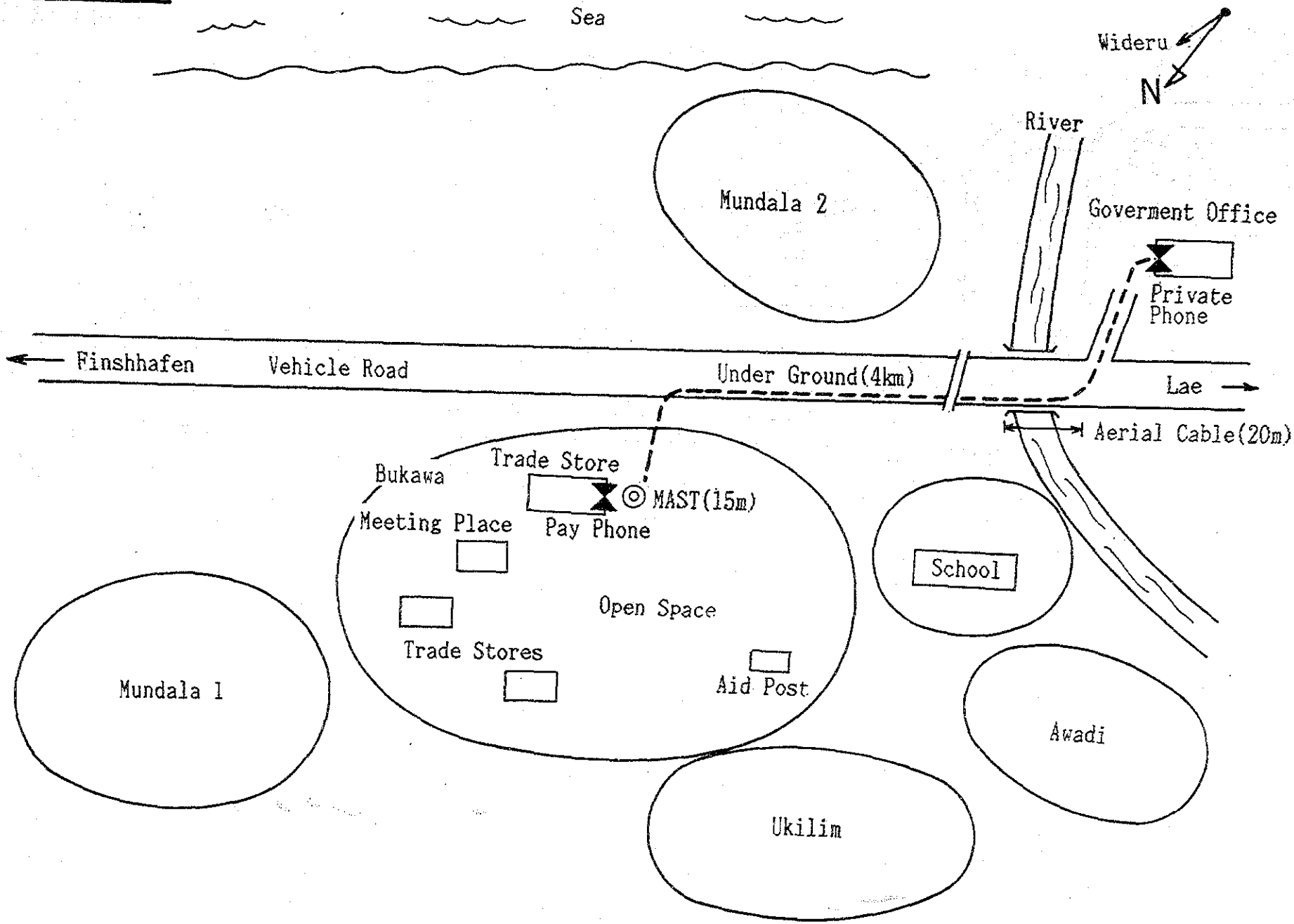
ANNEX 3

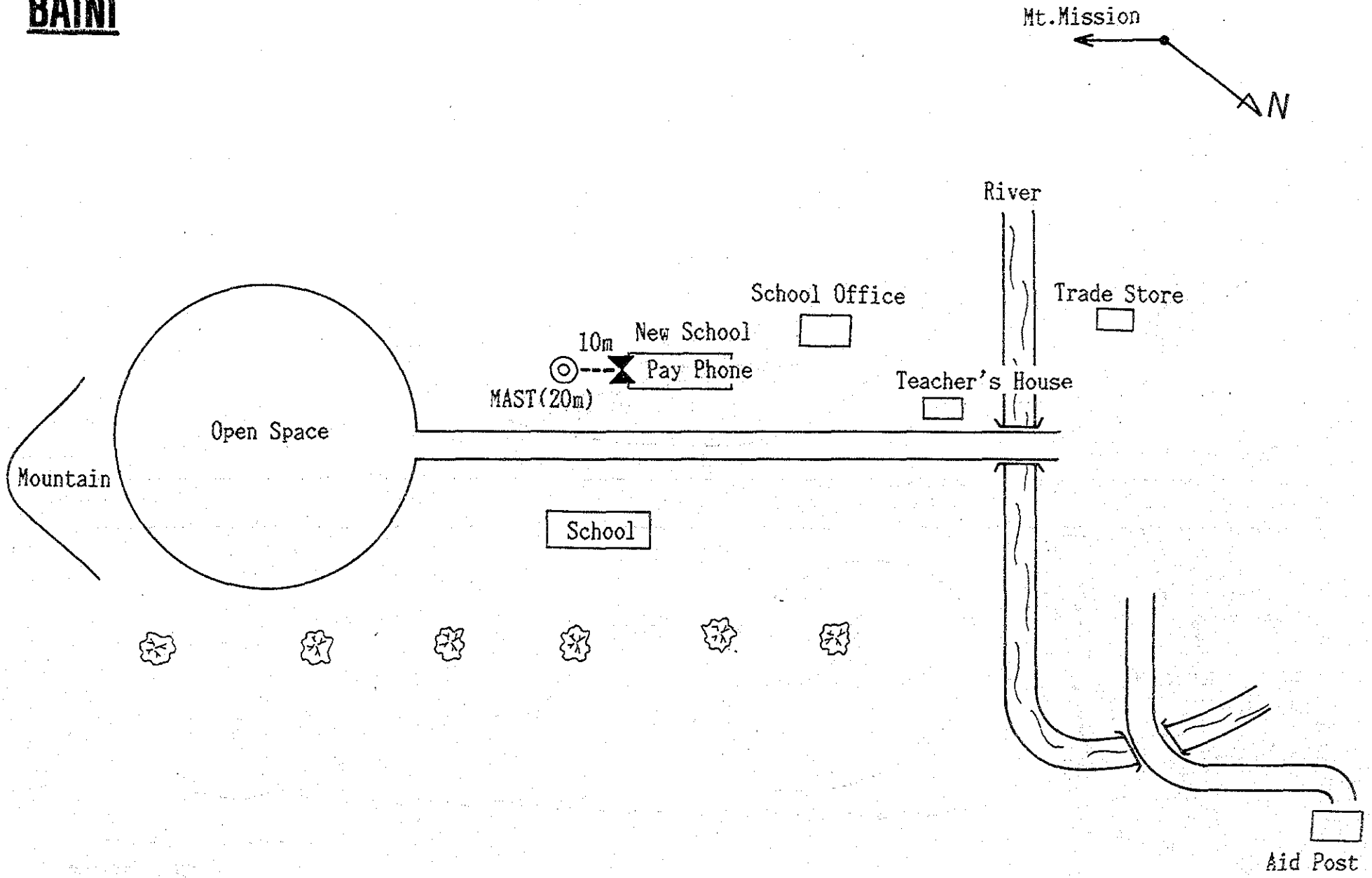
SITE SKETCH

MOROBE PROVINCE

BUKAWA

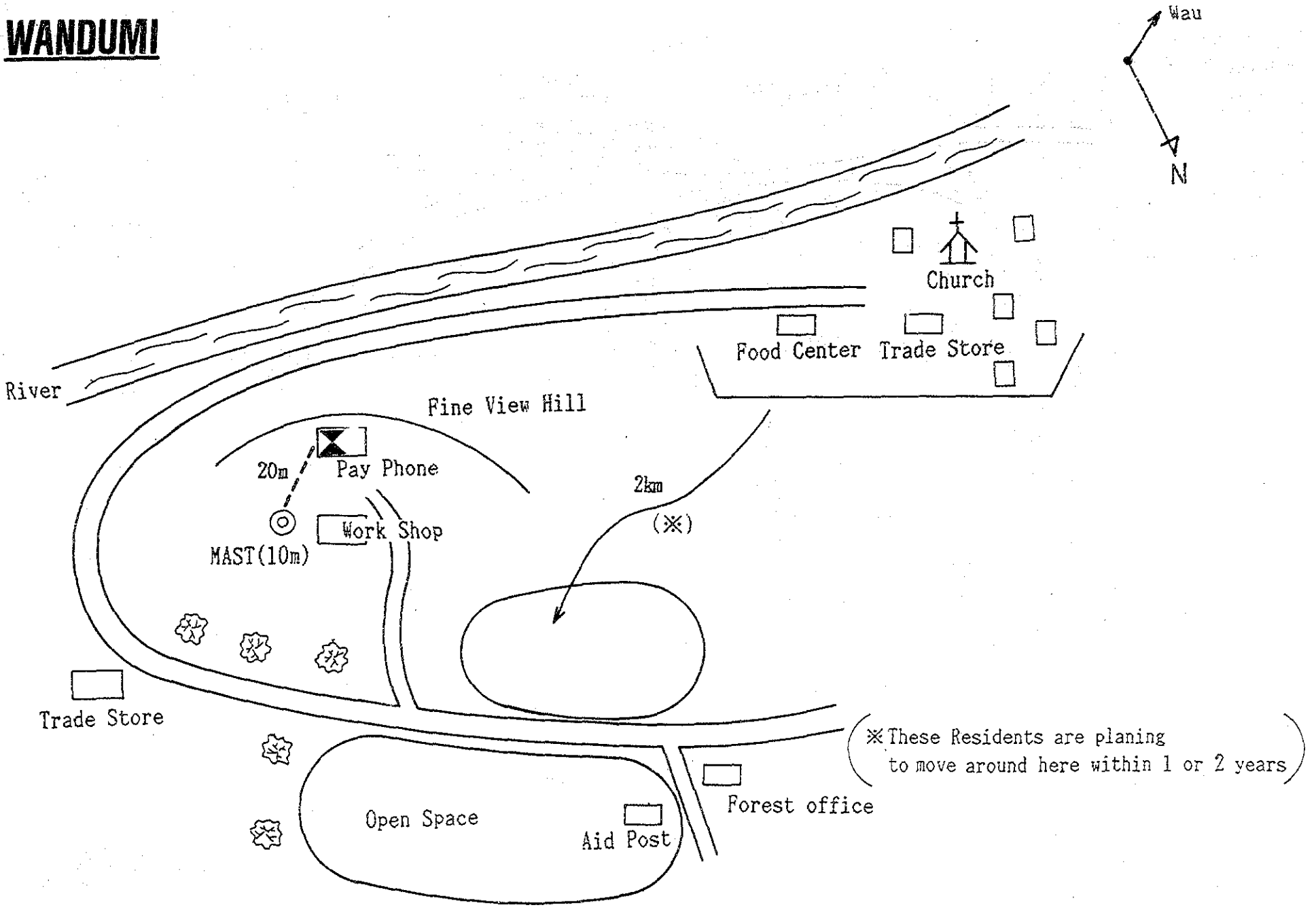

Sea
Wideru
N
River
Mundala 2
Goverment Office
Private Phone
Finshhafen
Vehicle Road
Under Ground(4km)
Lae
Aerial Cable(20m)
Bukawa
Trade Store
MAST(15m)
Meeting Place
Pay Phone
School
Open Space
Trade Stores
Aid Post
Mundala 1
Awadi
Ukilim

