

**Hooiberg a/d Bergkappeweg 1
te Vorden**

Onderdeel:	Statische berekening
Opdrachtgever:	Dijkman Bouw B.V. Lage Weide 29 7231 NN Warnsveld
Projectnr.:	16.137
Datum:	02-01-2017
Constructeur:	ing. J. Wassing

IBANnr. NL61 INGB 0006 0894 55 K.v.K. 58421564

Tenzij uitdrukkelijk anders overeengekomen, worden alle opdrachten aanvaard en uitgevoerd volgens De Nieuwe Regeling 2011 (DNR 2011) Rechtsverhouding opdrachtgever – architect, ingenieur en adviseur, uitgegeven door NLingenieurs te 's-Gravenhage en gedeponereerd ter griffie van de Rechtbank te Amsterdam onder nummer 78/2011



Project : Hooiberg a/d Bergkappeweg 1 te Vorden

Project nr. : 16.137 Datum : 02-01-2017

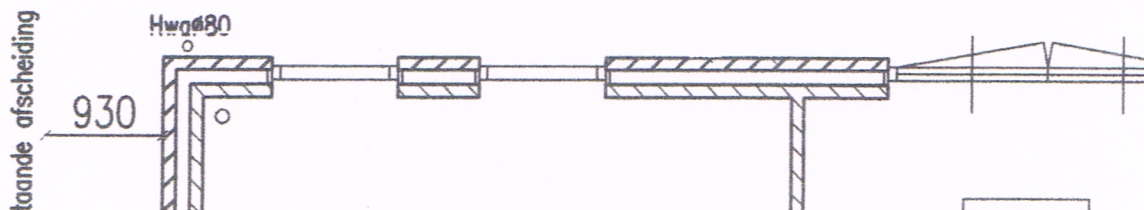
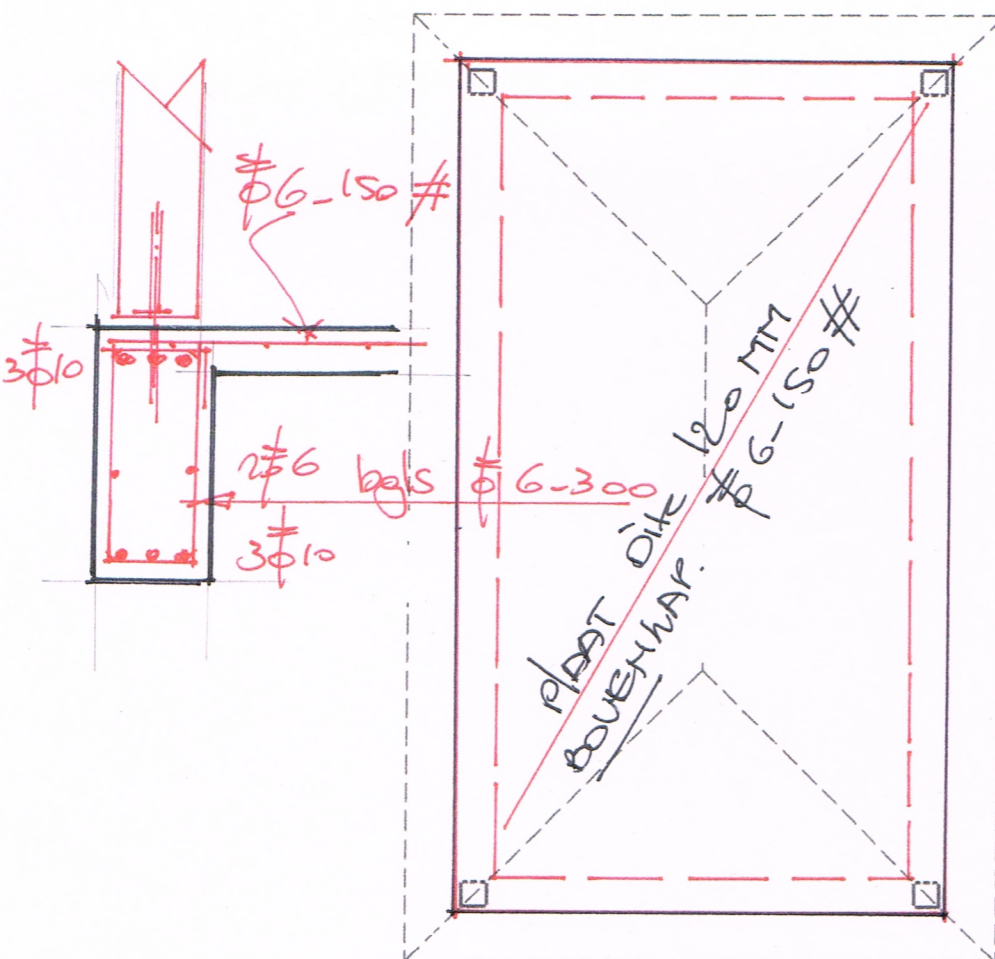
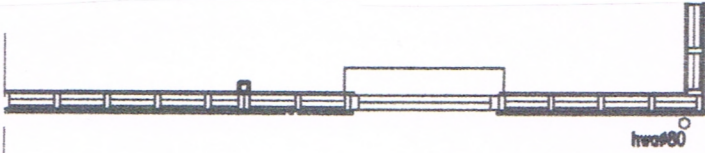
Blad **A**

Jan Wassing Adviseur Bouwconstructies

Proj.nr.	16.137
Datum	02-01-2017
Gecontr.	JWG
Opmerking	Blaad A

Jan Wassing
Adviseur Bouwconstructies

St. Martinusstraat 7
7231 CK Warnsveld
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FUNDERING / BEG. GRONDVLAK



Project : Hooiberg a/d Bergkappeweg 1 te Vorden

Project nr. : 16.137 Datum : 02-01-2017

Blad **B**



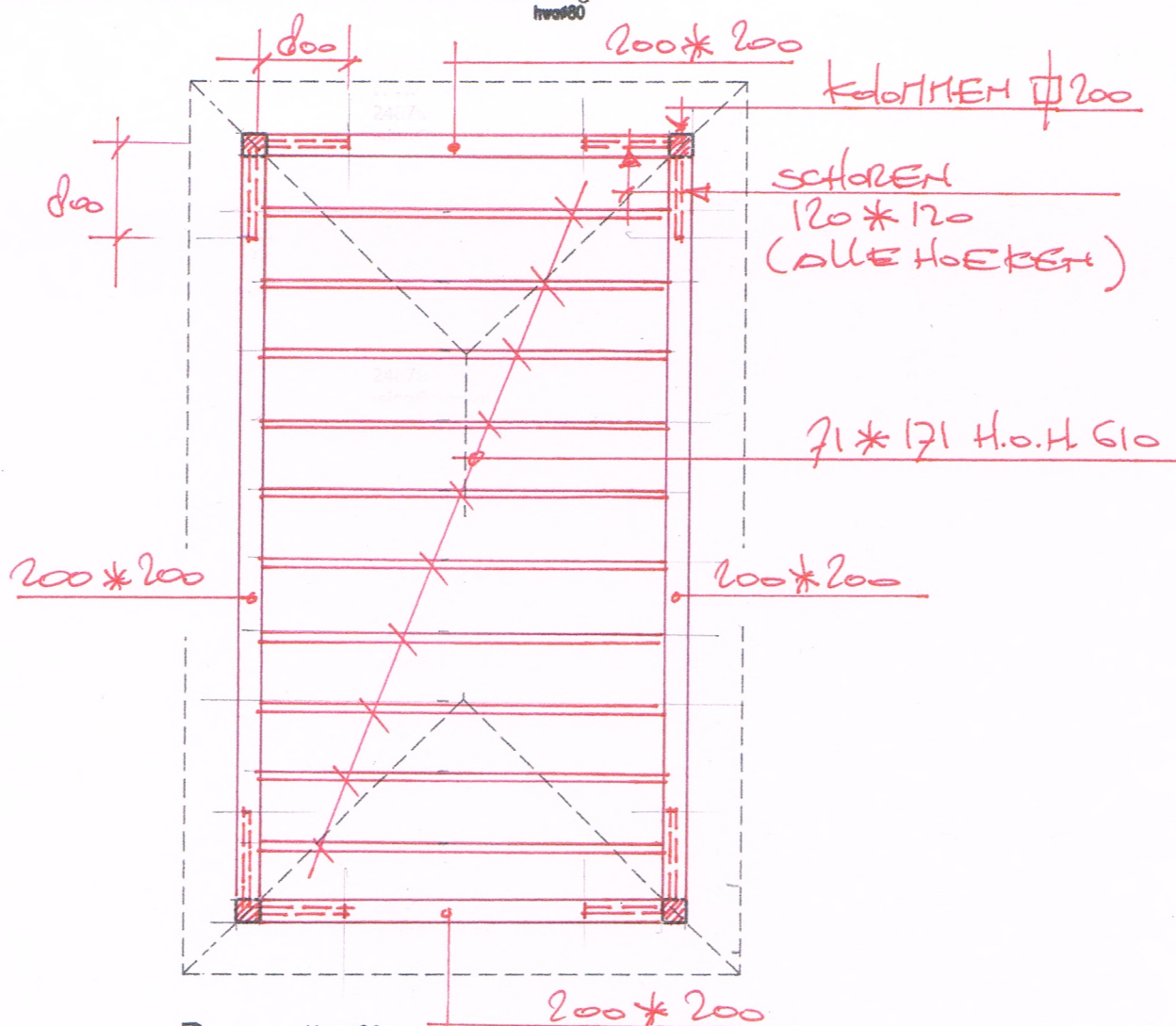
Jan Wassing

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Jan Wassing Adviseur Bouwconstructies

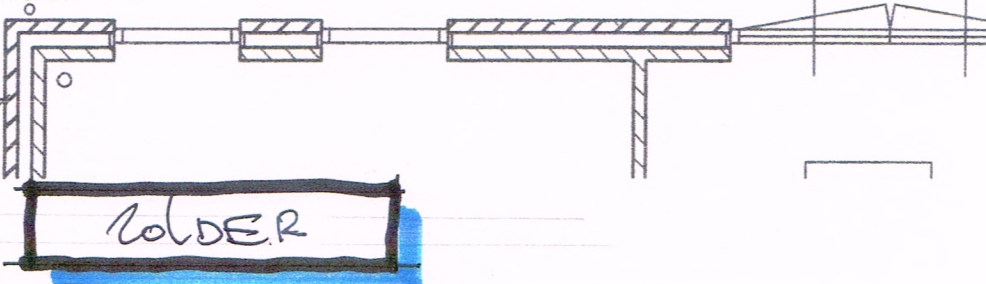
Proj.nr.	16.137
Datum	02/03 - 2016
Gecontr.	JWG
Opmerking	B/D B



taande afscheiding

Hwg#80

930





Project : Hooiberg a/d Bergkappeweg 1 te Vorden

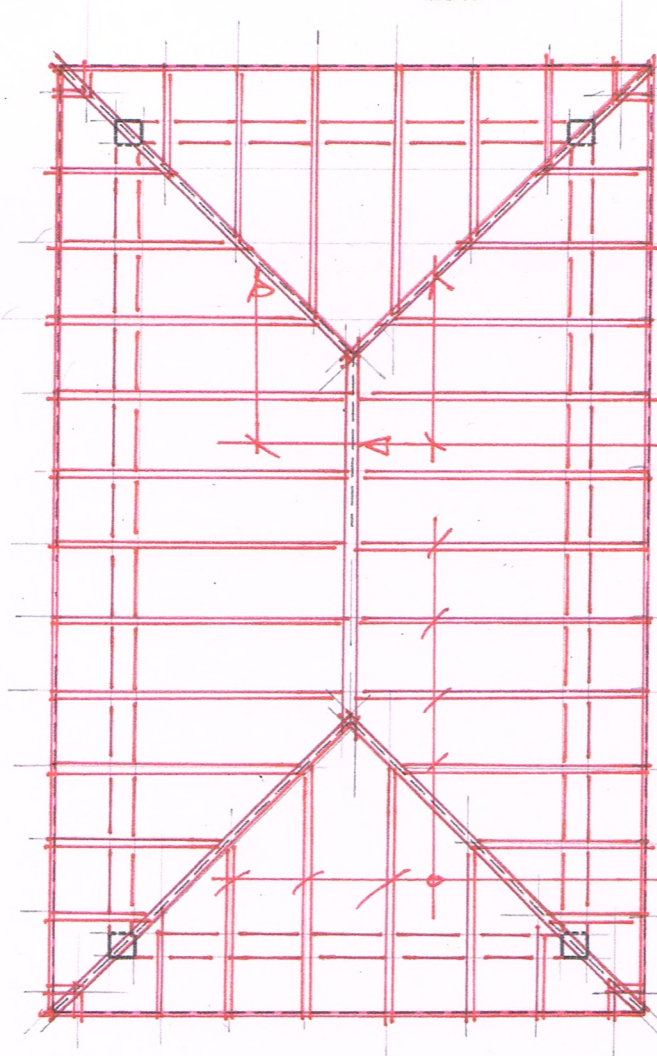
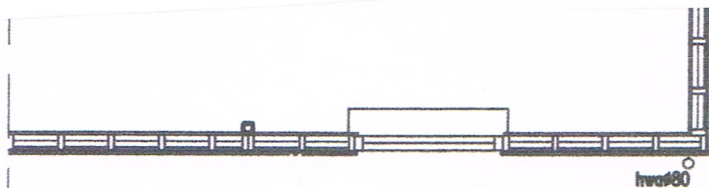
Project nr. : 16.137 Datum : 02-01-2017

Blad (C)

Jan Wassing Adviseur Bouwconstructies	
Proj.nr.	16.137
Datum	02-01-2017
Gecontr.	JWS
Opmerking	blad (C)

Jan Wassing
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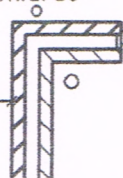
Hoekgording
Hoekbalk
46x121 o.g.

Sporen 46x96
H.o.H. 610

toande afscheiding

930

Hwg 80



KAP.



Project : Hooiberg a/d Bergkappeweg 1 te Vorden

Project nr. : 16.137

Datum :

Blad 1

Algemeen:

Berekening: NEN-EN-1990 t/m 1999

Ontwerplevensduur: Bijgebouw: klasse 3; t=15 jaar

Gevolgklasse : Bijgebouw: Klasse 1 (CC1)

Grondslag: Aangehouden: zand, matig vast, $\phi' = 32,5^\circ$

In het werk te controleren: zo nodig grondverbetering toepassen.

