

**GAUTENG DEPARTMENT OF EDUCATION /
GAUTENGSE DEPARTEMENT VAN ONDERWYS**
SENIOR CERTIFICATE EXAMINATION / SENIORSERTIFIKAAT-EKSAMEN

**BUILDING CONSTRUCTION SG/
BOUKONSTRUKSIE SG**

SECTION A / AFDELING A

QUESTION / VRAAG 1

A	B	C	D
			Substructure centre line / Onderbou hartlyn
			[2 x 14 000] = [28 000] mm
			[2 x 8 000] = [16 000] mm
			[44 000] mm
			Minus [4 x 330] = [1 320] mm
			= [42 680] mm
			The centre line is / Die hartlyn is [42,68] mm
			Height of superstructure is 375 mm / Hoogte van bobou is 375 mm
			50 bricks per square metre for a half-brick wall / 50 stene per vierkante meter vir 'n halfsteenmuur
			There are [3] half-brick walls Daar is [3] halfsteenmure
1/	[42,68] [0,375] [16,005]	[16 005]	
[3 /]	[16,005] [50] [800,25]		[2 400,75] bricks are required [2 400,75] stene word benodig
			Superstructure centre line / Bobou hartlyn
			2 x 14 000 = 28 000 mm
			2 x 8 000 = 16 000 mm
			44 000 mm
			Minus [4 x 220] = [880] mm
			= [43 120] mm
			The centre line is / Die hartlyn is [43,12] mm
			Height of superstructure is [2 900] mm Hoogte van bobou is [2 900] mm
			50 bricks per square metre for a half-brick wall / 50 stene per vierkante meter vir 'n halfsteenmuur
			There are [2] half-brick walls Daar is [2] halfsteenmure
1/	[43,12] [2,9] [125,048]	[125,048]	
[2 /]	[125,048] [50] [625,24]		[12 504,8] bricks are required [12 504,8] stene word benodig

			Beam filling centre line/ Balkvulling hartlyn
			2 x 14 000 = 28 000 mm
			2 x 8 000 = 16 000 mm
			44 000 mm
			Minus [4 x 110] = [440] mm = [43 560] mm
			The centre line is / Die hartlyn is [43,56] mm
			Height of beam filling is 225 mm Hoogte van valkvulling is 225 mm
			50 bricks per square metre for a half-brick wall / 50 stene per vierkante meter vir 'n halfsteenmuur
			There are [] half-brick walls Daar is [] halfsteenmure
1/	[43,56] [0,225] [9,801]	[]	
1/	[9,801] [50] [490,05]		[490,05] bricks are required [490,05] stene word benodig
			Total for structure without deductions / Totaal vir struktuur sonder aftrekkings
			Substructure / Onderbou [2 400,75]
			Superstructure / Bobou [12 504,8]
			Beam filling / Balkvulling [490,05]
			[15 395,6] Bricks / Stene
			Deductions / Aftrekkings
			Doors / Deure
			[2] x 2 x 1
			50 bricks per square metre for a half-brick wall / 50 stene per vierkante meter vir 'n halfsteenmuur
			There are [2] half-brick walls Daar is [2] halfsteenmure
2/	[2] [1] [4]	[]	
[2/]	[4] [50] [200]		There are [400] bricks Daar is [400] stene

			Windows / Vensters
			[6] x 2 x 1,5
			50 bricks per square metre for a half-brick wall / 50 stene per vierkante meter vir 'n halfsteenmuur
			There are 2 half-brick walls / Daar is 2 halfsteenmure
[6 /]	[2] [1,5] [18]		
2/	[18] [50] [900]		There are [1 800] bricks Daar is [1 800] stene
			Total deductions / Totale aftrekkings
			Doors / Deure [400] Windows / Vensters [1 800] [2 200] Bricks / Stene
			Total bricks for structure / Totale hoeveelheid stene vir die struktuur
			Structure / Struktuur [15 395,6] Deductions / Aftrekkings [2 200] [13 195,6]
			Plus 6% wastage / vermorsing
			[13 195,6] [0,06] x [791,7] [13 195,6] [791,7] + [13 987,3]
			[13 988] bricks will be required for the structure [13 988] stene sal benodig word vir die struktuur

[60]

QUESTION / VRAAG 2

- 2.1 *
- * There must be no changes of direction under the building.
Die riool mag nie onder die gebou van rigting verander nie.
 - * An access opening should be installed on both sides where the sewer enters under the building, and at the point of exit.
'n Toegangsopening moet aan beide kante, waar die riool onder die gebou in- en uitgaan, aangebring word.
 - * No connections must be made under the building.
Geen aansluitings mag onder die gebou gemaak word nie.
 - * The sewer should be laid at least 50 mm from the foundation.
Die riool moet minstens 50 mm weg van die fondasie gelê wees.

* It is preferable to use heavy cast iron pipes.
By voorkeur moet van swaar gietysterrioolpype gebruik gemaak word.

* Where permission is granted to use earthen pipes, the whole sewer must be boxed.
Waar toestemming verleen is vir die gebruik van erderioolpype, moet die hele pyp in bekisting gelê wees.

ANY FIVE / ENIGE VYF 2X5=(10)

2.2 * All work on the sewerage system complies with the regulations.
Dat alle rioleringswerk aan die regulasies voldoen.

* Cleaning eyes should be installed at each branching off.
Steekoë moet by elke vertakking aangebring word.

* A ventilation pipe must be installed at the highest or furthest point of the system.
'n Ontlugpyp moet op die hoogste of verste punt van die stelsel geïnstalleer word.

* Drains must have the correct gradient.
Die riool moet die regte val hê.

* Must be laid straight from one point to the other.
Moet van punt tot punt reguit gelê wees.

* Stench traps must be installed where waste water enters the drain.
Stankafsluiters moet geïnstalleer word waar vuilwater die riool binnegaan.

* The whole system must be water- and airtight.
Die hele stelsel moet water- en lugdig wees.

* All drainpipes must be put on a solid concrete base, to prevent them from sagging or breaking.
Alle rioolpype moet op 'n soliede basis gelê word om te verhoed dat die pype breek of sak.

* The system must be of such a nature that all sewerage will flow away easily.
Die stelsel moet van so 'n aard wees dat die rioolvuil maklik weg sal vloei.

