

RELACION KONSTRUKTIV

BOX 2x(4.5m x 3m)

**"RINDERTIMI I URES NE LUMIN MANATI",
BASHKIA LEZHE**

POROSITESI:“ BASHKIA LEZHE“

LLOGARITJA KONSTRUKTIVE E TOMBINOS BOX 2 x (4.5m x 3m)

Hyrje

Te gjithë strukturat e mureve mbajtes e prites, tombino box te cilat perfshihen ne kete projekt, jane konceptuar, dimensionuar apo llogaritur, referuar si normativave tona te projektimit, ashtu edhe ata te huaja.

Themelet ne secilin rast iu eshte dhene zgjidhja me te mundshme si teknike ashtu edhe ekonomike, mbeshtetur edhe ne rekomandimet e dhena nga studimi gjeologo-inxhinierik.

Baza mbeshtetese llogaritese:

- Referuar kushteve tona teknike te projektimit KTP-21-23-78.
- Referuar Standartit Italian DM-90-96, Ordinanza 3274
- Referuar EC.

Materialet ndertimore dhe karakteristikat perkatese :

Materialet që do të përdoren në konstruksion do jene si ne vijim:

Betonet me karakteristikat perkatese si ne vijim :

- Beton per mure dhe themele , klasa C 25/30 ose marke (M-300)

Karakteristikat e betoneve						
R_{ck}	30,00	40	45	N/mm^2		Rezistenca karakteristike kubike, max .
f_{ck}	24,90			N/mm^2	$= 0.83 \cdot R_{ck}$	Rezistenca karakteristike cilindrike, max .
f_{cd}	16,60			N/mm^2	$= f_{ck} / 1.5$	Rezistenca e projektit ne shtypje
f_{cm}	32,90			N/mm^2	$= f_{ck} + 8$	Rezistenca karakteristike cilindrike, mesatare
f_{ctm}	2,56			N/mm^2	$= 0.3 \cdot (f_{ck})^{2/3}$	Rezistenca mesatare ne terheqje
f_{ctk}	1,79			N/mm^2	$= 0.7 \cdot (f_{ctm})$	Rezistenca karakteristike ne terheqje
f_{ctd}	1,19			N/mm^2	$= (f_{ctm}) / 1,5$	Rezistenca ne terheqje e projektit
σ_{adm}	14,94			N/mm^2	$= 0.6 \cdot (f_{ck})$	Sforcimet e lejuara nen komb. e ngarkesave te vec.
E_c	31447,1			N/mm^2	$= 1000 \cdot 22 \cdot (f_{cm} / 10)^{0.3}$	Moduli elastik sekant

Hekuri FeB 44k .

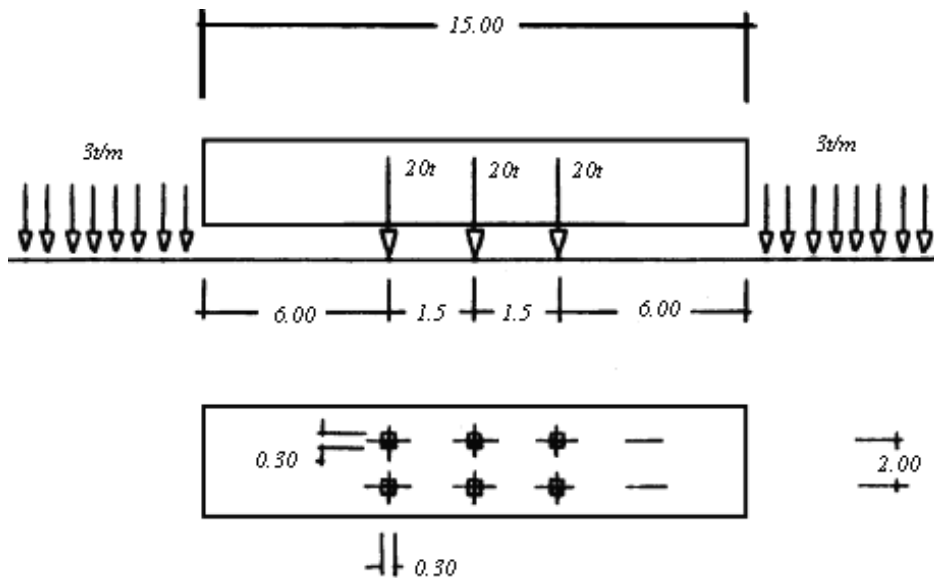
Hekur FeB 44k				
f_{tk}	540	N/mm ²		Rezistenca karakteristike ne keputje
f_{yk}	430	N/mm ²	=0.8*f _{tk}	Rezistenca karakteristike e rrjedhshmerise
f_{sd}	373.9	N/mm ²	= f _{yk} /1.15	Rezistenca llogaritese
E_s	200000,00	N/mm ²		Moduli i elasticitetit

LLOGARITJA E NGARKESAVE

Llogaritja e ngarkesave

- **Ngarkesat e perhershme**
(sipas shtresave dhe peshes vetjake te vete struktures)
- **Ngarkesa e perkoshme (nga mjetet levizese):**

