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1. Introduction of CAMBRIDGE project

(1) Background and purpose

The Department of Roads (DoR) is responsible for maintenance of 272 road bridges in the country. Around half of these bridges are temporary Bailey bridges and have limited load capacity and carriage width. In addition, some of concrete bridges constructed in 1970~1980 have outlived their design lives, and difficult to keep the current heavy load of vehicle. Under this situation, the Royal Government of Bhutan requested for a “Technical Cooperation Project for Capacity Development in Construction and Maintenance of Bridges (the Project)” to Japan for ensuring the safety bridges to improve road network as an important program in the “11th five-year plan (2013-2018)”. The purpose of the Project is to develop the bridge management system, to give the technical skill about inspection/diagnosis, repair/reinforcement and construction and maintenance cycle of bridges and to be enhance the capacity of bridge engineers involved in bridges under DoR.

(2) Project members and activities

The Project consists of 11 engineers from Bridge Division of DoR, 44 engineers from the Regional Offices of DoR and 11 JICA Experts. JICA Experts will repeat a 1 to 3-month stay during three years. Through this period, assistance and OJT on the bridge management will be held by JICA Experts. JCC (Joint Coordinating Committee) meeting is held every 6 months. The status of the Project will be confirmed and the future planning will be improved in JCC if there are any problems. Then the training in Japan will be held for some engineers of DoR. In addition, this Project is given a name as 『CAMBRIDGE』.

【Headquarters of DoR (Responsible person)】

Karma Galay	Director
Karma Wangdi	Chief Engineer, Bridge Division
Rinchen Khandu	Executive Engineer, Bridge Division
Ngawang Thinley	Executive Engineer, Bridge Division
Koncho Tempel	Deputy Exe. Engineer, Bridge Division

【Regional Office of DoR (Responsible person)】

Jigme Tenzin	Engineer, RO Lingmethang
Yeshey Penjor	Executive Engineer, RO S/Jongkhar
Tashi Wangmo	Executive Engineer, RO Trashigang
Yangki	Assistant Engineer, RO Trongsa
Nidup Wangmo	Assistant Engineer, RO Phuentsholing
Sangay Duba	Engineer, RO Tingtibi
Kinley Dorji	Engineer, RO Thimphu
Sonam Jamtsho	Engineer, RO Sarpang
Sonam Tobgyel	Executive Engineer, RO Lobeysa

【JICA Experts】

Keigo KONNO	Chief Advisor/ Bridge Engineering
Shinichi NII	Deputy Chief Advisor/ Inspection
Fumio HAKAMADA	Bridge Maintenance Plan
Takafumi KAMEDA	Bridge Manual/ Inspection
Hidetoshi NAKANO	Bridge Manual/ Repair
Takashi SAITO	Bridge Management System (BMS)
Sueo HIROSE	Bridge Construction/ Quality
Yoshihisa NODA	Bridge Construction/ Safety
Haruka SAITO	Coordinator/ Bridge Maintenance Plan
Hisako KOBAYASHI	Project Monitoring
Dai TAMAGAWA	Training plan in Japan

2. Schedule of the project

Schedule of the Project is shown as below. The Project started in October 2016. The policy of the Project was confirmed by DoR and JICA Experts in the 1st JCC. After that, the mission for the inventory of bridges and BMS was started. 2 JICA Experts for the management of the construction have been involved for preparing the draft field checklist for bridge construction from March 2017 in Bhutan. The OJT for bridge construction and inspection/diagnosis is being prepared.

3. 1st JCC

The meeting of the 1st JCC was held at the DoR HQ on 28 October 2016. Participating members were engineers of the Bridge Division in DoR HQ, the Chief Engineers from all Regional Offices of DoR, the chief representative of JICA and 6 JICA Experts. The overall goal and the selection of candidate

	2016			2017												2018												2019								
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Engineering / Inventory																																				
Inspection / Diagnosis																																				
Repair / Reinforcement																																				
BMS																																				
Management of construction																																				
Maintenance plan																																				
JCC	●																																			

bridges for carrying out OJT of the Project as shown below were discussed and confirmed.

