

Appendices

Appendix 1. Member List of the Survey Team

Member List of the Survey Team

1. Field Survey

Goro SAKAI	Leader for the Study Grant Aid Management Department, JICA
Takao AKIMOTO	Technical Advisor Ministry of Transport, Kanto District Transport Bureau
Kenji MAEDA	Project Manager / Railway Planner Pacific Consultants International
Saburo ARAKAWA	Facility Planner (Drainage, River Bank) Pacific Consultants International
Takashi OHORI	Facility Planner (Sloop Protection) Tonichi Engineering Consultants, INC.
Kunio TAKAHASHI	Facility Planner (Bridge) Pacific Consultants International
Kentoku KOUKA	Natural Conditions Survey (Geography, Environment) Tonichi Engineering Consultants, INC.
Kenji MORITA	Natural Conditions Survey (Hydrology) Pacific Consultants International
Masato TAKEI	Natural Conditions Survey (Topography) Tonichi Engineering Consultants, INC.
Kosei TANIWAKI	Construction Planner/Cost Estimator Pacific Consultants International
Toshiyuki HANDA	Interpreter Pacific Consultants International

2. Explanation of Draft Report

Keizo KAGAWA	Leader for the Study Tohoku Branch Office, JICA
Kenji MAEDA	Project Manager / Railway Planner Pacific Consultants International
Saburo ARAKAWA	Facility Planner (Drainage, River Bank) Pacific Consultants International

Takashi OHORI

Facility Planner (Sloop Protection)
Tonichi Engineering Consultants, INC.

Toshiyuki HANDA

Interpreter
Pacific Consultants International

Appendix 2. Survey Schedule

2-1 Filed Survey

No.	Date	Day	Team Leader	Technical Advisor	Project Manager Railway Planner	Facility Planner (Bank Protection & Drainage)	Facility Planner (Slope protection)	Bridge Rehabilitation Planner	Natural Conditions Surveyor	Natural Conditions Surveyor	Natural Conditions (Survey)	Construction Planner/ Cost Estimator	Interpreter
1	April 3	Mon.	Mr. G. SAKAI	Mr. T. AKIMOTO	Mr. K. MAEDA	Mr. S. ARAKAWA	Mr. T. OHORI	Mr. K.TAKAHASHI	Mr. K. KOUKA	Mr. K. MORITA	Mr. M. TAKEI	Mr. K. TANIWAKI	Mr. T. Handa
2	April 4	Tue	Narita to Beijing										
3	April 5	wed	Beijing to Ulanbaatar(UB)										
4	April 6	thu	Courtesy call to Japanese Embassy (EOJ) and JICA										
5	April 7	Fri	Courtesy call to Ministry of Infrastructure and Development (MOID), Ministry of External Relation(MOER) and Mongolian Railway, and Explanation of Inception Report										
6	April 8	sat	Site Survey										
7	April 9	sun	Site Investigation										
8	April 10	mon	Site Investigation										
9	April 11	tue	Discuss with MOID/MR on the draft of the Minutes										
10	April 12	wed	Meeting with MOID/MR on the draft of the Minutes										
11	April 13	thu	Sign of the Minutes, Courtesy call to EOJ/JICA										
12	April 14	Fri	UB, Seoul to Narita										
13	April 15	sat											
14	April 16	sun											
15	April 17	Mon.											
16	April 18	Tue											
17	April 19	wed											
18	April 20	Thu											
19	April 21	Fri											
20	April 22	sat											
21	April 23	sun											
22	April 24	Mon.											
23	April 25	Tue											
24	April 26	wed											
25	April 27	Thu											
26	April 28	Fri											
27	April 29	sat											
28	April 30	sun											
29	May 1	Mon.											
30	May 2	Tue											
31	May 3	wed											
32	May 4	Thu											
33	May 5	Fri											
34	May 6	sat											
35	May 7	sun											
36	May 8	Mon.											
37	May 9	Tue											
38	May 10	wed											
39	May 11	Thu											
40	May 12	Fri											
41	May 13	sat											
42	May 14	sun											
43	May 15	Mon.											
44	May 16	Tue											
45	May 17	wed											

2-2 Draft Final Report Explanation

No.	Date	Day	Team Leader	Project Manager Railway Planner	Facility Planner (Bank Protection & Drainage)	Facility Planner (Slope protection)	Bridge (Rehabilitation Planner)			
1	July 31	Mon.	Mr. K. KAGAWA	Mr. K. MAEDA	Mr. S. ARAKAWA	Mr. T. OHORI	Mr. K.TAKAHASHI			
2	August 1	Tue								
3	April 2	Wed								
4	April 3	Thu	Narita to Beijing	Narita to Beijing						
			Beijing to Ulanbaatar(UB), Courtesy call to Japanese Embassy(EOJ) and JICA	Beijing to Ulanbaatar(UB), Courtesy call to Japanese Embassy(EOJ)						
				Courtesy call to JICA, Report explanation to MOID and MR						
				Meeting with MR Counter Part						
			Meeting with MR Counter Part							
5	April 4	Fri	Site Survey and Meeting with MR Counter Part							
6	April 5	Sat								
7	April 6	sun						Holiday		
8	April 7	Mon	Meeting with MR, MONE, MIOD, MOF and MOER					Meeting with MR Counter Part		
9	April 8	Tue	Meeting for Minutes of Discussion		Meeting with MR Counter Part					
10	April 9	Wed	Sign to Minutes of Discussion		Meeting with MR Counter Part					
11	April 10	Thu	Report to EOJ and JICA							
12	April 11	Fri.	UB, Seoul to Narita							

Appendix 3. List of Party Concerned in the Recipient Country

List of Party Concerned in the Recipient Country (Filed Survey)
(April 3, 2000 to May 17, 2000)

Embassy of Japan in Mongolia	Marokimi Hanada Kouji Fukazawa Hiroshi Fujimoto	Ambassador plenipotentiary First Secretary Third Secretary
JICA Mongolia Office	Kenji Matumoto Keizou Egawa Mr. M. Ganzorig	Resident Representative Councilor Senior clerk
Ministry of Infrastructure and Development(MOID)	Mr. B. Batjav Mr. S. Jamts	Director General of Policy Implementation & Coordination Dept. Senior Officer
Mongolian Railway(MR)	Mr. B. Rash Mr. J. Nyamaa Mr. N. Batmunkh Mr. G. Vandandagva Mr.Yu. Nyamjargal Mr.Zorigsayhan Mr.Ch. Erdenedalai Mr. Norvoo Mr. Dagvagonchig Mr. Altangerel Mrs.Yumchinsuren Mr.D.Sukhtumur Mr.Arslan Mr.Janchiv Mr.P.Bat-Erdene Mrs.Altanchimeg	President Chief Engineer of Mongolian Railway Vice-president Director of Track Dept. Chief engineer of Track Dept. Senior engineer of Track Dept. Senior engineer of Bridge Track Facilities Dept. Track Facilities Dept. Locomotive Dept Housing Section Director of Signal&Telecom Dept. Financial Dept. Passenger Transport Dept. Freight Transport Dept. Housing Dept.
Ministry of External Relation(MOER)	Mr. D. Davaasambuu	Assistant Director of Foreign Trade and Economic Cooperation Dept.
Ministry of Finance(MOF)	Mr. D. Chimeddagva	Director of Treasury Dept.
Ministry of Nature and the Environment(MONE)	Mr. B. Ganbaatar Ms. D. Sodnom Ms. L. Dolgormaa	Section chief of Association cooperation Senior engineer Senior engineer
JICA Expert	Keiji Fujimura Yasushi Fujimoto	Expert Expert

Ulaanbaatar City Major Working Unit	Mr. Munkhjargal	Expert
US ERDENE Co.	Mr. Myagmar	President
GEOTECH CO.LTD	Mr. S. Doljin	Dire
TSN	Mr. M. Myagmarjav	Senior engineer
(Survey Company)	Mr. Lhanasuren	Senior engineer
	Mr. Hattoriventu	Senior engineer
SAN-INDUSTRIAL Co.,Ltd (Concrete Plant)	Mr. D. Dorjpurev	President

List of Party Concerned in the Recipient Country (Draft Final Report Explanation)
(July 31, 2000 to August 11, 2000)

Embassy if Japan in Mongolia	Marokimi Hanada Kouji Fukazawa Hiroshi Fujimoto	Ambassador plenipotentiary First Secretary Third Secretary
JICA Mongolia Office	Kenji Matumoto Tetsuo Amagai Mr. M. Ganzorig	Resident Representative Councilor Senior clerk
Ministry of Infrastructure and Development(MOID)	Mr. R. Bud Mr. S. Munkhtuya	Director General Department of Strategic Planning and Integrated Policy Senior Officer
Mongolian Railway(MR)	Mr. B. Rash Mr. J. Nyamaa Mr. G. Vandandagva Mr. Uurdmandakh Mr.Yu. Nyamjargal Mr.Ch. Erdenedalai	President Chief Engineer of Mongolian Railway Vice-president Director of Track Dept. Chief engineer of Track Dept. Senior engineer of Track Dept.
Ministry of External Relation(MOER)	Mr. Munkhbat Mr. D. Davaasambuu	Director of Foreign Trade and Economic Cooperation Dept. Assistant Director of Foreign Trade and Economic Cooperation Dept.

Ministry of Finance(MOF)	Mr. Munkhbat Mr. L. Dashdorj Mr. Enkhbayar	State Secretary of MOF Head, Physical Policy Dept. Assistance physical Policy Dept. Assistance Physical Policy Dept. Section chief of Association cooperation Senior engineer Senior engineer
	Mr. B. Batjargar	
Ministry of Nature and the Environment(MONE)	Mr. B. Ganbaatar	
	Ms. D. Sodnom Ms. L. Dolgormaa	
JICA Expert	Keiji Fujimura	Expert

Appendix 4. Minutes of Discussion

MINUTES OF DISCUSSIONS
ON BASIC DESIGN STUDY
ON THE RAILWAY REHABILITATION PROJECT
IN MONGOLIA

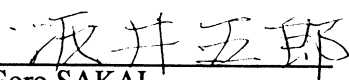
In response to a request from the Government of Mongolia, the Government of Japan decided to conduct a Basic Design Study on the Railway Rehabilitation Project (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").


JICA dispatched to Mongolia the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Goro Sakai, Deputy Director, Office of Technical Cooperation and Examination, Grant Aid Management Department, JICA, and is scheduled to stay in the country from April 4 to May 16, 2000.


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

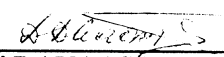
In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed with further works and prepare the Basic Design Study Report.

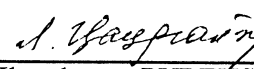
Ulaanbaatar, April 13, 2000


Goro SAKAI
Leader,
Basic Design Study Team,
JICA


Jigjid NYAMAA
Chief Engineer,
Mongolian Railway


Bat-khuyag BATJAV
Director General,
Policy Implementation & Coordination Dept.
Ministry of Infrastructure Development


Dalrai DAVAASAMBUU
Deputy Director,
Foreign Trade & Economic Cooperation Dept.
Ministry of External Relations


Khandsuren PUREVSUREN
Director General,
State Treasury Department,
Ministry of Finance

ATTACHMENT

1. Objective

The objective of the Project is to improve the efficiency of the railway transport by rehabilitating their physical facilities for increased demands in both international and domestic transportation.

2. Project Area

The Project area is from northern border station of Sukhbaatar to Bayan station as shown in ANNEX-1.

3. Responsible and Implementing Agency

The Responsible Agency of the Project is the Ministry of Infrastructure Development.

The Implementing Agency of the Project is the Mongolian Railway.

4. Items requested by the Government of Mongolia

After discussions with the Team, the following items shown in ANNEX-2 were finally requested by Mongolian side. JICA will assess appropriateness of the request and will recommend to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

- (1) Mongolian side understands the Japan's Grant Aid Scheme explained by the Team, as described in ANNEX-3.
- (2) Mongolian side will take necessary measures, as described in ANNEX-4 for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Study

- (1) The consultants will proceed with further studies in Mongolia until May 16, 2000.
- (2) JICA will prepare the draft report in English and dispatch a team in order to explain its contents in the end of July 2000.
- (3) In case that the contents of the report are accepted in principle by the Government of Mongolia, JICA will complete the final report and send it to the Government of Mongolia by November 2000.

