Oasys Forum 2007

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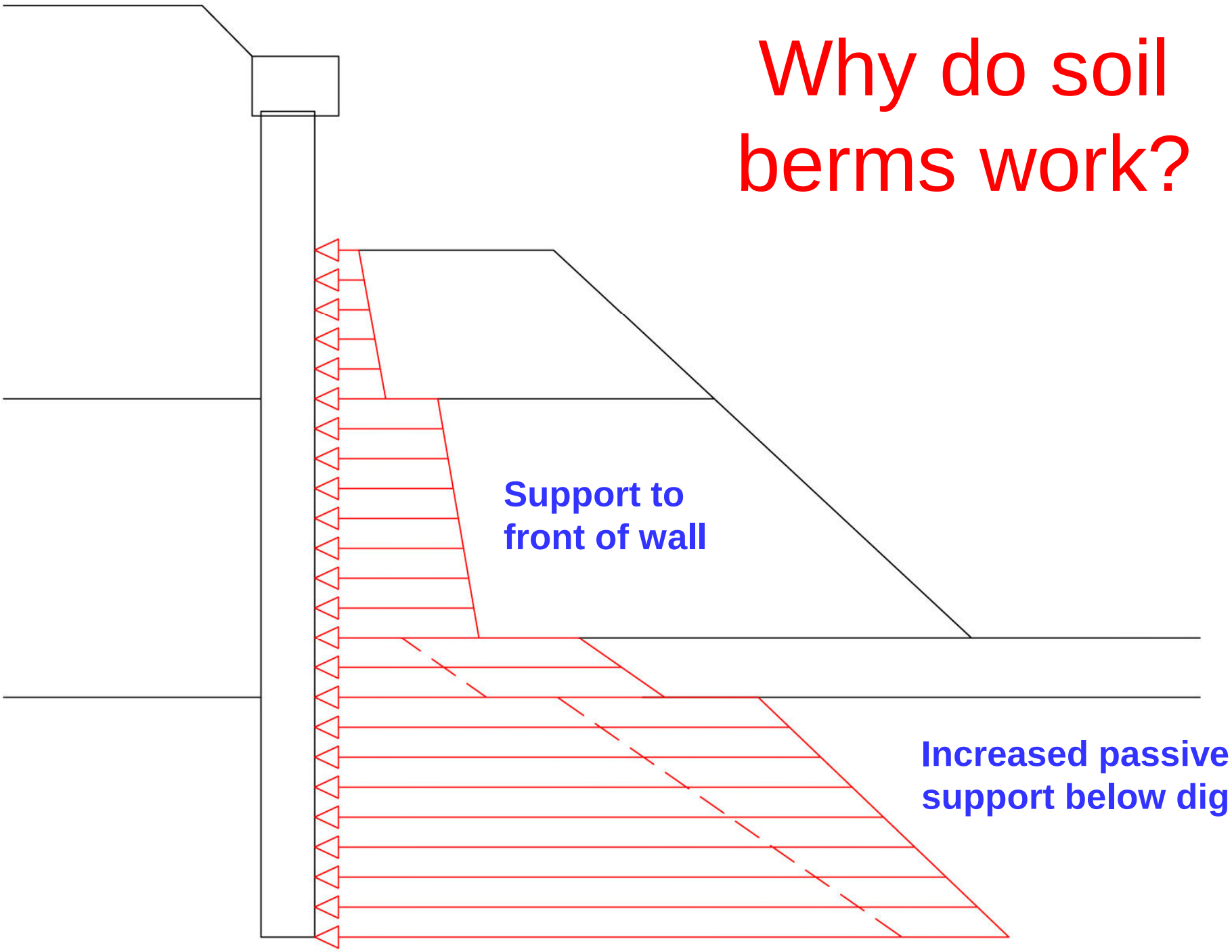
Modelling Berms in FREW

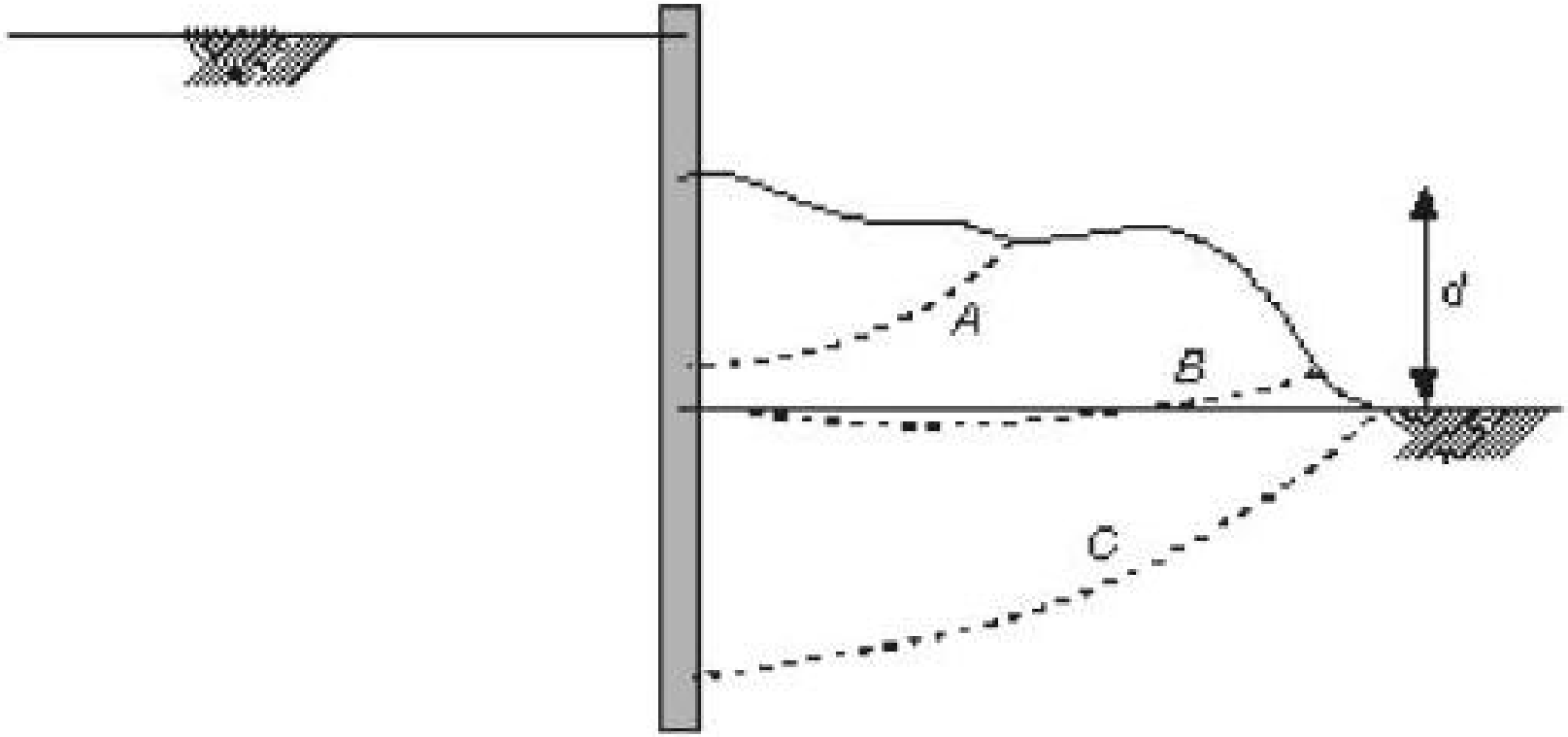
Soil Berms

- Weight of soil berm increases the passive support below dig level
- Face of soil berm provides support to the front of the retaining wall
- Difficult to model in FREW

Why do soil berms work?



