VOLUME 5

RECORDS OF SEMINAR AND MEETING/DISCUSSION

1. Seminar

(1) 1st Seminar

The Project for the Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines
1st Seminar

Date and Time: 6 August 2012, 9AM
Venue: Sapphire Hall, 5th Floor, Citystate Tower Hotel, Manila

Minutes of Meeting:

- Opening remarks by Asst-Dir. Doroy
- Dr. Tsuchida made a presentation on "Brief Introduction to the Study on Improvement of Bridges through Disaster Mitigating Measures for Large Scale Earthquakes" and "Current Practices on Large Scale Seismic Design and Mitigation in Japan".
- Dr. Santos made a presentation on "Issues on the Current Seismic Design of Bridges in the Philippines and Comparison of Major Items in Bridge Seismic Design Specifications (JRA, AASHTO and NSCP)".
- Mr. Oyama made a presentation on "Basic Comparison of Design Seismic Acceleration Response Spectra – JICA, AASHTO and NSCP".
- Dr. Tsuchida made a presentation on "Impact Vibration Test" and "Procedure of Impact Vibration Test of Lambingan Bridge".
- Discussions:
  - Ms. Atienza from TWG asked the definition of Large and Moderate earthquake. Dr. Santos answered that Level 1 earthquake is defined from 0.2 gal to 0.3 gal response acceleration spectra in Japan and Small/Moderate earthquake is going to be defined through this project.
  - Mr. Lanuza from PHIVOLCS asked if the possibility of liquefaction is considered in the design of existing bridges. Mr. Doroy answered that after 1992 liquefaction analysis have been required and considered in the design of bridges.
  - Ms. Bautista from TCP group asked the adoption of impact vibration test for one-span bridge and how to calculate the natural period (T). Dr. Tsuchida answered that the result of impact vibration test or natural vibration test has to be compared with the result of calculation or natural vibration for a sound structure. He also mentioned that the adaption of the test for a one-span bridge is difficult due to the effect of the earth's structure.
  - Ms. Bautista from TCP group asked further if vibration test can be adapted to the structural evaluation of other bridges. Dr. Tsuchida answered that said test can be adapted to abnormal vibration evaluation of the superstructure. However, it needs comparison between the test result of a sound structure or the measured results just after construction as a baseline.

- Mr. Lanuza from PHIVOLCS asked if when evaluating the result of natural vibration test or impact vibration test, should other external factors be evaluated or the structure characteristics is enough for evaluation. Dr. Tsuchida answered that structural characteristics is enough for evaluation.
- Mr. Sison from ASEP asked how to harmonize the revised version of NSCP and the bridge seismic specification of this project. Dr. Santos answered that harmonizing will be done in this Study based on results of discussion with DPWH.
- Mr. Nagao, JICA expert from TCP group asked why the impact vibration test needs to be conducted for three times. Dr. Tsuchida answered that conducting test three times is not specified in this demonstration.
- Mr. Nagao, JICA expert from TCP group asked whether the local consultant can conduct impact vibration test. Dr. Tsuchida answered that there are some local consultants conducting natural vibration test especially for buildings.
- Ms. Atienza from TWG asked which is more dangerous for bridges inland earthquake or plate earthquake. Dr. Santos answered it depends on the distance from seismic epicenter and the structure type. However, inland fault type produces higher seismic forces.
- Ms. Atienza from TWG asked what ground motion will be adopted? Dr. Santos answered that the study shall pay attention to both types of earthquake (inland and plate). The Study will prepare the seismic ground acceleration map considering the Philippine geological features.
- Mr. Doroy from TWG asked if the weight of 60 kg used in the impact vibration test is based from which guidelines or manuals. Dr. Tsuchida answered that the weight is not regulated. The critical point is the fluctuation and using a maximum 60 kg of weight is favorable for the conduct of the test. However, the desirable weight and times of test shall be referred to guidelines or manuals.

- Seminar adjourned.

Prepared by:

Dr. Takayuki Tsuchida
Assistant Team Leader
JICA STUDY TEAM

Confirmed by:

OIC Assistant Dir. Adriano M. Doroy
Bureau of Design, DPWH

ATTACHMENT 1: LIST OF ATTENDEES

1. Related People from "the Project for Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines"

1) 6 people from TWG members
Adriano M. Doroy, Edwin C. Matanguihan, Carolina S. Canuel, Dominador P. Aquino, Reynaldo P. Faustino, Guillerma Jayne Atienza

2) 5 people from BOD
Susan Domanais, Dennis P. Abason, Sarah B. Esmael, Ricardo C. DEVERA, Felipe S. Ranes

3) 5 people from related organizations
Angelito Lanuza (PHIVOLCS), Henremogne C. Penerubio (PHIVOLCS), Erik Sison (ASEP), Kazushi Suzuki (JICA Philippine Office), Grace Mirandilla Vela (JICA Philippine Office)

4) 10 people from JICA Study Team
Shingo Gose, Takayuki Tsuchida, Toshio Ichikawa, Jovito C. Santos, Hiroaki Otake, Kenichi Tanaka, Ryo Tanahashi, Yasushi Oyama, Yumi Iwashita, Grace Loterte

Subtotal: 26 Participants

2. Related People from "Improvement of Quality Management for Highway and Bridge Construction and Maintenance, Phase II"

1) 4 engineers from CWG on Bridge Engineering Inspection Manual
Emmanuel A. Adriano, Rufino D. Valiente, Nelia I. Antonio, Feliciano R. Espina

2) 2 engineers from Regional Project Managers
Elsa T. Naboye, Alvin C. Cabueñas

3) 4 engineers from Central office
Mary Ann T. Bautista, Rodrigo Yago, Feliciano P. Carpio, Cherri C. Estudillo

4) 2 engineers from JICA TCP-II Team
Hideo Nagao, Ryoichi Yamasaki

Subtotal: 12 participants

3. JICA advisor

1) Seitaro TSUKUDA

Subtotal: 1 participant

Total: 39 participants

1st Seminar on The Project for the Study on Improvement of the Bridges Through Disaster Mitigating Measures for Large-Scale Earthquakes in the Republic of the Philippines

Date: August 6th, 2012 Time: 9:00-15:30

Venue: Sapphire Hall, 5th Floor, CITYSTATE TOWER HOTEL and Lambingan Bridge

ATTENDANCE SHEET

No.	Name	Office	Designation	Phone Number	Signature
1	SUSAN DOMAGUAIS	BOD, DPWH	ENGR. III	304-3561	[signature]
2	DENNIS P. ABAGON	BOD, DPWH	ENGR II	SAME ABOVE	[signature]
3	Seitaro Tsukuda	DPWH	JICA advisor	09204411888	[signature]
4	Sarah B. Esmael	DPWH	ENGR II	3043561	[signature]
5	Toshio ICHIKAWA	Consultant	JICA study Team	9298806255	[signature]
6	Kenichi TANAKA	Consultant	|	092-9562-1615	[signature]
7	Ryo Tanahashi	Consultant	|	0915 991 5687	[signature]
8	Adrian M. Dory	BOD	O/C Asst. Dir.	304-3461	[signature]
9	Jayne T. Atienza	BOD	Sr. Geologist	3043060	[signature]
10	EDWIN MATANGUIHAN	BOD	O/C - BRIDGES	3043061	[signature]
11	HIDEO NAGAO	TCP	JICA Expert	0928-324-[illegible]	[signature]
12	Ryoichi Yamasaki	JICA - TCP	JICA ROAD Expert	09185527325	[signature]
13	Emmanuel Adrian	PS	E-II	3043029	[signature]
14	Mary Ann T. Bautista	PS	E-III	3143487	[signature]
15	RUFINO VALIENTE	BOD	E-IV	3043561	[signature]
16	ALVIN C. CABRERA	BDC	E-?	09160916749	[signature]
17	NELIA L ANTONIO	CAR	E 3	09204620923	[signature]
18	Dominador Agan	BOM	Engr. IV	3043710	[signature]
19	FELICIANO P. ESPINA	DPWH - RO VII	ENGR. III	09998102186	[signature]
20	Elsa T. Naboye	DPWH-CAR	Engr 3	09184780276	[signature]
21	Rodrigo Yago	JICA TCP II	Engr 1	09271951556	[signature]
22	CHERRI ESTUDILLO	JICA - DPWH	Engg Assistant	09166979052	[signature]
23	Feliciano P. Carpio	JICA TCP	Asst Engr	09183180813	[signature]
24	Hiroaki Ohtake	JICA team	Engineer		[signature]
25	RICARDO C. DEVERA	DPWH-NCR	ENGR. III	304-36-57	[signature]
26	ERIK SISON	ASEP / EASUSON	ENGR	8317115 / 09179130[illegible]	[signature]
27	Shingo Gose	JICA			[signature]
28	Carol Carmel	DPWH	O/C PPD	3043352	[signature]
29	Angelito Lorenza	PHIVOLCS	SR, SRS	09154382787	[signature]
30	Hermogenes C. Penarubio	"	SRS 1	0999-359-0909	[signature]

-1-

ATTACMENT 2: PHOTO

Photo 1

Photo 2

Photo 3

Photo 4

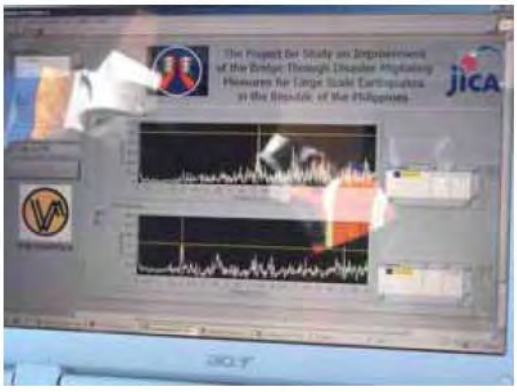

Photo 5

Photo 6

(2) 2nd Seminar

The Project for the Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines

Minutes of Meeting
For
2nd Seminar
On
Demonstration of Natural Vibration Test

Date & Time:	September 4, 2012, 8:15pm-5:00pm
Venue of Presentation: Venue of Demonstration:	Conference Room, DPWH Regional Office (Region No.VIII) Lilo-an Bridge
Objectives:	Demonstration of Natural Vibration Test
Participants:	1. Technical Working Group Members 2. Representative from DPWH Bridge Division, BOD 3. Related People from "Improvement of Quality Management for Highway and Bridge Construction and Maintenance, Phase II" 4. Representative from Regional Office 5. Representative from District Engineering Office 6. Representative from JICA Philippine Office 7. Representative from Embassy of Japan 8. JICA Study Team Members (Refer to Attachment 2)

Seminar Program:

8:15-8:30	Opening Remarks	Asst. Dir. Adriano Doroy
8:30-9:00	Brief Introduction of Natural Vibration Test	Dr. Takayuki Tsuchida
9:00-9:40	Discussion	
10:00-12:30	Move to Lilo-an Bridge (Target Bridge)	
13:30-14:30	Natural Vibration Test at the Site	Dr. Takayuki Tsuchida Mr. Sherwin Lalap
14:30-17:00	Move back to Tacloban City	

Outline of the presentation and the discussion are shown in Attachment 1.

Pictures of the seminar are shown in Attachment 3.

Attachment 1: Results of the Discussion on the 2nd Seminar (September 4, 2012)

1. Presentation on the demonstration of Natural Vibration Test (NVT)

Dr. Tsuchida made a presentation on the following two topics.

1) Impact Vibration Test (IVT) results of Lambingan Bridge
2) The basic information of Natural Vibration Test (NVT) and the test procedure for Lilo-an Bridge

2. Discussion regarding the presentation

Major questions and answers after the presentation are as follows.

- Question-1:

In the 13th slide of the presentation, why the Impact Vibration Test (IVT) result of Pier-2 is used as "Standard Value of Natural Frequency" for the evaluation of the Pier-1 test result? Isn't there any formula to decide "the Standard Value of Natural Frequency" for tested piers?

(Answer by Dr. Tsuchida)

Best way to acquire "the Standard Value of Natural Frequency" is to conduct IVT right after the bridge constructions. However, there's no available test data of Lambingan Bridge. In this case, the natural frequency of Pier-2 is assumed as "the Standard Value" to compare the difference of natural frequencies between two piers. If tested piers are structurally similar, piers with larger natural frequency are considered to be sounder.

- Question-2:

Is it possible to decide "the Standard Value of Natural Frequency" by computational analyses?

(Answer by Dr. Tsuchida)

The results from computational analyses of natural frequencies tend to be deferent from those from actual measurement. Therefore, continuous measurements of natural frequencies are recommendable for structural evaluations.

- Question-3:

How is "the Standard Value of Natural Frequency" for Lilo-an Bridge going to be decided after Today's demonstration of NVT? The results of deferent piers will be compared just like IVT results of Lambingan Bridge?

(Answer by Dr. Tsuchida)

In case of Lilo-an Bridge, it is impossible to evaluate structural soundness of piers by comparing NVT results of different piers since the heights of piers are different. The comparison of different piers' test results can be applied only if tested piers are structurally similar. The frequency data acquired today will be used as sample data for future work.

- Question-4:

  How do we decide on the specific natural frequencies of structures?

  (Answer by Dr. Tsuchida)

  The frequency at peak acceleration in Fourier Spectrum should be taken as natural frequency of structures in consideration with vibration modes.

- Question-5:

  What is the recommendation to minimize the abnormal vibration of Mawo Bridge?

  (Answer by Dr. Tsuchida)

  One of the ways to mitigate the abnormal vertical vibration of superstructures is to install seismic dampers including Tuned Mass Damper (TMD) since the cause of abnormal vibration seems to be observed due to the lack of superstructure damping.

Prepared by:

Dr. Takayuki Tsuchida
Assistant Team Leader
JICA STUDY TEAM

Confirmed by:

Assistant Dir. Adriano M. Doroy
Bureau of Design, DPWH

Attachment 2: List of Attendance

ATTENDANCE SHEET

No.	NAME	POSITION	DEPARTMENT	SIGNATURE
1.	ARISTARCO DOROY	ENGR. V	BOC - DPWH	
2.	DOMINADOR AQUINO	Engr. IV	BOM - DPWH	
3.	Lydia Chua	Engr V	NCR - DPWH	
4.	Lorna D. Añano	Engr. III	TCSDEO	
5.	MARICHU T. EDUARTE	Engineer II	TCSDEO	
6.	MEJOS, NICANOR.	ENGR. II	NS 2ND. DEO	
7.	CHARLITO S. CABUNGBOS	ENGR. III	RO - VIII	
8.	RODRIGO YAGO	TCP II Engr	JICA Team	
9.	HIDEO NAGAO	JICA TCP	JICA	
10.	AKIO YONEZAWA	Second Sec	EoJ	
11.	JAYNE T. ATIENZA	Sr. Geologist BOD - DPWH	→	
12.	SUSAN DOMANAIS	ENGR III	BOD - DPWH	
13.	Suzuki Kazushi	PFA	JICA	
14.	DENNIS P. ABAGON	ENGR II	BOD · DPWH	
15.	Mary Ann T. Bautista	Engr. III	DPD, PS, DPWH	
16.	RUFINO D. VALIENTE	E - IV	BOD, DPWH	

No.	NAME	POSITION	DEPARTMENT	SIGNATURE
17.	Rachel L. Lumapas	Engr. III	PRCM, R.O. #VII	[signature]
18.	NELIA I. ANTONIO	Engr. VI	DPWH-CAR	[signature]
19.	BOBBY Z. PADILLA	ENGR. II	DPWH - BRS	[signature]
20.	Emmanuel Adriano	E-II	DPWH - CO	[signature]
21.	FELICIANO R. ESPINA	ENGR. III	DPWH-R07	[signature]
22.	Romie B. Dorey	JICA - R7 TCP Proj. Manager	DPWH R07	[signature]
23.	CHERRI ESTUDILLO	Engg Assistant	DPWH - C.O.	[signature]
24.	ROSARIO B. ROSETE	ENGR. II	DPWH-BILIRAN	[signature]
25.	LANI G. ATICERIA	C/M [illegible]	DPWH-NSEO I	[signature]
26.	EUGENE S. A-JAYA	ENGR. II	DPWH LEYTE 1	[signature]
27.	CHITO NELSON EUBONES	E-II	LEYTE I	[signature]
28.	RENATO C. DABUK	ENGR. II	RO_VIII	[signature]
29.	Hiroaki Ohtake	Seismic design and inspection assistant	JICA Team	[signature]
30.	Takayuki Tsuchida	ASSIST. Team Leader JICA Team	JICA Team	[signature]
31.	Kunihiko Harada	Environmental Specialist JICA Study Team	"	[signature]
32.	Ryo Tanahashi	Hydraulic Specialist JICA Team	"	[signature]
33.	Adriano M. Dorry	O/C Asst. Dir.	BOD	[signature]
34.				
35.				
36.				
37.				
38.				

No.	NAME	POSITION	DEPARTMENT	SIGNATURE
39.	VICENTE R. VALLEJO	Engr. IV	DPWH Region 7	
40.	Elsa T. Naboya	E-3	DPWH-CAR	
41.	Vinna Elsa U. Garrabul	E-II	DPWH-NSTED	
42.	[illegible]	E-II	DPWH-BILIRAN	
43.	LUCAS G. HOLASCA	C/M CALBAYOG	LEYTE II	
44.	[illegible]	[illegible]	LEYTE II	
45.	DENNIS B. JOSON	[illegible]	DPWH-4th LED	
46.	JOSEPH C. PERALTA	E-II	DPWH-2ND	
47.	ALBERT B. LAZARTE	E-II	SAMAR I	
48.	DENNIS T. ORAIS	Draftsman II	DPWH-5 LED	
49.	ERLINDA P. CRUZ	E-II	-do-	
50.	ADELINA GOMEZ	E-III	DPWH R.O.	
51.	ESPERANZA MENDOZA - E-IV		DPWH-R.O. 8 POO	
52.	Tonette Lim	R.I.O. I	DPWH-R.O. REGION	
53.	GLENN B. QUILINA	C/M Carpenter	DPWH-ESED	
54.	NIÑO CARLO C. CASTILLEJOS	ENGR. AIDE	DPWH - ESED	
55.	Daniel A. Estigoy	E-II	DPWH - NSTED	
56.	FE L. Zalavaria	Training Staff	DPWH R.O.8	
57.	GERALDINE F. JANDUSAY	Training Staff	DPWH ROS	
58.	MARY ANN H. ANICETO	Training Staff	-do-	
59.	ROMULO L. HERMO	Training Officer	-do-	

Attachment 3: Pictures

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

(3) 3rd Seminar

The Project for the Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes In the republic of the Philippines

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Minutes of Meeting

For

3rd Seminar

On

Demonstration of Downhole Shear Wave Test (DSWT)

Date & Time:	October 11, 2012, 2:30 pm-4:00 pm
Venue:	Nagtahan Bridge
Objectives:	Demonstration of Downhole Shear Wave Test (DSWT)
Participants:	1. Technical Working Group Members 2. Representative from DPWH Bridge Division, BOD 3. Representative from JICA Philippine Office 4. Representative form Embassy of Japan 5. JICA Expert 6. Representative from PHIVOLCS 7. JICA Study Team Members 8. Engineers from local consulting firms (EASCON, Vibrametrics) (Refer to Attachment 2)

Seminar Program:

14:30-14:35	Opening remarks	Dr. Jovito C. Santos and Mr. Kenichi Tanaka
14:35-14:50	Brief explanation on DSWT demonstration	Mr. Kenichi Tanaka
14:50-15:30	Demonstration of DSWT	Mr. Kevin Carlo de Castro
15:30-16:00	Discussion on the demonstration	Answered by Mr. Kenichi Tanaka, Dr. William Tanzo, and Mr. Kevin Carlo de Castro
16:00-16:10	Closing remarks	Dr. Jovito C. Santos and Mr. Kenichi Tanaka

Outline of the presentation and discussion are shown in Attachment 1.

Pictures of the seminar are shown in Attachment 3.

The Project for the Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes In the republic of the Philippines

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Attachment 1: Results of the Discussion on the 3rd Seminar (October 11, 202)

1. Presentation on the demonstration of DSWT

Mr. Tanaka and engineers of EASCON presented the following topics and conducted demonstration on DSWT:

1) Explanation on the principle and basics of the DSWT; and
2) Demonstration of the DSWT and data processing at the site.

2. Discussion on the topics presented

Major questions and answer raised after the presentation were as follows:

- Question-1:

  The distance between the trigger point (wooden plank) and the borehole doesn't seem to be long enough to obtain good data. Is it good enough?

  (Answered by Dr. Tanzo)

  The distance between the trigger point and the borehole is defined in the DSWT specification by ASTM. Our DSWT is not conducted for an academic study, but focused on more engineering aspects. Therefore, the distance is considered to be sufficient enough to meet the purpose.

- Question-2:

  Is this test (DSWT) really necessary for seismic design of bridges? Japan Road Association (JRA) allows use of empirical calculation formula to estimate shear wave velocity using SPT blow counts (N values).

  (Answered by Mr. Tanaka)

  The JRA's formula has limitations for their usage because of the following reasons:

  - N values must be 50 and less for sandy soils; and
  - N values must be 25 and less for clayey soils.

  In addition to geotechnical aspects, DSWT can give bridge engineers essential information for bridge seismic design: For example, estimation of structural natural periods considering ground conditions and/ or seismic motion amplification due to the site affects. Therefore, the DSWT is a very useful technology for seismic design of bridges.

- Question-3:

  How do we know the depth of the borehole geophones in consecutive testing at the site?

  (Answered by Mr. Kevin Carlo de Castro)

  Plastic tapes (markers) are put on the signal cable connected to the borehole geophones every one meter. Therefore, site technicians can visibly determine the depth of the geophones in the borehole.

- Question-4:

  Is hammer energy sufficient enough for the test? Also, are the counterweights sufficient enough to stabilize the wooden plank as the trigger point of shear waves?

  (Answered by Dr. Tanzo)

  Engineers who conduct DSWT must select appropriate counterweight and hammer size depending on the borehole and site conditions. For deeper boreholes, we can use a truck/ vehicle to stabilize the wooden planks, and other triggering tools to generate appropriate initial shear waves.

Prepared by:

Dr. Shingo Gose
Team Leader
JICA Study Team

Confirmed by:

Asst. Dir. Adriano M. Doroy
Bureau of Design, DPWH

Attachment 2: List of Attendance

FIELD DEMONSTRATION
" In-Situ Shear Wave Velocity Measurement using Downhole Seismic Testing"

Place: Nagtahan Bridge
Date: October 11, 2012 @ 2:00 pm.

