

ORDINE INGEGNERI
della provincia di Barletta Andria Trani



Hotel Caporala

-Verona-

Zona Sismica 3

Valori dei parametri a_g , F_o , T_C^* per i periodi di ritorno T_R di riferimento

T_R [anni]	a_g [g]	F_o [-]	T_C^* [s]
30	0,038	2,552	0,236
50	0,052	2,466	0,254
72	0,062	2,514	0,259
101	0,074	2,497	0,263
140	0,086	2,463	0,265
201	0,102	2,437	0,270
475	0,147	2,430	0,277
975	0,191	2,473	0,279
2475	0,270	2,382	0,290



Le verifiche di resistenza allo SLV con analisi dinamica modale richiedono la descrizione dell'azione sismica mediante lo spettro di progetto con fattore di struttura (q) posto pari a 3 (struttura a pareti isolate, classe di duttilità CD" B") secondo le seguenti relazioni:

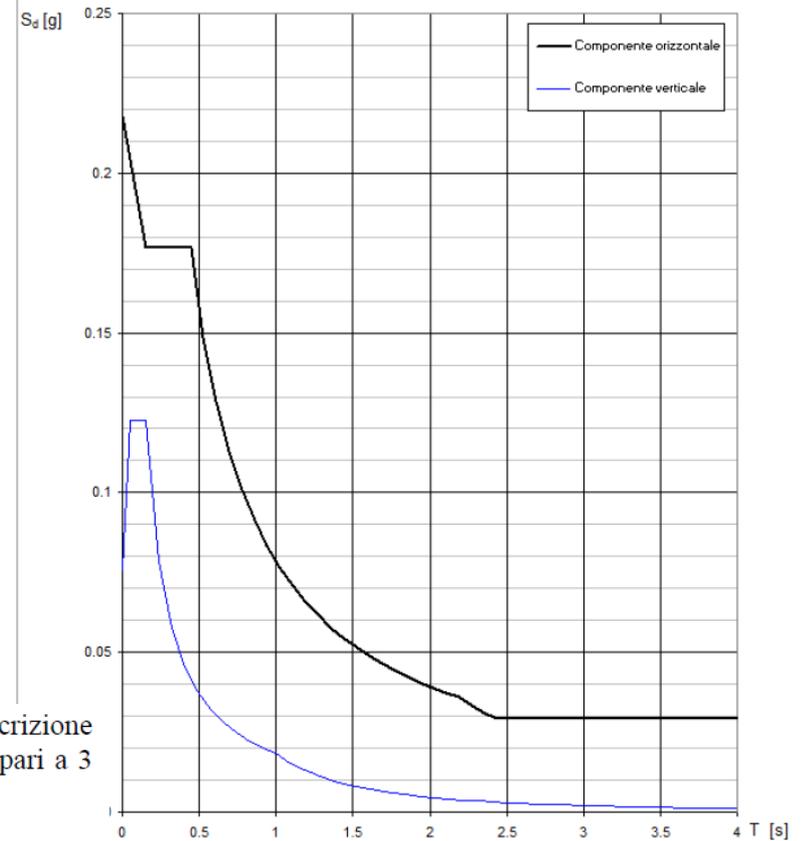
$$0 \leq T < T_B \quad S_d(T) = a_g \cdot S \cdot \frac{1}{q} \cdot F_o \cdot \left[\frac{T}{T_B} + \frac{q}{F_o} \cdot \left(1 - \frac{T}{T_B} \right) \right]$$

$$T_B \leq T < T_C \quad S_d(T) = a_g \cdot S \cdot \frac{1}{q} \cdot F_o$$

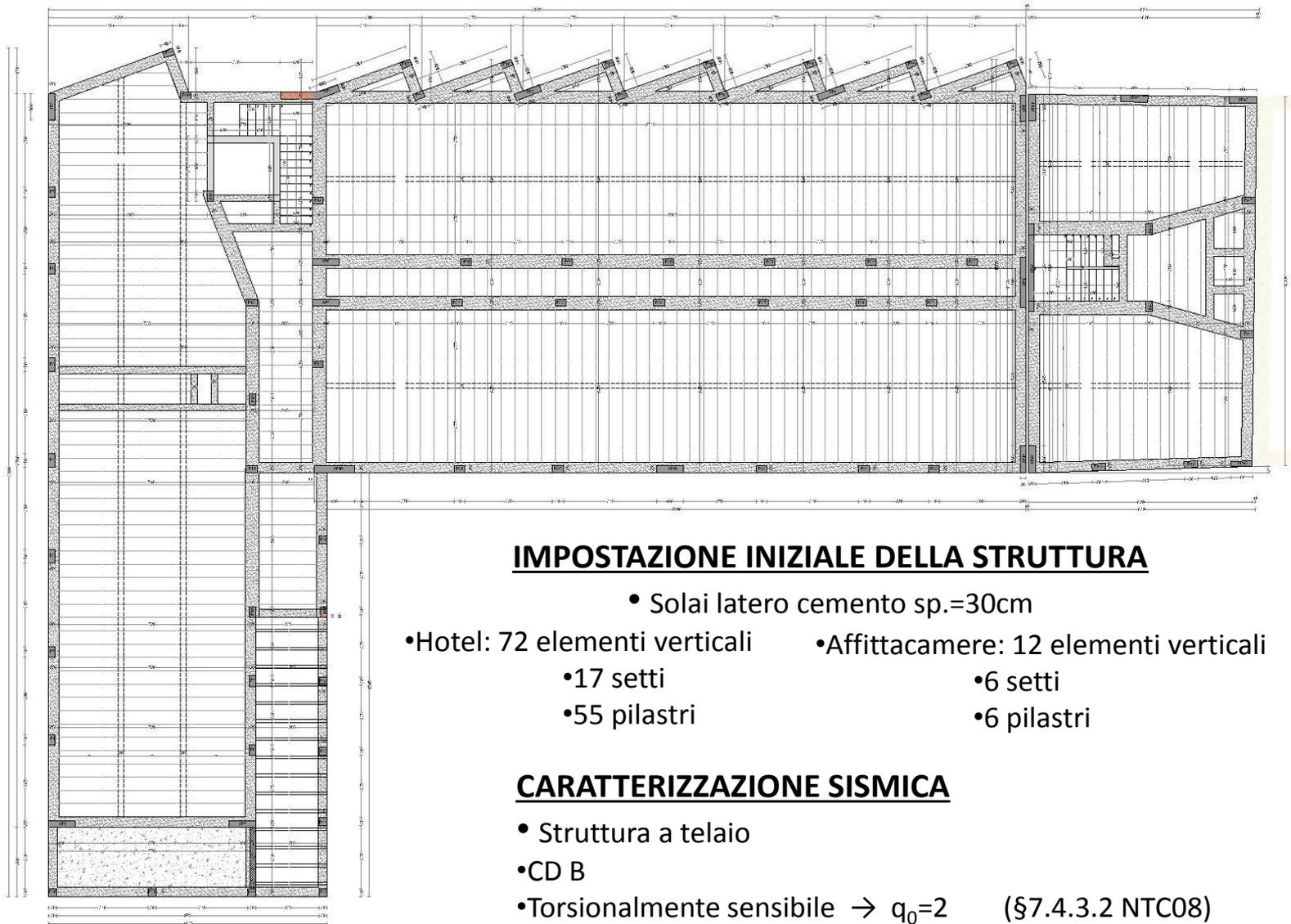
$$T_C \leq T < T_D \quad S_d(T) = a_g \cdot S \cdot \frac{1}{q} \cdot F_o \cdot \left(\frac{T_C}{T} \right)$$

