

Country Name Arab Republic of Egypt	<b>The Project for Improvement of the Bridges Management Capacity</b>
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## I. Project Outline

Background	General Authority for Roads, Bridges and Land Transport (GARBLT) managed a road network of more than 23,000 km across Egypt, on which 1,473 bridges existed. However, there were a large number of deteriorated bridges due to insufficient maintenance, causing an adverse influence on not only the domestic but also the international transport system. In GARBLT, there were lack of human resources with adequate knowledge, and sufficient techniques and necessary equipment for appropriate inspection and evaluation of bridges. (Figures at the time of ex-ante evaluation).												
Objectives of the Project	<p>The project aimed to improve the capacity of GARBLT on bridge maintenance management in Egypt through enhancement of bridge maintenance management cycle and the capacity of GARBLT engineers on bridge inspection and repair, and preparation of Bridge Maintenance System (BMS), thereby having bridges maintained properly.</p> <ol style="list-style-type: none"> <li>Overall Goal: Bridges in Egypt are maintained properly.</li> <li>Project Purpose: Capacity of GARBLT on bridge maintenance management is improved.</li> </ol>												
Activities of the Project	<ol style="list-style-type: none"> <li>Project Site: Whole region of Egypt.</li> <li>Main Activities: Proposal and trial on measures to improve maintenance management cycle, development of bridge inspection manuals and on-site training (OST) on inspection using the manuals, development of a bridge repair manual and OST on minor repair, development of BMS and OST on BMS utilization.</li> <li>Inputs (to carry out above activities) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Japanese Side</td> <td style="width: 50%; border: none;">Egyptian Side</td> </tr> <tr> <td style="border: none;">1) Experts: (long-term) 1 person, (short-term) 10 persons</td> <td style="border: none;">1) Staff allocated: 9 persons</td> </tr> <tr> <td style="border: none;">2) Trainees received: 15 persons</td> <td style="border: none;">2) Building and facilities: Office space and warehouse in the GARBLT headquarters</td> </tr> <tr> <td style="border: none;">3) Equipment: Equipment for bridge inspection and repair, server for BMS, etc.</td> <td style="border: none;">3) Local cost</td> </tr> <tr> <td style="border: none;">4) Local cost</td> <td></td> </tr> </table> </li> </ol>			Japanese Side	Egyptian Side	1) Experts: (long-term) 1 person, (short-term) 10 persons	1) Staff allocated: 9 persons	2) Trainees received: 15 persons	2) Building and facilities: Office space and warehouse in the GARBLT headquarters	3) Equipment: Equipment for bridge inspection and repair, server for BMS, etc.	3) Local cost	4) Local cost	
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Project Period	March 2012 – June 2015 (Extension: April -June 2015)	Project Cost	(ex-ante) 400 million yen, (actual) 488 million yen										
Implementing Agency	General Authority for Roads, Bridges and Land Transport (GARBLT)												
Cooperation Agency in Japan	Honshu-Shikoku Bridge Expressway Co., Ltd., Nippon Engineering Consultants Co., Ltd., Chodai Co., Ltd.												

## II. Result of the Evaluation

### <Special Perspectives Considered in the Ex-Post Evaluation>

- The target year for Overall Goal is 3-5 years after the project completion, according to the existing documents. Therefore, the target year for the ex-post evaluation was set to be 2020 (i.e. five years after the project completion).
- The target figure for the first Indicator for Overall Goal (i.e. Frequency of regular training/seminars for GARBLT engineers to spread bridge maintenance management over Egypt) is not available in existing the documents; however, in the Project Completion Report, it is recommended to hold a seminar once a year to achieve Overall Goal. In view of the above, the target figure was set to be at least once a year in this ex-post evaluation.
- The definition of the second Indicator for Overall Goal (i.e. Bridges in Egypt are managed properly based on the manuals developed by the project) is not clearly mentioned in the existing documents. In this ex-post evaluation, the achievement status of the followings were confirmed: planning and implementation of bridge inspections based on the project manuals in each district under GARBLT, planning and implementation of repairs based on the manual and using the repair technologies demonstrated by the project as needed, and registration of inspections and repairs in the BMS based on the manual. In addition, appropriateness of the number of inspected and repaired bridges was examined in view of the description of the Overall Goal. (Although the target number is not clear in the Overall Goal, it was expected that “bridges other than 20 target bridges of the project are inspected and repaired by GALBLT engineers” at the planning stage.) Also, utilization status of data in the BMS for planning of inspections and repairs was checked.

