

**UMFAHRUNG VAHRN**  
**BAUARBEITEN OHNE ANSCHLUSS BRIKEN NORD**  
**CIRCONVALLAZIONE VARNA**  
**OPERE CIVILI SENZA COLLEGAMENTO BRESSANONE NORD**

ŒMÙØ PÜWÞ ÕÙÚÛURÒSVÁÉÚÛÜ ÕòVVUÁÒÙÒôWQUÁ

1	F.F.E.2018	Lizenznummer/ Estremi licenza d'uso	T. Ungerer	G. Fischnaller	G. Fischnaller
€Á	FEE DEF Á	^ •c^Œ•*æ^Ä ä æ^ääq ^Á	VEM *^ ^!Á	ÖE&@æ ^!Á	ÖE&@æ ^!Á
Ü^çÉ	Öæ { Bææ Œ•*æ^Œ ^!~ } *Dääq ^Œ* q } æ ^} ç Á		^ •c  D æ[  æ Á *^] !>-D•æ q æ Á		-^ä^*Bæ ] ç çÄ

$$\hat{O}[\{ \{ \tilde{a}^{\alpha} \} c^{\alpha} | \Lambda]$$

**PROVINCIA AUTONOMA DI BOLZANO**  
**Ripartizione infrastrutture**  
**Ufficio tecnico strade nord/est**

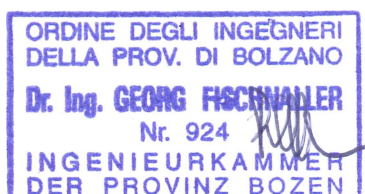
Vĩ [ Á^|Á [ &amp; { ^ } ċ K

**GALLERIA VARNA  
CENTRALE DI SERVIZIO  
CALCOLI STATICI**



ŌÜWÚÚÄÖÁÜÜŌÖNVOZÜPÖ

8DÀÒWÀÒ} \*ā ^ ^ | ā \* Á : | Á  
XāÖæ c'ÁFH ËH€ GÁ' ^ • • æ [ } ^ Á



ÓXÈÜĚ ĜĬ Á

**7-6**

## INHALTSVERZEICHNIS / INDICE

1	EINLEITUNG/ INTRODUZIONE	2
2	GRUNDLAGEN/ BASI DI CALCOLO	2
2.1	Materialeigenschaften/ Proprietà dei materiali	4
2.2	Teilsicherheitsbeiwerte Materialien / Fattori parziali materiali	4
2.3	Teilsicherheitsbeiwerte Einwirkungen / Fattori parziali azioni	5
2.4	Kombinationsbeiwerte/ Coefficienti di combinaione	5
2.5	Kombinationsregeln/ Combinazioni delle azioni	6
2.6	Expositionsklassen/ Classi d'esposizione	6
2.7	Betondeckung/ Copriferro	6
2.8	Kennwerte Bauwerke/ Caratteristiche strutture	6
2.9	Herkunft und Charakteristik der Berechnungsmethode/ <i>Origine e caratteristiche dei metodi di calcolo</i>	7
3	LASTEN/ AZIONI	8
3.1	Eigenlast	8
3.2	Auffüllung/ rinterro	8
3.3	Nutzlast/ Carico d'esercizio	9
3.4	Erddruck/ Spinta del terreno	9
3.5	Erdbeben/ Sisma	9
4	ERGEBNISSE/ RISULTATI	10



[illegible]



## 2.3 Teilsicherheitsbeiwerte Einwirkungen / Fattori parziali azioni

ÖÈ ÆI ÆFÖÈ ÆI ÈÈÁ

		Coefficiente	EQU <sup>(1)</sup>	A1 STR	A2 GEO
Carichi permanenti	favorevoli	$\gamma_{G1}$	0,90	1,00	1,00
	sfavorevoli		1,10	1,35	1,00
Carichi permanenti non strutturali <sup>(2)</sup>	favorevoli	$\gamma_{G2}$	0,00	0,00	0,00
	sfavorevoli		1,50	1,50	1,30
Carichi variabili da traffico	favorevoli	$\gamma_Q$	0,00	0,00	0,00
	sfavorevoli		1,35	1,35	1,15
Carichi variabili	favorevoli	$\gamma_{Qi}$	0,00	0,00	0,00
	sfavorevoli		1,50	1,50	1,30
Distorsioni e presollecitazioni di progetto	favorevoli	$\gamma_{\epsilon 1}$	0,90	1,00	1,00
	sfavorevoli		1,00 <sup>(3)</sup>	1,00 <sup>(4)</sup>	1,00
Ritiro e viscosità, Variazioni termiche, Cedimenti vincolari	favorevoli	$\gamma_{\epsilon 2}, \gamma_{\epsilon 3}, \gamma_{\epsilon 4}$	0,00	0,00	0,00
	sfavorevoli		1,20	1,20	1,00

<sup>(1)</sup> Equilibrio che non coinvolga i parametri di deformabilità e resistenza del terreno; altrimenti si applicano i valori di GEO.  
<sup>(2)</sup> Nel caso in cui i carichi permanenti non strutturali (ad es. carichi permanenti portati) siano compiutamente definiti si potranno adottare gli stessi coefficienti validi per le azioni permanenti.  
<sup>(3)</sup> 1,30 per instabilità in strutture con precompressione esterna  
<sup>(4)</sup> 1,20 per effetti locali

## 2.4 Kombinationsbeiwerte/ Coefficienti di combinaione

ÖÈ ÆI ÆFÖÈ ÆI ÈÈÁ

Categoria/Azione variabile	$\Psi_{0j}$	$\Psi_{1j}$	$\Psi_{2j}$
Categoria A Ambienti ad uso residenziale	0,7	0,5	0,3
Categoria B Uffici	0,7	0,5	0,3
Categoria C Ambienti suscettibili di affollamento	0,7	0,7	0,6
Categoria D Ambienti ad uso commerciale	0,7	0,7	0,6
Categoria E Biblioteche, archivi, magazzini e ambienti ad uso industriale	1,0	0,9	0,8
Categoria F Rimesse e parcheggi (per autoveicoli di peso $\leq 30$ kN)	0,7	0,7	0,6
Categoria G Rimesse e parcheggi (per autoveicoli di peso $> 30$ kN)	0,7	0,5	0,3
Categoria H Coperture	0,0	0,0	0,0
Vento	0,6	0,2	0,0
Neve (a quota $\leq 1000$ m s.l.m.)	0,5	0,2	0,0
Neve (a quota $> 1000$ m s.l.m.)	0,7	0,5	0,2
Variazioni termiche	0,6	0,5	0,0



## 2.9 Herkunft und Charakteristik der Berechnungsmethode/ Origine e caratteristiche dei metodi di calcolo

### Durchgeführte Analysen/ Tipo di analisi svolta:

V:æ , ^|\ •æ æ ^•^} ~~Analisi strutturali:Á~~

Úcāā &@ā ^æÁÚcāā &@ā ^æ^Á Á ~~baÁ~~

Úcāā &@ā &@ā ^æÁÚcāā &@ā [ } Áā ^æ^Á } ^ā ~~Á~~

### Verwendete Software:

ÖÖÁœ • cāā ÄÈ | Ëā ^ } : Á | ËGJÍ HÍ ~~licenza n. 29535Ä~~

P^|•^||^|Ä^|dā àÖÖÁÖÖÁ } āÚcāā Á[ -ç æ^ÁÖ { àPÄÜ à^| @ē •^} ÄÖ~ • &@æ āDÄ

Produttore / distributore DIE CAD und Statik Software GmbH, Oberhausen (Germania)

### Zuverlässigkeit der verwendeten Berechnungsmethoden/ Affidabilità dei metodi di calcolo

Òā Äē -{ ^|\ •æ ^•^Úc āā { Ä^|ÁÚ[ -ç æ^ā[ \~ { ^ } cāā } Ácāā Ä^| |ē • • | &@^ā } āÖ^ā Ä Ë  
} ^c@āÄ^|Äç|, ^ } ā^c } ÁÚ[ \* |æ { ^ Ä Ä^\*^ } • cē } ā| &@ } ÁcāÄ^ : ^ā dÖÖÄ Ä[ } Ä^ } ÁP^| Ë  
• c||^| } Ä^| ä^|cÁÚ[ -ç æ^ā[ \~ { ^ } cāā } Ä } c@|cē • |^ &@ } ā^Ä -{ | { cāā } ^ } Ä~ Ä^ } Ä@ Ë  
[ |^c &@ } ÄÖ~ } ā|æ^ } Ä } āÄ^ } Äç|, ^ } ā^c } ÄÖ^| ^ &@ ~ } \* • || \* æā@ ^ } Ä~ Ä^ } Ä@ Ë  
ā ~ } \* • ^| ^ &@ } Ä } āÄ~ Ä æ@ ||: ä @æ^ } Äcāāā } ä |^ } ËÖā ÄZ~ ç^| |ē • • ä \^āÄ^| ÄÖ^| ^ &@ Ë  
} ~ } \* • { ^c@ ā^ } Ä~ |ä^Ä à^| Äā ^ Äē • • æ^| |ē -cā ^ Ä@ : æ@Ä[ } ÁÚ[ à^à^ { ^ • • } \* ^ } Ä ~~Ä^| Ë~~  
\* |^ &@Ä[ } Ä^| ^ā Ä^ā ä |c } Ä &@ ā &@ } Ä4~ } \* ^ } Ä^à^| | > -cÄ

Un attento esame preliminare della documentazione a corredo del software ha consentito di valutarne l'affidabilità e l'idoneità al caso specifico. La documentazione, fornita dal produttore e distributore del software, contiene un esauriente descrizione delle base teoriche e degli algoritmi impiegati, l'individuazione dei campi d'impegno, nonché casi prova interamente risolti e commentati, corredati dei file di input necessari a riprodurre l'elaborazione. È stata verificata l'affidabilità del metodo di calcolo attraverso un numero indicativo di casi di prova in cui i risultati dell'analisi numerica sono stati confrontati con soluzioni teoriche e soluzioni realizzate.



## Validierung der Berechnungsmethoden/ Validazione del metodo di calcolo

OE ~!~} aÁ^!ÁÖä ~æ@Öä^!Áæ^} a^} ÁÖæ cāÁ} aÁ^!Á^!&@^>@c} Á[ } d[ |^} Á æÁaÁ  
Pæ@^!^&@~} \* Á ~Áæ^!} æä^} Á^!^&@~} \*•} |[\*!æ { ^} Á æ@Á!-!á!|æÖÖaÁ ^•^} Ë  
|æ@} Á^!^&@~} \*•&@æ Á^!á^} Á^!Áæ aÁ^!ää a!dÄ

Sulla base della semplicità delle struttura e del controllo puntuale non si è reso necessario di eseguire i calcoli nuovamente e diverso da quello originario mediante un programma di calcolo diverso da quello usato originariamente. Le sezioni di calcolo sono state verificate con delle semplici verifiche a mano.

