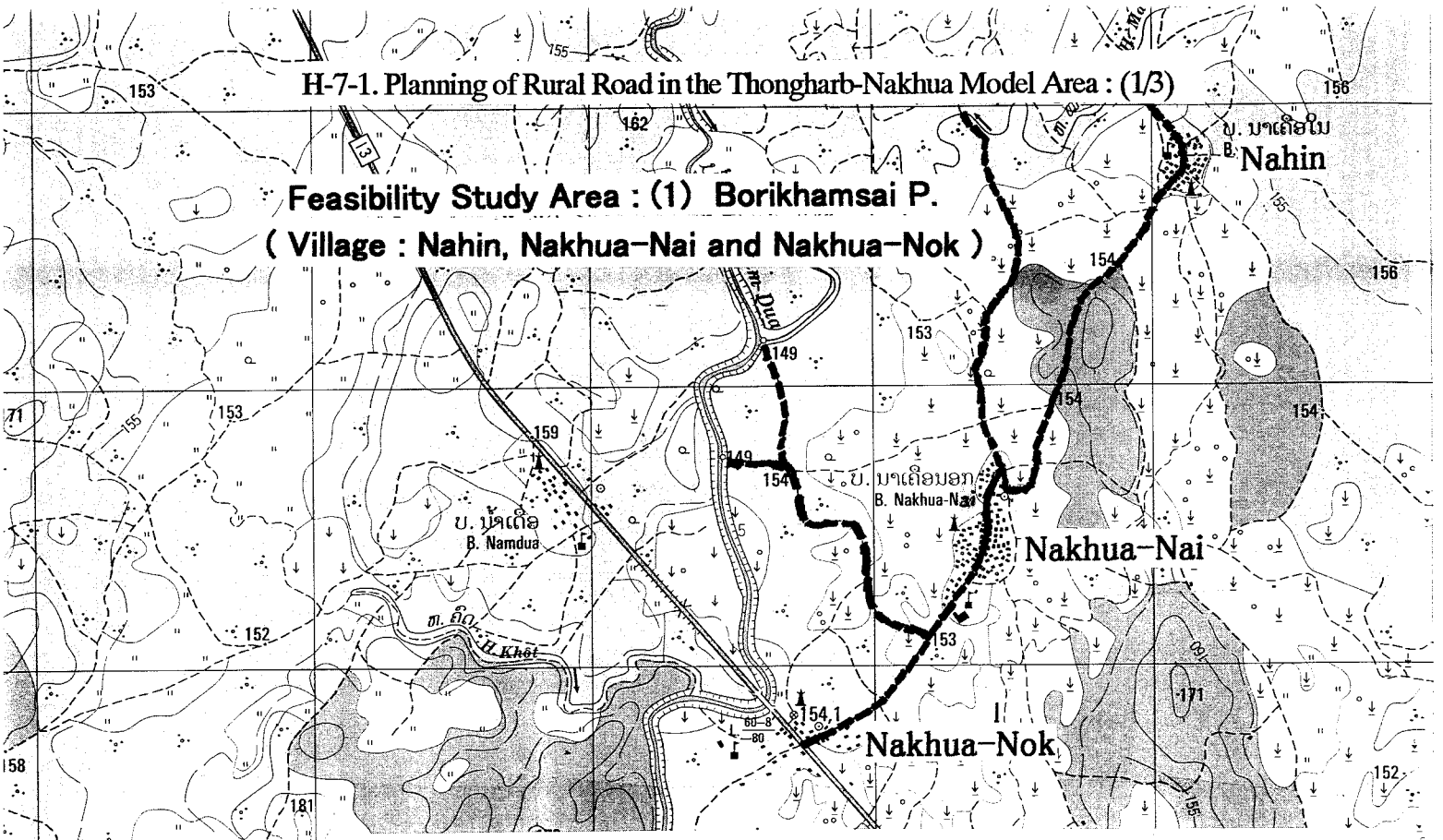
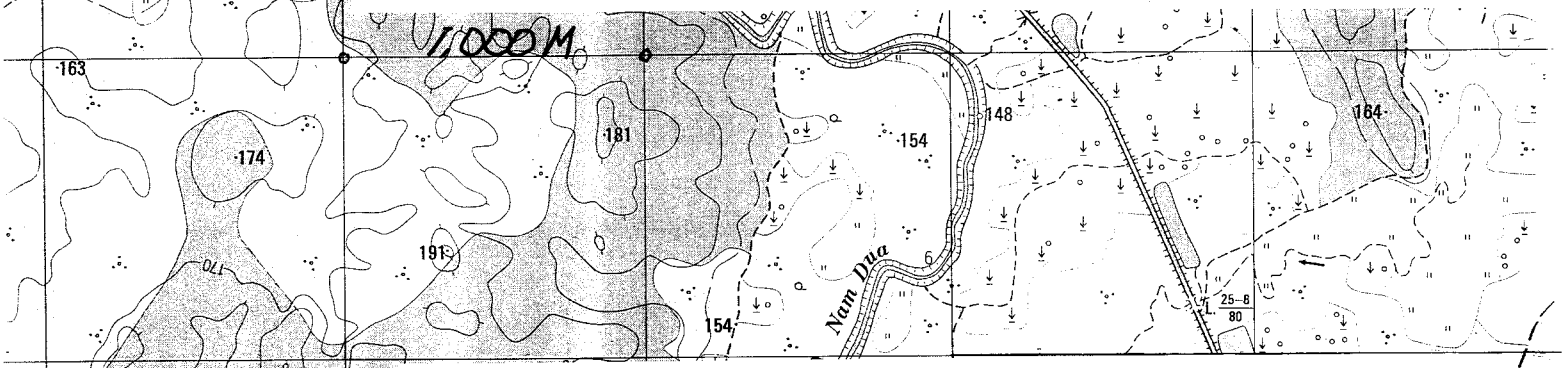
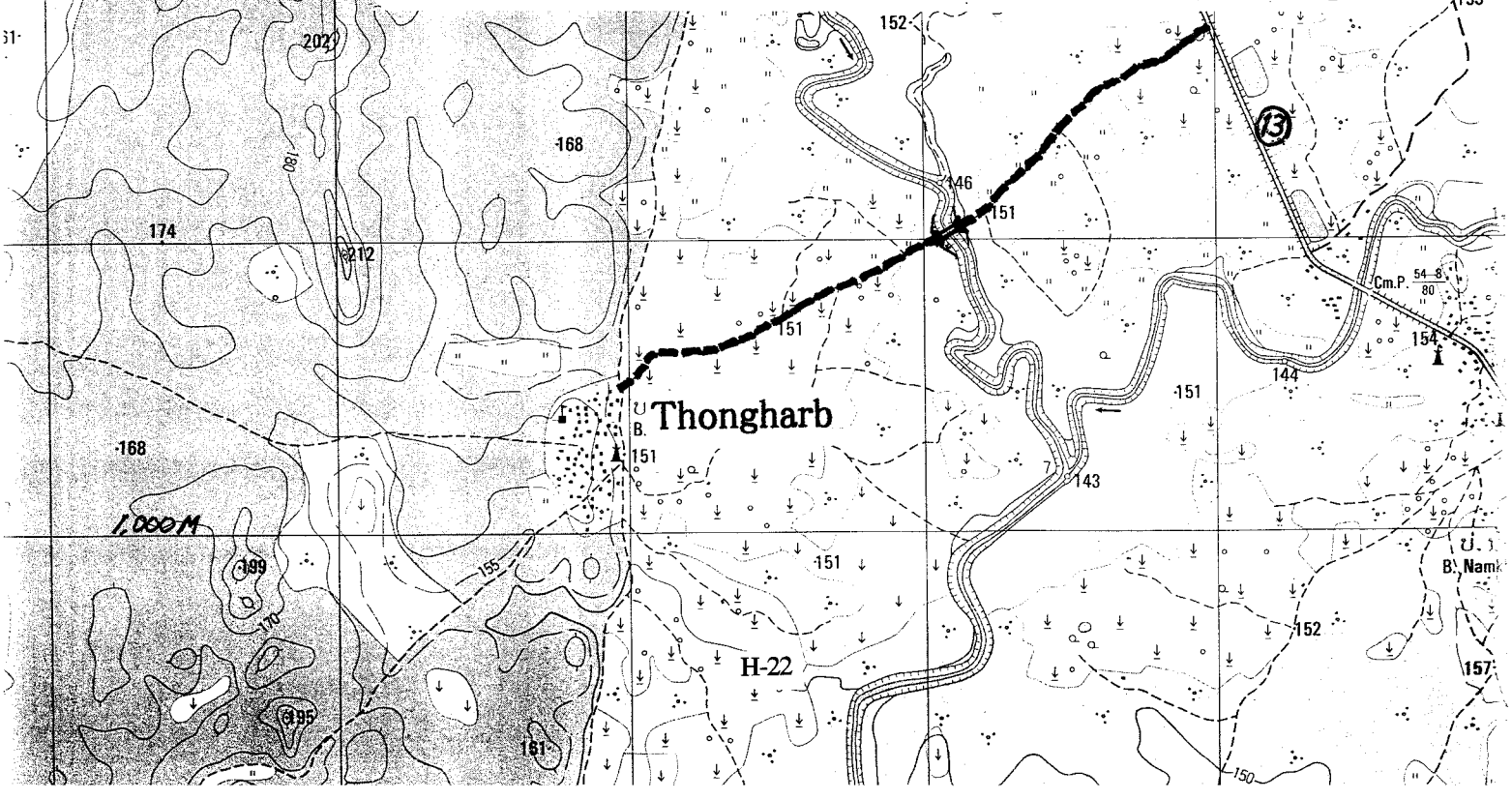
H-7-1. Planning of Rural Road in the Thongharb-Nakhua Model Area : (1/3)



