

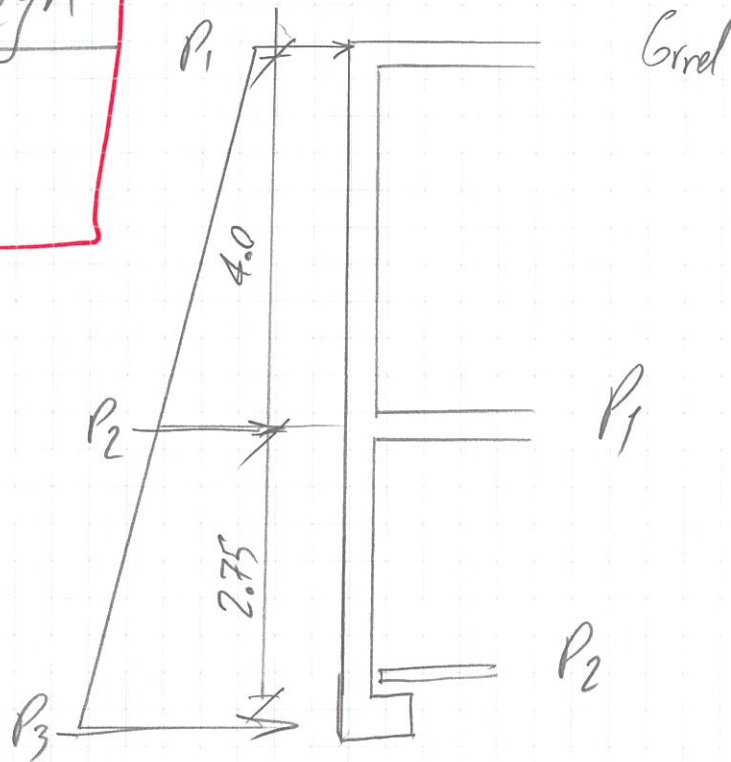
Alexandra Park

Item 3

Foundation Wall Sections

Foundation wall design

Section 3/5-301



$$P = K(\gamma H + q)$$

$$K = 0.4$$

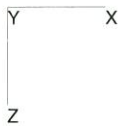
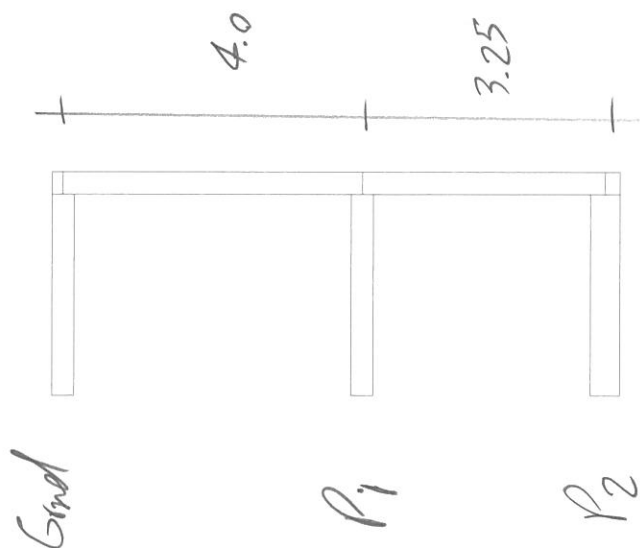
$$\gamma = 21 \text{ kN/m}^3$$

$$q = 12 \text{ kPa surcharge}$$

Ground level: $H = 0 \rightarrow P_1 = 0.4[0 + 12] = 4.8 \text{ kN/m}$ (for 1m width)

P_1 level: $H = 4 \rightarrow P_2 = 0.4[(4 \times 21) + 12] = 38.4 \text{ kN/m}$

P_2 level: $H = 6.75 \rightarrow P_3 = 0.4[(6.75 \times 21) + 12] = 61.5 \text{ kN/m}$



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File: E:\Projects\13015-Alexandra Park\City\Foundation wall 3.slb

