

APPENDICES

APPENDIX 1

**MEMBER LIST
OF
THE STUDY TEAM**

MEMBER LIST OF THE STUDY TEAM

1. First Field Study in the Republic of Ghana

Mr. Koichiro KOROKI	Leader	Deputy Director, Administration Div., Procurement Dept., JICA
Mr. Hidenori NAKAMURA	Project Coordinator	Third Project Management Div., Grant Aid Management Dept., JICA
Mr. Mitsuo KIUCHI	Chief Consultant/ Road Traffic Planner	Katahira & Engineers International
Mr. Minoru MIURA	Bridge Designer I	Katahira & Engineers International
Mr. Keiichi MURAKAMI	Bridge Designer II	Katahira & Engineers International
Mr. Yosuke USUI	River Characteristic Analyst	Katahira & Engineers International

2. Second Field Study in the Republic of Ghana

Mr. Kenji KIYOMIZU	Leader	Development Specialist, JICA
Mr. Mitsuo KIUCHI	Chief Consultant/ Road Traffic Planner	Katahira & Engineers International
Mr. Minoru MIURA	Bridge Designer I	Katahira & Engineers International
Mr. Keiichi MURAKAMI	Bridge Designer II	Katahira & Engineers International
Mr. Hidetaka SAGARA	Topographic Surveyor/ Geologist	Katahira & Engineers International
Mr. Yosuke USUI	River Characteristic Analyst	Katahira & Engineers International
Mr. Kazuyuki HIRAOKA	Construction Planner/ Cost Estimator	Katahira & Engineers International

3. Explanation on Draft Report

Mr. Shigetada KAYUMI	Leader	Development Specialist, JICA
Mr. Mitsuo KIUCHI	Chief Consultant/ Road Traffic Planner	Katahira & Engineers International
Mr. Minoru MIURA	Bridge Designer I	Katahira & Engineers International
Mr. Kazuyuki HIRAOKA	Construction Planner/ Cost Estimator	Katahira & Engineers International

APPENDIX 2

STUDY SCHEDULE

STUDY SCHEDULE

1. First Field Study (January 11 to February 24, 2000)

No.	Date		Activities
1	Jan. 11	Tue.	• Tokyo to London (Messrs. Koroki, Nakamura, Kiuchi, Murakami, Usui)
2	Jan. 12	Wed.	• London to Accra (above 5 members)
3	Jan. 13	Thu.	• Discussion at JICA Ghana and EOJ • Courtesy Call to MOF, MRT and DFR • Discussion with DFR
4	Jan. 14	Fri.	• Site Survey
5	Jan. 15	Sat.	• Site Survey
6	Jan. 16	Sun.	• Team Meeting
7	Jan. 17	Mon.	• Discussion with DFR
8	Jan. 18	Tue.	• Discussion with DFR • Discussion with DFID
9	Jan. 19	Wed.	• Discussion with DFR • Report to EOJ
10	Jan. 20	Thu.	• Signing of Minutes of Discussion • Report to JICA Ghana • Left Accra (Messrs. Koroki and Nakamura)
11	Jan. 21	Fri.	• Site Survey • Arrived and left London (Messrs. Koroki and Nakamura)
12	Jan. 22	Sat.	• Site Survey • Arrived Tokyo (Messrs. Koroki and Nakamura)
13	Jan. 23	Sun.	• Site Survey
~15	~ Jan. 25	~Tue.	
16	Jan. 26	Wed.	• Site Survey • Tokyo to London (Mr. Miura)
17	Jan. 27	Thu.	• Site Survey • London to Accra (Mr. Miura)
18	Jan. 28	Fri.	• Discussion at JICA Ghana (Mr. Miura) • Site Survey
19	Jan. 29	Sat.	• Site Survey
20	Jan. 30	Sun.	• Team meeting
21	Jan. 31	Mon.	• Discussion with DFR • Site Survey
22	Feb. 1	Tue.	• Site Survey
~30	~Feb. 9	~Wed.	

No.	Date		Activities
31 ~38	Feb. 10 ~Feb. 17	Thu. ~Thu.	<ul style="list-style-type: none"> • Compilation of Site Survey Results • Discussion with DFR
39	Feb. 18	Fri.	<ul style="list-style-type: none"> • Report to DFR • Report to JICA Ghana and EOJ
40 ~41	Feb. 19 ~Feb. 20	Sat. ~Sun.	<ul style="list-style-type: none"> • Team Meeting
42	Feb. 21	Mon.	<ul style="list-style-type: none"> • Left Accra (Messrs. Kiuchi, Miura, Hiraoka, Usui)
43	Feb. 22	Tue.	<ul style="list-style-type: none"> • Arrived London (above 4 members) • Procurement Survey from Third Country
44	Feb. 23	Wed.	<ul style="list-style-type: none"> • Left London (above 4 members)
45	Feb. 24	Thu.	<ul style="list-style-type: none"> • Arrived Tokyo (above 4 members)

2. Second Field Study (April 5 to June 13, 2000)

No.	Date		Activities
1	Apr. 5	Wed.	<ul style="list-style-type: none"> • Tokyo to London (Messrs. Kiyomizu, Kiuchi, Miura, Murakami, Sagara, Hiraoka)
2	Apr. 6	Thu.	<ul style="list-style-type: none"> • London to Accra (above 6 members)
3	Apr. 7	Fri.	<ul style="list-style-type: none"> • Report to and discussion at JICA Ghana • Courtesy Call to MRT and DFR • Discussion with DFR
4 ~5	Apr. 8 ~Apr. 9	Sat. ~Sun.	<ul style="list-style-type: none"> • Site Survey
6	Apr. 10	Mon.	<ul style="list-style-type: none"> • Discussion with DFR • Tokyo to Zurich (Mr. Usui)
7	Apr. 11	Tue.	<ul style="list-style-type: none"> • Discussion with DFR • Discussion with DFID • Zurich to Accra (Mr. Usui)
8	Apr. 12	Wed.	<ul style="list-style-type: none"> • Signing of Minutes of Discussion • Report to JICA Ghana and EOJ • Site Survey • Left Accra (Mr. Kiyomizu)
9	Apr. 13	Thu.	<ul style="list-style-type: none"> • Site Survey • Arrive London and left for Tokyo (Mr. Kiyomizu)
10	Apr. 14	Fri.	<ul style="list-style-type: none"> • Site Survey • Arrive Tokyo (Mr. Kiyomizu)
11 ~51	Apr. 15 ~May 25	Sat. ~Thu.	<ul style="list-style-type: none"> • Site Survey • Compilation of Site Survey Results
52	May 26	Fri.	<ul style="list-style-type: none"> • Report to JICA Ghana • Site Survey • Compilation of Site Survey Results
53 ~54	May 27 ~May 28	Sat. ~Sun.	<ul style="list-style-type: none"> • Site Survey • Compilation of Site Survey Results

No.	Date		Activities
55	May 29	Mon.	<ul style="list-style-type: none"> • Site Survey • Compilation of Site Survey Results • Discussion with DFR • Left Accra (Messrs. Kiuchi and Miura)
56	May 30	Thu.	<ul style="list-style-type: none"> • Site Survey • Compilation of Site Survey Results • Arrived London (above 2 members) • London to Madrid (Mr. Kiuchi)
57	May 31	Wed.	<ul style="list-style-type: none"> • Site Survey • Compilation of Site Survey Results • Procurement Survey in Spain (Mr. Kiuchi) • Procurement Survey in England (Mr. Miura) • Left Accra (Messrs. Murakami, Sagara and Usui)
58	June 1	Thu.	<ul style="list-style-type: none"> • Site Survey • Compilation of Site Survey Results • Procurement Survey in Spain (Mr. Kiuchi) • Procurement Survey in England (Mr. Miura) • Arrived London (above 3 members)
59	June 2	Fri.	<ul style="list-style-type: none"> • Site Survey • Compilation of Site Survey Results • Madrid to London (Mr. Kiuchi) • Left London (Messrs. Kiuchi, Miura, Murakami, Sagara and Usui)
60	June 3	Sat.	<ul style="list-style-type: none"> • Site Survey • Compilation of Site Survey Results • Arrived Tokyo (above 5 members)
61	June 4	Sun.	<ul style="list-style-type: none"> • Site Survey
~64	~June 7	~Wed.	<ul style="list-style-type: none"> • Compilation of Site Survey Results
65	June 8	Thu.	<ul style="list-style-type: none"> • Compilation of Site Survey Results
~67	~June 10	~Sat.	
68	June 11	Sun.	<ul style="list-style-type: none"> • Left Accra (Mr. Hiraoka)
69	June 12	Mon.	<ul style="list-style-type: none"> • Arrived London and Left London (Mr. Hiraoka)
70	June 13	Tue.	<ul style="list-style-type: none"> • Arrived Tokyo (Mr. Hiraoka)

3. Explanation on Draft Report (August 19 to August 30, 2000)

No.	Date		Activities
1	Apr. 19	Sat.	• Tokyo to London (Messrs. Kiuchi, Miura and Hiraoka)
2	Apr. 20	Sun.	• London to Accra (above 3 members)
3	Apr. 21	Mon.	• Report to and discussion with JICA Ghana and EOJ • Explanation of Draft Report to DFR
4	Apr. 22	Tue.	• Explanation of Draft Report to and discussion with DFR
~7	~Apr. 25	~Fri.	• Report to JICA Ghana
8	Apr. 26	Sat.	• Team Meeting • Tokyo to London (Mr. Kayumi)
9	Apr. 27	Sun.	• London to Accra (Mr. Kayumi) • Team Meeting
10	Apr. 28	Mon.	• Signing of Minutes of Discussion • Report to JICA Ghana and EOJ • Left Accra (Messrs. Kayumi, Kiuchi, Miura and Hiraoka)
11	Apr. 29	Tue.	• Arrive and left London (above 4 members)
12	Apr. 30	Wed.	• Arrive Tokyo (above 4 members)

APPENDIX 3

**LIST OF PARTIES CONCERNED
IN THE REPUBLIC OF GHANA**

LIST OF PARTIES CONCERNED IN THE REPUBLIC OF GHANA

Ministry of Finance:

Dr. William Adote	Director, International Economic Relations Division (IERD)
Ms. Ages Batsa	Head, Bilateral Unit, IERD
Mr. Augustis Kwasi Adu	Assistant Desk Officer

Ministry of Roads and Transport:

Mr. Edward K. Salia	Minister
Mr. Kwesi Abbey Sam	Chief Director
Mr. J.L. Lamptey	Director
Mr. Frank Otibu Mpare	Director
Mr. Franu Marnu	Deputy Director
Mr. J.B. Uoraon Reng Yoriec	Senior Engineer
Mr. A.G. Beckley	Coordinator

Department of Feeder Roads:

(Head Office)

Mr. C.D. Antwi	Director, Department of Feeder Roads
Mr. Alex Twumasi-Boakye	Deputy Director (Planning)
Mr. Tony Essilfie	Deputy Director (Maintenance)
Mr. Martin Hmensa	Deputy Director (Development)
Mr. Solomon Gaudiner	Chief Engineer
Mr. Badu Preko	Assistant Engineer

(Regional Office)

Mr. Henry Danso	Regional Engineer (Volta)
Mr. Prince Nfodxo	Deputy Regional Engineer (Eastern)
Mr. C.W. Dartey	Regional Engineer (Central)
Mr. J.A. Ashley	Regional Engineer (Ashanti)
Mr. Kofifse Afadzinu	Sr. Land Surveyor (Ashanti)
Mr. Sanls Sompson	Sr. Technical Officer (Ashanti)
Mr. Peter K. Yawson	Maintenance Engineer (Brong-Ahafo)
Mr. R.O. Otoo	Maintenance Engineer (Upper West)
Mr. C.B. Ofasi	Regional Engineer (Upper East)
Mr. Mahhew Anyimiah	Geodetic Engineer (Northern)
Mr. S. Nunoo	Maintenance Engineer (Northern)

Ghana Highway Authority:

Mr. Peter Dagadu	Acting Director (Bridge Division)
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APPENDIX 4

MINUTES OF DISCUSSION

MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY (1)
ON THE PROJECT FOR
CONSTRUCTION OF SMALL AND MEDIUM SCALE BRIDGES
IN THE REPUBLIC OF GHANA

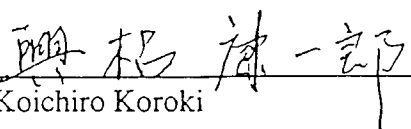
In response to a request from the Government of the Republic of Ghana (hereinafter referred to as "Ghana"), the Government of Japan decided to conduct a Basic Design Study on The Project for Construction of Bridges (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to the Ghana the Basic Design Study (1) Team (hereinafter referred to as "the Team"), which is headed by Mr. Koichiro Koroki, Deputy Director, Administration Division, Procurement Department, JICA, and is scheduled to stay in the country from January 12, 2000 to February 21, 2000.

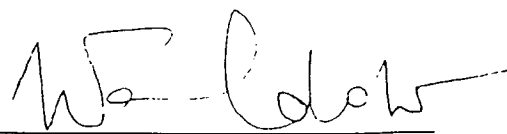
The Team held discussions with the officials concerned of the Government of Ghana and conducted a field survey at the study area.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Interim Report.

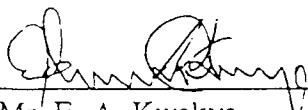
Accra, January 20, 2000



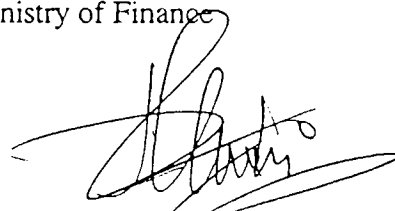
Mr. Koichiro Koroki
Leader
Basic Design Study Team
Japan International Cooperation Agency



Dr. William Adote
Director
International Economic Relations Div.
Ministry of Finance



Mr. E. A. Kwakye
Director, Planning
Ministry of Roads and Transport



Mr. C. D. Antwi
Director
Department of Feeder Roads
Ministry of Roads and Transport

ATTACHMENT

1. Objective of the Project

The objective of the Project is to secure a safe and smooth transport at the targeted feeder roads aiming at improving living standards of rural people and accelerating the rural development by constructing the medium span bridges and providing steel bridges for short span bridges along the feeder roads in 7 Regions (Upper East, Upper West, Northern, Brong-Ahafo, Volta, Ashanti, and Eastern).

The main components of the Project are (A) construction of medium span bridges and (B) procurement of steel bridges for short span bridges in 7 Regions.

2. Project sites

The sites of the Project are shown in Annex-1.

3. Responsible Ministry and Implementing Agency

The Responsible Ministry is the Ministry of Roads and Transport (MRT). The Implementing Agency is the Department of Feeder Roads (DFR) of MRT. The organization charts of MRT and DFR are shown in Annex-2.

4. Items requested by the Government of Ghana

After discussions with the Team, the items described in Annex-3 were finally requested by Ghanaian side. Final components of the Project, however, will be decided after further study.

5. Japan's Grant Aid Scheme

5-1. Ghanaian side understands the Japan's Grant Aid Scheme explained by the Team, as described in Annex-4.

5-2. Ghanaian side shall take the necessary measures, as described in Annex-5, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Study

6-1. The consultants will proceed to further studies in Ghana until February 21, 2000.

6-2. JICA will prepare the interim report in English and dispatch a mission to discuss its contents and to study in detail at the sites around the end of March, 2000.

6-3. JICA will prepare the draft report and dispatch a mission in order to explain its contents around August 2000.

6-4. In case that the contents of the report are accepted in principle by the Government of Ghana, JICA will complete the final report and send it to the Government of Ghana by October 2000.

7. Other Relevant Issues

7-1. Procedure of Land Acquisition

Compensation for land acquisition to construct feeder roads is not necessary while compensation for crops and property including houses is necessary. The Land Valuation Board will assess the necessary compensation cost based upon consolidated land acquisition plan prepared by the DFR. Compensation will be paid to beneficiaries by the DFR through the Land Valuation Board.

The Team will provide necessary information regarding the land necessary for the execution of the Project, such as the land for bridges and connecting roads, temporary offices, working areas, storage yards and others at Explanation of Draft Report. The Department of Feeder Roads shall secure the land for bridges, temporary offices and storage yards, take responsibility for demolition of all obstacles, if necessary, and clear sites before the commencement of construction.

Concrete period of execution should be confirmed at Explanation of Draft Report.

7-2. Procedure of Exemption of Taxes and Customs

Confirmation of exemption of taxes and customs as well as components of the Project at approval in the Ghanaian parliament after exchange of notes is required and the Government of Ghana shall provide necessary arrangement for the confirmation of tax exemption at the parliament.

The Japanese contractor or supplier will be exempted from customs duties and internal taxes in advance in a manner that the DFR approves a list of materials with respect to the supply of products and services under the Verified Contracts and submit the list to the customs and the Ministry of Finance.

7-3. Consultant Services for Construction of Steel Bridges using Steel Girders

As for the Project Component (B), i.e., procurement of steel bridges for short span bridges under the Japan's Grant Aid, Ghanaian side has to erect steel superstructures and design and construct substructures and approach roads. Ghanaian side requested consultant services for (1) preparation of guideline manuals for steel girder erection, (2) preparation of guideline manuals for designing of substructure, approach road and embankment and (3) guidance and training at sites on steel girder erection, as one of the components of the Grant Aid to secure the smooth implementation of works by Ghanaian side. Ghanaian side shall submit an additional official request form for Grant Aid on these components through diplomatic channel by the end of February 2000.

7-4. Demolition of Existing Bridges

Ghanaian side understands that demolition of existing bridges shall be borne by Ghanaian side in all cases for the Project Component (B) and in case that a new bridge will be constructed at upstream/downstream side of the existing bridge for the Project Component (A) when there are existing bridges at Project sites.

7-5. Design Work and Construction Work for Project Component (B)

Design work of substructures and construction of bridges and connecting roads for Project Component (B) where procurement of steel bridges is borne by Japan's Grant Aid are the responsibilities of the Government of Ghana.

7-6. Construction of Connecting Roads

The Government of Ghana shall make passable all roads and bridges leading to the Project sites before the commencement of construction for Project Component (A) and before the commencement of inland transportation of materials and equipment for Project Component (B).

7-7. Construction Period for Project Component (B)

The Government of Ghana shall construct all projected steel bridges within the period of two years after delivery of steel materials purchased under the verified contracts for Project Component (B).

7-8. Allocation of Necessary Budget

The Government of Ghana shall allocate the necessary budget to meet the cost of design and construction work for projected bridges under the Project Component (B).

7-9. Proposed Bridges along Trunk Roads under the Jurisdiction of Ghana Highway Authority

The DFR shall take necessary measures to let the Ghana Highway Authority (GHA) prepare a confirmation letter that, until the roads are upgraded to the trunk road standard, the responsible organization for construction and maintenance of bridges and approach roads to the bridges is not the GHA but the DFR, where proposed bridges in the Project are on the future trunk roads.

The deadline for preparation of the letter shall be determined at discussion between the Team and the DFR at the second field survey scheduled to be held around the end of March 2000 after confirmation of targeted bridges for detailed natural conditions survey.

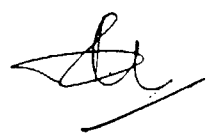
7-10. Designated Port of Disembarkation

The designated port of disembarkation for the Project Component (B) is Takoradi Seaport.

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UPPER WEST

UPPER EAST

- M-20
- S-28
- S-27
- M-19
- S-30
- S-29
- M-18
- M-15

- S-24
- S-25

NORTHERN

- S-22
- S-21
- S-23

BRONG-AHAFO

- S-9
- S-8
- M-6
- M-5
- S-8

VOLTA

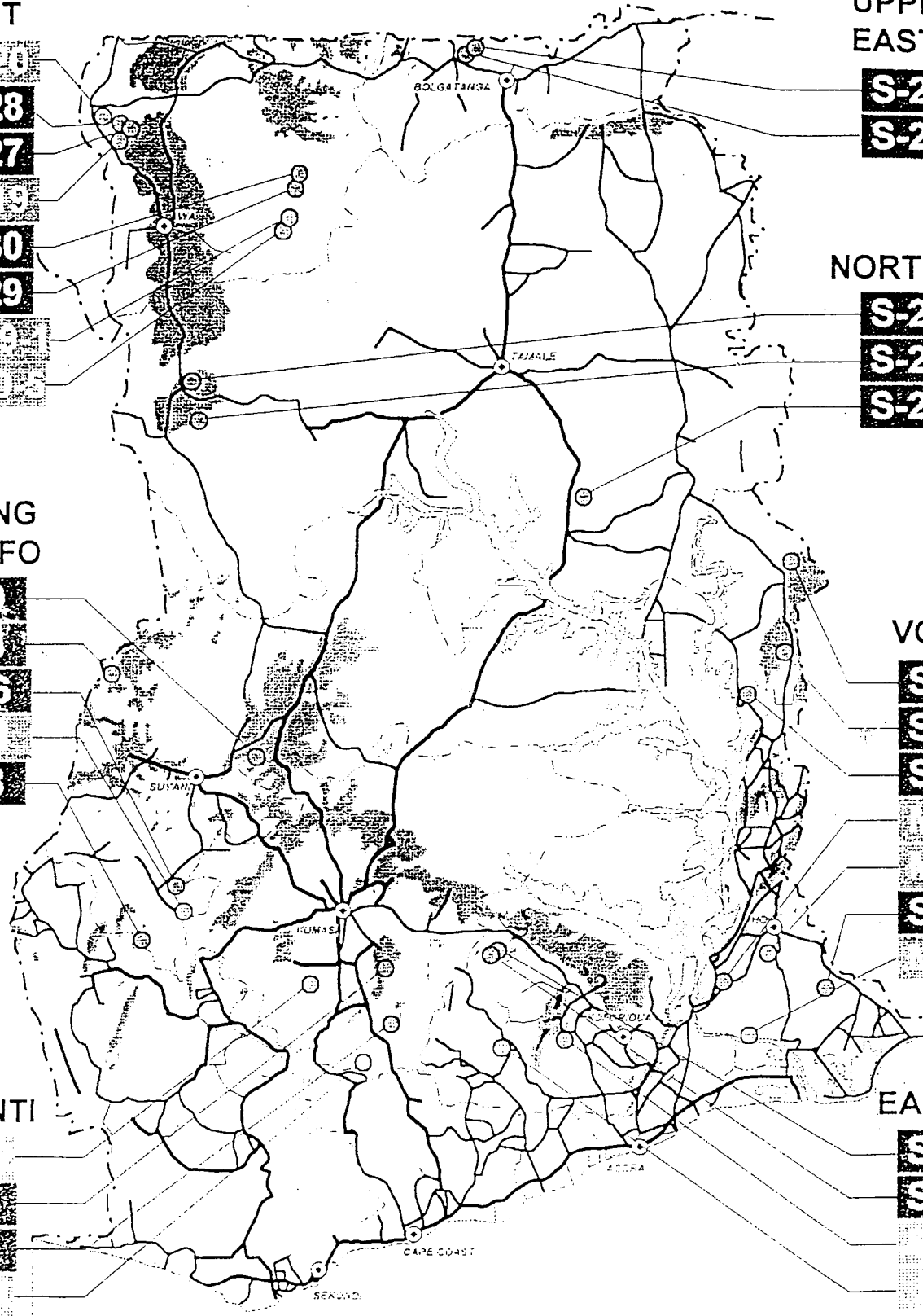
- S-18
- S-17
- S-20
- M-7
- M-8
- S-19
- M-9

ASHANTI

EASTERN

- S-2
- S-1

- S-12
- S-14

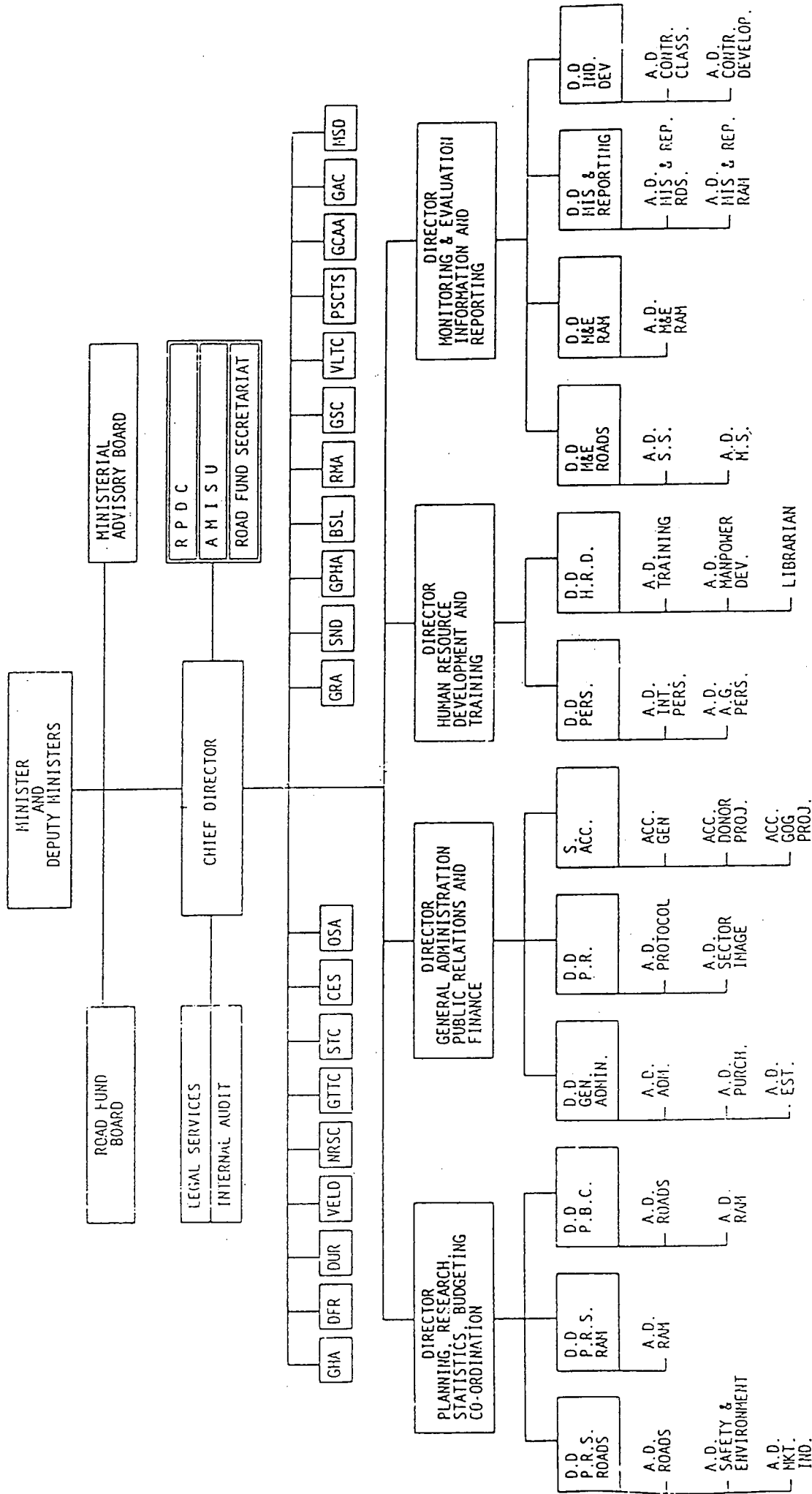


- ⊙ **S-12** Requested Short Span Bridges
- Requested Medium Span Bridges

LOCATION MAP OF REQUESTED BRIDGES

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ORGANIZATIONAL STRUCTURE - MINISTRY OF ROADS AND TRANSPORT



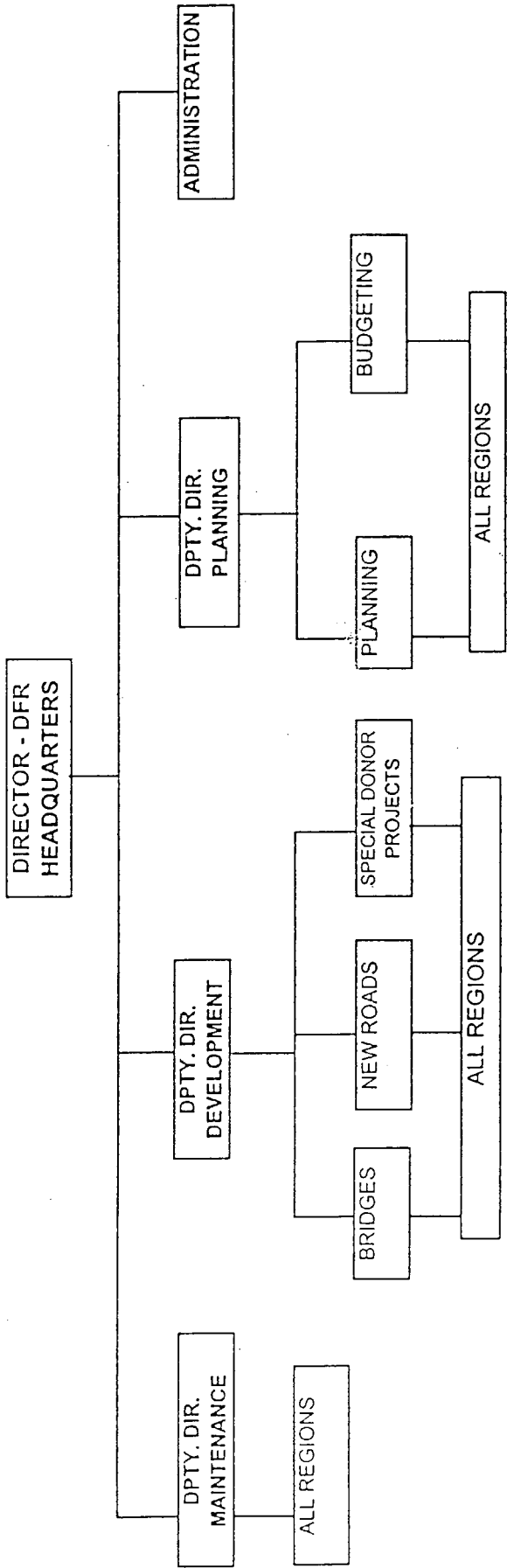
MINISTER	1	4	20		
DY MINISTER	2	12	42		
CHIEF DIRECTOR	1	26			
		DIRECTORS	4		
		DY DIRECTORS	12		
		ASST. DIRECTORS	26		
<input type="checkbox"/>	CIVIL SERVICE DEPARTMENT	<input type="checkbox"/>	SUBVENTED PUBLIC SERVICE	<input type="checkbox"/>	NON-SUBVENTED PUBLIC SERVICE
<input type="checkbox"/>		<input type="checkbox"/>	PUBLIC COMPANY	<input type="checkbox"/>	CONSULTANCY

Annex-2

JUNE 1997

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Proposed Bridge List for First Field Survey

Br. Code	Region	Road Name	River Name
Material Supply Type			
S-27	Upper West	Jirapa-Duori-Lawra	Nantarbo
S-28	Upper West	Jirapa-Duori-Lawra	Duaba
S-17	Volta	Brewaniase-Pusupu	Labo
S-18	Volta	Nkwanta-Kue	Bonakye
S-29	Upper West	Jumo-Tiniabele	
S-30	Upper West	Tiniabele-Sawuabele	
S-24	Upper East	Navrongo-Gamango	Tankara
S-25	Upper East	Navrongo-Gamango	Budunga
S-19	Volta	Keyime-Adaklu Torda	Kplikpa
S-20	Volta	Asukawkaw-Adumadam	Kohunu
S-21	Northern	Bole-Grupe	Kabawu
S-22	Northern	Sawla-Gellinkon	Wiago
S-23	Northern	Binjai-Kadengel	Nyalma
M-6	Brong Ahafo	Mehame Jn.-Dadiesoaba	Tano
S-6	Brong Ahafo	Morle-Kokosua	Tain
S-1	Ashanti	Fumso-Aboabo	Fum
S-2	Ashanti	Dagyanso-Gyapada-Adwafo	Banko
S-12	Eastern	Pankese-Apradan	Nwin
S-14	Eastern	Pankese-Brankrom	Nwin
S-9	Brong Ahafo	Tanoanafo-Tano Kwayem	Tano
S-8	Brong Ahafo	Tetekwa-Brekuline	Sui
Construction Type			
Add-5	Upper West	Bulenga-Katua-Yala	Kulpawn
M-20	Upper West	Jirapa-Douri-Lawra	Fulo
M-19	Upper West	Babile-Jirapa	Dobaa
M-19-1	Upper West	Bulenga-Katua-Yala	
M-10	Volta	Ho-Dzakpo	Kalakpa
M-11	Volta	Amesianyakope-Osiabura	Alabo
M-12	Volta	Volo-Adidome	Kolo
M-3-1	Ashanti	Nkoranza-Mpakyire	Fum
M-3-2	Ashanti	Odaho-Jacobu	Oda
M-9	Eastern	Akwatia-Kusi	Birim
S-15	Eastern	Suhum-Okanta-Odumase	Densu
M-4	Brong Ahafo	Kukuom-Sienkyem	Tano

List of Equipment Requested by the Government of Ghana

- | | |
|---|------------|
| 1. Pickup (including spare parts) | 7 vehicles |
| 2. Extension girder | 2 sets |
| 3. Girder pulling tools | 2 sets |
| 4. Steel bridge assemble tools | 2 sets |
| 5. Truck with crane (8-10 ton, including spare parts) | 1 vehicle |
| 6. Cargo Truck (8ton, including spare parts) | 2 vehicles |
| 7. Total station (survey instruments) | 2 sets |
| 8. GPS (survey instruments) | 2 sets |

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JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedures

1) Japan's Grant Aid Program is executed through the following procedures.