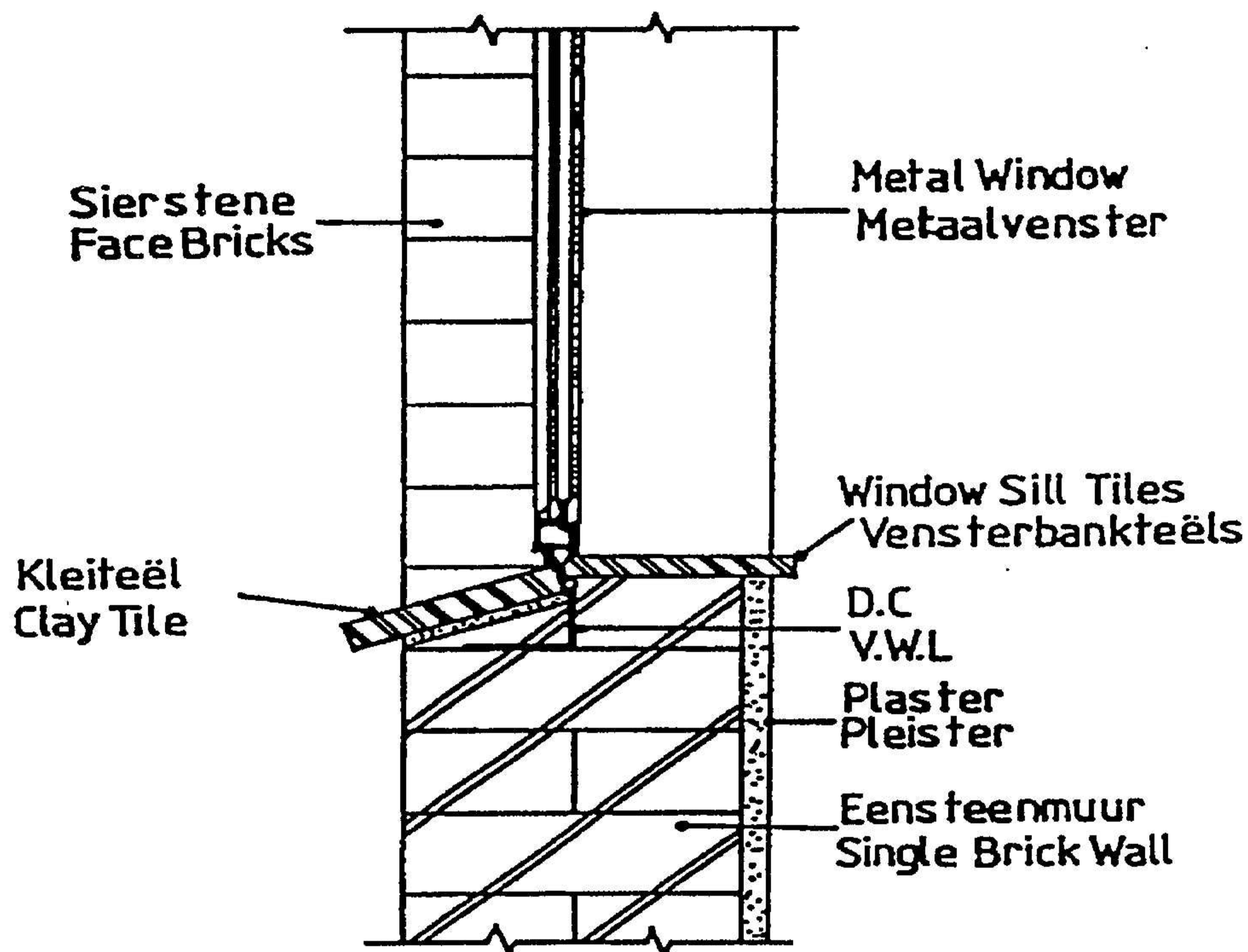
* Rather avoid laying drainpipes underneath a building. Where it is not possible, drainpipes must be placed in concrete.
Vermy waar moontlik, om rioolpype onder geboue te lê, indien onvermydelik, moet die rioolpype in beton geplaas word.

ANY FIVE / ENIGE VYF 2X5=(10)

- 2.3 *
- A solar collector must face north, at an angle of 35° to the horizontal. A minimum deviation of 15° and a maximum of 5° is permissible, i.e. the angle must not be less than 20° or more than 40°.
Die sonkollektor moet reg noord wys vanuit 'n hoek van 35° tot die horisontaal. 'n Afwyking van 15° minimum en 5° maksimum is toelaatbaar, d.w.s. die hoek moet nie kleiner as 20° en groter as 40° wees nie.
- * Install a solar collector and an electric storage cylinder which have been approved by the SABS.
Gebruik 'n sonkollektor en 'n opgaarsilinder wat deur die SABS goedgekeur is.
- * Insulate the circulation pipes in order to minimise loss of heat.
Isoleer die primêre sirkulasiepype om hitteverlies te voorkom.
- * Shadows and shade over the collector must be avoided, as this could seriously affect the performance of the system.
Maak seker dat die sonkollektor onder geen omstandighede in die skaduwee is nie, aangesien dit die werking kan belemmer.
- * The primary circulation pipes must be as short as practicable without badly decreasing the pressure head.
Die primêre sirkulasiepype moet so kort wees as prakties moontlik sonder om die drukhoogte te beïnvloed.
- * Cold water must be supplied to the system through a pressure-reducing valve.
Koue water moet deur 'n drukverminderingsklep na die sisteem vervoer word.
- * The glass of the solar collector must not be dirty.
Glaspaneel van die sonkollektor moet nie vuil wees nie.
- ANY FIVE / ENIGE VYF 2X5=(10)

2.4 Window sill construction of a metal window.
Vensterbankkonstruksie van metaalvenster.

One brick wall	2	<i>Eensteinmuur</i>
Plaster	2	<i>Pleister</i>
Damp course	2	<i>Vogweerlaag</i>
Window sill tiles	2	<i>Vensterbankteëls</i>
Clay tiles	2	<i>Kleiteëls</i>
Face bricks	2	<i>Sierstene</i>
Metal window	2	<i>Metaalvenster</i>
Labelling	2	<i>Byskrifte</i>
Linework	2	<i>Lynwerk</i>
Neatness	<u>2</u>	<i>Netheid</i>
	20	



(20)

2.5 Formwork / Bekisting

- * It must be strong enough to support the weight of the concrete.
Dit moet sterk genoeg wees om die massa van die nat beton te dra.
- * It should not bend to the weight of the concrete or any other load.
Dit behoort nie te buig onder die las van die nat beton of enige ander kragte wat daarop inwerk nie.
- * It must be erected accurately according to measurements, sizes and position as the concrete, when wet, is plastic and will take the shape of the formwork.
Dit moet akkuraat volgens maat, grootte en posisie aanmekaar getimmer word, aangesien die nat beton die vorm van die bekisting aanneem.
- * The joints must be leak-proof to keep the grout in.
Die laste moet lek-vry wees sodat die voegbry nie kan uitloop nie.
- * The formwork must be of a size to be erected easily by hand or a hoist.
Die grootte van die bekisting moet so wees om maklik met die hand of meganiese hystoerusting in posisie geplaas te word.