Skeme ngarkesa sipas DM-90/96



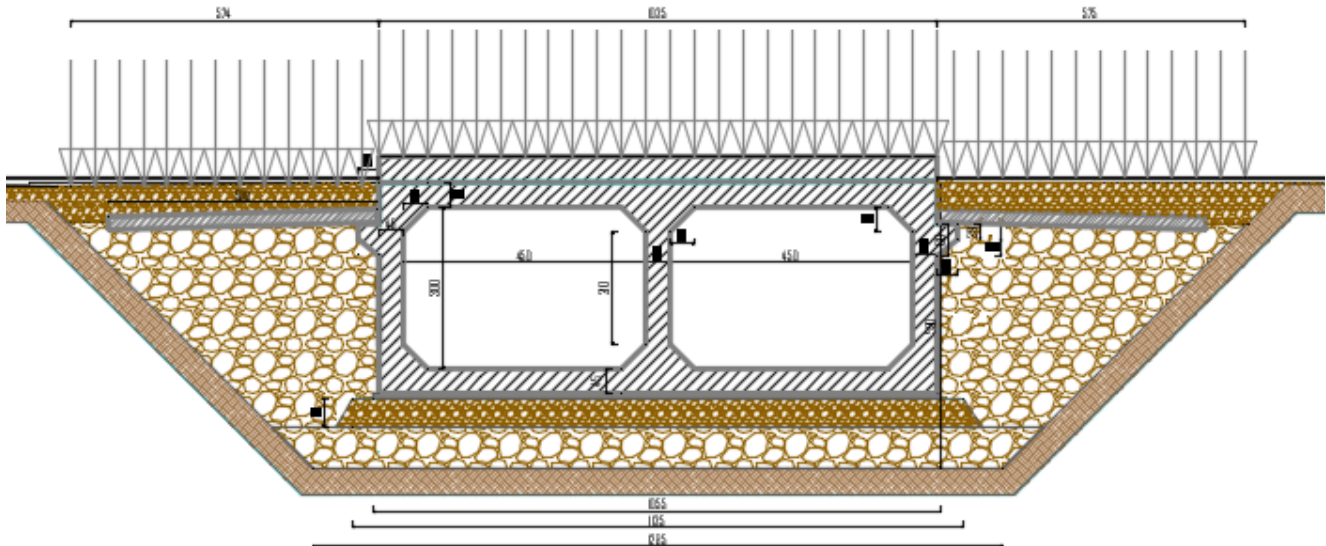
LLOGARITJA E STRUKTURAVE TIP KESSON

TOMBINO KATERKENDESHE 2 x (4.5m x 3m)

Llogaritjet e ketyre strukturave jane bere duke iu referuar MEF (Metoda e Elementeve te Fundem) si per modelet numerike plane, ashtu edhe ato hapesinore.

Prerja Terthore e tombinos Box 2 x (4.5 m x 3 m)

Ngarkesat e Perhershme (sipas shtresave dhe peshes vetjake te struktures)



Ne vijim jepet procedura e llogaritjes ne rastin plan sipas MEF e cila bazohet ne nje mini program ose “flete excel-i “ .

- **Te dhena :**
- **Gjeometrike :**
 - Lartesia 300cm
 - Gjeresia 450cm
 - Spesori i soletes – 45cm
 - Spesori i pareteve anesore -45cm
 - Spesori i themelit- 45 cm
 - Trashesia e mbushjes mbi solete 250-500cm
- **Karakteristikate betonit dhe te terrenit :**
 - Pesha volumore e betonit – 25kN/m^3
 - Moduli elasticitetit – $3 \cdot 10^7\text{kN/m}^3$
 - Pesha volumore e mbushjes – 20kN/m^3
 - Pesha volumore e terrenit- 20kN/m^3
 - Kendi i ferkimit te brendshem -35°
 - Koeficienti i spintes (ripozo) $k_{st} = 1 - \sin 35^\circ = 0.426$
 - Pressioni per ngarkese sismike (sipas shprehjeve te Wood) $q_{sis} = 13,0\text{ kN/m}^2$
 - Koeficienti i Winklerit per bazamentin – 10.000 kN/m^3
- **Ngarkesat :**
 - Pesha vetjake + permanente
 - Spinta e terrenit
 - Mbingarkesa e automjeteve
 - Forza e frenimit -40kN/m
 - Sizmiciteti

Ngarkesa e levizshme – Rasti A (rasti pare) + Rasti B (rasti dyte)

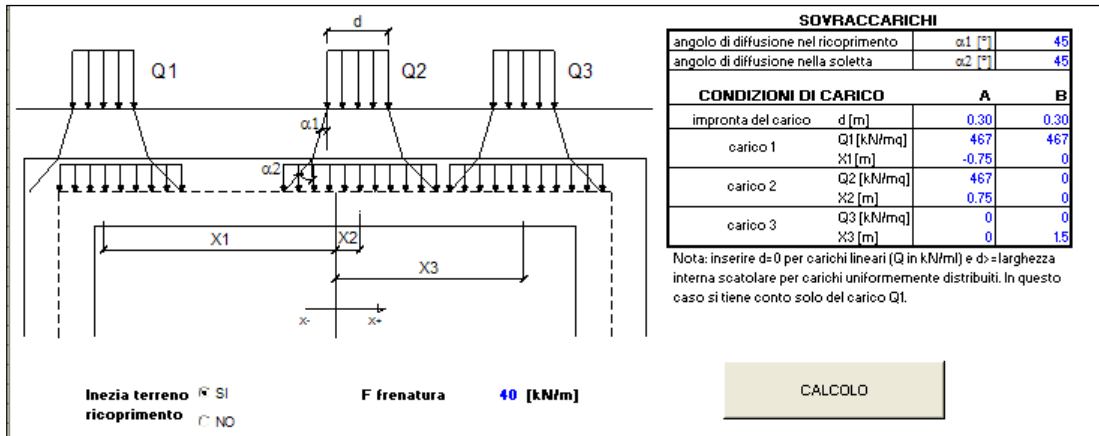


Fig.1.2.(Rastet mbi pozicionimin e ngarkesave te levizshme)

Kombinimi i ngarkesave si ne vijim :

combinazioni di carico										
condizioni di carico	1	2	3	4	5	6	7	8	9	10
peso proprio + perm.	1.35	1.35	1.35	1.35	1					
falda + spinta terreno	1.35	1.35	1.35	1.35	1					
sovraccarico A	1.5	1.5		1.5						
sovraccarico B			1.5							
sovraccarico terreno	1.5		1.5	1.5						
frenatura			1	1						
sisma			1	1	1					

Tab.1.3 (Kombinimet e ngarkesave)

➤ Verifikimet :

Ne vijim jane paraqitur diagramat e forcate te brendshme (M,N,Q) per secilen pjese perberese te tombinos , duke iu referuar rastit te pozicionimit me te disfavorshem. Jane paraqitur gjithashtu dhe verifikimet SLU perkatese.