ATTENDANCE		
NAME	COMPANY	CONTACT NO.
1. Seitaro Tsukuda	DPWH	0920441-1888
2. Emmanuel Adriano	DPWH-PS	304-3069
3. Jayne T. Atienza	BOD-DPWH	304-3060/66
4. Susan D. Domanais	BOD-DPWH	304-3561
5. Blesilda S. Ramos	BOD-DPWH	304-3561
6. Sarah B. Esmael	BOD-DPWH	304-3561
7. Ryo Tanaheshi	JICA Study Team	
8. Toshio Ichikawa	JICA Study Team	
9. Kei Katayama	JICA Study Team	
10. Edwin C. Matangulhan	BOD-DPWH	304-3061
11. Adriano M. Doroy	BOD-DPWH	304-3317
12. William T. Tanzo	JICA Study Team	0918923-9185
13. Rhommel N. Grutas	PhiVolcs	0906387-2830
14. Jovito C. Santos	JICA Study Team	
15. Kenichi Tanaka	JICA Study Team	
16. Kendu De Castro	Eascon	
17. Heidee Ibalao	Eascon	
18. Janemae Eugenio	Eascon	
19. John Lee Laguerta	Eascon	0917806-8208
20. Domingo Clemente Jr.	Eascon	
21. Rolly Espinosa	EMCCI	0922889-4230
22. Jason Mark Angeles	EMCCI	0939659-6646
23. Charmaine Veñegas	EMCCI	0926736-8125
24. Akio Yonezawa	Japan Embassy	0918909-7513
25. Lydia Chua	DPWH-NCR	0917834-5509
26. Wenceslawa P. Abanador	DPWH-NCR	
27. Reynaldo P. Faustino	BRS	0927622-9526
28. Ezekiel A. Saguil	EMCCI	0933720-0058
29. Shera E. Hermosilla	EMCCI	0922889-3357
30. Shingo Gose	JICA Study Team	

Attachment 3: Pictures

Explanation on Principle of DSWT

Explanation on DSWT Demonstration

Demonstration of Data Processing

Participants

Explanation on Borehole Geophones

Generation of Seismic Wave by Hammer

Discussion on the Demonstration

Discussion on the Demonstration

(4) 4th Seminar

The Project for Study on Improvement of Bridges
through Disaster Mitigating Measures
for Large Scale Earthquakes in the Republic of the Philippines

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Minutes of Meeting
For
4th Seminar
On
The Project for Study on Improvement of Bridges
through Disaster Mitigating Measures
for Large Scale Earthquakes in the Republic of the Philippines

Date:	January 17 (Thu) and 18 (Fri), 2013
Venue:	Citystate Tower Hotel
Objectives:	1. To present the proposed seismic design specifications including seismic design spectra for the bridges in the Project 2. To introduce the evaluation procedure/results and recommendations for the bridge replacement/retrofitting 3. To introduce the seismic retrofitting practices in Japan 4. To collect opinions and comments from participants regarding the present issues, problems and concerns
Participants: First day, 79 attendees Second day, 70 attendees	1. DPWH Engineers (Planning, Bridge Design, Construction and Maintenance) 2. ASEP Engineers 3. Representatives from PHIVOLCS 4. Local Consultants 6. Representatives from JICA (Tokyo HQ) 5. Representatives from JICA Philippine Office 6. Representative from Embassy of Japan 7. Representatives from JACA Advisory Committee 8. JICA Experts 9. JICA TCP Members 10. Invited Lecturers/Presenters from Japanese Associations 11. JICA Study Team Members (Refer to Attachment 3)

Attachment 1: Seminar Program

Attachment 2: Results of Discussions

Attachment 3: List of Attendance

Attachment 4: Pictures

Attachment 1: Seminar Program (January 17 & 18, 2013)

Day 1: January 17, 2013 (Thu)		
09:00 – 09:30	**Registration**	
09:30 – 09:40	**Philippine National Anthem**	
09:40 – 09:50	**Welcome Address**	**Mr. Yoshihiro KAKISHITA** Senior Advisor to the Director General, Economic Infrastructure Department, JICA
09:50 – 10:00	**Opening Remarks**	**Mr. Raul C. Asis** Undersecretary, DPWH
10:00 – 10:40	**Session 1:** Major Damages due to Large Scale Earthquake in the Philippines	**Mr. Edwin Matanguihan** Chief, Bridges Division, Bureau of Design, DPWH
	-- Coffee Break –	
11:00 – 12:00	**Session 2:** Earthquake Disaster Mitigation Strategies for Roads	**Dr. Shojiro KATAOKA** JICA Advisory Committee
	-- Lunch --	
13:00 – 14:00	**Session 3:** Outline of the Proposed Bridge Seismic Design Specifications	**Dr. Jovito Santos** JICA Study Team
14:00 – 15:00	**Session 4:** Development of Design Earthquake Motions for Bridges in the Philippines	**Dr. William Tanzo** JICA Study Team
	-- Coffee Break --	
15:20 – 16:20	**Session 5:** Evaluation Results and Selection of Objective Bridges for Outline Design in the Project	**Dr. Takayuki TSUCHIDA** JICA Study Team
Day 2: January 18, 2013 (Fri)		
09:00 – 10:30	**Session 6:** Seismic Retrofit of Concrete Piers	**Mr. Takahiro KAKUTA** The Overseas Construction Association of Japan, Inc. (OCAJI)
	-- Coffee Break --	
10:50 – 12:20	**Session 7:** Introduction of Seismic Devices in Japan	**Mr. Tsuyoshi HASHIMOTO** **Mr. Atsushi KAJI** Japan Bridge Association (JBA)
	-- Lunch --	
13:30 – 15:00	**Session 8:** Seismic Retrofitting Practices on Bridge Foundations in Japan	**Mr. Hitoshi YAMAJI** The Overseas Construction Association of Japan, Inc. (OCAJI)
	-- Coffee Break --	
15:20 – 16:50	**Session 9:** Ground Improvement Countermeasures against Liquefaction in Japan	**Dr. Kenji HARADA** The Overseas Construction Association of Japan, Inc. (OCAJI)
16:50 – 17:10	**Fill up Questionnaire**	
17:10 – 17:20	**Wrap up**	**Mr. Gilberto S. Reyes** Director, Bureau of Design, DPWH
17:20 – 17:30	**Closing Remarks**	**Mr. Yoshihiro KAKISHITA** Senior Advisor to the Director General, Economic Infrastructure Department, JICA

Note: All Sessions include Question/Answer

Master of Ceremony: **Dr. Jovito Santos** and **Ms. Guillerma Jayne Atienza**

Moderator of Question/Answer: **Mr. Adriano M. Doroy**

Attachment 2: Results of Discussions (January 17 & 18, 2013)

Session 1: Major Damages due to Large Scale Earthquake in the Philippines	**Mr. Edwin Matanguihan** Chief, Bridges Division, Bureau of Design, DPWH

- Question-1:

  Are bending failures also considered to be the type of pile failures although all presented pile failures were explained as shear failures?

  (Answer)

  Of course, pile failures can be caused by the combination of bending forces, shear forces, and axial forces, which can result to different types of failures. However, this presentation focuses only on the cases of shear failures, which is one of the common type of pile failures.

- Question-2:

  Liquefaction tends to occur at either intensity of over 7.0 or magnitude of over 5.0. Therefore, is it correct that liquefactions can occur at all the bridge sites whenever the sites are hit by large-scale earthquakes with intensity of over 7.0?

  (Answer)

  The answer is "No". The cause of liquefaction is not only the intensity of earthquakes but also soil conditions on sites. Therefore, we need the result of certain soil tests in order to find out the liquefaction potential of the sites.

Session 2: Earthquake Disaster Mitigation Strategies for Roads	**Dr. Shojiro KATAOKA** JICA Advisory Committee

- Question-1:

  Is the study on countermeasures against tsunami included in this project?

  (Answer)

  The answer is "No". The effective countermeasures for tsunami haven't been established even in Japan because the most prospective wall type prevention structures are quite costly. The effective prevention systems have been studied for future disasters.

- Question-2:

  How many percentages of roads and bridges damaged by earthquakes in the past are restored in Japan?

  (Answer)

  The status of the restorations depends on administrators of roads. However, in terms of arterial highways, almost ninety nine percent of roads and bridges are already restored.

Session 3: Outline of the Proposed Bridge Seismic Design Specifications	**Dr. Jovito Santos** JICA Study Team

- Question-1:

  Who will prepare the response acceleration spectrum for the new specifications, especially the localized one? I think PHIVOLCS is the suitable organization for the preparation.

  (Answer)

  In this project, the Study Team will prepare the seismic hazard maps which include peak ground acceleration based on the sources of earthquakes. Also, we prepare response spectrum using the localized conditions, based on the "Probabilistic Seismic Hazard Approach (PSHA)". We've been coordinating with PHIVOLCS for the acquisition of past earthquake data to be used for our data preparation. However, this project focuses on only limited areas for the generation of the data, so we need to coordinate with DPWH for the revision of the generated data in order to apply them to localized areas.

- Question-2:

  The 3rd NSCP[1)] prepared by ASEP is under review by their revision committee. It is important that ASEP and the Study Team coordinate for the harmonization of ASEP code and the new specifications to be prepared by the Study Team in this project. ASEP would like Dr. Jovito Santos to attend future ASEP meetings and workshops.

  1) NSCP: National Structural Code of the Philippines

  (Answer)

  Dr. Santos, as a representative of the Study Team, will attend future ASEP meetings for the harmonization of the bridge seismic design specifications.

Session 4: Development of Design Earthquake Motions for Bridges in the Philippines	**Dr. William Tanzo** JICA Study Team

- Question-1:

  Will the Study Team prepare more than one type of spectrum? For example, should the spectrum be categorized depending on soil conditions of the sites?

  (Answer)

  Yes, the Study Team will prepare response acceleration spectrum considering the soil type differences, based on the methodology used in the current AASHTO LRFD specifications.

- Question-2:

  Is it possible to use the past earthquake records for the development of the spectrum?

  (Answer)

  The answer is "No" because there's no recorded data of actual large scale earthquakes in the Philippines. That's why the Study team decided to use PSHA for the development of spectrum. However, we could use future large scale data for the modification of spectrum developed using PSHA.

Session 5: Evaluation Results and Selection of Objective Bridges for Outline Design in the Project	**Dr. Takayuki TSUCHIDA** JICA Study Team

- Question-1:

  Palanit Bridge is already under the process of bidding for rehabilitation works. Therefore, is it possible to replace Palanit Bridge with San Juanico Bridge, which needs some repair works?

  (Answer)

  The answer is "No". The objective of bridge selection in this project is to conduct outline design with appropriate improvement measures using the new bridge seismic design specifications. The objective is totally different from that of bridge selection for rehabilitation works.

- Question-2:

  Is Wawa Bridge planned to be replaced along with the existing bridge alignment, or is there any alternative plan for alignment change?

  (Answer)

  The alignment for the bridge replacement is still under consideration. The new alignment will be decided considering important factors such as cost-effectiveness and construction plan including detour.

- Question-3:

  Why isn't even one bridge in DPWH Region VI selected in this project although Region VI has the second highest number of bridges in the Philippines?

  (Answer)

  As for the target bridges outside Metro Manila, this project focuses only on the longer span bridges along with Pan-Philippine Highway, which can be used as an emergency route in case of large scale earthquakes.

Session 6: Seismic Retrofit of Concrete Piers	**Mr. Takahiro KAKUTA** The Overseas Construction Association of Japan, Inc. (OCAJI)

- Question-1:

  As for the Composite Material Sheet Jacket, how long can resin resist deterioration in shoreline areas after the installation?

  (Answer)

  It depends on the material to be chosen from many kinds of applicable materials. However, generally speaking, they're assumed to last within the range of twenty to thirty years.

- Question-2:

  As for the Composite Material Sheet Jacket, in what direction should carbon fiber sheets be installed for the purpose of seismic retrofit?

  (Answer)

If shear strength of piers needs to be improved, carbon fiber sheets should be installed in horizontal direction. Also, if bending strength of piers needs to be improved, they should be installed in a vertical direction.

- Question-3:

  As for column retrofit of pile bent piers, how should we decide the range of the column retrofit without pile caps which are supposed be the end point of the column jacketing?

  (Answer)

  In case of pile bent piers, we'd better apply both column retrofit and piles for reinforcement, adding pile caps which could be the boundary of columns and pile foundations.

Session 7: Introduction of Seismic Devices in Japan	**Mr. Tsuyoshi HASHIMOTO** **Mr. Atsushi KAJI** Japan Bridge Association (JBA)

- Question-1:

  What kind of earthquake data are used in Japanese bridge designs? For example, large scale earthquakes, or earthquake records acquired near target bridges?

  (Answer)

  Seismic wave data developed by Japanese Road Association (JRA) have been used for bridge seismic designs which require dynamic response analyses. The seismic wave types are categorized into three in accordance with three-soil classification criteria of JRA. Moreover, each soil-classified seismic wave is categorized into "plate boundary type (type I)" and "inland direct strike type (type II).

- Question-2:

  Are presented isolation devices, especially dampers, patented products? Also, when procuring the products, how could we choose the types of dampers? Are they supposed to be designed under given conditions, or are they factory-fabricated products?

  (Answer)

  Yes, many companies have patents, and dampers are factory-fabricated products.

Session 8: Seismic Retrofitting Practices on Bridge Foundations in Japan	**Mr. Hitoshi YAMAJI** The Overseas Construction Association of Japan, Inc. (OCAJI)

- Question-1:

  What is the best seismic retrofit scheme for bridges over active faults such as C-5 Bridge over Marikina Valley Fault in Metro Manila?

  (Answer)

  It is impossible to control the effects of active fault movements so we'd better design the alignments avoiding the active faults.

Session 9: Ground Improvement Countermeasures against Liquefaction in Japan	**Dr. Kenji HARADA** The Overseas Construction Association of Japan, Inc. (OCAJI)

- Question-1:

  What is the effective spacing of soil-cement columns against liquefaction?

  (Answer)

  Against liquefaction, the effective spacing of soil-cement columns is usually within the range of 1.5m to 2.0m, which is the result from selection of typical replacement ratio[2)]. However, we also have the choice to overlap soil-cement columns for better stability.

  2) Replacement Ratio = Total cross-section area of soil-cement columns / Target area for soil improvement

- Question-2:

  How can we determine liquefiable areas?

  (Answer)

  In Japan, liquefiable potential of bridge sites is evaluated by the JRA criteria, using the result of soil tests such as N-values, fine content, and mean grain diameter.

- Question-3:

  In case a 2km2 of a site is liquefiable and a target bridge is within the area, what is the minimum required range for soil improvement to prevent liquefaction-induced lateral spreading?

  (Answer)

  Ground within the range of 100m from the bridge site should be improved. The criteria were developed after the Hyogo-ken Nambu Earthquake in 1995.

Prepared by:

Dr. Shingo GOSE
Team Leader
JICA Study Team

Confirmed by:

Mr. Gilberto S. Reyes
Director
Bureau of Design, DPWH

Attachment 3: List of Attendance

ATTENDANCE SHEET

DPWH (The Project-Related)

No.	Name	Position/Organization	Signature
1	Raul C. Asis	Undersecretary, Technical Services, DPWH	
2	Luis A. Mamitag, Jr.	Assistant Secretary, Technical Services, DPWH	
3	Gilberto S. Reyes	Director, Bureau of Design, DPWH	
4	Adriano M. Doroy	OIC, Assistant Director, BOD, DPWH	
5	Edwin C. Matanguihan	OIC, Chief, Bridges Division, BOD, DPWH	
6	Aristarco M. Doroy	Chief, Project Assistance Division Area 1, BOC, DPWH	
7	Carolina S. Canuel	Chief, Development Planning Division, PS, DPWH	
8	Dominador P. Aquino	Chief, Planning and Programming Division, BOM, DPWH	
9	Reynaldo P. Faustino	Chief, Research and Development Division, BRS, DPWH	
10	Lydia G. Chua	Chief, Planning and Design Division, NCR, DPWH	
11	Guillerma Jayne T. Atienza	Senior Geologist, Survey and Investigation Division, BOD, DPWH	

ATTENDANCE SHEET

JICA (The Project-Related)

No.	Name	Position/Organization	Signature
1	Akio Yonezawa	Second Secretary, Economic Affairs (Infrastructure), Embassy of Japan	
2	Seitaro Tsukuda	Road Planning & Management Advisor from JICA, DPWH	
3	Shojiro Kataoka	Member, JICA Advisory Committee	
4	Yoshihiro Kakishita	Senior Advisor to the Director General, Economic Infrastructure Department, JICA Tokyo Office	
5	Takanori Fukui	Transportation and ICT Division 2 Economic Infrastructure Department, JICA Tokyo Office	
6	Kazushi Suzuki	Project Formulation Advisor, Economic Growth Section, JICA Philippine Office	
7	Floro O. Adviento	Program Manager, Economic Growth Section, JICA Philippine Office	
8	Grace Mirandilla Vela	Program Officer, Economic Growth Section, JICA Philippine Office	
9	Takayuki Tsuchida	Asst. Team Leader, JICA Study Team	
10	Toshio Ichikawa	Member, JICA Study Team	
11	Jovito Santos	Member, JICA Study Team	
12	Hiroaki Ohtake	Member, JICA Study Team	
13	Akira Takaue	Member, JICA Study Team	
14	Kei Katayama	Member, JICA Study Team	
15	Hiroshi Saito	Member, JICA Study Team	
16	William Tanzo	Adviser, JICA Study Team	
17	Takahiro Kakuta	Invited Lecturer, JICA Study Team	
18	Tsuyoshi Hashimoto	Invited Lecturer, JICA Study Team	
19	Atsushi Kaji	Invited Lecturer, JICA Study Team	
20	Hitoshi Yamaji	Invited Lecturer, JICA Study Team	
21	Kenji Harada	Invited Lecturer, JICA Study Team	
	Yasufumi WATANABE	JICA Study Team	
	HIROAKI IKI	SMCC	

ATTENDANCE SHEET

Others

No.	Name	Position/Organization	Signature
1	Hideo Nagao	Team Leader, JICA Project Team (TCP)	
2	Yoshinori Obata	Advisor from JICA, JICA Project Team (TCP)	
3	Violeta T. LIWANA	DPWH Regional Office No. Region III (TCP counterpart)	
4	Recy L. CALMA	DPWH Regional Office No. Region III (TCP counterpart)	
5	Charlito S. CARLOBOS	DPWH Regional Office No. Region VIII (TCP counterpart)	
6	Adelina P. GOMEZ	DPWH Regional Office No. Region VIII (TCP counterpart)	
7	Danilo C. PIOQUINTO	DPWH Regional Office No. Region XIII (TCP counterpart)	
8	Ruel M. NAZARENO	DPWH Regional Office No. Region XIII (TCP counterpart)	
9	SUSAN DOMANAIS	BDD	
10	Ruel Nazareno	DPWH XIII	
11	RUFINO VALIENTE	BOD.	
12	WENCESLAWA P. ABANADOR	NLR	
13	RICARDO C. DE VERA	NCR	
14	BANISTER B. BAGNAS	STRUCTURAL ENGR. / PERTCONSULT	
15	ELEONOR C. [illegible]	E-III, BRM / DPWH	
16	Aldin S. Albano	Engr II / DPWH 10	
17	Bonifacio R. Lora	Chief of Staff / DPWH10	
18	Erlinda Doliente	E-III / DPWH - CAR	
19	Emmanuel Adriano	E-II / DPWH	
20	WILFREDO WPG	E-V / BOD - DPWH	
21	ELIZALDE VOLEGAS	DPWH REGION IV-B	
22	CABUENAS, ALVIN C	DPWH - XI, D.C.	
23	IBRAHIM, MASHUD	MASTER II	DPWH XII
24	ALGIN GINGATAN	DPWH - XI, DC	
25	RAMOS, MUSTAPHA K.	DPWH XII, KCOR. CITY	

ATTENDANCE SHEET

Others

No.	Name	Position/Organization	Signature
26	Roy Andrew Molano	ENGR. II / DPWH REGION 4A	
27	ARLENE S. MAÑOSCA	ENGR II / DPWH REGION 4A	
28	JAYJONNER B. BIARES	E-III / DPWH-CAR	
29	Bobby Z. Fodulla	E-II / DPWH - BPS	
30	Ms. LUCILA PINERO	ENGR III / DPWH RPC - VI	
31	OLIVER E. TAMORA	ENGR II / DPWH REGO. VI	
32	RHETT WILLIAM VARONA	ENC II / DPWH R02	
33	JAN MICHAEL RAMOS	ENGR II DPWH R02	
34	REYNALDO M. BENITO	AVP/DCEO ENGG CORP	
35	ADELINA P. GOMEZ	ENGR-III - / DPWH - R.O. 8	
36	CHARLITO S. CABUDBOS	ENGR III - DPWH - V - 8	
37	HONEY PEÑAFLORIDA	SRS I - PHIVOLCS	
38	ROBERTO N TIGLAO	SCIENTIST - PHIVOLCS	
39	LINO M. REYNERA	ENGR. III - BRS-DPWH	
40	GERARD PATRICK J. MAYO	ENGR II / DPWH BAB	
41	BRIGILDO FABIA	ENGR II / DPWH - R05	
42	SALVADOR MARC R. BOTIN	ENGR II / DPWH R.O.V	
43	ERNALITA R. VILLARIN	ENGR. III / DPWH R.O. IX	
44	CARLOS M VILLAFAÑA	ASEP	
45	Jose Clifford Aquio	ENGR III / DPWH R.O. 7	
46	HORACE HOGAN C. FRIGILLANA	ENGR II / DPWH RO I	
47	CANDIDA RAMIREZ	ENGR IV	
48	RENATO B. GREGORIO	ENGR. II / DPWH R.O. 9	
49	FREDERICK FRANCIS M. SISON	E.H. SISON ENGINEERS CO. / DPWH	
50	Adam Abinales	ASEP / AAetc	

Attachment 4: Pictures

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

(5) 5th Seminar

The Project for Study on Improvement of Bridges
through Disaster Mitigating Measures
for Large Scale Earthquakes in the Republic of the Philippines

Minutes of Meeting
For
5th Seminar
On
The Project for Study on Improvement of Bridges
through Disaster Mitigating Measures
for Large Scale Earthquakes in the Republic of the Philippines

Date:	June 20 (Thu) and 21 (Fri), 2013
Venue:	Century Park Hotel
Objective:	1. To report on the progress of the project including seismic design spectrum for 7 bridges selected in this project 2. To introduce recommendations on improvement schemes (replacement/seismic retrofit) for the 7 selected bridges 3. To introduce seismic retrofit technologies and practices in Japan 4. To collect opinions and comments from participants regarding present issues, problems and concerns on the project
Participants: 80 attendees	1. DPWH Officers and Engineers 2. ASEP Engineers 3. Representative from PHIVOLCS 4. Local Consultants 5. Chairperson of JICA Advisory Committee 6. Representatives from JICA (Tokyo HQ) 7. Representatives from JICA Philippine Office 8. Representative from Embassy of Japan 9. JICA Experts 10. JICA TCP Members 11. Invited Lecturers/Presenters from Japanese Associations 12. JICA Study Team Members (Refer to Attachment 3)

Attachment 1: Seminar Program

Attachment 2: Results of Discussions

Attachment 3: List of Attendance

Attachment 4: Pictures

Attachment 1: Seminar Program (June 20 & 21, 2013)

Day 1: June 20, 2013 (Thu)		
9:00 – 9:30	**Registration**	
9:30 – 9:40	**Philippine National Anthem**	
9:40 – 9:50	**Welcome Address on behalf of JICA**	**Mr. Eigo AZUKIZAWA** Senior representative, JICA Philippine Office
9:50 – 10:00	**Welcome Address on behalf of DPWH**	**Mr. Usec. Raul C. ASIS** Undersecretary, DPWH
10: 00– 10:10	**Opening Remarks**	**Mr. Yukihiro TSUKADA** Chairperson, JICA Advisory Committee (JAC)
10:30 – 11:30	**Report on Japan Training**	**Ms. Yumi IWASHITA** JICA Study Team **Mr. Edwin C. MATANGUIHAN** BOD, DPWH **Mr. Aristarco M. DOROY** BOC, DPWH
12:50 – 13:40	**Session 1:** Outline of the Study	**Dr. Shingo GOSE** JICA Study Team
13:40 – 14:40	**Session 2:** Explanation of Draft Design of Earthquake Ground Motions for the Objective Bridges	**Dr. William TANZO** JICA Study Team
15:00 – 16:00	**Session 3:** Improvement Scheme for Guadalupe Bridge and Mawo Bridge and Retrofitting Outline Design of 1st Mandaue-Mactan Bridge and Lilo-an Bridge	**Dr. Takayuki TSUCHIDA** JICA Study Team
16:00 – 17:00	**Session 4:** Explanation of Countermeasure on the Bridge to be Replaced	**Dr. Akira TAKAUE** JICA Study Team

Day 2: June 21, 2013 (Fri)		
9:00 – 10:30	**Special Lecture:** Performance-Based Bridge Seismic Design Methodology	**Dr. Hisanori OTSUKA** Professor emeritus of Kyushu University
10:40 – 12:10	**Session 5:** Practice on Press-in Piling Technologies	**Mr. Tsunenobu NOZAKI** International Press-in Association (IPA)
13:10 – 14:40	**Session 6:** Practice on Bearings and Unseating Prevention System	**Dr. Shoichiro KATO** Japan Bridge Bearing Association (JBBA)
15:00 – 16:30	**Session 7:** Practice on Ground Improvement Under Limited Space	**Dr. Kenji HARADA** The Overseas Construction Association of Japan, Inc. (OCAJI)
16:30 – 16:50	**Fill out Questionnaire**	
16:50 – 17:00	**Wrap up**	**Mr. Gilberto S. REYES** Director, Bureau of Design, DPWH
17:00 – 17:10	**Closing Remarks**	**Mr. Eigo AZUKIZAWA** JICA Philippine Office

Attachment 2: Results of Discussions

Session 1: Outline of the Study	**Dr. Shingo GOSE** JICA Study Team

- Question-1:

  A large scale earthquake which hit Metro Manila area around Guadalupe Bridge about 300 years ago might have caused serious ground deformation. How will ground deformation effects caused by earthquakes be considered in this study?

  (Answer)

  Ground deformation of firm layers caused by earthquakes is small enough to neglect in bridge designs. On the other hand, liquefied layers could cause considerably large ground deformation, which could lead to serious foundation damages. Thus, consideration of liquefaction effect in bridges design has been emphasized in this study.

- Question-2:

  It seems to be very practical to adopt seismic design methodology of JRA code into Philippine bridge design code as an alternative option for bridge designs. What will be the revised Philippine code like?

  (Answer)

  Philippine seismic design code will be revised by harmonizing the latest AASHTO LRFD code with JRA code.

Session 2: Explanation of Draft Design of Earthquake Ground Motions for the Objective Bridges	**Dr. William TANZO** JICA Study Team

- Question-1:

  Doesn't results of 'Probabilistic Seismic Hazard Approach (PSHA)' need to be checked by 'Deterministic Data' such as actual earthquake records to confirm the reliability of analyses results?

  (Answer)

  Verification of analyses results by "Deterministic Data" is included in PSHA as a part of its process.

- Question-2:

  Why aren't historically accounted earthquake events directly used in PSHA?

  (Answer)

  Although there exists Philippine earthquake data of historically accounted events from 1600 to 1900 (mostly recorded at old churches that were built earlier all over the Philippines) as analyzed by Dr. Leyo Bautista, the data cannot be directly used in PSHA since it lacks completeness in the smaller events which will create bias in the PSHA analysis. Nevertheless, it is used to verify the delineation of assumed earthquake source modeling.

Session 3: Improvement Scheme for Guadalupe Bridge and Mawo Bridge and Retrofitting Outline Design of 1st Mandaue-Mactan Bridge and Lilo-an Bridge	**Dr. Takayuki TSUCHIDA** JICA Study Team

- Question-1:

  Why don't the retrofit plans in this study include the retrofit of superstructures?

  (Answer)

  Because the concept of seismic retrofit planning in this study is to protect bridges from fatal damages due to earthquake such as collapse of substructures and falling down of superstructures.

- Comment-1:

  In the comparison studies of improvement measures, the cost of the improvement measures is compared not with the actual cost but ratio. In order to prevent the change of target bridges' improvement measures (ether seismic retrofit or replacement) due to the inaccuracy of cost estimation, please show the actual estimated cost of the improvement measures.

Session 4: Explanation of Countermeasure on the Bridge to be Replaced	**Dr. Akira TAKAUE** JICA Study Team

- Question-1:

  Seismic technologies weren't introduced in the presentation on replacement plans. Are there any seismic technologies considered in the replacement plans, especially, for superstructures?

