - C7-C8(Q-11)-PARETE E - INVILUPPO MIN SLE(RARA)-F22

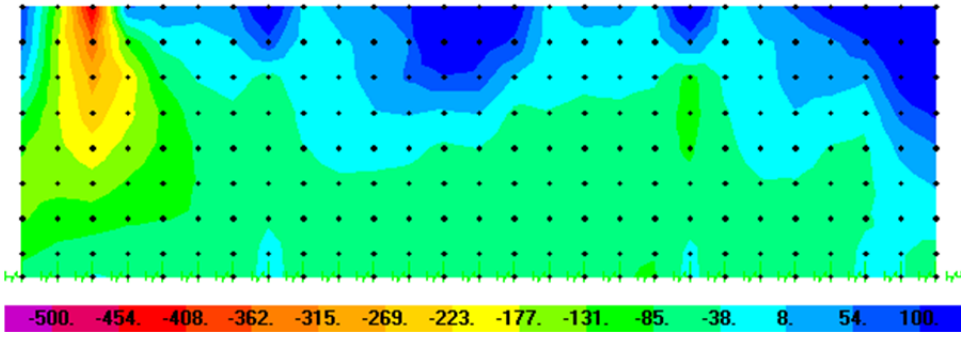


FIG. 4.616 - C7-C8(Q-11)-PARETE E - INVILUPPO MAX SLE(RARA)-F22

C7-C8(q-11)-Parete E - ferri verticali - Verifiche agli SLE (Comb. rare)				
Monconi di ripresa - L=3.0m				
B=1.0m,H=0.5m,A1= 770mm^2(θ14/200mm), A2=385mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	-35kN	-40kNm	**2.2**	**105**
M_{max}/N_{max}	-35kN	+15kNm	**1.0**	**49**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.5m,A1=A2=452mm^2(θ14/400mm), H1=0.429m, H2=0.071m				
M_{min}/N_{max}	+100kN	-21kNm	**1.3**	**269**
M_{max}/N_{max}	+100kN	+18kNm	**0.9**	**251**

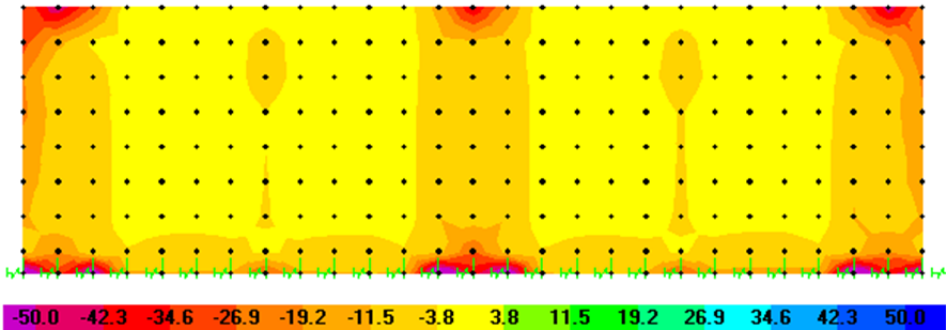


FIG. 4.617 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLE(RARE)-M22

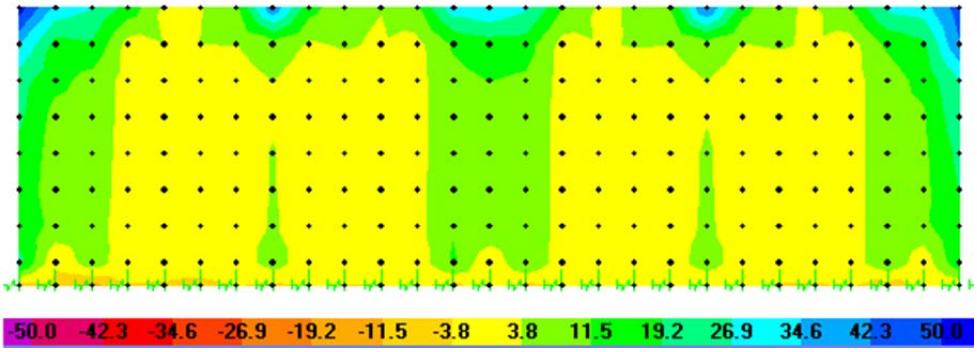


FIG. 4.618 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLE(RARE)-M22)

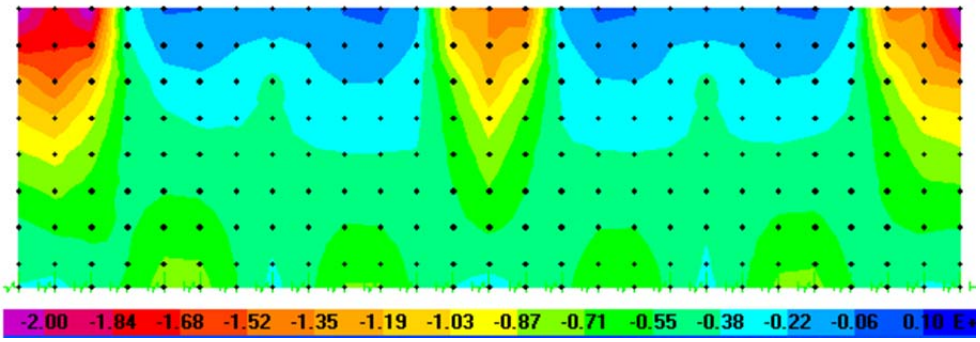


FIG. 4.619 - C7-C8(Q-11)-SETTO F - INVILUPPO MIN SLE(RARE)-F22

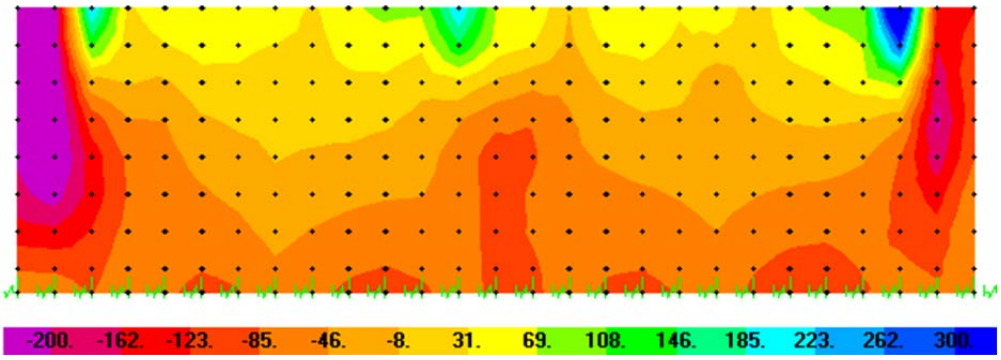


FIG. 4.620 - C7-C8(Q-11)-SETTO F - INVILUPPO MAX SLE(RARE)-F22

C7-C8(q-11)-Setto F - ferri verticali - Verifiche agli SLE(comb. rare)				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	-70kN	-12kNm	**3.0**	**48**
M_{max}/N_{max}	-70kN	+14kNm	**0.5**	**-**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m,H=0.50m,A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
M_{max}/N_{max}	-80kN	-50kNm	**2.7**	**207**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
M_{min}/N_{max}	+100kN	-6kNm	**4.2**	**191**
M_{max}/N_{max}	+100kN	+3kNm	**0.9**	**71**

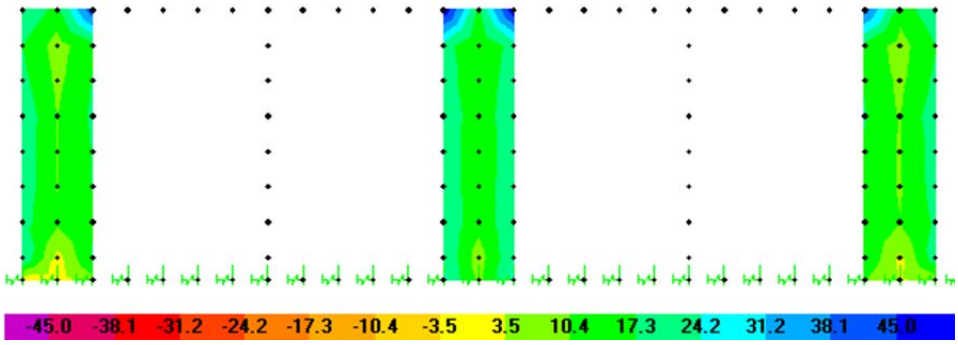


FIG. 4.621 - C7-C8(Q-11)-SETTI F/G - INVILUPPO MAX SLE(RARA)-M22

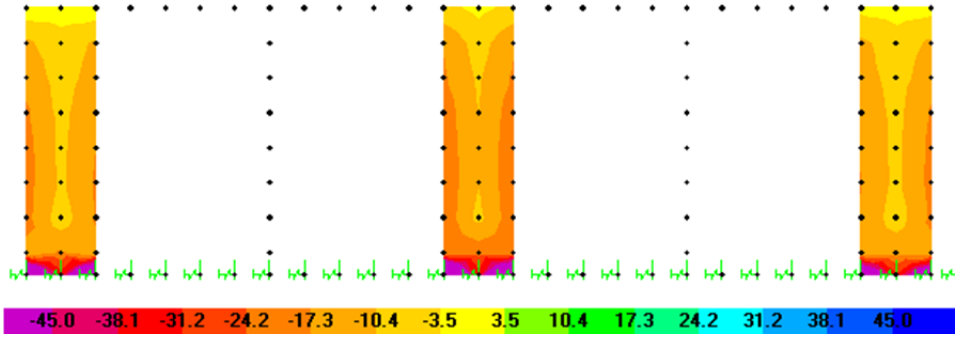


FIG. 4.622 - C7-C8(Q-11)-SETTI F/G - INVILUPPO MIN SLE(RARA)-M22

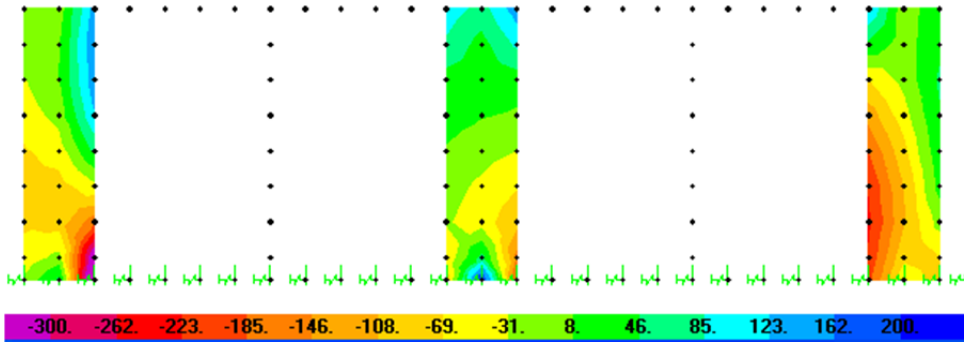


FIG. 4.623 - C7-C8(Q-11)-SETTI FRA F/G - INVILUPPO MIN SLE(RARA)-F22

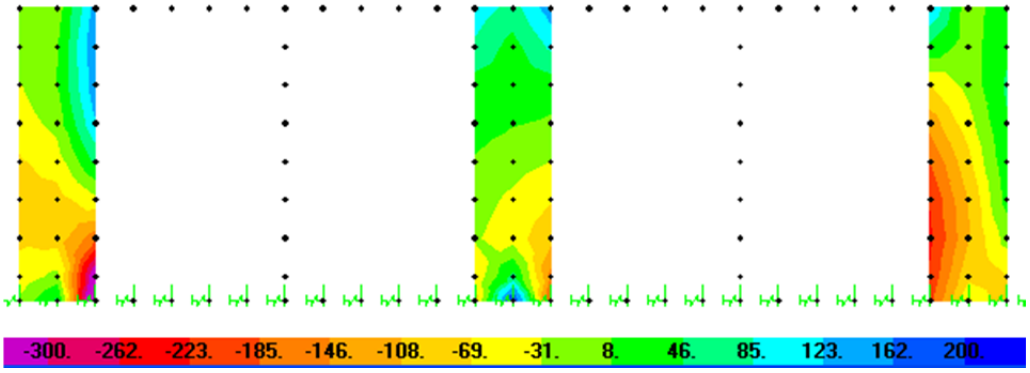


FIG. 4.624 - C7-C8(Q-11)-SETTI F/G - INVILUPPO MAX SLE(RARA)-F22

Setti fra F/G - ferri verticali - Verifiche agli SLE (comb. rara)				
Monconi di ripresa - L=3.0m - setti 50cm				
B=1.0m H=0.50m A1=A2=565mm^2(θ12/200mm), H1=0.430m, H2=0.07m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
M_{min}/N_{max}	+50kN	-45kNm	**1.4**	**81**
M_{max}/N_{max}	+50kN	+30kNm	**0.7**	**34**

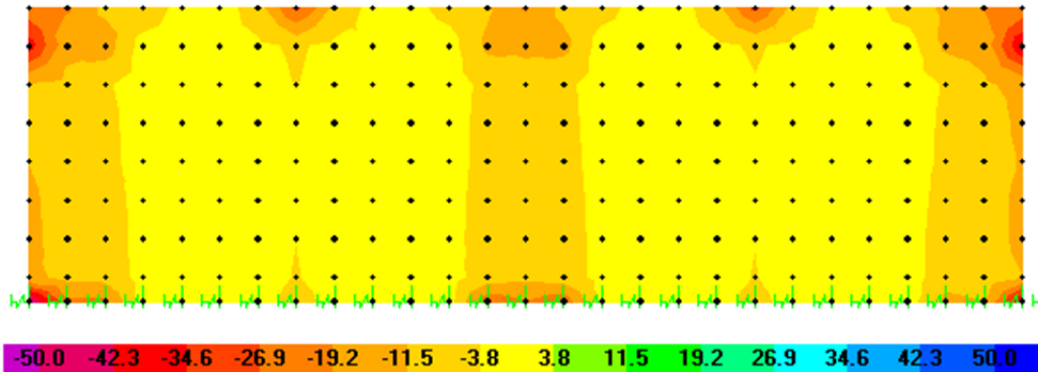


FIG. 4.625 - C7-C8(Q-11)-SETTI G - INVILUPPO MIN SLE(RARA)-M22

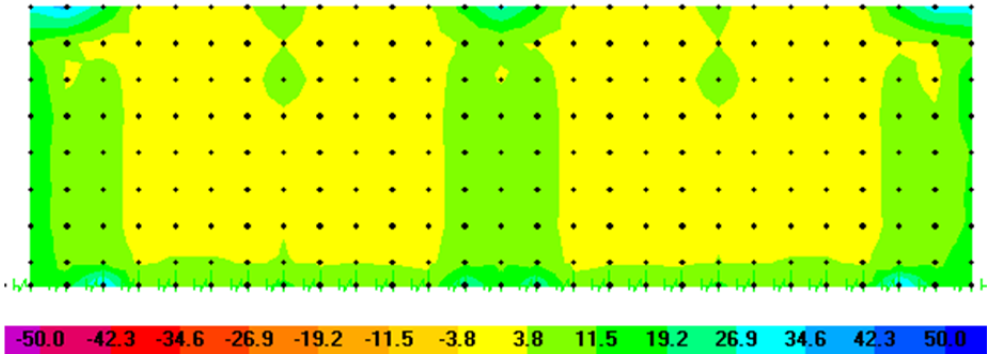


FIG. 4.626 - C7-C8(Q-11)-SETTI G - INVILUPPO MAX SLE(RARA)-M22

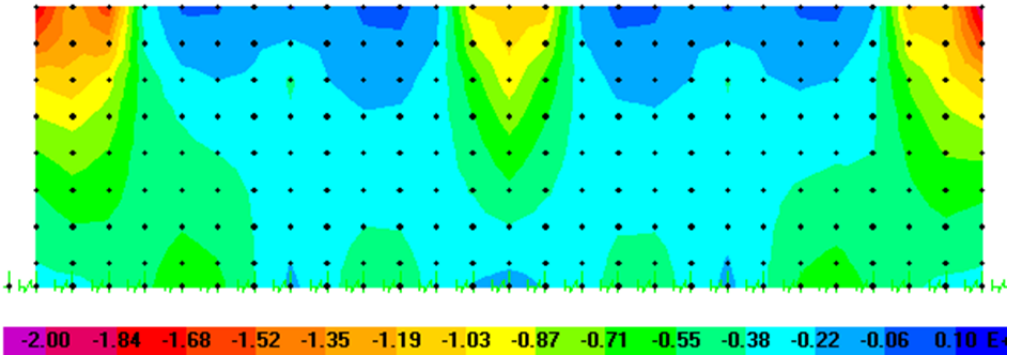


FIG. 4.627 - C7-C8(Q-11)-SETTI G - INVILUPPO MIN SLE(RARA)-F22

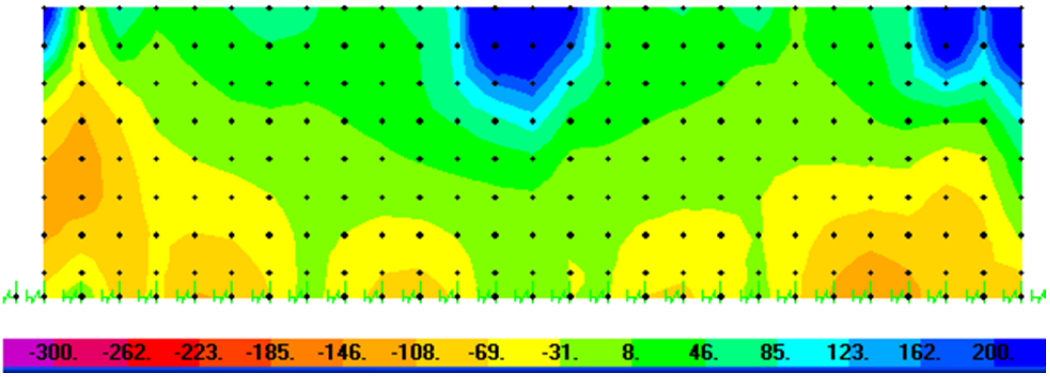


FIG. 4.628 - C7-C8(Q-11)-SETTI G - INVILUPPO MAX SLE(RARA)-F22

C7-C8(q-11)-Setto G - ferri verticali - Verifiche agli SLE (comb. rara)				
Monconi di ripresa - L=3.0m - setti 25cm				
B=1.0m H=0.25m A1=A2=770mm^2(θ14/200mm), H1=0.179m, H2=0.071m				
Comb.	N_{Sd}	M_{Sd}	**σ_c[MPa]**	**σ_a[MPa]**
N_{max}/M_{min}	-30kN	-8kNm	**1.8**	**40**
N_{max}/M_{max}	-30kN	+6kNm	**1.3**	**25**
Monconi di ripresa - L=3.0m - corrispondenza pilastri - sp. 50cm				
B=1.0m H=0.50m A1=A2=770mm^2(θ14/200mm), H1=0.429m, H2=0.071m				
N_{max}/M_{max}	-40kN	-17kNm	**0.9**	**29**
Verticali correnti (escluso pilastri)				
B=1.0m,H=0.25m,A1=A2=565mm^2(θ12/200mm), H1=0.180m, H2=0.07m				
N_{max}/M_{min}	+50kN	-10kNm	**4.6**	**214**
N_{max}/M_{max}	+50kN	+7kNm	**3.7**	**184**

4.5 Verifica pilastri cassoni B7-B8 a q.ta-13.00

L'orditura minima dei pilastri secondo D.M. 14/1/2008 parag. 4.1.6.1.2

$A_{s,min}= 0.10\ N_{Ed} / f_{yd} \geq 0{,}003A_c$

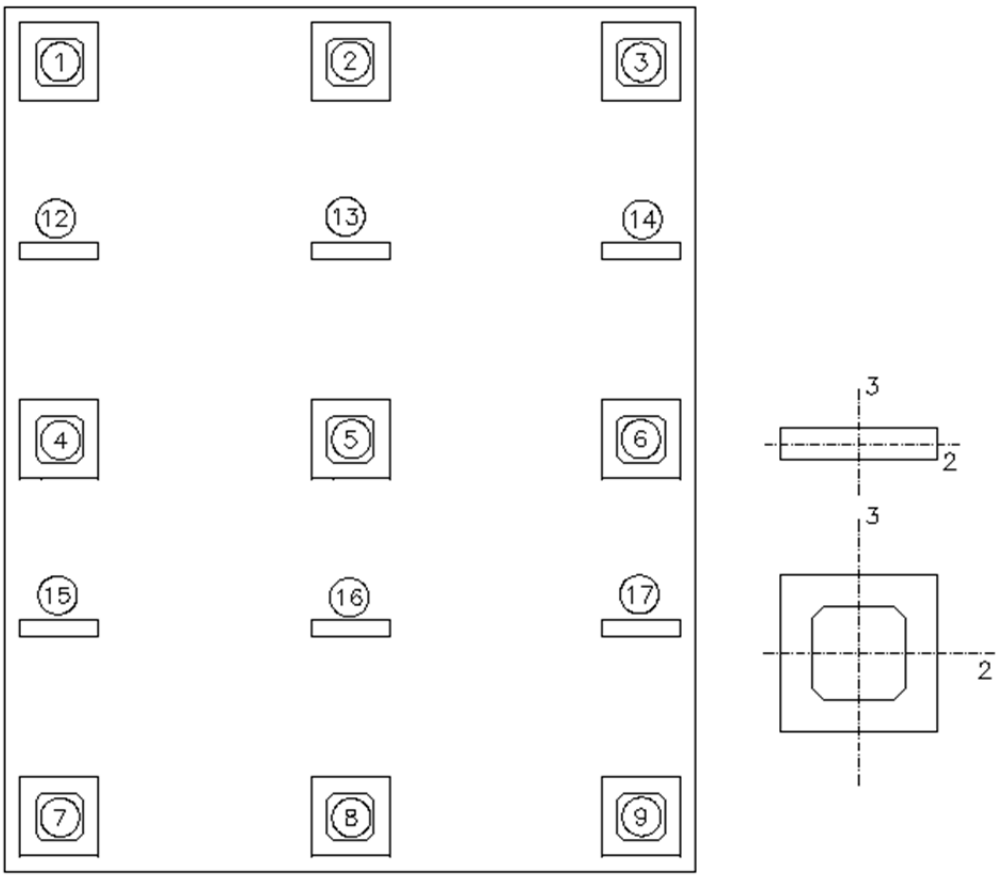


FIG. 4.629 - CASSONE - NUMERAZIONE PILASTRI - NUMERAZIONE ASSI E PILASTRI

Le sollecitazioni ai pilastri vengono trasmesse dalle travi dentro le pareti dei pilastri che le trasferiscono al cassone pieno sottostante.

L'orditura minima:

Pilastri da 2.5x2.5m

$A_{s,min}= 0.10\ N_{Ed} / f_{yd} = 0.10 \times 29156x10^3 / 391 = 7457\ mm^2 \geq 0.003 \times (2500^2 - 1500^2) = 12000 mm^2$

Si predispone di 72 barre passo 200mm, del diametro 24mm per l'incastro cassone/pilastro, e di n°36 del diametro 24mm e n°36 del diametro 26mm per l'incastro pilastro/trave d'impalcato.

L'area minima predisposta è pari a 72x452=32544mm^2 .

Pilastri da 0.5x2.5m

$A_{s,min}$= 0.10 N_{Ed} / f_{yd} = 0.10 x 10854x10^3 / 391 =2776 mm^2 ≥ 0.003 x (500x2500)=3750mm^2

Si predispone di 28 barre del diametro 18mm passo 200mm lungo i lati pari a 28x254=7112mm^2

4.5.1 Pilastri cassoni modulo B7-B8(q.-13) - SLU (escluso sisma)

Di seguito si riporta una Tab. riepilogativa con le combinazioni più gravose per quanto riguarda gli stati limiti ultimi.

Il momento M2 agisce intorno all'asse perpendicolare alle travi dell'impalcato mentre il momento M3 agisce intorno all'asse parallelo all'asse delle travi dell'impalcato.

Pilastri da 2.5x2.5m - Pressoflessione agli SLU:

Pilastri 2.5x2.5 - SLU				
PARTE BASSA - TORRE / CASSONE (-4.10/0.00)				
P	V2	V3	M2	M3
KN	KN	KN	KN-m	KN-m
5900	-1903	1421	-5085	1987
-17980	-2369	757	936	-5972
-1869	**-4207**	1617	192	-5821
-8212	-205	**-4751**	6051	-415
-5822	-2697	3465	**-10969**	2276
-1591	-2715	284	450	**-10694**
PARTE ALTA - TORRE / TRAVE (0.00/1.67)				
P	V2	V3	M2	M3
KN	KN	KN	KN-m	KN-m
6057	-1730	1248	-7220	4893
-17714	-2369	757	-1751	2438
-1602	**-3824**	1233	-4866	8433
-8212	-205	**-4751**	6051	-415
-5260	-839	3560	**-16724**	556
-2269	-3020	2622	-10670	**14713**

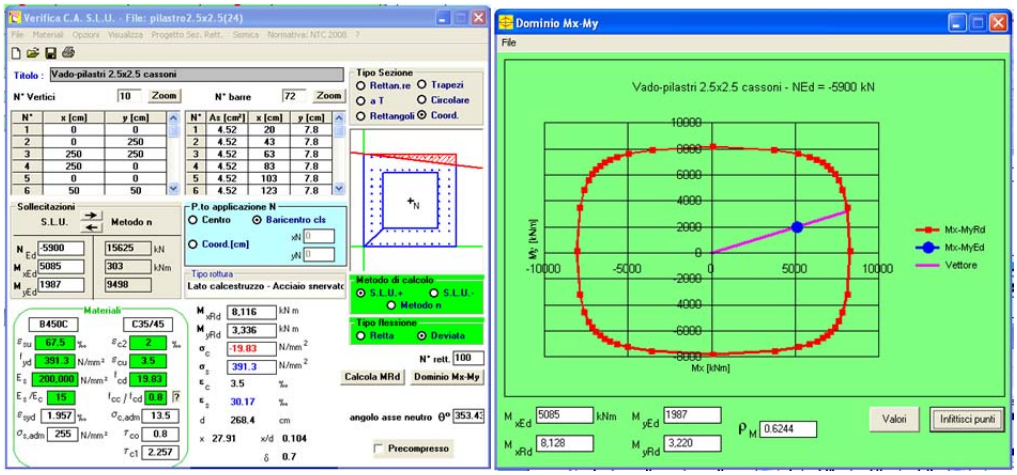


FIG. 4.630 - B7-B8(Q.-13) - PILASTRI 2.5X2.5M - PARTE BASSA - VERIFICA A PRESSOFLESSIONE DEVIATA -PMIN(TRAZIONE)

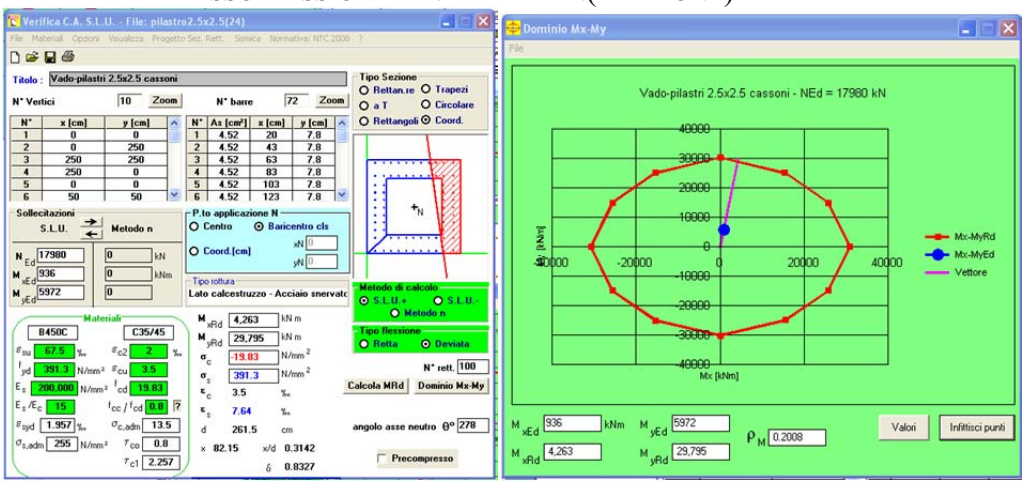


FIG. 4.631 - B7-B8(Q.-13) - PILASTRI 2.5X2.5M - PARTE BASSA - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MAX} (COMPRESSIONE)

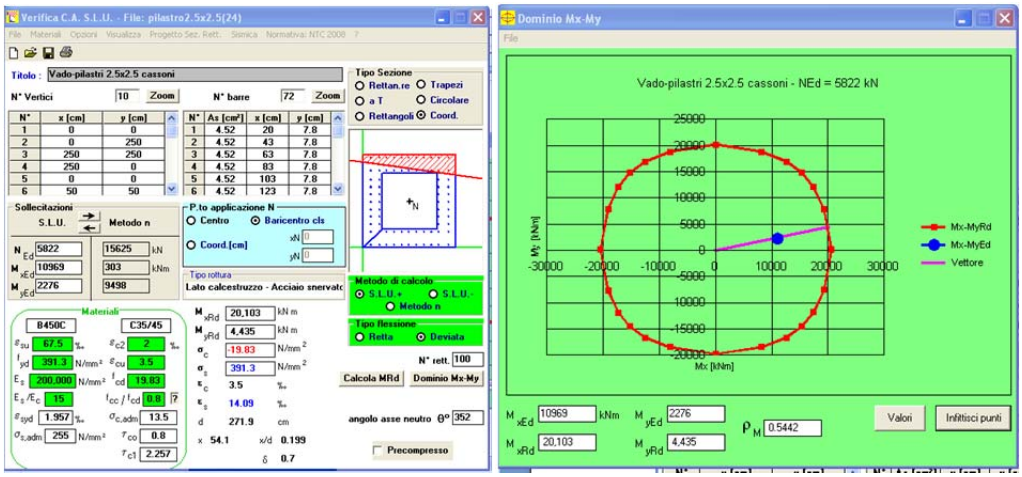


FIG. 4.632 - B7-B8(Q.-13) - PILASTRI 2.5X2.5M - PARTE BASSA - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M2

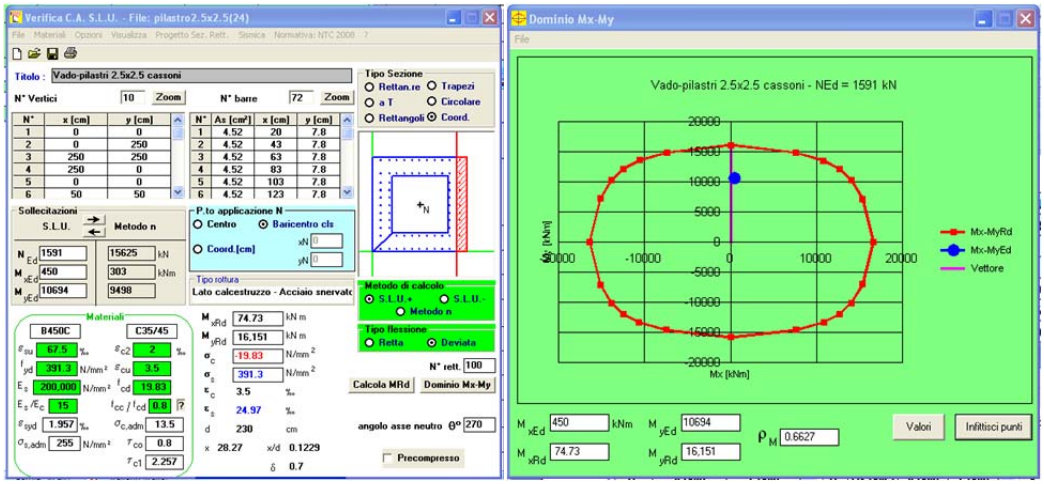


FIG. 4.633 - B7-B8(Q.-13) - PILASTRI 2.5X2.5M - PARTE BASSA - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M3

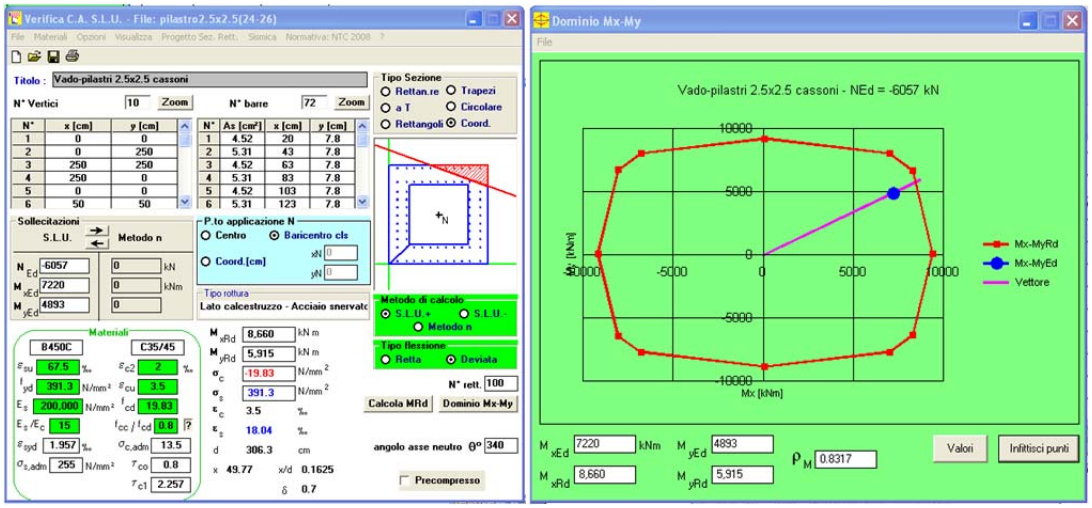


FIG. 4.634 - B7-B8(Q.-13) - PILASTRI 2.5X2.5M - PARTE ALTA - VERIFICA A PRESSOFLESSIONE DEVIATA -P_{MIN}(TRAZIONE)

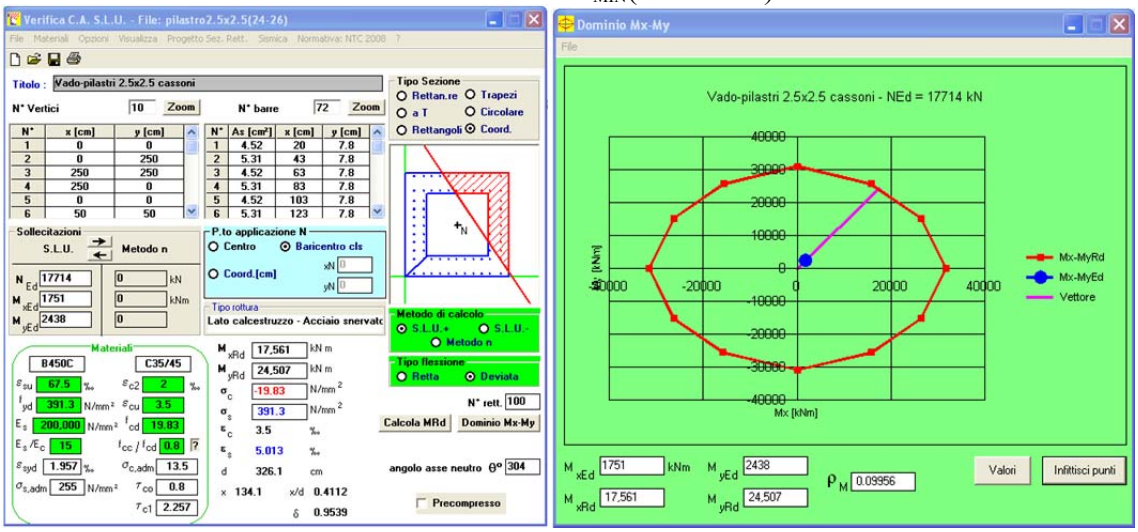


FIG. 4.635 - B7-B8(Q.-13) - PILASTRI 2.5X2.5M - PARTE ALTA - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MAX} (COMPRESSIONE)

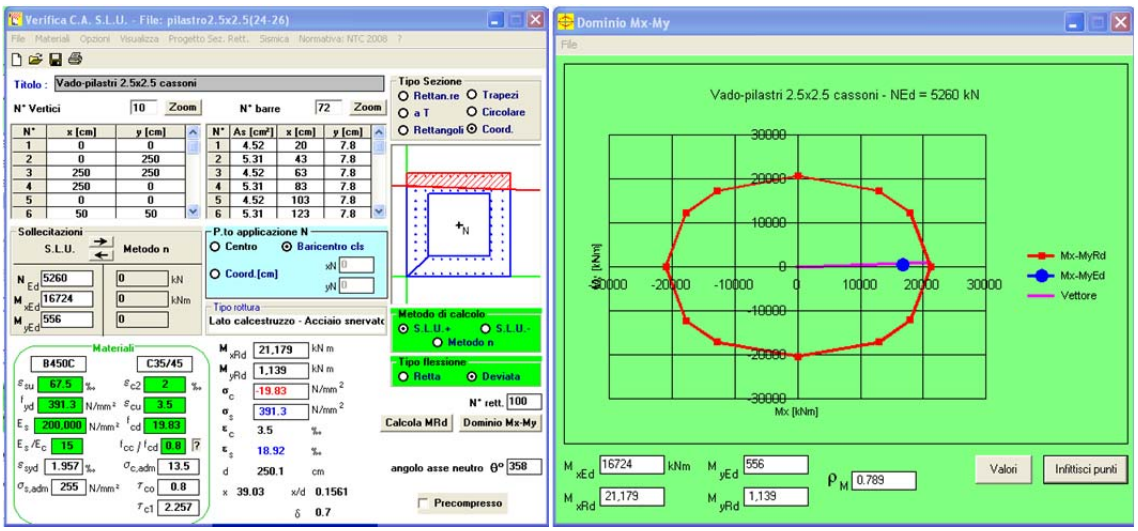


FIG. 4.636 - B7-B8(Q.-13) - PILASTRI 2.5X2.5M - PARTE ALTA - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M2

