3-7 Other Social Infrastructure Conditions

This section examines the current conditions of the social and economic infrastructure other than the already described roads and water supply facilities.

Table A3-7-1 gives the results of the social and economic survey conducted by Kandy District. These results show that the Minipe AGA Division, to which the Stage I and II areas belong, is one of the least developed areas in Kandy District in terms of the established social and economic infrastructure. The field survey conducted by the Study Team found the level of the social and economic infrastructure in the Stage III and IV and Nagadeepa areas to be even lower than that of the Stage I and II areas.

The number of main facilities in these areas and the number in the Mahaweli River Development Project System C area are given below for comparison purposes. While there is little difference in the number of schools and cooperatives, the Project Area has an inadequate provision of hospitals, banks, etc.

Facility	Minipe	Nagadeepa	System C	
Schools	330	270	180	families/school
Hospitals/Clinics	1,500	1,200	500	families/hospital
Post Offices	570	620	1,000	families/post office
Cooperatives	380	500	250	families/cooperative
Banks	2,400	2,500	1,000	families/bank

The social and economic facilities are listed in Table A3-7-1 while Figure 3-7-1 gives their locations.

Fig. 3-7-1 a Socio-economic Infrastructure

Stage I Section I, II

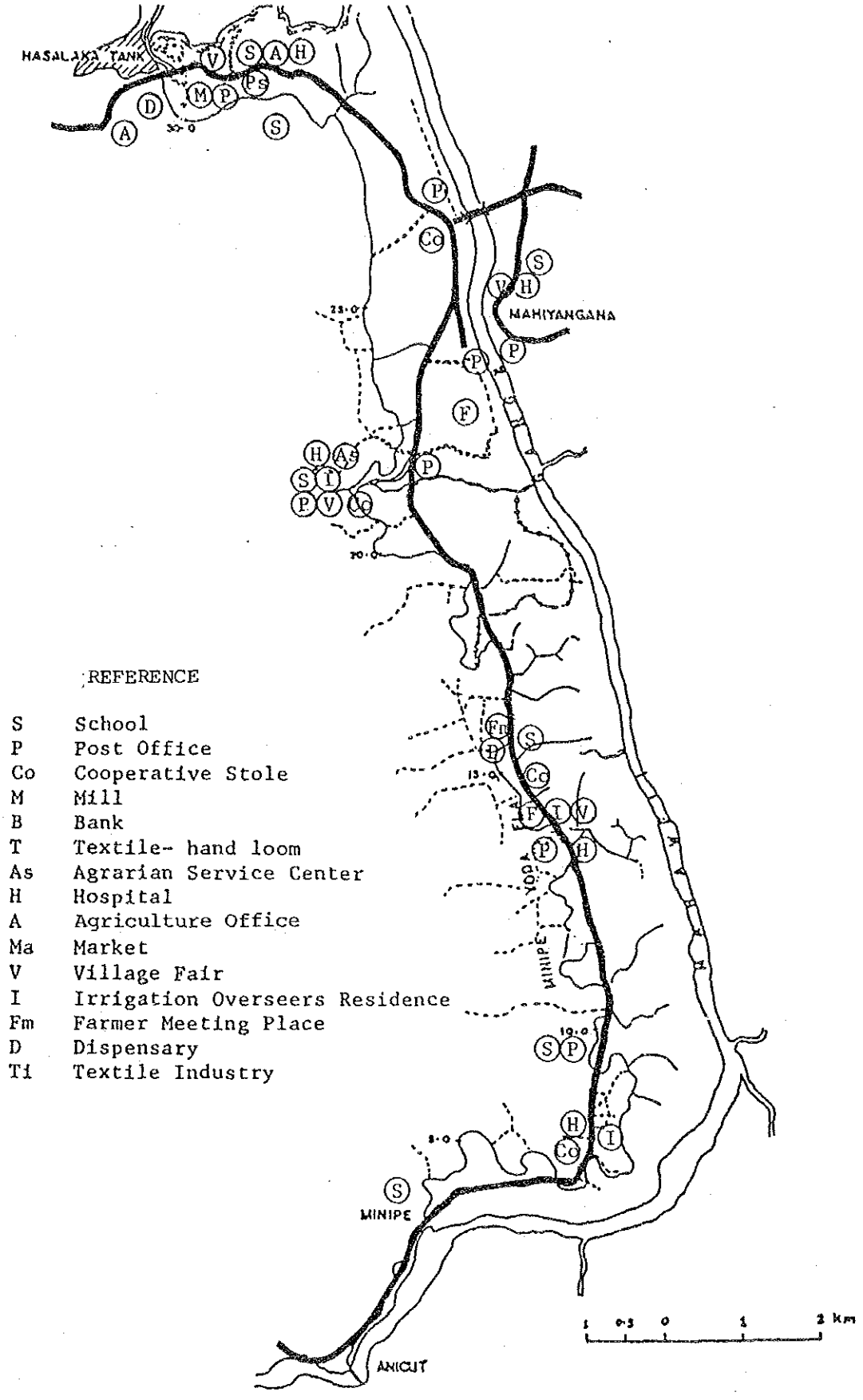


Fig. 3-7-1 b Socio-economic Infrastructure

Stage II Section I, II

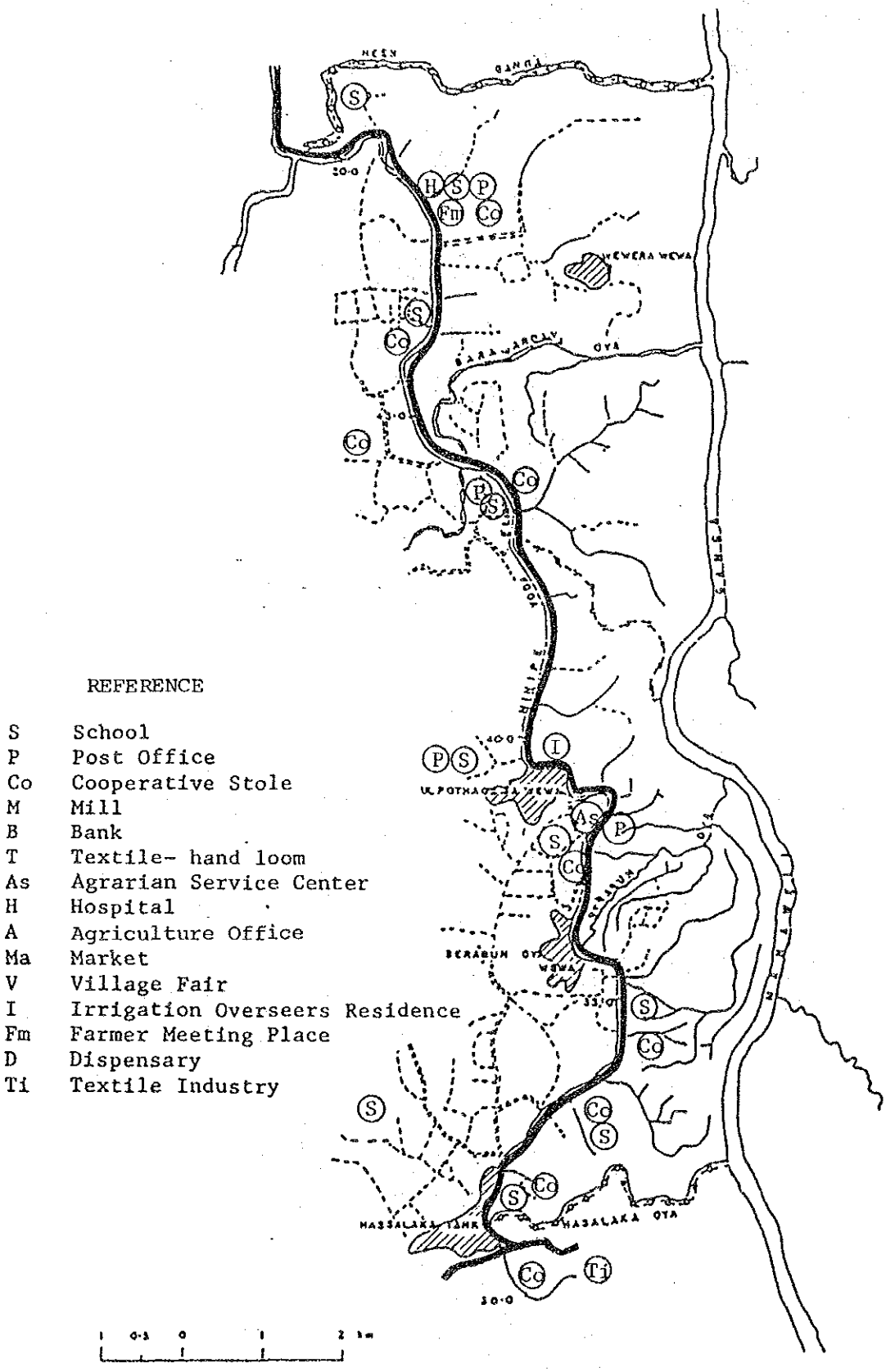


Fig. 3-7-1 c Socio-economic Infrastructure

Stage III Section I, II, Stage IV

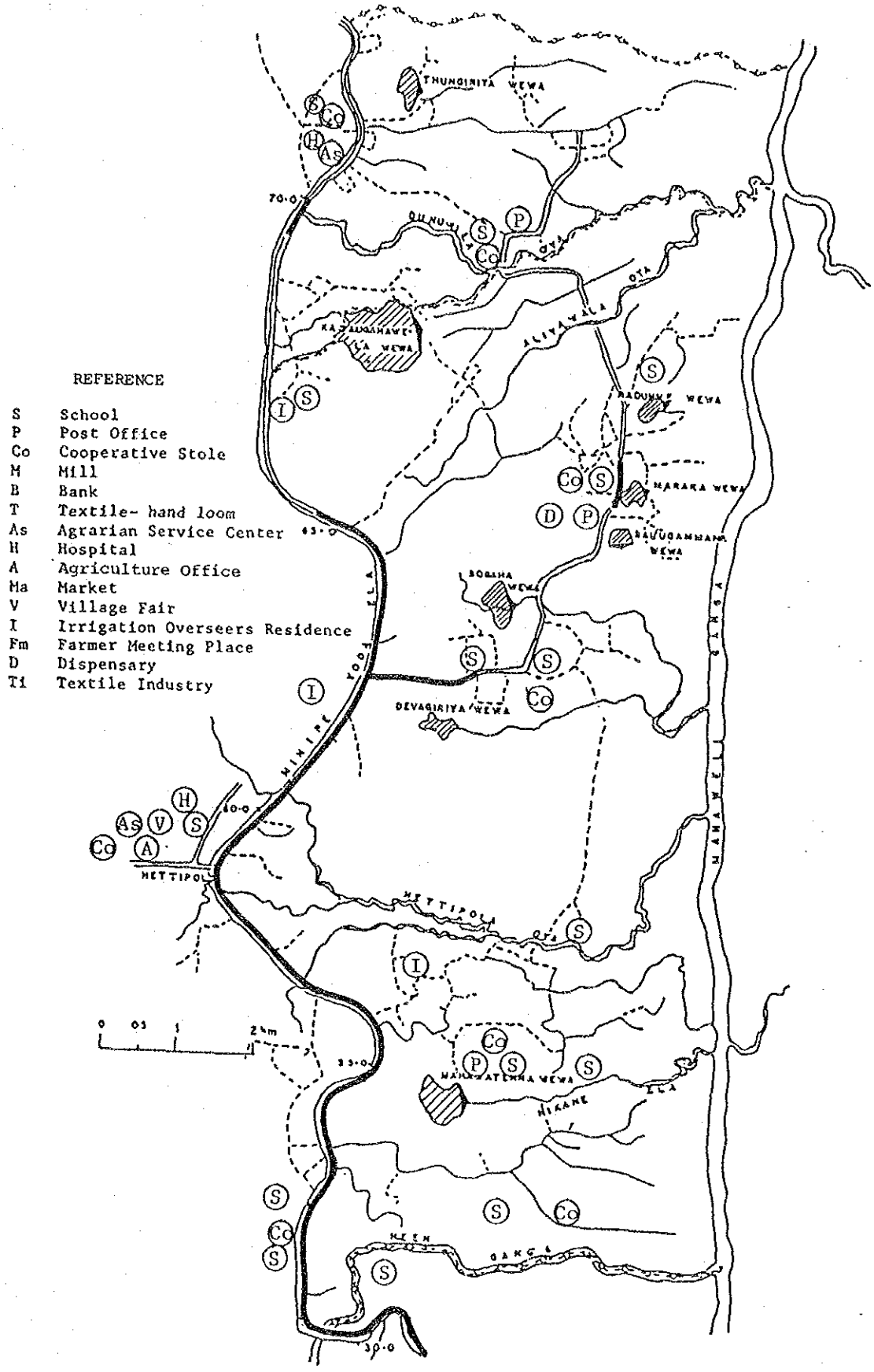
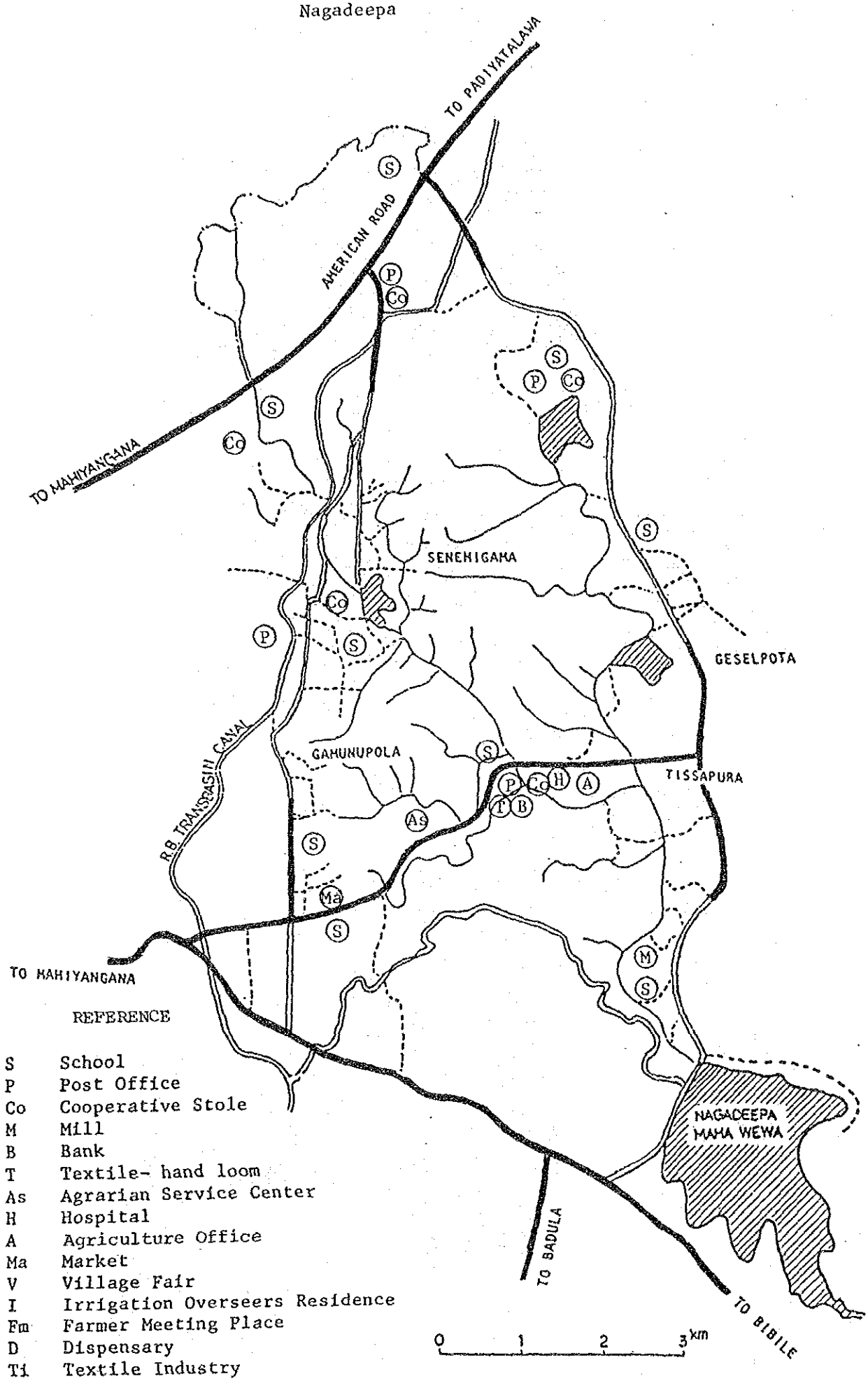


Fig. 3-7-1 d Socio-economic Infrastructure

Nagadeepa



REFERENCE

S	School
P	Post Office
Co	Cooperative Stole
M	Mill
B	Bank
T	Textile- hand loom
As	Agrarian Service Center
H	Hospital
A	Agriculture Office
Ma	Market
V	Village Fair
I	Irrigation Overseers Residence
Fm	Farmer Meeting Place
D	Dispensary
Ti	Textile Industry

3-8 Construction Conditions

3-8-1 Construction Materials

Field reconnaissance was conducted for soil collection sites and quarries in both the Minipe and Nagadeepa areas based on information provided by the RDA Construction Offices.

(1) Borrow pits

The locations of the borrow pits for surface and sub-base course materials for gravelled roads are shown in Figure 3-8-1. The borrow pit for the Stage I and II areas is located some 1.3km from the Division Office in Hasalaka off National Highway A26. According to data provided by the RDA Executive Engineer's Office in Udadumbara, the CBR value of the soil at this site is as good as 50% and a sufficient volume of soil is available.

In the case of the Stage III and IV areas, there are two borrow pits; one at Handungamuwa to the west of the trunk road and another at Hettipola located between the trunk road and the Mahaweli river. According to data provided by the RDA Executive Engineer's Office in Nalanda, the respective CBR values are 29% and 8%, suggesting the use of the former.

There are no borrow pits for obtaining good sub-base course materials in the Nagadeepa area. However, there is a borrow pit at Kuda Lumka which can be reached from Tissapura via Aluketiyawa. The 4km section between Tissapura and Aluketiyawa is tarred while the remining 3.4km section to Kuda Lumka is gravelled. According to data provided by the RDA Executive Engineer's Office in Mahiyangana, the CBR value of the soil at this site is 24% (Table A3-6-2) and a sufficient soil volume is available.

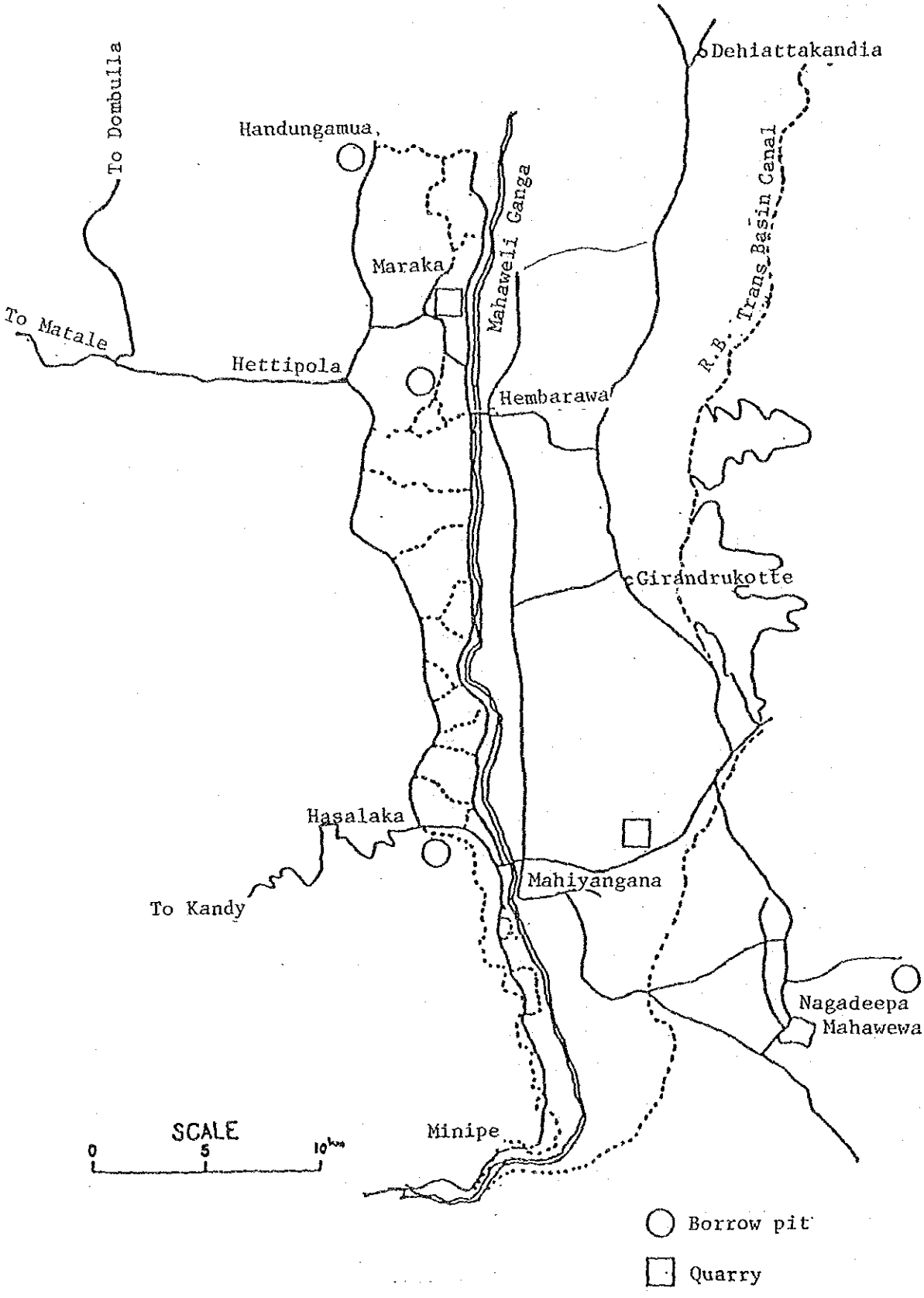


Fig. 3-8-1 Location of Borrow Pits and Quarries

(2) Quarries

The volume of crushed rocks required for use in the construction of sub-base courses and wells can be easily obtained in view of the fact that rocky mountains are located both in and outside the Project Area.

The Project Area has many small quarries and quirrying is manually conducted. Since the total production volume of these quarries is low, however, mechanical quarrying must be introduced to meet the requirements of the Project.

The quarry located near Mile Post 47 on State Road A26 is the best situated produce the required volume of crushed rocks for the Stage I and II and Nagadeepa areas. In regard to the Stage III and IV areas, the quarry at Gruwelayaya, which is the largest in and at the centre of these areas, is the most suitable choice as it is also near the roads subject to rehabilitation.

As the rocks available from the above quarries are gneiss of the Vijayan Series formed in the Pre-Cambrian, they are good sub-base course materials.

3-8-2 Local Construction Capability

(1) Well construction

Deep tube wells in Sri Lanka constructed by government agencies (i.e., Water Resources Board and Water Supply Drainage Board), and private construction companies.

The Water Resources Board has 6 deep well drilling machines while the Water Supply Drainage Board has 23. Government related deep well construction is mostly conducted by one of these Boards. Although the private construction companies are smaller in size, they also have their own drilling machines and conduct both public and private work. Therefore, the supply of drilling machines from Japan for the Project appears unnecessary.

The Water Resources and Water Supply Drainage Boards are more capable of conducting large-scale work than the private construction companies and are technically more reliable in many aspects, including the preliminary investigation quality. However, their work efficiency is inferior to that of the private construction companies and they sometimes find it difficult to keep to a schedule. Since they give priority to government work, they may be unavailable for this grant aid project under a Japanese contractor.

Shallow wells are generally constructed by small local construction companies. The Gramodaya Mandalaya and the Rural Development Societies organized by local farmers also construct shallow wells. When construction work is of a governmental nature, it tends to be given to a community organization rather than to a construction company. Since the Project plans the construction of many shallow wells in a short period of time, the only realistic way to meet the construction schedule will be to enlist the cooperation of local organizations in the capacity of subcontractors or sub-subcontractors.

(2) Road rehabilitation

Many subcontractors are available for road rehabilitation work in Sri Lanka. The Study Team checked the number of required construction machines owned by these companies and found that general construction machines can be rented, despite high rental charges for motorized graders, macadam rollers, etc. However, it appears that dump trucks (4 ton), bulldozers (9 tons), and generators (5 KVA) cannot be procured locally.

Local road paving generally involves the manual laying of ten inches of crushed rocks and sub-base work using the Telford Macadam method.

CHAPTER 4

PROJECT CONTENTS

CHAPTER 4 PROJECT CONTENTS

4-1 Objectives of the Project

The Project aims at upgrading the standard of living of the inhabitants of the Project Area, i.e., the Minipe and Nagadeepa areas, which are already developed settlement areas, through the consolidation of the basic social infrastructure and the subsequent improvement of the living environment to narrow the social and economic gaps between the Project Area and neighboring areas.

To achieve these objectives, the Project aims at the consolidation of the domestic water supply facilities through the construction of new wells and the rehabilitation of existing wells in addition to the rehabilitation of roads in the Project Area with grant aid from the Government of Japan.

4-2 Examination of Requested Contents

The contents of the original request made by the Government of Sri Lanka are given in 2-3. While the original request consisted of four plans, the subjects of the present study were limited to rural water supply and rural road rehabilitation, omitting bridge construction and pasture development (also described in 2-3). Although the basic frameworks of the two plans subject to the study were satisfactory, further elaboration was deemed necessary.

In view of the above, the Study Team held a series of discussions with the Sri Lankan side during the study period to clarify the concrete project contents and their priorities, and the preferred direction for project implementation.

With regard to road rehabilitation, it was decided that a study should be conducted in accordance with the revised road rehabilitation priority list (Appendix 1-5), which is understood to have been

prepared on the basis of requests from local communities, and that a priority list be prepared by the Study Team based on the study results. The actual section of target roads is to be based on this list taking into consideration the priority rank of each road and the suitability of the required work to qualify for grant aid. It must be noted here, however, that the field study on roads given in the revised list found inaccurate road length descriptions and route duplications. In addition, those routes which the RDA plans to rehabilitate using other funds and canal O.M. roads subject to rehabilitation under the yen loan project were also included in the revised list.

With regard to rural water supply, as no concrete information had been given on how many wells are required and their locations, it was decided that a plan should be prepared after first studying the current water supply situation, hydrogeological conditions, and local requirements. However, it was confirmed that the plan should include the construction of deep wells to supply water for drinking purposes and the construction and rehabilitation of shallow wells to supply domestic water for purposes other than drinking.

4-3 Outline of the Project

4-3-1 Work Plan

Appropriate project contents for the implementation of the Minipe and Nagadeepa Rural Development Project as a grant aid project of the Government of Japan are as follows.

(1) Rural water supply plan

1) construction of deep wells
2) construction of shallow wells
3) rehabilitation of shallow wells

(2) Rural road rehabilitation plan ;

1) rehabilitation of roads and related structures

These two plans are outlined below.

4-3-2 Rural Water Supply Plan

(1) Basic Policy

The plan aims at the construction of deep and shallow wells and the rehabilitation of existing shallow wells to provide a stable supply of safe domestic water throughout the year for inhabitants of the Project Area.

The basic purposes of these wells are the supply of drinking water (deep wells) and other domestic water (shallow wells). Shallow wells subject to rehabilitation will be communal wells and privately owned but communally used wells and will be divided into two groups (A and B) based on the scale of necessary rehabilitation work. Such measures as the lining of wells and repair of the ground section will be employed to prevent the infiltration of dirty surface water into the wells. The use of chemicals to disinfect well water, suggested in the Feasibility Study Report, has been abandoned in view of increasing O.M. costs due to the future purchase of chemicals and the fact that local inhabitants may not accept chemicals in their domestic water.

The plan is designed to meet the needs of population growth up to 1995. By 1995 one shallow well should have been provided for each 20 households on average. With regard to deep wells, as these are far more expensive than shallow wells, their number will be decided based on the required yield and they will be distributed in such a manner as to enable the inhabitants of the Project Area to equally benefit from them.

(2) Plan outline

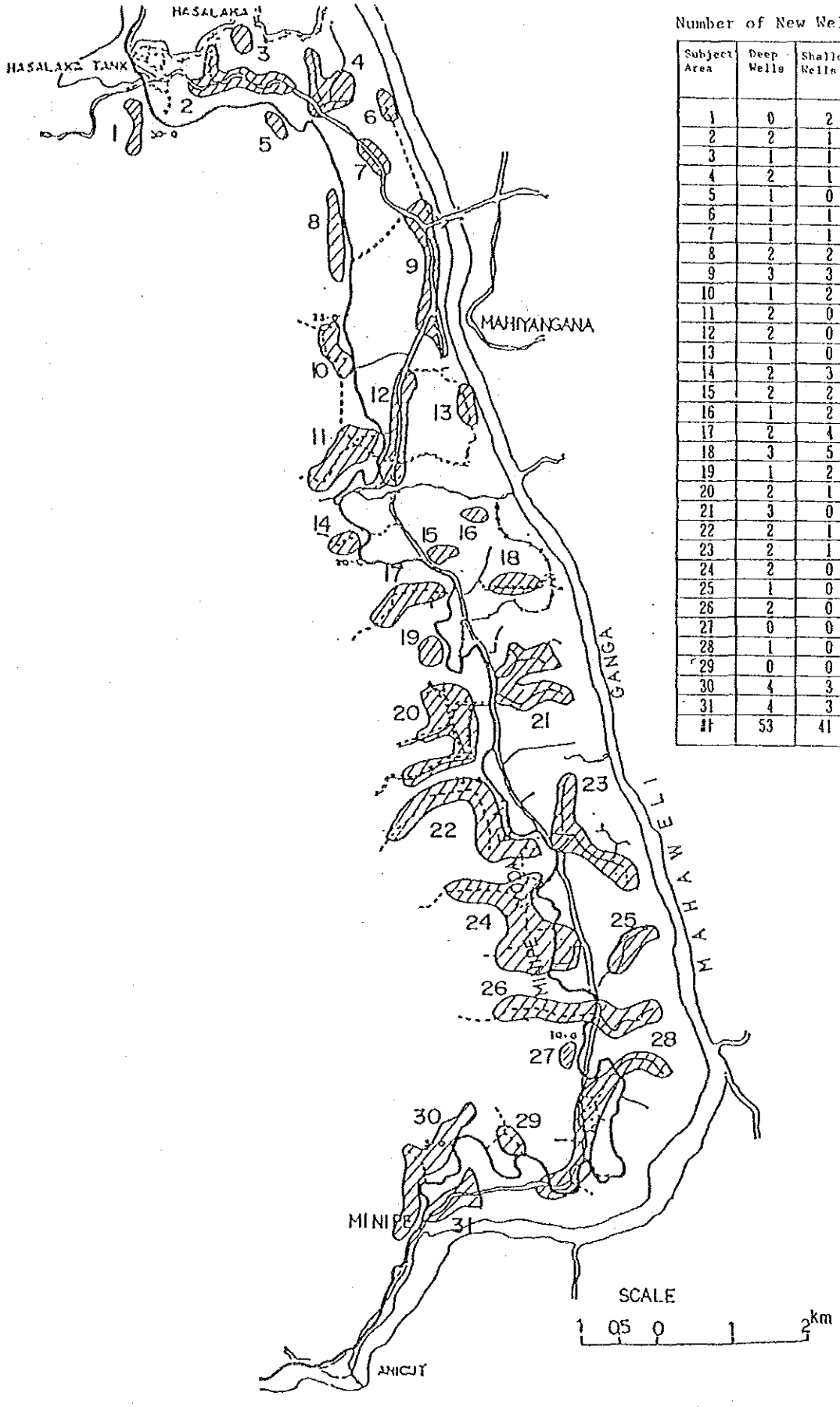
The number of rural water supply facilities (i.e., wells) to be either constructed or rehabilitated under the Project is given in Table 4-3-1 for each target area while the respective number of wells for each GS division is given in Table A3-5-1 and Figure 4-3-1.

Table 4-3-1 Well Distribution Plan

	Minipe				Sub-total	Nagadeepa	TOTAL
	I	II	III	IV			
Population (1995)	22,300	28,200	22,100	8,500	81,100	16,600	97,700
Existing Deep Wells	6	13	48	18	85	3[b]	88
Existing Shallow Wells[a]	178	189	129	59	502	85	597
New Deep Wells	53	62	0(16)	0(8)	115(24)	44	159(24)
New Shallow Wells	41	66	55	12	174	53	227
Rehabilitated Shallow Wells (A)	54	59	27	6	146	27	173
Rehabilitated Shallow Wells (B)	44	56	20	8	128	40	168

a) Existing shallow wells = communal shallow wells + communally used private wells.
b) Unsuitable for drinking water.

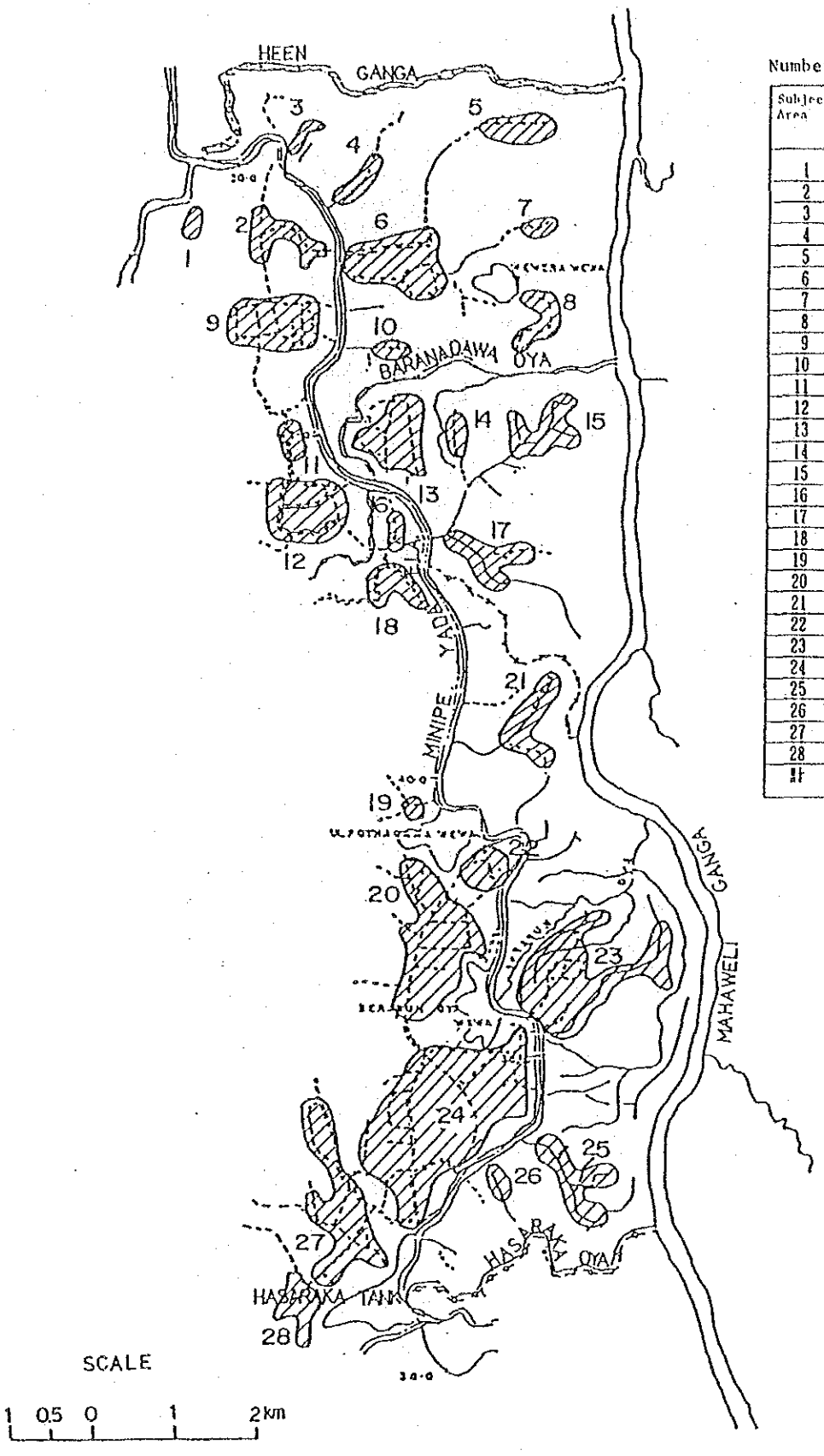
Figures in brackets are planned numbers of deep wells by DANIDA Project.



