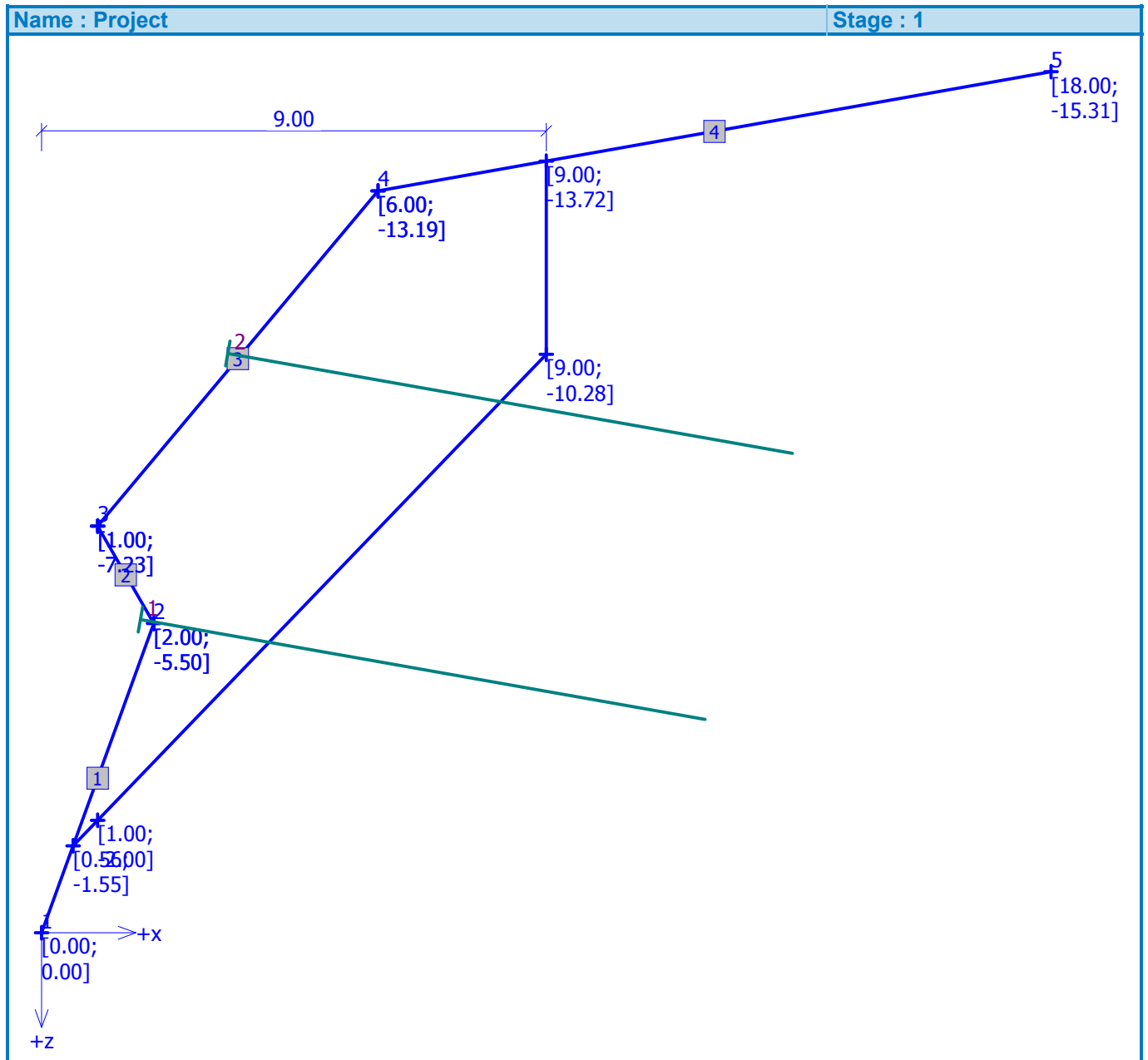


# Analysis of rock stability

## Input data

Project

Date : 15.6.2007



## Terrain

### Terrain sections

| Number | Gradient<br>$\alpha$ [°] | Overall length<br>$l$ [m] | Horizontal length<br>$l_h$ [m] | Height<br>$l_v$ [m] |
|--------|--------------------------|---------------------------|--------------------------------|---------------------|
| 1      | 70.00                    | 5.85                      | 2.00                           | 5.50                |
| 2      | 120.00                   | 2.00                      | -1.00                          | 1.73                |
| 3      | 50.00                    | 7.78                      | 5.00                           | 5.96                |
| 4      | 10.00                    | 12.19                     | 12.00                          | 2.12                |