Project: Alexandra Park

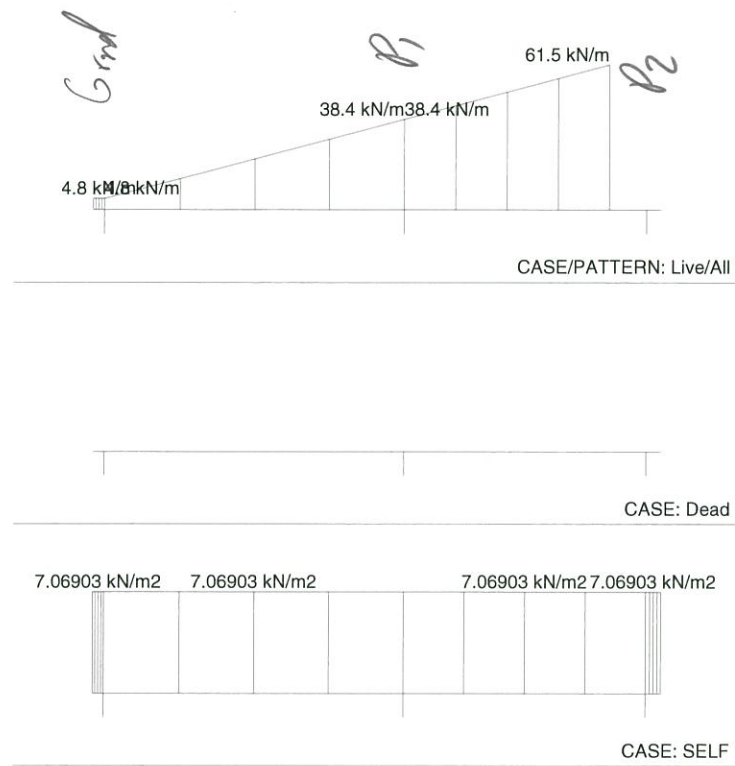
Frame: Foundatio wall - Section 3/S301

Engineer: Houman

Code: CSA A23.3-04

Date: 01/22/15

Time: 10:48:34



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File: E:\Projects\13015-Alexandra Park\City\Foundation wall 3.slb

Project: Alexandra Park

Frame: Foundatio wall - Section 3/S301

Engineer: Houman

Code: CSA A23.3-04

Date: 01/22/15

Time: 10:48:43

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[1] INPUT ECHO
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General Information

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=====
File name: E:\Projects\13015-Alexandra Park\City\Foundation wall 3.slb
Project: Alexandra Park
Frame: Foundatio wall - Section 3/S301
Engineer: Houman
Code: CSA A23.3-04
Reinforcement Database: CSA G30.18
Mode: Design
Number of supports = 3 + Left cantilever + Right cantilever
Floor System: One-Way/Beam

```

Live load pattern ratio = 100%
Deflections are based on cracked section properties.
In negative moment regions, Ig and Mcr DO NOT include flange/slab contribution (if available)
Long-term deflections are calculated for load duration of 60 months.
0% of live load is sustained.
Compression reinforcement calculations NOT selected.
Default incremental rebar design selected.
Combined M-V-T reinforcement design NOT selected.
Moment redistribution NOT selected.
Effective flange width calculations selected.
Rigid beam-column joint NOT selected.
Torsion analysis and design NOT selected.

Material Properties

```

=====
          Slabs|Beams          Columns
          -----
wc      =      2402.8          2402.8 kg/m3
f'c     =      30             35 MPa
Ec      =      26668          28214 MPa
fr      =      1.6432         3.5497 MPa
Precast concrete construction is not selected.

fy      =      413.69 MPa, Bars are not epoxy-coated
fyt     =      413.69 MPa
Es      =      199950 MPa

```

Reinforcement Database

```

=====
Units: Db (mm), Ab (mm^2), Wb (kg/m)
Size    Db    Ab    Wb    Size    Db    Ab    Wb
-----
#10     11     100    1    #15     16     200    2
#20     20     300    2    #25     25     500    4
#30     30     700    5    #35     36    1000    8
#45     44    1500   12    #55     56    2500   20