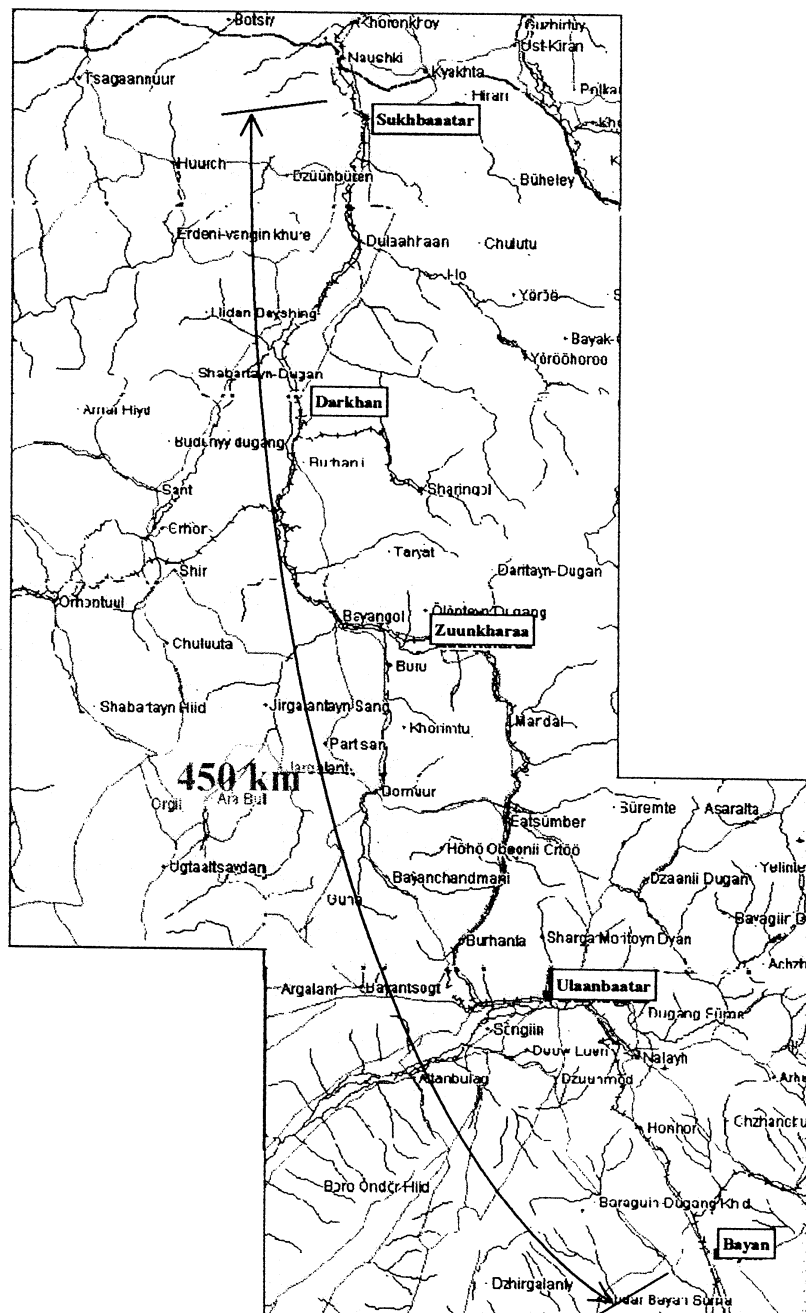
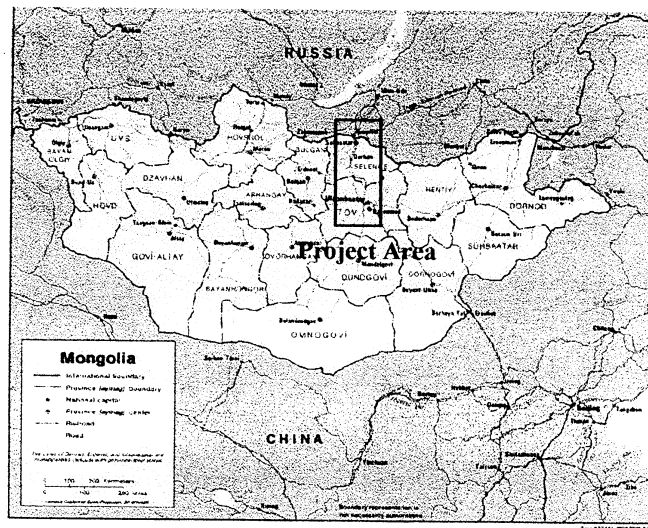
7. Other Relevant Issues

- (1) Both sides confirmed that the Mongolian Railway should not be privatized in the future.
- (2) Mongolian side shall ensure enough budget and personnel to operate and maintain the facilities after the completion of the Project.
- (3) Mongolian side shall submit answers to the questionnaire which the Team handed to the Mongolian side by May 15, 2000.

- (4) The Mongolian Railway has agreed to provide an inspection train and necessary number of counterpart personnel to the Team during the period of their studies.
- (5) Mongolian side promised to exempt Japanese juridical and physical nationals engaged in the Project from customs duties, internal taxes including VAT, and other physical levies which may be imposed in Mongolia regarding the supply of products and services under the verified contracts.

X

- 1/18
2/18
1.18



PROJECT AREA MAP

-14
E.
1.18

ANNEX - 2

ITEMS REQUESTED BY THE GOVERNMENT OF MONGOLIA

As a consequence of the discussions with the Team, the following items were finally requested by Mongolian side.

1. Mongolian side acknowledged that for the smooth implementation of the project the exchange of opinions and effective coordination of the all concerned governmental agencies and bodies are very important.
2. In order to ensure the safe and reliable train operation and to prevent from natural disasters, MR necessitates urgently the rehabilitation of the 101 locations mentioned in the Project Application by the work items following the table below.

No.	Work Items	Number of Locations
1.	River Bank Revetment (including Groyne)	8
2.	Railway Track Re-Alignment	1
3.	Slope Stability	20
4.	Bridge Rehabilitation	11
5.	Drain Improvement	59
6.	Provision of Drainage Facilities in Sukhbaatar Station	1
7.	River Widening near Railway Bridge	1
	Total:	101 locations

3. Transfer of the up-to-date technology and know-how on the construction work under the train operation along the "life-line" of Mongolian people.
4. Mongolian side requested the counterpart training in Japan concerning railway substructure maintenance and management.

Handwritten signatures and initials:
-1st
S.
D.
U. Gf

Japan's Grant Aid Program

1. Japan's Grant Aid Procedures

(1) The Japan's Grant Aid is executed by the following procedures.

- Application (request made by a recipient country)
- Study (Preparatory Study / Basic Design Study conducted by JICA)
- Appraisal & Approval (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
- Determination of Implementation (Exchange of Notes between the Governments of Japan and the recipient country)
- Implementation (Implementation of the Project)

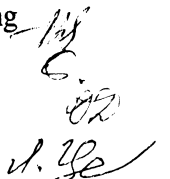
(2) Firstly, an application or a request for a Project submitted by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is suitable for Japan's Grant Aid. If the request is deemed appropriate, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency).

Secondly, JICA conducts the study (Basic Design Study), using a Japanese consulting firm(s). If the background and objective of the requested project are not clear, a Preparatory Study is conducted prior to a Basic Design Study.

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

Fourthly, the project approved by the Cabinet becomes official when pledges by the Exchange of Notes signed by the both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.



2. Basic Design Study

(1) Contents of the Study

The purpose of the Study (Preparatory Study / Basic Design Study) conducted on a Project requested by JICA is to provide a basic document necessary for appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

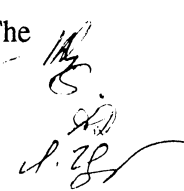
- (a) to confirm background, objectives, benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for Project implementation;
- (b) to evaluate appropriateness of the Project for the Grand Aid Scheme from a technical, social and economical point of view;
- (c) to confirm items agreed on by both parties concerning the basic concept of the Project;
- (d) to prepare a basic design of the Project;
- (e) to estimate cost involved in 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 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) Selecting (a) Consulting Firm(s)

For smooth implementation of the study, JICA uses (a) consulting firm(s) registered. JICA selects (a) firm(s) through proposals submitted by firms which are interested. The



firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference made by JICA.

The consulting firm(s) used for the study is(are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency.

3. Japan's Grant Aid Scheme

(1) What is Grant Aid?

The Grant Aid provides a recipient country with non-reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation as such.

(2) Exchange of Notes (E/N)

The Japan's Grant Aid is extended in accordance with the Exchange of Notes by both Governments, 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 Japanese single fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedure such as Exchange of Notes, concluding contracts with (a) consulting firm(s) and (a) contractor(s) and a 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 single fiscal year at most by mutual agreement between the two Governments.

(4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

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



However the prime contractors, namely, consulting, construction and procurement firms, are limited to "Japanese nationals" (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons).

(5) Necessity of the "Verification"

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

(6) Undertakings required to the Government of the Recipient Country

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

- (a) to secure land necessary for the sites of the Project and to clear and level the land prior to commencement of the construction work,
- (b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
- (c) to secure buildings prior to the installation work in case the Project is providing equipment,
- (d) to ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,
- (e) 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,
- (f) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(7) Proper Use

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

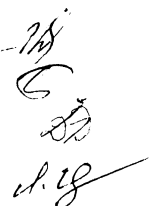
(8) Re-export

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

(9) Banking Arrangement (B/A)

(a) The Government of the recipient country or its designated authority shall 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 Government of the recipient country or its designated authority under the contracts verified.

(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.



ANNEX - 4

MAJOR UNDERTAKINGS TO BE TAKEN BY EACH GOVERNMENTS

No.	Items	To be Covered by Grant Aid	To be Covered by Recipient Country
1.	To secure land		○
2.	To clear, level and reclaim the site when needed		○
3.	To construct gates and fences in and around the site		○
4.	To bear the following commissions to the Japanese foreign exchange bank for the banking services based upon the B/A 1) Advising commission of A/P 2) Payment commission		○ ○
5.	To ensure unloading and customs clearance at port of disembarkation in the recipient country 1) Marine (Air) transportation of the products from Japan to the recipient country 2) Tax exemption and custom 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 contracts.		○
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, necessary for construction of the facilities as well as for the transportation and installation of the equipment.		○
10.	To coordinate and solve any issues related to the Project which may be raised from the third parties or inhabitants in the Project area during implementation of the Project.		○

B/A: Banking Arrangement

A/P: Authorization to Pay

X

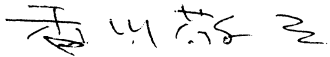
MINUTES OF DISCUSSIONS
ON BASIC DESIGN STUDY
ON THE RAILWAY REHABILITATION PROJECT
IN MONGOLIA
(EXPLANATION OF DRAFT REPORT)

In April 2000, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team on the Railway Rehabilitation Project (hereinafter referred to as "the Project") to the Mongolia, and through discussion, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the study.

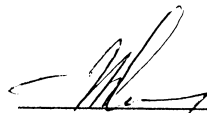
In order to explain and to consult Mongolian side on the components of the draft report, JICA sent to Mongolia the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Keizo Kagawa, Deputy Director, Tohoku Branch Office, JICA, from August 1 to August 11, 2000.

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

Ulaanbaatar, August 9, 2000



Keizo KAGAWA
Leader,
Draft Report Explanation Team,
JICA



Jigjid NYAMAA
Chief Engineer,
Mongolian Railway



Rentsen BUD
Director General,
Strategic Planning & Integrated Policy
Department,
Ministry of Infrastructure Development



Anya MUNKHBAT
Director,
Foreign Trade and Economic
Cooperation Department,
Ministry of External Relations



Luvsandash DASHDORJ
Head,
Fiscal Policy Department,
Ministry of Finance

ATTACHMENT

1. Components of the Draft Report

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

2. Japan's Grant Aid Scheme

The Mongolian side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Mongolia as explained by the Team and as described in ANNEX-3 and ANNEX-4 of the Minutes of Discussions signed by both parties on April 13, 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 Mongolia by November, 2000.

4. Other Relevant Issues

- (1) The Mongolian side shall ensure enough budget and personnel to operate and maintain the facilities after the completion of the Project.
- (2) The Mongolian side will execute formalities related to the environmental approval of the Government of Mongolia for smooth implementation of the Project by the end of October, 2000.
- (3) The Mongolian Railway shall take necessary measures for usage of the land necessary for the Project.
- (4) The Mongolian Railway shall coordinate and solve any issues related to the Project which may be raised from third parties or inhabitants in the Project area during implementation of the Project.
- (5) The Mongolian side promised to exempt Japanese juridical and physical nationals engaged in the Project from customs duties, internal taxes including VAT, and other fiscal levies which may be imposed in Mongolia regarding the supply of products and services under the verified contracts.

Japan's Grant Aid Program

1. Japan's Grant Aid Procedures

(1) The Japan's Grant Aid is executed by the following procedures.

- Application (request made by a recipient country)
- Study (Preparatory Study / Basic Design Study conducted by JICA)
- Appraisal & Approval (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
- Determination of Implementation (Exchange of Notes between the Governments of Japan and the recipient country)
- Implementation (Implementation of the Project)

(2) Firstly, an application or a request for a Project submitted by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is suitable for Japan's Grant Aid. If the request is deemed appropriate, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency).

