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

TECHNIKA (CIVIL / *SIVIEL*) HG

POSSIBLE ANSWERS OCT / NOV 2006

QUESTION 1 / *VRAAG 1*

1.1

1.1.1 There must be no change of direction under the building.
Die riool mag nie van rigting verander onder die gebou nie.

1.1.2 There must be no connections underneath the building.
Geen aansluitings mag onder die gebou gemaak word nie.

1.1.3 An access opening should be installed on both sides where the sewer enters the building and at the exit.
Toegangsopeninge moet aan beide kante, waar die riool onder die gebou in- en uitgaan, aangebring word.

1.1.4 It is preferable to use heavy cast-iron pipes for the sewer line.
Verkieslik moet swaar gietysterpype vir die rioollyn gebruik word.

1.1.5 The sewer should be laid at least 50 cm clear of any foundations.
Die riool moet minstens 50 cm vry van enige fondasies wees.

ONE MARK EACH / *EEN PUNT ELK*

1.2

1.2.1 The area must be fenced in.
Die gebied moet omhein wees.

1.2.2 The area must be kept clean.
Die gebied moet skoon wees.

1.2.3 The building area must be lit at night.
Die bougebied moet snags verlig wees.

1.2.4 Walkways must be erected under cranes and building work on sideways.
Loopgange moet aangebring word onder hyskrane en bouwerk op sypaadjies.

1.2.5 A hard hat and protective clothing must be worn.
? Hardehoed en beskermingsklere moet gedra word.

1.2.6 Sufficient and unambiguous notices must be put up on the building site.
Voldoende kennisgewings moet duidelik op die perseel aangebring word.

1.2.7 No unskilled labourers or other persons are allowed on the site.
Ongemagtigde persone en onopgeleide werkers mag nie die perseel betree nie.

1.2.8 Where dangerous excavations are in progress, they must be effectively enclosed.
Waar gevaarlike uitgrawings op die terrein plaasvind, moet dit omhein wees.

1.2.9 Scaffolding in use must stand firm and be kept clean.
Steiers wat gebruik word, moet stewig staan en skoon gehou word.

1.2.10 Material, which is not immediately used, must be neatly stored.
Materiaal wat nie dadelik gebruik word nie, moet netjies opgeberg word.

1.2.11 Vehicles moving around on the site must be minimised.
Voertuie wat op die terrein beweeg, moet tot ? minimum beperk word.

ANY TEN ONE MARK EACH / ***ENIGE TIEN EEN PUNT ELK***

1.3

1.3.1 The space in which the stairs and landings are housed.
Die spasie toegelaat vir die trap en bordes.

1.3.2 The upper surface of a step on which the foot is placed, or the horizontal distance between two consecutive treads.
Die boonste gedeelte van ? trap waarop die voet geplaas word, dit wil sê, die horisontale afstand tussen twee agtereenvolgende optreë.

1.3.3 The parts on both sides of the steps.
Die dele aan weerskante van die trap

1.3.4 Riser plus tread.
Optree plus ? aantree.

1.3.5 The horizontal part between two sets of stairs.
Die horisontale deel tussen twee stelle trappe.

TWO MARKS EACH / ***TWEE PUNTE ELK***

1.4

1.4.1	Green	*Groen*
1.4.2	Blue	*Blou*
1.4.3	Black	*Swart*
1.4.4	Red	*Rooi*
1.4.5	Grey	*Grys*

ONE MARK EACH / ***EEN PUNT ELK***

1.5

1.5.1 Screw the instrument onto the tripod.
Skroef die instrument op die driepoot vas.

1.5.2 Open the tripod legs and set the instrument to a comfortable height.
Maak die pote van die driepoot oop en stel dit totdat die instrument op ? gerieflike hoogte staan.

1.5.3 Set the base plate on a horizontal level by means of the small spirit level.
Stel die basisplaat horisontaal waterpas op met behulp van die klein waterpas.

1.5.4 Set the instrument's foot screws in the centre of the up- and downward position.
Stel die instrument se voetskroewe halfpad tussen die op- en afwaartse stelposisie.

1.5.5 Make sure the tripod is set at a comfortable height and set the foot plate air bubble in the centre.
Maak seker dat die driepoot op ? gerieflike hoogte is, en stel die voetplaat se lugbel sentraal in.

1.5.6 Turn the telescope so that the tubular air bubble is parallel in the direction between any two foot screws.
Die teleskoop moet nou gedraai word sodat die lugbel parallel is aan die rigting tussen enige twee voetskroewe.

1.5.7 These two foot screws are now altered at the same time until the air-bubble is in the centre. See to it that both foot screws are turned equally and at the same time.
Hierdie twee voetskroewe word nou gelyktydig met albei hande gestel totdat die lugbel sentraal is. Sorg dat beide skroewe gelyktydig en ewe veel gedraai word.

1.5.8 Turn the telescope clockwise through 90 degrees over the third screw.
Draai nou die teleskoop kloksgewys deur 90 grade oor die derde skroef.

1.5.9 By only turning this foot screw, centre the air-bubble.
Verstel nou net hierdie voetskroef tot die lugbel sentraal is.

1.5.10 The instrument is now ready for use.
Die instrument is nou gereed vir gebruik.

TWO MARKS EACH / *TWEE PUNTE ELK*

1.6

1.6.1 Appoint a building contractor.
Stel ? boukontrakteur aan.

1.6.2 Arrange municipal services.
Reël vir munisipale dienste.

1.6.3 Clean up the building site.
Maak die bouterrein skoon.

1.6.4 Level out the building area.
Maak die bou-area gelyk.

1.6.5 Order the necessary building material.
Bestel die boumateriaal soos benodig.

TWO MARKS EACH / *TWEE PUNTE ELK* **[60]**

QUESTION 2 / *VRAAG 2*

MEMBER *ONDERDEEL*	NATURE *AARD*	MAGNITUDE *GROOTTE*
AH	STRUT / *STUT*	3 kN
BH	TIE / *STANG*	3 kN
CK	STRUT / *STUT*	2,5 kN
DL	STRUT / *STUT*	2,5 kN
EN	TIE / *STANG*	4 kN
FN	STRUT / *STUT*	4 kN
GM	TIE / *STANG*	1,1 kN
GJ	TIE / *STANG*	1,7 kN
HJ	STRUT / *STUT*	8,6 kN
JK	TIE / *STANG*	0,9 kN
KL	STRUT / *STUT*	2,5 kN
LM	TIE / *STANG*	2 kN
MN	STRUT / *STUT*	9,2 kN