BAINI



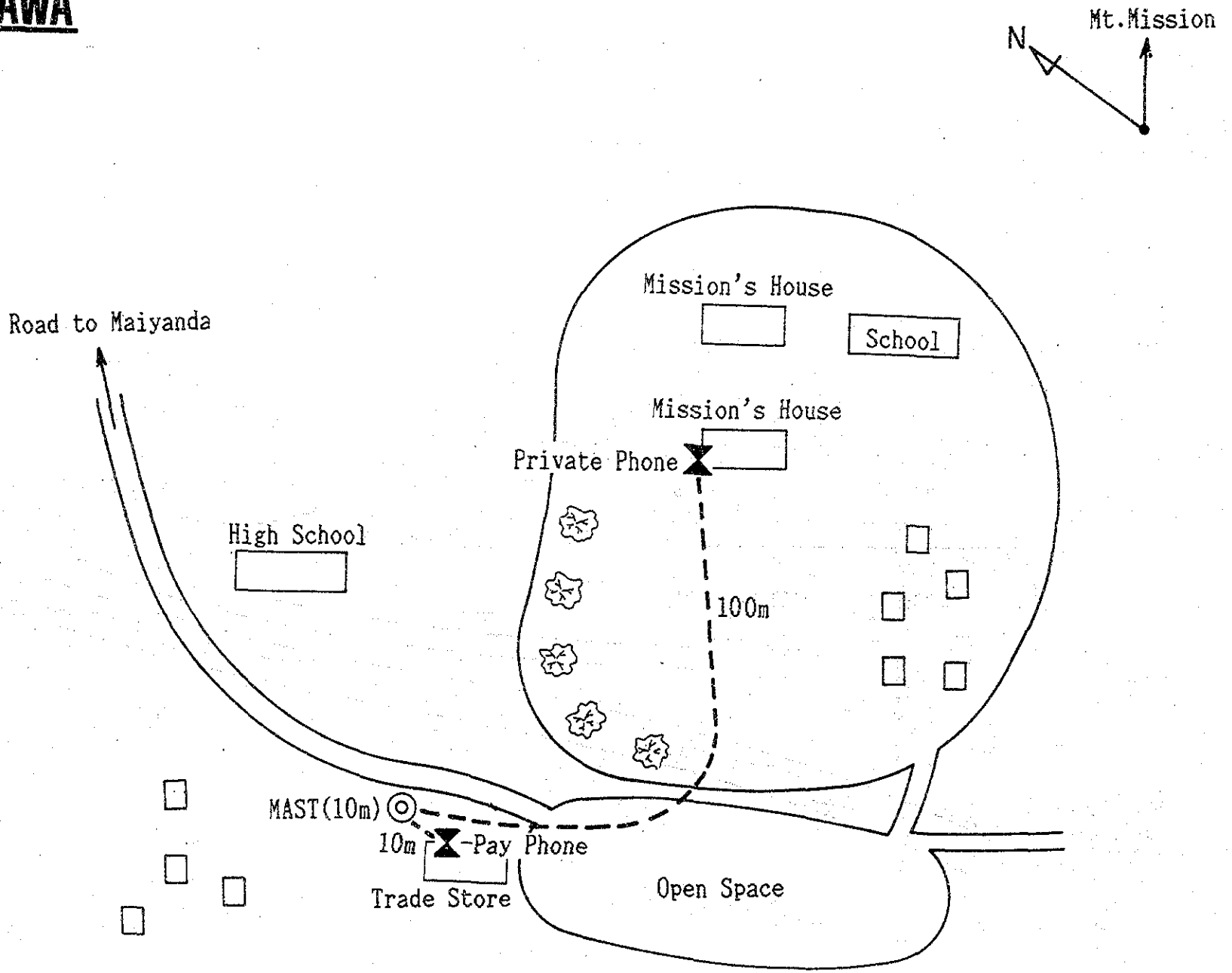
Annex-3-2

WANDUMI



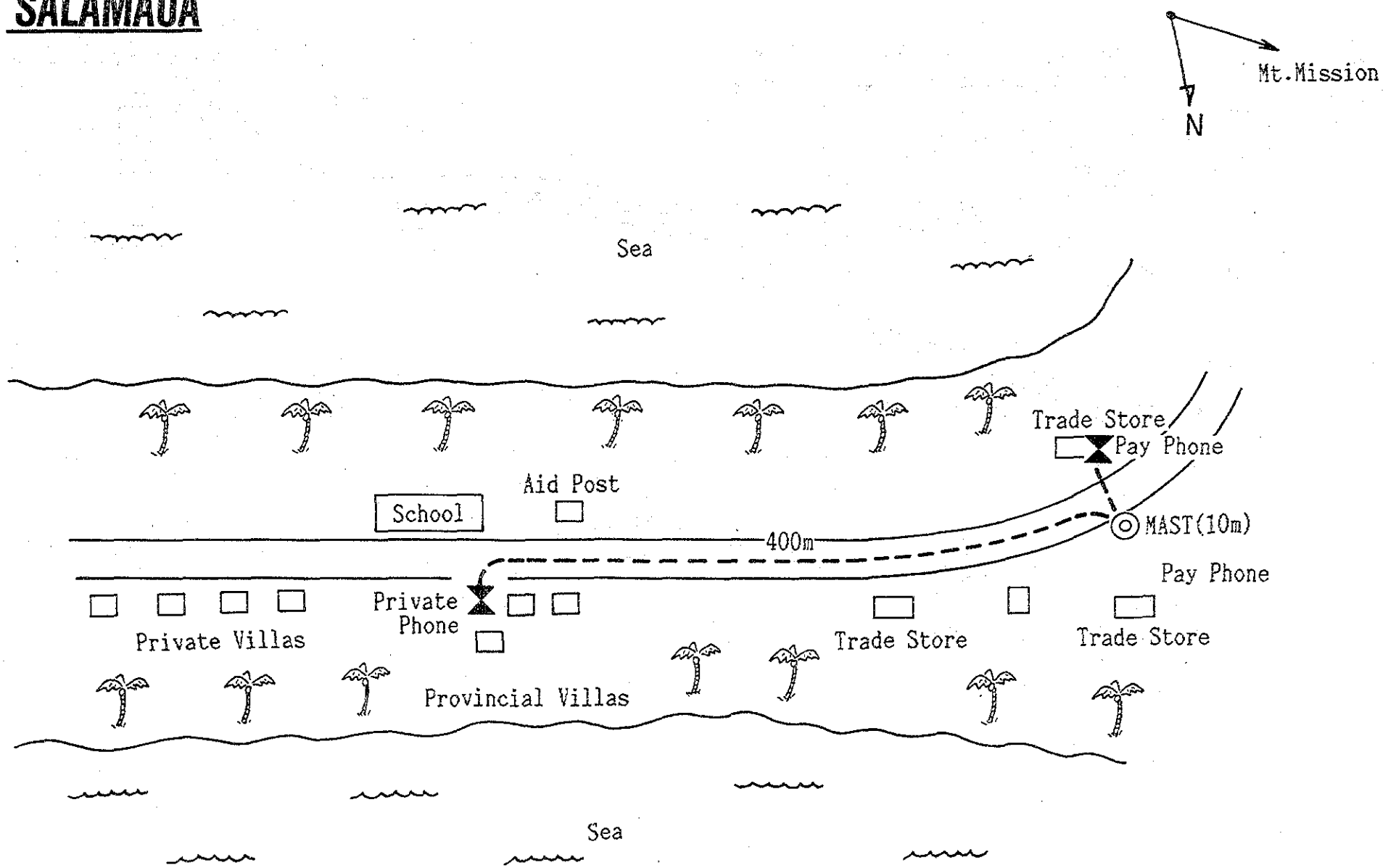
Annex-3-3

YAIWAHAWA



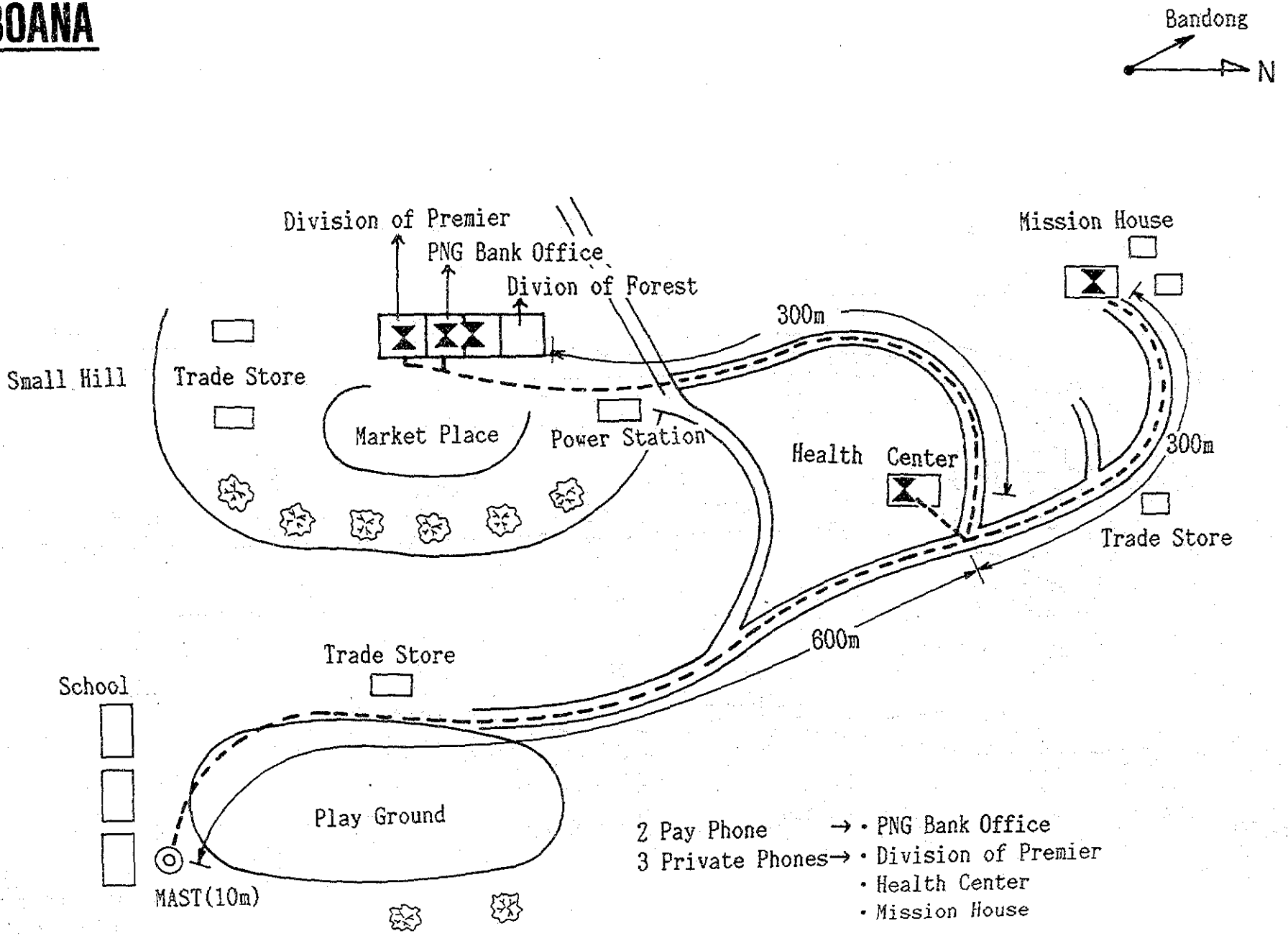
Annex-3-4

SALAMAUA



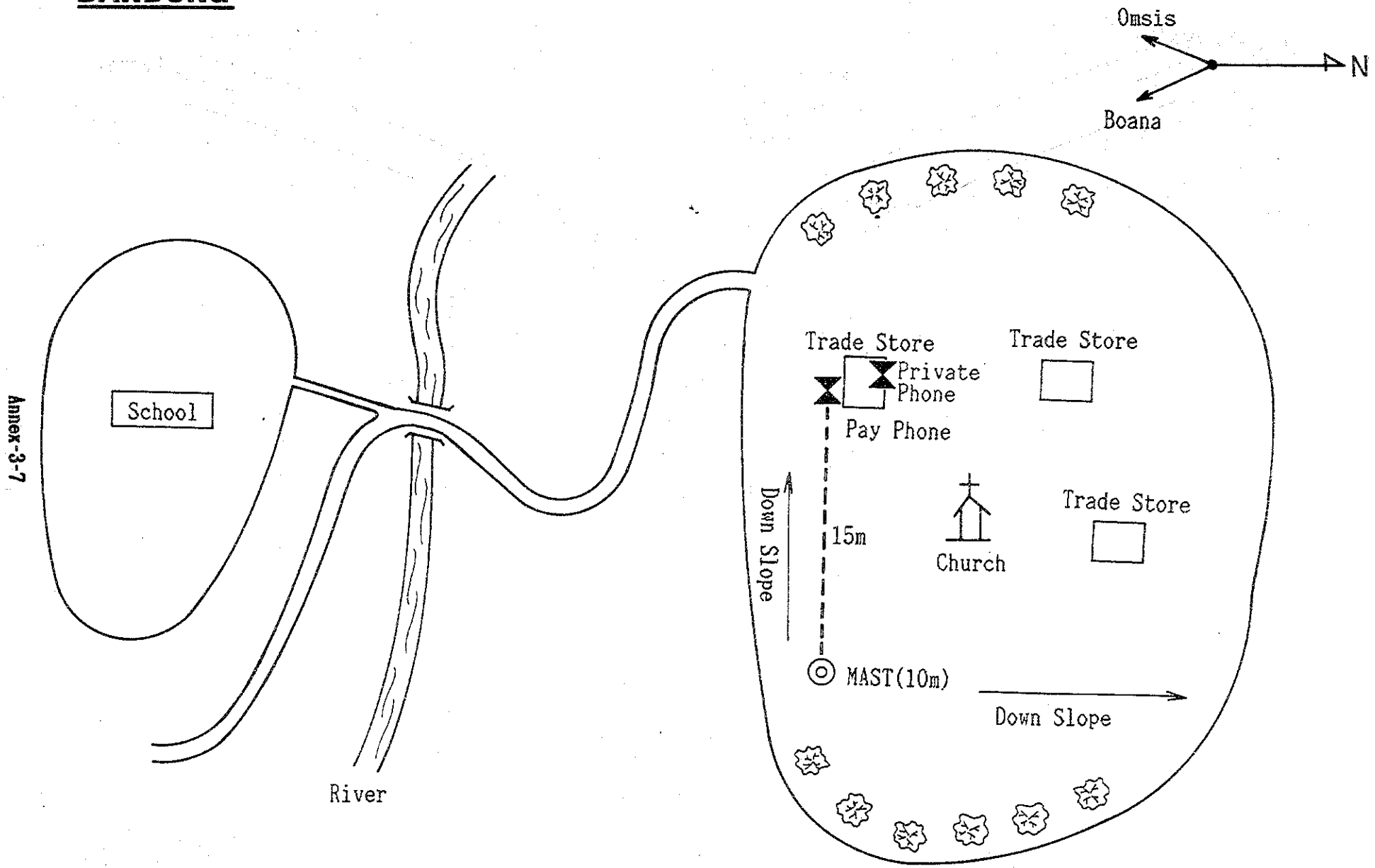
Annex-3-5

BOANA



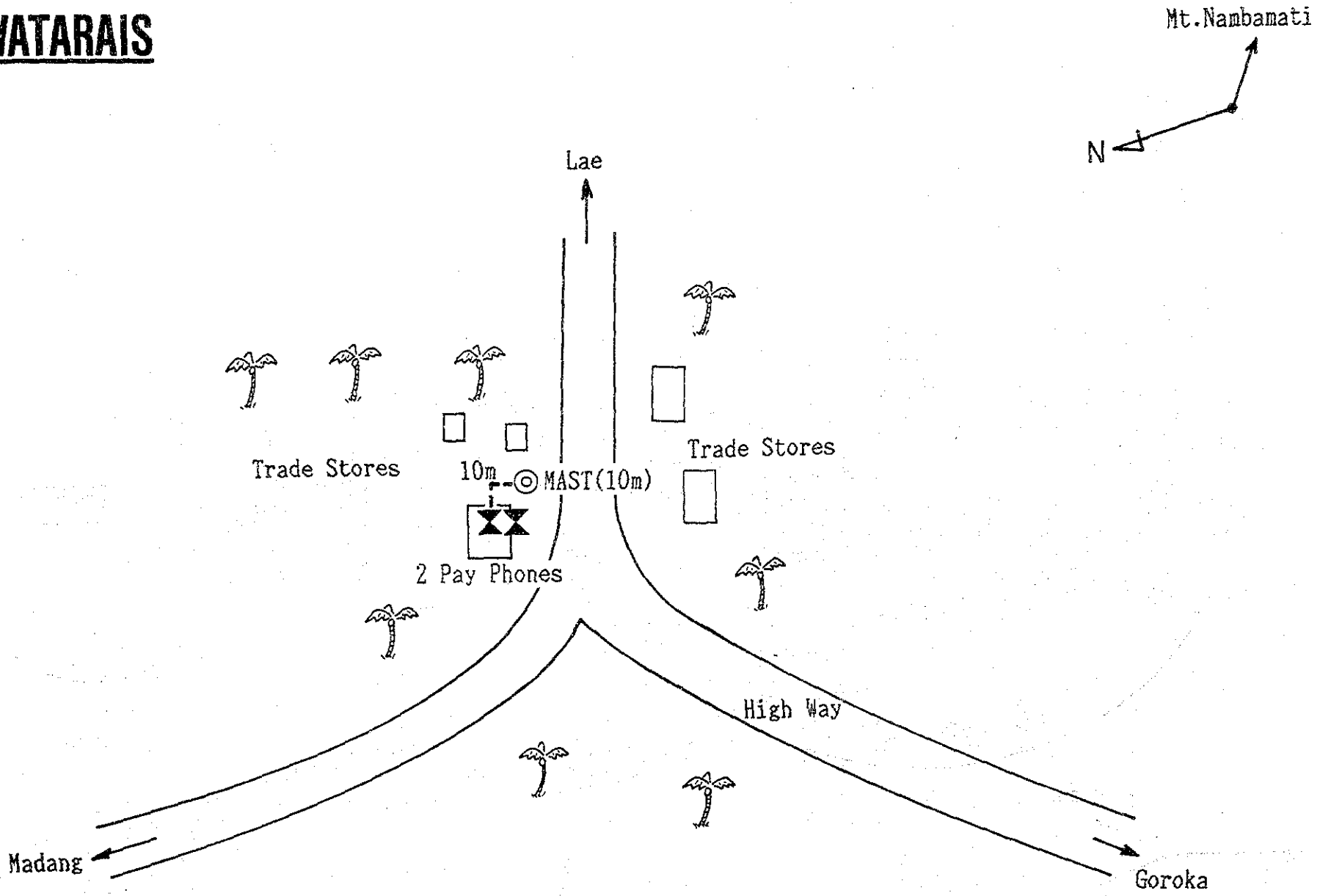
Annex-3-8

BANDONG



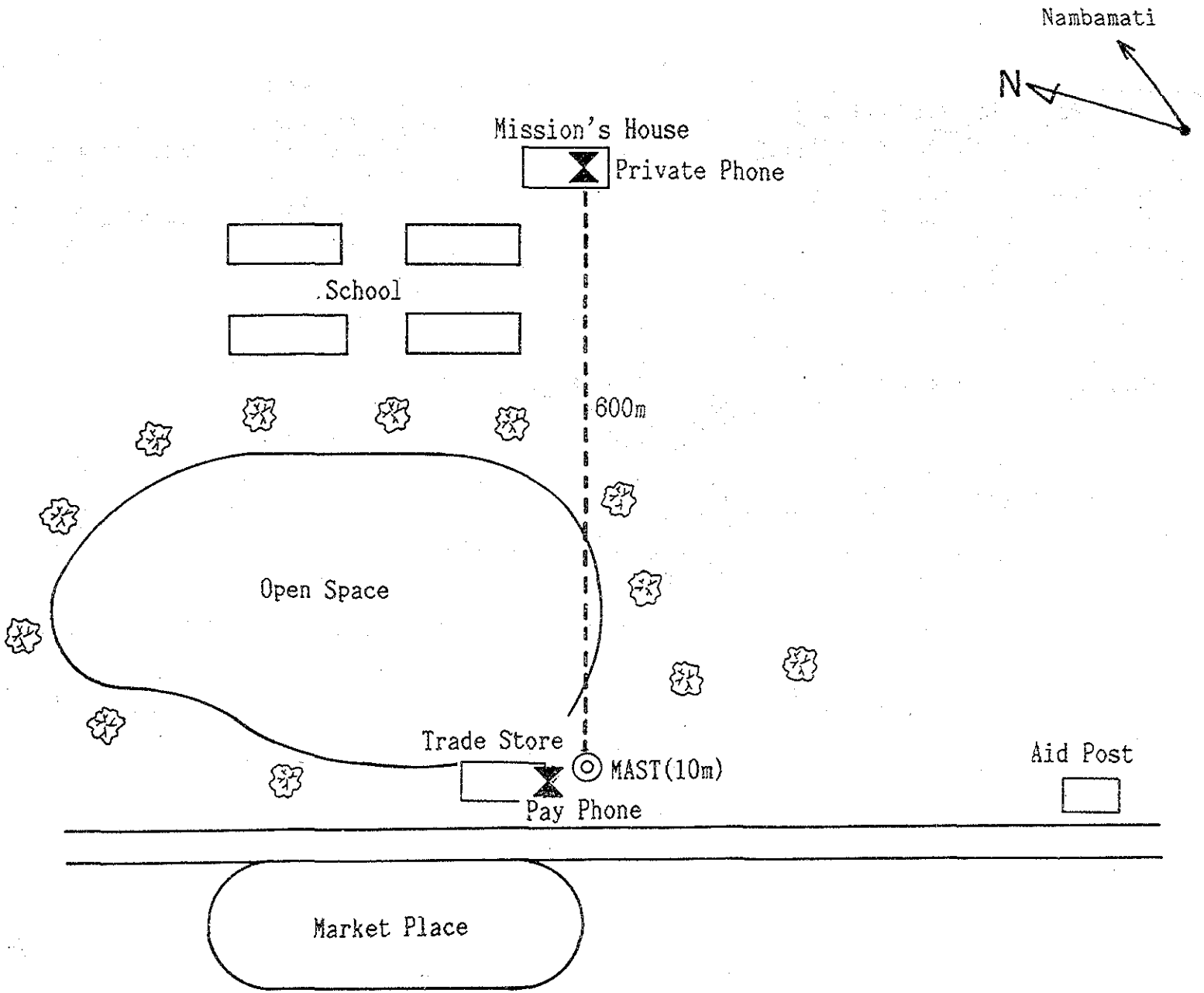
Annex-3-7

WATARAIS



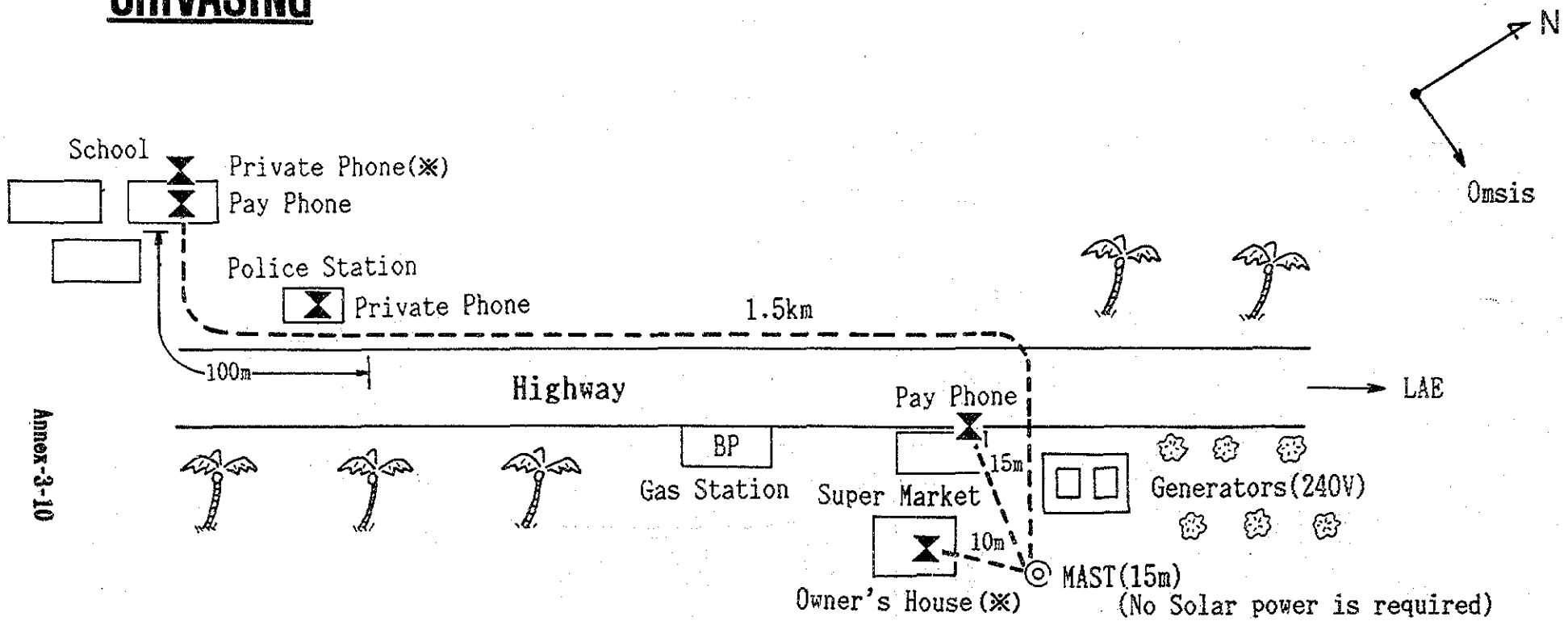
Annex-3-8

KAIAPIT



Annex-3-9

CHIVASING



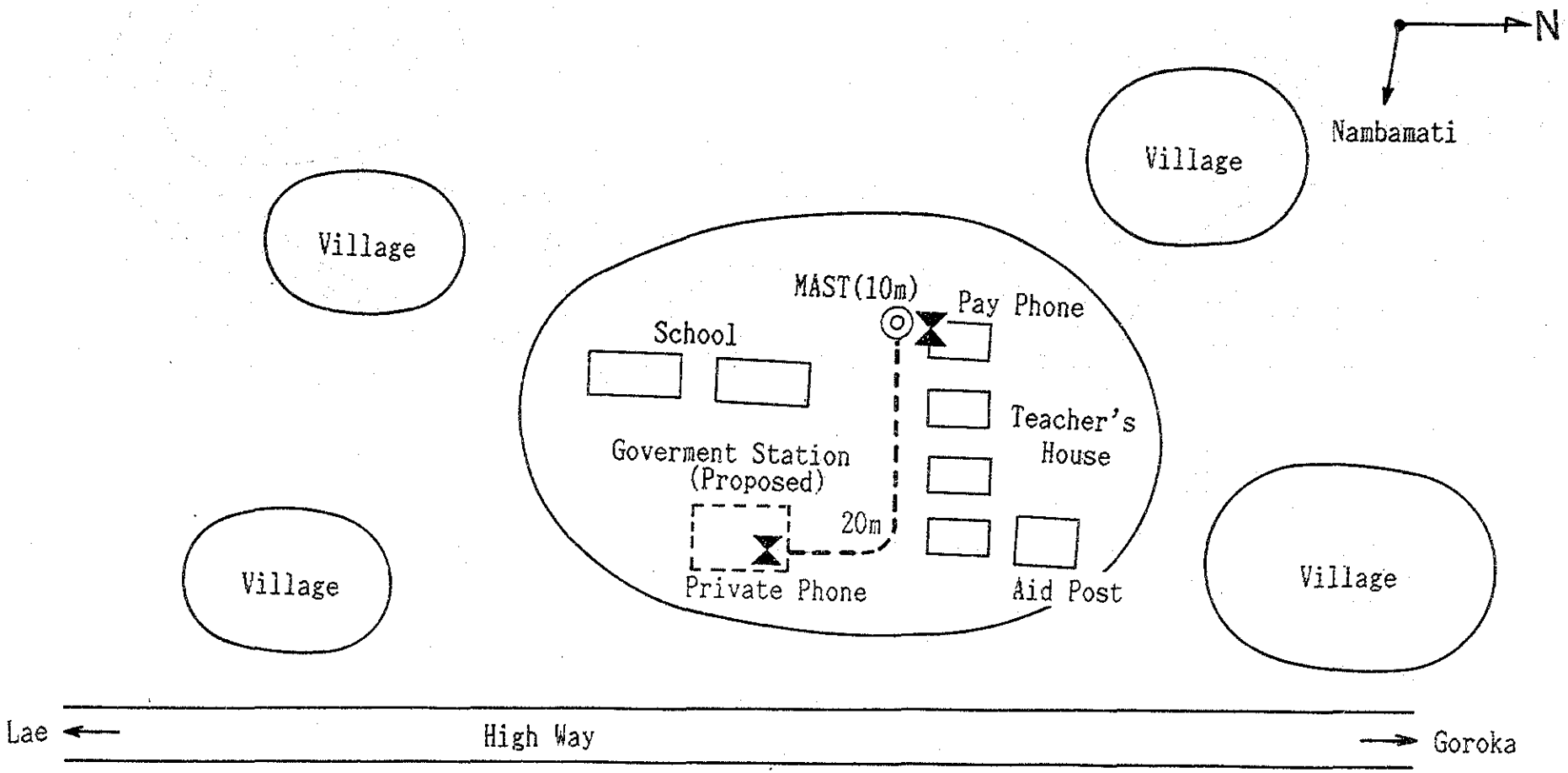
Annex-3-10

2 Pay Phones
- School
- Super Market

3 Private Phones
- Police Station
- Super Market Owner
- School

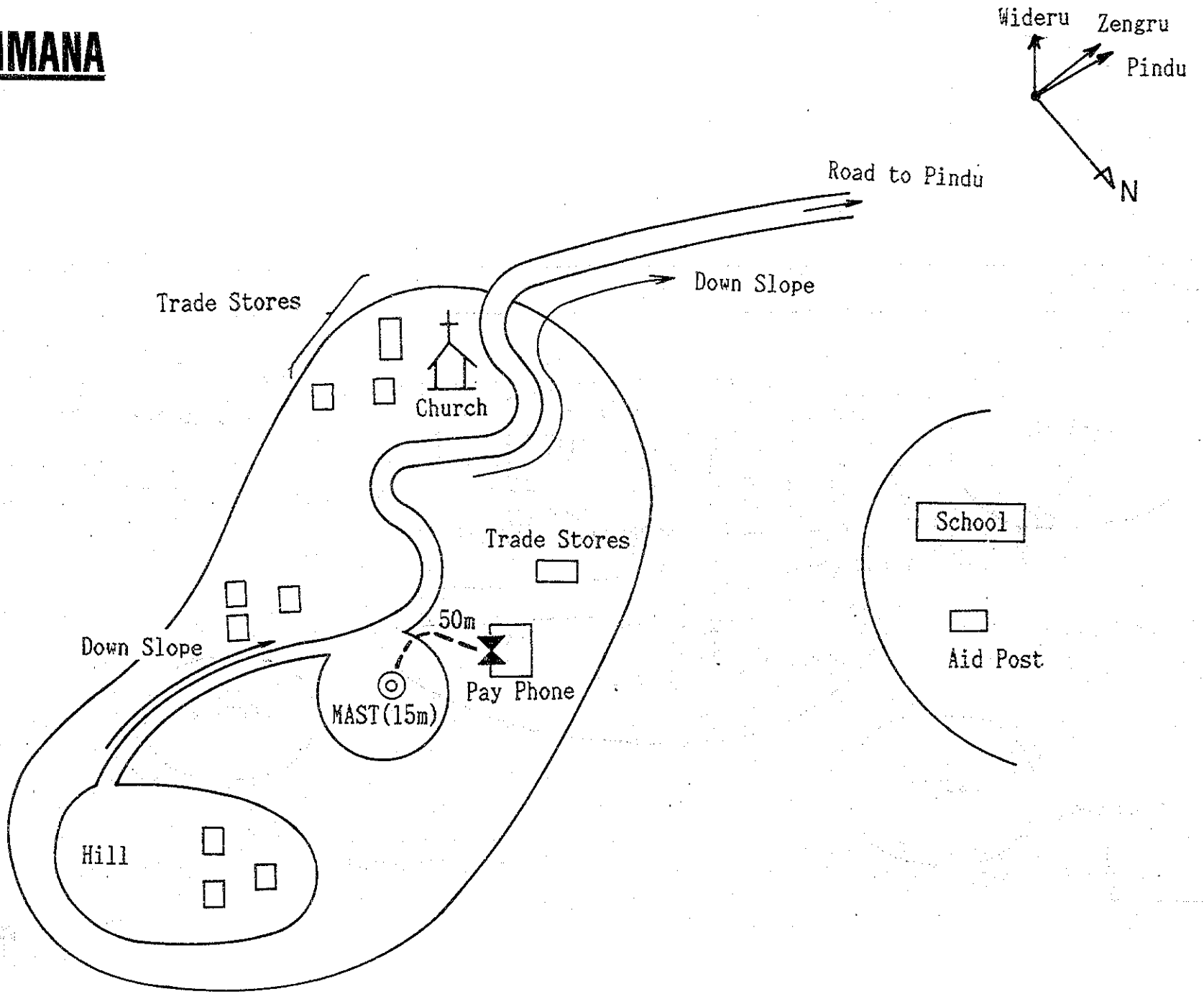
(※) Private Phone
(Replace Existing Telephone)

UMI



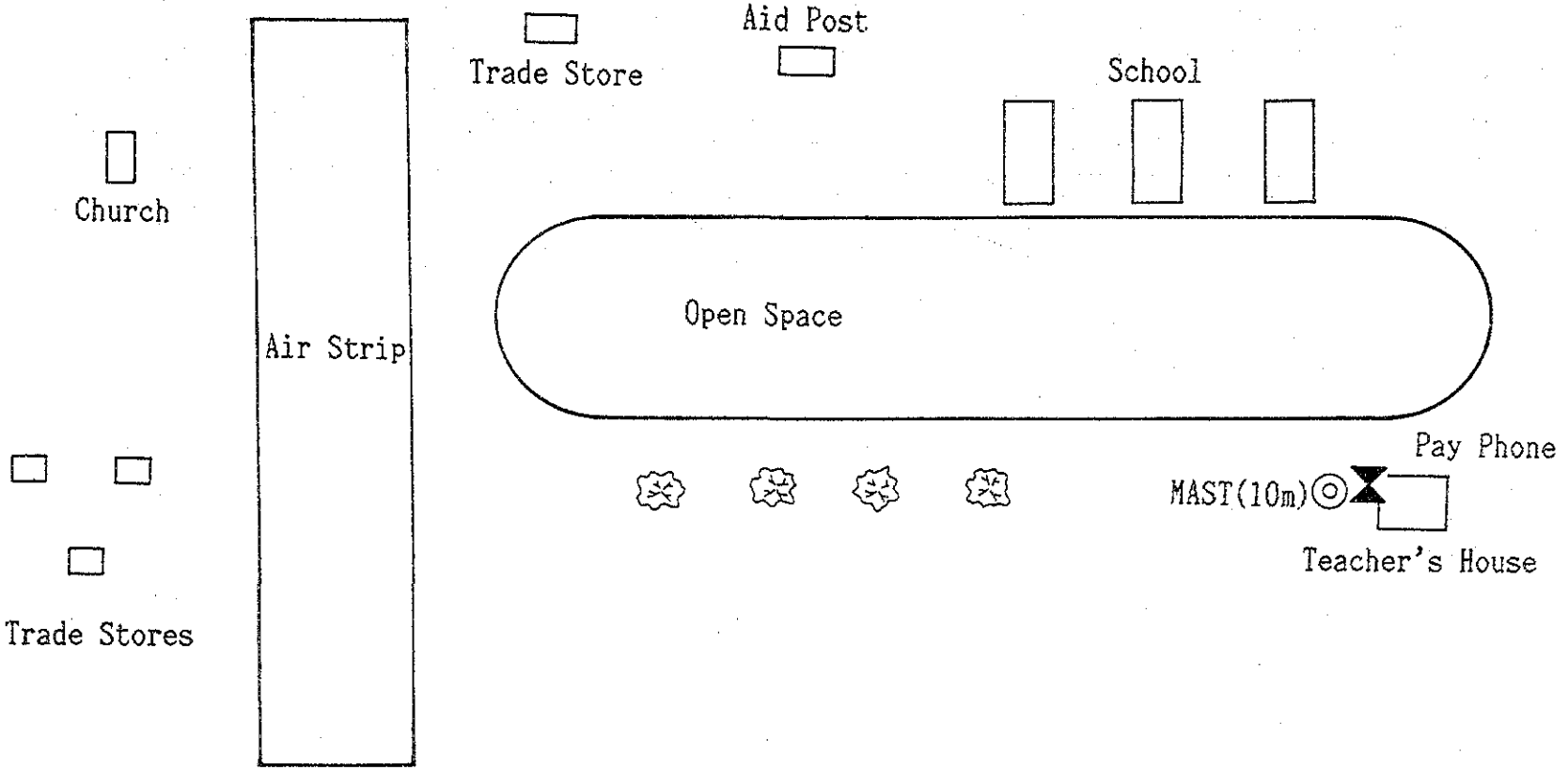
Annex-3-11

SILIMANA

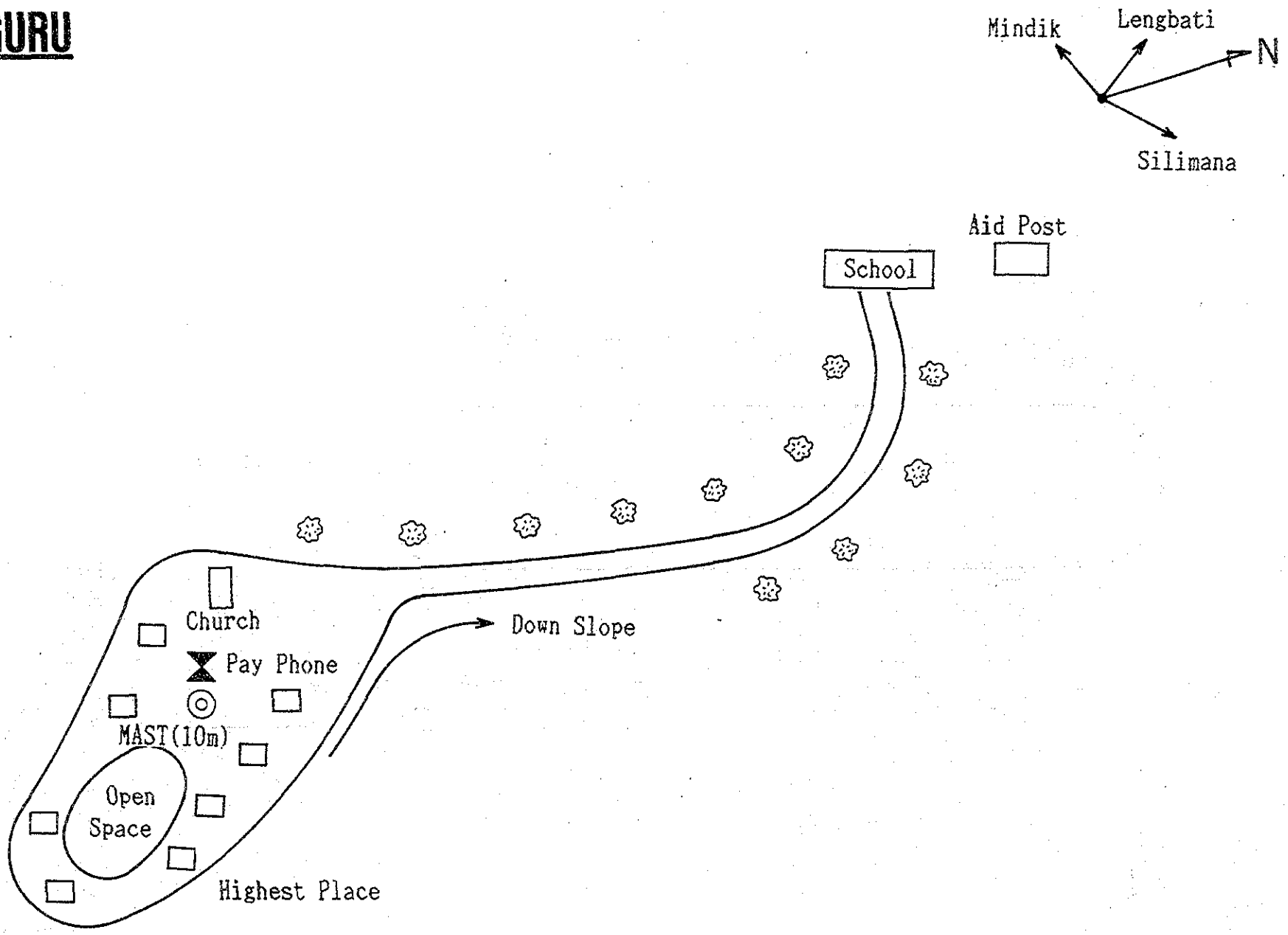

Wideru
Zengru
Pindu
N
Road to Pindu
Down Slope
Trade Stores
Church
School
Trade Stores
50m
Down Slope
Pay Phone
MAST(15m)
Aid Post
Hill

LENGBATI

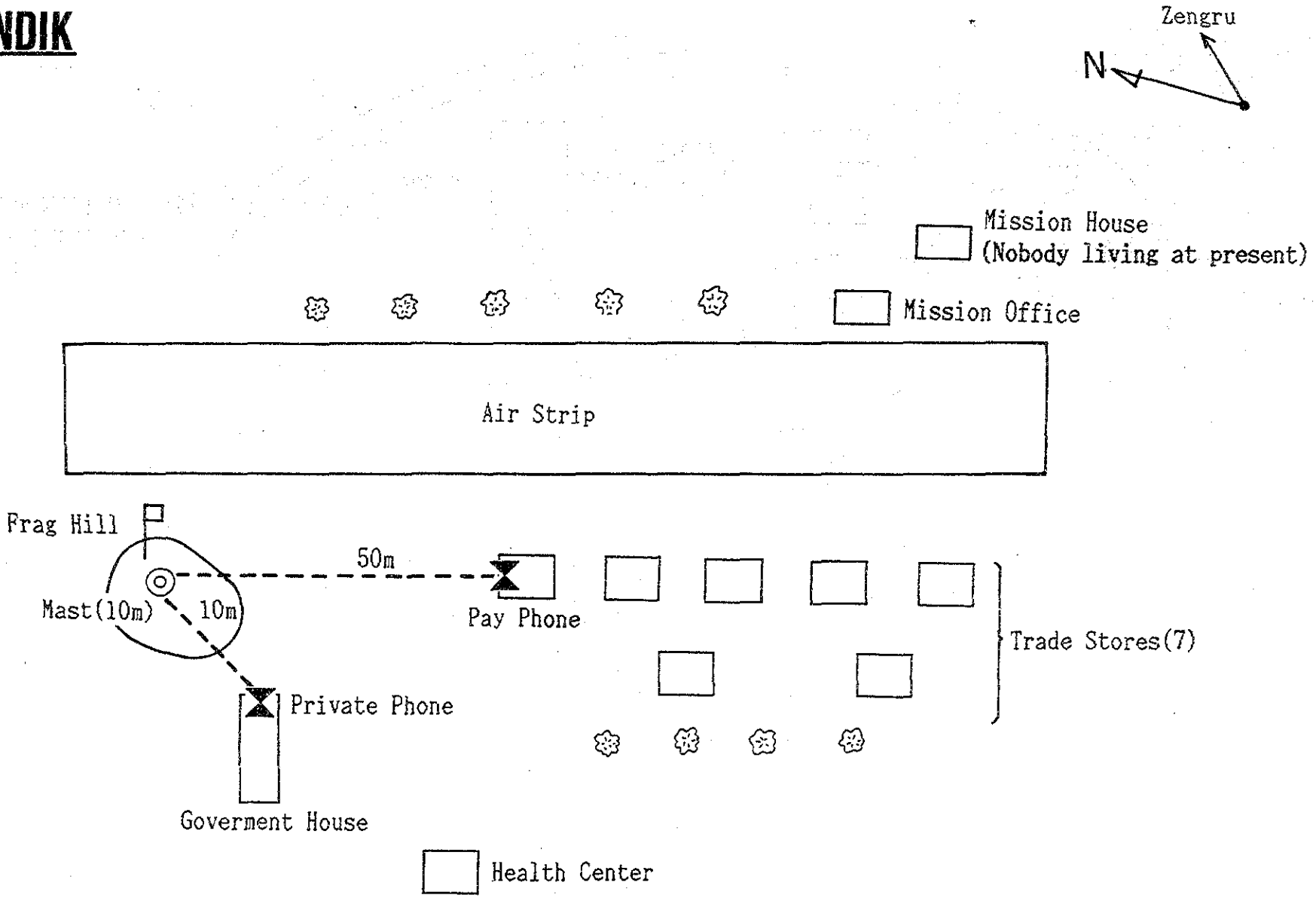

N
Zengru


Trade Store
Aid Post
School
Church
Air Strip
Open Space
Pay Phone
MAST(10m)
Teacher's House
Trade Stores

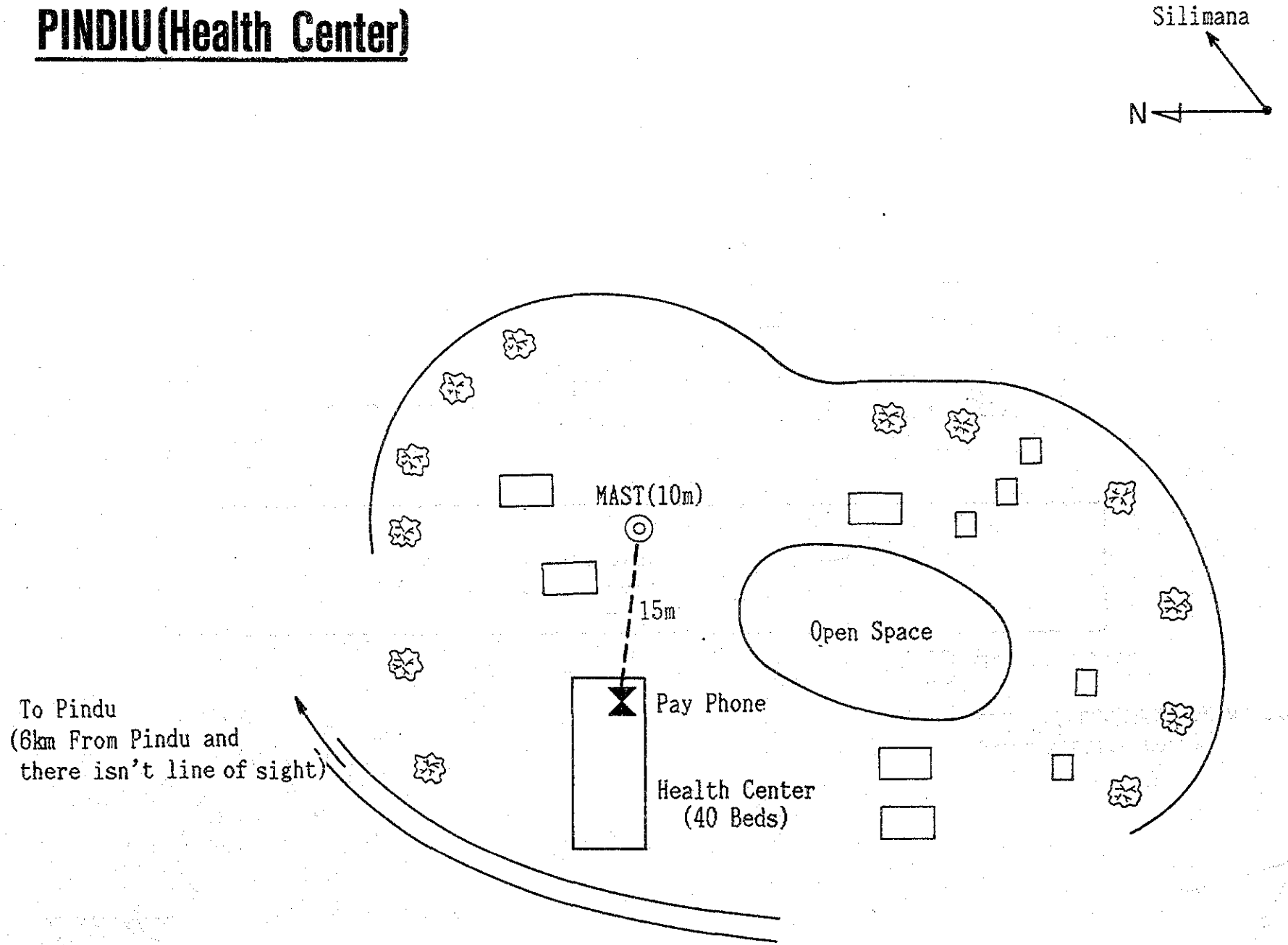
ZENGURU


Mindik
Lengbati
N
Silimana
Aid Post
School
Church
Pay Phone
MAST(10m)
Open Space
Highest Place
Down Slope

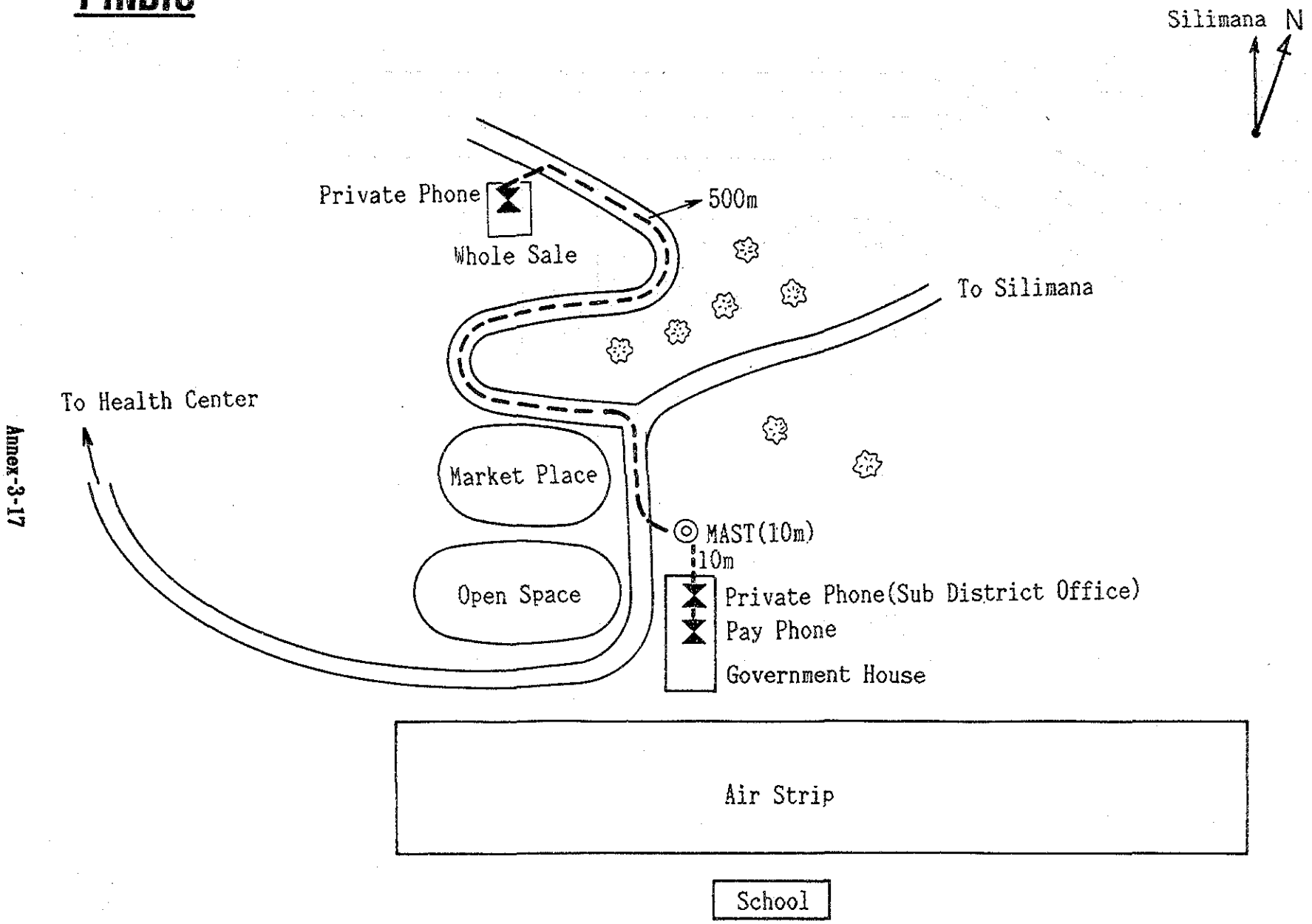
MINDIK


Zengru
N
Mission House
(Nobody living at present)
Mission Office
Air Strip
Frag Hill
50m
Mast(10m)
10m
Pay Phone
Trade Stores(7)
Private Phone
Goverment House
Health Center

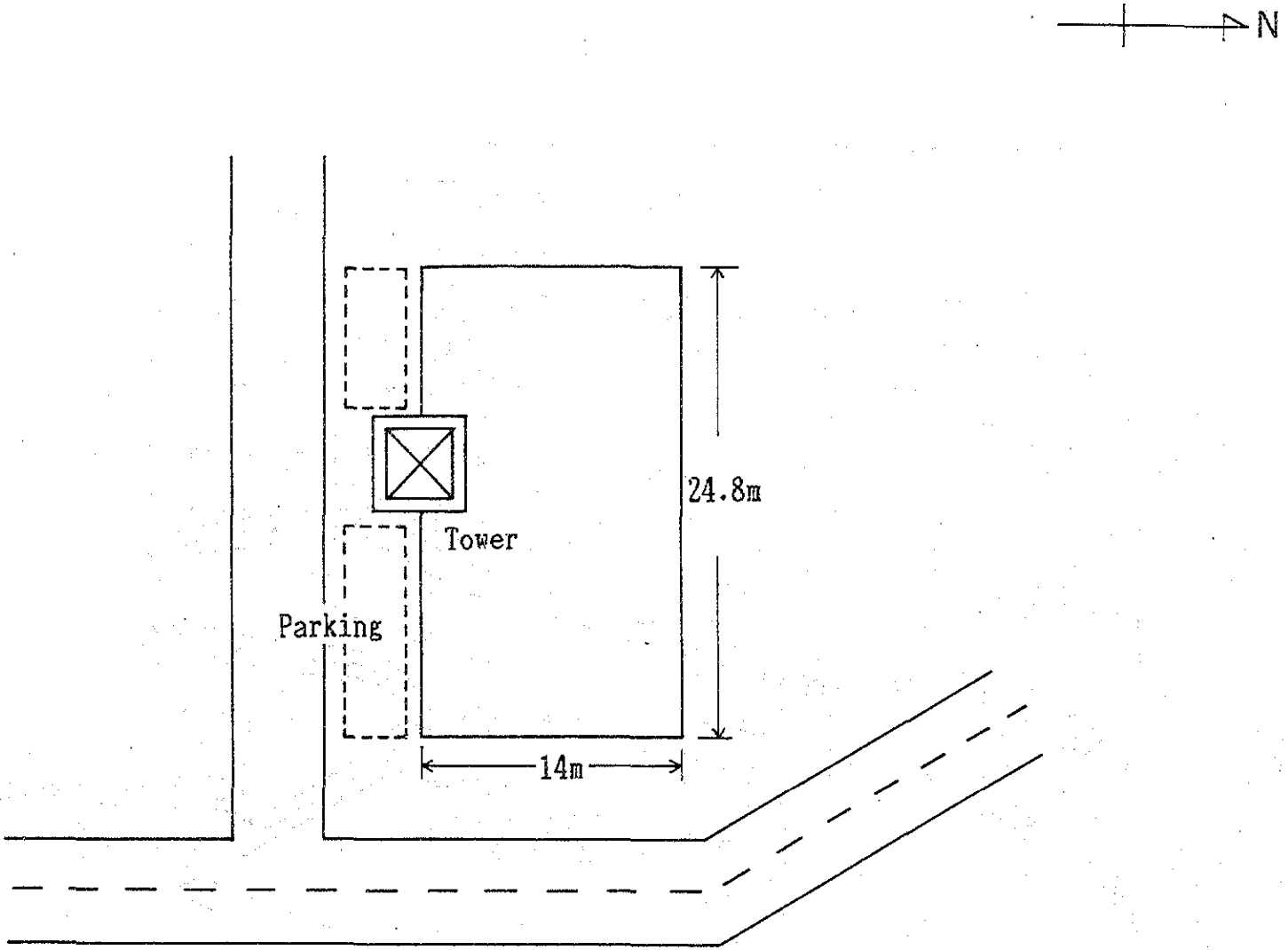
PINDIU(Health Center)

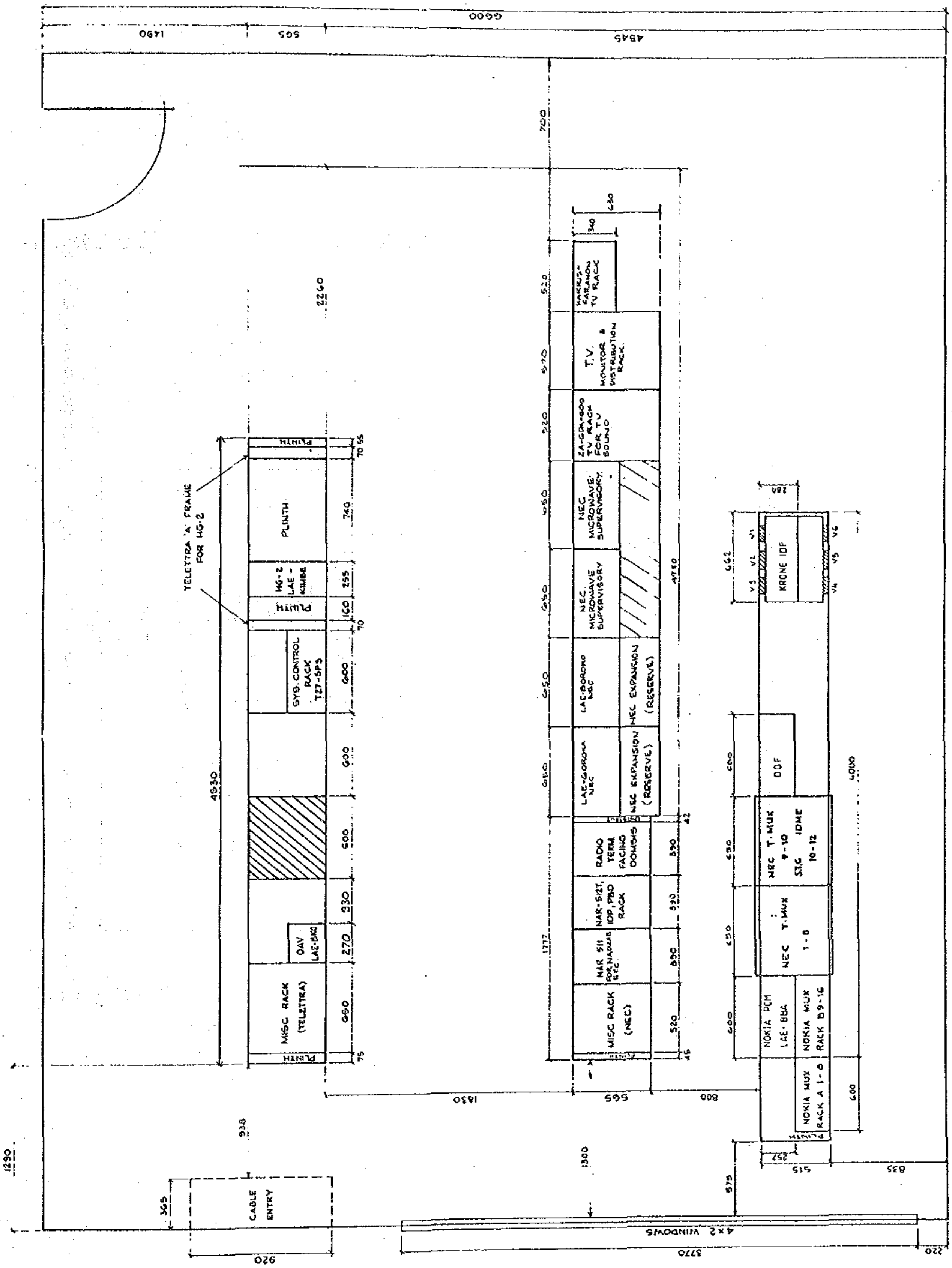


PINDIU


Silimana N
Private Phone
Whole Sale
500m
To Silimana
To Health Center
Market Place
Open Space
MAST(10m)
10m
Private Phone(Sub District Office)
Pay Phone
Government House
Air Strip
School

