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Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

**FEASIBILITY STUDY
ON
REHABILITATION AND MAINTENANCE
OF
BRIDGES ALONG ARTERIAL ROADS**

**FINAL REPORT
VOLUME III
(APPENDIX)**

JUNE, 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

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Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

**FEASIBILITY STUDY
ON
REHABILITATION AND MAINTENANCE
OF
BRIDGES ALONG ARTERIAL ROADS**

**FINAL REPORT
VOLUME III
(APPENDIX)**

JUNE, 1989

JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団

19503

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APPENDIX 1

1.1 MINUTES OF DISCUSSION



MINUTES OF DISCUSSION

INITIAL JOINT MEETING BETWEEN THE JICA ADVISORY
COMMITTEE, STUDY TEAM AND THE DPWH STEERING COMMITTEE REGARDING
THE IMPLEMENTATION OF THE FEASIBILITY STUDY OF THE
REHABILITATION AND MAINTENANCE OF BRIDGES ALONG ARTERIAL ROADS

1.0 The Japanese Mission (hereinafter called as the Mission) composed of members of the JICA Advisory Committee, headed by Mr. F. Takahashi, as representative of the committee, visited the Philippines from December 8 to December 15, 1987 for the purpose of coordinating and to initiate the actual conduct of the feasibility study for the Rehabilitation and Maintenance of Bridges along Arterial Roads.

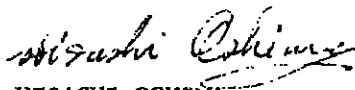
2.0 For the above purpose, a joint meeting between the Mission, the Japanese Study Team and the DPWH Steering Committee was held on December 10, 1987. Agenda of meeting is shown in Annex A while the list of the participants is shown in Annex B.

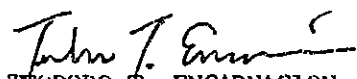
3.0 After a series of discussions, the DPWH and the Japanese Study Team agreed to and the Mission concurred in the following:

3.1 The Inception Report (20 copies) submitted by the JICA for the above mentioned Study was in general accepted.

3.2 In so far as the Government of the Philippines inputs to the Study as indicated in the agreed Implementing Arrangement are concerned, the DPWH panel assured the Mission that the DPWH will endeavor to provide all the services and support as may be required in the conduct of the Study.

Signed on December 11, 1987 in Manila, Philippines.


HISASHI OSHIMA
Team Leader
Japanese Study Team


TEODORO T. ENCARNACION
Undersecretary
as Chairman of the DPWH Steering
Committee



Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
Bonifacio Drive, Port Area, Manila

ANNEX - A

FEASIBILITY STUDY OF THE REHABILITATION AND MAINTENANCE
OF BRIDGES ALONG ARTERIAL ROADS

AGENDA FOR THE INITIAL JOINT MEETING OF THE DPWH
STEERING COMMITTEE, JICA ADVISORY COMMITTEE AND STUDY TEAM

December 10, 1987 - 9:00 A.M.

Conference Room, Office of Undersecretary T. Encarnacion
DPWH, Bonifacio Dr, Manila

1. Opening Remarks and Introduction of the DPWH Steering Committee Members : Chairman of the DPWH Steering Committee
2. Response and Introduction of the JICA Advisory Committee Mission Members and Japanese Study Team Members : Head of the JICA Advisory Committee
3. Explanation of the Inception Report : Team Leader of the Japanese Study Team
4. Discussion on the Inception Report
5. Other Matters



Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
Bonifacio Drive, Port Area, Manila

ANNEX - B

INITIAL JOINT MEETING BETWEEN THE JICA ADVISORY
COMMITTEE AND STUDY TEAM AND THE DPWH STEERING COMMITTEE
FEASIBILITY STUDY OF THE REHABILITATION AND MAINTENANCE
OF BRIDGES ALONG ARTERIAL ROADS

December 10, 1987

List of Participants

JICA Advisory Committee

- | | |
|--------------------------|-------------------------|
| 1. Mr. Fumio Takahashi | Head of the Mission |
| 2. Mr. Tadashi Yoshihara | Member of the Mission |
| 3. Mr. Koji Mori | Coordinator, JICA Tokyo |

DPWH Steering Committee

- | | |
|--|----------|
| 1. Undersecretary Teodoro T. Encarnacion | Chairman |
| 2. Asst. Secretary Manuel M. Bonoan | Member |
| 3. Director Francisco N. Pascual | Member |
| 4. Director Edmundo Ilir | Member |
| 5. Director Rodolfo Rosales | Member |
| 6. Proj. Director Jose Salvador | Member |

JICA Study Team Members

- | | |
|-----------------------------|--------------------|
| 1. Mr. Hisashi Oshima | Team Leader |
| 2. Mr. Koji Enomoto | Deputy Team Leader |
| 3. Mr. Masahisa Tsuchihashi | Team Member |
| 4. Mr. Yuhsuke Doi | Team Member |
| 5. Mr. Masami Takahashi | Team Member |

Other Participants

- | | |
|---------------------------|------------------------------------|
| 1. Mr. Koji Kaminaga | First Secretary, Embassy of Japan |
| 2. Mr. Katsuhiko Ozawa | Coordinator, JICA Philippines |
| 3. Mr. Toshiyuki Nakamura | JICA Adviser, DPWH |
| 4. Mr. Jose P. Gloria | Project Engineer II, PMO-FS, DPWH |
| 5. Mr. Geronimo S. Alonzo | Chief Civil Engineer, PMO-FS, DPWH |

H. O.

J



MINUTES OF DISCUSSION

SECOND JOINT MEETING BETWEEN THE JAPANESE
STUDY TEAM AND THE DPWH STEERING COMMITTEE
REGARDING THE IMPLEMENTATION OF THE FEASIBILITY STUDY ON
REHABILITATION AND MAINTENANCE OF BRIDGES ALONG ARTERIAL ROADS

- 1.0 For the purpose of discussing the Summary of Progress Report of the Feasibility Study on Rehabilitation and Maintenance of Bridges along Arterial Roads, a joint meeting between the Japanese Study Team and the DPWH Steering Committee was held on March 21, 1988. The agenda of the meeting is shown in Annex A while the list of the participants is in Annex B.
- 2.0 After a series of discussions, the following points were agreed upon between the DPWH and Japanese Study Team.
 - 2.1 The Summary of Progress Report submitted by the Study Team for the above mentioned Study was in general accepted.
 - 2.2 Of the 742 bridges inspected along Manila North Road (Malinta, Bulacan-Laoag City Section) and Pan-Philippine Highway (Allacapan, Cagayan-Lilban, Leyte Section), 52 bridges were selected as high priority for immediate rehabilitation based on the following criteria; i) Technical, ii) Traffic Volume, and iii) Socio-Economic Aspects.
 - 2.3 Preliminary design will be done on 22 bridges out of the 52 priority bridges and 5 bridges will be subjected to detailed surveys during the Phase II of the Study.
 - 2.4 The DPWH panel assured the Study Team that the DPWH will continue to provide all the services and support as may be required for the next phase of the Study.

Signed on March 21, 1988 in Manila, Philippines.

Hisashi Oshima
HISASHI OSHIMA
Team Leader
Japanese Study Team

Teodoro T. Encarnacion
TEODORO T. ENCARNACION
Undersecretary
As Chairman of the DPWH
Steering Committee



Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
Bonifacio Drive, Port Area, Manila

A N N E X A

THE FEASIBILITY STUDY

ON

REHABILITATION AND MAINTENANCE OF BRIDGES ALONG ARTERIAL ROADS

AGENDA FOR THE JOINT MEETING BETWEEN DPWH STEERING COMMITTEE
AND JICA STUDY TEAM

MARCH 21, 1988 9:30 AM

CONFERENCE ROOM, OFFICE OF UNDERSECRETARY T. ENCARNACION
DPWH, BONIFACIO DRIVE, MANILA

1. OPENING REMARKS AND INTRODUCTION OF DPWH STEERING COMMITTEE MEMBERS : CHAIRMAN OF THE DPWH STEERING COMMITTEE
2. EXPLANATION OF THE STATUS AND SUMMARY OF PROGRESS OF THE STUDY : TEAM LEADER OF THE JAPANESE STUDY TEAM
3. DISCUSSION ON THE SUMMARY OF PROGRESS REPORT
4. OTHER MATTERS

H.O.



Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
Bonifacio Drive, Port Area, Manila

A N N E X B

SECOND JOINT MEETING BETWEEN THE JAPANESE STUDY TEAM AND
THE DPWH STEERING COMMITTEE REGARDING THE FEASIBILITY STUDY ON
REHABILITATION AND MAINTENANCE OF BRIDGES ALONG ARTERIAL ROADS

March 21, 1988

LIST OF PARTICIPANTS

DPWH STEERING COMMITTEE

1. Mr. Teodoro T. Encarnacion - Chairman
2. Mr. Manuel M. Bonoan - Member
3. Mr. Francisco N. Pascual - Member
(represented by Mr. C. Rodriguez)
4. Mr. Edmundo Mir - Member
5. Mr. Rodolfo Rosales - Member
6. Mr. Jose Salvador - Member
7. Mr. Toshiyuki Nakamura - Member

JAPANESE STUDY TEAM

1. Mr. Hisashi Ohshima - Team Leader
2. Mr. Koji Enomoto - Deputy Team Leader
Bridge Engineer A
(Superstructure)
3. Mr. Masahisa Tsuchihashi - Bridge Engineer A
(Substructure)
4. Mr. Yuhsuke Doi - Bridge Engineer B
(Substructure)
5. Mr. Masami Takahashi - Bridge Engineer B
(Substructure)

OTHER PARTICIPANTS

1. Mr. Katshuhiko Ozawa - Coordinator, JICA
Philippines
2. Mr. Geronimo S. Alonzo - Chief Civil Engineer
PMO-FS, DPWH
3. Mr. Edwin Matanguihan - Supervising C.E. I
Bureau of Public Works, DPWH



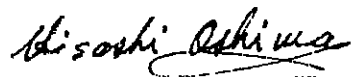
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DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

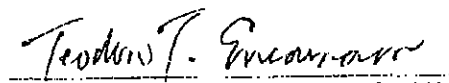
MINUTES OF DISCUSSION

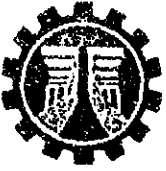
THIRD JOINT MEETING BETWEEN THE JAPANESE
STUDY TEAM AND THE DPWH STEERING COMMITTEE
REGARDING THE IMPLEMENTATION OF THE FEASIBILITY STUDY ON
REHABILITATION AND MAINTENANCE OF BRIDGES ALONG ARTERIAL ROADS

- 1.0 For the purpose of discussing the Progress Report of the Feasibility Study on Rehabilitation and Maintenance of Bridges along Arterial Roads, a joint meeting between the Japanese Study Team and the DPWH Steering Committee was held on June 6, 1988. The agenda of the meeting is shown in Annex A while the list of the participants is in Annex B.
- 2.0 After a series of discussions, the following points were agreed upon between the DPWH and Japanese Study Team.
 - 2.1 The twenty (20) copies of the Progress Report for the above mentioned Study were submitted by the Japanese Study Team in accordance with the Implementing Arrangement on the Technical Cooperation, and the Progress Report submitted was in general accepted.
 - 2.2 Preliminary design will be done on 22 representative bridges for immediate rehabilitation out of the 52 bridges and 5 bridges will be subjected to detailed surveys during Phase I of the Study.
 - 2.3 The DPWH panel assured the Japanese Study Team that the DPWH will continue to provide all the services and support as may be required for the Phase II of the Study.

Signed on June 6, 1988 in Manila, Philippines.


HISASHI OHSUIMA
Team Leader
Japanese Study Team


TEODORO T. ENCARNACION
Undersecretary
As Chairman of the DPWH
Steering Committee



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

A N N E X A

THE FEASIBILITY STUDY
ON
REHABILITATION AND MAINTENANCE OF BRIDGES ALONG ARTERIAL ROADS
AGENDA FOR THE JOINT MEETING BETWEEN DPWH STEERING COMMITTEE
AND JAPANESE STUDY TEAM

JUNE 6, 1988 9:00 AM

CONFERENCE ROOM, OFFICE OF UNDERSECRETARY T. ENCARNACION
DPWH, BONIFACIO DRIVE, MANILA

1. OPENING REMARKS AND INTRODUCTION OF DPWH STEERING COMMITTEE MEMBERS : CHAIRMAN OF THE DPWH STEERING COMMITTEE
2. EXPLANATION OF THE STATUS AND PROGRESS OF THE STUDY : TEAM LEADER OF THE JAPANESE TEAM STUDY TEAM
3. DISCUSSION ON THE PROGRESS REPORT
4. OTHER MATTERS

H.O.

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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

A N N E X B

THIRD JOINT MEETING BETWEEN THE JAPANESE STUDY TEAM AND
THE DPWH STEERING COMMITTEE REGARDING THE FEASIBILITY STUDY ON
REHABILITATION AND MAINTENANCE OF BRIDGES ALONG ARTERIAL ROADS

JUNE 6, 1988

LIST OF PARTICIPANTS

DPWH STEERING COMMITTEE

1. Mr. Teodoro T. Encarnacion - Chairman
2. Mr. Manuel M. Bonoan - Member
3. Mr. Francisco N. Pascual - Member
4. Mr. Edmundo Mir - Member
5. Mr. Leonardo A. Nunez - Member
(represented by Mr. Victor Tisbe)
6. Mr. Jose Salvador - Member
7. Mr. Toshiyuki Nakamura - Member

JAPANESE STUDY TEAM

1. Mr. Hisashi Ohshima - Team Leader
2. Mr. Koji Enomoto - Deputy Team Leader
Bridge Engineer A
(Superstructure)
3. Mr. Masahisa Tsuchihashi - Bridge Engineer A
(Substructure)
4. Mr. Masami Takahashi - Bridge Engineer B
(Substructure)
5. Mr. Yasushi Shimano - Hydrologist

OTHER PARTICIPANT

1. Mr. Geronimo S. Alonzo - Chief Civil Engineer
PMO-FS, DPWH

U.D.



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

MINUTES OF DISCUSSION

FOURTH JOINT MEETING BETWEEN THE JICA ADVISORY COMMITTEE,
STUDY TEAM AND THE DPWH STEERING COMMITTEE REGARDING THE
IMPLEMENTATION OF THE FEASIBILITY STUDY ON THE REHABILITATION
AND MAINTENANCE OF BRIDGES ALONG ARTERIAL ROADS

- 1.0 The JICA Advisory Mission (hereinafter called as the Mission) headed by MR. MINORU FUJIWARA visited the Philippines from November 15 - 20, 1988 to review and discuss with the officials of the Department of Public Works and Highways (hereinafter called as DPWH Panel), the Interim Report submitted by the Study Team on the Feasibility Study of the Rehabilitation and Maintenance of Bridges Along Arterial Roads.
- 2.0 For the above purpose, a joint meeting between the JICA Advisory Committee, JICA Study Team and the DPWH panel was held on November 17, 1988. The agenda of meeting is shown in Annex A and the list of participants is shown in Annex B.
- 3.0 After a series of discussion, the DPWH Panel and the Study Team agreed and the Mission concurred on the following:
 - 3.1 The Interim Report (20 Copies) submitted by the JICA Study Team was in principle agreed and accepted.
 - 3.2 The 52 bridges proposed by the JICA Study Team as the bridges for inclusion under the bridge rehabilitation program were accepted by the DPWH panel.
 - 3.3 It was also accepted that the classification of the 52 bridges into three categories are as follows: 1) 12 bridges for new construction, 2) 13 bridges for reconstruction of superstructure and 3) 27 bridges for repairs.
 - 3.4 The basis for estimating the approximate construction/rehabilitation cost of the 52 bridges based on preliminary design of representative bridges were technically acceptable.
 - 3.5 The methods adopted for the economic evaluation and the system of bridge data base were in general accepted by the DPWH Panel.

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3.6 The DPWH will endeavor to provide all the services and support as may be required for the next phase of the study.

Signed on November 17, 1988 in Manila, Philippines.

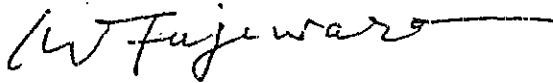


HISASHI OSHIMA
Team Leader
JICA Study Team



TEODORO T. ENCARNACION
Undersecretary
As Chairman of the DPWH
Steering Committee

Witnessed:



MINURO FUJIWARA
Chairman
JICA Advisory Committee

H.O.

M.F.



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

ANNEX - A

THE FEASIBILITY STUDY
ON
THE REHABILITATION AND MAINTENANCE
OF
BRIDGES ALONG THE ARTERIAL ROADS
AGENDA FOR THE FOURTH JOINT MEETING BETWEEN
DPWH STEERING COMMITTEE, JICA ADVISORY COMMITTEE
AND JICA STUDY TEAM

November 17, 1988 9:00 AM

Conference Room, Office of Undersecretary T. Encarnacion
DPWH, Bonifacio Drive, Manila

1. OPENING REMARKS AND INTRODUCTION OF DPWH STEERING COMMITTEE MEMBERS : CHAIRMAN OF THE DPWH STEERING COMMITTEE
2. RESPONSE AND INTRODUCTION OF THE JICA ADVISORY COMMITTEE MISSION MEMBERS AND JICA STUDY TEAM MEMBERS : CHAIRMAN OF THE JICA ADVISORY COMMITTEE & TEAM LEADER OF THE JICA STUDY TEAM
3. EXPLANATION OF THE INTERIM REPORT : TEAM LEADER OF THE JICA STUDY TEAM
4. DISCUSSION ON THE INTERIM REPORT
5. OTHER MATTERS

H.O.

