

Statische berekening

Project: Opbouw woning Aalscholver 8, Leimuiden
 Onderdeel: Berekening fundering, hout- en staalconstructie
 Opdrachtgever: [REDACTED] Bouwkundig Adviesbureau
 Werknummer: 7210796
 Documentnummer: 01

| | Naam | Paraaf | Datum |
|---------------------|--|--|------------|
| Opgesteld door: | [REDACTED] | [REDACTED] | 18-03-2022 |
| Gecontroleerd door: | [REDACTED] | [REDACTED] | 18-03-2022 |
| Vrijgave door: | | | |
| Acceptatie door: | | | |

| Revisie | Datum | Omschrijving |
|---------|------------|----------------------|
| 1 | 22-03-2022 | Diverse aanpassingen |
| | | |
| | | |
| | | |



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1. Algemeen

1.1 Toegepaste normen

| | | |
|-------------|--------------|---|
| NEN-EN 1990 | (Eurocode 0) | : Grondslagen |
| NEN-EN 1991 | (Eurocode 1) | : Belastingen op constructies |
| NEN-EN 1992 | (Eurocode 2) | : Ontwerp en berekening van betonconstructies |
| NEN-EN 1993 | (Eurocode 3) | : Ontwerp en berekening van staalconstructies |
| NEN-EN 1994 | (Eurocode 4) | : Ontwerp en berekening van staal-betonconstructies |
| NEN-EN 1995 | (Eurocode 5) | : Ontwerp en berekening van houtconstructies |
| NEN-EN 1996 | (Eurocode 6) | : Ontwerp en berekening van metselwerkconstructies |
| NEN-EN 1997 | (Eurocode 7) | : Geotechnisch ontwerp |

1.2 Toegepaste materialen

Beton C20/25

Betonstaal B500

Constructiestaal S235, tenzij anders aangegeven.

Standaard bouw hout C18, tenzij anders aangegeven.

1.3 Rekensoftware

| | |
|------------|-----------------|
| Technosoft | Raamwerken |
| | Liggers |
| | Verbindingen |
| | Balkroosters |
| | Palen Verticaal |

1.4 Bouwwerkgegevens

| | |
|------------------------|---|
| Type | : Categorie A - Niet in een woongebouw gelegen woning |
| Referentieperiode | : 50 jaar |
| Gevolgklasse | : CC1 |
| Betrouwbaarheidsklasse | : RC1 |



2. Belastingaannames

hellend dak:

e.g. pannendak 41° : $0.65 / \cos 43$
sneeuw, $\mu_1 = 0.51$: 0.51×0.7

$q_G = 0.86 \text{ kN/m}^2$
 $q_Q = 0.36 \text{ ''}$

plat dak:

e.g. balklaag :
dakbedekking en isolatie :
plafond :

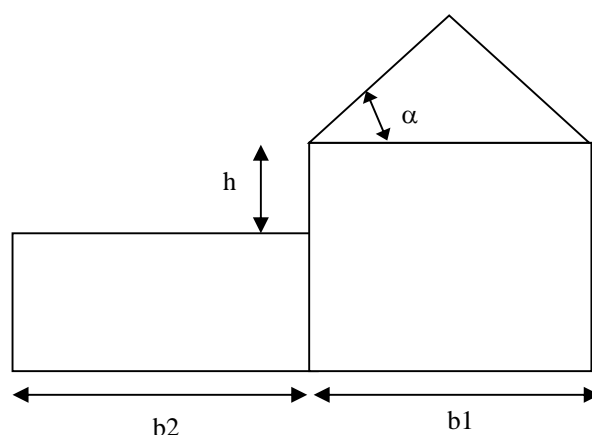
$= 0.30 \text{ kN/m}^2$
 $= 0.10 \text{ ''}$
 $= 0.10 \text{ ''}$

sneeuw μ_1 : 0.8×0.7
v.b. categorie H 10 m² : $\psi_0 = 0, \psi_1 = 0, \psi_2 = 0.1$

$q_G = 0.50 \text{ kN/m}^2$
 $q_Q = 0.56 \text{ ''}$
 $q_Q = 1.00 \text{ ''}$

$b_2 = 5.50 \text{ m}$
 $b_1 = 6.40 \text{ m}$
 $h = 2.60 \text{ m}$ ($\mu_{w;\max} = 4.00$)
 $\alpha = 41^\circ$ ($\mu_1 = 0.51$)

$\mu_s = 0.25$
 $\mu_w = 2.29$
 $\mu_2 = 2.54$
sneeuwlast max = 1.78 kN/m^2
 $l_s = 5.20 \text{ m}$
sneeuwlast min = 0.56 kN/m^2
(als $l_s > b_2$)



verdiepingsvloer:

e.g. kanaalplaatvloer : $d = 200$
afwerking : 20.0×0.06

$= 3.00 \text{ kN/m}^2$
 $= 1.20 \text{ ''}$
 $q_G = 4.20 \text{ kN/m}^2$

wanden :
v.b. : $\psi_0 = 0.4, \psi_1 = 0.5, \psi_2 = 0.3$

$= 0.80 \text{ kN/m}^2$
 $= 1.75 \text{ ''}$
 $q_Q = 2.55 \text{ kN/m}^2$

verdiepingsvloer hout:

e.g. balklaag :
afwerking + plafond :

$= 0.30 \text{ kN/m}^2$
 $= 0.20 \text{ ''}$
 $q_G = 0.50 \text{ kN/m}^2$

wanden :
v.b. : $\psi_0 = 0.4, \psi_1 = 0.5, \psi_2 = 0.3,$

$= 0.50 \text{ kN/m}^2$
 $= 1.75 \text{ ''}$
 $q_Q = 2.25 \text{ kN/m}^2$



3. Houtconstructie

3.1 gordingen

Uitgangspunt bij de berekening is dat de belasting evenwijdig aan het dakvlak wordt opgenomen door de muurplaat

| | | | | | | | |
|---|---|---------------------------------------|---|-----|------|-------------------------|--|
| l rep | = | 3.00 m | hout | C | 24 | | |
| breedte | = | 70 mm | klimaatklasse I, belastingduurklasse kort | | | | |
| hoogte | = | 170 mm | belastingfactor ver. belasting | = | 1.35 | | |
| belastingbreedte gording | = | 1.10 m | momentane faktor | = | 0 | | |
| dakhelling | = | 41 ° | windgebied | 1 | | | |
| pg | = | 0.86 kN/m ² | | | | | |
| qg | = | 0.86 x 1.10 x (cos 41 °) ² | | | = | 0.54 kN/m | |
| p sneeuw ⊥ dakvlak | = | 0.53 x (cos 41 °) ² | | | = | 0.30 kN/m ² | |
| p winddruk + onderdruk | = | 0.92 x 0.69 | | | = | 0.63 kN/m ² | |
| qq | = | 0.63 x 1.10 | | | = | 0.70 kN/m | |
| <u>berekening uiterste grenstoestand :</u> | | | | | | | |
| qd | = | 1.08 x 0.54 + 1.35 x 0.70 | | | = | 1.59 kN/m | |
| Md | = | 1/8 x 1.59 x 3.00 ² | | | = | 1.79 kNm | |
| kh | = | 0.98 | fu;d | | = | 16.20 N/mm ² | |
| Wy | = | 3.37E+5 mm ³ | Mu;d | | = | 5.46 kNm | |
| <u>berekening bruikbaarheidsgrenstoestand :</u> | | | | | | | |
| Iy | = | 2.87E+7 mm ⁴ | | | | | |
| q eind doorbuiging | = | 2 x 0.54 + 1.00 x 0.70 | | | = | 1.56 kN/m | |
| q bijkomende doorbuiging | = | 1.56 - 0.54 | | | = | 1.02 kN/m | |
| u eind | = | 5.2 mm | = L / | 574 | | | |
| u bijk | = | 3.4 mm | = L / | 877 | | | |

3.2 balklaag carport

| | | | | | | | |
|---|---|--------------------------------|---|------|-------------------|-------------------------|--|
| l rep | = | 3.20 m | hout | C | 18 | | |
| breedte | = | 58 mm | klimaatklasse I, belastingduurklasse kort | | | | |
| hoogte | = | 155 mm | | | | | |
| hoh afstand balken | = | 0.61 m | momentane faktor | 0.00 | | | |
| qg | = | 0.49 x 0.61 | | | = | 0.30 kN/m | |
| qq | = | 1.00 x 0.61 | | | = | 0.61 kN/m | |
| <u>berekening uiterste grenstoestand :</u> | | | | | | | |
| qd | = | 1.08 x 0.30 + 1.35 x 0.61 | | | = | 1.14 kN/m | |
| M _{Ed} | = | 1/8 x 1.14 x 3.20 ² | | | = | 1.47 kNm | |
| kh | = | 1.00 | f _{m;d} | | = | 12.46 N/mm ² | |
| Wy | = | 2.32E+5 mm ³ | M _{c,Rd} | | = | 2.89 kNm | |
| <u>berekening bruikbaarheidsgrenstoestand :</u> | | | | | | | |
| Iy | = | 1.80E+7 mm ⁴ | E= | 9000 | N/mm ² | | |
| q eind doorbuiging | = | 1.6 x 0.30 + 1.00 x 0.61 | | | = | 1.09 kN/m | |
| q bijkomende doorbuiging | = | 1.09 - 0.30 | | | = | 0.79 kN/m | |
| u eind | = | 9.16 mm | = L / | 350 | | | |
| u bijk | = | 6.65 mm | = L / | 481 | | | |



4. Staalconstructie

4.1 ligger doorbraak binnenblad

| | | | | |
|-------------------------------|---|---------------------------------|---------|-------------------------|
| l_{eff} | = | 1.20 m | $W_y =$ | 5.41E+4 mm ³ |
| toepassen | : | L150x100x10 | $I_y =$ | 5.52E+6 mm ⁴ |
| <u>q:</u> | | | | |
| e.g. hellend dak | = | 0.86 x 2.70 | = | 2.32 kN/m |
| zoldervloer | = | 4.20 x 2.70 | = | 11.34 kN/m |
| binnenblad | = | 2.20 x 3.50 | = | 7.70 kN/m |
| ligger | = | 2.42E+3 x 7.70E-5 | = | 0.19 kN/m + |
| | | | qg = | 21.55 kN/m |
| v.b. zoldervloer | = | 2.55 x 2.70 | qq = | 6.89 kN/m |
| qd | = | 1.08 x 21.55 + 1.35 x 6.89 | = | 32.57 kN/m |
| M_{Ed} | = | 1/8 x 32.57 x 1.20 ² | = | 5.86 kNm |
| $M_{c,Rd}$ | = | 5.41E-02 x 235 | = | 12.71 kNm |
| q rep | = | 21.55 + 6.89 | = | 28.43 kN/m |
| <u>totale doorbuiging</u> | = | 0.7 mm | | |
| toelaatbaar | = | 0.003 x 1200 | = | 3.6 mm |
| <u>bijkomende doorbuiging</u> | = | .2 mm | = | |
| toelaatbaar | = | 0.002 x 1200 | = | 2.4 mm |
| Rg | = | 1/2 x 21.55 x 1.20 | = | 12.93 kN |
| Rq rep | = | 1/2 x 6.89 x 1.20 | = | 4.13 kN |
| Rd | = | 1/2 x 32.57 x 1.20 | = | 19.54 kN |
| f'_d | = | 4.41 N/mm ² | | |
| ben. oplegvlak | = | 19540 / 4.41 | = | 4431 mm ² |
| toepassen | : | 100 x 150 | = | 15000 mm ² |



4.2 ligger doorbraak buitenblad

| | | | | |
|-------------------------------|---|--------------------------------|---------|-------------------------|
| l_{eff} | = | 1.20 m | $W_y =$ | 2.47E+4 mm ³ |
| toepassen | : | L100x10 | $I_y =$ | 1.77E+6 mm ⁴ |
| q_i | | | | |
| e.g. hellend dak | = | 0.86 x 1.20 | = | 1.03 kN/m |
| buitenblad | = | 2.00 x 3.50 | = | 7.00 kN/m |
| ligger | = | 1.92E+3 x 7.70E-5 | = | 0.15 kN/m + |
| | | | $q_g =$ | 8.18 kN/m |
| v.b. sneeuw | = | 0.36 x 1.20 | $q_q =$ | 0.43 kN/m |
| q_d | = | 1.08 x 8.18 + 1.35 x 0.43 | = | 9.42 kN/m |
| M_{Ed} | = | 1/8 x 9.42 x 1.20 ² | = | 1.70 kNm |
| $M_{c,Rd}$ | = | 2.47E-02 x 235 | = | 5.80 kNm |
| q_{rep} | = | 8.18 + 0.43 | = | 8.61 kN/m |
| <u>totale doorbuiging</u> | = | 0.6 mm | | |
| toelaatbaar | = | 0.003 x 1200 | = | 3.6 mm |
| <u>bijkomende doorbuiging</u> | = | .0 mm | = | |
| toelaatbaar | = | 0.002 x 1200 | = | 2.4 mm |
| R_g | = | 1/2 x 8.18 x 1.20 | = | 4.91 kN |
| $R_{q rep}$ | = | 1/2 x 0.43 x 1.20 | = | 0.26 kN |
| R_d | = | 1/2 x 9.42 x 1.20 | = | 5.65 kN |
| f'_d | = | 4.41 N/mm ² | | |
| ben. oplegvlak | = | 5650 / 4.41 | = | 1281 mm ² |
| toepassen | : | 100 x 150 | = | 15000 mm ² |



4.3 ligger carport

4.3.1 belastingen

q:

plat dak : 0.60 x 1.6

v.b. plat dak : 1.00 x 1.6

q_G = 0.96 kN/m

q_Q = 1.60 "

4.3.2 berekening

Technosoft Raamwerken release 6.74

22 mrt 2022

Project.....: 7210796
Onderdeel.....: ligger carport
Dimensies.....: kN;m;rad (tenzij anders aangegeven)
Datum.....: 14/03/2022
Bestand.....: y:\harder constructie en adviesbureau\werken\7210796\2.
constructieberekeningen\ligger carport r1.rww

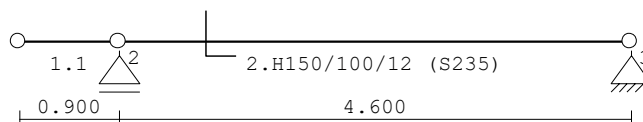
Belastingbreedte.: 1.000
Rekenmodel.....: 1e-orde-elastisch.
Theorie voor de bepaling van de krachtsverdeling:
Geometrisch lineair.
Fysisch lineair.