- | | |
|---------------------------------------|---|
| - Application | (Request made by the recipient country) |
| - Study | (Basic Design Study conducted by Japan International Cooperation Agency (JICA)) |
| - Appraisal & Approval | (Appraisal by the Government of Japan and Approval by the Cabinet) |
| - Determination of the Implementation | (The Note exchanged between the Governments of Japan and recipient country) |

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study) using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the study

The aim of the Basic Design Study (hereafter referred to as "the Study") conducted by JICA on a requested project (hereafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows :

- a) Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
- b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
- c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- d) Preparation of a basic design of the Project.

e) Estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The selected firm(s) carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consultant firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

3. Japan's Grant Aid Scheme

1) Japan's Grant Aid

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed. However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However, the prime contractors, namely, consulting, constructing and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

6) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as the following:

- (1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.
- (2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.
- (3) To secure buildings prior to the procurement in case the installation of the equipment.
- (4) To ensure all the expenses and prompt excursion for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.
- (5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for its operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

8) "Re-export"

The products purchased under the Grant Aid should not be re-exported from the recipient country.

9) Banking Arrangements (B/A)

- a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.

Major Undertakings to be taken by Each Government

NO	Items	To be covered by Grant Aid	To be covered by Recipient side
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To relocate water supply lines, electric power lines, telephone lines and others attached to the existing bridge		●
4	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
5	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site		●
6	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein 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 the products and services under the verified contract		●
8	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
9	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities		●
10	To coordinate and solve any issues related to the Project which may be raised from third parties or inhabitants in the Project area		●

W. L. V.

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MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY (2)
ON THE PROJECT FOR CONSTRUCTION OF SMALL AND MEDIUM SCALE BRIDGES
IN THE REPUBLIC OF GHANA

In January 2000, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study (1) Team on the Project for Construction of Small and Medium Scale Bridges (hereinafter referred to as "the Project") to the Republic of Ghana (hereinafter referred to as "Ghana"), and through discussion, field survey, and technical examination of the results in Japan, JICA prepared an interim report of the Study.

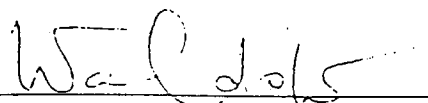
In order to explain and to consult Ghana on the components of the interim report and to conduct detailed field survey, JICA sent to Ghana the Basic Design Study (2) Team (hereinafter referred to as "the Team"), which is headed by Mr. Kenji Kiyomizu, Development Specialist, JICA, from April 6, 2000 to May 31, 2000.

As a result of discussions, both parties confirmed the main items described on the attached sheets. The Team will proceed with further works and prepare the Basic Design Study Report.

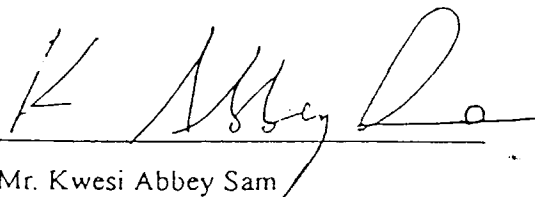
Accra, April 12, 2000

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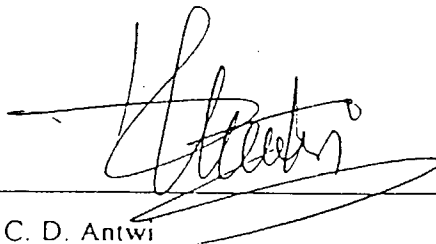
Mr. Kenji Kiyomizu
Leader
Basic Design Study Team
Japan International Cooperation Agency



Dr. William Adote
Director
International Economic Relations Div.
Ministry of Finance



Mr. Kwesi Abbey Sam
Chief Director
Ministry of Roads and Transport



Mr. C. D. Antwi
Director
Department of Feeder Roads
Ministry of Roads and Transport

ATTACHMENT

1. Components of Interim Report

The Government of Ghana agreed and accepted in principle the components of the interim report explained by the Team.

2. Japan's Grant Aid Scheme

Ghanaian side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Ghana as explained by the Team and described in Annex-4 and Annex-5 of the Minutes of Discussions signed by both parties on January 20, 2000.

3. Schedule of the Study

3-1. The consultants will proceed to further studies in Ghana until May 31, 2000.

3-2. JICA will prepare the draft report and dispatch a mission in order to explain its contents around August 2000.

3-3. In case that the contents of the report is accepted in principle by the Government of Ghana, JICA will complete the final report and send it to the Government of Ghana by October 2000.

4. Other relevant issues

4-1. Proposed Bridges for Detailed Survey in the Basic Design Study (2)

Both parties agreed that the bridges shown in Annex-1 will be surveyed in detail in this Basic Design Study (2).

4-2 Budget Allocation in the fiscal year 2001 for road and bridge construction by the Ghanaian side

The Government of Ghana shall allocate necessary budget to meet the cost of construction of bridges and approach roads which will be necessary for the construction of bridges of material supply type and S-1, S-12, S-24, S-25, S-27, S-28, M-19, and M-20.

4-3 Environmental Impact Assessment

The Department of Feeder Roads (DFR) shall prepare an Environmental Management Planning Document based on the Draft Basic Design Report until the end of September, 2000 and shall get the Project approved by the Ministry of Environment, Science and Technology before Exchanging of Notes.

W.S.P.



K.A.P. 12/01/00



4-4 Land Acquisition and Demolition of Existing Bridges

DFR shall secure the land for bridges, temporary offices and storage yards, and shall take responsibility for demolition of all obstacles, if necessary, and clear sites before commencement of construction.

DFR shall demolish existing bridges after construction of new bridge in all cases for material supply type and in case that a new bridge will be shifted to the side of existing bridge for facility construction type.

4-5 Design Standard

Both parties agreed the design standards shown in Annex-2 be utilized for the Project.



List of the Bridges for Detailed Survey in Basic Design Study (2)

Bridge Code	Province	Proposed Length (m)
Proposed Bridges for Material Supply Type (7 Bridges)		
S-19	Volta	20
S-8	Brong Ahafo	20
S-21	Northern	20
S-22	ditto	25
S-29	Upper West	15
S-30	ditto	15
S-30-2	ditto	15
Proposed Bridges for Facility Construction Type (15 Bridges)		
M-11	Volta	35
M-12	ditto	50
S-12	Eastern	20
S-15	ditto	30
M-9	ditto	50
S-1	Ashanti	20
M-3-1	ditto	45
M-3-2	ditto	45
M-4	Brong Ahafo	40
S-24	Upper East	45
S-25	ditto	35
S-27	Upper West	25
S-28	ditto	50
M-19	ditto	40
M-20	ditto	30

WSP



12/04/00



Design Standards

1) Hydrological Design Standards

- Return Period 50 years
- Freeboard 1.0 meter

2) Bridge Design Standards for Material Supply Type Bridges including S-1 and S-12

- Superstructure Type Pony Truss Type
- Design Live Load HA Loading and to be checked against 30 units of HB Loading (British Standard)
- Carriageway Width 3.5 meters
- Sidewalk Clear Width 1.0 meter (One side only)

3) Bridge Design Standards for the Construction Type Bridges excluding S-1 and S-12

- Structure Type To be determined after a comparative study of alternative bridge schemes
- Design Live Load HA Loading and to be checked against 30 units of HB Loading (British Standard)
- Carriageway Width 3.5 meters
- Sidewalk Clear Width 1.0 meter (One side only)

W21



MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY
ON THE PROJECT FOR CONSTRUCTION OF SMALL AND MEDIUM SCALE BRIDGES
IN THE REPUBLIC OF GHANA
(EXPLANATION ON DRAFT REPORT)

In April and May 2000, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team on the Project for Construction of Small and Medium Scale Bridges (hereinafter referred to as "the Project") to the Republic of Ghana (hereinafter referred to as "Ghana"), and through discussion, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the study.

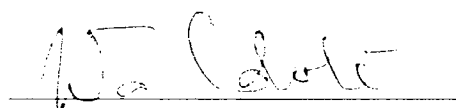
In order to explain and to consult Ghana on the components of the draft report, JICA sent to Ghana the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Shigetada Kayumi, Development Specialist, JICA, from August 20 to August 28.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

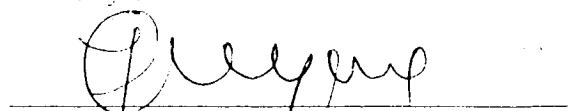
Accra, August 28, 2000



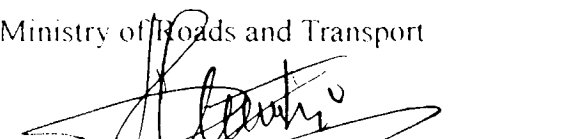
Mr. Shigetada Kayumi
Leader
Draft Report Explanation Team
Japan International Cooperation Agency



Dr. William Adote
Director
International Economic Relations Division
Ministry of Finance



Mr. Frank Otibu Mpare
Director
Finance and Administration
Ministry of Roads and Transport



Mr. C. D. Antwi
Director
Department of Feeder Roads
Ministry of Roads and Transport

ATTACHMENT

1. Components of the Draft Report

The Government of Ghana agreed and accepted in principle the components of the draft report explained by the Team.

2. Japan's Grant Aid Scheme

Ghanaian side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Ghana as explained by the Team and described in Annex-3 and Annex-4 of the Minutes of Discussions signed by both parties on January 20, 2000.

3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed item and send it to the Government of Ghana by November 2000.

4. Other Relevant Issues

4-1 Bridge M-11 and S-15

DFR clearly understood that from the viewpoint of cost performance, traffic service level required, hydrological conditions, etc., M-11 and S-15 are designed as bridges that can accept spill over during rainy seasons in the Basic Design. However, in anticipating of complaints on the traffic interruption during rainy seasons from concerned people, DFR requested strongly the team to consider the change of the bridge type.

The team will re-study the basic design of the bridges M-11 and S-15, based on the additional information which is provided by DFR.



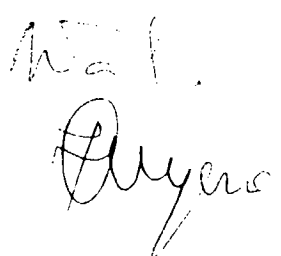
The study result will be informed to DFR at the earliest possible time.

4-2 Priority of Change Requested Bridges

DFR commented that (M-11)'s priority is higher than (S-15)'s from the viewpoint of necessities.

4-3 Allocation of Necessary Budget

The Government of Ghana shall allocate the necessary budget for the Project. The necessary budget for the Ghanaian fiscal year 2001 shall be arranged before Exchanging of Notes.

4-4 Environmental Impact Assessment

DFR shall prepare an Environmental Management Planning Document based on the Draft Basic Design Report and shall get the Environmental Permit (PE) from the Ministry of Environment, Science and Technology before Exchanging of Notes.

4-5 Construction / Improvement / Rehabilitation of Access Roads to the Bridge Sites

DFR shall construct / improve / rehabilitate the access roads to the bridge sites before the commencement of construction for the Construction Type Bridges and before the commencement of inland transportation of materials and equipment for the Material Supply Type Bridges.

4-6 Land Acquisition and Clearing the Sites

DFR shall secure the land for the bridges, temporary offices, and storage yards, take responsibility for the demolition of all obstacles, and clear sites before the commencement of construction.

4-7 Relocation of Project affected People

DFR in close coordination with the Land Valuation Board shall relocate the project affected people and pay necessary compensation cost for relocation and crops as well as properties to the project affected people before the commencement of construction.



APPENDIX 5

**COST ESTIMATION BORNE
BY THE GOVERNMENT OF GHANA**

Cost Estimation Borne by the Government of Ghana

Unit : Million US\$

	Bridge No.	Estimated Cost						Remarks
		ROW/ Compensation	Subject Road (up to Bridge)	Sub-structure	Erection	Subject Road (After Bridge)	Total	
Material Supply Type Bridges	S-19	-	0.097	0.160	0.040	0.076	0.373	
	S-12	-	0.033	0.160	0.040	0.336	0.569	
	S-1	-	0.010	0.160	0.040	0.485	0.695	
	S-8	-	0.060	0.160	0.040	0.450	0.710	
	S-21	-	0.450	0.160	0.040	0.508	1.158	
	S-22	-	0.044	0.160	0.040	0.098	0.342	
	S-27	-	0.008	0.160	0.040	-	0.208	
	S-28	-	-	0.480	0.120	-	0.600	
	S-29	-	0.158	0.160	0.040	0.117	0.475	
	S-30	-	0.039	0.160	0.040	0.027	0.266	
	S-30-2	-	0.060	0.160	0.040	-	0.260	
	M-19	-	-	0.320	0.080	-	0.400	
	M-20	-	0.055	0.160	0.040	-	0.255	
	Total	-	1.014	2.560	0.640	2.097	6.311	
Construction Type Bridges	M-11	-	0.061	-	-	0.108	0.169	
	M-12	0.030	0.439	-	-	0.400	0.869	17.5km x 15m
	S-15	-	0.034	-	-	0.238	0.272	
	M-3-1	0.090	0.091	-	-	0.411	0.592	3.1km x 15m 7 houses
	M-3-2	0.045	0.287	-	-	0.120	0.452	3.1km x 15m 20 houses
	Total	0.165	0.912	-	-	1.277	2.354	
Grand Total		0.165	1.926	2.560	0.640	3.374	8.665	

Custom Clearance Fee : 0.012 Million US\$

APPENDIX 6

**ENGINEERING AND
SOCIO-ECONOMIC CHARACTERISTICS
OF THE REQUESTED BRIDGE SITE**

Site Condition and Assessment of Engineering Necessity for Requested Bridges (1/3)

No.	1	2	3	4	5	6	7	8	9	10	11	12
Bridge Code	S-17	S-18	S-19	S-20	M-10	M-11	M-12	S-12	S-14	S-15	M-9	S-1
Region	Volta	Volta	Volta	Volta	Volta	Volta	Volta	Eastern	Eastern	Eastern	Eastern	Ashanti
District	Kadjebi	Nkwanta	Akatsi	Kate-Krachi	Ho	Ho	Adidome	Kwahu-South	Kwahu-South	East-Akim	Kwaebibirem	Adansi West
Existence of Bridge	Exist	None	None	None	Exist	None	None	Exist	Exist	Exist	None	Exist
Road Closure Term (days)*	4 (4)	4 (4)	60 (60)	10 (365)	15 (15)	150 (365)	365 (365)	35 (365)	22 (22)	21 (365)	365 (365)	3 (3)
Bridge Type	RCDG	Ford	Ford	-	Wooden	-	-	Foot Pass	Wooden	Foot Pass	-	Wooden
Length (m)	11.5	-	-	-	-	-	-	-	21	-	-	14.5
Width (m)	7.4	-	-	-	-	-	-	-	4.4	-	-	4.2
Condition	Good	-	-	-	Temporally	-	-	-	Decrepit	-	-	Temporally
Necessity of Re-construction	None	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary
Existence of Detour Road	Exist	None	Exist	None	None	Exist	None	Exist	Exist	Exist	Exist	Exist
Distance of Detour Road (km)	26.1	-	29.5	-	-	38.3	-	27.4	32.6	27.1	18.4	53.0
Additional Distance (km)	21.0	-	25.5	-	-	35.3	-	25.7	31.6	24.8	12.3	50.7
Road Class	F.R.(Branch)	F.R.(Link)	F.R.(Branch)	F.R.(Branch)	F.R.(Branch)	F.R.(Link)	F.R.(Link)	F.R.(Link)	F.R.(Link)	F.R.(Link)	F.R.(Link)	F.R.(Link)
Road Width (m)	6.0	6.0-3.0	4.0-1.0	1.0	6.0-4.0	4.0-3.0	2.5	1.0	3.0	4.0-1.0	1.0	4.0
Existence of Development Plan	-	-	-	-	-	-	-	-	-	-	-	-
Necessity of Improvement	None	Necessary	Necessary	Necessary	None	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary
Length for Improvement**	None	2.7(R.G.)	1.1(w)+1.6(N)	0.3(N)	-	3.0(w)	9.0(N)	1.2(N)	5.0(w)	6.2(w)+0.3(N)	3.4(N)	11.0(w)
Structures for Improvement***	-	6.3(R.G.)	1.9(N)	2.7(N)	2.5(w)	0.7(N)	8.5(N)	4.2(N)+2.1(w)	2.8(w)	2.0(N)	2.7(N)	0.3(w)
Improvement***	-	-	-	-	-	-	-	-	-	-	-	-
Topography	Flat	Rolling	Flat	Rolling	Rolling	Rolling	Flat	Rolling	Rolling	Rolling	Flat	Rolling
Geology	Rock	Rock	Silt/Cray	Rock	Sand/Gravel	Rock	Silt/Cray	Sand/Gravel	Sand/Gravel	Silt/Cray	Rock	Rock
Depth (m)	5.1	1.0	2.8	3.7	2.5	4.4	4.8	3.3	4.3	3.7	9.9	2.8
Width (m)	0.2	dry	dry	0.1	0.5	0.5	1.8	0.6	0.1	0.3	2	dry
Characteristic	within channel	within channel	dry	24.2	4.5	10.0	25.7	11.0	3.0	3.2	21.2	dry
Requested Bridge Length (m)	25	25	25	20	40	40	-	28	28	25	50	12
Proposed Bridge Length (m)	35	-	20	30	15	35	50	20	25	30	50	20
Bridge Type	Ispan	River bed Protection	Ispan	Ispan	Ispan	Ispan	2-3span	Ispan	Ispan	Ispan	2-3span	Ispan
Bridge Height (m)	8.8	-	5.0	7.2	4.6	7.9	8.3	5.5	6.5	6.5	13.5	5.0
No. of Lane	1	-	1	1	1	1	1	1	1	1	1	1
Difficulty of Construction	Ordinary	Easy	Easy	Easy	Easy	Difficult	Difficult	Easy	Easy	Ordinary	Difficult	Easy
Road Class	GHA	GHA	F.R.	F.R.	GHA	GHA	GHA	GHA	GHA	GHA	GHA	GHA
Surface Type	Gravel	Paved/Gravel	Gravel	Gravel	Paved	Paved	Paved	Paved	Paved	Paved	Paved	Paved
Condition	Fair/Bad	Fair/Bad	Fair/Bad	Fair	Good	Good	Good	Fair	Fair	Good/Fair	Good/Fair	Good/Fair
Existence of Bridge	0	25	25	25	25	25	25	25	25	25	25	25
Bridge Type/Scale	0	0	25	25	25	25	25	25	25	25	25	25
Road Closure Term for Vehicle	2	2	18	20	10	20	20	20	10	20	20	2
Additional Distance on Detour	0	0	4	10	10	6	10	4	6	4	4	8
Improvement of Access Rd	0	0	10	10	10	10	3	6	6	6	10	6
Road Class	0	0	4	4	4	5	5	5	5	5	5	5
(Connecting Road Condition	0	0	2	3	5	5	5	5	5	5	5	5
Total	2	27	88	97	89	96	93	90	82	90	94	76
Remarks												

Note: *) For Pedestrian (For Vehicle **) (w): Widening, (N): New Construction, (R.G.): Re-Graveling ***) Bridge (Culvert)

Site Condition and Assessment of Engineering Necessity for Requested Bridges (2/3)

No.	13	14	15	16	17	18	19	20	21	22	23	24
Region	S-2	M-3-1	M-3-2	S-6	S-8	S-9	M-4	M-6	S-21	S-22	S-23	S-24
District	Ashanti	Ashanti	Ashanti	Brong-Ahafo	Brong-Ahafo	Brong-Ahafo	Brong-Ahafo	Brong-Ahafo	Northern	Northern	Northern	Upper East
Existence of Bridge	Exist	None	None	Exist	Exist	Exist	None	Asutifi	None	None	None	Kassena Nankana
Road Closure Term (days)*	9 (9)	365 (365)	365 (365)	18 (18)	12 (12)	14 (365)	365 (365)	16 (16)	8 (60)	8 (60)	6 (60)	20 (365)
Bridge Type	Wooden	Wooden	Wooden	Wooden	Wooden	Foot Pass	RCDG	RCDG	Ford	Ford	Culvert	-
Length (m)	5.9	19.0	11.6	19.0	11.6	-	-	21.7	-	-	-	-
Width (m)	3.5	-	-	4.6	3.6	-	-	6.5	-	-	-	-
Condition	Temporarily	-	-	Temporarily	Temporarily	-	-	Good	-	-	Damaged	-
Necessity of Re-construction	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	None	Washed Away	Necessary	Necessary	Necessary
Existence of Detour Road	Exist	None	None	None	None	Exist	Exist	Exist	Exist	None	None	None
Distance of Detour Road (km)	42.1	-	-	-	-	36.0	38.4	39.0	69.8	-	-	-
Additional Distance (km)	40.9	-	-	-	-	33.0	34.6	35.8	49.6	-	-	-
Road Class	F.R.(Link)	F.R.(Link)	F.R.(Link)	F.R.(Branch)	F.R.(Link)	F.R.(Link)	F.R.(Link)	F.R.(Link)	F.R.(Link)	F.R.(Branch)	F.R.(Branch)	F.R.(Branch)
Road Width (m)	6.0-5.0	5.0-1.0	3.0-1.0	6.0	5.0-6.0	4.0-1.0	1.0	6.0	6.0-3.0	5.0	6.0-5.0	1.0
Existence of Development Plan	-	-	-	-	-	-	-	-	-	-	-	-
Necessity of Improvement	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	None	Necessary	Necessary	Necessary	Necessary
Length for Improvement**	0.6(w)	6.0(w)+0.1(N)	3.7(w)+0.1(N)	3.6(R.G.)	4.0(R.G.)	6.0(w)+0.1(N)	1.6(N)	-	9.0(N)	2.9(R.G.)	-	4.6(N)
Structures for Improvement***	8.6(w)	5.2(w)+3.0(N)	3.0(N)	3.0(R.G.)	-	3.0(N)	2.2(N)	-	11.2(N)	6.5(R.G.)	-	10.9(N)
Topography	-	-	-	-	-	-	-	-	-	-	-	-
Geology	Rolling	Rolling	Rolling	Flat	Flat	Rolling	Rolling	Flat	Rolling	Rolling	Flat	Flat
Depth (m)	2.8	3.1	4.4	3.5	3.7	3.8	6.1	5.8	3.3	Rock	Silt/Clay	Rock
Width (m)	0.1	0.3	0.4	dry	0.1	0.8	0.9	0.6	dry	dry	dry	dry
Characteristic	100.0	37.0	31.0	-	35.1	50.0	-	-	35.0	44.6	300.0	-
Requested Bridge Length (m)	0.7	27.3	12.8	dry	1.8	10.8	14.8	11.3	dry	dry	dry	dry
Proposed Bridge Length (m)	70	45	45	24	28	20	60	25	20	27	25	28
Bridge Type	RCBC	1-2span	1-2span	1span	1span	1-2span	1-2span	1-2span	1span	1span	100-200	45
Bridge Height (m)	-	6.6	7.9	5.7	5.9	7.3	9.6	9.3	5.5	4.0	6.5	6.7
No. of Lane	-	1	1	1	1	1	1	1	1	1	1	1
Difficulty of Construction	Easy	Difficult	Difficult	Ordinary	Easy	Difficult	Difficult	Difficult	Easy	Easy	Difficult	Difficult
Road Class	GHA	GHA	F.R.	GHA	GHA	GHA	GHA	GHA	GHA	GHA	GHA	GHA
Surface Type	Paved	Paved	Gravel	Gravel	Paved/Gravel	Paved	Paved	Paved	Gravel	Paved	Paved/Gravel	Paved
Condition	Fair	Good	Fair/Bad	Fair/Bad	Fair/Bad	Fair	Good/Fair	Good/Fair	Fair	Fair	Fair/Bad	Good
Existence of Bridge	25	25	25	25	25	25	25	0	25	25	25	25
Bridge Type/Scale	0	25	25	25	25	25	25	0	25	25	2	25
Road Closure Term for Viacle	2	20	20	10	2	20	20	10	18	18	18	20
Additional Distance on Detour	0	10	10	10	10	6	6	0	6	10	0	10
Improvement of Access Rd	0	3	10	10	3	6	3	0	3	10	0	1
Road Class	0	5	5	4	5	5	5	0	5	4	0	4
Connecting Road Condition	0	5	2	2	2	5	5	0	3	5	0	5
Total	27	93	97	86	72	92	89	10	85	97	45	90
Remarks												

Note: *) For Pedestrian (For Vehicle) **) Widening, (N): New Construction, (R.G.): Re-Graveling ***): Bridge (Culvert)

Site Condition and Assessment of Engineering Necessity for Requested Bridges (3/3)

No.	25	26	27	28	29	30	31	32	33	34
Bridge Code	S-25	S-27	S-28	S-29	S-30	S-30-2	Add-5	M-19-1	M-19	M-20
Region	Upper East	Upper West	Upper West	Upper West	Upper West	Upper West	Upper West	Upper West	Upper West	Upper West
District	Kassena Nankana	Jirapa Lambussie	Jirapa Lambussie	Wa	Wa	Wa	Wa	Wa	Jirapa Lambussie	Lawra
Existence of Bridge	None	None	None	None	None	None	None	None	Exist	Exist
Road Closure Term (days)*	20 (90)	30 (60)	15 (60)	60 (60)	60 (60)	60 (60)	90 (365)	15 (42)	Un-known(60)	0 (60)
Bridge Type	Ford	Culverts	Culverts	Ford	Ford	Ford	-	Ford	Bailey	RCBC
Length (m)	-	-	-	-	-	-	-	-	40.0	-
Width (m)	-	-	-	-	-	-	-	-	6.0	-
Condition	-	Collapsed	Collapsed	-	-	-	-	-	Temporally	Damaged
Necessity of Re-construction	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary
Existence of Detour Road	None	Exist	Exist	None	None	None	None	None	Exist	Exist
Distance of Detour Road (km)	-	49.6	49.6	-	-	-	-	-	50.4	51.0
Additional Distance (km)	-	45.2	45.2	-	-	-	-	-	46.8	48.0
Road Class	F.R.(Branch)	F.R.(Link)	F.R.(Link)	F.R.(Branch)	F.R.(Branch)	F.R.(Branch)	Trunk Rd.	FR-Trunk Rd	F.R.(Link)	F.R.(Link)
Road Width (m)	6.0-1.0	6.0-5.0	6.0-5.0	4.0-3.0	3.0	3.0	6.0	5.0	6.0	6.0
Existence of Development Plan	-	-	-	-	-	-	-	-	-	-
Necessity of Improvement	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	None	Necessary
Length for Improvement**	0.5(N)	2.3(R.G.)	1.0(R.G.)	4.6(w)	1.3(w)	2.0(w)	0.5(R.G.)	0.8(w)	None	None
Structures for Improvement***	(2)	(3)	(1)	(1)	(1)	(1)	(1)	(2)	(2)	(2)
Topography	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
Geology	Rock	Rock	Rock	Rock	Rock	Rock	Sand/Gravel	Rock	Rock	Rock
Depth (m)	3.1	3.6	4.4	2.2	2.3	1.4	8.4	1.8	3.7	4.4
Width (m)	dry	dry	dry	dry	dry	dry	0.1	dry	dry	0.3
Characteristic	dry	dry	dry	dry	dry	dry	150.0	-	-	-
Requested Bridge Length (m)	Storage	Storage	Flooding	Overflow	Overflow	Overflow	within Channel	Overflow	Overflow	Overflow
Proposed Bridge Length (m)	-	24	24	20	24	-	90	40	30	45
Bridge Type	1span	1span	2-3span	1span	1span	1span	4-5span	River bed Protection	1-2span	1span
Bridge Height (m)	6.6	5.8	6.5	4.7	4.5	4.0	11.9	-	7.0	8.0
No. of Lane	1	1	1	1	1	1	2	-	1	1
Difficulty of Construction	Difficult	Easy	Difficult	Easy	Easy	Easy	Difficult	Easy	Difficult	Difficult
Road Class	GHA	GHA	GHA	GHA	GHA	GHA	GHA	GHA	GHA	GHA
Surface Type	Paved	Paved	Paved	Gravel	Gravel	Gravel	Gravel	Gravel	Gravel	Paved
Condition	Good	Good	Good	Fair/Bad	Fair/Bad	Fair/Bad	Fair	Bad	Fair	Good
Existence of Bridge	25	25	25	25	25	25	25	25	25	25
Bridge Type/Scale	25	25	25	25	25	25	2	0	25	25
Road Closure Term for Viecle	20	18	18	18	18	18	20	20	18	18
Additional Distance on Detour	10	6	6	10	10	10	0	0	6	6
Improvement of Access Rd	10	10	10	10	10	10	0	0	10	10
Road Class	4	5	5	4	4	4	0	0	5	5
Connecting Road Condition	5	5	5	2	2	2	0	0	3	5
Total	99	94	94	90	94	94	47	45	92	94
Remarks										

Note: *)-For Pedestrian (For Vehicle) **)-Widening, (N):New Construction, (R.G.): Re-Graveling ***)-Bridge(Culvert)

Site Condition and Assessment of Socio-Economic Effect for Requested Bridges (1/3)

No.	1	2	3	4	5	6	7	8	9	10	11	12
Bridge Code	S-17	S-18	S-19	S-20	M-10	M-11	M-12	S-12	S-14	S-15	M-9	S-1
Region	Volta	Volta	Volta	Volta	Volta	Volta	Volta	Eastern	Eastern	Eastern	Eastern	Ashanti
District	Kadjebi	Nkwanta	Akatsi	Kete-Krachi	Ho	Ho	Adidome	Kwahu-South	Kwahu-South	East-Akim	Kwaebirem	Adansi West
Existence of Bridge	RCDG	None	None	None	Wooden	None	None	Foot Pass	Wooden	Foot Pass	None	Wooden
Poverty Ratio	151	151	151	151	151	151	151	151	151	151	151	151
Influenced Area (km ²)	56	78	39	10	23	63	92	23	18	49	63	41
No. of Beneficiary (person)	4,700	8,900	8,100	3,800	2,500	12,800	24,100	5,700	3,250	10,300	23,100	8,900
Main Industry	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture, Forestry	Agriculture, Forestry	Agriculture	Agriculture, Mining	Agriculture, Forestry
Main Product	Cassava, Yamu	Cassava, Yam	Cassava, Maize	Cassava, Maize	Cassava, Maize	Cassava, Maize	Cassava, Maize	Cocoa, Cassava	Cocoa, Cassava	Cocoa, Plantain	Cocoa, Palm, Diamond	Cocoa, Cassava
Related Project	-	-	-	-	UNDP	-	JICA, Spanish	-	-	-	Palm oil Research	ASIP
Regional Development Plan	-	-	-	-	-	-	-	-	-	-	-	-
Access to Public Facilities*	5.4	14.8	12.0	5.3	15.5	3.7	23.5	1.7	5.5	2.3	6.1	4.1
Truck	10	6	6	0	5	-	-	0	0	0	-	70
Mini-Bus	8	8	2	0	10	-	-	0	0	0	-	20
Sedan/Taxi	10	16	0	0	5	-	-	0	0	0	-	10
Motorcycle	0	0	0	0	40	-	-	0	0	0	-	10
Pedestrian/Bicycle	140	400	450	350	250	-	-	830	315	1,040	-	1,600
Boat	-	-	-	-	-	700	500	-	-	-	1500	-
Future Development Traffic Volume	0	42+15=57	32+16=48	12+0=12	0	49+25=74	84+84=168	21+21=42	13+13=26	38+38=76	74+74=148	0+50=50
Road Closure Term (days)**	4 (4)	4 (4)	60 (60)	10 (365)	15 (15)	150 (365)	Boat (365)	35 (365)	22 (22)	21 (365)	Boat (365)	3 (3)
Land Acquisition	None	Necessary	Necessary	Necessary	None	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	None
Removal of Obstruction	None	None	None	None	None	None	None	None	None	None	None	None
No. of People to Relocate	None	None	None	None	None	None	None	None	None	None	None	None
Peace & Order	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
No. of Beneficiary	5	20	25	5	5	20	25	15	5	20	25	25
Access to Public Facilities	1	25	20	25	18	22	25	20	15	20	20	16
Influenced Area/Productivity	10	15	12	2	10	10	10	8	2	10	8	12
Reduction of Road Closure	2	2	14	15	8	15	15	15	8	15	15	2
Present Traffic Volume	4	4	4	2	4	3	3	3	2	4	4	4
Future Traffic Volume	0	3	2	2	0	2	5	3	2	3	4	3
Related Project	0	0	0	0	3	0	5	0	0	0	3	3
Total	22	69	77	51	48	72	88	64	34	72	79	65
Remarks												

Note: *) - Distance to the Nearest Market (km)
 **) - For Pedestrian (For Vehicle)

Site Condition and Assessment of Socio-Economic Effect for Requested Bridges (2/3)