2x5=(10)
[60]

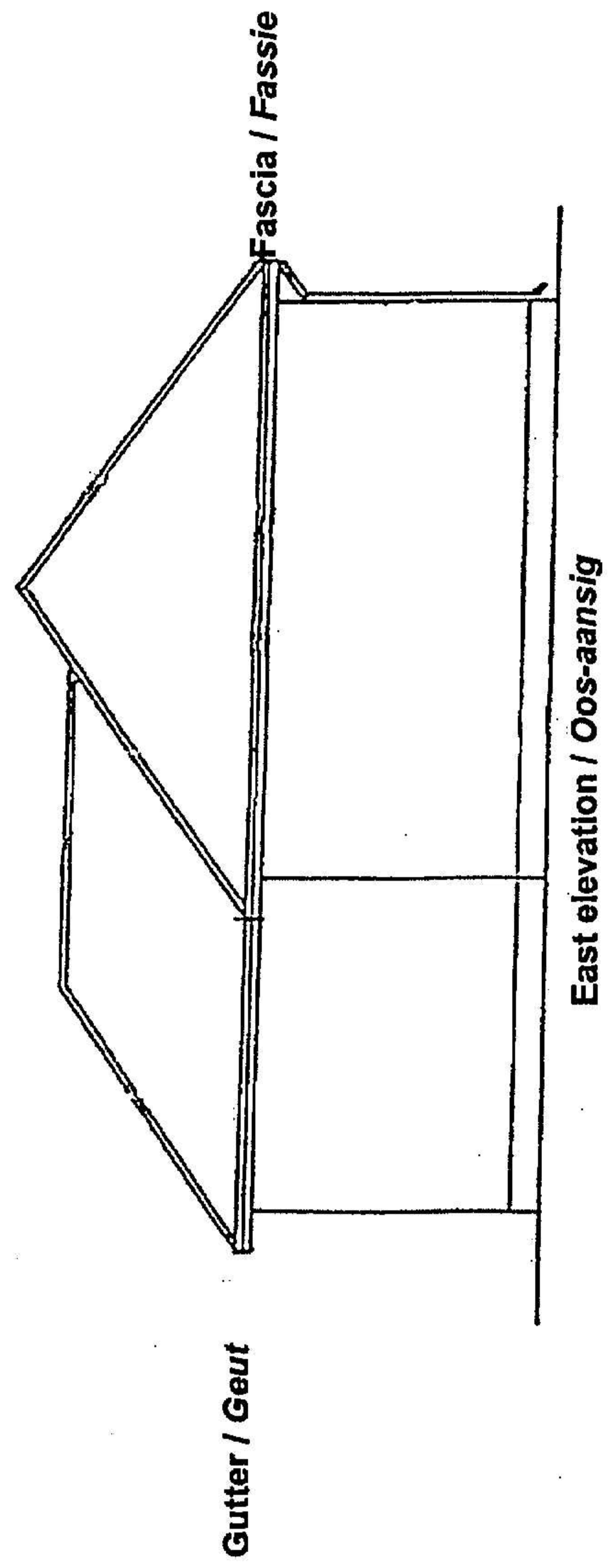
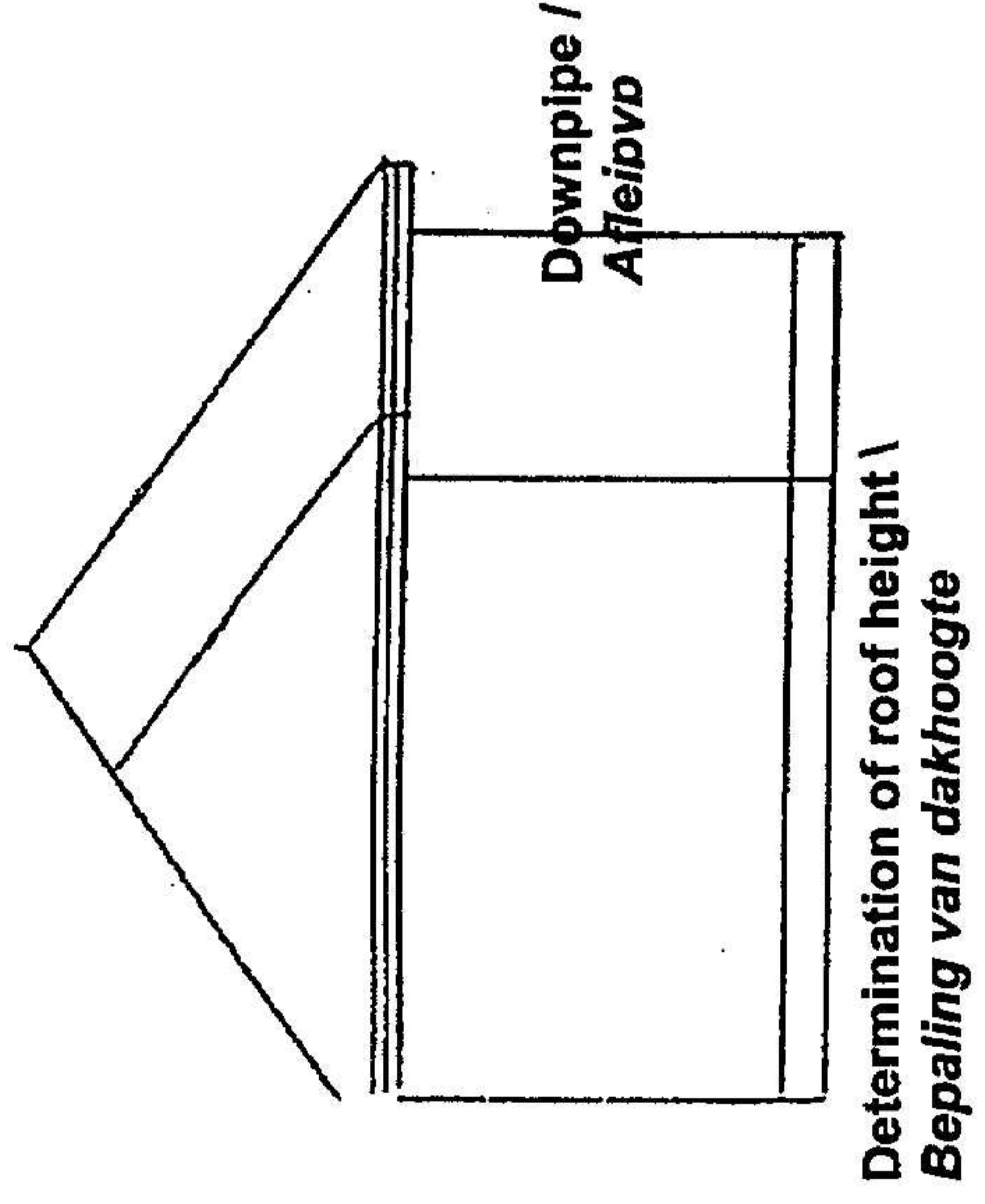
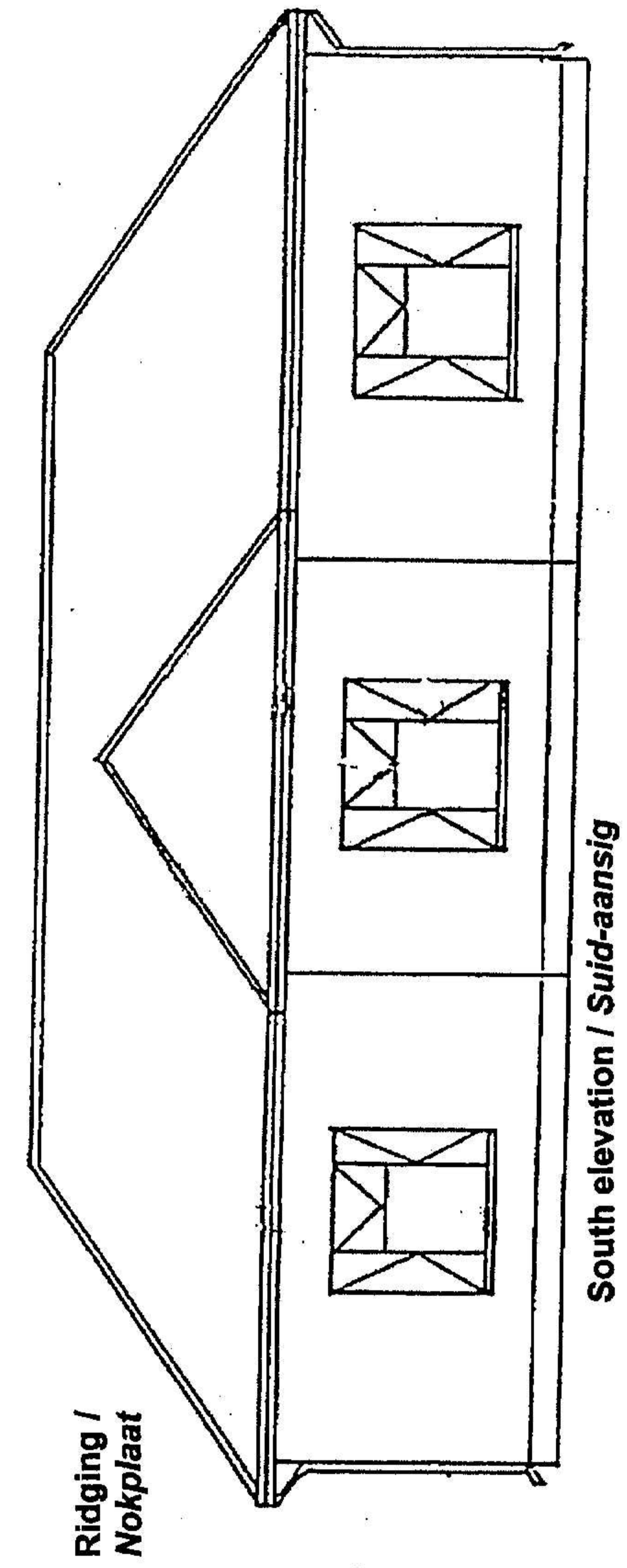
TOTAL FOR SECTION A / TOTAAL VIR AFDELING A: [120]

