

Country Name	The Project for Capacity Development on Bridge Maintenance and Management
Mongolia	

I. Project Outline

Background	Most of Mongolia's bridges were built in the 1960s and 1990s, and the aging bridges were not well maintained. Bridge maintenance was outsourced to state-owned or private road maintenance companies, but preventive and planned maintenance was not carried out. Many of the staff in Ministry of Road and Transport (MRT) and Ulaanbaatar City Government (UBC), which had jurisdiction over the bridges, did not have advanced knowledge in preventative and planned maintenance.				
Objectives of the Project	<p>The project aimed to improve MRT's and UBC's capacity for planning skills of bridge maintenance in Mongolia through (i) dissemination of a concept of bridge management cycle and development of guidelines and/or manuals regarding inspection, evaluation, priority assessment and selection of measures, (ii) development of database systems to record information of bridges nationwide and in UBC, (iii) development of national policy on maintenance and management, and (iv) training of staff members related to bridge/structure maintenance and management in MRT and UBC and implementation of training by Mongolian side, thereby contributing to improvement of maintenance status of bridges in Mongolia.</p> <ol style="list-style-type: none"> Overall Goal: Maintenance status of bridges is improved in Mongolia. Project Purpose: MRT's and UBC's capacity for planning skills of bridge maintenance is improved. 				
Activities of the Project	<ol style="list-style-type: none"> Project Site: MRT's Headquarters, UBC Main Activities: (i) Developing a bridge inspection manual, an evaluation manual, and guidelines for selection of measures, and conducting training on the concept of bridge management cycle; (ii) Inspecting and evaluating the existing bridges, proposing rehabilitation/retrofitting measures, developing bridge database systems and manuals (including training and certification of Master Trainers (MTs)); (iii) Developing mid-long term bridge maintenance and management plans¹ and proposing organizational structure for bridge maintenance; and (iv) Developing a program, manuals and materials (including training and certification of MTs), conducting training by Mongolian side (MTs, etc), and implementing pilot bridge rehabilitation works by Mongolian budget. Inputs (to carry out above activities) <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;"> <p>Japanese Side:</p> <ol style="list-style-type: none"> Experts: (long-term) 1 person, (short-term) 14 persons Trainees Received: 15 persons Equipment: PCs for databases, RC (reinforced concrete) radar, core drilling machine, bridge inspection camera Local cost </td> <td style="width: 50%;"> <p>Mongolian Side:</p> <ol style="list-style-type: none"> Staff Allocated: 37 persons Land and building: Office for experts at UBC Local cost: Rent for project office (by MRT), cost for pilot works (by UBC) </td> </tr> </table> 			<p>Japanese Side:</p> <ol style="list-style-type: none"> Experts: (long-term) 1 person, (short-term) 14 persons Trainees Received: 15 persons Equipment: PCs for databases, RC (reinforced concrete) radar, core drilling machine, bridge inspection camera Local cost 	<p>Mongolian Side:</p> <ol style="list-style-type: none"> Staff Allocated: 37 persons Land and building: Office for experts at UBC Local cost: Rent for project office (by MRT), cost for pilot works (by UBC)
<p>Japanese Side:</p> <ol style="list-style-type: none"> Experts: (long-term) 1 person, (short-term) 14 persons Trainees Received: 15 persons Equipment: PCs for databases, RC (reinforced concrete) radar, core drilling machine, bridge inspection camera Local cost 	<p>Mongolian Side:</p> <ol style="list-style-type: none"> Staff Allocated: 37 persons Land and building: Office for experts at UBC Local cost: Rent for project office (by MRT), cost for pilot works (by UBC) 				
Project Period	August 2013 - October 2015 (Extension: August - October 2015)	Project Cost	(ex-ante) 177 million yen, (actual) 200 million yen		
Implementing Agency	Ministry of Road and Transport (MRT)*; Ulaanbaatar City Government (UBC) *The name of MRT was changed to Ministry of Road and Transport Development (MRTD) in 2016.				
Cooperation Agency in Japan	CTI Engineering National Co., Ltd.; Central Nippon Expressway Company Limited; Oriental Consultants Global Co., Ltd.				

