REPORT

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1. General Information

Table [1] Units

Type	Unit
Length	m
Force	kN
Time	day

Table [2] Model dimensions

	min.	max.
X	-50.000	50.000
Y	0.000	100.000

Table [3] Model

Model	Plane strain
Element	6-Noded

2. Geometry

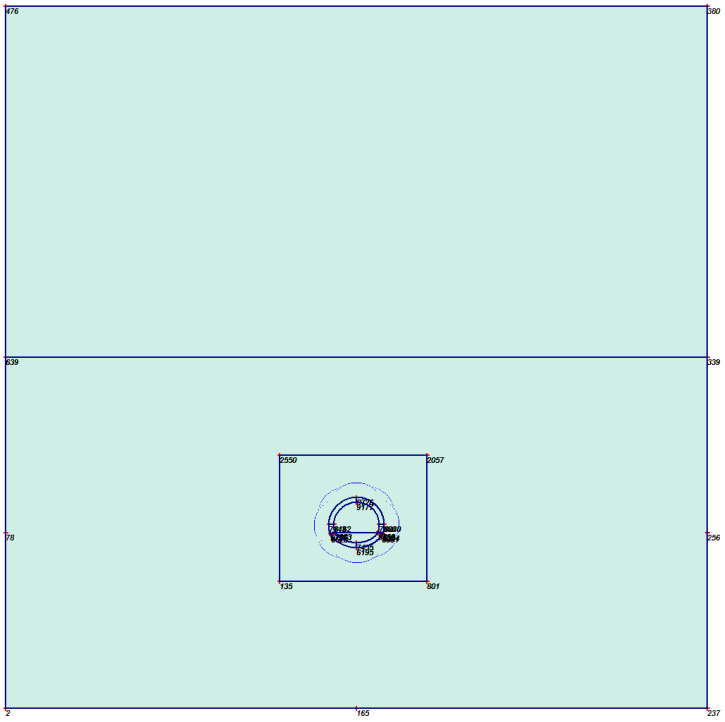


Fig. 1 Plot of geometry model with significant nodes

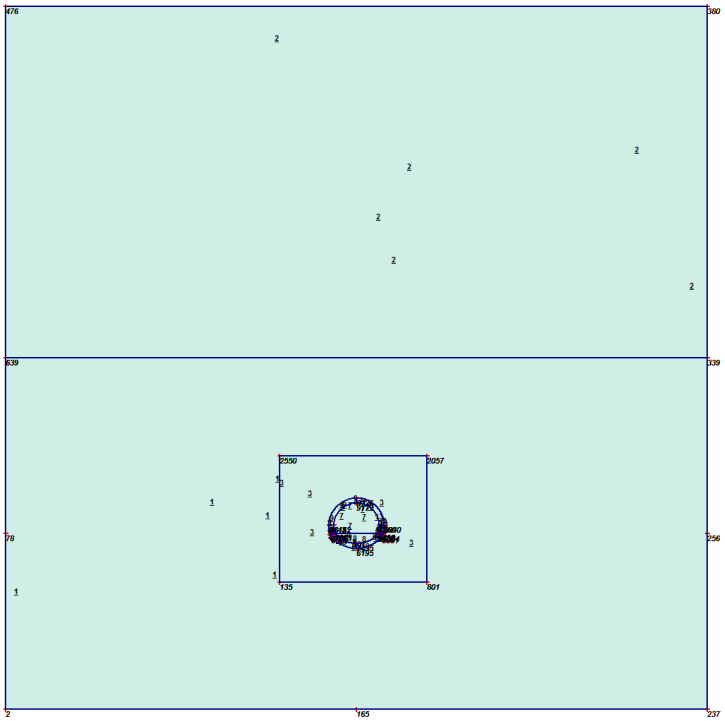


Fig. 2 Plot of geometry model with cluster numbers

3. Structures

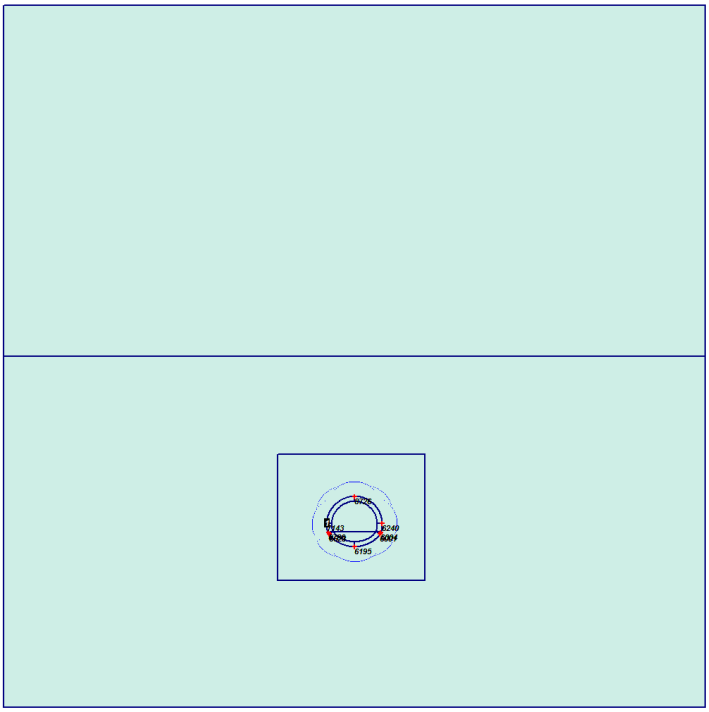


Fig. 3 Plot of geometry model with structures

Table [4] Beams

Plate no.	Data set	Length [m]	Nodes
1	Getto	4.202	6195, 6001.
2	Getto	0.244	6001, 6004.
3	Spritz-beton	1.379	6004, 6240.
4	Spritz-beton	6.076	6240, 8726.
5	Spritz-beton	6.076	8726, 7143.
6	Spritz-beton	1.379	7143, 6786.

Plate no.	Data set	Length [m]	Nodes
7	Getto	0.244	6786, 6623.
8	Getto	4.202	6623, 6195.

Table [5] Interfaces

Interface no.	Data set	Nodes
1	Calcari M. Antola	6001, 6195, 6004, 6001, 6240, 6004, 8726, 6240, 7143, 8726, 6786, 7143, 6623, 6786, 6195, 6623.

4. Mesh data

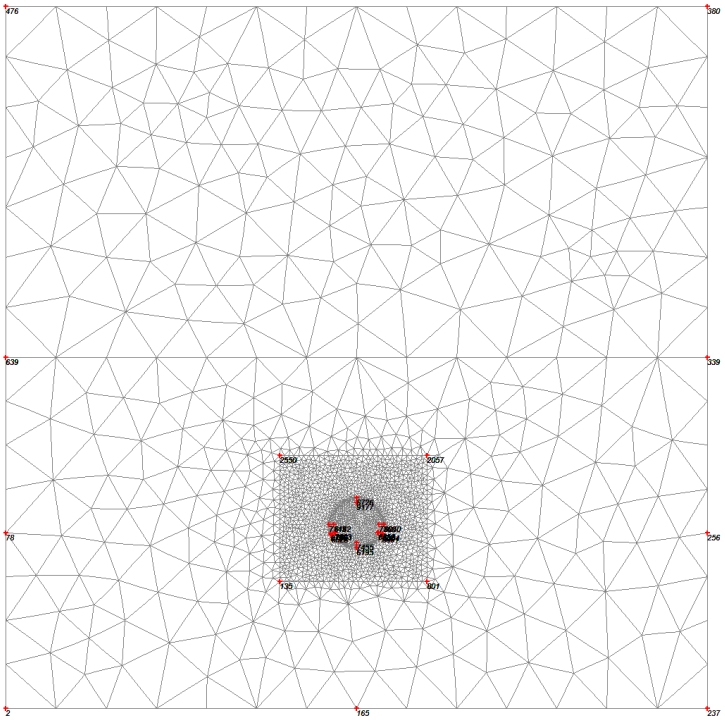


Fig. 4 Plot of the mesh with significant nodes

Table [6] Numbers, type of elements, integrations

Type	Type of element	Type of integration	Total no.
Soil	6-node triangle	3-point Gauss	4684
Plate	3-node line	3-point Gauss	108
Interface	3-node line	3-point Newton-Cotes	108

5. Material data

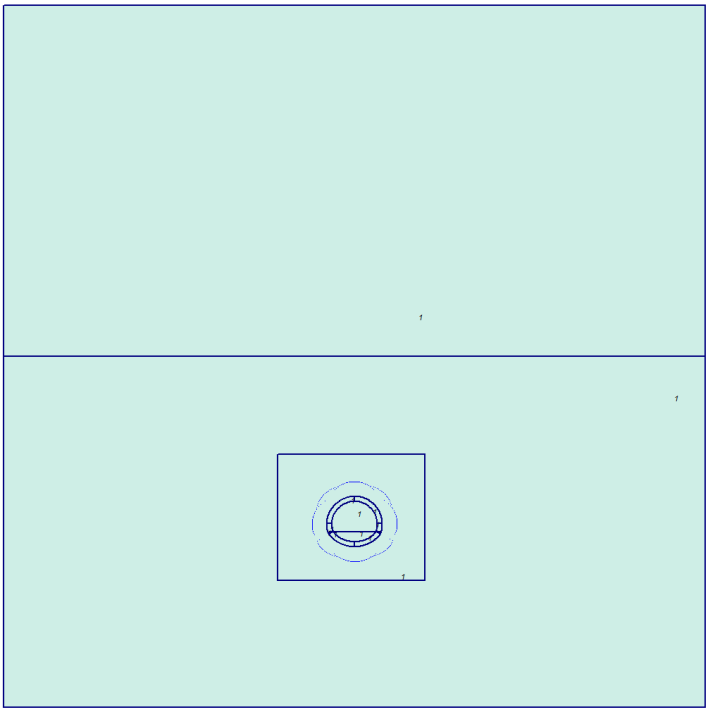


Fig. 5 Plot of geometry with material data sets

Table [7] Soil data sets parameters

Linear Elastic		**2** **Calotta**
Type		Non-porous
γ_{unsat}	[kN/m³]	25.00
γ_{sat}	[kN/m³]	25.00
k_x	[m/day]	0.000
k_y	[m/day]	0.000
e_{init}	[-]	0.500

Linear Elastic		**2** **Calotta**
c_k	[-]	1E15
E_{ref}	[kN/m²]	30000000.00
ν	[-]	0.200
G_{ref}	[kN/m²]	12500000.000
E_{oed}	[kN/m²]	33333333.333
E_{incr}	[kN/m²/m]	0.00
y_{ref}	[m]	0.000
R_{inter}	[-]	1.000
Interface permeability		Impermeable

Mohr-Coulomb		**1** **Calcari M. Antola**
Type		Drained
γ_{unsat}	[kN/m³]	26.00
γ_{sat}	[kN/m³]	26.00
k_x	[m/day]	0.009
k_y	[m/day]	0.009
e_{init}	[-]	0.500
c_k	[-]	1E15
E_{ref}	[kN/m²]	9000000.000
ν	[-]	0.250
G_{ref}	[kN/m²]	3600000.000
E_{oed}	[kN/m²]	10800000.000
c_{ref}	[kN/m²]	1200.00
φ	[°]	37.00
ψ	[°]	0.00

Mohr-Coulomb		**1** **Calcari M. Antola**
E_{inc}	[kN/m²/m]	0.00
y_{ref}	[m]	0.000
$c_{increment}$	[kN/m²/m]	0.00
$T_{str.}$	[kN/m²]	0.00
$R_{inter.}$	[-]	0.85
Interface permeability		Neutral

Table [8] Beam data sets parameters

No.	Identification	EA [kN/m]	EI [kNm²/m]	w [kN/m/m]	ν [-]	Mp [kNm/m]	Np [kN/m]
1	Spritz-beton	6.917E6	22800.00	5.00	0.20	1E15	1E15
2	Getto	2.18E7	1.6E6	17.50	0.20	1E15	1E15

6. Calculation phases

Table [9] List of phases

Phase	Ph-No.	Start phase	Calculation type	Load input	First step	Last step
Initial phase	0	0		-	0	0
K0	1	0	Plastic	Total multipliers	1	1
Scavo-Calotta	2	1	Plastic	Staged construction	2	3
Posa-centine	3	2	Plastic	Staged construction	4	17
Scavo-Arco-Rovescio	4	3	Plastic	Staged construction	18	19
Getto-Arco-Rovescio	5	4	Plastic	Staged construction	20	27
Getto-Calotta	6	5	Plastic	Staged construction	28	29

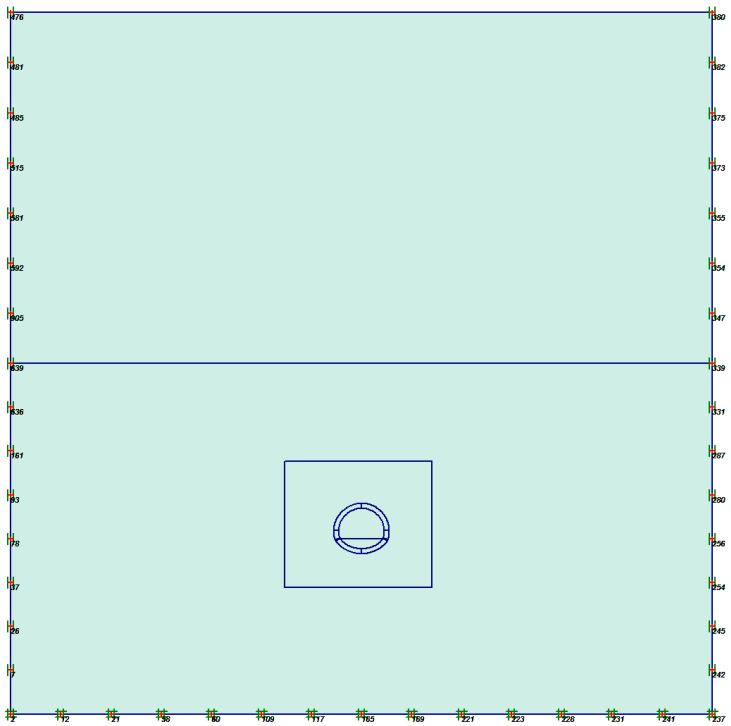


Fig. 6 Plot of geometry with loads & boundary conditions

Table [10] Node fixities

Node no.	Sign	Horizontal	Vertical	Node no.	Sign	Horizontal	Vertical
165	#	Fixed	Fixed	476636	||||	FixedFixed	FreeFree
237	#	Fixed	Fixed	380639	||||	FixedFixed	FreeFree
2	#	Fixed	Fixed	7256	||||	FixedFixed	FreeFree
169	#	Fixed	Fixed	26254	||||	FixedFixed	FreeFree
221	#	Fixed	Fixed	37245	||||	FixedFixed	FreeFree
223	#	Fixed	Fixed	78242	||||	FixedFixed	FreeFree
228	#	Fixed	Fixed	382905	||||	FixedFixed	FreeFree
231	#	Fixed	Fixed	375592	||||	FixedFixed	FreeFree
241	#	Fixed	Fixed	373581	||||	FixedFixed	FreeFree
117	#	Fixed	Fixed	355515	||||	FixedFixed	FreeFree
109	#	Fixed	Fixed	354485	||||	FixedFixed	FreeFree
60	#	Fixed	Fixed	347481	||||	FixedFixed	FreeFree
58	#	Fixed	Fixed	339331	||||	FixedFixed	FreeFree
21	#	Fixed	Fixed	93287	||||	FixedFixed	FreeFree
12	#	Fixed	Fixed	161280	||||	FixedFixed	FreeFree