Karakteristikat e materialeve (beton + hekur)

CARATTERISTICHE DEI MATERIALI

Calcestruzzo

$R_{ck} = 30$ (MPa)
 $\gamma_{m,c} = 1.9$
 $f_{cd} = R_{ck} / \gamma_{m,c} = 15.79$ (MPa)

Copriferro (asse armatura)

$c = 4.00$ (cm)

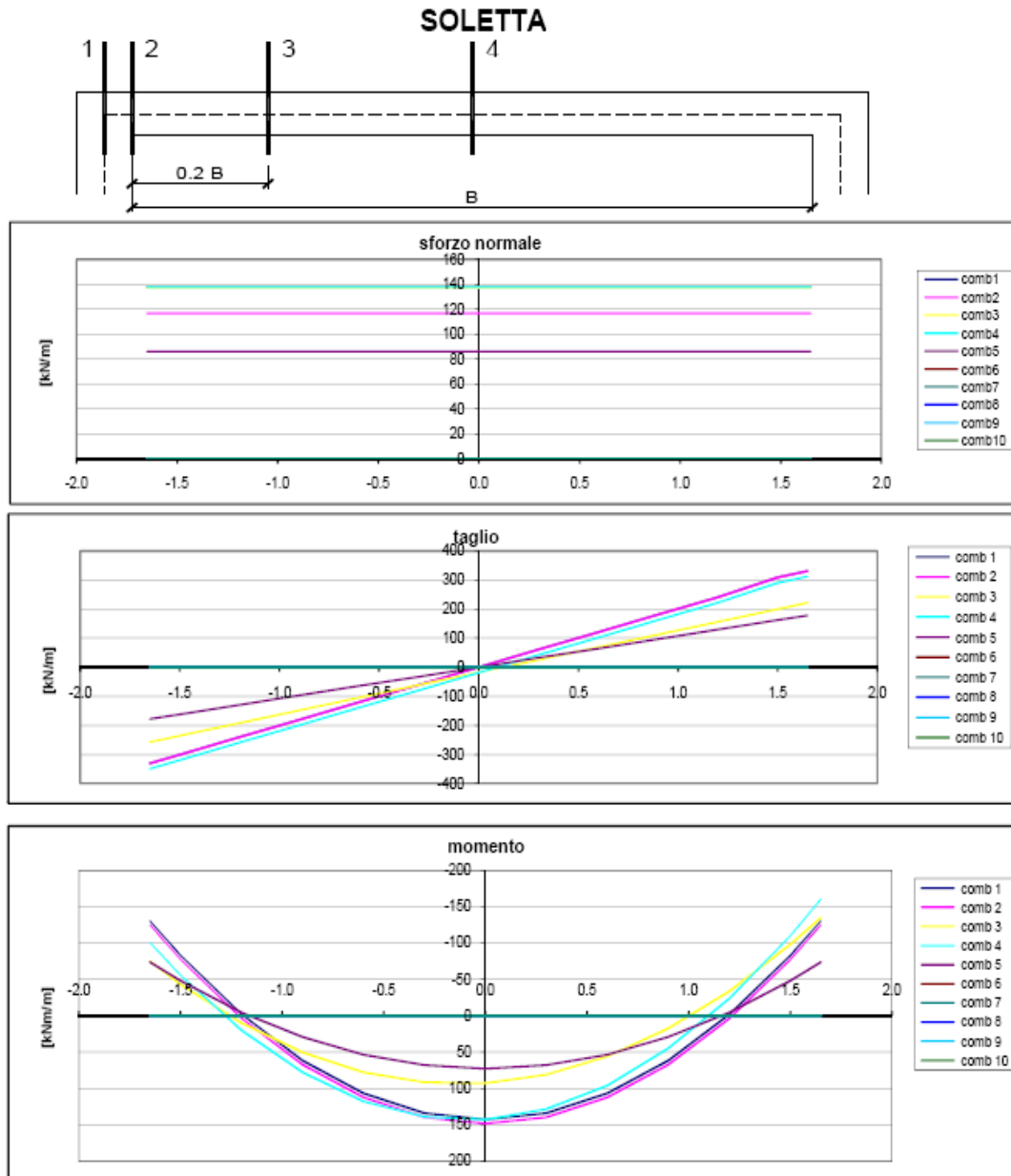
Acciaio

tipo di acciaio Fe B 44 k ▼
 $f_{yk} = 430$ (MPa)
 $\gamma_E = 1.00$
 $\gamma_S = 1.15$
 $f_{yd} = f_{yk} / \gamma_S / \gamma_E = 373.91$ (MPa)
 $E_s = 206000$ (MPa)
 $\epsilon_{ys} = 0.182\%$
 $\epsilon_{uk} = 1.111\%$ $\alpha_\epsilon = 0.9$
 $\epsilon_{ud} = 1.000\%$

Ne vijim ne Fig 1.4 jepen diagramat e M,N,Q per gjithe kombinimet per soleten . Ne tabelen e fundit jepen momentet e brendshme per kater seksionet e soletes (pasi seksionet e tjera jane simetrike me aksin e tombinos box) , te shoqeruara ne krah dhe me momentet rezistente perkates ne baze te armatures se vendosur.

Verifikimet jane positive.