Voor draagvermogen fundering op staal:
zie bijlagen F1 en F2

BELASTINGEN.

kN/m ²		
g	q	ψ

* kap α = 45°

$$Eg = 0.60 / \cos 45^\circ = 0.85$$

$$SNEEUW = 0.4 * 0.70 = 0.28 \quad 0$$

* zolder:

$$Eg. \text{ BALKEN + BESCH.} \quad 0.35$$

$$V.B. \text{ (CAT A)} \quad 1.75 \quad 0.4$$

* BEG. GRONDZOLDER

$$Eg = 0.12 * 24 = 2.90$$

$$AFW = 0.05 * 20 = 1.00$$

$$\hline 3.90$$

$$V.B. : \text{CAT A - TERREB.} \quad 2.50 \quad 0.4$$

* wind:

GEBIED III
ONBEBUWED
h = 5.25 M.

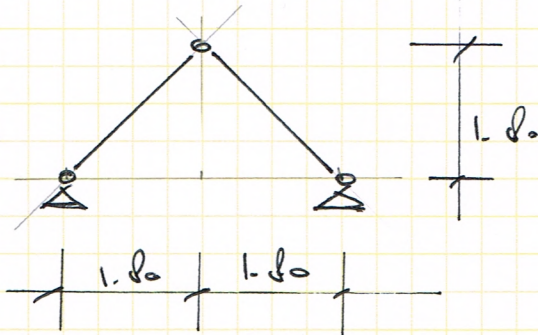
(?)

}

$$p_w = 0.55 \quad 0$$

* SPORREN

H.o.H. 610 mm



$$g_g = 0,61 * 0,85 = 0,52 \text{ kN/m} \quad *$$

zie blad 101 t/m 112:

$$N_g = 0,99 \text{ kN}$$

$$g_g = 0,21 * 8 / 2,55^2 = 0,26 \text{ kN/m}$$

$$N_g = 0,33 \text{ kN}$$

$$g_g = \dots = 0,26$$

zie blad 113 + 114:

SPORREN 46 * 96 H.o.H. 610

* HOEKKEPEREN :WIND RIET MAATGEVENDE → OPGEHOTTEN DOOR
OBSKULSTUKKEN.VERT. BELASTINGEN → OPGEHOTTEN DOOR
SPORREN.

HOEKKEPEREN PROEIJEN. 46 * 121

* BALK LAGZ ZOLVER :

$$l = 3,50 \text{ m.}$$

zie blad 115:

21 * 171 H.o.H. 600

SPANT - LANGRICHTING:

$$D_{sk} = 2.35 * 0.85 = 2.00$$

$$D_{old} = 1.80 * 0.35 = 0.63$$

$$E_{g} = 0.22$$

$$g = 2.85 \text{ t/m}$$

$$2.35 * 0.78 = 0.65$$

$$1.80 * 1.75 = 3.15$$

$$g_g = 3.80 \text{ t/m}$$

$$H_v = \left\{ (1.80 * 1.80 * \frac{1}{2}) * (0.70 + 0.30) + 1.80 \sqrt{2} * 5.30 * 0.02 \right\} * 0.55 = 1.01 \text{ t/m}$$

zie blad 113 t/m 119,

ligger: $M_d = 15.6 \text{ kNm}$

$$\boxed{200 * 200 \text{ mm}}$$

$$W_{ber} = 936 \text{ cm}^3$$

$$W_{aanw} = 1333 \text{ cm}^3$$

$$UC = 0.70$$

$$u_{kt} = 26.4 \text{ mm} = 0.004 \text{ t.}$$

$$u_g = 11.3 \text{ mm}$$

$$u_{by} = 15.1 \text{ mm} = 0.0023 \text{ t.}$$

teelb.:

$$N_g = 9.40 \text{ t/m}$$

$$N_g = 12.54 \text{ t/m}$$

$$H_g = \frac{2.34}{0.55} = 4.25 \text{ t/m}$$

$$H_g = \frac{2.78}{0.55} = 5.05 \text{ t/m}$$

$$\boxed{\# 200 \text{ mm}}$$

$$l_k = 2750 \text{ mm}$$

$$\text{zie blad 120 + 121 : } UC = 1.01$$

schoren: $l_s = \sqrt{0.80^2 + 0.75^2} = 1.10 \text{ m}$

$$N_g = 18.44 \text{ t/m}$$

$$H_g = 24.59 \text{ t/m}$$

zie blad 122 + 123:

$$\boxed{\# 120 \text{ mm}}$$

$$\rightarrow UC = 0.27$$

SPANT-DWARSRICHTING :

$$\begin{aligned} \text{D.A.} &= 2.35 * 0.85 = 2.00 \\ \text{Zolb.} &= 0.60 * 0.63 = 0.38 \\ \text{B.q.} & \quad \quad \quad 0.22 \end{aligned}$$

$$\begin{aligned} 2.35 * 0.28 &= 0.65 \\ 0.6 * 1.7 &= 1.05 \end{aligned}$$

$$q_g = 2.60 \text{ kN/m}$$

$$q_g = 1.70 \text{ kN/m}$$

$$\begin{aligned} t/w &= \left\{ \left(\frac{1}{2} * 1.80 + 1.80 * 1.50 \right) \sqrt{2} * (0.7 + 0.30) + \right. \\ &\quad \left. + 1.80 * 1.80 * 0.02 \right\} * 0.55 = 3.40 \text{ t/m} \end{aligned}$$

zie blad 124 t/m 130 :

AANHOUDEN : ARMEIINGEN ALS SPANT IN LANGRICHTING.

FUNDERING :

D.M.V. PLOOT MET VERSTROND.

N.B. : BIJLAGEN F1 EN F2 DIE MEN UITSLUITEND
PER BEPALING VAN DE MEERWERKENDE
BREEDTE.

GEÏJKMATIG VERDEELDE BELASTING →
→ NIET MASTGEVEND.

uit kolommen.

$$F_g = 9.40 + 1.68 = 11.08 \text{ kN}$$

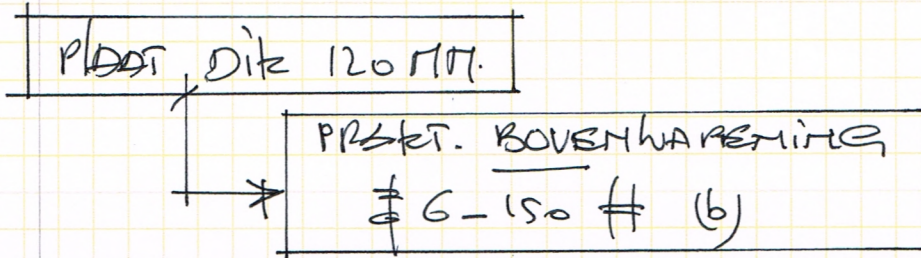
$$F_g = 3.14 + 3.82 = 6.96 \text{ kN}$$

$$\Rightarrow F_d = 24.60 \text{ kN}$$

zie bijlagen F_1 en F_2 :

Benodigde oppervlakte $\approx 0.7 * 0.70 \text{ m}$.

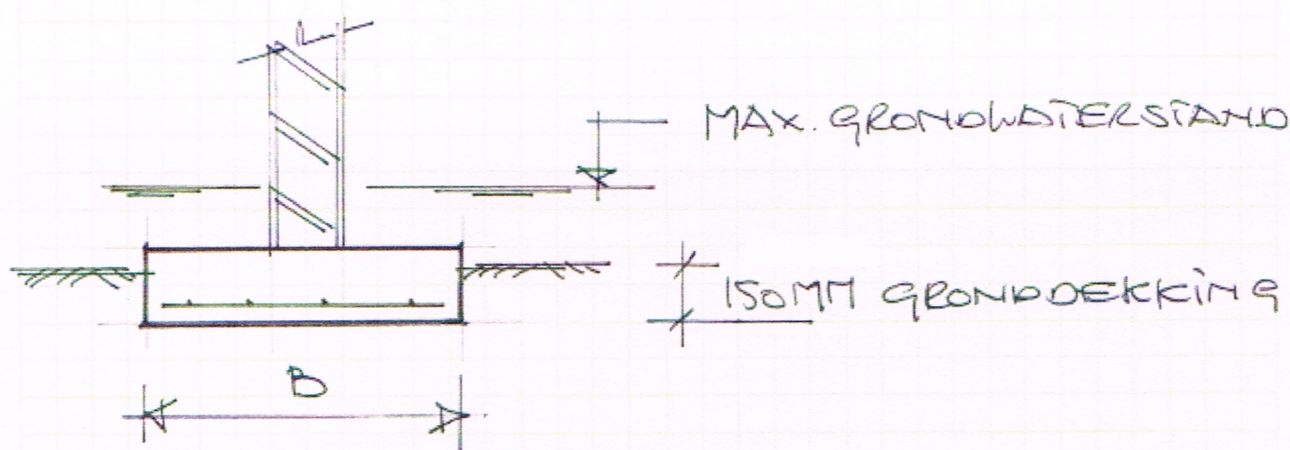
$$F_u = 0.7 * 43.4 = 30.38 \text{ kN} > F_d.$$



VERSTAND : PRSKT. WARMEN.

DRAAGVERMOGEN FUNDERING OP STAAL :

ZAND, MATIG VAST
GRONDOEDKING 150 MM.



$$\phi' = 32,5^\circ$$

$$\phi_{e;d} = \frac{32,5}{1,15} = 28,3 \Rightarrow \begin{matrix} H_g = 15,5 \\ N_f = 16,5 \end{matrix}$$

ONDER STROOK :

$$\phi'_{e;d} = \frac{20}{1,1} - 10 = 8,18$$

$$N_f = 16,5 ; s_f = 1,0 ; i_f = 1,0$$

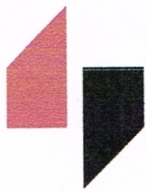
$$0,5 * 8,18 * 16,5 * B = 67,5 B \text{ [kN/m}^2\text{]}$$

GRONDOEDKING :

$$\sigma = 18 \text{ kN/m}^3 ; \sigma'_{v,2;d} = \frac{10}{1,1} - 10 = 6,36 \text{ kN/m}^2$$

$$N_g = 15,5 \Rightarrow 6,36 * 15,5 * 0,15 = 14,79 \text{ [kN/m}^2\text{]}$$

$$\text{TOTAL: } F_{r,v;d} = B * (67,5 B + 14,8) \text{ [kN/m}^2\text{]}$$



ZAND, MATIG VAST : $\phi = 32.5^\circ$
 GRONDDEKKING : 150 MM.

BETON : C20/25

STAAL : B500A

MIL. KLASSE : XC4

STROOKDIKTE : 200 MM

BETONDEKKING : 40 MM (ONDER)

B M	$F_{r,v}; d$ kN/m'	M_d kNm/m'	Δa mm/m'	WAARNAME (VOORSTEL.)
0.40	16.7	0.84	16	
0.50	24.3	1.52	28	
0.60	33.2	2.49	46	
0.70	43.4	3.80	70	
0.80	55.0	5.50	101	
0.90	68.6	7.65	141	
1.00	82.3	10.29	191	
1.10	98.0	13.48	251	
1.20	115.0	17.25	323	
1.30	133.3	21.66	327	
1.40	153.0	26.78	408	

$$M_d = \frac{1}{2} \frac{q_d}{B} * \left(\frac{1}{2} B\right)^2 = \frac{1}{8} q_d B$$

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel: Sporenkap
 Dimensies: kN;m;rad (tenzij anders aangegeven)
 Datum....: 28/12/2016
 Bestand...: G:\Projects (TS)\16.137 - 1.rww

Belastingbreedte.: 0.610

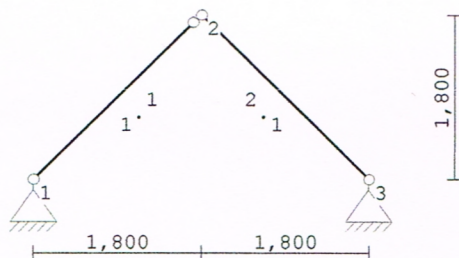
Theorie voor de bepaling van de krachtsverdeling: Geometrisch lineair.

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

Toegepaste normen volgens Eurocode met Nederlandse NB

Belastingen	NEN-EN 1990:2002	C2:2010	NB:2011(nl)
	NEN-EN 1991-1-1:2002	C1:2009	NB:2011(nl)
	NEN-EN 1991-1-3:2003	C1:2009	NB:2011(nl)
	NEN-EN 1991-1-4:2005	C2:2011	NB:2011(nl)

GEOMETRIE



PROFIELVORMEN [mm]

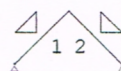
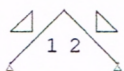
1 B*H 46*96