No.	Bridge Code	13	14	15	16	17	18	19	20	21	22	23	24
	Region	S-2	M-3-1	M-3-2	S-6	S-8	S-9	M-4	M-6	S-21	S-22	S-23	S-24
	District	Ashanti	Ashanti	Ashanti	Brong-Ahafo	Brong-Ahafo	Brong-Ahafo	Brong-Ahafo	Brong-Ahafo	Northern	Northern	Northern	Upper East
	Existence of Bridge	Wooden	None	None	Wooden	Wooden	Foot Pass	None	RCDG	None	None	None	None
	Poverty Ratio	151	151	151	151	151	151	151	151	151	126	126	126
	Influenced Area (km ²)	35	90	78	22	197	42	67	64	198	65	218	61
	No. of Beneficiary (person)	29,300	40,000	24,900	3,800	16,400	7,300	24,900	22,800	6,800	7,500	13,500	9,000
	Main Industry	Agriculture	Agriculture, Forestry	Agriculture, Forestry	Agriculture	Agriculture, Forestry	Agriculture, Forestry	Agriculture, Forestry	Agriculture, Forestry	Agriculture, Live Stock	Agriculture, Live Stock	Agriculture	Agriculture, Live Stock
	Main Product	Cocoa, Cassava	Cocoa, Cassava, Log	Cocoa, Plantain	Cocoa, Yam	Cocoa, Plantain, Log	Cocoa, Maize, Log	Cocoa, Plantain, Log	Cocoa, Plantain, Log	Yam, Beans, Goat	Yam, Beans, Cattle	Yam, Maize, Nuts	Tomato, Rice, Cattle
	Related Project	31st Women Mov.	-	-	-	-	-	-	-	-	-	-	-
	Socio-Economic Condition	-	-	-	-	-	-	-	-	-	-	-	-
	Regional Development Plan	-	-	-	-	-	-	-	-	-	-	-	-
	Access to Public Facilities*	3.8	23.5	3.1	10.1	16.7	15.6	6.3	3.2	20.2	3.4	21.9	11.6
	Truck	70	-	-	25	15	0	-	30	10	5	11	0
	Mini-Bus	30	-	-	20	20	0	-	50	0	0	0	0
	Sedan/Taxi	50	-	-	10	30	0	-	60	5	5	0	0
	Motorcycle	50	-	-	10	10	0	-	70	0	0	10	0
	Pedestrian/Bicycle	1,060	-	-	600	1,100	470	-	700	130	500	2,000	1,500
	Boat	-	2,600	600	-	-	-	325	-	-	-	-	-
	Future Development Traffic Volume	0+45=45	124+124=248	83+83=166	0	33	49+25=74	80+40=120	0	53+27=80	37	71	38
	Road Closure Term (days)**	9 (9)	Boat (365)	Boat (365)	18 (18)	12 (12)	14 (365)	Boat (365)	16 (16)	8 (60)	8 (60)	6 (60)	20 (365)
	Land Acquisition	None	Necessary	Necessary	None	None	Necessary	Necessary	Necessary	None	None	None	Necessary
	Removal of Obstruction	None	10 houses	10 houses	None	None	None	None	None	None	None	None	None
	No. of People to Relocate	None	60	60	None	None	None	None	None	None	None	None	None
	Peace & Order	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
	No. of Beneficiary	30	30	30	5	30	5	30	30	20	20	5	15
	Access to Public Facilities	15	25	25	18	18	22	22	1	24	25	25	25
	Influenced Area/Productivity	8	12	10	2	15	2	10	10	15	12	10	8
	Reduction of Road Closure	2	15	15	8	2	15	15	8	14	14	14	15
	Present Traffic Volume	5	4	3	4	4	2	2	5	4	3	4	4
	Future Traffic Volume	3	5	5	0	2	3	4	0	4	2	3	2
	Related Project	3	0	0	0	0	0	3	3	3	0	3	3
	Total	66	91	88	37	71	49	86	57	84	76	64	72
	Remarks												

Note: *) - Distance to the Nearest Market (km)
 **) - For Pedestrian (For Vehicle)

Site Condition and Assessment of Socio-Economic Effect for Requested Bridges (3/3)

No.	25	26	27	28	29	30	31	32	33	34
Bridge Code	S-25	S-27	S-28	S-29	S-30	S-30-2	Add-5	M-19-1	M-19	M-20
Region	Upper East	Upper West	Upper West	Upper West	Upper West	Upper West	Upper West	Upper West	Upper West	Upper West
District	Kassena Nankana	Jirapa Lambussie	Jirapa Lambussie	Wa	Wa	Wa	Wa	Wa	Jirapa Lambussie	Lawra
Existence of Bridge	None	None	None	None	None	None	None	None	Bailey	RCBC
Poverty Ratio	126	126	126	126	126	126	126	126	126	126
Influenced Area (km ²)	36 / 76	79 / 108	79 / 108	117	91	91	500	85 / 500	67	29 / 108
No. of Beneficiary (person)	18,400 / 27,400	15,800 / 32,300	15,800 / 32,300	12,000	10,000	10,000	21,500	4,000 / 21,500	23,600	13,700 / 32,300
Main Industry	Agriculture, Live Stock	Agriculture, Live Stock	Agriculture, Live Stock	Agriculture, Live Stock	Agriculture, Live Stock	Agriculture, Live Stock	Agriculture, Live Stock	Agriculture, Live Stock	Agriculture, Live Stock	Agriculture, Live Stock
Main Product	Tomato, Rice, Cattle	Yam, Millet, Cattle	Yam, Rice, Cattle	Yam, Rice, Cattle	Yam, Maize, Nuts	Yam, Maize, Nuts	Colon, Cassava, Cattle	Colon, Cassava, Cattle	Yam, Millet, Cattle	Yam, Millet, Cattle
Related Project	-	Duori Water	-	-	-	-	-	-	-	-
Regional Development Plan	-	-	-	-	-	-	-	-	-	-
Access to Public Facilities*	11.6	4.4	4.4	18.5	22.7	22.7	49.7	5.4	8.6	5.2
Truck	18	15	8	8	5	5	0	0	80	10
Mini-Bus	0	6	2	0	0	0	0	0	20	2
Sedan/Taxi	0	0	0	0	0	0	0	0	5	0
Motorcycle	50	15	10	0	0	0	0	0	50	15
Pedestrian/Bicycle	1,500	1,000	800	480	180	180	350	500	1,500	1,200
Boat	-	-	-	-	-	-	-	-	-	-
Future Development Traffic Volume	45 (88)	48(87+44=131)	48 (131)	25 (61)	49	49	180+180=360	25 (360)	0	0 (131)
Road Closure Term (days)**	20 (90)	30 (60)	15 (60)	60 (60)	60 (60)	60 (60)	90 (365)	15 (42)	Un-known(60)	0 (60)
Land Acquisition	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	Necessary	None	Necessary
Removal of Obstruction	None	None	None	None	None	None	None	None	None	None
No. of People to Relocate	None	None	None	None	None	None	None	None	None	None
Peace & Order	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
No. of Beneficiary	30 (20)	15 (20)	15 (20)	20 (30)	20	20	5	5 (5)	30	25 (20)
Access to Public Facilities	25	22	22	25	25	25	25	25	16	16
Influenced Area/Productivity	8 (8)	8 (8)	8 (8)	12 (15)	15	15	12	15 (12)	10	8
Reduction of Road Closure	15	14	14	14	14	14	15	12	14	14
Present Traffic Volume	4	4	4	2	2	2	2	3	5	4
Future Traffic Volume	3 (4)	3 (4)	3 (4)	2 (3)	2	2	5	2 (5)	0	0 (4)
Related Project	3	3	3	5	5	5	5	5	0	3
Total	88 (79)	69 (75)	69 (75)	80 (94)	83	83	69	67 (67)	75	70 (69)
Remarks										

Note: *) - Distance to the Nearest Market (km)
 **) - For Pedestrian (For Vehicle)

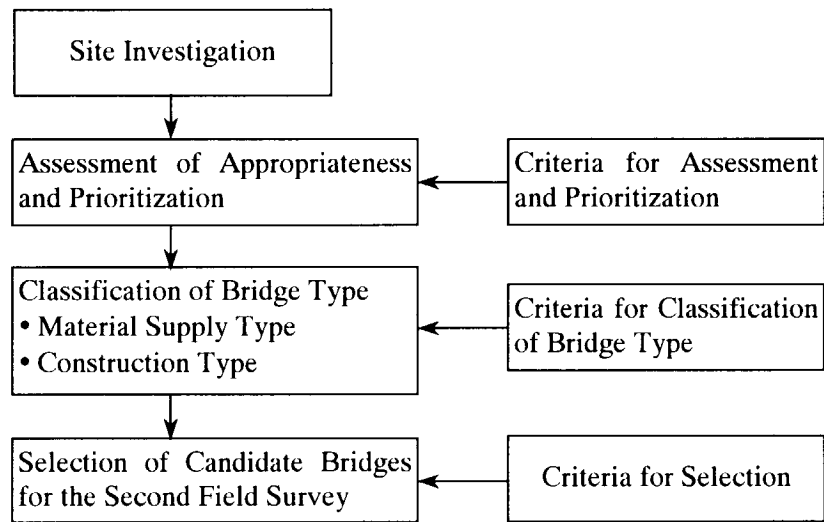
APPENDIX 7

**SELECTION OF BRIDGES
FOR THE SECOND FIELD SURVEY**

SELECTION OF BRIDGES FOR THE SECOND FIELD SURVEY

1. Selection Procedure

Based on the collected data during the first field survey, requested 34 bridges were assessed their appropriateness on the points of engineering necessity and socio-economic effects, then prioritized into A, B and C groups. Procedure of the selection is shown below:



2. Criteria for Assessment

Criteria for assessment of engineering necessity is shown in Table 7-1 and criteria for assessment of socio-economic effect is shown in Table 7-2. Potential/development traffic volume was estimated by the method explained below:

Among investigated bridge sites with vehicle traffic, the existing traffic volume was co-related with population of beneficiary and influenced area, then an unit such as population per vehicle and area per vehicle was calculated. The established unit was applied to a bridges site where presently bridge is not constructed to estimate potential/development traffic.

For a site of bridge which will complete a road link on the road network, an increase of through traffic can be expected. Increase of through traffic was estimated as shown below:

Existing Condition	Potential/Development Traffic Volume (No./day)	Through Traffic Volume (No./day)
Existing bridge / culvert with vehicle traffic	Zero	30% of Present ADT
Ford crossing with vehicle traffic	Bridge Number either 30% of Present ADT or Number of vehicles calculated by a formula below	50% of Present ADT
Vehicle impassable	Truck 1 vehicle per 4km ² Mini-bus 1 vehicle per 650 persons Sedan 1 vehicle per 1,000 persons	100% of Number calculated by left formula in case of no detour available. 50% of Number calculated by left formula in case of no detour available.

Cost of improvement on the project road was estimated based on the data of DFR as follows;

Re-Graveling	\$15,000/km
Widening	\$30,000/km
New construction	\$40,000/km
Pipe culvert (D900, L = 8m)	\$ 5,000/site
Pipe culvert (2-D900, L = 8m)	\$10,000/site
Box culvert (Single, L = 8m)	\$15,000/site
Box culvert (Double, L = 8m)	\$20,000/site
Box culvert (Triple, L = 8m)	\$35,000/site

Necessary cost of improvement for each bridge site is shown in Table 7-3.

Table 7-1 Criteria for Assessment of Engineering Necessity

Item for Assessment	Condition	Point
1) Existence of Bridges	None	25
	Exist, Need Re-construction	25
	Exist, Re-construction not needed	0
2) Bridge Type / Scale	Bridge Length less 80m	25
	Bridge Length 80m or More	2
	Culvert or Drift	0
3) Road Closure Term for Vehicle	90 days or More	20
	60 days ~ 89 days	18
	30 days ~ 59days	15
	15 days ~ 29 days	10
	1 day ~ 14 days	2
	No Closure	0
4) Additional Distance on Detour	No Detour Route	10
	50 km or More	8
	30 km ~ Less 50 km	6
	10 km ~ Less 30 km	4
	Less 10 km	2
5) Improvement of Access Road	Less \$0.25 million	10
	\$0.25 million ~ Less \$0.5 million	6
	\$0.5 million ~ Less \$1.0 million	3
	\$1.0 million or More	1
6) Road Class	Feeder Road (Link)	5
	Feeder Road (Branch)	4
	Trunk Road	1
7) Connection Road Condition	Paved (Good, Fair)	5
	Paved (Fair/Bad)	3
	Paved (Bad/Fair, Bad)	1
	Un-paved (Good, Fair)	3
	Un-paved (Fair/Bad)	2
	Un-paved (Bad/Fair, Bad)	1
Total (Full Score)		100

Note: In the case of condition shown below, items 4) ~ 7) are given zero point.

- Proposed bridge length over 80m at the site of no existing bridge
- Road closure term less 30 days for the site of existing bridge, which dose not require re-construction
- Proposed bridge type is Culvert or Drift

Table 7-2 Criteria for Assessment of Socio-Economic Effect

Item for Assessment	Condition	Point
1) Number of Beneficiary	20,000 persons or More	30
	10,000 ~ 19,999 persons	25
	5,000 ~ 9,999 persons	20
	3,500 ~ 4,999 persons	10
	Less 3,500 persons	2
2) Access to Public Facilities	Need Re-construction , No Detour Route	25
	Detour 50km or More	24
	Detour 30 ~ 49km	22
	Detour 10 ~ 29km	20
	Detour Less 10km	15
	Re-construction not needed Road Closure 1 month or More	5
Road Closure Less 1 month	1	
3) Influenced Area/ Productivity	100 km ² or More	15
	75 km ² ~ Less 100 km ²	12
	50 km ² ~ Less 75 km ²	10
	25 km ² ~ Less 50 km ²	5
	Less 25 km ²	2
4) Reduction of Road Closure	90 days or More	15
	60 days ~ 89 days	14
	30 days ~ 59 days	12
	15 days ~ 29 days	5
	Less 15 days	2
5) Present Traffic Volume	Exist Vehicle Traffic , 100/day or More	5
	Less 100/day	4
	No Vehicle Traffic , 1,000 persons/day or More	4
	500 ~ 999 persons/day	3
	Less 500 persons/day	2
6) Future Traffic Volume	150/day or More	5
	80/day ~ 149/day	4
	40/day ~ 79/day	3
	10/day ~ 39/day	2
	1/day ~ 9/day	1
	None	0
7) Related Project	2 Projects or More	5
	1 Project	3
	None	0
Sub-total (Full Score)		100
Ratio of Bridge Scale	Proposed Bridge Length Up to 25m	1.00
	26 ~ 39m	0.90
	40 ~ 49m	0.85
	50 ~ 69m	0.80
	70 ~ 99m	0.70
	100m or More	0.60

Table 7-3 Estimation of Improvement Cost of Project Road

Unit: US\$1,000

Br Code	Up to the Bridge	Beyond the Bridge	Total
S-17	0	0	0
S-18	$2.7 \times 15 = 40.5$	$6.3 \times 15 = 94.5$	135.0
S-19	$1.1 \times 30 + 1.6 \times 40 = 97.0$	$1.9 \times 40 = 76.0$	173.0
S-20	$0.3 \times 40 + 1 \times 5 \times 2 = 22.0$	$2.7 \times 40 + 1 \times 5 \times 2 = 118.0$	140.0
M-10	-	$2.5 \times 30 = 75.0$	75.0
M-11	$3 \times 30 + 4 \times 5 \times 2 = 130.0$	$0.7 \times 40 + 8 \times 5 \times 2 = 108.0$	238.0
M-12	$9 \times 40 + 4 \times 5 \times 2 = 440.0$	$8.5 \times 40 + 4 \times 5 \times 2 = 380.0$	820.0
S-12	$1.2 \times 40 + 0 = 48.0$	$4.2 \times 40 + 2.1 \times 30 + 3 \times 35 = 336.0$	384.0
S-14	$5 \times 30 + 1 \times 35 + 4 \times 5 \times 2 = 225.0$	$2.8 \times 30 + 2 \times 20 = 124.0$	349.0
S-15	$6.2 \times 30 + 0.3 \times 40 + 2 \times 5 \times 2 = 238.0$	$2.0 \times 40 + 4 \times 5 \times 2 = 120.0$	358.0
M-9	$3.4 \times 40 = 136.0$	$2.7 \times 40 = 108.0$	244.0
S-1	$11.0 \times 30 + 1 \times 35 + 1 \times 20 + 10 \times 5 \times 2 = 485.0$	$0.3 \times 40 = 12.0$	497.0
S-2	$0.6 \times 30 = 18.0$	$8.6 \times 30 + 1 \times 20 + 4 \times 5 \times 2 = 318.0$	336.0
M-3-1	$6 \times 30 + 0.1 \times 40 + 14 \times 15 = 394.0$	$5.2 \times 30 + 3 \times 40 + 9 \times 5 \times 3 = 411.0$	805.0
M-3-2	$3.7 \times 30 + 0.1 \times 40 = 115.0$	$3.0 \times 40 = 120.0$	235.0
S-6	$3.6 \times 15 = 54.0$	$3.0 \times 15 = 45.0$	99.0
S-8	$4 \times 15 = 60.0$	$15 \times 30 = 450$	510.0
S-9	$6 \times 30 + 0.1 \times 40 = 184.0$	$3.0 \times 40 = 120.0$	304.0
M-4	$1.6 \times 40 + 5 \times 20 \times 2 = 228.0$	$2.2 \times 40 \times 2 + 9 \times 15 = 311.0$	539.0
M-6	-	-	-
S-21	$9 \times 40 + 2 \times 35 + 2 \times 5 \times 2 = 450.0$	$11.2 \times 40 + 20 \times 3 = 508.0$	958.0
S-22	$2.9 \times 15 = 43.5$	$6.5 \times 15 = 97.5$	141.0
S-23	$2 \times 35 = 70.0$	$4.5 \times 30 + 70 \times 30 = 2,235.0$	2,350.0
S-24	$4.6 \times 40 + 9 \times 20 = 364.0$	$10.9 \times 40 + 20 \times 15 = 736.0$	1,100.0
S-25	$0.5 \times 40 + 2 \times 35 = 90.0$	-	90.0
S-27	$2.3 \times 15 + 3 \times 35 = 139.5$	-	139.5
S-28	$1.0 \times 15 = 15.0$	-	15.0
S-29	$4.6 \times 30 + 1 \times 20 = 158.0$	$3.9 \times 30 = 117.0$	275.0
S-30	$1.3 \times 30 = 39.0$	$0.9 \times 30 = 27.0$	66.0
S-30-2	$2.0 \times 30 = 60.0$	-	60.0
Add-5	$0.5 \times 15 + 60 \times 30 + 1 \times 35 = 1,842.5$	-	1,842.5
M-19-1	$0.8 \times 30 + 2 \times 20 = 64.0$	$6.3 \times 30 = 189.0$	253.0
M-19	-	-	-
M-20	-	$2 \times 35 = 70.0$	70.0
Total	6,250.0	7,306.0	13,556.0

3. Assessment and Prioritization

Based on the established criteria, requested 34 bridges were assessed. The result of the assessment for engineering necessity and socio-economic effect are shown in Appendix-8.

The score of each bridges was plotted on the graph in accordance with their total points of assessment. Priority zone and score of each bridge are shown in Figure 7-1.

- Priority A (22 bridges) Both engineering necessity and socio-economic effect are high and appropriate as a candidate bridge
- Priority B (5 bridges) Engineering necessity is high but socio-economic effect is insufficient, thus low priority as a candidate bridge (S-6, S-9, S-14, S-20, M-10)
- (3 bridges) Socio-economic effect is high but engineering necessity is insufficient, thus low priority as a candidate bridge (S-23, Add-5, M-19-1)
- Priority C (4 bridges) Either engineering necessity or socio-economic effect or both factors are extremely low, thus not appropriate as a candidate bridge (S-2, S-17, S-18, M-6)

In this project, 22 bridges prioritized as A group were selected as candidate bridges for the second field survey.

4. Classification of Bridge Type

Selected 22 bridges were classified into a material supply type and a construction type. Basically, the bridges of which a proposed bridge length is 25m or less were classified as a material supply type, but three bridges, S-1, S-12 and S-27, were classified as a construction type due to the following reason:

S-27 Protection works against scouring for the bridge and the approach road shall be carefully designed and constructed due to the difficult hydrological condition

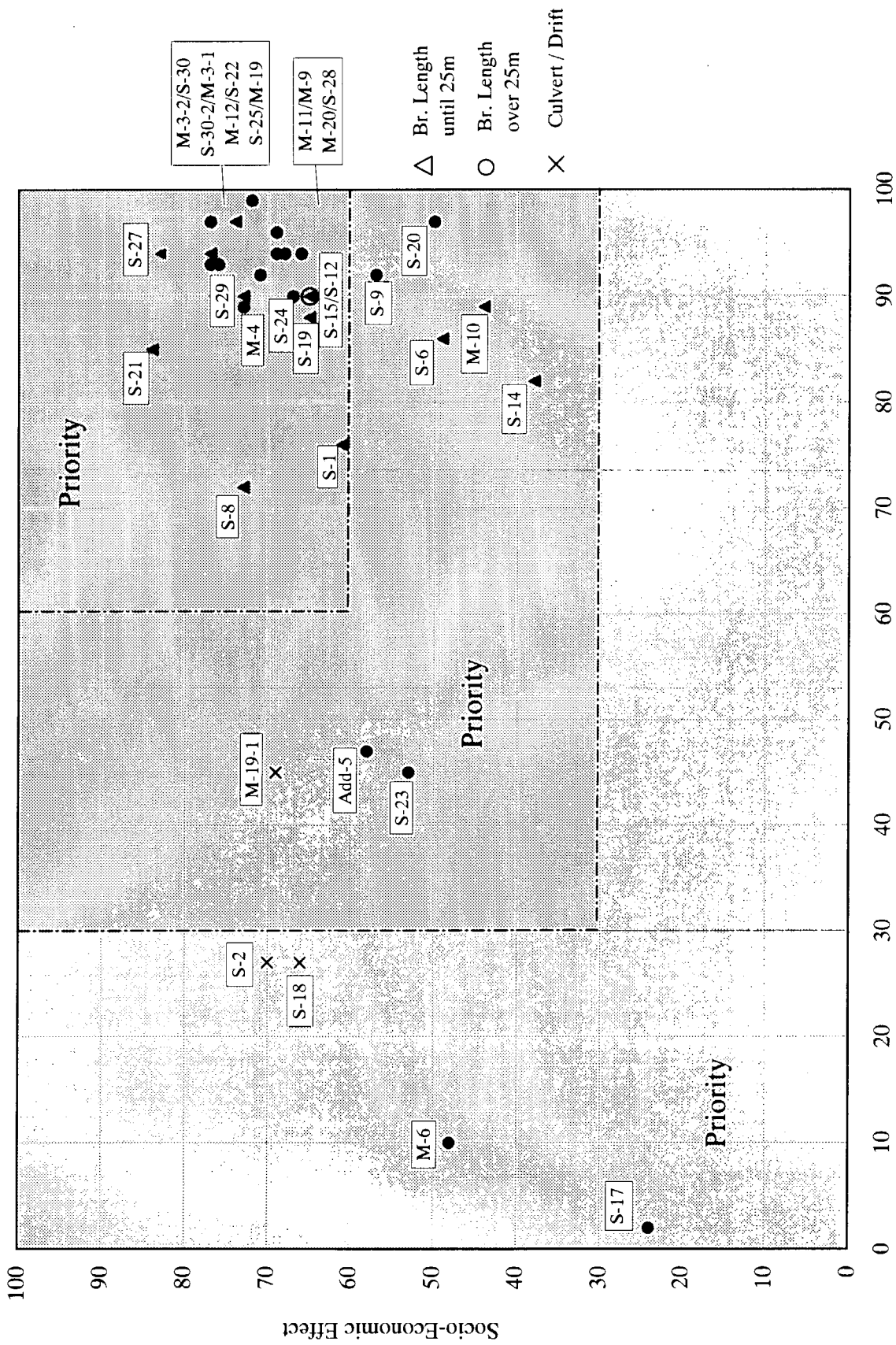
S-1 & S-12 In order to reduce the Ghanian side financial burden as well as to undertake timely trainings for the bridge assembly and erection to the Ghanian officials, two bridges were recommended to be classified as a construction type.

The following seven (7) bridges were classified as a material supply type:

S-19, S-8, S-21, S-22, S-29, S-30, S-30-2

The remaining 15 bridges were classified as a constructin type as follows:

M-11, M-12, S-12, S-15, M-9, S-1, M-3-1, M-3-2, M-4, S-24, S-25, S-27, S-28,
M-19, M-20



Engineering Necessity

Figure 7-1 Assessment of Appropriateness and Priority

The candidate bridges for the second field survey are summarized in Table 7-4.

Table 7-4 Candidate Bridges for the Second Field Survey

Region	No. of Requested Bridge	Candidate Bridges for Second Field Survey		
		Material Supply Type	Construction Type	Total
Volta	7	S - 19 (20 m)	M - 11 (35 m) M - 12 (50 m)	3 (105 m)
Eastern	4	---	S - 12 (20 m) S - 15 (30 m) M - 9 (50 m)	3 (100 m)
Ashanti	4	---	S - 1 (20 m) M - 3 - 1 (45 m) M - 3 - 2 (45 m)	3 (110 m)
Brong Ahafo	5	S - 8 (20 m)	M - 4 (40 m)	2 (60 m)
Northern	3	S - 21 (20 m) S - 22 (25 m)	---	2 (45 m)
Upper East	2	---	S - 24 (45 m) S - 25 (35 m)	2 (80 m)
Upper West	8 (9)	S - 29 (15 m) S - 30 (15 m) S - 30 - 2 (15 m)	S - 27 (25 m) S - 28 (50 m) M - 19 (40 m) M - 20 (30 m)	7 (190 m)
Total	33 (34)	7 (130 m)	15 (560 m)	22 (690 m)

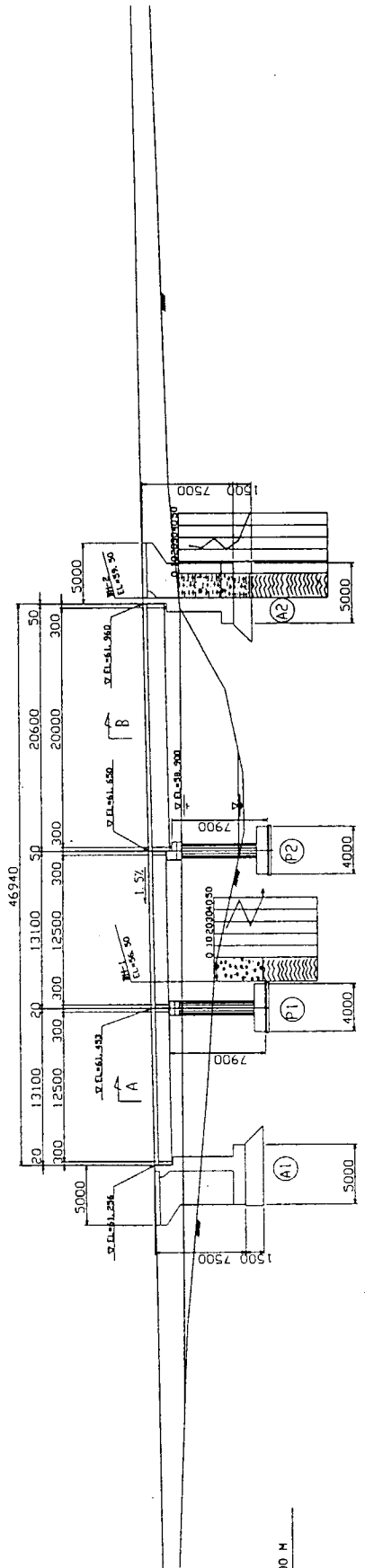
APPENDIX 8

**GENERAL VIEW
OF CONSTRUCTION TYPE BRIDGES**

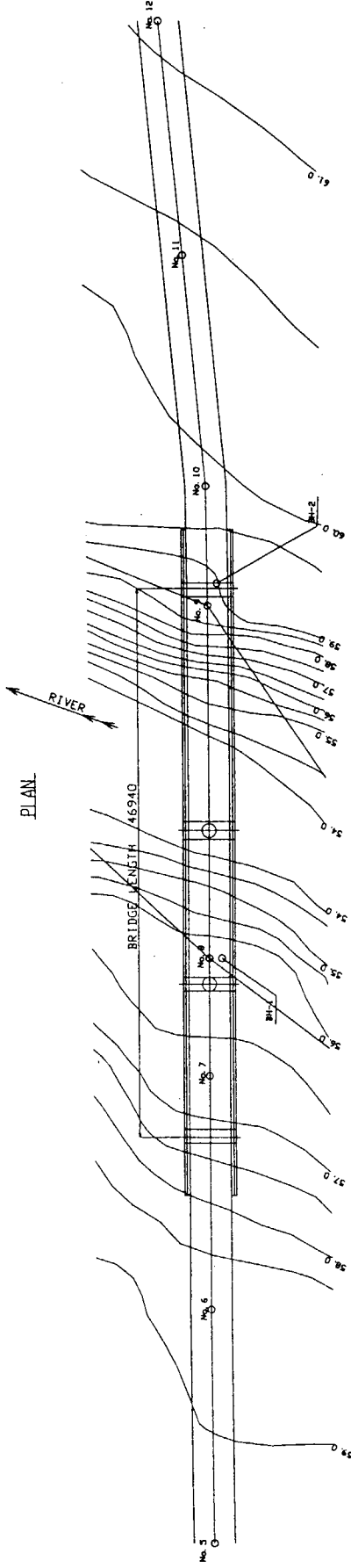
M-11 GENERAL VIEW

SCALE 1: 200

ELEVATION

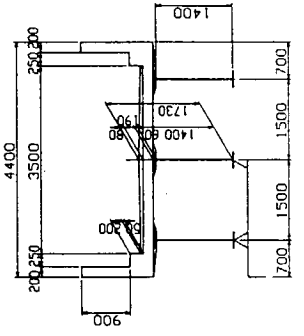


PLAN



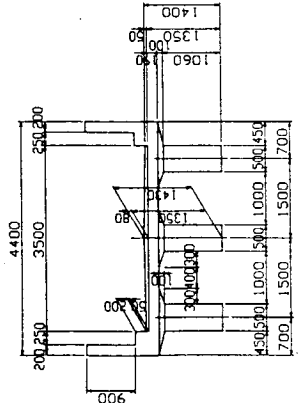
CROSS SECTION B

SCALE 1: 50



CROSS SECTION A

SCALE 1: 50

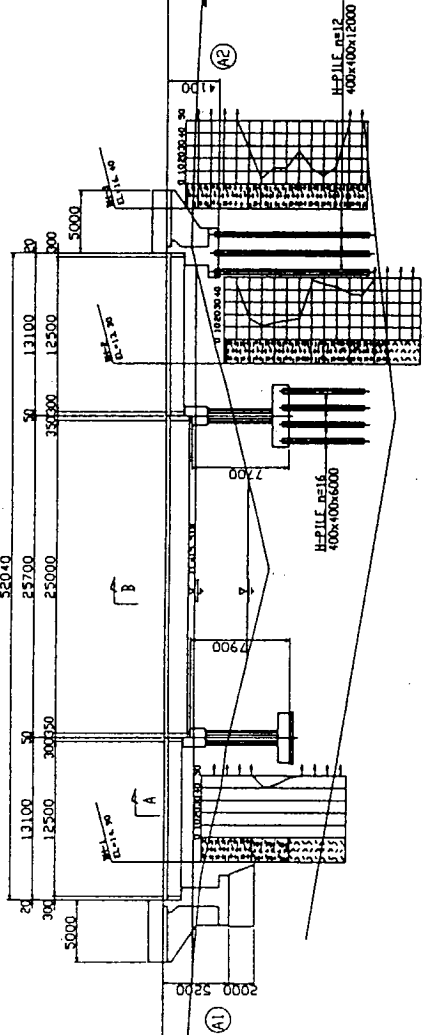


PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	M-11 GENERAL VIEW
GOVERNMENT OF GHANA	
DEPARTMENT OF FEEDER ROADS	
CHECKED	NAME _____ DATE _____ SIGNATURE _____
APPROVED	NAME _____ DATE _____ SIGNATURE _____
CONSULTANT:	
KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED	NAME _____ DATE _____ SIGNATURE _____
CHECKED	NAME _____ DATE _____ SIGNATURE _____
DRAWING No.	SCALE 1: 200

M-12 GENERAL VIEW

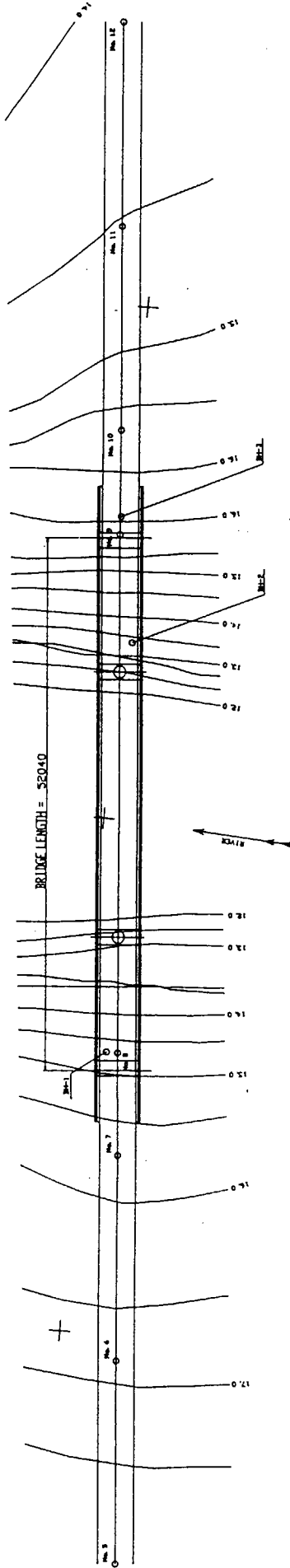
SCALE 1:200

ELEVATION



DATUM LEVEL 9.000 M

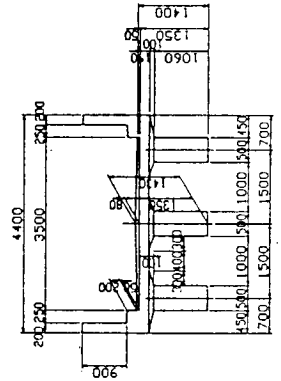
PLAN



BRIDGE LENGTH = 26200

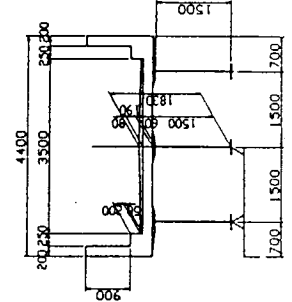
CROSS SECTION A

SCALE 1:50



CROSS SECTION B

SCALE 1:50

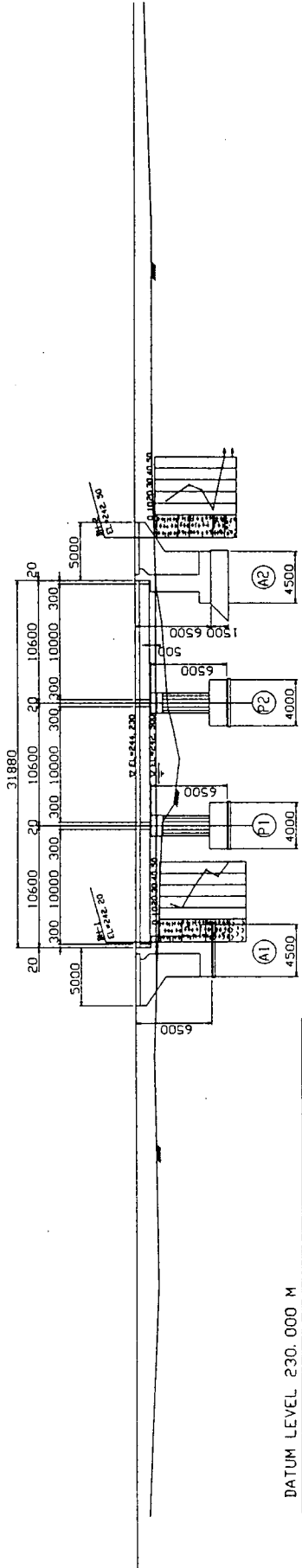


PROJECT	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION	M-12 GENERAL VIEW
GOVERNMENT OF OMAN DEPARTMENT OF FEEDER ROADS	
DESIGNER	DATE
CHECKED	APPROVED
CONSULTANT	
KA AHIRA & ENGINEERS INTERNATIONAL	
DRAWN	SCALE
CHECKED	DATE
DATE	SIGNATURE
DATE	SIGNATURE
DATE	SIGNATURE

