

## Summary of Evaluation Results

| <b>1. Outline of the Project</b>  |   |
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| <b>Country:</b> Arab Republic of Egypt  | <b>Project Title:</b> The Project for Improvement of the Bridge Management Capacity in Egypt  |
| <b>Sector:</b> Public Works/Utilities<br>-Transportation/Traffic-Roads  | <b>Cooperation Scheme:</b> Technical Cooperation Project  |
| <b>Division in Charge:</b> Transportation and ICT Division 3 and Planning and Coordination Division, Economic Infrastructure Department   | <b>Total Cost:</b><br>408.33million yen at the time of the Terminal Evaluation  |
| Period of Cooperation:<br>March 2012 ~ March 2015   | <b>Partner Country's Implementation Organization:</b><br>General Authority for Roads, Bridges and Land Transport (GARBLT)                       |
| R/D signing :30 October, 2011   | <b>Supporting Organization in Japan:</b> Honshu-Shikoku Bridge Expressway co., Ltd., Nippon Engineering Consultants co., Ltd., Chodai co., Ltd. |
|   | <b>Related Cooperation Scheme:</b> none   |
| <p><b>1-1 Background of the Project</b></p> <p>Currently Egypt has a road network of more than 64,000 km across the country, on which more than 3,000 bridges are in service. Statistics shows that 98 % of its domestic cargo depends on these road networks. There is no doubt the road network plays a significant role to national economy.</p> <p>However, it is said that traffic infrastructure in the country have not been properly maintained. In particular, there exist a large number of deteriorated bridges due to insufficient maintenance, causing an adverse influence to not only the domestic but also the international transport system.</p> <p>To deal with these issues, the Government of Egypt, the responsible organization for the development and maintenance of roads, General Authority for Roads, Bridges and Land Transport (hereinafter referred to as GARBLT), started the Program for Bridge Maintenance/Management and Repair. Because there is lack of human resources with adequate knowledge, and insufficient technics and necessary equipment for appropriate inspection and evaluation of bridges, the effect of the Program has not fully been achieved.</p> <p>In addition, GARBLT has curbed hires of new young staff to fill up vacant of the retired staff, under the policy of curbing personnel expenses by the Government of Egypt, causing personnel shortage. However, maintenance of major bridges in Egypt is continued to be under the direct management of GARBLT, so it has a strong sense of crisis in relation to decreasing of engineering technical level.</p> <p>As the background mentioned above, in response to the request by the Government of Egypt to assist developing capacity for bridge management and repair, the Government of Japan decided to implement the Project for Improvement of the Bridge Management Capacity in Egypt under JICA's technical cooperation scheme.</p> |   |

Responding to a request from Egyptian Government on the above-mentioned technical cooperation project, JICA started its implementation in March 2012 for three years. The Mid-term Review on the Project has been conducted in February 2014.

## **1-2 Project Overview**

The objective of the Project is to improve bridge maintenance capacity of GARBLT Headquarter (hereinafter referred to as GARBLT HQ) and District Offices, thereby contributing to enhancing an appropriate bridge maintenance capacity in Egypt.

### **(1) Overall Goal**

Bridges in Egypt are maintained properly.

### **(2) Project Purpose**

Capacity of GARBLT on bridge maintenance management is improved.

### **(3) Outputs**

- 1) Bridge maintenance management cycle is enhanced.
- 2) Capacity of GARBLT's engineers on bridge inspection is enhanced.
- 3) Capacity of GARBLT's engineers on bridge repair is enhanced.
- 4) Bridge Management System (BMS) is prepared.