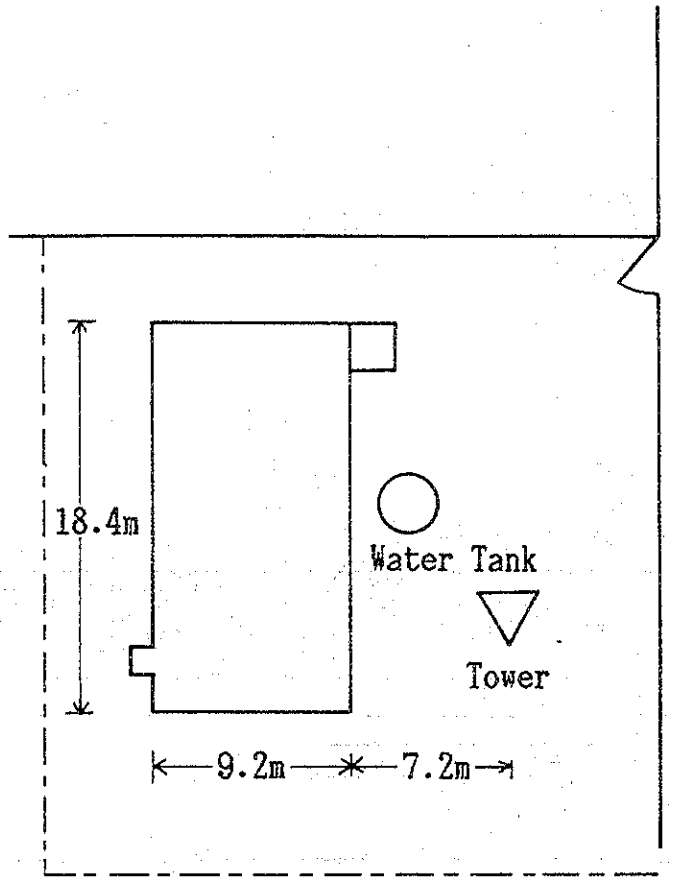
LAE

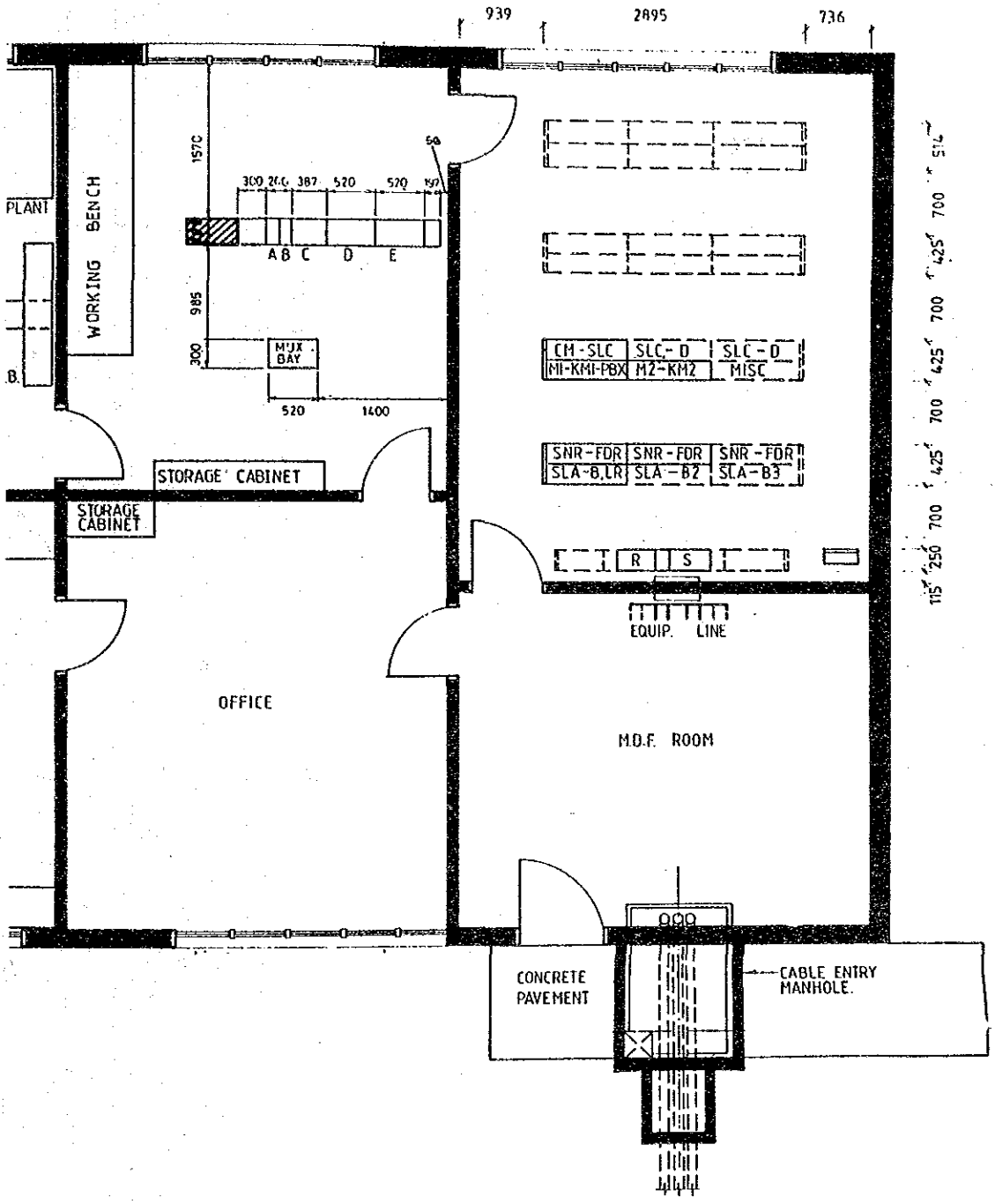



6600
1480
505
4545
700
2260
4930
TELETTRA 'A' FRAME FOR HG-2
PLINTH
HG-2 LAE-KIMBE
MISC RACK (TELETTRA)
MISC RACK (NEC)
RADIO TERM. FACING DOWNS
NEC EXPANSION (RESERVE)
LAE-GOROKA NEC
LAE-BOROKO NEC
NEC MICROWAVE SUPERVISORY
T.V. MONITOR & DISTRIBUTION RACK
KRONE IDF
DDF
NEC T-MUX 1-8
NOKIA PCM
NOKIA MUX RACK B9-16
NOKIA MUX RACK A 1-8
CABLE ENTRY
4x2 WINDOWS
1830
800
1300
920
3770

LAE

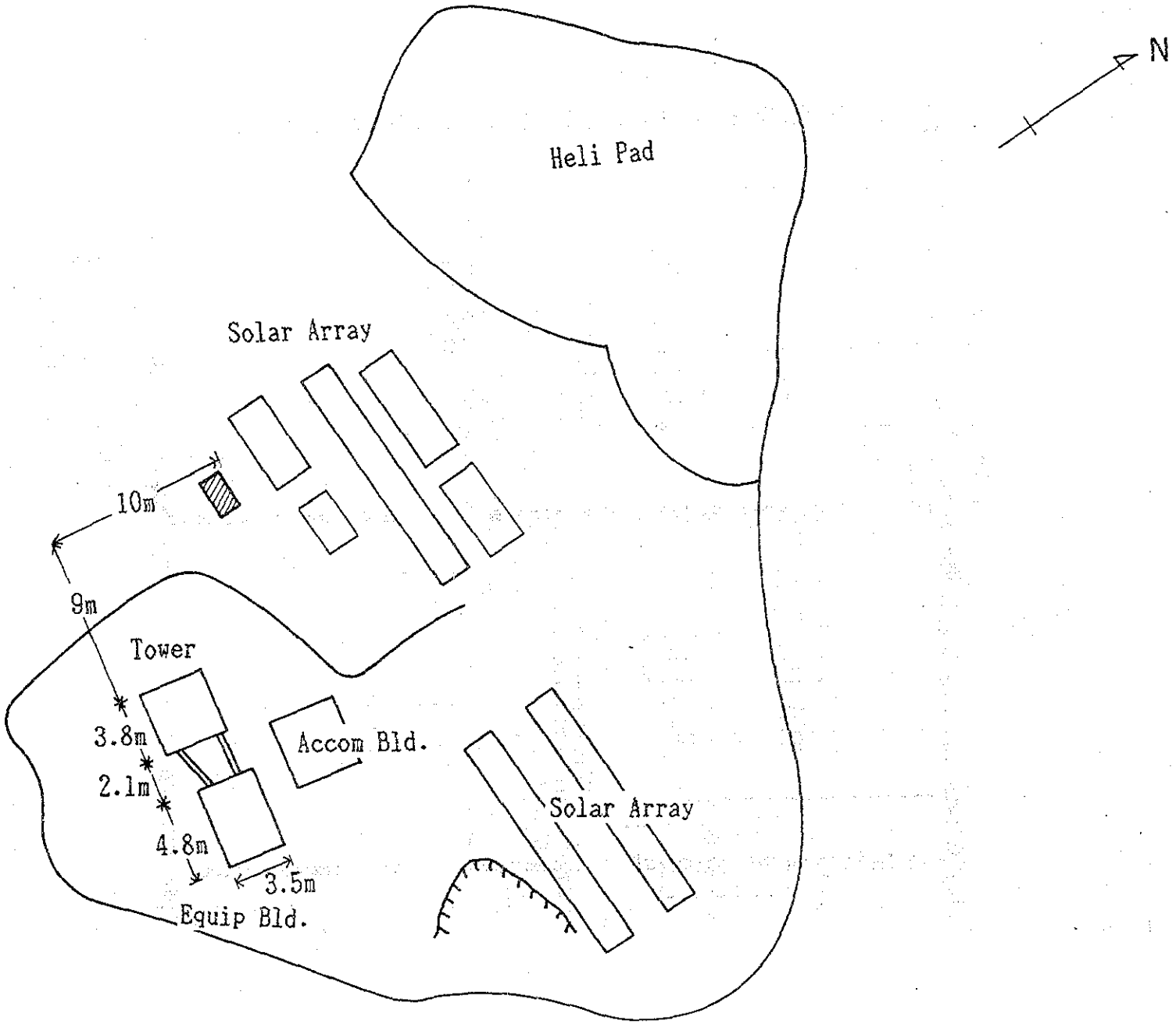
WAU



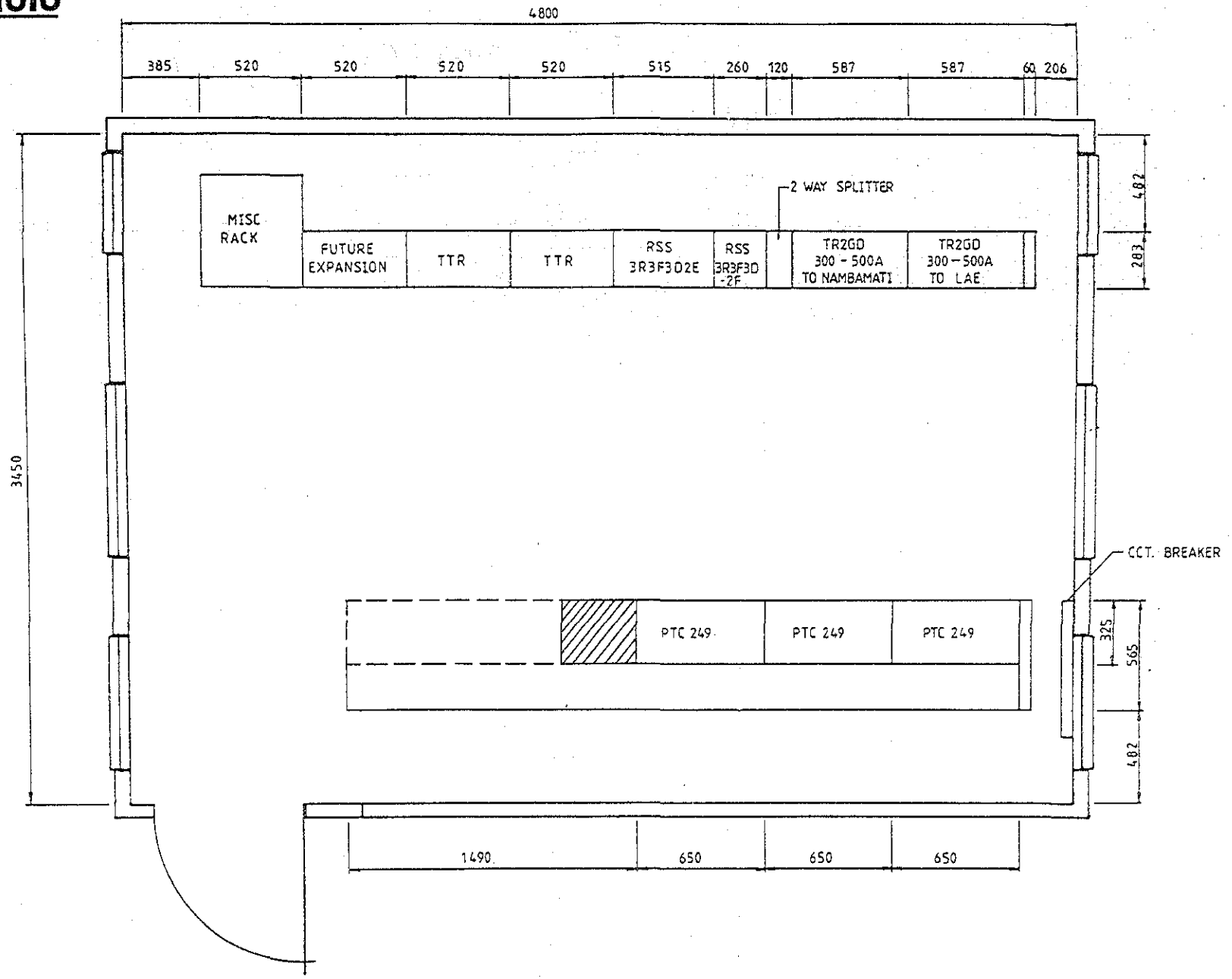

939
2895
736
PLANT
WORKING BENCH
B.
157C
985
300
MUX BAY
520
1400
A B C D E
CM-SLC
MI-KMI-PBX
SLC-D
M2-KM2
SLC-D
MISC
SNR-FDR
SLA-B,LR
SNR-FDR
SLA-B2
SNR-FDR
SLA-B3
R
S
EQUIP. LINE
STORAGE CABINET
STORAGE CABINET
OFFICE
M.D.F. ROOM
CONCRETE PAVEMENT
CABLE ENTRY MANHOLE.

WAU

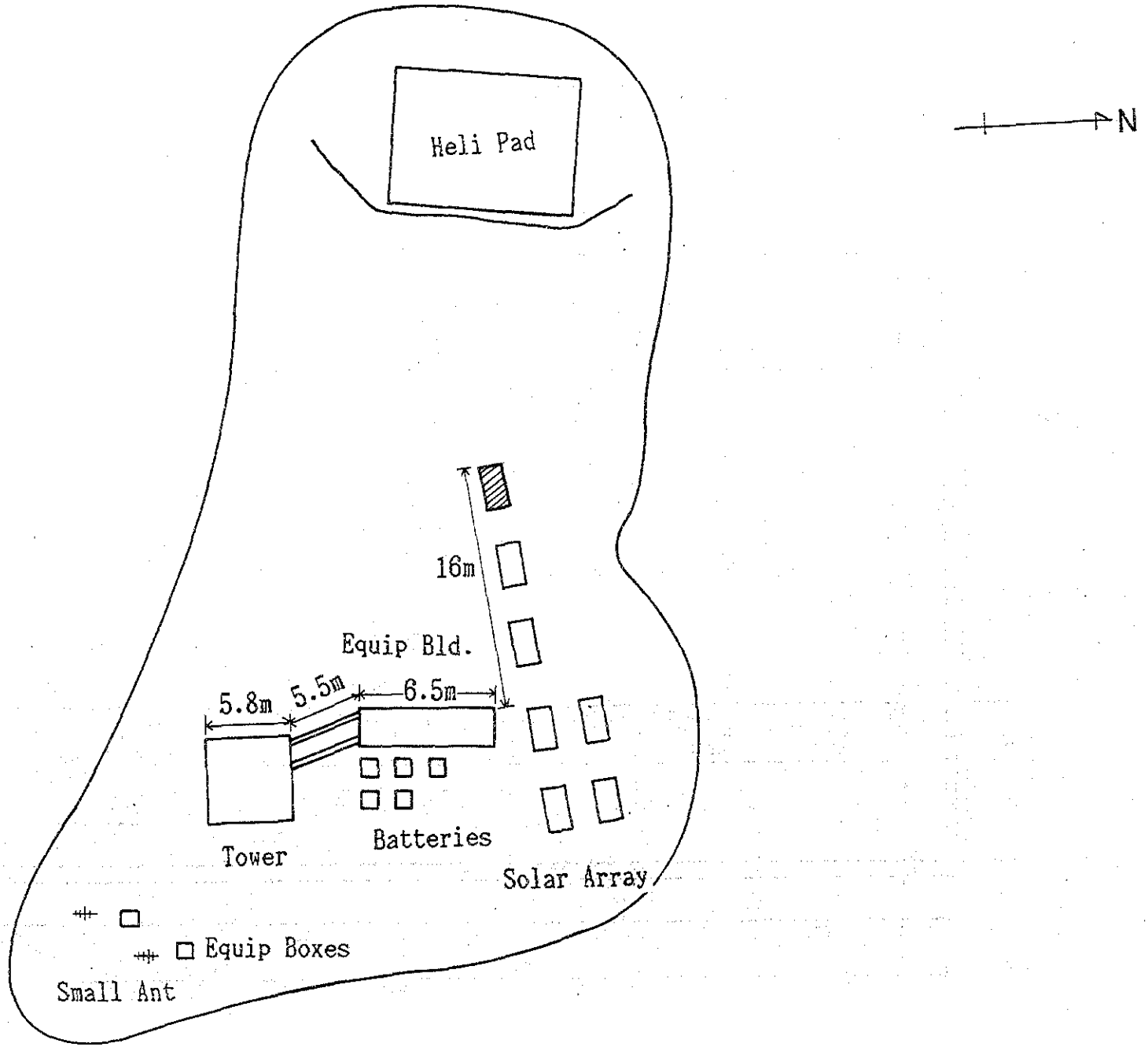
OMSIS


N
Heli Pad
Solar Array
10m
9m
Tower
3.8m
2.1m
4.8m
3.5m
Equip Bld.
Accom Bld.
Solar Array

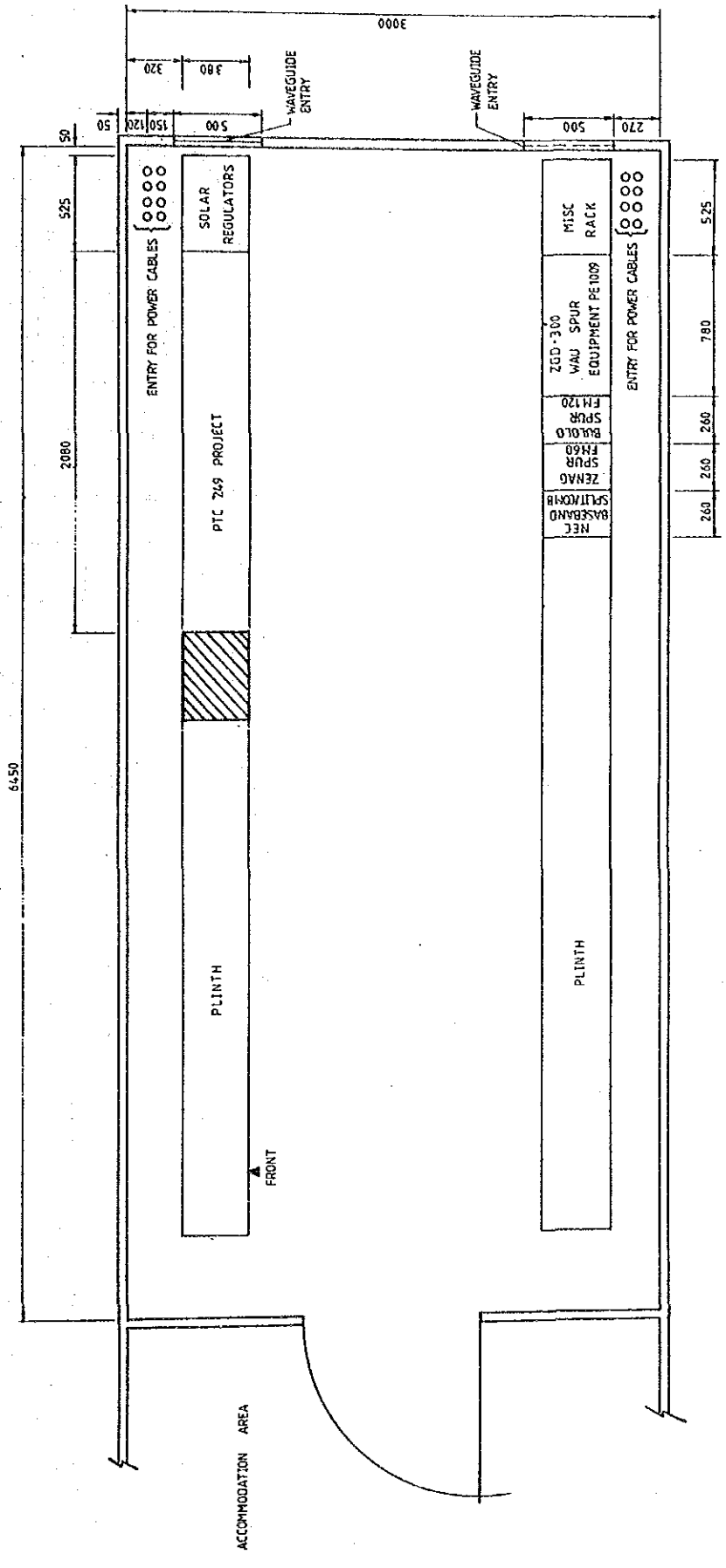
OMSIS


4800
385
520
520
520
520
515
260
120
587
587
60
206
3450
MISC RACK
FUTURE EXPANSION
TTR
TTR
RSS 3R3F3D2E
RSS 3R3F3D -2F
2 WAY SPLITTER
TR2GD 300 - 500A TO NAMBAMATI
TR2GD 300 - 500A TO LAE
482
283
CCT. BREAKER
PTC 249
PTC 249
PTC 249
325
565
482
1490
650
650
650

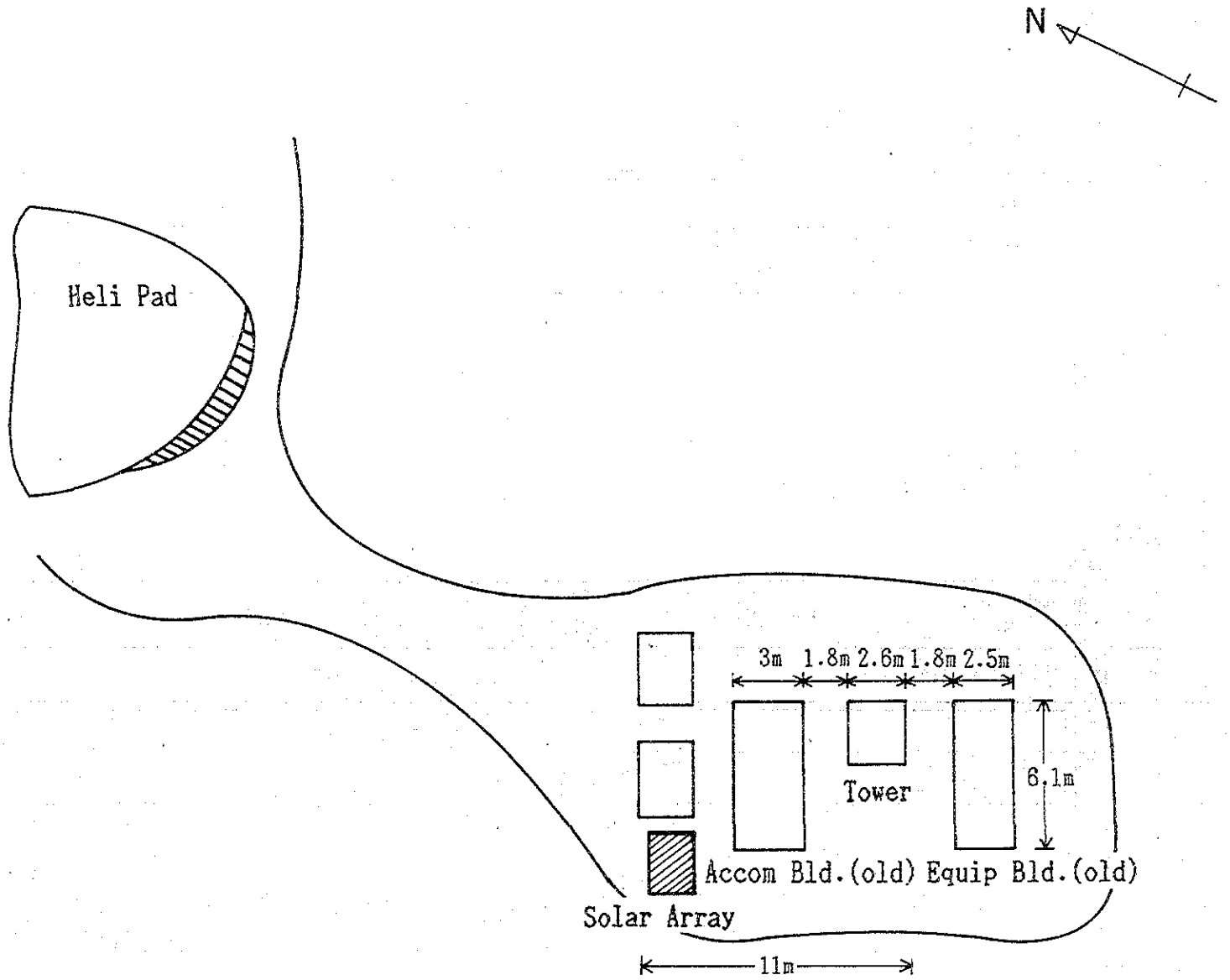
Mt. MISSION


Heli Pad
N
16m
Equip Bld.
5.8m
5.5m
6.5m
Tower
Batteries
Solar Array
Equip Boxes
Small Ant

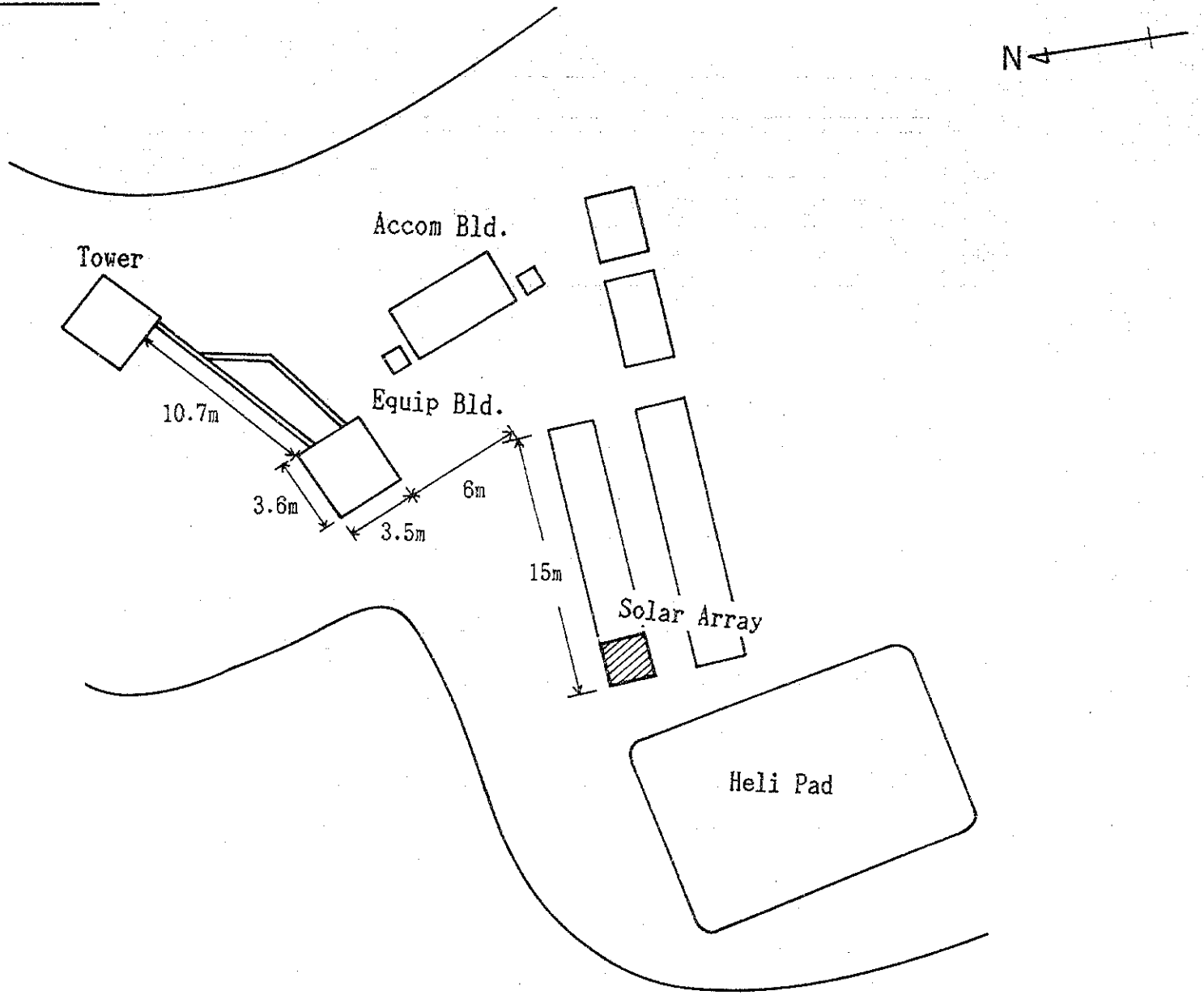
Mt. MISSION


3000
320
380
WAVEGUIDE ENTRY
WAVEGUIDE ENTRY
50
120
150
500
500
270
50
525
2080
6450
ENTRY FOR POWER CABLES
SOLAR REGULATORS
PTC 249 PROJECT
PLINTH
FRONT
MISC RACK
ZGD-300 WAU SPUR EQUIPMENT PE1009
BLOLO SPUR FM120
ZENAG SPUR FM60
NEC BASEBAND SPLITCOM-B
PLINTH
ENTRY FOR POWER CABLES
525
780
260
260
260
ACCOMMODATION AREA

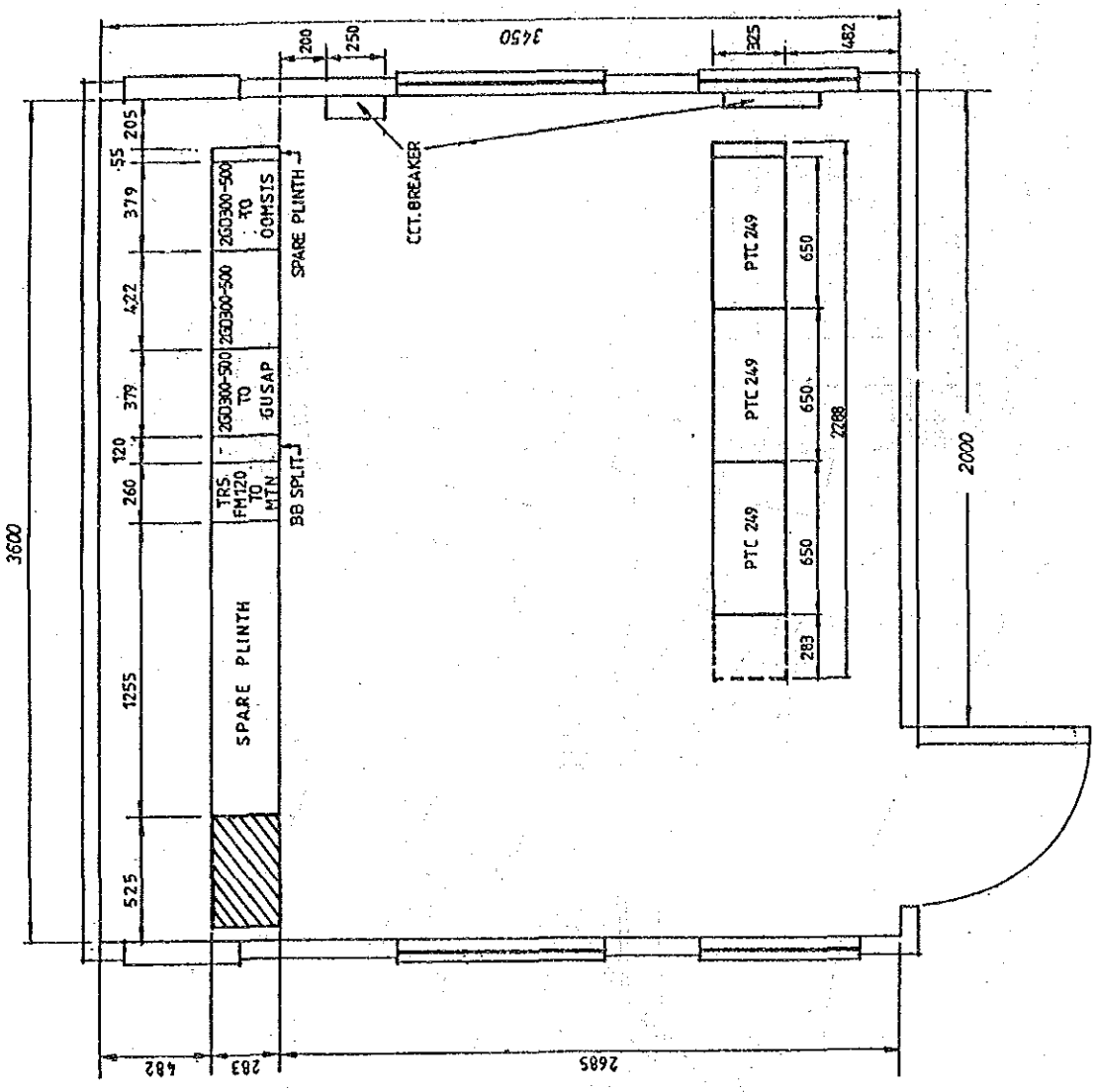
WIDERU


N
Heli Pad
3m 1.8m 2.6m 1.8m 2.5m
6.1m
Tower
Accom Bld.(old)
Equip Bld.(old)
Solar Array
11m

Mt. NAMBAMATI

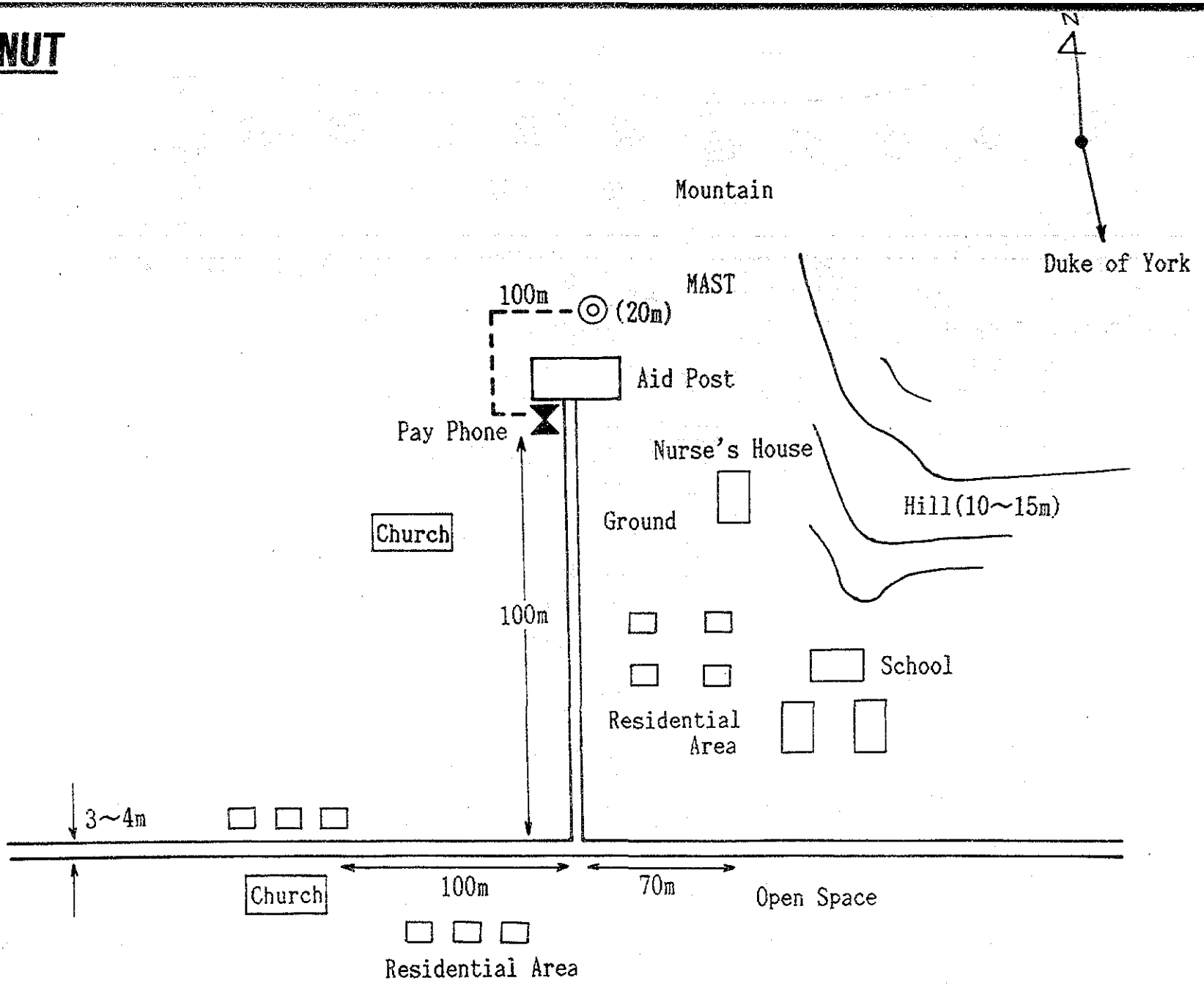


NAMBAMATI

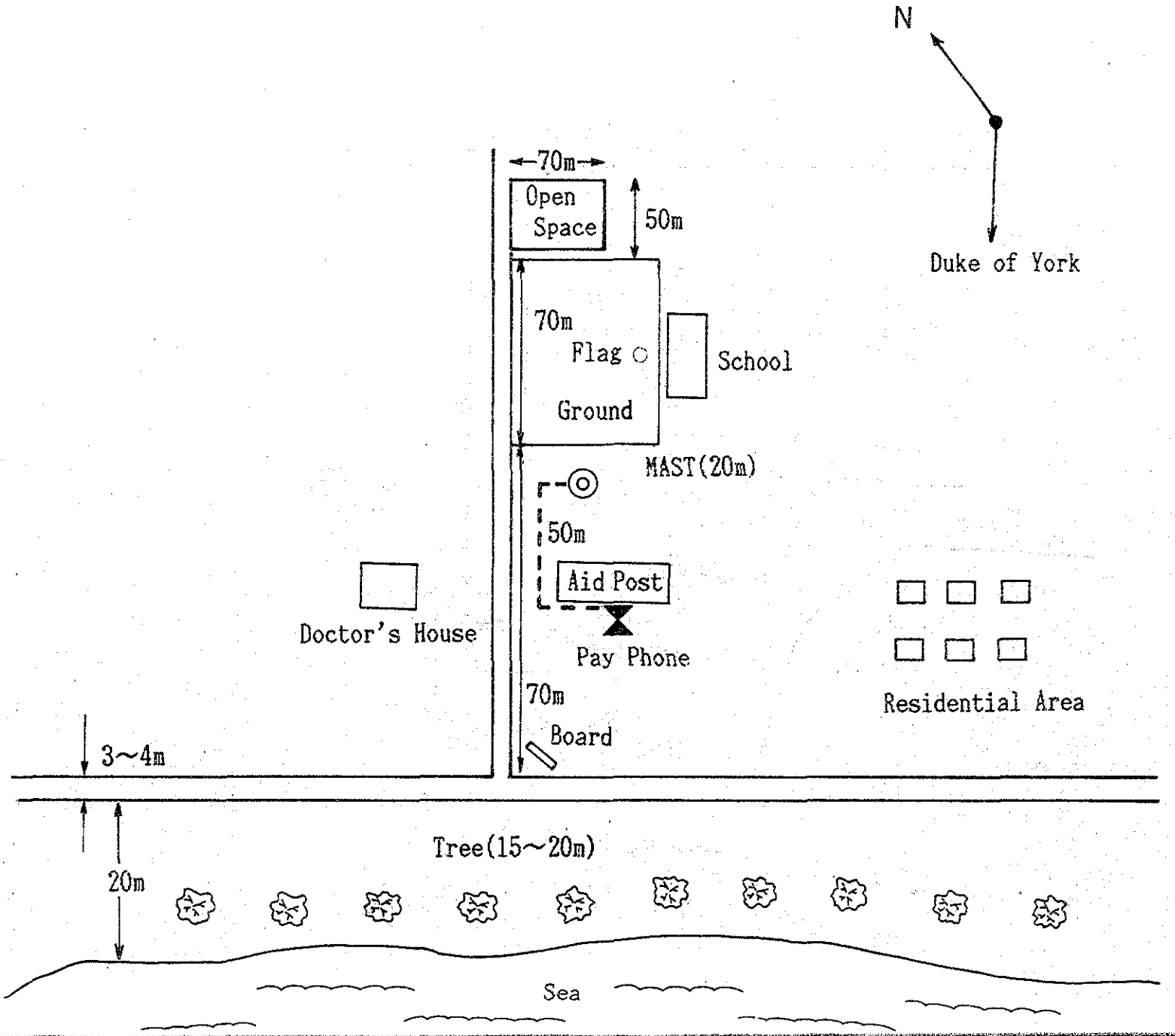

3450
200
250
325
482
205
55
379
422
379
120
260
1255
525
3600
2GD300-500 TO OOMSIS
2GD300-500
2GD300-500 TO GUSAP
TRS FM120 TO MTN
SPARE PLINTH
SPARE PLINTH
BB SPLIT
CCT.BREAKER
PTC 249
PTC 249
PTC 249
650
650
650
283
2288
2000
482
283
2685