S-15 GENERAL VIEW

SCALE 1:200

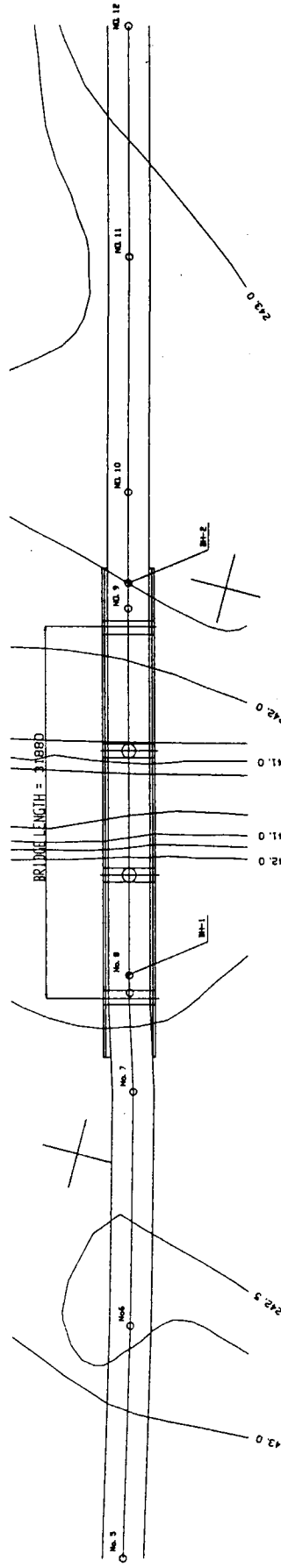
ELEVATION



DATUM LEVEL 230.000 M

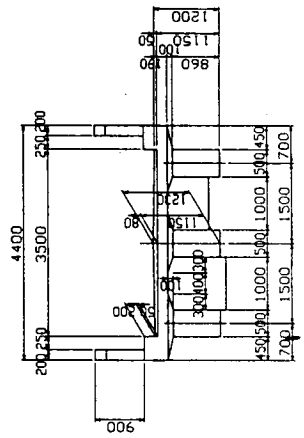
PLAN

RIVER



CROSS SECTION

SCALE 1:50

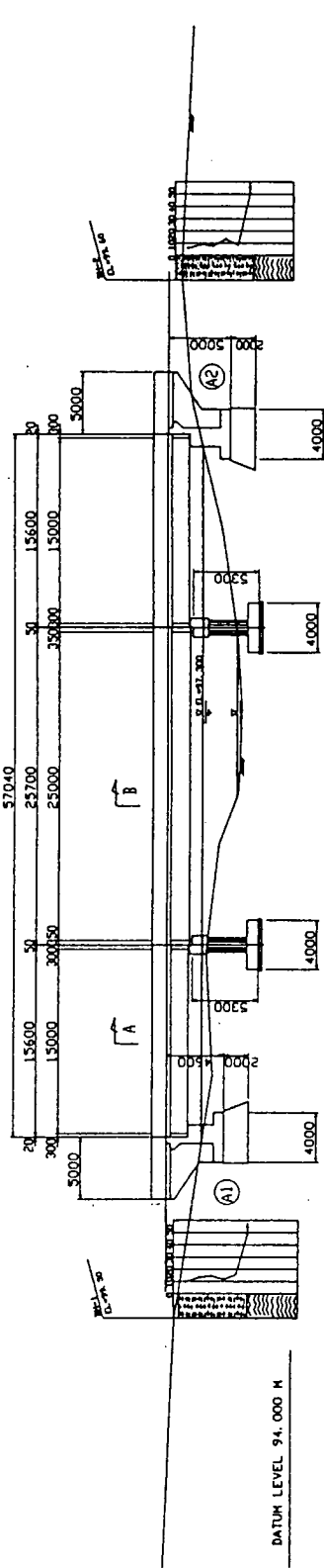


PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	S-15 GENERAL VIEW
GOVERNMENT OF GAMBIA	
DEPARTMENT OF FEEDER ROADS	
DESIGNED BY:	NAME: _____ DATE: _____ SIGNATURE: _____
APPROVED BY:	NAME: _____ DATE: _____ SIGNATURE: _____
CONSULTANT:	
KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED BY:	NAME: _____ DATE: _____ SIGNATURE: _____
APPROVED BY:	NAME: _____ DATE: _____ SIGNATURE: _____
DRAWING NO.	SCALE 1:200

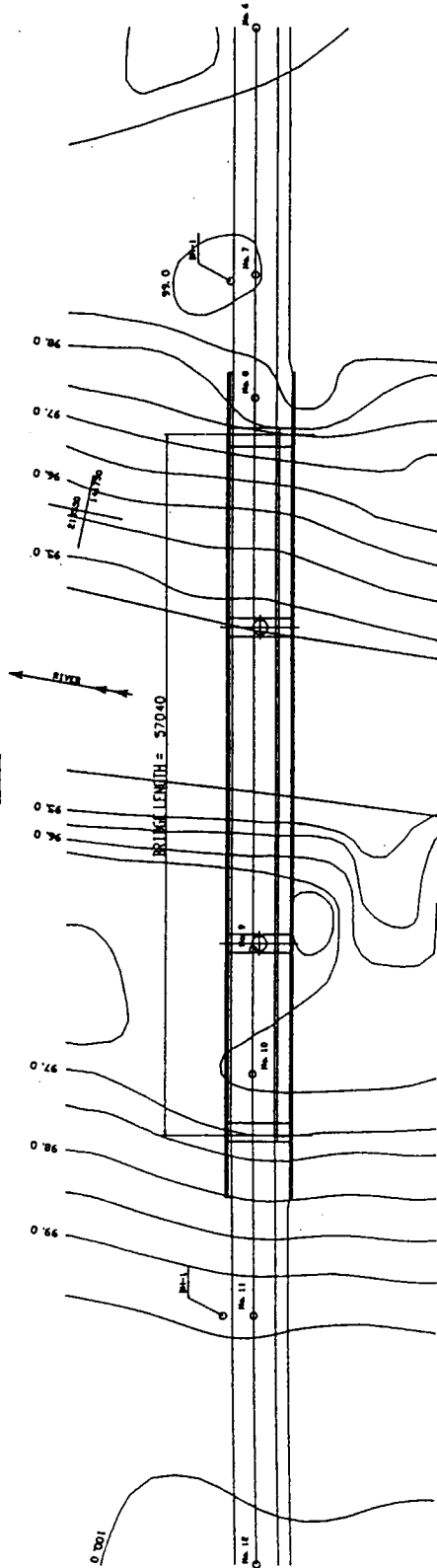
M-3-1 GENERAL VIEW

SCALE 1:200

ELEVATION

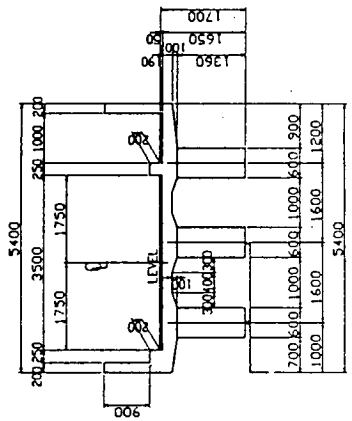


PLAN



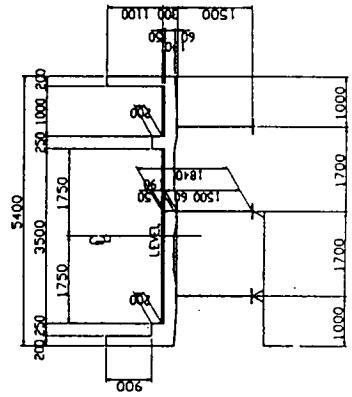
CROSS SECTION A

SCALE 1:50



CROSS SECTION R

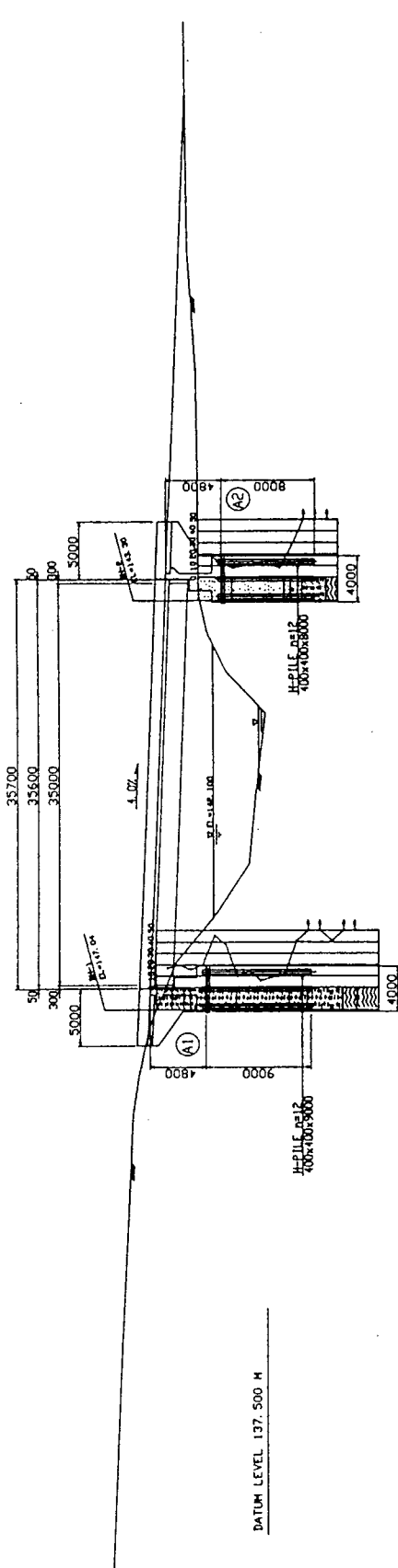
SCALE 1:50



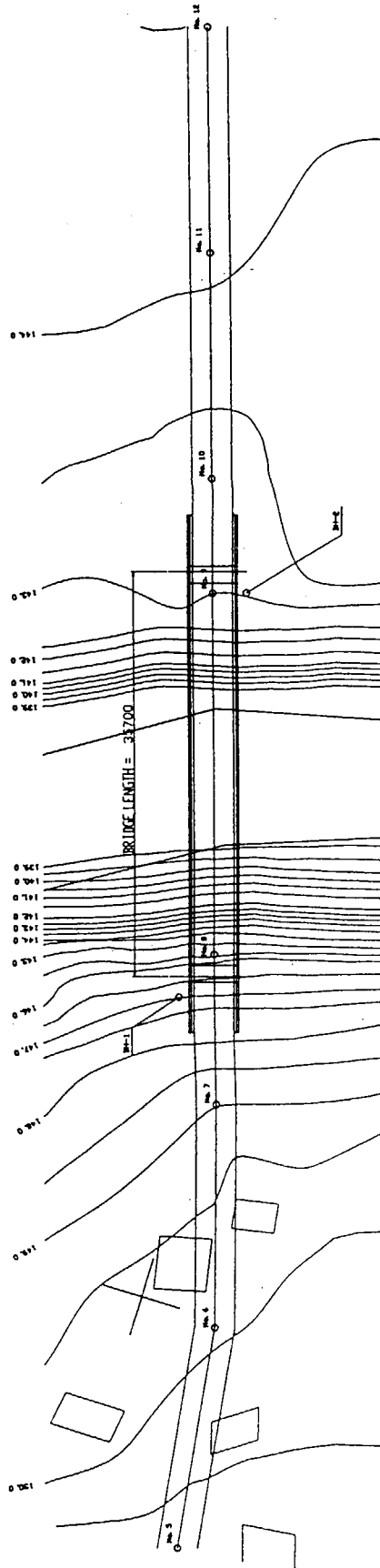
PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	M-3-1 GENERAL VIEW
GOVERNMENT OF CHINA DEPARTMENT OF FEEDER ROADS	
DESIGNED:	DATE: SIGNATURE:
CHECKED:	DATE: SIGNATURE:
CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED:	DATE: SIGNATURE:
CHECKED:	DATE: SIGNATURE:
DRAWING NO.	SCALE 1:200

M-3-2 GENERAL VIEW

SCALE 1:200
ELEVATION

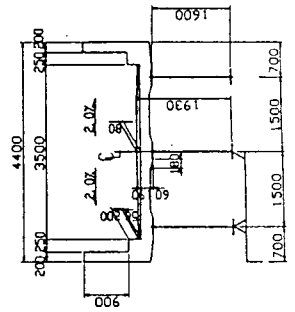


PLAN



CROSS SECTION

SCALE 1:50



PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	M-3-2 GENERAL VIEW
GOVERNMENT OF OMAN DEPARTMENT OF FEEDER ROADS	
DESIGNED BY:	DATE:
CHECKED BY:	DATE:
CONSULTANT:	
KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED BY:	DATE:
CHECKED BY:	DATE:
DRAWING NO.	SCALE
	1:200

APPENDIX 9

REFERENCES

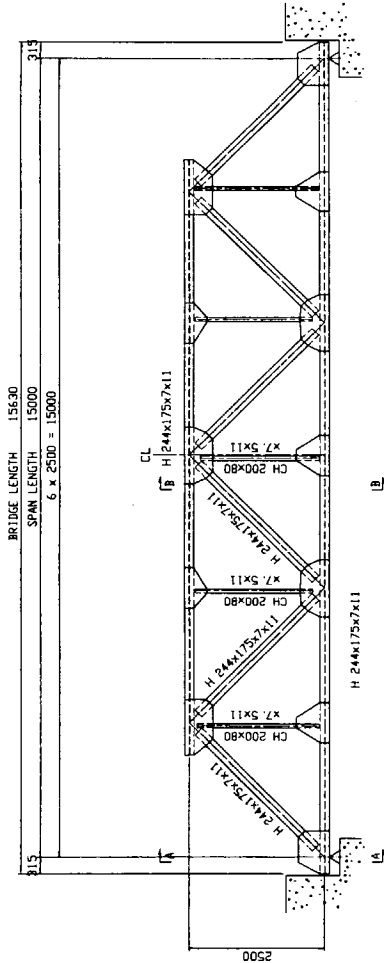
Reference

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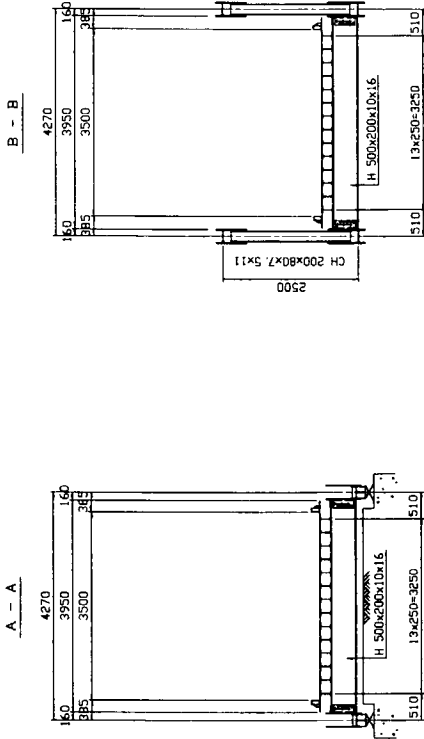
APPENDIX 10

DRAWINGS

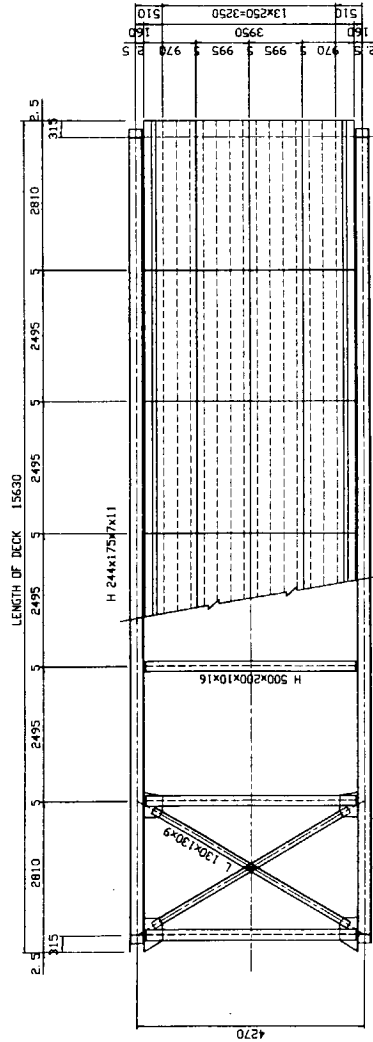
SIDE VIEW



CROSS SECTION



PLAN



ST. HEIGHT OF SUPPORT

	ST. HEIGHT OF SUPPORT	CH PL
1. DECK PL	6.0 mm	
2. DECK BEAM	200.0 mm	H 200x100
3. GROSS BEAM	500.0 mm	H 500
4. GUSSET PL	5.0 mm	t = 10/2 = 5.0mm
5. SUPPORT	198.5 mm	
6. L. FLG	10.0 mm	
7. U. SHOE	25.0 mm	
8. L. SHOE	75.0 mm	
TOTAL	980.5 mm	

GENERAL ARRANGEMENT
SCALE 1:50

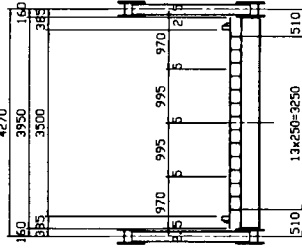
PORTABLE BRIDGE
SUPERSTRUCTURE
15m PONY TRUSS

MARKING DIAGRAM

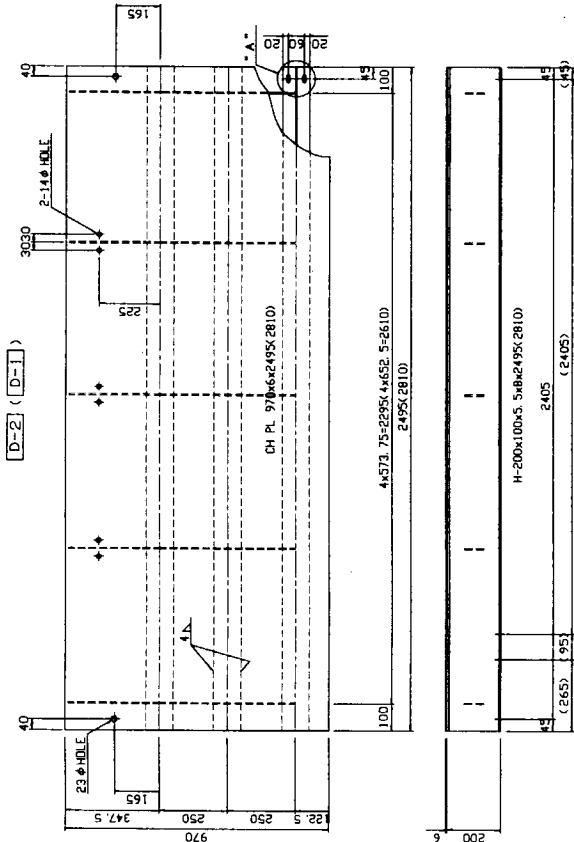
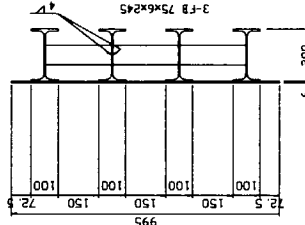
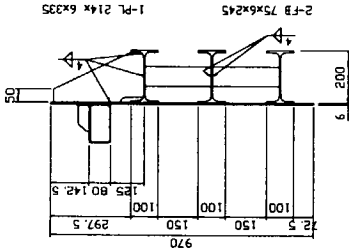
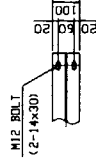
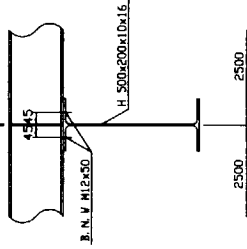
2.5	2810	5	2495	5	2495	5	2495	5	2495	5	2810	2.5
1	D-1	D-2	D-2	D-2	D-2	D-2	D-2	D-2	D-2	D-2	D-1	1
2	D-3	D-4	D-4	D-4	D-4	D-4	D-4	D-4	D-4	D-4	D-3	2
3	D-3	D-4	D-4	D-4	D-4	D-4	D-4	D-4	D-4	D-4	D-3	3
4	D-1	D-2	D-2	D-2	D-2	D-2	D-2	D-2	D-2	D-2	D-1	4

6x2500=15000
SPAN LENGTH 15000

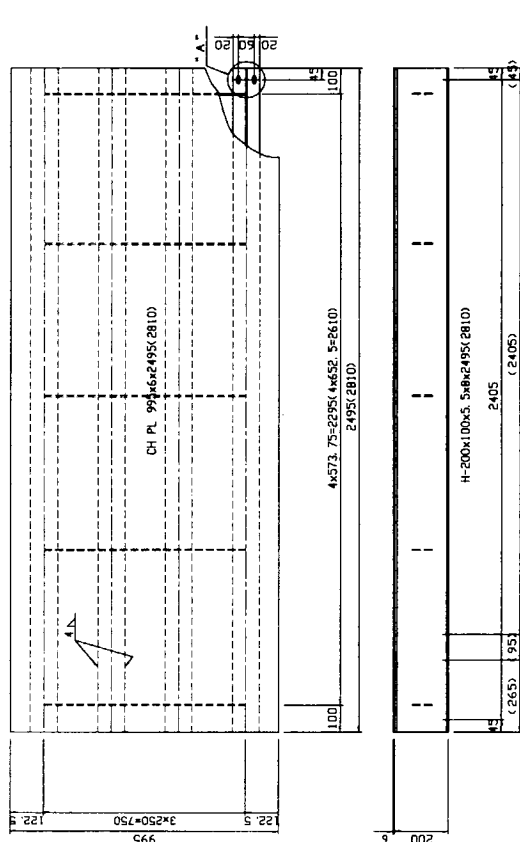
CROSS SECTION



DETAIL OF "A"



D-4 (D-3)



NOTE

1. MATERIAL STANDARD NOT DESCRIBED IS JIS G3101 SS400 OR EQUIVALENT.
2. ALL MEMBERS SHALL BE HOT DIP GALVANIZED TO JIS H8641 GRADE HD255 OR EQUIVALENT.
3. ALL HIGH STRENGTH BOLTS ARE JIS B1186 F8T(M22) AND HOT DIP GALVANIZED TO JIS H8641.

- 1-C 150x80x4.5x2495(2810)(STR 400)
- 2-PL 141x4.5x 71
- 3-PL 45x 6 x120
- 3-PL 45x 6 x100
- 6-B.N.V M12x35
- 2-B.N.V M20x50

PORTABLE BRIDGE
SUPERSTRUCTURE
15m PONY TRUSS

DECK PLATE
SCALE 1:10

LB-107 (Fix-R75) - S56

MATERIAL LIST

NO.	NAME	MATERIAL	Q'TY	WEIGHT (KGF)	REMARKS
①	LOWER SHOE	SC450	1	84.5	
②	UPPER SHOE	SS400	1	14.1	
③	PINCH PLATE	SS400	2	6.2	
④	ANCHOR BOLT & NUT	SS400	2	26.3	
⑤	WASHER	SS400	2	0.4	
TOTAL (Kgf)				131.5	

MATERIAL SHALL BE GALVANIZED 0.46m2

LB-108 (Mov-R75-e20) - S56

MATERIAL LIST

NO.	NAME	MATERIAL	Q'TY	WEIGHT (KGF)	REMARKS
①	LOWER SHOE	SC450	1	89.8	
②	UPPER SHOE	SS400	1	14.9	
③	PINCH PLATE	SS400	2	5.6	
④	ANCHOR BOLT & NUT	SS400	2	15.0	
⑤	WASHER	SS400	2	0.2	
TOTAL (Kgf)				125.5	

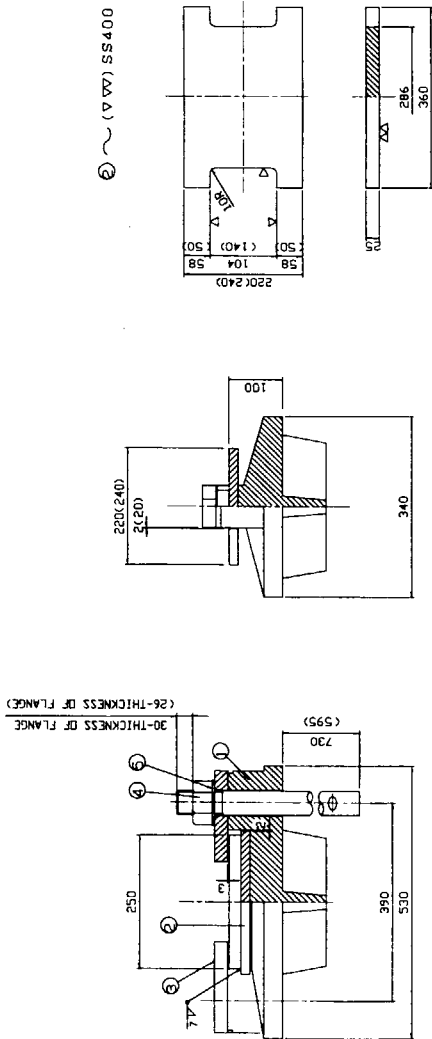
MATERIAL SHALL BE GALVANIZED 0.38m2

DIMENSIONS IN () INDICATE THE MOVABLE BEARING.

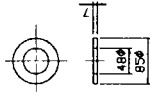
EQUIVALENT MATERIALS OTHER THAN LISTED IN THE ABOVE TABLE ARE ACCEPTABLE SUBJECT TO THE APPROVAL OF CONSULTANT.

PORTABLE BRIDGE
SUPERSTRUCTURE
15m PONY TRUSS

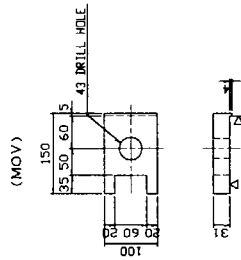
LINE BEARING
SCALE 1:5



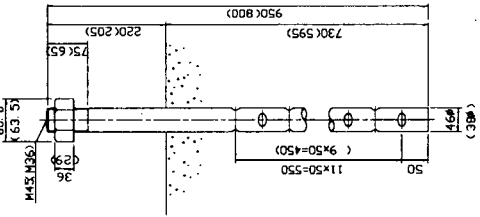
⑤ ~ SS400



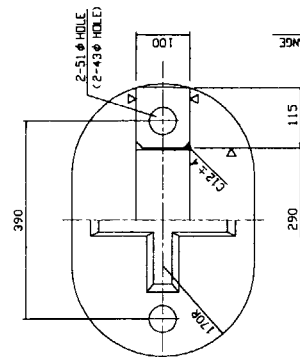
② ~ (MOV) SS400



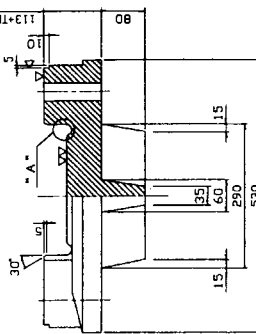
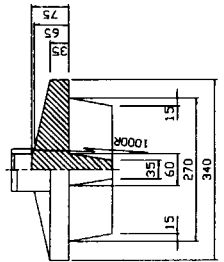
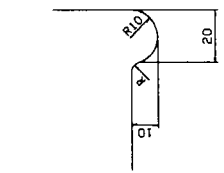
④ ~ SS400



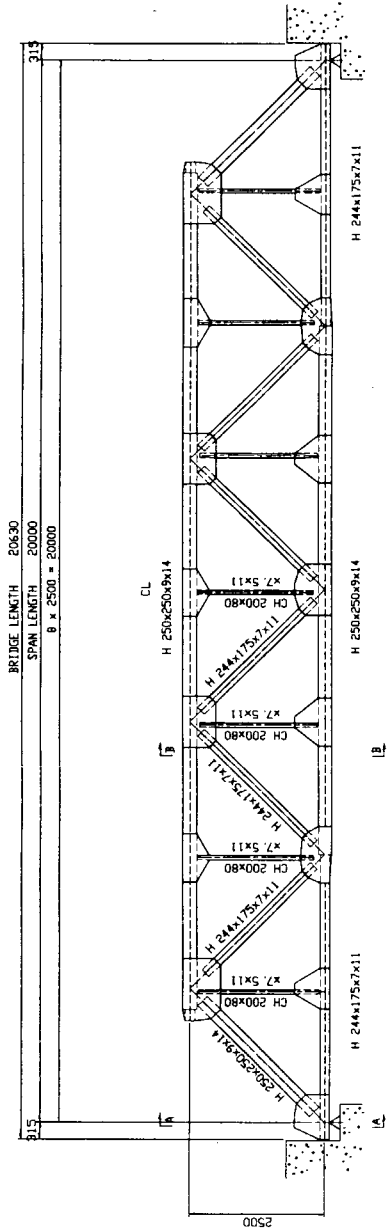
① ~ (FIX) SC450



DETAIL OF "A" S=1:1

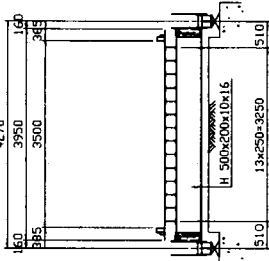


SIDE VIEW

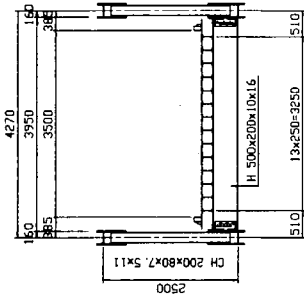


CROSS SECTION

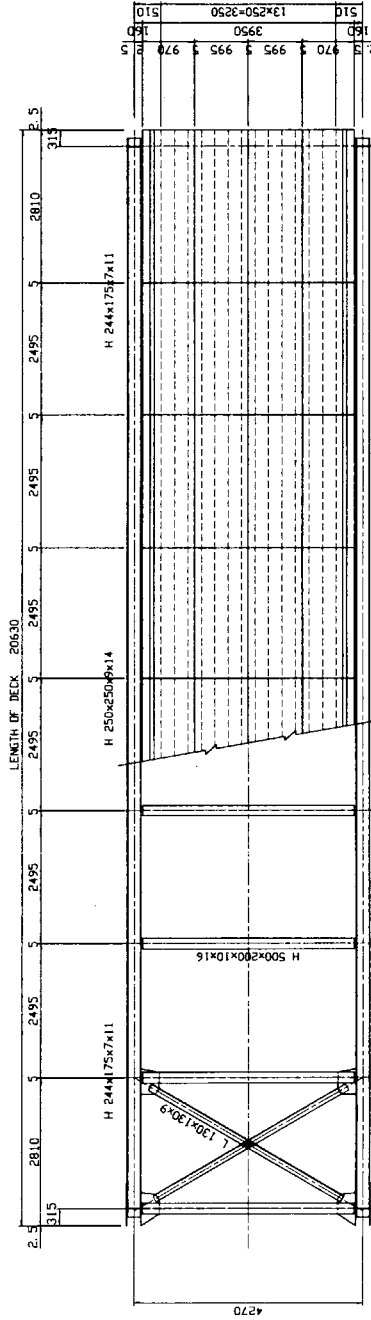
A - A



B - B



PLAN



ST. HEIGHT OF SUPPORT

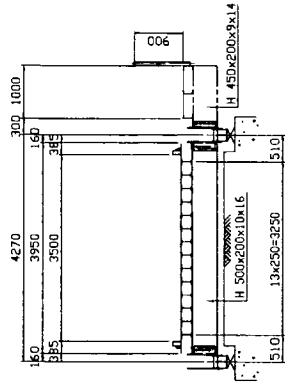
	St. Height	Ch. PL
1. DECK PL	6.0 mm	Ch. PL
2. DECK BEAM	200.0 mm	H 200x100
3. CROSS BEAM	500.0 mm	H 500
4. GUSSET PL	5.0 mm	t = 10/2 = 5.0mm
5. SUPPORT	159.5 mm	
6. L. FLG	10.0 mm	
7. U. SHOE	25.0 mm	
8. L. SHOE	75.0 mm	
TOTAL	980.5 mm	

