Evaluation and comparison of classical earth pressure theories for cohesion-less (φ) backfill using professional softwares

¹Pinki Sharma,

¹Assistant Professor, ¹M S Patel Department of Civil Engineering, ¹Charotar University of Science and Technology-CHARUSAT, Changa-Anand, India

Abstract: Earth pressure related problems are one of the important topics of research in the area of geotechnical engineering to solve problems like retaining walls, ground anchors etc. Very often in the construction of building or bridges it is necessary to retain earth in a relatively vertical position whenever embankments are involved in the construction. The retaining material on the higher level exerts a force on retaining wall may causes its overturning, sliding, bearing etc. A retaining wall is massive structure so it is necessary to design and check stability of retaining wall analytically as well by software as per IS:456-2000. The calculation of wall dimension of particular earth retaining problem require several runs of analysis and thus computer application is desirable. The present research deals with evaluation of cantilever retaining wall by comparison of Excel worksheet & softwares Geo-5, RetainPro & RETWALL for single layered homogeneous φ soil backfill with and without ground water table. The MS-Excel Spreadsheet is to be prepared to carry out stability analysis. The analysis of Retaining wall can be done by using various static earth pressure theories such as Rankine, Coulomb's. Factory of safety against sliding, overturning and base pressure are satisfied without considering shear key & with provision of shear key.

Index Terms— Cantilever retaining wall, Professional softwares, Single layered homogeneous φ soil backfill

I. INTRODUCTION

Retaining walls are structures that are used to retain earth (or any other material) in a position where the ground level changes abruptly. They can be of many types such as gravity wall, cantilever wall, counterfort wall and buttress wall among others. The lateral force due to earth pressure is the main force that acts on the retaining wall which has the tendency to bend, slide and overturn it. The present research focuses on stability analysis of the cantilever type of wall for overturning, sliding and bearing. The main considerations are the external stability of the section with the help of codal provision i.e. IS: 456:2000 Satisfying the external stability criteria is primarily based on the section giving the required factor of safety. The ratio of resisting forces to the disturbing forces is the factor of safety, and this factor of safety should always be greater and equal to 1.55 for the structure to be safe against failure with respect to that particular criteria. Different modes of failure have different factors of safety. In this study stability check for a cantilever wall is obtained using a computer program that calculates various sections satisfying the stability criteria, according to the height and properties of earth that the wall is required to support.

Retaining walls are structures designed to restrain soil to unnatural slopes. They are used to bound soils between two different elevations often in areas of terrain possessing undesirable slopes or in areas where the landscape needs to be shaped severely and engineered for more specific purposes like hillside farming or roadway overpasses. It is a structure designed and constructed to resist the lateral pressure of soil when there is a desired change in ground elevation that exceeds the angle of repose of the soil.

In general, two classical methods of analysis have been proposed for evaluation of retaining wall.

1.Rankine earth pressure theory:

Rankine earth pressure is a state of stress evaluation of soil behind a retaining structure that traditionally assumes a vertical wall and no fiction between the soil/wall interfaces. The orientation of the resultant earth pressure is parallel to the back slope surface.

2. Coulomb's earth pressure theory:

In Coulomb theory Coulomb failure plane varies as a function of wall geometry and wall friction between soil/wall interfaces is taken into account.

Due to the rapid development of increasingly powerful computers, the solution of rather complex multi-phase problems encountered in widely different fields of engineering tasks is feasible nowadays. Nowadays, the numbers of software in the market is growing. Software is developed to help users in making their task easier. We can find different software for different business processes. In Geotechnical Engineering, there are few softwares which can be bought in the market. For example Geo-5, RetainPro, RETWALL, iCadRetaining wall Software and many more but in this study we are going to carryout evaluation of cantilever retaining wall by comparison by softwares Geo-5, RetainPro & RETWALL.

1775

II. OBJECTIVE OF THE STUDY

The aim of this study is to carry out evaluation and design of cantilever retaining wall by using EXCEL worksheet and professional softwares like Geo-5, Retrain pro and RETWALL .We are going to implement model to carry out stability analysis of retaining wall by considering static earth pressure.The factor of safety calculated with professional softwares alike Geo-5, RetainPro and RETWALL is validated or compared with traditional methods. A comparative parametric study is carried out between softwares/worksheet & traditional methods.

III. SCOPE OF WORK

•

Professional softwares like Geo-5, RetainPro and RETWALL & Excel Sheet evaluate the cantilever retaining wall of

- Homogeneous soil profile, with water table and without water table.
- With surcharge and without surcharge.
- With sloping and, without sloping backfill.

Also we will carry out evaluation and design of cantilever retaining wall using softwares Geo-5, RetainPro, RETWALL and Excel worksheet and will obtain results in terms of FOS against overturning (FOS OTM), FOS against sliding(FOS SLD), max and min base pressures. It gives detailed description of results based on Rankine, Coulomb's, Mazindrani, Muller-Breslau, Caquot-Kérisel, Absi earth pressure theories and also help in identifying limitations of softwares. Hence we can validate the results of worksheet and softwares Geo5, RetainPro and RETWALL.

IV. FLOW CHART



General

Professional softwares like Geo-5, RetainPro and RETWALL & Excel Sheet evaluate the cantilever retaining wall of different parameters that considered are as follows :

- $q = Uniform surcharge in kN/m^2$
- $\hat{\beta}$ = Backfill inclination with horizontal

Dw = GWT depth in meter

C, ϕ , C- ϕ single or double layered backfill

Table 1 Various Cases Considered

	Description						
Modal no.	q=Surcharge (kN/m ²)	β (degree)	GWT Dw (m)	Backfill			
Validation modal HJ Shah	17	0	0	φ Single layer backfill			
Modal 1	5	10	4.0	φ Single layer backfill			
Modal 2	10	15	0.0	φ Single layer backfill			

Validity of Softwares

It is necessary to validate the computer software by checking the output result of the computer software. Hence, it is important to validate the Geo-5, RetainPro, RETWALL software before we can really apply to solving problem. To validate the Geo-5, RETAIN – PRO, RETWALL, an example from known sources with an answer is used to analyze with the Geo-5, RetainPro, RETWALL. The importance of the process to validate the software is :

- To confirm and to know that the process of inputting data is correct.
- To ensure and be able to correctly interpret the computer data and understand enough the procedure of using the software.
- To satisfy that software will give the correct answer.

[1] Validation Problem

To validate the Geo-5, RetainPro, RETWALL software an example solved of a slope problem that had been chosen. The example problem selected is the Example 5.2 from the book "REINFORCED CONCRETE VOL – I" by Dr. H J SHAH. Below are the lists of the given data from the example:

4.00 m
1.00 m
17 kN/m ²
0 degree
0.0 m
φ S <mark>ingle la</mark> yer backfil <mark>l</mark>
17 kN/m ³
0 kN/m^2
30 deg
20 degree
160 kN/m ²
10 kN/m ³
0.55
M20
Fe415

T.11.2D

Table 2 Data of Validation Model



Fig 1 Geometry of Retaining Wall (Validation Model)

	Table 5 Results of Vandation Woder Osing Different Softwares											
Methods	Ka	wt of soil	wt of conc.	РА	PH	PV	MR	МО	FOS OTM	FOS SLD	Pmax	Key Ht m
Geo-5 (Mazindrani)	0.333	139.23	77.62	126.26	126.26	0	499.68	191.38	2.61	1.6	99.31	0.75
Geo-5 (Coulomb)	0.297 0.297 0.297	139.23	77.62	113.25	100.25	50.4	646.07	150.22	4.3	2.71	93.08	0.75
Geo-5 (Muller Breslau)	0.297 0.297 0.297	139.23	77.62	113.25	100.25	50.4	646.07	150.22	4.3	2.71	93.08	0.75
Geo-5 (Caquot- Kérisel)	0.307 0.309 0.309	139.23	77.62	116.17	103.79	52.15	651.1	154.76	4.21	2.58	93.63	0.75
Geo-5 (Absi)	0.306 0.3 0.3	139.23	77.62	114.79	102.51	51.64	649.9	154.42	4.21	2.62	93.47	0.75
Classical (Rankine)	0.333	139.23	77.62	99.18	99.18	0	499.58	189.95	2.664	1.74	126.6	0.75

© 2017 IJCRT | Volume 5, Issue 4 December 2017 | ISSN: 2320-2882

Classical (coulomb)	0.297	139.23	77.62	83.03	83.03	0	596.38	158.15	3.77	1.84	107.9	0.75
Excel worksheet (Rankine)	0.333	139.23	70.13	99.18	99.18	0	490.68	188.89	2.6	1.55	123.1	0
Excel worksheet (coulomb)	0.297	139.23	70.13	83.03	83.03	0	587.38	158.15	3.71	1.55	86.22	0
RetainPro (Rankine)	0.333	146.27	77.62	99.03	99.03	0	471.61	188.53	2.5	1.61	114.6	0.75
RetainPro (Coulomb)	0.297	146.27	77.62	86.5	86.5	0	471.61	164.67	2.86	1.85	100.6	0.75
RETWALL	-	-	-	99.18	99.18	0	494.14	188.9	2.61	1.67	125	0.75



Fig 2 Graphical Representation of FOS OTM results by diff. Software (Val Model)



Fig 3 Graphical Representation of FOS SLD results by diff. Software (Val Model)



Fig V Graphical Representation of Max Base Pressure results by diff. Software (Val Model)

Model 1

Table 4Data ofModel 1

Wall Height, Hc	4.80 m
Depth below GL, Df	1.00 m
Surcharge, q	5 kN/m ²
Backfill inclination, β	10 degree
GWT depth, Dw	0.0 m
Backfill	φ Single layer backfill
Unit weight, γ	20 kN/m ³
Cohesion, C	0 kN/m ²
Angle of internal friction, ϕ	30 deg
Angle of wall friction, δ	20 degree
SBC of soil	200 kN/m ²
Water density	10 kN/m ³
Coefficient of friction	0.5
Grade of Concrete	M20
Grade of Steel	Fe415







