

Phase2 Analysis Information

Project Summary

File Name: PHASE PR 3
 Last saved with Phase2 version: 9.004
 Analysis: Converted from Slide v6.034 with PHASE2 9.004

General Settings

Single stage model
 Analysis Type: Plane Strain
 Solver Type: Gaussian Elimination
 Units: Metric, stress as kPa
 Permeability Units: meters/second
 Time Units: days

Analysis Options

Maximum Number of Iterations: 500
 Tolerance: 0.001
 Number of Load Steps: Automatic
 Convergence Type: Absolute Energy
 Tensile Failure: Reduces Shear Strength
 Joint tension reduces joint stiffness by a factor of 0.01

Strength Reduction Settings

Initial Estimate of SRF: 0.25
 Step Size: Custom
 Final SRF: 1.5
 Step Size: 0.25
 Limit SSR Search Area: No
 Accelerate SSR Analysis: Yes
 Apply SSR to Mohr-Coulomb Tensile Strength: Yes
 Convergence Parameters: Automatic

Groundwater Analysis

Method: Piezometric Lines
 Pore Fluid Unit Weight: 9.81 kN/m³
 Probability: None

Field Stress

Field stress:	Gravity
Using actual ground surface	
Total stress ratio (horizontal/vertical in-plane):	Total stress ratio1
Total stress ratio (horizontal/vertical out-of-plane):	Total stress ratio1
Locked-in horizontal stress (in-plane):	0
Locked-in horizontal stress (out-of-plane):	0

Seismic Loading

Horizontal seismic load coefficient: 0.125 (positive to the right)
 Vertical seismic load coefficient: 0 (positive up)
 Seismic load applied in: 1. Stage 1

Mesh

Mesh type: Uniform
 Element type: 6 Noded triangles
 Number of elements: 6652
 Number of nodes: 13685

Mesh Quality

5 of 6652 Elements (0.1 % of elements) are poor quality elements
 0 of 6652 Elements (0.0 % of elements) are poor quality elements because of the side length ratio
 5 of 6652 Elements (0.1 % of elements) are poor quality elements because of the minimum interior angle
 0 of 6652 Elements (0.0 % of elements) are poor quality elements because of the maximum interior angle
 0 of 6652 Elements (0.0 % of elements) are poor quality elements because they are inverted
 Note: Elements can be of poor quality for more than one reason

Poor quality elements defined as:

Side length ratio (maximum / minimum) > 30.00
 Minimum interior angle < 2.0 degrees
 Maximum interior angle > 175.0 degrees

Excavation Areas

Original Un-deformed Areas


External Boundary Area: 5440.712 m²
 External Boundary Perimeter: 782.288 m

1. Stage 1


External Boundary Area: 5429.607 m² (-11.1044 m² change from original area)
 External Boundary Perimeter: 782.307 m (0.0185211 m change from original perimeter)

Material Properties


Material: Peščeno glinena zemljina

Color	
Initial element loading	field stress & body force
Unit weight	19 kN/m ³
Elastic type	isotropic
Young's modulus	3000 kPa
Poisson's ratio	0.3
Failure criterion	Mohr-Coulomb
Is Jointed	No
Peak tensile strength	0 kPa
Residual tensile strength	0 kPa
Peak friction angle	22.4 degrees
Peak cohesion	2 kPa
Material type	Plastic
Dilation Angle	0 degrees
Residual Friction Angle	22.4 degrees
Residual Cohesion	0 kPa
Piezo to use	1
Hu Type	Custom
Hu value	1


Material: Zameljen prod

Color	
Initial element loading	field stress & body force
Unit weight	20 kN/m ³
Elastic type	isotropic
Young's modulus	6000 kPa
Poisson's ratio	0.3
Failure criterion	Mohr-Coulomb
Is Jointed	No
Peak tensile strength	0 kPa
Residual tensile strength	0 kPa
Peak friction angle	26 degrees
Peak cohesion	0 kPa
Material type	Plastic
Dilation Angle	0 degrees
Residual Friction Angle	26 degrees
Residual Cohesion	0 kPa
Piezo to use	1
Hu Type	Custom
Hu value	1


Material: Zameljen prod - rečni

Color	
Initial element loading	field stress & body force
Unit weight	21 kN/m ³
Elastic type	isotropic
Young's modulus	20000 kPa
Poisson's ratio	0.3
Failure criterion	Mohr-Coulomb
Is Jointed	No
Peak tensile strength	0 kPa
Residual tensile strength	0 kPa
Peak friction angle	35 degrees
Peak cohesion	1 kPa
Material type	Elastic
Piezo to use	1
Hu Type	Custom
Hu value	1


