

## Hoofdberekeningen

Projectnaam: **Uitbreiding terrein Coolrec  
Aan de Grevelingenweg 3 te Dordrecht**

Werknummer: **23-157**  
Onderdeel: **B**

Rapport Hoofdberekeningen  
ten behoeve van calculatiefase

Architect: BB Ingenieurs, Breda  
Opdrachtgever: Coolrec Nederland bv, Venray  
Opgesteld door: [REDACTED]  
Gecontroleerd door: [REDACTED]  
Versie: A d.d. 06-03-2024

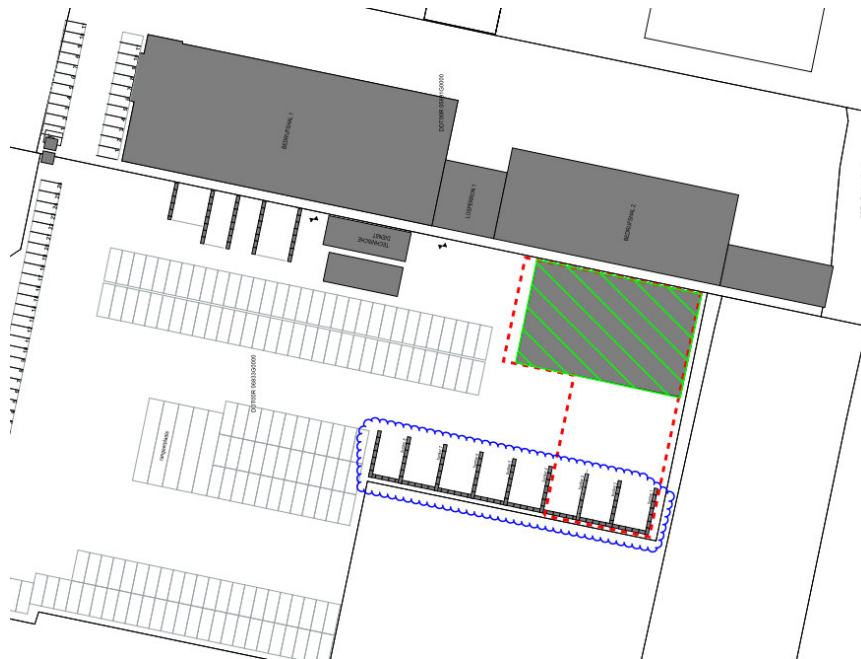
|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknnummer   | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | 1          |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

## Inhoud

|                                                                    |            |
|--------------------------------------------------------------------|------------|
| <b>INHOUD.....</b>                                                 | <b>1</b>   |
| <b>1 INLEIDING.....</b>                                            | <b>2</b>   |
| 1.1 OPZET CONSTRUCTIE.....                                         | 2          |
| <b>2 STABILITEIT.....</b>                                          | <b>3</b>   |
| 2.1 WIND IN X-RICHTING .....                                       | 4          |
| 2.2 WIND IN Y-RICHTING .....                                       | 6          |
| <b>3 GEWICHTSBEREKENINGEN.....</b>                                 | <b>8</b>   |
| 3.1 BELASTINGEN .....                                              | 8          |
| 3.2 WAND AS A .....                                                | 9          |
| 3.3 WAND AS I .....                                                | 10         |
| 3.4 DAKSPANT HEA240 KOLOMMEN.....                                  | 11         |
| 3.5 DAKSPANT HEB240 KOLOMMEN.....                                  | 12         |
| 3.6 CONSTRUCTIE BOVEN OVERHEAD DEUR.....                           | 13         |
| 3.7 GEVELSTEUNEN.....                                              | 17         |
| 3.8 IPE330 KOLOM BRANDWAND .....                                   | 20         |
| <b>4 BALKENROOSTER.....</b>                                        | <b>23</b>  |
| 4.1 BEREKENING CONSOLE .....                                       | 25         |
| <b>BIJLAGE I OVERZICHTSTEKENING STABILITEIT .....</b>              | <b>I</b>   |
| <b>BIJLAGE II OVERZICHTSTEKENING BELASTINGEN OP FUNDERING.....</b> | <b>II</b>  |
| <b>BIJLAGE III COMPUTERUITVOER GEWICHTSBEREKENINGEN .....</b>      | <b>III</b> |
| <b>BIJLAGE IV COMPUTERUITVOER BALKENROOSTER.....</b>               | <b>IV</b>  |

## 1 Inleiding

In opdracht van Coolrec Nederland bv te Venray is door Van Boxsel Engineering advies uitgebracht ten behoeve van de uitbreiding van het terrein van Coolrec te Dordrecht. Op het terrein wordt een nieuwe stalen hal gemaakt, groen aangegeven in onderstaande afbeelding. De hal wordt over een bestaande betonnen bedrijfsvloer gemaakt, rood aangegeven in onderstaande afbeelding. Daarnaast worden 8 nieuwe opslagbunkers van legioblokken gemaakt, blauw aangegeven in onderstaande afbeelding. De bestaande bebouwing is grijs aangegeven. Dit blijft behouden.



In dit rapport zijn de hoofdberekeningen opgenomen. Dit betreft de stabiliteit, gewichtsberekeningen en berekening van de funderingsconstructie.

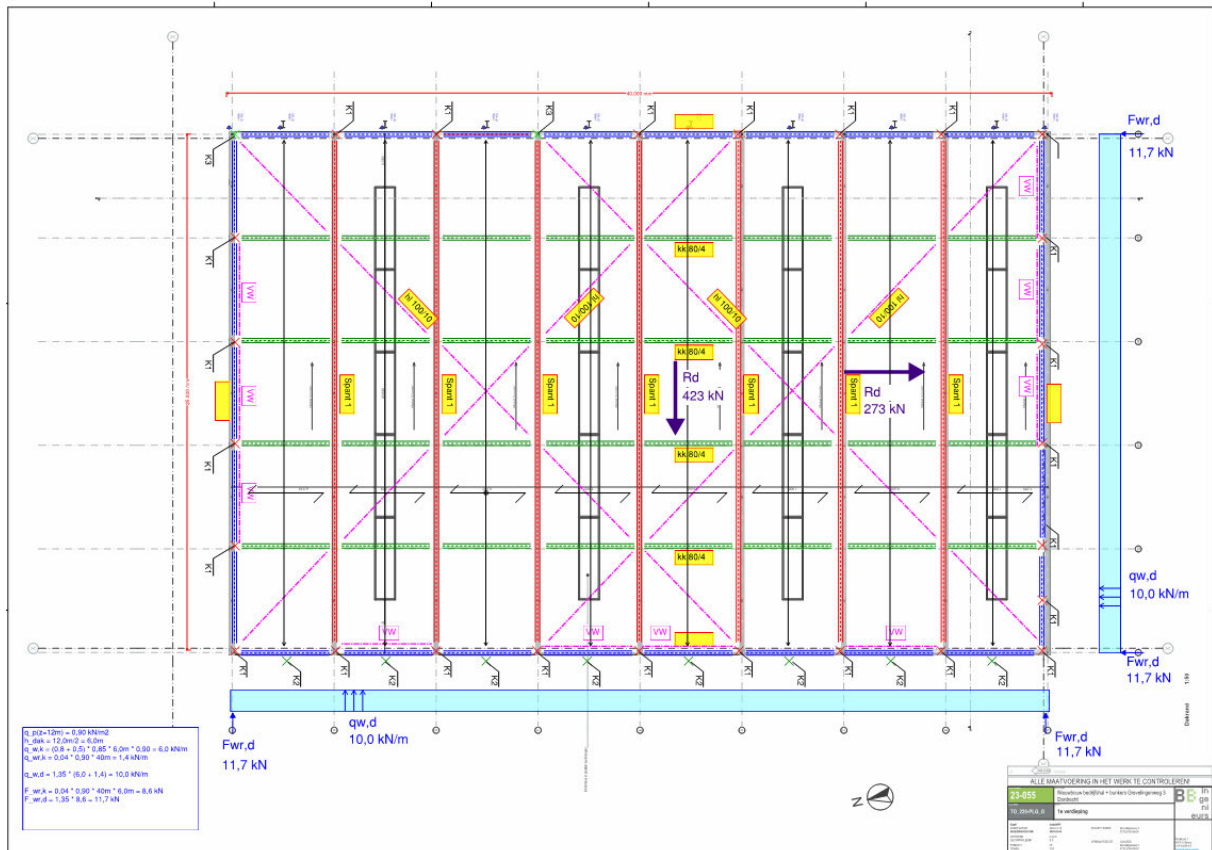
### 1.1 Opzet constructie

De constructieve opzet van het plan is als volgt:

- De bestaande betonnen bedrijfsvloer blijft behouden. Deze is gefundeerd op staal.
- De stalen hal wordt om de vloer heen gebouwd.
- De stalen hal wordt gefundeerd op palen en een in het werk gestorte funderingsbalken.
- Paalsysteem nader te bepalen i.o.m. geotechnisch adviseur.
- Plaatselijk gaat de halconstructie door de bestaande vloer. Hier moeten sleuven van de bestaande vloer weggehaald worden.
- De volledige bovenbouw van de hal wordt gemaakt met een staalconstructie.
- Voor de dakoverspanning wordt gebruik gemaakt van vakwerkspanten.
- Buiten de nieuwe hal worden opslagbunkers van legioblokken gemaakt.
- Opslagbunkers, inclusief fundering, conform uitwerking leverancier.

## 2 Stabiliteit

In dit hoofdstuk wordt de stabiliteit van de stalen hal beschouwd. Windbelasting op het dakvlak werkt in twee richtingen. De belasting is voor beide richtingen gelijk genomen. Via de kruizen in het dak wordt de belasting afgedragen naar de windverbanden in de gevel. Onderstaande tekening is ook opgenomen in [bijlage I](#).



### Belastingen

$$\begin{aligned}
 Q_{p(z=12m)} &= 0,90 \text{ kN/m}^2 \\
 h_{dak} &= 12,0 \text{ m} \\
 Q_{w,k} &= (0,8 + 0,5) * 0,85 * 12,0 \text{ m} / 2 * 0,90 = 6,0 \text{ kN/m} \\
 Q_{wr,k} &= 0,04 * 0,90 * 40 \text{ m} = 1,4 \text{ kN/m} \\
 Q_{w,d} &= 1,35 * (6,0 + 1,4) = 10,0 \text{ kN/m}
 \end{aligned}$$

*gecombineerd winddruk+zuiging  
windwrijving op dak*

$$\begin{aligned}
 F_{wr,k} &= 0,04 * 0,90 * 40 \text{ m} * 6,0 \text{ m} = 8,6 \text{ kN} \\
 F_{wr,d} &= 1,35 * 8,6 = 11,7 \text{ kN}
 \end{aligned}$$

Belastingen zijn als rekenwaarde weergegeven op de overzichtstekeningen. In Matrixframe worden deze waarden ingevoerd als karakteristiek ( $R_d$  gedeeld door 1,35).



|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknnummer   | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | 4          |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

## 2.1 Wind in X-richting

De wind draagt af naar het windverband op as 1. Torsie wordt voorkomen door de windverbanden op assen A en I. In het dakvlak zijn twee kruizen aangebracht met hoeklijnen L100x100x10.

$$R_d = 25m * 10,0 \text{ kN/m} + 2 * 11,7 \text{ kN} = 273 \text{ kN}$$

Torsie

$$T_d = 273 \text{ kN} * 25m/2 = 3413 \text{ kNm}$$

Windverbanden assen A en I

$$F_d = 3414 \text{ kNm} / 40m = 85 \text{ kN} \quad \textit{niet maatgevend}$$

### Hoeklijn L100x100x10

Naast de optredende spanning in het hoeklijn wordt ook de vervorming van het hoeklijn onder eigen gewicht gecontroleerd.

| L100x100x10 |       |                 |
|-------------|-------|-----------------|
| G           | 15,0  | kg/m            |
| A           | 19,2  | cm <sup>2</sup> |
| W           | 24,6  | cm <sup>3</sup> |
| I           | 176,7 | cm <sup>4</sup> |

$$F_{t,d} = 273 \text{ kN} / 2 * \sqrt{2} / 2 = 97 \text{ kN}$$

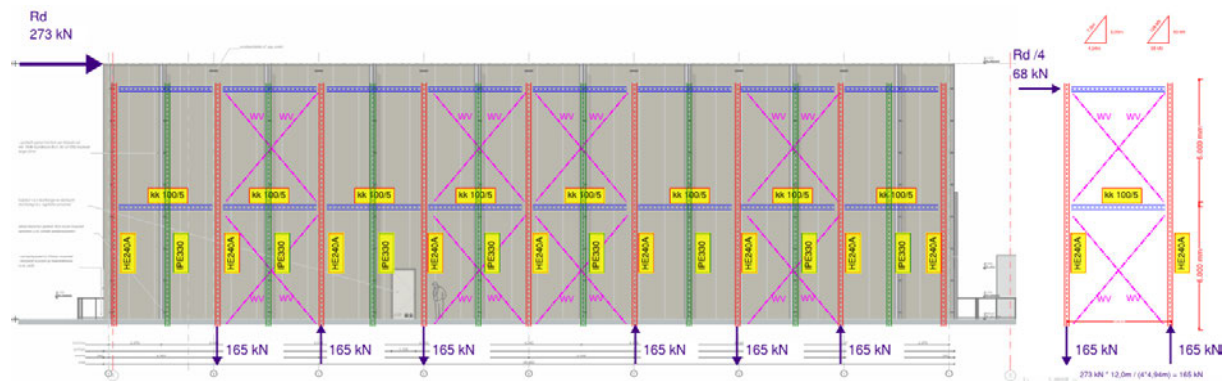
$$\sigma_d = \frac{F_{t,d}}{A_s} = \frac{97 \text{ kN}}{1920 \text{ mm}^2} = 50 \text{ N/mm}^2$$

$$w = \frac{5 * g * L^4}{384 * E * I} = \frac{5 * 0,15 * 5000\sqrt{2}}{384 * 210.000 * 177 * 10^4} = 13 \text{ mm}$$

|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknummer    | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | 5          |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

### Windverband gevel as 6

De windbelasting wordt afgedragen naar de windverbanden in de gevel op as 6. De kokers in de dakrand leiden deze belasting in naar de windverbanden en worden op knik getoetst. Vervolgens worden de diagonalen van het verband getoetst. Kolommen zijn in de Matrixframe gewichtsberekeningen berekend met windlast.



### Dakrand kokers

De kracht die moet worden ingeleid bedraagt  $273 \text{ kN} / 2 = 137 \text{ kN}$ . Tevens dragen deze kokers een deel van de dakbelasting en steunen ze de gevel tegen windbelasting. Verificatie van de kokers volgt in hoofdstuk 3.

### Diagonaal strip 100x10

De kracht per diagonaal in het windverband bedraagt  $273 \text{ kN} * \sqrt{2} / 4 = 97 \text{ kN}$

$$\sigma_d = \frac{F_{t,d}}{A_s} = \frac{97 \text{ kN}}{(100 - 25) * 10} = 129 \text{ N/mm}^2$$

$$u. c. = \frac{129}{235} = 0,55$$

### Opwaartse belasting

De belasting bij de kolomvoet bedraagt 165 kN, dit wordt in de gewichtsberekening gereduceerd door belasting uit permanente belasting.

|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknummer    | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | 6          |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

## 2.2 Wind in Y-richting

De wind draagt af naar de windverbanden op assen A en I. In het dakvlak zijn twee kruizen aangebracht met hoeklijnen L100x100x10.

$$R_d = 40\text{m} * 10,0 \text{ kN/m} + 2 * 11,7 \text{ kN} = 423 \text{ kN}$$

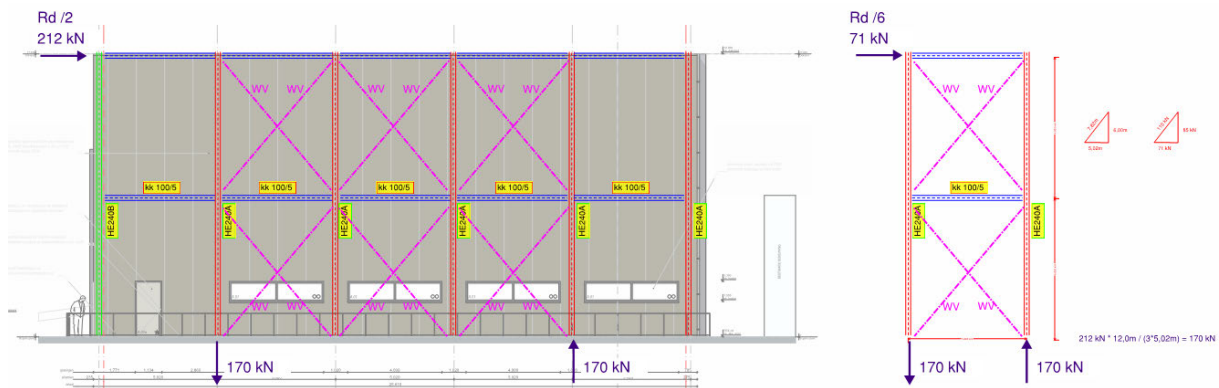
Hoeklijn L100x100x10

$$F_{t,d} = 423 \text{ kN} / 2 * \sqrt{2} / 2 = 150 \text{ kN}$$

$$\sigma_d = \frac{F_{t,d}}{A_s} = \frac{150 \text{ kN}}{1920 \text{ mm}^2} = 78 \text{ N/mm}^2$$

### Windverband gevel as A

De kokers in de dakrand leiden deze belasting in naar de windverbanden en worden op knik getoetst in combinatie met buigend moment uit de dakplaten. Vervolgens worden de diagonalen van het verband getoetst. Kolommen zijn in de Matrixframe gewichtsberekeningen berekend met windlast.



### Dakrand kokers

De kracht die moet worden ingeleid bedraagt  $423 \text{ kN} / 2 = 212 \text{ kN}$ . Tevens dragen deze kokers een deel van de dakbelasting en steunen ze de gevel tegen windbelasting. Verificatie van de kokers volgt in hoofdstuk 3.

### Diagonaal strip 100x10

De kracht per diagonaal in het windverband bedraagt  $212 \text{ kN} * \sqrt{2} / 3 = 100 \text{ kN}$

$$\sigma_d = \frac{F_{t,d}}{A_s} = \frac{100 \text{ kN}}{(100 - 25) * 10} = 133 \text{ N/mm}^2$$

$$u. c. = \frac{133}{235} = 0,57$$

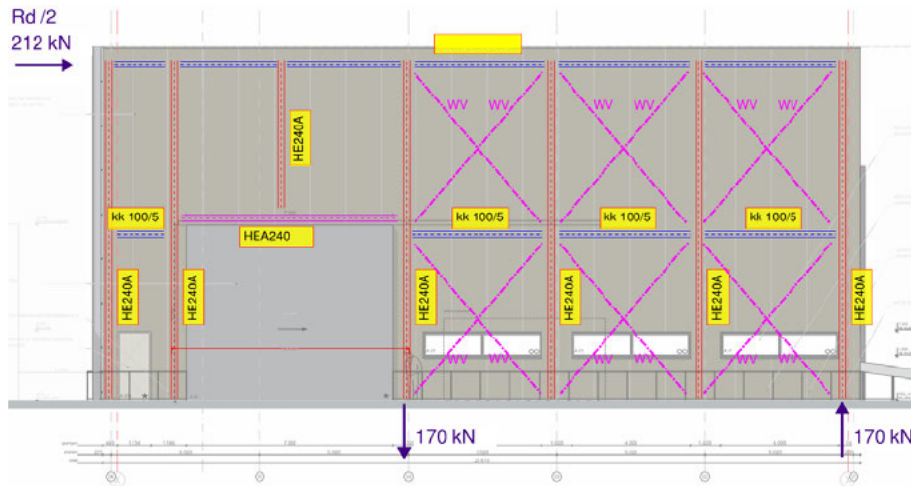
### Opwaartse belasting

De belasting bij de kolomvoet bedraagt 170 kN, dit wordt in de gewichtsberekening gereduceerd door belasting uit permanente belasting.

|               |          |        |           |            |
|---------------|----------|--------|-----------|------------|
| werknummer    | paraaf   | gezien | onderdeel | bladnummer |
| <b>23-157</b> | PM       |        | B         | 7          |
|               | datum    |        | gewijzigd |            |
|               | 6-3-2024 |        |           |            |

### Windverband gevel as I

Het windverband in de gevel op as I is vergelijkbaar met het windverband in de gevel op as A.



|               |          |        |           |            |
|---------------|----------|--------|-----------|------------|
| werknnummer   | paraaf   | gezien | onderdeel | bladnummer |
| <b>23-157</b> | ■        |        | B         | 8          |
|               | datum    |        | gewijzigd |            |
|               | 6-3-2024 |        |           |            |

### 3 Gewichtsberekeningen

#### 3.1 **Belastingen**

Belastingen volgen uit rapport A. De belasting op het dak wordt gesplitst voor belasting op de bovenregel en op de onderregel.

##### Dak

##### *Bovenregel*

|                   |             |                   |
|-------------------|-------------|-------------------|
| - Sandwichpanelen | 0,15        |                   |
| - Zonnepanelen    | <u>0,25</u> |                   |
|                   | 0,40        | kN/m <sup>2</sup> |

##### *Onderregel*

|                                     |      |                   |
|-------------------------------------|------|-------------------|
| - Sprinkler+leidingwerk+verlichting | 0,25 | kN/m <sup>2</sup> |
|-------------------------------------|------|-------------------|

|                            |      |                   |
|----------------------------|------|-------------------|
| <i>Veranderlijk sneeuw</i> | 0,70 | kN/m <sup>2</sup> |
|----------------------------|------|-------------------|

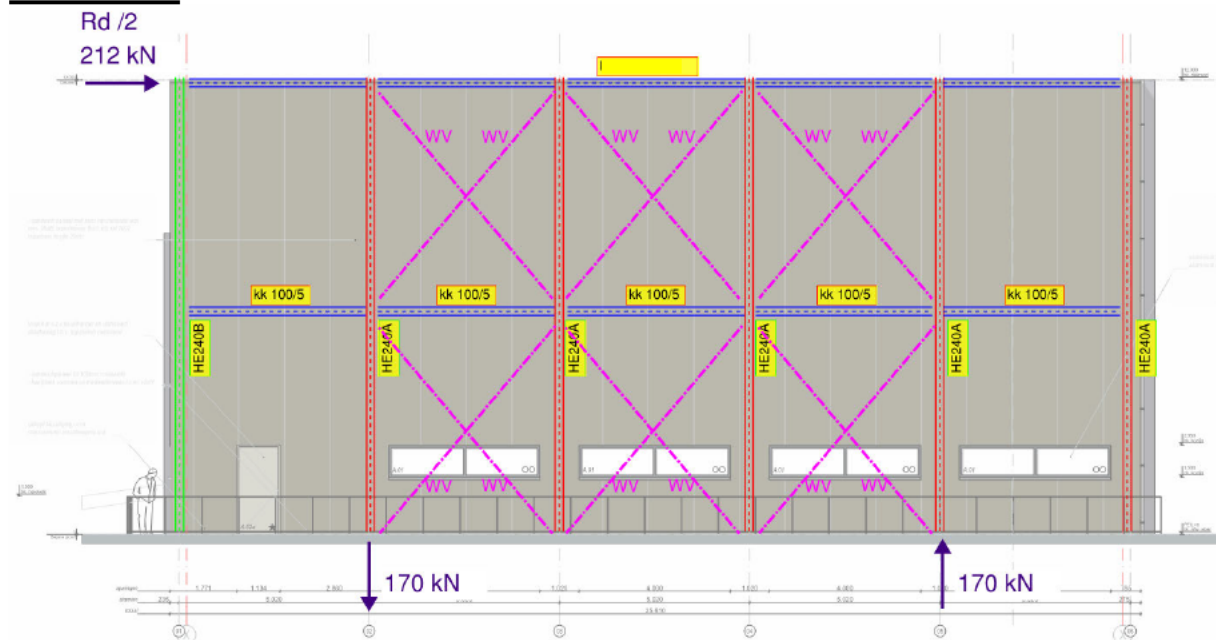
##### Gevels

|                   |      |                   |
|-------------------|------|-------------------|
| - Sandwichpanelen | 0,20 | kN/m <sup>2</sup> |
|-------------------|------|-------------------|

|            |          |           |           |            |
|------------|----------|-----------|-----------|------------|
| werknummer | paraaf   | gezien    | onderdeel | bladnummer |
| 23-157     |          |           | B         | 9          |
|            | datum    | gewijzigd |           |            |
|            | 6-3-2024 |           |           |            |

### 3.2 Wand as A

#### Wandaanzicht



#### Belastingen

Eigen gewicht *in matrixframe*

Permanent

$$Q_{dak,boven,k} = 4,94m/2 * 0,40 = 1,0 \text{ kN/m}$$

$$Q_{dak,onder,k} = 4,94m/2 * 0,25 = 0,6 \text{ kN/m}$$

Veranderlijk sneeuw

$$Q_{dak,sneeuw,k} = 4,94m/2 * 0,70 = 1,7 \text{ kN/m}$$

Veranderlijk wind

Stabiliteitskrachten:  $R_d = 170 \text{ kN}$ , daarmee  $R_k = 126 \text{ kN}$

#### Berekening

Zie bijlage III – 1 t/m 12

#### Opmerkingen

De windbelasting  $R_d/2$  is in matrixframe ingevoerd. Dit geeft een kleine afwijking van de windkrachten bij de kolomvoeten.

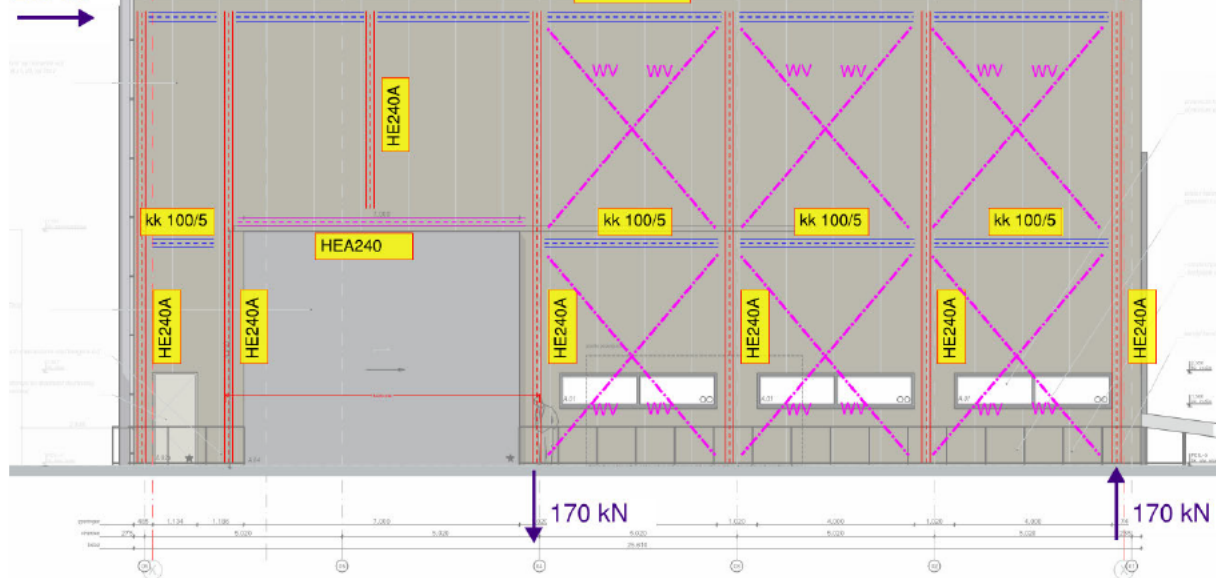
|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknummer    | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | 10         |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

### 3.3 Wand as I

#### Wandaanzicht

Rd /2

212 kN



#### Belastingen

Eigen gewicht *in matrixframe*

Permanent

$$Q_{dak,boven,k} = 4,94\text{m}/2 * 0,40 = 1,0 \text{ kN/m}$$

$$Q_{dak,onder,k} = 4,94\text{m}/2 * 0,25 = 0,6 \text{ kN/m}$$

Veranderlijk sneeuw

$$Q_{dak,sneeuw,k} = 4,94\text{m}/2 * 0,70 = 1,7 \text{ kN/m}$$

Veranderlijk wind

Stabiliteitskrachten:  $R_d = 170 \text{ kN}$ , daarmee  $R_k = 126 \text{ kN}$

#### Berekening

Zie bijlage III – 13 t/m 24

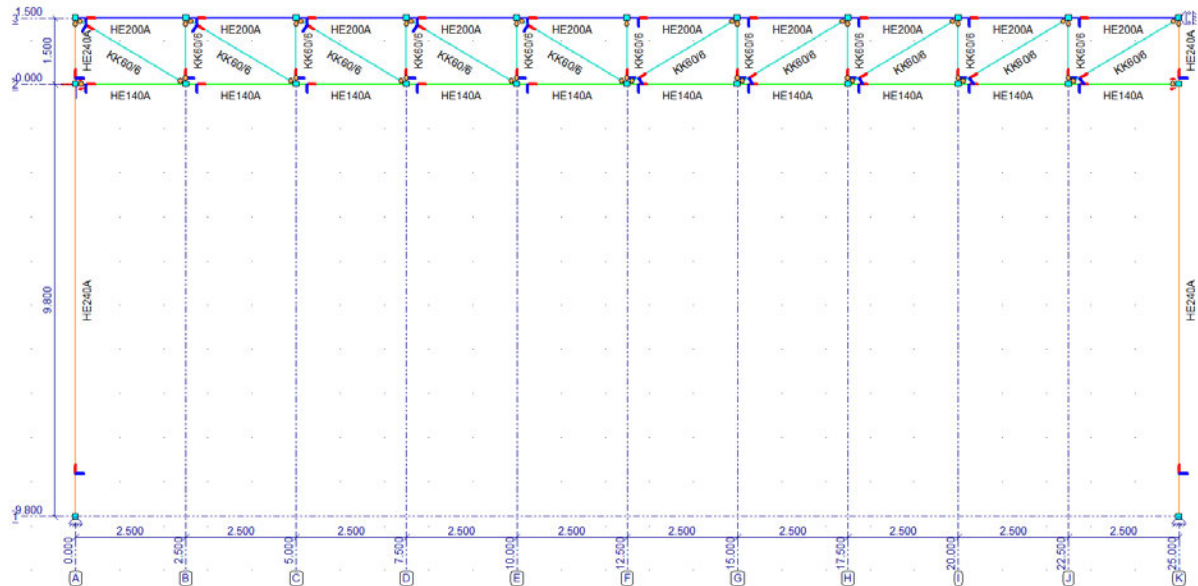
#### Opmerkingen

De windbelasting  $R_d/2$  is in matrixframe ingevoerd. Dit geeft een kleine afwijking van de windkrachten bij de kolomvoeten.

|               |                                                                                   |           |           |            |
|---------------|-----------------------------------------------------------------------------------|-----------|-----------|------------|
| werknummer    | paraaf                                                                            | gezien    | onderdeel | bladnummer |
| <b>23-157</b> |  |           | B         | 11         |
|               | datum                                                                             | gewijzigd |           |            |
|               | 6-3-2024                                                                          |           |           |            |

### 3.4 Dakspant HEA240 kolommen

#### Schematisering



#### Belastingen

Eigen gewicht *in matrixframe*

Permanent

$$q_{\text{dak,boven,k}} = 4,94\text{m} \cdot 0,40 = 2,0 \text{ kN/m}$$

$$q_{\text{dak,onder,k}} = 4,94\text{m} \cdot 0,25 = 1,3 \text{ kN/m}$$

Veranderlijk sneeuw

$$q_{\text{dak,sneeuw,k}} = 4,94\text{m} \cdot 0,70 = 3,5 \text{ kN/m}$$

Veranderlijk wind

$$q_{\text{wind,k}} = (0,8 + 0,3) \cdot 5,0\text{m} \cdot 0,9 = 4,95 \text{ kN/m}$$

Stabiliteitskrachten:  $R_d = 170 \text{ kN}$ , daarmee  $R_k = 126 \text{ kN}$

#### Berekening

Zie bijlage III – 25 t/m 38

#### Afwatering

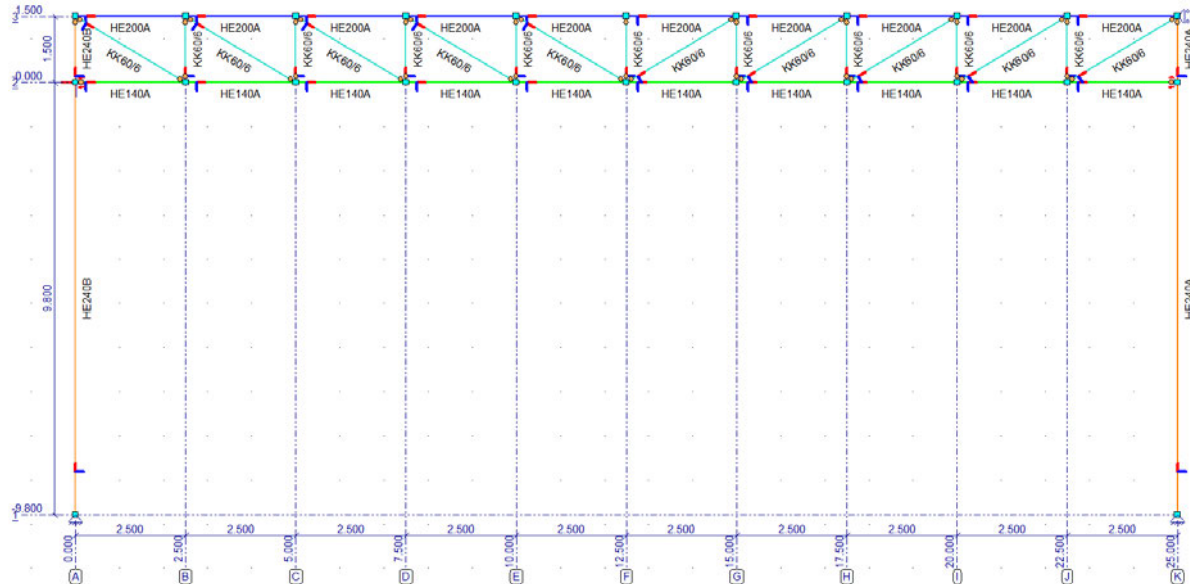
Doorbuiging van het spant bedraagt 45,4mm in de karakteristieke situatie. Er dient na het optreden van deze doorbuiging voldoende afschot over te blijven voor voldoende afwatering van regenwater. Er wordt een zeeg van 30 mm toegepast om dit te realiseren.



|               |           |        |           |            |
|---------------|-----------|--------|-----------|------------|
| werknummer    |           | gezien | onderdeel | bladnummer |
| <b>23-157</b> |           |        | <b>B</b>  | <b>12</b>  |
| datum         | gewijzigd |        |           |            |
| 6-3-2024      |           |        |           |            |

### 3.5 Dakspant HEB240 kolommen

#### Schematisering



#### Belastingen

Eigen gewicht *in matrixframe*

Permanent

$$q_{\text{dak,boven,k}} = 4,94\text{m} \cdot 0,40 = 2,0 \text{ kN/m}$$

$$q_{\text{dak,onder,k}} = 4,94\text{m} \cdot 0,25 = 1,3 \text{ kN/m}$$

Veranderlijk sneeuw

$$q_{\text{dak,sneeuw,k}} = 4,94\text{m} \cdot 0,70 = 3,5 \text{ kN/m}$$

Veranderlijk wind

$$q_{\text{wind,k}} = (0,8 + 0,3) \cdot 2,5\text{m} \cdot 0,9 = 2,48 \text{ kN/m}$$

$$F_{w,k} = 2,48 \text{ kN/m} \cdot 6,0\text{m} = 14,9 \text{ kN}$$

Stabiliteitskrachten:  $R_d = 170 \text{ kN}$ , daarmee  $R_k = 126 \text{ kN}$

Reactie uit HEB500 ligger

PB 53 kN

VB 44 kN *sneeuw*

#### Berekening

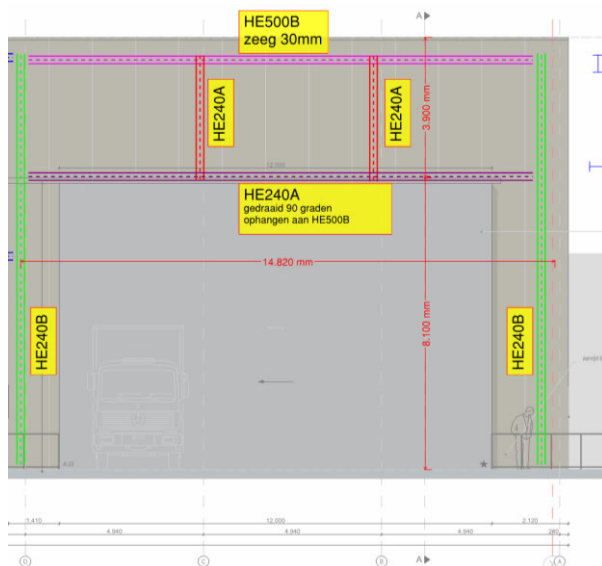
Zie bijlage III – 39 t/m 52

|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknnummer   | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | <b>B</b>  | <b>13</b>  |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

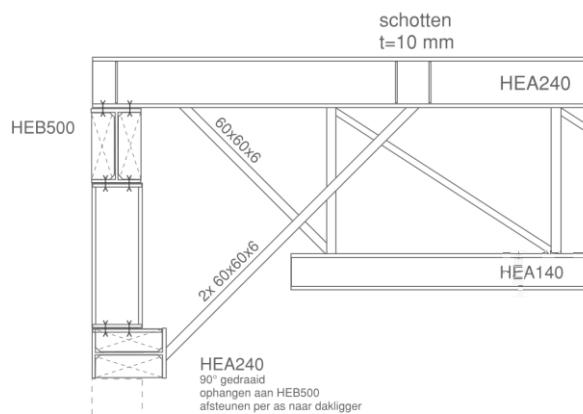
### 3.6 Constructie boven overhead deur

Boven de overhead deur worden twee liggers aangebracht.

- De bovenste ligger is een HE500B profiel welke de dakspanten van assen B en C opvangt.
- De onderste ligger is een HE240A profiel welke de windbelasting op de overhead deur opvangt. Daarom wordt deze ligger 90 graden gedraaid. Tevens wordt de ligger opgehangen aan de HE500B ligger.



Aanzicht



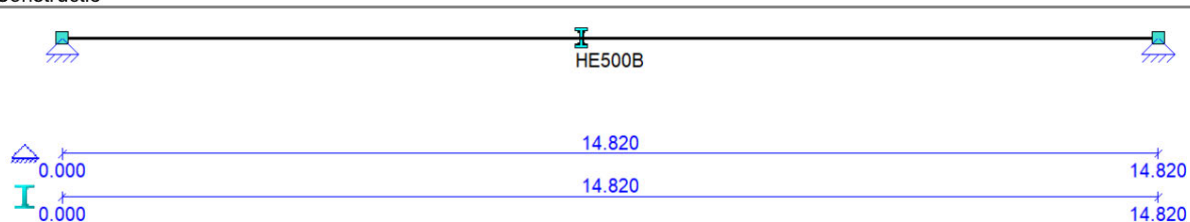
Doorsnede

|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknummer    | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | 14         |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

### 3.6.1 Ligger HEB500

#### Schematisering

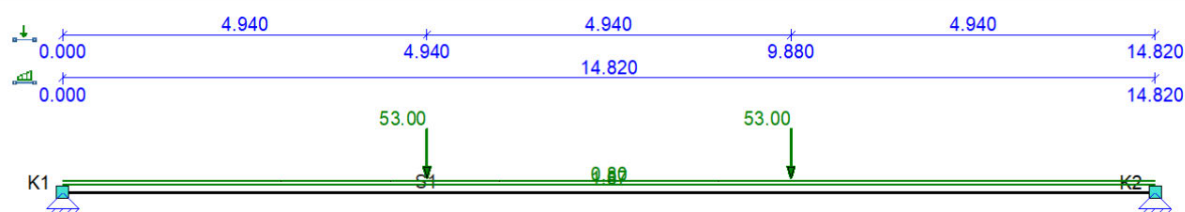
##### Constructie



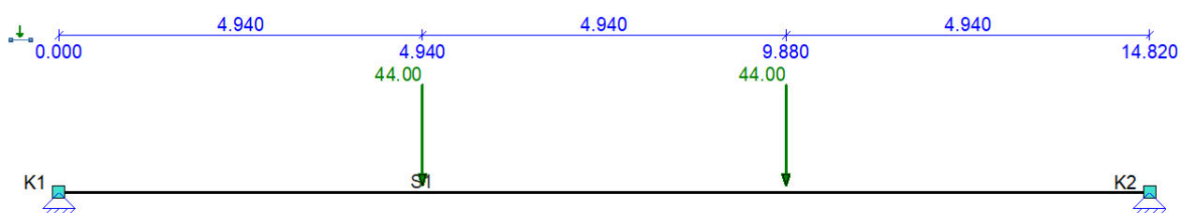
#### Belastingen

Uit berekening H3.4 Dakspant HEA240 kolommen volgt een reactie van 53 kN (EG + PB) en 44 kN (VB sneeuw). Ook wordt er een gevelbelasting van 0,8 kN/m gerekend (4m \* 0,20).

##### B.G.1: Permanent



##### B.G.2: Sneeuw



#### Berekening

Zie bijlage III – 53 t/m 58

#### Conclusie

De ligger HEB500 volstaat met kipsteunen. Deze steunen worden door de dakliggers verzorgt.

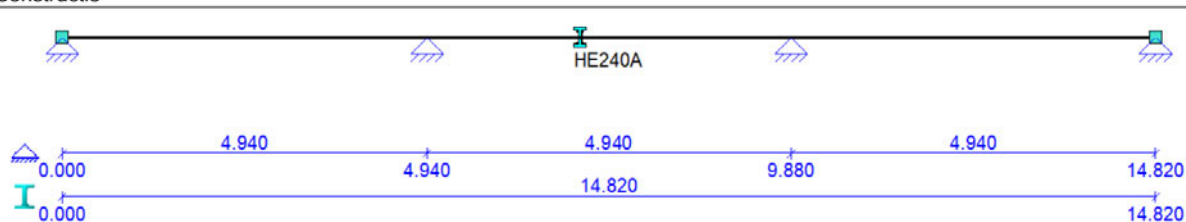
De reactiekrachten PB 73 kN en VB 44 kN worden aangebracht op het schema uit H3.5 Dakspant HEA240 kolommen.

|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknnummer   | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | 15         |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

### 3.6.2 Ligger HEA240

#### Schematisering

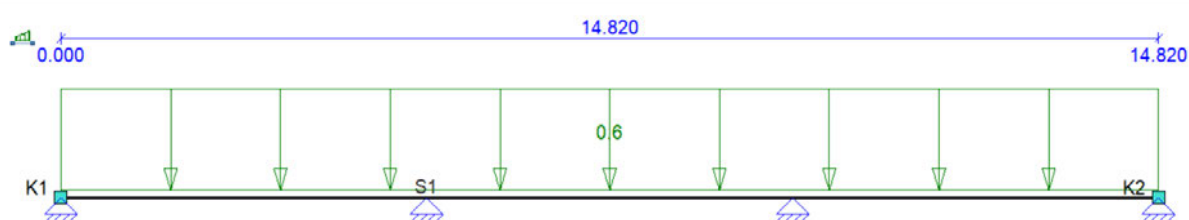
##### Constructie



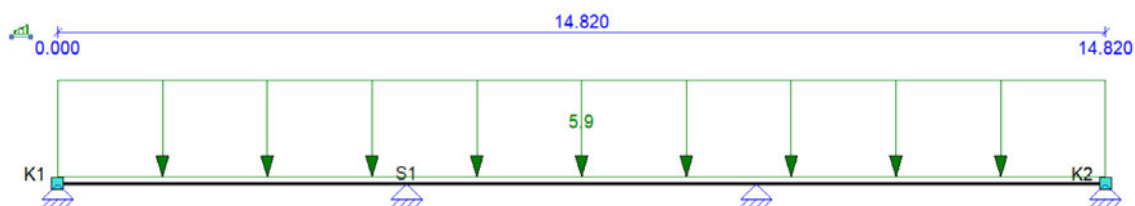
#### Belastingen

Het gewicht van

##### B.G.1: Permanent



##### B.G.2: Wind



##### B.G.2: WIND

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|--------------|
| q          | 5.9         | 5.9       | 0.000        | 14.820 (L) | Z        |              |
| Som lasten | Z: 88.0     |           |              |            |          |              |
|            |             |           | m            | m          |          |              |

#### Berekening

Zie bijlage III – 59 t/m 64

#### Conclusie

Het profiel volstaat. Vervormingen zijn minimaal, door het toepassen van steunen naar de dakligger.

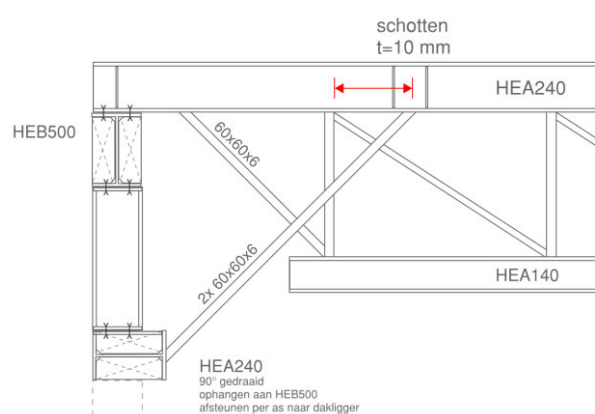
|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknnummer   | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | <b>B</b>  | <b>16</b>  |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

### 3.6.3 Steunen HEA240

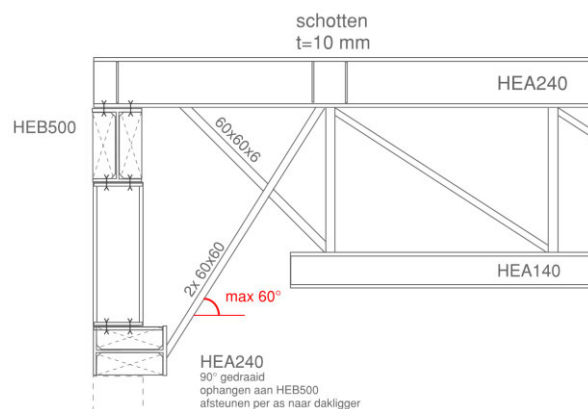
De steunen die de HEA240 ligger verstijven worden belast met een drukkracht van 47 kN en hebben een lengte van ca. 4,0m. Er worden twee kokers 60x60 toegepast. Het profiel hangt af van de hoek van de drukschoor.

### 3.6.4 Bovenregel spant

De bovenregel van het spant wordt belast door dezelfde drukkracht van 47 kN. Om deze kracht op te kunnen nemen in de bovenregel dient de afstand tussen de drukdiagonaal en verticaal van het vakwerk te worden geminimaliseerd. Hierbij dient de drukdiagonaal wel een hoek van ca 45° te hebben, maximaal 60°.



Afstand tussen drukschoor en verticaal in rood



Hoek van max 60° aanhouden

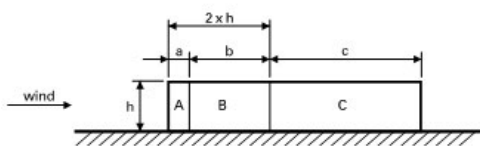
### 3.7 Gevelsteunen

#### 3.7.1 Capaciteit sandwich gevel

In onderstaande afbeelding is de capaciteit van de gevel bepaald. Er wordt een hoh afstand van de gevelsteunen aangehouden van 3,0m.

#### SAB WB (-FA) 120.1000 (FR) ML

Maximale overspanning in de gevel in m<sup>1</sup> bij gegeven windbelasting



bij 12 meter  
q = 1,26 kN/m

| Windzuiging in kN/m <sup>2</sup> |       |       | Windgebied 1 |       |           |       |         |       | Windgebied 2 |       |           |       |         |       | Windgebied 3 |       |         |       |   |   |
|----------------------------------|-------|-------|--------------|-------|-----------|-------|---------|-------|--------------|-------|-----------|-------|---------|-------|--------------|-------|---------|-------|---|---|
|                                  |       |       | Kust         |       | Onbebouwd |       | Bebouwd |       | Kust         |       | Onbebouwd |       | Bebouwd |       | Onbebouwd    |       | Bebouwd |       |   |   |
| h (m)                            | a (m) | b (m) | A            | B     | A         | B     | A       | B     | A            | B     | A         | B     | A       | B     | A            | B     | A       | B     | A | B |
| 9                                | 3,6   | 14,4  | -2,17        | -1,55 | -1,37     | -0,98 | -1,08   | -0,77 | -1,81        | -1,29 | -1,15     | -0,82 | -0,91   | -0,65 | -0,95        | -0,68 | -0,74   | -0,53 |   |   |
| 15                               | 6     | 24    | -2,39        | -1,71 | -1,62     | -1,16 | -1,34   | -0,96 | -2,00        | -1,43 | -1,37     | -0,98 | -1,12   | -0,80 | -1,12        | -0,80 | -0,92   | -0,66 |   |   |
| 30                               | 12    | 48    | -2,72        | -1,94 | -2,00     | -1,43 | -1,72   | -1,23 | -2,28        | -1,63 | -1,68     | -1,20 | -1,44   | -1,03 | -1,39        | -0,99 | -1,19   | -0,85 |   |   |

| Winddruk in kN/m <sup>2</sup> |  |  | Windgebied 1 |           |         | Windgebied 2 |           |         | Windgebied 3 |         |
|-------------------------------|--|--|--------------|-----------|---------|--------------|-----------|---------|--------------|---------|
|                               |  |  | Kust         | Onbebouwd | Bebouwd | Kust         | Onbebouwd | Bebouwd | Onbebouwd    | Bebouwd |
| Gebouwhoogte tot 9 meter      |  |  | 1,71         | 1,08      | 0,85    | 1,42         | 0,90      | 0,72    | 0,75         | 0,58    |
| Gebouwhoogte tot 15 meter     |  |  | 1,88         | 1,28      | 1,06    | 1,57         | 1,08      | 0,88    | 0,88         | 0,73    |
| Gebouwhoogte tot 30 meter     |  |  | 2,13         | 1,57      | 1,35    | 1,79         | 1,32      | 1,13    | 1,09         | 0,94    |

Voor de windzone C mag de waarde van windzone B worden gereduceerd met factor 0,7.

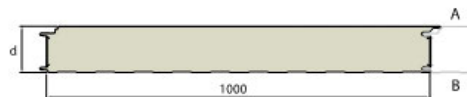
#### SAB WB (-FA) 120.1000 (FR) ML

##### Gevolgklasse CC1

Maximale overspanning in m<sup>1</sup>

Doorbuiging kortstondig L/100

Doorbuiging langdurig L/150



| Aantal velden                                                                       | Kleur-groep | Windzuiging (kN/m²) |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-------------------------------------------------------------------------------------|-------------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                                                                     |             | -0,25               | -0,35 | -0,45 | -0,55 | -0,65 | -0,75 | -0,85 | -0,95 | -1,05 | -1,15 | -1,25 | -1,35 | -1,45 | -1,55 | -1,65 | -1,75 | -1,85 | -1,95 | -2,05 | -2,15 | -2,25 | -2,35 | -2,45 | -2,55 |
|  | I-II-III    | 11,35               | 9,59  | 8,46  | 7,65  | 7,04  | 6,55  | 6,02  | 5,39  | 4,88  | 4,45  | 4,10  | 3,79  | 3,53  | 3,30  | 3,10  | 2,92  | 2,77  | 2,62  | 2,50  | 2,38  | 2,28  | 2,18  | 2,09  | 2,01  |
|  | I-II-III    | 11,35               | 9,59  | 7,66  | 6,30  | 5,36  | 4,68  | 4,16  | 3,75  | 3,41  | 3,14  | 2,91  | 2,71  | 2,54  | 2,39  | 2,26  | 2,14  | 2,04  | 1,94  | 1,86  | 1,78  | 1,71  | 1,64  | 1,58  | 1,53  |
|  | I-II-III    | 11,35               | 9,59  | 8,46  | 7,05  | 5,97  | 5,18  | 4,58  | 4,10  | 3,72  | 3,40  | 3,13  | 2,91  | 2,71  | 2,54  | 2,39  | 2,26  | 2,14  | 2,03  | 1,94  | 1,85  | 1,77  | 1,70  | 1,63  | 1,57  |

| Aantal velden                                                                       | Kleur-groep | Winddruk (kN/m²) |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-------------------------------------------------------------------------------------|-------------|------------------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                                                                                     |             | 0,25             | 0,35  | 0,45 | 0,55 | 0,65 | 0,75 | 0,85 | 0,95 | 1,05 | 1,15 | 1,25 | 1,35 | 1,45 | 1,55 | 1,65 | 1,75 | 1,85 | 1,95 | 2,05 | 2,15 | 2,25 | 2,35 | 2,45 | 2,55 |
|  | I-II-III    | 11,66            | 10,34 | 9,45 | 8,77 | 8,20 | 7,63 | 7,17 | 6,78 | 6,45 | 6,16 | 5,91 | 5,69 | 5,49 | 5,31 | 5,14 | 5,00 | 4,86 | 4,73 | 4,62 | 4,51 | 4,40 | 4,31 | 4,22 | 4,14 |
|  | I-II-III    | 13,22            | 11,17 | 9,85 | 8,91 | 8,20 | 7,63 | 7,17 | 6,78 | 6,45 | 6,16 | 5,91 | 5,69 | 5,49 | 5,31 | 5,14 | 5,00 | 4,86 | 4,73 | 4,62 | 4,51 | 4,40 | 4,31 | 4,22 | 4,14 |
|  | I-II-III    | 13,22            | 11,17 | 9,85 | 8,91 | 8,20 | 7,63 | 7,17 | 6,78 | 6,45 | 6,16 | 5,91 | 5,69 | 5,49 | 5,31 | 5,14 | 5,00 | 4,86 | 4,73 | 4,62 | 4,51 | 4,40 | 4,31 | 4,22 | 4,14 |

|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknummer    | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | 18         |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

### 3.7.2 Kokers dakrand

De kokers in de dakrand worden op drie manieren belast:

- Drukkracht uit stabiliteit
- Moment tgv verticale belasting uit dakbelasting
- Moment tgv horizontale belasting uit wind

#### Belasting

|      |                                  |      |           |             |
|------|----------------------------------|------|-----------|-------------|
| Dak  | 4,94m / 2 x (0,40 + 0,25)   0,70 | 1,61 | 1,73 kN/m | verticaal   |
| Wind | 3,0m/2 x (0,80+0,30) x 0,90      |      | 1,49 kN/m | horizontaal |
| Druk |                                  |      | 212 kN    | axiaal      |

$$q_{v,d} = 1,20 * 1,61 + 1,50 * 1,73 = 4,53 \text{ kN/m}$$

$$q_{h,d} = 1,50 * 1,49 = 2,24 \text{ kN/m}$$

#### Krachten

$$M_{v,d} = \frac{1}{8} * q_{v,d} * L^2 = \frac{1}{8} * 4,53 * 5,02^2 = 14,3 \text{ kNm}$$

$$M_{h,d} = \frac{1}{8} * q_{h,d} * L^2 = \frac{1}{8} * 2,24 * 5,02^2 = 7,1 \text{ kNm}$$

$$N_d = 212 \text{ kN}$$

#### Berekeningen

| K180x180x6,3 |      |                 |
|--------------|------|-----------------|
| G            | 34,0 | kg/m            |
| A            | 43,3 | cm <sup>2</sup> |
| W            | 241  | cm <sup>3</sup> |
| I            | 2168 | cm <sup>4</sup> |

$$\sigma_{v,d} = \frac{M_{v,d}}{W} = \frac{14,3 \text{ kNm}}{241 \text{ cm}^3} = 59 \text{ N/mm}^2$$

$$\sigma_{h,d} = \frac{M_{h,d}}{W} = \frac{7,1 \text{ kNm}}{241 \text{ cm}^3} = 29 \text{ N/mm}^2$$

$$\sigma_{n,d} = \frac{N_d}{A} = \frac{212 \text{ kN}}{4330 \text{ mm}^2} = 49 \text{ N/mm}^2 \quad \text{excl knik}$$

$$\sigma_d = 138 \text{ N/mm}^2$$

$$w = \frac{5 * q_k * L^4}{384 * E * I} = \frac{5 * 4,53 * 5,02^4}{384 * 210.000 * 2168 \text{ cm}^4} = 8 \text{ mm} \quad \text{verticaal}$$

|               |                                                                                  |           |                |                  |
|---------------|----------------------------------------------------------------------------------|-----------|----------------|------------------|
| werknummer    |  | gezien    | onderdeel<br>B | bladnummer<br>19 |
| <b>23-157</b> | datum<br>6-3-2024                                                                | gewijzigd |                |                  |

### 3.7.3 Gevelsteunen UNP

De UNP profielen worden enkel belast door wind.

#### Belasting

Wind 3,0m x (0,80+0,30) x 0,90 2,97 kN/m *horizontaal*

$$q_{h,d} = 1,50 * 2,97 = 4,46 \text{ kN/m}$$

#### Krachten

$$M_{h,d} = \frac{1}{8} * q_{h,d} * L^2 = \frac{1}{8} * 4,46 * 5,02^2 = 14,0 \text{ kNm}$$

#### Berekeningen

| UNP180 |      |                 |
|--------|------|-----------------|
| G      | 22,0 | kg/m            |
| A      | 28,0 | cm <sup>2</sup> |
| W      | 150  | cm <sup>3</sup> |
| I      | 1350 | cm <sup>4</sup> |

$$\sigma_{h,d} = \frac{M_{h,d}}{W} = \frac{14,0 \text{ kNm}}{150 \text{ cm}^3} = 93 \text{ N/mm}^2$$

$$w = \frac{5 * q_k * L^4}{384 * E * I} = \frac{5 * 4,46 * 5,02^4}{384 * 210.000 * 1350 \text{ cm}^4} = 13 \text{ mm} \quad \text{horizontaal}$$

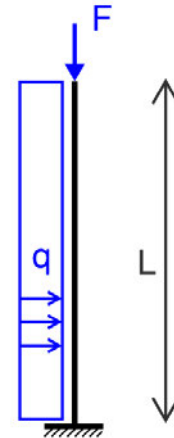


### 3.8 IPE330 kolom brandwand

De brandwand wordt voorzien van een tweede kolommenrij in het geval er brand in de hal uitbreekt. Deze kolommen dragen 12 meter uit en worden belast door het eigen gewicht van de kolom en de gevel, alsmede 20% van de windbelasting (accidentele situatie).

#### Schematisering

Zie afbeelding rechts



#### Belastingen

F-last

Eigen gewicht

Permanent

*in matrixframe*

gevel  $5,0\text{m} \times 0,20 \text{ kN/m}^2 = 1,0 \text{ kN/m}$

q-last

De windlast op de kolom wordt berekend met een drukcoëfficiënt voor vrijstaande wanden;

$L = 40\text{m}$

$H = 12\text{m}$

$L/H = 3,3$

Op basis van tabel 7.9 uit NEN-EN 1991-1-4 (zie ook volgende pagina) kunnen de volgende drukcoëfficiënten worden bepaald;

Tabel 7.9 — Aanbevolen drukcoëfficiënten  $c_{p,\text{net}}$  voor vrijstaande wanden en borstweringen

| Dichtheid       | Zone                                       | A                | B   | C   | D   |
|-----------------|--------------------------------------------|------------------|-----|-----|-----|
| $\varphi = 1$   | Zonder omgezette einden                    | $\ell/h \leq 3$  | 2,3 | 1,4 | 1,2 |
|                 |                                            | $\ell/h = 5$     | 2,9 | 1,8 | 1,4 |
|                 |                                            | $\ell/h \geq 10$ | 3,4 | 2,1 | 1,7 |
|                 | Met omgezette einden met lengte $\geq h^a$ |                  | 2,1 | 1,8 | 1,4 |
| $\varphi = 0,8$ |                                            |                  | 1,2 | 1,2 | 1,2 |

<sup>a</sup> Er mag lineair worden geïnterpoleerd bij omgezette einden met een lengte tussen 0,0 en  $h$ .

Factor zone A: 2,39 na lineair interpoleren van 2,3 en 2,9

Factor zone B: 1,46 na lineair interpoleren van 1,4 en 1,8

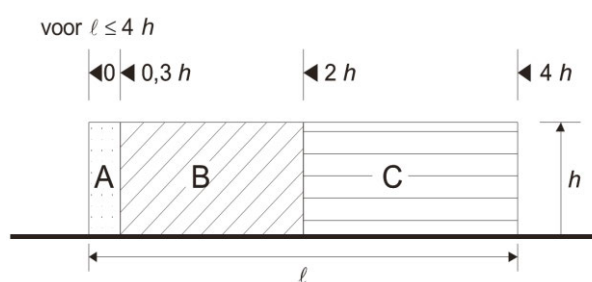
|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknnummer   | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | 21         |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

De kolommen aan het einde van de wand zijn maatgevend (tussen assen A-B en H-I);

Wind links van kolom  $3,00\text{m} * 2,39 * 0,20 * 0,90 = 1,29 \text{ kN/m}$

Wind rechts van kolom  $4,94\text{m}/2 * 1,46 * 0,20 * 0,90 = 0,65 \text{ kN/m}$

$q_{\text{wind,k}} = 1,94 \text{ kN/m}$



Overzicht zones voor bepaling drukcoëfficiënten.



Zones t.b.v. drukcoëfficiënten bij brandwand

#### Berekening

Zie bijlage III – 65 t/m 70

#### Conclusie

De kolommen voldoen constructief. De gevelpanelen dienen de IPE kolommen te steunen tegen kippen. Hogere vervorming in accidentele situatie akkoord.

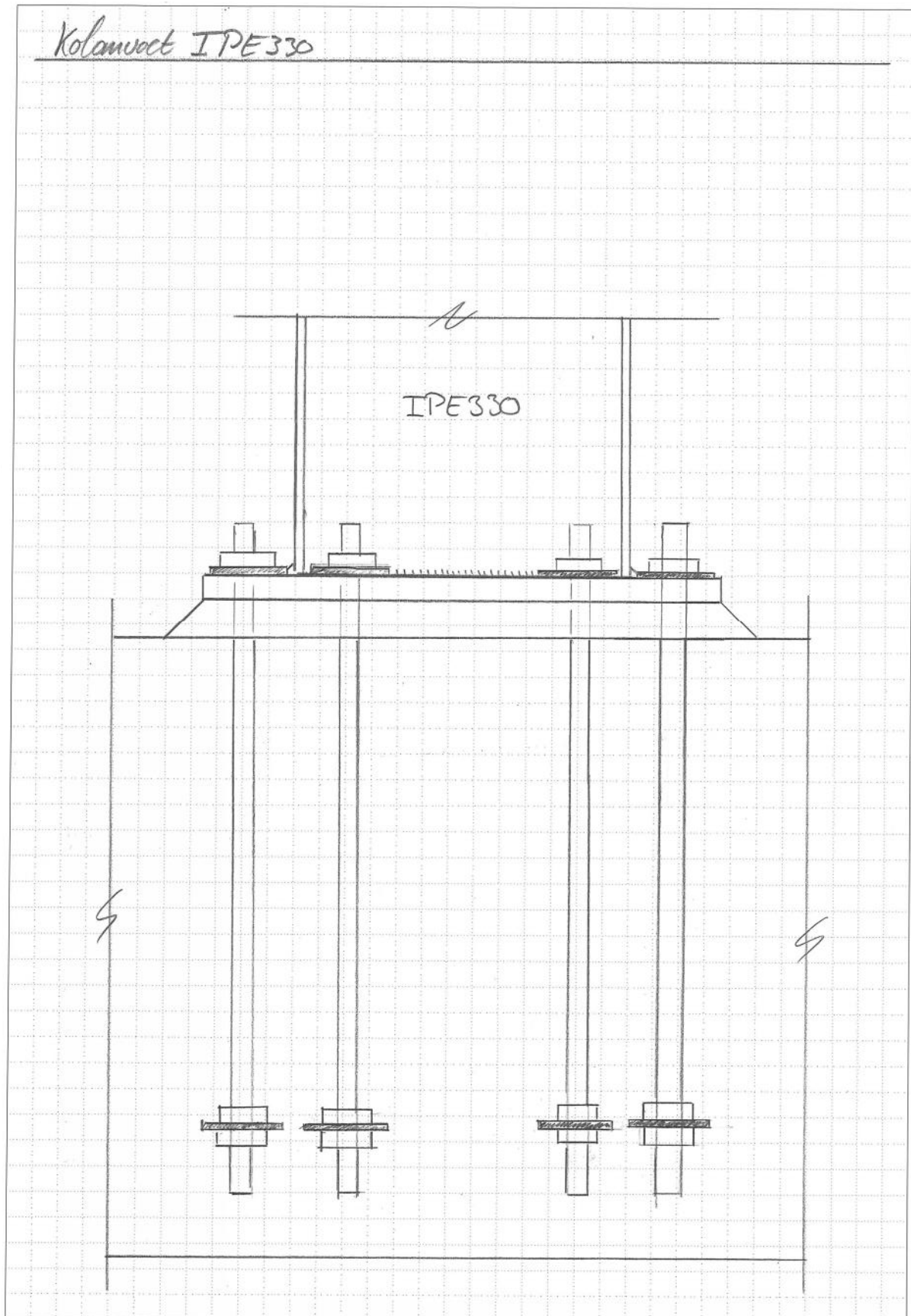
#### 3.8.1 Berekening kolomvoet

De reactiekrachten op de fundering zijn overgenomen in een kolomvoet berekening. De voetplaat heeft een dikte van 25 mm met een afmeting van 300x500mm. Er worden per zijde vier ankers M27 4.6 toegepast met voetplaatjes.

#### Berekening

Zie bijlage III – 71 t/m 77

|            |          |        |           |            |
|------------|----------|--------|-----------|------------|
| werknummer | paraaf   | gezien | onderdeel | bladnummer |
| 23-157     | ■        |        | B         | 22         |
|            | datum    |        | gewijzigd |            |
|            | 6-3-2024 |        |           |            |

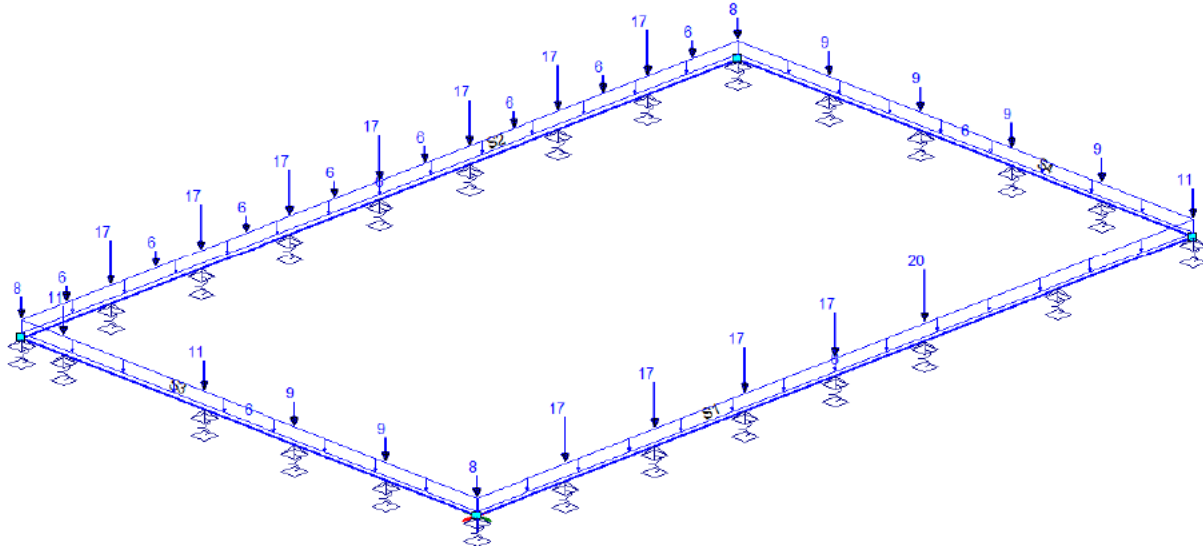


|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknummer    | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | 23         |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

## 4 Balkenrooster

### Schematisering

*Inclusief belasting uit eigen gewicht*



### Belastingen

Belastingen volgen uit de gewichtsberekeningen. Deze belastingen zijn ook aangegeven op de overzichtstekening in [bijlage II](#). De beschouwing van de belasting op de fundering in de accidentele situatie is in een los model beschouwd.

### Uitgangspunten beton

| Element        | Kwaliteit | Milieuklasse | Hoogte | Breedte | Dekking | d      |
|----------------|-----------|--------------|--------|---------|---------|--------|
|                |           |              | mm     | mm      | mm      | mm     |
| Funderingsbalk | C30/37    | XC3          | 600 mm | 400 mm  | 30 mm   | 570 mm |

|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknnummer   | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | 24         |
|               | datum                                                                             |        | gewijzigd |            |
|               | 6-3-2024                                                                          |        |           |            |

### Berekening

Zie [bijlage IV](#). – 1 t/m 37      *berekening standaard situatie*

Zie [bijlage IV](#). – 38 t/m 68      *berekening accidentele situatie*

*In de berekening van de accidentele situatie wordt door Matrixframe gerekend met een staalspanning van  $f_{yd} = 435 \text{ N/mm}^2$  daar waar dit  $500 \text{ N/mm}^2$  mag zijn.*

### Wapening

*Voor de balken op assen 1, A en I*

|               |            |                                   |                        |
|---------------|------------|-----------------------------------|------------------------|
| Basiswapening | 4R12       | $A_s = 452 \text{ mm}^2$          |                        |
| Bijleg        | 1R16       | $A_s = 201 \text{ mm}^2$          | 1x op as 1, 1x op as A |
| Beugels       | 2sn R8-300 | $A_s = 667 \text{ mm}^2/\text{m}$ |                        |
| Flankstaven   | 1R8        |                                   |                        |

*Voor de balk op as 6, ter plaatse van de brandwand*

|               |            |                                    |
|---------------|------------|------------------------------------|
| Basiswapening | 5R16       | $A_s = 1005 \text{ mm}^2$          |
| Bijleg        | 2R20       | $A_s = 314 \text{ mm}^2$           |
| Beugels       | 2sn R8-200 | $A_s = 1000 \text{ mm}^2/\text{m}$ |
| Flankstaven   | 2R10       |                                    |

*Voor de consoles bij de IPE kolommen*

|               |              |                          |
|---------------|--------------|--------------------------|
| Basiswapening | 5hs R12      | $A_s = 565 \text{ mm}^2$ |
| Beugels       | 4bgls R8-150 |                          |
| Flankstaven   | 1hs R8       |                          |



#### 4.1 Berekening console

Berekening Console

$M_d = 140 \text{ kNm}$   
 $N_d = 17,9 \text{ kN}$   
 $V_d = 23,3 \text{ kN}$

$$R = \frac{M}{2} = \frac{140 \text{ kNm}}{0,55 \text{ m}} = 255 \text{ kN}$$

$$A_{s,l} = \frac{M_d / z}{f_{yk} \times \alpha_g d} = \frac{140 / 2}{500 \times 0,9 \times 570} = 273 \text{ mm}^2$$

pas toe 5 st  $\phi 12$   $A_s = 565 \text{ mm}^2$

$l_{req} = \frac{273}{565} \times 420 \text{ mm} = 203 \text{ mm} \rightarrow 350 \text{ mm}$  recht in balk

Buigels

$$V_d = 255 \text{ kN} + 17,9 \text{ kN} = 273 \text{ kN}$$

$$A_{s,buig} = 0,26 \times \frac{273}{500 \times 0,9 \times 570} = 277 \text{ mm}^2$$

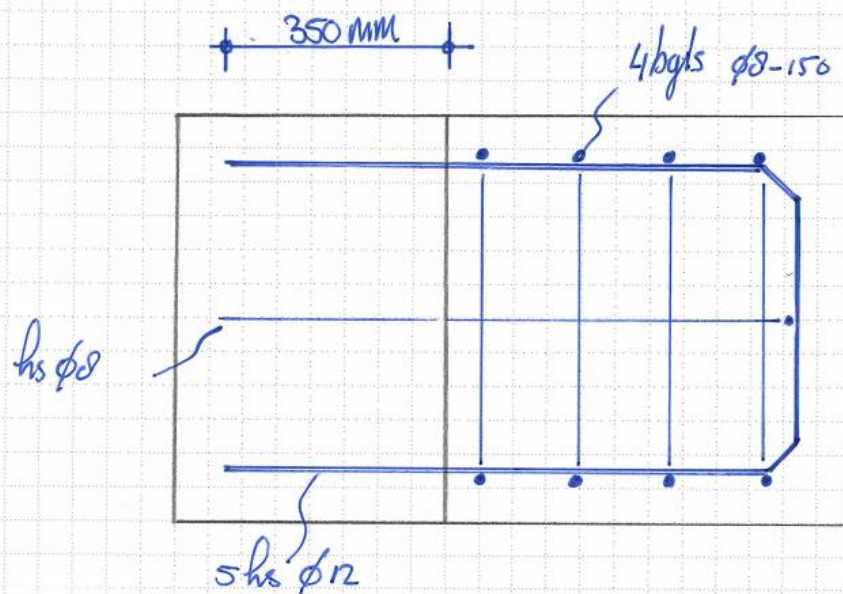
4  $\phi 8$  2 sn  $A_s = 400 \text{ mm}^2$

$$\beta = \frac{a_0}{2d} = \frac{300 \text{ mm}}{2 \times 570}$$

$$\beta = 0,26$$

|            |                                                                                   |        |           |            |
|------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknummer | paraaf                                                                            | gezien | onderdeel | bladnummer |
| 23-157     |  |        | B         | 26         |
|            | datum                                                                             |        | gewijzigd |            |
|            | 6-3-2024                                                                          |        |           |            |

Wapening console

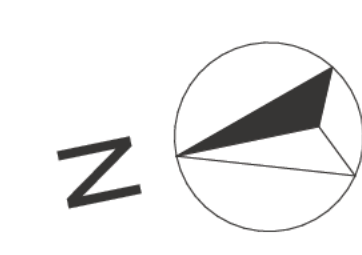


|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknnummer   | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | I-0        |
|               | datum                                                                             |        | gewijzigd |            |
|               | 06-03-2024                                                                        |        |           |            |

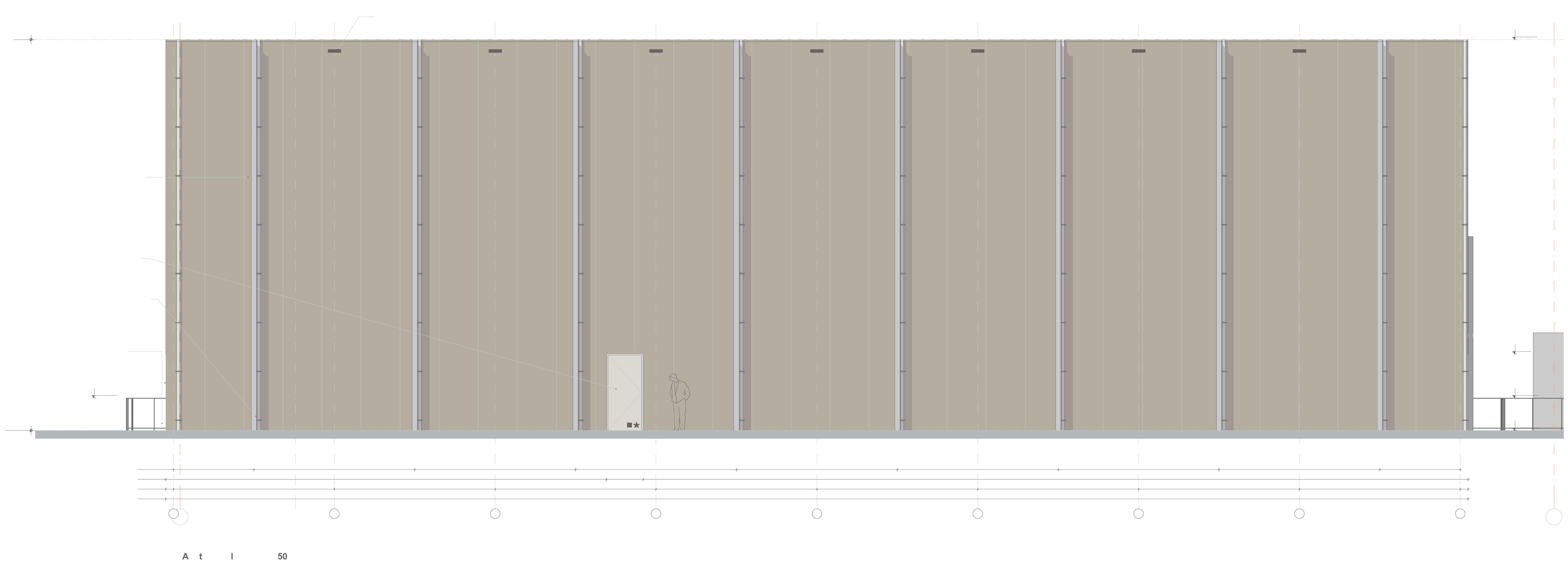
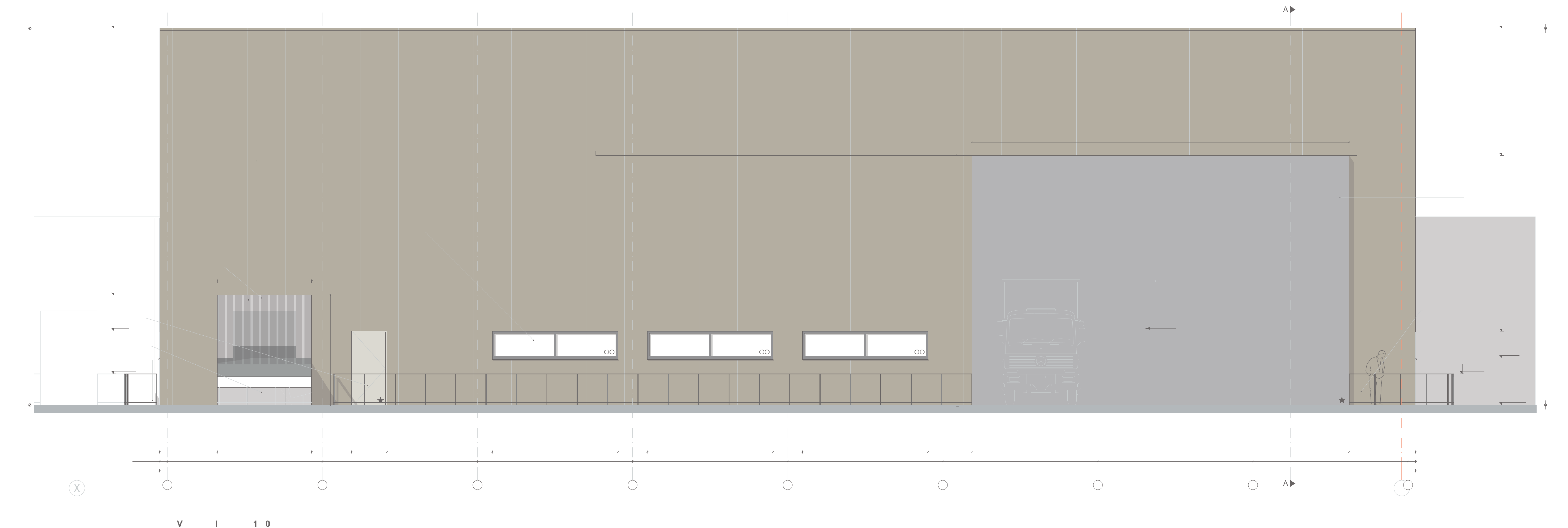
**BIJLAGE I Overzichtstekening stabiliteit**

Vanaf volgende pagina



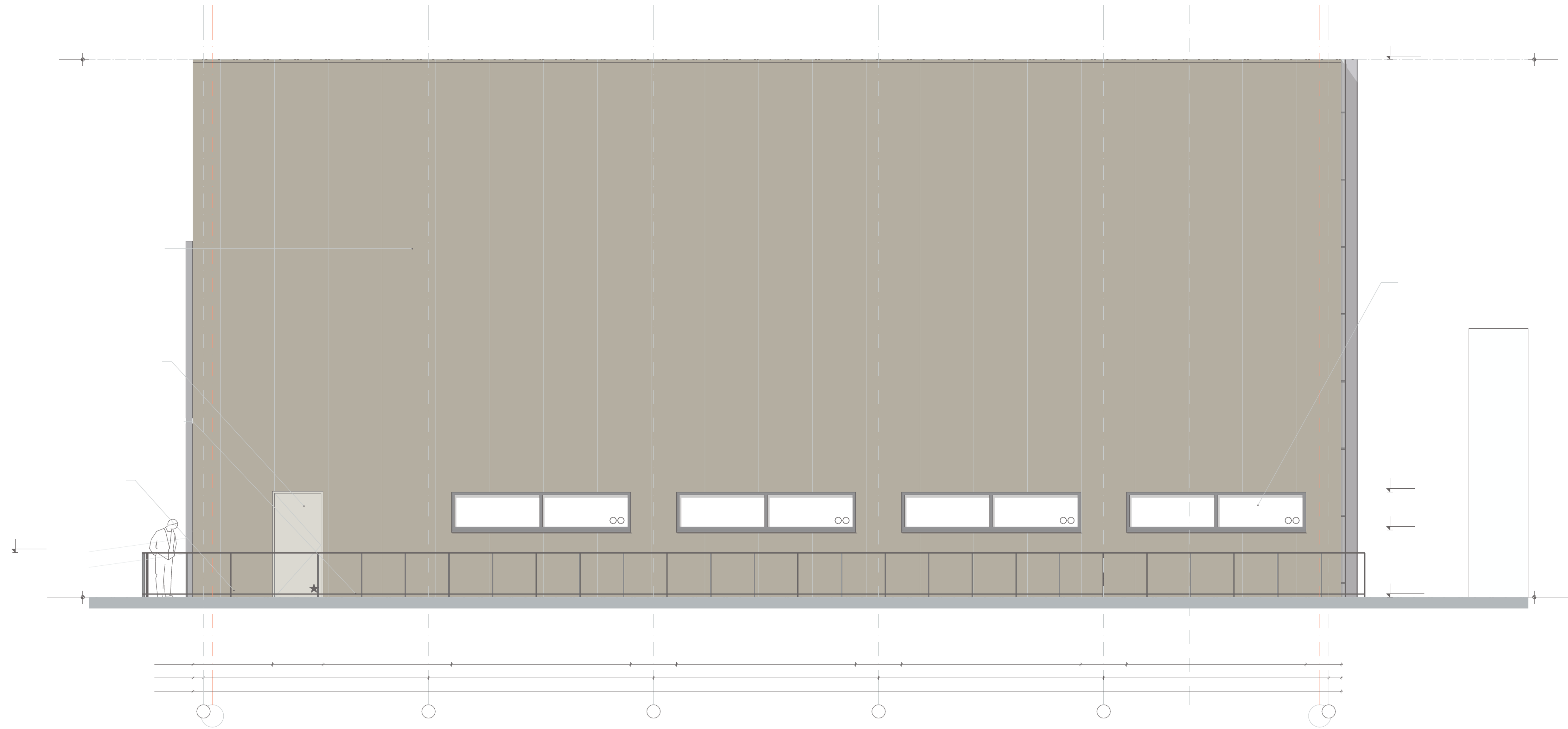




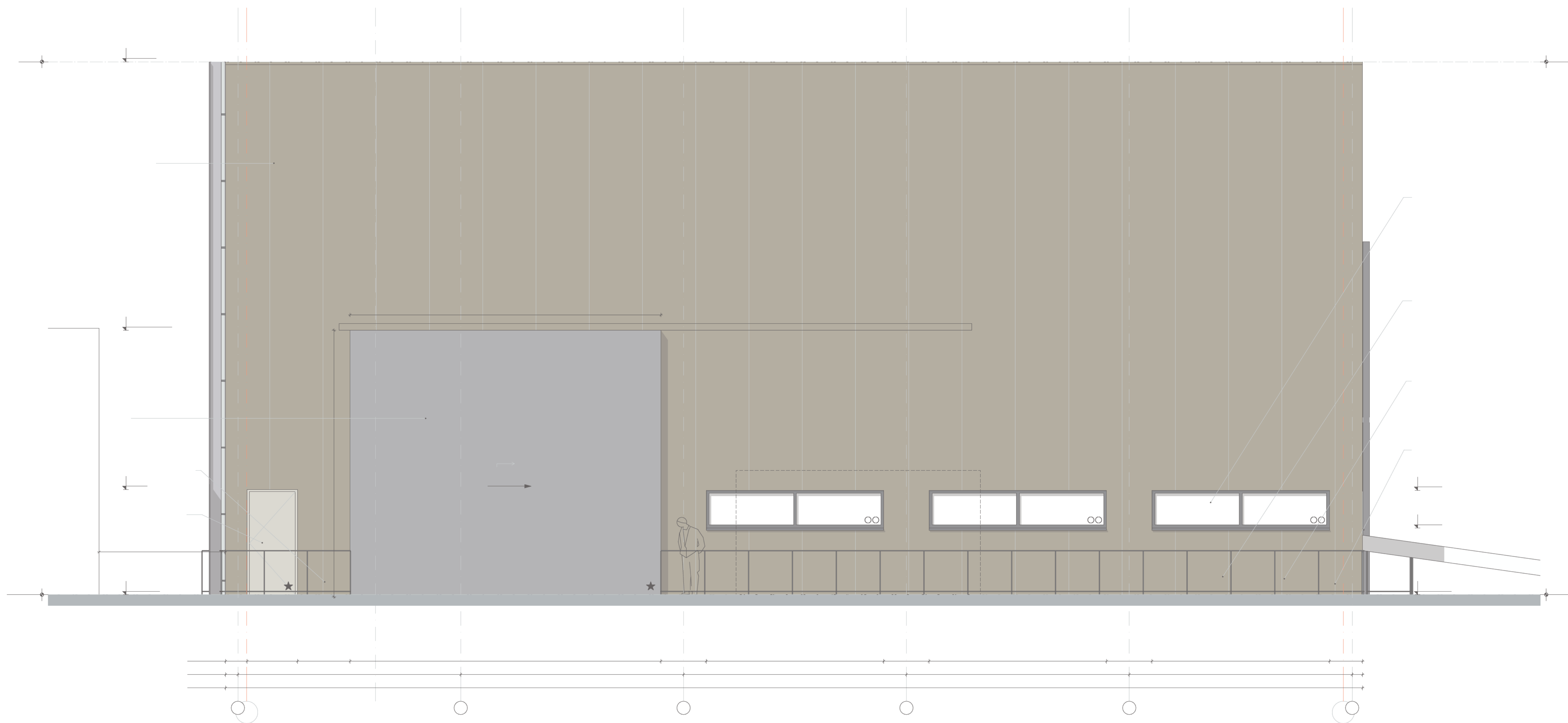


|                                               |         |                           |
|-----------------------------------------------|---------|---------------------------|
| A L M A T O R N G N E T W R K E O N R L R E ! |         |                           |
| 23 0 5                                        | D d h t | BE in<br>ge<br>ni<br>eurs |
| TO 0 VL O                                     | G I     |                           |
| F                                             |         |                           |





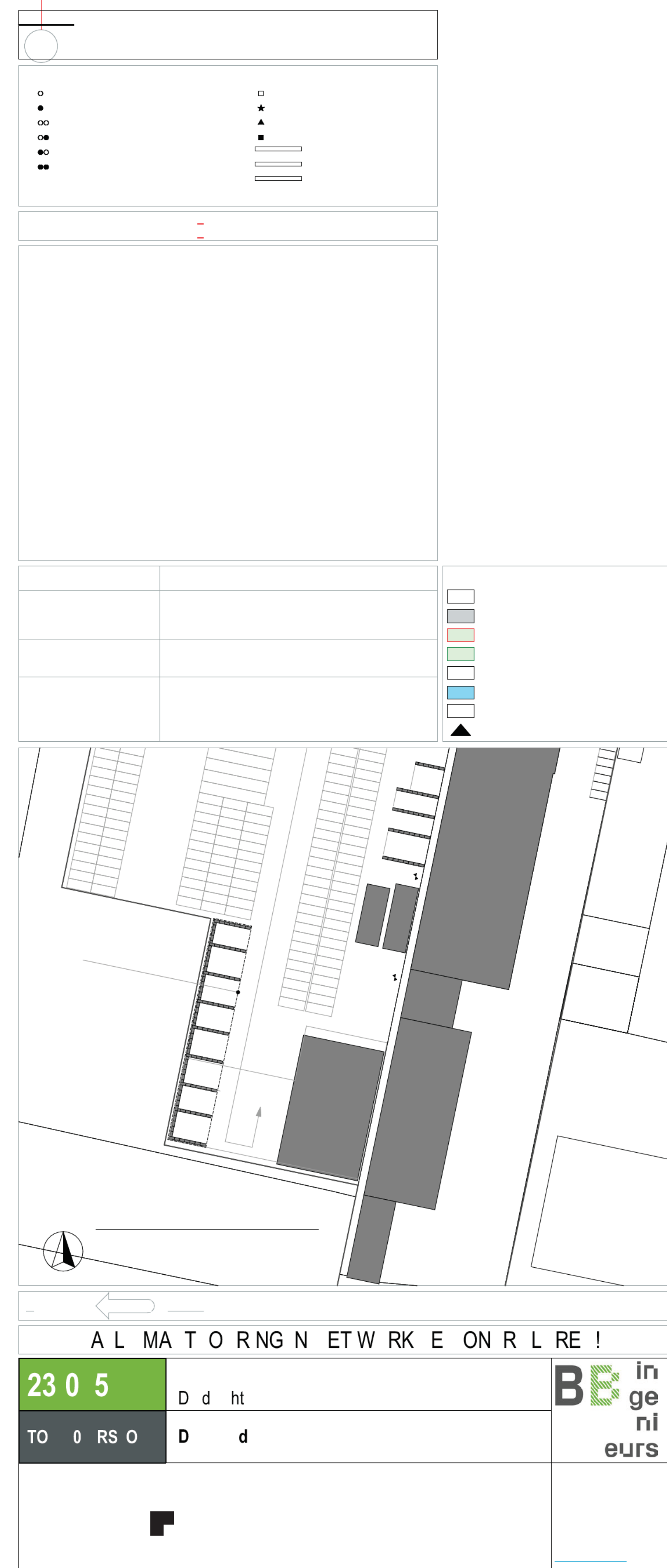
R ht ij l 1 0



i k j l 1 0

|                                                      |               |                                           |
|------------------------------------------------------|---------------|-------------------------------------------|
|                                                      |               |                                           |
| <p>A L M A T O R N G N E T W R K E O N R L R E !</p> |               |                                           |
| <p>23 0 5</p>                                        | <p>D d ht</p> | <p><b>B</b> in<br/>ge<br/>ni<br/>eurs</p> |
| <p>TO 1 VL O</p>                                     | <p>G l</p>    |                                           |
|                                                      |               |                                           |



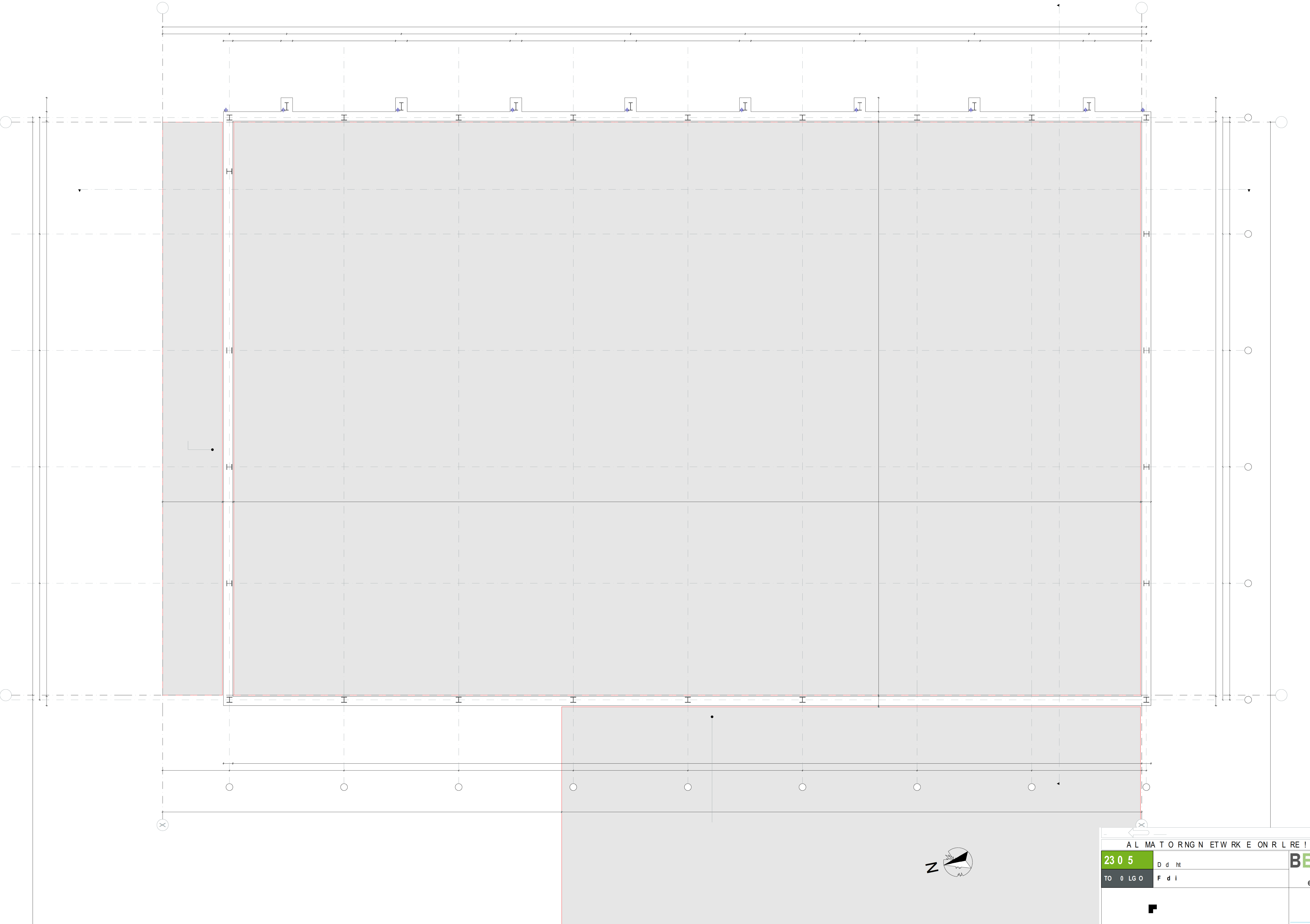




|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknnummer   | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | II-0       |
|               | datum                                                                             |        | gewijzigd |            |
|               | 06-03-2024                                                                        |        |           |            |

**BIJLAGE II Overzichtstekening belastingen op fundering**  
Vanaf volgende pagina





←

×

A L M A T O R N G N E T W R K E O N R L R E !

