DEPARTAMENTO DE LA PAZ

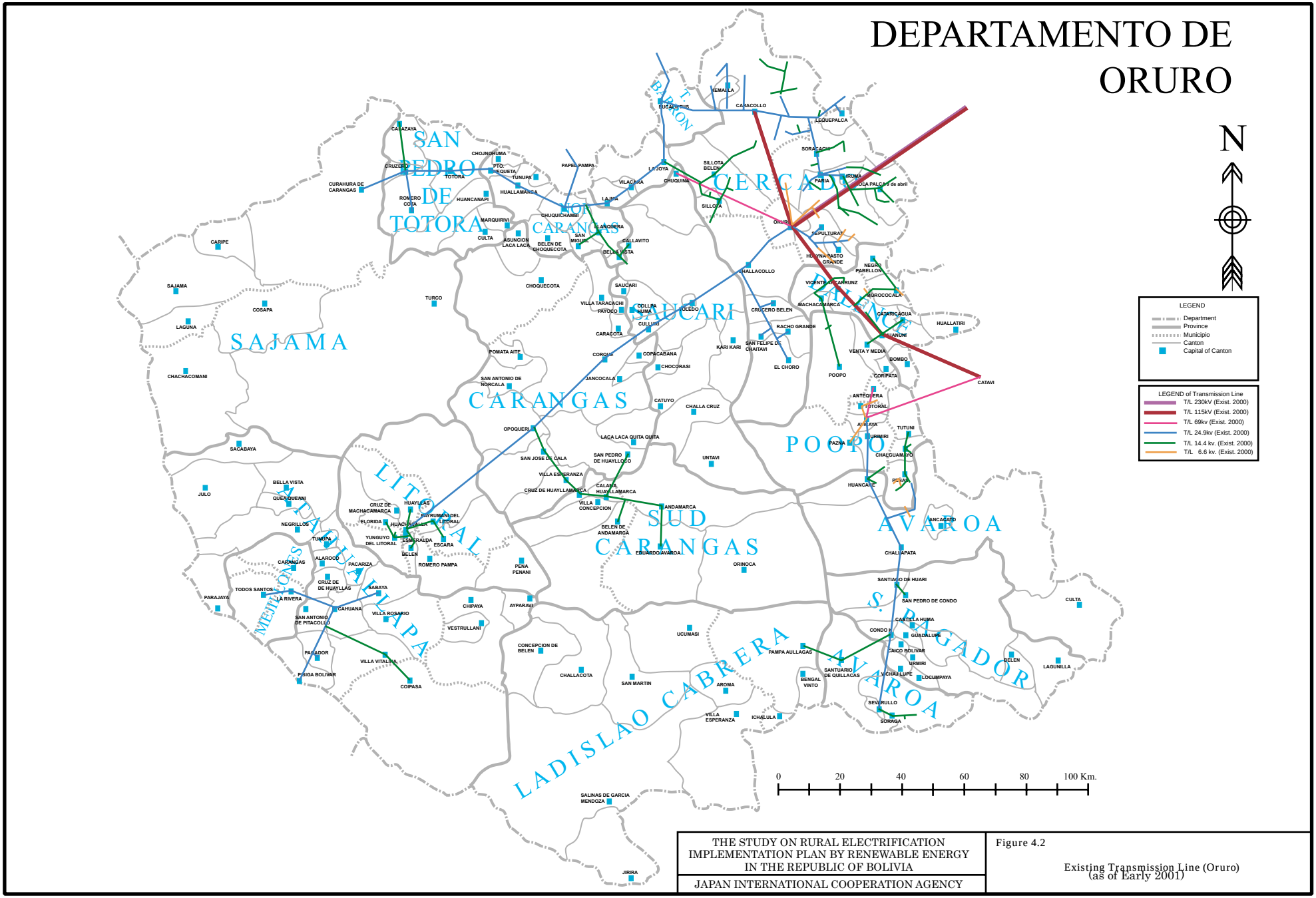
N

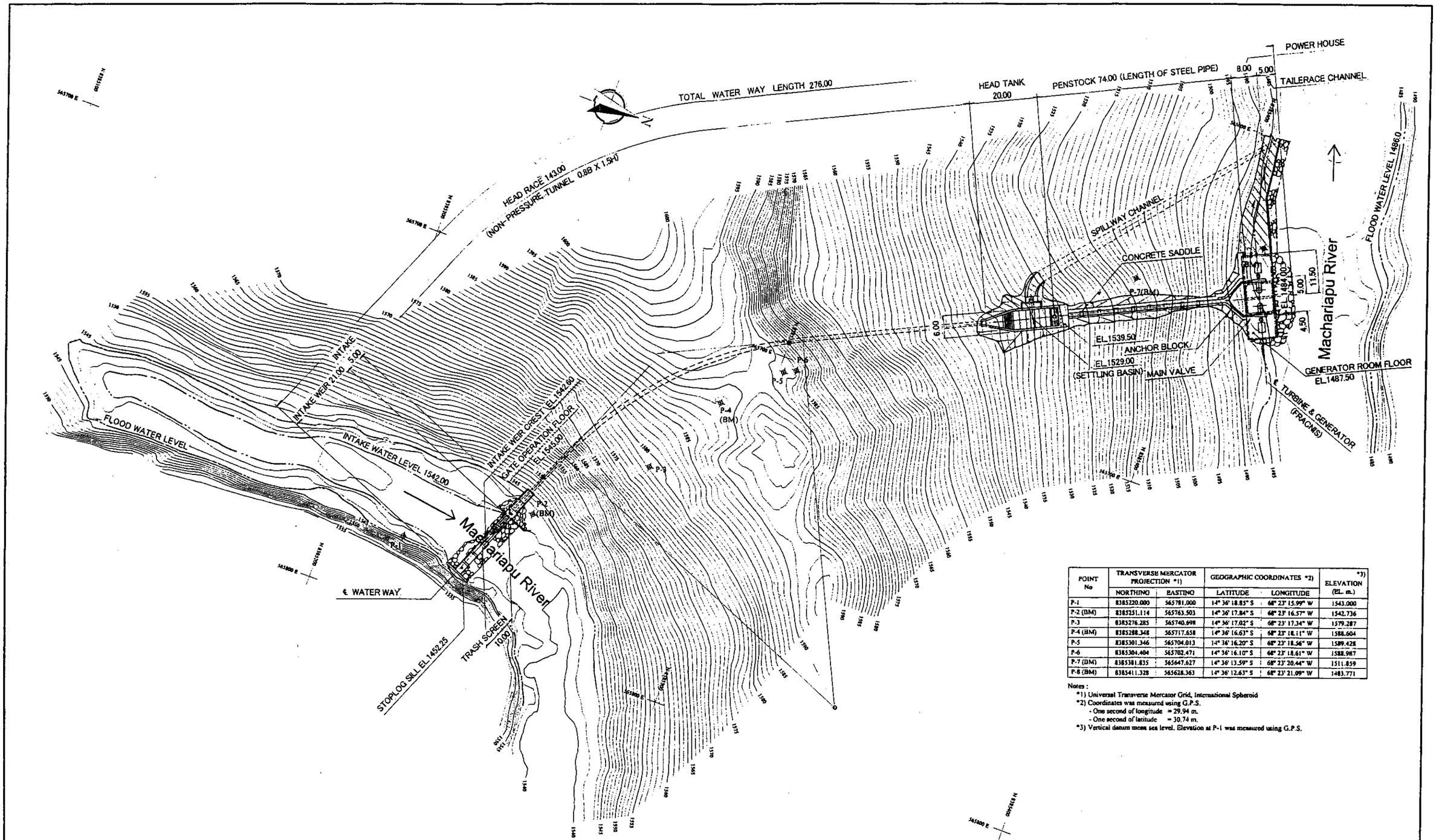
LEGEND
Department
Province
Capital of Canton

