

Country Name	<b>The Project for Study on Improvement of the Bridges through Large Scale Earthquakes Disaster Mitigating Measures</b>		
Republic of the Philippines			

**I. Project Outline**

Background	Since the Philippines is within the Pacific Rim of Volcanic Zone, it is geographically prone to large earthquake disasters similar to the “North Luzon Earthquake of 1990,” which imply the necessity of earthquake-related disaster mitigation measures. Although the Department of Public Works and Highways (DPWH) had carried out emergency seismic inspection and retrofit of public infrastructures, it still lacked the experience sufficient for inspection and retrofit of large and special type bridges along the major national highways serving as emergency lifeline road. Moreover, the seismic design standards and specifications for bridges had not been updated/ revised.								
Objectives of the Project	<p>This project aims to revise the bridge seismic design standard and propose a plan for bridge improvement based on the standard in the Philippines, thereby contributing to the strengthening of urban disaster prevention functions and safety and durability of bridges resistant to large-scale earthquake disasters, by way of designing bridges based on the standard and conducting seismic strengthening works on target bridges based on the improvement plan.</p> <ol style="list-style-type: none"> <li>Expected Goals through the proposed plan<sup>1</sup> : Urban disaster prevention function is strengthened through improvement of the safety and durability of bridges as a lifeline that is resistant to large-scale earthquake disasters.</li> <li>Expected utilization of the proposed plan : <ul style="list-style-type: none"> <li>-Revised bridge seismic design standard and reference materials proposed by the Project are utilized for bridge design in the Philippines.</li> <li>-Seismic strengthening works of the target bridges<sup>2</sup> are implemented by DPWH and related organizations such as donors based on the plan for bridge improvement (retrofit / replacement) proposed by the Project.</li> </ul> </li> </ol>								
Activities of the Project	<ol style="list-style-type: none"> <li>Project Site : Metro Manila area and outside Metro Manila area (mainly along the Philippine-Japan Friendship Highway)</li> <li>Main Activities: <ul style="list-style-type: none"> <li>- Package A (Seismic design guidelines<sup>3</sup> for bridges): Collection of earthquake records, soil and geological condition classifications, records of seismic damages on existing bridges; identification and analysis of issues and concerns on the current DPWH seismic design specifications<sup>4</sup>; development of draft on revision of the current specifications and reference materials; seminars for technology transfer.</li> <li>-Package B (The plan for bridge improvement within Metro Manila) and Package C (The plan for bridge improvement outside Metro Manila): Inspection of bridge conditions, including environmental and social conditions around the bridges; traffic volume survey on the roads related to the bridges; prioritization and selection of bridges to be retrofitted or replaced; preparation of outline design of retrofit or replacement and estimation of cost for the selected bridges to be retrofitted or replaced.</li> </ul> </li> <li>Inputs (to carry out above activities) <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Japanese Side</td> <td style="width: 50%;">Philippines Side</td> </tr> <tr> <td>1) Mission Members: 21 persons</td> <td>Staff Allocated: 8 persons from DPWH</td> </tr> <tr> <td>2) Training Received: 10 persons</td> <td></td> </tr> </table> </li> </ol>			Japanese Side	Philippines Side	1) Mission Members: 21 persons	Staff Allocated: 8 persons from DPWH	2) Training Received: 10 persons	
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Project Period	April 2012 to December 2013	Project Cost	(ex-ante) 420 million yen (actual) 387 million yen						
Implementing Agency	Department of Public Works and Highways (DPWH)								
Cooperation Agency in Japan	CTI Engineering International Co., Ltd; Chodai Co., Ltd; Nippon Koei Co., Ltd.								