NEW IRELAND PROVINCE

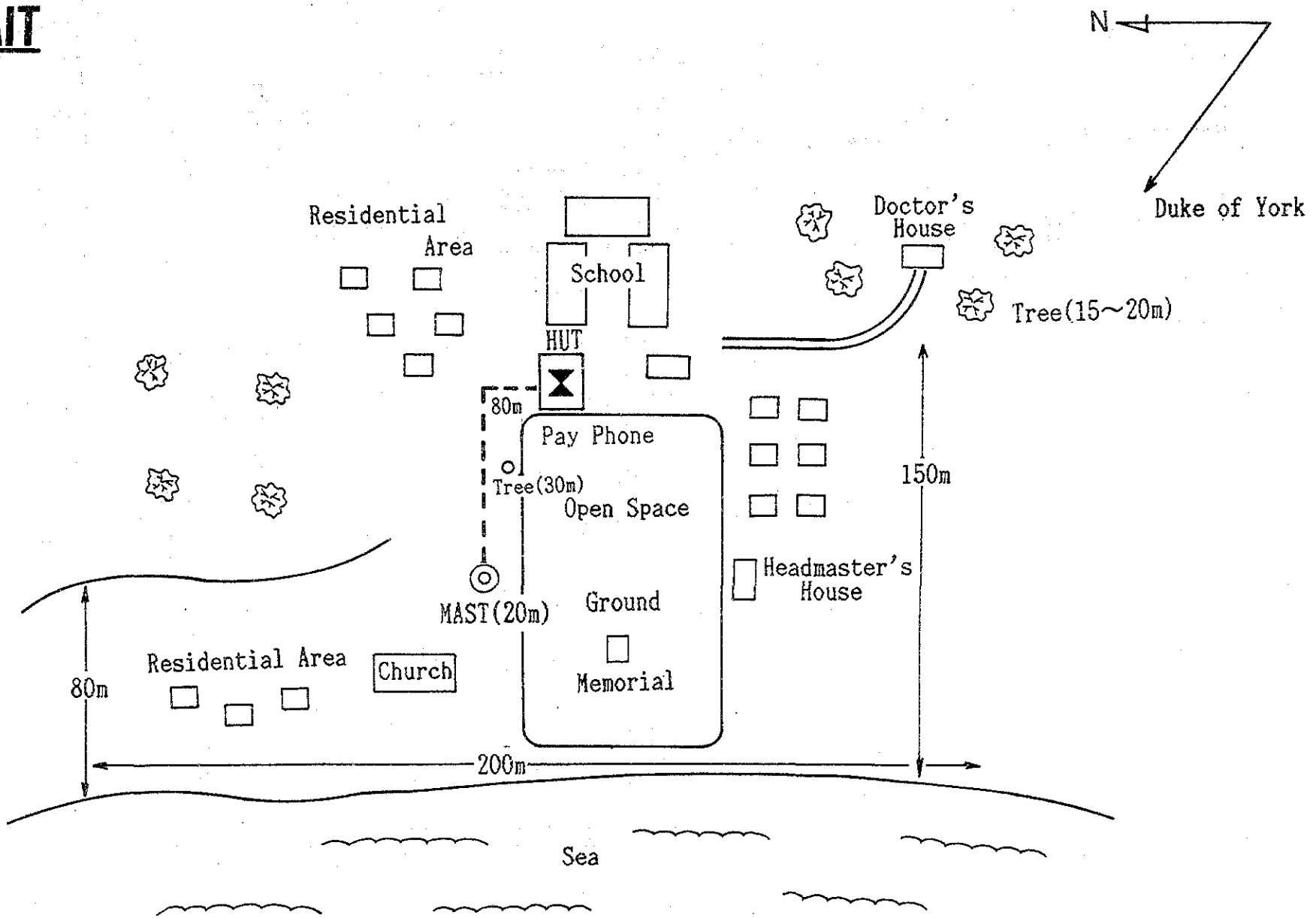
KABANUT


N
Mountain
Duke of York
MAST
100m
(20m)
Aid Post
Pay Phone
Nurse's House
Ground
Hill(10~15m)
Church
100m
School
Residential
Area
3~4m
Church
100m
70m
Open Space
Residential Area

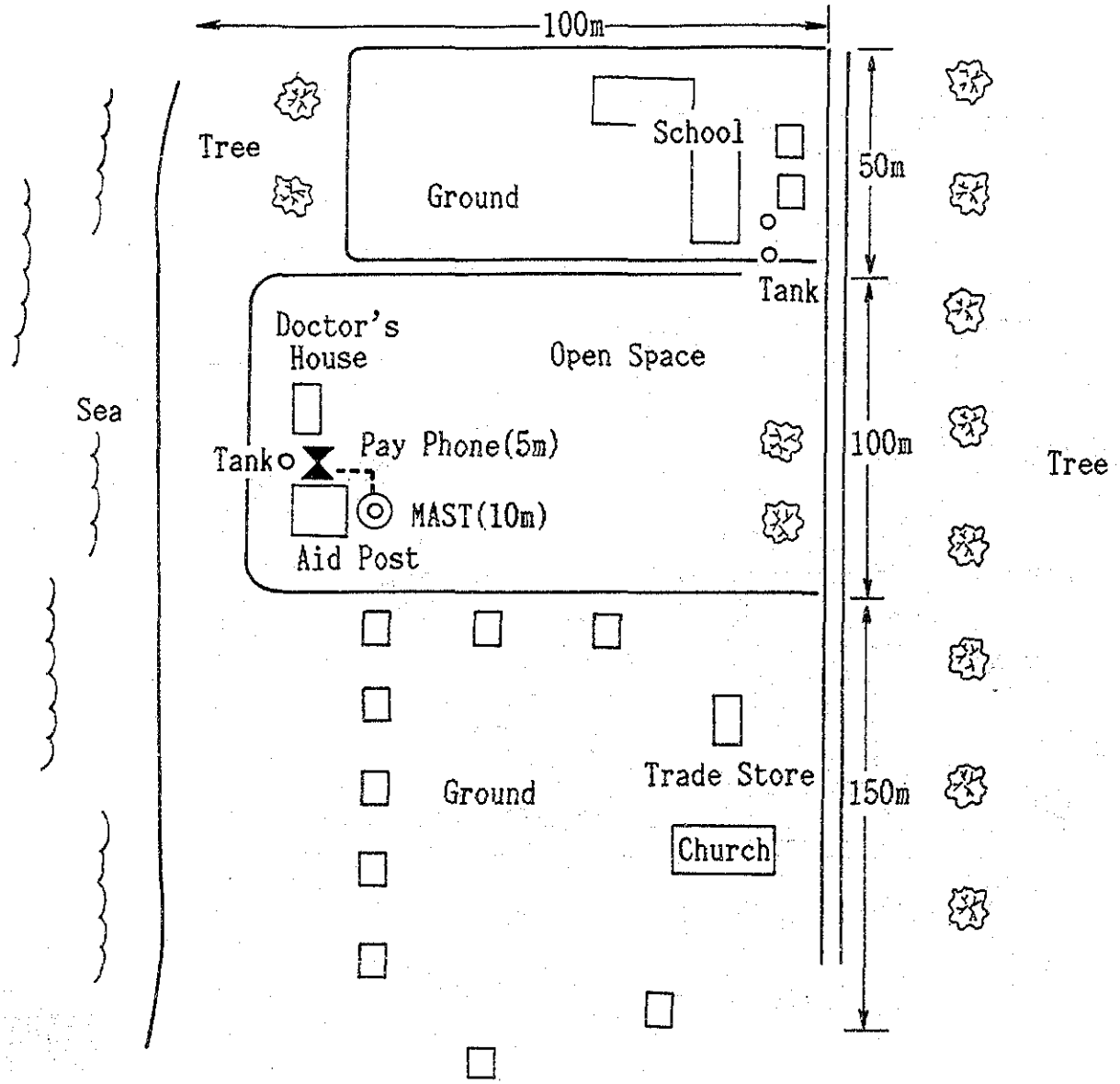
KABAHON

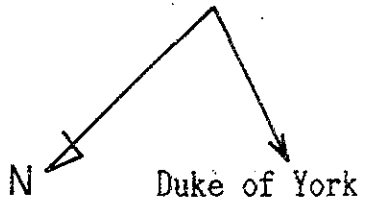

N
Duke of York
70m
Open Space
50m
70m
Flag
Ground
School
MAST(20m)
50m
Aid Post
Pay Phone
Doctor's House
Residential Area
70m
Board
3~4m
Tree(15~20m)
20m
Sea

KAIT

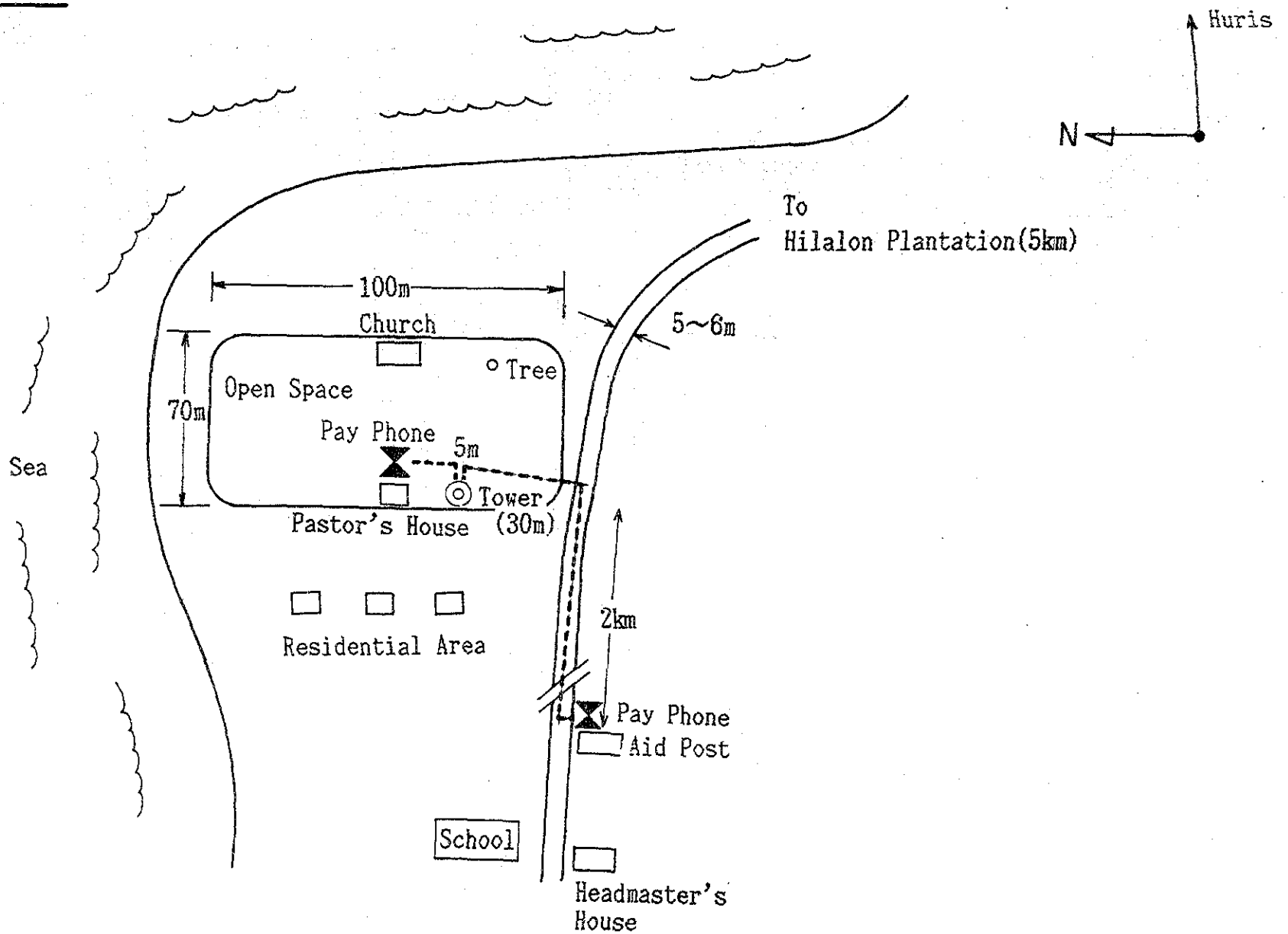

N
Duke of York
Residential Area
School
Doctor's House
Tree(15~20m)
HUT
80m
Pay Phone
Tree(30m)
Open Space
150m
Headmaster's House
MAST(20m)
Ground
Memorial
Residential Area
Church
80m
200m
Sea

PALIPAL(Duke of York)

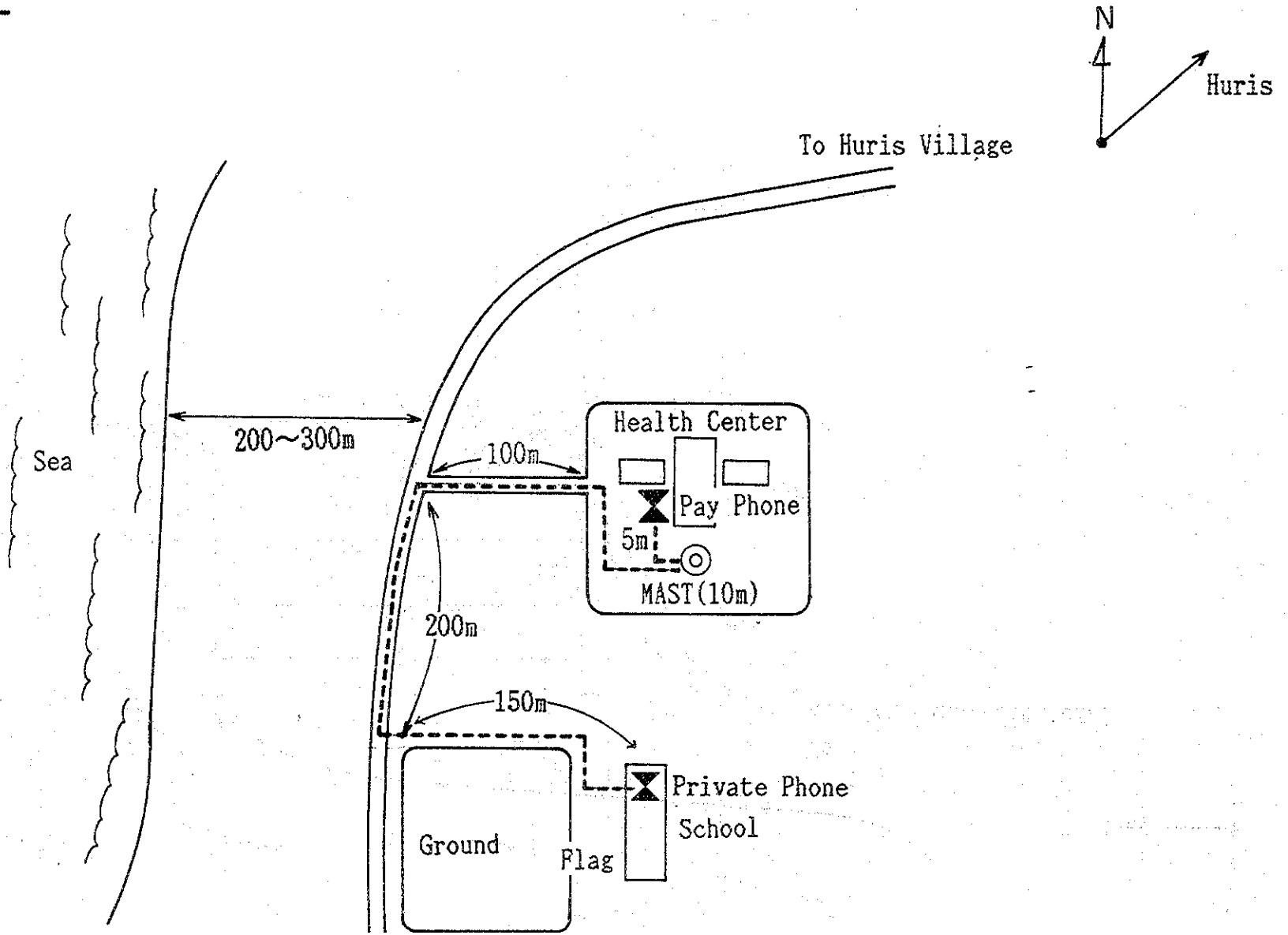




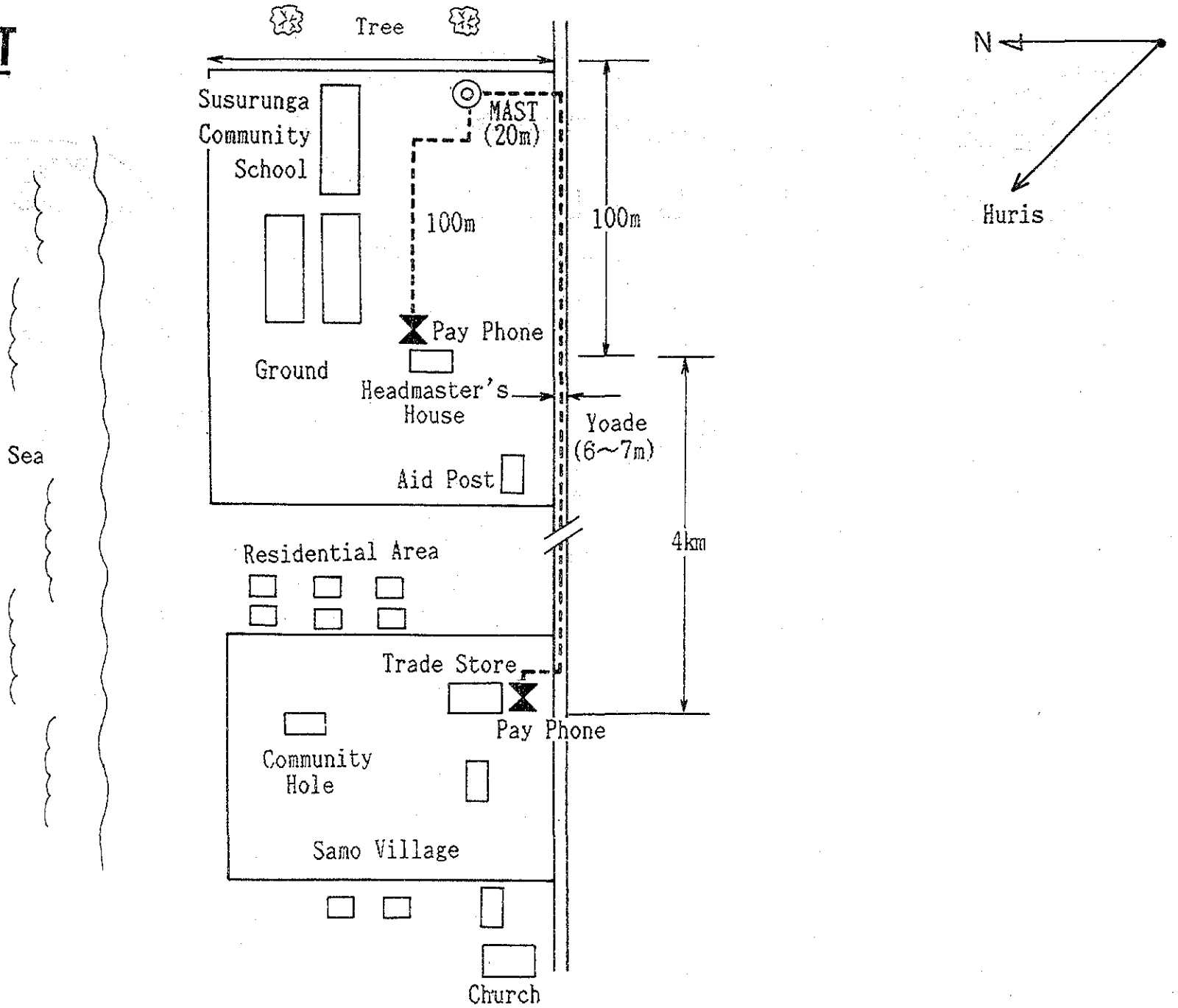
HILALON


Huris
N
To
Hilalon Plantation(5km)
100m
Church
5~6m
Tree
Open Space
70m
Pay Phone
5m
Sea
Tower
Pastor's House
(30m)
Residential Area
2km
Pay Phone
Aid Post
School
Headmaster's
House

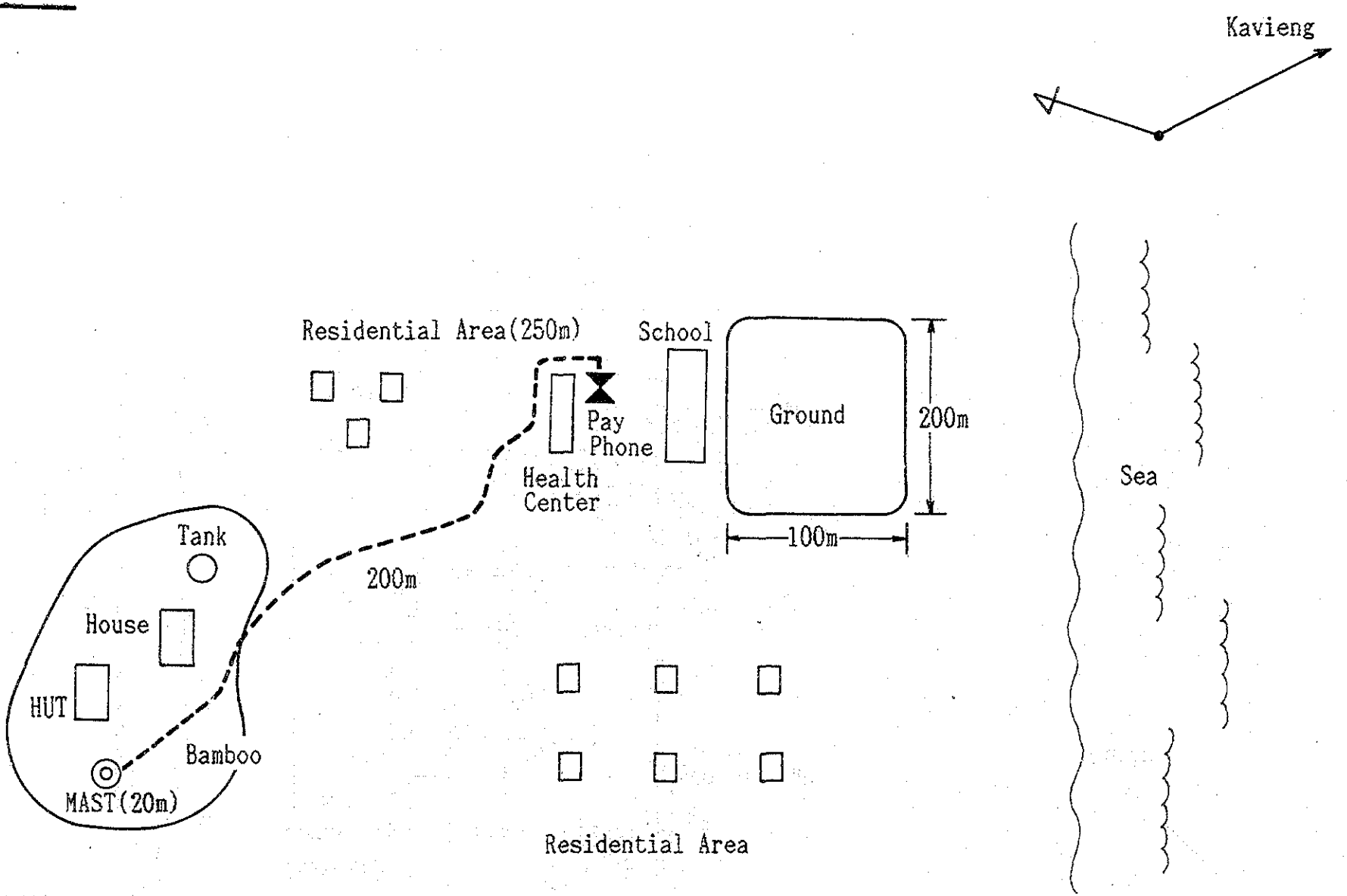
LIPEK


N
Huris
To Huris Village
Sea
200~300m
100m
Health Center
Pay Phone
5m
MAST(10m)
200m
150m
Private Phone
School
Ground
Flag

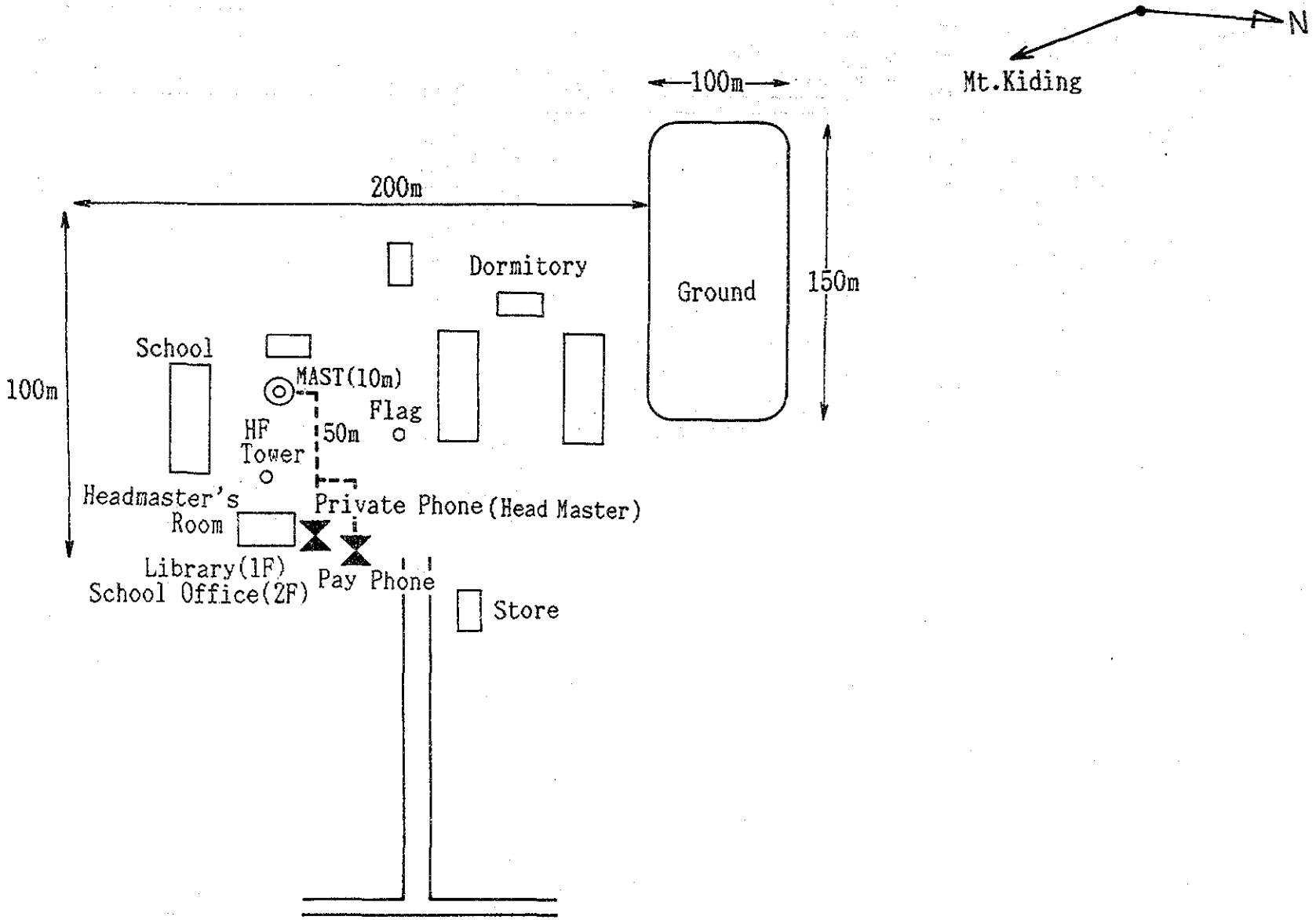
HIPAGAT


Tree
Susurunga
Community
School
MAST
(20m)
100m
100m
Pay Phone
Ground
Headmaster's
House
Yoade
(6~7m)
Aid Post
Sea
4km
Residential Area
Trade Store
Pay Phone
Community
Hole
Samo Village
Church
N
Huris

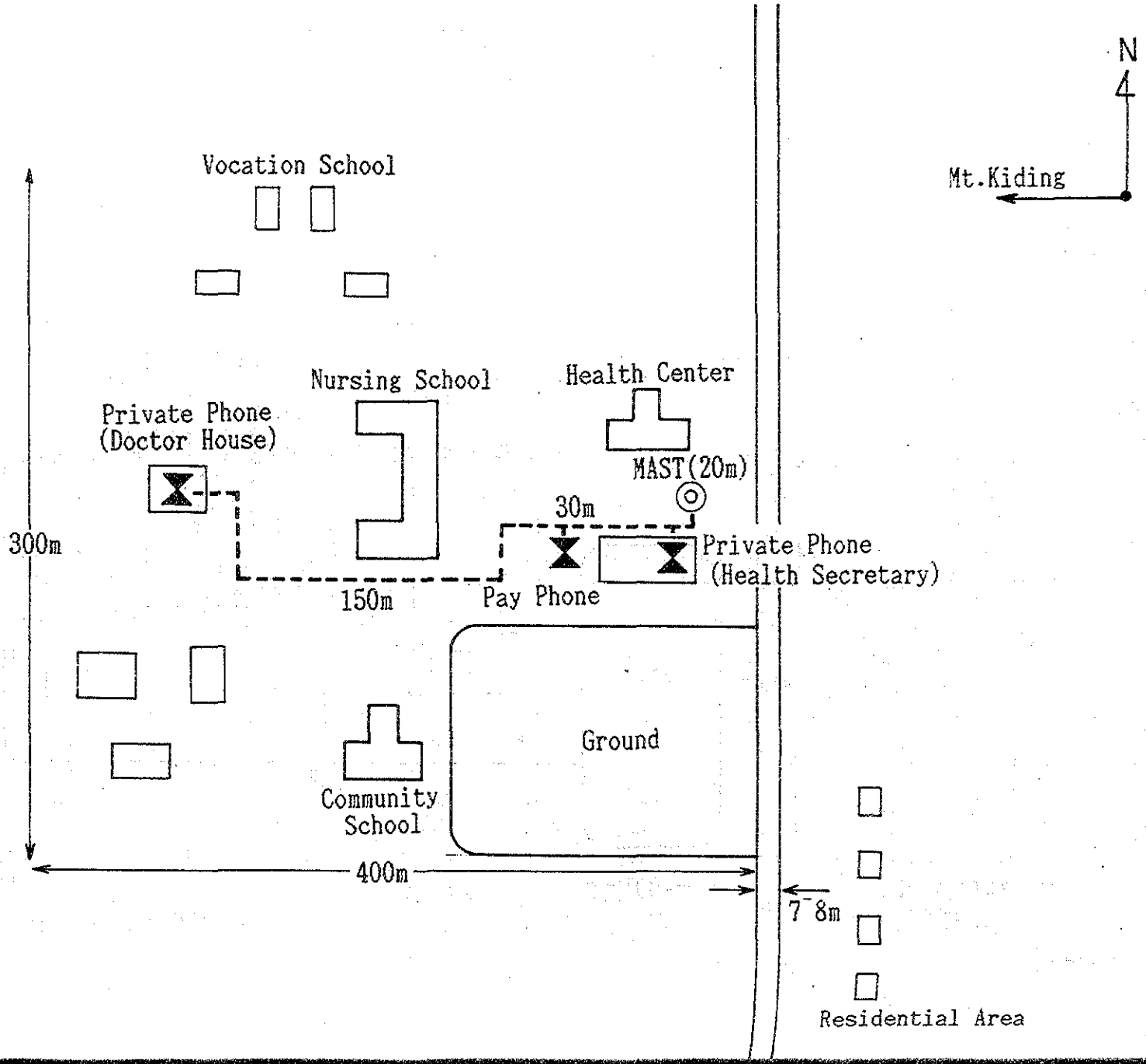
TASKUL


Kavieng
Residential Area(250m)
School
Ground
200m
100m
Pay
Phone
Health
Center
Sea
Tank
200m
House
HUT
Bamboo
MAST(20m)
Residential Area