Plannning of Rural Road in the Thongharb-Nakhua Model Area



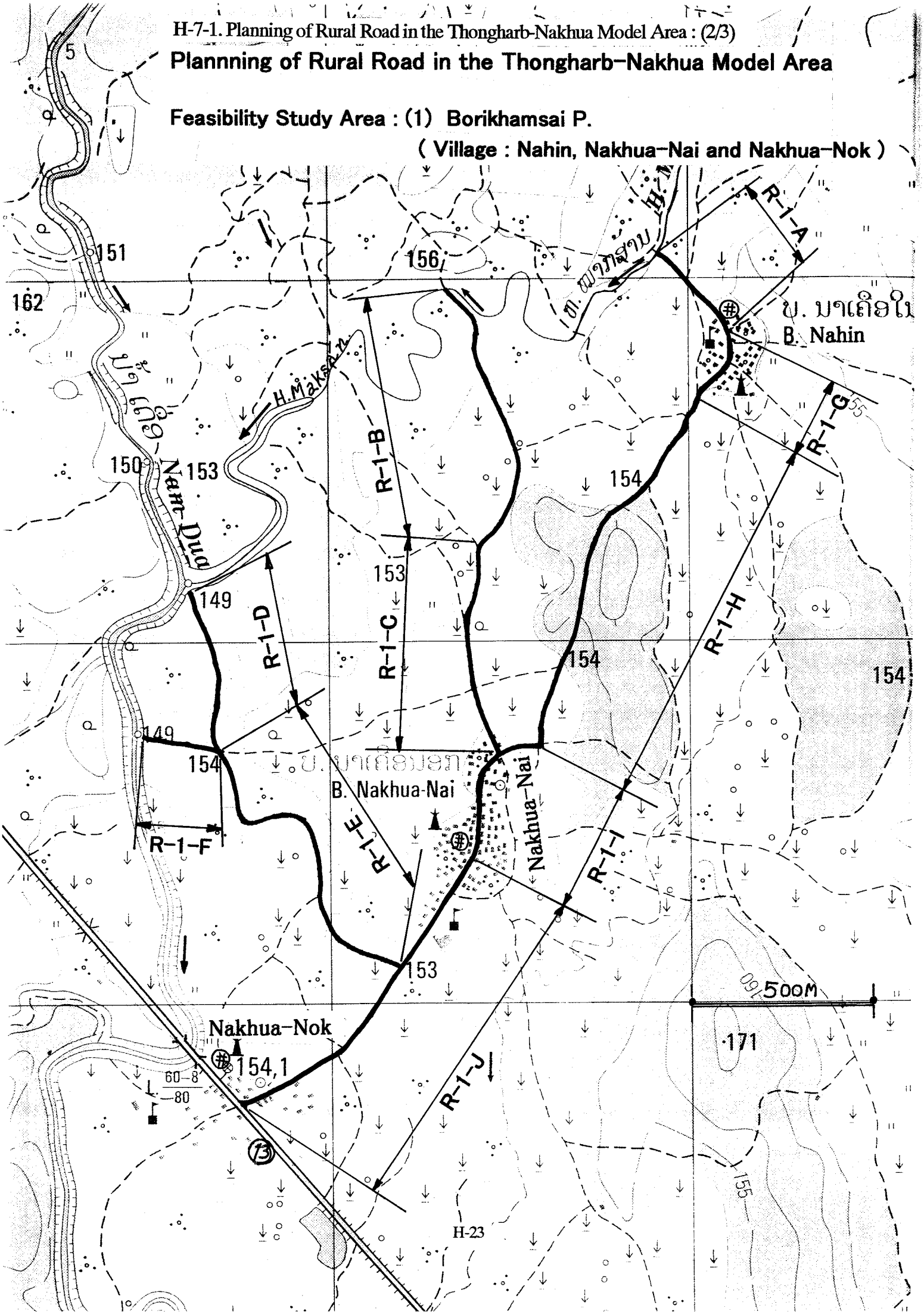
Feasibility Study Area : (1) Borikhamsai P. (Village Thongharb)



Plannning of Rural Road in the Thongharb-Nakhua Model Area

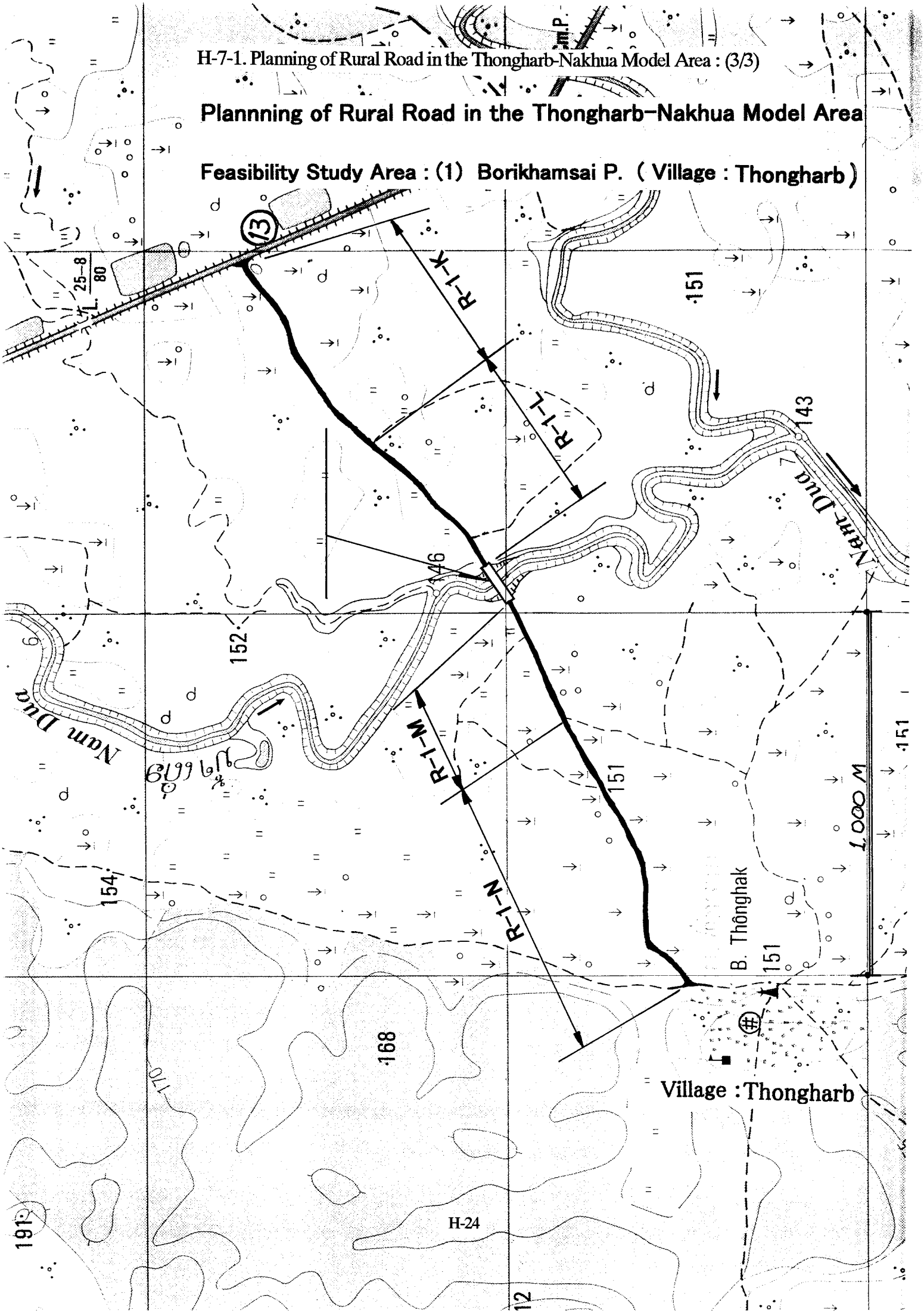
Feasibility Study Area : (1) Borikhamsai P.