23 0 5

D d h t

TO 0 L G O

F d i

BE in ge ni eurs



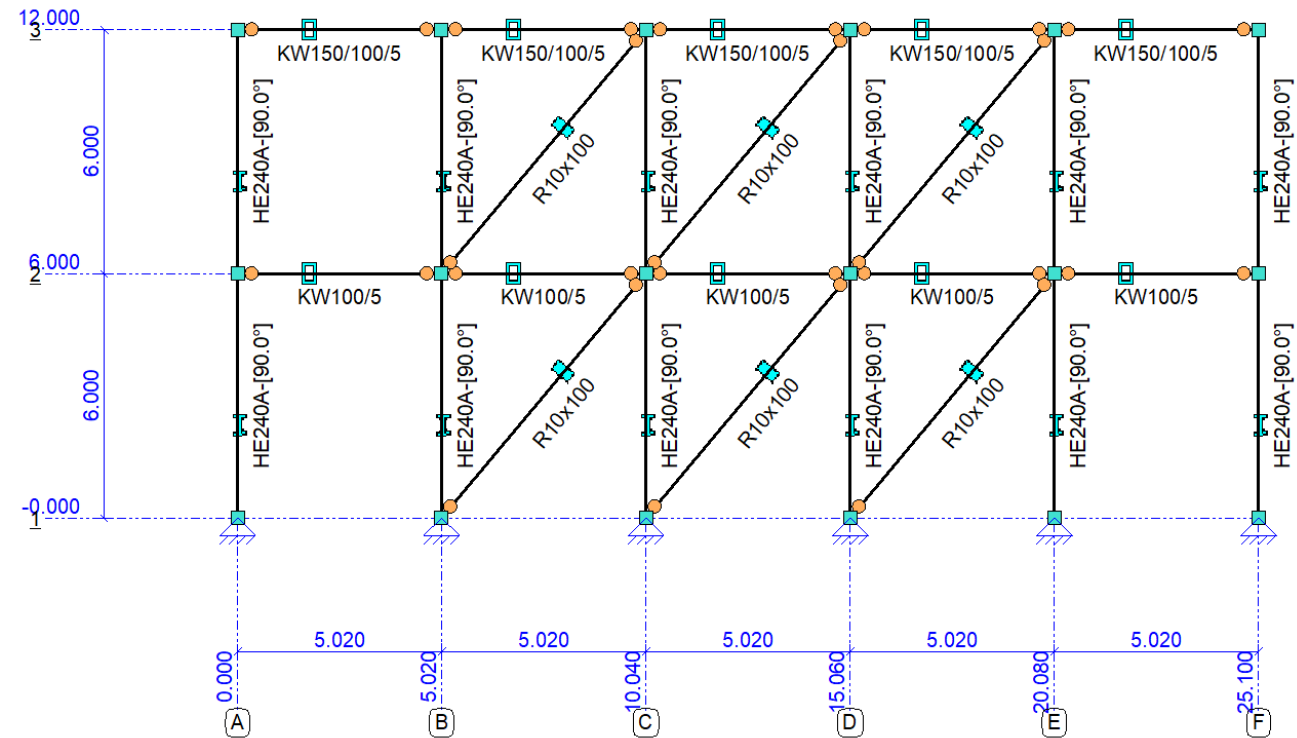
|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknummer    | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | III-0      |
|               | datum                                                                             |        | gewijzigd |            |
|               | 06-03-2024                                                                        |        |           |            |

**BIJLAGE III Computeruitvoer gewichtsberekeningen**  
Vanaf volgende pagina



|                        |                                                                                                                                                                                    |                                     |               |                  |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------|------------------|
| VAN BOXSEL ENGINEERING |                                                                                                                                                                                    | T: 0162-451280 E: info@vanboxsel.nl |               | www.vanboxsel.nl |
| Projectomschrijving    | Uitbreiding terrein Coolrec                                                                                                                                                        |                                     | Projectnummer | 23-157           |
| Onderdeel              |                                                                                                                                                                                    |                                     | Constructeur  | PM               |
| Opdrachtgever          | Coolrec                                                                                                                                                                            |                                     | Eenheden      | m, mm, kN, kNm   |
| Bestand                | C:\Users\pm\van Boxsel Engineering\Ruby - Documenten\Documenten\2023\23-157 Coolrec\1. berekeningen intern\Rapport B\Matrixframe modellen\23-157 wand as A - met windverbanden.mxf |                                     |               |                  |

Constructie



PROFIELEN

| Profiel | Profielnaam | Oppervlakte | Iy              | Materiaal        | Hoek |
|---------|-------------|-------------|-----------------|------------------|------|
| P2      | HE240A      | 7684        | 2 7688e+07      | S235             | 90   |
| P3      | KW100/5     | 1888        | 2 8279e+06      | S275H(EN10210 1) | 0    |
| P4      | R10x100     | 1000        | 8 3333e+05      | S235             | 0    |
| P8      | KW150/100/5 | 2362        | 7 3157e+06      | S235H(EN10210 1) | 0    |
|         |             | mm          | mm <sup>4</sup> | °                |      |

PROFIELVORMEN

| Profiel | Verl. h. | hB    | hE    | tf  | tw  | tf2 | B    | bL  | bR  | Raatl. | Hoogte |
|---------|----------|-------|-------|-----|-----|-----|------|-----|-----|--------|--------|
| P4      | Nee      | 100 0 | 100 0 | 0 0 | 0 0 | 0 0 | 10 0 | 0 0 | 0 0 | Nee    | 0 0    |
|         |          | mm    | mm    | mm  | mm  | mm  | mm   | mm  | mm  |        | mm     |

MATERIALEN

| Materiaalnaam    | Poison | Dichtheid        | E-Modulus  | Uitzettingcoeff |
|------------------|--------|------------------|------------|-----------------|
| S235             | 0 30   | 78 50            | 2 1000e+05 | 12 0000e 06     |
| S275H(EN10210 1) | 0 30   | 78 50            | 2 1000e+05 | 12 0000e 06     |
| S235H(EN10210 1) | 0 30   | 78 50            | 2 1000e+05 | 12 0000e 06     |
|                  |        | kNm <sup>3</sup> | N/mm       | C°m             |

SCHARNIEREN

| Staal | Positie   | Scharnier | X    | Z    | Yr      |
|-------|-----------|-----------|------|------|---------|
| S13   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S14   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S15   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S16   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S17   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
|       |           | m         | kNm  | kNm  | kNm/rad |

| Staaf | Positie   | Scharnier | X    | Z    | Yr      |
|-------|-----------|-----------|------|------|---------|
| S18   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S19   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S20   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S21   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S22   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S23   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| S24   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| S25   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| S26   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| S27   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| S28   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| m     |           |           | kNm  | kNm  | kNm/rad |

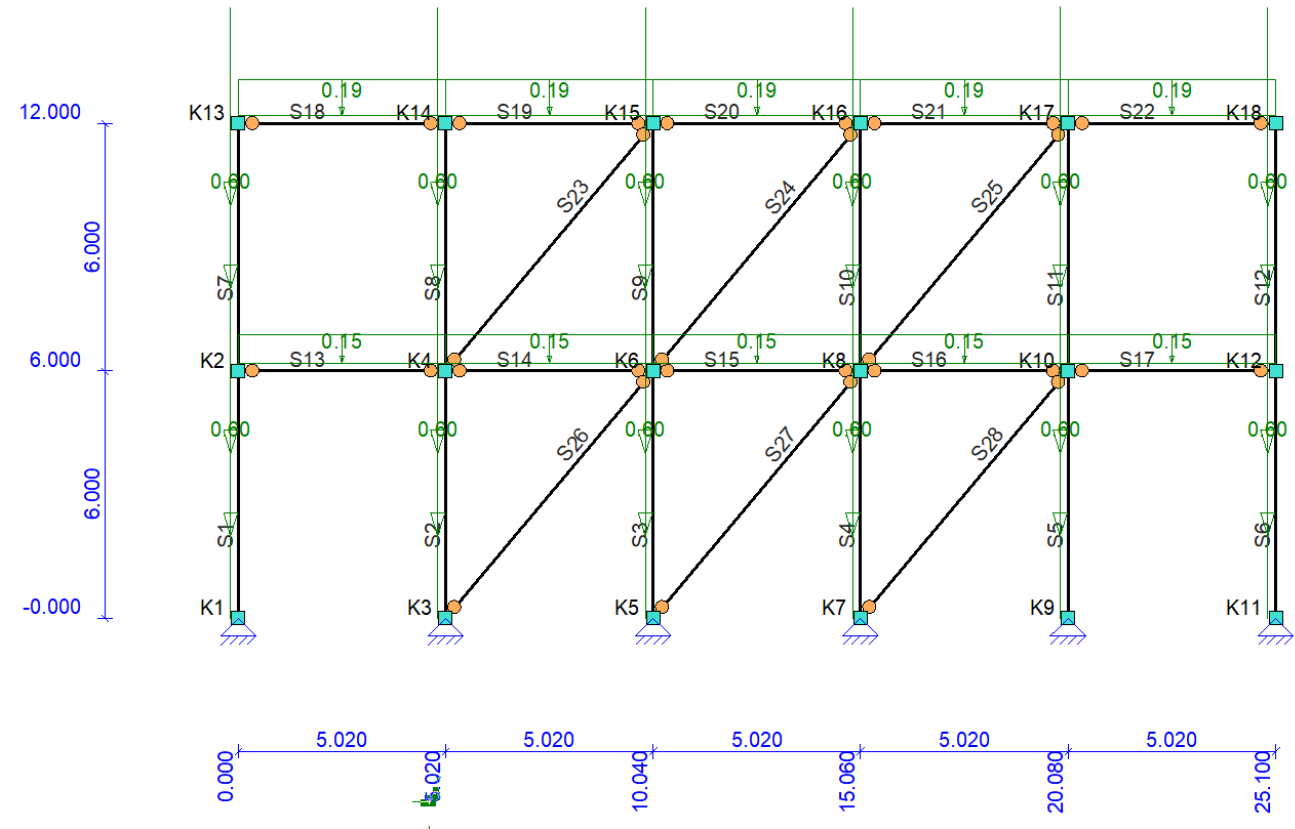
OPLEGGINGEN

| Oplegging | Object | Positie | X    | Z    | Yr      | Hoek | Yr |
|-----------|--------|---------|------|------|---------|------|----|
| O1        | K1     | K1      | Vast | Vast | Vrij    | 0    |    |
| O2        | K3     | K3      | Vast | Vast | Vrij    | 0    |    |
| O3        | K5     | K5      | Vast | Vast | Vrij    | 0    |    |
| O4        | K7     | K7      | Vast | Vast | Vrij    | 0    |    |
| O5        | K9     | K9      | Vast | Vast | Vrij    | 0    |    |
| O6        | K11    | K11     | Vast | Vast | Vrij    | 0    |    |
| m         |        |         | kNm  | kNm  | kNm/rad |      | °  |

BELASTINGSGEVALLEN TYPEN

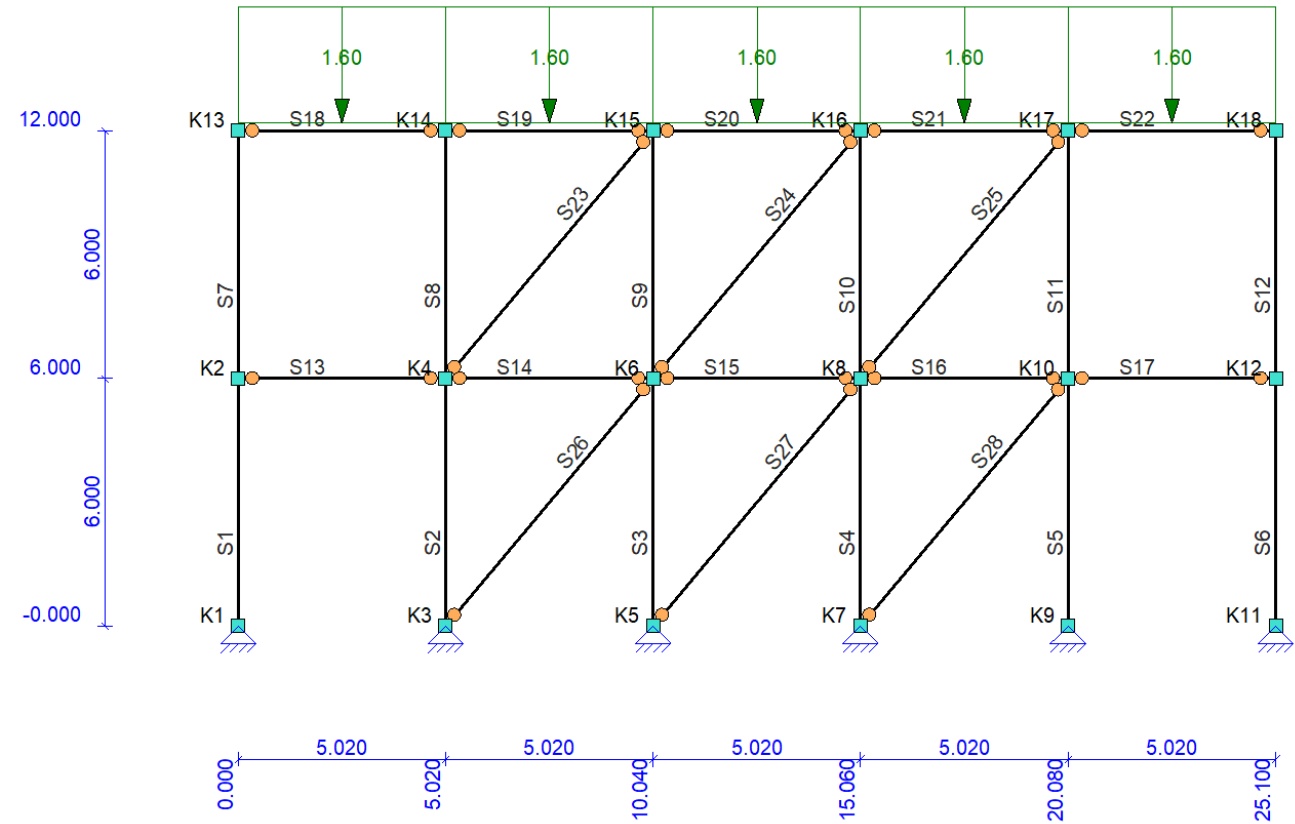
| Label | Omschrijving  | B.G.Type         | Gunstig/Ong. | Element | Niveau | Veld  | $\Psi_0$ | $\Psi_1$ | $\Psi_2$ | $C_{prob}$ |
|-------|---------------|------------------|--------------|---------|--------|-------|----------|----------|----------|------------|
| B G 1 | Eigen gewicht | Permanent        |              |         | N v t  | N v t |          |          |          | UGT/GGT    |
| B G 2 | Permanent     | Permanent        |              |         | N v t  | N v t |          |          |          |            |
| B G 3 | Sneeuw        | Sneeuw belasting |              |         | N v t  | N v t |          | 0 20     |          | 1 00/1 00  |
| B G 4 | Windbelasting | Windbelasting    |              |         | N v t  | N v t |          | 0 20     |          | 1 00/1 00  |

B.G.1: E gen gewcht



| B.G.1: EIGEN GEWICHT |                    |           |              |            |          |                |              |
|----------------------|--------------------|-----------|--------------|------------|----------|----------------|--------------|
| Type                 | Beginwaarde        | Endwaarde | Beginafstand | Endafstand | Richting | Staat of knoop | Omschrijving |
| qG                   | 1 00               | 1 00      | 0 000        | L          | Z"       | S1 S22         |              |
| Som lasten           | Z: 51.80 Yr: -0.58 |           |              |            |          |                |              |
|                      |                    |           | m            | m          |          |                |              |

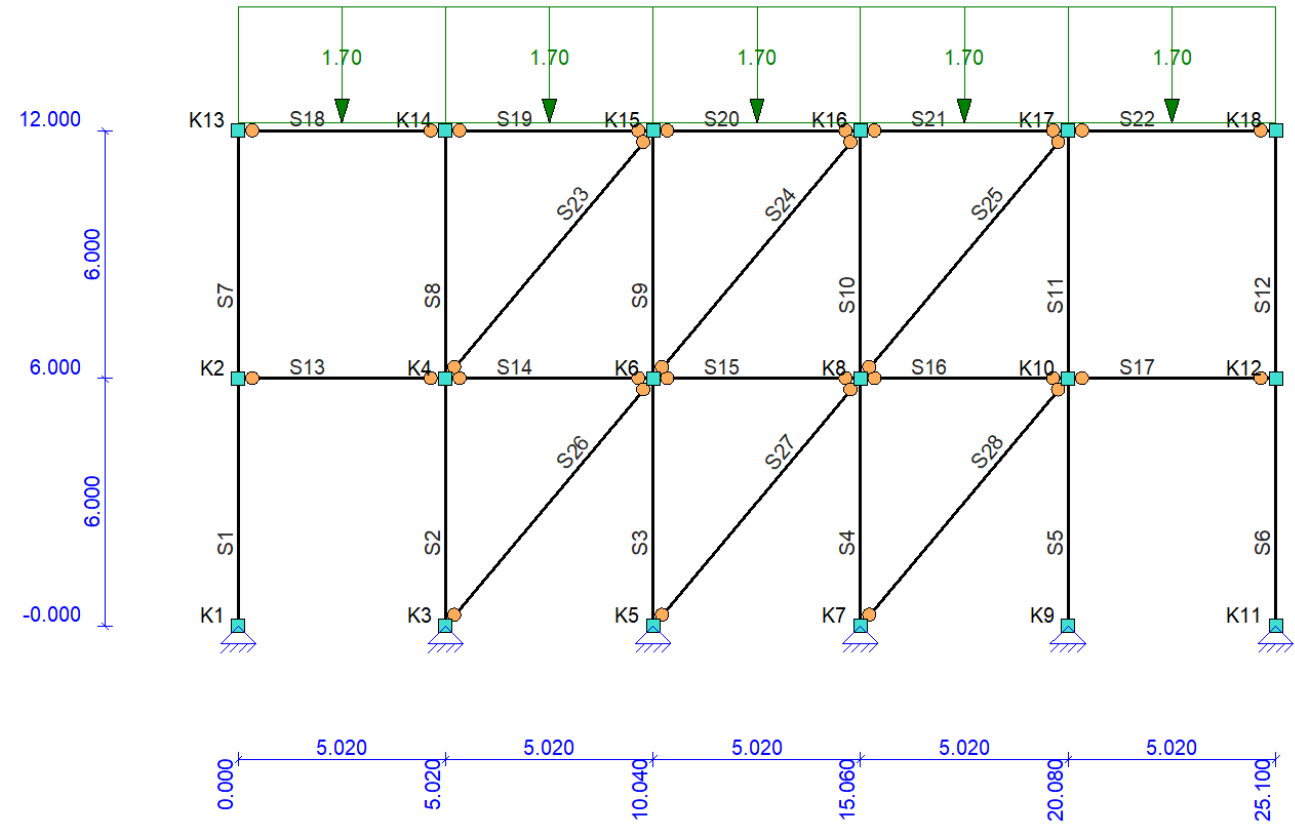
B.G.2: Permanent



B.G.2: PERMANENT

| Type       | Beginwaarde | Endwaarde          | Beginafstand | Endafstand | Richting | Staat of knoop | Omschrijving |
|------------|-------------|--------------------|--------------|------------|----------|----------------|--------------|
| q          | 1 60        | 1 60               | 0 000        | L          | Z        | S18 S22        |              |
| Som lasten |             | Z: 40.16 Yr: -2.80 |              |            |          |                |              |
|            |             |                    | m            | m          |          |                |              |

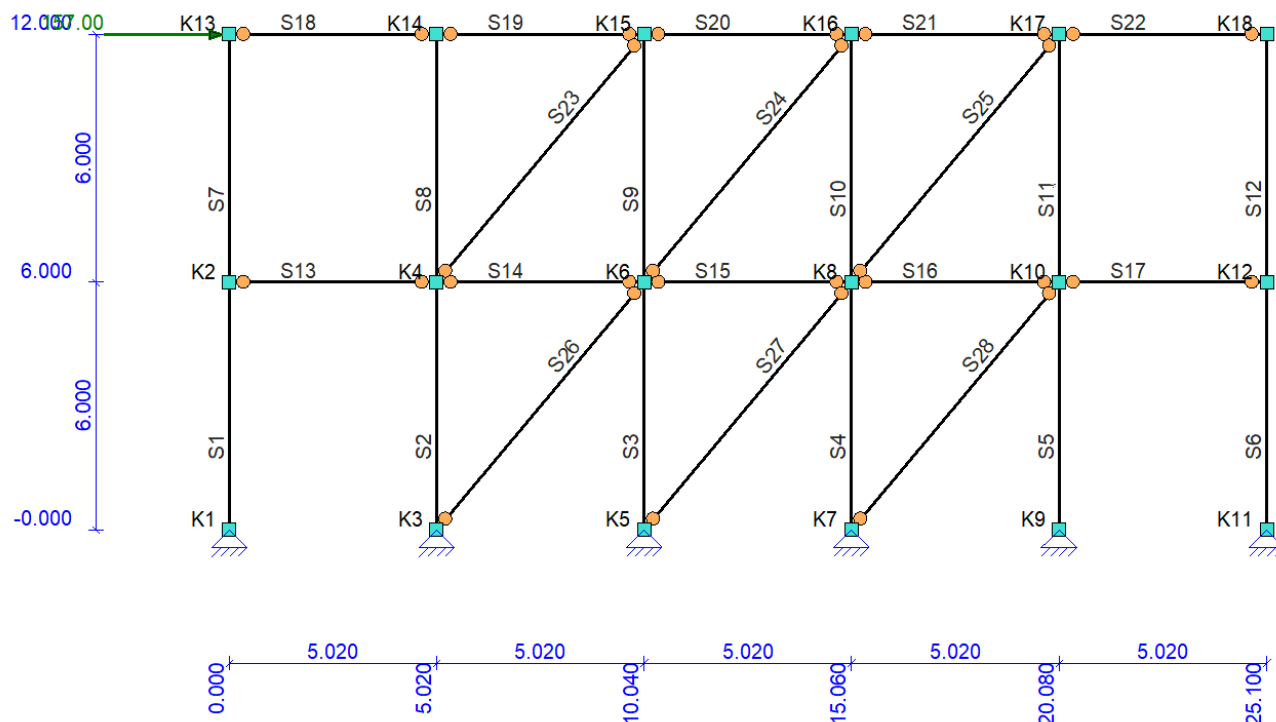
B.G.3: Sneeuw



B.G.3: SNEEUW

| Type       | Beginwaarde | Endwaarde          | Beginafstand | Endafstand | Richting | Staat of knoop | Omschrijving |
|------------|-------------|--------------------|--------------|------------|----------|----------------|--------------|
| q          | 170         | 170                | 0.000        | L          | Z        | S18 S22        |              |
| Som lasten |             | Z: 42.67 Yr: -2.97 |              |            |          |                |              |
|            |             |                    | m            | m          |          |                |              |

## B.G.4: Windbelasting



## B.G.4: WINDBELASTING

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Staf of knoop | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|---------------|--------------|
| N          | 157.00      |           |              |            | X        | K13           |              |
| Som lasten | X: 157.00   |           |              |            |          |               |              |
|            |             |           | m            | m          |          |               |              |

## BELASTINGSCOMBINATIES

## Fundamenteel

| B.G.  | Omschrijving  | Fu.C.1 | Fu.C.2 | Fu.C.3 |
|-------|---------------|--------|--------|--------|
| B.G.1 | Eigen gewicht | 1.08   | 1.08   | 1.22   |
| B.G.2 | Permanent     | 1.08   | 1.08   | 1.22   |
| B.G.3 | Sneeuw        | 1.01   |        |        |
| B.G.4 | Windbelasting |        | 1.17   |        |

## Karakteristiek

| B.G.  | Omschrijving  | Ka.C.(w1) | Ka.C.1 | Ka.C.2 | Ka.C.3 |
|-------|---------------|-----------|--------|--------|--------|
| B.G.1 | Eigen gewicht | 1.00      | 1.00   | 1.00   | 1.00   |
| B.G.2 | Permanent     | 1.00      | 1.00   | 1.00   | 1.00   |
| B.G.3 | Sneeuw        |           |        | 0.75   |        |
| B.G.4 | Windbelasting |           |        |        | 0.86   |

## Frequent

| B.G.  | Omschrijving  | Fr.C.(w1) | Fr.C.1 | Fr.C.2 |
|-------|---------------|-----------|--------|--------|
| B.G.1 | Eigen gewicht | 1.00      | 1.00   | 1.00   |
| B.G.2 | Permanent     | 1.00      | 1.00   | 1.00   |
| B.G.3 | Sneeuw        |           | 0.20   |        |
| B.G.4 | Windbelasting |           |        | 0.20   |

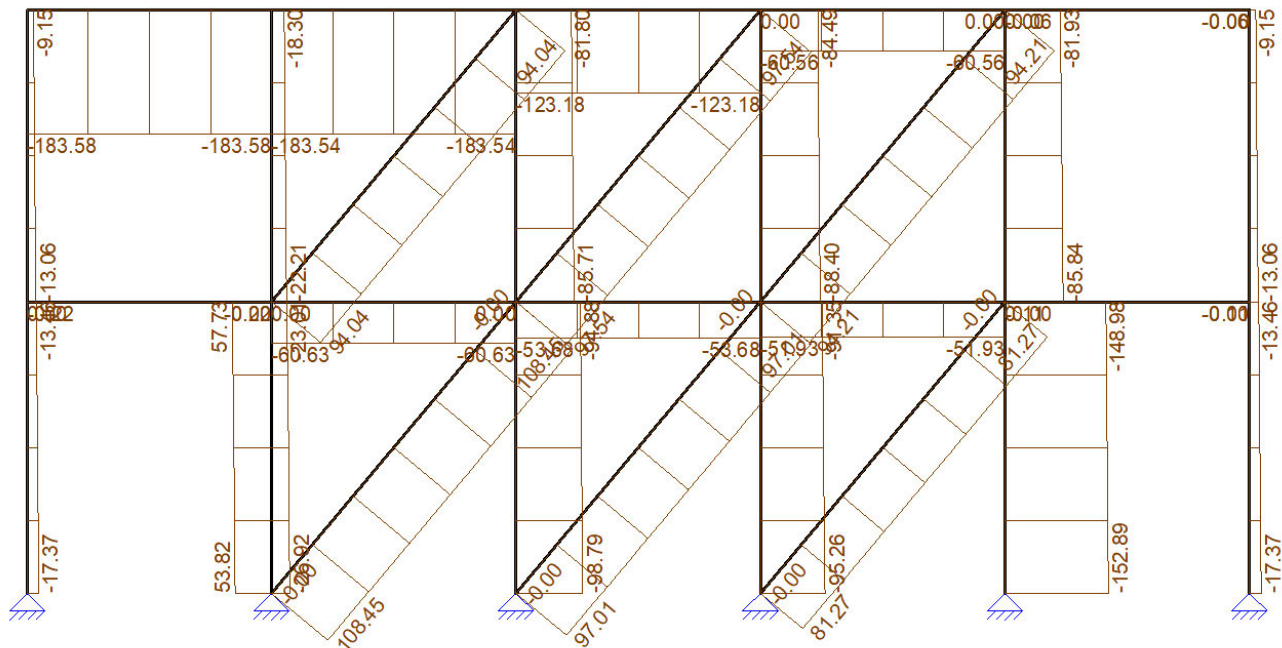
## Quasi-permanent

| B.G.  | Omschrijving  | Qu.C.1 |
|-------|---------------|--------|
| B.G.1 | Eigen gewicht | 1.00   |
| B.G.2 | Permanent     | 1.00   |
| B.G.3 | Sneeuw        |        |
| B.G.4 | Windbelasting |        |





Fu.C. Omhu ende Normaa kracht (Nx)



## EXTREME STAAFKRACHTEN

| Staat               | Veld                 | B.C.  | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM <sub>0</sub> | xM <sub>0</sub> | T/D | N <sub>max</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> |
|---------------------|----------------------|-------|----------------|------------------|-------------------|----------------|-----------------|-----------------|-----|------------------|----------------|------------------|----------------|
| <b>Fundamenteel</b> |                      |       |                |                  |                   |                |                 |                 |     |                  |                |                  |                |
| S1                  | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |                 |                 | T   | -17.37           | 0 00           | 0 00             | 0 00           |
|                     | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.66          |                 |                 | T   | 13 06            | -0.11          | -0.11            | -0.11          |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0.01           |                 |                 | T   | 14 75            | 0 00           | 0 00             | 0 00           |
| S2                  | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |                 |                 | T   | -26.92           | 0 00           | 0 00             | 0 00           |
|                     | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.21          |                 |                 | D   | 57.73            | -0.04          | -0.04            | -0.04          |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0.01           |                 |                 | T   | 20 67            | 0 00           | 0 00             | 0 00           |
| S3                  | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.13          |                 |                 | T   | -98.79           | -0.02          | -0.02            | -0.02          |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0.01           |                 |                 | T   | 20 67            | 0 00           | 0 00             | 0 00           |
| S4                  | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.16          |                 |                 | T   | -95.26           | -0.03          | -0.03            | -0.03          |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0.01           |                 |                 | T   | 20 67            | 0 00           | 0 00             | 0 00           |
| S5                  | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.33          |                 |                 | T   | -152.89          | -0.06          | -0.06            | -0.06          |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0.01           |                 |                 | T   | 20 67            | 0 00           | 0 00             | 0 00           |
| S6                  | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |                 |                 | T   | -17.37           | 0 00           | 0 00             | 0 00           |
|                     | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.33          |                 |                 | T   | 13 06            | -0.06          | -0.06            | -0.06          |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0.01           |                 |                 | T   | 14 75            | 0 00           | 0 00             | 0 00           |
| S7                  | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |                 |                 | T   | -13.06           | 0 00           | 0 00             | 0 00           |
|                     | Veld 1 (0 000 6 000) | Fu C2 | -0.66          |                  |                   | 0 00           |                 |                 | T   | 8 75             | 0.11           | 0.11             | 0.11           |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0.01           |                  |                   | 0 00           |                 |                 | T   | 9 88             | -0.00          | -0.00            | -0.00          |
| S8                  | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |                 |                 | T   | -22.21           | 0 00           | 0 00             | 0 00           |
|                     | Veld 1 (0 000 6 000) | Fu C2 | -0.21          |                  |                   | 0 00           |                 |                 | T   | 13 59            | 0.04           | 0.04             | 0.04           |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0.01           |                  |                   | 0 00           |                 |                 | T   | 15 35            | -0.00          | -0.00            | -0.00          |
| S9                  | Veld 1 (0 000 6 000) | Fu C2 | -0.13          |                  |                   | 0 00           |                 |                 | T   | -85.71           | 0.02           | 0.02             | 0.02           |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0.01           |                  |                   | 0 00           |                 |                 | T   | 15 35            | -0.00          | -0.00            | -0.00          |
| S10                 | Veld 1 (0 000 6 000) | Fu C2 | -0.16          |                  |                   | 0 00           |                 |                 | T   | -88.40           | 0.03           | 0.03             | 0.03           |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0.01           |                  |                   | 0 00           |                 |                 | T   | 15 35            | -0.00          | -0.00            | -0.00          |
| S11                 | Veld 1 (0 000 6 000) | Fu C2 | -0.33          |                  |                   | 0 00           |                 |                 | T   | -85.84           | 0.06           | 0.06             | 0.06           |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0.01           |                  |                   | 0 00           |                 |                 | T   | 15 35            | -0.00          | -0.00            | -0.00          |
| S12                 | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |                 |                 | T   | -13.06           | 0 00           | 0 00             | 0 00           |
|                     | Veld 1 (0 000 6 000) | Fu C2 | -0.33          |                  |                   | 0 00           |                 |                 | T   | 8 75             | 0.06           | 0.06             | 0.06           |
|                     | Veld 1 (0 000 6 000) | Fu C3 | 0.01           |                  |                   | 0 00           |                 |                 | T   | 9 88             | -0.00          | -0.00            | -0.00          |
| S13                 | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | 0 50             | 2 510             | 0 00           |                 |                 | D   | 0 00             | 0 40           | 0 40             | 0 40           |
|                     | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 0 50             | 2 510             | 0 00           |                 |                 | T   | -0.22            | 0 40           | 0 40             | 0 40           |
|                     | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | 0.57             | 2 510             | 0 00           |                 |                 | D   | 0 00             | 0.45           | 0.45             | -0.45          |
| S14                 | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | 0 50             | 2 510             | 0 00           |                 |                 | D   | 0 00             | 0 40           | 0 40             | 0 40           |
|                     | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 0 50             | 2 510             | 0 00           |                 |                 | T   | -60.63           | 0 40           | 0 40             | 0 40           |
| <b>m</b>            |                      |       | <b>kNm</b>     |                  |                   | <b>kNm</b>     | <b>m</b>        | <b>m</b>        |     | <b>kN</b>        | <b>kN</b>      | <b>kN</b>        | <b>kN</b>      |

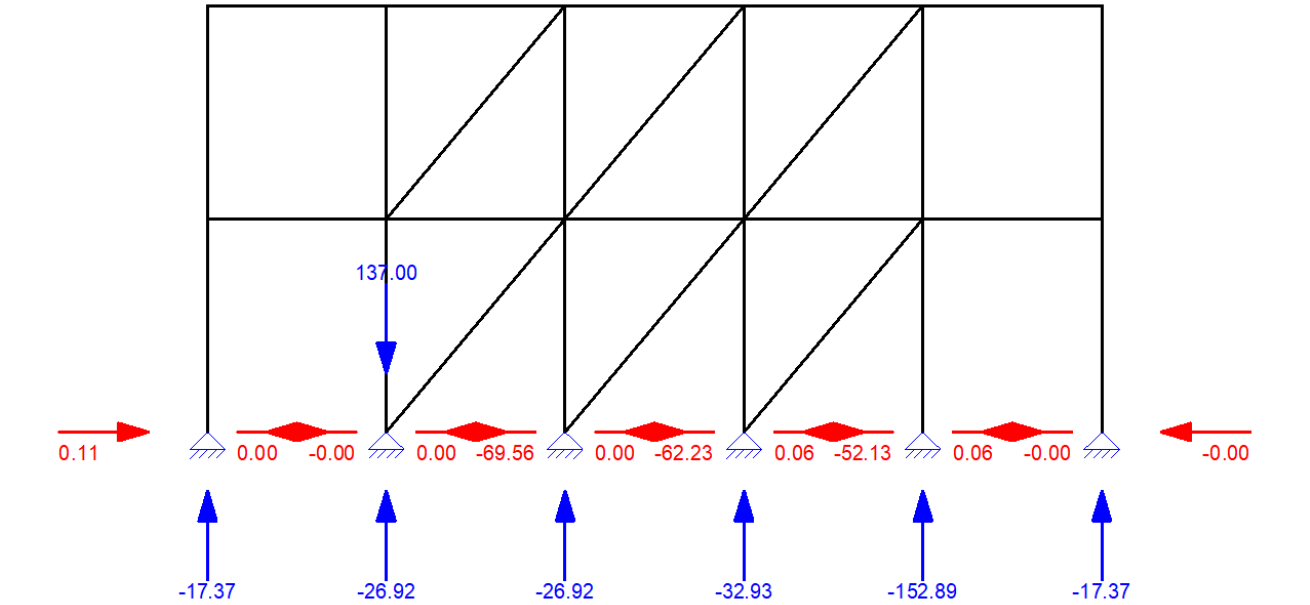
| Staaf | Veld                 | B.C.  | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM0 | xM0 | T/D | N <sub>max</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> |
|-------|----------------------|-------|----------------|------------------|-------------------|----------------|-----|-----|-----|------------------|----------------|------------------|----------------|
| S15   | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | <b>0.57</b>      | 2 510             | 0 00           |     |     | D   | <b>0.00</b>      | <b>0.45</b>    | <b>0.45</b>      | <b>-0.45</b>   |
|       | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | 0 50             | 2 510             | <b>0.00</b>    |     |     | T   | 0 00             | 0 40           | 0 40             | 0 40           |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 0 50             | 2 510             | 0 00           |     |     | T   | <b>-53.68</b>    | 0 40           | 0 40             | 0 40           |
| S16   | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | <b>0.57</b>      | 2 510             | 0 00           |     |     | T   | 0 00             | <b>0.45</b>    | <b>0.45</b>      | <b>-0.45</b>   |
|       | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | 0 50             | 2 510             | <b>0.00</b>    |     |     | T   | 0 00             | 0 40           | 0 40             | 0 40           |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 0 50             | 2 510             | 0 00           |     |     | T   | <b>-51.93</b>    | 0 40           | 0 40             | 0 40           |
| S17   | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | <b>0.57</b>      | 2 510             | 0 00           |     |     | T   | 0 00             | <b>0.45</b>    | <b>0.45</b>      | <b>-0.45</b>   |
|       | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | 0 50             | 2 510             | <b>0.00</b>    |     |     | T   | 0 00             | 0 40           | 0 40             | 0 40           |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 0 50             | 2 510             | 0 00           |     |     | D   | <b>0.11</b>      | 0 40           | 0 40             | 0 40           |
| S18   | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | <b>0.57</b>      | 2 510             | 0 00           |     |     | T   | <b>-0.00</b>     | <b>0.45</b>    | <b>0.45</b>      | <b>-0.45</b>   |
|       | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | <b>11.48</b>     | 2 510             | <b>0.00</b>    |     |     | T   | 0 00             | <b>9.15</b>    | <b>9.15</b>      | <b>-9.15</b>   |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 6 07             | 2 510             | 0 00           |     |     | T   | <b>-183.58</b>   | 4 84           | 4 84             | 4 84           |
| S19   | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | <b>11.48</b>     | 2 510             | <b>0.00</b>    |     |     | T   | 0 00             | <b>9.15</b>    | <b>9.15</b>      | <b>-9.15</b>   |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 6 07             | 2 510             | 0 00           |     |     | T   | <b>-183.54</b>   | 4 84           | 4 84             | 4 84           |
| S20   | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | <b>11.48</b>     | 2 510             | <b>0.00</b>    |     |     | T   | 0 00             | <b>9.15</b>    | <b>9.15</b>      | <b>-9.15</b>   |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 6 07             | 2 510             | 0 00           |     |     | T   | <b>-123.18</b>   | 4 84           | 4 84             | 4 84           |
| S21   | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | <b>11.48</b>     | 2 510             | <b>0.00</b>    |     |     | D   | 0 00             | <b>9.15</b>    | <b>9.15</b>      | <b>-9.15</b>   |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 6 07             | 2 510             | 0 00           |     |     | T   | <b>-60.56</b>    | 4 84           | 4 84             | 4 84           |
| S22   | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | 6 86             | 2 510             | 0 00           |     |     | D   | <b>0.00</b>      | 5 47           | 5 47             | 5 47           |
|       | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | <b>11.48</b>     | 2 510             | <b>0.00</b>    |     |     | D   | 0 00             | <b>9.15</b>    | <b>9.15</b>      | <b>-9.15</b>   |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 6 07             | 2 510             | 0 00           |     |     | T   | <b>-0.06</b>     | 4 84           | 4 84             | 4 84           |
|       | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | 6 86             | 2 510             | 0 00           |     |     | D   | <b>0.00</b>      | 5 47           | 5 47             | 5 47           |
| S23   | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |     |     | D   | <b>94.04</b>     | 0 00           | 0 00             | 0 00           |
| S24   | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |     |     | D   | <b>97.54</b>     | 0 00           | 0 00             | 0 00           |
| S25   | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |     |     | D   | <b>94.21</b>     | 0 00           | 0 00             | 0 00           |
| S26   | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |     |     | D   | <b>108.45</b>    | 0 00           | 0 00             | 0 00           |
|       | Veld 1 (0 000 7 823) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | <b>-0.00</b>     | 0 00           | 0 00             | 0 00           |
| S27   | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |     |     | D   | <b>97.01</b>     | 0 00           | 0 00             | 0 00           |
|       | Veld 1 (0 000 7 823) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | <b>-0.00</b>     | 0 00           | 0 00             | 0 00           |
| S28   | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |     |     | D   | <b>81.27</b>     | 0 00           | 0 00             | 0 00           |
|       | Veld 1 (0 000 7 823) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | <b>-0.00</b>     | 0 00           | 0 00             | 0 00           |
| m     |                      |       | kNm            | kNm              | m                 | kNm            | m   | m   |     | kN               | kN             | kN               | kN             |

OPLEGREACTIES (BELASTINGSGEVALLEN)

| B.C. | Oplegging    | Positie | X              | Z             | Yr   |
|------|--------------|---------|----------------|---------------|------|
| BG1  | O1           | K1      | 0 00           | 8 08          | 0 00 |
|      | O2           | K3      | 0 00           | 8 91          | 0 00 |
|      | O3           | K5      | 0 00           | 8 91          | 0 00 |
|      | O4           | K7      | 0 00           | 8 91          | 0 00 |
|      | O5           | K9      | 0 00           | 8 91          | 0 00 |
|      | O6           | K11     | 0 00           | 8 08          | 0 00 |
|      | Som Reacties |         | <b>-0.00</b>   | <b>-51.80</b> |      |
| BG2  | O1           | K1      | 0 00           | 4 02          | 0 00 |
|      | O2           | K3      | 0 00           | 8 03          | 0 00 |
|      | O3           | K5      | 0 00           | 8 03          | 0 00 |
|      | O4           | K7      | 0 00           | 8 03          | 0 00 |
|      | O5           | K9      | 0 00           | 8 03          | 0 00 |
|      | O6           | K11     | 0 00           | 4 02          | 0 00 |
|      | Som Reacties |         | <b>-0.00</b>   | <b>-40.16</b> |      |
| BG3  | O1           | K1      | 0 00           | 4 27          | 0 00 |
|      | O2           | K3      | 0 00           | 8 53          | 0 00 |
|      | O3           | K5      | 0 00           | 8 53          | 0 00 |
|      | O4           | K7      | 0 00           | 8 53          | 0 00 |
|      | O5           | K9      | 0 00           | 8 53          | 0 00 |
|      | O6           | K11     | 0 00           | 4 27          | 0 00 |
|      | Som Reacties |         | <b>-0.00</b>   | <b>-42.67</b> |      |
| BG4  | O1           | K1      | 0 09           | 0 00          | 0 00 |
|      | O2           | K3      | 59 45          | 132 73        | 0 00 |
|      | O3           | K5      | 53 19          | 5 20          | 0 00 |
|      | O4           | K7      | 44 55          | 12 50         | 0 00 |
|      | O5           | K9      | 0 05           | 115 03        | 0 00 |
|      | O6           | K11     | 0 05           | 0 00          | 0 00 |
|      | Som Reacties |         | <b>-157.00</b> | <b>-0.00</b>  |      |
|      |              |         | kN             | kN            | kNm  |

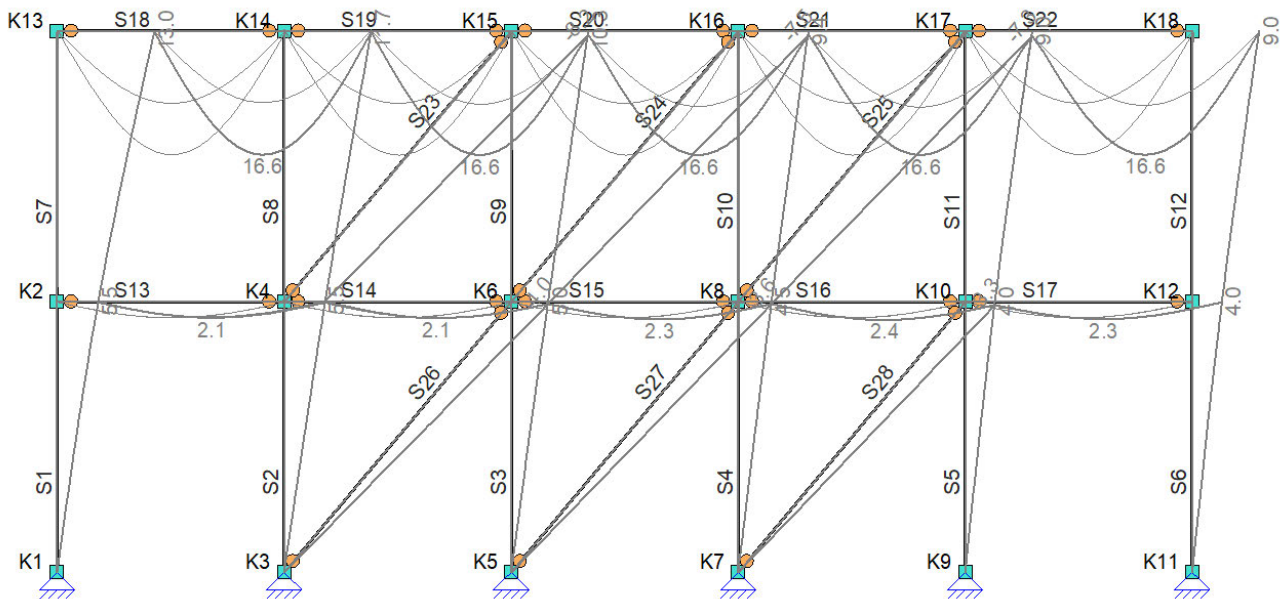
| B.C. | Oplegging  | Positie | X      | Z    | Yr  |
|------|------------|---------|--------|------|-----|
|      | Som Lasten |         | 157.00 | 0.00 |     |
|      |            |         | kN     | kN   | kNm |

Fu.C. Omhu ende Op egreact es



| OPLEGREACTIES (FUNDAMENTEEL) |              |         |         |         |      |
|------------------------------|--------------|---------|---------|---------|------|
| B.C.                         | Oplegging    | Positie | X       | Z       | Yr   |
| Fu C1                        | O1           | K1      | 0.00    | 17.37   | 0.00 |
|                              | O2           | K3      | 0.00    | 26.92   | 0.00 |
|                              | O3           | K5      | 0.00    | 26.92   | 0.00 |
|                              | O4           | K7      | 0.00    | 26.92   | 0.00 |
|                              | O5           | K9      | 0.00    | 26.92   | 0.00 |
|                              | O6           | K11     | 0.00    | 17.37   | 0.00 |
|                              | Som Reacties |         | -0.00   | -142.42 |      |
| Fu C2                        |              |         | 0.00    | 142.42  |      |
|                              | O1           | K1      | 0.11    | 13.06   | 0.00 |
|                              | O2           | K3      | 69.56   | 137.00  | 0.00 |
|                              | O3           | K5      | 62.23   | 24.39   | 0.00 |
|                              | O4           | K7      | 52.13   | 32.93   | 0.00 |
|                              | O5           | K9      | 0.06    | 152.89  | 0.00 |
|                              | O6           | K11     | 0.06    | 13.06   | 0.00 |
|                              | Som Reacties |         | -183.69 | -99.32  |      |
|                              | Som Lasten   |         | 183.69  | 99.32   |      |
| Fu C3                        | O1           | K1      | 0.00    | 14.75   | 0.00 |
|                              | O2           | K3      | 0.00    | 20.67   | 0.00 |
|                              | O3           | K5      | 0.00    | 20.67   | 0.00 |
|                              | O4           | K7      | 0.00    | 20.67   | 0.00 |
|                              | O5           | K9      | 0.00    | 20.67   | 0.00 |
|                              | O6           | K11     | 0.00    | 14.75   | 0.00 |
|                              | Som Reacties |         | -0.00   | -112.19 |      |
|                              | Som Lasten   |         | 0.00    | 112.19  |      |
|                              |              |         | kN      | kN      | kNm  |

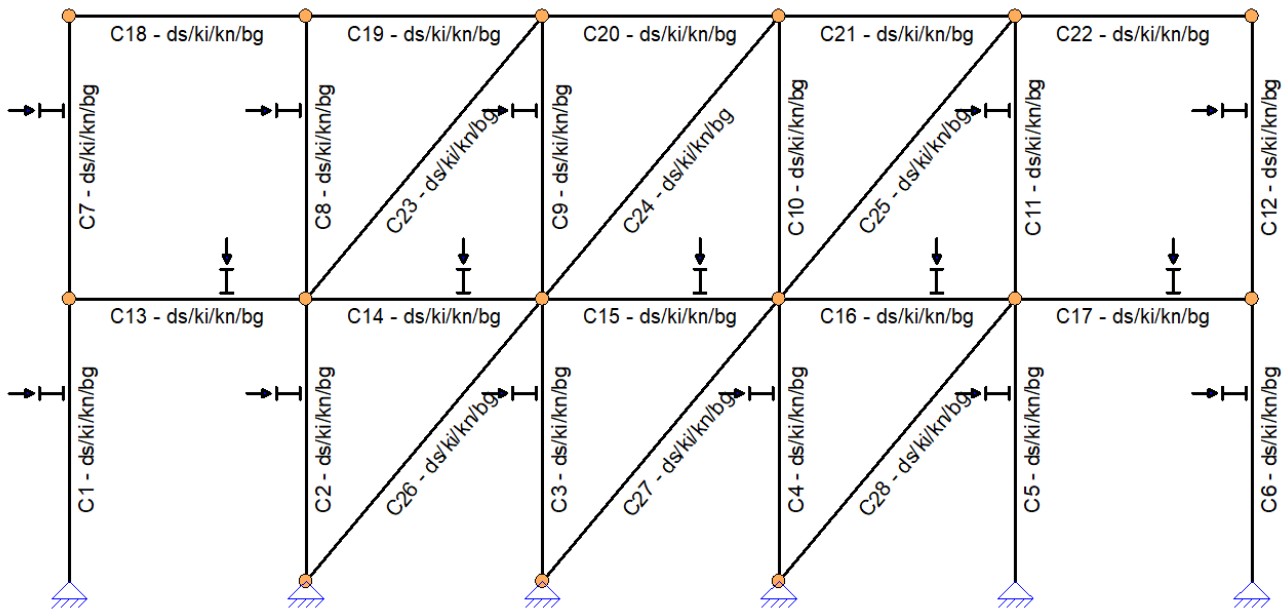
Ka.C. Omhu ende Doorbu g ngen



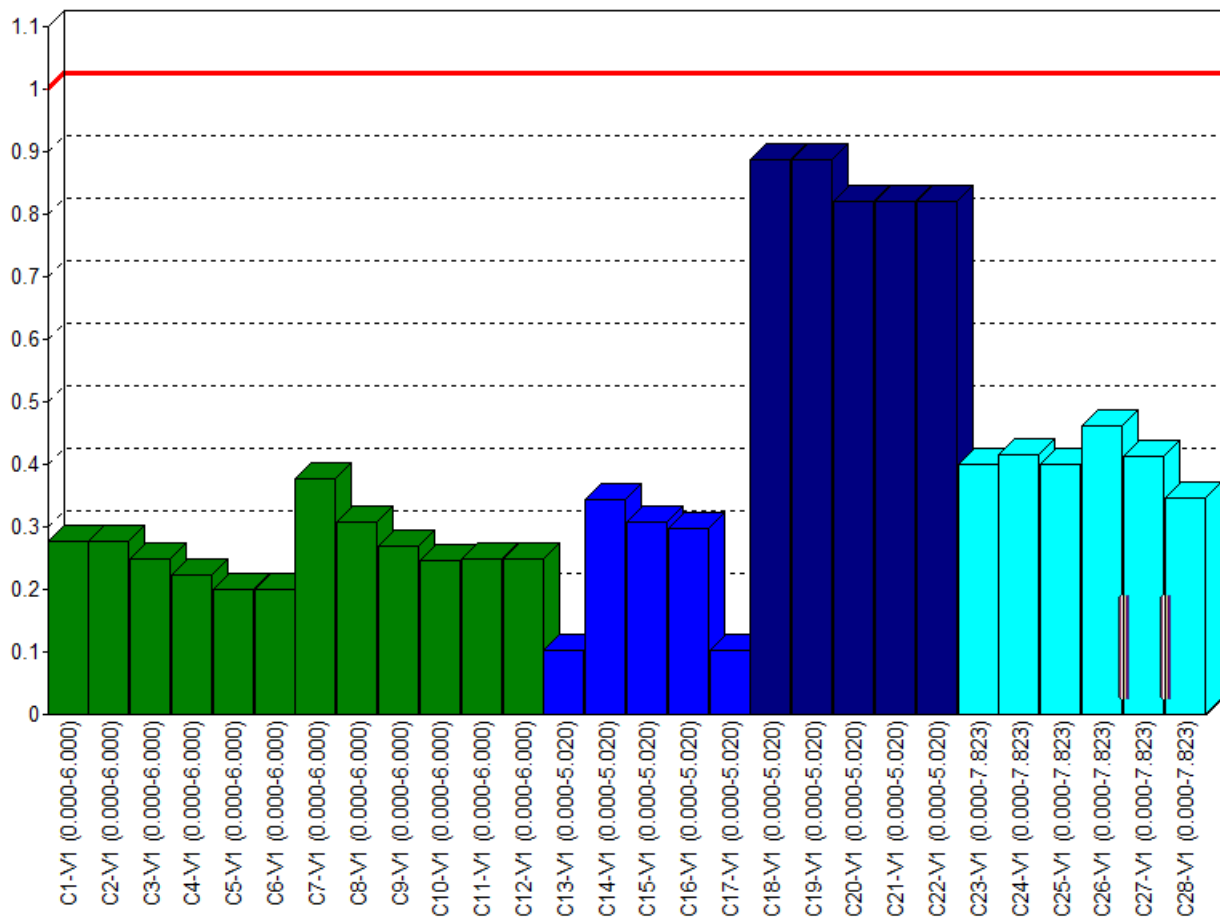
## EXTREME DOORBUIGINGEN (KARAKTERISTIEK)

| Staaf | Veld                 | B.C.     | Knoop Begin |    | Z'afst | Z'   | Staaf       |        | Knoop End |     |
|-------|----------------------|----------|-------------|----|--------|------|-------------|--------|-----------|-----|
|       |                      |          | X           | Z  |        |      | Z' glb dist | Z' glb | X         | Z   |
| S1    | Veld 1 (0 000 6 000) | Ka C3    | 00          | 00 | 3 464  | -0.2 | 6 000       | 55     | 00        | 55  |
| S2    | Veld 1 (0 000 6 000) |          | 00          | 00 | 3 464  | -0.1 | 6 000       | 55     | 01        | 55  |
| S3    | Veld 1 (0 000 6 000) |          | 00          | 00 | 3 464  | -0.0 | 6 000       | 50     | 03        | 50  |
| S4    | Veld 1 (0 000 6 000) |          | 00          | 00 | 3 464  | -0.0 | 6 000       | 45     | 03        | 45  |
| S5    | Veld 1 (0 000 6 000) |          | 00          | 00 | 3 464  | -0.1 | 6 000       | 40     | 04        | 40  |
| S6    | Veld 1 (0 000 6 000) |          | 00          | 00 | 3 464  | -0.1 | 6 000       | 40     | 00        | 40  |
| S7    | Veld 1 (0 000 6 000) |          | 00          | 55 | 2 536  | -0.2 | 6 000       | 130    | 01        | 130 |
| S8    | Veld 1 (0 000 6 000) |          | 01          | 55 | 2 536  | -0.1 | 6 000       | 117    | 01        | 117 |
| S9    | Veld 1 (0 000 6 000) |          | 03          | 50 | 2 536  | -0.0 | 6 000       | 103    | 05        | 103 |
| S10   | Veld 1 (0 000 6 000) |          | 03          | 45 | 2 536  | -0.0 | 6 000       | 94     | 05        | 94  |
| S11   | Veld 1 (0 000 6 000) |          | 04          | 40 | 2 536  | -0.1 | 6 000       | 90     | 07        | 90  |
| S12   | Veld 1 (0 000 6 000) |          | 00          | 40 | 2 536  | -0.1 | 6 000       | 90     | 01        | 90  |
| S13   | Veld 1 (0 000 5 020) | Ka C(w1) | 01          | 00 | 2 510  | 2.1  | 2 515       | 21     | 01        | 01  |
| S14   | Veld 1 (0 000 5 020) |          | 01          | 01 | 2 510  | 2.1  | 2 510       | 21     | 01        | 01  |
| S15   | Veld 1 (0 000 5 020) |          | 01          | 01 | 2 510  | 2.1  | 2 510       | 21     | 01        | 01  |
| S16   | Veld 1 (0 000 5 020) |          | 01          | 01 | 2 510  | 2.1  | 2 510       | 21     | 01        | 01  |
| S17   | Veld 1 (0 000 5 020) |          | 01          | 01 | 2 510  | 2.1  | 2 505       | 21     | 01        | 00  |
| S18   | Veld 1 (0 000 5 020) | Ka C2    | 02          | 01 | 2 510  | 16.5 | 2 512       | 166    | 02        | 01  |
| S19   | Veld 1 (0 000 5 020) |          | 02          | 01 | 2 510  | 16.5 | 2 510       | 166    | 02        | 01  |
| S20   | Veld 1 (0 000 5 020) |          | 02          | 01 | 2 510  | 16.5 | 2 510       | 166    | 02        | 01  |
| S21   | Veld 1 (0 000 5 020) |          | 02          | 01 | 2 510  | 16.5 | 2 510       | 166    | 02        | 01  |
| S22   | Veld 1 (0 000 5 020) |          | 02          | 01 | 2 510  | 16.5 | 2 510       | 166    | 02        | 01  |
| S22   | Veld 1 (0 000 5 020) |          | 02          | 01 | 2 510  | 16.5 | 2 508       | 166    | 02        | 01  |
| m     |                      |          | mm          | mm | m      | mm   | m           | mm     | mm        | mm  |

Staa def n t e

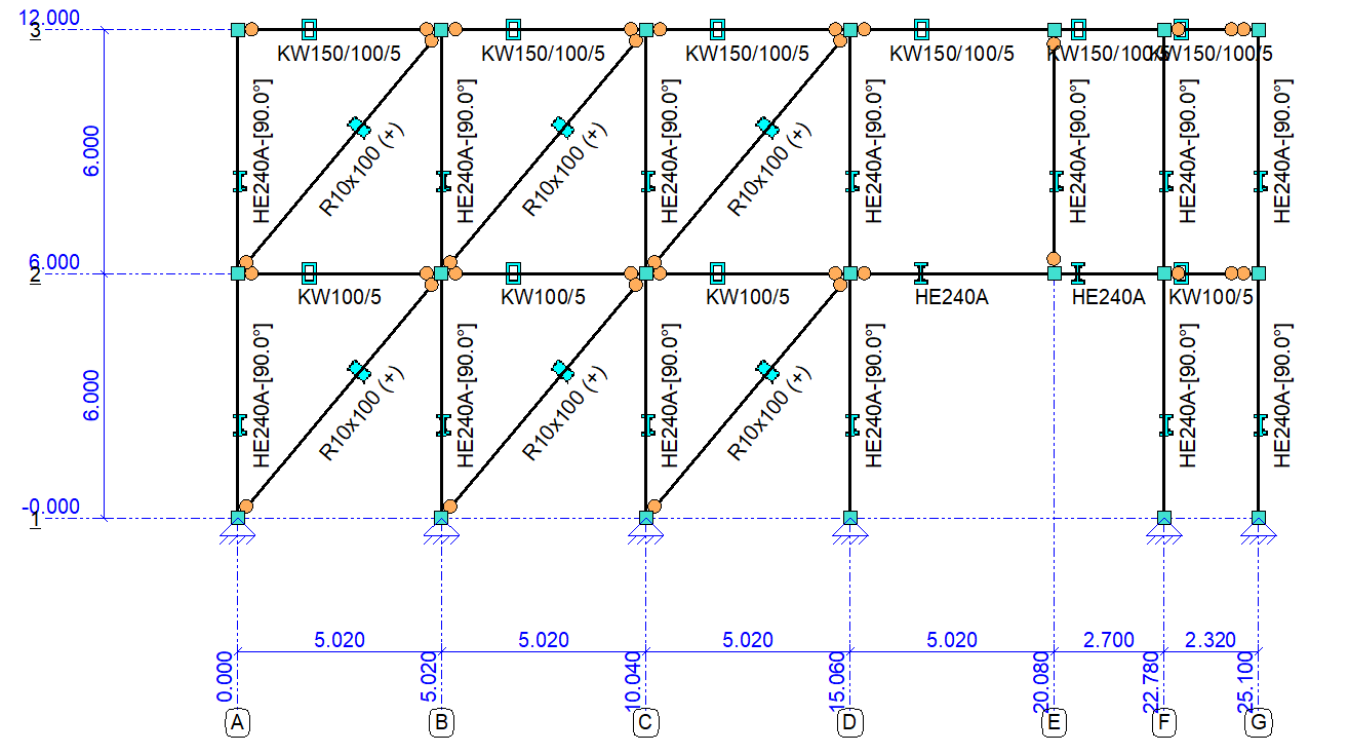


Afb. Staa UC D agram



|                        |                                                                                                                                                                                    |                                     |               |                  |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------|------------------|
| VAN BOXSEL ENGINEERING |                                                                                                                                                                                    | T: 0162-451280 E: info@vanboxsel.nl |               | www.vanboxsel.nl |
| Projectomschrijving    | Uitbreiding terrein Coolrec                                                                                                                                                        |                                     | Projectnummer | 23-157           |
| Onderdeel              |                                                                                                                                                                                    |                                     | Constructeur  | PM               |
| Opdrachtgever          | Coolrec                                                                                                                                                                            |                                     | Eenheden      | m, mm, kN, kNm   |
| Bestand                | C:\Users\pm\van Boxsel Engineering\Ruby - Documenten\Documenten\2023\23-157 Coolrec\1. berekeningen intern\Rapport B\Matrixframe modellen\23-157 wand as I - met windverbanden.mxf |                                     |               |                  |

Construct e



PROFIELEN

| Profiel | Profielnaam | Oppervlakte | Iy              | Materiaal        | Hoek |
|---------|-------------|-------------|-----------------|------------------|------|
| P2      | HE240A      | 7684        | 2 7688e+07      | S235             | 90   |
| P3      | KW100/5     | 1888        | 2 8279e+06      | S275H(EN10210 1) | 0    |
| P8      | KW150/100/5 | 2362        | 7 3157e+06      | S235H(EN10210 1) | 0    |
| P9      | HE240A      | 7684        | 7 7632e+07      | S235             | 0    |
| P10     | R10x100     | 1000        | 8 3333e+05      | S235             | 0    |
|         |             | mm          | mm <sup>4</sup> |                  | °    |

PROFIELVORMEN

| Profiel | Verl. h. | hB    | hE    | tf  | tw  | tf2 | B    | bL  | bR Raatl. | Hoogte |
|---------|----------|-------|-------|-----|-----|-----|------|-----|-----------|--------|
| P10     | Nee      | 100.0 | 100.0 | 0.0 | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 Nee   | 0.0    |
|         |          | mm    | mm    | mm  | mm  | mm  | mm   | mm  | mm        | mm     |

MATERIALEN

| Materiaalnaam    | Poison | Dichtheid         | E-Modulus  | Uitzettingcoeff |
|------------------|--------|-------------------|------------|-----------------|
| S235             | 0.30   | 78.50             | 2 1000e+05 | 12 0000e 06     |
| S275H(EN10210 1) | 0.30   | 78.50             | 2 1000e+05 | 12 0000e 06     |
| S235H(EN10210 1) | 0.30   | 78.50             | 2 1000e+05 | 12 0000e 06     |
|                  |        | kN/m <sup>3</sup> | N/mm       | C°m             |

PROFIELEN (GEAVANCEERD)

| Profiel | Ivv            | Avz Trek       | Druk | Kabelelement | Voorspanning |
|---------|----------------|----------------|------|--------------|--------------|
| P10     | 8 3333e 09     | 8 3333e 04 Ja  | Nee  | Nee          | Nee          |
|         | m <sup>4</sup> | m <sup>4</sup> |      |              |              |

SCHARNIEREN

| Staaf | Positie   | Scharnier | X    | Z    | Yr      |
|-------|-----------|-----------|------|------|---------|
| S13   | 0.000     | A1        | Vast | Vast | Vrij    |
|       | 5.020 (L) | A1        | Vast | Vast | Vrij    |
| S14   | 0.000     | A1        | Vast | Vast | Vrij    |
|       | m         |           | kNm  | kNm  | kNm/rad |

| Staaf | Positie   | Scharnier | X    | Z    | Yr      |
|-------|-----------|-----------|------|------|---------|
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S15   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S17   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 320 (L) | A1        | Vast | Vast | Vrij    |
| S18   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S19   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S20   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A1        | Vast | Vast | Vrij    |
| S22   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 320 (L) | A1        | Vast | Vast | Vrij    |
| S23   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| S24   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| S25   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| S26   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| S27   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| S28   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 7 823 (L) | A1        | Vast | Vast | Vrij    |
| S29   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 6 000 (L) | A1        | Vast | Vast | Vrij    |
| S30   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A2        | Vast | Vast | Vast    |
| S31   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 4 361     | A1        | Vast | Vast | Vrij    |
| S32   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 5 020 (L) | A2        | Vast | Vast | Vast    |
| S33   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 4 361     | A1        | Vast | Vast | Vrij    |
| m     |           |           | kNm  | kNm  | kNm/rad |

OPLEGGINGEN

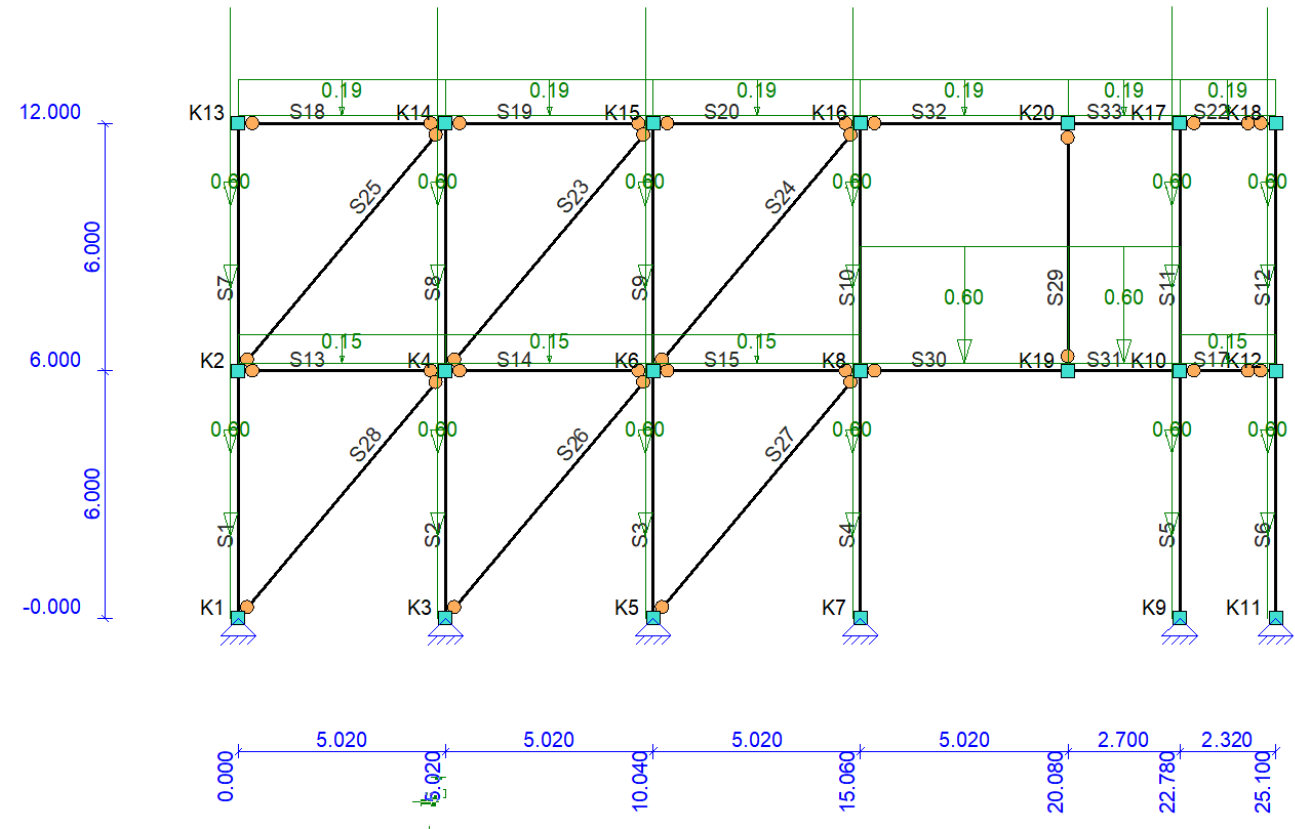
| Oplegging | Object | Positie | X    | Z    | Yr      | Hoek | Yr |
|-----------|--------|---------|------|------|---------|------|----|
| O1        | K1     | K1      | Vast | Vast | Vrij    | 0    |    |
| O2        | K3     | K3      | Vast | Vast | Vrij    | 0    |    |
| O3        | K5     | K5      | Vast | Vast | Vrij    | 0    |    |
| O4        | K7     | K7      | Vast | Vast | Vrij    | 0    |    |
| O5        | K9     | K9      | Vast | Vast | Vrij    | 0    |    |
| O6        | K11    | K11     | Vast | Vast | Vrij    | 0    |    |
| m         |        |         | kNm  | kNm  | kNm/rad |      | °  |

BELASTINGSGEVALLEN TYPEN

| Label | Omschrijving  | B.G.Type         | Gunstig/Ong. | Element | Niveau | Veld | Ψ <sub>0</sub> | Ψ <sub>1</sub> | Ψ <sub>2</sub> | C <sub>prob</sub><br>UGT/GGT |
|-------|---------------|------------------|--------------|---------|--------|------|----------------|----------------|----------------|------------------------------|
| B G 1 | Eigen gewicht | Permanent        |              |         | Nv t   | Nv t |                |                |                |                              |
| B G 2 | Permanent     | Permanent        |              |         | Nv t   | Nv t |                |                |                |                              |
| B G 3 | Sneeuw        | Sneeuw belasting |              |         | Nv t   | Nv t |                | 0 20           |                | 0 75/0 75                    |
| B G 4 | Windbelasting | Windbelasting    |              |         | Nv t   | Nv t |                | 0 20           |                | 0 93/0 93                    |



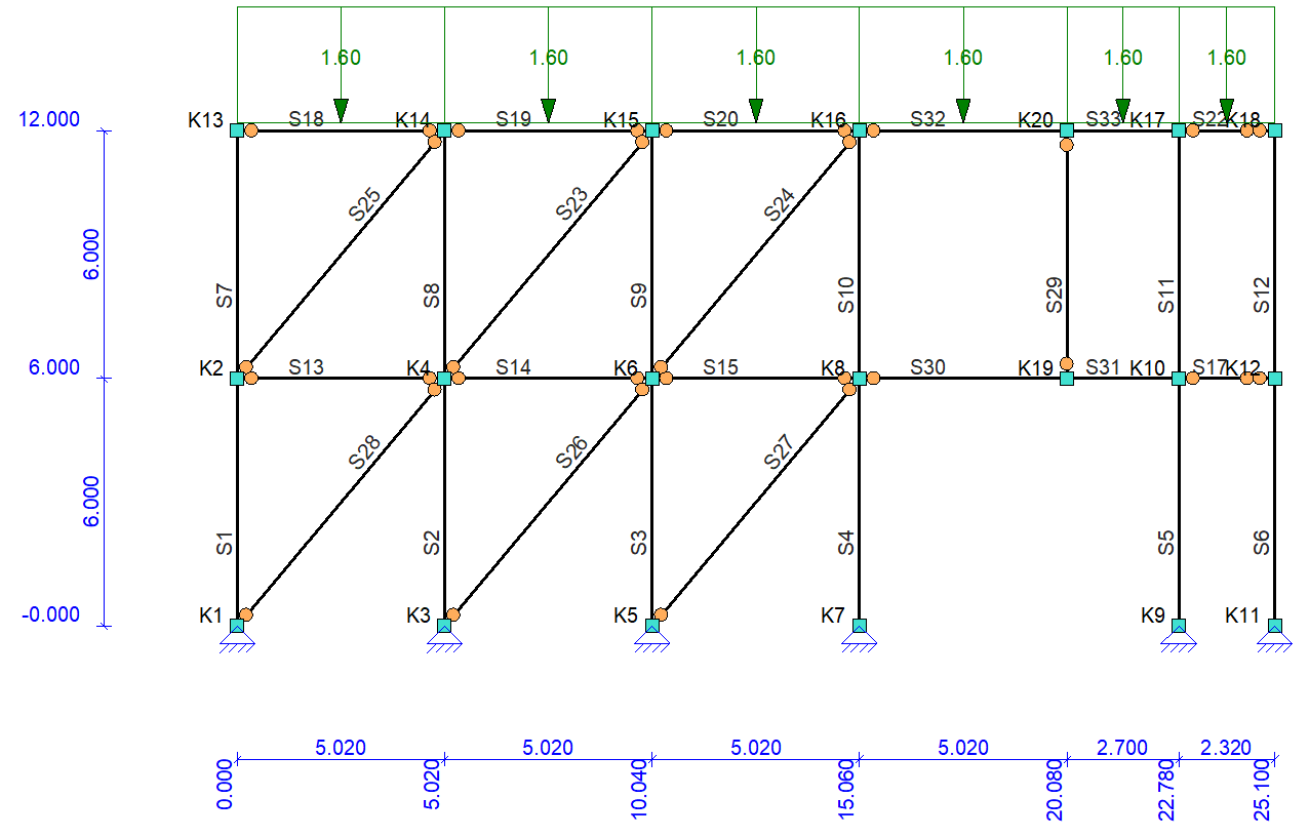
B.G.1: E gen gewcht



B.G.1: EIGEN GEWICHT

| Type       | Beginwaarde        | Endwaarde | Beginafstand | Endafstand | Richting | Staat of knoop             | Omschrijving |
|------------|--------------------|-----------|--------------|------------|----------|----------------------------|--------------|
| qG         | 1.00               | 1.00      | 0.000        | L          | Z"       | S1 S15 S17 S20 S22 S30 S33 |              |
| Som lasten | Z: 55.31 Yr: -0.45 |           |              |            |          |                            |              |
|            |                    |           | m            | m          |          |                            |              |

