conducted by Sri Lanka Office: August, 2021

Country Name	**The Project for Capacity Development on Bridge Management**
Democratic Socialist Republic of Sri Lanka	

I. Project Outline

Background	There were about 4,800 bridges on the national highways[1] in Sri Lanka, which were managed by Road Development Authority (RDA). As of 2010, the bridges which were more than 50-years old accounted for 42% of the total and the ratio was expected to increase to 60% in 2020. From the experiences of Japan and other countries, it was known that maintenance cost of the bridges became higher at an accelerated rate when they became 50-years old or more. Therefore, there was a need for RDA to establish appropriate system for bridge management, including bridge management strategy, institutional framework, manuals, database system, human resource development and others (Figures at the time of ex-ante evaluation unless otherwise stated).		
Objectives of the Project	The project aimed to improve institutional capacity of RDA on bridge management in Sri Lanka through (i) preparation of bridge management strategy/plan, (ii) re-establishment of institutional framework of RDA head office and regional offices (Provincial Director, Chief Engineer, Executive Engineer) on bridge management, (iii) revision and development of bridge inspection and diagnosis manuals as well as development of bridge repair manual and bridge management guidelines, (iv) establishment of Bridge Management System[2] (BMS), and (v) enhancement of basic engineering knowledge of the staff of RDA head office and regional offices in sample provinces by seminars and on-the-job training (OJT), thereby enabling RDA to conduct bridge management in a systematic manner throughout the country in accordance to the Bridge Management Cycle. 1. Overall Goal: RDA conducts bridge management in a systematic manner throughout the country in accordance to the Bridge Management Cycle. 2. Project Purpose: Institutional capacity of RDA on bridge management is improved.		
Activities of the Project	1. Project site: Sri Lanka (Sample provinces: Central, Western, and Southern Provinces) 2. Main activities: (i) Preparation of the bridge management strategy, (ii) re-establishment of institutional framework of RDA head office and regional offices on bridge management (i.e. Bridge Management and Assessment Unit (BM&AU)), (iii) revision and development of bridge inspection and diagnosis manual as well as development of bridge repair manual and bridge management guidelines, (iv) establishment of the BMS[3] used by BM&AU and (v) enhancement of basic engineering knowledge of the staff assigned to BM&AU as well as other staff of RDA head office and regional offices in the sample provinces, by the seminars and OJTs, and commencement of training for the staff in the other provinces by the staff of BM&AU as trainers. 3. Inputs (to carry out above activities) Japanese Side 1) Experts: 13 persons 2) Trainees received: 30 persons 3) Equipment: A bridge inspection vehicle, 9 pole cameras for bridge inspection, etc. 4) Local cost Sri Lankan Side 1) Staff allocated: 16 persons 2) Building and facilities: Project office 3) Local cost		
Project Period	(ex-ante) November 2014-November 2017 (actual) February 2015-February 2018	Project Cost	(ex-ante) 300 million yen, (actual) 492 million yen
Implementing Agency	Ministry of Highways/ Road Development Authority (RDA)		
Cooperation Agency in Japan	Japan Bridge & Structure Institute INC., Central Nippon Expressway Company Ltd., Dainichi Consulting Inc.		

II. Result of the Evaluation

< Special Perspectives Considered in the Ex-Post Evaluation >

- Continuation status of the Project Purpose Indicator 1 (“For all the bridges in the sample provinces, except those cannot be accessed due to adverse natural environment and others, bridge inspection and diagnosis are conducted in line with the revised bridge inspection and diagnosis manual”) was confirmed using the data collected for the Overall Goal Indicator 1 (“All the bridges on national highways in the country (approx. 4,800 numbers) are inspected and diagnosed in line with the bridge inspection and diagnosis manuals”).

1 Relevance
<Consistency with the Development Policy of Sri Lanka at the Time of Ex-Ante Evaluation >

[1] The bridges on the national highways referred to in the project excluded those on the expressways covered by the expressway maintenance mechanism.

[2] In the logical framework of the project, the system to be established through the project was referred to as “Bridge Management Data System”. During the project implementation, the term “Bridge Management System (BMS)”, the term used in the Ex-ante Evaluation Sheet, was used by those concerned with the project because the system had more functions than data collection and had to reflect and emphasize the management aspect as otherwise it might be considered as a simple database.