$$T \geq T_D \quad S_d(T) = a_g \cdot S \cdot \frac{1}{q} \cdot F_o \cdot \left(\frac{T_C \cdot T_D}{T^2} \right) \quad \text{con } S_d(T) \geq 0.20 \cdot a_g$$

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



Spettro di progetto per lo SLV con $q=3$



IMPOSTAZIONE INIZIALE DELLA STRUTTURA

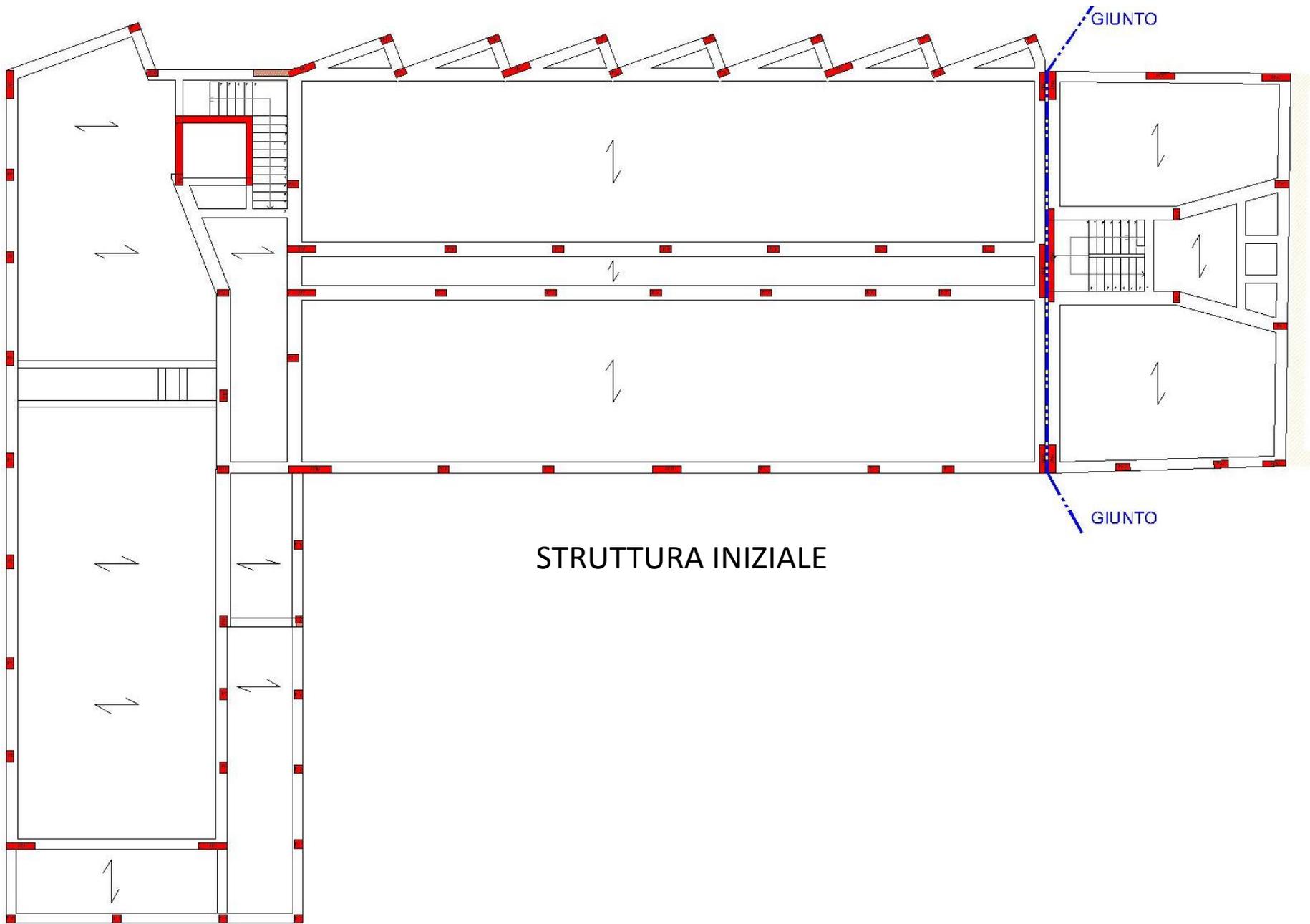
- Solai latero cemento sp.=30cm
- Hotel: 72 elementi verticali
 - 17 setti
 - 55 pilastri
- Affittacamere: 12 elementi verticali
 - 6 setti
 - 6 pilastri

CARATTERIZZAZIONE SISMICA

- Struttura a telaio
- CD B
- Torsionalmente sensibile → $q_0=2$ (§7.4.3.2 NTC08)

Tabella 7.4.I – Valori di q_0

Tipologia	q_0	
	CD" B"	CD" A"
Strutture a telaio, a pareti accoppiate, miste	$3,0 \alpha_{IV} / \alpha_1$	$4,5 \alpha_{IV} / \alpha_1$
Strutture a pareti non accoppiate	3,0	$4,0 \alpha_{IV} / \alpha_1$
Strutture deformabili torsionalmente	2,0	3,0
Strutture a pendolo inverso	1,5	2,0