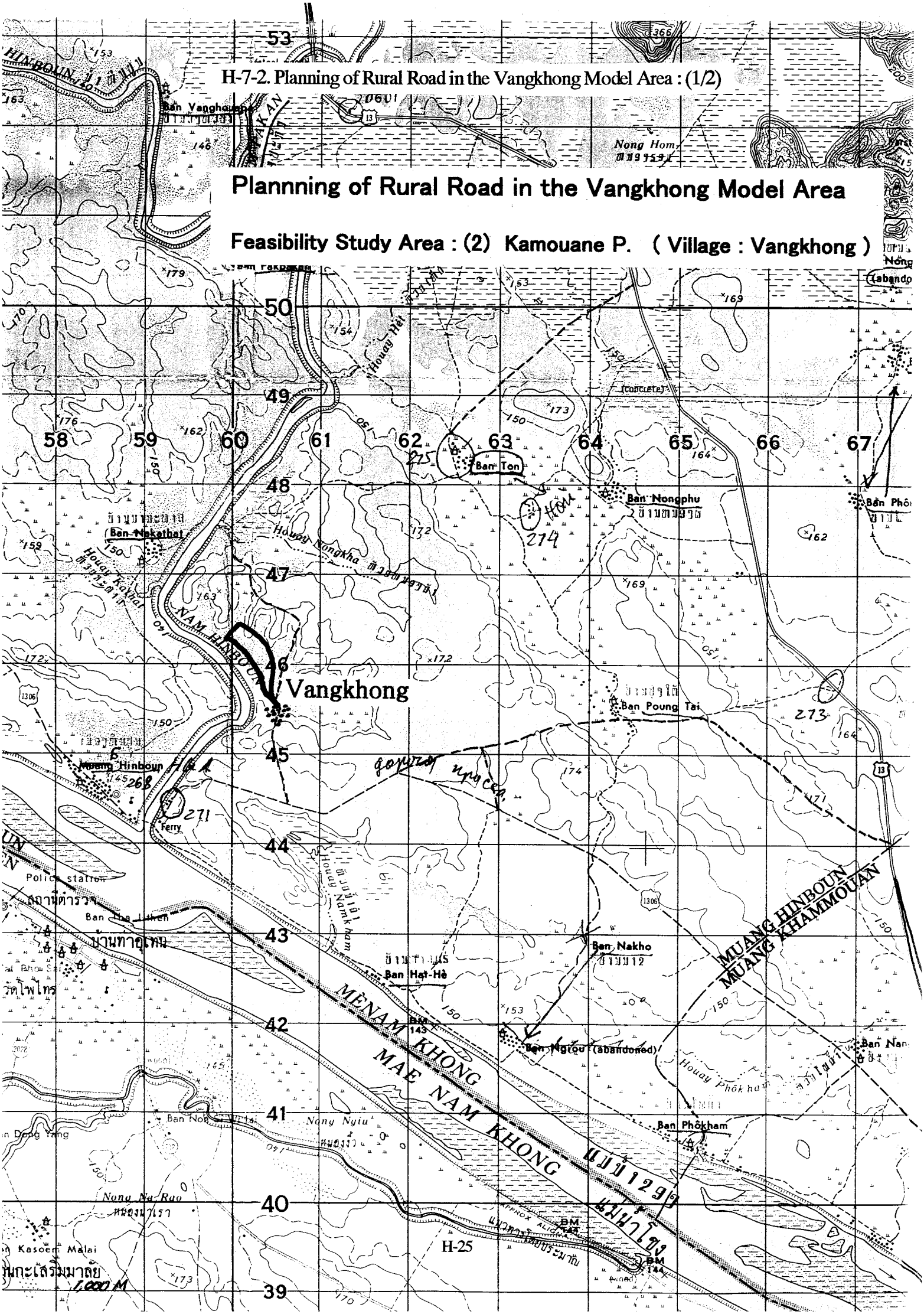
(Village : Nahin, Nakhua-Nai and Nakhua-Nok)



Plannning of Rural Road in the Thongharb-Nakhua Model Area

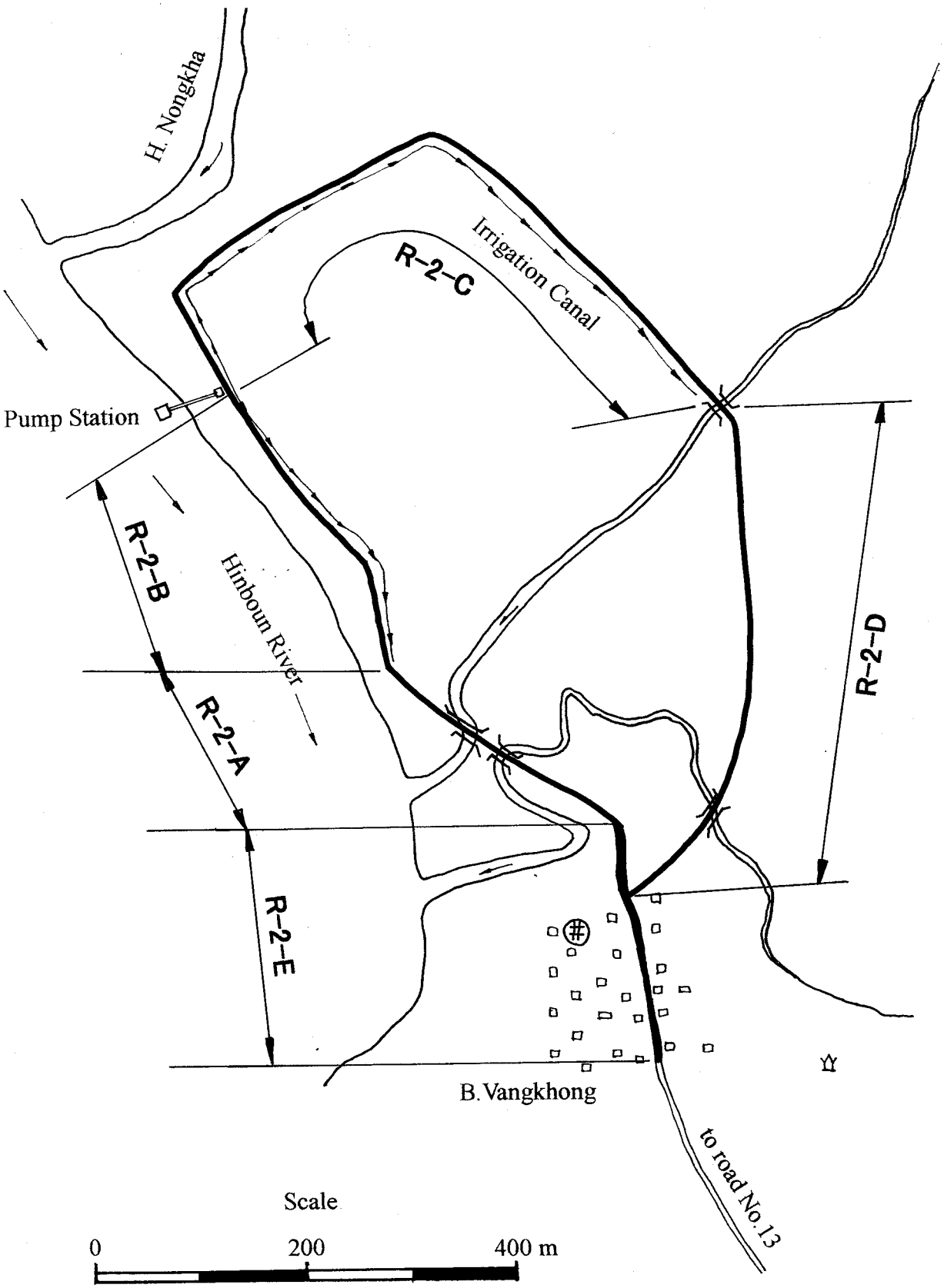
Feasibility Study Area : (1) Borikhamsai P. (Village : Thongharb)




H-7-2. Planning of Rural Road in the Vangkhong Model Area : (1/2)
Plannning of Rural Road in the Vangkhong Model Area
Feasibility Study Area : (2) Kamouane P. (Village : Vangkhong)
Vangkhong
Ban Vanghouan
Nong Hom
Houay Hai
Ban Ton
Ban Nongphu
Ban Nakathat
Houay Nongkha
Houay Kaonai
NAM HINBOUN
Ban Poung Tai
Muang Hinboun
Ferry
Police station
Houay Namk ham
Ban Nakho
MUANG HINBOUN
MUANG KHAMMOUAN
Ban Hat-Hè
Ban Ngiou (abandoned)
Houay Phôk ham
Ban Phôkham
MÉNAM KHONG
MAE NAM KHONG
Nong Nyiu
Nong Na Rao
Kasoen Malai
1000 M
H-25