II. Result of the Evaluation

<Special Perspective Considered in the Ex-Post Evaluation>

- At the time of terminal evaluation, "maintenance budget document" included in Indicator 1 of the Project Purpose ("Maintenance budget document with breakdowns for existing bridges prepared by June, 2015") was interpreted as budget allocation proposed in the Mid/Long-term Bridge Maintenance and Management Plans (the Mid/Long-term Plans) formulated under the project. In this ex-post evaluation, the same interpretation shall be applied to be consistent with the terminal evaluation.
- Target year for the Overall Goal in the existing documents shall be set to be three years after the completion of the project (i.e. 2018), normal timing of the ex-post evaluation, since there is no reference in the existing documents.
- Since detailed definition of Indicator of the Overall Goal ("The percentage of defective bridges repaired increases by 30% in comparison with the equivalent percentage from 2013.") is not available in the existing documents, it shall be defined as "Among the target bridges of the Mid/Long-term Plans developed by the project, the ratio of the number of bridges (accumulated number) on which rehabilitation/retrofitting or replacement works were implemented to the number of defective bridges in 2013 (base year) increases by 30 percentage points in the whole of MRTD and UBC in comparison with the equivalent in 2013", which interpretation can be assumed based on the analysis of the relevant information. The number of "defective" bridges in 2013 shall be defined as the sum of the number of "defective" bridges in the Mid/Long-term Plans formulated in 2015 and the number of bridges on which rehabilitation/retrofitting or replacement works were implemented in 2013 and 2014. The "defective" bridges in the Mid/Long-term Plans shall be defined as the bridges for which implementation of measures in the mid-term plan period (2015-2020) and preferential implementation of measures in the mid-long-term period (2015-2030) were proposed in the said Plans.

¹ Target bridges were all of the bridges on international and national roads over 100 meters managed by MRT (currently MRTD) (68 bridges in total) and all of the bridges within Ulaanbaatar City managed by UBC (70 bridges in total).

1 Relevance

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

At the time of ex-ante evaluation and project completion, the project was consistent with the policy of “developing regions and infrastructure, and reducing urban and rural disparities”, one of the priorities set forth in the Millennium Development Goals Based Comprehensive National Development Strategy of Mongolia (2008-2015).

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

There was a need to improve MRT (currently MRTD)’s and UBC’s capacity for bridge maintenance at the time of ex-ante evaluation as described in “Background”, and there was a continuous need at the time of project completion.

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

In the “Country Assistance Policy for Mongolia” (2012) of the Government of Japan, the project was included in the programs for “Enhancement of the Capacity and Function of Ulaanbaatar as an Urban Center,” one of the three priority areas under the basic policy of assistance of “Supporting the Effort toward Poverty Reduction through Sustainable Economic Growth”.

<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 by the time of project completion. Capacity of MRT (currently MRTD) and UBC for planning skills of bridge maintenance was improved through the activities of the project. The Mid/Long-term Plans (2015-2030) for MRT (currently MRTD) and UBC, including budget allocation for maintenance of the existing bridges (Indicator 1) and implementation schedules for the same (Indicator 2), were prepared and agreed, and the bridge maintenance databases developed by the project were utilized to prepare the Mid/Long-term Plans (Indicator 3).

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

The effects of the project have continued at the time of ex-post evaluation. MRTD and UBC have prepared the annual budget and plan for bridge maintenance based on the Mid/Long-term Plans agreed through the project. At MRTD, the bridge maintenance database developed by the project has been migrated to the integrated GIS database for roads and bridges newly established in 2017 and the bridge maintenance data has been continuously updated and utilized for preparing the maintenance budget and plan. At UBC, basic data in the bridge maintenance database has been entered to the integrated GIS database for roads and bridges newly established with UBC’s budget in 2017, and new maintenance data has been entered to the integrated database; however, the existing data in the bridge maintenance database has been utilized for preparing the maintenance budget and plan². In implementing bridge maintenance plans, MRTD and UBC have utilized three kinds of manuals developed under the project, i.e. manuals for bridge inspection, bridge soundness evaluation, and selection of bridge rehabilitation/retrofitting measures, which became official documents through a ministerial order of MRT (currently MRTD) before the project completion³, and have made reference to the reports on bridge inspection and soundness evaluation in preparing the maintenance plans and budget for the following year.

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

The Overall Goal was achieved by the time of ex-post evaluation. In 2013 (i.e. the base year), there were 132 defective bridges among the 138 bridges covered by the Mid/Long-term Plans for MRTD and UBC. Out of these 132 defective bridges in 2013, the percentage of the bridges rehabilitated/retrofitted or replaced by 2018 (i.e. the target year) was 43%, which increased by 33 percentage points (target value: 30 % percentage points)⁴ in comparison with the equivalent percentage in 2013, i.e. 10%.