Gunstige werking van de permanente belasting wordt automatisch verwerkt.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | | | |
|-------------|----------------------|-----------------|-------------|
| Belastingen | NEN-EN 1990:2002 | C2:2010,A1:2019 | NB:2019(nl) |
| | NEN-EN 1991-1-1:2002 | C1/C11:2019 | NB:2019(nl) |
| Staal | NEN-EN 1993-1-1:2006 | C2:2011,A1:2016 | NB:2016(nl) |

GEOMETRIE



MATERIALEN

| Mt | Kwaliteit | E-modulus[N/mm ²] | S.G. | Pois. | Uitz. coëff |
|----|-----------|-------------------------------|------|-------|-------------|
| 1 | S235 | 210000 | 78.5 | 0.30 | 1.2000e-05 |

PROFIELEN [mm]

| Prof. | Omschrijving | Materiaal | Oppervlak | Traagheid | Vormf. |
|-------|--------------|-----------|------------|------------|--------|
| 1 | H150/100/12 | 1:S235 | 2.8740e+03 | 6.5000e+06 | 0.00 |

PROFIELEN vervolg [mm]

| Prof. | Staaftype | Breedte | Hoogte | e | Type | b1 | h1 | b2 | h2 |
|-------|-----------|---------|--------|------|------|----|----|----|----|
| 1 | 0:Normaal | 100 | 150 | 48.9 | | | | | |

PROFIELVORMEN [mm]

1 H150/100/12



KNOPEN

| Knoop | X | Z |
|-------|-------|-------|
| 1 | 0.000 | 0.000 |
| 2 | 0.900 | 0.000 |
| 3 | 5.500 | 0.000 |



Project.....: 7210796
Onderdeel.....: ligger carport

STAVEN

| St. | ki | kj | Profiel | Aansl.i | Aansl.j | Lengte Opm. |
|-----|----|----|---------------|---------|---------|-------------|
| 1 | 1 | 2 | 1:H150/100/12 | NDM | NDM | 0.900 |
| 2 | 2 | 3 | 1:H150/100/12 | NDM | NDM | 4.600 |

VASTE STEUNPUNTEN

| Nr. | knoop | Kode | XZR | l=vast | 0=vrij | Hoek |
|-----|-------|------|-----|--------|--------|------|
| 1 | 2 | 010 | | | | 0.00 |
| 2 | 3 | 110 | | | | 0.00 |

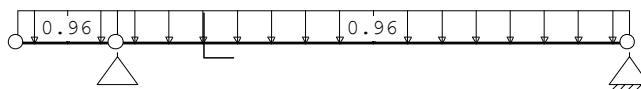
BELASTINGGEVALLEN

| B.G. | Omschrijving | Type |
|------|----------------------|-----------------------------|
| 1 | Permanente belasting | EGZ=-1.00 |
| 2 | v.b. plat dak | 2 Ver. bel. pers. ed. (q_k) |

BELASTINGEN

B.G:1 Permanente belasting

Eigen gewicht van alle staven is meegenomen in berekening. Richting:↓

**STAAFBELASTINGEN**

B.G:1 Permanente belasting

| Staaft | Type | q1/p/m | q2 | A | B | ψ_0 | ψ_1 | ψ_2 |
|--------|------------|--------|-------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -0.96 | -0.96 | 0.000 | 0.000 | | | |
| 2 | 1:QZLokaal | -0.96 | -0.96 | 0.000 | 0.000 | | | |

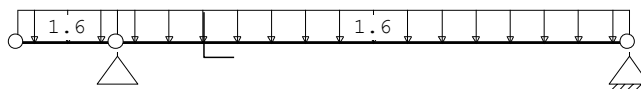
REACTIES

B.G:1 Permanente belasting

| Kn. | X | Z | M |
|-----|------|-------|--------------------------|
| 2 | | 3.90 | |
| 3 | 0.00 | 2.62 | |
| | 0.00 | 6.52 | : Som van de reacties |
| | 0.00 | -6.52 | : Som van de belastingen |

BELASTINGEN

B.G:2 v.b. plat dak

**STAAFBELASTINGEN**

B.G:2 v.b. plat dak

| Staaft | Type | q1/p/m | q2 | A | B | ψ_0 | ψ_1 | ψ_2 |
|--------|------------|--------|-------|-------|-------|----------|----------|----------|
| 1 | 1:QZLokaal | -1.60 | -1.60 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 |
| 2 | 1:QZLokaal | -1.60 | -1.60 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 |

REACTIES

B.G:2 v.b. plat dak

| Kn. | X | Z | M |
|-----|------|-------|--------------------------|
| 2 | | 5.26 | |
| 3 | 0.00 | 3.54 | |
| | 0.00 | 8.80 | : Som van de reacties |
| | 0.00 | -8.80 | : Som van de belastingen |



Project.....: 7210796
Onderdeel.....: ligger carport

BELASTINGCOMBINATIES

| BC Type | | | |
|---------|------|-----------|------------------|
| 1 Fund. | 1.22 | $G_{k,1}$ | |
| 2 Fund. | 1.08 | $G_{k,1}$ | + 1.35 $Q_{k,2}$ |
| 3 Kar. | 1.00 | $G_{k,1}$ | + 1.00 $Q_{k,2}$ |
| 4 Quas. | 1.00 | $G_{k,1}$ | |
| 5 Freq. | 1.00 | $G_{k,1}$ | |
| 6 Blij. | 1.00 | $G_{k,1}$ | |

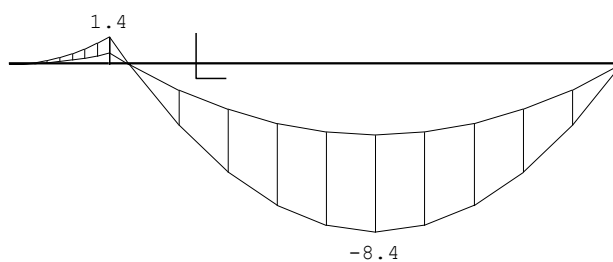
GUNSTIGE WERKING PERMANENTE BELASTINGEN

| BC Staven met gunstige werking | |
|--------------------------------|------|
| 1 | Geen |
| 2 | Geen |

OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES

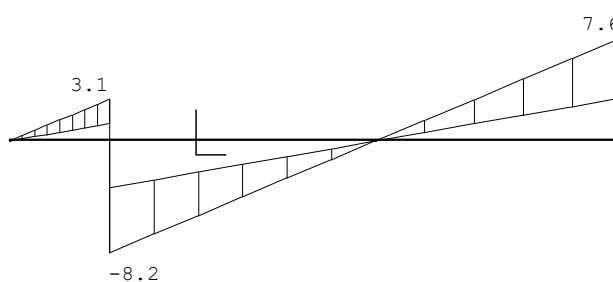
MOMENTEN

Fundamentele combinatie



DWARSKRACHTEN

Fundamentele combinatie





Project.....: 7210796
Onderdeel.....: ligger carport

STAALPROFIELEN - ALGEMENE GEGEVENS

Stabiliteit: Classificatie gehele constructie: Geschoord

PROFIEL/MATERIAAL

| P/M nr. | Profielnaam | Vloeisp. [N/mm ²] | Productie methode | Min. drsn. klasse |
|-----------------------------------|-------------|-------------------------------|-------------------|-------------------|
| 1 | H150/100/12 | 235 | Gewalst | 1 |
| Partiële veiligheidsfactoren: | | | | |
| Gamma M;0 : 1.00 Gamma M;1 : 1.00 | | | | |

KNIKSTABILITEIT

| Staafl | l _{sys} [m] | Classif. y | sterke as | l _{knik;y} [m] | Extra | | l _{knik;z} [m] | aanp. z |
|--------|----------------------|------------|-----------|-------------------------|--------------|------------|-------------------------|---------|
| | | | | | aanp. y [kN] | Classif. z | | |
| 1 | 0.900 | Geschoord | | 0.900 | 0.0 | Geschoord | 0.900 | 0.0 |
| 2 | 4.600 | Geschoord | | 4.600 | 0.0 | Geschoord | 4.600 | 0.0 |

KIPSTABILITEIT

| Staafl | Plts. aangr. | l gaffel [m] | Kipsteunafstanden | |
|--------|--------------|--------------|-------------------|-------|
| | | | [m] | [m] |
| 1 | 1.0*h | boven: | 0.90 | 0.900 |
| | | onder: | 0.90 | 0.900 |
| 2 | 1.0*h | boven: | 4.60 | 4.600 |
| | | onder: | 4.60 | 4.600 |

TOETSING SPANNINGEN

| Staafl nr. | P/M | BC | Sit | Kl | Plaats | Norm | Artikel | Formule | Hoogste toetsing | | Opm. |
|------------|-----|----|-----|----|--------|---------|---------|---------|---------------------------|-----|------|
| | | | | | | | | | U.C. [N/mm ²] | | |
| 1 | 1 | 2 | 1 | 3 | Einde | EN3-1-1 | 6.2.8 | (6.29) | 0.092 | 22 | 76 |
| 2 | 1 | 2 | 1 | 3 | My-max | EN3-1-1 | 6.2.5 | (6.12y) | 0.558 | 131 | 76 |

Opmerkingen:

[76] Toetsing van kipstabiliteit voor dit profieltype is niet voorzien.

TOETSING DOORBUIGING

| Staafl | Soort | Mtg | Lengte [m] | Overst | Zeeg | u _{tot} [mm] | BC | Sit | u | | |
|--------|-------|-----|------------|--------|------|-----------------------|-------|----------|-------|-------------|---------|
| | | | | | | | | | [mm] | Toelaatbaar | *1 |
| 1 | Dak | ss | 0.90 | J | N | 0.0 | 6.1 | 3 1 Eind | 6.1 | -7.2 | 2*0.004 |
| | | ss | | | | | | 3 1 Bijk | 3.5 | -7.2 | 2*0.004 |
| 2 | Dak | db | 4.60 | N | N | 0.0 | -10.8 | 3 1 Eind | -10.8 | -18.4 | 0.004 |
| | | db | | | | | | 3 1 Bijk | -6.2 | -18.4 | 0.004 |



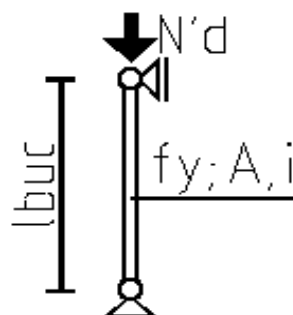
4.4 kolom onder ligger

 F_d : zie 4.3

 $F_d = 11.30 \text{ kN}$

Berekening drukkracht pendelkolommen

| | | |
|----------------------|---|-----------------------|
| profiel | = | K80/80/5 |
| N_{Ed} | = | 11.3 kN |
| f_y | = | 235 N/mm ² |
| I_{buc} | = | 2800 mm ⁴ |
| A | = | 1479 mm ² |
| i_z | = | 30.55 mm |
| instabiliteitskromme | = | c |
| λ_1 | = | 93.91 |
| λ | = | 0.98 |
| Φ | = | 1.17 |
| χ | = | 0.55 |
| $N_{b,Rd}$ | = | 192.56 kN |
| u.c. | = | 0.06 (voldoet) |





5. Bestaande constructie

5.1 controle balklaag garage

| | | | | | | | |
|---|---|--------------------------------|---|------|-------------------|---|-------------------------|
| l rep | = | 3.00 m | hout | C | 18 | | |
| breedte | = | 71 mm | klimaatklasse I, belastingduurklasse middellang | | | | |
| hoogte | = | 171 mm | | | | | |
| belastingbreedte | = | 0.61 m | momentane faktor (ψ_2) 0.3 | | | | |
| qg | = | 0.50 x 0.61 | | | | = | 0.31 kN/m |
| qq | = | 2.25 x 0.61 | | | | = | 1.37 kN/m |
| <u>berekening uiterste grenstoestand :</u> | | | | | | | |
| qd | = | 1.08 x 0.31 + 1.35 x 1.37 | | | | = | 2.18 kN/m |
| M_{Ed} | = | 1/8 x 2.18 x 3.00 ² | | | | = | 2.46 kNm |
| kh | = | 1.00 | $f_{m,d}$ | | | = | 11.08 N/mm ² |
| Wy | = | 3.46E+5 mm ³ | $M_{c,Rd}$ | | | = | 3.83 kNm |
| <u>berekening bruikbaarheidsgrenstoestand :</u> | | | | | | | |
| Iy | = | 2.96E+7 mm ⁴ | E= | 9000 | N/mm ² | | |
| q eind doorbuiging | = | 1.6 x 0.31 + 1.18 x 1.37 | | | | = | 2.11 kN/m |
| q bijkomende doorbuiging | = | 2.11 - 0.31 | | | | = | 1.80 kN/m |
| u eind | = | 8.35 mm | = L/ | 359 | | | |
| u bijk | = | 7.14 mm | = L/ | 420 | | | |



5.2 controle bestaande fundering

Voor de controle van de bestaande fundering wordt gebruik gemaakt van de bestaande berekening.
De extra belasting uit de opbouw wordt toegevoegd. Het gaat om de balken 1, 2, 18 en 20.