  (Answer)

  Today's presentation focuses on the concept of replacement plans for selection of bridge types. In our future study, 3-D dynamic analyses are assumed as a part of seismic design of target bridges. In addition, application of rubber bearings is planned for the replacement plans.

- Question-2:

  Improvement works of only five bridges were presented today. However, there are older bridges such as Ayala Bridge whose seismic capacity seems to be more problematic. Doesn't this study include such older bridges?

  (Answer)

  This study focuses on the bridges selected in preparatory JICA Study. Improvement planning of other older bridges will be undertaken by DPWH and local funds. For example, Ayala Bridge has been already under consideration of seismic retrofit by local funds.

Special Lecture: Performance-Based Bridge Seismic Design Methodology	**Dr. Hisanori OTSUKA** Professor emeritus of Kyushu University

- Question-1:

  Is there any practical method in Japan to define the skeleton curves of deteriorated pier columns?

  (Answer)

  The skeleton curves of deteriorated pier columns are defined with the following three steps. First of all, experiments are conducted to in order to figure out the characteristics of the deteriorated

pier columns. Second, analyses which include cracks in the model are conducted. Finally, the skeleton curves will be defined, comparing and verifying the results of experiments and analyses.

- Question-2:

  Do Japanese bridge design specifications have specific design criteria for countermeasures against liquefaction and tsunami?

  (Answer)

  Japanese bridge design codes have design criteria for liquefaction, but not for tsunami. Japan came across the importance of consideration for tsunami effects in bridge designs after Tohoku Earthquake in 2011, and it has been still under discussion since then.

Session 5: Practice on Press-in Piling Technologies	**Mr. Tsunenobu NOZAKI** International Press-in Association (IPA)

- Question-1:

  What is the minimum required overhead clearance for pile-driving work under existing superstructures?

  (Answer)

  It depends on what pile diameter is applied. However, in extreme cases, the minimum required overhead clearance is 2.2m from pile head to bottom surface of the existing superstructures. Additionally, the minimum required overhead clearance for standard Tubular Piler and Gyro Piler can be 3.0m to 4.0m between the top of the piles and the overhead clearance.

- Question-2:

  If construction sites have boulders, what pile-driving mode will be applied? Will any additional machine be required under such conditions? Also, is pre-augering necessary?

  (Answer)

  Boulders can't be penetrated with typical 'Press-in Piling Technologies'. Accordingly, Super Crush Mode or Gyropress Method will be appropriate. As Super Crush Mode is simultaneous augering method, pre-augering is not required. However, if the boulders are very occasional, pre-augering may be efficient with Standard Press-in method.

Session 6: Practice on Bearings and Unseating Prevention System	**Dr. Shoichiro KATO** Japan Bridge Bearing Association (JBBA)

- Question-1:

  Large-scale earthquakes could cause longer vibrations in bridge structures. In that case, before application of seismic isolation devices, the possibility of resonance between bridge structure vibration and ground motion should be considered. Could you elaborate the amount of resonance effect in such cases?

(Answer)

Isolation devices are basically applied to bridges on the firm ground where isolated structures with longer period can be separated from ground motion with short period. However, there're possibilities of resonance for bridges on the soft ground where seismic waves are magnified and period of ground motion could be synchronized with that of isolated structures. Therefore, the application of isolation devices must be well studied when the sites have soft layers and liquefiable layers where period of ground motion could be magnified.

- Question-2:

  Are all the presented products patented?

  (Answer)

  Yes, they are. Designers need to choose appropriate products from product lists depending on design conditions. Product lists will be provided to customers if they are requested.

Session 7: Practice on Ground Improvement Under Limited Space	**Dr. Kenji HARADA** The Overseas Construction Association of Japan, Inc. (OCAJI)

- Question-1:

  What is the ratio of soil mixture for soil improvement works?

  (Answer)

  It depends on what soil improvement methods are applied. In case of static injection method with soil mortar, which is one of typical soil improvement methods, the mixture ratio of soil and additional materials is as follows;

  - 1360kg/m3 of aggregate,
  - 160kg/m3 of soil mortar, and
  - 426kg/m3 of water in 1m3 of soil.

- Question-2:

  What is the depth limitation of the soil improvement works?

  (Answer)

  For the countermeasure against liquefaction, soil improvement works are planned with maximum depth of 20m in Japan. This is because liquefaction is defined to be effective on foundation structures within the range of 20m depth in JRA code.

Prepared by:

Dr. Shingo GOSE
Team Leader
JICA Study Team

Confirmed by:

Mr. Adriano DOROY
OIC- Asst. Director
Bureau of Design, DPWH

Attachment 3: List of Attendance

DPWH (The project-related)

No.	Name	Position/Organization	Signature
1	Rogelio L. Singson	Secretary, DPWH	
2	Raul C. ASIS	Undersecretary, Technical Services, DPWH	
3	Maria Catalina E. Cabral	Assistant Secretary, Planning Services, DPWH	
4	Gilberto S. Reyes	Director, Bureau of Design, DPWH	
5	Adriano M. Doroy	OIC, Assistant Director, BOD, DPWH	
6	Edwin C. Matanguihan	OIC, Chief, Bridges Division, BOD, DPWH	
7	Aristarco M. Doroy	Chief, Project Assistance Division Area 1, BOC, DPWH	
8	Carolina S. Canuel	Chief, Development Planning Division, PS, DPWH	
9	Dominador P. Aquino	Chief, Planning and Programming Division, BOM, DPWH	
10	Reynaldo P. Faustino	Chief, Research and Development Division, BRS, DPWH	
11	NEMESIO C. CAEG Lydia G. Chua	Chief, Planning and Design Division, NCR, DPWH	
12	Guillerma Jayne T. Atienza	Senior Geologist, Survey and Investigation Division, BOD, DPWH	

The Project for Study on Improvement of Bridges
through Disaster Mitigating Measures
for Large Scale Earthquakes in the Republic of the Philippines

JICA/JICA Study Team (The project-related)

No.	Name	Position/Organization	Signature
13	Yukihiro Tsukada	Chairperson, JICA Advisory Committee	
14	Akio Yonezawa	Second Secretary, Economic Affairs (Infrastructure), Embassy of Japan	
15	Seitaro Tsukuda	Advisor from JICA Road Planning & Management, DPWH	
16	Takanori Fukui	Transportation and ICT Division 2 Economic Infrastructure Department, JICA Tokyo Office	
17	Eigo Azukizawa	Senior representative, Economic Growth Section, JICA Philippine Office	
18	Kazushi Suzuki	Project Formulation Advisor, Economic Growth Section, JICA Philippine Office	
19	Floro O. Adviento	Program Manager, Economic Growth Section, JICA Philippine Office	
20	Grace Mirandilla Vela	Program Officer, Economic Growth Section, JICA Philippine Office	
21	Shingo Gose	Team Leader, JICA Study Team	
22	Takayuki Tsuchida	Asst. Team Leader, JICA Study Team	
23	Jovito Santos	Member, JICA Study Team	
24	Ryuichi Ueno	Member, JICA Study Team	
25	Yasufumi Watanabe	Member, JICA Study Team	
26	Hiroaki Ohtake	Member, JICA Study Team	
27	Yumi Iwashita	Member, JICA Study Team	
28	Akira Takaue	Member, JICA Study Team	
29	Kunihiko Harada	Member, JICA Study Team	
30	Kei Katayama	Member, JICA Study Team	
31	Hiroshi Saito	Member, JICA Study Team	
32	William Tanzo	Member, JICA Study Team	
33	Hisanori Otsuka	Invited Lecturer, JICA Study Team	
34	Tsunenobu Nozaki	Invited Lecturer, JICA Study Team	
35	Shoichiro Kato	Invited Lecturer, JICA Study Team	
36	Kenji Harada	Invited Lecturer, JICA Study Team	

CHIGI OKAJIMA Sumitomo Mitsui Const.

KENICHI SAITO OCAJI. (SMCC)

Yasuhisa Hidaijima

~~HISANORI~~

HISANORI YAEGASHI GIICEN

Yuya Takagi ~~OCAJE~~ JICA Ph.

Participants

No.	Name	Position/Organization	Signature
37	~~Ryoichi Yamasaki~~	Team Member, JICA Project Team (TCP)	
38	~~Yoshinori Obata~~	Advisor from JICA, JICA Project Team (TCP)	
39	~~Feliciano Empio~~	Advisor from JICA, JICA Project Team (TCP)	
40	Frederick Francis Sison	E.H Sison Engineering Company	
41	Guillerma Mina	Angel Lazaro and Associates	
42	Vinci Nicholas R. Villaseñor	ASEP	
43	Adam Abinales	ASEP	
44	Danilo A. Domingo	ASEP	
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48	Henremagne Peñarubia	PHIVOLCS	
49	Wenceslawa P. Abanador	DPWH- NCR	
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54	Napoleon Jesus Nazareno Jr.	DPWH- Region I	
55	Rhett Willef Varella	DPWH- Region II	
56	Edwin Galano	DPWH- Region II	
57	Mark Abay	DPWH- Region III	
58	Recel Cabio	DPWH- Region III	
59	Rey Andrew Morano	DPWH- Region IV-A	
60	Arlene Sioco-Mañosca	DPWH- Region IV-A	
61	Juliet C. Calvo	DPWH- Region IV-B Engr. III	
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63	Mark Salvador	DPWH- Region V	
64	Erwin Macatingrao	DPWH- Region V	

CARLOS VILLARAZA ASEP

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70	Rhodel Canillas	DPWH- Region VIII	
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72	Paterno Cadungog	DPWH- Region IX	
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74	Jessie Tutor	DPWH- Region X	
75	Algin Gingatan	DPWH- Region XI	
76	Arnel Bernardino	DPWH- Region XI	
77	Mashud Maftor Ibrahim	DPWH- Region XII	
78	Arnold Ulangkaya	DPWH- Region XII	
79	Glenn Castañeda	DPWH- Region XIII	
80	Lloyd Cedro	DPWH- Region XIII	
81	Marina P. Cognita	DPWH – R X II	
82	ALGIE B. VILLA	DPWH - RXII	
83	Danilo Basicarin	DPWH R-7	
84	FEODULFO ANTONIANO	DPWH – BRS	
85	A-bi. Day	DPWH Rec. Officer	
86	JACINTO MENDOZA	BOC PAD 1	
87	Feliciano P. Cardi	ASST. Engr. / JICA TCP II	
88	SUSAN [illegible]	ENGR. III / BOD, DPWH	
89	[illegible] OBAZA	JICA TCP	
90	Jason Guzman	PICE member	
91	Wilhelmina Andrade	DPWH- BOD	
92	DENNIS P ABAGON	DPWH- BOD	

PAGURIGAN REC C. ASEP

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94	KRISTOFER BRYAN SY		
95	[illegible] G. [illegible]	DPWH – CAR	
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Attachment 4: Pictures

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

(6) 6th Seminar

The Project for Study on Improvement of Bridges
through Disaster Mitigating Measures
for Large Scale Earthquakes in the Republic of the Philippines

Minutes of Meeting
For
Training/Workshop
For
The Proposed DPWH LRFD Bridge Seismic Design Specifications

Date:	November 13 (Wed) and 14 (Thu), 2013
Venue:	The Bayleaf
Objective:	1. To introduce the provisions and requirements of the proposed DPWH Bridge Seismic Design Specifications (BSDS) to the DPWH bridge design engineers, 2. To introduce the new bridge operational classification and seismic performance requirements of bridges in the Philippines, 3. To introduce the proposed seismic hazard maps (PGA and response spectral coefficient maps) for use in the design of DPWH bridges, 4. To provide examples to the participants on the application of the BSDS to bridge design, and 5. To gather opinions/comments from the participants on the use of the BSDS.
Participants: 38 attendees	1. DPWH Officers and Engineers 2. Local Consultants 3. Representatives from JICA Philippine Office 12. JICA Study Team Members (Refer to Attachment 3)

Attachment 1: Seminar Program

Attachment 2: Results of Discussions

Attachment 3: List of Attendance

Attachment 4: Pictures

Attachment 1: Training/Workshop Program (November 13 & 14, 2013)

DAY 1– November 13, 2013 (Wed)		
Time	**Topic**	**Person Assigned**
09:00 – 09:30	Program Registration	- Ms. Minami Kato
09:30 – 10:00	Philippine National Anthem Program Orientation Opening Remarks • JICA • DPWH Introduction of Participants	 - Dr. Jovito C. Santos - Mr. Floro O. Adviento (JICA) - Usec. Raul C. Asis - Asst. Dir. Adriano M. Doroy
10:00 – 10:30	[D1-01] Background and Outline of BSDS • Background • Introduction: Philippine Seismicity and Seismic Vulnerability of Bridges • Policies on Development of BSDS • Outline of the Proposed BSDS	 - Dr. Shingo Gose - Dr. Jovito C. Santos
11:30 – 10:50	[D1-02] BSDS Section 1: Introduction • Purpose of Specifications • Scope of Specifications • Seismic Design Philosophy • Seismic Design Flowcharts	- Dr. Jovito C. Santos
10:50 – 11:00	**Coffee Break**	-
11:00 – 12:00	[D1-03] Basics of Structural Dynamics and Earthquake Engineering • Structural Vibration Characteristics (Fundamental periods and mode shapes) • SDOF and MDOF, Free/Forced Vibration, Damping • Earthquake Ground Motion and Loading	- Dr. Takayuki Tsuchida
12:00 – 13:00	- **Lunch Break**	
13:00 – 13:30	[D1-04] BSDS Section 3: General Requirements • Applicability, Operational Class and Seismic Performance • Seismic Hazard and Site Effects • Seismic Performance Zone and R-Factors	- Dr. Jovito C. Santos
13:30 – 14:30	[D1-05] Development of Design Spectral Acceleration Mapping for Philippine Bridges – Part 1 • Site-Specific Design Spectra for 7 Aseismic-Improvement Objective Bridges for Use in Package B and Package C • Spectral Acceleration Maps for the Philippines for Draft BSDS	- Dr. William T. Tanzo
14:30 – 14:45	**Coffee Break**	
14:45 – 15:00	[D1-06] BSDS Section 4: Analysis Requirements • Single Span and Multi-span Bridges • Mathematical and Dynamic Analysis Model • Other Requirements	- Dr. Jovito C. Santos
15:00 – 16:00	[D1-07] Example of Analysis Model of a Bridge Including Soil Springs	- Mr. Hiroaki Ohtake - Dr. Akira Takaue
16:00 – 17:00	[D1-08] Development of Design Spectral Acceleration Mapping for Philippine Bridges – Part 2 • Site-Specific Design Spectra for 7 Aseismic-Improvement Objective Bridges for Use in Package B and Package C • Spectral Acceleration Maps for the Philippines for Draft BSDS	- Dr. William T. Tanzo
17:00 – 17:15	Wrap-up for Day 1	- Asst. Dir. Adriano M. Doroy

DAY 2 – November 14, 2013 (Thu)		
Time	**Topic**	**Person Assigned**
09:00 – 09:30	[D2-01] BSDS Section 5: Design Requirements • Combination of Forces • Design Forces for Seismic Zones • Foundation Requirements • Bearing Support System	- Dr. Jovito Santos
09:45 – 10:30	[D2-02] Example of Design of Pier and Foundation	- Mr. Hiroaki Ohtake
10:30 – 10:45	**Coffee Break**	
10:45 – 11:00	[D2-03] BSDS Section 6: Effects of Seismically Unstable Ground • Soil Liquefaction • Liquefaction-induced Lateral Spreading	- Dr. Jovito Santos
11:00 – 11:30	[D2-04] Example of Foundation Design Considering Ground Liquefaction	- Mr. Hiroaki Ohtake
11:30 – 12:30	- **Lunch Break**	
12:30 – 12:45	[D2-05] BSDS Section 7: Unseating Prevention System • Seat Length, Unseating Prevention Device, Settlement Limiting Device, Displacement Limiting Devise	- Dr. Jovito Santos
12:45 – 13:45	[D2-06] Example of Unseating Prevention System Design	- Dr. Akira Takaue
13:45 – 14:00	[D2-07] BSDS Section 8: Requirements for Seismically Isolated Bridges • Modelling and Performance Requirements and Verification	- Dr. Jovito Santos
14:00 – 14:15	- **Coffee Break**	
14:15 – 15:45	[D2-08] Design Example of Multi Span Continuous Bridge	- Mr. Kei Katayama
15:45 – 16:00	Feedback/Training Evaluation	- Ms. Minami Kato
16:00 – 16:15	Awarding of Certificates	- Asst. Dir. Adriano M. Doroy - JICA - Dir. Gilberto S. Reyes
16:15 – 16:30	Closing Remarks • JICA • DPWH	 - JICA - Dir. Gilberto S. Reyes
16:30	Get-together	- Ms. Grace Loterte

Attachment 2: Results of Discussions

Session D1-4: BSDS Section-3 (General Requirements)	Dr. Jovito Santos JICA Study Team

- Question-1: After large-scale earthquakes, is it possible to pass bridges whose seismic performance level is 3 (SPL-3) without any repair?
- Answer: The answer is no. The definition of SPL-3 is "Performance level of a bridge to ensure safety against collapse during earthquakes". In other words, structures don't collapse during earthquakes but some damages are allowed as design concept. Therefore, the damaged structures will need major repair or strengthening works before it becomes passable again.
- Question-2: If bridge span length is more than 150m, which is the limit length as conventional bridge, what specific measures should be taken besides basic requirements in BSDS?
- Answer: The DPWH shall require additional analysis and design required for non-conventional bridges suitable for the bridge type. This may require site specific investigation to generate earthquake ground motion or more sophisticated modeling and analysis.
- Question-3: Is the definition of soil such as clay or sand (alluvial or diluvial) clearly specified in BSDS? If not, interpretation of soil type classification tends to depend on the engineers' experience.
- Answer: The definition of soil type specified in the BSDS is described as alluvial or diluvial which can be quantified based on the range of "the characteristic value of ground, T_G" which is calculated using N-values. Unlike the present classification based on qualitative definitions, the BSDS soil classification can be done without any bias or different interpretations among engineers since the determination of the ground type is a qualitative approach.

Session D1-5: Development of Design Spectral Acceleration	Dr. William Tanzo JICA Study Team

- Question-1: If earthquakes occur twice at the same site, is the epicenter of the said earthquakes the same?
- Answer: The epicenter of two earthquakes is different even if the source/rupture of the earthquake are the same.
- Question-2: What's the difference in definition between recurrence interval and return period?
- Answer: "Recurrence interval" is the average time span between earthquake occurrences on a fault or in a source zone while "return period" is the probability in any given year that ground motions of a given intensity will be exceeded.
- Question-3: Is it possible to design bridges that can survive the vertical ground motion caused by active fault movements?
- Answer: It may be futile to build bridges strong enough to resist active fault movements. If active faults are found, we'd better stay away from them in planning bridges.

Session D1-7: Example of Analysis Model of a Bridge Including Soil Springs	Mr. Hiroaki Ohtake Dr. Akira Takaue JICA Study Team

- Question-1: Should the spring constant, Kv be applied without fixing the vertical movement of the piles if the pile length is short?
- Answer: If there's much difference in analyses results between model with Kv and model with Fixity, Kv should be applied. In addition to the comparison of the 2 analysis cases, applicability of spread footing should be considered.
- Question-2: Please explain the acquisition process of different damping factors applied in spectrum resulting from modal analysis.
- Answer: Damping factors in resulted spectrum are automatically calculated for each vibration mode of structures in the process of multimode spectral analysis. The difference of factor values occurs because of the application of different damping ratios to different materials.

Session D1-8: Development of Design Spectral Acceleration Mapping for Philippine Bridges – Part 2	Dr. William Tanzo JICA Study Team

- Question-1: Is 30m-depth of SPT good enough to determine the value of acceleration coefficient, PGA?
- Answer: In order to determine PGA values for site-generalized design spectrum, 30m-depth of SPT is good enough. However, for site-specific design spectrum, deeper SPT could be needed, depending on the site conditions.
- Question-2: Is there any established procedure to update contour maps?
- Answer: If we get more trench data, we can update the analysis model for earthquake recurrence model using characteristic earthquake, refining parameters already incorporated in the models.

Session D2-1: BSDS Section 5: Design Requirements	Dr. Jovito Santos JICA Study Team

- Question: There seems to be no provisions for design of expansion joints. Will it be included in BSDS in the future?
- Answer: Since AASHTO provides the requirements for expansion joints, it is not included in the proposed BSDS.

Session D2-2: Example of Design of Pier and Foundation	Mr. Hiroaki Ohtake JICA Study Team

- Question-1: Please explain the determination process of modulus of deformation, "α*Eo". Are the values based on soil test results?
- Answer: In the example explained today, value of "α*Eo" is decided using formula Eo=2800*(N-value) multiplied by coefficient "α" defined in BSDS.

- Question-2: What is the appropriate foundation type as a countermeasure against forces caused by liquefaction or very soft clay layers?
- Answer: Large diameter concrete pile foundation is effective. Also, if the force is too large for foundation to resist, soil improvement is recommended for additional measure besides the application of concrete piles.

Session D2-4: Example of Foundation Design Considering Ground Liquefaction	**Mr. Hiroaki Ohtake** JICA Study Team

- Question-1: Is it possible for engineers to determine the cause of structural damage as liquefaction-induced lateral spreading by ocular inspection, without any structural drawings and soil data of the site?
- Answer: It's impossible to determine the cause of damage of underground structures just by ocular inspection. At least, soil data of the site is necessary to study liquefaction potential at the site.
- Question-2: Please explain the difference of foundation scale between structure designed by JRA code and that designed by LRFD code although BSDS adopts the foundation design methodology of JRA.
- Answer: The difference hasn't been studied yet. That is one of the issues to be studied in the next phase of this project.

Session D2-6: Example of Unseating Prevention System Design	**Dr. Akira Takaue** JICA Study Team

- Question-1: Do we need to order products of unseating prevention devices to Japan for their application?
- Answer: The devices can be produced in the Philippines because the mechanism of devices applied here is same as that of Japanese products.
- Question-2: With regards to the slack of unseating prevention devices, when do the devices begin to function?
- Answer: The devices function when horizontal displacement of bridge structures reaches 75% of the slack.

Session D2-7: BSDS Section 8: Requirements for Seismically Isolated Bridges	**Dr. Jovito Santos** JICA Study Team

- Question-1: What is the definition of "Long period" and "Short Period"?
- Answer: Practically, natural periods of 0.2-0.6 seconds are regarded as "Short Period" while "Long period" is considered to be more than 1.0 second.
- Question-2: Which governs design of structures either bearing strain limit or P-⊿effect?

- Answer: It depends on the design conditions. Both requirements should be verified since it could govern the scale of structures.

Session D2-8: Design Example of Multi Span Continuous Bridge	**Mr. Kei Katayama** JICA Study Team

- Question: In the presentation, 1% of pile diameter is applied as displacement limit of pile foundations. What is the reason of application of 1%? Is it explained in BSDS?
- Answer: BSDS recommends the reference displacement to be 1% of the foundation width (≤ 50mm) and is taken as the allowable displacement of substructure (taken from JRA). It is used in the example to limit substructure displacement at the elastic range, although it could reach 5% of foundation width during an earthquake.

Other issues during Workshop

- Please include the issue re: Orthogonal combination of seismic forces
- Also the recommendation to modify/ change the "cover design"
- Also verification on use of JRA pile formula with the AASHTO provisions.

Prepared by:

Dr. Shingo GOSE
Team Leader
JICA Study Team

Confirmed by:

Mr. Gilberto S. REYES
Director
Bureau of Design, DPWH

Attachment 3: List of Attendance

ATTENDANCE SHEET

DPWH (The project-related)

No	Name	Position/Organization	Signature
1.	Raul C. Asis	Undersecretary Technical Service	
2.	Gilberto S. Reyes	Director Bureau of Design, DPWH	
3.	Adriano M. Doroy	OIC, Assistant Director Bureau of Design	
4.	Edwin C. Matanguihan	OIC, Chief Bridges Division, BOD	
5.	Aristarco M. Doroy	Chief Project Assistance Division Area 1, BOC, DPWH	
6.	Dominador P. Aquino	Chief Planning and Programming Division, BOM, DPWH	
7.	Carolina S. Canuel	Chief Development Planning Division, PS, DPWH	
8.	Reynaldo P. Faustino	Chief Research and Development Division, BRS, DPWH	
9.	Lydia G. Chua	Chief Planning and Design Division, NCR, DPWH	
10.	Guillerma Jayne T. Atienza	Senior Geologist Survey and Investigation Division, BOD, DPWH	

JICA/ JICA Study Team (The project-related)

No.	Name	Position/Organization	Signature
11.	Floro O. Adviento	Program Manager Economic Growth Section, JICA Philippine Office	
12.	Grace Mirandilla Vela	Program Officer Economic Growth Section, JICA Philippine Office	
13.	Shingo Gose	Team Leader JICA Study Team	
14.	Takayuki Tsuchida	Assistant Team Leader JICA Study Team	
15.	Jovito Santos	Member JICA Study Team	
16.	Hiroaki Ohtake	Member JICA Study Team	
17.	Minami Kato	Member JICA Study Team	
18.	Akira Takaue	Member JICA Study Team	
19.	Kei Katayama	Member JICA Study Team	
20.	William Tanzo	Member JICA Study Team	

Participants

No.	Name	Position/Organization	Signature
21.	Wenceslawa Abanador	DPWH- NCR	
22.	Edgar Enriquez	DPWH-CAR	
23.	Jose Clifford T. Aquino	DPWH- Region I	
24.	Edwin G. Galano	DPWH- Region II	
25.	Mark R. Abay	DPWH- Region III	
26.	Arlene S. Mañosca	DPWH- Region IV-A	
27.		DPWH- Region IV-B	
28.	Salvador Mark Botin	DPWH- Region V	
29.		DPWH- Region VI	
30.	Danilo R. Paricaran	DPWH- Region VII	
31.		DPWH- Region VIII	
32.	Paterno C. Cadungog Jr.	DPWH- Region IX	
33.	Liberty M. Vallar	DPWH- Region X	
34.	Algin Gingatan	DPWH- Region XI	
35.	Mashud Mastor j. Ibrahim	DPWH- Region XII	
36.	Danilo C. Pioquinto	DPWH- Region XIII	
37.		Pertconsult International	
38.	Clarisse Salcedo	DCCD Engineering Corporation	
39.		United Technologies Consolidated Partnership	
40.		J.F Cancio & Associates	
41.	Guillermo Mina	Angel Lazaro & Associates	
42.	Frederick Francis M. Sison	E.H Sison Engineers, Co.	
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44	MARIANO S. FLORES,	DPWH, BOD	
45.	Mel Harvey A. Gonzales	DPWH, BOD	
46.	SUSAN D. DOMANAIS	DPWH, BOD	
47.	Arnold O. Dacuag	DPWH, CAR	
48	REMEGIO M. MORANTTE	DPWH, BRS	
49	VICENTE B. MIRANDA, JR	DPWH, BRS	

Attachment 4: Pictures

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

2. Discussion

(1) 1st Meeting/Discussion

Meeting/Discussion (DPWH-JICA Study Team)

Policy on Development of Bridge Seismic Design Specifications

Date and Time : August 13, 2012 2:00pm – 5:00pm
Venue : DPWH Conference Room

1. Purpose:

(a) To have a common consensus on the policy for the development of bridge seismic design specifications.
(b) To compare the present seismic performance criteria of DPWH, AASHTO and JRA and to discuss possible target seismic performance criteria for the DPWH specifications.
(c) To introduce a development method for design seismic ground motion for bridges and the development of design response acceleration spectra.
(d) To discuss possible soil type classification for seismic design.
(e) To present other policy items for further discussions.