[3] The BMS established under the project comprised of 3 sub-systems, namely, Bridge Database System, Bridge Inspection Support System, and Bridge Repair and Maintenance System.

At the time of ex-ante evaluation, the project was consistent with the "Mahinda Chintana 2006-2016: Vision for a new Sri Lanka", the national development plan of Sri Lanka, which prioritized development of road infrastructure, which would revitalize economic activities, and set forth improvement of the existing road network in its strategic actions.

<Consistency with the Development Needs of Sri Lanka at the Time of Ex-Ante Evaluation >

At the time of ex-ante evaluation, the project was consistent with the needs of Sri Lanka for improvement of bridge management as described in the "Background".

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

At the time of ex-ante evaluation, the project was consistent with the Country Assistance Policy for Sri Lanka (2012), which includes "Promotion of economic development" as one of the important strategies, and development of transport infrastructure, which improves domestic structure as one of the target areas.

<Evaluation Result>

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

2 Effectiveness/Impact

<Status of Achievement of the Project Purpose at the Time of Project Completion>

The Project Purpose was achieved at the time of project completion. All bridges in the sample provinces on the national highways were inspected and diagnosed in line with the revised bridge inspection and diagnosis manual (Indicator 1). RDA was ready for expanding the BMS to the entire country within 2 years from the completion of the project (i.e., by February 2020) because it already completed the inspection of around 60% of the bridges in the non-sample provinces on average as of October 2017 and the engineers of BM&AU, working in the regional offices, were entering the data to the BMS as soon as they returned to the offices from the inspection on the same day (Indicator 2). Two seminars on the revised bridge inspection and diagnosis manual were held, targeting the staff at RDA head office and regional offices in the sample provinces, and as many as 95% of the participants (target: more than 70%) showed their understanding when they participated in these seminars (Indicator 3). All of 9 engineers in the BM&AU obtained the Certificate of Bridge Inspection after the OJT on bridge inspection by the project (Indicator 4).

<Continuation Status of Project Effects at the Time of Ex-post Evaluation>

The project effects were continued at the time of ex-post evaluation. The bridge management strategy developed under the project and approved by the board of RDA by the project completion was continuously utilized. The roles and responsibilities of BM&AU in RDA head office and regional offices identified under the project and approved by the board by the project completion were put into practice and functioning. All the manuals and guidelines revised/developed under the project were distributed to all regional offices as the official documents approved by the board and continuously utilized.[4] The engineers of BM&AU trained by the project continuously conducted training to the engineers and technical officers of the regional offices. All bridges in the sample provinces, were continuously inspected and diagnosed by BM&AU in line with the manual. The BMS was expanded to the entire country within 2 years after the project completion as planned. The staff of RDA head office and regional offices in the sample provinces maintained the transferred skills and knowledge on bridge inspection and diagnosis (For more details, please see <Technical Aspect> of "Sustainability"). All of the 9 engineers who had obtained the Certificate of Bridge Inspection through the project remained with BM&AU.

<Status of Achievement for Overall Goal at the Time of Ex-post Evaluation>

The Overall Goal was achieved at the time of ex-post evaluation. All the bridges on the national highways were inspected and diagnosed[5] in line with the manual revised under the project (Indicator 1), and the results of the inspection and diagnosis of all the bridges on the national highways were entered in the BMS by BM&AU (Indicator 2). RDA utilized information produced by the BMS, such as priorities and costs for repairs, strengthening and reconstruction of the bridges, at the time of decision making. For example, the BMS was being utilized to prepare the list of weak bridges based on the health and importance index for repair and re-construction with tentative cost. Based on the list, the priority list for the year was prepared by BM&AU, which was sent to Planning Department of RDA for annual budgeting purpose, and once budget allocation was made the critical work to be carried out was determined from the allocated budget based on the priorities and amount of allocation (Indicator 3).

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

Negative impacts were not observed.

<Evaluation Result>

Therefore, the effectiveness/impact of the project is high.