Voor de belastingcombinaties mag er gerekend worden met factoren voor de bestaande bouw volgens NEN 8700 tabel A1.2(B) en A1.2(C).

Technosoft Balkroosters release 6.73

14 mrt 2022

Project.....: Nieuwbouw 47 rijwoningen Beukenlaan/Kerklaan te Leimuiden
Onderdeel.....: Berekening staalconstructie & fundering - balkrooster_bnr_1_tm_7
Constructeur.: miranda
Dimensies.....: kN/m/rad
Datum.....: 29/04/2015
Bestand.....: y:\harder constructie en adviesbureau\werken\7210796\2.
 constructieberekeningen\balkrooster_2_optie.grw
Torsiefac.....: 10 %

Betrouwbaarheidsklasse : 1 Referentieperiode : 50
Ouderdom bij belasten : 28 Relatieve vochtigheid : 50%
Doorbuigingen(beton) zijn dmv gecorrigeerde stijfheden berekend.

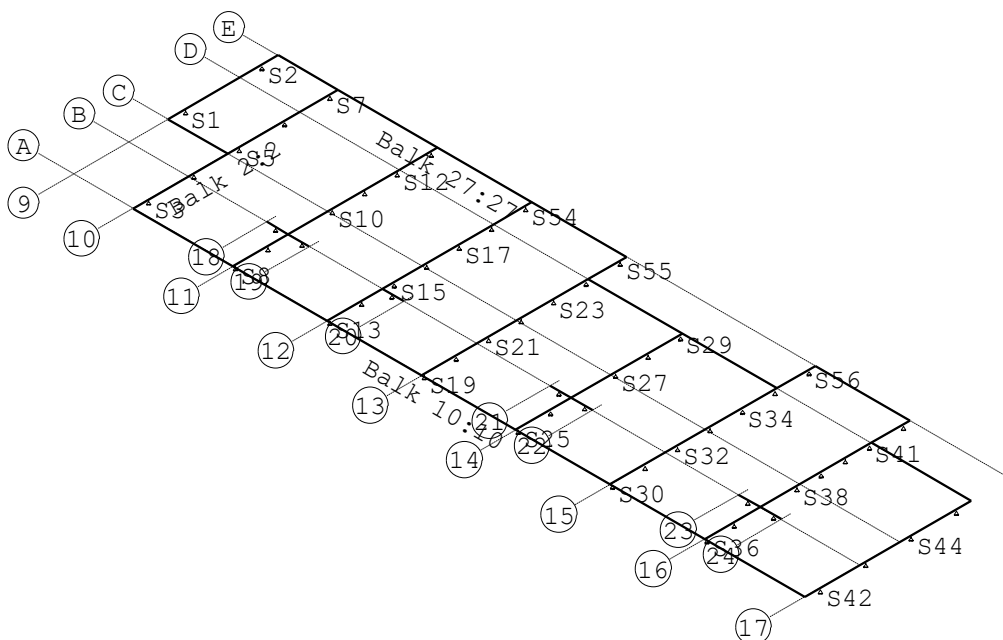
Fysisch lineair : Er is gerekend met de e-modulus uit de materiaaltabel.
Fys.NLE.kort : Er is gerekend met een gecorrigeerde e-modulus (korte duur).
Deze e-mod. is berekend mbv de krachten uit de fysisch lineair berekening.

Belastingfactoren zijn bepaald conform NEN8700:2011
Tabel A1.2(B) en (C): Factoren bij verbouw.

Toegepaste normen volgens Eurocode met Nederlandse NB

| | | | |
|-------------|--------------------------|-----------------|-------------|
| Belastingen | NEN-EN 1990:2002 | C2:2010,A1:2019 | NB:2019(nl) |
| | NEN-EN 1991-1-1:2002 | C1/C11:2019 | NB:2019(nl) |
| | NEN 8700:2011 | | |
| Beton | NEN-EN 1992-1-1:2011(nl) | C2/A1:2015(nl) | NB:2016(nl) |

GEOMETRIE





Project.....: Nieuwbouw 47 rijwoningen Beukenlaan/Kerklaan te Leimuiden
Onderdeel.....: Berekening staalconstructie & fundering - balkrooster_bnr_1_tm_7

MATERIALEN

| Mt | Kwaliteit | E-modulus[N/mm2] | S.G. | Pois. | Uitz. coëff |
|----|-----------|------------------|------|-------|-------------|
| 1 | C20/25 | 7480 | 25.0 | 0.20 | 1.0000e-05 |

MATERIALEN vervolg

| Mt | Kwaliteit | Cement | Kruipfac. |
|----|-----------|--------|-----------|
| 1 | C20/25 | | 3.01 |

PROFIELEN [mm]

| Prof. | Omschrijving | Materiaal | Oppervlak | Torsietr. | Traagheid | Vormf. |
|-------|--------------|-----------|-----------|-----------|-----------|--------|
| 1 | B*H 350*400 | 1:C20/25 | 1.400e+05 | 2.766e+09 | 1.867e+09 | 0.00 |
| 2 | B*H 400*400 | 1:C20/25 | 1.600e+05 | 3.605e+09 | 2.133e+09 | 0.00 |

PROFIELEN vervolg [mm]

| Prof. | Staaftype | Breedte | Hoogte | Zs | Rek.As | Type | b1 | h1 | b2 | h2 |
|-------|-----------|---------|--------|-----|--------|------|----|----|----|----|
| 1 | 0:Normaal | 350 | 400 | 200 | 0.00 | 0:RH | | | | |
| 2 | 0:Normaal | 400 | 400 | 200 | 0.00 | 0:RH | | | | |

PROFIELVORMEN [mm]

1 B*H 350*400



2 B*H 400*400



STRAMIENLIJNEN

| Nr. | Naam | X-begin | Y-begin | X-eind | Y-Eind |
|-----|------|---------|---------|--------|--------|
| 1 | 9 | 0.000 | 0.000 | 0.000 | 9.000 |
| 2 | 10 | 3.225 | 0.000 | 3.225 | 9.000 |
| 3 | 11 | 8.625 | 0.000 | 8.625 | 11.075 |
| 4 | 12 | 13.725 | 0.000 | 13.725 | 11.075 |
| 5 | 13 | 18.825 | 0.000 | 18.825 | 11.075 |
| 6 | 14 | 23.925 | 0.000 | 23.925 | 9.000 |
| 7 | 15 | 29.025 | 0.000 | 29.025 | 11.075 |
| 8 | 16 | 34.125 | 0.000 | 34.125 | 11.075 |
| 9 | 17 | 39.525 | 0.000 | 39.525 | 9.000 |
| 10 | A | 0.000 | 0.000 | 39.525 | 0.000 |
| 11 | B | 0.000 | 2.995 | 39.525 | 2.995 |
| 12 | C | 0.000 | 5.125 | 39.525 | 5.125 |
| 13 | D | 0.000 | 9.000 | 39.525 | 9.000 |
| 14 | E | 0.000 | 11.075 | 39.525 | 11.075 |
| 15 | 18 | 7.475 | 2.500 | 7.475 | 3.500 |
| 16 | 19 | 9.775 | 2.500 | 9.775 | 3.500 |
| 17 | 20 | 14.875 | 2.500 | 14.875 | 3.500 |
| 18 | 21 | 22.775 | 2.500 | 22.775 | 3.500 |
| 19 | 22 | 25.075 | 2.500 | 25.075 | 3.500 |
| 20 | 23 | 32.975 | 2.500 | 32.975 | 3.500 |
| 21 | 24 | 35.275 | 2.500 | 35.275 | 3.500 |



Project.....: Nieuwbouw 47 rijwoningen Beukenlaan/Kerklaan te Leimuiden
Onderdeel.....: Berekening staalconstructie & fundering - balkrooster_bnr_1_tm_7

BALKEN

| Nr. | Naam | Begin | Eind | Profiel |
|-----|------|-------|------|---------------|
| 1 | 1 | 9;C | 9;E | 1:B*H 350*400 |
| 2 | 2 | 10;A | 10;E | 2:B*H 400*400 |
| 3 | 3 | 11;A | 11;D | 1:B*H 350*400 |
| 4 | 4 | 12;A | 12;D | 1:B*H 350*400 |
| 5 | 5 | 13;A | 13;D | 1:B*H 350*400 |
| 6 | 6 | 14;A | 14;D | 1:B*H 350*400 |
| 7 | 7 | 15;A | 15;D | 1:B*H 350*400 |
| 8 | 8 | 16;A | 16;D | 1:B*H 350*400 |
| 9 | 9 | 17;A | 17;D | 2:B*H 400*400 |
| 10 | 10 | 10;A | 17;A | 1:B*H 350*400 |
| 11 | 11 | B;18 | 11;B | 1:B*H 350*400 |
| 12 | 12 | 11;B | B;19 | 1:B*H 350*400 |
| 13 | 13 | B;12 | 20;B | 1:B*H 350*400 |
| 14 | 14 | 14;B | B;21 | 1:B*H 350*400 |
| 15 | 15 | B;22 | 14;B | 1:B*H 350*400 |
| 16 | 16 | B;23 | 16;B | 1:B*H 350*400 |
| 17 | 17 | 16;B | B;24 | 1:B*H 350*400 |
| 18 | 18 | 9;C | 10;C | 1:B*H 350*400 |
| 19 | 19 | 13;D | 15;D | 1:B*H 350*400 |
| 20 | 20 | 9;E | 10;E | 1:B*H 350*400 |
| 21 | 21 | 16;D | 17;D | 1:B*H 350*400 |
| 22 | 22 | 11;D | 11;E | 1:B*H 350*400 |
| 23 | 23 | 12;D | 12;E | 1:B*H 350*400 |
| 24 | 24 | 13;D | 13;E | 2:B*H 400*400 |
| 25 | 25 | 15;D | 15;E | 2:B*H 400*400 |
| 26 | 26 | 16;D | 16;E | 2:B*H 400*400 |
| 27 | 27 | 10;E | 13;E | 1:B*H 350*400 |
| 28 | 28 | 15;E | 16;E | 1:B*H 350*400 |

BALKEN vervolg

| Nr. | Naam | Aansl.begin | Aansl.eind | Excentr. | Pasm.begin | Pasm.eind | Opm. |
|-----|------|-------------|------------|----------|------------|-----------|------|
| 1 | 1 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 2 | 2 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 3 | 3 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 4 | 4 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 5 | 5 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 6 | 6 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 7 | 7 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 8 | 8 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 9 | 9 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 10 | 10 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 11 | 11 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 12 | 12 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 13 | 13 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 14 | 14 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 15 | 15 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 16 | 16 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 17 | 17 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 18 | 18 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 19 | 19 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 20 | 20 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 21 | 21 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 22 | 22 | WDM | WDM | 0.000 | 0.000 | 0.000 | |



Project.....: Nieuwbouw 47 rijwoningen Beukenlaan/Kerklaan te Leimuiden
Onderdeel.....: Berekening staalconstructie & fundering - balkrooster_bnr_1_tm_7

BALKEN vervolg

| Nr. | Naam | Aansl.begin | Aansl.eind | Excentr. | Pasm.begin | Pasm.eind | Opm. |
|-----|------|-------------|------------|----------|------------|-----------|------|
| 23 | 23 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 24 | 24 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 25 | 25 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 26 | 26 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 27 | 27 | WDM | WDM | 0.000 | 0.000 | 0.000 | |
| 28 | 28 | WDM | WDM | 0.000 | 0.000 | 0.000 | |

Opmerkingen:

De torsie traagheid van alle balken is tot 10% gereduceerd

STEUNPUNTTYPE

| | | | |
|------------|--------------|-----------------|------------|
| Nr. | : 1 | Assenstelsel: | Gloobaal |
| Afmeting | : 220*220 | Rotatie | X:Vrij |
| FRd | : 300.000000 | Verplaatsing Z: | Veerwaarde |
| Min.afst.: | 0.500 | Type: | Normaal |
| | | | 40000.000 |
| | | Rotatie | Y:Vrij |
| | | Ondergr. | Bovengr. |
| | | | -300.000 |