2. Participants:

1. DPWH Counterparts/TWG Members
2. BOD bridge design engineers
3. JICA Study team

3. Agenda

Items

- Opening and Acknowledgement of Participants
- Discussion Items:
  - (1) Reference Design Specifications
  - (2) Seismic Performance Criteria
  - (3) Design Seismic Ground Motion
    - ➢ Peak Ground Acceleration
    - ➢ Design Seismic Acceleration Spectra
    - ➢ Ground/Soil Type Classification
  - (4) Other Items for Further Discussions
    - ➢ Consideration of Ground Liquefaction
    - ➢ Design of Foundation
    - ➢ Unseating Prevention
    - ➢ LRFD Design Seismic Acceleration Response Spectra
    - ➢ Force-based vs Displacement-based Approach
  - (5) Seismic Hazard Analysis Approach to Development of Seismic Design Earthquake Motion in the Philippines
- Next Meeting and Agenda
- Closure

Minutes of Meeting
For
1st TWG-JICA Study Team Discussion
On
Policy for the Development of DPWH Bridge Seismic Design Specifications (BSDS)

Date & Time:	August 13, 2012, 2:00pm-5:00pm
Venue:	DPWH BOD Conference Room, 4th floor
Objectives:	Discussion on Policy for the Development of DPWH Bridge Seismic Design Specifications (BSDS)
Participants:	1. DPWH Counterparts/ TWG Members 2. BOD Bridge Design Engineers 3. JICA Study Team Members (See attached List of Attendees)

Meeting Agenda:

1. Opening and Acknowledgement of Participants
2. Reference Design Specifications
3. Seismic Performance Criteria (SPC)
4. Design Seismic Ground Motion
   - Peak Ground Acceleration
   - Design Seismic Acceleration
   - Ground/ Soil Type Classification
5. Other Items for Further Discussions
   - Consideration of Ground Liquefaction
   - Design of Foundation
   - Unseating Prevention/ Fall-down Prevention
   - LRFD Design Seismic Acceleration Response Spectra
   - Force-based vs Displacement-based Approach
6. Closing Remarks

The results of discussions are shown in Attachment 1.

Attachment 1: Results of 1st TWG-JICA Study Team Discussion (August 13, 2012)

Minutes	Action

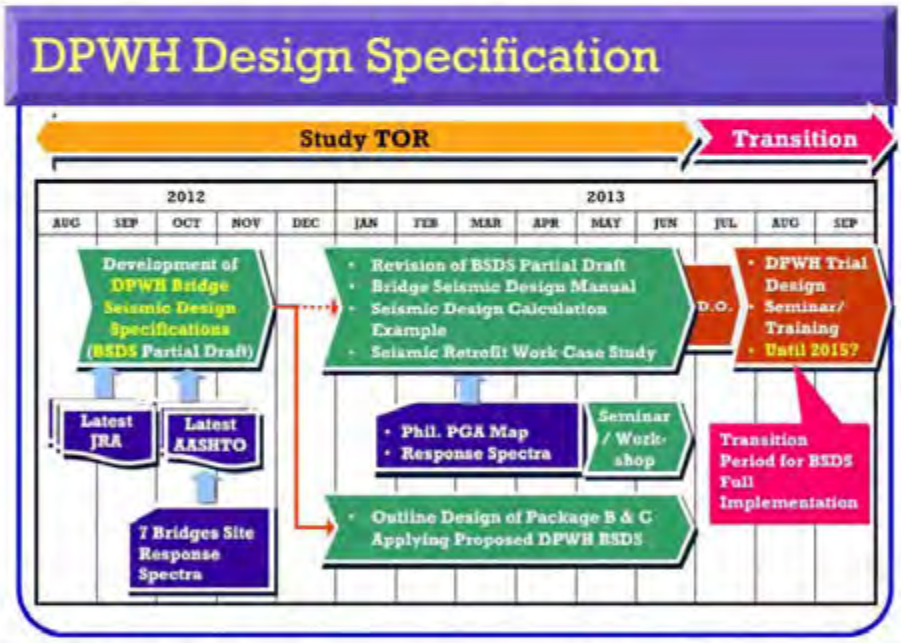
1. Opening

- The meeting started at 2:00pm with opening remarks from Asist-Dir. Mr. Doroy.

2. Reference Design Specifications

2.1 Development Process of DPWH Bridge Seismic Design Specifications (BSDS)

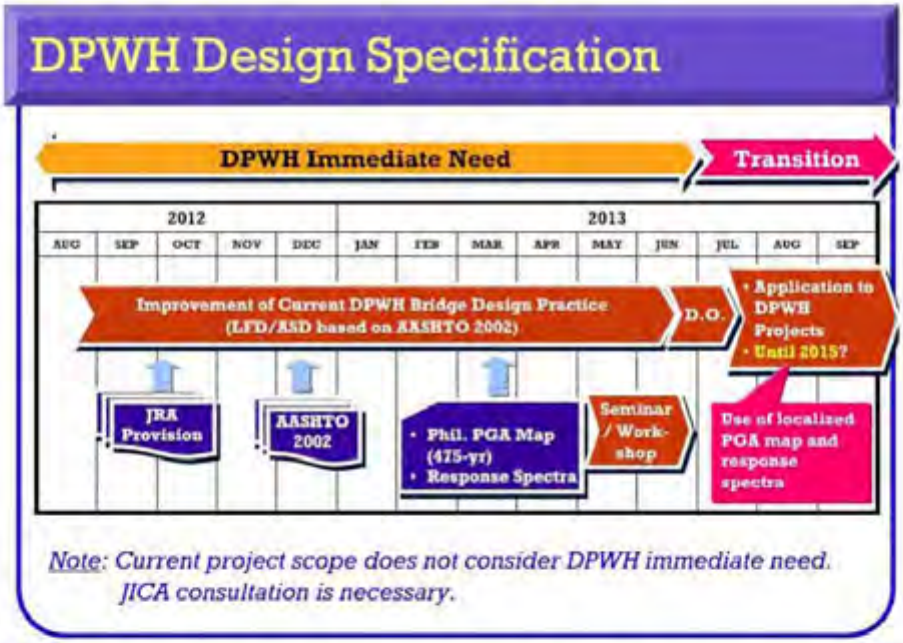
- DPWH Counterparts (hearafter called as DPWH) agreed with the suggested study flow on Development Process of DPWH Bridge Seismic Design Specifications (BSDS) shown in Figure-1.



* Initial draft of the BSDS will be prepared by Dec. 2012 with site specific response spectra for the outline design of seven (7) bridges.
* Final draft of BSDS including contours of PGA and spectra will be prepared by June 2013.
* Transition period will be set after the submission of draft BSDS to prepare and orient DPWH for the new BSDS: DPWH will continue with the current design practice based on "AASHTO Standard Specifications for Highway Bridges 17th Ed., 2002" during the period.

Figure-1 Development of DPWH Bridge Seismic Design Specifications

Minutes	Action
2.2 Work Plan for DPWH's Immediate Needs	
• JICA Study Team (hearafter called as Study Team) suggested the development of contour maps of PGA (475-yr return period) in this project since DPWH will continue to use the current design practice based on "AASHTO LFD, 2002" during the transition period. The suggested plan for the immediate needs is shown in Figure-2.	Study Team will provide "the 475-yr return PGA contour maps" and "the localized response spectra" by June 2013 (the end of the project).
• In this regard, Study Team informed that the work scope for DPWH's immediate need isn't considered in the current project scope.	Study Team will consul with JICA about the plan.



* DPWH's immediate need will be a contour map of PGA (475-yr return period), localized response spectra based on local soil conditions and JRA provisions (including liquefaction evaluation) applicable to the current design practice

Figure 2 DPWH current design practice need for seismic design

2.3 Technical Assistance during the Transition Period

- Study Team emphasized the importance of an institutionalization of the new BSDS with DPWH during the transition period to prepare and orient DPWH for the new BSDS: Training/workshops for DPWH bridge engineers (including regional offices), DPWH trial design, preparation of standard drawings, etc. will be necessary.

Minutes	Action
• In this regard, DPWH requested Study Team to provide the technical assistance during the transition period: This isn't included in the present scope of the project.	Study Team will consul with JICA about the request.
2.4 Approval and Application of the new BSDS	
• Study Team confirmed that the new BSDS will be implemented with the issue of a Department Order (D.O.). The timing of full implementation was indicated to be during the transition period: From 2013 to 2015.	
• Study Team confirmed that the new BSDS will be used in the seismic design part of the full bridge design specifications which will be developed by DPWH under the NRIMP (WB funded) project.	
• Study Team confirmed that the implementation of the transition period for the new BSDS (assisted by Study Team) will be done in parallel with the use of the current DPWH bridge design practice for its on-going bridge design projects: Once DPWH has institutionalized the new BSDS, it will be fully utilized for all bridge projects.	
3. Seismic Performance Criteria (SPC)	
• DPWH agreed with the SPC proposed by Study Team: The new BSDS will follow the AASHTO 2012 LRFD force-based (R-factor) method requirements with one level of design earthquake.	
4. Design Seismic Ground Motion	
4.1 Peak Ground Acceleration (PGA)	
• DPWH agreed with the Study Team's proposal to develop PGA.	
4.2 Design Seismic Acceleration	
• DPWH agreed with the Study Team's proposal to develop design seismic acceleration using probabilistic approach.	Study Team will develop site specific design spectra for the outline design of seven (7) bridges under Package-B & C.

Minutes	Action
• DPWH agreed to decide the use of either the 475-yr or 1,000-yr return period as the design earthquake: The return period will be decided once the contour maps are prepared, considering the balance between safety and economics.	
4.3 Ground/ Soil Type Classification	
• DPWH agreed to adjust the present design response spectra used by DPWH (based on the AASHTO 2002 LFD Specifications) following the JRA soil classification which is more appropriate for this design method.	
• Study Team suggested reviewing the applicability of JRA soil classification for the new BSDS based on AASHTO LRFD 2012 since soil parameters in AASHTO are embedded in the design methodology.	
• Study Team suggested more detailed discussions with DPWH on the soil classification for the new BSDS during the development of the specifications.	
5. Other Items for Further Discussions	
• Study Team suggested the following items for the further discussions. - Consideration of Ground Liquefaction - Design of Foundation - Unseating Prevention/ Fall-down Prevention - LRFD Design Seismic Acceleration Response Spectra - Force-based vs Displacement-based Approach	
• DPWH emphasized the consideration of ground liquefaction in the new BSDS.	Study Team (by Mr. Tanaka) will discuss the liquefaction consideration in the next meeting.
• DPWH requested the application of JRA provisions and technology for the design of base isolation for bridges.	
• Study team requested the attendance of more Philippine bridge engineers such as engineers of BOD for the future discussions.	
• DPWH requested more detailed comparisons of reference specifications in the future discussions.	

Minutes	Action

6. Closing

- The meeting ended at 5:00pm with closing remarks from Asist-Dir. Mr. Doroy.

Prepared by:

Dr. Takayuki Tsuchida
Assistant Team Leader
JICA STUDY TEAM

Confirmed by:

o/c Assistant Dir. Adriano M. Doroy
Bureau of Design, DPWH

Attachment 2: List of Attendance

Meeting/Discussion (DPWH-JICA Study Team)
Policy on Development of Bridge Seismic Design Specificatinos

The Project for the Study on Improvement of the Bridges Through
Disaster Mitigating Measures for Large-Scale Earthquakes in the Republic of the Philippines

Date: August 13th, 2012 Time: 14:00-17:00
Venue: Conference Room, BOD, DPWH

ATTENDANCE SHEET

No.	Name	Office	Designation	Phone Number	Signature
1	Toshio Ichikawa	JICA Study Team		09299804755	[signature]
2	REYNALDO P. FAUSTINO	BRS, DPWH	OIC-Assist Dir	09276273126	[signature]
3	Ryo Tanahashi	JICA Study Team		09159915677	[signature]
4	Kunihiko HARADA	〃	Environment	09206902140	[signature]
5	Hiroshi Saito	〃	road design	09206902563	[signature]
6	Takayuki Tsuchiya	〃	ASSIST. TL		[signature]
7	WILLIAM TANZO	〃		0918 923 9185	[signature]
8	Akira TAKAUE	〃	Bridge Design	09204624425	[signature]
9	Hiroaki Ohtake	〃	seismic design structure		[signature]
10	Jayne T. Afienza	BOD, DPWH	Sr. Geologist	3043060/66	[signature]
11	Kenichi TANAKA	J.S.T.	Sr. Geologist		[signature]
12	YASUSHI OYAMA	〃	Earthquake	09292176652	[signature]
13	DOMINADOR AQUINO	DPWH-BOM	Engr IV	3043710	[signature]
14	Lydia G. Chua	DPWH-NCR	Engr. V	3043687	[signature]
15	WENCESLAO P. ARANADOR	DPWH - NCR	ENGR II	3043686	[signature]
16	ARISTARCO M. DOTY	BOD	ENGR V	5045792	[signature]
17	EMMANUEL ARIAS	PS	E-II	3043069	[signature]
18	JOVITO SANTOS	JICA Study Team	Specification		[signature]
19	BLESILDA RAMOS	BOD	ENGR IV	304-3541	[signature]
20	JULAN DOMANAN	BOD	ENGR. III	3043571	[signature]
21	Adriano M. Doroy	BOD	OIC Asst. Dir.	3043411	[signature]
22	Kei Katayama	JICA Study Team	Bridge Design		[signature]
23	Yumi IWASHITA	JICA Study Team	Training plan		[signature]
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Attachment 3: Pictures

	
Photo 1	**Photo 2**
	
Photo 3	**Photo 4**
	
Photo 5	**Photo 6**

(2) 2nd Meeting/Discussion

2nd Meeting/Discussion (DPWH-JICA Study Team)

Policy on Development of Bridge Seismic Design Specifications

Date and Time : September 25, 2012 2:00pm – 3:30pm: Courtesy Call
September 26, 2012 9:00am – 12:00pm: Site Visit
September 26, 2012 3:30pm – 5:30pm: Presentation/Discussion
Venue : DPWH BOD Conference Room, 4th floor

1. Purpose:

(a) To have a common consensus on the policy for the development of bridge seismic design specifications.
(b) To introduce the present seismic performance criteria of JRA and to discuss possible target seismic performance criteria for the DPWH specifications.

2. Participants:

1. DPWH representatives/counterparts
2. BOD bridge design engineers
3. A member of JICA Advisory Committee
4. Representatives of JICA Tokyo Office and Philippine Office
5. A representative of Embassy of Japan
6. JICA Study Team members

3. Agenda on 2nd Meeting/Discussion on September 26, 2012

- Opening and Acknowledgement of Participants
- Presentation by a member of JICA Advisory Committee
- Discussion
- Closure

Minutes of Meeting
For
2nd TWG-JICA Study Team Discussion
On
Policy on Development of Bridge Seismic Design Specifications

Date & Time:	September 26, 2012, 2:00pm-5:15pm
Venue:	DPWH Director's Lounge, 2nd floor
Objectives:	1. To have common consensus on the policy for the development of bridge seismic design specification. 2. To introduce the present seismic performance criteria of JRA and to Discuss possible target seismic performance criteria for the DPWH Specification.
Participants:	1. DPWH Counterparts/ TWG Members 2. BOD Bridge Design Engineers 3. JICA Project Advisory Committee Member 4. JICA Expert 5. JICA Study Team members (See attached List of Attendees)

Meeting Agenda:

1. Opening and Acknowledgement of Participants
2. Presentation by Mr. Hoshikuma (a member of JICA Advisory Committee)
3. Discussion
4. Closure

Attachment 1: Results of 2nd TWG-JICA Study Team Discussion (Sep. 26, 2012)

Minutes

- Opening
  - The meeting started at 2:00pm with opening remarks from Director Reyes.

- Introductory remarks from JICA by Mr. Yoshihiro Kakishita and introduction of the speaker, Dr. Junichi Hoshikuma of PWRI CAESAR (Center for Advanced Engineering Structural Assessment and Research, Public Works Research Institute; Ministry of Land, Infrastructure, Transport and Tourism, Japan).

- Dr. Hoshikuma presented:
  (1) Bridge damages due to past earthquakes and lessons learned from the damages;
  (2) Seismic design specifications of highway bridges in Japan; and
  (3) Seismic retrofit strategies for existing bridges in Japan based on damage due to past earthquakes.

- During the presentation, Dr. Hoshikuma presented examples of bridge damage during the 1990 Luzon Earthquake: Magsaysay Bridge and Carmen Bridge.

- Lastly for the presentation, Dr. Hoshikuma summarized that:
  (1) Large earthquake never experienced could occur in both Japan and the Philippines;
  (2) Required seismic performance of bridges for large earthquake should be discussed in advance;
  (3) Lessons learned from past earthquakes are very important for the development of the new bridge seismic design specifications. Bridges in Japan have already experienced similar damage, and Japanese seismic design specifications have been revised based on damage experiences.

Minutes

- Discussions:
  - Dir. Reyes asked about the important factors to analyze the scale/size of earthquakes. Dr. Hoshikuma explained that magnitude is important However, distance and focal depth are more important as far as earthquake effects are concerned. Dir. Reyes stated that the biggest worry for Metro Manila is the potential movement of the (Marikina) Valley Fault System.

  - Dir. Reyes asked if the use of TEMPCORE steel[1)] is allowed in Japan. In seismic designs, ductility is of primary important factor; therefore the use of TEMPCORE steel is recommended for neither Japan nor the Philippines.

    1) Transcriber's Note: TEMPCORE steel reinforcing bars are high-strength weldable reinforcing bars developed in Western Europe. In order to produce the desired property of high strength at cheaper cost compared to the use of alloys, hot rolled steel is subjected to in-line heat treatment in 3 successive stages; of which as soon as the quenching operation (1st stage) is completed, the surface layer is tempered by using residual heat left in the core of the bar (hence, TEMPCORE); and finally normally cooled to ambient temperature.

  - Asst. Director Doroy asked if multi-column type piers are preferable than single-column piers due to better redundancy. The Japanese side responded that single column-piers are common in Japan primarily due to restricted space problem.

  - Asst. Dir. Doroy further commented that the continuity of spans is recommended especially for new designs. Dr. Gose stated that all existing simple spans in Tokyo metropolitan area are retrofitted with unseating prevention devices.

  - DPWH C/P Atienza commented on the financial issue of countermeasures against lateral spreading. JICA Study Team agreed at the countermeasures against lateral spreading is expensive.

- In response to the query of Dir. Reyes about the retrofitting manual, Dr. Gose explained that the manual will include variety of retrofitting methods and provide guidelines for the proper selection.

- Asst. Dir. Doroy asked if the Japanese experts are familiar with STU[2]. Dr. Gose said that these are called "damper-stopper" in Japan.

2) Transcriber's Notes: STU (Shock Transmission Unit) is a piston-cylinder assembly containing silicone putty material in the chamber. The STU device is designed to be connected in parallel (direction of seismic horizontal force) to a movable bridge bearing which will allow free movement under slowly applied loads such as temperature or creep; but which will become a rigid link under rapidly applied loads and thereby enabling earthquake load sharing among multiple piers of a bridge.

- Closing
  - The meeting ended at 5:15pm with the closing remarks from Director Reyes.

Prepared by:

Dr. Shingo Gose
Team Leader
JICA Study Team

Confirmed by:

Dir. Gilberto S. Reyes
Bureau of Design, DPWH
10/9

Attachment 2: List of Attendance

Meeting/Discussion (DPWH-JICA Study Team)

Policy on Development of Bridge Seismic Design Specifications

The Project for the Study on Improvement of the Bridges Through

Disaster Mitigating Measures for Large-Scale Earthquakes in the Republic of the Philippines

Date: September 26, 2012 Time: 14:00-17:15

Venue: 2F Directors Lounge, DPWH

ATTENDANCE SHEET

No.	Name	Office	Designation	Signature
1	Hiroaki Ohtake	JICA Study Team	Seismic retrofit design and inspection assistant	H. Ohtake
2	[illegible]	BOC-DPWH	Engr. V	
3	[illegible]	BOM-DPWH	Engr. IV	
4	Adriana M. Doroy	BOD	o/c Asst. Dir.	
5	MARIANO S. FLORES	BOD	OIC-ENGR. IV	
6	SUSAN D. DOMINGO	BOD	ENGR. III	
7	BLESILDA S. CAMUS	BOD	ENGR IV	
8	Kenichi TANAKA	JICA STUDY TEAM	Geology	
9	Ryo Tanahashi	JICA Study Team	Hydrology	
10	Hiroshi Kaneko	JICA STUDY Team	Traffic / economic	
11	Tomoyuki Nishikawa	JICA STUDY TEAM	Topo Survey	
12	Toshio Ichikawa	JICA Study Team	Bridge Engineering	
13	WILLIAM TANTO	JICA Study Team	Design Eq Motions	
14	Ruel Nazareno	R.O.XII	ENGR III	
15	Takayuki Tsuchida	JICA Study Team	ASSIST. Team Leader	
16	Jovito Santos	JICA Study Team	Specifications	
17	Jayne T Atienza	SIO, BOD	Sr. Geologist	
18	Seitaro Tsukuda	PS DPWH	Advisor	
19	Caroline Canual	PS DPWH	OIC, Div. chief	
20	Yoshihiro Kakishita	JICA HQ	Senior Advisor to DG	
21	GOSE Shinya	JICA Study Team	Team Leader	
22	Hoshikuma Junichi	PWRI	Team Leader	
23	Gilberto S. Reyes	BOD	Dir.	
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Attachment 3: Pictures

Photo 1

Photo 2

Photo 3

Photo 6

Photo 5

Photo 6

(3) 3rd Meeting/Discussion

3rd Meeting/Discussion (DPWH-JICA Study Team)

Criteria for Second Screening and Major Design Conditions

Date and Time : September 27, 2012 2:00pm – 5:00pm
Venue : DPWH BOD Conference Room, 4th floor

1. **Purpose:**
   (a) To confirm the selection criteria of the target bridges during the Second Screening
   (b) To confirm the major design conditions for the comparison study and outline design of the bridges
   (c) Other relevant issue to be discussed

2. **Participants:**
   1. DPWH counterparts
   2. BOD bridge design engineers
   3. JICA Study Team members
   4. Representatives of JICA Philippine Office

3. **Agenda on 3rd Meeting/Discussion on September 27, 2012**
   - Opening and Acknowledgement of Participants
   - Presentation by a member of JICA Study Team
   - Discussion
   - Closure

Minutes of Meeting
For
3rd TWG-JICA Study Team Discussion
On
Policy for the Development of DPWH Bridge Seismic Design Specifications (BSDS)

Date & Time:	September 27, 2012, 2:00pm-5:30pm
Venue:	DPWH BOD Conference Room, 4th floor
Objectives:	1. To confirm the selection criteria of the target bridges during the Second Screening. 2. To confirm the major conditions for the comparison study and outline design of the bridges 3. Other relevant issue to be discussed
Participants:	1. DPWH Counterparts/ TWG Members 2. BOD Bridge Design Engineers 3. JICA Study Team Members (See attached List of Attendees)

Meeting Agenda:

1. Opening and Acknowledgement of Participants
2. Presentation by a member of JICA Advisory Committee
3. Discussion
4. Closure

The results of discussions are shown in Attachment 1.