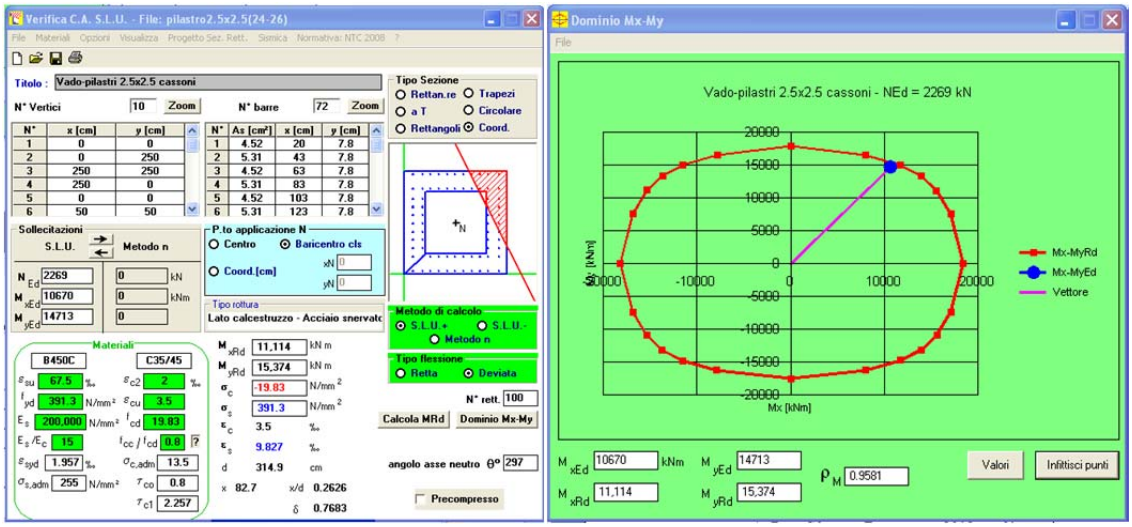


FIG. 4.637 - B7-B8(Q.-13) - PILASTRI 2.5X2.5M - PARTE ALTA - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M3

Pilastri da 2.5x2.5m - Taglio

Si prevedono ferri orizzontali θ18/250 n°4 braccia come orditura a taglio

	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	**Vres [kN]**
Taglio appoggio setto	250	1016	2	0	1.00	2,180.7	391.0	1	0.5	6930	8927	**6930**

Pilastri da 0.5x2.5m - SLU:

Pilastri 0.5x2.5 - SLU				
PARTE BASSA - TORRE / CASSONE (-4.10/0.00)				
P	**V2**	**V3**	**M2(min)**	**M3**
KN	KN	KN	KN-m	KN-m
-7510	-590	334	247	-386
807	-475	-35	-264	1215
-3565	**-858**	351	299	-451
-1256	-167	**374**	372	-127
-1256	-167	374	**372**	-127
-3000	-726	-26	-270	**2475**
PARTE ALTA - TORRE / TRAVE (0.00/1.67)				
P	**V2**	**V3**	**M2(min)**	**M3**
KN	KN	KN	KN-m	KN-m
-7427	-513	-50	-258	1571
856	-441	-208	-70	1948
-3481	**-781**	-32	-267	2458
-3385	-406	**-243**	6	2144
-1292	-120	-15	**-276**	312
-3418	-747	-205	-78	**3680**

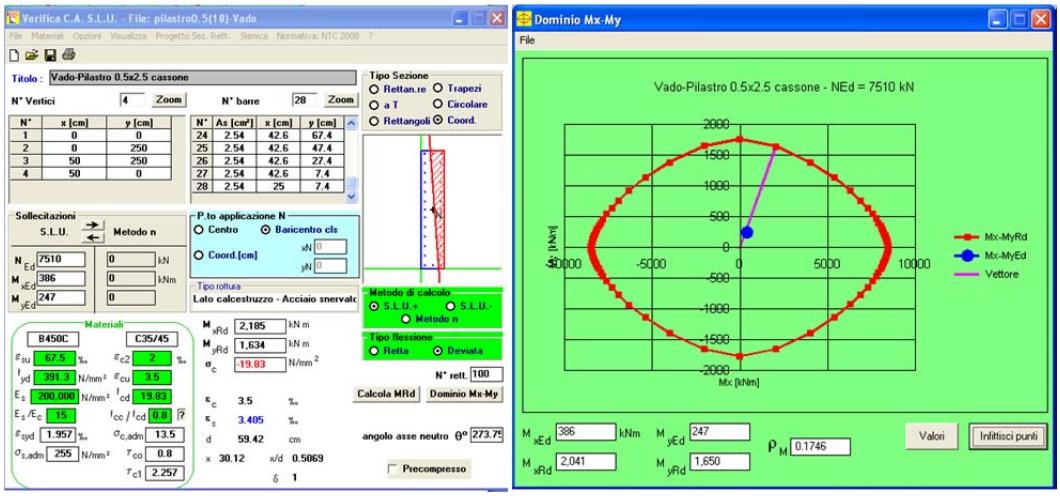


FIG. 4.638 - B7-B8(Q.-13) - PILASTRI 0.5X2.5M - PARTE BASSA - VERIFICA A PRESSOFLESSIONE DEVIATA -P_{MAX}(COMPRESSIONE)

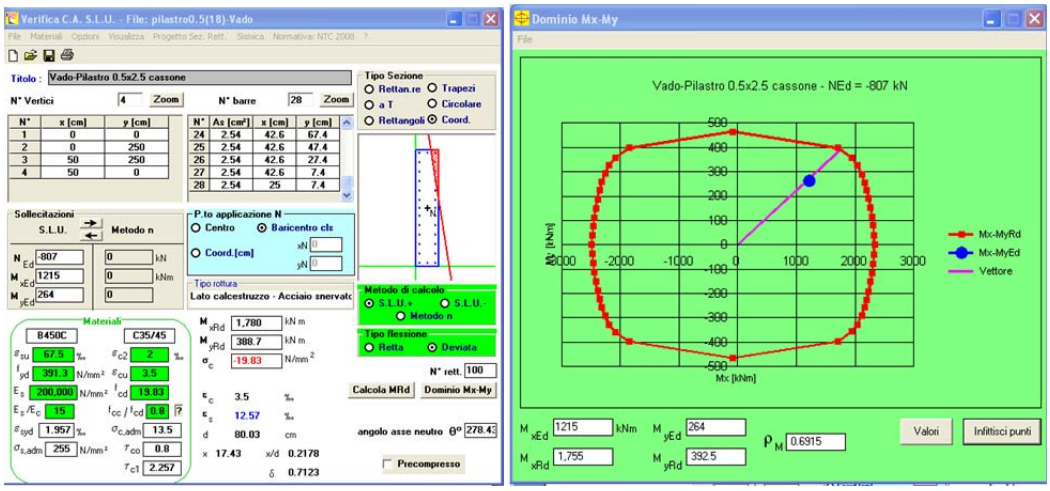


FIG. 4.639 - B7-B8(Q.-13) - PILASTRI 0.5X2.5M - PARTE BASSA - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MIN}

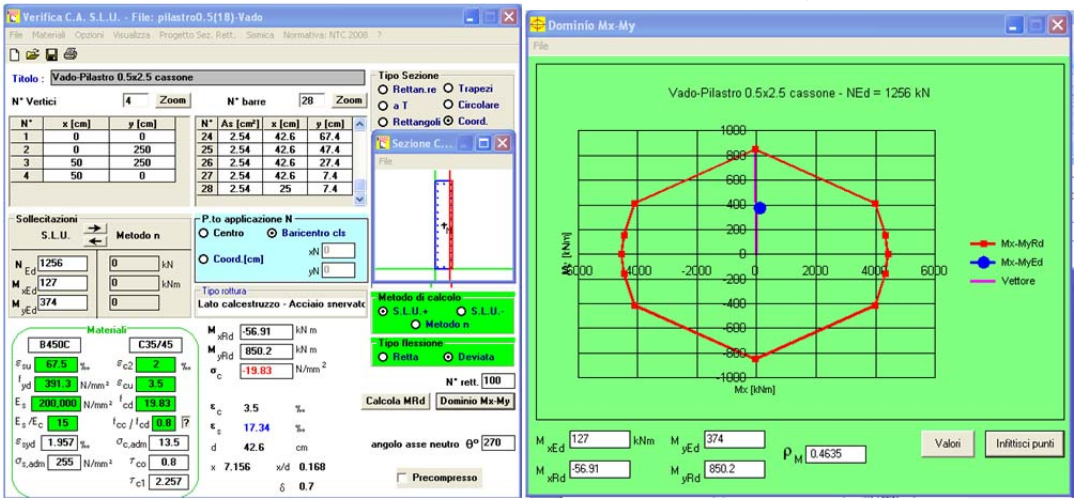


FIG. 4.640 - B7-B8(Q.-13) - PILASTRI 0.5X2.5M - PARTE BASSA - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M2

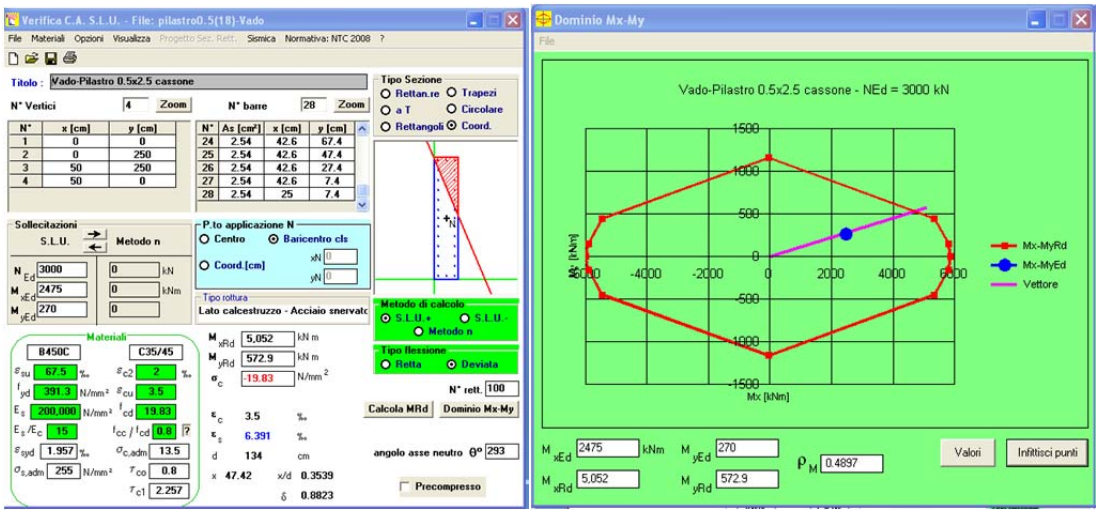


FIG. 4.641 - B7-B8(Q.-13) - PILASTRI 0.5X2.5M - PARTE BASSA - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M3

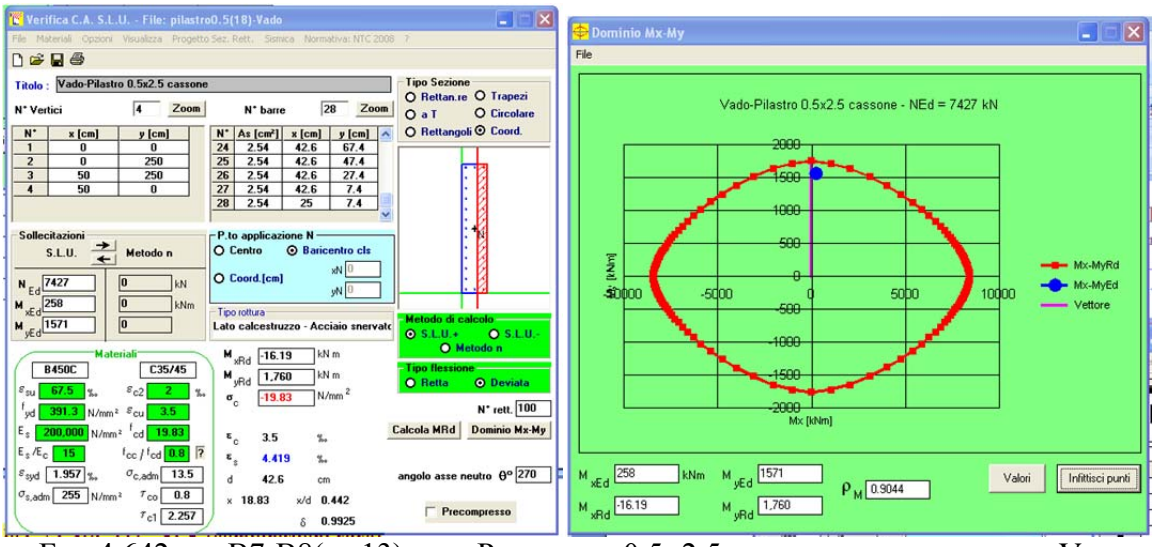


FIG. 4.642 - B7-B8(Q.-13) - PILASTRI 0.5X2.5M - PARTE ALTA - VERIFICA A PRESSOFLESSIONE DEVIATA -P_{MAX}(COMPRESSIONE)

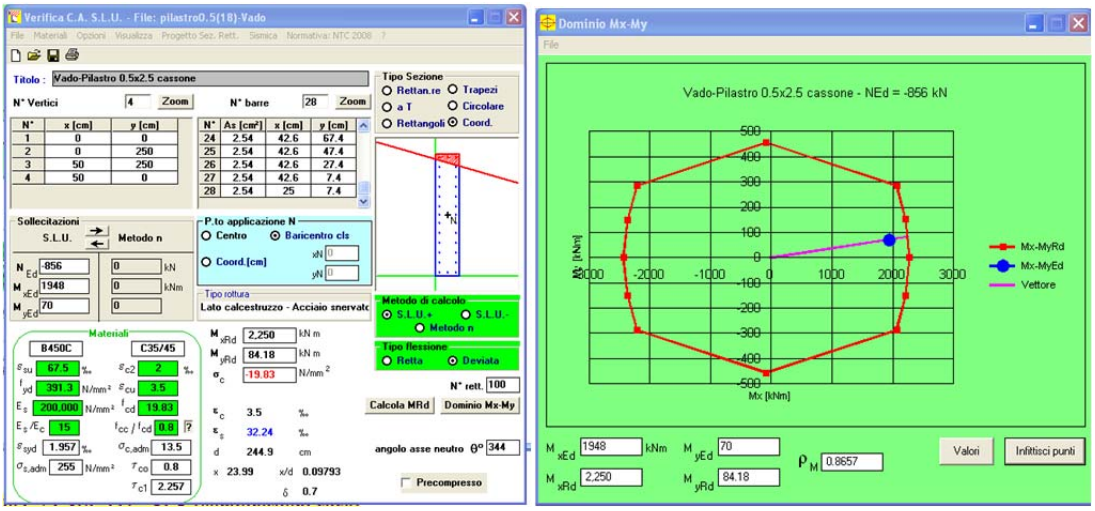


FIG. 4.643 - B7-B8(Q.-13) - PILASTRI 0.5X2.5M - PARTE ALTA - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MIN}

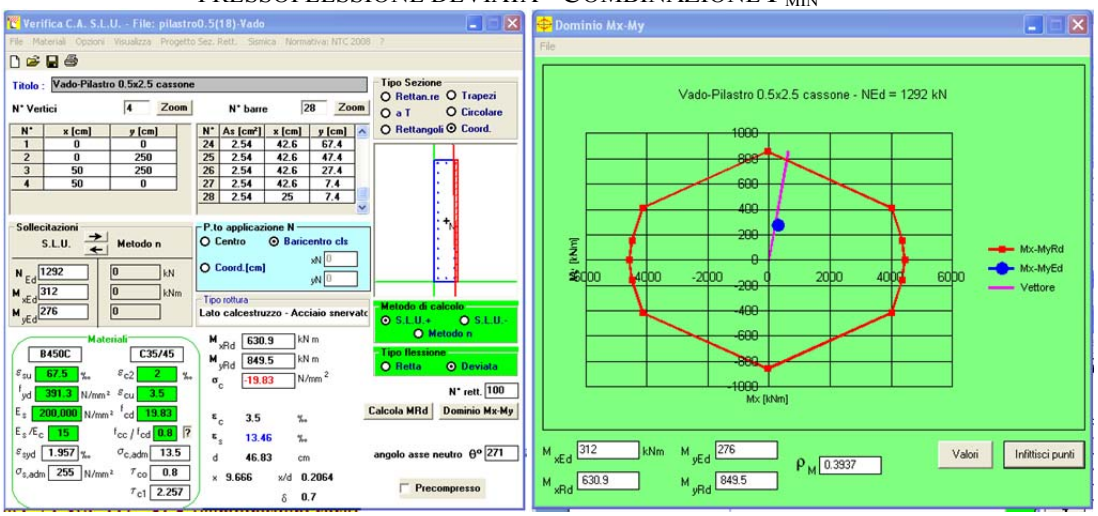


FIG. 4.644 - B7-B8(Q.-13) - PILASTRI 0.5X2.5M - PARTE ALTA - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M2

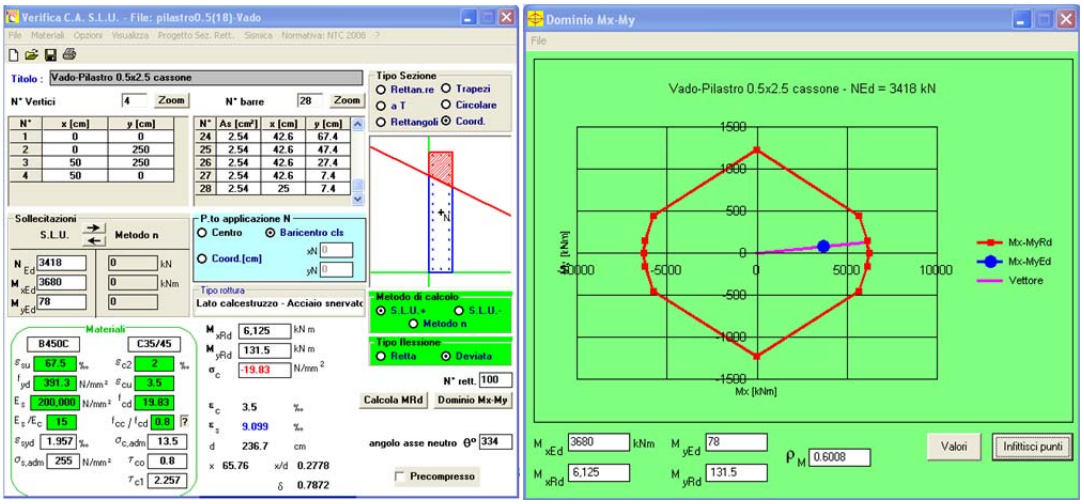


FIG. 4.645 - B7-B8(Q.-13) - PILASTRI 0.5X2.5M - PARTE ALTA - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M3

Pilastri da 0.5x2.5m - taglio:

Si si prede un staffatura orizzontale composta da θ12/250 due braccia con una resistenza a taglio pari a (per taglio V2), e quattro braccia per il taglio V3:

	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	Vres [kN]
Taglio V3	250	448	2	0	1.00	381.6	391.0	1	0.516	535	1,562	**535**
	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	Vres [kN]
Taglio V2	250	224	2	0	1.00	2,185.2	391.0	1	0.516	1,531	8,945	**1,531**

4.5.2 Pilastri cassoni modulo B7-B8(-13.00) - SLU (azioni sismiche)

Di seguito si riporta una Tab. riepilogativa con le combinazioni più gravose per quanto riguarda gli stati limiti ultimi per le combinazioni sismiche.

Il momento M2 agisce intorno all'asse perpendicolare alle travi dell'impalcato mentre il momento M3 agisce intorno all'asse parallelo all'asse delle travi dell'impalcato.

Si esegue la verifica sia all'incastro con il cassone sia in sommità del pilastro in corrispondenza della trave prefabbricata dell'impalcato.

Pilastri da 2.5x2.5m - pressoflessione agli SLU:

Pilastri 2.5x2.5 - SLU sisma				
PARTE BASSA - TORRE / CASSONE (-4.10/0.00)				
P	**V2**	**V3**	**M2**	**M3**
KN	KN	KN	KN-m	KN-m
-14599	-242	-3132	-5049	-1245
2099	83	3473	4881	1448
-7889	**3051**	601	1182	-1277
-10058	-464	**-3678**	-941	30
-11596	-794	-2575	**-9492**	2540
-8094	3051	601	1709	**6438**
PARTE ALTA - TORRE / TRAVE (0.00/+1.67)				
P	**V2**	**V3**	**M2**	**M3**
KN	KN	KN	KN-m	KN-m
-14599	-242	-3132	-5049	-1245
2252	71	3410	8738	1497
-7889	**3051**	601	1182	-1277
-10058	-464	**-3678**	-941	30
-11597	-164	-2238	**-14961**	-340
-6903	-888	-877	-4623	**-8592**

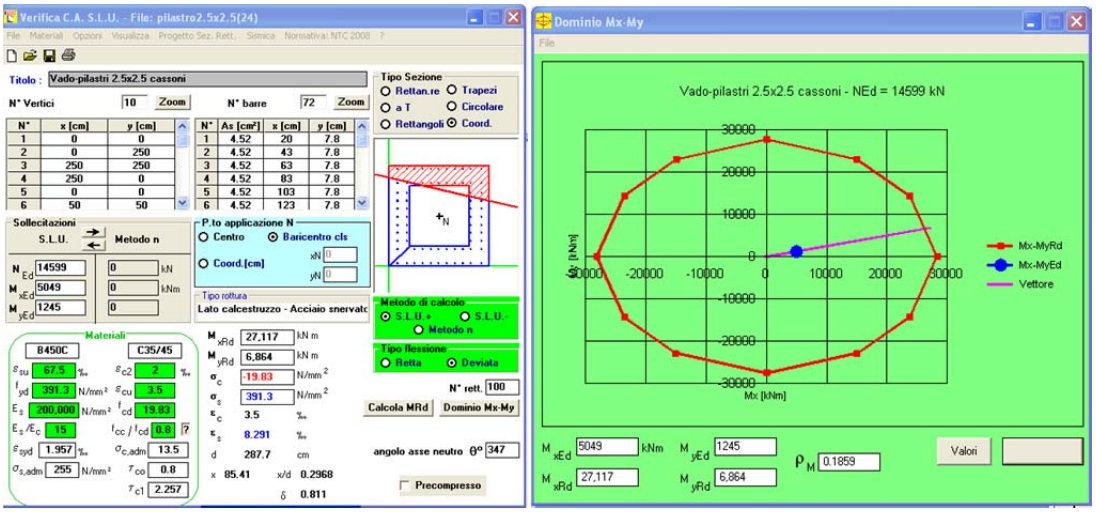


FIG. 4.646 - B7-B8(Q.-13) - PARTE BASSA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MAX}(COMPRESSIONE)

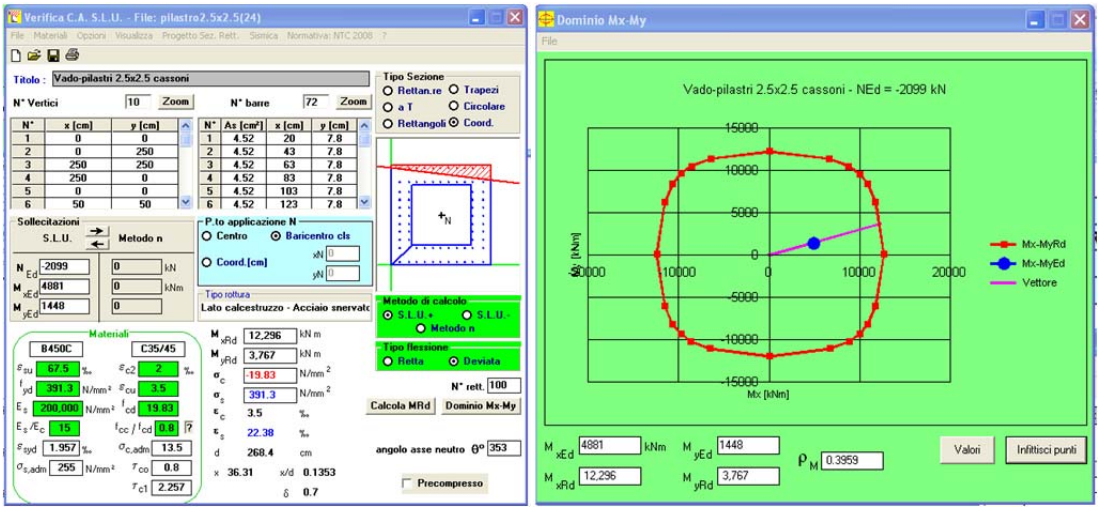


FIG. 4.647 - B7-B8(Q.-13) - PARTE BASSA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MIN}

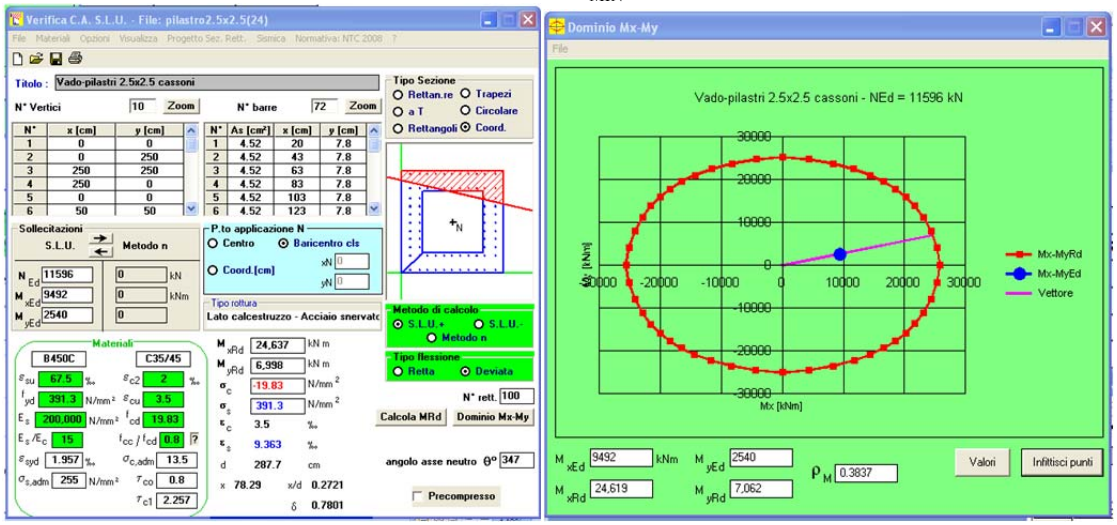


FIG. 4.648 - B7-B8(Q.-13) - PARTE BASSA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - M2

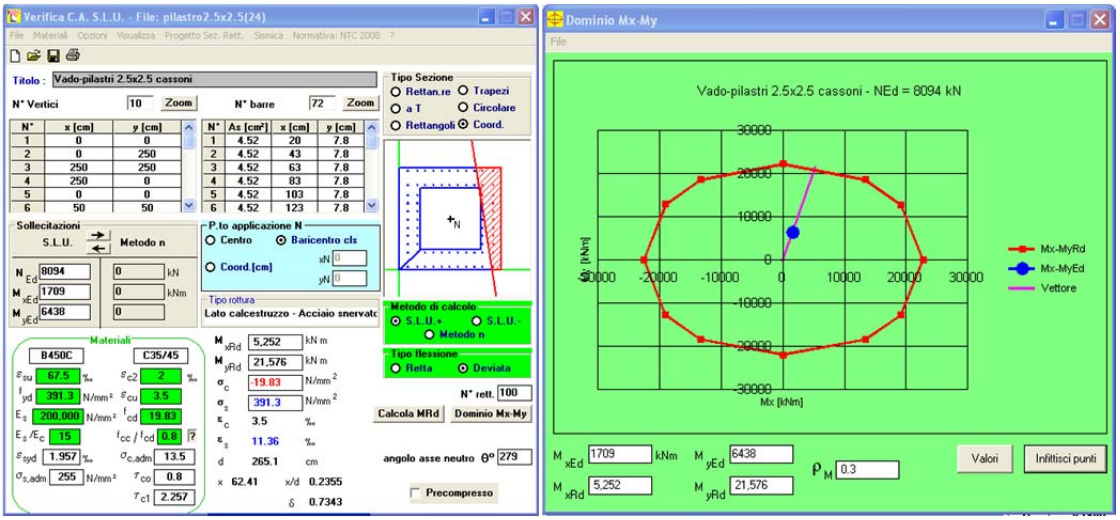


FIG. 4.649 - B7-B8(Q.-13) - PARTE BASSA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - M3

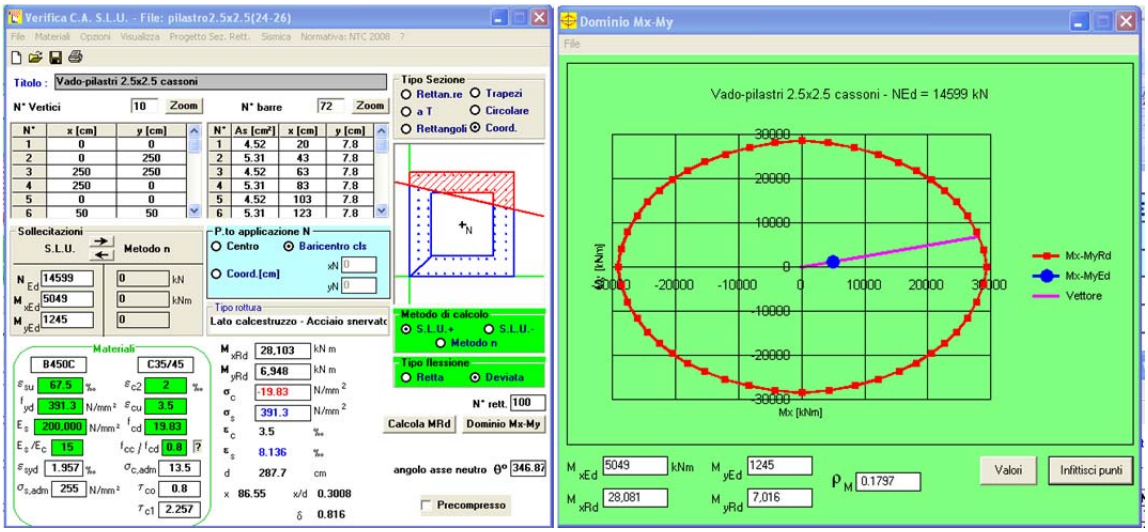


FIG. 4.650 - B7-B8(Q.-13) - PARTE ALTA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MAX}(COMPRESSIONE)

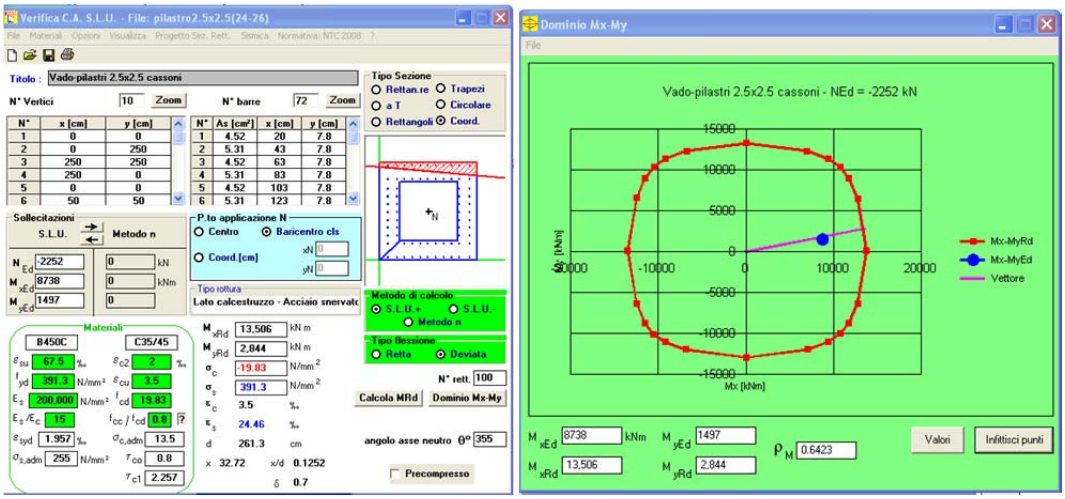


FIG. 4.651 - B7-B8(Q.-13) - PARTE ALTA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MIN}

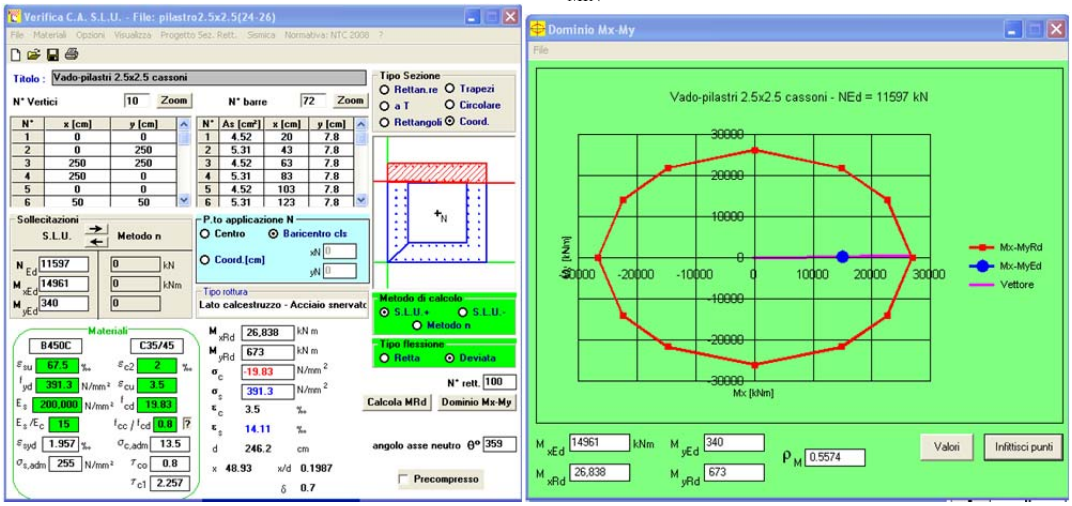


FIG. 4.652 - B7-B8(Q.-13) - PARTE ALTA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - M2

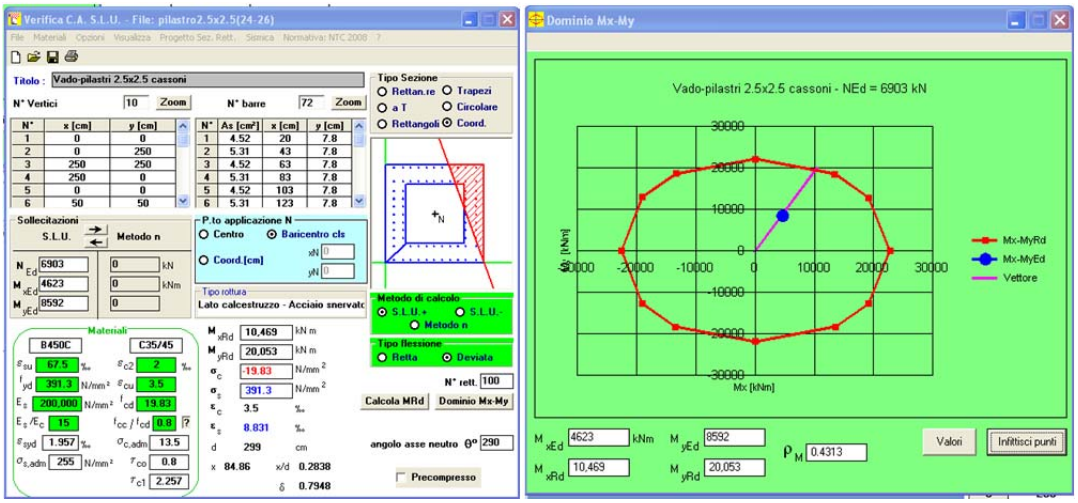


FIG. 4.653 - B7-B8(Q.-13) - PARTE ALTA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - M3

Pilastri da 2.5x2.5m - Verifica a taglio

Si prevedono ferri orizzontali θ18/250 n°4 braccia come orditura a taglio

	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	**Vres [kN]**
Taglio appoggio setto	250	1016	2	0	1.00	2,180.7	391.0	1	0.5	6930	8927	**6930**

Pilastri da 0.5x2.5m - Pressoflessione agli SLU sisma:

Pilastri 0.5x2.5 - SLU sisma				
PARTE BASSA - TORRE / CASSONE (-4.10/0.00)				
P	**V2**	**V3**	**M2(min)**	**M3**
KN	KN	KN	KN-m	KN-m
-295	92	26	30	-144
-4461	-146	-42	-112	-63
-1332	**513**	4	8	270
-4397	-146	**-42**	-22	-206
-4461	-146	-42	**-112**	-63
-2174	-117	-13	-7	**-1553**
PARTE ALTA - TORRE / TRAVE (0.00/+1.67)				
P	**V2**	**V3**	**M2(min)**	**M3**
KN	KN	KN	KN-m	KN-m
-248	88	8	43	-206
-4398	-142	-24	-22	-206
-1217	**501**	-1	24	363
-4348	-142	**-24**	-14	-345
-3139	87	-5	**74**	684
-2126	-105	-8	-4	**-2354**

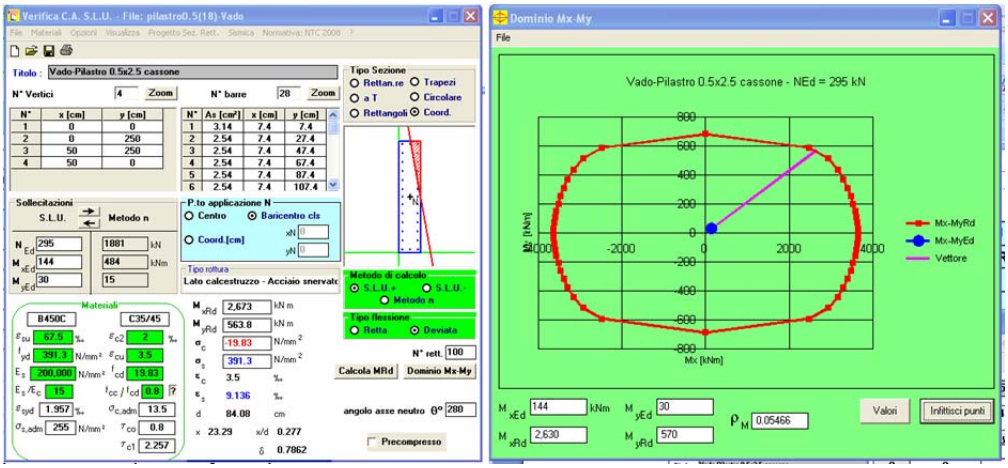


FIG. 4.654 - B7-B8(Q.-13) - PARTE BASSA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MIN}

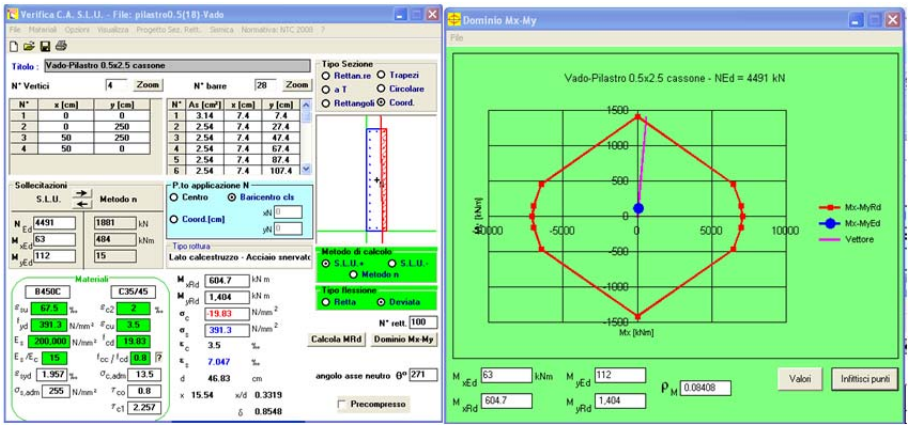


FIG. 4.655 - B7-B8(Q.-13) - PARTE BASSA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - M2/P_{MAX}

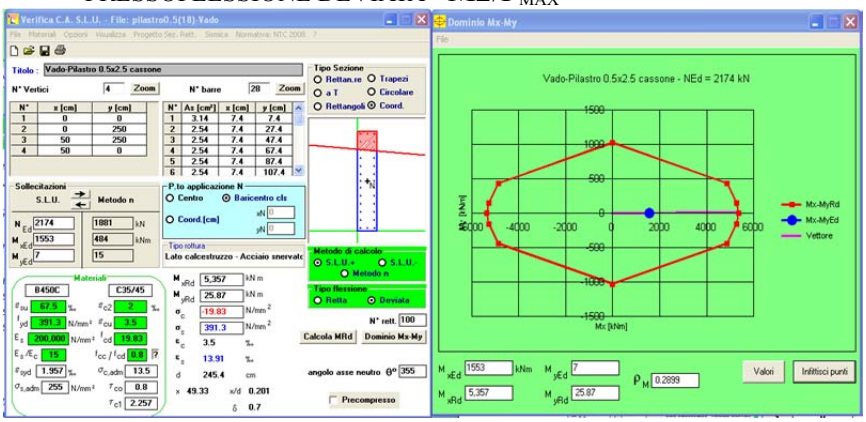


FIG. 4.656 - B7-B8(Q.-13) - PARTE BASSA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - M3

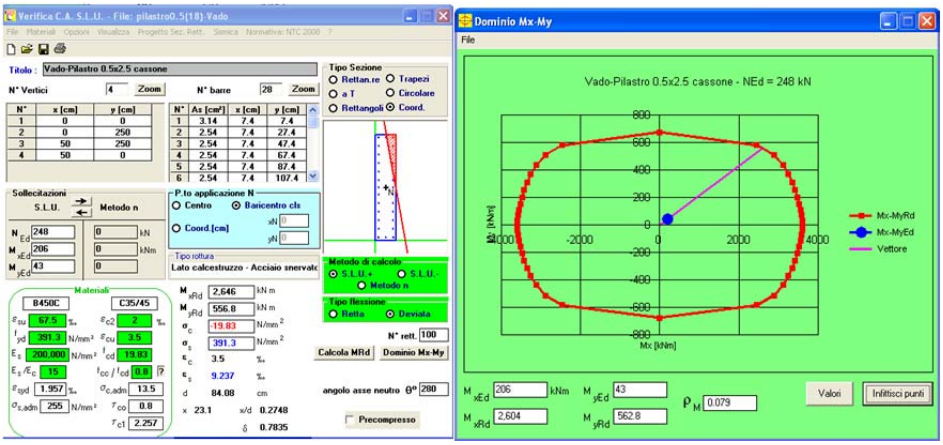


FIG. 4.657 - B7-B8(Q.-13) - PARTE ALTA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MIN}

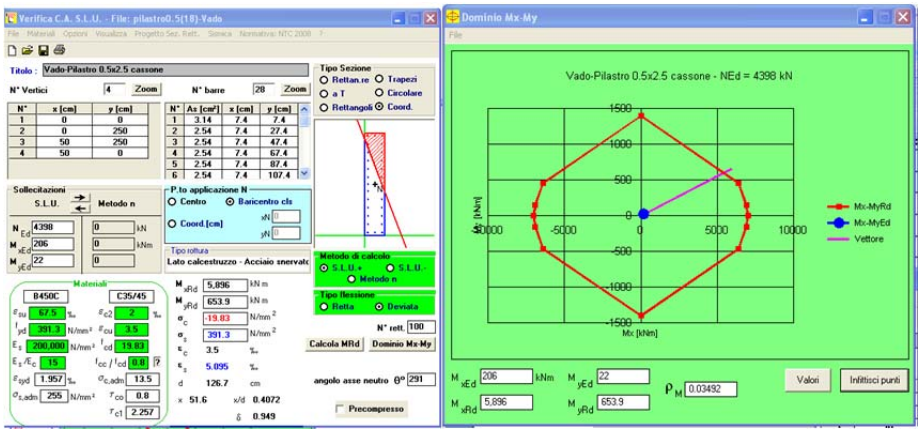


FIG. 4.658 - B7-B8(Q.-13) - PARTE ALTA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MAX}

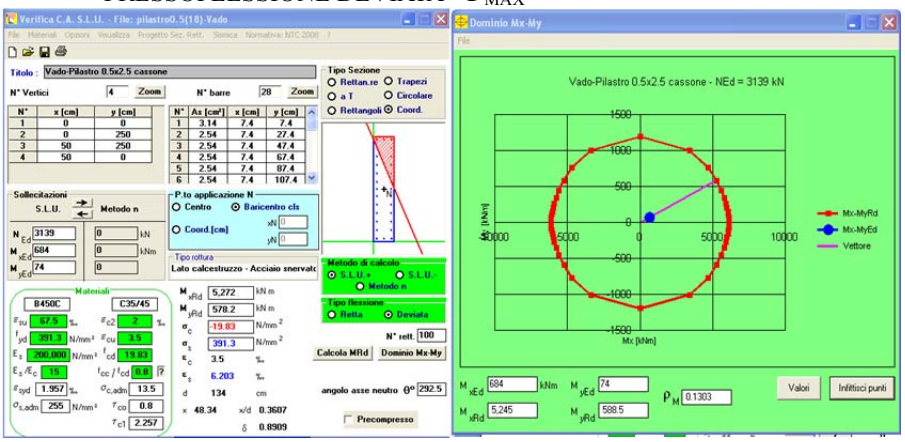


FIG. 4.659 - B7-B8(Q.-13) - PARTE ALTA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - M2

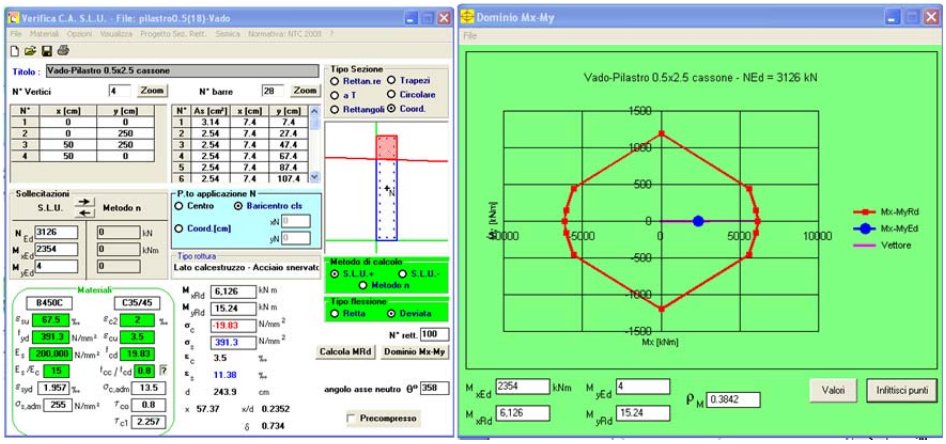


FIG. 4.660 - B7-B8(Q.-13) - PARTE ALTA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - M3

Pilastri da 0.5x2.5m - Verifica a taglio

Si prevede una staffatura orizzontale composta da θ12/250 due braccia con un resistenza al taglio pari a (per taglio V2), e quattro braccia per il taglio V3:

	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	Vres [kN]
Taglio V3	250	448	2	0	1.00	381.6	391.0	1	0.516	535	1,562	**535**
	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	Vres [kN]
Taglio V2	250	224	2	0	1.00	2,185.2	391.0	1	0.516	1,531	8,945	**1,531**

4.5.3 Pilastri cassoni modulo B7-B8(q.-13) - SLE (combinazioni freq.)

Pilastri 2.5x2.5 - SLE(freq)		
PTE BASSA - TORRE / CASSONE (-4.10/0.00)		
P	M2	M3
KN	KN-m	KN-m
-1304	441	122
-10636	-1675	39
-4904	**-4434**	-194
-8488	1681	**3767**
PTE ALTA - TORRE / TRAVE (0.00/1.67)		
P	M2	M3
KN	KN-m	KN-m
-1147	594	771
-10636	-1675	39
-4542	**6408**	-55
-3580	-1284	**4106**

Pilastri 0.5x2.5 - SLE (freq.)		
P	M2(min)	M3
KN	KN-m	KN-m
- **3,940**	- 10	- 17
- **528**	- 3	- 52
- 1,945	- **67**	98
- 3,130	18	**1,317**

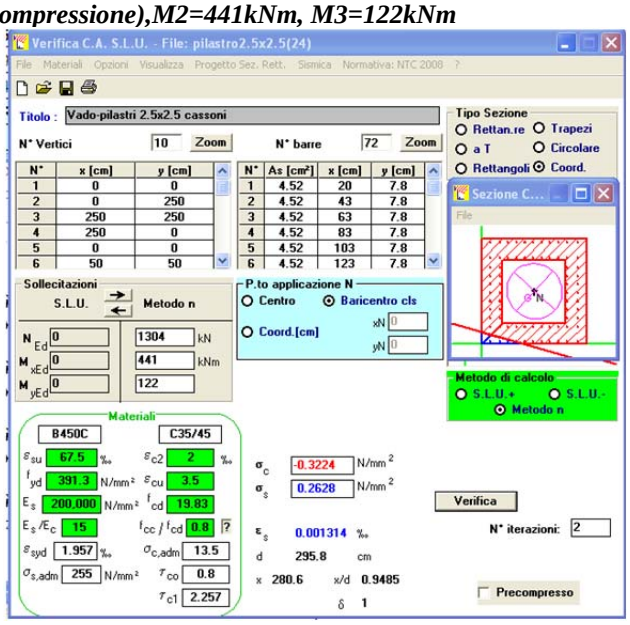
FIG.4.661 - PILASTRI SOLLECITAZIONI AGLI SLE(FREQUENTI)

Essendo l'orditura dei pilastri 0.5x2.5 uniforme si riporta soltanto l'inviluppo delle sollecitazioni per la verifica alla fessurazione alle combinazioni frequenti.

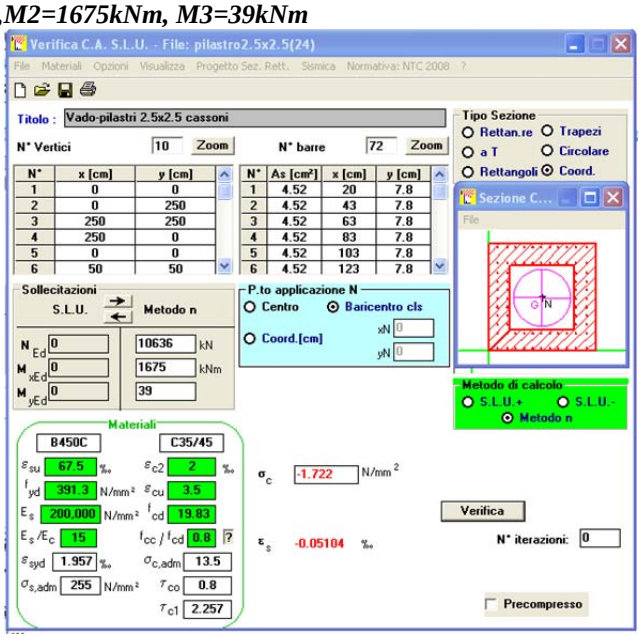
Pilastri da 2.5x2.5m - SLE(frequente):

Si esegue la verifica alla fessurazione alle combinazioni frequenti.

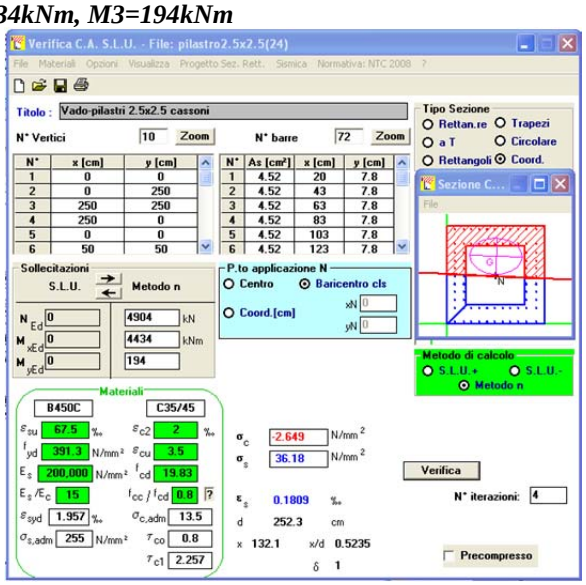
1) ***Parte Bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{max} P=-1304kN(compressione),M2=441kNm, M3=122kNm***



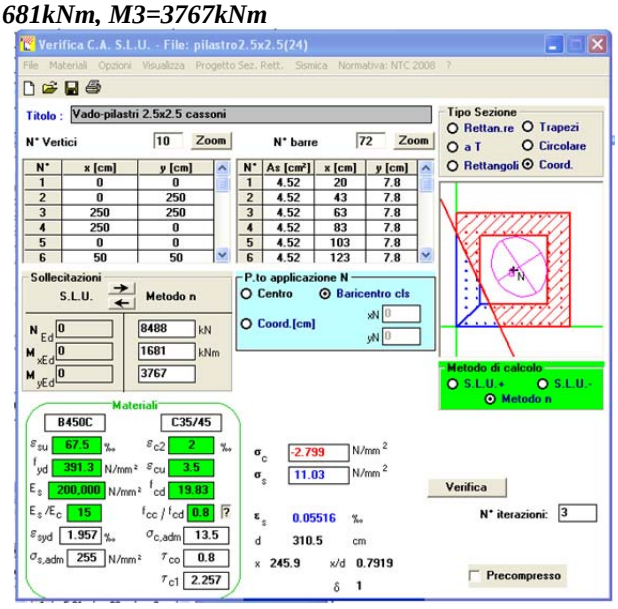
2) ***Parte Bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{min} P=-10636kN,M2=1675kNm, M3=39kNm***



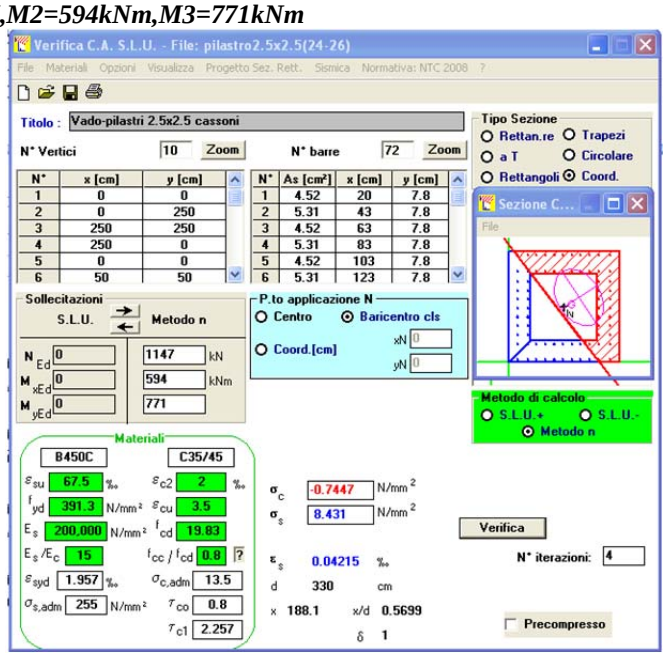
3) Parte Bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione M2 P=-4904kN,M2=4434kNm, M3=194kNm



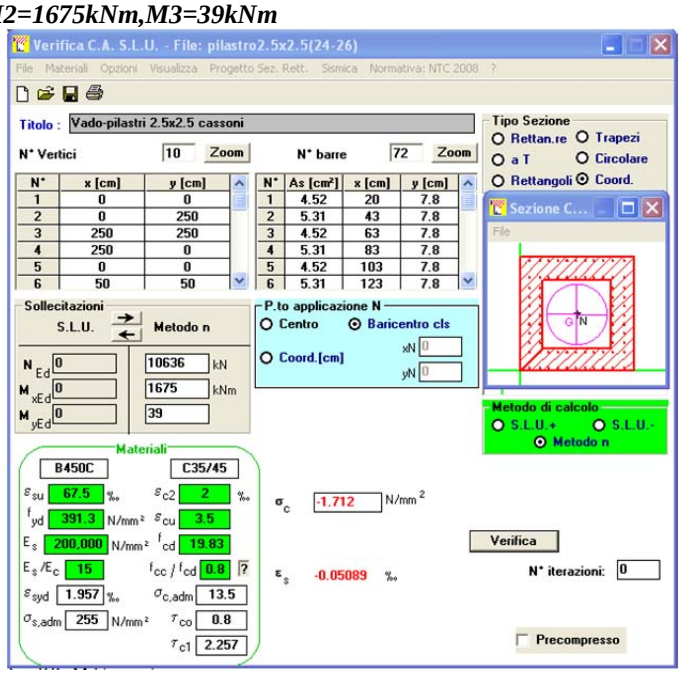
4) Parte Bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione M3 P=-8488kN,M2=1681kNm, M3=3767kNm



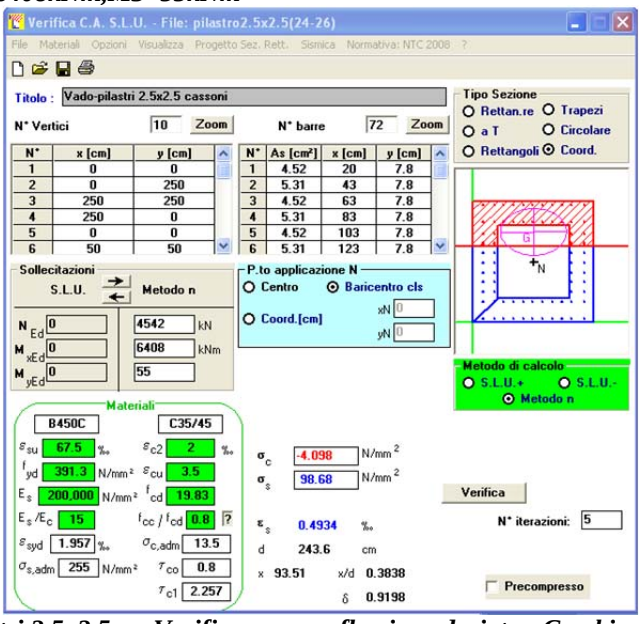
5) Parte Alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{max}
P=-1147kN,M2=594kNm,M3=771kNm



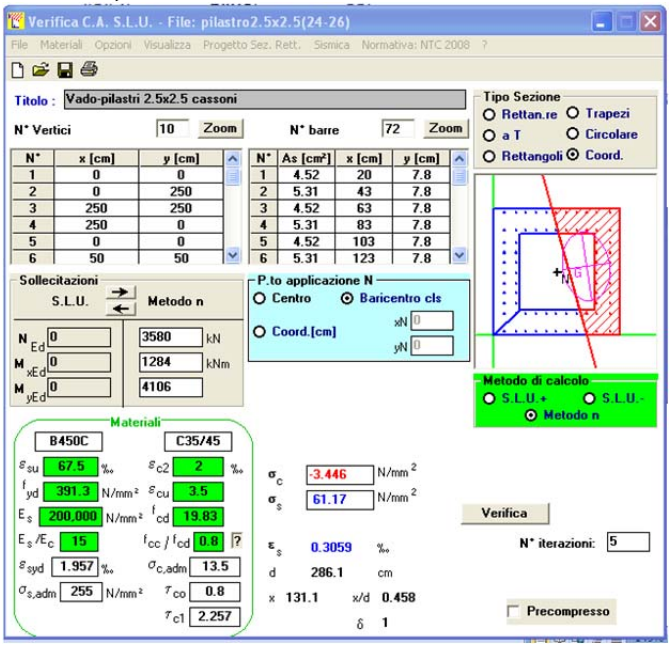
6) Parte Alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{min}
P=-10636kN,M2=1675kNm,M3=39kNm



7) Parte Alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione M2 P=-4542kN,M2=6408kNm,M3=55kNm



8) Parte Alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione M3 P=-3580kN,M2=1284kNm,M3=4106kNm



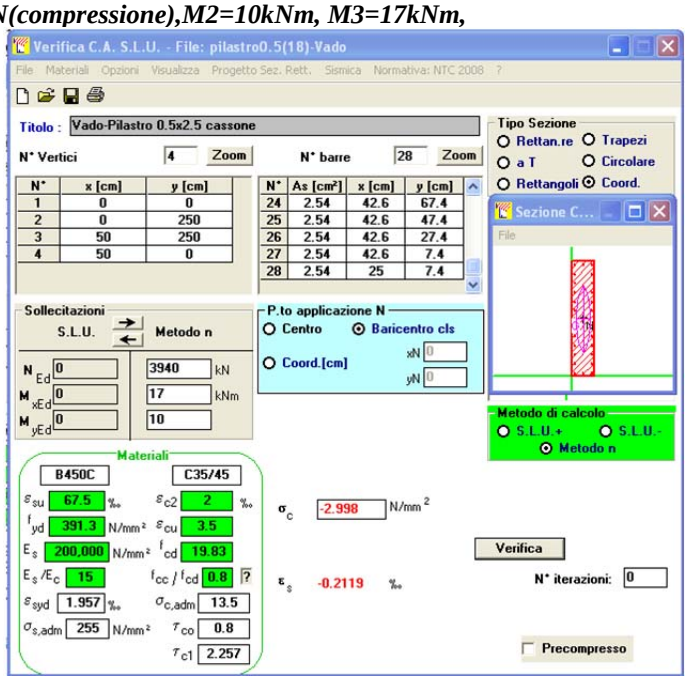
La massima tensione nelle barre è pari a 98.9N/mm^2.

Secondo quanto previsto dalla Tab. C4.1..II-III nella Circolare 02 febbraio 2009 n°617/CSLLPP contenente istruzioni all'applicazione del DM 14/1/2008 con barre del diametro fino a 25mm con passo di 200mm, la fessurazione di 0.2mm è soddisfatta senza calcolo diretto per valori della tensione nell'acciaio fino a 160MPa.

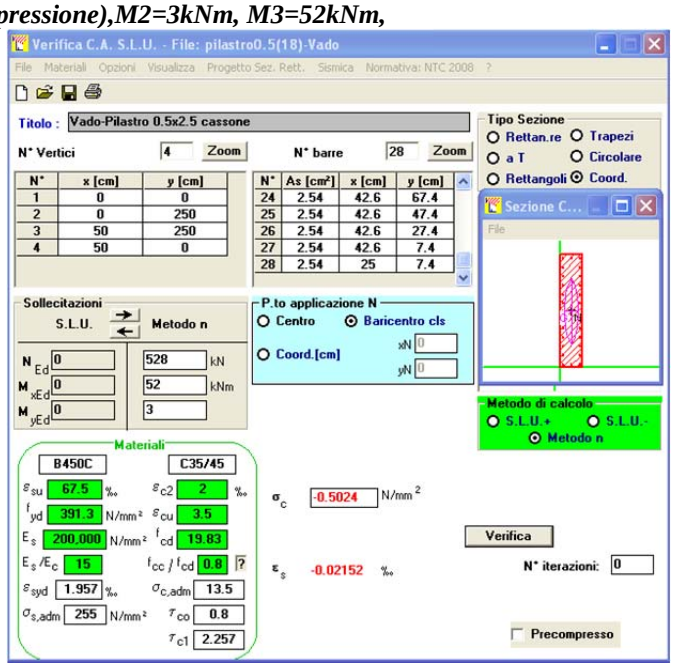
Considerando il basso tasso di lavoro del ferro molto inferiore ai 160MPa anche se presente il diametro 26mm, si considera la verifica soddisfatta.

Pilastri da 0.5x2.5m:

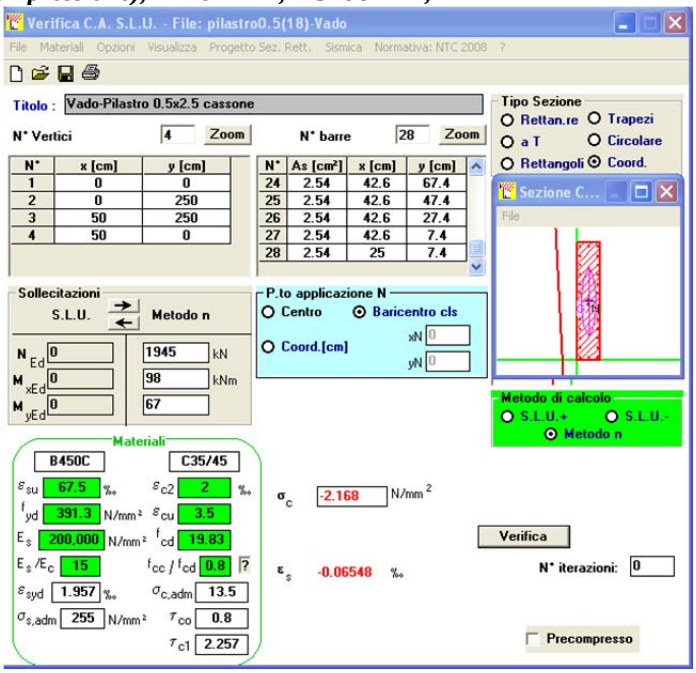
1) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{min}
P=-3940kN(compressione),M2=10kNm, M3=17kNm,



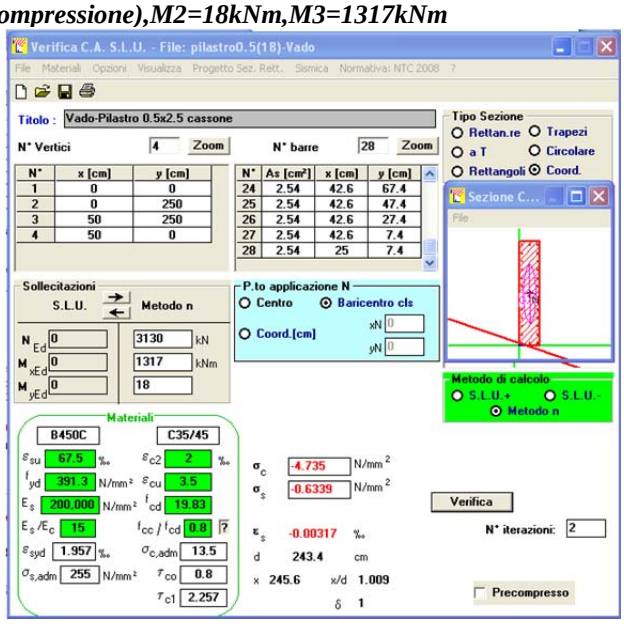
2) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{max}
P=-528kN(compressione),M2=3kNm, M3=52kNm,



3) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione M2
P=-1945kN(compressione),M2=67kNm, M3=98kNm,



4) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione M3 P=-3130kN(compressione),M2=18kNm,M3=1317kNm



I pilastri rettangolari 2.5x0.50m risultano tutti compressi con valori di compressione del calcestruzzo modesti. Essendo la sezione completamente compressa la fessurazione risulta zero.

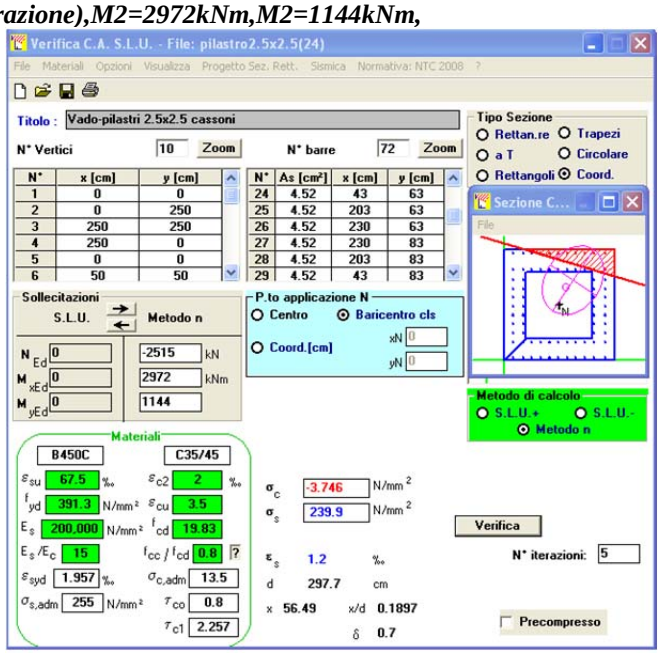
4.5.4 Pilastri cassoni modulo B7-B8(q.-13) - SLE (combinazioni rare)

Pilastri 2.5x2.5 - SLE (rara)		
PARTE BASSA - TORRE / CASSONE (-4.10/0.00)		
P	**M2**	**M3**
KN	KN-m	KN-m
2,515	- 2,972	1,144
- **12,492**	578	- 3,925
- 6,489	- **10,557**	46
- 4,900	- 1,554	**8,741**
PARTE ALTA - TORRE / TRAVE (0.00/+1.67)		
P	**M2**	**M3**
KN	KN-m	KN-m
2,672	- 4,069	2,928
- **12,287**	- 1,397	1,832
- 4,421	- **10,800**	283
- 2,152	4,550	**9,553**

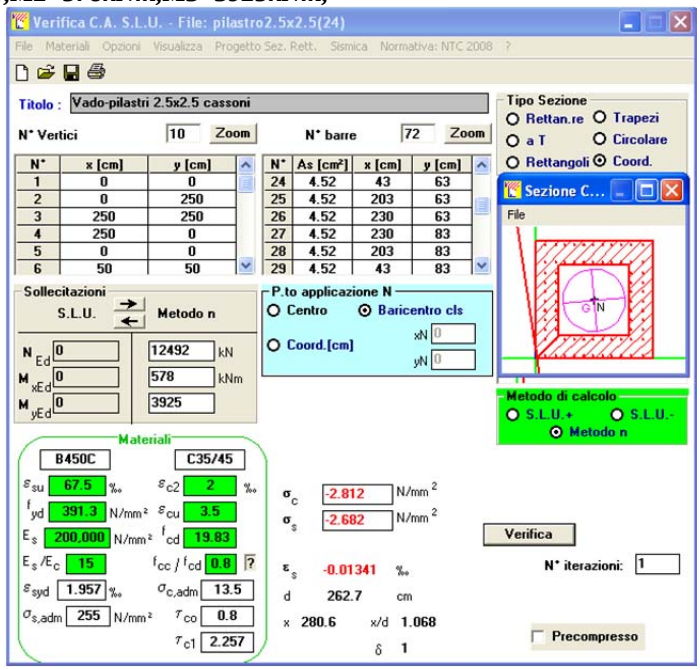
Pilastri 0.5x2.5 - SLE (rara)		
P	**M2(min)**	**M3**
KN	KN-m	KN-m
273	- 28	1,211
- **5,382**	109	- 239
- 4,200	- **360**	54
- 2,547	- 37	**2,390**

FIG. 4.662 - PILASTRI - SOLLECITAZIONI AGLI SLE(RARE)

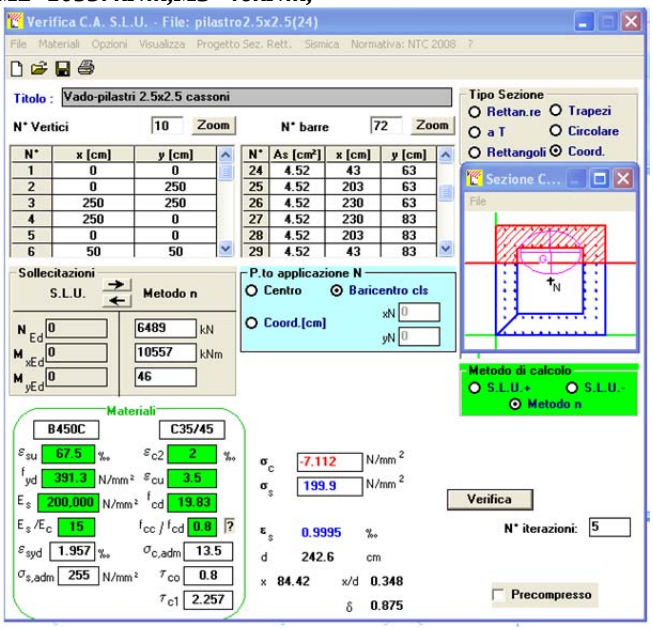
1) B7-B8(-13) - Parte bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - P_{min}
P=+2515kN(trazione),M2=2972kNm,M2=1144kNm,



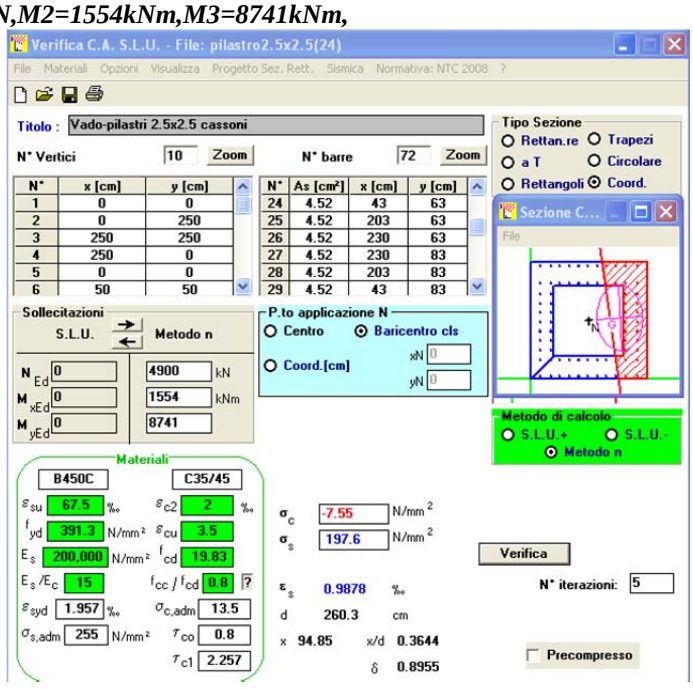
2) B7-B8(-13) - Parte bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - P_{max}
P=-12492kN,M2=578kNm,M3=3925kNm,