7. Results for phase 1

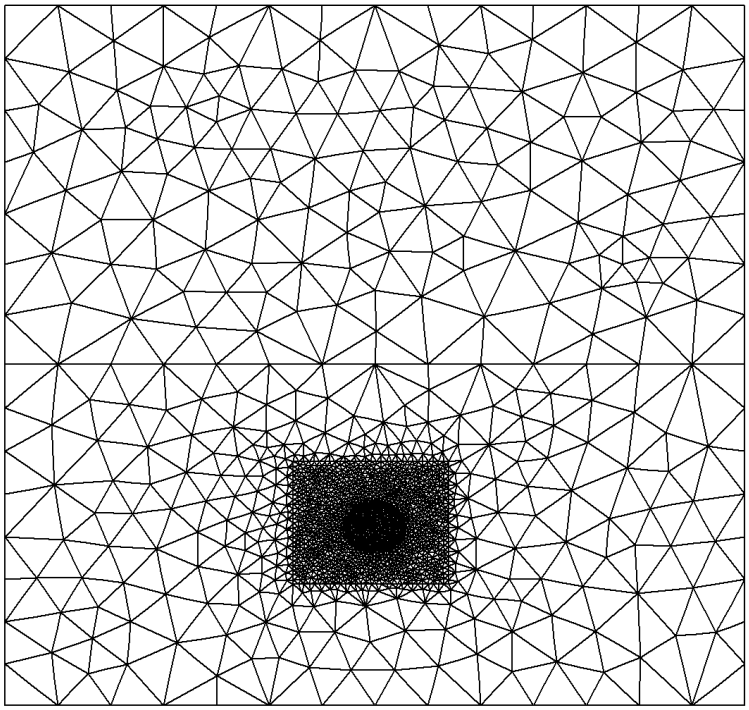


Fig. 7 Plot of deformed mesh

- step no: 1 - (phase: 1)

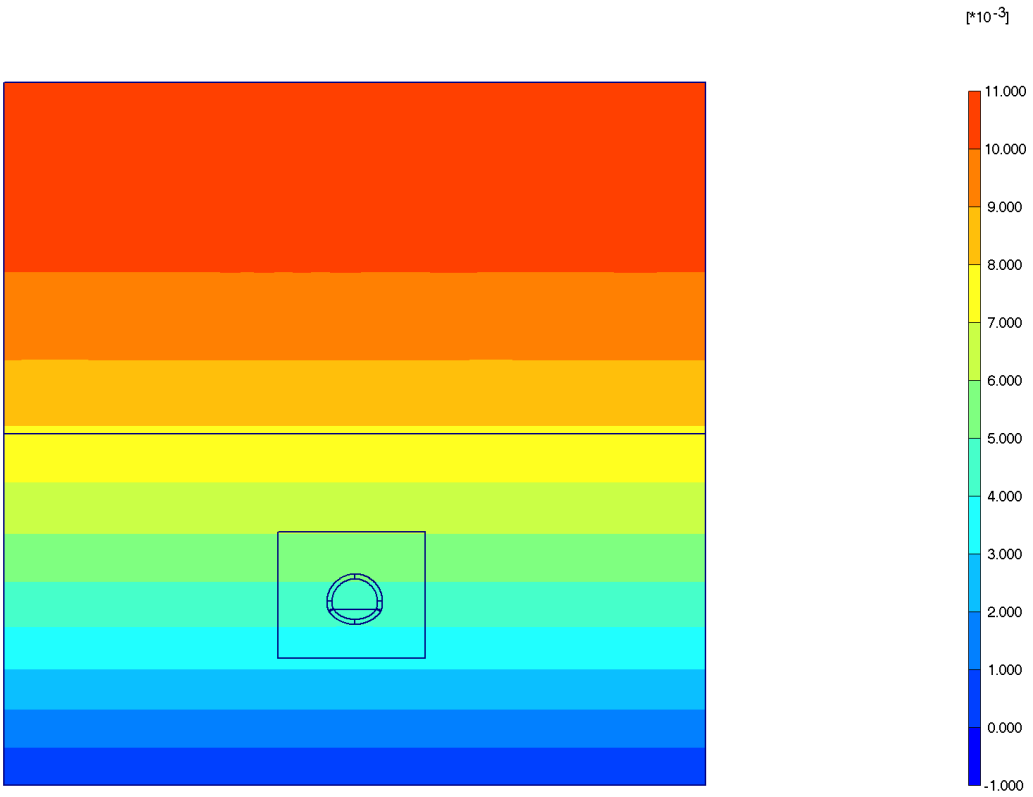


Fig. 8 Plot of total displacements (shadings)

- step no: 1 - (phase: 1)

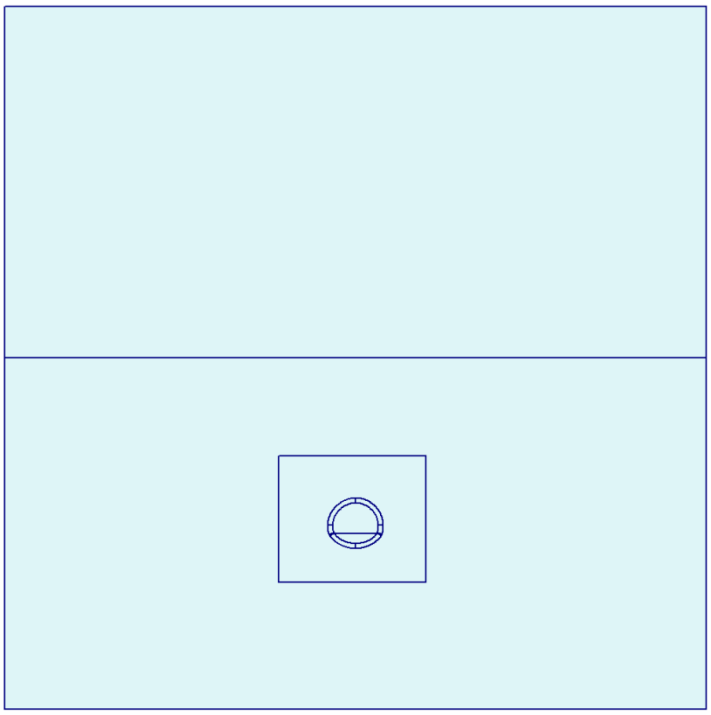


Fig. 9 Plot of total strains (principal directions)

- step no: 1 - (phase: 1)

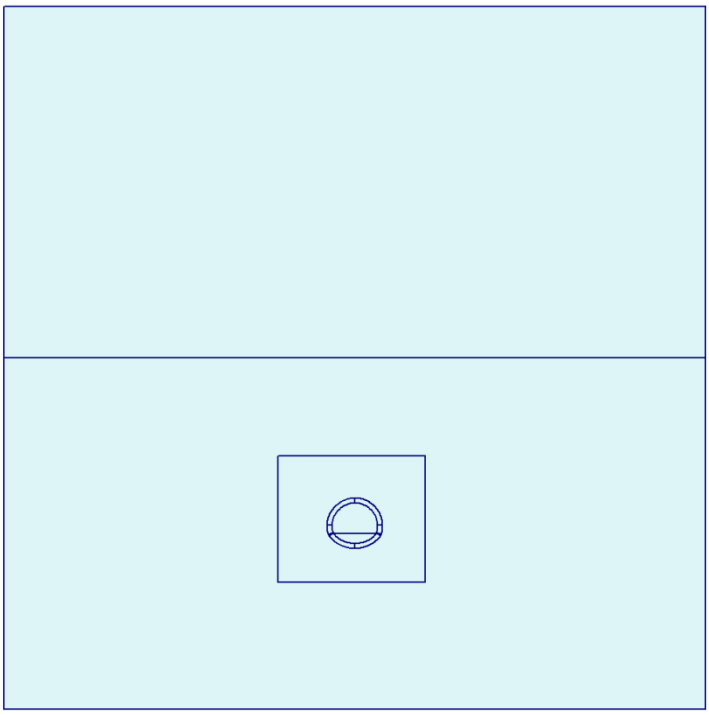


Fig. 10 Plot of total strains (shear shadings)

- step no: 1 - (phase: 1)

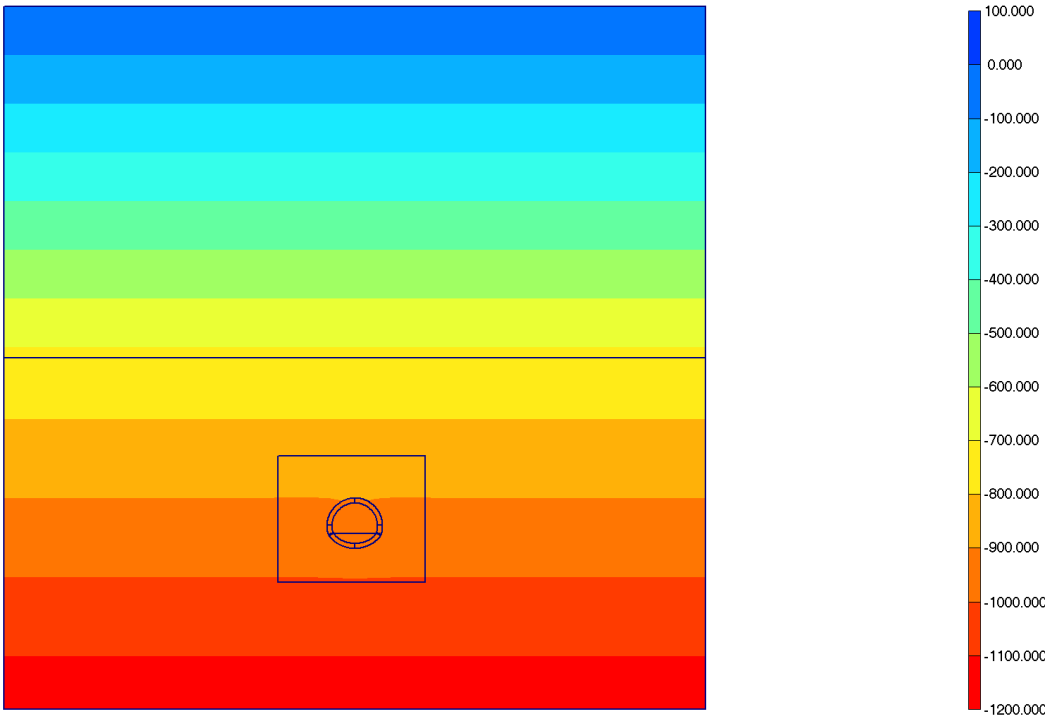


Fig. 11 Plot of effective stresses (mean shadings)

- step no: 1 - (phase: 1)

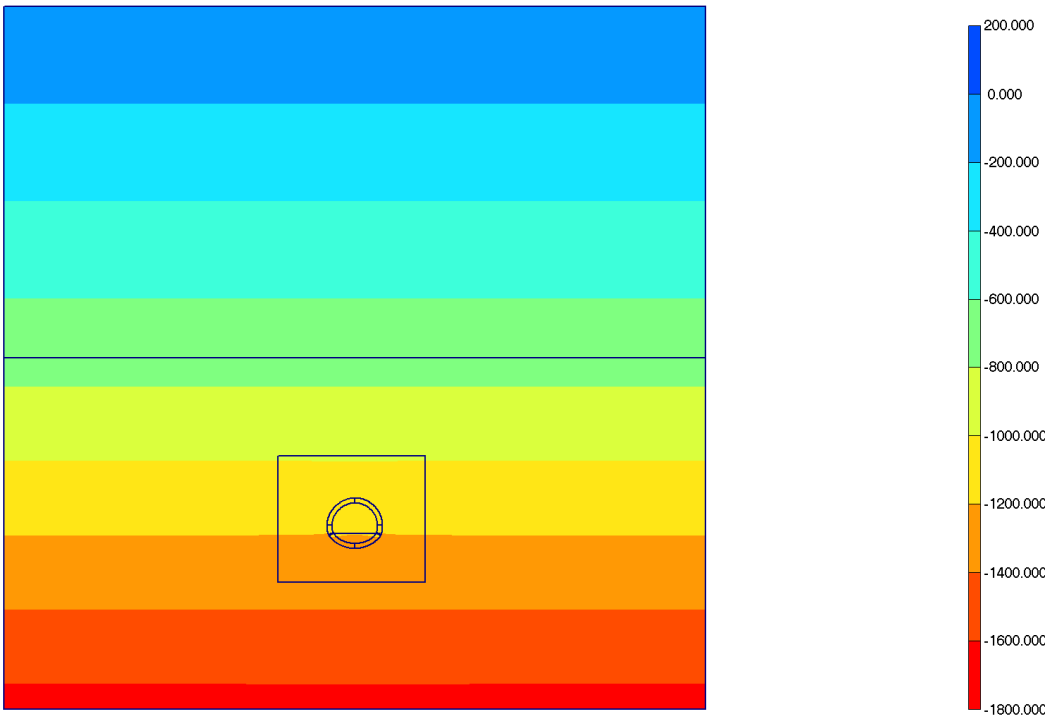


Fig. 12 Plot of total stresses (mean shadings)

- step no: 1 - (phase: 1)

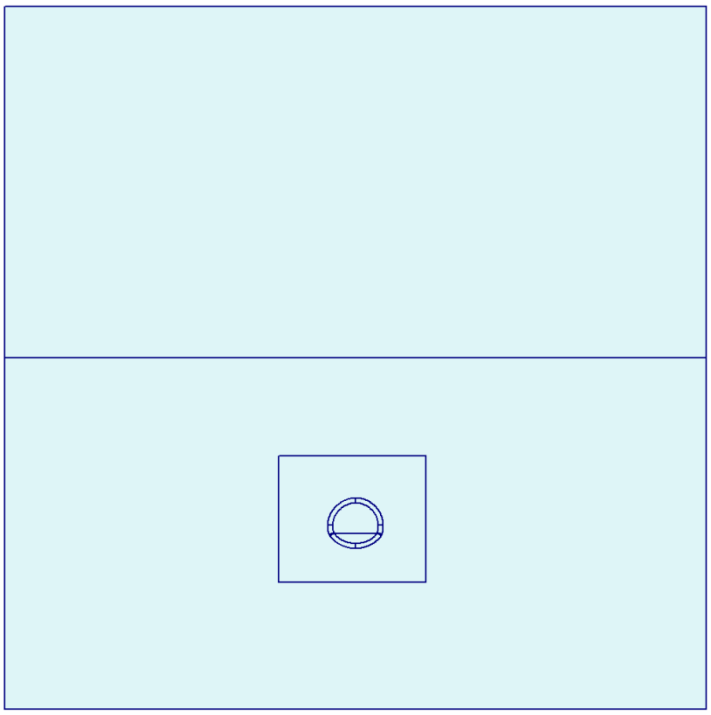


Fig. 13 Plot of plastic points

- step no: 1 - (phase: 1)