## 3 LASTEN/ AZIONI

### 3.1 Eigenlast

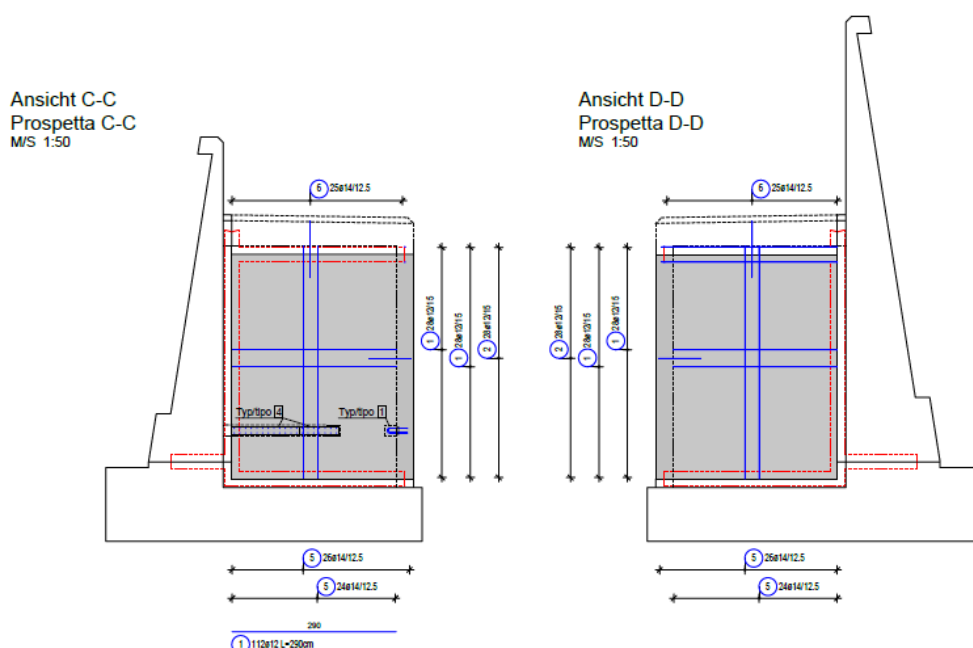
ÖaÖa^} |æcÁ^•ÁæQa^ç} •Á äaÁ æÁMG\PD Áæ\*^} [{ { ^} Ä

Si considera un peso proprio di MG\PD

### 3.2 Auffüllung/ rinterro

Z~ { Á! |cāQ Á äaÁæ Á^da~\*^æ~a^Á æÁH { Á æ^!æ^!á^!á^&çæ Áæ a^!^} ÁÖ} a^Á  
{ æÁ æ ËH € Áæ @Á!æ ÁÖXËH ÇÄ

Verso il portale il rinterro è di 3,50m, mentre sul lato opposto della centrale si hanno min. 1,50m di rinterro (vedi documento BV-S-382):



$$g_{Auflas,maxt} = 3,50m \cdot 20kN/m^3 = 70kN/m^2$$

$$g_{\text{Auflas, mint}} = 1,50\text{m} \cdot 20\text{kN/m}^3 = 30\text{kN/m}^2$$

### 3.3 Nutzlast/ Carico d'esercizio

Ò Á äáÁä^Ä~ c |æ öœ Äâ^|Ö^& ^Äç [ } Á M \ Þ Æ Äâ! > & • æ @ ä ç Å! Äâ ÄQ} ^} | ê { ^ Á M Á  
F ∈ Þ Æ Ä

*Si considera un carico d'esercizio di  $q = 5 \text{ kN/m}^2$  per il solaio e  $q = 10 \text{ kN/m}^2$  per i locali interni della centrale.*

### 3.4 Erddruck/ Spinta del terreno

0>|ÁæÁÓ'dāà\*^aē~ā^Á āāÁ^!Áæā^ÁÓ!āā!~&Á āÁæMÁE|HÁ^!>&•æ@ā dÁ^|&@Á āÁ  
 †|\*oÁ^ā ā!oÁ āāÁ

Per la centrale di servizio si considera una spinta attiva con  $k_a = 0,33$ , definita come segue:

[illegible]

Òæ}ãMÊ€(œÞ(ÊHMFÊ\ÞÁ

### 3.5 Erdbeben/ Sisma

[illegible]

Öæ Ì Ò ^ à è ~ á ^ Á æ } Å æ ö | Á { è i Ö È Ë Ì Í Î Ï Ð Ñ Ò Ó Ô Ù @ ^ Å ä Å , ^) á } \* Á ] ^ : ä å & @ / \$ [ } Ê  
• d \ c | • á ^ æ Å > / Å ä • ä æ Å ^ Á ^ | @ æ } Å Ì Ò à à ^ à ^ æ | Á | b | a | ó ^ í à ^ Æ

[illegible]

Öæ ÄÜ^&@}{ [ â^||Áââ @æc^oÁæ ÁÕ^âê~ â^Ëâæ ACE ~>||{ æ^|æ^Á { Áâæ ÁÕ^âê~ â^Á^ } âÁ^ç^} c^|/^Á^ c |æ c^} Æ



## Content

Input data	F
System Information	F
Plat	F
Tafel	G
Folded plate (1/4)	G
Folded plate (2/4)	G
Folded plate (3/4)	G
Folded plate (4/4)	H
Reinforcements arrangement	H
Loadcase (1/2)	H
Loadcase (2/2)	H
Distributed load (constant, load covers partially)	H
Distributed load (lin., load covers partially) (1/2)	H
Distributed load (lin., load covers partially) (2/2)	I
Linear superposition rule	I
Design parameters	I
1 - UNI EN 1992-1-1	I
Design group (UNI EN 1992-1-1)	I
Results: Design groups	I
Folding Plate	I
Bending design top	I
UNI EN 1992-1-1: Bending design top	I
Design group: Auto	I
Bending design bottom	I
UNI EN 1992-1-1: Bending design bottom	I
Design group: Auto	I
Shear force design	I
UNI EN 1992-1-1: Shear design	I
Design group: Auto	I
Abb.: Eigenlast/ peso proprio	I
Abb.: Nutzlast/ carico d'esercizio	I
Abb.: Aufschüttung/ rinterro	I
Abb.: Erddruck/ Spinta terreno	J
Abb.: Erdbeben/ sisma	F€
Bodenplatte/ Platea	F€
Bodenplatte/ Platea	FF
Bodenplatte/ Platea	FF
Decke/ Solaio	FG
Decke/ Solaio	FG
Decke/ Solaio	FH
Decke/ Solaio	FH
Zwischendecke/ Solaio intermedio	FI
Zwischendecke/ Solaio intermedio	FI
Zwischendecke/ Solaio intermedio	FI
Wände/ Pareti	FI
Wände/ Pareti	FI

Berechnet mit dem Programmteil 'Faltwerk' der D.I.E. Baustatik - www.die.de. Lizenz: 29535

## Input data

### System Information

Reinforcements arrangement	F
Bar connections	F
Distributed load	F
Design parameters	F
Folded plate	H

A superposition-rule for linear calculations will be created automatically if necessary.

A design group will be created automatically if necessary.

Dead load is taken into account in loadcase 1.