Fig 6 Verification of Model 1 by Mazindrani Theory







Fig 8 Dimensioning of Model 1 by Mazindrani Theory

Input	data								
Project	t							\sim	
Date :	14-09-2015								
(input fo	or current task) ards					\leq		7
Concre	te structures :	IS 456						\sim	
Wall ar	nalysis						10		
Active e Passive Earthqu Shape Base ke Allowat Verifica	earth pressure e earth pressure uake analysis of earth wedge ey : ole eccentricity ation methodole	calculation re calculatio e :	: Mazindrani (F n : Mazindrani (F Mononobe-O Consider alw The base key 0.333 Safety factors	Rankin) Rankin) kabe ays vertical / is considere s (ASD)	d as incl		ng bottom		
				Safety facto	rs				
Safety	factor for over	turning :	Perma	nent design	situatio	n =	1	55 [_]	
Safety	factor for slidi	ng resistanc	e:		SF	. =	1	.55 [-]	
Safety	factor for bear	ing capacity	<i>i</i> :	6	SF	ь =	1	.55 [-]	
Materia	al of structure)			\mathcal{O}				
Unit we Analysi	eight $\gamma = 25.00$ is of concrete s	kN/m ³ structures ca	arried out accordi	ing to the star	dard IS	456.			
Concre	te M 20			-1/					
Compre	essive strengt	n	$f_{ck} = 20$	00 MPa	>				
Tensile	strength		f _{cr} = 3.	13 MPa					
Longitu	idinal steel : Fe	e 415	10						
Tensile	strength		$f_{yk} = 41$	5.00 MPa					
Terrain	profile				\mathcal{O}				
Terrain	behind constr	uction has t	the slope 1: 5.67	(slope angle	is 10.00) °).			
Water i	nfluence			\sim					
GWT b	ehind the strue	cture lies at	a depth of 4.001	m					
Uplift in	foot bottom			the second se	10 C				
-		due to differ	ent pressures is	not consider	éd.				
Basic s	soil paramete	due to differ rs	ent pressures is	not consider	éd.				
Basic s	soil paramete	rs Name	ent pressures is	not considere Pattern	éd. ^{Φef} [°]	c _{ef} [kPa]	γ [kN/m ³]	^γ su [kN/m³]	δ [°]
Basic s	b1	rs Name	ent pressures is	Pattern	éd.	C _{ef} [kPa] 0.00	γ [kN/m³] 20.00	^γ su [kN/m³] 10.00	δ [°] 20.00
Basic s	b1	Name	ent pressures is	Pattern	Φef [°] 30.00 alysis.	C _{ef} [kPa] 0.00	γ [kN/m³] 20.00	γ _{su} [kN/m³] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa	b1 s are considere	Name	ent pressures is	Pattern pressure ana	Φef [°] 30.00 alysis.	C _{ef} [kPa] 0.00	γ [kN/m³] 20.00	γsu [kN/m³] 10.00	δ [°] 20.00
Basic s No. 1 All soils Soil pa b1	b1 are considered	Name	ent pressures is	Pattern pressure and	φ _{ef} [°] 30.00 alysis.	C _{ef} [kPa] 0.00	γ [kN/m³] 20.00	Ysu [kN/m³] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we	b1 b1 are considered arameters eight :	Name	ionless for at rest	Pattern pressure ana /m ³	Φef [°] 30.00 alysis.	C _{ef} [kPa] 0.00	γ [kN/m3] 20.00	Ysu [kN/m³] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle of	b1 b1 arameters eight : -state : of internal fricti	Name	ent pressures is ionless for at rest $\gamma = 20.00 \text{ kN.}$ effective $\gamma = 30.00^{\circ}$	Pattern Pattern pressure and /m ³	Pef [°] 30.00 alysis.	C _{ef} [kPa] 0.00	γ [kN/m3] 20.00	Ysu [kN/m3] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Cohesi	b1 b1 a are considere arameters eight : -state : of internal friction	Name	ent pressures is ionless for at rest $\gamma = 20.00 \text{ kN}$ effective $\varphi_{ef} = 30.00 \circ$ $\zeta_{ef} = 0.00 \text{ kP}$	Pattern • • • • • • • • • • • • • • • • • • •	Pef [°] 30.00	C _{ef} [kPa] 0.00	γ [kN/m³] 20.00	Ysu [kN/m3] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Cohesi Angle o	b1 b1 s are considere arameters eight : -state : of internal friction ion of soil : of friction struct	Name Name add as cohes ion :	ent pressures is ionless for at rest q = 20.00 kN effective $\varphi_{ef} = 30.00 \circ$ $\zeta_{ef} = 0.00 \text{ kPa}$ $\delta = 20.00 \circ$	Pattern pressure and /m ³ a	Pef [°] 30.00 alysis.	C _{ef} [kPa] 0.00	γ [kN/m³] 20.00	Ysu [kN/m3] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Cohesi Angle o Soil :	b1 s are considere arameters eight : -state : of internal fricti ion of soil : of friction struct	Name Name add as cohes ion :	ent pressures is ionless for at rest effective $\varphi_{ef} = 30.00 \circ$ $C_{ef} = 0.00 \text{ kPa}$ $\delta = 20.00 \circ$ cohesionless	Pattern Pattern pressure ana /m3 a	Pef ["] 30.00	Cef [kPa] 0.00	γ [kN/m³] 20.00	Ysu [kN/m3] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Cohesi Angle o Soil : Satural	b1 s are considered arameters eight : -state : of internal friction ion of soil : of friction struct ted unit weight	Name Name add as cohes ion :	ent pressures is ionless for at rest effective $\varphi_{ef} = 30.00 \circ$ $C_{ef} = 0.00 \text{ kPa}$ $\delta = 20.00 \circ$ cohesionless $\gamma_{sat} = 20.00 \text{ kN}$	Pattern Pattern pressure and /m ³ a /m ³	Pef ["] 30.00 alysis.	Cef [kPa] 0.00	γ [kN/m³] 20.00	Ysu [kN/m3] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Cohesi Angle o Soil : Satural Geolog	b1 b1 s are considered arameters eight : -state : of internal friction of friction struct ted unit weight gical profile ar	Aue to differ rs Name ed as cohesi ion : soil : t: nd assigned	ent pressures is ionless for at rest $\varphi_{ef} = 20.00 \text{ kN}$ effective $\varphi_{ef} = 30.00 \circ$ $C_{ef} = 0.00 \text{ kP}$ $\delta = 20.00 \circ$ cohesionless $\varphi_{sat} = 20.00 \text{ kN}$ d soils	Pattern Pattern pressure and /m ³ a	Pef [°] 30.00 alysis.	C _{of} [kPa] 0.00	γ [kN/m3] 20.00	Ysu [kN/m3] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Soil : Satural Geolog No.	b1 b1 s are considered arameters eight : -state : of internal friction of soil : of friction struct ted unit weight jical profile ar	Assigned	ent pressures is ionless for at rest effective $\varphi_{ef} = 30.00 \circ$ $c_{ef} = 0.00 \text{ kPa}$ $\delta = 20.00 \circ$ cohesionless $\gamma_{sat} = 20.00 \text{ kN}$ d soils	Pattern Pattern pressure and /m ³ a /m ³	Pef ["] 30.00 alysis.	Cef [kPa] 0.00	γ [kN/m3] 20.00	Ysu [kN/m3] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Cohesi Angle o Soil : Satural Geolog	b1 b1 s are considered arameters eight : -state : of internal friction ion of soil : of friction struct ted unit weight ical profile an Layer [m]	ed as cohes ion : soil : t: Assigned	ent pressures is ionless for at rest $\gamma = 20.00$ kN. effective $\varphi_{ef} = 30.00$ ° Cef = 0.00 kP. $\delta = 20.00$ ° cohesionless $\gamma_{sat} = 20.00$ kN. d soils soil	Pattern Pattern pressure and /m ³ a /m ³	Pef ["] 30.00 alysis.	Cef [kPa] 0.00	γ [kN/m³] 20.00	Ysu [kN/m3] 10.00	δ [°] 0 20.00 Pattern
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Soil : Satural Geolog No. 1	b1 b1 s are considered arameters eight : -state : of internal friction friction struct ted unit weight fical profile an Layer [m]	Name Name Assigned b1	ent pressures is ionless for at rest q = 20.00 kN effective $p_{ef} = 30.00 \circ$ $c_{ef} = 0.00 \text{ kPa}$ $\delta = 20.00 \circ$ cohesionless $\gamma_{sat} = 20.00 \text{ kN}$ d soils	Pattern Pattern pressure and /m ³ a /m ³	Pef ["] 30.00 alysis.	Cef [kPa] 0.00	γ [kN/m3] 20.00	Ysu [kN/m3] 10.00	δ [°] 20.00 Pattern
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Soil : Satural Geolog No. 1 Input s	b1 b1 s are considered arameters eight : -state : of internal friction of soil : of friction struct ted unit weight jical profile ar Layer [m] -	Name Name add as cohes add as c	ent pressures is ionless for at rest effective $\varphi_{eff} = 30.00 \circ$ $C_{eff} = 0.00 \text{ kP}_{3}$ $\delta = 20.00 \circ$ cohesionless $\gamma_{sat} = 20.00 \text{ kN}_{3}$ d soils soil	Pattern Pattern pressure ana /m3 a /m3	Pef ["] 30.00 alysis.	Cef [kPa] 0.00	γ [kN/m3] 20.00	Ysu [kN/m3] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle c Cohesi Angle c Soil : Satural Geolog No. 1 Input s No.	b1 b1 s are considered arameters eight : -state : of internal friction ion of soil : of friction struct ted unit weight jical profile an Layer [m] - urface surcha	Assigned b1 arges arge	ent pressures is ionless for at rest $\gamma = 20.00 \text{ kN}.$ effective $\varphi_{ef} = 30.00 \degree$ $C_{ef} = 0.00 \text{ kP}.$ $\delta = 20.00 \degree$ cohesionless $\gamma_{sat} = 20.00 \text{ kN}.$ d soils soil	Pattern Pattern pressure ana /m ³ a /m ³	Pef ["] 30.00 alysis.	Cef [kPa] 0.00	γ [kN/m³] 20.00	Ysu [kN/m3] 10.00	δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle c Cohesi Angle c Soil : Satural Geolog No. 1 Input s No.	b1 b1 s are considered arameters eight : -state : of internal friction of friction struct ted unit weight fical profile an Layer [m] - urface surcha Surch new	Assigned b1 arges change	ent pressures is ionless for at rest $\gamma = 20.00$ kN. effective $\varphi_{ef} = 30.00 \circ$ Cef = 0.00 kP. $\delta = 20.00 \circ$ cohesionless $\gamma_{sat} = 20.00$ kN. d soils soil	Pattern Pattern pressure and /m ³ a /m ³	Pef ["] 30.00 alysis.	Cef [kPa] 0.00	γ [kN/m ³] 20.00	Ysu [kN/m3] 10.00	δ [°] 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Cohesi Angle o Soil : Saturat Geolog No. 1 Input s No. 1	b1 b1 s are considered arameters eight : -state : of internal friction of friction struct ted unit weight fical profile an Layer [m] - urface surcha new YES	Assigned b1 arges change	ent pressures is ionless for at rest $\varphi = 20.00 \text{ kN}$ effective $\varphi_{ef} = 30.00 \degree$ $C_{ef} = 0.00 \text{ kP}$ $\delta = 20.00 \degree$ cohesionless $\gamma_{sat} = 20.00 \text{ kN}$ d soils soil Action permanent	Pattern Pattern pressure and /m ³ a /m ³ Mag.1 [kN/m ²] 5.00	Pef ["] 30.00 alysis.	Cef [kPa] 0.00	γ [kN/m ³] 20.00	Ysu [kN/m3] 10.00	δ [°] 0 20.00 Pattern
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Cohesi Angle o Soil : Saturat Geolog No. 1 Input s No. 1 No. 1	b1 b1 s are considered arameters eight : -state : of internal friction of friction struct ted unit weight ical profile an Layer [m] - urface surcha New YES	Assigned b1 b1 arges change	ent pressures is ionless for at rest q = 20.00 kN effective $p_{ef} = 30.00 \circ$ $c_{ef} = 0.00 \text{ kPa}$ $\delta = 20.00 \circ$ cohesionless $\gamma_{sat} = 20.00 \text{ kN}$ d soils soil	Pattern Pattern pressure and /m ³ a /m ³ Mag.1 [kN/m ²] 5.00 Nam	Pef ["] 30.00 alysis. alysis. [kN//] mag [kN//] ee [kn//]	Cef [kPa] 0.00	γ [kN/m ³] 20.00	Ysu [kN/m3] 10.00 10.00 Length [δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle of Cohesi Angle of Soil : Saturat Geolog No. 1 Input s No. 1 No. 1 No. 1	b1 b1 s are considered arameters eight : -state : of internal friction friction struct ted unit weight fical profile an Layer [m] - urface surcha Surch new YES s1	Assigned b1 b1 arges arge change	ent pressures is ionless for at rest q = 20.00 kN effective $p_{ef} = 30.00 \circ$ $C_{ef} = 0.00 \text{ kPa}$ $\delta = 20.00 \circ$ cohesionless $\gamma_{sat} = 20.00 \text{ kN}$ d soils soil Action permanent	Pattern Pattern pressure ana /m ³ a /m ³ Mag.1 [kN/m ²] 5.00 Nam	éd. (°] 30.00 alysis. Mag [kN/i) e	Cef [kPa] 0.00	γ [kN/m³] 20.00	Ysu [kN/m3] 10.00 10.00 Length [δ [°] 0 20.00
Basic s No. 1 All soils Soil pa b1 Unit we Stress- Angle o Soil : Satural Geolog No. 1 Input s No. 1 Resista	b1 b1 s are considered arameters eight : -state : of internal friction of friction struct ted unit weight frical profile an Layer [m] - urface surcha Surch new YES s1 ance on front	Assigned bl bl arges arge change	ent pressures is ionless for at rest q = 20.00 kN effective $p_{eff} = 30.00 \circ$ $c_{eff} = 0.00 \text{ kPa}$ $\delta = 20.00 \circ$ cohesionless $\gamma_{sat} = 20.00 \text{ kN}$ d soils soil Action permanent	Pattern Pattern pressure ana /m ³ a /m ³ Mag.1 [kN/m ²] 5.00 Nam	éd. (°) 30.00 alysis. Mag [kN//	Cef [kPa] 0.00	γ [kN/m ³] 20.00	Ysu [kN/m3] 10.00 10.00 Length [δ [°] 0 20.00

 δ = 0.00 ° Angle of friction struc.-soil Soil thickness in front of structure h = 0.60 mTerrain in front of structure is flat.

Settings of the stage of construction

Design situation : permanent Active pressure acts on the wall and stem.

. TP

Verification No. 1 Instruction es acting on o

Name	F _{hor}	App.Pt.	Fvert	App.Pt.	Design			
	[kN/m]	z [m]	[kN/m]	x [m]	coefficient			
Weight - wall	0.00	-1.36	114.50	1.62	1.000			
FF resistance	-43.20	0.20	0.00	0.00	1.000			
Weight - earth wedge	0.00	-3.58	251.12	2.72	1.000			
Active pressure	154.34	-1.78	27.21	3.61	1.000			
Water pressure	28.80	-0.20	0.00	4.00	1.000			
Uplift pressure	0.00	-5.80	0.00	1,40	1.000			
s1	11.99	-2.83	2,11	3.77	1.000			
s1	0.00	-6.03	13.00	2.70	1.000			

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 1010.12$ kNm/m Overturning moment $M_{ovr} = 323.52$ kNm/m

Safety factor = 3.12 > 1.55

Wall for overturning is SATISFACTORY

Check for slip Resisting horizontal force H_{res} = 235.53 kN/m Active horizontal force H_{act} = 151.93 kN/m

Safety factor = 1.55 > 1.55 Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY Bearing capacity of foundation soil

Design load acting at the center of footing bottom

No	Moment	Norm. force	Shear Force	Eccentricity	Stress	
NO.	[kNm/m]	[kN/m]	[kN/m]	[-]	[kPa]	
1	129.30	407,95	151.93	0.079	121.19	

	Service	load acting at the ce	nter of footing bottor	n						
No	Moment Norm. force		Shear Force							
	NO.	[kNm/m]	[kN/m]	[kN/m]						
	1	129.30	407.95	151.93						
	Verification of foundation soil									

Eccentricity verification Max. eccentricity of normal force e = 0.079 Maximum allowable eccentricity $e_{alw} = 0.333$

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacity

Max. stress at footing bottom = 121.19 kPa Bearing capacity of foundation soil R_d = 200.00 kPa

Safety factor = 1.65 > 1.55

Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY

Dimensioning No. 1

Forces acting on construction	orces acting on construction							
Name	Fhor	App.Pt.	Fvert	App.Pt.	Design			
	[kN/m]	z [m]	[kN/m]	x [m]	coefficient			
Weight - wall	0.00	-2.48	45.49	0.22	1.000			
Active pressure	91.95	-1.77	16.21	0.40	1.000			
Water pressure	7.19	-0.40	0.00	0.40	1.000			
Uplift pressure	0.00	-5.20	0.00	0.40	1.000			
s1	9.09	-2.60	1.60	0.40	1.000			
Wall stem check Reinforcement and dimensions of Bar diameter = 20.0 mm Number of bars = 5 Reinforcement cover = 30.0 mm Cross-section width = 1.00 m Cross-section depth = 0.40 m	yall stem check veinforcement and dimensions of the cross-section iar diameter = 20.0 mm lumber of bars = 5 veinforcement cover 1.00 m cross-section width = 1.00 m cross-section depth = 0.40 m							
Reinforcement ratio $\rho = 0$.44 % >	0.20% = p	min					
$\begin{array}{llllllllllllllllllllllllllllllllllll$.08 m < .77 kN > 10 .17 kNm > 18	0.17 m = x 0.13 kN = V 0.13 kN = V 0.17 kN = 10 0.17 kN = 10						
Cross-section is SATISFACTOR	ross-section is SATISFACTORY.							