Possible failure modes



Berm Geometry

Weight effect

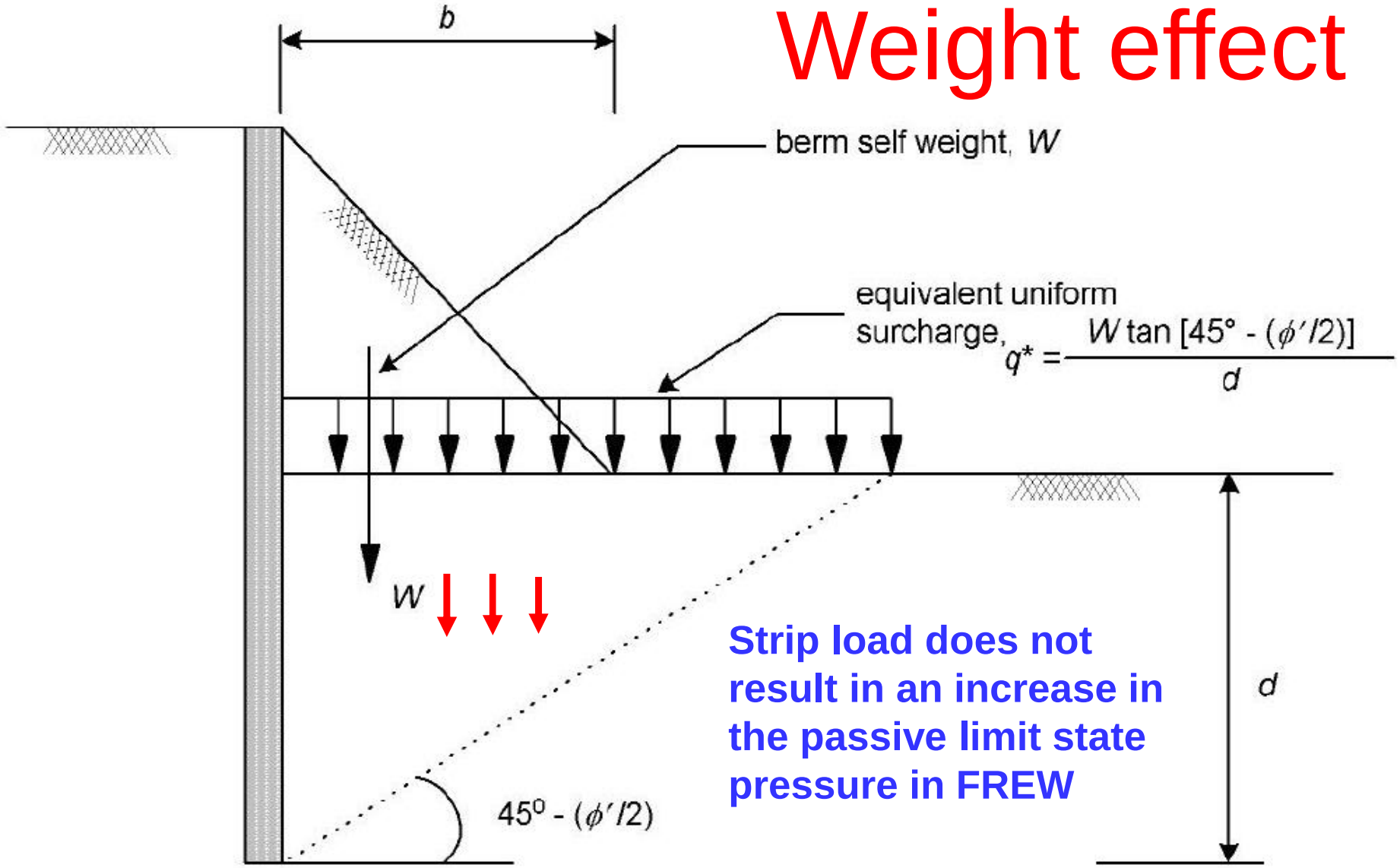


FIGURE 7.2 *Representation of a berm as an equivalent surcharge*

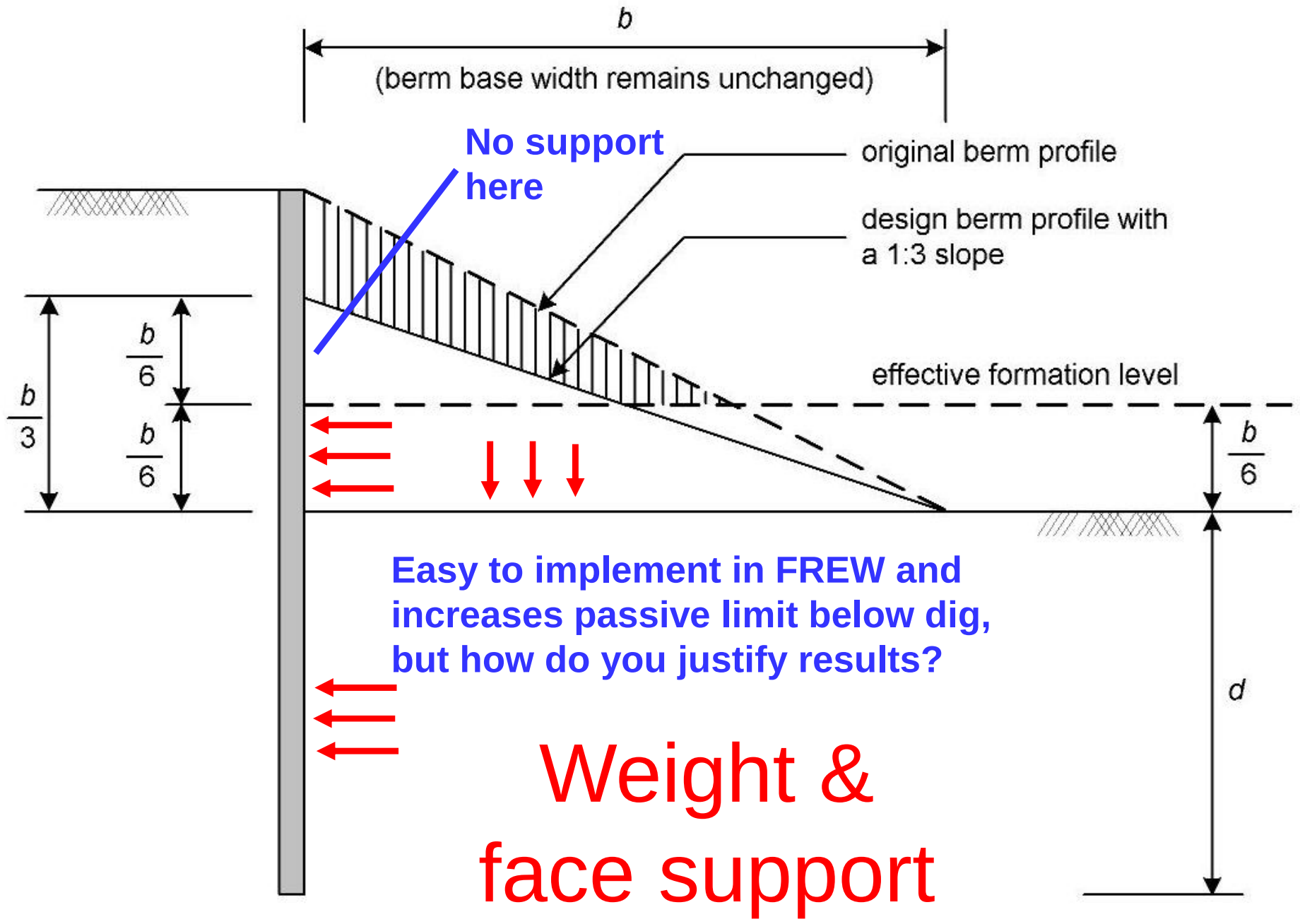
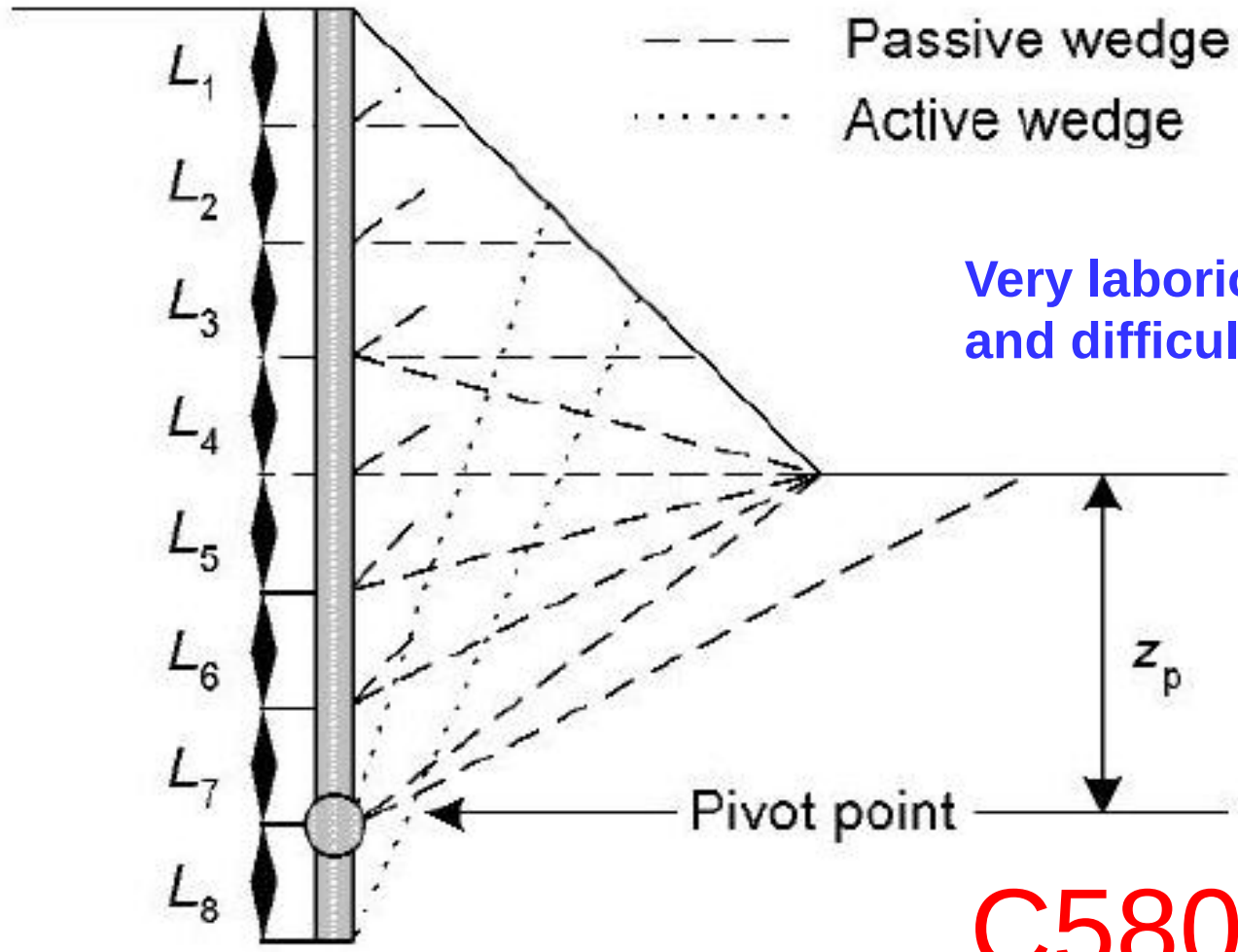