LASTVELDEN

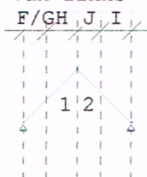
Wind staven

Sneeuw staven

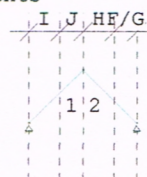


WIND ZONES

Wind van links



Wind van rechts

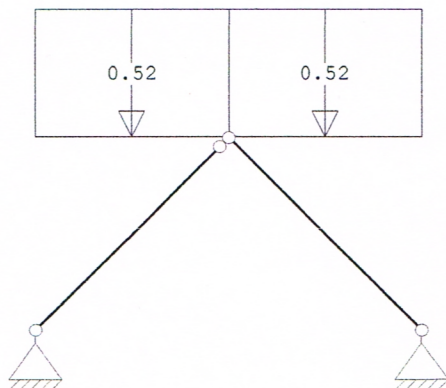


Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden

Onderdeel: Sporenkap

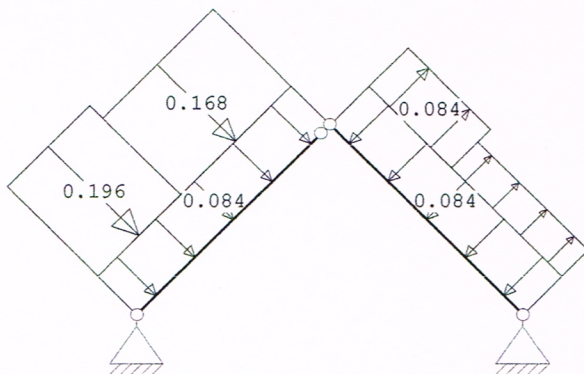
BELASTINGEN

B.G:1 Permanente belasting



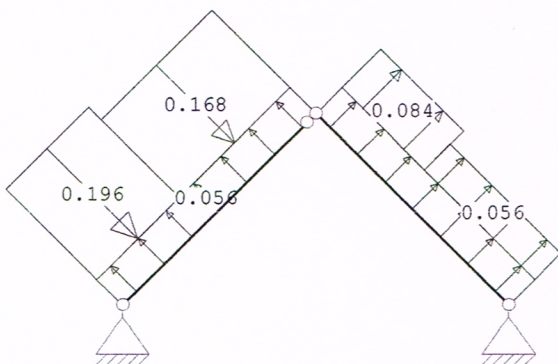
BELASTINGEN

B.G:2 Wind van links onderdruk A



BELASTINGEN

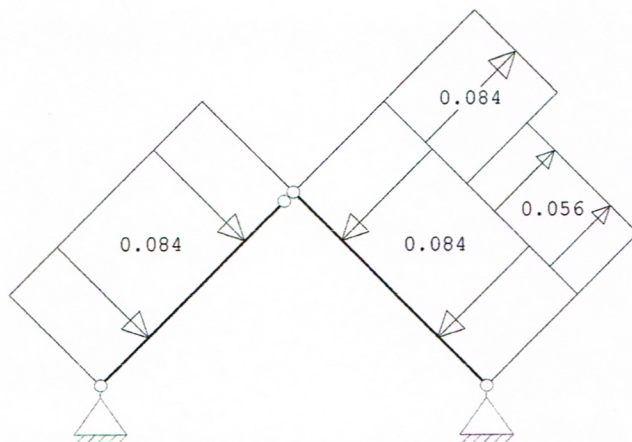
B.G:3 Wind van links overdruk A



Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
Onderdeel: Sporenkap

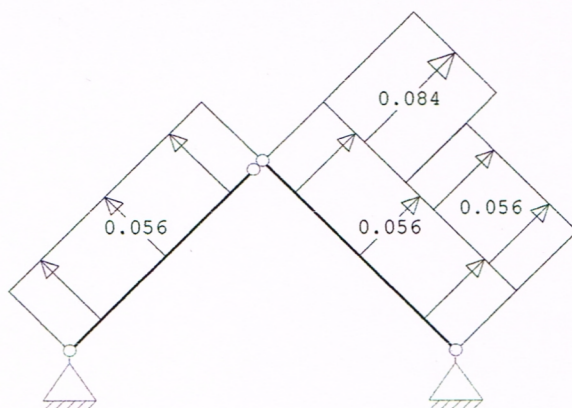
BELASTINGEN

B.G:4 Wind van links onderdruk B



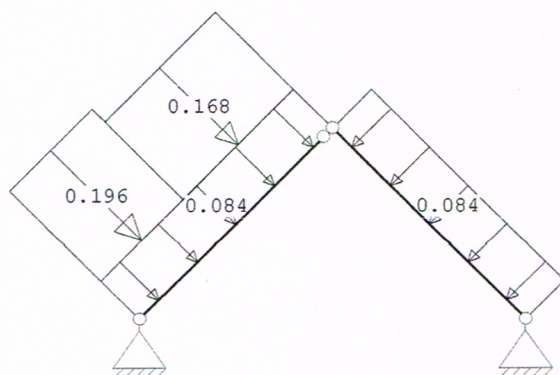
BELASTINGEN

B.G:5 Wind van links overdruk B



BELASTINGEN

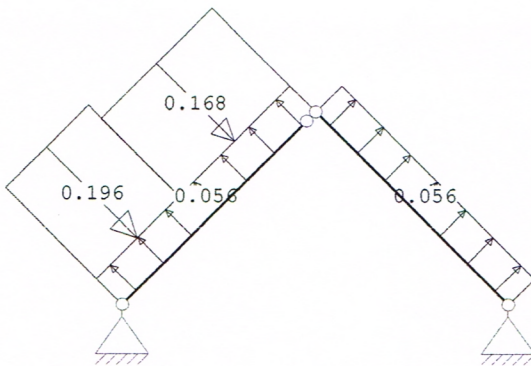
B.G:6 Wind van links onderdruk C



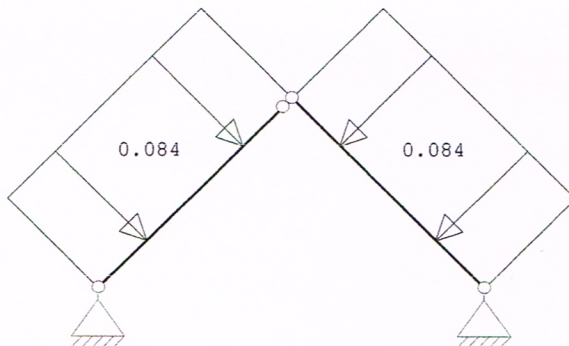
Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
Onderdeel: Sporenkap

BELASTINGEN

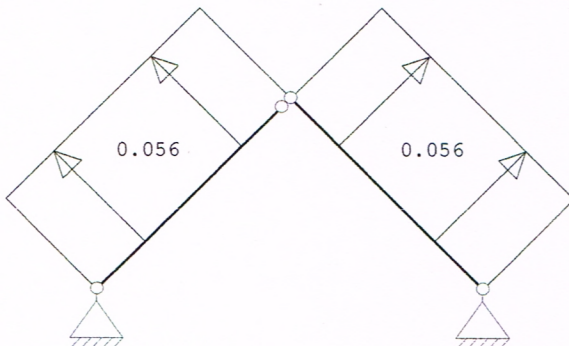
B.G:7 Wind van links overdruk C

**BELASTINGEN**

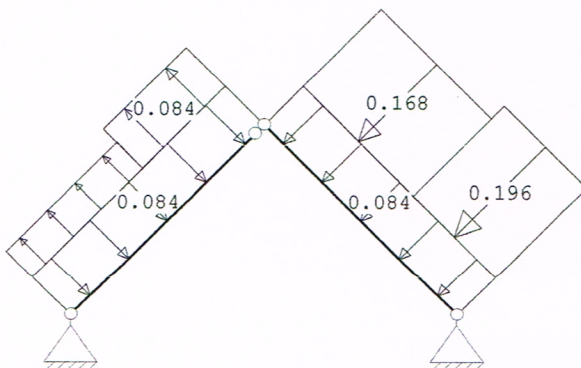
B.G:8 Wind van links onderdruk D

**BELASTINGEN**

B.G:9 Wind van links overdruk D

**BELASTINGEN**

B.G:10 Wind van rechts onderdruk A

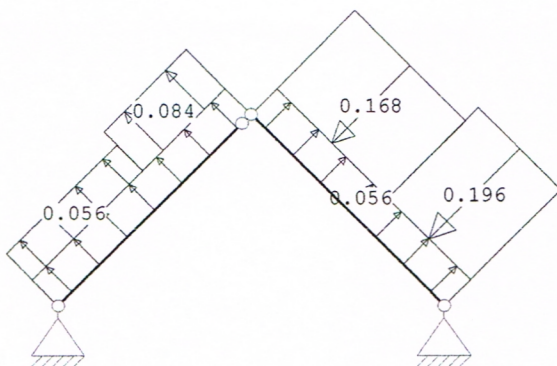


Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden

Onderdeel: Sporenkap

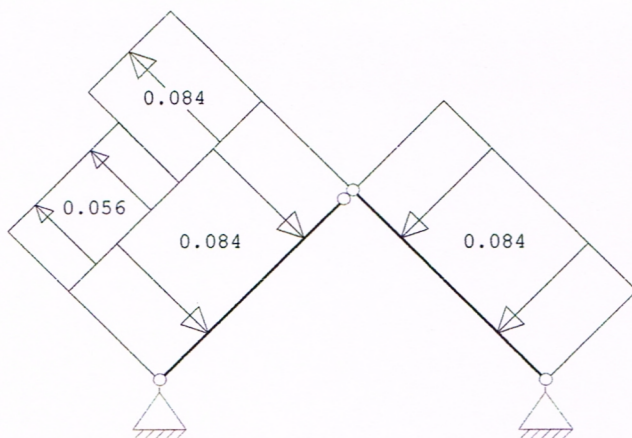
BELASTINGEN

B.G:11 Wind van rechts overdruk A



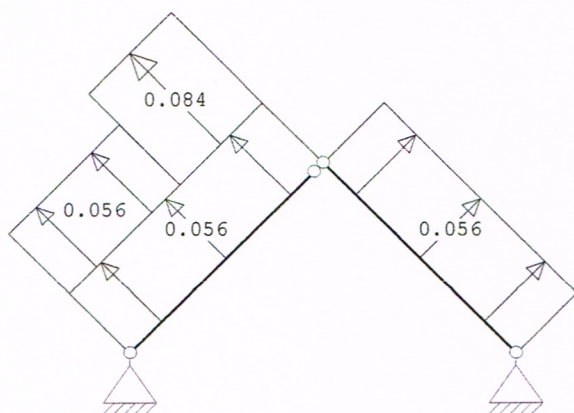
BELASTINGEN

B.G:12 Wind van rechts onderdruk B



BELASTINGEN

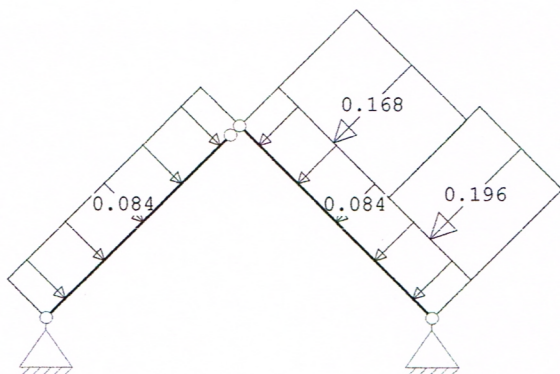
B.G:13 Wind van rechts overdruk B



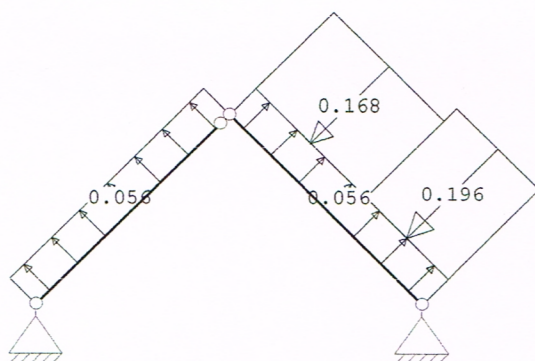
Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
Onderdeel: Sporenkap