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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

ANNEX - B

FOURTH JOINT MEETING BETWEEN THE JICA ADVISORY COMMITTEE,
STUDY TEAM AND THE DPWH STEERING COMMITTEE REGARDING THE
FEASIBILITY STUDY ON THE REHABILITATION AND MAINTENANCE OF
BRIDGES ALONG ARTERIAL ROADS

November 17, 1988

LIST OF PARTICIPANTS

JICA ADVISORY COMMITTEE

- | | | | |
|----|-----------------------|---|--------------------------|
| 1. | Mr. MINORU FUJIWARA | - | Chairman |
| 2. | Mr. MASAACKI UEDA | - | Member |
| 3. | Mr. KEIICHI MATSUZAKI | - | Member |
| 4. | Mr. AKIRA ENDO | - | Coordinator, JICA, Tokyo |

DPWH STEERING COMMITTEE

- | | | | |
|----|----------------------------|---|----------|
| 1. | Mr. TEODORO T. ENCARNACION | - | Chairman |
| 2. | Mr. MANUEL M. BONOAN | - | Member |
| 3. | Mr. FRANCISCO N. PASCUAL | - | Member |
| 4. | Mr. EDMUNDO V. MIR | - | Member |
| 5. | Mr. LEONARDO A. NUNEZ | - | Member |
| 6. | Mr. JOSE SALVADOR | - | Member |
| 7. | Mr. HIDEO TSUJI | - | Member |

JICA STUDY TEAM

- | | | | |
|----|--------------------------|---|----------------------|
| 1. | Mr. HISASHI OSHIMA | - | Team Leader |
| 2. | Mr. KOJI ENOMOTO | - | Deputy Team Leader |
| 3. | Mr. MASAHISA TSUCHIHASHI | - | Bridge Engineer |
| 4. | Mr. TOSHIO ICHIKAWA | - | Maintenance Engineer |
| 5. | Mr. YASUHIKO KUROSAWA | - | Economist |
| 6. | Mr. NAOSHI OKAMURA | - | System Engineer |

OTHER PARTICIPANTS

- | | | | |
|----|------------------------|---|--|
| 1. | Mr. GERONIMO S. ALONZO | - | Chief Civil Engineer
PMO-FS, DPWH |
| 2. | Mr. EDWIN MATANGUIHAN | - | Supervising C.E. I
Bureau of Design, DPWH |

A.O.

J MF




REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA


MINUTES OF DISCUSSION

FIFTH JOINT MEETING BETWEEN THE JICA ADVISORY COMMITTEE
STUDY TEAM AND THE DPWH STEERING COMMITTEE REGARDING THE
IMPLEMENTATION OF THE FEASIBILITY STUDY ON THE REHABILITATION
AND MAINTENANCE OF BRIDGES ALONG ARTERIAL ROADS

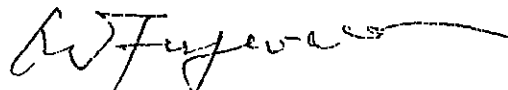
- 1.0 The JICA Advisory Mission (hereinafter called as the Mission) headed by Mr. MINORU FUJIWARA visited the Philippines from March 6-10, 1989 to review and discuss with the officials of the Department of Public Works and Highways (hereinafter called as DPWH Panel), the Draft Final Report submitted by the Study Team on the Feasibility Study of the Rehabilitation and Maintenance of Bridges along Arterial Roads.
- 2.0 For the above purpose, a joint meeting between the JICA Advisory Committee, JICA Study Team and the DPWH Panel was held on March 8, 1989. The agenda of the meeting is shown in Annex A and the list of participants is shown in Annex B.
- 3.0 After a series of discussion, the DPWH Panel and the Study Team agreed and the Mission concurred on the following:
 - 3.1 The Draft Final Report (20 copies) submitted by the JICA Study Team was in principle agreed and accepted.
 - 3.2 The Government of the Philippines will submit to the JICA its comments in writing on or before March 31, 1989 thru the JICA Manila Office.

Signed on March 8, 1989 in Manila, Philippines.


HISASHI OSHIMA
Team Leader
JICA Study Team


TEODORO T. ENCARNACION
Undersecretary
As Chairman of the DPWH
Steering Committee

Witnessed:


MINORU FUJIWARA
Chairman
JICA Advisory Committee



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

A N N E X A

THE FEASIBILITY STUDY
ON
THE REHABILITATION AND MAINTENANCE
OF
BRIDGES ALONG ARTERIAL ROADS
AGENDA FOR THE FIFTH JOINT MEETING BETWEEN
DPWH STEERING COMMITTEE, JICA ADVISORY COMMITTEE
AND JICA STUDY TEAM

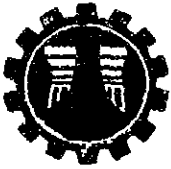
March 8, 1989 2:00 P.M.

Conference Room, Office of Asst. Secretary M. Bonoan
DPWH, Bonifacio Drive, Manila

1. OPENING REMARKS AND INTRODUCTION OF DPWH STEERING COMMITTEE MEMBERS : CHAIRMAN OF THE DPWH STEERING COMMITTEE
2. RESPONSE AND INTRODUCTION OF THE JICA ADVISORY COMMITTEE MISSION MEMBERS AND JICA STUDY TEAM MEMBERS : CHAIRMAN OF THE JICA ADVISORY COMMITTEE & TEAM LEADER OF THE JICA STUDY TEAM
3. EXPLANATION OF THE DRAFT FINAL REPORT : TEAM LEADER OF THE JICA STUDY TEAM
4. DISCUSSION ON THE DRAFT FINAL REPORT
5. OTHER MATTERS

H.O.

WF.



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

A N N E X B

FIFTH JOINT MEETING BETWEEN THE JICA ADVISORY COMMITTEE,
STUDY TEAM AND THE DPWH STEERING COMMITTEE REGARDING THE
FEASIBILITY STUDY ON THE REHABILITATION AND MAINTENANCE OF
BRIDGES ALONG ARTERIAL ROADS

March 8, 1989

LIST OF PARTICIPANTS

JICA ADVISORY COMMITTEE

1. Mr. MINORU FUJIWARA - Chairman
2. Mr. MASA AKI UEDA - Member
3. Mr. TADASHI YOSHITHARA - Member
4. Mr. TOKUKIYO HIRAI - Coordinator
JICA, Tokyo

DPWH STEERING COMMITTEE

1. Mr. TEODORO T. ENCARNACION - Chairman
2. Mr. MANUEL M. BONOAN - Member
3. Mr. FRANCISCO N. PASCUAL - Member
(Represented by Mr. Carlos V. Rodriguez)
4. Mr. LEONARDO A. NUNEZ - Member
(Represented by Mr. Manuel Llamoso)
5. Mr. JOSE SALVADOR - Member
6. Mr. HIDEO TSUJI - Member

JICA STUDY TEAM

1. Mr. HISASHI OSHIMA - Team Leader
2. Mr. KOJI ENOMOTO - Deputy Team Leader

OTHER PARTICIPANTS

1. Mr. GERONIMO S. ALONZO - Chief Civil Engineer
PMO-FS, DPWH

G.S.

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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

4 April 1989

The President
Japan International Cooperation Agency
Tokyo, Japan

Thru: The Resident Representative
JICA, Manila Office

S i r :

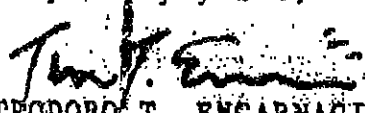
Subject: Feasibility Study on Rehabilitation and
Maintenance of Bridges Along Arterial Roads

This has reference to the agreement reached during the 5th joint meeting between the JICA Advisory Committee, the Study Team and the DPWH Steering Committee regarding the Draft Final Report for the above Study.

In this regard, may we inform you that we have thoroughly reviewed the above mentioned Report and we find it comprehensive and generally acceptable. We therefore wish to commend the Study Team for all their efforts they have made in all the stages of the Study. We only would suggest that the streams of cost and benefits by individual bridge project, in economic terms, are included in the Report.

At this point, we wish to express once more our appreciation to the JICA for its generous assistance extended to the successful completion of the Study as we look forward to the continued assistance of the JICA to our development efforts.