Plannning of Rural Road in the Vangkhong Model Area

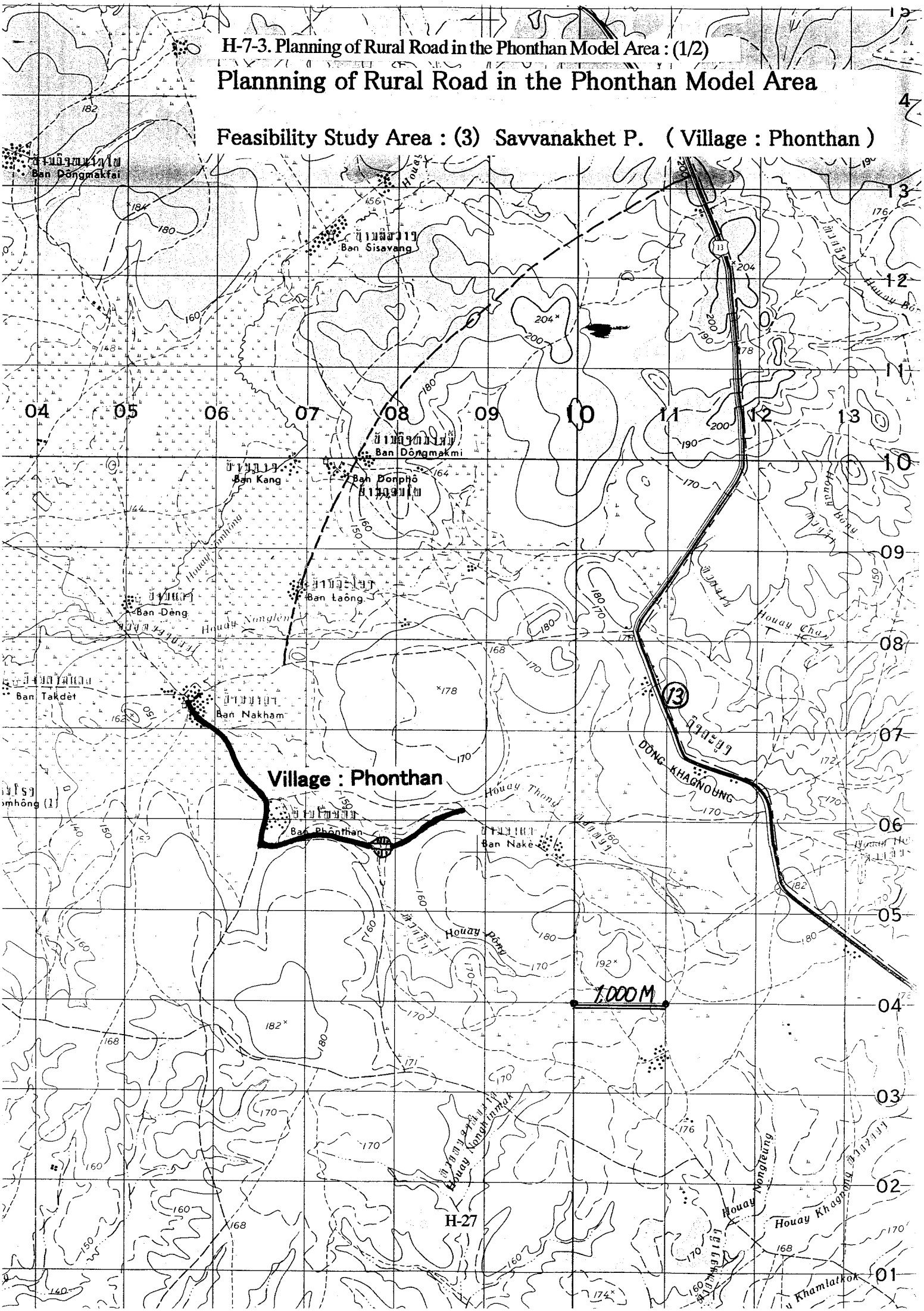
Feasibility Study Area : (2) Kamouane P. (Village : Vangkhong)



H-7-3. Planning of Rural Road in the Phonthan Model Area : (1/2)

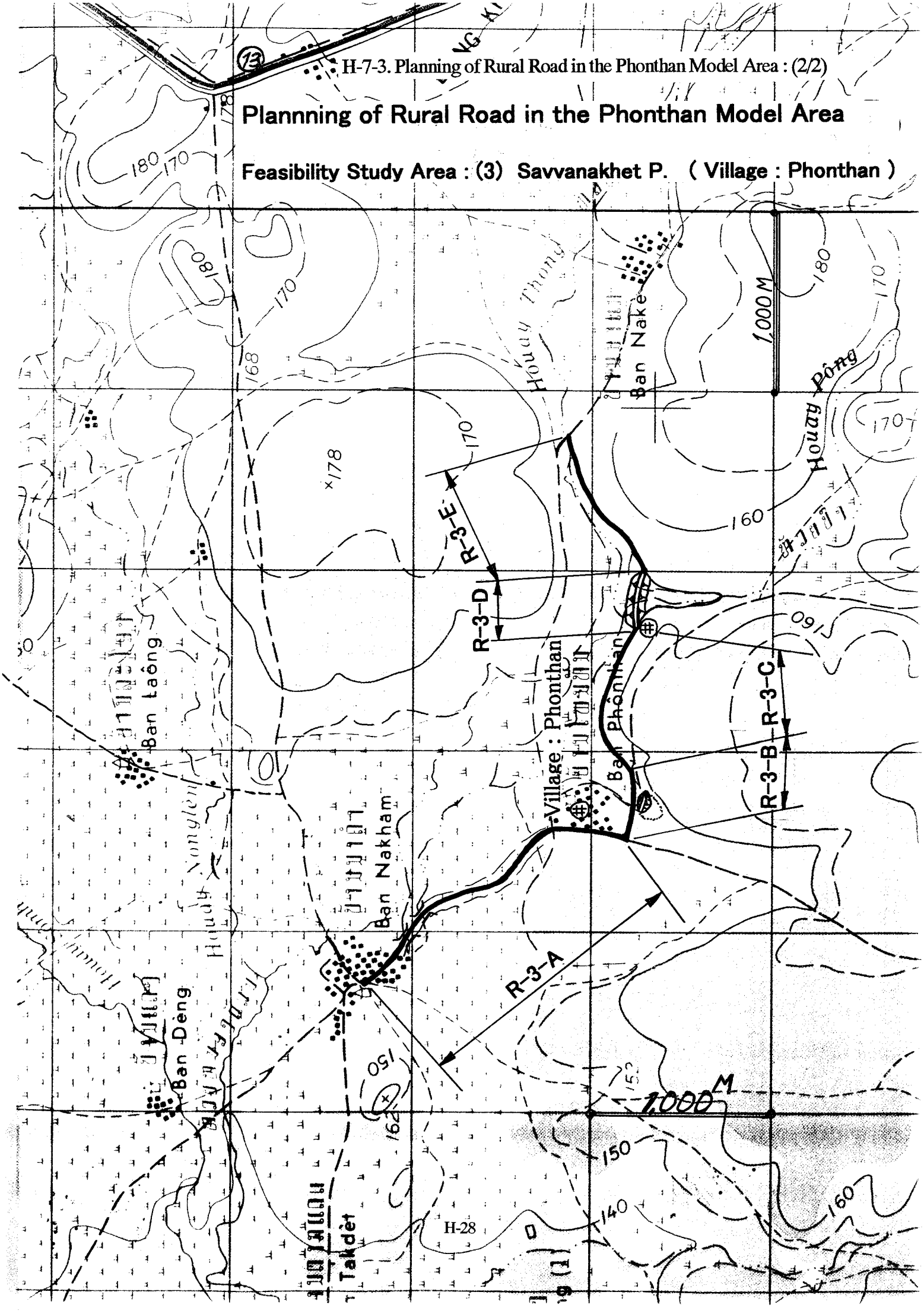
Plannning of Rural Road in the Phonthan Model Area

Feasibility Study Area : (3) Savvanakhet P. (Village : Phonthan)



Plannning of Rural Road in the Phonthan Model Area

Feasibility Study Area : (3) Savvanakhet P. (Village : Phonthan)