BELASTINGEN

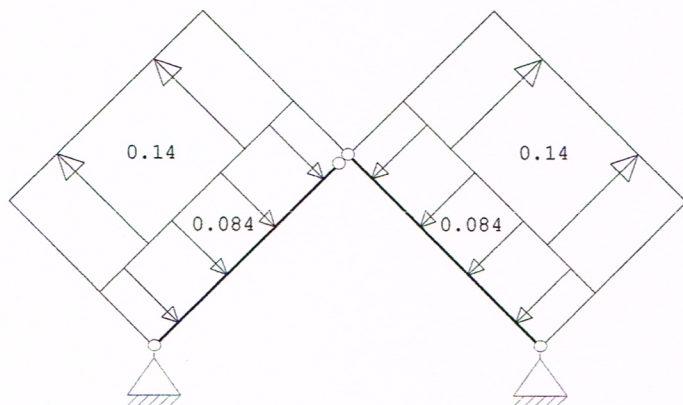
B.G:14 Wind van rechts onderdruk C

**BELASTINGEN**

B.G:15 Wind van rechts overdruk C

**BELASTINGEN**

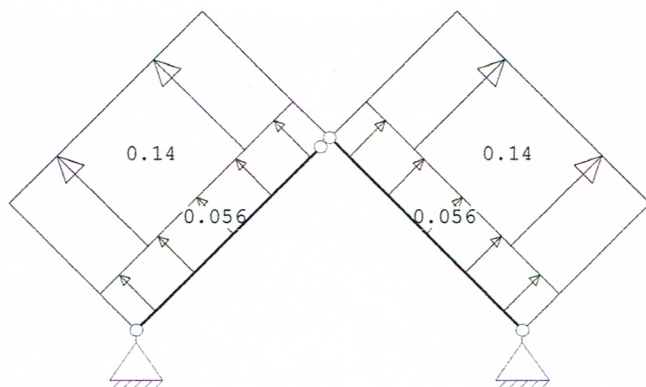
B.G:16 Wind loodrecht onderdruk A



Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
Onderdeel: Sporenkap

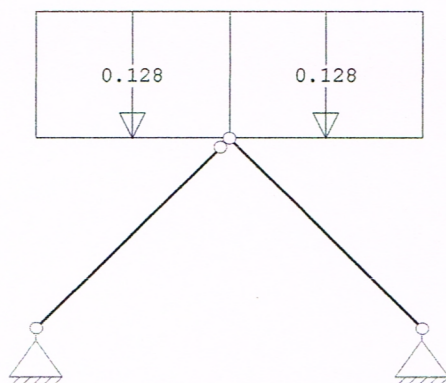
BELASTINGEN

B.G:17 Wind loodrecht overdruk A



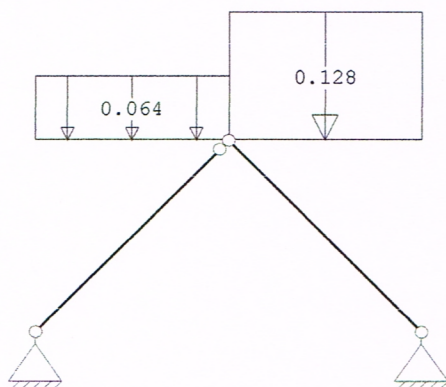
BELASTINGEN

B.G:18 Sneeuw A



BELASTINGEN

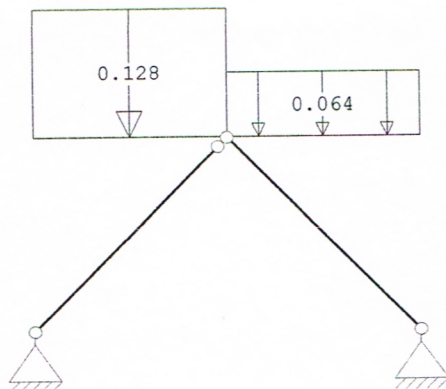
B.G:19 Sneeuw B



Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel: Sporenkap

BELASTINGEN

B.G:20 Sneeuw C

**BELASTINGCOMBINATIES**

BC Type	BG Gen. Factor	BG Gen. Factor	BG Gen. Factor	BG Gen. Factor
1 Fund.	1 Perm	1.22		
2 Fund.	1 Perm	0.90		
3 Fund.	1 Perm	1.08	2 Extr	1.35
4 Fund.	1 Perm	1.08	3 Extr	1.35
5 Fund.	1 Perm	1.08	4 Extr	1.35
6 Fund.	1 Perm	1.08	5 Extr	1.35
7 Fund.	1 Perm	1.08	6 Extr	1.35
8 Fund.	1 Perm	1.08	7 Extr	1.35
9 Fund.	1 Perm	1.08	8 Extr	1.35
10 Fund.	1 Perm	1.08	9 Extr	1.35
11 Fund.	1 Perm	1.08	10 Extr	1.35
12 Fund.	1 Perm	1.08	11 Extr	1.35
13 Fund.	1 Perm	1.08	12 Extr	1.35
14 Fund.	1 Perm	1.08	13 Extr	1.35
15 Fund.	1 Perm	1.08	14 Extr	1.35
16 Fund.	1 Perm	1.08	15 Extr	1.35
17 Fund.	1 Perm	1.08	16 Extr	1.35
18 Fund.	1 Perm	1.08	17 Extr	1.35
19 Fund.	1 Perm	1.08	18 Extr	1.35
20 Fund.	1 Perm	1.08	19 Extr	1.35
21 Fund.	1 Perm	1.08	20 Extr	1.35
22 Fund.	1 Perm	0.90	2 Extr	1.35
23 Fund.	1 Perm	0.90	3 Extr	1.35
24 Fund.	1 Perm	0.90	4 Extr	1.35
25 Fund.	1 Perm	0.90	5 Extr	1.35
26 Fund.	1 Perm	0.90	6 Extr	1.35
27 Fund.	1 Perm	0.90	7 Extr	1.35
28 Fund.	1 Perm	0.90	8 Extr	1.35
29 Fund.	1 Perm	0.90	9 Extr	1.35
30 Fund.	1 Perm	0.90	10 Extr	1.35
31 Fund.	1 Perm	0.90	11 Extr	1.35
32 Fund.	1 Perm	0.90	12 Extr	1.35
33 Fund.	1 Perm	0.90	13 Extr	1.35
34 Fund.	1 Perm	0.90	14 Extr	1.35
35 Fund.	1 Perm	0.90	15 Extr	1.35
36 Fund.	1 Perm	0.90	16 Extr	1.35
37 Fund.	1 Perm	0.90	17 Extr	1.35
38 Fund.	1 Perm	0.90	18 Extr	1.35
39 Fund.	1 Perm	0.90	19 Extr	1.35
40 Fund.	1 Perm	0.90	20 Extr	1.35
41 Kar.	1 Perm	1.00	2 Extr	1.00
42 Kar.	1 Perm	1.00	3 Extr	1.00
43 Kar.	1 Perm	1.00	4 Extr	1.00
44 Kar.	1 Perm	1.00	5 Extr	1.00
45 Kar.	1 Perm	1.00	6 Extr	1.00
46 Kar.	1 Perm	1.00	7 Extr	1.00

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel: Sporenkap

BELASTINGCOMBINATIES

BC Type	BG Gen.	Factor	BG Gen.	Factor	BG Gen.	Factor	BG Gen.	Factor
47 Kar.	1 Perm	1.00	8 Extr	1.00				
48 Kar.	1 Perm	1.00	9 Extr	1.00				
49 Kar.	1 Perm	1.00	10 Extr	1.00				
50 Kar.	1 Perm	1.00	11 Extr	1.00				
51 Kar.	1 Perm	1.00	12 Extr	1.00				
52 Kar.	1 Perm	1.00	13 Extr	1.00				
53 Kar.	1 Perm	1.00	14 Extr	1.00				
54 Kar.	1 Perm	1.00	15 Extr	1.00				
55 Kar.	1 Perm	1.00	16 Extr	1.00				
56 Kar.	1 Perm	1.00	17 Extr	1.00				
57 Kar.	1 Perm	1.00	18 Extr	1.00				
58 Kar.	1 Perm	1.00	19 Extr	1.00				
59 Kar.	1 Perm	1.00	20 Extr	1.00				
60 Quas.	1 Perm	1.00						
61 Freq.	1 Perm	1.00						
62 Freq.	1 Perm	1.00	2 psil	1.00				
63 Freq.	1 Perm	1.00	3 psil	1.00				
64 Freq.	1 Perm	1.00	4 psil	1.00				
65 Freq.	1 Perm	1.00	5 psil	1.00				
66 Freq.	1 Perm	1.00	6 psil	1.00				
67 Freq.	1 Perm	1.00	7 psil	1.00				
68 Freq.	1 Perm	1.00	8 psil	1.00				
69 Freq.	1 Perm	1.00	9 psil	1.00				
70 Freq.	1 Perm	1.00	10 psil	1.00				
71 Freq.	1 Perm	1.00	11 psil	1.00				
72 Freq.	1 Perm	1.00	12 psil	1.00				
73 Freq.	1 Perm	1.00	13 psil	1.00				
74 Freq.	1 Perm	1.00	14 psil	1.00				
75 Freq.	1 Perm	1.00	15 psil	1.00				
76 Freq.	1 Perm	1.00	16 psil	1.00				
77 Freq.	1 Perm	1.00	17 psil	1.00				
78 Freq.	1 Perm	1.00	18 psil	1.00				
79 Freq.	1 Perm	1.00	19 psil	1.00				
80 Freq.	1 Perm	1.00	20 psil	1.00				
81 Blij.	1 Perm	1.00						

GUNSTIGE WERKING PERMANENTE BELASTINGEN

BC Staven met gunstige werking

- 1 Geen
- 2 Alle staven de factor:0.90
- 3 Geen
- 4 Geen
- 5 Geen
- 6 Geen
- 7 Geen
- 8 Geen
- 9 Geen
- 10 Geen
- 11 Geen
- 12 Geen
- 13 Geen
- 14 Geen
- 15 Geen
- 16 Geen
- 17 Geen
- 18 Geen
- 19 Geen
- 20 Geen
- 21 Geen
- 22 Alle staven de factor:0.90
- 23 Alle staven de factor:0.90
- 24 Alle staven de factor:0.90

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden

Onderdeel: Sporenkap

GUNSTIGE WERKING PERMANENTE BELASTINGEN

BC Staven met gunstige werking

25 Alle staven de factor:0.90
 26 Alle staven de factor:0.90
 27 Alle staven de factor:0.90
 28 Alle staven de factor:0.90
 29 Alle staven de factor:0.90
 30 Alle staven de factor:0.90
 31 Alle staven de factor:0.90
 32 Alle staven de factor:0.90
 33 Alle staven de factor:0.90
 34 Alle staven de factor:0.90
 35 Alle staven de factor:0.90
 36 Alle staven de factor:0.90
 37 Alle staven de factor:0.90
 38 Alle staven de factor:0.90
 39 Alle staven de factor:0.90
 40 Alle staven de factor:0.90

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES**STAAFKRACHTEN**

Fundamentele combinatie

St.	Kn.	Pos.	NXi/NXj		DZi/DZj		MYi/MYj	
			Min BC	Max BC	Min BC	Max BC	Min BC	Max BC
1	1		-1.51 15	-0.56 37	-0.82 3	0.04 37	0.00 3	0.00 37
1	1.195		-1.18 15	-0.28 37	-0.04 3	0.00 37	-0.51 3	0.02 37
1	1.259		-1.16 15	-0.26 37	-0.01 5	0.01 31	-0.51 3	0.02 37
1	1.273		-1.16 15	-0.26 37	0.00 5	0.01 31	-0.51 3	0.02 37
1	2		-0.80 15	0.04 37	-0.04 37	0.80 3	0.00 3	0.00 37
2	2		-0.80 3	0.04 37	-0.80 11	0.04 37	0.00 11	0.00 37
2	1.273		-1.16 3	-0.26 37	-0.01 11	0.00 37	-0.51 11	0.02 37
2	1.287		-1.16 3	-0.26 37	-0.01 23	0.01 7	-0.51 11	0.02 37
2	1.350		-1.18 3	-0.28 37	-0.00 23	0.04 11	-0.51 11	0.02 37
2	3		-1.51 3	-0.56 37	-0.04 37	0.82 11	-0.00 11	0.00 37

REACTIES

Fundamentele combinatie

Kn.	X-min	X-max	Z-min	Z-max	M-min	M-max
1	0.10	0.79	0.37	1.44		
3	-0.79	-0.10	0.37	1.44		

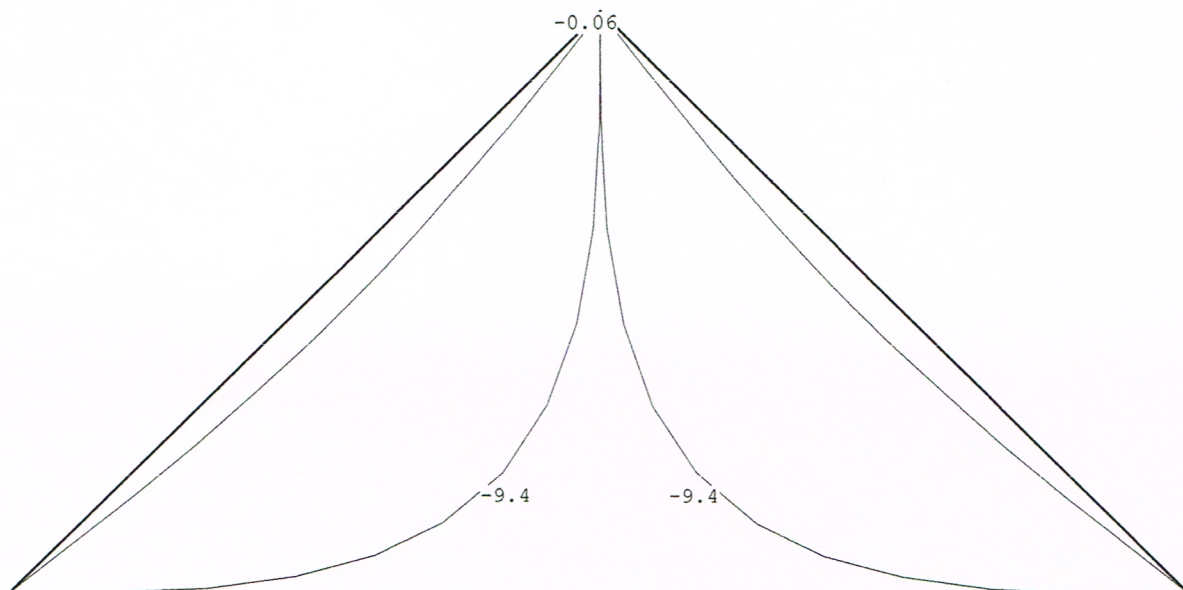
Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden

Onderdeel: Sporenkap

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES**VERPLAATSINGEN**

[mm]

Karakteristieke combinatie

**STAAFKRACHTEN**

Karakteristieke combinatie

St.	Kn.	Pos.	NXi/NXj		Dzi/Dzj		MYi/MYj	
			Min BC	Max BC	Min BC	Max BC	Min BC	Max BC
1	1		-1.32 49	-0.74 56	-0.68 41	-0.08 56	0.00 41	0.00 56
1	1.260		-0.99 49	-0.42 56	-0.00 43	0.00 50	-0.42 41	-0.05 56
1	1.273		-0.99 49	-0.41 56	0.00 43	0.01 50	-0.42 41	-0.05 56
1	2		-0.66 49	-0.08 56	0.08 56	0.66 41	0.00 41	0.00 56
2	2		-0.66 41	-0.08 56	-0.66 49	-0.08 56	0.00 49	0.00 56
2	1.273		-0.99 41	-0.41 56	-0.01 49	0.00 56	-0.42 49	-0.05 56
2	1.286		-0.99 41	-0.42 56	-0.00 42	0.00 45	-0.42 49	-0.05 56
2	3		-1.32 41	-0.74 56	0.08 56	0.68 49	-0.00 49	0.00 56

REACTIES

Karakteristieke combinatie

Kn.	X-min	X-max	Z-min	Z-max	M-min	M-max
1	0.23	0.68	0.58	1.26		
3	-0.68	-0.23	0.58	1.26		

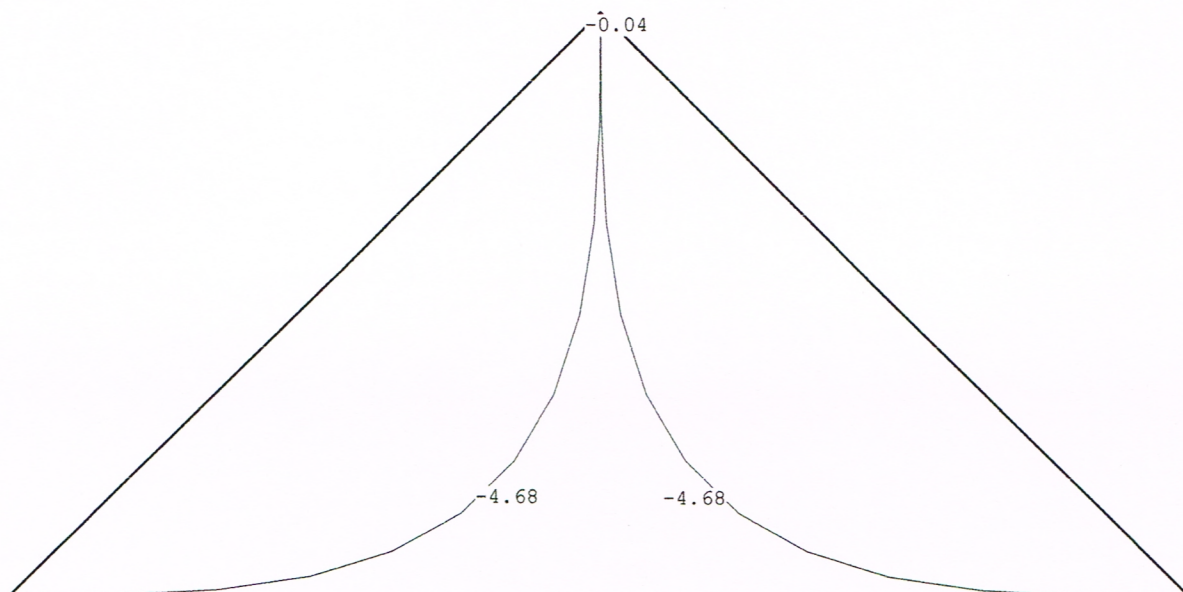
Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden

Onderdeel: Sporenkap

OMHULLENDE VAN DE BLIJVENDE COMBINATIES**VERPLAATSINGEN**

[mm]

Blijvende combinatie

**STAAFKRACHTEN**

Blijvende combinatie

St.	Kn.	Pos.	NX_i/NX_j	DZ_i/DZ_j	MY_i/MY_j
1	1		-0.99	-0.33	0.00
1	1.273			0.00	-0.21
1	2		-0.33	0.33	0.00
2	2		-0.33	-0.33	0.00
2	1.273			0.00	-0.21
2	3		-0.99	0.33	0.00