Very truly yours,


TEODORO T. ENCARNACION
Undersecretary

APPENDIX 1.2

LIST OF MEMBERS CONCERNED

Members of DPWH Steering Committee

Chairman	Undersecretary Teodoro T. Encarnacion	Undersecretary, DPWH
Member	Asst. Secretary Manuel M. Bonoan	Assistant Secretary, DPWH
	Director Francisco N. Pascaul	Bureau of Design, DPWH
	Director Edmundo Mir	Bureau of Construction, DPWH
	Director Rodolfo Rosales	Bureau of Maintenance, DPWH
	Proj. Director Jose Salvador	PMO-PJHL/OECF-Assisted Project
	JICA Adviser Mr. Toshiyuki Nakamura	JICA Adviser, DPWH

Member of Japan Advisory Committee (Phase I)

Chairman	M. Fujiwara	Head, Bridge Division Structure and Bridge Department PWRI, MOC
Member	F. Takahashi	Second Construction Section First Construction Division JHPC
	T. Yamamoto	Special Planning Officer Hokkaido Development Agency
	T. Yoshihara	Senior Engineer Design Division 2nd Construction Dept. Metropolitan Expressway Public Corporation

Members of Japan Advisory Committee (Phase II)

Chairman	M. Fujiwara	Head, Bridge Division Structure and Bridge Department PWRI, MOC
Member	K. Matsuzaki	First Engineering Section, First Construction Division JHPC
	M. Ueda	Special Planning Officer Planning Department Hokkaido Development Agency
	T. Yoshiraha	Senior Engineer Design Division 2nd Construction Dept. Metropolitan Expressway Public Corporation

Members of Japanese Study Team

Team leader	H. Ohshima
Bridge Engineer A (Superstructure)	K. Enomoto
Bridge Engineer A (Substructure)	M. Tsuchihashi
Bridge Engineer B (Superstructure)	Y. Doi
Bridge Engineer B (Substructure)	M. Takahashi
Maintenance Engineer	T. Ichikawa
Hydrologist	Y. Shimano
Economist	Y. Kurosawa
System Engineer	N. Okamura

REGIONAL OFFICES OF DPWH AND CHIEF OF OFFICES

REGION	LOCATION	DIRECTOR
1	San Fernando, La Union	Marcos Kabiling
2	Tuguegarao, Cagayan	Vicente Lopez
3	San Fernando, Pampanga	Jose Pendoza
4 A	Quezon City	Eduardo Lagunilla
4 B	Quezon City	Mastor Ibrahim
5	Legazpi City	Jose Regalado
6	Iloilo City	Mario Talatala
7	Cebu City	Melchor Canete
8	Tacloban City	Alfredo Torres
9	Zamboanga City	Abdulbarri Ramos
10	Cagayan de Oro City	Ernesto Silvela
11	Davao City	Wilfredo Valencia
12	Cotabato City	Jesus Camayo
NCR	Quezon City	Eugenio Manalo

Members of DPWH Counterparts

(Phase I)

Team Leader	Jose P. Gloria
Project Coordinator	Geronimo S. Alonzo
Asst. Project Coordinator	Bayani J. Lusica
Bridge Engineers	Edwin Matanguihan Rufino Valiente Norberto Gonzalbo Benigno Pauco Earl Harder
Senior Civil Engineer	Joel Surot
Traffic Engineer	Faustino Sta. Maria
Drainag/Hydrology Engineer	Magdalena Euste
Transport Economist	Aniceta Mago
General Economist	Josefina David
Cost Estimator	Maria Theresa Juan
System Analyst	
Junior Engineers	Cenmar Gara Manuel Ramilo Lualhati Bernabe Susan Maano
Economic Researchers	Lilia Naungayan Josefina Rafol Marjorie Villanueva Jeanette Guerzon
Draftsman	Graciano Bucud Rogelio Eslava Ronald Marcelino Arnel Paz Ramon Corpuz Rolita Asuncion
Typists/Wordprecessors	Jocelyn Mahusay Helen Bathan
Drivers	Romeo David Joselito Udarbe
Xerox Machine Operator	Diosdado Diego

Members of DPWH Counterparts

(Phase II)

Team Leader	Jose P. Gloria
Project Coordinator	Geronimo S. Alonzo
Bridge Engineers	Edwin Matanguihan Rufino Valiente Joel Surot Norberto Gonzalbo Benigno Pauco Earl Harder Ma. Theresa Juan
Traffic Engineer	Cesario Vicente
Drainage/Hydrology Engineer	Magdalena Euste
Transport Economist	Aniceta Mago
General Economist	Josefina David
Junior Engineers	Lualhati Bernabe Manuel Ramilo Cenmar Gara Susan Maaño Raul Tangonan Audie Pilorin Tony Yaptangco Dionisio Pascua Mabini Mariano Tony Valenzuela Rogelio Eslava Arnel Paz Hernand Dalisay Charisse Dizon
Economic Researchers	Lilia Naungayan Josefina Fafol Jeanette Guerzon

(to be continued)

(Continuation)

Draftsman

Ronald Marcelino

Antonio Palo

Ramon Corpuz

Rey Camata

Arman Dapar

Danilo Florendo

Secretary/Typist

Jocelyn Mahusay

Helen Bathan

Drivers

Romco David

Joselito Udarbe

Xerox Machine Operator

Diosdado Diego

APPENDIX 1.3

**LOCATION OF REGIONAL AND DISTRICT
ENGINEERING OFFICES,
DPWH**

LOCATION OF REGIONAL AND DISTRICT ENGINEERING OFFICES, DPWH

DISTRICT OFFICE	LOCATION
Region I	- San Fernando, La Union
- Ilocos Norte Eng'g District	- San Nicolas, Ilocos Norte
- Ilocos Sur Eng'g District	- Vigan, Ilocos Sur
- La Union Eng'g District	- San Fernando, La Union
- Pangasinan 1st Eng'g District	- Rosales, Pangasinan
- Pangasinan 2nd Eng'g District	- Alaminos, Pangasinan
Region II	- Tuguegarao, Cagayan
- Cagayan North Eng'g District	- Aparri, Cagayan
- Cagayan South Eng'g District	- Tuguegarao, Cagayan
- Isabela 1st Eng'g District	- Ilagan, Isabela
- Isabela 2nd Eng'g District	- Cauayan, Isabela
- Nueva Viscaya Eng'g District	- Bayombong, Nueva Viscaya
Region III	- San Fernando, Pampanga
- San Jose City Eng'g District	- San Jose City
- Cabanatuan City Eng'g District	- Cabanatuan City
- Nueva Ecija Eng'g District	- Talavera, Nueva Ecija
- Bulacan Eng'g District	- Malolos, Bulacan
- Tarlac Eng'g District	- Gerona, Tarlac
- Pampang Eng'g District	- San Fernando, Pampanga
Region IV-A	- Quezon City Metro Manila
- San Pablo City Eng'g District	- San Pablo City
- Laguna Eng'g District	- Sta. Cruz, Laguna
- Batangas Eng'g District	- Batangas City
- Quezon 1st Eng'g District	- Lucena City
- Quezon 2nd Eng'g District	- Catanauan, Quezon
- Lucena City Eng'g District	- Lucena City

DISCTRICT OFFICE

LOCATION

Region V

- | | |
|-----------------------------------|--------------------------|
| - Camarines Norte, Eng'g District | - Legaspi City |
| - Camarines Sur, Eng'g District | - Daet, Camarines Norte |
| - Naga City Eng'g District | - Canaman, Camarines Sur |
| - Iriga City Eng'g District | - Naga City |
| - Albay Eng'g District | - Iriga City |
| - Legazpi City Eng'g District | - Legazpi City |
| - Sorsogon Eng'g District | - Legazpi City |
| | - Sorsogon, Sorsogon |

Region VIII

- | | |
|---------------------------------|-----------------------------|
| - Northern Samar Eng'g District | - Tacloban City |
| - Samar Eng'g District | - Catarman, Northern Samar |
| - Calbayog City Eng'g District | - Catbalogan, Western Samar |
| - Tacloban City Eng'g District | - Calbayog City |
| - Leyte Eng'g District | - Tacloban City |
| - Southern Leyte Eng'g District | - Tacloban City |
| | - Maasin, Leyte |

APPENDIX 3.1

LIST OF COLLECTED DATA

LIST OF COLLECTED DATA

(1) EXISTING BRIDGE INVENTORY & AS-BUILT DRAWINGS (i)