Secondly, JICA conducts the study (Basic Design Study), using a Japanese consulting firm(s). If the background and objective of the requested project are not clear, a Preparatory Study is conducted prior to a Basic Design Study.

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

Fourthly, the project approved by the Cabinet becomes official when pledges by the Exchange of Notes signed by the both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

2. Basic Design Study

(1) Contents of the Study

The purpose of the Study (Preparatory Study / Basic Design Study) conducted on a Project requested by JICA is to provide a basic document necessary for appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

- (a) to confirm background, objectives, benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for Project implementation;
- (b) to evaluate appropriateness of the Project for the Grand Aid Scheme from a technical, social and economical point of view;
- (c) to confirm items agreed on by both parties concerning the basic concept of the Project;
- (d) to prepare a basic design of the Project;
- (e) to estimate cost involved in 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 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) Selecting (a) Consulting Firm(s)

For smooth implementation of the study, JICA uses (a) consulting firm(s) registered. JICA selects (a) firm(s) through proposals submitted by firms which are interested. The

firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference made by JICA.

The consulting firm(s) used for the study is(are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency.

3. Japan's Grant Aid Scheme

(1) What is Grant Aid?

The Grant Aid provides a recipient country with non-reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation as such.

(2) Exchange of Notes (E/N)

The Japan's Grant Aid is extended in accordance with the Exchange of Notes by both Governments, 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 Japanese single fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedure such as Exchange of Notes, concluding contracts with (a) consulting firm(s) and (a) contractor(s) and a 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 single fiscal year at most by mutual agreement between the two Governments.

(4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

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

However the prime contractors, namely, consulting, construction and procurement firms, are limited to "Japanese nationals" (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons).

(5) Necessity of the "Verification"

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

(6) Undertakings required to the Government of the Recipient Country

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

- (a) to secure land necessary for the sites of the Project and to clear and level the land prior to commencement of the construction work,
- (b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
- (c) to secure buildings prior to the installation work in case the Project is providing equipment,
- (d) to ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,
- (e) 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,
- (f) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(7) Proper Use

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

(8) Re-export

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

(9) Banking Arrangement (B/A)

- (a) The Government of the recipient country or its designated authority shall 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 Government of the recipient country or its designated authority under the contracts verified.
- (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.

ANNEX - 4

MAJOR UNDERTAKINGS TO BE TAKEN BY EACH GOVERNMENTS

No.	Items	To be Covered by Grant Aid	To be Covered by Recipient Country
1.	To secure land		○
2.	To clear, level and reclaim the site when needed		○
3.	To construct gates and fences in and around the site		○
4.	To bear the following commissions to the Japanese foreign exchange bank for the banking services based upon the B/A 1) Advising commission of A/P 2) Payment commission		○ ○
5.	To ensure unloading and customs clearance at port of disembarkation in the recipient country 1) Marine (Air) transportation of the products from Japan to the recipient country 2) Tax exemption and custom 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 contracts.		○
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, necessary for construction of the facilities as well as for the transportation and installation of the equipment.		○
10.	To coordinate and solve any issues related to the Project which may be raised from the third parties or inhabitants in the Project area during implementation of the Project.		○

B/A: Banking Arrangement

A/P: Authorization to Pay

CS

PS

AM

Appendix 5. References

5-1 Hydrological & Meteorological Data

- 1 . Position of Meteorological Stations
- 2 . Average Air Temperature (1961-1998)
- 3 . Maximum Air Temperature (1961-1998)
- 4 . Minimum Air Temperature (1961-1998)
- 5 . Average Monthly Precipitation (1961-1998)
- 6 . Maximum Dairy Precipitation (1961-1998)
- 7 . Average Rainy days (1961-1998)
- 8 . Maximum Precipitation (1961-1998)
- 9 . Maximum Minutely Precipitation (1961-1998)
- 1 0 . Maximum Dairy Precipitation for Various Recurrence Intervals
- 1 1 . Average Wind Velocity (1961-1998)
- 1 2 . Maximum Wind Velocity (1961-1998)
- 1 3 . Average Humidity (1961-1998)
- 1 4 . Average Discharge and Discharge for Various Recurrence Intervals in Normal Times
- 1 5 . Average Discharge and Discharge for Various Recurrence Intervals in Rainy Season
- 1 6 . Average Discharge and Discharge for Various Recurrence Intervals in Snowmelt Season

1. Position of Meteorological Stations

No.	Station	Establishment	Latitude	Longitude	Altitude (m)
1.	Sukhebaatar	1965.	50° 14'	106° 11'	621
2.	Darkhan	1983.	49° 28'	105° 59'	707
3.	Baruunharaa	1939.	48° 55'	106° 04'	807
4.	Zuunharaa	1965.	48° 55'	106° 52'	861
5.	Ulaanbaatar	1965.	47° 56'	106° 59'	1306
6.	Buyant-Uhaa	1936.	47° 51'	106° 45'	1272
7.	Maanyt	1956.	47° 18'	107° 29'	1429

2. Average Air Temperature (1961-1998)

No.	Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1	Sukhebaatar	-22.8	-18.4	-7.0	3.4	11.1	16.9	19.2	17.0	9.9	1.5	-10.2	-19.1	0.1
2	Darkhan	-23.9	-18.7	-6.8	3.3	11.3	15.5	18.9	16.8	9.6	1.6	-10.4	-19.4	-0.2
3	Baruunharaa	-24.5	-20.4	-7.8	2.8	10.9	16.4	18.5	16.4	9.3	0.6	-10.8	-20.6	-0.7
4	Zuunharaa	-24.2	-21.1	-8.9	2.1	10.0	16.3	17.9	15.7	8.8	-0.2	-9.0	-21.8	-1.3
5	Ulaanbaatar	-21.7	-17.3	-8.3	1.1	9.5	14.8	17.1	15.1	8.4	0.2	-11.1	-19.3	-1.0
6	Buyant-Uhaa	-24.8	-20.1	-9.5	0.5	9.0	14.7	16.7	14.8	7.5	-1.1	-13.1	-22.0	-2.3
7	Maanyt	-22.3	-19.0	-10.0	0.1	8.8	14.4	16.4	14.5	7.3	-1.4	-12.7	-20.1	-2.0

UNIT : °C

3. Maximum Air Temperature (1961-1998)

No.	Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual/Day
1	Sukhebaatar	-2.8	8.0	19.8	30.5	35.0	37.0	40.5	33.9	29.7	27.0	11.6	12.3	40.5 / 1992.7.3
2	Darkhan	-2.0	8.3	21.5	27.8	36.5	40.4	43.0	37.1	30.0	27.2	13.7	7.0	43.0 / 1999.7.24
3	Baruunharaa	1.9	9.0	21.5	29.8	36.0	37.5	43.0	36.4	31.6	27.0	14.1	8.4	43.0 / 1999.7.24
4	Zuunharaa	-0.2	6.2	17.2	30.0	34.5	36.5	40.0	35.0	30.2	26.9	15.1	4.0	40.0 / 1977.7.16
5	Ulaanbaatar	-1.8	8.5	18.3	25.0	31.6	34.5	38.0	34.6	29.1	22.5	13.0	6.1	38.0 / 1999.7.24
6	Buyant-Uhaa	-1.9	9.8	17.0	25.5	34.7	34.7	38.0	36.9	30.8	24.1	12.9	7.3	38.0 / 1999.7.24
7	Maanyt	-0.5	6.7	16.3	23.4	33.2	35.2	39.4	35.8	28.3	26.1	12.7	7.0	39.4 / 1972.7.12

UNIT : °C

4. Minimum Air Temperature (1961-1998)

UNIT : °C

No.	Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual/Day
1	Sukhebaatar	-42.9	-43.0	-36.1	-25.1	-9.4	-3.0	3.1	-1.4	-8.5	-23.1	-33.1	-40.9	-43.0 /1969.2.21
2	Darkhan	-42.4	-40.9	-38.7	-24.3	-9.7	-6.5	-0.4	0.0	-10.6	-21.9	-36.3	-40.3	-42.4 /1998.1.16
3	Baruunharaa	-45.7	-43.7	-37.7	-23.1	-10.4	-6.7	-8.7	-2.3	-10.2	-24.5	-37.4	-42.8	-45.7 /1967.1.14
4	Zuunharaa	-47.2	-42.4	-40.3	-22.9	-9.8	-3.9	-0.7	-3.6	-9.5	-22.5	-36.6	-43.1	-47.2 /1967.1.14
5	Ulaanbaatar	-39.6	-37.3	-33.0	-26.1	-10.4	-3.1	-0.2	-3.3	-13.5	-22.5	-33.1	-38.5	-39.6 /1979.1.30
6	Buyant-Uhaa	-44.2	-42.7	-35.1	-24.7	-16.1	-6.5	-3.0	-5.6	-18.0	-32.4	-38.5	-41.6	-44.2 /1998.1.13
7	Maanyt	-44.7	-45.4	-39.0	-34.9	-16.6	-7.4	-2.5	-4.1	-18.0	-30.4	-37.5	-45.7	-45.7 /1966.12.25

5. Average Monthly Precipitation (1961-1998)

UNIT : mm

No.	Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Nov.- Mar. Total	Apr.- Oct. Total	Annual Total
1	Sukhebaatar	3.1	2.3	2.9	10.1	17.9	52.9	76.8	69.4	35.6	10.1	5.7	3.0	17.0	272.9	289.9
2	Darkhan	4.5	2.9	3.2	9.6	19.9	58.1	83.8	82.7	38.7	13.5	5.0	5.2	20.7	306.4	327.1
3	Baruunharaa	3.6	3.0	3.9	9.2	17.7	54.4	82.4	74.2	36.2	11.0	5.8	4.6	20.9	284.9	305.9
4	Zuunharaa	2.3	2.1	3.1	10.3	19.0	59.3	84.4	80.3	30.7	10.2	2.7	3.1	13.3	294.2	307.6
5	Ulaanbaatar	1.7	1.9	3.2	7.7	13.1	48.4	74.4	70.5	30.2	8.4	4.4	3.0	14.1	252.7	266.9
6	Buyant-Uhaa	1.2	1.7	2.6	7.9	12.2	47.7	71.0	65.5	29.0	6.7	3.7	2.7	11.8	240.0	251.9
7	Maanyt	0.7	1.2	1.6	5.0	11.6	39.9	71.8	66.9	23.3	5.4	3.3	1.4	8.1	224.1	232.1

6. Maximum Dairy Precipitation (1961-1998)

UNIT : mm

No.	Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual /Day
1	Sukhebaatar	6.0	7.7	11.2	17.5	38.9	40.1	49.4	51.7	35.6	19.8	10.7	6.5	51.7
	Year	1972	1973	1973	1967	1997	1990	1975	1990	1969	1967	1994	1965	1990.8.7
2	Darkhan	8.9	3.8	9.9	13.4	37.1	43.4	56.9	68.3	30.7	15.8	11.0	7.7	68.3
	Year	1987	1996	1993	1994	1988	1990	1997	1996	1994	1998	1984	1996	1996.8.9
3	Baruunharaa	10.2	12.1	12.3	24.8	25.8	57.4	76.6	43.4	37.7	22.8	17.7	6.0	76.6
	Year	1984	1970	1968	1997	1968	1990	1991	1985	1994	1969	1965	1964	1991.7.27
4	Zuunharaa	3.0	4.0	8.0	19.0	21.0	67.8	44.0	39.0	29.0	18.0	5.0	4.0	67.8
	Year	1972	1970	1968	1967	1965	1978	1965	1969	1975	1969	1965	1972	1978.6.28
5	Ulaanbaatar	2.0	3.9	6.7	14.3	29.4	45.4	51.4	51.7	36.0	14.2	5.6	8.0	51.7
	Year	1994	1993	1981	1979	1978	1992	1984	1984	1975	1984	1972	1969	1984.7.27
6	Buyant-Uhaa	3.1	4.0	5.2	25.6	23.0	74.9	60.1	48.8	34.2	12.9	6.8	5.4	74.9
	Year	1978	1976	1987	1979	1980	1967	1995	1994	1991	1994	1993	1978	1967.6.27
7	Maanyt	2.4	2.5	4.4	8.9	27.2	55.3	51.0	43.5	30.0	12.5	7.1	3.8	55.3
	Year	1974	1971	1971	1979	1991	1967	1993	1961	1973	1993	1961	1967	1967.6.16

7. Average Rainy days (1961-1998)

UNIT : Day

No.	Station	Jun.	Jul.	Aug.	Sep.	Oct.	Annual
1	Sukhebaatar	14	17	15	10	6	67
2	Darkhan	15	17	16	10	7	65
3	Baruunharaa	13	16	14	9	6	58
4	Zuunharaa	11	17	14	8	4	54
5	Ulaanbaatar	13	18	16	9	6	62
6	Maanyt	11	13	14	7	4	49

8. Maximum Precipitation (1961-1998)

UNIT : mm/min.