5.1.2. Analysis by Coulomb and Muller Breslau Theory





Fig 9 Verification of Model 1 by Coulomb and Muller Breslau Theory





Fig 11 Dimensioning of Model 1 by Coulomb and Muller Breslau Theory

Cantilever wall analysis					
Input data					
Project					
Date : 14-09-2015					
Settings				~ 1	
(input for current task) Materials and standards					
Concrete structures : IS 456					\sim
Wall analysis					
Active earth pressure calculation : Passive earth pressure calculation : Earthquake analysis : Shape of earth wedge : Base key : Allowable eccentricity : Verification methodology :	Coulomb Coulomb Mononobe-Oka Consider alway The base key is 0.333 Safety factors (abe ys vertical s considered as (ASD)	inclined	d footing bottom	
	S	afety factors			
	Permane	ent design situ	ation		
Safety factor for overturning :			SFo=	1.55	[-]
Safety factor for sliding resistance :			SF _s =	1.55	[—]
Safety factor for bearing capacity :		10	SFb =	1.55	[-]

Verification No. 1

Forces acting on construction

Name	F _{hor}	App.Pt.	Fvert	App.Pt.	Desig	n
	[kN/m]	z [m]	[kN/m]	x [m]	coeffici	ent
Weight - wall	0.00	-1.36	114.50	1.62		1.000
FF resistance	-43.20	0.20	0.00	0.00		1.000
Weight - earth wedge	0.00	-3.58	251.12	2.72		1.000
Active pressure	134.02	-1.74	68.61	3.71	~ 7	1.000
Water pressure	28.80	-0.20	0.00	4.00		1.000
Uplift pressure	0.00	-5.80	0.00	1,40	}	1.000
s1	10.32	-2.79	5.55	3.84		1.000
s1	0.00	-6.03	13.00	2.70		1.000

Verification of complete wall

Safety factor = 4.26 > 1.55 Wall for overturning is SATISFACTORY

Check for slip Resisting horizontal force $H_{res} = 261.41$ kN/m Active horizontal force $H_{act} = 129.94$ kN/m

Safety factor = 2.01 > 1.55 Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

-2.79 -6.03 13.00

No. 1 Service lo	[kNm/m]				-	
1 Service lo	2.00	[kN/m]	[kN/m]		[-]	[kPa]
Service lo	2.90	452,78	3	129.94	0.002	113
	ad acting at the ce	nter of footing botto	m		· · · · · · · · · · · · · · · · · · ·	
	Moment	Norm. force	Shear Fo	rce		
No.	[kNm/m]	[kN/m]	[kN/m]			
1	2.90	452.78	3	129.94		
Verificatio	on of foundation so	il A	- ·			
Verificatio	n of bearing capac s at footing bottom	city σ = 113.56 k	Pa			
Verificatio Max. stres Bearing ca Safety fact Bearing ca Overall ve	on of bearing capac s at footing bottom pacity of foundation tor = 1.76 > 1.55 apacity of foundati erification - bearing	sity $\sigma = 113.56 \text{ k}$ soil $R_d = 200.00 \text{ k}$ on soil is SATISFAG capacity of found.	Pa Pa CTORY soil is SATISF	ACTORY		
Verificatio Max. stres Bearing ca Safety fact Bearing ca Overall ve Dimensi Forces ac	on of bearing capac s at footing bottom ipacity of foundation ior = 1.76 > 1.55 apacity of foundati erification - bearing oning No. 1 ting on construction	Solution $\sigma = 113.56 \text{ k}$ $\sigma = 113.56 \text{ k}$ $\sigma = 200.00 \text{ k}$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = \sigma = \sigma = \sigma$ $\sigma = \sigma = \sigma = $	Pa Pa CTORY soil is SATISF	ACTORY		
Verificatio Max. stres Bearing ca Safety fact Bearing ca Overall ve Dimensi Forces ac Name	on of bearing capac s at footing bottom pacity of foundation tor = 1.76 > 1.55 apacity of foundati erification - bearing oning No. 1 ting on construction	Solution $\sigma = 113.56 \text{ k}$ $\sigma = 200.00 \text{ k}$ $\sigma = 200.00 \text{ k}$ $\sigma = 300.00 \text{ k}$	Pa Pa CTORY soil is SATISF	ACTORY	App.Pt.	Design
Verificatio Max. stress Bearing ca Safety fact Bearing ca Overall ve Dimensi Forces ac Name	on of bearing capac s at footing bottom ipacity of foundation ior = 1.76 > 1.55 apacity of foundati erification - bearing oning No. 1 ting on construction	city σ = 113.56 k soil R _d = 200.00 k on soil is SATISFAC capacity of found. on Fhor [kN/m]	Pa Pa CTORY soil is SATISF	ACTORY Fvert	App.Pt.	Design
Verificatio Max. stres Bearing ca Safety fact Bearing ca Overall ve Dimensi Forces ac Name Weight - v	which the set of the s	city σ = 113.56 k soil R _d = 200.00 k on soil is SATISFAC capacity of found. on Fhor [kN/m] 0.00	Pa Pa CTORY soil is SATISF App.Pt. z [m] -2.48	ACTORY Fvert [kN/m] 45.49	App.Pt. x [m] 0.22	Design coefficient
Verificatio Max. stress Bearing ca Safety fact Bearing ca Overall ve Dimensi Forces ac Name Weight - v Active pre	when of bearing capac s at footing bottom spacity of foundation for = 1.76 > 1.55 apacity of foundati erification - bearing oning No. 1 ting on construction wall ssure	city σ = 113.56 k soil R _d = 200.00 k on soil is SATISFAC (capacity of found. con Fhor [kN/m] 0.00 84.06	Pa Pa CTORY soil is SATISF App.Pt. z [m] -2.48 -1.77	ACTORY Fvert [kN/m] 45.49 30.60	App.Pt. ×[m] 0.22 0.40	Design coefficient
Verificatio Max. stress Bearing ca Safety fact Bearing ca Overall ve Dimensi Forces ac Name Weight - v Active pre Water pre	wall ssure sat footing bottom tor = 1.76 > 1.55 apacity of foundation tor = 1.76 > 1.55 apacity of foundati rification - bearing oning No. 1 ting on construction wall ssure ssure	city σ = 113.56 k soil R _d = 200.00 k on soil is SATISFAC capacity of found.	Pa Pa CTORY soil is SATISF App.Pt. z [m] -2.48 -1.77 -0.40	ACTORY Fvert [kN/m] 45.49 30.60 0.00	App.Pt. x [m] 0.22 0.40 0.40	Design coefficient 1.0 1.0
Verificatio Max. stress Bearing ca Safety fact Bearing ca Overall ve Dimensi Forces ac Name Weight - v Active pre Uplift pres	wall ssure ssure sat footing bottom pacity of foundation tor = 1.76 > 1.55 apacity of foundati rification - bearing oning No. 1 ting on construction usure ssure assure assure	city σ = 113.56 k soil R _d = 200.00 k on soil is SATISFAC capacity of found.	Pa Pa CTORY soil is SATISF App.Pt. z [m] -2.48 -1.77 -0.40 -5.20	ACTORY Fvert [kN/m] 45.49 30.60 0.00 0.00	App.Pt. x [m] 0.22 0.40 0.40 0.40	Design coefficient 1.0 1.0 1.0 1.0

5.1.3. Analysis by Caquot - Kérisel theory



Fig12 Verification of Model 1 by Caquot - Kérisel theory







Fig 14 Dimensioning of Model 1 by Caquot - Kérisel theory

Cantilever wall analysis					
Input data					
Project					
Date : 14-09-2015					
Settings				A	
(input for current task) Materials and standards					
Concrete structures : IS 456 Wall analysis				$\left(\right)$	
Active earth pressure calculation : Passive earth pressure calculation Earthquake analysis : Shape of earth wedge : Base key : Allowable eccentricity : Verification methodology :	Caquot-Keris Caquot-Keris Mononobe-O Consider alw The base key 0.333 Safety factors	el el kabe ays vertical / is considered a s (ASD)	as inclined foot	ing bottom	/
		Safety factors			
	Perma	nent design sit	uation		
Safety factor for overturning :			SFo=	1.55	[-]
Safety factor for sliding resistance	:		SF _s =	1.55	[-]
Safety factor for bearing capacity	:	10	SFb=	1.55	[-]
Verification No. 1					
Forces acting on construction					
Name	Fhor [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Design
Weight - wall	0.00	-1.36	114.50	1.62	1.000
FF resistance	-43.17	0.20	0.00	0.00	1.000
Active pressure	138.75	-3.56	70.99	3.71	1.000
Water pressure	28.80	-0.20	0.00	4.00	1.000
Uplift pressure	0.00	-5.80	0.00	1)40	1.000
s1	0.00	-2.79	13.00	3.84	1.000
Resisting horizontal force $H_{res} =$ Active horizontal force $H_{act} =$ Safety factor = 1.95 > 1.55 Wall for slip is SATISFACTORY	262.90 kN/m 135.05 kN/m		(5)		
Overall check - WALL is SATISF	ACTORY				
Bearing capacity of founda	ation soil				
Design load acting at the center	of footing bot	tom			
No. Moment	Norm. force	Shear F	orce	Eccentricity	Stress
[kNm/m]	[kN/m]	35	n] 135.05	0.00	[kPa] 4 114 77
Service load acting at the center	r of footing bot	tom	100.00	0.00	
No Moment	Norm. force	Shear F	orce		
IkNm/m]	[kN/m]	[kN/r	n]		
1 7.36	455.	35	135.05		
Verification of foundation soil					
Eccentricity verification Max. eccentricity of normal force of Maximum allowable eccentricity	e = 0.004				
Eccentricity of the normal force Verification of bearing capacity Max. stress at footing bottom Bearing capacity of foundation soil	is SATISFACT σ = 114.77 R _d = 200.00	ORY kPa kPa			
Bearing capacity of foundation s	soil is SATISFA	CTORY			
Overall verification - bearing cap Dimensioning No. 1	pacity of found	. soil is SATISI	ACTORY		
Forces acting on construction					
Name	Fhor	App.Pt.	Fvert	App.Pt.	Design
	[kN/m]	z [m]	[kN/m]	x [m]	coefficient
vveight - wall	0.00	-2.48	45.49	0.22	1.000
Water pressure	7 19	-1.77	0.00	0.40	1.000
Uplift pressure	0.00	-5.20	0.00	0.40	1.000
s1	8,63	-2.60	3.14	0,40	1.000

Wall stem checkReinforcement and dimensions of the cross-sectionBar diameter= 20.0 mmNumber of bars= 5Reinforcement cover= 30.0 mmCross-section width= 1.00 mReinforcement ratio ρ = 0.44 %> 0.20 %= \$\mathcal{pmin}\$Reinforcement ratio ρ = 0.44 %> 0.20 %= \$\mathcal{pmin}\$Number of heutral axis x= 0.08 m< 0.17 m</td>= \$\text{xmax}\$Ultimate shear forceVrd= 179.77 kN> 103.19 kN= \$\mathcal{Vu}\$Utimate momentMrd= 185.17 kNm > 171.83 kNm = MuCross-section is SATISFACTORY.