CALCULATE P / ***BEREKEN P***

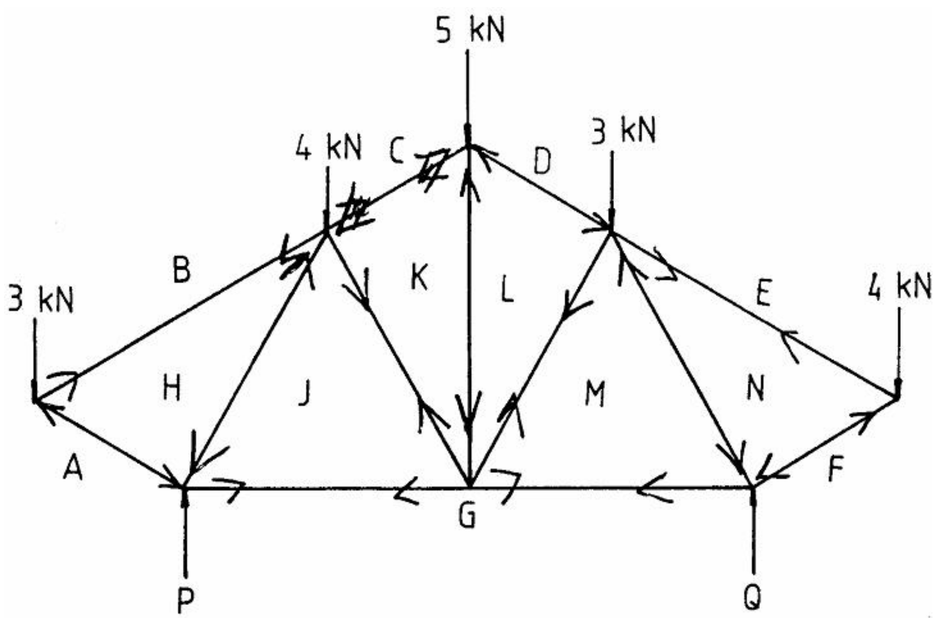
Take moments about Q / *Neem momente om Q*

$$(P \times 4) + (4 \times 1) = (3 \times 1) + (5 \times 2) + (4 \times 3) + (3 \times 5)$$
$$4P = 3 + 10 + 12 + 15 - 4$$
$$4P = 36$$
$$P = \frac{36}{4}$$
$$\mathbf{P = 9\ kN}$$

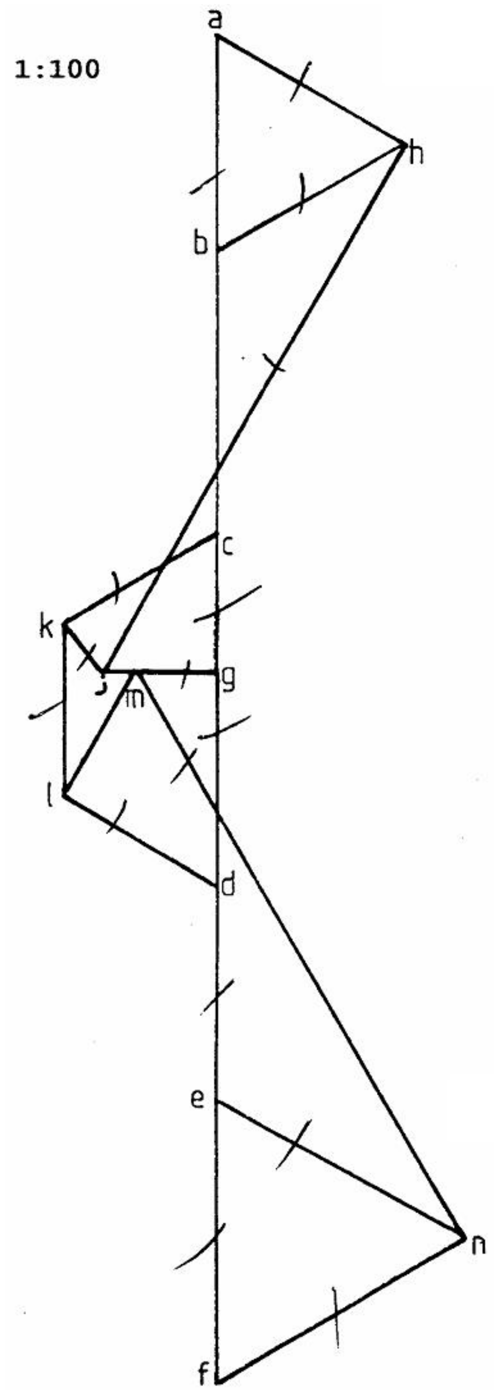
CALCULATE Q / ***BEREKEN Q***

Take moments about P / *Neem momente om P*

$$(Q \times 4) + (3 \times 1) = (4 \times 1) + (5 \times 2) + (3 \times 3) + (4 \times 5)$$
$$4Q = 4 + 10 + 9 + 20 - 3$$
$$4Q = 40$$
$$Q = \frac{40}{4}$$
$$\mathbf{Q = 10\ kN}$$



SPACE DIAGRAM / ***RUIMTEDIAGRAM SKAAL*** **1:100**



VECTOR DIAGRAM SCALE 10 mm = 1 kN /
***VEKTORDIAGRAM SKAAL* 10 mm = 1 kN** **[60]**

QUESTION 3 / *VRAAG 3*

3.1

CALCULATE SHEAR FORCES ***BEREKEN SKUIFKRAGTE***

Point: / *Punt*

A	=	**0 kN**
B -	=	**0 kN**
B +	=	**- 2 kN**
C -	=	- 2 kN – 9 kN = **- 11 kN**
C +	=	-2 kN – 9 kN – 6 kN = - **17 kN**
D -	=	- 2 kN – 9 kN – 6 kN – 6 kN = **- 23 kN**
D +	=	-2 kN – 9 kN – 6 kN – 6 kN – 4 kN = - **27 kN**
E -	=	- 2 kN – 9 kN – 6 kN – 6 kN – 4 kN = **- 27 kN**
E +	=	-2 kN – 9 kN – 6 kN – 6 kN – 4 kN – 3 kN = **- 30 kN**
F	=	-2 kN – 9 kN – 6 kN – 6 kN – 4 kN – 3 kN = - **30 kN**