STEUNPUNTEN

| Nr. | Steunpunttype | Balk | Positie | Excentr. | Hoek | Opm: |
|-----|---------------|----------|---------|----------|-------|------|
| 1 | 1:220*220 | Balk 1:1 | 0.900 | 0.000 | 0.000 | |
| 2 | 1:220*220 | Balk 1:1 | 5.050 | 0.000 | 0.000 | |
| 3 | 1:220*220 | Balk 2:2 | 0.825 | 0.000 | 0.000 | |
| 4 | 1:220*220 | Balk 2:2 | 3.275 | 0.000 | 0.000 | |
| 5 | 1:220*220 | Balk 2:2 | 5.725 | 0.000 | 0.000 | |
| 6 | 1:220*220 | Balk 2:2 | 8.175 | 0.000 | 0.000 | |
| 7 | 1:220*220 | Balk 2:2 | 10.625 | 0.000 | 0.000 | |
| 8 | 1:220*220 | Balk 3:3 | 0.100 | 0.000 | 0.000 | |
| 9 | 1:220*220 | Balk 3:3 | 1.85 | 0.000 | 0.000 | |
| 10 | 1:220*220 | Balk 3:3 | 5.35 | 0.000 | 0.000 | |
| 11 | 1:220*220 | Balk 3:3 | 7.1 | 0.000 | 0.000 | |
| 12 | 1:220*220 | Balk 3:3 | 8.850 | 0.000 | 0.000 | |
| 13 | 1:220*220 | Balk 4:4 | 0.10 | 0.000 | 0.000 | |
| 14 | 1:220*220 | Balk 4:4 | 1.850 | 0.000 | 0.000 | |
| 15 | 1:220*220 | Balk 4:4 | 3.600 | 0.000 | 0.000 | |
| 16 | 1:220*220 | Balk 4:4 | 5.350 | 0.000 | 0.000 | |
| 17 | 1:220*220 | Balk 4:4 | 7.10 | 0.000 | 0.000 | |
| 18 | 1:220*220 | Balk 4:4 | 8.850 | 0.000 | 0.000 | |
| 19 | 1:220*220 | Balk 5:5 | 0.100 | 0.000 | 0.000 | |
| 20 | 1:220*220 | Balk 5:5 | 1.85 | 0.000 | 0.000 | |
| 21 | 1:220*220 | Balk 5:5 | 3.600 | 0.000 | 0.000 | |
| 22 | 1:220*220 | Balk 5:5 | 5.35 | 0.000 | 0.000 | |
| 23 | 1:220*220 | Balk 5:5 | 7.1 | 0.000 | 0.000 | |
| 24 | 1:220*220 | Balk 5:5 | 8.85 | 0.000 | 0.000 | |
| 25 | 1:220*220 | Balk 6:6 | 0.100 | 0.000 | 0.000 | |
| 26 | 1:220*220 | Balk 6:6 | 1.85 | 0.000 | 0.000 | |
| 27 | 1:220*220 | Balk 6:6 | 5.35 | 0.000 | 0.000 | |
| 28 | 1:220*220 | Balk 6:6 | 7.1 | 0.000 | 0.000 | |
| 29 | 1:220*220 | Balk 6:6 | 8.850 | 0.000 | 0.000 | |
| 30 | 1:220*220 | Balk 7:7 | 0.100 | 0.000 | 0.000 | |
| 31 | 1:220*220 | Balk 7:7 | 1.85 | 0.000 | 0.000 | |
| 32 | 1:220*220 | Balk 7:7 | 3.600 | 0.000 | 0.000 | |
| 33 | 1:220*220 | Balk 7:7 | 5.35 | 0.000 | 0.000 | |
| 34 | 1:220*220 | Balk 7:7 | 7.1 | 0.000 | 0.000 | |
| 35 | 1:220*220 | Balk 7:7 | 8.850 | 0.000 | 0.000 | |



Project.....: Nieuwbouw 47 rijwoningen Beukenlaan/Kerklaan te Leimuiden
Onderdeel.....: Berekening staalconstructie & fundering - balkrooster_bnr_1_tm_7

STEUNPUNTEN

| Nr. | Steunpunttype | Balk | Positie | Excentr. | Hoek Opm: |
|-----|---------------|------------|---------|----------|-----------|
| 36 | 1:220*220 | Balk 8:8 | 0.100 | 0.000 | 0.000 |
| 37 | 1:220*220 | Balk 8:8 | 1.550 | 0.000 | 0.000 |
| 38 | 1:220*220 | Balk 8:8 | 4.950 | 0.000 | 0.000 |
| 39 | 1:220*220 | Balk 8:8 | 6.250 | 0.000 | 0.000 |
| 40 | 1:220*220 | Balk 8:8 | 7.550 | 0.000 | 0.000 |
| 41 | 1:220*220 | Balk 8:8 | 8.850 | 0.000 | 0.000 |
| 42 | 1:220*220 | Balk 9:9 | 0.825 | 0.000 | 0.000 |
| 43 | 1:220*220 | Balk 9:9 | 3.275 | 0.000 | 0.000 |
| 44 | 1:220*220 | Balk 9:9 | 5.725 | 0.000 | 0.000 |
| 45 | 1:220*220 | Balk 9:9 | 8.175 | 0.000 | 0.000 |
| 46 | 1:220*220 | Balk 11:11 | 0.450 | 0.000 | 0.000 |
| 47 | 1:220*220 | Balk 12:12 | 0.70 | 0.000 | 0.000 |
| 48 | 1:220*220 | Balk 13:13 | 0.450 | 0.000 | 0.000 |
| 49 | 1:220*220 | Balk 14:14 | 0.700 | 0.000 | 0.000 |
| 50 | 1:220*220 | Balk 15:15 | 0.450 | 0.000 | 0.000 |
| 51 | 1:220*220 | Balk 16:16 | 0.450 | 0.000 | 0.000 |
| 52 | 1:220*220 | Balk 17:17 | 0.700 | 0.000 | 0.000 |
| 53 | 1:220*220 | Balk 22:22 | 1.700 | 0.000 | 0.000 |
| 54 | 1:220*220 | Balk 23:23 | 1.700 | 0.000 | 0.000 |
| 55 | 1:220*220 | Balk 24:24 | 1.700 | 0.000 | 0.000 |
| 56 | 1:220*220 | Balk 25:25 | 1.700 | 0.000 | 0.000 |
| 57 | 1:220*220 | Balk 26:26 | 1.700 | 0.000 | 0.000 |

BELASTINGGEVALLEN

| B.G. | Omschrijving | Belast/onbelast | ψ_0 | ψ_1 | ψ_2 | e.g. |
|------|--------------|--------------------|----------|----------|----------|-------|
| 1 | Permanent | 2:Permanent EN1991 | | | | -1.00 |
| 2 | v.b. beggr | 0:Alles tegelijk | 0.40 | 0.50 | 0.30 | 0.00 |
| 3 | v.b. verd | 0:Alles tegelijk | 0.40 | 0.50 | 0.30 | 0.00 |
| 4 | v.b. zolder | 0:Alles tegelijk | 0.40 | 0.50 | 0.30 | 0.00 |

BELASTINGGEVALLEN

| B.G. | Omschrijving | Type |
|------|--------------|---------------------------------|
| 1 | Permanent | 1 Permanente belasting |
| 2 | v.b. beggr | 2 Ver. bel. pers. ed. (q_k) |
| 3 | v.b. verd | 2 Ver. bel. pers. ed. (q_k) |
| 4 | v.b. zolder | 2 Ver. bel. pers. ed. (q_k) |

Gewichtsberekening

Permanent

Balk 1

Type:-QZGlobaal

| Index | Omschrijving | Formule | Waarde |
|---------|-------------------|-------------------------------------|------------|
| q40 | hellend dak | 0.86×1.6 | 1.38 kN/m |
| | verdiepingsvloer | 0.50×1.6 | 0.80 kN/m |
| | begane grondvloer | 3.60×1.6 | 5.76 kN/m |
| | gevel | $2.00 \times 3.0 + 2.50 \times 3.0$ | 13.50 kN/m |
| Totaal: | | | 21.44 kN/m |

Type:-PZLokaal

| Index | Omschrijving | Formule | Waarde |
|-------|----------------|---------|---------|
| F20 | ligger carport | 3.54 | 3.54 kN |



Balk 2

| Type:-QZGlobaal Positie:0.000 Lengte:9.000 | | | |
|--|-------------------|-------------------|------------|
| Index | Omschrijving | Formule | Waarde |
| q28 | begane grondvloer | 3.60×2.5 | 9.00 kN/m |
| | verdiepingsvloer | 4.40×2.5 | 11.00 kN/m |
| | zoldervloer | 4.40×2.5 | 11.00 kN/m |
| | gevel | 4.00×5.7 | 22.80 kN/m |
| Totaal: | | | 53.80 kN/m |

| Type:-QZGlobaal Positie:5.125 Lengte:5.950 | | | |
|--|-------------------|-------------------|-----------|
| Index | Omschrijving | Formule | Waarde |
| q41 | hellend dak | 0.86×1.6 | 1.38 kN/m |
| | verdiepingsvloer | 0.50×1.6 | 0.80 kN/m |
| | begane grondvloer | 3.60×1.6 | 5.76 kN/m |
| Totaal: | | | 7.94 kN/m |

| Index | Omschrijving | Formule | Waarde |
|-------|----------------|-------------------|------------|
| q29 | gevel minimaal | 4.00×0.1 | 0.40 kN/m |
| q30 | gevel maximaal | 4.00×4.4 | 17.60 kN/m |
| q31 | gevel | 2.50×2.0 | 5.00 kN/m |
| q43 | plat dak | 0.60×1.6 | 0.96 kN/m |

Type:-PZLokaal

| | | | |
|----|-----|------------------------------|----------|
| F9 | dak | $0.87 \times 4.1 \times 3.2$ | 11.41 kN |
|----|-----|------------------------------|----------|

Balk 18

Type:-QZGlobaal

| Index | Omschrijving | Formule | Waarde |
|---------|-------------------|------------------------------|------------|
| q33 | gevel 70% opening | $4.00 \times 3.0 \times 0.7$ | 8.40 kN/m |
| | gevel 20% opening | $2.50 \times 2.5 \times 0.8$ | 5.00 kN/m |
| Totaal: | | | 13.40 kN/m |

v.b. beggr

Balk 1

| Index | Omschrijving | Formule | Waarde |
|-------|-------------------|-------------------|-----------|
| q36 | v.b. begane grond | 2.55×1.6 | 4.08 kN/m |

Balk 2

| Index | Omschrijving | Formule | Waarde |
|-------|-------------------|-------------------|-----------|
| q21 | v.b. begane grond | 2.55×2.5 | 6.38 kN/m |
| q35 | v.b. begane grond | 2.55×1.6 | 4.08 kN/m |

v.b. verd

Balk 1

| Index | Omschrijving | Formule | Waarde |
|-------|-----------------|-------------------|-----------|
| q42 | v.b. verdieping | 2.25×1.6 | 3.60 kN/m |

Balk 2

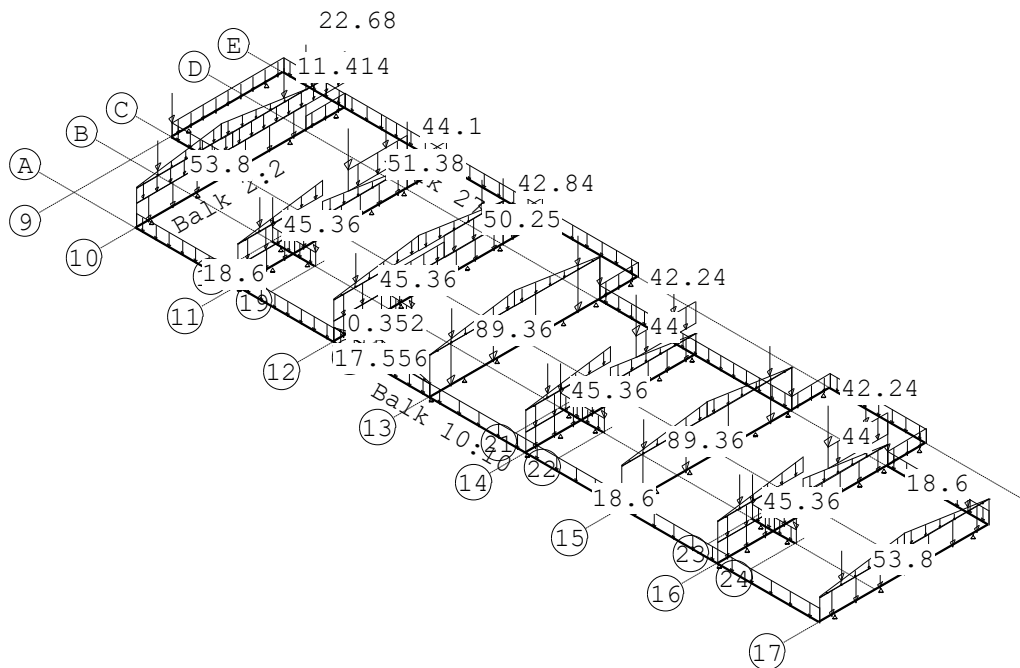
| Index | Omschrijving | Formule | Waarde |
|-------|-----------------|-------------------|-----------|
| q23 | v.b. verdieping | 2.55×2.5 | 6.38 kN/m |
| q44 | v.b. verdieping | 2.25×1.6 | 3.60 kN/m |