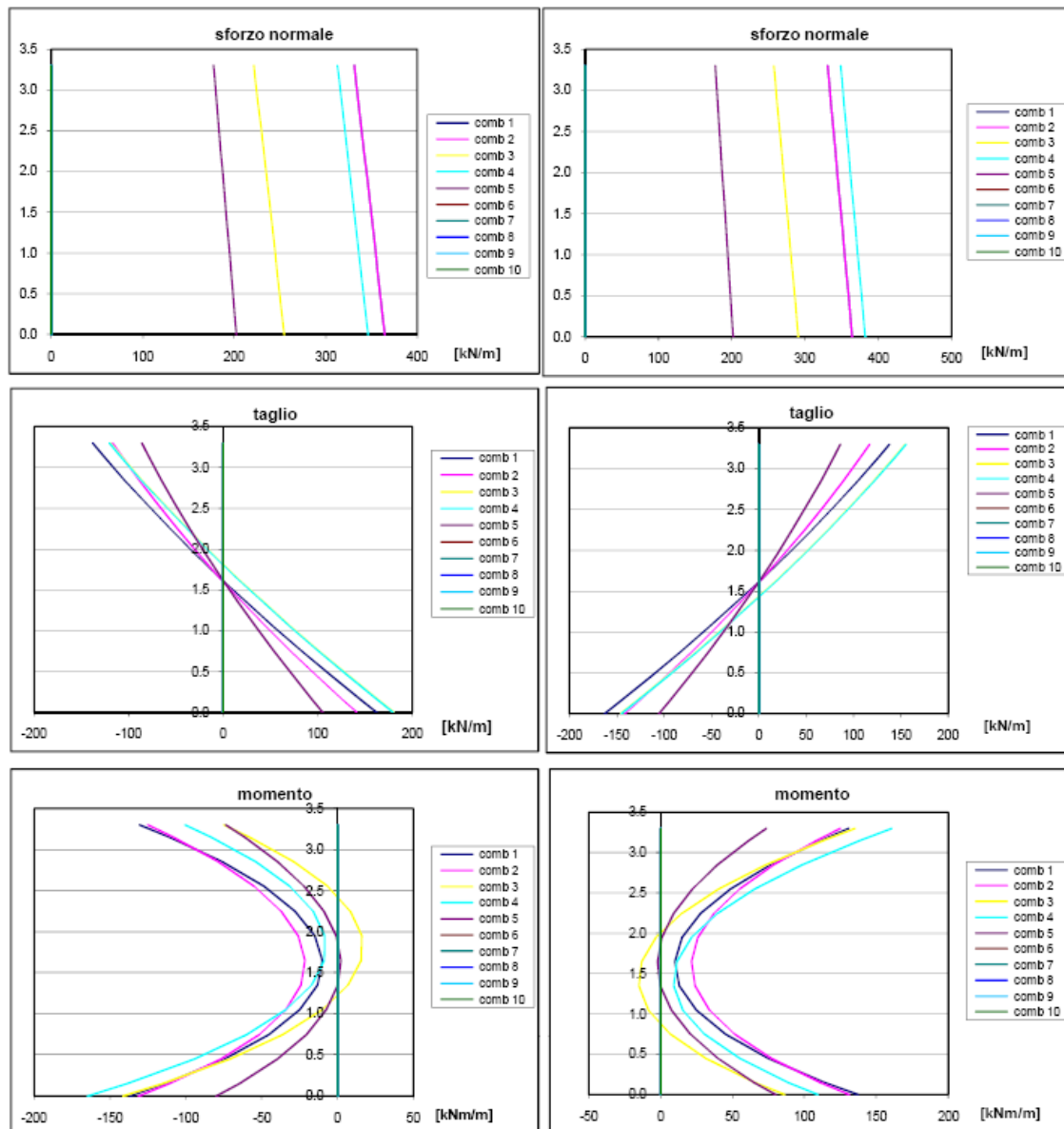
Shenim : Seksioni llogarites 1- eshte pozicionuar ne mbeshtetje; seksioni llog.4 ne hapesire , ndersa te tjeret jane pozicionuar ne menyre progressive.



sez.	M [kNm/m]	N [kN/m]	Af [cmq/m]	A'f [cmq/m]	Mu [kNm/m]
1	-160.8	137.8	16.5	14	161.0
2	-110.0	137.8	14	14	140.4
3 min	0.0	0.0	14	14	124.8
3 max	77.5	137.8	14	14	140.4
4	148.1	116.8	16	14	154.6

Fig.1.4 (Diagrama e M,N,Q per Soleten + verifikimi SLU)

PARETI



sez.	M [kNm/m]	N [kN/m]	Af [cmq/m]	A'f [cmq/m]	Mu [kNm/m]
1	-160.8	349.1	14	14	163.5
2	-138.3	350.6	14	14	163.7
3 min	-65.3	356.7	5	5	90.4
3 max	0.0	0.0	5	5	47.6
4 min	-26.0	344.6	5	5	89.0
4 max	16.0	234.9	5	5	76.3
5 min	-59.8	338.5	5	5	88.3
5 max	0.0	0.0	14	14	124.8
6	-138.9	344.6	14	14	163.0
7	-164.6	346.1	16	14	179.4

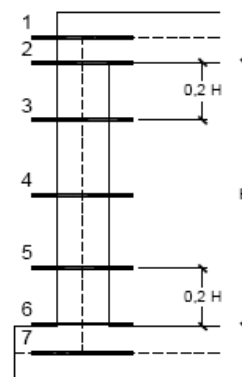
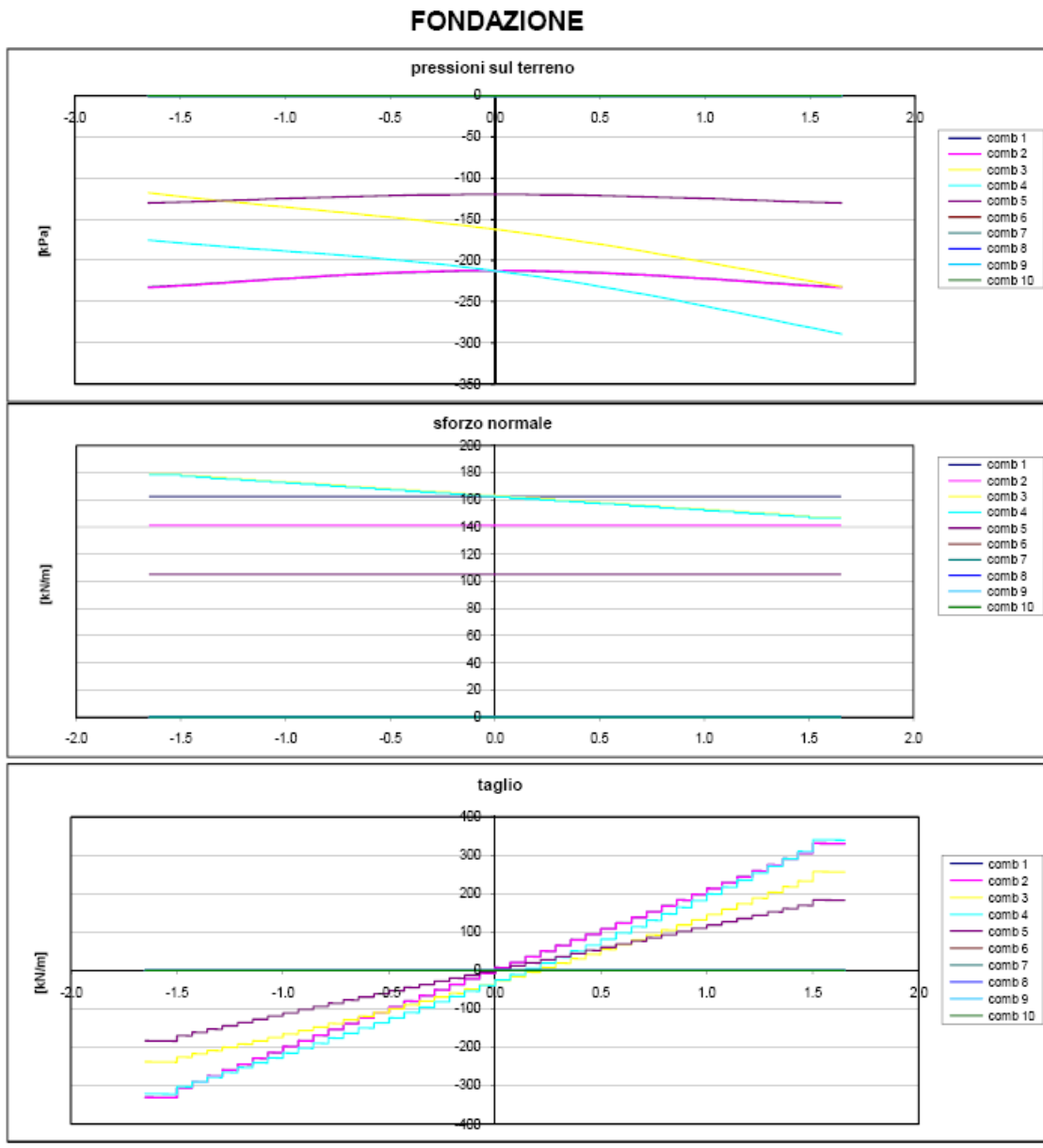