FIGURE 7.3 *Representation of a berm by means of a raised effective formation level (after Fleming et al, 1994)*



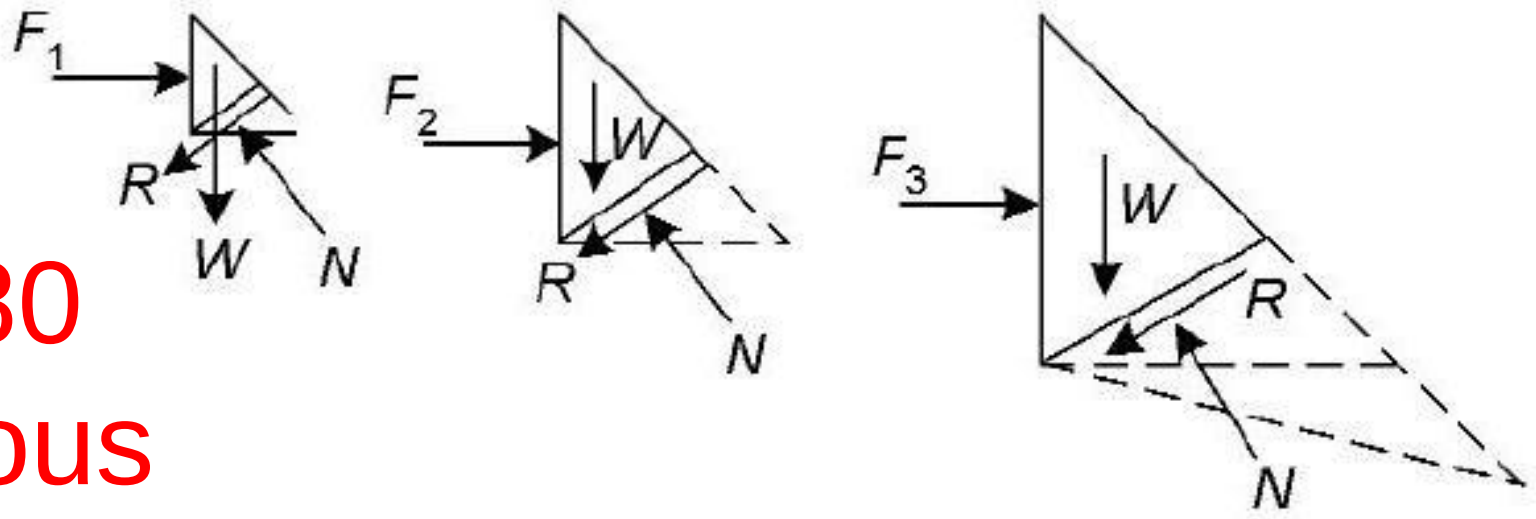
Very laborious and difficult

C580 rigorous method

Step 1

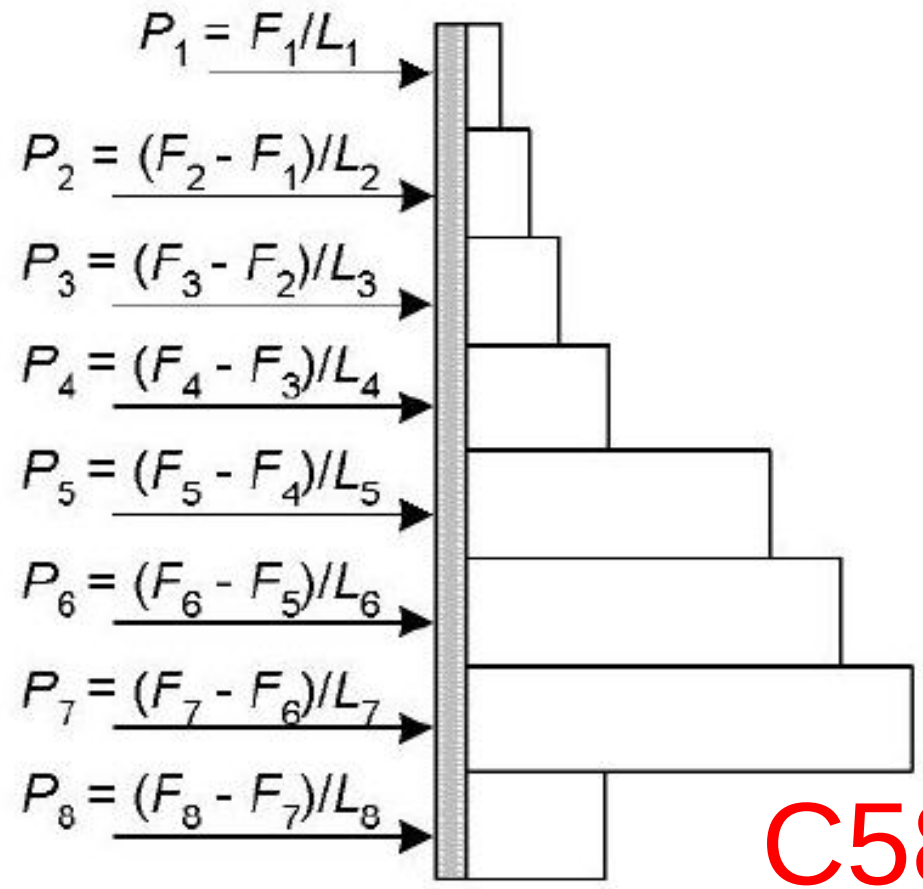
Sub-divide the problem with a series of node points

C580 rigorous method



Step 2

Undertake Coulomb wedge analyses at each of the node points for different failure surfaces. At and above the pivot point, determine the plane failure surface at each node point which requires the least force to fail, i.e. passive wedges. At and below the pivot, determine the plane failure surface at each node point corresponding to active conditions.



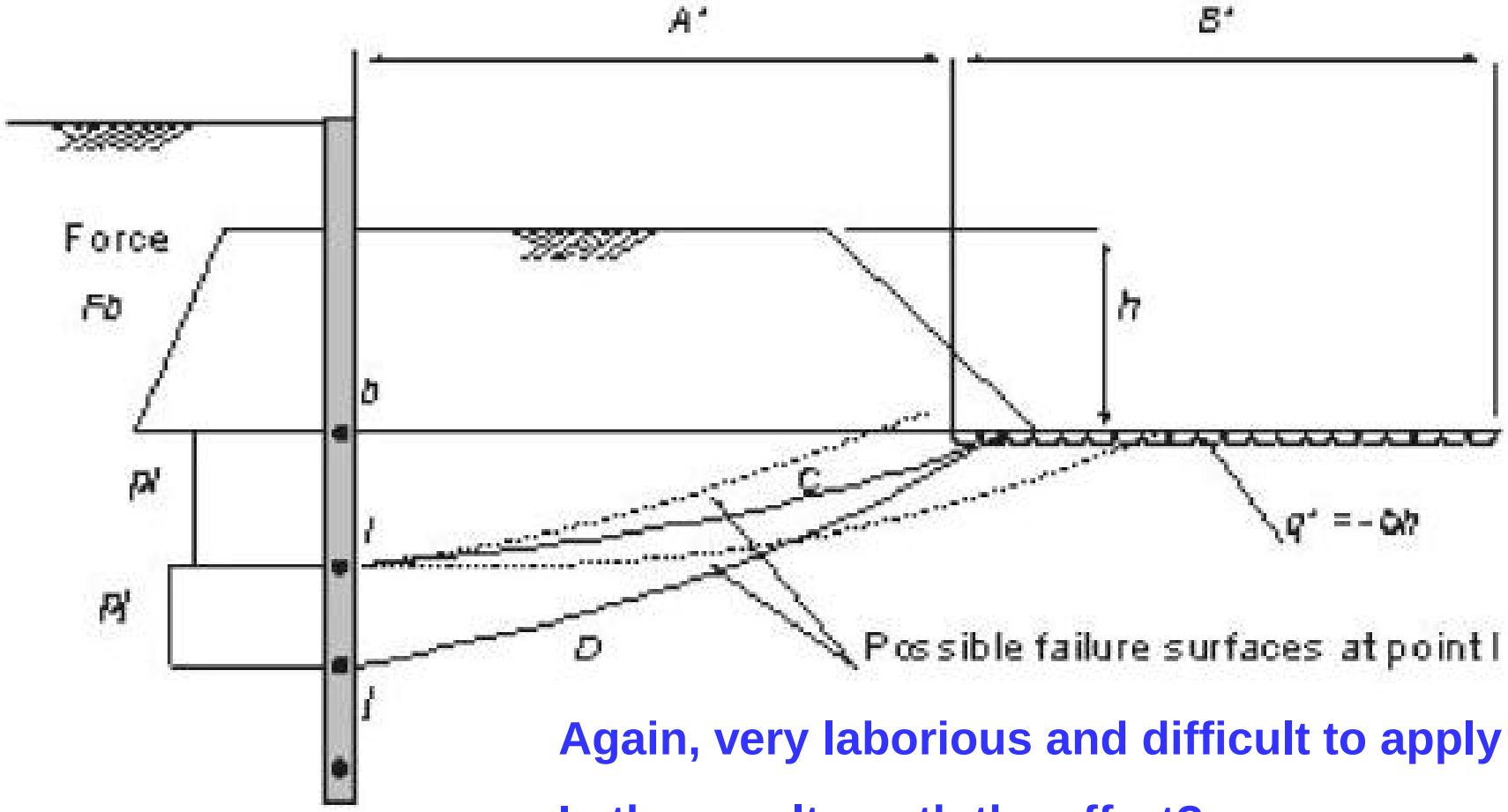
How do we convert computed values into FREW soil parameters?