LEGEND
T/L 230kV(Exist. 2000)
T/L 115kV(Exist. 2000)
T/L 69kv(Exist. 2000)
T/L 34.5kv(Exist. 2000)
T/L 24.9kv(Exist. 2000)
T/L 19.9kv(Exist. 2000)
T/L 14.4kv(Exist. 2000)

0 20 40 60 80 100 Km.

THE STUDY ON RURAL ELECTRIFICATION IMPLEMENTATION PLAN BY RENEWABLE ENERGY IN THE REPUBLIC OF BOLIVIA	Figure 4.1 Existing Transmission Line(La Paz) (as of Eary 2001)
JAPAN INTERNATIONAL COOPERATION AGENCY	


DEPARTAMENTO DE ORURO
N
LEGEND
Department
Province
Municipio
Canton
Capital of Canton
LEGEND of Transmission Line
T/L 230kV (Exist. 2000)
T/L 115kV (Exist. 2000)
T/L 69kv (Exist. 2000)
T/L 24.9kv (Exist. 2000)
T/L 14.4 kv. (Exist. 2000)
T/L 6.6 kv. (Exist. 2000)
SAN PEDRO DE TOTORA
CARANGAS
CERCADO
SAUCARI
SAJAMA
CARANGAS
POOPO
LITORAL
MEJILLONES
ATAHUALLAPA
SUD CARANGAS
AVAROA
PANTALEON DALENCE
LADISLAO CABRERA
S. PAGADOR
0 20 40 60 80 100 Km.
THE STUDY ON RURAL ELECTRIFICATION IMPLEMENTATION PLAN BY RENEWABLE ENERGY IN THE REPUBLIC OF BOLIVIA
JAPAN INTERNATIONAL COOPERATION AGENCY
Figure 4.2
Existing Transmission Line (Oruro)
(as of Early 2001)

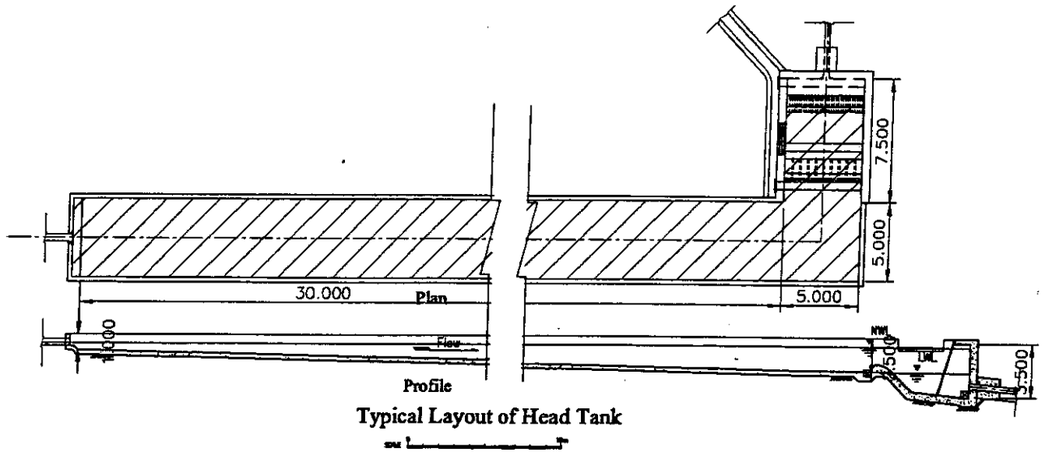


POINT No	TRANSVERSE MERCATOR PROJECTION *1)		GEOGRAPHIC COORDINATES *2)		*3) ELEVATION (EL. m.)
	NORTHING	EASTING	LATITUDE	LONGITUDE	
P-1	8385220.000	565781.000	14° 36' 18.85" S	68° 23' 15.99" W	1543.000
P-2 (BM)	8385251.114	565763.503	14° 36' 17.84" S	68° 23' 16.57" W	1542.736
P-3	8385276.285	565740.698	14° 36' 17.02" S	68° 23' 17.34" W	1579.287
P-4 (BM)	8385288.348	565717.658	14° 36' 16.63" S	68° 23' 18.11" W	1588.604
P-5	8385301.346	565704.013	14° 36' 16.20" S	68° 23' 18.56" W	1589.428
P-6	8385304.404	565702.471	14° 36' 16.10" S	68° 23' 18.61" W	1588.987
P-7 (BM)	8385381.835	565647.627	14° 36' 13.59" S	68° 23' 20.44" W	1511.859
P-8 (BM)	8385411.328	565628.363	14° 36' 12.63" S	68° 23' 21.09" W	1483.771