Material: Zaglinjen melj

Color	
Initial element loading	field stress & body force
Unit weight	20 kN/m ³
Elastic type	isotropic
Young's modulus	6000 kPa
Poisson's ratio	0.3
Failure criterion	Mohr-Coulomb
Is Jointed	No
Peak tensile strength	0 kPa
Residual tensile strength	0 kPa
Peak friction angle	24.9 degrees
Peak cohesion	7 kPa
Material type	Plastic
Dilation Angle	0 degrees
Residual Friction Angle	24.9 degrees
Residual Cohesion	0 kPa
Piezo to use	1
Hu Type	Custom
Hu value	1


Material: Peščena glina

Color	
Initial element loading	field stress & body force
Unit weight	20 kN/m ³
Elastic type	isotropic
Young's modulus	8000 kPa
Poisson's ratio	0.25
Failure criterion	Mohr-Coulomb
Is Jointed	No
Peak tensile strength	0 kPa
Residual tensile strength	0 kPa
Peak friction angle	25 degrees
Peak cohesion	10 kPa
Material type	Elastic
Piezo to use	None
Ru value	0


Material: Zbita peščena glina

Color	
Initial element loading	field stress & body force
Unit weight	21 kN/m ³
Elastic type	isotropic
Young's modulus	12000 kPa
Poisson's ratio	0.3
Failure criterion	Mohr-Coulomb
Is Jointed	No
Peak tensile strength	0 kPa
Residual tensile strength	0 kPa
Peak friction angle	28 degrees
Peak cohesion	18 kPa
Material type	Elastic
Piezo to use	None
Ru value	0

Material: Tamponsko nasutje

Color	
Initial element loading	field stress & body force
Unit weight	21 kN/m ³
Elastic type	isotropic
Young's modulus	50000 kPa
Poisson's ratio	0.25
Failure criterion	Mohr-Coulomb
Is Jointed	No
Peak tensile strength	0 kPa
Residual tensile strength	0 kPa
Peak friction angle	35 degrees
Peak cohesion	0 kPa
Material type	Plastic
Dilation Angle	0 degrees
Residual Friction Angle	35 degrees
Residual Cohesion	0 kPa
Piezo to use	None
Ru value	0

Material: AB temelj

Color	
Initial element loading	field stress only
Elastic type	isotropic
Young's modulus	3e+007 kPa
Poisson's ratio	0.15
Failure criterion	Mohr-Coulomb
Is Jointed	No
Peak tensile strength	0 kPa
Residual tensile strength	0 kPa
Peak friction angle	0 degrees
Peak cohesion	12500 kPa
Material type	Elastic
Piezo to use	None
Ru value	0

Shear Strength Reduction - Material Properties

Strength Reduction Factor: 0.25
 Maximum Total Displacement: 0.104762 m
 Converged: yes

Material	Peščeno glinena zemljina
Peak friction angle	58.7613 degrees
Peak cohesion	8 kPa
Residual Friction Angle	58.7613 degrees
Residual Cohesion	0 kPa

Material	Zameljen prod
Peak friction angle	62.8614 degrees
Peak cohesion	0 kPa
Residual Friction Angle	62.8614 degrees
Residual Cohesion	0 kPa

Material	Zameljen prod - rečni
Elastic material - no strength reduction	

Material	Zaglinjen melj
Peak friction angle	61.694 degrees
Peak cohesion	28 kPa
Residual Friction Angle	61.694 degrees
Residual Cohesion	0 kPa

Material	Peščena glina
Elastic material - no strength reduction	

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Material Zbita peščena glina

Elastic material - no strength reduction

Material Tamponsko nasutje

Peak friction angle	70.3516 degrees
Peak cohesion	0 kPa
Residual Friction Angle	70.3516 degrees
Residual Cohesion	0 kPa

Material AB temelj

Elastic material - no strength reduction

Strength Reduction Factor: 0.5
 Maximum Total Displacement: 0.104765 m
 Converged: yes

Material Peščeno glinena zemljina

Peak friction angle	39.5001 degrees
Peak cohesion	4 kPa
Residual Friction Angle	39.5001 degrees
Residual Cohesion	0 kPa

Material Zameljen prod

Peak friction angle	44.2884 degrees
Peak cohesion	0 kPa
Residual Friction Angle	44.2884 degrees
Residual Cohesion	0 kPa

Material Zameljen prod - rečni

Elastic material - no strength reduction

Material Zaglinjen melj

Peak friction angle	42.8727 degrees
Peak cohesion	14 kPa
Residual Friction Angle	42.8727 degrees
Residual Cohesion	0 kPa