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

From 2016 to 2018, MRTD conducted inspection and soundness evaluation of eight bridges, and rehabilitated, retrofitted, or replaced five bridges, which were not covered by the Mid/Long-term Plan, utilizing the acquired knowledge and skills and the manuals developed under the project. UBC has conducted regular inspection of “Sun Bridge” constructed under a Japanese grant aid project titled “Project for Construction of Railway Fly-over in Ulaanbaatar City” (2009-2012), utilizing the maintenance knowhow transferred through the project. According to the implementing agency, negative impacts on natural environment and socio-economic environment have not been caused by the project.

<Evaluation Result>

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

Achievement of Project Purpose and Overall Goal

Aim	Indicators	Results
(Project Purpose) MRT’s and UBC’s capacity for planning skills of bridge maintenance is improved.	1. Maintenance budget document with breakdowns for existing bridges is prepared by June 2015.	Status of the Achievement: achieved (continued) (Project Completion) - The Mid/Long-term Plans for MRT (currently MRTD) and UBC, including the budget allocation, were finalized by March 2015. (Ex-post Evaluation) - MRTD and UBC have prepared annual budget proposals for bridge maintenance based on the Mid/Long-term Plans.
	2. Implementation	Status of the Achievement: achieved (continued)

²The integrated database is scheduled to be updated with the budget of UBC in 2019 and the database developed by the project is planned to be incorporated into the integrated database then.

³According to the terminal evaluation, it was possible to have the manuals approved by the Minister of Road and Transport (then) by setting a goal of obtaining official approvals on the manuals, the project deliverables, before dissemination and having close collaboration with the implementing agency on this matter from the beginning of the project.

⁴For reference, the percentage was increased by 25 percent points (83% of the overall target value of 30 percent points) at MRTD alone and 14 percent points at UBC alone.

	schedule of maintenance for existing Bridge is prepared by June 2015.	(Project Completion) - The Mid/Long-term Plans for MRT (currently MRTD) and UBC, including the implementation schedules, were finalized by March 2015. (Ex-post Evaluation) - MRTD and UBC have prepared annual maintenance plans based on the Mid/Long-term Plans.																																			
	3. Data from the newly developed database system is utilized for formulating maintenance budget and implementation schedule for existing bridges.	Status of the Achievement: achieved (continued) (Project Completion) - Databases developed by the project were utilized for formulating the Mid/Long-term Plans for MRT (currently MRTD) and UBC. (Ex-post Evaluation) - MRTD: The database developed by the project was migrated to the integrated database for roads and bridges in 2017. The data has been updated and utilized for formulating maintenance budget and plan. - UBC: Basic data of the database developed by the project was entered in the integrated database for roads and bridges in 2017. New data has been entered in the integrated database, but the existing data in the database developed by the project has been utilized for formulating maintenance budget and plan.																																			
(Overall Goal) Maintenance status of bridges is improved in Mongolia.	The percentage of defective bridges repaired increases by 30% in comparison with the equivalent percentage from 2013.	(Ex-post Evaluation) achieved <table border="1"> <thead> <tr> <th></th> <th>2013 Base Year</th> <th>2014</th> <th>2015</th> <th>2016</th> <th>2017</th> <th>2018 Target Year</th> </tr> </thead> <tbody> <tr> <td>Number of defective bridges among the target bridges of the Mid/Long-term Plans for MRTD and UBC(=A)</td> <td>132</td> <td>/</td> <td>/</td> <td>/</td> <td>/</td> <td>/</td> </tr> <tr> <td>Number of the defective bridges repaired(=B)</td> <td>13</td> <td>20</td> <td>28</td> <td>36</td> <td>42</td> <td>57</td> </tr> <tr> <td>Percentage of defective bridges repaired(=A/B)</td> <td>10%</td> <td>15%</td> <td>21%</td> <td>27%</td> <td>32%</td> <td>43%</td> </tr> <tr> <td>Degree of increase of the percentage of the defective bridges repaired compared to 2013</td> <td>/</td> <td>5%</td> <td>11%</td> <td>17%</td> <td>22%</td> <td>33%</td> </tr> </tbody> </table>		2013 Base Year	2014	2015	2016	2017	2018 Target Year	Number of defective bridges among the target bridges of the Mid/Long-term Plans for MRTD and UBC(=A)	132	/	/	/	/	/	Number of the defective bridges repaired(=B)	13	20	28	36	42	57	Percentage of defective bridges repaired(=A/B)	10%	15%	21%	27%	32%	43%	Degree of increase of the percentage of the defective bridges repaired compared to 2013	/	5%	11%	17%	22%	33%
	2013 Base Year	2014	2015	2016	2017	2018 Target Year																															
Number of defective bridges among the target bridges of the Mid/Long-term Plans for MRTD and UBC(=A)	132	/	/	/	/	/																															
Number of the defective bridges repaired(=B)	13	20	28	36	42	57																															
Percentage of defective bridges repaired(=A/B)	10%	15%	21%	27%	32%	43%																															
Degree of increase of the percentage of the defective bridges repaired compared to 2013	/	5%	11%	17%	22%	33%																															