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Span Data

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Slabs

Units: L1, wL, wR (m); t, bEff, Hmin (mm)

Span	Loc	L1	t	wL	wR	bEff	Hmin
1	Int	0.150	300	0.500	0.500	1000	0 LC
2	Int	4.000	300	0.500	0.500	1000	157
3	Int	3.250	300	0.500	0.500	1000	123
4	Int	0.200	300	0.500	0.500	1000	0 RC

Support Data

=====

Columns

Units: c1a, c2a, c1b, c2b (mm); Ha, Hb (m)

Supp	c1a	c2a	Ha	c1b	c2b	Hb	Red%
1	0	0	0.000	300	1000	3.000	10
2	0	0	0.000	300	1000	3.000	100
3	0	0	0.000	400	1000	3.000	10

Boundary Conditions

Units: Kz (kN/mm); Kry (kN-mm/rad)

Supp	Spring Kz	Spring Kry	Far End A	Far End B
1	0	0	Fixed	Fixed
2	0	0	Fixed	Fixed
3	0	0	Fixed	Fixed

Load Data

=====

Load Cases and Combinations

Case Type	SELF DEAD	Dead DEAD	Live LIVE
U1	0.000	0.000	1.500

Area Loads

Units: Wa (kN/m2)

Case/Patt	Span	Wa
SELF	1	7.07
	2	7.07
	3	7.07
	4	7.07

Line Loads

Units: Wa, Wb (kN/m), La, Lb (m)

Case/Patt	Span	Wa	La	Wb	Lb
Live	1	4.80	0.000	4.80	0.150
	2	4.80	0.000	38.40	4.000
	3	38.40	0.000	61.50	2.750
Live/Odd	1	4.80	0.000	4.80	0.150
	3	38.40	0.000	61.50	2.750
Live/Even	2	4.80	0.000	38.40	4.000
Live/S1	1	4.80	0.000	4.80	0.150
	2	4.80	0.000	38.40	4.000
Live/S2	2	4.80	0.000	38.40	4.000
	3	38.40	0.000	61.50	2.750
Live/S3	3	38.40	0.000	61.50	2.750

Reinforcement Criteria

=====

Slabs and Ribs

	Top bars		Bottom bars	
	Min	Max	Min	Max
Bar Size	#15	#20	#15	#20
Bar spacing	25	457	25	457 mm
Reinf ratio	0.14	5.00	0.14	5.00 %
Cover	50		25	mm
There is NOT more than 300 mm of concrete below top bars.				

Beams

	Top bars		Bottom bars		Stirrups	
	Min	Max	Min	Max	Min	Max
Bar Size	#20	#35	#20	#35	#10	#20
Bar spacing	25	457	25	457	152	457 mm
Reinf ratio	0.14	5.00	0.14	5.00 %		

Cover	38	38	mm	
Layer dist.	25	25	mm	
No. of legs				2
Side cover				38
1st Stirrup				76
				mm
There is NOT more than 300 mm of concrete below top bars.				

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[2] DESIGN RESULTS

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Top Reinforcement

Units: Width (m), Mmax (kNm), Xmax (m), As (mm²), Sp (mm)

Span Zone	Width	Mmax	Xmax	AsMin	AsMax	AsReq	SpProv	Bars
1 Left	1.00	0.00	0.000	600	6077	0	250	4-#15 *3 *5
Midspan	1.00	0.00	0.000	600	6077	0	250	4-#15 *3 *5
Right	1.00	0.00	0.000	600	6077	0	250	4-#15 *3 *5
2 Left	1.00	6.81	1.445	600	6077	80	250	4-#15 *3 *5
Midspan	1.00	13.30	2.555	600	6077	157	250	4-#15 *3 *5
Right	1.00	57.45	3.850	600	6077	698	250	4-#15
3 Left	1.00	62.37	0.150	600	6077	760	250	4-#15
Midspan	1.00	12.17	1.165	600	6077	144	250	4-#15 *3 *5
Right	1.00	5.95	2.035	600	6077	70	250	4-#15 *3 *5
4 Left	1.00	0.00	0.200	600	6077	0	250	4-#15 *3 *5
Midspan	1.00	0.00	0.200	600	6077	0	250	4-#15 *3 *5
Right	1.00	0.00	0.200	600	6077	0	250	4-#15 *3 *5

NOTES:

*3 - Design governed by minimum reinforcement.