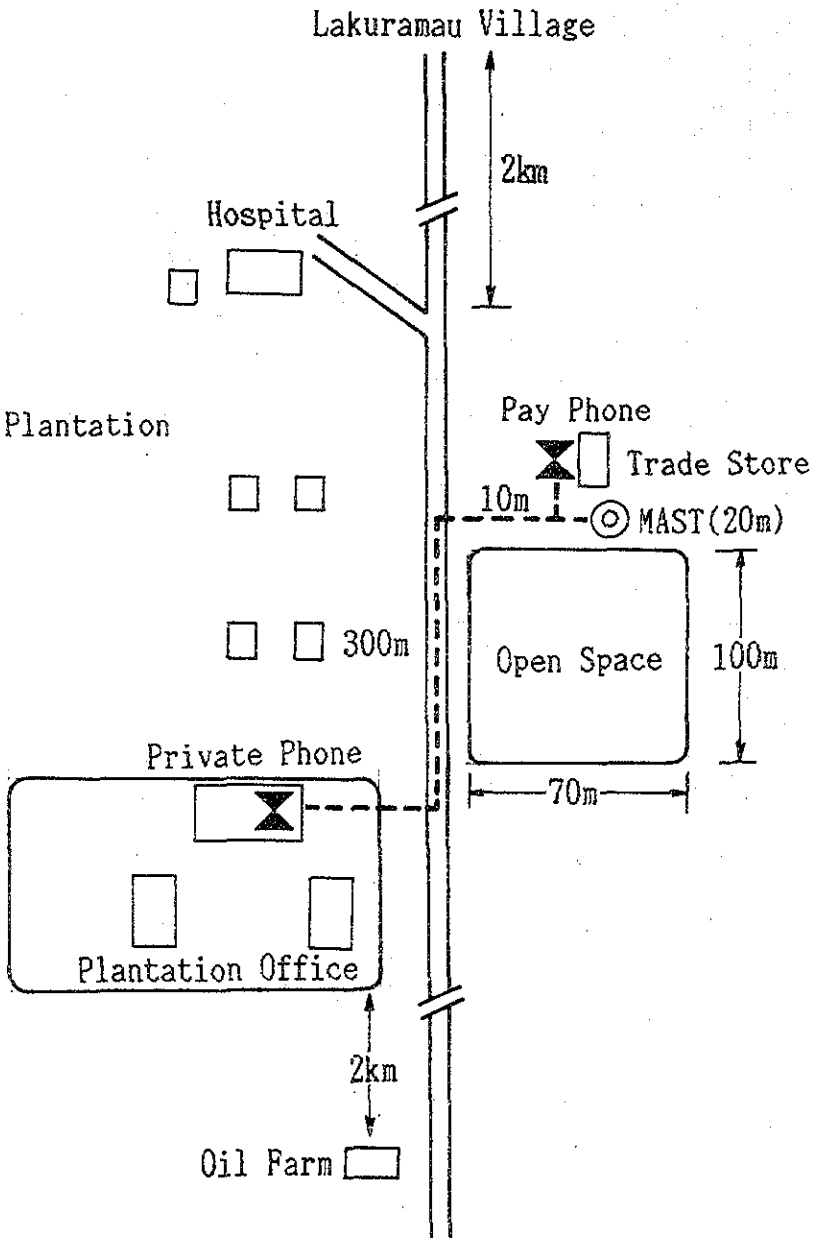
MANGAI

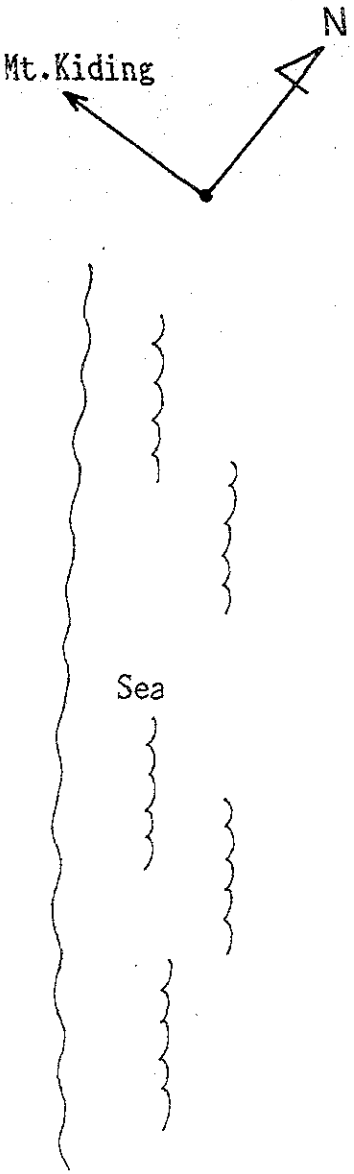

N
Mt.Kiding
100m
200m
Dormitory
Ground
150m
School
MAST(10m)
Flag
100m
HF
Tower
50m
Headmaster's
Room
Private Phone(Head Master)
Library(1F)
School Office(2F)
Pay Phone
Store

LEMAKOT

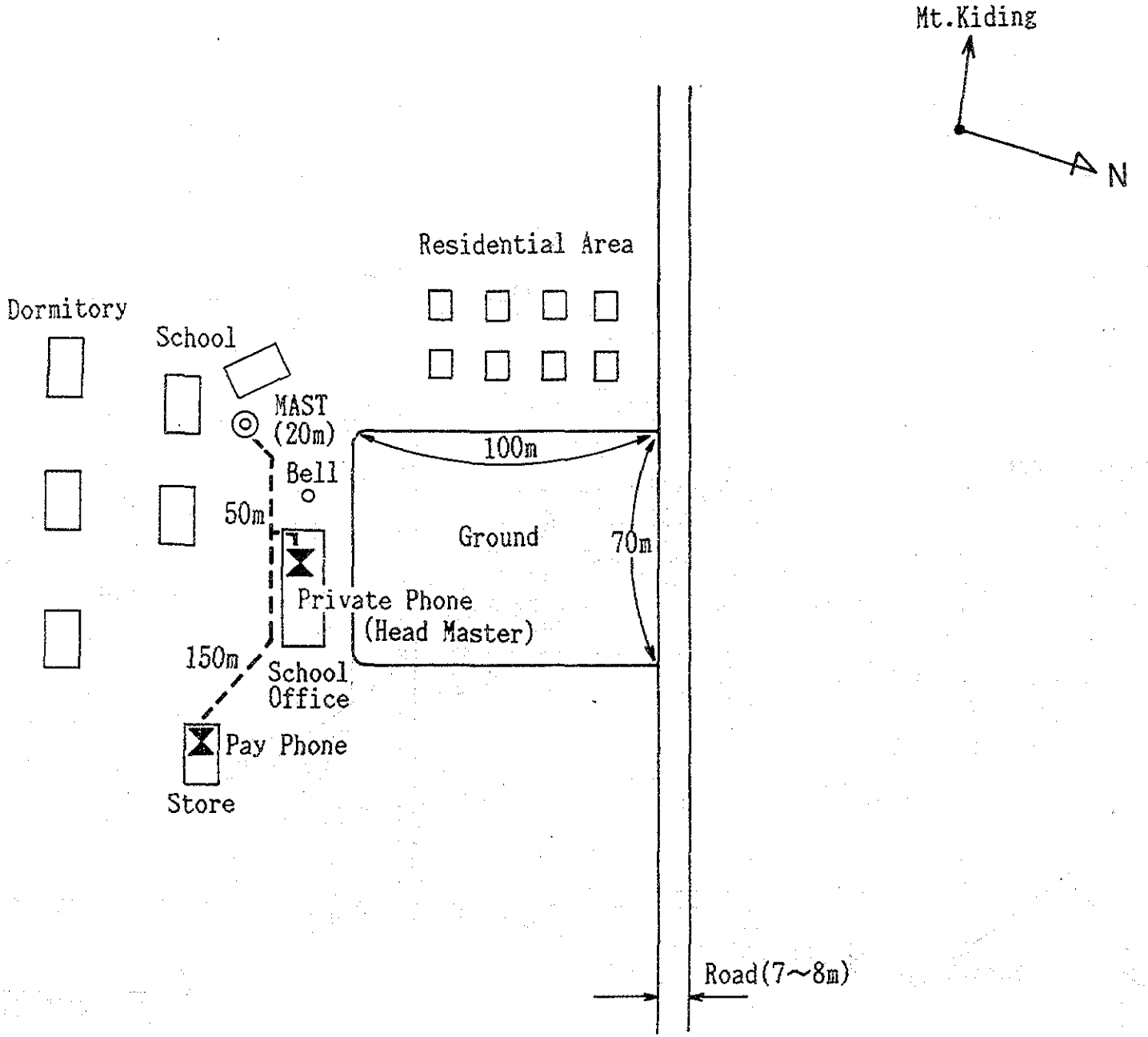

N
Mt.Kiding
Vocation School
Nursing School
Health Center
Private Phone
(Doctor House)
MAST(20m)
30m
300m
Private Phone
(Health Secretary)
150m
Pay Phone
Ground
Community
School
400m
7~8m
Residential Area

LAKURAMAU (Plantation)

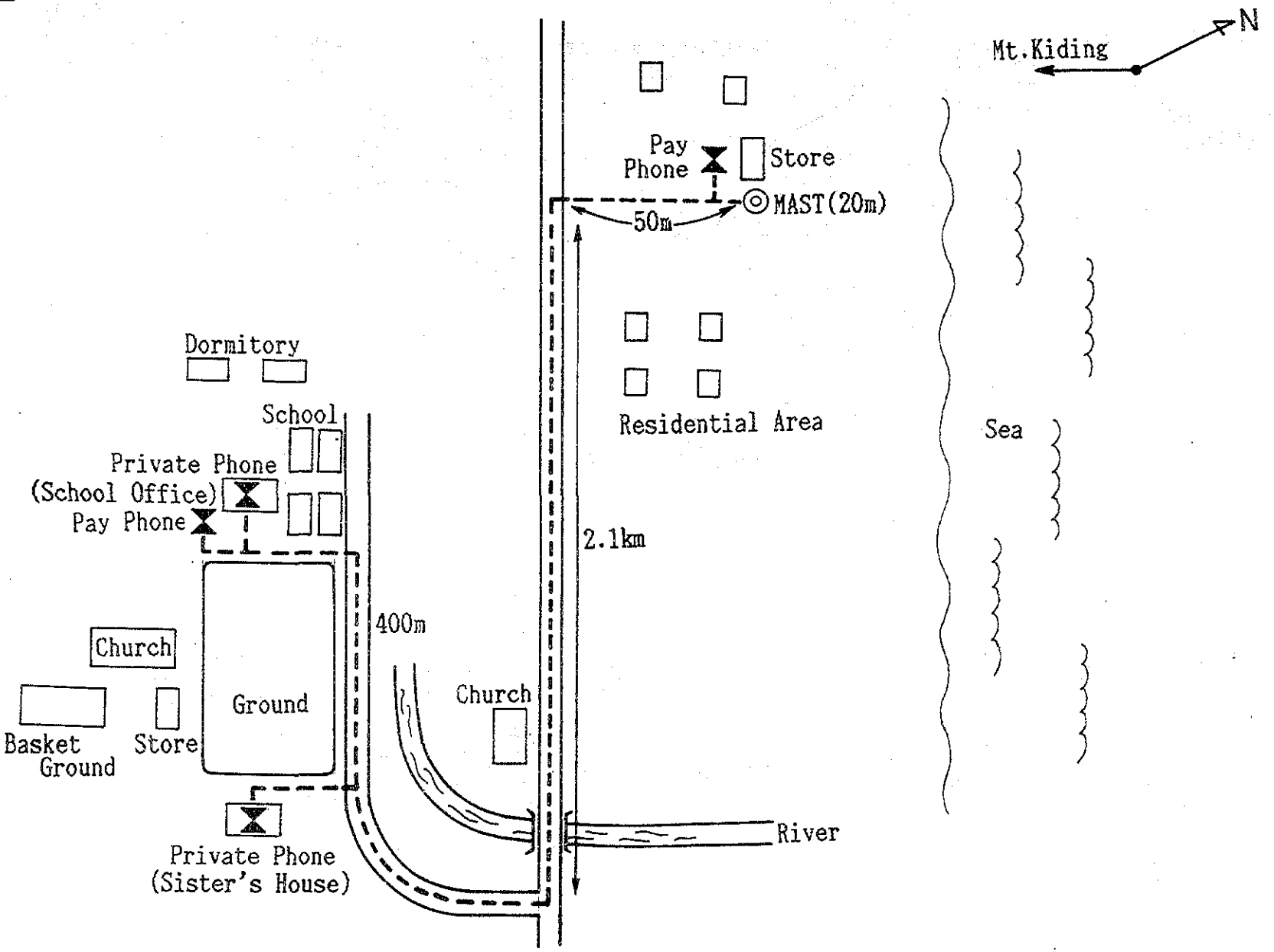




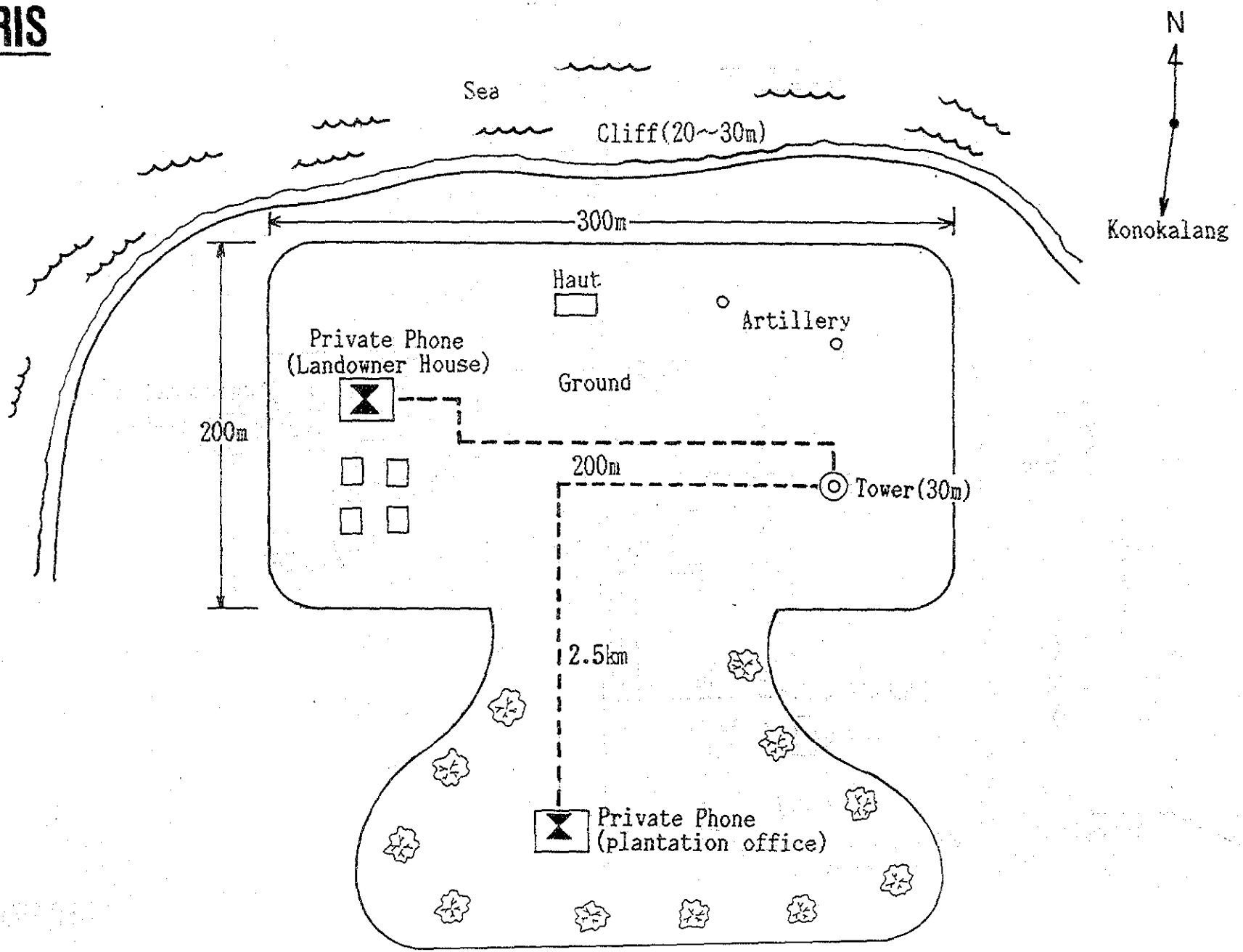
MADINA


Mt.Kiding
N
Residential Area
Dormitory
School
MAST
(20m)
Bell
50m
100m
Ground
70m
Private Phone
(Head Master)
150m
School
Office
Pay Phone
Store
Road(7~8m)

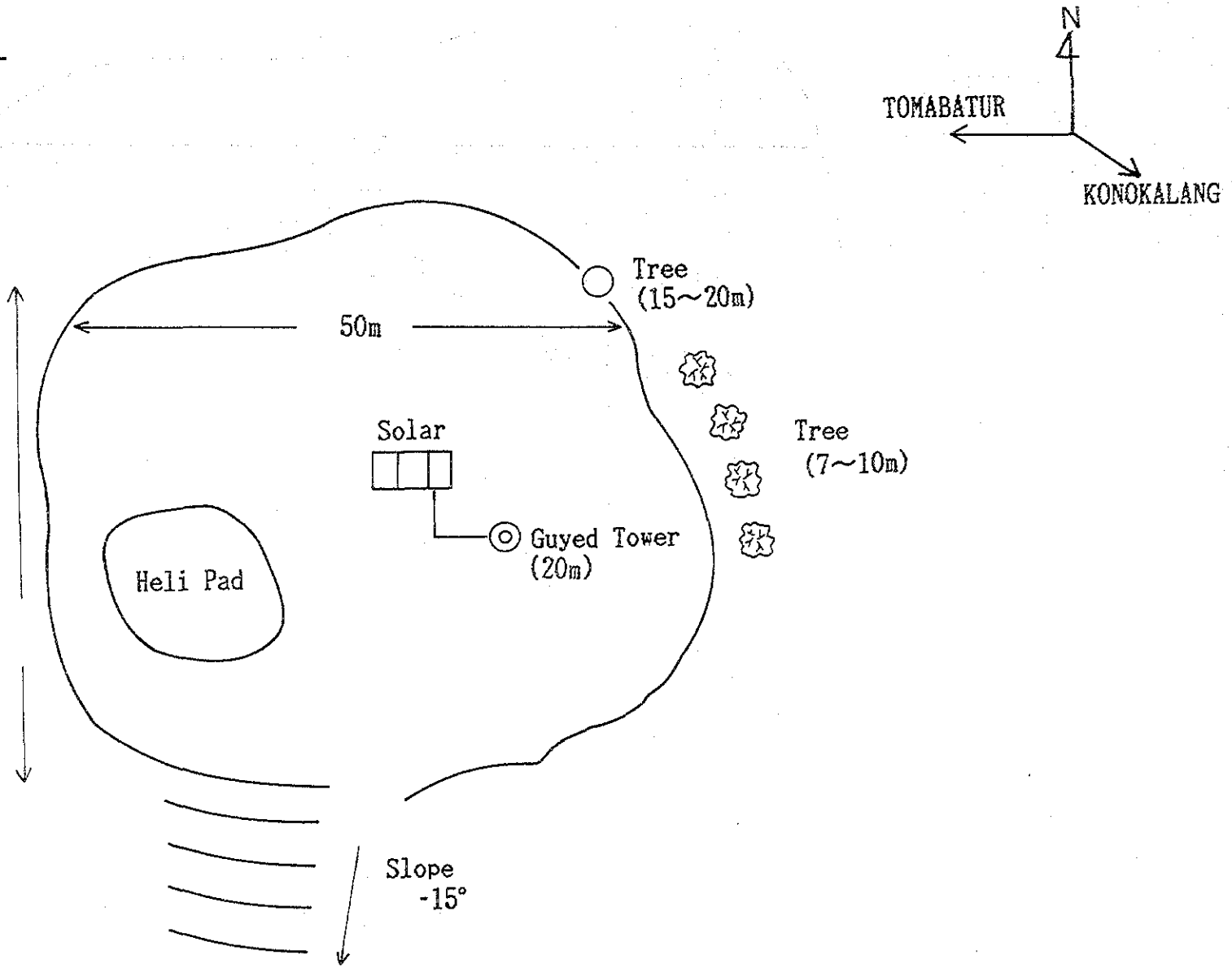
MANGOP


Mt.Kiding
N
Pay Phone
Store
MAST(20m)
50m
Residential Area
Dormitory
School
Private Phone
(School Office)
Pay Phone
2.1km
Sea
400m
Church
Ground
Church
Basket Ground
Store
River
Private Phone
(Sister's House)

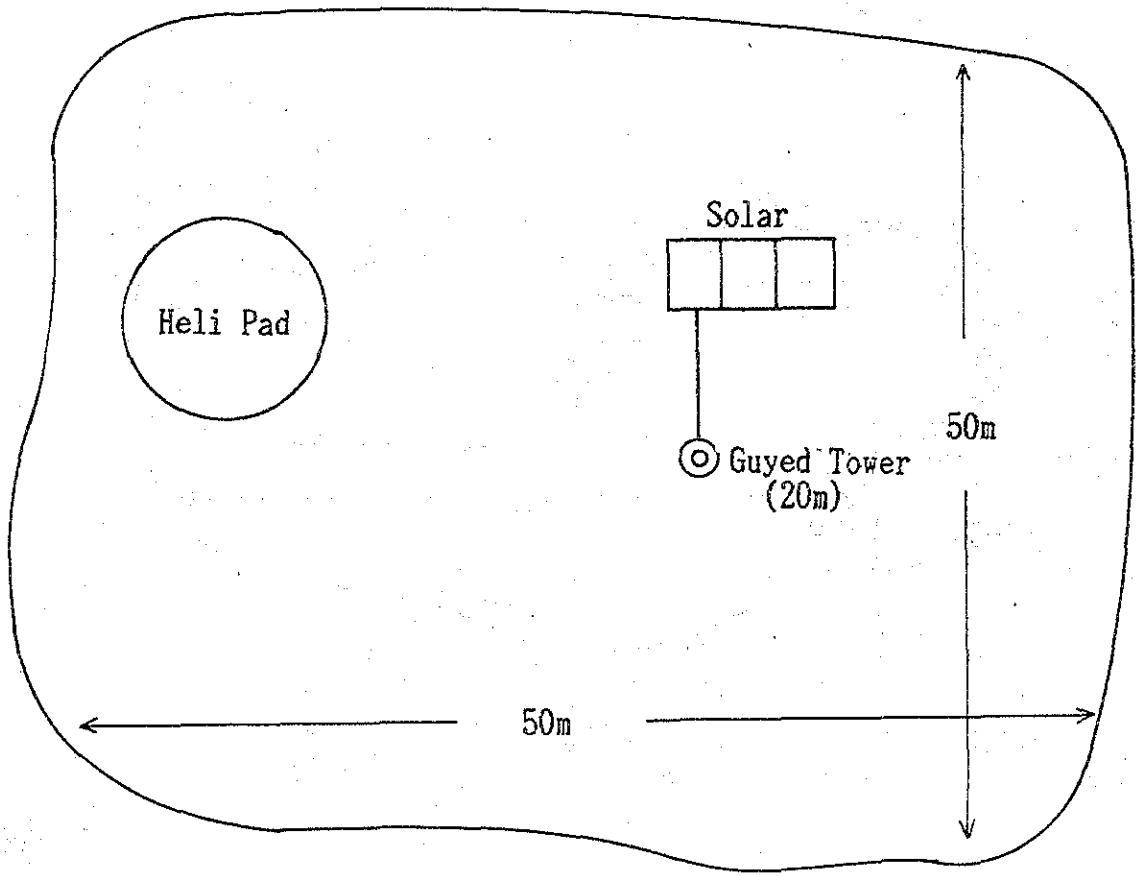
HURIS


N
Konokalang
Sea
Cliff(20~30m)
300m
200m
Haut
Artillery
Private Phone
(Landowner House)
Ground
200m
Tower(30m)
2.5km
Private Phone
(plantation office)

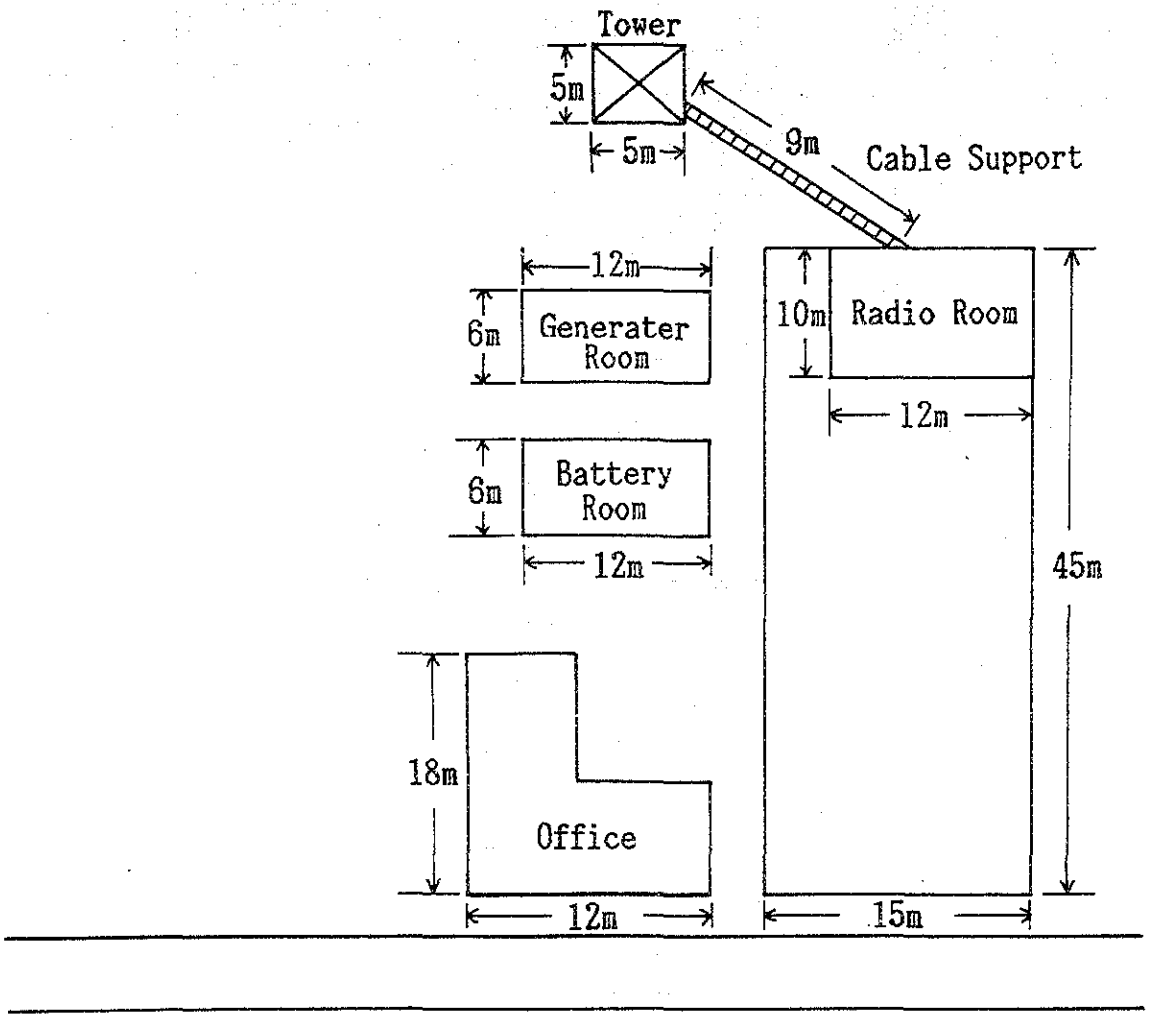
DUKE OF YORK

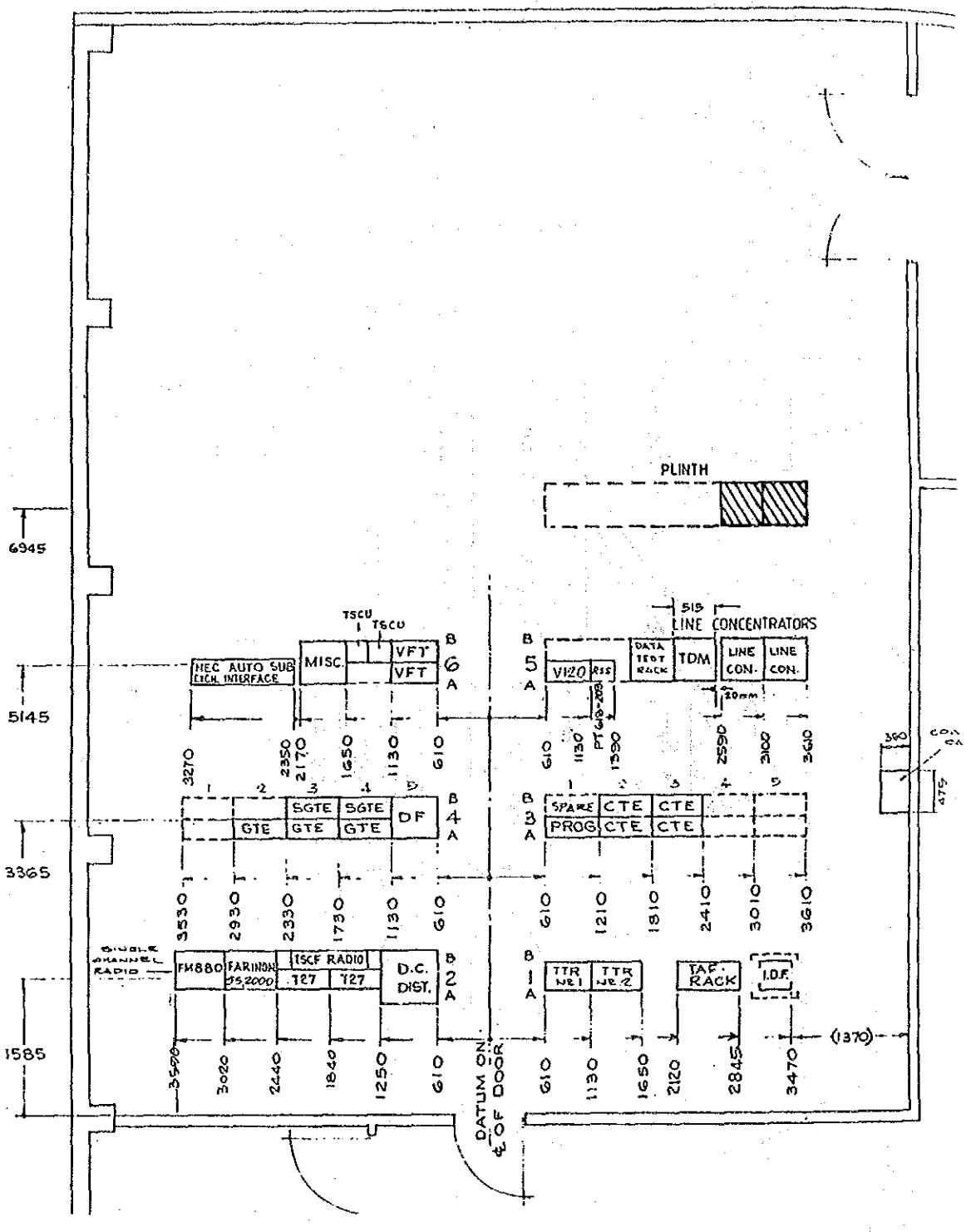

N
TOMABATUR
KONOKALANG
Tree
(15～20m)
50m
Solar
Tree
(7～10m)
Guyed Tower
(20m)
Heli Pad
Slope
-15°

Mt. KIDING



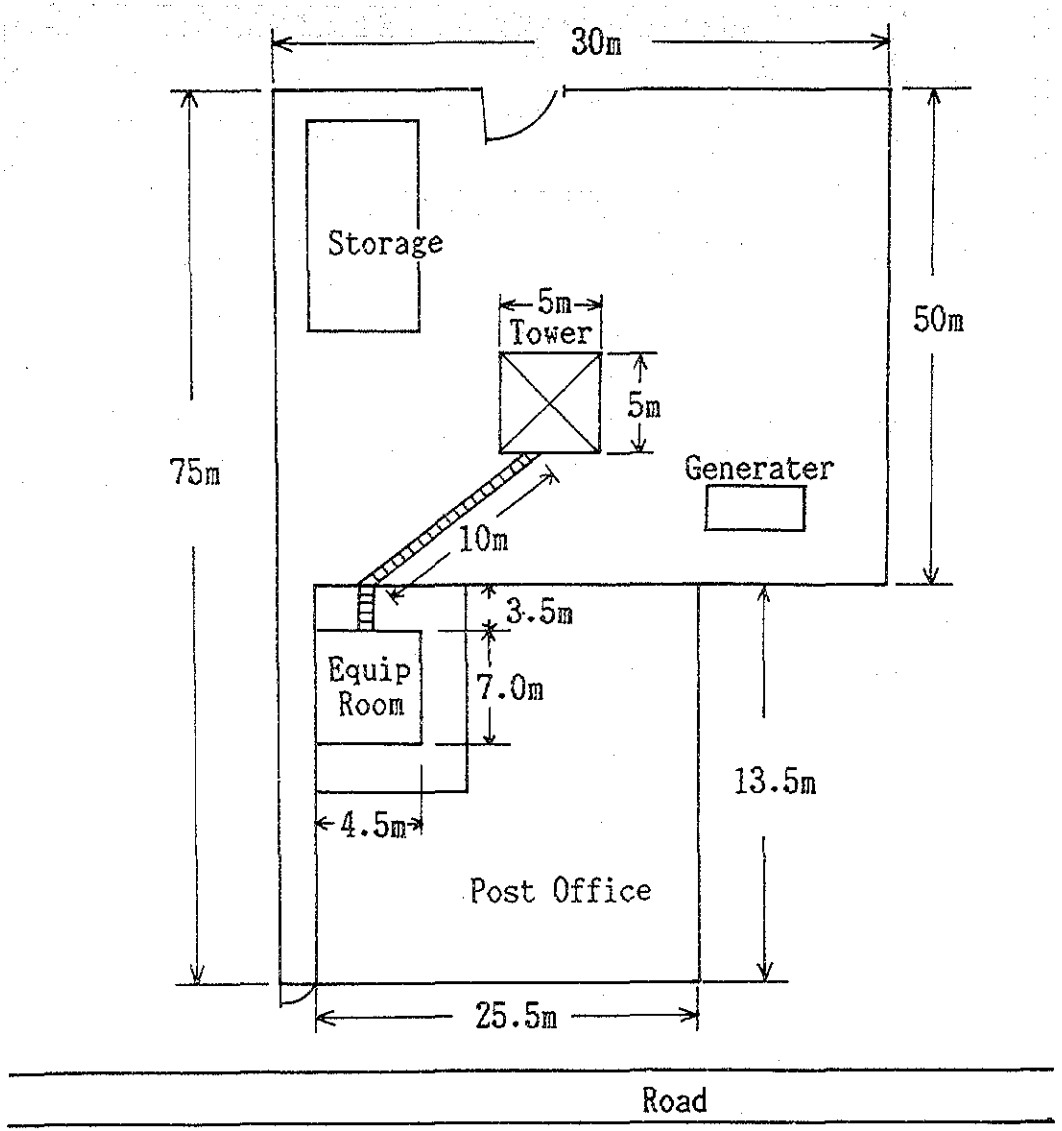
RABAUL


Tower
5m
5m
9m
Cable Support
12m
6m
Generater Room
10m
Radio Room
12m
6m
Battery Room
12m
45m
18m
Office
12m
15m

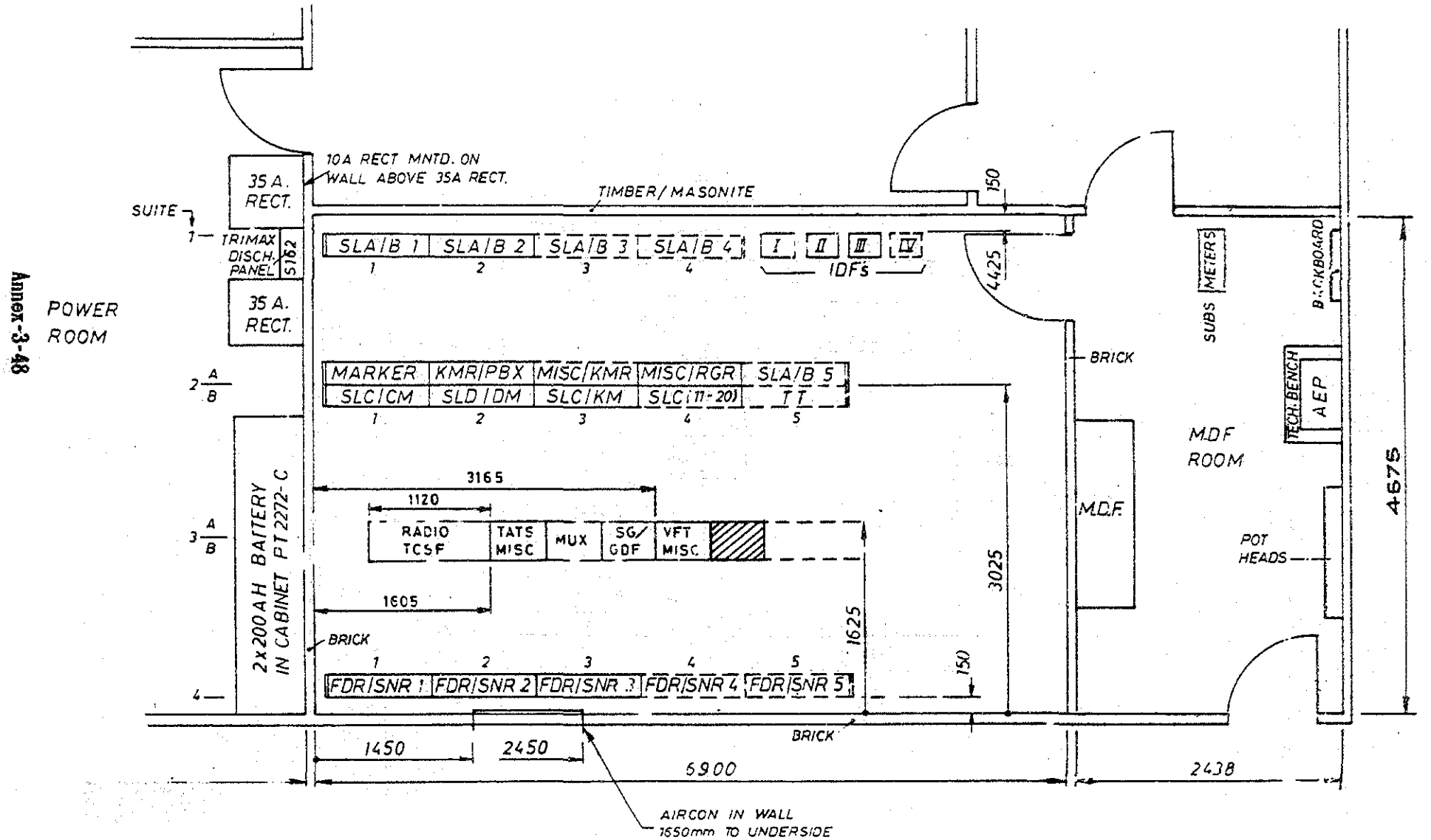

PLINTH
TSCU
TSCU
MISC.
VFT
VFT
NEC AUTO SUB
SGTE
SGTE
DF
GTE
GTE
GTE
FM880
FARINON
TSCF RADIO
727
727
D.C.
DIST.
SINGLE CHANNEL RADIO
515
LINE CONCENTRATORS
VI20
DATA TEST RACK
TDM
LINE CON.
LINE CON.
SPARE
CTE
CTE
PROG
CTE
CTE
TTR
TTR
TAF RACK
I.D.F.
DATUM ON ℄ OF DOOR
6945
5145
3365
1585
(370)

