

Country Name	<b>The Project for Strengthening of Construction Quality Control</b>
Kingdom of Cambodia	

**I. Project Outline**

Background	<p>In Cambodia, the Ministry of Public Works and Transport (MPWT) worked intensively on construction and rehabilitation of transportation infrastructures such as roads and bridges with their government budget and donors' financial support in order to achieve sustainable and efficient socioeconomic development and poverty reduction. Quality of roads developed by the projects with supports of the donors was controlled through supervisions of consultants and/or contractors. On the other hand, construction and maintenance of roads and bridges, which were funded by the government budget were directly implemented by the Road Infrastructure Department (RID), Heavy Equipment Center (HEC) under the MPWT and each provincial Department of Public Works and Transport (DPWT) but the quality of works, was not ensured through supervisions including inspection of standard for construction material and construction technique and method. Under those situations, the government of Cambodia requested the government of Japan a technical cooperation project to establish Quality Control and Quality Assurance (QC/QA) system for road and bridge construction.</p>												
Objectives of the Project	<p>Through formulating the guidelines of quality standard, establishing library management for documents, and delivering technical trainings of quality control, the project aimed at improving capacity of MPWT engineers in the quality control for road and bridge construction and maintenance, thereby contributing to improvement of quality and cycle of road and bridge construction and maintenance.</p> <ol style="list-style-type: none"> <li>Overall Goal: Quality and Cycle of road and bridge construction and maintenance are improved.</li> <li>Project Purpose: Capacity of MPWT engineers in the quality control for road and bridge construction and maintenance undertaken by force account is improved through application of the Quality Control and Quality Assurance (QC/QA) system (Standard Guideline: SG, Regulations: RG, Trainings, Standard Drawings)</li> </ol>												
Activities of the project	<ol style="list-style-type: none"> <li>Project site: Siem Reap, Kandal and Kampong Cham</li> <li>Main activities: 1) Formulating the guidelines of quality standard for construction and maintenance of roads and bridges, 2) Formulating the procurement plan of laboratory equipment to meet the standards, 3) Supporting preparation of the library management and maintenance plan, 4) Implementing the technical guidance about library operation and management to the Cambodian counterparts, 5) Planning and implementing pilot training courses of quality control of construction for the staff of RID, HEC, DPWT, General Inspectorate and other personal concerned.</li> <li>Inputs (to carry out above activities) <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Japanese Side</td> <td style="width: 50%;">Cambodian Side</td> </tr> <tr> <td>1. Experts: persons: 11 persons</td> <td>1. Staff allocated: 16 persons</td> </tr> <tr> <td>2. Acceptance of trainees in Japan: 11 persons</td> <td>2. Land and Facilities: Office spaces for the Japanese experts</td> </tr> <tr> <td>3. Equipment: High Pressure Triaxial Machine, Multispeed Motorized Compression Device, Density/ Moisture Gauge, Color Digital Printer, etc.</td> <td>3. Local cost: cost for implementation of the pilot projects etc.</td> </tr> </table> </li> </ol>					Japanese Side	Cambodian Side	1. Experts: persons: 11 persons	1. Staff allocated: 16 persons	2. Acceptance of trainees in Japan: 11 persons	2. Land and Facilities: Office spaces for the Japanese experts	3. Equipment: High Pressure Triaxial Machine, Multispeed Motorized Compression Device, Density/ Moisture Gauge, Color Digital Printer, etc.	3. Local cost: cost for implementation of the pilot projects etc.
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Ex-Ante Evaluation	2009	Project Period	May, 2009 – October 2012	Project Cost	(Ex-ante) 398million yen (Actual) 425 million yen								
Implementing Agency	Ministry of Public Works and Transport (MPWT)												
Cooperation Agency or Contract Agency in Japan	Ministry of Land, Infrastructure, Transport and Tourism.												