Source: Project Completion Report; questionnaire and interview survey with MRTD and UBC

3 Efficiency

Both the project cost and the project period slightly exceeded the plan (ratio against the plan: 113% respectively). The project period was extended for three months to provide technical assistance to bridge rehabilitation works conducted by Ulaanbaatar (UB) City with its own budget. The Outputs of the project were produced as planned. Therefore, the efficiency of the project is fair.

4 Sustainability

<Policy Aspect>

Infrastructure sector is continued to be a priority area in the “Mongolia Sustainable Development Vision 2030” formulated in 2016, the latest national development plan. In addition, the “Road Law” revised in 2017 clearly defines the division of roles of the organizations in charge of maintenance of roads and road facilities (bridges), and the “State Policy on Road Sector” to be formulated in 2019 is expected to have a chapter on road and bridge maintenance⁵.

<Institutional Aspect>

MRTD and UBC conduct preventive bridge maintenance based on the revised “Road Law” stated above and the division of roles regarding bridge maintenance system agreed through the project⁶. At the time of ex-post evaluation, necessary number of staff was secured at MRTD, UBC, and the road maintenance companies in charge of maintenance at the field level, as the staff responsible for bridge maintenance related work were allocated as planned.

Major organizations in charge of bridge maintenance and number of relevant staff (as of June 2019)

Bridges on international and national roads		Bridges within UB City	
Organizations in charge	Number of relevant staff	Organizations in charge	Number of relevant staff
Road Policy Implementation and Coordination Department, MRTD	7	Road Development Department, UBC	13
Roads and Transport Development Center (RTDC), MRTD	230	UB Road Maintenance Company	200
Road maintenance companies (28 in total)	753		

Source: Questionnaire survey with MRT and UBC

<Technical Aspect>

MRTD, including Road Policy Implementation and Coordination Department and RTDC, and UBC maintain the technical capacity necessary for preventive bridge maintenance. Most of the technical counterparts (C/Ps) assigned at the time of project completion continuously engage in bridge maintenance, and those who got transferred/left the office handed over the duties to the relevant staff. MRTD conducts regular training and supplemental irregular training for field engineers from road maintenance companies, etc., using the maintenance manuals, and training is given by the former C/Ps certified as the MTs or the successors of the MTs who got transferred/left the office. The manuals are distributed at the time of training. They have been also available at the website of MRTD from July 2015

⁵ According to MRTD, after approval of the National Policy, the Implementation Plan is scheduled to be prepared. MRTD plans to prepare the Implementation Plan based on the Mid/Long-term Plan for MRTD formulated under the project.

⁶ For example, at MRTD, Road Policy Implementation and Coordination Department is responsible for preparation of maintenance budget proposal and management of the manuals, and RTDC, an extra-ministrial bureau, for preparation of maintenance plan, inspection, soundness evaluation, and selection of repair measures, and management and update of the database. At UBC, Maintenance Section of Road Development Department is in charge of preparation of maintenance plan, inspection, soundness evaluation, and selection of repair measures, whereas Planning Coordination Section is in charge of preparation of maintenance budget and management and update of the database. Road maintenance companies and UB Road Maintenance Company are responsible for daily maintenance and conduct joint inspection and soundness evaluation with RTDC and UBC respectively.

before the project completion. Major equipment provided by the project has been utilized, too. On the other hand, at MRTD and UBC, regular in-house training is not conducted and new MTs have not been certified partly because the MTs and the successors of the MTs who got transferred/left the office give guidance on a daily basis. Neither MT system is institutionalized as an organizational rule, nor certification process is established. Considering the possibility of further transfer/turnover of the MTs in future, there remains a concern about whether the knowledge and skills will be continuously maintained fully.