RABAUL

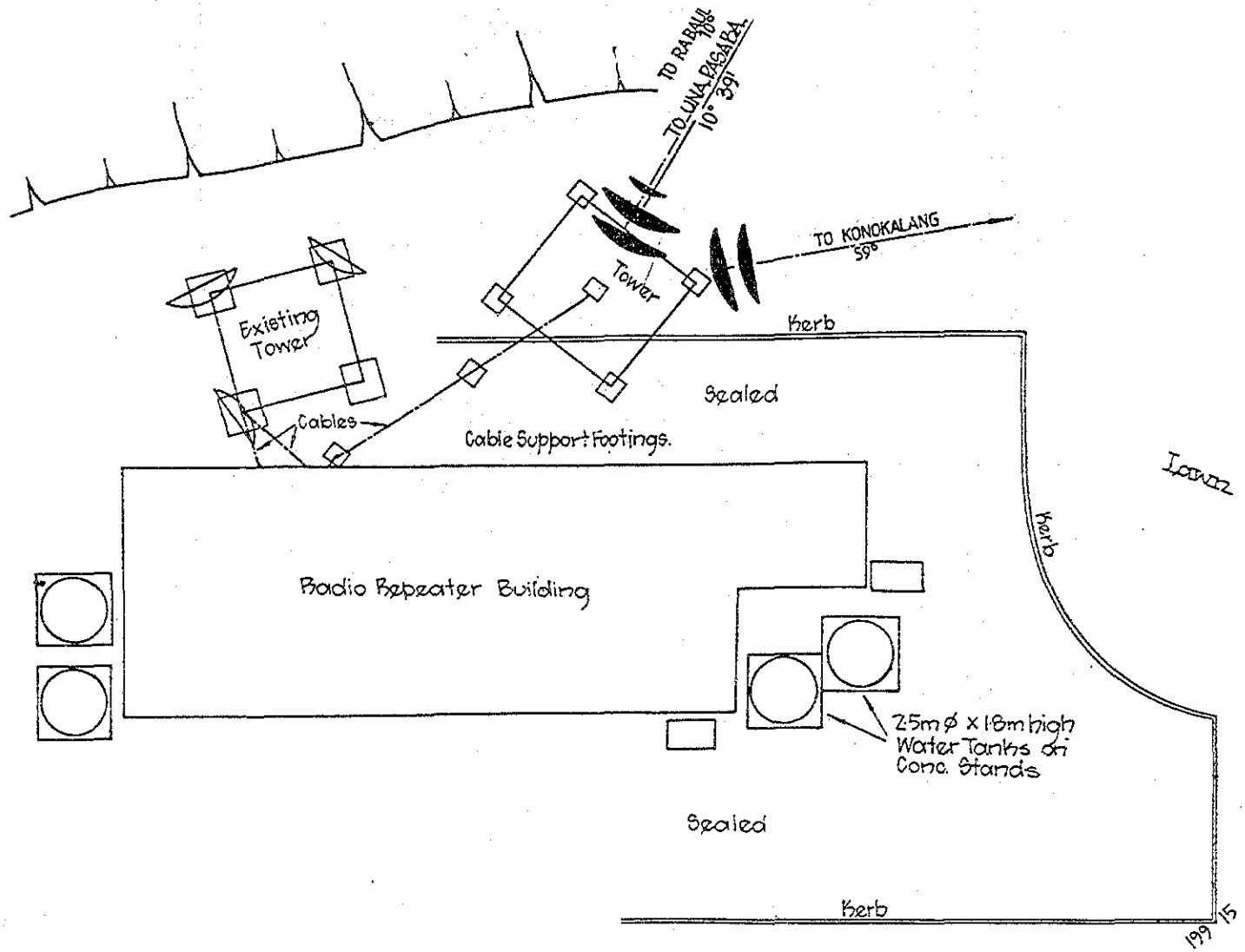
KAVIENG


30m
Storage
5m
Tower
5m
50m
75m
Generater
10m
3.5m
Equip
Room
7.0m
13.5m
4.5m
Post Office
25.5m
Road

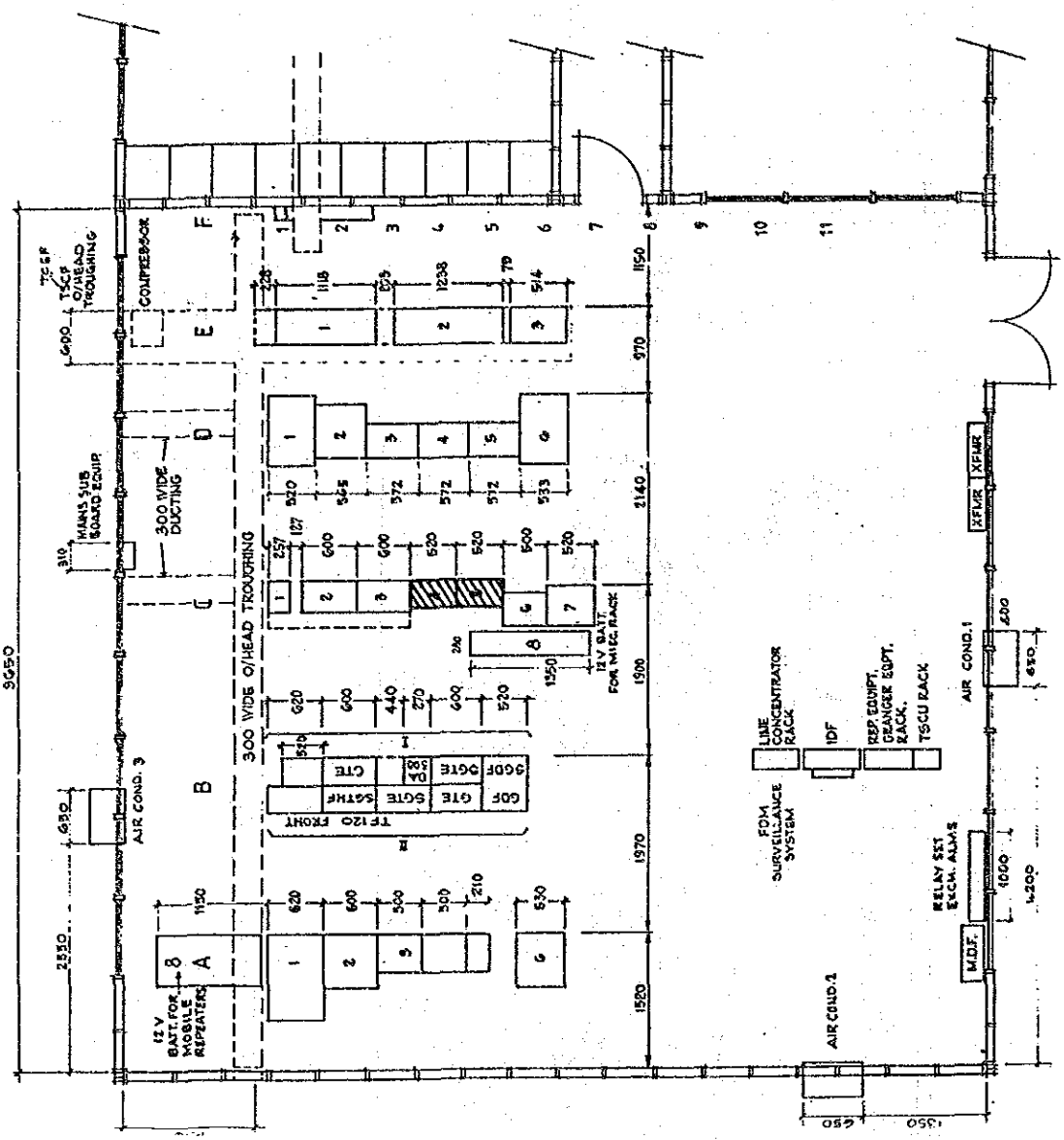
KAVIENG


Annex-3-48
POWER ROOM
35 A. RECT.
10A RECT MNTD. ON WALL ABOVE 35A RECT.
TIMBER/MASONITE
SUITE
1
TRIMAX DISCH. PANEL
S162
35 A. RECT.
SLA/B 1
SLA/B 2
SLA/B 3
SLA/B 4
I
II
III
IV
IDFs
150
4425
SUBS METERS
BLACKBOARD
BRICK
2 A/B
MARKER
SLC/CM
KMR/PBX
SLD/DM
MISC/KMR
SLC/KM
MISC/RGR
SLC (11-20)
SLA/B 5
TT
TECH. BENCH
AEP
M.D.F ROOM
3165
1120
3 A/B
RADIO TCSF
TATS MISC
MUX
SG/ GDF
VFT MISC.
M.D.F.
POT HEADS
4675
3025
1605
1625
BRICK
4
2x200 AH BATTERY IN CABINET PT 2272-C
FDR/SNR 1
FDR/SNR 2
FDR/SNR 3
FDR/SNR 4
FDR/SNR 5
150
BRICK
1450
2450
6900
2438
AIRCON IN WALL
1650mm TO UNDERSIDE

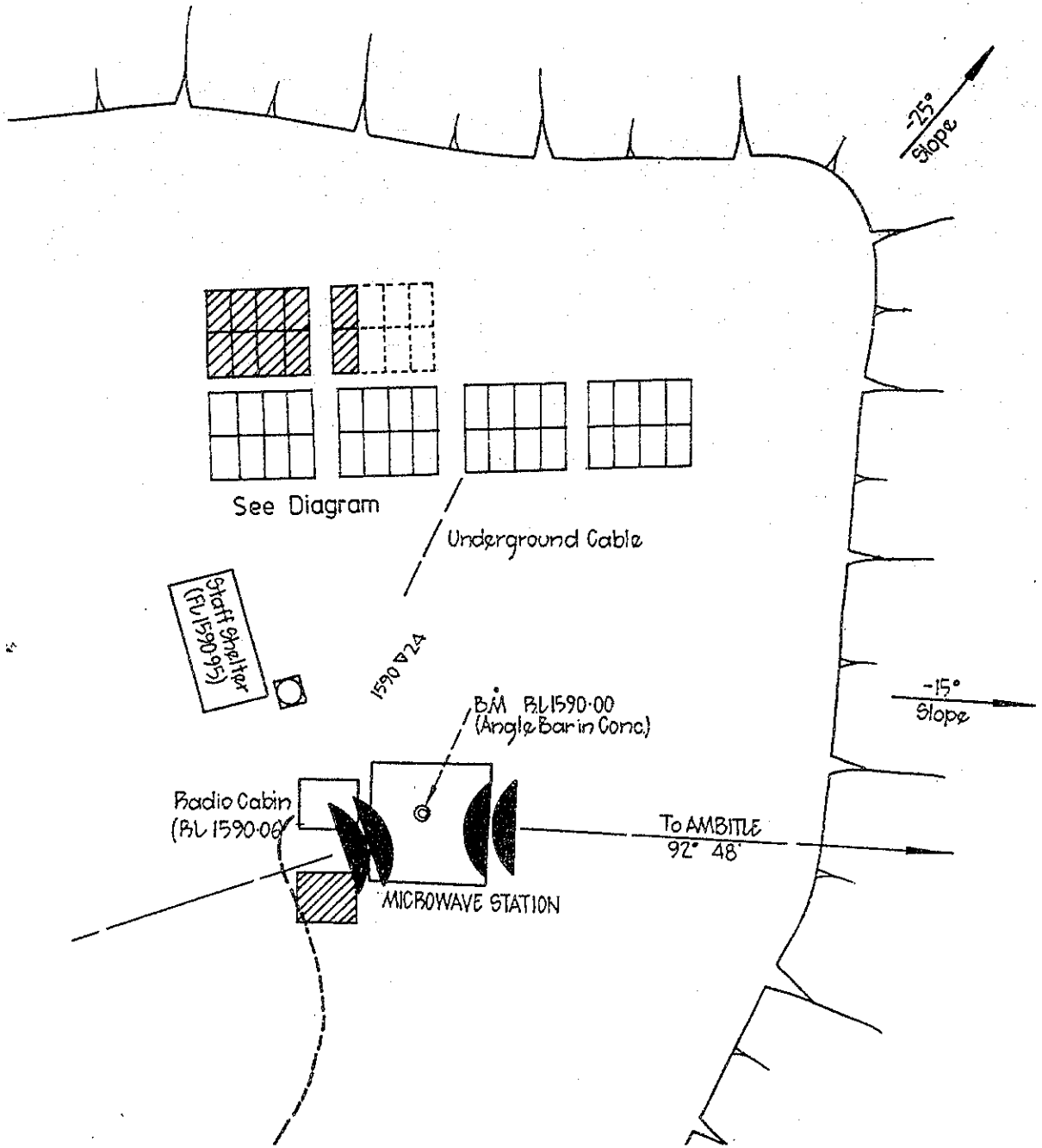
TOMOAVATUR


TO RABAUL
TO UNA PASAREA
10° 39'
TO KONOKALANG
59°
Tower
Existing Tower
Cables
Cable Support Footings.
Kerb
Sealed
Lawn
Kerb
Radio Repeater Building
2.5m ø x 18m high Water Tanks on Conc. Stands
Sealed
Kerb
199 15

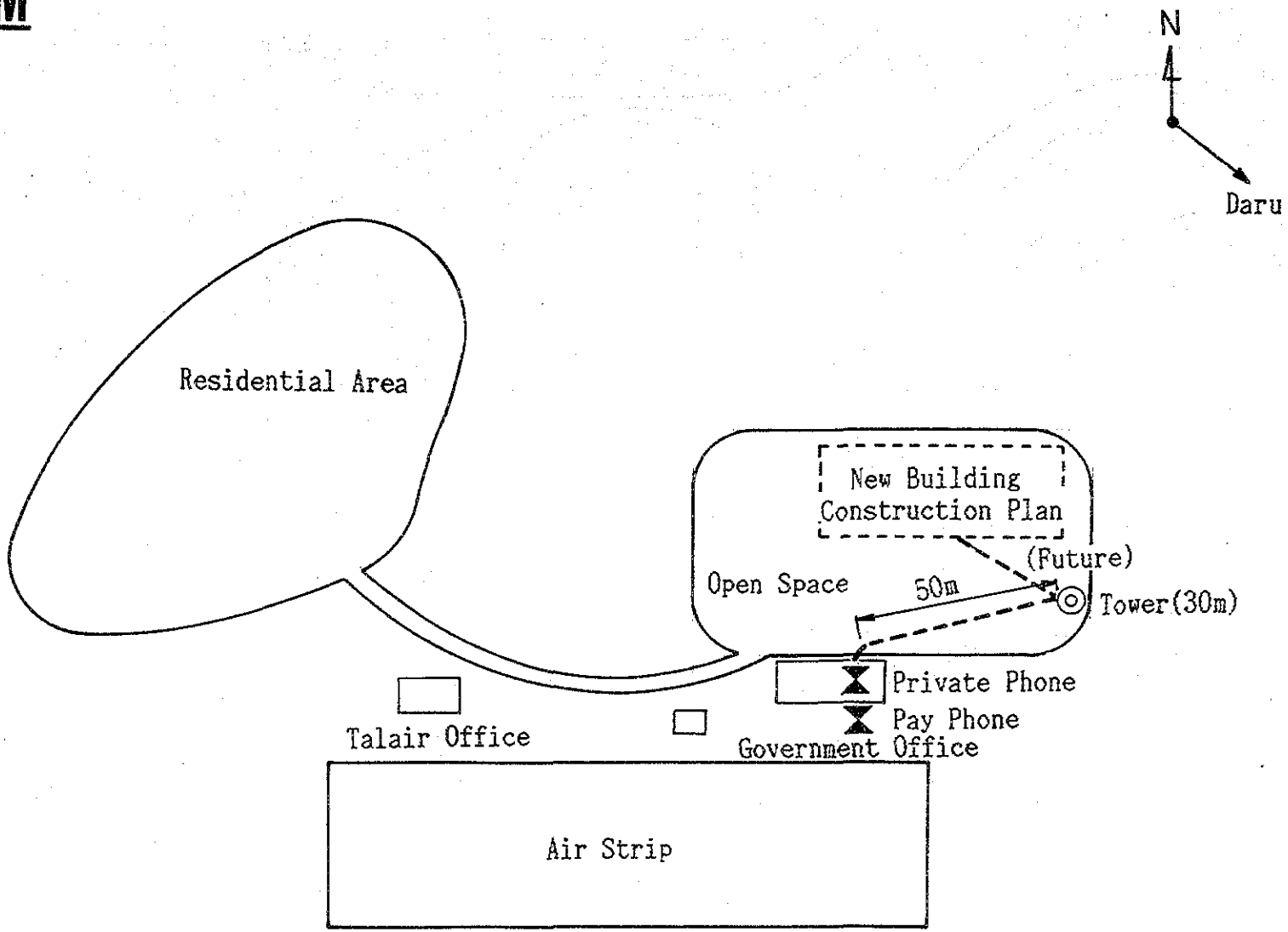
TOMAVATUR


300 WIDE O/HEAD TROUGHING
MAINS SUB BOARD EQUIP
300 WIDE DUCTING
AIR COND. 3
COMPRESSOR
12 V BATT. FOR MOBILE REPEATERS
12 V BATT. FOR MISC RACK
TF120 FRONT
LINE CONCENTRATOR RACK
IDF
REP. EQUIPT. GRANGER EQPT. RACK.
TSCU RACK
AIR COND. 1
XFMR
FDM SURVEILLANCE SYSTEM
RELAY SET EXCH. ALM'S
M.D.F.
AIR COND. 2

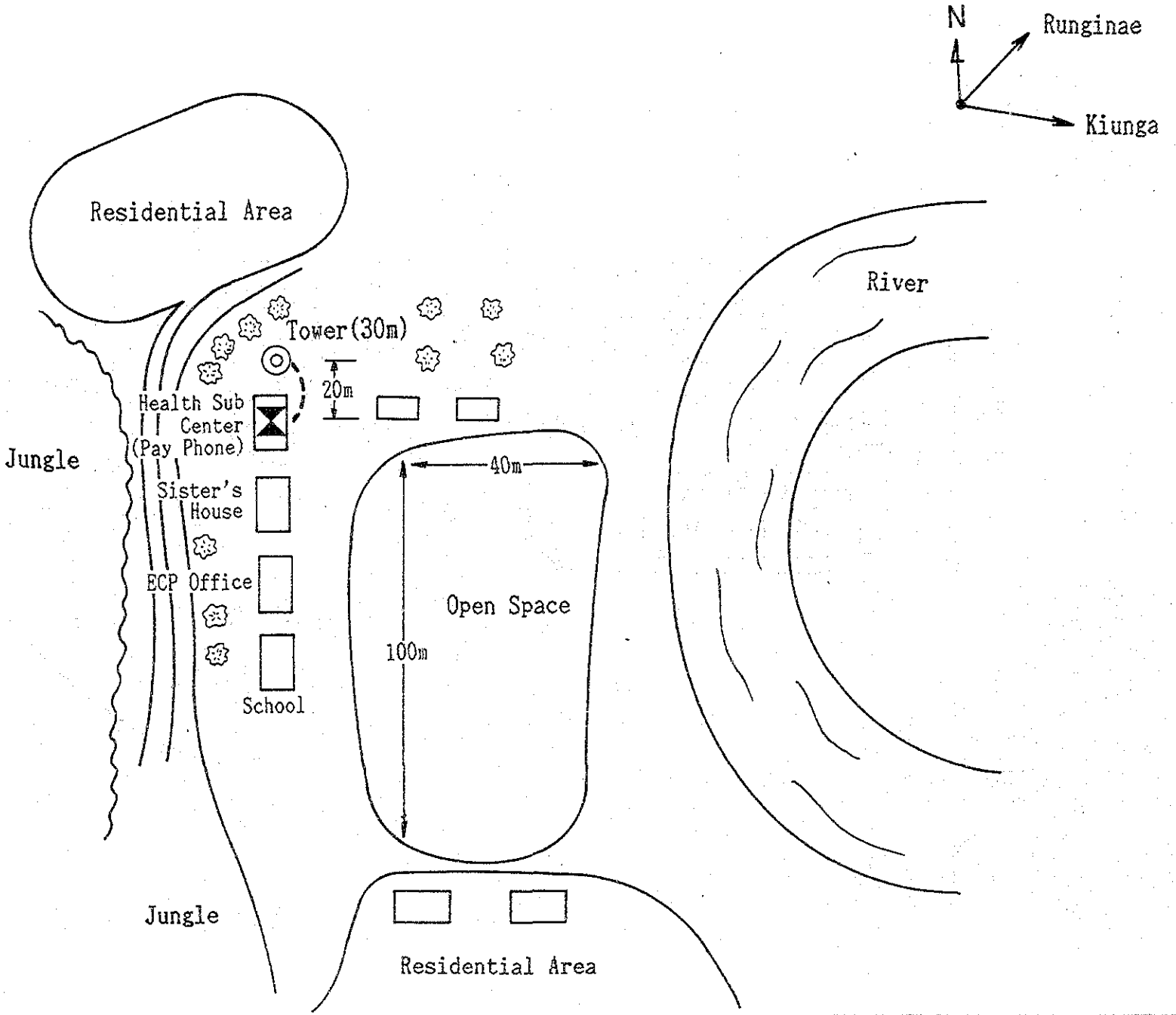
KONOKALANG


-25°
Slope
See Diagram
Underground Cable
Staff shelter
(FL 1590·95)
1590 A24
BM BL 1590·00
(Angle Bar in Conc.)
-15°
Slope
Radio Cabin
(BL 1590·06)
To AMBITLE
92° 48'
MICROWAVE STATION

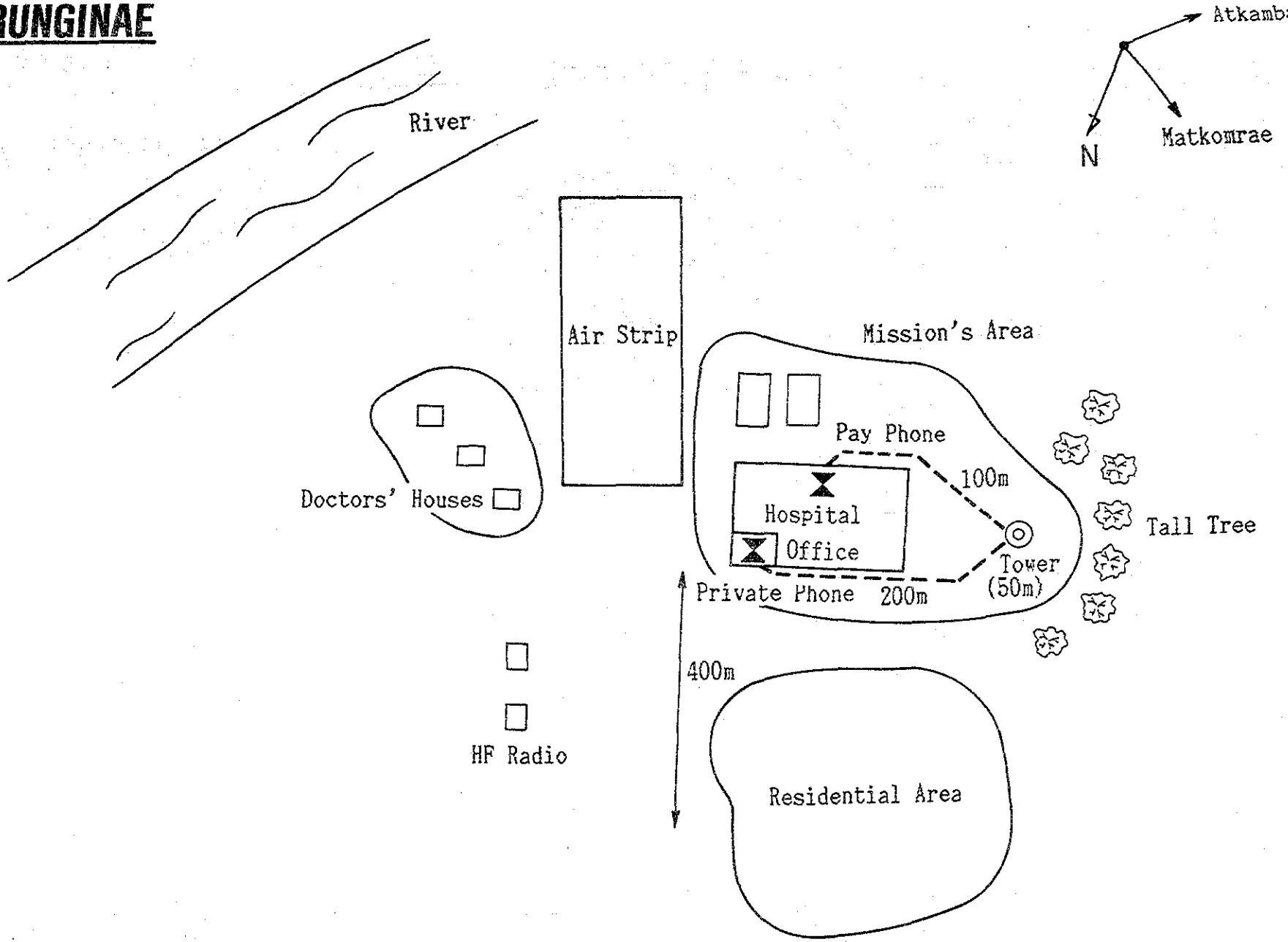
WESTERN PROVINCE


N
Daru
Residential Area
New Building
Construction Plan
(Future)
Open Space
50m
Tower(30m)
Private Phone
Pay Phone
Government Office
Talair Office
Air Strip

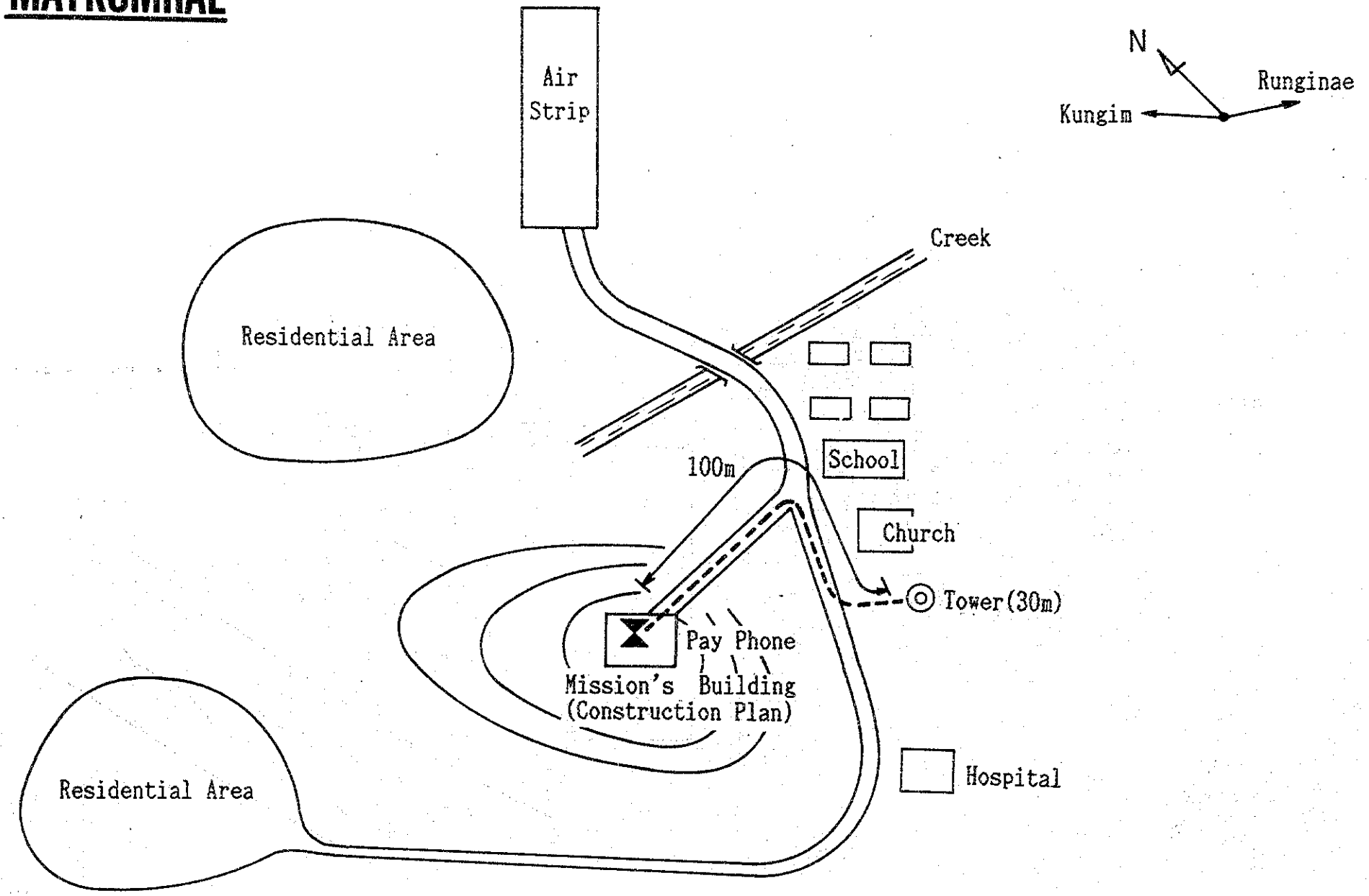
ATKAMBA


N
Runginae
Kiunga
Residential Area
Tower(30m)
20m
Health Sub Center
(Pay Phone)
Jungle
Sister's House
ECP Office
School
40m
Open Space
100m
River
Jungle
Residential Area

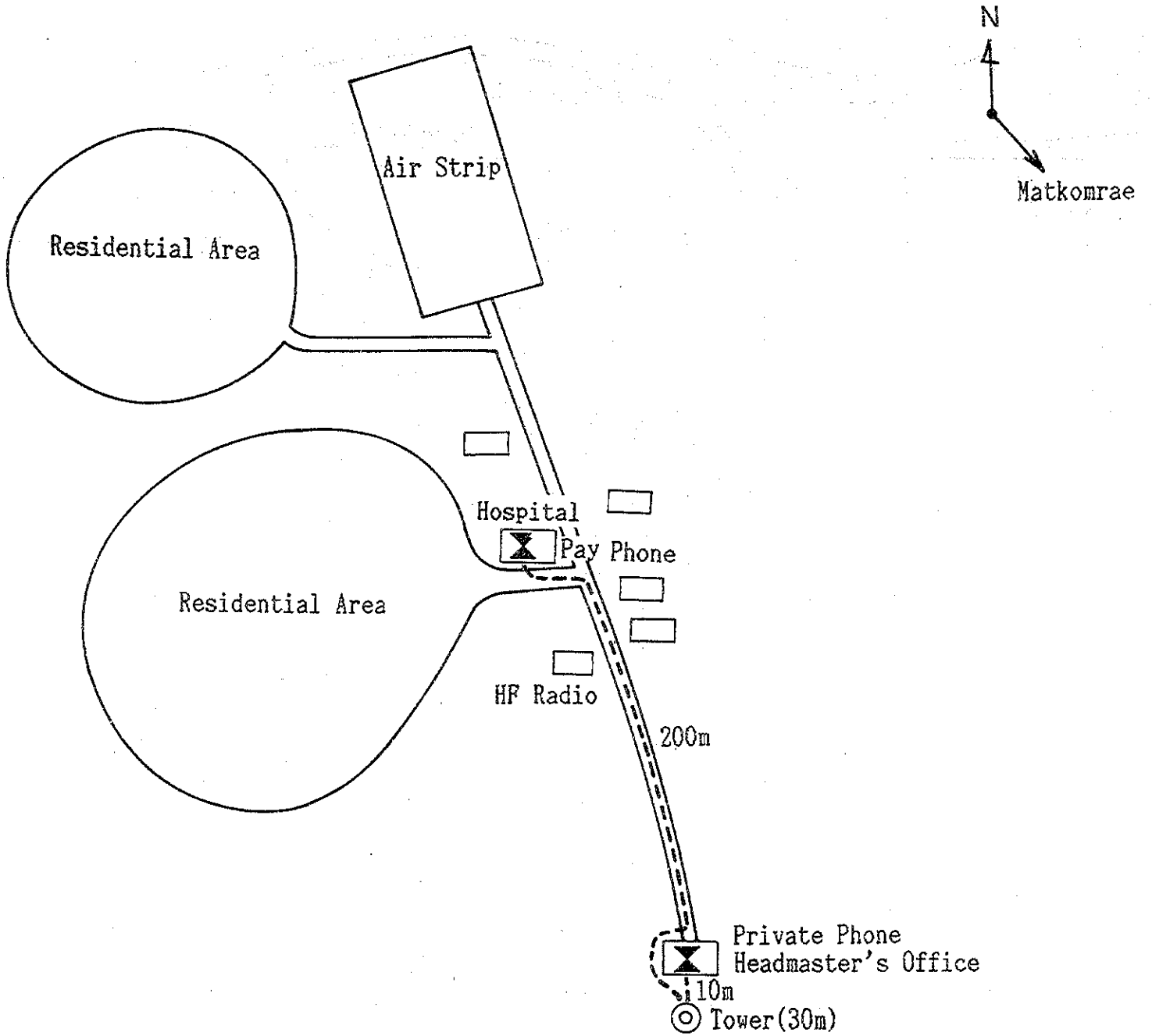
RUNGINAE


Atkamba
Matkomrae
N
River
Air Strip
Mission's Area
Pay Phone
100m
Hospital
Office
Tower
(50m)
Tall Tree
Private Phone
200m
400m
Doctors' Houses
HF Radio
Residential Area

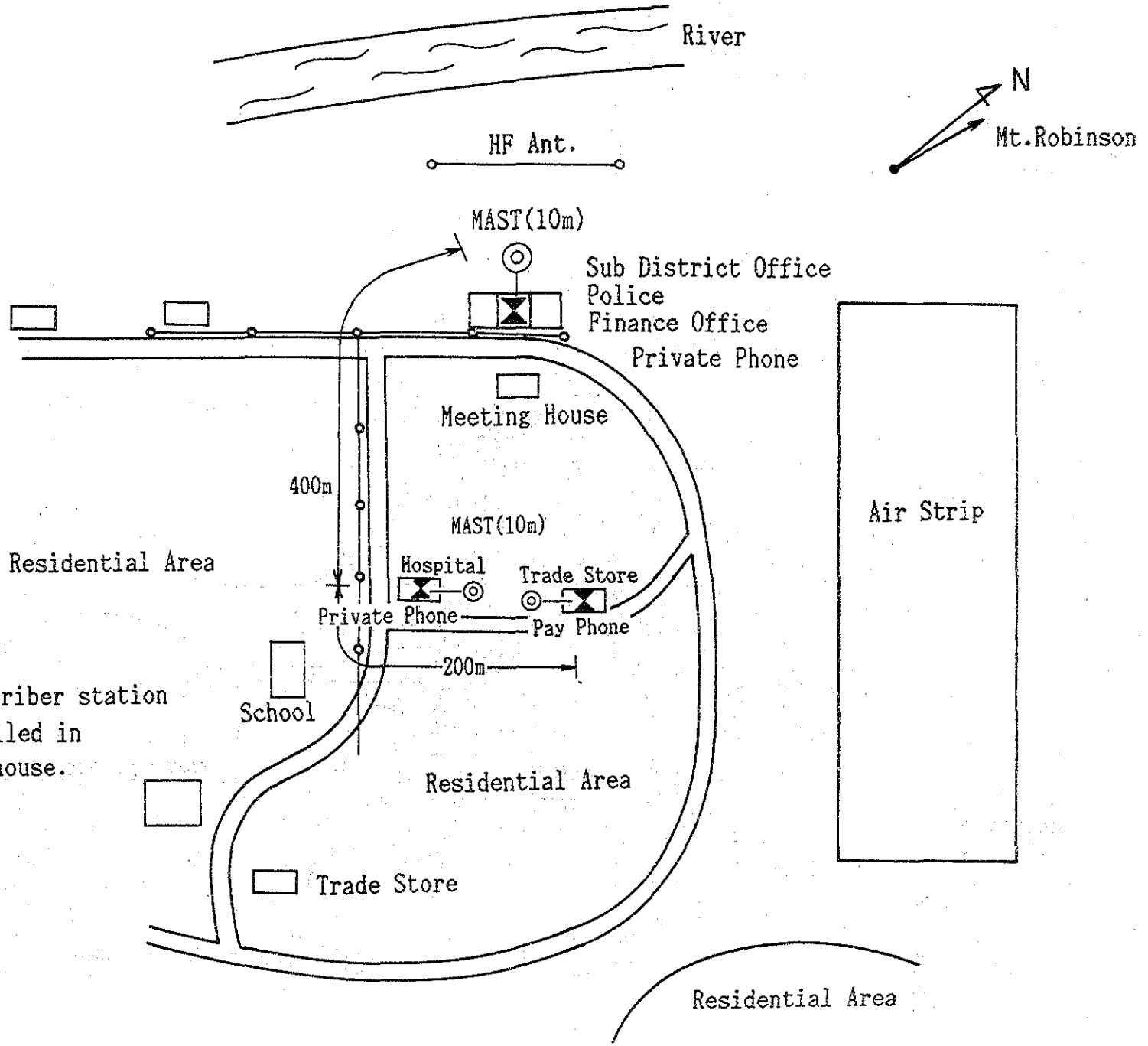
MATKOMRAE


Air
Strip
N
Runginae
Kungim
Creek
Residential Area
School
100m
Church
Tower(30m)
Pay Phone
Mission's Building
(Construction Plan)
Hospital
Residential Area