3.2

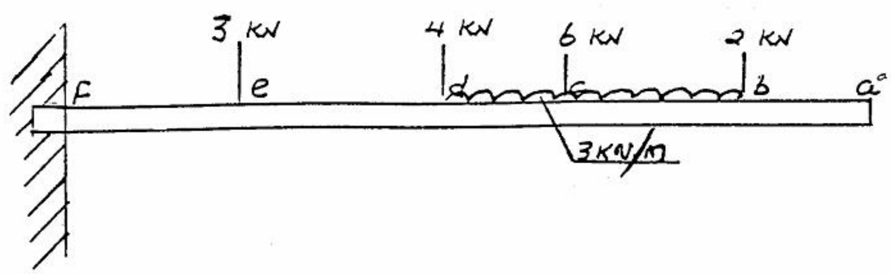
CALCULATE BENDING MOMENTS ***BEREKEN BUIGMOMENTE***

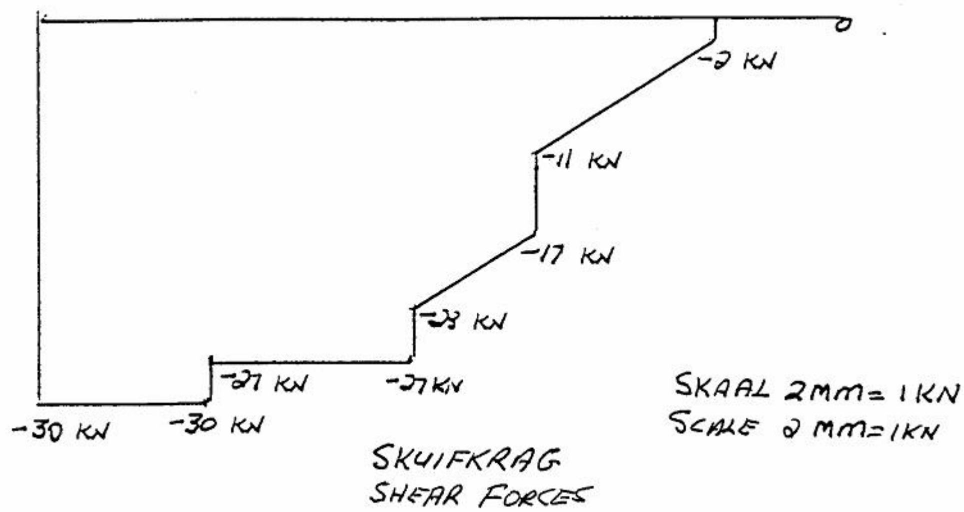
Point: / *Punt*

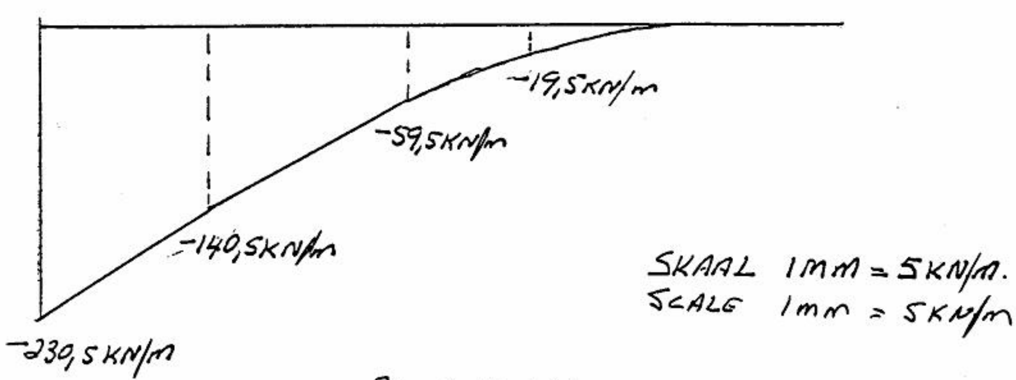
A	=	**0 kN/m**
B	=	**0 kN/m**
C	=	-(2 x 3) – (9 x 1,5)
	=	- 6 – 13,5
	=	- **19,5 kN/m**
D	=	-(2 x 5) – (6 x 2) – (15 x 2,5)
	=	10 – 12 – 37,5
	=	**- 59,5 kN/m**
E	=	-(2 x 8) – (6 x 5) – (4 x 3) – (15 x 5,5)
	=	16 – 30 – 12 – 82,5
	=	**- 140,5 kN/m**
F	=	-(2 x 11) – (6 x 8) – (4 x 6) – (3 x 3) – (15 x 8,5)
	=	22 – 48 – 24 – 9 – 127,5
	=	**- 230,5 kN/m**