5.1.4. Analysis by Absi Theory











No	Moment	Norm. force	Shear Fo	orce	Eccentricity	Stress
NO.	[kNm/m]	[kN/m]	[kN/m	<mark>ון</mark>	[-]	[kPa]
1 Comulae II	7.01	454 4	05 	133.11	0.004	114.52
Service I	Moment	Norm, force	Shear Fo	orce		
No.	[kNm/m]	[kN/m]	[kN/m	1]		
1	7.01	454.8	55	133.11		
Verificati	on of foundation soi	\vee				
Eccentrie Max. ecc Maximum	city verification entricity of normal force allowable eccentricity	e = 0.004 $e_{alw} = 0.333$				
Eccentri	ity of the normal for	ce is SATISFACT	ORY			
Verificati Max. stre Bearing c	on of bearing capaci ss at footing bottom apacity of foundation s	ty $\sigma = 114.52$ soil R _d = 200.00	kPa kPa			
Safety fac Bearing of	ctor = 1.75 > 1.55 capacity of foundation	on soil is SATISFA		ACTORY		
Dimens	ioning No. 1	- paole, or round				
Forces	ting on construction					
Torces a	cing on construction	• •		-		
Name		Fhor	App.Pt.	Fvert	App.Pt.	Design
		[kN/m]	z [m]	[kN/m]	x [m]	coefficient
Weight -	wall	0.00	-2.48	45.49	0.22	1.000
Active pre	essure	84.60	-1.77	30.79	0.40	1.000
vvater pro	essure	7.19	-0.40	0.00	0.40	1.000
Uplift pre	ssure	0.00	-5.20	0.00	0.40	1.000
SI		8.30	-2.60	3.04	0.40	1.000
Reinforce Bar diame Number o Reinforce Cross-sec Reinforce	$\begin{array}{llllllllllllllllllllllllllllllllllll$	of the cross-sectio m 0.44 % > ($0.20 \% = \rho_{m}$			
Reinforce Bar diame Number o Reinforce Cross-sec Reinforce Position o Ultimate s	ment and dimensions of ther = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio p = f neutral axis x = hear force V_{rd} = 1 homent M_{rd} = 1	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 106 85.17 kNm > 166	n 0.20 % = ρ_{m} 0.17 m = x_{m} 0.15 kN = V_{u} 0.44 kNm = M_{v}	in nax		
Reinforce Bar diame Number o Reinforce Cross-sec Cross-sec Reinforce Position o Ultimate s Ultimate r	ment and dimensions of ther = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio p = f neutral axis x = hear force V _{rd} = 1 homent M _{rd} = 1	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 106 85.17 kNm > 166	n 0.20 % = ρ_{m} 0.17 m = x_{m} 0.15 kN = V_{u} 0.44 kNm = M_{L}	nin nax		
Reinforce Bar diame Number o Reinforce Cross-sec Reinforce Position o Ultimate s Ultimate n Cross-se	ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio p = f neutral axis x = hear force V _{rd} = 1 homent M _{rd} = 1 ction is SATISFACTCO	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 106 9.85.17 kNm > 166 9.8Y.	n 0.20 % = ρ_{m} 0.17 m = x_{m} 0.15 kN = V_{u} 6.44 kNm = M_{t}	lin lin lin		
Reinforce Bar diame Number o Reinforce Cross-sec Cross-sec Reinforce Position o Ultimate s Ultimate r Cross-sec De stabili	$\begin{array}{rcl} \textbf{check} \\ \textbf{ment and dimensions} \\ \textbf{ter} &= 20.0 \text{ m} \\ \textbf{f bars} &= 5 \\ \textbf{ment cover} &= 30.0 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion depth} &= 0.40 \text{ m} \\ \textbf{ment ratio} & \rho &= \\ \textbf{f neutral axis } x &= \\ \textbf{hear force} & V_{rd} &= 1 \\ \textbf{hear force} & V_{rd} &= 1 \\ \textbf{homent} & M_{rd} &= 1 \\ \textbf{ction is SATISFACTC} \\ \textbf{ity} \end{array}$	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 106 85.17 kNm > 166 9RY.	n $0.20 \% = \rho_{m}$ $0.17 m = x_{m}$ $0.15 kN = V_{u}$ $0.44 kNm = M_{u}$	nin nax		
Reinforce Bar diame Number o Reinforce Cross-sec Cross-sec Reinforce Position o Ultimate s Ultimate r Cross-sec De stabili	$\begin{array}{rcl} \textbf{check} \\ \textbf{ment and dimensions} \\ \textbf{ter} &= 20.0 \text{ m} \\ \textbf{f bars} &= 5 \\ \textbf{ment cover} &= 30.0 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion depth} &= 0.40 \text{ m} \\ \textbf{ment ratio} & \rho &= \\ \textbf{f neutral axis } x &= \\ \textbf{hear force} & V_{rd} &= 1 \\ \textbf{hear force} & V_{rd} &= 1 \\ \textbf{torn is SATISFACTO} \\ \textbf{ity} \end{array}$	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 106 85.17 kNm > 166 0RY.	n 0.20 % = pm 0.17 m = xm 0.15 kN = Vu 5.44 kNm = Mu			Stage - Analysis
Wall sten Reinforce Bar diame Number o Reinforce Cross-sec Reinforce Position o Ultimate s Ultimate r Cross-sec Pestabili *** *** ***	$\begin{array}{l} \textbf{check} \\ \textbf{ment and dimensions} \\ \textbf{ter} &= 20.0 \text{ m} \\ \textbf{f bars} &= 5 \\ \textbf{ment cover} &= 30.0 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion depth} &= 0.40 \text{ m} \\ \textbf{ment ratio} \rho &= \\ \textbf{f neutral axis } x &= \\ \textbf{hear force} V_{rd} &= 1 \\ \textbf{hear force} V_{rd} &= 1 \\ \textbf{ction is SATISFACTO} \\ \textbf{ity} \end{array}$	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 0RY.	n $0.20 \% = \rho_{m}$ $0.17 m = x_{m}$ $0.15 kN = V_{u}$ $5.44 kNm = M_{u}$			Stage - analysis
Wall sten Reinforce Bar diame Number o Reinforce Cross-sec Reinforce Position o Ultimate s Ultimate r Cross-sec Position o Ultimate r Cross-sec Pestabili *** *** ***	$\begin{array}{l} \textbf{check} \\ \textbf{ment and dimensions} \\ \textbf{ter} &= 20.0 \text{ m} \\ \textbf{f bars} &= 5 \\ \textbf{ment cover} &= 30.0 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion depth} &= 0.40 \text{ m} \\ \textbf{ment ratio} \rho &= \\ \textbf{f neutral axis } x &= \\ \textbf{hear force} V_{rd} &= 1 \\ \textbf{hear force} V_{rd} &= 1 \\ \textbf{homent} M_{rd} &= 1 \\ \textbf{ction is SATISFACTO} \\ \textbf{ity} \end{array}$	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 0RY.	n $0.20 \% = \rho_{m}$ $0.17 m = x_{m}$ $0.15 kN = V_{u}$ $5.44 kNm = M_{u}$			Stage - analysis
Wall sten Reinforce Cross-sec Cross-sec Reinforce Oross-sec Reinforce Position o Ultimate s Ultimate r Cross-sec Pestabili ** * * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ○ * ● * ● * ● * ● * ● * ● * ● * ● * ● * ● * ● * ● * ● * ● * ●<	ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V _{rd} = 1 hear force V _{rd} = 1 totion is SATISFACTO	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 0RY.	n $0.20 \% = \rho_{m}$ $0.17 m = x_{m}$ $0.15 kN = V_{u}$ $0.15 kN = M_{u}$ $0.14 kNm = M_{u}$			
Wall steen Reinforce Cross-sec Cross-sec Reinforce Oross-sec Reinforce Position o Ultimate s Ultimate r Cross-sec Position o Ultimate s Ultimate s Valid teneror ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** ** **	ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V _{rd} = 1 hear force V _{rd} = 1 totion is SATISFACTO	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 0RY.	n 0.20 % = ρ_{m} 0.17 m = x_{m} 0.15 kN = V_{u} 0.44 kNm = Mu			
Wall sten Reinforce Oross-sec Cross-sec Reinforce Oross-sec Reinforce Position o Ultimate s Ultimate r Cross-sec Postabili ***	$\begin{array}{c} \textbf{a} \textbf{check} \\ \textbf{ment and dimensions} \\ \textbf{ter} &= 20.0 \text{ m} \\ \textbf{f bars} &= 5 \\ \textbf{ment cover} &= 30.0 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion depth} &= 0.40 \text{ m} \\ \textbf{ment ratio} \rho &= \\ \textbf{f neutral axis } x &= \\ \textbf{hear force} V_{rd} &= 1 \\ \textbf{hear force} V_{rd} &= 1 \\ \textbf{toron is SATISFACTO} \\ \textbf{ty} \\ \textbf{a} &= 40, 30, 40, 30, 40, 30, 40, 50, 50, 50 \\ \textbf{true} &= 1 \\ \textbf{toron is SATISFACTO} \\ \textbf{true} &= 1 \\ $	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 0RY.	n 0.20 % = pm 0.17 m = xm 0.15 kN = Vu 0.44 kNm = Mu 0.44 kNm = Mu			
Wall sten Reinforce Oross-sec Cross-sec Reinforce Oross-sec Reinforce Position o Ultimate s Ultimate r Cross-sec Postabili ***	The check ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V_{rd} = 1 hear force V_{rd} = 1 totion is SATISFACTO ity	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 DRY .	n 0.20 % = pm 0.17 m = xm 0.15 kN = Vu 5.44 kNm = Mu 8 m 10			
Wall sten Reinforce Cross-sec Cross-sec Reinforce Oross-sec Reinforce Position o Ultimate s Ultimate n Cross-sec Pestabili *** *** *** *** *** ***	ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V_{rd} = 1 hear force V_{rd} = 1 totion is SATISFACTO ity	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 DRY .	n 0.20 % = pm 0.17 m = xm 0.15 kN = Vu 5.44 kNm = Mu 2.44 kNm			
Wall sten Reinforce Cross-sec Reinforce Oross-sec Reinforce Position o Ultimate s Ultimate n Cross-sec Pestabili *** *** *** ***	ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V_{rd} = 1 hear force V_{rd} = 1 thear force V_{rd} = 1 thear force V_{rd} = 1 thear force V_{rd} = 1 hear force V_{rd} = 1	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 DRY.	n 0.20 % = pm 0.17 m = xm 0.15 kN = Vu 0.44 kNm = Mu 0.44 kNm			
Wall sten Reinforce Cross-sec Cross-sec Reinforce Position o Ultimate s Ultimate n Cross-sec Postabili ** * ** ** ** **	The check ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V_{rd} = 1 hear force V_{rd} = 1 the star force V_{rd} = 1 the	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 DRY.	n 0.20 % = pm 0.17 m = xm 0.15 kN = Vu 5.44 kNm = Mu 2.44 kNm			
Reinforce Bar diame Number o Reinforce Cross-sec Reinforce Position o Ultimate s Ultimate n Cross-sec Postabili etal demetor	ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V_{rd} = 1 hear force V_{rd} = 1 totion is SATISFACTO ity	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 DRY.	n 0.20 % = pm 0.17 m = xm 0.15 kN = Vu 5.44 kNm = Mu 2.44 kNm			
Reinforce Bar diame Number o Reinforce Cross-sec Reinforce Position o Ultimate s Ultimate n Cross-sec Postabili er/al demetor	The check ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V_{rd} = 1 hear force V_{rd} = 1 thear force	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 DRY.	n 0.20 % = pm 0.17 m = ×m 0.15 kN = Vu 3.44 kNm = Mu 2.44 kNm			
Reinforce Bar diame Number o Reinforce Cross-sec Reinforce Position o Ultimate s Ultimate n Cross-sec Postabili ela denezion ↔	ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V_{rd} = 1 hear force V_{rd} = 1 thear force V_{rd} = 1 thear force V_{rd} = 1 thear force V_{rd} = 1 hear force V_{rd} = 1 hear force V_{rd} = 1 thear force V_{rd} = 1 thear force V_{rd} = 1 hear force V_{rd} = 1	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 DRY.	n 0.20 % = pm 0.17 m = xm 0.15 kN = Vu 0.15 kN = Vu 0.44 kNm = Mu 0.44 kNm			
Reinforce Bar diame Number o Reinforce Cross-sec Reinforce Position o Ultimate s Ultimate n Cross-sec Postabili ™	The check ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V_{rd} = 1 hear force V_{rd} = 1 thear force	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 DRY .	n 0.20 % = pm 0.17 m = xm 0.15 kN = Vu 0.15 kN = Vu 0.44 kNm = Mu 0.44 kNm			
Reinforce Bar diame Number o Reinforce Cross-sec Reinforce Position o Ultimate s Ultimate n Cross-sec Postabili ***********************************	The check ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V_{rd} = 1 hear force V_{rd} = 1 thear force	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 DRY. 0.20 30 20 30 20 30 30 30 0000000000000000	n 0.20 % = pm 0.17 m = xm 0.15 kN = Vu 0.44 kNm = Mu 0.44 kNm			
Wall Stem Reinforce Bar diame Number of Reinforce Cross-sec Reinforce Position of Ultimate s Ultimate n Cross-sec Ope stabilitie *** *** **** ************************************	n check ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V_{rd} = 1 hear force V_{rd} = 1 thear force	of the cross-section m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 DRY.	n 0.20 % = pm 0.17 m = ×m 0.15 kN = Vu 0.44 kNm = Mu 0.44 kNm			
Bandiane Reinforce Bar diame Number o Reinforce Cross-sec Reinforce Position o Ultimate s Ultimate r Cross-sec Position o Ultimate r Cross-sec Position o Ultimate s Ultimate s	The check ment and dimensions of the r = 20.0 m f bars = 5 ment cover = 30.0 m tion width = 1.00 m tion depth = 0.40 m ment ratio ρ = f neutral axis x = hear force V_{rd} = 1 hear force V_{rd} = 1 thear force	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 0RY. 0.20 300 20 30 30 30 30 30 08 30 30 30 30 30 30 30 30 30 08 30 30 30 30 30 30 30 30 30 30 30 30 30	n 0.20 % = pm 0.17 m = ×m 0.15 kN = Vu 0.44 kNm = Mu 0.44 kNm			
Reinforce Bar diame Number o Reinforce Cross-sec Reinforce Position o Ultimate s Ultimate r Cross-sec Position o Ultimate s Ultimate r	$ \begin{array}{c} \textbf{check} \\ \textbf{ment and dimensions } \\ \textbf{ter} &= 20.0 \text{ m} \\ \textbf{f bars} &= 5 \\ \textbf{ment cover} &= 30.0 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion width} &= 1.00 \text{ m} \\ \textbf{tion depth} &= 0.40 \text{ m} \\ \textbf{ment ratio} & \rho &= \\ \textbf{f neutral axis } x &= \\ \textbf{hear force} & V_{rd} &= 1 \\ \textbf{hear force} & V_{rd} &= 1 \\ \textbf{hear force} & V_{rd} &= 1 \\ \textbf{toment is SATISFACTO} \\ \textbf{ity} \\ \hline \end{array} $	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 DRY. 0.20 30 20 20 20 30 30 30 0.20 30 20 30 30 30 30 30 30 0.20 30 30 20 30 30 30 30 30 30 0.20 30 30 30 30 30 30 30 30 30 30 30 30 30	n 0.20 % = pm 0.17 m = ×m 0.15 kN = Vu 0.44 kNm = Mu 0.44 kNm	e się suface wihod opiemization ty verificiation (ali methoda)		
Reinforce Bar diame Number o Reinforce Cross-sec Cross-sec Position o Ultimate s Ultimate r Cross-sec Position o Ultimate s	a check ment and dimensions of the r a check ment cover f bars ment cover stion width = 1.00 m tion depth tion depth = 0.40 m ment ratio p f neutral axis x = hear force Vrd tion is SATISFACTO ity	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 PRY. 0.20 30 20 30 30 30 30 30 30 9 8 0 8 0 8 0 10 10 10 10 10 10 10 10 10 10 10 10 1	n 0.20 % = pm 0.17 m = ×m 0.15 kN = Vu 0.44 kNm = Mu 0.44 kNm	a sig surface without optimization ty verification (all methods) (F2 + 12 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 15 2 > 15 0 A CCEPT methods (F2 > 1		
Reinforce Bar diame Number o Reinforce Cross-sec Cross-sec Position o Ultimate s Ultimate r Cross-sec Postabili the state	a check ment and dimensions of the r a check ment cover f bars ment cover stion width = 1.00 m tion depth tion depth = 0.40 m ment ratio p f neutral axis x = hear force Vrd 1 ction is SATISFACTO ity detail femetroire fet	of the cross-sectio m 0.44 % > (0.08 m < (79.77 kN > 100 85.17 kNm > 166 PRY .	n 0.20 % = pm 0.17 m = ×m 0.15 kN = Vu 3.44 kNm = Mu 3.44 kNm = Mu 1.5 kN 1.5 k	e se sufuere vilhoutgemeater ty verification (al method) F8 = 12 > 15 0 ACCEPT retrinon: F8 = 12		

Fig 18 Slope stability of Model 1

Results (Stage o Analysis 1	f construction 1	
Slope stability verif	ication (all methods	5) 7
Bishop :	FS = 1.62 > 1.50	ACCEPTABLE
Fellenius / Petterson	: FS = 1.53 > 1.50	ACCEPTABLE
Spencer :	FS = 1.63 > 1.50	ACCEPTABLE
Janbu :	FS = 1.63 > 1.50	ACCEPTABLE
Morgenstern-Price :	FS = 1.63 > 1.50	ACCEPTABLE



Height from top of footing to top of retained soil 10.13.8.31 Fig 22 Overturning Moment calculations by Rankine Theory 5.2.2. Analysis by Coulomb Theory