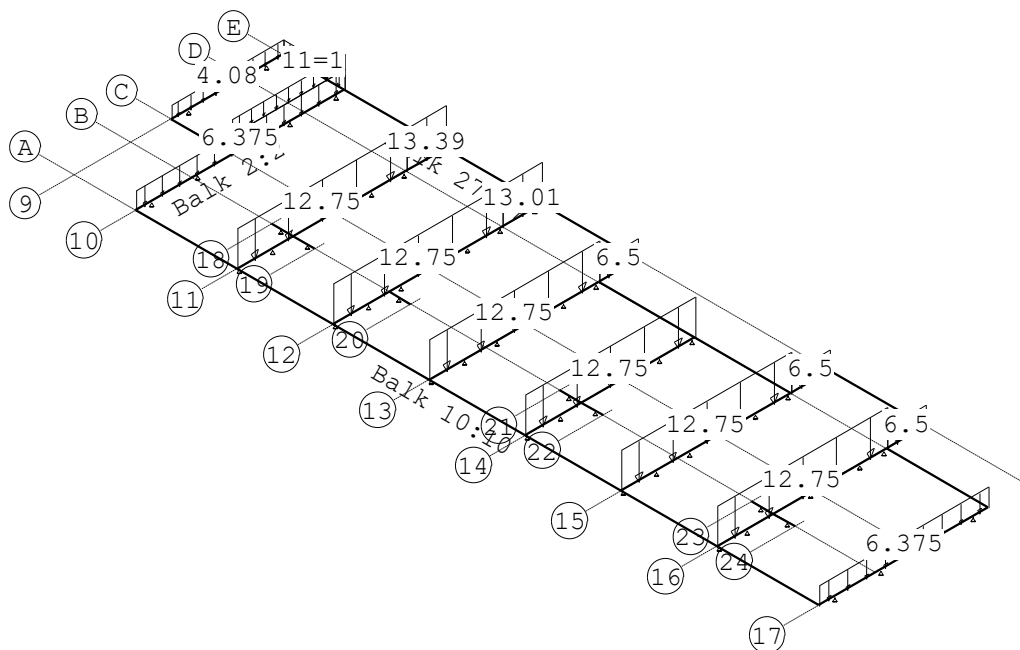
Project.....: Nieuwbouw 47 rijwoningen Beukenlaan/Kerklaan te Leimuiden
Onderdeel.....: Berekening staalconstructie & fundering - balkrooster_bnr_1_tm_7

VELDBELASTINGEN

B.G:1 Permanent

**VELDBELASTINGEN**

B.G:2 v.b. beggr

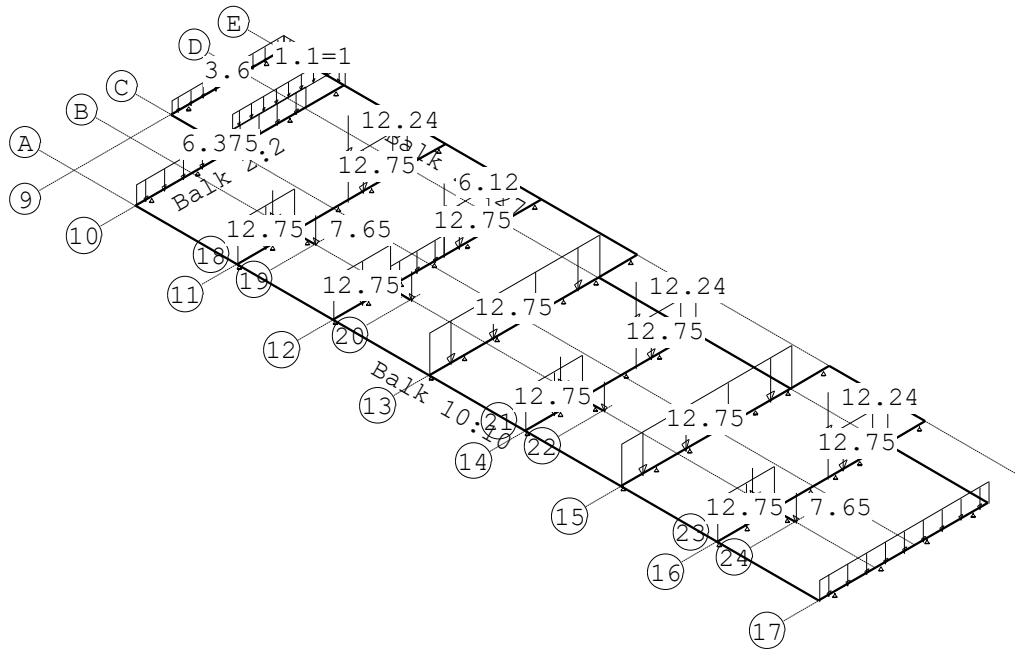




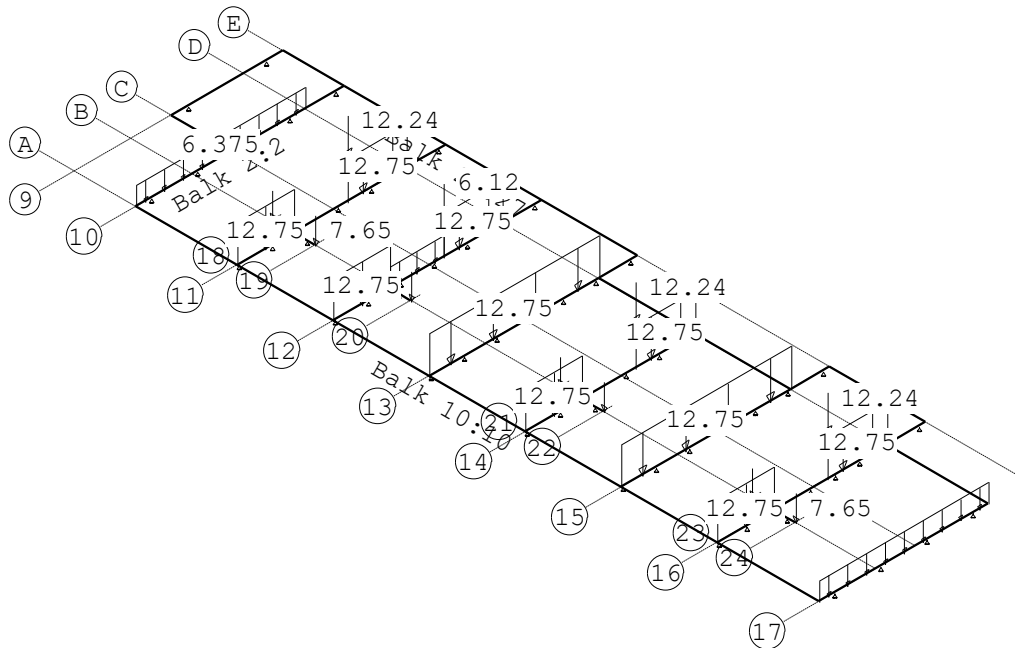
Project.....: Nieuwbouw 47 rijwoningen Beukenlaan/Kerklaan te Leimuiden
Onderdeel.....: Berekening staalconstructie & fundering - balkrooster_bnr_1_tm_7

VELDBELASTINGEN

B.G:3 v.b. verd

**VELDBELASTINGEN**

B.G:4 v.b. zolder



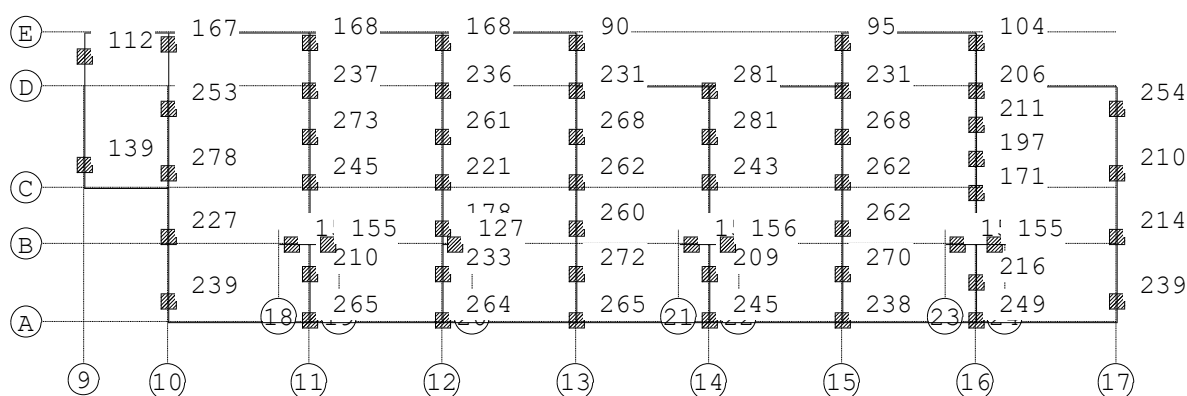


BELASTINGCOMBINATIES

| BC Type | BG | Gen. | Factor | BG | Gen. | Factor | BG | Gen. | Factor | BG | Gen. | Factor |
|----------|----|------|--------|----|------|--------|----|------|--------|----|------|--------|
| 1 Fund. | 1 | Perm | 1.15 | 2 | psi0 | 1.10 | 3 | psi0 | 1.10 | 4 | psi0 | 1.10 |
| 2 Fund. | 1 | Perm | 1.05 | 2 | Extr | 1.10 | 3 | Extr | 1.10 | 4 | psi0 | 1.10 |
| 3 Fund. | 1 | Perm | 1.05 | 2 | Extr | 1.10 | 3 | psi0 | 1.10 | 4 | Extr | 1.10 |
| 4 Fund. | 1 | Perm | 1.05 | 2 | psi0 | 1.10 | 3 | Extr | 1.10 | 4 | Extr | 1.10 |
| 5 Kar. | 1 | Perm | 1.00 | 2 | Extr | 1.00 | 3 | Extr | 1.00 | 4 | psi0 | 1.00 |
| 6 Kar. | 1 | Perm | 1.00 | 2 | Extr | 1.00 | 3 | psi0 | 1.00 | 4 | Extr | 1.00 |
| 7 Kar. | 1 | Perm | 1.00 | 2 | psi0 | 1.00 | 3 | Extr | 1.00 | 4 | Extr | 1.00 |
| 8 Freq. | 1 | Perm | 1.00 | 2 | psi1 | 1.00 | 3 | psi1 | 1.00 | 4 | psi1 | 1.00 |
| 9 Quas. | 1 | Perm | 1.00 | 2 | psi2 | 1.00 | 3 | psi2 | 1.00 | 4 | psi2 | 1.00 |
| 10 Blij. | 1 | Perm | 1.00 | | | | | | | | | |

REACTIES Fysisch lineair

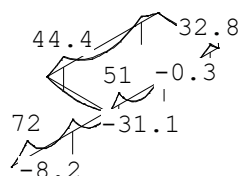
B.C:2 Fundamenteel B (6.10b)



OMHULLENDE VAN DE FUNDAMENTELE COMBINATIES

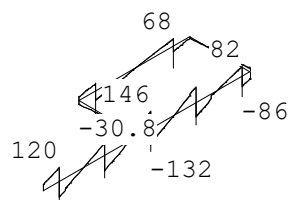
MOMENTEN Fysisch lineair

Fundamentele combinatie



DWARSKRACHTEN Fysisch lineair

Fundamentele combinatie



**PROFIELGEGEVENS Balk****[N] [mm]**

t.b.v. profiel:1 B*H 350*400

Algemeen

Materiaal : C20/25

Doorsnede

breedte : 350 hoogte : 400 zwaartepunt tov onderkant : 200

Fictieve dikte : 186.7

Betonkwaliteit element : C20/25 Kruipcoëf. : 3.010

Staalkwaliteit hoofdwapening : 500 $E_{u,k}$: 5.00

Staalkwaliteit beugels : 500

Betondekking

Milieu : Boven Onder

Hoofdwapening : 2de laag 2de laag

Nominale dekking : 30 30

Toegepaste dekking : 43 43

Toegepaste zijdekking : 48

Beugel / Verdeelwapening : 1ste laag 1ste laag

Nominale dekking : 30 30

Toegepaste dekking : 35 35

Toegepaste zijdekking : 40

Wapening

Basiswapening buitenste laag : 4x10 4x10

H.o.h.afstand 2e laag : 0 0

Beugels

Beugeldiameter : 8

Min. hoek betondrukdiagonaal θ : 21.8 z berekenen via: MRd**PROFIELGEGEVENS Balk****[N] [mm]**

t.b.v. profiel:2 B*H 400*400

Algemeen

Materiaal : C20/25

Doorsnede

breedte : 400 hoogte : 400 zwaartepunt tov onderkant : 200

Fictieve dikte : 200.0

Betonkwaliteit element : C20/25 Kruipcoëf. : 3.010

Staalkwaliteit hoofdwapening : 500 $E_{u,k}$: 5.00

Staalkwaliteit beugels : 500

Betondekking

Milieu : Boven Onder

Hoofdwapening : 2de laag 2de laag

Nominale dekking : 30 30

Toegepaste dekking : 43 43

Toegepaste zijdekking : 48

Beugel / Verdeelwapening : 1ste laag 1ste laag

Nominale dekking : 30 30

Toegepaste dekking : 35 35

Toegepaste zijdekking : 40

Wapening

Basiswapening buitenste laag : 5x12 5x10

H.o.h.afstand 2e laag : 0 0

Beugels

Beugeldiameter : 8

Min. hoek betondrukdiagonaal θ : 21.8 z berekenen via: MRd**Hoofdwapening**

Balk 1:1

| Geb. | Pos. [mm] | $M_{E,d}$ [kNm] | $M_{R,d}$ [kNm] | z B/O [mm] | A_b [mm ²] | A_a [mm ²] | Basiswapening +Bijlegwapening | Opm. |
|------|--------------|--------------------|--------------------|---------------|-----------------------------|-----------------------------|----------------------------------|------|
| 1 | S1-0 | 44.44 | 58.05 | 340 Bov | 301 | 315 | 4x10 | 2 |
| 2 | S1+0 | 44.44 | 58.73 | 327 Bov | 289 | 315 | 4x10 | |
| 3 | S2-1959 | -40.16 | -48.01 | 292 Ond | 259 | 315 | 4x10 | |
| 4 | S2-0 | 26.30 | 48.01 | 292 Bov | 165 | 315 | 4x10 | |
| 5 | S2+0 | 26.30 | 46.44 | 339 Bov | 178 | 315 | 4x10 | 2 |

Opmerkingen

[2] Benodigde wapening en inwendige hefboomsarm zijn bepaald volgens gedrongen ligger detaillering, zie nationale bijlage art. 6.1(10).