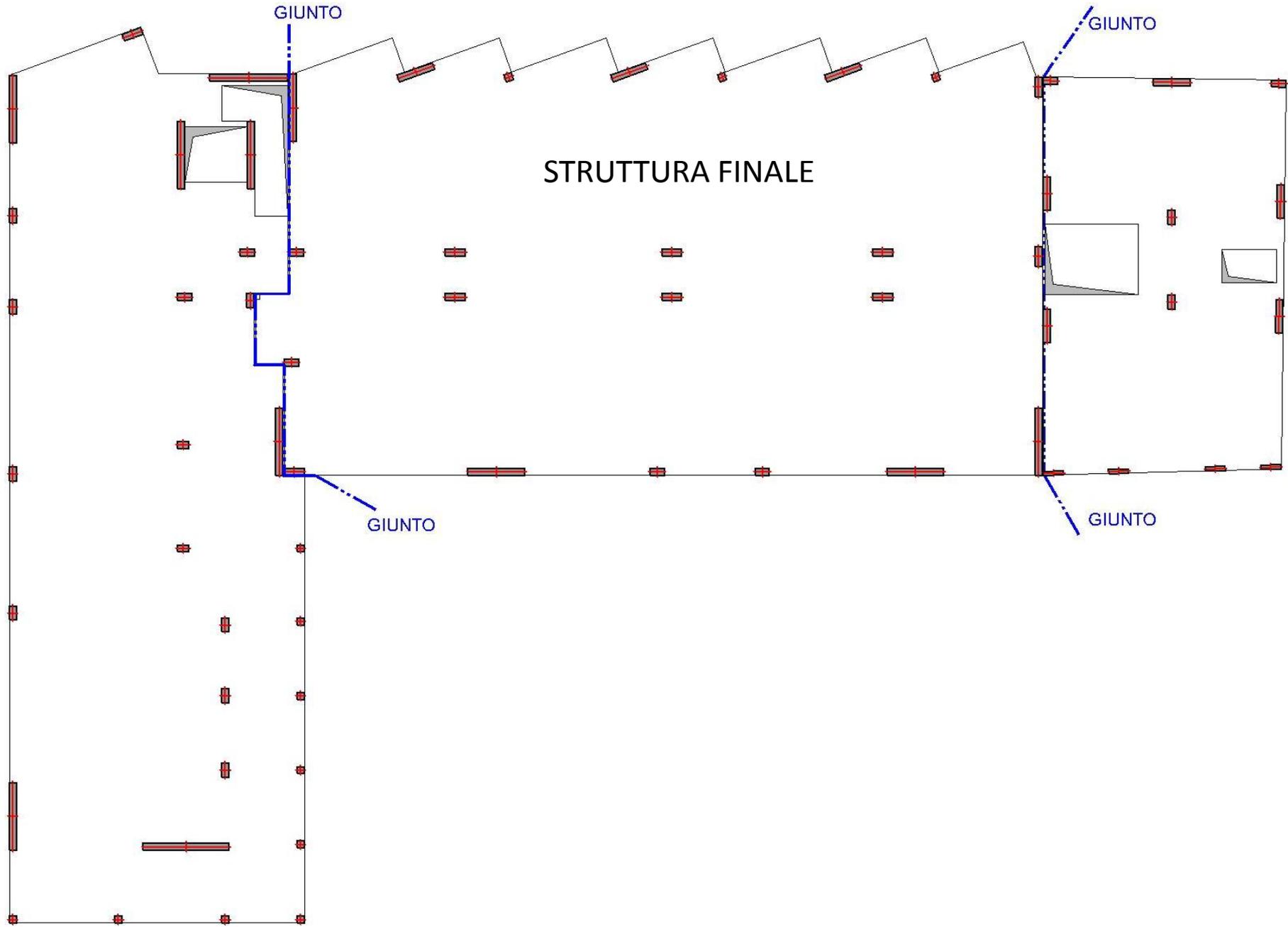
GIUNTO

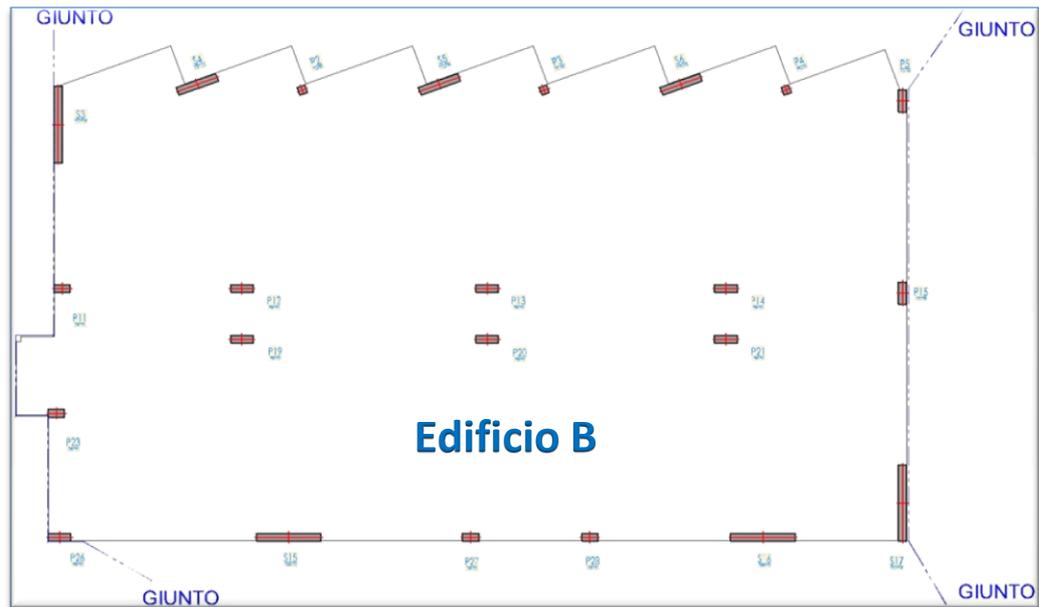
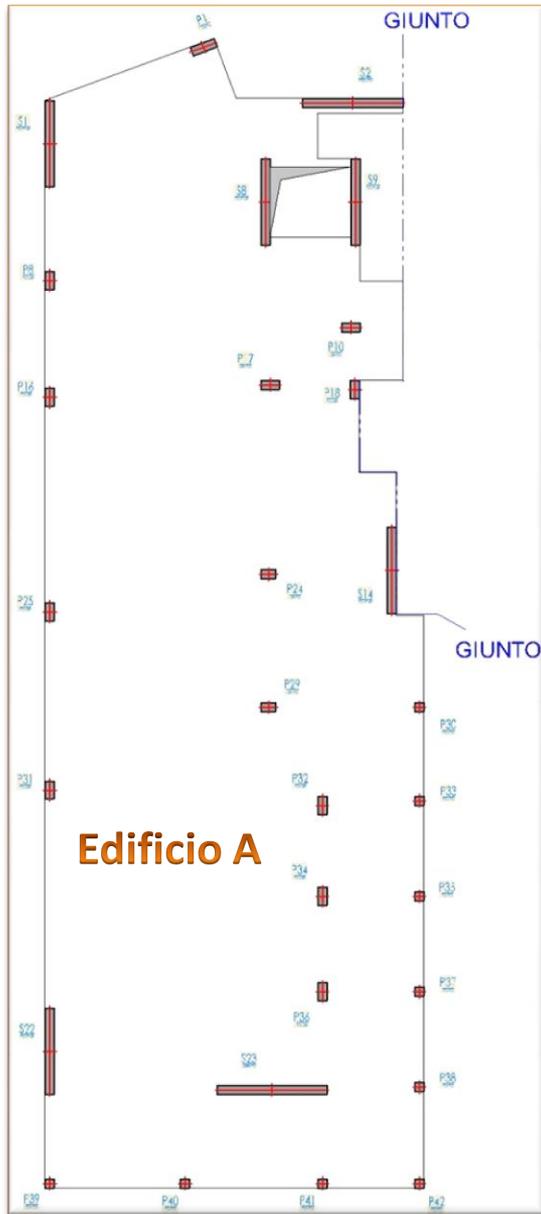
GIUNTO