No.	Station	5'	10'	20'	40'	60'	90'	1440'	2880'
1.	Darkhan	6.4	8.0	12.0	16.4	18.8	19.2	48.0	68.7
2.	Baruunharaa	12.9	13.9	20.4	22.8	32.1	45.8	93.2	93.2
3.	Ulaanbaatar	6.4	10.0	12.8	15.3	15.3	15.3	51.7	62.1
4.	Maanyt	9.1	16.3	19.0	23.1	29.9	35.0	62.5	65.6

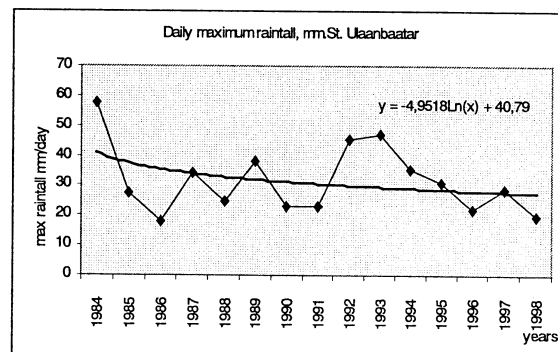
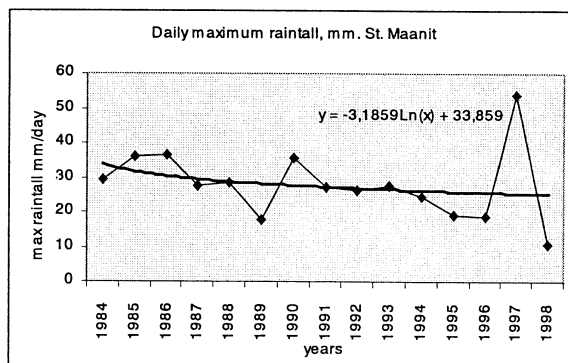
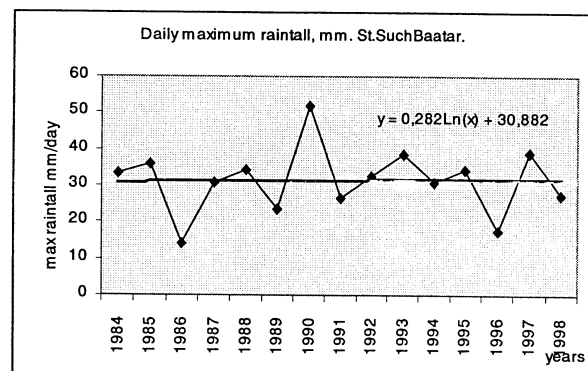
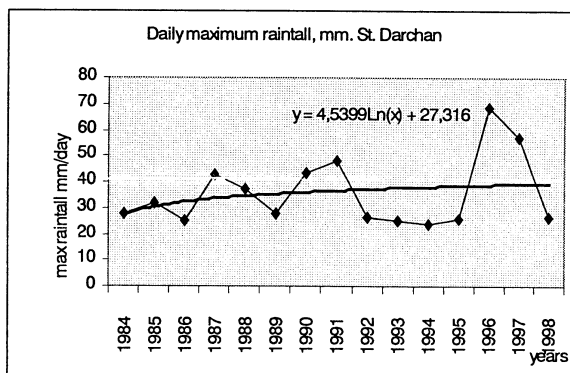
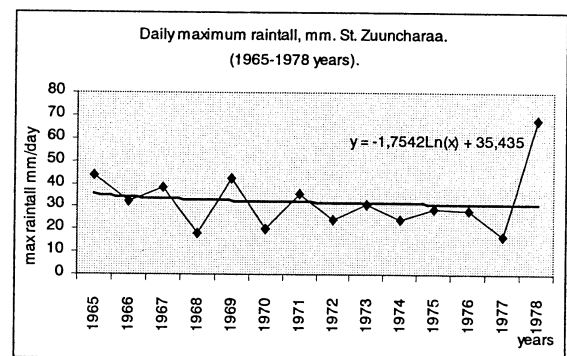
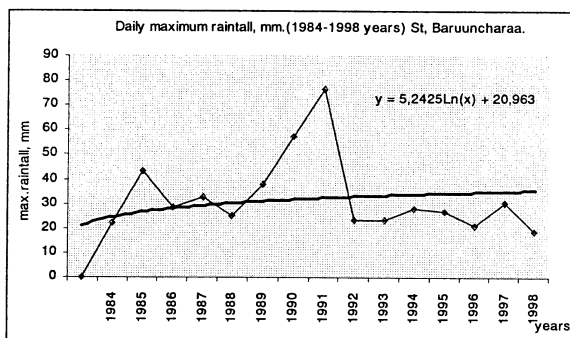
9. Maximum Minutely Precipitation (1961-1998)

UNIT : mm/min.

No.	Station	May	Jun.	Jul.	Aug.	Sep.	Annual
1.	Sukhebaatar	0.08	0.25	0.82	0.58	0.05	0.82
2.	Darkhan	0.70	1.68	1.05	1.72	0.80	1.72
3.	Baruunharaa	0.27	0.46	1.85	0.70	0.29	1.85
4.	Ulaanbaatar	0.13	1.12	1.28	1.00	0.40	1.28
5.	Buyant-Uhaa	0.05	0.43	0.43	0.23	0.33	0.45
6.	Maanyt	0.15	0.58	1.22	1.12	0.41	1.22

10. Maximum Dairy Precipitation for Various Recurrence Intervals

Station \ Year	Maximum Dairy Precipitation for Various Recurrence Intervals [mm/day]					
	100	50	20	10	5	2
Sukhebaatar	65	51	49	44	38	32
Darkhan	75	70	60	43	40	31
Baruunharaa	80	75	55	41	39	26
Zuunharaa	70	65	45	42	40	31
Ulaanbaatar	80	75	63	47	38	29
Maanyt	64	60	55	42	36	29



11. Average Wind Velocity (1961-1998)

UNIT : m/s

No.	Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1	Sukhebaatar	1.0	1.3	1.6	2.7	2.5	2.0	1.4	1.4	1.4	1.4	1.2	0.9	1.6
2	Darkhan	0.7	0.9	1.6	2.6	2.9	2.5	1.9	1.4	2.0	1.9	1.6	1.1	1.8
3	Baruunharaa	1.6	1.6	2.2	2.9	3.1	2.5	1.8	1.9	2.2	2.0	1.8	1.6	2.1
4	Zuunharaa	0.7	1.2	1.4	2.4	2.5	2.0	1.5	1.5	1.6	1.4	1.2	0.8	1.5
5	Ulaanbaatar	1.4	2.0	2.7	3.5	3.6	3.2	2.8	2.6	2.6	2.4	1.8	1.5	2.5
6	Buyant-Uhaa	0.7	1.2	2.4	3.8	4.0	3.6	3.0	2.5	2.6	2.1	1.3	0.9	2.3
7	Maanyt	2.6	3.0	3.4	4.6	4.9	4.3	3.7	3.3	3.3	3.2	2.7	2.5	3.5

12. Maximum Wind Velocity (1961-1998)

UNIT : m/s

No.	Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual /Day
1	Sukhebaatar	16	14	18	24	24	18	18	24	16	18	16	16	24
	Year	1967	1975	1991	1998	1993	1991	1992	1974	1993	1976	1993	1976	1974.8.13
2	Darkhan	14	20	14	20	24	18	14	20	18	23	14	21	24
	Year	1988	1992	1990	1992	1985	1990	1996	1993	1989	1991	1993	1989	1985.5.5.
3	Baruunharaa	18	18	20	24	24	18	16	16	18	17	18	18	24
	Year	1966	1968	1964	1988	1990	1979	1989	1968	1967	1971	1965	1992	1990.5.15.
4	Ulaanbaatar	18	30	19	24	20	18	15	14	16	18	16	20	30
	Year	1988	1998	1981	1986	1983	1984	1982	1995	1983	1993	1989	1997	1998.2.29.
5	Buyant-Uhaa	12	14	20	28	20	40	20	17	17	17	17	13	40
	Year	1990	1998	1975	1972	1986	1949	1976	1983	1987	1987	1991	1996	1949.6.20.
6	Maanyt	18	17	20	24	18	20	16	20	16	18	18	24	24
	Year	1995	1968	1967	1968	1994	1990	1989	1965	1993	1976	1976	1965	1968.4.21.

13. Average Humidity (1961-1998)

UNIT : %

No.	Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
1	Sukhebaatar	76	73	62	48	47	57	67	68	66	65	72	76	65
2	Darkhan	84	81	69	51	49	62	73	76	72	69	77	83	70
3	Baruunharaa	77	75	63	49	46	56	65	67	64	63	70	77	64
4	Zuunharaa	79	77	67	54	51	61	71	73	70	70	73	79	69
5	Ulaanbaatar	77	72	61	51	47	55	63	65	62	61	70	77	63
6	Buyant-Uhaa	80	77	64	54	50	59	69	71	68	67	77	81	67
7	Maanyt	77	74	65	54	50	58	66	68	64	63	73	78	66

14. Average Discharge and Discharge for Various Recurrence Intervals in Normal Times

No.	River – Position	Period (Year)	River Basin		Average (m ³ /s)	Standard (m ³ /s)	Discharge for Various Recurrence Intervals (m ³ /s)				
			Area (km ²)	Average Altitude (m)			100 Year	20 Year	10 Year	4 Year	2 Year
1	Selenge – Hutag Vil.	24	69800	1909	140	142	325	243	208	161	126
2	Selenge – Sukhebaatar	13	281700	1316	348	439	608	587	560	481	348
3	Orhon – Orhon /Bulgan Pre.	53	23600	1900	46.8	46.8	98.5	79.8	70.0	55	42.8
4	Tuul – Ulaanbaatar	53	6300	1852	28	28.3	70	66.8	53.8	36.5	23.5
5	Haraa – Baruunharaa	45	9580	1331	10.5	10.5	33	23.1	18.8	13.2	8.89
6	Haraa – Darkhan	7	11928	-	18.3	15.4	-	-	-	-	-
7	Yeroo – Dulaanhaan	13	2930	969	2.09	-	8.1	5.48	4.36	2.87	1.74

15. Average Discharge and Discharge for Various Recurrence Intervals in Rainy Season

UNIT : m³/s

No.	River – Position	Maximum		Average (m ³ /s)	Discharge for Various Recurrence Intervals (m ³ /s)				
		Q (m ³ /s)	Year		1000 Year	100 Year	50 Year	20 Year	10 Year
1	Selenge – Hutag Vil.	2200	1986	746	4050	2640	2220	1760	1425
2	Orhon – Orhon /Bulgan Pre.	562	1965	292	1066	855	738	678	593
3	Tuul – Ulaanbaatar	1580	1966	374	3450	2000	1600	1160	862
4	Haraa – Baruunharaa	245	1966	89.1	716	402	332	230	182
5	Yeroo – Dulaanhaan	350	1983	225	1950	1140	930	684	526

16. Average Discharge and Discharge for Various Recurrence Intervals in Snowmelt Season

UNIT : m³/s

No.	River – Position	Maximum		Average (m ³ /s)	Discharge for Various Recurrence Intervals (m ³ /s)				
		Q (m ³ /s)	Year		1000 Year	100 Year	50 Year	20 Year	10 Year
1	Selenge – Hutag Vil.	794	1966	408	1700	1200	1050	860	730
2	Orhon – Orhon /Bulgan Pre.	873	1951	131	940	560	360	290	260
3	Tuul – Ulaanbaatar	424	1991	95.2	900	480	370	260	195
4	Haraa – Baruunharaa	227	1985	27.5	240	140	110	80	62
5	Yeroo – Dulaanhaan	227	1985	121	1950	1140	930	684	526

5-2 Soundness Analysis (Slope Stability)

① 8pk10

General Condition	L=95m A=3,800m ²	H=26m Clearance to Slope : 3.0m	i=30°
Slope Classification	I II III IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of Slope	Crack/Joint : Downward, Upward, Others Overhang : Yes (L, M, S), NO Weathering : Yes (L, M, S), NO Loose Boulders : Yes (L, M, S), NO Talus(Scree) : Yes (L, M, S), NO		
Others	Relocation of Telecom. : Yes (000m), NO Cable Visibility for Driver : Good, Bad		

② 9pk2

General Condition	L=65m A=1,800m ²	H=18m Clearance to Slope : 4.6 ~5.1m	i=50°
Slope Classification	I II III IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of Slope	Crack/Joint : Downward, Upward, Others Overhang : Yes (L, M, S), NO Weathering : Yes (L, M, S), NO Loose Boulders : Yes (L, M, S), NO Talus(Scree) : Yes (L, M, S), NO		
Others	Relocation of Telecom. : Yes (000m), NO Cable Visibility for Driver : Good, Bad		

