
File :.....voorbeeld uitdraai\XBeam2DConcreteDutch.xbe2

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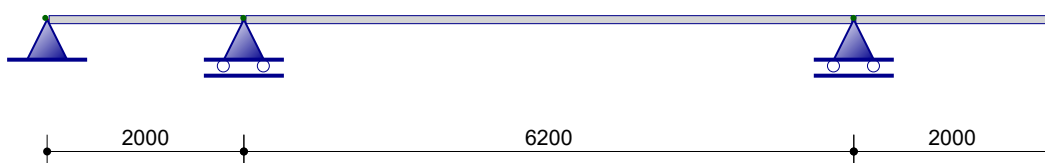
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Applied standards: : NEN-EN 1992-1-1+C1:2011/NB:2016+A1:2020 nl

Consequence class : CC1

Gravity acceleration g : 9,81 m/s²




1 Input Data



1.1 NODES

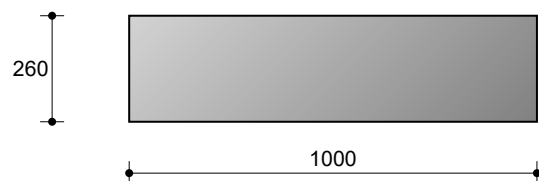
Node Number	Coordinates		Restrains		
	X [mm]	Z [mm]	Tx	Tz	Ry
1	0	0	A	A	
2	2000	0		A	
3	8200	0		A	
4	10200	0			

1.2 BEAMS

Beam Number	Node		Beam type	Profile	Length [mm]
	from	to			
1	1	2		Profile 1	2000
2	2	3		Profile 1	6200
3	3	4		Profile 1	2000

1.3 PROFILES

Profile Number	Name	Weight [kg/m]	E [N/mm ²]	A [mm ²]	I _y [mm ⁴]	Wy;el_1 [mm ³]	Wy;el_2 [mm ³]
1	Profile 1	650,0	6748	2,6E5	1,4647E9	1,1267E7	1,1267E7

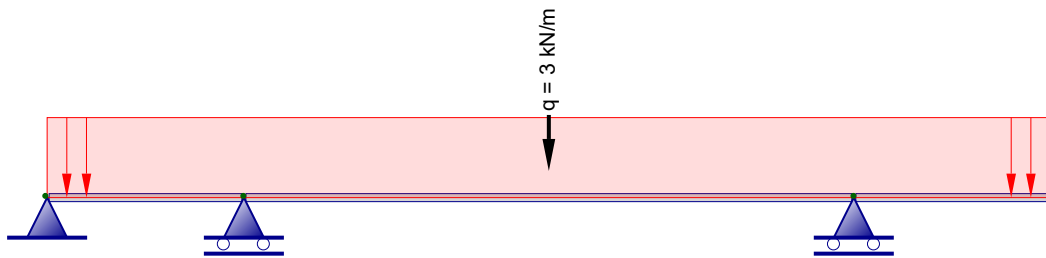
Profile 1

Element type	Slab	Structural Class S4
Prefab	no	
Concrete grade	C20/25	Creep coefficient 2,70
Steel grade	B500B	
Granule diameter	31,5 mm	
Env. class	Top side XC4	Bottom side XC4
Concrete surface	Can be checked	Can be checked
ΔC_{dev}	5 mm	
Cover	35 mm	35 mm
Nominal cover c_{nom}	30 mm	30 mm
		EN 1992-1-1 (4.1)
Number of stirrup sections	3	Angle compression strut 40

1.4 LOAD CASES

no.	Description	Type	ψ_0	ψ_1	ψ_2
1	Dead load	Dead load incl. self-weight	1,00	1,00	1,00
2	Live load	A:domestic	0,40	0,50	0,30