Fig.1.5 (Diagrama e M,N,Q per Paretet anesore + verifikimi SLU)

Mesiper ne Fig 1.5 jepen diagramat e M,N,Q per gjithë kombinimet per paretet anesore te tombinos . Ne tabelen e fundit jepen momentet e brendshme per seksionet e paretëve te shoqeruara perkrah dhe me momentet rezistente perkates ne baze te armatures se vendosur. Verifikimet jane positive.

Shenim : Seksioni llogarites 1- eshte pozicionuar ne koke te paretit; seksioni llogarites 7 ne afersi te themelit , ndersa te tjeret jane pozicionuar ne menyre progressive.



sez.	M [kNm/m]	N [kN/m]	Af [cmq/m]	A'f [cmq/m]	Mu [kNm/m]
1	-164.6	178.4	16.5	14	165.4
2	-116.5	178.4	14	14	144.9
3 min	0.0	0.0	14	14	124.8
3 max	81.7	153.3	14	14	142.1
4	149.9	141.2	16	14	157.3

Fig.1.6 (Diagramat e M,N,Q per Themelin + verifikimi SLU)

Mesiper ne Fig 1.6 jepen diagramat e M,N,Q per gjithë kombinimet per themelin . Ne tabelen e fundit jepen momentet e brendshme per kater seksionet e themelit (pasi seksionet e tjera jane

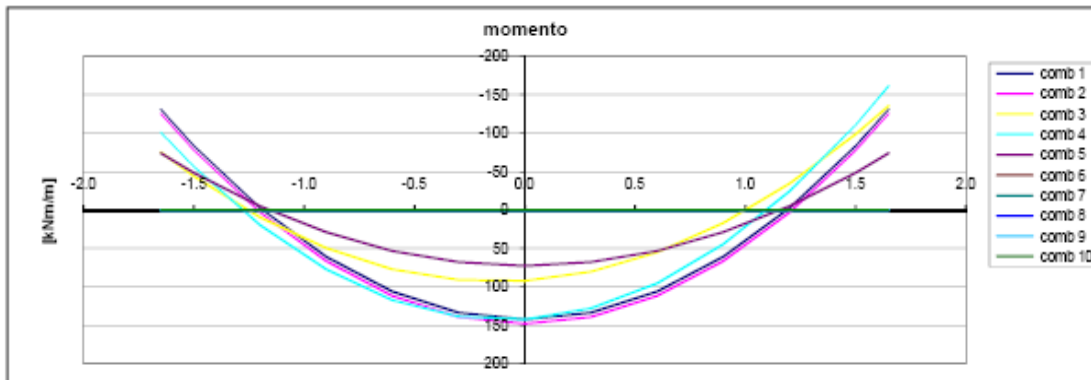
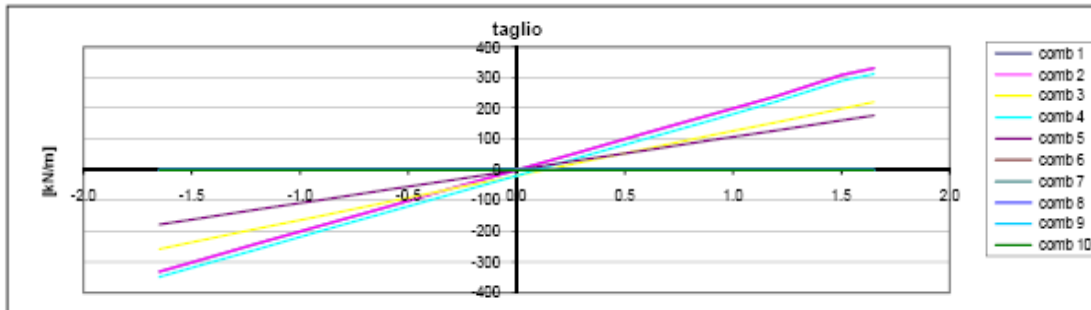
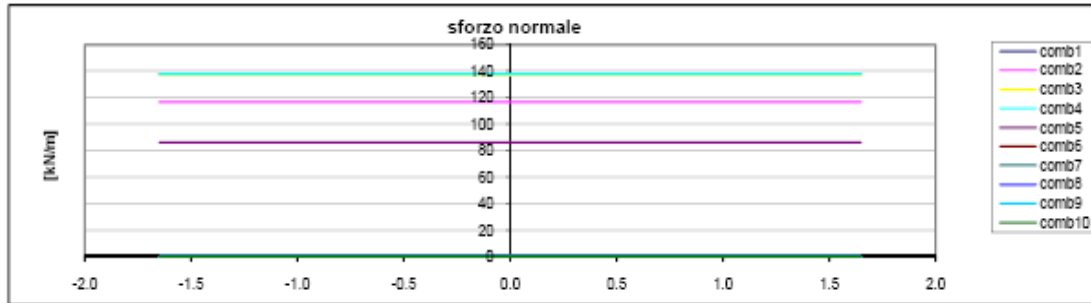
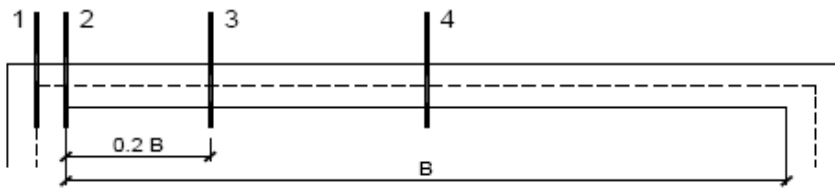
simetrike me aksin e tombinos box), te shoqeruara ne krah dhe me momentet rezistente perkates ne baze te armatures se vendosur. Verifikimet jane positive.