Step 3

C580 rigorous method

An equivalent earth pressure can then be calculated from the knowledge of the resistance provided by each of the wedges and the distance between the node points.

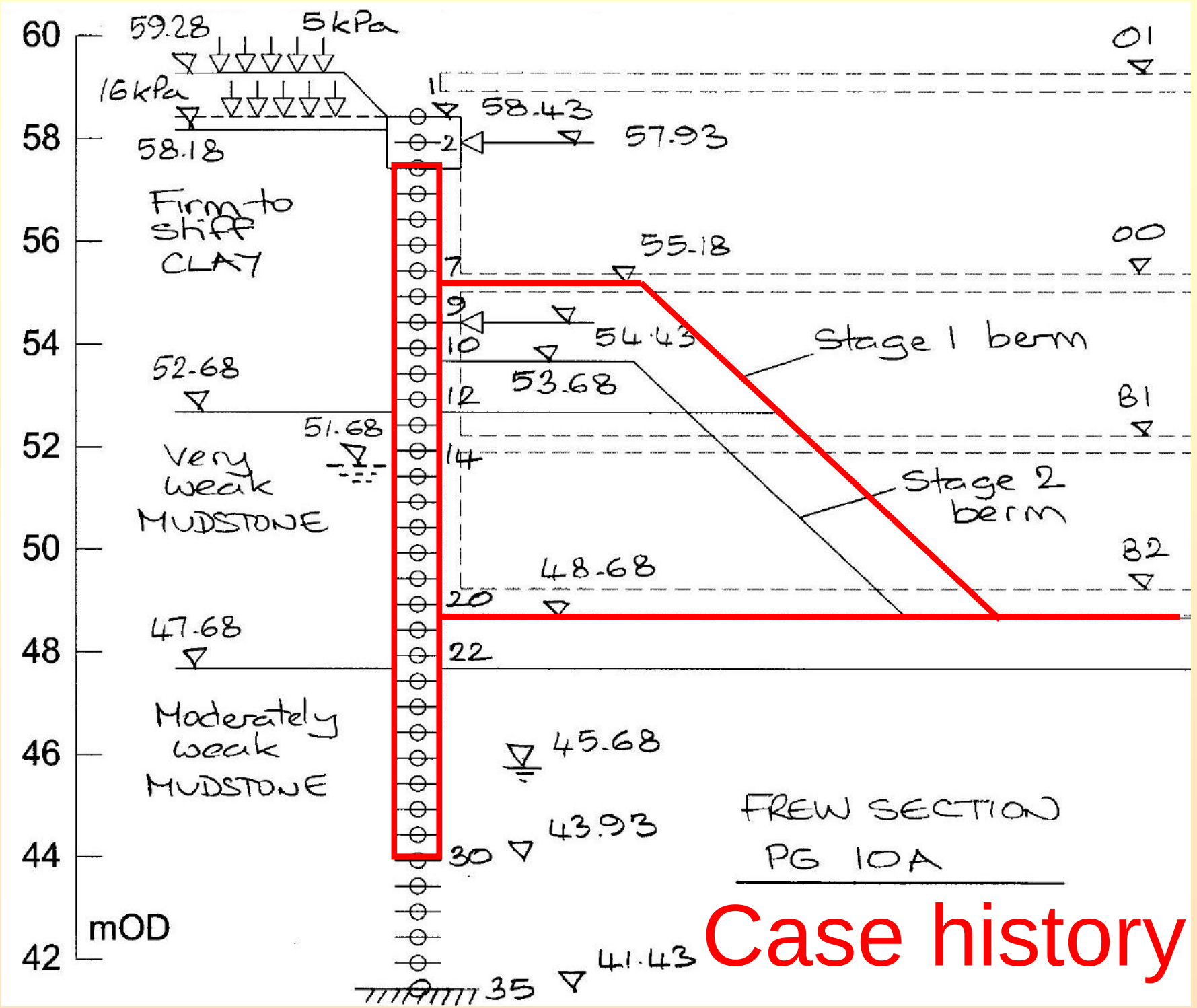
FREW manual method



Again, very laborious and difficult to apply

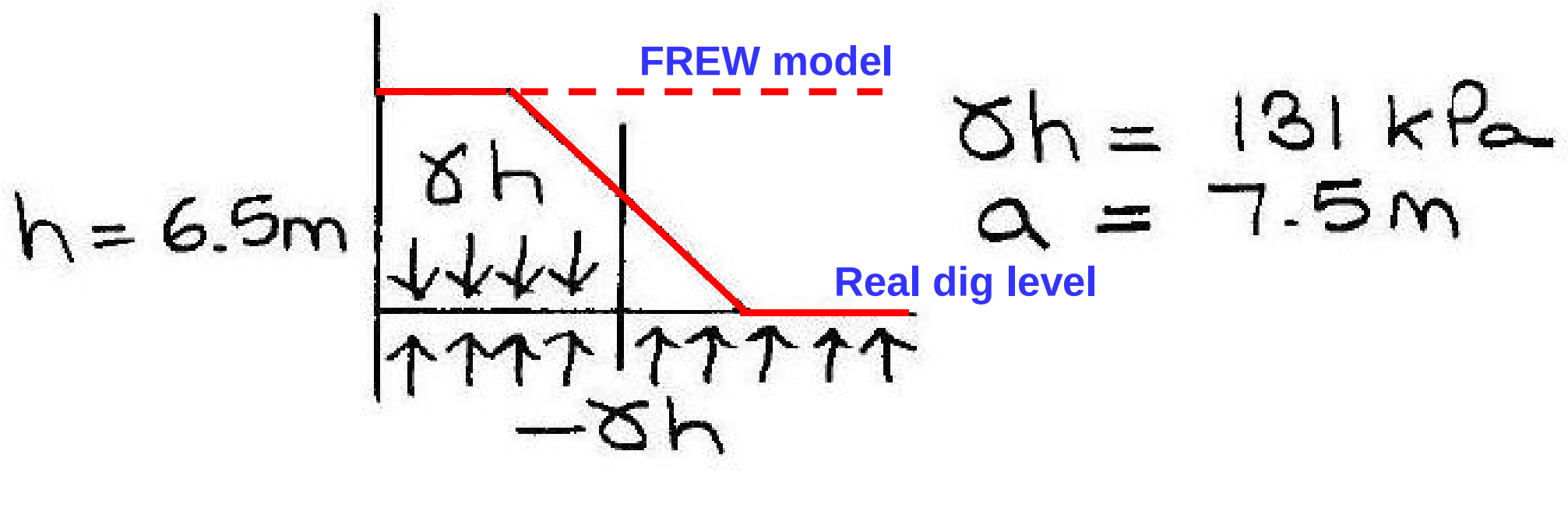
Is the result worth the effort?