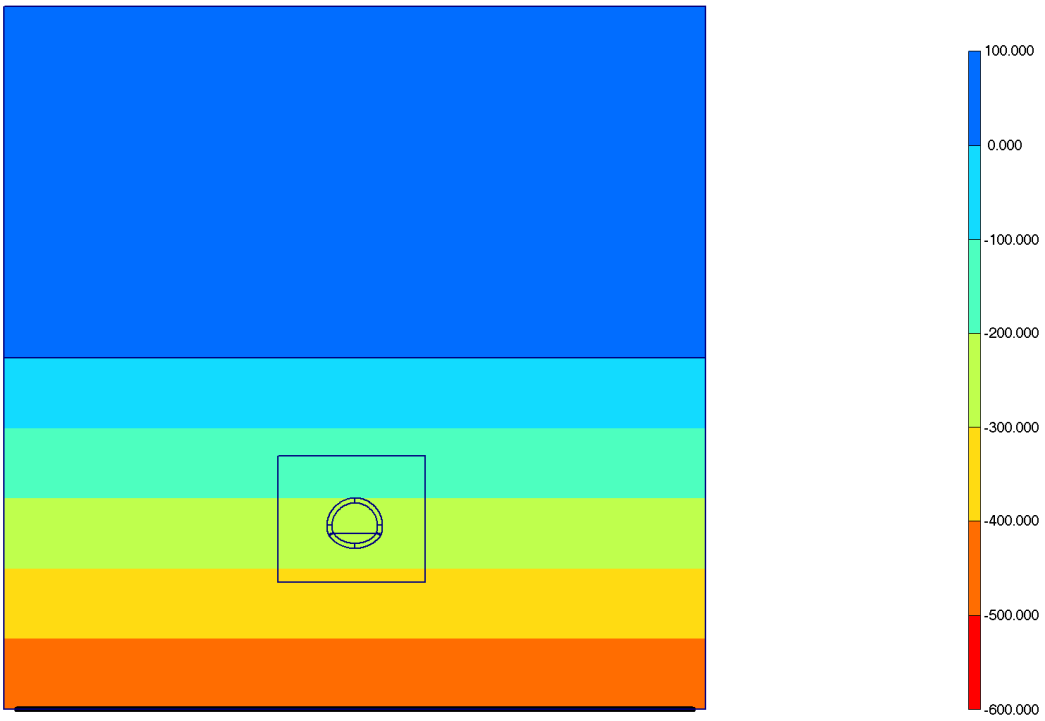


Fig. 14 Plot of active pore pressures (shadings)

- step no: 1 - (phase: 1)

8. Results for phase 2

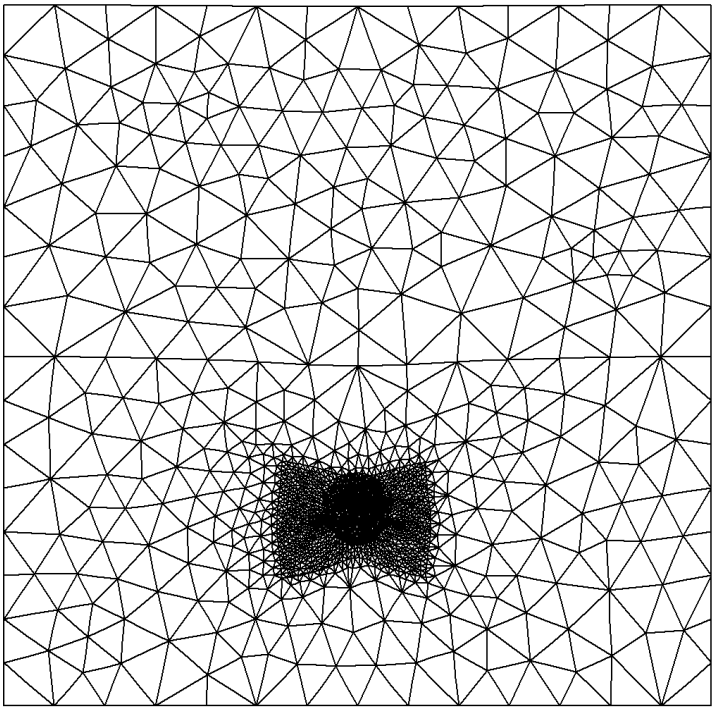


Fig. 15 Plot of deformed mesh

- step no: 3 - (phase: 2)

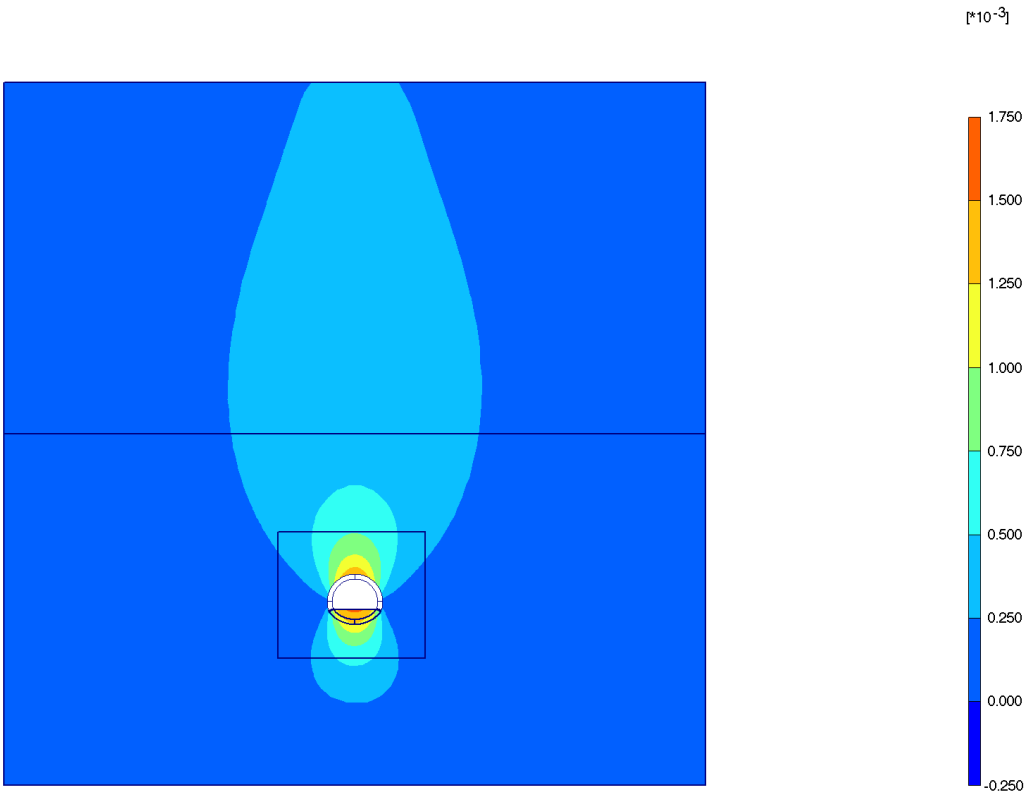


Fig. 16 Plot of total displacements (shadings)

- step no: 3 - (phase: 2)

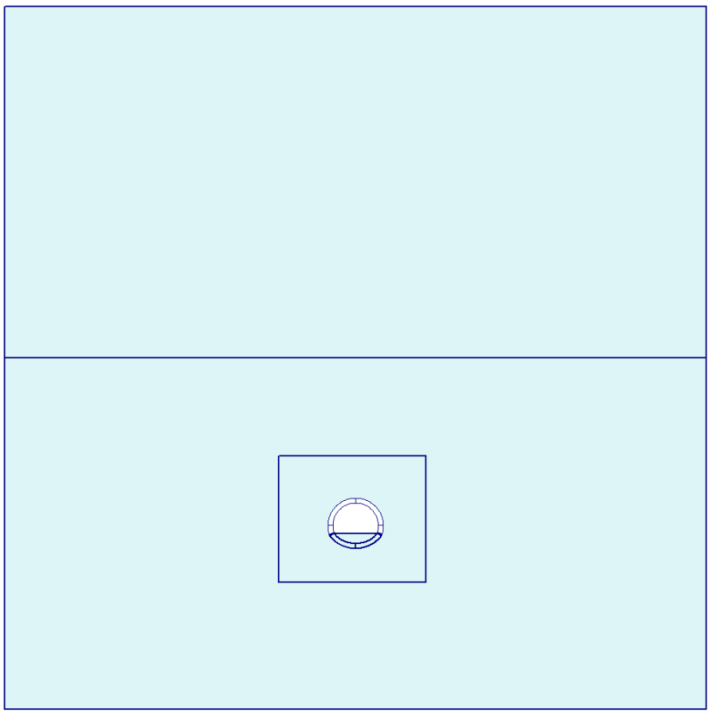


Fig. 17 Plot of total strains (principal directions)

- step no: 3 - (phase: 2)

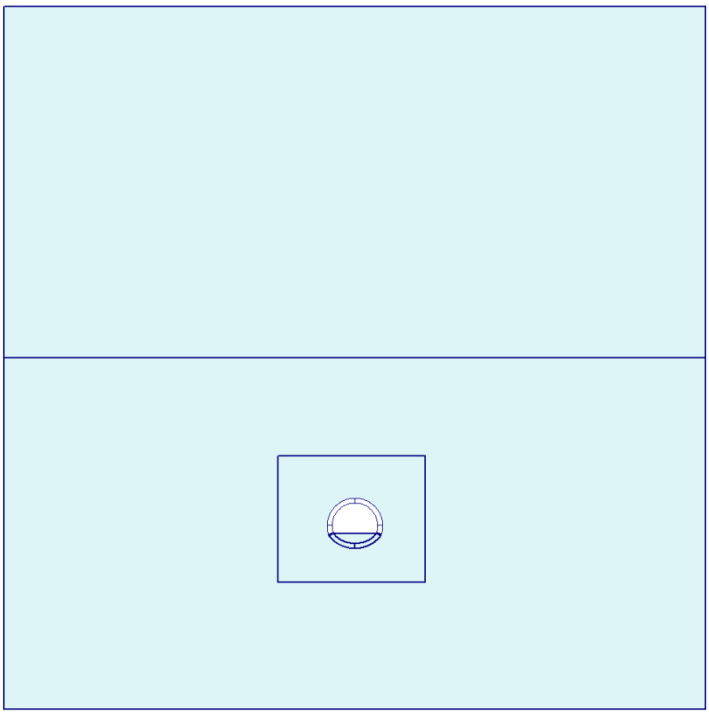


Fig. 18 Plot of total strains (shear shadings)

- step no: 3 - (phase: 2)

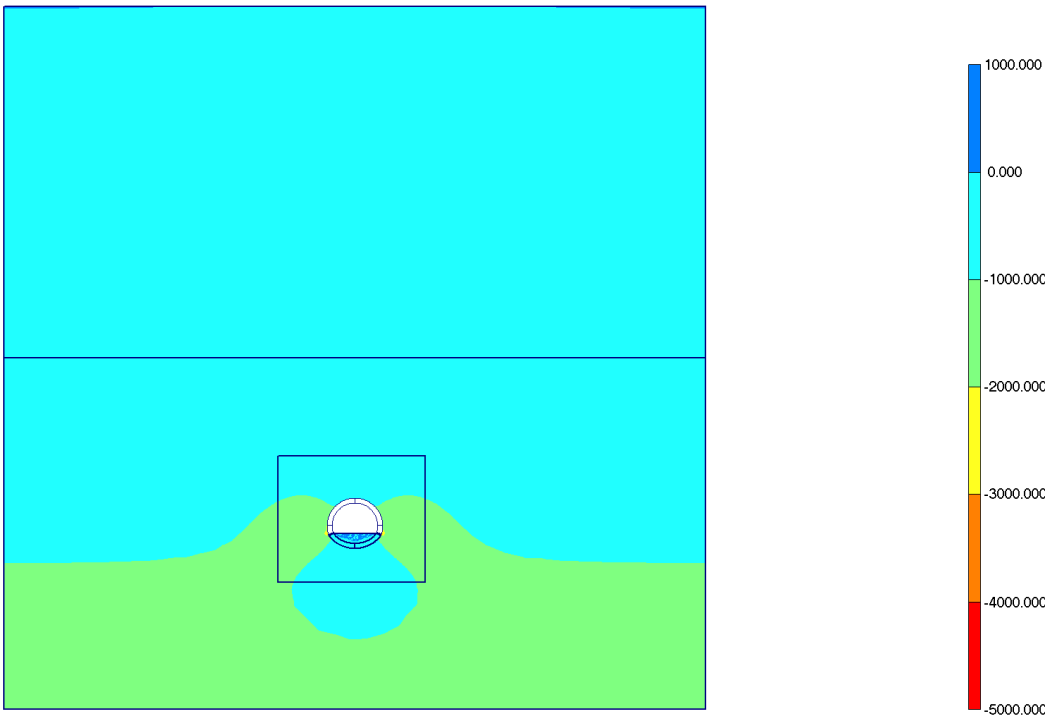


Fig. 19 Plot of effective stresses (mean shadings)

- step no: 3 - (phase: 2)

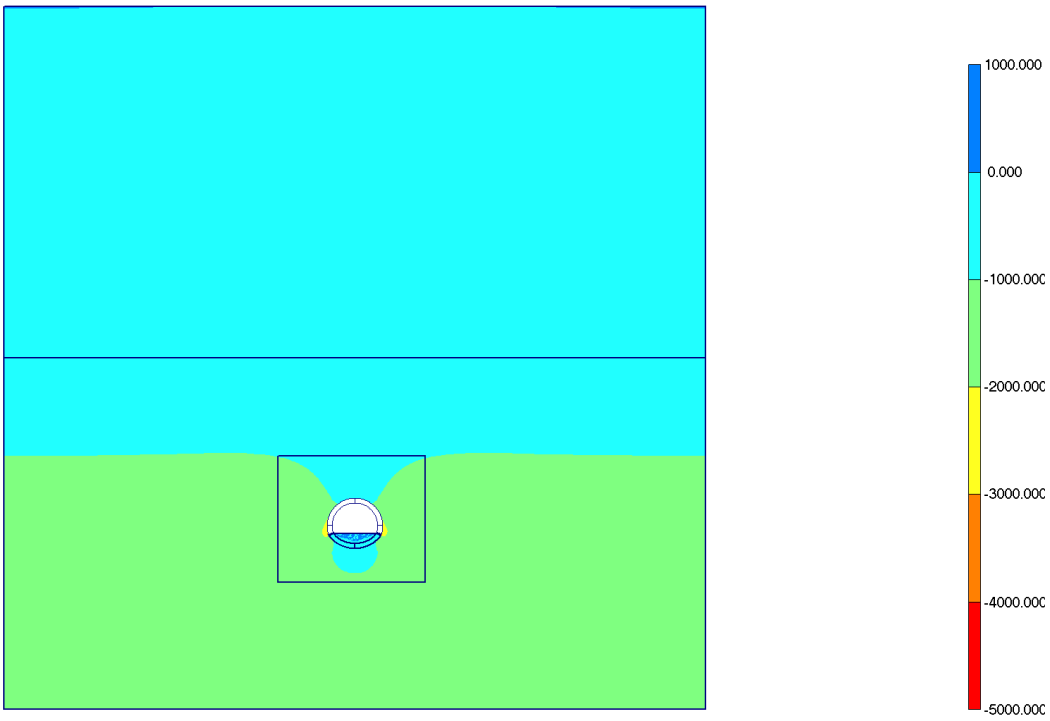


Fig. 20 Plot of total stresses (mean shadings)