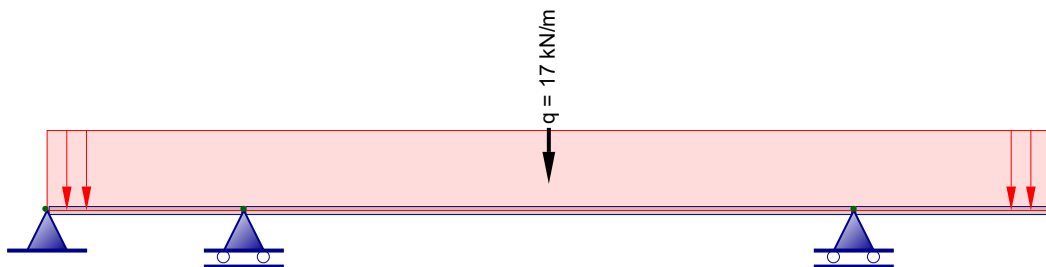
1.5 LOAD CASE 1 Dead load Excluding self-weight



1.5.1 Beam loads

Type	Loads			Distance from		
	q1	q2	Angle	Node	a [mm]	L [mm]
q	-3,000 kN/m	-3,000 kN/m	0,0	1	0	10200

1.6 LOAD CASE 2 Live load



1.6.1 Beam loads

Type	Loads			Distance from		
	q1	q2	Angle	Node	a [mm]	L [mm]
q	-17,000 kN/m	-17,000 kN/m	0,0	1	0	10200

2 Calculation Results

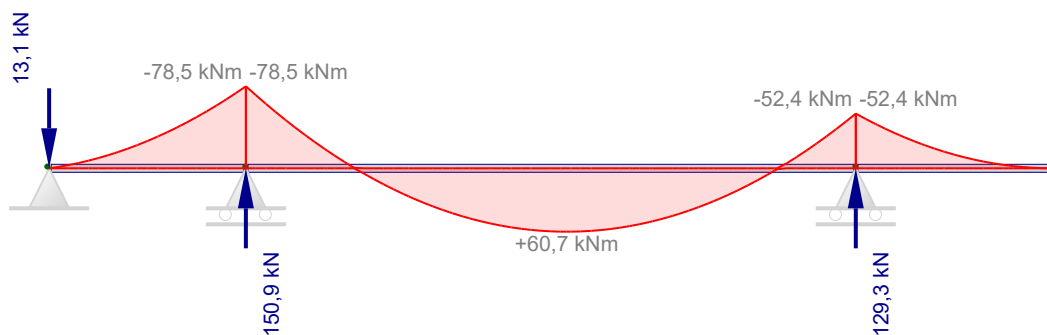
2.1 ULTIMATE LIMIT STATES (ULS)

2.1.1 Load combinations

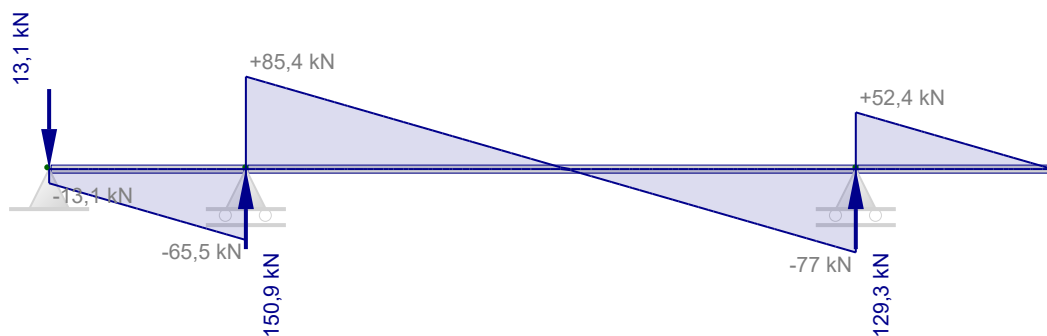
Geometric linear analysis

Combination Number	Description	Type
1	ULS(6.10a)	ULS
2	ULS(6.10b)	ULS

Combination Number	Load case ($\psi \times \gamma$)			
	1	2		
1	1,00x1,22	0,40x1,35		
2	1,00x1,08	1,00x1,35		