Berm strip load surcharge and calculation of passive pressure beneath berm


60
58
56
54
52
50
48
46
44
42
mOD
59.28
5kPa
16kPa
58.18
Firm to stiff CLAY
52.68
51.68
Very weak MUDSTONE
47.68
Moderately weak MUDSTONE
45.68
43.93
41.43
1
2
7
9
10
12
14
20
22
30
35
58.43
57.93
55.18
54.43
53.68
48.68
01
00
B1
B2
Stage 1 berm
Stage 2 berm
FREW SECTION
PG 10A
Case history

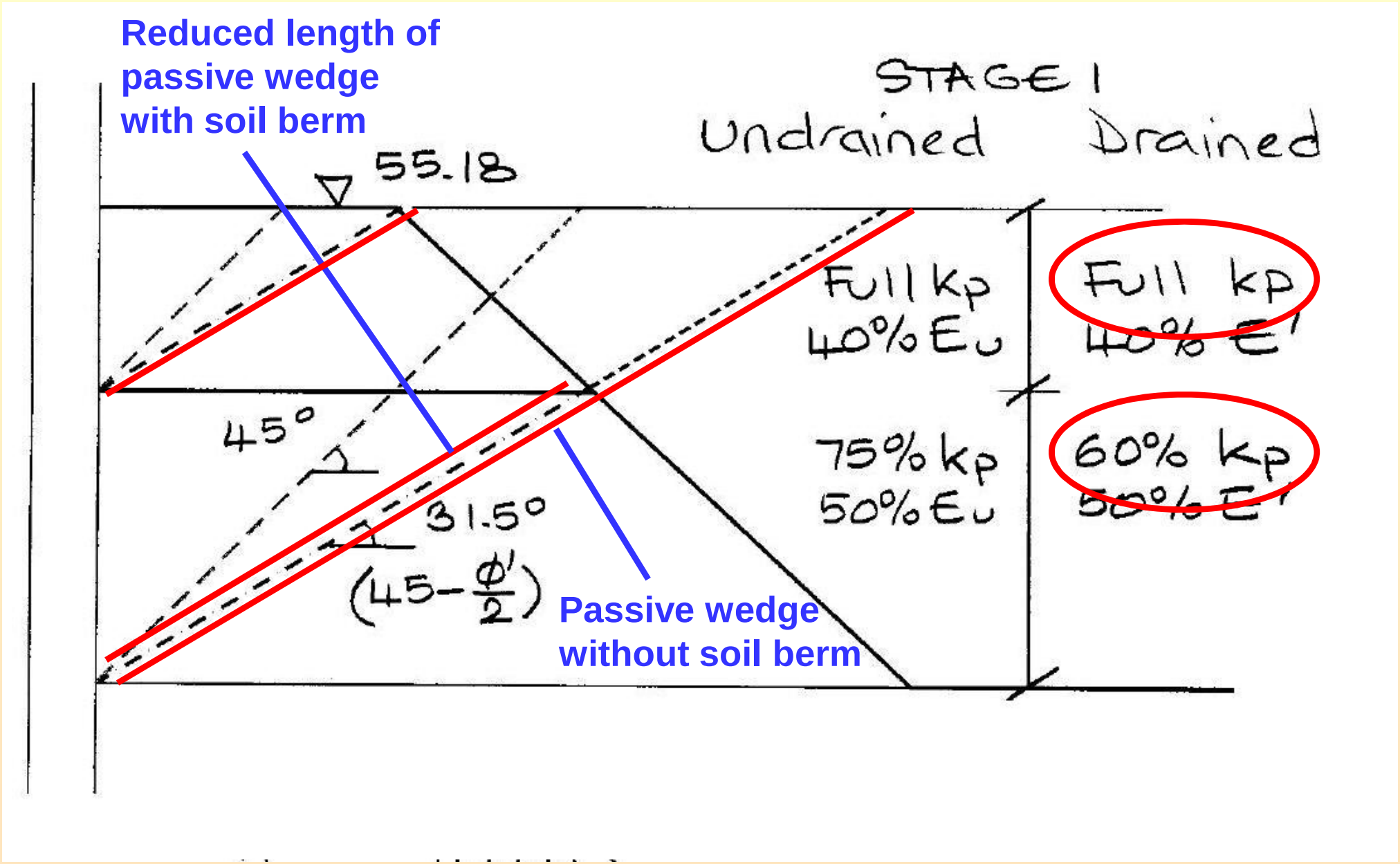
Old FREW manual

Positive strip load models
weight of soil berm

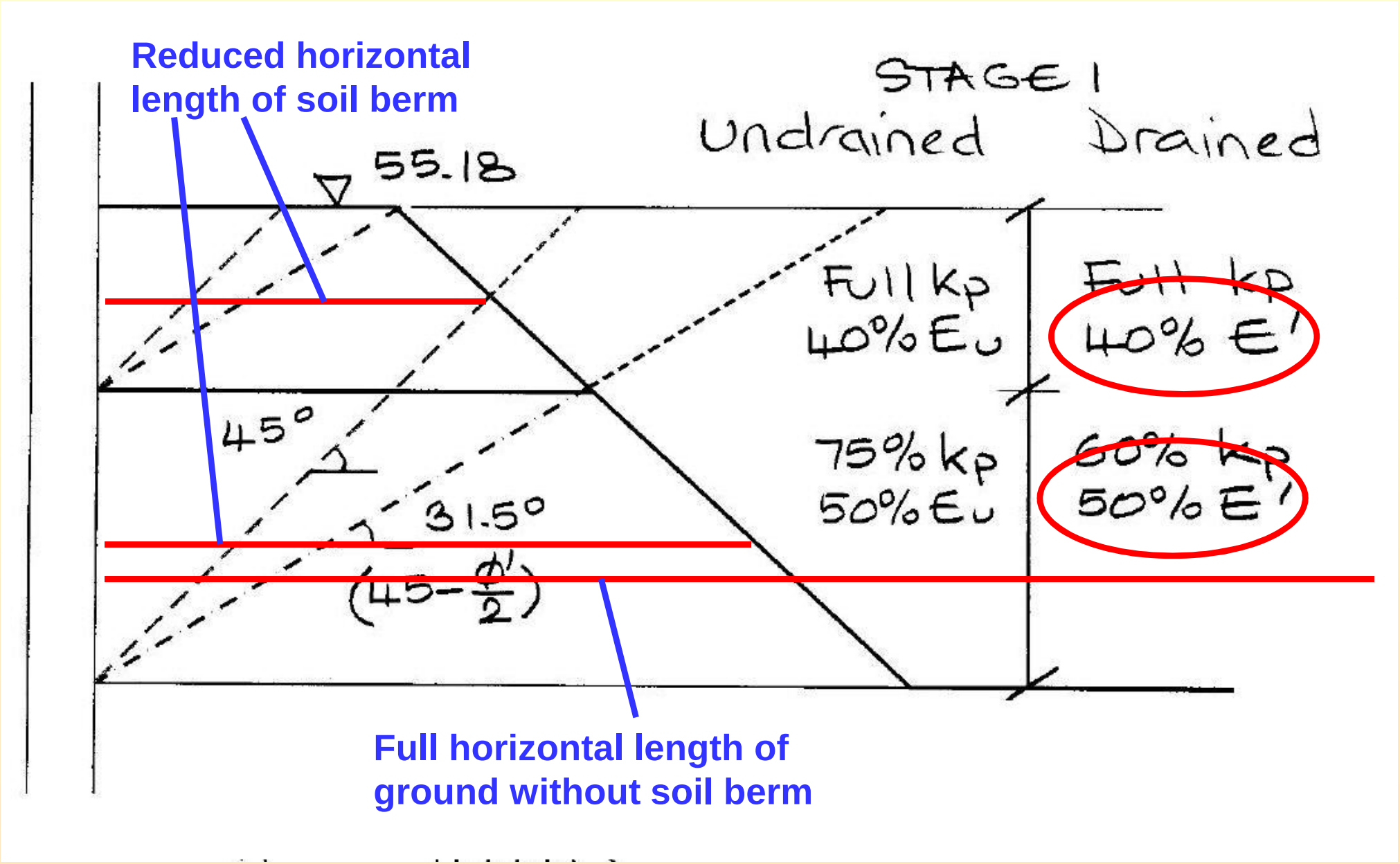


Negative udl models
effect of excavation

Assessing parameters Kp



Assessing parameters E



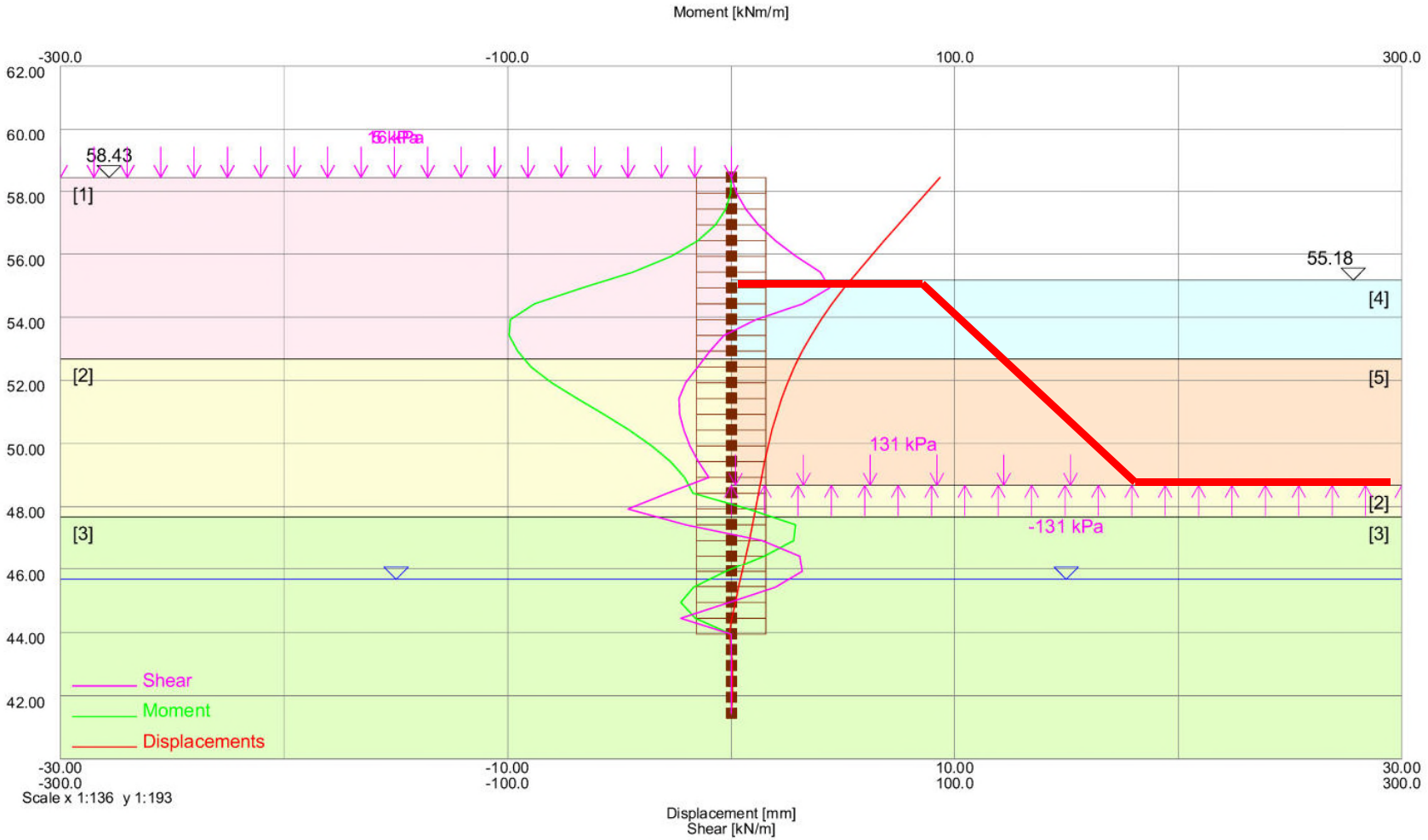
Westpile

Raison Foster Associates

PORTLAND GATE, LEEDS METROPOLITAN UNIV