*5 - Number of bars governed by maximum allowable spacing.

Top Bar Details

Units: Length (m)

Span	Left		Continuous		Right	
	Bars	Length	Bars	Length	Bars	Length
1	---	---	4-#15	0.15	---	---
2	---	---	4-#15	4.00	---	---
3	---	---	4-#15	3.25	---	---
4	---	---	4-#15	0.20	---	---

Bottom Reinforcement

Units: Width (m), Mmax (kNm), Xmax (m), As (mm²), Sp (mm)

Span	Width	Mmax	Xmax	AsMin	AsMax	AsReq	SpProv	Bars
1	1.00	0.00	0.075	0	6705	0	0	---
2	1.00	37.13	1.926	600	6705	402	333	3-#15 *3
3	1.00	59.55	1.786	600	6705	652	250	4-#15
4	1.00	0.00	0.100	0	6705	0	0	---

NOTES:

Design

→ 15e2k VOF ✓

shown on drawing: 20e2k ✓

→ 15e305 VIF ✓

shown on drawing: 15e250 VIF

*3 - Design governed by minimum reinforcement.

Bottom Bar Details

=====

Units: Start (m), Length (m)

Span	Long Bars			Short Bars		
	Bars	Start	Length	Bars	Start	Length
1	---			---		
2	3-#15	0.00	4.00	---		
3	3-#15	0.00	3.25	1-#15	1.13	2.12
4	---			---		

Flexural Capacity

=====

Units: x (m), As (mm²), PhiMn (kNm)

Span	x	AsTop	AsBot	PhiMn-	PhiMn+
1	0.000	800	0	-65.56	0.00
	0.075	800	0	-65.56	0.00
	0.150	800	0	-65.56	0.00
2	0.000	800	600	-65.56	54.91
	0.150	800	600	-65.56	54.91
	1.445	800	600	-65.56	54.91
	2.000	800	600	-65.56	54.91
	2.555	800	600	-65.56	54.91
	3.850	800	600	-65.56	54.91
	4.000	800	600	-65.56	54.91
3	0.000	800	600	-65.56	54.91
	0.150	800	600	-65.56	54.91
	1.132	800	600	-65.56	54.91
	1.165	800	619	-65.56	56.61
	1.477	800	800	-65.56	72.59
	1.625	800	800	-65.56	72.59
	2.035	800	800	-65.56	72.59
	3.050	800	800	-65.56	72.59
	3.250	800	800	-65.56	72.59
4	0.000	800	0	-65.56	0.00
	0.100	800	0	-65.56	0.00
	0.200	800	0	-65.56	0.00

Slab Shear Capacity

=====

Units: b, dv (mm), Xu (m), PhiVc, Vu (kN)

Span	b	dv	Beta	Vratio	PhiVc	Vu	Xu
1	1000	218	0.210	1.000	162.84	0.00	0.00
2	1000	218	0.210	1.000	162.84	78.16	3.63
3	1000	218	0.210	1.000	162.84	110.82	0.37
4	1000	218	0.210	1.000	162.84	0.00	0.00

Deflections

=====

Section properties

Units: Ig, Icr, Ie (mm⁴), Mcr, Mmax (kNm)