### Table 1

Name	Name	X [m]	Y [m]	Z [m]
F	F	0.00	0.00	0.00
G	G	1.00	0.00	0.00
H	H	0.00	0.00	0.00
I	I	1.00	0.00	0.00
J	J	1.00	0.00	0.00
K	K	0.00	0.00	0.00
L	L	0.00	0.00	0.00
M	M	0.00	0.00	0.00
N	N	0.00	0.00	0.00
O	O	0.00	0.00	0.00
P	P	0.00	0.00	0.00
Q	Q	0.00	0.00	0.00
R	R	0.00	0.00	0.00
S	S	0.00	0.00	0.00
T	T	0.00	0.00	0.00
U	U	0.00	0.00	0.00
V	V	0.00	0.00	0.00
W	W	0.00	0.00	0.00
X	X	0.00	0.00	0.00
Y	Y	0.00	0.00	0.00
Z	Z	0.00	0.00	0.00
AA	AA	0.00	0.00	0.00
AB	AB	0.00	0.00	0.00
AC	AC	0.00	0.00	0.00
AD	AD	0.00	0.00	0.00
AE	AE	0.00	0.00	0.00
AF	AF	0.00	0.00	0.00
AG	AG	0.00	0.00	0.00
AH	AH	0.00	0.00	0.00
AI	AI	0.00	0.00	0.00
AJ	AJ	0.00	0.00	0.00
AK	AK	0.00	0.00	0.00
AL	AL	0.00	0.00	0.00
AM	AM	0.00	0.00	0.00
AN	AN	0.00	0.00	0.00
AO	AO	0.00	0.00	0.00
AP	AP	0.00	0.00	0.00
AQ	AQ	0.00	0.00	0.00
AR	AR	0.00	0.00	0.00
AS	AS	0.00	0.00	0.00
AT	AT	0.00	0.00	0.00
AU	AU	0.00	0.00	0.00
AV	AV	0.00	0.00	0.00
AW	AW	0.00	0.00	0.00
AX	AX	0.00	0.00	0.00
AY	AY	0.00	0.00	0.00
AZ	AZ	0.00	0.00	0.00
BA	BA	0.00	0.00	0.00
BB	BB	0.00	0.00	0.00
BC	BC	0.00	0.00	0.00
BD	BD	0.00	0.00	0.00
BE	BE	0.00	0.00	0.00
BF	BF	0.00	0.00	0.00
BG	BG	0.00	0.00	0.00
BH	BH	0.00	0.00	0.00
BI	BI	0.00	0.00	0.00
BJ	BJ	0.00	0.00	0.00
CK	CK	0.00	0.00	0.00
CL	CL	0.00	0.00	0.00
CM	CM	0.00	0.00	0.00
CN	CN	0.00	0.00	0.00
CO	CO	0.00	0.00	0.00
CP	CP	0.00	0.00	0.00
CQ	CQ	0.00	0.00	0.00
CR	CR	0.00	0.00	0.00
CS	CS	0.00	0.00	0.00
CT	CT	0.00	0.00	0.00
CU	CU	0.00	0.00	0.00
CV	CV	0.00	0.00	0.00
CW	CW	0.00	0.00	0.00
CX	CX	0.00	0.00	0.00
CY	CY	0.00	0.00	0.00
CZ	CZ	0.00	0.00	0.00
DA	DA	0.00	0.00	0.00
DB	DB	0.00	0.00	0.00
DC	DC	0.00	0.00	0.00
DD	DD	0.00	0.00	0.00
DE	DE	0.00	0.00	0.00
DF	DF	0.00	0.00	0.00
DG	DG	0.00	0.00	0.00
DH	DH	0.00	0.00	0.00
DI	DI	0.00	0.00	0.00
DJ	DJ	0.00	0.00	0.00
DK	DK	0.00	0.00	0.00
DL	DL	0.00	0.00	0.00
DM	DM	0.00	0.00	0.00
DN	DN	0.00	0.00	0.00
DO	DO	0.00	0.00	0.00
DP	DP	0.00	0.00	0.00
DQ	DQ	0.00	0.00	0.00
DR	DR	0.00	0.00	0.00
DS	DS	0.00	0.00	0.00
DT	DT	0.00	0.00	0.00
DU	DU	0.00	0.00	0.00
DV	DV	0.00	0.00	0.00
DW	DW	0.00	0.00	0.00
DX	DX	0.00	0.00	0.00
DY	DY	0.00	0.00	0.00
DZ	DZ	0.00	0.00	0.00
EA	EA	0.00	0.00	0.00
EB	EB	0.00	0.00	0.00
EC	EC	0.00	0.00	0.00
ED	ED	0.00	0.00	0.00
EE	EE	0.00	0.00	0.00
EF	EF	0.00	0.00	0.00
EG	EG	0.00	0.00	0.00
EH	EH	0.00	0.00	0.00
EI	EI	0.00	0.00	0.00
EJ	EJ	0.00	0.00	0.00
EK	EK	0.00	0.00	0.00
EL	EL	0.00	0.00	0.00
EM	EM	0.00	0.00	0.00
EN	EN	0.00	0.00	0.00
EO	EO	0.00	0.00	0.00
EP	EP	0.00	0.00	0.00
EQ	EQ	0.00	0.00	0.00
ER	ER	0.00	0.00	0.00
ES	ES	0.00	0.00	0.00
ET	ET	0.00	0.00	0.00
EU	EU	0.00	0.00	0.00
EV	EV	0.00	0.00	0.00
EW	EW	0.00	0.00	0.00
EX	EX	0.00	0.00	0.00
EY	EY	0.00	0.00	0.00
EZ	EZ	0.00	0.00	0.00
FA	FA	0.00	0.00	0.00
FB	FB	0.00	0.00	0.00
FC	FC	0.00	0.00	0.00
FD	FD	0.00	0.00	0.00
FE	FE	0.00	0.00	0.00
FF	FF	0.00	0.00	0.00
FG	FG	0.00	0.00	0.00
FH	FH	0.00	0.00	0.00
FI	FI	0.00	0.00	0.00
FJ	FJ	0.00	0.00	0.00
FK	FK	0.00	0.00	0.00
FL	FL	0.00	0.00	0.00
FM	FM	0.00	0.00	0.00
FN	FN	0.00	0.00	0.00
FO	FO	0.00	0.00	0.00
FP	FP	0.00	0.00	0.00
FO	FO	0.00	0.00	0.00
FR	FR	0.00	0.00	0.00
FS	FS	0.00	0.00	0.00
FT	FT	0.00	0.00	0.00
FU	FU	0.00	0.00	0.00
FV	FV	0.00	0.00	0.00
FW	FW	0.00	0.00	0.00
FX	FX	0.00	0.00	0.00
FY	FY	0.00	0.00	0.00
FZ	FZ	0.00	0.00	0.00
GA	GA	0.00	0.00	0.00
GB	GB	0.00	0.00	0.00
GC	GC	0.00	0.00	0.00
GD	GD	0.00	0.00	0.00
GE	GE	0.00	0.00	0.00
GF	GF	0.00	0.00	0.00
GG	GG	0.00	0.00	0.00
GH	GH	0.00	0.00	0.00
GI	GI	0.00	0.00	0.00
GJ	GJ	0.00	0.00	0.00
GK	GK	0.00	0.00	0.00
GL	GL	0.00	0.00	0.00
GM	GM	0.00	0.00	0.00
GN	GN	0.00	0.00	0.00
GO	GO	0.00	0.00	0.00
GP	GP	0.00	0.00	0.00
GO	GO	0.00	0.00	0.00
GR	GR	0.00	0.00	0.00
GS	GS	0.00	0.00	0.00
GT	GT	0.00	0.00	0.00
GU	GU	0.00	0.00	0.00
GV	GV	0.00	0.00	0.00
GW	GW	0.00	0.00	0.00
GX	GX	0.00	0.00	0.00
GY	GY	0.00	0.00	0.00
GZ	GZ	0.00	0.00	0.00
HA	HA	0.00	0.00	0.00
HB	HB	0.00	0.00	0.00
HC	HC	0.00	0.00	0.00
HD	HD	0.00	0.00	0.00
HE	HE	0.00	0.00	0.00
HF	HF	0.00	0.00	0.00
HH	HH	0.00	0.00	0.00
HI	HI	0.00	0.00	0.00
HJ	HJ	0.00	0.00	0.00
HK	HK	0.00	0.00	0.00
HL	HL	0.00	0.00	0.00
HM	HM	0.00	0.00	0.00
HN	HN	0.00	0.00	0.00
HO	HO	0.00	0.00	0.00
HP	HP	0.00	0.00	0.00
HO	HO	0.00	0.00	0.00
HR	HR	0.00	0.00	0.00
HS	HS	0.00	0.00	0.00
HT	HT	0.00	0.00	0.00
HU	HU	0.00	0.00	0.00
HV	HV	0.00	0.00	0.00
HW	HW	0.00	0.00	0.00
HX	HX	0.00	0.00	0.00
HY	HY	0.00	0.00	0.00
HZ	HZ	0.00	0.00	0.00
IA	IA	0.00	0.00	0.00
IB	IB	0.00	0.00	0.00
IC	IC	0.00	0.00	0.00
ID	ID	0.00	0.00	0.00
IE	IE	0.00	0.00	0.00
IF	IF	0.00	0.00	0.00
II	II	0.00	0.00	0.00
IJ	IJ	0.00	0.00	0.00
IK	IK	0.00	0.00	0.00
IL	IL	0.00	0.00	0.00
IM	IM	0.00	0.00	0.00
IN	IN	0.00	0.00	0.00
IO	IO	0.00	0.00	0.00
IP	IP	0.00	0.00	0.00
IO	IO	0.00	0.00	0.00
IR	IR	0.00	0.00	0.00
IS	IS	0.00	0.00	0.00
IT	IT	0.00	0.00	0.00
IU	IU	0.00	0.00	0.00
IV	IV	0.00	0.00	0.00
IW	IW	0.00	0.00	0.00
IX	IX	0.00	0.00	0.00
IY	IY	0.00	0.00	0.00
IZ	IZ	0.00	0.00	0.00
JA	JA	0.00	0.00	0.00
JB	JB	0.00	0.00	0.00
JC	JC	0.00	0.00	0.00
JD	JD	0.00	0.00	0.00
JE	JE	0.00	0.00	0.00
JF	JF	0.00	0.00	0.00
JH	JH	0.00	0.00	0.00
JI	JI	0.00	0.00	0.00
JJ	JJ	0.00	0.00	0.00
JK	JK	0.00	0.00	0.00
JL	JL	0.00	0.00	0.00
JM	JM	0.00	0.00	0.00
JN	JN	0.00	0.00	0.00
JO	JO	0.00	0.00	0.00
JP	JP	0.00	0.00	0.00
JO	JO	0.00	0.00	0.00
JR	JR	0.00	0.00	0.00
JS	JS	0.00	0.00	0.00
JT	JT	0.00	0.00	0.00
JU	JU	0.00	0.00	0.00
JV	JV	0.00	0.00	0.00
JW	JW	0.00	0.00	0.00
JX	JX	0.00	0.00	0.00
JY	JY	0.00	0.00	0.00
JZ	JZ	0.00	0.00	0.00
KA	KA	0.00	0.00	0.00
KB	KB	0.00	0.00	0.00
KC	KB	0.00	0.00	0.00
KD	KB	0.00	0.00	0.00
KE	KB	0.00	0.00	0.00
KF	KB	0.00	0.00	0.00
KH	KB	0.00	0.00	0.00
KI	KB	0.00	0.00	0.00
KJ	KB	0.00	0.00	0.00
KK	KB	0.00	0.00	0.00
KL	KB	0.00	0.00	0.00
KM	KB	0.00	0.00	0.00
KN	KB	0.00	0.00	0.00
KO	KB	0.00	0.00	0.00
KP	KB	0.00	0.00	0.00
KO	KB	0.00	0.00	0.00
KR	KB	0.00	0.00	0.00

## Material

Name	Standard	Description	E-modulus [-] [N/mm²]	Mue [-]	Gamma [kN/m³]	AlphaT [1/°]
2 - C25/30 B450C	UNI EN 1992-1-1	C25/30	31447	0,167	25	1E-05

## Folded plate (1/4)

Name	Material	Thickness [cm]	Bem.Param.	Bewehrungsanord.	Phi [-]
1	2	30	1	1	2.50
1 - Kopie	2	30	1	1	2.50
3	2	30	1	1	2.50
4	2	30	1	1	2.50
5	2	30	1	1	2.50
6	2	30	1	1	2.50
7	2	30	1	1	2.50
8	2	30	1	1	2.50
9	2	30	1	1	2.50
10	2	30	1	1	2.50
11	2	30	1	1	2.50
12	2	30	1	1	2.50
13	2	30	1	1	2.50
14	2	20	1	1	2.50
15	2	20	1	1	2.50
16	2	30	1	1	2.50
17	2	30	1	1	2.50
18	2	30	1	1	2.50

## Folded plate (2/4)

Name	Corner pts.
1	1; 8; 7; 6; 5; 4; 3; 2
1 - Kopie	1 - Kopie; 8 - Kopie; 7 - Kopie; 6 - Kopie; 5 - Kopie; 4 - Kopie; 3 - Kopie; 2 - Kopie
3	8 - Kopie; 8; 1; 1 - Kopie
4	1 - Kopie; 4 - Kopie; 4; 1
5	5 - Kopie; 5; 4; 4 - Kopie
6	8; 18; 18 - Kopie; 8 - Kopie
7	17 - Kopie; 17; 7; 7 - Kopie
8	7 - Kopie; 2 - Kopie; 2; 7
9	3 - Kopie; 6 - Kopie; 6; 3
10	7 - Kopie; 19 - Kopie; 19; 7
11	20 - Kopie; 20; 6; 6 - Kopie
12	6 - Kopie; 21 - Kopie; 21; 6
13	23 - Kopie; 23; 5; 5 - Kopie
14	37; 6 - Kopie (2); 3 - Kopie (2); 36
15	6 - Kopie (2); 5 - Kopie (2); 38; 39
16	18 - Kopie (2); 17 - Kopie (2); 17; 18
17	19 - Kopie (2); 20 - Kopie (2); 20; 19
18	21 - Kopie (2); 23 - Kopie (2); 23; 21

## Folded plate (3/4)

Name	Orientation [m]	Origin [m]	Local X x/y/z	Local Y x/y/z	LocalZ x/y/z
1	Z = 0,00	O	+X	+Y	+Z
1 - Kopie	Z = -4,30	O	+X	+Y	+Z
3	X = 0,00	O	+Y	+Z	+X
4	Y = 0,00	O	+X	+Z	-Y
5	X = 15,00	O	+Y	+Z	+X
6	Y = 3,00	O	+X	+Z	-Y
7	Y = 3,00	O	+X	+Z	-Y
8	X = 8,00	O	+Y	+Z	+X
9	X = 12,00	O	+Y	+Z	+X

Name	Orientation	Origin	Local X	Local Y	LocalZ
10	Y = 3,00	O	+X	+Z	-Y
11	Y = 3,00	O	+X	+Z	-Y
12	Y = 3,00	O	+X	+Z	-Y
13	Y = 3,00	O	+X	+Z	-Y
14	Z = -1,00	O	+X	+Y	+Z
15	Z = -1,00	O	+X	+Y	+Z
16	Y = 3,00	O	+X	+Z	-Y
17	Y = 3,00	O	+X	+Z	-Y
18	Y = 3,00	O	+X	+Z	-Y

## Folded plate (4/4)

Name	Bed. loc. X [kN/m²]	Loss	Y [kN/m²]	Loss	Z [kN/m²]	Loss	Complete loss
1	5000.00	without	5000.00	without	80000.00	without	No

Loss of bedding is only taken into account when doing non-linear calculations.