MARKS AS SHOWN / *PUNTE SOOS AANGEDUI*

3.3

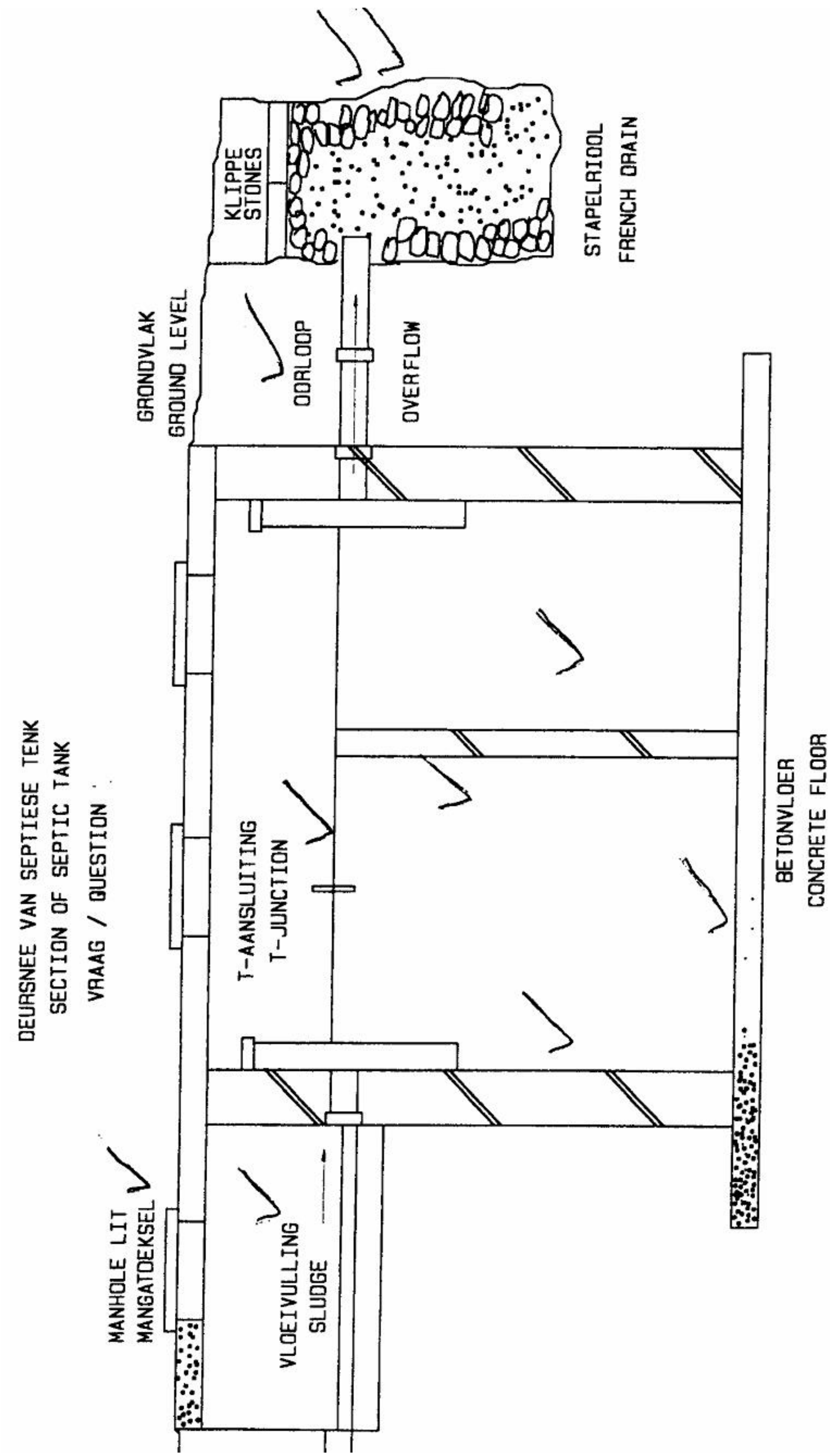






MARKS AS SHOWN / ***PUNTE SOOS AANGETOON***

3.4

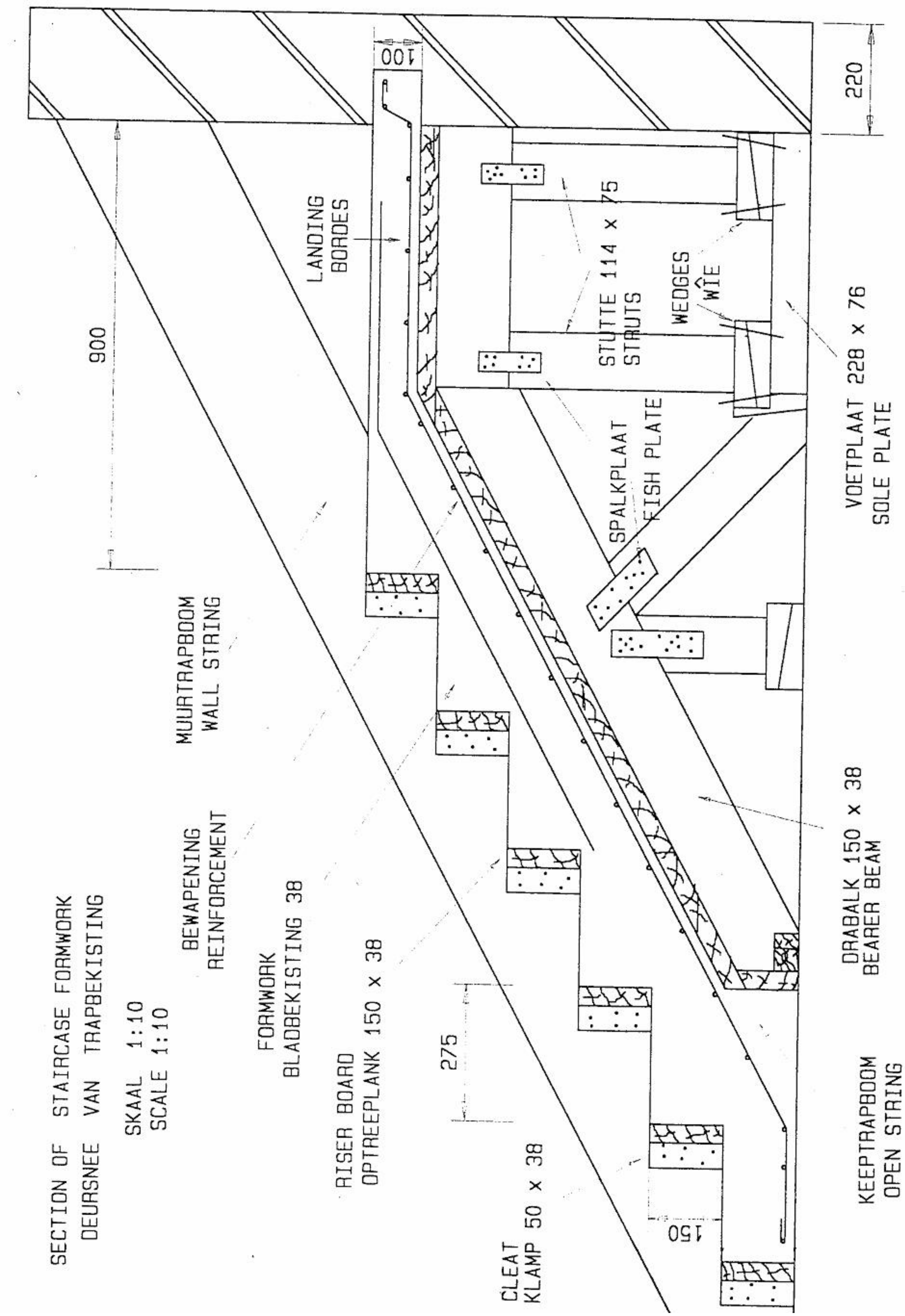


TWO MARKS PER TICK / *TWEE PUNTE PER REGMERK* **[60]**

QUESTION 4 / *VRAAG 4*

CONCRETE STAIRCASE FORMWORK / *BETONTRAPBEKISTING*

WALL	3	*MUUR*
LANDING	4	*BORDES*
RISE	2	*STYGING*
TREAD	2	*LOOPVLAK*
LANDING REINFORCEMENT	4	*BORDESBEWAPENING*
STAIRCASE REINFORCEMENT	3	*TRAPWAPENING*
FISH PLATES	2	*SPALKPLATE*
BEARER BEAM	2	*DRABALK*
BEARER	2	*DRAER*
VERTICAL STRUTS	4	*VERTIKALE STUTTE*
DIAGONAL STRUTS	2	*SKUINSSTUTTE*
WEDGES	4	*WIGPARE*
SLAB FORMWORK	4	*BLADBEKISTING*
CLAMPS	3	*KLAMPE*
RISER FORMWORK	3	*OPTREEPLANKE*
DIMENSIONS	4	*AFMETINGS*
LABELLING	4	*BYSKRIFTE*
LINE WORK	4	*LYNWERK*
SCALE	4	*SKAAL*
	60	



SECTION OF STAIRCASE FORMWORK
DEURSNEE VAN TRAPBEKISTING
SKAAL 1:10
SCALE 1:10
BEWAPENING
REINFORCEMENT
FORMWORK
BLADBEKISTING 38
RISER BOARD
OPTREEPLANK 150 x 38
CLEAT
KLAMP 50 x 38
MUURTRAPBOOM
WALL STRING
900
275
150
100
220
LANDING
BORDES
STUTTE 114 x 75
STRUTS
WEDGES
WÎE
SPALKPLAAT
FISH PLATE
VOETPLAAT 228 x 76
SOLE PLATE
DRABALK 150 x 38
BEARER BEAM
KEEPTRAPBOOM
OPEN STRING

[60]

QUESTION 5 / *VRAAG 5*

5.1

The vacuum tank is supplied with a suction pipe which reaches the bottom of the tank. At the top end of this pipe at street level, or on a straight level with the pavement, a valve is attached and covered with a manhole cover. All the sewage is sucked up through this pipe.

The local government is responsible for the emptying of these tanks. The sewage is moved to the sewerage plant to be re-worked.

Periodically or when these tanks are full and must be emptied, a rubber hose from a container on a specially designed truck, is attached to the valve of the suction pipe in the tank.