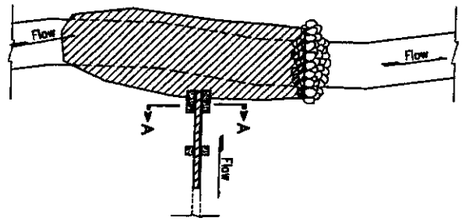
Notes :
*1) Universal Transverse Mercator Grid, International Spheroid
*2) Coordinates was measured using G.P.S.
- One second of longitude = 29.94 m.
- One second of latitude = 30.74 m.
*3) Vertical datum mean sea level. Elevation at P-1 was measured using G.P.S.

CONTOUR INTERVAL 1.0 METERS
ELEVATION UNIT IN METERS (m) FROM SEA LEVEL
HORIZONTAL UNIT IN METERS (m).

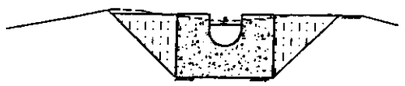
THE STUDY ON RURAL ELECTRIFICATION IMPLEMENTATION PLAN BY RENEWABLE ENERGY IN THE REPUBLIC OF BOLIVIA	JICA JAPAN INTERNATIONAL COOPERATION AGENCY	LOCATION : APOLO / FRANZ TAMAYO PROVINCE LA PAZ DEPARTAMENT MACHARIAPU RIVER	**Figure 6.1 Layout Plan of Apolo MHP (Río Machariapu)**	SCALE : 1: 1000	DATE : JULY - 2001	SHEET : 1 / 1



