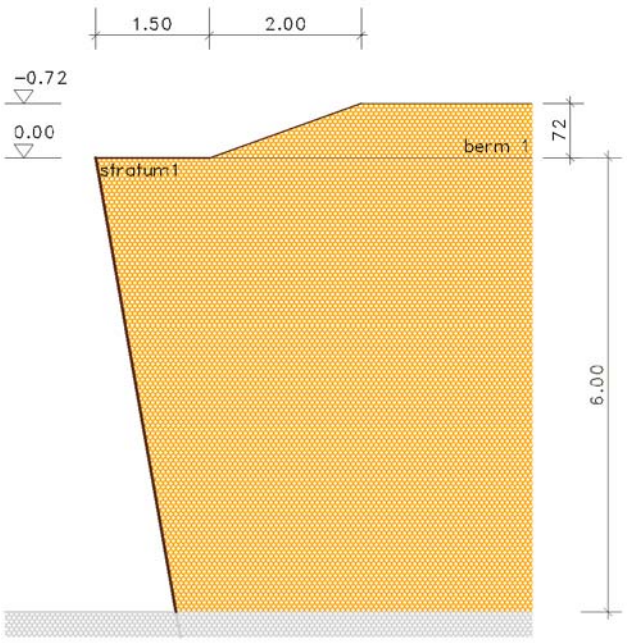
calculation of earth pressures

According to DIN 4084:2017-08 and associated standard specifications

calculation of the active earth pressure

1. system

scale 1:100



wall inclination

contact surface inclined to the earth structure with α = 10.00°

wall friction

for a **rough** wall surface, angle of wall friction $\delta = 2/3 \cdot \varphi'_k$

Oberfläche

broken course

berm	x m	a m	l m	h m	β °	γ kN/m³
1	0.00	1.50	2.00	0.72	19.8	18.00

a - distance l - lenght h - height β - inclination angle γ - unit weight of soil

soil strata

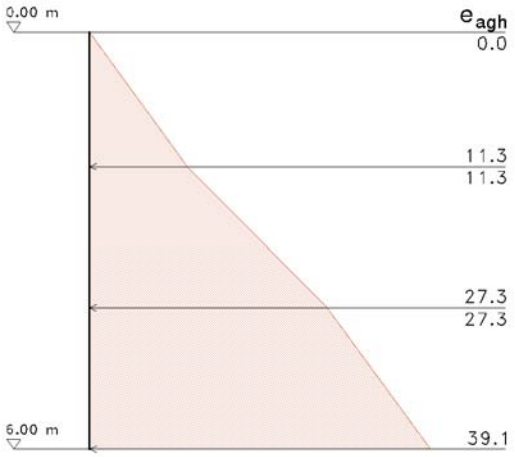
stratum	notation	soil type	d m	γ kN/m³	γ' kN/m³	φ' °	c' kN/m²
1	stratum1	non-cohesive	---	18.00	11.00	35.00	---

d - stratum thickness γ - unit weight of soil γ' - unit weight of submerged soil φ' - angle of internal friction of drained soil
c' - cohesion of the drained soil

2. active earth pressure

2.1. from dead load of the soil

e_{agh} horiz. earth pressure due to soil weight



soil

$\Sigma(\gamma \cdot h)$	total soil weight at the depth considered
$\Sigma(\gamma \cdot h)_{cal}$	total soil weight at the depth considered plus influence of slope
K_{agh}	coefficient of earth pressure acc. to [1] section 6.02.3, eqn.(6.02)
e_{ah}/e_{av}	horiz. and vertical ordinate of earth pressure
e_{ares}	res. ordinate of earth pressure from horizontal and vertical proportion

z m	$\Sigma(\gamma \cdot h)$ kN/m²	$\Sigma(\gamma \cdot h)_{cal}$ kN/m²	K_{agh} -	e_{ah} kN/m²	e_{av} kN/m²	e_{ares} kN/m²
0.00	0.00	0.00	0.323	0.00	0.00	0.00
1.94	34.87	34.87	0.323	11.28	7.42	13.50
1.94	34.87	25.73	0.438	11.28	7.42	13.50
3.96	71.35	62.21	0.438	27.27	17.94	32.64
3.96	71.35	84.31	0.323	27.27	17.94	32.64
6.00	108.00	120.96	0.323	39.13	25.73	46.83

horizontal component of the earth pressure force $E_{h=}$ 117.59 kN/m
vertical component of the earth pressure force $E_{v=}$ 77.34 kN/m
earth pressure force E = 140.74 kN/m
point of application of the earth pressure force $z_{E=}$ 4.05 m

3. summary

kind of earth pressure	earth pressure force			
	E_h kN/m	E_v kN/m	E kN/m	z_E m
soil	**117.59**	77.34	140.74	4.05

literature and standard specifications:

[1] Dörken/Dehne/Kliesch: Grundbau in Beispielen, Teil 1, Werner Verlag, 5.Aufl., 2013