Number of New Wells

Subject Area	Deep Wells	Shallow Wells
1	0	2
2	2	1
3	1	1
4	2	1
5	1	0
6	1	1
7	1	1
8	2	2
9	3	3
10	1	2
11	2	0
12	2	0
13	1	0
14	2	3
15	2	2
16	1	2
17	2	4
18	3	5
19	1	2
20	2	1
21	3	0
22	2	1
23	2	1
24	2	0
25	1	0
26	2	0
27	0	0
28	1	0
29	0	0
30	4	3
31	4	3
#1	53	41

Fig. 4-3-1a Locations and Number of New Wells (Minipe Stage I)



Number of New Wells

Subject Area	Deep Wells	Shallow Wells
1	2	1
2	5	5
3	0	1
4	0	1
5	0	2
6	2	2
7	1	1
8	2	1
9	4	3
10	2	1
11	1	1
12	2	2
13	3	4
14	1	1
15	1	3
16	1	1
17	4	3
18	1	1
19	1	1
20	3	2
21	4	4
22	4	4
23	7	7
24	4	4
25	3	3
26	1	1
27	1	1
28	2	5
∑	62	66

Fig. 4-3-1b Locations and Number of New Wells (Minipe Stage II)

STAGE IV

Number of New Wells

Subject Area	Deep Wells	Shallow Wells
1	0	4
2	0	0
3	0	1
4	0	2
5	0	2
6	0	1
7	0	1
8	0	1
計	0	12

STAGE III

Number of New Wells

Subject Area	Deep Wells	Shallow Wells
1	0	1
2	0	3
3	0	4
4	0	3
5	0	3
6	0	10
7	0	0
8	0	0
9	0	0
10	0	0
11	0	3
12	0	3
13	0	2
14	0	2
15	0	0
16	0	0
17	0	1
18	0	3
19	0	3
20	0	0
21	0	0
22	0	1
23	0	1
24	0	6
25	0	6
計	0	55

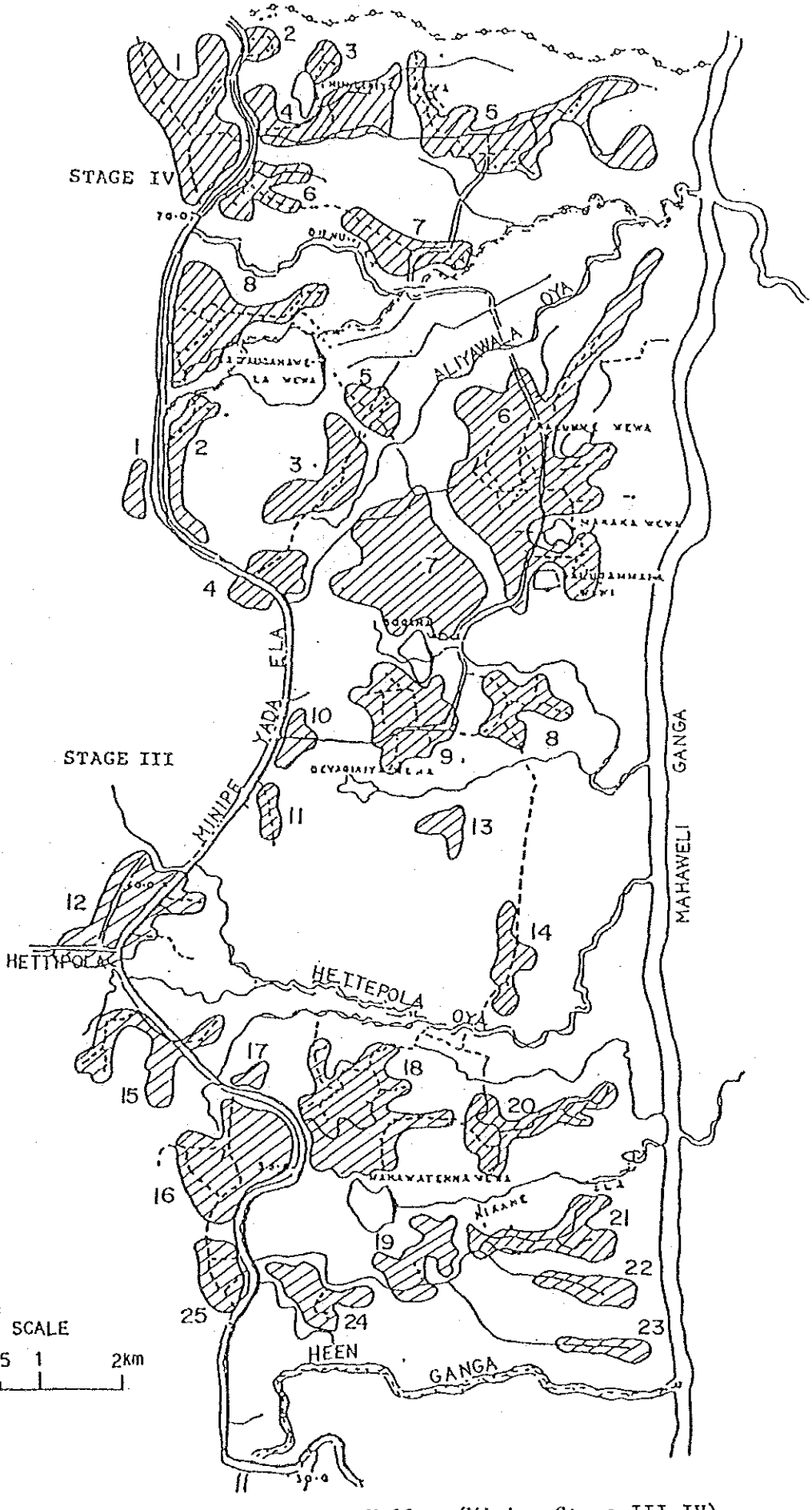
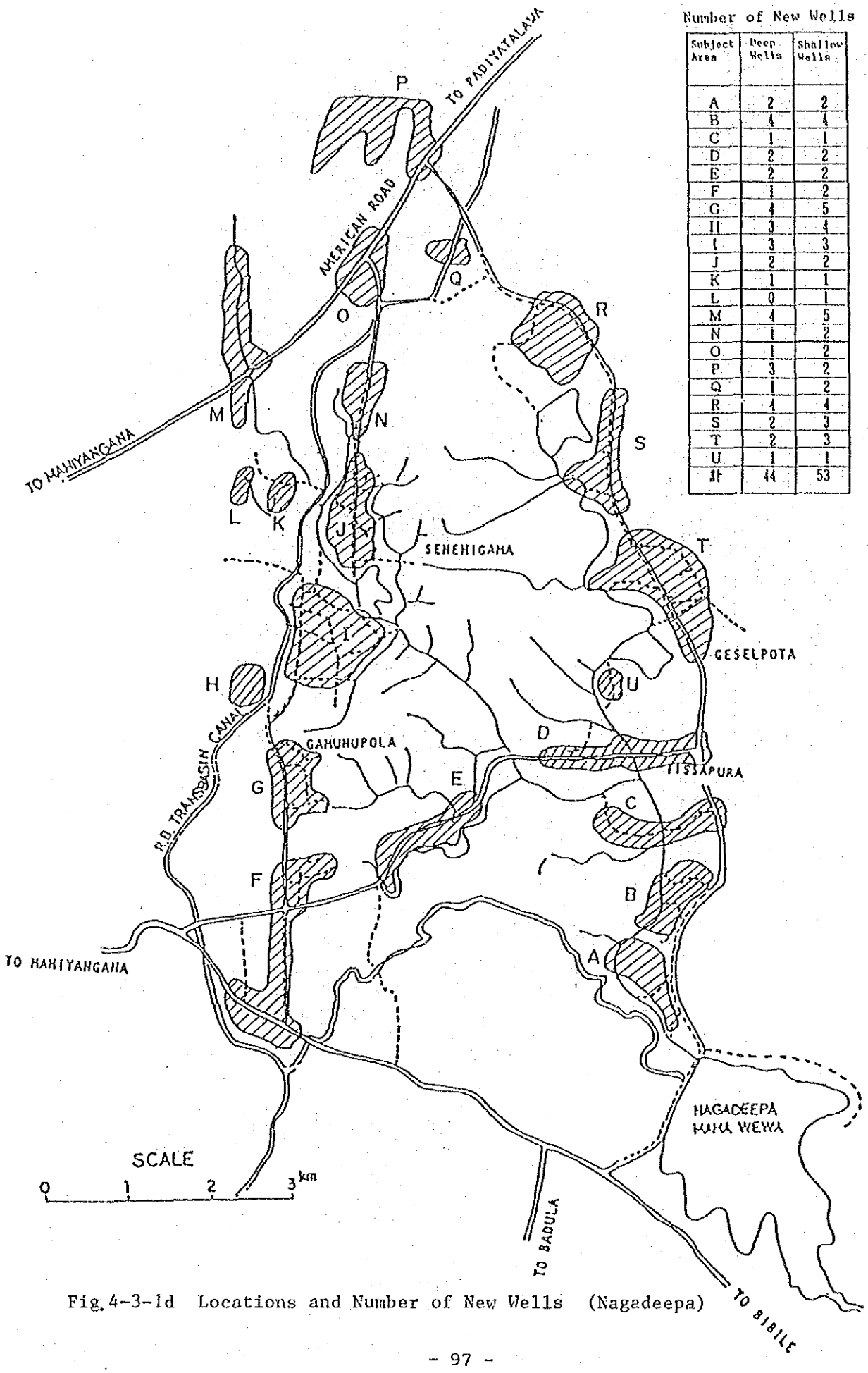


Fig.4-3-1c Locations and Number of New Wells (Minipe Stage III.IV)



Number of New Wells

Subject Area	Deep Wells	Shallow Wells
A	2	2
B	4	4
C	1	1
D	2	2
E	2	2
F	1	2
G	4	5
H	3	4
I	3	3
J	2	2
K	1	1
L	0	1
M	4	5
N	1	2
O	1	2
P	3	2
Q	1	2
R	4	4
S	2	3
T	2	3
U	1	1
計	44	53

Fig.4-3-1d Locations and Number of New Wells (Nagadeepa)

4-3-3 Rural Road Rehabilitation Plan

(1) Basic policy

The basic policy for the rural road rehabilitation plan for the Project Area is summarized as follows.

i) In principle, the target roads will be rehabilitated to their original condition. Improvement work may also be conducted at certain sections to facilitate road traffic.

ii) The road priority ranking for the selection of the target roads will be decided on the basis of the field survey results, conducted in accordance with the road rehabilitation priority list submitted by the Sri Lankan side, taking the following points into consideration.

- efficient road network
- access from villages to trunk roads
- access to public facilities in villages
- current conditions of feeder roads
- current traffic conditions
- village requirements
- exclusion of canal O.M. roads subject to rehabilitation by the Irrigation Department under the yen loan project

(2) Target roads for rehabilitation

The priority ranking of the roads subject to rehabilitation was decided based on the field survey results compiled by the Study Team and the priorities given in the priority list prepared by the Sri Lankan side while taking the selection conditions referred to in (1) above into consideration (Table 4-3-2).

Minipe

The Minipe area narrowly stretched in a north-south direction and its trunk road is located on the top of the main canal embankment. As development in the northern section of

the Minipe area lags behind that of other areas, stress is given to development in this section. Stress on the northern section was also apparent in the Sri Lankan priority list. As a result, the paving of some currently gravelled sections of Maraka Road (bus route) is planned to consolidate the road network, to improve access between villages, and to improve public transport (bus transport).

The Study Team attended a series of Project Committee meetings organized by the farmer representatives for each stage in order to understand the local requirements and then conducted the field survey for the roads given in the Sri Lankan priority list to confirm their locations and current conditions. The priority rank for each road was then decided taking the local requirements into consideration. In the Minipe area, high priority was given to Old Polonalwa Road which acted as a trunk road prior to the construction of the current trunk road and particularly to those sections playing an important role as substitute routes for the current trunk road. With regard to Mahwatenna Road for which rehabilitation was strongly requested at the local meeting despite its omission from the Sri Lankan priority list, the road was surveyed and given high priority due to its poor surface conditions and the lack of either an alternative route or connecting routes. The priority rank for those branch roads providing access to the trunk road was decided based on the number of households along these roads.

It was decided to omit from the road rehabilitation plan the Hettipola - Hasalaka section of the Handunganuwa - Hasalaka Road which was given top priority in the Sri Lankan priority list as the rehabilitation of this section by the RDA has already been decided. Conversely, Mahwatenna Road and a gravelled section of Maraka Road which were not included in the Sri Lankan priority list were added to the target roads.

Nagadeepa

The Nagadeepa area has a compact shape and requires trunk roads running in both a horizontal and vertical direction. A tight road network can be achieved by the introduction of many branch roads, thereby connecting isolated areas, consolidating the living environment and stimulating local development.

The Study Team also attended a Project Committee meeting in the Nagadeepa area in order to understand the local requirements. The locations and current conditions of the roads given in the Sri Lankan priority list were then confirmed with the assistance of local inhabitants.

The Nagadeepa area has one trunk road running in a east-west direction and two trunk roads running in a north-south direction and these roads were given high priority to secure efficient and safe public transport services. Semitrunk roads connecting with trunk roads and playing an important role in the transportation of agricultural products, as well as local inhabitants, were also given high priority to achieve an efficient road network throughout the entire Nagadeepa area.

Table 4-3-2 gives the priority rank of those roads subject to the planned rehabilitation. The total length of roads schedule for rehabilitation is described in (3) below.

(3) Outline of Rehabilitation plan

The length of the roads scheduled for rehabilitation to be executed with Japanese grant aid is as follows:

	Minipe	Nagadeepa
Pavement Roads	23.0km	34.5km
Improvement (Paving) of Roads	(20.4km)	(15.0km)
Rehabilitation of Paved Roads	(2.6km)	(19.5km)
Rehabilitation of Gravelled Roads	20.9km	10.1km
Total	43.9km	44.6km

Details of the plan are given in Table 4-3-3 and Figure 4-3-2.

Road rehabilitation type

Road rehabilitation types in the Project area are following four types.

Type I : Construction of asphalt pavement on existing gravel road.

Type II : Repairing of broken surface course or subbase course of existing paved roads by overlay method.

Type III: Filling up pot holes of existing paved roads with asphalt mixture, and covering with sealcoat over the relevant section.

Type IV : Repairing deteriorated existing gravel road with appropriate materials.

Above mentioned road rehabilitation types are shown in Fig. 5-3-5 in Section 5.

Table 4-3-2(a)

Road Rehabilitation Priority List and Subject Routes for Rehabilitation

(MINIPE)

Rank	Route	Route No.	Length (km)
1.	Hettipola - Handungamuwa	(1)	7.0
2.	Lediyangala - Kubukandana (Part)	(5)	5.7
3.	Radunna Tank - Karawgaha (Part)	(6)	5.3
4.	Devagiriya - Kanaththa	(24)	2.4
5.	Madekanda Road	(27)	3.6
6.	Maraka Road	(29)	5.2
7.	Polonnaruwa Road	(2)	6.9
8.	Mahwatenna Road	(30)	4.4
9.	Gruwelayaya Cemetery to Mahaweli River	(3)	1.9
10.	Tungiriya - Madekanda Road	(28)	1.5
11.	D 1 to Ulpothagama	(7)	5.2
12.	D 1 to Mahaasmedduma	(8)	1.9
13.	Udawela-Co-op - Habutuwa	(11)	4.5
14.	Pundalugasyaya Road	(17)	1.2
15.	Keenapessa to D 4	(9)	0.7
16.	D 7 to Mahayaya	(10)	1.3
17.	Amuneyaya Road	(4)	1.4
18.	Udawela Co-op to end of colony	(12)	2.4
19.	Weware Road	(15)	2.0
20.	Kolongada-Hospital	(23)	0.8
21.	Palugalla Road	(16)	2.4
22.	Meegalla Road	(18)	1.2
23.	Wileyaya Road	(19)	2.3
24.	Muthettuthena to Main Canal	(20)	3.7
25.	D 34 - Weragantota	(21)	1.5
26.	Radunna Road	(25)	1.8
	Total length		78.2 km

Subject Routes for Rehabilitation

The top 10 routes will be subject to rehabilitation by Japanese grant aid cooperation

Table 4-3-2(b)

Road Rehabilitation Priority List and Subject Routes for Rehabilitation

(NAGADEEPA)

Rank	Route	Route No.	Length (km)
1.	Mapakada-Kongaha Junction-Tissapura-Keselpotha-50th Mile Post	(1)	16.5
2.	Andaulpotha - Tissapura	(2)	5.9
3.	Kongaha Junction-Gemunupura Senevipura-Orubeduwewa (49th Mile Post)	(3)	8.6
4.	Kongaha Junction-16th Mile Post (Mapakada)	(4)	1.5
5.	Keselpotha to Arawatta (Part)	(5)	1.9
6.	Abayapura to 20th Mile Post (Mapakada)	(6)	4.3
7.	Orubeduwewa temple to Diyetana Oya	(7)	1.2
8.	Tissapura Dispensary to Rotawewa	(8)	1.8
9.	Keselpotha - Main Canal	(10)	0.4
10.	Hospital - Tract 10	(11)	0.5
11.	Tract 2/Lot 59-Tract 3/Lot 01 (Via Kumbukottawela)	(13)	2.0
12.	Tract 2/Lot 36-Tract 2/Lot 40	(14)	0.5
13.	Tract 1/44 - Tract 1/57	(32)	0.7
14.	Tract 5/0 - Lot 6/74	(15)	1.4
15.	Tract 5 - Lot 5/23	(16)	1.0
16.	Peradeniya Stores to Kolong 1a (47 1/2 mile post)	(17)	0.8
17.	Lot 5/105 to Lot 5/144	(19)	1.2
18.	Lot 6/91 to Lot 6/84	(20)	0.3
19.	Senevigama (Bogaha Junction) Tract/158	(22)	0.6
20.	16 Boutique - Arawatta (near Laundry)	(25)	0.6
21.	Gemunupura School - Gemunupura temple	(28)	0.6
22.	Tract 5/Lot 37 - Abhayapura School	(26)	1.4
23.	Abhayapura School - Tract 4/D1	(27)	0.4
24.	Tract 4/Lot 8 - Tract 4/D1	(29)	0.8
25.	Lot 6/223 - Mongaha Junction	(23)	0.4
26.	Lot 5/155 to Lot 5/175	(21)	1.0
27.	Tract 2/56 - Tract 2/46	(30)	0.6
28.	Tract 2/04 - Tract 2/08	(31)	0.6
29.	Tract 1/19 - Tract 1/17	(33)	0.4
30.	Tract 3/142 - Tract 3/109	(34)	0.5
31.	Tract 3/139 - Tract 3/127	(35)	0.7

32.	Keselpotha - Ikiriyagoda	(9)	2.6
33.	Badulle (15th mile post) Road - Tract 3/FC 18	(12)	1.6
34.	Husssin Stores to Puwakgaswela	(18)	1.2
35.	Lot 8/17 to Arawatta Vidyalaya	(24)	1.4
		Total Length	65.9 km

Subject Routes for Rehabilitation

The top 11 routes will be subject to rehabilitation by Japanese grant aid cooperation

Table 4-3-3a Subject Routes for Rehabilitation (by Types): MINIPE

Rank	Route	Route No.	Length of Roads Scheduled for Rehabilitation (km)				
			Type I	Type II	TypeIII	TypeIV	Type V
1.	Hettipola - Handungamuwa	(1)	7.0	-	-	-	7.0
2.	Lediyangala - Kubukandana (Part)	(5)	2.7	-	-	3.0	5.7
3.	Radunna Tank - Karawgaha (Part)	(6)	2.5	-	-	2,8	5.3
4.	Devagiriya - Kanaththa	(24)	0.8	-	1.6	-	2.4
5.	Madekanda Road	(27)	2.7	-	-	0.9	3.6
6.	Maraka Road	(29)	4.2	-	1.0	-	5.2
7.	Polonnaruwa Road	(2)	0.5	-	-	6.4	6.9
8.	Mahwatenna Road	(30)	-	-	-	4.4	4.4
9.	Gruwelayaya Cemetry to Mahaweli River	(3)	-	-	-	1.9	1.9
10.	Tungiriya - Madekanda Road	(28)	-	-	-	1.5	1.5
			20.4		2.6	20.9	43.9

Road rehabilitation types in the Project area are following four types.

Type I : Construction of asphalt pavement on existing gravel road.

Type II : Repairing of broken surface course or subbase course of existing paved roads by overlay method.

Type III: Filling up pot holes of existing paved road with asphalt mixture, and covering with sealcoat over the relevant section.

Type IV : Repairing deteriorated existing gravel road with appropriate materials.

Table 4-3-3b Subject Routes for Rehabilitation (by Types): NAGADEEPA

Rank	Route	Route No.	Length of Roads Scheduled for Rehabilitation (km)				
			Type I	Type II	TypeIII	TypeIV	Type V
1.	Mapakada-Kongaha Junction-Tissapura-Keselpotha-50th Mile Post	(1)	4.7	3.9	7.9	-	16.5
2.	Andaulpotha - Tissapura	(2)	3.3	0.9	1.7	-	5.9
3.	Kongaha Junction-Gemunupura Senevipura-Orubeduwewa (49th Mile Post)	(3)	8.6				
4.	Kongaha Junction-16th Mile Post (Mapakada)	(4)	1.5	-	-	-	1.5
5.	Keselpotha to Arawatta (Part)	(5)	0.3	-	-	1.6	1.9
6.	Abayapura to 20th Mile Post (Mapakada)	(6)	-	-	1.7	2.6	4.3
7.	Orubeduwewa temple to Diyetana Oya	(7)	-	-	-	1.2	1.2
8.	Tissapura Dispensary to Rotawewa	(8)	-	-	-	1.8	1.8
9.	Keselpotha - Main Canal	(10)	-	-	-	0.4	0.4
10.	Hospital - Tract 10	(11)	-	-	-	0.5	0.5
11.	Tract 2/Lot 59-Tract 3/Lot 01 (Via Kumbukottawela)	(13)	-	-	-	2.0	2.0
			1.5	5.4	14.1	10.1	44.6

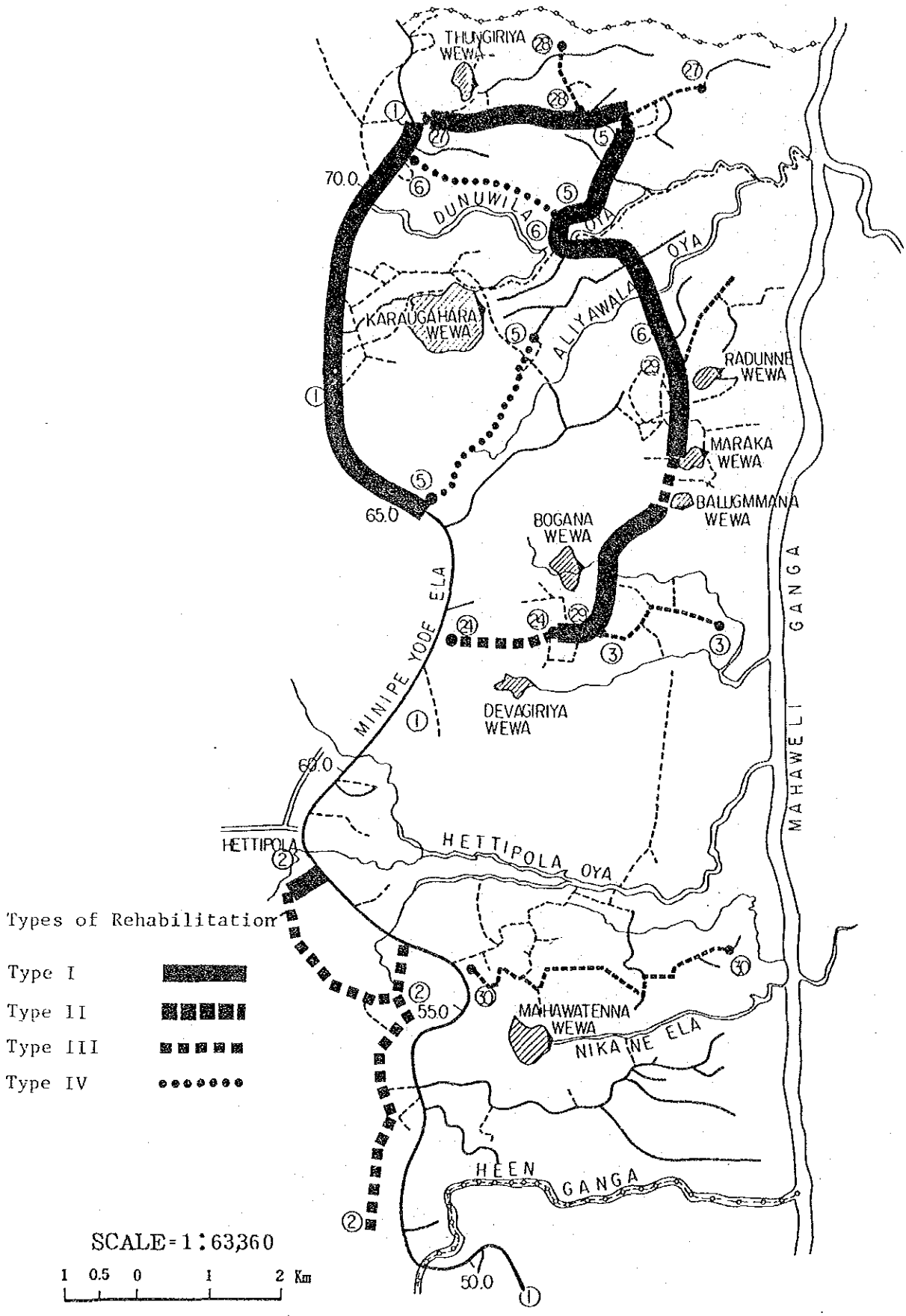


Fig. 4-3-2a Proposed Road for Rehabilitation

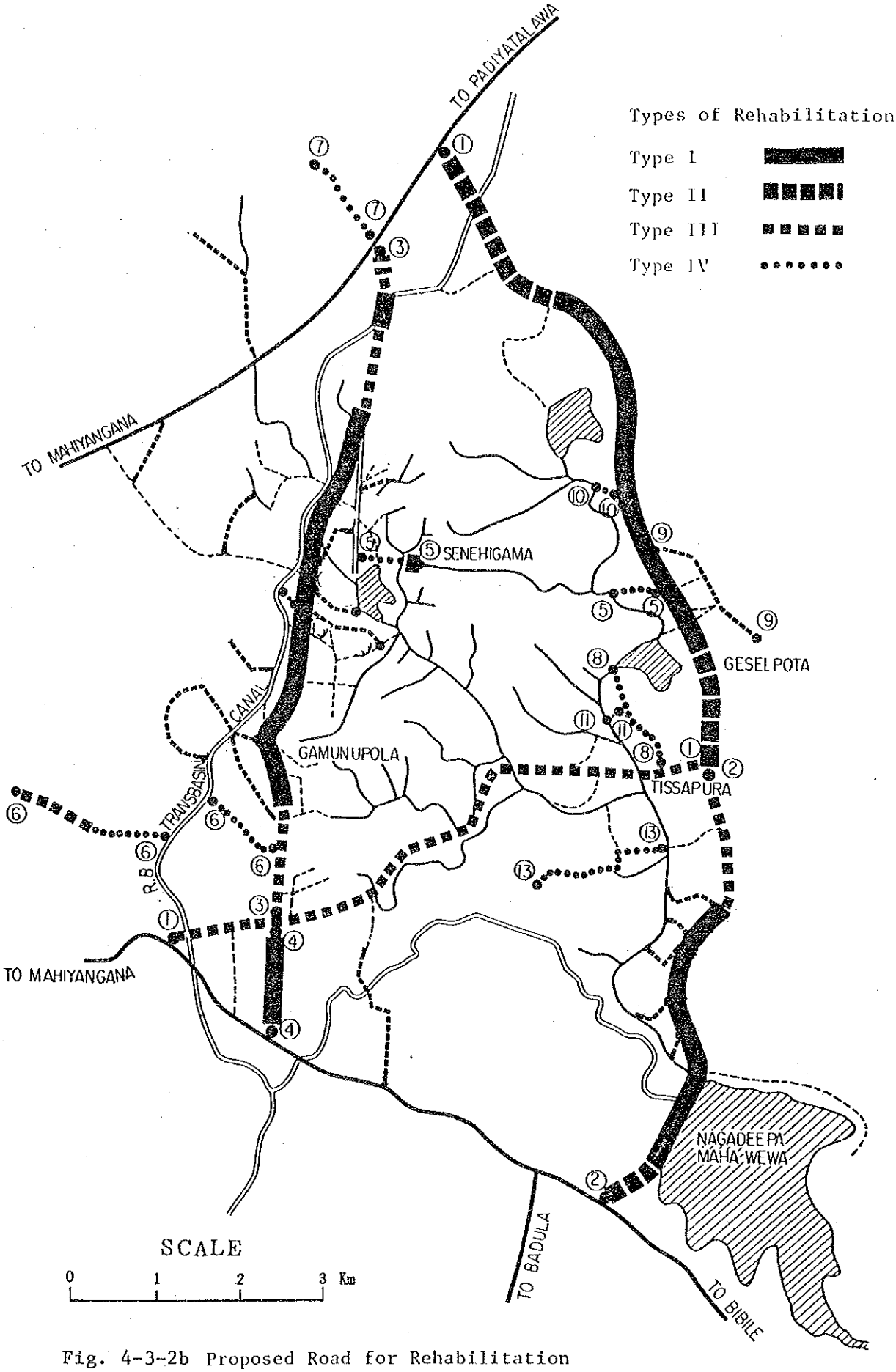


Fig. 4-3-2b Proposed Road for Rehabilitation

CHAPTER 5

BASIC DESIGN

CHAPTER 5 BASIC DESIGN

5-1 Design Policy

5-1-1 Basic Well Design Policy

(1) Number of new wells

The required number of new wells for each area will be decided on the basis of the design population for the project completion year (1995) and the basic water supply unit adopted for the Project to make up for the estimated water supply shortage of existing wells in 1995. Communally used private wells will be included in the number of existing wells. However, private wells for individual use will be excluded in view of the fact that they tend to dry up in the dry season.

(2) Deep tube wells

The deep tube wells with a hand pump to be constructed will be of a similar type to those popularly used in Sri Lanka. Each well will be provided with an apron and a drain.

(3) Shallow wells

The shallow wells will be dug wells which are popular in Sri Lanka. Hand pumps will not be provided in respect of local opinion and, therefore, the wells will be open wells. A parapet, apron and drain will be provided for each well.

(4) Rehabilitation of shallow wells

- Type A -

Those dug wells without lining or with deteriorated lining conditions will be rehabilitated to the same standard as a new shallow well. In addition, the well depth will be increased to obtain an adequate yield in the dry season.

- Type B -

With regard to those shallow wells with relatively good lining conditions but with broken or incomplete ground structures, the ground structures will be either newly constructed or repaired. The surface area surrounding the well will be sealed with clay to improve water quality and the well depth will be increased as in the case of Type A wells.

5-1-2 Basic Road Design Policy

In principle, the design will follow the existing design criteria in Sri Lanka and the longitudinal and horizontal road alignments will not be changed.

5-2 Design Criteria

5-2-1 Wells

The design criteria for wells are as follows.

Target year	:	1995
Types and purposes	:	deep tube wells - drinking water shallow wells - domestic water for other than drinking purposes
Design basic water supply unit	:	45ℓ/day
Service population	:	20 households/shallow well
Service area	:	max. water carrying distance of 400m
Drawing method	:	deep wells - hand pump shallow wells - bucket
Pumping hours	:	2 hours/day
Design strokes	:	35 strokes/min.

5-2-2 Road Rehabilitation

The design criteria for road rehabilitation are as follows.

	Class I Roads	Class II Roads
Carriage width	12'(3.6m)	10'(3.0m)
Shoulder width	2'(0.6m)	2'(0.6m)
Road width	16'	12'
Right of way	33'	20'

In addition, the following guidelines and specifications enforced by the Road Development Agency will be referred to.

- Road Design and Road Construction Work Guidelines
- Standard Cross-Section (Class I Roads)
- Class I Road Specifications for Settlement Areas

5-3 Basic Design

5-3-1 Rural Water Supply Facilities

(1) Number of new wells

The required number of new wells was decided based on the following design criteria. The resulting number of new wells for each area is given in Table 4-3-1, and their distribution by GS divisions is shown in Table A3-5-1 and Figure 4-3-2.

1) Deep Wells

Daily yield/well

Yield/stroke	:	0.45ℓ/stroke
Design strokes	:	35 strokes/min
Yield/minute	:	15.7ℓ/min
Pumping hours	:	2 hours/day
Daily yield	:	1.89m^3/day
Supply volume (drinking water)	:	5ℓ/person/day

Required number of deep wells = (Population x 5ℓ/day) ÷ 1,890ℓ/day

Required number of new deep wells = Required number of deep wells - Number of existing deep wells

2) Shallow wells

Service population/well	:	120 (20 households x 6)
Supply volume (domestic water)	:	40ℓ/day
Daily yield	:	$4.8m^3$/day
Yield/minute	:	20ℓ/min (minimum)

Required number of new shallow wells = (Population ÷ 120) - (Number of existing shallow wells)

* Number of existing shallow wells = (Number of existing communal wells + number of communally used private wells)

(2) Number of wells to be rehabilitated

In accordance with the well survey results and the basic design policy, the wells to be rehabilitated were selected from among the communal shallow wells and communally used private shallow wells and were classified into A and B groups (Table 4-3-1 and Figure 3-5-1).

(3) Deep well design

Deep tube wells will be drilled with a diameter of 172mm (6 3/4") at the upper part (i.e., surface soil and strongly weathered rock layers), and 114mm (4 1/2") at the hard rock layer. These are reasonable figures in view of the performance of those wells constructed in Sri Lanka in the past and also in the light of the pumping capacity of the planned hand pump. Since hard bedrock exists below the soil and strongly weathered rock layers in the Project Area, the drilling machine to be used should be capable of both the rotary and impact (air-hammer) drilling methods to deal with both soft and hard rock layers. The well construction companies and public agencies referred to in 3.8 possess this type of drilling machine.

The deep well structure will be protected by casing pipes (ϕ150mm) with a lower end sealed by cement mortar for the upper layers and a simply drilled hole for the hard layer. The pump to be used will be the push-up type and the pumping pipe should be long enough to secure a sufficiently submerged section. Although the actual pumping pipe length will be decided for individual pumps based on the pumping test results, a length of 15m has been tentatively decided assuming a minimum still water level of GL -8m, a maximum water level drop of 6m, and a submerged pipe length of 1m. An apron made of concrete and a drain will be provided at the surface for each well.

In view of current well problems caused by rusted pump materials, the pumps, pumping pipes (risers), casing pipes, etc., for the new wells will be corrosion-resistant. The depth of each well was decided based on the electric prospecting results, topography of the target sites, and data on existing wells. Figure 5-3-1 shows the standard deep well structure with a depth of 30 - 50m and a casing pipe length of 10m. The planned depth for each well is given in Table A5-3-1.

In the eastern part of the Nagadeepa area, however, the electric prospecting results suggest the existence of unweathered rocks at a relatively shallow depth and, therefore, the construction of deep wells in this area may prove more difficult than in other areas. While the basic design anticipates the construction of deep wells (40 - 50m in depth), a thorough hydrogeological survey, including test drilling, should be conducted at the detailed design stage to avoid the construction of empty wells or wells with an insufficient yield.