NO.	NAME OF DATA	PUBLISHED BY:	YEAR PUBLISHED	REMARKS
1	IBRD ASSISTED Pavement and axle load study	Renardet - SA F.F. Cruz & Co. Inc, RC GAITE	Oct. 1985	-
2	Master Plan for road rehabilitation and disaster pavement project	JICA	Nov. 1985	-
3	Reconnaissance report for the improvement of long span bridges in Cagayan Valley Road and M.N.R.	Nippon Koei	Sept. 1985	-
4	Proposed master plan for rehabilitation and maintenance of Maharlika highway	Katahira Engineers Inc. Techniks Group Co-op.	May 1985	-
5	Feasibility Study of the Road Improvement Project on the Pan-Philippine Highway	JICA	June 1987	-
6	The Feasibility Study of the Road Improvement Pro- ject (Phase II) Appendix S-3 Structural Inventory	JICA	March 1982	-
7	Highway Design Guidelines	Bureau of Design	-	Highway Section
8	Proposed re-construction of Baraca Br. No.2	Region V	1987	
9	List of Bridges Manila North Road, Daang Maharlika Master File	PMO-Office	-	-
10	List of Section/Bridges Manila North, Daang Maharlika	PMO-Office	-	-
11	Road Inventory System (Master List) Manila North, Daang Maharlika	PMO-Office	-	-
12	Standard 160 - 8 Truss span 24' - 0" Roadway	Bureau of Public Works	-	-
13	240' - 0" Span thru Truss 205' - 0" Roadway	Bureau of Public Works	-	-
14	189' - 0" Span thru Truss	Bureau of Public Works	1949	-
15	160' - 8" Span thru Truss	Bureau of Public Works	1948	-

LIST OF COLLECTED DATA

(1) EXISTING BRIDGE INVENTORY AND AS-BUILT DRAWINGS (ii)

NO.	NAME OF DATA	PUBLISHED BY:	YEAR PUBLISHED	REMARKS
16	160' - 8" Span thru Truss 20' - 0" Roadway	-	-	-
17	Plaridel Bridge (Truss)	DPWH	-	-
18	Pinacananan Bridge (Truss)	DPWH	Oct. 1949	-
19	Jumbo Bridge (S.I.)	DPWH	Jan. 1984	-
20	Ipil Bridge (RCDG)	DPWH	Feb. 1984	-
21	Bailey Bridge	DPWH	-	-
22	Baretbet Bridge	Concrete Aggregates Corporation C.A.C.	Jan. 31, 1983	-
23	Baraca Bridge (S.I.B.)	DPWH	-	-
24	Barit Bypass (RCDG)	DPWH	-	-
25	Salug Daku (S.I.B.)	DPWH	-	-
26	Bauang Bridge (Pony)	DPWH	1984	-
27	Mag-ampon Bridge	DPWH	July 1982	-
28	Batu Bridge (Truss)	DPWH	Nov. 1948	-
29	Sicsican Bridge (Truss)	DPWH	-	-
30	Malalam Bridge (Truss)	DPWH	Oct. 1949	-

LIST OF COLLECTED DATA

(1) EXISTING BRIDGE INVENTORY AND AS-BUILT DRAWINGS (iii)

NO.	NAME OF DATA	PUBLISHED BY:	YEAR PUBLISHED	REMARKS
31	Babuyan Bridge (S.I.B.)	DPWH	-	-
32	Himogaan Bridge (Truss)	U.S. Public Roads Adm.	June 1949	-
33	Rugao Bridge (Truss)	DPWH	Apr. 1948	-
34	Contract No.1 DWG Vol. No.2 Structural Plan, Manila North Road	Eng'g Dev. Corp. of the Philippines (EDCOP)	1973	IBRD
35	Contract No.2 DWG Vol. No.2 Structural Plan, Manila North Road	Eng'g Dev. Corp. of the Philippines (EDCOP)	1973	IBRD
36	MNR Improvement Project (Rosario-Laoag Section) Package II-B	Nippon Koei Co., Ltd./Katahira and Engr's Techniks Group	-	OECF
37	MNR Improvement Project (Rosario-Laoag Section) Package II-A	Nippon Koei Co., Ltd./Katahira and Engr's Techniks Group	-	OECF
38	MNR Improvement Project (Rosario-Laoag Section) Package II-G	Nippon Koei Co., Ltd./Katahira and Engr's Techniks Group	-	OECF
39	MNR Improvement Project (Rosario-Laoag Section) Package II-C	Nippon Koei Co., Ltd./Katahira and Engr's Techniks Group	-	OECF
40	MNR Improvement Project (Rosario-Laoag Section) Package II-C	- do -	-	OECF
41	Soils and Materials Report (Manila North Road)	Eng'g Dev. Corp. of the Philippines (EDCOP)	-	IBRD
42	Contract No.3 DWG Vol. No.2 Structural Plan, Manila North Road	- do -	1973	IBRD
43	Repair of Plaridel Bridge Det. of Piles and Beam	Foundation Specialist	1988	DPWH Region I
44	Standard details of precast reinforcing concrete piles	DPWH (BOD)	April 1, 1982	-
45	Bored Piles (2,250 ϕ and 1,100 ϕ)	Foundation Specialist (Contractor and Consultants)	-	-

LIST OF COLLECTED DATA

(1) EXISTING BRIDGE INVENTORY AND AS-BUILT DRAWINGS (iv)

NO.	NAME OF DATA	PUBLISHED BY:	YEAR PUBLISHED	REMARKS
46	Standard RCDG (15.0 m)	DPWH	July 1975	-
47	Standard P.C. Girder Br.	DPWH	Aug. 1978	-
48	Standard RCDG (12.0 m)	DPWH	Sept. 1971	-
49	Standard RCDG (8.0 m)	R.C. GAITE	-	-
50	Standard RCDG (15.0 m)	DPWH	-	-
51	Standard S.I.B.	NIPPON KOKAN K.K.	Aug. 1, 1981	-
52	Standard R.C. Box Girder	DPWH	May 1966	-
53	Standard S.I.B.	DPWH	May 1970	-
54	Standard RCDG (10.0 m)	DPWH	Oct. 1975	-
55	Standard P.C. Girder Bridge	DPWH	Aug. 1978	-
56	Standard Bailey Bridge (36.60 m)	DPWH	July 1982	-
57	Standard PSC I-Beam	DPWH	May 1981	-
58	Standard Bailey Bridge (6-18 m)	DPWH	June 1981	-
59	Standard R.C. Sheet Pile	DPWH	-	-
60	Standard Precast Reinforced Concrete Piling (400 x 400 and 350 x 350)	DPWH	Feb. 1981	-

LIST OF COLLECTED DATA

(1) EXISTING BRIDGE INVENTORY AND AS-BUILT DRAWINGS (✓)

NO.	NAME OF DATA	PUBLISHED BY:	YEAR PUBLISHED	REMARKS
61	Standard Prestressed Concrete Pile (350 x 350 and 400 x 400)	DPWH (BOD)	-	-
62	Typical Abutment Detail	DPWH	Sept. 1982	-
63	Standard Grouted Spillways, Inlet and Spring Box	DPWH	-	-
64	Standard 2 to 6 meters R.C. Retaining Wall	DPWH	Sept. 1967	-
65	Grouted Rip-rap Protection for Slope of Embankment	DPWH	-	-
66	Stone Masonry Retaining Wall for Gravel on Rockfill Gravity Type	DPWH	-	-
67	Dry Rubble Masonry Retaining Wall	DPWH	1985	-
68	Standard 10 ft. x 10 ft. Reinforced Concrete Box Culvert Fill 50 to 60 ft.	DPWH	Oct. 1959	-
69	Standard Reinforced Concrete Culvert and Sewer Pipes	DPWH	-	-
70	Typical Abutment Details for 8.0 m RCDG Spans	DPWH	-	-
71	Standard Details of Concrete and Steel Composite Piles	DPWH	Oct. 1965	-
72	Standard Approach Slab	DPWH	-	-
73	Typical Abutment Details for 40 meters and 45 meters Span	DPWH	April 1, 1982	-

LIST OF COLLECTED DATA

(2) SOCIO-ECONOMIC DATA

NO.	NAME OF DATA	PUBLISHED BY:	YEAR PUBLISHED	REMARKS
1	Existing National Ports	Philippine Ports Authority	1986	-
2	Existing Airports	-	1986	-
3	Existing Power Plants	National Power Corporation	1986	-
4	Existing Irrigation Facility	National Irrigation Authority	1986	-
5	Motor Vehicles Registration	Bureau of Land Transportation	1986	-
6	On-going and Proposed Projects	National Economical and Development Authority	1986	-
7	Value of Agricultural Production	Bureau of Agricultural Authority	1986	-
8	Household Income by Province, 1985	National Census and Statistics Office	1986	-
9	Wages	National Wage Council Department of Labor	1986	-
10	MPWH Infrastructure Atlas 1986	MPWH	1987	-
11	MPWH C-Y 1986 Infrastructure Program	MPWH	1987	-
12	Philippine Statistical Year-Book 1987	National Economical and Development Authority	1987	-
13	Gross Regional Domestic Product	National Economical and Development Authority	1986	-
14	1985 Census of Population and Housing by Province	NSCO	1985	-
15	Philippine Power System Development Map	National Power Corporation	1987	-