SECTION B / AFDELING B**QUESTION / VRAAG 3****SOUTH ELEVATION / SUID-AANSIG**

Roof height auxiliary view	6	<i>Dakhoogte hulpaansig</i>
Roof design	2	<i>Dakontwerp</i>
Substructure	2	<i>Onderbou</i>
Superstructure	2	<i>Bobou</i>
Gutter	2	<i>Geut</i>
Fascia board	2	<i>Fassieplank</i>
Downpipe	2	<i>Afleipyp</i>
Ridging	2	<i>Nokplaat</i>
Window placing	2	<i>Vensterplasing</i>
Window sill	2	<i>Vensterbank</i>
Window opening	6	<i>Oopswaai rame getoon</i>
Labelling	2	<i>Byskrifte</i>
Linework	2	<i>Lynwerk</i>
Scale	<u>2</u>	<i>Skaal</i>
	36	

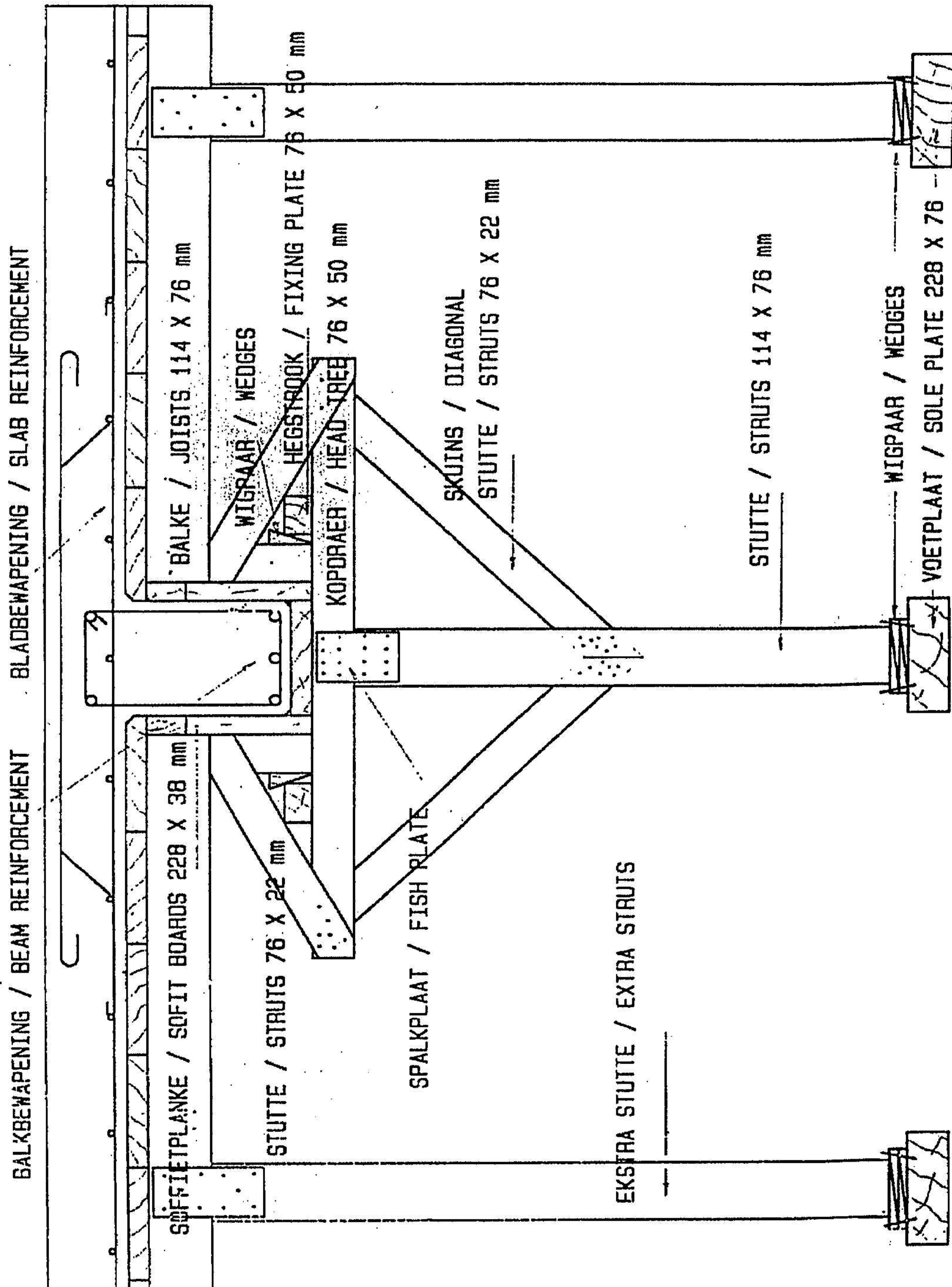
EAST ELEVATION / OOS-AANSIG

Roof design	4	<i>Dakontwerp</i>
Ridging	2	<i>Nokplaat</i>
Fascia board	2	<i>Fassieplank</i>
Gutter	2	<i>Geut</i>
Downpipe	2	<i>Afleipyp</i>
Substructure	2	<i>Onderbou</i>
Superstructure	2	<i>Bobou</i>
Neatness	4	<i>Netheid</i>
Linework	2	<i>Lynwerk</i>
Scale	<u>2</u>	<i>Skaal</i>
	24	



Scale 1:100 / Skaal

QUESTION / VRAAG 4



Labels and measurements / Afmetings en byskrifte
 Detail / Detail
 Scale / Skaal 1:10

091221a.dwg

QUESTION / VRAAG 5

5.1 Calculate LR / Bereken LR

Take moments about RR / *Neem momente om RR*

$$\text{L. O. M.} = \text{R. O. M}$$

$$\text{LR} \times 10 = (5 \times 2) + (9 \times 6) + (7 \times 8)$$

$$10 \text{ LR} = 10 + 54 + 56$$

$$10 \text{ LR} = 120$$

$$\text{LR} = \frac{120}{10}$$

$$\text{LR} = 12 \text{ Kn}$$

Calculate RR / *Bereken RR*Take moments about LR / *Neem momente om LR*

$$\text{L. O. M.} = \text{R. O. M}$$

$$\text{RR} \times 10 = (7 \times 2) + (9 \times 4) + (5 \times 8)$$

$$10 \text{ RR} = 14 + 36 + 40$$

$$10 \text{ RR} = 90$$

$$\text{RR} = \frac{90}{10}$$

$$\text{RR} = 9 \text{ kN}$$

Test / *Toets*

$$\begin{array}{l} \text{Upward forces /} \\ \text{Opwaartse kragte} \end{array} = \begin{array}{l} \text{Downward forces /} \\ \text{Afwaartse kragte} \end{array}$$

$$12 \text{ kN} + 9 \text{ kN} = 7 \text{ kN} + 9 \text{ kN} + 5 \text{ kN}$$

$$21 \text{ kN} = 21 \text{ kN}$$

5.2 Calculate bending moments /
Bereken buigmomente

(Force x Distance) /
(Krag x Afstand)

$$\begin{aligned} \text{BMA} &= \text{LR} \times 0 \\ &= 12 \times 0 \\ &= 0 \text{ kNm} \end{aligned}$$

$$\begin{aligned} \text{BMB} &= \text{LR} \times 2 \\ &= 12 \times 2 \\ &= 24 \text{ kNm} \end{aligned}$$

$$\begin{aligned} \text{BMC} &= (\text{LR} \times 4) - (\text{B} \times 2) \\ &= (12 \times 4) - (7 \times 2) \\ &= 48 - 14 \\ &= 34 \text{ kNm} \end{aligned}$$

$$\begin{aligned} \text{BMD} &= (\text{LR} \times 8) - (\text{C} \times 4) - (\text{B} \times 6) \\ &= (12 \times 8) - (9 \times 4) - (7 \times 6) \\ &= 96 - 36 - 42 \\ &= 18 \text{ kNm} \end{aligned}$$

$$\begin{aligned} \text{BME} &= (\text{LR} \times 10) - (\text{D} \times 2) - (\text{C} \times 6) - (\text{B} \times 8) \\ &= (12 \times 10) - (5 \times 2) - (9 \times 6) - (7 \times 8) \\ &= 120 - 10 - 54 - 56 \\ &= 0 \text{ kNm} \end{aligned}$$