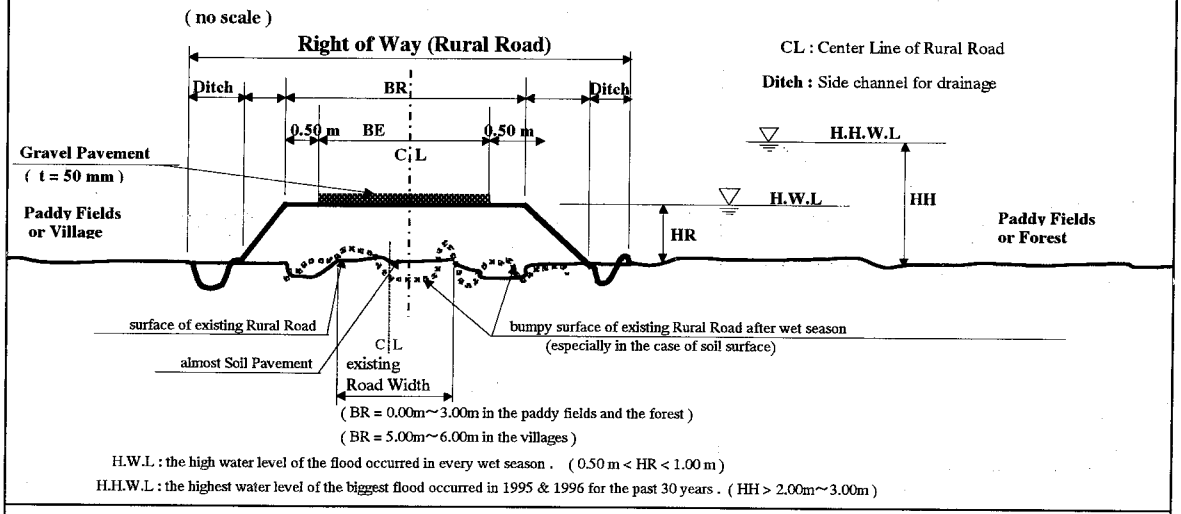
H-8-1. Planning and Design of Rural Road ; (1) in the Thongharb-Nakhua Model Area

Plannning and Design of Rural Road in the Thongharb-Nakhua Model Area

to extend the width and to heighten the surface of Rural Road

to construct the new Rural Road through the paddy fields and the forest area

(1) To extend the existing width up to the adequate width as the standard Rural Road
(2) To heighten the existing surface of Rural Road up to H.W.L
(3) To construct the new Rural Road through the paddy fields and the forest area
(4) To construct the new Gravel Pavement (thickness : t = 50 mm) , and the new Ditch (H*B=0.50m*0.50m)
(5) Total Road Width = BR = BE + 0.50*2 ; Effective Road Width = BE ; Shoulder Width = 0.50 m



H.W.L : the high water level of the flood occurred in every wet season . (0.50 m < HR < 1.00 m)
H.H.W.L : the highest water level of the biggest flood occurred in 1995 & 1996 for the past 30 years . (HH > 2.00m~3.00m)

Feasibility Study Area : (1) Thongharb-Nakhua Model Area (Nahin, Nakhua-Nai, Nakhua-Nok and Thongharb)

Village	Road No.	Road Width		Height	Length	Ratio	Pavement	Bridge Type				Materals	Earth Work		New or	Note
		BE	BR	HR	LL	α	t	Box		Pipe		Gravel	Cutting	Banking	Improve.-A	
		m	m	m	m	%	mm	Type	Quan.	Type	Quan.	m3	m3	m3	Improve.-G	
Nahin	R-1-A	4.00	5.00	0.50	400	100	50		0	P-1	1	80.0	160.0	940.0	New	P. Field
Nakhua-Nai	R-1-B	4.00	5.00	0.50	1,000	100	50		0	P-1	3	200.0	400.0	2,350.0	Improve.-A	P. Field
Nakhua-Nai	R-1-C	4.00	5.00	0.50	700	100	50		0	P-1	2	140.0	280.0	1,645.0	Improve.-A	P. Field
Nakhua-Nok	R-1-D	4.00	5.00	0.50	500	100	50		0	P-1	2	100.0	200.0	1,175.0	Improve.-A	P. Field
Nakhua-Nok	R-1-E	4.00	5.00	0.50	1,000	100	50		0	P-1	3	200.0	400.0	2,350.0	Improve.-A	P. Field
Nakhua-Nok	R-1-F	4.00	5.00	0.50	200	100	50		0	P-1	1	40.0	80.0	470.0	New	Forest
Nahin	R-1-G	5.00	6.00	0.50	300	100	50		0		0	75.0	0.0	0.0	Improve.-G	Village
Nahin	R-1-H	5.00	6.00	0.50	1,200	100	50		0	P-2	3	300.0	0.0	0.0	Improve.-G	Village
Nakhua-Nai	R-1-I	5.00	6.00	0.50	400	100	50		0		0	100.0	0.0	0.0	Improve.-G	Village
Nakhua-Nok	R-1-J	5.00	6.00	0.50	1,100	100	50		0		0	275.0	0.0	0.0	Improve.-G	Village
																(Route 13)
Thongharb	R-1-K	4.00	5.00	0.50	700	100	50		0	P-1	2	140.0	280.0	1,645.0	New	P. field
Thongharb	R-1-L	4.00	5.00	0.50	500	100	50		0	P-1	2	100.0	200.0	1,175.0	New	Forest
	Thongharb Weir , to be newly constructed crossing over the Nam Dua River and to be used as the Bridge															River
Thongharb	R-1-M	4.00	5.00	0.50	400	100	50		0	P-1	1	80.0	160.0	940.0	Improve.-A	P. field
Thongharb	R-1-N	4.00	5.00	0.50	1,100	100	50		0	P-1	3	220.0	440.0	2,585.0	Improve.-A	P. field
Total (Whole)					**9,500**				**0**	**P-1,-2**	**23**	**2,050.0**	**2,600.0**	**15,275.0**		
Total (New)					**1,800**				**0**	**P-1**	**6**	**360.0**	**720.0**	**4,230.0**		
Total (Improve.-All)					**4,700**				**0**	**P-1**	**14**	**940.0**	**1,880.0**	**11,045.0**		
Total (Improve.-Gravel Pavement)					**3,000**				**0**	**P-2**	**3**	**750.0**	**0.0**	**0.0**		

Note : Improve.-A = improvement of all the part of rural road , Improve.-G = improvement of the only gravel pavement of the surface for rural road .

Note : About P-1 and P-2 , see the figures of both Bridge (Type-P) : pipe of reinforced concrete .

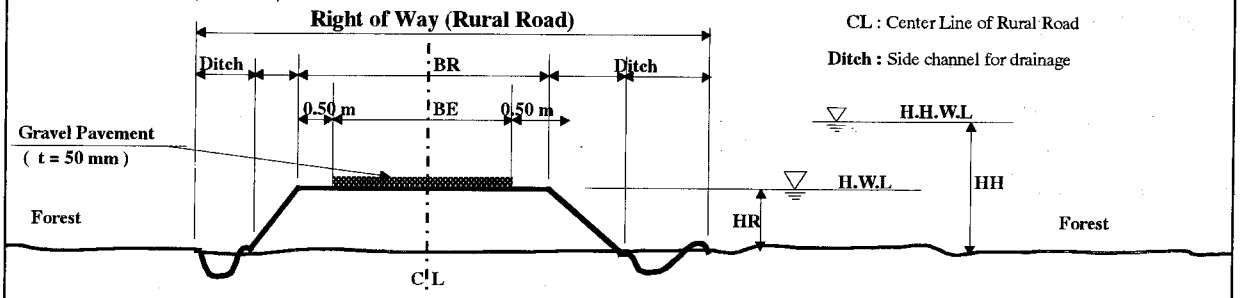
H-8-2. Planning and Design of Rural Road ; (2) in the Vangkhong Model Area

Plannning and Design of Rural Road in the Vangkhong Model Area

to construct the new Rural Road through the paddy fields and the forest area

(1) To construct the new Rural Road through the forest area under land reclamation
(2) To construct the new Gravel Pavement (thickness : t = 50 mm) on the existing rural road
(3) Total Road Width = BR = BE + 0.50*2 ; Effective Road Width = BE ; Shoulder Width = 0.50 m

(no scale)



the existing Rural Road condition :
BR = (0.00 m ~ 3.00 m) in the forest or no road
BR = (5.00 m ~ 6.00 m) in the village Ban. Vangkhong

H.W.L : the high water level of the flood occurred in every wet season . (0.50 m < HR < 1.00 m)
H.H.W.L : the highest water level of the biggest flood occurred in 1995 & 1996 for the past 30 years . (HH > 2.00m~3.00m)

Feasibility Study Area : (2) Vangkhong Model Area (Village : Ban. Vangkhong)