③ 9pk4

General Condition	L=125m A=3,700m ²	H=25m Clearance to Slope : 3.5 ~4.1m	i=45°
Slope Classification	I II III IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of Slope	Crack/Joint : Downward, Upward, Others Overhang : Yes (L, M, S), NO Weathering : Yes (L, M, S), NO Loose Boulders : Yes (L, M, S), NO Talus(Scree) : Yes (L, M, S), NO		
Others	Relocation of Telecom. : Yes (000m), NO Cable Visibility for Driver : Good, Bad		

④ 10pk7

General Condition	L=100m A=2,500m ²	H=23m Clearance to Slope : 4.0 ~5.2m	i=60°
Slope Classification	I II III IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of Slope	Crack/Joint : Downward, Upward, Others Overhang : Yes (L, M, S), NO Weathering : Yes (L, M, S), NO Loose Boulders : Yes (L, M, S), NO Talus(Scree) : Yes (L, M, S), NO		
Others	Relocation of Telecom. : Yes (000m), NO Cable Visibility for Driver : Good, Bad		

⑤ 10pk9

General Condition	L=75m A=1,900m ²	H=18m Clearance to Slope : 3.7 ~6.0m	i=60°
Slope Classification	I II III IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of Slope	Crack/Joint : Downward, Upward, Others Overhang : Yes (L, M, S), NO Weathering : Yes (L, M, S), NO Loose Boulders : Yes (L, M, S), NO Talus(Scree) : Yes (L, M, S), NO		
Others	Relocation of Telecom. : Yes (000m), NO Cable Visibility for Driver : Good, Bad		

⑥ 12pk1

General Condition	L=95m A=3,500m ²	H=21m Clearance to Slope : 2.8 ~4.0m	i=40°
Slope Classification	I II III IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of Slope	Crack/Joint : Downward, Upward, Others Overhang : Yes (L, M, S), NO Weathering : Yes (L, M, S), NO Loose Boulders : Yes (L, M, S), NO Talus(Scree) : Yes (L, M, S), NO		
Others	Relocation of Telecom. : Yes (120m), NO Cable Visibility for Driver : Good, Bad		

H:Huge, L:Large, M:Medium, S:Small

⑦ 13pk3

General Condition	L=175m A=7,000m ²	H=26m Clearance to Slope : 2.9 ~3.6m	i=45°
Slope Classification	I II III IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of Slope	Crack/Joint Overhang Weathering Loose Boulders Talus(Scree)	Downward, Upward, Others Yes (L, M, S), NO Yes (L, M, S), NO Yes (L, M, S), NO Yes (L, M, S), NO	
Others	Relocation of Telecom. Cable Visibility for Driver	Yes (120m), NO Good, Bad	

⑧ 14pk8

General Condition	L=110m A=2,400m ²	H=20m Clearance to Slope : 5.4m	i=70°
Slope Classification	I II III IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of Slope	Crack/Joint Overhang Weathering Loose Boulders Talus(Scree)	:Downward, Upward, Others :Yes (L, M, S), NO :Yes (L, M, S), NO :Yes (L, M, S), NO :Yes (L, M, S), NO	
Others	Relocation of Telecom. :Yes(000m), NO Cable Visibility for Driver :Good, Bad		

⑨ 17pk5

General Condition	L=90m A=2,200m ²	H=20m Clearance to Slope : 5.0 ~6.0m	i=45°
Slope Classification	I II III IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of Slope	Crack/Joint Overhang Weathering Loose Boulders Talus(Scree)	:Downward, Upward :Yes (L, M, S) :Yes (L, M, S) :Yes (L, M, S) :Yes (L, M, S)	Others NO NO NO NO
Others	Relocation of Telecom. Cable Visibility for Driver	:Yes(000m), Good	NO Bad

⑩ 18pk1

General Condition	L=80m A=3,200m ²	H=27m Clearance to Slope : 4.0 ~6.0m	i=64°
Slope Classification	I II III IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of Slope	Crack/Joint Overhang Weathering Loose Boulders Talus(Scree)	Downward, Upward, Others :Yes (L, M, S) NO :Yes (L, M, S) NO :Yes (L, M, S) NO :Yes (L, M, S) NO	
Others	Relocation of Telecom. Cable Visibility for Driver	:Yes (000m), NO Good, Bad	

⑪ 18pk10

General Condition	L=115m A=6,000m ²	H=45m Clearance to Slope : 4.5 ~5.0m	i=58°
Slope Classification	I II III IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of Slope	Crack/Joint Overhang Weathering Loose Boulders Talus(Scree)	:Downward, Upward, Others :Yes (L, M, S), NO :Yes (L, M, S), NO :Yes (L, M, S) NO :Yes (L, M, S), NO	
Others	Relocation of Telecom. :Yes(000m), NO Cable Visibility for Driver : Good, Bad		

⑫ 51pk8

General Condition	L=65m A=1,900m ²	H=19m Clearance to Slope : 3.0 ~3.5m	i=40°		
Slope Classification	I	II	III	IV	V
Sort of Rock	Sedimentary rocks, Igneous rocks, Others				
Condition of Slope	Crack/Joint	: Downward, Upward, Others			
	Overhang	: Yes (L, M, S), NO			
	Weathering	: Yes (L, M, S), NO			
	Loose Boulders	: Yes (L, M, S), NO			
	Talus(Scree)	: Yes (L, M, S), NO			
Others	Relocation of Telecom. Cable	: Yes (000m), NO			
	Visibility for Driver	: Good, Bad			

H:Huge, L:Large, M:Medium, S:Small

⑬ 52pk3

General Condition	L=120m	H=15m	i=55°		
	A=2,400m ²	Clearance to Slope : 3.5	~7.0m		
Slope Classification	I	II	III	IV	V
Sort of Rock	Sedimentary rocks, Igneous rocks, Others				
Condition of Slope	Crack/Joint	: Downward, Upward, Others			
	Overhang	: Yes (L, M, S) NO			
	Weathering	: Yes (L, M, S), NO			
	Loose Boulders	: Yes (L, M, S), NO			
	Talus(Scree)	: Yes (L, M, S), NO			
Others	Relocation of Telecom. Cable	: Yes (000m), NO			
	Visibility for Driver	: Good, Bad			

⑭ 52pk10

General Condition	L=35m	H=10m	i=53°		
	A=420m ²	Clearance to Slope : 4.0m			
Slope Classification	I	II	III	IV	V
Sort of Rock	Sedimentary rocks, Igneous rocks, Others				
Condition of Slope	Crack/Joint	: Downward, Upward, Others			
	Overhang	: Yes (L, M, S) NO			
	Weathering	: Yes (L, M, S) NO			
	Loose Boulders	: Yes (L, M, S) NO			
	Talus(Scree)	: Yes (L, M, S) NO			
Others	Relocation of Telecom.	: Yes (000m), NO			
	Cable				
	Visibility for Driver	Good Bad			

⑮ 54pk2

General Condition	L=140m	H=30m	i=36°		
	A=7,000m ²	Clearance to Slope : 3.0 ~5.0m			
Slope Classification	I	II	III	IV	V
Sort of Rock	Sedimentary rocks, Igneous rocks, Others				
Condition of Slope	Crack/Joint	: Downward, Upward, Others			
	Overhang	: Yes (L, M, S) NO			
	Weathering	: Yes (L, M, S), NO			
	Loose Boulders	: Yes (L, M, S), NO			
	Talus(Scree)	: Yes (L, M, S), NO			
Others	Relocation of Telecom. : Yes(000m), NO Cable Visibility for Driver : Good, Bad				

⑯ 57pk8

General Condition	L=145m	H=28m	i=38°		
	A=6,500m ²	Clearance to Slope : 3.0		~4.0m	
Slope Classification	I	II	III	IV	V
Sort of Rock	Sedimentary rocks, Igneous rocks, Others				
Condition of Slope	Crack/Joint	Downward, Upward, Others			
	Overhang	Yes (L, M, S), NO			
	Weathering	Yes (L, M, S), NO			
	Loose Boulders	Yes (L, M, S), NO			
	Talus(Scree)	Yes (L, M, S), NO			
Others	Relocation of Telecom.	: Yes(000m), NO			
	Cable				
	Visibility for Driver	: Good, Bad			

⑰ 61pk9

General Condition	L=180m	H=20m	i=27°		
	A=5,400m ²	Clearance to Slope : 2.0		~3.5m	
Slope Classification	I	II	III	IV	V
Sort of Rock	Sedimentary rocks, Igneous rocks, Others				
Condition of Slope	Crack/Joint	: Downward, Upward, Others			
	Overhang	Yes (L, M, S), NO			
	Weathering	Yes (L, M, S), NO			
	Loose Boulders	Yes (L, M, S), NO			
	Talus(Scree)	Yes (L, M, S), NO			
Others	Relocation of Telecom.	: Yes (000m), NO			
	Cable				
	Visibility for Driver	Good, Bad			

⑱ 250pk7

General Condition	L=170m	H=30m	i=50°		
	A=6,800m ²	Clearance to Slope : 4.8			~3.5m
Slope Classification	I	II	III	IV	V
Sort of Rock	Sedimentary rocks, Igneous rocks, Others				
Condition of Slope	Crack/Joint	Downward, Upward, Others			
	Overhang	Yes (L, M, S), NO			
	Weathering	Yes (L, M, S), NO			
	Loose Boulders	Yes (L, M, S) NO			
	Talus(Scree)	Yes (L, M, S), NO			
Others	Relocation of Telecom.	Yes(000m),			NO
	Cable				
	Visibility for Driver	Good, Bad			

H:Huge, L:Large, M:Medium, S:Small

⑪ 267pk3

General	L=160m	H=30m	i=35°
Condition	A=8,000m ²	Clearance to Slope : 3.3 ~4.5m	
Slope	I	II	III
Classification	IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of	Crack/Joint	: Downward, Upward, Others	
Slope	Overhang	: Yes (H, M, S), NO	
	Weathering	: Yes (L, M, S), NO	
	Loose Boulders	: Yes (L, M, S), NO	
	Talus(Scree)	: Yes (L, M, S), NO	
Others	Relocation of Telecom. : Yes (180m), NO		
	Cable		
	Visibility for Driver	: Good, Bad	

H:Huge, L:Large, M:Medium, S:Small

⑫ 283pk9

General	L=380m	H=40m	i=35°
Condition	A=15,000m ²	Clearance to Slope : 8.0 ~9.0m	
Slope	I	II	III
Classification	IV V		
Sort of Rock	Sedimentary rocks, Igneous rocks, Others		
Condition of	Crack/Joint	: Downward, Upward, Others	
Slope	Overhang	: Yes (H, M, S), NO	
	Weathering	: Yes (L, M, S), NO	
	Loose Boulders	: Yes (L, M, S), NO	
	Talus(Scree)	: Yes (L, M, S), NO	
Others	Relocation of Telecom. : Yes (400m), NO		
	Cable		
	Visibility for Driver	: Good, Bad	

5-3 Soundness Analysis (bridge)

①235PK3+5

	Superstructure													
	Main Girder						Overhanging Slab							
Reinforced Concrete Exposure	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Isolation	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Leakage of Water	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Omission Dropping	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Fissility	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Crack	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Janke	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Check Hammer	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No

	Substructure													
	Abutment						Pier							
Reinforced Concrete Exposure	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Isolation	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Leakage of Water	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Omission Dropping	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Fissility	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Crack	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Janka	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Check Hammer	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Frost Heave	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Scour	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No

②245PK10

	Superstructure			
	Main Girder		Overhanging Slab	
Reinforced Concrete Exposure	Yes (L M S)	No	Yes (L M S)	No
Isolation	Yes (L M S)	No	Yes (L M S)	No
Leakage of Water	Yes (L M S)	No	Yes (L M S)	No
Omission Dropping	Yes (L M S)	No	Yes (L M S)	No
Fissility	Yes (L M S)	No	Yes (L M S)	No
Crack	Yes (L M S)	No	Yes (L M S)	No
Janka	Yes (L M S)	No	Yes (L M S)	No
Check Hammer	Yes (L M S)	No	Yes (L M S)	No

	Substructure											
	Abutment			Pier								
Reinforced Concrete Exposure	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Isolation	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Leakage of Water	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Omission Dropping	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Fixtality	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Crack	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Janka	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Check Hammer	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Frost Heave	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Scour	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No

③255PK3

	Superstructure											
	Main Girder						Overhanging Slab					
Reinforced Concrete Exposure	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Isolation	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Leakage of Water	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Omission Dropping	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Fissility	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Crack	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Janka	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Check Hammer	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No

	Substructure													
	Abutment			Pier										
Reinforced Concrete Exposure	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Isolation	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Leakage of Water	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Omission Dropping	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Fissility	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Crack	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Janka	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Check Hammer	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Frost Heave	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Scour	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No