(4) Shallow well design

Shallow wells will be manually excavated open dug wells without a hand pump. The hole diameter will be 2m and 1.5m diameter concrete pipes will be placed for the entire well depth. The space between the hole wall and the exterior of the concrete pipes will

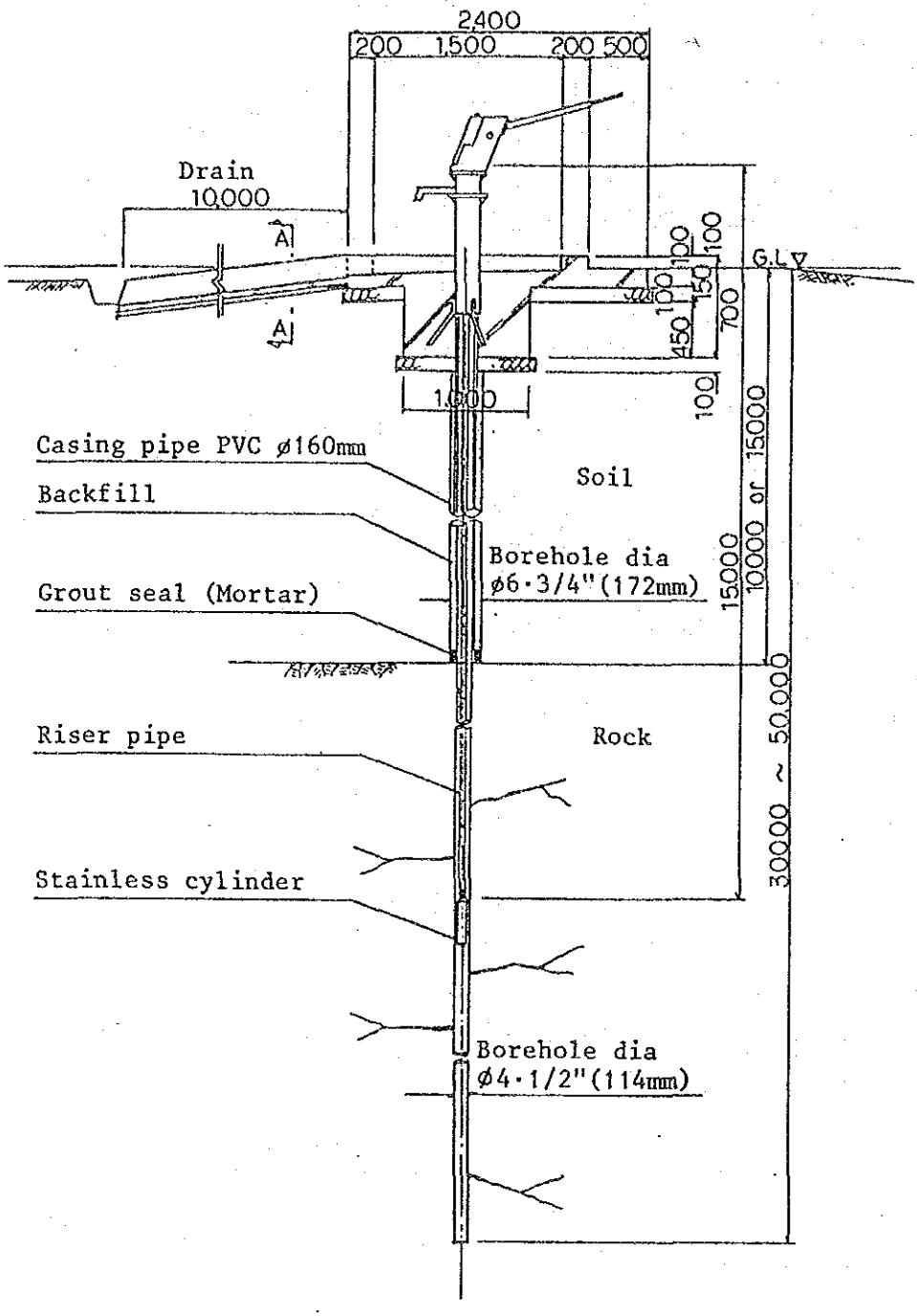


Fig. 5-3-1 New Deep Tube Well

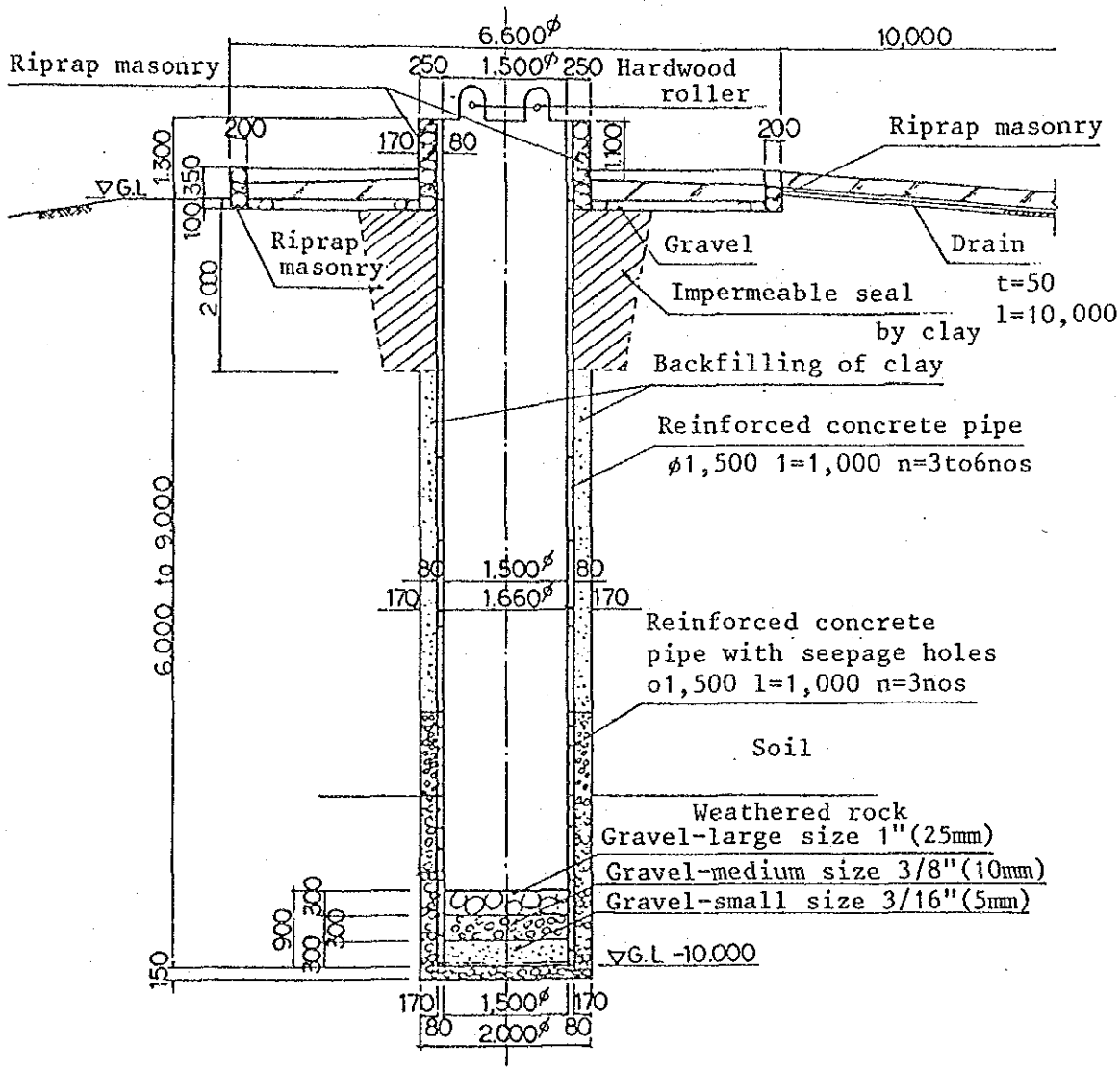


Fig. 5-3-2 New Shallow Well

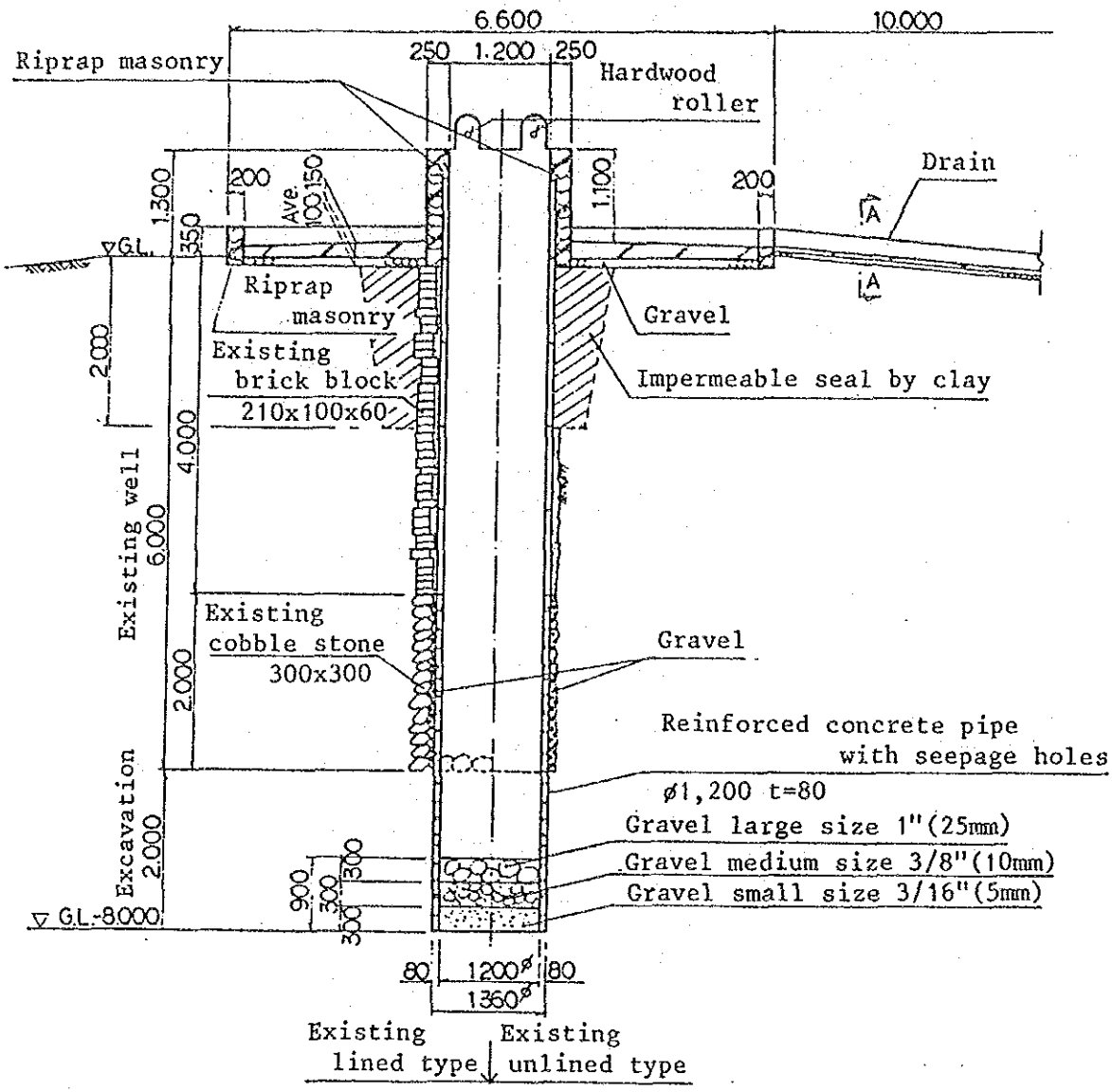


Fig. 5-3-3 Improvement of Existing Well(Type A)

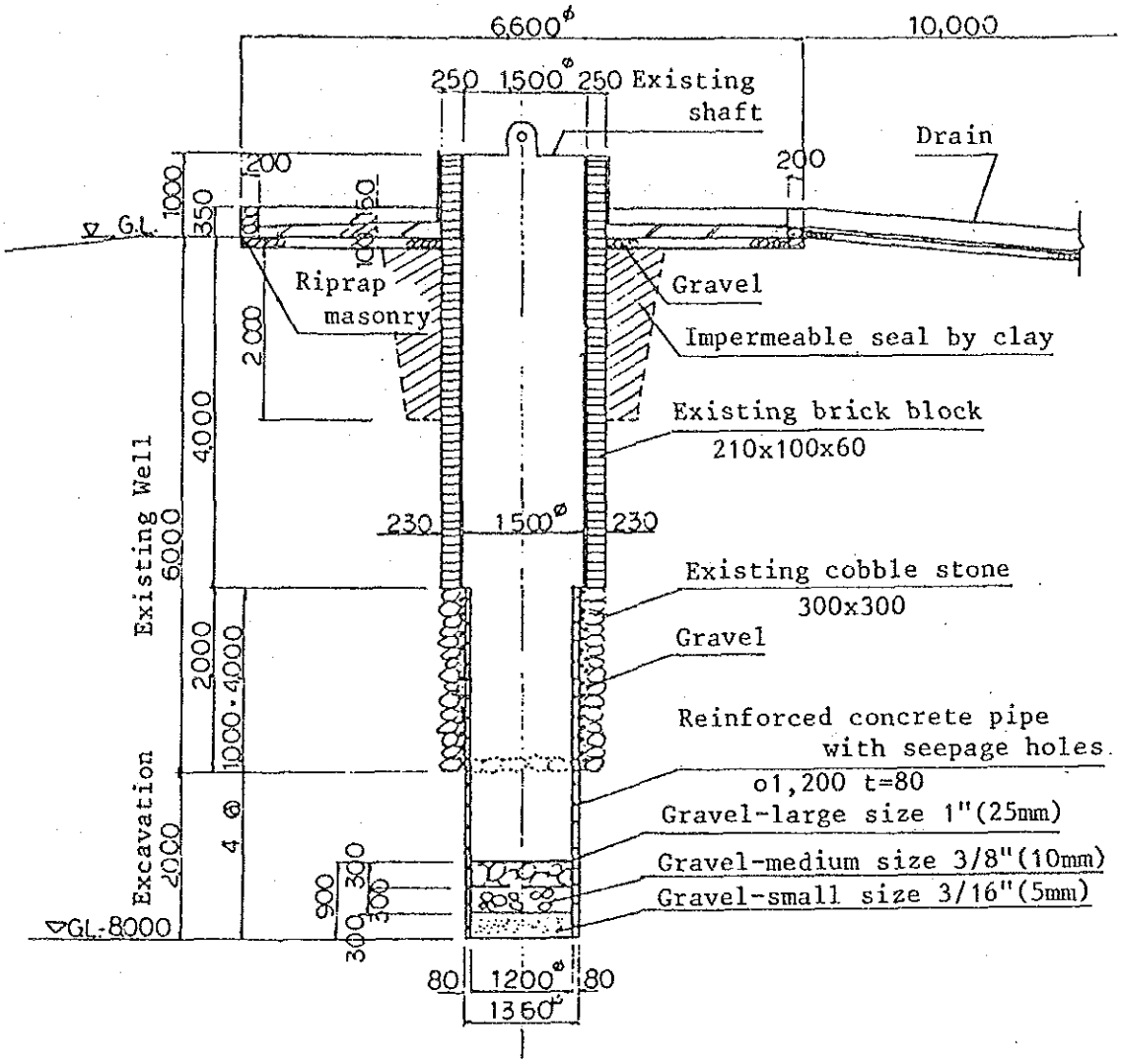


Fig. 5-3-4 Improvement of Existing Well(Type B)

be filled with filter gravel at the bottom and sealing clay at the top with ordinary soil between them. A parapet, apron and drain will be provided at the surface for each well.

The depth of each well wa decided based on the electric prospecting results and data on existing wells. Although the depth varies (Table A5-3-1.), a standard depth of 8.0m has been decided. Figure 5-3-2 shows the standard shallow well structure.

(5) Type A shallow wells for rehabilitation

Dug wells or lined wells with deteriorated or incomplete linings will be rehabilitated by placing concrete pipes (diameter of 1.5m or 1.2m depending on the size of the well) using the same method adopted for the construction of new shallow wells. The well depth may be increased by 1 - 2m if necessary. The area surrounding the well will be excavated to 3m and refilled with clay to prevent the infiltration of dirty surface water. The standard structure is shown in Figure 5-3-3.

(6) Type B shallow wells for rehabilitation

In case of shallow wells with relatively good lining conditions or with partially broken or incomplete ground structure, the ground perimeter of the well will be sealed with clay or the ground structures will be reconstructed. If necessary, the well depth may be increased by 1 - 2m and concrete pipes placed for the bottom part of the well and the extended section (Figure 5-3-4).

5-3-2 Road Rehabilitation Design

The road rehabilitation design is in line with the basic policy and takes the following rehabilitation objectives into consideration.

(1) Paving of unpaved bus routes.
(2) Repaving and shoulder repair of heavily deteriorated sections.
(3) Repair of pot holes and seal coating of slightly damaged sections.

(4) Clearing of right of way; excavation for and construction of side ditch; repair and/or reconstruction of drainage facilities (culverts, etc.) crossing roads; paving of steep slope carriage way and improvement of shoulders for gravelled roads.

(5) Preservation of current longitudinal and horizontal alignments.

(6) Paving

A road paving improvement plan was proposed based on the technical examination of the current road structure. This plan has been adopted with the approval of the RDA and the rehabilitated road structure corresponding to the current road conditions is shown in Figure 5-3-5.

(7) Standard cross-section

The standard cross-section of tarred and gravelled roads are shown in Figure 5-3-6.

(8) The selection of roads to be rehabilitated (Table 4-3-3) was based on the basic policy described in 4-3-4 (1).

(9) The following drawings for road rehabilitation work are given in the Appendix.

A : general drawings for road rehabilitation

B : related structural drawings

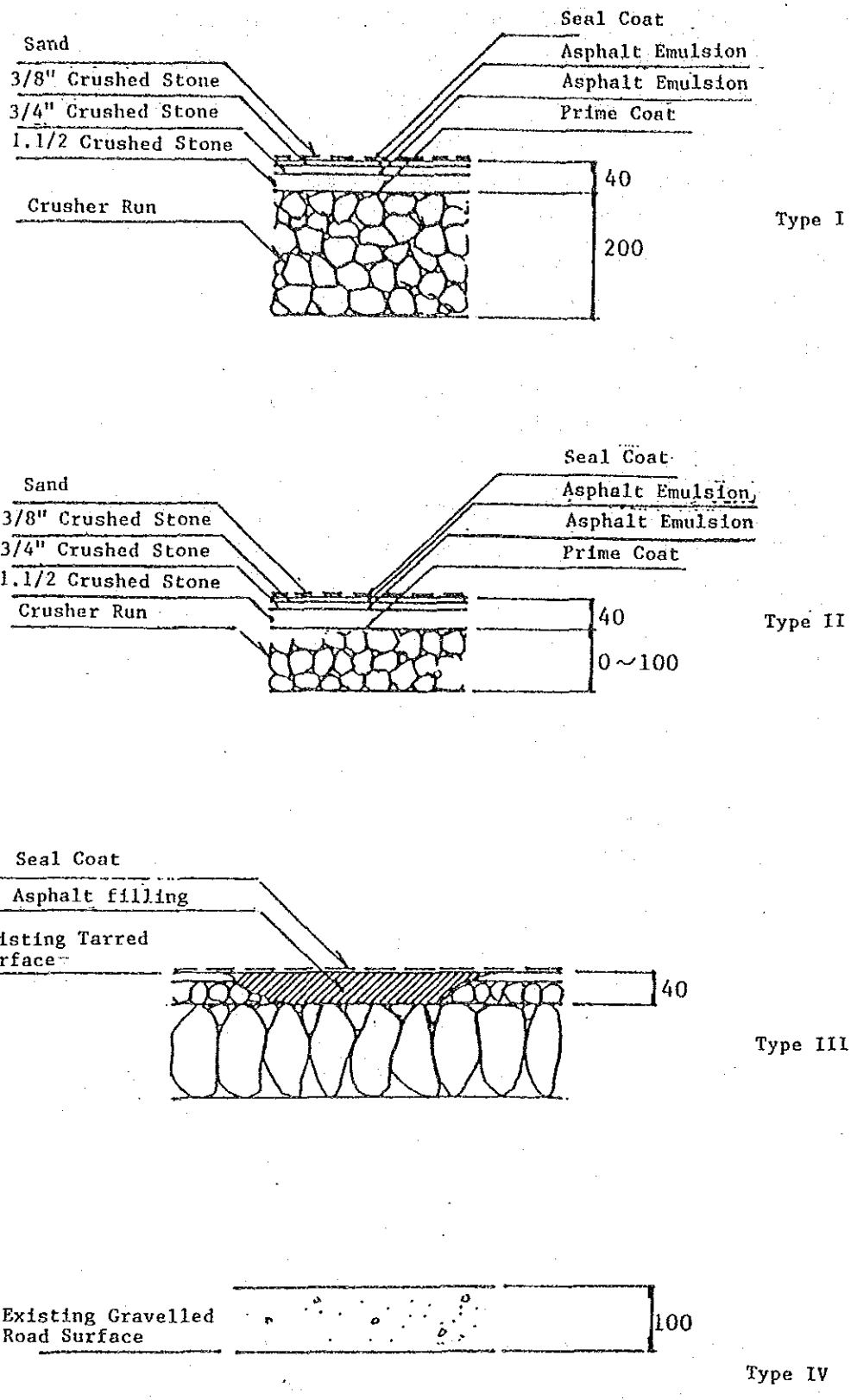
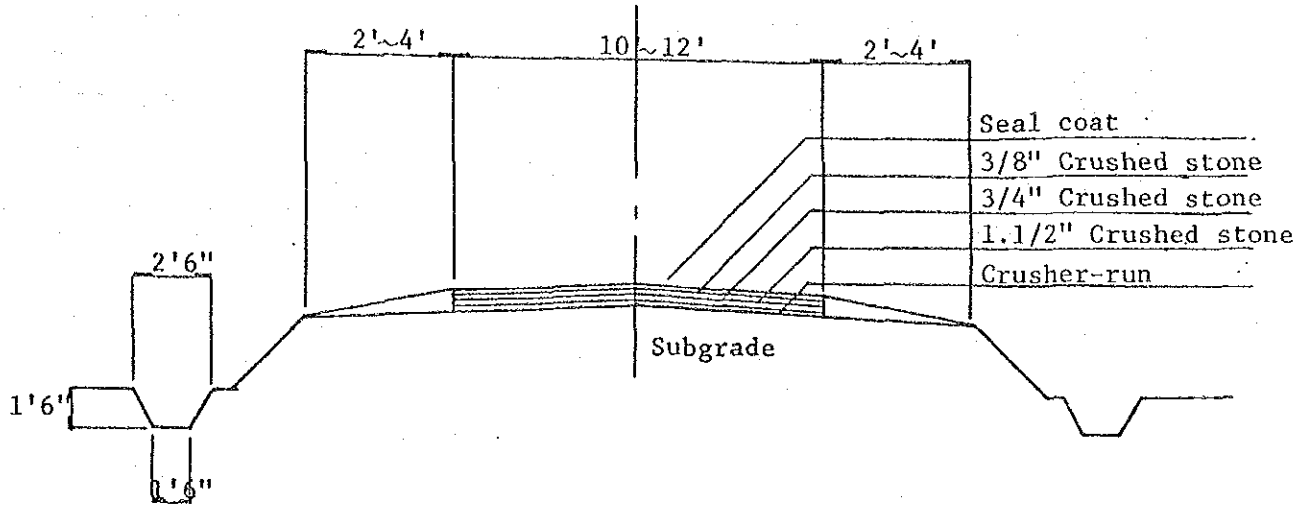


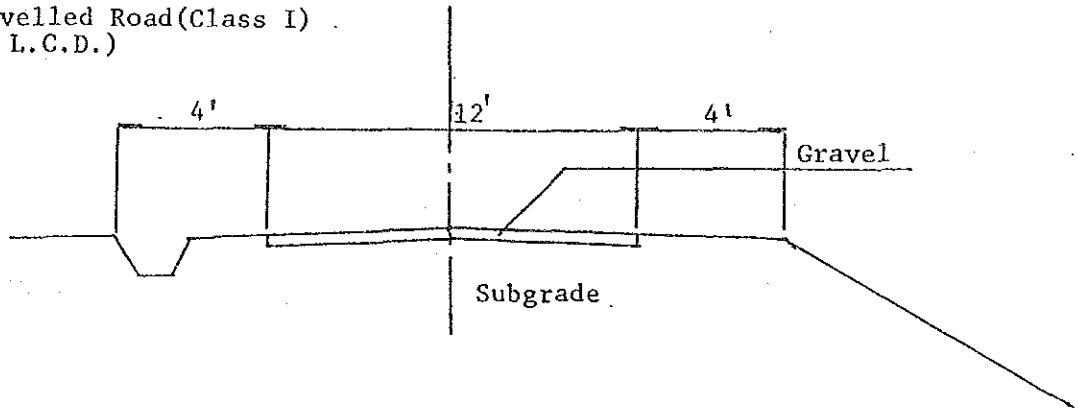
Figure 5-3-5 Paving Types

Fig. 5-3-6 Typical Cross-section

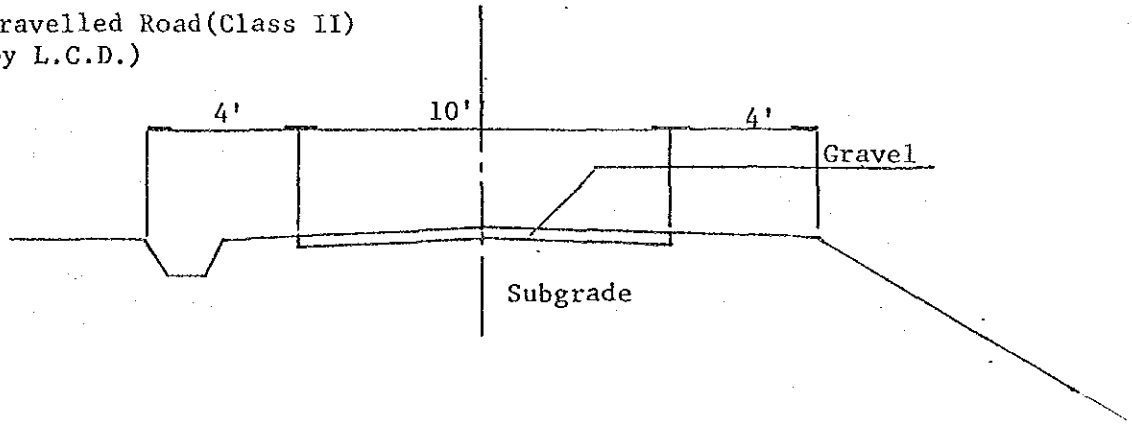
Paved Road

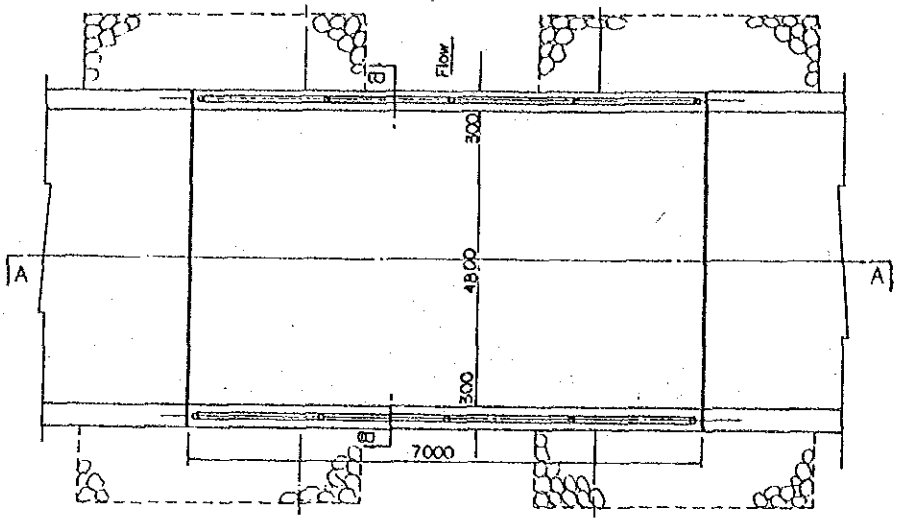


Gravelled Road(Class I)
(by L.C.D.)



Gravelled Road(Class II)
(by L.C.D.)





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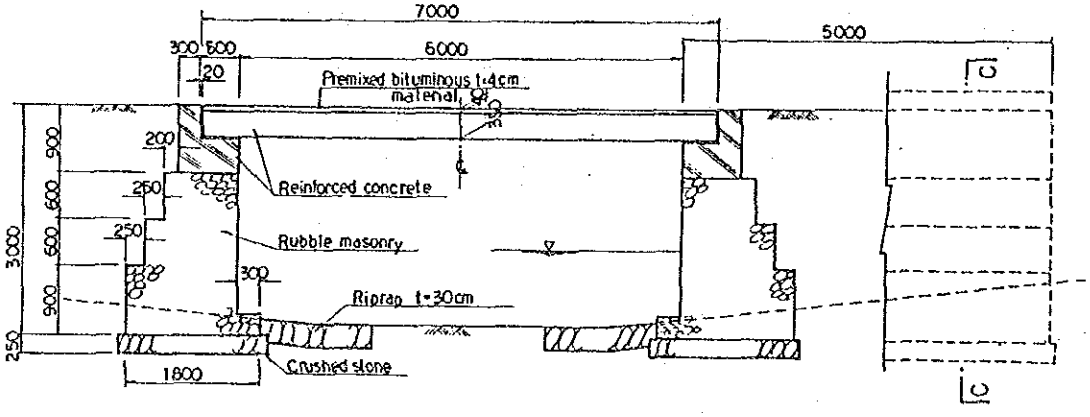
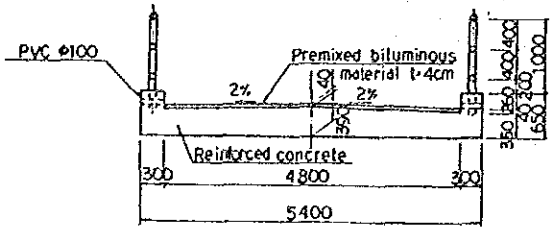
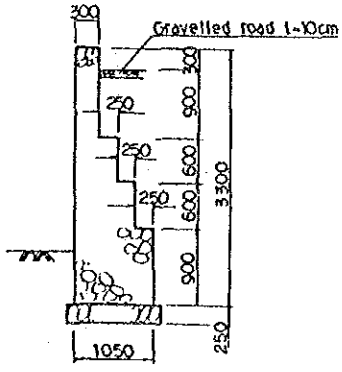


A-A SECTION

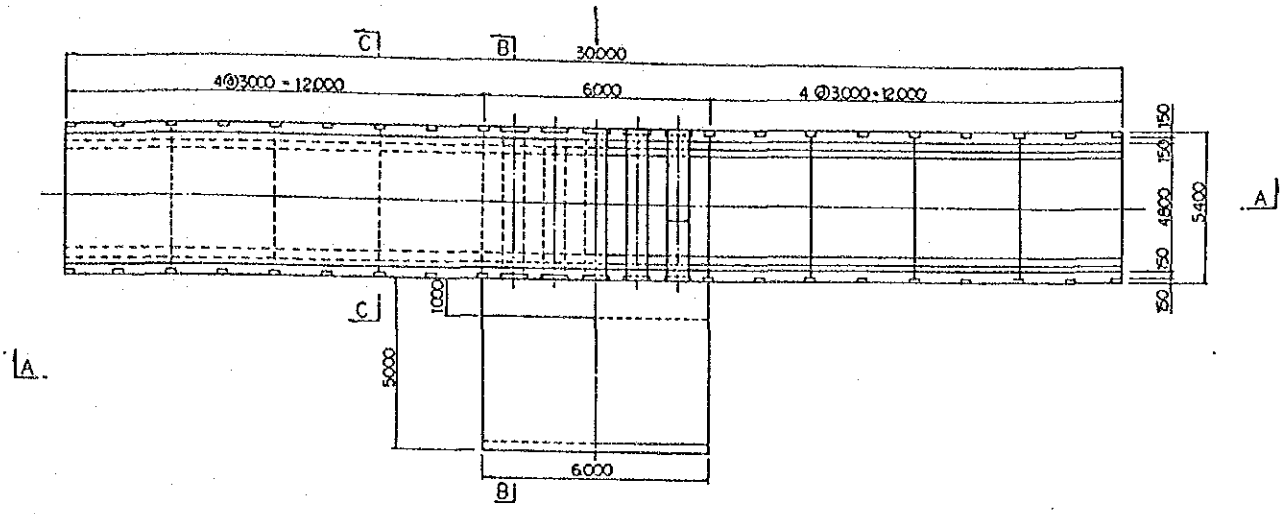


B-B SECTION

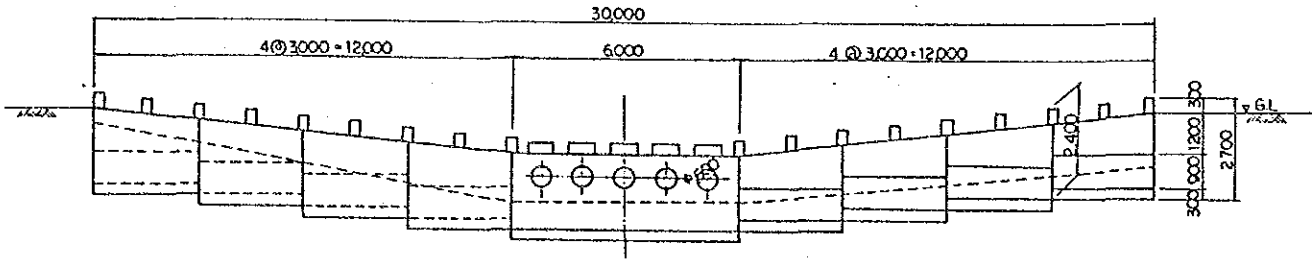


C-C SECTION

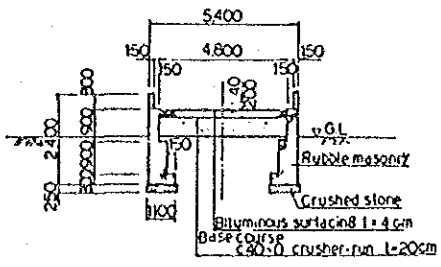
Fig. 5-3-7 Bridge



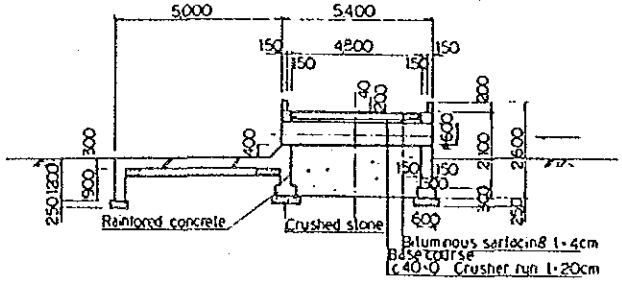
PLAN



A-A SECTION



C-C SECTION



B-B SECTION

Fig. 5-3-8 Causeway

5-3-3 Rehabilitation Work

Rehabilitation works of the relevant Rural Development Project by Japanese Grant Aid are as follows.

(1) Fural water supply plan

	Minipe	Nagadeepa	Total
- Construction of deep wells	115 wells	44 wells	159 wells
- Construction of shallow wells	174 wells	53 wells	227 wells
- Rehabilitation of shallow wells (Type A)	146 wells	27 wells	173 wells
- Rehabilitation of shallow wells (Type B)	128 wells	40 wells	168 wells
(Total of shallow wells)	448 wells	120 wells	568 wells

(2) Rural road rehabilitation plan

- Pavement roads (Type I)	20.4 km	15.0 km	35.4 km
- Improvement (paving) of roads (Type II)	-	5.4 km	5.4 km
- Rehabilitation (paving) of roads (Type II)	2.6 km	14.1 km	16.7 km
- Rehabilitation of gravel roads	20.9 km	10.1 km	31.0 km
	43.9 km	44.6 km	88.5 km

CHAPTER 6

PROJECT IMPLEMENTATION PLAN

CHAPTER 6 PROJECT IMPLEMENTATION PLAN

The following implementation plan is recommended in the event of the Project's implementation with grant aid from the Government of Japan.

6-1 Project Implementation

(1) Project implementation organization

The Project will be implemented by the Irrigation Department under the supervision of and in coordination with the Ministry of Lands and Land Development (MLLD).