STRUTTURA FINALE

GIUNTO

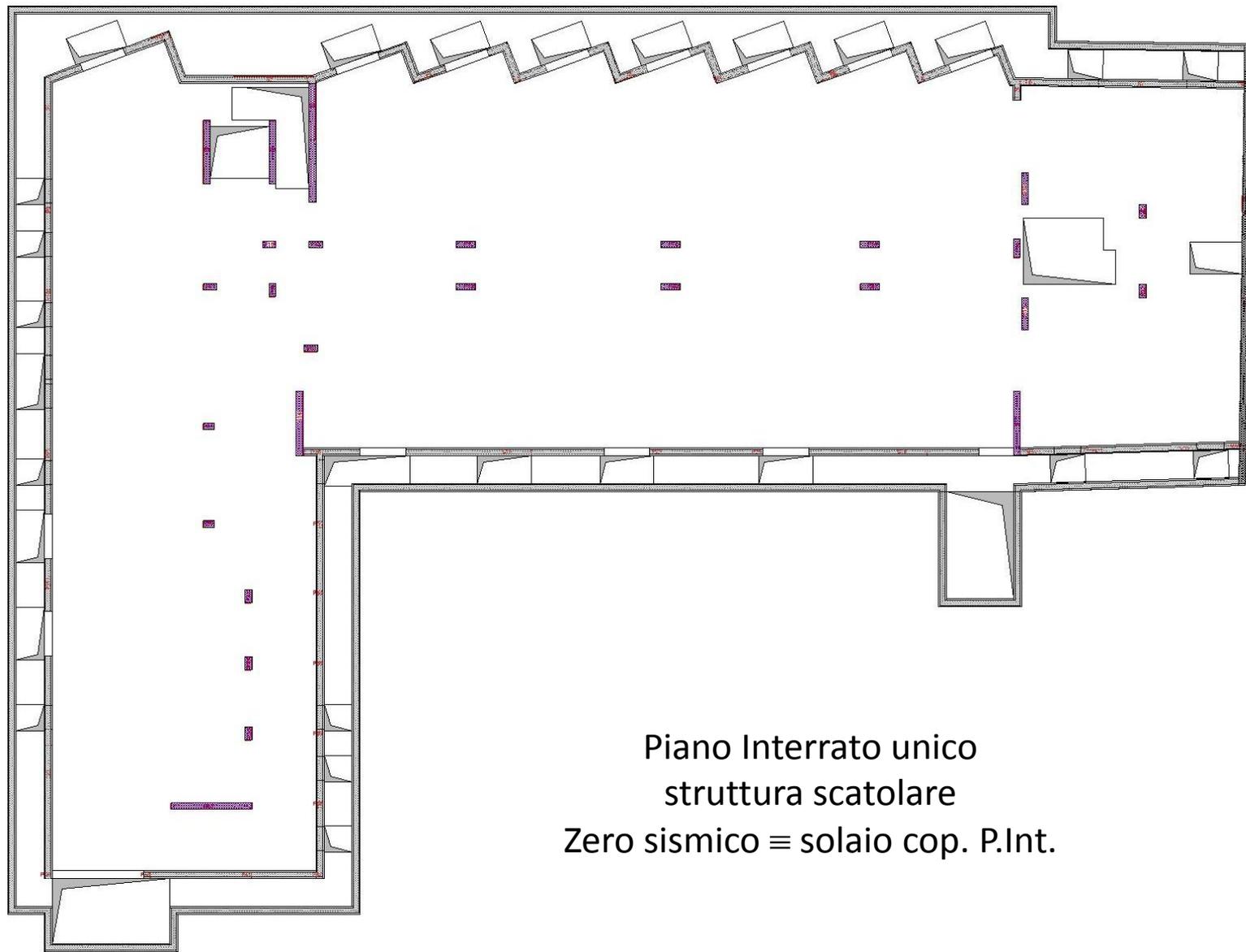
GIUNTO





- Si ottengono 3 strutture:
- sismicamente indipendenti
 - regolari in pianta ed in altezza
 - non sensibili a modi torsionali

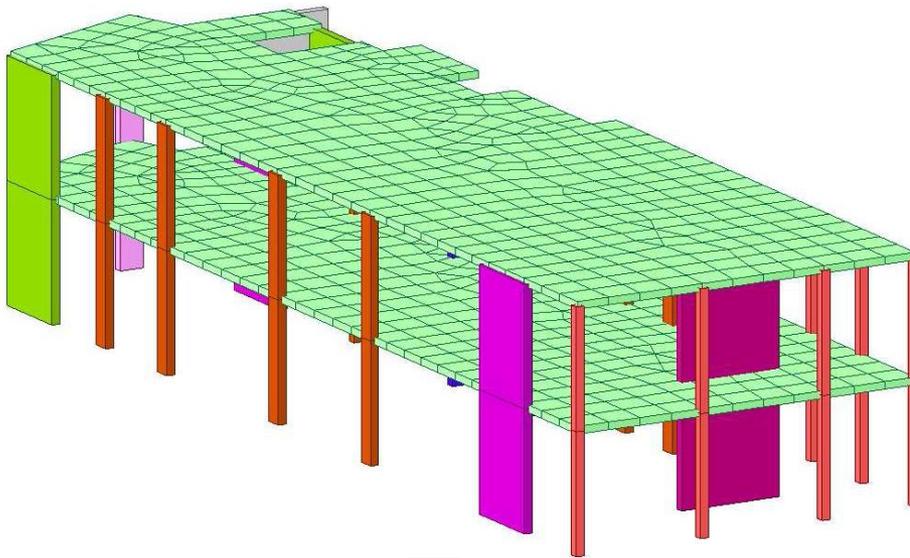




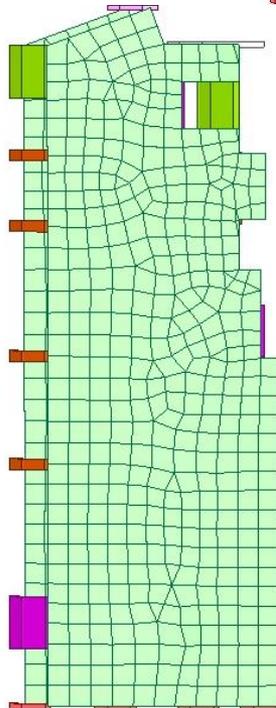
Piano Interrato unico
struttura scatolare
Zero sismico \equiv solaio cop. P.Int.