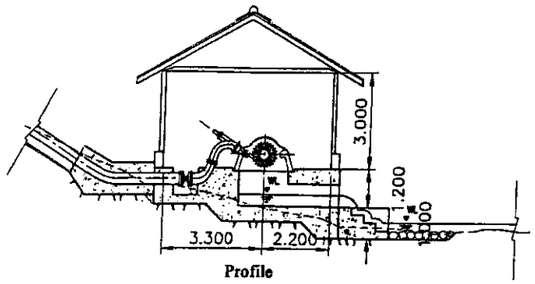
Typical Layout of Head Tank

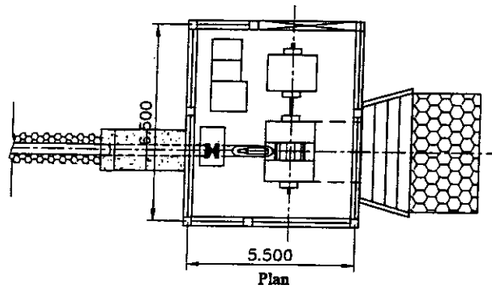


Layout Plan of Intake

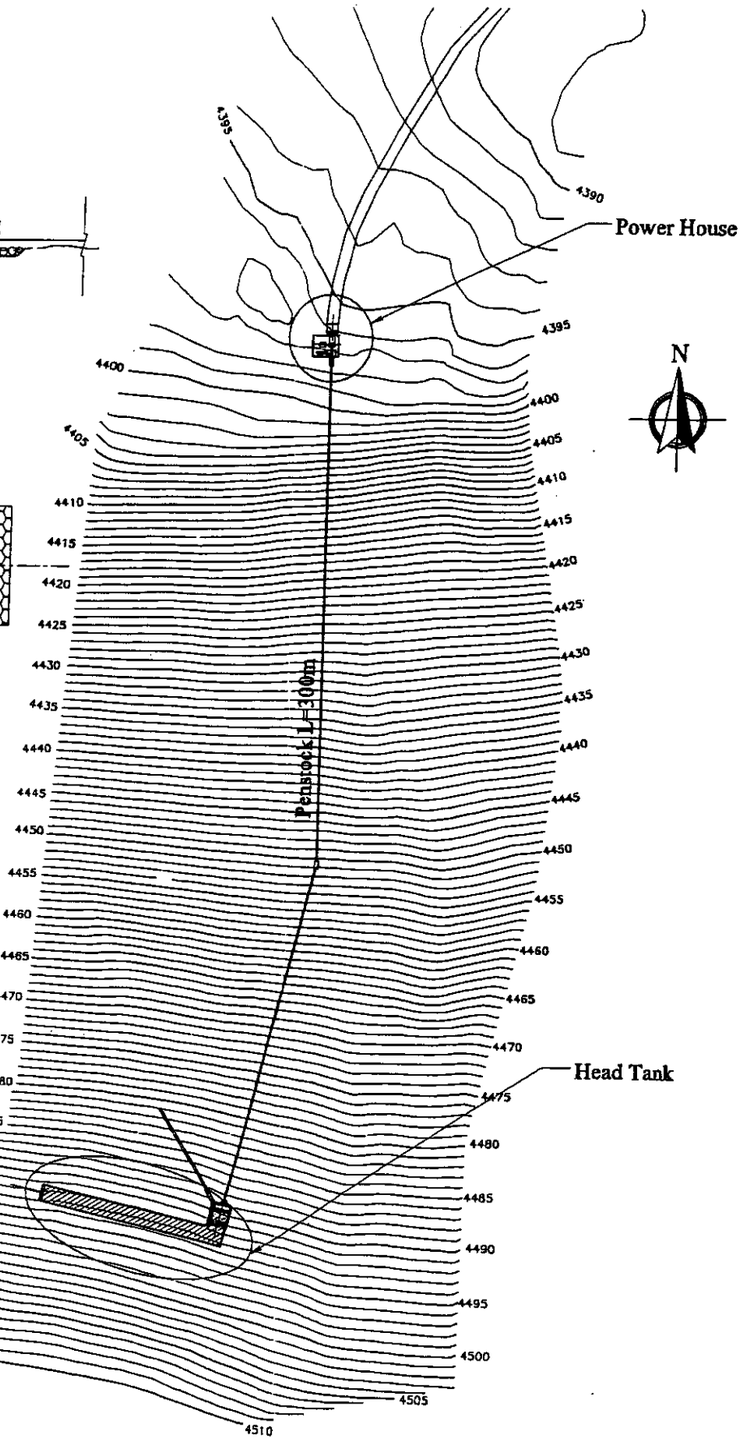


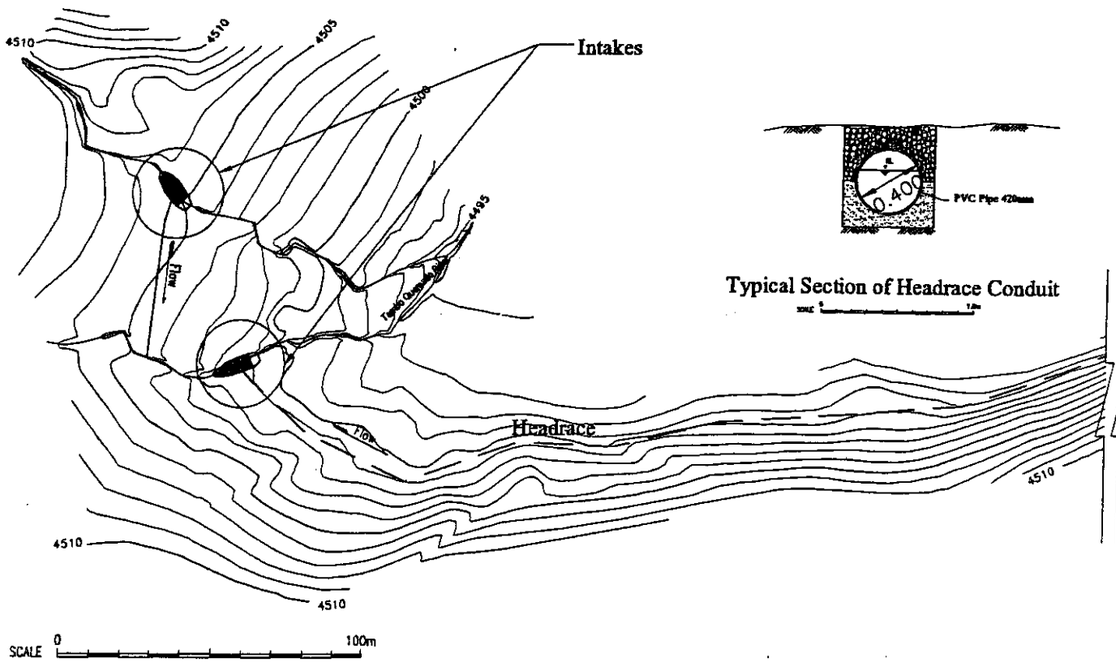
Section A-A





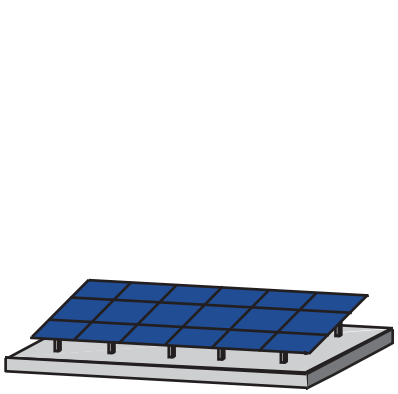
Typical Layout of Power House



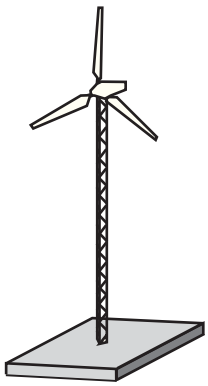


Typical Section of Headrace Conduit

THE STUDY ON RURAL ELECTRIFICATION IMPLEMENTATION PLAN BY RENEWABLE ENERGY IN THE REPUBLIC OF BOLIVIA	JICA JAPAN INTERNATIONAL COOPERATION AGENCY	LOCATION: TAMBO QUEMADO / SAJAMA PROVINCE ORURO DEPARTAMENT	Figure 6.2 Layout Plan of Tambo Quemado MHP	SCALE : H = 1 : 2000	DATE : Feubary- 2001 / SHEET :



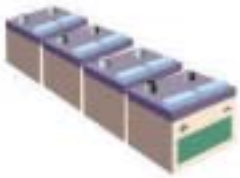
Photovoltaic Generation 16 kWp



Wind Generation 80 kW

DC Controler

Inverter 64kVA

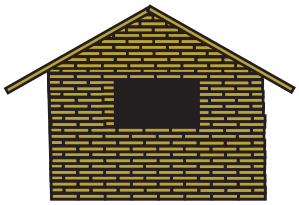


Battery Bank
44 kAh

Converter 20kVA

Exsisting Diesel
Generator 135 kVA

Back up Power Source



Demand	
Household	150
Micro-Enterprise	10
Cafe	8
Office	7
Store	5
School	3
Health Clinic	1
Community Center	1