Achievement of Project Purpose and Overall Goal

<table>
<tr><th>Aim</th><th>Indicators</th><th>Results</th><th>Source</th></tr>
<tr><td>(Project Purpose) Institutional capacity of RDA on bridge management is improved</td><td>Indicator 1: For all the bridges in the sample provinces, except those cannot be accessed due to adverse natural environment and others, bridge inspection and diagnosis are conducted in line with the revised bridge</td><td>Status of the Achievement (Status of the Continuation): achieved (continued)
(Project Completion)
<Ratio of inspected and diagnosed bridges on the national highways in the Sample Provinces>
<table><tr><th></th><th>Western Province</th><th>Central Province</th><th>Southern Province</th><th>Total</th></tr><tr><td>(i) No. of total bridges</td><td>737</td><td>508</td><td>455</td><td>1,700</td></tr><tr><td>(ii) No. of inspected & diagnosed bridges</td><td>717</td><td>457</td><td>410</td><td>1,584</td></tr></table></td><td>source: Project Completion Report (PCR); questionnaire and interview survey to RDA.</td></tr>
</table>

[4] It is noted that the bridge repair manual was developed to act as a guide to select the appropriate repair method suitable for Sri Lanka and identified 30 methods for minor and major repairs, including a few new methods which were explained in the seminar on bridge repair by the project. RDA mentioned that the manual was useful and utilized, but, as for the new methods, they did not have an opportunity to use them as much mainly because the methods could be used only for particular type of damages, and they did not come across many of those damages. The reason for the mismatch was not clear.

[5] As RDA's bridge inventory changed from time to time due to construction of new bridges and/or classification and declassification of the existing structures, BM&AU kept track of such changes and update the BMS by taking the initiative to find out what the ongoing projects were and paying attention to classification and declassification of the structures in the absence of the formal mechanism to inform such changes to BM&AU.