## Reinforcements arrangement

Name	Hox,z [cm]	Hoy,z [cm]	Hux,z [cm]	Huy,z [cm]
1	4.0	4.0	4.0	4.0

## Loadcase (1/2)

Name	Lc. type	E.-gewicht	γ (inf) [-]	γ (sup) [-]	ψ 0 [-]	ψ 1 [-]	ψ 2 [-]	Creep [-]
1	carichi permanenti	Yes	1,00	1,30	0,00	0,00	0,00	1,00
2	categoria A	No	0,00	1,50	0,70	0,50	0,30	0,70
3	carichi permanenti non strutturali	No	1,00	1,35	0,00	0,00	0,00	1,00
Erddruck	carichi permanenti non strutturali	No	1,00	1,35	0,00	0,00	0,00	1,00
Erdbeben	altra variabile	No	0,00	1,50	0,80	0,70	0,50	0,70

## Loadcase (2/2)

Name	Comment
1	Ständig (automatisch)
2	categoria A
3	carichi permanenti non strutturali
Erddruck	carichi permanenti non strutturali
Erdbeben	altra variabile

## Distributed load (constant, load covers partially)

Name	Loadcase	Plate	Load type	Direction	Size [kN/m²]	Corner pts.
2	2	1 - Kopie	Local	Z	5.00	8 - Kopie; 5 - Kopie; 4 - Kopie; 1 - Kopie
3	2	14	Local	Z	10.00	37; 6 - Kopie (2); 3 - Kopie (2); 36
4	2	15	Local	Z	10.00	6 - Kopie (2); 5 - Kopie (2); 38; 39

## Distributed load (lin., load covers partially) (1/2)

Name	Loadcase	Plate	Load type	Direction	N. 1	Size 1 [kN/m²]	N. 2	Size 2 [kN/m²]	N. 3	Size 3 [kN/m²]
1	3	1 - Kopie	Local	Z	8 - Kopie	70.00	1 - Kopie	70.00	4 - Kopie	30.00
5	Erddruck	4	Local	Z	1 - Kopie	-9.90	4 - Kopie	-5.80	1	-51.48
6	Erddruck	5	Local	Z	5 - Kopie	-5.80	4 - Kopie	-5.80	4	-38.28
7	Erddruck	3	Local	Z	5 - Kopie	5.80	4 - Kopie	5.80	4	38.28
8	Erdbeben	4	Local	Z	1 - Kopie	-0.19	4 - Kopie	-0.11	1	-0.98
9	Erdbeben	3	Local	Z	8 - Kopie	0.11	1 - Kopie	0.11	1	0.98
10	Erdbeben	5	Local	Z	5 - Kopie	-0.11	4 - Kopie	-0.11	4	-0.98

## Distributed load (lin., load covers partially) (2/2)

Name	Corner pts.
1	8 - Kopie; 5 - Kopie; 4 - Kopie; 1 - Kopie
5	1 - Kopie; 4 - Kopie; 4; 1
6	5 - Kopie; 4 - Kopie; 4; 5
7	8 - Kopie; 1 - Kopie; 1; 8
8	1 - Kopie; 4 - Kopie; 4; 1
9	8 - Kopie; 1 - Kopie; 1; 8
10	5 - Kopie; 4 - Kopie; 4; 5

## Linear superposition rule

Name: Auto (UNI EN 1992-1-1), Type of exclusion: Mutual exclusion of groups

Loadcase	Rule	Type	Exclusion	Load category
1		Ständig		
2		Nutzlast		
3		Ständig		
Erddruck		Ständig		
Erdbeben		Nutzlast		

## Design parameters

### 1 - UNI EN 1992-1-1

Property	Value
Arrangement of longitudinal reinforcement	Asymmetrical (Bar, Plate)
Minimum reinforcement in columns/walls	Minimum reinforcement is placed
Minimum reinforcement in columns/walls	Only maximum reinforcement is placed. An error message indicates larger values.
Type of bar for shear reinforcement	Automatic
Lever arm z	Is taken from bending design
Strut angle Theta	Gets calculated automatically
Angle of shear reinforcement	90,0
Shrinkage strain Eps,cs	-0,6
Consider reduction in cracked state	Yes

## Design group (UNI EN 1992-1-1)

Name	Rule	Lc.-Group	Non linear rule	Situation	Theory
Auto	Auto		Grundkombination		1

## Results: Design groups

### Folding Plate

### Bending design top

UNI EN 1992-1-1: Bending design top

Design group: Auto

Pos	Plate	x	y	asx,t	m.Ed	n.Ed	asy,t	m.Ed	n.Ed
		[m]	[m]	[cm <sup>2</sup> /m]	[kNm/m]	[kN/m]	[cm <sup>2</sup> /m]	[kNm/m]	[kN/m]
	1	3,14	2,01	0,23	-19,48	-118,02	7,03	-76,30	-33,49
	1	6,94	2,50	3,41	-26,64	63,40	4,54	-42,82	31,54
	1 - Kopie	2,50	0,00	0,00	0,00	0,00	3,80	-43,96	-31,99
	1 - Kopie	3,20	3,00	5,43	-21,52	314,02	1,26	-7,01	42,90
	3	0,00	-1,61	2,34	-21,47	21,50	0,38	-3,84	1,02
	3	1,50	0,00	1,74	-7,76	92,70	3,06	-45,78	-100,57
	4	1,52	-1,07	1,85	-12,07	50,94	0,99	-14,29	-26,49
	4	5,98	-1,60	1,79	-12,94	40,94	2,23	-23,81	-2,86
	5	0,51	-1,05	0,40	-1,95	15,16	0,34	-1,91	11,45
	5	1,00	-1,00	0,94	-5,31	31,46	0,34	-1,84	11,79
	6	1,60	-4,30	3,58	-16,76	143,40	2,91	-40,02	-69,03
	7	5,87	-4,30	2,45	-11,69	96,72	2,51	-39,06	-91,62



Pos	Plate	x [m]	y [m]	asx,t [cm <sup>2</sup> /m]	m.Ed [kNm/m]	n.Ed [kN/m]	asy,t [cm <sup>2</sup> /m]	m.Ed [kNm/m]	n.Ed [kN/m]
	7	6,40	-4,30	2,49	-14,90	77,70	2,34	-35,32	-77,09
	8	0,50	0,00	2,45	-0,88	222,55	2,39	-1,76	208,73
	8	1,00	-0,54	2,53	0,50	242,29	1,52	-0,22	140,68
	9	0,00	0,00	1,54	-1,21	133,61	1,53	1,16	154,15
	9	1,00	-0,50	1,78	0,79	174,08	0,97	1,35	103,76
	10	8,60	0,00	2,75	-9,94	167,56	1,70	-24,38	-45,84
	10	9,20	-4,30	0,88	-11,51	-14,96	2,40	-38,65	-97,04
	11	10,80	-4,30	0,93	-11,98	-15,13	1,64	-35,09	-127,20
	11	11,40	0,00	1,46	-8,34	48,31	1,19	-21,28	-60,51
	12	12,35	0,00	1,58	-5,69	96,98	1,16	-12,67	-2,62
	12	12,70	0,00	1,43	-7,10	70,05	1,39	-21,77	-49,50
	13	14,30	-1,00	1,01	-2,32	74,02	0,00	0,00	0,00
	13	15,00	0,00	0,66	-3,21	32,91	0,93	-9,90	-0,57
	14	9,78	3,00	1,57	-4,39	73,98	2,72	-13,37	42,66
	14	10,25	3,00	1,77	-4,61	70,31	2,49	-12,23	39,46
	15	12,00	1,00	1,71	-9,61	14,81	0,58	-1,45	30,74
	15	13,90	3,00	1,27	-3,30	50,17	1,64	-7,61	30,77
	16	4,40	-1,00	2,84	-20,37	65,20	1,23	-14,87	-13,26
	17	9,20	0,00	2,36	-11,53	91,26	2,10	-39,29	-123,55
	17	9,60	0,00	0,94	-9,70	1,27	2,30	-43,65	-141,31
	18	12,70	0,00	1,43	-7,10	70,05	1,39	-21,77	-49,50

## Bending design bottom

UNI EN 1992-1-1: Bending design bottom

Design group: Auto

Pos	Plate	x [m]	y [m]	asx,b [cm <sup>2</sup> /m]	m.Ed [kNm/m]	n.Ed [kN/m]	asy,b [cm <sup>2</sup> /m]	m.Ed [kNm/m]	n.Ed [kN/m]
	1	5,00	0,00	2,85	13,49	113,35	5,68	69,00	-79,79
	1	8,00	2,00	5,74	54,41	35,81	0,00	0,00	0,00
	1 - Kopie	3,10	1,52	2,38	21,08	27,36	6,43	66,11	-0,08
	1 - Kopie	4,00	3,00	6,64	40,21	202,78	0,83	7,69	7,43
	3	3,00	-3,23	3,22	17,17	114,45	1,14	5,66	55,70
	4	4,00	0,00	3,10	14,09	126,73	5,51	72,43	-119,83
	5	1,50	0,00	1,41	7,43	51,14	1,93	29,91	-67,74
	6	0,00	-3,76	2,66	14,63	91,63	0,81	2,52	53,22
	6	0,00	-1,08	2,27	17,10	46,99	1,06	5,28	40,03
	7	7,47	0,00	1,88	10,10	66,18	0,00	0,00	0,00
	7	8,00	-3,76	0,83	12,50	-25,70	0,01	0,83	-4,59
	8	0,00	0,00	2,23	0,24	207,27	2,32	0,69	211,54
	8	1,00	-0,54	2,63	0,50	242,29	1,54	0,42	140,68
	9	0,50	0,00	1,73	1,03	153,40	1,92	2,40	158,26
	9	1,00	0,00	1,96	1,18	172,99	1,49	2,93	113,58
	10	8,00	-3,76	0,83	12,50	-25,70	0,01	0,83	-4,59
	10	8,60	0,00	2,04	2,09	172,81	0,00	0,00	0,00
	11	11,40	0,00	0,80	2,91	48,31	0,00	0,00	0,00
	11	12,00	0,00	0,10	-3,12	37,34	0,00	0,00	0,00
	12	12,35	0,00	1,20	1,76	96,98	0,00	0,00	0,00
	12	12,70	0,00	0,92	1,80	70,05	0,00	0,00	0,00
	13	15,00	-3,75	0,40	3,25	6,87	0,04	0,36	-3,03
	13	15,00	-0,50	1,07	4,90	43,82	0,00	0,00	0,00
	14	10,38	1,53	0,72	2,88	18,22	1,45	6,91	25,17
	14	10,88	2,02	1,03	3,80	29,39	1,44	5,12	43,32
	15	13,07	2,25	0,78	3,73	13,77	0,74	2,68	21,49
	15	14,53	2,04	0,44	2,56	2,95	0,91	3,30	26,66
	16	4,80	-1,00	0,81	5,15	23,23	0,00	0,00	0,00
	16	4,80	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	17	9,20	-0,62	1,20	-4,40	152,87	0,00	0,00	0,00
	17	10,80	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	18	12,70	0,00	0,92	1,80	70,05	0,00	0,00	0,00
	18	14,30	0,00	0,02	2,28	-13,92	0,00	0,00	0,00