Figure 7.1 Wind - PV Hybrid System
in Charana, La Paz Department

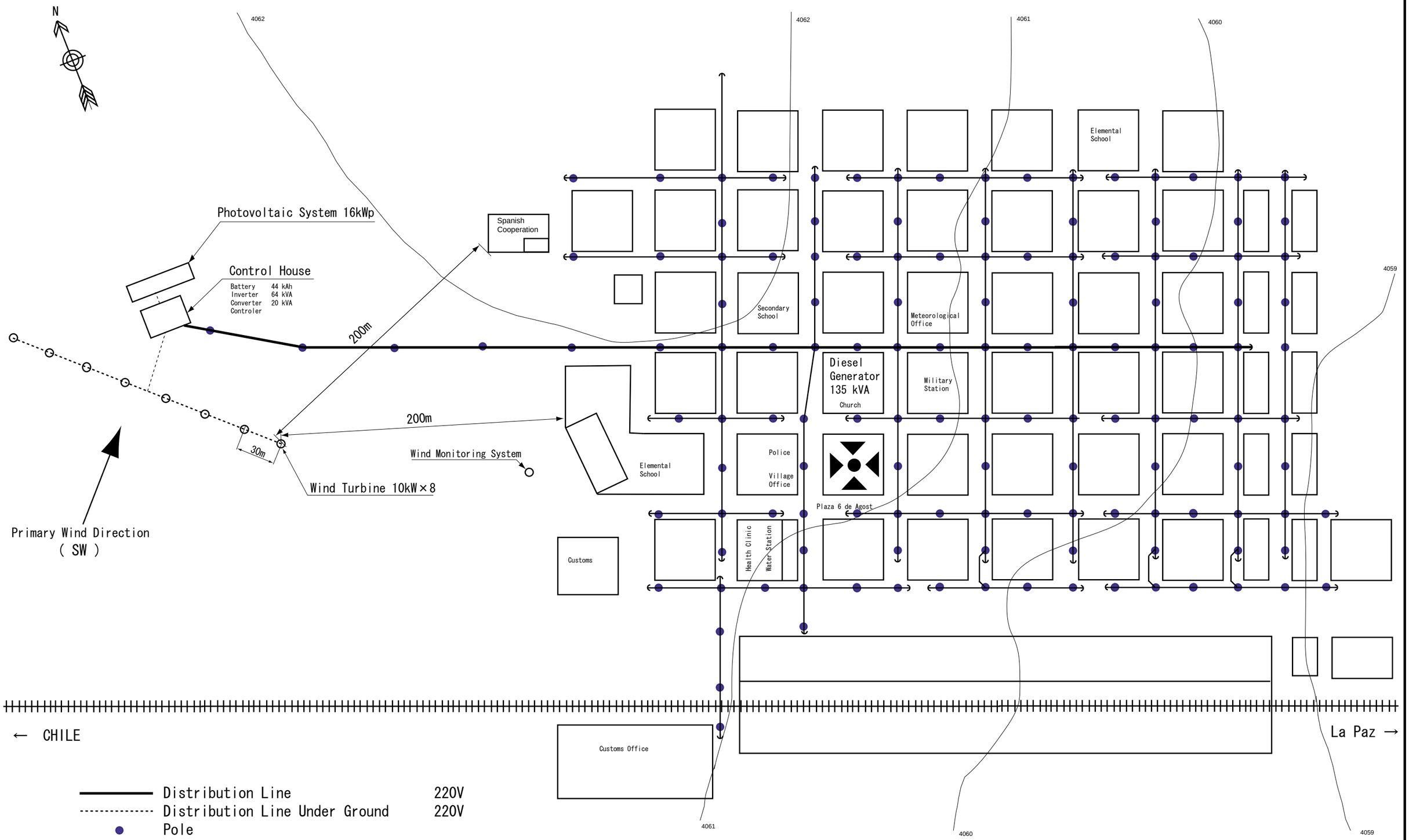
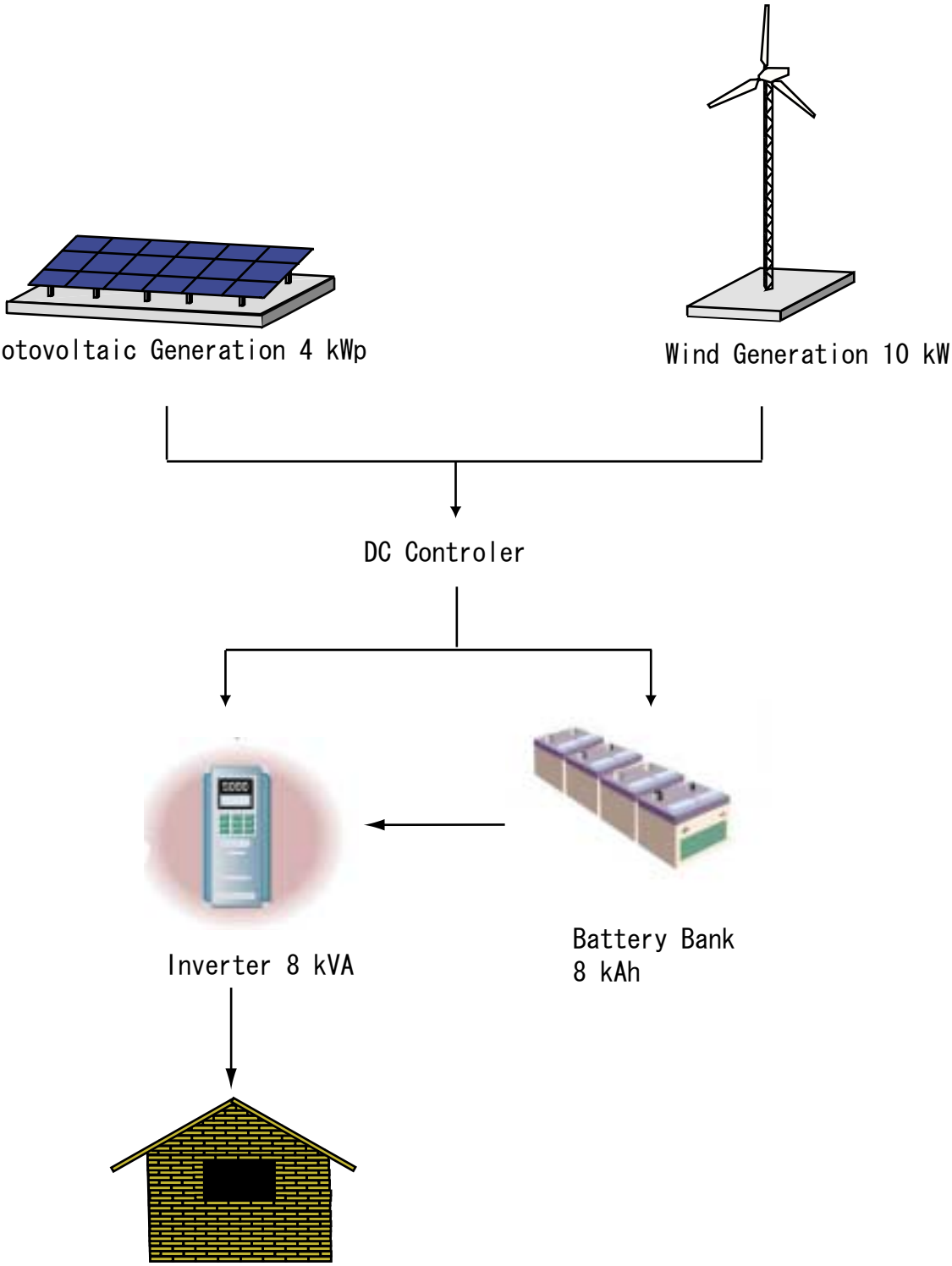