<table>
<tr><td rowspan="4">Bridge management strategy/plan are prepared.</td><td>inspection and diagnosis manuals.</td><td>
<table>
<tr><td>(iii) No of bridges not inspected as there was no access</td><td>20</td><td>51</td><td>45</td><td>116</td></tr>
<tr><td>(iv) No of bridges not inspected for other reasons</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>(v) % of inspected & diagnosed bridge except those which cannot be accessed (=(ii)/((i)-(iii))</td><td>100%</td><td>100%</td><td>100%</td><td>100%</td></tr>
</table>
(Ex-post Evaluation)
*Refer to item (vi) of the table in the Results of Overall Goal Indicator 1.</td><td></td></tr>
<tr><td>Indicator 2: RDA is ready for expanding BMS to entire country within 2 years from the completion of the project.</td><td>Status of the Achievement (Status of the Continuation): achieved (continued)
(Project Completion)
-RDA was ready for expanding the BMS to the entire country within 2 years from the completion of the project (i.e., by February 2020) because, as of October 2017, it already completed the inspection of around 60% of the bridges in the non-sample provinces on average and the engineers of BM&AU, working in the regional offices, were entering the data to the BMS as soon as they returned to the offices from the inspection on the same day.
(Ex-post Evaluation)
- The inspection of bridges in the non-sample provinces and inputting the results into the BMS were completed within 2 years from the completion of the project by December 2019.</td><td>source: PCR; questionnaire and interview survey to RDA.</td></tr>
<tr><td>Indicator 3: More than 70% of the staff at RDA head office and regional offices in the sample provinces shows their understanding when they participated in the seminars on the revised and developed bridge inspection and diagnosis manuals.</td><td>Status of the Achievement (Status of the Continuation): achieved (continued)
(Project Completion)
<Ratio of the participants of the seminars on the revised and developed bridge inspection and diagnosis manual who showed their understanding>
<table>
<tr><td>Date</td><td>% of the participants who showed their understanding.</td></tr>
<tr><td>July 2017</td><td>95%</td></tr>
<tr><td>September 2017</td><td>95%</td></tr>
</table>
(Ex-post Evaluation)
- Staff of RDA head office and regional offices in the sample provinces maintained transferred skills and knowledge on bridge inspection and diagnosis, by applying them in their routine operations and referring to the manuals.</td><td>source: PCR; questionnaire and interview survey to RDA.</td></tr>
<tr><td>Indicator 4: All engineers in BM&AU obtain Certificate of Bridge Inspection.</td><td>Status of the Achievement (Status of the Continuation): achieved (continued)
(Project Completion)
-All of 9 BM&AU engineers obtained the Certificate of Bridge Inspection after the training by the project.
(Ex-post Evaluation)
-All of 9 engineers who had obtained the Certificate of Bridge Inspection remained with BM&AU.</td><td>source: Questionnaire and interview survey to RDA.</td></tr>
<tr><td rowspan="3">(Overall Goal) RDA conducts bridge management in a systematic manner throughout the country in accordance to the Bridge Management Cycle.</td><td>Indicator 1: All the bridges on national highways in the country (approx. 4,800 numbers) are inspected and diagnosed in line with the bridge inspection and diagnosis manuals.</td><td>(Ex-post Evaluation) achieved
<Ratio of inspected and diagnosed bridges on the national highways in the country (as of March 2021)>
<table>
<tr><td></td><td>Sample provinces</td><td>The other provinces</td><td>Total</td></tr>
<tr><td>(i) No. of total bridges</td><td>1,734</td><td>2,497</td><td>4,231</td></tr>
<tr><td>(ii) No. of inspected & diagnosed bridges</td><td>1,734</td><td>2,497</td><td>4,231</td></tr>
<tr><td>(iii) No of bridges not inspected as there is no access</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>(iv) No of bridges not inspected for other reasons</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>(v) % of total bridges inspected & diagnosed(=(ii)/(i))</td><td>100%</td><td>100%</td><td>100%</td></tr>
<tr><td>(vi) (For reference) % of inspected & diagnosed bridge except those which cannot be accessed (=(ii)/((i)-(iii))</td><td>100%</td><td>100%</td><td>100%</td></tr>
</table></td><td>source: Questionnaire and interview survey to RDA.</td></tr>
<tr><td>Indicator 2: Results of inspection and diagnosis of all the bridges on national highways (approx. 4,800 numbers) in the country are entered in the BMS.</td><td>(Ex-post Evaluation) achieved
-The results of the inspection and diagnosis of all the bridges on the national highways, excluding those on the expressways covered under the expressway maintenance mechanism, were entered in the BMS (4,231 bridges as of March 2021).</td><td>source: Questionnaire and interview survey to RDA</td></tr>
<tr><td>Indicator 3: RDA utilizes information produced by the BMS, such as priorities and costs for repairs, strengthening and reconstruction of the bridges in the country, at the time of decision making.</td><td>(Ex-post Evaluation) achieved-
-The BMS was being utilized to prepare the list of weak bridges for repair and re-construction with tentative cost. The priority list for the year, prepared by the BM&AU, was sent to RDA Planning Department for annual budgeting purpose, and once budget allocation was made, the critical works to be carried out was determined from the allocated budget based on the priorities and amount of allocation.</td><td>source: Questionnaire and interview survey to RDA</td></tr>
<tr><td colspan="4">3 Efficiency</td></tr>
</table>

Although the project period was within the plan (ratio against the plan: 100%), the project cost largely exceeded the plan (ratio against the plan: 164%) mainly due to increase of dispatch period of experts, implementation of an additional training in Japan for senior officials, and procurement of additional equipment (9 inspection cameras). Meanwhile, the Outputs of the project were produced as planned. Therefore, the efficiency of the project is fair.

4 Sustainability

<Policy Aspect>

The National Policy Framework Vistas of Prosperity and Splendour (2020-2025) prioritized upgrading and development of road infrastructure. In addition, the bridge management strategy, developed under the project, had been approved by the board of RDA as stated in "Effectiveness/Impact".

< Institutional/Organizational Aspect>

Organizational structure for bridge management was established. Within RDA, BM&AU was formerly established as a sub-division of Engineering Services Division, with a permanent recurrent expenditure budget allocation. As mentioned in "Effectiveness/Impact", the roles and responsibilities of BM&AU in the head office and the regional offices, identified under the project, were put into practice and functioning. RDA had enough staff to promote bridge management. The number of staff members of BM&AU was 16 (i.e., the unit head, 9 engineers trained directly by the project and 3 additional engineers assigned after the project completion to enhance BM&AU, who were trained by the trained engineers, and 3 supporting staff). In addition, BM&AU was planning to recruit an information technology (IT) expert in future to assist them to improve the BMS (e.g., improving/adding functions, correcting system errors, etc.[6]). Other than those assigned to BM&AU, 94 staff members were engaged in bridge management at the regional offices.