900mm PILE WALL - SECTION PG 10A
Fully drained construction

Stage 1 with soil berm

Job No.	Sheet No.	Rev.
C07/032		
Drg. Ref.		
Made by CAR	Date 28-Apr-2007	Checked



STAGE 1 : Drained dig with soil berm 55.18mOD

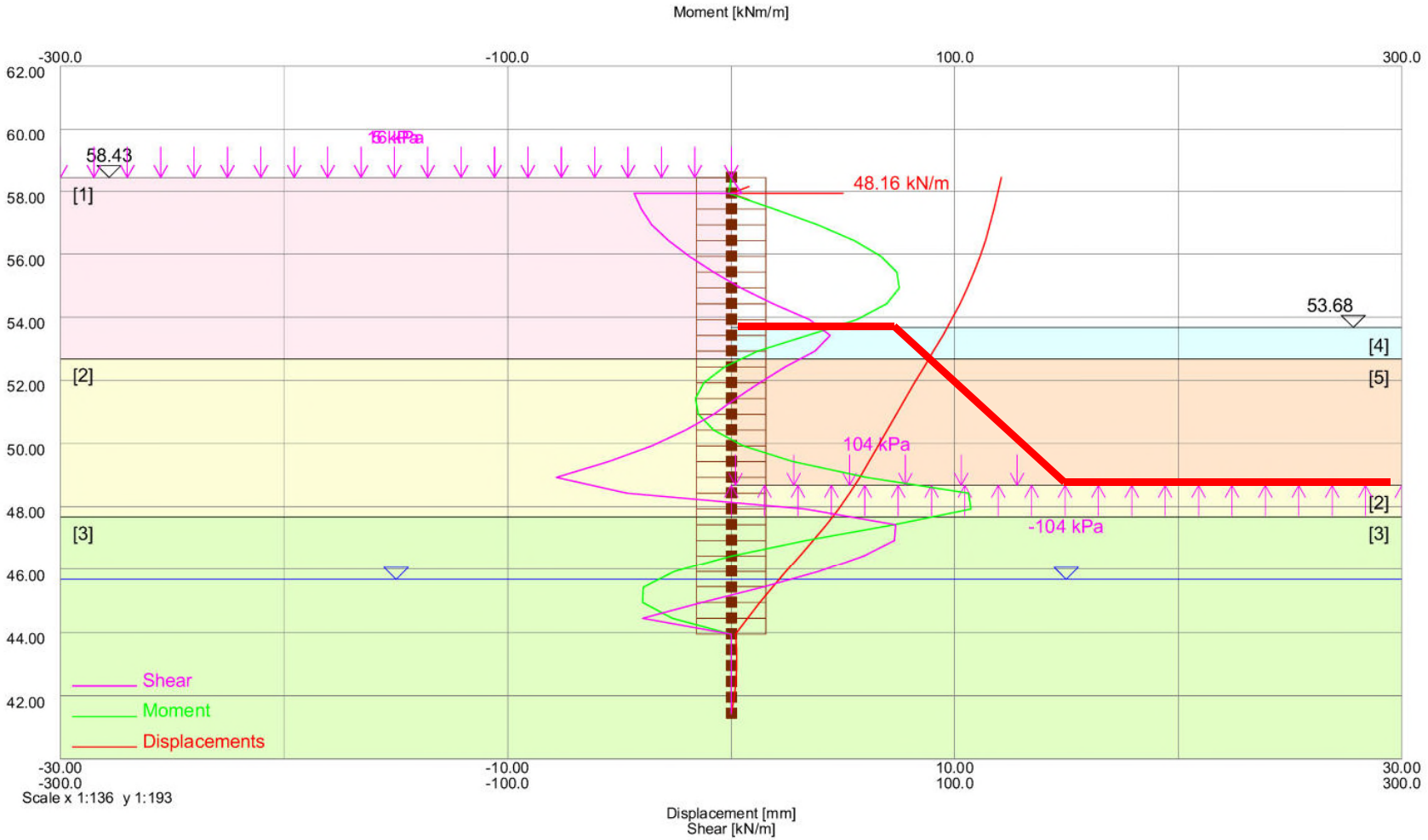
Westpile

Raison Foster Associates

PORTLAND GATE, LEEDS METROPOLITAN UNIV
900mm PILE WALL - SECTION PG 10A
Fully drained construction

Stage 2 with reduced soil berm

Job No.	Sheet No.	Rev.
C07/032		
Drg. Ref.		
Made by CAR	Date 28-Apr-2007	Checked



STAGE 2 : Upper prop & reduce berm to 54.43mOD

Westpile

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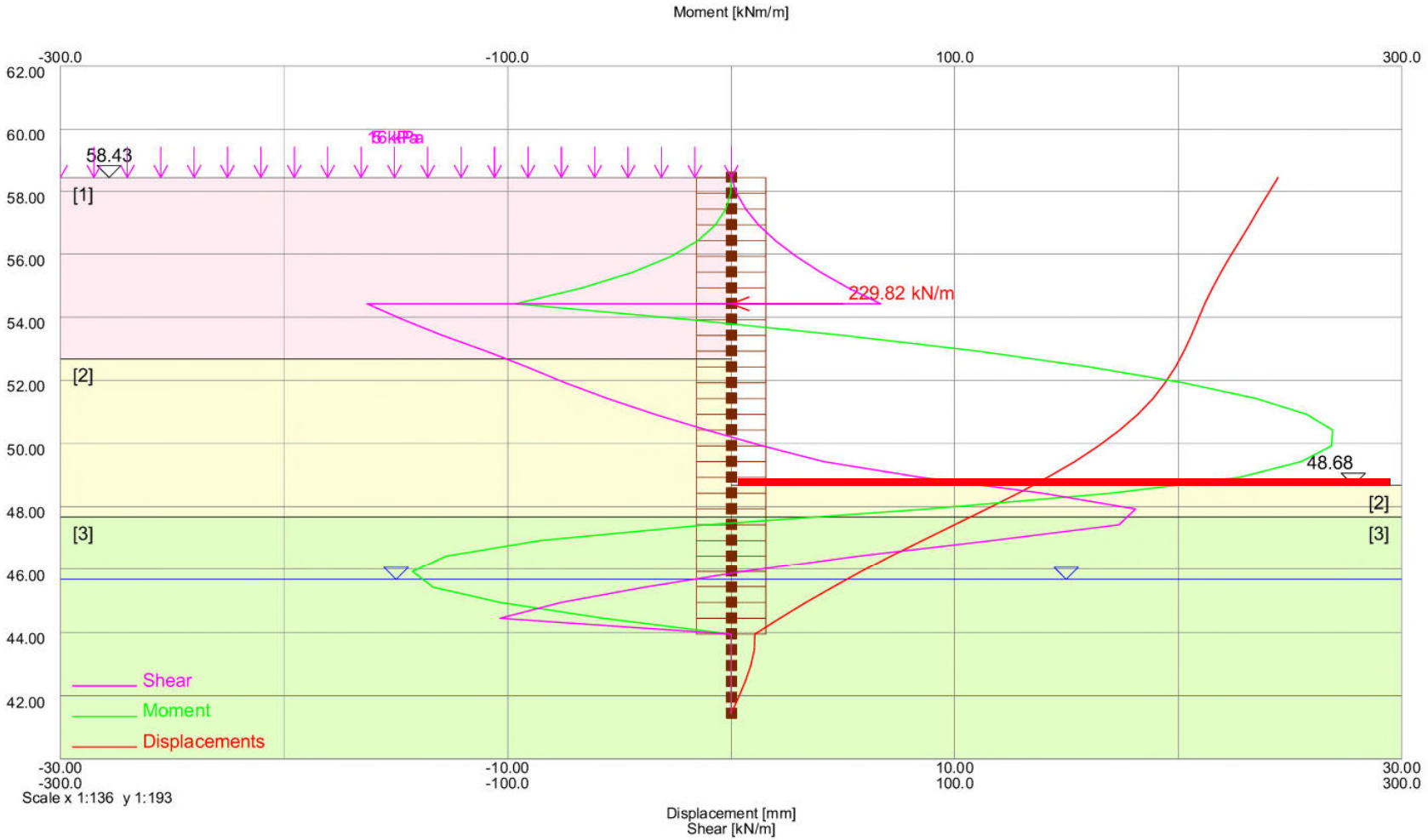
PORTLAND GATE, LEEDS METROPOLITAN UNIV
900mm PILE WALL - SECTION PG 10A
Fully drained construction