Modello struttura Edificio A

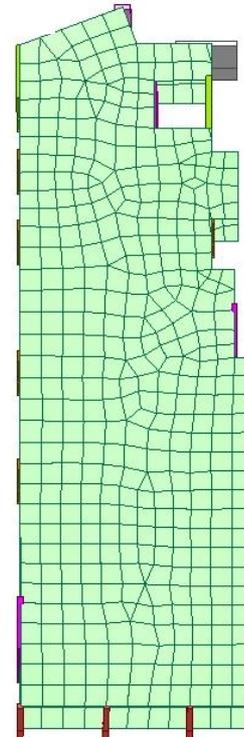
Modi di Vibrare



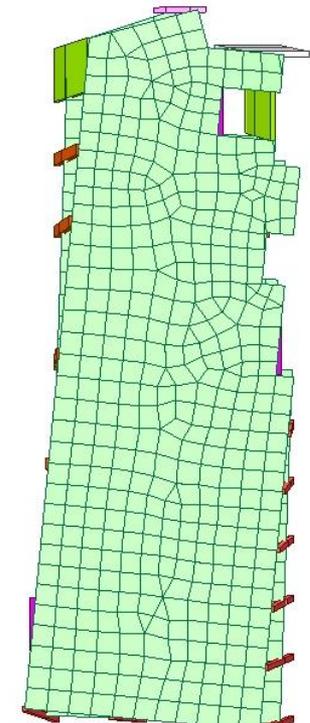
Mode No	TRAN-X		TRAN-Y		TRAN-Z		ROTN-X		ROTN-Y		ROTN-Z	
	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)
1	81.2026	81.2026	0.0059	0.0059	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0134	0.0134
2	0.0062	81.2088	80.5608	80.5667	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0091	0.0225
3	0.0059	81.2147	0.0095	80.5762	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	80.7294	80.7519
4	18.7577	99.9724	0.0000	80.5762	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0073	80.7591
5	0.0001	99.9725	19.3955	99.9717	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0302	80.7894
6	0.0275	100.0000	0.0283	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	19.2106	100.0000
Mode No	TRAN-X		TRAN-Y		TRAN-Z		ROTN-X		ROTN-Y		ROTN-Z	
	MASS	SUM	MASS	SUM	MASS	SUM	MASS	SUM	MASS	SUM	MASS	SUM
1	540.5263	540.5263	0.0394	0.0394	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	8.2177	8.2177
2	0.0412	540.5675	536.2537	536.2931	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	5.6040	13.8217
3	0.0394	540.6069	0.0634	536.3565	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	49593.278	49607.100
4	124.8610	665.4678	0.0000	536.3565	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.4710	49611.571
5	0.0005	665.4683	129.1065	665.4630	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	18.5744	49630.146
6	0.1830	665.6513	0.1883	665.6513	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	11801.375	61431.521



