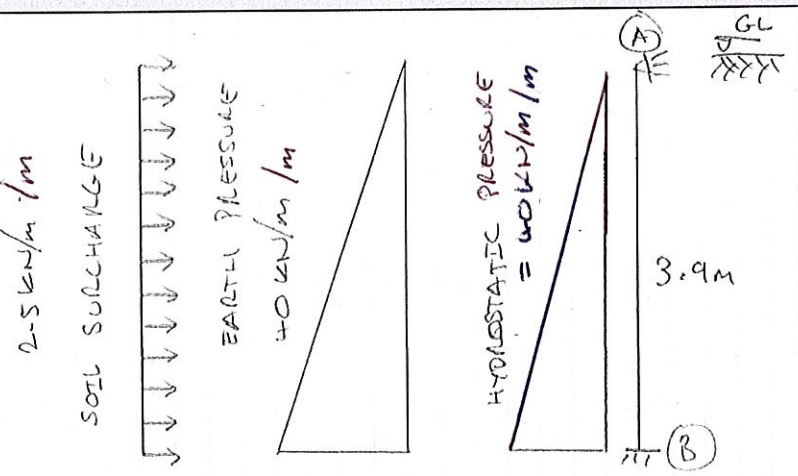
JOB TITLE:	JOB NUMBER / FILE:	CALCULATION NUMBER:		Form
ST. PAULS MEWS	162176	1/3		
CALCULATION:	CALCULATION BY:	DATE:	CHECKED BY:	
LINER WALL	NS	01/04/16		

CALCULATIONS:

REF



LOADING.

EARTH PRESSURE = 0.5 Pah

$K_p = \frac{1+\sin 37}{1-\sin 37} = 4 \quad K_a = \frac{1}{4} = 0.25$

$P_a = 20 \times 0.25 \times 4 = 20 KN/m^2$

EARTH PRESSURE = 0.5 x 20 x 4m = 40 KN/m

SOIL SURCHARGE = $P_{sc} = K_a V_{sc}$

$V_{sc} = 10 KN/m^2$

VOLUME 2: HIGHWAY STRUCTURE DESIGN.

$V_{sc} = 10 KN/m^2$ - CONSERVATIVE DUE TO SOIL SURCHARGE FROM ST. PAULS MEWS ACCESS

$K_a = 0.25$

$P_{sc} = 10 KN/m^2 \times 0.25 = 2.5 KN/m^2$

$2.5 KN/m^2 \times 1m = 2.5 KN/m /m$

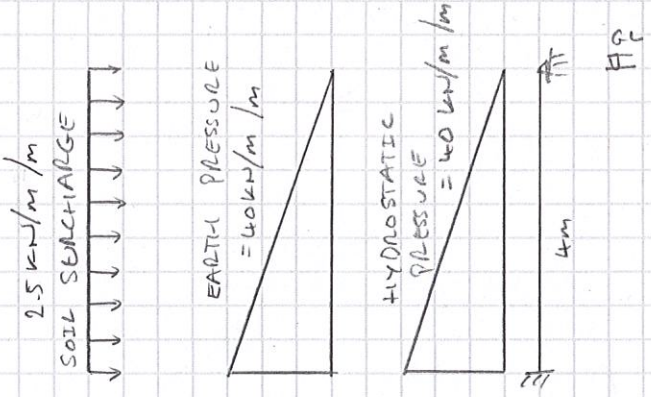
WATER PRESSURE IS ASSUMED TO BE ACTED AT GROUND LEVEL.

OUTPUT

JOB TITLE:	JOB NUMBER / FILE:	CALCULATION NUMBER:		Form
ST PAULS MEWS	142176	2/3		
CALCULATION:	CALCULATION BY:	DATE:	CHECKED BY:	
LINER WALL	NS	14/04/16		

CALCULATIONS:

REF



MAX MOMENT = 117.5 kNm

$b = 1000$

$d = 200 - 10 - 40 = 150\,mm$

$$K = \frac{117.5 \times 10^6}{40 \times 1000 \times 150^2} = 0.1305 < 0.156$$

$$z = 150\left[0.5 + \sqrt{0.125 - 0.1305/0.9}\right] = 123.6\,mm \leq 0.95d = 142.5\,mm$$

$$A_s = \frac{117.5 \times 10^6}{0.87 \times 500 \times 123.6} = 2185.4\ mm^2/m$$