**Scheurvorming volgens artikel 7.3.3**

Balk 1:1

| Geb. | Pos. | $M_{E;freq}$ | B/O | σ_s | art. | s | s | \emptyset_{km} | \emptyset_{km} | σ_b | σ_b | Opm. |
|------|---------|--------------|-----|----------------------|-------|------|------|------------------|------------------|----------------------|----------------------|------|
| | [mm] | [kNm] | | [N/mm ²] | | opt. | max. | opt. | max. | opt. | max. | |
| | | | | | | [mm] | [mm] | [mm] | [mm] | [N/mm ²] | [N/mm ²] | |
| 1 | S1+0 | 39.05 | Bov | 301.9 | 7.3.3 | 61 | 148 | 10.0 | 7.9 | | | |
| 2 | S1+0 | 39.05 | Bov | 301.9 | 7.3.3 | 61 | 148 | 10.0 | 7.9 | | | |
| 3 | S2-1959 | -31.84 | Ond | 305.7 | 7.3.3 | 82 | 143 | 10.0 | 7.7 | | | |
| 4 | S2+0 | 21.75 | Bov | 208.8 | 7.3.3 | 82 | 264 | 10.0 | 16.6 | | | |
| 5 | S2+0 | 21.75 | Bov | 208.8 | 7.3.3 | 82 | 264 | 10.0 | 16.6 | | | |

Wring- en dwarskrachtwapening

Balk 1:1

| Geb. | Vanaf | Tot | Beugels | Lengte | <Wringing> | | <Dwarskr.> | | | | Opm. |
|------|---------|---------|---------|--------|--------------------|----------------------|--------------------|-----------|----------|----------|------|
| | [mm] | [mm] | | [mm] | A_{lang} | A_{bg1} | A_{bg1} | A_{opg} | V_{Ed} | T_{Ed} | |
| | | | | | [mm ²] | [mm ² /m] | [mm ²] | | [kN] | [kNm] | |
| 1 | S1-900 | S1-600 | Ø8-250 | 300 | 11 | 2 | 250 | 0 | 44.4 | 0 | 58 |
| 2 | S1-600 | S1+0 | Ø8-250 | 600 | 11 | 2 | 250 | 0 | 63.6 | 0 | 6,58 |
| 3 | S1+0 | S1+1175 | Ø8-250 | 1175 | 11 | 2 | 250 | 0 | 75.8 | 0 | 6 |
| 4 | S1+1175 | S2-875 | Ø8-300 | 2100 | 0 | 0 | 250 | 0 | 37.4 | 0 | |
| 5 | S2-875 | S2+0 | Ø8-250 | 875 | 11 | 2 | 250 | 0 | 67.7 | 0 | 6 |
| 6 | S2+0 | S2+300 | Ø8-250 | 300 | 11 | 2 | 250 | 0 | 44.3 | 0 | 58 |
| 7 | S2+300 | S2+900 | Ø8-300 | 600 | 0 | 0 | 250 | 0 | 33.9 | 0 | 58 |

Opmerkingen

[6] 9.2.2 (4) 50% van de dwarskrachtwapening moet uit beugels bestaan.

[58] 6.2.3: Z is berekend m.b.v. 0.9d

Hoofdwapening

Balk 2:2

| Geb. | Pos. | M_{Ed} | M_{Rd} | z | B/O | A_b | A_a | Basiswapening | Opm. |
|------|---------|----------|----------|------|-----|--------------------|--------------------|-----------------|------|
| | [mm] | [kNm] | [kNm] | [mm] | | [mm ²] | [mm ²] | +Bijlegwapening | |
| 1 | S3-825 | -0.52 | -55.49 | 325 | Ond | 132* | 393 | 5x10 | 2,54 |
| 2 | S3-0 | 71.52 | 79.91 | 325 | Bov | 507 | 566 | 5x12 | 2 |
| 3 | S3+0 | 71.52 | 82.62 | 326 | Bov | 484 | 566 | 5x12 | |
| 4 | S4-1148 | -8.23 | -59.49 | 297 | Ond | 132* | 393 | 5x10 | 54 |
| 5 | S4+0 | 50.73 | 82.62 | 326 | Bov | 331 | 566 | 5x12 | |
| 6 | S5-1132 | -32.36 | -59.49 | 297 | Ond | 203 | 393 | 5x10 | |
| 7 | S5+0 | 50.59 | 82.62 | 326 | Bov | 330 | 566 | 5x12 | |
| 8 | S6-1200 | -31.06 | -59.49 | 297 | Ond | 195 | 393 | 5x10 | |
| 9 | S6+0 | 45.73 | 82.62 | 326 | Bov | 295 | 566 | 5x12 | |
| 10 | S6+1106 | -22.99 | -59.49 | 297 | Ond | 178* | 393 | 5x10 | 1 |
| 11 | S7-0 | 32.83 | 82.62 | 326 | Bov | 207 | 566 | 5x12 | |
| 12 | S7+0 | 32.83 | 61.47 | 250 | Bov | 303 | 566 | 5x12 | 2 |
| 13 | S7+450 | -0.28 | -42.68 | 250 | Ond | 132* | 393 | 5x10 | 2,54 |

Opmerkingen

[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).

[2] Benodigde wapening en inwendige hefboomsarm zijn bepaald volgens gedrongen ligger detaillering, zie nationale bijlage art. 6.1(10).

[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.3

Balk 2:2

| Geb. | Pos. | $M_{E;freq}$ | B/O | σ_s | art. | s | s | \emptyset_{km} | \emptyset_{km} | σ_b | σ_b | Opm. |
|------|---------|--------------|-----|----------------------|-------|------|------|------------------|------------------|----------------------|----------------------|------|
| | [mm] | [kNm] | | [N/mm ²] | | opt. | max. | opt. | max. | opt. | max. | |
| | | | | | | [mm] | [mm] | [mm] | [mm] | [N/mm ²] | [N/mm ²] | |
| 1 | S3-825 | -0.46 | Ond | 3.6 | 7.3.3 | 74 | 300 | 10.0 | 22.9 | | | |
| 2 | S3+0 | 62.94 | Bov | 341.4 | 7.3.3 | 73 | 98 | 12.0 | 6.2 | | | |
| 3 | S3+0 | 62.94 | Bov | 341.4 | 7.3.3 | 73 | 98 | 12.0 | 6.2 | | | |
| 4 | S4-1148 | -5.83 | Ond | 44.9 | 7.3.3 | 74 | 300 | 10.0 | 22.9 | | | |
| 5 | S4+0 | 44.61 | Bov | 241.9 | 7.3.3 | 73 | 223 | 12.0 | 11.1 | | | |
| 6 | S5-1132 | -28.61 | Ond | 220.5 | 7.3.3 | 74 | 249 | 10.0 | 14.7 | | | |
| 7 | S5+0 | 43.96 | Bov | 238.4 | 7.3.3 | 73 | 227 | 12.0 | 11.5 | | | |
| 8 | S6-1200 | -25.88 | Ond | 199.5 | 7.3.3 | 74 | 275 | 10.0 | 18.2 | | | |
| 9 | S6+0 | 39.17 | Bov | 212.4 | 7.3.3 | 73 | 259 | 12.0 | 15.7 | | | |
| 10 | S6+1106 | -18.73 | Ond | 144.3 | 7.3.3 | 74 | 300 | 10.0 | 22.9 | | | |
| 11 | S7+0 | 28.89 | Bov | 156.7 | 7.3.3 | 73 | 300 | 12.0 | 22.4 | | | |
| 12 | S7+0 | 28.89 | Bov | 156.7 | 7.3.3 | 73 | 300 | 12.0 | 22.4 | | | |
| 13 | S7+450 | -0.23 | Ond | 1.8 | 7.3.3 | 74 | 300 | 10.0 | 22.9 | | | |

**Wring- en dwarskrachtwapening**

Balk 2:2

| Geb. | Vanaf | Tot | Beugels | Lengte | <Wringing> | | <Dwarskr.> | | V_{Ed} [kN] | T_{Ed} [kNm] | Opm. |
|------|---------|---------|-------------|--------|----------------------------------|-----------------------------------|---------------------------------|---------------------------------|------------------|-------------------|--------|
| | [mm] | [mm] | | [mm] | A_{lang} [mm ²] | A_{bgl} [mm ² /m] | A_{bgl} [mm ²] | A_{opg} [mm ²] | | | |
| 1 | S3-825 | S3+0 | Ø8-250 (3s) | 825 | 61 | 8 | 348 | 0 | 119.6 | 2 | 6,8,58 |
| 2 | S3+0 | S3+775 | Ø8-250 (3s) | 775 | 61 | 8 | 345 | 0 | 122.5 | 2 | 6,8 |
| 3 | S3+775 | S4-775 | Ø8-300 (3s) | 900 | 0 | 0 | 286 | 0 | 45.9 | 2 | 8 |
| 4 | S4-775 | S4+0 | Ø8-250 (3s) | 775 | 61 | 8 | 290 | 0 | 102.9 | 2 | 6,8 |
| 5 | S4+0 | S4+775 | Ø8-250 (3s) | 775 | 61 | 8 | 349 | 0 | 123.8 | 2 | 6,8 |
| 6 | S4+775 | S4+1075 | Ø8-250 (3s) | 300 | 61 | 8 | 286 | 0 | 51.5 | 2 | 8 |
| 7 | S4+1075 | S5-775 | Ø8-300 (3s) | 600 | 0 | 0 | 286 | 0 | 34.8 | 2 | 8 |
| 8 | S5-775 | S5+0 | Ø8-250 (3s) | 775 | 61 | 8 | 411 | 0 | 145.8 | 2 | 6,8 |
| 9 | S5+0 | S5+775 | Ø8-250 (3s) | 775 | 15 | 2 | 370 | 0 | 131.4 | 0 | 6,8 |
| 10 | S5+775 | S6-775 | Ø8-300 (3s) | 900 | 0 | 0 | 286 | 0 | 49.0 | 0 | 8 |
| 11 | S6-775 | S6+0 | Ø8-250 (3s) | 775 | 15 | 2 | 373 | 0 | 132.2 | 0 | 6,8 |
| 12 | S6+0 | S6+775 | Ø8-250 (3s) | 775 | 15 | 2 | 338 | 0 | 120.1 | 0 | 6,8 |
| 13 | S6+775 | S7-775 | Ø8-300 (3s) | 900 | 0 | 0 | 286 | 0 | 45.3 | 0 | 8 |
| 14 | S7-775 | S7+0 | Ø8-250 (3s) | 775 | 15 | 2 | 286 | 0 | 81.6 | 0 | 6,8 |
| 15 | S7+0 | S7+450 | Ø8-250 (3s) | 450 | 15 | 2 | 316 | 0 | 86.0 | 0 | 6,8,59 |

Opmerkingen

[6] 9.2.2 (4) 50% van de dwarskrachtwapening moet uit beugels bestaan.

[8] Er zijn meer dan 2 beugelsneden per doorsnede toegepast.

[58] 6.2.3: Z is berekend m.b.v. 0.9d

[59] 6.2.3: Z is berekend m.b.v. de gedrongen ligger berekening art 6.1 (10)

Hoofdwapening

Balk 18:18

| Geb. | Pos. | M_{Ed} [kNm] | M_{Rd} [kNm] | z B/O [mm] | A_b [mm ²] | A_a [mm ²] | Basiswapening +Bijlegwapening | Opm. |
|------|------|-------------------|-------------------|---------------|-----------------------------|-----------------------------|----------------------------------|------|
| 1 | 0 | 0.25 | 48.01 | 292 Bov | 120* | 315 | 4x10 | 54 |
| 2 | 1585 | -24.15 | -48.01 | 292 Ond | 156* | 315 | 4x10 | 1 |
| 3 | 3225 | 1.99 | 48.01 | 292 Bov | 120* | 315 | 4x10 | 54 |

Opmerkingen

[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).