PORTABLE BRIDGE
SUPERSTRUCTURE
20m PONY TRUSS

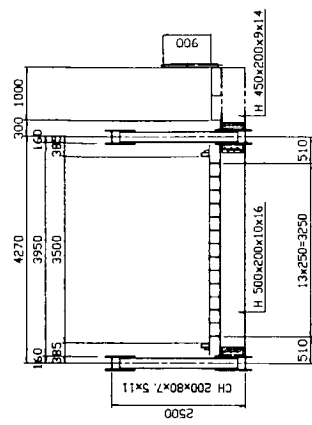
GENERAL ARRANGEMENT
SCALE 1:50

CROSS SECTION

A - A



B - B



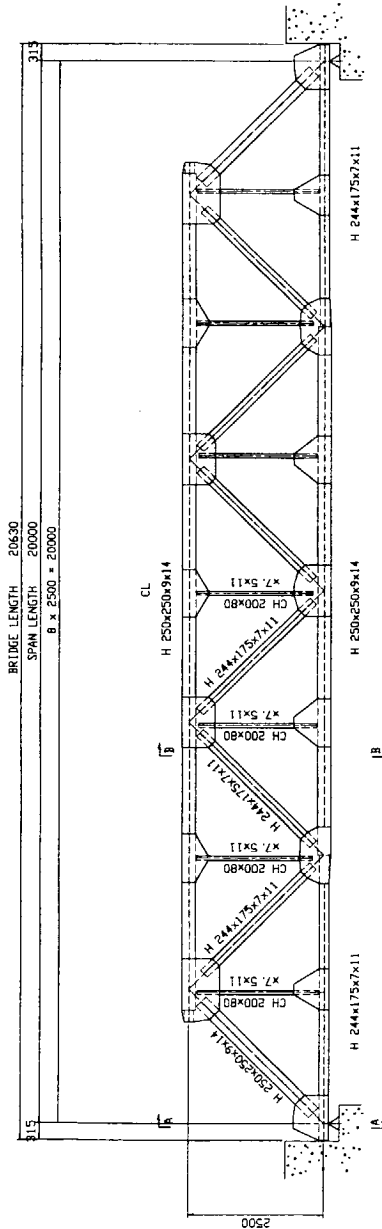
ST. HEIGHT OF SUPPORT

	6.0 mm	Ch. PL.
1. DECK PL	200.0 mm	H 200x100
2. DECK BEAM	500.0 mm	H 500
3. CROSS BEAM	5.0 mm	t = 10/2 = 5.0mm
4. GUSSET PL	159.5 mm	
5. SUPPORT	10.0 mm	
6. L. FLG	25.0 mm	
7. U. SHOE	75.0 mm	
8. L. SHOE	980.5 mm	
TOTAL		

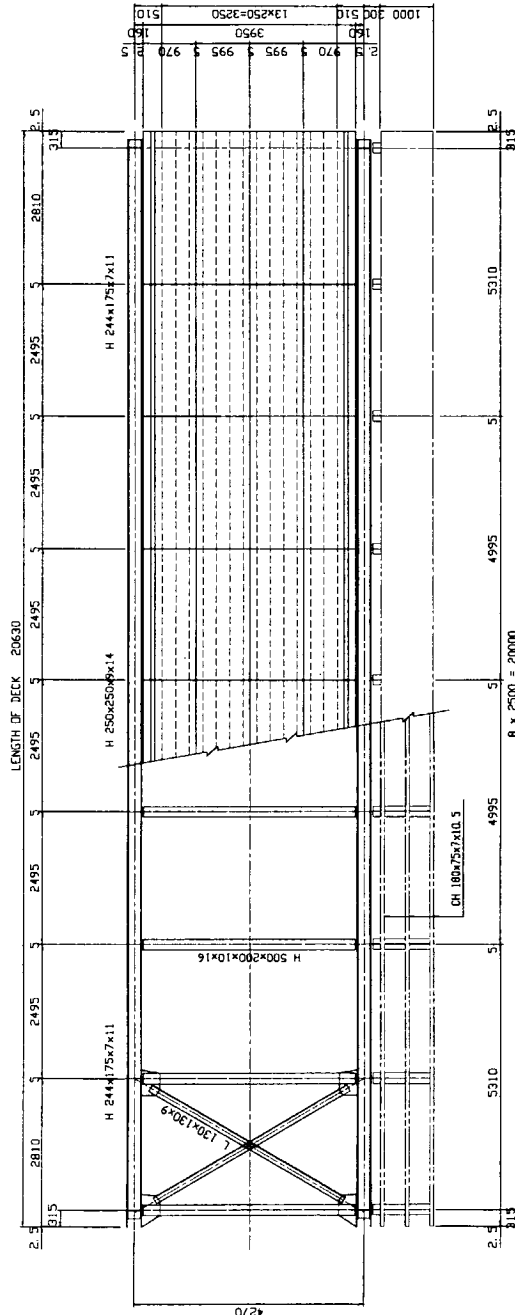
PORTABLE BRIDGE
SUPERSTRUCTURE
20m PONY TRUSS

PORTABLE BRIDGE
SUPERSTRUCTURE
20m PONY TRUSS
(with Pedestrian Deck)

SIDE VIEW

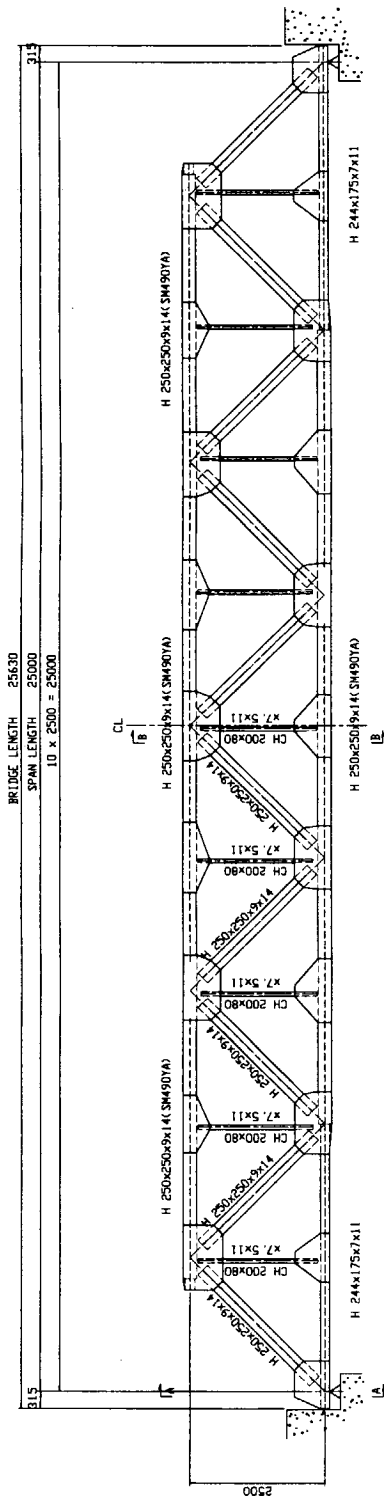


PLAN



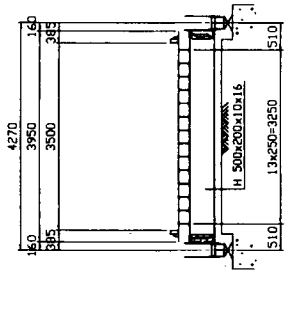
GENERAL ARRANGEMENT
SCALE 1:50

SIDE VIEW

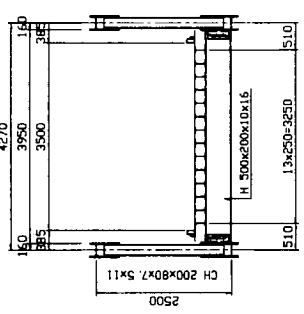


CROSS SECTION

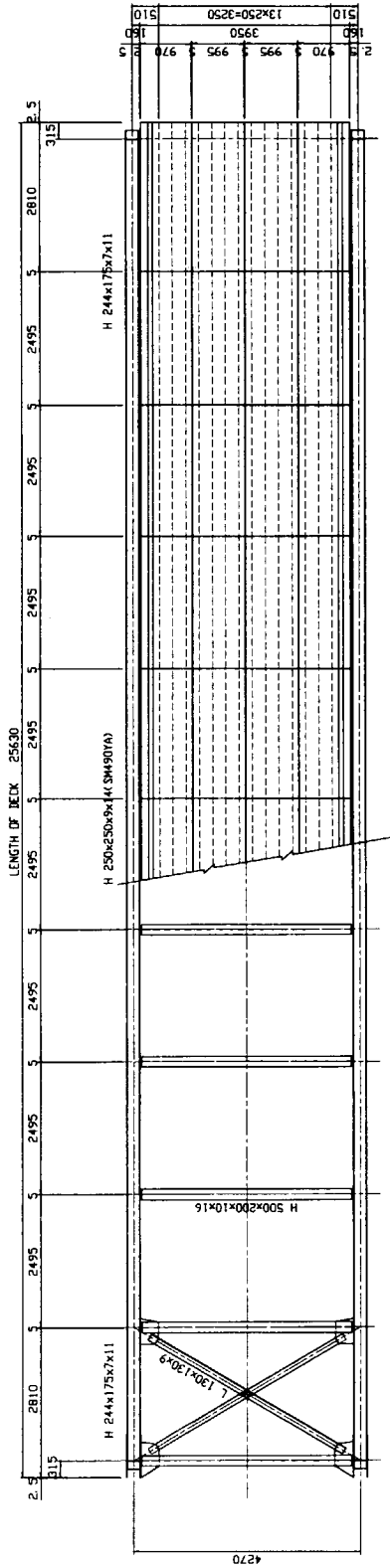
A - A



B - B



PLAN

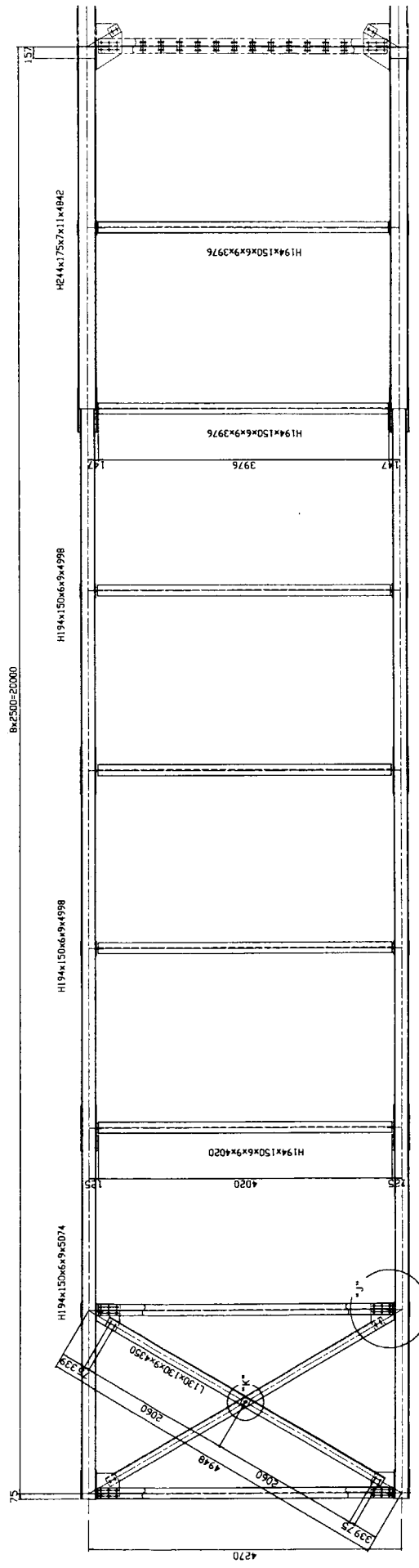
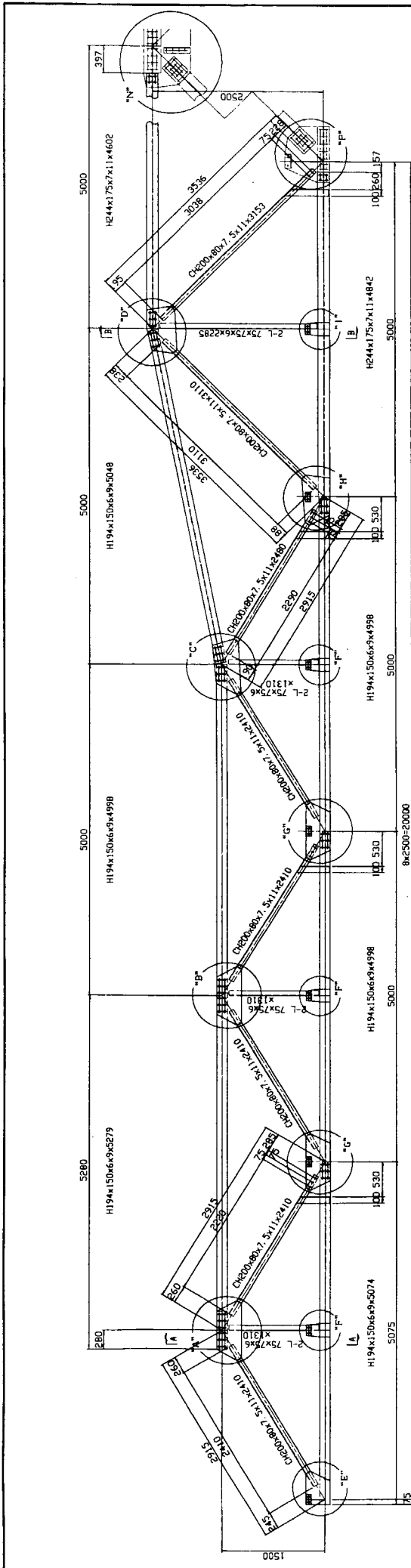


ST. HEIGHT OF SUPPORT

	Ch PL	Ch PL
1. DECK PL	6.0 mm	H 200x100
2. DECK BEAM	200.0 mm	H 200x100
3. CROSS BEAM	500.0 mm	H 500
4. GUSSET PL	5.0 mm	t = 10/2 = 5.0mm
5. SUPPORT	159.5 mm	
6. L. FLG	10.0 mm	
7. U. SHOE	25.0 mm	
B. L. SHOE	75.0 mm	
TOTAL	980.5 mm	

PORTABLE BRIDGE
SUPERSTRUCTURE
25m PONY TRUSS

GENERAL ARRANGEMENT
SCALE 1:50



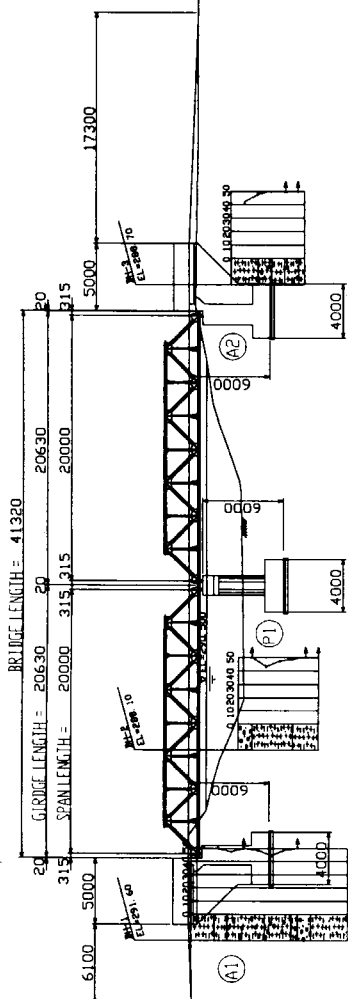
- NOTE
1. MATERIAL STANDARD NOT DESCRIBED IS JIS G3101 SS400 OR EQUIVALENT.
 2. ALL HIGH STRENGTH BOLTS ARE JIS B1186 F10T(M22).
 3. HOLES FOR HIGH STRENGTH BOLTS: 25.0 ϕ

LAUNCHING NOSE AND FLOOR BEAM
SCALE 1:30

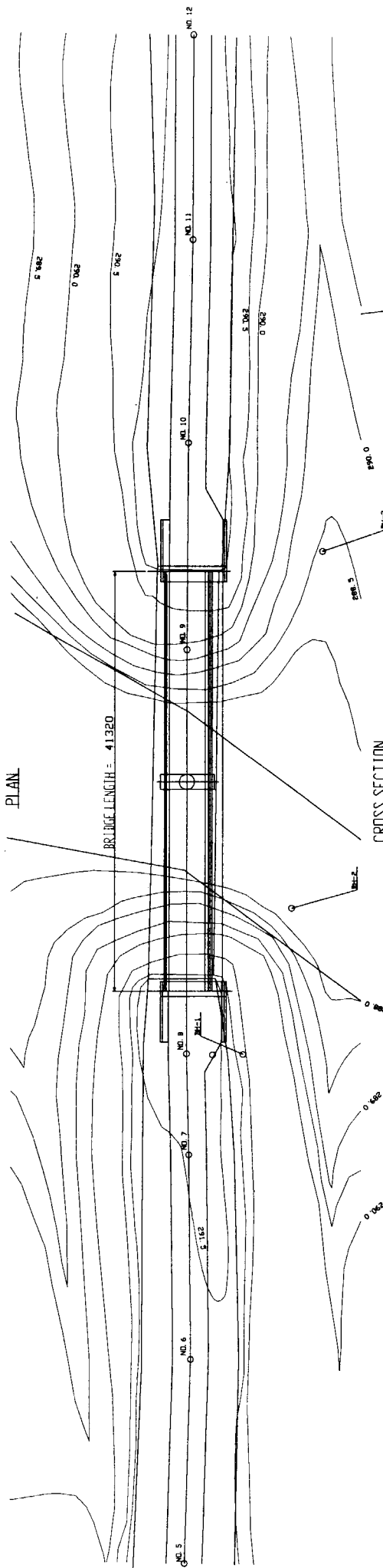
M-19 GENERAL VIEW

SCALE 1:200

ELEVATION

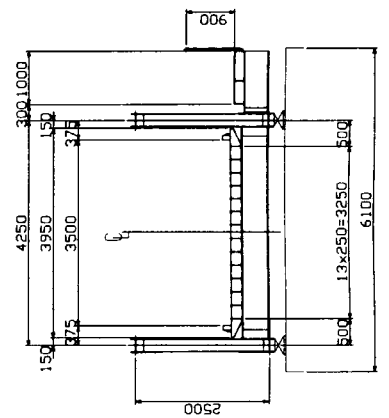


PLAN



CROSS SECTION

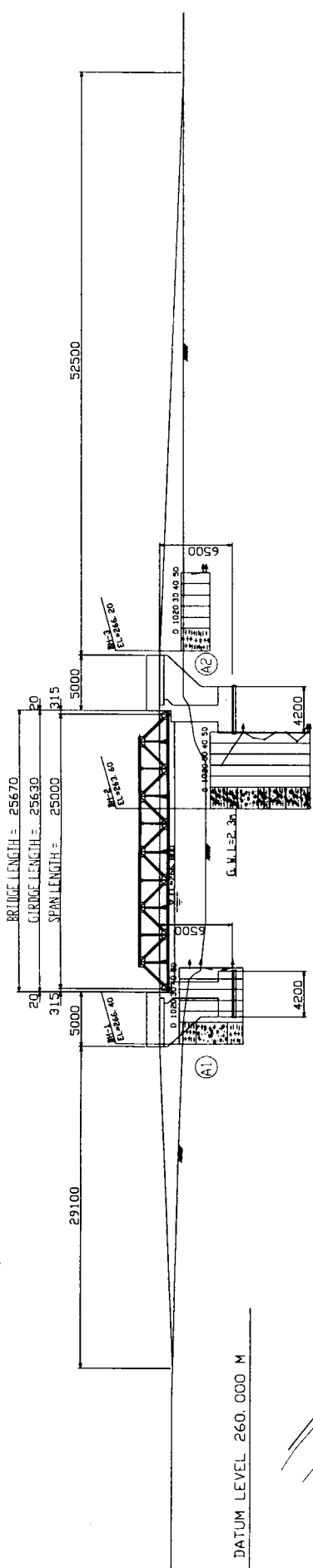
SCALE 1:50



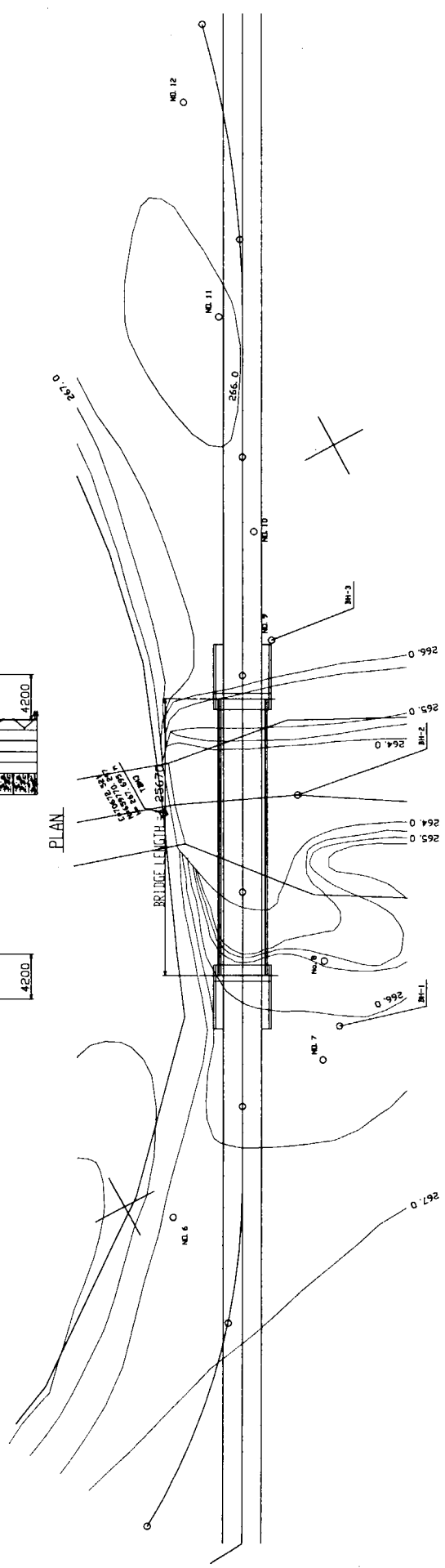
PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	M-19 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED	NAME
APPROVED	DATE
DESIGNED	SIGNATURE
CONSULTANT	
KATAHRA & ENGINEERS INTERNATIONAL	
ASSIGNED	NAME
CHECKED	DATE
DRAWING NO	SCALE
	1:200

M-20 GENERAL VIEW

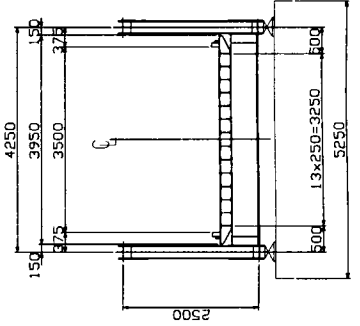
SCALE 1: 200
ELEVATION



PLAN



CROSS SECTION

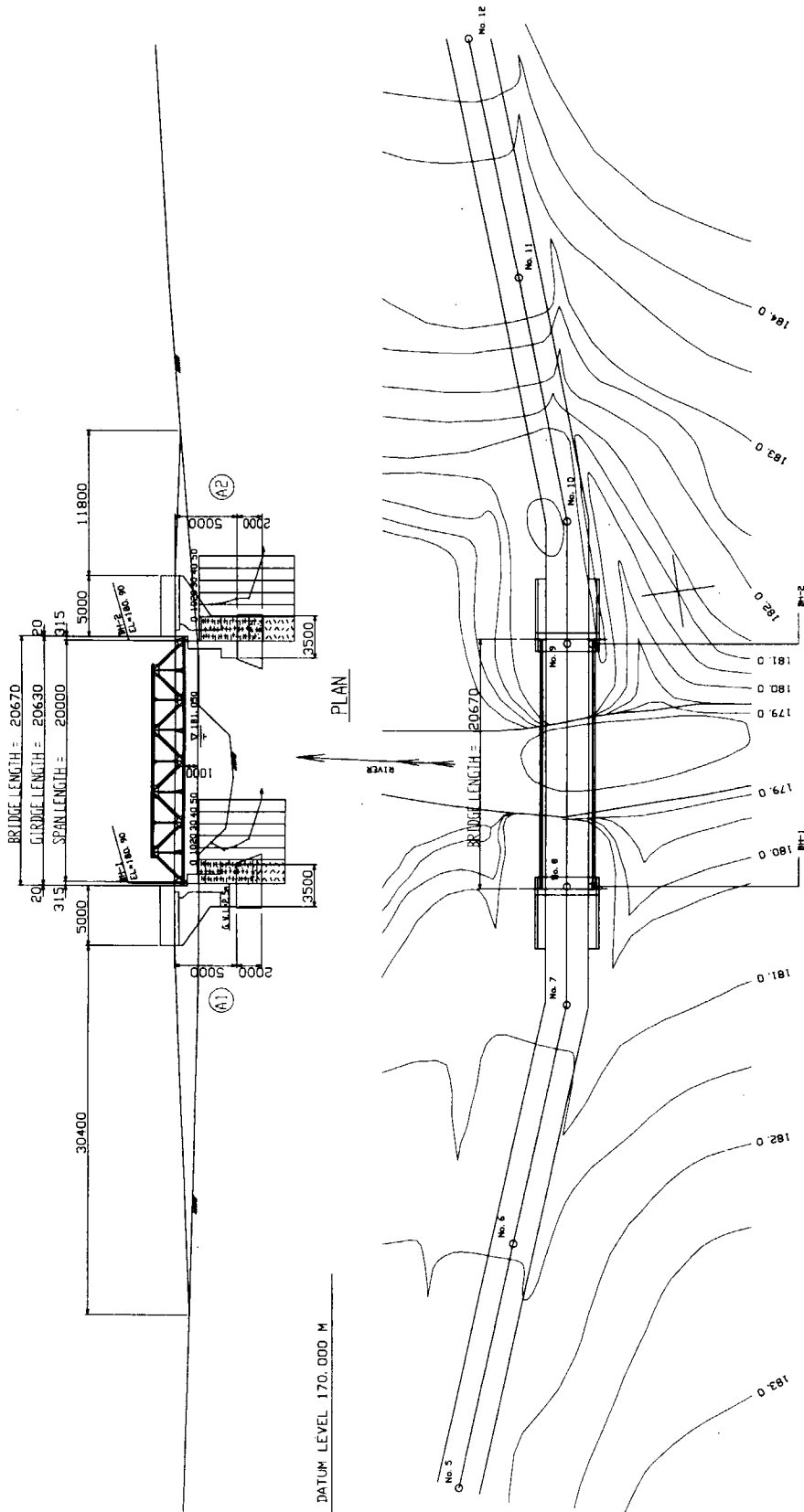


PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES		
DESCRIPTION:	M-20 GENERAL VIEW		
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS			
CHECKED	NAME	DATE	SIGNATURE
APPROVED	NAME	DATE	SIGNATURE
CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL			
DESIGNED	NAME	DATE	SIGNATURE
CHECKED	NAME	DATE	SIGNATURE
PRINTING NO.	SCALE	1: 200	

S-1 GENERAL VIEW

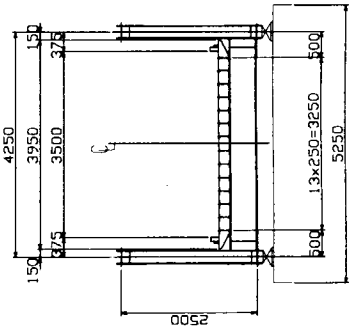
SCALE 1:200

ELEVATION



CROSS SECTION

SCALE 1:50

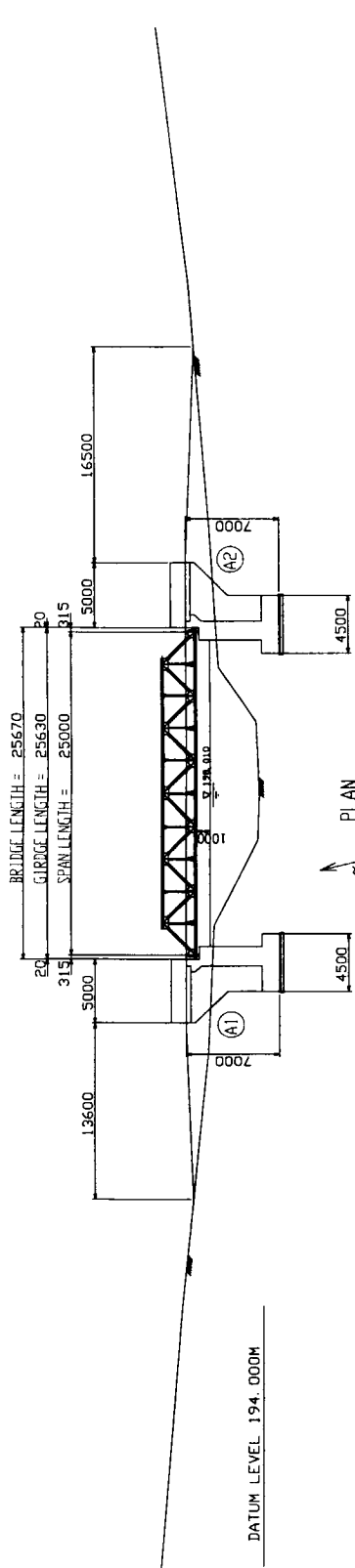


PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	S-1 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED	DATE
APPROVED	SIGNATURE
CONSULTANT:	
KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED	DATE
DRAWN	SIGNATURE
DRAWING No.	SCALE
	1:200

S-8 GENERAL VIEW

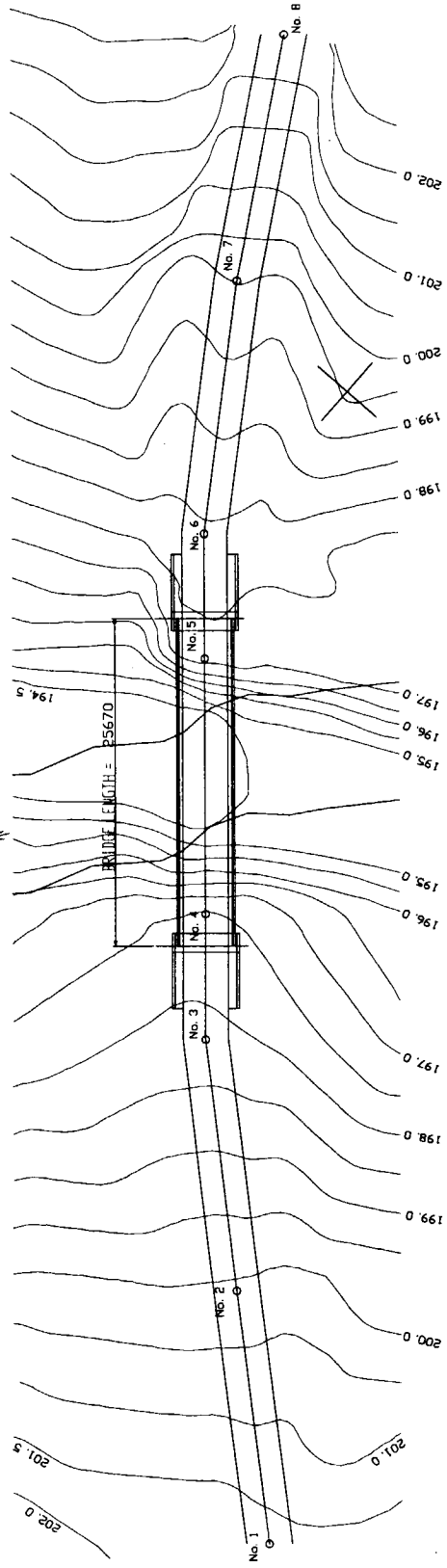
SCALE 1: 200

ELEVATION



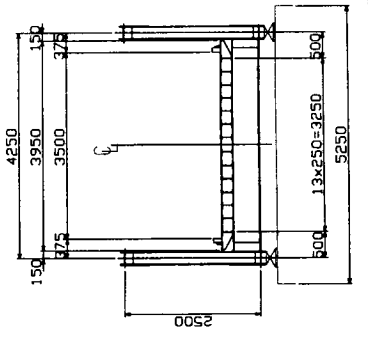
PLAN

RIVER



CROSS SECTION

SCALE 1: 50

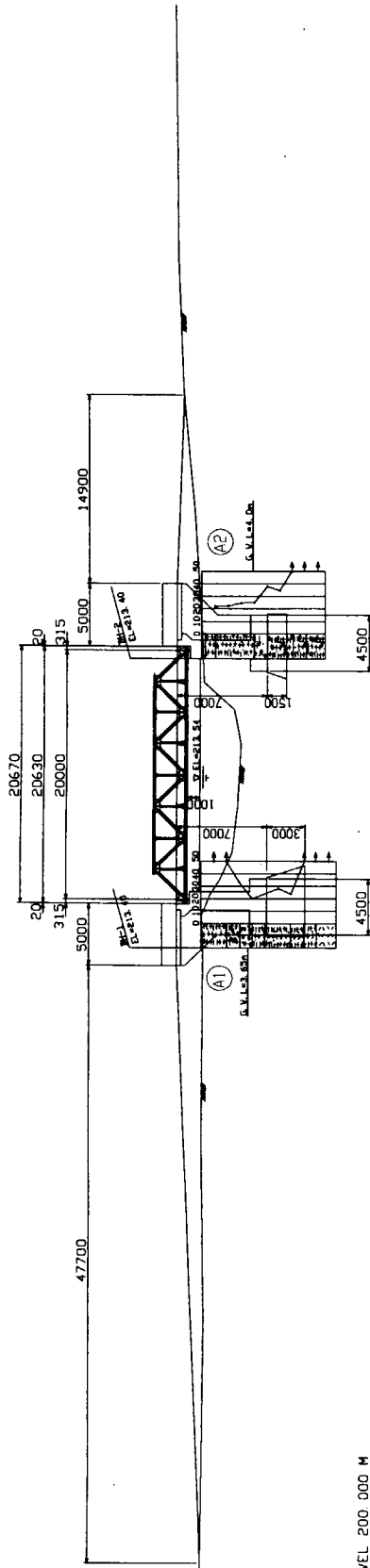


PROJECT	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION	S-8 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED	NAME DATE SIGNATURE
APPROVED	NAME DATE SIGNATURE
APPROVED	NAME DATE SIGNATURE
CONSULTANT KATAPIRA & ENGINEERS INTERNATIONAL	
DESIGNED	NAME DATE SIGNATURE
CHECKED	NAME DATE SIGNATURE
DRAWING No.	SCALE 1: 200