**II. Result of the Evaluation**

<b>1 Relevance</b>
<p>&lt;Consistency with the Development Policy of Cambodia at the time of ex-ante evaluation and project completion&gt;  The project was consistent with the Cambodia's development policy of "the National Strategic Development Plan (NSDP) (2006-2010)", "NSDP (2009-2013)" and "the Rectangular Strategy for Growth, Employment, Equity and Efficiency Phase II (2008)" which aimed at "continuous redevelopment and construction of infrastructure including roads and bridges".</p> <p>&lt;Consistency with the Development Needs of Cambodia at the time of ex-ante evaluation and project completion &gt;  The project was consistent with the Cambodia's development needs of improvement of capacity of MPWT on quality control for construction and maintenance of roads and bridges in order to reduce the maintenance costs of road infrastructure.</p> <p>&lt;Consistency with Japan's ODA Policy at the time of ex-ante evaluation&gt;  The project was consistent with the Japan's ODA policy to support sustainable economic development including economic infrastructure, which was prioritized in the Country Assistance Plan for Cambodia (2002).</p> <p>&lt;Evaluation Result&gt;  In light of the above, the relevance of the project is high.</p>
<b>2 Effectiveness/Impact</b>

<Status of Achievement for the Project Purpose at the time of Project Completion>

The Project Purpose was mostly achieved by project completion. The SG and RG, which had been revised by the project, were applied to at least 10 periodic maintenance and 15 emergency projects by the time of project completion. (Thereafter, the periodic maintenance was implemented in 16 provinces<sup>1</sup> and the emergency projects were carried out in all the 24 provinces by force account for the period from 2013 to 2015.) Through the technical trainings by the project, the MPWT trainers upgraded their knowledge and skills on SG and RG as well as teaching method but the average scores of the post-test ranged from 54 to 68 by training session which were below the target of 70.

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

The project effects have been partially continued since the project completion. The SG and RG revised by the project have been continuously applied to the periodic maintenance and emergency projects for roads but no data are available for bridge construction and maintenance. According to MPWT, the SG and RG have been applied to at least 70-80% of the maintenance and emergency projects for roads. The MPWT and DPWT staffs have utilized them for their daily works and have pointed out many points to be revised and updated. In addition, laboratory equipment installed by the project for the laboratory of MPWT, such as soil analysis sieve sets, has been utilized for necessary tests of road and bridge construction as a part of QC/QA activities of MPWT, which has greatly contributed to improvement of the quality of construction works under MPWT.

Since the management system of completion documents developed by the project is essential for the QC/QA activities of MPWT and DPWTs, the database to compile as-built drawings developed by the project has been sustained and utilized by the MPWT officials. In addition, completion documents of new projects, which are received or collected by the Public Works Research Center (PWRC) in electric format, have been continuously compiled and uploaded in to the database system. The number of documents uploaded in the database system increased from 12,000 at the time of project completion to 12,181 at the time of ex-post evaluation. However, the Library renovated by the project was temporarily moved to other location at the Equipment Supply Center of the HEC, in order to make office space for the officials. Since the books and other documents stored in the Library, except the server and computers, have been kept in a store room where the officials cannot easily access, the Library has not been well functioning at the time of ex-post evaluation despite of increasing documents and books stored in the Library.

In terms of technical trainings on the QC/QA system for road and bridge construction and maintenance, no training has been delivered for the MPWT and DPWT officials by MPWT or DPWTs due to the budget constraint. All the trainers of RID, HEC and PWRC interviewed at the ex-post evaluation, who had been trained by the project, have not been engaged in the trainings on the QC/QA system. Therefore, the trainers trained by the project and the senior engineers with knowledge and skills on the QC/QA system have made efforts to transfer their knowledge and skills to junior or newly recruited staff through daily practices.

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

The Overall Goal has been achieved. According to PWRC, there has been no large scale defect found on in the force account construction projects implemented by MPWT since the project completion. According to the Director of PWRC and the Director of HEC, the main reason is improvement of the capacity of the engineers and technicians in the QC/QA for road and bridge construction and maintenance.