Attachment 1: Results of 3rd TWG-JICA Study Team Discussion (September 27, 2012)

Minutes	Action
1. Opening	
• The meeting started at 2:00pm with opening remarks from Asst. Dir. Mr. Doroy.	
2. The Selection Criteria of the Target Bridges during the Second Screening	
• The JICA Study Team (known as Study Team) proposed the selection criteria of the target bridges for the second screening. Some issues regarding the rating system were pointed out by DPWH.	
• DPWH basically agreed with the evaluated items in the criteria.	
• However, DPWH requested that the criteria should be prepared, more focused on the evaluation of bridge seismic vulnerabilities.	
• DPWH requested that the criteria system should be in more quantitative manner though the proposed system was rather in qualitative manner based on engineer's judgments.	Study Team will confirm the revised criteria in the next discussion.
3. The Major Conditions for the Comparative Study and Outline Design of the Target Bridges.	
3.1 Progress of Hydraulic Study	
• The Study Team explained that the Philippine Coast Guard (PCG) proposed the vertical clearance of "3.0m plus vessel heights" from Highest High Tide Level.	
• However, DPWH confirmed that the minimum vertical clearance shall be 3.75m from the Highest High Tide Level.	
• DPWH pointed out that Pasig-Marikina River could carry debris in flood condition.	
3.2 Seismic Retrofit Plans for the Target Bridges (Package B and C)	
• The Study Team introduced seismic retrofit plans for the target bridges of Package B and C.	
• DPWH requested the Study Team to introduce new seismic technologies such as countermeasures for liquefaction-induced lateral spreading and base isolation devices.	Study Team will introduce new seismic technologies in reference books and manuals.

4. Closing

The meeting ended at 5:30 pm with closing remarks from Asst. Dir. Doroy.

Prepared by:

Dr. Shingo Gose
Team Leader
JICA Study Team

Confirmed by:

Asst. Dir. Adriano M. Doroy
Bureau of Design, DPWH

Attachment 2: List of Attendance

Meeting/Discussion (DPWH-JICA Study Team)
Policy on Development of Bridge Seismic Design Specificatinos

The Project for the Study on Improvement of the Bridges Through
Disaster Mitigating Measures for Large-Scale Earthquakes in the Republic of the Philippines

Date: September 27, 2012 Time: 14:00-
Venue: Conference Room, BOD, DPWH

ATTENDANCE SHEET

No.	Name	Office	Designation	Signature
1	Hiroaki Ohtake	JICA Study Team	Seismic design and inspection assistant	
2	Takayuki Tsuchida	〃	Assist. Team Leader	
3	[illegible]	BOC	ENGR V	
4	JAYNE T. ATIENZA	BOD	Sr. Geologist	
5	DOMINADOR AGUIRRE	BOM	Eng IV	
6	Adriano M. Dorry	BOD	O/C Asst. Dir.	
7	BENITA R. VALENCIA	BRS	ENGR III	
8	WENCESLAWA P. ABANADOR	NCR	ENGR II	
9	Ryo Tanahashi	JICA-Study Team	Hydrology and Meteorology	
10	Kenichi TANAKA	JST	Geology and Geotechnical	
11	Tomoyuki Nishikawa	JICA Study Team	Topo Survey	
12	GOSE Shingo	〃	Team Leader	
13	Jovito Santos	〃	Specifications	
14	Hiroshi Kaneko	〃	Traffic / Economic	
15	SUSAN D. DOMANAIS	BOD	ENGR. III	
16	BLESILDA S. RAMOS	BOD	ENGR IV	
17	Carol Camus	PS	OIC, Engr V	
18	Toshio ICHIKAWA	JICA study team	Bridge Engineer	
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Attachment 3: Pictures

	
Photo 1	**Photo 2**
	
Photo 3	**Photo 4**
	
Photo 5	**Photo 6**

(4) 4th Meeting/Discussion

The Project for the Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines

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Minutes of Meeting
For
4th TWG-JICA Study Team Discussion
On
2nd Screening Criteria for Bridge Prioritization

Date & Time:	October 18, 2012, 10:00pm – 13:30pm
Venue:	DPWH BOD Conference Room, 4th floor
Objectives:	1. To discuss 2nd Screening to select bridges of Package B and C for outline design 2. To discuss other relevant issues
Participants:	1. Technical Working Group Members 2. BOD Bridge Design Engineers 3. JICA Study Team Members (See attached List of Attendees)

Meeting Agenda:

1. Opening and acknowledgement of participants
2. Discussions
   - Flowchart of 2nd screening implementation category for Package B and C selection of bridges for outline design
   - Evaluation criteria for non-technical issues
   - Opinions/suggestions
3. Closure

The results of discussions are shown in Attachment 1.

Attachment 1: Results of 4th TWG-JICA Study Team Discussion (October 18, 2012)

Minutes	Action

1. Opening

- The meeting started at 10:30am with opening remarks from Asist-Dir. Mr. Doroy.

2. Mr. Ichikawa presented the proposed flowchart of the 2nd screening implementation category in order to select Package B and C for outline design selection. The flowchart consists of the following 3 parts:

- ***Part 1 – Identification of Issues***: include traffic condition, bridge seismic vulnerability and environmental condition.
- ***Part 2 – Improvement Measure and Cost Estimate***: choice of retrofit and replacement, including cost implications
- ***Part 3 – Evaluations and Recommendations***: setting evaluation criteria consisting of Important Factors and Other Factors.

3. The DPWH and the JICA Team agreed on the following "Evaluation Criteria for Non-Technical Issues":

3.1 Environmental Impact

- It was agreed to use the following:

Environmental Consideration (10)	
Involuntary Resettlement (PAPs)*	Score
Over 200	0
20 – 199	5
Less than 20	10

*PAPs – project affected persons

Study Team will take note of the changes and revise accordingly.

3.2 Project Maturity

- The first criteria "Status in National Development Plan" is renamed "Consistency with Philippine Development Plan"
- The second criteria "Understanding in DPWH and Related Agency" is renamed "Compliance with DPWH Policy"

Study Team will take note of the changes and revise accordingly.

3.3 Project Model Case

- It was agreed to use the following:

Project Model Case (10)	
Criteria Item	Score
Use of new retrofit technology not yet applied in the Philippines	10
Use of latest retrofit technology but already applied in the Philippines	5

Study Team will take note of the changes and revise accordingly.

Minutes	Action

3.4 Road Network

- "Traffic Volume" criteria shall be:

Description	Metro Manila		Outside Metro Manila	
	Impact on Public Transport		Impact on Road Transport	
Level	Traffic Vol. (AADT)	(15)	Traffic Vol. (AADT)	(15)
Low	Less than 50,000	5	Less than 2,000	5
Moderate	50,000 – 150,000	10	2,000 – 10,000	10
High	Over 150,000	15	Over 10,000	15

Study Team will take note of the changes and revise accordingly.

- "Volume to Capacity Ratio" criteria to be used for alternative route/bridge in case of bridge collapse shall be:

Volume to Capacity Ratio, V/C (15)		
Congestion	V/C Ratio	Score
Heavy	Over 1.5	15
Medium	1.0 – 1.5	10
Light	Under 1.0	5

Study Team will take note of the changes and revise accordingly.

3.5 Economic Evaluation

- The evaluation for "Economic Loss" criteria is not finalized and agreed that the JICA team will study further the parameters on how to calculate the economic loss. One parameter which can simplify the criteria is the use of "road user cost" to determine the economic loss in case of bridge collapse.

Study Team will propose the parameters for calculating economic loss.

4. In prioritizing bridges for outline design, it was agreed that the Evaluation and Recommendation table will be revised to include both the criteria on:
   - "Technical Issues" including the Bridge Seismic Vulnerability evaluation which was done during the first screening, and
   - "Non-Technical" issues mentioned in Item 3 above.

Study Team will revise the Evaluation and Recommendation to include technical and non-technical issues to prioritize bridge improvements

5. However, Mr. Doroy commented that the DPWH system for prioritizing bridges for retrofit considers only Seismic Vulnerability and Structural Soundness. The Study Team responded to consider such system and will examine further the inclusion or non-inclusion of the non-technical items in bridge selection. The above criteria will be finalized in the next meeting.

Study Team to finalize evaluation criteria and recommendation in the next meeting.

Minutes	Action
6. A more refined and systematic evaluation for bridge retrofit prioritization will be developed and included in the Retrofit Manual.	Study Team will prepare a more systematic Evaluation System for Bridge Retrofit Prioritization to be included in the Retrofit Manual.

6. Closing

- The meeting ended at 13:30pm.

Prepared by:

Dr. Shingo Gose
Team Leader
JICA STUDY TEAM

Confirmed by:

Assistant Dir. Adriano M. Doroy
Bureau of Design, DPWH

Attachment 2: List of Attendance

The Project for Study on Improvement of the Bridges through
Disaster Mitigating Measures for Large Scale Earthquakes
in the Republic of the Philippines

Attachment 2: List of Attendance

4th Meeting/Discussion (TWG-JICA Study Team)
Policy on Development of Bridge Seismic Design Specifications (Follow-up)

The Project for the Study on Improvement of the Bridges Through
Disaster Mitigating Measures for Large-Scale Earthquakes in the Republic of the Philippines

Date : October 18, 2012
Venue: Conference room, BOD, DPWH
Time : 10:00 am

ATTENDANCE SHEET

No.	Name	Office	Designation	Phone number	Signature
1	Carolina Canuel	PS	OIC, DPO, PS	304 3352	
2	Reynaldo P. Faustino	BRS	OIC, Asst Bu. Dir	9263530	
3	Cydiq G. Chua	NCR	Engr V, PDD	304-3744	
4	BLESILDA S. RAMOS	BOD	Engr V	304-3561	
5	MERCEDITA P. ABANADOR	NCR	ENGR II	304-3657	
6	Felipe S. Ramos	BRS	Engr V	4810857	
7	JOSE Shingo	JICA STUDY Office Study Team			
8	JOVITO SANTOS	JICA Team	Study Member		
9	WILLIAM TANZO	JICA Study Team	Study member	0918 923 9185	
10	Tomoyuki Nishikawa	JICA Study Team	Study member		
11	Aristarco Dony	BOC	Engr V	0920 [illegible]	
12	Adriano Doroy	BOD	OIC Asst Dir.	304-3411	
13	Toshio Ichikawa	JICA Team	Study Member		
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Attachment 3: Pictures

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

(5) 5th Meeting/Discussion

The Project for Study on Improvement of Bridges through
Disaster Mitigating Measures for Large Scale Earthquakes
in the Republic of the Philippines

Minutes of Meeting
For
5th TWG-JICA Study Team Discussion
On
Road Design Conditions of Lambingan Bridge

Date & Time:	February 7, 2013, 9:00pm – 10:30pm
Venue:	DPWH BOD Conference Room, 4th floor
Objectives:	1. To discuss road design conditions of Lambingan Bridge 2. To discuss relevant issues
Participants:	1. Technical Working Group Members 2. JICA Study Team Members (See attached List of Attendees)

Meeting Agenda:

1. Opening and acknowledgement of participants
2. Discussions
   - Road Design Conditions of Lambingan Bridge
   - Relevant Issues
3. Closure

The results of discussions are shown in Attachment 1.

Attachment 1: Results of 5th TWG-JICA Study Team Discussion (February 7, 2013)

Minutes	Action
1. Opening • The meeting started at 9:00am with opening remarks from Asst. Dir. Mr. Doroy.	
2. Mr. Saito presented the result of study on road design conditions of Lambingan Bridge. The discussion result is as follows. • There's no road-width-widening plan of New Panaderos St. with existing four lanes, on which Lambingan Bridge is located, although the bridge and its approach areas behind abutments have six lanes. • JICA Study Team (hereafter called as Study Team) recommended four-lane condition instead of six lanes considering the economic aspect and constraints of construction. • However, Mr. Doroy advised to maintain the existing number of lanes in order to keep the current status. • Number of spans will be chosen from either one or three. • The bridge replacement plan will be proposed, based on the comparison study considering the following items 1) Number of spans 2) Construction schemes; either stage construction or typical construction with temporary detour bridges • If the stage construction is applied, it's better to select girder-type than truss or arch-type for the traffic safety reason.	Study Team will plan the bridge replacement under the condition of six lanes. Study Team will propose the bridge replacement plan with the result of the comparison study. DPWH will check the replacement possibility of existing buildings on the planned detour together with Study Team.
3. Discussions on the relevant issues • The law of the Philippines prohibits the modification or demolishing of historical bridges which are older than 50 years. • DPWH will look for the drawings of Lilo-an Bridge and 1st Mandaue-Mactan Bridge.	
4. Closing • The meeting ended at 10:30am.	

Prepared by:

Dr. Takayuki Tsuchida
Assistant Team Leader
JICA Study Team

Confirmed by:

Assistant Dir. Adriano M. Doroy
Bureau of Design, DPWH

Attachment 3: Pictures

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

5th TWG-JICA Study Team Discussion

The Project for Study on Improvement of Bridges Through
Disaster Mitigating Measures for Large-Scale Earthquakes in the Republic of the Philippines

Date: February 7, 2013
Venue: Conference Room, BOD, DPWH

ATTENDANCE SHEET

No.	Name	Position/Organization	Signature
1	Adriano M. Doroy	OIC, Assistant Director, BOD, DPWH	
2	Aristarco M. Doroy	Chief, Project Assistance Division Area 1, BOC, DPWH	
3	Lydia G. Chua	Chief, Planning and Design Division, NCR, DPWH	
4	Takayuki Tsuchida	Asst. Team Leader, JICA Study Team	
5	Yasufumi Watanabe	Member, JICA Study Team	
6	Hiroaki Ohtake	Member, JICA Study Team	
7	Akira Takaue	Member, JICA Study Team	
8	Kei Katayama	Member, JICA Study Team	
9	Hiroshi Saito	Member, JICA Study Team	
10	EDWIN C. MATANGUIHAN	O/C-CHIEF, BOD-BRIDGES DIV.	
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(6) 6th Meeting/Discussion

The Project for Study on Improvement of Bridges through
Disaster Mitigating Measures for Large Scale Earthquakes
in the Republic of the Philippines

Minutes of Meeting
For
6th TWG-JICA Study Team Discussion
On
Comparison Study on Improvement Measure Schemes of Target Bridges
(Lambingan Bridge and Guadalupe Bridge)

Date & Time:	February 27, 2013, 9:00pm – 11:40pm
Venue:	DPWH BOD Conference Room, 4th floor
Objectives:	1. To discuss comparison study results of improvement measure schemes for Lambingan Bridge and Guadalupe Bridge 2. To discuss other relevant issues
Participants:	1. DPWH Counterparts 2. JICA Study Team Members (See attached List of Attendees)

Meeting Agenda:

1. Opening and acknowledgement of participants
2. Discussions
   - Comparison study results of improvement measure schemes for Lambingan Bridge
   - Comparison study results of improvement measure schemes for Guadalupe Bridge
   - Other relevant issues
3. Closure

The results of discussions are shown in Attachment 1.

Attachment 1: Results of 6th TWG-JICA Study Team Discussion (February 27 2013)

Minutes	Action
1. Opening • The meeting started at 9:00am with opening remarks from Asst. Dir. Doroy.	
2. Dr. Takaue presented the company profile of Chodai and introduced major bridges designed by Chodai engineers.	
3. Dr. Takaue presented the result of comparison study on improvement measure schemes for Lambingan Bridge. The discussion result is as follows. • DPWH agreed with the design conditions and the comparison study procedures.	
• However, with regards to the abutment relocation, the proposed abutment locations must be carefully examined if they are consistent with the dike locations planned in "Pasig-Marikina River Channel Improvement Project (Phase III). Also, the dike along the front area of abutments must be planned in this project so as to protect new abutments from scouring.	JICA Study Team (hereafter called as Study Team) will re-check the proposed abutment locations with the finalized dike plan.
• The improvement measure scheme will be chosen from the following two alternatives after their further studies: - Alternative-1: Simply-supported Steel Deck Stiffened Lohse Bridge with two arch chords by stage construction method. - Alternative-2: Simply-supported Steel Deck Stiffened Lohse Bridge with one arch chord by total construction method (need of the temporary detour bridge).	Study Team will propose the finalized improvement measure scheme after further comparative study.
• "Simply-supported Steel Deck Stiffened Lohse Bridge with one arch chord by stage construction method" is excluded from the improvement measure selection due to the 24-hour-total-closure of the river for seven days during the superstructure installation.	

Minutes	Action
4. Mr. Katayama presented the result of comparison study on improvement measure schemes for Guadalupe Bridge. The discussion result is as follows.	
• Study team proposed replacement of the outside bridges and the installation of unseating prevention devices for the inside bridge. As of this moment, the replacement of the inside bridge in the near future shall be considered.	
• DPWH agreed with the replacement of the outside bridges and their improvement measure schemes.	
• However, DPWH requested for the seismic retrofit of the inside bridge instead of replacement, considering the difficulty of traffic regulation and land acquisition caused by the replacement work.	Study Team will have further study on the proper improvement measure scheme for the inside bridge.
• With regards to seismic retrofit work planning, DPWH explained that there's a high possibility of approval for the increase of river inhibition from Coast Guard if the horizontal navigation clearance of at least 35 meters is secured.	
• JICA Study Team stated that the outline design of the inside bridge doesn't have to be conducted in this study due to limited time. However, the need of seismic retrofit for the inside bridge must be stated at least as a result of this study in accordance with the result of previous JICA study.	
5. Other Relevant Issues	
• DPWH requested the Study Team to explain about the applied seismic technologies for the target bridges for replacement in future meetings.	Study Team will prepare explanation of applied seismic technologies for the target bridges for replacement in future meetings.
6. Closing	
• The meeting ended at 11:30am.	

Prepared by:

For / Hiroaki Ohtake

Dr. Takayuki Tsuchida
Assistant Team Leader
JICA Study Team

Confirmed by:

Assistant Dir. Adriano M. Doroy
Bureau of Design, DPWH

Attachment 2: List of Attendance

6th TWG-JICA Study Team Discussion

The Project for Study on Improvement of Bridges through
Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines

Date: February 27, 2013
Venue: Conference Room, BOD, DPWH

ATTENDANCE SHEET

No.	Name	Position/Organization	Signature
1	Adriano M. Doroy	OIC, Assistant Director, BOD, DPWH	
2	Edwin C. Matanguihan	OIC, Chief, Bridges Division, BOD, DPWH	
3	Aristarco M. Doroy	Chief, Project Assistance Division Area 1, BOC, DPWH	
4	Carolina S. Canuel	Chief, Development Planning Division, PS, DPWH	
5	Dominador P. Aquino	Chief, Planning and Programming Division, BOM, DPWH	
6	Reynaldo P. Faustino	Chief, Research and Development Division, BRS, DPWH	
7	Lydia G. Chua	Chief, Planning and Design Division, NCR, DPWH	
8	Guillerma Jayne T. Atienza	Senior Geologist, Survey and Investigation Division, BOD, DPWH	
9	Hiroaki Ohtake	Member, JICA Study Team	
10	Akira Takaue	Member, JICA Study Team	
11	Kei Katayama	Member, JICA Study Team	
12	Hiroshi Saito	Member, JICA Study Team	
13	Yasufumi Watanabe	Member, JICA Study Team	
14	WENCESLAWA P. ABANADOR	PDD - NCR DPWH	
15			

Attachment 3: Pictures

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

(7) 7th Meeting/Discussion

The Project for Study on Improvement of Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines

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Minutes of Meeting
For
7th TWG-JICA Study Team Discussion
On
Draft Bridge Seismic Design Specifications

Date & Time:	July 08, 2013, 2:00pm – 6:00pm
Venue:	DPWH BOD Asst. Dir. Doroy's Office, 4th floor
Objectives:	1. To discuss draft provisions for seismic design of bridges 2. To discuss the proposed localized maps (PGA and response spectra coefficients) and site specific generated response spectra for7 bridges
Participants:	1. DPWH Counterparts • Adriano M. Doroy, BOD Asst. Dir. • Edwin C. Matanguihan, Bridge Design Chief • Rufino D. Valiente, BOD Bridge • Mariano S. Flores, BOD Bridge • Blessie Ramos, BOD Bridge 2. JICA Study Team Members • Takayuki Tsuchida • Jovito C. Santos • William Tanzo • Hiroaki Ohtake

Meeting Agenda:

1. Proposed Schedule of Project Major Events
2. Discussions
   - Proposed Draft Provisions for Seismic Bridge Design Specifications
   - Proposed PGA and Spectral Coefficients
   - Site Specific Spectra for 7 Bridges under Study

The results of discussions are shown in Attachment 1.

Attachment 1: Results of 7th TWG/BOD Bridge Design Group - JICA Study Team Discussion (July 08, 2013)

Minutes	Action

1. Schedule on Project Major Events

- The following schedule on major events for the project was agreed between BOD and the Study Team:
  - 6th TWG : Sept. 27, 2013 (Fri)
  - 7th TWG : Nov. 8, 2013 (Fri)
  - Seminar/Training : Nov. 13-14, 2013 (Wed, Thu)
  - 3rd JCC : Nov.15, 2013 (Fri)

2. Discussion on the Proposed Bridge Seismic Design Specifications (BSDS) follows with the following items agreed:

(1) Section 1: Introduction

- Article 1.1 Background
  - To add in Item (2) "The current design practice of bridges under the DPWH (engineers and consultants) is to refer to the *AASHTO Standard Specifications for Highway Bridges (17th Edition, 2002)* as the design specifications with minor revisions to suit local conditions. Design for earthquake forces is based on Division I-A (Seismic Design) of this Specification utilizing the AASHTO design seismic response spectra for Types I-IV AASHTO soil classification to model the seismic design forces. However, the peak ground acceleration (PGA) is based on the seismic zone map of the Philippines as given in the *National Structural Code of the Philippines (NSCP) Vol. II (Bridges)*, 1997 with reprint in 2006. The design PGA coefficients are 0.2 for Palawan and Sulu and 0.4 for the rest of the country."
  - To rewrite in Item (3) the "localization of the Philippine design seismic ground acceleration map, including the corresponding seismic design response spectra"
- Article 1.2 Purpose of Specifications
  - To rewrite Item 3) as "provide guidance to the DPWH engineers and the engineering professionals in the seismic design of bridges that will set the minimum requirements for seismic design integrity and safety under a large earthquake"
  - Proposed insertion to Commentary C1.2 – "These Specifications are intended to guide the DPWH engineers and the design professionals for the minimum requirements in the

Minutes	Action

design of bridges under large earthquake as an extreme event. However, it does not limit the design engineers to employ new and advanced technologies in the design and construction of bridges. Such technologies which are not covered in these Specifications shall be subject to the approval of the DPWH.

- Article 1.3 Scope of Specifications
  - Item (4) shall be rewritten as "The applicability of these Specifications to the types of bridges with regards to conventional structural form and construction method shall be as specified in the AASHTO LRFD Specifications. For non-conventional bridges and other types of construction (e.g. suspension bridges, cable stayed bridges, arch type bridges, and movable bridges), appropriate provisions of these Specifications may be adopted subject to prior approval by the DPWH."
  - Item (5) shall be rewritten as "The provisions of these Specifications shall be taken as the minimum requirements for structural stability that is necessary to provide for public safety. When necessary, additional provisions may be specified by the DPWH to achieve higher performance criteria for repairable damage that may be attributed to essential or critical bridges. Where such additional requirements are specified, they shall be site or project specific and are tailored to a particular structure type. The DPWH may require, if necessary, the sophistication of design or the quality of materials and construction to be higher than the minimum requirements."
  - Item (6) shall be rewritten as "The potential effects of unstable ground conditions (e.g. liquefaction, lateral spreading, landslides and slope movements, and fault displacements) on the on the structural stability and function of the bridge shall be considered."
  - Commentary C1.3 2nd paragraph, last sentence is rewritten as "The displacement-based alternative approach to seismic design is expected to be applied to DPWH bridges in the future."
- Article 1.4 Seismic Design Philosophy
  - Add the notation to Commentary C1.4 (2)-1) "***Note**: The above Items a) to f) are based on the design concept of the DPWH Department Order No. 75 (DPWH Advisory for Seismic Design of Bridges), dated July 17, 1992."*

Minutes	Action

(2) Appendix 1A: Earthquake Resisting Systems (ERS)

- 2nd paragraph in the Introduction shall be rewritten as "*In the Global Seismic Design Strategies (GSDS) given in Item (3) below,* ***Type 1*** *(Ductile Substructure with Essentially Elastic Superstructure) is widely used in the design of bridges in the Philippines under the DPWH. However, as practiced in the current design, the foundations are designed as elastic members capable of resisting the plastic forces generated in the piers or the elastic demand forces from the multimode analysis.* ***Type 2*** *(Essentially Elastic Substructure with a Ductile Superstructure) is not commonly used for seismic design and not recommended under these Specifications. However, it is presented in this Appendix for completeness.* ***Type 3*** *(Elastic Superstructure and Substructure with a Fusing Mechanism between the Two) may be applied to the design of bridges where the use of this strategy will be advantageous to the structure. Type 3 GSDS will need DPWH prior approval before application to bridge design."*

(3) Section 3: General Requirements

- Article 3.2 Bridge Operational Classification
  - It was agreed to have three (3) Operational Classifications – OC-I (Critical), OC-II (Essential), OC-III (Others)
- Article 3.5.1 Ground Types Definitions (Site Class Definitions)
  - Three (3) ground types (Type I-III) for seismic design defined by the ground characteristic value will be used in the specifications.
- Article 3.6.1 Design Response Spectrum
  - The form of the design response spectrum shall be based on the AASHTO LRFD methodology using 3-point coefficients (PGA, S_s and S_1) to determine the spectral shapes. The PGA, S_s and S_1 shall be taken from the coefficient maps for the Philippines generated by PSHA method considering all possible sources of earthquakes.
  - The basic form example of the PGA, 0.2-sec spectral acceleration coefficient (S_s) and the 1-sec spectral acceleration coefficient (S_1) maps were presented for the 500-yr and 1,000-yr return periods. It was agreed to prepare only the 1,000-yr return period maps to be included in the BSDS at the entire Philippines level and at regional levels

Minutes	Action

with bigger scales. The 500-yr return period map will be prepared for comparison purposes.