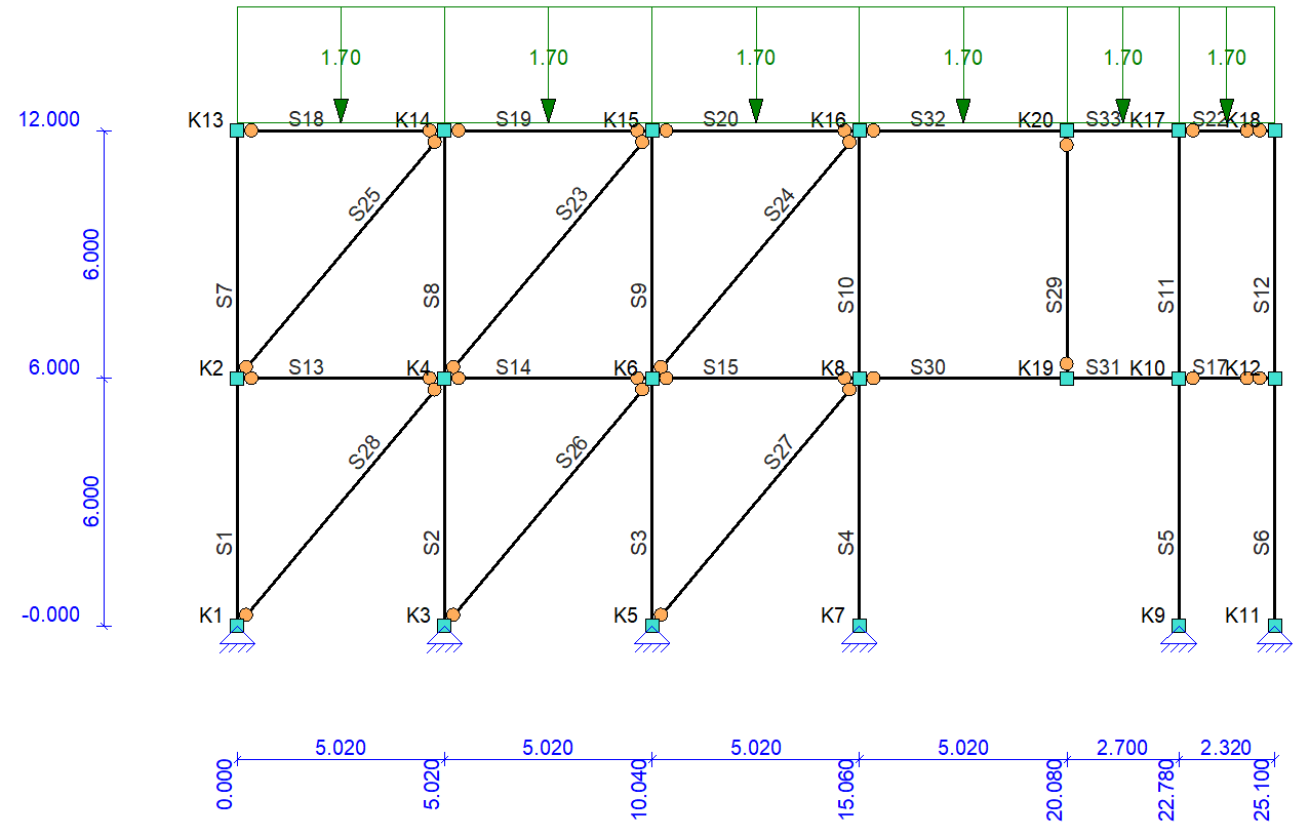
B.G.2: Permanent



B.G.2: PERMANENT

| Type       | Beginwaarde        | Endwaarde | Beginafstand | Endafstand | Richting | Staaf of knoop      | Omschrijving |
|------------|--------------------|-----------|--------------|------------|----------|---------------------|--------------|
| q          | 1.60               | 1.60      | 0.000        | L          | Z        | S18 S20 S22 S32 S33 |              |
| Som lasten |                    |           |              |            |          |                     |              |
|            | Z: 40.16 Yr: -1.96 |           |              |            |          |                     |              |
|            |                    |           | m            | m          |          |                     |              |

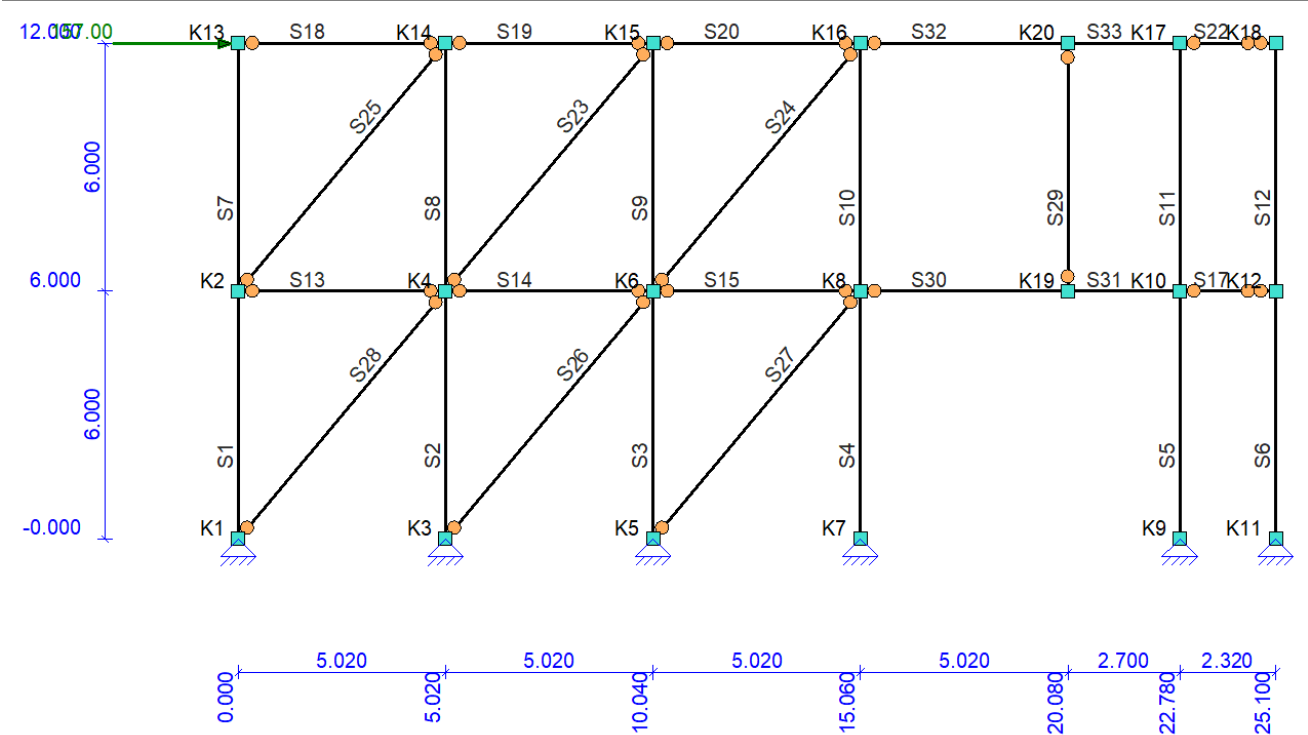
B.G.3: Sneeuw



B.G.3: SNEEUW

| Type       | Beginwaarde | Endwaarde          | Beginafstand | Endafstand | Richting | Staaf of knoop      | Omschrijving |
|------------|-------------|--------------------|--------------|------------|----------|---------------------|--------------|
| q          | 1.70        | 1.70               | 0.000        | L          | Z        | S18 S20 S22 S32 S33 |              |
| Som lasten |             | Z: 42.67 Yr: -2.08 |              |            |          |                     |              |
|            |             |                    | m            | m          |          |                     |              |

B.G.4: Windbelasting



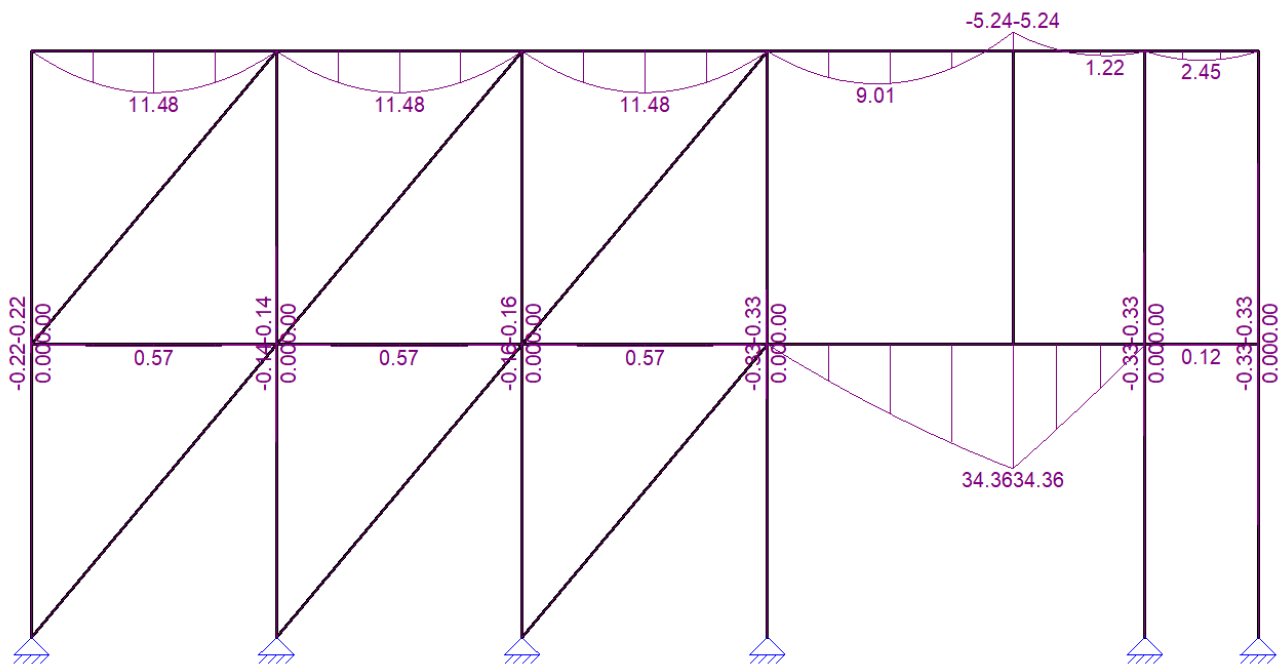
B.G.4: WINDBELASTING

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Staf of knoop | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|---------------|--------------|
| N          | 157.00      |           |              |            | X        | K13           |              |
| Som lasten | X: 157.00   |           |              |            |          |               |              |
|            |             |           | m            | m          |          |               |              |

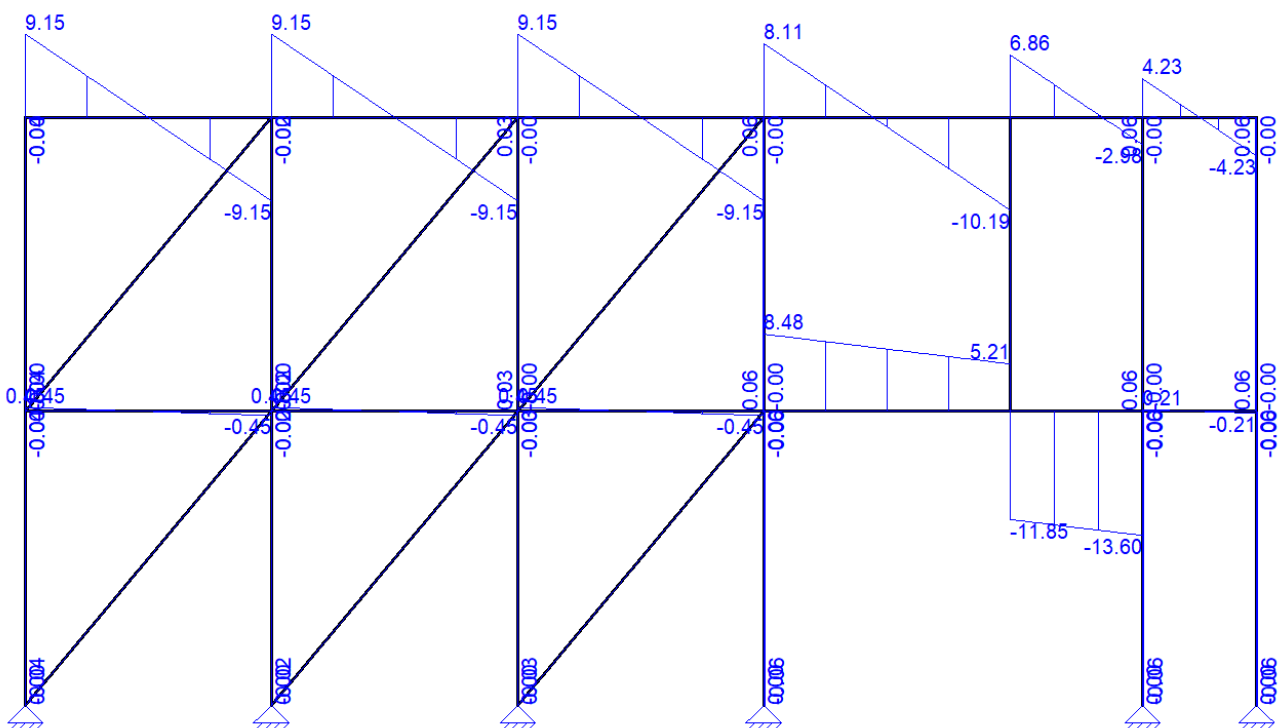
BELASTINGSCOMBINATIES

| Fundamenteel    |               |           |        |        |        |  |
|-----------------|---------------|-----------|--------|--------|--------|--|
| B.G.            | Omschrijving  | Fu.C.1    | Fu.C.2 | Fu.C.3 |        |  |
| B.G.1           | Eigen gewicht | 1.08      | 1.08   | 1.22   |        |  |
| B.G.2           | Permanent     | 1.08      | 1.08   | 1.22   |        |  |
| B.G.3           | Sneeuw        | 1.01      |        |        |        |  |
| B.G.4           | Windbelasting |           | 1.17   |        |        |  |
| Karakteristiek  |               |           |        |        |        |  |
| B.G.            | Omschrijving  | Ka.C.(w1) | Ka.C.1 | Ka.C.2 | Ka.C.3 |  |
| B.G.1           | Eigen gewicht | 1.00      | 1.00   | 1.00   | 1.00   |  |
| B.G.2           | Permanent     | 1.00      | 1.00   | 1.00   | 1.00   |  |
| B.G.3           | Sneeuw        |           |        | 0.75   |        |  |
| B.G.4           | Windbelasting |           |        |        | 0.86   |  |
| Frequent        |               |           |        |        |        |  |
| B.G.            | Omschrijving  | Fr.C.(w1) | Fr.C.1 | Fr.C.2 |        |  |
| B.G.1           | Eigen gewicht | 1.00      | 1.00   | 1.00   |        |  |
| B.G.2           | Permanent     | 1.00      | 1.00   | 1.00   |        |  |
| B.G.3           | Sneeuw        |           | 0.20   |        |        |  |
| B.G.4           | Windbelasting |           |        | 0.20   |        |  |
| Quasi-permanent |               |           |        |        |        |  |
| B.G.            | Omschrijving  | Qu.C.1    |        |        |        |  |
| B.G.1           | Eigen gewicht | 1.00      |        |        |        |  |
| B.G.2           | Permanent     | 1.00      |        |        |        |  |
| B.G.3           | Sneeuw        |           |        |        |        |  |
| B.G.4           | Windbelasting |           |        |        |        |  |

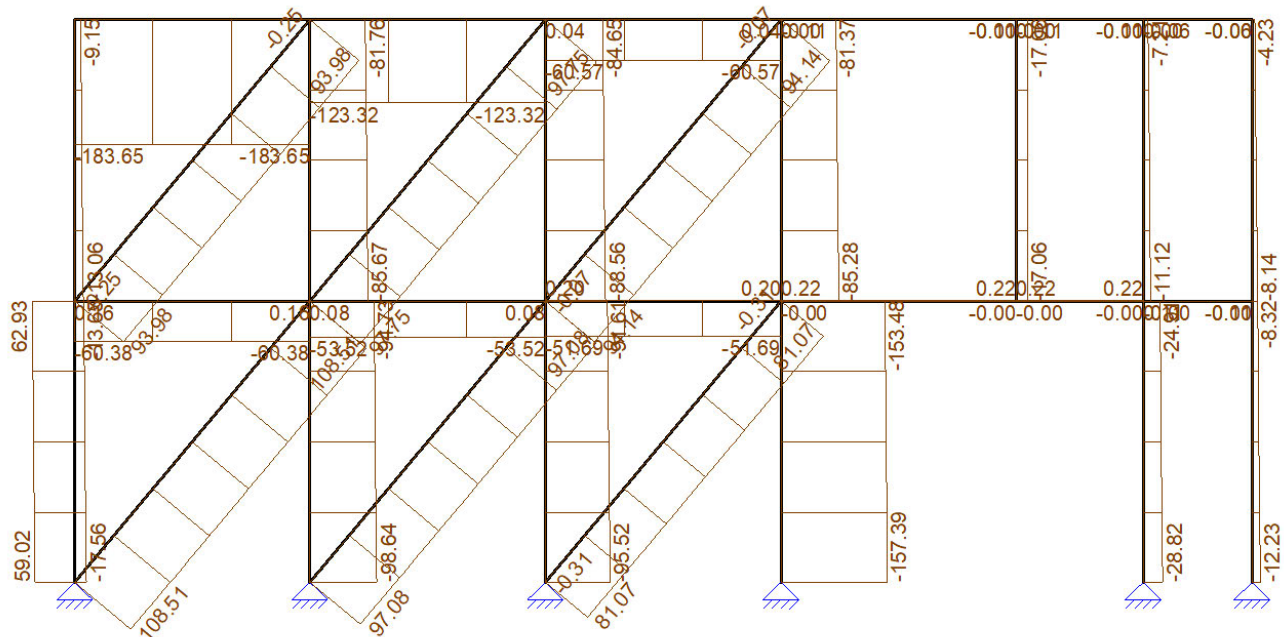
Fu.C. Omhu ende Momenten (My)



Fu.C. Omhu ende Dwarskracht (Vz)



Fu.C. Omhu ende Normaa kracht (Nx)



## EXTREME STAAFKRACHTEN

| Staaf        | Veld                 | B.C.  | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM0 | xM0 | T/D | N <sub>max</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> |
|--------------|----------------------|-------|----------------|------------------|-------------------|----------------|-----|-----|-----|------------------|----------------|------------------|----------------|
| Fundamenteel |                      |       |                |                  |                   |                |     |     |     |                  |                |                  |                |
| S1           | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |     |     | T   | -17.56           | 0 00           | 0 00             | 0 00           |
|              | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.22          |     |     | D   | 62.93            | -0.04          | -0.04            | -0.04          |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 14 86            | 0 00           | 0 00             | 0 00           |
| S2           | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.14          |     |     | T   | -98.64           | -0.02          | -0.02            | -0.02          |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 20 51            | 0 00           | 0 00             | 0 00           |
| S3           | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.16          |     |     | T   | -95.52           | -0.03          | -0.03            | -0.03          |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 20 96            | 0 00           | 0 00             | 0 00           |
| S4           | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.33          |     |     | T   | -157.39          | -0.06          | -0.06            | -0.06          |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 25 77            | 0 00           | 0 00             | 0 00           |
| S5           | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |     |     | T   | -28.82           | 0 00           | 0 00             | 0 00           |
|              | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.33          |     |     | T   | 20 20            | -0.06          | -0.06            | -0.06          |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 22 82            | 0 00           | 0 00             | 0 00           |
| S6           | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |     |     | T   | -12.23           | 0 00           | 0 00             | 0 00           |
|              | Veld 1 (0 000 6 000) | Fu C2 | 0 00           |                  |                   | -0.33          |     |     | T   | 10 24            | -0.06          | -0.06            | -0.06          |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 11 57            | 0 00           | 0 00             | 0 00           |
| S7           | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |     |     | T   | -13.06           | 0 00           | 0 00             | 0 00           |
|              | Veld 1 (0 000 6 000) | Fu C2 | -0.22          |                  |                   | 0 00           |     |     | T   | 8 75             | 0.04           | 0.04             | 0.04           |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 9 88             | -0.00          | -0.00            | -0.00          |
| S8           | Veld 1 (0 000 6 000) | Fu C2 | -0.14          |                  |                   | 0 00           |     |     | T   | -85.67           | 0.02           | 0.02             | 0.02           |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 15 25            | -0.00          | -0.00            | -0.00          |
| S9           | Veld 1 (0 000 6 000) | Fu C2 | -0.16          |                  |                   | 0 00           |     |     | T   | -88.56           | 0.03           | 0.03             | 0.03           |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 15 51            | -0.00          | -0.00            | -0.00          |
| S10          | Veld 1 (0 000 6 000) | Fu C2 | -0.33          |                  |                   | 0 00           |     |     | T   | -85.28           | 0.06           | 0.06             | 0.06           |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 14 73            | -0.00          | -0.00            | -0.00          |
| S11          | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |     |     | T   | -11.12           | 0 00           | 0 00             | 0 00           |
|              | Veld 1 (0 000 6 000) | Fu C2 | -0.33          |                  |                   | 0 00           |     |     | T   | 7 80             | 0.06           | 0.06             | 0.06           |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 8 82             | -0.00          | -0.00            | -0.00          |
| S12          | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |     |     | T   | -8.14            | 0 00           | 0 00             | 0 00           |
|              | Veld 1 (0 000 6 000) | Fu C2 | -0.33          |                  |                   | 0 00           |     |     | T   | 6 15             | 0.06           | 0.06             | 0.06           |
|              | Veld 1 (0 000 6 000) | Fu C3 | 0 00           |                  |                   | 0 00           |     |     | T   | 6 94             | -0.00          | -0.00            | -0.00          |
| S13          | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | 0 50             | 2 510             | 0 00           |     |     | D   | 0.16             | 0 40           | 0 40             | 0 40           |
|              | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 0 50             | 2 510             | 0 00           |     |     | T   | -60.38           | 0 40           | 0 40             | 0 40           |
|              | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | 0.57             | 2 510             | 0 00           |     |     | D   | 0 09             | 0.45           | 0.45             | -0.45          |
| S14          | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | 0 50             | 2 510             | 0 00           |     |     | D   | 0.08             | 0 40           | 0 40             | 0 40           |
|              | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 0 50             | 2 510             | 0 00           |     |     | T   | -53.52           | 0 40           | 0 40             | 0 40           |
| m            |                      |       | kNm            |                  | kNm               | m              | kNm | m   | m   | kN               | kN             | kN               | kN             |

| Staaf | Veld                 | B.C.  | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM0   | xM0 | T/D | N <sub>max</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> |
|-------|----------------------|-------|----------------|------------------|-------------------|----------------|-------|-----|-----|------------------|----------------|------------------|----------------|
| S15   | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | <b>0.57</b>      | 2 510             | 0 00           |       |     | D   | 0 04             | <b>0.45</b>    | <b>0.45</b>      | <b>-0.45</b>   |
|       | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | 0 50             | 2 510             | <b>0.00</b>    |       |     | D   | <b>0.20</b>      | 0 40           | 0 40             | 0 40           |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 0 50             | 2 510             | 0 00           |       |     | T   | <b>-51.69</b>    | 0 40           | 0 40             | 0 40           |
| S17   | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | <b>0.57</b>      | 2 510             | 0 00           |       |     | D   | 0 15             | <b>0.45</b>    | <b>0.45</b>      | <b>-0.45</b>   |
|       | Veld 1 (0 000 2 320) | Fu C2 | 0 00           | 0 11             | 1 160             | 0 00           |       |     | D   | <b>0.11</b>      | 0 19           | 0 19             | 0 19           |
|       | Veld 1 (0 000 2 320) | Fu C3 | 0 00           | <b>0.12</b>      | 1 160             | 0 00           |       |     | T   | <b>-0.00</b>     | <b>0.21</b>    | <b>0.21</b>      | <b>-0.21</b>   |
| S18   | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | <b>11.48</b>     | 2 510             | <b>0.00</b>    |       |     | T   | 0 00             | <b>9.15</b>    | <b>9.15</b>      | <b>-9.15</b>   |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 6 07             | 2 510             | 0 00           |       |     | T   | <b>-183.65</b>   | 4 84           | 4 84             | 4 84           |
| S19   | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | <b>11.48</b>     | 2 510             | <b>0.00</b>    |       |     | T   | 0 16             | <b>9.15</b>    | <b>9.15</b>      | <b>-9.15</b>   |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 6 07             | 2 510             | 0 00           |       |     | T   | <b>-123.32</b>   | 4 84           | 4 84             | 4 84           |
| S20   | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | <b>11.48</b>     | 2 510             | <b>0.00</b>    |       |     | D   | 0 03             | <b>9.15</b>    | <b>9.15</b>      | <b>-9.15</b>   |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 6 07             | 2 510             | 0 00           |       |     | T   | <b>-60.57</b>    | 4 84           | 4 84             | 4 84           |
| S22   | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | 6 86             | 2 510             | 0 00           |       |     | D   | <b>0.04</b>      | 5 47           | 5 47             | 5 47           |
|       | Veld 1 (0 000 2 320) | Fu C1 | 0 00           | <b>2.45</b>      | 1 160             | <b>-0.00</b>   |       |     | D   | 0 00             | <b>4.23</b>    | <b>-4.23</b>     | <b>-4.23</b>   |
|       | Veld 1 (0 000 2 320) | Fu C2 | 0 00           | 1 30             | 1 160             | 0 00           |       |     | T   | <b>-0.06</b>     | 2 24           | 2 24             | 2 24           |
|       | Veld 1 (0 000 2 320) | Fu C3 | 0 00           | 1 47             | 1 160             | 0 00           |       |     | D   | <b>0.00</b>      | 2 53           | 2 53             | 2 53           |
| S23   | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |       |     | D   | <b>97.75</b>     | 0 00           | 0 00             | 0 00           |
| S24   | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |       |     | D   | <b>94.14</b>     | 0 00           | 0 00             | 0 00           |
|       | Veld 1 (0 000 7 823) | Fu C3 | 0 00           |                  |                   | 0 00           |       |     | T   | <b>-0.07</b>     | 0 00           | 0 00             | 0 00           |
| S25   | Veld 1 (0 000 7 823) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | <b>-0.25</b>     | 0 00           | 0 00             | 0 00           |
|       | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |       |     | D   | <b>93.98</b>     | 0 00           | 0 00             | 0 00           |
| S26   | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |       |     | D   | <b>97.08</b>     | 0 00           | 0 00             | 0 00           |
| S27   | Veld 1 (0 000 7 823) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | <b>-0.31</b>     | 0 00           | 0 00             | 0 00           |
|       | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |       |     | D   | <b>81.07</b>     | 0 00           | 0 00             | 0 00           |
| S28   | Veld 1 (0 000 7 823) | Fu C2 | 0 00           |                  |                   | 0 00           |       |     | D   | <b>108.51</b>    | 0 00           | 0 00             | 0 00           |
| S29   | Veld 1 (0 000 6 000) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | <b>-17.06</b>    | 0 00           | 0 00             | 0 00           |
| S30   | Veld 1 (0 000 5 020) | Fu C1 | 0 00           |                  |                   | <b>34.36</b>   |       |     | T   | 0 00             | <b>8.48</b>    | <b>8.48</b>      | <b>5.21</b>    |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           |                  |                   | 20 04          |       |     | D   | <b>0.22</b>      | 5 63           | 5 63             | 2 36           |
|       | Veld 1 (0 000 5 020) | Fu C3 | 0 00           |                  |                   | 22 61          |       |     | T   | <b>-0.00</b>     | 6 35           | 6 35             | 2 66           |
| S31   | Veld 1 (0 000 2 700) | Fu C1 | <b>34.36</b>   |                  |                   | <b>0.00</b>    |       |     | T   | 0 00             | <b>-11.85</b>  | <b>-13.60</b>    | <b>-13.60</b>  |
|       | Veld 1 (0 000 2 700) | Fu C2 | 20 04          |                  |                   | 0 00           |       |     | D   | <b>0.22</b>      | 6 54           | 8 30             | 8 30           |
|       | Veld 1 (0 000 2 700) | Fu C3 | 22 61          |                  |                   | <b>-0.00</b>   |       |     | T   | <b>-0.00</b>     | 7 38           | 9 37             | 9 37           |
| S32   | Veld 1 (0 000 5 020) | Fu C1 | 0 00           | <b>9.01</b>      | 2 224             | <b>-5.24</b>   | 4 447 |     | D   | 0 00             | <b>8.11</b>    | <b>-10.19</b>    | <b>-10.19</b>  |
|       | Veld 1 (0 000 5 020) | Fu C2 | 0 00           | 4 86             | 2 245             | 2 56           | 4 491 |     | T   | <b>-0.11</b>     | 4 33           | 5 35             | 5 35           |
|       | Veld 1 (0 000 5 020) | Fu C3 | 0 00           | 5 51             | 2 248             | 2 86           | 4 497 |     | D   | <b>0.00</b>      | 4 90           | 6 04             | 6 04           |
| S33   | Veld 1 (0 000 2 700) | Fu C1 | <b>-5.24</b>   | <b>1.22</b>      | 1 882             | <b>-0.00</b>   | 1 065 |     | D   | 0 00             | <b>6.86</b>    | <b>6.86</b>      | <b>-2.98</b>   |
|       | Veld 1 (0 000 2 700) | Fu C2 | 2 56           | 0 71             | 1 842             | 0 00           | 0 984 |     | T   | <b>-0.11</b>     | 3 55           | 3 55             | 1 65           |
|       | Veld 1 (0 000 2 700) | Fu C3 | 2 86           | 0 81             | 1 836             | 0 00           | 0 972 |     | D   | <b>0.00</b>      | 4 00           | 4 00             | 1 88           |
| m     |                      |       | kNm            | kNm              | m                 | kNm            | m     | m   |     | kN               | kN             | kN               | kN             |

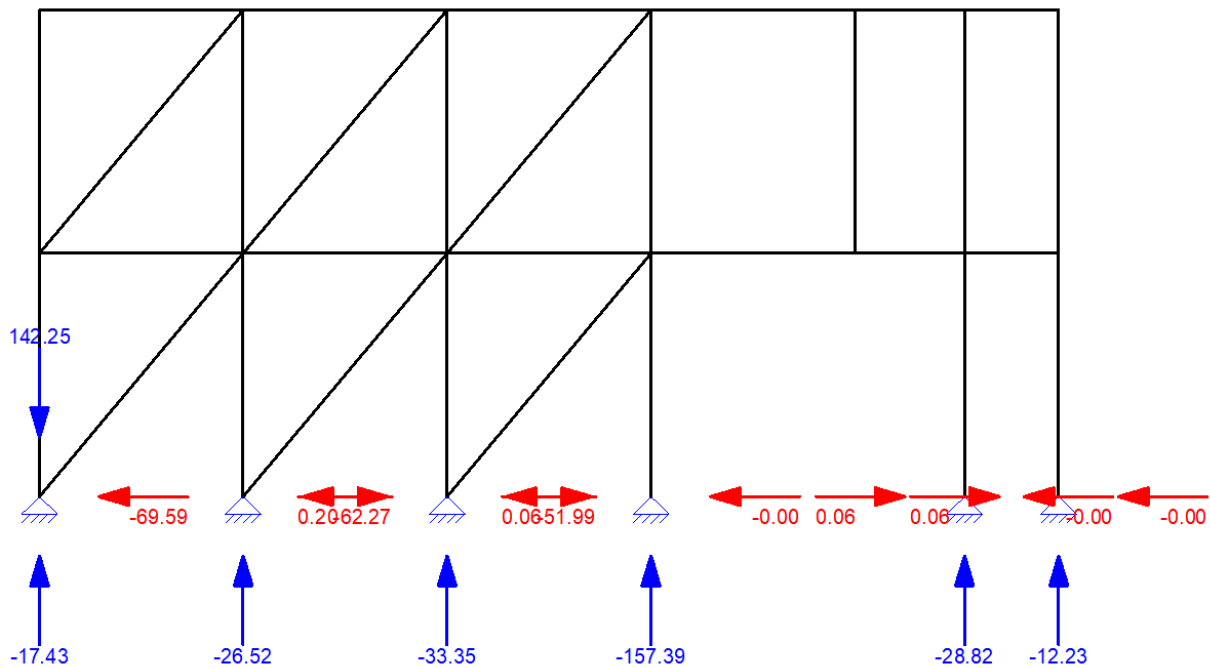
OPLEGREACTIES (BELASTINGSGEVALLEN)

| B.C. | Oplegging    | Positie | X            | Z             | Yr   |
|------|--------------|---------|--------------|---------------|------|
| BG1  | O1           | K1      | 0 03         | 8 03          | 0 00 |
|      | O2           | K3      | 0 03         | 8 88          | 0 00 |
|      | O3           | K5      | 0 06         | 9 11          | 0 00 |
|      | O4           | K7      | 0 00         | 11 00         | 0 00 |
|      | O5           | K9      | 0 00         | 10 67         | 0 00 |
|      | O6           | K11     | 0 00         | 7 62          | 0 00 |
|      | Som Reacties |         | <b>-0.00</b> | <b>-55.31</b> |      |
|      | Som Lasten   |         | <b>0.00</b>  | <b>55.31</b>  |      |
| BG2  | O1           | K1      | 0 03         | 4 07          | 0 00 |
|      | O2           | K3      | 0 03         | 7 86          | 0 00 |
|      | O3           | K5      | 0 06         | 8 21          | 0 00 |
|      | O4           | K7      | 0 00         | 10 13         | 0 00 |
|      | O5           | K9      | 0 00         | 8 03          | 0 00 |
|      | O6           | K11     | 0 00         | 1 86          | 0 00 |
|      | Som Reacties |         | <b>0.00</b>  | <b>-40.16</b> |      |
|      | Som Lasten   |         | <b>0.00</b>  | <b>40.16</b>  |      |
| BG3  | O1           | K1      | 0 04         | 4 32          | 0 00 |
|      | O2           | K3      | 0 03         | 8 36          | 0 00 |
|      | O3           | K5      | 0 07         | 8 73          | 0 00 |
|      | O4           | K7      | 0 00         | 10 76         | 0 00 |
|      | O5           | K9      | 0 00         | 8 53          | 0 00 |
|      | O6           | K11     | 0 00         | 1 97          | 0 00 |
|      | Som Reacties |         | <b>0.00</b>  | <b>-42.67</b> |      |
|      | Som Lasten   |         | <b>0.00</b>  | <b>42.67</b>  |      |
|      |              |         | kN           | kN            | kNm  |



| B.C. | Oplegging    | Positie | X       | Z      | Yr   |
|------|--------------|---------|---------|--------|------|
| BG4  | O1           | K1      | 59.42   | 132.74 | 0.00 |
|      | O2           | K3      | 53.17   | 5.21   | 0.00 |
|      | O3           | K5      | 44.55   | 12.51  | 0.00 |
|      | O4           | K7      | 0.05    | 115.02 | 0.00 |
|      | O5           | K9      | 0.05    | 0.00   | 0.00 |
|      | O6           | K11     | 0.05    | 0.00   | 0.00 |
|      | Som Reacties |         | -157.00 | -0.00  |      |
|      | Som Lasten   |         | 157.00  | 0.00   |      |
|      |              |         | kN      | kN     | kNm  |

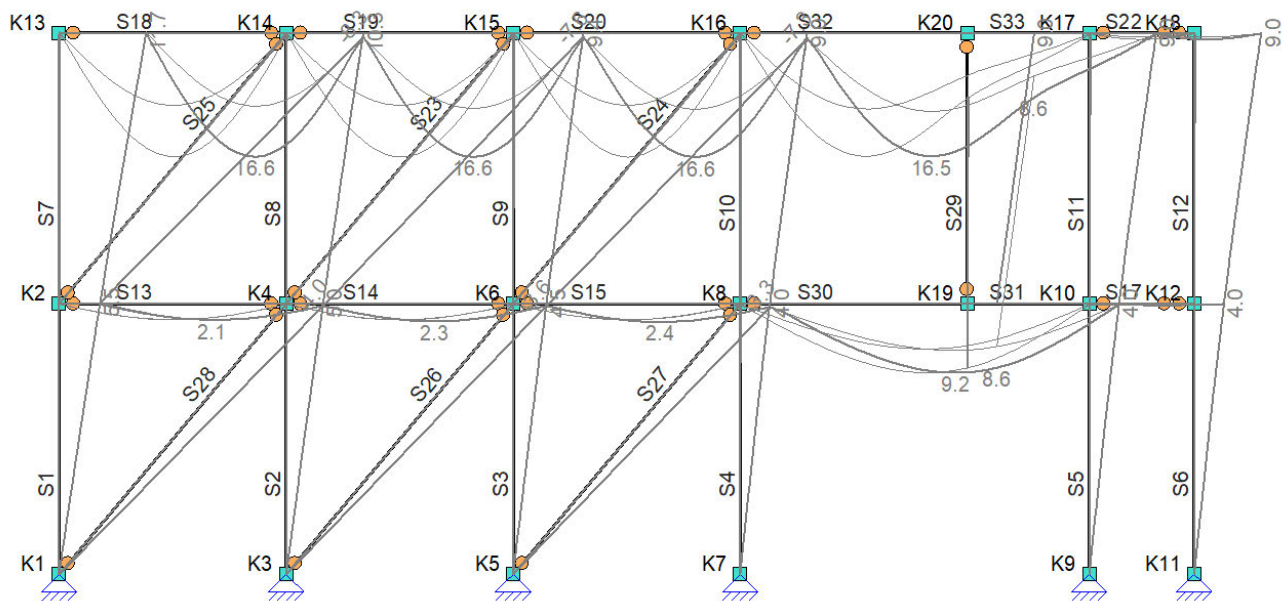
Fu.C. Omhu ende Oplegreacties



## OPLEGREACTIES (FUNDAMENTEEL)

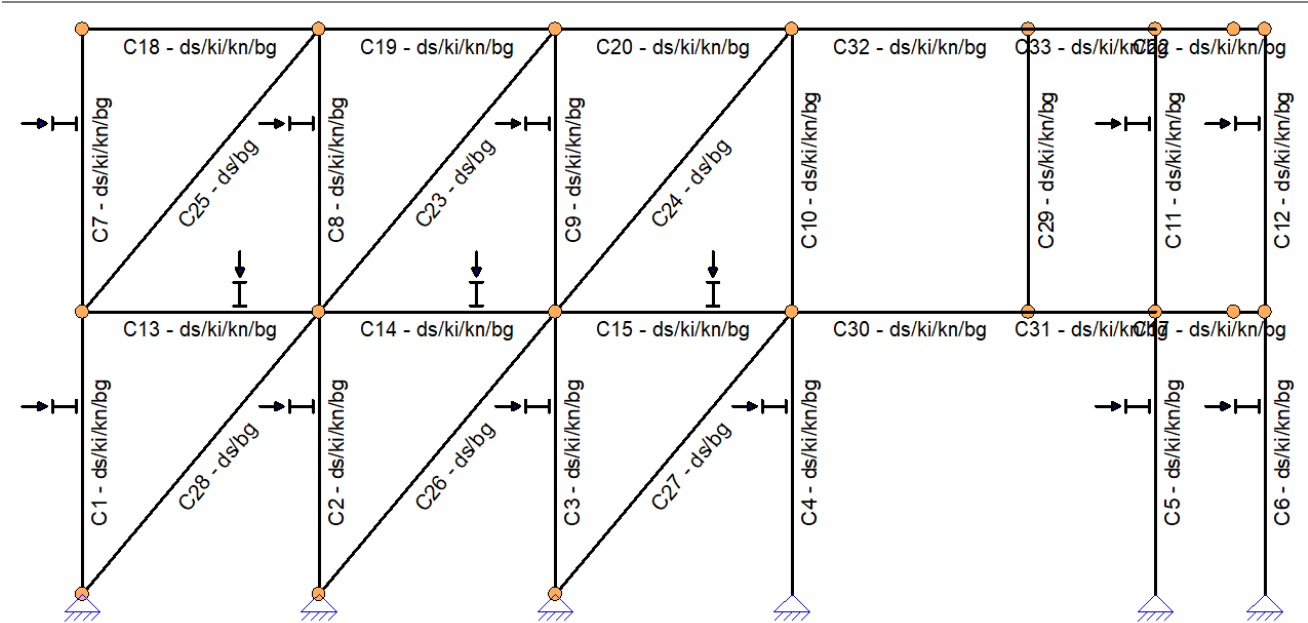
| B.C.  | Oplegging    | Positie | X       | Z       | Yr   |
|-------|--------------|---------|---------|---------|------|
| Fu C1 | O1           | K1      | 0.11    | 17.43   | 0.00 |
|       | O2           | K3      | 0.09    | 26.52   | 0.00 |
|       | O3           | K5      | 0.20    | 27.53   | 0.00 |
|       | O4           | K7      | 0.00    | 33.68   | 0.00 |
|       | O5           | K9      | 0.00    | 28.82   | 0.00 |
|       | O6           | K11     | 0.00    | 12.23   | 0.00 |
|       | Som Reacties |         | -0.00   | -146.21 |      |
|       | Som Lasten   |         | 0.00    | 146.21  |      |
| Fu C2 | O1           | K1      | 69.59   | 142.25  | 0.00 |
|       | O2           | K3      | 62.27   | 24.18   | 0.00 |
|       | O3           | K5      | 51.99   | 33.35   | 0.00 |
|       | O4           | K7      | 0.06    | 157.39  | 0.00 |
|       | O5           | K9      | 0.06    | 20.20   | 0.00 |
|       | O6           | K11     | 0.06    | 10.24   | 0.00 |
|       | Som Reacties |         | -183.69 | -103.11 |      |
|       | Som Lasten   |         | 183.69  | 103.11  |      |
| Fu C3 | O1           | K1      | 0.08    | 14.76   | 0.00 |
|       | O2           | K3      | 0.07    | 20.43   | 0.00 |
|       | O3           | K5      | 0.15    | 21.14   | 0.00 |
|       | O4           | K7      | 0.00    | 25.77   | 0.00 |
|       | O5           | K9      | 0.00    | 22.82   | 0.00 |
|       | O6           | K11     | 0.00    | 11.57   | 0.00 |
|       | Som Reacties |         | -0.00   | -116.48 |      |
|       | Som Lasten   |         | 0.00    | 116.48  |      |
|       |              |         | kN      | kN      | kNm  |

Ka.C. Omhu ende Doorbu g en

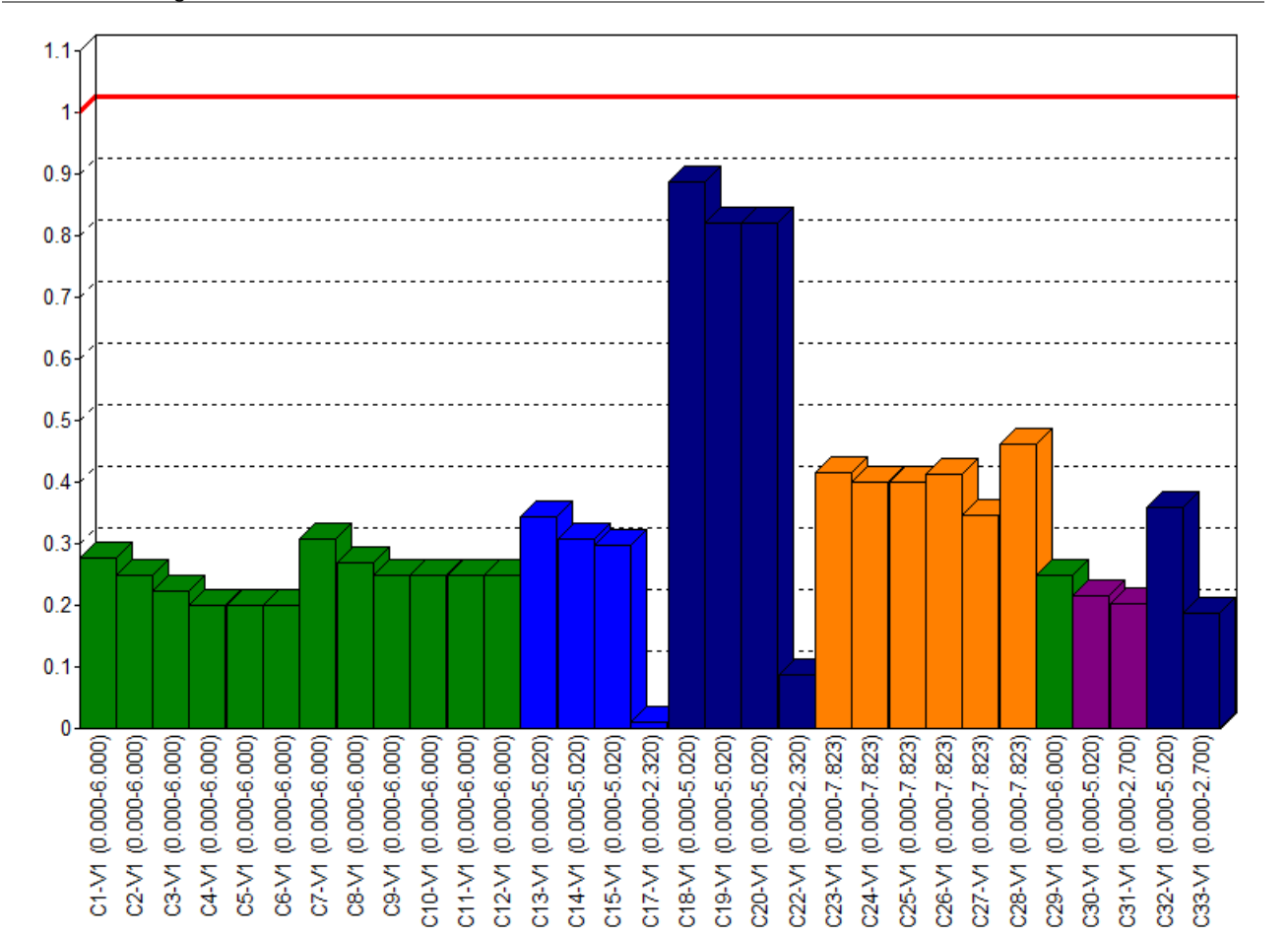
**EXTREME DOORBUIGINGEN (KARAKTERISTIEK)**

| Staaf | Veld                 | B.C.     | Knoop Begin |    | Z'afst | Z'   | Staaf | Z' glb dist | Z' glb | Knoop Eind |     |
|-------|----------------------|----------|-------------|----|--------|------|-------|-------------|--------|------------|-----|
|       |                      |          | X           | Z  |        |      |       |             |        | X          | Z   |
| S1    | Veld 1 (0 000 6 000) | Ka C3    | 00          | 00 | 3 464  | -0.1 |       | 6 000       | 55     | 02         | 55  |
| S2    | Veld 1 (0 000 6 000) |          | 00          | 00 | 3 464  | -0.0 |       | 6 000       | 50     | 03         | 50  |
| S3    | Veld 1 (0 000 6 000) |          | 00          | 00 | 3 464  | -0.0 |       | 6 000       | 45     | 03         | 45  |
| S4    | Veld 1 (0 000 6 000) |          | 00          | 00 | 3 464  | -0.1 |       | 6 000       | 40     | 04         | 40  |
| S5    | Veld 1 (0 000 6 000) |          | 00          | 00 | 3 464  | -0.1 |       | 6 000       | 40     | 01         | 40  |
| S6    | Veld 1 (0 000 6 000) |          | 00          | 00 | 3 464  | -0.1 |       | 6 000       | 40     | 00         | 40  |
| S7    | Veld 1 (0 000 6 000) |          | 02          | 55 | 2 536  | -0.1 |       | 6 000       | 117    | 01         | 117 |
| S8    | Veld 1 (0 000 6 000) |          | 03          | 50 | 2 536  | -0.0 |       | 6 000       | 103    | 05         | 103 |
| S9    | Veld 1 (0 000 6 000) |          | 03          | 45 | 2 536  | -0.0 |       | 6 000       | 94     | 05         | 94  |
| S10   | Veld 1 (0 000 6 000) |          | 04          | 40 | 2 536  | -0.1 |       | 6 000       | 90     | 07         | 90  |
| S11   | Veld 1 (0 000 6 000) | Ka C(w1) | 01          | 40 | 2 536  | -0.1 |       | 6 000       | 90     | 01         | 90  |
| S12   | Veld 1 (0 000 6 000) |          | 00          | 40 | 2 536  | -0.1 |       | 6 000       | 90     | 00         | 90  |
| S13   | Veld 1 (0 000 5 020) |          | 01          | 00 | 2 510  | 2.1  |       | 2 514       | 21     | 01         | 01  |
| S14   | Veld 1 (0 000 5 020) |          | 01          | 01 | 2 510  | 2.1  |       | 2 510       | 21     | 01         | 01  |
| S15   | Veld 1 (0 000 5 020) |          | 01          | 01 | 2 510  | 2.1  |       | 2 514       | 21     | 01         | 01  |
| S17   | Veld 1 (0 000 2 320) | Ka C2    | 01          | 01 | 1 160  | 0.1  |       | 1 072       | 01     | 01         | 00  |
| S18   | Veld 1 (0 000 5 020) |          | 02          | 01 | 2 510  | 16.5 |       | 2 512       | 166    | 02         | 01  |
| S19   | Veld 1 (0 000 5 020) |          | 02          | 01 | 2 510  | 16.5 |       | 2 510       | 166    | 02         | 01  |
| S20   | Veld 1 (0 000 5 020) |          | 02          | 01 | 2 510  | 16.5 |       | 2 511       | 166    | 02         | 02  |
| S22   | Veld 1 (0 000 2 320) |          | 02          | 01 | 1 160  | 0.8  |       | 1 140       | 08     | 02         | 01  |
| S30   | Veld 1 (0 000 5 020) |          | 01          | 01 | 2 859  | 3.2  |       | 4 118       | 92     | 01         | 86  |
| S31   | Veld 1 (0 000 2 700) |          | 01          | 86 | 1 148  | 0.9  |       | 0 000       | 86     | 01         | 01  |
| S32   | Veld 1 (0 000 5 020) |          | 02          | 02 | 2 389  | 12.0 |       | 2 739       | 165    | 02         | 86  |
| S33   | Veld 1 (0 000 2 700) |          | 02          | 86 | 1 895  | 0.2  |       | 0 000       | 86     | 02         | 01  |
| m     |                      |          | mm          |    | mm     | mm   | m     |             | mm     | mm         | mm  |

Staa def n t e

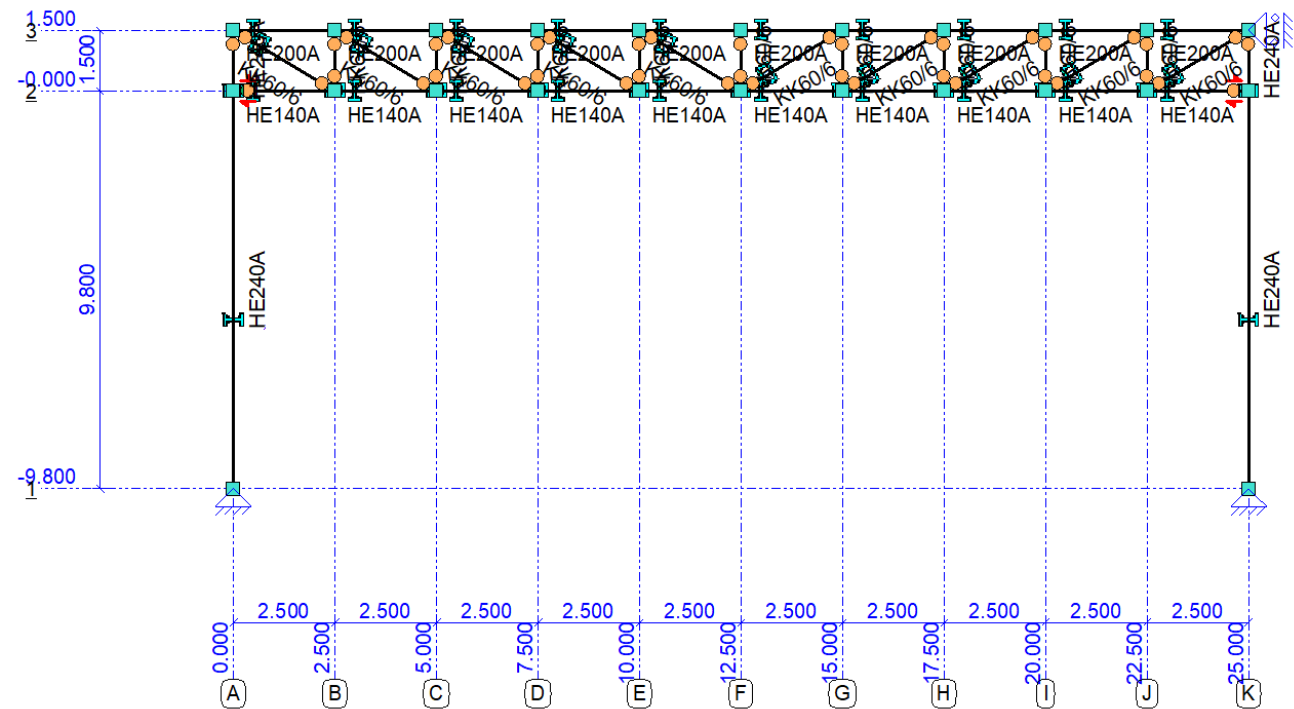


Afb. Staa UC D agram



|                        |                                                                                                                                                                            |                                     |               |                  |  |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------|------------------|--|
| VAN BOXSEL ENGINEERING |                                                                                                                                                                            | T: 0162-451280 E: info@vanboxsel.nl |               | www.vanboxsel.nl |  |
|                        |                                                                                                                                                                            |                                     |               |                  |  |
| Projectomschrijving    | Uitbreiding terrein Coolrec                                                                                                                                                |                                     | Projectnummer | 23-157           |  |
| Onderdeel              |                                                                                                                                                                            |                                     | Constructeur  | LH - PM          |  |
| Opdrachtgever          | Coolrec                                                                                                                                                                    |                                     | Eenheden      | m, mm, kN, kNm   |  |
| Bestand                | C:\Users\pm\van Boxsel Engineering\Ruby - Documenten\Documenten\2023\23-157 Coolrec\1. berekeningen intern\Rapport B\Matrixframe modellen\23-157 dakspant HEA kolommen.mxf |                                     |               |                  |  |

Constructie



PROFIELEN

| Profiel | Profielnaam | Oppervlakte | Iy              | Materiaal        | Hoek |
|---------|-------------|-------------|-----------------|------------------|------|
| P1      | HE200A      | 5383        | 3 6922e+07      | S235             | 0    |
| P2      | KK60/6      | 1203        | 5 6065e+05      | S275H(EN10219 1) | 0    |
| P3      | HE140A      | 3142        | 1 0331e+07      | S235             | 0    |
| P4      | HE240A      | 7684        | 7 7632e+07      | S235             | 0    |
|         |             | mm          | mm <sup>4</sup> | °                |      |

MATERIALEN

| Materiaalnaam    | Poison | Dichtheid         | E-Modulus  | Uitzettingcoeff |
|------------------|--------|-------------------|------------|-----------------|
| S235             | 0.30   | 78.50             | 2.1000e+05 | 12.0000e-06     |
| S275H(EN10219 1) | 0.30   | 78.50             | 2.1000e+05 | 12.0000e-06     |
|                  |        | kN/m <sup>3</sup> | N/mm       | °/m             |

SCHARNIEREN

| Staaf | Positie   | Scharnier | X    | Z    | Yr      |
|-------|-----------|-----------|------|------|---------|
| S1    | 0.000     | A3        | Vrij | Vast | Vrij    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S2    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S3    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S4    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S5    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S6    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S7    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S8    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S9    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S10   | 0.000     | A2        | Vast | Vast | Vast    |
|       | 0.000     | A2        | Vast | Vast | Vast    |
| m     |           |           | kNm  | kNm  | kNm/rad |

| Staaf | Positie   | Scharnier | X    | Z    | Yr      |
|-------|-----------|-----------|------|------|---------|
|       | 2 500 (L) | A3        | Vrij | Vast | Vrij    |
| S11   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 2 500 (L) | A2        | Vast | Vast | Vast    |
| S12   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 2 500 (L) | A2        | Vast | Vast | Vast    |
| S13   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 2 500 (L) | A2        | Vast | Vast | Vast    |
| S14   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 2 500 (L) | A2        | Vast | Vast | Vast    |
| S15   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 2 500 (L) | A2        | Vast | Vast | Vast    |
| S16   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 2 500 (L) | A2        | Vast | Vast | Vast    |
| S17   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 2 500 (L) | A2        | Vast | Vast | Vast    |
| S18   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 2 500 (L) | A2        | Vast | Vast | Vast    |
| S19   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 2 500 (L) | A2        | Vast | Vast | Vast    |
| S20   | 0 000     | A2        | Vast | Vast | Vast    |
|       | 2 500 (L) | A2        | Vast | Vast | Vast    |
| S21   | 1 500 (L) | A1        | Vast | Vast | Vrij    |
| S22   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 1 500 (L) | A1        | Vast | Vast | Vrij    |
| S23   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 1 500 (L) | A1        | Vast | Vast | Vrij    |
| S24   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 1 500 (L) | A1        | Vast | Vast | Vrij    |
| S25   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 1 500 (L) | A1        | Vast | Vast | Vrij    |
| S26   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 1 500 (L) | A1        | Vast | Vast | Vrij    |
| S27   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 1 500 (L) | A1        | Vast | Vast | Vrij    |
| S28   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 1 500 (L) | A1        | Vast | Vast | Vrij    |
| S29   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 1 500 (L) | A1        | Vast | Vast | Vrij    |
| S30   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 1 500 (L) | A1        | Vast | Vast | Vrij    |
| S31   | 1 500 (L) | A1        | Vast | Vast | Vrij    |
| S32   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 915 (L) | A1        | Vast | Vast | Vrij    |
| S33   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 915 (L) | A1        | Vast | Vast | Vrij    |
| S34   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 915 (L) | A1        | Vast | Vast | Vrij    |
| S35   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 915 (L) | A1        | Vast | Vast | Vrij    |
| S36   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 915 (L) | A1        | Vast | Vast | Vrij    |
| S37   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 915 (L) | A1        | Vast | Vast | Vrij    |
| S38   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 915 (L) | A1        | Vast | Vast | Vrij    |
| S39   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 915 (L) | A1        | Vast | Vast | Vrij    |
| S40   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 915 (L) | A1        | Vast | Vast | Vrij    |
| S41   | 0 000     | A1        | Vast | Vast | Vrij    |
|       | 2 915 (L) | A1        | Vast | Vast | Vrij    |
| m     |           |           | kNm  | kNm  | kNm/rad |

#### OPLEGGINGEN

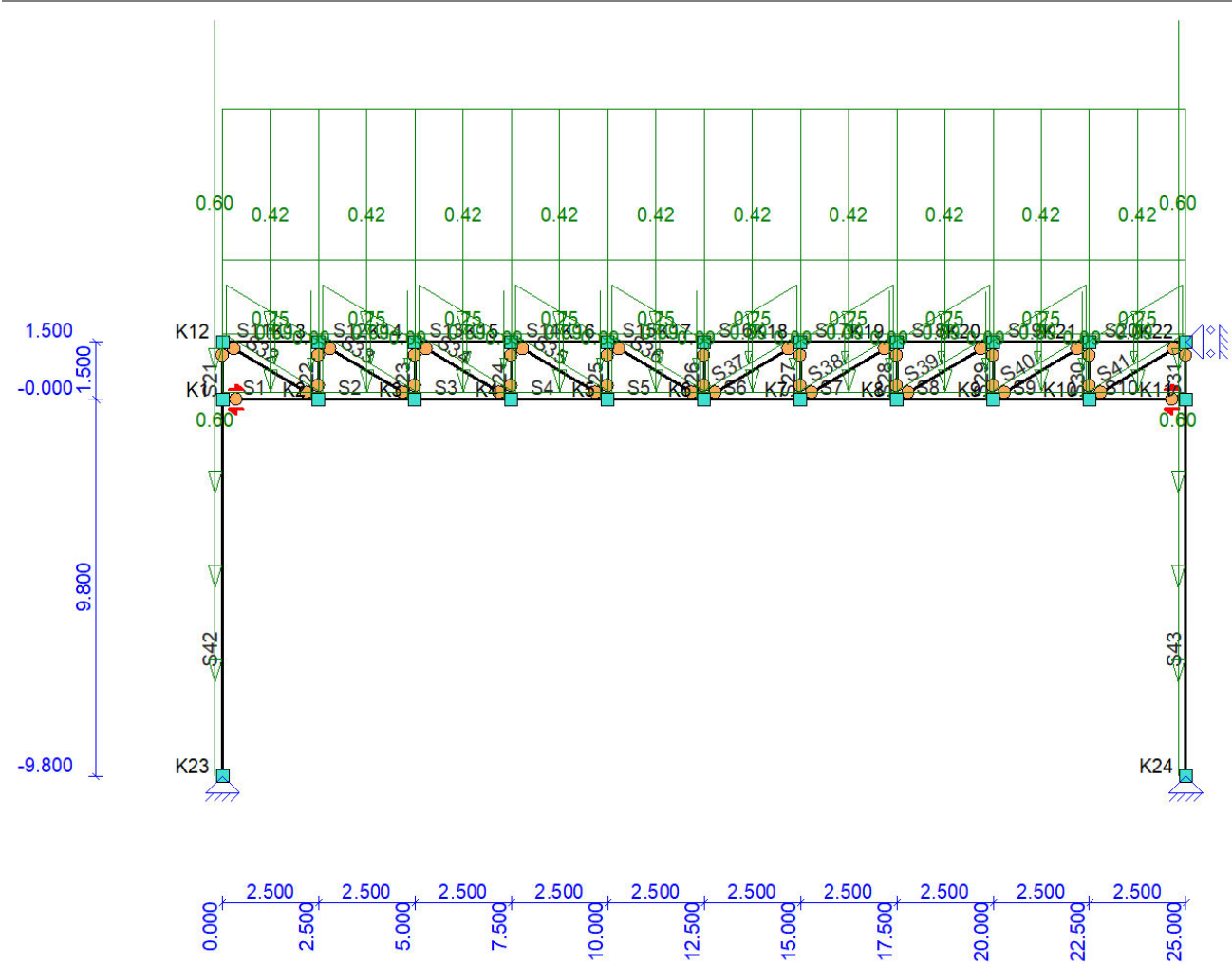
| Oplegging | Object | Positie | X   | Z   | Yr      | Hoek | Yr |
|-----------|--------|---------|-----|-----|---------|------|----|
|           |        | m       | kNm | kNm | kNm/rad |      | °  |

| Oplegging | Object | Positie | X    | Z    | Yr   | Hoek    | Yr |
|-----------|--------|---------|------|------|------|---------|----|
| O1        | K23    | K23     | Vast | Vast | Vrij | 0       |    |
| O2        | K24    | K24     | Vast | Vast | Vrij | 0       |    |
| O3        | K22    | K22     | Vast | Vrij | Vrij | 0       |    |
|           |        |         | m    | kN/m | kN/m | kNm/rad | °  |

### BELASTINGSGEVALLEN TYPEN

| Label | Omschrijving  | B.G.Type         | Gunstig/Ong. | Element | Niveau | Veld | $\Psi_0$ | $\Psi_1$ | $\Psi_2$ | $C_{prob}$<br>UGT/GGT |
|-------|---------------|------------------|--------------|---------|--------|------|----------|----------|----------|-----------------------|
| B G 1 | Eigen gewicht | Permanent        | +/           |         | Nvt    | Nvt  |          |          |          |                       |
| B G 2 | Permanent     | Permanent        | +/           |         | Nvt    | Nvt  |          |          |          |                       |
| B G 3 | Sneeuw        | Sneeuw belasting |              |         | Nvt    | Nvt  |          | 0.20     |          | 0.75/0.75             |
| B G 4 | Windbelasting | Windbelasting    |              |         | Nvt    | Nvt  |          | 0.20     |          | 0.93/0.93             |
| B G 5 | Windbelasting | Windbelasting    |              |         | Nvt    | Nvt  |          | 0.20     |          | 0.93/0.93             |

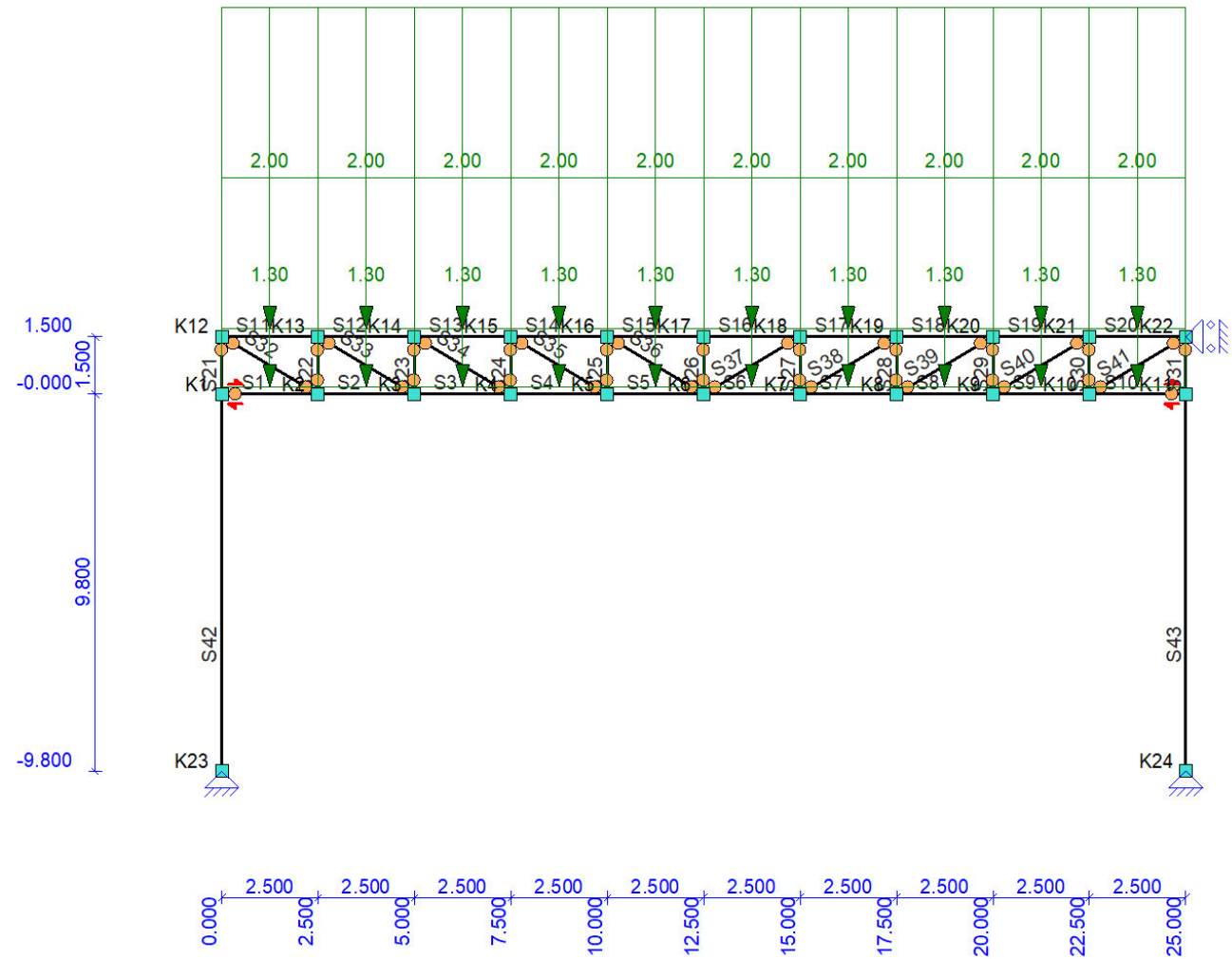
### B.G.1: Eigen gewicht



### B.G.1: EIGEN GEWICHT

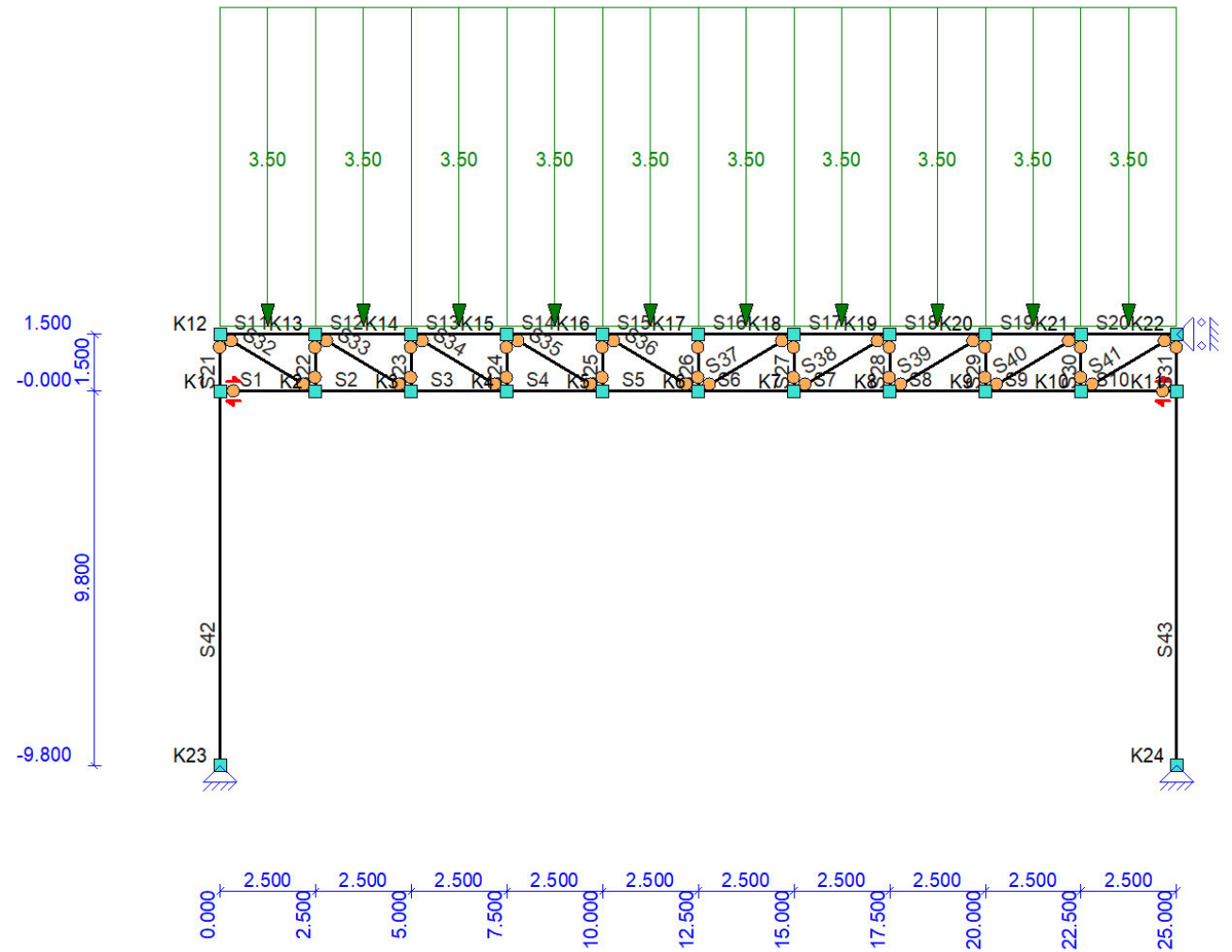
| Type       | Beginwaarde | Endwaarde                   | Beginafstand | Endafstand | Richting | Staat of knoop | Omschrijving |
|------------|-------------|-----------------------------|--------------|------------|----------|----------------|--------------|
| qG         | 1.00        | 1.00                        | 0.000        | L          | Z"       | S1 S43         |              |
| Som lasten |             | X: -0.00 Z: 34.39 Yr: -0.12 |              | m          | m        |                |              |

B.G.2: Permanent



| B.G.2: PERMANENT |                    |           |              |            |          |                |              |
|------------------|--------------------|-----------|--------------|------------|----------|----------------|--------------|
| Type             | Beginwaarde        | Endwaarde | Beginafstand | Endafstand | Richting | Staat of knoop | Omschrijving |
| q                | 2.00               | 2.00      | 0.000        | L          | Z        | S11 S20        |              |
| q                | 1.30               | 1.30      | 0.000        | L          | Z        | S1 S10         |              |
| Som lasten       | Z: 82.50 Yr: -0.11 |           |              |            |          |                |              |
|                  |                    |           | m            | m          |          |                |              |

B.G.3: Sneeuw

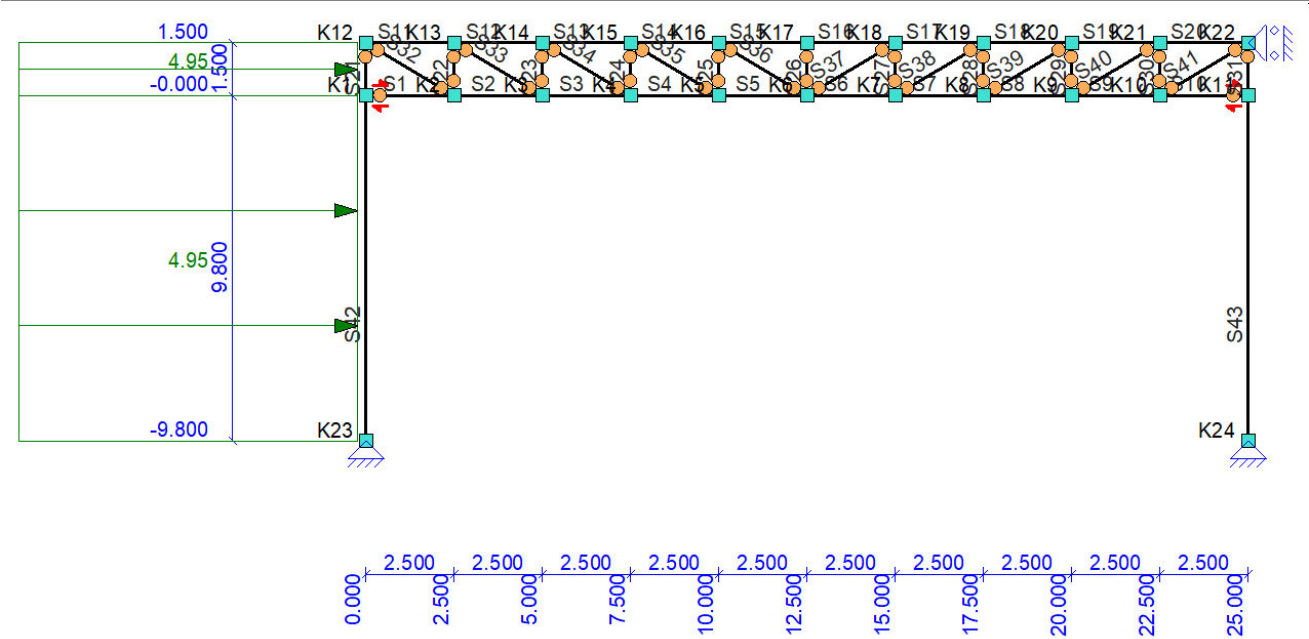


B.G.3: SNEEUW

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Staat of knoop | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|----------------|--------------|
| q          | 3.50        | 3.50      | 0.000        | L          | Z        | S11 S20        |              |
| Som lasten | Z: 87.50    |           |              |            |          |                |              |
|            |             |           | m            | m          |          |                |              |

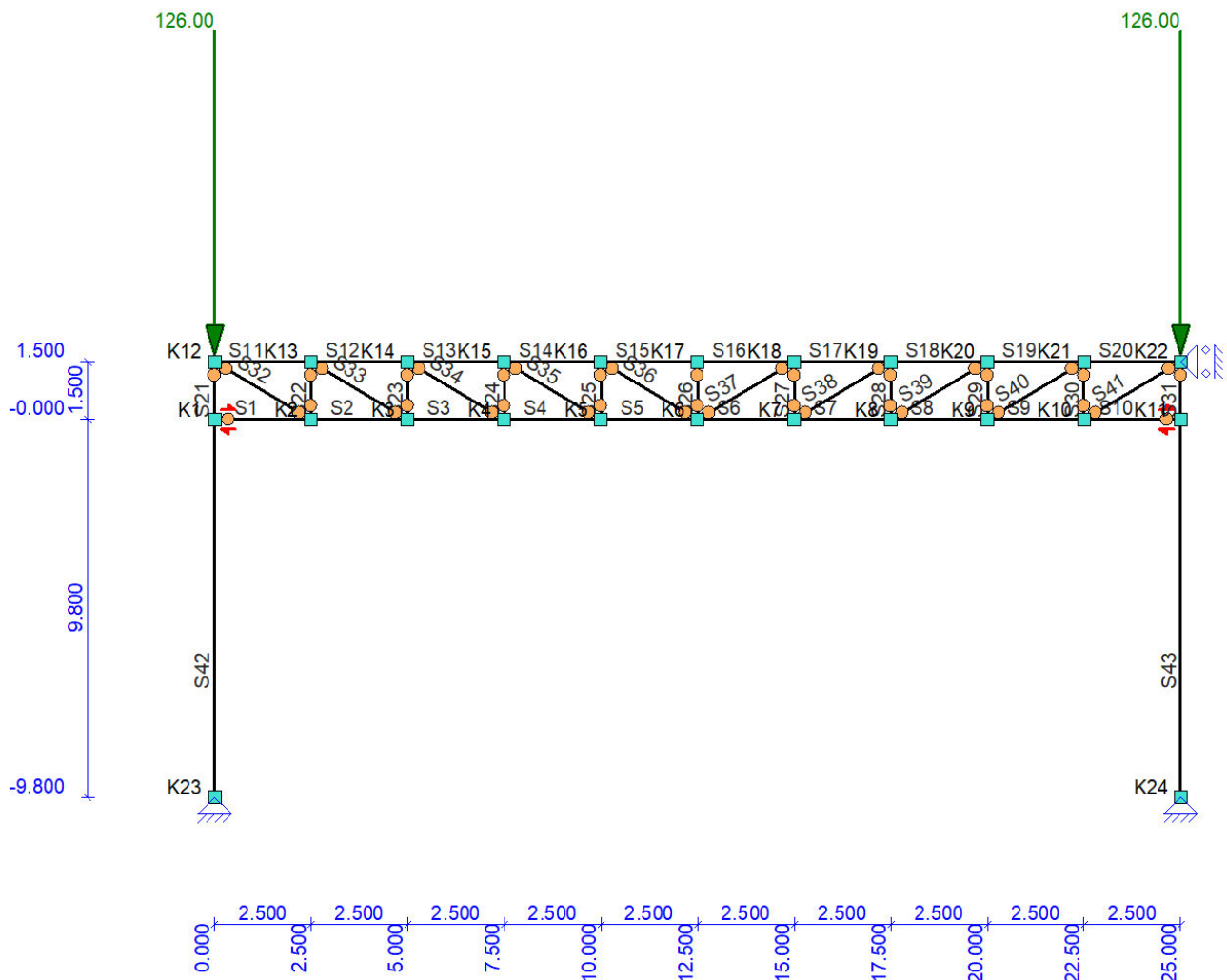


B.G.4: Windbelasting



| B.G.4: WINDBELASTING |                    |           |              |            |          |                |              |
|----------------------|--------------------|-----------|--------------|------------|----------|----------------|--------------|
| Type                 | Beginwaarde        | Endwaarde | Beginafstand | Endafstand | Richting | Staat of knoop | Omschrijving |
| q                    | 4.95               | 4.95      | 0.000        | L          | X        | S21 S42        |              |
| Som lasten           | X: 55.94 Yr: -0.15 |           |              |            |          |                |              |
|                      |                    |           | m            | m          |          |                |              |

B.G.5: W ndbe ast ng



### B.G.5: WINDBELASTING

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Staaft van knoep | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|------------------|--------------|
| N          | 126.00      |           |              |            | Z        | K12 K22          |              |
| Som lasten |             | Z: 252.00 |              |            |          |                  |              |
|            |             |           | m            | m          |          |                  |              |

## BELASTINGSCOMBINATIES

| Basisgegevens |               |        |        |        |        |        |        |        |        |
|---------------|---------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Fundamenteel  |               |        |        |        |        |        |        |        |        |
| B.G.          | Omschrijving  | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 | Fu.C.5 | Fu.C.6 | Fu.C.7 | Fu.C.8 |
| B.G.1         | Eigen gewicht | 108    | 0.90   | 108    | 0.90   | 108    | 0.90   | 1.22   | 0.90   |
| B.G.2         | Permanent     | 108    | 0.90   | 108    | 0.90   | 108    | 0.90   | 1.22   | 0.90   |
| B.G.3         | Sneeuw        | 101    | 101    |        |        |        |        |        |        |
| B.G.4         | Windbelasting |        |        | 1.17   | 1.17   |        |        |        |        |
| B.G.5         | Windbelasting |        |        |        |        | 1.17   | 1.17   |        |        |

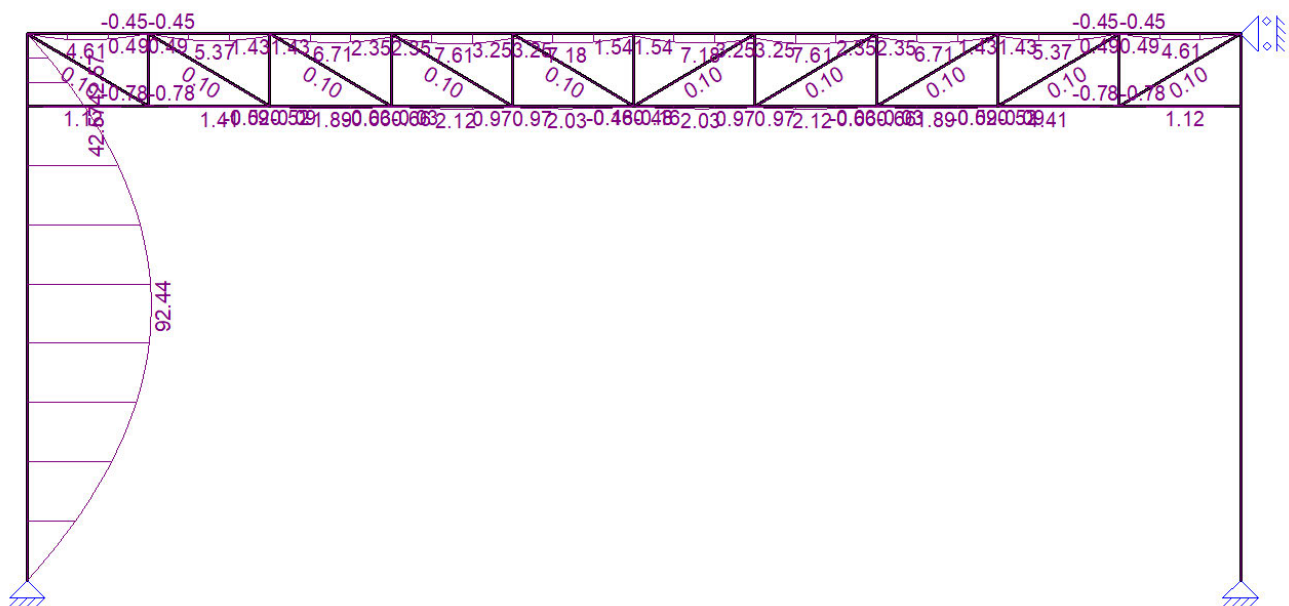
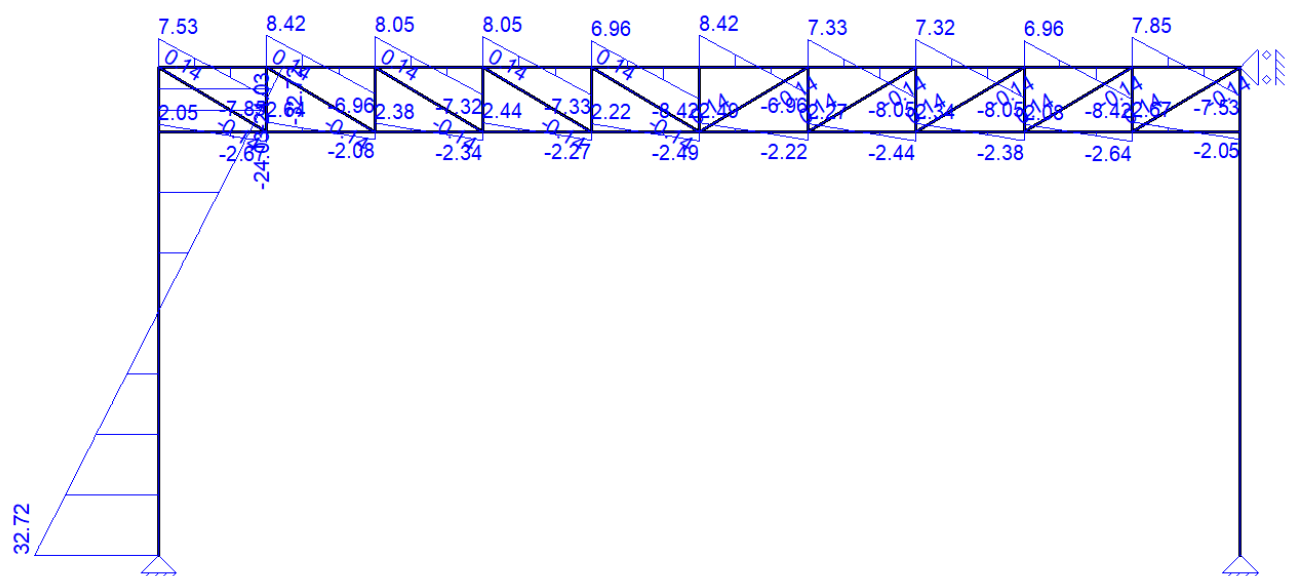
| Karakteristiek |               |           |        |        |        |        |
|----------------|---------------|-----------|--------|--------|--------|--------|
| B.G.           | Omschrijving  | Ka.C.(w1) | Ka.C.1 | Ka.C.2 | Ka.C.3 | Ka.C.4 |
| B.G.1          | Eigen gewicht | 1.00      | 1.00   | 1.00   | 1.00   | 1.00   |
| B.G.2          | Permanent     | 1.00      | 1.00   | 1.00   | 1.00   | 1.00   |
| B.G.3          | Sneeuw        |           |        | 0.75   |        |        |
| B.G.4          | Windbelasting |           |        |        | 0.86   |        |
| B.G.5          | Windbelasting |           |        |        |        | 0.86   |