<Technical Aspect>

The BM&AU engineers assigned at the RDA head office and the regional offices sustained the skill and knowledge transferred through the project by applying them in their daily operation and referring to the manuals. Both at the relevant departments of the head office and the regional offices of RDA, the related staff maintained the skills and knowledge transferred through the project by referring to the manuals and through training provided by the BM&AU engineers. Further, any clarifications related to any contents of the manuals were cleared by the BM&AU engineers attached to the head office and the regional offices. Meanwhile, the bridge inspection vehicle provided under the project was maintained in good condition and utilized appropriately.

<Financial Aspect>

As stated in "Effectiveness/Impact", RDA secured the budget for the critical works for repairs, strengthening, and/or reconstruction of the priority bridges through the governmental annual budget using the information produced by the BMS. RDA also continuously secured the necessary budget for the activities of BM&AU, using the foreign aid related domestic fund for this project, which was kept open after the project completion. Once it is closed, the budget shall be secured through RDA's budget for the recurrent expenditure.

<Evaluation Result>

In light of the above, no problem has been observed in terms of the policy, institutional/organizational, technical, and financial aspects of the implementing agency. Therefore, the sustainability of the project effects is high.

5 Summary of the Evaluation

The project achieved the Project Purpose ("Institutional capacity of RDA on bridge management is improved and bridge management strategy/plan is prepared"). The effects of the project continued and the Overall Goal ("RDA conducts bridge management in a systematic manner throughout the country in accordance to the Bridge Management Cycle") was achieved. As for the sustainability, no major problems were observed in terms of the policy, institutional/organizational, technical, and financial aspects. Regarding the efficiency, the project cost largely exceeded the plan while the project period was within the plan. Considering all of the above points, this project is evaluated to be highly satisfactory.

III. Recommendations & Lessons Learned

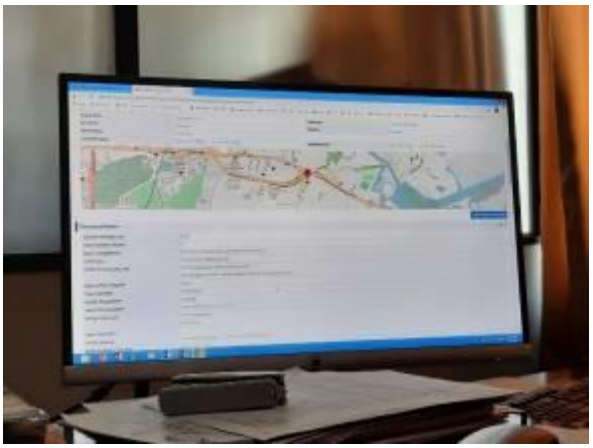
Recommendations for Implementing Agency:

-It is recommended that, by the end of 2021, RDA set up instruction to all relevant Divisions and Project Management Units to inform BM&AU in case of any change to the bridge inventory in order to ensure timely update of the BMS.

Lessons Learned for JICA:

-One of the major report produced by the BMS developed under the project required manual correction because some of the software functions were not appropriately designed. Initial data system introduced by the project was an excel macro, which would not be sustainable for the long term. The implementing agency requested for a more sustainable and expandable system to the project, and preparing the final system started much later partly due to this. Finally, the BMS was provided only towards the end of the technical cooperation project (TCP), so there was insufficient time to test it for some period and correct all errors as planned during the TCP period. At the formulation stage of a TCP including system development, project deliverables such as software/database need to be discussed with the implementing agency in detail so that their actual needs are clearly identified, and the agreed specifications and timeline considering time for commissioning and testing should be included in the terms of reference of the experts.

[6] For example, the BMS had a function to prioritize bridges need for repairs, strengthening and reconstruction. However, a report produced by BMS for prioritization required manual correction because some of the software functions were not appropriately designed.



Bridge details in the BMS.

One of the bridges inspected using the bridge inspection vehicle.