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

According to PWRC, RID and DPWTs of Kampong Cham, Kandal, and Siem Reap, no negative impact on natural environment by the pilot project implemented under the project has been observed. Also, there was no resettlement and land acquisition by the project. No other positive and negative impacts by project were observed at the time of ex-post evaluation.

<Evaluation Result>

In light of the above, the project mostly achieved the Project Purpose and achieved the Overall Goal through improvement of the capacity of MPWT in quality control of construction and maintenance of roads and bridges. However, the project achievements have only partially continued because the Library has not been functioning and the technical trainings on the QC/QA system has not been delivered. Therefore, the effectiveness/impact of the project is fair.

Achievement of project purpose and overall goal

Aim	Indicators	Results																		
(Project Purpose) Capacity of MPWT engineers in the quality control for road and bridge construction and maintenance undertaken by force account is improved through application of the QC/QA system.	(Indicator 1) By the end of the project, the revised SG and RG are applied to at least three force account projects of roads and bridges starting from 2013 (new construction or major rehabilitation under periodic maintenance ) in three provinces except in the two pilot provinces.	<p><u>Status of the achievement: Achieved</u></p> (Project Completion) <ul style="list-style-type: none"> <li>● At least 10 periodic maintenance and 15 emergency projects undertaken in force account were implemented by applying the revised SG and RG.</li> <li>● No information available about bridge construction and maintenance.</li> </ul> (Ex-post evaluation) Continued. [Number of force account projects implemented in accordance with the SG and RG] <table border="1" data-bbox="759 1742 1433 1921"> <thead> <tr> <th colspan="2"></th> <th>2013</th> <th>2014</th> <th>2015</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Road</td> <td>Construction</td> <td>N.A</td> <td>N.A</td> <td>N.A</td> </tr> <tr> <td>Maintenance (periodic)</td> <td>10</td> <td>11</td> <td>10</td> </tr> <tr> <td>Emergency</td> <td>15</td> <td>90</td> <td>86</td> </tr> </tbody> </table> <p>Note: Only aggregated data are available and no data are available at provincial level.</p>			2013	2014	2015	Road	Construction	N.A	N.A	N.A	Maintenance (periodic)	10	11	10	Emergency	15	90	86
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<sup>1</sup> Kandal, Kampong Thom, Pailin, Pursat, Prey Veng, Preah Vihea, Preah Sihanouk, Mondul Kiri, Siem Reap, Steung Treng, Svay Rieng, Otdar Meanchey, Kampong Chhnang, Koh Kong, Kampot, and Kampong Speu

	(Indicator 2) Trainers who received TOT are assessed and trainees who participated the annual technical training in year 2012 improve the knowledge level of quality control and score 70 at the post test.	<u>Status of the achievement: Partially achieved</u> (Project completion) <ul style="list-style-type: none"> <li>The MPWT trainers upgraded their knowledge and skills on SG and RG as well as teaching method but continuous improvement were needed.</li> <li>The average score of the post-test ranged from 54 to 68 depending on the training sessions.</li> </ul> (Ex-post Evaluation) Not continued <ul style="list-style-type: none"> <li>No training on the QC/QA system has been delivered for MPWT and DPWT staff by MPWT and DPWT due to the budget constraint.</li> <li>All the trainers of RID, HEC and PWRC trained by the project, who were interviewed at the ex-post evaluation, have not been engaged in any trainings on the QC/QA system.</li> </ul>										
(Overall goal) Quality and Cycle of road and bridge construction and maintenance are improved.	(Indicator 1) Large scale defects will not be found on the Defect Liability Inspection in the force account construction projects of MPWT.	<u>Status of achievement: Achieved</u> (Ex-post Evaluation) [Number of large scale defects found] <table border="1" data-bbox="759 524 1536 589"> <thead> <tr> <th>2012</th> <th>2013</th> <th>2014</th> <th>2015</th> <th>2016</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>	2012	2013	2014	2015	2016	0	0	0	0	0
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Source : Project completion report, MPWT Annual Report, interviews with Director and Deputy Chief of Office of PWRC, Director of HEC, and trainers

### 3 Efficiency

Although the project period was as planned (ratio against the plan: 100%), the project cost exceeded the plan (ratio against the plan: 106%). Therefore, efficiency of the project is fair.