LIST OF COLLECTED DATA

(3) FLOOD RECORDS AND OTHER RELEVANT DATA

NO.	NAME OF DATA	PUBLISHED BY:	YEAR PUBLISHED	REMARKS
1	MPWH Infrastructure Atlas 1986 Part.3 Water Resources	DPWH	1987	-
2	Major Rivers along Arterial Roads	-	-	-
3	Field Interview Record	-	-	-
4	Philippine Water Data	Nat'l Water Resource Council	1970,1971,1972	-
5	Philippine Water Data	- do -	Jan. 1980	-
6	Rainfall Intensity-Duration-Frequency Data of the Philippines	PAGASA	Vol.1, 1st Edition 1981	-
7	Climatological Normals/Average of the Philippines (1951-1985)	- do -	Dec. 1987	-
8	Climatological Extremes in the Philippines (up to 1986)	- do -	Jan. 1988	-
9	Nationwide Flood Control Plan and River Dredging Program	DPWH, Nippon Koei Co., Ltd., Nikken Consultant Inc. & BTMC	Vols. I, II, V Nov. 1982	-
10	Detailed Eng'g Study of the PNR's Main-Line North Rehabilitation Project	PCI, Japan Transportation, Consultants, Inc. & F.F.Cruz & Co. Inc.	May 1985.	-
11	Final Report for the Master Plan Study on the Cagayan River Basin Water Resources Development	JICA	Aug. 1987	-
12	Report for Study on Hydropower Potentials in Luzon Island	- do -	Aug. 1987	-
13	Feasibility Study Report on the Pampanga Delta Development Project	- do -	Feb. 1982	-
14	Re-Study of Mayon Volcano Sabo and Flood Control Project	- do -	Mar. 1983	-

LIST OF COLLECTED DATA

(4) TRAFFIC DATA

NO.	NAME OF DATA	PUBLISHED BY:	YEAR PUBLISHED	REMARKS
1	Highway Planning Manual (Vol. 1 - Vol. 6)	MPWH Planning & Development Office	Aug. 1981	-
2	Pavement Axle Load Study (Vol. 1 - Vol. 3)	IBRD	Oct. 1985	-
3	Traffic Volume of 1986			

LIST OF COLLECTED DATA

(5) OTHER EXISTING DATA (i)

NO.	NAME OF DATA	PUBLISHED BY:	YEAR PUBLISHED	REMARKS
1	Rainfall Intensity-Duration-Frequency of Philippine Vol. 1 First Edition	The Hydrology and Flood Forecast Center in PAGASA	1981	-
2	Climatological Normals/Averages of the Philippine (1951-1985)	National Institute of Climatology PAGASA	Dec. 1987	-
3	Fourth UNDP Road Feasibility Study, Draft Report on the Feasibility of Upgrading the Kalibo - Estancia/Carles Road, Panay Island	UNDP	Nov. 1987	-
4	Northwest Leyte Road/Improvement Project	Katahira Engineers Inc.	1987	-
5	Geological Hazard & Preparedness Systems	Philippine Institute of Volcanology and Seismology	-	-
6	Part G Seismic Zones of the Philippines	Er. Sergio S, SUSJ	-	-
7	Standard Specification for Highways & Bridges 1972	Bureau of Public Highways	1972	-
8	General Specification for Road & Bridges 1976	MPWH	1976	-
9	Price Monitoring System, Mouale 4; Unit Price Ceiling of Civil Works Pay Items	DPWH	1987	-
10	Geological Map	Bureau of Cost and Geodetic Survey	-	-
11	Philippine Land Map S = 1 : 250,000	B.C.G.S.	-	-
	S = 1 : 50,000	B.C.G.S.	-	-
	S = 1 : 1,000,000	B.C.G.S.	-	-

LIST OF COLLECTED DATA

(5) OTHER EXISTING DATA (ii)

NO.	NAME OF DATA	PUBLISHED BY:	YEAR PUBLISHED	REMARKS
12	Construction Cost of Bridge Fifth IBRD Highway Project			
	(1) Masbate-Cataingan-Placek Road, Sagawsawan Bridge	Approved Agency Estimate	Dec. 1985	-
	(2) Comparison of Unit Cost	JICA	Dec. 1987	-
	West Leyte Road Nov. 1987			
	North West Leyte Sept. 1987			
	Laogag-Allacapan Nov. 1987			
	C-3 Project Dec. 1987			
13	Feasibility Study of Load Improvement Project on the Pan-Philippine Highway	JICA	Sept. 1987	-
14	P.D. No. 1594 Implementing Rules and Regulations as ammended	MPWH	June 1982	-
15	Standard Specifications for Public Works and High- ways, Vol. II: Highways Bridges & Airports. 1988	DPWH	1988	-
16	Land Use Opportunity Map of the Philippines	Bureau of Soil and Water Management	-	-
17	Administration Map, 1 : 2,000,000	B.C.G.S.	1984	-
18	Mineral Distribution Map of the Philippines 1 : 2,500,000	Bureau of Mines	1985	-
19	Geological Map of the Philippines	Bureau of Mines and Geo-Sciences		-
20	Geological Map, 1 : 50,000	Bureau of Mines and Geo-Sciences	1983	-
21	Soil Map, 1 : 100,000	Bureau of Soils	1940	-
22	Soil Survey of Province (15 provinces)	Department of Agriculture and Commerce		-

APPENDIX 4.1

INVENTORY SHEETS FOR VISUAL INSPECTION

INVENTORY SHEET NO.2

INVENTORY SHEET NO.2		Bridge No.	
(1) Road Name/Sec.		(2) Name of Bridge	
(3) Location		km from	(4) Name of River
(5) Year Built		19	(6) Design Load
(7) Bridge Length		(8) Span	
(9) Bridge Width		(10) Carriageway Width	
(11) Crossing Condition		Crossing River, Railway Roadway, valley, Others	(12) Clearance
(13) Plan of Bridge		Straight, Curve, Skew	
(14) Environment		Detour Length, Scio-Economic	
(15) Type of Bridge		Steel, R.C, P.C (Post, Pre), Other ()	
(16) Type of Support		Simple, Continuous (spans), Rigid-Frame, Other()	
(17) Type of Beam		I-beam, T-beam, Box-beam, Slab, Other()	
(18) Beam	Nos.	(19) Cross Beam	Nos.
	Pitch	(20) Stringer	Nos.
(21) Slab	Type	(22) Pavement	Ashalt. Concrete
	Span	(23) Railing	Concrete, Steel, Aluminium
(24) Expansion Joint		Steel(), Rubber(), Dummy Joint()	
(25) Substructure	Abutment	Cant, Pile-bent, Open	
	Pier	Wall, Colum, Pile-bent	
(26) Foundation		Spread, Pile(), Others	
(27) Waterway Width		(28) Flood Velocity	
(29) Orientation of Water-way and Bridge		Coincident, Incoincident()	
(30) Traffic Volume			
Note :			

INVENTORY SHEET NO.3

INVENTORY SHEET NO.3		Bridge No.	
Bridge Number		Inventory Date	
Item of Inventory	Defective Condition		Rating
(1) Pavement	Waving, Abrasion, Cracking, Pot-Hole		
	Condition		
(2) Curve & Railing			
(3) Exansion Joint	Noise, Leakage, Deference in level,		
	Condition		
(4) Deck Slab	Cracking, Exposure of R-bar, Spalling, Pot-Hole		
	Condition		
(5) Concrete Beam	Cracking, Exposure of R-bar, Spalling, Deformation		
	Condition		
(6) Steel Beam (Bracing, etc.)	Cracking, Corrosion, Painting, Deformation		
	Condition		
(7) Painting Cond.	Discoloration, Rust, Exfoliation		
	Condition		
(8) Shoe	Defection of Shoe, Defection of shoe Base		
	Condition		
(9) Abutment	Settlement, Movement, Declining, Scouring,		
	Condition		
(10) Pier	Settlement, Movement, Declining, Scouring,		
	Condition		
(11) Slope Protection	Settlement, Movement, Declining, Scouring,		
	Condition		
(12) Drainage			
(13) Approach Road			
(14) River Condititon	Scouring, Sedimentation, Others		
Rating of Evaluation	Note(Major Causes or Recommendation)		Rating of Repair
			A:Urgent replacement repair B:Need repair C:Maintenance only

SUPPLEMENTARY DATA OF INVENTORT SHEET NO.2

SUPPLEMENTARY DATA OF INVENTORT SHEET NO.2		
Traffic Volume		
Recorded F.W.L		
Design Discharge		
Max. Flood Peak		
Detouring		
Repair Records	1	
	2	
	3	
	4	
	5	
Region		
Note;		