### **(4) Inputs**

**Japanese side:** Total amount of inputs: 408.33 million yen (As of the end of October 2014)

**Experts:** One long-term expert: Chief Advisor

Ten short-term experts: Leader/Bridge Management Expert, Bridge Inspection, Bridge Repair, BMS, Cable-Stayed Bridge, Coordinator, Bridge Inspection, Fatigue of Steel  
A total of 97.60 man-months as of the end of October 2014

**Number of trainees received:** 10 participants in two training courses in Japan, "The 1st C/P (counterpart) training for the Project for Improvement of the Bridge Management Capacity" "The 2nd C/P training for the Project for Improvement of the Bridge Management Capacity" The 3rd C/P training is scheduled during November 8-22 2014

**Equipment:** A total of 109.75 million yen (As the end of October 2014); concrete rebound hammer, ultrasonic tester for concrete crack, carbonation test phenolphthalein, chloride ion penetration tester, paint thickness meter, reinforcement concrete detector for substructure, ultrasonic metal thickness gauge, portable water pressure washer, generator, shotcrete materials, anti-corrosion paint, microcore apparatus, reinforced concrete detector (radar type), BMS server, BMS system development and bridge inspection vehicle are provided.

**Local operational cost borne by the Japanese side;** A total of 12.85 million yen (As the end of October 2014); employment, rent, consumables, travel and transportation, documentation, etc.

**Egyptian side:**

**Number of C/P personnel:** A total of nine personnel are assigned as C/P members (As of the end of October 2014)

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| <b>Facility offered:</b> An office space, and warehouse in the GARBLT HQ Building.  |                       |                      |   |
| <b>Local operation cost borne by the Egyptian side:</b> A total of 37,400 LE (As of the end of October 2014), the transportation cost for attendance in on-site training (OST) by C/P and WG. |                       |                      |   |
| <b>2. Evaluation Team</b>   |                       |                      |   |
| <b>Member</b>   | Mr. Fusato Tanaka     | Leader               | Director, Team 3, Transportation and ICT Group, Infrastructure and Peacebuilding Department, JICA |
|   | Mr. Kota Wakabayashi  | Cooperation Planning | Team 3, Transportation and ICT Group, Infrastructure and Peacebuilding Department, JICA           |
|   | Ms. Yasunori Minagawa | Evaluation Analysis  | Consultant, SKK Research & Consulting Inc.  |

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| <b>Period of Evaluation</b> | 24 October – 7 November, 2014 | <b>Evaluation Type</b> | Terminal Evaluation |
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| <b>3. Results of Evaluation</b>   |  |  |  |
| <b>3-1 Confirmation of Results</b>  |  |  |  |
| <b>3-1-1 Achievement of Outputs</b>   |  |  |  |
| <u>(Output 1) Bridge maintenance management cycle is enhanced.</u>  |  |  |  |
| <p>Output 1 is not achieved at the time of terminal evaluation because the achievement test is not implemented now. There is a high possibility to achieve the Output 1 by the Project completion. The importance of bridge maintenance management cycle and preventive measures has been repeatedly explained by Japanese experts in WGs, TWG, and JCC and the understanding on these topics of maintenance engineers of GARBLT has been improved. In fact, it was observed that in Aswan Bridge in Upper Egypt, the bridge has been cleaned up and lighting has been set up by a GARBLT engineer for inspection based on the concept of bridge maintenance management cycle.</p>  |  |  |  |
| <u>(Output 2) Capacity of GARBLT's engineers on bridge inspection is enhanced.</u>  |  |  |  |
| <p>Output 2 is not expected to be achieved because the the bridge inspection with bridge inspection vehicle is not implemented yet. If the project period is extended, the output 2 will be achieved. Three kinds of manuals have been drafted. Based on the drafted manuals, a series of OST (On-Site-Training) for inspection have been conducted, covering all district offices of GARBLT.</p> <p>The members of inspection core team are not able to participate in the OST sufficiently, and GARBLT is tracking to improve the organization by recruiting the new engineers, in actual, new four engineers are recruited as full time stuffs. On the other hand, a bridge inspection vehicle, one of equipment written in PDM to be provided from Japan as Input, has not been delivered to GARBLT at the time of Terminal Evaluation<sup>2</sup>. Therefore, OST using the vehicle in the remaining period of the Project may not be implemented sufficiently, if the Project will not be extended its period corresponding to the delay.</p> |  |  |  |

<sup>2</sup> The bridge inspection vehicle was delivered to GARBLT on 7 November 2014, the next day of the Evaluation Team's return to Japan.