Span	Ie, avg		Zone	Ig	Icr	Mcr	Load Level			
	Dead	Dead+Live					Mmax	Ie	Mmax	Ie
1	2.2500e+009	2.2500e+009	Right	2.2500e+009	2.6261e+008	24.65	-0.08	2.2500e+009	-0.13	2.2500e+009
2	2.2500e+009	1.6921e+009	Left	2.2500e+009	2.6261e+008	24.65	-1.33	2.2500e+009	-4.09	2.2500e+009
			Midspan	2.2500e+009	2.5208e+008	24.65	7.85	2.2500e+009	26.56	1.8492e+009
			Right	2.2500e+009	2.6261e+008	24.65	-12.32	2.2500e+009	-59.97	4.0057e+008
3	2.2500e+009	9.5849e+008	Left	2.2500e+009	2.6261e+008	24.65	-10.14	2.2500e+009	-64.56	3.7320e+008
			Midspan	2.2500e+009	3.2407e+008	24.65	4.18	2.2500e+009	39.08	8.0716e+008
			Right	2.2500e+009	2.6261e+008	24.65	-1.24	2.2500e+009	-10.81	2.2500e+009
4	2.2500e+009	2.2500e+009	Left	2.2500e+009	2.6261e+008	24.65	-0.14	2.2500e+009	-0.14	2.2500e+009

Maximum Instantaneous Deflections

Units: D (mm)

Span	Ddead	Dlive	Dtotal
1	-0.02	-0.07	-0.09
2	0.17	0.51	0.68
3	0.05	0.94	0.99
4	-0.01	-0.17	-0.19

Maximum Long-term Deflections

Time dependant factor for sustained loads = 2.000

Units: D (mm)

Span	Dsust	Lambda	Dcs	Dcs+lu	Dcs+l	Dtotal
1	-0.02	2.000	-0.04	-0.11	-0.11	-0.13
2	0.17	2.000	0.34	0.85	0.85	1.01
3	0.05	2.000	0.10	1.04	1.04	1.08
4	-0.01	2.000	-0.02	-0.20	-0.20	-0.21

Material Takeoff

=====

Reinforcement in the Direction of Analysis

Top Bars:	47.7 kg	<=>	6.28 kg/m	<=>	6.280 kg/m^2
Bottom Bars:	37.5 kg	<=>	4.93 kg/m	<=>	4.931 kg/m^2
Stirrups:	0.0 kg	<=>	0.00 kg/m	<=>	0.000 kg/m^2
Total Steel:	85.2 kg	<=>	11.21 kg/m	<=>	11.211 kg/m^2
Concrete:	2.3 m^3	<=>	0.30 m^3/m	<=>	0.300 m^3/m^2