Figure 7.2
Installation Map of Wind-PV Hybrid
Generation System in Charana, La Paz Department



Demand	
Household	30
Cafe	3
Store	2
School	1
Health Clinic	1
Community Center	1

Figure 7.3
Wind - PV Hybrid System
in Caripe, Oruro Department

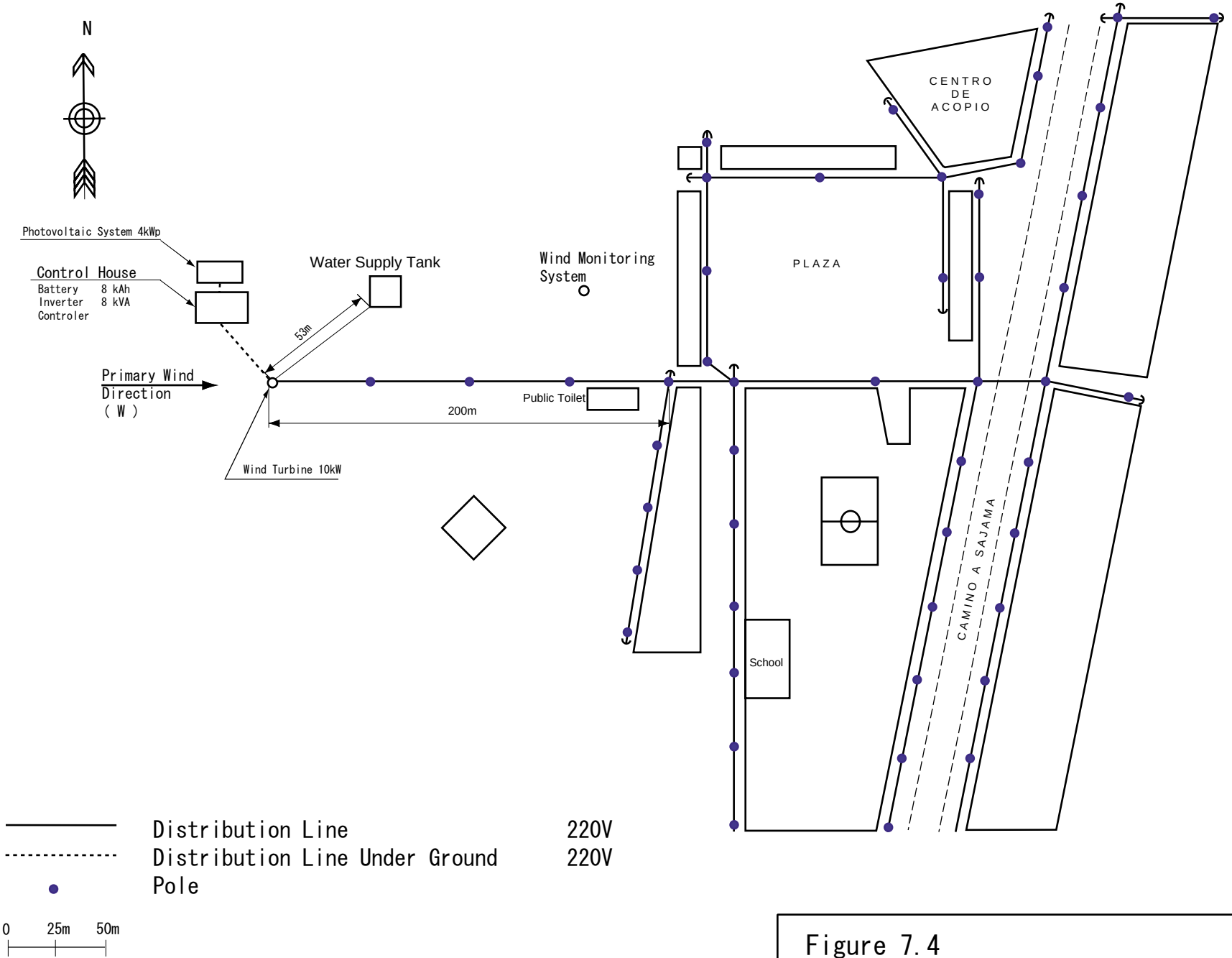
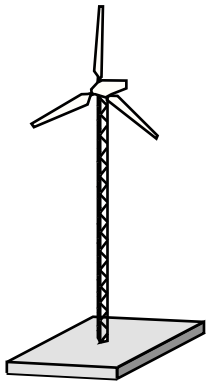


Figure 7.4
Installation Map of Wind-PV Hybrid
Generation System in Caripe,Oruro Department