- Comparison of site-generalized design response spectra for 500-yr and 1,000-yr return periods with the NSCP (1997)/AASHTO design response spectra was presented.
- Further discussions for this section will be done in the next meeting.

- Article 3.7 Seismic Performance Zones (SPZ)
  - The Seismic Zones shall be replaced by "Seismic Performance Zone(SPZ)" to distinguish it from the Philippine seismic zone map in the NSCP

(4) Design Response Spectra for DPWH Current Design Practice

- Since the proposed BSDS cannot be applied immediately by DPWH, PGA coefficient map and design response spectra, for Types I-IV soil class, consistent with the AASHTO 17th edition methodology will be prepared for the 500-year return period earthquake. This will be used for the current DPWH seismic design practice.

3. Next Meeting

- Discussions for Sections 3 and 4 and the design seismic response spectra will continue in the next meeting on July 11 (Thu) at BOD.

Prepared by:

Benito Santos

for **Dr. Takayuki Tsuchida**
Assistant Team Leader

JICA Study Team

Confirmed by:

o/c **Assistant Dir. Adriano M. Doroy**
Bureau of Design, DPWH

Attachment 1: Pictures

Photo 1

Photo 2

Photo 3

Photo 4

(8) 8th Meeting/Discussion

The Project for Study on Improvement of Bridges through
Disaster Mitigating Measures for Large Scale Earthquakes
in the Republic of the Philippines

Minutes of Meeting
For
8th TWG-JICA Study Team Discussion
On
Draft Bridge Seismic Design Specifications

Date & Time:	July 11, 2013, 2:00pm – 5:40pm
Venue:	DPWH BOD Asst. Dir. Doroy's Office, 4th floor
Objectives:	1. To discuss draft provisions for DPWH LRFD Seismic Bridge Design Specifications
Participants:	1. DPWH Counterparts • Adriano M. Doroy, BOD Asst. Dir. • Edwin C. Matanguihan, Bridge Design Chief • Mariano S. Flores, BOD Bridge • Blessie Ramos, BOD Bridge 2. JICA Study Team Members • Jovito C. Santos

Meeting Agenda:

1. Discussions
   - Proposed Draft Provisions for DPWH LRFD Seismic Bridge Design Specifications
     - Section 3 : General Provisions
     - Section 4 : Analysis and Design Requirements

The results of discussions are shown in Attachment 1.

Attachment 1: Results of 8th TWG/BOD Bridge Design Group - JICA Study Team Discussion (July 11, 2013)

Minutes	Action

The results of discussion on the Proposed DPWH LRFD Seismic Bridge Design Specifications (SBDS) are as follows:

(1) Section 3: General Requirements

- Article 3.1 Applicability of Specifications
  - Items (1) – (5) on the applicability of the specifications are basically agreed.

- Article 3.2 Bridge Operational Classification
  - Three Bridge Operational Classifications were agreed – Critical (OC-I), Essential (OC-II) and Others (OC-III)

- Article 3.3 Seismic Performance Requirements
  - Three seismic performance levels were agreed –
    1) Seismic Performance Level 1 (SPL-1) - Performance level of a bridge to ensure its normal sound functions during an earthquake.
    2) Seismic Performance Level 2 (SPL-2) - Performance level of a bridge to sustain limited damages during an earthquake and capable of recovery immediately for critical bridges and within a short period for essential bridges.
    3) Seismic Performance Level 3 (SPL-3) - Performance level of a bridge to ensure safety against collapse during an earthquake.

  - Two levels of ground motion, as shown below, shall be considered. Level 1 earthquake loading shall be decided by comparison of 50-yr and 100-yr return periods while Level 2 shall be earthquake loading with 100-yr return period. The bridge service life shall be taken as 50-years.

Earthquake Ground Motion and Seismic Performance

Earthquake Ground Motion (EGM)	Bridge Operational Classification		
	OC-I (Critical Bridges)	OC-II (Essential Bridges)	OC-III (Other Bridges)
Level 1 (Small to moderate earthquakes which are highly probable during the bridge service life)	SPL-1 *(Keep the bridge sound function; resist seismic forces within elastic limit)*	SPL-1 *(Keep the bridge sound function; resist seismic forces within elastic limit)*	SPL-1 *(Keep the bridge sound function; resist seismic forces within elastic limit)*
Level 2 (Large earthquakes with a 1,000-year return period)	SPL-2 *(Limited seismic damage and capable of recovering bridge function without structural repair immediately)*	SPL-2 *(Limited seismic damage and capable of recovering bridge function with structural repair within short period)*	SPL-3 *(May suffer damage but should not cause collapse of bridge or any of its structural elements)*

Minutes	Action

- Article 3.4 Seismic Hazard
  - Item (3) shall be rewritten as: "A Site-Specific Procedure shall be used, as may be required by DPWH, for very important bridges in close proximity with an active fault."

- Article 3.5 Site Effects
  - The ground types for seismic design shall be classified into Types I-III as defined by the ground characteristic values given below:

Ground Type	Characteristic Value of Ground, T_G (s)
Type I	$T_G < 0.2$
Type II	$0.2 \leq T_G < 0.6$
Type III	$0.6 \leq T_G$

  - Site factors for the above types shall be similar to AASHTO Class C, D and E, respectively

- Article 3.6 Seismic Hazard Characterization
  - The design response spectrum shall be based on the AASHTO response spectrum determined from the mapped coefficients of PGA and the spectral acceleration coefficients.
  - The following acceleration coefficient maps for a 1,000-yr return earthquake shall be prepared:
    - PGA
    - 0.2-sec horizontal response spectra
    - 1.0-sec horizontal response spectra
  - The elastic seismic response coefficient shall be determined from AASHTO procedure.

- Article 3.7 Seismic Performance Zones
  - Four seismic performance zones (AASHTO) shall be used for minimum analysis and design requirements

- Article 3.8 Response Modification Factors
  - Use of AASHTO R-factors for the 3 operational categories

- Article 3.9 Requirements for Temporary Bridges and Stage Construction
  - Will follow AASHTO provisions

Minutes	Action

(2) Section 4: Analysis and Design Requirements

- Article 4.1 Analysis Requirements
  - The analysis requirements for single span and multi-span bridges shall follow the AASHTO provisions with adjustment in the analysis for seismic performance zones 3 and 4 for critical bridges to include multimode elastic method (MM) and time history method (TH), as indicated below:

Seismic Zone	Single-Span Bridges	Multispan Bridges					
		Other Bridges		Essential Bridges		Critical Bridges	
		Regular	Irregular	Regular	Irregular	Regular	Irregular
1	No seismic analysis required	*	*	*	*	*	*
2		SM/UL	SM	SM/UL	MM	MM	MM
3		SM/UL	MM	MM	MM	MM	MM/TH
4		SM/UL	MM	MM	MM	MM/TH	MM/TH

- Article 4.2 Design Requirements
  - Will follow the same provisions for AASHTO LRFD load combinations and design forces for seismic performance zones 1 to 4.

(3) Design Response Spectra for DPWH Current Design Practice

- For immediate application by DPWH in the current bridge design practice for earthquake loads, the PGA coefficient map and design seismic response spectra for Types I-IV soil class, consistent with the AASHTO 17th edition methodology will be prepared. Two alternative PGA maps (500-year and 1,000-year return period earthquakes) will be prepared and compared to determine which PGA map will be applied for the current DPWH seismic design practice.

Next Meeting

- Discussions for other sections shall be done in the next assignment period of the JICA Team.

Prepared by:

Dr. Jovito C. Santos
JICA Study Team

Confirmed by:

Assistant Dir. Adriano M. Doroy
Bureau of Design, DPWH

3. TWG

(1) 1st Meeting of TWG

The Project for the Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines

1st Meeting of the Technical Working Group

Date and Time: 18 April 2012, 2pm

Venue: Conference Room, BOD, DPWH

Attended by: Asst-Dir. Doroy, E. Matanguihan, A. Doroy, C. Canuel, D. Aquino, R. Faustino, L. Chua, S. Gose, T. Tsuchida, T. Ichikawa, K. Tanaka, R. Tanahashi, Y. Oyama, Y. Iwashita

Minutes of Meeting:

- This first meeting is the kick-off meeting with the Counterpart Team (CP) which jointly working with the members of the JICA Study Team will serve as the Technical Working Group.
  - Asst.-Dir. Doroy first explained the composition of the CP; then introduces the members of the CP. The chiefs of each CP will be responsible to assign assistants in their respective divisions.
  - JICA Study Team team leader S. Gose introduced the 16-member JICA Study Team as listed on page 6 of the Draft Inception Report (hereafter, IR-draft).
- Dr. Gose discussed Package B which consists of 17 bridges in Metro Manila located across the Pasig River and Marikina River (IR-draft p.19).
- Dr. Gose discussed Package C which consists of 16 bridges outside Metro Manila (IR-draft p.20). These are mostly located along the Pan-Philippine Highway; and are mostly of longer spans.
- Dr. Gose discussed Package A which will prepare Draft Bridge Seismic Design Specifications and Reference Books and Manuals.
- The draft Inception Report (distributed during this meeting) will be finalized.
- Package A has four steps. Packages B and C have the same activities which will consist of the first screening and the second screening for selected bridges.
- There was a discussion regarding old bridges with no drawings. DPWH mentioned that they would use backward calculations.
- There was a discussion on policy of judgment for replacement. DPWH has an existing replacement policy.
- Based on the project schedule, bridges to be retrofitted or replaced will be selected by November 2012.
- Listed bridges on IR-draft p.19 and p.20 that are shaded red indicate severe damage at the present. Ayala Bridge may be excluded from the screenings for the reason that DPWH already has the plan to replace it. Likewise, Lucban Bridge (planned to

be replaced) and Magapit Bridge (ongoing retrofit) may be excluded from the screenings

- During bridge inspections, CP will arrange boat and clearance with the Coast Guard. Coordination will be one week ahead. The Study Team will try to obtain inspection sheets from Mr. Nagao (will return to the Philippines on May 6). It is also agreed that the Study Team will meet with CP members E. Matanguihan and L. Chua tomorrow (19 April) for further discussions.
- Dr. Gose discussed seismic design specifications on pp.25–29 of IR-draft. He emphasized the need for the Philippines to develop original specifications since there are differences on seismic bridge design requirements between the Philippines and the U.S.. Traditionally, the Philippines has relied on the U.S. code AASHTO for bridge design.
- Dr. Gose asked the CP for comments to finalize the Inception Report before submission to the JCC (Joint Coordinating Committee).
- It was affirmed throughout the meeting that the CP agrees to cooperate with the JICA Study Team in different activities of the study.
- Meeting adjourned.

Prepared by:

For Tokiyuki Ohtake

Dr. Takayuki Tsuchida
Deputy Team Leader
JICA STUDY TEAM

Confirmed by:

Assistant Dir. Adriano M. Doroy
Bureau of Design, DPWH

ATTACMENT 1: PICTURE

Photo 1

(2) 2nd Meeting of TWG

The Project for the Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines

2nd Meeting of the Technical Working Group

Date and Time: 1 June 2012, 10am

Venue: Conference Room, BOD, DPWH

Attended by: Asst-Dir. A. Doroy, E. Matanguihan, D. Aquino, J. Atienza, R. Faustino, V. Santos, C. Canuel, W. Abanador, R. Valiente T. Tsuchida, T. Ichikawa, H. Ohtake, W. Tanzo

Minutes of Meeting:

- Opening remarks by Asst-Dir. Doroy.
- Mr. Ichikawa reported on the progress of the 1st screening of Package B. Details of the 1st screening will be presented in the next TWG.
- Dr. Tsuchida reported on the progress of the 1st screening of Package C. Bridges that are being/planned for replacement or retrofit by the DPWH will not be selected for 2nd screening. Dr. Tsuchida requested CP to verify if the 2nd Magsaysay Bridge has been renamed as Macapagal Bridge as had been reported at the site. Details of the 1st screening will be presented in the next TWG.
- Mr. Ichikawa discussed the scoring system for evaluation of 1st screening.
- Discussions:
  - It was suggested by CP that road importance and loading capacity be separated in the scoring system for evaluation of the 1st screening.
  - The scoring system for seating length was discussed and it was recommended to be reviewed.
  - CP asked if structural type should be included in the scoring and how it should be reflected.
  - CP would like to clarify how scoring for liquefaction will be conducted. It is suggested that liquefaction scoring should be based on boring data if available; or PHIVOLCS liquefaction mapping if boring data are not available.
- The 3rd TWG meeting is tentatively scheduled on June 25. Agenda will include presentation of the results of the 1st screening and the ratings.
- Meeting adjourned.

Prepared by:

For Jitsuaki Ohtake

Dr. Takayuki Tsuchida
Deputy Team Leader
JICA STUDY TEAM

Confirmed by:

Assistant Dir. Adriano M. Doroy
Bureau of Design, DPWH

ATTACHMENT 1: LIST OF ATTENDEES

M E E T I N G

SUBJECT : TWG Meeting relative to the Project "Improvement of Bridges thru Disaster Mitigating Measures for Large Scale Earthquakes"

DATE : June 1, 2012 TIME: 10:00 A.M.

VENUE : BOD Conference Rm.

A T T E N D A N C E

NAME	OFFICE	DESIGNATION	TEL. NO.	SIGNATURE
1. DOMINADOR P. AQUINO	BOM	Engr IV	3073710	
2. T. Tsuchida	JICA Team	Assist TeamLeader		
JAYNE T. ATIENZA	BOD	Sr. Geologist	3043060	
WILLIAM T. TANZO	JICA TEAM	adviser	0918 923 9185	
REYNALDO P. FAUSTINO	BRS	OIC Assist Bu. Director	9263530	
Toshio ICHIKAWA	JICA Team	Bridge Engineer	09298[illegible]	
7. Hiroaki Ohtake	JICA Team	Bridge Engineer	09293897035	
VICTOR J. SANTOS	BOC-PMO I	Engr. III	3043396 to 97	
Caroline Camuel	PS	Engr. V OIC DPD	3043352	
10. WENCESLAWA P ABANADOR	NCR	ENGR II	3093687	
RUFINO D. VALIENTE	BOD	Engr IV	3043361	
EDWIN C. MATANGUIHAN	BOD	OIC - BRIDGES DIV	3043061	
A. M. Deray	BOM			

ATTACMENT 3: PICTURE

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

(3) 3rd Meeting of TWG

The Project for the Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines

3rd Meeting of the Technical Working Group (TWG)

Date and Time: 2 July 2012, 10AM

Venue: Conference Room, BOD, DPWH

Attended by: Asst-Dir. Adriano Doroy, E. Matanguihan, D. Aquino, J. Atienza, R. Faustino, E. Adriano, W. Abanador, L. Chua, Aristarco Doroy, S. Gose, S. Tsukuda, G. Mirandilla Vela, F. Adviento, T. Ichikawa, J. Santos, Y. Oyama, H. Ohtake, W. Tanzo

Minutes of Meeting:

- Opening remarks by Asst-Dir. Doroy
- Approval of previous minutes (2nd TWG, 1 June 2012)
  - Mr. Doroy has confirmed with the regional director that the 2nd Magsaysay Bridge had been renamed Macapagal Bridge. Therefore, the said bridge will be cited as Macapagal (2nd Magsaysay) Bridge in reporting for this Project.
  - The minutes of the 2nd TWG is approved.
- Mr. Ichikawa reported on the result of the 1st screening of Package B. Based on the result of the 1st screening, the following five (5) bridges from Package B are candidates for 2nd screening: Guadalupe Bridge, Lambingan Bridge, Marikina Bridge, Delpan Bridge, and Nagtahan Bridge.
- Mr. Ohtake reported on the result of the 1st screening of Pacakge C. Based on the result of the 1st screening, the following seven (7) bridges from Package C are candidates for 2nd screening: Wawa Bridge, Palanit Bridge, Buntun Bridge, Lilo-an Bridge, Mawo Bridge, Sicsican Bridge, and 1st Mactan-Mandaue Bridge.
- Discussions:
  - It was suggested by CP that a closer inspection of the substructure of Nagtahan Bridge be made since some tabular steel piles are already exposed.
  - It was suggested by CP that the seismic retrofit of Sicsican Bridge was already implemented by DPWH so 2nd screening should instead include Biliran Bridge.
  - CP Engr. Matanguihan commented that criteria should emphasize more on seismic considerations. Asst.-Dir. Doroy asked if distance from fault line is a factor to consider; and suggested that the selection should be more on seismic performance, not on condition assessment.
  - The 4th TWG meeting is tentatively scheduled next month.
- Meeting adjourned.

The Project for the Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines

Prepared by:	Confirmed by:
For J. Tsuchida (Otsuka)	
Dr. Takayuki Tsuchida	**OIC Assistant Dir. Adriano M. Doroy**
Assistant Team Leader	**Bureau of Design, DPWH**
JICA STUDY TEAM	

ATTACHMENT 1: LIST OF ATTENDEES

MEETING

SUBJECT TWG Meeting on the Project for Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes

DATE 02 July 2017 **TIME:** 10:00 AM

VENUE B O D

ATTENDANCE

NAME	OFFICE	DESIGNATION	TEL. NO.	SIGNATURE
1. ADRIANO M. DOROY	BOD	OIC - ASST. DIR.		
2. EDWIN C. MATANGUIHAN	BOD	OIC - BRIDGES DIV		
3. REYNALDO P. FAUSTINO	BRS	OIC - ASSIST. DIR.		
4. LYDIA G. CHUA	NCR	Engr. V	304-3784	
5. W P ABANADOR	[illegible]	ENGR. II	304-3686	
6. [illegible] as Representative of [illegible]	PS	E - II	304-3889	
7. JAYNE T. ATIENZA	BOD	Sr. Geologist	304-3060	
8. YASUSHI OYAMA				
9. JOVITO SANTOS	JICA STUDY	MEMBER		
10. [illegible]	"	"	0919 2127860	
11. Hiroaki Ohtake	"	"		
12. Grace Arandilla Uelo	JICA PP	Program Officer	889-7119	
13. FLORO ADVIENTO	JICA PP	PROGRAM MANAGER	889-7119	
14. Dominador Aquino	DPWH-BOM	Engr. IV	304-3710	
15. WILLIAM TANZO	JICA STUDY	MEMBER	0918-923-9185	
16. Senaro Tsukagi	DPWH [illegible]	Advisor	0920 [illegible]	
17. [illegible]	BOD - [illegible]	Engr. V	0920 [illegible]	
18. Toshio ICHIKAWA	JICA STUDY	MEMBER	09298504755	

ATTACMENT 3: PICTURE

	
Photo 1	**Photo 2**
	
Photo 3	**Photo 4**
	
Photo 5	**Photo 6**

(4) 4th Meeting of TWG

The Project for the Study on Improvement of the Bridges through
Disaster Mitigating Measures for Large Scale Earthquakes
in the Republic of the Philippines

Minutes of Meeting
For
4th TWG Meeting
On
Draft Interim Report

Date & Time:	November 27, 2012, 2:00 p.m.-5:00p.m.
Venue:	Director's Lounge, 2nd floor, DPWH
Objectives:	1. To explain the progress of the above project with draft interim report. 2. To discuss the technical issues regarding; - revision of bridge seismic design specifications and, - prioritization and selection of the target bridges for the outline design. 3. To collect opinions and comments from participants regarding the draft interim report.
Participants:	1. Technical Working Group (TWG) members 2. A representative from JICA Philippine Office 3. JICA expert 4. JICA study team members (See attached list of attendees: Attachment 2)

Meeting Agenda:

1. Opening and acknowledgement of participants
2. Explanation of Draft Interim Report
3. Discussions
4. Closure

The results of discussions are shown in Attachment 1.

Attachment 1: Results of 4th TWG Meeting (November 27, 2012)

Minutes	Action
1. Opening • The meeting started at 2:00pm with opening remarks from Asst. Dir. Doroy.	
2. Dr. Tsuchida made a presentation on draft interim report of the project. The major discussions on the presentation are as follows. • DPWH basically accepted the overall contents of the interim report. • However, DPWH and Study team need further discussions on the following items. - Design seismic performance requirements - Design earthquake levels - Small/Moderate: 100-year return period - Large/Major (1): 1000-year return period - Large/Major (2): 475-year return period - Bridge importance category • Design seismic performance requirements and design earthquake levels will be decided by DPWH after JICA Study Team's proposal in consideration of financial capacity and acceptable degree of damages due to large scale earthquakes. • Asst. Dir. Doroy emphasized a point agreed in the previous meeting that DPWH requests the development of design earthquake such as "475-year PGA contour map" that could be immediately applied to the current Philippine bridge design code (LFD) during the transition period while the output of the study is towards the adoption of LRFD design principles. • DPWH requested formalization of bridge prioritization and selection criteria for seismic retrofit design although it is not included in the scope of works. Study Team explained that the criteria used in the 2nd screening are formulated only for the bridge selection of this project. Study Team suggested that DPWH formalize the criteria of bridge prioritization and selection criteria for seismic retrofit design, based on the criteria used in this project.	Study Team will propose the seismic performance requirements and the design earthquake level, based on the results of comparative study on probabilistic seismic hazard analyses (PSHA).

Minutes	Action
• Also, DPWH requested the preparation of seismic bridge retrofit manual in this project although it is not included in the scope of works.	Study Team will consult JICA on the preparation of bridge seismic retrofit design manual.
• Study Team suggested the following bridges for the outline design: - two (2) bridges in Package B : Guadalupe Bridge and Lambingan Bridge - four (4) bridges in Package C: Mawo Bridge, Wawa Bridge, Palanit Bridge, and 1st Mandaue-Mactan Bridge	
DPWH agreed with the recommendation except for inclusion of Lilo-an Bridge besides the above bridges: DPWH recognizes Lilo-an Bridge as especially important bridge because the bridge is the only connection of two of Leyte islands. In regard with this, DPWH requested that Study Team should conduct outline designs in accordance with the number of bridges said in TOR: two (2) bridges for Package B and five (5) bridges for Package C.	Study Team will confirm the number of bridges for outline design with JICA.
• DPWH suggested that the next seminar for introduction of applicable Japanese technologies should be held for two (2) days considering the number of topics and time scheduling: The seminar is tentatively scheduled on January 17-18, 2013. DPWH agreed with Study Team's request that Members of JICA Advisory will make a courtesy call to Secretary Singson during that time.	Study Team will rearrange the seminar schedule and inform DPWH by the end of this year. DPWH will coordinate the courtesy call to the Secretary Singson.
• DPWH requested that Study Team prepare the executive summary of the interim report by 2nd JCC meeting.	Study Team will prepare the executive summary of the interim report by 2nd JCC meeting.
3. The 2nd JCC meeting is tentatively scheduled on December 5, 2012. The Study Team shall be informed of the final schedule after the schedule of Usec. Asis is confirmed.	
4. DPWH counterpart Ms. Atienza invited the Study Team members to the Geological Convention GEOCON 2012 on December 10-11, 2012 at Dusit Hotel organized by the Geological Society of the Philippines: Information on Negros Earthquake will be introduced	

Minutes	Action

during the sessions.

5. Closing

- The meeting ended at 5:00pm.

Prepared by:

Dr. Takayuki Tsuchida
Assistant Team Leader
JICA Study Team

Confirmed by:

Assistant Dir. Adriano M. Doroy
Bureau of Design, DPWH

Attachment 2: List of Attendance

Name	Position/Organization	Signature
1) ADRIANO M. DOROY	O/C-ASST. DIR. - BOD	
2) DOMINADOR P. AQUINO	Engr. IV	
3) EDWIN C. MATANGUIHAN	OIC - BRIDGES DIV	
4) Lydia G. Chua	Engr. V - DPWH - NCR	
5) NENITA R. VALENCIA	ENGR III BRS	
EMMANUEL ADRIANO (REPRESENTING CAROLINA CANUEL)		
7) Seitaro Tsukuda	Advisor DPWH	佃誠太郎
8) Hiroaki Ohtake.	JICA Study Team.	大竹弘晃
9) William Tanzo	JICA Study Team	
10) Takayuki Tsuchida	JICA Study Team	
11) WENCESLAUA ABARABAR	ENGR II MR	
12) ARISTARCO M. DOROY	ENGR. V	
13) JAYNE T. ATIENZA	Sr. Geologist - BOD	
14) Grace M. Vela	JICA/Program Officer	

Attachment 3: Pictures

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

(5) 5th Meeting of TWG

The Project for the Study on Improvement of the Bridges through
Disaster Mitigating Measures for Large Scale Earthquakes
in the Republic of the Philippines

Minutes of Meeting
For
5th TWG Meeting
On
Earthquake Ground Motion and Outline Design

Date & Time:	May17, 2013, 2:00pm - 5:00pm
Venue:	BOD Conference Room, DPWH
Objectives:	The Technical Working Group (TWG) discussed the project and aims to: - Present the draft design of earthquake ground motions for the objective bridges; - Present the countermeasure on the selected bridges for outline design; - Discuss the technical issues regarding revision of bridge seismic design earthquake ground motion and countermeasure of objective bridges for the outline design; and - Collect opinions and comments from participants regarding the draft interim report.
Participants:	1. Technical Working Group (TWG) members 2. JICA Study Team members 3. A representative from JICA Philippine Office (See attached list of attendees: Attachment 2)

Meeting Agenda:

1. Opening remarks
2. Major contract modifications between JICA and Study Team
3. Detail comparison study on improvement scheme selection for Guadalupe Bridge & Mawo Bridge
4. Retrofitting outline design of 1st Mandaue-Mactan Bridge and Lilo-an Bridge
5. Explanation of countermeasure on the Bridge to be replaced
6. Explanation of draft design of earthquake ground motions for the objective bridges
7. Closing remarks

The results of discussions are shown in Attachment 1.