With the aid of a pump the air in the tank on the truck is sucked out. The vacuum formed by this sucks up the sewage into the tank on the truck, which takes it to the sewerage plant.

Die vakuumtenk is voorsien van ? suigpyp wat tot op die bodem van die tenk strek. Aan die bopunt van hierdie pyp, op straatvlak, of op ? gelyk vlak met die sypaadjie, is ? klep aangebring wat met ? mangatdeksel bedek is. Die rioolvuil word deur hierdie suigpyp uitgesuig.

Die plaaslike owerhede is verantwoordelik vir die lediging van hierdie tenks en ook om die rioolvuil na die rioolwerke te neem en daar te laat verwerk.

Periodiek of wanneer hierdie tenk vol is en geledig moet word, word ? rubberslang vanaf ? houer op ? vragmotor, wat spesiaal vir hierdie doel ontwerp is, gekoppel aan die klep van die suigpyp.

Met behulp van 'n pomp word die lug in die tenk op die vragmotor uitgepomp. Die vakuum wat hierdeur gevorm word, suig die rioolvuil tot in die tenk op die vragmotor wat dit na die rioolwerke vervoer.

TEN MARKS / *TIEN PUNTE*

5.2

The bottom end and all other openings are properly sealed off by means of rubber plugs.
The sewer system is now filled with water by means of a hose until the water starts running over.

The opening is now also sealed with a rubber plug. This plug is supplied with a 12 mm hose standing 600 mm vertically and supplied with a funnel.
The sewer is now further filled to the brim of the funnel.
After time for absorption is allowed, the water level in the funnel should stay constant.

Any leakage can now be detected by looking for water leaks or signs of dampness on the pipes.

This test ensures that the whole system is flushed.

Die onderpunt en alle ander openinge van die stelsel word deeglik met rubberproppe verseël.
Die rioolstelsel word hierna deur middel van 'n tuinslang met water gevul totdat dit begin uitloop.