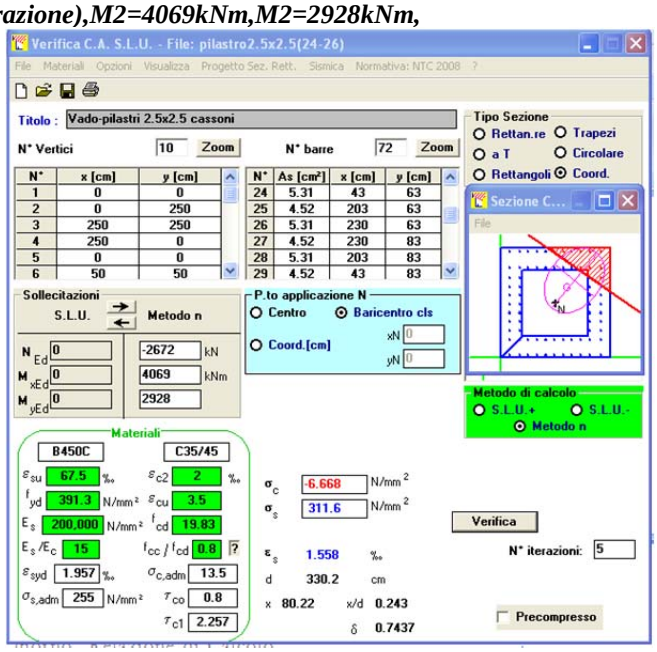
3) B7-B8(-13) - Parte bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - M2 P=-6489kN,M2=10557kNm,M3=46kNm,



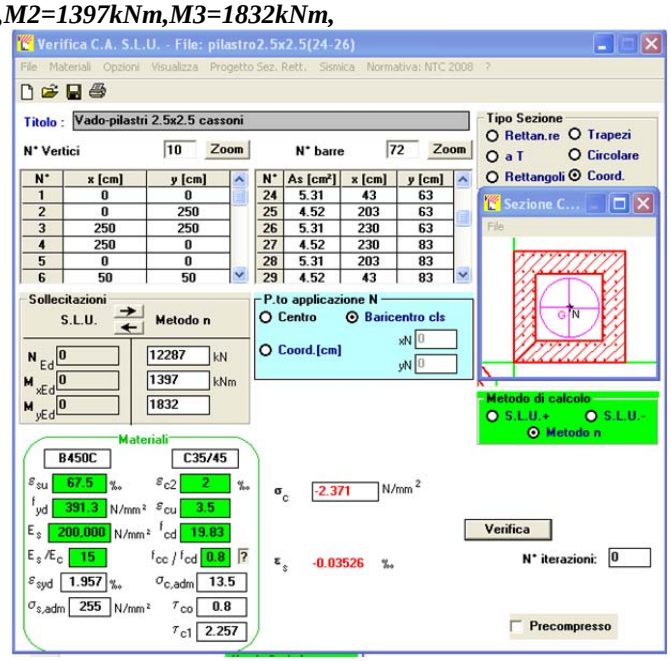
4) B7-B8(-13) - Parte bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - M3 P=-4900kN,M2=1554kNm,M3=8741kNm,



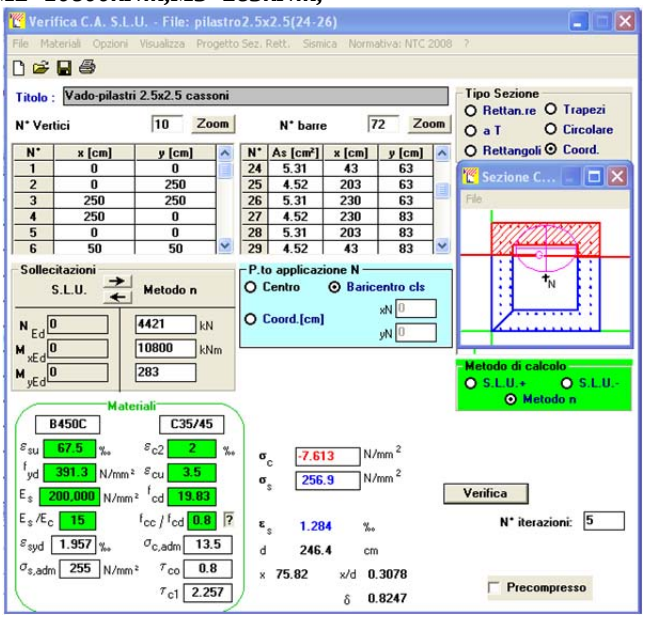
5) B7-B8(-13) - Parte alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - P_{min}
P=+2672kN(trazione),M2=4069kNm,M2=2928kNm,



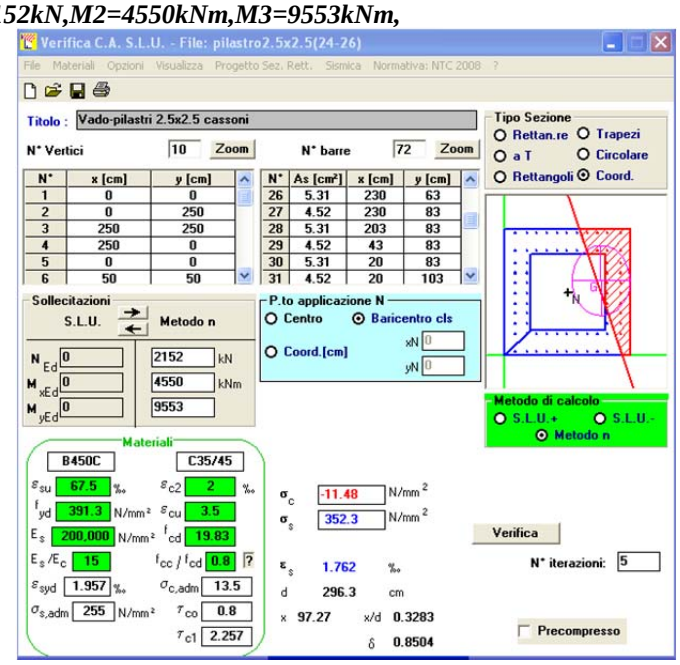
6) B7-B8(-13) - Parte alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - P_{max}
P=-12287kN,M2=1397kNm,M3=1832kNm,



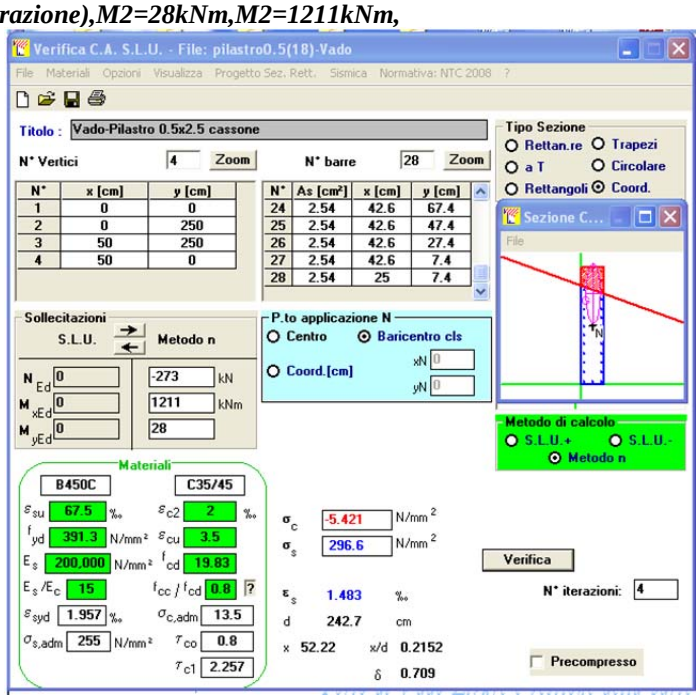
7) B7-B8(-13) - Parte alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - M2 P=-4421kN,M2=10800kNm,M3=283kNm,



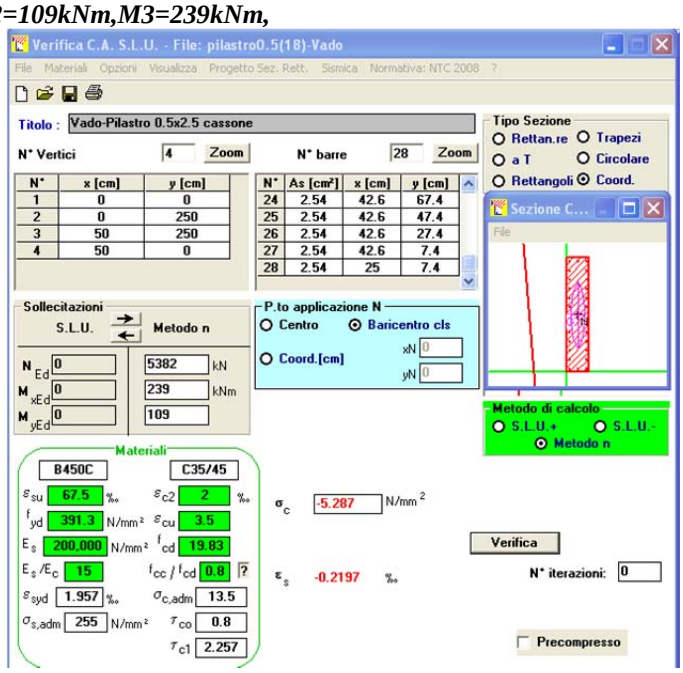
8) B7-B8(-13) - Parte alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - M3 P=-2152kN,M2=4550kNm,M3=9553kNm,



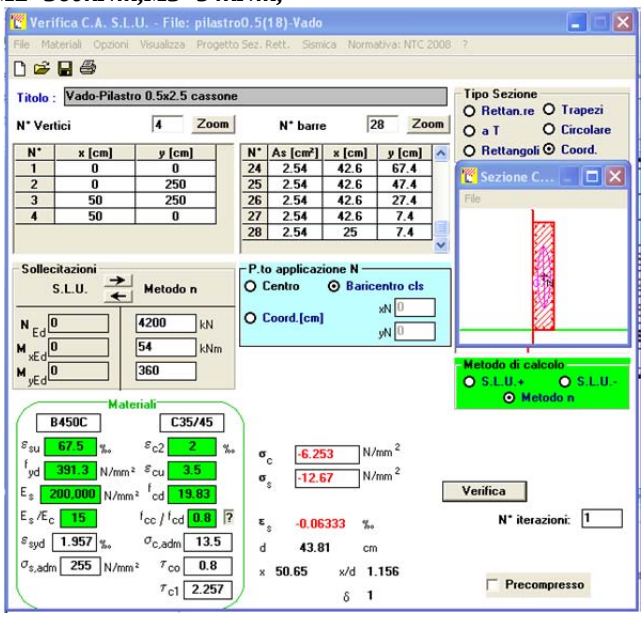
9) B7-B8(-13) - Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - P_{min}
P=+273kN(trazione),M2=28kNm,M2=1211kNm,



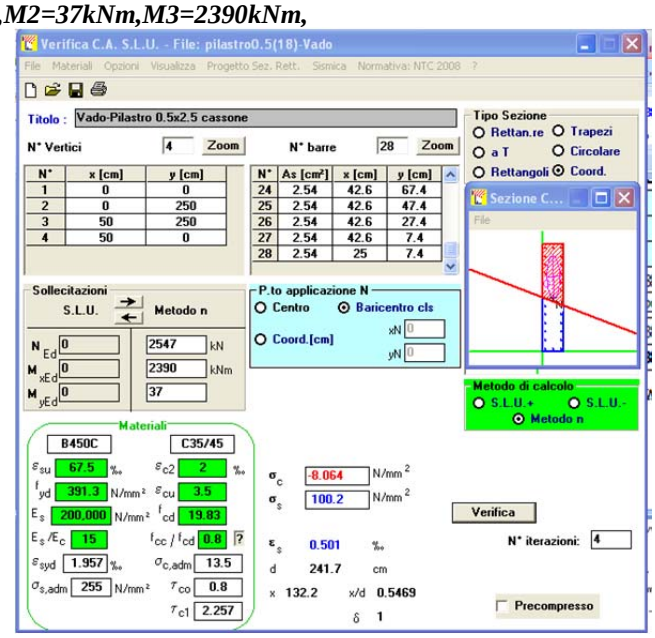
10) B7-B8(-13) - Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - P_{max}
P=-5382kN,M2=109kNm,M3=239kNm,



11) B7-B8(-13) - Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - M2 P=-4200kN,M2=360kNm,M3=54kNm,



12) B7-B8(-13) - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - M3 P=-2547kN,M2=37kNm,M3=2390kNm,



Le tensioni sia dell'acciaio sia del calcestruzzo sono entro i limiti di normativa.

4.5.5 Pilastri cassoni C7-C8 a q.ta-11.00

L'orditura minima dei pilastri secondo D.M. 14/1/2008 parag. 4.1.6.1.2

As,min= 0.10 NEd / fyd ≥ 0,003Ac

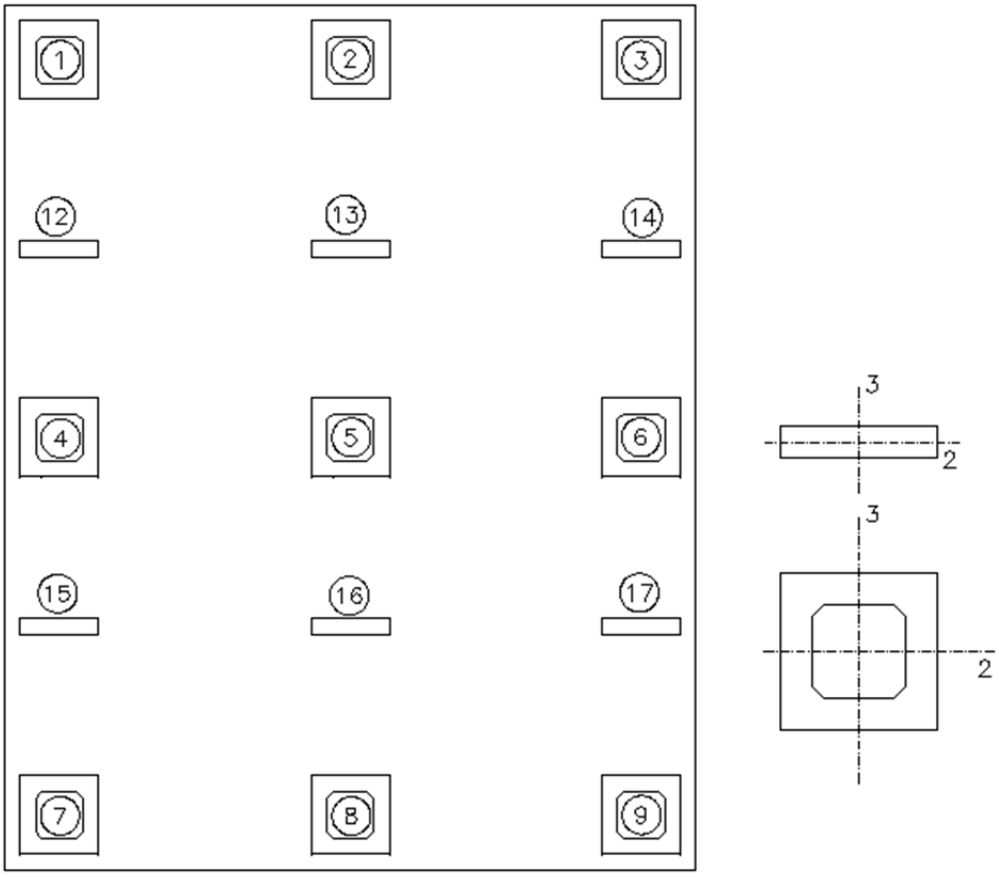


FIG. 4.663 - CASSONE - NUMERAZIONE PILASTRI - NUMERAZIONE ASSI E PILASTRI

Le sollecitazioni alle pilastri viene trasmessi dalle travi dentro le pareti delle pilastri che li trasferisce al cassone pieno sottostante.

L'orditura minima:

Pilastri da 2.5x2.5m

$A_{s,min}$= 0.10 N_{Ed} / f_{yd} = 0.10 x 29156x10^3 / 391 =7457 mm^2 ≥ 0.003 x (2500^2-1500^2)=12000mm^2

Si predispone di 72 barre del passo 200mm, del diametro 20mm per l'incastro cassone/pilastro, del diametro 24mm per l'incastro pilastro/trave d'impalcato.

L'orditura minima predisposta è pari a 72x314=22608mm2 .

Pilastri da 0.5x2.5m

$A_{s,min}$= 0.10 N_{Ed} / f_{yd} = 0.10 x 10854x10^3 / 391 =2776 mm^2 ≥ 0.003 x (500x2500)=3750mm^2

Si predispone di 28 barre del diametro 18 passo 200mm lungo i lati pari a 28x254=7112mm^2

4.5.6 Pilastri cassoni modulo C7-C8(q.-11) - SLU (escluso sisma)

Di seguito si riporta una Tab. riepilogativa con le combinazioni più gravose per quanto riguardano gli stati limiti ultimi.

Il momento M2 agisce intorno all'asse perpendicolare alle travi dell'impalcato mentre il momento M3 agisce intorno all'asse parallelo all'asse delle travi dell'impalcato.

Pilastri da 2.5x2.5m - Pressoflessione agli SLU:

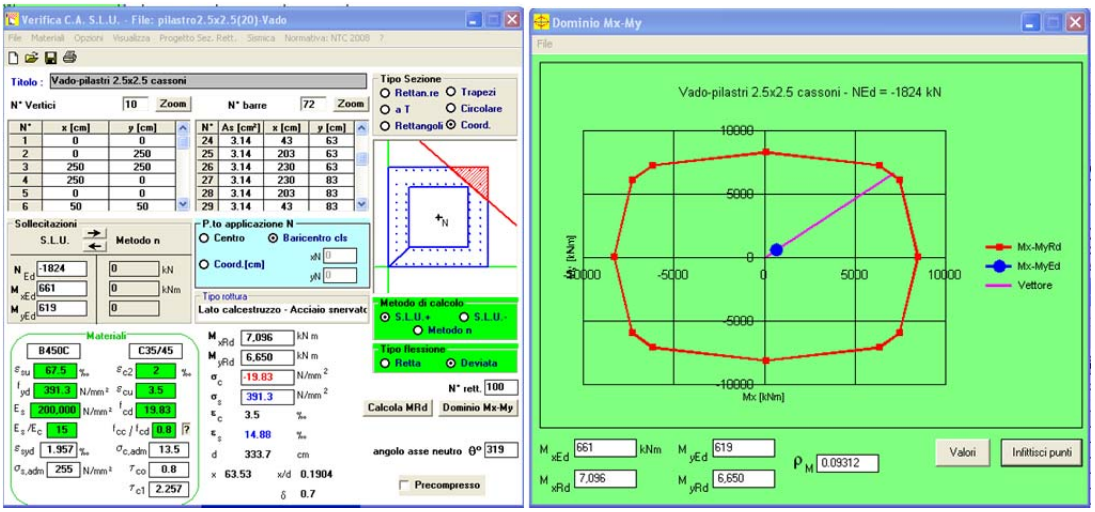


FIG. 4.664 - C7-C8(Q.-11) - PARTE BASSA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MIN}(TRAZIONE)

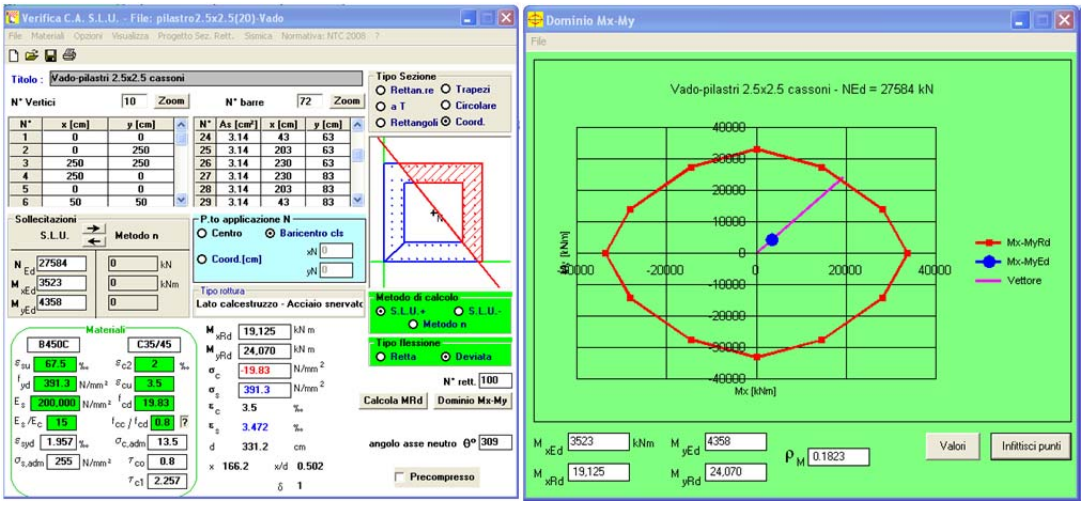


FIG. 4.665 - C7-C8(Q.-11) - PARTE BASSA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MAX}

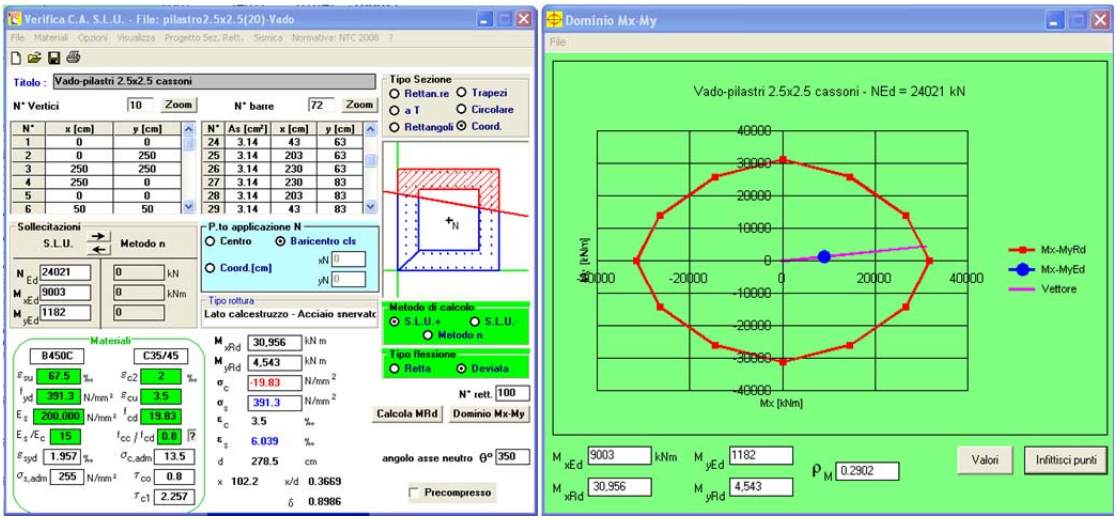


FIG. 4.666 - C7-C8(Q.-11) - PARTE BASSA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - M2

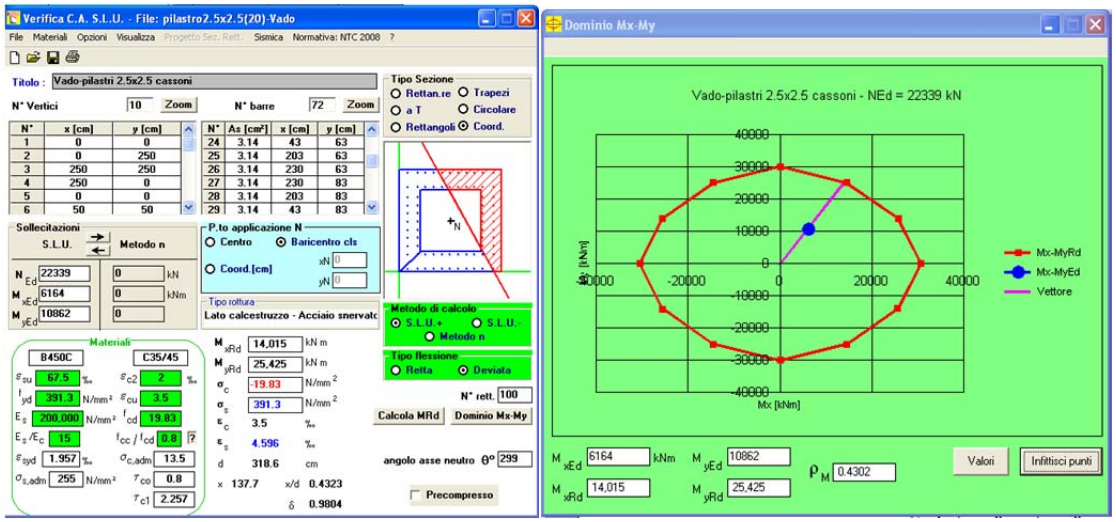


FIG. 4.667 - C7-C8(Q.-11) - PARTE BASSA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M3

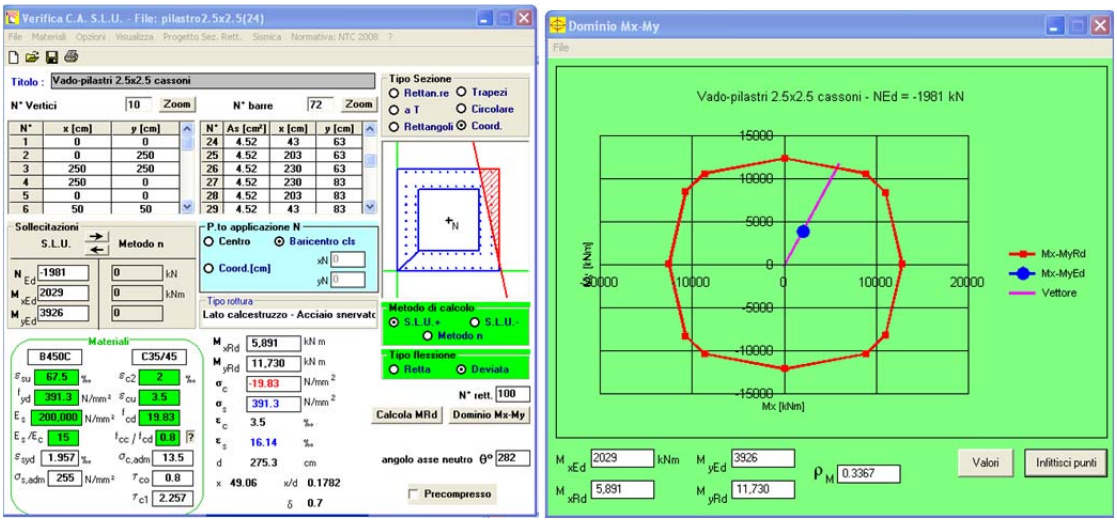


FIG. 4.668 - C7-C8(Q.-11) - PARTE ALTA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MIN}(TRAZIONE)

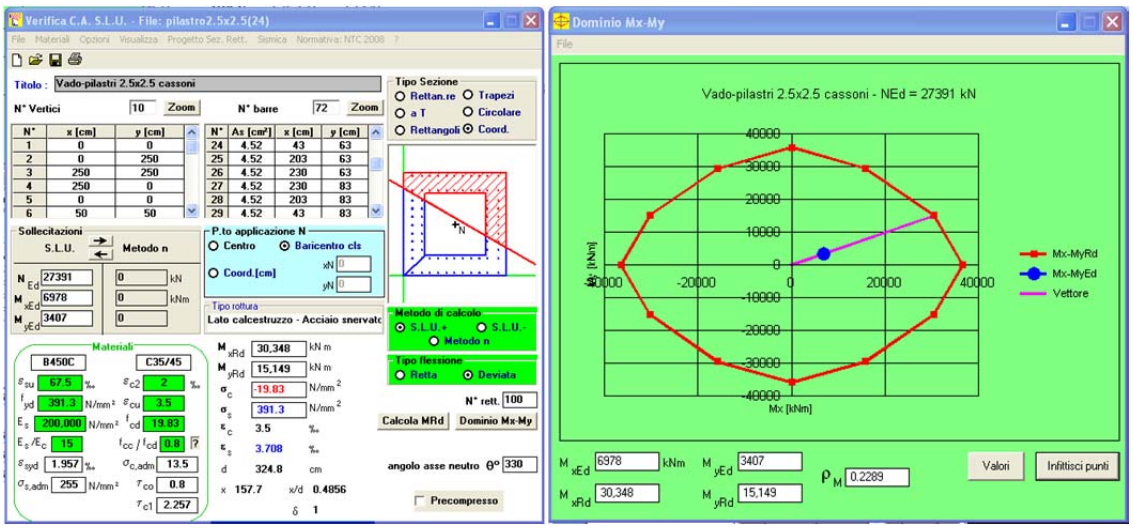


FIG. 4.669 - C7-C8(Q.-11) - PARTE ALTA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - P_{MAX}(COMPRESSIONE)

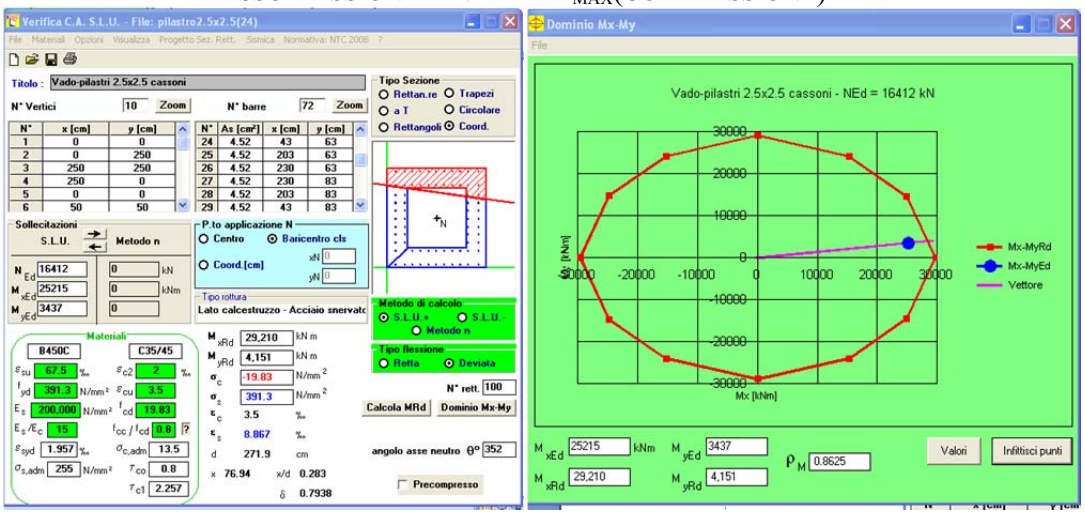


FIG. 4.670 - C7-C8(Q.-11) - PARTE ALTA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - M2

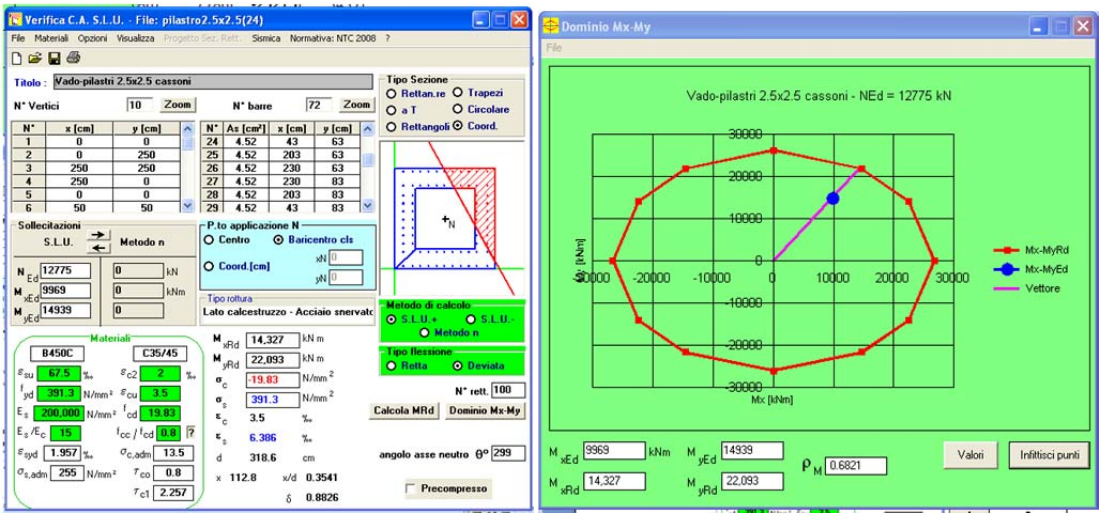


FIG. 4.671 - C7-C8(Q.-11) - PARTE ALTA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - M3

Pilastri 2.5x2.5 - SLU				
PT.BASSA - TORRE/CASSONE (-2.75/0.0)				
P	**V2**	**V3**	**M2**	**M3**
KN	KN	KN	KN-m	KN-m
1824	-2918	933	-661	-619
-27584	-3141	4203	3523	-4358
-12340	**-5144**	4824	4918	-6325
-16809	-1392	**8192**	8140	-1529
-24021	-1848	6743	**9003**	1182
-22339	-1088	5407	6164	**-10862**
PT.ALTA - TORRE/TRAVE (0.0/+1.67)				
P	**V2**	**V3**	**M2**	**M3**
KN	KN	KN	KN-m	KN-m
1981	-2763	777	-2029	3926
-27391	-2890	3952	-6978	3407
-12147	**-4894**	4573	-7181	6599
-16616	-1142	**7942**	-12633	1734
-16412	-986	7786	**-25215**	3437
-12775	-3880	2307	-9969	**14939**

Pilastri da 2.5x2.5m - Taglio

Si prevedono ferri orizzontali θ18/250 n°4 braccia come orditura a taglio

	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	**Vres [kN]**
Taglio appoggio setto	250	1016	2	0	1.00	2179.8	391.0	1	0.5	6928	8923	**6928**

Pilastri 0.5x2.5 - SLU				
P	V2	V3	M2(min)	M3
KN	KN	KN	KN-m	KN-m
-7004	-665	271	194	-379
1250	-482	-109	-136	1762
-2652	**-1105**	283	224	-430
-5655	-590	**320**	318	-112
-5655	-590	320	**318**	-112
-2532	-1023	-126	-105	**4015**

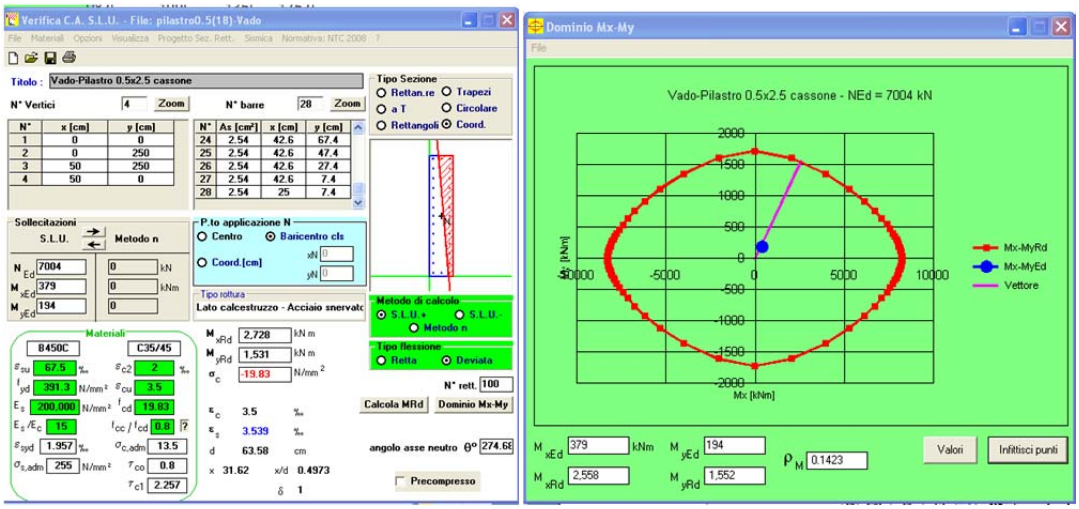


FIG. 4.672 - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MAX}(COMPRESSIONE)

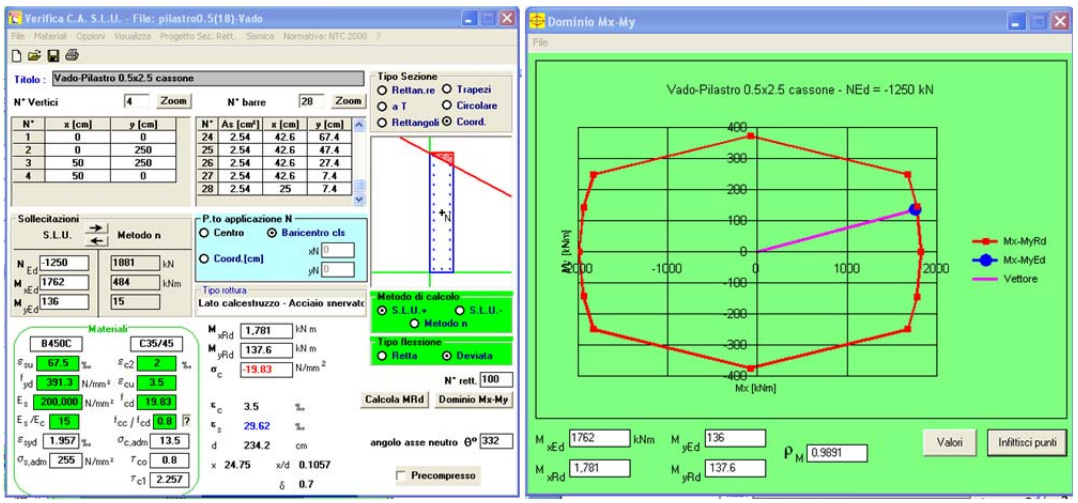


FIG. 4.673 - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MIN}

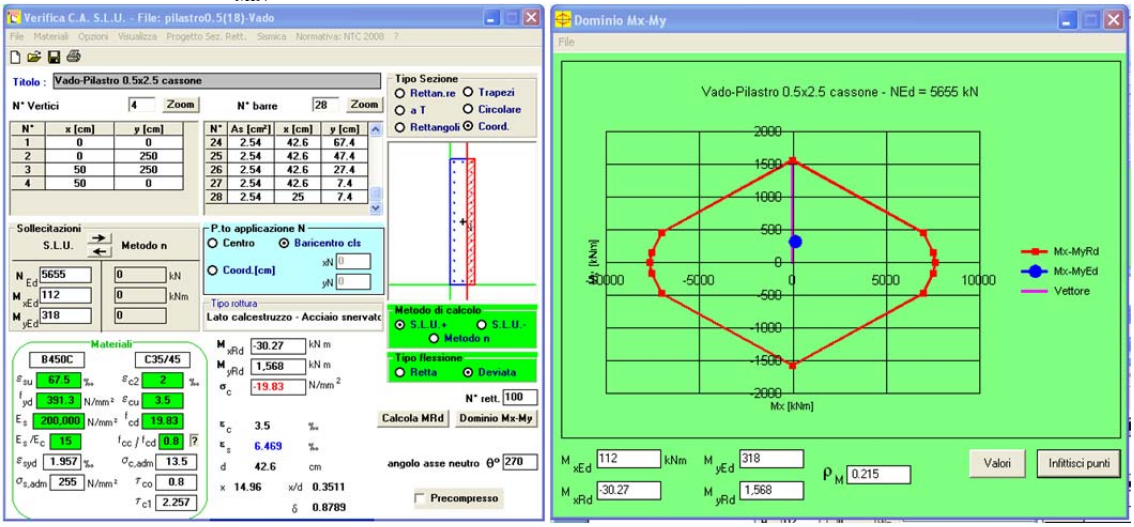


FIG. 4.674 - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M2

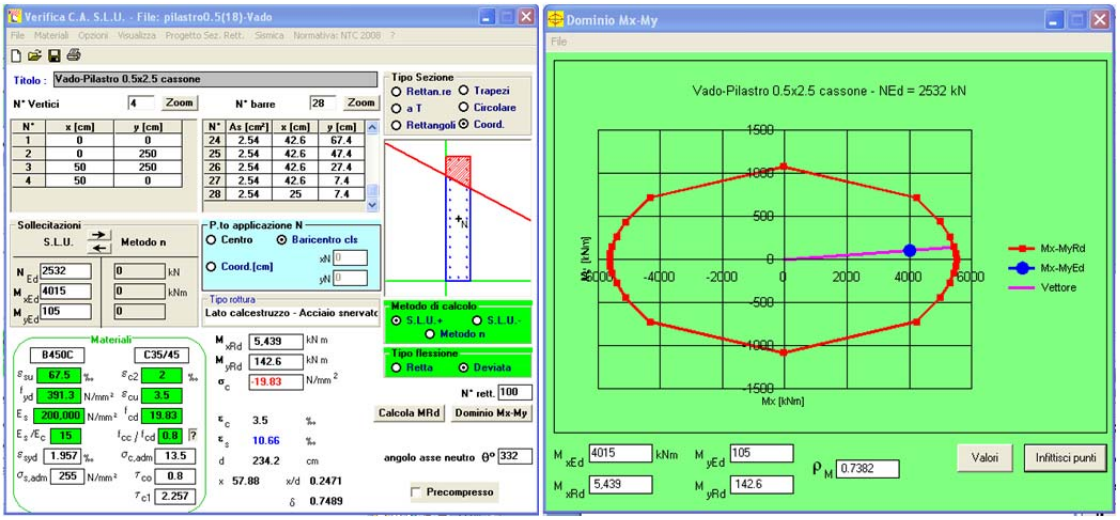


FIG. 4.675 - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M3

Pilastri da 0.5x2.5m - taglio:

Si si prede un staffatura orizzontale composta da θ12/250 due braccia con una resistenza a taglio pari a (per taglio V2), e quattro braccia per il taglio V3:

	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	Vres [kN]
Taglio V3	250	448	2	0	1.00	381.6	391.0	1	0.516	535	1,562	**535**
	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	Vres [kN]
Taglio V2	250	224	2	0	1.00	2,185.2	391.0	1	0.516	1,531	8,945	**1,531**

4.5.7 Pilastri cassoni modulo C7-C8(q.-11) - SLU (sisma)

Di seguito si riporta una Tab. riepilogativa con le combinazioni più gravose per quanto riguarda gli stati limiti ultimi per le combinazioni sismiche.