Village	Road No.	Road Width		Height	Length	Ratio	Pavement	Bridge Type				Materals	Earth Work		New or	Note
		BE	BR	HR	LL	α	t	Box		Pipe		Gravel	Cutting	Banking	Improve.-A	
		m	m	m	m	%	mm	Type	Quan.	Type	Quan.	m3	m3	m3	Improve.-G	
Vangkhong	R-2-A	4.00	5.00	0.50	400	100	50	B-23	1	P-1	2	80.0	160.0	940.0	New	Forest
	-ditto-							B-13	1		0					
Vangkhong	R-2-B	4.00	5.00	0.50	350	100	50		0		0	70.0	140.0	822.5	New	Forest
															(Pump Station)	
Vangkhong	R-2-C	4.00	5.00	0.50	800	100	50	B-13	1		0	160.0	320.0	1,880.0	New	Forest
Vangkhong	R-2-D	4.00	5.00	0.50	700	100	50	B-13	1	P-1	3	140.0	280.0	1,645.0	New	Forest
Vangkhong	R-2-E	5.00	6.00	0.50	150	100	50		0		0	37.5	0.0	0.0	Improve.-G	Village
Total (Whole)					**2,400**			**B-13,-23**	**4**	**P-1**	**5**	**487.5**	**900.0**	**5,287.5**		
Total (New)					**2,250**			**B-13,-23**	**4**	**P-1**	**5**	**450.0**	**900.0**	**5,287.5**		
Total (Improve.-All)					**0**				**0**		**0**	**0.0**	**0.0**	**0.0**		
Total (Improve.-Gravel Pavement)					**150**				**0**		**0**	**37.5**	**0.0**	**0.0**		

Note : Improve.-A = improvement of all the part of rural road , Improve.-G = improvement of the only gravel pavement of the surface for rural road .

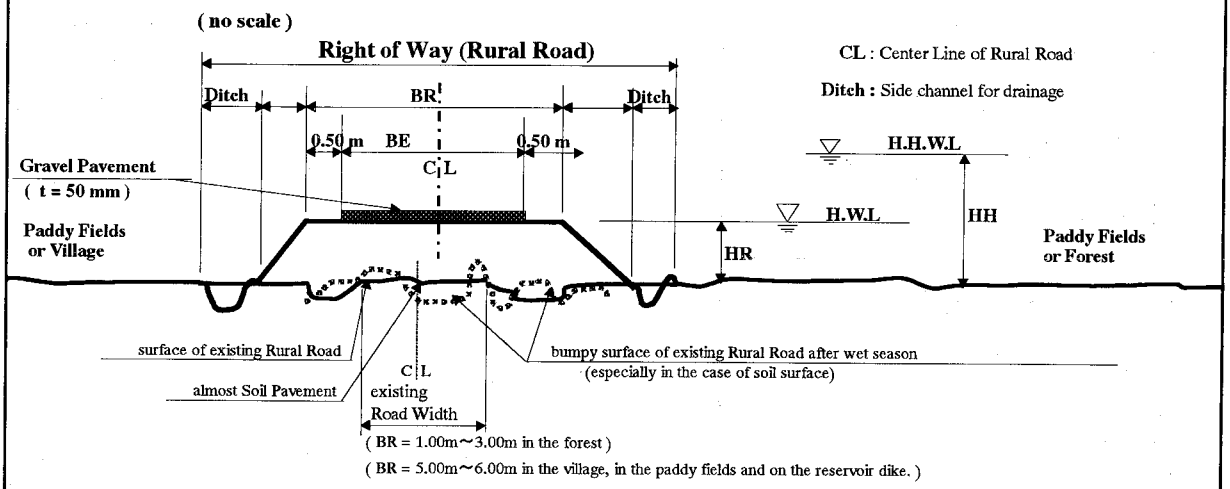
Note : About B-13, B-23, and P-1 , see the figures of both Bridge (Type-P) : box culvert of reinforced concrete and Bridge (Type-B) : pipe of reinforced concrete .

H-8-3. Planning and Design of Rural Road ; (3) in the Phonthan Model Area

Plannning and Design of Rural Road in the Phonthan Model Area

to extend the width and to heighten the surface of Rural Road

(1) To extend the existing width up to the adequate width as the standard Rural Road
(2) To heighten the existing surface of Rural Road up to H.W.L
(3) To construct the new Gravel Pavement (thickness : t = 50 mm) , and the new Ditch (H*B=0.50m*0.50m)
(4) Total Road Width = BR = BE + 0.50*2 ; Effective Road Width = BE ; Shoulder Width = 0.50 m



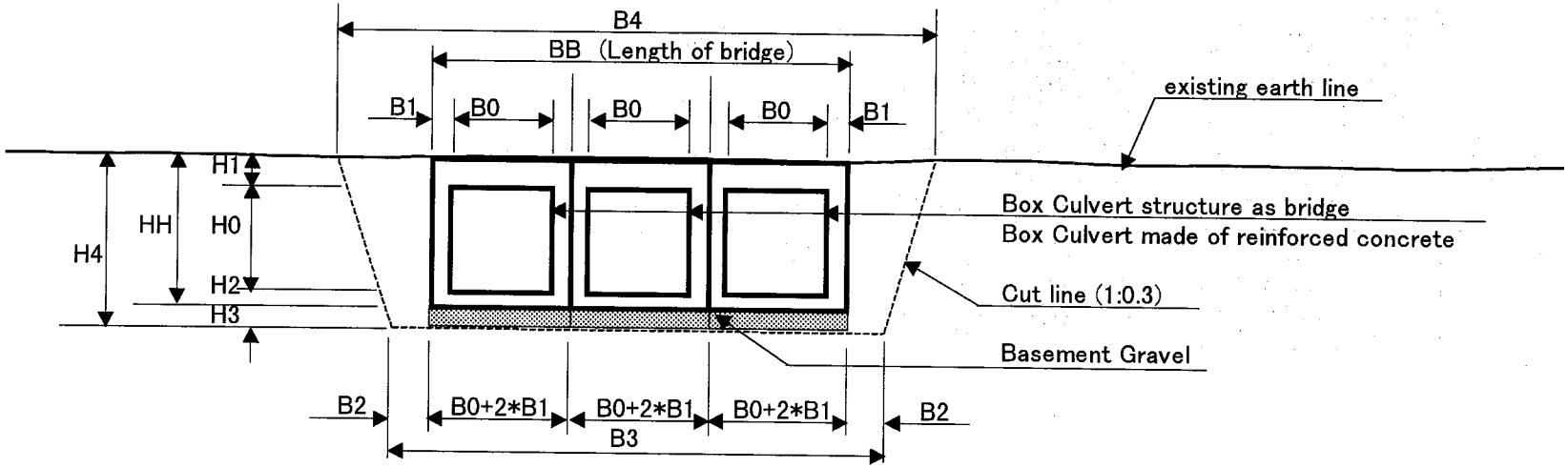
H.W.L : the high water level of the flood occurred in every wet season . (0.50 m < HR < 1.00 m)
H.H.W.L : the highest water level of the biggest flood occurred in 1995 & 1996 for the past 30 years . (HH > 2.00m~3.00m)

Feasibility Study Area : Phonthan Model Area (Village : Ban. Phonthan)

Village	Road No.	Road Width		Height	Length	Ratio	Pavement	Bridge Type				Materals	Earth Work		New or	Note
		BE	BR	HR	LL	α	t	Box		Pipe		Gravel	Cutting	Banking	Improve.-A	
		m	m	m	m	%	mm	Type	Quan.	Type	Quan.	m3	m3	m3	Improve.-G	
Nakham																
Phonthan	R-3-A	5.00	6.00	0.50	1,200	100	50	B-4	2	P-23	1	300.0	0.0	0.0	Improve.-G	P. Field
Phonthan	-ditto-	5.00	6.00	0.50	200	100	50		0	P-1	1	50.0	0.0	0.0	Improve.-G	village
Phonthan	-ditto-	5.00	6.00	0.50	300	100	50		0	P-1	1	75.0	120.0	855.0	Improve.-A	Forest
Phonthan	R-3-B	4.00	5.00	0.50	500	100	50		0	P-1	1	100.0	200.0	1,175.0	Improve.-A	Forest
Phonthan	R-3-C	4.00	5.00	0.50	700	100	50		0	P-1	2	140.0	280.0	1,645.0	Improve.-A	Forest
Phonthan	R-3-D	4.00	5.00	0.50	300	100	50		0		0	60.0	0.0	0.0	Improve.-G	Reservoir
Phonthan	R-3-E	4.00	5.00	0.50	1,000	100	50		0	P-1	3	200.0	400.0	2,350.0	Improve.-A	Forest
Nake																
Total (Whole)					**4,200**			**B-4**	**2**	**P-1,-23**	**9**	**925.0**	**1,000.0**	**6,025.0**		
Total (New)					**0**				**0**		**0**	**0.0**	**0.0**	**0.0**		
Total (Improve.-All)					**2,500**				**0**	**P-1**	**7**	**515.0**	**1,000.0**	**6,025.0**		
Total (Improve.-Gravel Pavement)					**1,700**			**B-4**	**2**	**P-1,-23**	**2**	**410.0**	**0.0**	**0.0**		

Note : Improve.-A = improvement of all the part of rural road , Improve.-G = improvement of the only gravel pavement of the surface for rural road .