**II. Result of the Evaluation**

< Special Perspectives Considered in the Ex-Post Evaluation >

- (i) Indicator 2 for the Expected Utilization of the proposed plan (i.e. the number of seismic strengthening works): Ex-post evaluation for this Project was originally planned after five years from completion of the Project (i.e. at the earliest in 2018) as per the ex-ante evaluation sheet. In addition, according to the implementation schedule of the bridge improvement plan proposed by the Project, the construction works start in 2018. Considering the above, it is not appropriate to use the number of construction works to assess the degree of utilization at the time of ex-post evaluation conducted in 2017. It is noted that, as per the said schedule, detailed design (DD) and tender assistance is conducted from the beginning of 2015 to the middle of 2017 and tendering is implemented from the beginning of 2017 to the first quarter of 2018. In addition, the Final Report of the Project recommended that, among 7 priority bridges, 2 in Metro Manila be replaced urgently while the other 5 outside Manila be improved “at appropriate timing”. For the ex-post evaluation, therefore, “the number of seismic strengthening works for which DD has been implemented and tendering process has started (at least 2)” shall be checked as an alternative indicator to assess the degree of utilization for Indicator 2.

<sup>1</sup> The degree of achievement of expected goals is not to be assessed in principle at the time of ex-post evaluation, since it is defined as the medium-to-long-term goals which will be attained as a result of crystallizing the proposed plan (“output” of the project)

<sup>2</sup> The bridges prioritized by the Project: Lambingan Bridge (Br) and Guadalupe Br. (for Metro Manila/Package B); 1st Mandaue- Mactan Br., Palanit Br, Mawo Br., Lilo-an Br., and Wawa Br. (for outside Metro Manila/Package C)

<sup>3</sup> “Guidelines” consist of standard and reference materials to be proposed through Package A of the Project.

<sup>4</sup> “Specifications” is a term used in Final Report for “standard” actually proposed through Package A.

1 Relevance

<Consistency with the Development Policy of the Philippines at the Time of Ex-Ante Evaluation and Project Completion>

The Project was consistent with the development policy of the Philippines both at the time of ex-ante evaluation and project completion, as development of infrastructure resistant to natural disasters was regarded as a priority action issue from the viewpoint of improving the investment environment in the Philippine Medium Term Development Plan (2011-2016).

<Consistency with the Development Needs of the Philippines at the Time of Ex-Ante Evaluation and Project Completion >

The Project was consistent with the development needs of the Philippines to improve the durability and safety of bridges and other infrastructures under large-scale earthquakes as mentioned in the “Background” above at the time of ex-ante evaluation. In the interview for the ex-post evaluation, DPWH confirmed the continuity of the needs at the time of project completion.

<Consistency with Japan’s ODA Policy at the Time of Ex-Ante Evaluation>

The Project was consistent with Japan’s ODA policy as development and improvement of major transportation networks supporting economic growth was listed as an area of cooperation of the Country Assistance Program for the Philippines (2008).

<Evaluation Result>

In light of the above, the relevance of the Project is high.

2 Effectiveness/Impact

<Status of Achievement for the Objectives at the time of Project Completion>

The Objectives were achieved at the time of project completion. All of the planned study items were implemented, and the revised DPWH bridges seismic design specifications (BSDS), including reference materials, and projects for seismic strengthening of bridges targeting the 7 priority bridges (2 in Metro Manila Area and 5 outside Metro Manila Area) were proposed. According to the key officials, DPWH was satisfied with the quality of the draft of the revised BSDS because it provided design criteria and maps based on Philippine/local conditions. DPWH was also satisfied with the quality of the design for the 7 priority bridges because it conformed to the draft of the revised BSDS.

<Utilization Status of the Proposed Plan at the time of Ex-post Evaluation>

The revised BSDS proposed by the Project was approved and published through DPWH’s Department Order in February 2016, and the mandatory use of it became effective in February 2017. It is being used to update the standard plans for the new bridges by DPWH, and its design criteria and methodology are incorporated in the standard terms of reference (TOR) for consultancy services for construction of new bridges. The revised BSDS had been utilized for bridge design in the Philippines even before its approval. For example, it has been applied in Bridge Construction Replacement Program (2015-2022), a locally-funded project for the rehabilitation of 112 bridges implemented by DPWH, since 2015 (Indicator 1).

In the meantime, the degree of utilization of the proposed project for seismic strengthening of the priority bridges is lower than expected (Indicator 2). DD has not been implemented for any bridges yet. As for the two priority bridges in Metro Manila, however, a Japanese ODA loan agreement was signed in August 2015. DD and tender assistance are planned to be conducted from July 2017 to June 2019, and DPWH is in the process of procuring consultants for this. It is two years behind the schedule proposed by this Project because of project approval and procurement-related matters. With respect to the five priority bridges outside Metro Manila, DPWH has allocated budget in the past years for various works such as retrofitting and maintenance, but those works are not based on the retrofitting / replacement plan proposed under this Project.