Il momento M2 agisce intorno all'asse perpendicolare alle travi dell'impalcato mentre il momento M3 agisce intorno all'asse parallelo all'asse delle travi dell'impalcato.

Si esegue la verifica sia all'incastro con il cassone sia in sommità del pilastro in corrispondenza della trave prefabbricata dell'impalcato.

Pilastri da 2.5x2.5m - pressoflessione agli SLU(sisma):

Pilastri 2.5x2.5 - SLU sisma				
PT.BASSA - TORRE/CASSONE (-2.75/0.0)				
P	V2	V3	M2	M3
KN	KN	KN	KN-m	KN-m
171	137	3786	5865	1860
-17033	-1024	-1613	-354	-2396
-3737	**3135**	2065	2565	4398
-4608	-97	**6056**	5705	1969
-13004	-683	-954	**-10005**	1243
-6148	-1500	-396	-190	**-5949**
PT.ALTA - TORRE/TRAVE (0.0/+1.67)				
P	V2	V3	M2	M3
KN	KN	KN	KN-m	KN-m
325	128	3738	10930	1746
-16888	-1016	-1567	-7510	-592
-3425	**3106**	2051	867	643
-4306	-106	**6007**	3234	2500
-12844	-674	-905	**-19602**	2230
-8931	-1078	-77	-6290	**-8711**

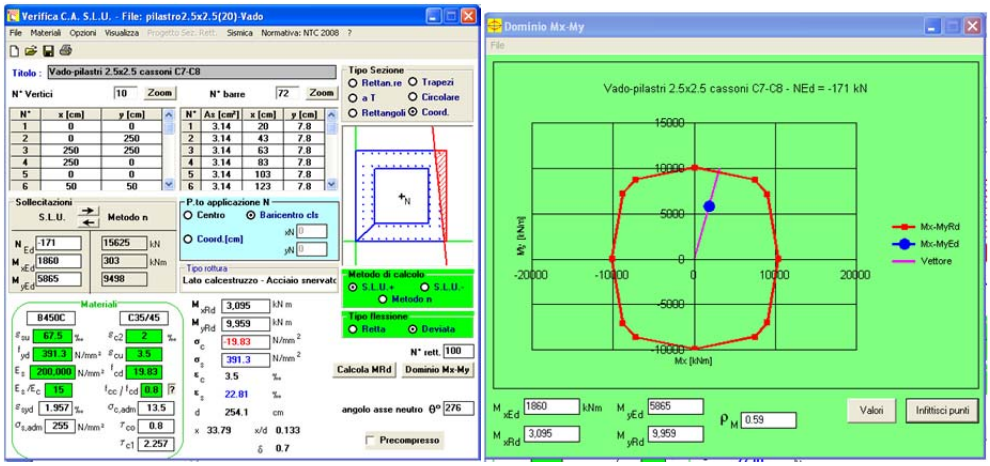


FIG. 4.676 - PARTE BASSA PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MIN}

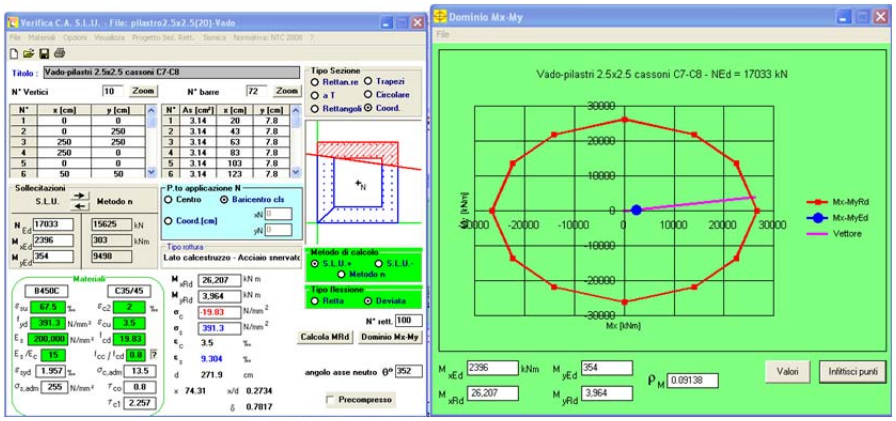


FIG. 4.677 - PARTE BASSA PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MAX}

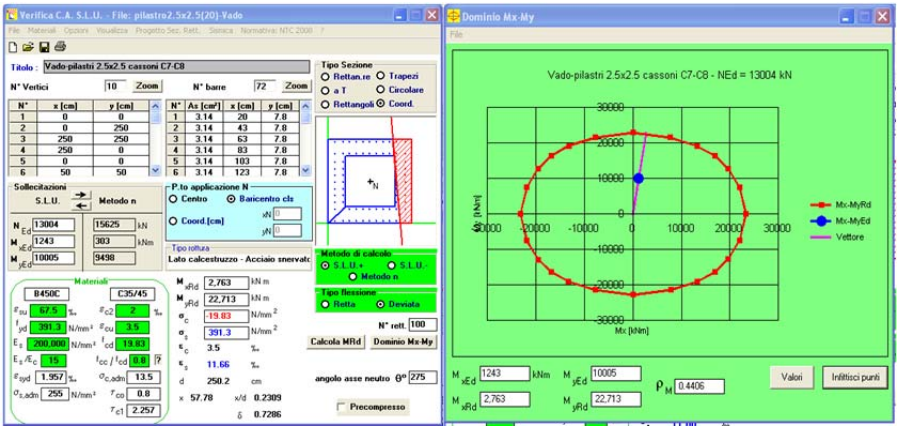


FIG. 4.678 - PARTE BASSA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M2

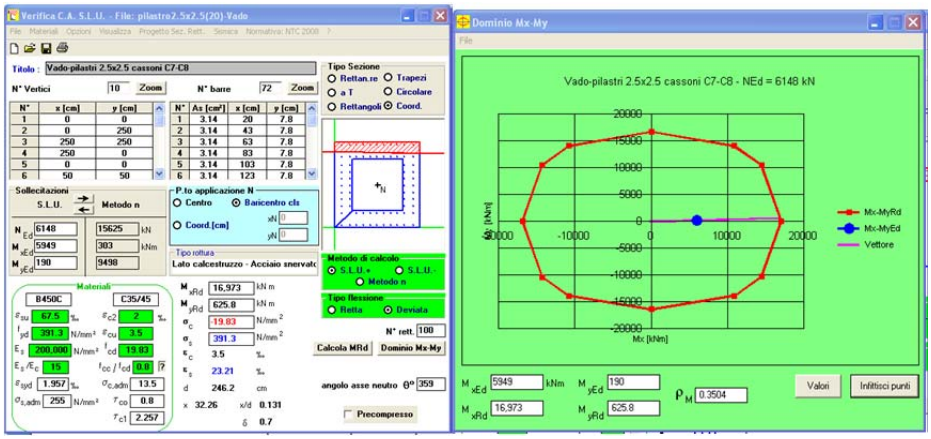


FIG. 4.679 - PARTE BASSA - PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M3

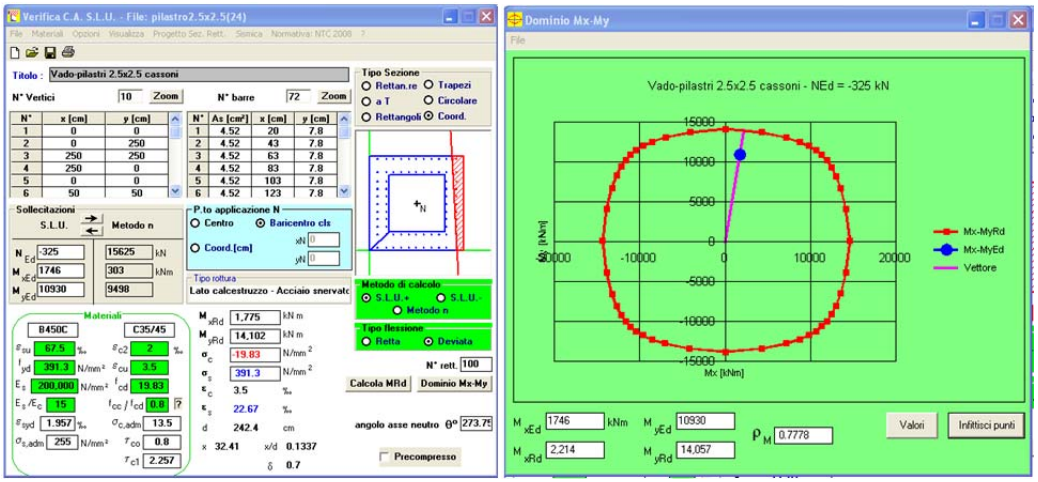


FIG. 4.680 - PARTE ALTA PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MIN}

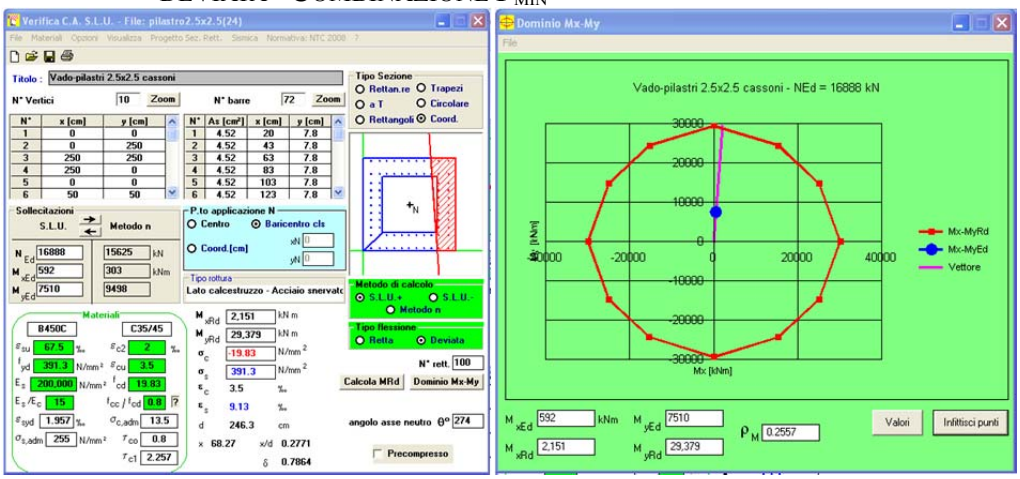


FIG. 4.681 - PARTE ALTA PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MAX}

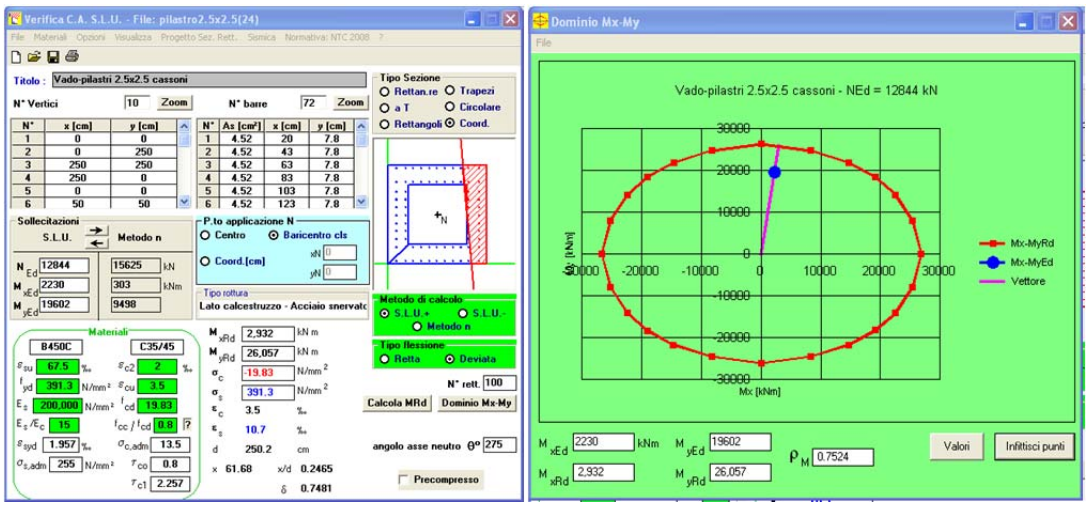


FIG. 4.682 - PARTE ALTA PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M2

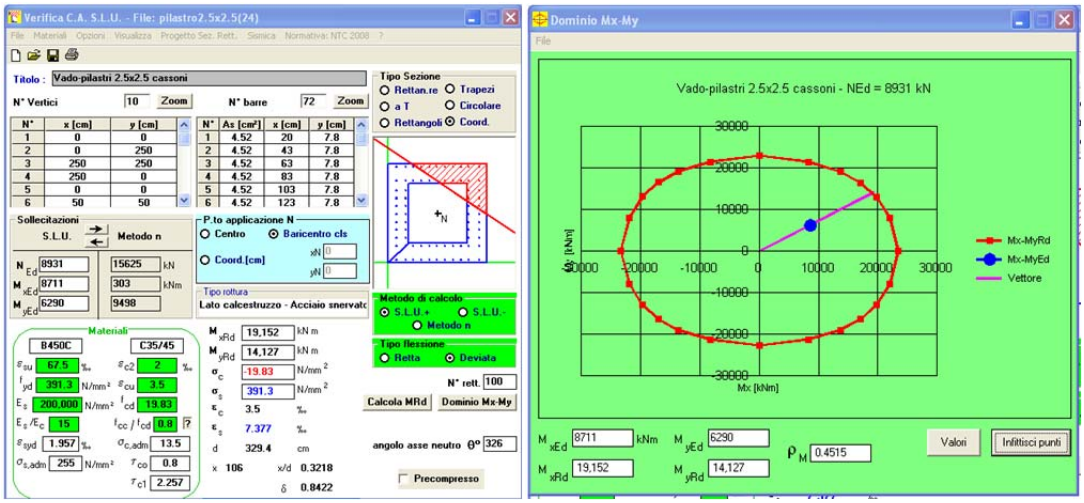


FIG. 4.683 - PARTE ALTA PILASTRI 2.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M3

Pilastri da 2.5x2.5m - Verifica a taglio

Si prevedono ferri orizzontali θ18/250 n°4 braccia come orditura a taglio

	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	**Vres [kN]**
Taglio appoggio setto	250	1016	2	0	1.00	2,180.7	391.0	1	0.5	6930	8927	**6930**

Pilastri da 0.5x2.5m - pressoflessione agli SLU sisma:

Pilastri 0.5x2.5 - SLU sisma				
PARTE BASSA - TORRE / CASSONE (-2.75/0.00)				
P	V2	V3	M2(min)	M3
KN	KN	KN	KN-m	KN-m
-232	105	43	11	-141
-4282	-305	-27	-56	-81
-1198	**647**	16	38	238
-2829	105	**49**	112	84
-2829	105	49	**112**	84
-2047	-152	-3	-5	**-1430**
PARTE ALTA - TORRE / TRAVE (0.00/+1.67)				
P	V2	V3	M2(min)	M3
KN	KN	KN	KN-m	KN-m
-184	102	29	25	-199
-4234	-302	-13	-14	643
-1149	**638**	12	4	181
-2733	102	**35**	18	649
-3984	-171	-4	**-70**	-351
-2000	-143	1	-24	**-2450**

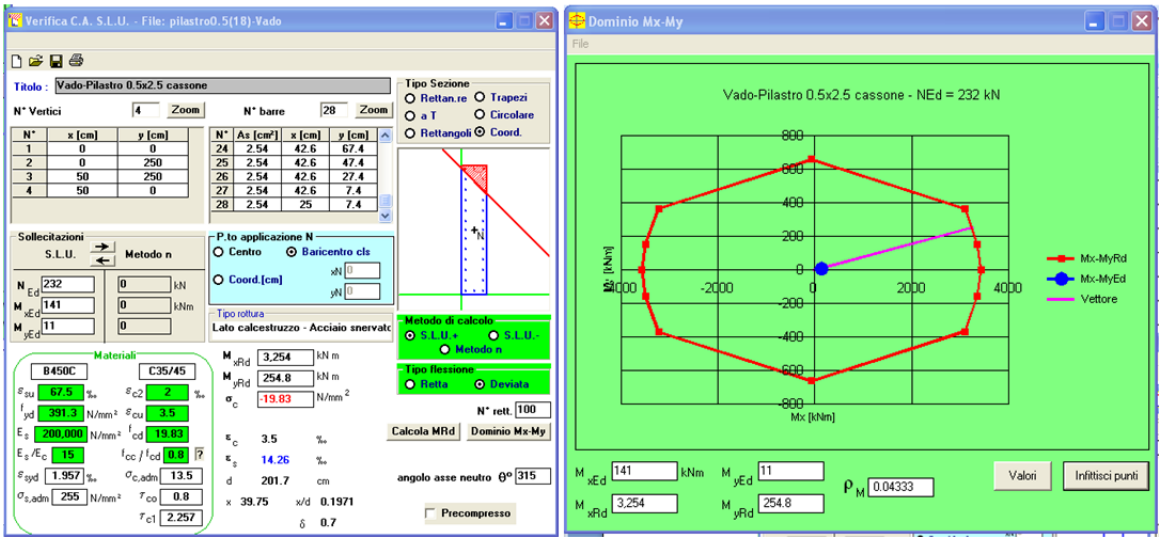


FIG. 4.684 - PARTE BASSA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MIN}

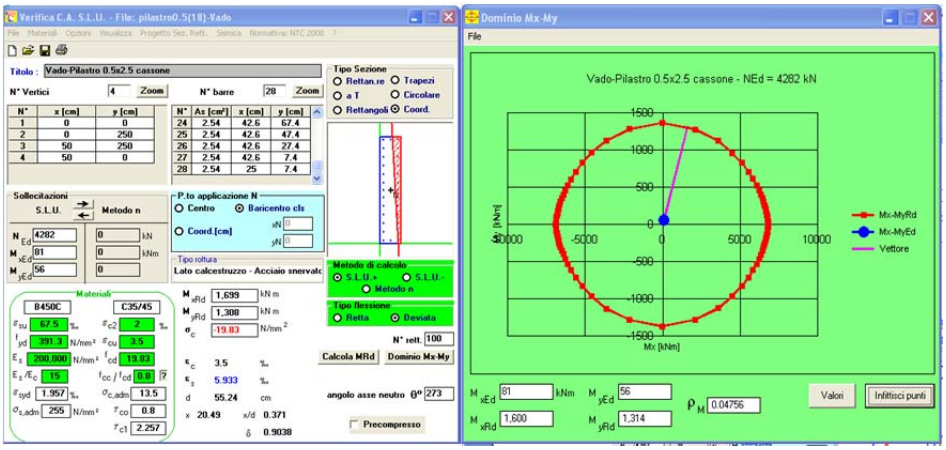


FIG. 4.685 - PARTE BASSA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MAX}

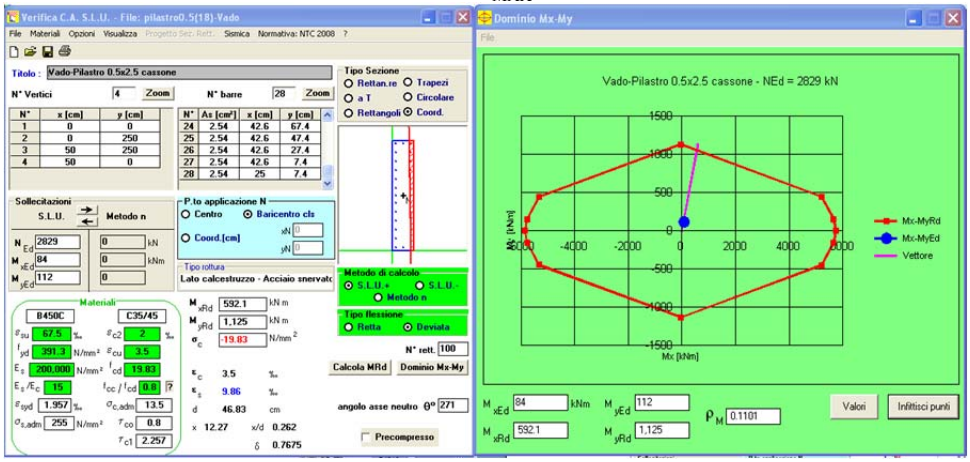


FIG. 4.686 - PARTE BASSA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M2

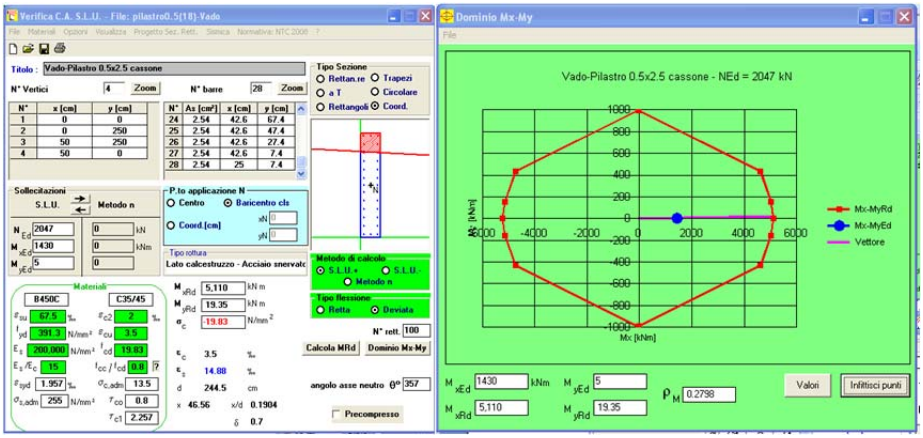


FIG. 4.687 - PARTE BASSA -PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M3

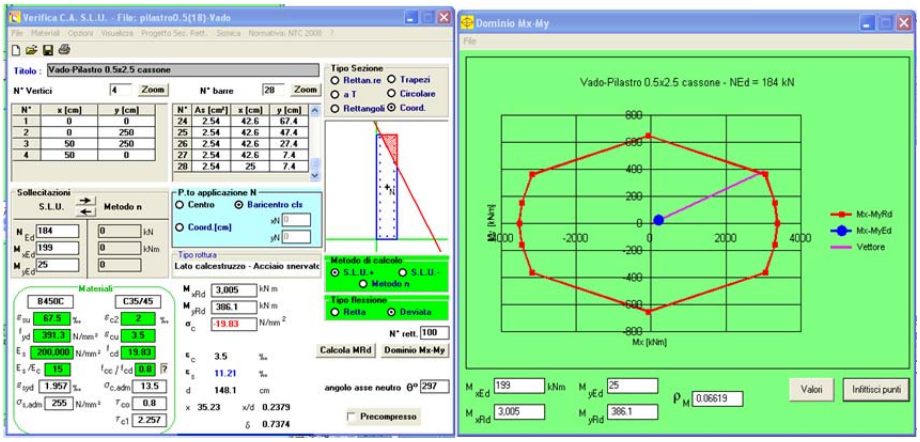


FIG. 4.688 - PARTE ALTA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MIN}

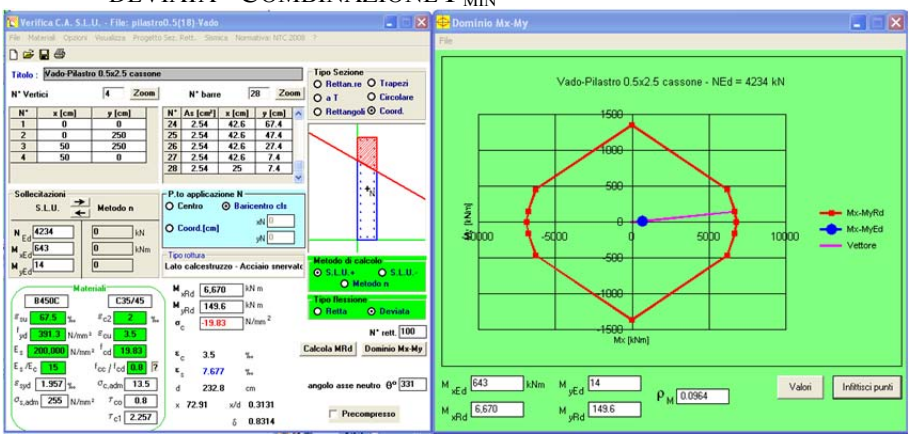


FIG. 4.689 - PARTE ALTA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE P_{MAX}(COMPRESSIONE)

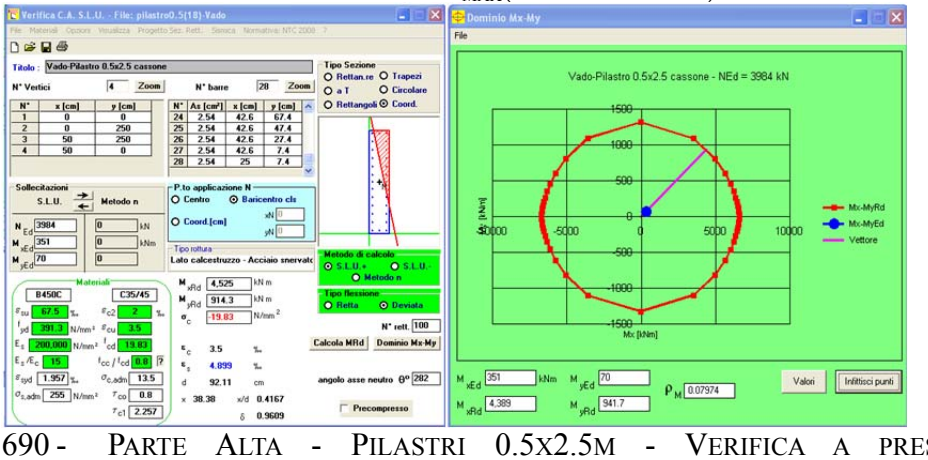


FIG. 4.690 - PARTE ALTA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M2

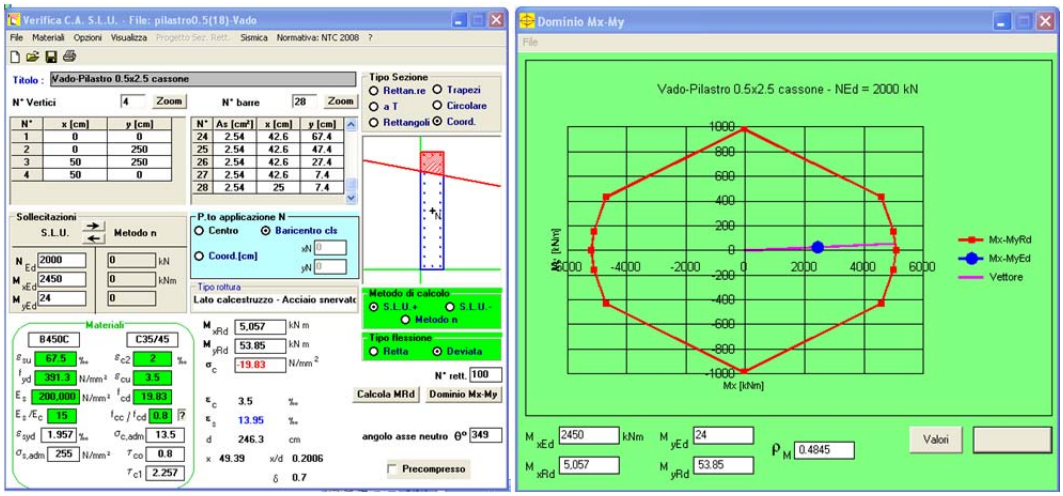


FIG. 4.691 - PARTE ALTA - PILASTRI 0.5X2.5M - VERIFICA A PRESSOFLESSIONE DEVIATA - COMBINAZIONE M3

Pilastri da 0.5x2.5m - Verifica a taglio

Si si prese una staffatura orizzontale composta da θ12/250 due braccia con una resistenza a taglio pari a (per taglio V2), e quattro braccia per il taglio V3:

	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	Vres [kN]
Taglio V3	250	448	2	0	1.00	381.6	391.0	1	0.516	535	1,562	**535**
	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	Vres [kN]
Taglio V2	250	224	2	0	1.00	2,185.2	391.0	1	0.516	1,531	8,945	**1,531**

4.5.8 Pilastri cassoni modulo C7-C8(q.-11) - SLE (combinazioni freq.)

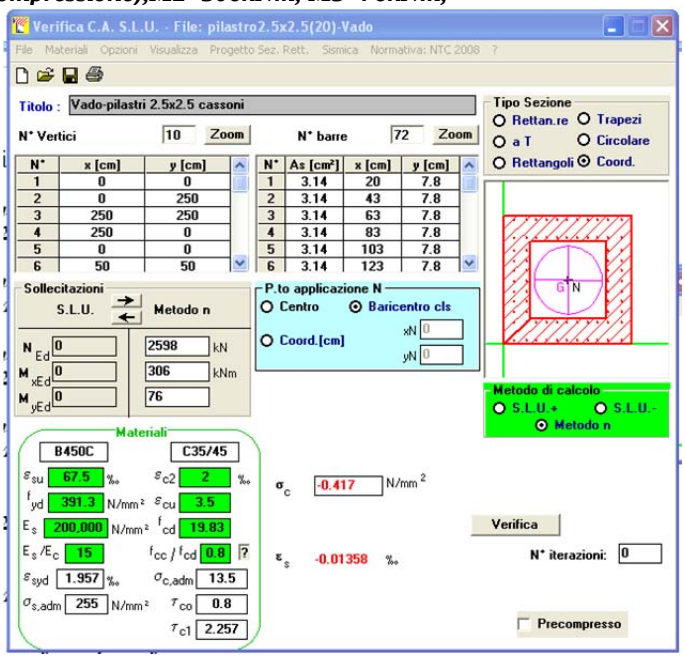
Pilastri 2.5x2.5 - SLE(freq)		
PARTE BASSA - TORRE / CASSONE (-2.75/0.00)		
P	M2	M3
KN-m	KN-m	KN-m
-2598	-306	-76
-13122	3165	-1469
-8543	**-4604**	1247
-11769	-1665	**4057**
PARTE ALTA - TORRE / TRAVE (0.00/+1.67)		
P	M2	M3
KN-m	KN-m	KN-m
-2441	-975	-136
-12973	-2110	212
-8379	**-9060**	1933
-11612	-4792	**4573**

Pilastri 0.5x2.5 - SLE (freq.)		
P	M2(min)	M3
KN	KN-m	KN-m
- **597**	- 10	34
- **4,020**	- 10	1
- 3,474	**63**	- 36
- 3,163	- 15	**1,222**

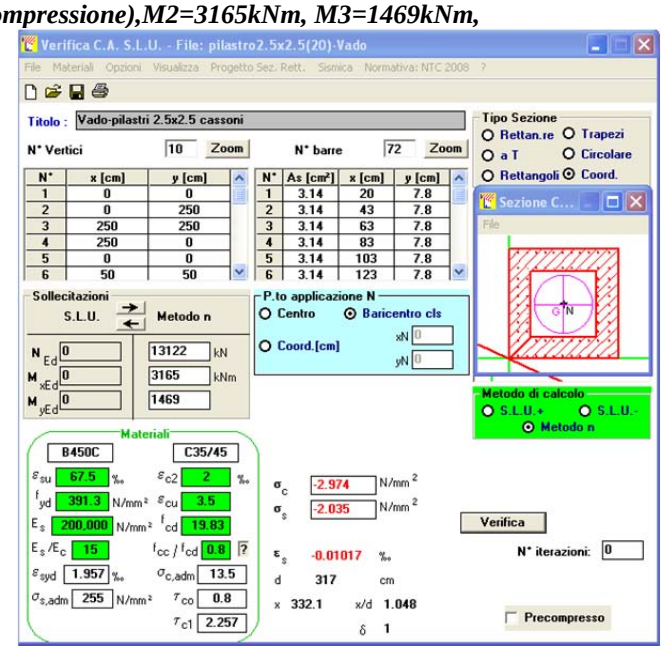
FIG. 4.692 - PILASTRI - SOLLECITAZIONI AGLI SLE(FREQUENTI)

Si esegue la verifica alla fessurazione alle combinazioni frequenti.