Foundation wall design

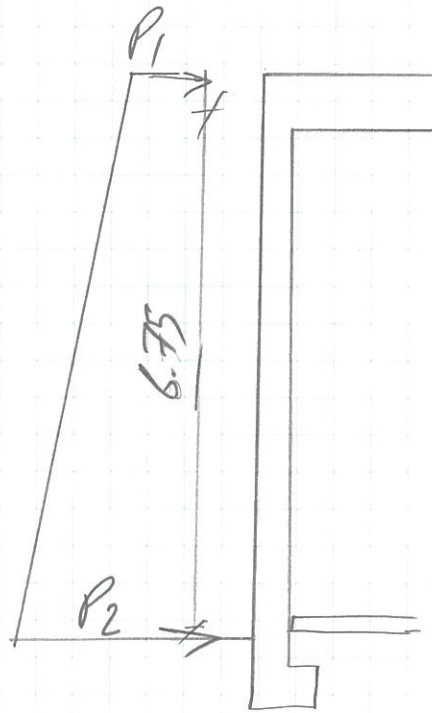
section 2/5-303

$$P = K(\gamma H + q)$$

$$K = 0.4$$

$$\gamma = 21 \text{ kN/m}^3$$

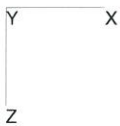
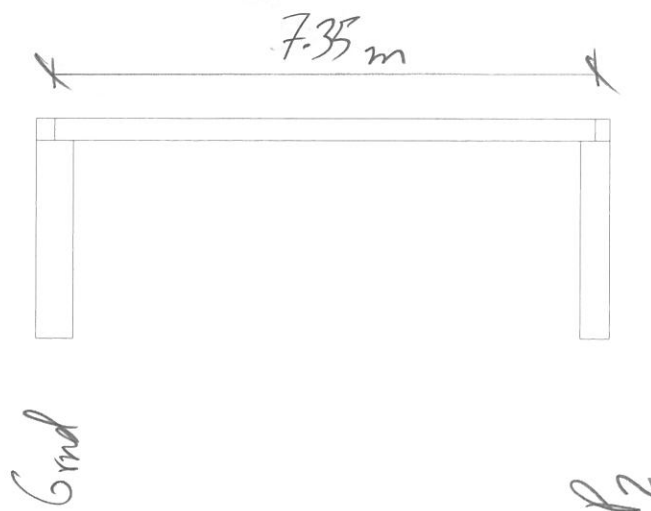
$$q = 12 \text{ kPa surcharge}$$



Ground level: $H = 0 \rightarrow P_1 = 0.4[0 + 12] = 4.8 \text{ kN/m (per 1m width)}$

P_2 level: $H = 6.75 \text{ m} \rightarrow P_2 = 0.4[(6.75 \times 21) + 12] = 61.5 \text{ kN/m}$

Section 2/S-303



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Project: Alexandra Park

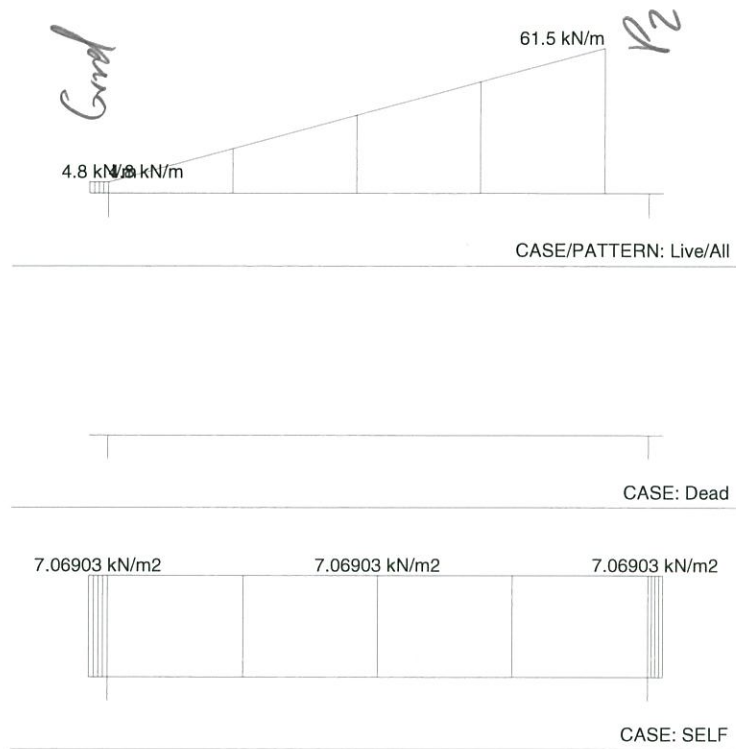
Frame: Foundatio wall - Section 2/S303

Engineer: Houman

Code: CSA A23.3-04

Date: 01/22/15

Time: 09:46:45



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File: E:\Projects\13015-Alexandra Park\City\Foundation wall 2-S303.slb

Project: Alexandra Park

Frame: Foundatio wall - Section 2/S303

Engineer: Houman

Code: CSA A23.3-04

Date: 01/22/15

Time: 09:46:52

=====

Slabs

Units: L1, wL, wR (m); t, bEff, Hmin (mm)

Span	Loc	L1	t	wL	wR	bEff	Hmin	
1	Int	0.250	300	0.500	0.500	1000	0	LC
2	Int	7.350	300	0.500	0.500	1000	351	*b
3	Int	0.200	300	0.500	0.500	1000	0	RC

NOTES:

*b - Slab thickness is less than minimum. Deflection check required.