Envelop M-line



Envelop D-line

2.1.2 Envelope reaction forces

Node Number	Combination Number	Fx [kN]	Fz [kN]	My [kNm]
1	1		-6,413	
	2		-13,081	
2	1		73,966	
	2		150,869	
3	1		63,415	

Node Number	Combination Number	Fx [kN]	Fz [kN]	My [kNm]
3	2		129,349	
Minimum / maximum values				
1	2		-13,081	
2	2		150,869	

2.1.3 Envelope beam forces

Beam Number	Combination Number	Node Number	x-local [mm]	Nx-local [kN]	Vz-local [kN]	My-local [kNm]
1	1	1		0,000	-6,413	0,000
	2	1		0,000	-13,081	0,000
	1	2		0,000	32,093	-38,506
	2	2		0,000	65,461	-78,541
2	1	2		0,000	41,873	38,506
	2	2		0,000	85,409	78,541
	2		3261	0,000	0,000	60,722
	1	3		0,000	37,735	-25,680
	2	3		0,000	76,969	-52,380
	3	3		0,000	25,680	25,680
3	1	3		0,000	25,680	25,680
	2	3		0,000	52,380	52,380

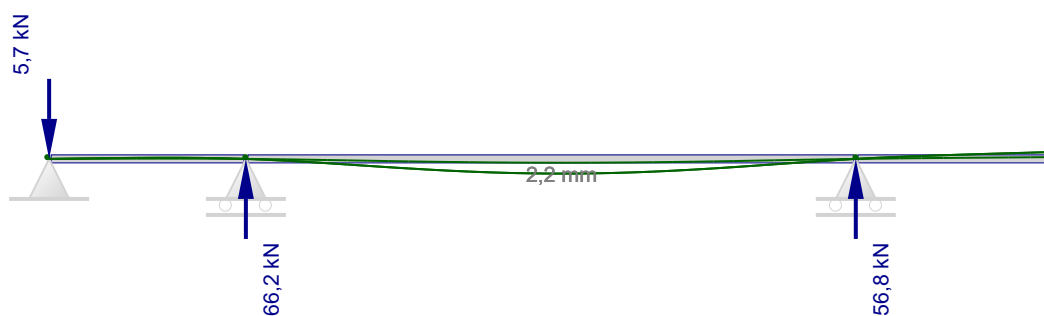
2.2 SERVICE LIMIT STATES (SLS)

2.2.1 Load combinations

Geometric linear analysis

Combination Number	Description	Type
3	SLS Permanent	SLS Permanent
4	SLS Quasi permanent	SLS Quasi permanent
5	SLS	SLS

Combination Number	Load case ($\psi \times \gamma$)			
	1	2		
3	1,00x1,00			
4	1,00x1,00	0,30x1,00		
5	1,00x1,00	0,50x1,00		



Envelop displacements

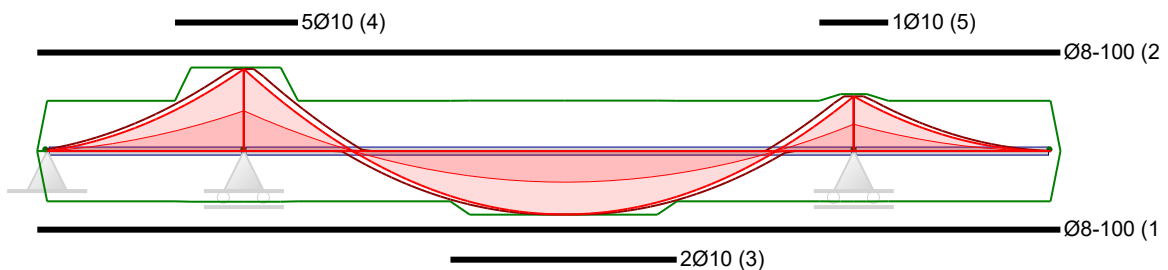
2.2.2 Envelope node displacements

Node Number	Combination Number	dx [mm]	dz [mm]	dr [mrad]
1	3	0,0	0,0	0,2
	5	0,0	0,0	0,8
2	3	0,0	0,0	-0,5
	5	0,0	0,0	-1,9
3	3	0,0	0,0	0,8
	5	0,0	0,0	3,1
4	3	0,0	1,0	0,4
	5	0,0	4,0	1,6
Minimum / maximum values				
1	3	0,0		
1	3	0,0		
2	5		0,0	
4	5		4,0	
2	5			-1,9
3	5			3,1