KUNGIM

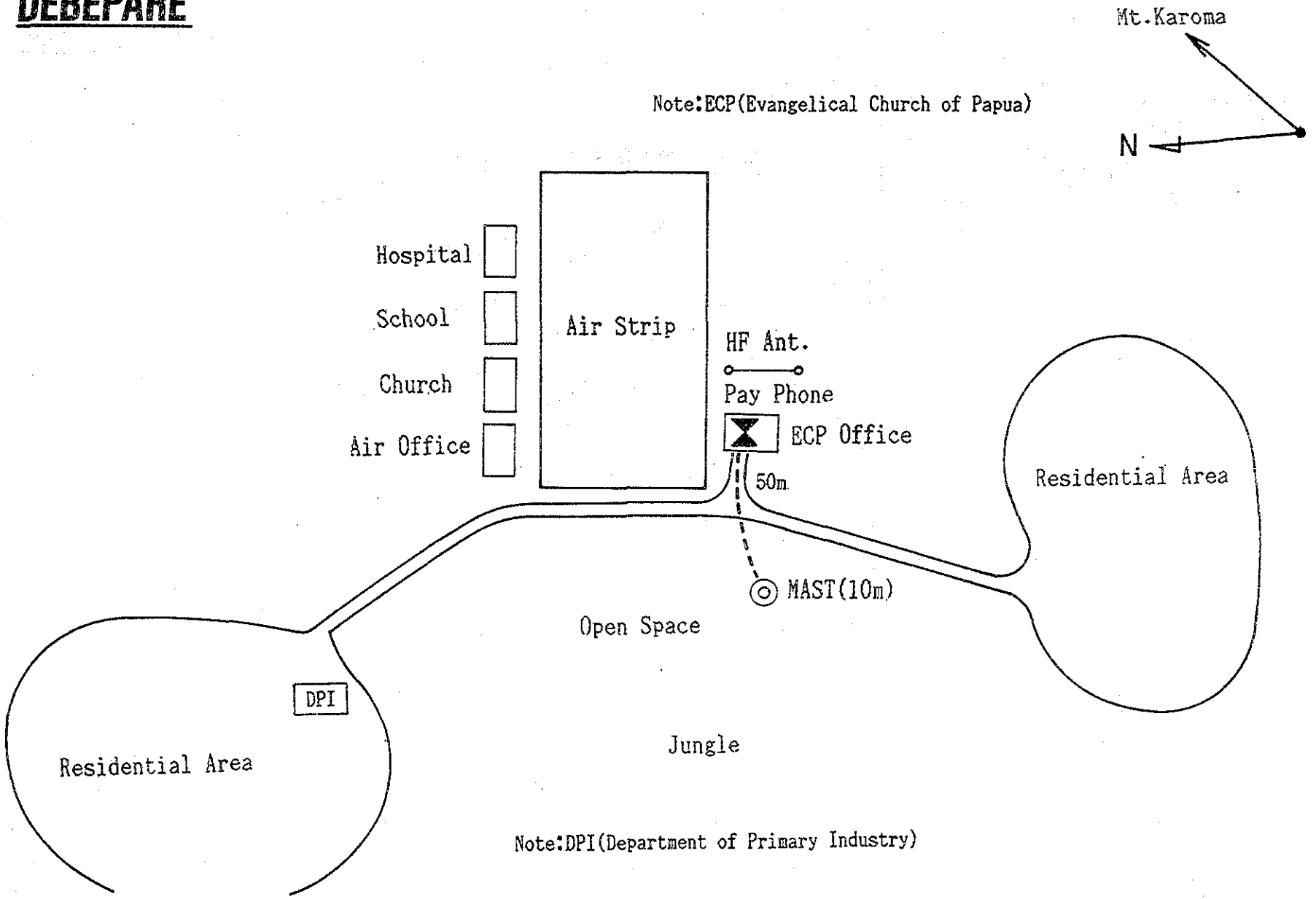

N
Matkomrae
Air Strip
Residential Area
Residential Area
Hospital
Pay Phone
HF Radio
200m
Private Phone
Headmaster's Office
10m
Tower(30m)

NINGERUM

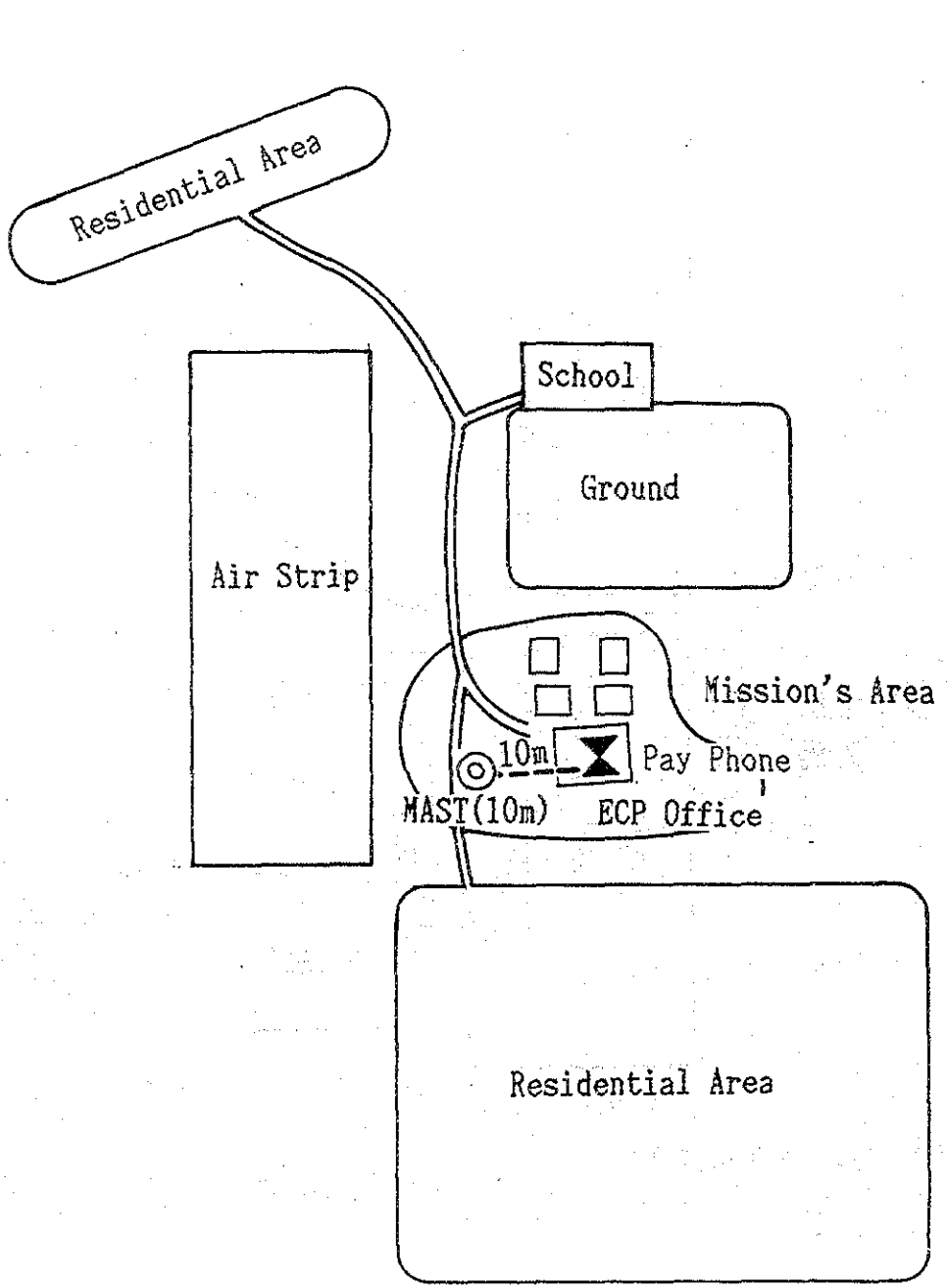


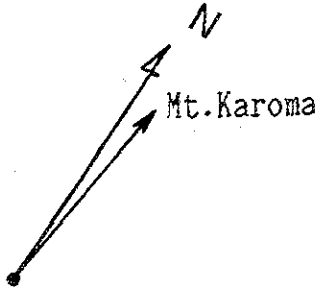
Note: The each subscriber station will be installed in subscriber's house.

DEBEPARE

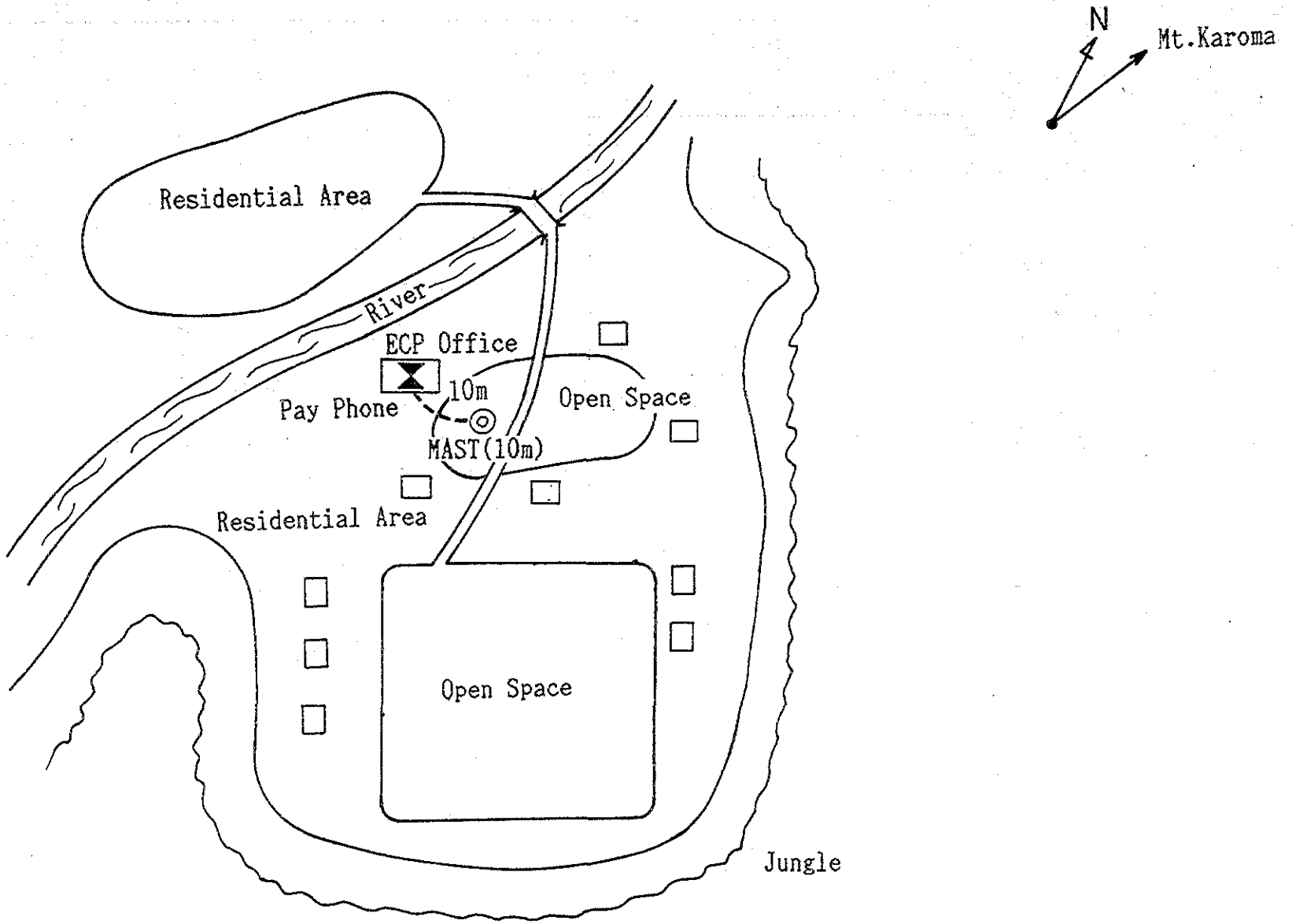

Mt.Karoma
N
Note:ECP(Evangelical Church of Papua)
Hospital
School
Church
Air Office
Air Strip
HF Ant.
Pay Phone
ECP Office
50m
Residential Area
MAST(10m)
Open Space
DPI
Residential Area
Jungle
Note:DPI(Department of Primary Industry)

MOGULU

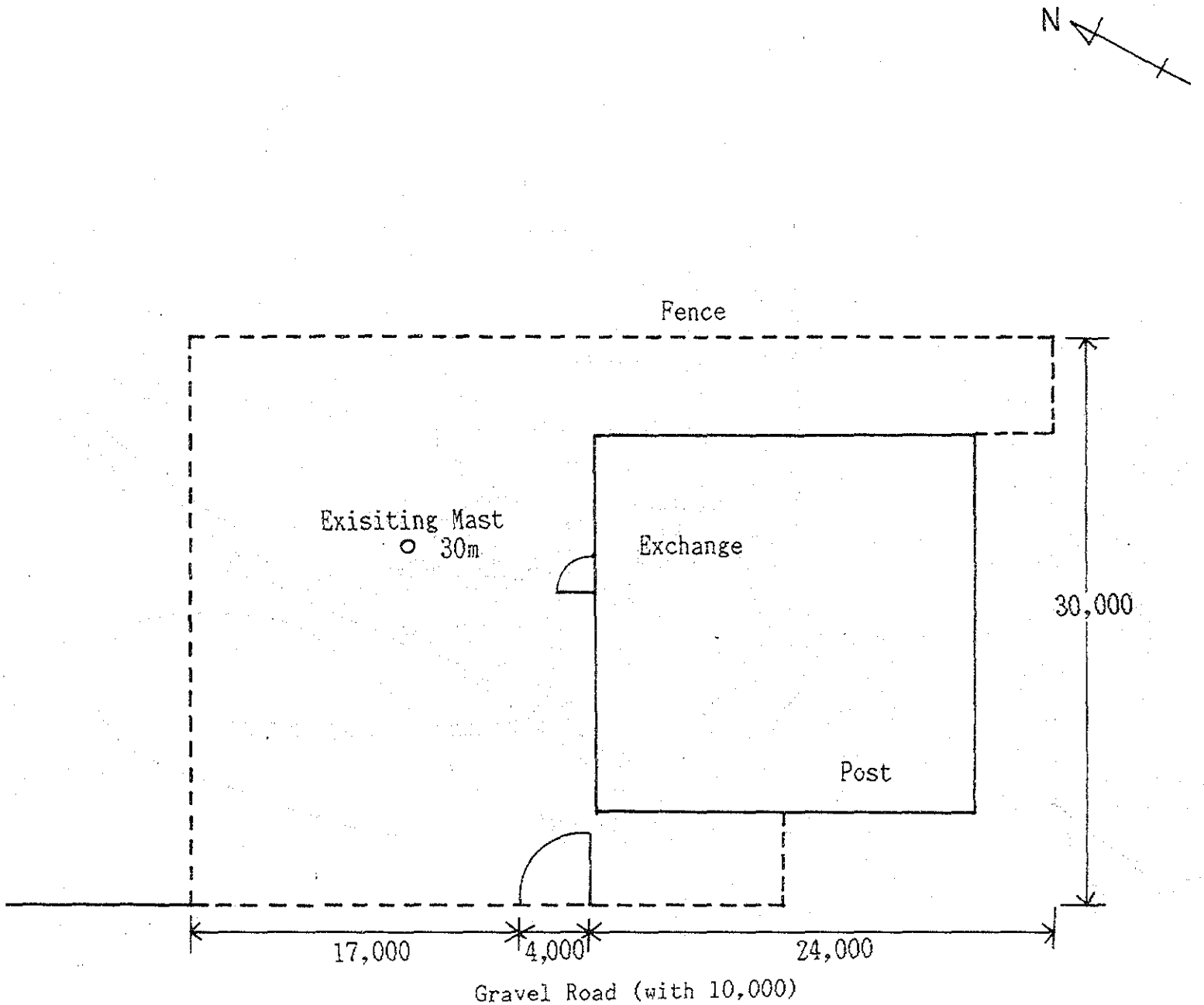

Residential Area
School
Ground
Air Strip
Mission's Area
10m
Pay Phone
MAST(10m)
ECP Office
Residential Area


N
Mt.Karoma

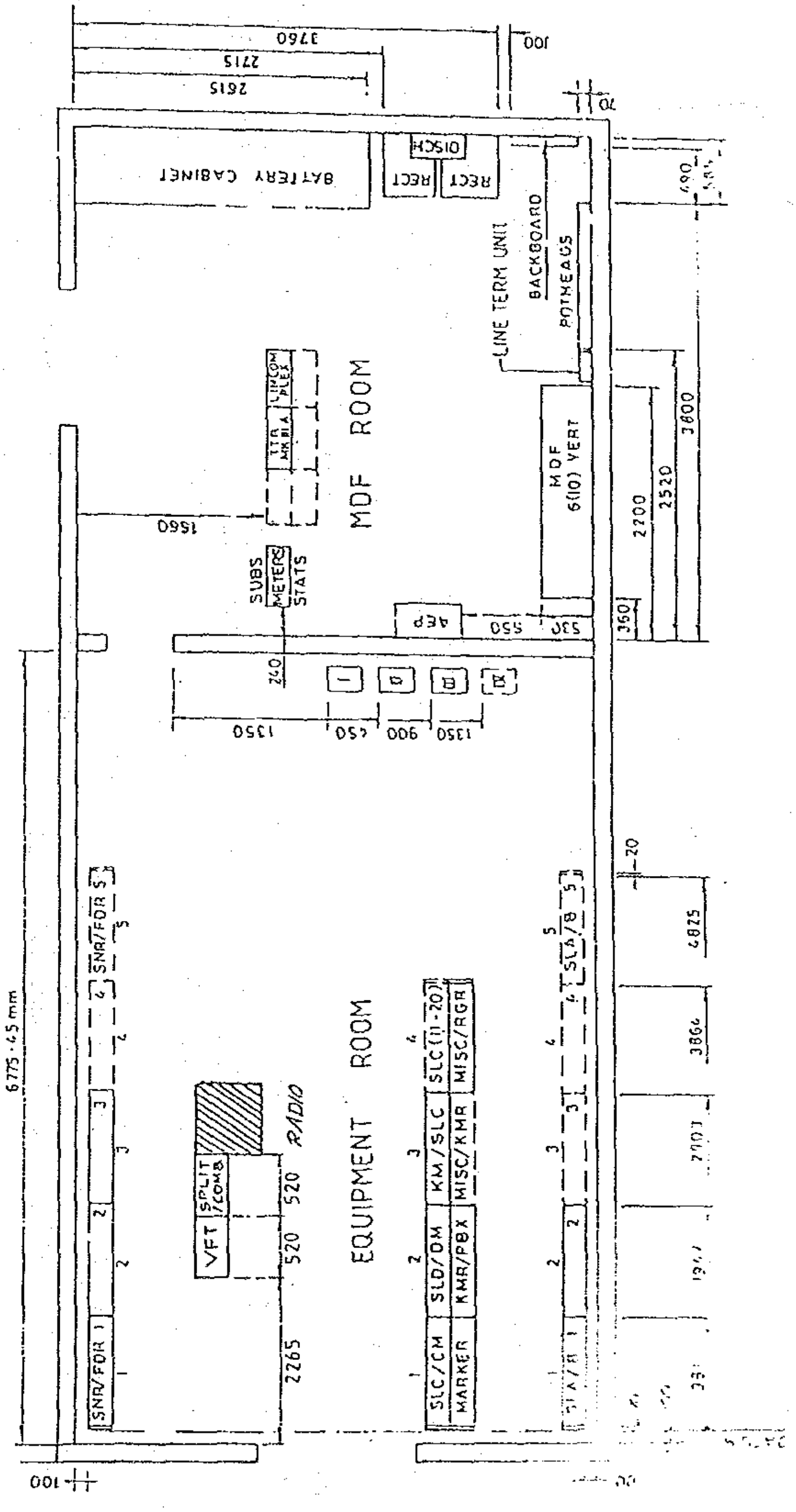
SUABI


N
Mt.Karoma
Residential Area
River
ECP Office
Pay Phone
10m
MAST(10m)
Open Space
Residential Area
Open Space
Jungle

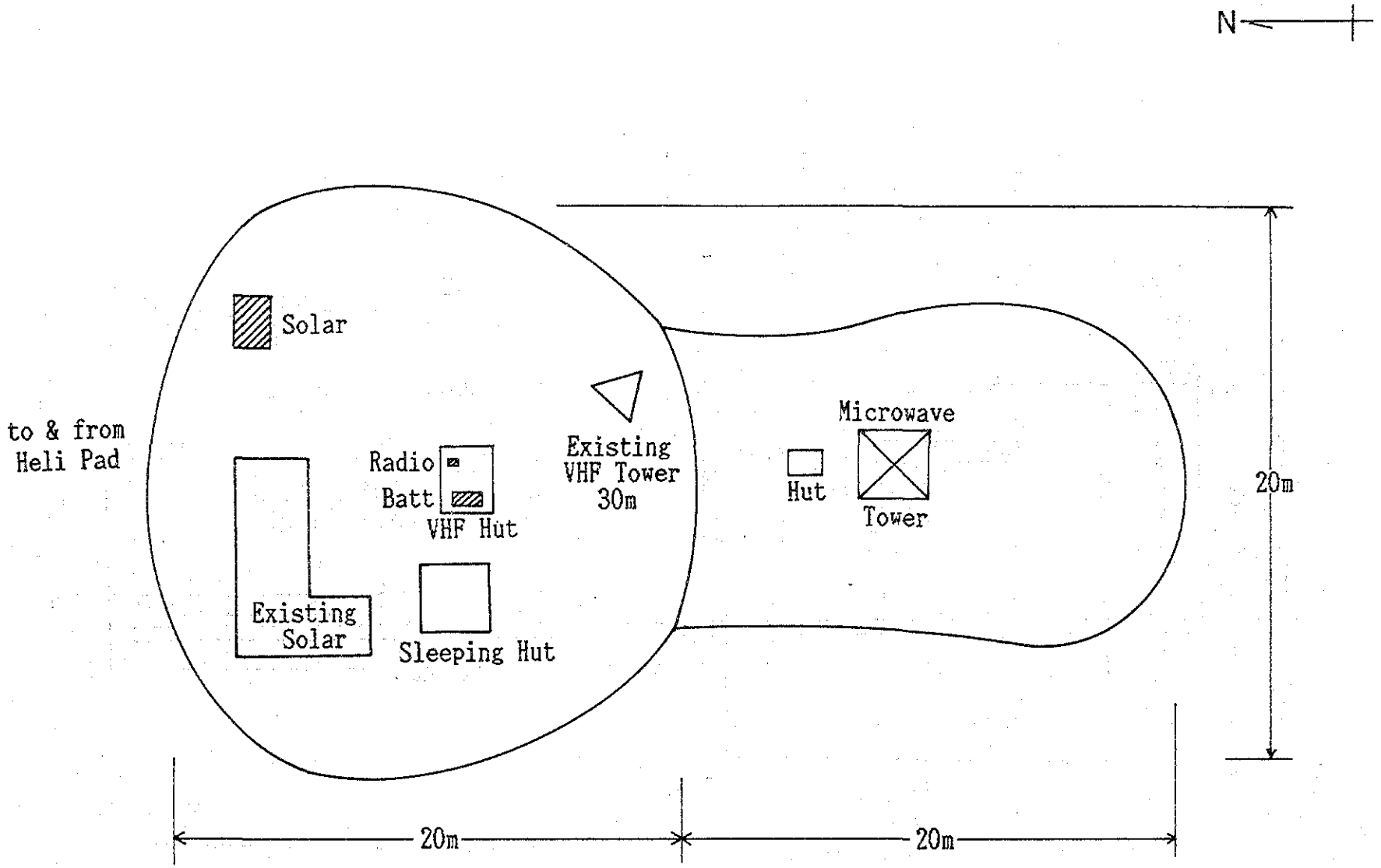
DARU


N
Fence
Exisiting Mast
30m
Exchange
Post
30,000
17,000
4,000
24,000
Gravel Road (with 10,000)

DARU


BATTERY CABINET
RECT
RECT
DISCH
LINE TERM UNIT
BACKBOARD
POTHEADS
MDF ROOM
MDF 6(10) VERT
SUBS
METERS
STATS
EQUIPMENT ROOM
RADIO
VFT
SPLIT /COMB
SNR/FDR 1
SNR/FDR 5
SLC/CM
MARKER
SLD/DM
KMR/PBX
KM/SLC
MISC/KMR
SLC(11-20)
MISC/RGR
3760
2715
2615
100
1560
2700
2520
3800
6775·45 mm
1350
450
900
1350
520
520
2265
1200
1972
4825
3864

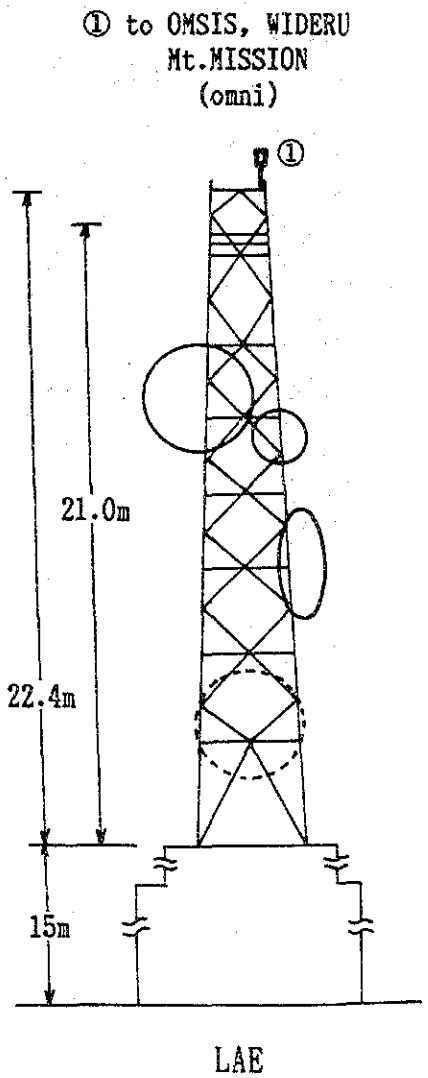
Mt. KAROMA


N
Solar
to & from
Heli Pad
Radio
Batt
VHF Hut
Existing
VHF Tower
30m
Existing
Solar
Sleeping Hut
Microwave
Hut
Tower
20m
20m
20m

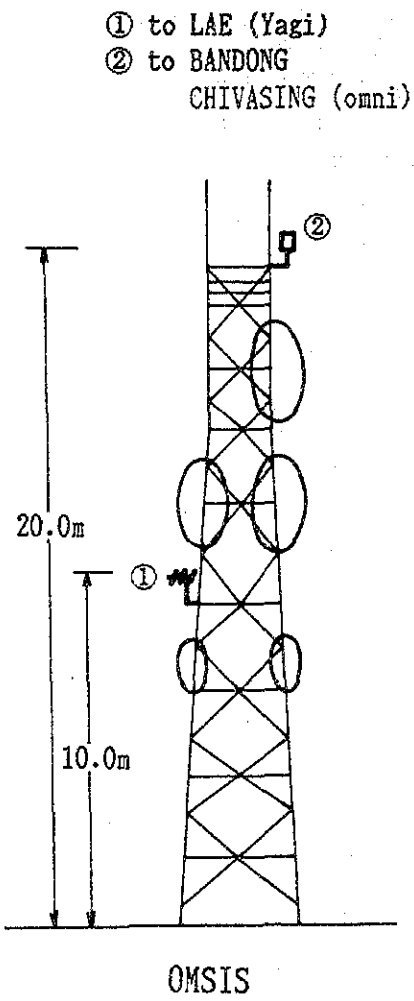
ANNEX 4

EQUIPMENT AND ANTENNA INSTALLATION SKETCH AT THE EXISTING OFFICE

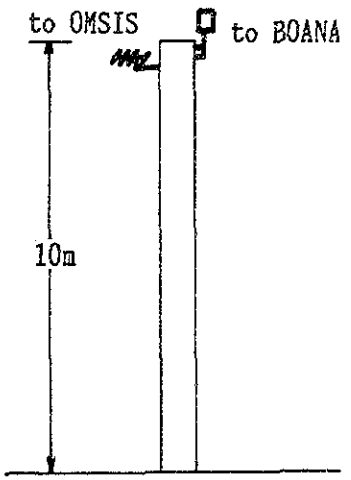
MOROBE PROVINCE(1/3)



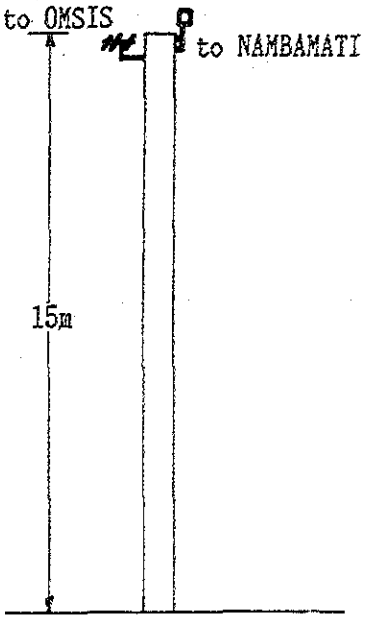
LAE



OMSIS



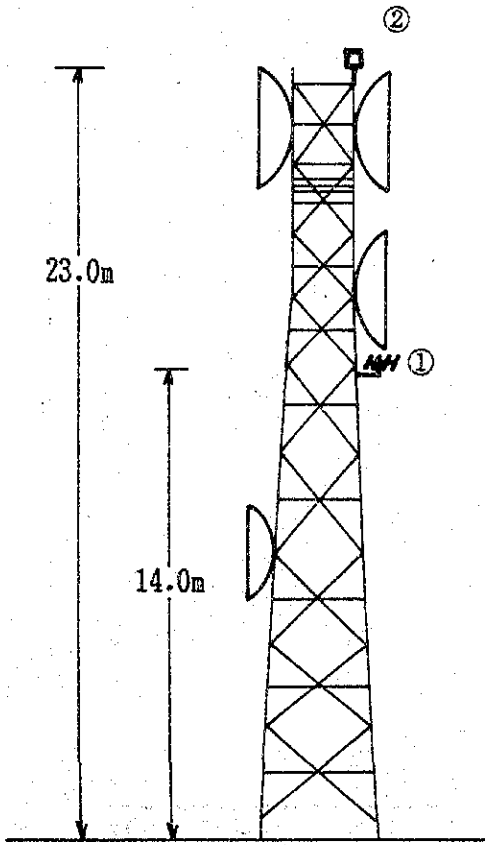
BANDONG



CHIVASING.

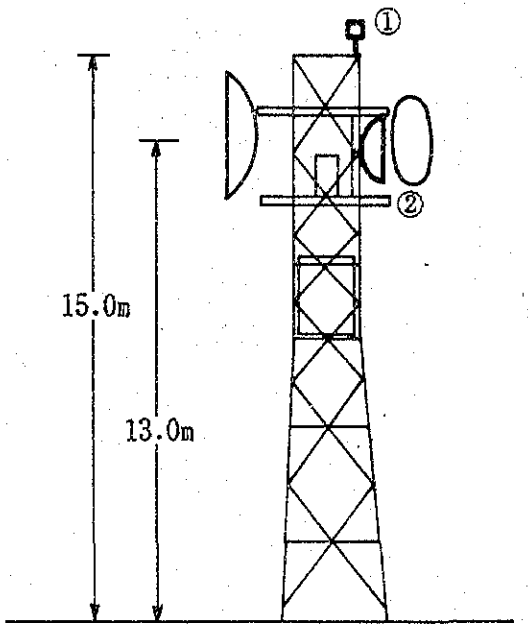
MOROBE PROVINCE(2/3)

① to CHIVASING (Yagi)
② to KAIAPIT
UMI
WATARAIS
(omni)

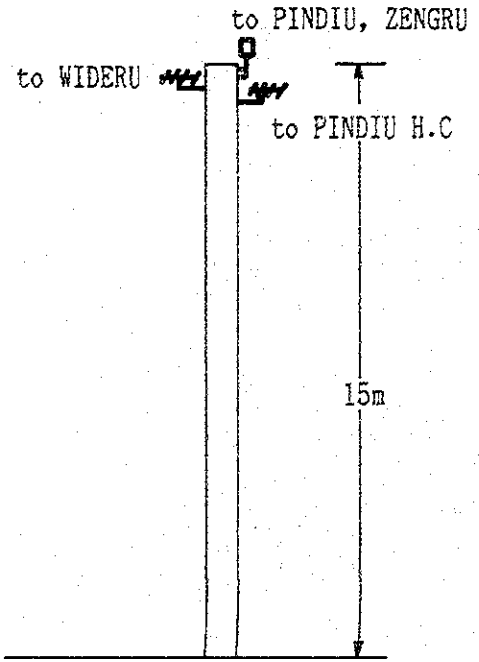


NAMBAMATI

① to SILIMANA
BUKAUA (omni)
② to LAE (1.2mφ)

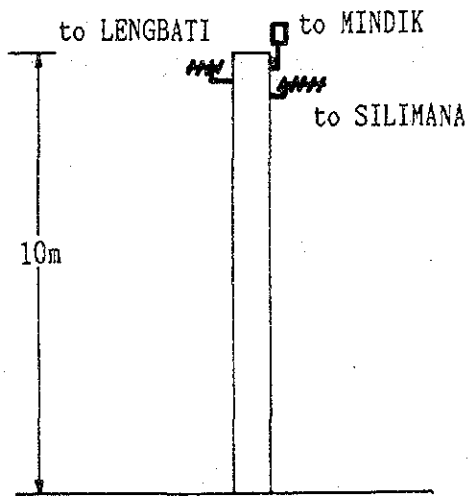


WIDERU

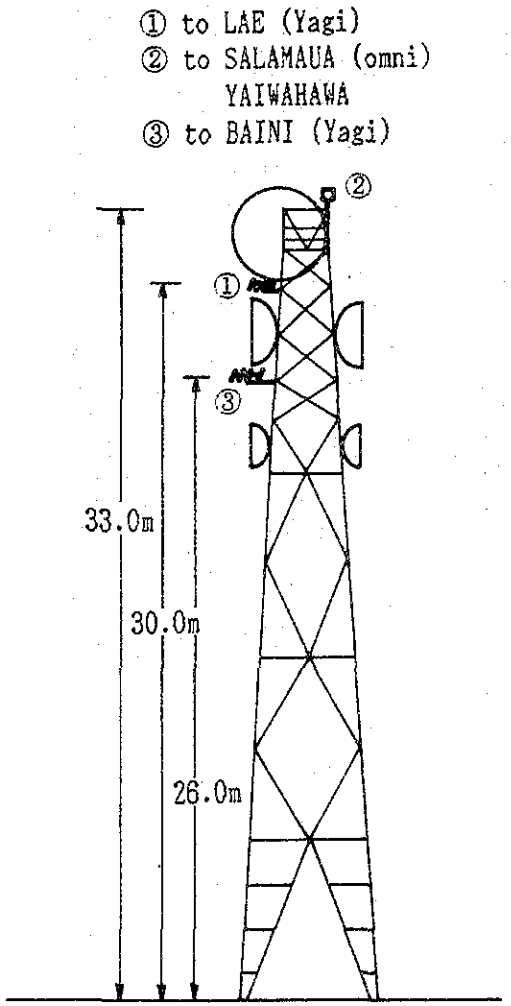


SILIMANA

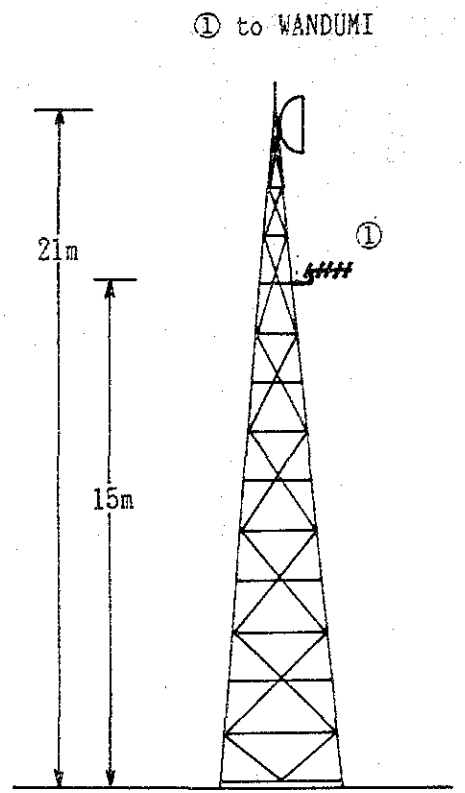
MOROBE PROVINCE(3/3)