**Frequent**

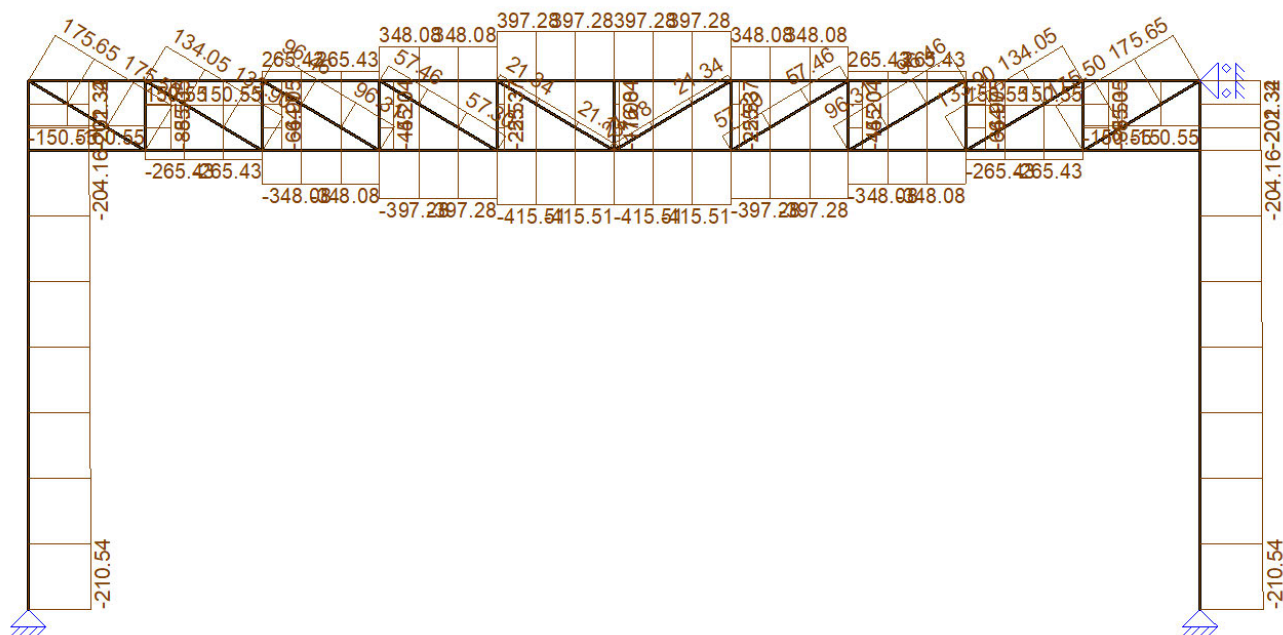
| B.G.  | Omschrijving  | Fr.C.(w1) | Fr.C.1 | Fr.C.2 | Fr.C.3 |
|-------|---------------|-----------|--------|--------|--------|
| B.G.1 | Eigen gewicht | 100       | 100    | 100    | 100    |
| B.G.2 | Permanent     | 100       | 100    | 100    | 100    |
| B.G.3 | Sneeuw        |           | 0.20   |        |        |
| B.G.4 | Windbelasting |           |        | 0.20   |        |
| B.G.5 | Windbelasting |           |        |        | 0.20   |

**Quasi-permanent**

| B.G.  | Omschrijving  | Qu.C.1 |
|-------|---------------|--------|
| B.G.1 | Eigen gewicht | 100    |
| B.G.2 | Permanent     | 100    |
| B.G.3 | Sneeuw        |        |
| B.G.4 | Windbelasting |        |
| B.G.5 | Windbelasting |        |

**Fu.C. Omhu ende Momenten (My)****Fu.C. Omhu ende Dwarskracht (Vz)**

Fu.C. Omhu ende Normaa kracht (Nx)



## EXTREME STAAFKRACHTEN

| Staaf               | Veld                 | B.C.  | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM <sub>0</sub> | xM <sub>0</sub> | T/D | N <sub>max</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> |
|---------------------|----------------------|-------|----------------|------------------|-------------------|----------------|-----------------|-----------------|-----|------------------|----------------|------------------|----------------|
| <b>Fundamenteel</b> |                      |       |                |                  |                   |                |                 |                 |     |                  |                |                  |                |
| S1                  | Veld 1 (0 000 2 500) | Fu C1 | 0 00           | <b>1.12</b>      | 1 159             | 0 38           | 2 318           |                 |     | 0 00             | 1 94           | 2 24             | 2 24           |
|                     | Veld 1 (0 000 2 500) | Fu C7 | 0 00           | 1 11             | 1 084             | <b>-0.78</b>   | 2 168           |                 |     | 0 00             | <b>2.05</b>    | <b>-2.67</b>     | <b>-2.67</b>   |
| S2                  | Veld 1 (0 000 2 500) | Fu C1 | 0 38           | <b>1.41</b>      | 1 463             | 0 51           | 0 164           |                 | D   | <b>150.55</b>    | 2 44           | 2 44             | 1 73           |
|                     | Veld 1 (0 000 2 500) | Fu C2 | 0 26           | 1 25             | 1 476             | <b>0.52</b>    | 0 135           |                 | D   | 136 55           | 2 05           | 2 05             | 1 43           |
| S3                  | Veld 1 (0 000 2 500) | Fu C5 | 0 62           | 0 96             | 1 376             | <b>-0.09</b>   | 0 302           | 2 449           | D   | 83 96            | 2 30           | 2 30             | 1 88           |
|                     | Veld 1 (0 000 2 500) | Fu C7 | <b>-0.78</b>   | 1 06             | 1 398             | 0 08           | 0 337           | 2 459           | D   | 94 90            | <b>2.64</b>    | <b>2.64</b>      | <b>-2.08</b>   |
| S4                  | Veld 1 (0 000 2 500) | Fu C1 | 0 51           | <b>1.89</b>      | 1 284             | 0 65           |                 |                 | D   | <b>265.43</b>    | 2 15           | 2 15             | 2 03           |
|                     | Veld 1 (0 000 2 500) | Fu C2 | <b>0.52</b>    | 1 68             | 1 289             | <b>0.66</b>    |                 |                 | D   | 240 74           | 1 79           | 1 79             | 1 69           |
| S5                  | Veld 1 (0 000 2 500) | Fu C5 | <b>-0.09</b>   | 1 25             | 1 267             | 0 02           | 0 045           | 2 490           | D   | 148 16           | 2 12           | 2 12             | 2 06           |
|                     | Veld 1 (0 000 2 500) | Fu C7 | 0 08           | 1 42             | 1 262             | <b>-0.03</b>   | 0 036           | 2 487           | D   | 167 35           | <b>2.38</b>    | <b>2.38</b>      | <b>-2.34</b>   |
| S6                  | Veld 1 (0 000 2 500) | Fu C1 | 0 65           | <b>2.12</b>      | 1 325             | <b>0.97</b>    |                 |                 | D   | <b>348.08</b>    | 2 21           | 2 21             | 1 96           |
|                     | Veld 1 (0 000 2 500) | Fu C2 | <b>0.66</b>    | 1 89             | 1 331             | 0 94           |                 |                 | D   | 315 70           | 1 85           | 1 85             | 1 63           |
| S7                  | Veld 1 (0 000 2 500) | Fu C7 | <b>-0.03</b>   | 1 55             | 1 295             | 0 18           | 0 012           |                 | D   | 219 47           | <b>2.44</b>    | <b>2.44</b>      | <b>-2.27</b>   |
|                     | Veld 1 (0 000 2 500) | Fu C1 | <b>0.97</b>    | <b>2.03</b>      | 1 128             | 0 46           |                 |                 | D   | <b>397.28</b>    | 1 88           | 2 29             | 2 29           |
| S8                  | Veld 1 (0 000 2 500) | Fu C2 | 0 94           | 1 81             | 1 118             | <b>0.48</b>    |                 |                 | D   | 360 33           | 1 56           | 1 92             | 1 92           |
|                     | Veld 1 (0 000 2 500) | Fu C7 | 0 18           | 1 49             | 1 178             | <b>-0.16</b>   | 2 435           |                 | D   | 250 49           | <b>2.22</b>    | <b>-2.49</b>     | <b>-2.49</b>   |
| S9                  | Veld 1 (0 000 2 500) | Fu C1 | 0 46           | <b>2.03</b>      | 1 372             | <b>0.97</b>    |                 |                 | D   | <b>397.28</b>    | 2 29           | 2 29             | 1 88           |
|                     | Veld 1 (0 000 2 500) | Fu C2 | <b>0.48</b>    | 1 81             | 1 382             | 0 94           |                 |                 | D   | 360 33           | 1 92           | 1 92             | 1 56           |
| S10                 | Veld 1 (0 000 2 500) | Fu C7 | <b>-0.16</b>   | 1 49             | 1 322             | 0 18           | 0 065           |                 | D   | 250 49           | <b>2.49</b>    | <b>2.49</b>      | <b>-2.22</b>   |
|                     | Veld 1 (0 000 2 500) | Fu C1 | <b>0.97</b>    | <b>2.12</b>      | 1 175             | 0 65           |                 |                 | D   | <b>348.08</b>    | 1 96           | 2 21             | 2 21           |
| S11                 | Veld 1 (0 000 2 500) | Fu C2 | 0 94           | 1 89             | 1 169             | <b>0.66</b>    |                 |                 | D   | 315 70           | 1 63           | 1 85             | 1 85           |
|                     | Veld 1 (0 000 2 500) | Fu C7 | 0 18           | 1 55             | 1 205             | <b>-0.03</b>   | 2 488           |                 | D   | 219 47           | <b>2.27</b>    | <b>-2.44</b>     | <b>-2.44</b>   |
| S12                 | Veld 1 (0 000 2 500) | Fu C1 | 0 65           | <b>1.89</b>      | 1 216             | 0 51           |                 |                 | D   | <b>265.43</b>    | 2 03           | 2 15             | 2 15           |
|                     | Veld 1 (0 000 2 500) | Fu C2 | <b>0.66</b>    | 1 68             | 1 211             | <b>0.52</b>    |                 |                 | D   | 240 74           | 1 69           | 1 79             | 1 79           |
| S13                 | Veld 1 (0 000 2 500) | Fu C5 | 0 02           | 1 25             | 1 233             | <b>-0.09</b>   | 0 010           | 2 455           | D   | 148 16           | 2 06           | 2 12             | 2 12           |
|                     | Veld 1 (0 000 2 500) | Fu C7 | <b>-0.03</b>   | 1 42             | 1 238             | 0 08           | 0 013           | 2 464           | D   | 167 35           | <b>2.34</b>    | <b>-2.38</b>     | <b>-2.38</b>   |
| S14                 | Veld 1 (0 000 2 500) | Fu C1 | 0 51           | <b>1.41</b>      | 1 037             | 0 38           | 2 336           |                 | D   | <b>150.55</b>    | 1 73           | 2 44             | 2 44           |
|                     | Veld 1 (0 000 2 500) | Fu C2 | <b>0.52</b>    | 1 25             | 1 024             | 0 26           | 2 365           |                 | D   | 136 55           | 1 43           | 2 05             | 2 05           |
| S15                 | Veld 1 (0 000 2 500) | Fu C5 | <b>-0.09</b>   | 0 96             | 1 124             | 0 62           | 0 051           | 2 198           | D   | 83 96            | 1 88           | 2 30             | 2 30           |
|                     | Veld 1 (0 000 2 500) | Fu C7 | 0 08           | 1 06             | 1 102             | <b>-0.78</b>   | 0 041           | 2 163           | D   | 94 90            | <b>2.08</b>    | <b>-2.64</b>     | <b>-2.64</b>   |
| S16                 | Veld 1 (0 000 2 500) | Fu C1 | 0 38           | <b>1.12</b>      | 1 341             | <b>-0.00</b>   | 0 182           |                 |     | 0 00             | 2 24           | 2 24             | 1 94           |
|                     | Veld 1 (0 000 2 500) | Fu C7 | <b>-0.78</b>   | 1 11             | 1 416             | 0 00           | 0 332           |                 |     | 0 00             | <b>2.67</b>    | <b>2.67</b>      | <b>-2.05</b>   |
| S17                 | Veld 1 (0 000 2 500) | Fu C1 | 0 00           | <b>4.61</b>      | 1 224             | 0 40           | 2 448           |                 | T   | <b>-150.55</b>   | <b>7.53</b>    | <b>-7.85</b>     | <b>-7.85</b>   |
|                     | Veld 1 (0 000 2 500) | Fu C2 | 0 00           | 4 24             | 1 218             | <b>-0.45</b>   | 2 437           |                 | T   | 136 55           | 6 96           | 7 32             | 7 32           |
| S18                 | Veld 1 (0 000 2 500) | Fu C3 | 0 00           | 2 29             | 1 324             | <b>0.49</b>    |                 |                 | T   | 116 58           | 3 47           | 3 47             | 3 08           |
|                     | Veld 1 (0 000 2 500) | Fu C7 | 0 00           | 2 49             | 1 297             | 0 35           |                 |                 | T   | 94 90            | 3 83           | <b>3.83</b>      | 3 55           |
| m                   |                      |       | kNm            | kNm              | m                 | kNm            | m               | m               |     | kN               | kN             | kN               | kN             |

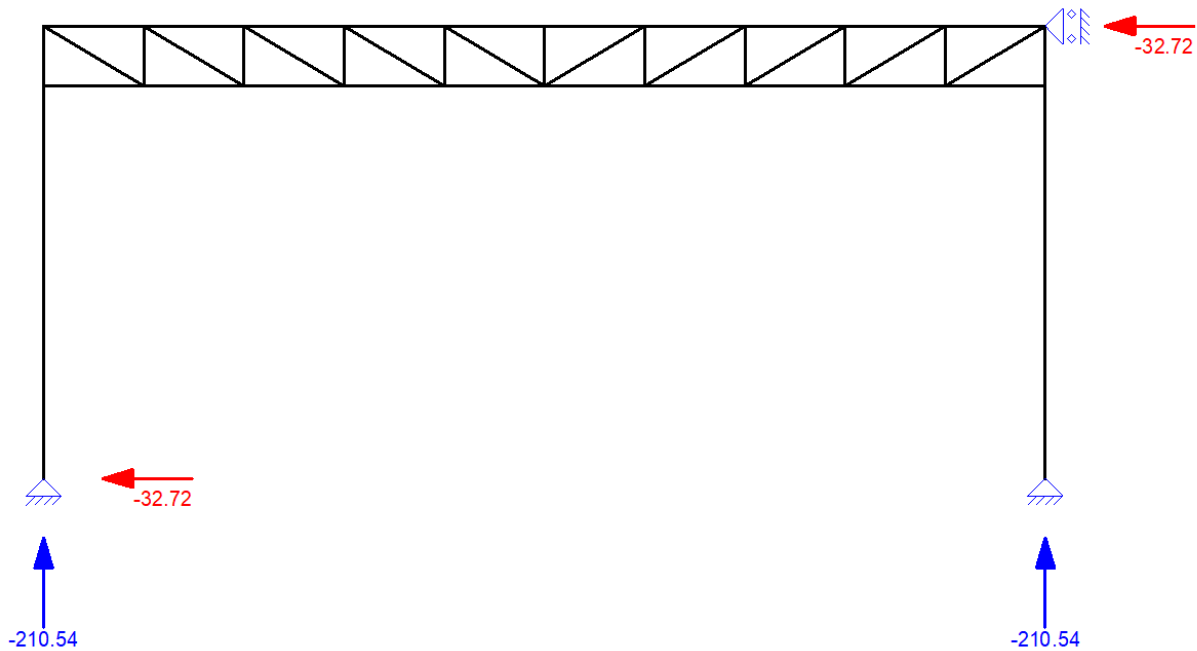
| Staaf | Veld                 | B.C.  | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM0   | xM0 | T/D | N <sub>max</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> |
|-------|----------------------|-------|----------------|------------------|-------------------|----------------|-------|-----|-----|------------------|----------------|------------------|----------------|
| S12   | Veld 1 (0 000 2 500) | Fu C1 | 0 40           | 5.37             | 1 369             | 1.43           | 0 048 |     | T   | -265.43          | 8.42           | 8.42             | -6.96          |
|       | Veld 1 (0 000 2 500) | Fu C2 | -0.45          | 4 90             | 1 368             | 1 23           | 0 059 |     | T   | 240 74           | 7 82           | 7 82             | 6 47           |
|       | Veld 1 (0 000 2 500) | Fu C3 | 0.49           | 2 98             | 1 380             | 1 34           |       |     | T   | 180 75           | 3 61           | 3 61             | 2 93           |
| S13   | Veld 1 (0 000 2 500) | Fu C1 | 1.43           | 6.71             | 1 309             | 2.35           |       |     | T   | -348.08          | 8.05           | 8.05             | -7.32          |
| S14   | Veld 1 (0 000 2 500) | Fu C1 | 2.35           | 7.61             | 1 309             | 3.25           |       |     | T   | -397.28          | 8.05           | 8.05             | -7.33          |
| S15   | Veld 1 (0 000 2 500) | Fu C1 | 3.25           | 7.18             | 1 131             | 1 42           |       |     | T   | -415.51          | 6.96           | -8.42            | -8.42          |
|       | Veld 1 (0 000 2 500) | Fu C3 | 2 35           | 4 01             | 1 126             | 1.54           |       |     | T   | 264 37           | 2 95           | 3 60             | 3 60           |
| S16   | Veld 1 (0 000 2 500) | Fu C1 | 1 42           | 7.18             | 1 369             | 3.25           |       |     | T   | -415.51          | 8.42           | 8.42             | -6.96          |
|       | Veld 1 (0 000 2 500) | Fu C3 | 1.54           | 4 01             | 1 374             | 2 35           |       |     | T   | 264 37           | 3 60           | 3 60             | 2 95           |
| S17   | Veld 1 (0 000 2 500) | Fu C1 | 3.25           | 7.61             | 1 191             | 2.35           |       |     | T   | -397.28          | 7.33           | -8.05            | -8.05          |
| S18   | Veld 1 (0 000 2 500) | Fu C1 | 2.35           | 6.71             | 1 191             | 1.43           |       |     | T   | -348.08          | 7.32           | -8.05            | -8.05          |
| S19   | Veld 1 (0 000 2 500) | Fu C1 | 1.43           | 5.37             | 1 131             | 0 40           | 2 452 |     | T   | -265.43          | 6.96           | -8.42            | -8.42          |
|       | Veld 1 (0 000 2 500) | Fu C2 | 1 23           | 4 90             | 1 132             | -0.45          | 2 441 |     | T   | 240 74           | 6 47           | 7 82             | 7 82           |
|       | Veld 1 (0 000 2 500) | Fu C3 | 1 34           | 2 98             | 1 120             | 0.49           |       |     | T   | 180 75           | 2 93           | 3 61             | 3 61           |
| S20   | Veld 1 (0 000 2 500) | Fu C1 | 0 40           | 4.61             | 1 276             | -0.00          | 0 052 |     | T   | -150.55          | 7.85           | 7.85             | -7.53          |
|       | Veld 1 (0 000 2 500) | Fu C2 | -0.45          | 4 24             | 1 282             | 0 00           | 0 063 |     | T   | 136 55           | 7 32           | 7 32             | 6 96           |
|       | Veld 1 (0 000 2 500) | Fu C3 | 0.49           | 2 29             | 1 176             | 0.00           |       |     | T   | 116 58           | 3 08           | 3 47             | 3 47           |
|       | Veld 1 (0 000 2 500) | Fu C7 | 0 35           | 2 49             | 1 203             | 0 00           |       |     | T   | 94 90            | 3 55           | -3.83            | 3 83           |
| S21   | Veld 1 (0 000 1 500) | Fu C3 | 42.57          |                  |                   | 0 00           |       |     | T   | 54 91            | -24.03         | -32.72           | -32.72         |
|       | Veld 1 (0 000 1 500) | Fu C5 | 0 00           |                  |                   | 0 00           |       |     | T   | -202.32          | 0 00           | 0 00             | 0 00           |
| S22   | Veld 1 (0 000 1 500) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | -85.50           | 0 00           | 0 00             | 0 00           |
| S23   | Veld 1 (0 000 1 500) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | -64.90           | 0 00           | 0 00             | 0 00           |
| S24   | Veld 1 (0 000 1 500) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | -45.20           | 0 00           | 0 00             | 0 00           |
| S25   | Veld 1 (0 000 1 500) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | -25.53           | 0 00           | 0 00             | 0 00           |
| S26   | Veld 1 (0 000 1 500) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | -17.00           | 0 00           | 0 00             | 0 00           |
| S27   | Veld 1 (0 000 1 500) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | -25.53           | 0 00           | 0 00             | 0 00           |
| S28   | Veld 1 (0 000 1 500) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | -45.20           | 0 00           | 0 00             | 0 00           |
| S29   | Veld 1 (0 000 1 500) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | -64.90           | 0 00           | 0 00             | 0 00           |
| S30   | Veld 1 (0 000 1 500) | Fu C1 | 0 00           |                  |                   | 0 00           |       |     | T   | -85.50           | 0 00           | 0 00             | 0 00           |
| S31   | Veld 1 (0 000 1 500) | Fu C5 | 0 00           |                  |                   | 0 00           |       |     | T   | -202.32          | 0 00           | 0 00             | 0 00           |
| S32   | Veld 1 (0 000 2 915) | Fu C1 | 0 00           | 0 09             | 1 458             | 0 00           |       |     | D   | 175.65           | 0 13           | 0 13             | 0 13           |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0 00           | 0.10             | 1 458             | 0 00           |       |     | D   | 110 76           | 0.14           | 0.14             | -0.14          |
| S33   | Veld 1 (0 000 2 915) | Fu C1 | 0 00           | 0 09             | 1 458             | 0 00           |       |     | D   | 134.05           | 0 13           | 0 13             | 0 13           |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0 00           | 0.10             | 1 458             | 0 00           |       |     | D   | 84 58            | 0.14           | 0.14             | -0.14          |
| S34   | Veld 1 (0 000 2 915) | Fu C1 | 0 00           | 0 09             | 1 458             | 0 00           |       |     | D   | 96.46            | 0 13           | 0 13             | 0 13           |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0 00           | 0.10             | 1 458             | 0 00           |       |     | D   | 60 87            | 0.14           | 0.14             | -0.14          |
| S35   | Veld 1 (0 000 2 915) | Fu C1 | 0 00           | 0 09             | 1 458             | 0 00           |       |     | D   | 57.46            | 0 13           | 0 13             | 0 13           |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0 00           | 0.10             | 1 458             | 0 00           |       |     | D   | 36 26            | 0.14           | 0.14             | -0.14          |
| S36   | Veld 1 (0 000 2 915) | Fu C1 | 0 00           | 0 09             | 1 458             | 0 00           |       |     | D   | 21.34            | 0 13           | 0 13             | 0 13           |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0 00           | 0.10             | 1 458             | 0 00           |       |     | D   | 13 55            | 0.14           | 0.14             | -0.14          |
| S37   | Veld 1 (0 000 2 915) | Fu C1 | 0 00           | 0 09             | 1 458             | 0 00           |       |     | D   | 21.34            | 0 13           | 0 13             | 0 13           |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0 00           | 0.10             | 1 458             | 0 00           |       |     | D   | 13 55            | 0.14           | -0.14            | -0.14          |
| S38   | Veld 1 (0 000 2 915) | Fu C1 | 0 00           | 0 09             | 1 458             | 0 00           |       |     | D   | 57.46            | 0 13           | 0 13             | 0 13           |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0 00           | 0.10             | 1 458             | 0 00           |       |     | D   | 36 26            | 0.14           | 0.14             | -0.14          |
| S39   | Veld 1 (0 000 2 915) | Fu C1 | 0 00           | 0 09             | 1 458             | 0 00           |       |     | D   | 96.46            | 0 13           | 0 13             | 0 13           |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0 00           | 0.10             | 1 458             | 0 00           |       |     | D   | 60 87            | 0.14           | 0.14             | -0.14          |
| S40   | Veld 1 (0 000 2 915) | Fu C1 | 0 00           | 0 09             | 1 458             | 0 00           |       |     | D   | 134.05           | 0 13           | 0 13             | 0 13           |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0 00           | 0.10             | 1 458             | 0 00           |       |     | D   | 84 58            | 0.14           | -0.14            | -0.14          |
| S41   | Veld 1 (0 000 2 915) | Fu C1 | 0 00           | 0 09             | 1 458             | 0 00           |       |     | D   | 175.65           | 0 13           | 0 13             | 0 13           |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0 00           | 0.10             | 1 458             | 0 00           |       |     | D   | 110 76           | 0.14           | 0.14             | -0.14          |
| S42   | Veld 1 (0 000 9 800) | Fu C3 | 0 00           | 92.44            | 5 650             | 42.57          |       |     | T   | 63 12            | 32.72          | 32.72            | -24.03         |
|       | Veld 1 (0 000 9 800) | Fu C5 | 0 00           |                  |                   | 0 00           |       |     | T   | -210.54          | 0 00           | 0 00             | 0 00           |
| S43   | Veld 1 (0 000 9 800) | Fu C5 | 0 00           |                  |                   | 0 00           |       |     | T   | -210.54          | 0 00           | 0 00             | 0 00           |
| m     |                      |       | kNm            |                  | kNm               | m              | kNm   | m   | m   | kN               | kN             | kN               | kN             |

OPLEGREACTIES (BELASTINGSGEVALLEN)

| B.C.  | Oplegging    | Positie | X     | Z      | Yr   |
|-------|--------------|---------|-------|--------|------|
| B G 1 | O1           | K23     | 0 00  | 17 20  | 0 00 |
|       | O2           | K24     | 0 00  | 17 20  | 0 00 |
|       | O3           | K22     | 0 00  | 0 00   | 0 00 |
|       | Som Reacties |         | -0.00 | -34.39 |      |
|       | Som Lasten   |         | -0.00 | 34.39  |      |
| B G 2 | O1           | K23     | 0 00  | 41 25  | 0 00 |
|       | O2           | K24     | 0 00  | 41 25  | 0 00 |
|       | O3           | K22     | 0 00  | 0 00   | 0 00 |
|       | Som Reacties |         | -0.00 | -82.50 |      |
|       |              |         | kN    | kN     | kNm  |

| B.C.  | Oplegging           | Positie | X             | Z              | Yr         |
|-------|---------------------|---------|---------------|----------------|------------|
|       | <b>Som Lasten</b>   |         | <b>0.00</b>   | <b>82.50</b>   |            |
| B G 3 | O1                  | K23     | 0 00          | 43 75          | 0 00       |
|       | O2                  | K24     | 0 00          | 43 75          | 0 00       |
|       | O3                  | K22     | 0 00          | 0 00           | 0 00       |
|       | <b>Som Reacties</b> |         | <b>-0.00</b>  | <b>-87.50</b>  |            |
|       | <b>Som Lasten</b>   |         | <b>0.00</b>   | <b>87.50</b>   |            |
| B G 4 | O1                  | K23     | 27 97         | 0 00           | 0 00       |
|       | O2                  | K24     | 0 00          | 0 00           | 0 00       |
|       | O3                  | K22     | 27 97         | 0 00           | 0 00       |
|       | <b>Som Reacties</b> |         | <b>-55.93</b> | <b>-0.00</b>   |            |
|       | <b>Som Lasten</b>   |         | <b>55.94</b>  | <b>0.00</b>    |            |
| B G 5 | O1                  | K23     | 0 00          | 126 00         | 0 00       |
|       | O2                  | K24     | 0 00          | 126 00         | 0 00       |
|       | O3                  | K22     | 0 00          | 0 00           | 0 00       |
|       | <b>Som Reacties</b> |         | <b>-0.00</b>  | <b>-252.00</b> |            |
|       | <b>Som Lasten</b>   |         | <b>0.00</b>   | <b>252.00</b>  |            |
|       |                     |         | <b>kN</b>     | <b>kN</b>      | <b>kNm</b> |

Fu.C. Omhu ende Op egreact es

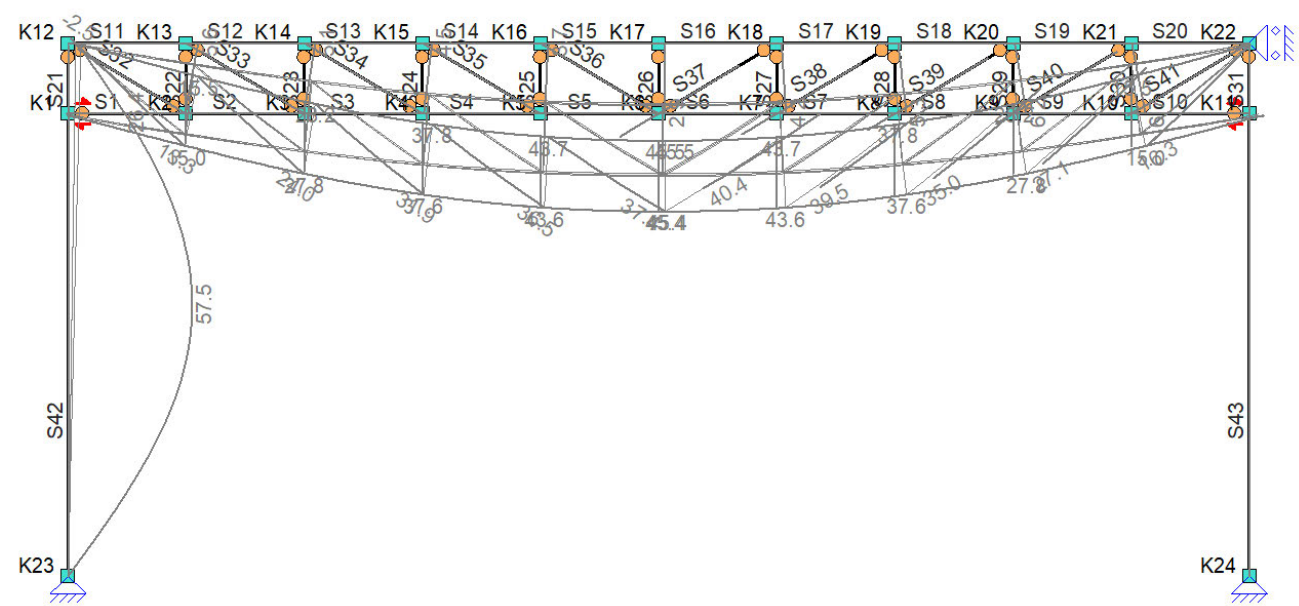


## OPLEGREACTIES (FUNDAMENTEEL)

| B.C.   | Oplegging           | Positie | X             | Z              | Yr         |
|--------|---------------------|---------|---------------|----------------|------------|
| Fu C 1 | O1                  | K23     | 0 00          | 107 31         | 0 00       |
|        | O2                  | K24     | 0 00          | 107 31         | 0 00       |
|        | O3                  | K22     | 0 00          | 0 00           | 0 00       |
|        | <b>Som Reacties</b> |         | <b>-0.00</b>  | <b>-214.62</b> |            |
|        | <b>Som Lasten</b>   |         | <b>-0.00</b>  | <b>214.62</b>  |            |
| Fu C 2 | O1                  | K23     | 0 00          | 96 79          | 0 00       |
|        | O2                  | K24     | 0 00          | 96 79          | 0 00       |
|        | O3                  | K22     | 0 00          | 0 00           | 0 00       |
|        | <b>Som Reacties</b> |         | <b>-0.00</b>  | <b>-193.58</b> |            |
|        | <b>Som Lasten</b>   |         | <b>-0.00</b>  | <b>193.58</b>  |            |
| Fu C 3 | O1                  | K23     | 32 72         | 63 12          | 0 00       |
|        | O2                  | K24     | 0 00          | 63 12          | 0 00       |
|        | O3                  | K22     | 32 72         | 0 00           | 0 00       |
|        | <b>Som Reacties</b> |         | <b>-65.44</b> | <b>-126.24</b> |            |
|        | <b>Som Lasten</b>   |         | <b>65.44</b>  | <b>126.24</b>  |            |
| Fu C 4 | O1                  | K23     | 32 72         | 52 60          | 0 00       |
|        | O2                  | K24     | 0 00          | 52 60          | 0 00       |
|        |                     |         | <b>kN</b>     | <b>kN</b>      | <b>kNm</b> |

| B.C.  | Oplegging    | Positie | X      | Z       | Yr   |
|-------|--------------|---------|--------|---------|------|
|       | O3           | K22     | 32.72  | 0.00    | 0.00 |
|       | Som Reacties |         | -65.44 | -105.20 |      |
|       | Som Lasten   |         | 65.44  | 105.20  |      |
| Fu C5 | O1           | K23     | 0.00   | 210.54  | 0.00 |
|       | O2           | K24     | 0.00   | 210.54  | 0.00 |
|       | O3           | K22     | 0.00   | 0.00    | 0.00 |
|       | Som Reacties |         | -0.00  | -421.08 |      |
| Fu C6 | O1           | K23     | 0.00   | 200.02  | 0.00 |
|       | O2           | K24     | 0.00   | 200.02  | 0.00 |
|       | O3           | K22     | 0.00   | 0.00    | 0.00 |
|       | Som Reacties |         | -0.00  | -400.04 |      |
| Fu C7 | O1           | K23     | 0.00   | 71.30   | 0.00 |
|       | O2           | K24     | 0.00   | 71.30   | 0.00 |
|       | O3           | K22     | 0.00   | 0.00    | 0.00 |
|       | Som Reacties |         | -0.00  | -142.61 |      |
| Fu C8 | O1           | K23     | 0.00   | 52.60   | 0.00 |
|       | O2           | K24     | 0.00   | 52.60   | 0.00 |
|       | O3           | K22     | 0.00   | 0.00    | 0.00 |
|       | Som Reacties |         | -0.00  | -105.20 |      |
|       |              |         | -0.00  | 105.20  |      |
|       |              |         | kN     | kN      | kNm  |

Ka.C. Omhu ende Doorbu g ngen

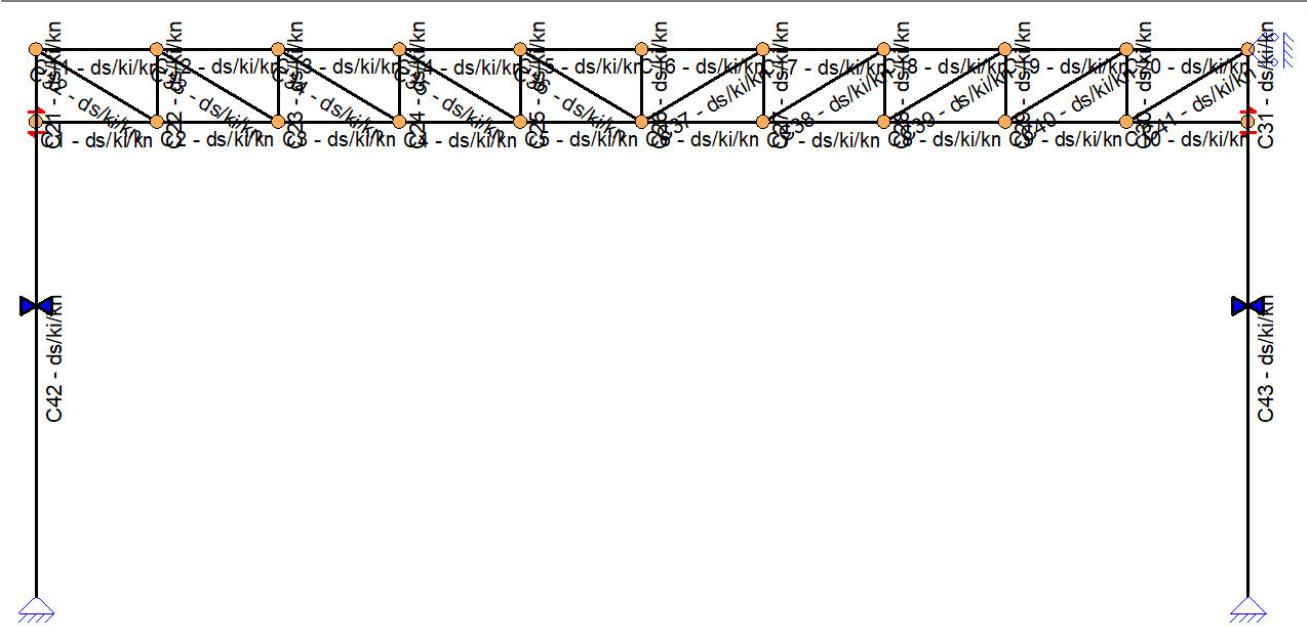


EXTREME DOORBUIGINGEN (KARAKTERISTIEK)

| Staaf | Veld                 | B.C.  | Knoop Begin |      |        | Z'  | Staaf | Z' glb dist | Z' glb | Knoop End |      |
|-------|----------------------|-------|-------------|------|--------|-----|-------|-------------|--------|-----------|------|
|       |                      |       | X           | Z    | Z'afst |     |       |             |        | X         | Z    |
| S1    | Veld 1 (0.000 2.500) | Ka C2 | 0.8         | 0.5  | 1.208  | 0.3 |       | 2.500       | 15.0   | 0.8       | 15.0 |
| S2    | Veld 1 (0.000 2.500) |       | 0.8         | 15.0 | 1.317  | 0.4 |       | 2.500       | 27.8   | 0.3       | 27.8 |
| S3    | Veld 1 (0.000 2.500) |       | 0.3         | 27.8 | 1.257  | 0.5 |       | 2.500       | 37.6   | 0.6       | 37.6 |
| S4    | Veld 1 (0.000 2.500) |       | 0.6         | 37.6 | 1.265  | 0.6 |       | 2.500       | 43.6   | 1.7       | 43.6 |
| S5    | Veld 1 (0.000 2.500) |       | 1.7         | 43.6 | 1.224  | 0.6 |       | 2.500       | 45.4   | 2.9       | 45.4 |
| S6    | Veld 1 (0.000 2.500) |       | 2.9         | 45.4 | 1.276  | 0.6 |       | 0.000       | 45.4   | 4.2       | 43.6 |
| S7    | Veld 1 (0.000 2.500) |       | 4.2         | 43.6 | 1.235  | 0.6 |       | 0.000       | 43.6   | 5.3       | 37.6 |
| S8    | Veld 1 (0.000 2.500) |       | 5.3         | 37.6 | 1.243  | 0.5 |       | 0.000       | 37.6   | 6.2       | 27.8 |
| S9    | Veld 1 (0.000 2.500) |       | 6.2         | 27.8 | 1.183  | 0.4 |       | 0.000       | 27.8   | 6.7       | 15.0 |
| S10   | Veld 1 (0.000 2.500) |       | 6.7         | 15.0 | 1.292  | 0.3 |       | 0.000       | 15.0   | 6.7       | 0.5  |
|       | m                    |       | mm          | mm   | m      | mm  |       | m           | mm     | mm        | mm   |

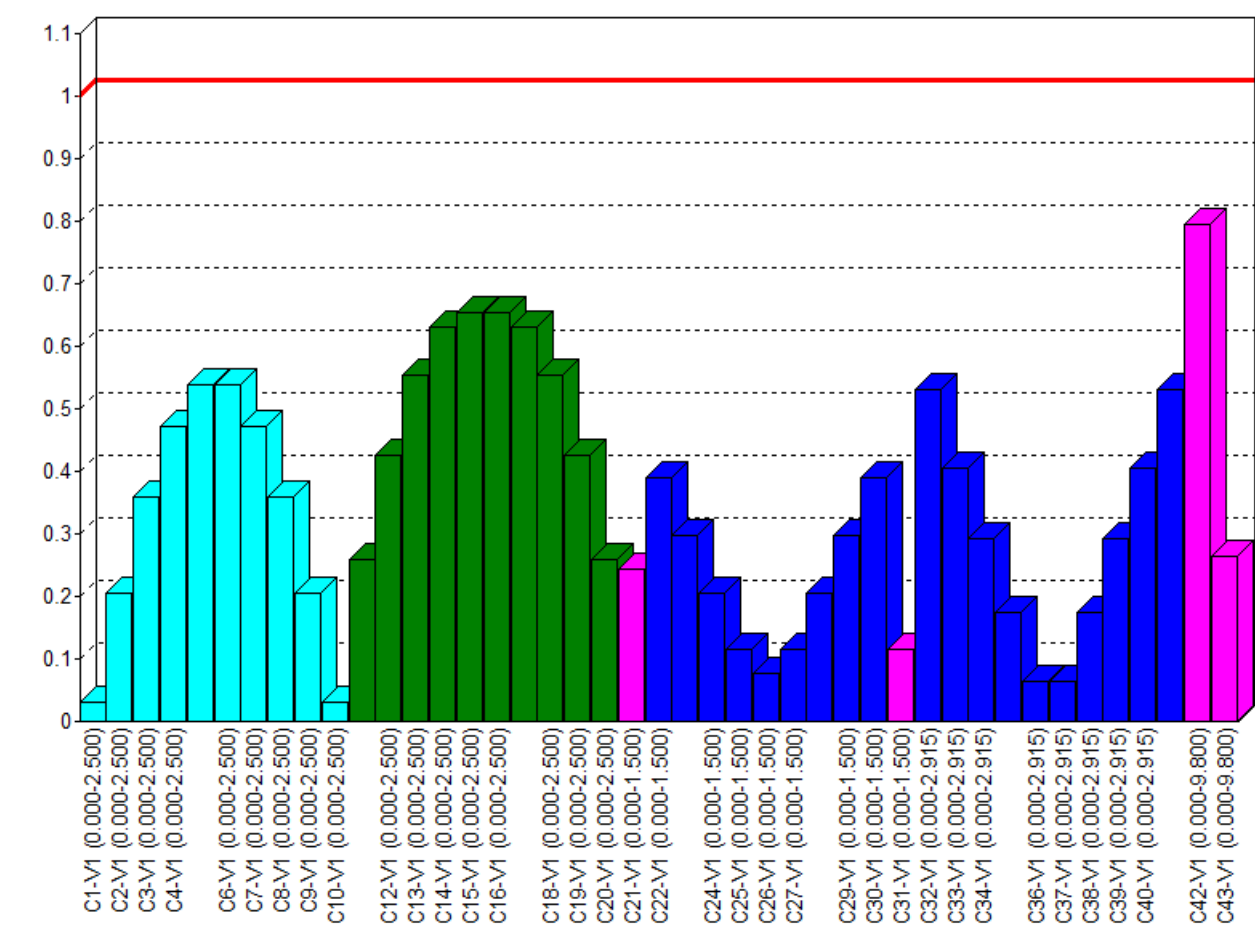
| Staaf | Veld                | B.C.                 | Knoop Begin |     | Staaf  |      |             | Knoop End |     |     |
|-------|---------------------|----------------------|-------------|-----|--------|------|-------------|-----------|-----|-----|
|       |                     |                      | X           | Z   | Z'afst | Z'   | Z' glb dist | Z' glb    | X   | Z   |
| S11   | Veld 1 (0 000 2500) | Ka C 3<br>Ka C (w 1) | 59          | 06  | 1 243  | 0.3  | 2 500       | 155       | 56  | 155 |
| S12   | Veld 1 (0 000 2500) |                      | 56          | 155 | 1 285  | 0.4  | 2 500       | 282       | 51  | 282 |
| S13   | Veld 1 (0 000 2500) |                      | 51          | 282 | 1 264  | 0.5  | 2 500       | 378       | 45  | 378 |
| S14   | Veld 1 (0 000 2500) |                      | 45          | 378 | 1 262  | 0.6  | 2 500       | 437       | 37  | 437 |
| S15   | Veld 1 (0 000 2500) |                      | 37          | 437 | 1 223  | 0.5  | 2 500       | 455       | 29  | 455 |
| S16   | Veld 1 (0 000 2500) |                      | 29          | 455 | 1 277  | 0.5  | 0 000       | 455       | 22  | 437 |
| S17   | Veld 1 (0 000 2500) |                      | 22          | 437 | 1 238  | 0.6  | 0 000       | 437       | 14  | 378 |
| S18   | Veld 1 (0 000 2500) |                      | 14          | 378 | 1 236  | 0.5  | 0 000       | 378       | 08  | 282 |
| S19   | Veld 1 (0 000 2500) |                      | 08          | 282 | 1 215  | 0.4  | 0 000       | 282       | 03  | 155 |
| S20   | Veld 1 (0 000 2500) |                      | 03          | 155 | 1 257  | 0.3  | 0 000       | 155       | 00  | 06  |
| S21   | Veld 1 (0 000 1500) |                      | 03          | 264 | 0 641  | 0.3  | 0 000       | 264       | 04  | 41  |
| S32   | Veld 1 (0 000 2915) |                      | 33          | 15  | 1 458  | 0.6  | 2915        | 81        | 43  | 81  |
| S33   | Veld 1 (0 000 2915) |                      | 78          | 63  | 1 458  | 0.6  | 2915        | 147       | 86  | 147 |
| S34   | Veld 1 (0 000 2915) |                      | 115         | 132 | 1 458  | 0.6  | 2915        | 195       | 121 | 195 |
| S35   | Veld 1 (0 000 2915) |                      | 142         | 184 | 1 458  | 0.6  | 2915        | 223       | 146 | 223 |
| S36   | Veld 1 (0 000 2915) |                      | 157         | 217 | 1 458  | 0.6  | 2 018       | 230       | 158 | 228 |
| S37   | Veld 1 (0 000 2915) |                      | 127         | 247 | 1 458  | 0.6  | 0 897       | 249       | 126 | 236 |
| S38   | Veld 1 (0 000 2915) |                      | 115         | 242 | 1 458  | 0.6  | 0 000       | 242       | 111 | 203 |
| S39   | Veld 1 (0 000 2915) |                      | 90          | 214 | 1 458  | 0.6  | 0 000       | 214       | 85  | 150 |
| S40   | Veld 1 (0 000 2915) |                      | 55          | 166 | 1 458  | 0.6  | 0 000       | 166       | 47  | 82  |
| S41   | Veld 1 (0 000 2915) |                      | 12          | 100 | 1 458  | 0.6  | 0 000       | 100       | 02  | 03  |
| S42   | Veld 1 (0 000 9800) | Ka C 3               | 00          | 00  | 5 091  | 43.0 | 5 738       | 575       | 03  | 264 |
| m     |                     |                      | mm          | mm  | m      | mm   | m           | mm        | mm  | mm  |

Staa def n t e



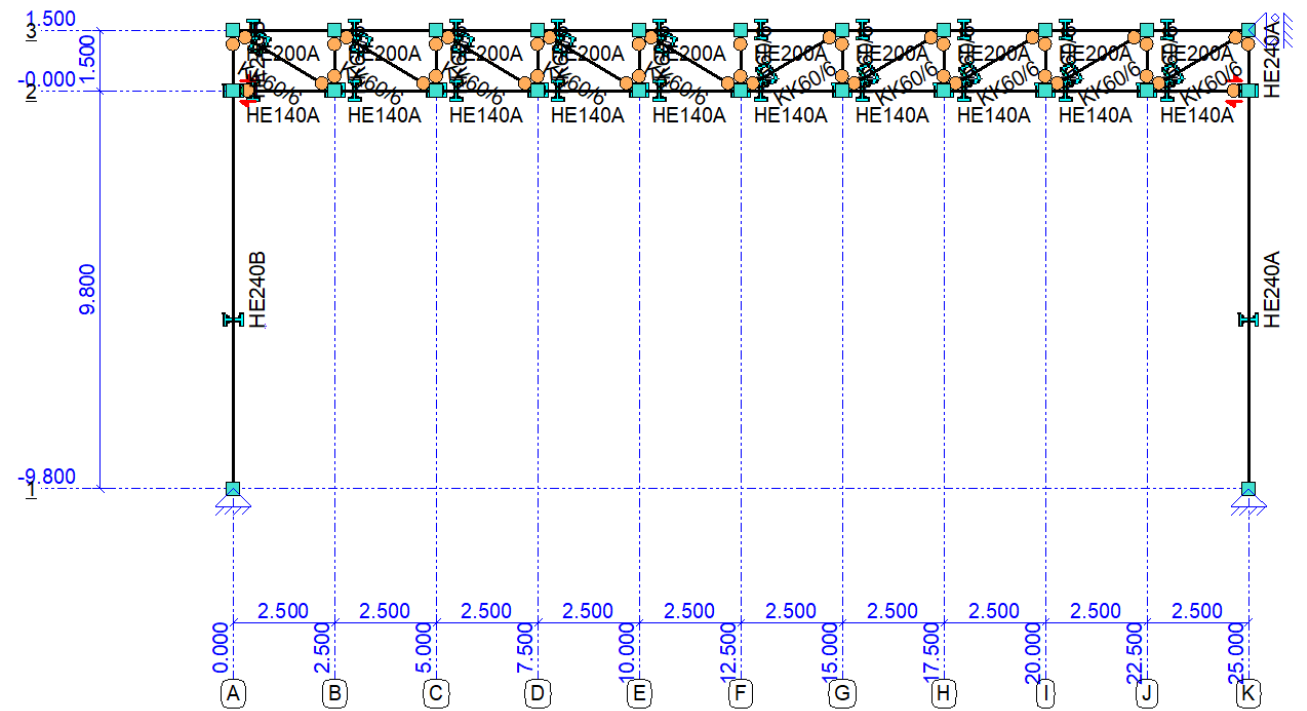


Afb. Staa UC D agram



|                        |                                                                                                                                                                            |                                     |               |                  |  |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------|------------------|--|
| VAN BOXSEL ENGINEERING |                                                                                                                                                                            | T: 0162-451280 E: info@vanboxsel.nl |               | www.vanboxsel.nl |  |
|                        |                                                                                                                                                                            |                                     |               |                  |  |
| Projectomschrijving    | Uitbreiding terrein Coolrec                                                                                                                                                |                                     | Projectnummer | 23-157           |  |
| Onderdeel              |                                                                                                                                                                            |                                     | Constructeur  | LH - PM          |  |
| Opdrachtgever          | Coolrec                                                                                                                                                                    |                                     | Eenheden      | m, mm, kN, kNm   |  |
| Bestand                | C:\Users\pm\van Boxsel Engineering\Ruby - Documenten\Documenten\2023\23-157 Coolrec\1. berekeningen intern\Rapport B\Matrixframe modellen\23-157 dakspant HEB kolommen.mxf |                                     |               |                  |  |

Construct e



PROFIELEN

| Profiel | Profielnaam | Oppervlakte | Iy              | Materiaal        | Hoek |
|---------|-------------|-------------|-----------------|------------------|------|
| P1      | HE200A      | 5383        | 3 6922e+07      | S235             | 0    |
| P2      | KK60/6      | 1203        | 5 6065e+05      | S275H(EN10219 1) | 0    |
| P3      | HE140A      | 3142        | 1 0331e+07      | S235             | 0    |
| P4      | HE240B      | 10599       | 1 1259e+08      | S235             | 0    |
| P5      | HE240A      | 7684        | 7 7632e+07      | S235             | 0    |
|         |             | mm          | mm <sup>4</sup> |                  | °    |

MATERIALEN

| Materiaalnaam    | Poison | Dichtheid        | E-Modulus  | Uitzettingcoeff |
|------------------|--------|------------------|------------|-----------------|
| S235             | 0.30   | 78.5             | 2 1000e+05 | 12 0000e 06     |
| S275H(EN10219 1) | 0.30   | 78.5             | 2 1000e+05 | 12 0000e 06     |
|                  |        | kNm <sup>3</sup> | Nmm        | C°m             |

SCHARNIEREN

| Staal | Positie   | Scharnier | X    | Z    | Yr      |
|-------|-----------|-----------|------|------|---------|
| S1    | 0.000     | A3        | Vrij | Vast | Vrij    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S2    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S3    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S4    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S5    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S6    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S7    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S8    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
| S9    | 0.000     | A2        | Vast | Vast | Vast    |
|       | 2.500 (L) | A2        | Vast | Vast | Vast    |
|       | m         |           | kNm  | kNm  | kNm/rad |

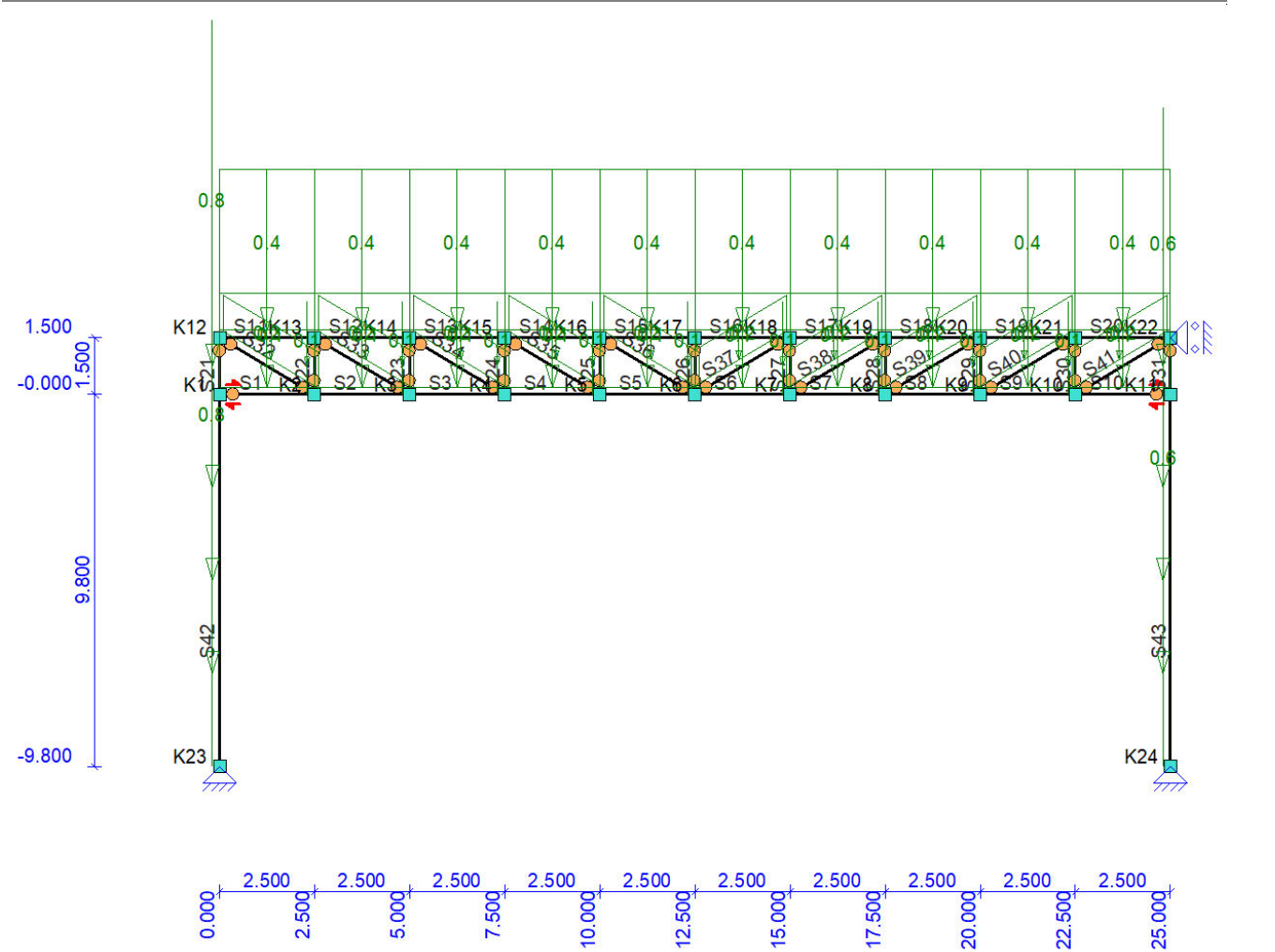
| Staaf    | Positie   | Scharnier | X          | Z          | Yr             |
|----------|-----------|-----------|------------|------------|----------------|
| S10      | 0 000     | A2        | Vast       | Vast       | Vast           |
|          | 2 500 (L) | A3        | Vrij       | Vast       | Vrij           |
| S11      | 0 000     | A2        | Vast       | Vast       | Vast           |
|          | 2 500 (L) | A2        | Vast       | Vast       | Vast           |
| S12      | 0 000     | A2        | Vast       | Vast       | Vast           |
|          | 2 500 (L) | A2        | Vast       | Vast       | Vast           |
| S13      | 0 000     | A2        | Vast       | Vast       | Vast           |
|          | 2 500 (L) | A2        | Vast       | Vast       | Vast           |
| S14      | 0 000     | A2        | Vast       | Vast       | Vast           |
|          | 2 500 (L) | A2        | Vast       | Vast       | Vast           |
| S15      | 0 000     | A2        | Vast       | Vast       | Vast           |
|          | 2 500 (L) | A2        | Vast       | Vast       | Vast           |
| S16      | 0 000     | A2        | Vast       | Vast       | Vast           |
|          | 2 500 (L) | A2        | Vast       | Vast       | Vast           |
| S17      | 0 000     | A2        | Vast       | Vast       | Vast           |
|          | 2 500 (L) | A2        | Vast       | Vast       | Vast           |
| S18      | 0 000     | A2        | Vast       | Vast       | Vast           |
|          | 2 500 (L) | A2        | Vast       | Vast       | Vast           |
| S19      | 0 000     | A2        | Vast       | Vast       | Vast           |
|          | 2 500 (L) | A2        | Vast       | Vast       | Vast           |
| S20      | 0 000     | A2        | Vast       | Vast       | Vast           |
|          | 2 500 (L) | A2        | Vast       | Vast       | Vast           |
| S21      | 1 500 (L) | A1        | Vast       | Vast       | Vrij           |
| S22      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 1 500 (L) | A1        | Vast       | Vast       | Vrij           |
| S23      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 1 500 (L) | A1        | Vast       | Vast       | Vrij           |
| S24      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 1 500 (L) | A1        | Vast       | Vast       | Vrij           |
| S25      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 1 500 (L) | A1        | Vast       | Vast       | Vrij           |
| S26      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 1 500 (L) | A1        | Vast       | Vast       | Vrij           |
| S27      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 1 500 (L) | A1        | Vast       | Vast       | Vrij           |
| S28      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 1 500 (L) | A1        | Vast       | Vast       | Vrij           |
| S29      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 1 500 (L) | A1        | Vast       | Vast       | Vrij           |
| S30      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 1 500 (L) | A1        | Vast       | Vast       | Vrij           |
| S31      | 1 500 (L) | A1        | Vast       | Vast       | Vrij           |
| S32      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 2 915 (L) | A1        | Vast       | Vast       | Vrij           |
| S33      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 2 915 (L) | A1        | Vast       | Vast       | Vrij           |
| S34      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 2 915 (L) | A1        | Vast       | Vast       | Vrij           |
| S35      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 2 915 (L) | A1        | Vast       | Vast       | Vrij           |
| S36      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 2 915 (L) | A1        | Vast       | Vast       | Vrij           |
| S37      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 2 915 (L) | A1        | Vast       | Vast       | Vrij           |
| S38      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 2 915 (L) | A1        | Vast       | Vast       | Vrij           |
| S39      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 2 915 (L) | A1        | Vast       | Vast       | Vrij           |
| S40      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 2 915 (L) | A1        | Vast       | Vast       | Vrij           |
| S41      | 0 000     | A1        | Vast       | Vast       | Vrij           |
|          | 2 915 (L) | A1        | Vast       | Vast       | Vrij           |
| <b>m</b> |           |           | <b>kNm</b> | <b>kNm</b> | <b>kNm/rad</b> |

## OPLEGGINGEN

| Oplegging | Object | Positie | X    | Z    | Yr   | Hoek    | Yr |
|-----------|--------|---------|------|------|------|---------|----|
| O1        | K23    | K23     | Vast | Vast | Vrij |         | 0  |
| Oplegging | Object | Positie | X    | Z    | Yr   | Hoek    | Yr |
| O3        | K22    | K22     | Vast | Vrij | Vrij |         | 0  |
|           |        |         | m    | kN/m | kN/m | kNm/rad | °  |

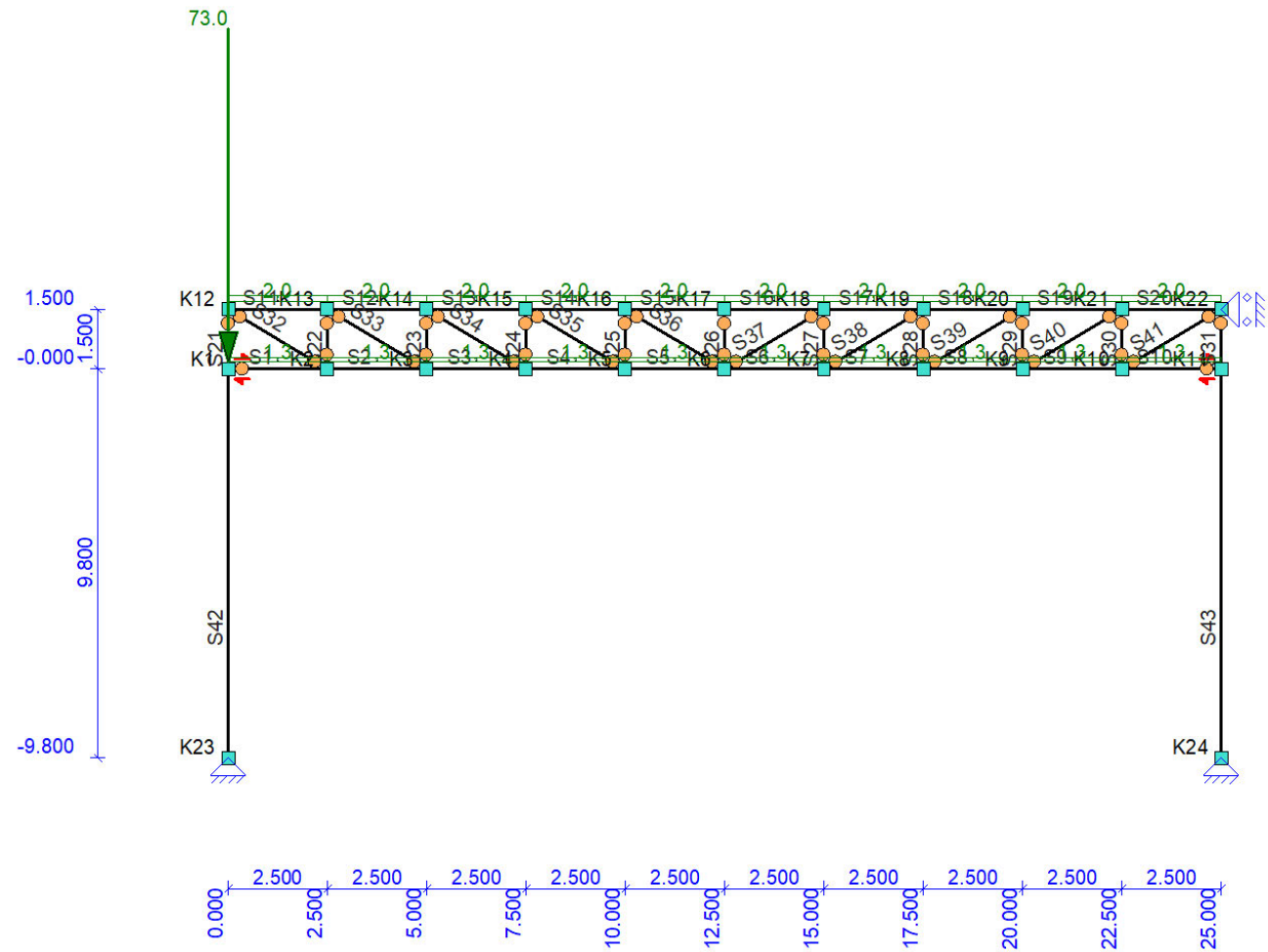
| BELASTINGSGEVALLEN TYPEN |               |                  |              |         |        |      |          |          |          |            |         |
|--------------------------|---------------|------------------|--------------|---------|--------|------|----------|----------|----------|------------|---------|
| Label                    | Omschrijving  | B.G.Type         | Gunstig/Ong. | Element | Niveau | Veld | $\Psi_0$ | $\Psi_1$ | $\Psi_2$ | $C_{prob}$ | UGT/GGT |
| B G 1                    | Eigen gewicht | Permanent        | +/           |         | Nvt    | Nvt  |          |          |          |            |         |
| B G 2                    | Permanent     | Permanent        | +/           |         | Nvt    | Nvt  |          |          |          |            |         |
| B G 3                    | Sneeuw        | Sneeuw belasting |              |         | Nvt    | Nvt  |          | 0.20     |          | 0.75/0.75  |         |
| B G 4                    | Windbelasting | Windbelasting    |              |         | Nvt    | Nvt  |          | 0.20     |          | 0.93/0.93  |         |
| B G 5                    | Windbelasting | Windbelasting    |              |         | Nvt    | Nvt  |          | 0.20     |          | 0.93/0.93  |         |

B.G.1: E gen gewcht



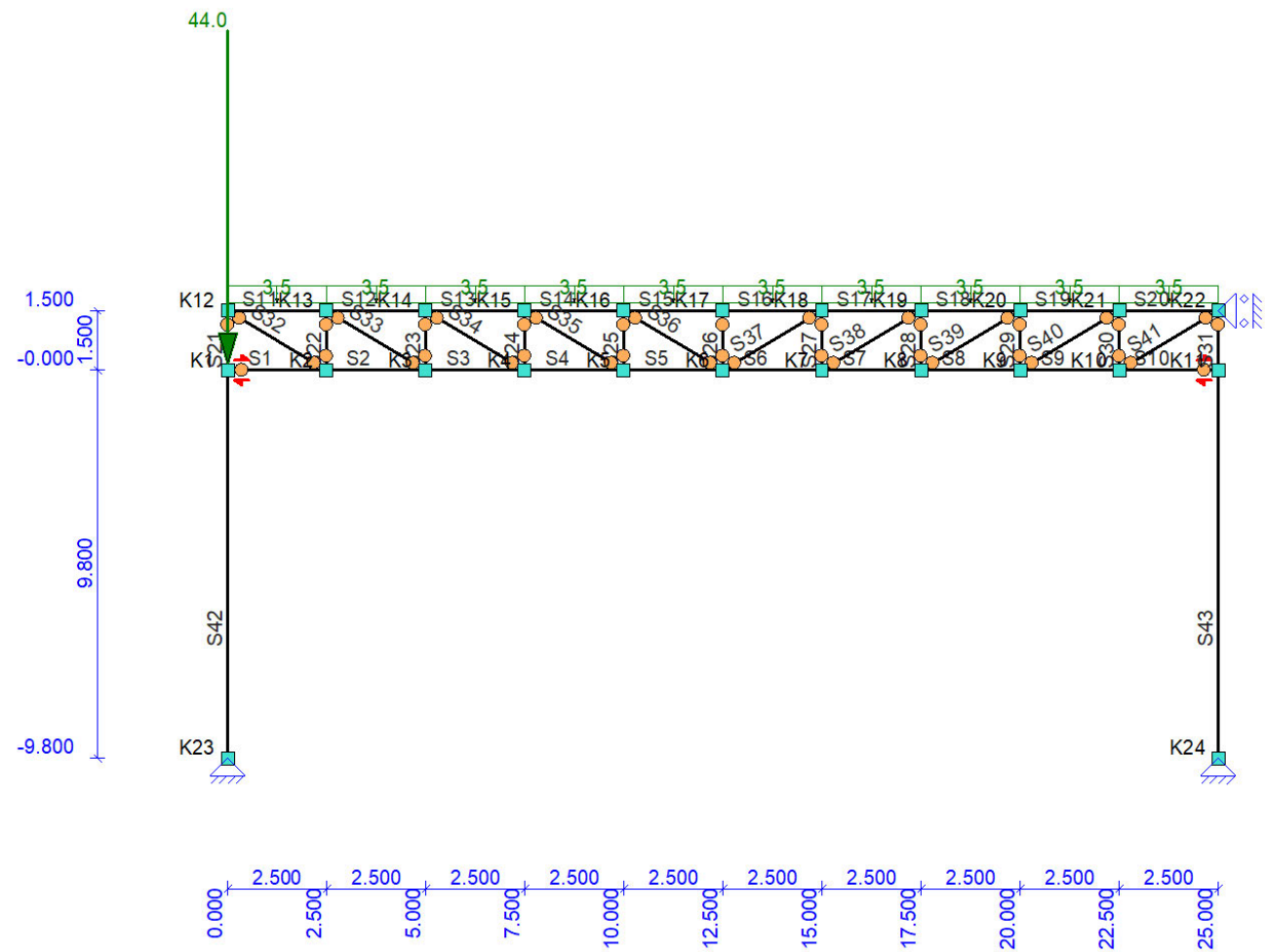
| B.G.1: EIGEN GEWICHT |             |                          |              |            |          |               |              |
|----------------------|-------------|--------------------------|--------------|------------|----------|---------------|--------------|
| Type                 | Beginwaarde | Endwaarde                | Beginafstand | Endafstand | Richting | Staf of knoop | Omschrijving |
| qG                   | 10          | 10                       | 0.000        | L          | Z"       | S1 S43        |              |
| Som lasten           |             | X: -0.0 Z: 37.0 Yr: -0.1 |              |            |          |               |              |
|                      |             |                          | m            | m          |          |               |              |

B.G.2: Permanent



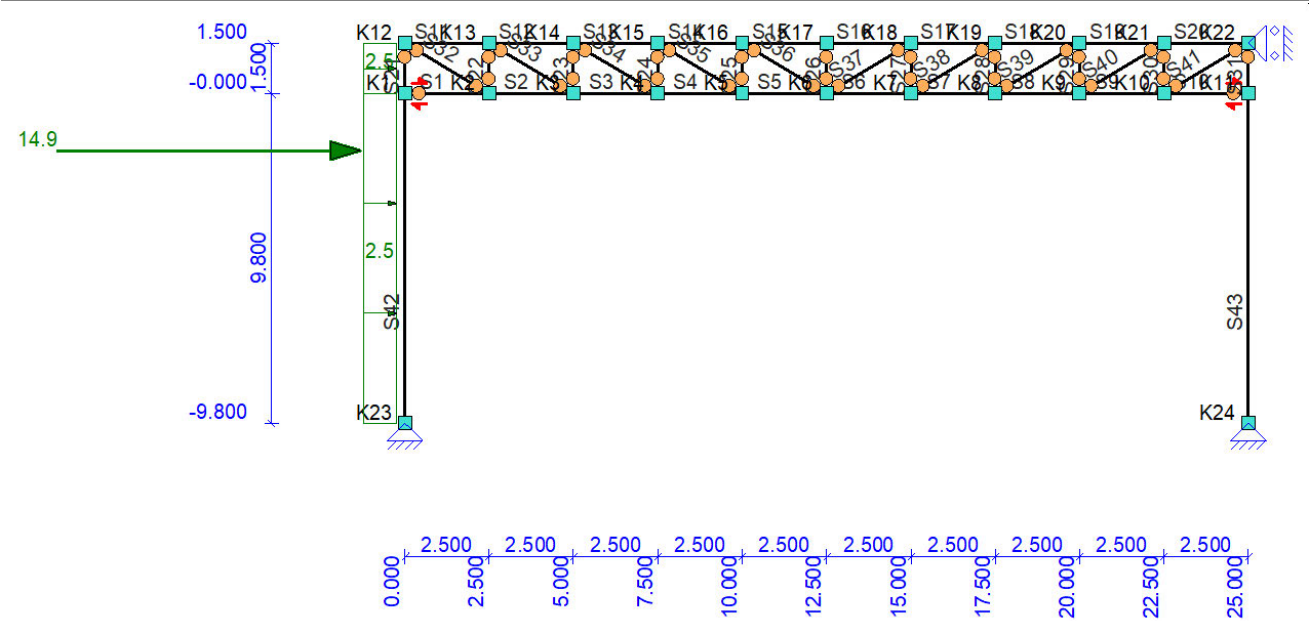
| B.G.2: PERMANENT |             |                   |              |            |          |                  |              |
|------------------|-------------|-------------------|--------------|------------|----------|------------------|--------------|
| Type             | Beginwaarde | Endwaarde         | Beginafstand | Endafstand | Richting | Staaft of knoopp | Omschrijving |
| q                | 20          | 20                | 0.000        | L          | Z        | S11 S20          |              |
| q                | 13          | 13                | 0.000        | L          | Z        | S1 S10           |              |
| N                | 73.0        |                   |              |            | Z        | K1               |              |
| Som lasten       |             | Z: 155.5 Yr: -0.1 |              |            |          |                  |              |
|                  |             |                   | m            | m          |          |                  |              |

B.G.3: Sneeuw



| B.G.3: SNEEUW |             |           |              |            |          |                  |              |
|---------------|-------------|-----------|--------------|------------|----------|------------------|--------------|
| Type          | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Staaft of knoopp | Omschrijving |
| q             | 35          | 35        | 0 000        | L          | Z        | S11 S20          |              |
| N             | 44 0        |           |              |            | Z        | K1               |              |
| Som lasten    |             | Z: 131.5  |              |            |          |                  |              |

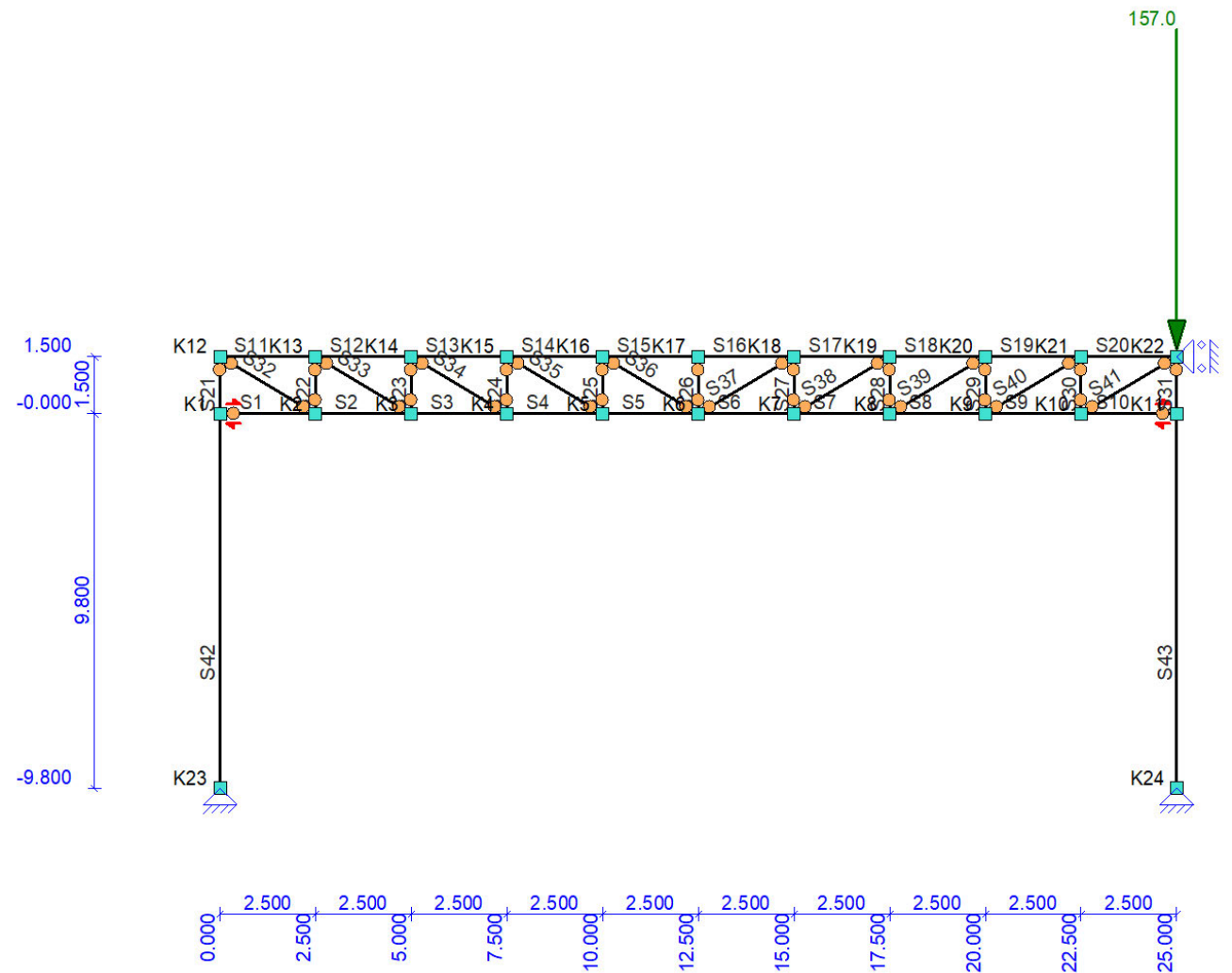
B.G.4: Windbelasting



B.G.4: WINDBELASTING

| Type       | Beginwaarde      | Endwaarde | Beginafstand | Endafstand | Richting | Staaf of knoop | Omschrijving |
|------------|------------------|-----------|--------------|------------|----------|----------------|--------------|
| q          | 25               | 25        | 0.000        | L          | X        | S21 S42        |              |
| F          | 14.9             |           | 8.100        |            | X        | S42            |              |
| Som lasten | X: 42.9 Yr: -0.1 |           |              |            |          |                |              |
|            |                  |           | m            | m          |          |                |              |

B.G.5: Windbelasting



B.G.5: WINDBELASTING

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Staf of knoop | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|---------------|--------------|
| N          | 157.0       |           |              |            | Z        | K22           |              |
| Som lasten |             | Z: 157.0  |              |            |          |               |              |

BELASTINGSCOMBINATIES

| Fundamenteel |               |        |        |        |        |        |        |        |        |
|--------------|---------------|--------|--------|--------|--------|--------|--------|--------|--------|
| B.G.         | Omschrijving  | Fu.C.1 | Fu.C.2 | Fu.C.3 | Fu.C.4 | Fu.C.5 | Fu.C.6 | Fu.C.7 | Fu.C.8 |
| B.G.1        | Eigen gewicht | 1.08   | 0.90   | 1.08   | 0.90   | 1.08   | 0.90   | 1.22   | 0.90   |
| B.G.2        | Permanent     | 1.08   | 0.90   | 1.08   | 0.90   | 1.08   | 0.90   | 1.22   | 0.90   |
| B.G.3        | Sneeuw        | 1.01   | 1.01   |        |        |        |        |        |        |
| B.G.4        | Windbelasting |        |        | 1.17   | 1.17   |        |        |        |        |
| B.G.5        | Windbelasting |        |        |        |        | 1.17   | 1.17   |        |        |

| Karakteristiek |               |           |        |        |        |        |
|----------------|---------------|-----------|--------|--------|--------|--------|
| B.G.           | Omschrijving  | Ka.C.(w1) | Ka.C.1 | Ka.C.2 | Ka.C.3 | Ka.C.4 |
| B.G.1          | Eigen gewicht | 1.00      | 1.00   | 1.00   | 1.00   | 1.00   |
| B.G.2          | Permanent     | 1.00      | 1.00   | 1.00   | 1.00   | 1.00   |
| B.G.3          | Sneeuw        |           |        | 0.75   |        |        |
| B.G.4          | Windbelasting |           |        |        | 0.86   |        |
| B.G.5          | Windbelasting |           |        |        |        | 0.86   |

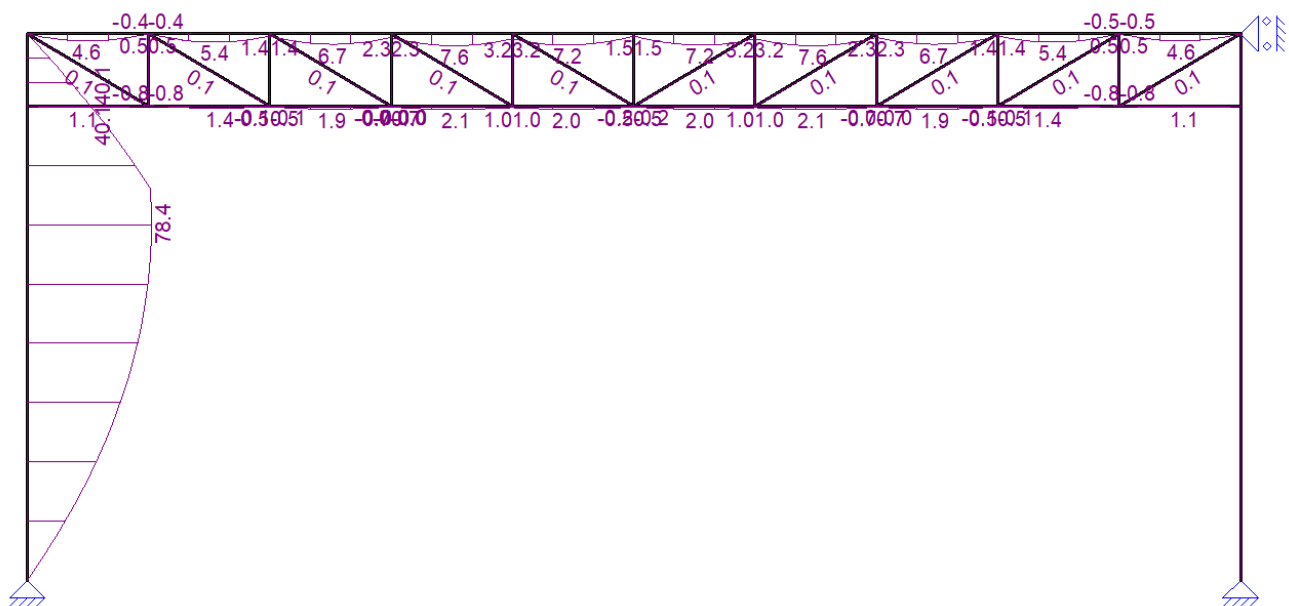
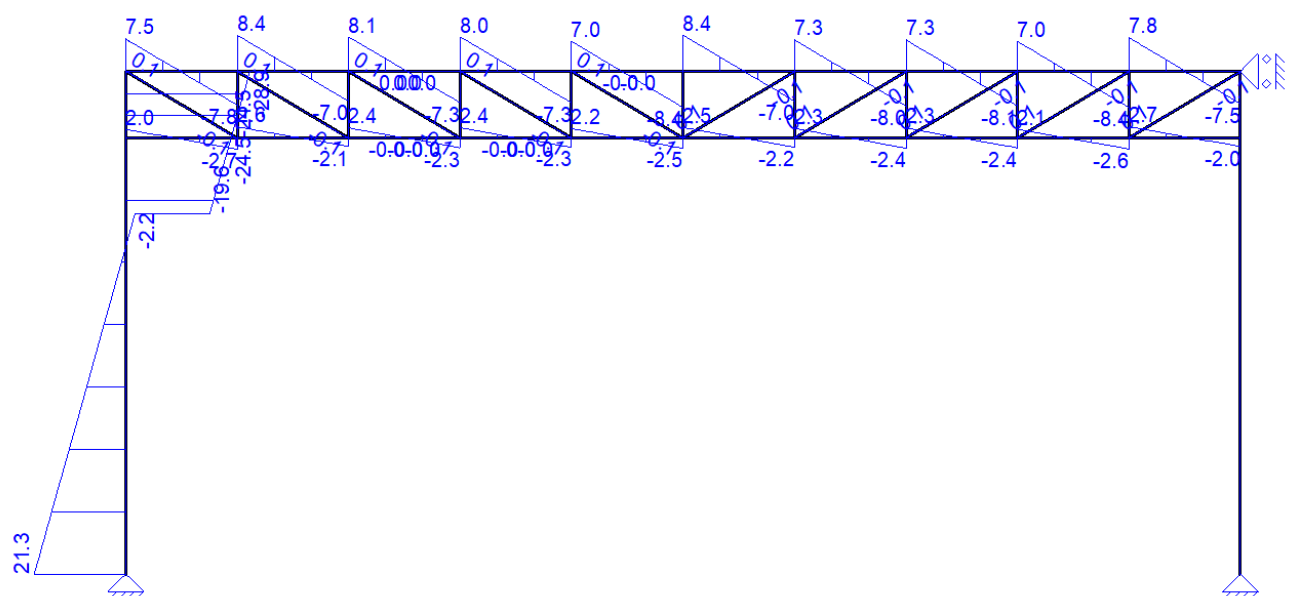
Frequent



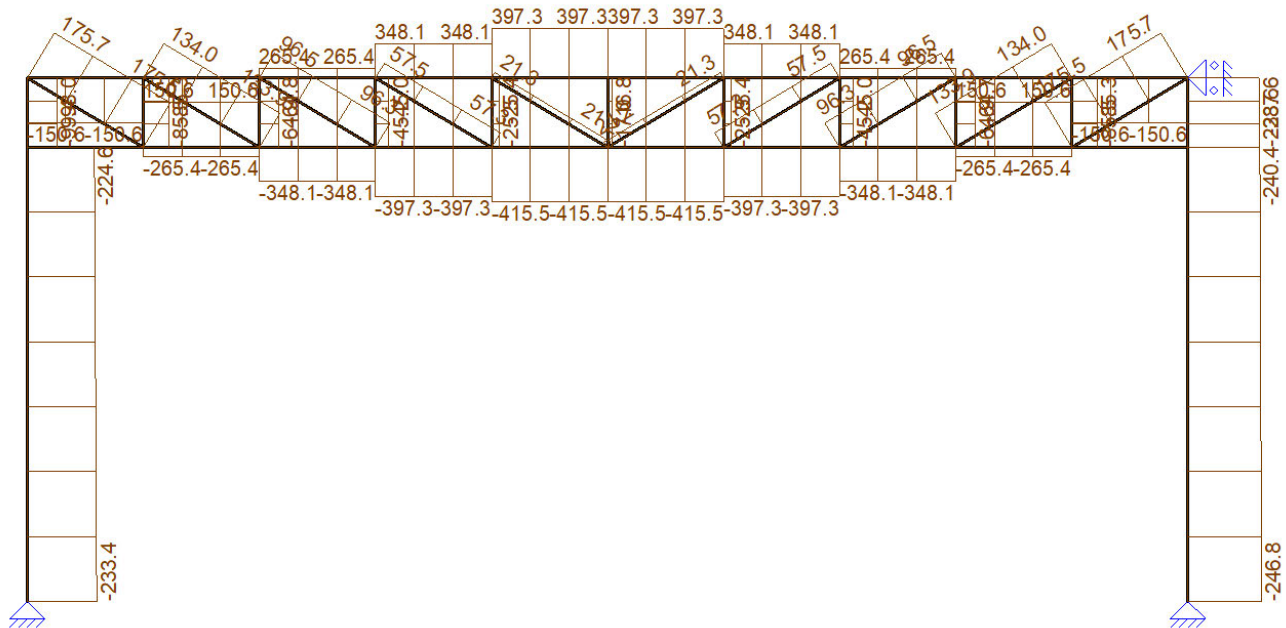
| B.G.  | Omschrijving  | Fr.C.(w1) | Fr.C.1 | Fr.C.2 | Fr.C.3 |
|-------|---------------|-----------|--------|--------|--------|
| B.G.1 | Eigen gewicht | 100       | 100    | 100    | 100    |
| B.G.2 | Permanent     | 100       | 100    | 100    | 100    |
| B.G.3 | Sneeuw        |           | 0.20   |        |        |
| B.G.4 | Windbelasting |           |        | 0.20   |        |
| B.G.5 | Windbelasting |           |        |        | 0.20   |