Coulomb Theory

Fig 23 Resisting Moment calculations by Rankine Theory



Height from top of footing to top of retained soil

1 by Coulomb Theory



Coulomb Theory

1258 N

10.13.8.31

© 2017 IJCRT | Volume 5, Issue 4 December 2017 | ISSN: 2320-2882



Fig 22 Overturning Moment calculations by Coloumb Theory

File Settings Tools License Help 🖽 🗑 🤤 Σ 🚳 🗞 ? Tapered Stem Retaining Wall Image: Construction of the second state of the s il Bearin√ Pier √ Key √ Other 🥩 🎕 🔁 📍 🗙 Çancel 🗸 Sav General Loads Stem Footing Load Factors Calc Info Results Construction Wall Loading Diagrams Summary Resisting Overtur ning Tilt ed Height . <mark>5199</mark>♥ m Resisting Moments Soil Over Heel Sloped Soil Over Heel Surcharge Over Heel Wall height above retained soil 0.000 🗣 m Distance 2.70 m 3.10 2.65 Moment 729,716.5 N-I 39,845.0 35,764.1 Eorce 270.265.4 N Height of Soil over Toe . 60.000 🗣 cm 5.67 € : 1 ▼ 1.800 € m 12,853.2 Soil Slope Water table height over heel 0.0 11,996.3 0.0 45.5 5,197.4 59,981.7 8,997.2 34,768.1 Soil Values Allow Soil Bearing 0.50 5,998.2 200.0 🖨 KPa 1.18 1.37 2.00 1.10 4.00 53.5 7,103.1 119,963.3 9,897.0 139,072.6 Lateral Pressure Method E.F.P. Soil Friction Angle. Active Pressure:Ka*Gamma (horiz). Passive Pressure:Kp*Gamma (horiz). 30.00 ♦ deg 6.629.53 KPa/m 60000.00 KPa/m Total Vertical Lo 417,600.7 N 87,413.1 N-Soil Density (heel side) . 20,000.0 0 N/m3 ting Mome Soil Density (toe side) . 20.000.0 • N/m3 *Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure e of vertical component of active lateral soil pressure. Use for Soil Pressure Use for Sliding Resistance Use for Overturning Resistance (available for sloped soil only) Use V FOR PIER FOUNDATION THE FOLLOWING ARE NOT APPLICA Resisting/Overturning 3.409 : 1.00 These values are used for soil pressure calculations Force = 417,600.7N Moment 331,544.9 N-m Height from top of footing to top of retained soil

Fig 23 Resisting Moment calculations by Coloumb Theory

5.3 Design by Excel workshee

CANTILEVER RETAINING WALL									
DATA:									
			Туре о	f layer	Without layer 🔻				
WALL HT. Above L	OWER GL, HC (m) =	4.80	INT FRICTION ANG	30.0					
FDn. Depth below L	OWER GL, Df (m) =	1.00	INT FRICTION ANG	30.0					
MIN. FoS	: OVERTURNING =	1.55	ANGLE OF WALL F	FRICTION, δ (°) =	20.0				
M	IN. FoS : SLIDING =	1.55	Rankine/Coul	omb's Theory	Rankine's The 💌				
	SBC, qa (kN/m ²) =	200	GWT from WALL	. TOP, Dw (m) =	4.00				
FRICTION COEFF	. @ Wall base, µ =	0.50	SOIL @ H	EEL ys at (kN/m³) =	20.00				
SURCHARG	E ANGLE, β (°) =	10.00	SOLLQ	HEEL: γb (kN/m ³) =	20.00				
SURCHARGE (Plan	Area), q ((kN/m ²)=	5.00	SOIL ABOVE	TOE : %b (kN/m ³) =	20.00				
Provide Key for C	Control of Sliding	Yes 💌	UNIT WT. OF WAT	TER, yw (kN/m ³) =	10.00				
SUBMERGEED UNIT	WT., Y' (kN/m ³) =	10.00	UNIT WT. OF CONC	YCONC (kN/m ³) =	25.00				
EQ AccCoef, Ah =	0.000	STE	P-2	SELECT, BI,TOE	OPTIMAL				
BwTOP, (mm) =	300		Bf,TOE, (m) =	1.00	1.00				
Bwtoe, (mm) =	100		Bf, (m) =	4.00	6.67				
DTmin (mm) =	600		BwBOT, (mm) =	400					
DHmin (mm) =	600	Overall Thkness	of Base, D (mm) =	600					
Neglect Toe Fill		1	Bf. HEEL (m) =	2.60					
for Stablility Chk	Yes	STEP-1	, (,						
DEF	PTH of KEY. (m) =	0.00							
TOTAL W	ALL HT. ABOVE FD	n. BOT., H (m) =	5.80	FoS. Overturning =	3.39				
	CLEAR ST	EM HT., Hc (m) =	5.20 FoS, SLIDING =		1.55				
TOTAL HT. A	ABOVE FDn. BOT.A	THEEL, Hh (m) =	6.26 D. max =		141.28				
ANGLE OF INNE	R WALL FACE W/	HORI. ((°) = 90.00 D. min =		57.07					
ANGLE OF INNE	R WALL FACE W /	VERT $\theta(\circ) =$	0.00	p, 1111 -					
Ka', B	ACK FILL STATIC =	0.350	Ko' FO	R SOIL. TOE FILL =	3.00				
Coulomb's Theor	rv incl. Wall Incli	nation & Wall Fri	ction used for Ac	tive Earth Pr.					
		Above	GWT	Below	GWT				
DYNAMIC EAR	TH PRESSURE	λ1 =	0.00	λ 1 =	0.00				
EO Acc. Av	0.000	λ2 =	0.00	λ2 =	0.00				
L & AUU, MV =	0.000	Ka 1 =	0.340	Ka 1 =	0.340				
		Ka 2 =	0.340	Ka 2 =	0.340				
		Ka.dvn =	0.340	Ka dyn =	0.340				
		nu,ujii -	0.540	nu,ujii -	0.040				
EARTH PR. CA	ALCULATIONS	(m)	Total Dyn. (kN/m2)	Static. (kN/m2)	Dyn. (kN/m2)				
TOP OF S	OIL ABOVE HEFT	6.26	0.00	1.75	0.00				
GWT IN B		1.80	30.32	32.01	-2.60				
0	BOT. OF HEFI	0.00	57.21	57.21	0.000				
	- St. Of Habb	0.00	01.21	51.21	0.000				
	STATIC FADTURE	Vert DIST EDON	Overturning Ment	DVO EADTH Dr	Overturning Ment				
COMPONENT	(kN)	TOE (m)	@ TOE, (kN.m)	(kN)	@ TOE-Dvn(kN.m)				

COMPONENT	STATIC EARTH Pr, (kN)	Vert. DIST. FROM TOE (m)	Overturning Mmt @ TOE, (kN.m)	Dyn EARTH Pr, (kN)	@ TOE-Dyn(kN.m)
Earth Pr-1	76.09	3.36	255.76	-5.79	
Earth Pr-2	79.88	0.82	65.43	-2.34	
TOTAL,	155.97		321.19	-8.12	-25.42

COMPONENT	Wt. (kN)	DIST. FROM TOE (m)	MMT @ TOE, (kN.m)
WALL - STEM, W1 =	45.50	1.22	55.68
BASE, W2 =	60.00	2.00	120.00
SOIL ABOVE TOE, W3 =	0.00	0.00	0.00
SOIL @ HEEL (ABOVE GWT), W4 =	219.92	2.72	598.95
SOIL @ HEEL (BELOW GWT), W5 =	31.20	2.70	84.24

Layered soil profile						
WALL HT. Above LOWER GL, HC (m) =	4.80					
FDn. Depth below LOWER GL, Df (m) =	1.00					

	level			Ka*y*Z		TOTAL E P	moment
	z1	1.75				6.04	27.37
	z2	25.92				41.81	165.25
	z3	25.92				72.59	101.62
	z4			45.50		27.40	25.58
						147.84	319.82
	z01	0	0 zo2 0.00 EARTH PRESSURE Ph				314.96
					Z	2.1	63
_					EARTH PRESSURE Pv	25.67	102.69
	ht			Ka*y*Z		TOTAL E P	moment
	z1			1.75		6.04	27.37
	z2			29.71		40.78	162.56
	z3			27.82		0.51	1.34
	z4			27.82		77.89	109.04
	z5			37.60		13.70	12.79
	z6			55.60		16.20	9.72
						155.12	322.83
		E	ARTH PRES	SURE WITH	WATER TABLE Ph	152.77	317.93
					Z	2.0	81
		E	ARTH PRES	SURE WITH	WATER TABLE Pv	26.94	107.75

	Earth pressure for flexure							
ht	Ka*y*Z		TOTAL E P	moment				
z1	1.75	1.75						
z2	22.72		36.26	116.04				
z3	22.72		57.03	62.73				
z4	38.10		21.53	15.79				
			120.07	213.97				
		EARTH PRESSURE Ph	118.24	210.72				
		Z	1.7	82				
		EARTH PRESSURE PV	20.85	83.40				
ht	Ka*y*Z		TOTAL E P	moment				
z1	1.75		5.24	19.40				
z2	29.71		27.96	94.14				
z3	26.21		1.75	3.26				
z4	26.21		57.67	63.44				
z5	33.90		8.46	6.20				
z6	51.90		16.20	9.72				
			117.28	196.16				
	EARTH PRESSURE WITH	WATER TABLE Ph	115.50	193.18				
		Z	1.6	73				
	EARTH PRESSURE WITH	WATER TABLE Pv	20.37	81.46				