Micro-Hydro Power 3 kW



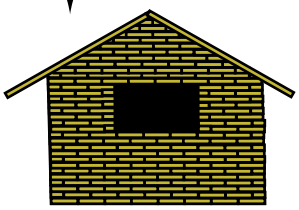
Wind Generation 20 kW

Converter 10kVA

DC
Controler

Inverter 14 kVA

Battery Bank
4 kAh



Demand	
Household	70
Cafe	3
Store	4
School	1
Health Clinic	1
Community Center	1

Figure 7.5
Wind - Micro Hydro Hybrid System
in Chachacomani, Oruro Dapartment

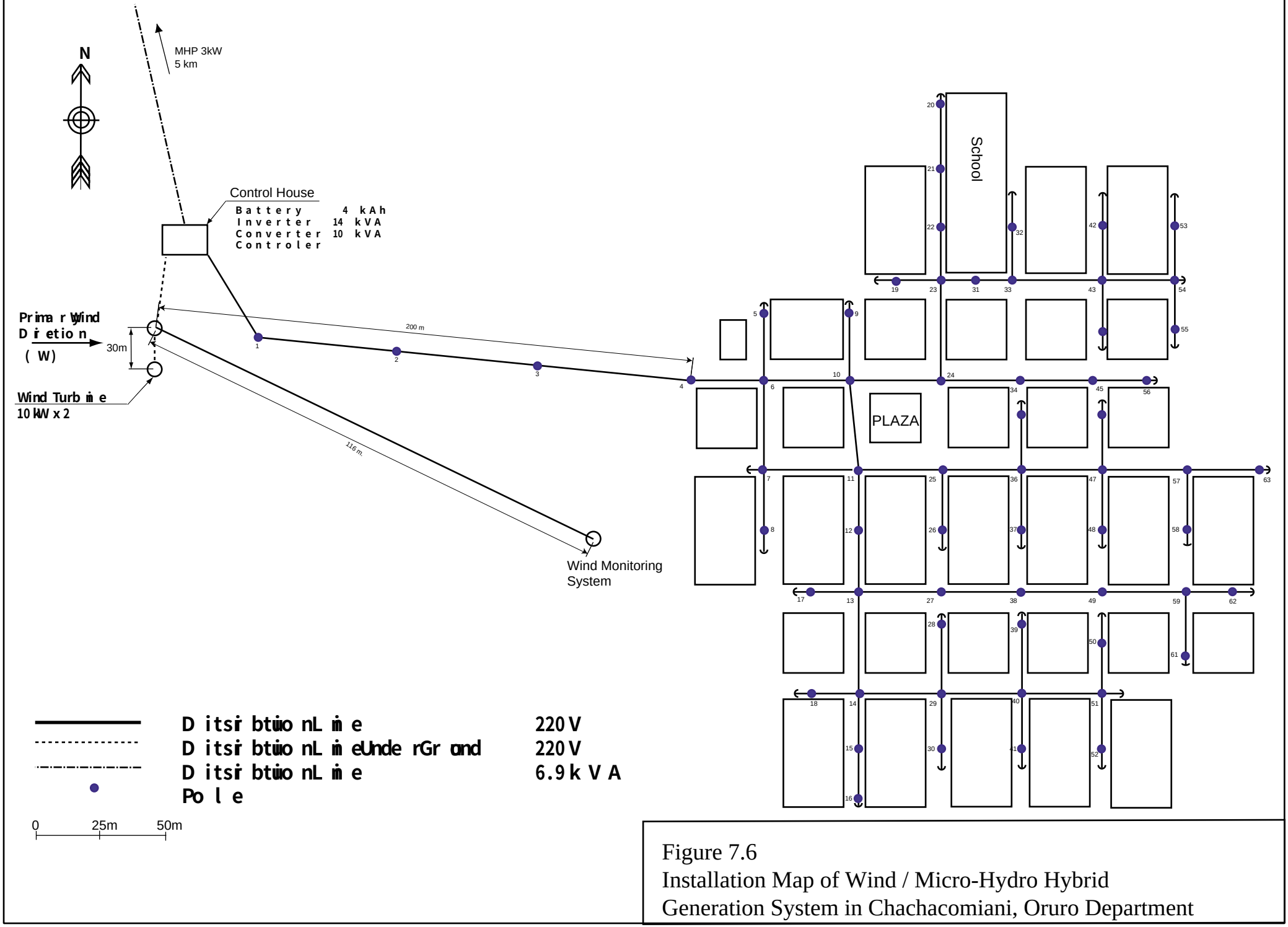
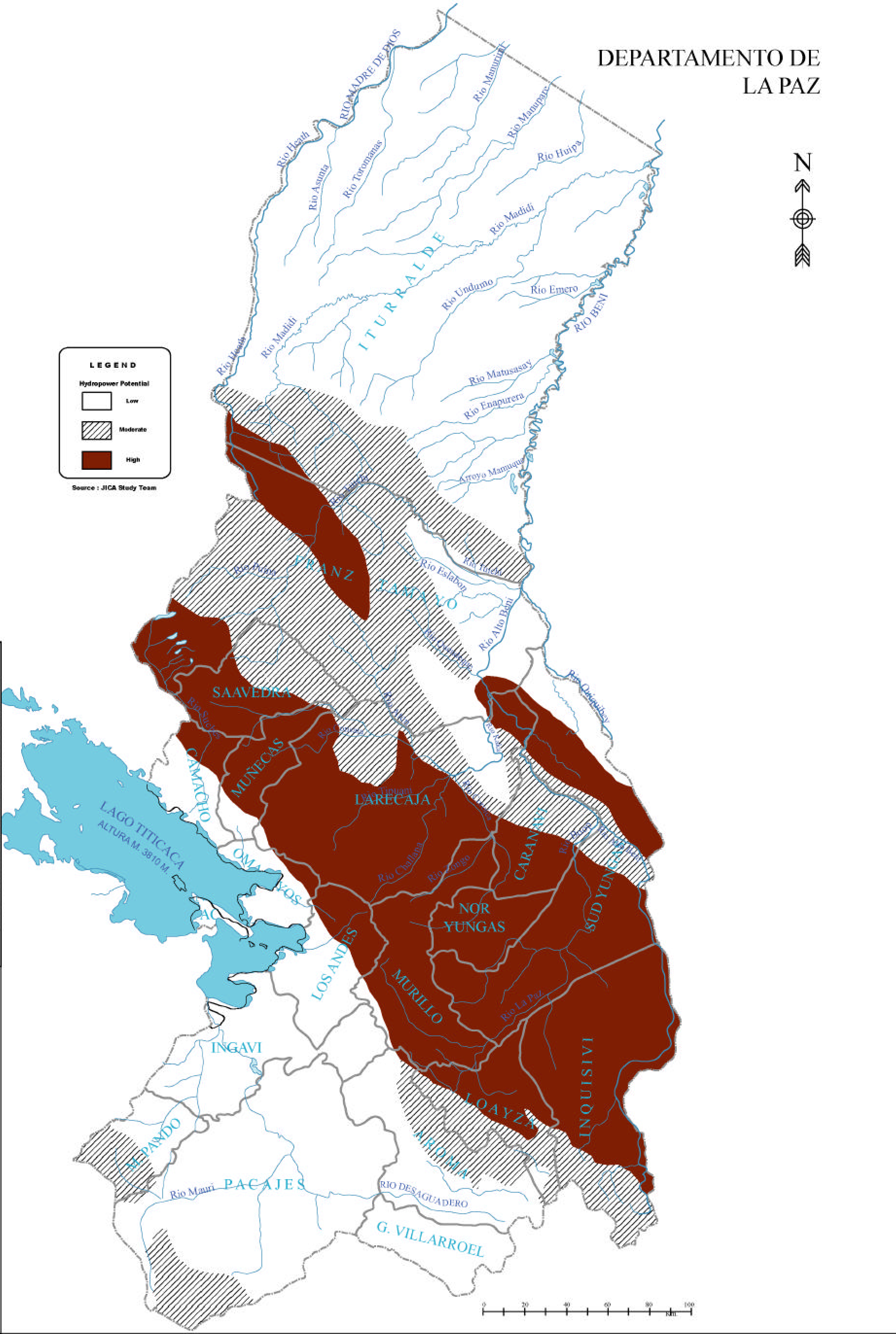