④285PK1

	Superstructure											
	Main Girder						Overhanging Slab					
Reinforced Concrete Exposure	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Isolation	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Leakage of Water	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Omission Dropping	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Fissility	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Crack	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Janka	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No
Check Hammer	Yes	(	L	M	S)	No	Yes	(	L	M	S)	No

	Substructure													
	Abutment						Pier							
Reinforced Concrete Exposure	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Isolation	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Leakage of Water	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Omission Dropping	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Fissility	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Crack	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Janka	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Check Hammer	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Frost Heave	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No
Scour	Yes	(	L	M	S	)	No	Yes	(	L	M	S	)	No

⑤289PK1

	Superstructure			
	Main Girder		Overhanging Slab	
Reinforced Concrete Exposure	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Isolation	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Leakage of Water	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Omission Dropping	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Fissility	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Crack	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Janka	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Check Hammer	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No

	Substructure			
	Abutment		Pier	
Reinforced Concrete Exposure	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Isolation	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Leakage of Water	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Omission Dropping	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Fissility	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Crack	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Janka	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Check Hammer	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Frost Heave	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Scour	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No

⑦338PK10

	Superstructure			
	Main Girder		Overhanging Slab	
Reinforced Concrete Exposure	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Isolation	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Leakage of Water	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Omission Dropping	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Fissility	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Crack	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Janka	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Check Hammer	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No

	Substructure	
	Abutment	
Reinforced Concrete Exposure	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Isolation	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Leakage of Water	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Omission Dropping	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Fissility	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Crack	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Janka	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Check Hammer	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Frost Heave	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Scour	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No

⑥334PK3

	Superstructure			
	Main Girder		Overhanging Slab	
Reinforced Concrete Exposure	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Isolation	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Leakage of Water	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Omission Dropping	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Fissility	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Crack	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Janka	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Check Hammer	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No

	Substructure			
	Abutment		Pier	
Reinforced Concrete Exposure	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Isolation	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Leakage of Water	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Omission Dropping	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Fissility	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Crack	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Janka	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Check Hammer	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Frost Heave	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Scour	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No

⑧344PK1

	Superstructure			
	Main Girder		Overhanging Slab	
Reinforced Concrete Exposure	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Isolation	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Leakage of Water	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Omission Dropping	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Fissility	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Crack	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Janka	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Check Hammer	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No

	Substructure	
	Abutment	
Reinforced Concrete Exposure	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Isolation	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Leakage of Water	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Omission Dropping	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Fissility	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Crack	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Janka	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Check Hammer	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Frost Heave	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No
Scour	Yes (<input type="checkbox"/> L <input checked="" type="checkbox"/> M <input type="checkbox"/> S)	No

⑨349PK10

	Superstructure			
	Main Girder		Overhanging Slab	
Reinforced Concrete Exposure	Yes (L M S)	No	Yes (L M S)	No
Isolation	Yes (L M S)	No	Yes (L M S)	No
Leakage of Water	Yes (L M S)	No	Yes (L M S)	No
Omission Dropping	Yes (L M S)	No	Yes (L M S)	No
Fissility	Yes (L M S)	No	Yes (L M S)	No
Crack	Yes (L M S)	No	Yes (L M S)	No
Janka	Yes (L M S)	No	Yes (L M S)	No
Check Hammer	Yes (L M S)	No	Yes (L M S)	No

	Substructure			
	Abutment		Pier	
Reinforced Concrete Exposure	Yes (L M S)	No	Yes (L M S)	No
Isolation	Yes (L M S)	No	Yes (L M S)	No
Leakage of Water	Yes (L M S)	No	Yes (L M S)	No
Omission Dropping	Yes (L M S)	No	Yes (L M S)	No
Fissility	Yes (L M S)	No	Yes (L M S)	No
Crack	Yes (L M S)	No	Yes (L M S)	No
Janka	Yes (L M S)	No	Yes (L M S)	No
Check Hammer	Yes (L M S)	No	Yes (L M S)	No
Frost Heave	Yes (L M S)	No	Yes (L M S)	No
Scour	Yes (L M S)	No	Yes (L M S)	No

⑩356PK1

	Superstructure			
	Main Girder		Overhanging Slab	
Reinforced Concrete Exposure	Yes (L M S)	No	Yes (L M S)	No
Isolation	Yes (L M S)	No	Yes (L M S)	No
Leakage of Water	Yes (L M S)	No	Yes (L M S)	No
Omission Dropping	Yes (L M S)	No	Yes (L M S)	No
Fissility	Yes (L M S)	No	Yes (L M S)	No
Crack	Yes (L M S)	No	Yes (L M S)	No
Janka	Yes (L M S)	No	Yes (L M S)	No
Check Hammer	Yes (L M S)	No	Yes (L M S)	No

	Substructure			
	Abutment		Pier	
Reinforced Concrete Exposure	Yes (L M S)	No	Yes (L M S)	No
Isolation	Yes (L M S)	No	Yes (L M S)	No
Leakage of Water	Yes (L M S)	No	Yes (L M S)	No
Omission Dropping	Yes (L M S)	No	Yes (L M S)	No
Fissility	Yes (L M S)	No	Yes (L M S)	No
Crack	Yes (L M S)	No	Yes (L M S)	No
Janka	Yes (L M S)	No	Yes (L M S)	No
Check Hammer	Yes (L M S)	No	Yes (L M S)	No
Frost Heave	Yes (L M S)	No	Yes (L M S)	No
Scour	Yes (L M S)	No	Yes (L M S)	No

⑪438PK7

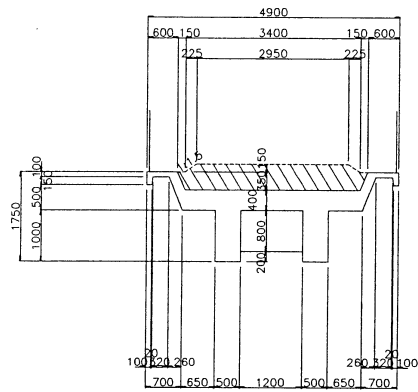
	Superstructure			
	Main Girder		Overhanging Slab	
Reinforced Concrete Exposure	Yes (L M S)	No	Yes (L M S)	No
Isolation	Yes (L M S)	No	Yes (L M S)	No
Leakage of Water	Yes (L M S)	No	Yes (L M S)	No
Omission Dropping	Yes (L M S)	No	Yes (L M S)	No
Fissility	Yes (L M S)	No	Yes (L M S)	No
Crack	Yes (L M S)	No	Yes (L M S)	No
Janka	Yes (L M S)	No	Yes (L M S)	No
Check Hammer	Yes (L M S)	No	Yes (L M S)	No

	Substructure			
	Abutment		Pier	
Reinforced Concrete Exposure	Yes (L M S)	No	Yes (L M S)	No
Isolation	Yes (L M S)	No	Yes (L M S)	No
Leakage of Water	Yes (L M S)	No	Yes (L M S)	No
Omission Dropping	Yes (L M S)	No	Yes (L M S)	No
Fissility	Yes (L M S)	No	Yes (L M S)	No
Crack	Yes (L M S)	No	Yes (L M S)	No
Janka	Yes (L M S)	No	Yes (L M S)	No
Check Hammer	Yes (L M S)	No	Yes (L M S)	No
Frost Heave	Yes (L M S)	No	Yes (L M S)	No
Scour	Yes (L M S)	No	Yes (L M S)	No

5-4 Basic Design (Bridge)

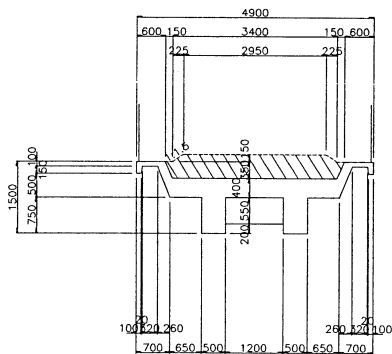
1) Bridge beam Section

①. 2 3 5 p k 3 + 5 ②. 2 4 5 p k 1 0 ④. 2 8 5 p k 1 (Upper Beam Repair)



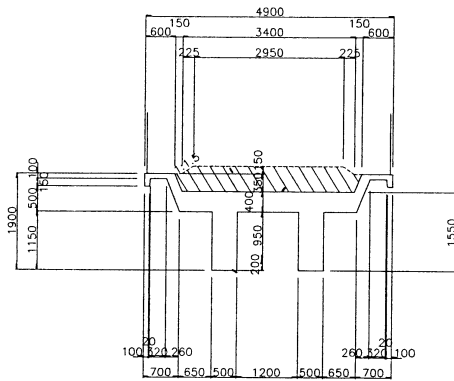
Section in bridge of current state

③. 2 5 5 p k 3 ⑩. 3 5 6 p k 1 0 (Upper Beam Repair)

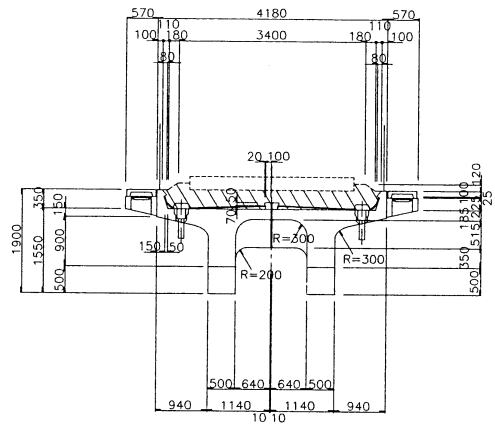


Section in bridge of current state

⑤. 2 8 9 p k 1 (Replacement of Beam)



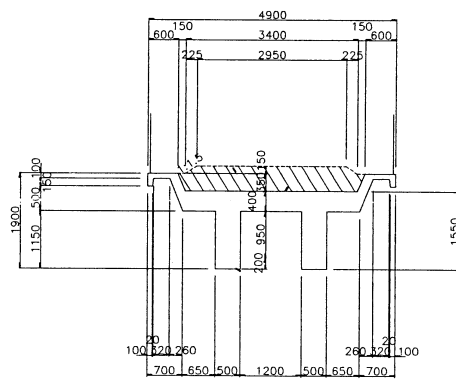
Section in bridge of current state



Section in bridge of replacement

⑥. 3 3 4 p k 3 (Upper Beam Repair)

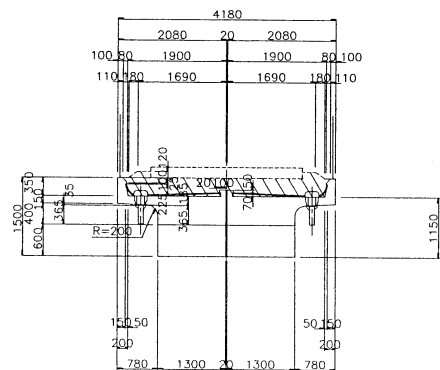
Section in bridge of current state

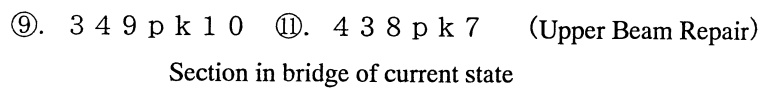


⑦. 3 3 8 p k 1 0 ⑧. 3 4 4 p k 1 (Replacement)