	Surcharge, W6 =	13.00	1	2.70		35.10			
Farth F	PrVert. Comp = Pay	27.08		4.00		108.34			
	TOTAL WT	206.70	M Do	nint kN m -		4002.24			
	TOTAL WI	. 390.70	wi-ree	SISI, KIN.III -	-	1002.31			
		Overturning) Mom	ent, kN.m =		295.76			
		CG OF LO	DADS FI	ROM TOE, m		1.72			
		ECO	C. OF TH	IE LOADS, m		0.28			
	Passive	Earth F	Pressure =		0.00				
			STEM					(
		NCC DESIG		STEW				_	
	EARTH PR. F	OR FLEXURE			fc	k (MPa) =	2	5	
		LEVEL FROM TOE	EART	TH PR. INT.	ď	x (mm) =	5	5	
EARTH PR. CA	ALCULATIONS	(m)	0	kN/m2)	DE	SIGN EO		IDF	
ТОР	OF SOIL at STEM	5.80		1.75	Mx	(kN.m)=	186	.44	
GWT IN BA	ACK FILL, IF ANY	1.80		29.71	D,criti	cal(mm)=	33	5	
	BOT. OF STEM	0.60		45.90	D.k=1	.5. (mm)=	48	7	
					D,k=1	1.2,(mm)=	53	8	
COMPONENT	CADTUR: (IN)	Vert. DIST. FROM	Bend	ing Mmt @	SELECT	「, D(mm)=	41	0	
COMPONENT	EARTH PF, (KN)	STEM BOT. (m)	SIEME	BOT., Mimax -		d. (mm)=	35	5	
Earth Dr. 4	64.06	2.64	(404 55		14-		12	
Earth Pr-1	61.96	2.01		101.55		K.=	2.2	22	
Earth Pr-2	44.68	0.56		24.89		р %=	0.70	00	
TOTAL,	106.64			186.44	Ast	mm2/m=	248	37	
*Act dooice	X-dir (mm2/m) -	2/187			As mir	(mm2/m)	40	2	
Ast design	x-air (minz/m) =	2401	-	-	As,mit		49		
Ld, reqd. (mm)	Bar Dia. / S	pacing (mm)	Provide	e Spacing	*As	t provide	d(mm2/i	m) =	
900	20	126		110		28	56		
	EADTURE				-	HECK FO		D	
	LARTH PR.	OK SHEAK			C	HECK FU	IN STEA	uX.	
	ALCUL ATIONS	LEVEL FROM TOE	EART	TH PR. INT.	ds	(mm) =	34	7	
EARTH PR. C/	ACCOLATIONS	(m)	0	kN/m2)	p% (cr	it.sec) =	0.8	2	
TOP	OF SOIL at STEM	5 00		175	P	FTA v -	2.6	3	
101		5.00			0		5.5		
GWT IN B	AUK HILL, IF ANY	1.80	2	29.71	BET	A,USE=	3.5	1J	
At Critical	Section for Shear	0.96	4	41.11	Tc,	(MPa) =	0.6	0	
			Band	ing Mart @					
COMPONENT	EARTH Pr. (kN)	Vert. DIST. FROM	STEM E	BOT., Mmax					
		STEM BOT. (m)	((kN.m)					
Earth Pr-1	61.96	2.25		139.55					
Earth Dr. 2	20.47	0.40		44.60					
Carut PI-2	29.47	0.40		11.00					
Vu,c (kN) =	91.43	Mu,c (kN.m)=		151.16	Tv,	(MPa) =	0.3	6	
		RCC DESIGN	OF TO	OF					
			-	F# Course	(60			
	W FACE OF W	ALL W FREE END		Ell. Cover,	(mm)	00	, 	Neglec	t loe fill
BASE PR. (kPa	a) 120.23	141.28		DESIG	GN FO	R FLEXU	IRE	itor vvt.	Calc.
SOIL PR. (kPa)) -8.00	-8.00	ŀ	Mx (ki	N.m)=	55.	53	No	
SOIL PR. (kPa) SELF WT.(kPa) -8.00	-8.00		Mx (k)	N.m)= (mm)=	55.	53)	No	•
SOIL PR. (kPa)) -8.00) -15.00	-8.00		Mx (k) D,critical(N.m)= (mm)=	55. 22	53 D	No	
SOIL PR. (kPa SELF WT.(kPa Net (kPa)) -8.00) -15.00 97.23	-8.00 -15.00 118.28	-	Mx (kf D,critical(D,k=1.5, (N.m)= (mm)= (mm)=	55. 22 29	63 0 6	No	Ţ
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE) -8.00) -15.00 97.23 LECT ` D '(mm	-8.00 -15.00 118.28 n) = 400		Mx (k) D,critical(D,k=1.5, (D,k=1.2,(N.m)= (mm)= (mm)= (mm)=	55.0 220 290 324	53 D 5 4	No	
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design) -8.00) -15.00 97.23 LECT ` D '(mm a X-dir (mm2/m	-8.00 -15.00 118.28 n) = 400 n) = 728	-	Mx (k) D,critical(D,k=1.5, (D,k=1.2,(d, (mm)=	N.m)= (mm)= (mm)= (mm)=	55.0 220 290 320 34	63 0 6 4 0	No	T
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design)8.00 -15.00 97.23 LECT ` D '(mm X-dir (mm2/m Bar Dia.	-8.00 -15.00 118.28 a) = 400 b) = 728 / Spacing (mp		Mx (kt D,critical(D,k=1.5, (D,k=1.2,(d, (mm)= `k'=	N.m)= (mm)= (mm)= (mm)=	55. 22 29 32 34 0.7	53 53 5 5 4 0 7	No	•
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design Ld, reqd. (mm) -8.00 -15.00 97.23 LECT ' D '(mm A X-dir (mm2/m) Bar Dia.	-8.00 -15.00 118.28 n) = 400 n) = 728 / Spacing (mn	- 	Mx (kł D,critical(D,k=1.5, (D,k=1.2,(d, (mm)= 'k'=	N.m)= (mm)= (mm)= (mm)=	55. 22 29 32 34 0.7	53 0 5 4 0 2 2	No	•
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design Ld, reqd. (mm) 900) -8.00 -15.00 97.23 LECT ' D '(mm A X-dir (mm2/m Bar Dia. 20	-8.00 -15.00 118.28 a) = 400 b) = 728 / Spacing (mn 431	- - -	Mx (kt D,critical(D,k=1.5, (D,k=1.2,(d, (mm)= 'k'= p %=	N.m)= (mm)= (mm)= (mm)=	55.1 229 320 34 0.7 0.2	63 0 6 4 0 2 2	No	•
SOIL PR. (kPa SELF WT.(kPa Net (kPa) *Ast design Ld, reqd. (mm 900 Provi) -8.00 -15.00 97.23 LECT ' D '(mm a X-dir (mm2/m) Bar Dia. 20 de Spacing	-8.00 -15.00 118.28 () = 400 -) = 728 / Spacing (mn 431 220	- - - -	Mx (kt D,critical(D,k=1.5, (D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r	N.m)= (mm)= (mm)= (mm)=	55.1 229 320 34 0.7 0.2 72	53 5 6 4 0 72 14 8	No	
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design Ld, reqd. (mm) 900 Provi *Ast provi) -8.00 -15.00 97.23 LECT ' D '(mm X-dir (mm2/m) Bar Dia. 20 de Spacing ded(mm2/m) =		n)	Mx (kt D,critical(D,k=1.5, (D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r As,min(mr	N.m)= (mm)= (mm)= (mm)= m= m2/m)	55.1 229 32 34 0.7 0.2 725 48	63 0 6 4 0 72 14 8 0	No	T
SOIL PR. (KPa SELF WT.(KPa Net (KPa) SE *Ast desigr Ld, reqd. (mm 900 Provi *Ast provi) -8.00) -15.00 97.23 LECT ¹ D '(mr 3 X-dir (mm2/m 4 X-dir (mm2/m) 0 Bar Dia. 20 de Spacing ded(mm2/m) =		n)	Mx (kt D,critical(D,k=1.5, (D,k=1.2,(d, (mm)= `k'= p %= Ast mm2/r As,min(mr	N.m)= (mm)= (mm)= (mm)= m= m2/m)	55 220 32 34 0.7 0.2 72 48	53 55 6 4 0 72 14 8 0	No	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi) -8.00) -15.00 97.23 LECT D (mm X-dir (mm2/m) Bar Dia. 20 de Spacing ded(mm2/m) = CHECK	-8.00 -15.00 118.28 a) = 400 a) = 728 / Spacing (mm 431 220 c 1428 CFOR SHEAR	n) =	Mx (kt D,critical(D,k=1.5, (D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r As,min(mr	N.m)= (mm)= (mm)= (mm)= m= m2/m)	55. 22/ 29/ 32/ 34 0.7 0.2' 72: 48	53 55 6 4 0 72 14 8 0	No	
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi) -8.00) -15.00 97.23 LECT D (mm A X-dir (mm2/m) Bar Dia. 20 de Spacing ded(mm2/m) = CHECP i= 0.66		n) =	Mx (kt D,critical(D,k=1.5, (D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408	N.m)= (mm)= (mm)= (mm)= m= m2/m)	55. 22 29 32 34 0.7 0.2 72 48	53 5 5 4 0 2 14 8 0	No	
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi) -8.00 -15.00 97.23 LECT ' D '(mm X-dir (mm2/m) X-dir (mm2/m) 20 de Spacing ded(mm2/m) = <u>CHECF</u> 5 0.66 = 104.39		n) = c) =	Mx (kt D,critical(D,k=1.5, (D,k=1.2,(d, (mm)= `k'= p %= Ast mm2/r Asset mm2/r 408 0.35	N.m)= (mm)= (mm)= m= m2/m)	55. 22/ 29/ 32 34 0.7 0.2' 72/ 48	53 5 6 4 0 2 14 8 0	No	
SOIL PR. (KPa SELF WT.(KPa Net (KPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi Shear Span, Ls Pc,shear (kPa) Vu,c (kN) -8.00) -15.00 97.23 LECT D'(mr AX-dir (mm2/m) X-dir (mm2/m) 20 de Spacing ded(mm2/m) = CHECP = 0.66 104.39 0 = 73.48	-8.00 -8.01 -15.00 118.28)= 400)= 7Spacing (mm 431 220 1428 CFOR SHEAR p% (crit.se BETA	n) = c) = -x =	Mx (kt D,critical(D,k=1.5, (D,k=1.2,(D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r Assection 408 0.35 8.29	N.m)= (mm)= (mm)= m= m2/m)	55. 22/ 29/ 32 34 0.7 0.2' 72: 48	553 56 4 0 72 14 8 0	No	
SOIL PR. (kPa SELF WT. (kPa) Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi Shear Span, Ls Pc,shear (kPa) Vu,c (kN) -8.00) -15.00 97.23 LECT [↑] D '(mr 3 X-dir (mm2/m 4 X-dir (mm2/m) 2 Bar Dia. 20 de Spacing de (mm2/m) = CHECP i= 0.66 104.39 0 = 73.48 0 = 24.75	 -8.00 -8.00 -15.00 118.28 400 a) = 400 a) = 728 / Spacing (mn 431 220 1428 FOR SHEAR BETA BETA, U 	n) = c) = SE=	Mx (kł D,critical(D,k=1.5, (D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2// As,min(mr 408 0.35 8.29 8.29	N.m)= (mm)= (mm)= m= m2/m)	55. 221 29 32 34 0.7 0.2' 72: 48	53 5 5 4 0 7 2 14 8 0	No	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi Shear Span, Ls Pc,shear (kPa) Vu,c (kN Mu,c (kN.m Ty, (MPa)) -8.00) -15.00 97.23 LECT ' D '(mr) Bar Dia. 20 de Spacing ded(mm2/m) = CHECP = 0.66 104.39 = 73.48 = 24.75 = 0.315		n) = c) = SE= a) =	Mx (k1 D,critical(D,k=1.5, (D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 8.29 0.421	N.m)= (mm)= (mm)= m= m2/m)	55. 221 290 322 34 0.7 0.2' 72' 48	553 0 5 4 0 72 14 3 0 0	No	
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi Shear Span, Ls p c,shear (kPa) Vu, c (kN Mu,c (kN.m T v, (MPa) D E SIGN OUT) -8.00) -15.00 97.23 LECT ' D '(mr A'-dir (mm2/m) Bar Dia. 20 de Spacing ded(mm2/m) = CHECP = 0.66 = 104.39 0 = 73.48 = 0.315 PUT FOR DEPTI	 -8.00 -8.00 -15.00 118.28 -9.400 118.28 -9.728 / Spacing (mm 431 220 -1428 -1428 KFOR SHEAR BETA,U TC, (MP HOF STEM & BA 	n) = c) = SE= a) = SE	Mx (k) D,critical(D,k=1.5, (D,k=1.2, (d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 8.29 0.421	N.m)= (mm)= (mm)= m= m2/m)	55. 220 32 34 0.7 0.2 72 48	553 0 5 4 0 72 14 3 0 0	No	
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi Shear Span, Ls p c,shear (kPa) Vu,c (kN.m T v, (MPa) D ESIGN OUT) -8.00) -15.00 97.23 LECT ' D '(mm X-dir (mm2/m) X-dir (mm2/m) 20 de Spacing ded(mm2/m) = CHECP 5 0.66 104.39 0 73.48 0 73.48 0 24.75 PUT FOR DEPTI BWBOT. (m		n) = c) = .x = SE= a) = .SE	Mx (k) D,critical D,k=1.2,(D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 8.29 0.421	N.m)= (mm)= (mm)= (mm)= 1000000000000000000000000000000000000	555 22 29 32 34 0.7 0.2 72 48	553 0 5 4 0 12 14 3 0 0	No	
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design Ld, reqd. (mm, 900 Provi *Ast provi Shear Span, Ls Pc,shear (kPa) Vu,c (kN.m Tv, (MPa) DE SIGN OUT	 → -8.00 → -8.00 → -15.00 97.23 LECT ' D '(mm X-dir (mm2/m) X-dir (mm2/m) 20 de Spacing ded (mm2/m) = CHECH - 0.666 - 104.39 → 73.48 > = 24.75 = 0.315 PUT FOR DEPTI BwBOT, (m 	(11) 100	n) = c) = -x = SE= a) =	Mx (kł) D,critical D,k=1.2, (D,k=1.2, (D,k=1.2, (D,k=1.2, (J,k=1.2, (Mx (mm)= 'k'= P %= Ast mm2/r Ass,min(mr 408 0.35 8.29 0.421 FINAL C	N.m)= (mm)= (mm)= (mm)= mn= m2/m)	55. 22 29 32 34 0.7 0.2 72 48	5 5 4 0 2 2 4 4 3 0	N0	
SOIL PR. (kPa SELF WT. (kPa) Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi Shear Span, Ls Pc,shear (kPa) Vu,c (kN Mu,c (kN.m Tv, (MPa) DE SIGN OUT) -8.00) -15.00 97.23 LECT ` D '(mm X-dir (mm2/m) X-dir (mm2/m) = 20 de Spacing ded(mm2/m) = CHECP = 0.666 = 104.39 > = 2.475 = 0.315 PUT FOR DEPTI BwBOT, (m ess o Base, D (m)	difference -8.00 -15.00 118.28 i) = 728 / Spacing (mm 431 220 1428 KFOR SHEAR b p% (crit.se BETA,U Tc, (MP H OF STEM & BA m) = 410 m) =	n) = c) = -x = SE= a) = .SE	Mx (kł D,critical) D,k=1.2,(D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 8.29 0.421 FINAL E	N.m)= (mm)= (mm)= (mm)= m= m2/m) 4	55. 22 29 32 34 0.7 72 48	5 5 4 0 7 2 14 3 0	No	
SOIL PR. (kPa SELF WT. (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi Shear Span, Ls Pc,shear (kPa) Vu,c (kN Mu,c (kN- Tv, (MPa) DE SIGN OUT) -8.00) -15.00 97.23 97.23 LECT ' D '(mr A'.dir (mm2/m)) Bar Dia. 20 20 ded Spacing ded(mm2/m) = CHECH 0.66 = 0.66 = 0.439 > = 24.75 0.315 PUT FOR DEPTI BwBOT, (m ess of Base, D (m)	-8.00 -8.00 -15.00 118.28 1) = 728 / Spacing (mm 431 220 1428 FOR SHEAR % FOR SHEAR bETA BETA,U Tc. (MP HOF STEM & BA m) = 410 m) = 450 CC DESIGN OF	n) = c) = -x = SE= a) = SE Heel	Mx (kł D,critical, D,k=1.2,(D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 0.421 FINAL E DIM.	N.m)= (mm)= (mm)= (mm)= m= m2/m) 4	555. 222 299 320 34 0.7 0.2 722 48	53 53 65 4 0 22 14 33 0	No	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi Shear Span, Ls Pc,shear (kPa) Vu,c (kN Mu,c (kN- Tv, (MPa) DE SIGN OUT) -8.00) -15.00 97.23 LECT ` D '(mr) Bar Dia.) Bar Dia. 20 de Spacing ded(mm2/m) = CHECP i= 0.66 i= 104.39 i= 24.75 i= 0.315 PUT FOR DEPTI BwBOT, (m ess of Base, D (m)	-8.00 -8.00 -15.00 118.28 0) = 728 / Spacing (mm 431 220 - 431 220 - 431 220 - 431 220 - 431 220 - 431 220 - - 431 220 - - - - - - - - - - - - - - - - - - - - - - - - <	n) = c) = -x = SE= a) = SE Heel	Mx (k) D,critical(D,k=1.5, (D,k=1.2, (d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 0.421: FINAL C DIM.	N.m)= (mm)= (mm)= (mm)= (mm)= 1000000000000000000000000000000000000	555. 222 299 322 34 0.7 0.2 722 48	53 53 65 4 0 2 2 14 3 3 0	No	
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi Shear Span, Ls Dc,shear (kPa) Vu,c (kN Mu,c (kN-m) Tv, (MPa) DE SIGN OUT) -8.00) -15.00 97.23 LECT D (mm a X-dir (mm2/m) Bar Dia. 20 de Spacing ded(mm2/m) = CHECP s= 0.66 s= 104.39 0 73.48 0 24.75 0 24.75		n) = c) = -x = SE= a) = -	Mx (k) D,critical(D,k=1.5, (D,k=1.2, (d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 0.421 FINAL D DIM. DESIGN F6	N.m)= (mm)= (mm)= (mm)= m2/m) 4 2 2 5 8 4 2 5 8 7 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8	55.1 22 29 32 34 0.7 72 48	5 5 4 0 2 2 14 3 0	No	
SOIL PR. (KPa SELF WT. (KPa Net (KPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi Shear Span, Ls Dc,shear (KPa) Vu,c (KN Mu,c (KN.m Tv, (MPa) DE SIGN OUT Overall Thin	 -8.00 -8.00 -15.00 97.23 LECT ' D '(mm a X-dir (mm2/m) a X-dir (mm2/m) a X-dir (mm2/m) = 0 a 20 a 20 a 20 a 20 a 20 a 20 a 20		n) =	Mx (kł D,critical) D,k=1.2,(D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 0.421 FINAL E DIM. DESIGN FC	N.m)= (mm)= (mm)= (mm)= m= m2/m) 4 2 2 5 N - - - - - - - - - - - - - - - - - -	55. 22 29 32 34 0.7 72 48	53 55 4 0 22 14 3 0	No	
SOIL PR. (kPa SELF WT. (kPa) Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi Shear Span, Ls Pc,shear (kPa) Vu,c (kl Mu,c (kl.m Tv, (MPa) DE SIGN OUT Overall Thkn	 -8.00 -8.00 -15.00 97.23 LECT ' D '(mr X-dir (mm2/m) X-dir (mm2/m) 20 de Spacing ded(mm2/m) = CHEC+ 0.66 0.66 0.66 0.66 0.66 9 - 73.48 9 - 73.48	-8.00 -8.00 -15.00 118.28 0) = 400 1) = 400 1) = 728 / Spacing (mm 431 220 1428 CFOR SHEAR BETA,U P% (crit.se BETA,U BETA,U Tc, (MP HOF STEM & BA m) = 450 CC DESIGN OF S7.07	n) =	Mx (kł D,critical) D,k=1.5, (D,k=1.2, (d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 0.421 FINAL E DIM. DE SIGN F(Cover,(mm)	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)=	55. 22 29 32 34 0.7 72 48 48 50 50	53 53 4 0 2 2 14 3 0	No	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi Shear Span, Ls Pc,shear (kPa) Vu,c (kN Mu,c (kN.m Tv, (MPa) DE SIGN OUT Overall Thkn BASE PR. (kPa) SOIL PR. (kPa)) -8.00) -15.00 97.23 97.23 LECT ' D '(mr N.4dir (mm2/m)) Bar Dia. 20 20 de Spacing 0 ded(mm2/m) = CHECH = 0.66 = 104.39 > = 73.48 > = 24.75 = 0.315 PUT FOR DEPTI BwBOT, (m) ess of Base, D (m) @ FACE OF WALL 111.81 -92.00		n) = c) = -x = a) = -x = -x = -x = 	Mx (kł D,critical(D,k=1.5, (D,k=1.2, (d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 0.421: FINAL E DIM. DE SIGN FC Cover,(mm) Mx (kN.m)=	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)=	55.1 22 29 32 34 0.7 0.2 72 48 48 5 5 60 163.46	Negleine	No to treat	