Material Peščena glina

Elastic material - no strength reduction

Material Zbita peščena glina

Elastic material - no strength reduction

Material	Tamponsko nasutje
Peak friction angle	54.4704 degrees
Peak cohesion	0 kPa
Residual Friction Angle	54.4704 degrees
Residual Cohesion	0 kPa

Material	AB temelj
Elastic material - no strength reduction	

Strength Reduction Factor: 0.75
Maximum Total Displacement: 0.104723 m
Converged: yes

Material	Peščeno glinena zemljina
Peak friction angle	28.7915 degrees
Peak cohesion	2.66667 kPa
Residual Friction Angle	28.7915 degrees
Residual Cohesion	0 kPa

Material	Zameljen prod
Peak friction angle	33.0364 degrees
Peak cohesion	0 kPa
Residual Friction Angle	33.0364 degrees
Residual Cohesion	0 kPa

Material	Zameljen prod - rečni
Elastic material - no strength reduction	

Material	Zaglinjen melj
Peak friction angle	31.7539 degrees
Peak cohesion	9.33333 kPa
Residual Friction Angle	31.7539 degrees
Residual Cohesion	0 kPa

Material	Peščena glina
Elastic material - no strength reduction	

Material	Zbita peščena glina
Elastic material - no strength reduction	

Material	Tamponsko nasutje
Peak friction angle	43.0335 degrees
Peak cohesion	0 kPa
Residual Friction Angle	43.0335 degrees
Residual Cohesion	0 kPa

Material	AB temelj
Elastic material - no strength reduction	

Strength Reduction Factor: 1
 Maximum Total Displacement: 0.104766 m
 Converged: yes

Material	Peščeno glinena zemljina
Peak friction angle	22.4 degrees
Peak cohesion	2 kPa
Residual Friction Angle	22.4 degrees
Residual Cohesion	0 kPa

Material	Zameljen prod
Peak friction angle	26 degrees
Peak cohesion	0 kPa
Residual Friction Angle	26 degrees
Residual Cohesion	0 kPa

Material	Zameljen prod - rečni
Elastic material - no strength reduction	

Material	Zaglinjen melj
Peak friction angle	24.9 degrees
Peak cohesion	7 kPa
Residual Friction Angle	24.9 degrees
Residual Cohesion	0 kPa

Material	Peščena glina
Elastic material - no strength reduction	

Material	Zbita peščena glina
Elastic material - no strength reduction	

Material	Tamponsko nasutje
Peak friction angle	35 degrees
Peak cohesion	0 kPa
Residual Friction Angle	35 degrees
Residual Cohesion	0 kPa

Material	AB temelj
Elastic material - no strength reduction	

Strength Reduction Factor: 1.25
 Maximum Total Displacement: 0.104881 m
 Converged: yes

Material	Peščeno glinena zemljina
Peak friction angle	18.2493 degrees
Peak cohesion	1.6 kPa
Residual Friction Angle	18.2493 degrees
Residual Cohesion	0 kPa

Material	Zameljen prod
Peak friction angle	21.315 degrees
Peak cohesion	0 kPa
Residual Friction Angle	21.315 degrees
Residual Cohesion	0 kPa

Material	Zameljen prod - rečni
Elastic material - no strength reduction	

Material	Zaglinjen melj
Peak friction angle	20.3724 degrees
Peak cohesion	5.6 kPa
Residual Friction Angle	20.3724 degrees
Residual Cohesion	0 kPa

Material	Peščena glina
Elastic material - no strength reduction	

Material	Zbita peščena glina
Elastic material - no strength reduction	

Material	Tamponsko nasutje
Peak friction angle	29.2561 degrees
Peak cohesion	0 kPa
Residual Friction Angle	29.2561 degrees
Residual Cohesion	0 kPa

Material	AB temelj
Elastic material - no strength reduction	

Strength Reduction Factor: 1.5
 Maximum Total Displacement: 0.105024 m
 Converged: yes

Material	Peščeno glinena zemljina
Peak friction angle	15.3645 degrees
Peak cohesion	1.33333 kPa
Residual Friction Angle	15.3645 degrees
Residual Cohesion	0 kPa

Material	Zameljen prod
Peak friction angle	18.0122 degrees
Peak cohesion	0 kPa
Residual Friction Angle	18.0122 degrees
Residual Cohesion	0 kPa

Material	Zameljen prod - rečni
Elastic material - no strength reduction	

Material	Zaglinjen melj
Peak friction angle	17.195 degrees
Peak cohesion	4.66667 kPa
Residual Friction Angle	17.195 degrees
Residual Cohesion	0 kPa