The Irrigation Department will commission a Japanese consultant, selected pursuant to the Japanese grant aid system to prepare the detailed design. Based on the detailed design, the Irrigation Department will then select a contractor through tenders with the assistance of the consultant as required by the grant aid system and will commission the selected contractor to conduct the construction work under the supervision of the consultant.

On the Sri Lankan side, a Central Coordinating Committee will be set up by the Secretary of the MLLD for the smooth implementation of the Project which consists of various components. This Committee will be chaired by the said Secretary and will consist of representatives of the government agencies and departments related to the Project. The Irrigation Department will also appoint a project director to assume the overall responsibility for project implementation.

As rural water supply and road construction and maintenance are under the jurisdiction of various agencies, the Land Commissioner's Department (LCD), which takes the responsibility of the well construction and the internal road rehabilitation will appoint a Project Manager to coordinate the work at project level. The construction and maintenance of the trunk roads will be

responsibility of the Road Development Authority (RDA) and therefore their assistance for supervision of the construction will be requested for these roads (Figure 6-1-1).

The MLLD is currently undergoing an organizational change to correspond to the organization of the Provincial Councils (in each of the 9 provinces) which were introduced following the organizational reform of local administration. However, it appears that this ongoing change will not affect the organizational structure for project implementation.

(2) Consultant

A Japanese consultant, selected pursuant to the Japanese grant aid system, will be responsible for the detailed design and the supervision of the construction work to be conducted with Japanese grant aid under an agreement with the Irrigation Department. The main components of the consulting work are as follows.

a. detailed design
b. preparation of tender documents, including technical specifications, for construction work
c. agent for tender procedure and analysis/evaluation of bidders
d. provision of advice at the time of contract negotiations with successful bidder
e. supervision of construction work
   - Feeder roads and wells concurrence of the LCD Project Engineer
   - Trunk roads concurrence of the RDA Project Engineer

(3) Contractor

The construction work will be conducted by a Japanese contractor, selected pursuant to the Japanese grant aid system, under an agreement with the Irrigation Department. The contractor will conduct the assigned construction work under the supervision of the consultant.

The Sri Lankan side will conduct the tender procedure using the consultant as its agent as described in (2) above and, following negotiations, will conclude the contract with the successful bidder (contractor). The contract will be a turnkey contract whereby the same contractor is responsible for the commencement and completion of the work and the completion of the work specified in the contract within the specified schedule.

In regard to the actual implementation of the construction work, part of the work will be subcontracted by the contractor to Sri Lankan contractors, public agencies and/or organizations.

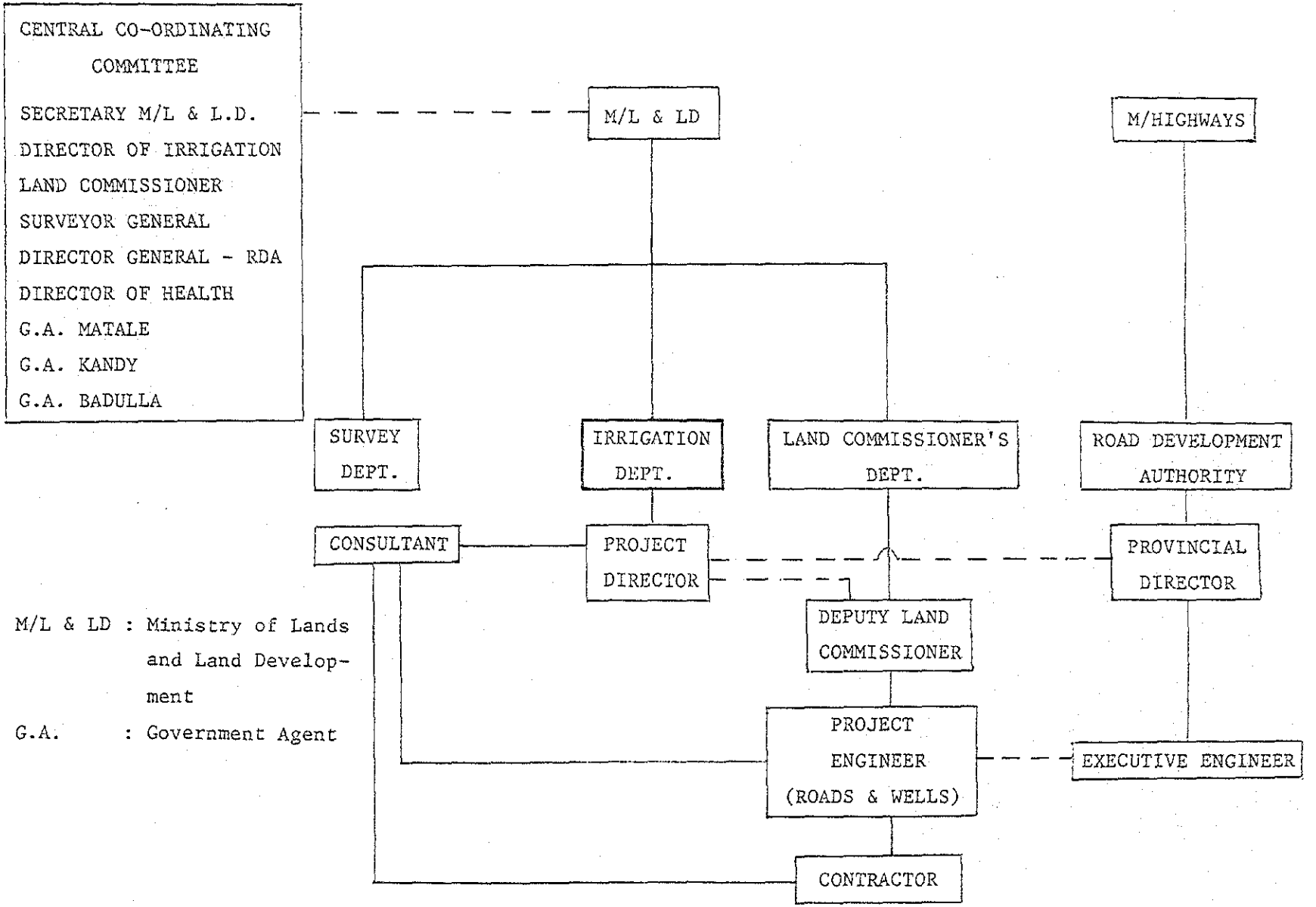


Fig. 6-6-1 Organization Chart of the Project Implementation

6-2 Division of Project-Related Work

An appropriate division of the Project-related work to be undertaken by the Japanese and Sri Lankan sides is as follows.

(1) Work to be undertaken by Japanese side

1) Implementation of the following work

Type	Minipe	Nagadeepa
Construction of Deep Wells	115 wells	44 wells
Construction of Shallow Wells	174 wells	53 wells
Rehabilitation of Shallow Wells	274 wells	67 wells
Rehabilitation of Paved Roads	23.0 km	34.5 km
Rehabilitation of Gravelled Roads	20.9 km	10.1 km

2) Consulting work for above (detailed design and supervision of construction work).

(2) Work to be undertaken by Sri Lankan side

The following work to be undertaken by the Sri Lankan side has been agreed upon with the Study Team and is confirmed in the Minutes of Discussions (Appendix 1-4).

1) Acquire the land or right of way required for project implementation.

2) Ensure the land or right of way required for the construction of temporary access roads from existing rural roads to the proposed tube well sites and roads.

3) Allow the transportation of vehicles, machine rigs and construction equipment on existing national roads and rural roads.

4) Exempt from import duties and incidental expenses and take the necessary measures for the customs clearance of all materials, equipment and spare parts brought into Sri Lanka for the implementation of the Project. These exemptions shall be subject to the existing Sri Lankan rules and regulations which

are applicable for similar grant aid programs.

5) Assume commissions of the Japanese foreign exchange bank for banking services based on the following banking arrangements.

   ① advice commissions of authorization to pay
   ② payment commission

6) Accord Japanese nationals whose services may be required in connection with the supply of products and services under verified contracts such facilities as may be necessary for their entry into and stay in Sri Lanka for their work.

7) Exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Sri Lanka with respect to the supply of products and services under verified contracts.

8) Bear all expenses, other than those to be borne by the grant aid, necessary for the construction of the facilities, as well as for transportation.

9) Provide facilities for the distribution of electricity, water supply, drainage, telephone lines and other incidental facilities to the Project site as required for the satisfactory operation and maintenance of the Project.

10) Fully maintain the wells and roads which are constructed and rehabilitated under the Project.

6-3 Implementation Plan

6-3-1 Two-Stage Implementation Plan

The construction work to be implemented by the Japanese side for the Project will take approx. two years and accordingly, the construction period will be divided into two years (two stages) pursuant to the Japanese grant aid system. In view of this system, the time of implementation, work volume, weather conditions and administrative division of the Project Area, it should prove appropriate for the construction stages to correspond to the administrative areas, i.e., the Minipe area and the Nagadeepa area. Therefore, the construction work for the Nagadeepa area will be conducted in the first stage in view of the smaller construction work volume involved and the construction work for the Minipe area will be conducted in the second stage. The resulting work volume for each stage is given in Table 6-3-1. The construction work for these two stages will partly overlap, as described in 6-4 later.

Table 6-3-1 Construction Volumes by Stages

	First Stage Nagadeepa	Second Stage Minipe	Total
Construction of Deep Wells	44 wells	115 wells	159 wells
Construction of Shallow Wells	53 wells	174 wells	227 wells
Rehabilitation of Shallow Wells (A)	27 wells	146 wells	173 wells
Rehabilitation of Shallow Wells (B)	40 wells	128 wells	168 wells
New Paving	15.0 km	20.4 km	35.4 km
Rehabilitation of Tarred Roads	19.5 km	2.6 km	22.1 km
Rehabilitation of Gravelled Roads	10.1 km	20.9 km	31.0 km

6-3-2 Procurement Plan

(1) Contractor

The contractor for the Project will be selected from Japanese construction companies by means of the competitive tender system, including qualifications examination (see 6-1). While the construction will in principle be conducted by this Japanese contractor, it is preferable that local construction companies (sub- contractors) and the local labour force be used as much as possible in view of economics, work contents, work volume and the requirement to vitalize the local economy. As described in 3-8-2, the local construction companies and public agencies are believed to be both qualitatively and quantitatively capable of performing any work assignment for the Project.

(2) Equipment Procurement Plan

In principle, the equipment and materials required for the Project will be procured locally. With regard to equipment and materials which are not locally available, or which are locally available but of poor quality, or whose stable supply in terms of quality and price cannot be expected, procurement in Japan will prove more reliable and efficient in order to ensure completion of the Project within the specified period.

The main equipment and materials to be procured locally and those to be procured in Japan are as follows:

1) Main equipment and materials to be procured locally

Construction equipment

Emulsion engine sprayer, Concrete engine mixer ($0.3m^3$), Flat cargo truck (4 ton and 8 ton), 4WD station wagon (85PS), Diesel generator (50KVA), Asphalt storage tank (3kℓ), Bulldozer (11 ton), Back hoe ($0.7m^3$), Fuel tank (24kℓ) and Boring machine

Construction materials

Cement, Reinforcing bars, Concrete aggregates, Filter gravel for wells, Bricks, Crushed stones, PVC pipes, RCC pipes, Concrete blocks, Timber, Asphalt for road paving, Tar, Asphalt emulsion, Steel materials, dynamite and hand pumps

2) Main equipment and materials to be procured in Japan

Construction equipment

Vibratory roller (2.5 - 2.8 ton), Engine type mower*, Motor grader (3.1m), Macadam roller (8 - 10 ton), Tyre roller (8 - 20 ton), Water boser with sprinkler (5.5 - 6.5kℓ), Bitumen engine sprayer*, Dump truck (4 ton)*, Truck mounted (mobile) crane (5 ton), Vibratory plate compactor (ϕ60 - 100kg), Bulldozer (9 ton)*, Submergible pump (ϕ50mm, 1.5kW), Diesel generator (5KVA)*, Coal pick hammer*, Dozer shovel (1.2m^3), Wheel loader (1.5 - 1.7m^3) and Portable air compressor (2m^3/min)*

while those items marked with an asterisk can be procured locally, they will be procured in Japan as it will be cheaper than renting them locally.

Construction materials

Forms for concrete cylinders for shallow wells.

(3) Points to note for construction work

Sri Lanka's religious and other customs should be properly respected and particular attention paid to the following in the course of the construction work.

1) Local inhabitants should be treated with respect as their cooperation is essential for the success of the Project.

2) Despite the maximum use of the local organization, labour force and construction methods in the course of project implementation, technically highly reliable construction results should be achieved in view of the high expectations of the Sri Lankan

side vis-a-vis Japanese technologies associated with Japanese grant aid.

3) The capability of private companies and public agencies should be carefully examined prior to subcontracting the boring work.

4) Particular attention should be paid to the above three points in the course of work control in view of the fact that the crucial points for work control are the production of crushed stones for road work, the provision of drilling machines for deep wells and the production of concrete cylinders for shallow wells.

5) Preparation work in the wet season should be efficiently organized to ensure the efficient use of the limited construction period in the dry season.

6) The water levels and yields of the target wells should be checked during the period when the water intake from canals is suspended in the dry season.

7) Due consideration should be given to not disturbing the normal traffic in the course of the road work.

8) The sites for new deep wells must be carefully chosen on the basis of the hydrogeological survey results to ensure a sufficient yield.

9) An on-site simple water quality test should be conducted for all newly drilled wells and a laboratory test using WHO standards should be conducted for an average of 1 in 5 deep wells. In the case of shallow wells, the simple water quality test and laboratory test should be conducted for an average of 1 in 5 wells and 1 in 20 wells respectively.

6-4 Implementation Schedule

As described in 6-3-1, the Project will be implemented in two stages and the respective periods are given in Table 6-3-1. It is recommended that the following implementation schedule be adopted

following the signing of the Exchanges of Notes for project implementation by the Governments of Sri Lanka and Japan.

Following the signing of the E/N for the first stage, the Sri Lankan side (Irrigation Department) will immediately conclude the contract with the consultant to initiate the detailed design work. This detailed design, including a field survey, will be completed within one and a half (1.5) months and will be followed by the tender procedure to select the contractor. The consultant will conduct the tender procedure on behalf of the Irrigation Department and the successful bidder will conclude the construction contract following negotiations with the Irrigation Department. This contract will be made within three months of the signing of the E/N and actual construction work will commence within three and a half (3.5) months. The construction work for the first stage will be completed within thirteen (13) months of the signing of the E/N. It is expected that the signing of the E/N for the second stage will take place five (5) months after the signing of the E/N for the first stage in the middle of the first stage construction period.

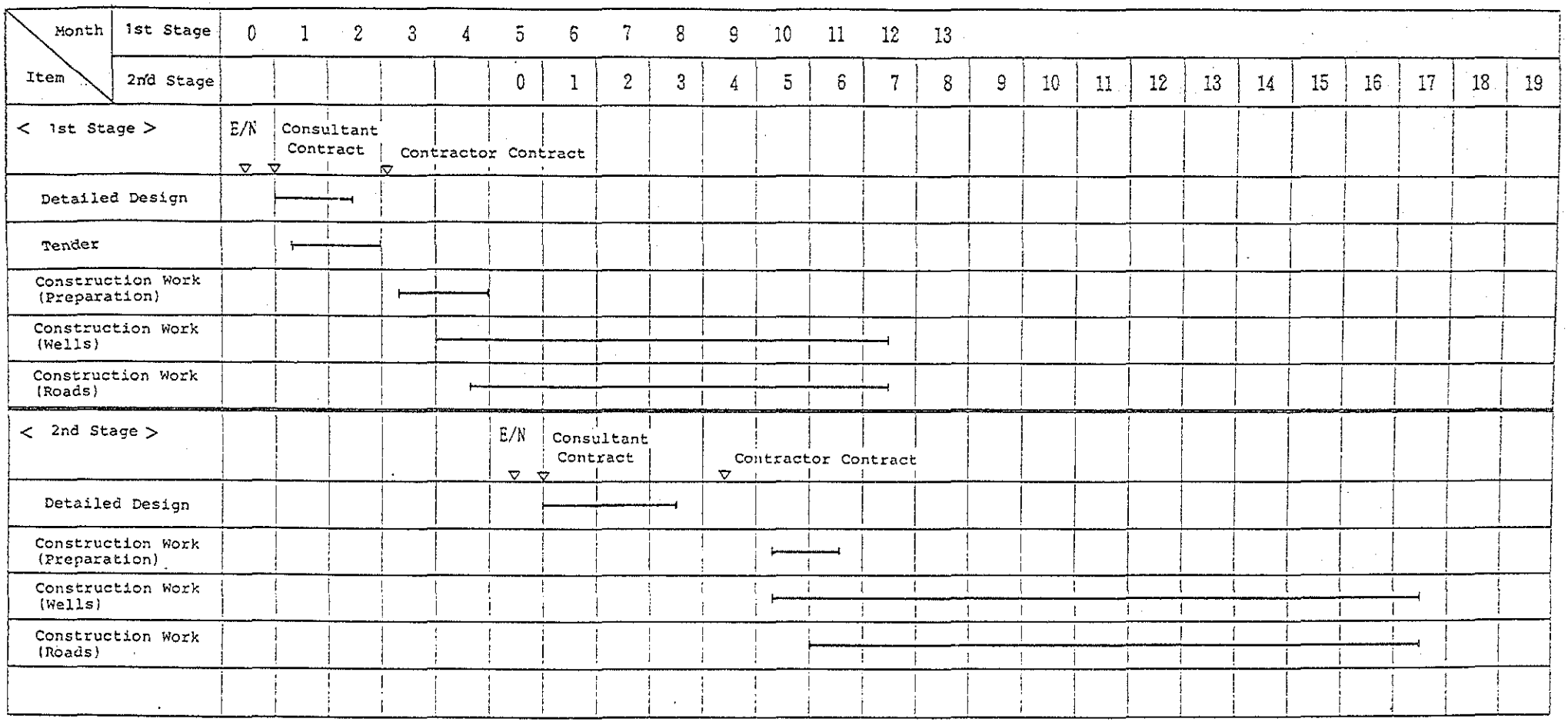
The contract procedure for the second stage will follow that for the first stage. However, the contractor may be appointed instead of being selected through the tender procedure. In either case, the construction contract for the second stage will be concluded and the construction work will commence within four months and five months of the signing of the E/N respectively. Since the construction volume for the second stage is larger than that for the first stage, a construction period of twelve (12) months is planned so that the work can be completed within seventeen (17) months from the signing of the E/N.

The above implementation schedule is shown in Figure 6-4-1.

6-5 Project Costs to be Borne by Sri Lankan Side

Bank commissions	:	250,000	(Unit Rs.)
Compensation for damaged crop	:	200,000	
Administration expenditure	:	2,000,000	
Transportation fee	:	3,000,000	
Site office construction cost	:	500,000	
Sub-total	:	5,950,000	
Taxes			
Custom duty and turnover tax	:	5,090,000	
Turnover tax on contract payments	:	7,200,000	
Corporate income tax	:	14,400,000	
Individual income tax	:	2,770,000	
Sub-total	:	29,460,000	
Total	:	35,410,000	

Figure 6-4-1 Project Implementation Schedule



CHAPTER 7

MAINTENANCE PLAN

CHAPTER 7 MAINTENANCE PLAN

7-1 Maintenance System

(1) Wells

Following the completion of the Project, the maintenance of both deep and shallow wells constructed or rehabilitated under the Project will be the responsibility of the local Pradeshiya Saba in each AGA division (joint organization of both public and private sectors) which is currently responsible for the maintenance of communal wells. The new and rehabilitated wells will, therefore, be maintained by their local users under the supervision of the Pradeshiya Saba. The structure of the Pradeshiya Saba is as follows.

Structure of Pradeshiya Saba

Chairman ..... Elected
|
Secretary ..... AGA for Target Area
|
PS Members ..... Representatives of GS Divisions

3 Clerks
2 Technical Officers
1 Doctor
1 Librarian
4 Workers
2 Messengers

(2) Roads

After the rehabilitation work for the target roads, maintenance work for each type of road will be executed by each relevant authority. Road maintenance is currently conducted under the following system and this system is expected to continue in the future.

Road Category	Responsible Office
a. Trunk Roads	RDA Executive Engineer's Offices
Stage I and II	Udadunbara Engineer's Office
Stage III and IV	Nalanda Engineer's Office
Nagadeepa	Mahiyangana Engineer's Office
b. Internal Roads	Land Commissioner, AGA Offices
c. Village Roads	Project Managers' Offices (INMAS), Divisional Development Councils
d. Canal O.M. Roads	Irrigation Department

With regard to trunk roads, an executive engineer of the RDA in each area is responsible for their maintenance, assisted by a deputy engineer and several staff members. The agencies responsible for the maintenance of internal roads and village roads vary a little from area to area. While the Divisional Development Councils are responsible in some areas, the Project Managers' Offices organize the farmers to maintain roads in other areas due to the lack of budgetary allocations for road maintenance. This situation is expected to continue in the future.

7-2 Maintenance Plan

(1) Wells

As described earlier, communal wells in the Project Area are currently maintained by the Pradeshiya Saba. However, due to the insufficient budget, the daily maintenance work relies entirely on the users and few maintenance records are available. Since the existing wells are mostly open-type shallow wells, the problem of mechanical breakdowns has not arisen. However, deep wells have recently been introduced in the Stage III and IV areas and the local inhabitants have begun to be aware of the importance of well maintenance.

A firm maintenance system should be established for the deep wells to be constructed under the Project. However, special budgetary

measures for the maintenance of the wells in the Project Area cannot be expected in view of the tight financial situation of the Government of Sri Lanka. Consequently, it is recommended that a self-maintenance system for users be introduced by appointing a person responsible for well maintenance under the guidance of the Pradeshiya Saba. The role to be played by the Pradeshiya Saba should include the provision of public hygiene education for those responsible for well maintenance, increasing the awareness of local inhabitants of the importance of public hygiene and the provision of the basic training required for well maintenance. As the actual maintenance will be conducted by local inhabitants, guidance should be provided to achieve a maintenance system which does not involve financing. Spare parts to meet the first two years' requirements will be provided under the Project. However, the Pradeshiya Saba is expected to supply these spare parts as it becomes necessary.

(2) Roads

Assuming that the maintenance of village and farm roads will continue to be conducted under the present system, the following suggestions are given to improve the maintenance work.

a. A road inventory for village and farm roads should be prepared by the relevant authority in each area as the first step of the road maintenance plan.

b. A maintenance plan for each road should be prepared based on the above inventory.

c. Plans dealing with the utilization of construction equipment, procurement of equipment and materials, required labour for maintenance, and maintenance schedule, should be prepared based on the maintenance plan referred to in b. above.

d. It is recommended that a request for cooperation be made to the RDA with regard to that construction equipment which is not possessed by the organizations responsible for road maintenance. The underlying reason for this suggestion is that the full-time possession of construction equipment for maintenance by these

organizations cannot be justified in the terms of the frequency of use, workshop construction cost and subsequent personnel costs.

e. As far as the required labour is concerned, it is recommended that farmers along the target roads be organized to conduct the actual work.

CHAPTER 8

PROJECT EVALUATION

CHAPTER 8 PROJECT EVALUATION

8-1 Effects of Project Implementation

The Implementation of the Project can be expected to have the following effects.

(1) Stable Domestic Water Supply in Dry Season

The dependence on wells increases in the dry season in the Project Area, particularly when the water intake to canals is suspended. Moreover, many wells dry up in the same period, making it extremely difficult for local inhabitants to secure domestic water. With the completion of the Project, however, those communal wells which currently dry up in the dry season will provide a stable water supply and the number of households per communal well supplying a sufficient volume of water in the dry season will be reduced from the present 50 to 20 due to the above improvement of existing wells and the construction of new wells. In addition, a deep well will be provided for a average of 60 households (i.e. one deep well per three shallow wells). These deep wells will provide a source of drinking water even in the case of the Project Area being hit by a severe drought, thereby ending the fear of local inhabitants of a water shortage and improving their standard of living.

(2) Stable Supply of Hygienic Drinking Water

The well water form the planned deep wells will originate from clean groundwater; therefore, these deep wells will provide local inhabitants with a stable supply of hygienic drinking water, improve the hygiene standard in the Project Area and reduce the occurrence of diseases caused by unhygienic drinking water, particularly dysentery which causes the highest number of deaths in the Project Area.

(3) Reduction of Required Labour

The carrying of water is regarded as work for women and children in the Project Area. As many local wells dry up in the dry season, the distance over which it becomes necessary to carry water is particularly long (much further than the usual 20 - 500m). With the construction of new wells under the Project, this distance is expected to be shortened to 150 - 300m in the dry season, reducing the unproductive heavy labour on the part of women and children and enabling them to direct their labour towards farming which is the basis of their livelihood. The effects of this additional labour on farming should be strongly felt through an improvement in the standard of living and development of the local economy.

(4) Consolidation of Local Road Network

The current road network if inadequate in the Stage III and IV areas, as well as in the Nagadeepa area, and the road conditions are extremely poor, preventing the expansion of bus services in these areas (buses are the only means of transport). As a result, the inhabitants are almost completely isolated from neighbouring areas.

With the rehabilitation of roads under the Project, however, the road network will be improved, allowing bus services to reach every corner. (The operating Office of the National Bus Service has clearly stated that bus services will be increased following improvement of the road network). The improved road network will facilitate transportation and will expand the sphere of life, in turn improving local living standards and stimulating the local economy.

(5) Stimulation of Local Communities

Exchanges between villages have not yet been fully established due to the poor village road conditions. With the rehabilitation of roads, however, exchanges between villages will increase, stimulating the social and economic lives of the communities.

(6) Marketing Improvement

Farmers currently find it difficult to ship their products due to the poor road conditions which also prevent product buyers from visiting the Project Area. As s result, the farming of cash crops, including vegetables, is not feasible.

With the rehabilitation of roads, these problems will be solved, stimulating agriculture which is the livelihood of local inhabitants and thereby increasing their cash income. The distribution of input goods of agriculture and essential products will also be improved, stimulating the local economy.

(7) Other Social and Economic Effects

Other effects of road rehabilitation include emergency transportation to hospital, quick dissemination of information and reduced travelling times.

(8) Multiple Effects with Irrigation Rehabilitation Project

The Project and the Irrigation Rehabilitation Project, implemented with a yen loan, will complement each other to achieve multiple effects, further accelerating and securing economic development in the Project Area.

(9) Correction of Gaps Between Communities

The implementation of the Project will close the current gaps between the standard of living and the social and economic infrastructure level of the Project Area and the neighbouring Mahaweli River Development Project System C Area.

8-2 Appropriateness of Project Implementation

The Implementation of the Project, consisting of well construction and road rehabilitation, is expected to achieve the various social and economic effects described in 8.1. The number of inhabitants to benefit from well construction under the Project will be as high as 54,000 in the Minipe area and 15,000 in the Nagadeepa area. The rehabilitation of roads will similarly benefit 25,000 inhabitants in the Minipe area and 15,000 in the Nagadeepa area. Despite these positive achievements of project implementation, however, it will be difficult for the Government of Sri Lanka to independently implement the Project due to financial constraints. Therefore, the provision of Japanese grant aid for the Project is deemed appropriate.

The size and contents of the Project indicated as a result of the Basic Design Study are also deemed appropriate in terms of the project size for Japanese grant aid cooperation and the contents of the original Sri Lankan request.

From the viewpoints of the existing National Development Plan of Sri Lanka, the contents requested by Sri Lanka, the level of rehabilitation, the implementation plan and the maintenance plan, the size and contents of the Project indicated as a result of the Basic Design Study are also deemed appropriate.

CHAPTER 9

CONCLUSION AND RECOMMENDATION

CHAPTER 9 CONCLUSION AND RECOMMENDATION

9-1 Conclusion

Sri Lanka is an agricultural country and the Government of Sri Lanka has been expending a large amount of capital and labour on large-scale agricultural development efforts, particularly in the dry zone. These past development efforts are beginning to bear fruit and the production of rice, the staple food, is now almost self-sufficient. At the same time, however, in addition to the problem of budgetary deficits, the problem of an unequal standard of living between existing villages and new settlements has arisen as a result of the past inadequate provision or maintenance of the social and economic infrastructure in these existing villages. The Government of Sri Lanka has, therefore, recently shifted its the priorities in its economic adjustment measures to improving the living standards and consolidating the infrastructure in rural areas.

The Project Area is a typical agricultural area suffering from the above-mentioned problem and is adjacent to the Mahaweli River Development Project System C area which is a model area for new development efforts. The social infrastructure of the Project Area is particularly poor in terms of a stable domestic water supply and efficient road network, hindering the improvement of the standard of living.

The implementation of the Project can be expected to achieve such effects as a stable supply of domestic water which constitutes the most basic requirement for human life; improvement of hygiene standards; reduction of unproductive labour; improvement of the transport network; vitalization and development of local communities; improvement of marketing; modernization of villages; increase of agricultural production; and a higher standard of medical care, etc. This will assist the Project Area to improve its living standards and narrow the various gaps between the Project Area and neighboring areas.

The Project is also in line with the current national Development Plan. Its size and contents are appropriate in view of the Government of Sri Lanka's current constraints on new investment and the requirements for a Japanese grant aid project. In conclusion, therefore, the Project is believed to be appropriate to qualify for grant aid from the Government of Japan.

9-2 Recommendations

The implementation of the Project is expected to greatly contribute to the improvement of the social and economic infrastructures of the Minipe and Nagadeepa areas and also to upgrading the living standards in these areas. Given Sri Lanka's current financial situation, however, it will be difficult to expect the taking of special budgetary measures for the maintenance of the facilities to be constructed under the Project. Self-maintenance by the local inhabitants will, therefore, be of crucial importance. In this context, the Government of Sri Lanka is strongly recommended to provide basic education on the importance of the maintenance of the facilities and basic maintenance skills to the inhabitants.

The road network and distribution conditions in the Minipe Stage III and IV areas will be improved with the completion of the road rehabilitation, thus stimulating the social and economic activities of the local inhabitants. However, these areas will still be geographically isolated from other areas due to their being bordered on three sides by a mountain range, the Mahaweli River, and the conservation area respectively. The Government of Sri Lanka plans to construct a bridge over the Mahaweli River to remove the largest constraint on the economic development of these areas (2-3-2). If this bridge construction project is implemented, these areas will be directly connected with the Mahaweli River Development Project System C area which is a large economic zone, thus removing the above constraint, multiplying the effects of the Project, and largely contributing to increasing employment opportunities for the second and third generations. This bridge construction will also

increase the effects of the Irrigation Rehabilitation Project (2-2-2).

It is, therefore, highly desirable that efforts to realize the early implementation of the bridge construction plan be encouraged.

APPENDICES

APPENDIX I

1-1 List of Study Team Members

Tetsuro HIRANO, Team Leader & Road Road Planning
Director,
Land Improvement Engineering Center
Tohoku Regional Agricultural Office
Ministry of Agriculture, Forestry and Fisheries

Hiroshi HOSOTANI, Groundwater Development
Planning Department
Chuugoku-Shikoku Agricultural Administration Office
Ministry of Agriculture, Forestry and Fisheries

Tadanori SUZUKI, Project Coordination
Grant Aid Planning & Survey Department
Japan International Cooperation Agency

Tsuneo AMANO, Rural Development Planning
(Team Leader of Consultant Party)
Japan Engineering Consultants Co., Ltd.

Katsuyuki IGARASHI, Hydrogeology & Deep Tube-Well Digging
Japan Engineering Consultants Co., Ltd.

Ko KUWATA, Road Design
Japan Engineering Consultants Co., Ltd.

Hideyuki WAKATABI, Geology & Land Survey
Japan Engineering Consultants Co., Ltd.

1-2 Study Schedule

Day	Date	Travel	Colombo	Site
1	July 26 Tues.	Narita-Bangkok		
2	27 Wed.	Bangkok-Colombo		
3	28 Thur.		Courtesy visit to JICA. Contracts with rent-a-car office & soil surveyor.	
4	29 Fri.		Courtesy visits to MLLD, ERD & ID & discussions with ID.	
5	30 Sat.		Data collection & preparation for field survey.	
6	31 Sun.		As above	
7	Aug. 1 Mon.		Courtesy visit to & discussions with LCD. Discussions with ID. Information collection.	
8	2 Tues.		Data & information collection. Discussions with MLLD. Courtesy visit to SPMD & MECA.	
9	3 Wed.	Colombo-Kandy-Hasalaka	Courtesy visits to & discussions with Kandy ID Office & Kandy District Addl GA.	
10	4 Thur.			Discussions with Minipe IE & Mapakada IE. Reconnaissance of Project Area.
11	5 Fri.			Discussions with Minipe IE, Kandy AGA & Matale AGA & ALC. Reconnaissance of Project Area.

Day	Date	Travel	Colombo	Site
12	6 Sat.			Reconnaissance of Project Area & electric prospecting.
13	7 Sun.			Road survey, well survey & electric prospecting.
14	8 Mon.	(Amano/Kuwata) Hasalaka-Colombo	Courtesy visit to & discussions with Kandy District Office.	Discussions with Minipe PM. Well survey, electric prospecting & road conditions survey.
15	9 Tues.		Data collection. Visa extension procedure. Discussions with companies commissioned for soil & water quality tests.	Road survey, sample well survey & electric prospecting.
16	10 Wed.		2nd party (government officials) arrives Colombo. Courtesy visit to Japanese Embassy and JICA Office. Data collection.	As above
17	11 Thur.		Courtesy visits to and discussions with ERD & MLLD by all Study Team members.	As above
18	12 Fri.		Discussions with ID & LCD.	Road survey, well survey & electric prospecting.
19	13 Sat.	Colombo-Kandy/ Hasalaka	Data collection.	As above
20	14 Sun.	Kandy-Hasalaka		Reconnaissance of Project Area, well survey & electric prospecting.

Day	Date	Travel	Colombo	Site
21	15 Mon.			As above & team meeting. Discussions with Nagadeepa PM & Hettipola AGA.
22	16 Tues.	Hasalaka-Badulla-Colombo	Visits to & discussions with Badulla District GA & AGA.	Road survey, well survey & electric prospecting.
23	17 Wed.		Visit to MLLD. Meetings with ID & soil testing company.	As above & discussions with Minipe PM.
24	18 Thur.		Signing of Minutes of Discussions. Information collection.	Stage IV Project Committee meeting. Traffic survey, well survey & electric prospecting.
25	19 Fri.	Colombo-Hasalaka	Government officials leave for Japan.	Stage III Project Committee meeting. Information collection, well survey & electric prospecting.
26	20 Sat.			Nagadeepa Project Committee meeting. Information collection, well survey, electric prospecting. Discussions with RDA (Mahiyangana).
27	21 Sun.			Road survey & adjustment of electrical equipment.
28	22 Mon.			CBR test, road survey, well survey & electric prospecting.
29	23 Tues.	(Amano/Wakatabi) Hasalaka-Colombo	Received revised road rehabilitation priority list.	As above

Day	Date	Travel	Colombo	Site
30	24 Wed.	(Wakatabi) Colombo-Hasalaka	Consultations with JICA Tokyo. Data collection from MEA, WRB, DANIDA & DAMPSAX.	Confirmation of roads given in revised list with IE & PM. Well survey & electric prospecting.
31	25 Thur.		Consultations with JICA Tokyo. Data collection from ID.	As above
32	26 Fri.		Consultations with JICA, Tokyo. Data collection from SPMD.	Confirmation of & survey on roads given in revised list. Well survey & analysis of electric prospecting results.
33	27 Sat.		Data collection from SPMD.	As above
34	28 Sun.	(Amano) Colombo-Hasalaka		As above
35	29 Mon.			Road survey, well survey & analysis of electric prospecting results.
36	30 Tues.			As above
37	31 Wed.			As above
38	Sept. 1 Thur.			As above
39	2 Fri.			As above
40	3 Sat.			As above
41	4 Sun.			Survey results & collected data arrangement. Team meeting & road survey.