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi Shear Span, Ls Pc,shear (kPa) Vu, c (kN Mu,c (kN, (MPa) DE SIGN OUT Overall Thkn BASE PR. (kPa) SOIL PR. (kPa)) -8.00) -15.00 97.23 LECT ' D '(mr a X-dir (mm2/m)) Bar Dia. 20 de Spacing ded(mm2/m) = CHECP i= 0.66 = 104.39 0 - 73.48 0		n) = c) = .x = SE = a) = .sE = .x = Eff. c	Mx (kł D,critical(D,k=1.5, (D,k=1.2, (D,k=1.2, (J,k=1.2, (J,k=1	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)=	55. 22 29 32 34 0.7 72 48 5 5 5 6 6 6 163.46 330	Negler compc	t vert.	3
SOIL PR. (KPa SELF WT.(KPa Net (KPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi Shear Span, Ls p c,shear (kPa) Vu,c (kN, Mu,c (kN,m Tv, (MPa) DESIGN OUT Overall Thkn SOIL PR. (KPa) SOIL PR. (KPa) Net (KPa)) -8.00) -15.00 97.23 LECT ' D '(mm A'-dir (mm2/m) 20 de Spacing ded(mm2/m) = CHECP 5 0.66 = 104.39 0 73.48 0 73.48 0 24.75 PUT FOR DEPTI BWBOT, (m ess of Base, D (m R(PUT FOR DEPTI BWBOT, (m) 0 FACE OF WALL 111.81 -92.00 -15.00 4.81		n) = c; = SE= a) = SE Heel	Mx (kł D,critical(D,k=1.2, (D,k=1.2, (D,k=1.2, (J,k=1.2, (J,k=1	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= ((mm)=	55. 22 29 32 34 0.7 72 48	Neglet romposition Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet N	t vert. el Dan	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi) -8.00) -15.00 97.23 LECT D (mm A X-dir (mm2/m) A X-dir (mm2/m) D Bar Dia. 20 de Spacing ded(mm2/m) = CHECP = 0.66 = 0.66 = 0.66 = 0.66 = 0.66 = 0.66 = 0.67 = 0.68 = 0.	-8.00 -8.00 -15.00 118.28 a) = 7592000 118.28 / Spacing (mm) 431 220	m) = c) = -x = SE= a) = SE Eff. C D,cr D,cr	Mx (kł D,critical D,k=1.2,(D,k=1.2,(D,k=1.2,(D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r Ass.min(mr 408 0.35 8.29 0.421 FINAL E DIM. DE SIGN F(Cover,(mm) Mx (kN.m)= Titical(mm)= =1.5, (mm)=	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)=	55. 22 29 32 34 0.7 72 48 52 60 163.46 330 464 512	53 53 0 5 4 0 2 14 3 0 0	No No tret. net of P: el Dsn	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi Shear Span, Ls Pc,shear (kPa) Vu,c (kN Mu,c (kN, Mu,c (kN, Mu,c (kN, Mu,c Vu,c (kN, Mu,c (kN, Mu,c)) DE SIGN OUT Overall Thkn Overall Thkn BASE PR. (kPa) SOIL PR. (kPa) SELF WT.(kPa) Net (kPa)	→ -8.00 → -15.00 97.23 JECT ' D '(mr A'dir (mm2/m) 3 A'dir (mm2/m) 20 de Spacing ded(mm2/m) = CHECH 0.66 = 104.39 > = 73.48 > = 24.75 = 0.315 PUT FOR DEPTI BwBOT, (m ess of Base, D (m (#) FACE OF WALL 111.81 -92.00 -15.00 4.81 CT D (mm) =		m) = c) = -x = SE= a) = SE= b,cr D,cr D,cr D,cr d, d	Mx (kł D,critical(D,k=1.5, (D,k=1.2, (DE SIGN FC Cover, (mm) Mx (kN.m)- -1.5, (mm)- -1.5, (mm)- -1.5, (mm)-	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= ((mm)=	55. 22 29 32 34 0.7 72 48 48 52 52 52 53 55 55 55 55 55 55 55 55 55 55 55 55	Negleickie Negleickie Negleickie Negleickie Negleickie No	No ct vert. onet of Pri- el Dsn	
SOIL PR. (kPa SELF WT.(kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi BASE PR. (kPa) SOIL PR. (kPa) SELF WT.(kPa) Net (kPa)) -8.00) -15.00 97.23 LECT ' D '(mr a X-dir (mm2/m)) Bar Dia. 20 de Spacing ded(mm2/m) = CHECP = 0.66 = 104.39 0 = 73.48 0 = 73.48 0 = 73.48 0 = 24.75 = 0.315 PUT FOR DEPTI BWBOT, (m ess of Base, D (m R(CHECP) = 75.00 -15.00 4.81 CT ' D '(mm) = 75.00		n) = c) = -x = SE = SE = Eff. C D,cr D,k ⁴ D,k d, (m	Mx (kł D,critical(D,k=1.2,(J,k=1.2,(J,k=1.2,(J,k=1.2,(<td>N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)=</td> <td>55. 22 29 32 34 0.7 72 48 5 5 5 5 6 0 163.46 330 464 512 390</td> <td>Negler compc No Negler Compc No</td> <td>No No tvert. Pl Dsn s</td> <td></td>	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)=	55. 22 29 32 34 0.7 72 48 5 5 5 5 6 0 163.46 330 464 512 390	Negler compc No Negler Compc No	No No tvert. Pl Dsn s	
SOIL PR. (KPa SELF WT.(KPa Net (KPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi Shear Span, Ls pc,shear (kPa) Vu,c (kI, Mu,c (kI,m Tv, (MPa) DE SIGN OUT Overall Thkn Overall Thkn SOIL PR. (KPa) SOIL PR. (KPa) SELF WT.(KPa) Net (KPa) SELF WT.(KPa) SELF WT.(KPa)	 -8.00 -8.00 -15.00 97.23 LECT ' D '(mm X-dir (mm2/m) Z0 de Spacing ded(mm2/m) = CHECP 0.66 104.39 2.4.75 2.4.75 2.4.75 2.4.75 DT FOR DEPTI BWBOT, (m es of Base, D (m R(9.2.00 -15.00 4.81 CT ' D '(mm) = Gar Da, (m) = Ta Tia, (m) = Ta Tia, (m) = Ta Tia, (m) = 		n) =	Mx (kł D,critical(D,k=1.2,(J,k=1.2,(J,k=1.2,(J,k=1.2,(<td>N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= ((mm)=</td> <td>55. 22 29 32 34 0.7 72 48</td> <td>Negler Torrection Negler Torrection</td> <td>No ttvert. el Dsn</td> <td></td>	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= ((mm)=	55. 22 29 32 34 0.7 72 48	Negler Torrection Negler Torrection	No ttvert. el Dsn	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi *Ast provi Uu,c (kH Mu,c (kH SELF *Ast design) Ld, reqd. (mm) 720) -8.00) -15.00 97.23 LECT ' D '(mr A'		n) = c) = SE = a) = SE = b, c Eff. C D, c D, c b, c b, c b, c b, c c a, c c c c c c c c c c c c c c c c c c c	Mx (kł Mx (kł D,critical D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r Ass mm2/r Ass.min(mr 408 0.35 8.29 0.421 FINAL E DIM. DE SIGN FC Cover,(mm) Mx (kN.m)= -1.5, (mm)= -1.5, (mm)=	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= ((mm)=	55. 22 29 32 34 0.7 0.2 72 48	53 53 6 4 0 2 14 3 0 0 14 3 0 0	No t vert. Innet of P:	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi Shear Span, Ls Dc,shear (kPa) Vu,c (kN Mu,c (kN, Mu,c (kN, Mu,c (kN, Mu,c SIGN OUT Overall Thkn Overall Thkn SOIL PR. (kPa) SELF WT.(kPa) SELF WT.(kPa) Net (kPa) SELF WT.(kPa) Net (kPa) SELF WT.(kPa)	→ -8.00 → -15.00 97.23 JECT ' D '(mm) A X-dir (mm2/m) - A X-dir (mm2/m) - A Zon - ded Spacing - ded(mm2/m) = - CHECH - = 0.66 = 104.39 > = 73.48 = 24.75 = 0.315 PUT FOR DEPTI BwB07, (m) ess of Base, D (m) - (@ FACE OF WALL 111.81 -92.00 - -15.00 4.81 CT ' D (mm) = - (dir (mm2/m) = - Bar Dia, / S 16 Spacing -		n) = c) = .x = SE= a) = .x = SE E Eff. C D,k* D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C D,k* C C C D,k* C C C C D,C C D C C C C C C C C C C C C	Mx (kł D,critical D,k=1.2, (D,k=1.2, (D,k=1.2, (D,k=1.2, (D,k=1.2, (D,k=1.2, (Mx (kl.m)= D,k=1.2, (D,k=1.	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= ((mm)= (mm))	55. 22 29 32 34 0.7 0.2 72 48 48 52 52 60 163.46 330 464 512 390 1.61 0.492 1919 540	S3 S3 S4 0 2 14 3 0 Negleta Compco Compco Compco No	No ct vert. onet of Pro-	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SELF WT. (kPa General Section of the sectio) -8.00) -15.00 97.23 LECT D (mm a X-dir (mm2/m) = 20 de Spacing ded(mm2/m) = CHECP i= 0.66 i= 104.39 0 = 73.48 0 = 24.75 = 0.315 PUT FOR DEPTI BwB0T, (m ess of Base, D (m R(CHECP) = 0.315 PUT FOR DEPTI BwB0T, (m ess of Base, D (m) -15.00 4.81 CT D (mm) = C-dir (mm2/m) = Bar Dia, 5 16 Spacing ed(mm2/m) =		n) = c) = -x = -x = SE = a) = SE = B B Eff. C D,cr D,cr D,cr D,cr D,cr A,st n A,st n A,st n	Mx (kl, m)- Mx (kl, m)- (mm)- (k-1,2,((mm)- (k-1,2,((mm)- (k-1,2,((k-1,2,((k-1,2,((mm)- (k-1,2,((k-1,2,((k-1,2,((k-1,2,((mm)- (itical((mm)- (itical((mm)- (itical((mm)- (itical((mm)- (itical((itical(<	A. (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= ((mm)= (m	55. 22 29 32 34 0.7 72 48 50 51 51 51 51 51 51 51 51 51 51 51 51 51	Neglet compc	No tvert.	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SELF WT. (kPa 'Ast design Ld, reqd. (mm 900 Provi *Ast provid Shear Span, Ls Pc,shear (kPa) Uu, c (kN Mu,c (kN-m Tv, (MPa) DE SIGN OUT Overall Thkn Overall Thkn SOIL PR. (kPa) SOIL PR. (kPa) SELF WT. (kPa) Net (kPa) SELF WT. (kPa) SELF WT. (kPa) SELF WT. (kPa) SELF WT. (kPa)) -8.00) -15.00 97.23 LECT ' D '(mr a X-dir (mm2/m) = 20 de Spacing ded(mm2/m) = CHECP = 0.66 = 104.39 0 = 73.48 0 = 73.48 0 = 73.48 0 = 24.75 = 0.315 PUT FOR DEPTI BWBOT, (m ess of Base, D (m R(CHECP - 10, 0) -15.00 4.81 cT ' D '(mm) = Cdir (mm2/m) = Bar Dia, / S 16 : spacing cdir(mm2/m) =		n) = c) = .x = SE= SE= Eff. C D,cr D,k' d, (m D,k' k'= p%= Ast.m As.m	Mx (kł D,critical(D,k=1.2, (D,k=1.2, (J,k=1.2, (J,k=1	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)=	55. 22 29 32 34 0.7 72 48 51 51 51 51 51 51 51 51 51 51 51 51 51	Neglet competition No	No No el Dsn S	
SOIL PR. (kPa SELF WT. (kPa) Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi Shear Span, Ls Pc, shear (kPa) Vu,c (kN Mu,c (kN.m Tv, (MPa) DE SIGN OUT Overall Thkn Overall Thkn SOIL PR. (kPa) SOIL PR. (kPa) SOIL PR. (kPa) SELE *Ast design J Ld, reqd. (mm) 720 Provide *Ast provide) -8.00) -15.00) 97.23 LECT ' D '(mm X-dir (mm2/m)) Bar Dia.) Bar Dia. 20 de de Spacing ded(mm2/m) = CHECP 0.66 = 104.39 > 73.48 > 24.75 PUT FOR DEPTI BWBOT, (m ess of Base, D (m @ FACE OF WALL 111.81 -92.00 -15.00 4.81 CCT ' D '(mm) = Gar Dia. / S 16 Spacing cdir (mm2/m) = CHECK F 2.40		n) = c) = .x = SE = SE = SE = D,cr D,cr D,cr D,cr Ast n Ast n Ast n	Mx (kł D,critical(D,k=1.2,(D,k=1.2,(J,k=1.2,(J,k=1.2,(J,k=1.2,(<td>N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= ((mm)=((mm)=((mm)=((mm))</td> <td>55. 22 29 32 34 0.7 72 48</td> <td>Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet</td> <td>tt vert. el Dan</td> <td></td>	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= ((mm)=((mm)=((mm)=((mm))	55. 22 29 32 34 0.7 72 48	Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet Neglet	tt vert. el Dan	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi Shear Span, Ls Dc,shear (kPa) DE SIGN OUT Overall Thkn Overall Thkn SOIL PR. (kPa) SOIL PR. (kPa) SOIL PR. (kPa) SELF WT.(kPa) Net (kPa) SELF WT.(kPa) SELF WT.(kPa) S) -8.00) -15.00 97.23 JECT ' D '(mr) Bar Dia.) Bar Dia.) Bar Dia. 20 ded(mm2/m) = CHECH CHECH = 0.66 = 0.64 = 0.439 = 73.48 = 24.75 = 0.315 PUT FOR DEPTI BwBOT, (m ess of Base, D (m QFACE OF WALL 111.81 -92.00 -15.00		n) = 	Mx (kł D,critical(D,k=1.5, (D,k=1.2, (J,k=1.2, (d, (mm)= 'k'= p %= Ast mm2/r Ast mm2/r Ass,min(mr 408 0.35 8.29 0.421 FINAL E DIM DE SIGN FC Cover,(mm) Mx (kN.m)= nm2/m= nm2/m= nin(mm2/m) 413 0.37	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= ((mm)=((mm)=)((mm)	55. 22 29 32 34 0.7 0.2 72 48 51 51 51 330 464 512 330 1.61 0.492 1919 540	Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Negleich Neglei	No tvert. Inter of P el Dsn	a 2
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SELF WT. (kPa General Section of the section Shear Span, Ls Pc,shear (kPa) DE SIGN OUT Overall Thkn SOIL PR. (kPa) SOIL PR. (kPa) SELF WT. (kPa) Shear Span, Ls Pc,shear (kPa) Vu, c (kH)) -8.00) -15.00 97.23 LECT D (mm a X-dir (mm2/m) = 20 de Spacing ded(mm2/m) = CHECF i= 0.66 i= 104.39 0 = 73.48 0 =		n) = c) = -x = SE= a) = SE SE Heel	Mx (kł D,critical(D,k=1.2, (D,k=1.2, (D,k=1.2, (J,k=1.2, (J,k=1	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)=	55. 22 29 32 34 0.7 72 48 54 51 540 55 540	Neglet compc	No tvert. el Dsn	
SOIL PR. (kPa) SELF WT. (kPa) Net (kPa) SELF WT. (kPa) Context (kPa) Shear Span, Ls Pc,shear (kPa) DE SIGN OUT DE SIGN OUT DE SIGN OUT DE SIGN OUT DE SIGN OUT DE SIGN OUT Coverall Thkn Self WT. (kPa) SOIL PR. (kPa) SELF WT. (kPa) Shear Span, Ls- Pc,shear (kPa) Mu,c. (kIkm)) -8.00) -15.00) 97.23 LECT ' D '(mm X-dir (mm2/m)) Bar Dia.) Bar Dia.) CHECH) Bar Dia.) CHECH) CHECH = 0.66 = 104.39 > -73.48 > = > 0.315 PUT FOR DEPTI BwBOT, (m ess of Base, D (m R(@ FACE OF WALL 111.81 -92.00 -15.00 -15.00 4.81 CCT ' D '(mm) = Cdir (mm2/m) = Bar Dia. / S 16 * spacing 0d(mm2/m) = CHECK F 2.40 0.00 -94.07 -413.89 -40.7		n) = c) = .x = SE SE Eff. C D,cr D,kr d, (m kr= p,kr= Ast n Ast n Ast n	Mx (kł D,critical) D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 0.421: FINAL E DE SIGN FC Cover,(mm) Mx (kl.m)- titical(mm)= -1.2,(mm)= -1.2,(mm)= -1.2,(mm)= -1.2,(mm)=	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)=((mm)=)((mm)=	55. 22 29 32 34 0.7 72 48 52 52 60 163.46 330 464 512 390 1.61 0.492 1919 540	Neglet compc	No No el Dsn	
SOIL PR. (kPa SELF WT. (kPa Net (kPa) SE *Ast design Ld, reqd. (mm 900 Provi *Ast provi Shear Span, Ls Pc,shear (kPa) Uu,c (kl Mu,c (kl,m Tv, (MPa) SELF *Ast design J SOIL PR. (kPa) SOIL PR. (kPa) SOIL PR. (kPa) SELF WT. (kPa) Shear Span, Ls- Pc,shear (kPa) Vu,c (kl) m Vu,c (kl) m Vu,c (kl) m Vu,c (kl) m Vu,c (kl) m) -8.00) -15.00 97.23 LECT ' D '(mr A'-dir (mm2/m)) Bar Dia. 20 de Spacing ded(mm2/m) = CHECK PUT FOR DEPTI BW80T, (m es of Base, D (m (mm2/m) = CHECK F Bar Dia. / S 16 Spacing ed(mm2/m) = CHECK F 2.40 0.00 -9.407 -9.407 -9.40		n) = c) = .x = SE = a) = .x = SE = B. Eff. C D,cr D,cr D,cr C D,cr Ast n Ast n Ast n	Mx (kł D,critical(D,k=1.2,(D,k=1.2,(d, (mm)= 'k'= p %= Ast mm2/r As,min(mr 408 0.35 8.29 0.421 FINAL E DE SIGN FC Cover,(mm) Mx (kN.m)- itical(mm)= -1.5, (mm)- -1.5, (mm)- m)= nm2/m= nin(mm2/m) 413 0.37 7.74 0.43	N.m)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)= (mm)=((mm)=((mm)=)((mm)=((mm))	55. 22 29 32 34 0.7 72 48	Neglet Neglet Neglet Neglet No	t vert. net of P: el Dsn	