(Output 3) Capacity of GARBLT's engineers on bridge repair is enhanced.

At the time of the terminal evaluation, the manual for the bridge repair is almost completed and the demonstration for the bridge repair is processed as scheduled. So, Output 3 is expected to be achieved by the Project completion.

Bridge repair manual of Indicator 3-1 has been drafted and will be finalised by the middle of December 2014. A final demonstration on bridge repair is scheduled to be conducted late November of 2014.

(Output 4) Bridge Management System (BMS) is prepared.

Output 4 is almost achieved at the time of the terminal evaluation and expected to be achieved by the Project completion.

After the Mid-term Review, the development of main part of BMS in Step1 and Step2, including development of additional function on photo management system was completed. In the remaining period of the Project, for more effective use of BMS, a practical use of repair cost assessment function in step2, using actual data on bridge repair unit cost available in Egypt kept by GARBLT, is expected to be tackled. For that purpose, discussion meetings on some topics such as a format of necessary data and available function in BMS has started between the Project team and GARBLT in October 2014. At present, data input to BMS is undertaking using inspection records of routine inspection.

**3-1-2 Prospect of Achievement of the Project Purpose**

As for the achievement of the Project, OST of inspection has been conducted in 17 bridges out of 20 target bridges for OST so far. With regard to the development of BMS, the system itself is mostly completed and the next step is to install actual data for using repair cost assessment function of BMS. For the bridge inspection implemented by GARBLT engineers, not by Japanese experts, to ensure the sustainability, GALBLT is tracking some organizational enhancement such as an assignment of full-time staff for the inspection core team members or increase of workforce.

However, the OST with the bridge inspection vehicle is not implemented because the delivery of an inspection vehicle is delayed due to the worsening security in 2013.

Considering these situation, Project Purpose is almost achieved except the bridge inspection by the bridge inspection vehicle. It is assumed that the training using the bridge inspection vehicle will not be sufficient if the project is ended as scheduled, in March 2015. Therefore, assuming that the Project period is extended corresponding to the delay of delivery of an inspection vehicle, the Project Purpose is expected to be achieved by the Project completion.

However, OST of inspection organized by GARBLT engineers, not by Japanese experts, to ensure technology transfer of bridge inspection has not been conducted yet, due to lack of the members of inspection core team participating OST. For tackling this matter, some organizational enhancement such as an assignment of full-time staff for the inspection core team members or increase of workforce is needed. Therefore, assuming that the Project period is extended corresponding to the delay of delivery of an inspection vehicle and that the effective implementation of OST involving sufficient members from inspection core team in the remaining period of the Project is conducted, the Project Purpose is expected to be achieved by the Project completion.

### **3-1-3 Prospect of Achievement of the Overall Goal**

Overall Goal is “Bridges in Egypt are maintained properly”, and most of the major bridges are under jurisdiction of GARBLT. For realizing the condition of Overall Goal in Egypt 3-5 years after the Project completion, a system for bridge engineers in HQs and those in district offices to share inspection and repair technology obtained in the Project is needed to be established. One of the measures is to train trainers who will be responsible for technology transfer to engineers in district offices of GARBLT. The progress on this matter is still small and the overall goal is not achieved at the time of the terminal evaluation. In the remaining period, the intensive training is planned to be implemented in order to train the members of an inspection core team. If these members are trained and the periodical training will be implemented by them, the overall goal will be achieved.

of the project, the intensive trainings for the core trainers are planned to be implemented.