- step no: 3 - (phase: 2)

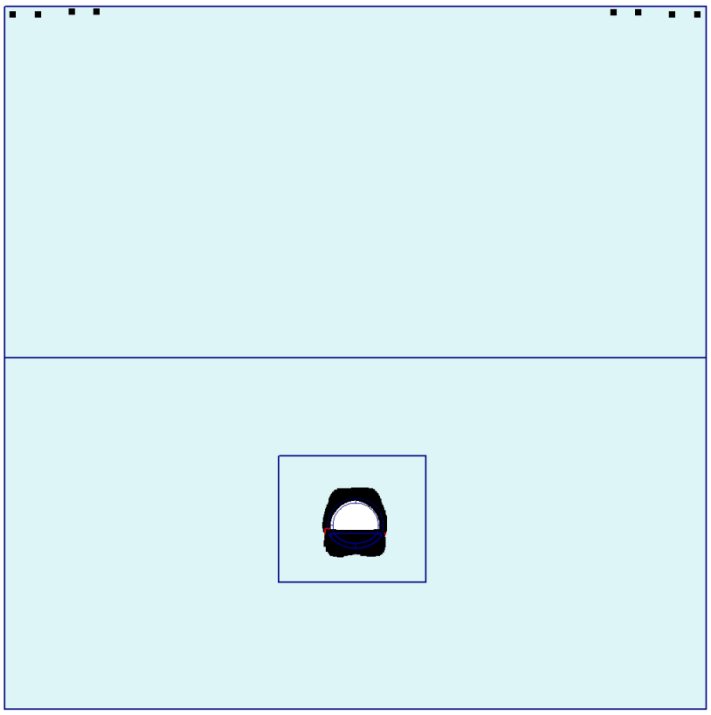


Fig. 21 Plot of plastic points

- step no: 3 - (phase: 2)

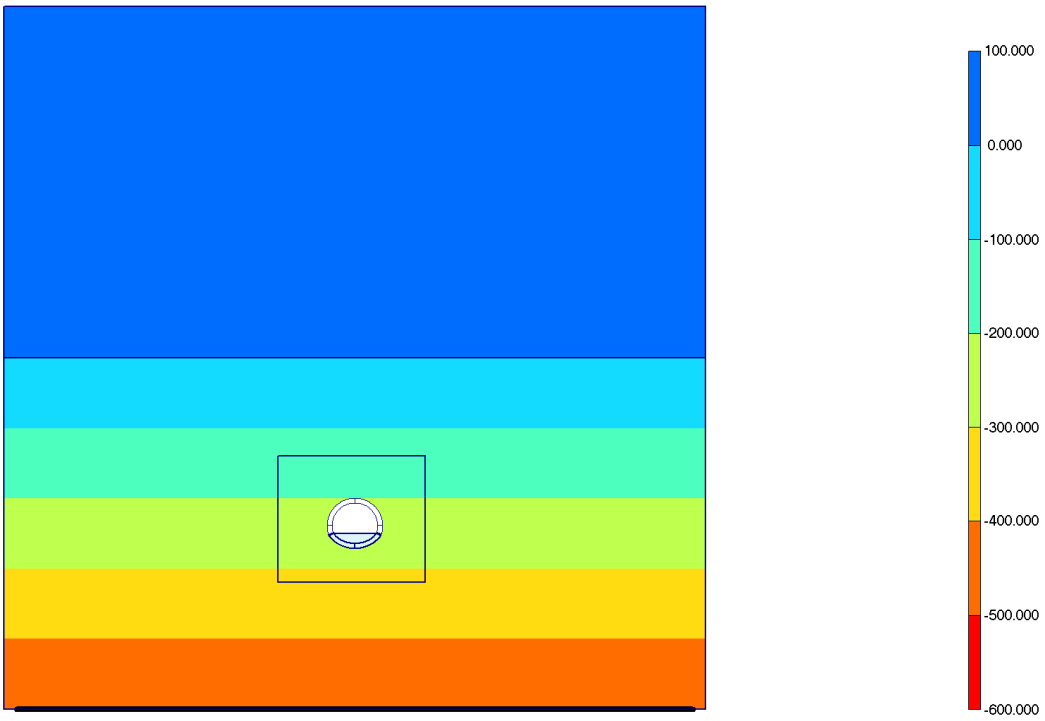


Fig. 22 Plot of active pore pressures (shadings)

- step no: 3 - (phase: 2)

9. Results for phase 3

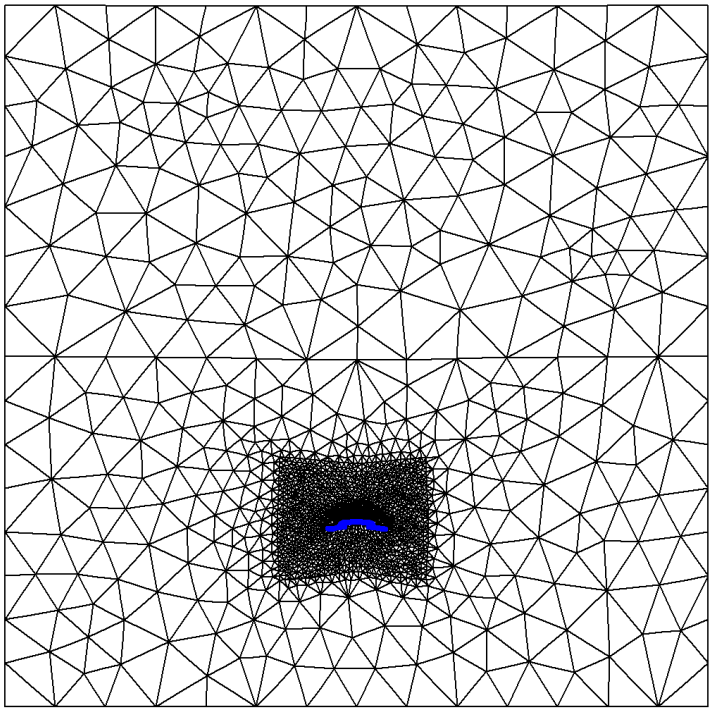


Fig. 23 Plot of deformed mesh

- step no: 17 - (phase: 3)

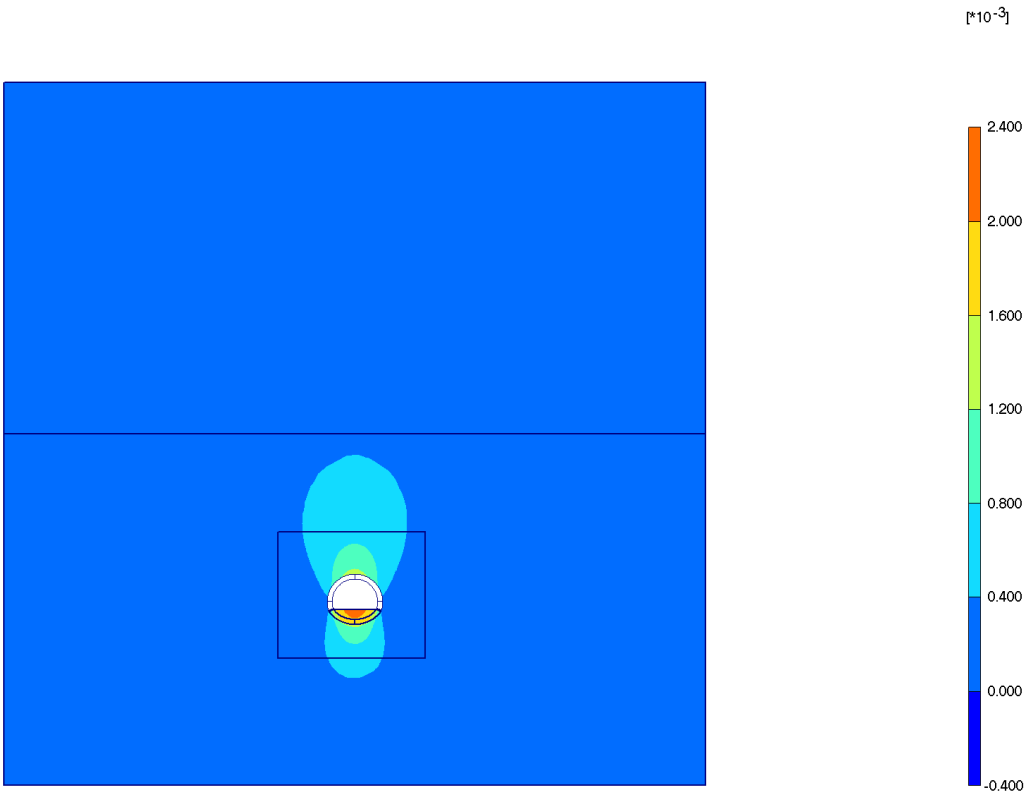


Fig. 24 Plot of total displacements (shadings)

- step no: 17 - (phase: 3)

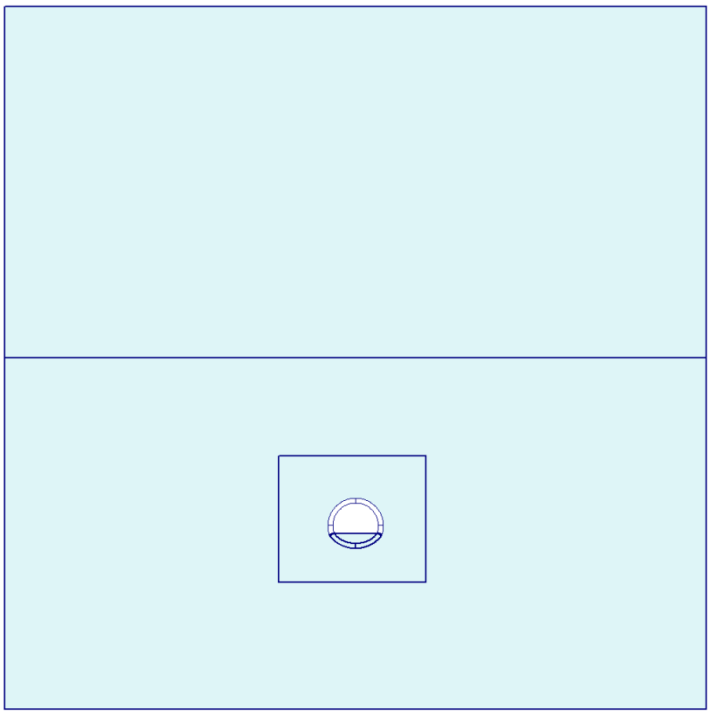


Fig. 25 Plot of total strains (principal directions)

- step no: 17 - (phase: 3)

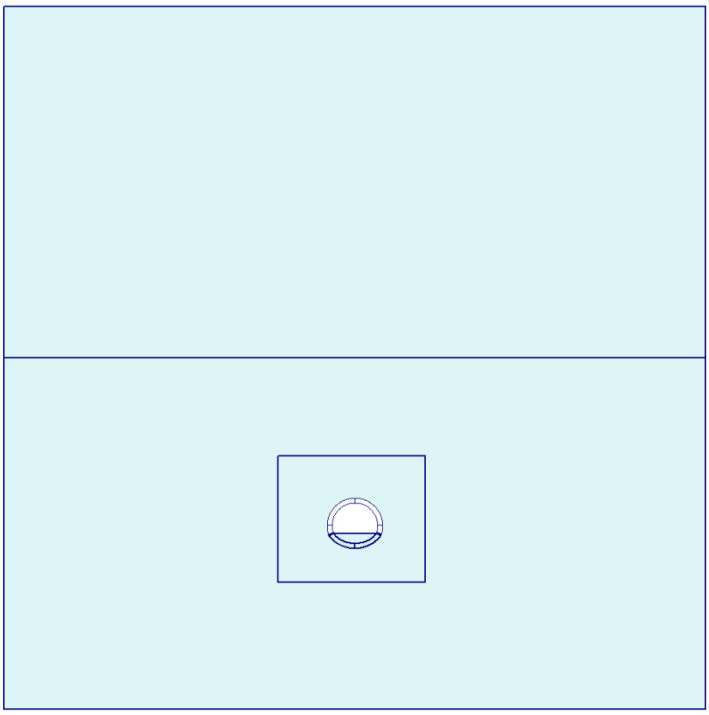


Fig. 26 Plot of total strains (shear shadings)

- step no: 17 - (phase: 3)

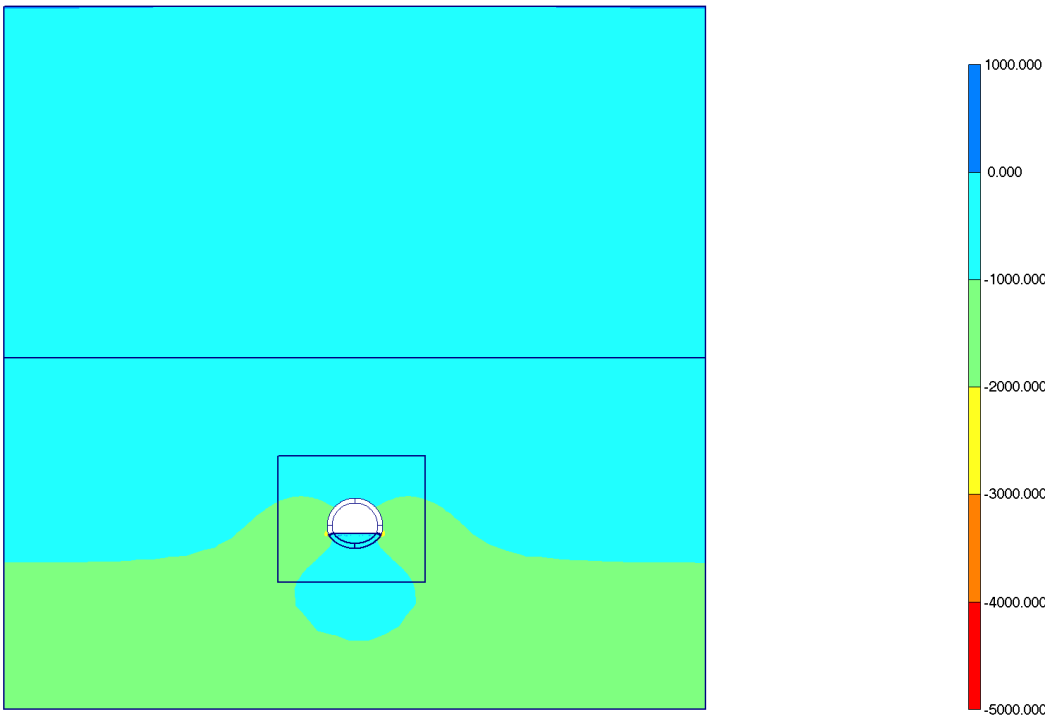


Fig. 27 Plot of effective stresses (mean shadings)