### 4 Sustainability

#### <Policy Aspect>

The QC/QA for road and bridge construction and maintenance undertaken in the force account was endorsed by MPWT's Prakas (Ministerial Ordinance) on Official Usage of "Standard Guideline and Regulations and Standard Drawings for Road and Bridge", which were issued and signed by the Minister of MPWT on 25<sup>th</sup> October 2012 and has been still effective at the time of ex-post evaluation.

#### <Institutional Aspect>

Whereas the organizational structure of MPWT has been changed, there was no change in organizational setting in DPWTs of Kandal, Kampong Cham and Siem Reap where the pilot project had been implemented in the project. The organizational reform of MPWT has significantly enhanced the performance and quality control of force account projects through a further clarification of responsibilities among units. However, the insufficient number of staff in MPWT and DPWTs has constrained implementation of the QC/QA activities. For MPWT, although 41 staff members and 27 staff members are deployed for HEC and PWRC respectively, the trained staff has been retired or resigned from MPWT. For DPWTs in the pilot sites, while Siem Reap and Kandal have the insufficient number of engineers and technicians for the QC/QA activities and need to wait for recruitment of new staff by MPWT, Kampong Cham has the sufficient number of technical staff because of the less number of maintenance and construction projects and the newly recruited staff to be deployed.

For maintenance of the database system and the Library, the sufficient staff is deployed in spite of no librarian: 3 staff members for the database system and 4 staffs for the Library.

In terms of technical trainings on the QC/QA system, the sufficient number of trainers and training staff are deployed but no training has been delivered by MPWT because of the budget constraint. One of the reasons for the limited commitment of MPWT could have been a limited coordination with the Human Resource Department about the technical trainings on the QC/QA system in order to incorporate them into the regular training programs for the Ministry's staffs.

For the activities related to revisions and updating of SG and RG, there was difficulty to continuously organize the team which composed of member from the different departments to be engaged in the activities, because the team had not been officially formed with an official assignment.

#### <Technical Aspect>

All MPWT staff members interviewed at the ex-post evaluation, including trainers and engineers of RID, HEC and PWRC, have sustained their skills and knowledge on the QC/QA system introduced by the project since they have continuously utilized them for their works. Also, the engineers and technicians of DPWT Kandal and DPWT Kompong Cham interviewed at the ex-post evaluation have sustained the skills and knowledge and applied them for their daily work though the technical staff of DPWT Siem Reap has not been trained on the QC/QA system due to the budget constraint. As mentioned above, the SG and RG revised by the project have been utilized for quality control of construction and maintenance of roads and bridges. A follow up project implemented from 2013 to 2014 also helped to promote QC/QA system through advises on seven priority projects. Technical transfer of the QC/QA system has been carried out through non formal trainings such as daily practices. Although the technical transfer by daily practices can improve the skills of technical staffs at site, it may cause unbalanced technical skill level among them and make it difficult to maintain technical standards of MPWT and DPWT. Therefore, the need for formal transferring such as formal trainings should be further considered.

For the management of the database system and the Library, the staff has deployed necessary skills and knowledge but need to improve them because they do not have sufficient ability to update their technical skills by themselves. The staff needs to improve their skills for proper updating and maintenance of the system since the development of the database system had been outsourced to a service provider and the library staff does not clearly understand the system. At the time of implementation of the follow up project from 2013 to 2014, these issues were already pointed out but no significant improvement has been made since then.