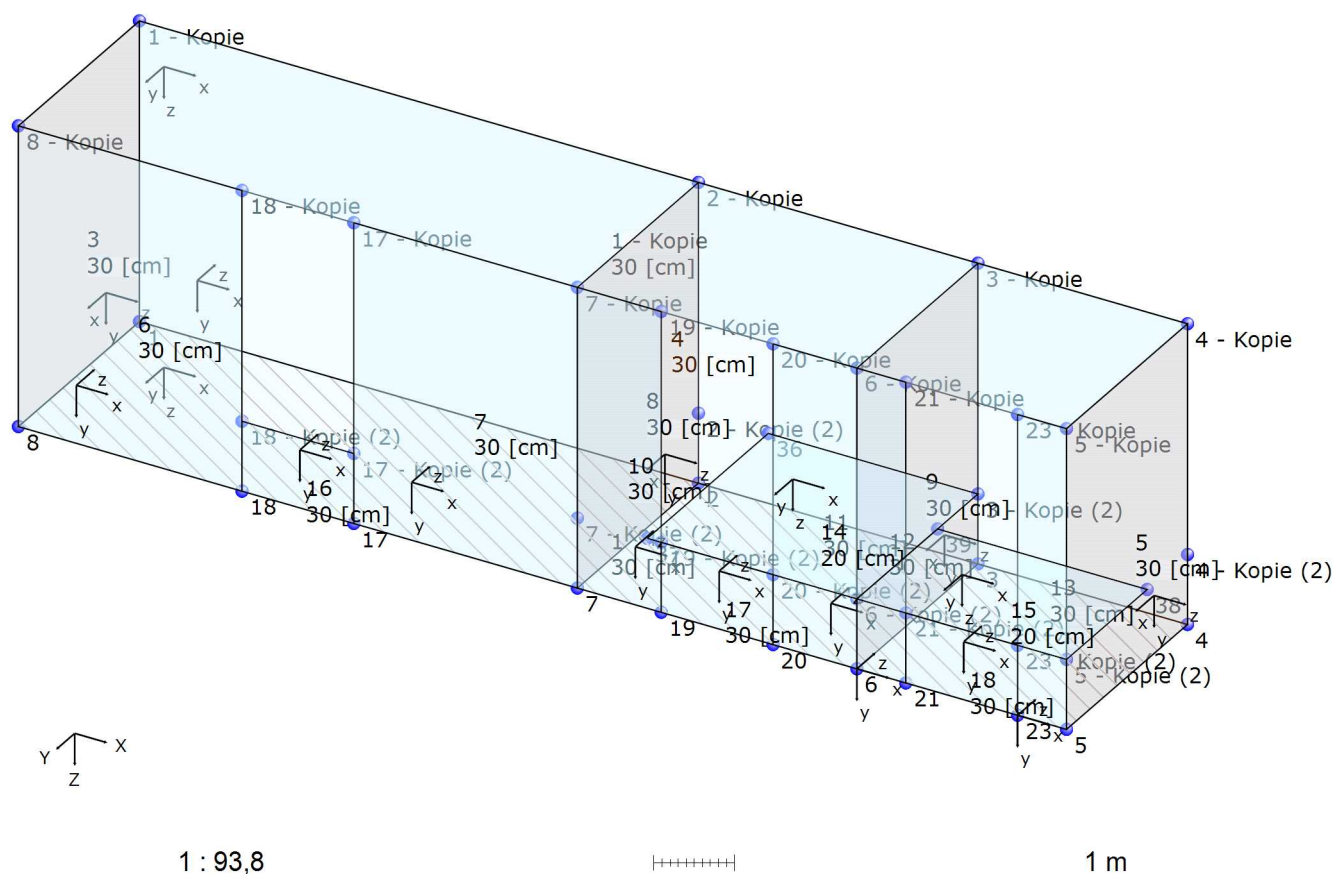
## Shear force design

UNI EN 1992-1-1: Shear design

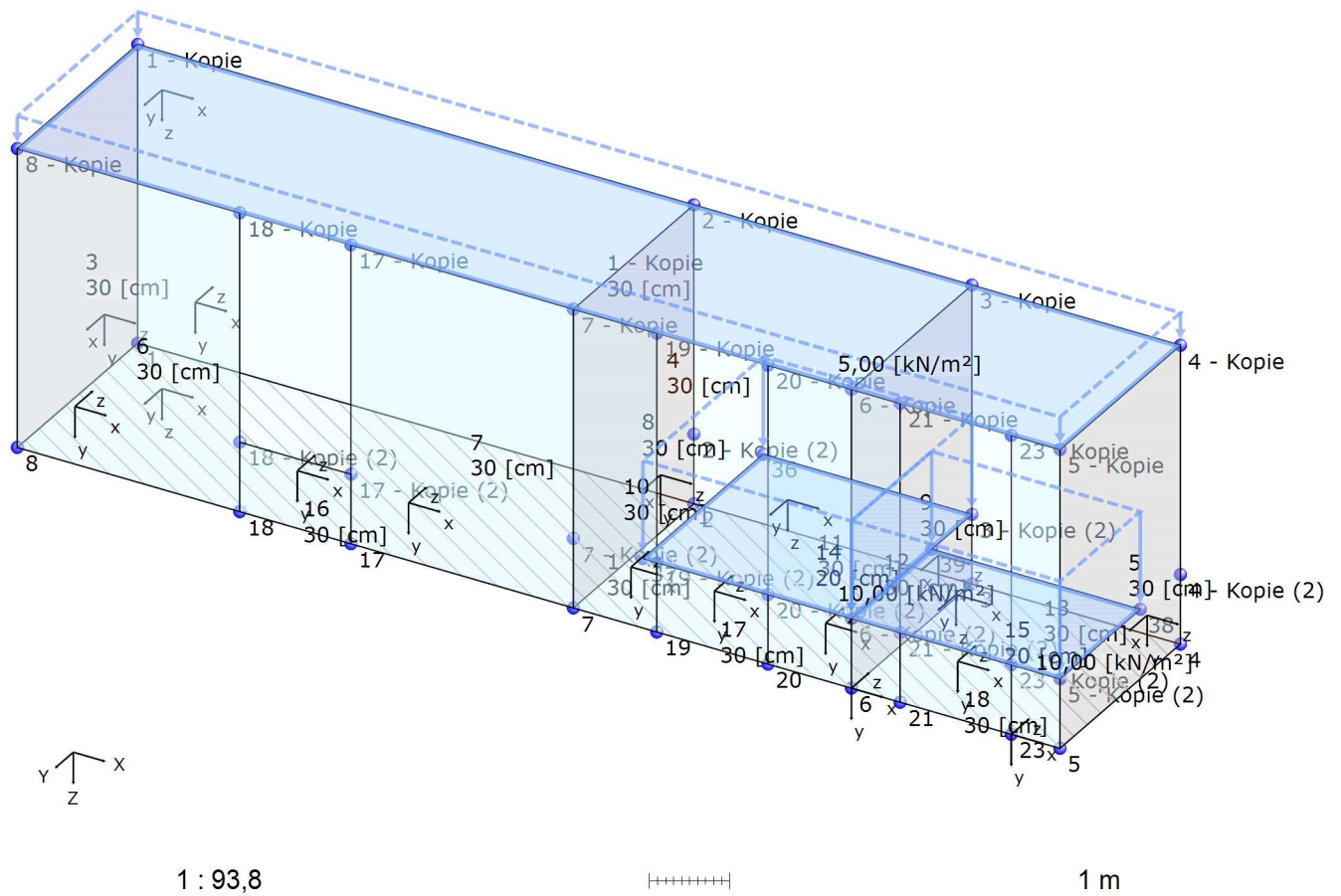
Design group: Auto

Pos	Plate	x [m]	y [m]	V.Ed [kN/m]	V.Edx [kN/m]	V.Edy [kN/m]	V.Rdc [kN/m]	V.Rds [kN/m]	V.Rdmax [kN/m]	asw [cm <sup>2</sup> /m <sup>2</sup> ]	lna. [-]
	1	4,80	3,00	162,44	-6,66	162,31	118,71	162,44	535,32	8,21	
	1 - Kopie	3,20	3,00	178,16	79,14	-159,61	104,20	178,16	628,60	7,66	
	3	3,00	0,00	31,88	28,72	-13,85	120,47	0,00	628,60	0,00	
	4	15,00	0,00	15,84	-15,73	1,87	116,54	0,00	628,60	0,00	
	5	3,00	0,00	17,29	-12,55	11,89	112,74	0,00	628,60	0,00	
	6	3,20	0,00	13,17	12,78	-3,22	139,29	0,00	488,50	0,00	
	7	8,00	0,00	13,49	-10,08	-8,97	109,60	0,00	628,60	0,00	
	8	3,00	0,00	4,40	-4,25	1,14	121,77	0,00	420,67	0,00	
	9	3,00	0,00	1,00	-0,30	0,95	130,99	0,00	355,47	0,00	
	10	9,20	0,00	33,43	-3,83	-33,21	136,29	0,00	628,60	0,00	
	11	12,00	0,00	4,44	-2,18	-3,87	121,63	0,00	628,60	0,00	
	12	12,70	0,00	17,68	-4,94	-16,97	132,55	0,00	628,60	0,00	
	13	15,00	0,00	18,00	-0,46	-17,99	120,57	0,00	628,60	0,00	
	14	12,00	3,00	5,99	-1,25	-5,85	78,24	0,00	311,13	0,00	
	15	15,00	3,00	15,62	15,35	-2,87	79,97	0,00	311,13	0,00	
	16	4,80	0,00	17,67	-17,12	-4,37	137,53	0,00	498,59	0,00	
	17	10,80	0,00	31,21	0,04	-31,21	135,77	0,00	628,60	0,00	
	18	14,30	0,00	21,61	-1,37	-21,57	132,22	0,00	628,60	0,00	