2.3 REINFORCEMENT

2.3.1 Longitudinal reinforcement

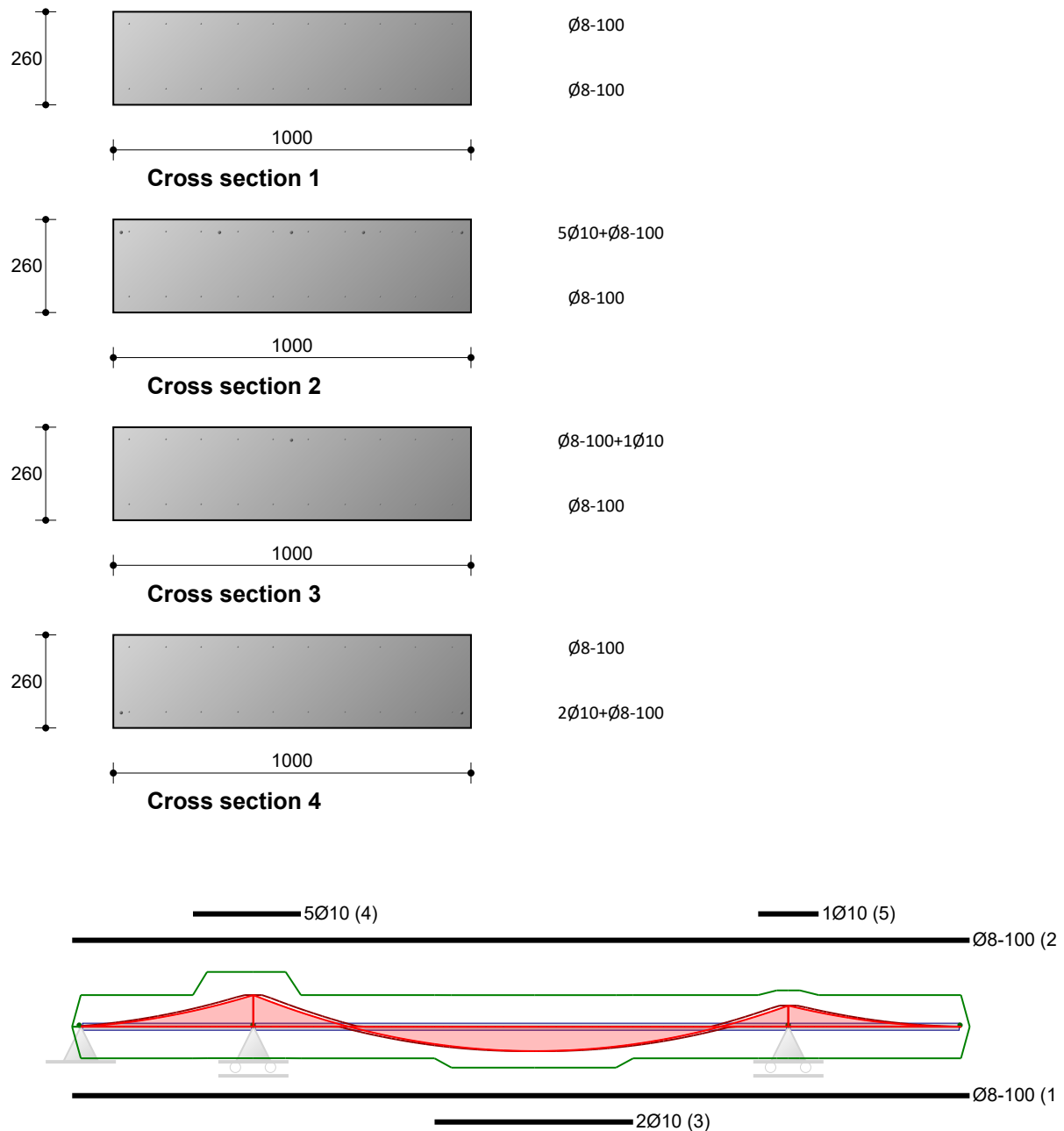
no.	from x [mm]	to x [mm]	Length [mm]	Side	Reinforcement	z [mm]	Ld begin [mm]	Ld end [mm]	Weight [kg]
1	-100	10300	10400	Bottom	Ø8-100	-225	100	100	41,1
2	-100	10300	10400	Top	Ø8-100	-35	100	100	41,1
3	4100	6400	2300	Bottom	2Ø10	-225	196	198	2,8
4	1300	2550	1250	Top	5Ø10	-35	163	176	3,9
5	7850	8550	700	Top	1Ø10	-35	215	217	0,4
Total									89,3