REACTIES

Blijvende combinatie

Kn.	X	Z	M
1	0.47	0.94	
3	-0.47	0.94	

Project : 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel : Sporen
 Datum : kN/m/rad
 Eenheden : 30/12/2016

Toegepaste normen volgens Eurocode met Nederlandse NB

Belastingen	NEN-EN 1990:2002	C2:2010	NB:2011(nl)
	NEN-EN 1991-1-1:2002	C1:2009	NB:2011(nl)
Hout	NEN-EN 1995-1-1:2005	A1:2011, C1:2006	NB:2011(nl)
	NEN-EN 14080:2013		

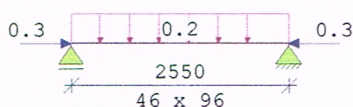
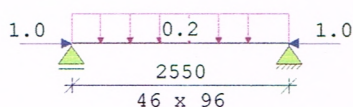
Berekening willekeurige staaf. (H)

Algemene gegevens

B x H	[mm] :	46 x 96	Referentie periode [j]:	50
l_{sys}	[mm] :	2550		
$l_{buc,y}$	[mm] :	2550	Toelaatbare doorbuiging	
$l_{buc,z}$	[mm] :	1000	Bijkomend [* 1] :	0.004
Plaats kipsteun	:	Bovenkant		
Steunpunt links	:	Rol	Eind [* 1] :	0.004
Steunpunt rechts	:	Scharnier		
Sterkteklasse	:	C18	Klimaatklasse :	I

Belastingen

		Permanent	Veranderlijk
q_z	[kN/m] :	-0.21	-0.21
Ψ_0	[-] :		0.00
Ψ_2	[-] :		0.00
F_z	[kN] :	0.00	0.00
Vanaf links	[mm] :	0	
N_x	[kN] :	0.99	0.33
$M_{y,links}$	[kNm] :	0.00	0.00
$M_{y,rechts}$	[kNm] :	0.00	0.00



Belastingfactoren (NEN-EN 1990)

Formule 6.10a:	γ_G :	1.22	γ_Q :	1.35
Formule 6.10b:	$\xi \gamma_G$:	1.08	γ_Q :	1.35

Partiële factor (Tabel 2.3 NEN-EN 1995-1-1)

$\gamma_M[-]$: 1.30

Stabiliteit

1. Factoren t.b.v. toetsing knikstabiliteit volgens par. 6.3.2.:

k_y	[-] :	1.92 frm(6.27)	$k_{c,y}$	[-] :	0.34 frm(6.25)
k_z	[-] :	1.46 frm(6.28)	$k_{c,z}$	[-] :	0.47 frm(6.26)

2. Factoren t.b.v. toetsing kipstabiliteit volgens par. 6.3.3.:

Fundamentele combinatie (6.10a):

$k_{crit,y}$ [-] : 1.00 frm(6.34)

Fundamentele combinatie (6.10b):

$k_{crit,y}$ [-] : 1.00 frm(6.34)

Fundamentele combinatie (6.10a)

			frm(6.23)	u.c.	0.42
Normaalkracht	[kN]	1.2	$\sigma_{c,0,d}$ [N/mm ²]	0.27	
Dwarskracht	[kN]	-0.3	$\sigma_{v,d}$ [N/mm ²]	0.11	
Moment	[kNm]	-0.2	$\sigma_{m,y,d}$ [N/mm ²]	2.95	
$f_{m,y,d}$	[N/mm ²]	9.1	$f_{c,0,d}$ [N/mm ²]	8.31	b_{ef} 46[mm] frm(6.13a)
$f_{t,0,d}$	[N/mm ²]	5.6	$f_{v,d}$ [N/mm ²]	1.57	k_{mod} 0.60 [-] tab(3.1)

Project : 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel : Sporen
 Datum : kN/m/rad
 Eenheden : 30/12/2016

Fundamentele combinatie (6.10b) **frm(6.23)** **u.c.** **0.51**

Normaalkracht [kN]	1.5	$\sigma_{c,0,d}$	[N/mm ²]	0.34		
Dwarskracht [kN]	0.7	$\sigma_{v,d}$	[N/mm ²]	0.22		
Moment [kNm]	-0.4	$\sigma_{m,y,d}$	[N/mm ²]	5.87		
$f_{m,y,d}$ [N/mm ²]	13.6	$f_{c,0,d}$	[N/mm ²]	12.46	b_{ef} 46[mm]	frm(6.13a)
$f_{t,0,d}$ [N/mm ²]	8.3	$f_{v,d}$	[N/mm ²]	2.35	k_{mod} 0.90 [-]	tab(3.1)

Doorbuiging **u.c.**

u_{bij}	=	6.06 < 10.20 [mm]	0.59
$u_{net,fin}$	=	9.85 < 10.20 [mm]	0.97

Project : 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel : Balklaag zolder
 Datum : kN/m/rad
 Eenheden : 30/12/2016

Toegepaste normen volgens Eurocode met Nederlandse NB

Belastingen	NEN-EN 1990:2002	C2:2010	NB:2011(nl)
	NEN-EN 1991-1-1:2002	C1:2009	NB:2011(nl)
Hout	NEN-EN 1995-1-1:2005	A1:2011, C1:2006	NB:2011(nl)
	NEN-EN 14080:2013		

Balklaag berekening. (H)

Algemene gegevens

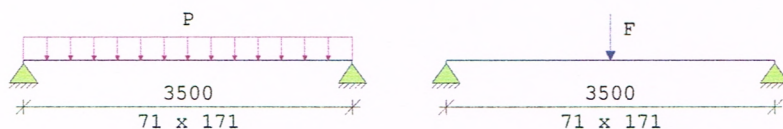
B x H	[mm] :	71 x 171	Sterkteklasse	:	C18
Overspanning	[mm] :	3500	Klimaatklasse	:	I
Opleglengte	[mm] :	100	Referentie periode [j]	:	50
H.o.h. afstand	[mm] :	610	Min. eigenfreq. [Hz]	:	3
Beschot sterkteklasse:		C18			
Dikte beschot	[mm] :	19	$E_{0, mean} \times I$ [Nm ² /m]	:	5144

Permanente belastingen G_{rep}

EG balklaag	:	0.35
Extra belasting	:	0.00
Totaal [kN/m ²]	:	0.35

Veranderlijke belastingen

$P_{rep} + P_{wanden}$ [kN/m ²]	:	1.75 =	1.75 +	0.00
Ψ_0 [-]	:	0.40		
Ψ_2 [-]	:	0.30		
F_{rep} [kN]	:	3.00		
F_{rep} oppervlak [m ²]	:	0.10 x 0.10		
Reductiefactor	:	0.76		



Belastingfactoren (NEN-EN 1990)

Formule 6.10a:	γ_G :	1.22	γ_Q :	1.35
Formule 6.10b:	$\xi \gamma_G$:	1.08	γ_Q :	1.35

Partiële factor (Tabel 2.3 NEN-EN 1995-1-1)

γ_M [-]: 1.30

Meegenomen combinaties in de berekening :	k_{mod} [-]	b_{ef} [mm]	$k_{C, 90, q}$	$k_{C, 90, F}$
* Perm. + q-last (6.10a) ($G_{rep} + P_{rep}$)	0.80	71	1.00	
* Perm. + q-last (6.10b) ($G_{rep} + P_{rep}$)	0.80	71	1.00	
* Perm. + puntlast (6.10a) ($G_{rep} + F_{rep}$)	0.90	71	1.00	1.00
* Perm. + puntlast (6.10b) ($G_{rep} + F_{rep}$)	0.90	71	1.00	1.00

Resultaten (maatgevende combinaties)

	eis	u.c.
Perm + plast(6.10b) frm(6.11) $\sigma_{m, y, d}$	= 8.64 < 12.46 [N/mm ²]	0.69
Perm + plast(6.10b) frm(6.13) $\sigma_{v, d}$	= 0.48 < 2.35 [N/mm ²]	0.21
Perm + plast(6.10b) frm(6.3) $\sigma_{C, 90, q, d} / (k_{C, 90, q} * f_{C, 90, d}) + \sigma_{C, 90, F, d} / (k_{C, 90, F} * f_{C, 90, d})$	< 1.00 = 0.06/ 1.52+ 0.56/ 1.52 = 0.40	
Verdeelde belasting u_{bij}	= 10.18 < 10.50 [mm]	0.97
Verdeelde belasting $u_{net, fin}$	= 11.75 < 14.00 [mm]	0.84
Resonantie : eerste eigen frequentie	= 8.19 > 3.00 [Hz]	0.37

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel: Spant Langsrichting
 Dimensies: kN;m;rad (tenzij anders aangegeven)
 Datum....: 28/12/2016
 Bestand...: G:\Projects (TS)\16.137 - 2.rww

Belastingbreedte.: 1.000

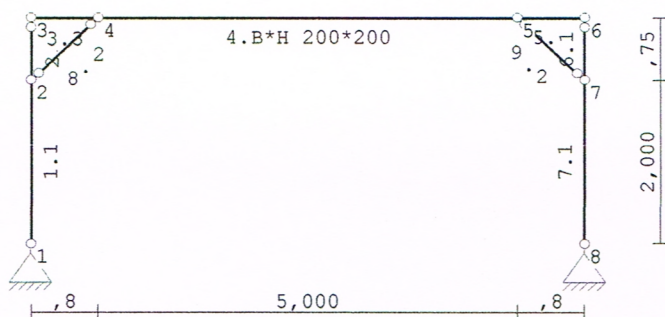
Theorie voor de bepaling van de krachtsverdeling: Geometrisch lineair.

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

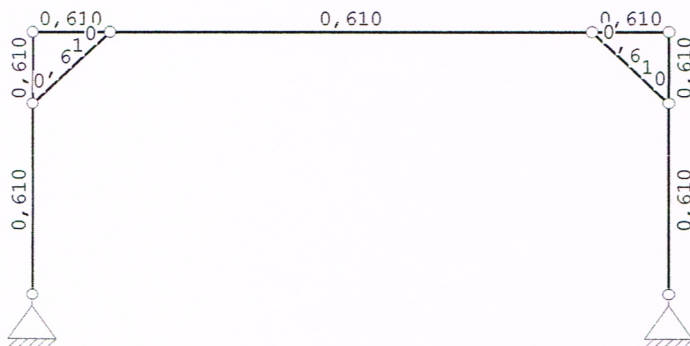
Toegepaste normen volgens Eurocode met Nederlandse NB

Belastingen	NEN-EN 1990:2002	C2:2010	NB:2011(nl)
	NEN-EN 1991-1-1:2002	C1:2009	NB:2011(nl)

GEOMETRIE



BELASTINGBREEDTEN



PROFIELVORMEN [mm]

1 B*H 200*200



2 B*H 120*120



3 B*H 200*200

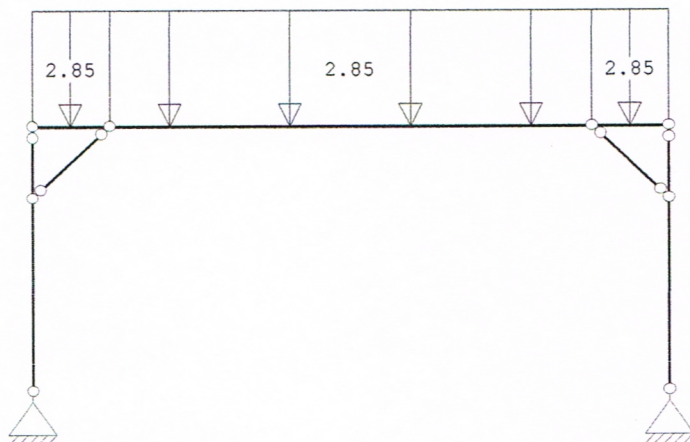


Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden

Onderdeel: Spant Langsrichting

BELASTINGEN

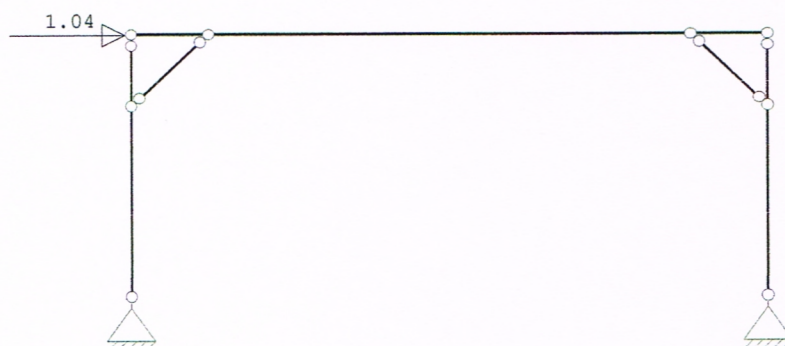
B.G:1 Permanente belasting

**BELASTINGEN**

B.G:2 Variabele belasting

**BELASTINGEN**

B.G:3 Wind belasting

**BELASTINGCOMBINATIES**

BC Type	BG Gen.	Factor	BG Gen.	Factor	BG Gen.	Factor	BG Gen.	Factor
1 Fund.	1 Perm	1.22						
2 Fund.	1 Perm	0.90						
3 Fund.	1 Perm	1.22	2 psi0	1.35				
4 Fund.	1 Perm	1.08	2 Extr	1.35				
5 Fund.	1 Perm	1.08	3 Extr	1.35				
6 Fund.	1 Perm	0.90	2 psi0	1.35				
7 Fund.	1 Perm	0.90	2 Extr	1.35				

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel: Spant Langsrichting

BELASTINGCOMBINATIES

BC Type	BG	Gen.	Factor	BG	Gen.	Factor	BG	Gen.	Factor	BG	Gen.	Factor
8 Fund.	1	Perm	0.90	3 Extr	1.35							
9 Fund.	1	Perm	1.08	3 Extr	1.35	2 psi0	1.35					
10 Fund.	1	Perm	0.90	3 Extr	1.35	2 psi0	1.35					
11 Kar.	1	Perm	1.00	2 Extr	1.00							
12 Kar.	1	Perm	1.00	3 Extr	1.00							
13 Kar.	1	Perm	1.00	3 Extr	1.00	2 psi0	1.00					
14 Quas.	1	Perm	1.00									
15 Quas.	1	Perm	1.00	2 psi2	1.00							
16 Freq.	1	Perm	1.00									
17 Freq.	1	Perm	1.00	2 psi1	1.00							
18 Freq.	1	Perm	1.00	3 psi1	1.00							
19 Freq.	1	Perm	1.00	3 psi1	1.00	2 psi2	1.00					
20 Blij.	1	Perm	1.00									