Day	Date	Travel	Colombo	Site
42	5 Mon.			Data collection from Matale IRDP & KAMSAX. Road Survey.
43	6 Tues.			Road survey, collected data arrangement & analysis & preliminary planning.
44	7 Wed.	(Amano-Igarashi) Hasalaka-Colombo		Discussion with & data collection from Naranda RDA Office.
45	8 Thur.		Data collection & preliminary planning.	Discussion with & data collection from Udadunbara RDA Office.
46	9 Fri.	Igarashi leaves for Japan		Discussion with & data collection from Mahiyangana AGA. Data collection from Hettipola RDC.
47	10 Sat.	(Kuwata/Wakatabe) Hasalaka-Colombo	Study Report preparation	
48	11 Sun.		As above	
49	12 Mon.		Report to & discussions with MLLD on study results.	
50	13 Tues.		Report to Japanese Embassy & JICA Office on study results.	
51	14 Wed.	Leave Colombo		
52	15 Thur.	Arrive Narita		

1-3 List of Interviewed Officials

Department of External Resources, Ministry of Finance and Planning

Senarat Weerapana	Asst. Director

Ministry of Lands & Land Development (MLLD)

Nanda Abeywickrema	Secretary
D.G. Premachandra	Addl. Secretary, Director of Irrigation Management Division
K.W.M.P. Mapitigama	Addl. Secretary (Admn)
S.M.F. Marikkar	Director (Planning)
S. Malalasekera	Deputy Director (Planning)

Settlement Planning and Management Division, MLLD

Ananda S. Weerasinghe	Director
T. Hewege	Deputy Director
D. W. Abeywickreme	Deputy Director

Irrigation Management Division, MLLD

P. Semnarath	Addl. Director
D.J.D.W. Ratnayake	Project Manager Minipe
H.W.A. Pangnadasa	Project Manager Nagadeepa

Irrigation Department, MLLD

K.D.P. Perera	Director
L.T. Wijesuriya	Deputy Director (MIRP)
E.P. Wimalabandu	Deputy Director (Major Const)
K.A.T. Nikapitiya	Deputy Director, Kandy Range
Siriwimal Ranatunga	Irrigation Engineer Hasalaka Div.
R.A.D.J.K. Ranaweera	Irrigation Engineer Mapakada Div.

Land Commissioner's Department, MLLD

A.A. Wijetunga	Land Commissioner
M.S. Wickramarachchi	Addl. Land Commissioner
D.B. Jajasekera	Asst. L.C. (Technical)
Tanath Gunaratne	Asst. L.C.

Water Resources Board, MLLD

Millavithanachchi	Addl. General Manager

Mahaweli Engineering and Construction Agency, Mahaweli Authority

N.G.R. de Silva	Chairman

Mahaweli Economic Agency, Mahaweli Authority

Jayantha Jayewardene	Addl. Managing Director/General Manager

Road Development Authority, Ministry of Highways

B.M. de Soysa	General Manager
G.S. Haththotuwegama	Director, Engineering Service Division
M.G.E. Perera	Deputy Director Highway Designs
G.L.A.J. de Silva	Deputy Director Bridge Designs
K.W. Fernando	Deputy Director Traffic Planning

National Water Supply and Drainage Board

A.P. Chandraratna	General Manager
C.J.A. Stambo	Asst. General Manager (Ground Water)

Kandy Kachcheri

K.W.E. Karalliyadda	Addl. Government Agent & Deputy Land Commissioner
R.B. Abeysinghe	Asst. G.A. Hasalaka

Matale Kachcheri

Y.M. Dayaratne Banda	Addl. Government Agent & Deputy Land Commissioner
D.M. Karunatne	Asst. G.A. Wilgamunth

Matale IRDP Office

S. Jayaweera	Project Director

Badulla Kachcheri

D.M.P.B. Dassanyake	Government Agent
K.A.J. Kahandawa	Addl. G.A. & Deputy Land Commissioner
W.A. Jayawiclerama	Asst. G.A. Redemaliadda

Pariament

Luxman Seneviratne	Member of Parliament Mahiyangana

KAMPSAY-KRUGER

H. Guldager	Acting Project Manager
Hans Guldager	Chief Hydrogeologist

Embassy of Japan

Yasunari Hamamoto	Ambassador
Minehisa Takada	Councilor
Kazuhiko Maruyama	First Secretary

JICA Sri Lanka Office

Jiro Hashiguchi	Resident Representative
Tetsuo Amagai	Assistant Resident Representative
Hiroshi Niino	Assistant Resident Representative

APPENDIX 1-4

MINUTES OF DISCUSSIONS ON THE BASIC DESIGN STUDY FOR MINIPE AND NAGADEEPA RURAL DEVELOPMENT PROJECT

In response to the request of the Government of the Democratic Socialist Republic of Sri Lanka, the Government of Japan decided to conduct a Basic Design Study on the Project for MINIPE and NAGADEEPA Rural Development Project (the Project) and entrusted the study to the Japan International Cooperation Agency (JICA). JICA sent to Sri Lanka the study team (the Team) headed by Mr. Tetsuro Hirano, Director, Land Improvement Engineering Center, Tohoku Regional Agricultural Office from July 26 to September 10, 1988.

The Team had a series of discussions on the Project with the officials concerned of the Government of Sri Lanka headed by Mr. Nanda Abeywickrema, Secretary, Ministry of Lands and Land Development, and conducted a field survey in the proposed area.

As a result of the study, both parties agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

August 18, 1988

平野哲郎

TETSURO HIRANO
Leader of Japanese Basic Design
Study Team
JICA

Nanda Abeywickrema

NANDA ABEYWICKREMA
Secretary
Ministry of Lands
and Land Development

1. The Project aims at raising up the living standards of people in the MINIPE and NAGADEEPA area, improving the difference in the social infrastructure standards between the Project area and the newly developed neighbouring areas.

2 The site of the Project is MINIPE and NAGADEEPA (site map is attached an annex I)

3. The Project components requested by the Sri Lanka side in July 1987 were as follows:

1) Rural Water Supply

The Project includes construction of wells and rehabilitation of existing wells which meet safe drinking water standards.

	MINIPE	NAGADEEPA
a) Repair of existing wells	500 wells	100 wells
b) New shallow wells	110 wells	85 wells
c) New tube wells	50 wells	20 wells

(2) Road Rehabilitation

In order to improve the transportation of agricultural products and materials within the area and to ameliorate farming and daily activities of inhabitants, the Project includes the rehabilitation of farm roads and village roads.

	MINIPE	NAGADEEPA
Village roads	19 Km	6 Km
Farm roads	12 Km	12 Km

However figures given in 3.(1) and 3.(2) above are being reviewed. Revised requirements will be intimated to the Team within a week.

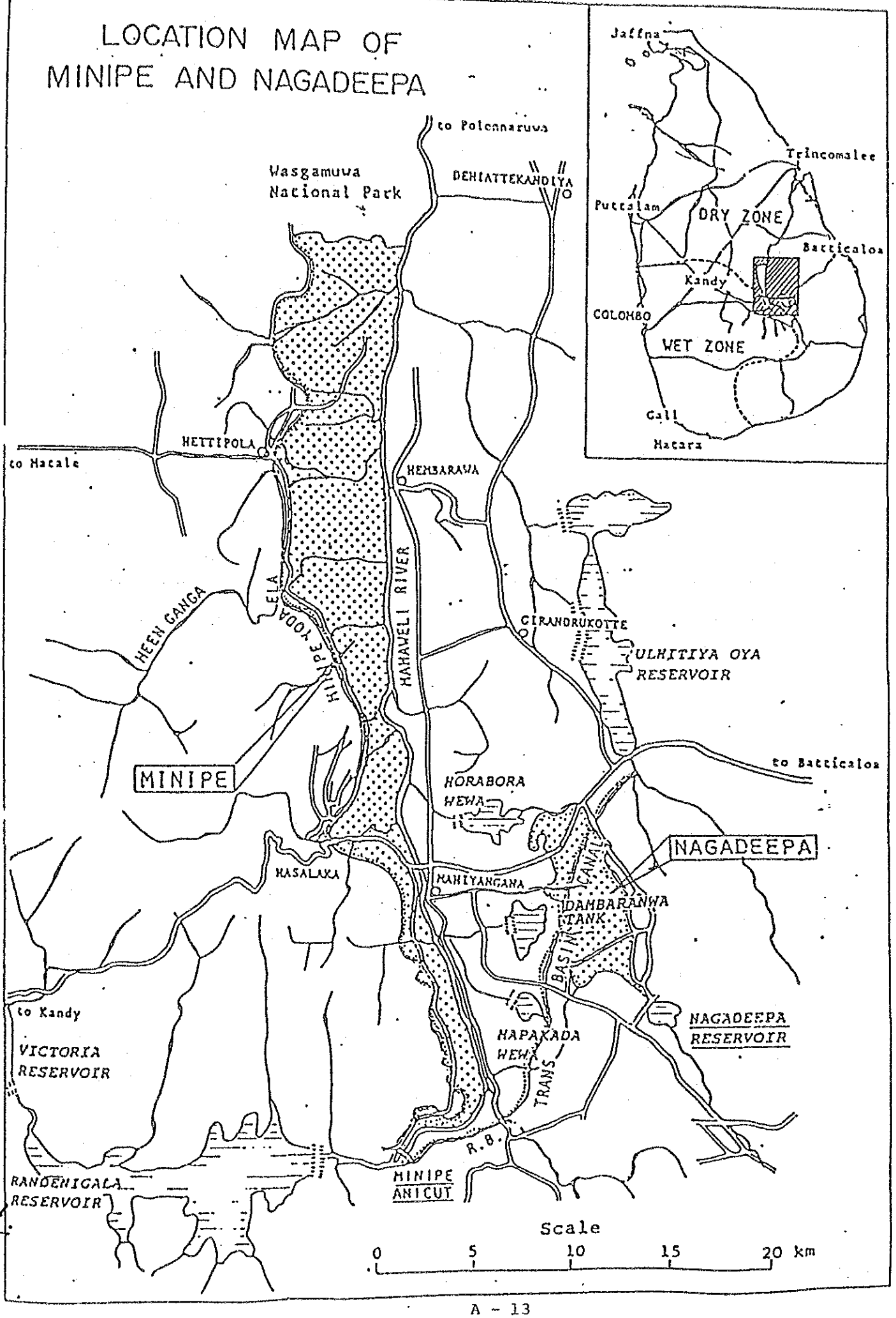
T.H.

4. The Department of Irrigation is the overall executive and implementing agency. The Ministry of Lands and Land Development shall supervise and coordinate the Project.

5. The Sri Lanka side has understood Japanese Grant Aid System explained by the Team which includes a principle of use of a Japanese Consultant Firm and a Japanese Contractor for the construction and supply of material.

6. The Government of Sri Lanka shall take the necessary measures as listed in annex II and shall accomplish these measures on condition that Grant Aid for the execution of the Project is extended.

T.H


LOCATION MAP OF
MINIPE AND NAGADEEPA
Jaffna
Trincomalee
Puttalam
DRY ZONE
Batticaloa
Kandy
COLOMBO
WET ZONE
Galle
Matara
to Polonnaruwa
Wasgamuwa
National Park
DEHIATTEKANDIYA
HETTIPOLA
to Matale
HEMBARAWA
HEEN GANGA
ELA
HURULE YODA
MAHAWELI RIVER
GIRANDURUKOTTE
ULHITIYA OYA
RESERVOIR
MINIPE
HORABORA
WEWA
to Batticaloa
NAGADEEPA
KASALAWA
MAHIYANGANA
CANAL
DAMBARANWA
TANK
BASIN
to Kandy
VICTORIA
RESERVOIR
NAGADEEPA
RESERVOIR
NAPAKADA
WEWA
TRANS
R.B.
MINIPE
ANICUT
RANDENIGALA
RESERVOIR
Scale
0
5
10
15
20 km

ANNEX II

1. To acquire the land or the right of way required for the project implementation.

2. To ensure the land or right of way necessary for construction of the temporary access roads from the existing rural roads to the proposed tubewell sites and roads.

3. To allow transportation of vehicles, machine rigs and construction equipment on the existing national roads and rural roads.

4. To exempt import duties and incidental expenses and to take necessary measures for customs clearance of the materials, equipment and spare parts brought for the implementation of the Project. These exemptions shall be subject to the existing Sri Lankan rules and regulations which are applicable to similar grant aid program.

5. To assume commissions to the Japanese foreign exchange bank for banking services based on the banking arrangement as follows:

   5.1 Advising Commission of Authorization to Pay

   5.2 Payment Commission

6. To accord Japanese nationals whose services may be required in connection with the supply of products and services under the verified contracts, such facilities as may be necessary for their entry into and stay in Sri Lanka for the performance of their work.

7. To exempt Japanese nationals from customs duties, internal taxes, and other fiscal levies which may be imposed in the recipient country with respect to the supply of products and services under the verified contracts.

T.H.

8. To bear all expenses, other than those to be borne by the grant aid, necessary for the construction of the facilities as well as for the transportation.

9. To provide facilities for distribution of electricity, water supply, drainage, telephone lines and other incidental facilities to the Project site, as required for satisfactory operation and maintenance of the project.

10. To fully maintain the wells and roads which are constructed and rehabilitated under the Japanese Grant Aid in cooperation with Department of Irrigation, inhabitants and other relevant authorities concerned under the coordinating role of the Ministry of Lands and Land Development.

MINUTES OF DISCUSSIONS

THE DRAFT REPORT OF THE BASIC DESIGN STUDY

FOR MINIPE AND NAGADEEPA RURAL DEVELOPMENT PROJECT

At the request of the Government of the Democratic Socialist Republic of Sri Lanka for Japanese grant aid on the Project for the Minipe and Nagadeepa Rural Development (hereinafter referred to as "the Project"), the Government of Japan decided to conduct a Basic Design Study (hereinafter referred to as "the Study") on the Project and the Japan International Cooperation Agency (JICA) sent the study team headed by Mr. Tetsuro Hirano, Director, Land Improvement Engineering Center, Tohoku Regional Agricultural Office, Ministry of Agriculture, Forestry and Fisheries from July 26 to September 10, 1988.

As a result of the Study and discussions, JICA prepared a Draft Final Report on the Project and dispatched a Mission to explain and discuss the Report starting from November 29 to December 8, 1988.

Both parties held a series of discussions of the report and agreed to recommend to their respective governments that the major points of understanding reached between them, attached herewith, should he examined toward the realization of the Project.

5th December, 1988

平野哲郎	
TETSURO HIRANO	A. A. WIJETUNGA
Leader of Japanese Basic Design Study Team	Acting Secretary Ministry of Lands & Land Development

MAJOR POINTS OF UNDERSTANDING

1. The Sri Lanka side has agreed in principle to the basic design proposed in the draft final report.

2. The Sri Lanka side understood the system of Japan's grant aid programe and confirmed the arrangement which is mentioned in the minutes of discussions on the Project signed on August 18,1988 between Japanese team leader and Secretary of Lands and Land Development

3 The final report (15 copies in English) on the Project will be submitted to the Sri Lanka side by April,1989.

APPENDIX 1-5

Ministry of Lands & Land Development
Settlement Planning and Management Division

Priority List of Road Rehabilitation
in Minipe Scheme (Stage I-IV)

(Prepared in Consultation with farmer leaders
in Minipe Scheme)

23/08/88

	Description of Road	Condition of the road	Currently maintain by	Length to be rehabilitated.
1.	Hasalaka - Hettipola	- Part mettled and tared.	Road Dev. authority	44.4 K.m
	Handungamuwa (Trunk road)	- Part Gravelled		
2.	Polonnaruwa Road (upto temple)	- Gravelled	Land Comm. Dept.	6.0 K.m
3.	Oruwelayaya Cemetry to - Mahaweli River	- Gravelled	Divisional Dev. council	4.8 K.m
4.	Amuneyaya Rd. (Part)	- Gravelled	Divisional Dev.coun.	2.4 K.m
5.	Leidiyangala to Kumbukandana (Part)	- Gravelled	Divisional Dev.coun.	4.0 K.m
6.	Radunna Tank to Karawgaha (Part)	- Gravelled	Divisional Dev.coun.	4.0 K.m
7.	D 1 to Ulpothagama	- Gravelled	Land Comm. Dept.	4.0 K.m
8.	D 1 to Mahaaswedduma	- Gravelled	Land Comm. Dept.	2.4 K.m
	Theenapessa to D 4	- Gravelled	Land Comm. Dept.	0.8 K.m
10.	D 7 to Mahayaya	- Gravelled	Land Comm. Dept..	0.8 K.m
11.	Udawela Co-op. to Habutuwa	- Gravelled	Land Comm. Dept.	4.8 K.m
12.	Udawela Co-op. to end of the colony	- Tared	Land Comm. Dept.	2.4 K.m
13.	Udawelapola to D 25	- Tared (1.2 k.m)	Land Comm. Dept.	1.6 K.m
14.	Dambagahawela Road	- Tared (2.4 k.m) - Gravelled (0.8 k.m)	Land Comm. Dept.	3.2 K.m
15.	Weware Road	- Tared (2.4 K.m) - Gravelled (7.2 k.m)	Land Comm. Dept. Land Comm. Dept.	9.6 K.m

	Description of Road	Condition of the road	Currently maintain by	Length to be - rehabi-litated
16.	Palugalla Road	- Gravelled	- Land Comm. Dept.	7.2 K.m
17.	Pundalugasyaya Road	- Gravelled	- Land Comm. Dept.	9.6 K.m
18.	Meegalla Road	- Gravelled	- Land Comm. Dept.	9.6 K.m
19.	Wileyaya Road	- Gravelled	- Land Comm. Dept.	7.2 K.m
20.	Muthettuthena to main chanal			4.5 K.m
2..	D 34 - Weragantota			2.8 K.m
22.	D 1 - D 13 ..			3.2 K.m
23.	Kolongoda to Hospital			2.5 K.m
24.	Devagiriya - Kanaththa			2.5 K.m
25.	Radunna Road			2.5 K.m
26.	Karavgahawewa - Kumbukandana			3.0 K.m
27.	Madekanda Road			3.0 K.m
28.	Tungiriya - Medakanda Road			2.5 K.m
		Total		155.3 K.m

Ministry of Lands & Land Development
Settlement Planning and Management Division

Priority List of Road Rehabilitation
in Nagadeepa Scheme

28/08/88

(Prepared in Consultation with farmer leaders in Nagadeepa Scheme)

	Description of Road	Condition of the road	Currently maintain by	Length to be rehabilitated
1.	Mapakada - Kongaha Junction - Tissapura- Keselpotha 50th mile post	1. Part mettled and tared (about 8 k.m) 2. Part Gravelled	Land Comm. Dept.	12.8 K.m
2.	Andaulpotha - Tissapura	1. Part mettled and tared (0.4 K.m) 2. Part Gravelled	Land Comm. Dept.	8.0 K.m
3.	Kongaha Junction - Gemunupura - Senevipura - Orubeduwewa (49th mile post)	1. Part mettled and tared (2.4 K.m) 2. Part Gravelled	Land Comm. Dept.	11.2 K.m
4.	Kongaha Junction - 16th mile post (Mapakada)	1. Gravelled	Land Comm. Dept.	3.2 K.m
	Keselpotha to Arawatta (BOP Road)	Gravelled	Land Comm. Dept.	5.6 K.m
6.	Abayapura to 20 th mile post (Mapakada)	Gravelled	Land Comm. Dept.	5.6 K.m
7.	Orubeduwewa Temple to Diyabana Oya	Gravelled	Land Comm. Dept.	1.6 K.m
	Total			48.0 K.m

Ministry of Lands & Land Development
Settlement Planning and Management Division

Priority List of Village Road Rehabilitation
in Nagadeepa Scheme

	Description of Road	Condition of the road	Maintain by	Length to be rehabilitated
1.	Tissapura Dispensary to Rotawewa	Gravelled	Land Comm. Dept.	3.2 K.m
2.	Keselpotha - Ikiriyagoda	Gravelled	Land Comm. Dept.	3.2 K.m
3.	Keselpotha - Main canal	Gravelled	Land Comm. Dept.	0.8 K.m
4.	Hospital - - Tract 10	Sandy	Land Comm. Dept.	0.8 K.m
5.	Badulla (15th mile Post) road- - Tract 3/FC 18	Sandy	Land Comm. Dept.	4.8 K.m
6.	Tract 2/Lot 59 - Tract 3/Lot 01 (Via Kumbukattawela)	Sandy	Land Comm. Dept.	2.4 K.m
7.	Tract 2/Lot 46 - Tract 2/Lot 41	Sandy	Land Comm. Dept.	0.8 K.m
8.	Tract 5/D - Lot 6/74	Sandy	Land Comm. Dept.	2.4 K.m
9.	Tract 5 - Lot 5/23	Sandy	Land Comm. Dept.	1.6 K.m
10.	Peradeniya Stores to Kolongala (47½ mile post)	Sandy	Land Comm. Dept.	1.2 K.m
11.	Hussain stores to Puwakgaswela	Sandy	Land Comm. Dept.	1.2 K.m
12.	Lot 5/105 to Lot 5/144 (Tract 5)	Sandy	Land Comm. Dept.	1.2 K.m
13.	Lot 6/91 to Lot 6/84	Sandy	Land Comm. Dept.	1.2 K.m
14.	Lot 5/155to lot 5/175 (Tract 5)	Sandy	Land Comm. Dept.	1.2 K.m
15.	Senevigama (Bogaha Junction) - Tract/Lot 158	Sandy	Land Comm. Dept.	0.8 K.m
16.	Lot 6/223 - Kongaha Junction	Sandy	Land Comm. Dept.	0.8 K.m
17.	Lot 8/17 to Arawatta Vidyalaya	Sandy	Land Comm. Dept.	2.0 K.m
18.	16 Boutique - Arawatta (near - Laundry)	Sandy	Land Comm. Dept.	0.8 K.m

	Description of Road	Condition of the road	Maintain by	Length to be rehabilitated
19.	Tract 5/Lot 37 - Abhayapura School	Sandy	Land Comm. Dept.	3.2 K.m
20.	Abhayapura School - Tract 4/D1	Sandy	Land Comm. Dept.	2.4 K.m
21.	Gemunupura School - Gemunupura - Temple	Sandy	Land Comm. Dept.	1.2 K.m
22.	Tract 4/Lot 8 - Tract 4/D	Sandy	Land Comm. Dept	3.2 K.m
				40.4 K.m

1-6 List of Collected Data and Documents

1. Helping the Rural Millions in Sri Lanka 1983
   - Central Bank of Sri Lanka
2. Economic & Social Statistics of Sri Lanka 1986
   - Central Bank of Sri Lanka
3. Drought Hazard and Rural Development 1986
   - Central Bank of Sri Lanka
4. Economic Performance the First Half 1987
   - Central Bank of Sri Lanka
5. Statistical Pocket Book of the Democratic Socialist Republic of Sri Lanka 1987
   - Ministry of Plan Implementation
6. Sri Lanka Socio-Economic Data 1988
   - Central Bank of Sri Lanka
7. Census of Population and Housing General Report 1981
   - Minister of Finance and Planning
8. Demographic and Health Survey 1987
   - Ministry of Plan Implementation
9. Report on the 1985 Survey of Business Activities and Planned Investments in Sri Lanka 1983/84 to 1985/86
   - Central Bank of Sri Lanka
10. Price and Wage Statistics 1985
    - Central Bank of Sri Lanka
11. Statistical Abstract of the Democratic Socialist Republic of Sri Lanka
    - Ministry of Plan Implementation
12. Annual Report
    - Central Bank of Sri Lanka
13. Annual Statement of Reservoir Replenishment and Behavior (Nagadeepa Reservoir) 1971 - 87
    - Irrigation Department
14. Reference Crop Evapotranspiration 1988 August
    - Irrigation Department
15. Planning for Rehabilitation of Settlement Scheme - Minipe Scheme -
    - Irrigation Department
16. Flow Date of the Mahaweli Ganga 1940 - 1987
    - Irrigation Department

17. Performance - System C

    - Mahaweli Economic Agency

18. Study on Co-operative Organization in Minipe and Derangala Settlement Schemes

    - Settlement Planning and Management Division, MLLD

19. Ground Water Investigation at Randenigala

    - Water Resources Board

20. Type Plan of Communal Well

    - Land Commissioner's Department

21. List of Deep Tube Wells Constructed by Kampsax-Kruger in Wilgamuwa A.G.A. Division

    - Kampsax-Kruger

22. Chemical Analysis from Deep Tube Wells

    - Kampsax-Kruger

23. Location Map of Tube Wells

    - Kampsax-Kruger

24. Class I - Roads in Colonization Schemes

    - Land Commissioner's Department

25. Guideline of Road Design

    - Land Commissioner's Department

    Estimate of the Expense necessary to be inccured for metal and tarring to a width of 8'(one mile)

    - Land Commissioner's Department

    Estimate for the Construction of a Mile of Road in Major Colonization Scheme. 16' - 0" Platform

    - Land Commissioner's Department

    KIRAMA HANDUGALA KETIYAPE ROAD

    " HAMBANTOA DISTRICT

    " "

    " "

    - Land Commissioner's Department

26. Traffic Survey - Minipe (10.8.1988)

    - SMPD/MLLD

27. Census of Vehicles

    - SMPD/MLLD

28. Draft Estimate for the Rehabilitation of a Mile of Class I (BOP) Roads in Minipe Scheme

    - Land Commissioner's Dept

29. Draft Estimate for the Rehabilitation of a Mile of Class II (BOP) Roads in Minipe Scheme

    - Land Commissioner's Dept.

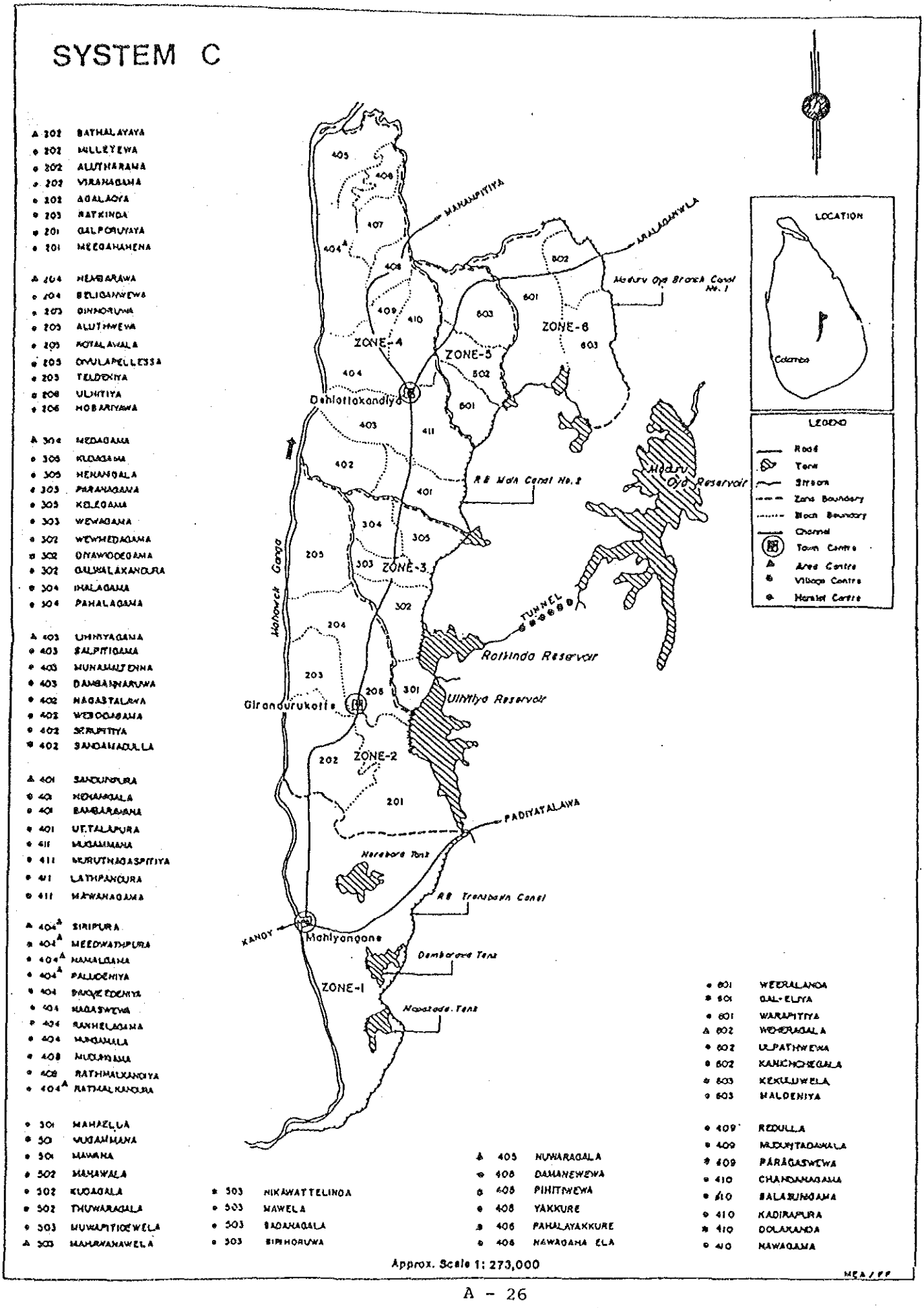
30. List of Roads - Nagadeepa Scheme

    - Badulla Kacheheri

APPENDIX II

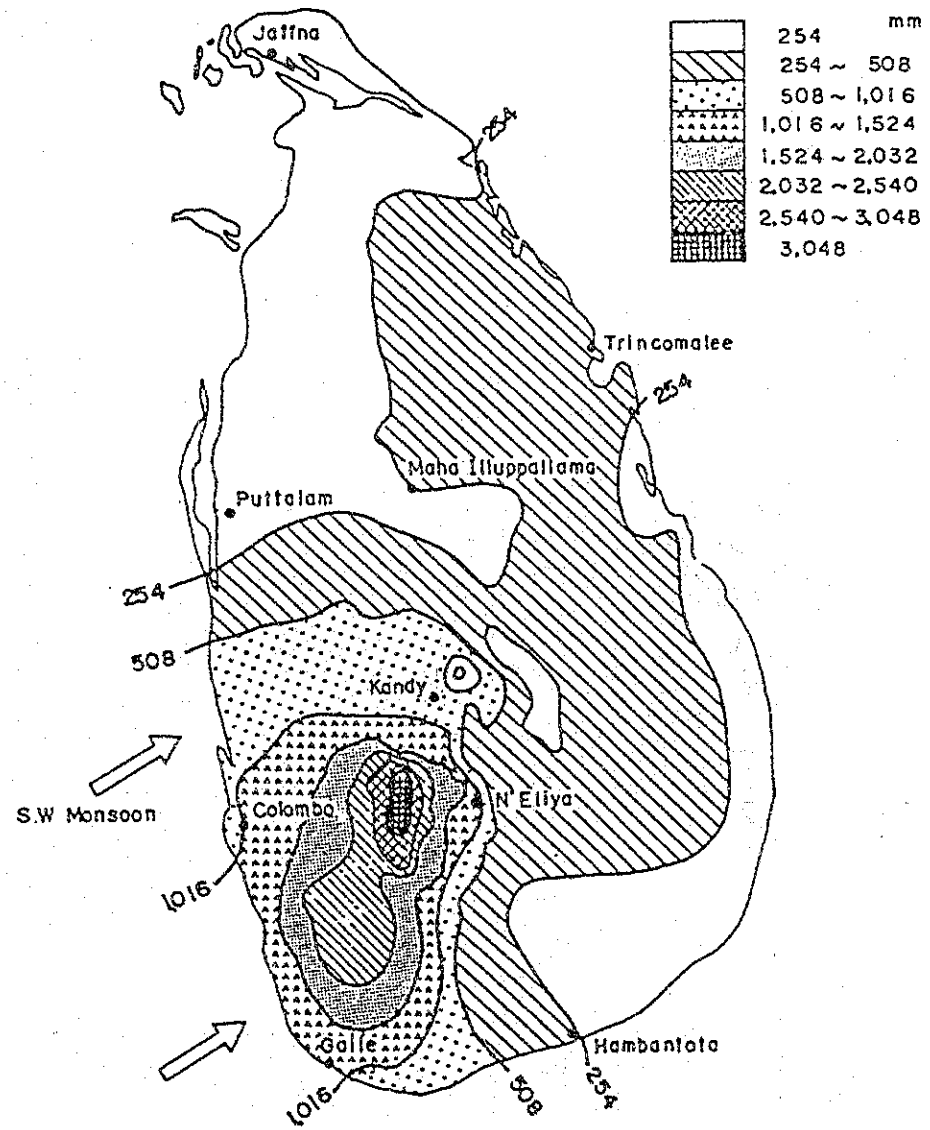
2-1 Additional Figures

Fig. A 3-2-1 Mahaweli System C General Map

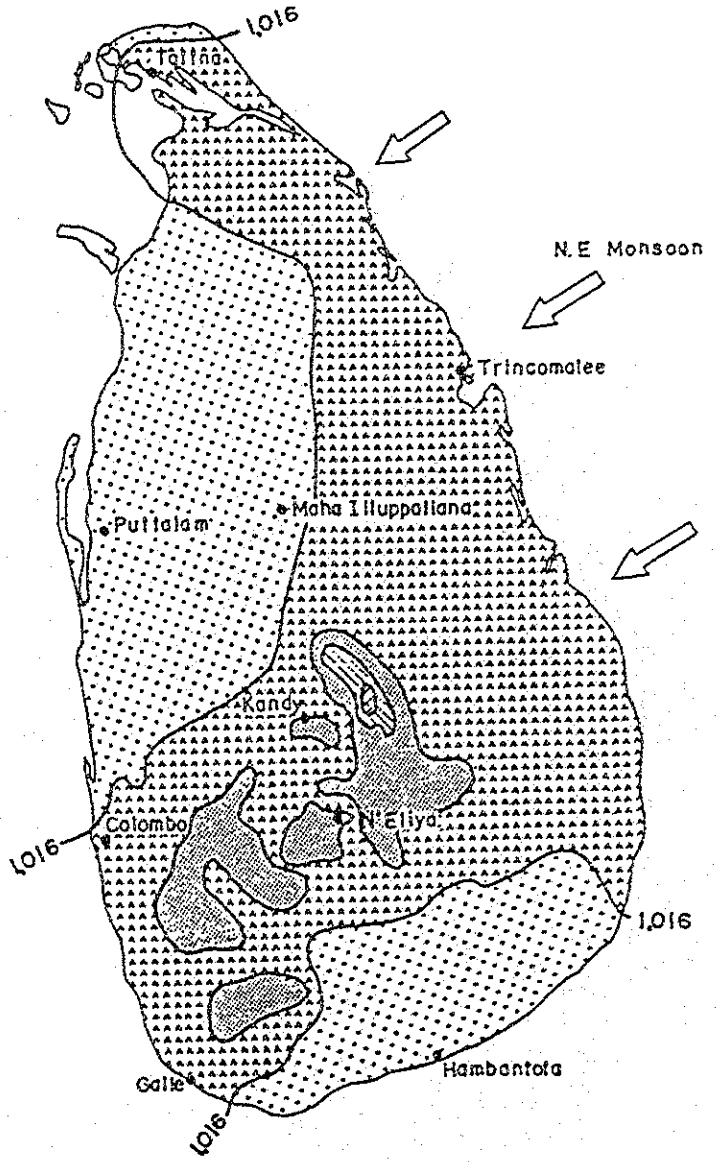


A - 26

Fig. A 3-3-1 Average Rainfall by Seasons



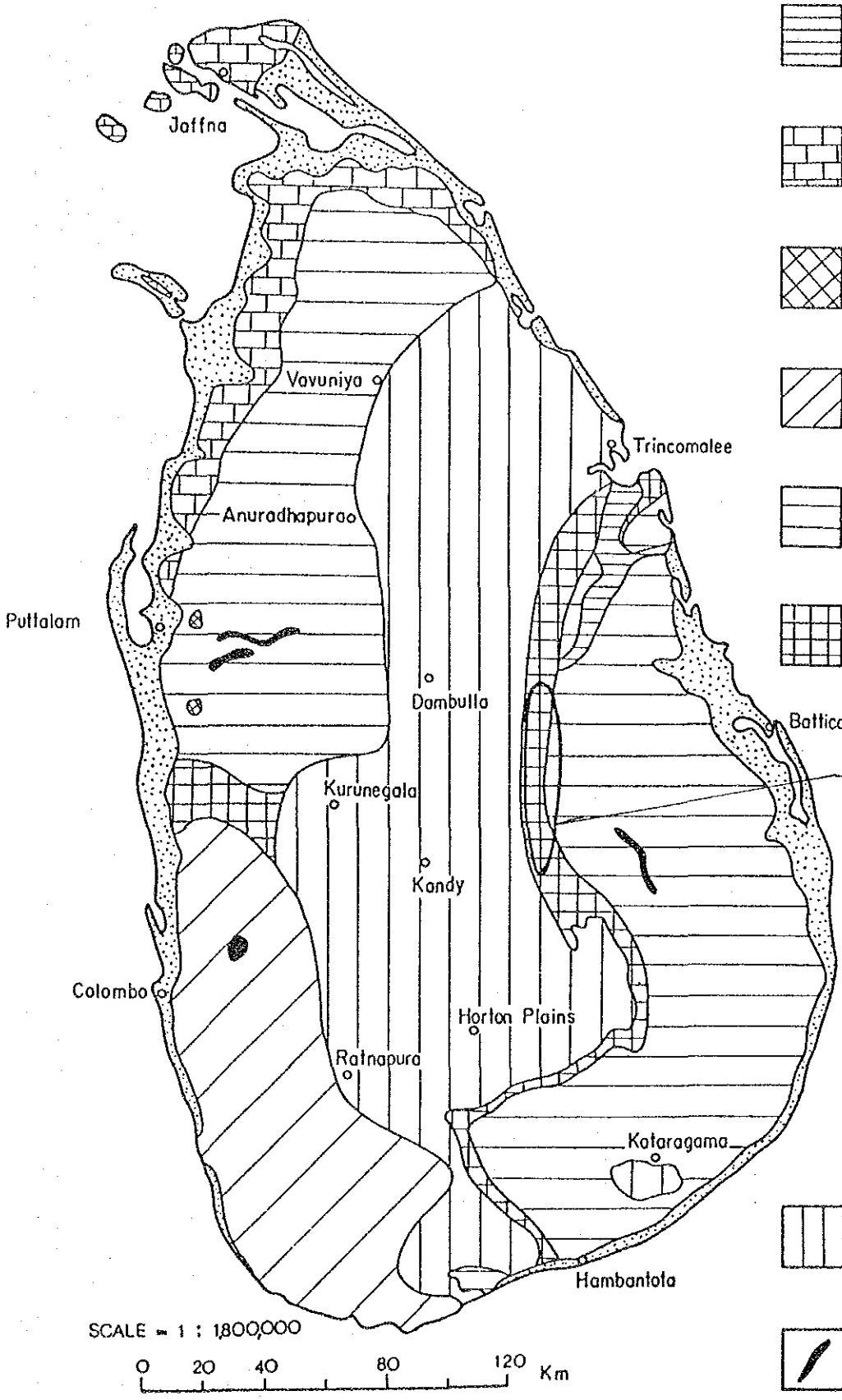
S.W. Monsoon Average Rainfall (Oct-Feb)