Support Data

=====

Columns

Units: c1a, c2a, c1b, c2b (mm); Ha, Hb (m)

Supp	c1a	c2a	Ha	c1b	c2b	Hb	Red%
1	0	0	0.000	500	1000	3.000	10
2	0	0	0.000	400	1000	3.000	10

Boundary Conditions

Units: Kz (kN/mm); Kry (kN-mm/rad)

Supp	Spring Kz	Spring Kry	Far End A	Far End B
1	0	0	Fixed	Fixed
2	0	0	Fixed	Fixed

Load Data

=====

Load Cases and Combinations

Case Type	SELF DEAD	Dead DEAD	Live LIVE
U1	0.000	0.000	1.500

Area Loads

Units: Wa (kN/m2)

Case/Patt	Span	Wa
SELF	1	7.07
	2	7.07
	3	7.07

Line Loads

Units: Wa, Wb (kN/m), La, Lb (m)

Case/Patt	Span	Wa	La	Wb	Lb
Live	1	4.80	0.000	4.80	0.250
	2	4.80	0.000	61.50	6.750
Live/Odd	1	4.80	0.000	4.80	0.250
Live/Even	2	4.80	0.000	61.50	6.750
Live/S1	1	4.80	0.000	4.80	0.250
	2	4.80	0.000	61.50	6.750
Live/S2	2	4.80	0.000	61.50	6.750

Reinforcement Criteria

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Slabs and Ribs

	Top bars		Bottom bars	
	Min	Max	Min	Max
Bar Size	#20	#25	#25	#25
Bar spacing	25	457	25	457 mm
Reinf ratio	0.14	5.00	0.14	5.00 %
Cover	50		25	mm

There is NOT more than 300 mm of concrete below top bars.

Beams

	Top bars		Bottom bars		Stirrups	
	Min	Max	Min	Max	Min	Max
Bar Size	#20	#35	#20	#35	#10	#20
Bar spacing	25	457	25	457	152	457 mm
Reinf ratio	0.14	5.00	0.14	5.00 %		
Cover	38		38	mm		
Layer dist.	25		25	mm		
No. of legs					2	6
Side cover					38	mm
1st Stirrup					76	mm

There is NOT more than 300 mm of concrete below top bars.

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[2] DESIGN RESULTS

Top Reinforcement

Units: Width (m), Mmax (kNm), Xmax (m), As (mm²), Sp (mm)

Span	Zone	Width	Mmax	Xmax	AsMin	AsMax	AsReq	SpProv	Bars
1	Left	1.00	0.00	0.000	600	7674	0	200	5-#20
	Midspan	1.00	0.00	0.000	600	7674	0	200	5-#20
	Right	1.00	0.00	0.000	600	7674	0	167	6-#20
2	Left	1.00	124.65	0.250	600	7674	1563	167	6-#20
	Midspan	1.00	0.06	2.665	600	7674	1	200	5-#20
	Right	1.00	91.15	7.150	600	7674	1124	200	5-#20
3	Left	1.00	0.00	0.200	600	7674	0	200	5-#20
	Midspan	1.00	0.00	0.200	600	7674	0	200	5-#20
	Right	1.00	0.00	0.200	600	7674	0	200	5-#20

NOTES :

*3 - Design governed by minimum reinforcement.
*5 - Number of bars governed by maximum allowable spacing.

Top Bar Details

Units: Length (m)

Span	Left				Continuous		Right			
	Bars	Length	Bars	Length	Bars	Length	Bars	Length	Bars	Length
1	---		---		5-#20	0.25	1-#20	0.25	---	
2	1-#20	2.53	---		5-#20	7.35	---		---	
3	---		---		5-#20	0.20	---		---	

Bottom Reinforcement

Units: Width (m), Mmax (kNm), Xmax (m), As (mm²), Sp (mm)

Span	Width	Mmax	Xmax	AsMin	AsMax	AsReq	SpProv	Bars
1	1.00	0.00	0.125	0	8382	0	0	---
2	1.00	218.88	4.182	600	8382	2591	167	6-#25
3	1.00	0.00	0.100	0	8382	0	0	---