Overall Goal1 : At all new DoR bridge construction sites, the quality control and safety control are implemented based on the checklist developed by the project.

Overall Goal2 : The % of defective bridges repaired increases by 30% in comparison to that in 2016.

Overall Goal3 : The % of safe bridges reaches 100% in comparison to that in 2016.

And the result of the attitude survey on bridge conducted for 52 engineers of DoR was in advance announced by JICA Experts (This result is shown in the lower-right of this paper.) . In this result, the anticipation for getting the technical skill enhanced through the Project was confirmed.



4. Progress of the project

(1) The inventory of bridges

The basic form for the inventory of bridges was created and prepared by the Bridge Division of DoR and JICA Experts. The basic form was distributed to the Regional Offices. Each engineer is collecting information for the inventory of bridges by using this form. These data become the basic information for BMS.

(2) The activity of BMS

Some seminars were held in the Regional Office. In this seminar, the outline and the development policy of BMS were explained. Now the program for managing the inventory of bridges is being developed.

(3) The checklist for the construction

The checklist for the quality and safety at the construction sites is being prepared by the Bridge Division of DoR and JICA Experts. Until the end of April in 2017, it will be completed and distributed to the Regional Office.

5. Future planning

(1) The inspection/ diagnosis/ repair of bridges

From April to June in 2017, the inventory of bridges will be completed. And the manual for the inspection, diagnosis and repair of bridges will be created and the OJT in one bridge site will be planned.

(2) BMS

The tentative program for the inventory of bridges will be made and input the basic information of bridges. After that, it will be improved further. And in this time, the program for managing the inspection of bridges will be developed.

(3) The management of the construction

The OJT in steel bridge and PC bridge for the quality and safety at the construction site will be held in October 2017.

6. Comment from the headquarters of DoR

We are strongly expecting that the capacity of bridge engineers who are involved with the construction and maintenance/repair of bridges under DoR is certainly enhanced by getting adequate assistance from the JICA Experts.

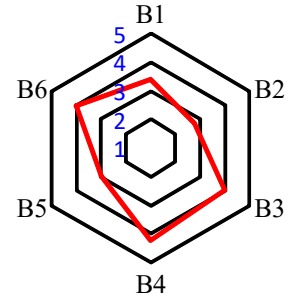
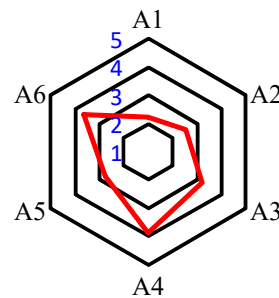
《Questions for the survey on attitude》

1. Do you understand the outline of 【A~F】 ?
2. Do you understand the method of 【A~E】 or the importance of 【F】 ?
3. What do you need to conduct continuously about 【A~F】 ?
4. Can you contribute to conduct continuously about 【A~F】 ?
5. Are the budget and engineer sufficient for 【A~F】 ?
6. Do you need the manual of 【A~F】 and recognize its?

《Selections of answer No》

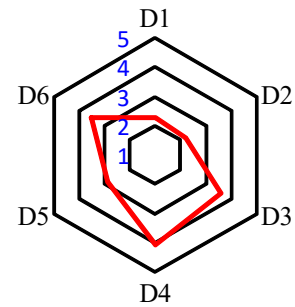
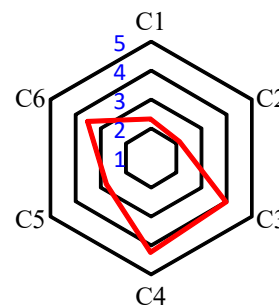
1: Not at all, 2: Slightly, 3: Partly, 4: Mostly, 5: Fully
(The red line shown below is the average of selections of answer No)

【A】 Bridge Plan and Bridge Design 【B】 Quality and Safety control on the Construction



【C】 Bridge Inspection / Diagnosis

【D】 Bridge Repair / Reinforcement



【E】 Bridge Management System

【F】 Bridge Maintenance Plan