**Quasi-permanent**

| B.G.  | Omschrijving  | Qu.C.1 |
|-------|---------------|--------|
| B.G.1 | Eigen gewicht | 100    |
| B.G.2 | Permanent     | 100    |
| B.G.3 | Sneeuw        |        |
| B.G.4 | Windbelasting |        |
| B.G.5 | Windbelasting |        |

**Fu.C. Omhu. ende Momenten (My)****Fu.C. Omhu. ende Dwarskracht (Vz)**

Fu.C. Omhu ende Normaa kracht (Nx)



## EXTREME STAAFKRACHTEN

| Staaf               | Veld                 | B.C.  | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM0      | xM0 T/D  | N <sub>max</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> |
|---------------------|----------------------|-------|----------------|------------------|-------------------|----------------|----------|----------|------------------|----------------|------------------|----------------|
| <b>Fundamenteel</b> |                      |       |                |                  |                   |                |          |          |                  |                |                  |                |
| S1                  | Veld 1 (0 000 2 500) | Fu C1 | 0 0            | <b>1.1</b>       | 1 156             | 0 4            | 2 312    |          | 0 0              | 19             | 22               | 22             |
|                     | Veld 1 (0 000 2 500) | Fu C7 | 0 0            | 1 1              | 1 082             | <b>-0.8</b>    | 2 165    |          | 0 0              | <b>2.0</b>     | <b>-2.7</b>      | <b>-2.7</b>    |
| S2                  | Veld 1 (0 000 2 500) | Fu C1 | 0 4            | <b>1.4</b>       | 1 467             | 0 5            | 0 170    | D        | <b>150.6</b>     | 2 5            | 2 5              | 17             |
|                     | Veld 1 (0 000 2 500) | Fu C2 | 0 3            | 1 2              | 1 481             | <b>0.5</b>     | 0 141    | D        | 136 6            | 2 1            | 2 1              | 14             |
| S3                  | Veld 1 (0 000 2 500) | Fu C7 | <b>-0.8</b>    | 1 1              | 1 400             | <b>-0.1</b>    | 0 341    | 2 460 D  | 94 9             | <b>2.6</b>     | <b>2.6</b>       | <b>-2.1</b>    |
|                     | Veld 1 (0 000 2 500) | Fu C1 | 0 5            | <b>1.9</b>       | 1 283             | 0 7            |          | D        | <b>265.4</b>     | 2 1            | 2 1              | 20             |
|                     | Veld 1 (0 000 2 500) | Fu C2 | <b>0.5</b>     | 1 7              | 1 288             | <b>0.7</b>     |          | D        | 240 7            | 1 8            | 1 8              | 17             |
| S4                  | Veld 1 (0 000 2 500) | Fu C7 | <b>-0.1</b>    | 1 4              | 1 261             | <b>-0.0</b>    | 0 035    | 2 487 D  | 167 4            | <b>2.4</b>     | <b>2.4</b>       | <b>-2.3</b>    |
|                     | Veld 1 (0 000 2 500) | Fu C1 | 0 7            | <b>2.1</b>       | 1 325             | <b>1.0</b>     |          | D        | <b>348.1</b>     | 2 2            | 2 2              | 20             |
|                     | Veld 1 (0 000 2 500) | Fu C2 | <b>0.7</b>     | 1 9              | 1 332             | 0 9            |          | D        | 315 7            | 1 9            | 1 9              | 16             |
| S5                  | Veld 1 (0 000 2 500) | Fu C7 | <b>-0.0</b>    | 1 6              | 1 295             | 0 2            | 0 012    | D        | 219 5            | <b>2.4</b>     | <b>2.4</b>       | <b>-2.3</b>    |
|                     | Veld 1 (0 000 2 500) | Fu C1 | <b>1.0</b>     | <b>2.0</b>       | 1 128             | 0 5            |          | D        | <b>397.3</b>     | 1 9            | 2 3              | 23             |
|                     | Veld 1 (0 000 2 500) | Fu C2 | 0 9            | 1 8              | 1 118             | <b>0.5</b>     |          | D        | 360 3            | 1 6            | 1 9              | 19             |
| S6                  | Veld 1 (0 000 2 500) | Fu C7 | 0 2            | 1 5              | 1 178             | <b>-0.2</b>    | 2 435    | D        | 250 5            | <b>2.2</b>     | <b>-2.5</b>      | <b>-2.5</b>    |
|                     | Veld 1 (0 000 2 500) | Fu C1 | 0 5            | <b>2.0</b>       | 1 372             | <b>1.0</b>     |          | D        | <b>397.3</b>     | 2 3            | 2 3              | 19             |
|                     | Veld 1 (0 000 2 500) | Fu C2 | <b>0.5</b>     | 1 8              | 1 382             | 0 9            |          | D        | 360 3            | 1 9            | 1 9              | 16             |
| S7                  | Veld 1 (0 000 2 500) | Fu C7 | <b>-0.2</b>    | 1 5              | 1 322             | 0 2            | 0 065    | D        | 250 5            | <b>2.5</b>     | <b>2.5</b>       | <b>-2.2</b>    |
|                     | Veld 1 (0 000 2 500) | Fu C1 | <b>1.0</b>     | <b>2.1</b>       | 1 175             | 0 7            |          | D        | <b>348.1</b>     | 2 0            | 2 2              | 22             |
|                     | Veld 1 (0 000 2 500) | Fu C2 | 0 9            | 1 9              | 1 169             | <b>0.7</b>     |          | D        | 315 7            | 1 6            | 1 9              | 19             |
| S8                  | Veld 1 (0 000 2 500) | Fu C7 | 0 2            | 1 6              | 1 205             | <b>-0.0</b>    | 2 488    | D        | 219 5            | <b>2.3</b>     | <b>-2.4</b>      | <b>-2.4</b>    |
|                     | Veld 1 (0 000 2 500) | Fu C1 | 0 7            | <b>1.9</b>       | 1 216             | 0 5            |          | D        | <b>265.4</b>     | 2 0            | 2 1              | 21             |
|                     | Veld 1 (0 000 2 500) | Fu C2 | <b>0.7</b>     | 1 7              | 1 211             | <b>0.5</b>     |          | D        | 240 7            | 1 7            | 1 8              | 18             |
| S9                  | Veld 1 (0 000 2 500) | Fu C5 | 0 0            | 1 2              | 1 231             | <b>-0.1</b>    | 0 010    | 2 453 D  | 148 2            | 2 1            | 2 1              | 21             |
|                     | Veld 1 (0 000 2 500) | Fu C7 | <b>-0.0</b>    | 1 4              | 1 238             | 0 1            | 0 013    | 2 464 D  | 167 4            | <b>2.3</b>     | <b>-2.4</b>      | <b>-2.4</b>    |
|                     | Veld 1 (0 000 2 500) | Fu C1 | 0 5            | <b>1.4</b>       | 1 037             | 0 4            | 2 336    | D        | <b>150.6</b>     | 1 7            | 2 4              | 24             |
| S10                 | Veld 1 (0 000 2 500) | Fu C2 | <b>0.5</b>     | 1 3              | 1 024             | 0 3            | 2 365    | D        | 136 6            | 1 4            | 2 1              | 21             |
|                     | Veld 1 (0 000 2 500) | Fu C5 | <b>-0.1</b>    | 1 0              | 1 130             | 0 6            | 0 053    | 2 206 D  | 84 0             | 1 9            | 2 3              | 23             |
|                     | Veld 1 (0 000 2 500) | Fu C7 | 0 1            | 1 1              | 1 102             | <b>-0.8</b>    | 0 041    | 2 163 D  | 94 9             | <b>2.1</b>     | <b>-2.6</b>      | <b>-2.6</b>    |
| S11                 | Veld 1 (0 000 2 500) | Fu C1 | 0 4            | <b>1.1</b>       | 1 341             | 0 0            | 0 182    |          | 0 0              | 2 2            | 2 2              | 19             |
|                     | Veld 1 (0 000 2 500) | Fu C7 | <b>-0.8</b>    | 1 1              | 1 416             | 0 0            | 0 332    |          | 0 0              | <b>2.7</b>     | <b>2.7</b>       | <b>-2.0</b>    |
|                     | Veld 1 (0 000 2 500) | Fu C1 | 0 0            | <b>4.6</b>       | 1 224             | 0 4            | 2 448    | T        | <b>-150.6</b>    | <b>7.5</b>     | <b>-7.8</b>      | <b>-7.8</b>    |
| S12                 | Veld 1 (0 000 2 500) | Fu C2 | 0 0            | 4 2              | 1 219             | <b>-0.4</b>    | 2 437    | T        | 136 6            | 7 0            | 7 3              | 7 3            |
|                     | Veld 1 (0 000 2 500) | Fu C3 | 0 0            | 2 3              | 1 321             | <b>0.5</b>     |          | T        | 112 8            | 3 5            | 3 5              | 3 1            |
|                     | Veld 1 (0 000 2 500) | Fu C7 | 0 0            | 2 5              | 1 298             | 0 4            |          | T        | 94 9             | 3 8            | <b>3.8</b>       | 3 6            |
| S12                 | Veld 1 (0 000 2 500) | Fu C1 | 0 4            | <b>5.4</b>       | 1 369             | <b>1.4</b>     | 0 048    | T        | <b>-265.4</b>    | <b>8.4</b>     | <b>8.4</b>       | <b>-7.0</b>    |
|                     | Veld 1 (0 000 2 500) | Fu C2 | <b>-0.4</b>    | 4 9              | 1 368             | 1 2            | 0 059    | T        | 240 7            | 7 8            | 7 8              | 6 5            |
| <b>m</b>            |                      |       | <b>kNm</b>     | <b>kNm</b>       | <b>m</b>          | <b>kNm</b>     | <b>m</b> | <b>m</b> | <b>kN</b>        | <b>kN</b>      | <b>kN</b>        | <b>kN</b>      |

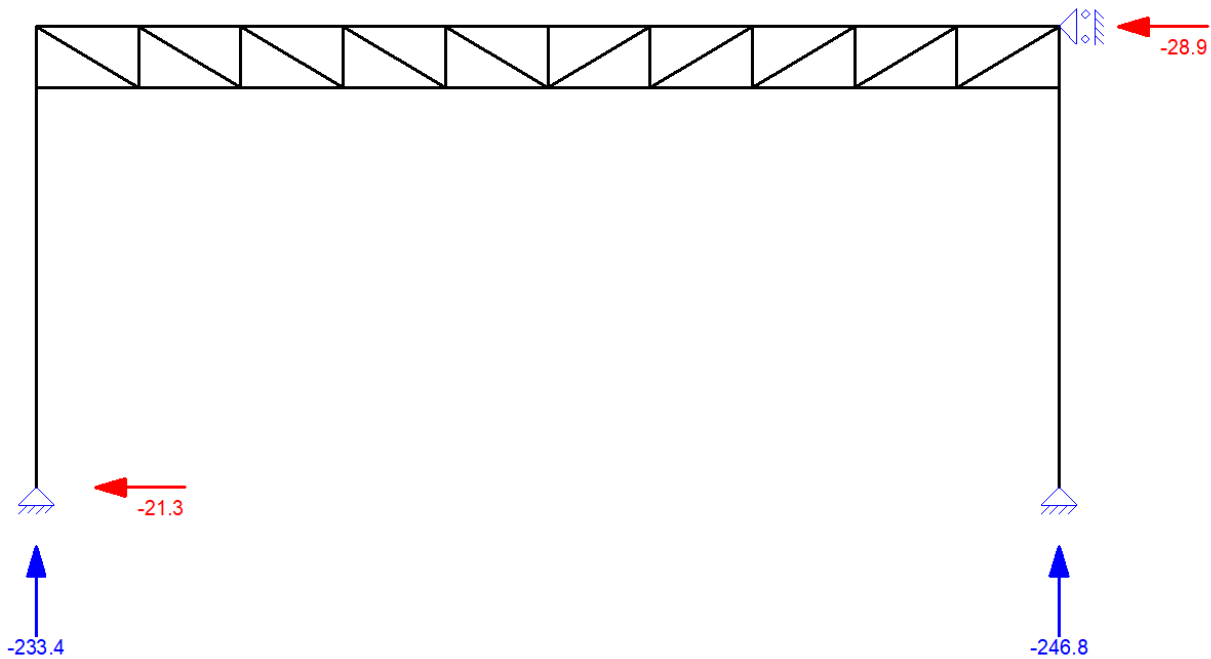
| Staaf | Veld                 | B.C.  | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM0   | xM0 T/D | N <sub>max</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> |
|-------|----------------------|-------|----------------|------------------|-------------------|----------------|-------|---------|------------------|----------------|------------------|----------------|
| S13   | Veld 1 (0 000 2 500) | Fu C3 | 0.5            | 3.0              | 1 381             | 1.3            |       | T       | 176.9            | 3.6            | 3.6              | 2.9            |
|       | Veld 1 (0 000 2 500) | Fu C1 | 1.4            | 6.7              | 1 309             | 2.3            |       | T       | -348.1           | 8.1            | 8.1              | -7.3           |
| S14   | Veld 1 (0 000 2 500) | Fu C1 | 2.3            | 7.6              | 1 309             | 3.2            |       | T       | -397.3           | 8.0            | 8.0              | -7.3           |
| S15   | Veld 1 (0 000 2 500) | Fu C1 | 3.2            | 7.2              | 1 131             | 1.4            |       | T       | -415.5           | 7.0            | -8.4             | -8.4           |
| S16   | Veld 1 (0 000 2 500) | Fu C3 | 2.3            | 4.0              | 1 121             | 1.5            |       | T       | 260.6            | 2.9            | 3.6              | 3.6            |
|       | Veld 1 (0 000 2 500) | Fu C1 | 1.4            | 7.2              | 1 369             | 3.2            |       | T       | -415.5           | 8.4            | 8.4              | -7.0           |
| S17   | Veld 1 (0 000 2 500) | Fu C3 | 1.5            | 4.0              | 1 379             | 2.3            |       | T       | 260.6            | 3.6            | 3.6              | 2.9            |
|       | Veld 1 (0 000 2 500) | Fu C1 | 3.2            | 7.6              | 1 191             | 2.3            |       | T       | -397.3           | 7.3            | -8.0             | -8.0           |
| S18   | Veld 1 (0 000 2 500) | Fu C1 | 2.3            | 6.7              | 1 191             | 1.4            |       | T       | -348.1           | 7.3            | -8.1             | -8.1           |
| S19   | Veld 1 (0 000 2 500) | Fu C1 | 1.4            | 5.4              | 1 131             | 0.4            | 2 452 | T       | -265.4           | 7.0            | -8.4             | -8.4           |
|       | Veld 1 (0 000 2 500) | Fu C2 | 1.2            | 4.9              | 1 132             | -0.5           | 2 441 | T       | 240.7            | 6.5            | 7.8              | 7.8            |
| S20   | Veld 1 (0 000 2 500) | Fu C3 | 1.3            | 3.0              | 1 119             | 0.5            |       | T       | 176.9            | 2.9            | 3.6              | 3.6            |
|       | Veld 1 (0 000 2 500) | Fu C1 | 0.4            | 4.6              | 1 276             | -0.0           | 0 052 | T       | -150.6           | 7.8            | 7.8              | -7.5           |
|       | Veld 1 (0 000 2 500) | Fu C2 | -0.5           | 4.2              | 1 282             | 0.0            | 0 063 | T       | 136.6            | 7.3            | 7.3              | 7.0            |
|       | Veld 1 (0 000 2 500) | Fu C3 | 0.5            | 2.3              | 1 179             | 0.0            |       | T       | 112.8            | 3.1            | 3.5              | 3.5            |
| S21   | Veld 1 (0 000 2 500) | Fu C7 | 0.4            | 2.5              | 1 203             | 0.0            |       | T       | 94.9             | 3.6            | -3.8             | 3.8            |
|       | Veld 1 (0 000 1 500) | Fu C1 | 0.0            |                  |                   | 0.0            |       | T       | -99.4            | 0.0            | 0.0              | 0.0            |
| S22   | Veld 1 (0 000 1 500) | Fu C3 | 40.1           |                  |                   | 0.0            |       | T       | 55.3             | -24.5          | -28.9            | -28.9          |
|       | Veld 1 (0 000 1 500) | Fu C1 | 0.0            |                  |                   | 0.0            |       | T       | -85.5            | 0.0            | 0.0              | 0.0            |
| S23   | Veld 1 (0 000 1 500) | Fu C1 | 0.0            |                  |                   | 0.0            |       | T       | -64.9            | 0.0            | 0.0              | 0.0            |
| S24   | Veld 1 (0 000 1 500) | Fu C1 | 0.0            |                  |                   | 0.0            |       | T       | -45.2            | 0.0            | 0.0              | 0.0            |
| S25   | Veld 1 (0 000 1 500) | Fu C1 | 0.0            |                  |                   | 0.0            |       | T       | -25.5            | 0.0            | 0.0              | 0.0            |
| S26   | Veld 1 (0 000 1 500) | Fu C1 | 0.0            |                  |                   | 0.0            |       | T       | -17.0            | 0.0            | 0.0              | 0.0            |
| S27   | Veld 1 (0 000 1 500) | Fu C1 | 0.0            |                  |                   | 0.0            |       | T       | -25.5            | 0.0            | 0.0              | 0.0            |
| S28   | Veld 1 (0 000 1 500) | Fu C1 | 0.0            |                  |                   | 0.0            |       | T       | -45.2            | 0.0            | 0.0              | 0.0            |
| S29   | Veld 1 (0 000 1 500) | Fu C1 | 0.0            |                  |                   | 0.0            |       | T       | -64.9            | 0.0            | 0.0              | 0.0            |
| S30   | Veld 1 (0 000 1 500) | Fu C1 | 0.0            |                  |                   | 0.0            |       | T       | -85.5            | 0.0            | 0.0              | 0.0            |
| S31   | Veld 1 (0 000 1 500) | Fu C5 | 0.0            |                  |                   | 0.0            |       | T       | -238.6           | 0.0            | 0.0              | 0.0            |
| S32   | Veld 1 (0 000 2 915) | Fu C1 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 175.7            | 0.1            | 0.1              | 0.1            |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 110.8            | 0.1            | 0.1              | -0.1           |
| S33   | Veld 1 (0 000 2 915) | Fu C1 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 134.0            | 0.1            | 0.1              | 0.1            |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 84.6             | 0.1            | -0.1             | -0.1           |
| S34   | Veld 1 (0 000 2 915) | Fu C1 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 96.5             | 0.1            | 0.1              | 0.1            |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 60.9             | 0.1            | 0.1              | -0.1           |
| S35   | Veld 1 (0 000 2 915) | Fu C1 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 57.5             | 0.1            | 0.1              | 0.1            |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 36.3             | 0.1            | 0.1              | -0.1           |
| S36   | Veld 1 (0 000 2 915) | Fu C1 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 21.3             | 0.1            | 0.1              | 0.1            |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 13.6             | 0.1            | -0.1             | -0.1           |
| S37   | Veld 1 (0 000 2 915) | Fu C1 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 21.3             | 0.1            | 0.1              | 0.1            |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 13.6             | 0.1            | -0.1             | -0.1           |
| S38   | Veld 1 (0 000 2 915) | Fu C1 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 57.5             | 0.1            | 0.1              | 0.1            |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 36.3             | 0.1            | 0.1              | -0.1           |
| S39   | Veld 1 (0 000 2 915) | Fu C1 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 96.5             | 0.1            | 0.1              | 0.1            |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 60.9             | 0.1            | 0.1              | -0.1           |
| S40   | Veld 1 (0 000 2 915) | Fu C1 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 134.0            | 0.1            | 0.1              | 0.1            |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 84.6             | 0.1            | 0.1              | -0.1           |
| S41   | Veld 1 (0 000 2 915) | Fu C1 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 175.7            | 0.1            | 0.1              | 0.1            |
|       | Veld 1 (0 000 2 915) | Fu C7 | 0.0            | 0.1              | 1 458             | 0.0            |       | D       | 110.8            | 0.1            | -0.1             | -0.1           |
| S42   | Veld 1 (0 000 9 800) | Fu C1 | 0.0            |                  |                   | 0.0            |       | T       | -233.4           | 0.0            | 0.0              | 0.0            |
|       | Veld 1 (0 000 9 800) | Fu C3 | 0.0            | 78.4             | 7 351             | 40.1           |       | T       | 144.8            | 21.3           | -24.5            | -24.5          |
| S43   | Veld 1 (0 000 9 800) | Fu C5 | 0.0            |                  |                   | 0.0            |       | T       | -246.8           | 0.0            | 0.0              | 0.0            |
| m     |                      |       | kNm            | kNm              | m                 | kNm            | m     | m       | kN               | kN             | kN               | kN             |

OPLGREACTIES (BELASTINGSGEVALLEN)

| B.C.  | Oplegging    | Positie | X    | Z      | Yr  |
|-------|--------------|---------|------|--------|-----|
| B G 1 | O1           | K23     | 0.0  | 19.8   | 0.0 |
|       | O2           | K24     | 0.0  | 17.2   | 0.0 |
|       | O3           | K22     | 0.0  | 0.0    | 0.0 |
|       | Som Reacties |         | -0.0 | -37.0  |     |
|       | Som Lasten   |         | -0.0 | 37.0   |     |
| B G 2 | O1           | K23     | 0.0  | 114.3  | 0.0 |
|       | O2           | K24     | 0.0  | 41.3   | 0.0 |
|       | O3           | K22     | 0.0  | 0.0    | 0.0 |
|       | Som Reacties |         | -0.0 | -155.5 |     |
|       | Som Lasten   |         | 0.0  | 155.5  |     |
| B G 3 | O1           | K23     | 0.0  | 87.8   | 0.0 |
|       |              |         | kN   | kN     | kNm |

| B.C. | Oplegging    | Positie | X     | Z      | Yr  |
|------|--------------|---------|-------|--------|-----|
|      | O2           | K24     | 0.0   | 43.8   | 0.0 |
|      | O3           | K22     | 0.0   | 0.0    | 0.0 |
|      | Som Reacties |         | -0.0  | -131.5 |     |
|      | Som Lasten   |         | 0.0   | 131.5  |     |
|      |              |         |       |        |     |
| BG4  | O1           | K23     | 18.2  | 0.0    | 0.0 |
|      | O2           | K24     | 0.0   | 0.0    | 0.0 |
|      | O3           | K22     | 24.7  | 0.0    | 0.0 |
|      | Som Reacties |         | -42.9 | -0.0   |     |
|      | Som Lasten   |         | 42.9  | 0.0    |     |
| BG5  | O1           | K23     | 0.0   | 0.0    | 0.0 |
|      | O2           | K24     | 0.0   | 157.0  | 0.0 |
|      | O3           | K22     | 0.0   | 0.0    | 0.0 |
|      | Som Reacties |         | -0.0  | -157.0 |     |
|      | Som Lasten   |         | 0.0   | 157.0  |     |
|      |              |         | kN    | kN     | kNm |

Fu.C. Omhu ende Op egreact es

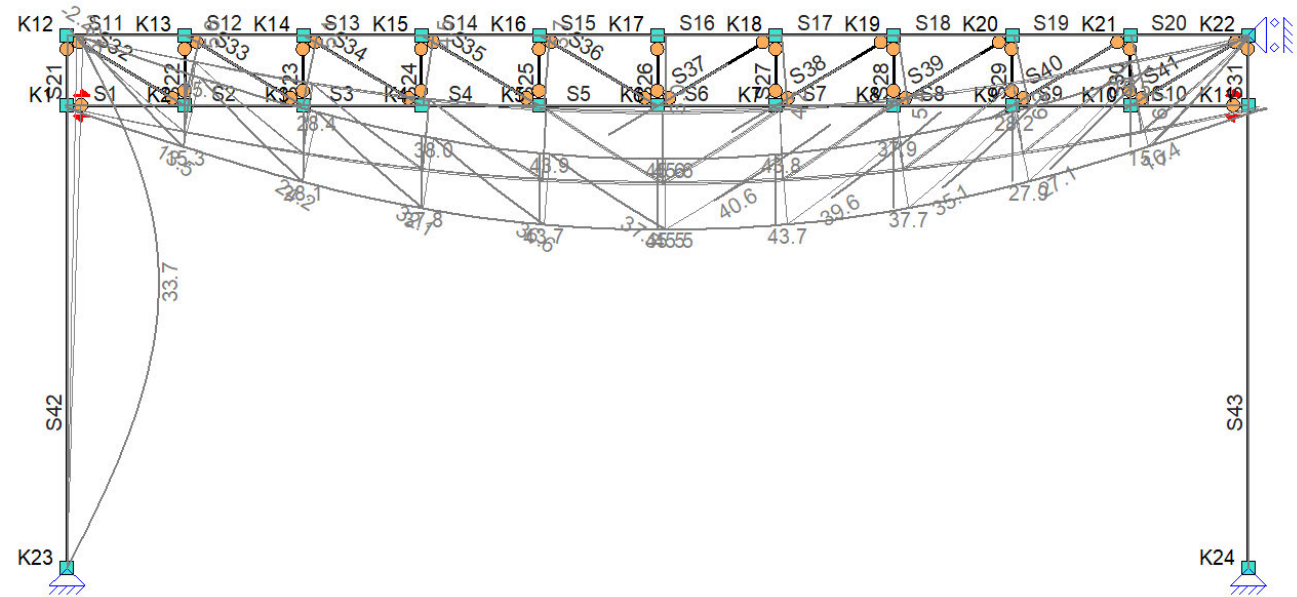


## OPLEGREACTIES (FUNDAMENTEEL)

| B.C.  | Oplegging    | Positie | X     | Z      | Yr  |
|-------|--------------|---------|-------|--------|-----|
| Fu C1 | O1           | K23     | 0.0   | 233.4  | 0.0 |
|       | O2           | K24     | 0.0   | 107.3  | 0.0 |
|       | O3           | K22     | 0.0   | 0.0    | 0.0 |
|       | Som Reacties |         | -0.0  | -340.7 |     |
|       | Som Lasten   |         | -0.0  | 340.7  |     |
| Fu C2 | O1           | K23     | 0.0   | 209.3  | 0.0 |
|       | O2           | K24     | 0.0   | 96.8   | 0.0 |
|       | O3           | K22     | 0.0   | 0.0    | 0.0 |
|       | Som Reacties |         | -0.0  | -306.0 |     |
|       | Som Lasten   |         | -0.0  | 306.0  |     |
| Fu C3 | O1           | K23     | 21.3  | 144.8  | 0.0 |
|       | O2           | K24     | 0.0   | 63.1   | 0.0 |
|       | O3           | K22     | 28.9  | 0.0    | 0.0 |
|       | Som Reacties |         | -50.2 | -207.9 |     |
|       | Som Lasten   |         | 50.2  | 207.9  |     |
| Fu C4 | O1           | K23     | 21.3  | 120.6  | 0.0 |
|       | O2           | K24     | 0.0   | 52.6   | 0.0 |
|       | O3           | K22     | 28.9  | 0.0    | 0.0 |
|       |              |         | kN    | kN     | kNm |

| B.C.  | Oplegging    | Positie | X     | Z      | Yr  |
|-------|--------------|---------|-------|--------|-----|
|       | Som Reacties |         | -50.2 | -173.2 |     |
|       | Som Lasten   |         | 50.2  | 173.2  |     |
| Fu C5 | O1           | K23     | 0 0   | 144 8  | 0 0 |
|       | O2           | K24     | 0 0   | 246 8  | 0 0 |
|       | O3           | K22     | 0 0   | 0 0    | 0 0 |
|       | Som Reacties |         | -0.0  | -391.6 |     |
|       | Som Lasten   |         | -0.0  | 391.6  |     |
| Fu C6 | O1           | K23     | 0 0   | 120 6  | 0 0 |
|       | O2           | K24     | 0 0   | 236 3  | 0 0 |
|       | O3           | K22     | 0 0   | 0 0    | 0 0 |
|       | Som Reacties |         | -0.0  | -356.9 |     |
|       | Som Lasten   |         | -0.0  | 356.9  |     |
| Fu C7 | O1           | K23     | 0 0   | 163 5  | 0 0 |
|       | O2           | K24     | 0 0   | 71 3   | 0 0 |
|       | O3           | K22     | 0 0   | 0 0    | 0 0 |
|       | Som Reacties |         | -0.0  | -234.8 |     |
|       | Som Lasten   |         | -0.0  | 234.8  |     |
| Fu C8 | O1           | K23     | 0 0   | 120 6  | 0 0 |
|       | O2           | K24     | 0 0   | 52 6   | 0 0 |
|       | O3           | K22     | 0 0   | 0 0    | 0 0 |
|       | Som Reacties |         | -0.0  | -173.2 |     |
|       | Som Lasten   |         | -0.0  | 173.2  |     |
|       |              |         | kN    | kN     | kNm |

Ka.C. Omhu ende Doorbu g ngen

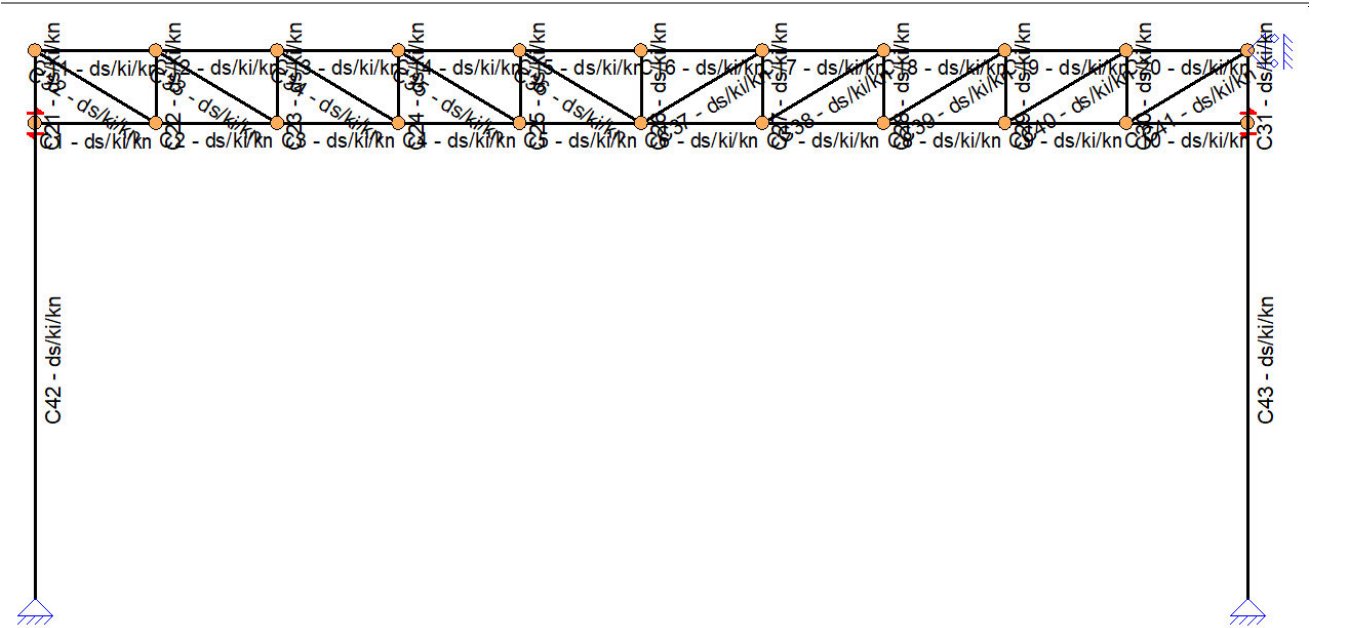


EXTREME DOORBUIGINGEN (KARAKTERISTIEK)

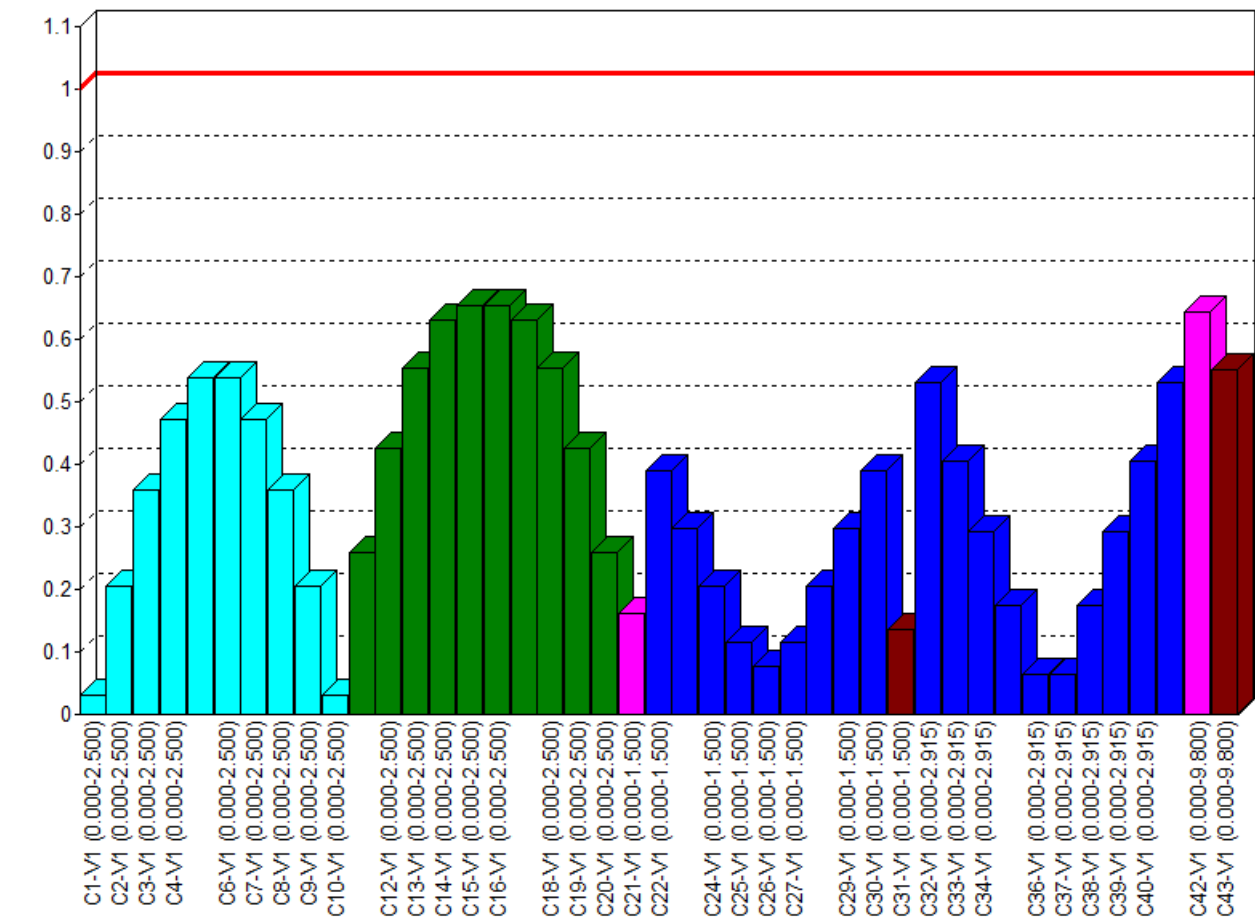
| Staaf | Veld                 | B.C.  | Knoop Begin |      |        | Staaf | Knoop End |             |        |      |
|-------|----------------------|-------|-------------|------|--------|-------|-----------|-------------|--------|------|
|       |                      |       | X           | Z    | Z'afst |       | Z'        | Z' glb dist | Z' glb | X    |
| S1    | Veld 1 (0.000 2.500) | Ka C2 | 0.8         | 0.9  | 1.206  | 0.3   | 2.500     | 15.3        | 0.8    | 15.3 |
| S2    | Veld 1 (0.000 2.500) |       | 0.8         | 15.3 | 1.319  | 0.4   | 2.500     | 28.1        | 0.3    | 28.1 |
| S3    | Veld 1 (0.000 2.500) |       | 0.3         | 28.1 | 1.257  | 0.5   | 2.500     | 37.8        | 0.6    | 37.8 |
| S4    | Veld 1 (0.000 2.500) |       | 0.6         | 37.8 | 1.265  | 0.6   | 2.500     | 43.7        | 1.7    | 43.7 |
| S5    | Veld 1 (0.000 2.500) |       | 1.7         | 43.7 | 1.224  | 0.6   | 2.432     | 45.5        | 3.0    | 45.5 |
| S6    | Veld 1 (0.000 2.500) |       | 3.0         | 45.5 | 1.276  | 0.6   | 0.000     | 45.5        | 4.2    | 43.7 |
| S7    | Veld 1 (0.000 2.500) |       | 4.2         | 43.7 | 1.235  | 0.6   | 0.000     | 43.7        | 5.4    | 37.7 |
| S8    | Veld 1 (0.000 2.500) |       | 5.4         | 37.7 | 1.243  | 0.5   | 0.000     | 37.7        | 6.2    | 27.9 |
| S9    | Veld 1 (0.000 2.500) |       | 6.2         | 27.9 | 1.183  | 0.4   | 0.000     | 27.9        | 6.7    | 15.1 |
| S10   | Veld 1 (0.000 2.500) |       | 6.7         | 15.1 | 1.292  | 0.3   | 0.000     | 15.1        | 6.7    | 0.5  |
| S11   | Veld 1 (0.000 2.500) |       | 5.9         | 0.9  | 1.244  | 0.3   | 2.500     | 15.7        | 5.6    | 15.7 |
|       | m                    |       |             | mm   | mm     | m     | mm        | m           | mm     | mm   |

| Staaf | Veld                | B.C.               | Knoop Begin |     | Z'afst | Z'   | Staaf | Z' glb dist | Z' glb | Knoop End |     |
|-------|---------------------|--------------------|-------------|-----|--------|------|-------|-------------|--------|-----------|-----|
|       |                     |                    | X           | Z   |        |      |       |             |        | X         | Z   |
| S12   | Veld 1 (0 000 2500) | Ka C3<br>Ka C(w 1) | 56          | 157 | 1285   | 0.4  | 2500  | 284         | 51     | 284       |     |
| S13   | Veld 1 (0 000 2500) |                    | 51          | 284 | 1264   | 0.5  | 2500  | 380         | 45     | 380       |     |
| S14   | Veld 1 (0 000 2500) |                    | 45          | 380 | 1262   | 0.6  | 2500  | 439         | 37     | 439       |     |
| S15   | Veld 1 (0 000 2500) |                    | 37          | 439 | 1223   | 0.5  | 2436  | 456         | 29     | 456       |     |
| S16   | Veld 1 (0 000 2500) |                    | 29          | 456 | 1277   | 0.5  | 0000  | 456         | 22     | 438       |     |
| S17   | Veld 1 (0 000 2500) |                    | 22          | 438 | 1238   | 0.6  | 0000  | 438         | 14     | 379       |     |
| S18   | Veld 1 (0 000 2500) |                    | 14          | 379 | 1236   | 0.5  | 0000  | 379         | 08     | 282       |     |
| S19   | Veld 1 (0 000 2500) |                    | 08          | 282 | 1215   | 0.4  | 0000  | 282         | 03     | 155       |     |
| S20   | Veld 1 (0 000 2500) |                    | 03          | 155 | 1257   | 0.3  | 0000  | 155         | 00     | 06        |     |
| S21   | Veld 1 (0 000 1500) |                    | 06          | 172 | 0638   | 0.2  | 0000  | 172         | 06     | 41        |     |
| S32   | Veld 1 (0 000 2915) |                    | 34          | 13  | 1458   | 0.6  | 2915  | 83          | 44     | 83        |     |
| S33   | Veld 1 (0 000 2915) |                    | 79          | 65  | 1458   | 0.6  | 2915  | 148         | 87     | 148       |     |
| S34   | Veld 1 (0 000 2915) |                    | 116         | 133 | 1458   | 0.6  | 2915  | 197         | 122    | 197       |     |
| S35   | Veld 1 (0 000 2915) |                    | 143         | 185 | 1458   | 0.6  | 2915  | 224         | 147    | 224       |     |
| S36   | Veld 1 (0 000 2915) |                    | 158         | 218 | 1458   | 0.6  | 2004  | 231         | 159    | 229       |     |
| S37   | Veld 1 (0 000 2915) |                    | 128         | 248 | 1458   | 0.6  | 0883  | 250         | 126    | 236       |     |
| S38   | Veld 1 (0 000 2915) |                    | 115         | 242 | 1458   | 0.6  | 0000  | 242         | 112    | 203       |     |
| S39   | Veld 1 (0 000 2915) |                    | 90          | 214 | 1458   | 0.6  | 0000  | 214         | 85     | 150       |     |
| S40   | Veld 1 (0 000 2915) |                    | 55          | 166 | 1458   | 0.6  | 0000  | 166         | 47     | 82        |     |
| S41   | Veld 1 (0 000 2915) |                    | 12          | 100 | 1458   | 0.6  | 0000  | 100         | 02     | 03        |     |
| S42   | Veld 1 (0 000 9800) |                    | Ka C3       | 00  | 00     | 5281 | 23.8  | 6042        | 337    | 06        | 172 |
|       | m                   |                    |             | mm  | mm     | m    | mm    | m           | mm     | mm        | mm  |

Staa def n t e

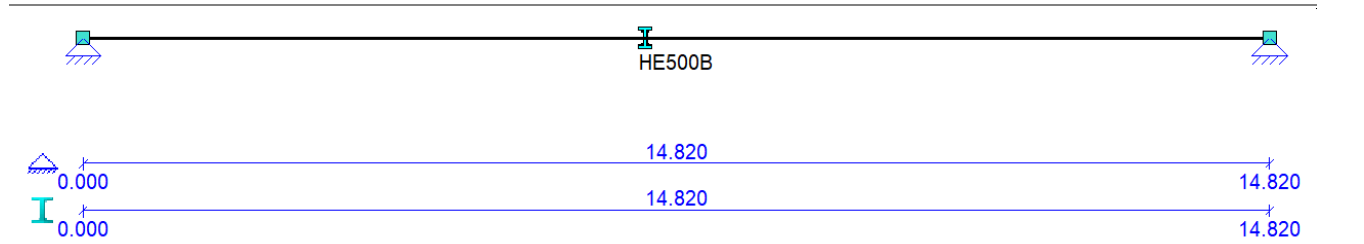


Afb. Staa UC D agram



|                        |                                                                                                                                                                                    |                                     |               |                  |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------|------------------|
| VAN BOXSEL ENGINEERING |                                                                                                                                                                                    | T: 0162-451280 E: info@vanboxsel.nl |               | www.vanboxsel.nl |
| Projectomschrijving    | Uitbreiding terrein Coolrec                                                                                                                                                        |                                     | Projectnummer | 23-157           |
| Onderdeel              |                                                                                                                                                                                    |                                     | Constructeur  |                  |
| Opdrachtgever          | Coolrec                                                                                                                                                                            |                                     | Eenheden      | m, mm, kN, kNm   |
| Bestand                | C:\Users\pm\van Boxsel Engineering\Ruby - Documenten\Documenten\2023\23-157 Coolrec\1. berekeningen intern\Rapport B\Matrixframe modellen\23-157 Ligger HEB500 - overhead deur.mxf |                                     |               |                  |

Construct e



BALKGEOMETRIE

| Positie          | Profielnaam | Hoek | Traagheidsmoment | Materiaal | E-Modulus  | Uitzettingcoeff | Gewicht |
|------------------|-------------|------|------------------|-----------|------------|-----------------|---------|
| 0 000 14 820 (L) | HE500B      | 0    | 1 0718e+09       | S235      | 2 1000e+05 | 12 0000e 06     | 1 87    |
| m                |             | °    | mm <sup>4</sup>  |           | Nmm        | C°m             | kN/m    |

MATERIALEN

| Materiaalnaam | Poison | Dichtheid        | E-Modulus  | Uitzettingcoeff |
|---------------|--------|------------------|------------|-----------------|
| S235          | 0 30   | 78 50            | 2 1000e+05 | 12 0000e 06     |
|               |        | kNm <sup>3</sup> | Nmm        | C°m             |

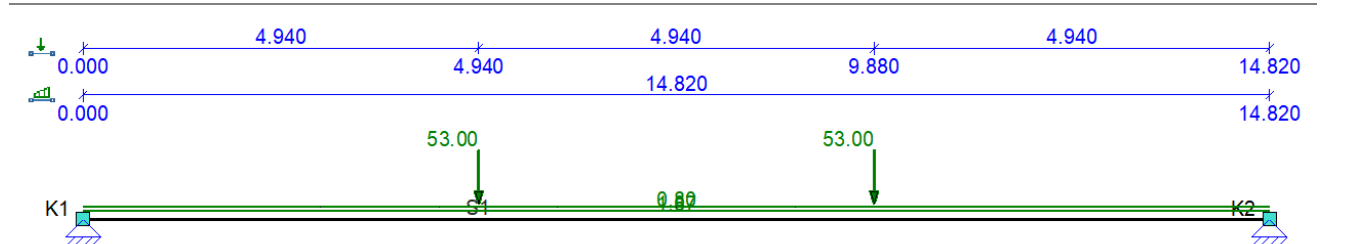
OPLEGGINGEN

| Oplegging | Object | Positie    | Z    | Yr      |
|-----------|--------|------------|------|---------|
| O1        | S1     | 0 000      | Vast | Vrij    |
| O2        | S1     | 14 820 (L) | Vast | Vrij    |
|           |        | m          | kNm  | kNm/rad |

BELASTINGSGEVALLEN TYPEN

| Label | Omschrijving | B.G.Type        | Gunstig/Ong. | Element | Niveau | Veld | Ψ <sub>0</sub> | Ψ <sub>1</sub> | Ψ <sub>2</sub> | C <sub>prob</sub> UGT/GGT |
|-------|--------------|-----------------|--------------|---------|--------|------|----------------|----------------|----------------|---------------------------|
| B.G.1 | Permanent    | Permanent       |              |         | Nvt    | Nvt  |                |                |                |                           |
| B.G.2 | Sneeuw       | Sneeuwbelasting |              |         | Nvt    | Nvt  |                | 0 20           |                | 1 00/1 00                 |

B.G.1: Permanent

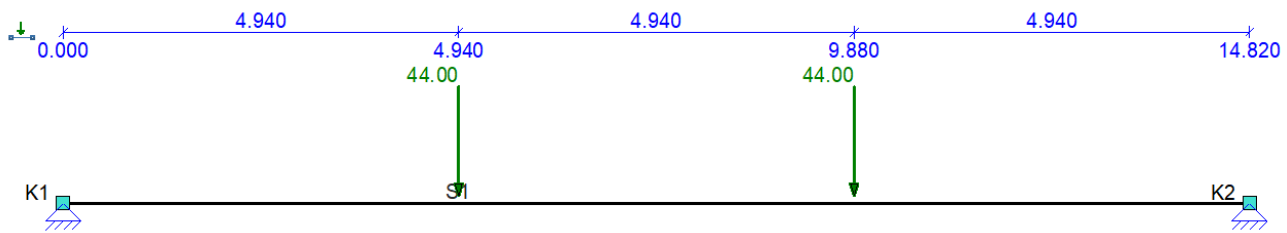


B.G.1: PERMANENT

| Type       | Beginwaarde | Endwaarde   | Beginafstand | Eindafstand | Richting | Omschrijving |
|------------|-------------|-------------|--------------|-------------|----------|--------------|
| qG         | 1 00 (1 87) | 1 00 (1 87) | 0 000        | 14 820 (L)  | Z        |              |
| F          | 53 00       |             | 4 940        |             | Z        |              |
| F          | 53 00       |             | 9 880        |             | Z        |              |
| q          | 0 80        | 0 80        | 0 000        | 14 820 (L)  | Z        |              |
| Som lasten | Z: 145.62   |             |              |             |          |              |
|            |             |             | m            | m           |          |              |



## B.G.2: Sneeuw



## B.G.2: SNEEUW

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|--------------|
| F          | 44.00       |           | 4.940        |            | Z        |              |
| F          | 44.00       |           | 9.880        |            | Z        |              |
| Som lasten | Z: 88.00    |           |              |            |          |              |
|            |             |           | m            | m          |          |              |

## BELASTINGSCOMBINATIES

## Fundamenteel

| B.G.  | Omschrijving | Fu.C.1 | Fu.C.2 |
|-------|--------------|--------|--------|
| B G 1 | Permanent    | 1.08   | 1.22   |
| B G 2 | Sneeuw       | 1.35   |        |

## Karakteristiek

| B.G.  | Omschrijving | Ka.C.(w1) | Ka.C.1 | Ka.C.2 |
|-------|--------------|-----------|--------|--------|
| B G 1 | Permanent    | 1.00      | 1.00   | 1.00   |
| B G 2 | Sneeuw       |           |        | 1.00   |

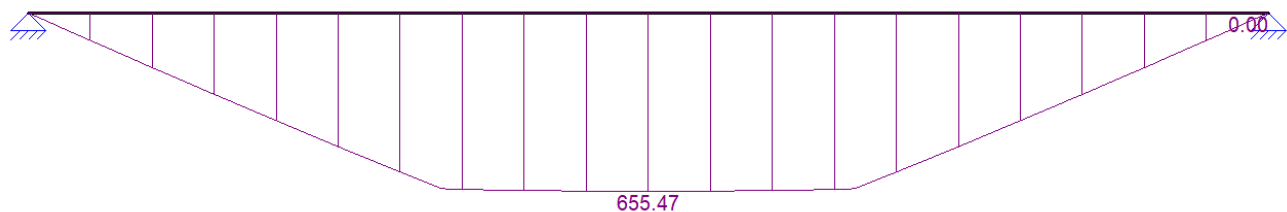
## Frequent

| B.G.  | Omschrijving | Fr.C.(w1) | Fr.C.1 |
|-------|--------------|-----------|--------|
| B G 1 | Permanent    | 1.00      | 1.00   |
| B G 2 | Sneeuw       |           | 0.20   |

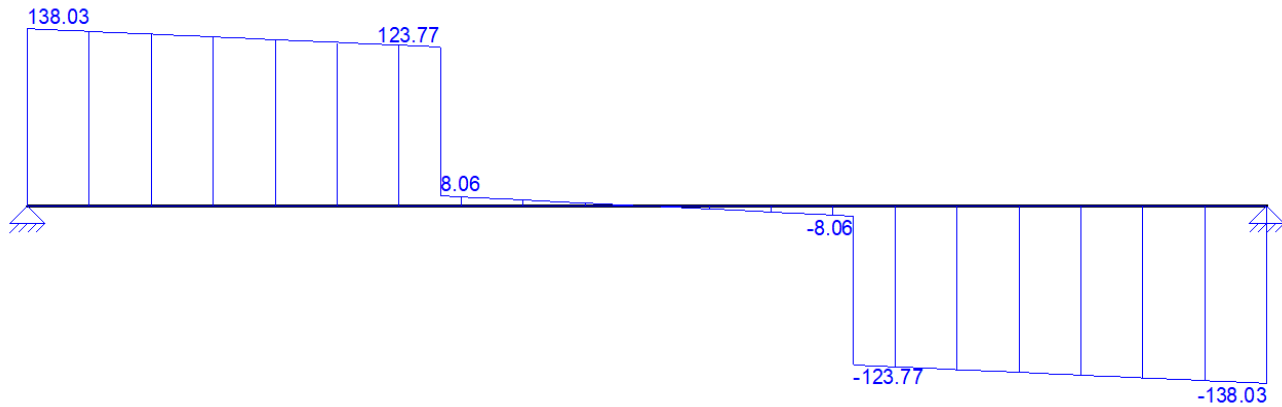
## Quasi-permanent

| B.G.  | Omschrijving | Qu.C.1 |
|-------|--------------|--------|
| B G 1 | Permanent    | 1.00   |
| B G 2 | Sneeuw       |        |

## Fu.C. Omhu. ende Momenten (My)



Fu.C. Omhu ende Dwarskracht (Vz)



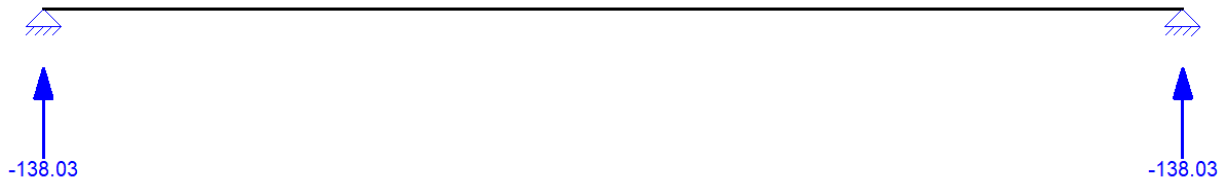
## EXTREME STAAFKRACHTEN

| Veld                  | B.C.   | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM <sub>0</sub> | xM <sub>0</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> |
|-----------------------|--------|----------------|------------------|-------------------|----------------|-----------------|-----------------|----------------|------------------|----------------|
| <b>Fundamenteel</b>   |        |                |                  |                   |                |                 |                 |                |                  |                |
| Veld 1 (0 000 14 820) | Fu C 1 | 0 00           | <b>655.47</b>    | 7 410             | 0 00           |                 |                 | <b>138.03</b>  | <b>138.03</b>    | <b>-138.03</b> |
| Veld 1 (0 000 14 820) | Fu C 2 | 0 00           | 408 96           | 7 410             | <b>0.00</b>    |                 |                 | 88 83          | 88 83            | 88 83          |
| m                     |        | kNm            | kNm              | m                 | kNm            | m               | m               | kN             | kN               | kN             |

## OPLEGREACTIES (BELASTINGSGEVALLEN)

| B.C. | Oplegging    | Positie       | Z    | Yr   | Z       | Yr   |
|------|--------------|---------------|------|------|---------|------|
| BG1  | O1           | S1 0 000      | Vast | Vrij | 72 81   | 0 00 |
|      | O2           | S1 14 820 (L) | Vast | Vrij | 72 81   | 0 00 |
|      | Som Reacties |               |      |      | -145.62 |      |
|      | Som Lasten   |               |      |      | 145.62  |      |
| BG2  | O1           | S1 0 000      | Vast | Vrij | 44 00   | 0 00 |
|      | O2           | S1 14 820 (L) | Vast | Vrij | 44 00   | 0 00 |
|      | Som Reacties |               |      |      | -88.00  |      |
|      | Som Lasten   |               |      |      | 88.00   |      |
|      |              |               |      |      | kN      | kNm  |

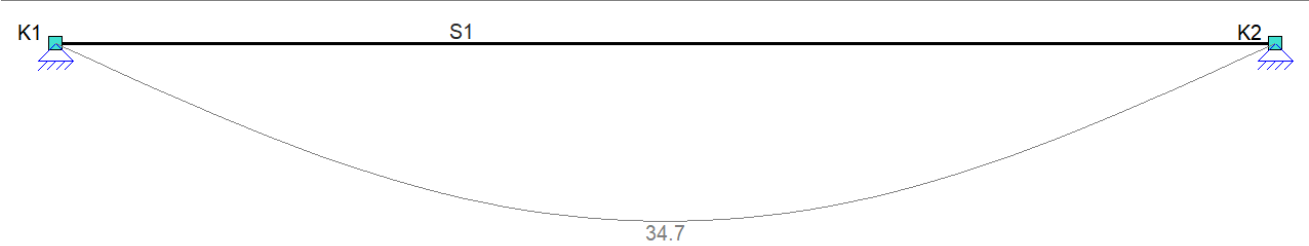
Fu.C. Omhu ende Op egreact es



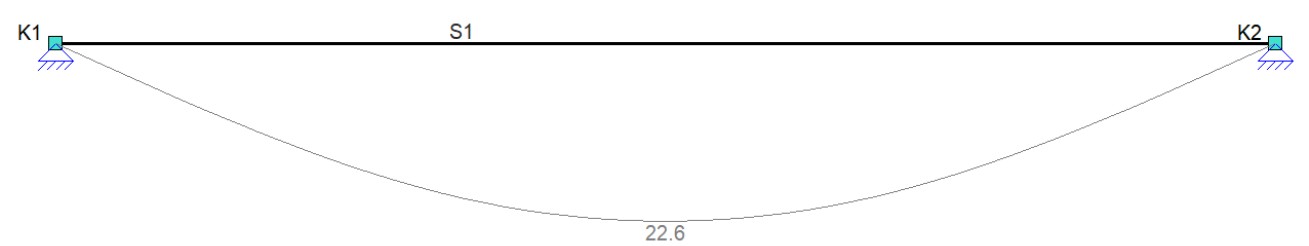
## OPLEGREACTIES (FUNDAMENTEEL)

| B.C.   | Oplegging    | Positie       | Z    | Yr   | Z       | Yr   |
|--------|--------------|---------------|------|------|---------|------|
| Fu C 1 | O1           | S1 0 000      | Vast | Vrij | 138 03  | 0 00 |
|        | O2           | S1 14 820 (L) | Vast | Vrij | 138 03  | 0 00 |
|        | Som Reacties |               |      |      | -276.07 |      |
|        | Som Lasten   |               |      |      | 276.07  |      |
| Fu C 2 | O1           | S1 0 000      | Vast | Vrij | 88 83   | 0 00 |
|        | O2           | S1 14 820 (L) | Vast | Vrij | 88 83   | 0 00 |
|        | Som Reacties |               |      |      | -177.65 |      |
|        | Som Lasten   |               |      |      | 177.65  |      |
|        |              |               |      |      | kN      | kNm  |

B.G.1 Doorbu g ngen



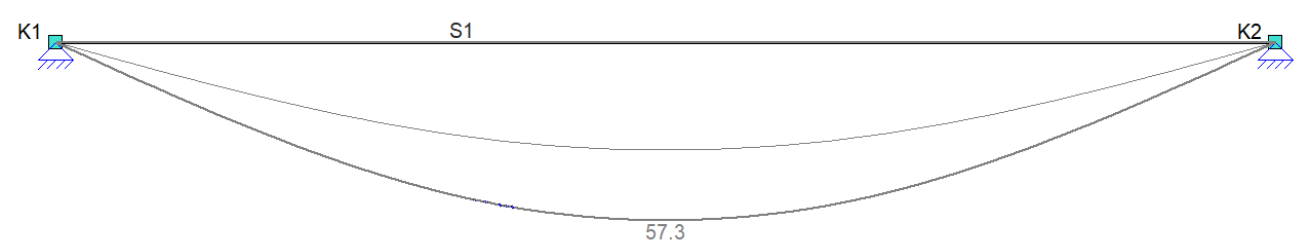
B.G.2 Doorbu g ngen



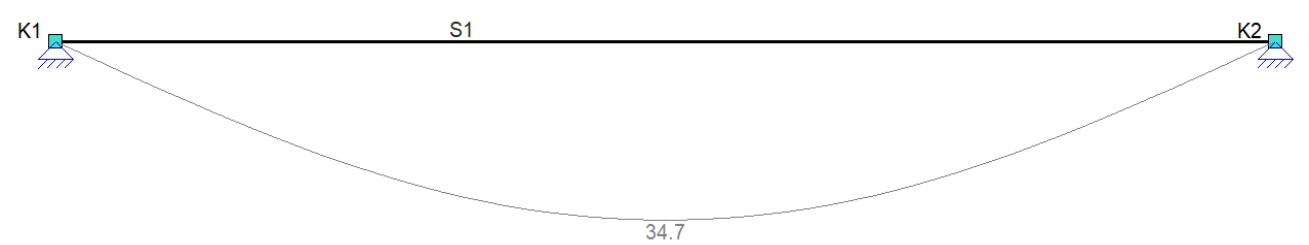
EXTREME DOORBUIGINGEN (BELASTINGSGEVALLEN)

| Veld                    | B.C.  | Veld Begin | Z   | Z'afst | Z'   | Veld | Z' g b dist | Z' glb | Veld End | Z   |
|-------------------------|-------|------------|-----|--------|------|------|-------------|--------|----------|-----|
| Veld 1 (0.000 - 14.820) | B.G.1 |            | 0.0 | 7.410  | 34.7 |      | 7.410       | 34.7   |          | 0.0 |
| m                       |       |            | mm  | m      | mm   |      | m           | mm     |          | mm  |

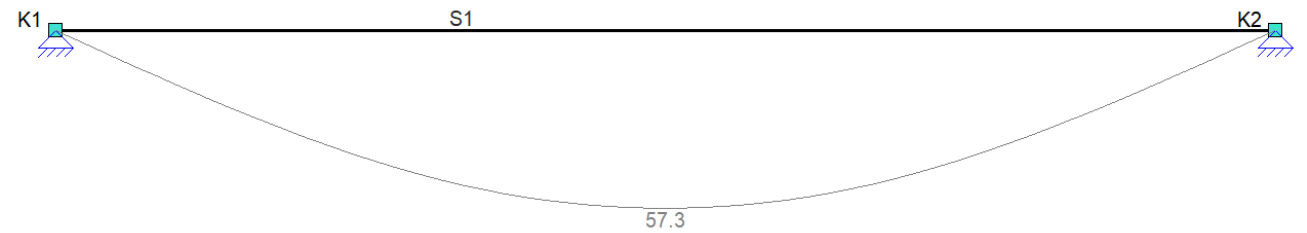
Ka.C. Omhu ende Doorbu g ngen



Ka.C.1 Doorbu g ngen



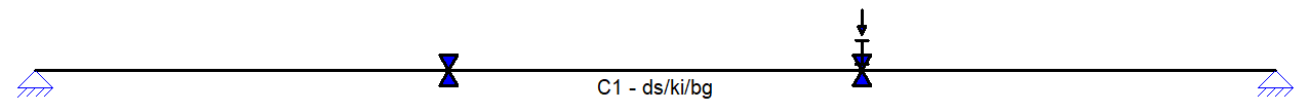
Ka.C.2 Doorbu g ngen



EXTREME DOORBUIGINGEN (KARAKTERISTIEK)

| Veld                    | B.C.  | Veld Begin | Z   | Z'afst | Z'   | Veld | Z' g b dist | Z' glb | Veld End | Z   |
|-------------------------|-------|------------|-----|--------|------|------|-------------|--------|----------|-----|
| Veld 1 (0.000 - 14.820) | Ka C2 |            | 0.0 | 7.410  | 57.3 |      | 7.410       | 57.3   |          | 0.0 |
| m                       |       |            | mm  | m      | mm   |      | m           | mm     |          | mm  |

Staa def n t e



CONSTRUCTIEDELEN

| Constructiedeel | Staa f/staven |
|-----------------|---------------|
| C1              | s1            |

INVOER GEGEVENS

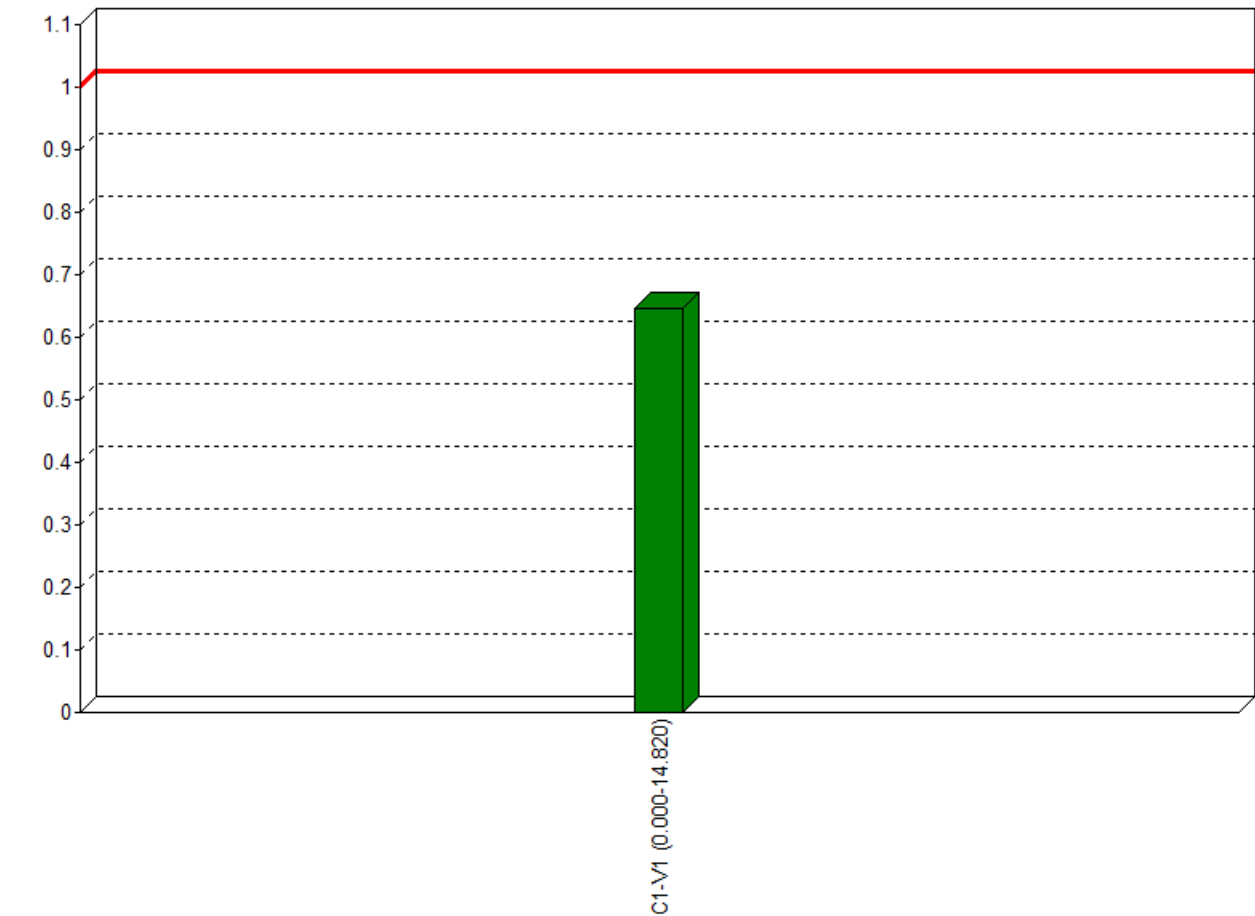
KIPSTEUNENGEGEVENS

| Staa f                 | Profiel | Begin    | End      | Kipsteunen boven | Kipsteunen onder | Aangrijphoogte |
|------------------------|---------|----------|----------|------------------|------------------|----------------|
| C1 V1 (0.000 - 14.820) | P5      | Gesteund | Gesteund | 4.949.88         | 4.949.88         | Bovenflens     |

DOORBUIGINGGEGEVENS

| Staa f                 | Constructietype | Toetsing | Zeeg Z' | Zeegvorm    | w <sub>max</sub> | w <sub>2</sub> + w <sub>3</sub> | Abs. limiet w <sub>2</sub> + w <sub>3</sub> |
|------------------------|-----------------|----------|---------|-------------|------------------|---------------------------------|---------------------------------------------|
| C1 V1 (0.000 - 14.820) | Dak             | Algemeen | 30      | Parabolisch | L/250            | L/250                           |                                             |
|                        |                 |          | mm      |             |                  |                                 | mm                                          |

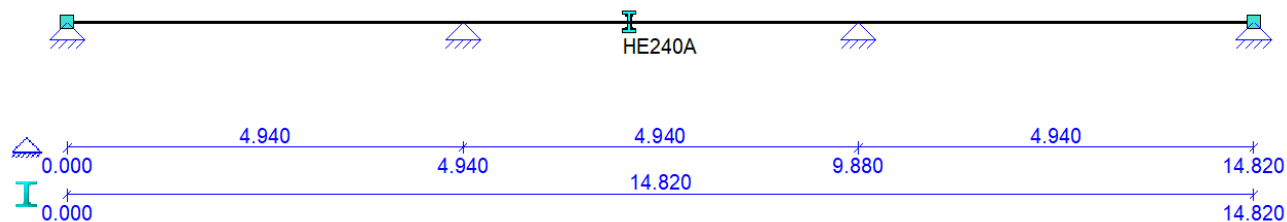
Afb. Staa UC D agram



| UNITY CHECK          |                      |            |                      |             |
|----------------------|----------------------|------------|----------------------|-------------|
| Label                | Toetsing             | Combinatie | Artikel              | Unity Check |
| C1 V1 (0.000-14.820) | Doorsnede            | Fu C1      | NEN EN1993 1 1(6 12) | 0.58        |
|                      | Kiptoetsing          | Fu C1      | NEN EN1993 1 1(6 54) | 0.65        |
|                      | Doorbuigingstoetsing | Ka C2      | NEN EN1990/NB A1 4 2 | 0.46        |

|                        |                                                                                                                                                                                         |                                     |               |                  |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------|------------------|
| VAN BOXSEL ENGINEERING |                                                                                                                                                                                         | T: 0162-451280 E: info@vanboxsel.nl |               | www.vanboxsel.nl |
| Projectomschrijving    | Uitbreiding terrein Coolrec                                                                                                                                                             |                                     | Projectnummer | 23-157           |
| Onderdeel              |                                                                                                                                                                                         |                                     | Constructeur  |                  |
| Opdrachtgever          | Coolrec                                                                                                                                                                                 |                                     | Eenheden      | m, mm, kN, kNm   |
| Bestand                | C:\Users\pm\van Boxsel Engineering\Ruby - Documenten\Documenten\2023\23-157 Coolrec\1. berekeningen intern\Rapport B\Matrixframe modellen\23-157 Ligger HEB300 - overhead deur wind.mxf |                                     |               |                  |

Constructie



#### BALKGEOMETRIE

| Positie          | Profielnaam | Hoek | Traagheidsmoment | Materiaal | E-Modulus  | Uitzettingcoeff | Gewicht |
|------------------|-------------|------|------------------|-----------|------------|-----------------|---------|
| 0.000 14.820 (L) | HE240A      | 0    | 7.7632e+07       | S235      | 2.1000e+05 | 12.0000e-06     | 0.60    |
| m                |             | °    | mm <sup>4</sup>  |           | N/mm       | C°m             | kN/m    |

#### MATERIALEN

| Materiaalnaam | Poison | Dichtheid         | E-Modulus  | Uitzettingcoeff |
|---------------|--------|-------------------|------------|-----------------|
| S235          | 0.30   | 78.5              | 2.1000e+05 | 12.0000e-06     |
|               |        | kN/m <sup>3</sup> | N/mm       | C°m             |

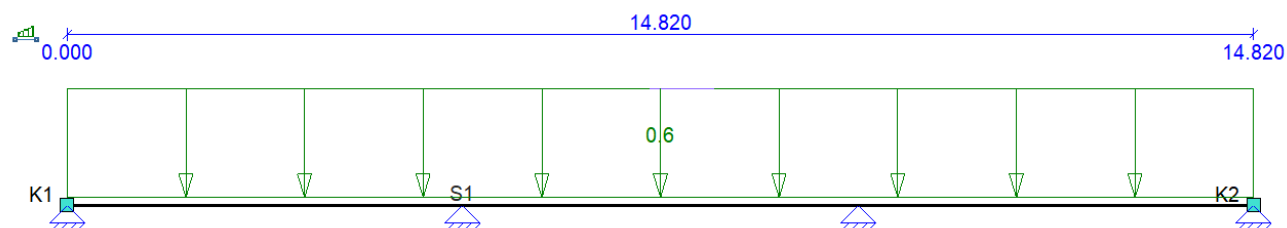
#### OPLEGGINGEN

| Oplegging | Object | Positie    | Z    | Yr      |
|-----------|--------|------------|------|---------|
| O1        | S1     | 0.000      | Vast | Vrij    |
| O2        | S1     | 4.940      | Vast | Vrij    |
| O3        | S1     | 9.880      | Vast | Vrij    |
| O4        | S1     | 14.820 (L) | Vast | Vrij    |
|           |        | m          | kN/m | kNm/rad |

#### BELASTINGSGEVALLEN TYPEN

| Label | Omschrijving | B.G.Type      | Gunstig/Ong. | Element | Niveau | Veld | $\psi_0$ | $\psi_1$ | $\psi_2$ | $C_{prob}$ |
|-------|--------------|---------------|--------------|---------|--------|------|----------|----------|----------|------------|
| B.G.1 | Permanent    | Permanent     |              |         | Nvt    | Nvt  |          |          |          |            |
| B.G.2 | Wind         | Windbelasting |              |         | Nvt    | Nvt  |          | 0.20     |          | 1.00/1.00  |

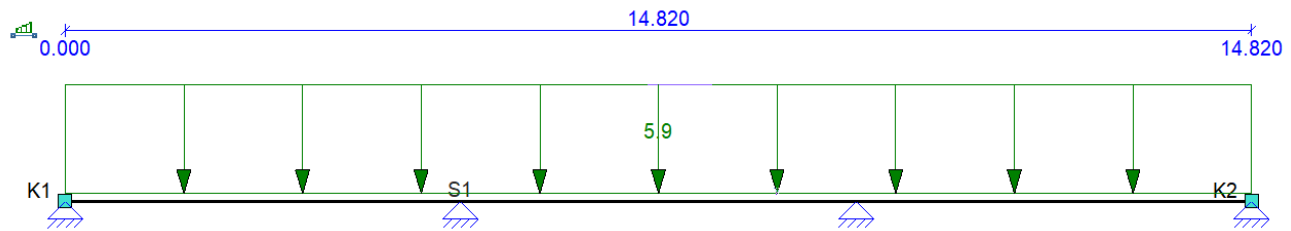
#### B.G.1: Permanent



#### B.G.1: PERMANENT

| Type       | Beginwaarde | Endwaarde   | Beginafstand | Endafstand | Richting | Omschrijving |
|------------|-------------|-------------|--------------|------------|----------|--------------|
| qG         | 1.00 (0.60) | 1.00 (0.60) | 0.000        | 14.820 (L) | Z        |              |
| Som lasten | Z: 8.9      |             |              |            |          |              |
|            |             |             | m            | m          |          |              |

## B.G.2: Wnd



## B.G.2: WIND

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|--------------|
| q          | 5.9         | 5.9       | 0.000        | 14.820 (L) | Z        |              |
| Som lasten |             | Z: 88.0   |              |            |          |              |
|            |             |           | m            | m          |          |              |

## BELASTINGSCOMBINATIES

## Fundamenteel

| B.G.  | Omschrijving | Fu.C.1 | Fu.C.2 |
|-------|--------------|--------|--------|
| B.G.1 | Permanent    | 1.08   | 1.22   |
| B.G.2 | Wind         | 1.35   |        |

## Karakteristiek

| B.G.  | Omschrijving | Ka.C.(w1) | Ka.C.1 | Ka.C.2 |
|-------|--------------|-----------|--------|--------|
| B.G.1 | Permanent    | 1.00      | 1.00   | 1.00   |
| B.G.2 | Wind         |           |        | 1.00   |

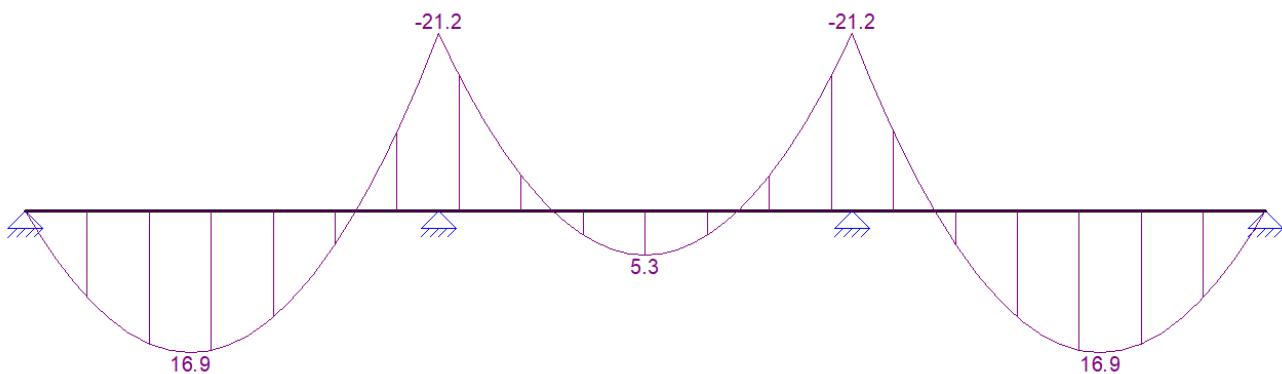
## Frequent

| B.G.  | Omschrijving | Fr.C.(w1) | Fr.C.1 |
|-------|--------------|-----------|--------|
| B.G.1 | Permanent    | 1.00      | 1.00   |
| B.G.2 | Wind         |           | 0.20   |

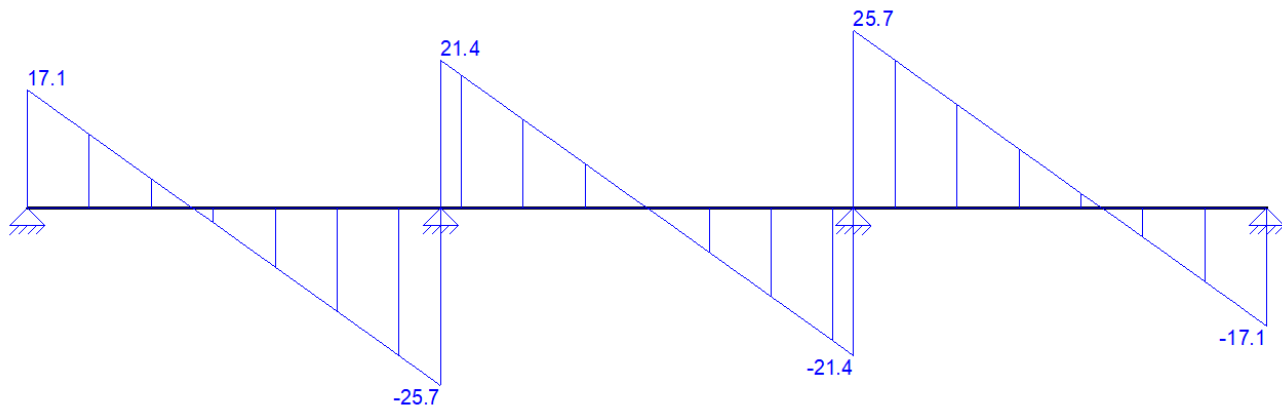
## Quasi-permanent

| B.G.  | Omschrijving | Qu.C.1 |
|-------|--------------|--------|
| B.G.1 | Permanent    | 1.00   |
| B.G.2 | Wind         |        |

## Fu.C. Omhu ende Momenten (My)



Fu.C. Omhu ende Dwarskracht (Vz)



## EXTREME STAAFKRACHTEN

| Veld                  | B.C.  | $M_b$ | $M_{max}$ | $xM_{max}$ | $M_e$ | $xM_0$ | $xM_0$ | $V_b$ | $V_{max}$ | $V_e$ |
|-----------------------|-------|-------|-----------|------------|-------|--------|--------|-------|-----------|-------|
| <b>Fundamenteel</b>   |       |       |           |            |       |        |        |       |           |       |
| Veld 1 (0.000 4.940)  | Fu C1 | 0.0   | 16.9      | 1.976      | 21.2  | 3.952  |        | 17.1  | -25.7     | -25.7 |
| Veld 2 (4.940 9.880)  | Fu C1 | -21.2 | 5.3       | 7.410      | -21.2 | 6.305  | 8.515  | 21.4  | 21.4      | 21.4  |
| Veld 3 (9.880 14.820) | Fu C1 | 21.2  | 16.9      | 12.844     | 0.0   | 10.868 |        | 25.7  | 25.7      | 17.1  |
| m                     |       | kNm   | kNm       | m          | kNm   | m      | m      | kN    | kN        | kN    |

## OPLEGREACTIES (BELASTINGSGEVALLEN)

| B.C. | Oplegging    | Positie       | Z    | Yr   | Z     | Yr  |     |
|------|--------------|---------------|------|------|-------|-----|-----|
| BG 1 | O1           | S1 0 000      | Vast | Vrij | 1.2   | 0.0 |     |
|      | O2           | S1 4 940      | Vast | Vrij | 3.3   | 0.0 |     |
|      | O3           | S1 9 880      | Vast | Vrij | 3.3   | 0.0 |     |
|      | O4           | S1 14 820 (L) | Vast | Vrij | 1.2   | 0.0 |     |
|      | Som Reacties |               |      |      | -8.9  |     |     |
|      | Som Lasten   |               |      |      | 8.9   |     |     |
| BG 2 | O1           | S1 0 000      | Vast | Vrij | 11.7  | 0.0 |     |
|      | O2           | S1 4 940      | Vast | Vrij | 32.3  | 0.0 |     |
|      | O3           | S1 9 880      | Vast | Vrij | 32.3  | 0.0 |     |
|      | O4           | S1 14 820 (L) | Vast | Vrij | 11.7  | 0.0 |     |
|      | Som Reacties |               |      |      | -88.0 |     |     |
|      | Som Lasten   |               |      |      | 88.0  |     |     |
|      |              |               |      |      |       | kN  | kNm |

Fu.C. Omhu ende Oplegreacties



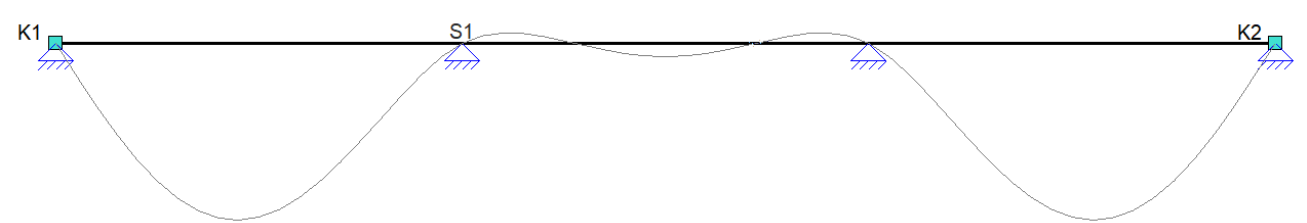
## OPLEGREACTIES (FUNDAMENTEEL)

| B.C.  | Oplegging    | Positie       | Z    | Yr   | Z      | Yr  |
|-------|--------------|---------------|------|------|--------|-----|
| Fu C1 | O1           | S1 0 000      | Vast | Vrij | 17 1   | 0 0 |
|       | O2           | S1 4 940      | Vast | Vrij | 47 1   | 0 0 |
|       | O3           | S1 9 880      | Vast | Vrij | 47 1   | 0 0 |
|       | O4           | S1 14 820 (L) | Vast | Vrij | 17 1   | 0 0 |
|       | Som Reacties |               |      |      | -128.5 |     |
|       | Som Lasten   |               |      |      | 128.5  |     |
| Fu C2 | O1           | S1 0 000      | Vast | Vrij | 1 5    | 0 0 |
|       | O2           | S1 4 940      | Vast | Vrij | 4 0    | 0 0 |
|       | O3           | S1 9 880      | Vast | Vrij | 4 0    | 0 0 |
|       |              |               |      |      | kN     | kNm |

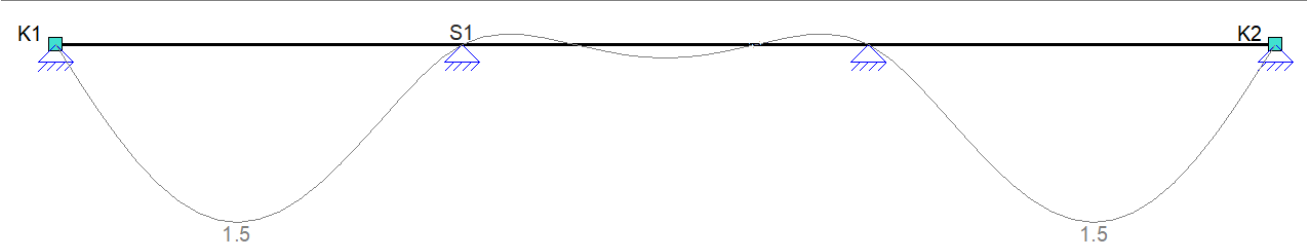


| B.C. | Oplegging    | Positie       | Z    | Yr   | Z     | Yr  |
|------|--------------|---------------|------|------|-------|-----|
|      | O4           | S1 14 820 (L) | Vast | Vrij | 15    | 00  |
|      | Som Reacties |               |      |      | -10.9 |     |
|      | Som Lasten   |               |      |      | 10.9  |     |
|      |              |               |      |      | kN    | kNm |