Shenim : Seksioni llogaries 1- eshte pozicionuar ne mbeshtetje; seksioni llog.4 ne hapesire , ndersa te tjeret jane pozicionuar ne menyre progressive.

Ne vijim jepet procedura e verifikimit sipas gjendjeve te sherbimit SLE per secilin element te struktures.

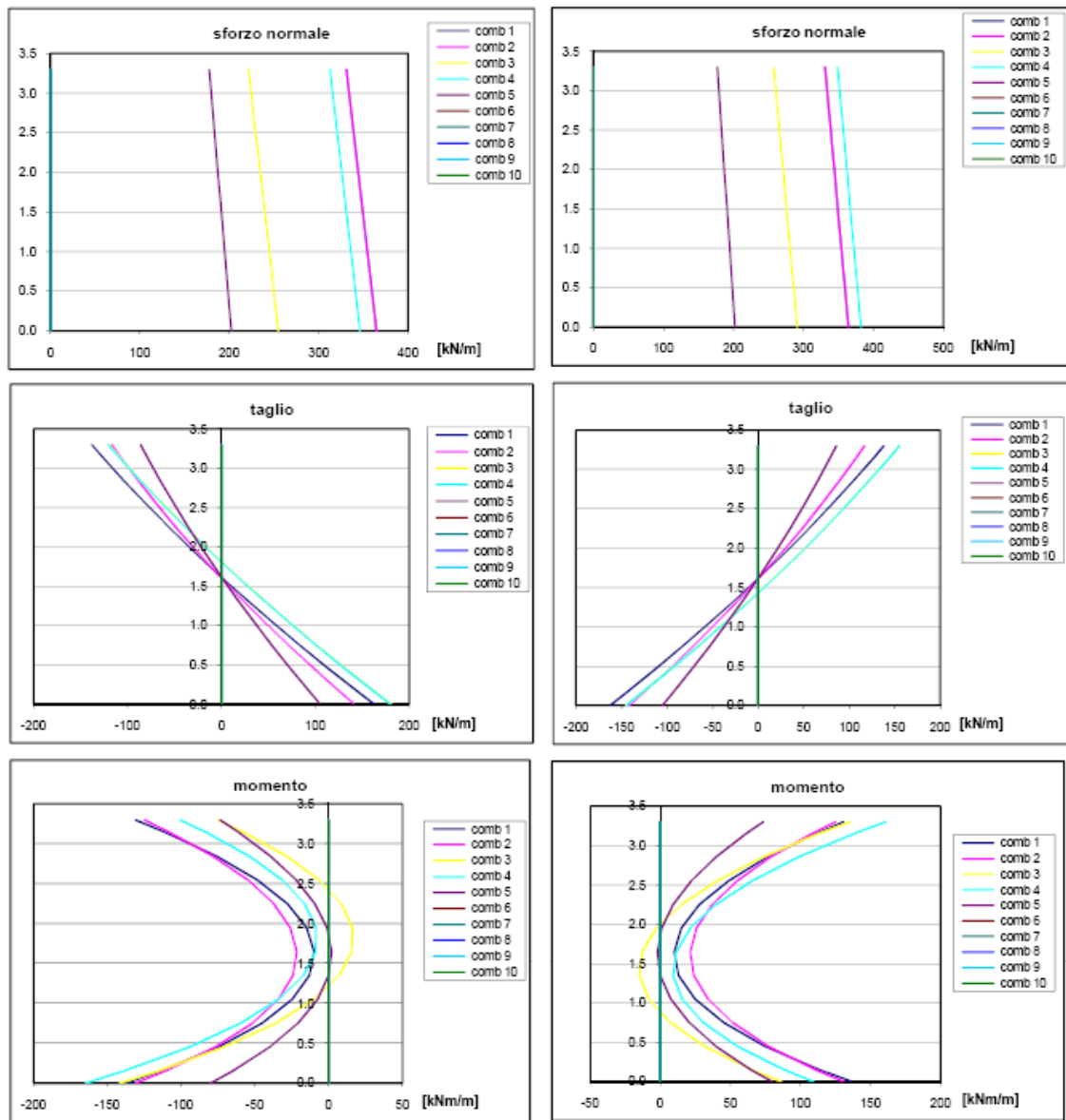
<u>CARATTERISTICHE DEI MATERIALI</u>	
<u>Calcestruzzo</u>	
Rck =	30 (MPa)
$f_{ctm} = 0.48 \cdot R_{ck}^{1/2} =$	2.83 (MPa)
coeff.omogeneizzazione acciaio n	15
<u>Copriferro</u> (distanza asse armatura-bordo)	
c =	3.00 (cm)
<u>Copriferro minimo di normativa</u> (ricoprimento armatura)	
$c_{min} =$	2.00 (cm)
<u>Valore limite di apertura delle fessure</u>	
w2	0.3 mm
<u>Acciaio</u>	
tipo di acciaio	Fe B 44 k ▼
f _{yk} =	430 (MPa)
E _s =	208000 (MPa)
k2 =	0.4
k3 =	0.125
β1 =	1.0
β2 =	1.0

