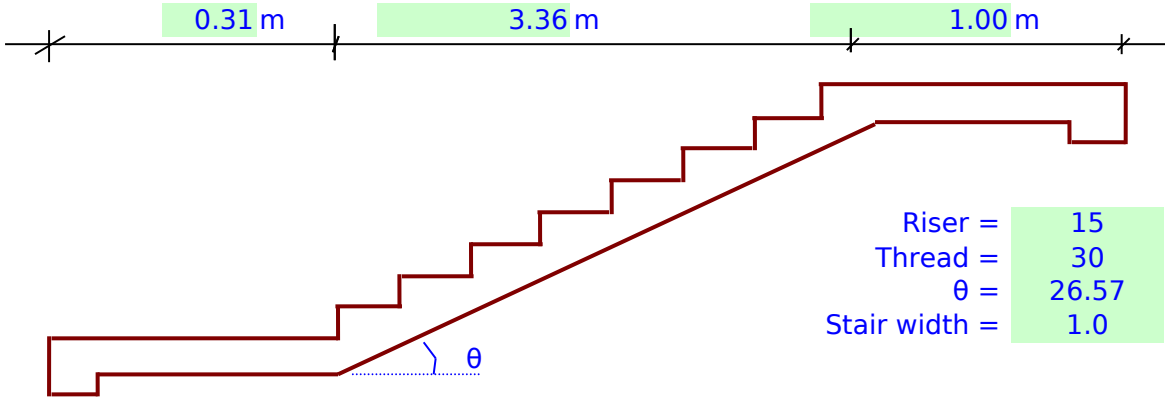
C-25 Km	S-300 Ks
19.00	3.95
20.00	3.96
21.00	3.96
22.00	3.97
23.00	3.98
24.00	3.98
25.00	3.99
26.00	4.00
27.00	4.02
28.00	4.03
29.00	4.04
30.00	4.05
31.00	4.06
32.00	4.07
33.00	4.08
34.00	4.09
35.00	4.10
36.00	4.11
37.00	4.12
38.00	4.15
39.00	4.17
40.00	4.18
41.00	4.20
42.00	4.21
43.00	4.24
44.00	4.26
45.00	4.29
46.00	4.31
47.00	4.34
48.00	4.36
49.00	4.39
50.00	4.41
51.00	4.46
52.00	4.49
53.00	4.51
54.00	4.56
55.00	4.62
56.00	4.65
57.00	4.67
58.00	4.73

Project :				**Page :**
Client :				**Designed By :**
Project No. :		**Date :**	**2007**	**Checked By :**

Stair No. 1



Riser =	15
Thread =	30
θ =	26.57
Stair width =	1.0

Materials Used:

Concrete:	**C-25**	f_u =	25
Steel:	**S-300**	f_{yk} =	300

Constants:

γ_c =	1.50	f_{cd} =	11.33	m =	28.77
γ_s =	1.15	f_{ctd} =	1.03	c_1 =	0.09
f_{ck} =	20	f_{yd} =	260.87	c_2 =	3002.34

DepthUsed:

$$d = \left(0.4 + 0.6\frac{f_{yk}}{400}\right)\frac{L_x}{\beta_a}$$

β_a = **24** **(EBCS 2 - 5**

Required d = 165.40 Provided d = **157.00**

D = **180**

Loading:

Dead load at Stair:

- Own wt. of slab (Inclined) =	5.03	KN/m	
- Due to steps per unit run =	1.88	KN/m	
- 3cm cement screed =	0.69	KN/m	
- 3cm terrazzo floor finish =	0.69	KN/m	
On thread =	1.38	KN/m	
On riser =	0.43	KN/m	
- 1.5cm plastering =	0.39	KN/m	
Total Dead Load on Stair	**9.10**	**KN/m**	
- Live load =	3.00	KN/m²	
Live load per unit meter =	**3.00**	**KN/m**	

Design Load = 1.3DL + 1.6LL
= **16.63 KN/m**

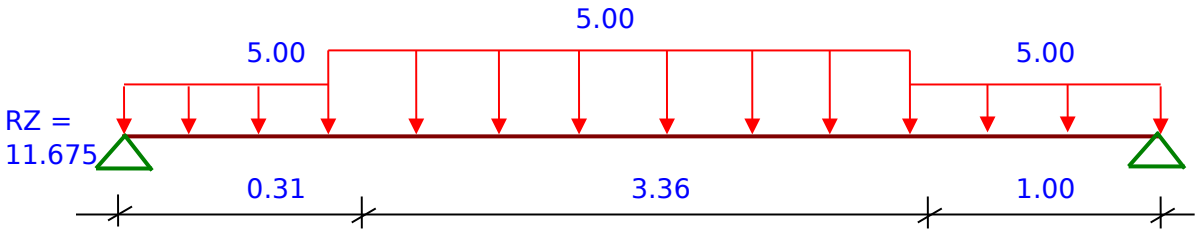
Dead load at Landing:

- Own wt. of slab	=	4.50	KN/m
- 3cm cement screed	=	0.69	KN/m
- 3cm terrazzo floor finish	=	0.69	KN/m
- 1.5cm plastering	=	0.35	KN/m
		6.22	**KN/m**

- Live load = 5.00 KN/m²
Live load per unit meter = **5.00 KN/m**

Design Load = 1.3DL + 1.6LL
= **16.09 KN/m**

Modeling



Design actions

Design Moment = 13.631 KNm
Design Shear = 11.675 KN

Check for Deflection

$$\Delta_{max} = \frac{5wL^4}{384EI}$$

w = 12.10 KN/m
L = 4.67 m
E = 29.0 Gpa
I = 0.0005 m⁴

= 5.31826 mm

- According to EBCS-2 Sec. 5.2.2 The final deflection shall not exceed the va

$$\delta = \frac{L_e}{200} = 23.35 \text{ mm}$$ **OK!**

Check for Shear Capacity

$$V_c = 0.25 f_{ctd} k_1 k_2 b_w d$$

f_{ctd} = 1.03
K_1 = 1.06

ρ_{min} = 0.00125

K_2= 1.44

Calculated Shear Capacity, V_c = 62.07 **OK!**

Reinforcement calculation

Φ = 16

M = 13.63 KNm

K_m = 24 K_s = 3.98 A_s = 345.25 mm^2

Spacing Required	**Use**	**Φ =**	**16**	**@**	**300**	**mm**
	Use	**Φ =**	**16**	**@**	**160**	**mm**

- According to EBCS-2 Sec.7.2.2.2 the ratio of the secondary reinforcement t
main reinforcement shall be at least equal to 0.2. Thus transverse reinforc

A_s = 314.00

Φ = **8**

Spacing Required	**Use**	**Φ =**	**8**	**@**	**160**	**mm**

cm
cm
º
m

Simply Supported	End Spans	Interior Spans	Cantilevers
20.00	**24.00**	**28.00**	**10.00**

.2.3)

Not Good

RZ =
11.675

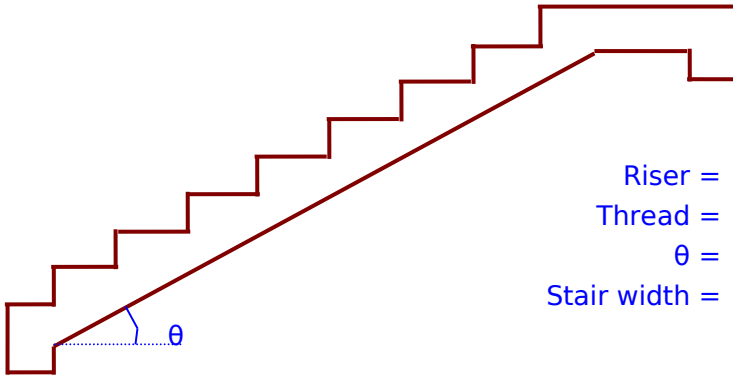
lue:

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ement:

Project :				
Client :				**Desig**
Project No. :		**Date :**	**2011**	**Chec**

Stair No. 1

0.00 — 2.73 m — 1.40



Riser =
Thread =
θ =
Stair width =

Materials Used:

Concrete: **C-25** f_u= 25
Steel: **S-300** f_{yk}= 300

Constants:

γ_c= 1.50	f_{cd}= 11.33	m=
γ_s= 1.15	f_{ctd}= 1.03	c_1=
f_{ck}= 20	f_{yd}= 260.87	c_2=

DepthUsed:

$$d = \left(0.4 + 0.6\frac{f_{yk}}{400}\right)\frac{L_x}{\beta_a}$$

β_a = **24**

Required d = 146.27

Provided d = D= **170**

Loading:

Dead load at Stair:

- Own wt. of slab (Inclined) =	5.23	KN/m
- Due to steps per unit run =	2.06	KN/m
- 3cm cement screed =	0.69	KN/m
- 3cm terrazzo floor finish =	0.81	KN/m
On thread =	1.65	KN/m
On riser =	0.63	KN/m
- 1.5cm plastering =	0.42	KN/m
Total Dead Load on Stair	**10.00**	**KN/m**
- Live load =	3.00	KN/m²

Live load per unit meter = **3.30** **KN/m**

Design Load = 1.35DL + 1.5LL
= **18.45** **KN/m**

Dead load at Landing:

- Own wt. of slab = 4.68 KN/m
- 3cm cement screed = 0.76 KN/m
- 3cm terrazzo floor finish = 0.89 KN/m
- 1.5cm plastering = 0.38 KN/m

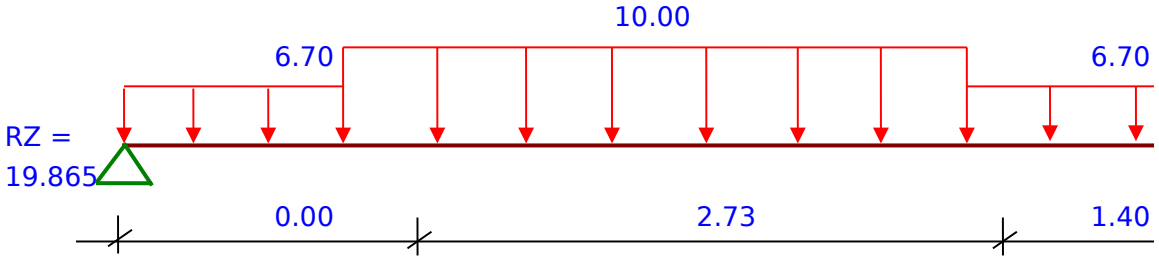
6.70 **KN/m**

- Live load = 3.00 KN/m²

Live load per unit meter = **3.30** **KN/m**

Design Load = 1.35DL + 1.5LL
= **14.00** **KN/m**

Modeling



Design actions

Design Moment = 16.63561 KNm
Design Shear = 19.865 KN

Check for Deflection

$$\Delta_{max} = \frac{5wL^4}{384EI}$$

w = 13.30 KN/m
L = 4.13 m
E = 29.0 Gpa
I = 0.00045 m⁴

= 3.85724 mm

- According to EBCS-2 Sec. 5.2.2 The final deflection shall not exceed t

$$\delta = \frac{L_e}{200}$$ = 20.65 mm **OK!**

Check for Shear Capacity

$$V_c = 0.25 f_{ctd} k_1 k_2 b_w d$$

f_{ctd} = 1.03 ρ_{min} = 0.00125

K_1 = 1.06

K_2 = 1.45

Calculated Shear Capacity, V_c = 65.16 **OK!**

Reinforcement calculation

Φ = 12

M = 16.64 KNm

K_m = 26 K_s = 4.00 A_s = 446.87

Spacing Required	**Use**	**Φ =**	**12**	**@**	**278**
	Use	**Φ =**	**12**	**@**	**270**

- According to EBCS-2 Sec.7.2.2.2 the ratio of the secondary reinforcer main reinforcement shall be at least equal to 0.2. Thus transverse re

A_s = 327.80

Φ = **10**

Spacing Required	**Use**	**Φ =**	**10**	**@**	**260**

Page :
ɹned By :
ːked By :

m



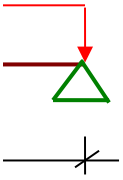
15	cm
30	cm
26.57	º
1.1	m

28.77
0.09
3002.34

Supported	Spans	Spans	Cantilevers
20.00	**24.00**	**28.00**	**10.00**

(EBCS 2 - 5.2.3)

149.00 **OK!**



RZ =
16.817

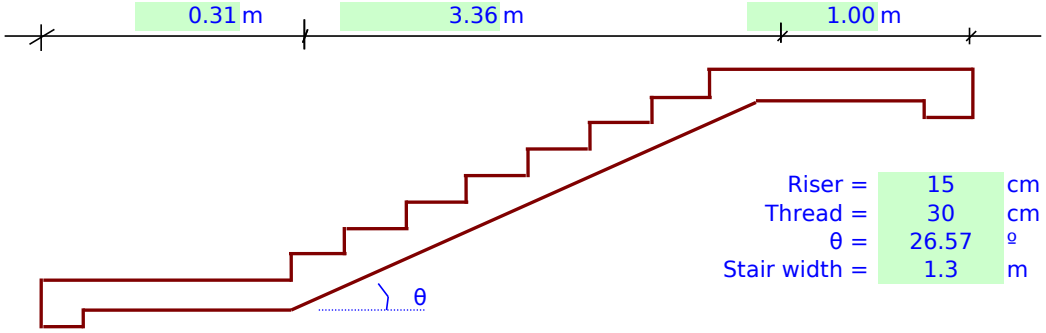
the value:

mm^2

mm
mm COMM
ment to the
inforcement:

mm

Stair No. 1



Riser =	15	cm
Thread =	30	cm
θ =	26.57	º
Stair width =	1.3	m

Materials Used:

Concrete: C-25 $f_u = 25$

Steel: S-300 $f_{yk} = 300$

Constants:

$\gamma_c = 1.50$	$f_{cd} = 11.33$	$m = 28.77$
$\gamma_s = 1.15$	$f_{ctd} = 1.03$	$c_1 = 0.09$
$f_{ck} = 20$	$f_{yd} = 260.87$	$c_2 = 3002.34$

DepthUsed:

$$d = \left(0.4 + 0.6\frac{f_{yk}}{400}\right)\frac{L_x}{\beta_a}$$

β_a = **24** **(EBCS 2 - 5.2.3)**

Required d = 165.40 Provided d = **157.00**

Required D = 187.40 D= **180**

Loading:

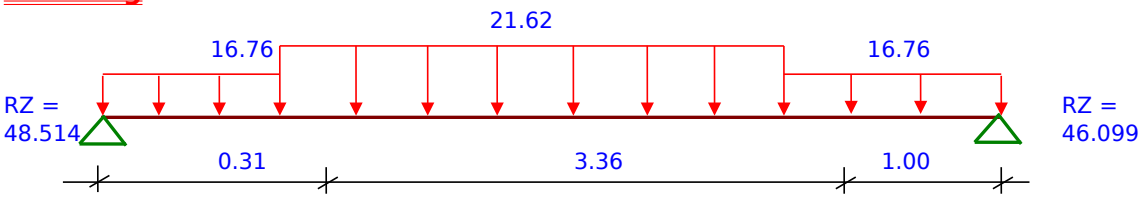
Dead load at Stair:

- Own wt. of slab (Inclined) =	6.54	KN/m	
- Due to steps per unit run =	2.44	KN/m	
- 3cm cement screed =	0.69	KN/m	
- 3cm terrazzo floor finish =	0.69	KN/m	
On thread =	1.79	KN/m	
On riser =	0.56	KN/m	
- 1.5cm plastering =	0.50	KN/m	
Total Dead Load on Stair	**11.83**	**KN/m**	
- Live load =	3.00	KN/m²	
Live load per unit meter =	**3.90**	**KN/m**	
Design Load =	1.3DL + 1.6LL		
=	**21.62**	**KN/m**	

Dead load at Landing:

- Own wt. of slab =	5.85	KN/m
- 3cm cement screed =	0.90	KN/m
- 3cm terrazzo floor finish =	0.90	KN/m
- 1.5cm plastering =	0.45	KN/m
	8.09	**KN/m**
- Live load =	3.00	KN/m²
Live load per unit meter =	**3.90**	**KN/m**
Design Load =	1.3DL + 1.6LL	
=	**16.76**	**KN/m**

Modeling



Design actions

Design Moment = 50.11029 KNm
Design Shear = 48.514 KN

Check for Deflection

$$\Delta_{max} = \frac{5wL^4}{384EI}$$

w = 15.73 KN/m
L = 4.67 m
E = 29.0 Gpa
I = 0.000632 m⁴

= 5.3 mm

- According to EBCS-2 Sec. 5.2.2 The final deflection shall not exceed the value:

$$\delta = \frac{L_e}{200}$$ = 23.35 mm **OK!**

Check for Shear Capacity

$$V_c = 0.25 f_{ctd} k_1 k_2 b_w d$$

f_{ctd} = 1.03 ρ_{min} = 0.0016667

K_1 = 1.08

K_2 = 1.44

Calculated Shear Capacity, V_c = 82.28 OK!

Reinforcement calculation

Φ = 16

M = 50.11 KNm

$K_m = 40$ $K_s = 4.17$ A_s = 1330.95 mm²

Spacing Required Use Φ = 16 @ 196 mm

- According to EBCS-2 Sec.7.2.2.2 the ratio of the secondary reinforcement to the main reinforcement shall be at least equal to 0.2. Thus transverse reinforcement:

A_s = 408.20

Φ = 8

Spacing Required Use Φ = 8 @ 160 mm