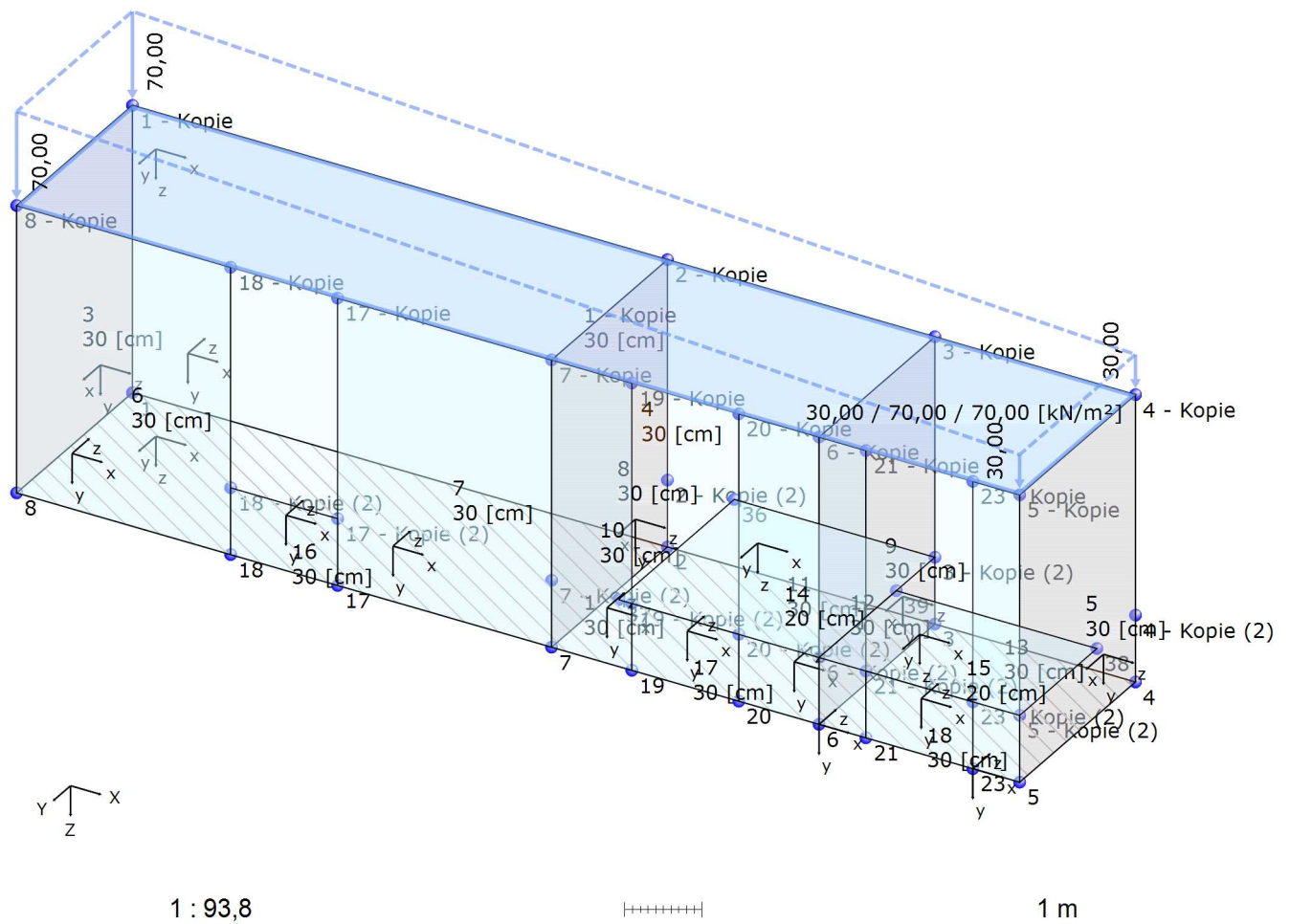
Abb.: Eigenlast/ peso proprio



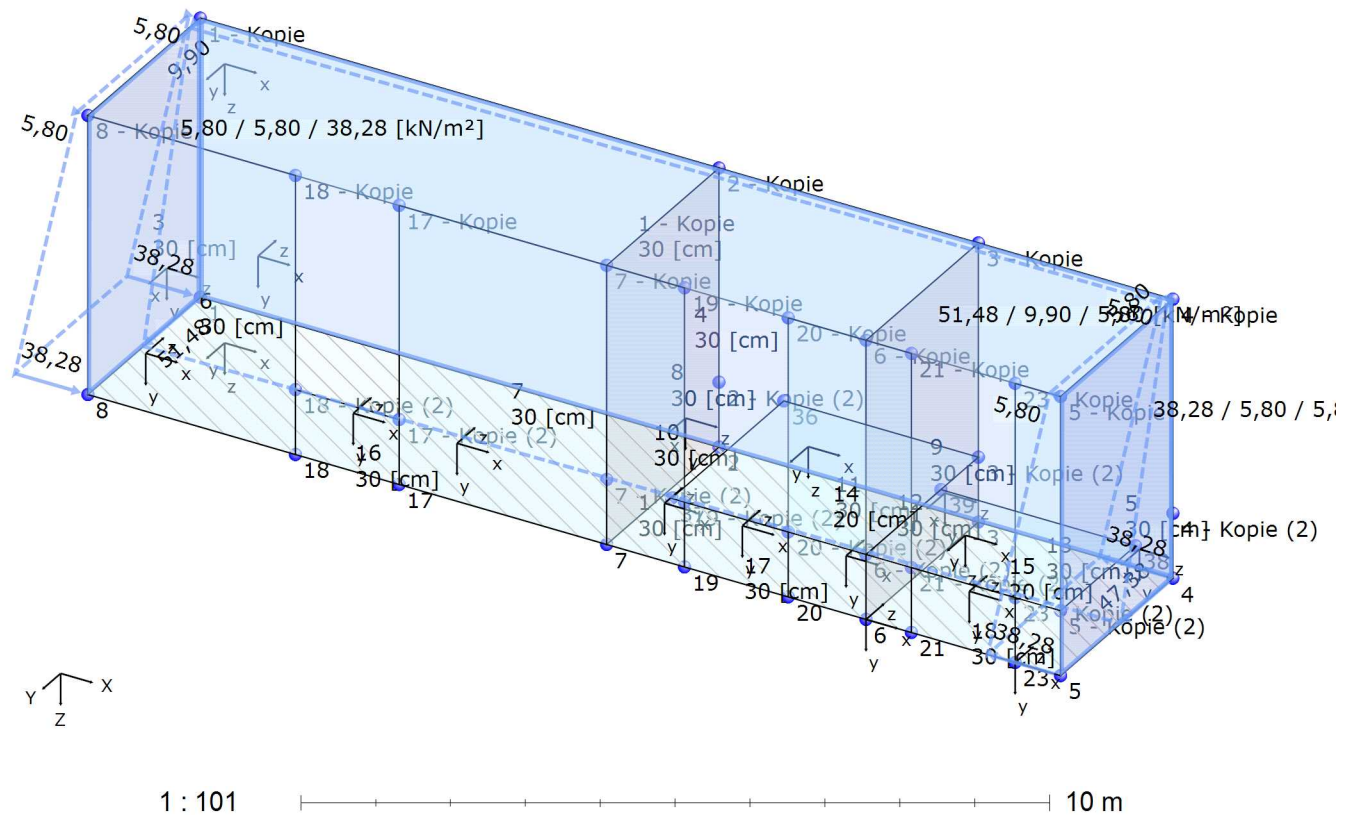
**Abb.: Nutzlast/ carico d'esercizio**  
Einwirkungen aus Loadcase 2



**Abb.: Aufschüttung/ rinterro**  
Einwirkungen aus Loadcase 3

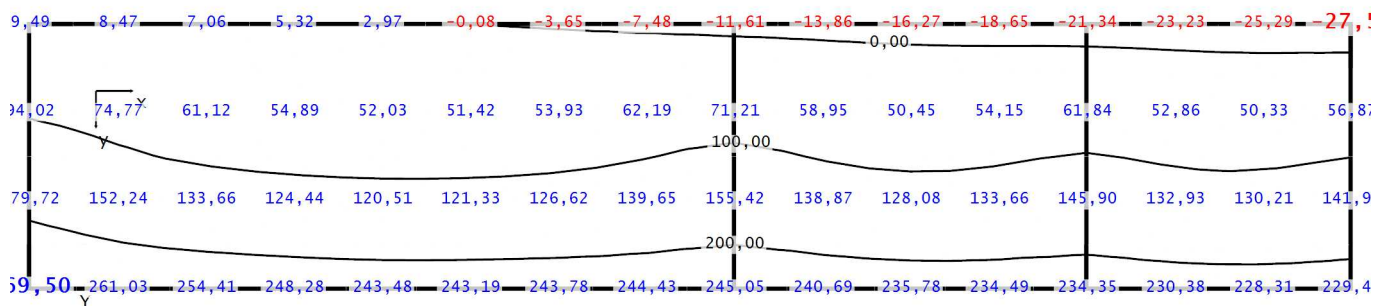


**Abb.: Erddruck/ Spinta terreno**  
Einwirkungen aus Loadcase Erddruck





**Pressungen Th. 1. O. UNI EN 1992-1-1, Kombination ohne Beiwerte - max sz,k [kN/m²]**



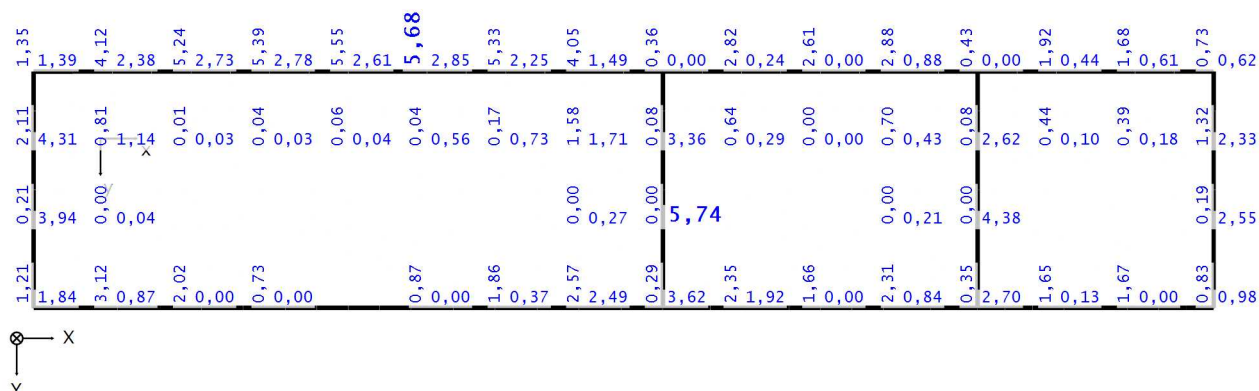
Wertebereich: min = -27,53 max = 269,50 [kN/m<sup>2</sup>]

1 : 85,9

1 m

## Bodenplatte/ Platea

### UNI EN 1992-1-1 - as,b [cm<sup>2</sup>/m]



Wertebereich: max = 5,74 [cm<sup>2</sup>/m] in X ; max = 5,68 [cm<sup>2</sup>/m] in Y

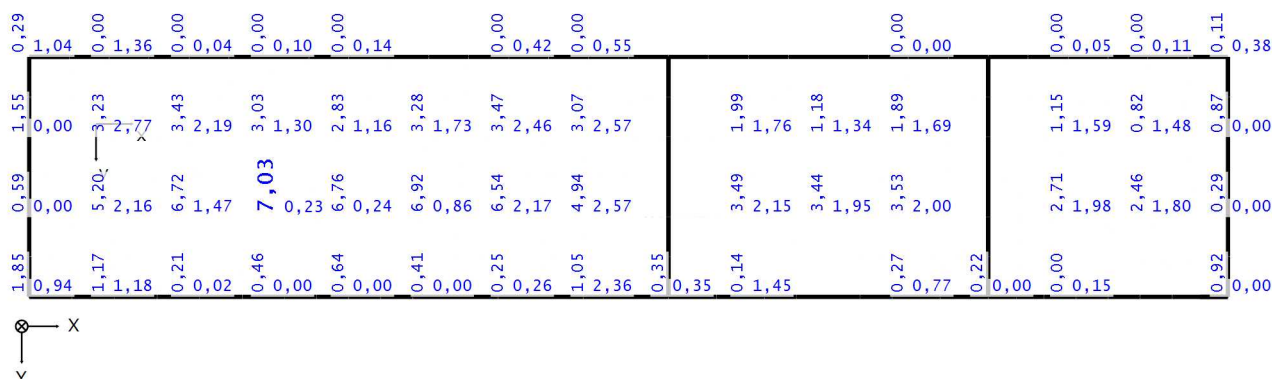
1 : 96,2



1 m

## Bodenplatte/ Platea

### UNI EN 1992-1-1 - as,t [cm<sup>2</sup>/m]



Wertebereich: max = 3,41 [cm<sup>2</sup>/m] in X ; max = 7,03 [cm<sup>2</sup>/m] in Y