- step no: 17 - (phase: 3)

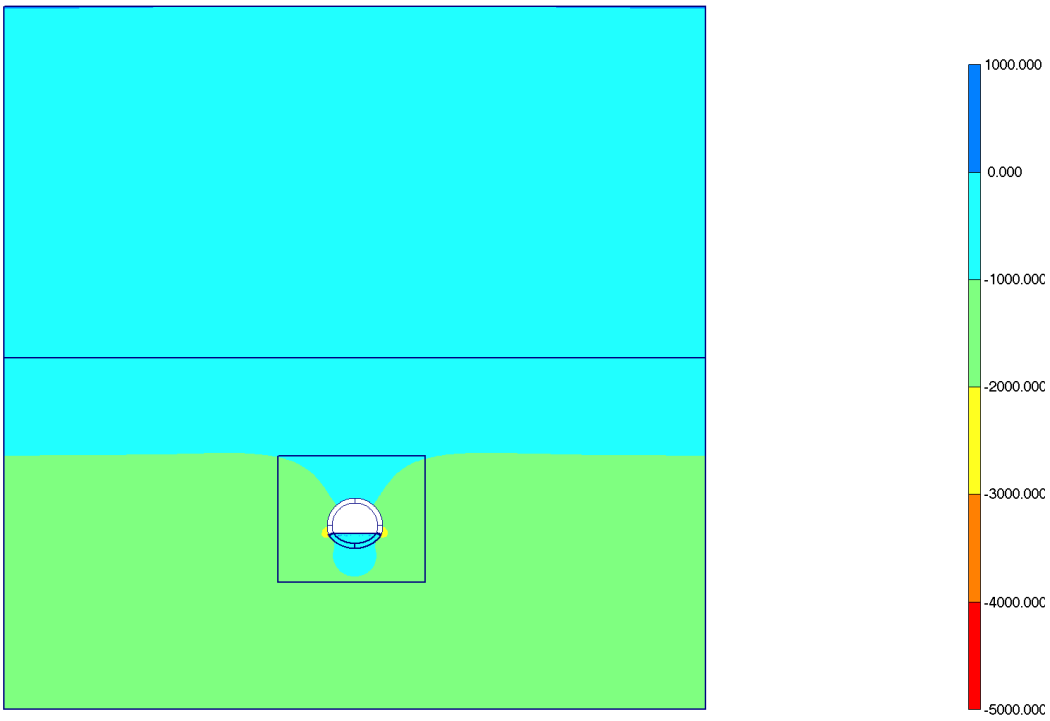


Fig. 28 Plot of total stresses (mean shadings)

- step no: 17 - (phase: 3)

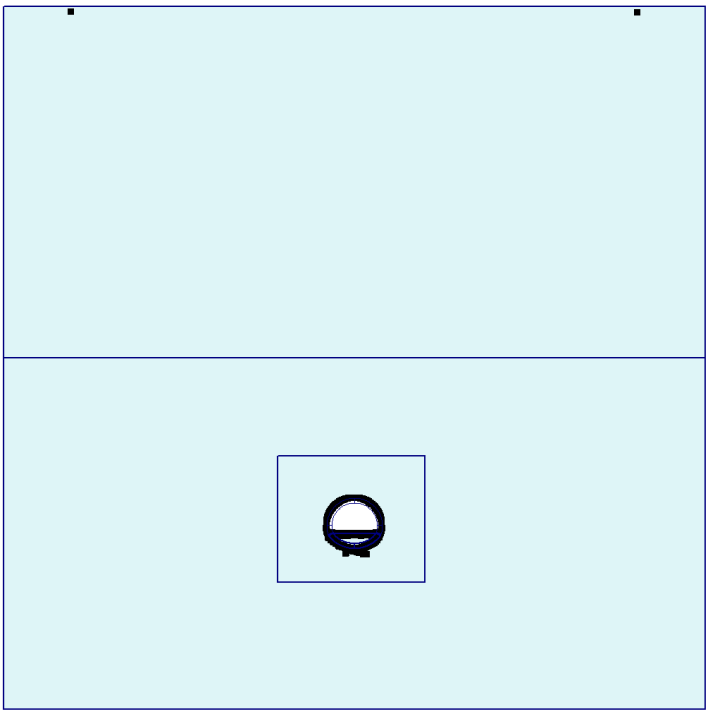


Fig. 29 Plot of plastic points

- step no: 17 - (phase: 3)

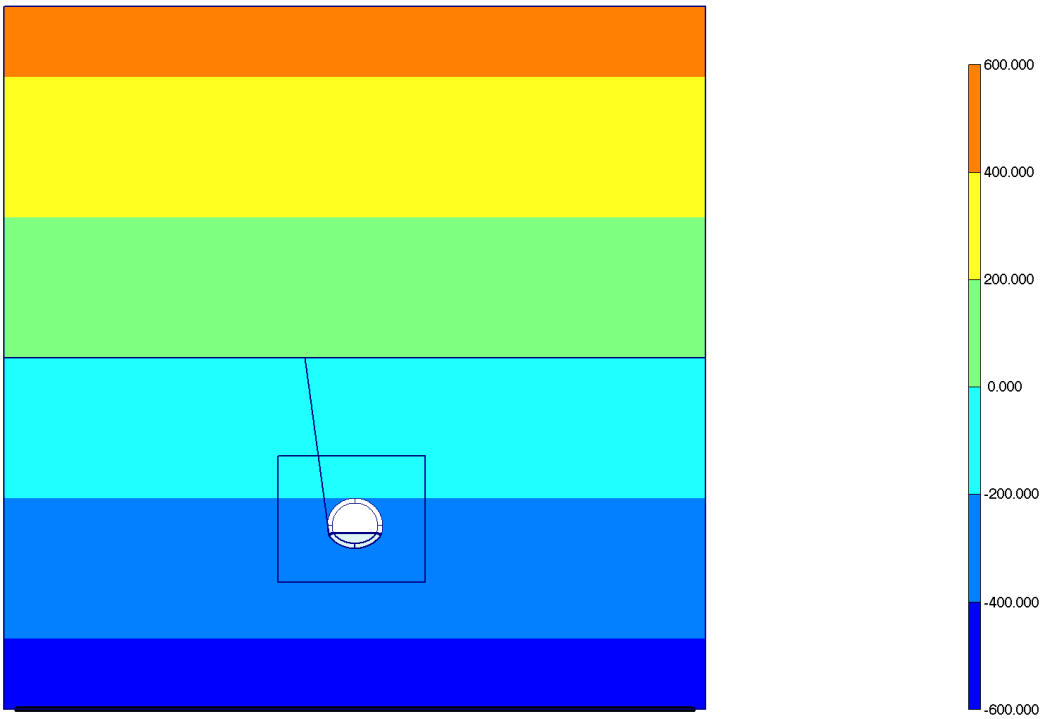


Fig. 30 Plot of active pore pressures (shadings)

- step no: 17 - (phase: 3)

10. Results for phase 4

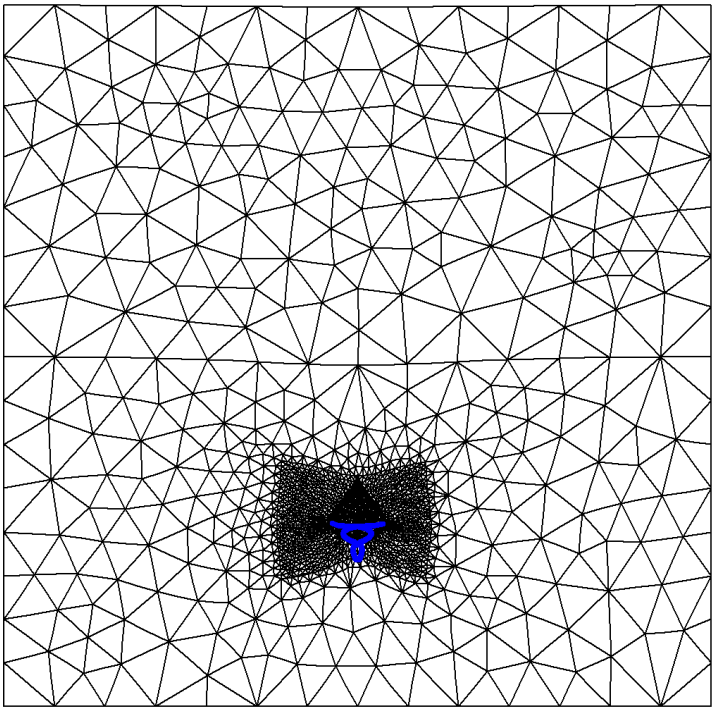


Fig. 31 Plot of deformed mesh

- step no: 19 - (phase: 4)

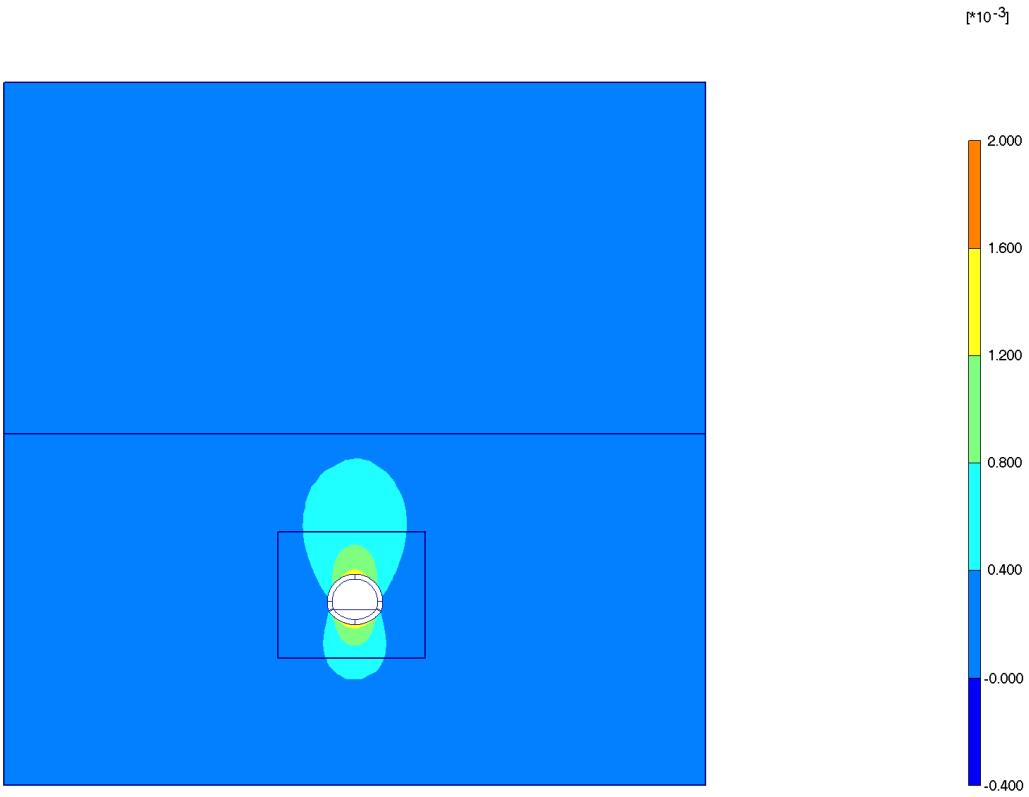


Fig. 32 Plot of total displacements (shadings)

- step no: 19 - (phase: 4)

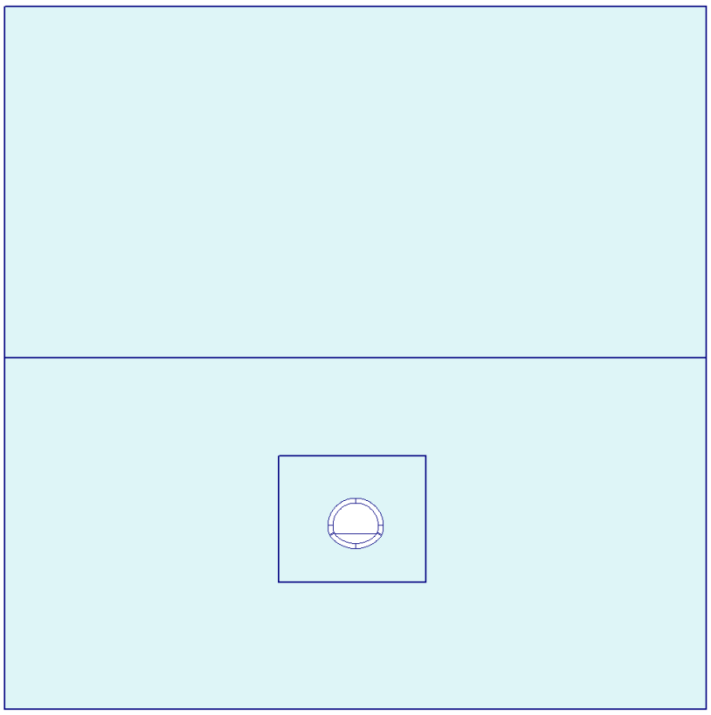


Fig. 33 Plot of total strains (principal directions)

- step no: 19 - (phase: 4)