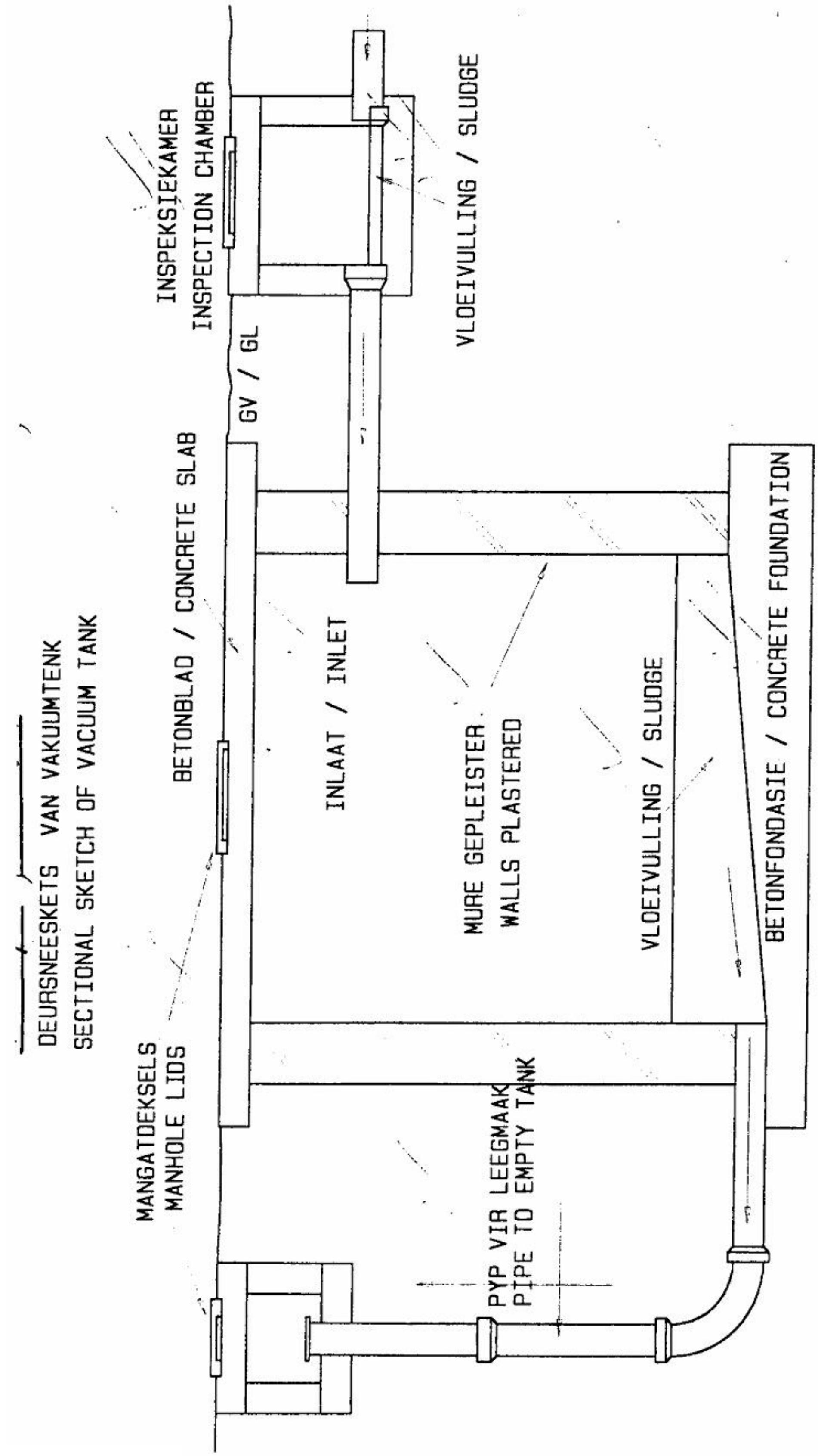
Die pypopening word dan ook met 'n rubberprop verseël. Hierdie prop is van 'n 12 mm-pyp voorsien wat 600 mm vertikaal staan en aan sy punt van 'n tregter voorsien is.
Die riool word nou verder tot op die rand van die tregter met water gevul.
Nadat tyd toegelaat is vir absorpsie, moet die watervlak in die tregter konstant bly.

Enige lekkasie sal nou baie maklik opgespoor kan word deur slegs te kyk waar water uitsypel of waar die pype nattigheid vertoon.

Hierdie toets verseker dat die hele stelsel skoongespoel word.