N.E. Monsoon Average Rainfall

Fig. A-3-3-2

Geological Map of Sri Lanka by P.G. Cooray (1968)



- Littoral sands, Dunes
- Alluvium
- Jaffna Limestone
- Upper Gondowana formation (sandstone, shale etc)
- Southwestern Group (gneiss, charnockite etc)
- Vijayan Series (gneiss, granite)
- Transitional zone
- Highland Series (Khondalite Group charnockite etc)
- Intrusives (dolerite, granite)

Fig A3-4-1 apparent specific resistivity curve

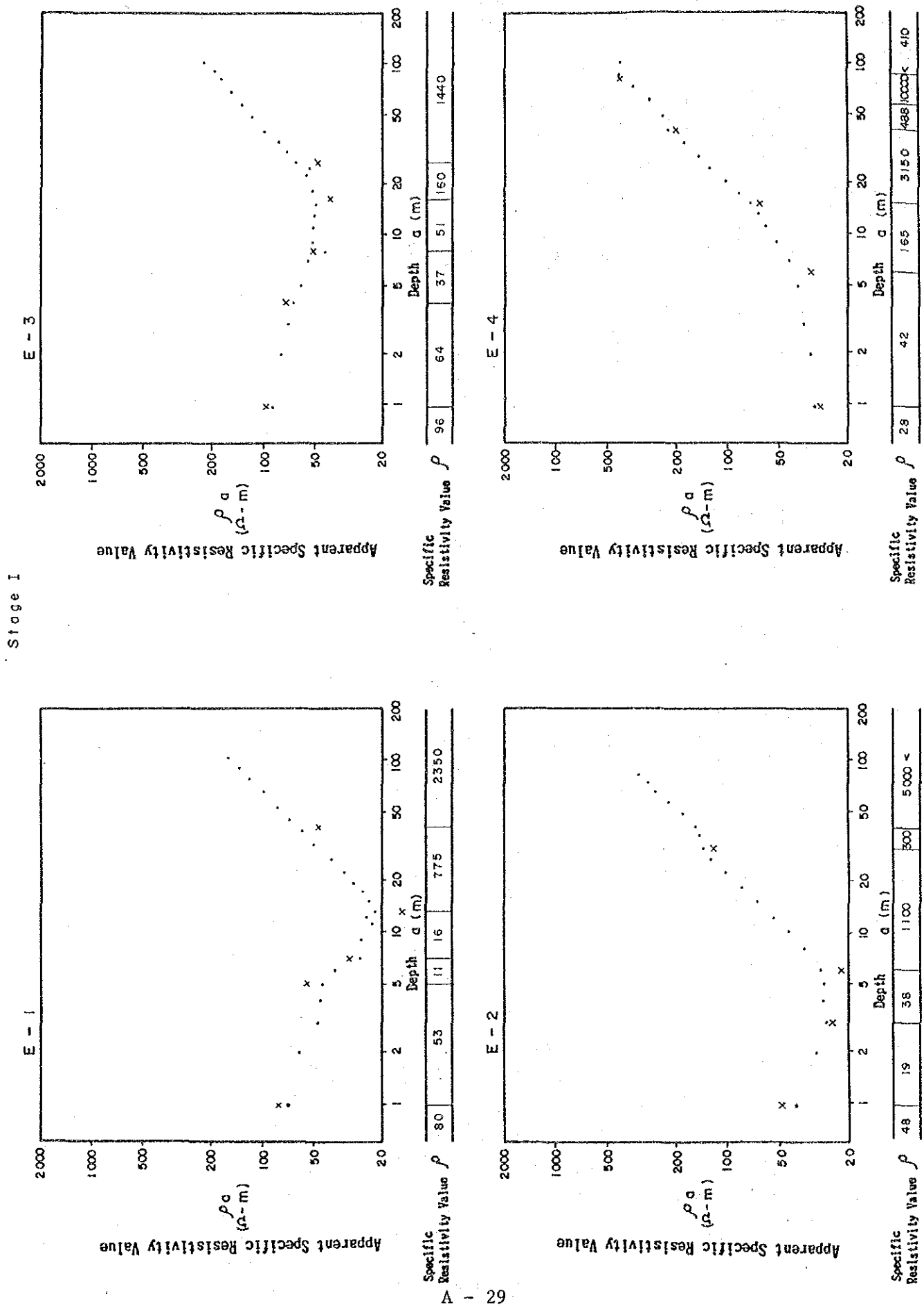


Fig A3-4-1 apparent specific resistivity curve

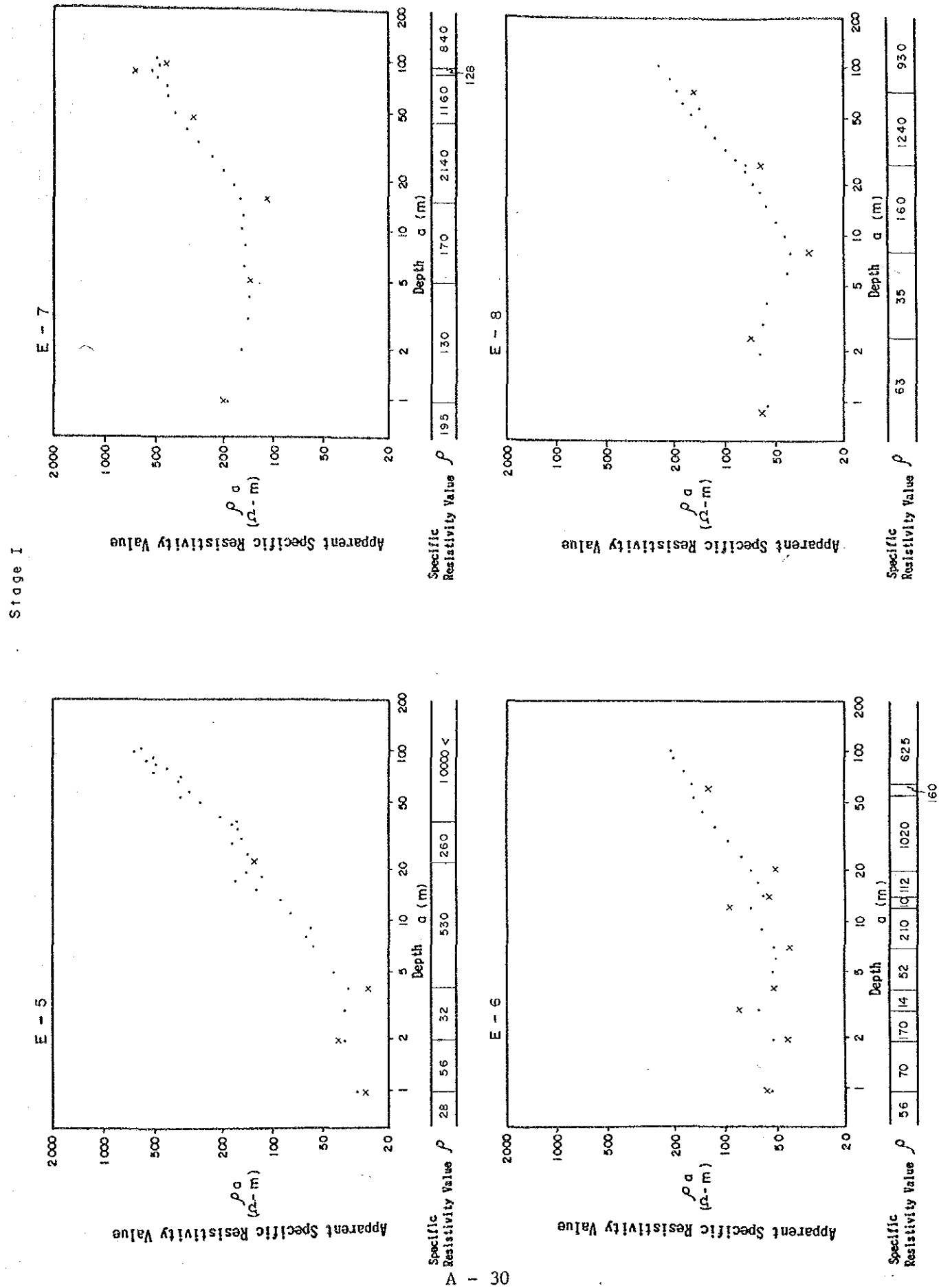


Fig A3-4-1 apparent specific resistivity curve

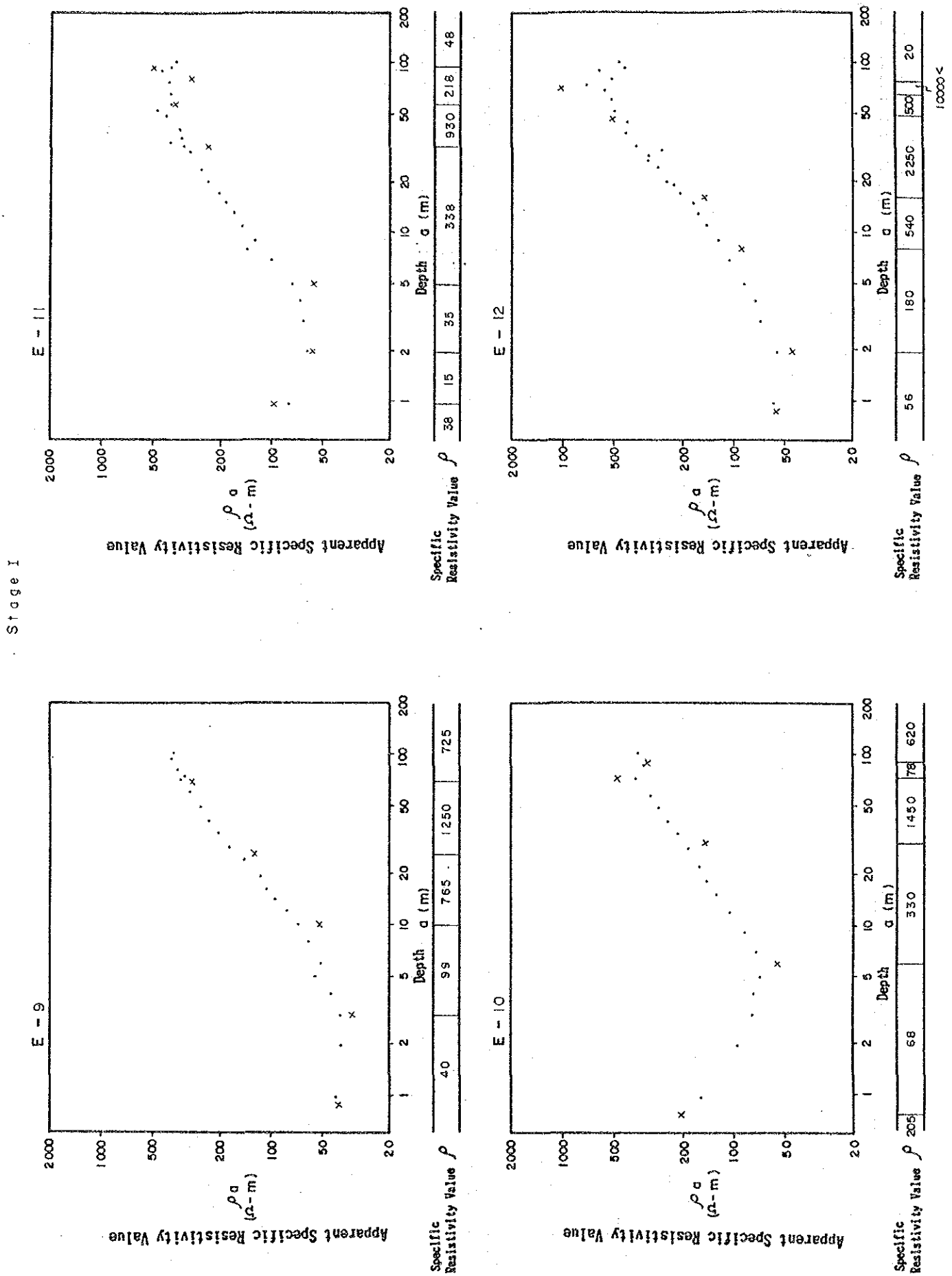


Fig A3-4-1 apparent specific resistivity curve

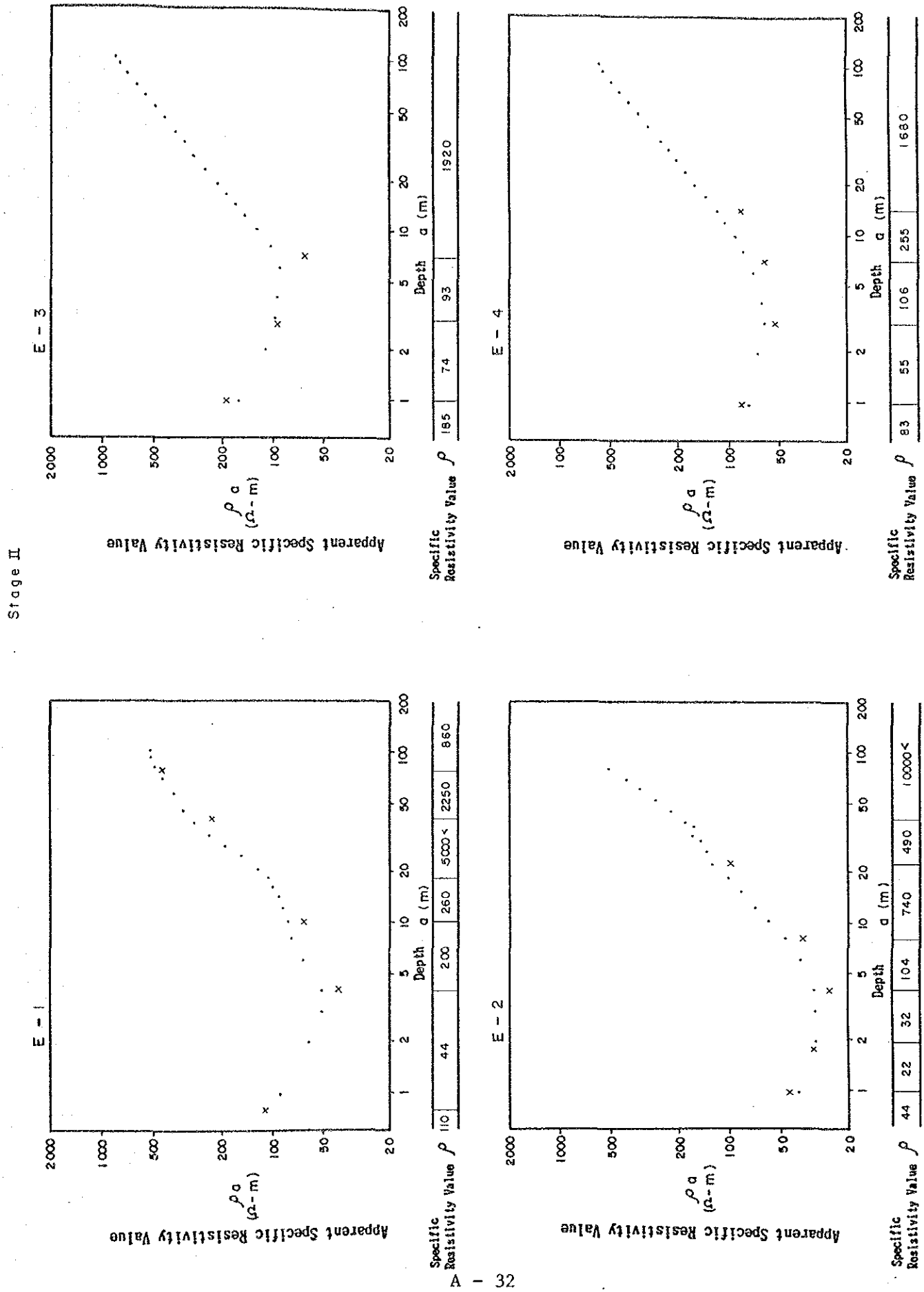
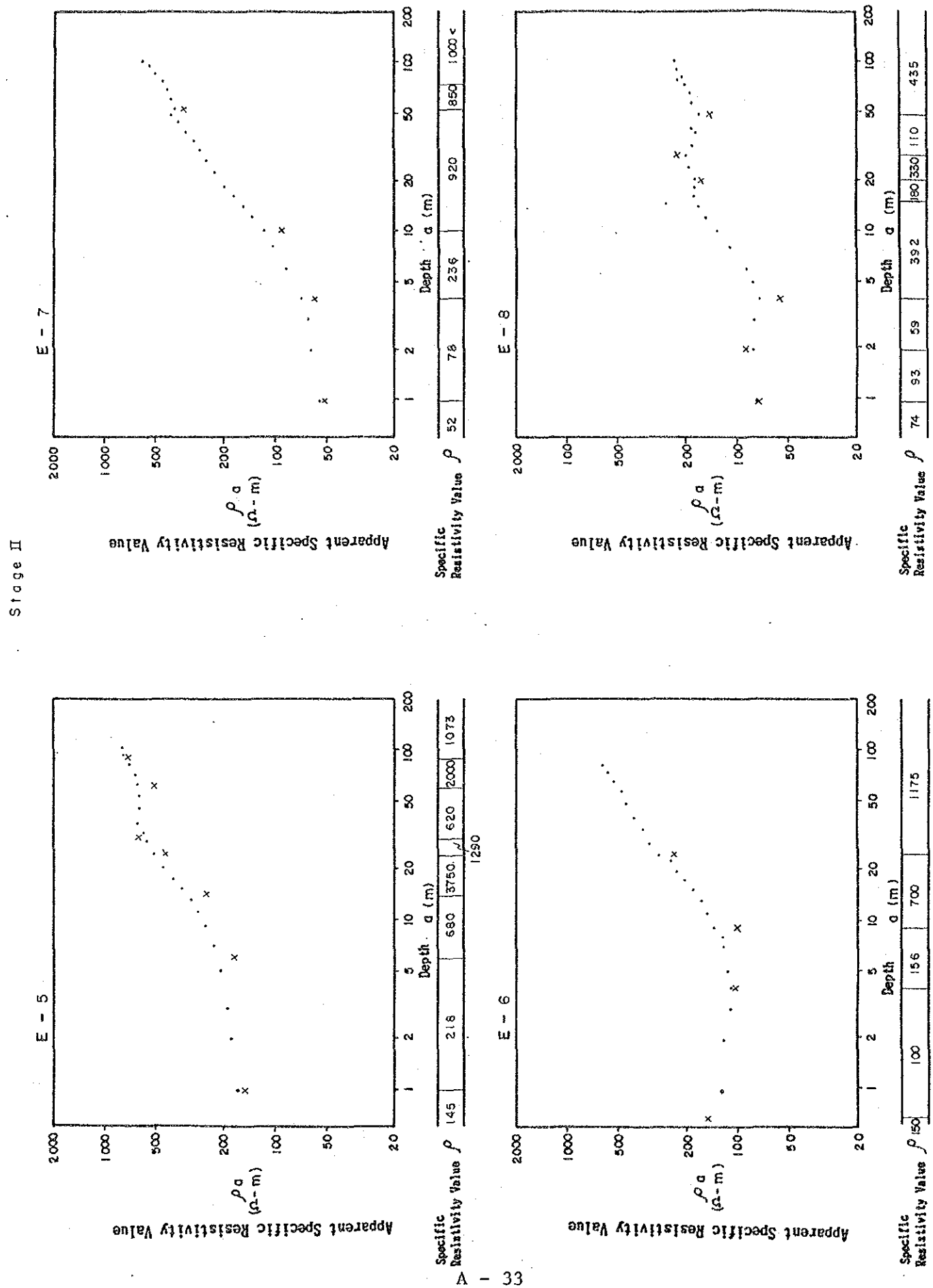
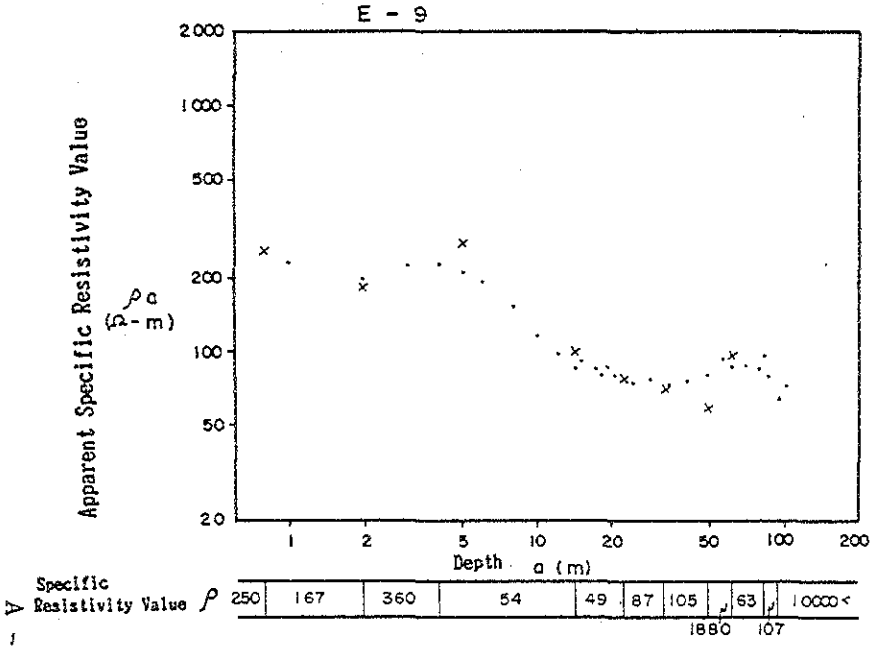
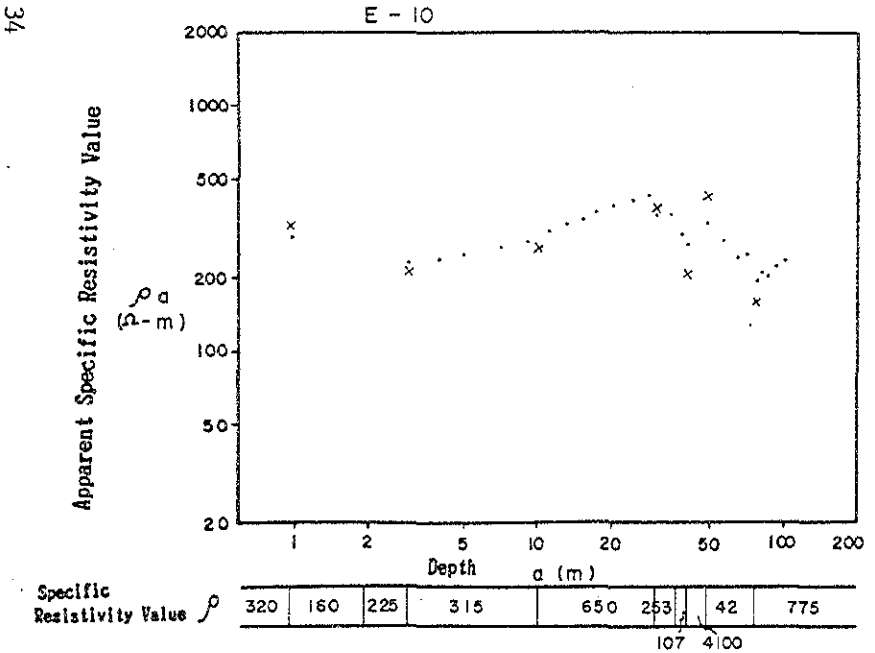
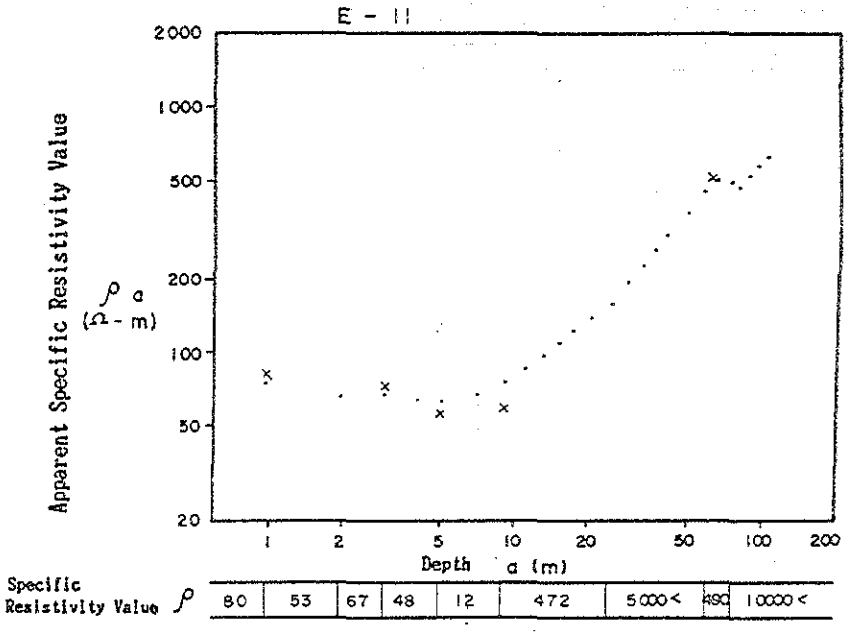