Attachment 1: Results of 5th TWG Meeting (May17 2013)

Minutes	Action
1. Opening Remarks	
• The meeting started at 2:00pm with opening remarks from Asst. Dir. Doroy.	
2. Major contract modifications between JICA and Study Team	TWG members were informed of contract modification between JICA and Study Team.
• Dr. Tsuchida announced the major contract modifications between JICA and Study Team.	
3. Detail comparison study on improvement scheme selection for Guadalupe Bridge & Mawo Bridge	
• The countermeasure of Guadalupe Bridge is recommended as replacement on the outer bridge and seismic retrofitting (partial reconstruction) on the inner bridge in accordance with the comparison studies.	The countermeasure of Guadalupe Bridge was basically accepted by TWG members.
+ Asst-Dir. Doroy asked about the difficulty of reconstruction of bridge pier without closure of existing traffic flow.	The Study Team will study the construction planning.
+ Asst-Dir. Doroy asked the affect to the river flow by the retrofitting of the foundation.	Dr. Tsuchida suggested to cut off the Steel Pipe Sheet Pile (SPSP) below the river bed to avoid the afflux of the river flow caused by the obstruction of SPSP.
+ Mr. Matanguihan asked about exact cost comparison.	Dr. Tsuchida replied that the cost will be estimated by the cost estimator who will arrive in June.
• The countermeasure of Mawo Bridge is recommended as replacement in accordance with the comparison studies.	The countermeasure of Mawo Bridge was basically accepted by TWG members.
+ Asst-Dir. Doroy asked about the proposed shortening of the bridge length and hydrographic study.	The Study Team will present the basis for shortening the bridge length.
4. Retrofitting outline design of 1st Mandaue-Mactan Bridge and Lilo-an Bridge	
• The Study Team proposed the following seismic retrofitting scheme on 1st Mandaue-Mactan Bridge. - Improvement of Bearing Restraint Conditions - Seismic retrofitting of bridge pier by Concrete Jacketing - Seismic retrofitting of foundation by Cast-in-Place Piles (inland) and Steel Pipe Sheet Pile (In deep water) - Installation of Unseating Prevention System	The concept of retrofitting scheme of 1st Mandaue-Mactan Bridge was accepted by TWG members but subject to cost analysis re: feasibility of retrofitting vs. new construction.
• The Study Team proposed the following seismic retrofitting scheme on Lilo-an Bridge. - Improvement of Bearing Restraint Conditions - Seismic retrofitting of bridge pier by Concrete Jacketing - Seismic retrofitting of foundation by Cast-in-Place Piles - Installation of Unseating Prevention System	The concept for Lilo-an Bridge was accepted by the TWG.
+ Asst-Dir. Doroy asked if previous study on retrofitting of 1st	

Minutes	Action
+ Asst-Dir. Doroy asked if previous study on retrofitting of 1st Mandaue-Mactan Bridge was referred.	The Study Team will confirm.
5. Explanation of countermeasure on the Bridge to be replaced	
• Dr. Takaue explained the methodology of comparison study and comparison study result of package B and C. The proposed bridge types on replacement bridges are as follows. - Lambingan Bridge: Single Spanned Steel Deck Stiffened Lohse Bridge (Stage Construction) - Guadalupe Bridge: 3-span continuous Steel Deck Box Girder Bridge (Outer Bridge) - Palanit Bridge: 3-span continuous PC-I Girder Bridge - Mawo Bridge: 3-span continuous Fin-back PC Box Girder Bridge - Wawa Bridge: 3-span continuous Composite Lattice Truss Bridge	The bridge types of five replacement bridges were basically accepted by TWG members for proceeding to the outline design phase.
+ Asst-Dir. Doroy asked if fabrication can be made in the Philippines	Dr. Takaue replied that it is available for basic fabrication except for high-technological fields.
+ Asst-Dir. Doroy asked about clearance requirement of the bridge and the inhibition ratio.	The Study Team will confirm.
6. Explanation of draft design of earthquake ground motions for the objective bridges • Dr. Tanzo explained the draft design earthquake ground motions for the objective bridges including the following, - Methodology to establish site-specific design spectra; - Example case of establishing design spectrum at 500-year return period for Wawa bridge; and - Comparison of design spectra for the 7 objectives bridges.	The concept of design of earthquake ground motion for the objective bridges was accepted by TWG members.
+ Asst-Dir. Doroy asked about the procedure of obtaining design spectra from the proposed contour map values.	Dr. Tanzo explained the details.
+ Mr. Matanguihan asked about the relative seismicity among the 7 objective-bridge Sites.	Dr. Tanzo explained the details.
7. Closing Remarks • The meeting adjourned at 5:20pm with closing remarks from Mr. Matanguihan.	

Prepared by:

Dr. Takayuki Tsuchida
Assistant Team Leader
JICA Study Team

Confirmed by:

o/c **Assistant Dir. Adriano M. Doroy**
Bureau of Design, DPWH

Attachment 2: List of Attendance

5th Technical Working Group (TWG) Meeting

The Project for Study on Improvement of Bridges through
Disaster Mitigating Measures for Large-Scale Earthquakes in the Republic of the Philippines

Date: May 17, 2013
Venue: Conference Room, BOD, DPWH

ATTENDANCE SHEET

No.	Name	Organization	Signature
1	Adriano M. Doroy	OIC, Assistant Director, BOD, DPWH	
2	Edwin C. Matanguihan	OIC, Chief, Bridges Division, BOD, DPWH	
3	Aristarco M. Doroy By: VICTOR SANTOS	Chief, Project Assistance Division Area 1, BOC, DPWH	
4	Carolina S. Canuel	Chief, Development Planning Division, PS, DPWH	Represented by
5	Dominador P. Aquino	Chief, Planning and Programming Division, BOM, DPWH	
6	Reynaldo P. Faustino	Chief, OIC, Asst Director, BRS Research and Development Division, BRS, DPWH	Represented by NENITA R. VALENCIA
7	Lydia G. Chua	Chief, Planning and Design Division, NCR, DPWH	
8	Guillerma Jayne T. Atienza	Senior Geologist, Survey and Investigation Division, BOD, DPWH	
9	Kazushi Suzuki	Project Formulation Advisor, Economic Growth Section, JICA	
10	Grace Mirandilla Vela	Program Officer, Economic Growth Section, JICA	
11	Takayuki Tuchida	JICA Study Team	
12	Akira Takaue	JICA Study Team	
13	Kei Katayama	JICA Study Team	
14	William Tanzo	JICA Study Team	
15	Masaki Ochi	JICA Study Team	Ochi Masaki

Attachment 3: Pictures

Photo 1

Photo 2

Photo 3

Photo 4

(6) 6th Meeting of TWG

The Project for Study on Improvement of Bridges through
Disaster Mitigating Measures for Large Scale Earthquakes
in the Republic of the Philippines

Minutes of Meeting
For
6th TWG Meeting
On
Draft Bridge Seismic Design Specifications and
Construction Planning & Cost Estimation of Seven Selected Bridges

Date & Time:	September 27, 2013, 10:00am - 13:00pm
Venue:	BOD Conference Room, DPWH
Objectives:	Objectives of the 6th-Technical Working Group (TWG) meeting were: - to present draft bridge seismic design specification (BSDS), - to present construction planning and cost estimation of seven (7) selected bridges, - to discus the technical issues regarding the above two items, and - to collect opinions and comments from participants regarding the above two items.
Participants:	1. Technical Working Group (TWG) members 2. JICA Study Team members 3. Representatives from JICA Philippine Office 4. JICA Expert (See attached list of attendees: Attachment 2)

Meeting Agenda:

1. Opening remarks
2. Explanation on the Draft Bridge Seismic Design Specifications
3. Explanation on Construction Planning and Cost Estimation of Seven Selected Bridges
4. Closing remarks

The results of discussions are shown in Attachment 1.

Attachment 1: Results of 6th TWG Meeting (September 27, 2013)

Minutes	Action
1. Opening Remarks	
• The meeting started at 10:00am with opening remarks from Mr. Matanguihan.	
2. Dr. Santos explained about the draft bridge seismic design specifications.	
• DPWH agreed on the overall content of the draft bridge seismic design specifications (BSDS).	
• As for section 3 (General requirements), DPWH requested to clarify the definition of design earthquake for critical bridges.	JICA Study Team will include 1000-yr return as the design earthquake and 2500-yr return as the earthquake greater than the design earthquake.
• In addition, DPWH and JICA Study Team confirmed that coordination with Planning Service (P/S) of DPWH and National Disaster Risk Reduction and Management Council (NDRRMC) is necessary in order to decide which roads are under the regional disaster prevention route.	BOD, DPWH will coordinate with NDCC and P/S.
• DPWH requested to transfer "Department Order No.75" from commentary to the main specifications of BSDS.	"Department Order No.75" will be moved to the main specs. of BSDS.
• DPWH reconfirmed the importance of seismic retrofit manual and requested JICA Study Team to prepare the manual.	JICA Study Team will propose the need of manual preparation to JICA.
• DPWH suggested that JICA Study Team should discuss the prepared contour maps with PHIVOLCS before its finalization.	JICA Study Team will have a meeting with PHIVOLCS.
3. Mr. Watanabe explained about construction planning and cost estimation of seven selected bridges.	
• DPWH basically agreed on the construction planning schemes of seven (7) selected bridges.	
• However, DPWH requested JICA Study Team to reconsider the construction duration of objective bridges, especially Guadalupe Bridge.	JICA Study Team will reconsider the construction planning to minimize the duration.
• DPWH pointed out that the estimated cost of 1st Mandaue-Mactan Bridge improvement plan is relatively higher than that of study result in the past and that the estimated cost is	JICA Study Team will study on the cost difference between two improvement plans.

close to that of Marcelo Fernan Bridge.

- DPWH requested to include the repair work of connection such as replacement of bolts in improvement plan of Lilo-an Bridge. — JICA Study Team will include the repair work in the plan.
- DPWH clarified if the new alignment of Wawa Bridge is within the "right of way (ROW)". Also, DPWH pointed out that the range of ROW in Wawa Bridge site might be less than 60m. JICA Study Team explained that the range was set based on the information from Regional Office-XIII.
- DPWH was concerned about the reduction of vertical clearance under Wawa Bridge because the water level might rise due to the effect of global warming/climate change in the future. — JICA Study Team will check the water level again in the detail design stage.
- DPWH requested JICA Study Team to submit one set of document on Improvement measure schemes of objective bridges with detail of cost estimation result. — JICA Study Team will submit the document, particularly to BOC representative.

4. Closing Remarks
   - The meeting adjourned at 13:00pm with closing remarks from Asst. Dir. Doroy.

Prepared by:

For

Dr. Shingo Gose
Team Leader
JICA Study Team

Confirmed by:

OIC **Assistant Dir. Adriano M. Doroy**
Bureau of Design, DPWH

Attachment 2: List of Attendance

ATTENDANCE SHEET

No.	Name	Organization	Signature
1	Adriano M. Doroy	OIC, Assistant Director, BOD, DPWH	
2	Edwin C. Matanguihan	OIC, Chief, Bridges Division, BOD, DPWH	
3	Aristarco M. Doroy	Chief, Project Assistance Division Area 1, BOC, DPWH	
4	Carolina S. Canuel	Chief, Development Planning Division, PS, DPWH	
5	Dominador P. Aquino	Chief, Planning and Programming Division, BOM, DPWH	
6	Reynaldo P. Faustino	Chief, Research and Development Division, BRS, DPWH	
7	Lydia G. Chua	Chief, Planning and Design Division, NCR, DPWH	
8	Guillerma Jayne T. Atienza	Senior Geologist, Survey and Investigation Division, BOD, DPWH	
9	Kazushi Suzuki	Project Formulation Advisor, Economic Growth Section, JICA	
10	Grace Mirandilla Vela	Program Officer, Economic Growth Section, JICA	
11	Shingo Gose	Team Leader JICA Study Team	
12	Takayuki Tsuchida	Assitant Team Leader JICA Study Team	
13	Jovito C. Santos	Member JICA Study Team	
14	Yasufumi Watanabe	Member JICA Study Team	
15	Hiroaki Ohtake	Member JICA Study Team	

The Project for Study on Improvement of Bridges through
Disaster Mitigating Measures for Large Scale Earthquakes
in the Republic of the Philippines

No.	Name	Organization	Signature
16	Kei Katayama	Member JICA Study Team	
17	Akira Takaue	Member JICA Study Team	
18	Hiroshi Saito	Member JICA Study Team	
19	William Tanzo	Adviser JICA Study Team	
20	Seitaro Tsukuda	JICA Expert DPWH	
21	MARITESS S. QUIMPO	DPWH-BRS	
22	SUSAN DOMINGO	BOD, BRIDGE DIVISION	
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Attachment 3: Pictures

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

(7) 7th Meeting of TWG

The Project for Study on Improvement of Bridges through
Disaster Mitigating Measures for Large Scale Earthquakes
in the Republic of the Philippines

Minutes of Meeting
For
7th TWG Meeting
On
Draft Final Report

Date & Time:	November 11, 2013, 14:15pm - 17:15pm
Venue:	BOD Conference Room, DPWH
Objectives:	Objectives of the 6th-Technical Working Group (TWG) meeting were: - to present the summary of draft final report; - to discuss the technical issues regarding the report contents, and; - to collect opinions and comments from participants regarding the report 's contents.
Participants:	1. Technical Working Group (TWG) members 2. JICA Study Team members (See attached list of attendees: Attachment 2)

Meeting Agenda:

1. Opening remarks
2. Explanation on the draft final report
3. Closing remarks

The results of discussions are shown in Attachment 1.

Attachment 1: Results of 7th TWG Meeting (November 11, 2013)

Minutes	Action
1. Opening Remarks • The meeting started at 14:15pm with opening remarks from Asst. Dir. Doroy.	
2. Dr. Tsuchida explained the summary of draft final report. The major discussions are as follows. • DPWH basically agreed on the overall content of the report.	
• However, DPWH requested JICA Study Team (hereafter called as Study Team) to revise the presentation content shown in the meeting before JCC meeting. Major revisions are as follows. - Revision-1: Preparation of PGA contour map comparison between 500-year return period and 1000-year return period. - Revision-2: Removal of detailed explanation of 1st and 2nd screening results; focus on the major difference between the existing design specifications and BSDS. - Revision-3: Addition of explanation for relatively high unit cost of Lambingan Bridge - Revision-4: Indicate the design condition/criteria using the BSDS for the outline design of seven (7) target bridges - Revision-5: Addition of explanation for cost increase in seismic retrofit plan of 1st Mandaue-Mactan Bridge, compared to the cost presented in the previous JICA project. - Revision-6: Revision of term in a slide for Chapter 21; Before: neighboring/proximity construction technology After: technology for construction with constraints and in limited working space - Revision-7: Addition of BSDS highlight that clearly indicates the difference from DPWH design requirements; in order to implement pilot project efficiently, more detailed explanation of BSDS provisions at JCC meeting is indispensable. - Revision-8: Revision of term in a slide for Chapter 22; Before: Draft Bridge Seismic Design Specifications After: Proposed Bridge Seismic Design Specifications	Study Team will revise the presentation contents reflecting the discussion results.

Minutes	Action
• Study Team explained the result of cost comparative study for determination of earthquake return period applied to BSDS. Also, Study Team emphasized that further study and verification is necessary to determine if a 500-year or 1000 year return period shall be used because the study result shown in the report is based on only one case study.	
• As for the bridge operational classification of 7 target bridges for outline design, DPWH pointed out that although Lambingan Bridge is categorized as "Essential Bridge" in BSDS the bridge is initially designed as "Critical Bridge" in the outline design.	Lambingan Bridge can be categorized as "Essentia Bridge" during the detailed design.
• DPWH pointed out that implementation of "improvement scheme in/and traffic intermodal area near Guadalupe Bridge" may provide traffic solution only in that locality and not the whole of EDSA. A more macro level solution is necessary like additional bridge near Guadalupe (a new bridge "Lawton Bridge" is proposed to be constructed upstream of Guadalupe bridge). The Study Team responded that the scheme is just an additional value recommendation besides the seismic improvement of Guadalupe Bridge. Therefore, it's up to DPWH if the scheme will be implemented.	Reclassify all bridges as to actual site conditions/functiona requirements based on proposed BSDS.
• Include discussion's re: construction cost and effects of bridges classification.	
3. Closing Remarks	
• The meeting adjourned at 17:15pm with closing remarks from Asst. Dir. Doroy.	

Prepared by:

for Ryuichi Ueno

Dr. Shingo Gose
Team Leader
JICA Study Team

Confirmed by:

OIC Assistant Dir. Adriano M. Doroy
Bureau of Design, DPWH

Attachment 2: List of Attendance

ATTENDANCE SHEET

No.	Name	Organization	Signature
1	Adriano M. Doroy	OIC, Assistant Director, BOD, DPWH	
2	Edwin C. Matanguihan	OIC, Chief, Bridges Division, BOD, DPWH	
3	Aristarco M. Doroy	Chief, Project Assistance Division Area 1, BOC, DPWH	
4	Carolina S. Canuel	Chief, Development Planning Division, PS, DPWH	
5	Dominador P. Aquino	Chief, Planning and Programming Division, BOM, DPWH	
6	Reynaldo P. Faustino	Chief, Research and Development Division, BRS, DPWH	
7	Lydia G. Chua	Chief, Planning and Design Division, NCR, DPWH	
8	Guillerma Jayne T. Atienza	Senior Geologist, Survey and Investigation Division, BOD, DPWH	
9	Kazushi Suzuki	Project Formulation Advisor, Economic Growth Section, JICA	
10	Grace Mirandilla Vela	Program Officer, Economic Growth Section, JICA	
11	Shingo Gose	Team Leader JICA Study Team	
12	Takayuki Tsuchida	Assitant Team Leader JICA Study Team	
13	Jovito C. Santos	Member JICA Study Team	
14	Hiroaki Ohtake	Member JICA Study Team	
15	Minami Kato	Member JICA Study Team	

ATTENDANCE SHEET

No.	Name	Organization	Signature
16	Kei Katayama	Member JICA Study Team	
17	Akira Takaue	Member JICA Study Team	
18	William Tanzo	Adviser JICA Study Team	
19	Seitaro Tsukuda	JICA Expert DPWH	
20	VICTOR J. SANTOS	ENGR. III, BRC REP. OF MUSTAPHA DORMY	
21	MARIANO S. FLORES JJV	OIC - DIST. IV BRIDGE DIV., BOD	
22			
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Attachment 3: Pictures

	
Photo 1	**Photo 2**
	
Photo 3	**Photo 4**
	
Photo 5	**Photo 6**

4. JCC

(1) 1st Meeting of JCC

The Project for the Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines

MINUTES OF MEETING ON 1st JOINT COORDINATING COMMITTEE

Joint Coordinating Committee (hereinafter referred to as "JCC") meeting on the Project for Study on Improvement of the Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines (hereinafter referred to as "the Project") was held on 27th April at the Operations Room, 2nd floor, Department of Public Works and Highways (hereinafter referred to as "DPWH") to discuss the outline, methodology and the schedule of the Project for smooth and successful implementation of the Project.

As a result of the discussions, the details are shown in ATTACHMENT 1, the JCC members mutually accepted the Draft Inception Report.

Mr. Raul C. Asis
Chairperson
Undersecretary
Technical Services
Department of Public Works and Highways

Mr. Takahiro Sasaki
Member
Chief Representative
JICA Philippine Office

ATTACHMENT 1: DETAILS OF THE MEETING

1. The 1st JCC meeting was opened and presided by Dir. Gilberto S. Reyes (as Project Manager of JCC). An invocation followed.

2. Opening remarks was given by Usec. Raul C. Asis (as Chairman of JCC) who said that this JICA Study is very timely and expects technology transfer from the Japanese experts in seismic bridge design guidelines and seismic screenings of bridges. Usec Asis extends full support from all the bureaus in the DPWH, the Planning Service, the NCR office, and from external agencies such Philippine Institute of Volcanology and Seismology (hereinafter referred to as "PHIVOLCS") and Association of Structural Engineers of the Philippines (hereinafter referred to as "ASEP.") Lastly, Usec. Asis informed Mr. Suzuki of JICA that he had secure an office space for the Study Team and had instructed the Administrative Service to prepare the office and install additional air conditioner so that the team could transfer hopefully by mid-May.

3. On behalf of Mr. Takahiro Sasaki (Chief Representative of Japan International Cooperation Agency, hereinafter referred to as "JICA"), Mr. Kazushi Suzuki (Project Formulation Advisor, JICA) first stated the importance of the Study in imparting knowledge in deepening understanding of seismic design of bridges in the Philippines; and the continuing good relationship between JICA and DPWH for the past 40 years resulting in the accomplishment of many successful projects. He inspires both sides (DPWH and JICA) for full cooperation to achieve project success for the Study. He thanked DPWH for promptly preparing an office space for the Study Team. Further, he encourages a good coordination of this Study Team not only with the counterparts but also with two ongoing JICA-DPWH projects.

4. Introduction of members
   (a) A Special Order is being prepared and to be signed by the Secretary. Dir.Gil Reyes introduced the 10 members from the Philippine side.
   (b) Dr. Gose introduced the JICA Study Experts.
   (c) Dir. Reyes also introduced the Counterpart members.

5. Dr. Gose presented the Inception Report
   (a) Dr. Gose explained about the project which consists of three packages, namely, Package A (Draft Bridge Seismic Design Specifications and Reference Book(s) and Manual(s)), Package B (17 bridges in Metro Manila located across the Pasig River and Marikina River), and Package C (16 bridges outside Metro Manila and are mostly located along the Pan-Philippine Highway).

(b) Furthermore, Dr. Gose presented an advanced information on the latest design spectra to be incorporated in the soon-to-be-revised Japan Road Association (hereinafter referred to as "JRA") specification based on analyses of earthquake motions recorded during Tohoku Pacific Coast Earthquake.

6. Floor opened for discussions:

(a) Dir. Reyes asked if the Japanese code will be used as the basis for revision of Philippine seismic bridge design code since the Philippines has traditionally used the American Association of State Highway and Transportation Officials (hereinafter referred to as "AASHTO") as basis, Dr. Gose stated that the plan at present is to harmonize both AASHTO and JRA codes into the proposed Philippine code, especially on provisions at large earthquakes and judgment of soil types in which the JRA code has advantages. Dir. Reyes further added that since DPWH is in the process of upgrading their design code, it is open to any specifications other than AASHTO as long as it is suitable to Philippine conditions; and he believed that Japan and the Philippines have similarities as far as seismicity is concerned.

(b) Dir. Reyes asked if the copies of the manual for distribution will be included in the Project. Dr. Gose will refer to Dr. Santos regarding the manual since he is most familiar with the task.

(c) Dir. Reyes asked if the Ayala Bridge which DPWH has planned to replace will still be included in the study. Dr. Gose said that Ayala bridge, as well as other bridges already with plans for replacement and retrofit, will still be included in the study since these were included in the original request for study to JICA from DPWH. Therefore, the Study Team will request drawings and data of these bridges; and these bridges will be included in the inspections.

(d) Dir. Navarro of Planning Service asked if the study will include recommendations to JICA for funding for the implementation of the study results. Dr. Gose responded that the Study Team would certainly be recommending the results of the study to be implemented. Mr. Suzuki of JICA responded that JICA would be coordinating with DPWH on the implementation of the results of the study and on matters such sources of funding, priorities of implementation.

(e) Dir. Reyes, Mr. Suzuki, Dr. Gose and Dir. Navarro discussed about the need to compare the list of bridges for study with the list of bridges being evaluated for replacement under

Public-Private Partnership (hereinafter referred to as "PPP") to check for overlap.

Dir. Navarro explained to Dr. Gose the uniqueness of the PPP in which toll fees will not be collected but the private sector proponent will be paid by the government over a period of time the costs (plus profits) for the PPP-implemented bridges.

Dr. Gose mentioned the possibility for the Study to recommend some bridges for implementation to be funded by PPP if found appropriate, especially since these large bridges require maintenance costs after completion.

(f) Dir. Reyes offers assistance in obtaining data needed for the study from other agencies such as PHIVOLCS etc. The Study Team members are preparing requests for data from several agencies and would like to coordinate with the Technical Working Group (hereinafter referred to as "TWG") regarding this.

(g) Sr. Geologist Atienza asked if the Study Team will conduct new geotechnical tests. Dr. Gose answered that some geotechnical boring investigations will be conducted for bridges identified for second screenings since JRA uses N-value to classify soil type as shown in page 18 of Inception Report.

(h) Sr. Geologist Atienza further cited additional data sources from PHIVOLCS, National Mapping and Resource Information Authority (hereinafter referred as to "NAMRIA"), Bureau of Mines and Geoscience, Pasig-Marikina River Improvement Project that will be useful for the JICA Study.

(i) For liquefaction, Dr. Gose stated the challenge of incorporating the "degree of liquefaction" in Philippine seismic bridge design specification.

(j) Asst-Dir. Doroy commented that JRA and AASHTO have respectively different approaches to liquefaction designs. Dr. Gose said that the Study will make comparisons of both approaches so that Philippine designers will have choices. He believes that JRA has high technology in liquefaction mitigation design to contribute to Philippine seismic bridge design specification.

7. Dir. Reyes closed the open forum/discussion; and should there be further questions/comments re: Inception Report, he entices members of JCC and TWG to submit to Bureau of Design (hereinafter referred as to "BOD") with him as the Project Manager so that these can be transmitted to the JICA Study Team.