<Financial Aspect>

MRTD and UBC prepare the bridge maintenance budget based on the Mid/Long-term Plans as well as the results of inspection and soundness evaluation. In the last three years (2016-2018), budget of MRTD for maintenance, rehabilitation, retrofitting, and replacement of roads and bridges⁷ was increased and amount of expenditure was the same as the budget. So were the budget and expenditure of UBC for bridge maintenance in the same period. In addition, UBC has been implementing replacement works of five large bridges included in its Mid/Long-term Plan, using grant and loan from Chinese Government. Necessary budget is considered to have been secured by MRTD and UBC as their bridge maintenance plans have been implemented.

Budget of MRTD and UBC related to bridge maintenance (Unit: million Mongolian Tugrik)

Budget of MRTD for maintenance, rehabilitation, retrofitting, and replacement of roads and bridges (Source: State budget)			Budget of UBC for bridge maintenance (Source: Road Fund)		
2016	2017	2018	2016	2017	2018
16,431	24,500	31,891	472	1,000	1,000

Source: Laws on State Budget for 2016, 2017, and 2018; questionnaire survey with UBC

<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

The project achieved the Project Purpose of improving MRT (currently MRTD)'s and UBC's capacity for planning skills of bridge maintenance. The effects of the project continued and the Overall Goal of improving maintenance status of bridges in Mongolia was achieved. As for the sustainability, some issues were observed in terms of future continuation of the project effects of the technical aspects because new MTs have not been certified and regular in-house training by MTs have not been conducted at MRTD and UBC. However, no problems were observed in terms of the policy, institutional, and financial aspects. About the efficiency, the project cost and 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:

- By 2020, it is recommended that Road Policy Implementation and Coordination Department of MRTD and Road Development Department of UBC enhance the sustainability of MT system by positioning MT in the organizational rules of MRTD (including RTDC) and UBC officially and incorporating it in the staff assessment schemes. Considering the possibility that MTs may leave the office/get transferred in future, MRTD and UBC are recommended to institutionalize regular in-house training by MTs and/or their successors (about once a year) to share the knowledge acquired through the project and to further improve the technical levels.
- Road Development Department of UBC are recommended to make sure that data in the bridge maintenance database shall be migrated and integrated smoothly to the GIS database for roads and maintenance to be updated in the fiscal year 2019, and that inspection and repair history data shall be continuously entered and updated after the integration.

Lessons Learned for JICA:

- During the project implementation, several measures were taken to promote utilization of the manuals developed by the project as described below. In the first half of the project period, the JICA expert team prepared draft manuals and then trained key persons for utilization of the manuals among the C/Ps (i.e. MTs) so that the manuals were well understood by them. In the latter half of the project period, the MTs gave guidance and training to the engineers in the implementing agencies and road maintenance companies, etc., using the manuals, so that the effectiveness of the manuals was recognized by Mongolian side. As a result of close coordination with the implementing agency, the manuals were approved as official documents and clearly positioned in the process of bridge maintenance works before the project completion, which led to continuous utilization of the manuals. Meanwhile, publication on the website and distribution by the implementing agency helped the manuals widely known to the relevant stakeholders. In similar projects, an implementing agency should be encouraged to distribute the training materials including manuals at the time of training, etc. and to publish them on the website during the project implementation period so that the relevant stakeholders can access them at any time to acquire the knowhow.
- MTs were trained/certified through the project, but new MTs were not trained/certified after the project completion mainly because MT system was not institutionalized as an organizational rule of MRTD and UBC (or national qualifications) and certification process was not established. Prior to MT certification by the project, MRTD and UBC should have been encouraged to establish official certification and evaluation system regarding MT by developing organizational rules for MT including the certification process and incorporating MT in the staff assessment schemes. (Or inclusion of assistance regarding institutionalization of official certification should have been examined in the project.)

⁷ The separate budget for bridge maintenance could not be obtained for MRTD.



Three kinds of manuals developed by the project (The manuals, approved by the order of the Minister of Road and Transport No. 60 dated March 11, 2015, are printed in official design of the ministry and distributed)



Core drilling machine provided by the project