Fig A3-4-1 apparent specific resistivity curve









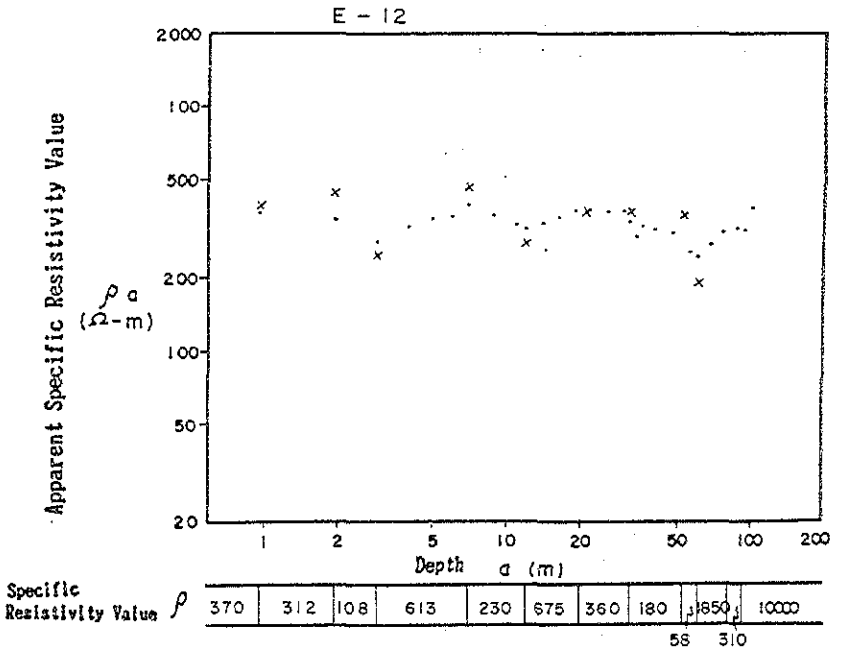


Fig A3-4-1 apparent specific resistivity curve

Fig A3-4-1 apparent specific resistivity curve

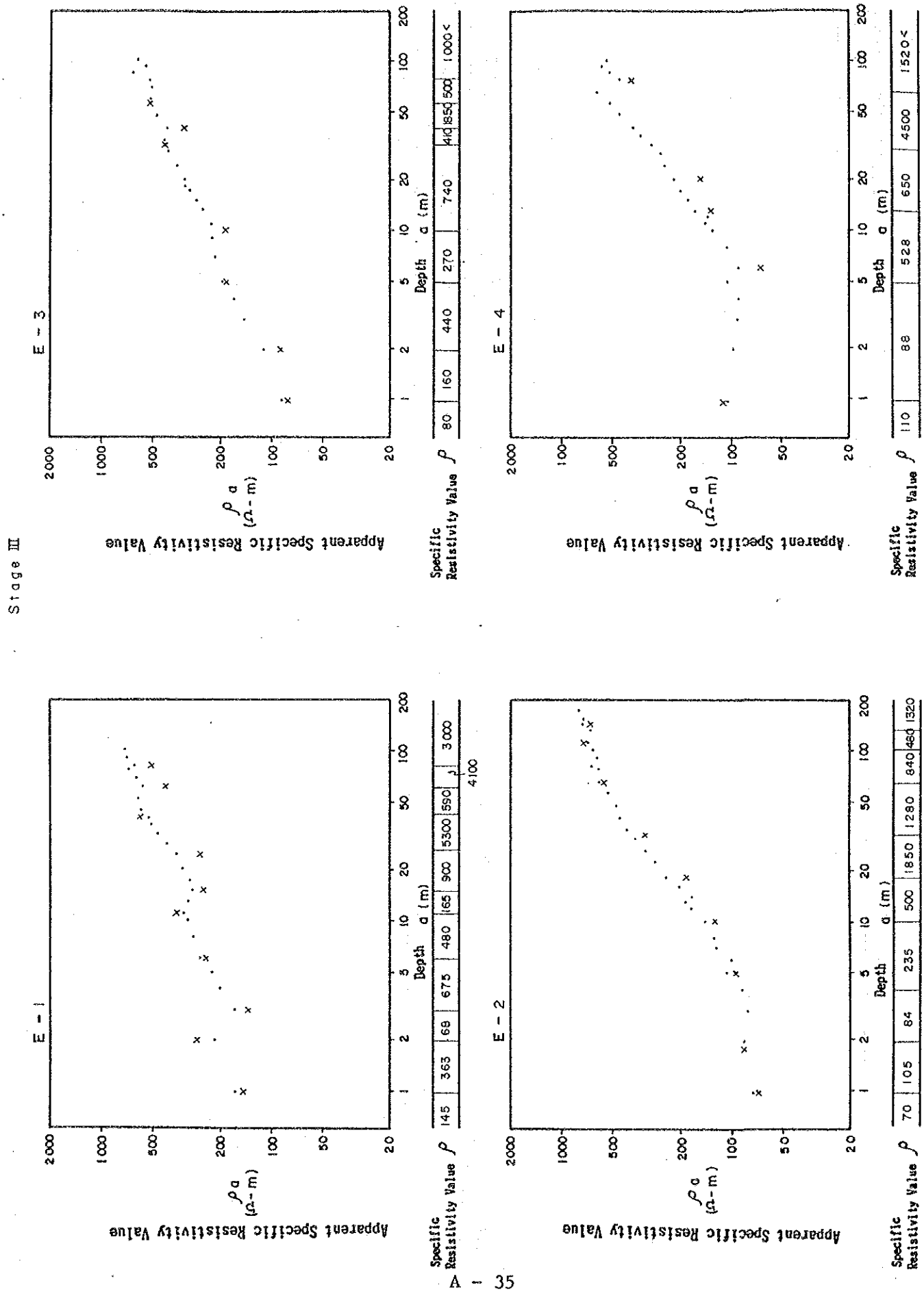


Fig A3-4-1 apparent specific resistivity curve

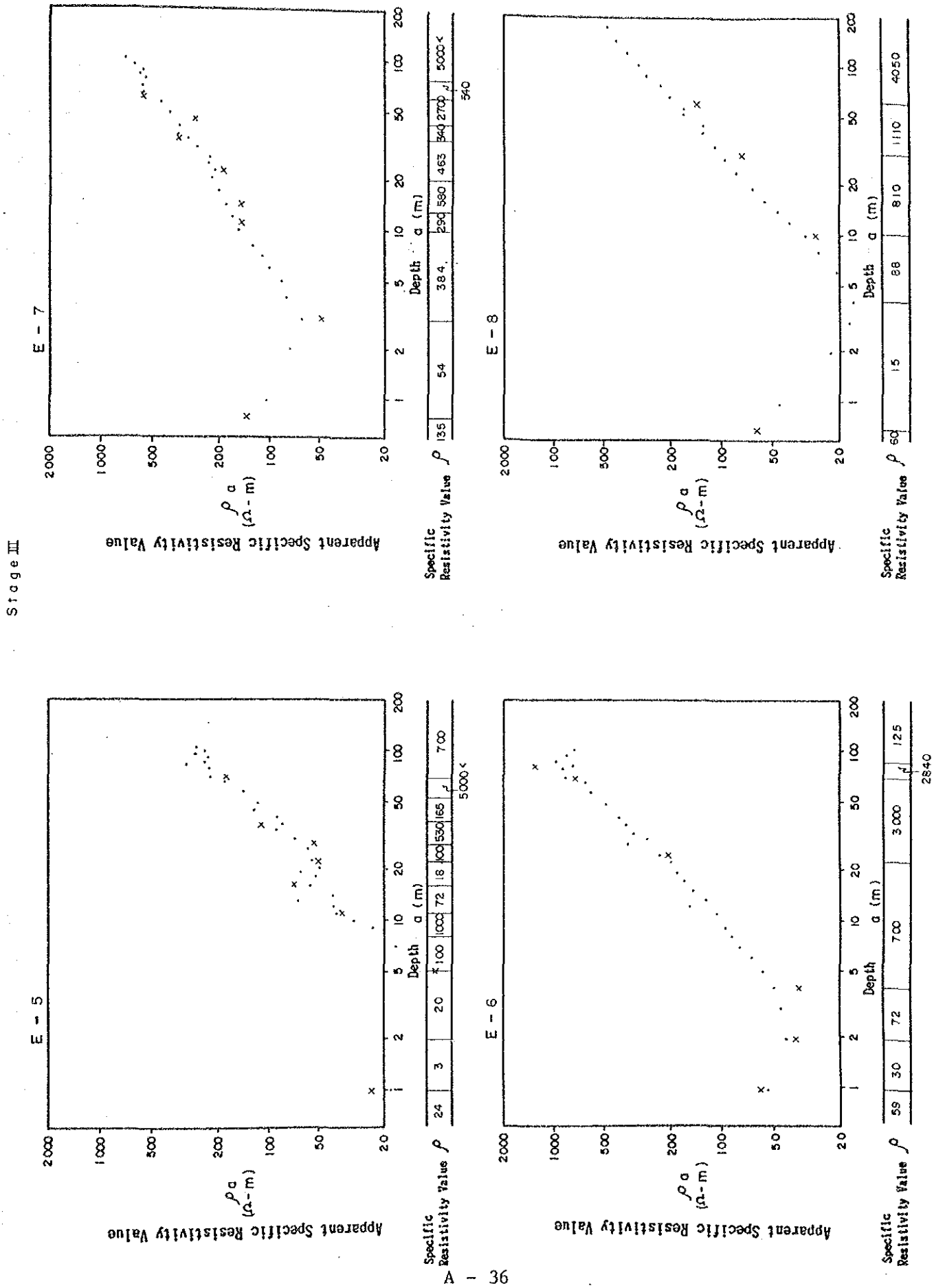


Fig A3-4-1 apparent specific resistivity curve

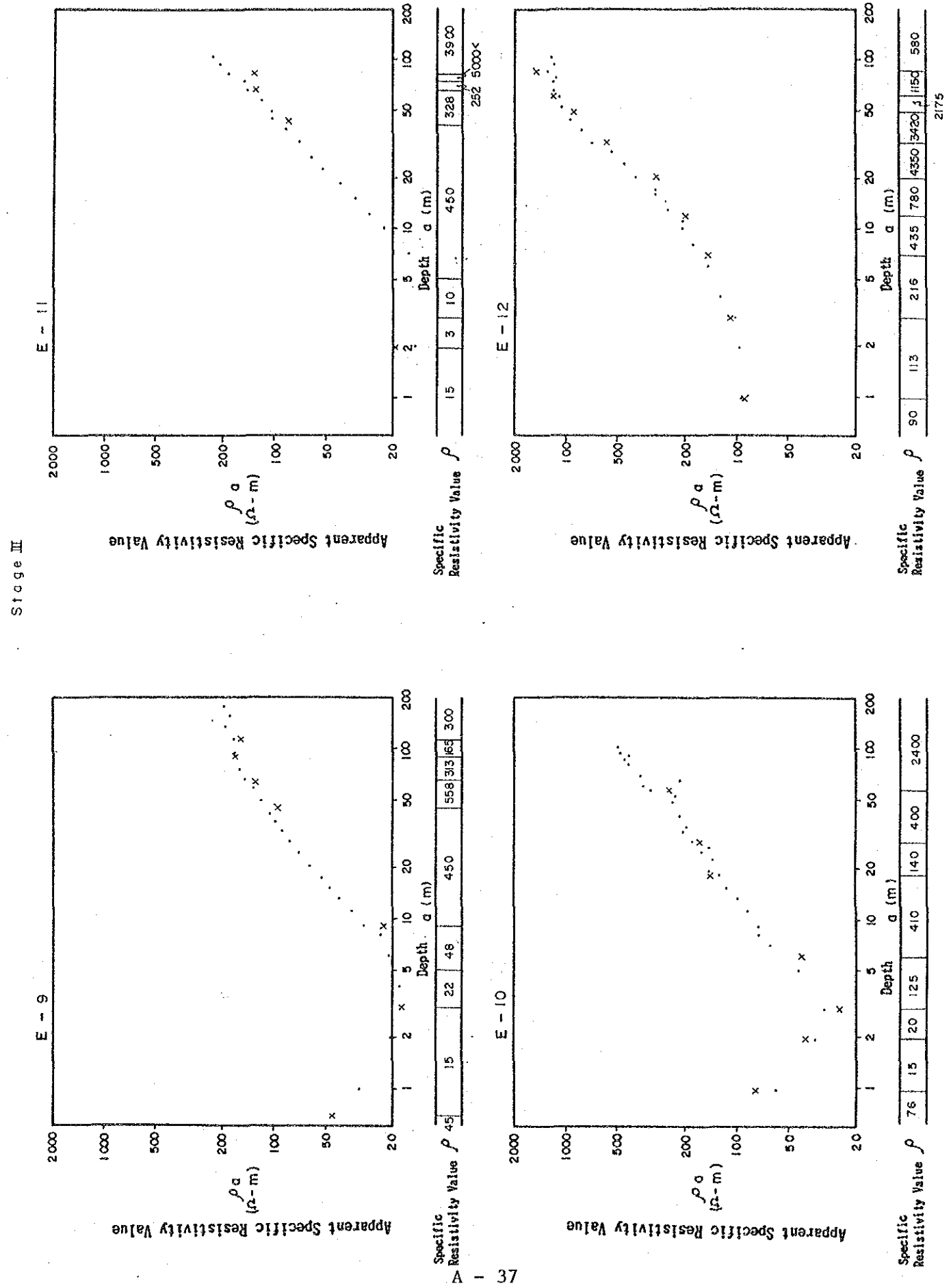
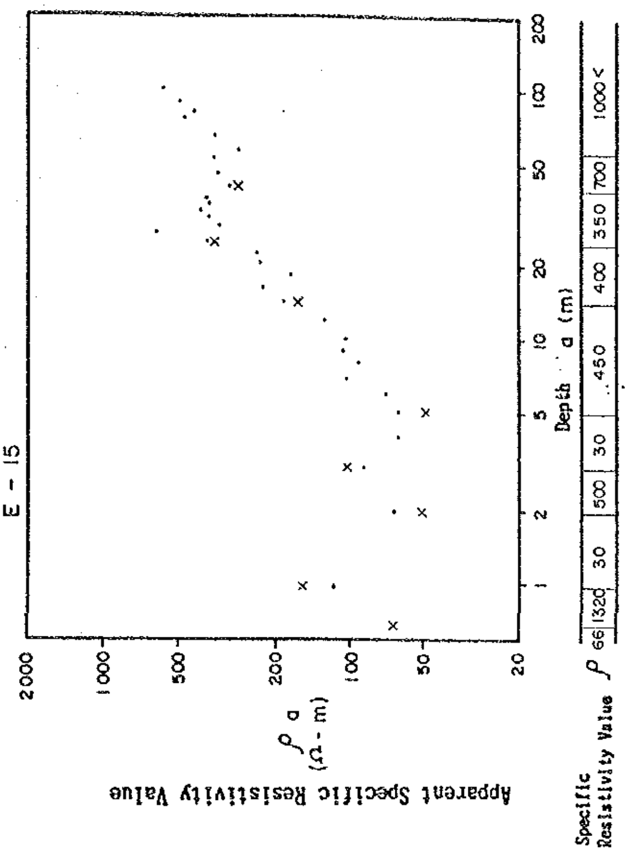
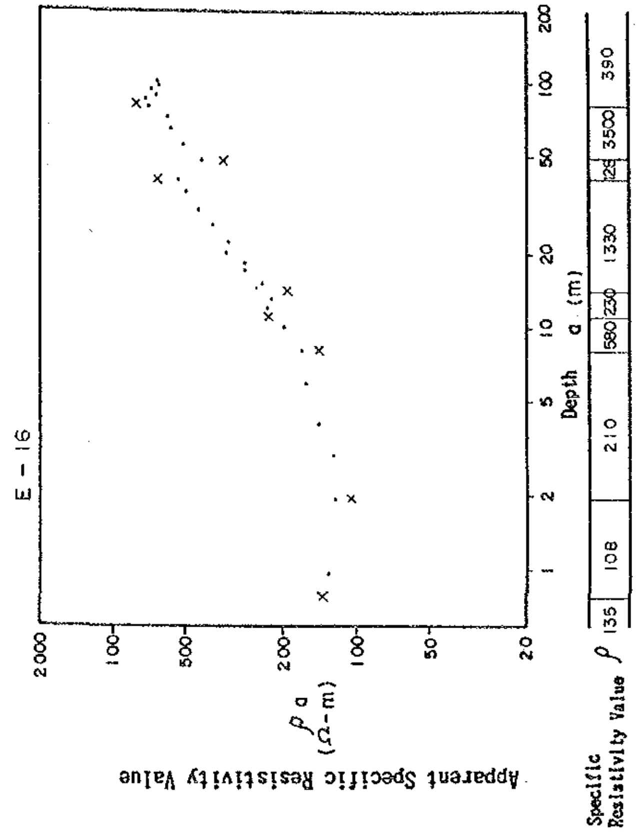
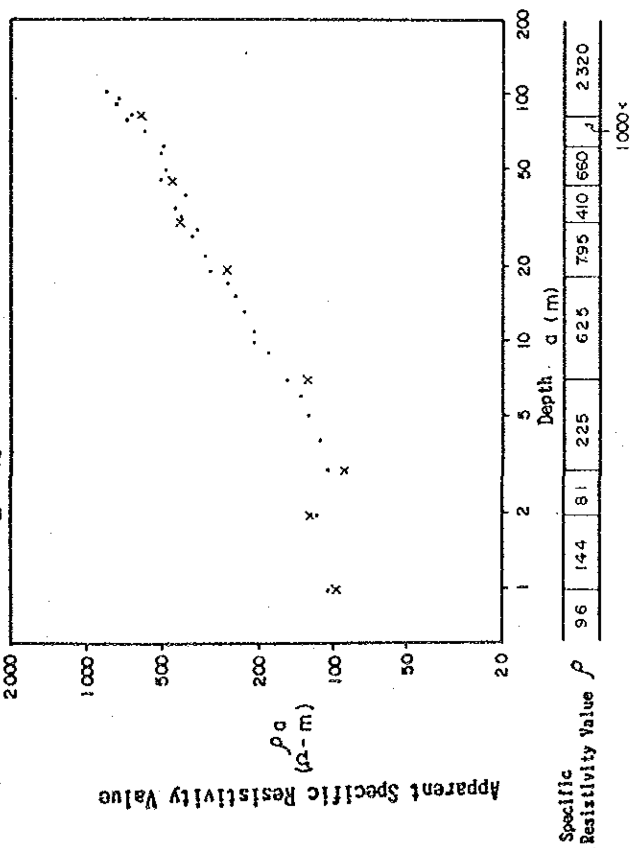


Fig A3-4-1 apparent specific resistivity curve

Stage Ⅲ







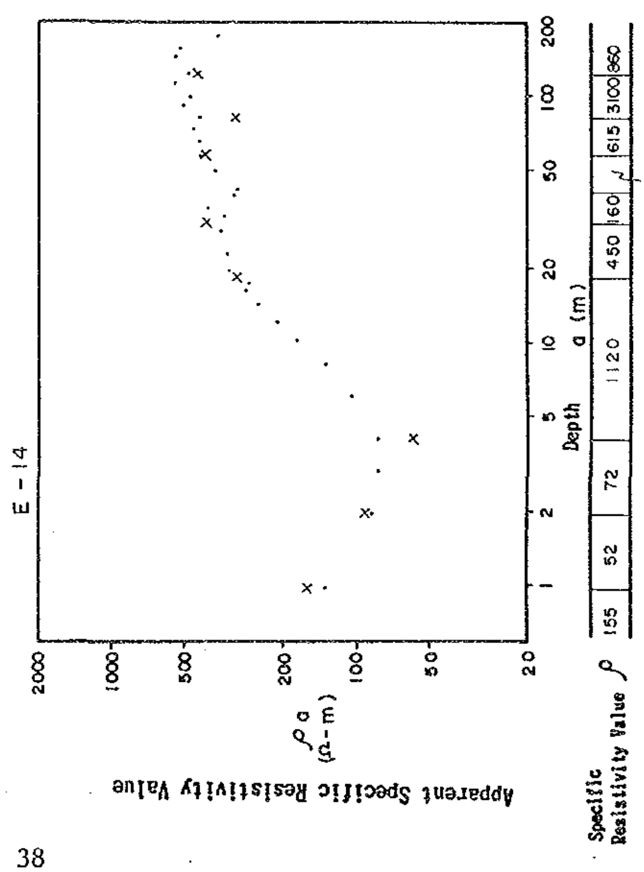


Fig A3-4-1 apparent specific resistivity curve

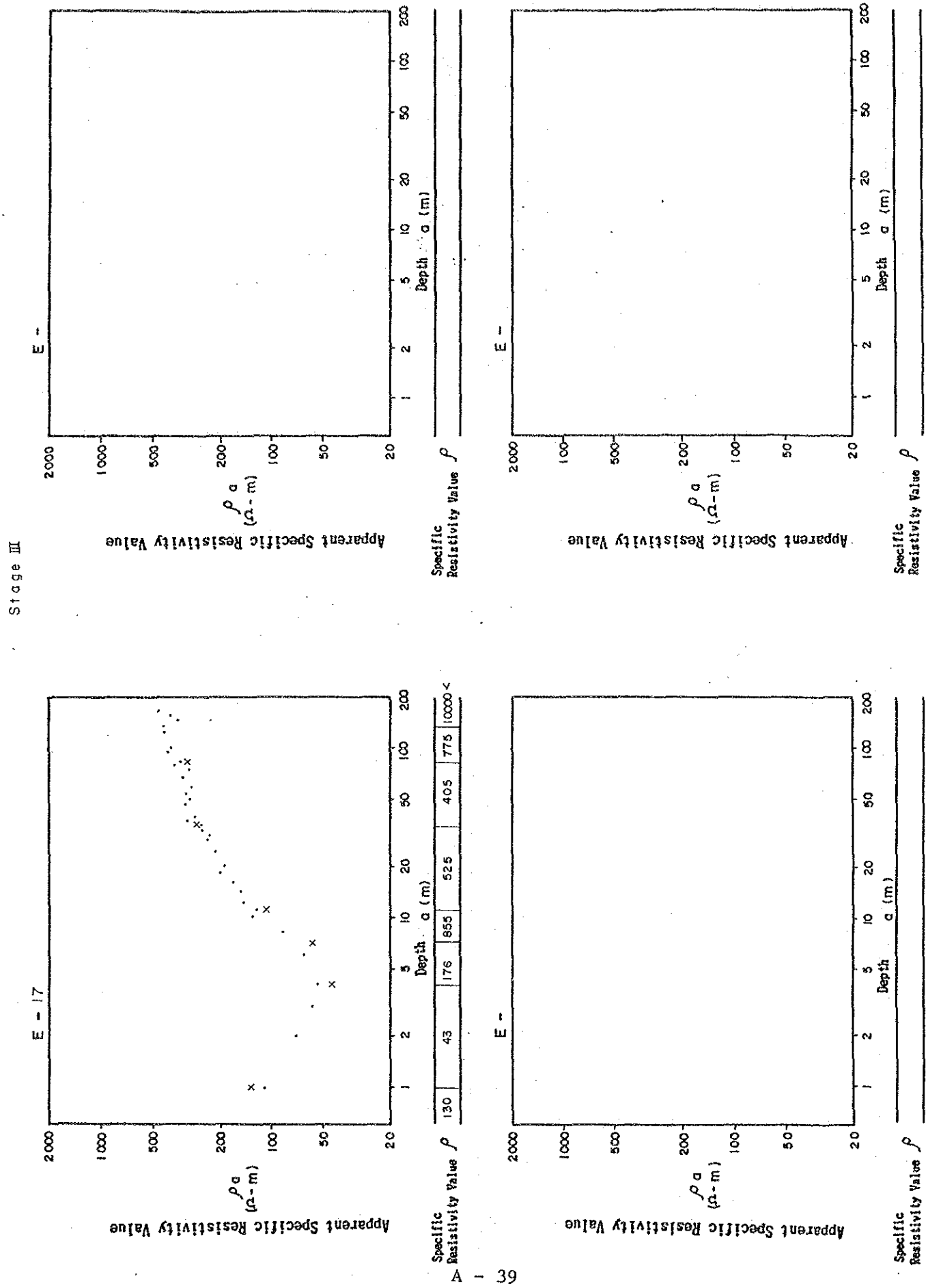


Fig A3-4-1 apparent specific resistivity curve

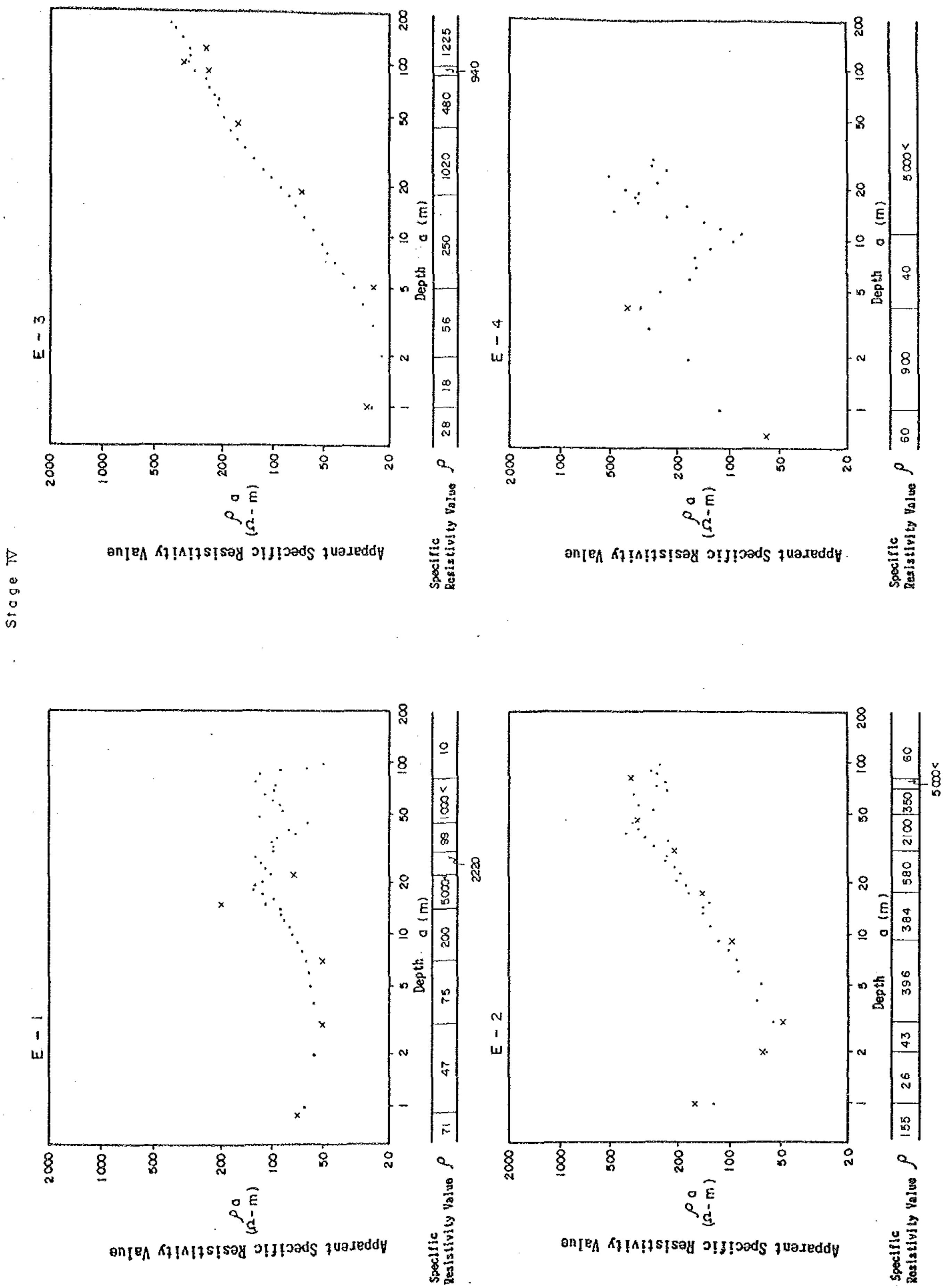


Fig A3-4-1 apparent specific resistivity curve

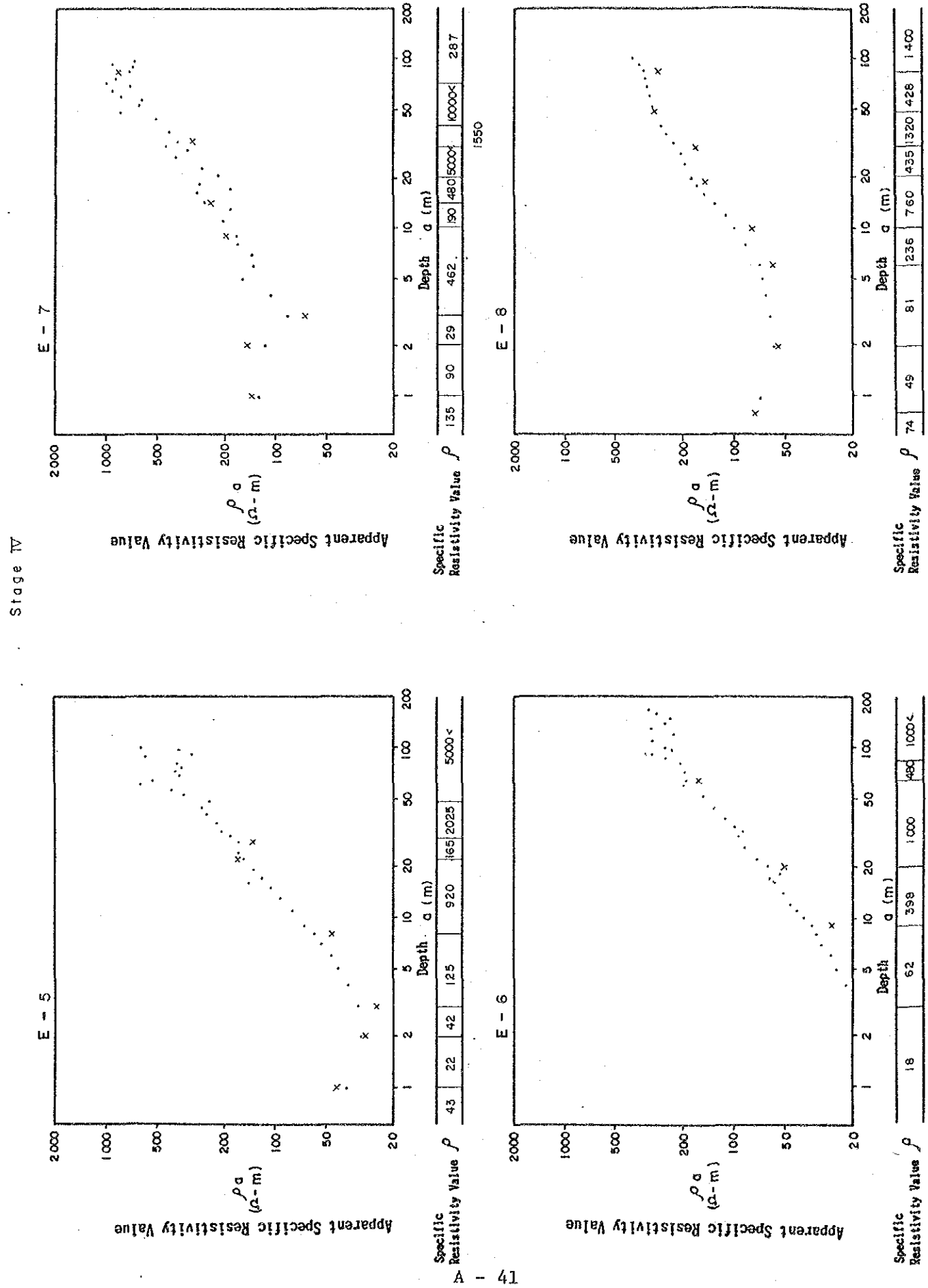


Fig A3-4-1 apparent specific resistivity curve

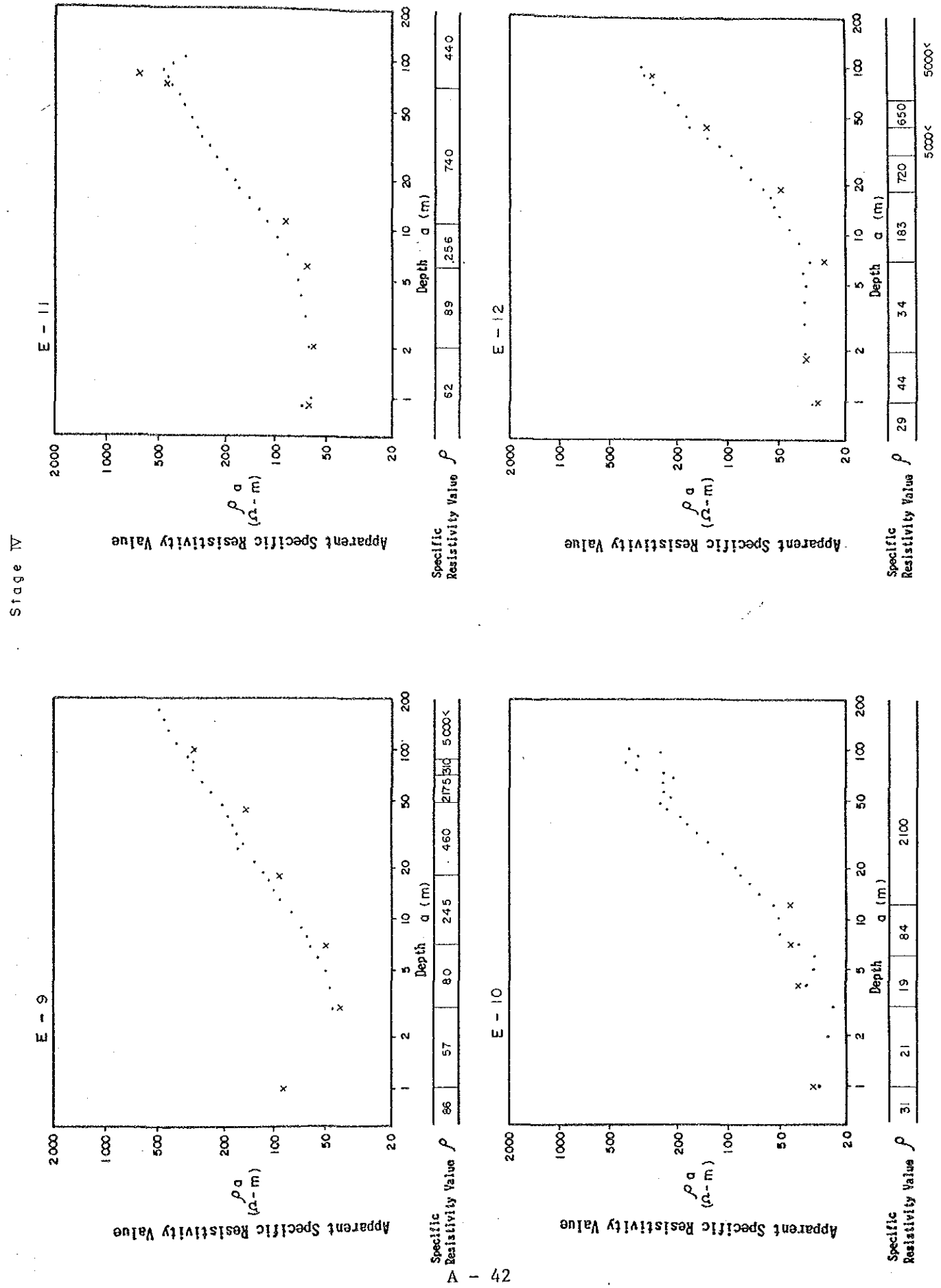
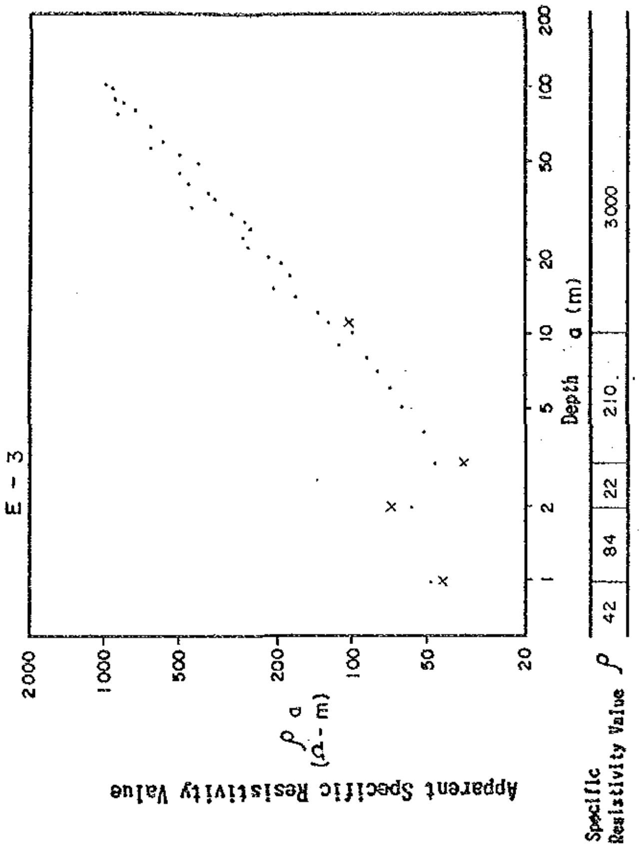
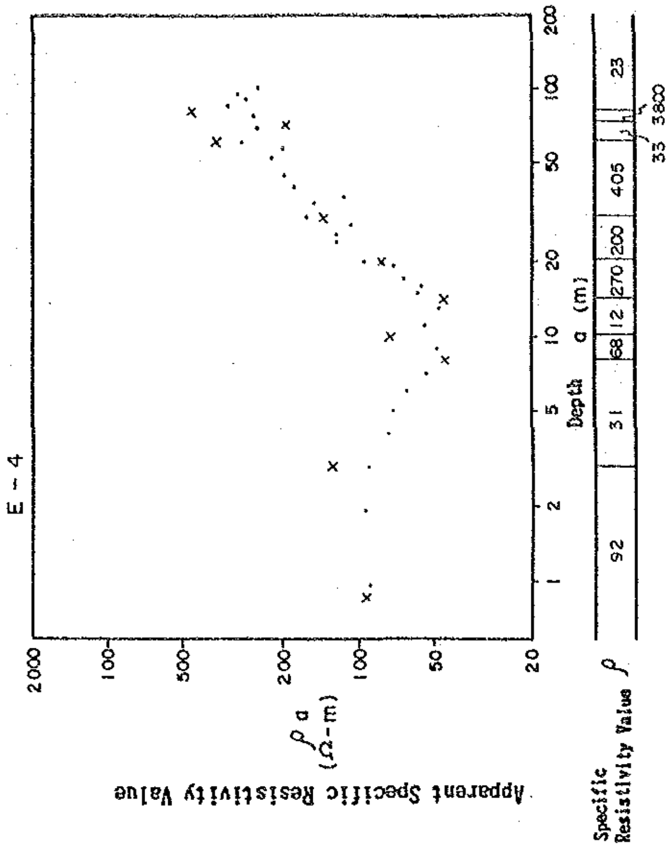
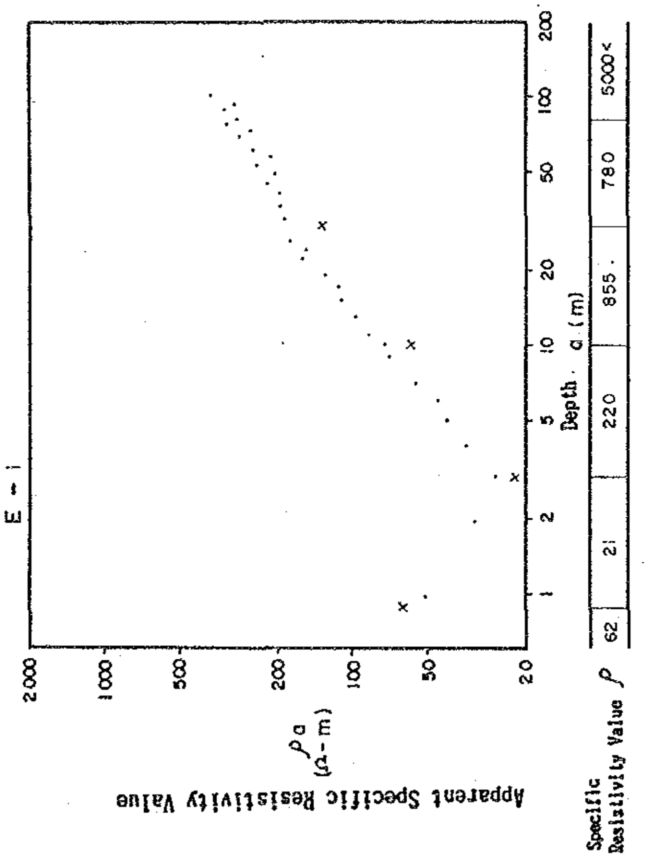