<Other Impacts at the time of Ex-post Evaluation>

The revised BSDS proposed by the Project served as an input for the finalization of DPWH Design Guidelines, Criteria and Standards (DGCS), 2015 Edition, which incorporates the industry’s best practice in design for public infrastructure adaptable to local requirements such as climatic, geotechnical, geological and seismological conditions.

<Evaluation Result>

In light of the above, through the Project, the Objectives were achieved at the time of Project completion and the Proposed Plan were partially utilized at the time of ex-post evaluation. Therefore, the effectiveness/impact of the Project is high.

Status of Achievement of Utilization Status of the Proposed Plan through the Proposed Plan

Aim	Indicators	Results
(Utilization of Proposed Plan)  -Revised bridge seismic design standard and reference materials proposed by the Project are utilized for bridge design in the Philippines.  -Seismic strengthening works of the target bridges are implemented by DPWH and related organizations such as donors based on the plan for bridge improvement (retrofit / replacement) proposed by the Project.	Indicator 1 Example(s) of utilization of the bridge seismic design standard and the reference materials proposed by the Project for bridge design in the Philippines.	(Ex-post Evaluation) achieved The revised BSDS proposed by the Project were approved by DPWH in February 2016 and the mandatory use became effective in February 2017. Examples of utilization of the revised BSDS and the reference materials are as follows: - The revised BSDS has been utilized to update the standard plans for new bridges and has been incorporated in the standard TOR since 2016. - The revised BSDS has been applied in Bridge Construction Replacement Program since 2015. - Incorporating the revised BSDS developed by the Project is a requirement for DD of bridges since 2016. This is included as a minimum requirement in the Consultants’ TOR for construction of new bridges
	Indicator 2 The number of seismic strengthening works  Alternative Indicator: The number of seismic strengthen works for which DD has been implemented and tendering process has started (at least 2)	(Ex-post Evaluation) partially achieved DPWH is in the process of procuring consultants for DD and tender assistance for the two priority bridges in Metro Manila. The 5 bridges outside Metro Manila have been allocated with budget in the past years for various works such as retrofitting and maintenance, but not based on the plan proposed under this Project.  <Utilization status of the proposed project for seismic strengthening of the priority bridges in Metro Manila >

	Bridge	Progress	Schedule in Future
	Lambingan Br.	- Japanese ODA loan agreement signed in Aug. 2015	- DD and Tender Assistance: Jul. 2017 to Jun. 2019 - Tendering: Jun. 2018 to Jun. 2019
	Guadalupe Br.	- Procurement of consultants for Detailed Design and Tender Assistance is ongoing	- Construction: Jul. 2019 to Dec. 2021 - Operation: Dec. 2021

Source : Focused group discussions with Bridge Management Cluster, United Project Management Office, DPWH; interview with Project Preparation Division; questionnaire and interview with Bureau of Design, DPWH

### 3 Efficiency

While the project cost was within the plan (ratio against the plan: 92%), the project period exceeded the plan slightly (ratio against the plan: 111%) because of the inclusion of additional outputs such as technical seminars, trainings, traffic simulation, schematic design of target bridges and completion of original outputs such as draft BSDS. Therefore, the efficiency of the Project is fair.

### 4 Sustainability

#### <Policy Aspect>

There is an established policy support. The objectives of the Philippine Development Plan (2017-2022) include enhancing the efficiency of the transport sector to sustain economic growth and increase competitiveness by providing adequate, accessible, reliable, and safe access for people and goods. The DPWH Strategy Map 2022 (2017-2022) aims at the full rehabilitation and retrofitting of all bridges identified to be in earthquake vulnerable areas to be completed by 2022.