GUIDELINES FOR BRIDGE INVENTORY SHEET NO.1

1. Fill-up column according to the order of DPWH stationing.
2. For the station refer to the DPWH official Km.
3. Write the corresponding name of bridge.
4. For the type of bridge refer to the note below the sheet. Designate the type of bridge according to their number. For continuous bridge (bridge with 2 or more spans) that uses different type of materials, indicate them separately.
5. Fill-up the No. of span and span length respectively. In cases, wherein there are 2 or more spans with different span length, indicate them separately.
6. For the bridge length, multiply the No. of span and the span length.
7. Width of bridge (including the sidewalk).
8. For the design load, indicate the traffic load/axle load (referred to as highway live loads) used in the design.
9. Indicate the year when it was constructed or built.
10. Priority column-fill it up using the data of the total rating evaluation of Sheet No.3.
11. For each bridge, under the heading remark, you will be using a letter code. The meaning of each code is given as follows:
 - A. The bridge is an old, narrow and in poor condition; it needs to be reconstructed.
 - B. The bridge is old, but in good condition; it might need to be reconstructed or widened because it is too narrow.
 - C. The bridge shows important shear cracks in the beams.
 - D. The bridge appears in good condition, but is beginning to have some problems of corrosion.
 - E. The bridge has a much damaged slab due to poor quality of the concrete and also shows shear cracks in the beams.
 - F. The bridge needs urgent repair at the beams damaged by collision and maintenance to avoid corrosion.
 - G. The bridge has the central span supported by additional temporary piers to reduce the vertical swaying. Permanent repairs must be made.
 - H. The bridge is completely broken at the support, due to a mistake in the design or in the construction.
 - I. Others (Specify your comments and suggestions).

GUIDELINES FOR BRIDGE INVENTORY SHEET NO.2

1. For Nos. (1) to (8) refer your data to Sheet No.1.
2. Bridge width (9) is the horizontal distance from fact to face of railings or curbs (if pedestrian walkways/sidewalks are not provided). See Typical Section of Fig. AP.4.1.
3. Carriageway width (10) horizontal distance between face to curbs. See Typical Section of Fig. AP.4.1.
4. Crossing condition (11): Indicate if teh bridge crosses a river, railway, roadway, valley, others.
5. Clearance/Freeboard (12) is the vertical distance from the bottom of the girder to the water maximum level. See Elevation of Fig. AP.4.1.
6. For teh plan of bridge (13), a bridge is considered straight if the abutments are perpendicular (90°) to the longitudinal axis of the bridge. If the abutments are not perpendicular to the longitudinal axis of the bridge it is said to be skewed. Please include the skew angle.
7. For the environment (14), specify if there are any indirect route (detour route including distance)
8. Indicate the type of material used (Steel, RC, P.C., others), including the Type of bridge (15) using the data of Sheet No.1.
9. For the type of support (16) simple refers to simply supported beam. Continuous refers to beams continuous over three or more supports and rigid frame refers to structures where the substructure is monolithically constructed with the superstructures.
10. For the Type of beam (17) refer to the attached Fig. AP.4.2.
11. For the No. of girder and pitch (18) refer to the Fig. AP.4.1.
12. Cross beam (19) refers to floor beam (transverse beam) in truss bridges or diaphragms in concrete and steel I-beam bridges.
13. Stringers (20) are used in bridges with truss - (longitudinal beams).

14. For the type of slab (21) R.C. is used in most Philippine bridges. For the span of slab refer to the attached figure (Fig. AP.4.1). Indicate the thickness of the slab if the data is available.
15. For expansion joints (24) indicate the type of material used. In Philippine bridges, there are only two types of material that are commonly used (Settled and Dummy Joint).
16. For the substructure (25) and foundation (26), see Fig. AP.4.3 and Fig. AP.4.4 respectively.
17. Waterway width (27) is the horizontal distance between the river banks measured when the water level is at its maximum (H.W.L.).
18. Hydrologists will provide information/data for the flood velocity (28).
19. Orientation of waterway and bridge (29): If the flow of water is parallel to the longitudinal axis of the pier it is coincident, otherwise, it is incoincident. Indicate the skew angle.
20. Traffic volume (30) refers to the number and type of vehicles that pass through the bridge.

NOTE:

1. Encircle the corresponding type of each item and/or specify if necessary.
2. For the Note (lower portion of the sheet), please try to sketch each bridge (Freehand only) and indicate the type of the bridge for each span.

GUIDELINES FOR BRIDGE INVENTORY SHEET NO.3

- (1) Pavement Condition: Pavement must be checked for cracking pot-holes, waving (track as made by wheels) and other evidence of deterioration. The surface of the pavement must be examined very carefully for evidence of deterioration. The underside of the slab should also be examined for indication of deterioration or distress.
- (2) Curbs and Railing: Check for cracks, spalls and other deterioration of the concrete and/or steel.
- (3) Expansion Joints: Poorly designed and maintained expansion joints are a constant source of trouble and should be examined carefully. Note if there is adequate space for thermal movement and if the joint is clear of any debris.
- (4) Deck Slab: Concrete decks must be checked for cracking, exposure of R-bar spalling and deformation. Examine the surface very carefully and note any evidence of deterioration.
- (5) Concrete Beam: Beams are to be checked for cracking and any disintegration of the concrete. Note any excessive vibration or deflection. Check for cracking or spalling. When cracking is found, locations of the cracks and their size should be carefully noted.
- (6) Steel Beam: Examine steel for cracking and corrosion. Check for rust stains. Stains may indicate severe corrosion of the steel.
- (7) Painting Condition: Steel bridges should be checked for condition of paint and corrosion. Stains (discoloration) may indicate severe damage on the structure. Check for discoloration, rusting and exfoliation.
- (8) Shoe: Shoe refers to the bearings. Examine all bearing devices to ascertain that they are functioning properly.
- (9), (10) Sub-structure: Abutment and pier should be inspected for deterioration and for movement. Indicate the condition of any suspected movement or settlement.

- (11) Slope Protection: Existing bank protection plus other protective devices should be checked and observed if they are sound and functioning properly. Determine the condition of the present slope protection.
- (12) Drainage: If downspouts were used to prevent the discharged of drainage water against any portion of the structure, give your opinion/observation if the downspouts are of sufficient size and number and if cleanouts are provided. Include the defects of the drainage.
- (13) Approach Road: Approach pavement condition is to be checked for unevenness, settlement, or roughness. Existence of one or more of the defects may cause vehicles coming on to the bridge to induce undesirable impact stresses to the structure. Examine joints between the approach pavement and the abutment backwall. Also, determine if the joint is adequately sealed to prevent accumulations of non-compressible materials.
- (14) River Condition: River condition should be observed for local and general scouring, sedimentation of river bed and erosion of river bank.

NOTE:

- (1) For Nos. 1 to 12 encircle the type of defect and describe the present condition of each item. Designate the rating according to their respective letter (A,B,C). Refer to the Rating of Repair on the lower portion of the sheet.
- (2) For Nos. 13 to 18, describe their condition and write their respective rating.
- (3) Rating of Evaluation (Total Rating).

APPENDIX 4.2

DEFINITION OF SPECIAL TERMS

APPENDIX 4.2 DEFINITION OF SPECIAL TERMS

To avoid confusion, certain terms used in this feasibility study, are hereinafter defined.

Specific terms specially pertaining to the rehabilitation and maintenance of bridge structures are grouped by condition of process as follows:

- For existing bridge condition
- For actions to be taken
- For upkeep of ordinary structure life

(Refer to Fig. AP 4-1)

(1) For Existing Bridge Conditions

- Defect:
An imperfection or fault; construction defects.
- Deficiency:
Lack or absence of structure; a shortage; design deficiency.
- Damage:
Injury to structure.
- Deterioration:
Decline in the quality of structure over a period of time due to the chemical or physical action of the environment.
- Failure:
Short pause or stop of mechanical function of a structure being maintained.
- Collapse:
Breakdown of structure by external forces.

(2) For Actions to be Taken

- Replacement:
Supplying of substitute for what has been lost, destroyed, used up, worn out or dismissed structure.

- Repair:
To restore that which is unserviceable to a serviceable condition by replacement of parts, components, or assemblies of structure.
- Improvement:
To change the structure for better condition.
- Remedy:
To cure, correct, restore, renew, or reform the structure
- Maintenance:
To maintain structural facilities and equipment to meet their operational function with minimum expenditure.