GUNSTIGE WERKING PERMANENTE BELASTINGEN

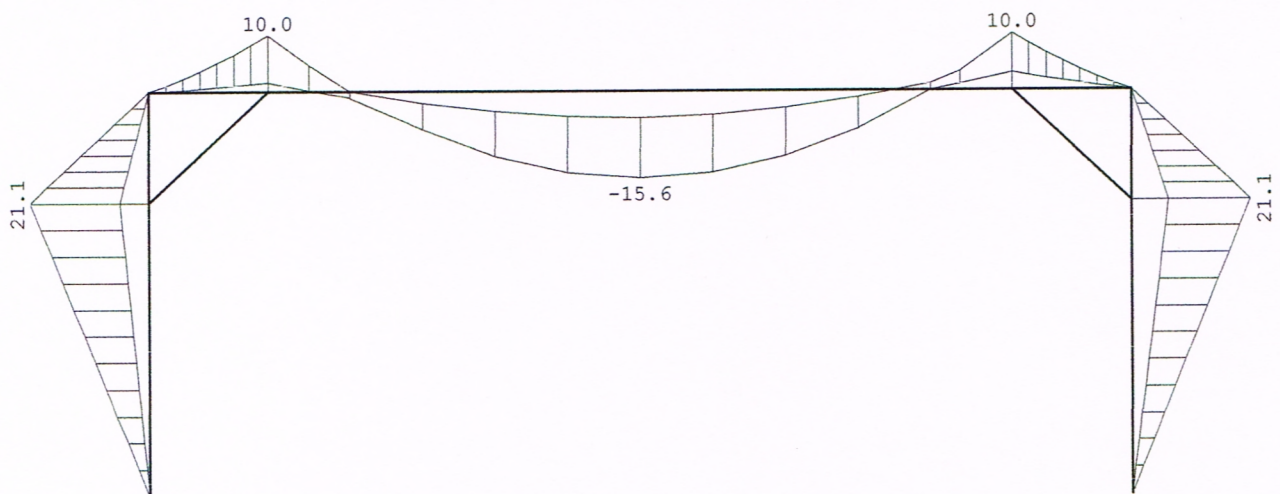
BC Staven met gunstige werking

- 1 Geen
- 2 Alle staven de factor:0.90
- 3 Geen
- 4 Geen
- 5 Geen
- 6 Alle staven de factor:0.90
- 7 Alle staven de factor:0.90
- 8 Alle staven de factor:0.90
- 9 Geen
- 10 Alle staven de factor:0.90

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES

MOMENTEN

Fundamentele combinatie



Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel: Spant Langsrichting

NORMAALKRACHTEN

Fundamentele combinatie

**STAAFKRACHTEN**

Fundamentele combinatie

St.	Kn.	Pos.	NXi/NXj			DZi/DZj			MYi/MYj					
			Min	BC	Max	BC	Min	BC	Max	BC	Min	BC	Max	BC
1	1		-27.09	4	-7.88	8	2.60	8	10.57	4	0.00	8	0.00	4
1	2		-27.09	4	-7.88	8	2.60	8	10.57	4	5.20	8	21.13	4
2	2		1.06	8	9.24	4	-28.18	4	-6.93	8	5.20	8	21.13	4
2	3		1.06	8	9.24	4	-28.18	4	-6.93	8	0.00	8	0.00	4
3	3		5.53	8	28.18	4	1.06	8	9.24	4	0.00	8	0.00	4
3	4		5.53	8	28.18	4	3.11	8	15.81	4	1.67	8	10.02	4
4	4		-10.57	4	-3.30	2	-20.52	4	-5.83	8	1.67	8	10.02	4
4	0.307		-10.57	4	-3.30	2	-18.00	4	-5.04	8	-0.00	8	4.11	4
4	0.548		-10.57	4	-3.30	2	-16.02	4	-4.42	8	-1.14	8	-0.00	4
4	2.500		-10.57	4	-3.30	2	0.00	4	0.58	8	-15.63	4	-4.89	2
4	4.237		-10.57	4	-3.30	2	4.46	2	14.26	4	-3.25	4	-0.00	8
4	4.452		-10.57	4	-3.30	2	5.01	2	16.02	4	-0.00	4	1.14	8
4	5		-10.57	4	-3.30	2	6.41	2	20.52	4	3.13	2	10.02	4
5	5		8.81	2	28.18	4	-15.81	4	-4.94	2	3.13	2	10.02	4
5	6		8.81	2	28.18	4	-9.24	4	-2.89	2	0.00	2	0.00	4
6	6		2.89	2	9.24	4	8.81	2	28.18	4	0.00	2	0.00	4
6	7		2.89	2	9.24	4	8.81	2	28.18	4	6.60	2	21.13	4
7	7		-27.09	4	-8.46	2	-10.57	4	-3.30	2	6.60	2	21.13	4
7	8		-27.09	4	-8.46	2	-10.57	4	-3.30	2	0.00	2	0.00	4
8	2		-53.11	4	-13.07	8	0.00	1	0.00	1	0.00	1	0.00	1
8	4		-53.11	4	-13.07	8	0.00	1	0.00	1	0.00	1	0.00	1
9	5		-53.11	4	-16.60	2	0.00	1	0.00	1	0.00	1	0.00	1
9	7		-53.11	4	-16.60	2	0.00	1	0.00	1	0.00	1	0.00	1

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden

Onderdeel: Spant Langsrichting

REACTIES

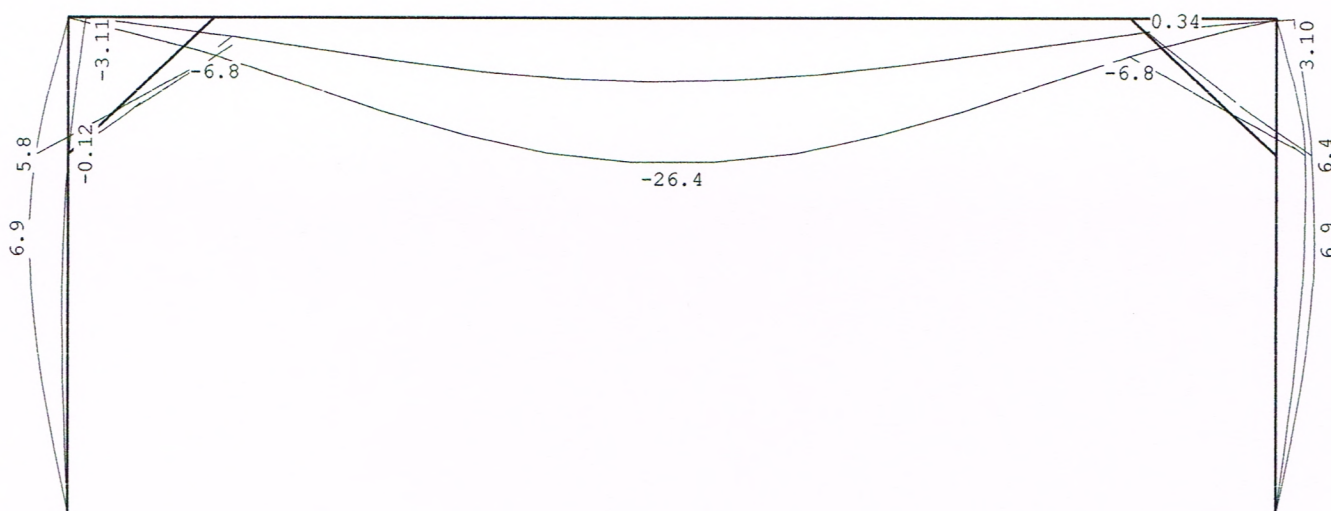
Fundamentele combinatie

Kn.	X-min	X-max	Z-min	Z-max	M-min	M-max
1	2.60	10.57	7.88	27.09		
8	-10.57	-3.30	8.46	27.09		

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES**VERPLAATSINGEN**

[mm]

Karakteristieke combinatie

**STAAFKRACHTEN**

Karakteristieke combinatie

St.	Kn.	Pos.	NXi/NXj		DZi/DZj		MYi/MYj	
			Min BC	Max BC	Min BC	Max BC	Min BC	Max BC
1	1		-21.94 11	-8.97 12	3.15 12	8.56 11	0.00 12	0.00 11
1	2		-21.94 11	-8.97 12	3.15 12	8.56 11	6.30 12	17.12 11
2	2		1.85 12	7.49 11	-22.83 11	-8.40 12	6.30 12	17.12 11
2	3		1.85 12	7.49 11	-22.83 11	-8.40 12	0.00 12	0.00 11
3	3		7.36 12	22.83 11	1.85 12	7.49 11	0.00 12	0.00 11
3	4		7.36 12	22.83 11	4.13 12	12.81 11	2.39 12	8.12 11
4	4		-8.56 11	-4.19 12	-16.62 11	-6.69 12	2.39 12	8.12 11
4	0.390		-8.56 11	-4.19 12	-14.03 11	-5.58 12	-0.00 12	2.13 11
4	0.548		-8.56 11	-4.19 12	-12.98 11	-5.13 12	-0.85 12	-0.00 11
4	2.348		-8.56 11	-4.19 12	-1.01 11	0.00 12	-12.59 11	-5.46 12
4	2.500		-8.56 11	-4.19 12	0.00 11	0.43 12	-12.66 11	-5.43 12
4	4.306		-8.56 11	-4.19 12	5.58 12	12.01 11	-1.83 11	-0.00 12
4	4.452		-8.56 11	-4.19 12	6.00 12	12.98 11	-0.00 11	0.85 12
4	5		-8.56 11	-4.19 12	7.56 12	16.62 11	4.56 12	8.12 11
5	5		11.17 12	22.83 11	-12.81 11	-6.84 12	4.56 12	8.12 11
5	6		11.17 12	22.83 11	-7.49 11	-4.56 12	0.00 12	0.00 11
6	6		4.56 12	7.49 11	11.17 12	22.83 11	0.00 12	0.00 11
6	7		4.56 12	7.49 11	11.17 12	22.83 11	8.38 12	17.12 11
7	7		-21.94 11	-9.84 12	-8.56 11	-4.19 12	8.38 12	17.12 11
7	8		-21.94 11	-9.84 12	-8.56 11	-4.19 12	0.00 12	0.00 11
8	2		-43.03 11	-15.83 12	0.00 11	0.00 11	0.00 11	0.00 11
8	4		-43.03 11	-15.83 12	0.00 11	0.00 11	0.00 11	0.00 11

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel: Spant Langsrichting

STAAFKRACHTEN

Karakteristieke combinatie

St.	Kn.	Pos.	NXi/NXj		DZi/DZj		MYi/MYj	
			Min BC	Max BC	Min BC	Max BC	Min BC	Max BC
9	5		-43.03	11	-21.06	12	0.00	11
9	7		-43.03	11	-21.06	12	0.00	11

REACTIES

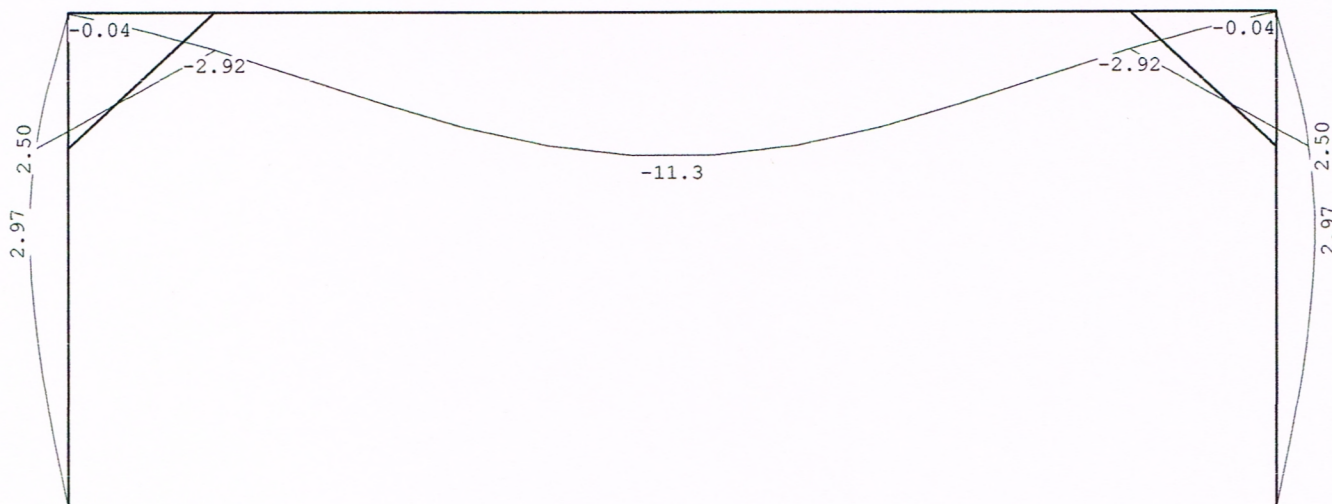
Karakteristieke combinatie

Kn.	X-min	X-max	Z-min	Z-max	M-min	M-max
1	3.15	8.56	8.97	21.94		
8	-8.56	-4.19	9.84	21.94		

OMHULLENDE VAN DE BLIJVENDE COMBINATIES**VERPLAATSINGEN**

[mm]

Blijvende combinatie

**STAAFKRACHTEN**

Blijvende combinatie

St.	Kn.	Pos.	NXi/NXj	DZi/DZj	MYi/MYj
1	1		-9.40	3.67	0.00
1	2		-9.40	3.67	7.34
2	2		3.21	-9.78	7.34
2	3		3.21	-9.78	0.00
3	3		9.78	3.21	0.00
3	4		9.78	5.49	3.48
4	4		-3.67	-7.12	3.48
4		0.548			-0.00
4		2.500		0.00	-5.43
4		4.452			-0.00
4	5		-3.67	7.12	3.48
5	5		9.78	-5.49	3.48
5	6		9.78	-3.21	0.00
6	6		3.21	9.78	0.00
6	7		3.21	9.78	7.34
7	7		-9.40	-3.67	7.34
7	8		-9.40	-3.67	0.00

Project..: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
Onderdeel: Spant Langsrichting

STAAFKRACHTEN

Blijvende combinatie

St.	Kn.	Pos.	NXi/NXj	DZi/DZj	MYi/MYj
8	2		-18.44	0.00	0.00
8	4		-18.44	0.00	0.00
9	5		-18.44	0.00	0.00
9	7		-18.44	0.00	0.00

REACTIES

Blijvende combinatie

Kn.	X	Z	M
1	3.67	9.40	
8	-3.67	9.40	

Project : 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel : Kolom
 Datum : kN/m/rad
 Eenheden : 30/12/2016