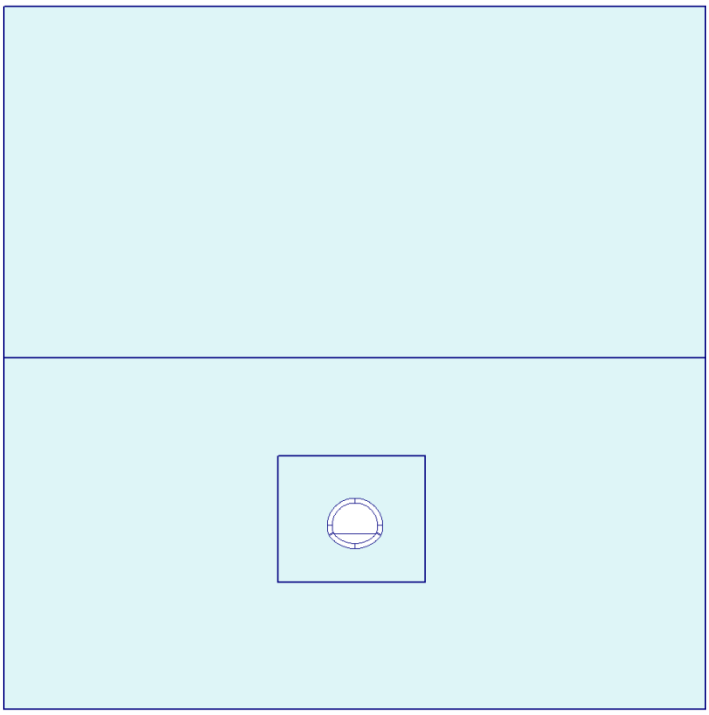


Fig. 34 Plot of total strains (shear shadings)

- step no: 19 - (phase: 4)

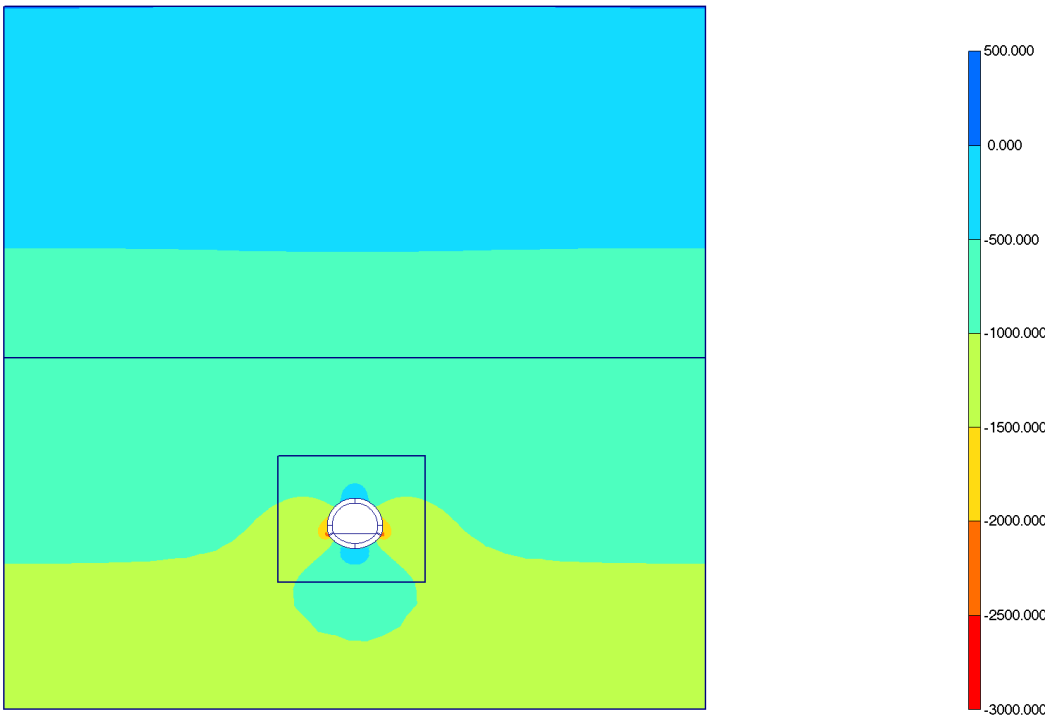


Fig. 35 Plot of effective stresses (mean shadings)

- step no: 19 - (phase: 4)

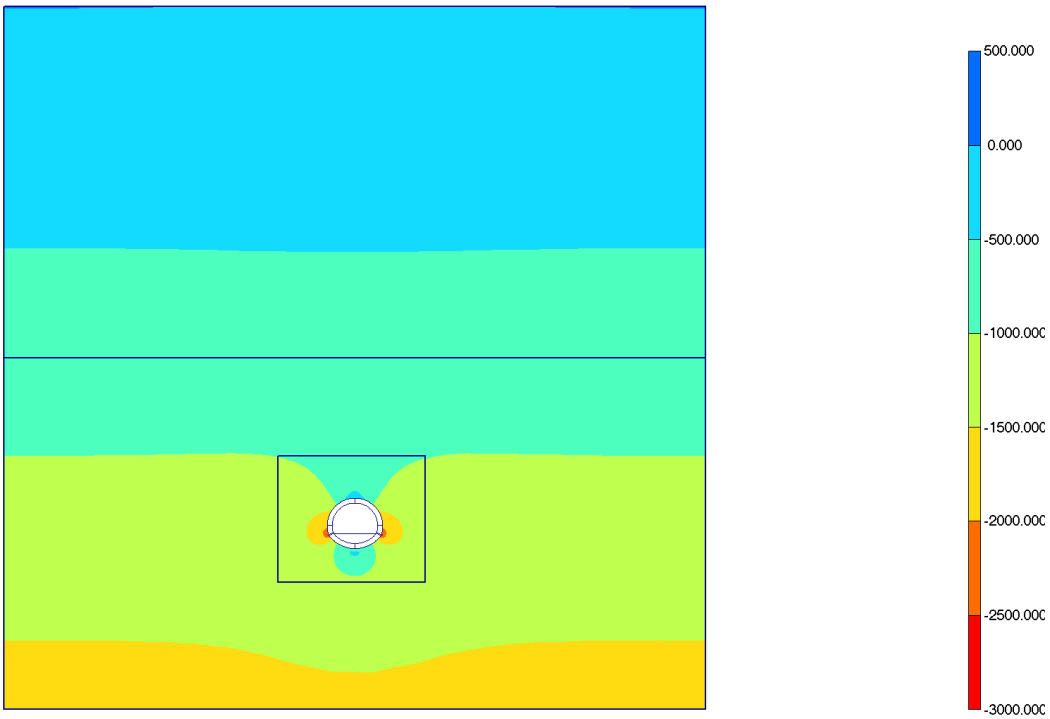


Fig. 36 Plot of total stresses (mean shadings)

- step no: 19 - (phase: 4)

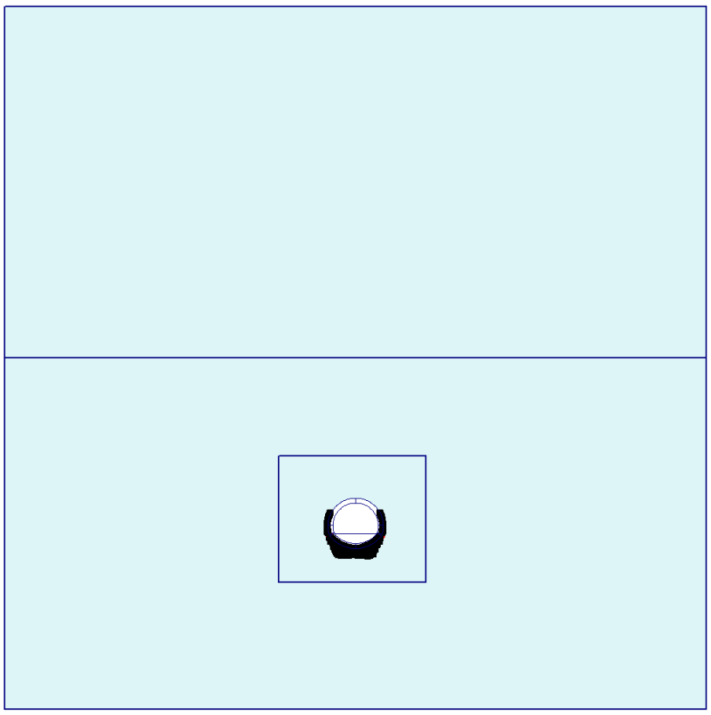


Fig. 37 Plot of plastic points

- step no: 19 - (phase: 4)

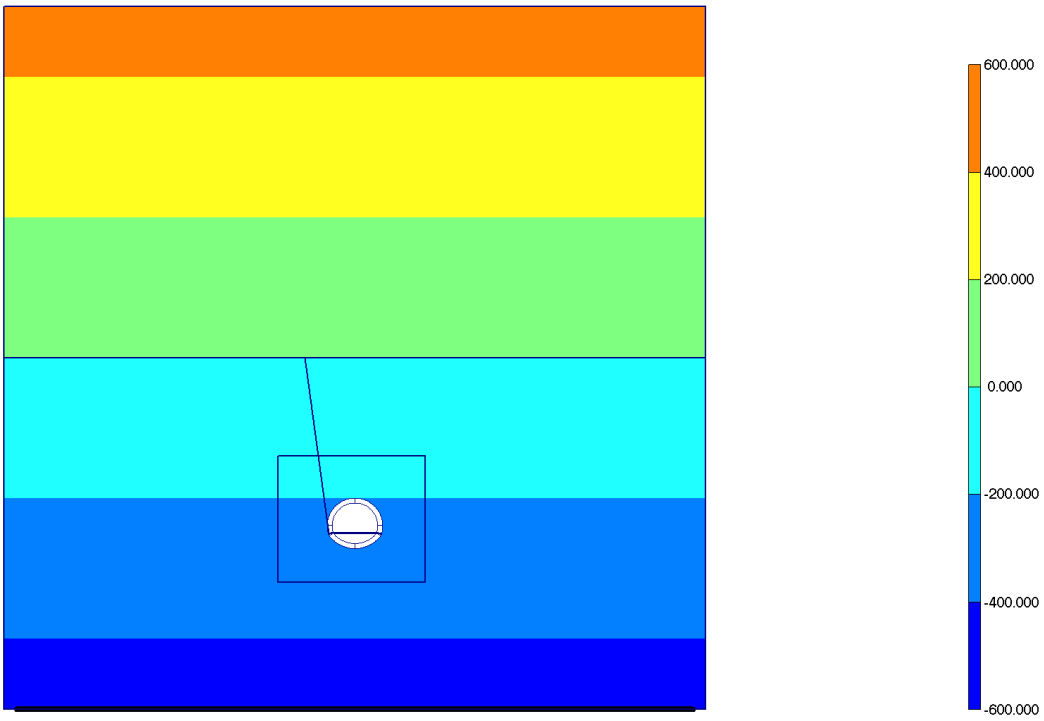


Fig. 38 Plot of active pore pressures (shadings)

- step no: 19 - (phase: 4)

11. Results for phase 5

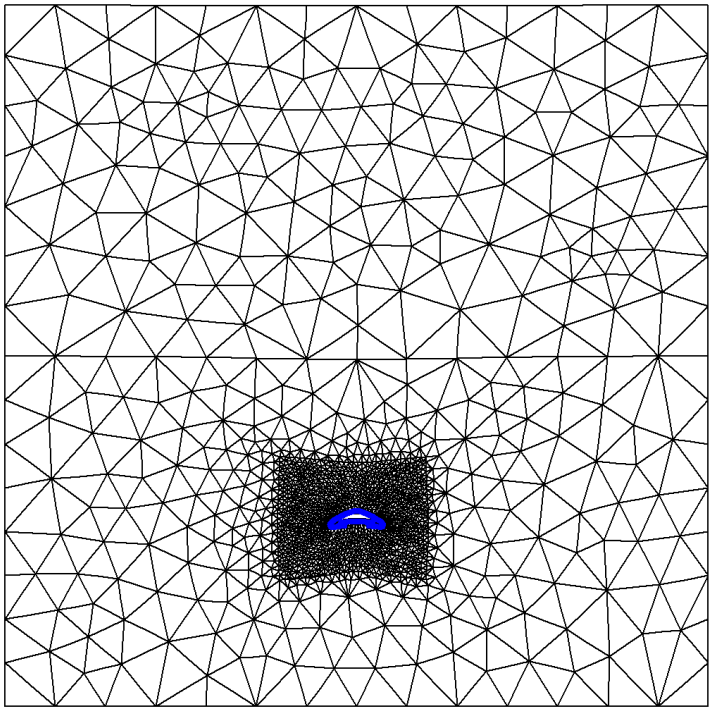


Fig. 39 Plot of deformed mesh

- step no: 27 - (phase: 5)

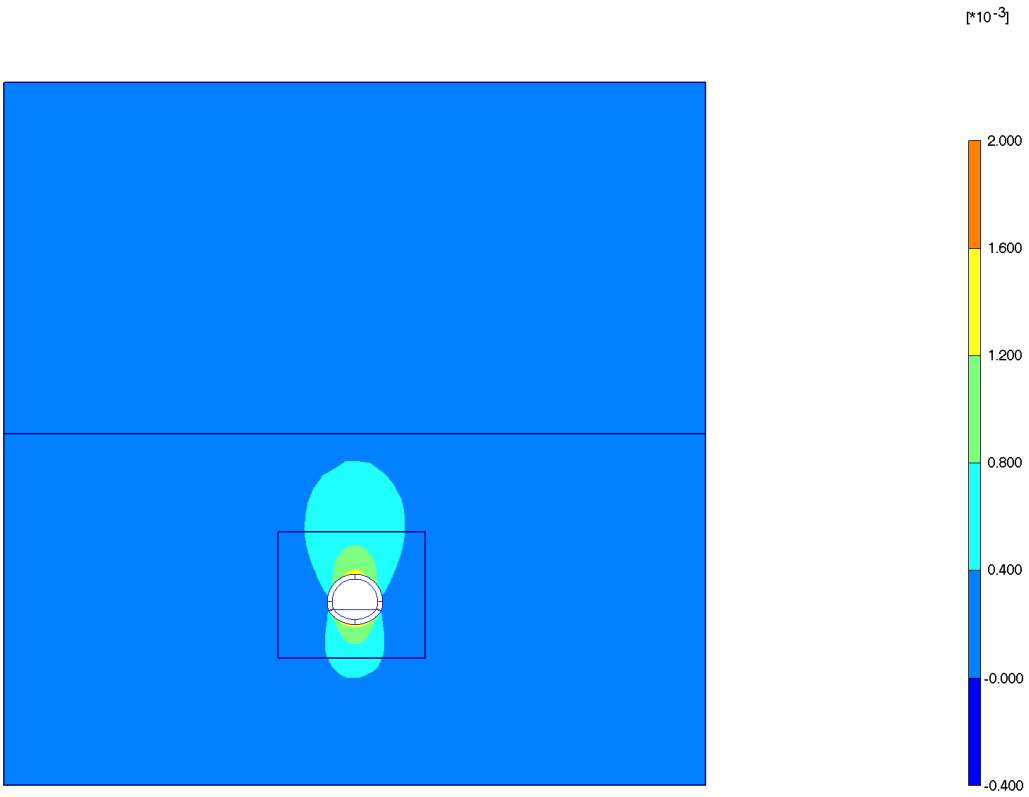


Fig. 40 Plot of total displacements (shadings)

- step no: 27 - (phase: 5)