ZENGURU

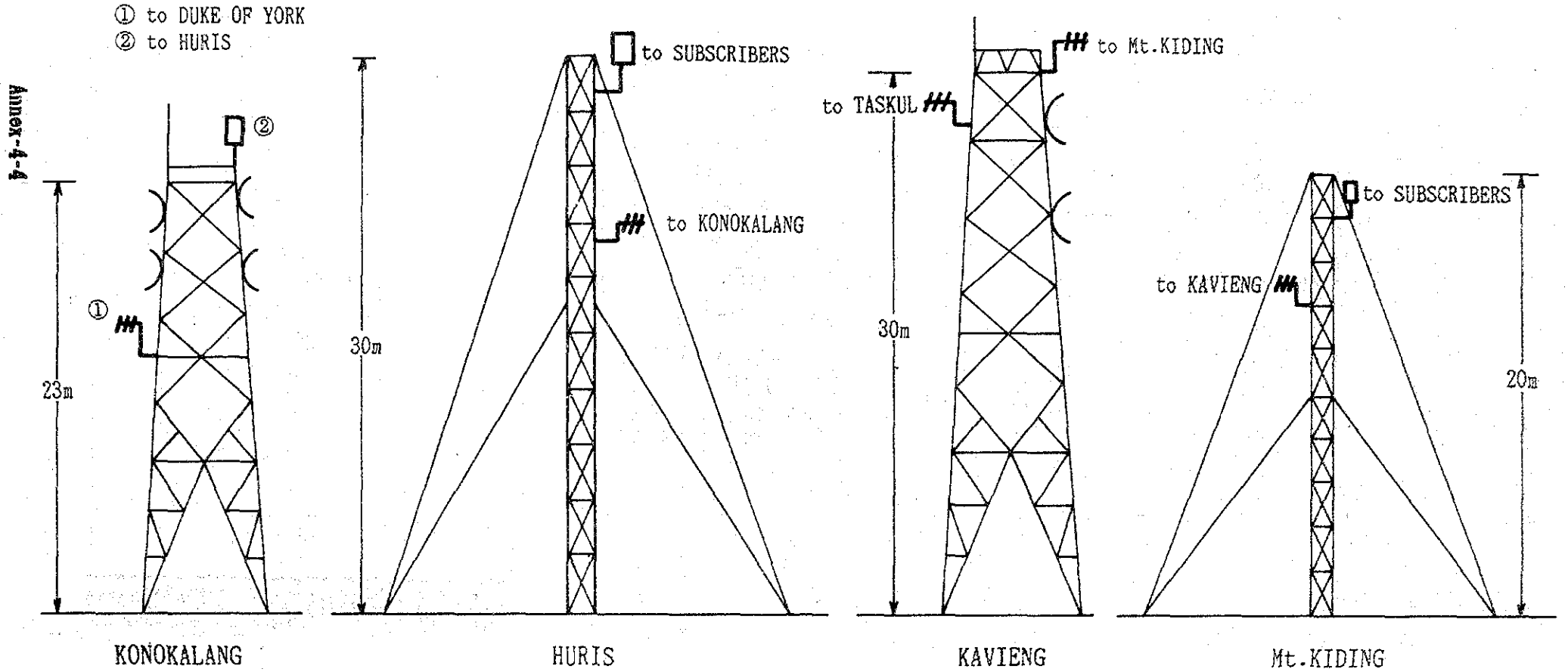


Mt.MISSION

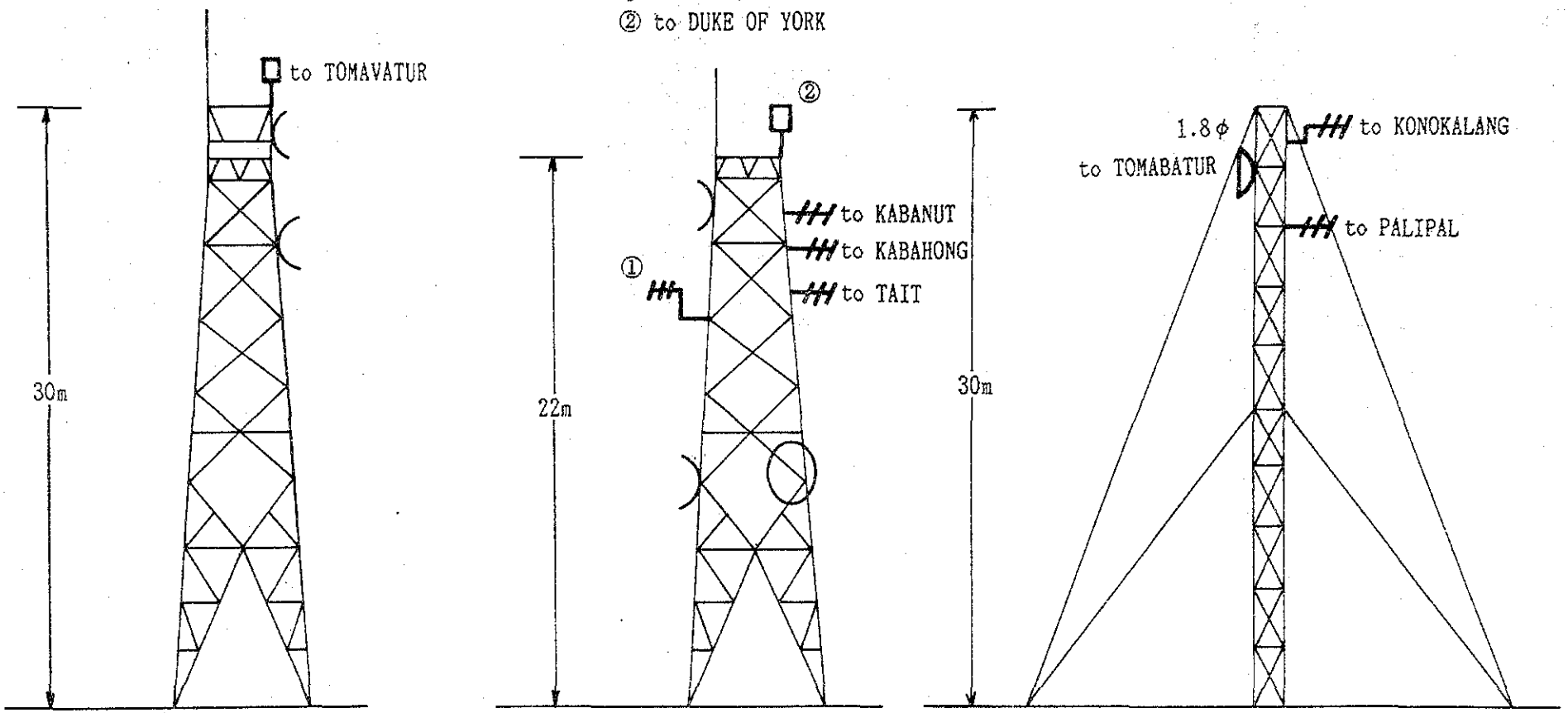


WAU

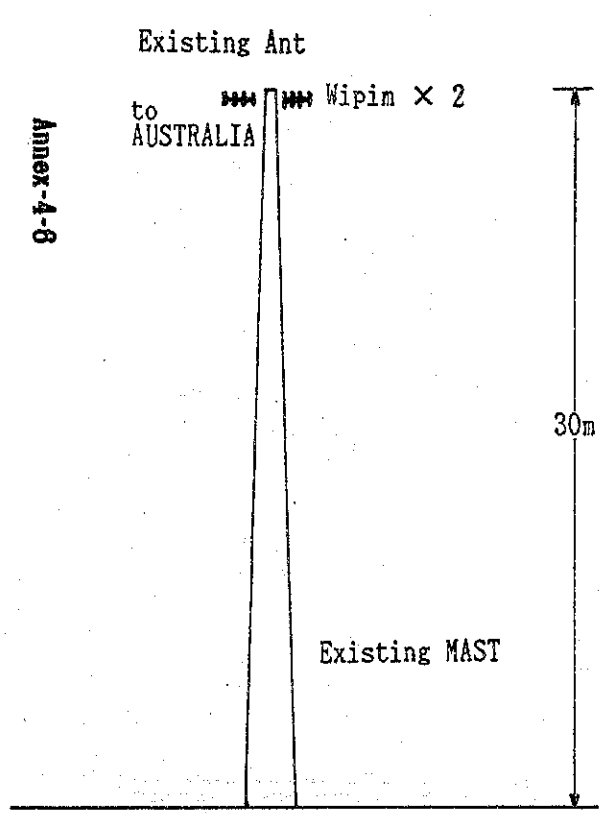
NEW IRELAND(1/2)



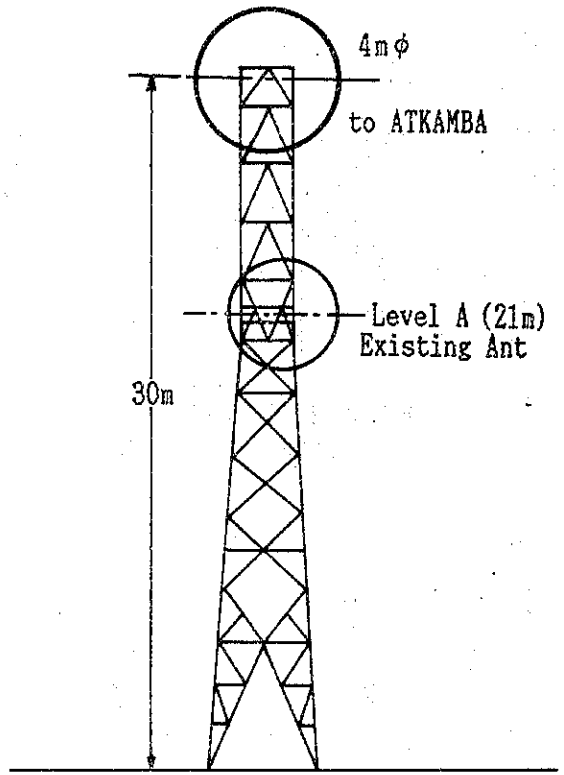
NEW IRELAND(2/2)



WESTERN PROVINCE(1/3)



DARU



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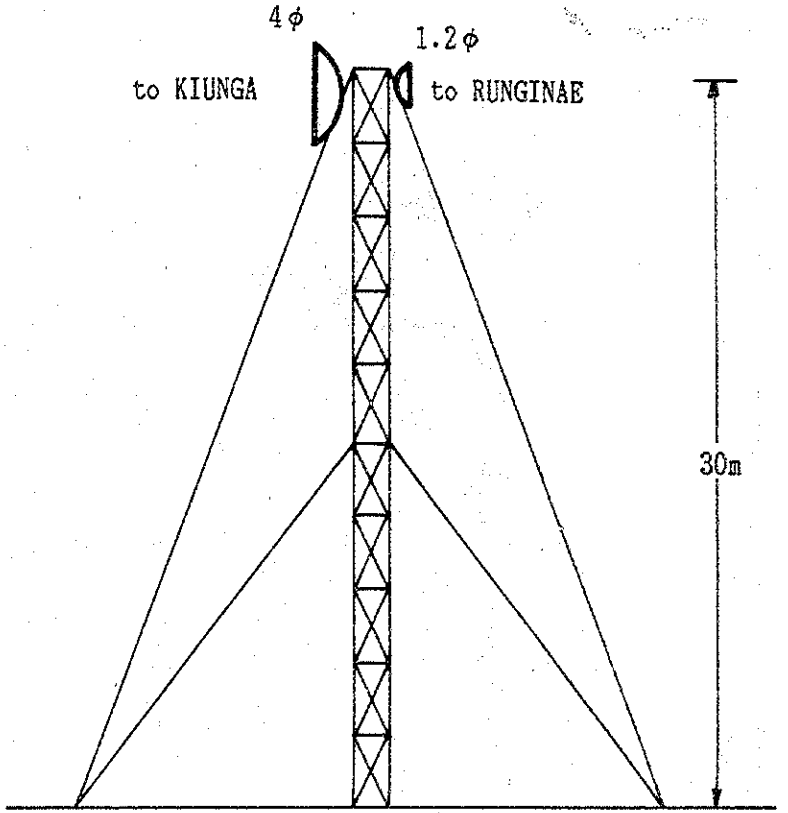

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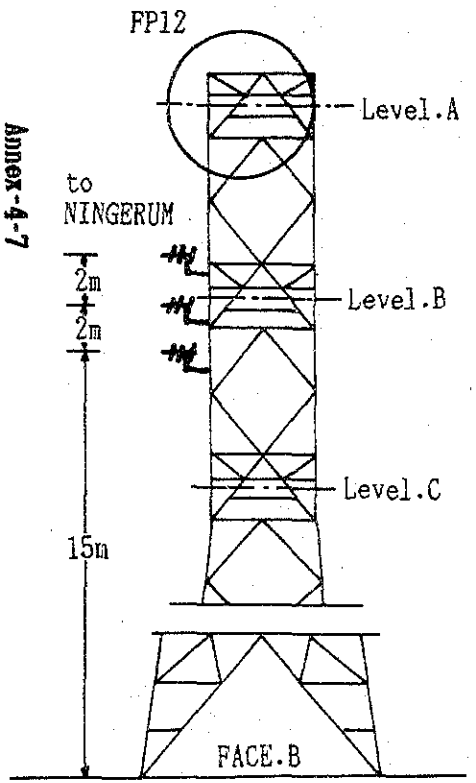
WESTERN PROVINCE(2/3)



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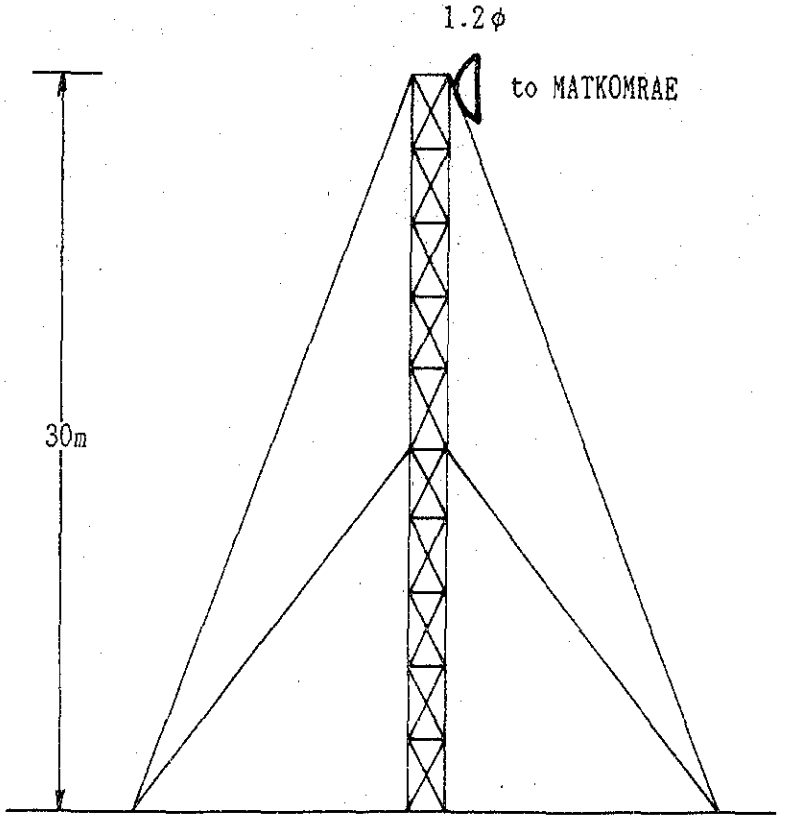

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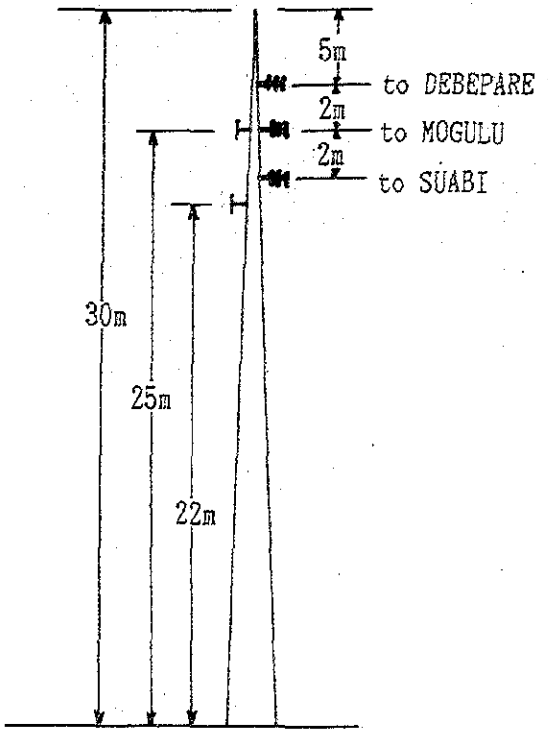

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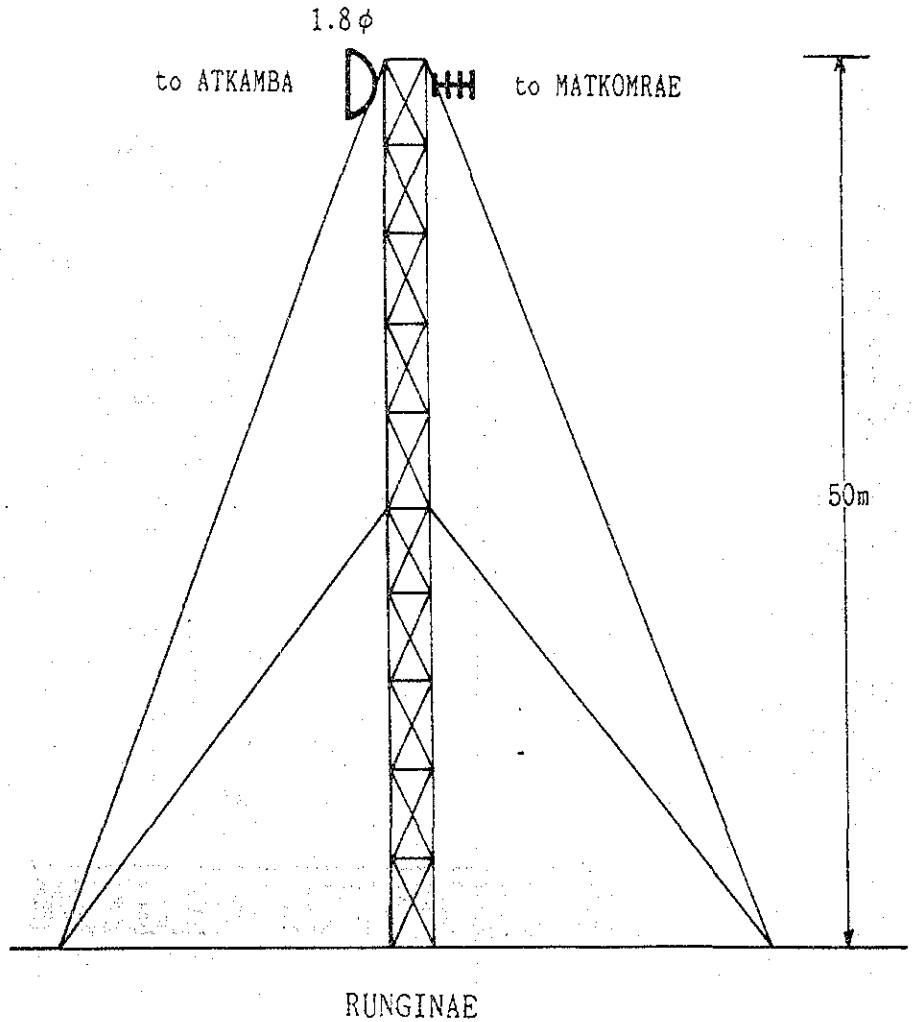
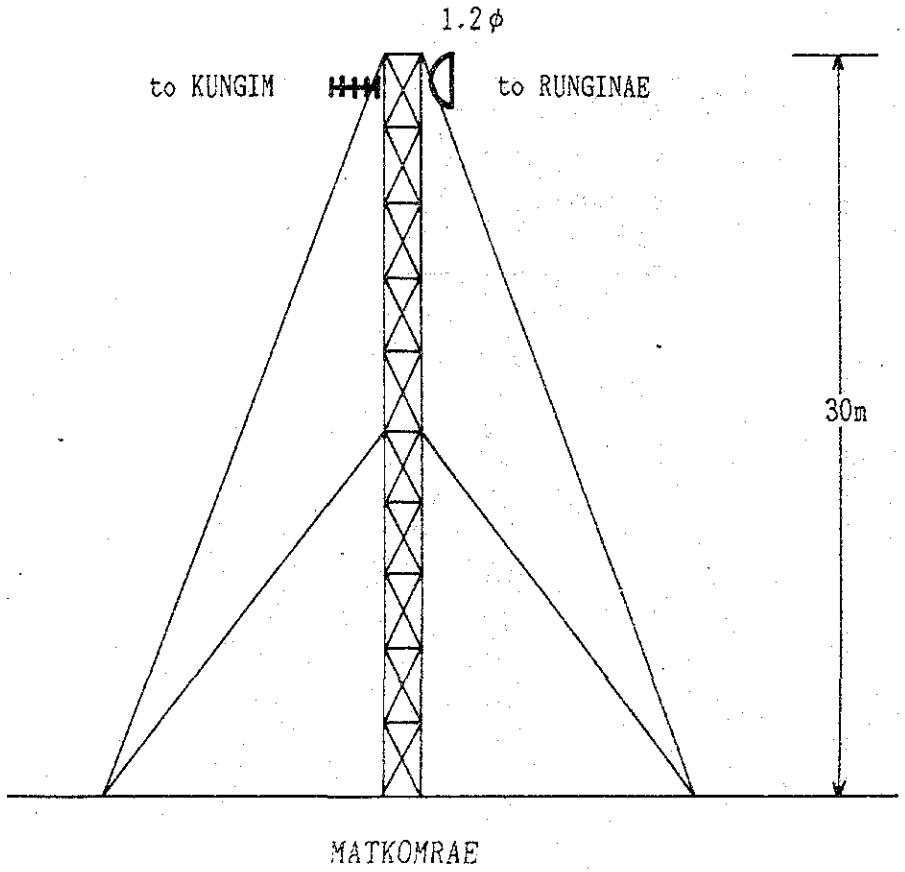




ANNEX 5

CALCULATION OF PHOTOVOLTAIC CAPACITY

Calculation of photovoltaic capacity(Morobe :TDMA Subscriber)

1. Condition

1) Installation place	:	P.N.G (MOROBE)
2) Latitude	:	6 °S
3) Kind of load	:	TDMA(Subscriber terminal)
4) System voltage	:	V=12 (V)
5) Average load consumption	:	PL=21.3(W)
6) Global solar radiation	:	Q(cal/cm2·day) 345(min.)-474(max.)

2. Result of calculation

1) Photovoltaic capacity	:	180.9
2) Battery capacity	:	298.2

3. Calculation procedure

Array angle	:	θ a=15°
Array angle factor	:	F 1.09(min.)-0.94(max.)
On array solar radiation	:	Q'

1) Photovoltaic capacity : Pm (Wp)

$Pm=(2400/Q'min.)\times PL\times 1/(K1\cdot K2\cdot K3)$

Q'min.	:	Minimum value of Q' 436mWH/cm2·day
K1	:	Charge efficiency 0.9
K2	:	Loss by dirt of glass 0.9
K3	:	Safety factor 0.8

$Pm=(2400/436)\times 21.3\times 1/(0.9\times 0.9\times 0.8)$

$=180.9$

2) Battery capacity : Be (AH)

$Be=(PL\cdot 24\cdot D)/(V)$

D : Number of no sun day 7

$Be=(21.3\times 24\times 7.0)/(12)$

$=298.2$

Calculation of photovoltaic capacity(Western :TDMA Subscriber)

1. Condition

1) Installation place	:	P.N.G (Western)
2) Latitude	:	8.5 °S
3) Kind of load	:	TDMA(Subscriber terminal)
4) System voltage	:	V=12 (V)
5) Average load consumption	:	PL=21.3(W)
6) Global solar radiation	:	Q(cal/cm2·day) 366(min.)-539(max.)

2. Result of calculation

1) Photovoltaic capacity	:	170.4
2) Battery capacity	:	298.2

3. Calculation procedure

Array angle	:	θ a=15°
Array angle factor	:	F 1.09(min.)-0.94(max.)
On array solar radiation	:	Q'

1) Photovoltaic capacity : Pm (Wp)

Pm=(2400/Q'min.)×PL×1/(K1·K2·K3)

Q'min.	:	Minimum value of Q'	463 mWH/cm2·day
K1	:	Charge efficiency	0.9
K2	:	Loss by dirt of glass	0.9
K3	:	Safety factor	0.8

Pm=(2400/463)×21.3 ×1/(0.9×0.9×0.8)
=170.4

2) Battery capacity : Be (AH)

Be=(PL·24·D)/(V)

D	:	Number of no sun day	7

Be=(21.3×24×7.0)/(12)
=298.2

Calculation of photovoltaic capacity(New Ireland :TDMA Subscriber)

1. Condition

   1) Installation place : P.N.G (New Ireland)
   2) Latitude : 4 °S
   3) Kind of load : TDMA(Subscriber terminal)
   4) System voltage : V=12 (V)
   5) Average load consumption : PL=21.3(W)
   6) Global solar radiation: Q(cal/cm2·day) 398.3(min.)-475.9(max.)

2. Result of calculation

   1) Photovoltaic capacity : 156.6
   2) Battery capacity : 298.2

3. Calculation procedure

   Array angle : $\theta a=15°$
   Array angle factor : F 1.09(min.)-0.99(max.)
   On array solar radiation : Q'

   1) Photovoltaic capacity : Pm (Wp)

      Pm=(2400/Q'min.)×PL×1/(K1·K2·K3)
        Q'min. : Minimum value of Q' 503.6mWH/cm2·day
        K1 : Charge efficiency 0.9
        K2 : Loss by dirt of glass 0.9
        K3 : Safety factor 0.8
      Pm=(2400/503.6)×21.3×1/(0.9×0.9×0.8)
        =156.6

   2) Battery capacity : Be (AH)

      Be=(PL·24·D)/(V)
        D : Number of no sun day 7

      Be=(21.3×24×7.0)/(12)
        =298.2

Calculation of photovoltaic capacity(Morobe :TDMA Repeater)

1. Condition

1) Installation place	:	P.N.G (Morobe)
2) Latitude	:	6 °S
3) Kind of load	:	TDMA(Repeater equipment)
4) System voltage	:	V=24 (V)
5) Average load consumption	:	PL=56.7(W)
6) Global solar radiation	:	Q(cal/cm2·day) 345(min.)-474(max.)

2. Result of calculation

1) Photovoltaic capacity	:	481.7
2) Battery capacity	:	298.2

3. Calculation procedure

Array angle	:	θ a=15°
Array angle factor	:	F 1.09(min.)-0.94(max.)
On array solar radiation	:	Q'

1) Photovoltaic capacity : Pm (Wp)

Pm=(2400/Q'min.)×PL×1/(K1·K2·K3)

Q'min.	:	Minimum value of Q' 436mWH/cm2·day
K1	:	Charge efficiency 0.9
K2	:	Loss by dirt of glass 0.9
K3	:	Safety factor 0.8

Pm=(2400/436)×56.7×1/(0.9×0.9×0.8)
=481.7

2) Battery capacity : Be (AH)

Be=(PL·24·D)/(V)

D	:	Number of no sun day 7

Be=(56.7×24×7.0)/(24)
=396.9

Calculation of photovoltaic capacity(Western :TDMA Repeater)

1. Condition

   1) Installation place : P.N.G (Western)
   2) Latitude : 8.5 °S
   3) Kind of load : TDMA(Repeater equipment)
   4) System voltage : V=24 (V)
   5) Average load consumption : PL=56.7(W)
   6) Global solar radiation: Q(cal/cm2·day) 366(min.)-539(max.)

2. Result of calculation

   1) Photovoltaic capacity : 453.6
   2) Battery capacity : 396.9

3. Calculation procedure

   Array angle : θ a=15°
   Array angle factor : F 1.09(min.)-0.94(max.)
   On array solar radiation : Q'

  1) Photovoltaic capacity : Pm (Wp)

     Pm=(2400/Q'min.)×PL×1/(K1·K2)
       Q'min. : Minimum value of Q' 463 mWH/cm2·day
       K1 : Charge efficiency 0.9
       K2 : Loss by dirt of glass 0.9
       K3 : Safety factor 0.8
     Pm=(2400/463)×56.7×1/(0.9×0.9×0.8)
       =453.6

  2) Battery capacity : Be (AH)

     Be=(PL·24·D)/(V)
       D : Number of no sun day 7

     Be=(56.7×24×7.0)/(24)
       =396.9

Calculation of photovoltaic capacity(New Ireland :TDMA Repeater)

1. Condition

1) Installation place	:	P.N.G (New Ireland)
2) Latitude	:	4 °S
3) Kind of load	:	TDMA(Repeater equipment)
4) System voltage	:	V=24 (V)
5) Average load consumption	:	PL=56.7(W)
6) Global solar radiation	:	Q(cal/cm2·day) 398.3(min.)-475.9(max.)

2. Result of calculation

1) Photovoltaic capacity	:	417.0
2) Battery capacity	:	396.9

3. Calculation procedure

Array angle	:	θ a=15°
Array angle factor	:	F 1.09(min.)-0.99(max.)
On array solar radiation	:	Q'

1) Photovoltaic capacity : Pm (Wp)

$Pm=(2400/Q'min.)\times PL\times 1/(K1\cdot K2\cdot K3)$

Q'min.	:	Minimum value of Q' 503.6mWH/cm2·day
K1	:	Charge efficiency 0.9
K2	:	Loss by dirt of glass 0.9
K3	:	Safety factor 0.8

$Pm=(2400/503.6)\times 56.7\times 1/(0.9\times 0.9\times 0.8)$

$=417.0$

2) Battery capacity : Be (AH)

$Be=(PL\cdot 24\cdot D)/(V)$

D : Number of no sun day 7

$Be=(56.7\times 24\times 7.0)/(24)$

$=396.9$

Calculation of photovoltaic capacity(Morobe :Single Channel)

1. Condition

   1) Installation place : P.N.G (Morobe)
   2) Latitude : 6 °S
   3) Kind of load : Single channel
   4) System voltage : V=12(V)
   5) Average load consumption : PL=9.0(W)
   6) Global solar radiation: Q(cal/cm2·day) 345(min.)-474(max.)

2. Result of calculation

   1) Photovoltaic capacity : 76.5
   2) Battery capacity : 126.0

3. Calculation procedure

   Array angle : θa=15°
   Array angle factor : F 1.09(min.)-0.94(max.)
   On array solar radiation : Q'

  1) Photovoltaic capacity : Pm (Wp)

     Pm=(2400/Q'min.)×PL×1/(K1·K2·K3)
       Q'min. : Minimum value of Q' 436mWH/cm2·day
       K1 : Charge efficiency 0.9
       K2 : Loss by dirt of glass 0.9
       K3 : Safety factor 0.8
     Pm=(2400/436)×9.0×1/(0.9×0.9×0.8)
       =76.5

  2) Battery capacity : Be (AH)

     Be=(PL·24·D)/(V)
       D : Number of no sun day 7

     Be=(9.0×24×7.0)/(12)
       =126.0

Calculation of photovoltaic capacity(Western :Single Channel)

1. Condition

1) Installation place	:	P.N.G (Western)
2) Latitude	:	8.5 °S
3) Kind of load	:	Single channel
4) System voltage	:	V=12 (V)
5) Average load consumption	:	PL=9.0(W)
6) Global solar radiation	:	Q(cal/cm2·day) 366(min.)-539(max.)

2. Result of calculation

1) Photovoltaic capacity	:	72.0
2) Battery capacity	:	126.0

3. Calculation procedure

Array angle	:	θ a=15°
Array angle factor	:	F 1.09(min.)-0.94(max.)
On array solar radiation	:	Q'

1) Photovoltaic capacity : Pm (Wp)

Pm=(2400/Q'min.)×PL×1/(K1·K2·K3)

Q'min.	:	Minimum value of Q'	463 mWH/cm2·day
K1	:	Charge efficiency	0.9
K2	:	Loss by dirt of glass	0.9
K3	:	Safety factor	0.8

Pm=(2400/463)×9.0×1/(0.9×0.9×0.8)
=72.0

2) Battery capacity : Be (AH)

Be=(PL·24·D)/(V)

D	:	Number of no sun day	7

Be=(9.0×24×7.0)/(12)
=126.0

Calculation of photovoltaic capacity(New Ireland :Single Channel)

1. Condition

   1) Installation place : P.N.G (New Ireland)
   2) Latitude : 4 °S
   3) Kind of load : Single channel
   4) System voltage : V=12(V)
   5) Average load consumption : PL=9.0(W)
   6) Global solar radiation: Q(cal/cm2·day) 398.3(min.)-475.9(max.)

2. Result of calculation

   1) Photovoltaic capacity : 66.2
   2) Battery capacity : 126.0

3. Calculation procedure

   Array angle : θ a=15°
   Array angle factor : F 1.09(min.)-0.99(max.)
   On array solar radiation : Q'

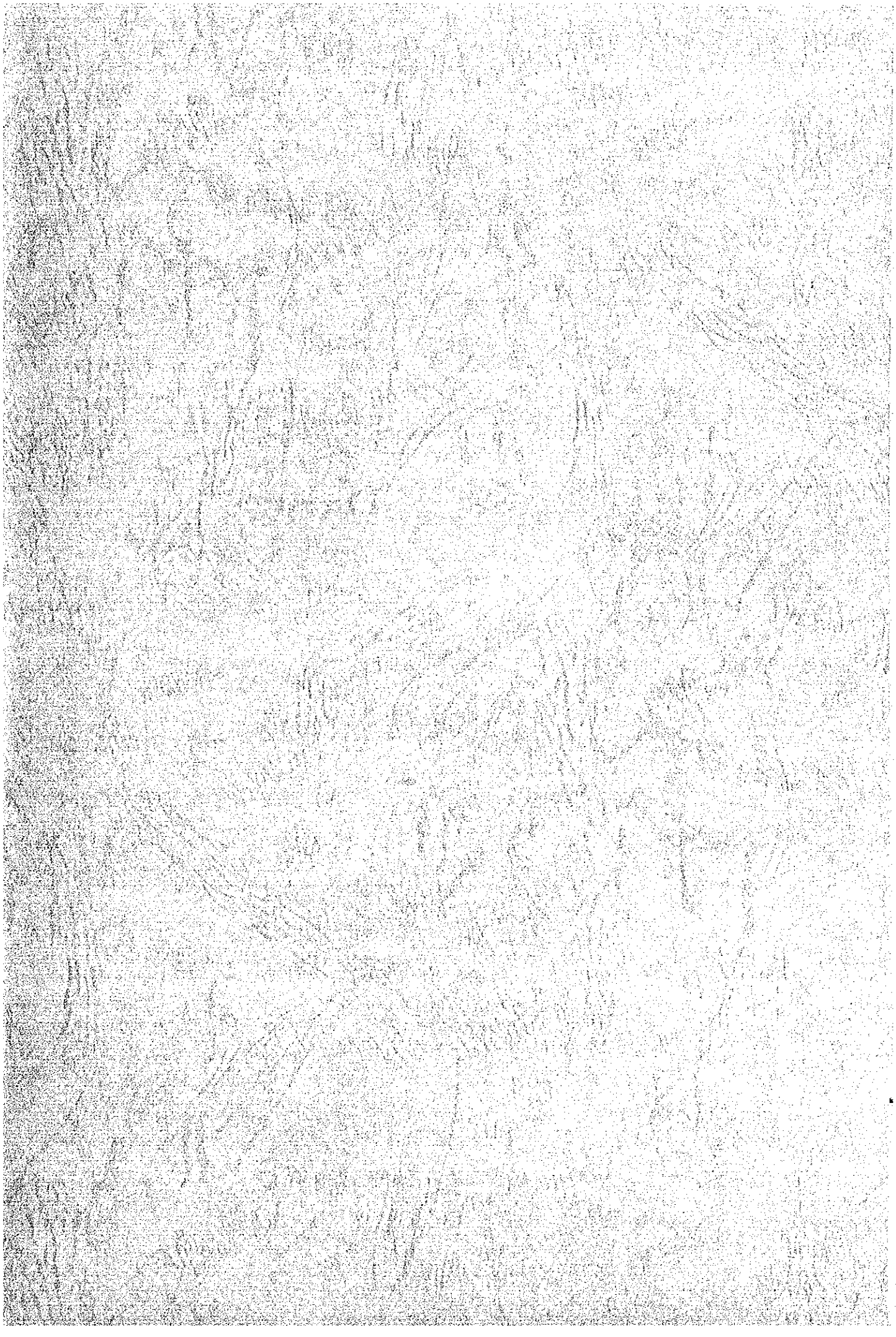
  1) Photovoltaic capacity : Pm (Wp)

     Pm=(2400/Q'min.)×PL×1/(K1·K2·K3)
       Q'min. : Minimum value of Q' 503.6mWH/cm2·day
       K1 : Charge efficiency 0.9
       K2 : Loss by dirt of glass 0.9
       K3 : Safety factor 0.8
     Pm=(2400/503.6)×9.0×1/(0.9×0.9×0.8)
       =66.2

  2) Battery capacity : Be (AH)

     Be=(PL·24·D)/(V)
       D : Number of no sun day 7

     Be=(9.0×24×7.0)/(12)
       =126.0



JICA