B.G.1 Doorbu g ngen



B.G.2 Doorbu g ngen



EXTREME DOORBUIGINGEN (BELASTINGSGEVALLEN)

| Veld                  | B.C.  | Veld Begin | Z  | Z'afst | Z'  | Veld | Z' glb dist | Z' glb | Veld End | Z  |
|-----------------------|-------|------------|----|--------|-----|------|-------------|--------|----------|----|
| Veld 1 (0 000 4 940)  | B G 2 |            | 00 | 2 203  | 1.5 |      | 2 203       | 15     |          | 00 |
| Veld 2 (4 940 9 880)  |       |            | 00 | 7 410  | 0.1 |      | 7 410       | 01     |          | 00 |
| Veld 3 (9 880 14 820) |       |            | 00 | 12 617 | 1.5 |      | 12 617      | 15     |          | 00 |
| m                     |       |            | mm | m      | mm  |      | m           | mm     |          | mm |

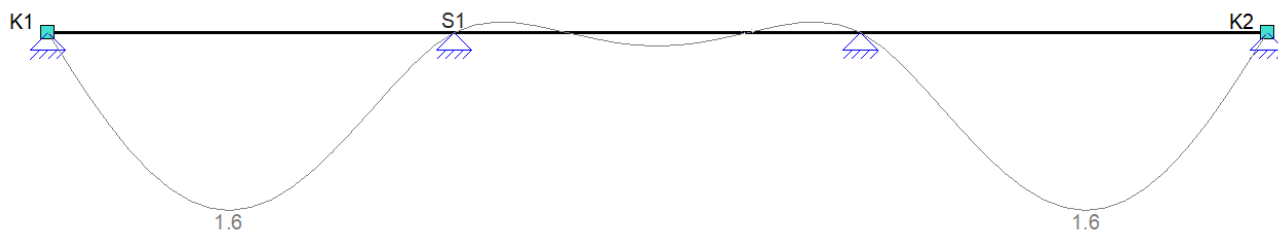
Ka.C. Omhu ende Doorbu g ngen



Ka.C.1 Doorbu g ngen



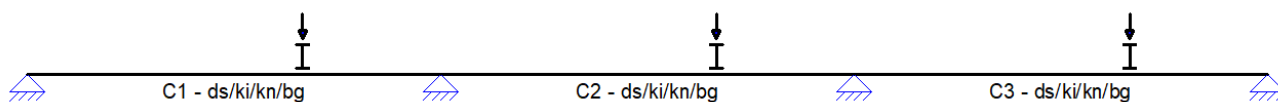
## Ka.C.2 Doorbu g ngen



## EXTREME DOORBUIGINGEN (KARAKTERISTIEK)

| Veld                  | B.C.  | Veld Begin | Z   | Z'afst | Z'  | Veld | Z' glb dist | Z' glb | Veld End | Z   |
|-----------------------|-------|------------|-----|--------|-----|------|-------------|--------|----------|-----|
| Veld 1 (0 000 4 940)  | Ka C2 |            | 0 0 | 2 203  | 1.6 |      | 2 203       | 1 6    |          | 0 0 |
| Veld 2 (4 940 9 880)  |       |            | 0 0 | 7 410  | 0.1 |      | 7 410       | 0 1    |          | 0 0 |
| Veld 3 (9 880 14 820) |       |            | 0 0 | 12 617 | 1.6 |      | 12 617      | 1 6    |          | 0 0 |
| m                     |       |            | mm  | m      | mm  |      | m           | mm     |          | mm  |

## Staa def n t e



## CONSTRUCTIEDELEN

| Constructiedeel | Staa f/staven |
|-----------------|---------------|
| C1              | s1            |
| C2              | s1            |
| C3              | s1            |

## INVOER GEGEVENS

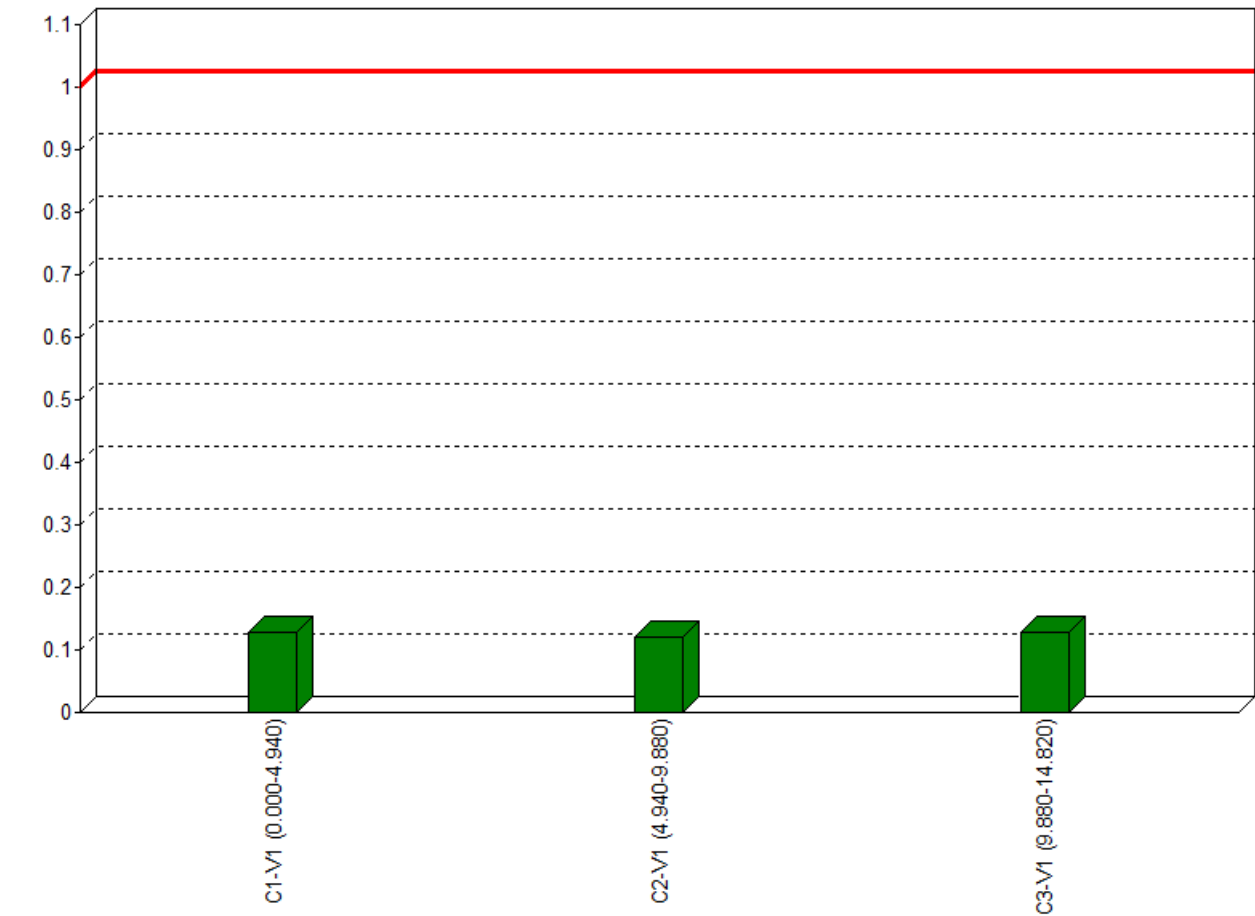
## KIPSTEUNENGEGEVENS

| Staa f               | Profiel | Begin    | End      | Kipsteunen boven | Kipsteunen onder | Aangrijphoogte |
|----------------------|---------|----------|----------|------------------|------------------|----------------|
| C1 V1 (0 000 4 940)  | F8      | Gesteund | Gesteund |                  |                  | Bovenflens     |
| C2 V1 (4 940 9 880)  | F8      | Gesteund | Gesteund |                  |                  | Bovenflens     |
| C3 V1 (9 880 14 820) | F8      | Gesteund | Gesteund |                  |                  | Bovenflens     |

## DOORBUIGINGGEGEVENS

| Staa f               | Constructietype | Toetsing | Zeeg Z' | Zeegvorm    | w <sub>max</sub> | w <sub>2</sub> + w <sub>3</sub> | Abs. limiet w <sub>2</sub> + w <sub>3</sub> |
|----------------------|-----------------|----------|---------|-------------|------------------|---------------------------------|---------------------------------------------|
| C1 V1 (0 000 4 940)  | Vloer           | Algemeen | 0       | Parabolisch | L/250            | L/333                           |                                             |
| C2 V1 (4 940 9 880)  | Vloer           | Algemeen | 0       | Parabolisch | L/250            | L/333                           |                                             |
| C3 V1 (9 880 14 820) | Vloer           | Algemeen | 0       | Parabolisch | L/250            | L/333                           |                                             |
|                      |                 |          | mm      |             |                  |                                 | mm                                          |

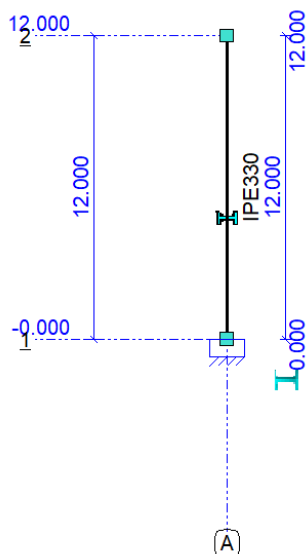
Afb. Staa UC D agram



| UNITY CHECK          |                      |            |                            |             |
|----------------------|----------------------|------------|----------------------------|-------------|
| Label                | Toetsing             | Combinatie | Artikel                    | Unity Check |
| C1 V1 (0.000 4.940)  | Doorsnede            | Fu C 1     | NEN EN1993 1 1(6 12)       | 0 12        |
|                      | Kiptoetsing          | Fu C 1     | NEN EN1993 1 1(6 54)       | 0 13        |
|                      | Doorbuigingstoetsing | Fr C 1     | NEN ENNEN EN1990/NB A1 4 2 | 0 02        |
| C2 V1 (4.940 9.880)  | Doorsnede            | Fu C 1     | NEN EN1993 1 1(6 12)       | 0 12        |
|                      | Kiptoetsing          | Fu C 1     | NEN EN1993 1 1(6 54)       | 0 04        |
|                      | Doorbuigingstoetsing | Fr C 1     | NEN ENNEN EN1990/NB A1 4 2 | 0 00        |
| C3 V1 (9.880 14.820) | Doorsnede            | Fu C 1     | NEN EN1993 1 1(6 12)       | 0 12        |
|                      | Kiptoetsing          | Fu C 1     | NEN EN1993 1 1(6 54)       | 0 13        |
|                      | Doorbuigingstoetsing | Fr C 1     | NEN ENNEN EN1990/NB A1 4 2 | 0 02        |

|                        |                                                                                                                                                                               |                                     |               |                  |  |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------|------------------|--|
| VAN BOXSEL ENGINEERING |                                                                                                                                                                               | T: 0162-451280 E: info@vanboxsel.nl |               | www.vanboxsel.nl |  |
|                        |                                                                                                                                                                               |                                     |               |                  |  |
| Projectomschrijving    | Uitbreiding terrein Coolrec                                                                                                                                                   |                                     | Projectnummer | 23-157           |  |
| Onderdeel              |                                                                                                                                                                               |                                     | Constructeur  | ■■■■             |  |
| Opdrachtgever          | Coolrec                                                                                                                                                                       |                                     | Eenheden      | m, mm, kN, kNm   |  |
| Bestand                | C:\Users\pm\van Boxsel Engineering\Ruby - Documenten\Documenten\2023\23-157 Coolrec\1. berekeningen intern\Rapport B\Matrixframe modellen\23-157 kolom IPE330 - brandwand.mxf |                                     |               |                  |  |

Constructie



#### STAVEN

| Staf | Knoop-B | Knoop-E | X-B   | X-E   | Z-B   | Z-E    | Lengte | Profiel | Positie |            |
|------|---------|---------|-------|-------|-------|--------|--------|---------|---------|------------|
| S1   | K1      | K2      | 0.000 | 0.000 | 0.000 | 12.000 | 12.000 | P1      | 0.000   | 12.000 (L) |
|      |         |         | m     | m     | m     | m      | m      |         |         | m          |

#### PROFIELEN

| Profiel | Profielnaam | Oppervlakte | Iy              | Materiaal | Hoek |
|---------|-------------|-------------|-----------------|-----------|------|
| P1      | FE330       | 6261        | 1.1767e+08      | S235      | 0    |
|         |             | mm          | mm <sup>4</sup> |           | °    |

#### MATERIALEN

| Materiaalnaam | Poison | Dichtheid         | E-Modulus  | Uitzettingcoëff |
|---------------|--------|-------------------|------------|-----------------|
| S235          | 0.30   | 78.50             | 2.1000e+05 | 12.0000e-06     |
|               |        | kN/m <sup>3</sup> | N/mm       | °/m             |

#### OPLEGGINGEN

| Oplegging | Object | Positie | X    | Z    | Yr   | Hoek     | Yr |
|-----------|--------|---------|------|------|------|----------|----|
| O1        | K1     | K1      | Vast | Vast | Vast | 0        |    |
|           |        |         | m    | kN/m | kN/m | kN/m/rad | °  |

#### BELASTINGSGEVALLEN TYPEN

| Label | Omschrijving  | B.G.Type      | Gunstig/Ong. | Element | Niveau | Veld   | $\Psi_0$ | $\Psi_1$ | $\Psi_2$ | $C_{prob}$ |
|-------|---------------|---------------|--------------|---------|--------|--------|----------|----------|----------|------------|
| B.G.1 | Eigen gewicht | Permanent     |              |         | N.v.t. | N.v.t. |          |          |          | UGT/GGT    |
| B.G.2 | Wind          | Windbelasting |              |         | N.v.t. | N.v.t. | 0.20     |          |          | 1.00/1.00  |

## B.G.1: Eigen gewicht



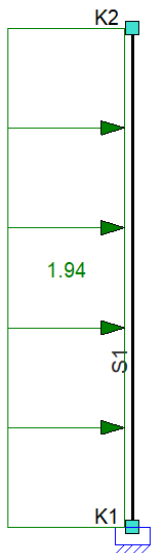
## B.G.1: EIGEN GEWICHT

| Type       | Beginwaarde | Endwaarde   | Beginafstand | Endafstand | Richting | Staat of knoop | Omschrijving |
|------------|-------------|-------------|--------------|------------|----------|----------------|--------------|
| qG         | 1 00 (0 49) | 1 00 (0 49) | 0 000        | 12 000 (L) | Z"       | S1             |              |
| q          | 1 00        | 1 00        | 0 000        | 12 000 (L) | Z"       | S1             |              |
| Som lasten |             | Z: 17.90    |              |            |          |                |              |

m

m

## B.G.2: Wind



## B.G.2: WIND

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Staat of knoop | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|----------------|--------------|
| q          | 1 94        | 1 94      | 0 000        | 12 000 (L) | X        | S1             |              |
| Som lasten |             | X: 23.28  |              |            |          |                |              |

m

m

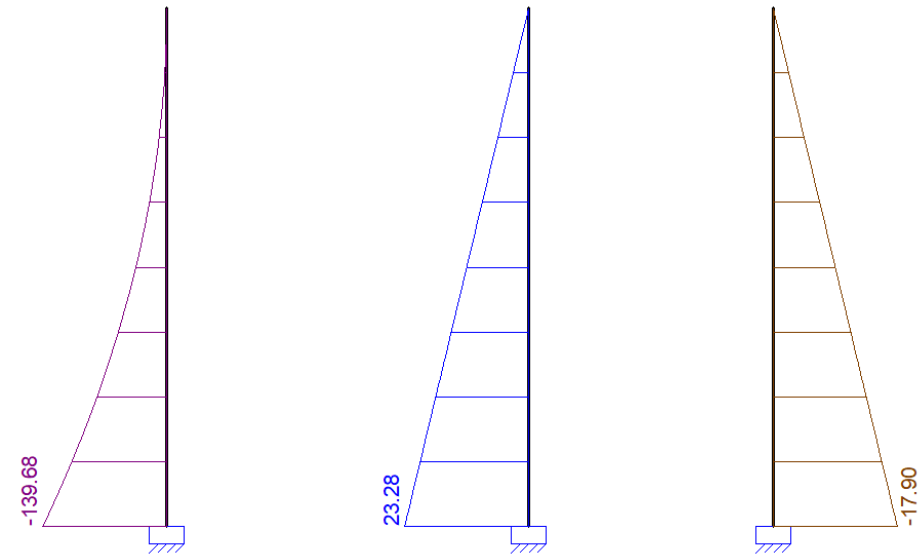
## BELASTINGSCOMBINATIES

Fundamenteel

B.G. Omschrijving Fu.C.1

|                        |                     |                  |
|------------------------|---------------------|------------------|
| B G 1                  | Eigen gewicht       | 1 00             |
| B G 2                  | Wind                | 1 00             |
| <b>Karakteristiek</b>  |                     |                  |
| <b>B.G.</b>            | <b>Omschrijving</b> | <b>Ka.C.(w1)</b> |
| B G 1                  | Eigen gewicht       | 1 00             |
| B G 2                  | Wind                | 1 00             |
| <b>Frequent</b>        |                     |                  |
| <b>B.G.</b>            | <b>Omschrijving</b> | <b>Fr.C.(w1)</b> |
| B G 1                  | Eigen gewicht       | 1 00             |
| B G 2                  | Wind                | 1 00             |
| <b>Quasi-permanent</b> |                     |                  |
| <b>B.G.</b>            | <b>Omschrijving</b> | <b>Qu.C.1</b>    |
| B G 1                  | Eigen gewicht       | 1 00             |
| B G 2                  | Wind                | 1 00             |

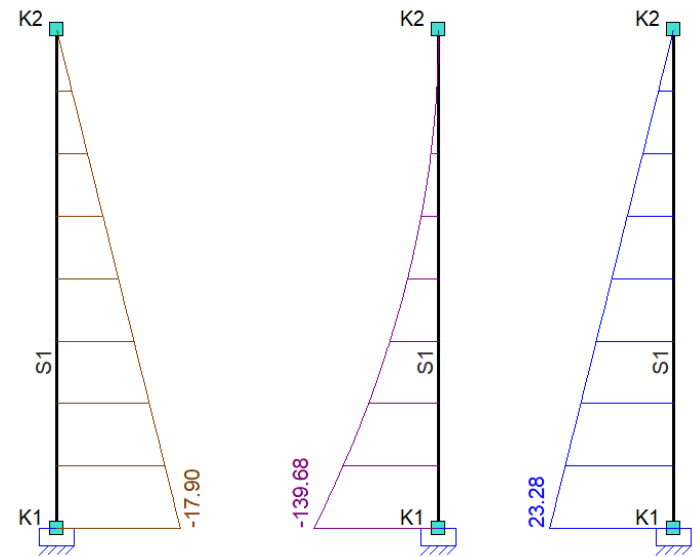
Fu.C. Omhu ende Momenten (My)
Fu.C. Omhu ende Dwarskracht (Vz)
Fu.C. Omhu ende Normaa kracht (Nx)



**EXTREME STAAFKRACHTEN**

| Staaf               | Veld                  | B.C.   | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM <sub>0</sub> | xM <sub>0</sub> | T/D | N <sub>max</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> |
|---------------------|-----------------------|--------|----------------|------------------|-------------------|----------------|-----------------|-----------------|-----|------------------|----------------|------------------|----------------|
| <b>Fundamenteel</b> |                       |        |                |                  |                   |                |                 |                 |     |                  |                |                  |                |
| S1                  | Veld 1 (0 000 12 000) | Fu C 1 | -139.68        |                  |                   | 0 00           |                 |                 | T   | -17.90           | 23.28          | 23.28            | 0 00           |
|                     | m                     |        | kNm            | kNm              | m                 | kNm            | m               | m               |     | kN               | kN             | kN               | kN             |

B.G.1 Normaa kracht (Nx)    B.G.2 Momenten (My)    B.G.2 Dwarskracht (Vz)



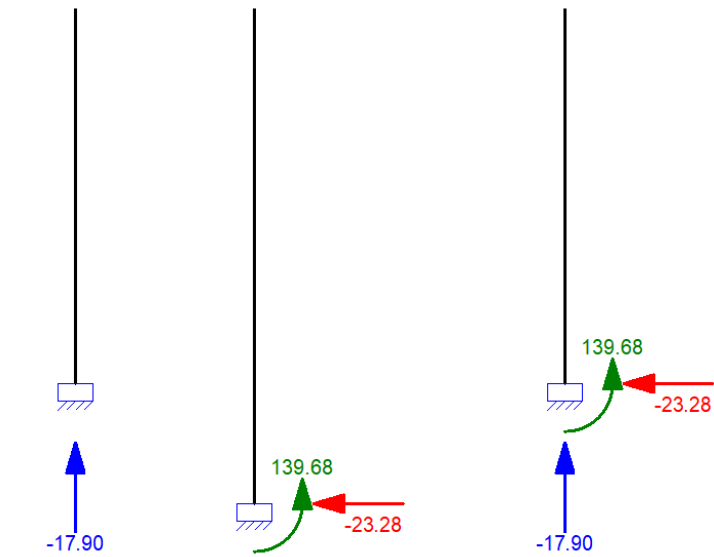
INTERNE KRACHTEN & VERPLAATSINGEN (BELASTINGSGEVALLEN)

| B.C. | Staaf | Positie   | Uz    | Uz'  | Nx    | Vz    | My     |
|------|-------|-----------|-------|------|-------|-------|--------|
| BG1  | S1    | 0 000     | 0 0   | 0 0  | 17 90 | 0 00  | 0 00   |
|      |       | 1 200     | 0 0   | 0 0  | 16 11 | 0 00  | 0 00   |
|      |       | 2 400     | 0 0   | 0 0  | 14 32 | 0 00  | 0 00   |
|      |       | 3 600     | 0 0   | 0 0  | 12 53 | 0 00  | 0 00   |
|      |       | 4 800     | 0 0   | 0 0  | 10 74 | 0 00  | 0 00   |
|      |       | 6 000     | 0 0   | 0 0  | 8 95  | 0 00  | 0 00   |
|      |       | 7 200     | 0 0   | 0 0  | 7 16  | 0 00  | 0 00   |
|      |       | 8 400     | 0 0   | 0 0  | 5 37  | 0 00  | 0 00   |
|      |       | 9 600     | 0 0   | 0 0  | 3 58  | 0 00  | 0 00   |
|      |       | 10 800    | 0 0   | 0 0  | 1 79  | 0 00  | 0 00   |
|      |       | L(12 000) | 0 0   | 0 0  | 0 00  | 0 00  | 0 00   |
| BG2  | S1    | 0 000     | 0 0   | 0 0  | 0 00  | 23 28 | 139 68 |
|      |       | 1 200     | 3 8   | 16 5 | 0 00  | 20 95 | 113 14 |
|      |       | 2 400     | 14 2  | 26 5 | 0 00  | 18 62 | 89 40  |
|      |       | 3 600     | 29 9  | 31 2 | 0 00  | 16 30 | 68 44  |
|      |       | 4 800     | 49 5  | 31 9 | 0 00  | 13 97 | 50 28  |
|      |       | 6 000     | 72 1  | 29 7 | 0 00  | 11 64 | 34 92  |
|      |       | 7 200     | 96 7  | 25 4 | 0 00  | 9 31  | 22 35  |
|      |       | 8 400     | 122 6 | 19 8 | 0 00  | 6 98  | 12 57  |
|      |       | 9 600     | 149 3 | 13 5 | 0 00  | 4 66  | 5 59   |
|      |       | 10 800    | 176 4 | 6 8  | 0 00  | 2 33  | 1 40   |
|      |       | L(12 000) | 203 5 | 0 0  | 0 00  | 0 00  | 0 00   |
|      |       | m         | mm    | mm   | kN    | kN    | kNm    |

B.G.1 Op egreact es

B.G.2 Op egreact es

Fu.C.1 Op egreact es



| KNOOPVERPLAATSINGEN |           |       |     |      |
|---------------------|-----------|-------|-----|------|
| Knoop               | B.C.      | X     | Z   | Yr   |
| Karakteristiek      |           |       |     |      |
| K1                  | Ka C (w1) | 0 0   | 0 0 | 0 0  |
| K2                  | Ka C (w1) | 203 5 | 0 1 | 22 6 |
|                     |           | mm    | mm  | rad  |

| DOORBUIGINGEN (KARAKTERISTIEK) |                       |           |             |     |        |       |           |       |  |
|--------------------------------|-----------------------|-----------|-------------|-----|--------|-------|-----------|-------|--|
| Staaf                          | Veld                  | B.C.      | Knoop Begin |     | Staaf  |       | Knoop End |       |  |
|                                |                       |           | X           | Z   | Z'afst | Z'    | X         | Z     |  |
| S1                             | Veld 1 (0 000 12 000) | Ka C (w1) | 0 0         | 0 0 | 4 440  | -32 0 | 0 1       | 203 5 |  |
|                                | m                     |           | mm          | mm  | m      | mm    | mm        | mm    |  |

Staa def n t e





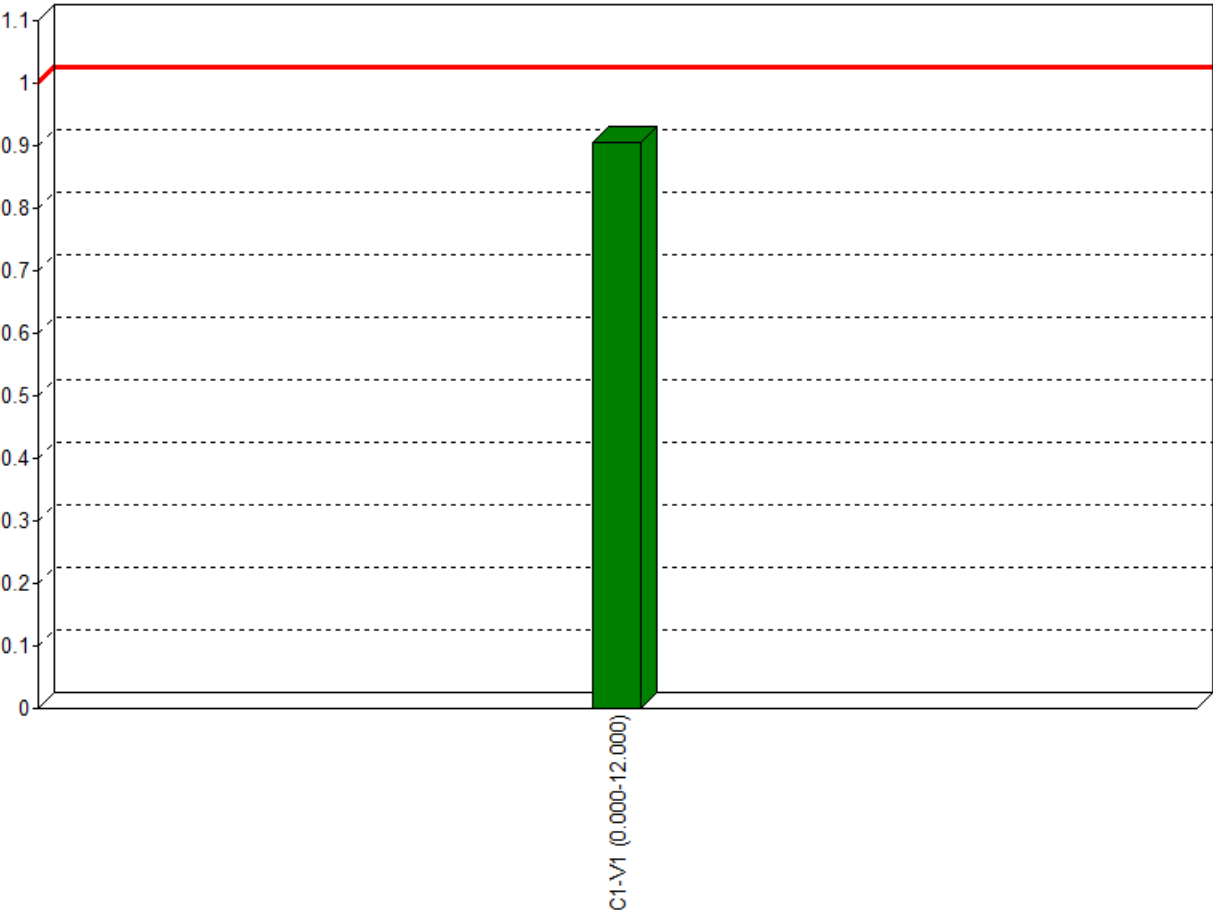
| CONSTRUCTIEDELEN |              |
|------------------|--------------|
| Constructiedeel  | Staal/staven |
| C1               | s1           |

INVOER GEGEVENS

| KNIKLENGTEGEGEVENS   |         |        |                        |        |           |                        |        |           |
|----------------------|---------|--------|------------------------|--------|-----------|------------------------|--------|-----------|
| Staal                | Profiel | Lsys   | Lokale Y-as<br>Methode | Lbuc   | Lbuc/Lsys | Lokale Z-as<br>Methode | Lbuc   | Lbuc/Lsys |
| C1 V1 (0 000 12 000) | P1      | 12 000 | handmatig geschoord    | 24 000 | 2 000     | handmatig ongeschoord  | 12 000 | 1 000     |
|                      |         |        |                        | m      |           |                        | m      |           |

| KIPSTEUNEGEGEVENS    |         |          |          |                  |                         |                |
|----------------------|---------|----------|----------|------------------|-------------------------|----------------|
| Staal                | Profiel | Begin    | End      | Kipsteunen boven | Kipsteunen onder        | Aangrijphoogte |
| C1 V1 (0 000 12 000) | P1      | Gesteund | Overstek |                  | 1 2 3 4 5 6 7 8 9 10 11 | Bovenflens     |

Afb. Staa UC D agram



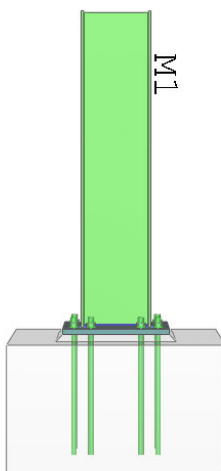
| EXTREME UNITY CHECK  |                |            |                           |             |
|----------------------|----------------|------------|---------------------------|-------------|
| Label                | Toetsing       | Combinatie | Artikel                   | Unity Check |
| C1 V1 (0 000 12 000) | Buiging & Druk | Fu C 1     | NEN EN1993 1 1(6 61&6 62) | 0.91        |

|                     |                                                                                                                                                                               |               |                |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|
|                     |                                                                                                                                                                               |               |                |
| Projectomschrijving | Uitbreiding Coolrec                                                                                                                                                           | Projectnummer | 23-157         |
| Onderdeel           |                                                                                                                                                                               | Constructeur  | ■              |
| Opdrachtgever       | Coolrec                                                                                                                                                                       | Eenheden      | m, mm, kN, kNm |
| Bestand             | C:\Users\pm\van Boxse! Engineering\Ruby - Documenten\Documenten\2023\23-157 Coolrec\1. berekeningen intern\Rapport B\Matrixframe modellen\23-157 kolom IPE330 - kolomvoet.mxf |               |                |

## 1. VOETPLAAT (NEN-EN 1993-1-8:2011/NB:2011)

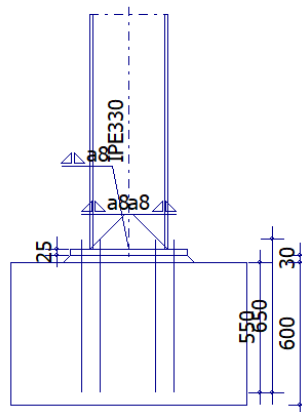
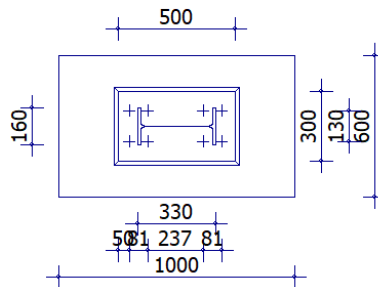
1. Voetp aat V rtuee mode

1. Voetp aat



## 1. Voetplaat Tekening

## 1. Voetplaat



Verbindingsgegevens  
 Kolom: IPE330  
 Kopplaat: 500x300x25 mm  
 Bouten: M27, Kwaliteit 4.6, Afstand 130  
 Maatvoering bout 1 t.o.v bovenzijde kopplaat  
 Randafstand: 49  
 Steek: 81, 237, 81

## VERB. VERKORT

### ALGEMEEN

|                       |                                              |
|-----------------------|----------------------------------------------|
| Verbindings type      | Voetplaatverbinding                          |
| Kolom                 | IPE330 (b 160, h 330, $f_t$ 11.5, $w_t$ 7.5) |
| Materiaal             | S235                                         |
| Raamwerk              | Statisch bepaald                             |
| Horizontale stijfheid | Geschoord raamwerk                           |
| Medium                | Net corrosief                                |
| Rekentype             | Elastisch                                    |

### VERBINDINGSONDERDELEN

|       | Breedte | Hoogte | Dikte | Las (h) |
|-------|---------|--------|-------|---------|
| Plaat | 300     | 500    | 25.0  | 8       |
|       | mm      | mm     | mm    | mm      |

### ANKERS: M27

|         |            |
|---------|------------|
| Sterkte | 4.6 (Gerd) |
| Afstand | 130 mm     |

|  |  |  |
|--|--|--|
|  |  |  |
|--|--|--|

|                     |        |
|---------------------|--------|
| $d_{g,nom}$         | 30 mm  |
| Totaal ankerengte   | 650 mm |
| Ankerengte in beton | 550 mm |

|                       | Afstand | Totale afstand |                     | Afstand | Totale afstand |
|-----------------------|---------|----------------|---------------------|---------|----------------|
| Randafstand boutrij 1 | 50      | 50             | Steek boutrijen 1-2 | 81      | 131            |
| Steek boutrijen 2-3   | 237     | 369            | Steek boutrijen 3-4 | 81      | 450            |
|                       | mm      | mm             |                     | mm      | mm             |

## FUNDERING

|           |           |           |            |
|-----------|-----------|-----------|------------|
| Hoogte    | 600.00 mm | Voegdikte | 30.00 mm   |
| $d$       | 360.00 mm | $b$       | 560.00 mm  |
| $e_d$     | 120.00 mm | $e_b$     | 220.00 mm  |
| $d_1$     | 600.00 mm | $b_1$     | 933.33 mm  |
| $d_2$     | 600.00 mm | $b_2$     | 1000.00 mm |
| Materiaal | C30/37    |           |            |

## BELASTINGEN: BC1

|            |        |            |         |            |        |
|------------|--------|------------|---------|------------|--------|
| $N_{1,Ed}$ | -17.90 | $M_{1,Ed}$ | -140.00 | $V_{1,Ed}$ | -23.30 |
|            | kN     |            | kNm     |            | kN     |

## BOUTGRENSWEERSTAND (NEN-EN 1993-1-8 TABEL 3.4)

|                                          |                            |                           |           |
|------------------------------------------|----------------------------|---------------------------|-----------|
| Stuwweerstand                            | $F_{b,Rd}$                 | Koppeling; $t \geq 25$ mm | 270.00 kN |
| Dwarskrachtcapaciteit (voor alle bouten) | $F_{v,Rd}$                 |                           | 356.94 kN |
| Trekcapaciteit                           | $\min(F_{t,Rd}, B_{p,Rd})$ |                           | 132.19 kN |

## OVERZICHT CONTROLES PER BELASTINGSGEVAL

| BC  | $M_{j,Rd}$ | UC max | Conclusie |
|-----|------------|--------|-----------|
| BC1 | 171.91     | 0.90   | Ok        |
|     | kNm        |        |           |

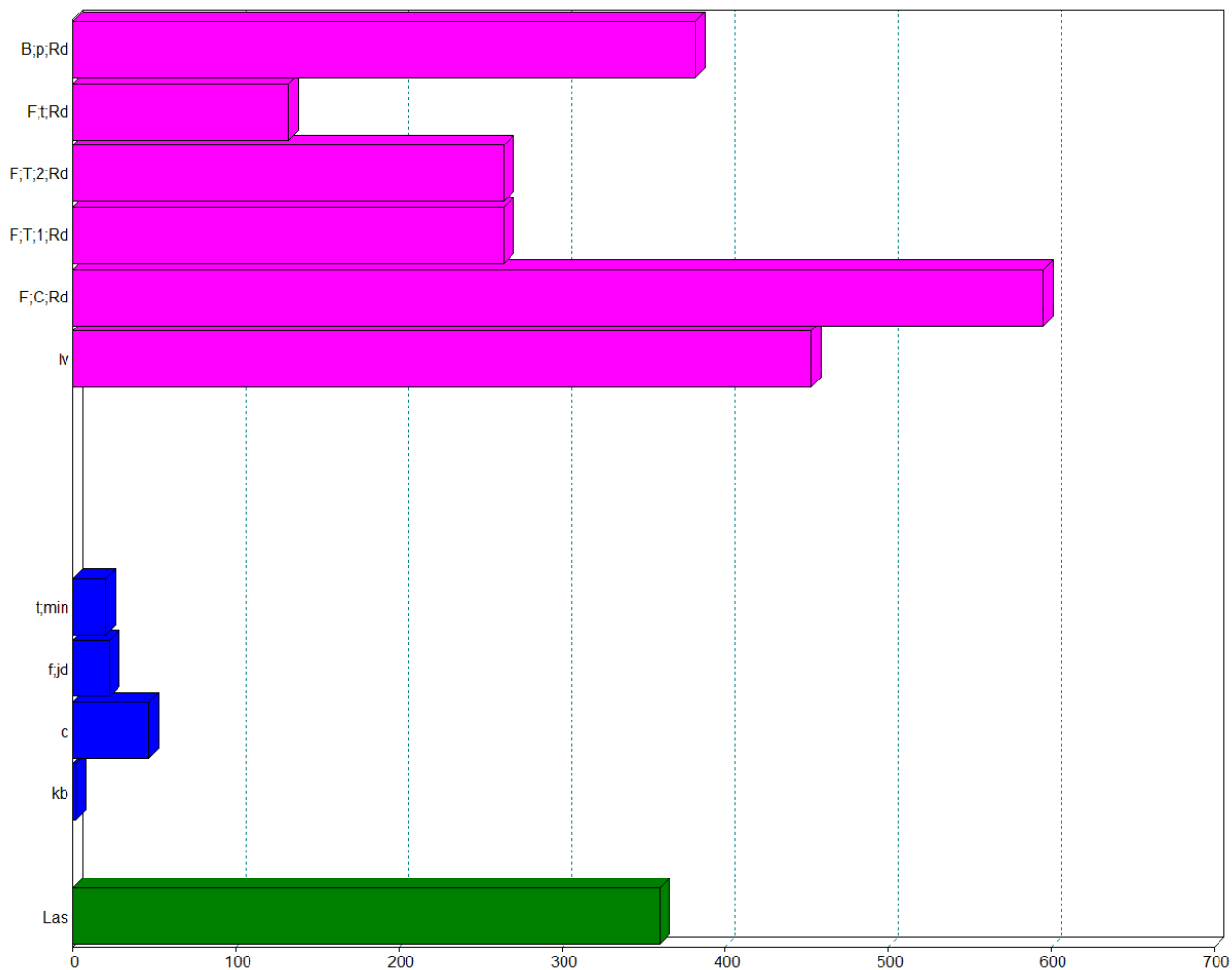
## CLASSIFICATIE DOOR STERKTE (NEN-EN 1993-1-8 #5.2.3)

| BC  | $M_{j,Rd}$ | $M_{kolom,u,d}$ | Conclusie             |
|-----|------------|-----------------|-----------------------|
| BC1 | 171.91     | 189.02          | Gedeeftelijke sterkte |
|     | kNm        | kNm             |                       |

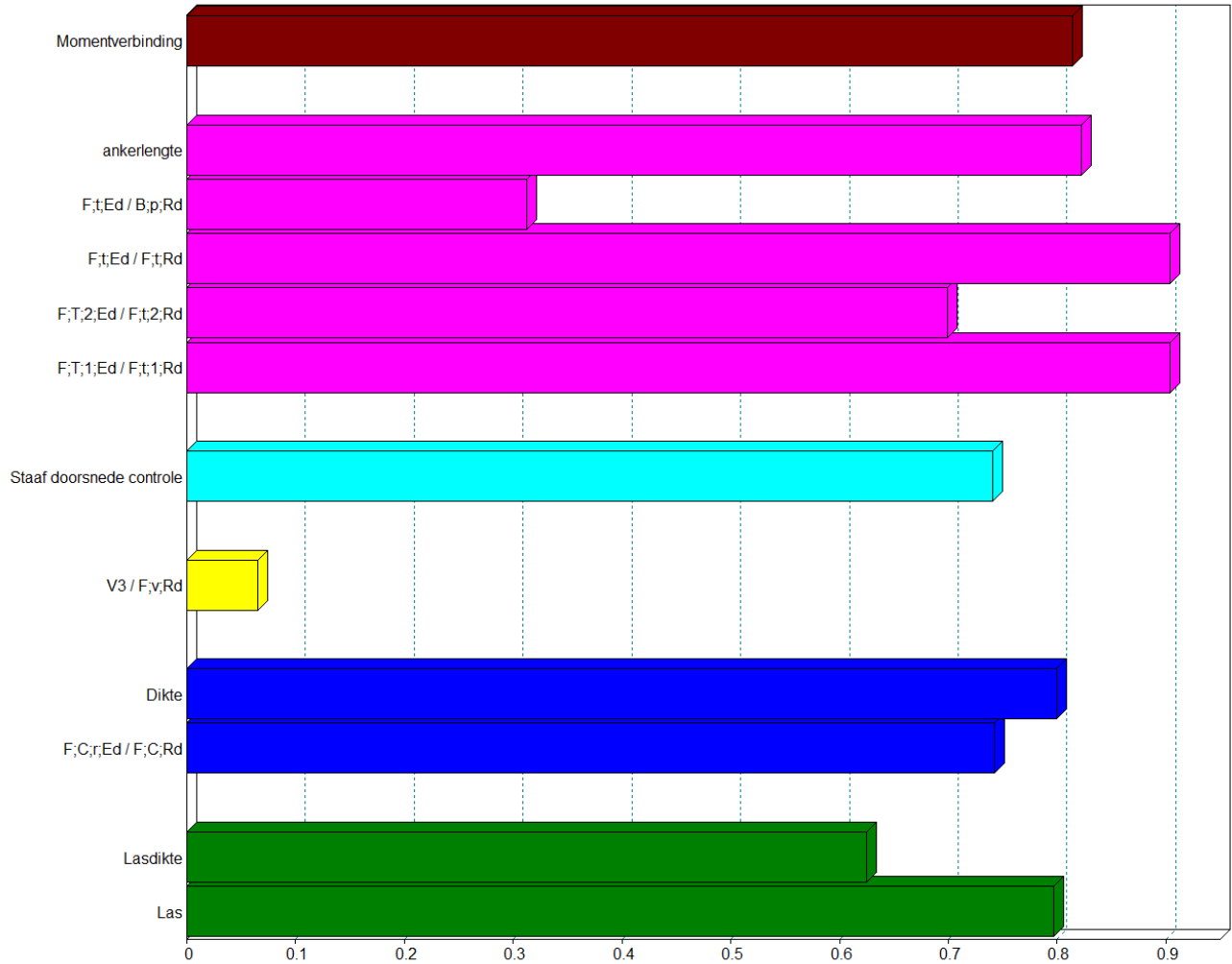
## CLASSIFICATIE DOOR STIJFHEID (NEN-EN 1993-1-8 #5.2.2)

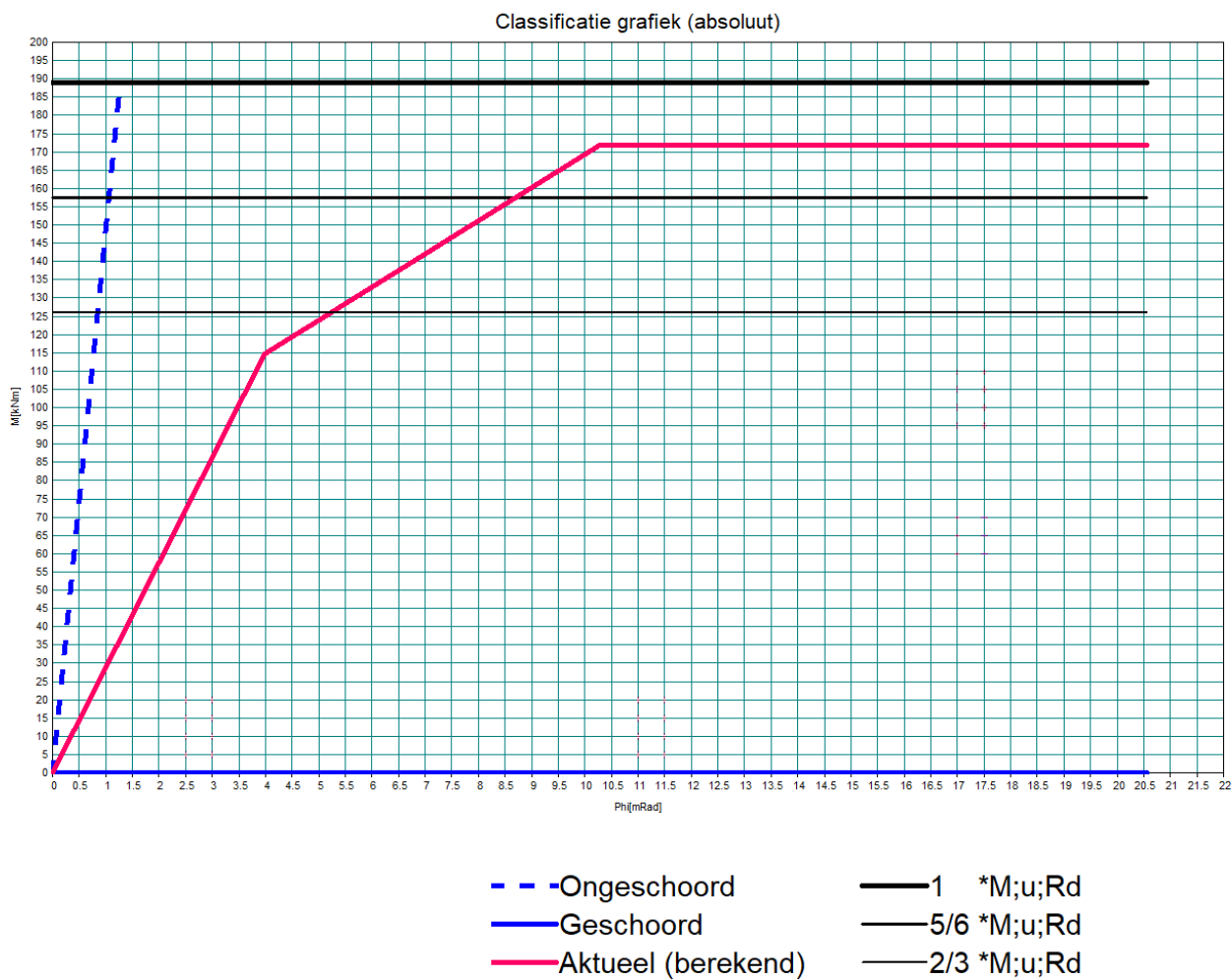
| BC  | Stijf   | Berekend | Conclusie |
|-----|---------|----------|-----------|
| BC1 | 0       | 28719    | Stijf     |
|     | kNm/rad | kNm/rad  |           |

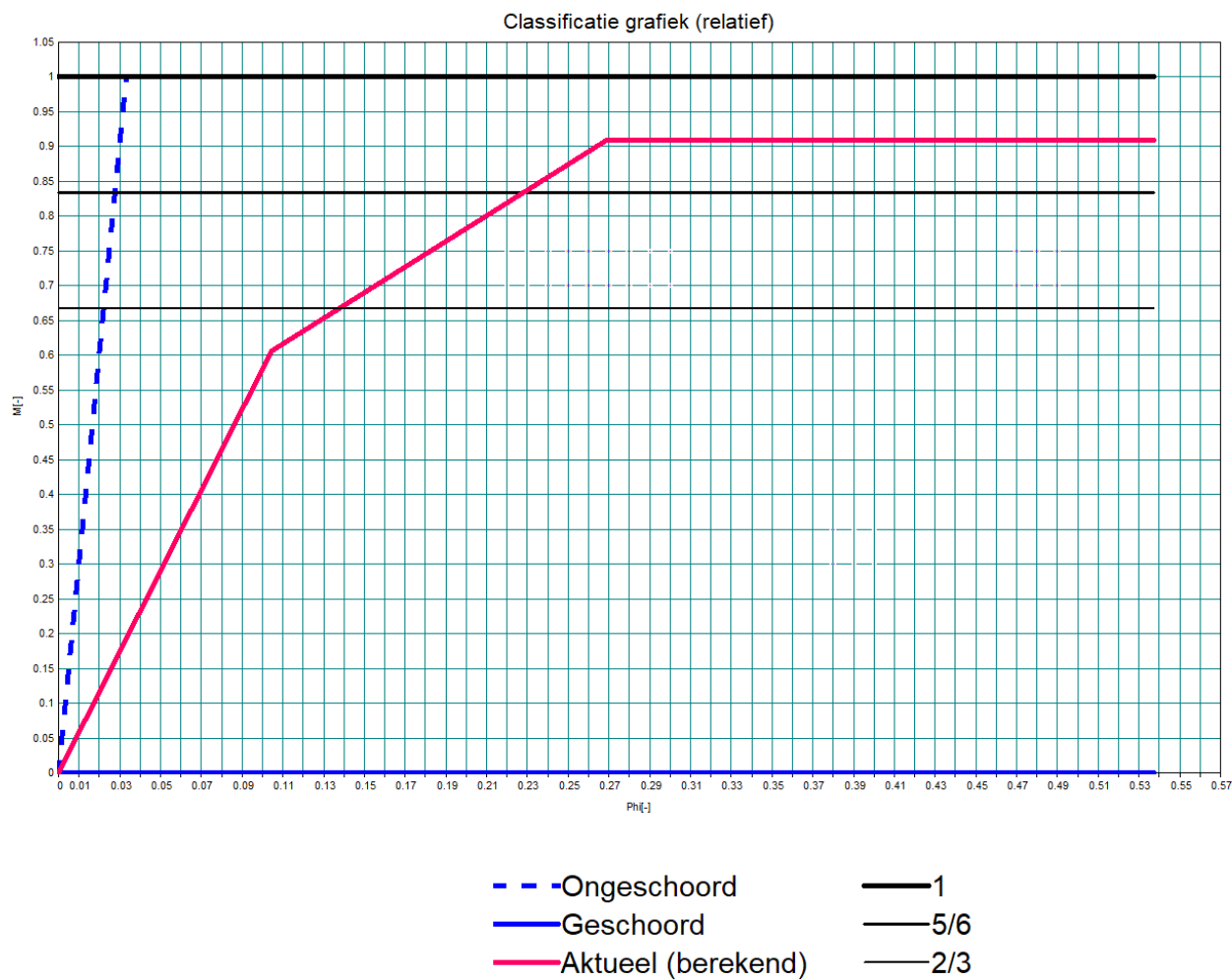
Rekenwaarde van de weerstand grafiek



Unitycheck grafiek









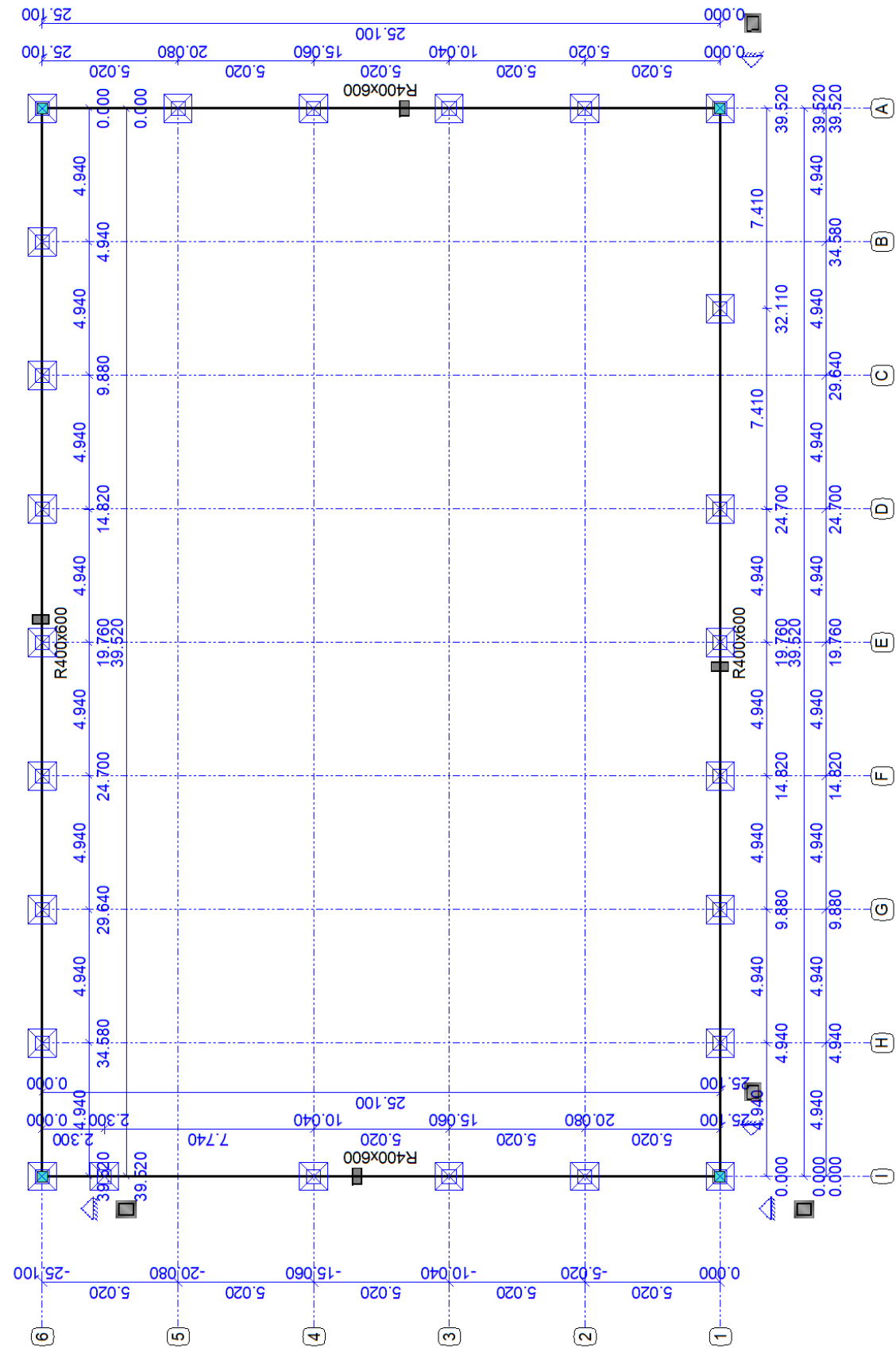
|               |                                                                                   |        |           |            |
|---------------|-----------------------------------------------------------------------------------|--------|-----------|------------|
| werknummer    | paraaf                                                                            | gezien | onderdeel | bladnummer |
| <b>23-157</b> |  |        | B         | IV-0       |
|               | datum                                                                             |        | gewijzigd |            |
|               | 06-03-2024                                                                        |        |           |            |

**BIJLAGE IV Computeruitvoer balkenrooster**

Vanaf volgende pagina

|                        |                                                                                                                                                                            |                                     |               |                  |  |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------|------------------|--|
| VAN BOXSEL ENGINEERING |                                                                                                                                                                            | T: 0162-451280 E: info@vanboxsel.nl |               | www.vanboxsel.nl |  |
|                        |                                                                                                                                                                            |                                     |               |                  |  |
| Projectomschrijving    | Uitbreiding terrein Coolrec                                                                                                                                                |                                     | Projectnummer | 23-157           |  |
| Onderdeel              |                                                                                                                                                                            |                                     | Constructeur  | [REDACTED]       |  |
| Opdrachtgever          | Coolrec                                                                                                                                                                    |                                     | Eenheden      | m, mm, kN, kNm   |  |
| Bestand                | C:\Users\pm\van Boxsel Engineering\Ruby - Documenten\Documenten\2023\23-157 Coolrec\1. berekeningen intern\Rapport B\Matrixframe modellen\23-157 Balkrooster fundering.mxf |                                     |               |                  |  |

Constructie



STAVEN

| Staaf | Knoop-B | Knoop-E | X-B    | X-E    | Y-B    | Y-E    | Lengte | Profiel | Positie |            |
|-------|---------|---------|--------|--------|--------|--------|--------|---------|---------|------------|
| S1    | K1      | K2      | 0 000  | 39 520 | 0 000  | 0 000  | 39 520 | P1      | 0 000   | 39 520 (L) |
| S2    | K4      | K3      | 39 520 | 0 000  | 25 100 | 25 100 | 39 520 | P1      | 0 000   | 39 520 (L) |
| S3    | K3      | K1      | 0 000  | 0 000  | 25 100 | 0 000  | 25 100 | P1      | 0 000   | 25 100 (L) |
| S4    | K2      | K4      | 39 520 | 39 520 | 0 000  | 25 100 | 25 100 | P1      | 0 000   | 25 100 (L) |
|       |         |         | m      | m      | m      | m      | m      |         |         | m          |

PROFIELEN

| Profiel | Profielnaam | It              | Iz              | Materiaal | Hoek |
|---------|-------------|-----------------|-----------------|-----------|------|
| P1      | R400x600    | 7 5125e+09      | 3 2000e+09      | C30/37    | 0    |
|         |             | mm <sup>4</sup> | mm <sup>4</sup> |           | °    |

PROFIELVORMEN

| Profiel | Verl. h. | hB    | hE    | tf  | tw  | tf2 | B     | bL  | bR  | Raatl. | Hoogte |
|---------|----------|-------|-------|-----|-----|-----|-------|-----|-----|--------|--------|
| P1      | Nee      | 600 0 | 600 0 | 0 0 | 0 0 | 0 0 | 400 0 | 0 0 | 0 0 | Nee    | 0 0    |
|         |          | mm    | mm    | mm  | mm  | mm  | mm    | mm  | mm  |        | mm     |

MATERIALEN

| Materiaalnaam | Poison | Dichtheid        | E-Modulus  | Uitzettingcoeff |
|---------------|--------|------------------|------------|-----------------|
| C30/37        | 0 20   | 25 00            | 3 3000e+04 | 10 0000e 06     |
|               |        | kNm <sup>3</sup> | Nmm        | C°m             |

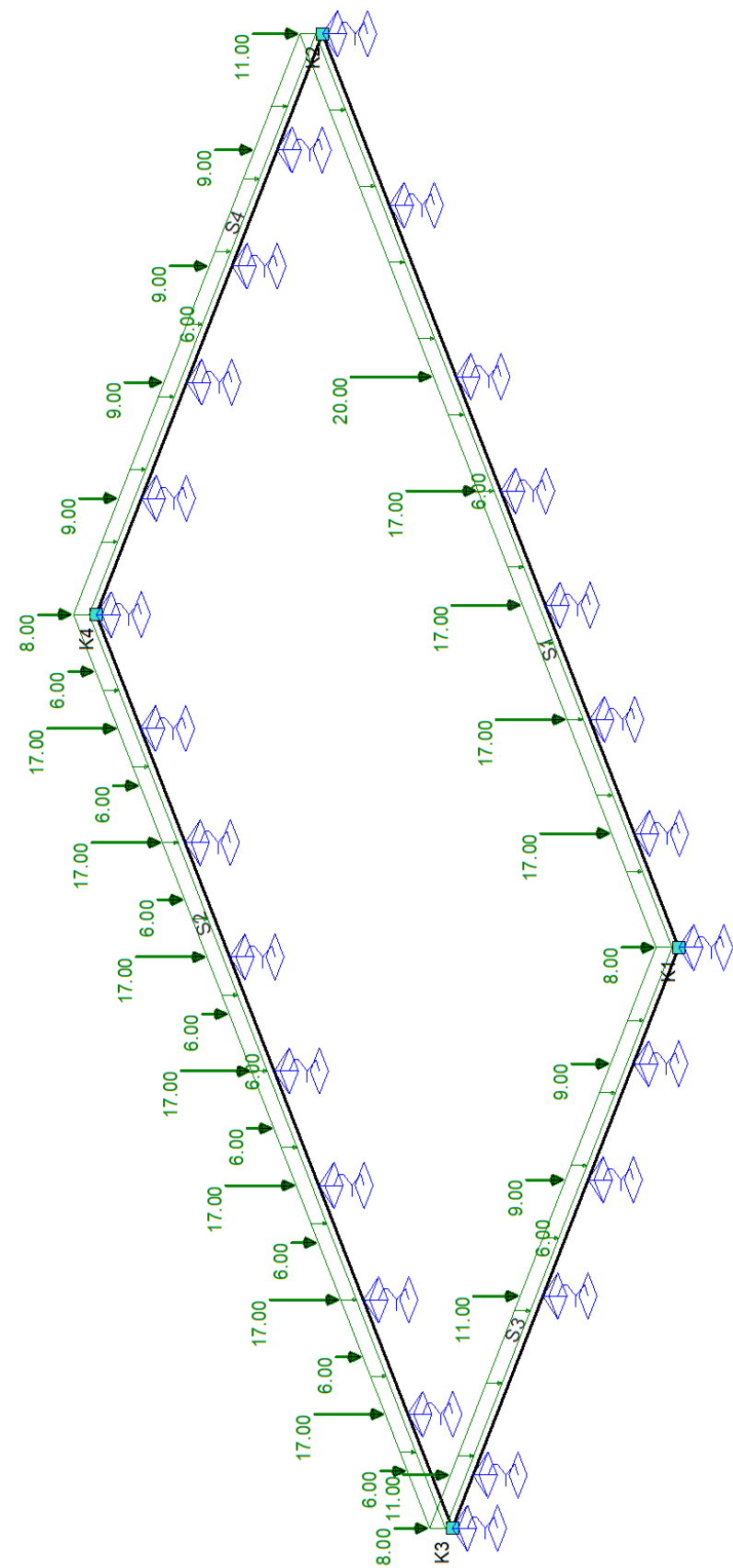
OPLEGGINGEN

| Oplegging | Object | Positie    | Z        | Xr      | Yr      |
|-----------|--------|------------|----------|---------|---------|
| O1        | S1     | 0 000      | 50000 00 | Vrij    | Vrij    |
| O2        | S1     | 4 940      | 50000 00 | Vrij    | Vrij    |
| O3        | S1     | 9 880      | 50000 00 | Vrij    | Vrij    |
| O4        | S1     | 14 820     | 50000 00 | Vrij    | Vrij    |
| O5        | S1     | 19 760     | 50000 00 | Vrij    | Vrij    |
| O6        | S1     | 24 700     | 50000 00 | Vrij    | Vrij    |
| O7        | S1     | 32 110     | 50000 00 | Vrij    | Vrij    |
| O8        | S1     | 39 520     | 50000 00 | Vrij    | Vrij    |
| O9        | S3     | 20 080     | 50000 00 | Vrij    | Vrij    |
| O10       | S4     | 5 020      | 50000 00 | Vrij    | Vrij    |
| O11       | S3     | 15 060     | 50000 00 | Vrij    | Vrij    |
| O12       | S4     | 10 040     | 50000 00 | Vrij    | Vrij    |
| O13       | S3     | 10 040     | 50000 00 | Vrij    | Vrij    |
| O14       | S4     | 15 060     | 50000 00 | Vrij    | Vrij    |
| O15       | S4     | 20 080     | 50000 00 | Vrij    | Vrij    |
| O16       | S3     | 2 300      | 50000 00 | Vrij    | Vrij    |
| O17       | S2     | 39 520 (L) | 50000 00 | Vrij    | Vrij    |
| O18       | S2     | 34 580     | 50000 00 | Vrij    | Vrij    |
| O19       | S2     | 29 640     | 50000 00 | Vrij    | Vrij    |
| O20       | S2     | 24 700     | 50000 00 | Vrij    | Vrij    |
| O21       | S2     | 19 760     | 50000 00 | Vrij    | Vrij    |
| O22       | S2     | 14 820     | 50000 00 | Vrij    | Vrij    |
| O23       | S2     | 9 880      | 50000 00 | Vrij    | Vrij    |
| O24       | S2     | 4 940      | 50000 00 | Vrij    | Vrij    |
| O25       | S2     | 0 000      | 50000 00 | Vrij    | Vrij    |
|           |        | m          | kNm      | kNm/rad | kNm/rad |

BELASTINGSGEVALLEN TYPEN

| Label | Omschrijving  | B.G.Type         | Gunstig/Ong. | Element | Niveau | Veld  | Ψ <sub>0</sub> | Ψ <sub>1</sub> | Ψ <sub>2</sub> | C <sub>prob</sub><br>UGT/GGT |
|-------|---------------|------------------|--------------|---------|--------|-------|----------------|----------------|----------------|------------------------------|
| B G 1 | Eigen gewicht | Permanent        |              |         | N v t  | N v t |                |                |                |                              |
| B G 2 | Permanent     | Permanent        |              |         | N v t  | N v t |                |                |                |                              |
| B G 3 | Sneeuw        | Sneeuw belasting |              |         | N v t  | N v t |                | 0 20           |                | 1 00/1 00                    |
| B G 4 | Wind          | Windbelasting    |              |         | N v t  | N v t |                | 0 20           |                | 1 00/1 00                    |

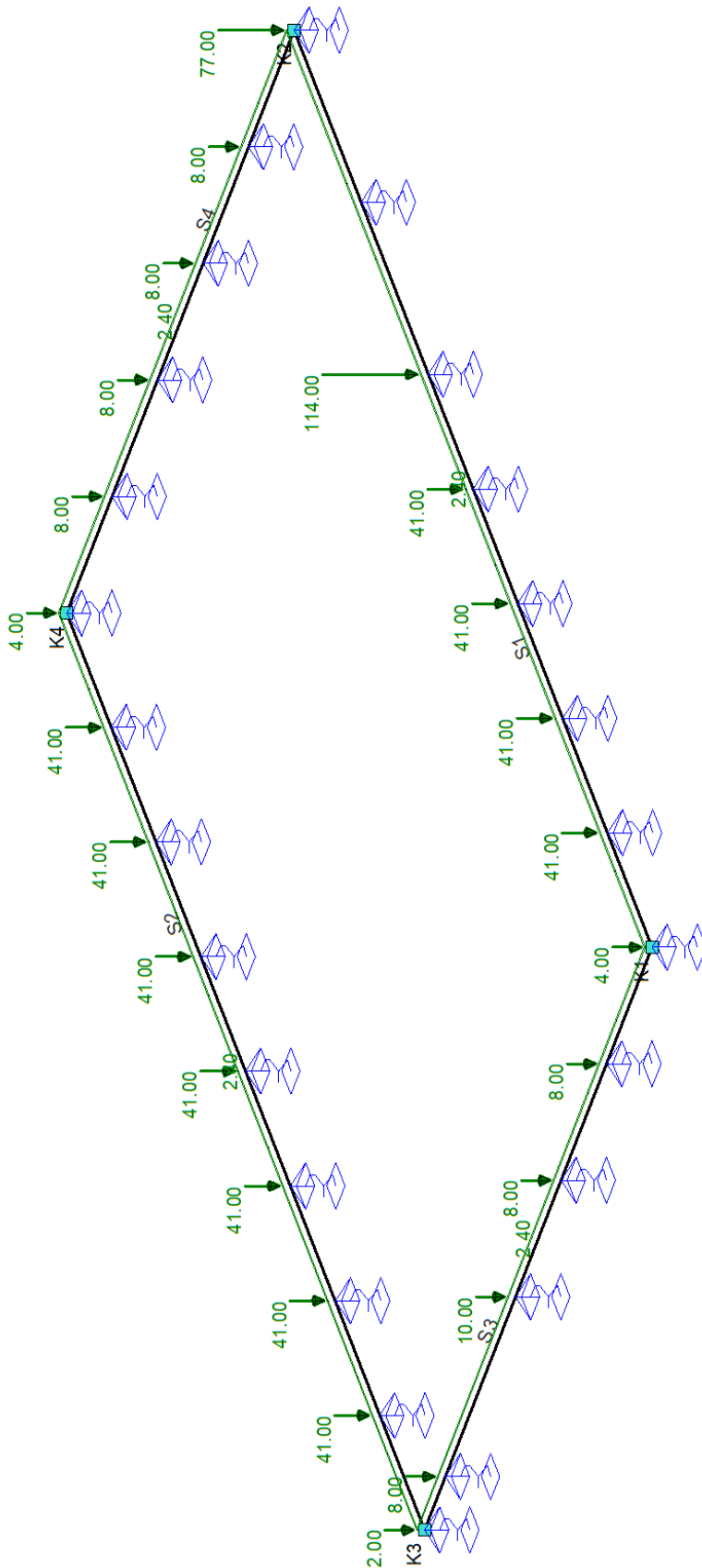
B.G.1: Egen gewicht



B.G.1: EIGEN GEWICHT

| Type       | Beginwaarde                   | Endwaarde | Beginafstand | Endafstand | Richting | Staaaf of knoop | Omschrijving |
|------------|-------------------------------|-----------|--------------|------------|----------|-----------------|--------------|
| qG         | 1 00                          | 1 00      | 0 000        | L          | Z        | S1 S4           |              |
| F          | 8 00                          |           | 0 000        |            | Z        | S1              |              |
| F          | 17 00                         |           | 4 940        |            | Z        | S1 S2           |              |
| F          | 17 00                         |           | 9 880        |            | Z        | S1 S2           |              |
| F          | 17 00                         |           | 14 820       |            | Z        | S1 S2           |              |
| F          | 17 00                         |           | 19 760       |            | Z        | S1 S2           |              |
| F          | 20 00                         |           | 24 700       |            | Z        | S1              |              |
| F          | 11 00                         |           | 39 520       |            | Z        | S1              |              |
| F          | 9 00                          |           | 5 020        |            | Z        | S4              |              |
| F          | 9 00                          |           | 10 040       |            | Z        | S4              |              |
| F          | 9 00                          |           | 15 060       |            | Z        | S3 S4           |              |
| F          | 9 00                          |           | 20 080       |            | Z        | S3 S4           |              |
| F          | 8 00                          |           | 25 100       |            | Z        | S4              |              |
| F          | 17 00                         |           | 24 700       |            | Z        | S2              |              |
| F          | 17 00                         |           | 29 640       |            | Z        | S2              |              |
| F          | 17 00                         |           | 34 580       |            | Z        | S2              |              |
| F          | 8 00                          |           | 39 520       |            | Z        | S2              |              |
| F          | 11 00                         |           | 2 300        |            | Z        | S3              |              |
| F          | 11 00                         |           | 10 040       |            | Z        | S3              |              |
| F          | 6 00                          |           | 2 470        |            | Z        | S2              |              |
| F          | 6 00                          |           | 7 410        |            | Z        | S2              |              |
| F          | 6 00                          |           | 12 350       |            | Z        | S2              |              |
| F          | 6 00                          |           | 17 290       |            | Z        | S2              |              |
| F          | 6 00                          |           | 22 230       |            | Z        | S2              |              |
| F          | 6 00                          |           | 27 170       |            | Z        | S2              |              |
| F          | 6 00                          |           | 32 110       |            | Z        | S2              |              |
| F          | 6 00                          |           | 37 050       |            | Z        | S2              |              |
| Som lasten | Z: 1141.44 Xr: -0.00 Yr: 0.00 |           | m            | m          |          |                 |              |

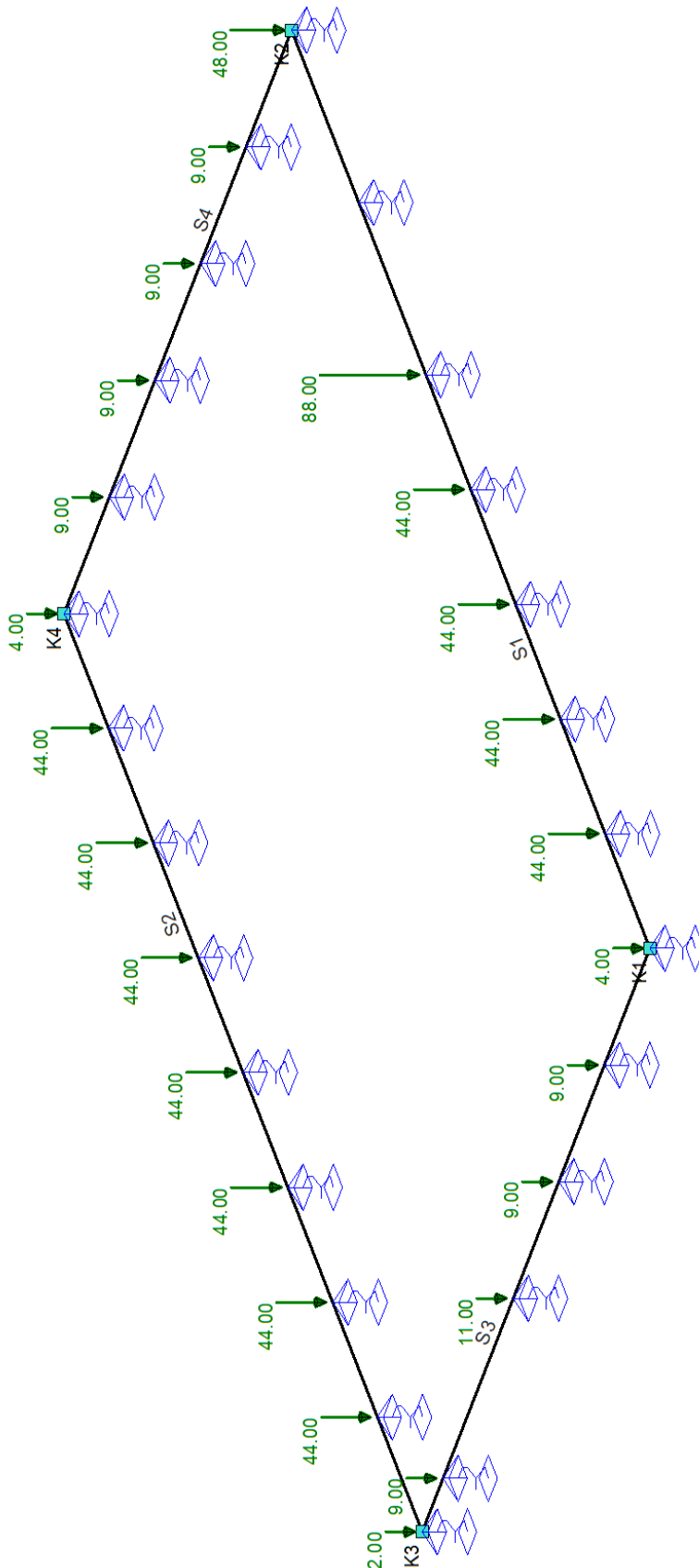
B.G.2: Permanent



**B.G.2: PERMANENT**

| Type              | Beginwaarde | Endwaarde                  | Beginafstand | Endafstand | Richting | Staaaf of knoop | Omschrijving |
|-------------------|-------------|----------------------------|--------------|------------|----------|-----------------|--------------|
| F                 | 4 00        |                            | 0 000        |            | Z        | S1              |              |
| F                 | 41 00       |                            | 4 940        |            | Z        | S1 S2           |              |
| F                 | 41 00       |                            | 9 880        |            | Z        | S1 S2           |              |
| F                 | 41 00       |                            | 14 820       |            | Z        | S1 S2           |              |
| F                 | 41 00       |                            | 19 760       |            | Z        | S1 S2           |              |
| F                 | 114 00      |                            | 24 700       |            | Z        | S1              |              |
| F                 | 77 00       |                            | 39 520       |            | Z        | S1              |              |
| F                 | 8 00        |                            | 5 020        |            | Z        | S4              |              |
| F                 | 8 00        |                            | 10 040       |            | Z        | S4              |              |
| F                 | 8 00        |                            | 15 060       |            | Z        | S3 S4           |              |
| F                 | 8 00        |                            | 20 080       |            | Z        | S3 S4           |              |
| F                 | 4 00        |                            | 25 100       |            | Z        | S4              |              |
| F                 | 41 00       |                            | 24 700       |            | Z        | S2              |              |
| F                 | 41 00       |                            | 29 640       |            | Z        | S2              |              |
| F                 | 41 00       |                            | 34 580       |            | Z        | S2              |              |
| F                 | 2 00        |                            | 39 520       |            | Z        | S2              |              |
| F                 | 8 00        |                            | 2 300        |            | Z        | S3              |              |
| F                 | 10 00       |                            | 10 040       |            | Z        | S3              |              |
| q                 | 2 40        | 2 40                       | 0 000        | L          | Z        | S1 S4           |              |
| <b>Som lasten</b> |             | <b>Z: 1028.18 Xr: 0.00</b> |              |            |          |                 |              |
|                   |             |                            | m            | m          |          |                 |              |

### B.G.3: Sneeuw

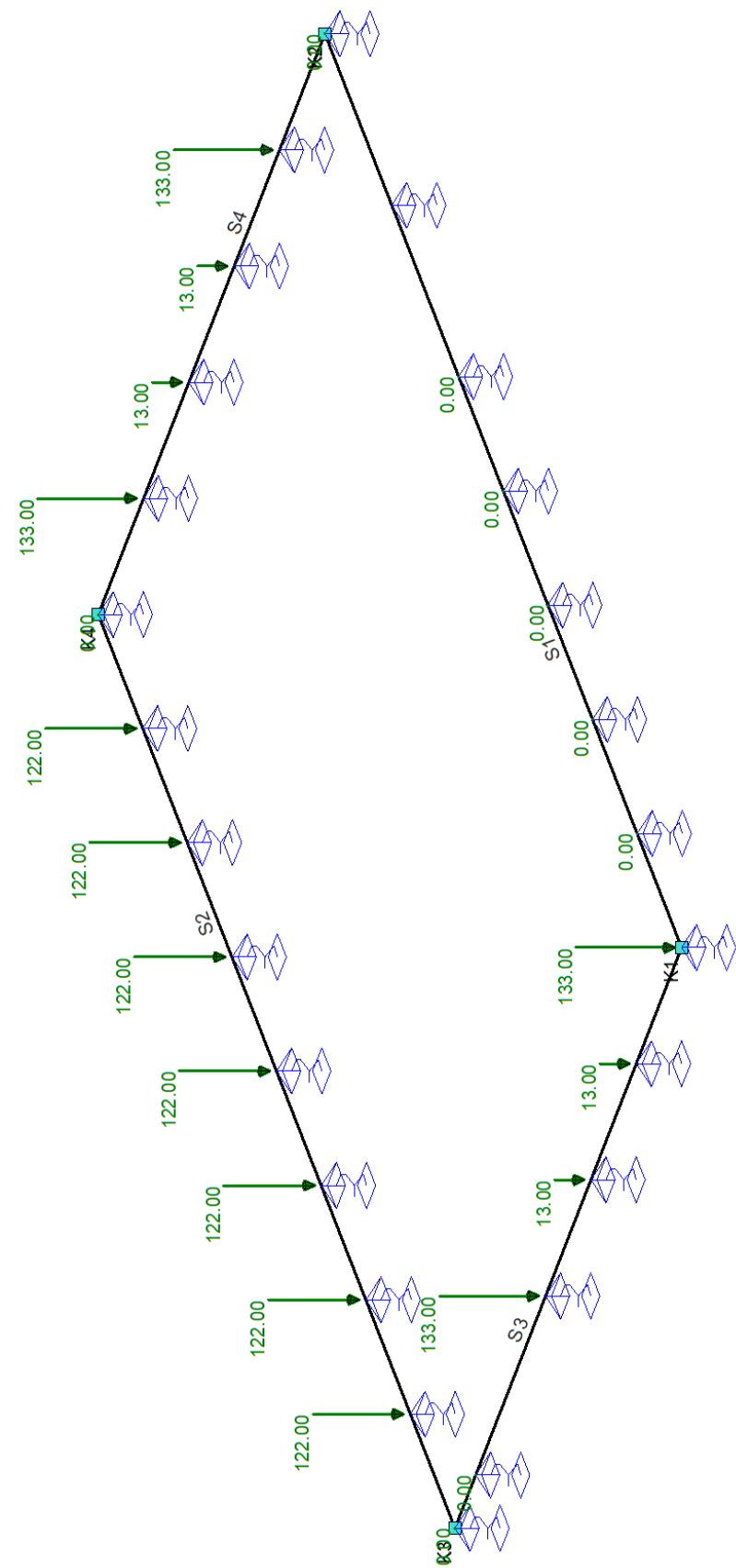




### B.G.3: SNEEUW

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Staf of knoop | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|---------------|--------------|
| F          | 4 00        |           | 0 000        |            | Z        | S1            |              |
| F          | 44 00       |           | 4 940        |            | Z        | S1 S2         |              |
| F          | 44 00       |           | 9 880        |            | Z        | S1 S2         |              |
| F          | 44 00       |           | 14 820       |            | Z        | S1 S2         |              |
| F          | 44 00       |           | 19 760       |            | Z        | S1 S2         |              |
| F          | 88 00       |           | 24 700       |            | Z        | S1            |              |
| F          | 48 00       |           | 39 520       |            | Z        | S1            |              |
| F          | 9 00        |           | 5 020        |            | Z        | S4            |              |
| F          | 9 00        |           | 10 040       |            | Z        | S4            |              |
| F          | 9 00        |           | 15 060       |            | Z        | S3 S4         |              |
| F          | 9 00        |           | 20 080       |            | Z        | S3 S4         |              |
| F          | 4 00        |           | 25 100       |            | Z        | S4            |              |
| F          | 44 00       |           | 24 700       |            | Z        | S2            |              |
| F          | 44 00       |           | 29 640       |            | Z        | S2            |              |
| F          | 44 00       |           | 34 580       |            | Z        | S2            |              |
| F          | 2 00        |           | 39 520       |            | Z        | S2            |              |
| F          | 9 00        |           | 2 300        |            | Z        | S3            |              |
| F          | 11 00       |           | 10 040       |            | Z        | S3            |              |
| Som lasten |             | Z: 704.00 |              |            |          |               |              |
|            |             |           | m            | m          |          |               |              |

B.G.4: Wnd



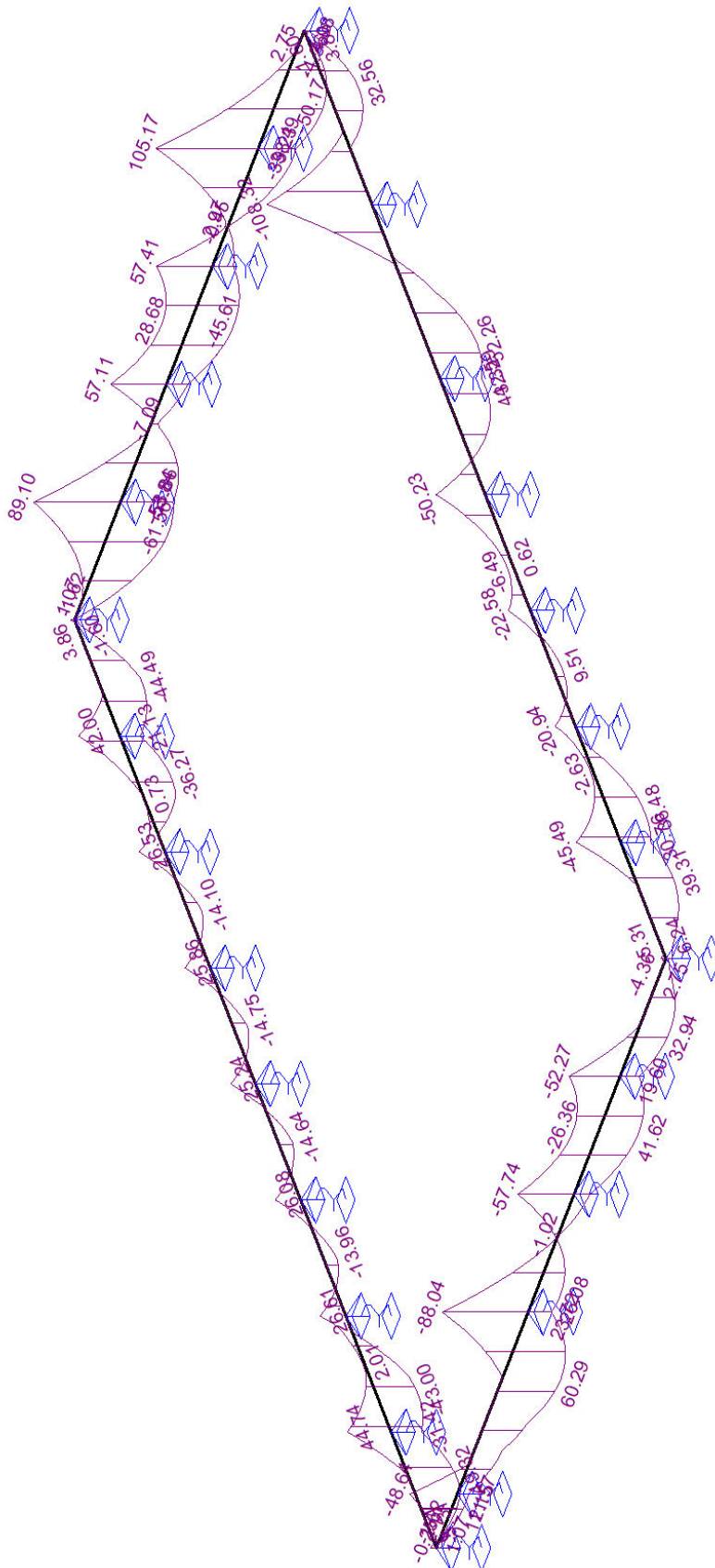
**B.G.4: WIND**

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Staaaf of knoop | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|-----------------|--------------|
| F          | 133 00      |           | 0 000        |            | Z        | S1              |              |
| F          | 0 00        |           | 4 940        |            | Z        | S1              |              |
| F          | 0 00        |           | 9 880        |            | Z        | S1              |              |
| F          | 0 00        |           | 14 820       |            | Z        | S1              |              |
| F          | 0 00        |           | 19 760       |            | Z        | S1              |              |
| F          | 0 00        |           | 24 700       |            | Z        | S1              |              |
| F          | 0 00        |           | 39 520       |            | Z        | S1 S2           |              |
| F          | 133 00      |           | 5 020        |            | Z        | S4              |              |
| F          | 13 00       |           | 10 040       |            | Z        | S4              |              |
| F          | 13 00       |           | 15 060       |            | Z        | S3 S4           |              |
| F          | 133 00      |           | 20 080       |            | Z        | S4              |              |
| F          | 0 00        |           | 25 100       |            | Z        | S4              |              |
| F          | 122 00      |           | 4 940        |            | Z        | S2              |              |
| F          | 122 00      |           | 9 880        |            | Z        | S2              |              |
| F          | 122 00      |           | 14 820       |            | Z        | S2              |              |
| F          | 122 00      |           | 19 760       |            | Z        | S2              |              |
| F          | 122 00      |           | 24 700       |            | Z        | S2              |              |
| F          | 122 00      |           | 29 640       |            | Z        | S2              |              |
| F          | 122 00      |           | 34 580       |            | Z        | S2              |              |
| F          | 0 00        |           | 2 300        |            | Z        | S3              |              |
| F          | 133 00      |           | 10 040       |            | Z        | S3              |              |
| F          | 13 00       |           | 20 080       |            | Z        | S3              |              |
| Som lasten | Z: 1438.00  |           |              |            |          |                 |              |
|            |             |           | m            | m          |          |                 |              |