USE H20 @ 100 c/c A_s PROVIDED = 3142 mm^2/m

ALONG OUTER FACE BOTTOM 1/3

OUTPUT

JOB TITLE:	JOB NUMBER / FILE:	CALCULATION NUMBER:		Form
ST. PAULS MEWS	142176	3 /3		
CALCULATION:	CALCULATION BY:	DATE:	CHECKED BY:	
LINER WALL	NS	14/04/16		

CALCULATIONS:

REF

MOMENT MID SPAN = 52 KNm

$b = 1000$

$d = 200 - 8 - 40 = 152\ mm$

$$K = \frac{52 \times 10^6}{40 \times 1000 \times 152^2} = 0.056$$

$$Z = 152\left[0.5 + \sqrt{0.25 - 0.056/0.9}\right] = 141.86_{mm} < 0.95d = 144.4mm$$

$$A_{S\,REQUIRED} = \frac{52 \times 10^6}{0.87 \times 500 \times 141.86} = 842.6\ mm^2/m$$

USE H16 ø @ 100c/c $A_{S\,PROVIDED} = 2011\ mm^2/m$

OUTER FACE 2/3 AND INNER FACE

OUTPUT

ANALYSIS

Tedds calculation version 1.0.13

Results

Node deflections

Load case: Self Weight

Node	Deflection		Rotation	Co-ordinate system
	X (mm)	Z (mm)	(°)	
1	0	0	0.01734	
2	0	0	0	

Load case: Permanent

Node	Deflection		Rotation	Co-ordinate system
	X (mm)	Z (mm)	(°)	
1	0	0	0.10257	
2	0	0	0	

Total base reactions

Load case/combination	Force	
	FX (kN)	FZ (kN)
Self Weight	0	18.4
Permanent	0	146.3

Element end forces

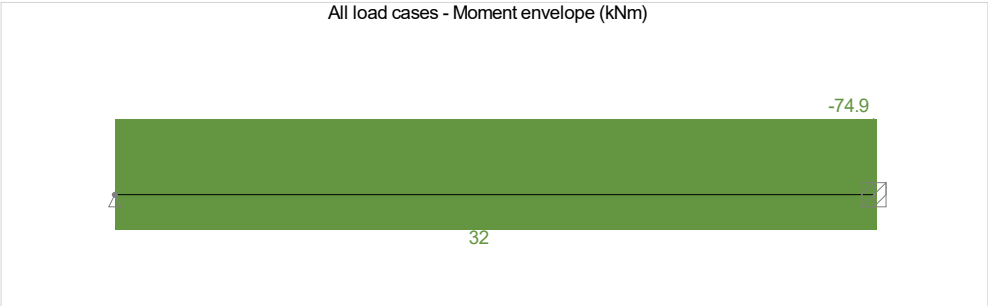
Load case: Self Weight

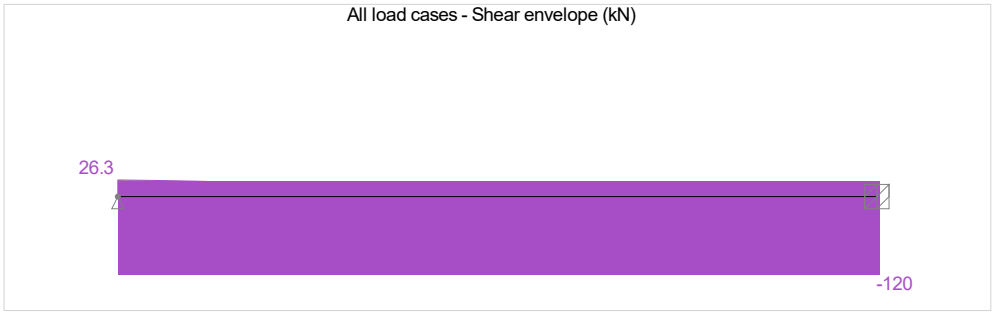
Element	Length (m)	Nodes Start/End	Axial force (kN)	Shear force (kN)	Moment (kNm)
1	3.9	1	0	-6.9	0
		2	0	-11.5	-8.9

Load case: Permanent

Element	Length (m)	Nodes Start/End	Axial force (kN)	Shear force (kN)	Moment (kNm)
1	3.9	1	0	-26.3	0
		2	0	-120	-74.9