### **3-2 Summary of Evaluation Results**

#### **(1) Relevance: High**

The Project Purpose is aligned with the Egyptian policies on solving the issues on maintenance of bridges in transport sector. The purpose is also consistent with Japanese government’s assistance policy to Egypt in transport sector. GARBLT who are responsible for the management of main bridges in Egypt has a strong sense of crisis that the capacity of in-house engineers comes to be lower and highly recognize on the importance of the personnel development. Therefore, the selection of implementing agency matches the needs. The Japan’s maintenance level of roads and bridges is high, and the JICA has conducted similar technical cooperation projects on maintenance on roads and bridges, resulted in a big advantage of Japan. Considering these points, the relevance of the Project is judged as high.

#### **(2) Effectiveness: Slightly high**

Project Purpose is almost achieved except for the bridge inspection by the bridge inspection vehicle. One of the contribution factors to Effectiveness is organizational enhancement executed by GARBLT such as Appointment of PAD, the establishment of BMS team. On the other hand, the delay of delivery of an inspection vehicle due to the worsening security and insufficient participation by the inspection core team due to their being busy are recognized as the impeding factors. Considering these points, the effectiveness of the Project is judged as slightly high.

#### **(3) Efficiency: Fair**

Each Output is expected to be achieved and it is almost achieved at the time of the terminal evaluation. As for Input from Japanese side, almost input has been provided as planned. However, security worsening in 2013, as an external factor, gave a negative influence to the Project activities such as a temporary return to Japan of Japanese experts as well as the delay of delivery of inspection vehicle. As input from Egyptian side, the appointment of PAD and the establishment of the inspection core team and BMS team have been implemented. However, the members of inspection core team are still not able to participate sufficiently in OST due to their being busy with their other tasks, and GARBLT is tracking to improve this situation by recruiting four new engineers specially for the Project in October 2014. Considering these points, the efficiency of the Project is judged as fair.

#### **(4) Impact: Fair**

With regard to the achievement of Overall Goal, as manuals developed in the Project have been translated into Arabic, they will be spread into district offices gradually. Also, BMS team has input inspection data of bridges other than target bridges to BMS. On the other hand, trainings and seminars on bridge maintenance management are still under discussion and needs trainers who are trained for those trainings as the members of inspection core team during the remaining period of the Project. Considering these points, the impact of the Project is judged as fair.

**(5) Sustainability: Slightly high**

With regard to policy sustainability, GARBLT has set out a policy on organizational enhancement for bridge maintenance management in GARBLT that the district offices' engineers are involved in bridge inspection. Also, regarding organizational sustainability, though improvement of the organization is not processed at the time of mid-term review, GARBLT appointed PAD and established the inspection core team and BMS team for organizational enhancement this time. As for technical sustainability, GARBLT's engineers come to understand the importance of preventive maintenance. Considering these points, the sustainability of the Project is judged as slightly high.

**3-3 Factors contributing to realization of effects**

**(1) Factors related to planning**

Bridge maintenance in Egypt is corrective maintenance so far. In the Project, it is observed that they come to understand the effectiveness of preventive maintenance, a very significant change from the viewpoint of technology transfer.

**(2) Factors related to the implementation process**

1) Training in Japan

After the training in Japan, the staff of GARBLT who participated in the training, understood the significance of the bridge maintenance management system, and come to aware the issues of present institutional system of the bridge maintenance in Egypt. After the training in Japan, the working group activities became more active and vitalized than before.

2) Activities using local language

The Project team members tried to use Arabic in WG's activities for the C/P to understand explanation of materials. Manuals prepared by the Project were translated into Arabic for GARBLT engineers to understand the contents.

3) Incidence of Birkat EL Sab Bridge

The fatigue crack and distorted downward incidence of Birkat EL Sab Bridge under the jurisdiction of Tanta District Office in June 2013 makes the related engineers come to aware the importance of various inspections. As a result, the significance of the Project which aims to promote the preventive measures began to be recognized owing to the incidence.