### 1 Relevance

#### <Consistency with the Development Policy of Egypt 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 national five-year socio-economic development plan (2007/08-2011/12) of Egypt, which included realization of safer transport network and reduction of environmental burden as one of the five basic strategies of the transport development sector.

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

At the time of ex-ante evaluation, the project was consistent with the needs of improvement of the capacity of GARBLT on bridge maintenance management as described in <Background>. Changes in the needs were not reported at the time of project completion.

#### <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 Program for the Arab Republic of Egypt (June 2008), which included “Realization of sustainable growth and employment generation” as one of the priority areas, under which realization of sustainable effect of financial support was to be pursued alongside “technical cooperation for the improvement of management including system architecture and maintenance and operation of infrastructures”.

<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 (judged based on the status of achievement of the three indicators: achieved, achieved, and partially achieved, respectively). Bridge inspections on 20 selected bridges (target bridges) were carried out by GARBLT engineers properly based on the inspection manuals through OST (Indicator 1). Typical repair technologies were demonstrated through OST as well (Indicator 2). GARBLT started inspection on bridges other than the target bridges in each district, and results of inspection were entered in the BMS based on the project manual except for those of some old bridges without drawings (ratio of bridges, for which inspection results were entered, was not available). (Indicator 3).

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

The project effects have continued to the time of ex-post evaluation. According to GARBLT, inspections and repairs of bridges, including the target bridges and other bridges in each district, have been conducted based on the project manuals and the Egyptian Code of Practice (ECP) that are applied to all bridges in Egypt<sup>1</sup>. (Please also see <Other Impacts> below). The statement of GARBLT was confirmed through review of maintenance reports for 2 bridges as well as site observation of inspection activities of 3 bridges by the evaluator. GARBLT also stated that all of the inspection and major repairs of new bridges have been recorded in the BMS based on the manual but those of old bridges have not been recorded due to lack of drawings (ratio of bridges, for which results of inspection and major repairs were entered, was not available). In addition, minor repairs have not been recorded because there are so many minor repairs and the number of staff of GARBLT for the data entry is limited.

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

The Overall Goal has been achieved (judged based on the status of achievement of the two indicators: achieved and partially achieved, respectively) and the achievement status is likely to continue in the target year (2020). The training center of GARBLT conducts regular training (at least once a year) to spread bridge maintenance, which is consistent with the concept in the project manuals, to its engineers all over Egypt (Indicator 1). Bridges in Egypt are properly maintained except for the data entry of inspection and major repair results of old bridges without drawings and minor repair results in the BMS and utilization of the BMS as a planning tool. As described above, inspections and repairs of bridges have been planned and conducted properly based on the project manuals and the ECP and results of inspections and major repairs of new bridges have been recorded in the BMS but not those of old bridges without drawings and minor repairs. The number of inspected bridges is considered appropriate in view of the Overall Goal because as many as 1,120 bridges in Egypt (including the 20 target bridges)<sup>2</sup> were inspected in 2018. The number of repaired bridges is also considered appropriate because minor defects are repaired promptly with the budget allocated to the district offices (DOs), and major defects are repaired with the budget allocated from the headquarters in order of priority. If the major repairs are not completed in the same year, the remaining ones are included in the repair plan in the next year. The BMS is yet to be utilized for planning of inspections and repairs primarily because the data entry of new bridges has not been completed due to a large number of ongoing projects and the limited manpower and that of old bridges not completed due to limited number of staff and budget to sufficiently conduct site surveys. It is not certain when the data entry will be completed (Indicator 2).

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

According to GARBLT, the committee for formulation/update of the ECP includes members from GARBLT trained by the project and the techniques in the project inspection manuals have been incorporated in the ECP to be applied in all bridge inspections. Meanwhile, negative impacts have not been observed.