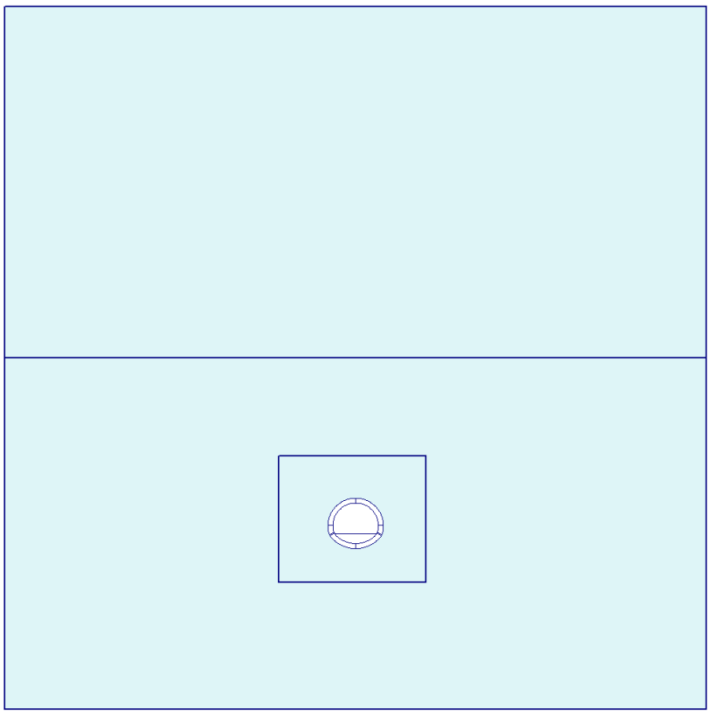


Fig. 41 Plot of total strains (principal directions)

- step no: 27 - (phase: 5)

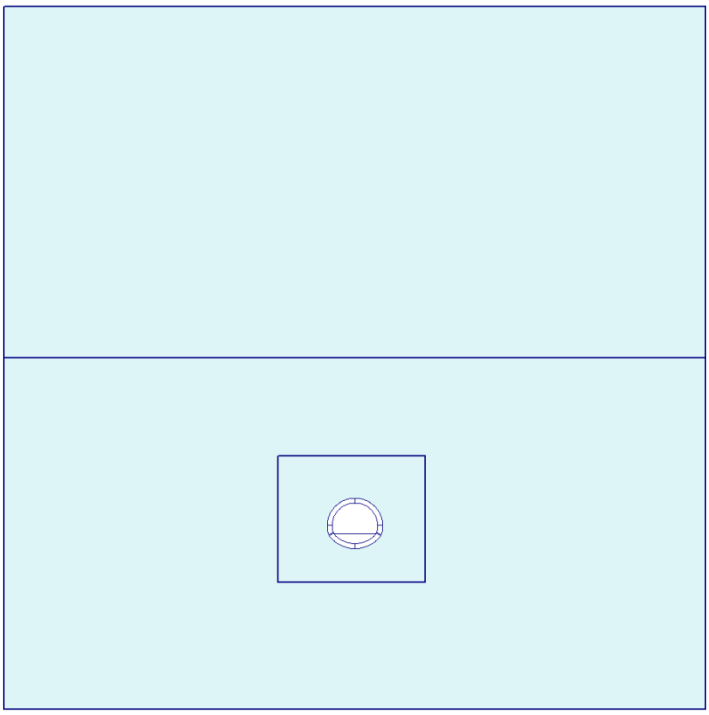


Fig. 42 Plot of total strains (shear shadings)

- step no: 27 - (phase: 5)

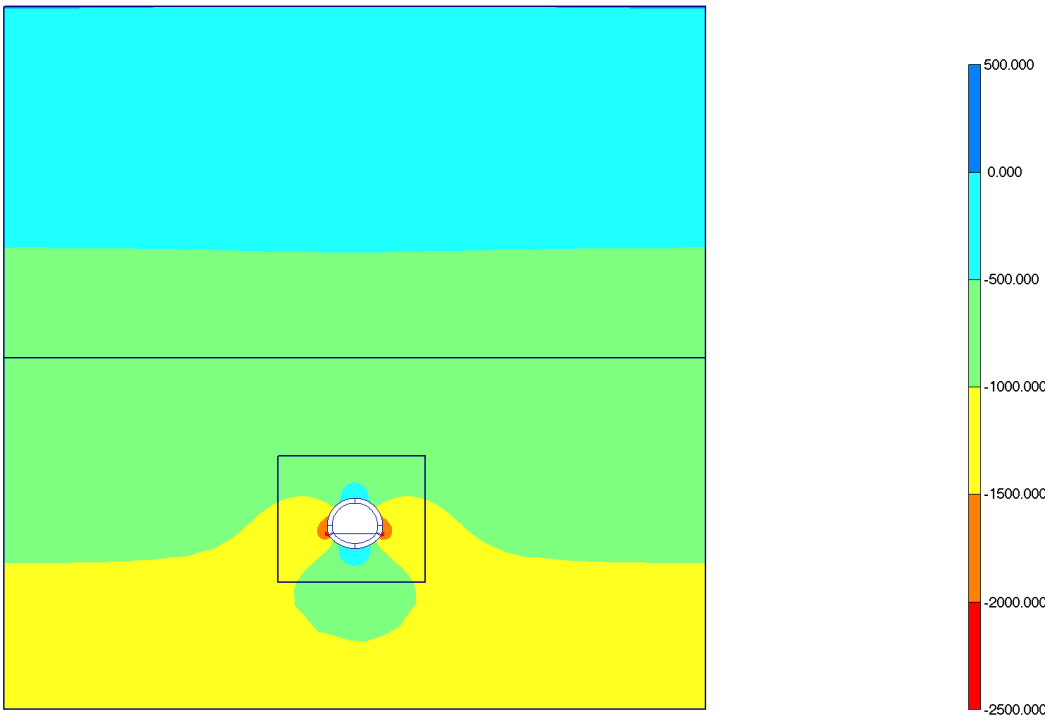


Fig. 43 Plot of effective stresses (mean shadings)

- step no: 27 - (phase: 5)

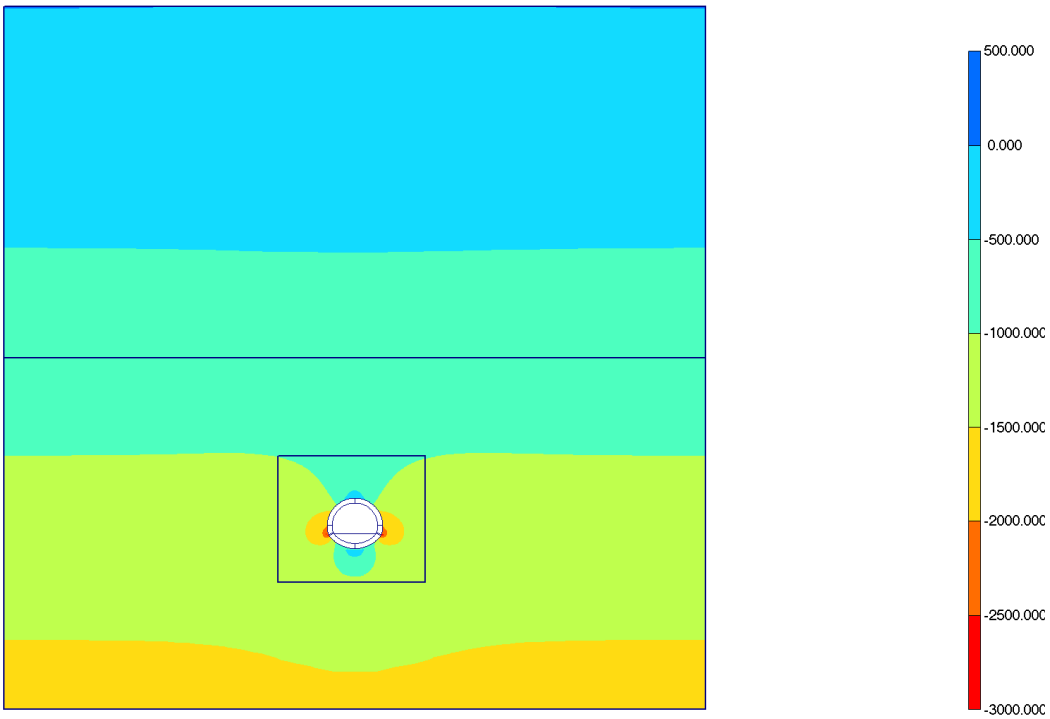


Fig. 44 Plot of total stresses (mean shadings)

- step no: 27 - (phase: 5)

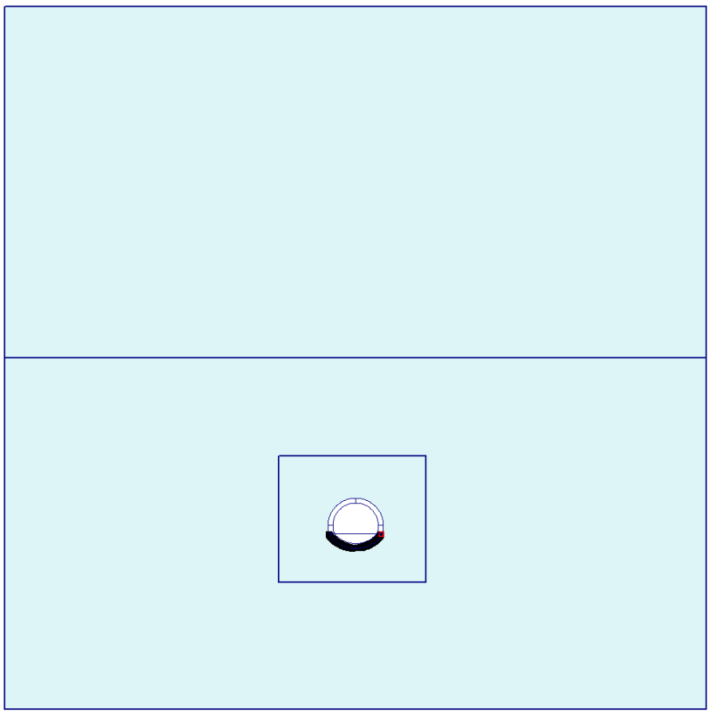


Fig. 45 Plot of plastic points

- step no: 27 - (phase: 5)

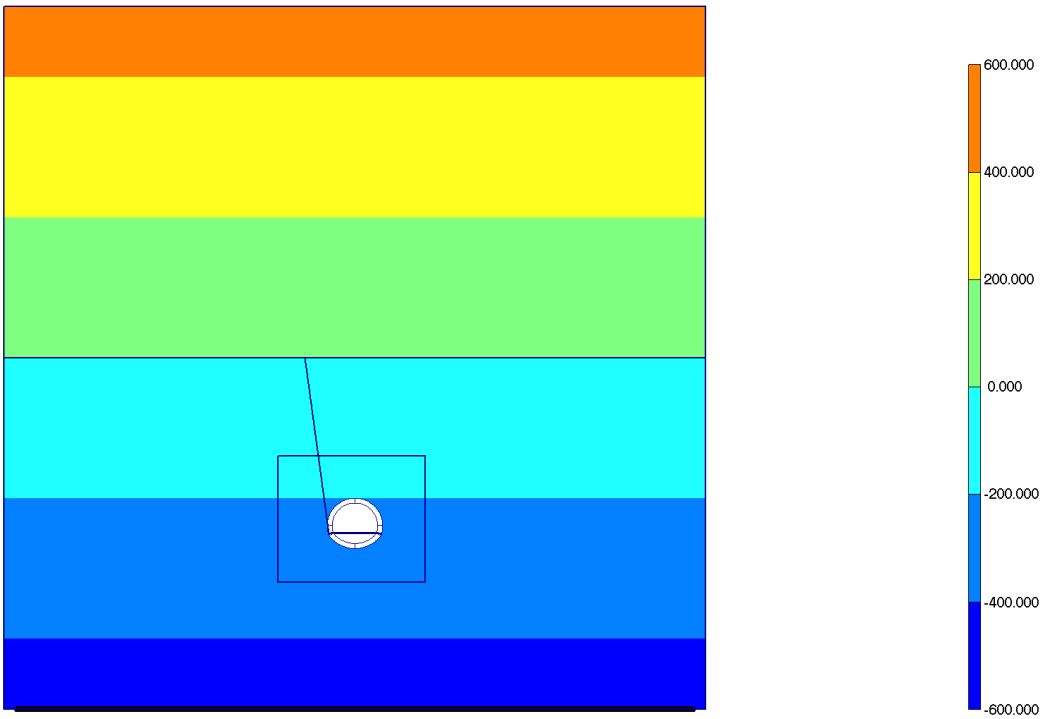


Fig. 46 Plot of active pore pressures (shadings)

- step no: 27 - (phase: 5)

12. Results for phase 6

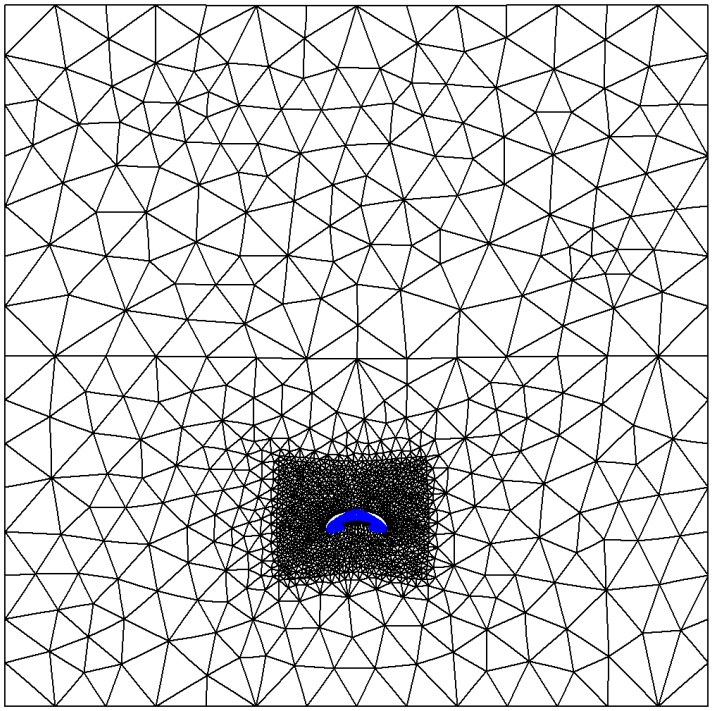


Fig. 47 Plot of deformed mesh

- step no: 29 - (phase: 6)