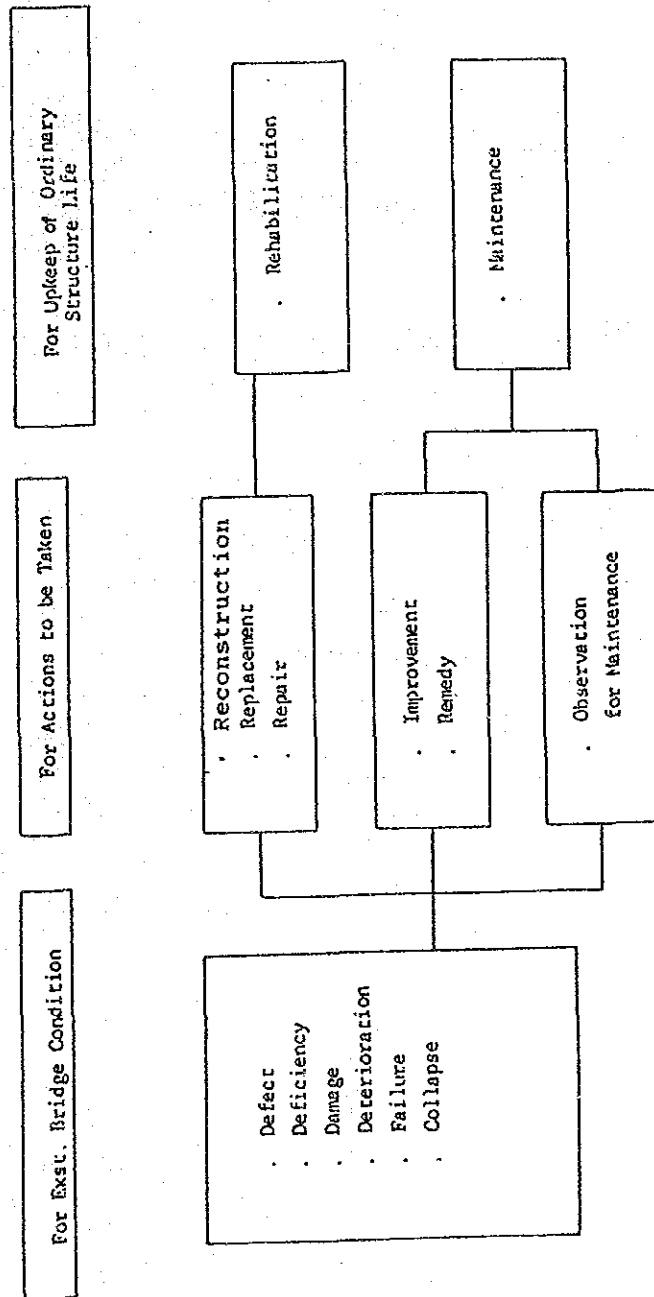
(3) For Upkeep of Ordinary Structure Life

- Rehabilitation:
To restore damaged and deteriorated structure in its operational condition through replacement or repair.

(4) Others

- Cracking:
Cracking occurs when tensile stresses exceed the tensile strength of the concrete. It may be transverse, longitudinal, diagonal or random.
- Spalling:
Spalling is the breaking away of pieces of concrete due to corrosion of the steel.
- Scaling
Scaling is a gradual decomposition of the cement paste, beginning at the surface and progressing downward, caused by poor materials, improper construction, and inadequate drainage.

Fig AP 4-1 TECHNICAL TERMS INVOLVED IN THIS FEASIBILITY STUDY
 (SPECIALLY PERTAINING TO REHABILITATION AND
 MAINTENANCE OF BRIDGE STRUCTURES)



APPENDIX 4.3

NO. OF BRIDGES BY YEAR, WIDTH AND TYPE

Table 1 No. of Bridges by Year Built and Type of Bridge

	Truss	Pony	S.I.B.	Others	* Steel R.C.D.G.	Con Slab P.C.D.G.	Arch	* Conc.	Others	Total
1901-1925	1	0	1	0	2	21	2	30	0	32
1926-1940	2	2	3	0	7	19	3	27	0	34
1941-1955	12	1	14	0	27	51	5	61	1	89
1956-1970	2	0	30	0	32	77	7	98	2	132
1971-	12	2	155	0	169	67	5	107	5	281
Not Known	5	2	45	0	52	76	8	117	5	174
Total	34	7	248	0	289	311	31	440	13	742

Table 2 No. of Bridges by Width and Type of Bridge

	Truss	Pony	S.I.B.	Others	* Steel R.C.D.G.	Con Slab P.C.D.G.	Arch	* Conc.	Others	Total
Less 5.0	0	0	0	0	0	0	0	0	0	0
5.0-	0	0	0	0	0	0	0	0	0	0
5.5-	1	0	0	0	1	0	0	0	0	1
6.0-	5	4	1	0	10	6	1	8	0	18
6.5-	2	0	0	0	2	3	2	7	0	9
7.0-	0	0	3	0	3	6	2	17	6	26
7.5-	4	0	4	0	8	49	7	67	0	75
8.0-	3	0	185	0	188	134	8	169	1	358
8.5-	11	3	37	0	51	80	2	102	4	157
9.0-	2	0	6	0	8	17	3	36	0	44
9.5-	4	0	3	0	7	4	3	12	0	19
10.0-	0	0	1	0	1	9	1	13	0	14
10.5-	0	0	4	0	4	0	0	1	0	5
11.0-	0	0	0	0	0	1	1	2	0	3
11.5-	0	0	0	0	0	1	0	2	1	3
12.0-	2	0	4	0	6	1	1	4	1	11
Not Known	0	0	0	0	0	0	0	0	0	0
Total	34	7	248	0	289	311	31	440	13	742

APPENDIX 6.1

**RESULTS OF VISUAL INSPECTION
(52 Bridges)**

RESULTS OF VISUAL INSPECTION OF 52 BRIDGES (1/11)

NO. REGION	BRIDGE NO.	BRIDGE TYPE NAME LENGTH	RATING	DETERIORATION AND DAMAGES							COMMENTS FOR COUNTERMEASURES							PHOTOGRAPHS	REHABILITATION METHODS
				SL	SU	SUB	IFD	FTN	EMB	OTHER	S	L	SU	SUB	FTN	EMB	OTHER		
1	III	MARILAO	A	●	○													Replacement of one span R.C.D.G. and Widening of Pier Cap.	
		R.C.D.G.		1. Cracks, spalling of concrete and exposure of reinforcing bars on the slab.	1. Strengthening of deck slab by means of steel plates to be installed in the slab soffit.														
		5 @ 12.0 = 60.0		2. Shear cracks on concrete girders.	2. Strengthening of girders must be studied.														
2	III	LABANGAN I	A	△	△	●											Reconstruction. Slope Protection. Foot Protection.		
		S-I-B		1. Some portions of slab with cracks	1. Maintenance repair on deck slab.														
		4 @ 25.0 = 100.00		2. Rusty steel girders. 3. Original pier at center of bridge was washed-out by floods.	2. Construction of a new pier to replace the temporary steel supports. Sounding boring test needed.														
3	III	SULIPAN	A	○	△												Reconstruction Slope protection.		
		TRUSS		1. Damaged truss members on the second span of thru truss due to vehicular collision.	1. Replacement/repair of damaged members is necessary.														
		6 @ 25.30 (PONY) 3 @ 58.90 (THRU) = 328.50		2. Last span of thru truss is sagging.	2. Replacement of bridge due to narrow carriageway width and sagging. Study on why only one span is needed.														
4	I	PLARIDEL	B	○	△												Replacement of Deck Slab. Reinforcement of Pier.		
		TRUSS		1. Minor cracks in the deck slab and difference in level at all expansion joints.	Repair of expansion joints needed since almost all are damaged and to prevent further damage.														
		13 @ 48.85 = 635.05		2. Truss members are rusty especially at gusset plates of lower chords.															
5	I	TAGAMUSING	A	●	●	●											Reconstruction Reinforcement of substructure. Slope protection Foot protection River bad protection		
		R.C.D.G.		1. Cracks, spalling of concrete and exposure of reinforcing bars in the slab and girders.	Replacement of bridge since all spans have almost the same conditions. Probable type and span of replacement must be studied.														
		4 @ 10.0		2. First span has the most damaged. 3. Scouring on all piers and at the slope protections.															
6	I	BUED	A*	△	○												Reconstruction Slope protection.		
		PONY/THRU TRUSS		1. Cracks on the bottom of slab at the truss spans.	1. Repair of damaged truss members is needed.														
		3@24.0(PONY)3850.0(THRU) 6@25.13,3330.8(S-I-B) 1@15.8,1@16.7(RC DG)=500.30		2. Some truss members are damaged due to vehicular collision. 3. Inadequate water clearance.	2. Raising of bridge since the water clearance is inadequate. 3. Flood level must be studied in relation to roadway elevation.														

NOTE: SL — Slab
 SU — Superstructure
 SUB — Substructure
 FTN — Foundation
 ● — Seriously Damage; Replacement
 ○ — Partially Damage; Repair
 △ — Minor Damage; Maintenance