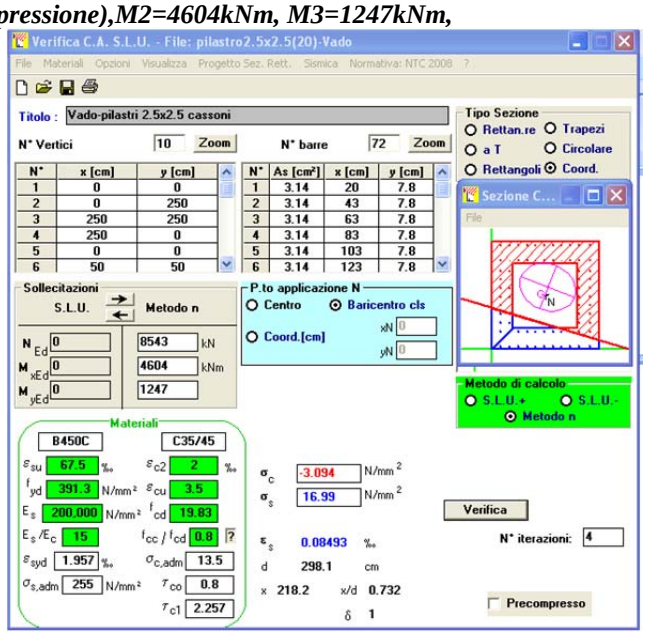
1) Parte bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - P_{min}
P=-2598kN(compressione),M2=306kNm, M3=76kNm,



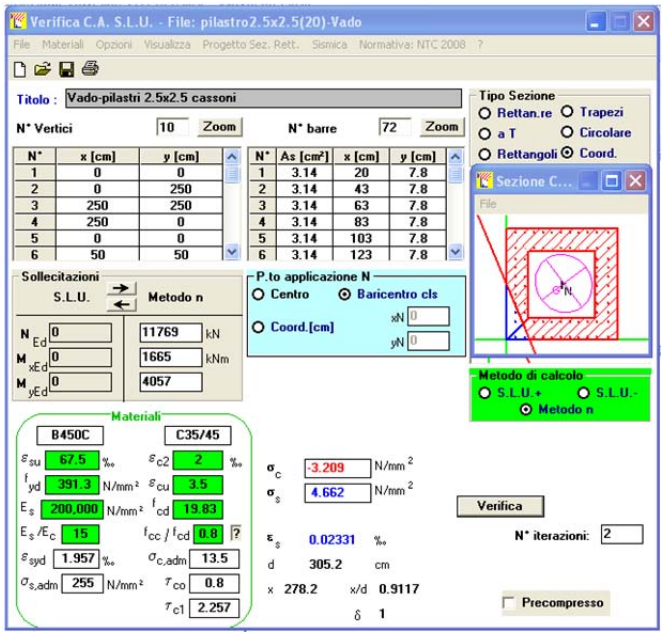
2) Parte bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - P_{max}
P=-13122kN(compressione),M2=3165kNm, M3=1469kNm,



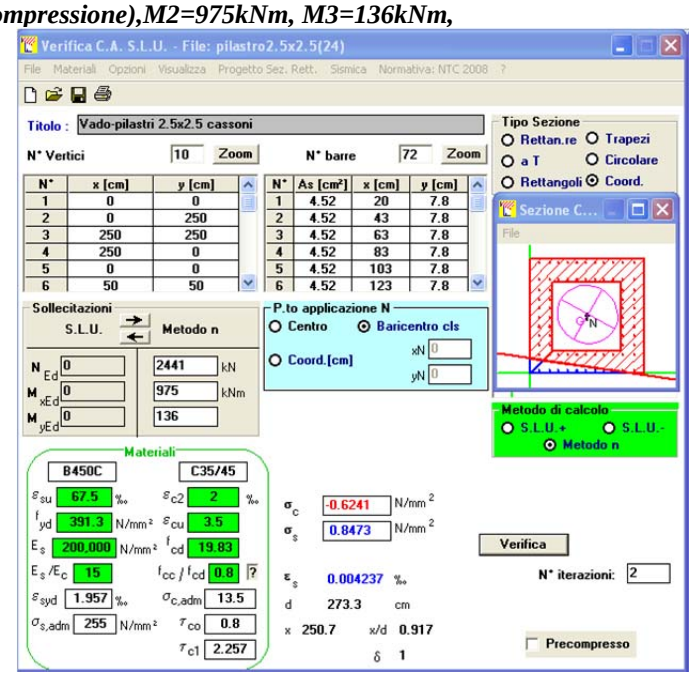
3) Parte bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - M2
P=-8543kN(compressione),M2=4604kNm, M3=1247kNm,



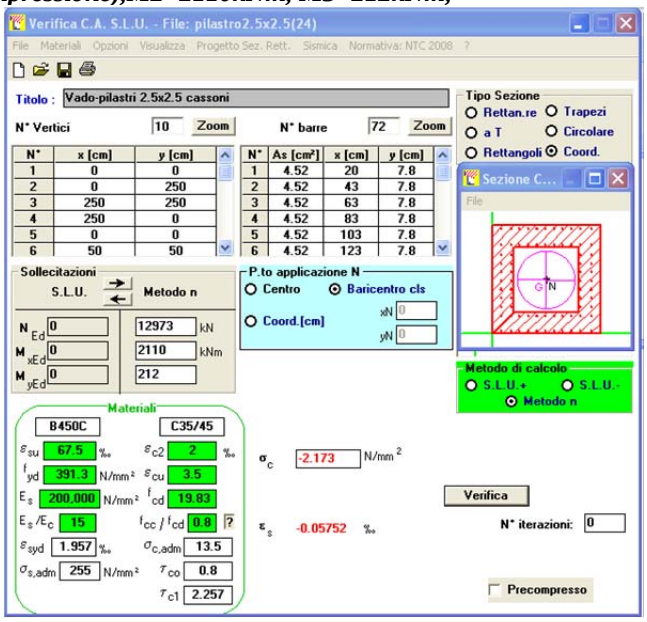
4) Parte bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - M3
P=-11769kN(compressione),M2=1665kNm, M3=4057kNm,



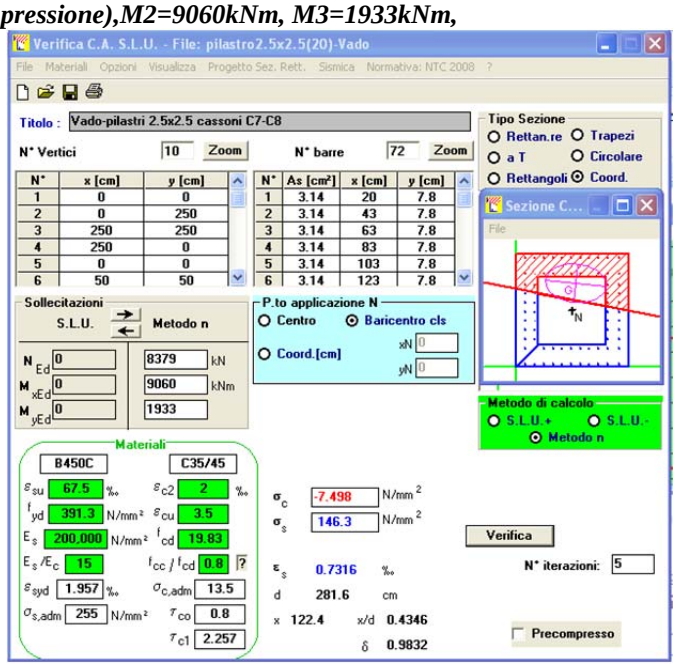
5) Parte alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - P_{min}
P=-2441kN(compressione),M2=975kNm, M3=136kNm,



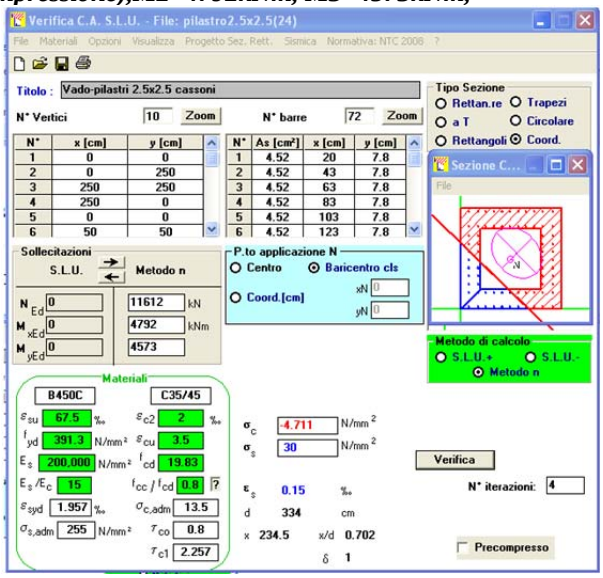
6) Parte alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - P_{max}
P=-12973kN(compressione),M2=2110kNm, M3=212kNm,



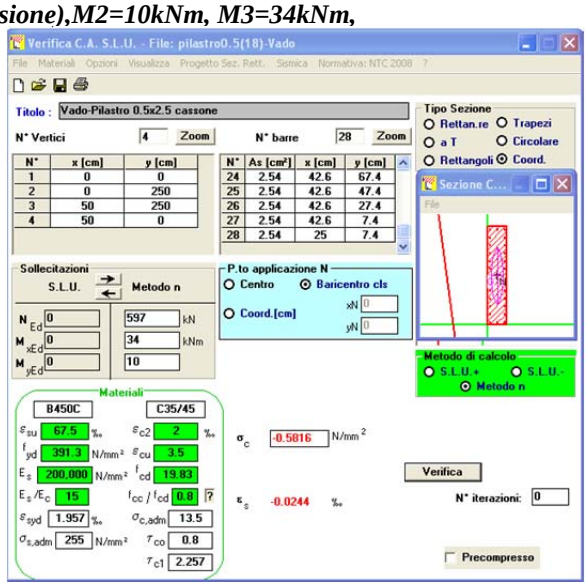
7) Parte alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - M2
P=-8379kN(compressione),M2=9060kNm, M3=1933kNm,



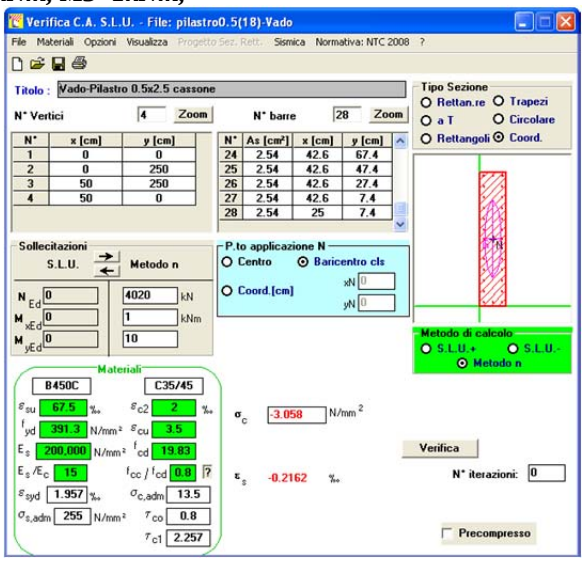
8) Parte alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - M3
P=-11612kN(compressione),M2=4792kNm, M3=4573kNm,



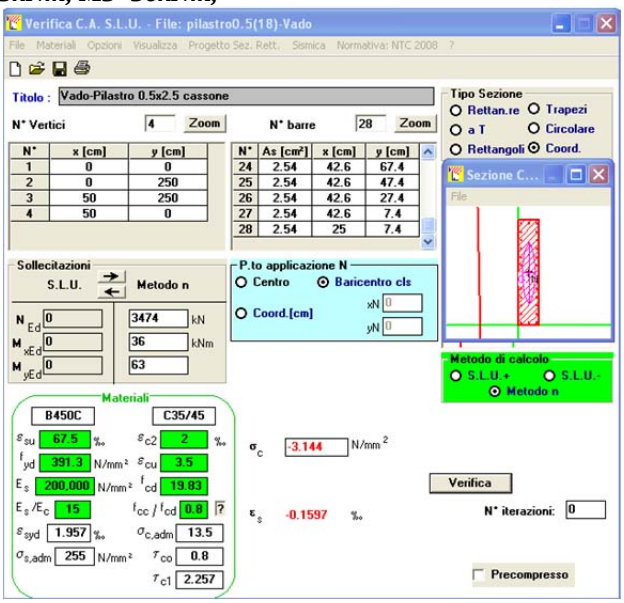
9) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{min}
P=-597kN(compressione),M2=10kNm, M3=34kNm,



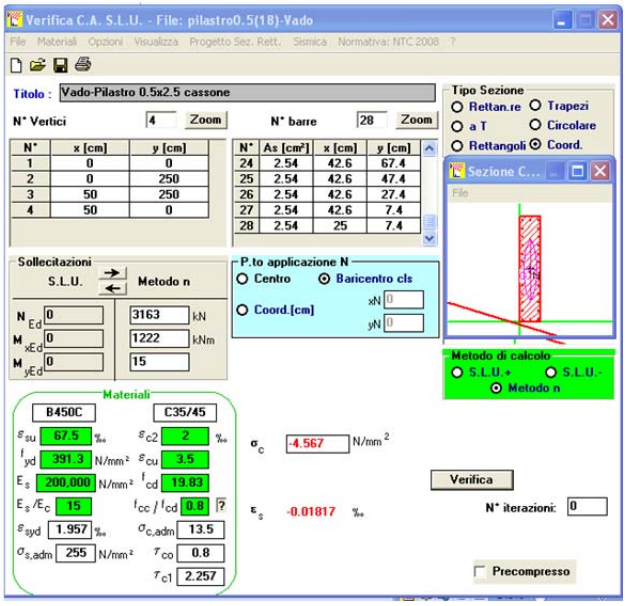
10) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{max} P=-4020kN,M2=10kNm, M3=1kNm,



11) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione M2 P=-3474kN,M2=63kNm, M3=36kNm,



12) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione M3 P=-3163kN,M2=15kNm, M3=1222kNm,



La massima tensione nelle barre è pari a 146N/mm^2.

Secondo quanto previsto dalla Tab. C4.1..II-III della Circolare 02 febbraio 2009 n°617/CSLLPP contenente istruzioni sull'applicazione del DM 14/1/2008 con barre del diametro fino a 25mm con passo di 200mm, la fessurazione di 0.2mm è soddisfatta senza calcolo diretto per valori della tensione nell'acciaio fino a 160MPa.

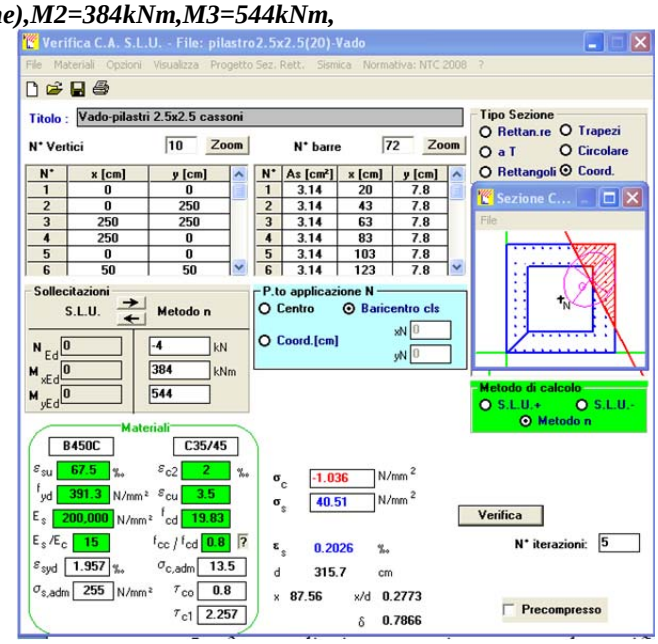
4.5.9 Pilastri cassoni modulo C7-C8(q.-11) - SLE (combinazioni rare)

Pilastri 2.5x2.5 - SLE(rara)		
PARTE BASSA - TORRE / CASSONE (-2.75/0.00)		
P	M2	M3
KN	KN-m	KN-m
4	- 384	- 544
- **18,860**	2,396	- 2,697
- 11,946	- **15,175**	2,915
- 11,887	- 6,420	**8,654**
PARTE ALTA - TORRE / TRAVE (0.00/+1.67)		
P	M2	M3
KN	KN-m	KN-m
160	- 1,275	2,358
- **18,712**	- 4,286	2,177
- 11,144	- **16,283**	2,385
- 8,675	- 6,154	**9,755**

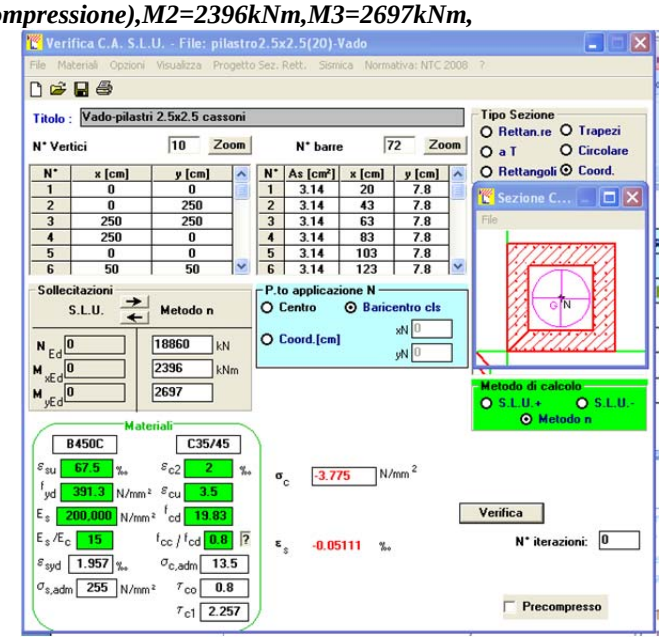
Pilastri 0.5x2.5 - SLE (rara)		
P	M2(min)	M3
KN	KN-m	KN-m
466	- 74	1,098
- **4,817**	95	- 238
- 3,976	**182**	- 31
- 1,823	- 53	**2,615**

FIG. 4.693 - PILASTRI - SOLLECITAZIONI AGLI SLE(RARE)

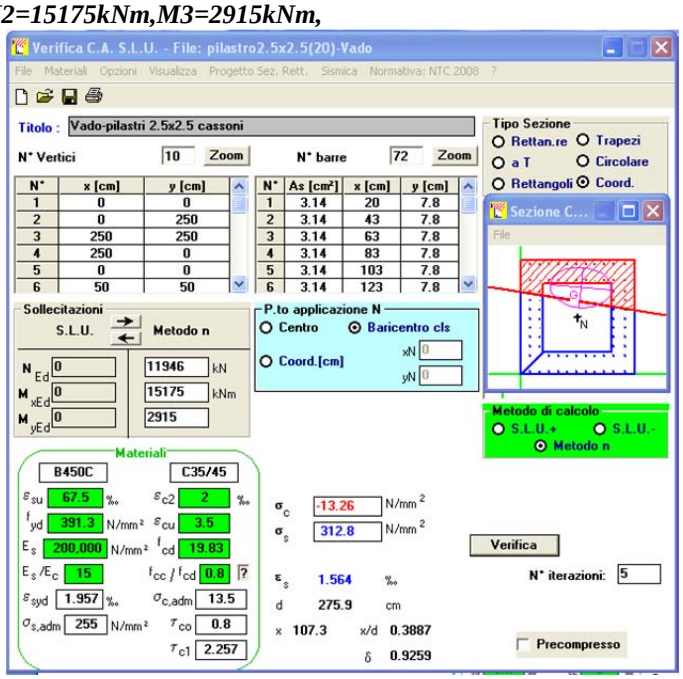
1) Parte Bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - P_{min}
P=+4kN(trazione),M2=384kNm,M3=544kNm,



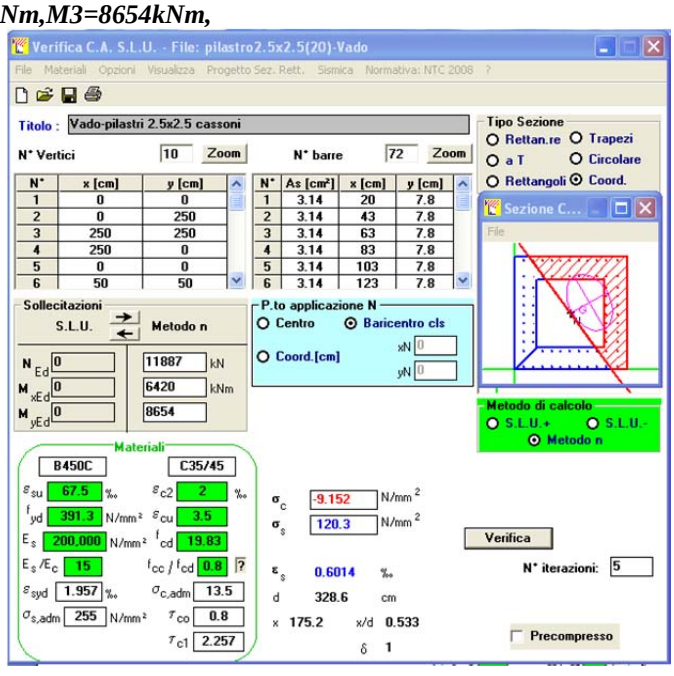
2) Parte Bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - P_{max}
P=-18860kN(compressione),M2=2396kNm,M3=2697kNm,



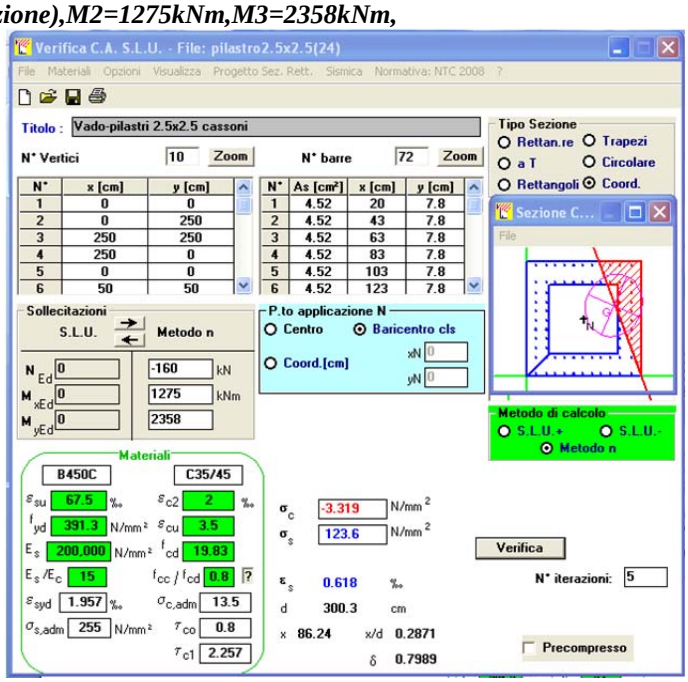
3) Parte Bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - M2 P=-11946kN,M2=15175kNm,M3=2915kNm,



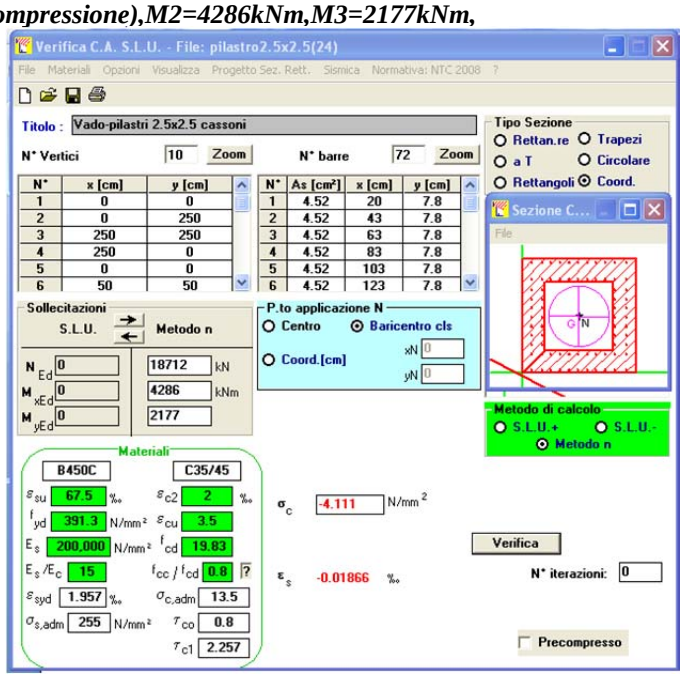
4) Parte Bassa - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - M3 P=-11887kN,M2=6420kNm,M3=8654kNm,



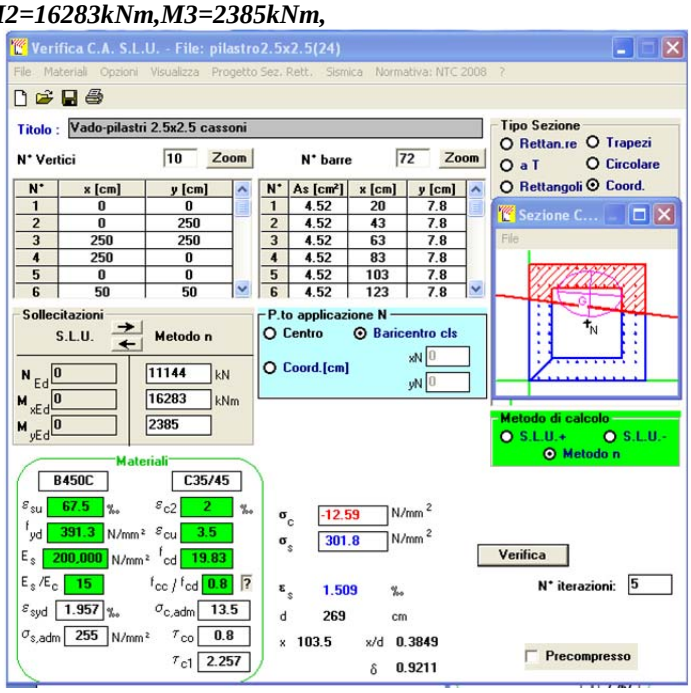
5) Parte Alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{min} P=+160kN(trazione),M2=1275kNm,M3=2358kNm,



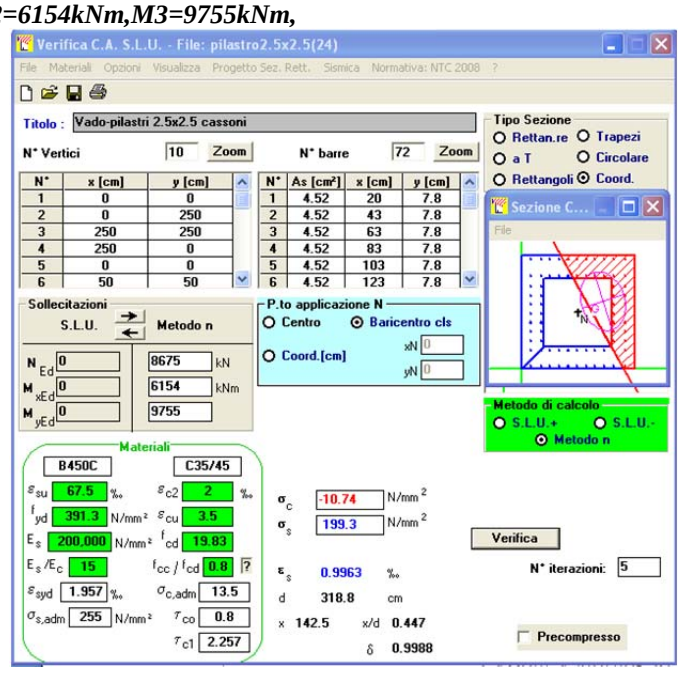
6) Parte Alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{max} P=-18712kN(compressione),M2=4286kNm,M3=2177kNm,



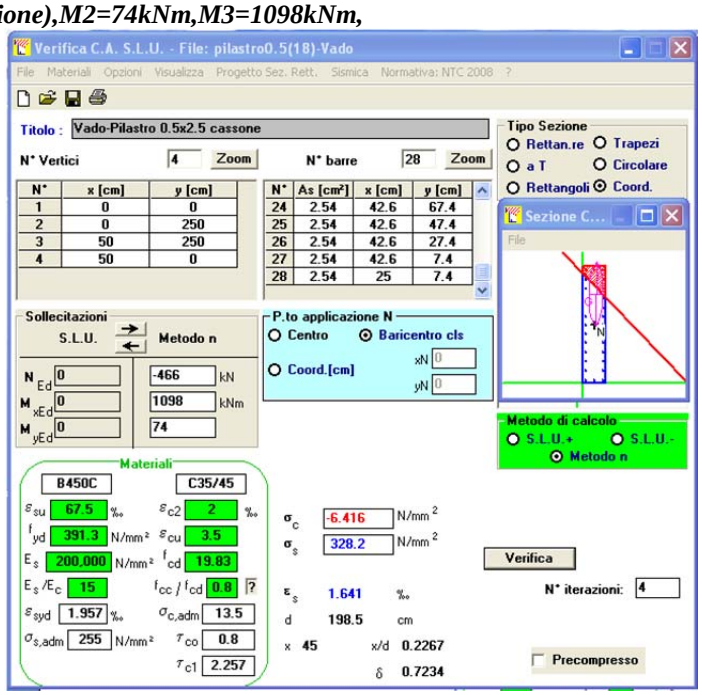
7) Parte Alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione M2 P=-11144kN,M2=16283kNm,M3=2385kNm,



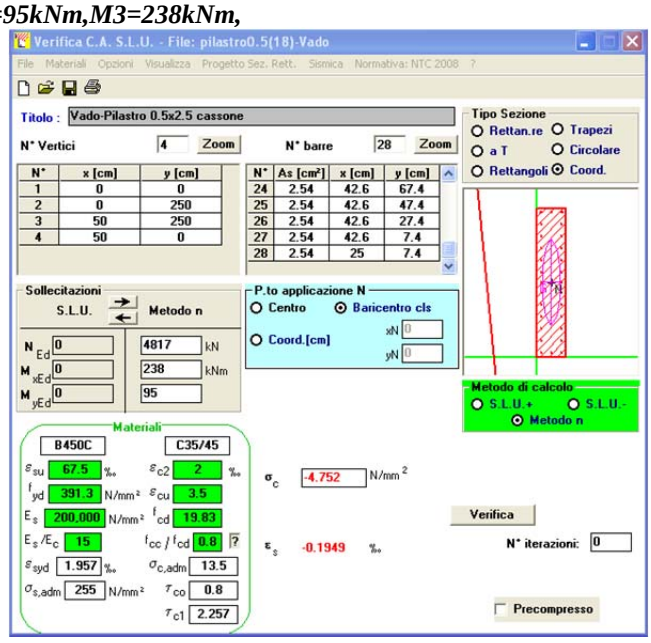
8) Parte Alta - Pilastri 2.5x2.5m - Verifica a pressoflessione deviata - Combinazione M3 P=-8675kN,M2=6154kNm,M3=9755kNm,



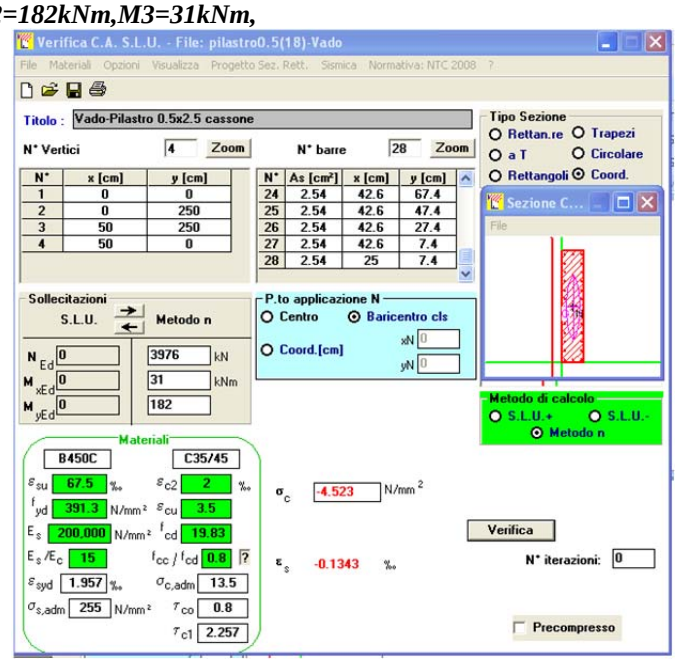
9) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{min}
P=466kN(trazione),M2=74kNm,M3=1098kNm,



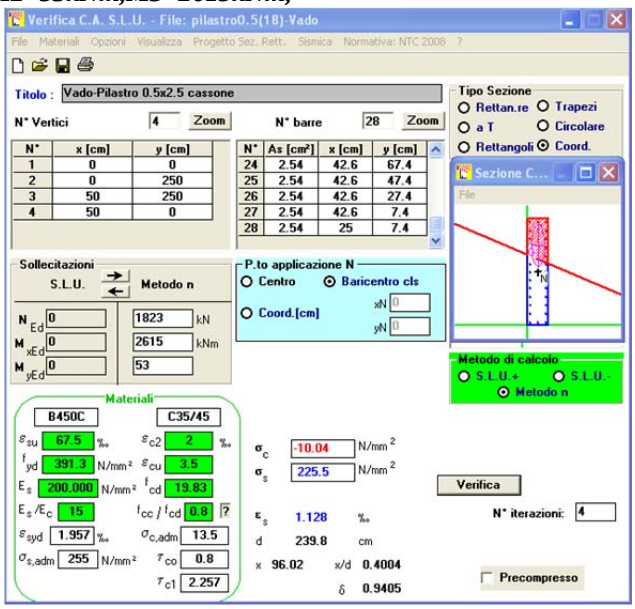
10) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione P_{max}
P=-4817kN,M2=95kNm,M3=238kNm,



11) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione M2 P=-3976kN,M2=182kNm,M3=31kNm,



12) Pilastri 0.5x2.5m - Verifica a pressoflessione deviata - Combinazione M3 P=-1823kN,M2=53kNm,M3=2615kNm,



Le tensioni sono entro i limiti di normativa.

4.6 Verifica solette di copertura cassoni

Le solette di copertura consistono in una soletta prefabbricata dello spessore di 15cm con un getto di completamento dello spessore di 25cm per uno spessore complessivo di 40cm per i cassoni imbasati a q.ta -9.50/-11.00/-13.00m. Per i cassoni imbasati a q.ta-16.50 le solette consistono in solette prefabbricate dello spessore di 15cm con un getto di completamento di 35cm per uno spessore complessivo di 50cm.

4.6.1 Verifiche solette prefabbricate - fase di getto di completamento

In questa fase le solette sono appoggiate sui setti/pareti del cassone e devono reggere oltre il proprio peso anche il getto di completamento. Le solette sono di 5 tipologie descritte come nella Fig. seguente.

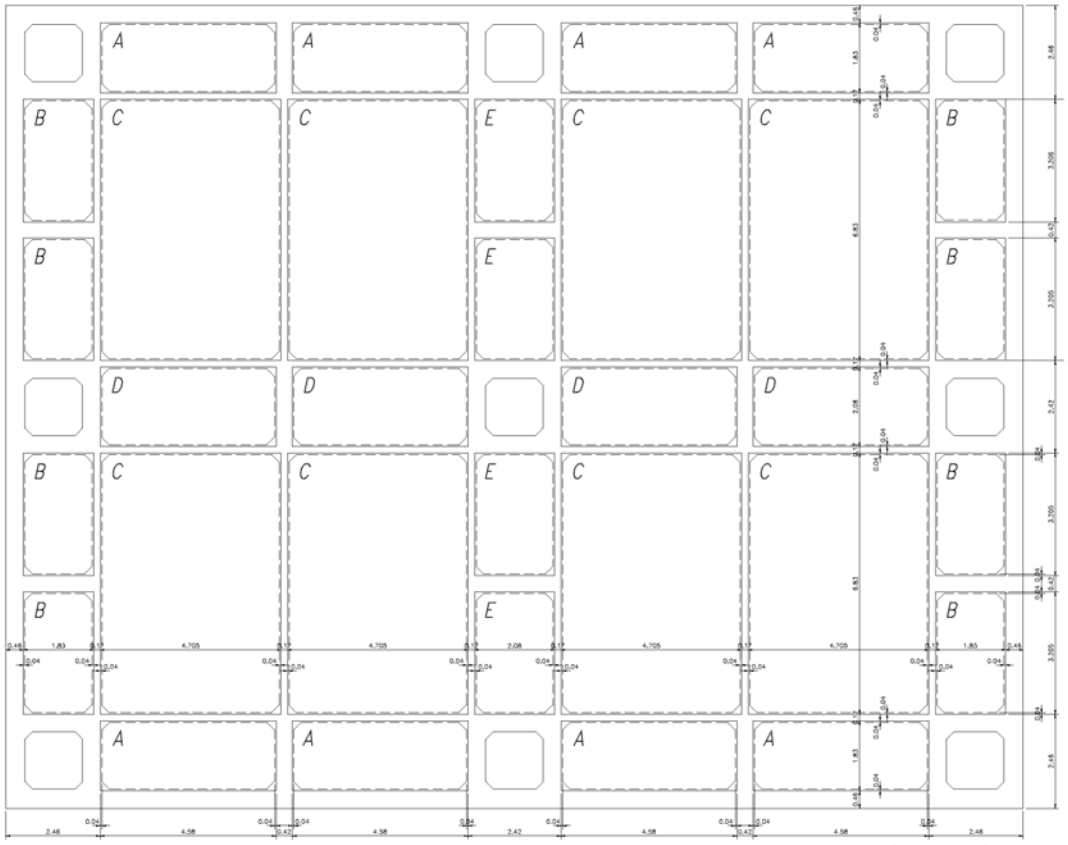


FIG. 4.694 - PIANTA CHIAVE SOLETTE DI COPERTURA

Si considerano oltre le fasi di costruzione (getto di completamento) le combinazioni di carico indicate nel capitolo 4.

Si distingue fra la fase di galleggiamento e affondamento e quella d'esercizio.