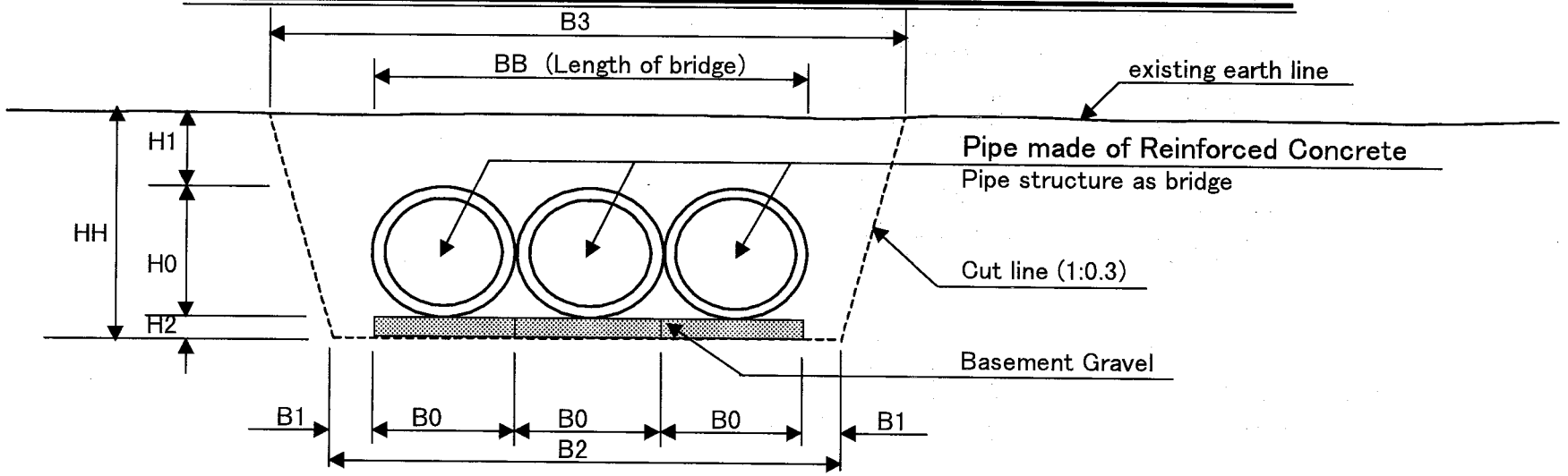
Note : About B-4, P-1 and P-23 , see the figures of both Bridge (Type-B) : box culvert of reinforced concrete and Bridge (Type-P) : pipe of reinforced concrete .



Bridge	Dimension of Box Culvert					Height of Box Bridge			Base	Length of Box Bridge					Quantity of Materials per unit width				
Type	H0	B0	N	Q	V	HH	H1	H2	H3	BB	B1	B2	B3	B4	Cut	Refill	Base	Concrete	R.F.Bar
(Unit)	(m)	(m)	(piece)	(m3/sec)	(m/sec)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m3/m)	(m3/m)	(m3/m)	(m3/m)	(kg/m)
Type-B-1	1.00	1.00	1	1.000	1.00	1.50	0.30	0.20	0.10	1.40	0.20	0.60	2.60	3.56	4.93	2.69	0.14	1.10	33.0
Type-B-2	1.00	1.00	2	2.000	1.00	1.50	0.30	0.20	0.10	2.80	0.20	0.60	4.00	4.96	7.17	2.69	0.28	2.20	66.0
Type-B-3	1.00	1.00	3	3.000	1.00	1.50	0.30	0.20	0.10	4.20	0.20	0.60	5.40	6.36	9.41	2.69	0.42	3.30	99.0
Type-B-4	1.00	1.00	4	4.000	1.00	1.50	0.30	0.20	0.10	5.60	0.20	0.60	6.80	7.76	11.65	2.69	0.56	4.40	132.0
Type-B-5	1.00	1.00	5	5.000	1.00	1.50	0.30	0.20	0.10	7.00	0.20	0.60	8.20	9.16	13.89	2.69	0.70	5.50	165.0
Type-B-11	1.50	1.50	1	2.250	1.00	2.20	0.40	0.30	0.10	2.10	0.30	0.60	3.30	4.68	9.18	4.35	0.21	2.37	71.1
Type-B-12	1.50	1.50	2	4.500	1.00	2.20	0.40	0.30	0.10	4.20	0.30	0.60	5.40	6.78	14.01	4.35	0.42	4.74	142.2
Type-B-13	1.50	1.50	3	6.750	1.00	2.20	0.40	0.30	0.10	6.30	0.30	0.60	7.50	8.88	18.84	4.35	0.63	7.11	213.3
Type-B-14	1.50	1.50	4	9.000	1.00	2.20	0.40	0.30	0.10	8.40	0.30	0.60	9.60	10.98	23.67	4.35	0.84	9.48	284.4
Type-B-15	1.50	1.50	5	11.250	1.00	2.20	0.40	0.30	0.10	10.50	0.30	0.60	11.70	13.08	28.50	4.35	1.05	11.85	355.5
Type-B-21	2.00	2.00	1	4.000	1.00	2.90	0.50	0.40	0.10	2.80	0.40	0.60	4.00	5.80	14.70	6.30	0.28	4.12	123.6
Type-B-22	2.00	2.00	2	8.000	1.00	2.90	0.50	0.40	0.10	5.60	0.40	0.60	6.80	8.60	23.10	6.30	0.56	8.24	247.2
Type-B-23	2.00	2.00	3	12.000	1.00	2.90	0.50	0.40	0.10	8.40	0.40	0.60	9.60	11.40	31.50	6.30	0.84	12.36	370.8
Type-B-24	2.00	2.00	4	16.000	1.00	2.90	0.50	0.40	0.10	11.20	0.40	0.60	12.40	14.20	39.90	6.30	1.12	16.48	494.4
Type-B-25	2.00	2.00	5	20.000	1.00	2.90	0.50	0.40	0.10	14.00	0.40	0.60	15.20	17.00	48.30	6.30	1.40	20.60	618.0

Note : H1 = H2 + 0.10 (including the thickness of the floor of bridge as the road-plate)

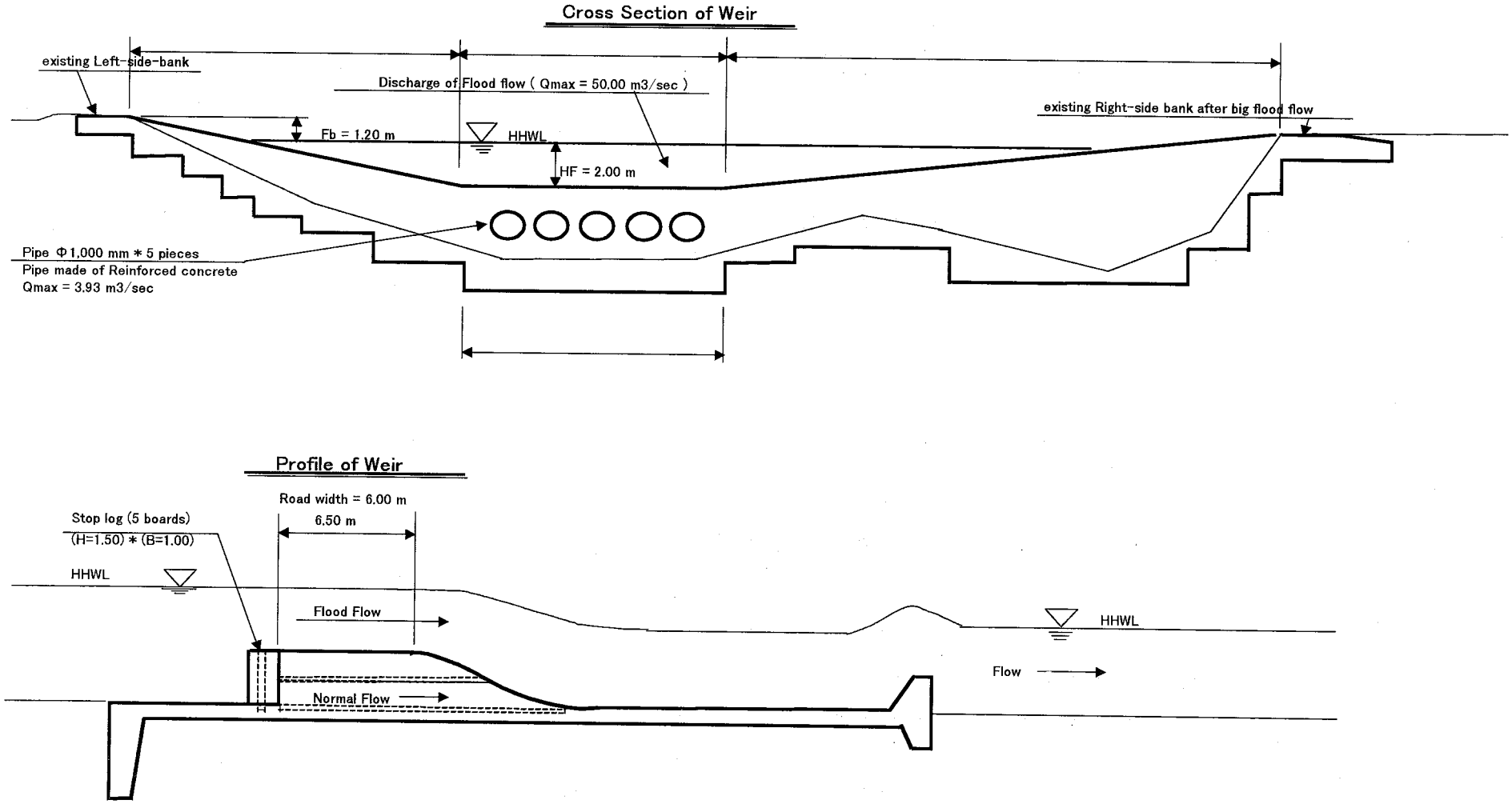
H-9-2. Planning and Design of Bridge , Pipe of Reinforced Concrete