[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.

Scheurvorming volgens artikel 7.3.3

Balk 18:18

| Geb. | Pos. | $M_{E, freq}$ [kNm] | B/O | σ_s [N/mm ²] | art. | s [mm] | s opt. | σ_{km} [mm] | σ_{km} opt. | σ_b [N/mm ²] | σ_b opt. | Opm. |
|------|------|------------------------|-----|------------------------------------|-------|-----------|-----------|-----------------------|-----------------------|------------------------------------|--------------------|------|
| | [mm] | | | | | | max. | | max. | | | |
| 1 | 0 | 0.22 | Bov | 2.1 | 7.3.3 | 82 | 300 | 10.0 | 22.9 | | | |
| 2 | 1585 | -21.01 | Ond | 201.7 | 7.3.3 | 82 | 273 | 10.0 | 17.8 | | | |
| 3 | 3225 | 1.70 | Bov | 16.4 | 7.3.3 | 82 | 300 | 10.0 | 22.9 | | | |

Wring- en dwarskrachtwapening

Balk 18:18

| Geb. | Vanaf | Tot | Beugels | Lengte | <Wringing> | | <Dwarskr.> | | V_{Ed} [kN] | T_{Ed} [kNm] | Opm. |
|------|-------|------|---------|--------|----------------------------------|-----------------------------------|---------------------------------|---------------------------------|------------------|-------------------|------|
| | [mm] | [mm] | | [mm] | A_{lang} [mm ²] | A_{bgl} [mm ² /m] | A_{bgl} [mm ²] | A_{opg} [mm ²] | | | |
| 1 | 0 | 3225 | Ø8-300 | 3225 | 0 | 0 | 250 | 0 | 31.8 | 0 | |

Hoofdwapening

Balk 20:20

| Geb. | Pos. | M_{Ed} [kNm] | M_{Rd} [kNm] | z B/O [mm] | A_b [mm ²] | A_a [mm ²] | Basiswapening +Bijlegwapening | Opm. |
|------|------|-------------------|-------------------|---------------|-----------------------------|-----------------------------|----------------------------------|------|
| 1 | 1087 | -7.43 | -48.01 | 292 Ond | 120* | 315 | 4x10 | 54 |
| 2 | 3225 | 22.22 | 48.01 | 292 Bov | 156* | 315 | 4x10 | 1 |

Opmerkingen

[1] * = Eisen met betrekking tot minimum wapening zijn toegepast, zie nationale bijlage art. 9.2.1.1(1).

[54] * = Eisen met betrekking tot minimum wapening ten behoeve van gecontroleerde scheurvorming zijn toegepast volgens art. 7.3.2.



Scheurvorming volgens artikel 7.3.3

Balk 20:20

| Geb. | Pos. | $M_{E, \text{freq}}$ | B/O | σ_s | art. | s | s | \emptyset_{km} | \emptyset_{km} | σ_b | σ_b | Opm. |
|------|------|----------------------|-----|----------------------|-------|------|------|------------------|------------------|----------------------|----------------------|------|
| | [mm] | [kNm] | | [N/mm ²] | | opt. | max. | opt. | max. | opt. | max. | |
| | | | | | | [mm] | [mm] | [mm] | [mm] | [N/mm ²] | [N/mm ²] | |
| 1 | 1087 | -5.83 | Ond | 56.0 | 7.3.3 | 82 | 300 | 10.0 | 22.9 | | | |
| 2 | 3225 | 19.35 | Bov | 185.7 | 7.3.3 | 82 | 284 | 10.0 | 19.8 | | | |

Wring- en dwarskrachtwapening

Balk 20:20

| Geb. | Vanaf | Tot | Beugels | Lengte | <Wringing> | | | | <Dwarskr.> | | | |
|------|-------|------|---------|--------|--------------------|----------------------|--------------------|--------------------|------------|----------|------|--|
| | [mm] | [mm] | | [mm] | A_{lang} | A_{bg1} | A_{bg1} | A_{opg} | V_{Ed} | T_{Ed} | Opm. | |
| | | | | | [mm ²] | [mm ² /m] | [mm ²] | [mm ²] | [kN] | [kNm] | | |
| 1 | 0 | 3225 | Ø8-300 | 3225 | 0 | 0 | 250 | 0 | 26.0 | 0 | | |

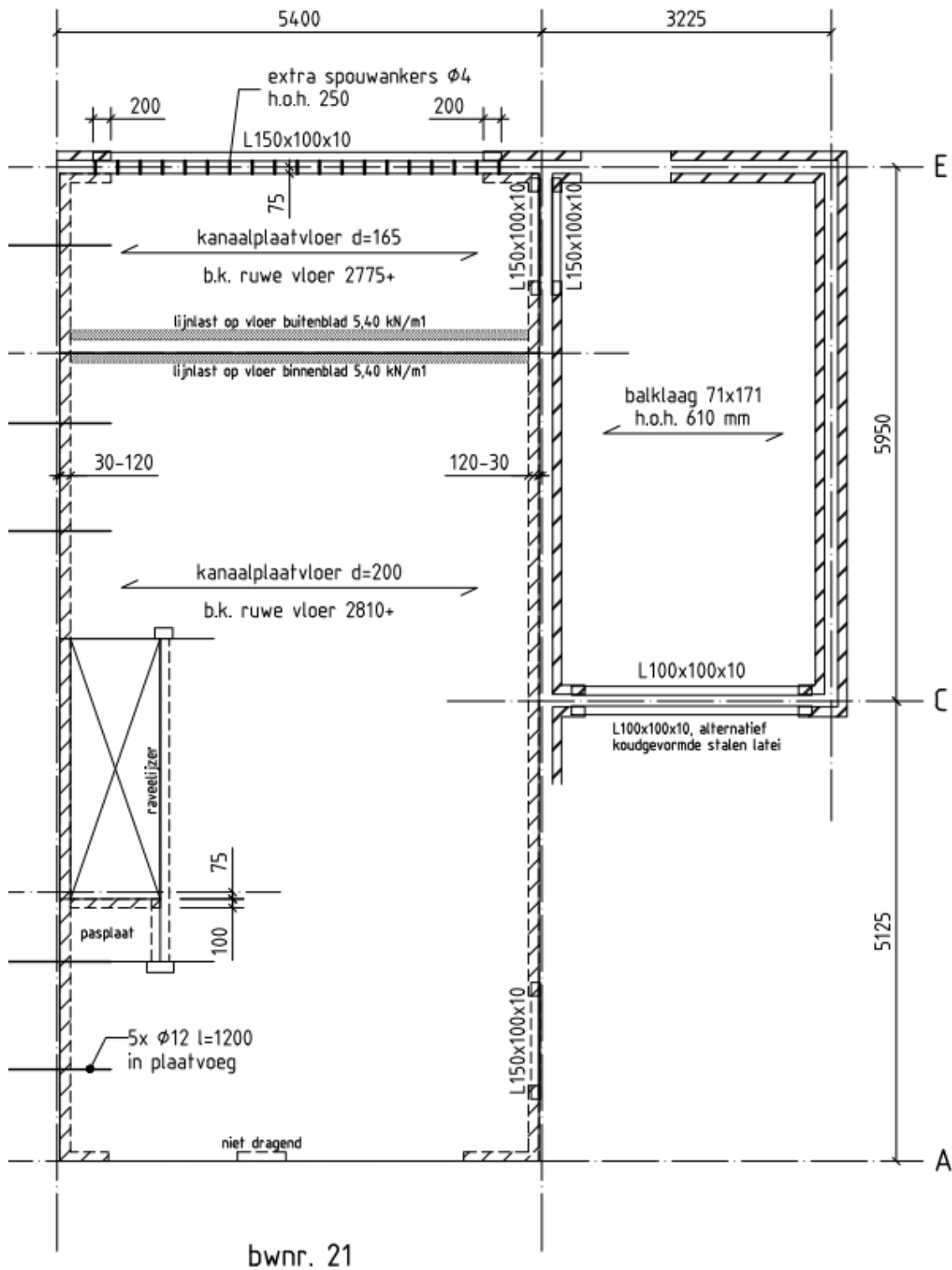
5.3 conclusie

De bestaande balklaag van het garage dak voldoet.

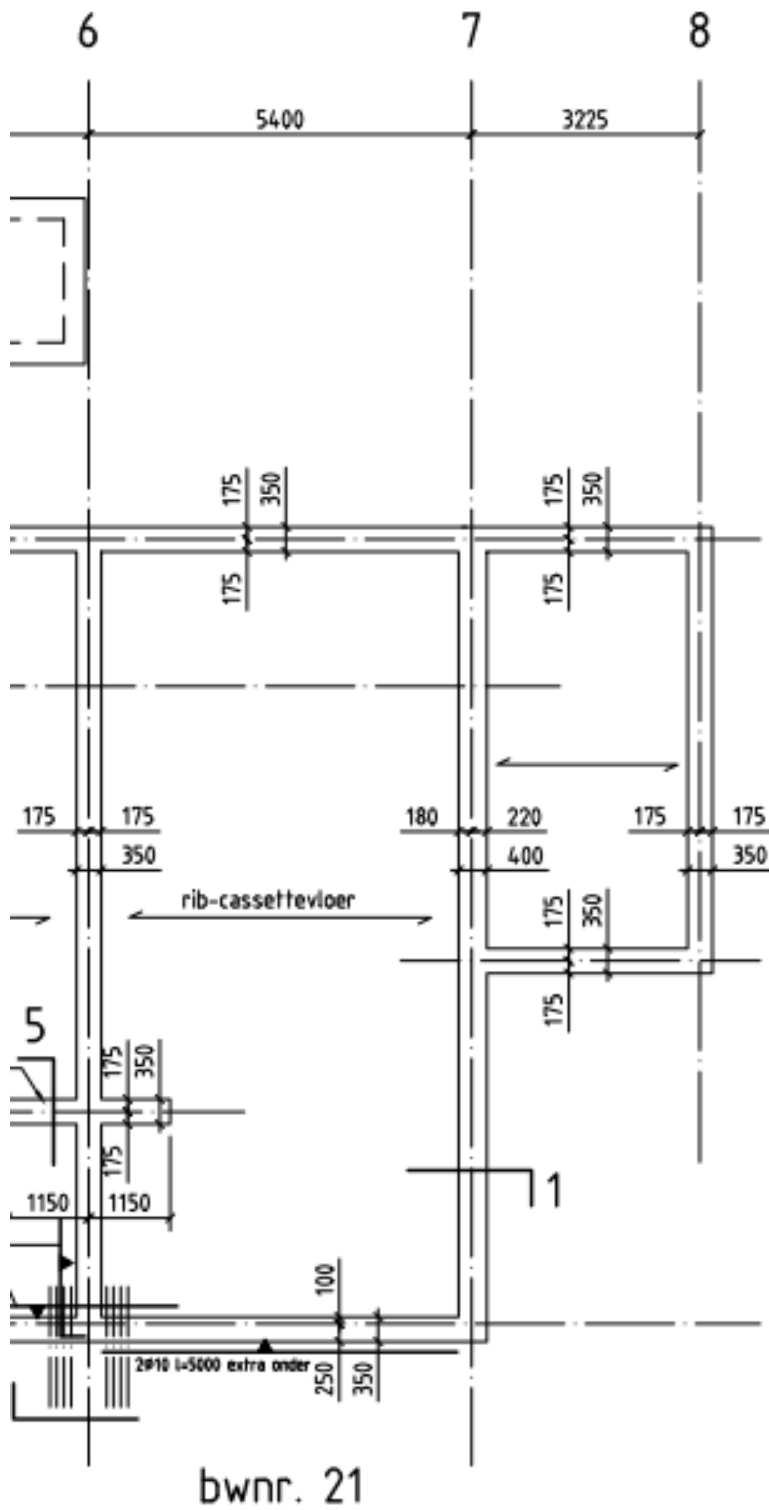
De bestaande fundering voldoet.