S-12 GENERAL VIEW

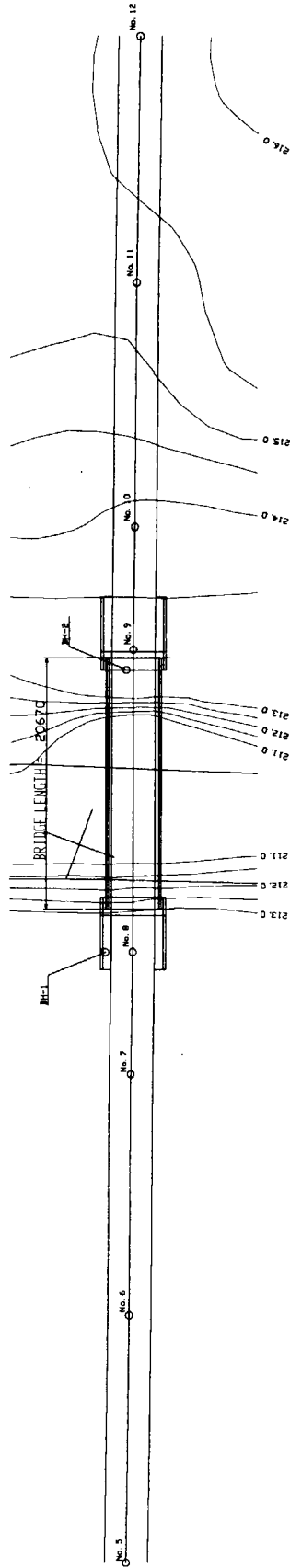
SCALE 1: 200

ELEVATION



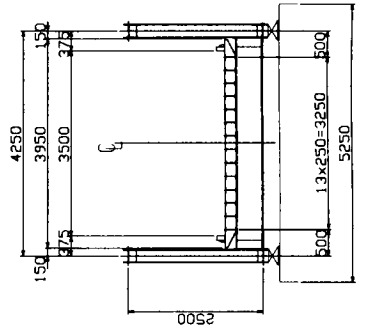
DATUM LEVEL 200.000 M

PLAN



CROSS SECTION

SCALE 1: 50

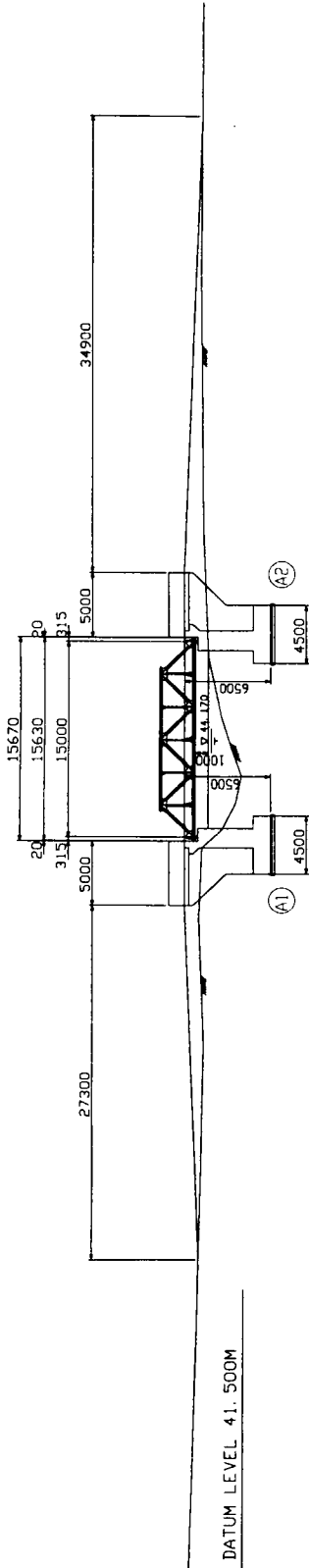


PROJECT	CONSTRUCTION
	SMALL SCALE BRIDGES
DESCRIPTION	S-12 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED	DATE
APPROVED	SIGNATURE
CONSULTANT KATRAIRA & ENGINEERS INTERNATIONAL	
DESIGNED	DATE
CHECKED	SIGNATURE
DRAWING No.	SCALE
	1:200

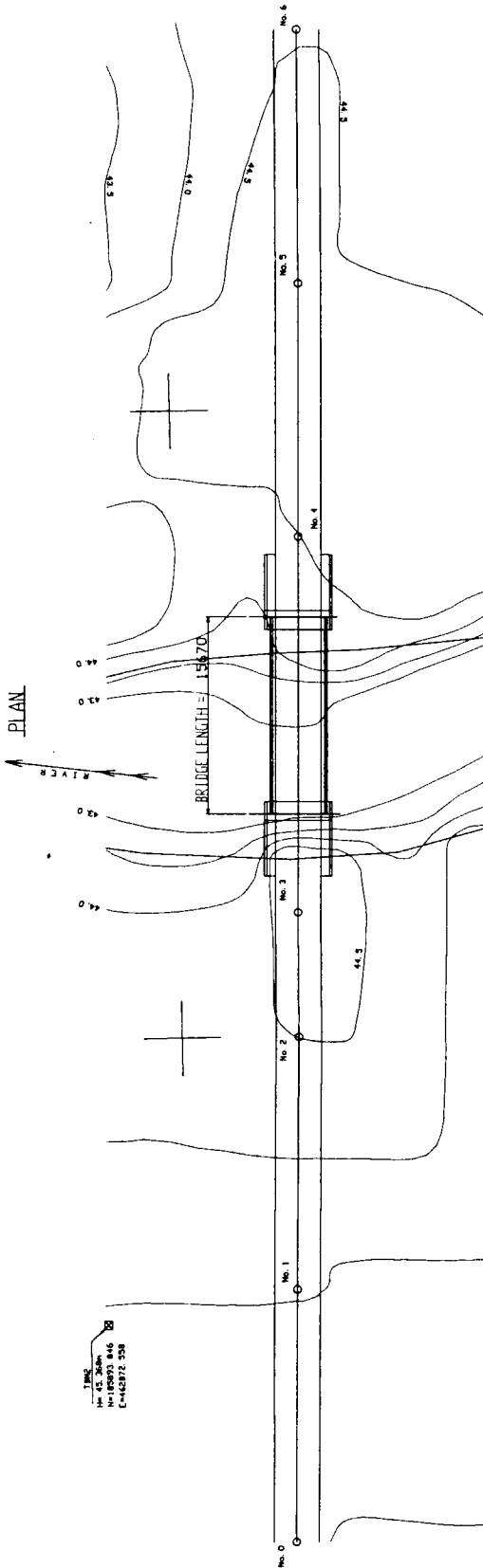
S-19 GENERAL VIEW

SCALE 1: 200

ELEVATION

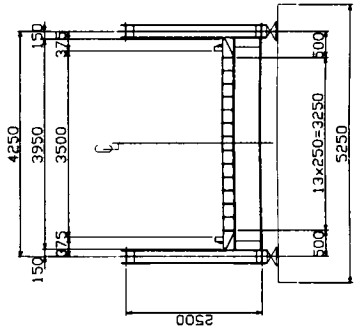


PLAN



CROSS SECTION

SCALE 1: 50

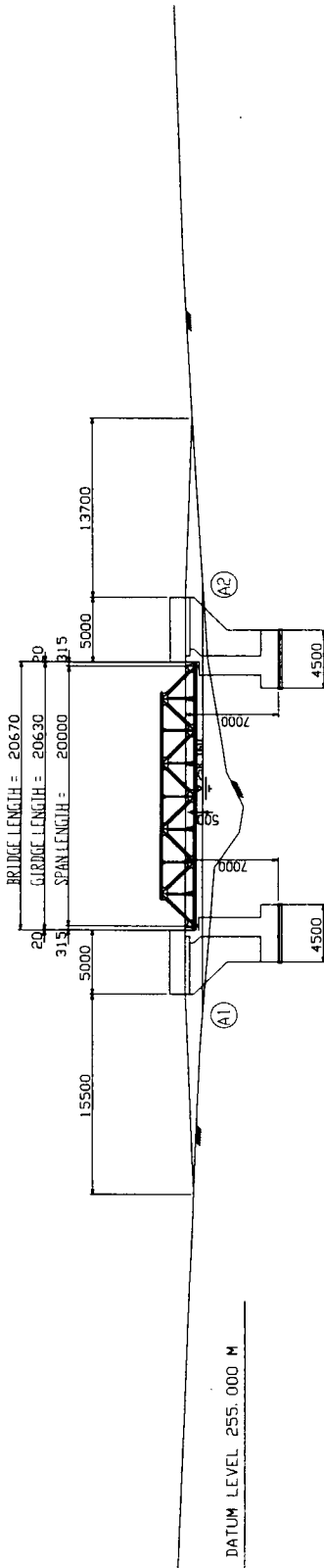


PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	S-19 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED	DATE
APPROVED	SIGNATURE
CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED	DATE
CHECKED	SIGNATURE
DRAWING No.	SCALE 1: 200

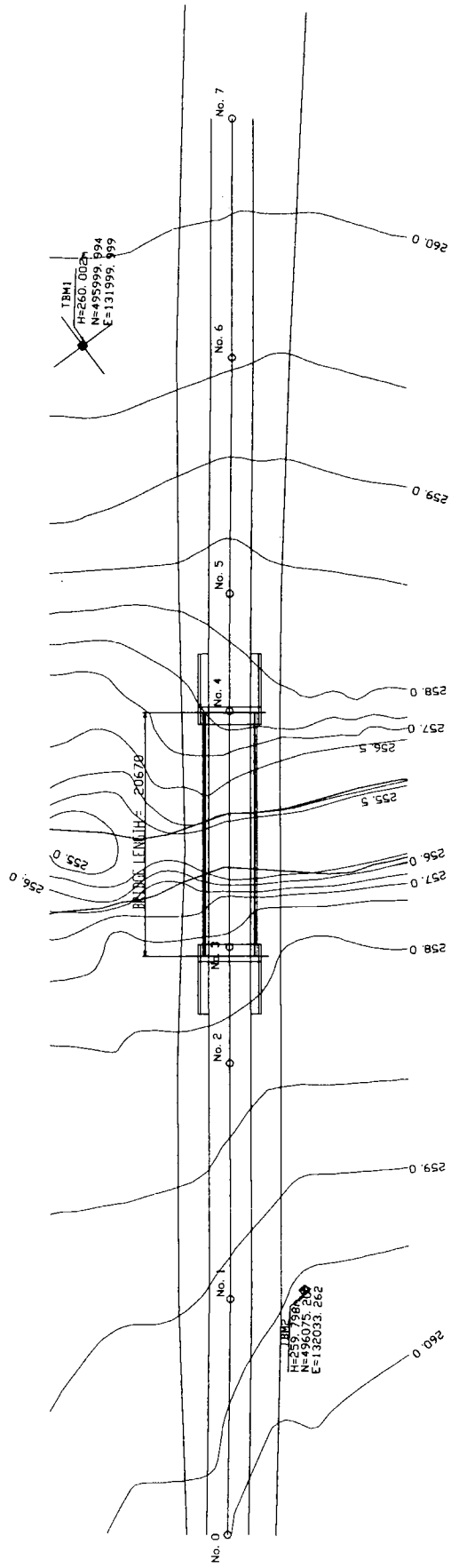
S-21 GENERAL VIEW

SCALE 1:200

ELEVATION

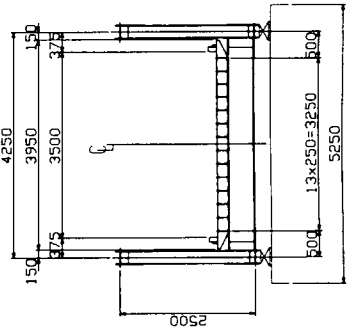


PLAN



CROSS SECTION

SCALE 1:50

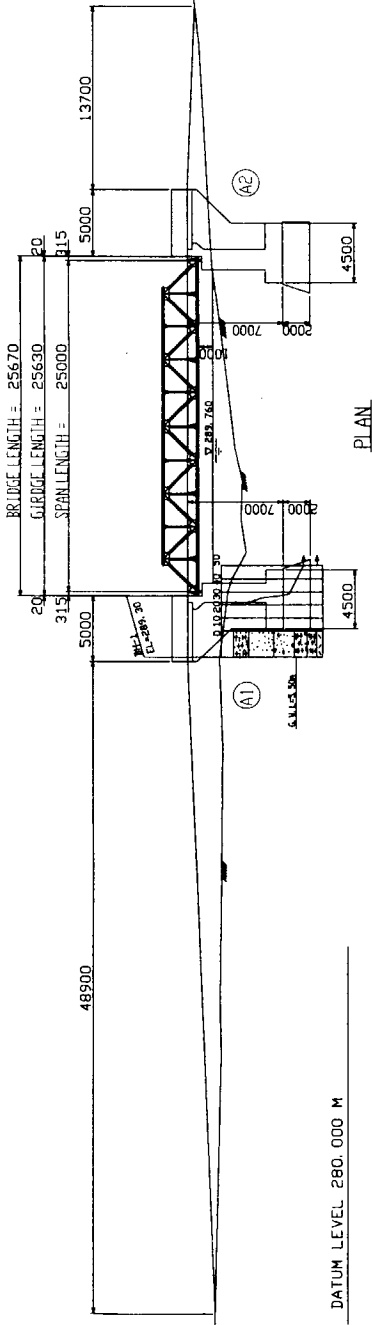


PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	S-21 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED	NAME
DATE	SIGNATURE
APPROVED	NAME
DATE	SIGNATURE
CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED	NAME
CHECKED	DATE
DATE	SIGNATURE
PRINTING No.	SCALE
	1:200

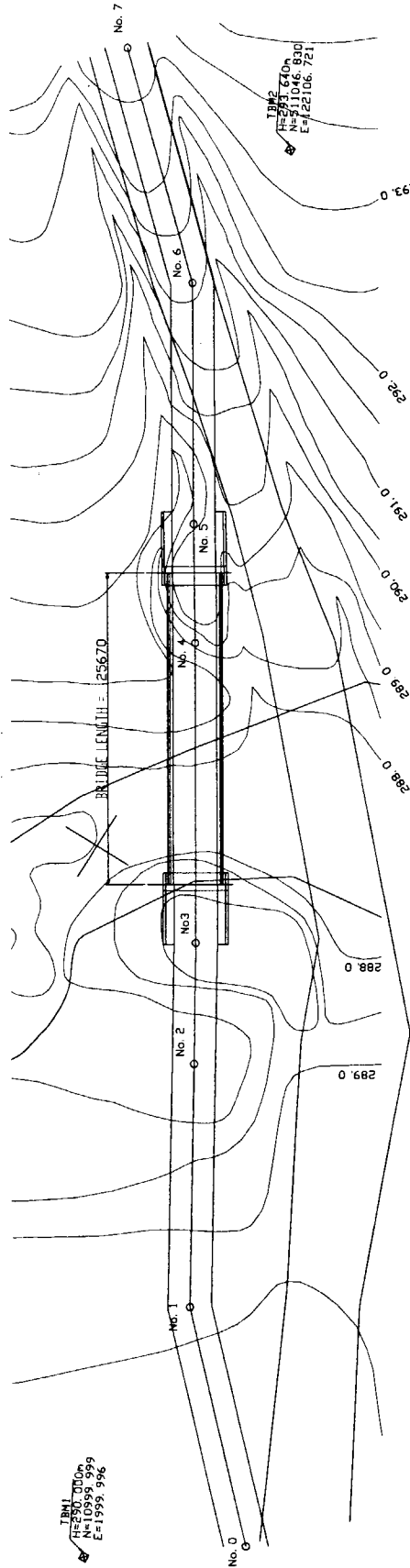
S-22 GENERAL VIEW

SCALE 1:200

ELEVATION

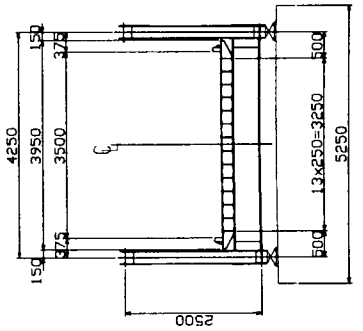


PLAN



GROSS SECTION

SCALE 1:50

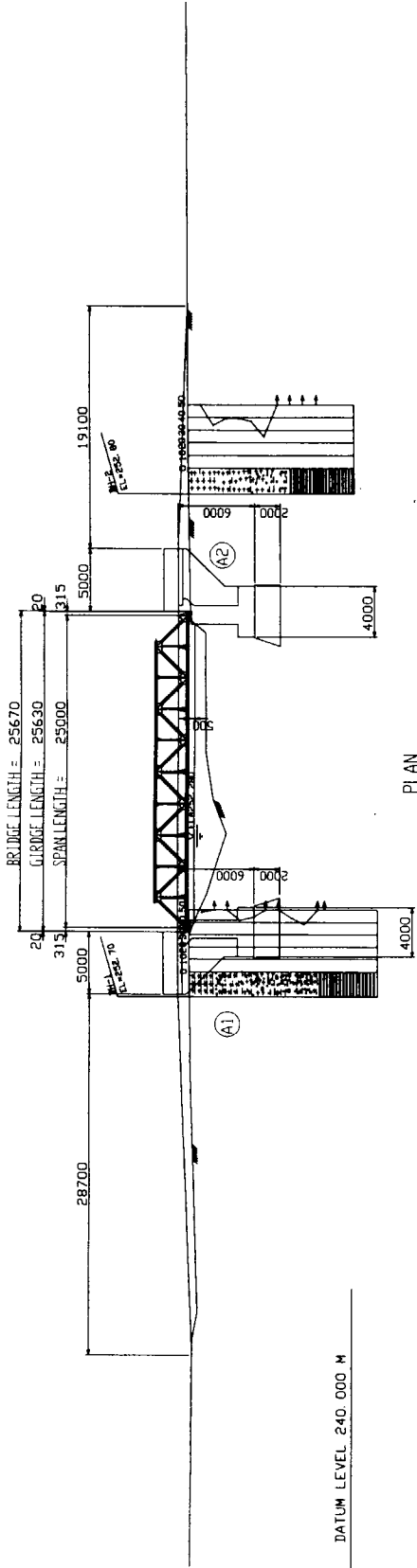


PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	S-22 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED:	NAME: _____ DATE: _____ SIGNATURE: _____
APPROVED:	NAME: _____ DATE: _____ SIGNATURE: _____
CONSULTANT: KATAHRA & ENGINEERS INTERNATIONAL	
DESIGNED:	NAME: _____ DATE: _____ SIGNATURE: _____
CHECKED:	NAME: _____ DATE: _____ SIGNATURE: _____
DRAWING No:	SCALE 1:200

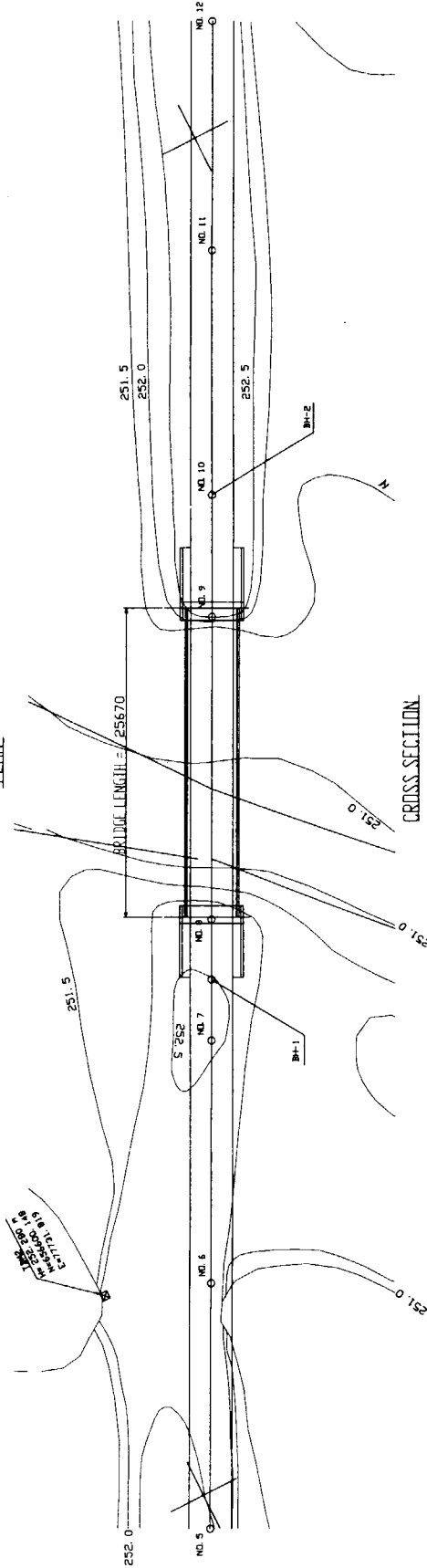
S-27 GENERAL VIEW

SCALE 1:200

ELEVATION

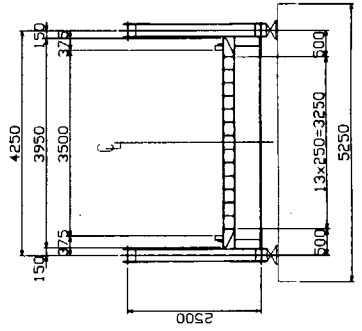


PLAN



GROSS SECTION

SCALE 1:50

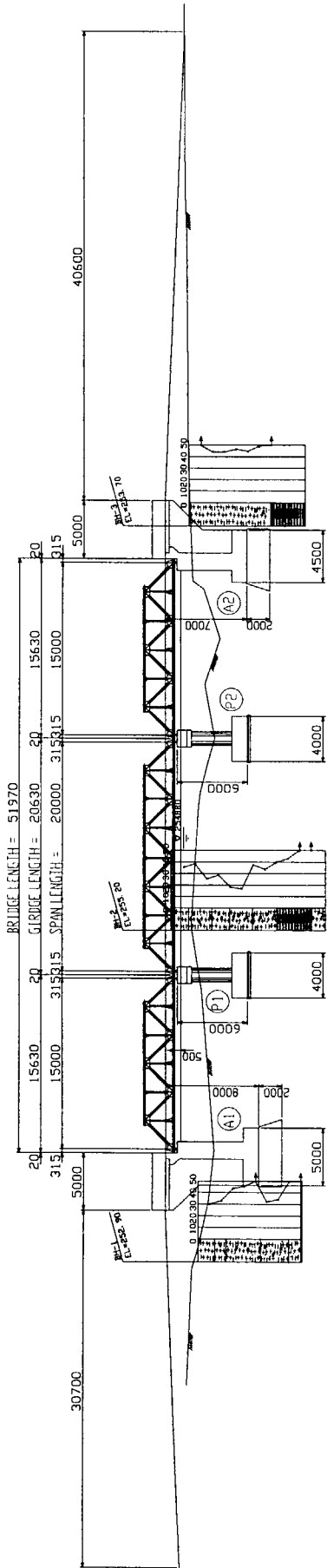


PROJECT	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION	S-27 GENERAL VIEW
GOVERNMENT OF CHINA DEPARTMENT OF FEEDER ROADS	
CHECKED	NAME
APPROVED	DATE
DATE	SIGNATURE
CONSULTANT KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED	NAME
CHECKED	DATE
DATE	SIGNATURE
DRAWING No.	SCALE
	1:200

S-28 GENERAL VIEW

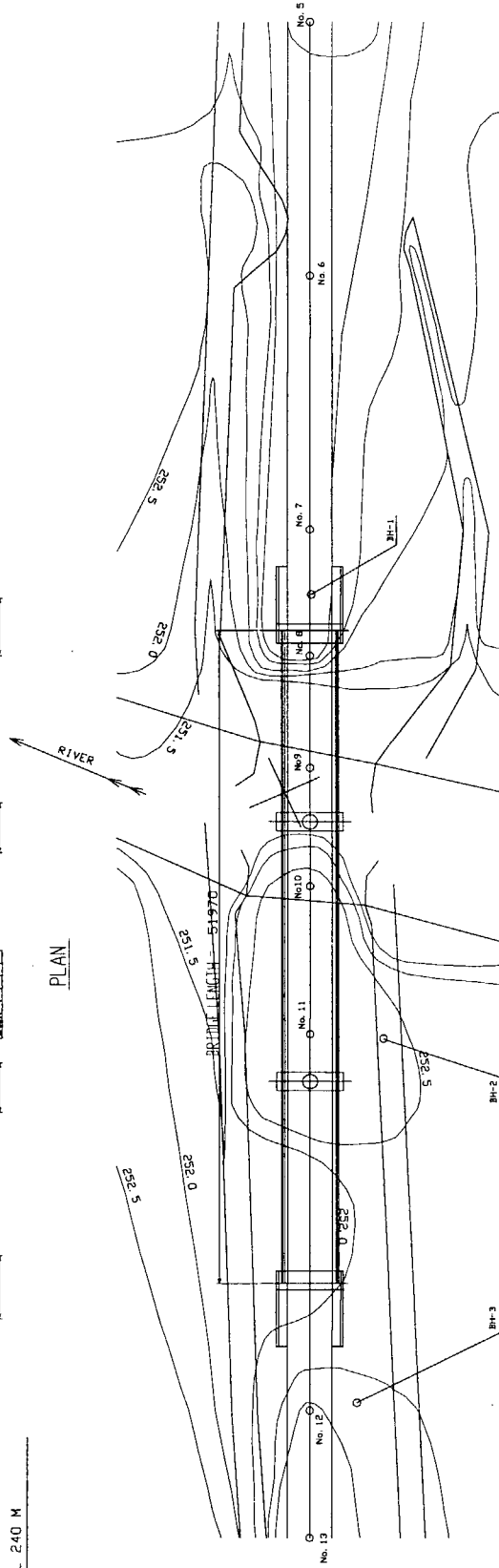
SCALE 1:200

ELEVATION



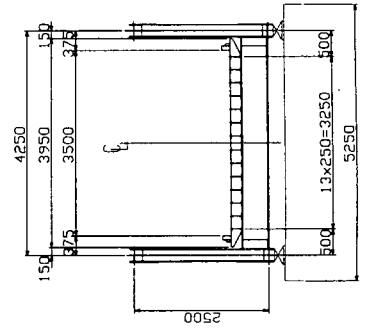
DATUM LEVEL 240 M

PLAN



CROSS SECTION

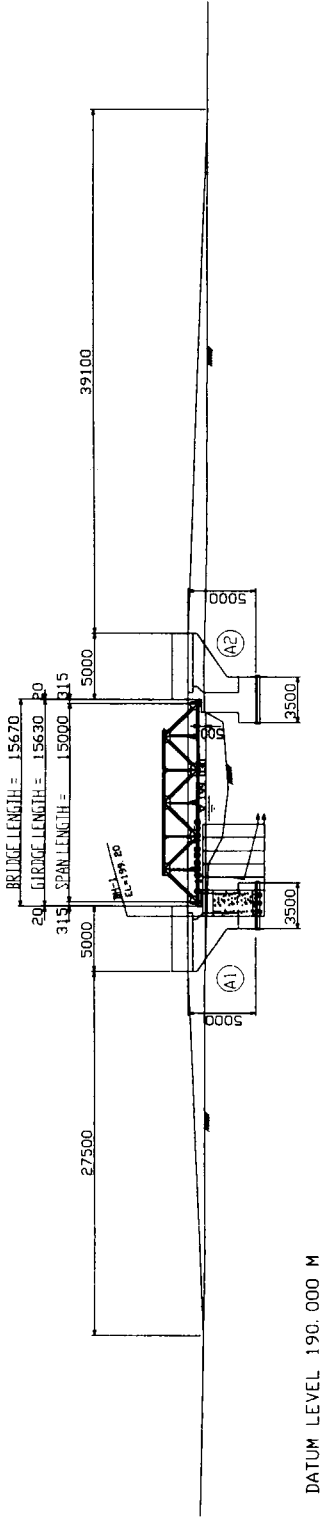
SCALE 1:50



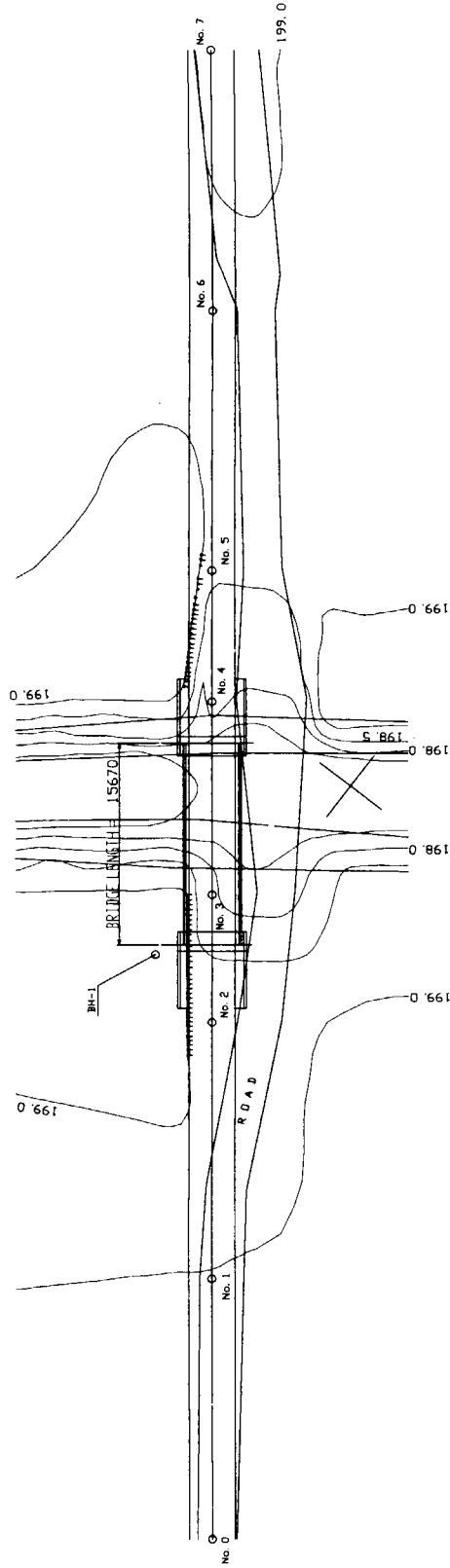
PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	S-28 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED:	DATE: SIGNATURE:
APPROVED:	DATE: SIGNATURE:
CONSULTANT:	
KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED:	DATE: SIGNATURE:
CHECKED:	DATE: SIGNATURE:
DRAWING NO:	SCALE: 1:200

S-29 GENERAL VIEW
SCALE 1:200

ELEVATION

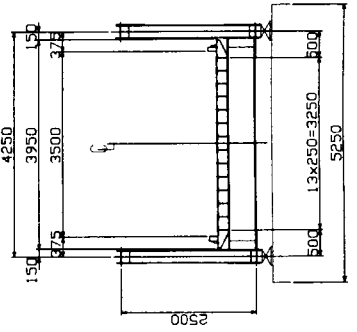


PLAN



CROSS SECTION

SCALE 1:50

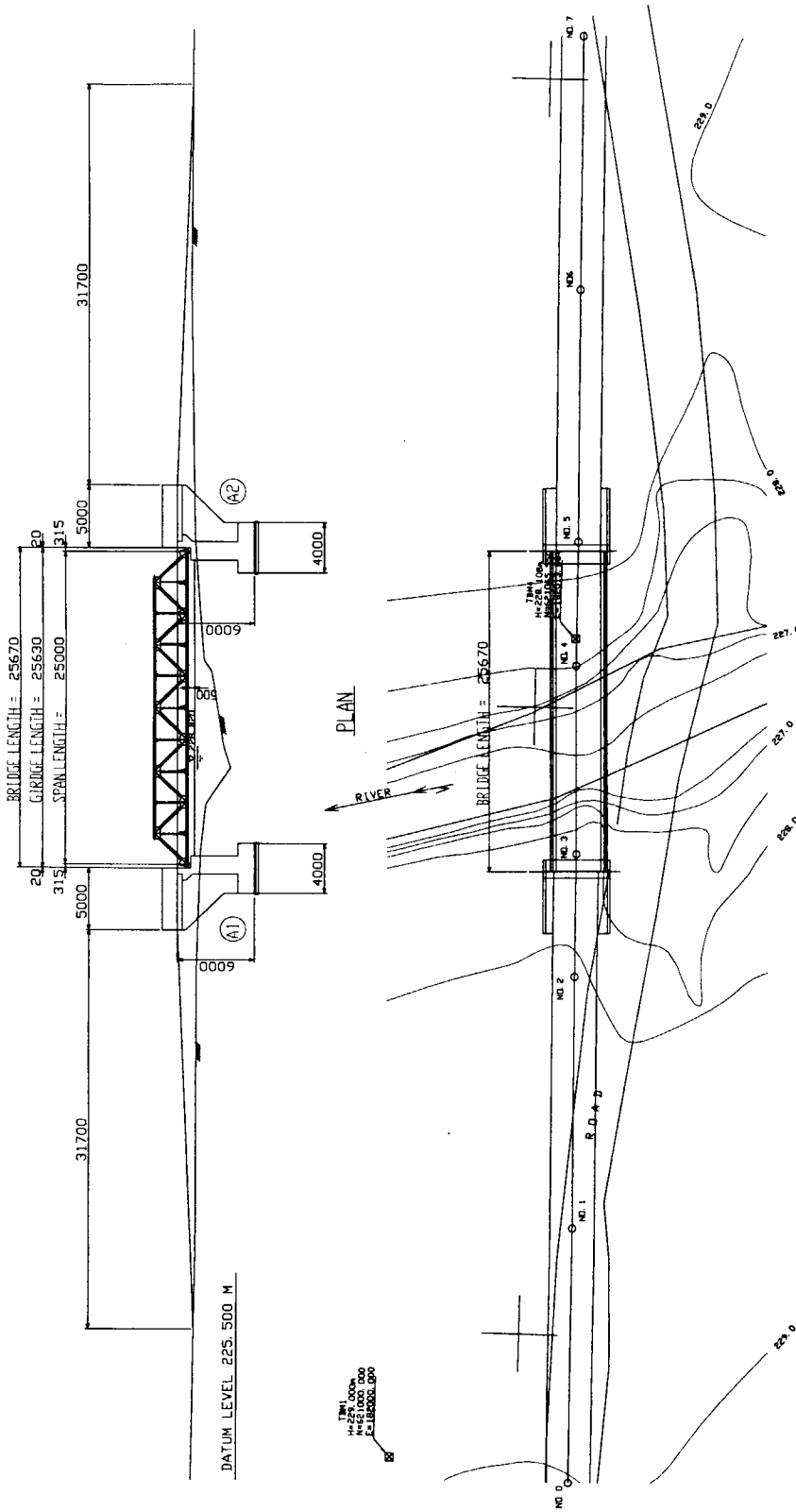


PROJECT	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION	S-29 GENERAL VIEW
GOVERNMENT OF GAMBIA DEPARTMENT OF FEEDER ROADS	
CHECKED	NAME DATE SIGNATURE
DRAWN	NAME DATE SIGNATURE
APPROVED	NAME DATE SIGNATURE
CONSULTANT: KATAMIRA & ENGINEERS INTERNATIONAL	
DESIGNED	NAME DATE SIGNATURE
ENGINEERED	NAME DATE SIGNATURE
DRAWING No.	SCALE 1:200