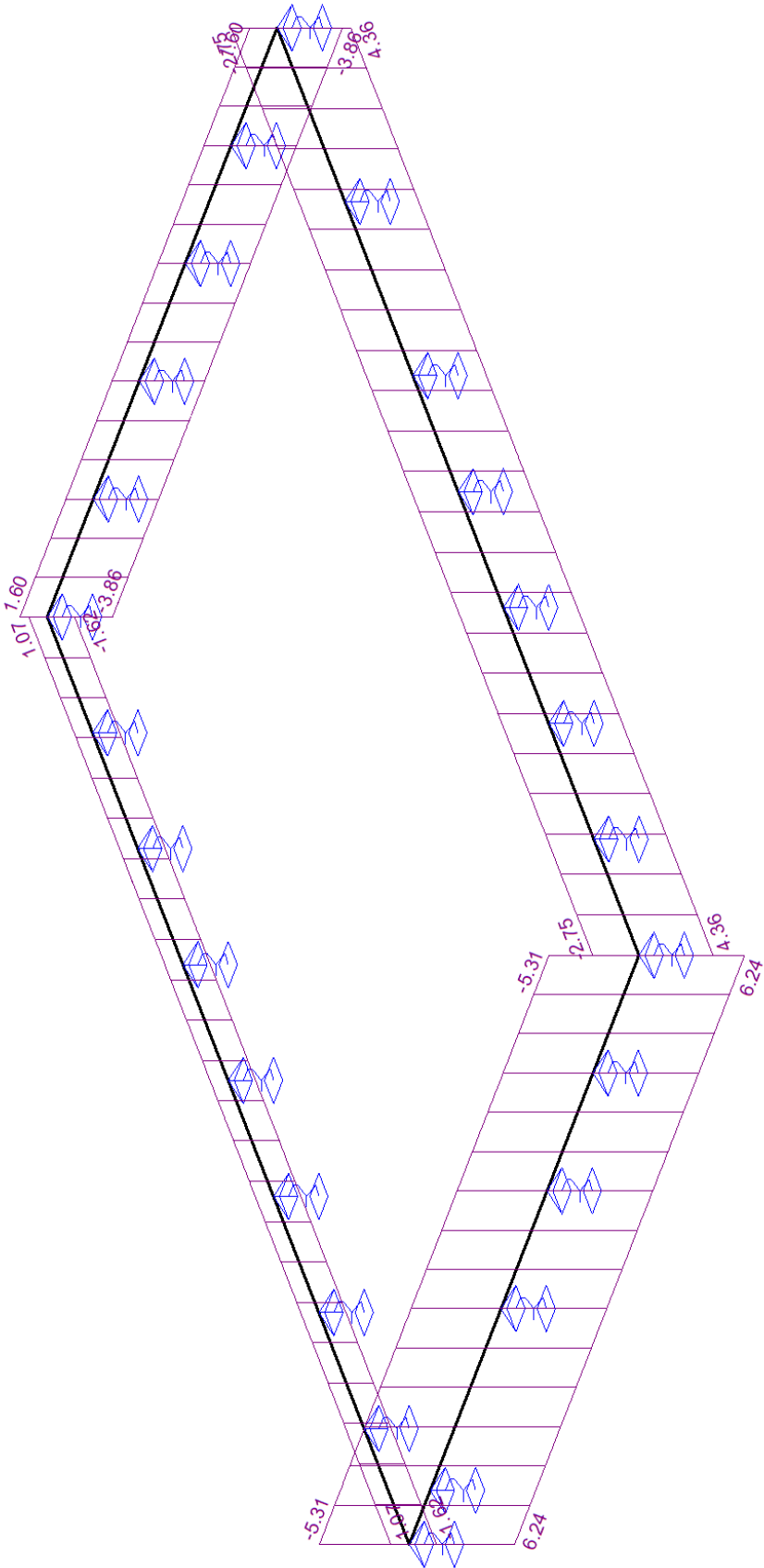
**BELASTINGSCOMBINATIES**

| Fundamenteel    |               |           |        |        |        |  |
|-----------------|---------------|-----------|--------|--------|--------|--|
| B.G.            | Omschrijving  | Fu.C.1    | Fu.C.2 | Fu.C.3 | Fu.C.4 |  |
| B G 1           | Eigen gewicht | 1 08      | 1 08   | 1 22   | 0 90   |  |
| B G 2           | Permanent     | 1 08      | 1 08   | 1 22   | 0 90   |  |
| B G 3           | Sheuw         | 1 35      |        |        |        |  |
| B G 4           | Wind          |           | 1 35   |        | 1 35   |  |
| Karakteristiek  |               |           |        |        |        |  |
| B.G.            | Omschrijving  | Ka.C.(w1) | Ka.C.1 | Ka.C.2 | Ka.C.3 |  |
| B G 1           | Eigen gewicht | 1 00      | 1 00   | 1 00   | 1 00   |  |
| B G 2           | Permanent     | 1 00      | 1 00   | 1 00   | 1 00   |  |
| B G 3           | Sheuw         |           |        | 1 00   |        |  |
| B G 4           | Wind          |           |        |        | 1 00   |  |
| Frequent        |               |           |        |        |        |  |
| B.G.            | Omschrijving  | Fr.C.(w1) | Fr.C.1 | Fr.C.2 |        |  |
| B G 1           | Eigen gewicht | 1 00      | 1 00   | 1 00   |        |  |
| B G 2           | Permanent     | 1 00      | 1 00   | 1 00   |        |  |
| B G 3           | Sheuw         |           | 0 20   |        |        |  |
| B G 4           | Wind          |           |        | 0 20   |        |  |
| Quasi-permanent |               |           |        |        |        |  |
| B.G.            | Omschrijving  | Qu.C.1    |        |        |        |  |
| B G 1           | Eigen gewicht | 1 00      |        |        |        |  |
| B G 2           | Permanent     | 1 00      |        |        |        |  |
| B G 3           | Sheuw         |           |        |        |        |  |
| B G 4           | Wind          |           |        |        |        |  |

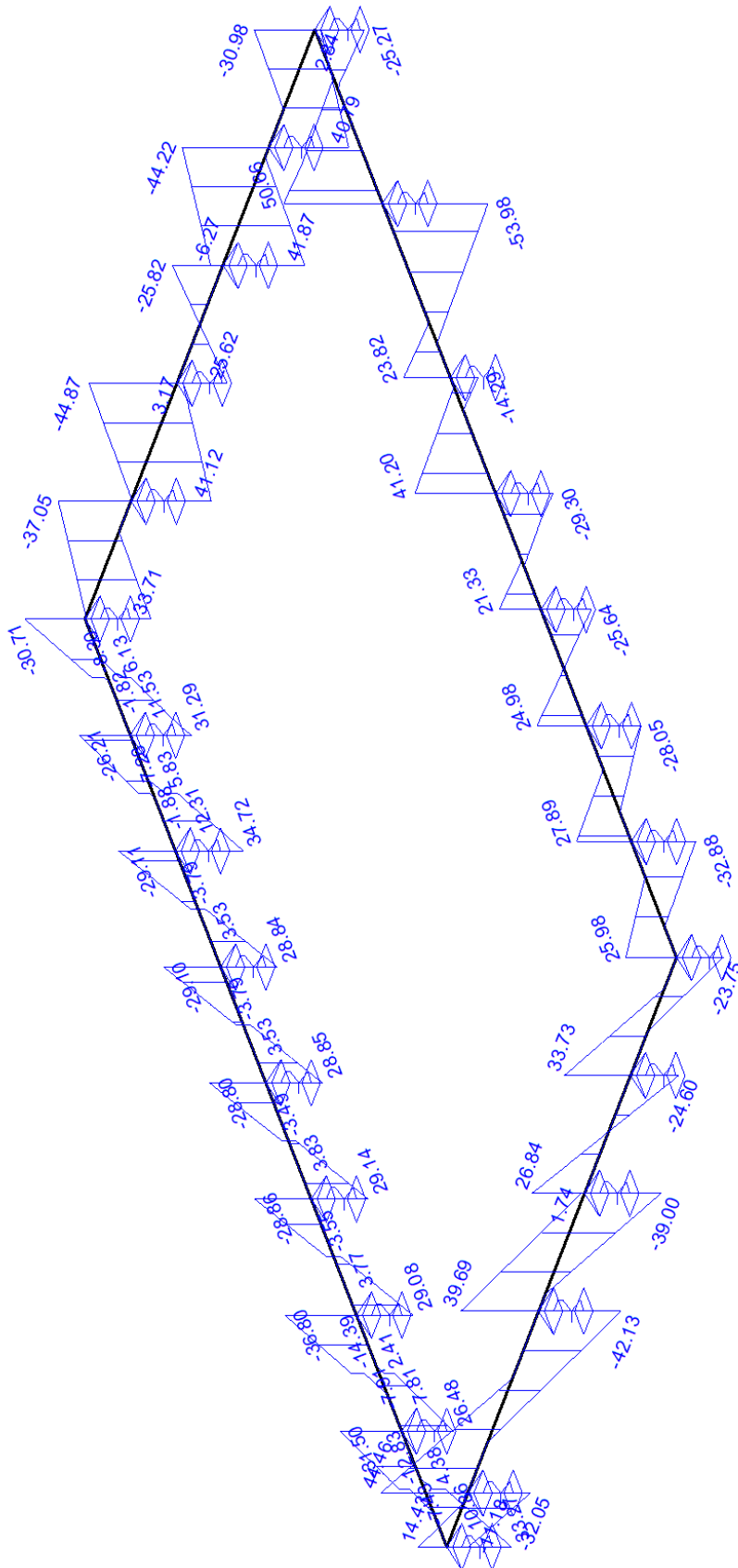
Fu.C. Omhu ende Momenten (My)



Fu.C. Omhu ende Tors emomenten



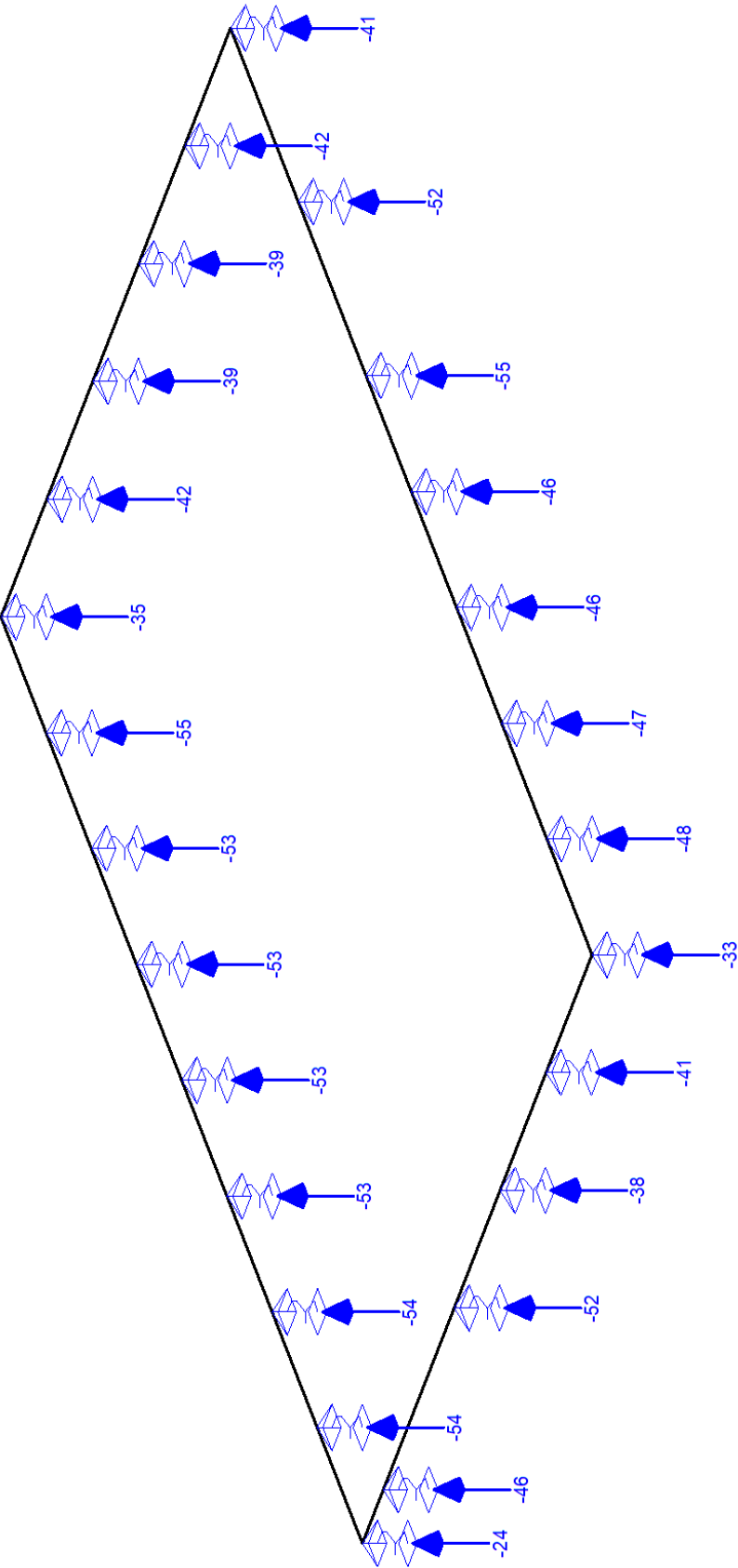
Fu.C. Omhu ende Dwarskracht (Vz)



EXTREME STAAFKRACHTEN

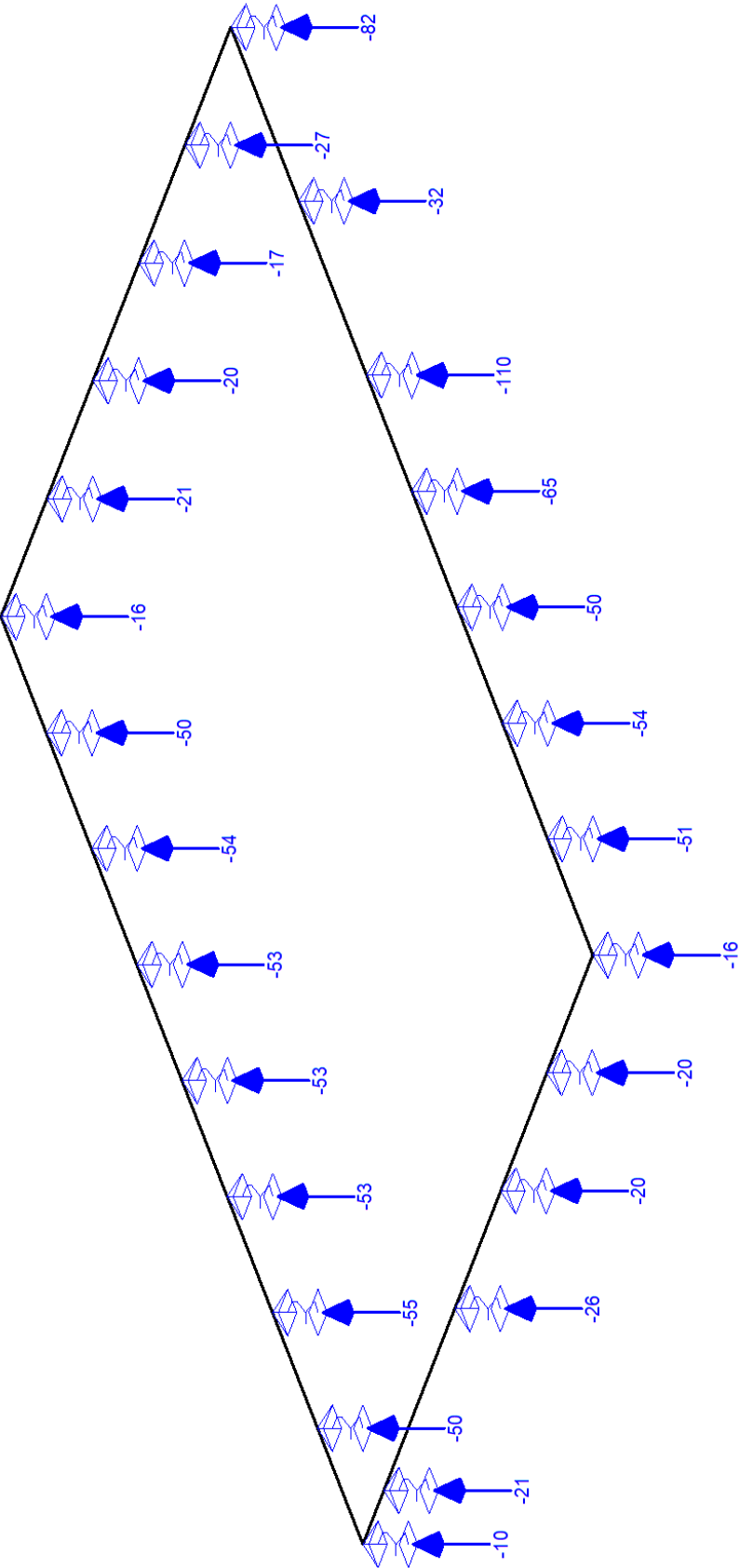
| Staaf        | Veld                   | B.C.  | M <sub>b</sub> | M <sub>lmax</sub> | xM <sub>lmax</sub> | M <sub>e</sub> | xM0    | xM0 | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> | Mx <sub>b</sub> | Mx <sub>e</sub> |
|--------------|------------------------|-------|----------------|-------------------|--------------------|----------------|--------|-----|----------------|------------------|----------------|-----------------|-----------------|
| Fundamenteel |                        |       |                |                   |                    |                |        |     |                |                  |                |                 |                 |
| S1           | Veld 4 (14 820 19 760) | Fu C1 | 21 76          | <b>-6.49</b>      | 16 655             | 50 23          |        |     | 16 64          | 28 17            | 28 17          | 1 44            | 1 44            |
|              | Veld 5 (19 760 24 700) | Fu C1 | 50 23          | 43 32             | 24 301             | <b>42.59</b>   | 21 211 |     | 41 20          | 41 20            | 3 62           | 1 44            | 1 44            |
|              | Veld 6 (24 700 32 110) | Fu C1 | <b>42.59</b>   | <b>52.26</b>      | 26 160             | <b>-108.32</b> | 29 554 |     | 13 25          | <b>-53.98</b>    | <b>-53.98</b>  | 1 44            | 1 44            |
|              | Veld 7 (32 110 39 520) | Fu C1 | <b>-108.32</b> | 22 13             | 37 473             | 3 12           | 35 264 |     | 48 65          | 48 65            | 18 57          | 1 44            | 1 44            |
|              | Veld 1 (0 000 4 940)   | Fu C2 | 6 24           | 14 09             | 1 316              | 45 49          | 3 078  |     | 11 94          | 32 88            | 32 88          | <b>-2.75</b>    | <b>-2.75</b>    |
| S2           | Veld 7 (32 110 39 520) | Fu C3 | 92 68          | 32 56             | 37 054             | 1 39           | 34 533 |     | <b>50.66</b>   | <b>50.66</b>     | 25 27          | 1 00            | 1 00            |
|              | Veld 1 (0 000 4 940)   | Fu C4 | 5 31           | 39 31             | 3 436              | 30 76          | 0 211  |     | 25 98          | 25 98            | 11 37          | <b>4.36</b>     | <b>4.36</b>     |
|              | Veld 1 (0 000 4 940)   | Fu C2 | 3 86           | 44 49             | 2 670              | 21 13          | 0 128  |     | 30 71          | 30 71            | 20 59          | <b>1.07</b>     | <b>1.07</b>     |
|              | Veld 2 (4 940 9 880)   | Fu C2 | 21 13          | 36 27             | 6 767              | 23 68          | 9 123  |     | 16 58          | <b>34.72</b>     | <b>34.72</b>   | 1 07            | 1 07            |
|              | Veld 7 (29 640 34 580) | Fu C2 | 23 68          | <b>43.00</b>      | 32 982             | <b>-31.42</b>  | 30 345 |     | <b>-36.80</b>  | <b>-36.80</b>    | 14 49          | 1 07            | 1 07            |
|              | Veld 8 (34 580 39 520) | Fu C2 | <b>-31.42</b>  | <b>-49.32</b>     | 36 567             | 6 24           | 39 327 |     | 18 02          | 33 27            | 33 27          | 1 07            | 1 07            |
|              | Veld 1 (0 000 4 940)   | Fu C4 | 1 60           | 12 01             | 1 660              | 42 00          | 3 147  |     | 12 55          | 30 20            | 30 20          | <b>-1.62</b>    | <b>-1.62</b>    |
|              | Veld 7 (29 640 34 580) | Fu C4 | 19 51          | <b>2.01</b>       | 31 792             | <b>44.74</b>   |        |     | 16 27          | 26 48            | 26 48          | 1 62            | 1 62            |
|              | Veld 8 (34 580 39 520) | Fu C4 | <b>44.74</b>   | 13 67             | 38 033             | 5 31           | 36 395 |     | 31 50          | 31 50            | 11 24          | 1 62            | 1 62            |
|              | Veld 1 (0 000 2 300)   | Fu C2 | 1 07           |                   |                    | 48 64          | 0 093  |     | <b>-11.18</b>  | 32 05            | 32 05          | <b>6.24</b>     | <b>6.24</b>     |
| S3           | Veld 2 (2 300 10 040)  | Fu C2 | 48 64          | <b>60.29</b>      | 7 201              | <b>23.72</b>   | 3 555  |     | <b>44.46</b>   | <b>44.46</b>     | 25 76          | 6 24            | 6 24            |
|              | Veld 3 (10 040 15 060) | Fu C2 | <b>23.72</b>   | 26 08             | 10 761             | 57 74          | 13 159 |     | 6 54           | 39 00            | 39 00          | 6 24            | 6 24            |
|              | Veld 4 (15 060 20 080) | Fu C2 | 57 74          | <b>-26.36</b>     | 17 690             | 52 27          |        |     | 23 86          | 23 86            | 21 68          | 6 24            | 6 24            |
|              | Veld 1 (0 000 2 300)   | Fu C4 | 1 62           | 12 15             | 1 909              | 11 57          | 0 116  |     | 14 43          | 14 43            | 2 96           | <b>-5.31</b>    | <b>-5.31</b>    |
|              | Veld 2 (2 300 10 040)  | Fu C4 | 11 57          | 29 34             | 4 468              | <b>-88.04</b>  | 7 253  |     | 16 39          | <b>-42.13</b>    | <b>-42.13</b>  | 5 31            | 5 31            |
|              | Veld 3 (10 040 15 060) | Fu C4 | <b>-88.04</b>  |                   |                    | 15 94          | 13 223 |     | 39 69          | 39 69            | <b>1.74</b>    | 5 31            | 5 31            |
|              | Veld 1 (0 000 5 020)   | Fu C2 | 2 75           | 50 17             | 3 415              | 38 49          | 0 090  |     | 30 98          | 30 98            | 14 56          | <b>-3.86</b>    | <b>-3.86</b>    |
| S4           | Veld 2 (5 020 10 040)  | Fu C2 | 38 49          | 39 23             | 5 424              | 57 41          | 8 365  |     | 3 67           | <b>41.87</b>     | <b>41.87</b>   | 3 86            | 3 86            |
|              | Veld 3 (10 040 15 060) | Fu C2 | 57 41          | <b>28.68</b>      | 12 557             | 57 11          |        |     | 22 83          | 22 83            | 22 71          | 3 86            | 3 86            |
|              | Veld 4 (15 060 20 080) | Fu C2 | 57 11          | 53 86             | 20 006             | <b>-53.84</b>  | 16 560 |     | <b>-44.87</b>  | <b>-44.87</b>    | 0 67           | 3 86            | 3 86            |
|              | Veld 5 (20 080 25 100) | Fu C2 | <b>-53.84</b>  | <b>-61.56</b>     | 21 384             | 1 07           | 25 068 |     | 11 83          | 33 71            | 33 71          | 3 86            | 3 86            |
|              | Veld 1 (0 000 5 020)   | Fu C4 | 4 36           |                   |                    | <b>105.17</b>  | 0 762  |     | 2 84           | 40 79            | 40 79          | <b>1.60</b>     | <b>1.60</b>     |
|              | Veld 2 (5 020 10 040)  | Fu C4 | <b>105.17</b>  |                   |                    | 21 54          | 8 342  |     | 44 22          | 44 22            | <b>-6.27</b>   | 1 60            | 1 60            |
|              | Veld 4 (15 060 20 080) | Fu C4 | 22 05          |                   |                    | 89 10          | 17 093 |     | <b>3.17</b>    | 41 12            | 41 12          | 1 60            | 1 60            |
| m            |                        |       | kNm            | kNm               | m                  | kNm            | m      | m   | kN             | kN               | kN             | kNm             | kNm             |

B.G.1 Op eegreacties

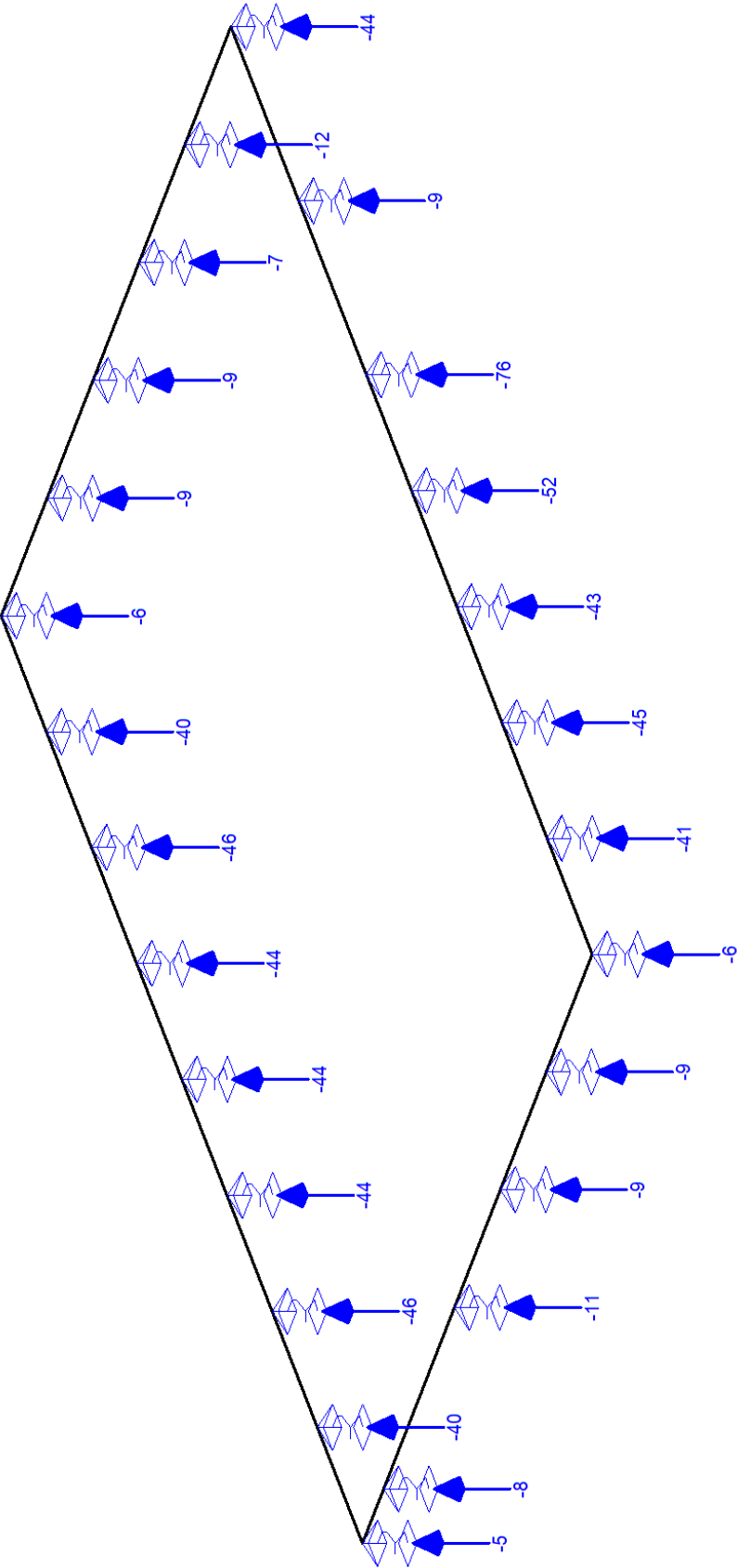




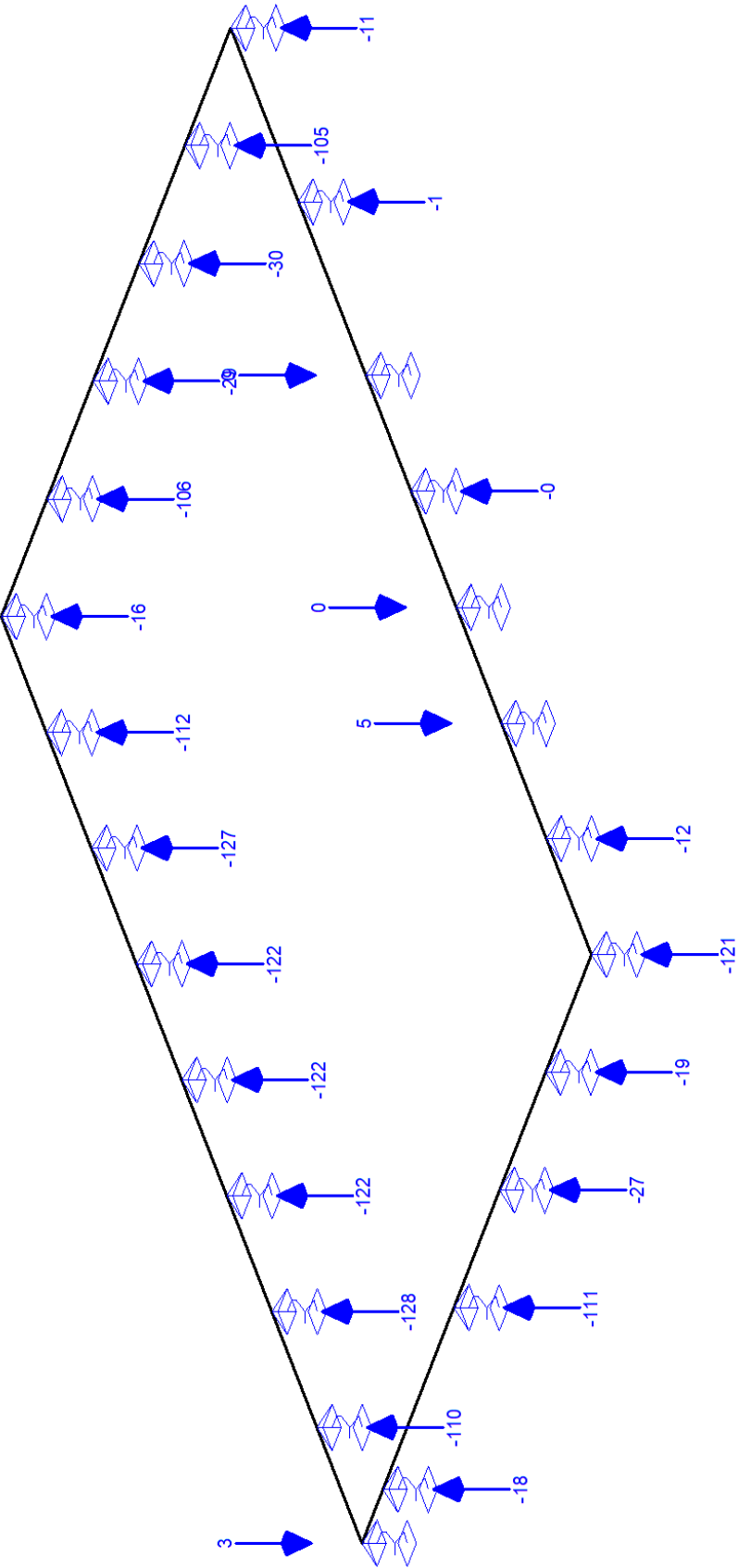
B.G.2 Op egreact es



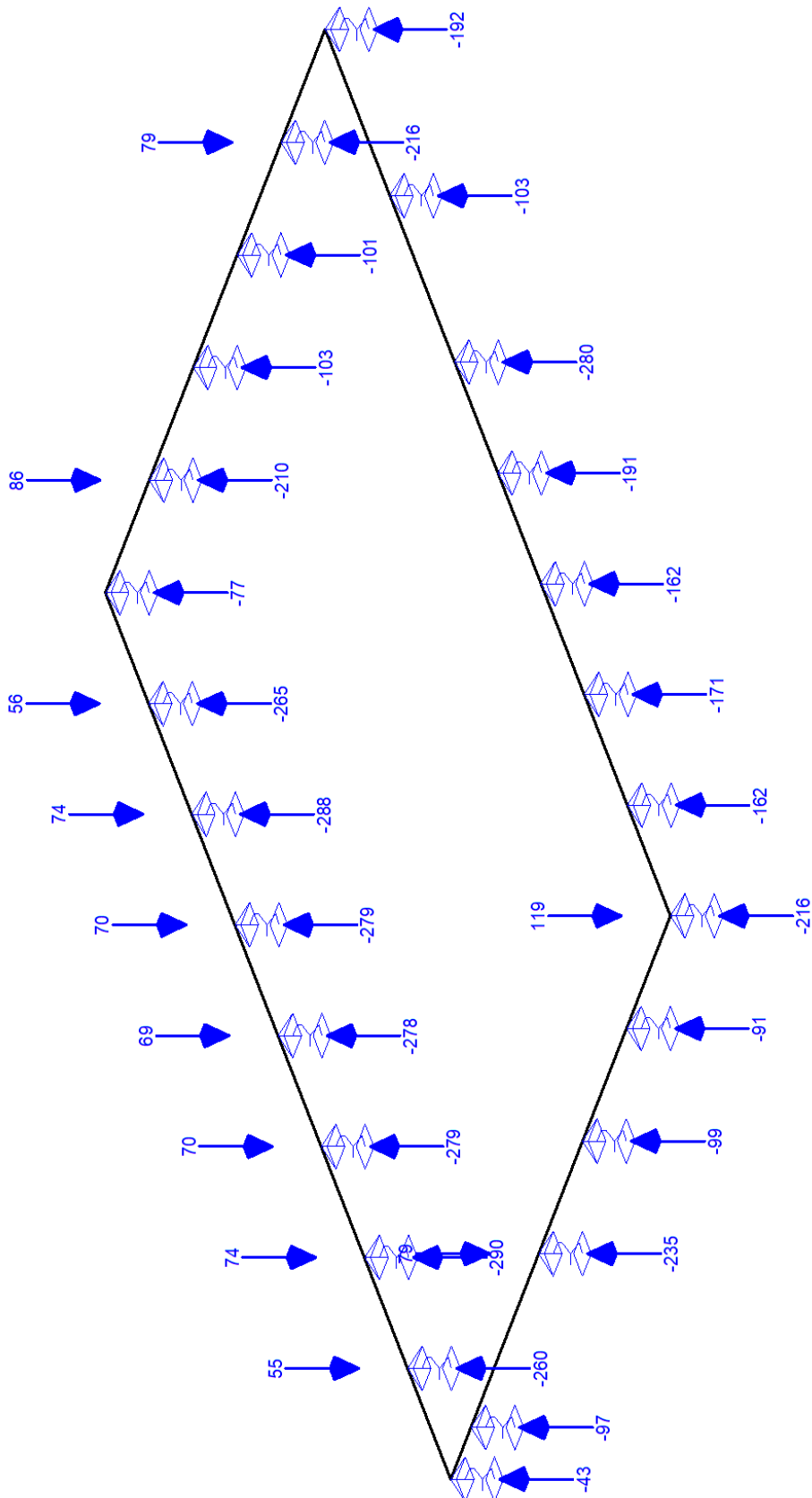
B.G.3 Op eegreact es



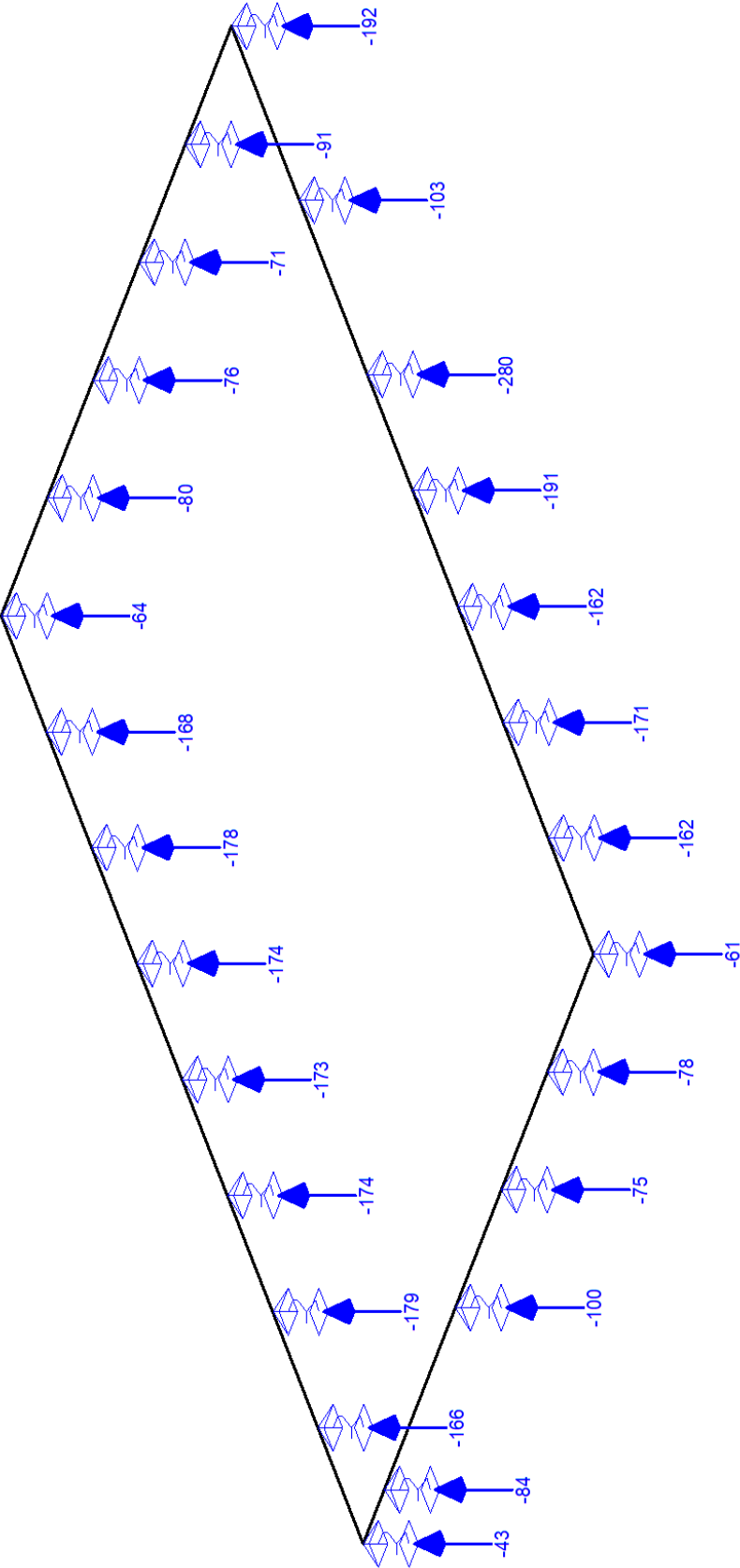
B.G.4 Op greact es



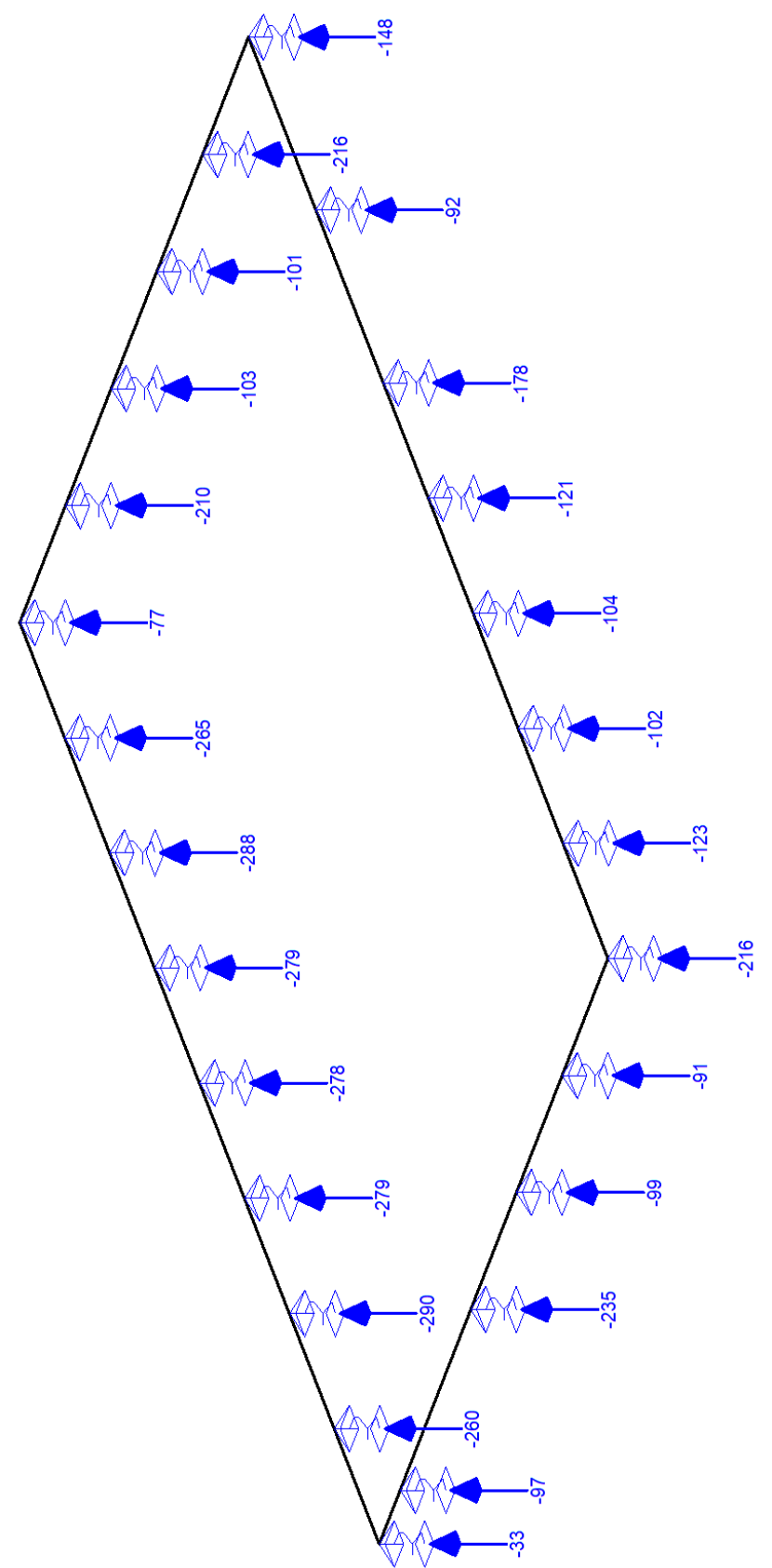
### Fu.C. Omhu ende Op egreact es



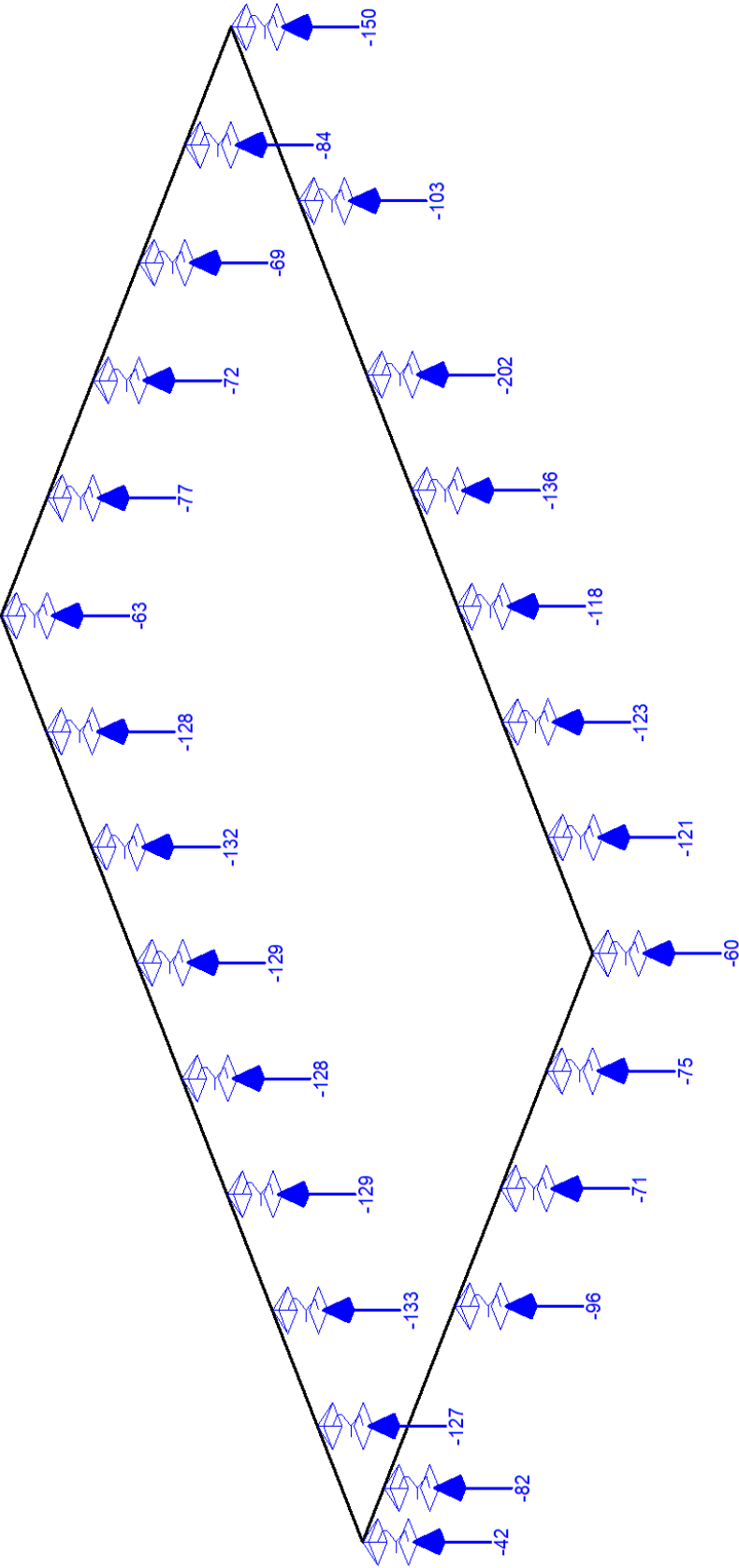
Fu.C.1 Op e greact es



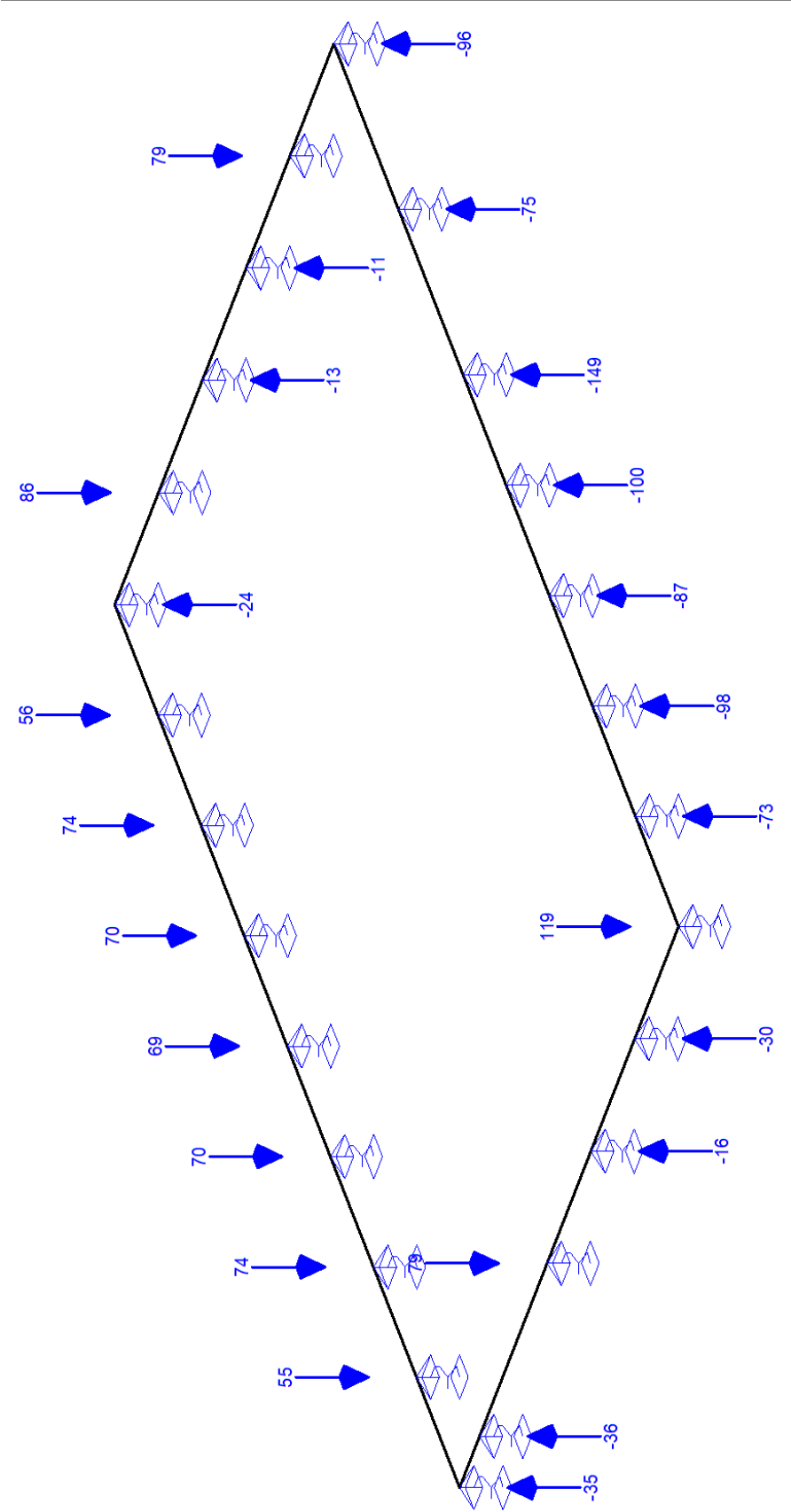
Fu.C.2 Opegreacties



Fu.C.3 Op egreact es

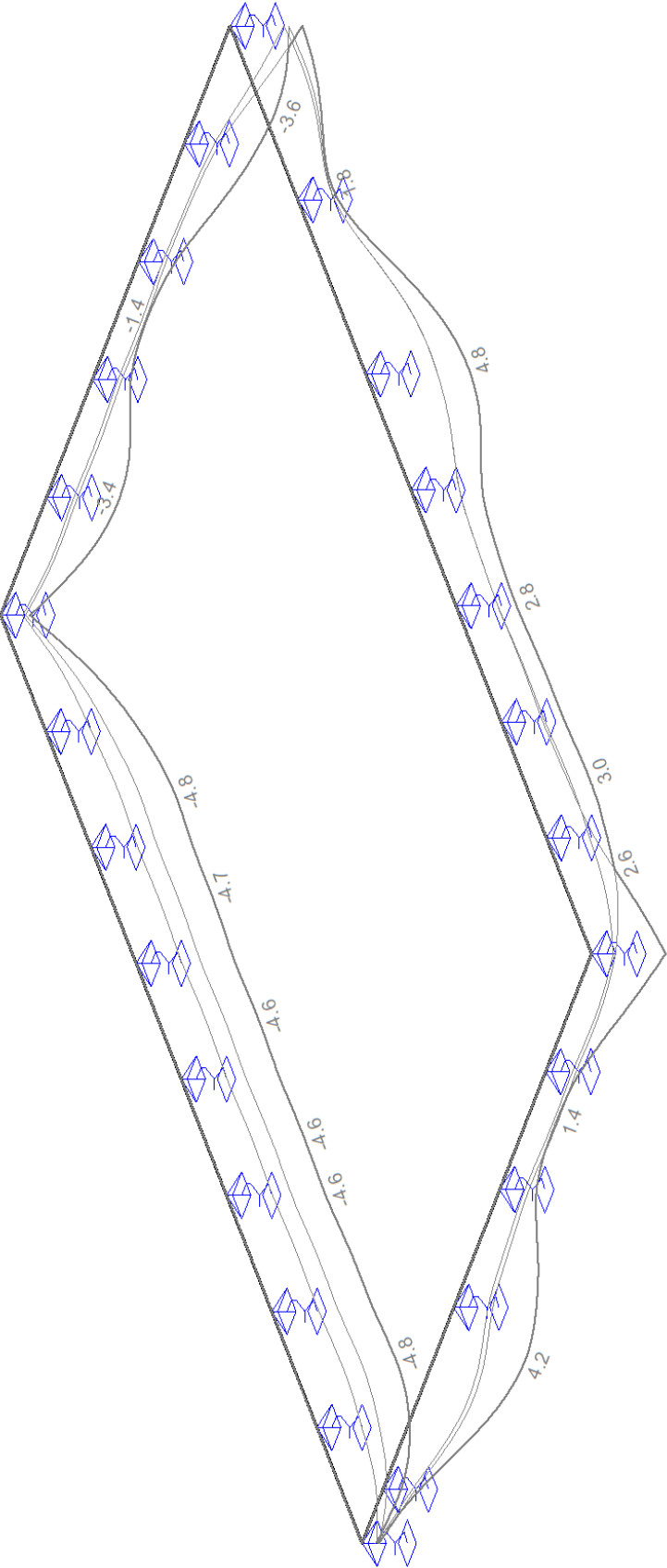


Fu.C.4 Op egreact es



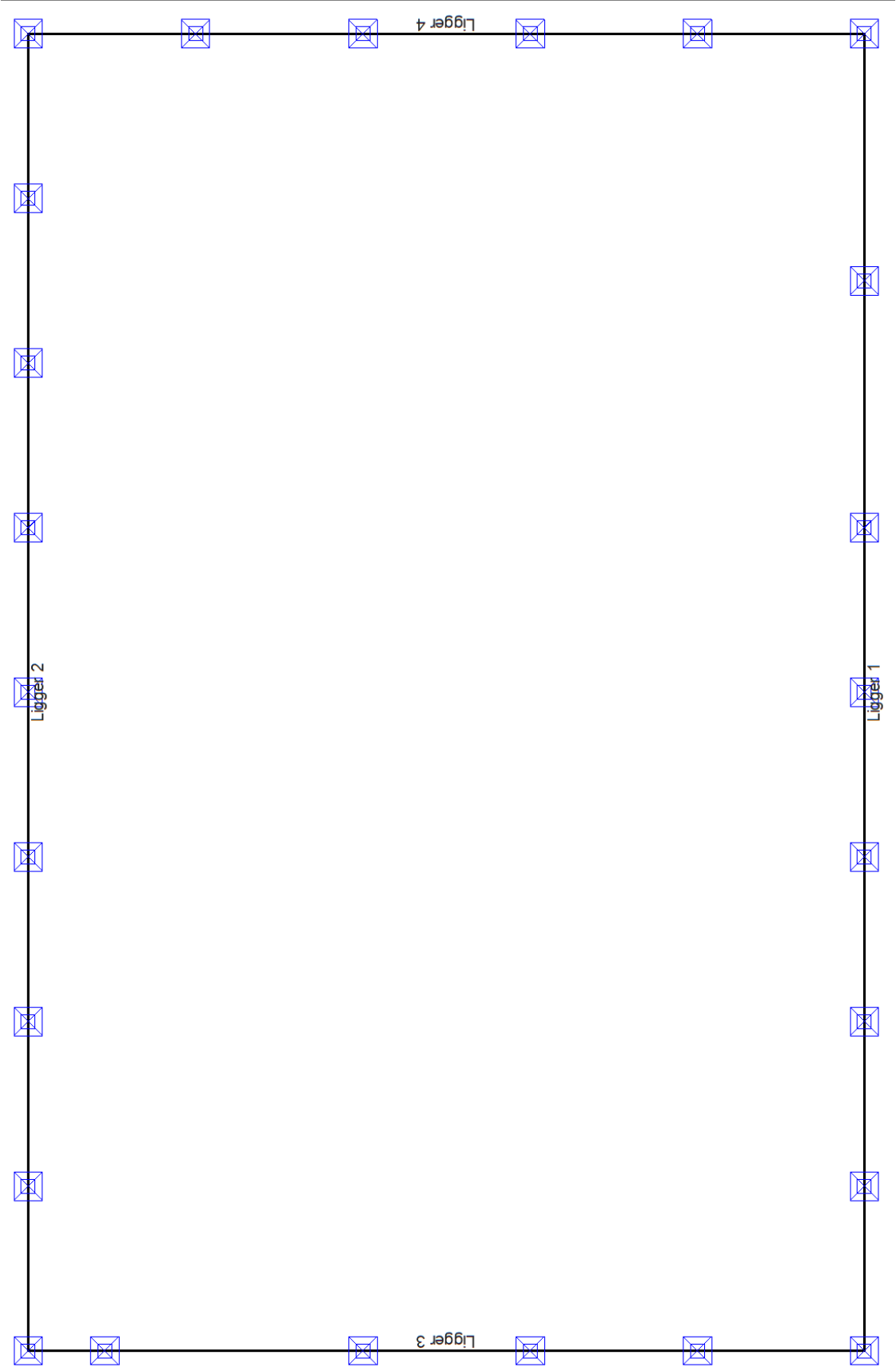


Ka.C. Omhu ende Doorbu g ngen



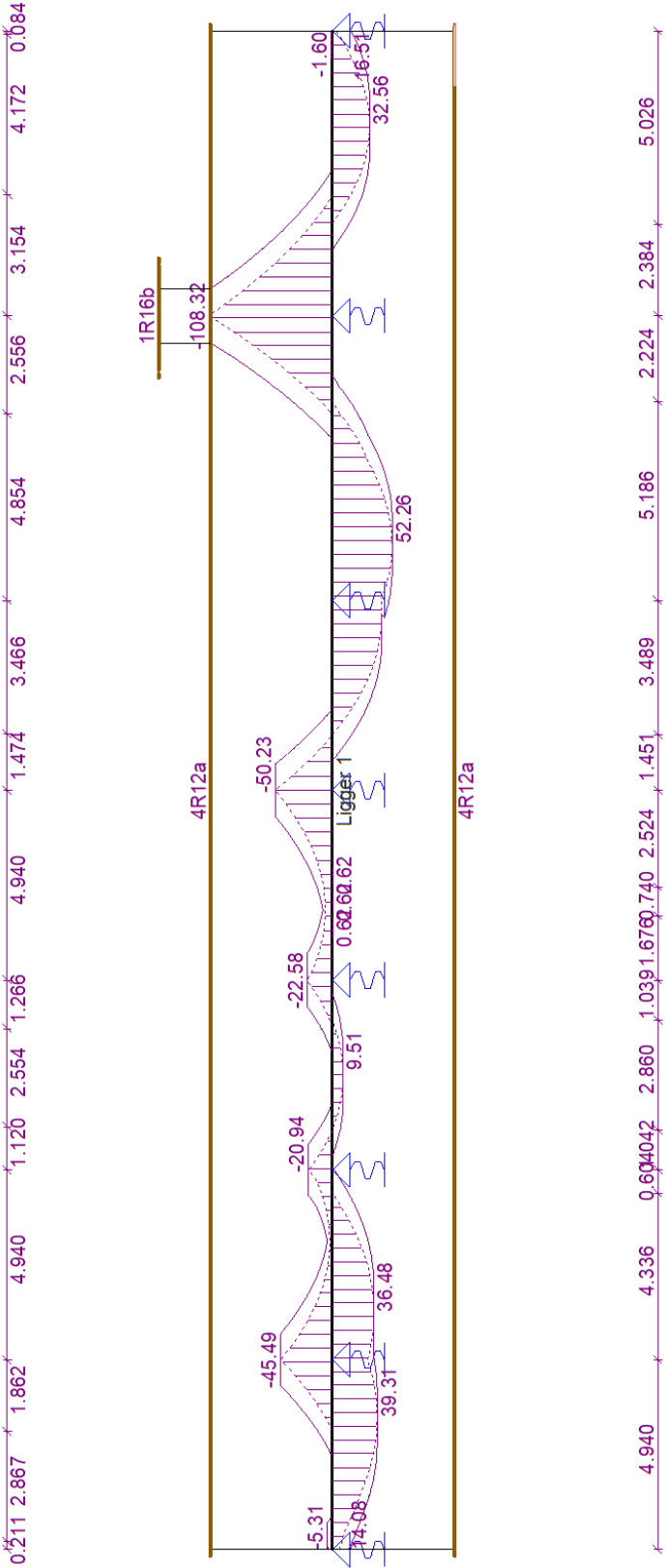


Betondefnite



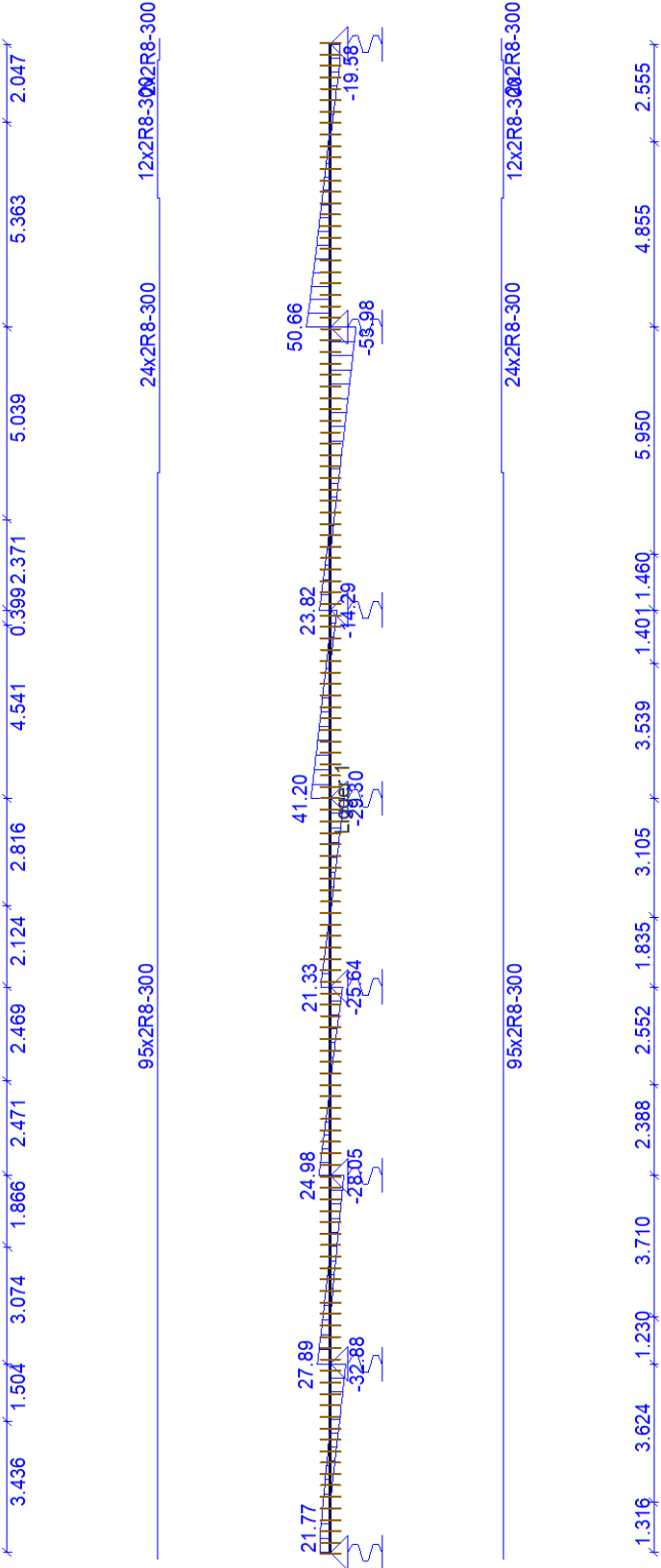
Langswap. (Afbouw)

L gger 1



Dwarskrachtwap. (Afbouw)

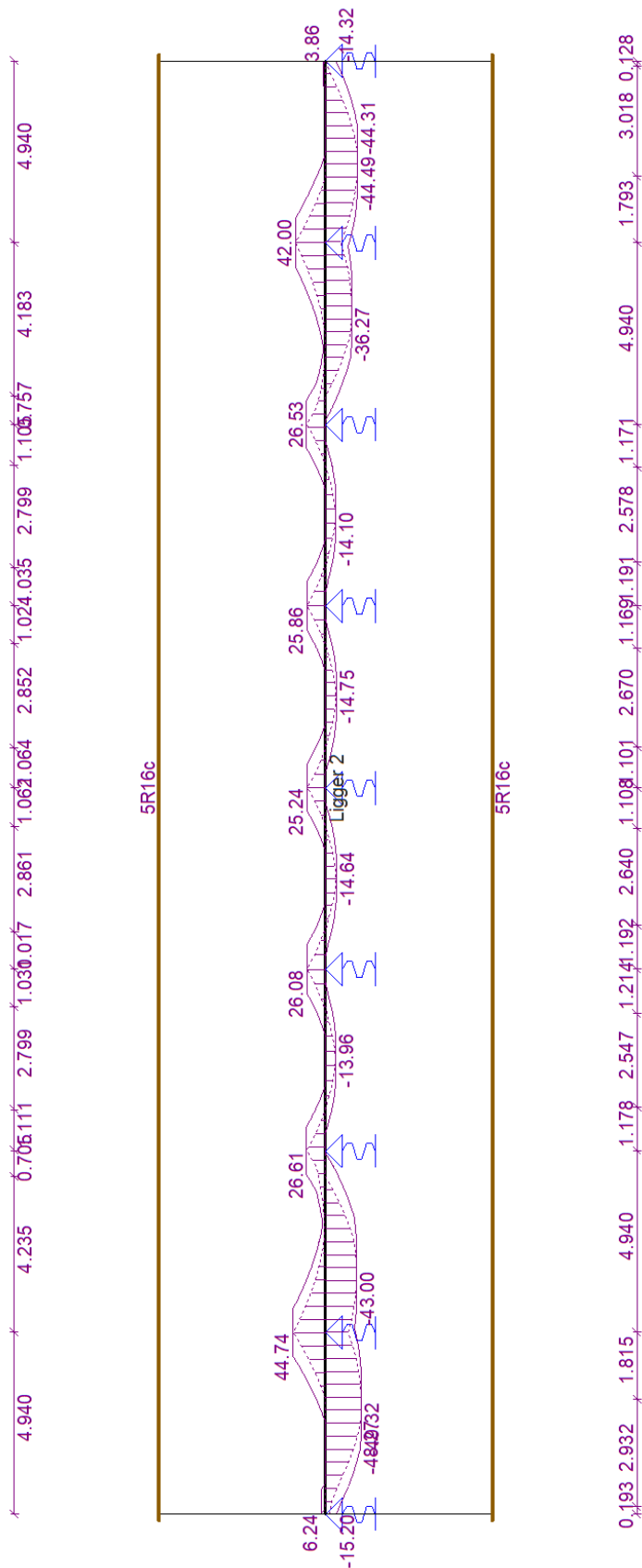
Logger 1



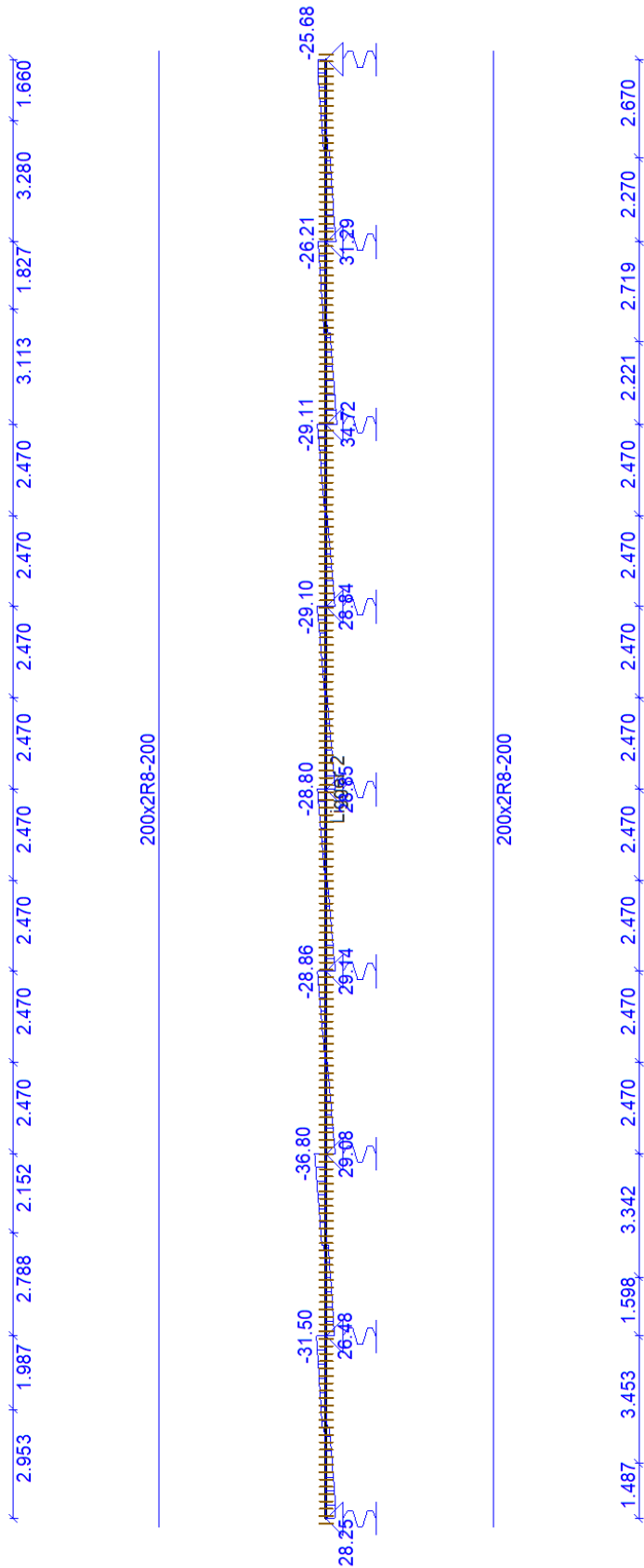


Langswap. (Afbouw)

## L gger 2



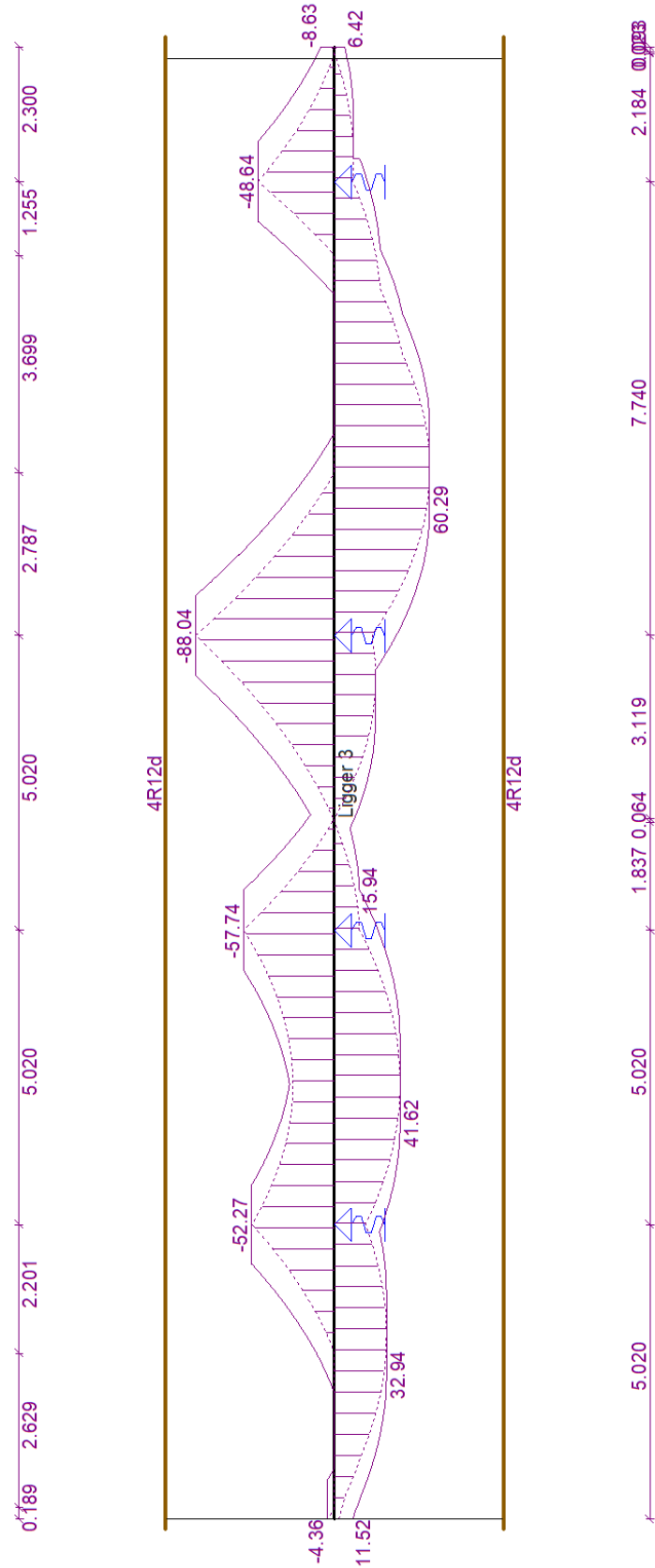
## L gger 2





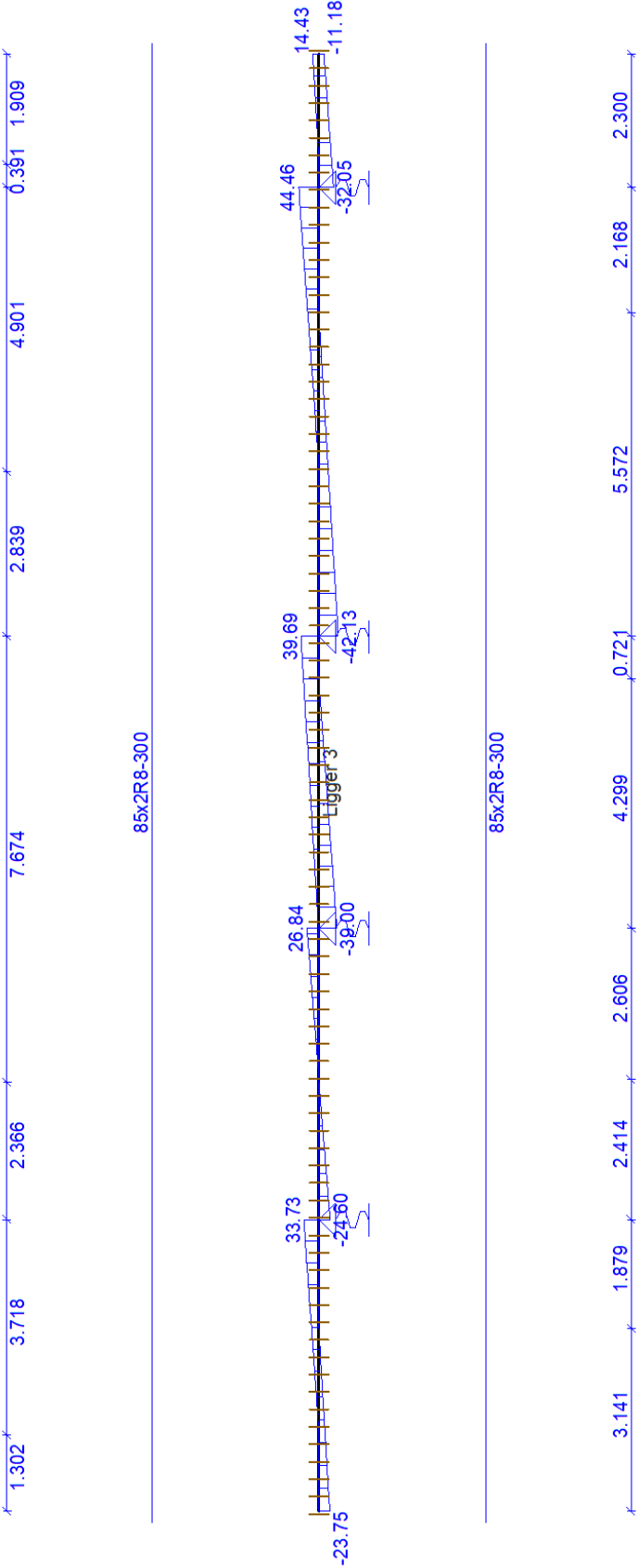
Langswap. (Afbouw)

Logger 3



Dwarskrachtwap. (Afbouw)

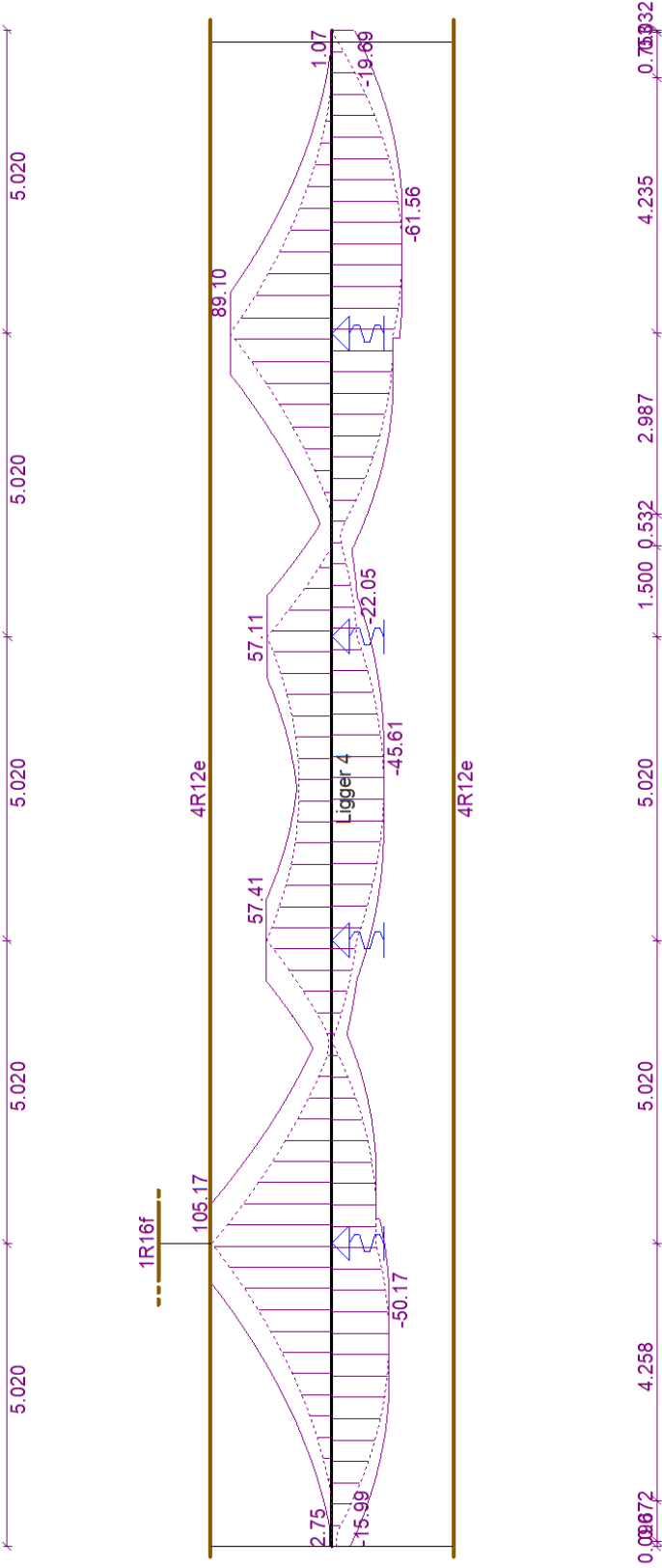
Logger 3





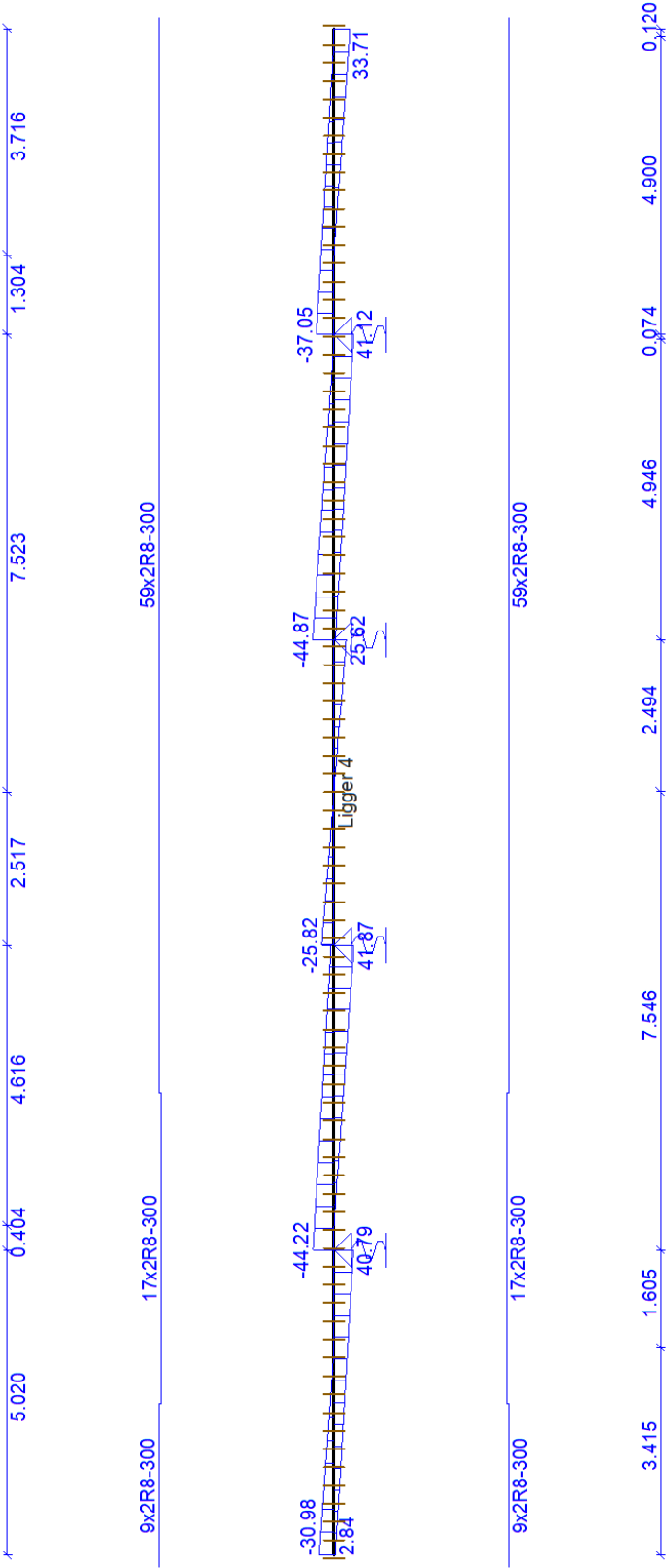
Langswap. (Afbouw)