Fasi di costruzione:

Carichi con getto di 25cm:

pp soletta	:	0.15x25	=	3.75kPa
pp getto	:	0.25x25	=	6.25kPa
				10.0kPa

Verifica agli Stati Limiti Ultimi/Stato Limite d'esercizio - fase provv.

Solette tipo A/B/D/E:

$M_{Sd} = 1.3 \times 10.0 \times 2.08^2 / 12.75 = 4.41$ kNm/m

B = 1.0 m, H = 0.15 m, H1 = 0.09 m (1°strato)

AF1 = 1570 mm^2 (ϕ20/200)

$M_{Rd} = 45.5$ kNm/m > M_{Sd}

Tensioni acciaio con M= M_{Sd}/1.3=3.4kNm/m; 28MPa

$M_{Sd} = 1.3 \times 10.0 \times 2.08^2 / 23.45 = 2.40$ kNm/m

B = 1.0 m, H = 0.15 m, H1 = 0.07 m (2°strato)

AF1 = 1570 mm^2 (ϕ20/200)

$M_{Rd} = 33.3$ kNm/m > M_{Sd}

Tensioni acciaio con M= M_{Sd}/1.3=1.85kNm/m; 20MPa

Solette 4.705x6.83m - soletta tipo C:

<u>Verifica agli Stati Limiti Ultimi - fase provv.</u>

(Santarella con l_y / l_x = 6.83/4.705=1.45=1.5)

<u>Getto 25cm:</u>

M_{Sd} = 1.3 x 10.0 x 4.705^2 / 12.75 = 22.57 kNm/m

B = 1.0 m, H = 0.15 m, H1 = 0.088 m (1°strato)

AF1 = 2260 mm^2 (ϕ24/200)

M_{Rd} = 57.6 kNm/m > M_{Sd}

Tensioni acciaio con M= M_{Sd}/1.3=17.4kNm/m; 106MPa

M_{Sd} = 1.3 x 10.0 x 4.705^2 / 22.8 = 12.62 kNm/m

B = 1.0m, H = 0.15m, H1 = 0.065 m (2°strato)

AF1 = 1905 mm^2 (ϕ22/200)

M_{Rd} = 32 kNm/m > M_{Sd}

Tensioni acciaio con M= M_{Sd}/1.3=9.71kNm/m; 94MPa

4.6.2 Dimensionamento delle solette di copertura cassoni a q.ta-11.00 (C7-C8)

Le solette di copertura del cassone sono sollecitate durante la fase di affondamento.

La pressione massima verticale è pari a 28kPa ((11-8.25)x10.1). Inoltre in fase d'esercizio le solette sono sollecitate dalla sovrapressione e sottopressione dovuta al passaggio della cresta d'onda e del cavo d'onda. Per le combinazioni d'esercizio è presente anche una forza di trazione.

Verifica agli Stati Limiti Ultimi solette con getto di completamento di 25cm

La pressione agli SLU: 1.3 x (0.4m x 14.9kN/mc + 28) = 44.1kPa

Di seguito si riportano i diagrammi di sollecitazioni

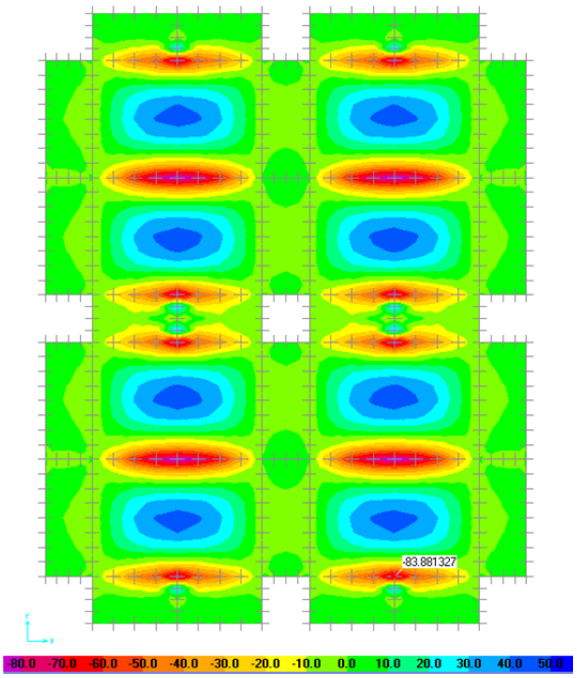


FIG. 4.695 - CASSONE Q.-11.00 - MOMENTO M_{22} - GALLEGGIAMENTO E AFFONDAMENTO

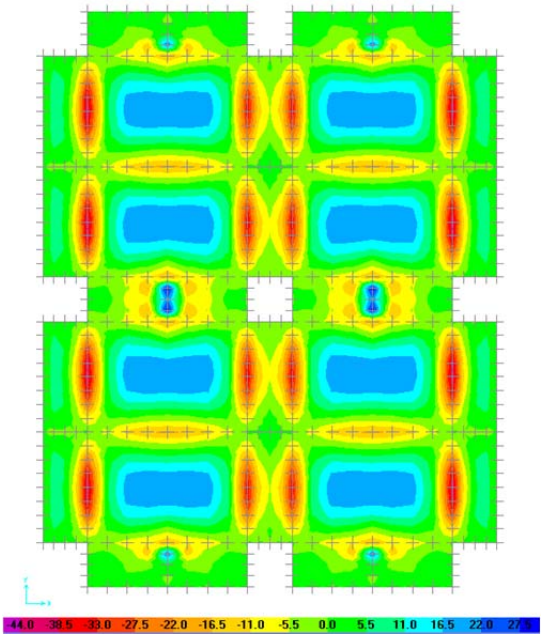


FIG. 4.696 - CASSONE Q.-11.00 - MOMENTO M_{11} - GALLEGGIAMENTO E AFFONDAMENTO

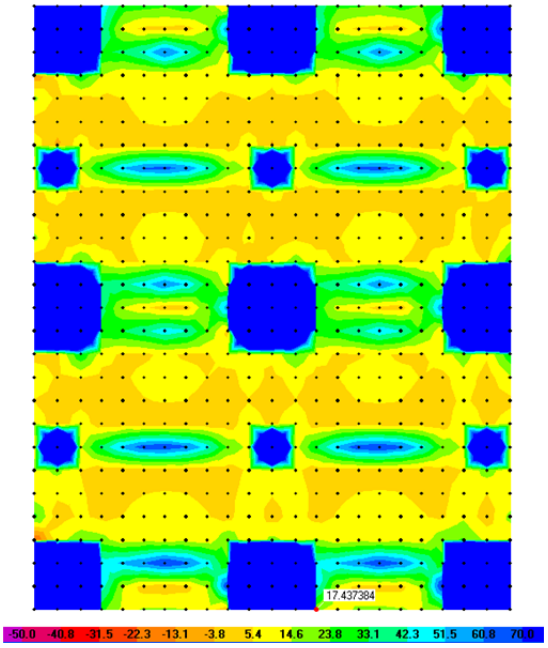


FIG. 4.697 - CASSONE Q.-11.00 - MOMENTO M_{22} - MAX INV-SLU

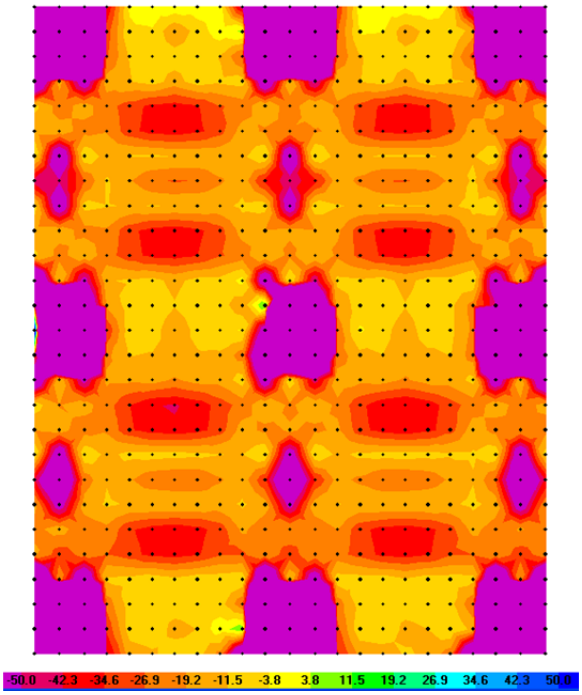


FIG. 4.698 - CASSONE Q.-11.00 - MOMENTO M_{22} - MIN - INV SLU

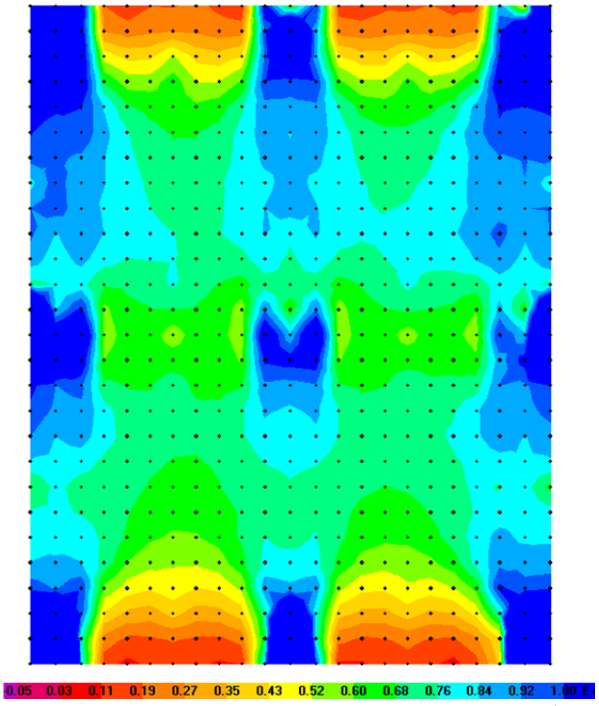


FIG. 4.699 - CASSONE Q.-11.00 - MOMENTO F_{22} - MAX INV-SLU(TRAZIONE)

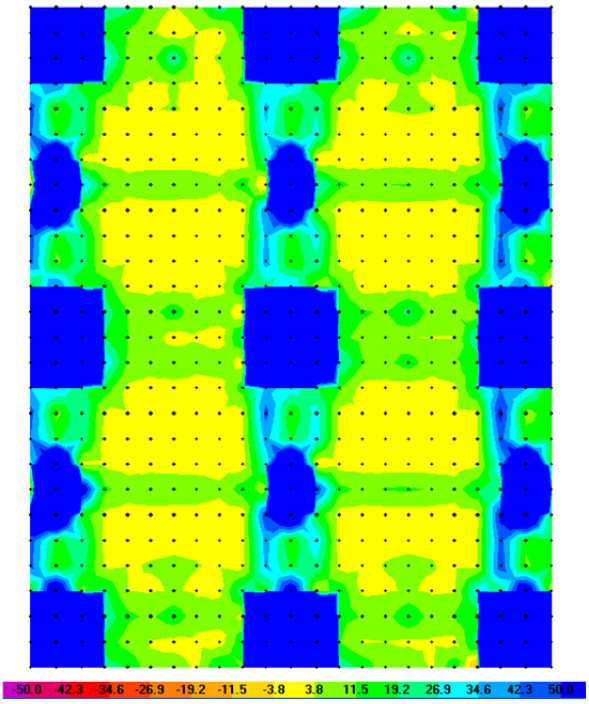


FIG. 4.700 - CASSONE Q.-11.00 - MOMENTO M_{11} - MAX INV-SLU

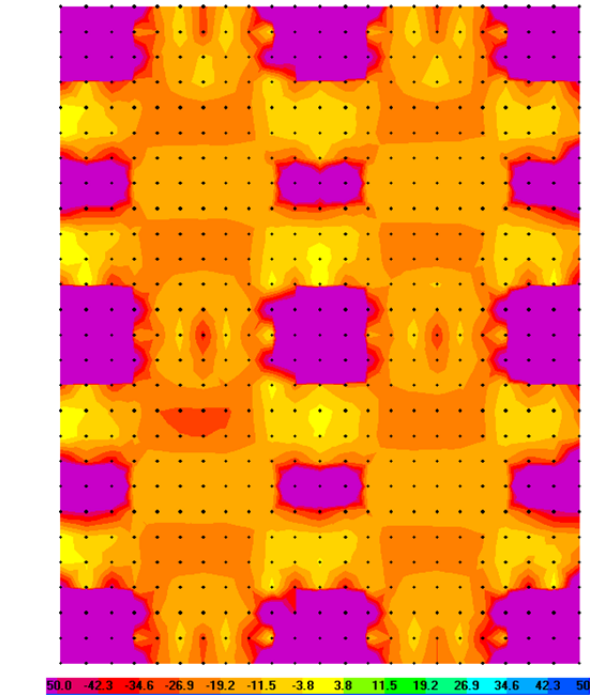


FIG. 4.701 - CASSONE Q.-11.00 - MOMENTO M_{11} - MIN INV-SLU

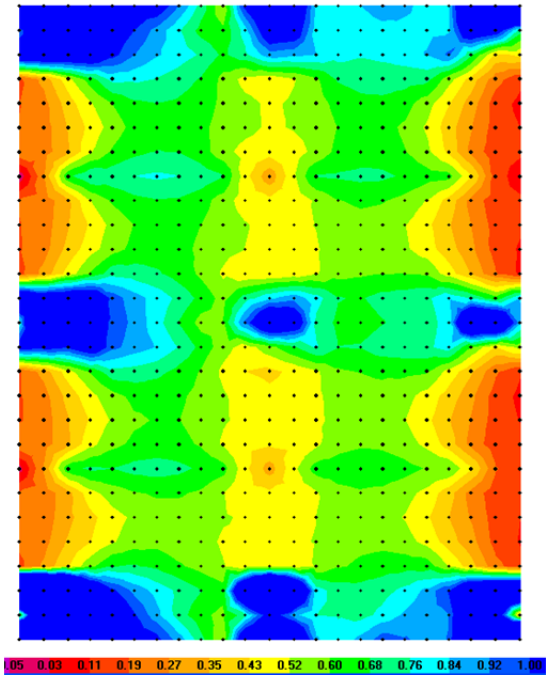


FIG. 4.702 - CASSONE Q.-11.00 - MOMENTO F_{11} - MAX INV-SLU(TRAZIONE)

Verifiche in fase di affondamento e galleggiamento agli SLU:

1° STRATO
Campata: M_{22} = 45kNm/m (solette C)

B = 1.0m H = 0.40 m H1 = 0.338 m (1°strato)

AF1 = 2260 mm^2 (ϕ24/200)

M_{Rd} = 280 kNm/m > M_{Sd}

M = 15kNm/m (solette A/B/D/E)

B = 1.0m H = 0.40 m H1 = 0.34 m (1°strato)

AF1 = 1570 mm^2 (ϕ20/200)

M_{Rd} = 200 kNm/m > M_{Sd}

Appoggio: M_{22} = - 90kNm/m

B = 1.0m H = 0.40 m H1 = 0.34 m (1°strato)

AF1 = 1570 mm^2 (ϕ20/200)
M_{Rd} = -199 kNm/m > M_{Sd}

2°STRATO
Campata: M_{11} = 25kNm/m (solette C)

B = l.0m H = 0.40 m H1 = 0.315 m (2°strato)

AF1 = 1905 mm^2 (ϕ22/200)

M_{Rd} = 220 kNm/m > M_{Sd}

Appoggio: M_{22} = -45kNm/m

B = l.0m H = 0.40 m H1 = 0.32 m (2°strato)

AF1 = 1570 mm^2 (ϕ20/200)

M_{Rd} = 186 kNm/m > M_{Sd}

Taglio: V_{max} = 44.1 x 4.9 / 2 = 108 kN/m

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	VRD
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
Taglio solette	0	400	371	1270			88	0,12	1,73	0,0034	35	19,8	0	0,15	0,47	177	175,44	**177**

Verifiche agli SLU(escluso Gall. & Aff.):

1° STRATO
Campata: M_{22} = -44 kNm/m (solette C), F_{22}=+800kN/m

B = l.0m H = 0.40 m H1 = 0.338 m (1°strato), H2=0.06m

AF1 = 2260 mm^2 (ϕ24/200), AF2 = 1570 mm^2 (ϕ20/200),

M_{Rd} = -90 kNm/m > M_{Sd}

M_{22} = 60 kNm/m (solette A/D), F_{22}=+800kN/m

B = l.0m H = 0.40 m H1 = 0.34 m (1°strato), H2=0.06m

AF1 = 1570 mm^2 (ϕ20/200), AF2 = 1570 mm^2 (ϕ20/200)

M_{Rd} = 81 kNm/m > M_{Sd}

Appoggio: M_{22} = +70kNm/m, F_{11} = +800kN/m(trazione)

B = 1.0m H = 0.40 m H1 = 0.338 m (1°strato), H2 = 0.06m

AF1 = 2260 mm^2 (ϕ24/200), AF2 = 1570 mm^2 (ϕ20/200),

M_{Rd} = +161 kNm/m > M_{Sd}

2°STRATO
Campata: M_{11} = +25 kNm/m (solette C), F_{11}=+700kN/m

B = 1.0m H = 0.40 m H1 = 0.320 m (2°strato), H2=0.080m

AF1 = 1570 mm^2 (ϕ20/200), AF2 = 1570 mm^2 (ϕ20/200)

M_{Rd} = 99 kNm/m > M_{Sd}

Appoggio: M_{11} = - 25kNm/m (setto C) , F_{22}=+700kN/m

B = 1.0m H = 0.40 m H1 = 0.315 m (2°strato) , H2 = 0.160m

AF1 = 1570mm^2 (ϕ20/200), AF2 = 1570mm^2 (ϕ20/200)

M_{Rd} = -145 kNm/m > M_{Sd}

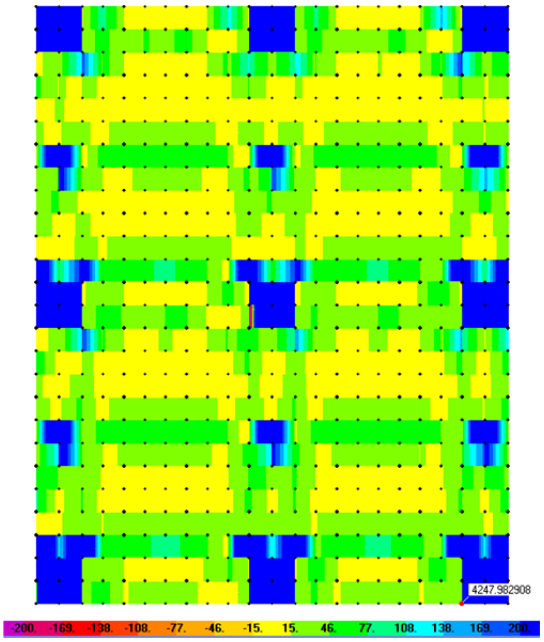


FIG. 4.703 - CASSONE Q.-11.00 - TAGLIO V_{23} [KN/M]

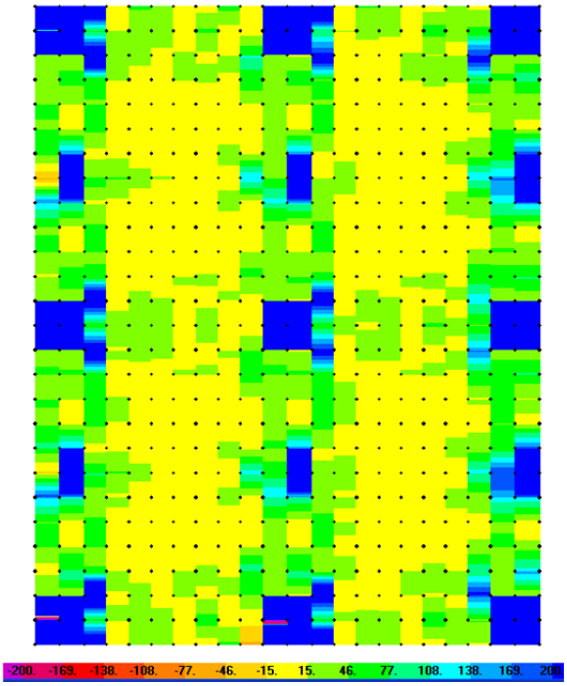


FIG. 4.704 - CASSONE Q.-11.00 - TAGLIO V_{13} [KN/M]

V = 80kN/m in presenza di trazione di 800kN/m

	Nsd	H	d1	A1	d2	A2	T	Crdc	k	fi1	fck	fcd	σ_c	k1	vmin	Vrd,c	Vrd,cmin	**VRD**
	[KN]	[mm]	[mm]	[mmq]	[mm]	[mmq]	(kN/m)									(kN)	(kN)	**(kN)**
soletta	-800	400	340	1570	60	1570	79	0.12	1.77	0.0046	35	19.8	-2	0.15	0.49	80	63.36	**80**

Si prevede una staffatura di n°3 barre del diametro ϕ14 passo 400mm nelle vicinanze degli appoggi.

	Orditura a taglio									acciaio	cls	
	p s(mm)	Asw	cot(teta)	cot(alfa)	sen(alfa)	z=0.9d (mm)	fywd	alfacw	v1	Vrd,s (kN)	Vrd,max (kN)	Vres [kN]
Taglio appoggio setto	400	462	2.5	0	1.00	306.0	391.0	1	0.5	345	1,080	345

Verifiche agli SLU(sisma):

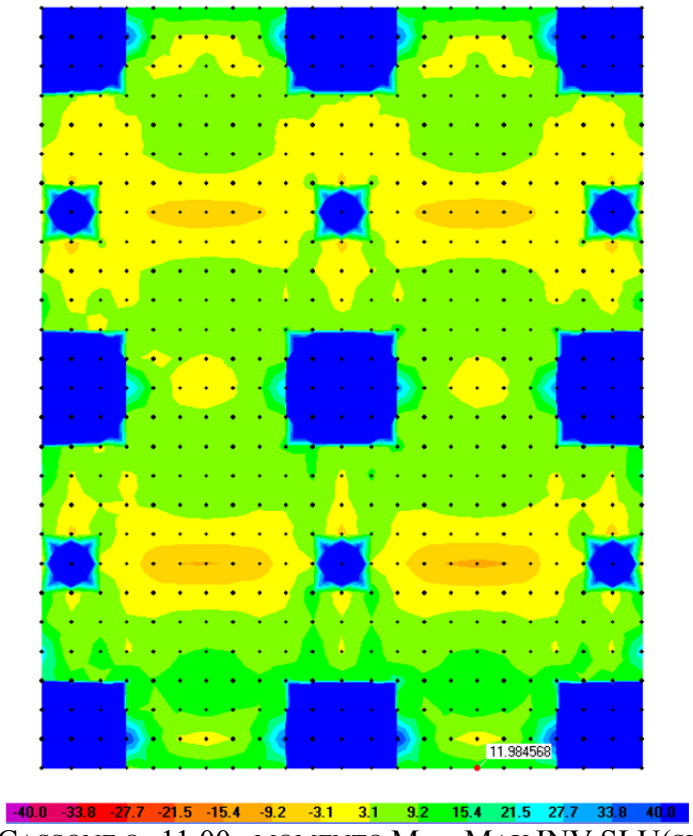


FIG. 4.705 - CASSONE Q.-11.00 - MOMENTO M_{22} - MAX INV-SLU(SISMA)

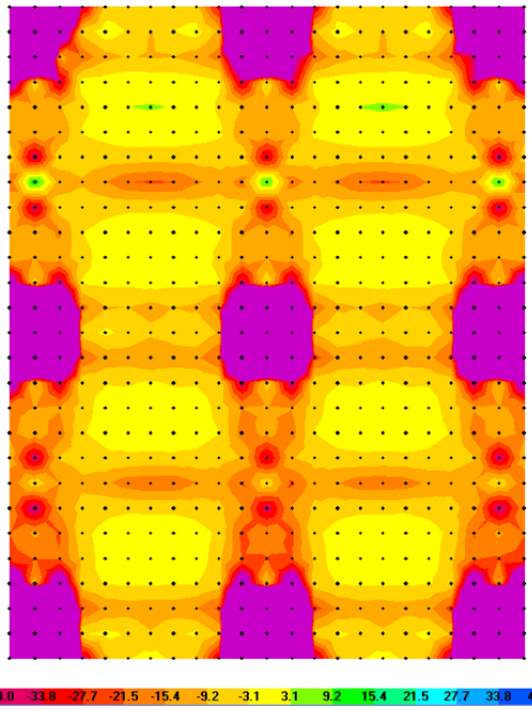


FIG. 4.706 - CASSONE Q.-11.00 - MOMENTO M_{22} - MIN - INV SLU(SISMA)

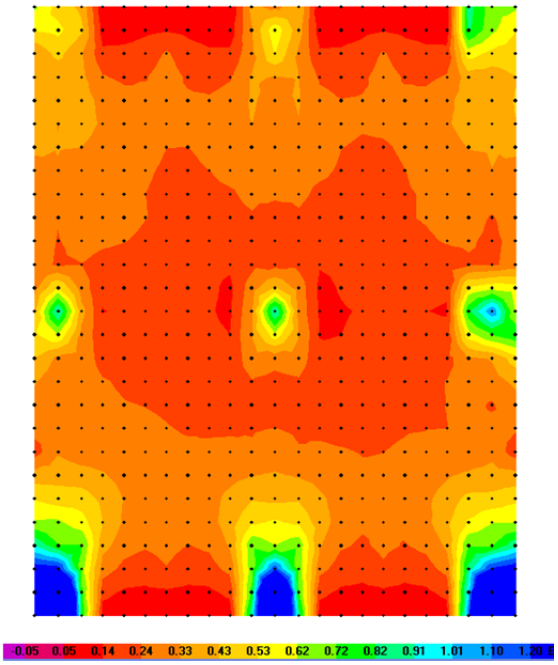


FIG. 4.707 - CASSONE Q.-11.00 - MOMENTO F_{22} - MAX - INV SLU(SISMA)

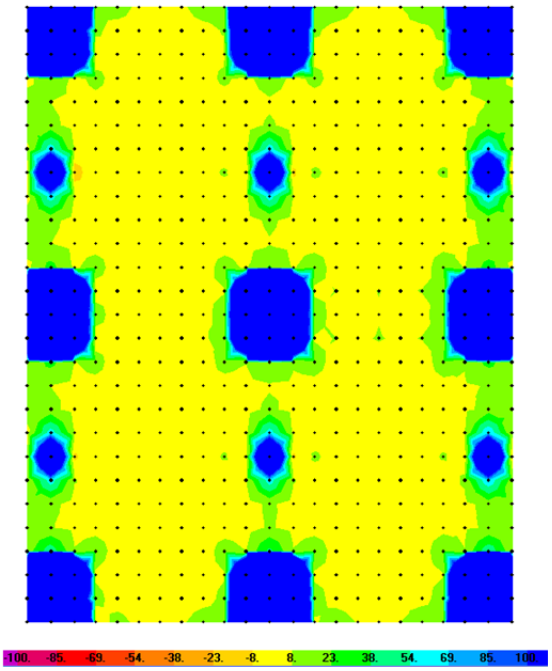


FIG. 4.708 - CASSONE Q.-11.00 - MOMENTO M_{11} - MAX INV-SLU(SISMA)

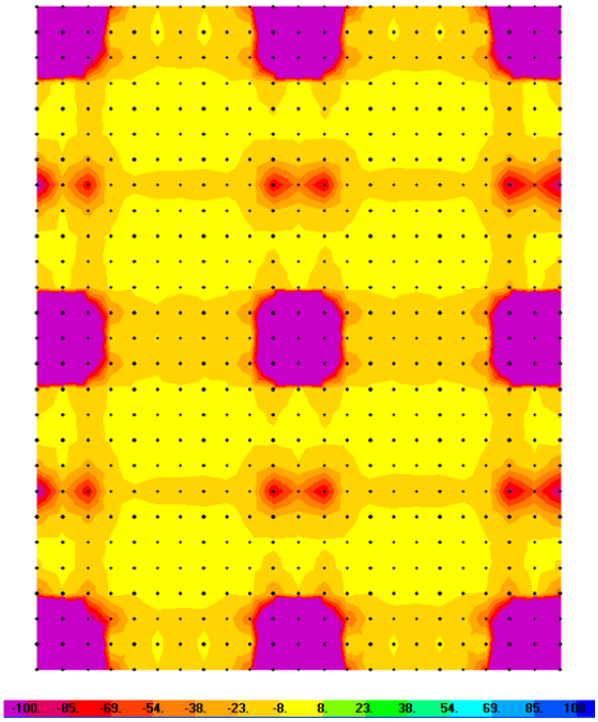


FIG. 4.709 - CASSONE Q.-11.00 - MOMENTO M_{11} - MIN INV-SLU(SISMA)

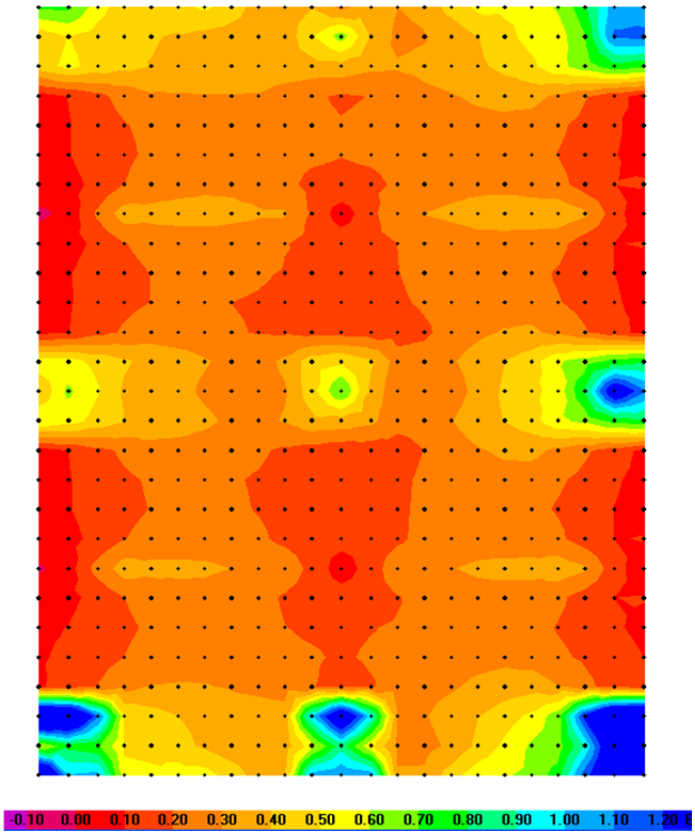


FIG. 4.710 - CASSONE Q.-11.00 - MOMENTO F_{11} - MAX INV-SLU(SISMA)

1° STRATO

Campata: M_{22} = 10kNm/m (solette C), F_{22}=+250kN/m

B = 1.0m H = 0.40 m H1 = 0.338 m (1°strato), H2=0.06m

AF1 = 2260 mm^2 (ϕ24/200), AF2 = 1570 mm^2 (ϕ20/200),

M_{Rd} = 242kNm/m > M_{Sd}

Campata: M_{22} = 13 kNm/m (solette A/D), F_{22}=+200kN/m

B = 1.0m H = 0.40 m H1 = 0.34 m (1°strato), H2=0.06m

AF1=AF2=1570 mm^2 (ϕ20/200)

M_{Rd} = 174kNm/m > M_{Sd}

Campata: M_{11} = +30 kNm/m (solette B/E), F_{11}=+170kN/m

B = l.0m H = 0.40 m H1 = 0.340 m , H2=0.080m (2°strato)

AF1=AF2 = 1570 mm^2 (ϕ20/200)

M_{Rd} = 190kNm/m > M_{Sd}

Appoggio: M_{22} = -22kNm/m, F_{22} = +250kN/m(trazione) (solette C)

B = l.0m H = 0.40 m H1 = 0.340 m (1°strato), H2 = 0.062m

AF1 = 2260 mm^2 (ϕ24/200), AF2 = 1570 mm^2 (ϕ20/200),

M_{Rd} = -169kNm/m > M_{Sd}

2°STRATO
Campata: M_{22} = +40 kNm/m (solette B/E), F_{22}=+700kN/m

B = l.0m H = 0.40 m H1 = 0.320 m (2°strato), H2=0.060m

AF1 = AF2= 1570 mm^2 (ϕ20/200)

M_{Rd} = 86kNm/m > M_{Sd}

Campata: M_{11} = +16 kNm/m (solette C), F_{11}=+300kN/m

B = l.0m H = 0.40 m H1 = 0.315 m , H2=0.080m

AF1 = 1905 mm^2 (ϕ22/200), AF2 = 1570 mm^2 (ϕ20/200)

M_{Rd} = 190kNm/m > M_{Sd}

Appoggio: M_{11} = - 30kNm/m (setto C) , F_{11}=+160kN/m

B = l.0m H = 0.40 m H1 = 0.320 m (2°strato), H2 = 0.080m

AF1 = 1570mm^2 (ϕ20/200), AF2 = 1570mm^2 (ϕ20/200)

M_{Rd} = - 180kNm/m > M_{Sd}

Il taglio massimo è pari a 200kN/m per cui l'orditura a taglio previsto per gli SLU è sufficiente.

Verifica agli Stati Limiti d'Esercizio (frequente)

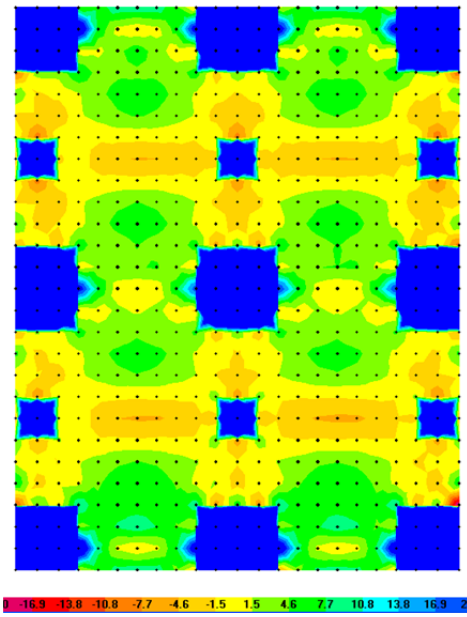


FIG. 4.711 - CASSONE Q.-11.00 - MOMENTO M_{22} - MAX INV-SLE(FREQ)

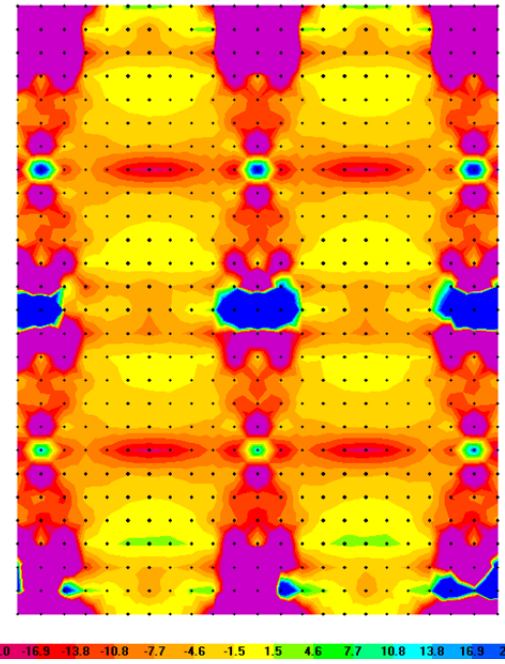


FIG. 4.712 - CASSONE Q.-11.00 - MOMENTO M_{22} - MIN INV-SLE(FREQ)

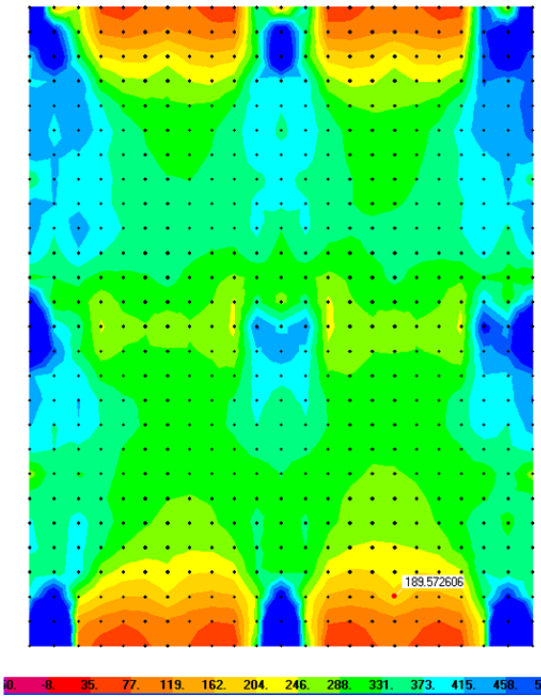


FIG. 4.713 - CASSONE Q.-11.00 - MOMENTO F_{22} - MAX INV-SLE(FREQ)

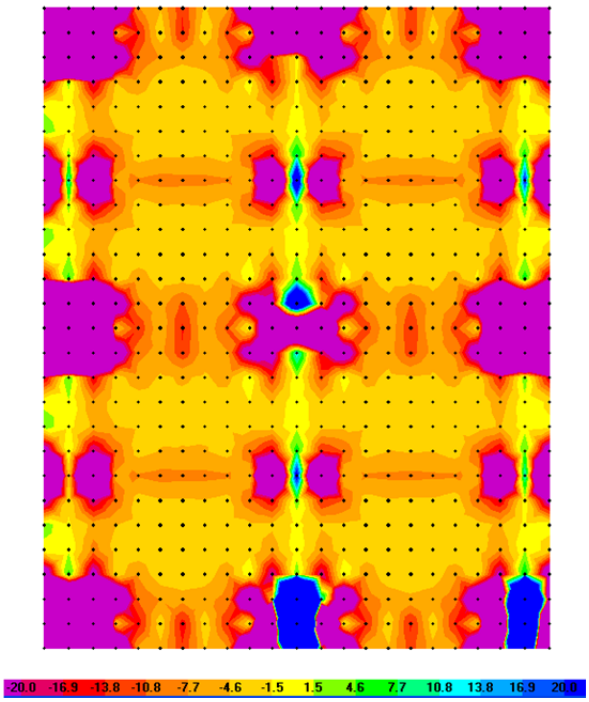


FIG. 4.714 - CASSONE Q.-11.00 - MOMENTO M11 - MIN INV-SLE(FREQ)

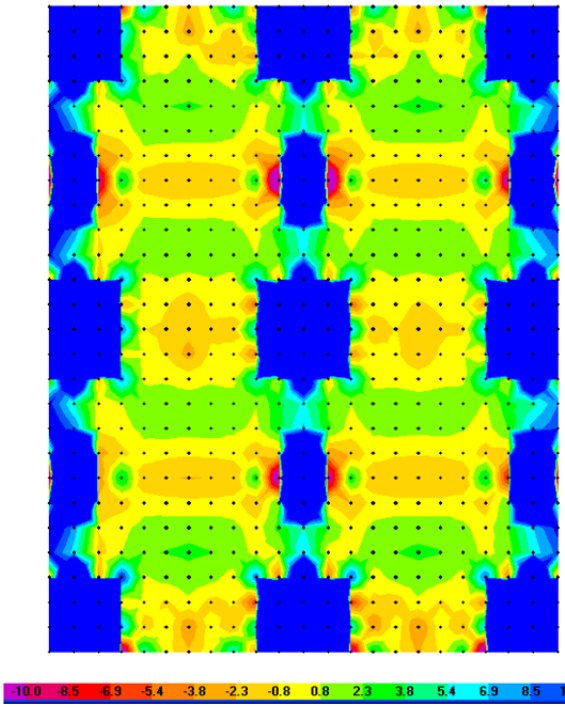


FIG. 4.715 - CASSONE Q.-11.00 - MOMENTO M_{11} - MAX INV-SLE(FREQ)

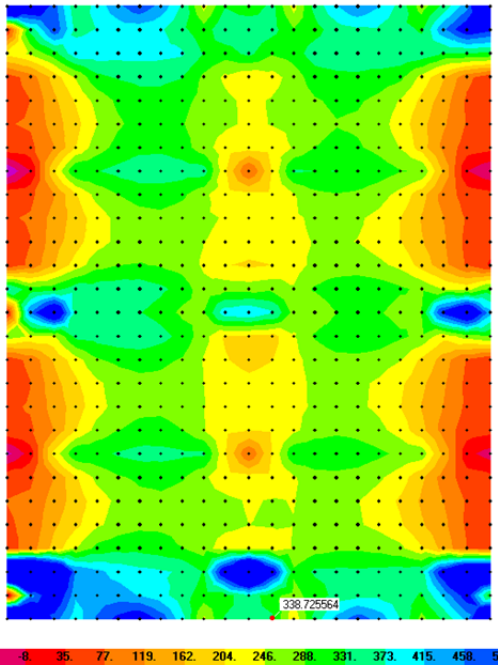


FIG. 4.716 - CASSONE Q.-11.00 - MOMENTO F_{11} - MAX INV-SLE(FREQ)

1° STRATO

Campata

Solette A/B/D/E:

M_{22} = 5kNm/m , F_{22} = +280 kN/m

B = 1.0m H = 0.40 m H1 = 0.34 m (1°strato) H2 = 0.06m

AF1 = 1570 mm^2 (ϕ20/200), AF2 = 1570 mm^2 (ϕ20/200)

σ_a=99MPa, σ_a=-MPa

Sigma_acc totale = 99+28(getto completamento)=127MPa
M_{22} = 62kNm/m da una tensioni di 127MPa nell'acciaio con una fessurazione pari a w=0.098mm.