Section in bridge of current state

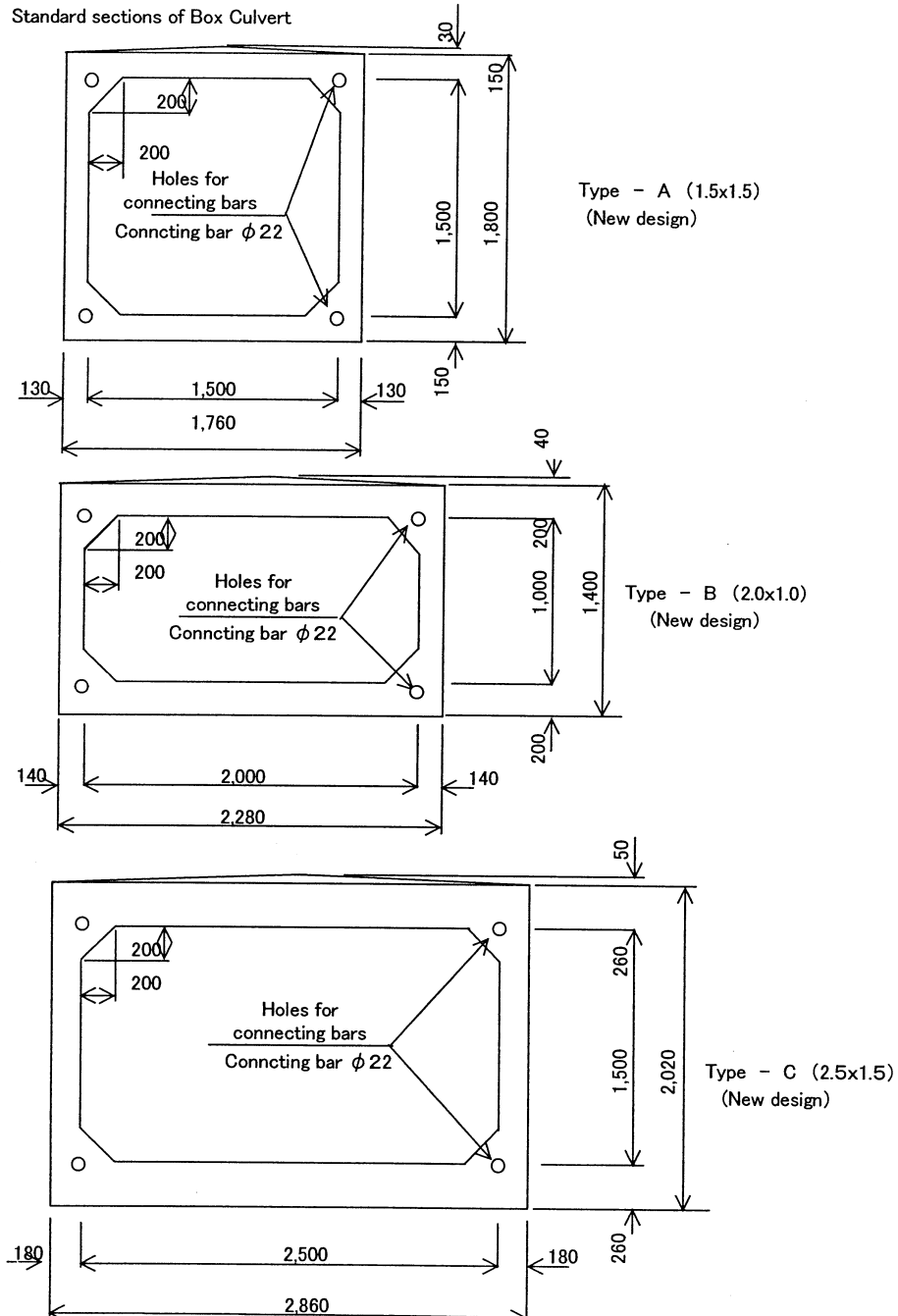
Section in bridge of replacement

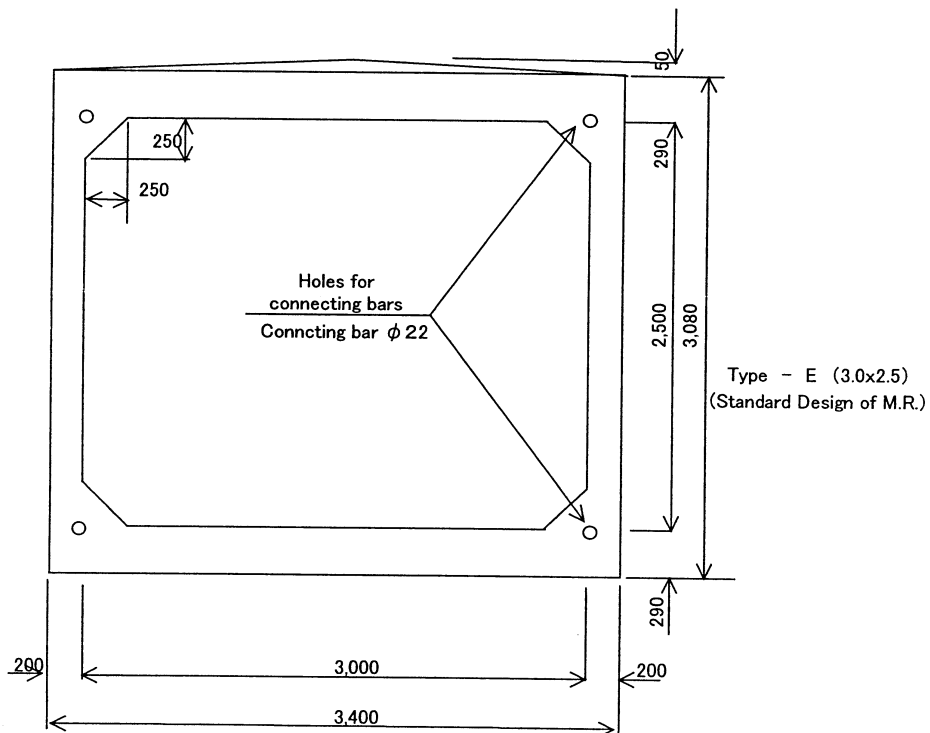
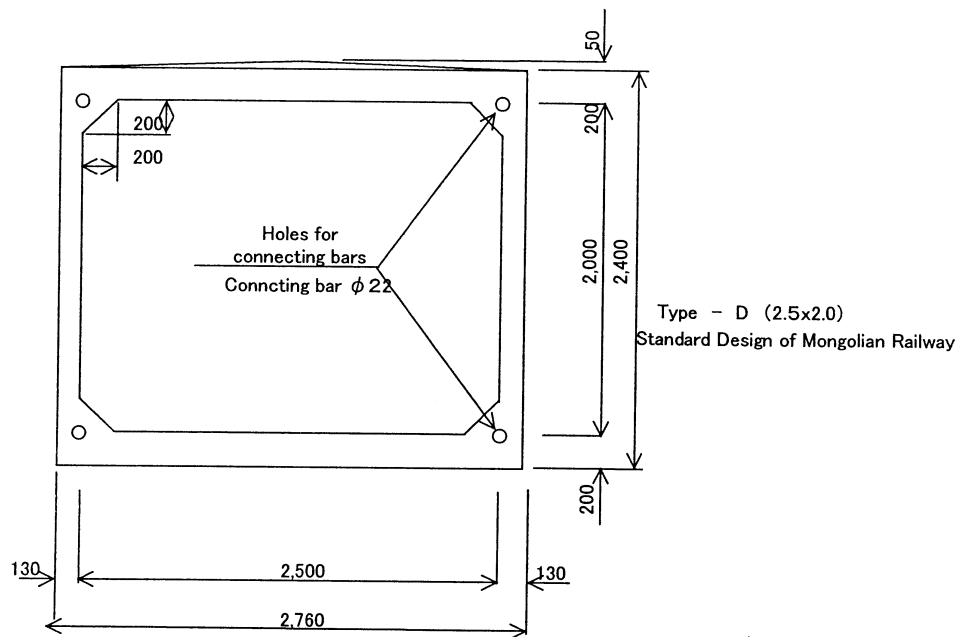




5-5 Basic Design (Drainage)

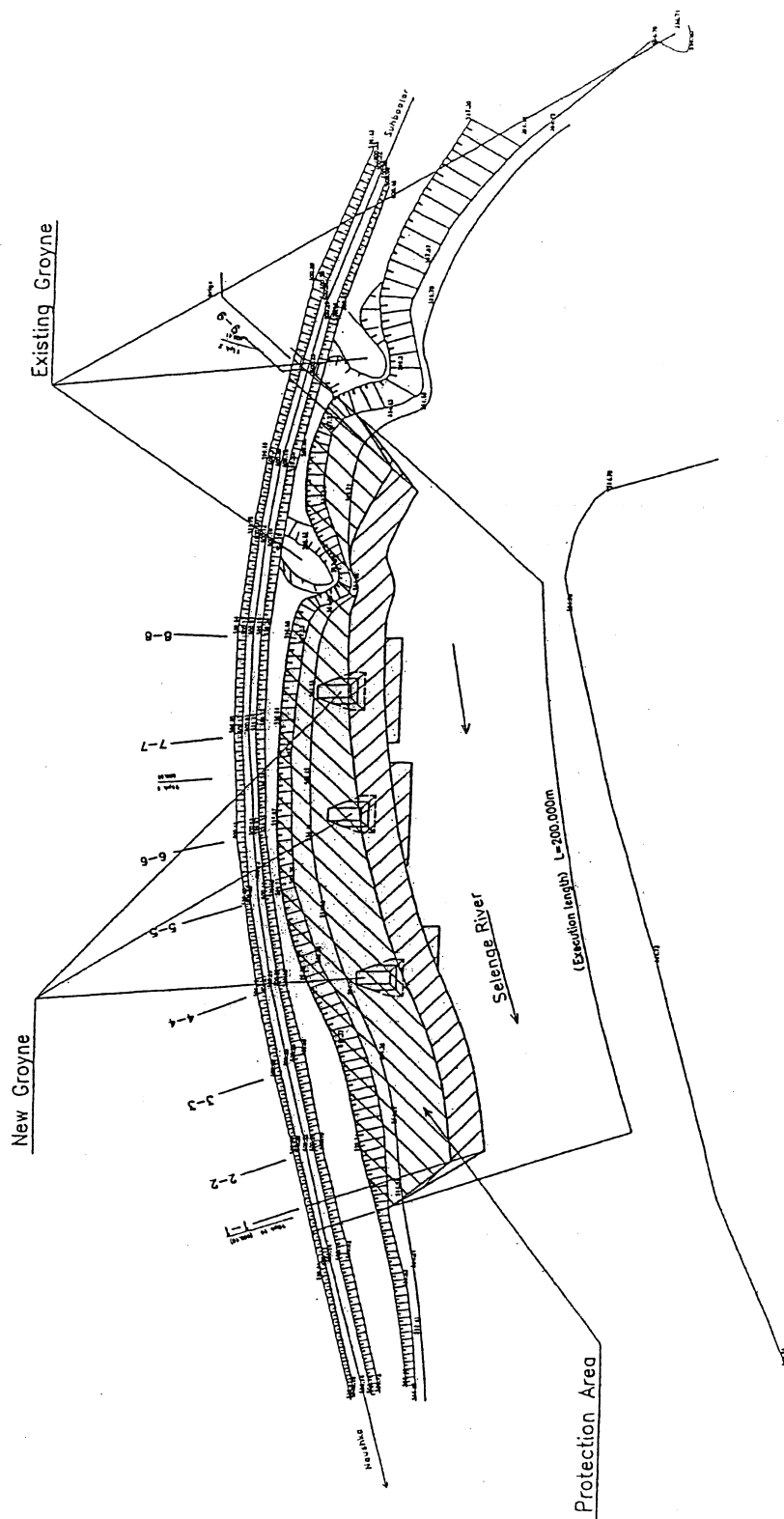
Standard sections of Box Culvert

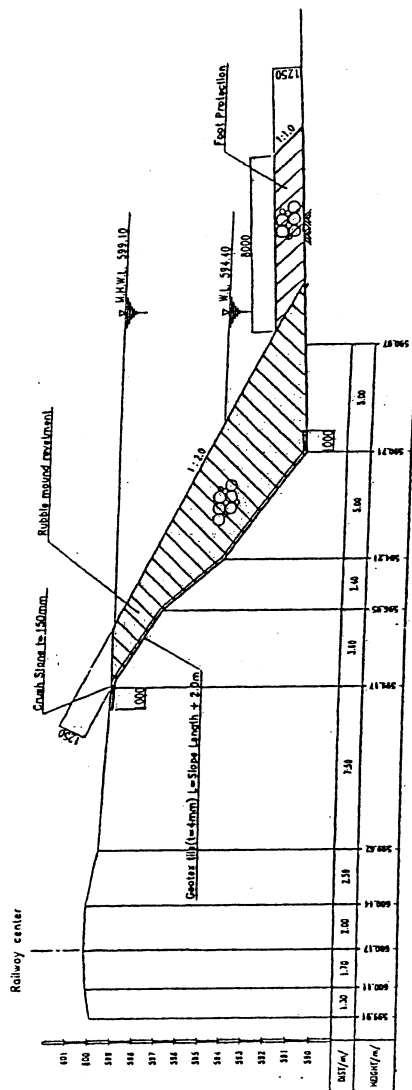




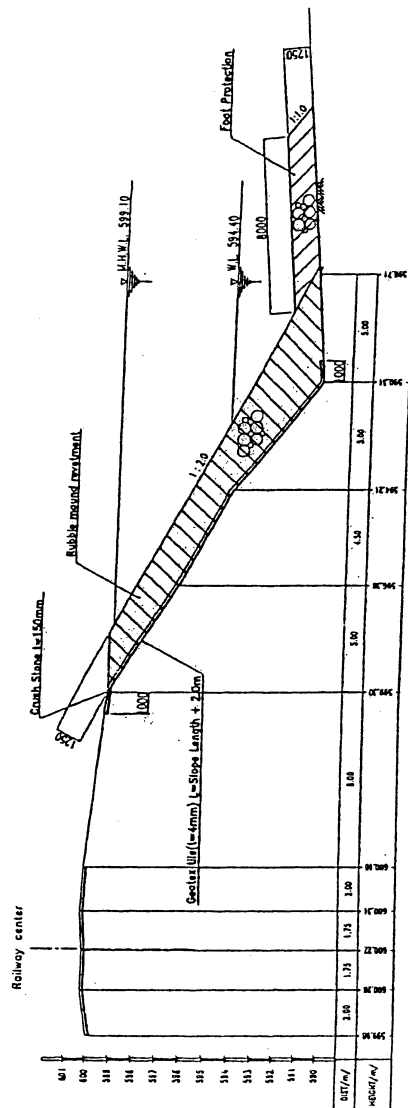
Basic Design on the Project for Rehabilitation of Highway Facilities			
Drawing Title	Project	Scale	No.
River Bank Protection	102K10-1003	1:1000	1/7
JAPAN INTERNATIONAL COOPERATION AGENCY			
PACIFIC CONSULTANTS INTERNATIONAL (PCI)			
TONICHI ENGINEERING CONSULTANTS, INC.			