<Evaluation Result>

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

Achievement of Project Purpose and Overall Goal

Aim	Indicators	Results
(Project Purpose) Capacity of GARBLT on bridge maintenance management is improved.	(Indicator 1) Bridge inspections on 20 selected bridge are carried out by GARBLT engineers properly.	Status of the Achievement: achieved (continued) (Project Completion) - Bridge inspections on 20 selected bridge carried out by GARBLT engineers through OST based on the project manuals. (Ex-post Evaluation) - Bridge inspections on 20 selected bridge have been carried out based on the project manuals and the ECP properly.
	(Indicator 2) Typical repair technologies are demonstrated on several bridges.	Status of the Achievement: achieved (continued) (Project Completion) - Typical repair technologies (e.g. washing by high-pressure washers) were demonstrated through OST. (Ex-post Evaluation) - Repairs have been conducted as based on the ECP, using the demonstrated technologies in the project manual as needed.
	(Indicator 3) GARBLT starts inspection	Status of the Achievement: partly achieved (partially continued) (Project Completion)

<sup>1</sup> Regarding Aswan Bridge (a target bridge), periodic inspection has not been conducted yet because it is scheduled every 5 years according to the statement from GARBLT's engineers although annual inspection is recommended by the manual. As for El-Salam Peace Bridge (another target bridge), an additional periodic inspection (fatigue inspection), which was recommended by the follow-up cooperation study of JICA for the grant aid project "The Project for Construction of the Suez Canal Bridge (1997)" ("Follow-up cooperation study on the bridge design (Counterpart training for the suez canal bridge project)" (2016)), has not been conducted, however,

<sup>2</sup> For reference, 1,120 bridges were equivalent to 74% of the bridges managed by GARBLT in 2018.

	on bridges other than target bridges in each district and the inspections and repair records are properly input in the BMS.	<ul style="list-style-type: none"> <li>- GARBLT started inspection on bridges other than target bridges in each district.</li> <li>- The inspection records were entered in the BMS based on the project manual except for those of old bridges without available drawings. Data entering status of repairs was not clear.</li> </ul> (Ex-post Evaluation) <ul style="list-style-type: none"> <li>- Inspections of bridges other than target bridges have been conducted in each district based on the project manuals and the ECP properly.</li> <li>- Inspections and major repairs of new bridges have been recorded in the BMS based on the project manual but those of old bridges without available drawings and minor repairs have not been recorded.</li> </ul>
(Overall Goal) Bridges in Egypt are maintained properly.	(Indicator 1) GARBLT holds regular seminars/trainings for its engineers to spread proper bridge maintenance over Egypt.	(Ex-post Evaluation) achieved <ul style="list-style-type: none"> <li>- GARBLT training center provides regular training for its engineers at all districts, including the training on maintenance of bridges to spread proper bridge maintenance over Egypt. Contents of the training are consistent with the concept in the project manuals. For example, 3 training courses related to bridge maintenance were conducted in 2018 (i.e. training courses on new survey technologies, introduction in project management, and bridges' technologies).</li> </ul>
	(Indicator 2) Bridges in Egypt are managed properly based on the manuals developed in the Project.	(Ex-post Evaluation) partially achieved <ul style="list-style-type: none"> <li>- Inspections of bridges have been conducted properly based on the project manuals and the ECP. In 2018, 1,120 bridges in Egypt were inspected.</li> <li>- Repairs have been conducted as needed based on the project manual and the ECP.</li> <li>- Inspections and major repairs of new bridges have been recorded in the BMS based on the project manual but those of old bridges without available drawings and minor repairs have not been recorded</li> <li>- The BMS is yet to be utilized as a planning tool because data entry of new bridges under construction has not been completed due to lack of manpower and that of old bridges due to limited number of staff and budget to sufficiently conduct site surveys. It is not certain when the data entry will be completed It is noted that GARBLT has asked the Central Agency for Organization and Administration to establish new posts of 25 engineers for the BMS and the matter is under study</li> </ul>

Source: Project Completion Report; questionnaire and interview survey to GARBLT; maintenance reports (2019) for 2 bridges; site observation on inspection activities of 3 bridges; and list of training courses of GARBLT training center.

### 3 Efficiency

Both the project cost and period exceeded the plan (ratio against the plan: 122% and 108% respectively). The project period was extended because of the delay of the procurement of a bridge inspection vehicle due to security worsening and the consequent delay of capacity development using the vehicle. The Outputs of the project were produced as planned. Therefore, the efficiency of the project is fair.

### 4 Sustainability

#### <Policy Aspect>

The need for enhancing the transport sector services and safety on the road network is set forth by Mid-term Sustainable Development Plan (2017-2020) and Egypt Vision 2030.