Toegepaste normen volgens Eurocode met Nederlandse NB

Belastingen	NEN-EN 1990:2002	C2:2010	NB:2011(nl)
	NEN-EN 1991-1-1:2002	C1:2009	NB:2011(nl)
Hout	NEN-EN 1995-1-1:2005	A1:2011, C1:2006	NB:2011(nl)
	NEN-EN 14080:2013		

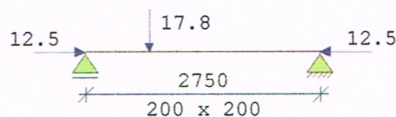
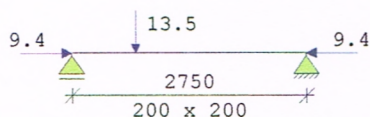
Berekening willekeurige staaf. (H)

Algemene gegevens

B x H	[mm] :	200 x 200	Referentie periode [j]:	50
l_{sys}	[mm] :	2750		
$l_{buc,y}$	[mm] :	2750	Toelaatbare doorbuiging	
$l_{buc,z}$	[mm] :	2000	Bijkomend [* 1] :	0.004
Plaats kipsteun	:	Bovenkant		
Steunpunt links	:	Rol	Eind [* 1] :	0.004
Steunpunt rechts	:	Scharnier		
Sterkteklasse	:	C24	Klimaatklasse :	I

Belastingen

	Permanent	Veranderlijk
q_z	[kN/m] : 0.00	0.00
Ψ_0	[-] :	0.40
Ψ_2	[-] :	0.30
F_z	[kN] : -13.46	-17.78
Vanaf links	[mm] : 750	
N_x	[kN] : 9.40	12.54
$M_{y,links}$	[kNm] : 0.00	0.00
$M_{y,rechts}$	[kNm] : 0.00	0.00



Belastingfactoren (NEN-EN 1990)

Formule 6.10a: γ_G : 1.22 γ_Q : 1.35
 Formule 6.10b: $\xi\gamma_G$: 1.08 γ_Q : 1.35

Partiële factor (Tabel 2.3 NEN-EN 1995-1-1)

γ_M [-]: 1.30

Stabiliteit

1. Factoren t.b.v. toetsing knikstabiliteit volgens par. 6.3.2.:

k_y	[-] :	0.88 frm(6.27)	$k_{c,y}$	[-] :	0.82 frm(6.25)
k_z	[-] :	0.70 frm(6.28)	$k_{c,z}$	[-] :	0.92 frm(6.26)

2. Factoren t.b.v. toetsing kipstabiliteit volgens par. 6.3.3.:

Fundamentele combinatie (6.10a):

$\kappa_{crit,y}$ [-] : 1.00 frm(6.34)

Fundamentele combinatie (6.10b):

$\kappa_{crit,y}$ [-] : 1.00 frm(6.34)

Fundamentele combinatie (6.10a) **frm(6.23)** **u.c.** **0.68**

Normaalkracht	[kN]	18.2	$\sigma_{c,0,d}$	[N/mm ²]	0.46
Dwarskracht	[kN]	-18.9	$\sigma_{v,d}$	[N/mm ²]	0.71
Moment	[kNm]	-14.2	$\sigma_{m,y,d}$	[N/mm ²]	10.65
$f_{m,y,d}$	[N/mm ²]	16.6	$f_{c,0,d}$	[N/mm ²]	14.54
$f_{t,0,d}$	[N/mm ²]	9.7	$f_{v,d}$	[N/mm ²]	2.77
			b_{ef}	200 [mm]	frm(6.13a)
			k_{mod}	0.90 [-]	tab(3.1)

Project : 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel : Kolom
 Datum : kN/m/rad
 Eenheden : 30/12/2016

Fundamentele combinatie (6.10b) **frm(6.23)** **u.c.** 1.01

Normaalkracht [kN]	27.1	$\sigma_{c,0,d}$	[N/mm ²]	0.68
Dwarskracht [kN]	-28.0	$\sigma_{v,d}$	[N/mm ²]	1.05
Moment [kNm]	-21.0	$\sigma_{m,y,d}$	[N/mm ²]	15.77

$f_{m,y,d}$	[N/mm ²]	16.6	$f_{c,0,d}$	[N/mm ²]	14.54	b_{ef}	200[mm]	frm(6.13a)
$f_{t,0,d}$	[N/mm ²]	9.7	$f_{v,d}$	[N/mm ²]	2.77	k_{mod}	0.90 [-]	tab(3.1)

Doorbuiging **u.c.**

u_{bij}	=	6.42 < 11.00	[mm]	0.58
$u_{net,fin}$	=	9.39 < 11.00	[mm]	0.85

Project : 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel : Schoren
 Datum : kN/m/rad
 Eenheden : 30/12/2016

Toegepaste normen volgens Eurocode met Nederlandse NB

Belastingen	NEN-EN 1990:2002	C2:2010	NB:2011(nl)
	NEN-EN 1991-1-1:2002	C1:2009	NB:2011(nl)
Hout	NEN-EN 1995-1-1:2005	A1:2011, C1:2006	NB:2011(nl)
	NEN-EN 14080:2013		

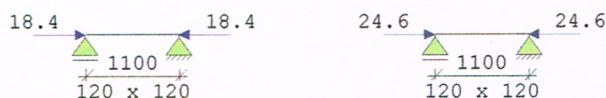
Berekening willekeurige staaf. (H)

Algemene gegevens

B x H	[mm] :	120 x 120	Referentie periode [j]:	50
l_{sys}	[mm] :	1100		
$l_{buc,y}$	[mm] :	1100	Toelaatbare doorbuiging	
$l_{buc,z}$	[mm] :	1100	Bijkomend [* l] :	0.004
Plaats kipsteun	:	Bovenkant		
Steunpunt links	:	Rol	Eind [* l] :	0.004
Steunpunt rechts	:	Scharnier		
Sterkteklasse	:	C24	Klimaatklasse :	I

Belastingen

	Permanent	Veranderlijk
q_z	[kN/m] :	0.00
Ψ_0	[-] :	0.40
Ψ_2	[-] :	0.30
F_z	[kN] :	0.00
Vanaf links	[mm] :	0
N_x	[kN] :	18.44
$M_{y,links}$	[kNm] :	0.00
$M_{y,rechts}$	[kNm] :	0.00



Belastingfactoren (NEN-EN 1990)

Formule 6.10a:	γ_G :	1.22	γ_Q :	1.35
Formule 6.10b:	$\xi \gamma_G$:	1.08	γ_Q :	1.35

Partiële factor (Tabel 2.3 NEN-EN 1995-1-1)

$\gamma_M[-]$: 1.30

Stabiliteit

1. Factoren t.b.v. toetsing knikstabiliteit volgens par. 6.3.2.:

k_y	[-] :	0.67 frm(6.27)	$k_{c,y}$	[-] :	0.94 frm(6.25)
k_z	[-] :	0.67 frm(6.28)	$k_{c,z}$	[-] :	0.94 frm(6.26)

2. Toetsing kipstabiliteit volgens par. 6.3.3. is n.v.t.:

- geen buigend moment op de staaf.

Fundamentele combinatie (6.10a)

			frm(6.23)	u.c.	0.18
Normaalkracht	[kN]	35.8	$\sigma_{c,0,d}$ [N/mm ²]	2.48	
Dwarskracht	[kN]	0.0	$\sigma_{v,d}$ [N/mm ²]	0.00	
Moment	[kNm]	0.0	$\sigma_{m,y,d}$ [N/mm ²]	0.00	
$f_{m,y,d}$	[N/mm ²]	17.4	$f_{c,0,d}$ [N/mm ²]	14.54	b_{ef} 120[mm] frm(6.13a)
$f_{t,0,d}$	[N/mm ²]	10.1	$f_{v,d}$ [N/mm ²]	2.77	k_{mod} 0.90 [-] tab(3.1)

Project : 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel : Schoren
 Datum : kN/m/rad
 Eenheden : 30/12/2016

Fundamentele combinatie (6.10b) **frm(6.23)** **u.c.** **0.27**

Normaalkracht [kN]	53.1	$\sigma_{c,0,d}$	[N/mm ²]	3.69	
Dwarskracht [kN]	0.0	$\sigma_{v,d}$	[N/mm ²]	0.00	
Moment [kNm]	0.0	$\sigma_{m,y,d}$	[N/mm ²]	0.00	
$f_{m,y,d}$ [N/mm ²]	17.4	$f_{c,0,d}$	[N/mm ²]	14.54	b_{ef} 120[mm] frm(6.13a)
$f_{t,0,d}$ [N/mm ²]	10.1	$f_{v,d}$	[N/mm ²]	2.77	k_{mod} 0.90 [-] tab(3.1)

Doorbuiging**u.c.**

u_{bij}	=	0.00 <	4.40 [mm]	0.00
$u_{het,fin}$	=	0.00 <	4.40 [mm]	0.00

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel: Spant Dwarsrichting
 Dimensies: kN;m;rad (tenzij anders aangegeven)
 Datum....: 28/12/2016
 Bestand...: G:\Projects (TS)\16.137 - 2.rww

Belastingbreedte.: 1.000

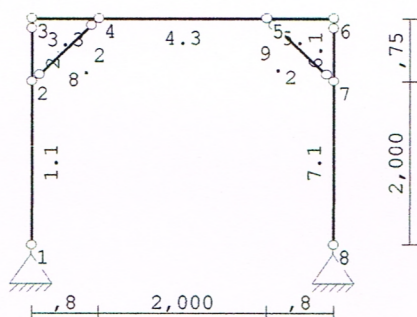
Theorie voor de bepaling van de krachtsverdeling: Geometrisch lineair.

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

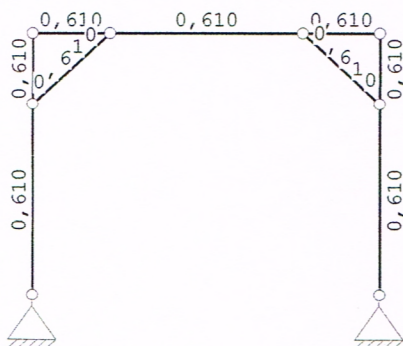
Toegepaste normen volgens Eurocode met Nederlandse NB

Belastingen	NEN-EN 1990:2002	C2:2010	NB:2011(nl)
	NEN-EN 1991-1-1:2002	C1:2009	NB:2011(nl)

GEOMETRIE



BELASTINGBREEDTEN



PROFIELVORMEN [mm]

1 B*H 200*200



2 B*H 120*120



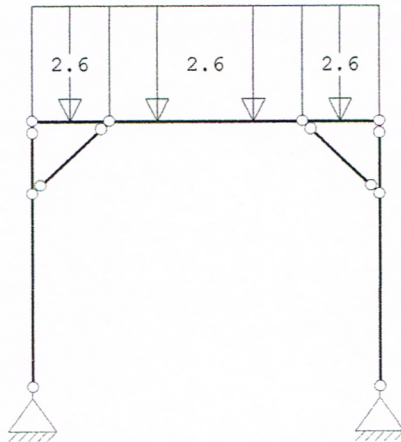
3 B*H 200*200



Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
Onderdeel: Spant Dwarsrichting

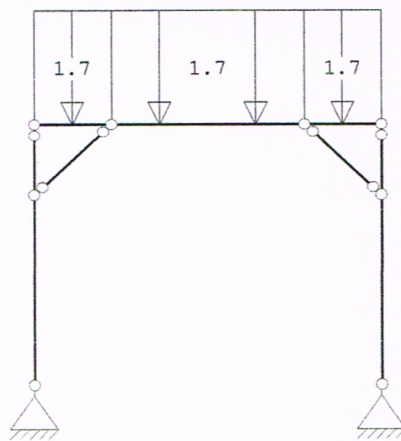
BELASTINGEN

B.G:1 Permanente belasting



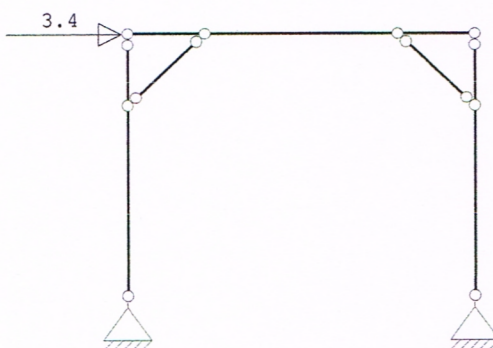
BELASTINGEN

B.G:2 Variabele belasting



BELASTINGEN

B.G:3 Wind belasting



BELASTINGCOMBINATIES

BC Type	BG Gen.	Factor	BG Gen.	Factor	BG Gen.	Factor	BG Gen.	Factor
1 Fund.	1 Perm	1.22						
2 Fund.	1 Perm	0.90						
3 Fund.	1 Perm	1.22	2 psi0	1.35				
4 Fund.	1 Perm	1.08	2 Extr	1.35				
5 Fund.	1 Perm	1.08	3 Extr	1.35				
6 Fund.	1 Perm	0.90	2 psi0	1.35				
7 Fund.	1 Perm	0.90	2 Extr	1.35				

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
 Onderdeel: Spant Dwarsrichting

BELASTINGCOMBINATIES

BC Type	BG	Gen.	Factor	BG	Gen.	Factor	BG	Gen.	Factor	BG	Gen.	Factor
8 Fund.	1	Perm	0.90	3 Extr	1.35							
9 Fund.	1	Perm	1.08	3 Extr	1.35	2 psi0	1.35					
10 Fund.	1	Perm	0.90	3 Extr	1.35	2 psi0	1.35					
11 Kar.	1	Perm	1.00	2 Extr	1.00							
12 Kar.	1	Perm	1.00	3 Extr	1.00							
13 Kar.	1	Perm	1.00	3 Extr	1.00	2 psi0	1.00					
14 Quas.	1	Perm	1.00									
15 Quas.	1	Perm	1.00	2 psi2	1.00							
16 Freq.	1	Perm	1.00									
17 Freq.	1	Perm	1.00	2 psi1	1.00							
18 Freq.	1	Perm	1.00	3 psi1	1.00							
19 Freq.	1	Perm	1.00	3 psi1	1.00	2 psi2	1.00					
20 Blij.	1	Perm	1.00									