(Location 10 pk 10) PLAN SCALE 1:1000





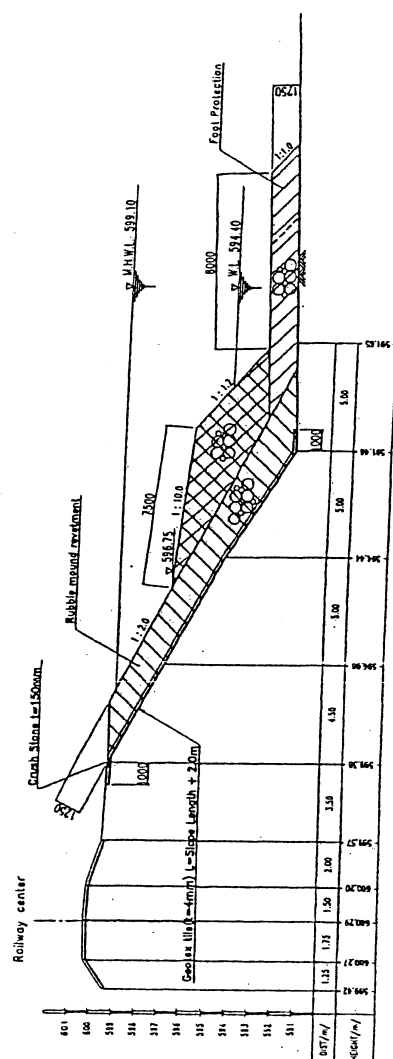
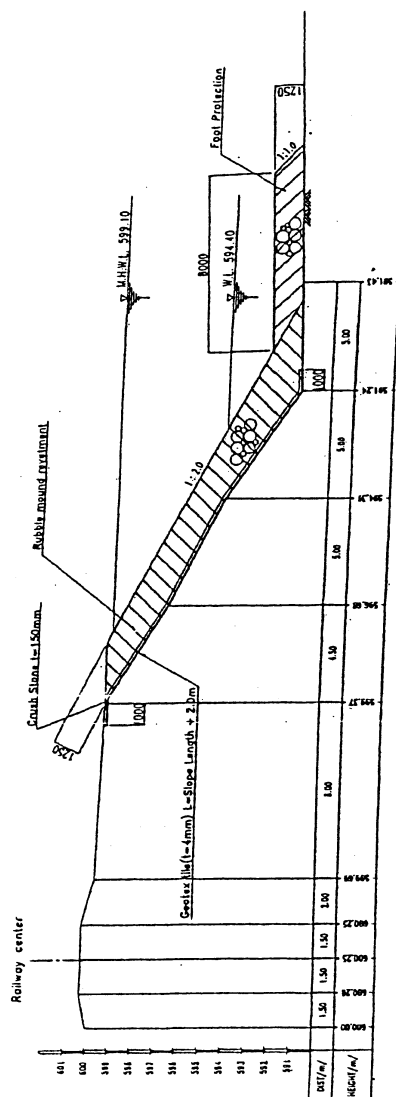
Section 1-1



Section 2-2

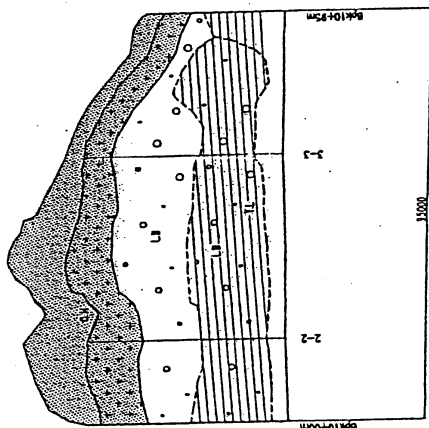
(Location 10 pk 10) CROSS SECTION SCALE 1:200

Basic Design on the Project for Rehabilitation of Railway Facilities			
Project Title	Basic Design on the Project for Rehabilitation of Railway Facilities	Scale	1:200
Project No.	10PK10-302	Sheet	2/7
JAPAN INTERNATIONAL COOPERATION AGENCY PACIFIC CONSULTANTS INTERNATIONAL (PCI) TONKIN ENGINEERING CONSULTANTS INC.			

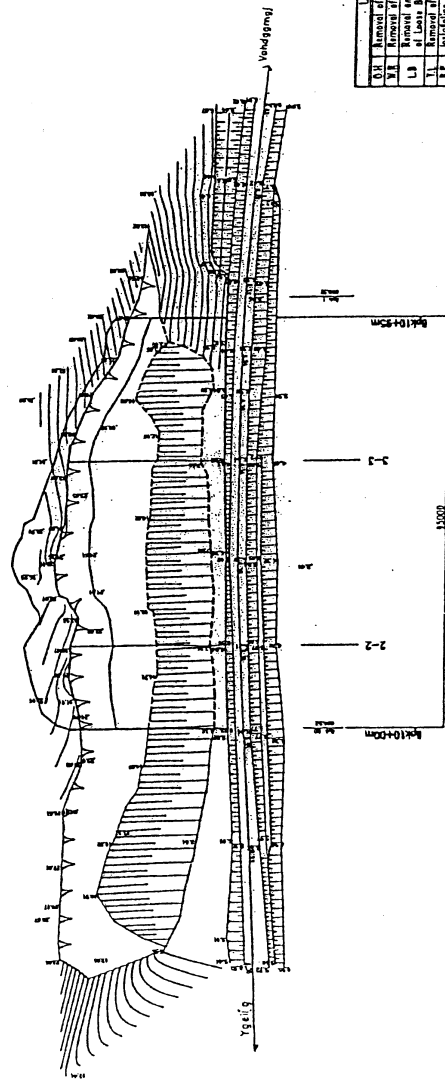


(Location 10 pk 10) CROSS SECTION

Basic Design for the Project for Rehabilitation of Railway Facilities	
Working Title	Scale
River Bank Protection	1:2000
JAPAN INTERNATIONAL COOPERATION AGENCY PACIFIC CONSULTANTS INTERNATIONAL (P.C.I.) TOMIUCHI ENGINEERING CONSULTANTS (INC.)	
	3/77

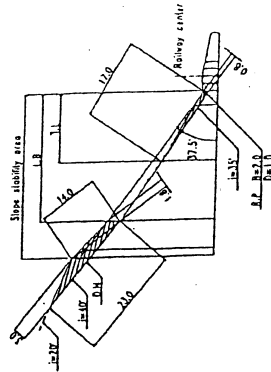


Front View

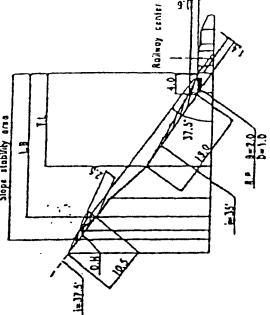


PLAN

(Location 8pk 10) SCALE 1:1000



SECTION 2-2



SECTION 3-3

0.1	Removal of boulders
0.2	Removal of weathered rock
0.3	Removal of soil and strengthening of loose boulders
0.4	Removal of debris (gravel)
0.5	Removal of debris (rock fragments)
0.6	Removal of debris (rock fragments)
0.7	Removal of debris (rock fragments)

Basic Design on the Project for Rehabilitation of Railway Facilities			
Project Title	Slope Stability	Scale	1:1000
Project No.	PK10	Sheet	4/7
JAPAN INTERNATIONAL COOPERATION AGENCY PACIFIC CONSULTANTS INTERNATIONAL (PCI) TUNUCHI ENGINEERING CONSULTANTS			

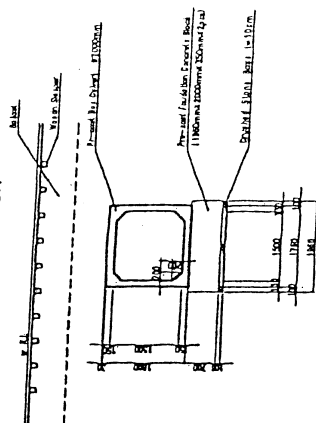
Side View

Cross Section $s=1/100$

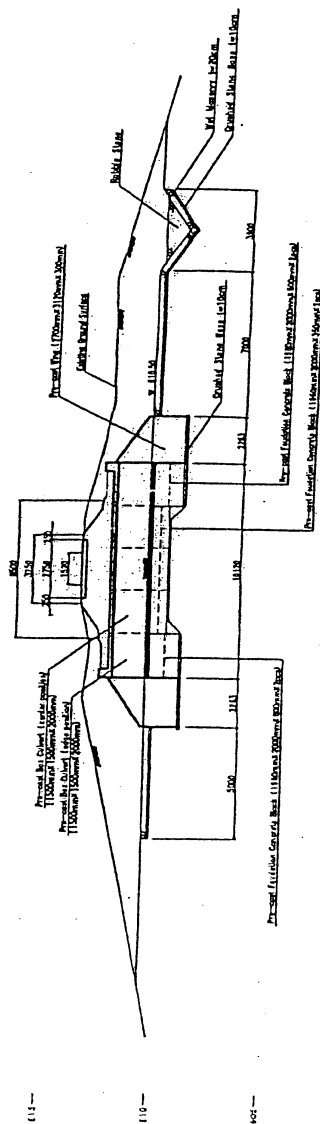
Plan 3-1/200

Drawn Title	Date	No.
Basic Design on the Project for Rehabilitation of Railway Facilities	13.06.1980	5/7

Cross Section



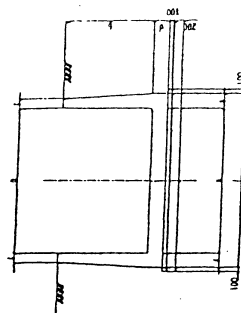
Side View



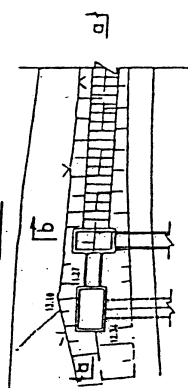
Basic Data on the Target for Evaluation of Heavy Fuel Oil									
Source Title	Dynamics Fuel Oil		Form	4					
	31PK3		1350.1300	6/7					
JAPAN INTERNATIONAL COOPERATION AGENCY PACIFIC CONSULTANTS INTERNATIONAL (PCI)									

[illegible]

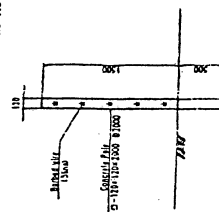
Cross section



Structural detail of part A
scale 1:500



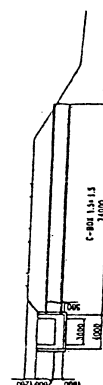
Structural detail of Fence
scale 1:50



	a	b	c	d	V _{Nl} : mm
TYP B	700	700	700	700	700
TYP C	800	900	1000	1100	1200
TYP D	900	1000	1100	1200	1300
TYP E	1000	1100	1200	1300	1400
TYP F	1100	1200	1300	1400	1500
TYP G	1200	1300	1400	1500	1600
TYP H	1300	1400	1500	1600	1700
TYP I	1400	1500	1600	1700	1800
TYP J	1500	1600	1700	1800	1900
TYP K	1600	1700	1800	1900	2000
TYP L	1700	1800	1900	2000	2100
TYP M	1800	1900	2000	2100	2200
TYP N	1900	2000	2100	2200	2300
TYP O	2000	2100	2200	2300	2400
TYP P	2100	2200	2300	2400	2500
TYP Q	2200	2300	2400	2500	2600
TYP R	2300	2400	2500	2600	2700
TYP S	2400	2500	2600	2700	2800
TYP T	2500	2600	2700	2800	2900
TYP U	2600	2700	2800	2900	3000
TYP V	2700	2800	2900	3000	3100
TYP W	2800	2900	3000	3100	3200
TYP X	2900	3000	3100	3200	3300
TYP Y	3000	3100	3200	3300	3400
TYP Z	3100	3200	3300	3400	3500

[illegible]

9-19



Drawing Title	Scale	Date	Sheet
Rehabilitation Station Drainage	1:3000	13.06.00	7/7

JAVAN INTERNATIONAL COOPERATION AGENCY
PACIFIC CONSULTANTS INTERNATIONAL (P) LTD.
TUNISI ENGINEERING CONSULTANTS INC.