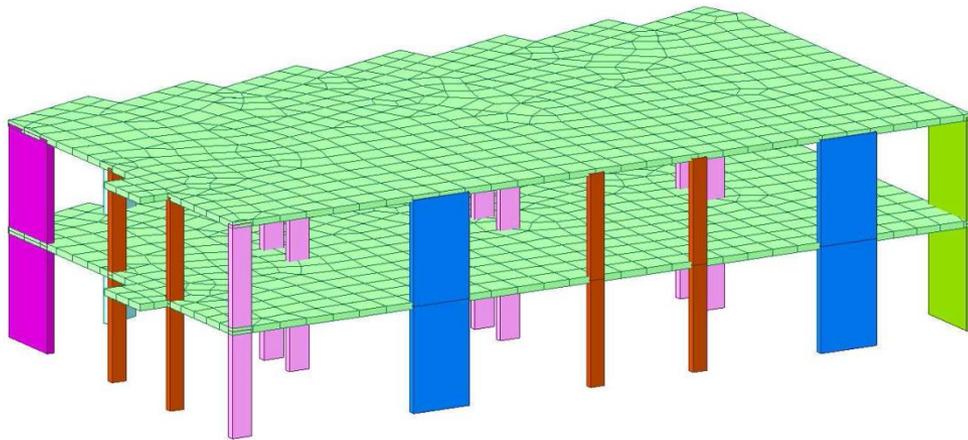
1° modo di vibrare
81.20% M



2° modo di vibrare
80.56% M



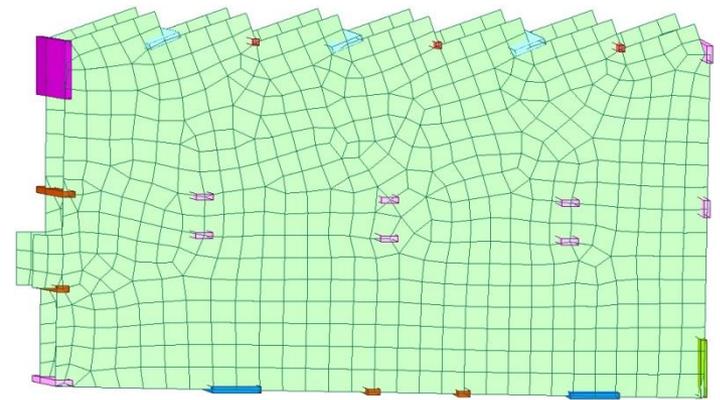
3° modo di vibrare
80.73% M



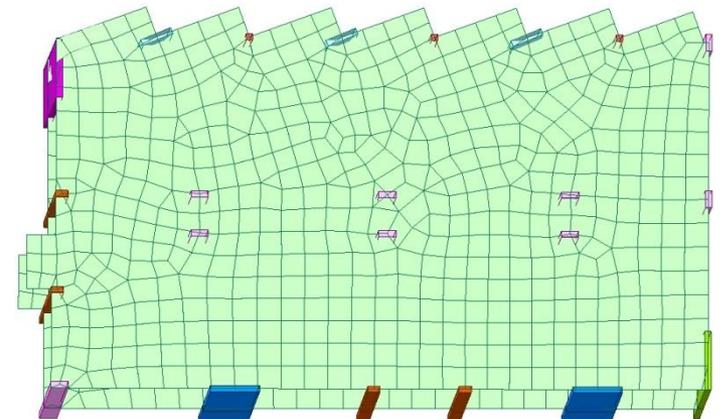
Modello struttura Edificio B

Modi di Vibrare

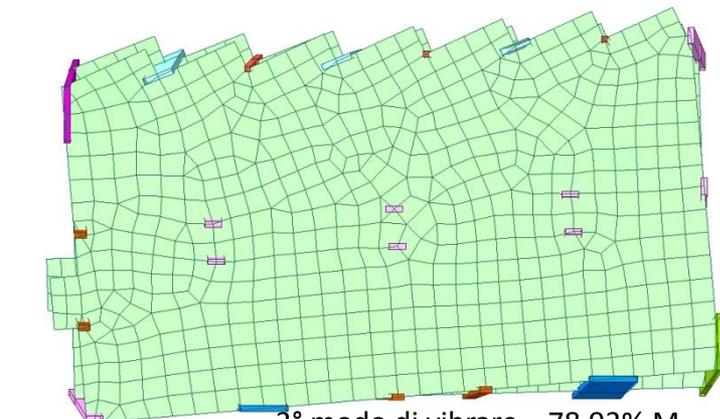
Mode No	TRAN-X		TRAN-Y		TRAN-Z		ROTN-X		ROTN-Y		ROTN-Z	
	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)	MASS(%)	SUM(%)
1	68.0193	68.0193	11.0956	11.0956	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.5487	1.5487
2	11.0379	79.0572	69.7089	80.8046	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0407	1.5894
3	1.4798	80.5370	0.0741	80.8786	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	78.9338	80.5231
4	13.4155	93.9524	5.4605	86.3391	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3945	80.9176
5	5.5939	99.5464	13.6342	99.9734	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0469	80.9645
6	0.4536	100.0000	0.0266	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	19.0355	100.0000
Mode No	TRAN-X		TRAN-Y		TRAN-Z		ROTN-X		ROTN-Y		ROTN-Z	
	MASS	SUM	MASS	SUM	MASS	SUM	MASS	SUM	MASS	SUM	MASS	SUM
1	579.6430	579.6430	94.5540	94.5540	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1084.4528	1084.4528
2	94.0621	673.7050	594.0414	688.5954	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	28.4810	1112.9337
3	12.6102	686.3152	0.6311	689.2265	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	55272.238	56385.171
4	114.3231	800.6383	46.5332	735.7597	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	276.2146	56661.386
5	47.6702	848.3085	116.1874	851.9471	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	32.8182	56694.204
6	3.8655	852.1741	0.2270	852.1741	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	13329.367	70023.571



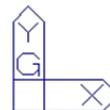
1° modo di vibrare – 68.02% M



2° modo di vibrare – 69.71% M

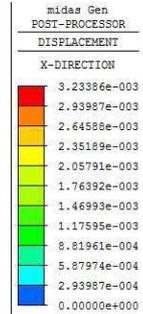
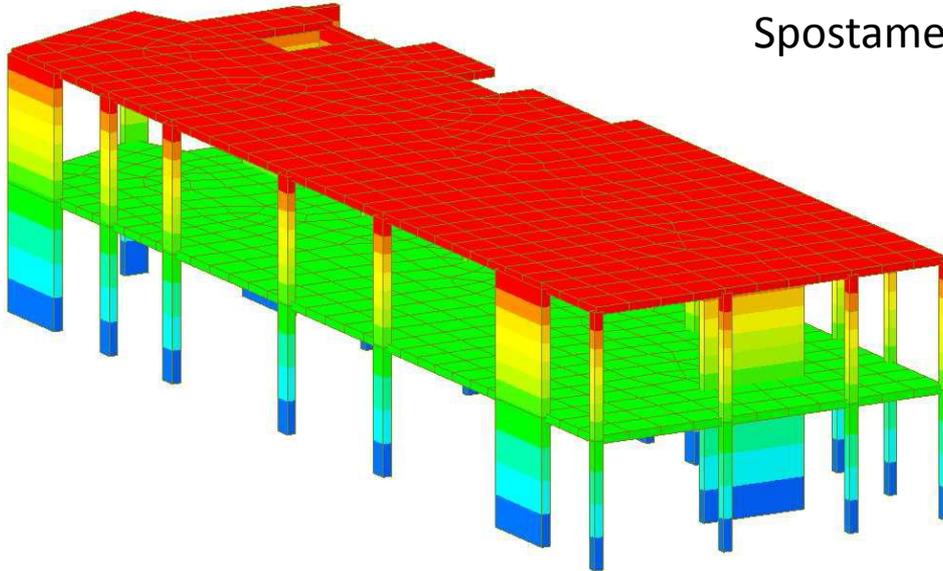


3° modo di vibrare – 78.93% M

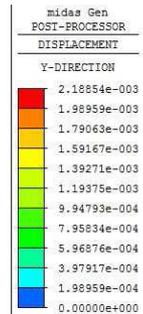
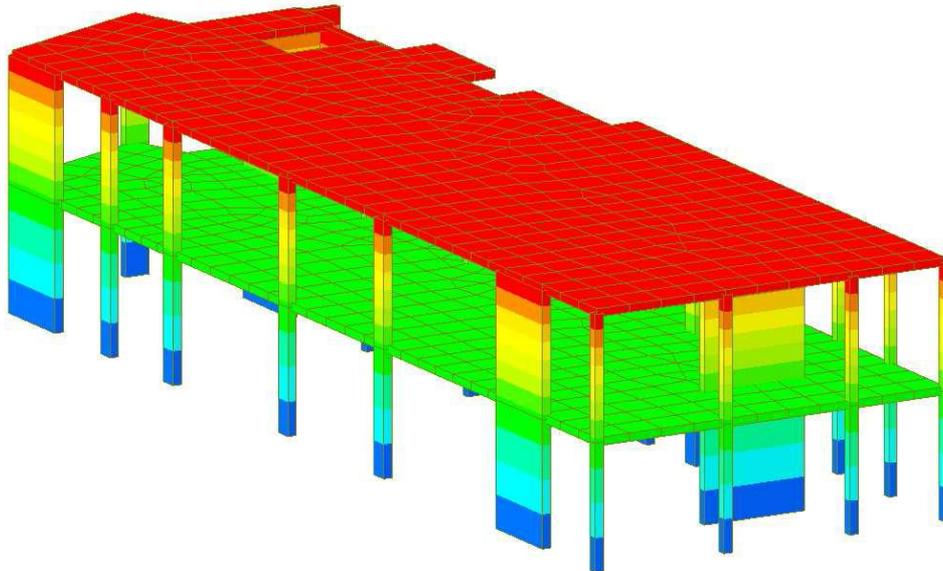