Calculate shear forces / Bereken skuifkragte

$$\begin{aligned} \text{SKA} &= \text{LR} \\ &= 12 \text{ kN} \end{aligned}$$

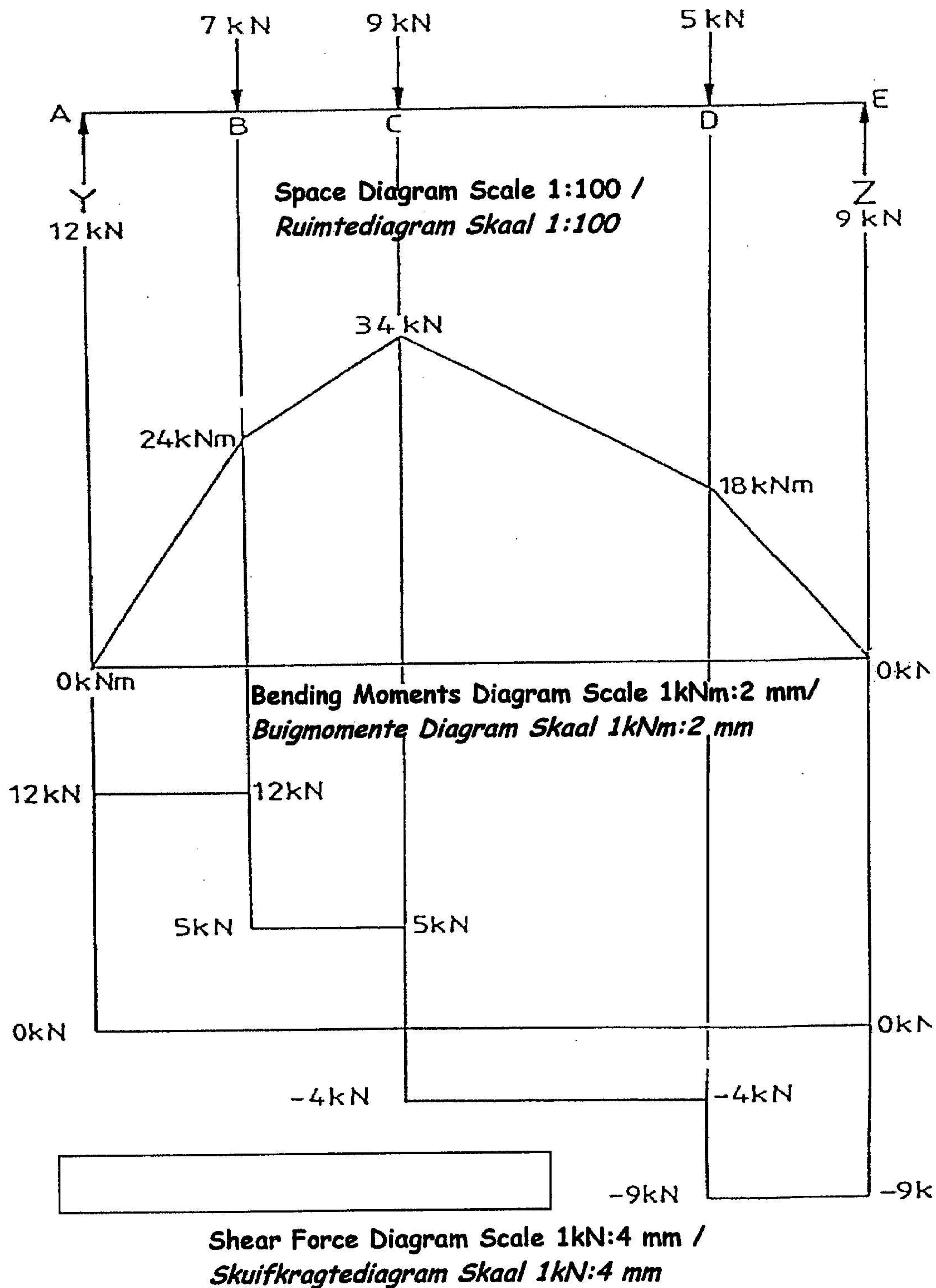
$$\begin{aligned} \text{SKB} &= \text{LR} - \text{B} \\ &= 12 - 7 \\ &= 5 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{SKC} &= \text{LR} - \text{B} - \text{C} \\ &= 12 - 7 - 9 \\ &= -4 \text{ kN} \end{aligned}$$

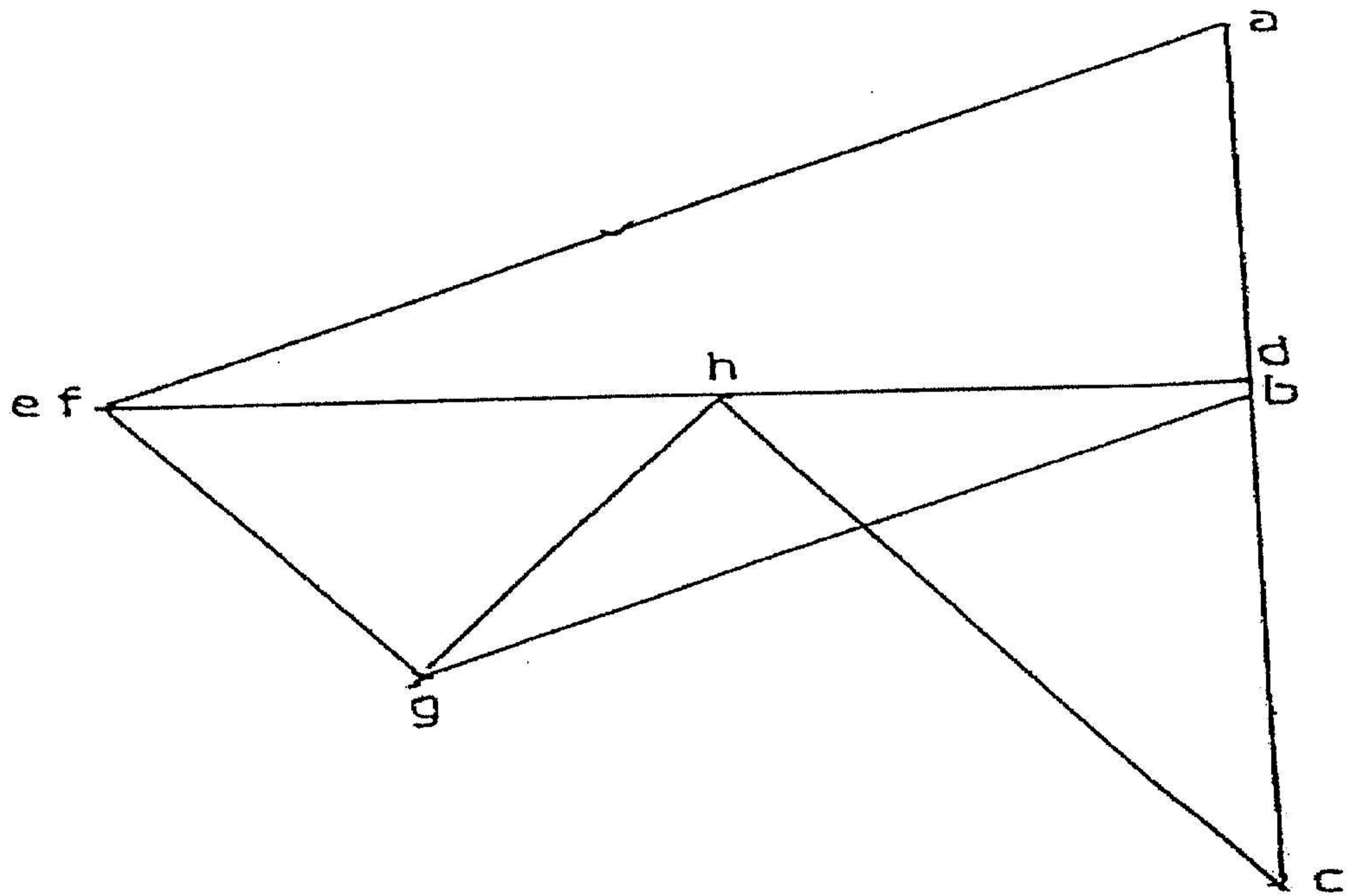
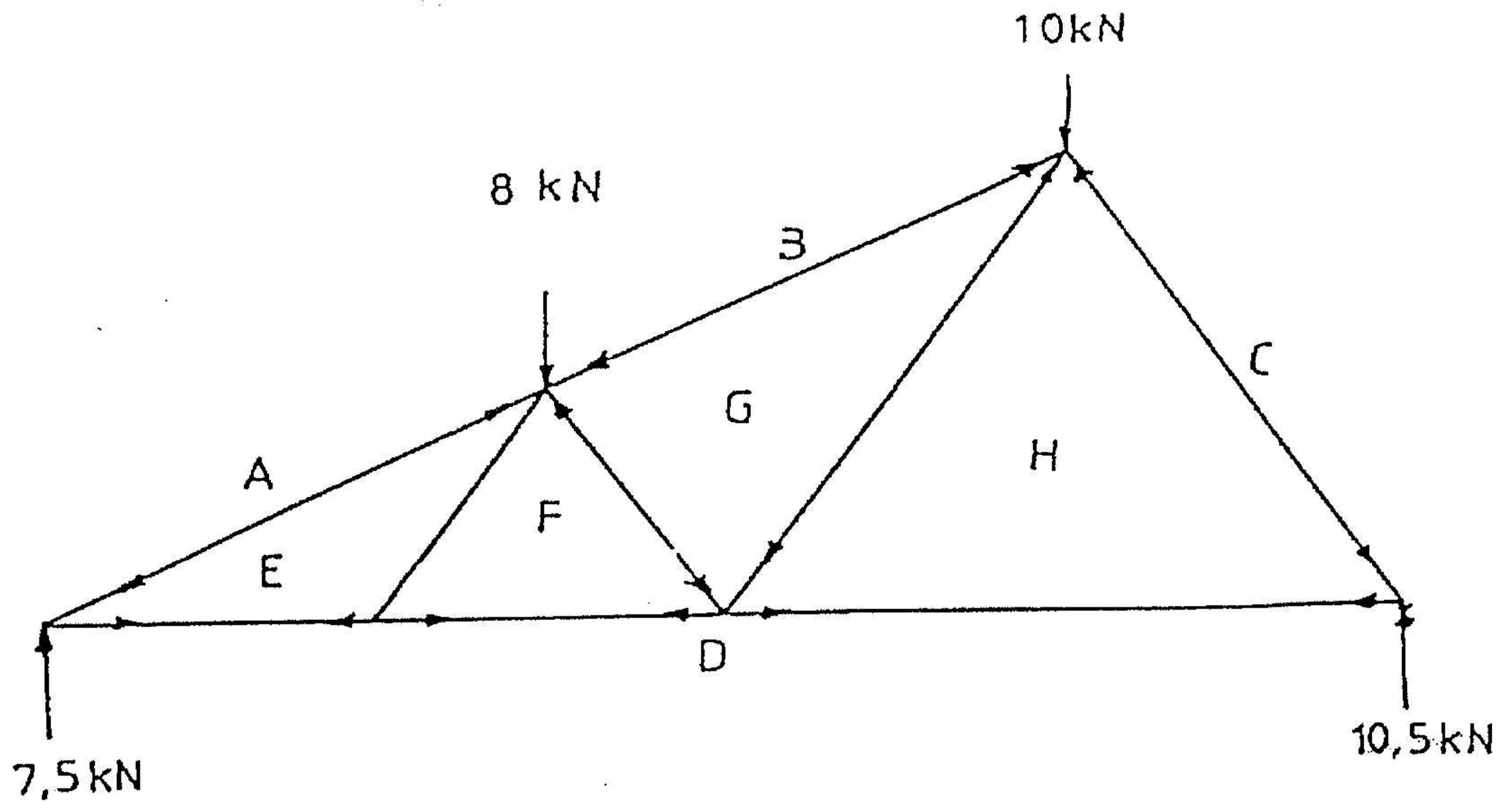
$$\begin{aligned} \text{SKD} &= \text{LR} - \text{B} - \text{C} - \text{D} \\ &= 12 - 7 - 9 - 5 \\ &= -9 \text{ kN} \end{aligned}$$