S-30-1 GENERAL VIEW

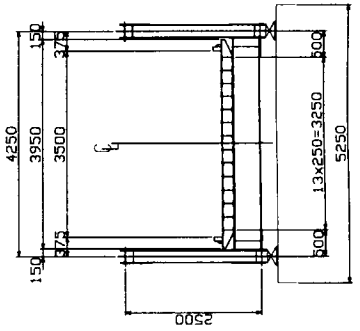
SCALE 1: 200

ELEVATION



CROSS SECTION

SCALE 1: 50

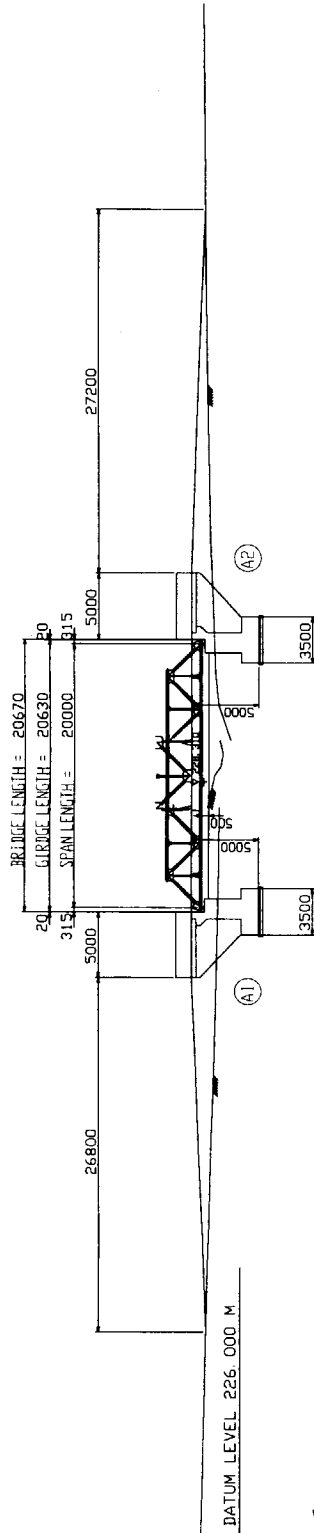


PROJECT	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION	S-30-1 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED	NAME _____ DATE _____ SIGNATURE _____
APPROVED	NAME _____ DATE _____ SIGNATURE _____
CONSULTANT: KATAHRA & ENGINEERS INTERNATIONAL	
DESIGNED	NAME _____ DATE _____ SIGNATURE _____
CHECKED	NAME _____ DATE _____ SIGNATURE _____
DRAWING No	SCALE 1: 200

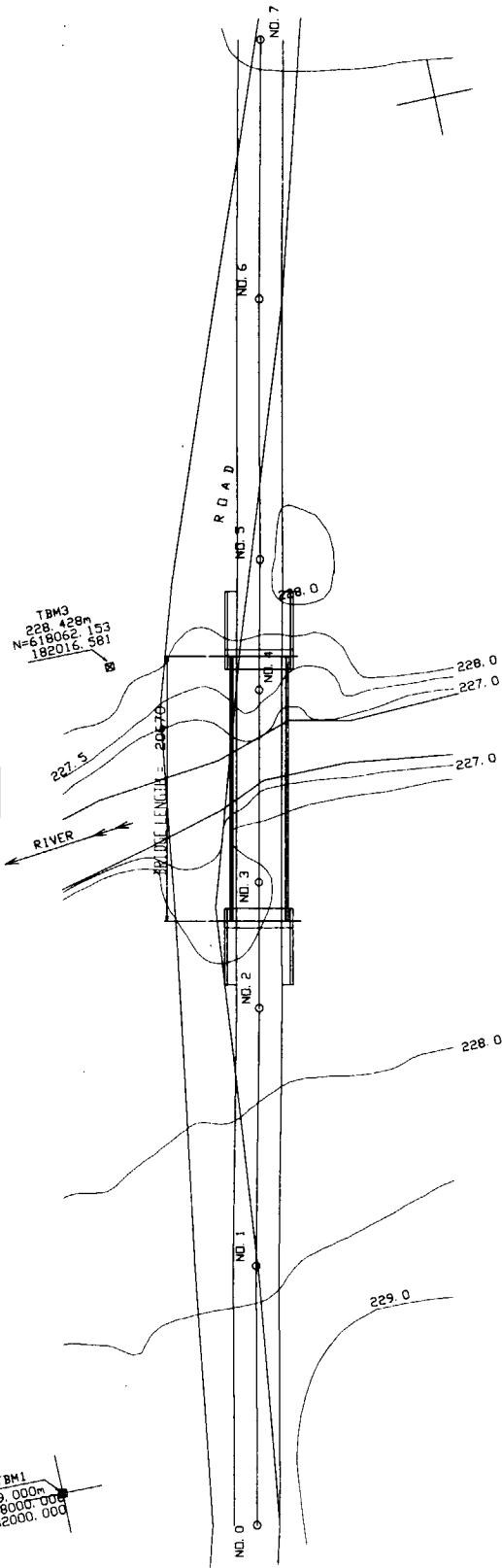
S-30-2 GENERAL VIEW

SCALE 1: 200

ELEVATION

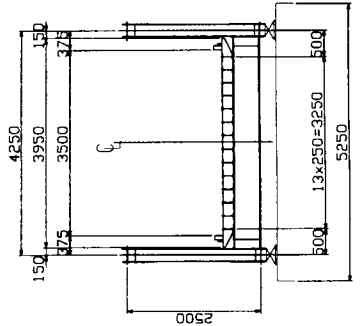


PLAN



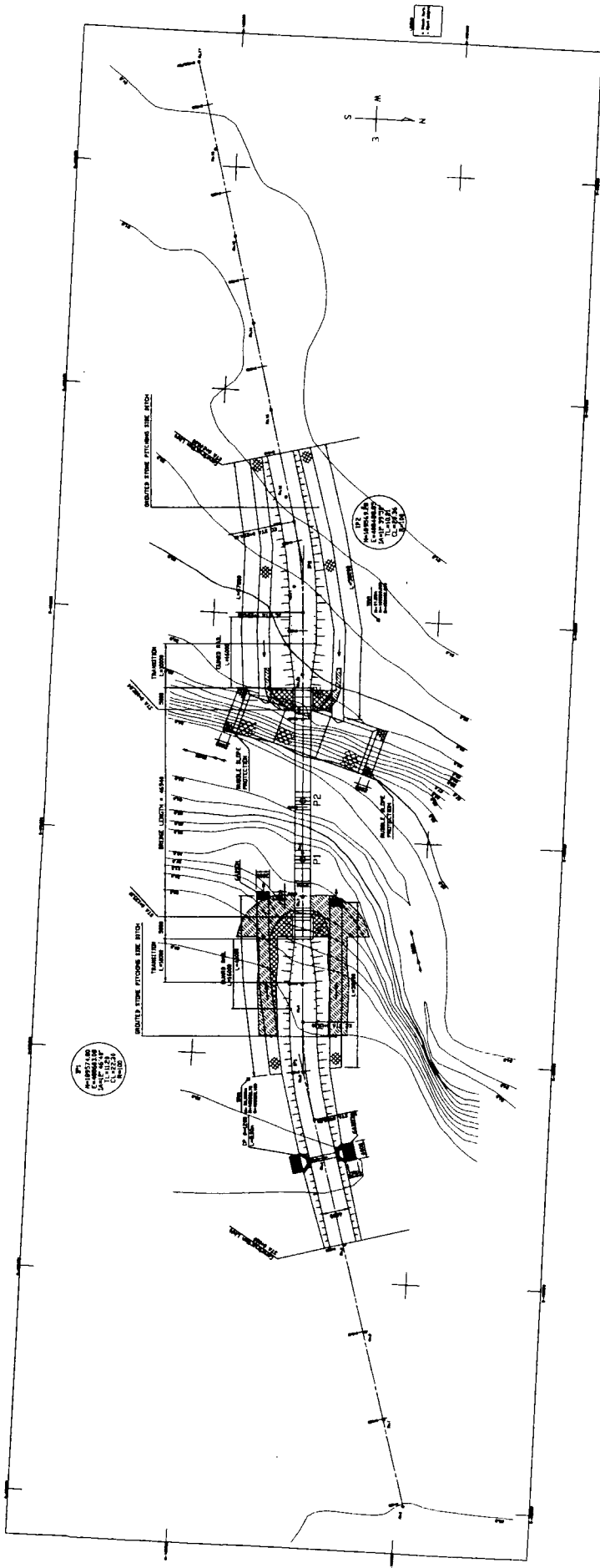
CROSS SECTION

SCALE 1: 50

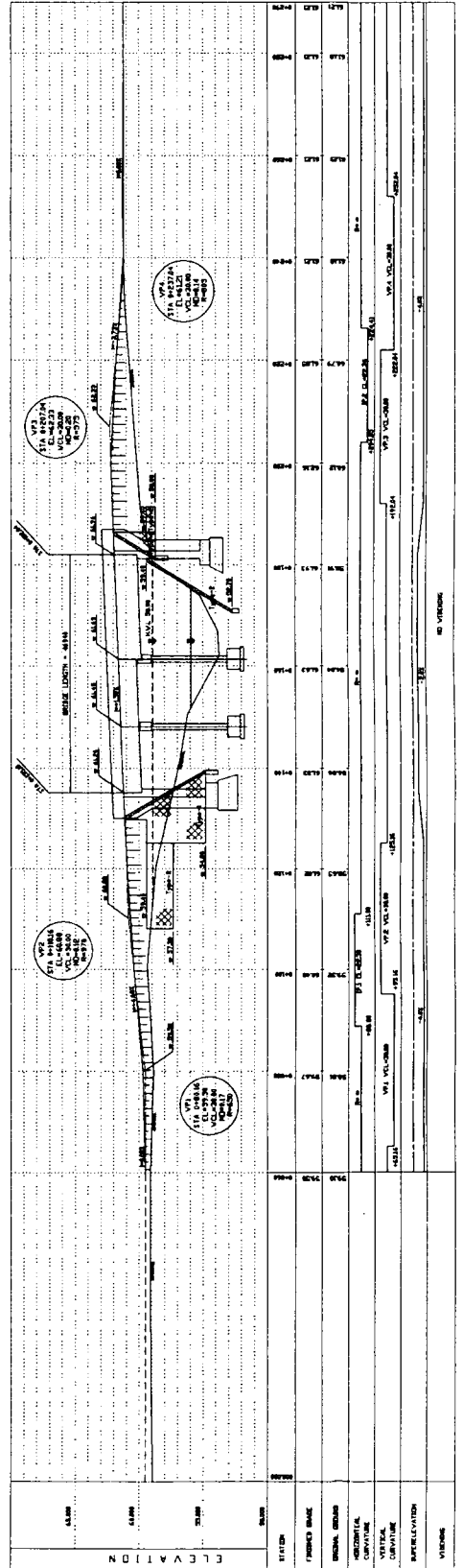


PROJECT	CONSTRUCTION OF SMALL SCALE BRIDGES	
DESCRIPTION	S-30-2 GENERAL VIEW	
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS		
CHECKED	NAME	DATE
APPROVED	NAME	DATE
CONSULTANT KATHIRA & ENGINEERS INTERNATIONAL		
DESIGNED	NAME	DATE
CHECKED	NAME	DATE
DRAWING No.	SCALE 1: 200	

PLAN



PROFILE

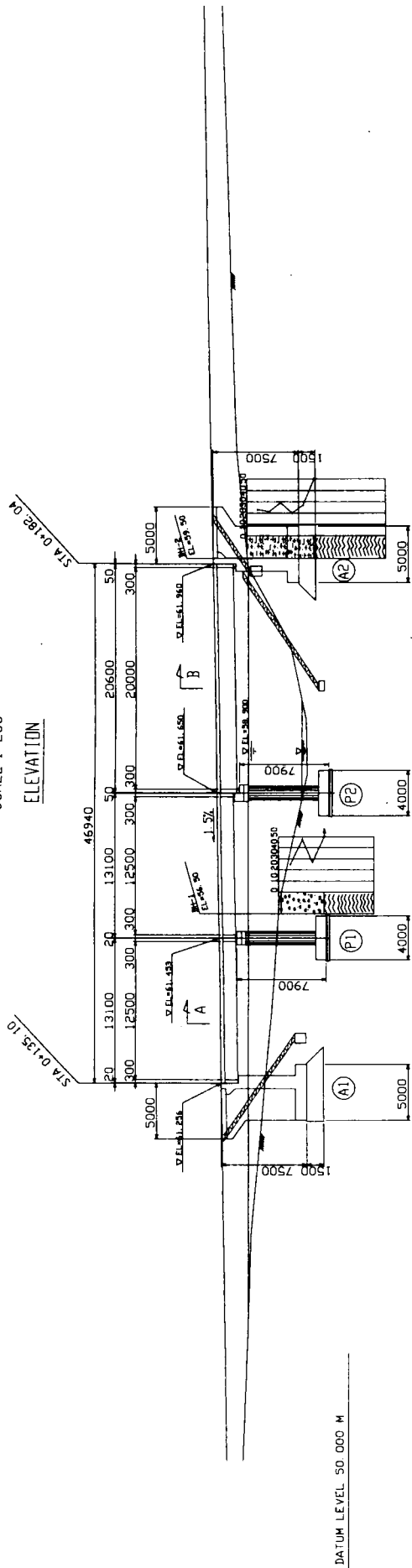


PROJECT:	CONSTRUCTION OF SMALL AND MEDIUM SCALE BRIDGES
DESCRIPTION:	M-11 BRIDGE PLAN & PROFILE OF APPROACH ROADS
	GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS
CHECKED	NAME DATE SIGNATURE
APPROVED	NAME DATE SIGNATURE
DESIGNED	NAME DATE SIGNATURE
CHECKED	NAME DATE SIGNATURE
DRAWING No.	SCALE
	H=1:500 V=1:250

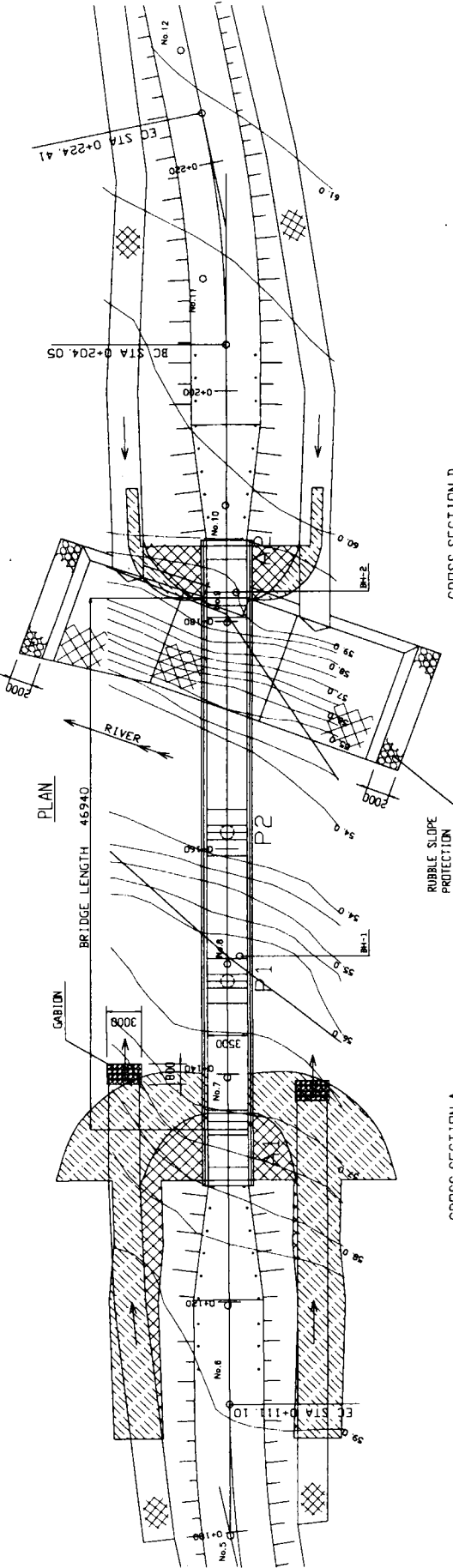
M-11 GENERAL VIEW

SCALE 1: 200

ELEVATION



DATUM LEVEL 50.000 M



PLAN

BRIDGE LENGTH 46940

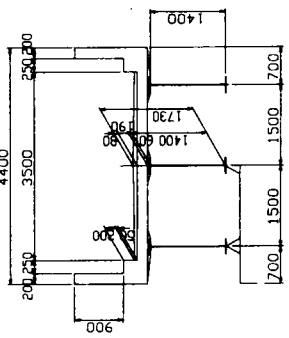
RIVER

GABIION

RUBBLE SLOPE PROTECTION

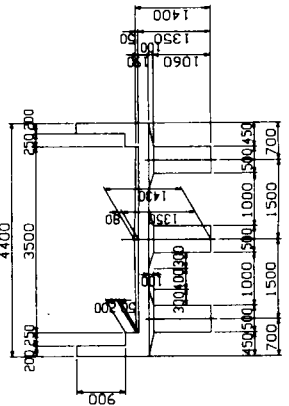
CROSS SECTION B

SCALE 1: 50



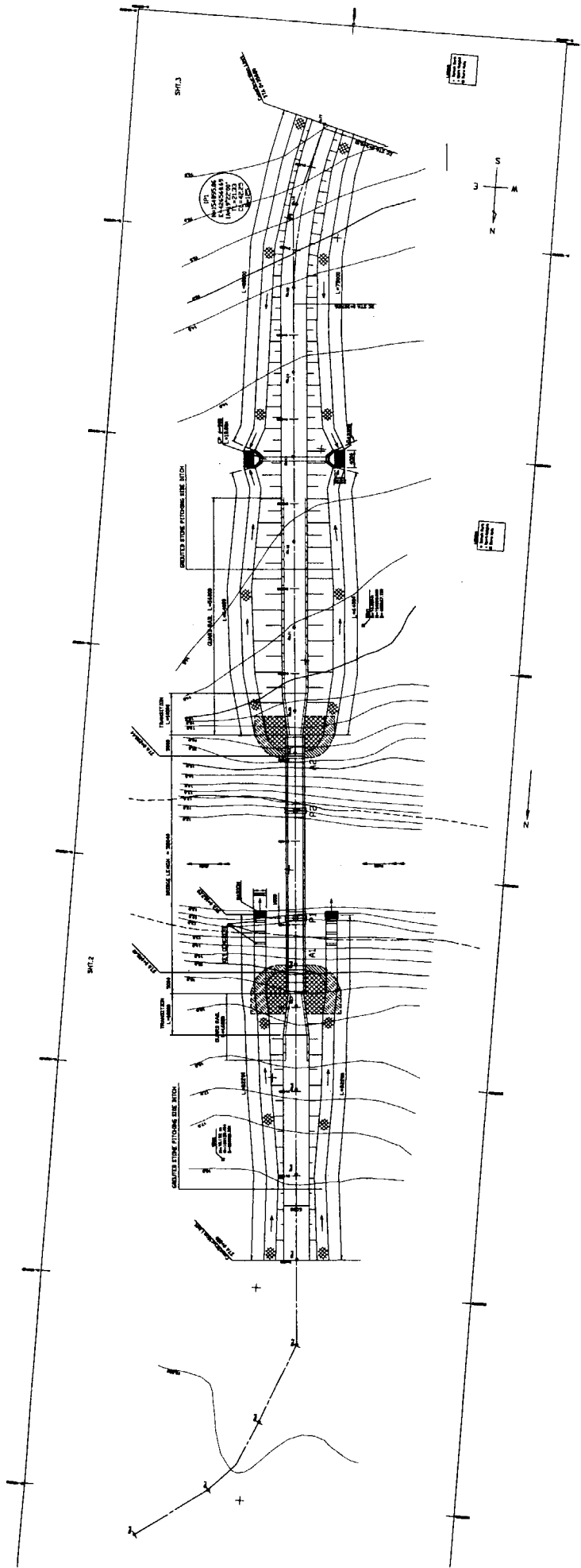
CROSS SECTION A

SCALE 1: 50

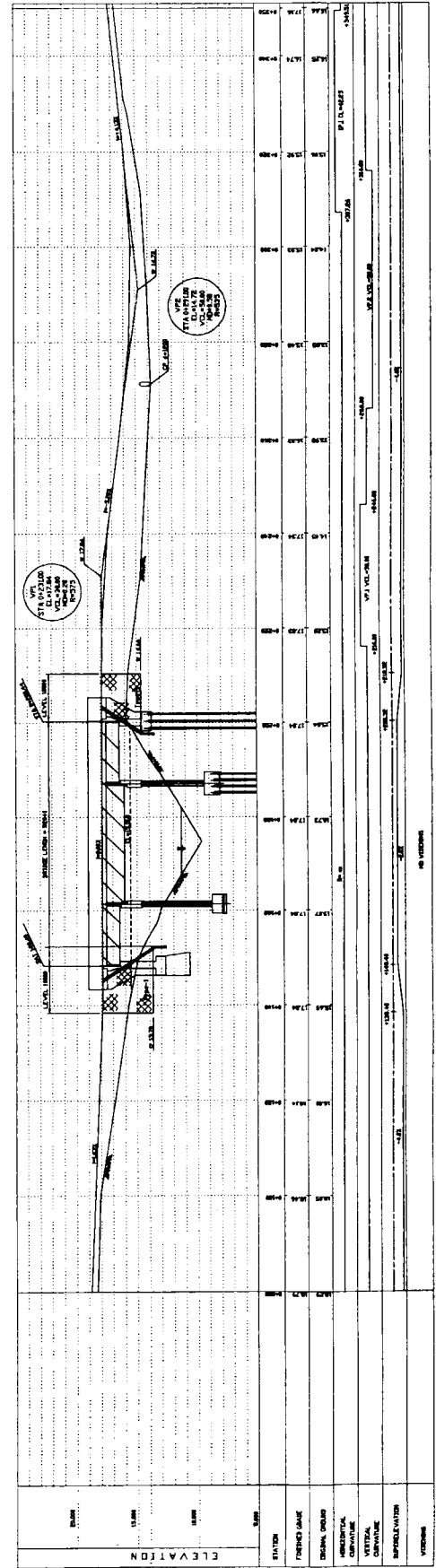


PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	M-11 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED	NAME DATE SIGNATURE
APPROVED	NAME DATE SIGNATURE
CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED	NAME DATE SIGNATURE
CHECKED	NAME DATE SIGNATURE
DRAWING No.	SCALE 1: 200

PLAN



PROFILE



PROJECT: CONSTRUCTION OF SMALL AND MEDIUM SCALE BRIDGES

DESCRIPTION: M-12 BRIDGE PLAN & PROFILE OF APPROACH ROADS

GOVERNMENT OF GHANA: DEPARTMENT OF FEEDER ROADS

CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL

CHECKED: NAME: DATE: SIGNATURE: _____

APPROVED: NAME: DATE: SIGNATURE: _____

DESIGNED: NAME: DATE: SIGNATURE: _____

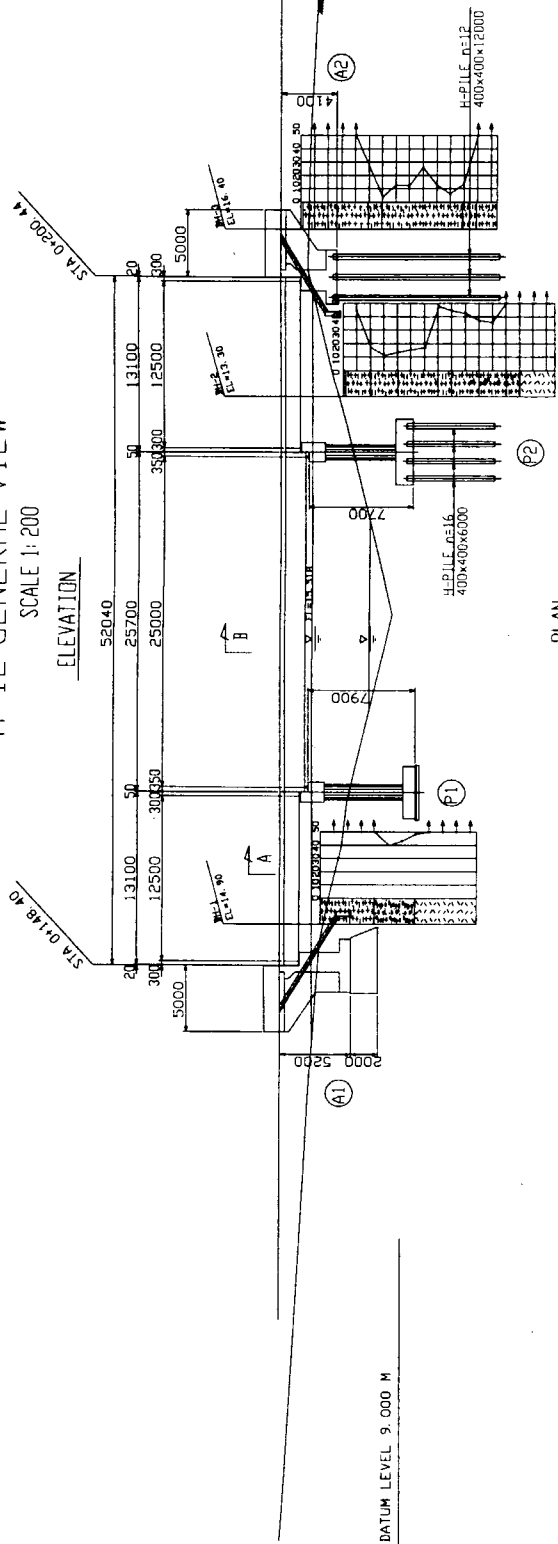
CHECKED: NAME: DATE: SIGNATURE: _____

DRAWING No. _____ SCALE: H=1:500 V=1:200

M-12 GENERAL VIEW

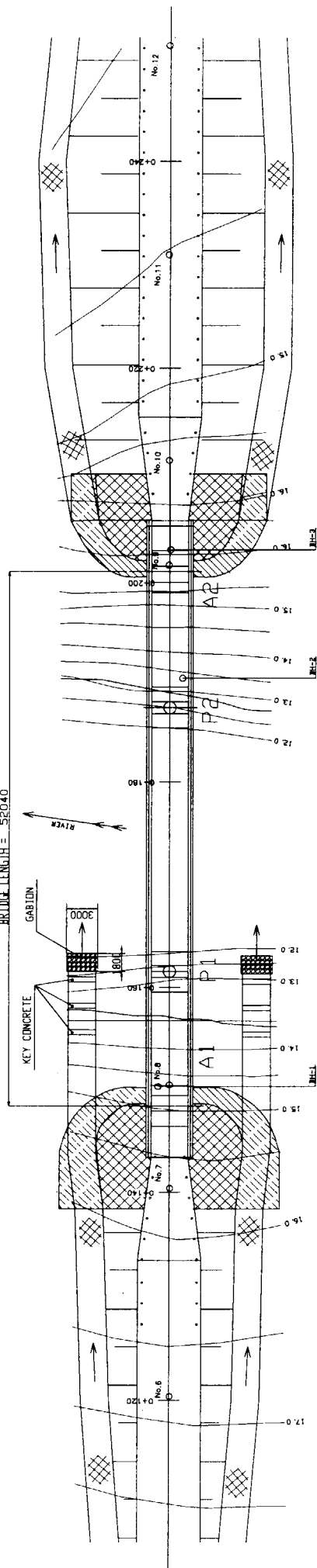
SCALE 1:200

ELEVATION



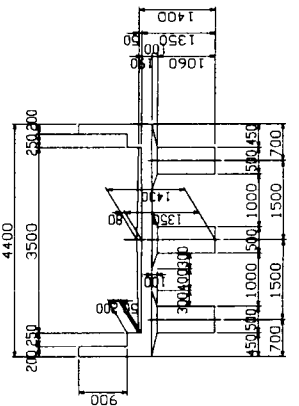
PLAN

BRIDGE LENGTH = 520.40



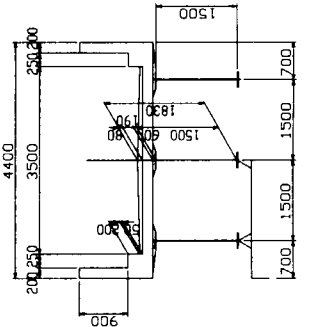
CROSS SECTION A

SCALE 1:50

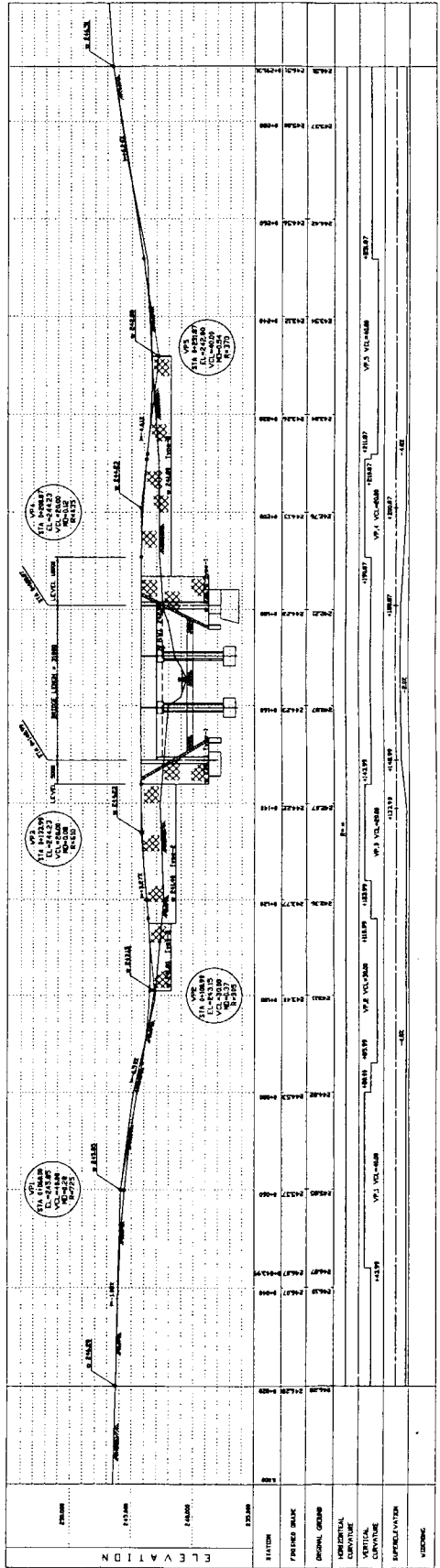
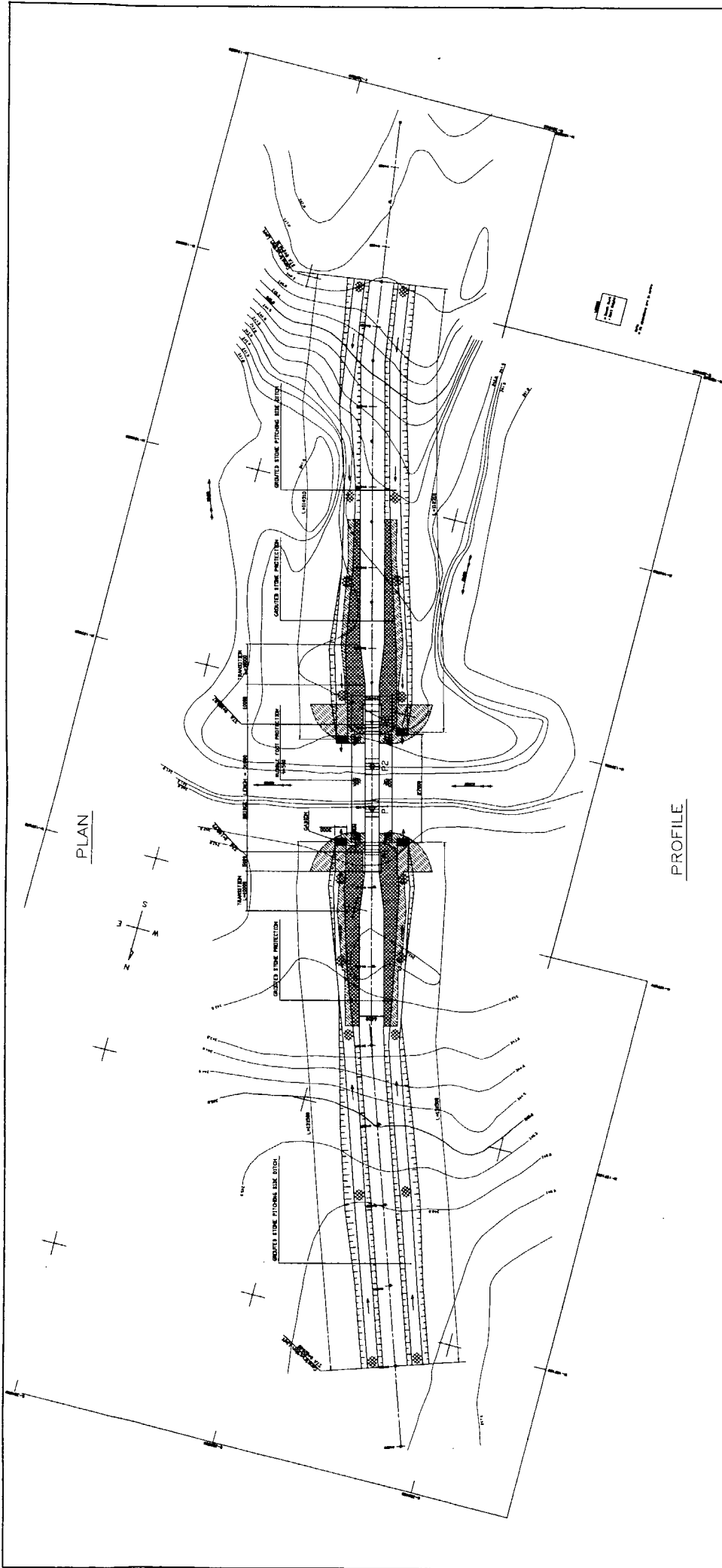