SOLETTA

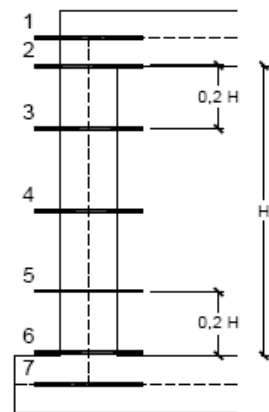


sez.	M	N	i	ϕ	Af	A'f	σ_c	σ_f	wk	w _{amm}
	[kNm/m]	[kN/m]	[cm]	[mm]	[cm ² /m]	[cm ² /m]	[Mpa]	[Mpa]	[mm]	[mm]
1	-160.8	137.8	13	16	16	10	13.12	376.98	0.292	0.300
2	-110.0	137.8	13	16	15	10	9.27	281.23	0.177	0.300
3 min	0.0	0.0	13	14	10	10	0.00			0.300
3 max	77.5	137.8	13	16	10	10	7.54	251.20	0.153	0.300
4	148.1	116.8	13	16	16	10	12.06	350.08	0.266	0.300

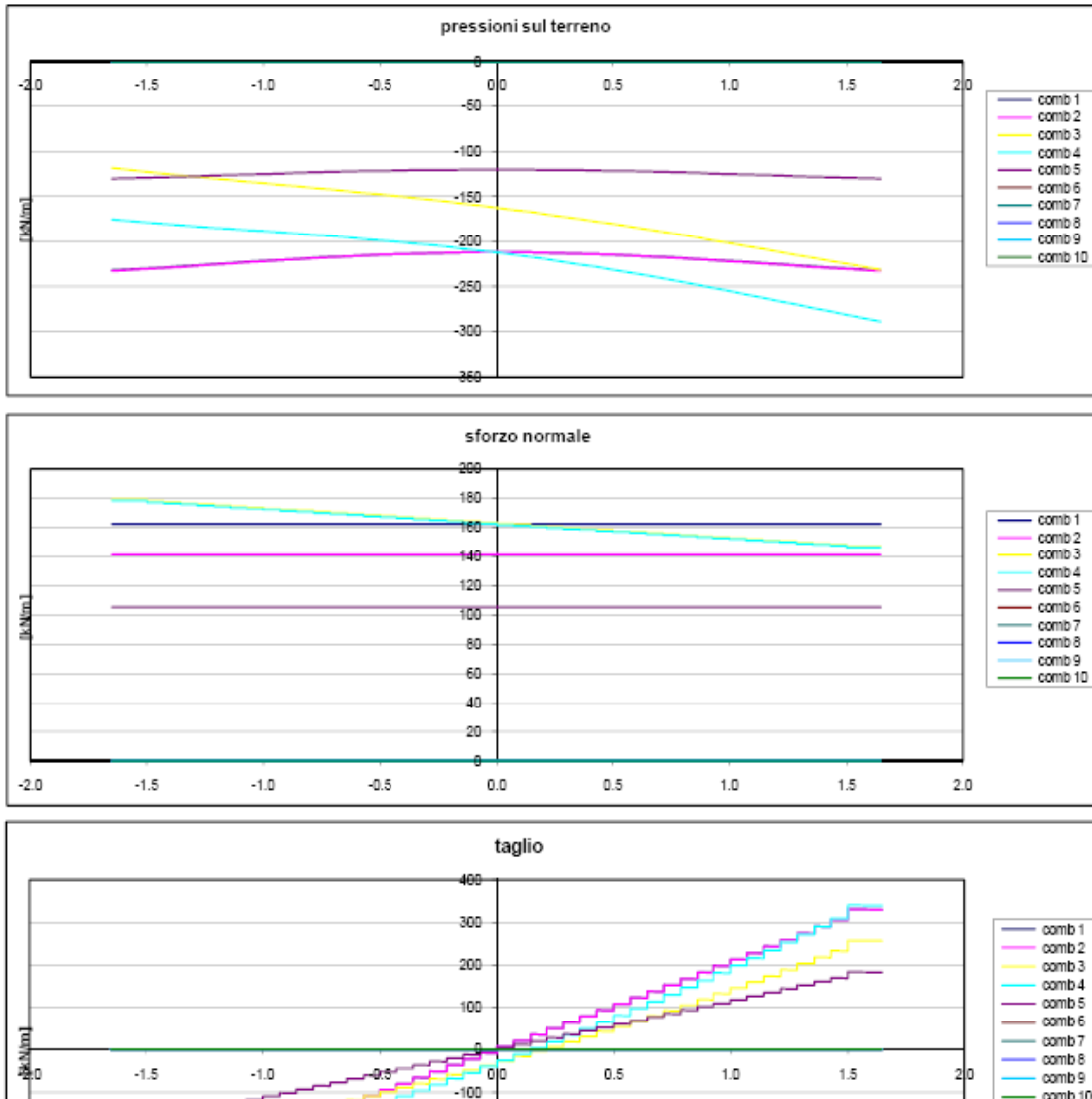
PARETI



sez.	M	N	i	ϕ	Af	A'f	σ_c	σ_f	wk	w _{amm}
	[kNm/m]	[kN/m]	[cm]	[mm]	[cmq/m]	[cmq/m]	[Mpa]	[Mpa]	[mm]	[mm]
1	-160.8	349.1	13	16	18	10	13.57	318.97	0.236	0.300
2	-138.3	350.6	13	16	18	10	11.76	261.04	0.181	0.300
3 min	-85.3	356.7	13	16	10	10	6.39	112.68	0.082	0.300
3 max	0.0	0.0	13	20	10	10	0.00			0.300
4 min	-26.0	344.6	13	12	10	10	2.57	3.87	0.002	0.300
4 max	16.0	234.9	13	10	10	10	1.83	0.63	0.000	0.300
5 min	-59.8	338.5	13	10	10	10	5.84	98.74	0.049	0.300
5 max	0.0	0.0	13	16	10	10	0.00			0.300
6	-138.9	344.6	13	16	18	10	11.80	264.08	0.184	0.300
7	-164.6	346.1	13	16	18	10	13.88	329.65	0.246	0.300



