Weight of structure :

Base slab = blinding
= [(2.99 x 3.86) - (0.72 x 0.51)]
x 0.35 x 24k/m³
= 93.86kN

Walls
= (1.895 + 0.51 + 0.72 + 2.60 + 2.615)
x 0.25 x 2.12 x 24kN/m³
= 106.09kN

Submerged Fill over "heel"
= (2.145 + 0.51 + 0.72 + 3.10 + 2.865)
x 0.25 x 2.12 x say 8kN/m³
= 15.50kN

Volume of structure
= [(2.99 x 3.86) - (0.72 x 0.51)] x 0.35]
+ [(3.86 - 0.5) x (2.99 - 0.25)
- (0.72 x 0.51)] x 2.12
= 22.65m³

Consider potential "flotation" :

Σ Weight = 93.86 + 106.09 + 15.50
= 215.45kN

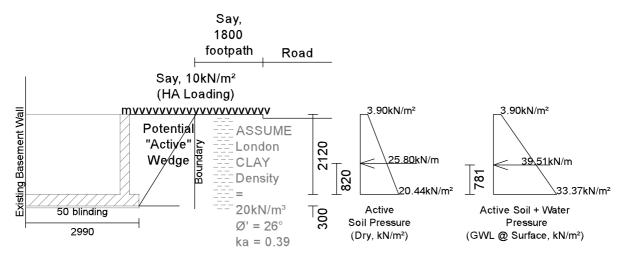Potential uplift = 22.65 x 10kN/m³
= 226.5kN

Now, displacement of "walls"
= 8.839m³/m depth
i.e. 8.839 x 10kN/m³ = 88.39kN/m depth

and
(226.5 - 215.45) / 88.39 = 0.125m

So, providing GWL does nor rise above
0.125m depth, structure is (just) stable
against flotation (ignoring potential soil
friction/adhesion between Fill and
surrounding soil.

All-in-all, flotation risk considered
acceptable.

Say,
1800
footpath   Road

Say, 10kN/m²
(HA Loading)

Existing Basement Wall

Potential
"Active"
Wedge

Boundary

ASSUME
London
CLAY
Density
=
20kN/m³
$\emptyset' = 26°$
ka = 0.39

2120

820

300

50 blinding

2990

3.90kN/m²

25.80kN/m

20.44kN/m²

Active
Soil Pressure
(Dry, kN/m²)

3.90kN/m²

39.51kN/m

781

33.37kN/m²

Active Soil + Water
Pressure
(GWL @ Surface, kN/m²)

Consider BM @ base of wall :

By Inspection,
BM(max) = 39.51 x 0.781
= 30.86kNm/m

Hence,
BM(max) ULS = 30.86 x 1.5
= 46.29kNm/m

Now, ASSUME
fcu = 40mm
Cover = 40mm (MIN)
Bar $\emptyset$ = 12mm
h = 250mm
So, d = 250 - 40 -12/2 = 204mm

M/bd^2 = 46.29 x 1000 / 1 / 204² = 1.11

Hence,
100As/bd = 0.28

Thus, As = 0.28 x 1000 x 204 / 100
= 571mm²/m

T12's @ 175 c/cs = 646mm²/m
i.e. 100As/bd = 0.317

Now, V(ULS) = (3.9 + 33.37) / 2 x 2.12 x 1.5 =
59.26kN/m

Hence,
V/bd = v = 59.26 x 1000 / 1000 / 204
= 0.29N/mm²

By Inspection, v < vcζs = ~ 0.71N/mm²

Consider BM @
base of wall / base slab interface :

BM(max) ULS = 30.86 x 1.5
= 46.29kNm/m

Now, ASSUME
fcu = 40mm
Cover = 40mm (MIN)
Bar $\emptyset$ = 10mm
h = 300mm
So, d = 300 - 40 -10/2 = 255mm

M/bd^2 = 46.29 x 1000 / 1 / 255² = 0.712

Hence,
100As/bd = 0.17

Thus, As = 0.17 x 1000 x 255 / 100
= 434mm²/m

T10's @ 175 c/cs = 449mm²/m

For consistency with wall reinforcement

Use T12's @ 175c/cs

By Inspection, Shear stresses OK!