#### <Financial Aspect>

The budget for road and bridge construction and maintenance undertaken in force account is divided in two items of project implementation and quality control. The total budget for road and bridge construction and maintenance has fluctuated year by year. The budget for 2016 increased to 133 million USD from 118.5 million USD in 2015. 2% of the total budget for project implementation (total direct costs) is allocated for the relevant department to conduct quality control activities including supervision at the ministry level. The

QC team have challenged to complete their QC/QA duty with in the allocated budget amount, as the budget for the QC team, however, has not been sufficient to cover necessary cost. The budget amount for each DPWT of the pilot provinces has varied by province and fluctuated by year and has not always been sufficient to sustain QC / QA activities.

<Evaluation Result>

In light of the above, slight problems have been observed in terms of the institutional, technical 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 mostly achieved the Project Purpose and achieved the Overall Goal for enhancing the capacity of MPWT to properly conduct the QC/QA activities for road and bridge construction and maintenance in good quality. While the laboratory equipment installed by the project contributed to improve the MPWT's QC/QA activities and quality of construction works, the Library to compile and to provide the necessary documents has not been well functioning and technical training on the QC/QA system has not been delivered. As for sustainability, the insufficient number of technical staffs of MPWT and DPWTs and lack of technical trainings on the QC/QA system due to the budget constraints have hampered the necessary QC/QA activities though the SG and RG revised by the project have been applied to force account projects of road and bridge construction and maintenance. As for efficiency, the project cost exceeded the plan.

In the light of above, this project is evaluated to be partially satisfactory.

### III. Recommendations & Lessons Learned

Recommendations for Implementing Agency:

[For MPWT]

- MPWT needs to periodically update SG and RG and disseminate them with hard and soft copies since SG and RG are utilized by MPWT and DPWT officials in daily works and necessity of revision and update are commonly pointed out.
- MPWT needs to restructure a library, which stores construction documents and books after completing construction of a new building and connect computer network so that every official can refer to relevant documents and materials efficiently.
- MPWT is recommended to have internal discussions on how to effectively implement official trainings. Trainings on SG and RG are currently conducted through OJT (On the Job Training), but they can be incorporated in the part of current annual training by MPWT or they can be conducted through a new official training system for selected members.

Lessons learned for JICA:

- At the planning stage, formulating a team comprised of officials in different departments was deemed effective because it made improvement of the overall capacity of the ministry (MPWT). However, after the project completion, it was difficult for the team to continue its activities such as revising the guidelines due to the fact that the team was ad hoc and not officially given roles. Therefore, JICA should take the below measures in future projects to prevent such problems:
  - 1) At the planning stage, JICA should be careful about the composition of a counterpart project team. If the team composes of people from some different departments, the project should have included activities to officially assign roles to the team (such as issuing decree) to continue activities after the project completion. Also, JICA should consider the possibility of utilization of the existing country system, instead of only considering the formulation of a new team to conduct the project activity so that the activity will be sustained after the project completion.
  - 2) At the implementation stage, Japanese experts should work to enhance ownership of the counterparts. For example, the Japanese experts can let counterparts implement the activity by themselves in the last year of the project period.
- The training conducted in the project was not held after the project period because of budgetary shortage and insufficient coordination within the ministries. Therefore, JICA should take the below measures in future projects to prevent such problems:
  - 1) At the planning stage, JICA should look at financial and institutional aspects for the training if the training should be continuously conducted for the post project period. Human Resource Department should be included in the discussion as this department is the one who organize regular training to the Ministry's staff. Moreover, financial planning of trainings with necessary coordination with the Ministry of Economy and Finance should have been included in project activities.
  - 2) At the implementation stage, feedback from each training should be discussed with the Human Resource Department and the Ministry of Economy and Finance to assess effects of the trainings and to ensure necessary budget for continuation of the training activities.



Road 71 in Kampong Cham under pilot project



Maintenance Works for the National Road 6 in Siem Reap (between Krong Serey Sophoan to Krong Siem Reap)