## Rock

Specific weight  $\gamma = 15.00 \text{ kN/m}^3$

Type of defined slip surface: Mohr-Coulomb

Angle of internal friction  $\phi = 36.00^\circ$

Cohesion  $c = 15.00 \text{ kPa}$

## Slip surface

| Number | Coordinate |        |
|--------|------------|--------|
|        | X [m]      | Y [m]  |
| 1      | 0.56       | -1.55  |
| 2      | 9.00       | -10.28 |
| 3      | 9.00       | -13.72 |

Slip surface gradient  $\alpha = 46.00^\circ$

Tension crack gradient  $\phi = 0.00^\circ$

Distance of tension crack  $x = 9.00 \text{ m}$

Type of slip surface: smooth

## Water

Influence of ground water table is not considered.

## Defined anchors

| Number | New anchor | Origin |        | Length l [m] | Gradient $\alpha$ [°] | Spacing b [m] |
|--------|------------|--------|--------|--------------|-----------------------|---------------|
|        |            | X [m]  | Z [m]  |              |                       |               |
| 1      | YES        | 1.98   | -5.53  | 10.00        | 10.00                 | 1.00          |
| 2      | YES        | 3.54   | -10.26 | 10.00        | 10.00                 | 1.00          |

| Number | Anchor type | Post-stressing | Force  | Bearing cap. |
|--------|-------------|----------------|--------|--------------|
|        |             |                | F [kN] | $R_t$ [kN]   |
| 1      | active      |                | 95.00  |              |
| 2      | active      |                | 95.00  |              |

## Earthquake

Horizontal seismic coefficient  $K_h = 0.0000$

Vertical seismic coefficient  $K_v = 0.0000$

## Analysis setting

Type of analysis - plane slip surface

Analysis carried out according to classical theory (safety factor)