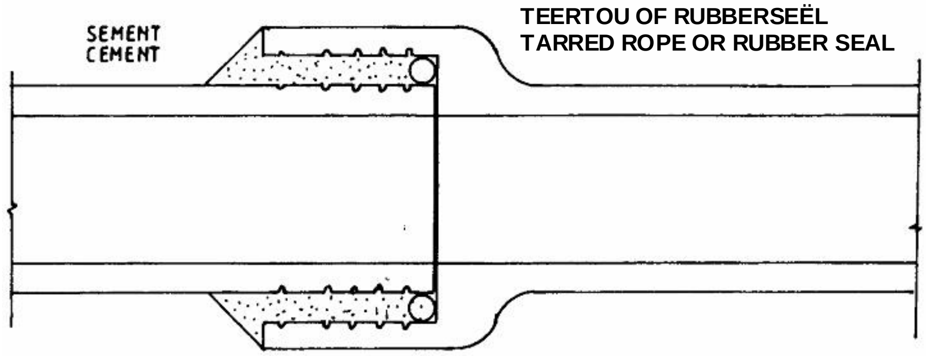
TEN MARKS / *TIEN PUNTE*

5.3



TEN MARKS / *TIEN PUNTE*

5.4

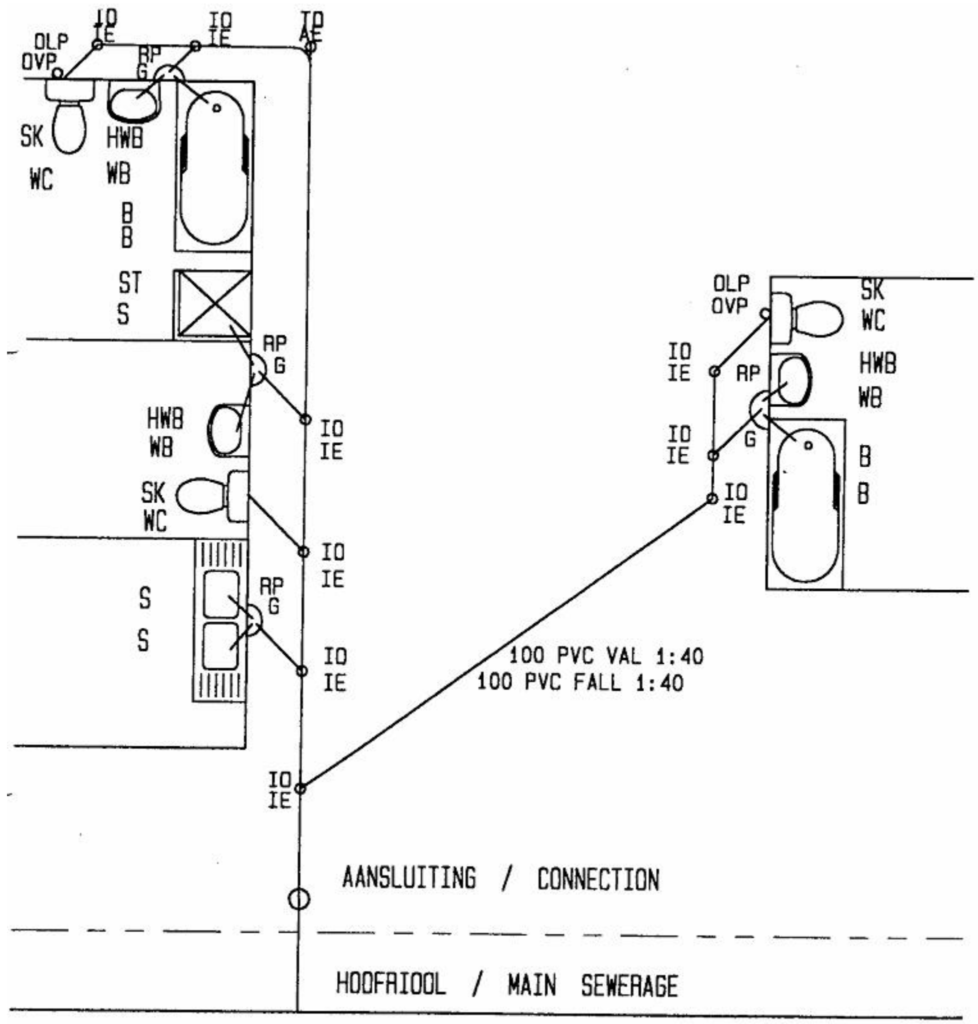


LAS TUSSEN TWEE ERDEWARE-RIOOLPYPE

JOINT BETWEEN TWO EARTHENWARE DRAIN PIPES

TEN MARKS / *TIEN PUNTE*

5.5

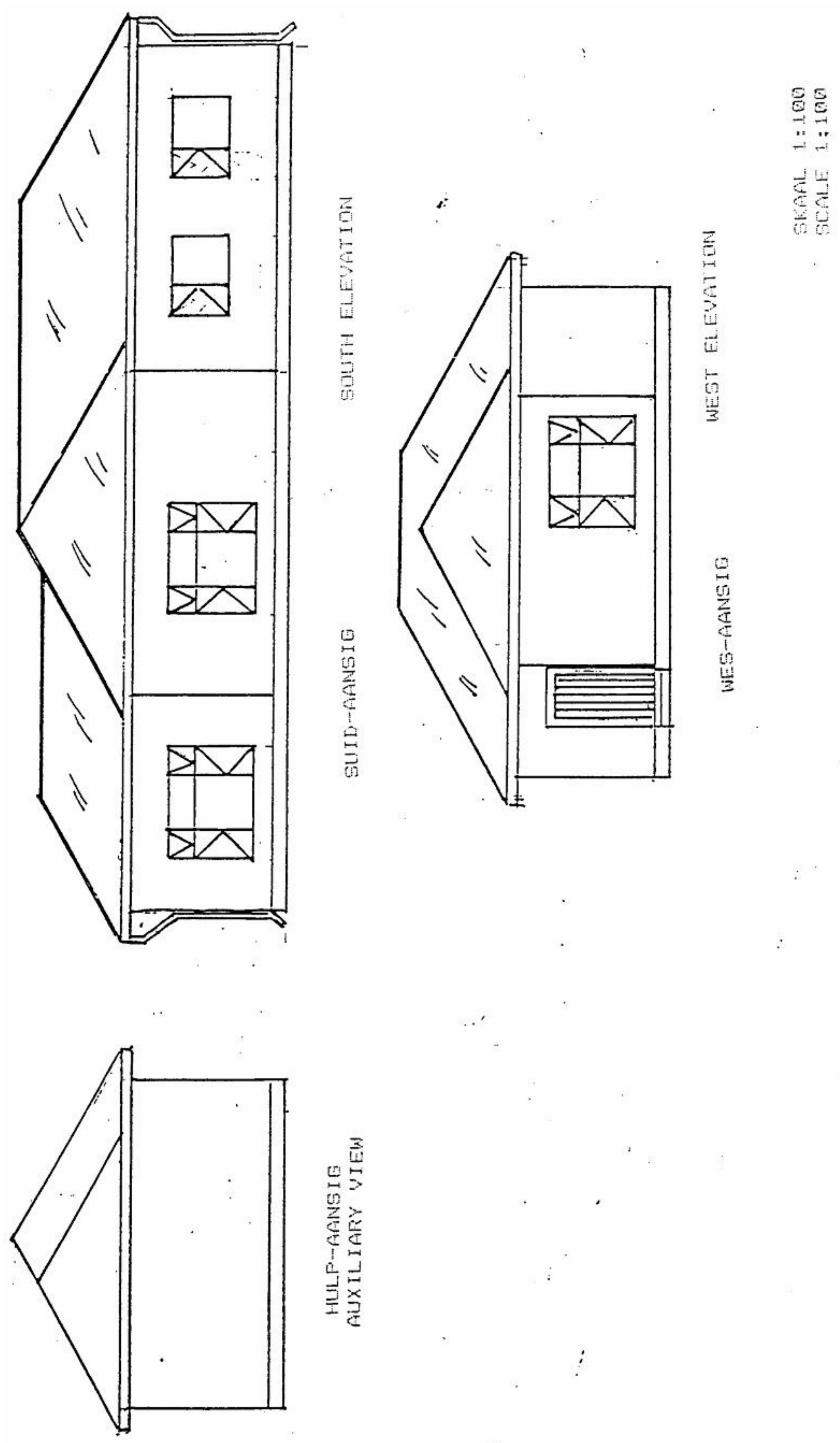


MARKS AS SHOWN / *PUNTE SOOS AANGEDUI* **[60]**

QUESTION 6/ *VRAAG 6*

DWELLING PLAN		***HUISPLAN***
SOUTH VIEW		***SUID-AANSIG***
DETERMINING OF ROOF HEIGHT	6	*BEPALING VAN DAKHOOGTE*
SUBSTRUCTURE	2	*ONDERBOU*
SUPERSTRUCTURE	2	*BOBOU*
GUTTER	2	*GEUT*
FASCIA BOARD	2	FASSIEPLANK
DOWNPIPES	2	*AFLEIPYPE*
WINDOW PLACING	2	*VENSTERPLASING*
WINDOW OPENERS	2	*VENSTEROOPMAKERS*
WINDOW SILL	2	*VENSTERBANK*
ROOF CONSTRUCTION	4	*DAKKONSTRUKSIE*
RIDGE CAP	2	*NOKPLAAT*
LINEWORK	2	*LYNWERK*
NEATNESS	2	*NETHEID*
SCALE	2	*SKAAL*
	34	