GUNSTIGE WERKING PERMANENTE BELASTINGEN

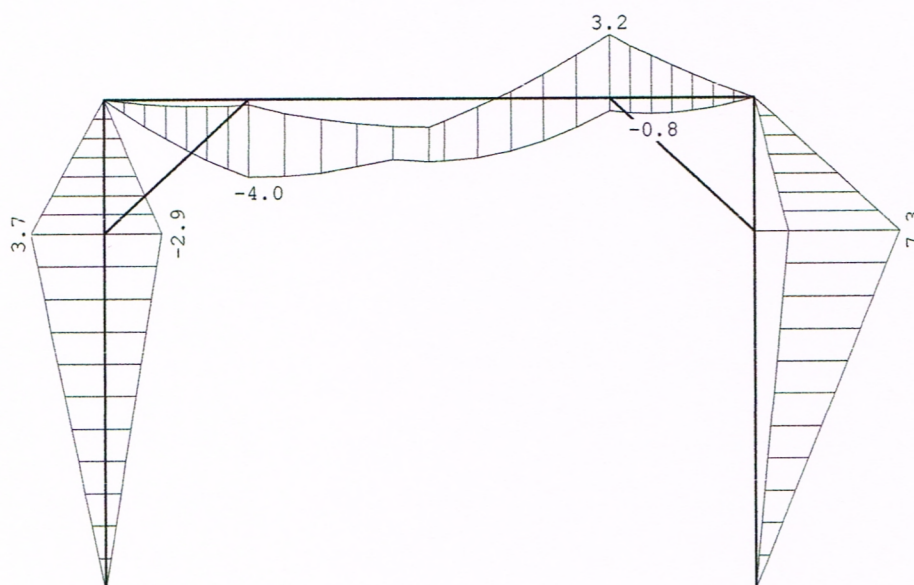
BC Staven met gunstige werking

- 1 Geen
- 2 Alle staven de factor:0.90
- 3 Geen
- 4 Geen
- 5 Geen
- 6 Alle staven de factor:0.90
- 7 Alle staven de factor:0.90
- 8 Alle staven de factor:0.90
- 9 Geen
- 10 Alle staven de factor:0.90

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES

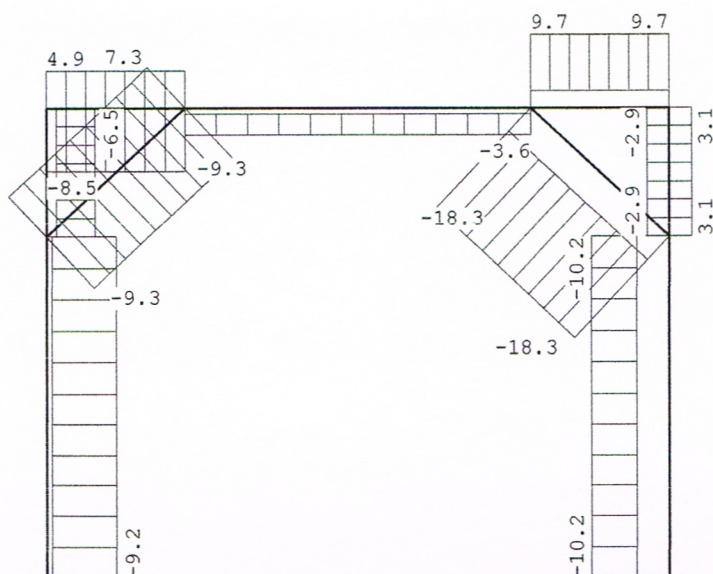
MOMENTEN

Fundamentele combinatie



Onderdeel: Spant Dwarsrichting

Fundamentele combinatie



Fundamentele combinatie

St.	Kn.	Pos.	NXi/NXj				DZi/DZj				MYi/MYj			
			Min BC		Max BC		Min BC		Max BC		Min BC		Max BC	
1	1		-9.19	4	-0.71	8	-1.45	8	1.84	4	0.00	8	0.00	4
1	2		-9.19	4	-0.71	8	-1.45	8	1.84	4	-2.90	8	3.68	4
2	2		-6.46	9	-1.31	2	-4.91	4	3.87	8	-2.90	8	3.68	4
2	3		-6.46	9	-1.31	2	-4.91	4	3.87	8	0.00	8	0.00	4
3	3		-8.46	8	4.91	4	-6.46	9	-1.31	2	0.00	9	0.00	2
3	0.559		-8.46	8	4.91	4	-4.38	9	0.00	2	-3.03	9	-0.37	2
3	4		-8.46	8	4.91	4	-3.82	8	1.23	4	-3.98	9	-0.30	2
4	4		-3.64	9	-0.84	2	-5.10	4	1.17	8	-3.98	9	-0.30	2
4	0.059		-3.64	9	-0.84	2	-4.80	4	1.30	8	-3.99	9	-0.43	2
4	0.764		-3.64	9	-0.84	2	-1.20	4	2.95	8	-3.06	9	-1.40	2
4	0.999		-3.64	9	-0.84	2	-0.00	4	3.51	8	-3.20	4	-1.47	2
4	1.372		-3.64	9	-0.84	2	0.87	2	4.89	9	-2.85	4	-0.00	8
4	5		-3.64	9	-0.84	2	2.34	2	7.23	9	-0.65	4	3.21	8
5	5		2.25	2	9.71	9	-5.28	9	-0.56	2	-0.65	4	3.21	8
5	0.241		2.25	2	9.71	9	-4.39	9	0.00	2	-0.80	4	2.09	8
5	6		2.25	2	9.71	9	-3.08	8	2.85	4	0.00	4	0.00	8
6	6		-2.85	4	3.08	8	2.25	2	9.71	9	0.00	2	0.00	9
6	7		-2.85	4	3.08	8	2.25	2	9.71	9	1.69	2	7.28	9
7	7		-10.21	9	-4.21	2	-3.64	9	-0.84	2	1.69	2	7.28	9
7	8		-10.21	9	-4.21	2	-3.64	9	-0.84	2	0.00	2	0.00	9
8	2		-9.26	4	7.29	8	0.00	1	0.00	1	0.00	1	0.00	1
8	4		-9.26	4	7.29	8	0.00	1	0.00	1	0.00	1	0.00	1
9	5		-18.30	9	-4.24	2	0.00	1	0.00	1	0.00	1	0.00	1
9	7		-18.30	9	-4.24	2	0.00	1	0.00	1	0.00	1	0.00	1

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden

Onderdeel: Spant Dwarsrichting

REACTIES

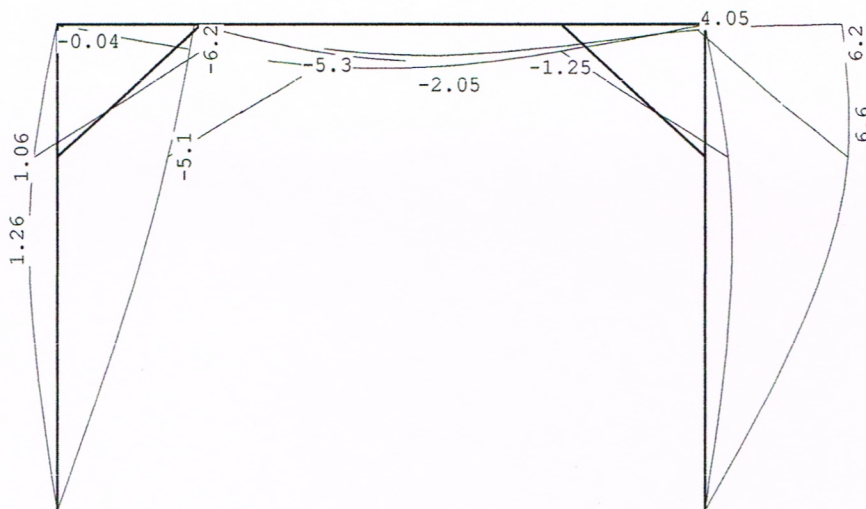
Fundamentele combinatie

Kn.	X-min	X-max	Z-min	Z-max	M-min	M-max
1	-1.45	1.84	0.71	9.19		
8	-3.64	-0.84	4.21	10.21		

OMHULLENDE VAN DE KARAKTERISTIEKE COMBINATIES**VERPLAATSINGEN**

[mm]

Karakteristieke combinatie

**STAAFKRACHTEN**

Karakteristieke combinatie

St.	Kn.	Pos.	NXi/NXj		DZi/DZj		MYi/MYj	
			Min BC	Max BC	Min BC	Max BC	Min BC	Max BC
1	1		-7.74 11	-2.08 12	-0.76 12	1.55 11	0.00 12	0.00 11
1	2		-7.74 11	-2.08 12	-0.76 12	1.55 11	-1.52 12	3.10 11
2	2		-5.08 13	-2.40 11	-4.14 11	2.03 12	-1.52 12	3.10 11
2	3		-5.08 13	-2.40 11	-4.14 11	2.03 12	0.00 12	0.00 11
3	3		-5.43 12	4.14 11	-5.08 13	-2.40 11	0.00 13	0.00 11
3	0.559		-5.43 12	4.14 11	-3.24 13	0.00 11	-2.33 13	-0.67 11
3	4		-5.43 12	4.14 11	-2.62 12	1.04 11	-3.01 13	-0.55 11
4	4		-2.88 13	-1.55 11	-4.30 11	-0.00 12	-3.01 13	-0.55 11
4	0.208		-2.88 13	-1.55 11	-3.40 11	0.54 12	-3.08 13	-1.35 11
4	0.633		-2.88 13	-1.55 11	-1.58 11	1.64 12	-2.79 13	-2.41 11
4	0.764		-2.88 13	-1.55 11	-1.01 11	1.98 12	-2.58 13	-2.17 12
4	1.000		-2.88 13	-1.55 11	0.00 11	2.60 12	-2.70 11	-1.63 12
4	1.502		-2.88 13	-1.55 11	2.16 11	4.24 13	-2.16 11	-0.00 12
4	5		-2.88 13	-1.55 11	4.30 11	5.88 13	-0.55 11	2.27 12
5	5		4.14 11	7.69 13	-4.04 13	-1.04 11	-0.55 11	2.27 12
5	0.241		4.14 11	7.69 13	-3.25 13	0.00 11	-0.67 11	1.41 12
5	6		4.14 11	7.69 13	-1.79 12	2.40 11	0.00 11	0.00 12
6	6		-2.40 11	1.79 12	4.14 11	7.69 13	0.00 11	0.00 13
6	7		-2.40 11	1.79 12	4.14 11	7.69 13	3.10 11	5.77 13
7	7		-8.50 13	-7.28 12	-2.88 13	-1.55 11	3.10 11	5.77 13
7	8		-8.50 13	-7.28 12	-2.88 13	-1.55 11	0.00 11	0.00 13
8	2		-7.80 11	3.83 12	0.00 11	0.00 11	0.00 11	0.00 11

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden

Onderdeel: Spant Dwaarsrichting

STAAFKRACHTEN

Karakteristieke combinatie

St.	Kn.	Pos.	NXi/NXj		DZi/DZj		MYi/MYj	
			Min BC	Max BC	Min BC	Max BC	Min BC	Max BC
8	4		-7.80	11 3.83	12	0.00	11 0.00	11 0.00
9	5		-14.50	13	-7.80	11 0.00	11 0.00	11 0.00
9	7		-14.50	13	-7.80	11 0.00	11 0.00	11 0.00

REACTIES

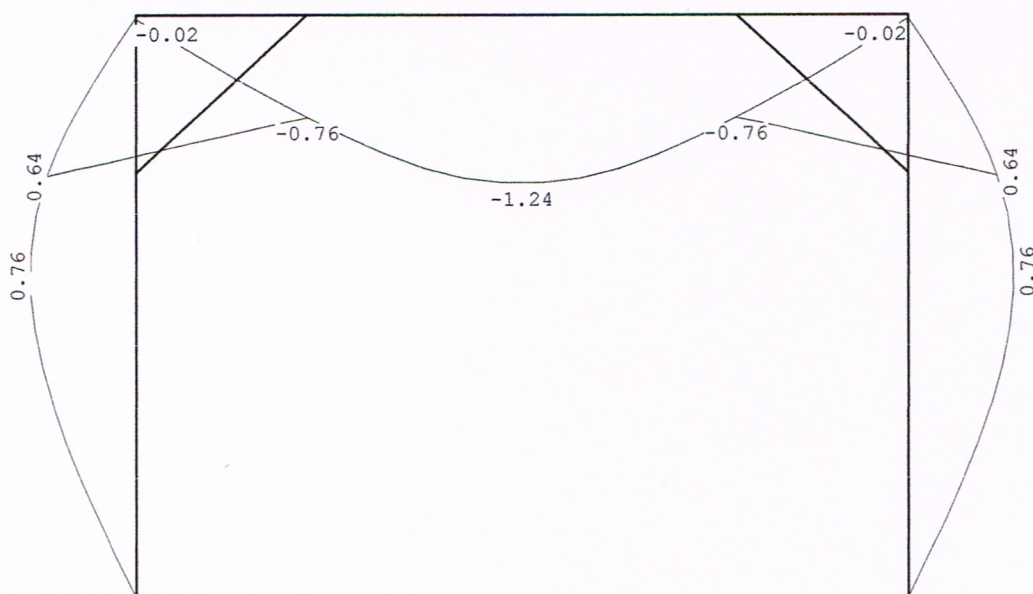
Karakteristieke combinatie

Kn.	X-min	X-max	Z-min	Z-max	M-min	M-max
1	-0.76	1.55	2.08	7.74		
8	-2.88	-1.55	7.28	8.50		

OMHULLENDE VAN DE BLIJVENDE COMBINATIES**VERPLAATSINGEN**

[mm]

Blijvende combinatie

**STAAFKRACHTEN**

Blijvende combinatie

St.	Kn.	Pos.	NXi/NXj	DZi/DZj	MYi/MYj
1	1		-4.68	0.94	0.00
1	2		-4.68	0.94	1.88
2	2		-1.45	-2.50	1.88
2	3		-1.45	-2.50	0.00
3	3		2.50	-1.45	0.00
3	0.559			0.00	-0.41
3	4		2.50	0.63	-0.33
4	4		-0.94	-2.60	-0.33
4	1.000			0.00	-1.63
4	5		-0.94	2.60	-0.33
5	5		2.50	-0.63	-0.33
5	0.241			0.00	-0.41
5	6		2.50	1.45	0.00

TS/Raamwerken

Rel: 6.07 2 jan 2017

Project...: 16.137 Hooiberg a/d Bergkappeweg 1 Vorden
Onderdeel: Spant Dwarsrichting

STAAFKRACHTEN

Blijvende combinatie

St.	Kn.	Pos.	NXi/NXj	DZi/DZj	MYi/MYj
6	6		-1.45	2.50	0.00
6	7		-1.45	2.50	1.88
7	7		-4.68	-0.94	1.88
7	8		-4.68	-0.94	0.00
8	2		-4.72	0.00	0.00
8	4		-4.72	0.00	0.00
9	5		-4.72	0.00	0.00
9	7		-4.72	0.00	0.00

REACTIES

Blijvende combinatie

Kn.	X	Z	M
1	0.94	4.68	
8	-0.94	4.68	