$$\begin{aligned} \text{SKE} &= \text{LR} - \text{B} - \text{C} - \text{D} + \text{E} \\ &= 12 - 7 - 9 - 5 + 9 \\ &= 0 \text{ kN} \end{aligned}$$

QUESTION / VRAAG 6



QUESTION/VRAAG 6



QUESTION / VRAAG 7

- 7.1 Surveying is the art of preparing a plan or view of a certain area by using physical measurements. On this plan, all the detail is reproduced in the form of sketches and symbols.

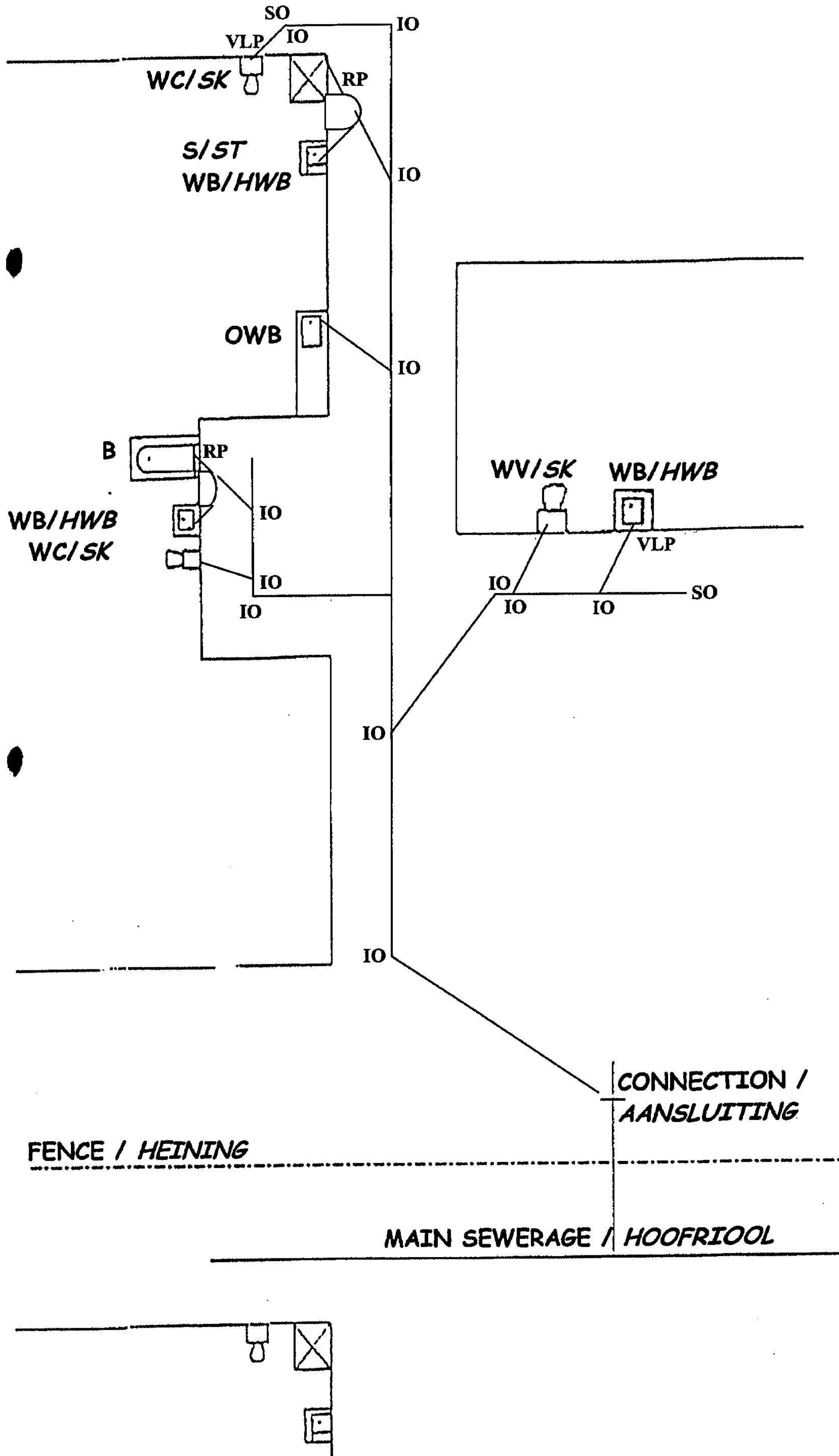
Opmetings is die kuns om deur fisiese metings in die veld 'n voorstelling / plan van die gemete area voor te berei, waarop alle fisiese besonderhede deur middel van sketse en simbole aangedui word.