#### <Institutional Aspect>

GARBLT is a well-established organization in charge of roads and bridges in Egypt. At central level, Central Department for Bridge Construction & Maintenance is continuously responsible for bridge maintenance, including management of the BMS developed by the project. However, organization for operation of the BMS, including operators and engineers, has not been established as recommended by the terminal evaluation of the project because of the shortage of staff due to ongoing projects on construction of a large number of bridges and government policy on controlling of new recruitment in the public sector. Apart from the manpower for the BMS, the necessary number of staff was considered to be allocated to conduct bridge maintenance at the time of ex-post evaluation because the inspections and repairs were conducted properly as described in "Effectiveness/Impact". The present number of staff, however, would be insufficient to conduct proper inspections and repairs in the future, considering a large number of bridges being constructed all over Egypt.

#### <Technical Aspect>

GARBLT has sustained technical capacity to conduct bridge maintenance according to the technical instruction in the project manuals and the ECP. All of the engineers trained by the project have continued to engage in bridge maintenance and apply the skills and knowledge acquired through the project in their duties, using the manuals. All of the equipment provided under the project are utilized and maintained in good condition, too.

#### <Financial Aspect>

According to GARBLT, budget is allocated for inspection and repair works and the amount of this budget is increasing every year to coop with securing the increasing needs for conducting proper bridge inspections and repairs all over Egypt as described in "Effectiveness/Impact". Meanwhile, the budget for new positions to establish organization for the BMS has not been secured/requested due to the government policy on control of new recruitment in the public sector. It is not certain whether the budget will be secured to employ sufficient number of engineers to ensure proper inspections and repairs expected to be increased after ongoing projects are completed.

#### <Evaluation Result>

In light of the above, some problems have been observed in terms of the institutional and financial aspects 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 ("Capacity of GARBLT on bridge maintenance management is improved") and the effects of the project have continued. The Overall Goal ("Bridges in Egypt are maintained properly") has been achieved. Regarding the sustainability, slight problems have been observed in terms of the institutional and financial aspects (e.g. organization for the BMS has not been established in GARBLT and it is not certain whether the budget for employing additional staff will be secured to ensure proper maintenance of a large number of bridges under construction in future). As for the efficiency, the project cost and period 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 Chairman of GARBLT immediately establish a new unit for BMS in charge of entering the bridge data at GARBLT headquarters. The unit should use a new technology to input the data for the bridges without available drawings.
- It is recommended that the BMS unit of GARBLT stated above issue the first annual report on the needs for maintenance/repair as a planning tool for the preventive maintenance by June 2020.
- It is recommended that GARBLT conduct regular fatigue inspection for EL-Salam Peace Bridge, recommended by the follow-up study of JICA, in addition to the inspections in the project manual, and issue the inspection report accordingly.
- Although Aswan Bridge is scheduled to be inspected every 5 years according to statement from GARBLT's engineers, more frequent inspection according to the inspection manuals (such as cable tension measurement) and publication of the detailed report would be desirable because it is a special bridge (Cable Stayed Bridge) in Egypt.

#### Lessons Learned for JICA:

- During the implementation of the project, it is important to promote daily discussion between JICA expert team and implementing agency to brought more deep understanding of the concerned issues<sup>3</sup>.
- The department for bridge inspection and repair (i.e. BMS unit) recommended by the project has not been established yet because of the recent policy of the government to decrease the hiring in government authorities. This might affect the sustainability of the project after completion. It is risky to link the future sustainability of the project with some event that might be uncertain in the future. When making recommendations on institutional aspects of the implementing agency at the end of the project, JICA should always propose different scenarios. For example, other possible scenario for this project, instead of establishing new department, is to study the possible restructuring of the GARBLT.

Bridge Inspection Vehicle



Photo 1. The bridge inspection vehicle in operation at the site (inspection of bridge)

Bridge Management System BMS



Photo 2. Staff in operation

<sup>3</sup> During the project implementation, daily discussions between JICA expert team and GARBLT engineers brought more deep understandings about the bridges issues in Egypt and contributed to identification of realistic common defects in bridges for effective investigation and repair; implementation of training for special and advanced inspection test, provision of convenient/suitable bridge inspection vehicle for assuring sustainability of operation, vast dissemination of knowledge of bridge repair and inspection to representatives of other relevant ministries and agencies working in the field of bridge inspection.