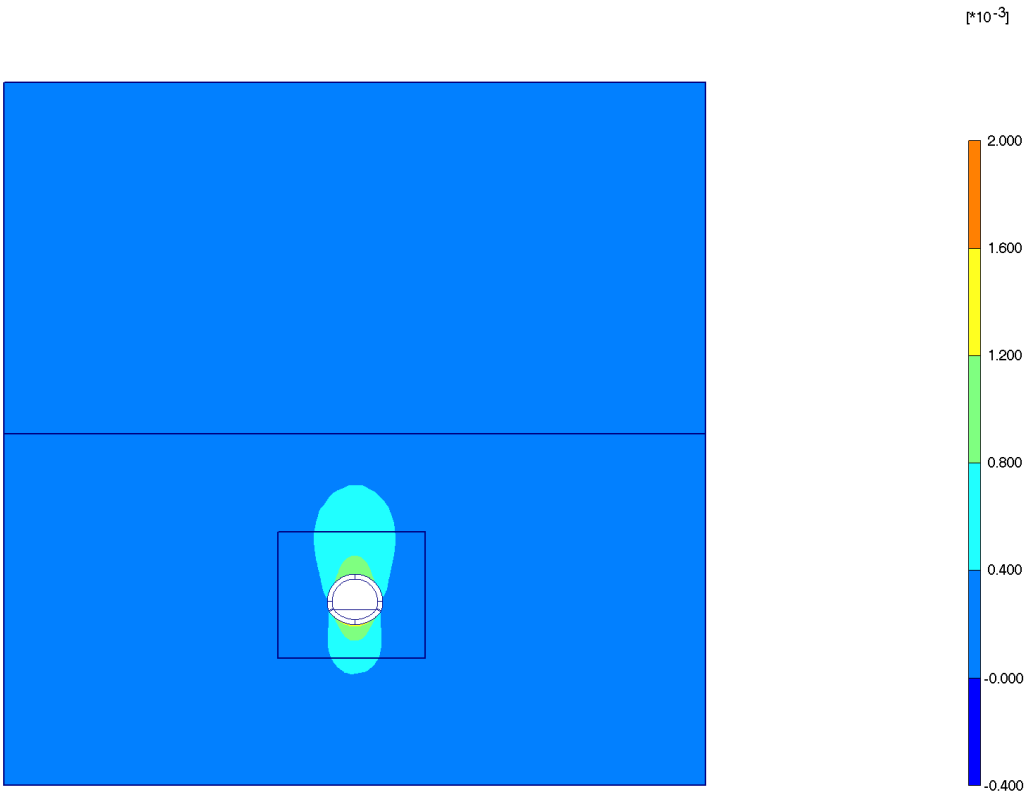


Fig. 48 Plot of total displacements (shadings)

- step no: 29 - (phase: 6)

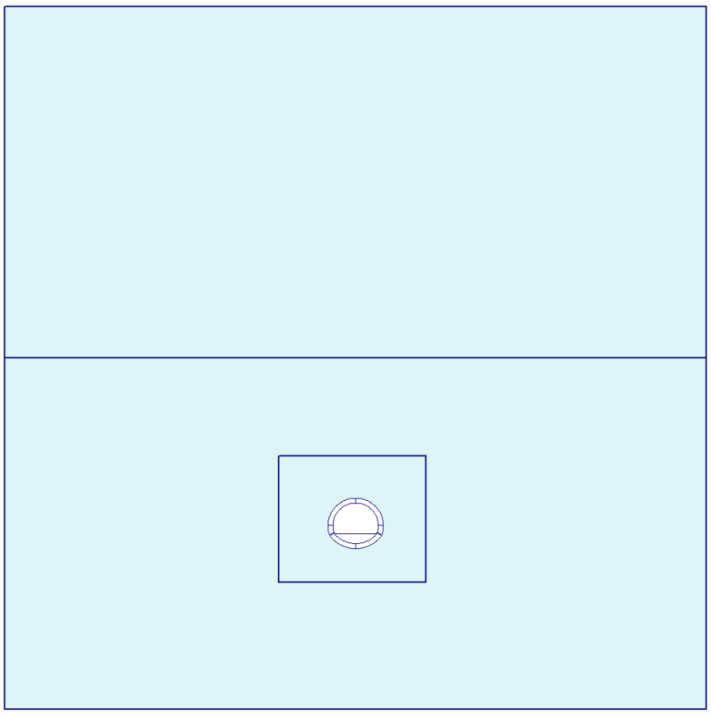


Fig. 49 Plot of total strains (principal directions)

- step no: 29 - (phase: 6)

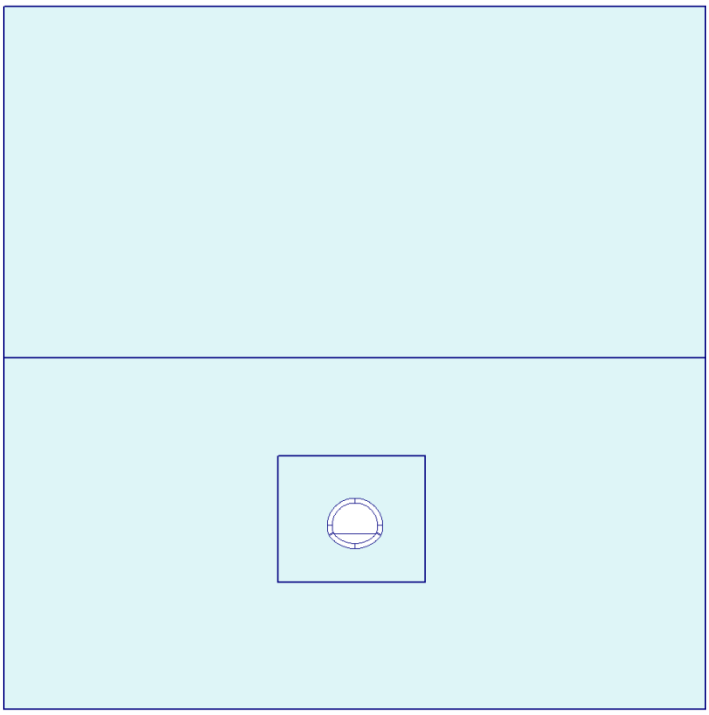


Fig. 50 Plot of total strains (shear shadings)

- step no: 29 - (phase: 6)

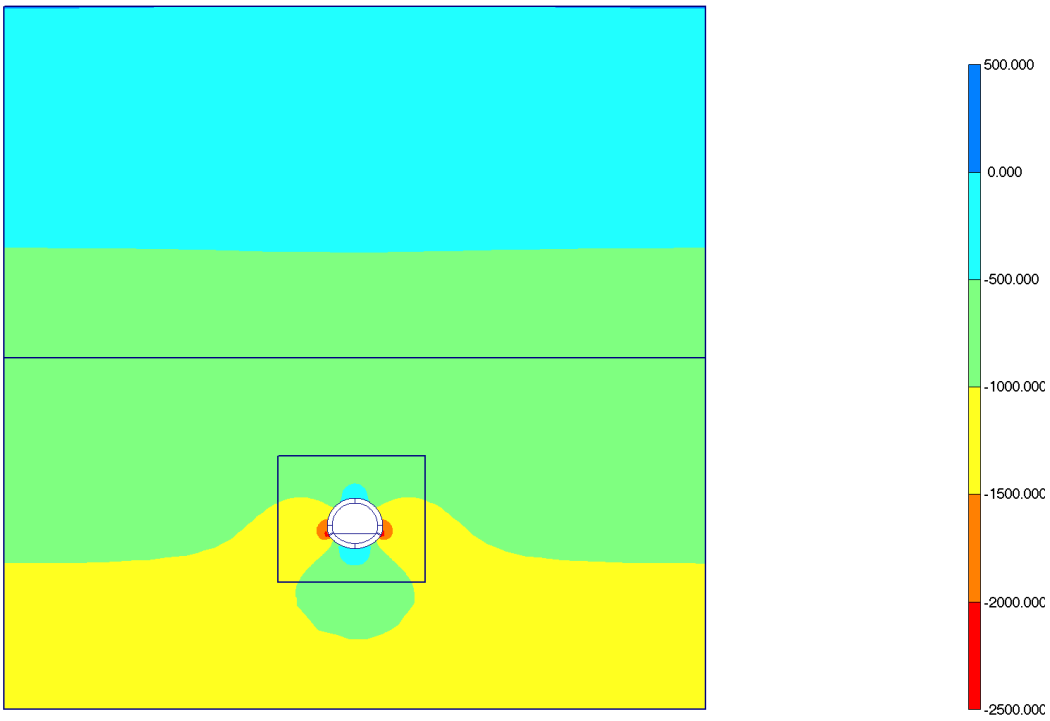


Fig. 51 Plot of effective stresses (mean shadings)

- step no: 29 - (phase: 6)

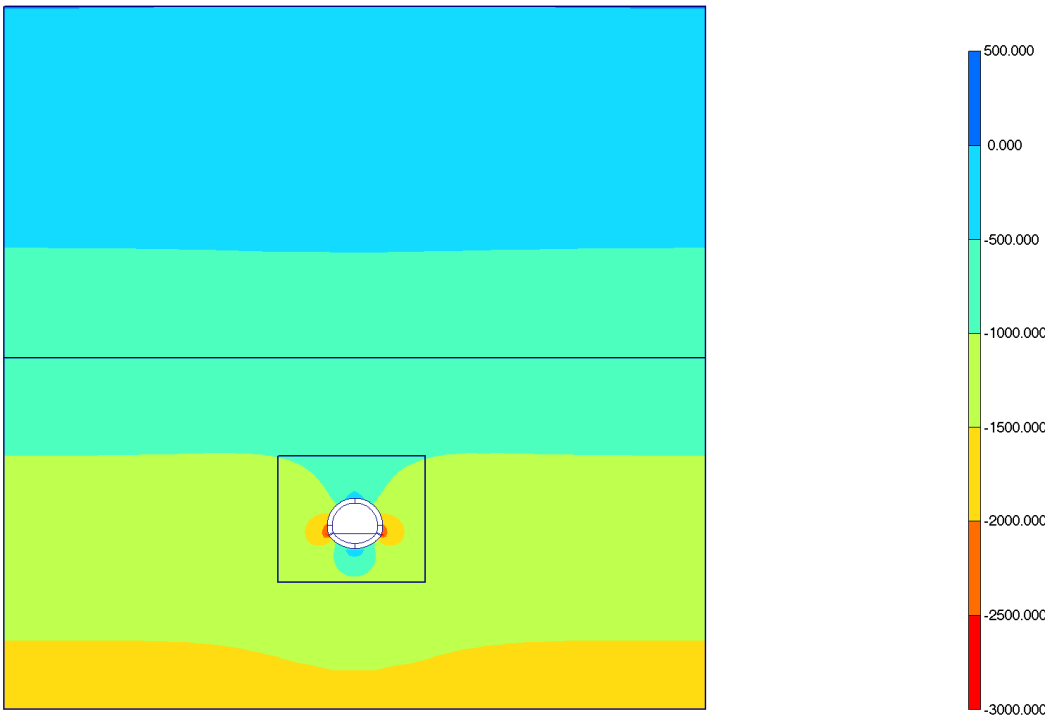


Fig. 52 Plot of total stresses (mean shadings)

- step no: 29 - (phase: 6)

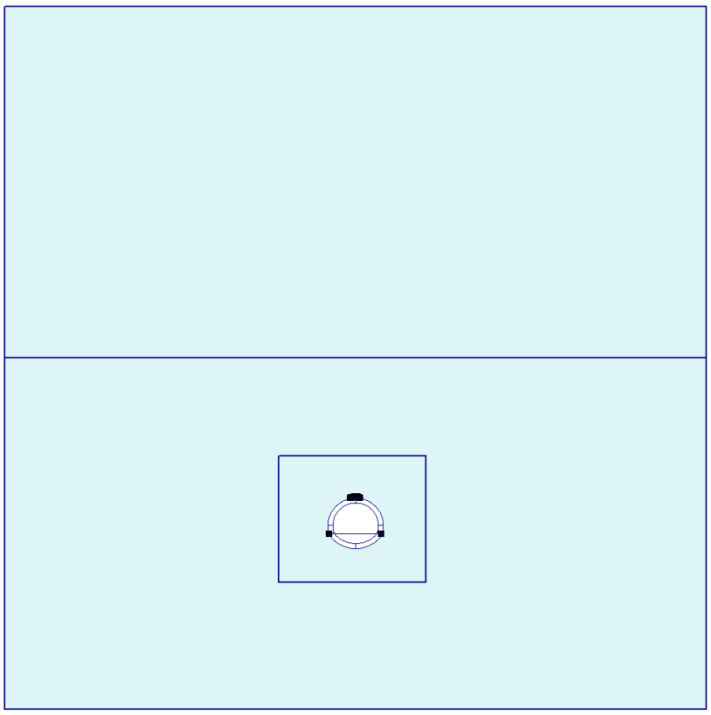


Fig. 53 Plot of plastic points

- step no: 29 - (phase: 6)

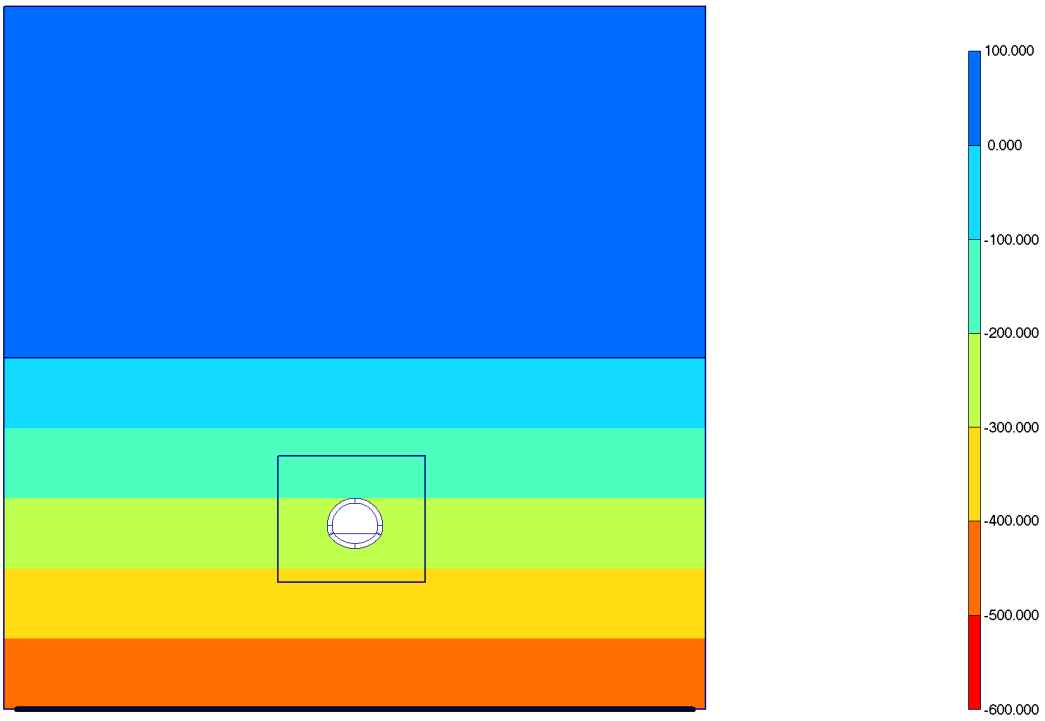


Fig. 54 Plot of active pore pressures (shadings)

- step no: 29 - (phase: 6)