Modello struttura Edificio A

Spostamenti (SLD)



Max spostamento
in X = 3.23mm

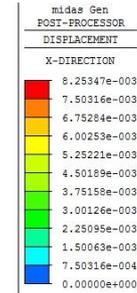
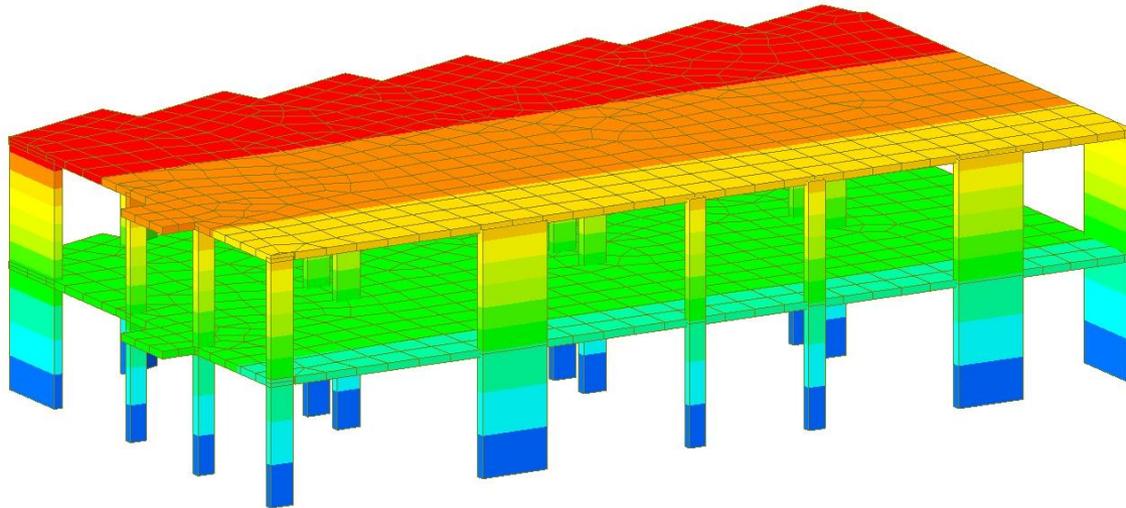


Max spostamento
in Y = 2.19mm

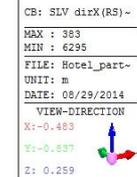


Modello struttura Edificio B

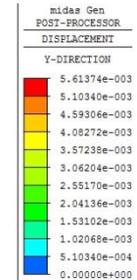
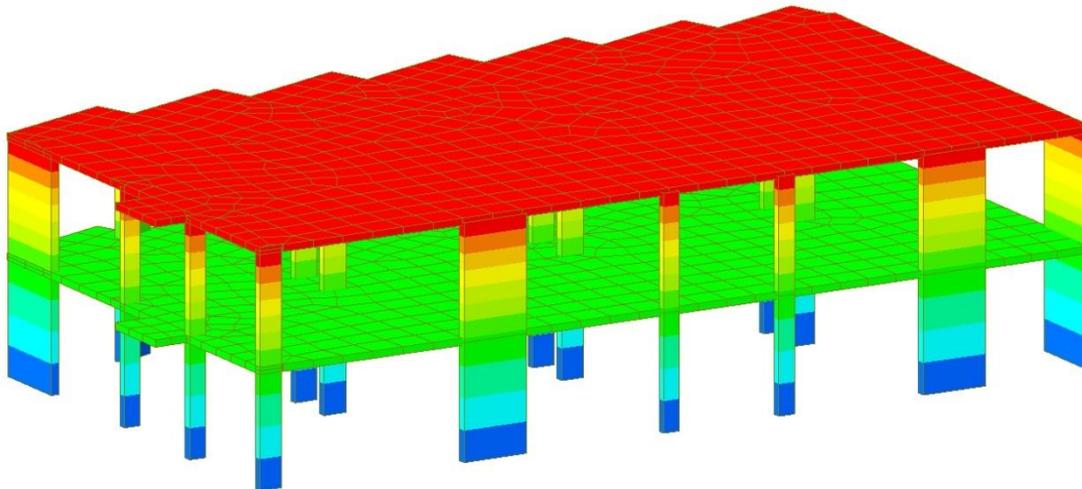
Spostamenti (SLD)



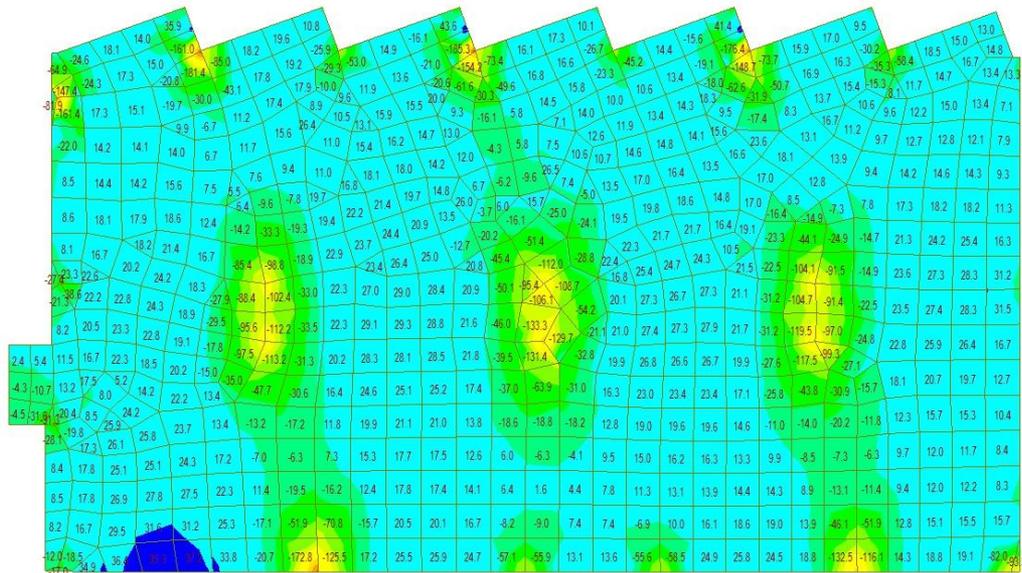
Max spostamento
in X = 8.25mm



Max spostamento
in Y = 5.61mm

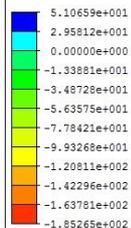


Comparazione Sollecitazioni Statiche – Sismiche sull’impalcato di solaio (Edificio B)



midas Gen
POST-PROCESSOR
PLATE FORCE

MOMENT-Mxx



Momenti Flettenti
dir.X
C.C. Sismica

CBcall: INV SISMA
ELEMENT

MAX : 4162

MIN : 4162

FILE: Mxx_plu

UNIT: kN*m/m

DATE: 02/12/2015

VIEW-DIRECTION

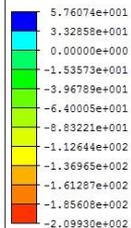
X: 0.000

Y: 0.000

Z: 1.000

midas Gen
POST-PROCESSOR
PLATE FORCE

MOMENT-Mxx



Si noti che la combinazione
sismica induce
sollecitazioni minori della
sollecitazione statica SLU