4) Appointment of PAD

Responding to a recommendation of the Mid-term Review in February 2014, GARBLT appointed Head of Bridge Sector as PAD of the Project in February 2014. As she has a responsibility of personnel matters on GARBLT, she took quick actions for organizational enhancement such as the establishment of inspection core team, BMS team and the recruitment of four new engineers to the Project

### **3-4 Factors that impeded realization of effects**

#### **Factors related to the implementation process**

##### 1) The frequent change of chairman of GARBLT as Project Director

The present chairman of GARBLT was taken up his post in February 2013. Before that, the chairman has been replaced once. The frequent change has affected the delay of holding JCC meeting. The project progress had a great deal of influences in terms of understanding the Project and managing the activities by the chairman as Project Director.

##### 2) Low participation in OST of the bridge inspection core team

As mentioned above, although the bridge inspection core team was established responding to a recommendation in the Mid-term Review, the members have not been able to implement their tasks as the team sufficiently due to their being busy with other tasks. In order to improve this situation, GARBLT is tracking some organizational enhancement such as an assignment of full-time staff for the inspection core team members or increase of workforce.

### **3-5 Conclusion**

Since the Project is consistent with one of Egyptian Government's basic strategies for transport sector development as well as measures for transport sector in Japan's ODA policy toward Egypt, the relevance is judged as high.

The effectiveness of the Project is considered slightly high, because the Project Purpose is expected to be achieved by the Project completion except for the bridge inspection with the bridge inspection vehicle.

On the other hand, the Project was influenced significantly by the security worsening of Egypt in 2013. Particularly, the delay of procurement of bridge inspection vehicle, one of equipment provided from Japan, continue even at present. Although the vehicle is planned to be delivered to GARBLT in the middle of November 2014, it is feared that OST using the vehicle to be conducted within the original schedule may not be implemented sufficiently. Considering the point, the efficiency is judged as fair.

In order to achieve Overall Goal, bridge engineers in HQs and those in district offices need to share inspection and repair technology obtained in the Project through a regular seminar/trainings organized by GARBLT. Progress on this matter, however, is still small. Thus, the impact of the Project is judged as fair.

Since GARBLT has taken actions for organizational strengthening continuously, based on recommendations in the Mid-term Review, the sustainability is judged as slightly high.

Thus, in order to ensure the achievement of Project Purpose as well as Outputs, the extension of Project period corresponding to the delay of procurement of a bridge inspection vehicle is recommended. The details are described in 3-6 Recommendation.

### **3-6 Recommendation**

#### (1) Extension of the Project

The procurement of the bridge inspection vehicle was delayed due to security worsening in 2013. In this circumstance, in order to achieve the project purpose, the extension of the project for further

trainings of bridge inspection using the bridge inspection vehicle is recommended.

The period of extension is appropriate to be three months. It is, however, recommended that the project period will be decided considering the progress of the following activities:

- 1) The data kept by Egyptian side for the development of Step2 of BMS will be decided by the discussion with JICA team.(target; by the end of November 2014)
- 2) After the completion of the training by Barin, GARBLT will start the training for the familiarization of the vehicle with JICA team.(target; by the end of November 2014)
- 3) The On-Site-Training for the detail inspection will be implemented with the inspection core team in the district office.(target; by the end of December 2014)
- 4) The surface inspection of Aswan Bridge will be implemented using the vehicle.(target; by the end of December 2014)

#### (2) Development of GARBLT Core Inspection Trainers

The inspection team could not join the OST sufficiently because as many of them are stationed in district offices. In order to ensure the sustainability, it is recommended to develop the Egyptian Core Inspection Trainers for planning the annual inspection plan, checking inspection results, technical transfer to other engineers and maintenance of the detail inspection equipment.

#### (3) Establishment of the organization for the operation of the BMS system

Based on a recommendation in the Mid-term Review, operators to input of inspection data were assigned and the training for them has been continued. However, the engineers who manage the bridge maintenance budget and analyze the inspection result by using BMS are not sufficiently assigned. Therefore it is recommended to establish the organization related to BMS with functions described above.

### **3-7 Lessons Learned**

#### (1) Additional personnel allocation in accordance with the status of the project

An additional personnel allocation of key persons in accordance with the Project status is advisable for breaking out of straitened circumstances.