Bridge	Dimension of Pipe				Height of Pipe Bridge			Base	Length of Pipe Bridge					Quantity of Materials per unit width			
Type	D	N	Q	V	HH	H1	H0	H2	BB	B0	B1	B2	B3	Cut	Refill	Base	Pipe
(Unit)	(mm)	(piece)	(m3/sec)	(m/sec)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m3/m)	(m3/m)	(m3/m)	(piece)
Type-P-1	600	1	0.283	1.00	1.42	0.60	0.72	0.10	0.72	0.72	0.60	1.92	2.77	1.79	1.31	0.07	1
Type-P-2	600	2	0.565	1.00	1.42	0.60	0.72	0.10	1.44	0.72	0.60	2.64	3.49	2.30	1.34	0.14	2
Type-P-3	600	3	0.848	1.00	1.42	0.60	0.72	0.10	2.16	0.72	0.60	3.36	4.21	2.81	1.37	0.22	3
Type-P-4	600	4	1.130	1.00	1.42	0.60	0.72	0.10	2.88	0.72	0.60	4.08	4.93	3.32	1.41	0.29	4
Type-P-5	600	5	1.413	1.00	1.42	0.60	0.72	0.10	3.60	0.72	0.60	4.80	5.65	3.83	1.44	0.36	5
Type-P-11	800	1	0.502	1.00	1.66	0.60	0.96	0.10	0.96	0.96	0.60	2.16	3.16	2.29	1.47	0.10	1
Type-P-12	800	2	1.005	1.00	1.66	0.60	0.96	0.10	1.92	0.96	0.60	3.12	4.12	3.09	1.45	0.19	2
Type-P-13	800	3	1.507	1.00	1.66	0.60	0.96	0.10	2.88	0.96	0.60	4.08	5.08	3.88	1.43	0.29	3
Type-P-14	800	4	2.010	1.00	1.66	0.60	0.96	0.10	3.84	0.96	0.60	5.04	6.04	4.68	1.40	0.38	4
Type-P-15	800	5	2.512	1.00	1.66	0.60	0.96	0.10	4.80	0.96	0.60	6.00	7.00	5.48	1.38	0.48	5
Type-P-21	1,000	1	0.785	1.00	1.90	0.60	1.20	0.10	1.20	1.20	0.60	2.40	3.54	2.85	1.60	0.12	1
Type-P-22	1,000	2	1.570	1.00	1.90	0.60	1.20	0.10	2.40	1.20	0.60	3.60	4.74	3.99	1.49	0.24	2
Type-P-23	1,000	3	2.355	1.00	1.90	0.60	1.20	0.10	3.60	1.20	0.60	4.80	5.94	5.13	1.38	0.36	3
Type-P-24	1,000	4	3.140	1.00	1.90	0.60	1.20	0.10	4.80	1.20	0.60	6.00	7.14	6.27	1.27	0.48	4
Type-P-25	1,000	5	3.925	1.00	1.90	0.60	1.20	0.10	6.00	1.20	0.60	7.20	8.34	7.41	1.16	0.60	5

Note : H0 , B0 = (including the thickness of pipe wall, approximately)

H-10. Planning and Design of Thongharb-Weir in Nam Dua River



Planning and Design of Thongharb-Weir in Nam Dua River Cross Section & Profile of Weir

H-11. List of Data Collected in the Study Area

1	Irrigation Facility Data , DAF and PAFSO Savannakhet province office , Jan. 1999
2	Irrigation Facility Data , DAF and PAFSO Khammouane province office , Jan. 1999
3	Irrigation Facility Data , DAF and PAFSO Borikhamxay province office , Jan. 1999
4	Geographic Maps (1:100,000) from National Geography Department , Jan. 1999
5	National, Province and Rural Road Network Data , DCTPC Savannakhet province office , Jan. 1999
6	National, Province and Rural Road Network Data , DCTPC Khammouane province office , Jan. 1999
7	National, Province and Rural Road Network Data , DCTPC Borikhamxay province office , Jan. 1999
8	Lao PDR Sector Memorandum "Priorities for Rural Infrastructure Development" Feb.1997 World Bank
9	Lao PDR Public Expenditure Review "Improving Efficiency and Equity Spending Priorities" Feb.1997 W. B.
10	Water Supply, Health, Hospital Data , Public Health Department , Savannakhet province office , Jan. 1999
11	Water Supply, Health, Hospital Data , Public Health Department , Khammouane province office , Jan. 1999
12	Water Supply, Health, Hospital Data , Public Health Department , Borikhamxay province office , Jan. 1999
13	District Access Priorities Thakhek District (August 1998) IRAP Khammouane MCTPC/SIDA/UNDP
14	District Access Priorities Hinboun District (August 1998) IRAP Khammouane MCTPC/SIDA/UNDP
15	District Accessibility Profile Thakhek District (August 1998) IRAP Khammouane MCTPC/SIDA/UNDP
16	District Accessibility Profile Hinboun District (August 1998) IRAP Khammouane MCTPC/SIDA/UNDP
17	District Road Network Thakhek District (August 1998) IRAP Khammouane MCTPC/SIDA/UNDP
18	District Road Network Hinboun District (August 1998) IRAP Khammouane MCTPC/SIDA/UNDP
19	Khammouane Province Thakhek District IRAP Accessibility Data Base , June 1998 by IRAP
20	Khammouane Province Hinboun District IRAP Accessibility Data Base , June 1998 by IRAP
21	Khammouane Province Xebanfai District IRAP Accessibility Data Base , Dec. 1998 by IRAP
22	Province Savannakhet Songkhon District IRAP Accessibility Data Base , Jun. 1997 by IRAP
23	Province Savannakhet Xaiphouthong District IRAP Accessibility Data Base , Jan. 1998 by IRAP
24	Province Savannakhet Khanthabuly District IRAP Accessibility Data Base , Jan. 1998 by IRAP
25	Province Savannakhet Xaibuly District IRAP Accessibility Data Base , Nov. 1998 by IRAP
26	District Accessibility Profile Songkhon District Savannakhet (June 1997) IRAP MCTPC/UNDP/ILO
27	District Accessibility Profile Xaiphouthong District Savannakhet (Jan. 1998) IRAP MCTPC/UNDP/ILO
28	District Accessibility Profile Khanthabuly District Savannakhet (Jan. 1998) IRAP MCTPC/UNDP/ILO
29	District Accessibility Profile Xaibuly District Savannakhet (Dec. 1998) IRAP MCTPC/UNDP/ILO
30	District Accessibility Profile Xebangfai District Khammouane (Dec. 1998) IRAP MCTPC/SIDA/UNDP
31	Road Network Analysis Xaibuly Savannakhet (Nov. 1998) IRAP MCTPC/UNDP/ILO
32	Integrated Agriculture/Rural Development, Information, Data in Lao PDR , Mar. 1997 ADCA (Japanese)
33	District Accessibility Profile Nonbok District Khammouane (June 1999) IRAP MCTPC/SIDA/UNDP