CROSS SECTION B

SCALE 1:50



PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	M-12 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED:	NAME DATE SIGNATURE
APPROVED:	NAME DATE SIGNATURE
CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED:	NAME DATE SIGNATURE
DRAWING No.	SCALE 1:200



PROJECT: CONSTRUCTION OF SMALL AND MEDIUM SCALE BRIDGES

DESCRIPTION: S-15 BRIDGE PLAN & PROFILE OF APPROACH ROADS

GOVERNMENT OF GHANA: DEPARTMENT OF FEEDER ROADS

CHECKED: _____ DATE: _____

APPROVED: _____ DATE: _____

CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL

DESIGNED: _____ DATE: _____

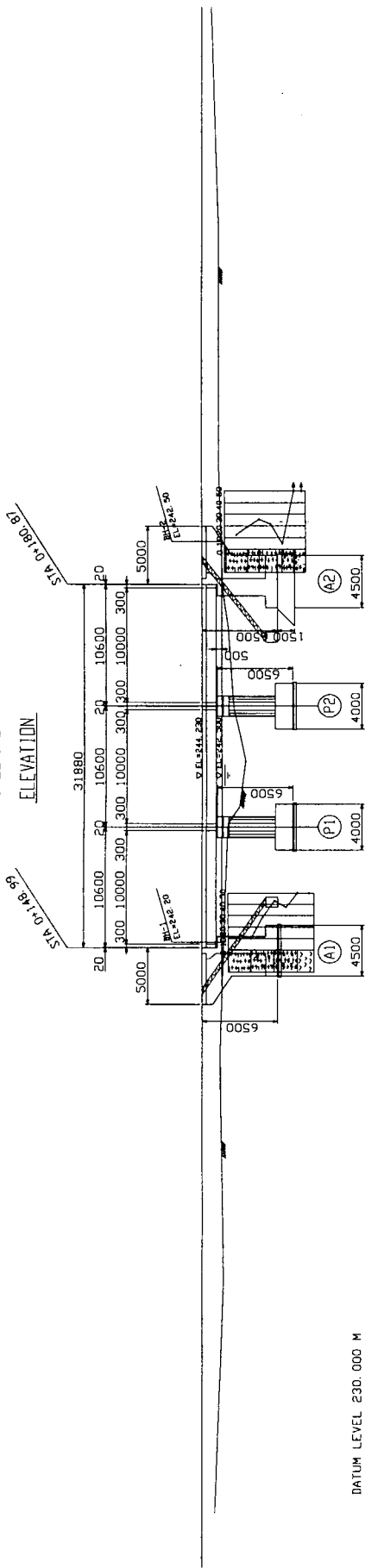
CHECKED: _____ DATE: _____

SCALE: 1"=1500' V=1:200

S-15 GENERAL VIEW

SCALE 1:200

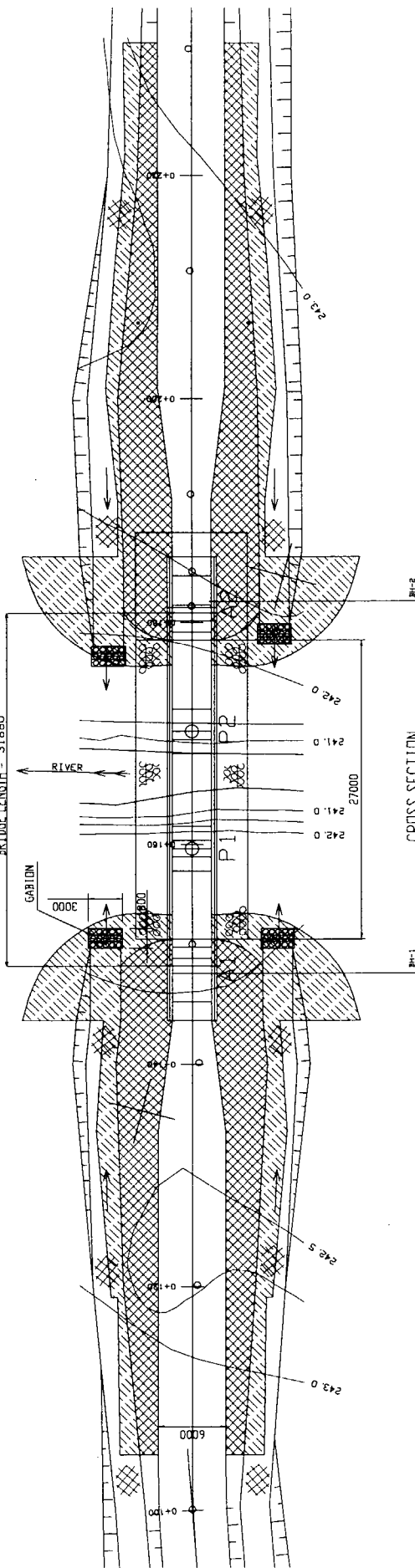
ELEVATION



DATUM LEVEL 230.000 M

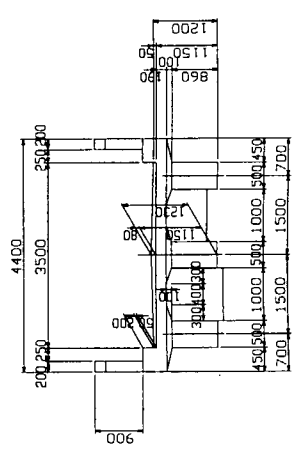
PLAN

BRIDGE LENGTH = 31880



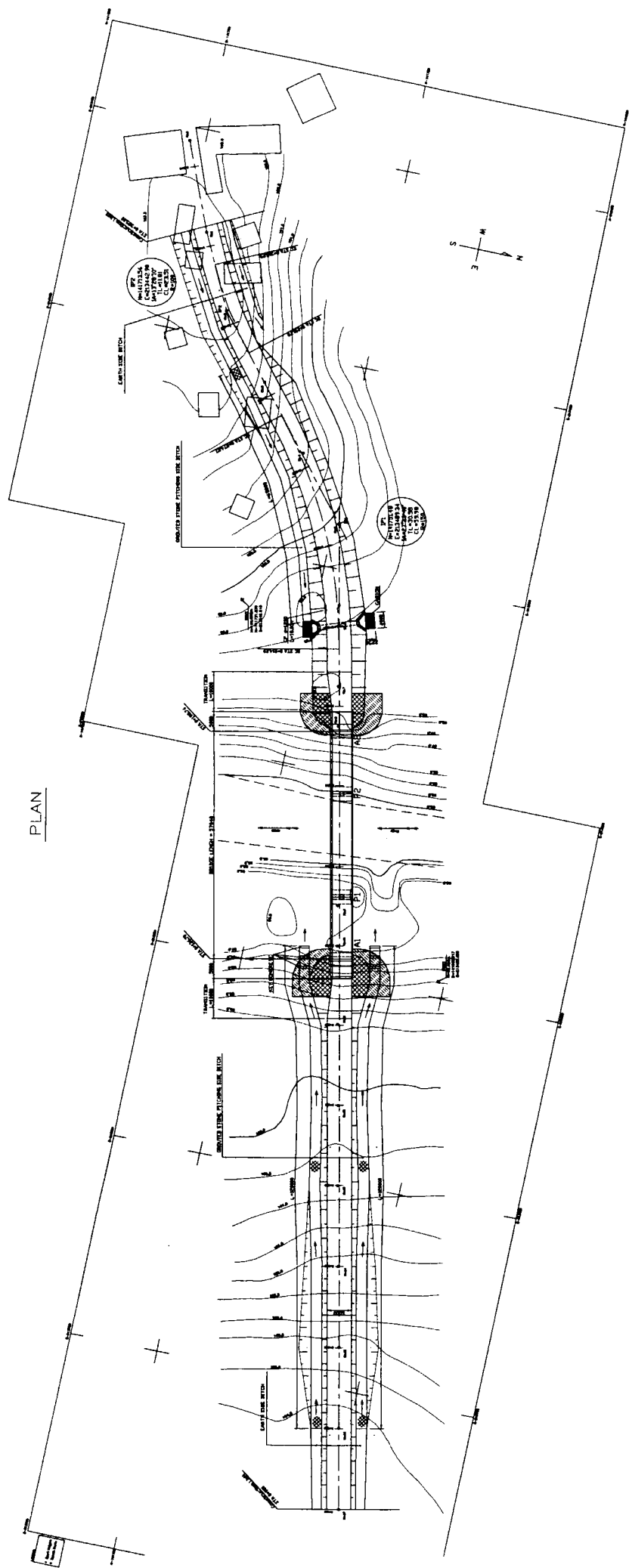
CROSS SECTION

SCALE 1:50

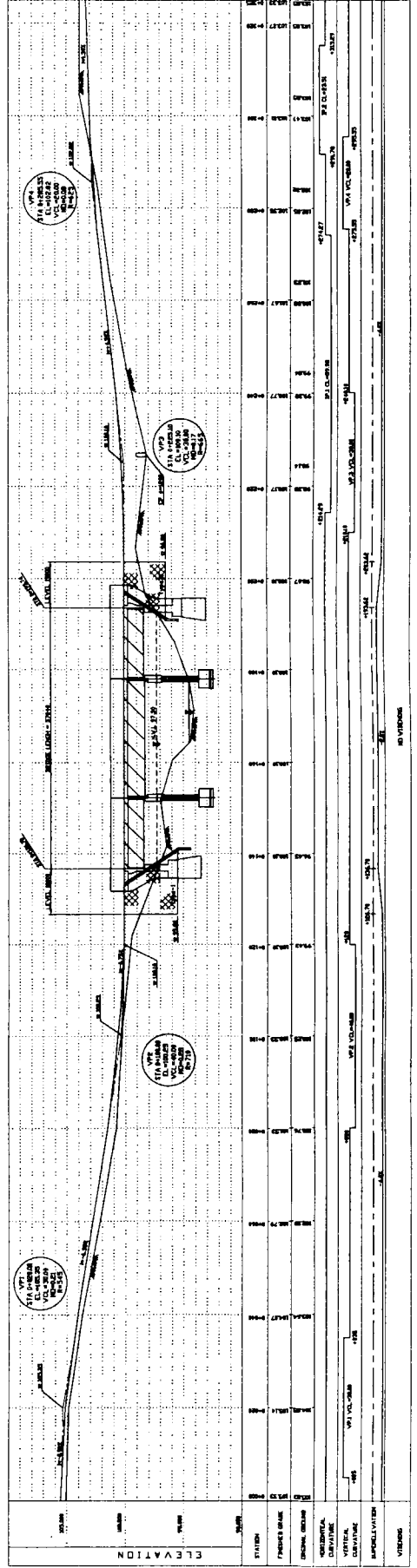


PROJECT:		CONSTRUCTION OF SMALL SCALE BRIDGES	
DESCRIPTION:		S-15 GENERAL VIEW	
GOVERNMENT OF GHANA: DEPARTMENT OF FEEDER ROADS			
CHECKED	NAME	DATE	SIGNATURE
APPROVED	NAME	DATE	SIGNATURE
CONSULTANT: KATAHRA & ENGINEERS INTERNATIONAL			
DESIGNED	NAME	DATE	SIGNATURE
CHECKED	NAME	DATE	SIGNATURE
DRAWING No.			SCALE 1:200

PLAN



PROFILE

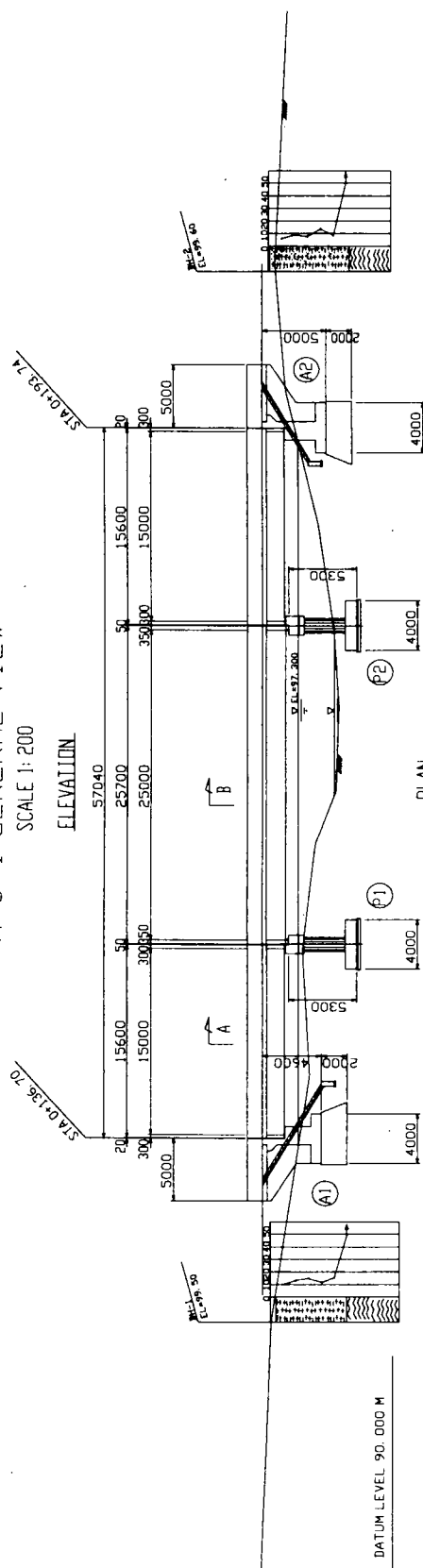


PROJECT:	CONSTRUCTION OF SMALL AND MEDIUM SCALE BRIDGES
DESCRIPTION:	M. J-1 BRIDGE PLAN & PROFILE OF APPROACH ROADS
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED	NAME DATE SIGNATURE
APPROVED	NAME DATE SIGNATURE
CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED	NAME DATE SIGNATURE
CHECKED	NAME DATE SIGNATURE
DRAWING No.	SCALE
	H=1:500 V=1:200

M-3-1 GENERAL VIEW

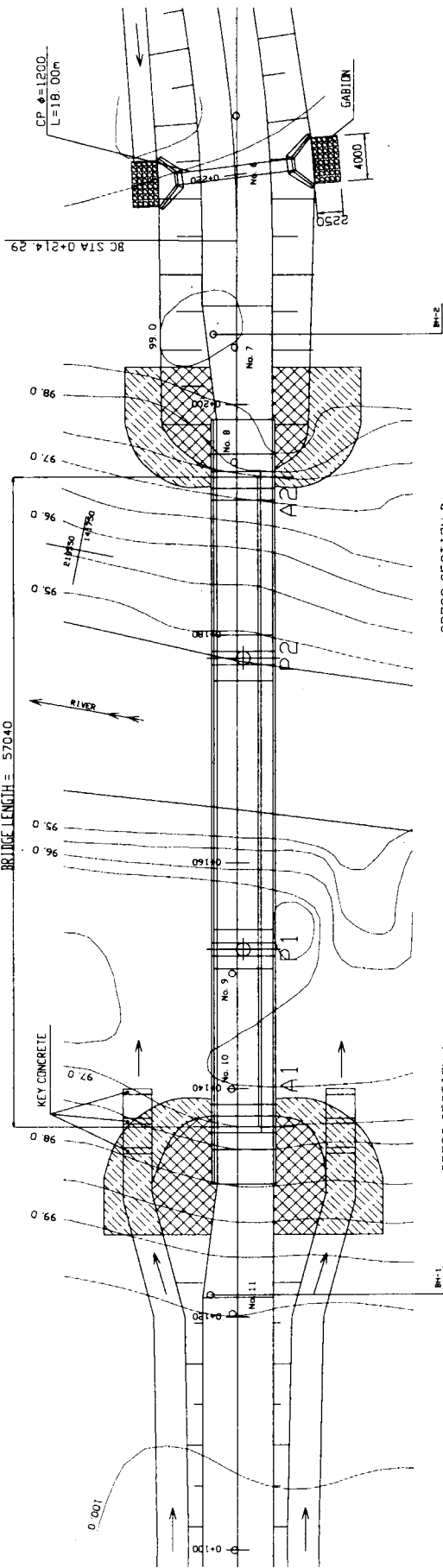
SCALE 1: 200

ELEVATION



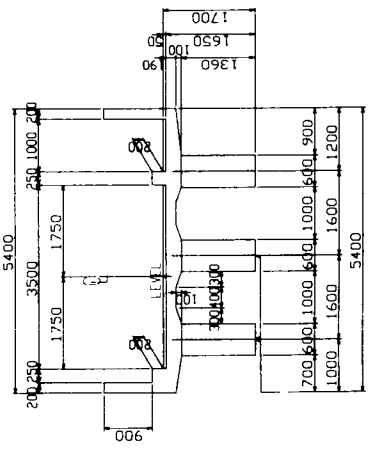
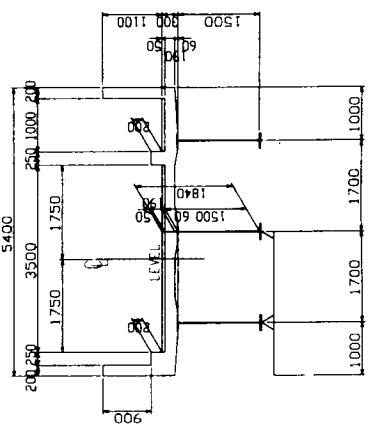
PLAN

BRIDGE LENGTH = 579.40



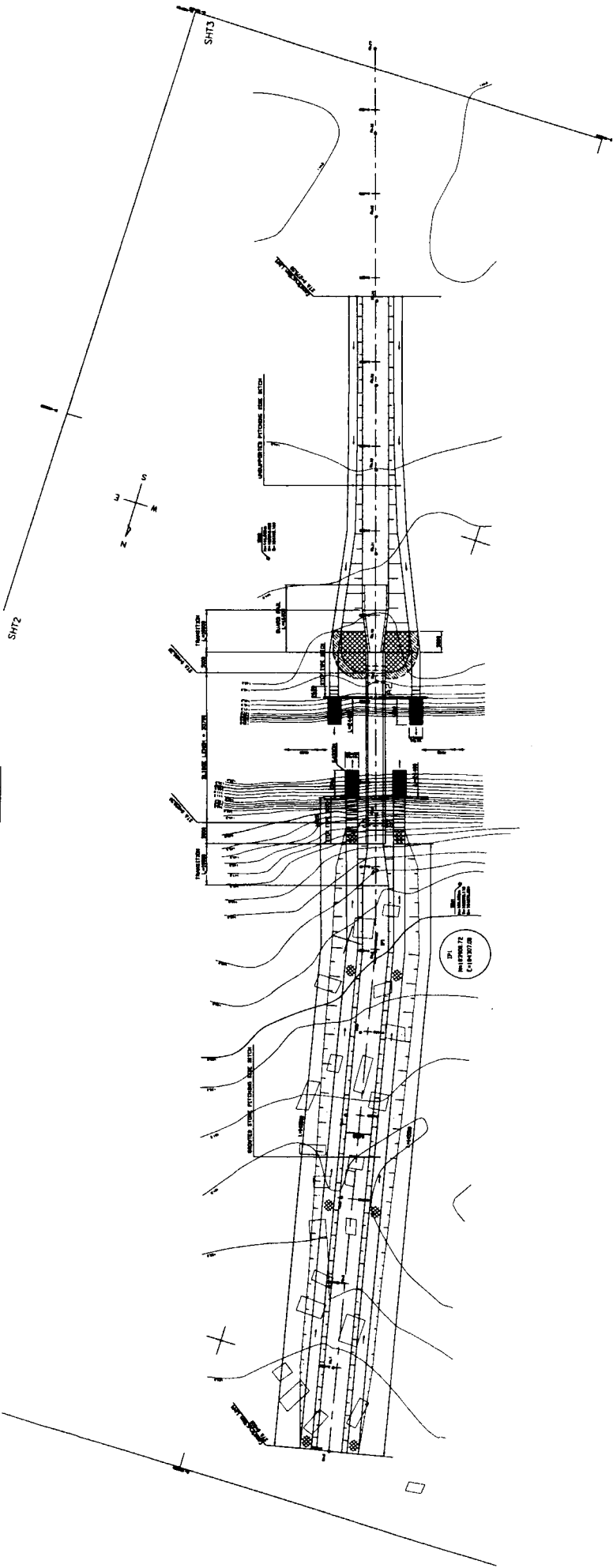
CROSS SECTION B
SCALE 1: 50

CROSS SECTION A
SCALE 1: 50

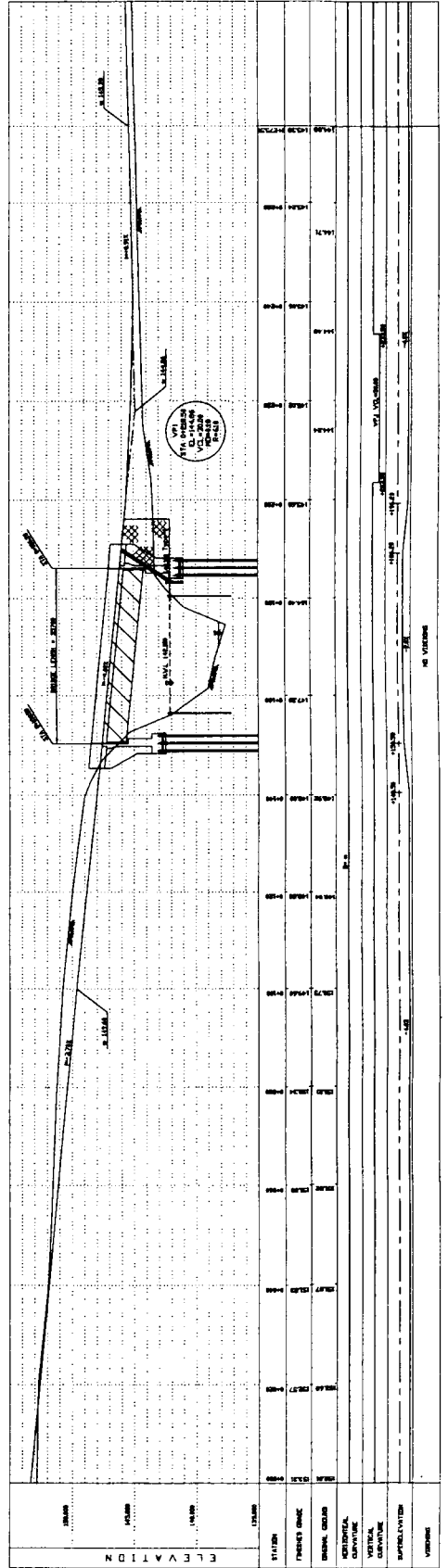


PROJECT:	CONSTRUCTION OF SMALL SCALE BRIDGES
DESCRIPTION:	M-3-1 GENERAL VIEW
GOVERNMENT OF GHANA DEPARTMENT OF FEEDER ROADS	
CHECKED:	NAME DATE SIGNATURE
APPROVED:	NAME DATE SIGNATURE
CONSULTANT: KATAHRA & ENGINEERS INTERNATIONAL	
DESIGNED:	NAME DATE SIGNATURE
CHECKED:	NAME DATE SIGNATURE
DRAWING No.	SCALE 1: 200

PLAN



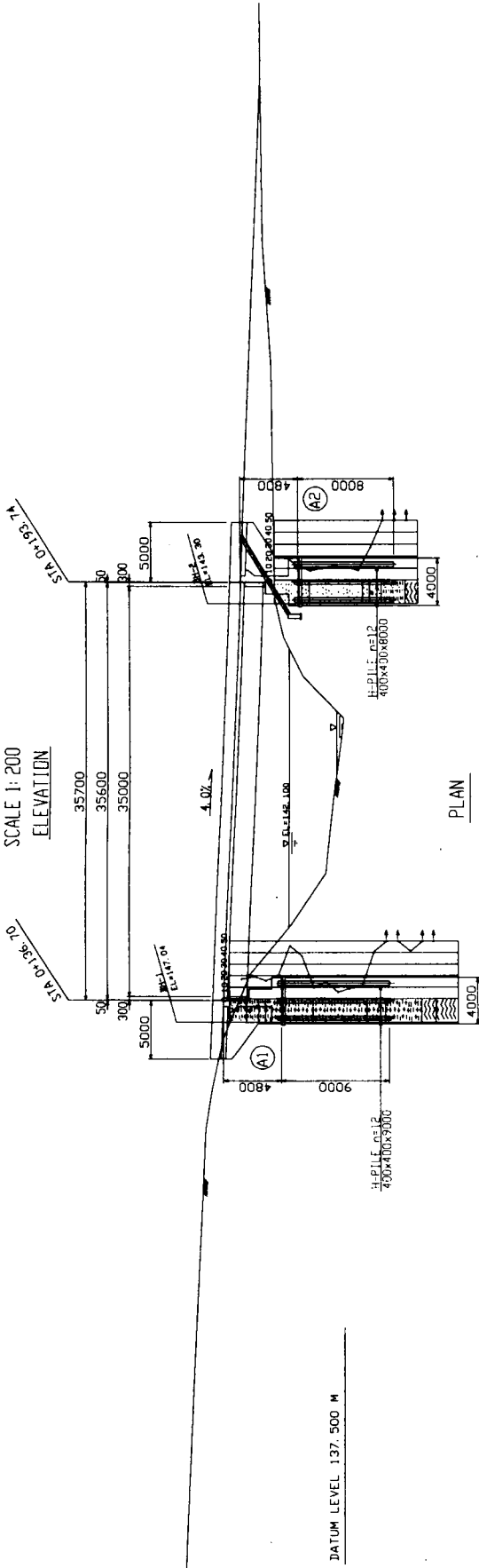
PROFILE



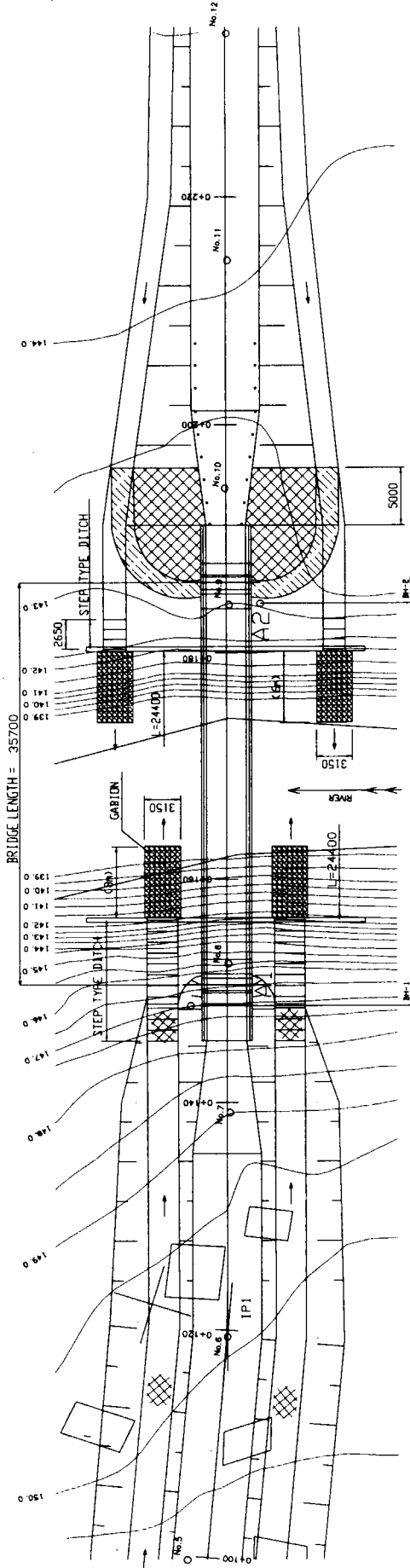
PROJECT:		CONSTRUCTION OF SMALL AND MEDIUM SCALE BRIDGES	
DESCRIPTION:		M-3-2 BRIDGE PLAN & PROFILE OF APPROACH ROADS	
GOVERNMENT OF CHINA:		DEPARTMENT OF FEEDER ROADS	
CHECKED	NAME	DATE	SIGNATURE
APPROVED	NAME	DATE	SIGNATURE
CONSULTANT:		KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED	NAME	DATE	SIGNATURE
CHECKED	NAME	DATE	SIGNATURE
DRAWING No.		SCALE	H=1:500 V=1:200

M-3-2 GENERAL VIEW

SCALE 1:200
ELEVATION

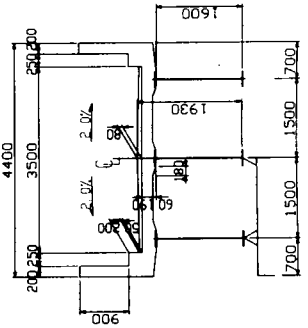


PLAN



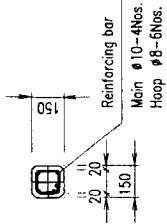
CROSS SECTION

SCALE 1:50

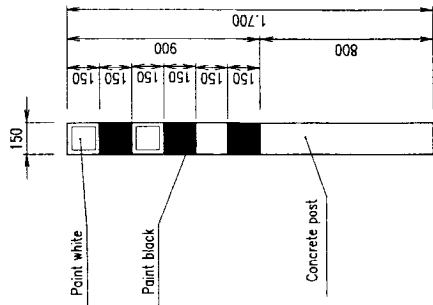


PROJECT: CONSTRUCTION OF SMALL SCALE BRIDGES	
DESCRIPTION: M-3-2 GENERAL VIEW	
GOVERNMENT OF GHANA: DEPARTMENT OF FEEDER ROADS	
CHECKED: _____	DATE: _____
APPROVED: _____	SIGNATURE: _____
CONSULTANT: KATAHIRA & ENGINEERS INTERNATIONAL	
DESIGNED: _____	DATE: _____
CHECKED: _____	SIGNATURE: _____
DRAWING No. _____	SCALE 1:200

GUIDE POST

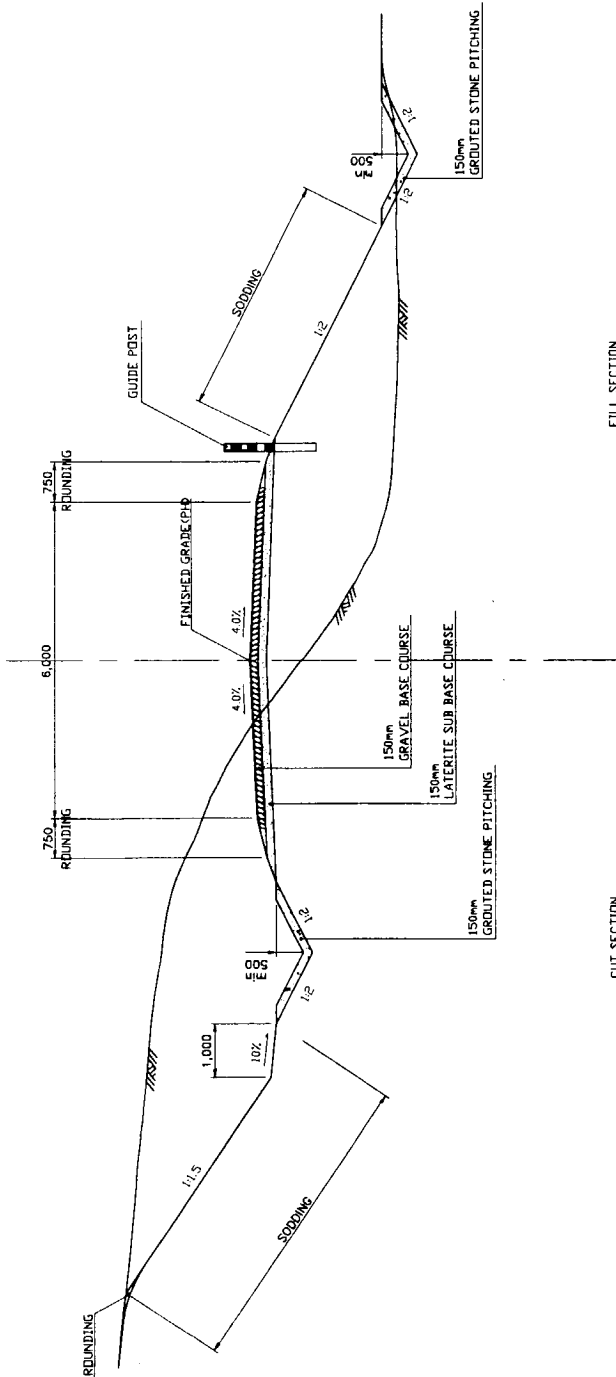


PLAN Scale 1 : 25



ELEVATION Scale 1 : 25

TYPICAL CROSS SECTION



FILL SECTION

CUT SECTION

PROJECT:		CONSTRUCTION OF SMALL AND MEDIUM SCALE BRIDGES	
DESCRIPTION:		APPROACH ROADS TYPICAL CROSS SECTION	
GOVERNMENT OF GHANA:			
DEPARTMENT OF FEEDER ROADS		SIGNATURE	
CHECKED	NAME	DATE	SIGNATURE
APPROVED	NAME	DATE	SIGNATURE
CONSULTANT:			
KATAHIRA & ENGINEERS INTERNATIONAL		SIGNATURE	
CHECKED	NAME	DATE	SIGNATURE
DRAWING No.		SCALE	1:50