Envelope shifted M-line (ULS)

2.3.2 Longitudinal reinforcement - Ultimate limit state (ULS)

x [mm]	Sect.	MEd [kNm]	MRd [kNm]	xu [mm]	xu,max [mm]	Side	Reinforcement	Remarks
0	1	-1,7	-48,1	31,0	89,5	Top	Ø8-100	
2000	2	-78,5	-80,0	39,0	117,9	Top	5Ø10+Ø8-100	
8200	3	-52,4	-54,5	32,4	96,7	Top	Ø8-100+1Ø10	
10200	1	-0,2	-48,1	31,0	89,5	Top	Ø8-100	
5261	4	60,7	60,9	33,9	103,0	Bottom	2Ø10+Ø8-100	



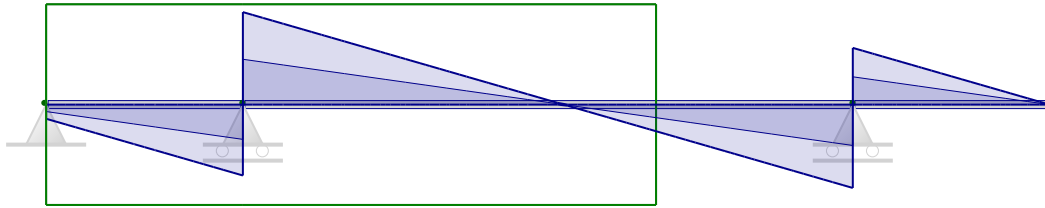
Envelope shifted M-line (SLS)

2.3.3 Longitudinal reinforcement - Service limit state (SLS)

Control of cracking without direct calculation

...EN 1992-1-1 art.7.3.3

x [mm]	Sect.	Mk [kNm]	MRk [kNm]	s [mm]	s,max [mm]	\emptyset [mm]	\emptyset ,max [mm]	Remarks
0	1	-0,7	-34,5	100,0	100,0	8,0	5,1	
2000	2	-34,5	-59,8	100,0	100,0	8,8	5,1	
8200	3	-23,0	-39,6	100,0	100,0	8,2	5,1	
10200	1	-0,1	-34,5	100,0	100,0	8,0	5,1	
5261	4	26,7	44,7	100,0	100,0	8,4	5,1	



Envelope D-line (ULS)

2.3.4 Shear reinforcement - Ultimate limit state (ULS)

...EN 1992-1-1 art.6.2.1

x [mm]	VEd [kN]	VRd,c [kN]	VRd,s [kN]	VRd,max [kN]	Side	Stirrups	Remarks
0	-13,1	-92,7	0,0	-783,5	Top		
2000	-65,5	-92,7	0,0	-783,5	Top		
6200	-24,6	-92,7	0,0	-783,5	Top		
2000	85,4	92,7	0,0	783,5	Bottom		