L gger 4



Dwarskrachtwap. (Afbouw)

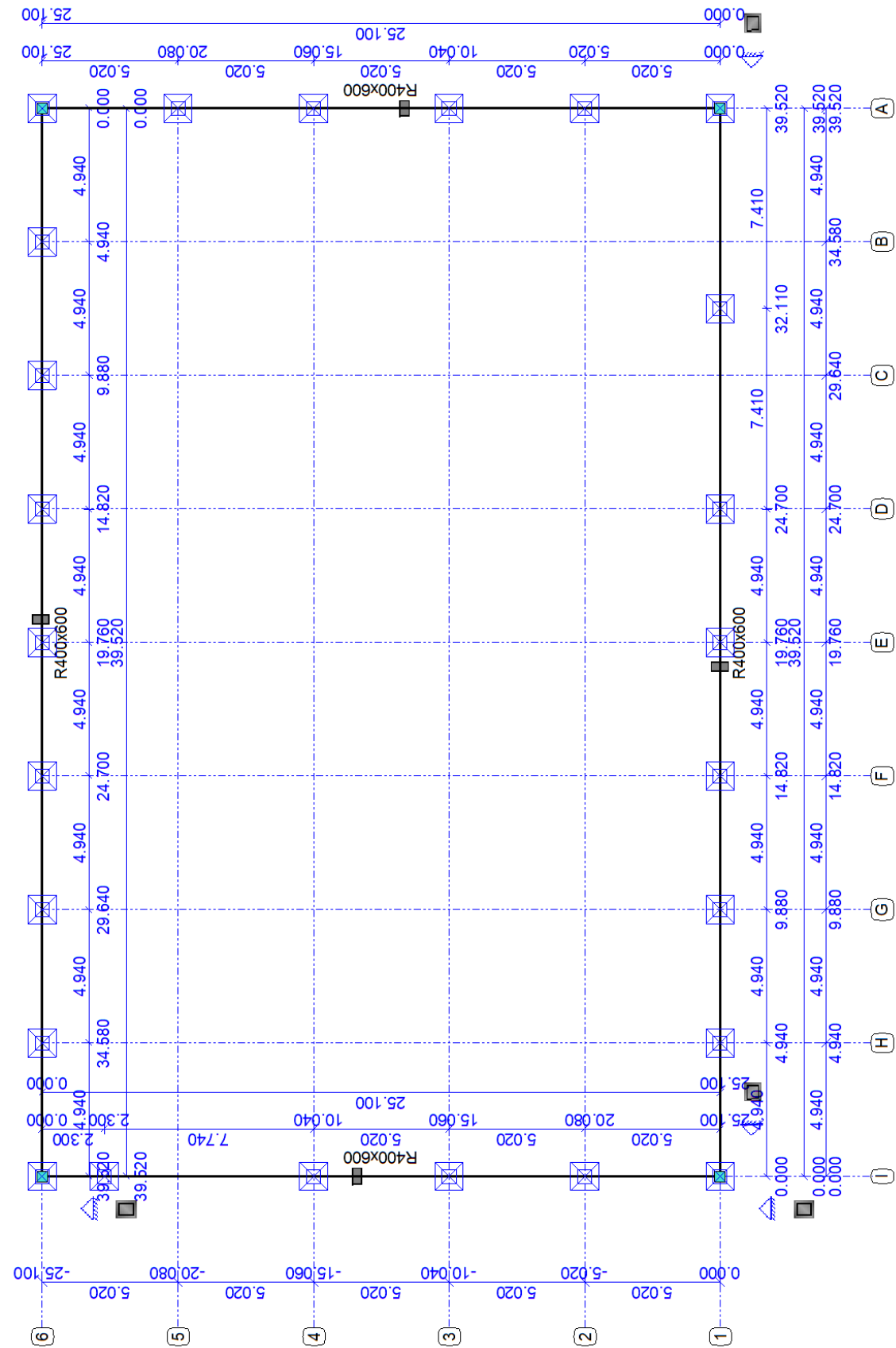
L gger 4





|                        |                                                                                                                                                                                                    |                                     |               |                  |  |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------|------------------|--|
| VAN BOXSEL ENGINEERING |                                                                                                                                                                                                    | T: 0162-451280 E: info@vanboxsel.nl |               | www.vanboxsel.nl |  |
|                        |                                                                                                                                                                                                    |                                     |               |                  |  |
| Projectomschrijving    | Uitbreiding terrein Coolrec                                                                                                                                                                        |                                     | Projectnummer | 23-157           |  |
| Onderdeel              |                                                                                                                                                                                                    |                                     | Constructeur  | [REDACTED]       |  |
| Opdrachtgever          | Coolrec                                                                                                                                                                                            |                                     | Eenheden      | m, mm, kN, kNm   |  |
| Bestand                | C:\Users\pm\van Boxsel Engineering\Ruby - Documenten\Documenten\2023\23-157 Coolrec\1. berekeningen intern\Rapport B\Matrixframe modellen\23-157 Balkrooster fundering - accidenteel brandwand.mxf |                                     |               |                  |  |

Constructie



STAVEN

| Staaf | Knoop-B | Knoop-E | X-B    | X-E    | Y-B    | Y-E    | Lengte | Profiel | Positie |            |
|-------|---------|---------|--------|--------|--------|--------|--------|---------|---------|------------|
| S1    | K1      | K2      | 0 000  | 39 520 | 0 000  | 0 000  | 39 520 | P1      | 0 000   | 39 520 (L) |
| S2    | K4      | K3      | 39 520 | 0 000  | 25 100 | 25 100 | 39 520 | P1      | 0 000   | 39 520 (L) |
| S3    | K3      | K1      | 0 000  | 0 000  | 25 100 | 0 000  | 25 100 | P1      | 0 000   | 25 100 (L) |
| S4    | K2      | K4      | 39 520 | 39 520 | 0 000  | 25 100 | 25 100 | P1      | 0 000   | 25 100 (L) |
|       |         |         | m      | m      | m      | m      | m      |         | m       |            |

PROFIELEN

| Profiel | Profielnaam | It              | Iz              | Materiaal | Hoek |
|---------|-------------|-----------------|-----------------|-----------|------|
| P1      | R400x600    | 7 5125e+09      | 3 2000e+09      | C30/37    | 0    |
|         |             | mm <sup>4</sup> | mm <sup>4</sup> |           | °    |

PROFIELVORMEN

| Profiel | Verl. h. | hB    | hE    | tf  | tw  | tf2 | B     | bL  | bR  | Raatl. | Hoogte |
|---------|----------|-------|-------|-----|-----|-----|-------|-----|-----|--------|--------|
| P1      | Nee      | 600 0 | 600 0 | 0 0 | 0 0 | 0 0 | 400 0 | 0 0 | 0 0 | Nee    | 0 0    |
|         |          | mm    | mm    | mm  | mm  | mm  | mm    | mm  | mm  |        | mm     |

MATERIALEN

| Materiaalnaam | Poison | Dichtheid        | E-Modulus  | Uitzettingcoeff |
|---------------|--------|------------------|------------|-----------------|
| C30/37        | 0 20   | 25 00            | 3 3000e+04 | 10 0000e 06     |
|               |        | kNm <sup>3</sup> | Nmm        | C°m             |

OPLEGGINGEN

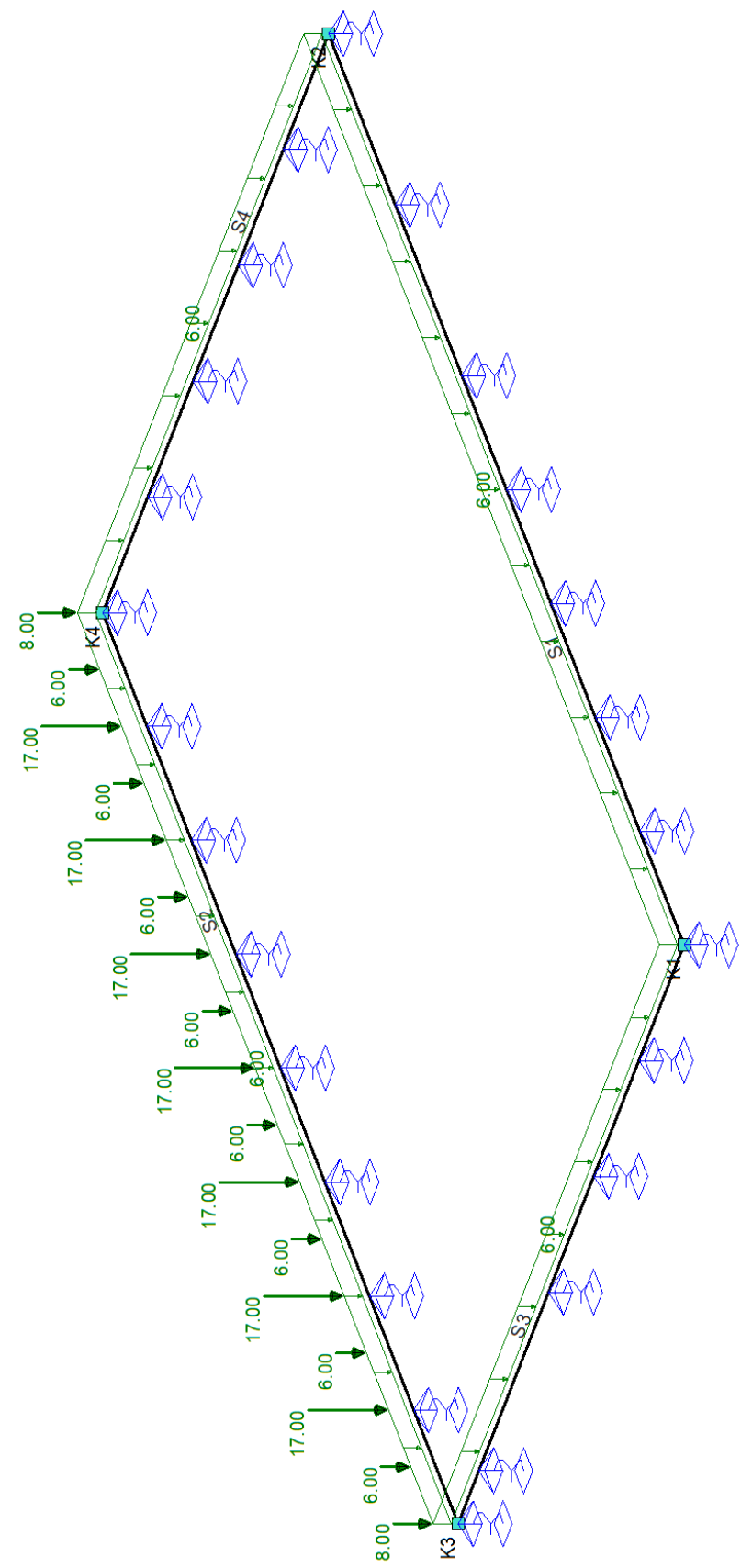
| Oplegging | Object | Positie    | Z        | Xr      | Yr      |
|-----------|--------|------------|----------|---------|---------|
| O1        | S1     | 0 000      | 50000 00 | Vrij    | Vrij    |
| O2        | S1     | 4 940      | 50000 00 | Vrij    | Vrij    |
| O3        | S1     | 9 880      | 50000 00 | Vrij    | Vrij    |
| O4        | S1     | 14 820     | 50000 00 | Vrij    | Vrij    |
| O5        | S1     | 19 760     | 50000 00 | Vrij    | Vrij    |
| O6        | S1     | 24 700     | 50000 00 | Vrij    | Vrij    |
| O7        | S1     | 32 110     | 50000 00 | Vrij    | Vrij    |
| O8        | S1     | 39 520     | 50000 00 | Vrij    | Vrij    |
| O9        | S3     | 20 080     | 50000 00 | Vrij    | Vrij    |
| O10       | S4     | 5 020      | 50000 00 | Vrij    | Vrij    |
| O11       | S3     | 15 060     | 50000 00 | Vrij    | Vrij    |
| O12       | S4     | 10 040     | 50000 00 | Vrij    | Vrij    |
| O13       | S3     | 10 040     | 50000 00 | Vrij    | Vrij    |
| O14       | S4     | 15 060     | 50000 00 | Vrij    | Vrij    |
| O15       | S4     | 20 080     | 50000 00 | Vrij    | Vrij    |
| O16       | S3     | 2 300      | 50000 00 | Vrij    | Vrij    |
| O17       | S2     | 39 520 (L) | 50000 00 | Vrij    | Vrij    |
| O18       | S2     | 34 580     | 50000 00 | Vrij    | Vrij    |
| O19       | S2     | 29 640     | 50000 00 | Vrij    | Vrij    |
| O20       | S2     | 24 700     | 50000 00 | Vrij    | Vrij    |
| O21       | S2     | 19 760     | 50000 00 | Vrij    | Vrij    |
| O22       | S2     | 14 820     | 50000 00 | Vrij    | Vrij    |
| O23       | S2     | 9 880      | 50000 00 | Vrij    | Vrij    |
| O24       | S2     | 4 940      | 50000 00 | Vrij    | Vrij    |
| O25       | S2     | 0 000      | 50000 00 | Vrij    | Vrij    |
|           |        | m          | kNm      | kNm/rad | kNm/rad |

BELASTINGSGEVALLEN TYPEN

| Label | Omschrijving  | B.G.Type         | Gunstig/Ong. | Element | Niveau | Veld  | Ψ <sub>0</sub> | Ψ <sub>1</sub> | Ψ <sub>2</sub> | C <sub>prob</sub><br>UGT/GGT |
|-------|---------------|------------------|--------------|---------|--------|-------|----------------|----------------|----------------|------------------------------|
| B G 1 | Eigen gewicht | Permanent        |              |         | N v t  | N v t |                |                |                |                              |
| B G 2 | Permanent     | Permanent        |              |         | N v t  | N v t |                |                |                |                              |
| B G 3 | Sneeuw        | Sneeuw belasting |              |         | N v t  | N v t |                | 0 20           |                | 1 00/1 00                    |
| B G 4 | Wind          | Windbelasting    |              |         | N v t  | N v t |                | 0 20           |                | 1 00/1 00                    |



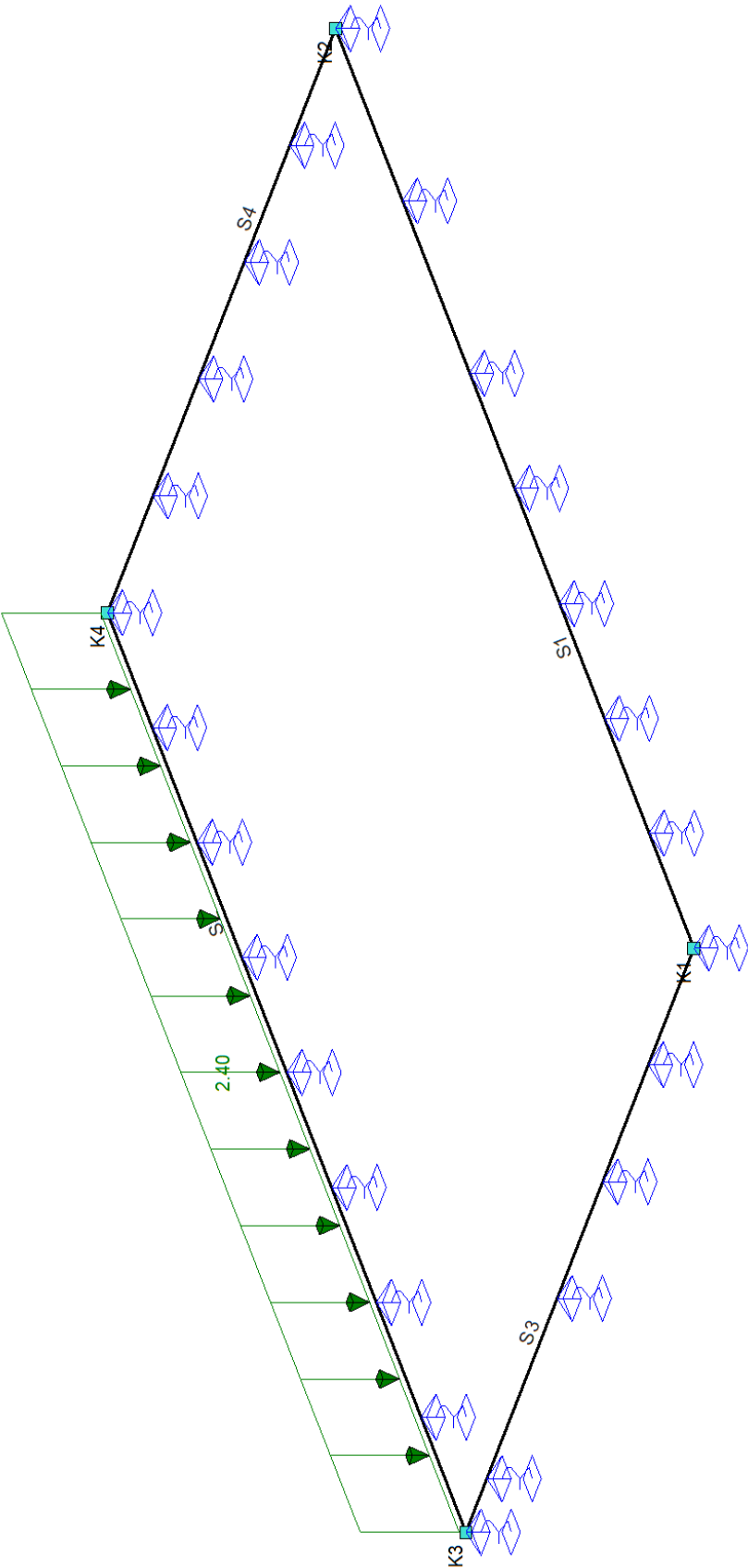
B.G.1: E gen gewcht



B.G.1: EIGEN GEWICHT

| Type       | Beginwaarde                  | Endwaarde | Beginafstand | Endafstand | Richting | Staaf of knoop | Omschrijving |
|------------|------------------------------|-----------|--------------|------------|----------|----------------|--------------|
| qG         | 1 00                         | 1 00      | 0 000        | L          | Z        | S1 S4          |              |
| F          | 8 00                         |           | 25 100       |            | Z        | S4             |              |
| F          | 17 00                        |           | 4 940        |            | Z        | S2             |              |
| F          | 17 00                        |           | 9 880        |            | Z        | S2             |              |
| F          | 17 00                        |           | 14 820       |            | Z        | S2             |              |
| F          | 17 00                        |           | 19 760       |            | Z        | S2             |              |
| F          | 17 00                        |           | 24 700       |            | Z        | S2             |              |
| F          | 17 00                        |           | 29 640       |            | Z        | S2             |              |
| F          | 17 00                        |           | 34 580       |            | Z        | S2             |              |
| F          | 8 00                         |           | 39 520       |            | Z        | S2             |              |
| F          | 6 00                         |           | 2 470        |            | Z        | S2             |              |
| F          | 6 00                         |           | 7 410        |            | Z        | S2             |              |
| F          | 6 00                         |           | 12 350       |            | Z        | S2             |              |
| F          | 6 00                         |           | 17 290       |            | Z        | S2             |              |
| F          | 6 00                         |           | 22 230       |            | Z        | S2             |              |
| F          | 6 00                         |           | 27 170       |            | Z        | S2             |              |
| F          | 6 00                         |           | 32 110       |            | Z        | S2             |              |
| F          | 6 00                         |           | 37 050       |            | Z        | S2             |              |
| Som lasten | Z: 958.44 Xr: -0.00 Yr: 0.00 |           | m            | m          |          |                |              |

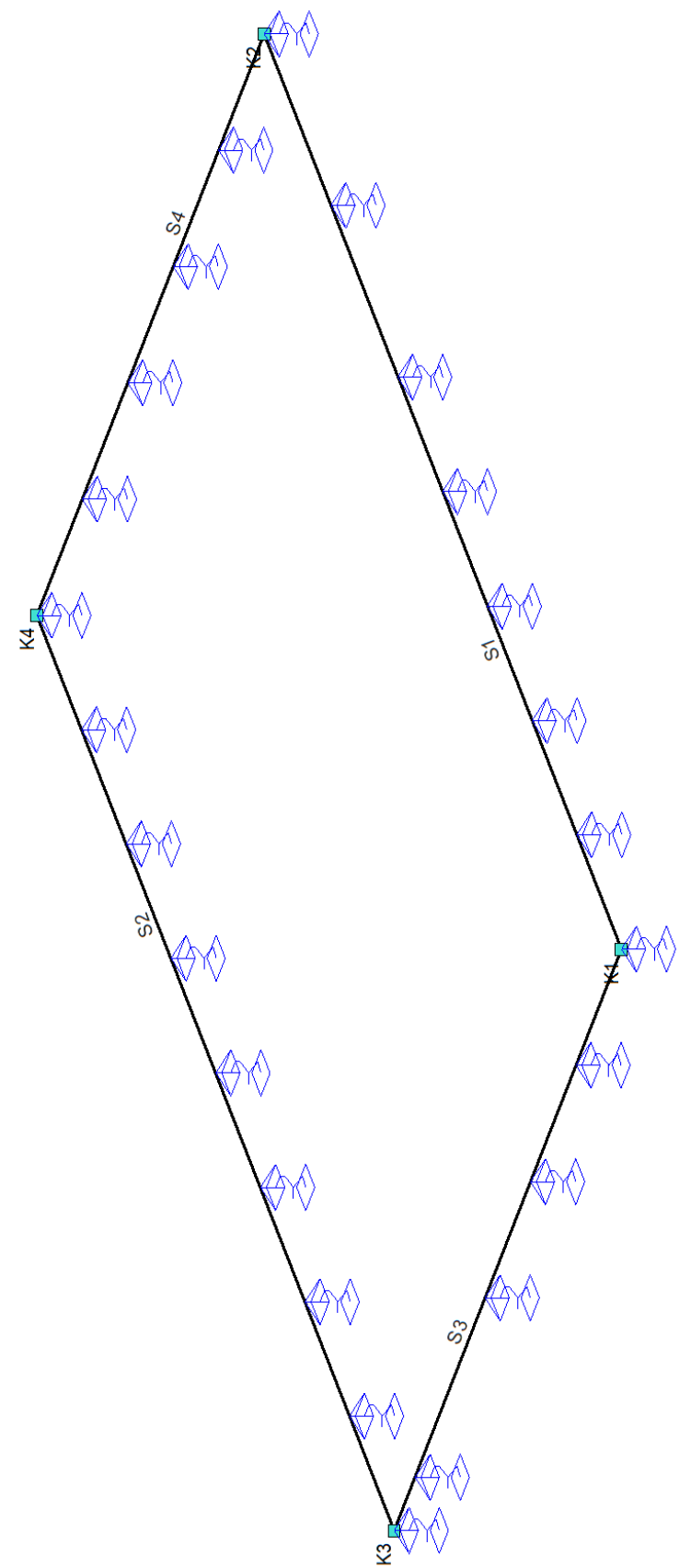
B.G.2: Permanent



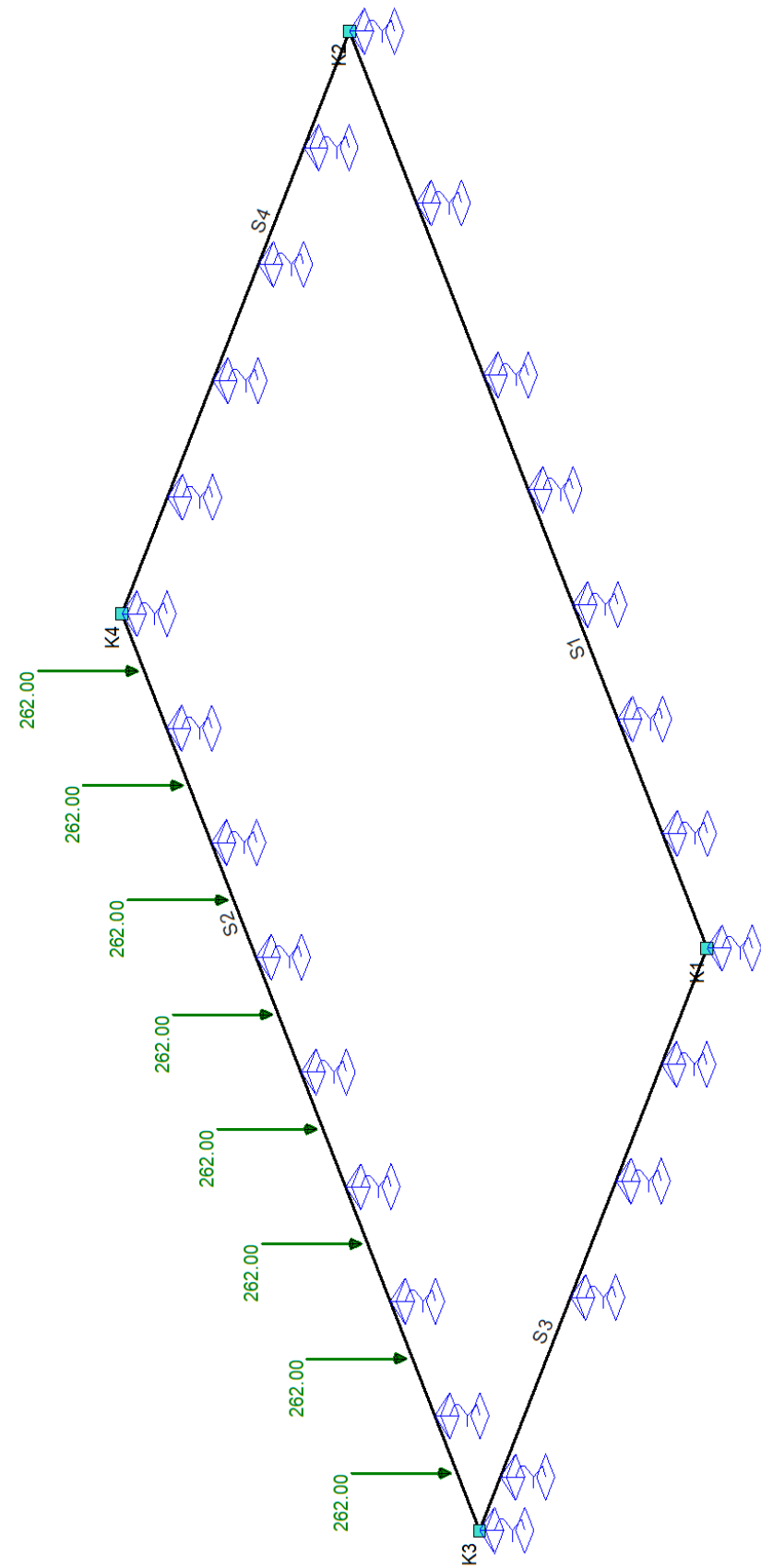
B.G.2: PERMANENT

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Staaf of knoop | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|----------------|--------------|
| q          | 2.40        | 2.40      | 0.000        | 39.520 (L) | Z        | S2             |              |
| Som lasten | Z: 94.85    |           | m            | m          |          |                |              |

B.G.3: Sneeuw



B.G.4: Wnd



B.G.4: WIND

| Type       | Beginwaarde | Endwaarde | Beginafstand | Endafstand | Richting | Staa of knoop | Omschrijving |
|------------|-------------|-----------|--------------|------------|----------|---------------|--------------|
| F          | 262 00      |           | 2 470        |            | Z        | S2            |              |
| F          | 262 00      |           | 7 410        |            | Z        | S2            |              |
| F          | 262 00      |           | 12 350       |            | Z        | S2            |              |
| F          | 262 00      |           | 17 290       |            | Z        | S2            |              |
| F          | 262 00      |           | 22 230       |            | Z        | S2            |              |
| F          | 262 00      |           | 27 170       |            | Z        | S2            |              |
| F          | 262 00      |           | 32 110       |            | Z        | S2            |              |
| F          | 262 00      |           | 37 050       |            | Z        | S2            |              |
| Som lasten | Z: 2096.00  |           |              |            |          |               |              |
|            |             |           | m            | m          |          |               |              |

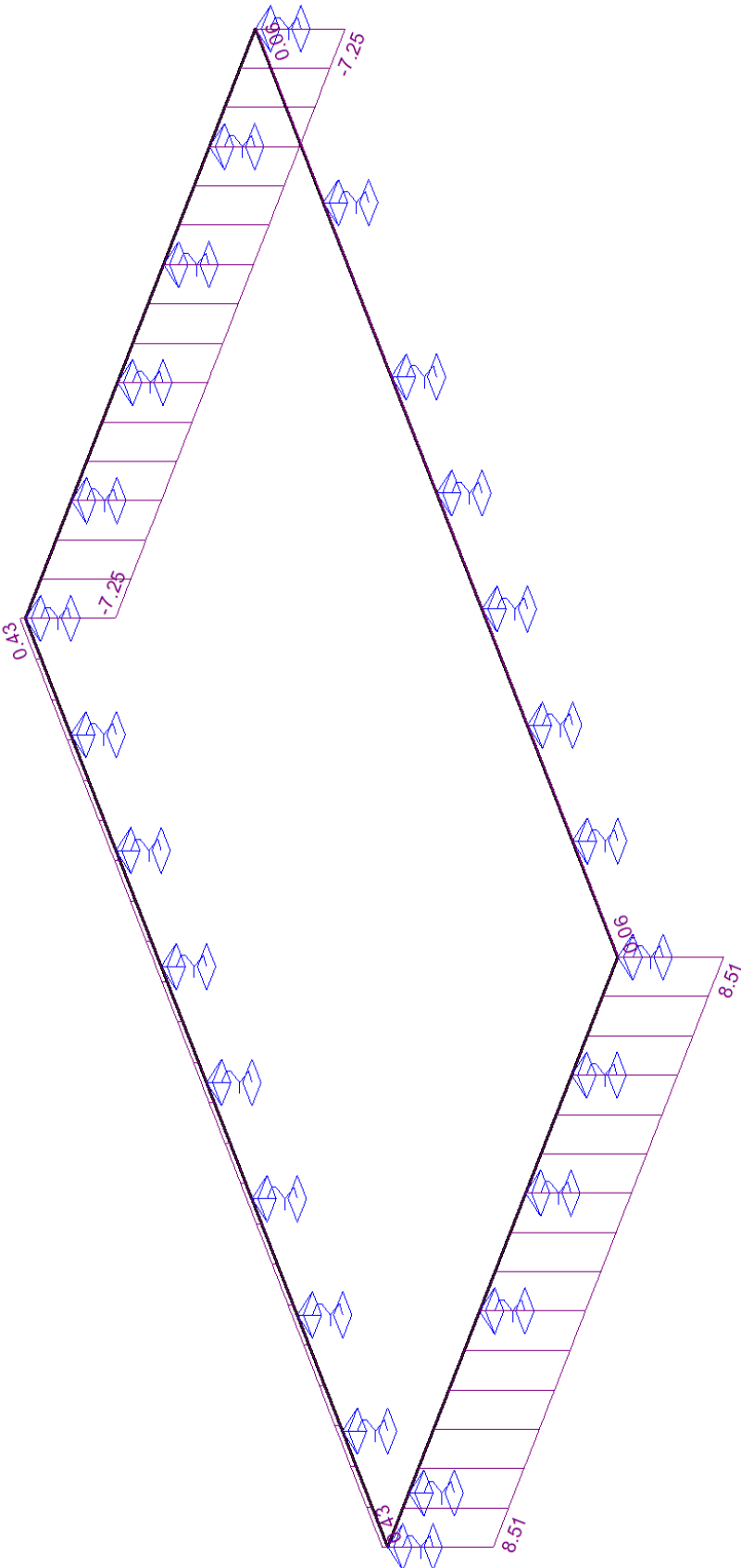
BELASTINGSCOMBINATIES

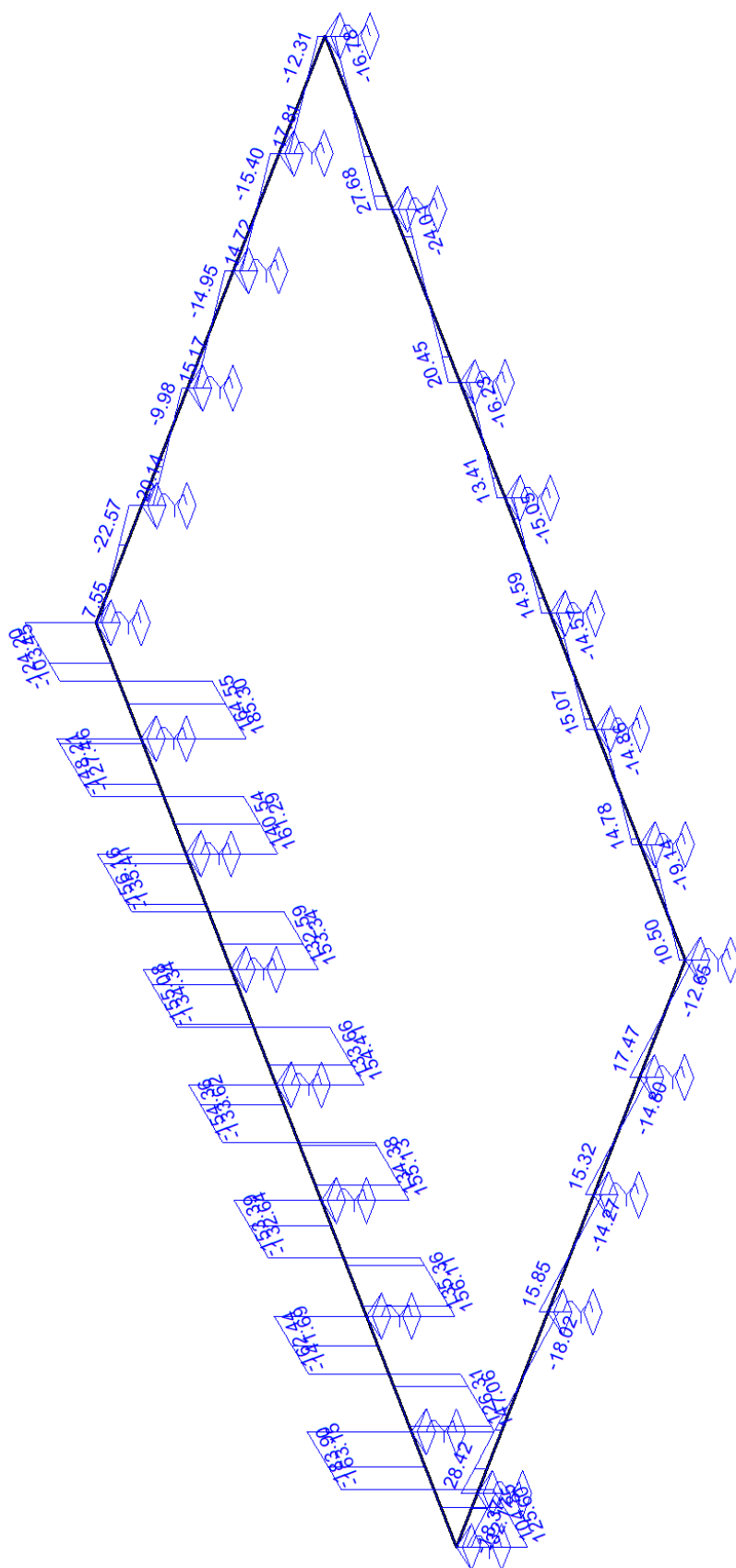
|                 |               |           |
|-----------------|---------------|-----------|
| Fundamenteel    |               |           |
| B.G.            | Omschrijving  | Fu.C.1    |
| B G 1           | Eigen gewicht | 1 00      |
| B G 2           | Permanent     | 1 00      |
| B G 3           | Sneeuw        | 1 00      |
| B G 4           | Wind          | 1 00      |
| Karakteristiek  |               |           |
| B.G.            | Omschrijving  | Ka.C.(w1) |
| B G 1           | Eigen gewicht | 1 00      |
| B G 2           | Permanent     | 1 00      |
| B G 3           | Sneeuw        | 1 00      |
| B G 4           | Wind          | 1 00      |
| Frequent        |               |           |
| B.G.            | Omschrijving  | Fr.C.(w1) |
| B G 1           | Eigen gewicht | 1 00      |
| B G 2           | Permanent     | 1 00      |
| B G 3           | Sneeuw        | 1 00      |
| B G 4           | Wind          | 1 00      |
| Quasi-permanent |               |           |
| B.G.            | Omschrijving  | Qu.C.1    |
| B G 1           | Eigen gewicht | 1 00      |
| B G 2           | Permanent     | 1 00      |
| B G 3           | Sneeuw        | 1 00      |
| B G 4           | Wind          | 1 00      |





Fu.C. Omhu ende Tors emomenten

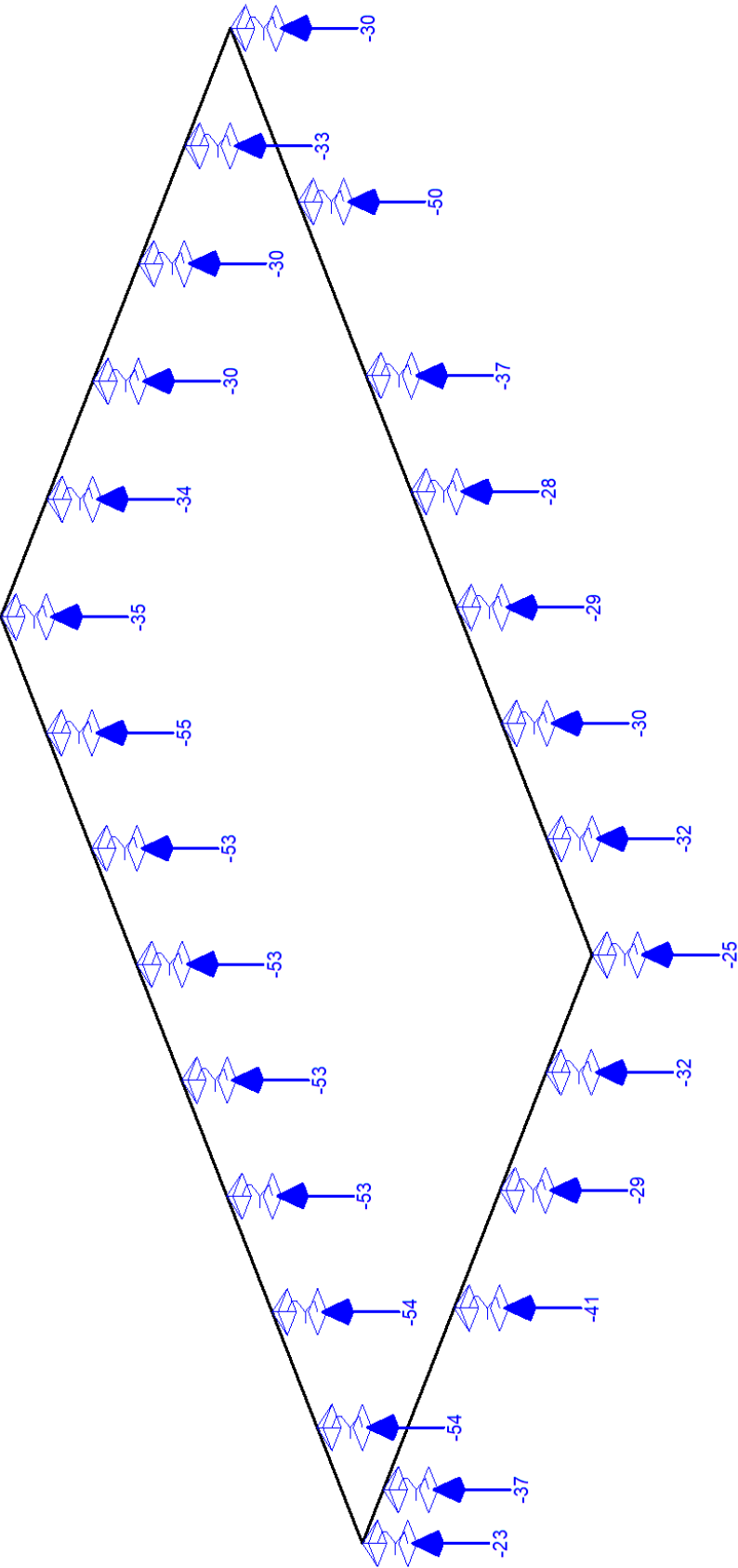




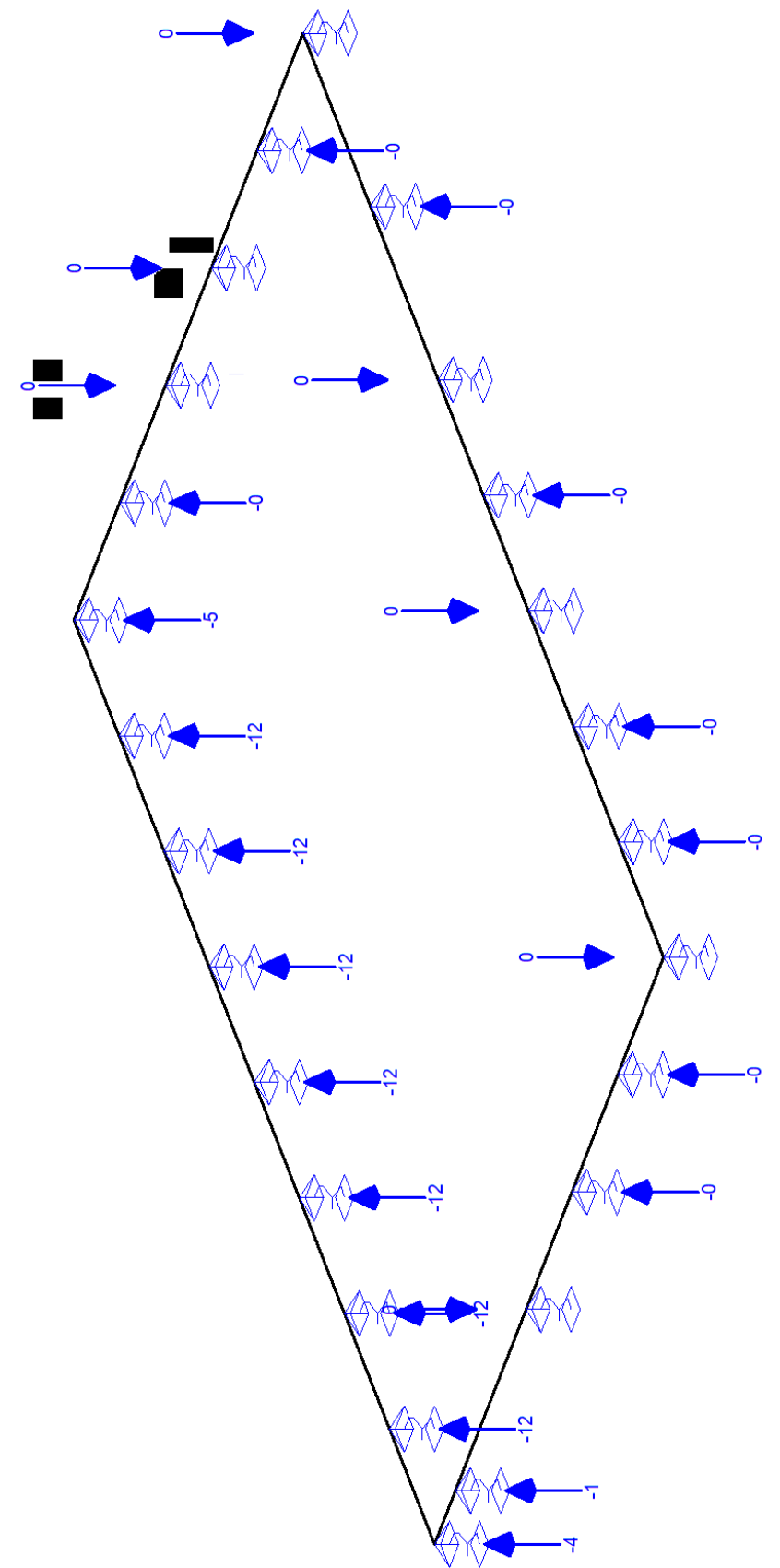
EXTREME STAAFKRACHTEN

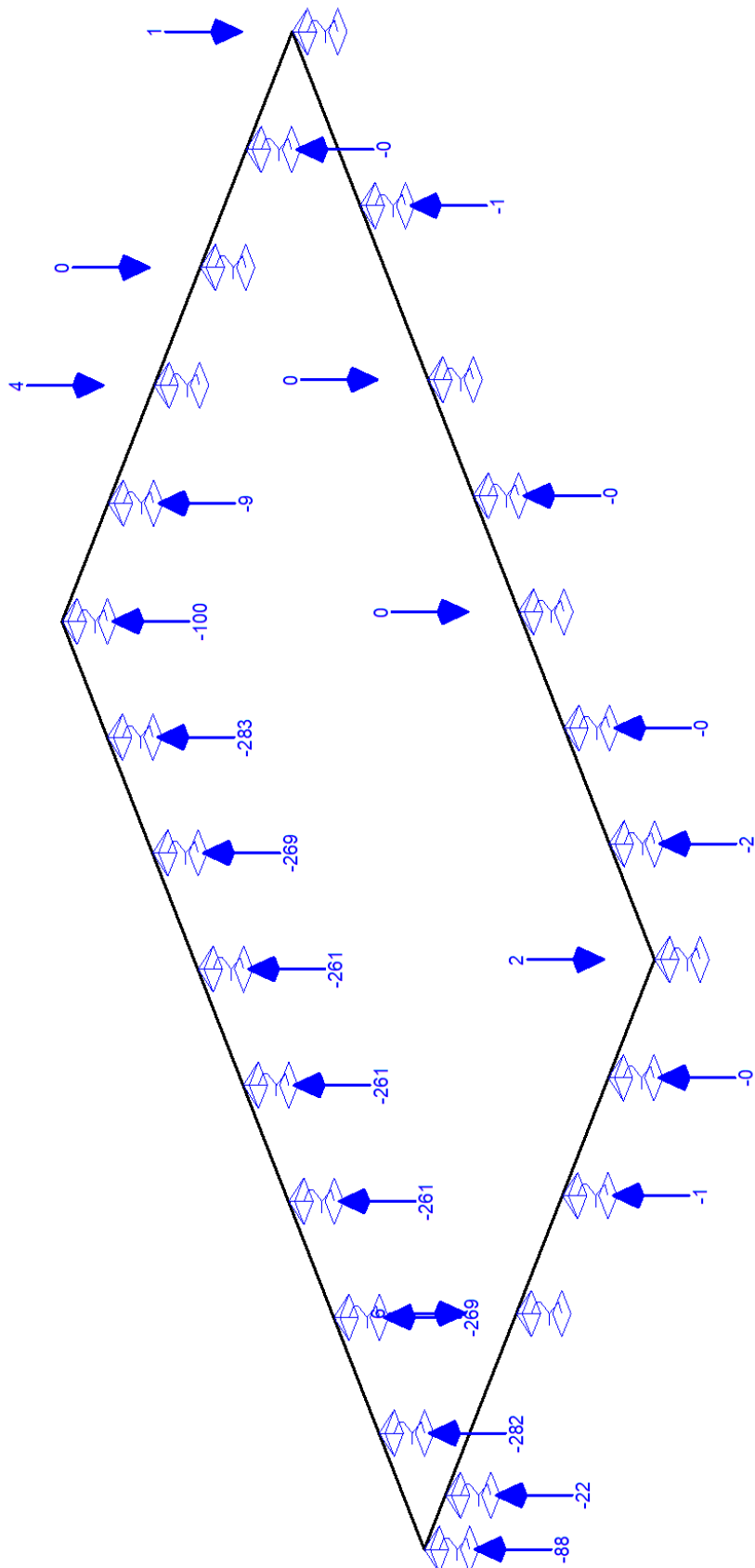
| Staaf        | Veld                   | B.C.  | M <sub>b</sub> | M <sub>max</sub> | xM <sub>max</sub> | M <sub>e</sub> | xM <sub>0</sub> | xM <sub>0</sub> | V <sub>b</sub> | V <sub>max</sub> | V <sub>e</sub> | Mx <sub>b</sub> | Mx <sub>e</sub> |
|--------------|------------------------|-------|----------------|------------------|-------------------|----------------|-----------------|-----------------|----------------|------------------|----------------|-----------------|-----------------|
| Fundamenteel |                        |       |                |                  |                   |                |                 |                 |                |                  |                |                 |                 |
| S1           | Veld 1 (0 000 4 940)   | Fu C1 | 8.51           | 17 69            | 1 749             | 12 85          | 4 178           |                 | 10 50          | 19 14            | 19 14          | 0.06            | 0.06            |
|              | Veld 6 (24 700 32 110) | Fu C1 | 19 92          | 14 92            | 28 108            | -33.13         | 25 878          | 30 338          | 20 45          | -24.01           | -24.01         | 0 06            | 0 06            |
|              | Veld 7 (32 110 39 520) | Fu C1 | -33.13         | 30.71            | 36 723            | 7.25           | 33 523          |                 | 27.68          | 27.68            | 16 78          | 0 06            | 0 06            |
| S2           | Veld 1 (0 000 4 940)   | Fu C1 | 7 25           | 273 89           | 2 470             | 158 17         | 0 058           | 4 069           | 124 20         | 185.30           | 185.30         | 0.43            | 0.43            |
|              | Veld 2 (4 940 9 880)   | Fu C1 | 158 17         | 182 27           | 7 410             | 190.49         | 6 042           | 8 660           | 148 21         | 161 29           | 161 29         | 0 43            | 0 43            |
|              | Veld 3 (9 880 14 820)  | Fu C1 | 190.49         | 169 60           | 12 350            | 183 51         | 11 143          | 13 581          | 156 16         | 156 16           | 153 34         | 0 43            | 0 43            |
| S3           | Veld 8 (34 580 39 520) | Fu C1 | 152 51         | -276.10          | 37 050            | 8 51           | 35 426          | 39 452          | -183.90        | -183.90          | 125 60         | 0 43            | 0 43            |
|              | Veld 1 (0 000 2 300)   | Fu C1 | 0.43           |                  |                   | -57.70         | 0 023           |                 | -18.37         | -32.17           | -32.17         | 8.51            | 8.51            |
|              | Veld 2 (2 300 10 040)  | Fu C1 | -57.70         | 9 61             | 7 037             | 17 44          | 5 247           | 8 827           | 28.42          | 28.42            | 18 02          | 8 51            | 8 51            |
| S4           | Veld 5 (20 080 25 100) | Fu C1 | 12 17          | 13 27            | 22 992            | 0 06           | 20 889          | 25 095          | 17 47          | 17 47            | 12 65          | 8 51            | 8 51            |
|              | Veld 1 (0 000 5 020)   | Fu C1 | -0.06          | -12.69           | 2 052             | 13 74          | 4 109           |                 | 12 31          | 17 81            | 17 81          | -7.25           | -7 25           |
|              | Veld 4 (15 060 20 080) | Fu C1 | 12 61          | 4.31             | 16 723            | 38.12          |                 |                 | 9 98           | 20.14            | 20.14          | 7 25            | 7 25            |
|              | Veld 5 (20 080 25 100) | Fu C1 | 38.12          | 4 32             | 23 841            | 0 43           | 22 641          | 25 042          | -22.57         | -22.57           | 7 55           | 7 25            | 7 25            |
|              | m                      |       | kNm            | kNm              | m                 | kNm            | m               | m               | kN             | kN               | kN             | kNm             | kNm             |

B.G.1 Op eegreact es

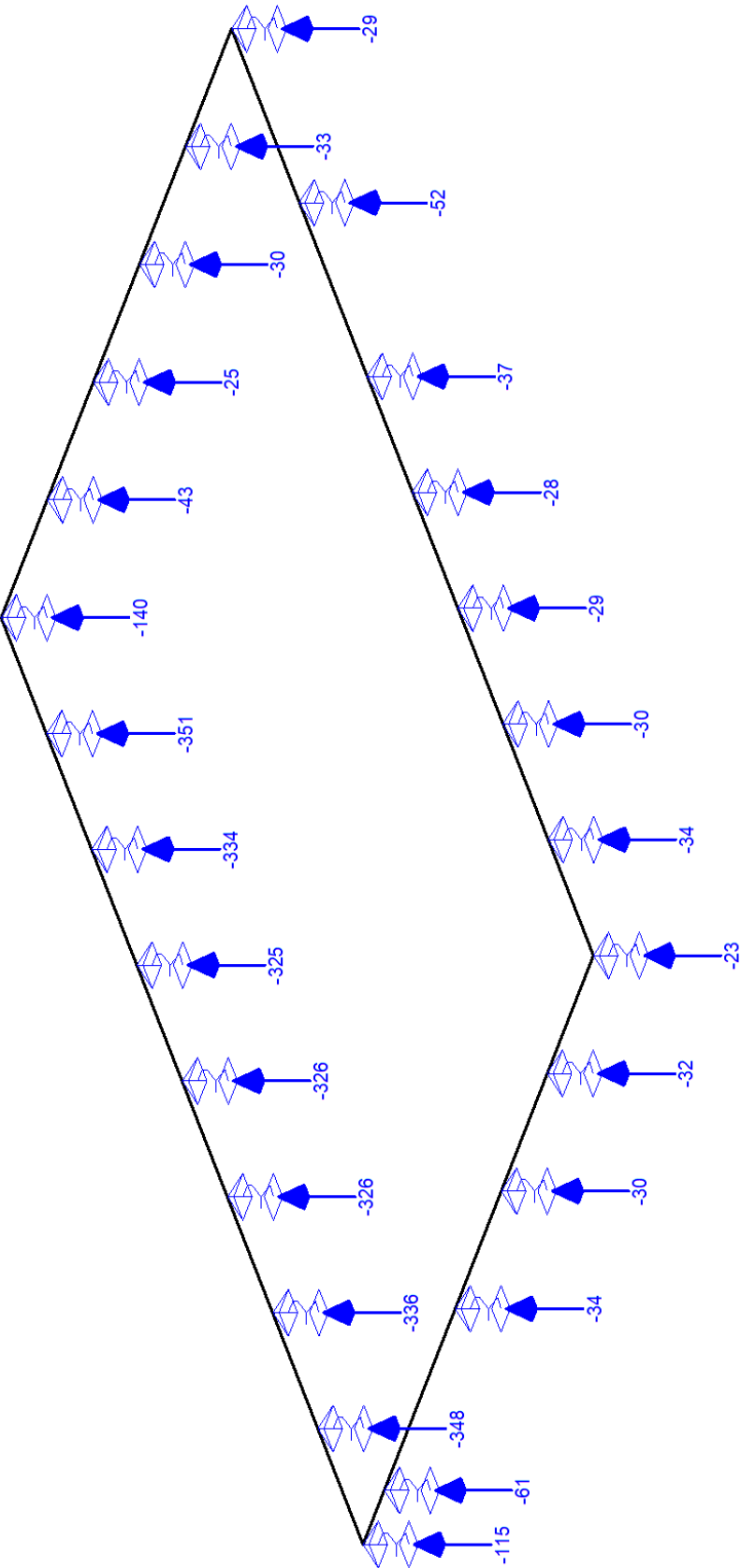


B.G.2 Op ecreact es

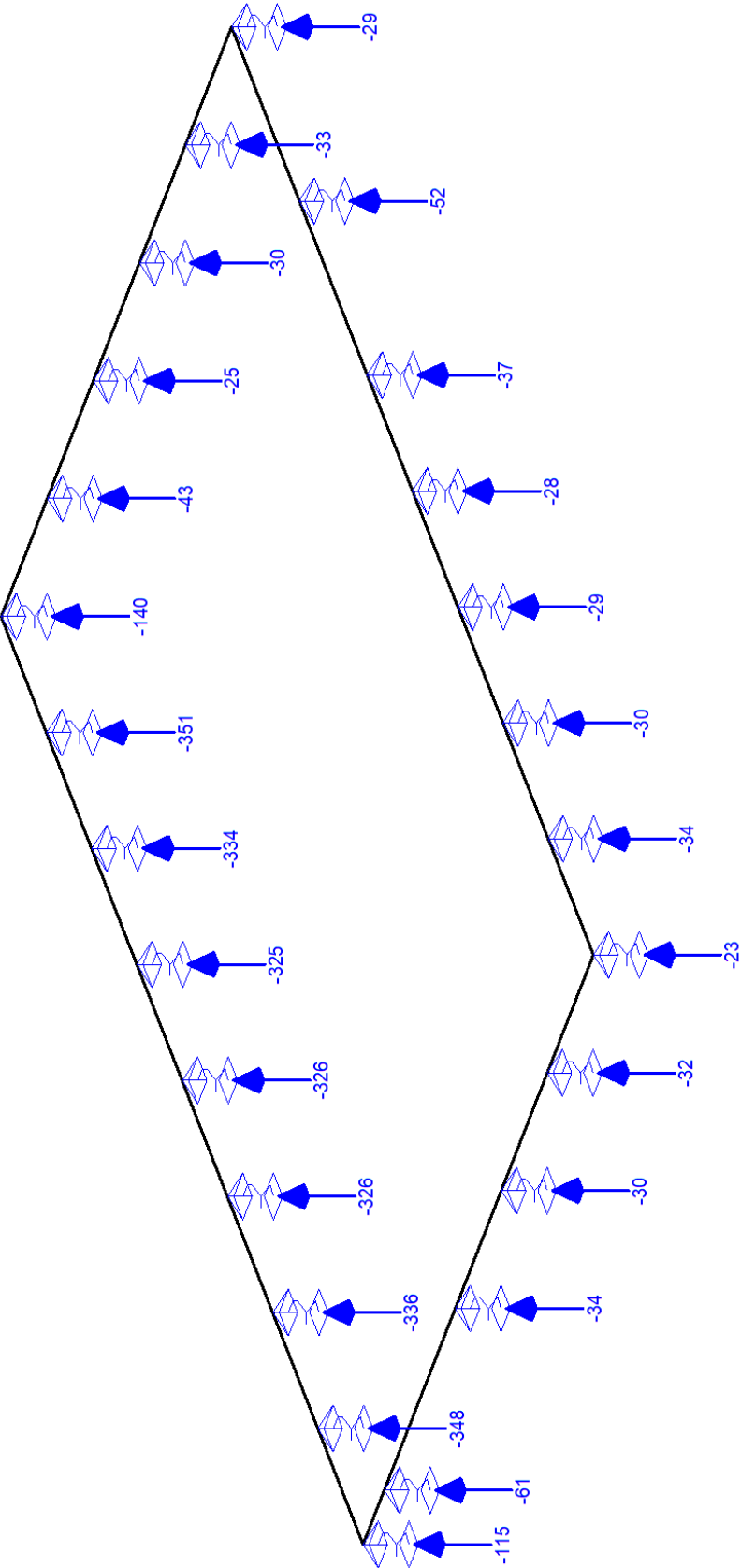




Fu.C. Omhu ende Op egreact es



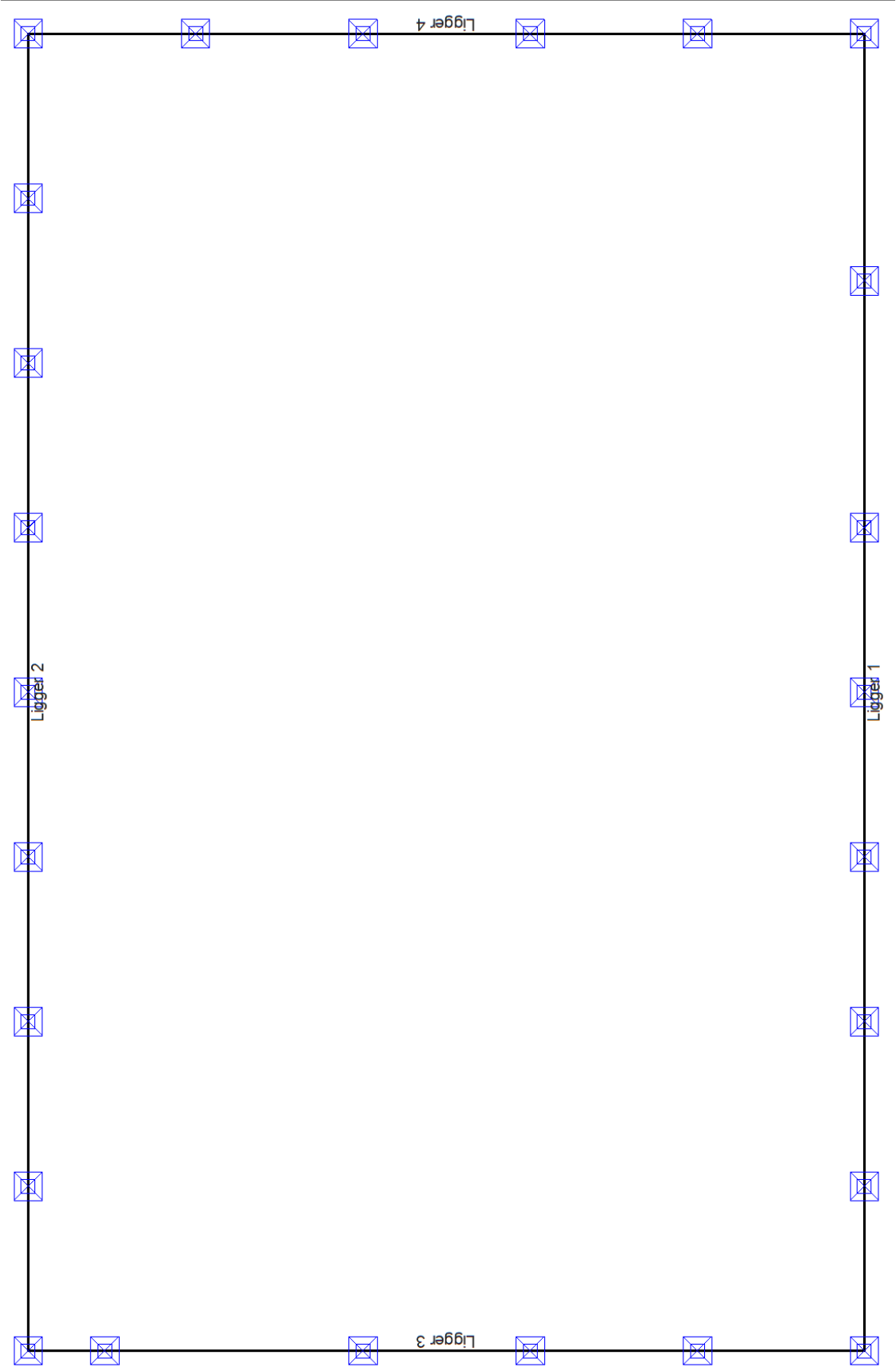
Fu.C.1 Opegreact es



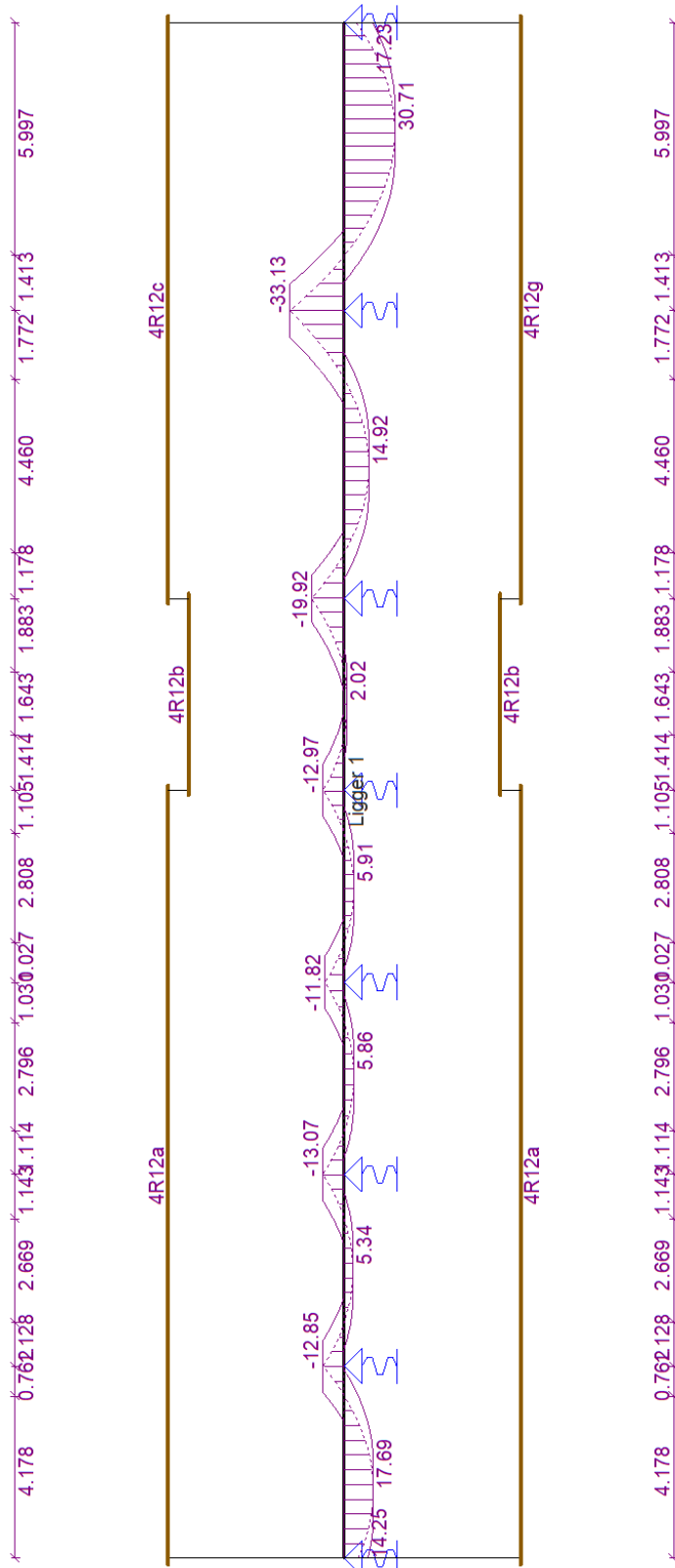




Betonde f n t e

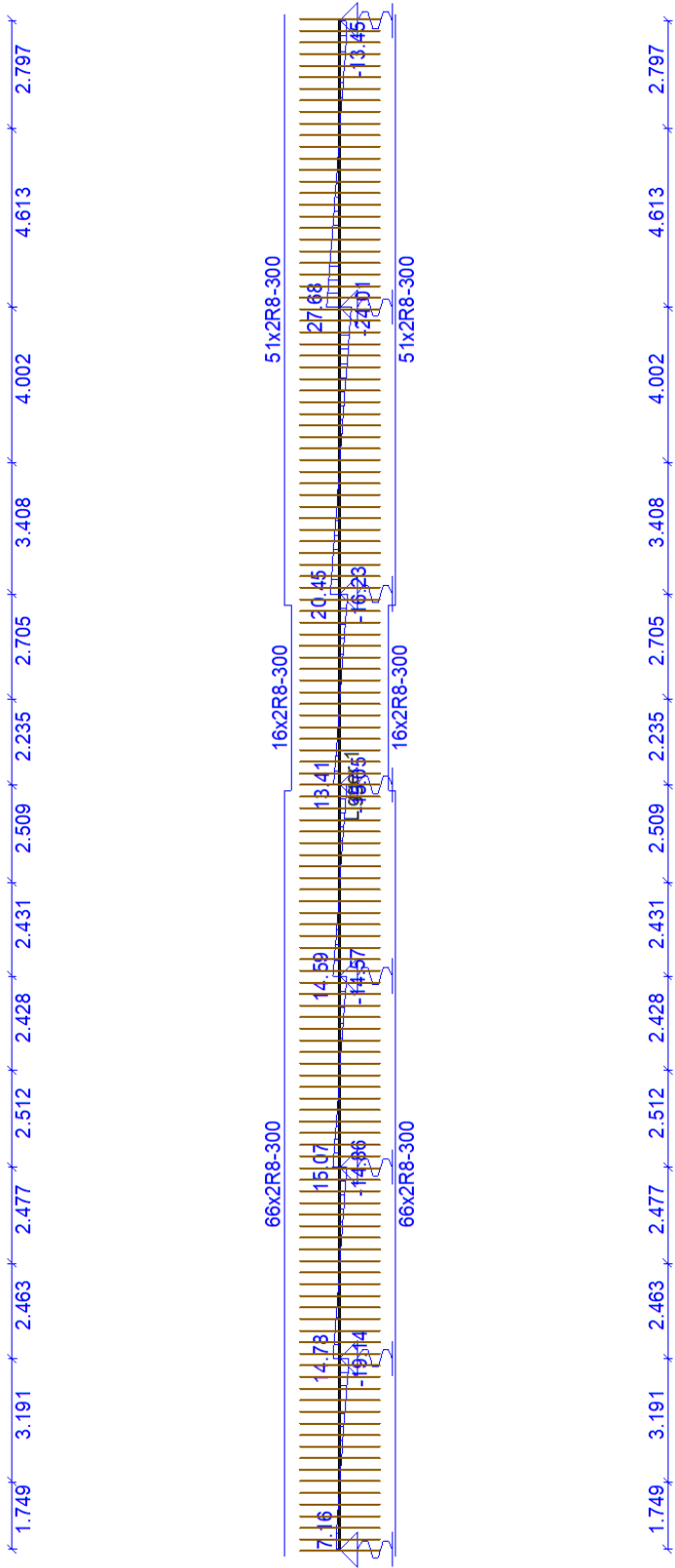


## L gger 1



Dwarskrachtwap. (Afbouw)

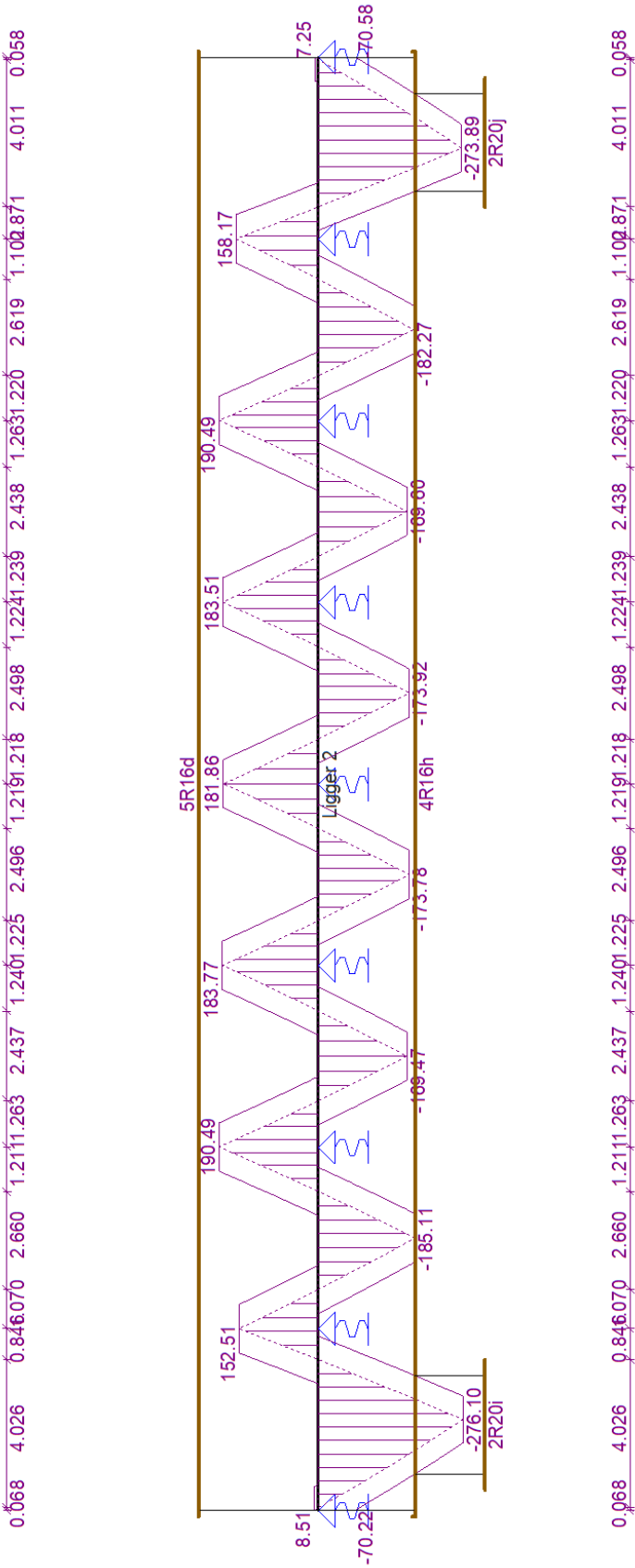
Logger 1





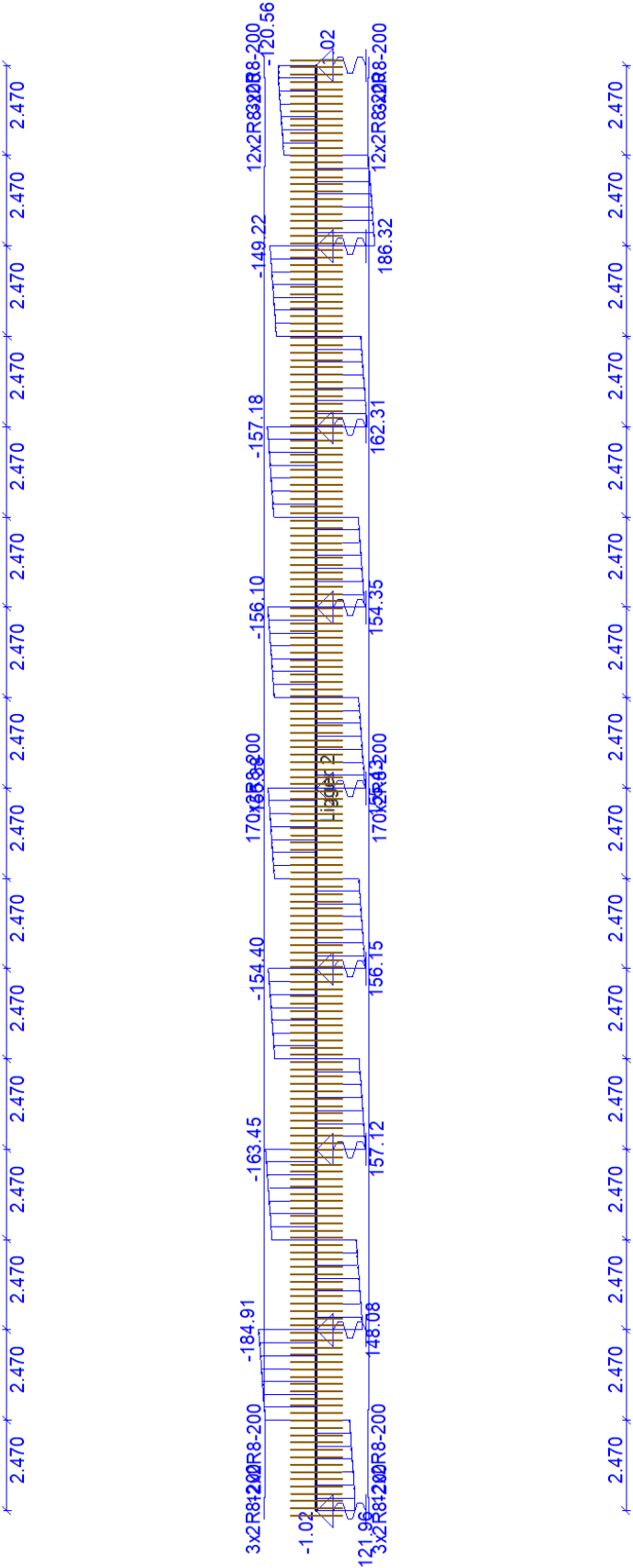
Langswap. (Afbouw)

L gger 2



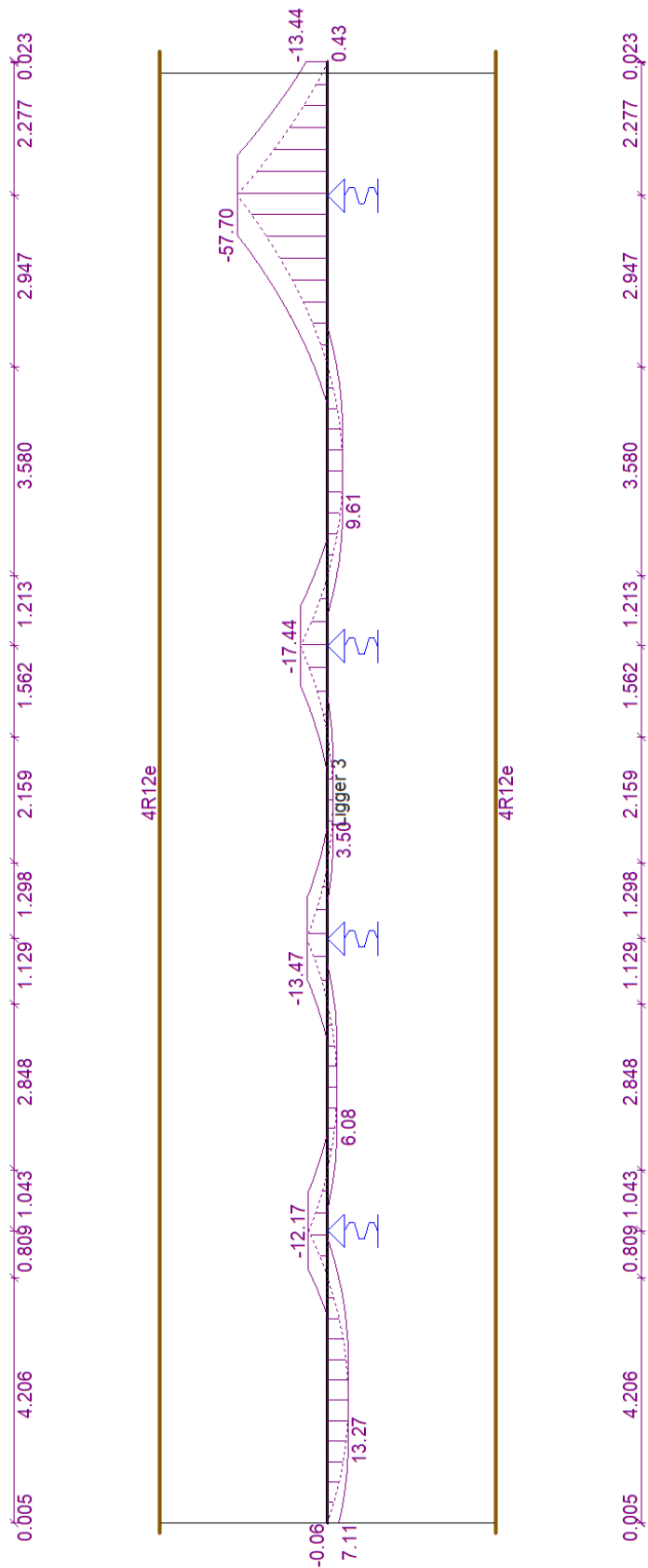
Dwarskrachtwap. (Afbouw)

L gger 2



Langswap. (Afbouw)

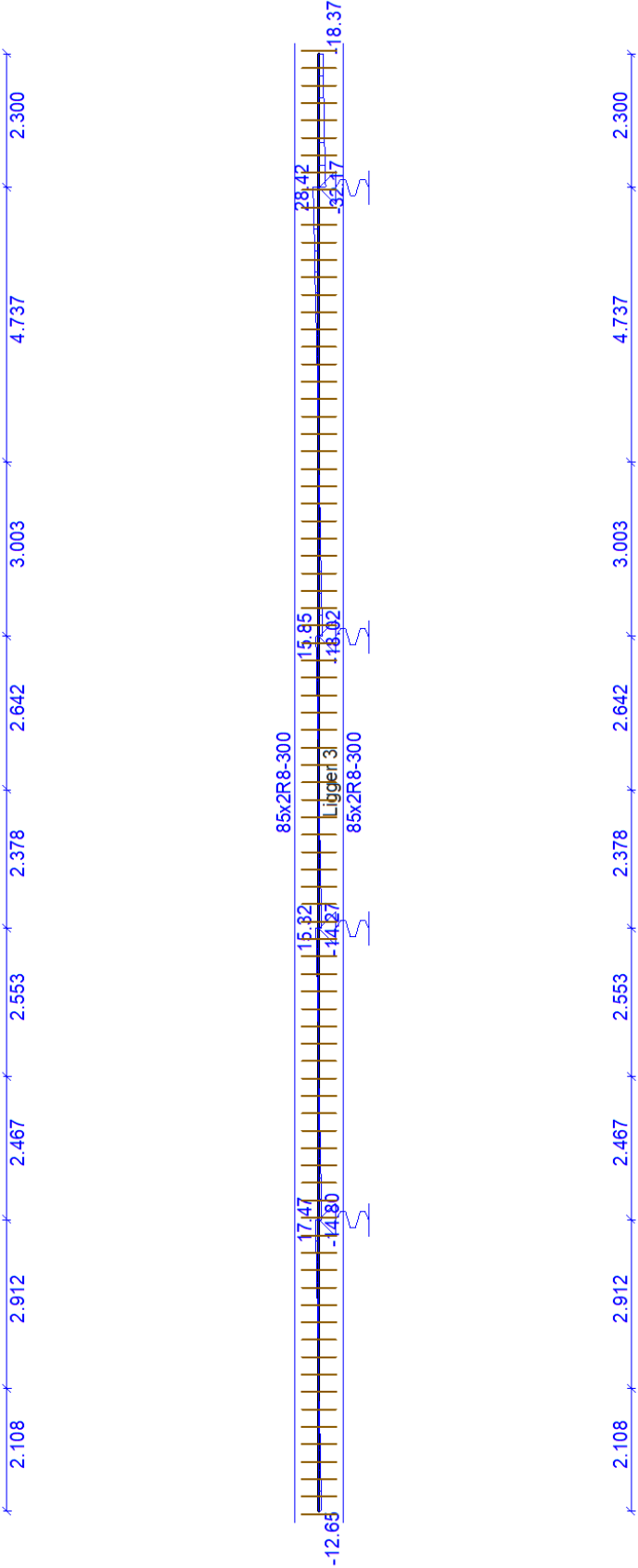
L gger 3





Dwarskrachtwap. (Afbouw)

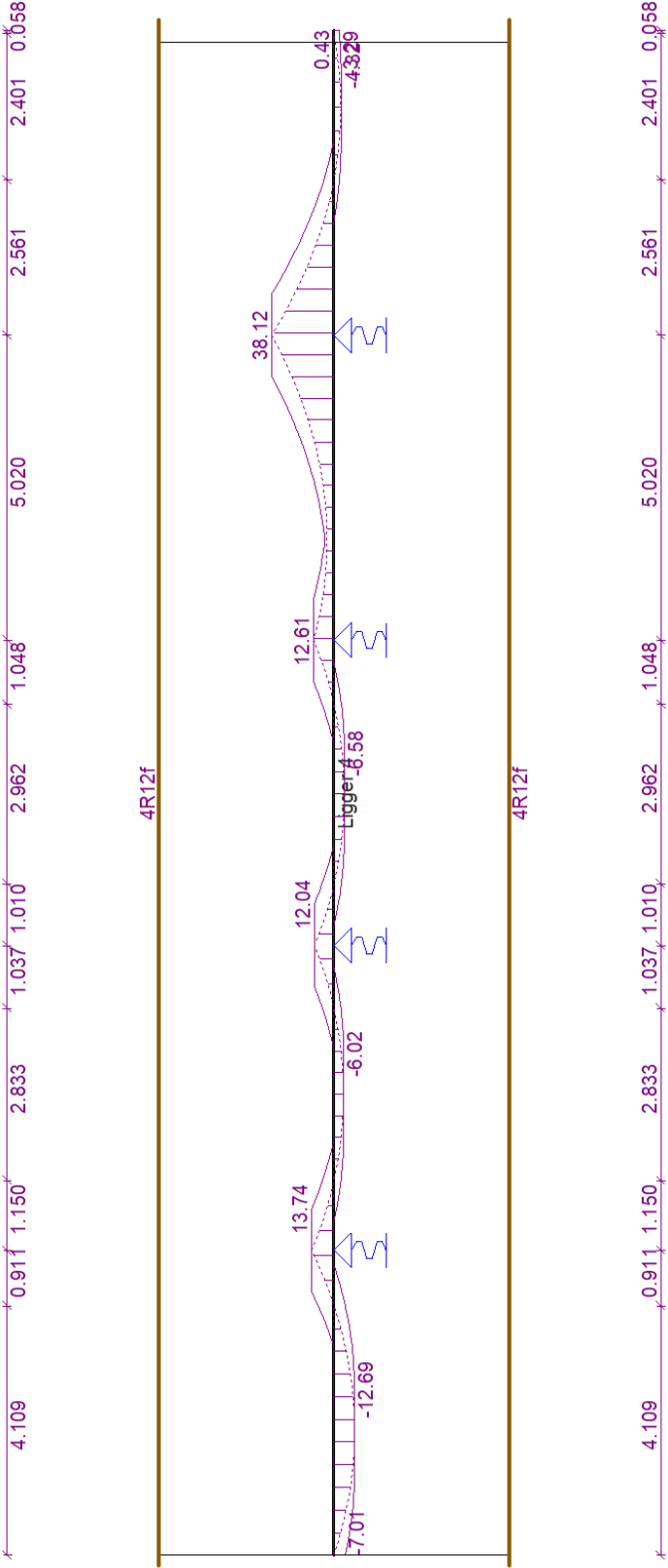
Logger 3





Langswap. (Afbouw)

L gger 4



Dwarskrachtwap. (Afbouw)

L gger 4