Stage 3 full dig

Job No.	Sheet No.	Rev.
C07/032		
Drg. Ref.		
Made by CAR	Date 28-Apr-2007	Checked



STAGE 3 : Lower prop & excavate to 48.68mOD

Westpile

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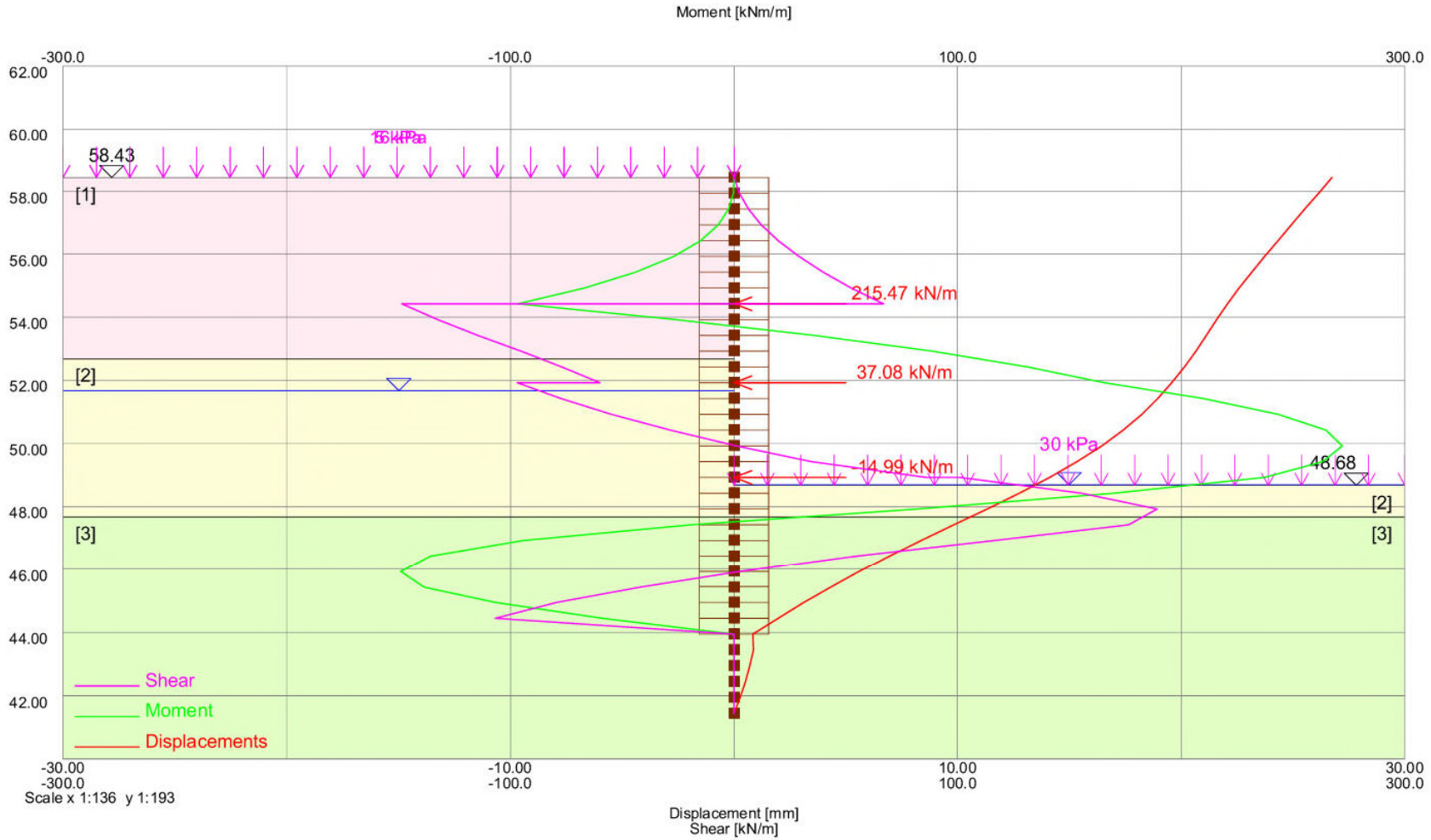
PORTLAND GATE, LEEDS METROPOLITAN UNIV
900mm PILE WALL - SECTION PG 10A
Fully drained construction

Stage 4 final

Job No.	Sheet No.	Rev.
C07/032		
Drg. Ref.		
Made by CAR	Date 28-Apr-2007	Checked



STAGE 4 : Cast slabs, remove prop & long term

Westpile

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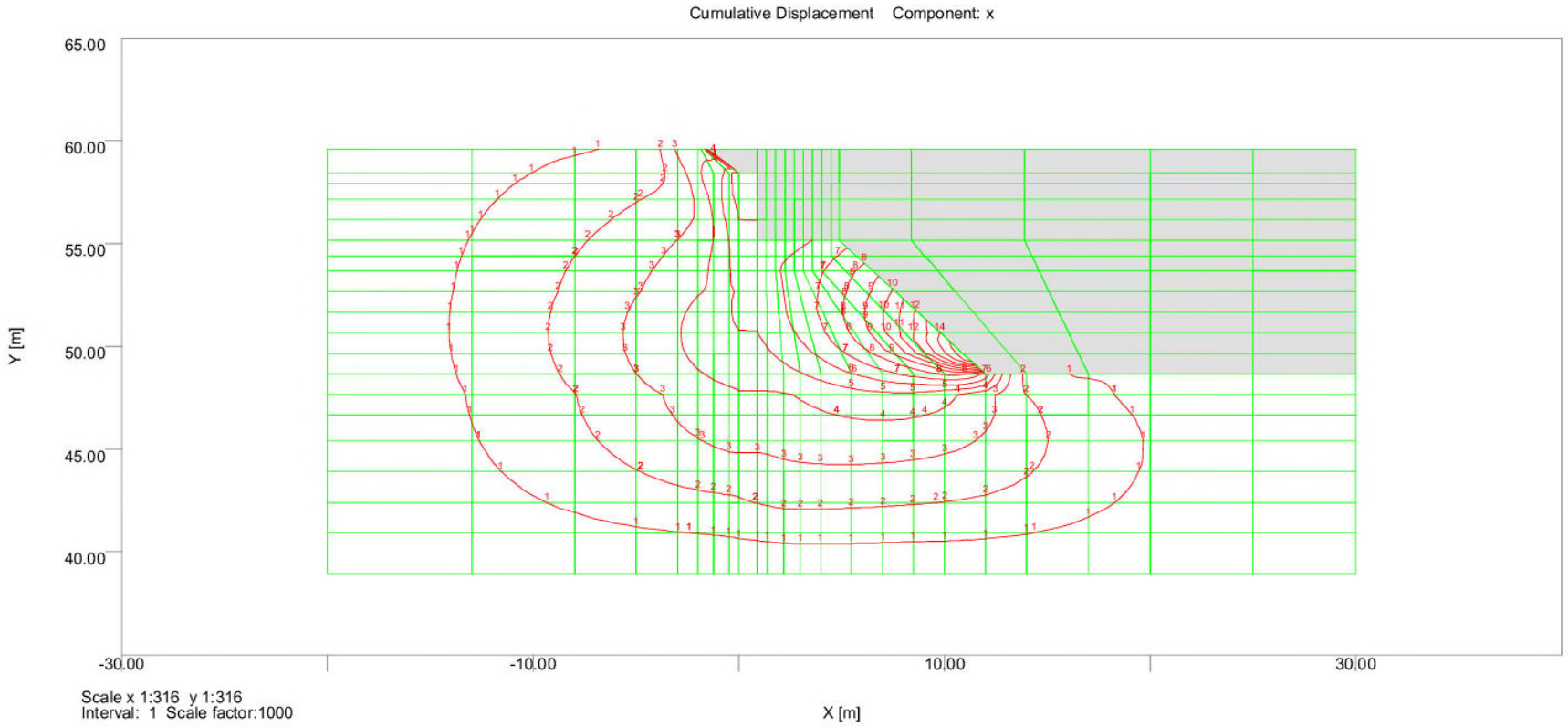
SAFE check for movements