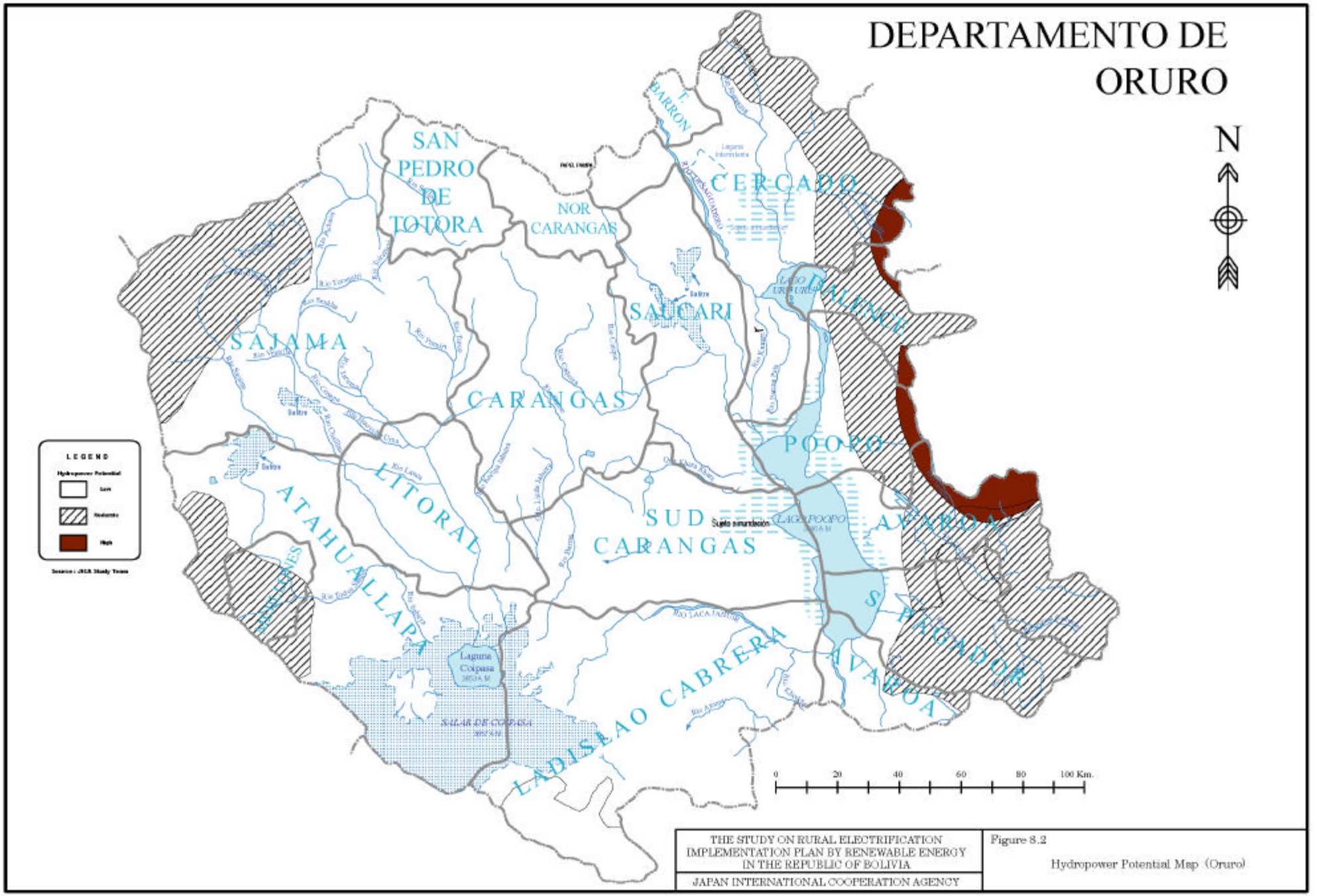
Figure 7.6
Installation Map of Wind / Micro-Hydro Hybrid Generation System in Chachacomiani, Oruro Department



THE STUDY ON RURAL ELECTRIFICATION
IMPLEMENTATION PLAN BY RENEWABLE ENERGY
IN THE REPUBLIC OF BOLIVIA
JAPAN INTERNATIONAL COOPERATION AGENCY

Figure 8.1

Hydropower Potential Map (La Paz)



THE STUDY ON RURAL ELECTRIFICATION IMPLEMENTATION PLAN BY RENEWABLE ENERGY IN THE REPUBLIC OF BOLIVIA	Figure 8.2 Hydropower Potential Map (Oruro)
JAPAN INTERNATIONAL COOPERATION AGENCY	