Earth pressure for shear								
ht	Ka*y*Z		TOTAL E P	moment				
z1	1.75	5.24	17.54					
22	22.72	22.72						
z3	22.72		47.83	44.12				
z4	35.62		18.06	11.10				
			107.39	175.93				
		Z	1.6	38				
		EARTH PRESSURE PV	18.65	74.59				
ht	Ka*y*Z		TOTAL E P	moment				
z1	1.75		5.24	17.54				
z2	29.71		27.96	84.21				
3.00	26.21		1.75	2.64				
z4	26.21		48.36	44.62				
z5	32.66		5.95	3.66				
z6	50.66		16.20	9.72				
			105.47	162.39				
	EARTH PRESSURE WITH	WATER TABLE Ph	103.86	159.92				
		Z	1.5	40				
	EARTH PRESSURE WITH	WATER TABLE Pv	18.31	73.26				

Fig 24 Design of model 1	by Excel	worksheet
--------------------------	----------	-----------

Methods	Ka	wt of soil	wt of conc.	PA	PH	PV	MR	МО	FOS OTM	FOS SLD	Pmax	Ke y Ht.
Geo-5 (Mazindrani	0.355	251.12	114.5	168.89 28.8	166.33 28.8	29.32	1010.1	323.52	3.12	1.55	121.19	0.6
Geo-5 (Coulomb)	0.343 0.343 0.34 0.34	251.12	114.5	162.27 28.8	144.34 28.8	74.61	1179.6	276.96	4.26	2.01	113.56	0.6
Geo-5 (Muller Breslau)	0.343 0.343 0.34 0.34	251.12	114.5	162.27 28.8	129.94 28.8	74.61	1179.6	276.96	4.26	2.01	113.56	0.6
Geo-5 (Caquot- Kérisel)	0.354 0.354 0.353 0.353	251.12	114.5	167.98 28.8	149.42 28.8	76.73	1189.1	285.74	4.16	1.95	114.17	0.6
Geo-5 (Absi)	0.353 0.353 0.342 0.342	251.12	114.5	165.91 28.8	147.51 28.8	75.93	1186.5	284.48	4.17	1.97	114.52	0.6
Classical (Rankine)	0.35	251.12	1 <mark>14.5</mark>	158.64	156.22	27.54	1011.3	321.75	3.14	1.58	147.55	0.6
Classical (coulomb)	0.34	251.12	11 <mark>4.5</mark>	<mark>15</mark> 4.57	145.24	52.8 <mark>3</mark>	1112.5	298.49	3.72	1.78	126.19	0.6
Excel worksheet (Rankine)	0.35	251.12	105.5	158.38	155.97	27.5	1003.9	321.19	3.39	1.55	141.08	0.1
Excel worksheet (coulomb)	0.34	251.12	105.5	154.5	145.18	52.8 <mark>4</mark>	1105.3	298.38	3.92	1.55	119.85	0.0
RetainPro (Rankine)	0.35	300	114.5	166.82	164.29	36.67	1095.1	330.55	3.31	1.86	132.9	0.6
RetainPro (Coulomb)	0.34	300	114.5	161.71	159.26	34.77	1087.6	319.15	3.4	1.92	129.5	0.6

Table 5 Results of Model 1 Using Different Softwares



Fig 25 Graphical Representation of FOS OTM results by diff. Software (Model 1)



Fig 26 Graphical Representation of FOS SLD results by diff. Software (Model 1)



Fig 27 Graphical Representation of Max Base Pressure results by diff. Software (Model 1)

Model 2

Table 6 Data of Model 2	
Wall Height, Hc	5.00 m
Depth below G, Df	1.00 m
Surcharge, q	10 kN/m ²
Backfill inclination, β	15 degree
GWT depth, Dw	0.0 m
Backfill	
Unit weight, γ	18 kN/m ³
Cohesion, C	0 kN/m^2
Angle of internal friction, ϕ	30 deg
Angle of wall friction, δ	20 degree
SBC of soil	220 kN/m ²
Water density	10 kN/m ³
Coefficient of friction	0.5
Grade of Concrete	M20
Grade of Steel	Fe415



Fig 28 Geometry of Retaining wall (Model 2)

Methods	Ka	wt of	wt of	PA	PH	PV	MR	MO	FOS	FO	Pmax	Key
		soil	conc.						OTM	S		Ht.
										SL		
										D		
Geo-5	0.386	269.02	113.57	213.18	205.92	55.17	1190.2	418.17	2.85	1.6	139.29	0.6
(Mazindra												
ni)												
Geo-5	0.376	269.02	113.57	206.14	183.34	94.21	1340.8	366.03	3.66	2.01	129.67	0.6
(Coulomb)	0.371											
(coulonic)	0.371											
Geo-5	0.376	269.02	113.57	206.14	183.34	94.21	1340.8	366.03	3.66	2.01	129.67	0.6
(Muller	0.371											
Breslau)	0.371											
Geo-5	0.388	269.02	113.57	213.25	189.69	97.42	1352.6	377.78	3.58	1.94	131.33	0.6
(Caquot-	0.385											
Kerisel)	0.385	2 (0, 02	110.57	210.57	107.00	06.05	1040.1	075.57	2.50	1.07	120.04	0.6
Geo-5	0.386	269.02	113.57	210.57	187.22	96.35	1349.1	375.57	3.59	1.97	130.94	0.6
(Absi)	0.374											
	0.374	260.00	110.57	175 5	1 (0 51	45.40	1170.2	405.22	0.00	1.50	166.0	0.6
(Danking)	0.373	269.02	113.57	1/5.5	169.51	45.42	11/0.3	405.33	2.88	1.56	100.8	0.6
(Rankine)	0.271	260.02	112 57	174 50	164.05	50.7	1227.5	202.26	2.12	1.66	1547	0.6
Classical	0.371	269.02	115.57	1/4.58	104.05	59.7	1227.5	392.20	5.15	1.00	154.7	0.6
(coulonid)	0.272	260.02	107.25	175.5	160 51	15 12	1162.1	105 22	2.07	1 5 5	162 50	0.2
Excel	0.575	209.02	107.25	175.5	109.31	43.42	1105.1	405.55	2.87	1.55	105.52	0.2
(Panking)								-				
(Kalikile)	0.371	260.02	107.25	174.58	164.05	50.7	1220.3	302.26	3 1 1	1 55	151 47	0.0
worksheet	0.371	209.02	107.25	1/4.30	104.05	39.1	1220.5	392.20	5.11	1.55	131.47	0.0
(coulomb)												2
Reatain	0.373	275	113.5	176 //	170.43	40.27	1107.8	/08.37	2 71	1.74	156.7	0.6
pro	0.575	215	115.5	170.44	170.45	40.27	1107.0	400.57	2.11	1.	150.7	0.0
(Rankin)										-		
Reatain	0.371	275	113.5	176.45	170.44	38.89	1102.3	408.39	2.69	1.73	157.4	0.6
pro		S							C V			
(coulomb)		R 31				× ×		1				
RETWAL	-	275	113.5	159.81	154.37	41.36	990.4	332.8	2.97	1.68	160	0.6
L						N. 1	_					

Table7 Results of Model 2 Using Different Softwares



Fig 29 Graphical Representation of FOS OTM results by diff. Software (Model 2)





VI. RESULT AND DISCUSSION

For Model 1 result among all earth pressure theories of Geo-5, Coulomb's and Muller Breslau theory gives higher FOS for overturning moment is $4.26 \ge 1.55$ and Mazindrani theory gives lesser FOS for sliding $1.55 \ge 1.55$. Among all softwares and their respective earth pressure theories, the most conservative maximum base pressure is 113.56 kN/m² which is obtained by Geo-5 software using Coulomb and Muller Breslau's earth pressure theory. For model 2 result among all earth pressure theories of Geo-5, Coulomb's and Muller Breslau theory gives higher FOS for overturning moment is $3.66 \ge 1.55$ and Mazindrani theory gives lesser FOS for sliding $1.6 \ge 1.55$. Among all softwares and their respective earth pressure theories, the most conservative maximum base pressure theories is 129.67 kN/m^2 which is obtained by Geo-5 software using Coulomb and Muller Breslau's earth pressure theory the results obtained are as satisfactory as classical earth pressure theories.

REFERENCES

- [1] Kerisel, Absi: Active and passive Earth pressure tables, 3rd ed., Balkema, 1990 ISBN90
- [2] Bowles, J.E. (1977) Foundation Analysis and Design, McGraw-Hill, New York.
- [3] Venanzio R.Greco, Stability of retaining walls against overturning. Journal of Geotechnical and Geoenvironmental engineering (Aug. 1997).p.p. 778-780
- [4] Mazindrani Z.H., Ganjali M H.1997. Lateral earth pressure problem of cohesieve backfill with inclined surface. Journal of geotechnical and Geo-Environmental engineering. ASCE,123(2):110-112
- [5] Arnold Verruijit: Soil mechanics, Delft University of Technology, 2001, 2006. http://geo.verruijt.net/
- [6] Reinforced concrete Vol 1 by Dr. H J Shah. (Elementry Reinforced Concrete)
- [7] Soil Mechanics in Engineering Practice, John Wiley And Sons, Inc, New York, Terzaghi, K. And Ralph.B.Peck (1967)
- [8] Soil Mechanics and foundation engineering by A S Rao and Gopal Ranjan.
- [9] Soil Mechanics and foundation engineering by V N S Murthy.
- [10] Soil Mechanics and foundation engineering by Braja M Das.
- [11] Shenbaga R Kaniraj (1988) Design aids in soil mechanics and foundation Engineering, Tata McGraw-Hill, Publishing Company Limited, New Delhi.