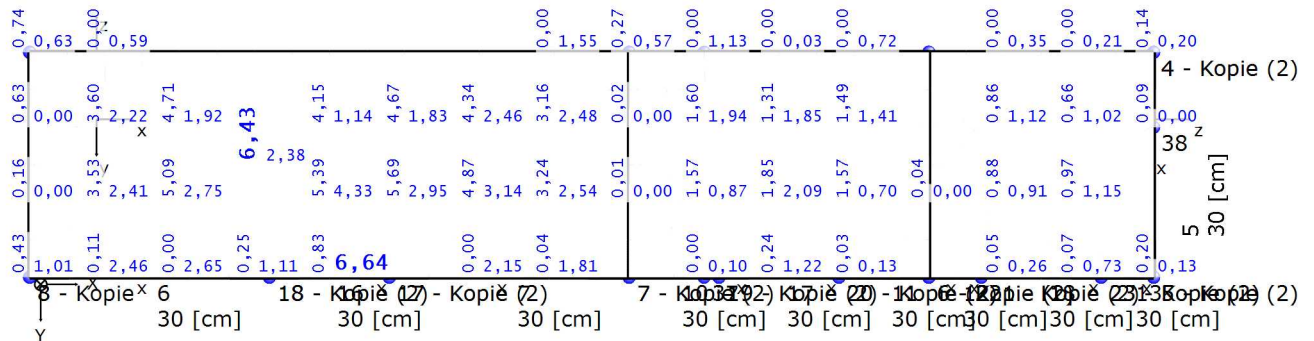
1 : 94,7



1 m

## Decke/ Solaio

### UNI EN 1992-1-1 - as,b [cm<sup>2</sup>/m]

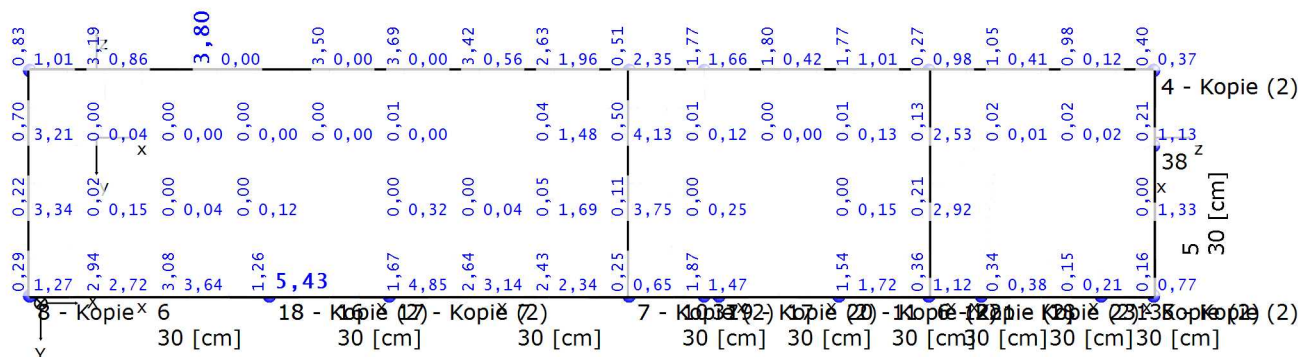


Wertebereich: max = 6,64 [cm<sup>2</sup>/m] in X ; max = 6,43 [cm<sup>2</sup>/m] in Y

1 : 101

## Decke/ Solaio

### UNI EN 1992-1-1 - as,t [cm<sup>2</sup>/m]



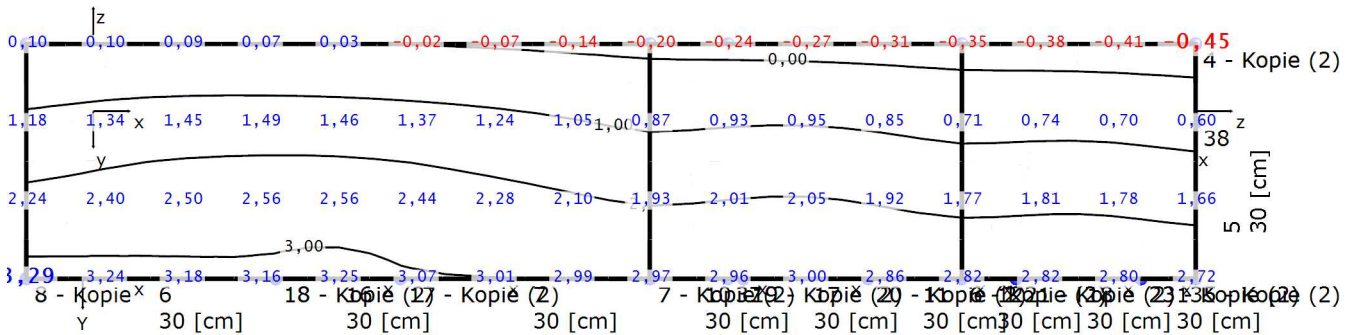
Wertebereich: max = 5,43 [cm<sup>2</sup>/m] in X ; max = 3,80 [cm<sup>2</sup>/m] in Y

1 : 101



## Decke/ Solaio

Globale Verformungen Th. 1. O. UNI EN 1992-1-1, Quasi ständige Kombination - max dz,d  
[mm]



Wertebereich: min = -0,46 max = 3,30 [mm]

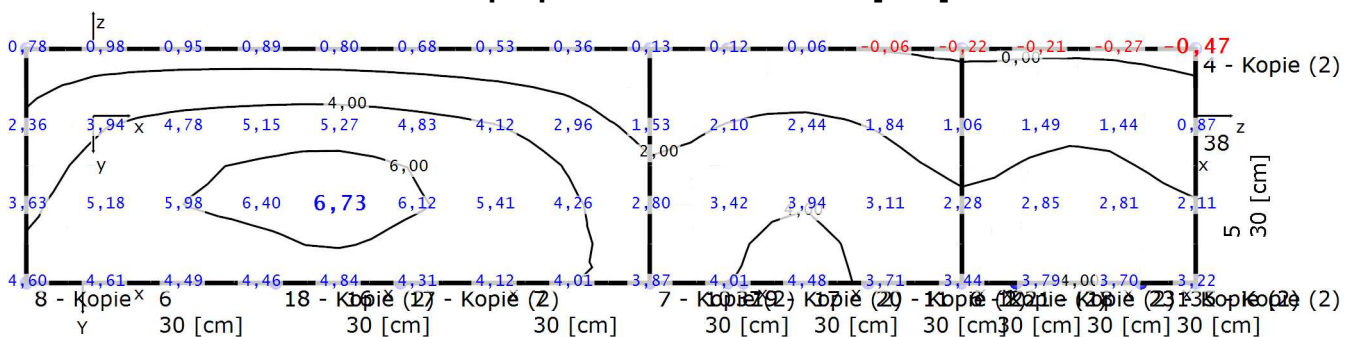
1 : 97,1

|||||

1 m

## Decke/ Solaio

Globale Verformungen im Zustand II, Th. 1. O., t = unendl., Betonzugf. berücks. - Lin.  
superpos. r.: Auto - max dz [mm]



Wertebereich: min = -0,47 max = 6,73 [mm]

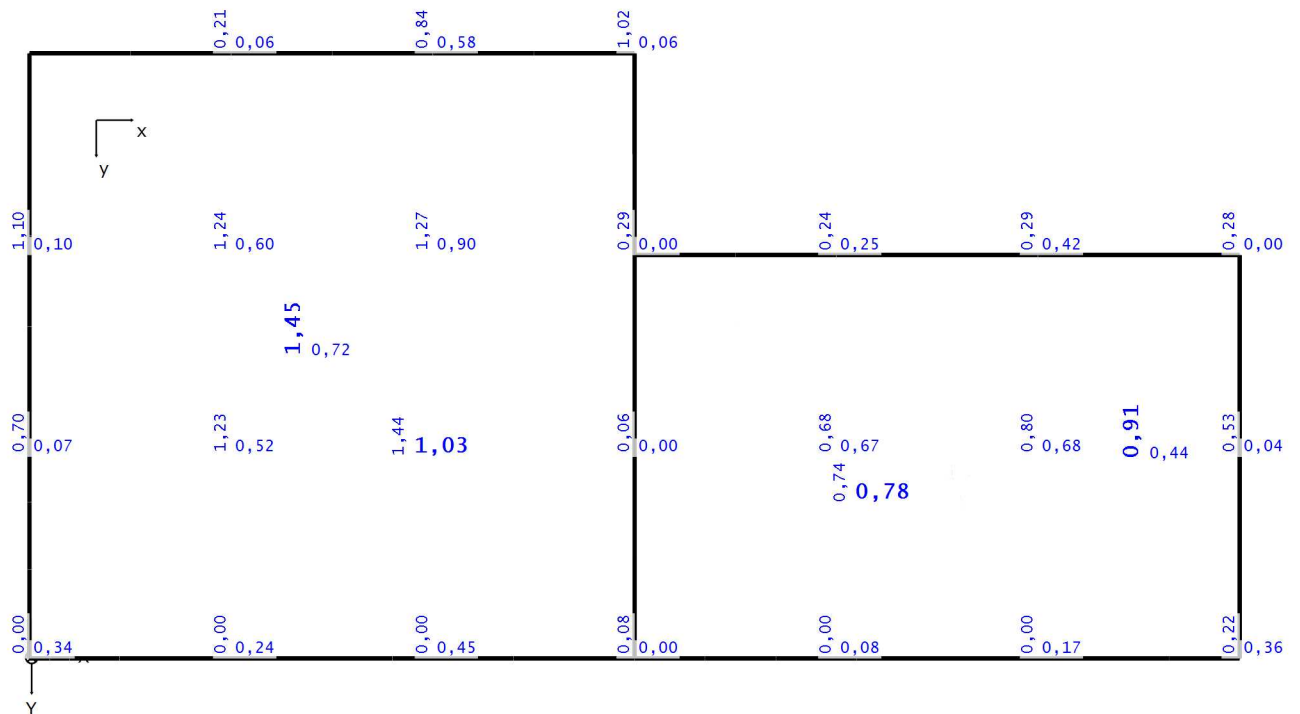
1 : 97,1

|||||

1 m

## Zwischendecke/ Solaio intermedio

UNI EN 1992-1-1 -  $a_{s,b}$  [cm<sup>2</sup>/m]



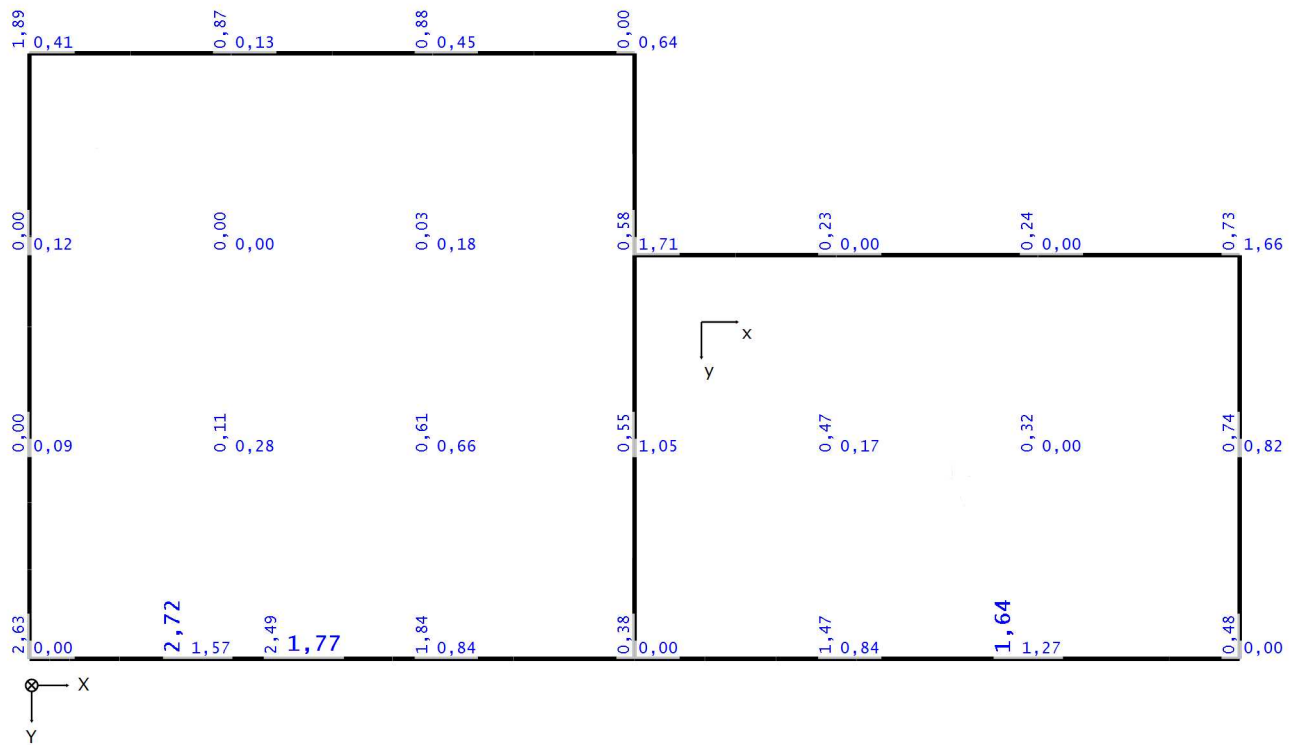
Wertebereich: max = 1,03 [cm<sup>2</sup>/m] in X ; max = 1,45 [cm<sup>2</sup>/m] in Y