Bottom Bar Details

Units: Start (m), Length (m)

Span	Long Bars			Short Bars		
	Bars	Start	Length	Bars	Start	Length
1	---			---		

Design sharp on along

25e192 25e180 VIF

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2 6-#25 0.00 7.35 ---
 3 --- ---

Flexural Capacity

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Units: x (m), As (mm^2), PhiMn (kNm)					
Span	x	AsTop	AsBot	PhiMn-	PhiMn+
1	0.000	1800	0	-142.31	0.00
	0.125	1800	0	-142.31	0.00
	0.250	1800	0	-142.31	0.00
2	0.000	1800	3000	-142.31	249.72
	0.250	1800	3000	-142.31	249.72
	2.207	1800	3000	-142.31	249.72
	2.527	1500	3000	-119.95	249.72
	2.665	1500	3000	-119.95	249.72
	3.675	1500	3000	-119.95	249.72
	4.735	1500	3000	-119.95	249.72
	7.150	1500	3000	-119.95	249.72
	7.350	1500	3000	-119.95	249.72
3	0.000	1500	0	-119.95	0.00
	0.100	1500	0	-119.95	0.00
	0.200	1500	0	-119.95	0.00

Slab Shear Capacity

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Units: b, dv (mm), Xu (m), PhiVc, Vu(kN)							
Span	b	dv	Beta	Vratio	PhiVc	Vu	Xu
1	1000	216	0.210	1.000	186.67	0.00	0.00
2	1000	216	0.210	1.000	186.67	182.28	6.78
3	1000	216	0.210	1.000	186.67	0.00	0.00

Deflections

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Section properties

Units: Ig, Icr, Ie (mm^4), Mcr, Mmax (kNm)

Span	Ie, avg		Zone	Ig	Icr	Mcr	Load Level				
	Dead	Dead+Live					Dead	Ie	Dead+Live	Mmax	Ie
1	2.2500e+009	2.2500e+009	Right	2.2500e+009	4.6430e+008	28.46	-0.22	2.2500e+009	-0.37	2.2500e+009	
2	2.2500e+009	7.3292e+008	Left	2.2500e+009	4.6430e+008	28.46	-23.74	2.2500e+009	-130.48	4.8283e+008	
			Midspan	2.2500e+009	8.4130e+008	28.46	28.31	2.2500e+009	173.79	8.4749e+008	
			Right	2.2500e+009	4.0060e+008	28.46	-15.30	2.2500e+009	-96.29	4.4836e+008	
3	2.2500e+009	2.2500e+009	Left	2.2500e+009	4.0060e+008	28.46	-0.14	2.2500e+009	-0.14	2.2500e+009	

Maximum Instantaneous Deflections

Units: D (mm)

Span	Ddead	Dlive	Dtotal
1	-0.15	-0.91	-1.06
2	2.05	21.64	23.69
3	-0.15	-1.34	-1.49

Maximum Long-term Deflections

Time dependant factor for sustained loads = 2.000

Units: D (mm)

Span	Dsust	Lambda	Dcs	Dcs+lu	Dcs+l	Dtotal
1	-0.15	2.000	-0.30	-1.21	-1.21	-1.36
2	2.05	2.000	4.10	25.74	25.74	27.79
3	-0.15	2.000	-0.30	-1.64	-1.64	-1.79

Material Takeoff

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Reinforcement in the Direction of Analysis

Top Bars:	98.4 kg	<=>	12.62 kg/m	<=>	12.619 kg/m^2
Bottom Bars:	173.1 kg	<=>	22.19 kg/m	<=>	22.191 kg/m^2
Stirrups:	0.0 kg	<=>	0.00 kg/m	<=>	0.000 kg/m^2
Total Steel:	271.5 kg	<=>	34.81 kg/m	<=>	34.810 kg/m^2
Concrete:	2.3 m^3	<=>	0.30 m^3/m	<=>	0.300 m^3/m^2