FONDAZIONE



sez.	M	N	i	ϕ	Af	A'f	σ_c	σ_f	wk	w _{amm}
	[kNm/m]	[kN/m]	[cm]	[mm]	[cmq/m]	[cmq/m]	[Mpa]	[Mpa]	[mm]	[mm]
1	-184.8	178.4	13	18'	18	10	13.53	375.55	0.290	0.300
2	-116.5	178.4	13	18'	15	10	9.89	267.08	0.184	0.300
3 min	0.0	0.0	13	14'	10	10	0.00			0.300
3 max	81.7	153.3	13	14'	10	10	7.98	281.14	0.153	0.300
4	149.9	141.2	13	18'	18	18	11.45	346.28	0.259	0.300

Fig.1.7 (Diagramat e M,N,Q + verifikimi SLE per gjithe elementet e struktures)

Deformimet e elementeve perberes ne tobinon box sipas kombinimeve jepen ne vijim:

fondazione	comb 1	comb 2	comb 3	comb 4	comb 5
x	[kPa]	[kPa]	[kPa]	[kPa]	[kPa]
-1.650	-232.280	-233.011	-118.065	-175.354	-130.165
-1.500	-230.203	-230.734	-122.485	-178.865	-129.151
-1.429	-229.101	-229.543	-124.458	-180.390	-128.600
-1.357	-227.949	-228.307	-126.363	-181.844	-128.019
-1.286	-226.764	-227.042	-128.211	-183.241	-127.417
-1.214	-225.559	-225.762	-130.015	-184.597	-126.800
-1.143	-224.349	-224.481	-131.785	-185.926	-126.178
-1.071	-223.147	-223.212	-133.531	-187.242	-125.557
-1.000	-221.965	-221.969	-135.263	-188.557	-124.944
-0.929	-220.815	-220.761	-136.991	-189.884	-124.346
-0.857	-219.707	-219.600	-138.723	-191.235	-123.768
-0.786	-218.652	-218.496	-140.467	-192.620	-123.217
-0.714	-217.659	-217.458	-142.233	-194.050	-122.697
-0.643	-216.735	-216.494	-144.027	-195.534	-122.212
-0.571	-215.889	-215.611	-145.856	-197.081	-121.768
-0.500	-215.126	-214.817	-147.727	-198.698	-121.367
-0.429	-214.453	-214.116	-149.645	-200.394	-121.013
-0.357	-213.876	-213.515	-151.616	-202.175	-120.708
-0.286	-213.397	-213.017	-153.645	-204.047	-120.456
-0.214	-213.021	-212.627	-155.736	-206.014	-120.258
-0.143	-212.751	-212.346	-157.892	-208.082	-120.115
-0.071	-212.587	-212.176	-160.117	-210.254	-120.029
0.000	-212.533	-212.120	-162.414	-212.533	-120.000
0.071	-212.587	-212.176	-164.784	-214.921	-120.029
0.143	-212.751	-212.346	-167.228	-217.419	-120.115
0.214	-213.021	-212.627	-169.749	-220.028	-120.258
0.286	-213.397	-213.017	-172.345	-222.747	-120.456
0.357	-213.876	-213.515	-175.017	-225.576	-120.708
0.429	-214.453	-214.116	-177.764	-228.513	-121.013
0.500	-215.126	-214.817	-180.583	-231.554	-121.367
0.571	-215.889	-215.611	-183.472	-234.697	-121.768
0.643	-216.735	-216.494	-186.430	-237.937	-122.212
0.714	-217.659	-217.458	-189.451	-241.268	-122.697
0.786	-218.652	-218.496	-192.532	-244.685	-123.217
0.857	-219.707	-219.600	-195.667	-248.180	-123.768
0.929	-220.815	-220.761	-198.851	-251.745	-124.346
1.000	-221.965	-221.969	-202.078	-255.372	-124.944
1.071	-223.147	-223.212	-205.340	-259.051	-125.557
1.143	-224.349	-224.481	-208.630	-262.771	-126.178
1.214	-225.559	-225.762	-211.939	-266.520	-126.800
1.286	-226.764	-227.042	-215.256	-270.286	-127.417
1.357	-227.949	-228.307	-218.574	-274.055	-128.019
1.429	-229.101	-229.543	-221.879	-277.812	-128.600
1.500	-230.203	-230.734	-225.161	-281.541	-129.151
1.650	-232.280	-233.011	-231.919	-289.207	-130.165

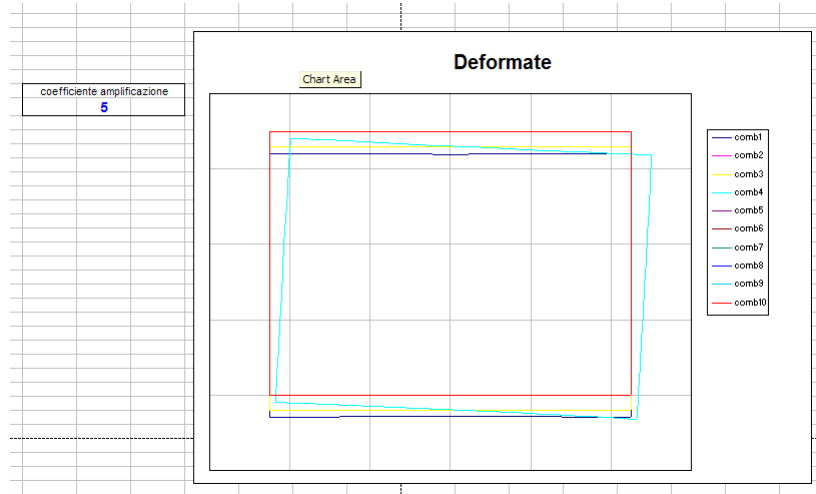


Fig.1.8 (Imazhe mbi gjendjen e deformuar te tombinos box)

Pergatiti

GJEOKONSULT & CO

Ing. Rroland HAJRO