8. Dir. Reyes appreciated the presence of Mr. Suzuki of JICA; and noted that the next JCC meeting will be sometime November.

9. In the Chairperson's closing remarks, Usec. Asis gives full support to the Project by inviting the members of the Study Team to approach JCC should there be any problems encountered during implementation of the Study even while JCC will be meeting only three times.

10. Draft Inception Report was accepted as Inception Report through JCC meeting.

Prepared by:

Dr. Shingo Gose
JICA STUDY TEAM

Confirmed by:

Dir. Gilberto S. Reyes
Project manager, DPWH

ATTACHMENT 2: LIST OF ATTENDEES

1. JCC members

No.	NAME	POSITION	ORGANIZATION
1	Raul C. Asis	Chairperson	Undersecretary, Technical Services, DPWH
2	Gilberto S. Reyes	Project Manager	Director, Bureau of Design, DPWH
3	Walter R. Ocampo	Member	Director, Bureau of Construction, DPWH
4	Melvin B. Navarro	Member	Director, Planning Service, DPWH
5	Betty S. Sumait	Member	OIC, Director, Bureau of Maintenance, DPWH
6	Judy F. Sese	Member	OIC, Director, Bureau of Research and Standards, DPWH
7	Nicasio G. Tambal (rep. R. Tagudando)	Member	Assistant Regional Director, National Capital Region, DPWH Regional Director, National Capital Region, DPWH

2. Counterpart (TWG) members

No.	NAME	POSITION	ORGANIZATION
1	Adriano M. Doroy	Head	OIC, Assistant Director, Bureau of Design, DPWH
2	Edwin C. Matanguihan	Member	OIC, Chief, Bridges Division, Bureau of Design, DPWH
3	Aristarco M. Doroy	Member	Chief, Project Assistance Division, Area I, Bureau of Contruction, DPWH
4	Carolina S. Canuel	Member	Chief, Development Planning Division, Planning Service, DPWH
5	Dominador P. Aquino	Member	Chief, Planning and Programming Division, Bureau of Maintenance, DPWH
6	Reynaldo P. Faustino	Member	Chief, Research and Development Division, Bureau of Research and Standards, DPWH
7	Lydia F. Chua	Member	Chief, Planning and Design Division, National Capital Region, DPWH
8	G. Jayne T. Atienza	Member	Senior Geologist, Survey and Investigation Division, Bureau of Design, DPWH

3. DPWH staff

Marilyn A. Oba (Exec. Asst II, BOD)

Milagros B. Perez (Secretary II, BOD)

Irvin F. Ferrera

4. JICA Philippines

No.	NAME	POSITION
1	Kazushi Suzuki	Project Formulation Advisor, Economic Growth Section
2	Grace Mirandilla Vela	Program Officer, Economic Growth Section

5. JICA Study Team

No.	NAME	ORGANAIZATION	POSITION
1	Shingo Gose	CTII	Team Leader /Seismic Design Specifications
2	Toshio Ichikawa	NK	Seismic Design Specifications /Bridge Inspection and Condition Survey
3	Ken-ichi Tanaka	NK	Geotechnical Investigation
4	Yasushi Oyama	CHODAI	Earthquake motion Analysis
5	Ryo Tanahashi	NK	Hydrology/Meteorology
6	Yumi Iwashita	CTII	Training Plan

6. Observer

William T. Tanzo (Advisor to JICA Study Team)

ATTACMENT 3: PICTURE

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

(2) 2nd Meeting of JCC

The Project for Study on Improvement of Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines

MINUTES OF MEETING ON 2nd JOINT COORDINATING COMMITTEE

Joint Coordinating Committee (hereinafter referred to as "JCC") meeting on "The Project for Study on Improvement of Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines (hereinafter referred to as "the Project")" was held on 11th of December at the Operations Room, 2nd floor, Department of Public Works and Highways (hereinafter referred to as "DPWH") to discuss the technical issues regarding;

1) revision of bridge seismic design specifications, and
2) prioritization and selection of target bridges for outline design.

As a result of the discussions, the JCC members mutually accepted the Draft Interim Report. The details are shown in ATTACHMENT 1.

Mr. Raul C. Asis
Chairperson of JCC
Undersecretary
Technical Services, DPWH

Mr. Takahiro Sasaki
Member of JCC
Chief Representative
JICA Philippine Office

3. Discussions

- DPWH asked if there's any difference between the new bridge seismic design specifications and the latest AASHTO LRFD code. Dr. Tsuchida explained that the new design specifications will have localized provisions on ground conditions and design earthquake motions with the consideration of actual Philippine conditions.
- DPWH requested that DPWH needs transition period to shift from the existing LFD to the latest LRFD while the output of the study is towards the adoption of current AASHTO LRFD design code principles. Study Team will have discussions with JICA on preparation of both LFD type and LRFD type design specifications.
- DPWH requested a bridge seismic retrofit design manual that includes step-by-step retrofit methods and design examples for the widespread use of the new design specifications in all the regions. Dr. Tsuchida explained that Study Team will request JICA for the additional scope to prepare the retrofit design manual since it's not included in the scope of works. Study Team will have discussions with JICA on the preparation of the bridge seismic retrofit design manual.
- DPWH asked if the new design specification will include the countermeasure against Tsunami. Mr. Suzuki of JICA explained that tsunami effect is not considered in this project because of the need for balance between cost and safety.
- DPWH asked if the many foreign-funded bridge projects in recent years had been implementing advanced Japanese technologies. Mr. Floro of JICA replied that he thinks advanced Japanese technologies have been implemented in recent Japanese-funded bridge projects, and that Japanese-funded bridges are less prioritized for seismic improvement as shown in the 1st screening result of this project.

  DPWH asked what type of bridge Study Team would recommend. Dr. Tsuchida explained that recommendable bridge types will be studied in outline design. Also, he explained that at this moment, Study Team assumes that steel bridges could be recommended for target bridges inside Metro Manila for the advantage of rapid construction application as an option, and that concrete bridges could be recommended for target bridges outside Metro Manila in order to avoid the maintenance problems of steel bridges due to lack of budget.
- DPWH asked about the cost criterion to choose either replacement or seismic retrofit in this study. Dr. Tsuchida explained that replacement is recommended if cost of seismic retrofit is over 60% of that of replacement.
- DPWH asked why soil classification criterion with three soil types will be recommended in the new design specifications, while criterion with four soil types is used in the current DPWH code. Dr. Tsuchida explained that three-soil-type criterion same as JRA's is recommended since;

- ground characteristics of the Philippines are similar to that of Japan, and
- all design parameters of engineering significance can be reflected by the proposed three soil types.

4. Approval of the Interim Report

- JCC members agreed with the overall contents of the interim report.

5. Closing

- On behalf of Mr. Sasaki, Mr. Floro of JICA gave the closing remarks at 5:00pm.

Prepared by:

Dr. Shingo Gose
Member of JCC
Team Leader
JICA Study Team

Confirmed by:

Mr. Gilberto S. Reyes
Project Manager
Director
Bureau of Design, DPWH

ATTACHMENT 2: LIST OF ATTENDEES

1. JCC members

No.	NAME	ORGANIZATION	POSITION
1	Raul C. Asis	Undersecretary, Technical Services, DPWH	Chairperson
2	Luis A. Mamitag, Jr.	Assistant Secretary, Technical Services, DPWH	Vice Chairperson
3	Gilberto S. Reyes	Director, Bureau of Design, DPWH	Project Manager
4	(Walter R. Ocampo)	Director, Bureau of Construction, DPWH	Member
	Represented by Rogelio R. Isturis	Engineer V, Bureau of Construction, DPWH	
5	Constante A. Llanes, Jr.	Director, Planning Service, DPWH	Member
6	Betty S. Sumait	OIC, Director, Bureau of Maintenance, DPWH	Member
7	Judy F. Sese	OIC, Director, Bureau of Research and Standards, DPWH	Member
8	Reynaldo G. Tagudando	Regional Director, National Capital Region, DPWH	Member
9	(Vinci Nicolas R. Villasenor) Represented by Adam C. Abinales	President, ASEP	Member
10	(Takahiro Sasaki) Represented by	Chief Representatives, JICA Philippine Office	Member
	1) Kazushi Suzuki	Project Formulation Advisor, Economic Growth Section, JICA Philippine Office	
	2) Floro O. Adviento	Program Manager, Economic Growth Section, JICA Philippine Office	
	3) Grace Mirandilla Vela	Program Officer, Economic Growth Section, JICA Philippine Office	
11	(JICA Study Experts)		Member
	1) Takayuki Tsuchida	Asst. Team Leader, JICA Study Team	
	2) Hiroaki Ohtake	Member, JICA Study Team	
	3) William T. Tanzo	Adviser, JICA Study Team	

2. Counterpart Team (Technical Working Group; TWG) members

No.	NAME	ORGANIZATION	POSITION
1	Adriano M. Doroy	OIC, Assistant Director, Bureau of Design, DPWH	Head
2	Edwin C. Matanguihan	OIC, Chief, Bridges Division, Bureau of Design, DPWH	Member
3	Carolina S. Canuel	Chief, Development Planning Division, Planning Service, DPWH	Member
4	Dominador P. Aquino	Chief, Planning and Programming Division, Bureau of Maintenance, DPWH	Member
5	Reynaldo P. Faustino	Chief, Research and Development Division, Bureau of Research and Standards, DPWH	Member
6	Lydia G. Chua	Chief, Planning and Design Division, National Capital Region, DPWH	Member

3. Others

No.	NAME	ORGANIZATION	POSITION
1	Seitaro Tsukuda	JICA expert, Development Planning Division, Planning Service, DPWH	
2	Felipe S. Ramos	Bureau of Research and Standards, DPWH	
3	Wenceslawa P. Abanador	Planning and Design Division, National Capital Region, DPWH	
4	Tomasito Esquivez	Technical Services, DPWH	

NAME	POSITION/OFFICE	TEL. NO./CELPHONE NO.	SIGNATURE
1. RAUL C. ASIS	Undersecretary		
Represented by TOMASITO ESPIRITU 2. LUIS A. MAMITAG, JR.	Assistant Secretary		
3. GILBERTO S. REYES	Director, Bureau of Design		
Represented by REBELIO R. ISTURIS Engr. V. BOC 4. WALTER R. OCAMPO	Director, Bureau of Construction		
CONSTANTE A. LLANES, JR. 5. CONSTANTINO A. LLANES	Director, Planning Service	09173896597	
6. BETTY S. SUMAIT	OIC, Director, BOM	3NF3618	
7. JUDY F. SESE	OIC, Director, BRS		
8. REYNALDO G. TAGUDANDO	Reg. Director, NCR	3D43780	
9. ADRIANO M. DOROY	OIC, Asst. Dir. BOD	9/6-3601	
10. EDWIN C. MATANGUIHAN	OIC, Chief, Bridges Div., BOD		
11. ARISTARCO M. DOROY	Chief, PAD I, BOC		
12. CAROLINA S. CANUEL	Chief, DPD, PS		
13. REYNALDO P. FAUSTINO	Chief, RDD, BRS		
14. LYDIA F. CHUA	Chief, PDD, NCR		
15. DOMINADOR P. AQUINO	Chief, PPD, BOM		
16. G. JAYNE T. ATIENZA	Sr. Geologist, SID, BOD		
PHIVOLCS			
1			
2			

NAME	POSITION/OFFICE	TEL. NO./CELPHONE NO.	SIGNATURE
ASEP			
1. Adam C. Abinales		0917 542 2376	
2			
JICA			
1. FLORO ADVIENTO	PROGRAM MANAGER	889-7119 loc. 212	
2. Grace Kela	Program Officer	" loc 225	
3. Suzuki Kazushi			
4. WILLIAM TAJOO	Study Team	0918 923 9185	
5. Takayuki Tsuchida	Study Team	0918 699 2408	
6. Hiroaki Ohtake	Study Team	09293897035	
7. Seigaru Tsukada	DPWH PS	09204411898	
SECRETARIAT			
1. MARILYN A. DELA	Actg A.O. III, PMO	430554	
2. Grace Lokete	Assistant staff TICA	210-5922	
3.			
4.			
Felipe S. Ramos	BRS TWG	4810051	
IRENESLAWA P. ABANADOR	DPWH-NCR	43686	
LUIS A. MAGALLANES JR.	DPS		

ATTACMENT 3: PICTURE

	
Photo 1	**Photo 2**
	
Photo 3	**Photo 4**
	
Photo 5	**Photo 6**

(3) 3rd Meeting of JCC

The Project for Study on Improvement of Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines

MINUTES OF MEETING ON 3rd JOINT COORDINATING COMMITTEE

Joint Coordinating Committee (hereinafter referred to as "JCC") meeting on "The Project for Study on Improvement of Bridges through Disaster Mitigating Measures for Large Scale Earthquakes in the Republic of the Philippines (hereinafter referred to as "the Project")" was held on 15th of November at the Operations Room, 2nd floor, Department of Public Works and Highways (hereinafter referred to as "DPWH") to discuss the technical issues regarding revision of bridge seismic design specifications and outline design of objective bridges.

As a result of the discussions, the JCC members mutually accepted the Draft Final Report. The details are shown in ATTACHMENT 1.

Mr. Raul C. Asis
Chairperson of JCC
Undersecretary
Technical Services, DPWH

Mr. Takahiro Sasaki
Member of JCC
Chief Representative
JICA Philippine Office

ATTACHMENT 1: DETAILS OF THE MEETING

1. Opening

- On behalf of the Chairman of the Joint Coordinating Committee (JCC), Usec. Asis who was attending an urgent meeting related to the actions taken by DPWH to the typhoon damage, Dir. Reyes (Project Manager) gave an opening remarks stating DPWH's 100% responsiveness by carrying out programs on disaster mitigation of earthquake effects on roads and bridges in the Philippines, and thank the JICA Study Team and the counterparts involved in bringing this project to near completion.
- JICA senior representative Azukizawa first expressed sincere sympathy to the affected people due to the Bohol Earthquake and Typhoon Yolanda; and expressed JICA's strong support in carrying out these assistance projects such as this project in order to share Japanese experiences in mitigating disasters related to large earthquakes.

2. Explanation of Draft Final Report

- Dr. Gose explained the Draft Final Report: Package A (bridge seismic design specifications); selection of bridges for seismic capacity improvement (Package B and Package C); outline design of selected bridges for seismic capacity improvement (package B and Package C); project implementation and recommendations.
- Dr. Santos explained the BSDS (Bridge Seismic Design Specifications): Philippine seismicity and seismic vulnerability of bridges; policies on development of BSDS; and outline of the proposed DPWH- BSDS.
- Dr. Tanzo added some explanations regarding the proposed earthquake design motions (spectral acceleration mapping) in relation to the recent Bohol earthquake and future large earthquake affecting Metro Manila.

3. Discussions

- Dir. Reyes started the discussion by saying that since the Big One could happen any time in Metro Manila, there should be plans for strengthening of the bridges in the near future, better next year or early 2015.
- Dir. Reyes asked, "how often do we need to update the spectral acceleration maps?". Dr. Tanzo replied that as new data (on new earthquakes, as well as new data on past earthquakes) are obtained. In the case of US, there had been three (3) major updates of seismic hazard mapping in the past two decades. Dr. Gose added that the design spectra in Japan are updated about every 10 years, especially in the aftermath of the 1995 Kobe and 2011 Tohoku earthquakes.
- Dir. Reyes asked ASEP regarding their comments:
  - ASEP representative Engr. Wilfredo Lopez asked if the spectral acceleration maps

developed for BSDS could be adopted for building design. Dr. Tanzo replied that the general procedure to develop spectral maps is the same for both bridges and buildings. However, there are major differences in the design return periods for bridges versus buildings, and also in the key spectral parameters (PGA for bridges versus long-period transition period for buildings).

  - ASEP president stated that a revised NSCP bridge code had been submitted to DPWH for review and the 7th edition of the NSCP building code will released in 2015 including the findings on Bohol earthquake and accelerographs. However, the seismic hazard map is still the 2-zone map until such time that spectral acceleration maps could be produced. The dilemma is the funding.
  - ASEP asked if the present project on the spectral acceleration maps could be expanded for buildings. Dr. Tanzo stated that his engagement within the defined scope of spectral acceleration mapping for this project is almost completed. Further, Asst. Dir. Doroy answered that expanding into spectral acceleration maps for buildings cannot be accommodated in this project at this time and it has to be in another project.

- Asst. Dir. Doroy has recommended in the TWG that a minimum of PGA for 1000-year return period be raised to 0.3g from 0.2g as computed in the PSHA study and consequently asked ASEP regarding its implication in the new revisions of the NSCP bridge code. ASEP replied that the latest revised NSCP bridge code submitted for approval still made use of the 2-zone map. However, if DPWH will adopt the BSDS, ASEP will convene the bridge committee to discuss harmonization of their code with the BSDS.
- ASEP asked about the implementation of the BSDS
  - Dir. Reyes stated that pilot projects should first be conducted to have some trial applications.
  - ASEP President Columna said that ASEP will convene as soon as possible to study implications of BSDS since there will be cost implications.
  - Dr. Gose reiterated that cost depends on operational classification.
- ASEP president Columna inquired if data were obtained from MGB (Mines and Geoscience Bureau) especially the sinkholes in Bohol in preparation of the spectral acceleration maps. Dr. Tanzo clarified that the spectral acceleration maps were developed for site class B following the AASHTO requirement; and site effects due to subsurface ground conditions including limestone formations are incorporated by site amplification factors which are separated from the maps.
- TWG-CP (technical working group counterpart) Atienza asked if the JICA Study Team can still accept comments after the JCC meeting. Dr. Gose said that they can accept comments until the project office closes on November 20, 2013.

4. Approval of the Draft Final Report (DFR)

- Dir. Reyes asked JCC members if there are any contentious issues:
  - ASEP had no issues against the DFR; and ASEP will convene as soon as possible to harmonize their revised NSCP bridge code with the BSDS.
  - PHIVOLCS had no representative in this final JCC meeting. TWG-CP Atienza stated that since the BSDS spectral mapping study had close coordination with PHIVOLCS and that agency had provided the data used in the analysis so she thinks that they have no issues.
  - GSP (Geological Society of the Philippines) former president Atienza asked if there are still issues from the attendees of the 3rd JCC meeting on the DFR.
  - TWG: TWG-CP Atienza had given comments during the workshop/training regarding soil description and the use of N-values. Further, bridge designers who attended the workshop/training were also asked to submit comments.
- Dr. Gose stated that comments will be incorporated and finalized in the Final Report to be submitted in December 2013.

5. Closing

- In the closing remark, Dir. Reyes express the following:
  - thanked the Government of Japan through JICA for the assistance provided in this project;
  - stated that the main output of this study which is the BSDS should be made sustainable; and
  - will seek more assistance in related projects such as: seismic retrofit manual for bridges; implementation of the result of this study especially Guadalupe Bridge; and localized spectral acceleration mapping for building code.

Prepared by:

for Ryuichi Ueno

Dr. Shingo Gose
Member of JCC
Team Leader
JICA Study Team

Confirmed by:

Mr. Gilberto S. Reyes
Project Manager
Director

ATTACHMENT 2: LIST OF ATTENDEES

Bureau of Design, DPWH

1. JCC members

No.	NAME	ORGANIZATION	POSITION
1	Gilberto S. Reyes	Director, Bureau of Design, DPWH	Project Mana
2	Virgilio B. Columna	President, ASEP	Member
3	(Takahiro Sasaki)	Chief Representatives, JICA Philippine Office	Member
	Represented by		
	1) Eigo Azukizawa	Senior Representative, JICA Philippine Office	
	2) Grace Mirandilla Vela	Program Officer, Economic Growth Section, JICA Philippine Office	
4	JICA Study Experts		
	1) Shingo Gose	Team Leader JICA Study Team	Member
	2) Takayuki Tsuchida	Asst. Team Leader, JICA Study Team	Member
	3) Jovito Santos	Member, JICA Study Team	Member
	4) Ryuichi Ueno	Member, JICA Study Team	Member
	5) Hiroaki Ohtake	Member, JICA Study Team	Member
	6) Minami Kato	Member, JICA Study Team	Member
	7) Kei Katayama	Member, JICA Study Team	Member
	8) Akira Takaue	Member, JICA Study Team	Member
	9) William T. Tanzo	Adviser, JICA Study Team	Member

2. Counterpart Team (Technical Working Group; TWG) members

No.	NAME	ORGANIZATION	POSITION
1	Adriano M. Doroy	OIC, Assistant Director, Bureau of Design, DPWH	Head
2	Aristarco M. Doroy	Chief, Project Assistance Division Area 1, Bureau of Construction, DPWH	Member
3	Carolina S. Canuel	Chief, Development Planning Division, Planning Service, DPWH	Member
4	Dominador P. Aquino	Chief, Planning and Programming Division, Bureau of Maintenance, DPWH	Member
5	Reynaldo P. Faustino	Chief, Research and Development Division, Bureau of Research and Standards, DPWH	Member
6	Lydia G. Chua	Chief, Planning and Design Division, National Capital Region, DPWH	Member

7	Guillerma Jayne T. Atienza	Senior Geologist, Survey and Investigation Division, Bureau of Design, DPWH	Member

3. Others

No.	NAME	ORGANIZATION
1	Juanito Cunanan	Director, ASEP
2	Felipe S. Ramos	Chief, Bureau of Research and Standards, DPWH
3	Wilfredo Lopez	Past President, ASEP
4	Wenceslawa P. Abanador	ENGR III, Planning and Design Division, National Capital Region, DPWH

3rd JOINT COORDINATING COMMITTEE (JCC) MEETING

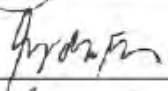
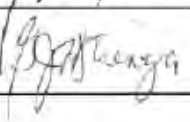
The Project for Study on Improvement of Bridges through
Disaster Mitigating Measures for Large-Scale Earthquakes in the Republic of the Philippines

Date: November 15, 2013
Venue: Conference Room, BOD, DPWH

ATTENDANCE SHEET

No.	Name	Organization	Position	Signature
1	Raul C. Asis	Undersecretary, Technical Services, DPWH	JCC Chairperson	
2	Euginio R. Pipo	Assistant Secretary, Technical Services, DPWH	JCC Vice Chairperson	
3	Gilberto S. Reyes	Director, Bureau of Design, DPWH	JCC Member	
4	Walter R. Ocampo	Director, Bureau of Construction, DPWH	JCC Member	
5	Melvin B. Navarro	Director, Planning Service, DPWH	JCC Member	
6	Betty S. Sumait	OIC, Director, Bureau of Maintenance, DPWH	JCC Member	
7	Judy F. Sese	OIC, Director, Bureau of Research and Standard, DPWH	JCC Member	
8	Reynaldo G. Tagudando	Regional Director, National Capital Region, DPWH	JCC Member	
9	Renato U. Solidum	Director, PHIVOLCS	JCC Member	
10	Virgilio B. Columna ~~Vingi Nicolas R. Villaseñor~~	President, ASEP	JCC Member	
11	Takahiro Sasaki ~~Takahiro Sasaki~~ represented by Mr. Eigo Azukizawa Senior Representive	Resident Representative, JICA Philippine Office	JCC Member	

ATTENDANCE SHEET

No.	Name	Organization	Position	Signature
12	Adriano M. Doroy	OIC, Assistant Director, BOD, DPWH	TWG Head	
13	Edwin C. Matanguihan	OIC, Chief, Bridges Division, BOD, DPWH	TWG Member	
14	Aristarco M. Doroy	Chief, Project Assistance Division Area 1, BOC, DPWH	TWG Member	
15	Carolina S. Canuel	Chief, Development Planning Division, PS, DPWH	TWG Member	
16	Dominador P. Aquino	Chief, Planning and Programming Division, BOM, DPWH	TWG Member	
17	Reynaldo P. Faustino	Chief, Research and Development Division, BRS, DPWH	TWG Member	
18	Lydia G. Chua	Chief, Planning and Design Division, NCR, DPWH	TWG Member	
19	Guillerma Jayne T. Atienza	Senior Geologist, Survey and Investigation Division, BOD, DPWH	TWG Member	

ATTENDANCE SHEET

No.	Name	Organization/Designation	Position	Signature
20	Akio Yonezawa	Second Secretary, Economic Affairs (Infrastructure), Embassy of Japan in the Philippines		
21	Seitaro Tsukuda	Road Planning & Management Advisor from JICA, DPWH		
22	Kazushi Suzuki	Project Formulation Advisor, Economic Growth Section, JICA		
23	Floro O. Adviento	Program Manager, Economic Growth Section, JICA		
24	Grace Mirandilla Vela	Program Officer, Economic Growth Section, JICA		
25	Shingo Gose	Team Leader, JICA Study Team	JCC Member	
26	Takayuki Tsuchida	Asst. Team Leader, JICA Study Team	JCC Member	
27	Jovito C. Santos	Member, JICA Study Team	JCC Member	
28	Hiroaki Ohtake	Member, JICA Study Team	JCC Member	
29	Minami Kato	Member, JICA Study Team	JCC Member	
30	Kei Katayama	Member, JICA Study Team	JCC Member	
31	Akira Takaue	Member, JICA Study Team	JCC Member	
32	William Tanzo	Adviser, JICA Study Team	JCC Member	
33	Ryuichi UENO	〃	〃	
34				

No.	Name	Organization/Designation	Position	Signature
35	JUANITO CUNANAN	ASEP	DIRECTOR	
36	Felipe S. Ramos	BRS-TSD	Div. Chief	
37	WILFREDO LOPEZ	ASEP	PP	
38	Wenceslawa Abanador	DPWH - NCR	ENGR III	

ATTACMENT 3: PICTURE

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6