Material	Peščena glina
Elastic material - no strength reduction	

Material	Zbita peščena glina
Elastic material - no strength reduction	

Material	Tamponsko nasutje
Peak friction angle	25.0234 degrees
Peak cohesion	0 kPa
Residual Friction Angle	25.0234 degrees
Residual Cohesion	0 kPa

Material	AB temelj
Elastic material - no strength reduction	

Displacements

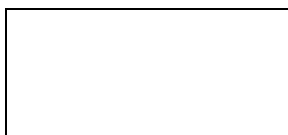
Yielded Elements

Yielded Mesh Elements

Number of yielded mesh elements: 239

List of All Coordinates

External boundary



X	Y
0	0
374.712	0
374.712	7.24382
374.712	13.0466
374.712	19.4301
374.712	20.0005
374.712	22
363.073	21.2341
351.783	20
330.343	17.8318
323.278	16
283.278	16
277.712	15.9914
259.712	16
251.712	16
232.716	15.3928
192.716	15.3928
173.712	15.1065
165.712	15.1065
151.712	14.4841
111.712	14.4841
97.7118	12.4353
89.7118	12.4353
73.2118	9.55195
33.2118	9.55195
16.7118	9.78048
8.7118	9.78048
-3.1956e-008	10
-2.6455e-008	8.27857

Material boundary

X	Y
8.7118	9.78048
8.7118	8.98048
16.7118	8.98048
16.7118	9.78048

Material boundary

X	Y
33.2118	9.55195
33.2118	9.25195
33.2118	8.25195
73.2118	8.25195
73.2118	9.25195
73.2118	9.55195

Material boundary

X	Y
33.2118	9.25195
73.2118	9.25195

Material boundary

X	Y
89.7118	12.4353
89.7118	11.6353
97.7118	11.6353
97.7118	12.4353

Material boundary

X	Y
111.712	14.4841
111.712	14.1841
111.712	13.1841
144.634	13.3011
151.715	13.3263
151.712	14.1841
151.712	14.4841

Material boundary

X	Y
111.712	14.1841
151.712	14.1841

Material boundary

X	Y
165.712	15.1065
165.712	14.3065
173.712	14.3065
173.712	15.1065

Material boundary

X	Y
192.716	15.3928
192.716	15.0928
192.716	14.0928
232.716	14.0928
232.716	15.0928
232.716	15.3928

Material boundary

X	Y
192.716	15.0928
232.716	15.0928

Material boundary

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X	Y
251.712	16
251.712	15.2
259.712	15.2
259.712	16

Material boundary

X	Y
283.278	16
283.278	15.7
283.278	14.7
316.304	14.7
323.275	14.7221
323.278	15.2419
323.278	15.7
323.278	16

Material boundary

X	Y
283.278	15.7
323.278	15.7

Material boundary

X	Y
323.278	15.2419
328.339	16.0005
337.072	17.0005
351.783	18.0005
365.343	19.6505
374.712	20.0005

Material boundary

X	Y
75.4405	7.83128
83.1547	8.40147
93.2855	9.41763
102.347	10.4464
128.741	12.2598
151.709	12.8901
159.235	12.8016
168.758	12.6895
307.112	13.6
320.789	14.4063
323.275	14.7221
327.583	15.2695
347.398	17.1498
366.351	19.0022
374.712	19.4301

Material boundary

X	Y
17.9796	1.90707
168.758	5.08955
307.746	5.01828
374.712	7.24382

Material boundary

X	Y
36.5677	3.87869
168.758	10.0893
307.714	10.82
374.712	13.0466

Material boundary

X	Y
-2.6455e-008	8.27857
14.7118	8.00675
45.6778	7.40054
75.4405	7.83128
70.1349	7.43911
36.5677	3.87869
17.9796	1.90707
0	0

Material boundary

X	Y
75.4405	7.83128
86.3925	9.00054
94.1691	10.0005
102.308	11.0005
113.993	12.0005
134.023	13.0005
144.634	13.3011
148.144	13.4005
151.715	13.3263
156.8	13.2205
159.235	12.8016
161.534	13.1305
168.703	13.0903
184.602	13.0005
256.167	14.0005
307.112	14.2
307.879	14.2278
316.304	14.7

Piezometric line



X	Y
-2.12975e-008	6.66462
73.2118	8.25195
83.249	10.043
93.544	10.885
110.762	12.868
151.715	13.3263
165.822	13.832
194.777	13.832
232.716	14.0928
283.278	14.7
323.275	14.7221
327.342	16.693
333.591	17.94
348.942	19.178
363.459	20.2905
374.712	20.875