#### <Institutional Aspect>

DPWH engages and oversees consultants and contractors for DD, supervision, and implementation of the seismic improvement projects. Within DPWH, Bridges Management Cluster (BMC) of United Project Management Office (UPMO) is responsible for seismic strengthening of the two priority bridges in Metro Manila, which are supported by the Japanese ODA loan project (i.e. Metro Manila Priority Bridges Seismic Improvement Project (MMPBSIP)). BMC/UPMO has a stable number of permanent staff for the past three years. As of June 2017, there are 46 permanent staff, consisting of 4 Project Managers, 40 Project Engineers, and 2 administrative staff. The number of permanent staff is expected to be maintained in the succeeding years since it has been approved under the Rationalization Plan of DPWH in 2014. Institutional set-up for MMPBSIP is being established. So far, 5 permanent staff have been assigned to deal with procurement for MMPBSIP. According to BMC/UPMO, a Project Manager and appropriate number of Project Engineers will be assigned before DD and tender assistance/construction begins. From these, the institutional set-up and the staffing of DPWH are considered appropriate to implement seismic strengthening for bridges.

#### <Technical Aspect>

DPWH conducts regular trainings for its staff in the central and field offices (i.e. Regional Offices, District Engineering Offices and Project Management Offices) on various topics, targeting 600 persons per annum. Trainings for the revised BSDS and DGCS (2015), however, have not been conducted even though the use of these documents were made mandatory in 2016. As for BMC/UPMO, it appears that the staff have at least basic skills for supervising their consultants and contractors for seismic improvement works since it is undertaking Bridge Construction Replacement Program utilizing the revised BSDS. Staff at BMC/UPMO, however, feel the need to improve their capacity in seismic design to implement MMPBSIP since they have only limited experiences on this area, and training will only be provided in the future by the Consultants to be engaged for the project. Given the above, it is not certain if DPWH staff have sufficient knowledge and skills to apply the revised BSDS and DGCS in supervision of the proposed bridges seismic improvement works appropriately at the moment.

#### <Financial Aspect>

Budget for seismic improvement project of the two priority bridges in Metro Manila is secured through MMPBSIP, for which Japan agreed to provide 9,783 million yen of ODA loan.

#### <Evaluation Result>

In light of the above, slight problems have been observed in terms of the technical aspect of the implementing agency. Therefore, the sustainability of the effectiveness through the Project is fair.

### 5 Summary of the Evaluation

This Project achieved its Objectives at the time of project completion, as the revised BSDS and the project for seismic strengthening of the seven priority bridges were proposed. The utilization status of the proposed plan, etc. at the time of ex-post evaluation is partial: while the revised BSDS has been approved by DPWH and has been utilized for bridge design in the Philippines, DD for seismic strengthening of the priority bridges has not been implemented yet. Regarding sustainability, slight problems have been observed in the technical aspect (lack of training for utilization of the BSDS). Nevertheless, the policy background, the institutional set-up, and the budget for utilization of the proposed plan, etc. are secured. As for efficiency, the project period slightly exceeded the plan. Considering all of the above points, this Project is evaluated to be satisfactory.

## III. Recommendations & Lessons Learned

#### Recommendations for Implementing Agency:

- It is recommended that DPWH organize annual seminars and trainings on the topic of bridge seismic design standards for better understanding and capacity enhancement of field staff at DPWH Regional Offices, District Engineering Offices and Project Management Offices in relation to the DGCS and BSDS.

#### Lessons Learned for JICA:

- One of the Objectives of the Project was to propose the draft of the revised BSDS for DPWH. After completion of the Project, its utilization has become mandatory for DPWH through the issuance of a Department Order. Inclusion of the issuance of a Department Order and/or policy directives in the project design (such as Indicators for Objectives/Project Purpose, Expected Utilization/Overall Goal, etc.) is considered as a good practice, which ensures the impact and sustainability of the project.



The Guadalupe Bridge along the Epifanio Delos Santos Avenue (EDSA) in Metro Manila is one of the seven (7) priority bridges proposed for retrofitting / replacement identified under this Project. The plan for the bridge is now included in the Loan Agreement for the Metro Manila Priority Bridges Seismic Improvement Project between the Republic of the Philippines and JICA.



Interview with Bureau of Design: Bureau of Design Director and Bridges Division Engineer explains how the revised Bridge Seismic Design Standards produced by the Project served as an input to the new Design Guidelines, Criteria & Standards (Volume 5) of DPWH.