WEST VIEW		***WES-AANSIG***
ROOF CONSTRUCTION	4	*DAKKONSTRUKSIE*
RIDGE CAP	2	*NOKPLAAT*
SUBSTRUCTURE	2	*ONDERBOU*
SUPERSTRUCTURE	2	*BOBOU*
GUTTER	2	*GEUT*
FASCIA BOARD	2	*FASSIEPLANK*
DOWNPIPE	2	*AFLEIPYP*
WINDOW	2	*VENSTER*
WINDOW SILL	2	*VENSTERBANK*
DOOR	2	*DEUR*
DOOR FRAME	2	*DEURKOSYN*
SCALE	2	*SKAAL*
	26	


SOUTH ELEVATION
SUID-AANSIG
WEST ELEVATION
WES-AANSIG
SKAAL 1:100
SCALE 1:100
HULP-AANSIG
AUXILIARY VIEW

[60]

QUESTION 7 / *VRAAG 7*

7.1

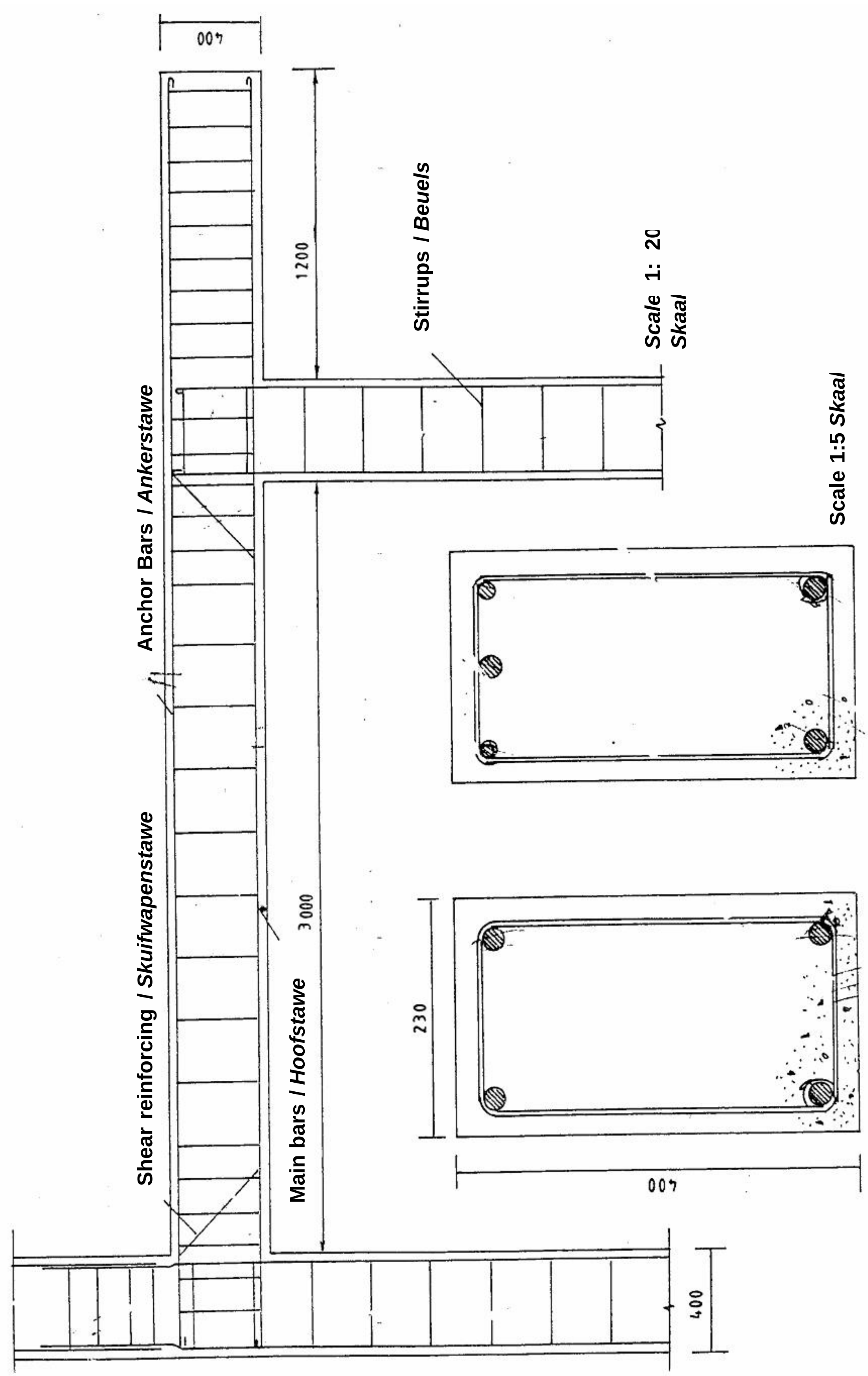
VERTICAL SECTION THROUGH CONSTRUCTION		***VERTIKALE SNIT DEUR KONSTRUKSIE***
MAIN BEAMS	4	*HOOFSTAWE*
SHEAR REINFORCING	8	*SKUIFWAPENING*
ANCHOR BARS	4	*ANKERSTAWE*
STIRRUPS CORRECT	4	*BEUELS KORREK*
COLUMN REINFORCING	4	*KOLOMWAPENING*
LINEWORK	4	*LYNWERK*
LABELS	4	*BYSKRIFTE*
DIMENSIONS	4	*AFMETINGS*
SCALE	4	*SKAAL*
	40	

7.2

VERTICAL SECTION THROUGH CANTILEVER		***VERTIKALE SNIT DEUR KANTELBALK***
MAIN BARS	3	*HOOFSTAWE*
STIRRUPS	2	*BEUELS*
CONCRETE COVERING	3	*BETONDEKKING*
SCALE	2	*SKAAL*
	10	

7.3

VERTICAL SECTION THROUGH COLUMN		***VERTIKALE SNIT DEUR KOLOM***
CONCRETE COVERING	2	*BETONDEKKING*
MAIN BARS	2	*HOOFSTAWE*
ANCHOR BARS	2	*ANKERSTAWE*
SHEAR REINFORCING	2	*SKUIFWAPENING*
STIRRUPS	1	*BEUELS*
SCALE	1	*SKAAL*
	10	



[60]

TOTAL / *TOTAAL:* 300