1 : 37,5



1 m

**UNI EN 1992-1-1 - as,t [cm²/m]**



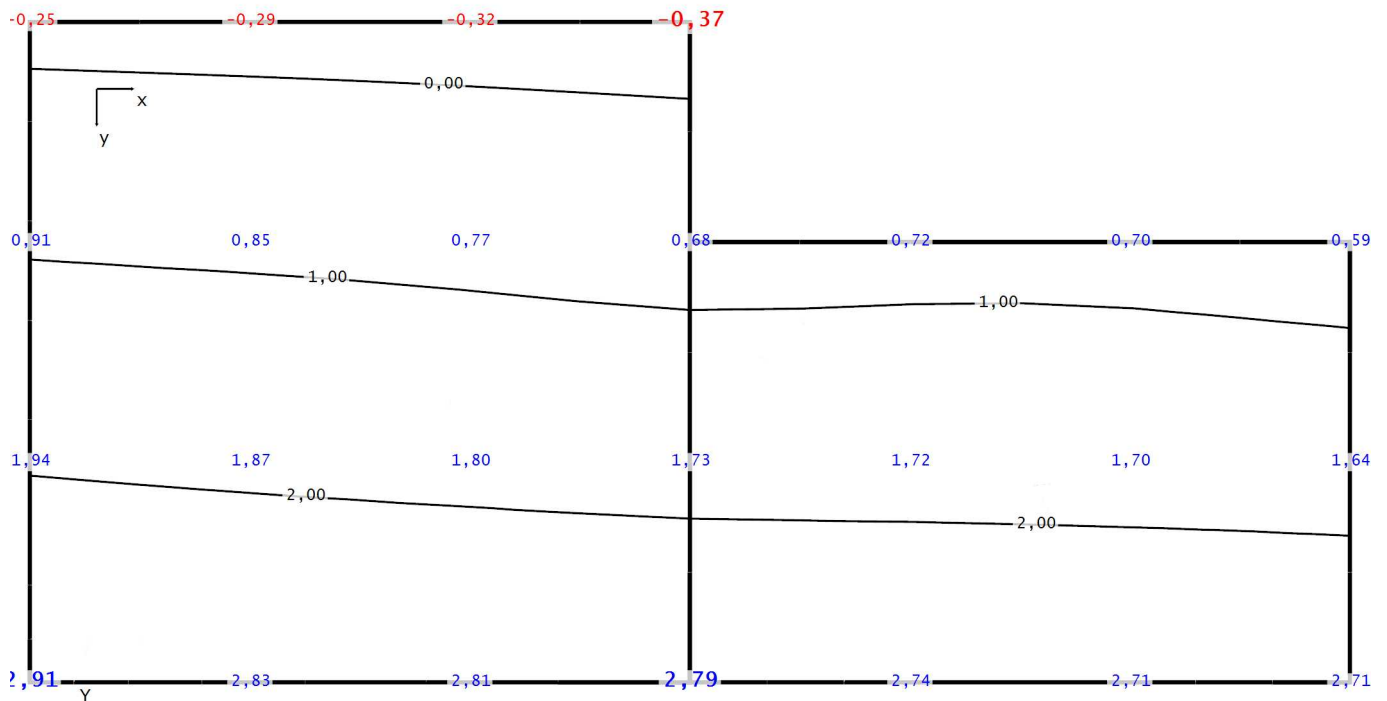
1 : 37,5



1 m

## Zwischendecke/ Solaio intermedio

Globale Verformungen Th. 1. O. UNI EN 1992-1-1, Quasi ständige Kombination - max dz,d  
[mm]



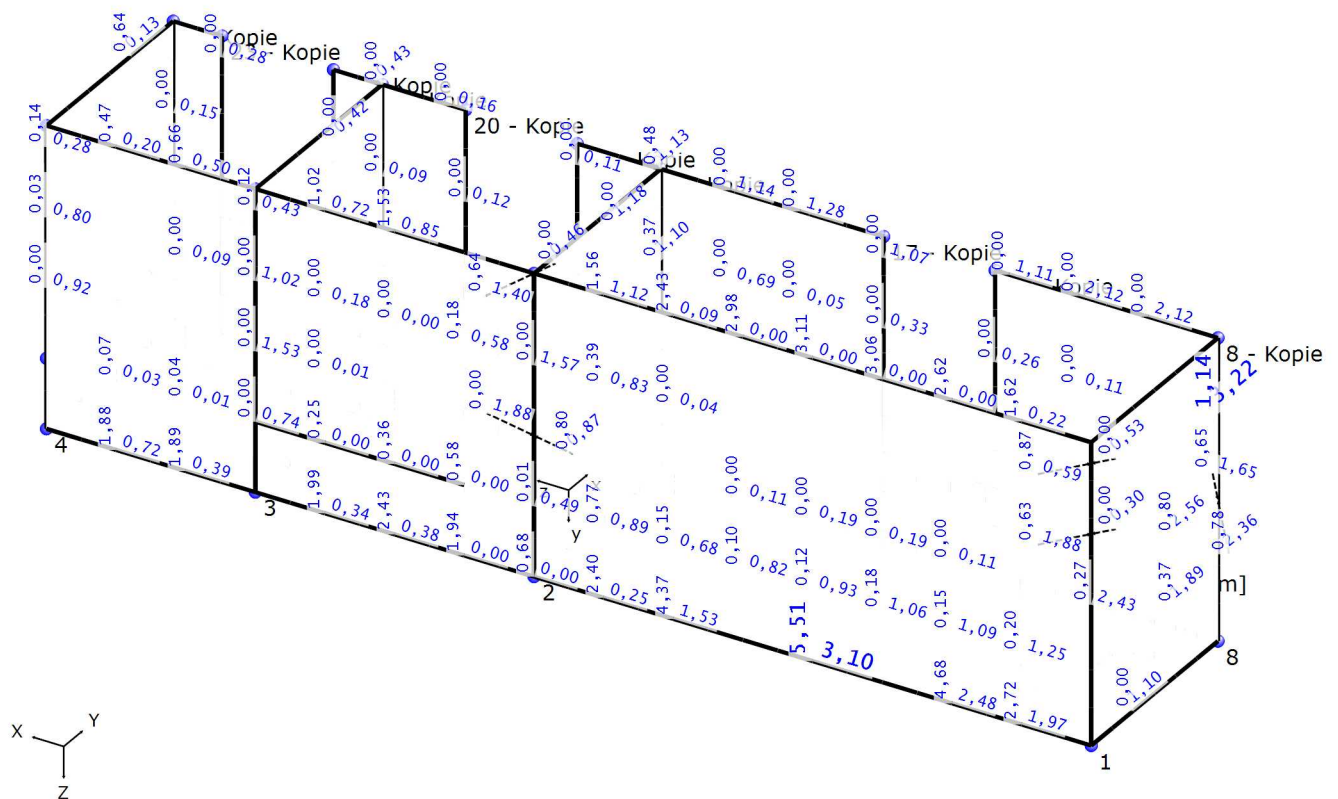
Wertebereich: min = -0,37 max = 2,91 [mm]

1 : 34,4



1 m

# Wände/ Pareti UNI EN 1992-1-1 - as,b [cm<sup>2</sup>/m]



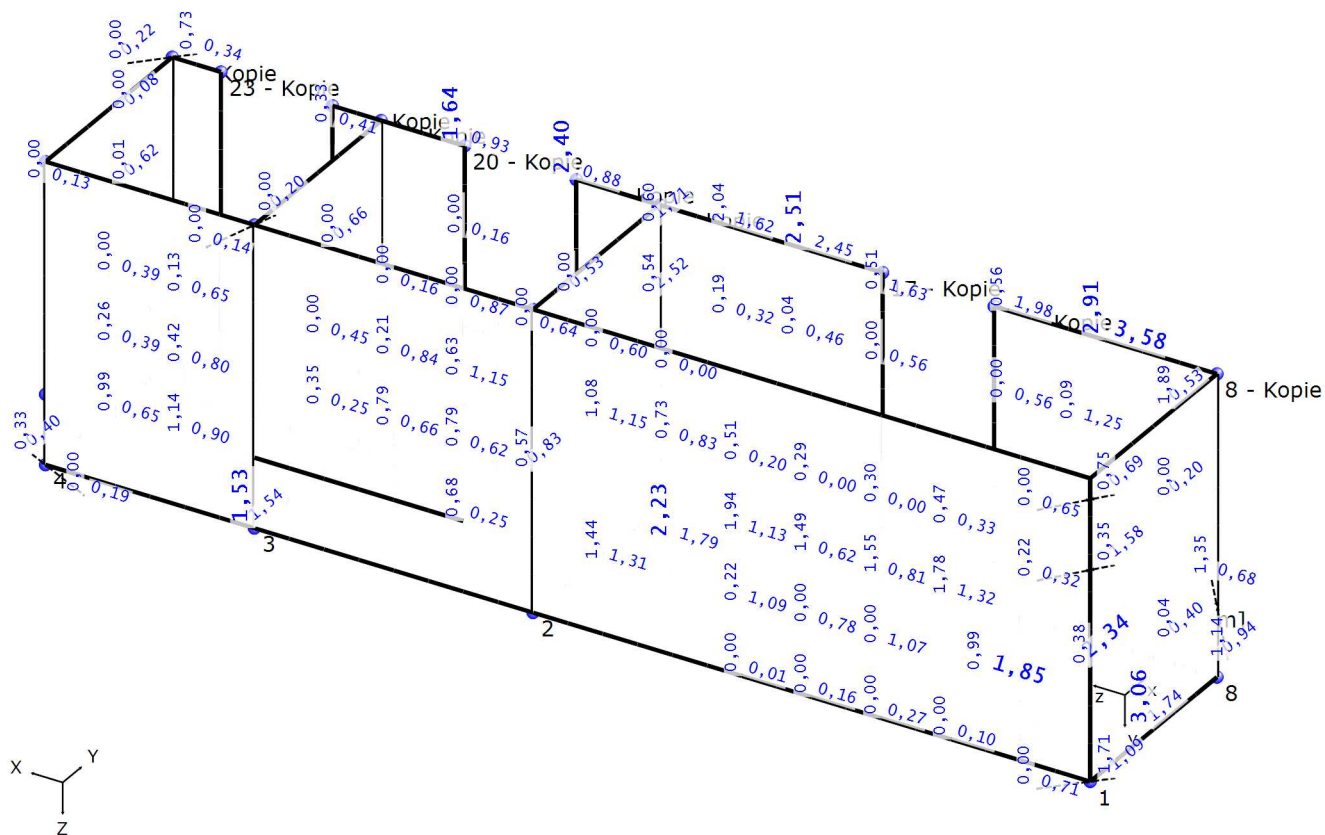
Wertebereich: max = 3,22 [cm<sup>2</sup>/m] in X ; max = 5,51 [cm<sup>2</sup>/m] in Y

1 : 92,9

+++++

1 m

# Wände/ Pareti UNI EN 1992-1-1 - as,t [cm<sup>2</sup>/m]



Wertebereich: max = 3,58 [cm<sup>2</sup>/m] in X ; max = 3,06 [cm<sup>2</sup>/m] in Y

1 : 92,9

+++++

1 m