Momenti Flettenti
dir.X
C.C. Statica SLU

CBcall: Invilupp-
ELEMENT

MAX : 4171

MIN : 4047

FILE: Mxx_plu

UNIT: kN*m/m

DATE: 02/12/2015

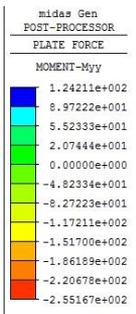
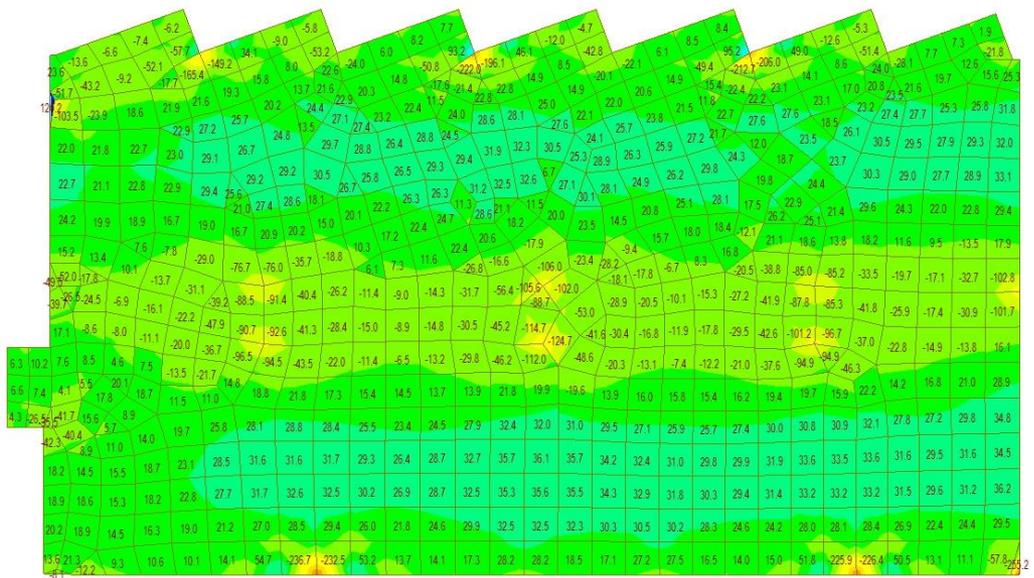
VIEW-DIRECTION

X: 0.000

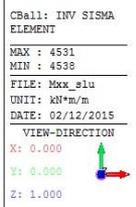
Y: 0.000

Z: 1.000

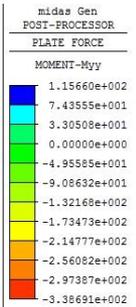
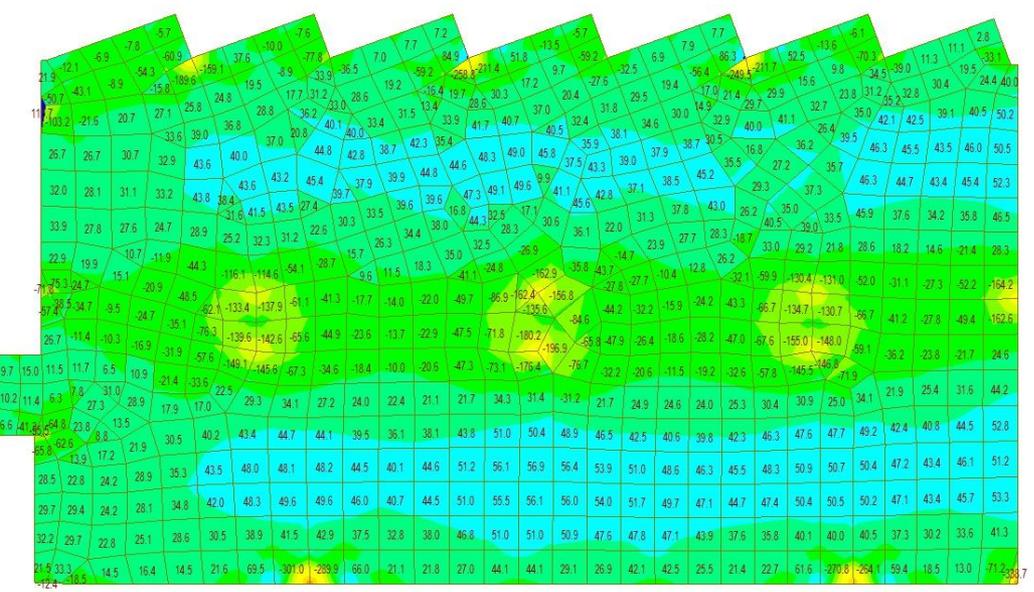
Comparazione Sollecitazioni Statiche – Sismiche sull'impalcato di solaio (Edificio B)



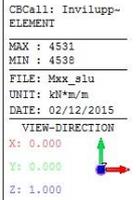
Momenti Flettenti
dir.Y
C.C. Sismica



Si noti che la combinazione sismica induce sollecitazioni minori della sollecitazione statica SLU



Momenti Flettenti
dir.Y
C.C. Statica SLU





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Engi.Co.

ENGINEERING & CONSULTING

V. Boccaccio, 22 – 20123 Milano, Italy



architecture & engineering

address:
Via Vittorio Emanuele II, 107
Brignano Gera d'Adda (BG) - ITALY
Tel. +39 0363 815859
C. F. e P. IVA 02758770164
E-mail: tekne2000@tin.it



MAZZOLA E SACHETTO
studio di architettura

V. Milano, 55/a – 37014 Castelnuovo
d.G. (VR), Italy

GRAZIE PER L'ATTENZIONE