Forces

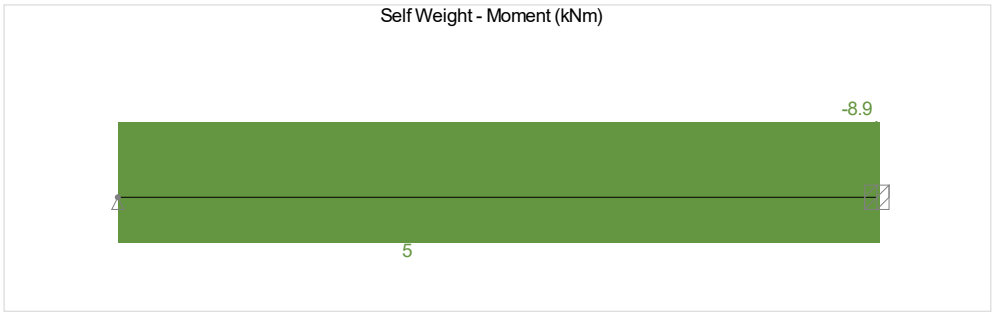


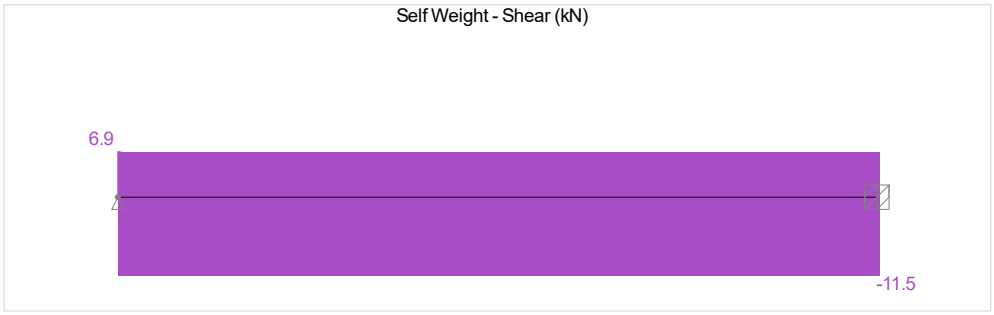


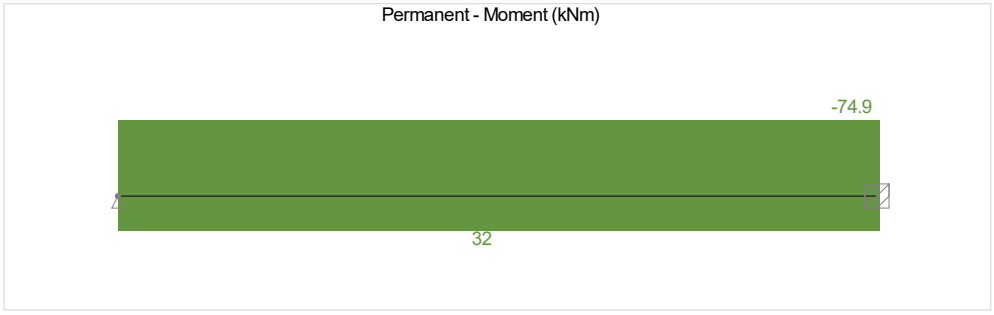
Element results

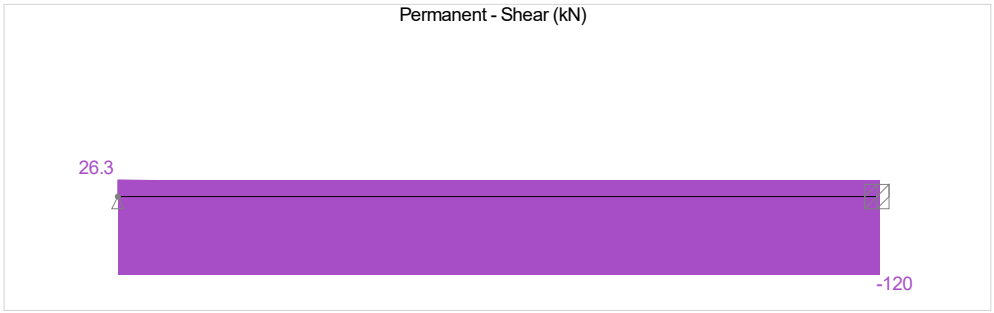
Envelope - All load cases

Element	Shear force		Moment			
	Pos (m)	Max abs (kN)	Pos (m)	Max (kNm)	Pos (m)	Min (kNm)
1	3.9	-120	1.816	32	3.9	-74.9








Permanent - Shear (kN)
26.3
-120