Soletta C:
M_{22} = 5kNm/m (soletta C), F_{22} = +280 kN/m

B = 1.0m H = 0.40 m H1 = 0.338 m (1°strato) H2 = 0.06m

AF1 = 2260 mm^2 (ϕ24/200), AF2 = 1570 mm^2 (ϕ20/200)

σ_a=74MPa, σ_c=-MPa

Soletta C:
1°strato - Sigma_acc totale = 74+106(getto completamento)=180MPa
M_{22} = 123kNm/m da una tensioni di 180MPa nell'acciaio con una fessurazione pari a w=0.190mm

Appoggio: M_{22} = - 18kNm/m, F_{22} = +290 kN/m

B = 1.0m H = 0.40 m H1 = 0.34 m (1°strato) H2 = 0.162 m

AF1 = 1570 mm^2 (ϕ20/200), AF2 = 2260 mm^2 (ϕ24/200)

σ_a=102MPa, w=0.092mm

2°STRATO

Campata:

Soletta A/B/D/E

M_{11} = 3kNm/m (soletta C), F_{11} = +300kN/m

B = 1.0m H = 0.40 m H1 = 0.32 m (2°strato) H2 = 0.08 m (2°strato)
AF1 = 1570 mm^2 (ϕ20/200), AF2 = 1570 mm^2 (ϕ20/200)

σ_a=102MPa,

2°strato - Sigma_acc totale = 102+20(getto completamento)=122MPa
M = 56kNm/m da una tensioni di 122MPa nell'acciaio con una fessurazione pari a w=0.111mm

Soletta C
M_{11} = 3kNm/m (soletta C), F_{11} = +300kN/m

B = 1.0m H = 0.40 m H1 = 0.315 m (2°strato) H2 = 0.08 m (2°strato)

AF1 = 1905 mm^2 (ϕ22/200), AF2 = 1570 mm^2 (ϕ20/200)

σ_a=85MPa,

2°strato - Sigma_acc totale = 85+94(getto completamento)=179MPa
M = 97kNm/m da una tensioni di 179MPa nell'acciaio con una fessurazione pari a w=0.186mm

Appoggio: M_{11} = -14kNm/m , F_{11} = + 300kN/m

B = 1.0m H = 0.40 m H1 = 0.32 m (2°strato) H2 = 0.16 m

AF1 = 1570 mm^2 (ϕ20/200), AF2 = 1570 mm^2 (ϕ20/200)

σ_a=102MPa, w=0.098mm

<u>Verifica agli Stati Limiti d'Esercizio (rara)</u>

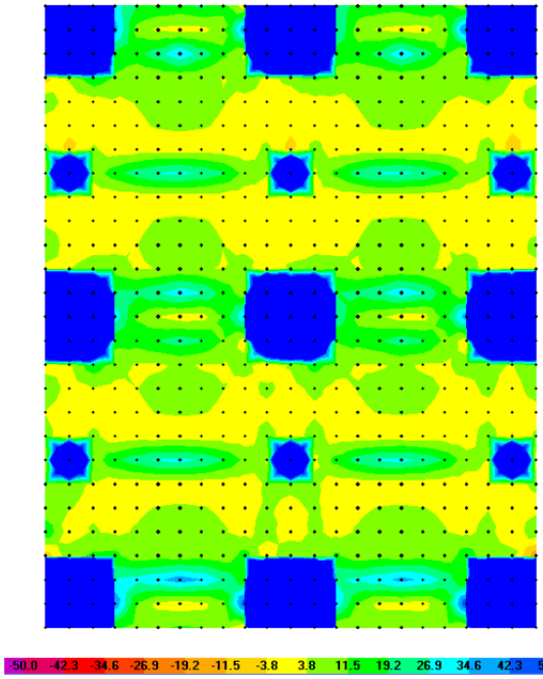


FIG. 4.717 - CASSONE Q.-11.00 - MOMENTO M_{22} - MAX INV-SLE(RARA)

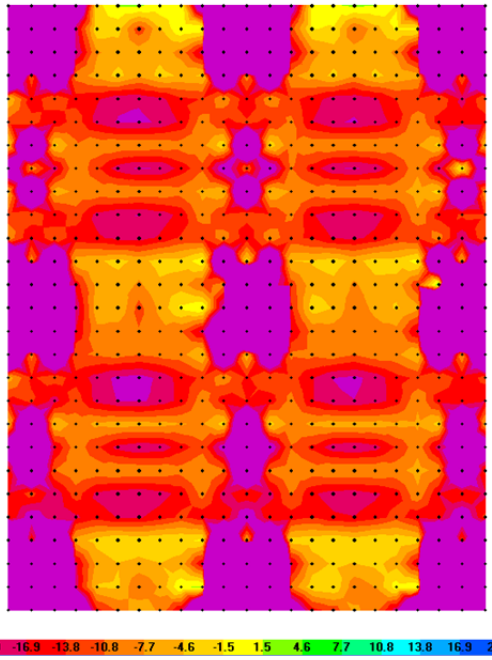


FIG. 4.718 - CASSONE Q.-11.00 - MOMENTO M_{22} - MIN INV-SLE(RARA)

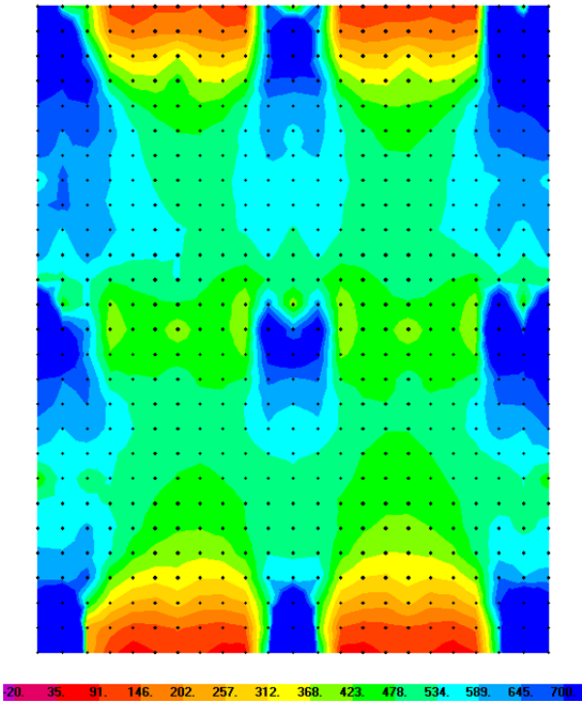


FIG. 4.719 - CASSONE Q.-11.00 - MOMENTO F_{22} - MAX INV-SLE(RARA)

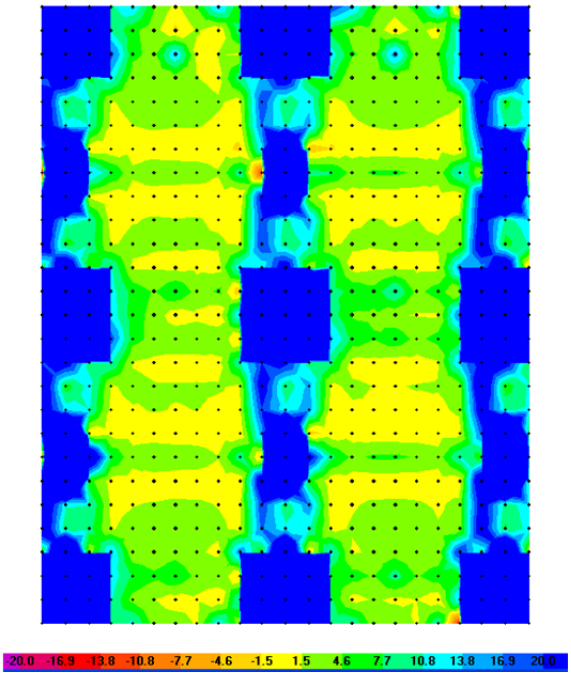


FIG. 4.720 - CASSONE Q.-11.00 - MOMENTO M_{11} - MAX INV-SLE(RARA)

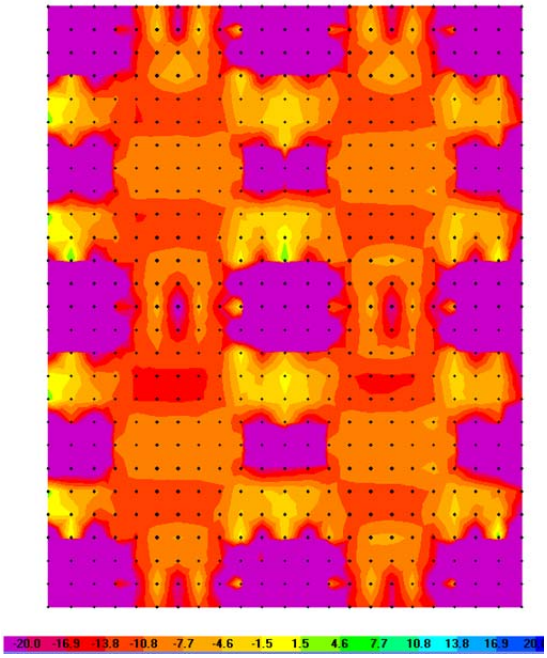


FIG. 4.721 - CASSONE Q.-11.00 - MOMENTO M_{11} - MIN INV-SLE(RARA)

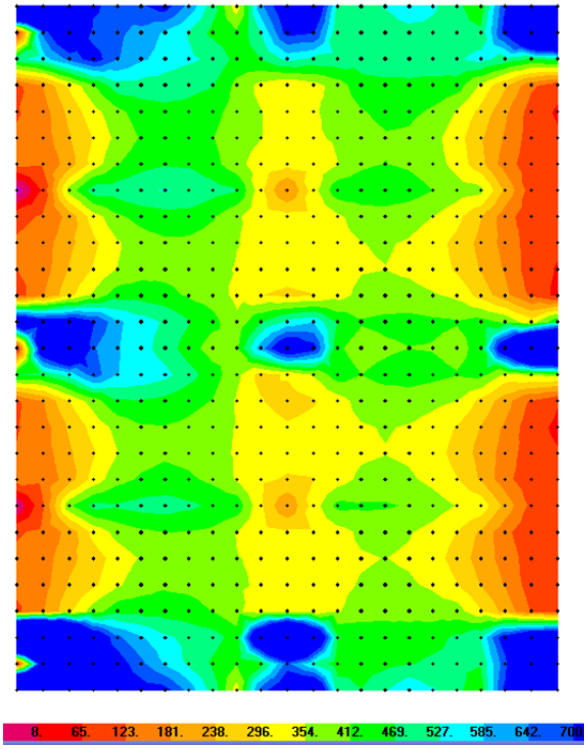


FIG. 4.722 - CASSONE Q.-11.00 - MOMENTO F_{11} - MAX INV-SLE(RARA)

1° STRATO
Campata:

Solette A/B/D/E:
M_{22} = 37kNm/m , F_{22} = +460 kN/m

B = 1.0m H = 0.40 m H1 = 0.34 m (1°strato) H2 = 0.06m

AF1 = 1570 mm^2 (ϕ20/200), AF2 = 1570 mm^2 (ϕ20/200)

σ_a=226MPa

Sigma_acc totale = 226+28(getto completamento)=254MPa

Soletta C:
M_{22} = 37kNm/m (soletta C), F_{22} = +460 kN/m

B = 1.0m H = 0.40 m H1 = 0.338 m (1°strato) H2 = 0.06m

AF1 = 2260 mm^2 (ϕ24/200), AF2 = 1570 mm^2 (ϕ20/200)

σ_a=158MPa

Soletta C:
1°strato - Sigma_acc totale = 158+106(getto completamento)=264MPa

Appoggio: M_{22} = - 22kNm/m, F_{22} = +460 kN/m

B = 1.0m H = 0.40 m H1 = 0.34 m (1°strato) H2 = 0.162 m

AF1 = 1570 mm^2 (ϕ20/200), AF2 = 2260 mm^2 (ϕ24/200)

σ_a=156MPa

2°STRATO
Campata:

Soletta A/B/D/E

M_{11} = 24kNm/m , F_{11} = +500kN/m

B = 1.0m H = 0.40 m H1 = 0.32 m (2°strato) H2 = 0.08 m (2°strato)
AF1 = 1570 mm^2 (ϕ20/200), AF2 = 1570 mm^2 (ϕ20/200)

σ_a=219MPa,

2°strato - Sigma_acc totale = 219+20(getto completamento)=239MPa

Soletta C
M_{11} = 10kNm/m (soletta C), F_{11} = +500kN/m

B = 1.0m H = 0.40 m H1 = 0.315 m (2°strato) H2 = 0.08 m (2°strato)

AF1 = 1905 mm^2 (ϕ22/200), AF2 = 1570 mm^2 (ϕ20/200)

σ_a=153MPa,

2°strato - Sigma_acc totale = 153+94(getto completamento)=247MPa

Appoggio: M_{11} = -10kNm/m , F_{11} = + 500kN/m

B = 1.0m H = 0.40 m H1 = 0.32 m (2°strato) H2 = 0.16 m

AF1 = 1570 mm^2 (ϕ20/200), AF2 = 1570 mm^2 (ϕ20/200)

σ_a=195MPa

4.6.3 Dimensionamento delle solette di copertura cassone a q.ta-13.00 (B7-B8)

I cassoni B7-B8 hanno un sovraccarico minore dei cassoni C7-C8 per cui si predispone la stessa orditura delle solette.

4.7 Pressioni trasmesse allo scanno d'imbasamento

Di seguito si riporta la deformazione verticale dello scanno sotto il solettone per gli inviluppi agli SLU, SLE(frequente) e SLE(rara) per le combinazioni di carico riportate nel capitolo 4. Il sovraccarico utilizzato è pari a 7.5t/m^2

La pressione sotto il cassone è pari alla deformazione verticale moltiplicato per la rigidezza della modulo di sottofondo utilizzato pari a 13000kN/m^3 per il perimetro di larghezza 5m e 8000kN/m^3 per la parte interna.

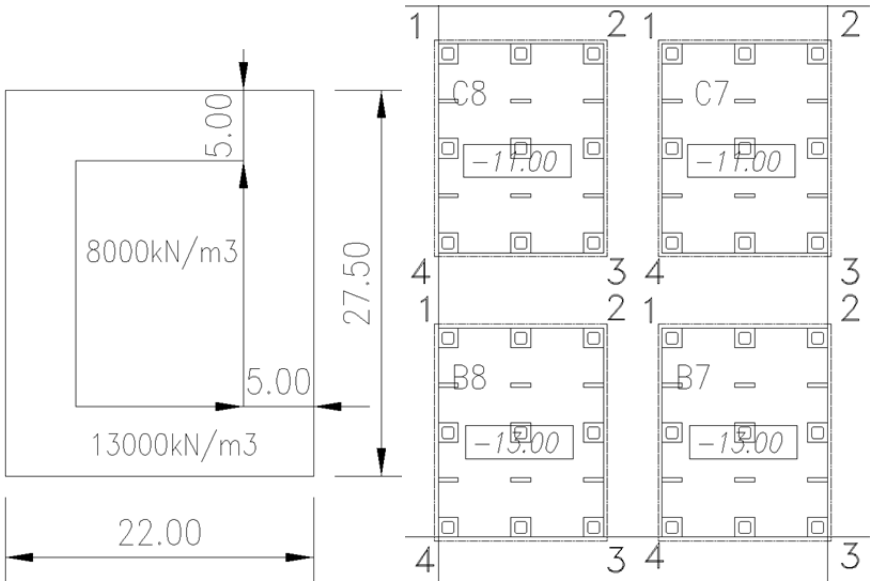


FIG. 4.723 - MODULO WINKLER DI SOTTOFONDO E SCHEMA IDENTIFICATIVO CASSONI

4.7.1 Pressioni agli SLU - cassoni B7-B8(q.-13)

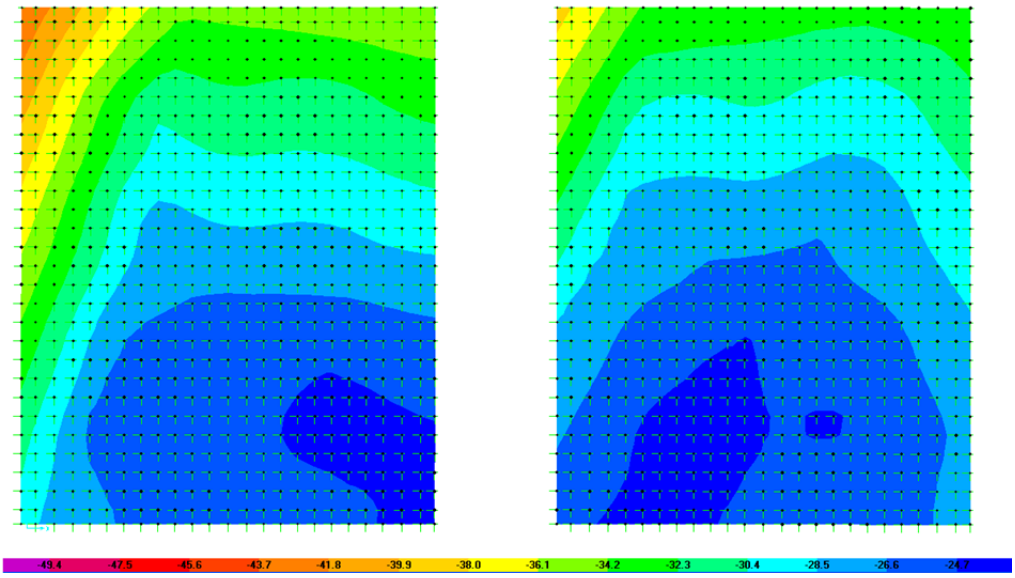


FIG. 4.724 - SLU - CASSONI B7-B8(-13) CEDIMENTO VERTICALE [MM]

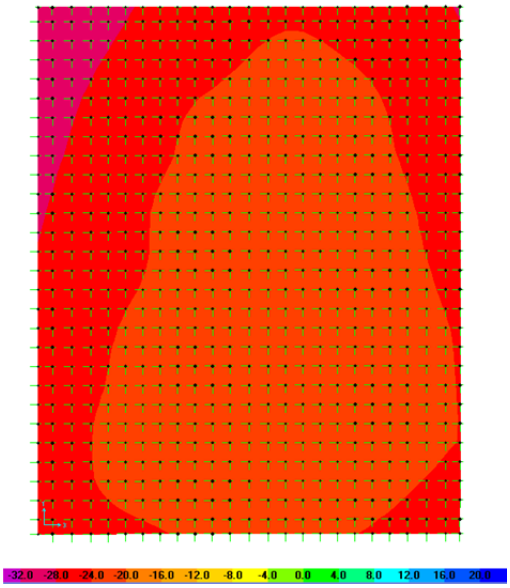


FIG. 4.725 - SLU(SISMA) - CASSONI B7-B8(-13) CEDIMENTO VERTICALE [MM]

La deformazione sotto il cassone varia da un minimo di 25mm a un massimo di 44mm per il perimetro con una pressione trasmesso allo scanno pari a 325kPa e 572kPa rispettivamente.

La deformazione al centro del cassone è pari a 28mm circa corrispondente ad una pressione di 224kPa.

Nella Tab. seguente si da la pressione nei vertici dei cassoni nonché la pressione media al centro del cassone:

SLU agli stati limiti ultimi						
	1	2	3	4	Pmedio	
B7	507*	423*	351*	325*	216**	kPa
B8	572*	468*	312*	390*	224**	kPa
B7/B8 (sisma)	403*	364*	325*	338*	176**	kPa
*cedimento x 13000kN/m^3/**cedimento x 8000kN/m^3						

4.7.2 Pressioni agli SLU - cassoni C7-C8(q.-11)

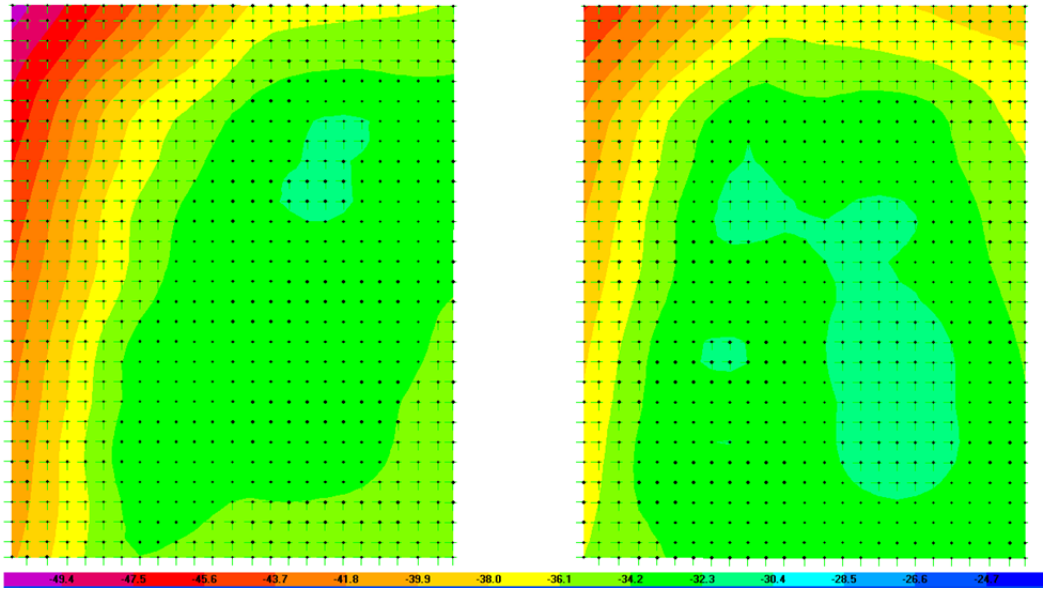


FIG. 4.726 - SLU - CASSONI C7-C8(-11) CEDIMENTO VERTICALE [MM]

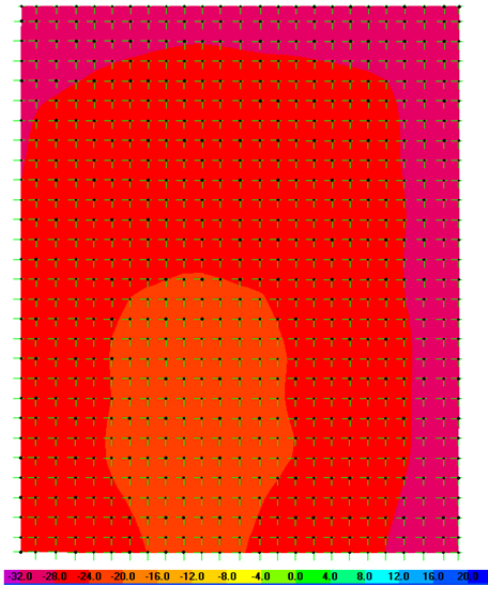


FIG. 4.727 - SLU(SISMA) - CASSONI C7-C8(-11) CEDIMENTO VERTICALE [MM]

La deformazione sotto il cassone varia da un minimo di 34mm ad un massimo di 50mm per il perimetro con una pressione trasmessa allo scanno pari a 442kPa e 598kPa rispettivamente.

La deformazione al centro del cassone è pari a 33mm circa corrispondente ad una pressione di 264kPa.

SLU agli stati limiti ultimi						
	1	2	3	4	Pmedio	
C7	598*	507*	442*	468*	264**	kPa
C8	650*	468*	468*	520*	264**	kPa
C7/C8(sisma)	403*	416*	403*	364*	192**	kPa
*cedimento x 13000kN/m^3/**cedimento x 8000kN/m^3						

4.7.3 Pressioni agli SLE combinazioni frequenti - cassoni B7-B8(-13)

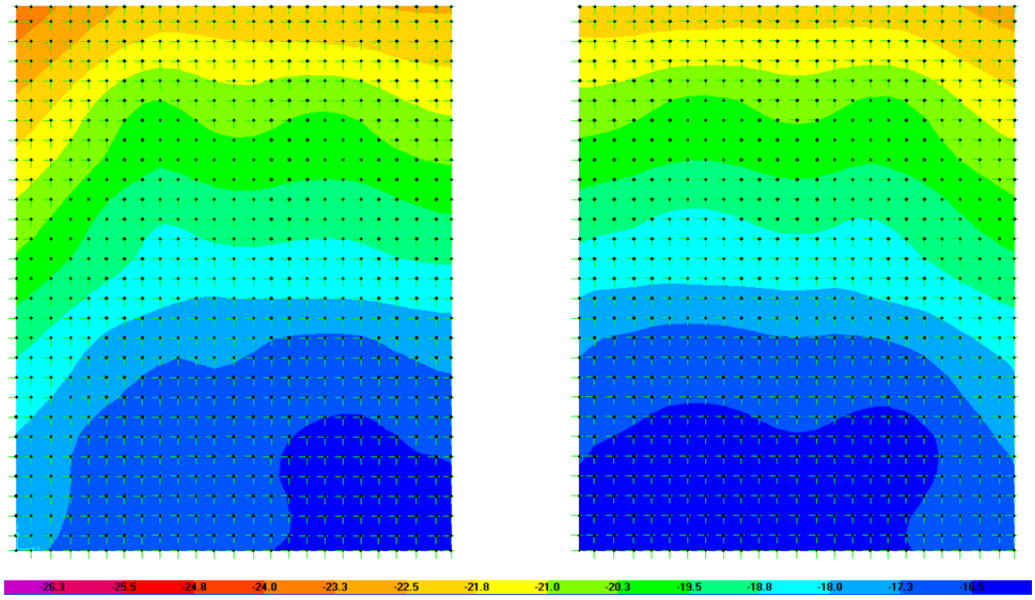


FIG. 4.728 - SLE(FREQ.) - CASSONI B7-B8(-13) CEDIMENTO VERTICALE [MM]

SLE - combinazioni frequenti						
	1	2	3	4	Pmedio	
B7	286*	299*	221*	208*	152**	kPa
B8	312*	299*	208*	221*	152**	kPa
*cedimento x 13000kN/m^3/**cedimento x 8000kN/m^3						

4.7.4 Pressioni agli SLE combinazioni frequenti - cassoni C7-C8(-11)

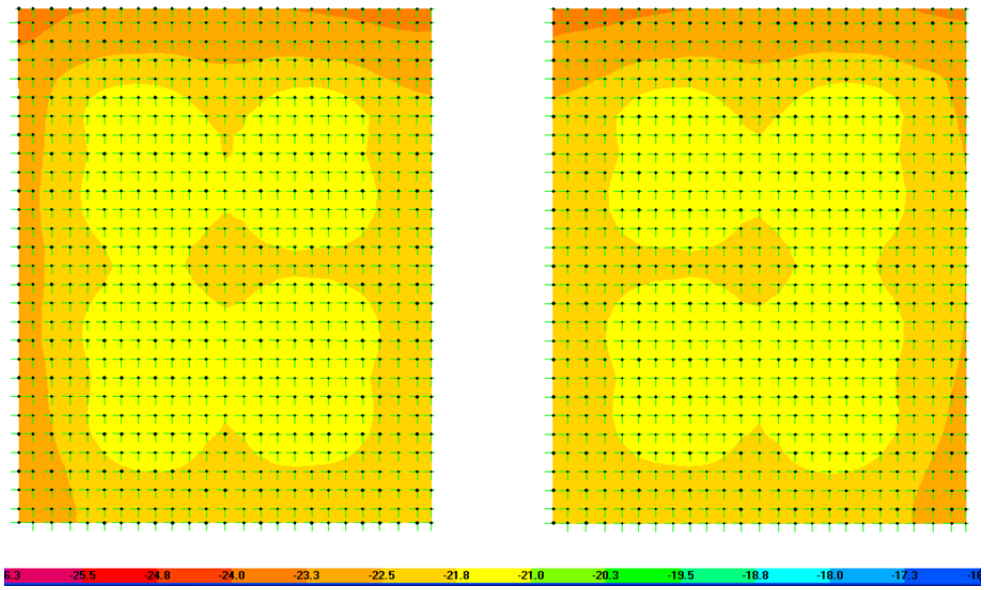


FIG. 4.729 - SLE(FREQ) - CASSONI C7-C8(-11) CEDIMENTO VERTICALE [MM]

SLE - combinazioni frequenti						
	1	2	3	4	Pmedio	
C7	312*	299*	299*	286*	176**	kPa
C8	312*	299*	299*	299*	176**	kPa
*cedimento x 13000kN/m^3/**cedimento x 8000kN/m^3						

4.7.5 Pressioni agli SLE combinazioni rare - cassoni B7-B8(-13)

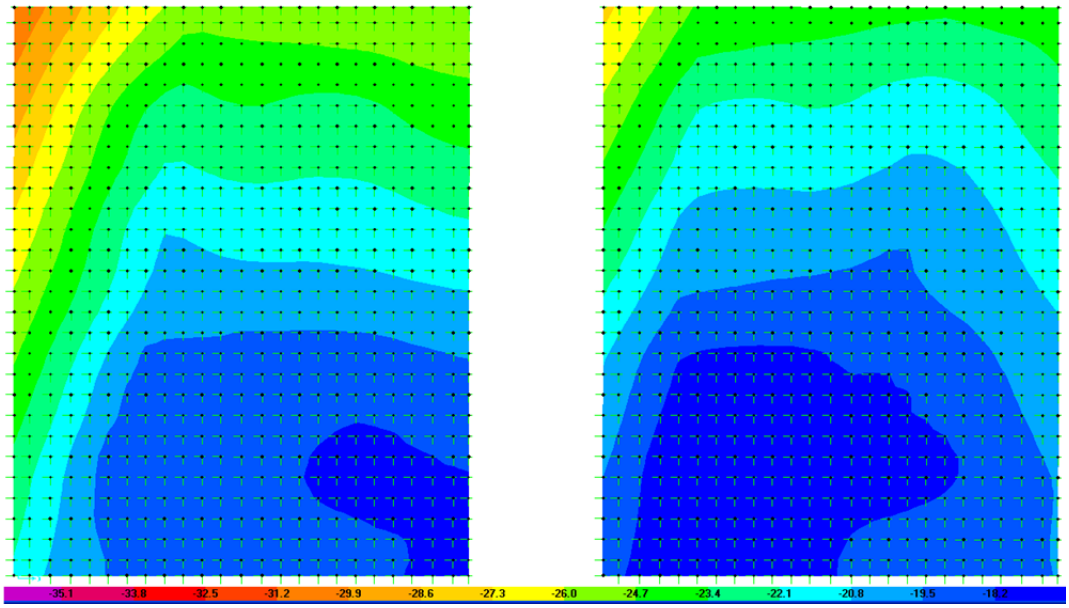


FIG. 4.730 - SLE(RARE) - CASSONI B7-B8(-11) CEDIMENTO VERTICALE [MM]

SLE - combinazioni rare						
	1	2	3	4	Pmedio	
B7	364*	312*	260*	247*	152**	kPa
B8	403*	338*	234*	286*	168**	kPa
*cedimento x 13000kN/m^3/**cedimento x 8000kN/m^3						

4.7.6 Pressioni agli SLE combinazioni rare - cassoni C7-C8(-11)

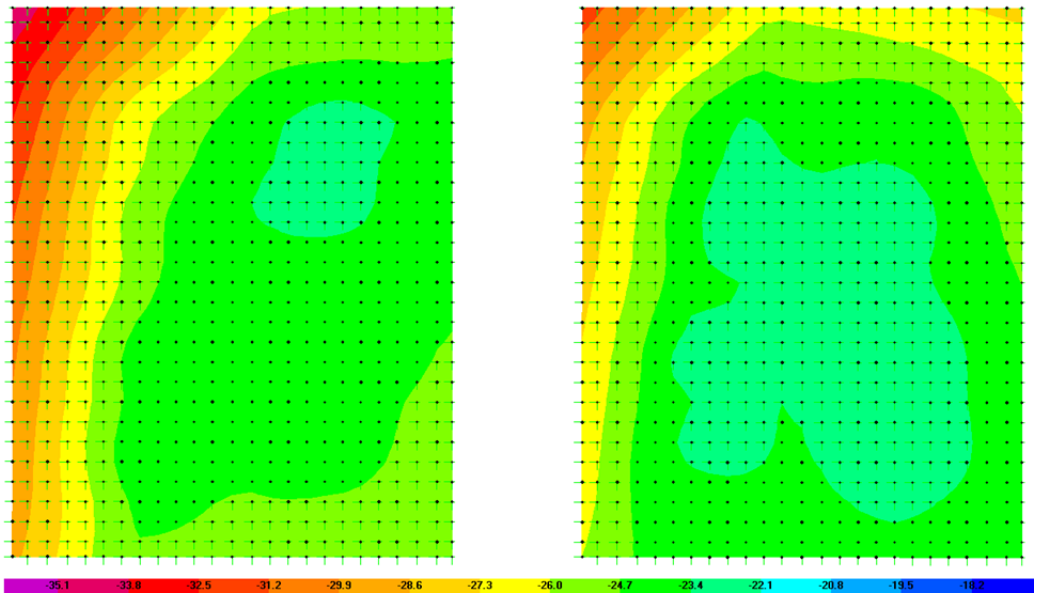


FIG. 4.731 - SLE(RARE) - CASSONI C7-C8(-11) CEDIMENTO VERTICALE [MM]

SLE - combinazioni rare						
	1	2	3	4	Pmedio	
C7	416*	364*	312*	338*	184**	kPa
C8	455*	338*	338*	377*	192**	kPa
*cedimento x 13000kN/m^3/**cedimento x 8000kN/m^3						