(6)

- 7.2 Rating of the wood
Defects in the wood
Twisting of wood
Lengths of the wood
Or any other if correct.

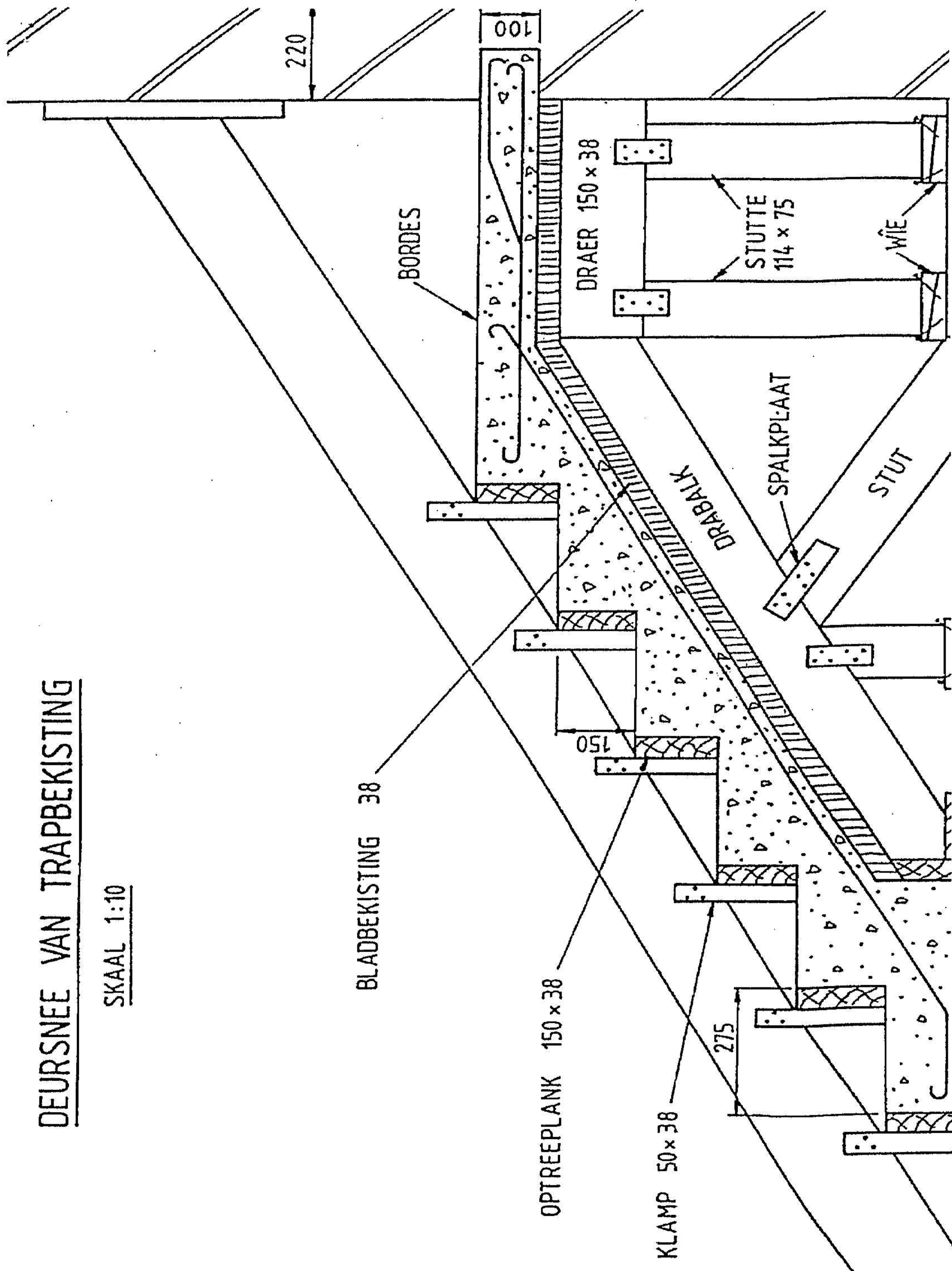
*Klassifikasie van die hout
Defekte in die hout
Gedraaide of skeefgetrekte hout
Lengte van die hout
Of enige ander as korrek.*

(4)



7.4	Wall	1	<i>Muur</i>
	Landing	2	<i>Bordes</i>
	Rise	1	<i>Styging</i>
	Tread	1	<i>Loopvlak</i>
	Landing reinforcement	2	<i>Bordes wapening</i>
	Staircase reinforcement	1	<i>Trap wapening</i>
	Fish plates	1	<i>Spalkplate</i>
	Bearer	1	<i>Drabalk</i>
	Bearer	1	<i>Draer</i>
	Vertical struts	2	<i>Vertikale stutte</i>
	Diagonal struts	1	<i>Skuinstut</i>
	Wedges	2	<i>Wie</i>
	Slab formwork	2	<i>Bladbekisting</i>
	Clamps	1	<i>Klampe</i>
	Riser formwork	1	<i>Optreeplanke</i>
	Dimensions	3	<i>Afmetings</i>
	Labelling	3	<i>Byskrifte</i>
	Linework	2	<i>Lynwerk</i>
	Scale	<u>2</u>	<i>Skaal</i>
		30	

(30)



DEURSNEE VAN TRAPBEKISTING

SKAAL 1:10

BLADBEKISTING 38

OPTREEPLANK 150 x 38

KLAMP 50 x 38

DRABALK

SPALKPLAAT

STUT

DRAER 150 x 38

STUTTE 114 x 75

WIE

BORDES

220

150

275

TOTAL FOR SECTION B / TOTAAL VIR AFDELING B:

(30)
[60]

[180]

TOTAL / TOTAAL:

300