Safety factor SF = 1.50

## Analysis No. 1 (Stage of construction 1)

### Partial results

Slip surface length = 12.15 m

Slip surface gradient = 46.00°

Gravity force  $W_z = 603.03 \text{ kN/m}$

Forces due to active anchors  $F_{ax} = 187.11 \text{ kN/m}$

Forces due to active anchors  $F_{az} = 32.99 \text{ kN/m}$

Normal force on slip surface  $N = 576.42 \text{ kN/m}$

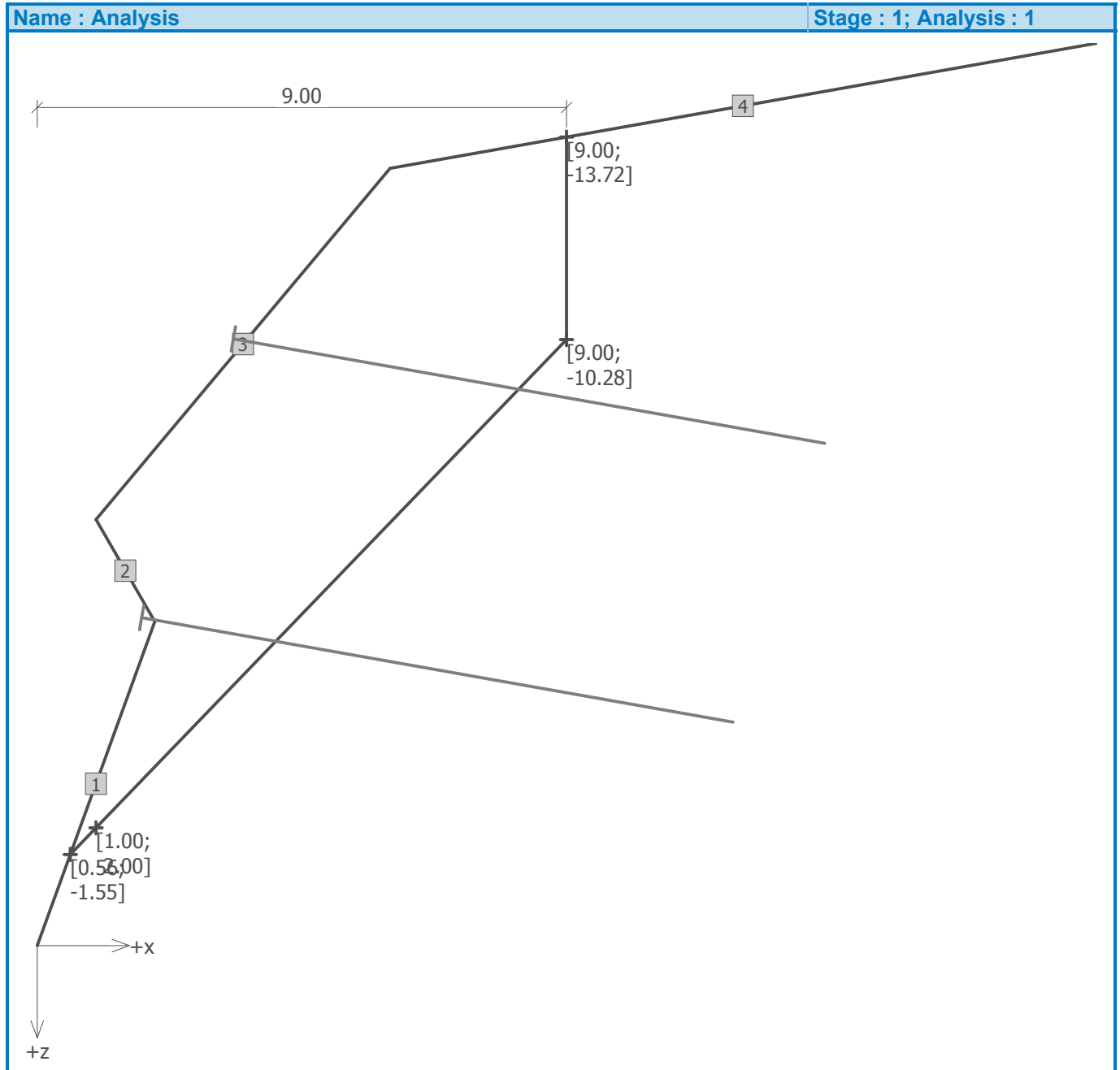
Shear stress on slip surface  $\tau = 49.48 \text{ kPa}$

## Verification

Resisting force  $T_{\text{resist}} = 600.98 \text{ kN/m}$   
Driving force  $T_{\text{driv}} = 327.54 \text{ kN/m}$

Factor of safety = 1.83 > 1.50

**Stability of rock slope is SATISFACTORY**



## Input data (Stage of construction 2)

### Rock

Specific weight  $\gamma = 15.00 \text{ kN/m}^3$

Type of defined slip surface: Mohr-Coulomb

Angle of internal friction  $\phi = 36.00^\circ$

Cohesion  $c = 15.00$  kPa

### Slip surface

| Number | Coordinate |        |
|--------|------------|--------|
|        | X [m]      | Y [m]  |
| 1      | 0.56       | -1.55  |
| 2      | 9.00       | -10.28 |
| 3      | 9.00       | -13.72 |

Slip surface gradient  $\alpha = 46.00$  °

Tension crack gradient  $\phi = 0.00$  °

Distance of tension crack  $x = 9.00$  m

Type of slip surface: smooth

### Water

Influence of ground water table is not considered.

### Defined anchors

| Number | New anchor | Origin |        | Length<br>l [m] | Gradient<br>$\alpha$ [°] | Spacing<br>b [m] |
|--------|------------|--------|--------|-----------------|--------------------------|------------------|
|        |            | X [m]  | Z [m]  |                 |                          |                  |
| 1      | NO         | 1.98   | -5.53  | 10.00           | 10.00                    | 1.00             |
| 2      | NO         | 3.54   | -10.26 | 10.00           | 10.00                    | 1.00             |

| Number | Anchor type | Post-stressing | Force  | Bearing cap. |
|--------|-------------|----------------|--------|--------------|
|        |             |                | F [kN] | $R_t$ [kN]   |
| 1      | active      |                | 95.00  |              |
| 2      | active      | YES            | 95.00  |              |

### Earthquake

Horizontal seismic coefficient  $K_h = 0.0000$

Vertical seismic coefficient  $K_v = 0.0000$

### Analysis setting

Type of analysis - plane slip surface

Analysis carried out according to classical theory (safety factor)

Safety factor SF = 1.50