Fig A3-4-1 apparent specific resistivity curve

Nagadeepa







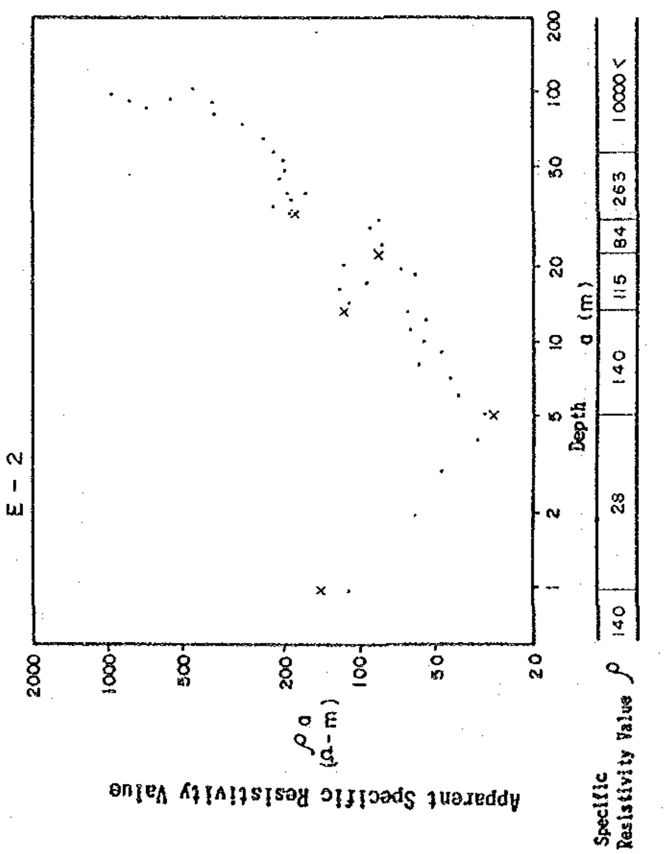


Fig A3-4-1　apparent specific resistivity curve

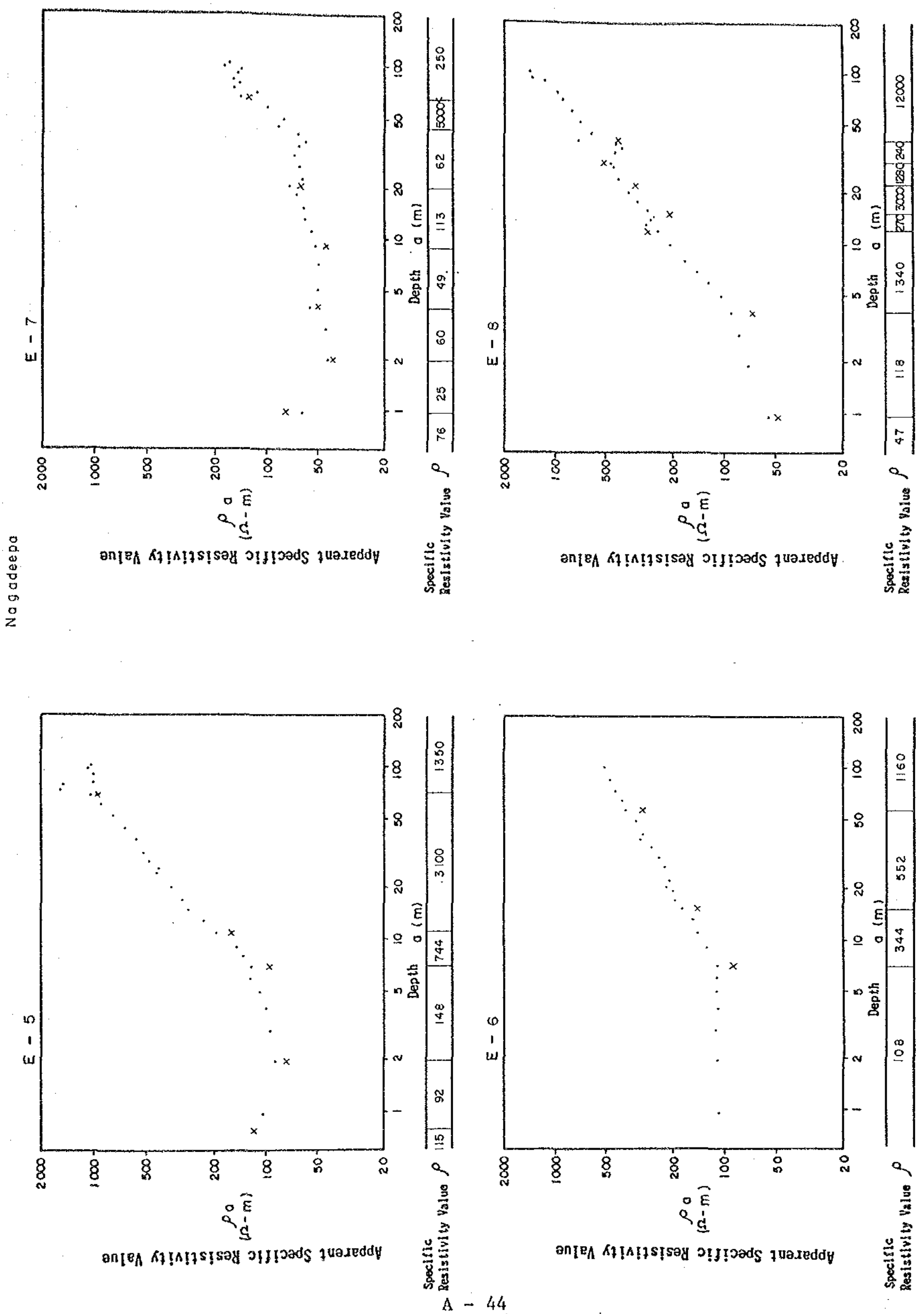


Fig A3-4-1 apparent specific resistivity curve

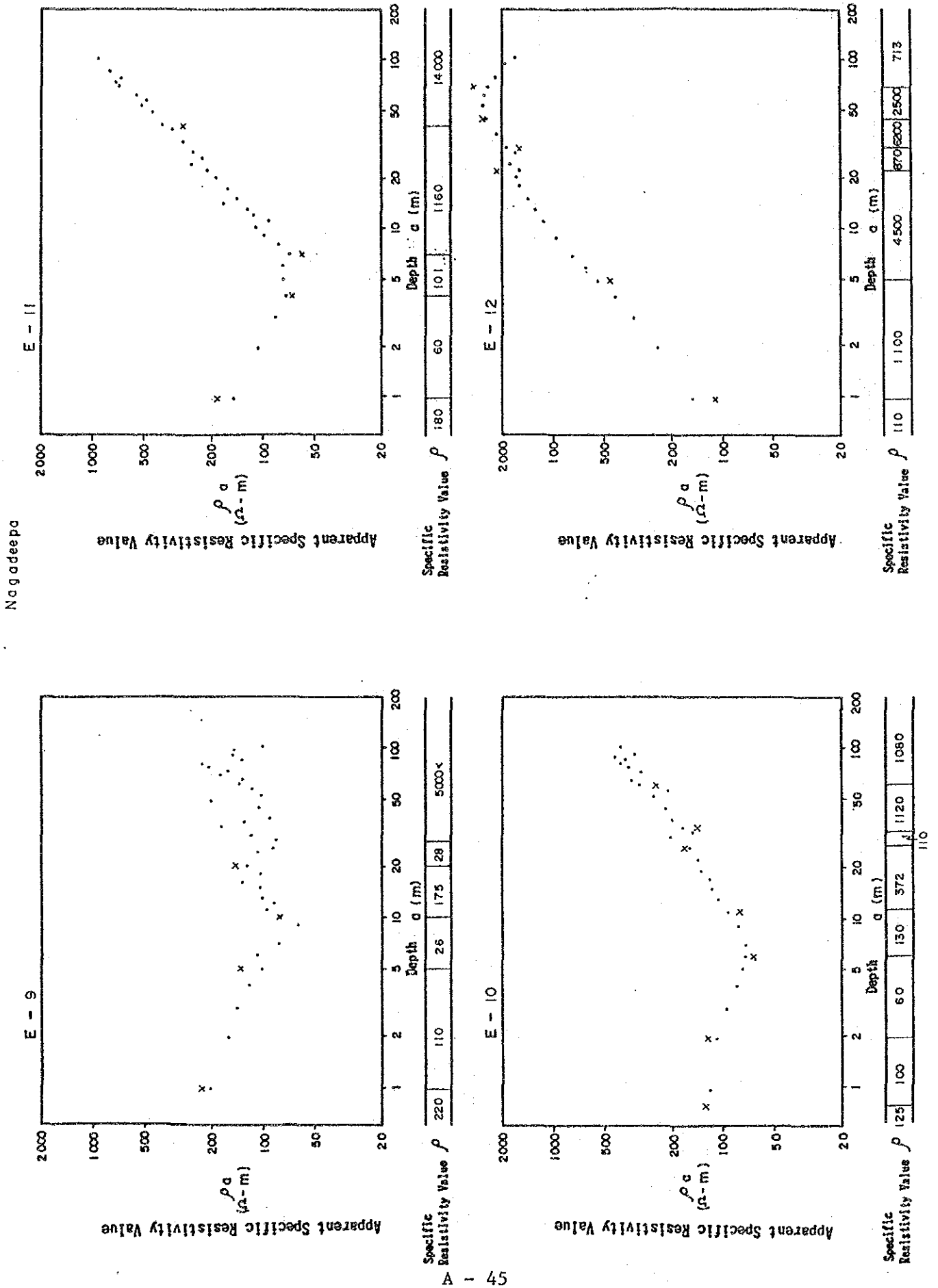


Fig A3-4-1 apparent specific resistivity curve

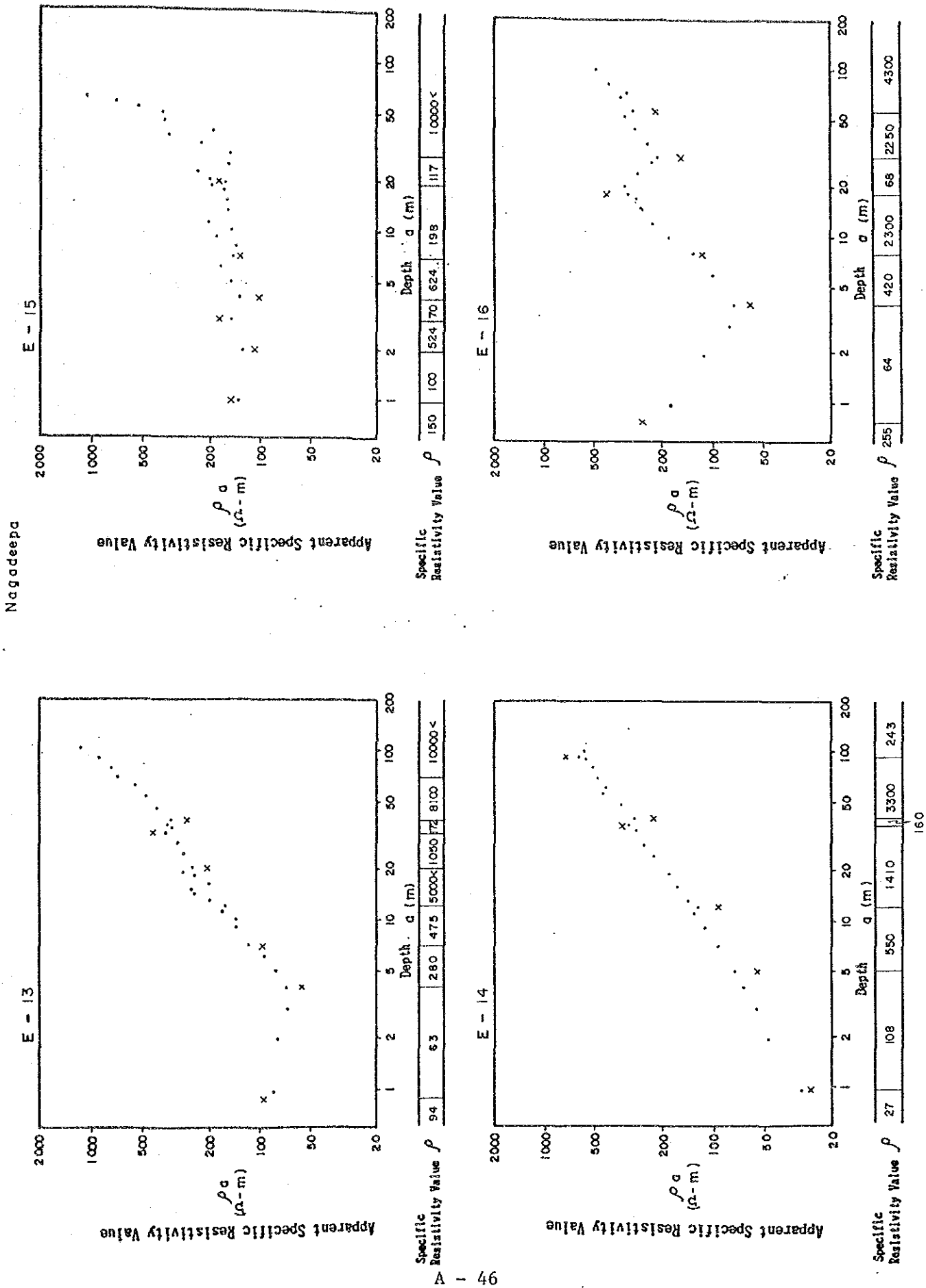
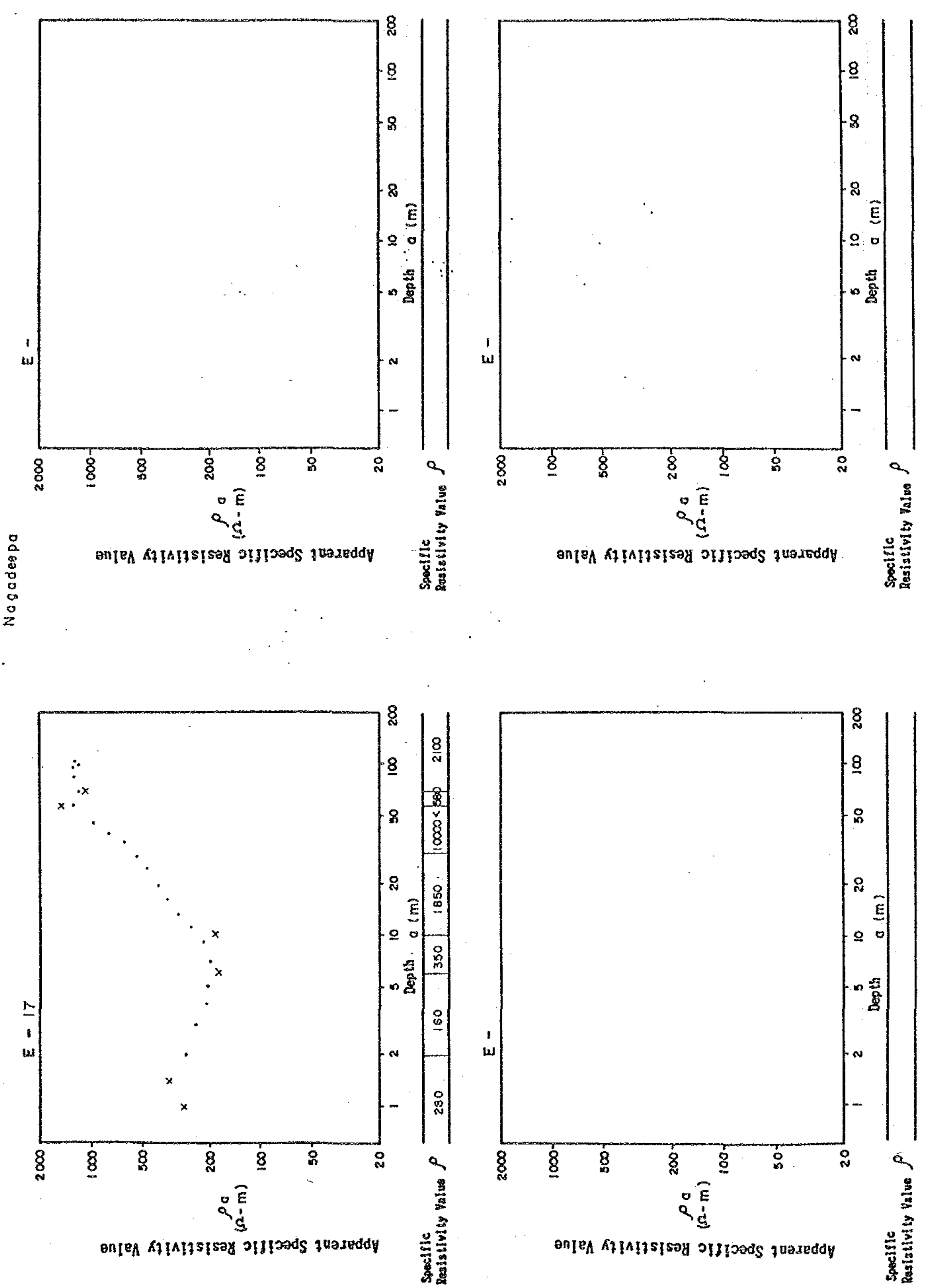
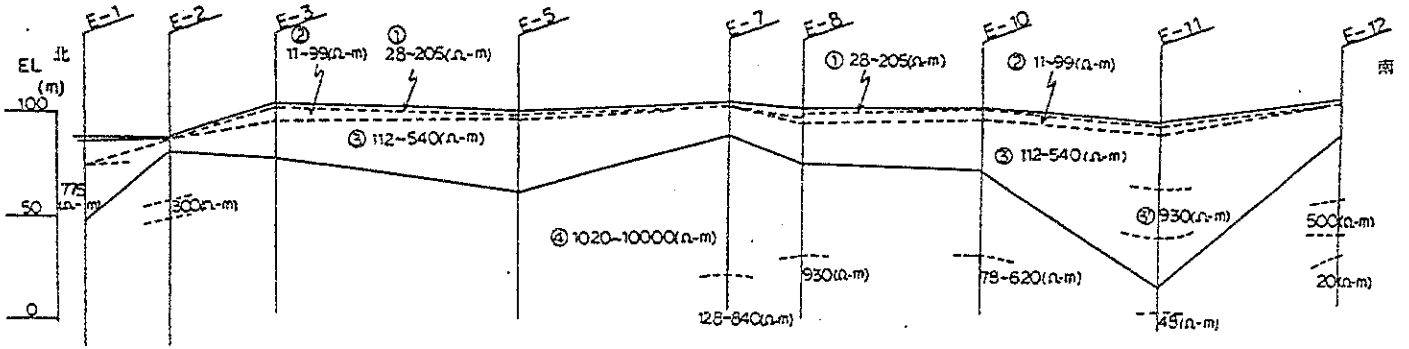


Fig A3-4-1 apparent specific resistivity curve



STAGE I

I—1 section



Reference

1 : 1st layer (Surface soil. Cohesive soil)

2 : 2nd layer (High weathered rock. Sandy soil. Cohesive soil. Aquifer)

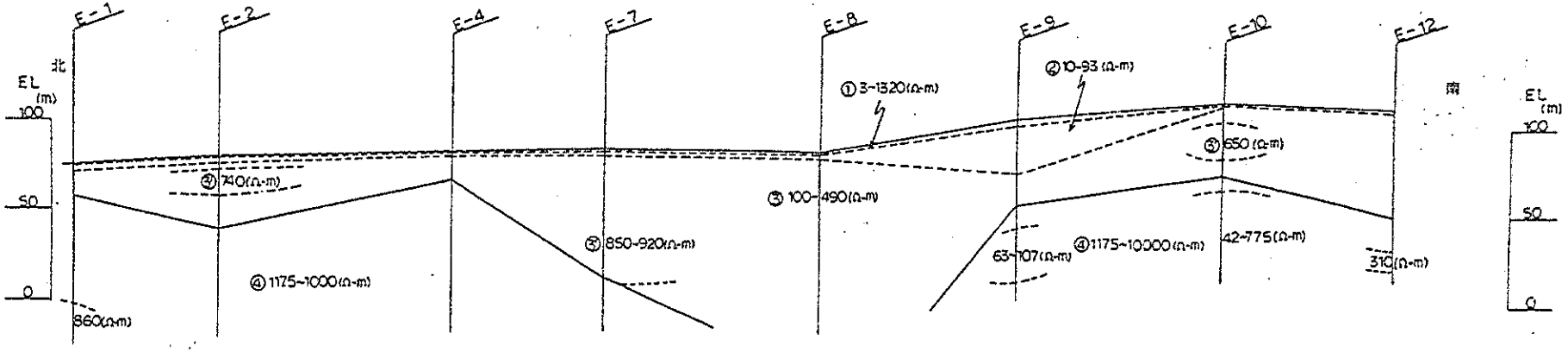
3 : 3rd layer (High weathered rock. Weathered rock. Aquifer)

3': 3'rd layer (Weathered rock. Light weathered rock. Aquifer)

4 : 4th layer (Light weathered rock. Unweathered rock. Aquifer is not expected)

STAGE II

II—1 section

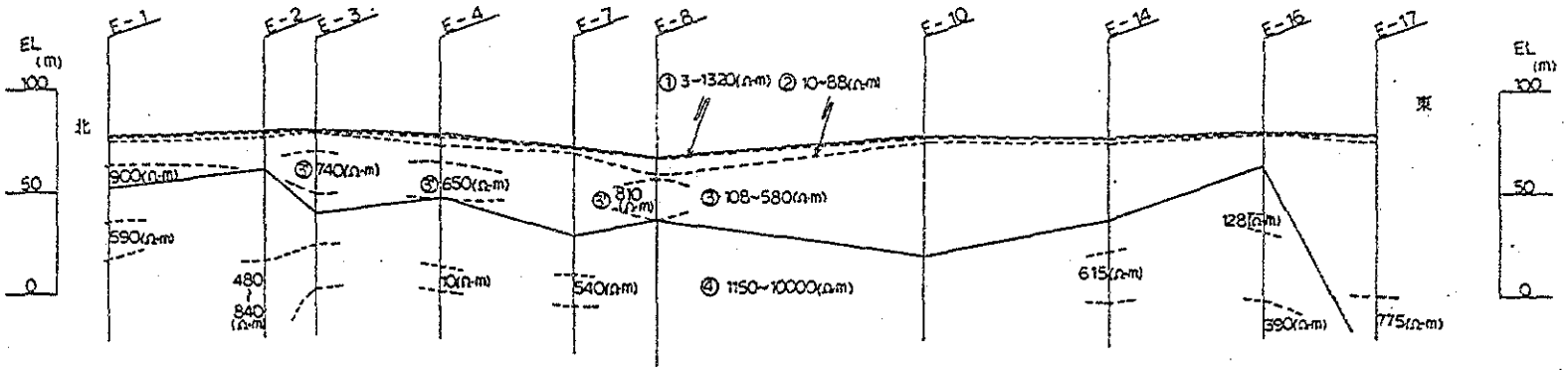


SCALE
0 1 2Km

Fig. A-3-4-2 Cross-Sectional Resistivity (1)

STAGE Ⅲ

Ⅲ－1 section



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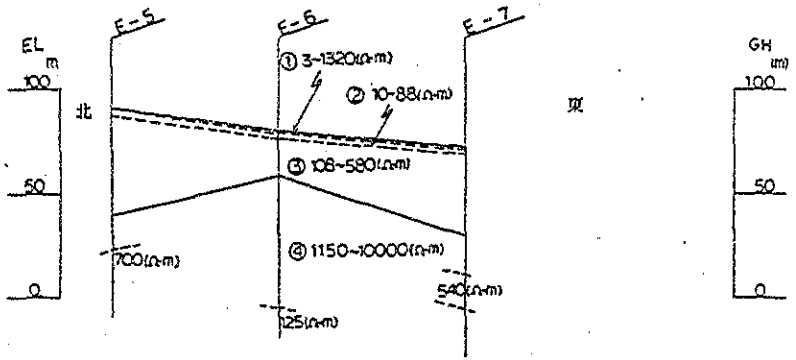
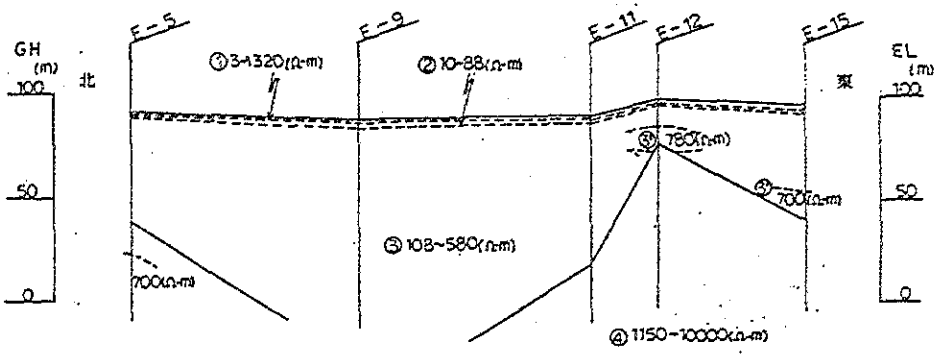
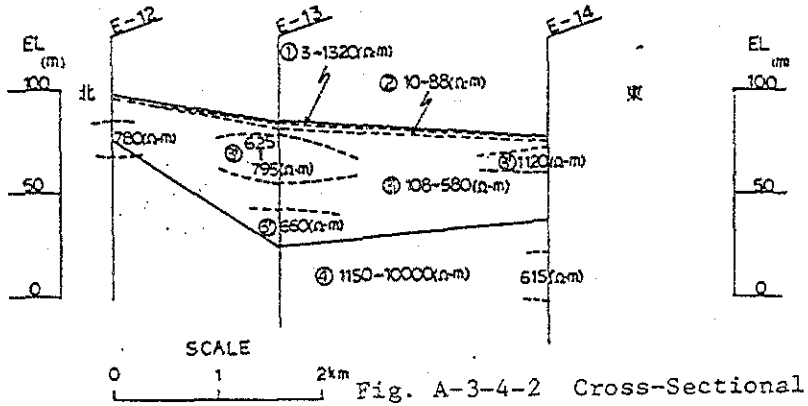


Ⅲ－2 section



Ⅲ－4 section



Reference

1 : 1st layer (Surface soil. Cohesive soil)

2 : 2nd layer (High weathered rock. Sandy soil. Cohesive soil. Aquifer)

3 : 3rd layer (High weathered rock. weathered rock. Aquifer)

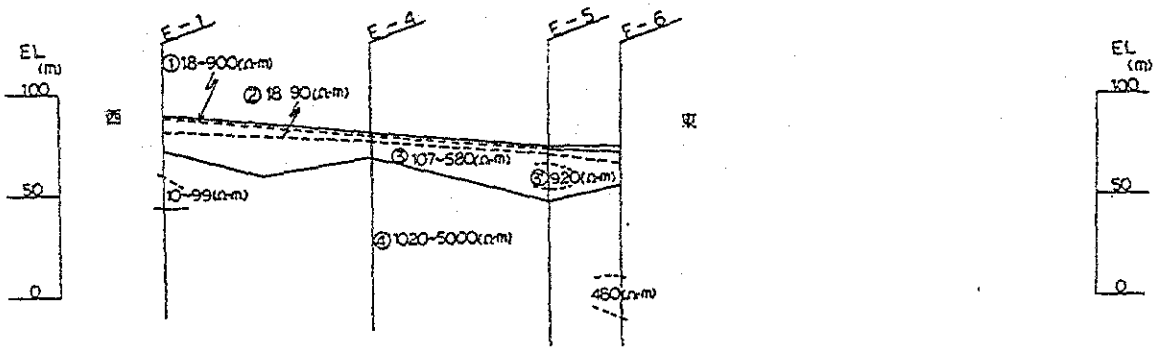
3': 3'rd layer (Weathered rock. Ligth weathered rock. Aquifer)

4 : 4th layer (Light weathered rock. Unweathered rock. Aquifer is not expected)

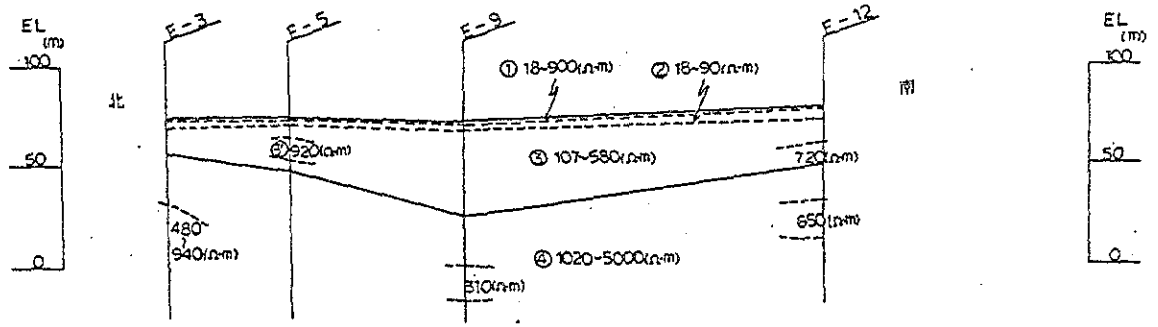
Fig. A-3-4-2 Cross-Sectional Resistivity (2)

STAGE Ⅳ

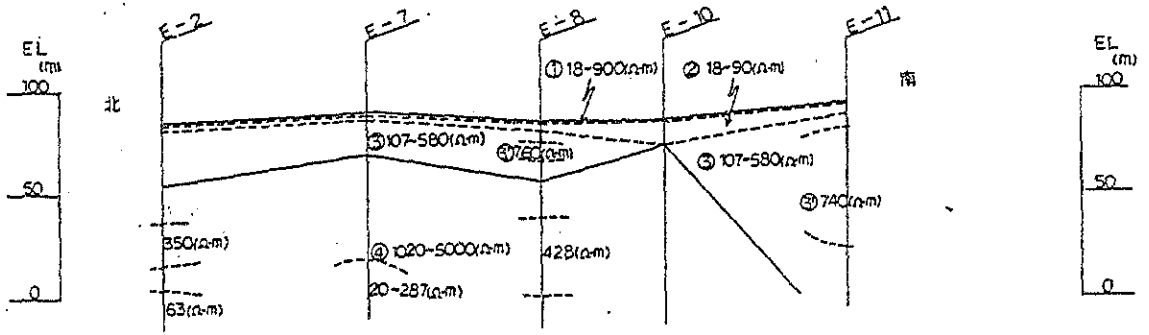
Ⅳ－1 section



Ⅳ－2 section



Ⅳ－3 section



SCALE
0 1 2km

Fig. A-3-4-2 Cross-Sectional Resistivity (3)

Reference

1 : 1st layer (Surface soil. Cohesive soil)

2 : 2nd layer (High weathered rock. Sandy soil. Cohesive soil. Aquifer)

3 : 3rd layer (High weathered rock. weathered rock. Aquifer)

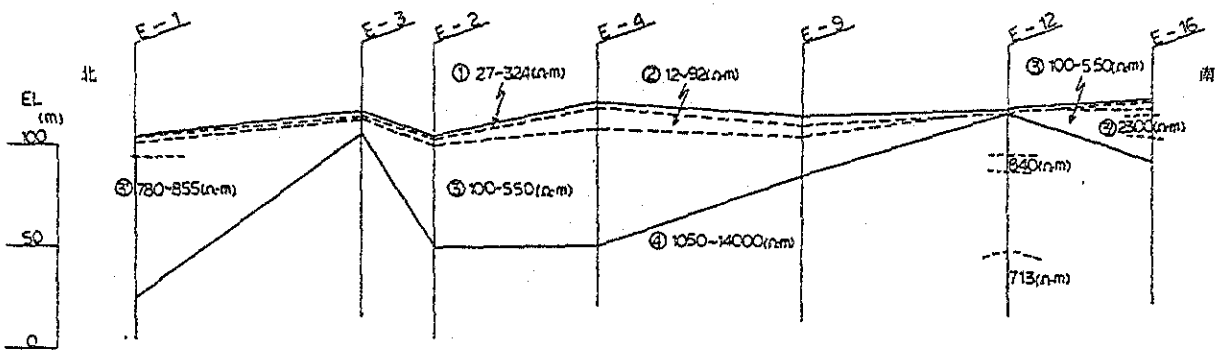
3': 3'rd layer (Weathered rock. Ligth weathered rock. Aquifer)

4 : 4th layer (Light weathered rock. Unweathered rock. Aquifer is not expected)

NAGADEEPA

Fig. A-3-4-2 Cross-sectional Resistivity (4)

N－1 section



Reference

1 : 1st layer (Surface soil. Cohesive soil)

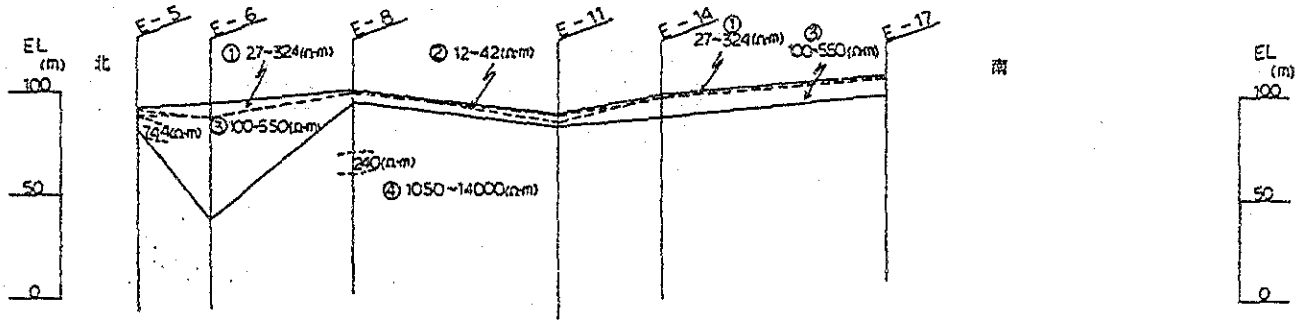
2 : 2nd layer (High weathered rock. Sandy soil. Cohesive soil. Aquifer)

3 : 3rd layer (High weathered rock. Weathered rock. Aquifer)

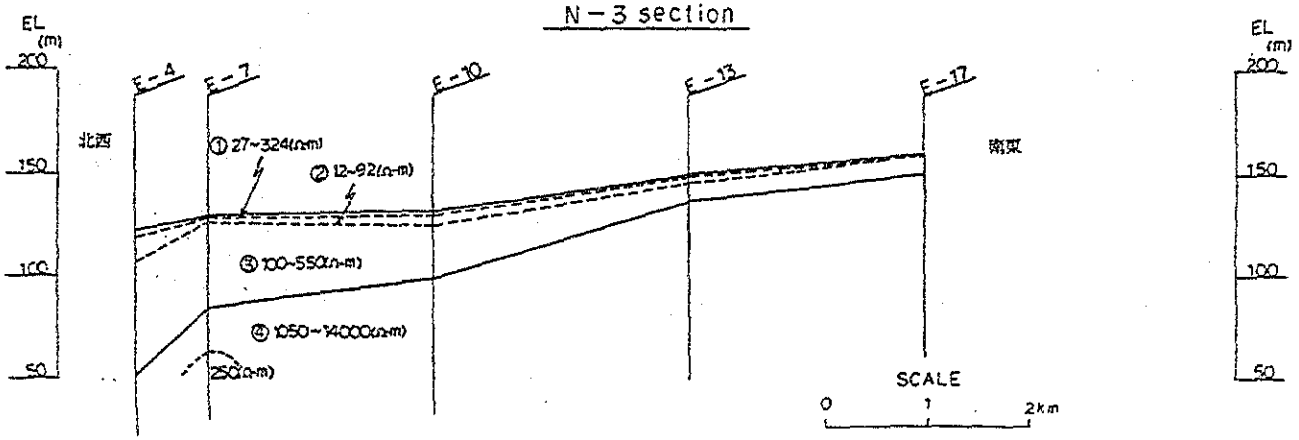
3': 3'rd layer (Weathered rock. Light weathered rock. Aquifer)

4 : 4th layer (Light weathered rock. Unweathered rock. Aquifer is not expected)

N－2 section



N－3 section



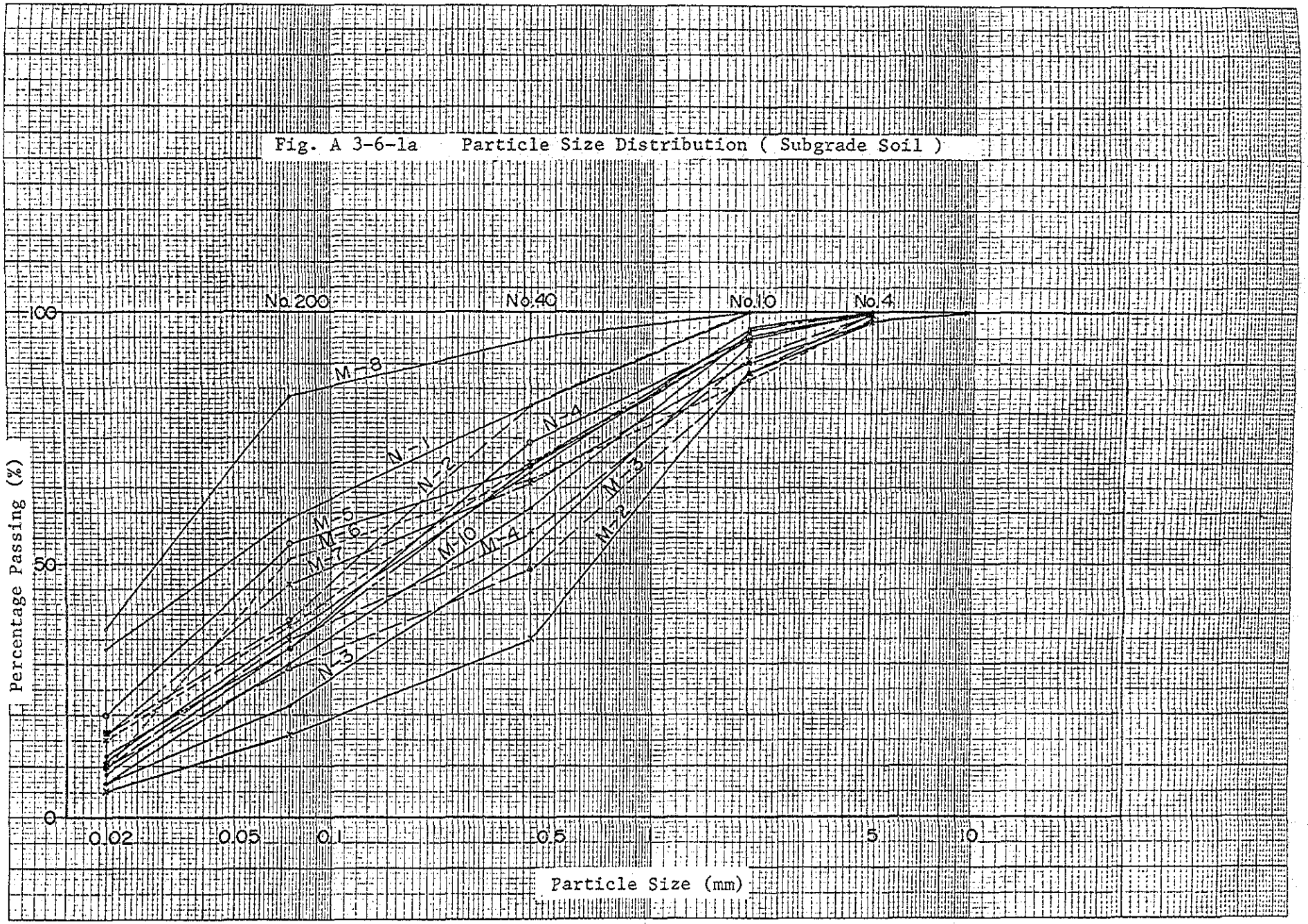


Fig. A 3-6-1a Particle Size Distribution (Subgrade Soil)

Fig. A 3-6-1b Particle Size Distribution (Borrow-pit Soil)