6. Bijlage

6.1 bestaande verdiepingsvloer tekening



6.2 bestaande fundering

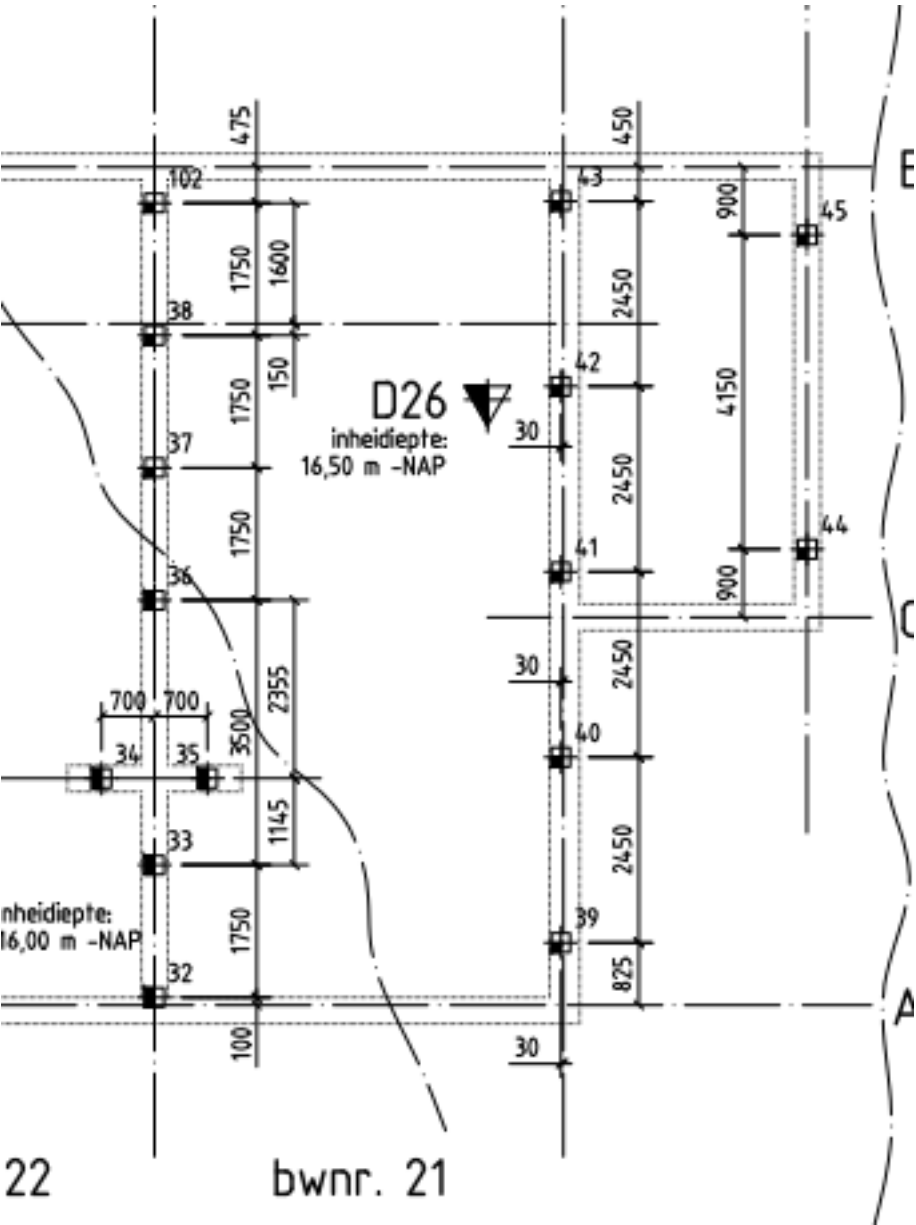




| balkwapening | | | |
|---|-------------------------|--------------------------|--------------|
| balk | onder | boven | beugels |
| balk as 1 | 5 ϕ 10 | 3 ϕ 12+2 ϕ 16 | ϕ 8-250 |
| balk as 2+16 b=350 | 4 ϕ 10 | 2 ϕ 10+2 ϕ 12* | ϕ 8-250 |
| balk as 2+16 b=400 | 5 ϕ 10 | 5 ϕ 10 | ϕ 8-250 |
| balk as 3+5+13+15 b=350 | 4 ϕ 10 | 4 ϕ 10* | ϕ 8-250 |
| balk as 3+5+13+15 b=400 | 5 ϕ 10 | 5 ϕ 10 | ϕ 8-250 |
| balk as 4 | 4 ϕ 10 | 2 ϕ 10+2 ϕ 12* | ϕ 8-250 |
| balk as 6+11 | 4 ϕ 10 | 2 ϕ 10+2 ϕ 12* | ϕ 8-250 |
| balk as 7+10 | 5 ϕ 10 | 5 ϕ 12 | ϕ 8-250 |
| balk as 12 | 4 ϕ 10 | 2 ϕ 10+2 ϕ 12* | ϕ 8-250 |
| balk as 14 b=350 | 4 ϕ 10 | 2 ϕ 10+2 ϕ 12* | ϕ 8-250 |
| balk as 14 b=400 | 5 ϕ 10 | 5 ϕ 10 | ϕ 8-250 |
| balk as 17 | 5 ϕ 10 | 3 ϕ 10+2 ϕ 12 | ϕ 8-250 |
| balk as A b=350 | 4 ϕ 10* | 4 ϕ 12* | ϕ 8-250 |
| balk as A b=460 | 4 ϕ 10+1 ϕ 10 | 4 ϕ 12+1 ϕ 10* | ϕ 8-250 |
| balk as B | 4 ϕ 12 | 4 ϕ 10 | ϕ 8-250 |
| balk as D | 4 ϕ 10* | 4 ϕ 12* | ϕ 8-250 |
| overige balken | 4 ϕ 10 | 4 ϕ 10 | ϕ 8-250 |
| * voor extra bijlegwapening zie plattegrond | | | |
| Laslengte : | onder | boven | |
| ϕ 10 | 700 mm | 1000 mm | |
| ϕ 12 | 850 mm | 1200 mm | |
| ϕ 16 | 1150 mm | 1600 mm | |

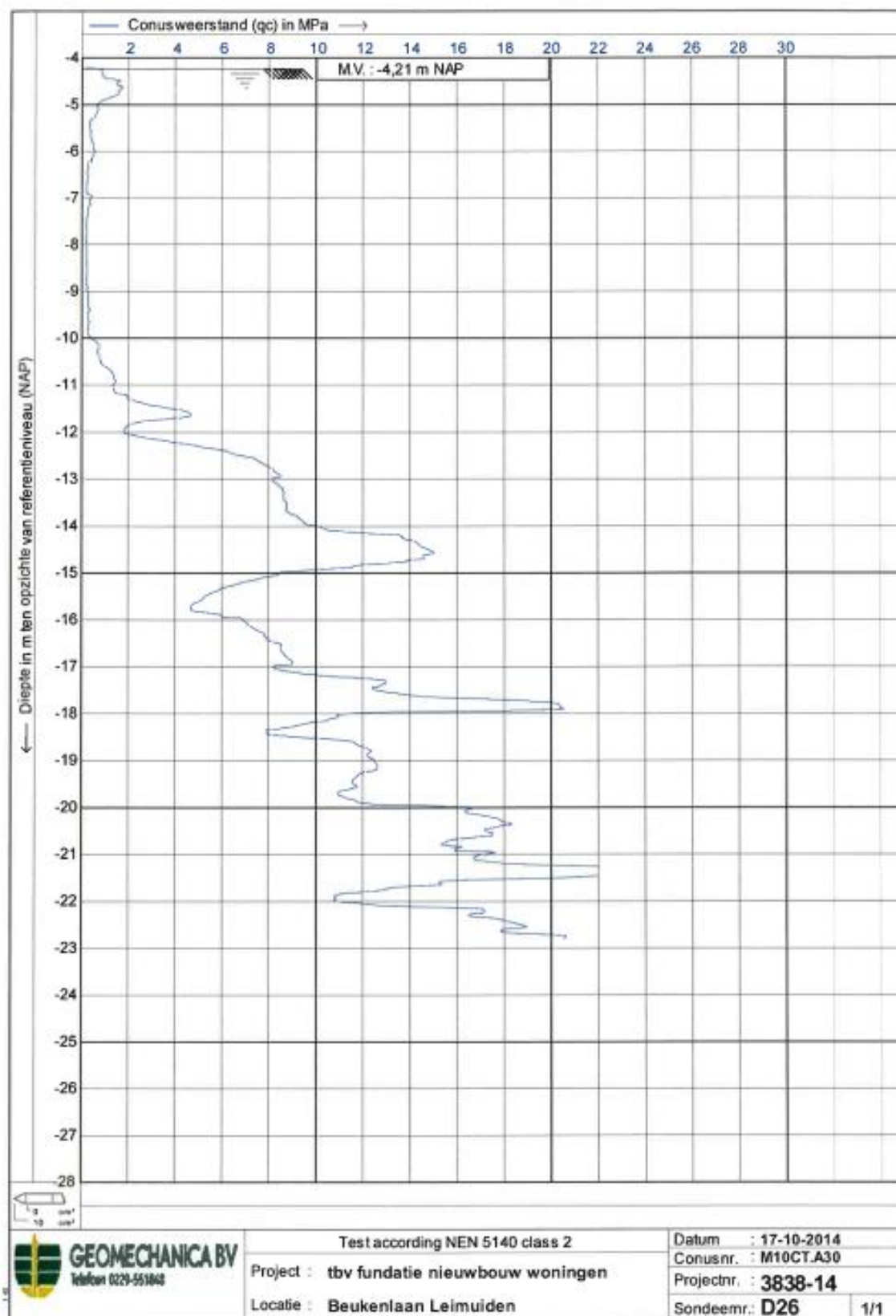


6.3 bestaand palenplan





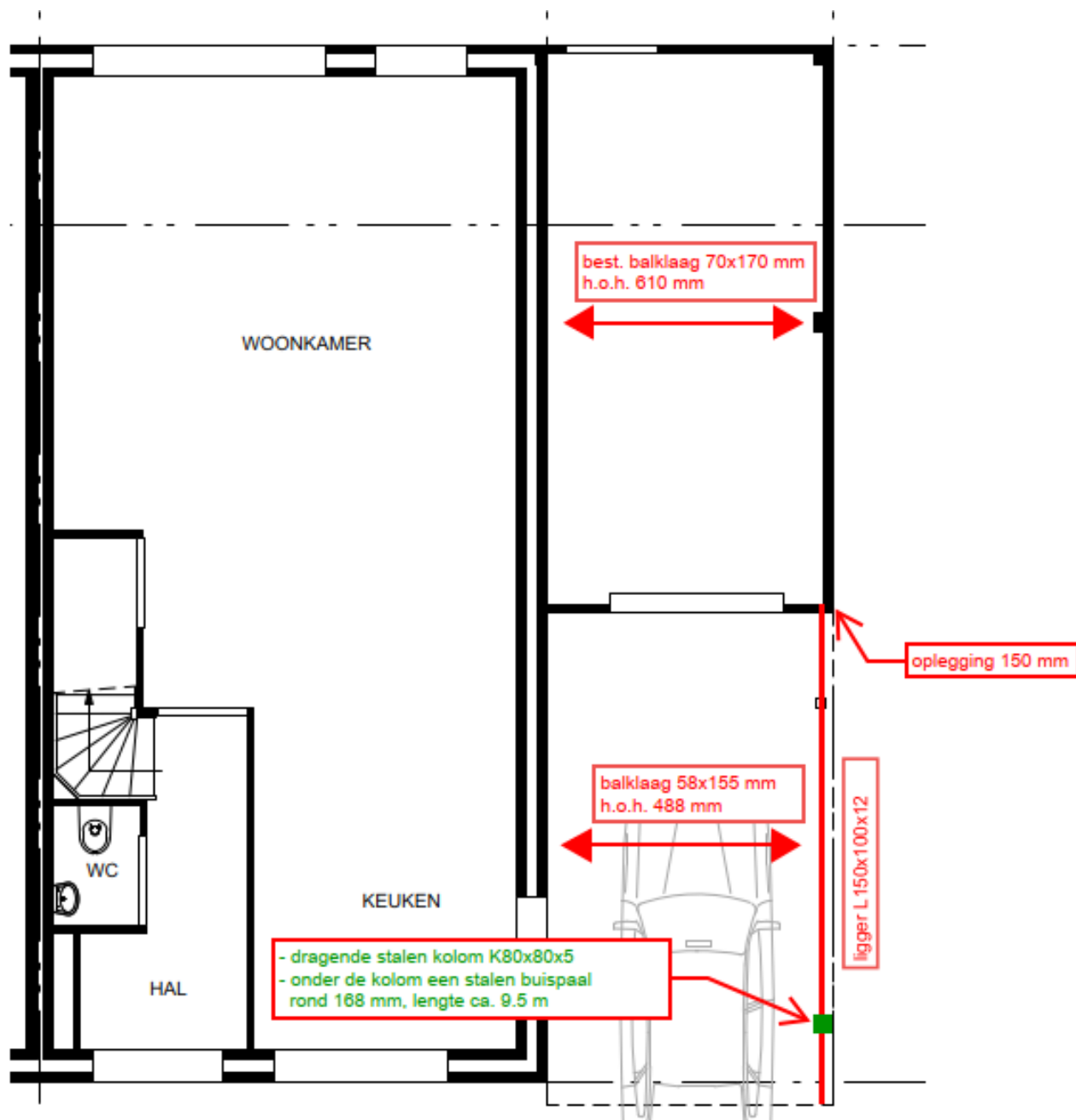
6.4 sondering

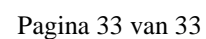




7. Schetsen

7.1 verdiepingsvloer / plat dak carport





Floor plan of the first floor (1e verdieping) showing the following rooms and dimensions:

- Slaapkamer 1:** Dimensions 2831 mm x 3491 mm.
- Slaapkamer 2:** Dimensions 2831 mm x 3491 mm.
- Werkkamer:** Dimensions 2831 mm x 3491 mm.
- Badkamer:** Dimensions 2831 mm x 3491 mm.
- Overloop:** Dimensions 2831 mm x 3491 mm.

Additional details and dimensions:

- Roof height: 1500 mm.
- Window specifications: 70x170 mm, h.o.h. 1100 mm.
- Wall specifications: L150x100x10 oplegging 150 mm.
- Door specifications: L100x100x10 oplegging 150 mm.