Job No.	Sheet No.	Rev.
C07/032		

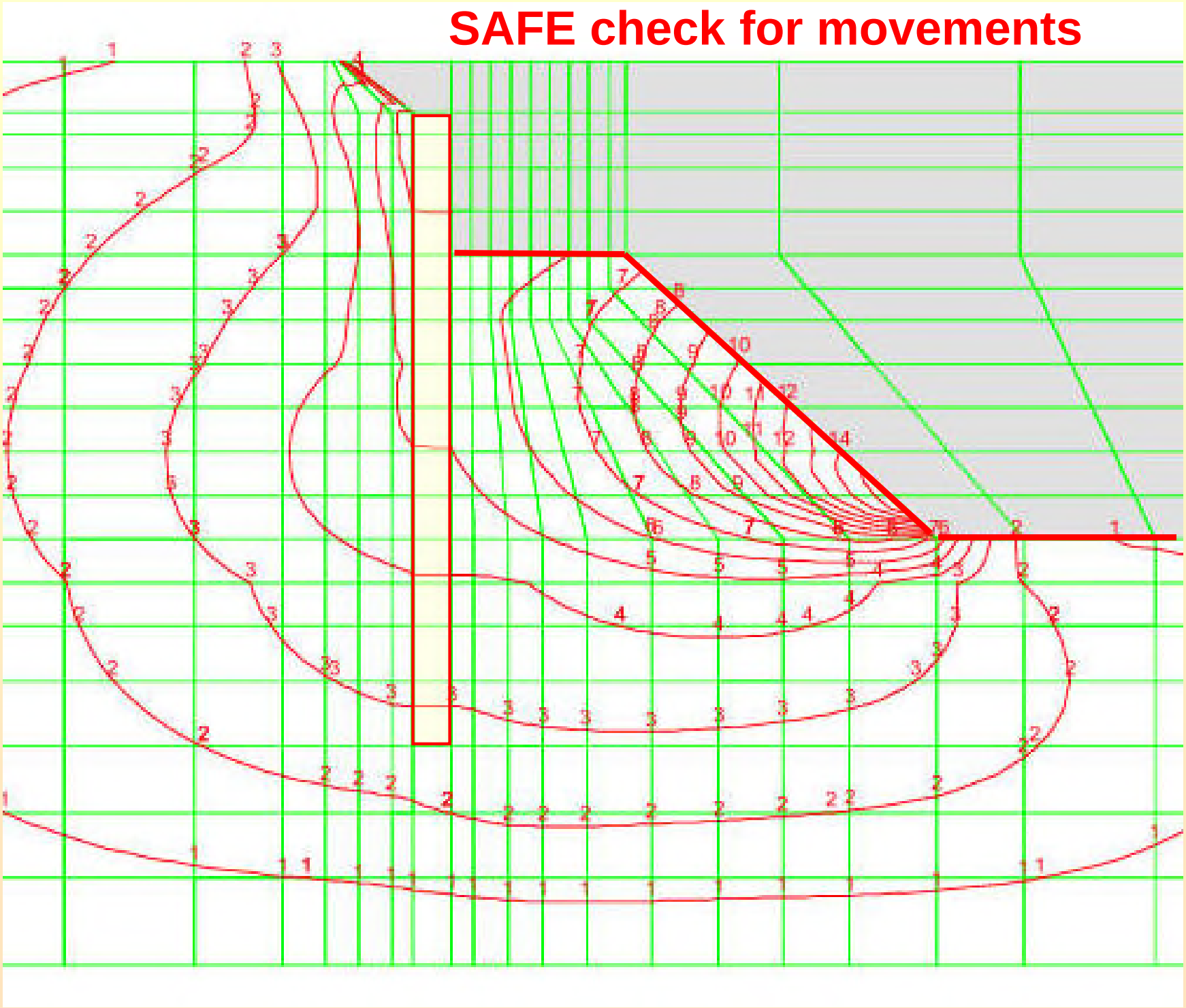
Drg. Ref.

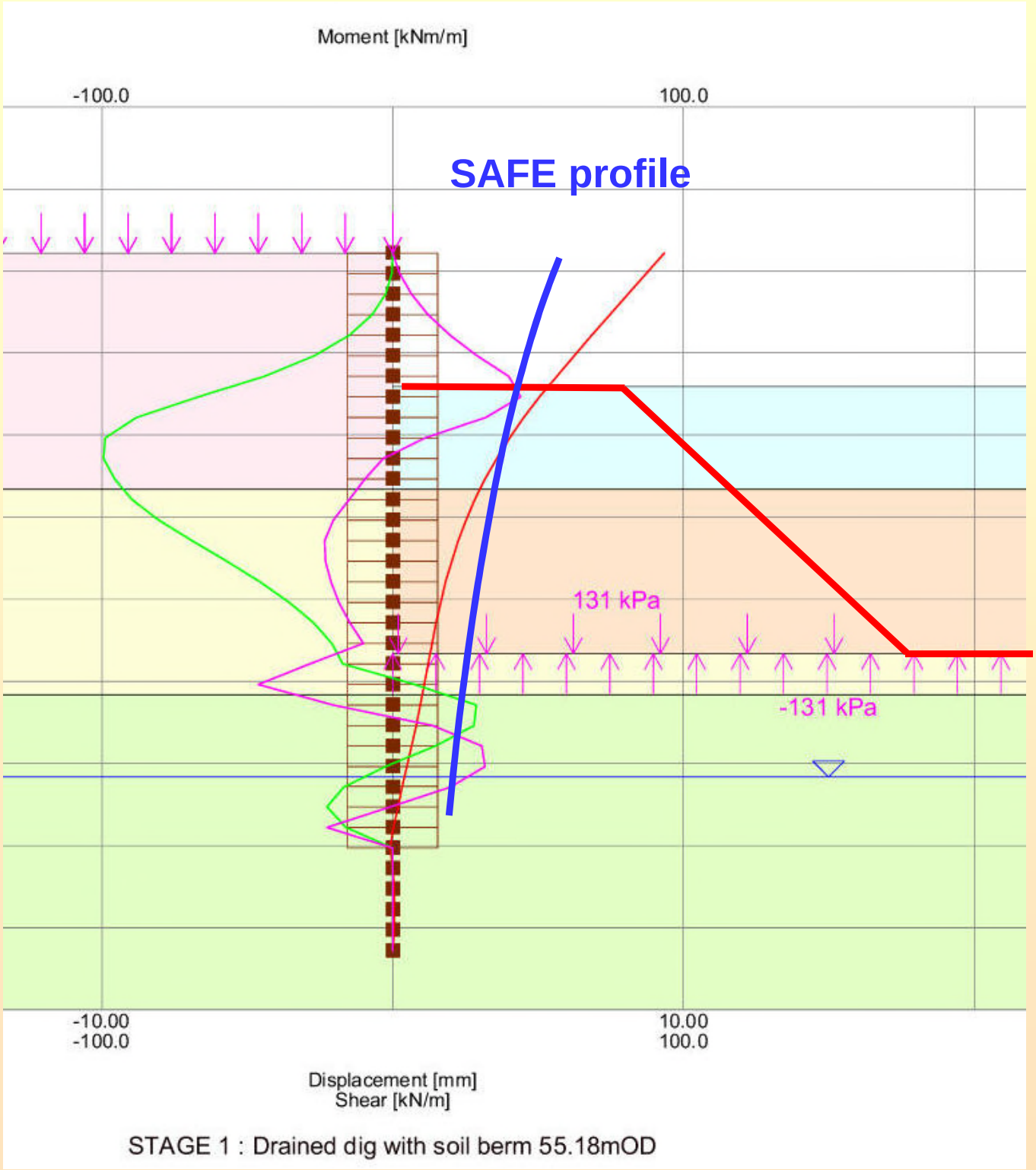
Made by	Date	Data	Checked
CAR	15-May-2007	10A_DX.sfd	

PORTLAND GATE, LEEDS METROPOLITAN UNIV
900mm PILE WALL - SECTION PG 10A
Fully drained excavation



SAFE check for movements




Moment [kNm/m]
-100.0
100.0
SAFE profile
131 kPa
-131 kPa
-10.00
-100.0
10.00
100.0
Displacement [mm]
Shear [kN/m]
STAGE 1 : Drained dig with soil berm 55.18mOD

FREW detail