

2021–2022
KCCP Road Asset Management
Final Report
(1st year to 3rd year)

Summary

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Infrastructure Development Institute–Japan
NIPPON ENGINEERING CONSULTANTS CO., LTD.

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Introduction

This report summarizes the activities and results of the entire three years of work that have been conducted since FY 2019 based on KCCP "Road Asset Management" (FY 2021-2022) final report.

1. Overview

1.1. Background

Demand for infrastructure in developing countries is high, and the Asia-Pacific region is expected to have a maintenance demand of approximately \$26 trillion by 2030. In addition, the infrastructure that Japan has supported in developing countries since the 1970s is approaching 50 years old. Considering the demand for new construction projects, it is essential to reduce costs by adopting the concept of preventive maintenance and optimizing maintenance management. Therefore, it is important to master the concept of asset management by properly understanding the current status of road assets (assets) such as bridges, predicting the deterioration (aging) and damage of individual assets, and then repairing and reinforcing them at the appropriate time to extend their estimated useful lives and realize a maintenance management plan that minimizes life cycle costs.

In October 2017, JICA launched the Road Asset Management Platform (hereinafter referred to as "RAMP") to establish a system to enable flexible responses to issues in developing countries by centrally covering everything from cutting-edge domestic initiatives to those of local governments. RAMP aims to provide efficient and effective assistance through a programmatic approach that combines issue-specific and country-specific seminar as well as technical cooperation projects.

1.2. Program Objectives

The program objectives of this assignment, [KCCP "Road Asset Management"] (hereinafter referred to as "the program"), are as follows.

- Acquire the basic knowledge and skills required for the maintenance cycle and understand the concept of road asset management.
- Understand the current status of road asset management in the participant's own country.

While assuming the above, the following classifications were established for the first year.

Basic: To acquire the basic knowledge and skills required for the maintenance cycle and to understand the concept of road asset management.

Intermediate: Utilizing the concept of road asset management, it will be possible to propose appropriate road maintenance and management plans in your country.

In the first year, seminars for "basic" and "intermediate" courses were offered respectively for

participants, whose eligibility was specified based on each work history as his/her level of proficiency. The basic level course was designed to provide participants opportunities to learn basic knowledge of inspection and diagnosis of concrete and steel bridges, as well as to learn how to formulate repair plans and use collected data, while the intermediate level course was designed to provide participants to utilize inspection data and predict future deterioration to formulate long-term repair or management plans.

From the second year onward, due to the influence of COVID-19, the participants were not grouped into courses based on proficiency level, but on the regions. Therefore, the seminars itself were consisted of lectures with the same content for both A and B courses.

1.3. Expected Results

- 1) Able to properly assess the current status of road assets such as bridges, etc.**
- 2) Predict deterioration (aging) and damage to individual assets.**
- 3) Repair and reinforcement can be implemented at the appropriate time.**
- 4) Manage maintenance plans that maximize the life of assets and minimize life cycle costs.**

1.4. Target

This project will be managed to efficiently and effectively realize the approach of RAMP implemented by JICA. In addition, after the completion of the seminar, information will be collected from each participant of the seminar, and follow-up activities with step of “monitoring” will be conducted on the activities of the participants for Road AM and to understand detailed needs to establish road asset management in the participants’ country. The objective is to maximize the effectiveness of the program by reflecting the results of these monitoring activities successively.

2. Seminar Activities

2.1. Seminar Overview

This seminar program was originally designed as a program which will be conducted in Japan therefore participants are invited to attend the program with either of "Basic" and "Intermediate" course.

Then, the first-year curriculums were scheduled for 14 days (excluding weekends) for the basic level, and 18 days (excluding weekends) for the intermediate level respectively, while the second-year courses were scheduled for 5 days for both "A" and "B" courses.

2.2. Preparation of General Information

Each year, a draft of the General Information (hereinafter referred to as "GI") to be sent to the counterpart government through the JICA overseas office (or diplomatic mission) was prepared and submitted to the division of JICA headquarters in charge and to Tokyo International Center. Initially, the GIs were submitted four months prior to the start of the seminar in Japan, but in the case of remote seminar, the GIs are submitted three months prior to the start of seminar, as travel procedures are no longer required.

The submission timeline for each year is as follows.

First year: Early September 2019

Second year: Early September 2020

Third year: Early October 2021

2.3. Preparation of Detailed Seminar Plan

About a month and a half before the start of the annual seminar, the seminar objectives, seminar items, implementation methods, lecturers, places to visit, and time, etc. were discussed with JICA and Tokyo International Center. In addition, the seminar curriculum, schedule, etc. were compiled and submitted as a detailed seminar plan (draft). The draft seminar plan was submitted in the format provided by JICA. The actual results for each year are shown in the following table of the original version; table 2-6, table 2-7, table 3-9, table 3-10, table 4-9, table 4-10.

2.4. Advice on Participant Selection

JICA Tokyo International Center, which has jurisdiction over the implementation of the seminar, provided advice on selection based on the list of applicants organized into a list of candidates and the

application documents provided.

Ability to Attend Seminar

To confirm that the participants were able to complete the seminar, the following two checks were made.

■ People who can obtain support from the department in charge of road maintenance

The three reports for the seminar should be submitted "Country Report", "Road Asset Management" Achievement Assessment", and "Action Plan". All of them require accurate knowledge and understanding of a wide range of road maintenance, inspection, and organization systems, so it is especially important to have the support of the road department of the participant's country to update the participants on the latest situation. Basically, the decision was made based on the CV with respect to the applicant's affiliation with a road department or having experience in road maintenance related career.

■ Language skills

Since there will be group work such as active learning, the secretariat placed importance on writing and speaking skills and made recommendations based on the English descriptions in the application forms submitted by the applicants themselves.

Table 2-1 shows the selection and attendance of participants for each year, and Table 2-2 shows the participation of participants by country and course.

In terms of courses, there are few participants from Asian countries after the second year, when seminar is conducted by region and remotely, while there is constant participation from African countries.

Table 2-1 Participant Selection and Attendance

	2019		2020		2021	
	Basic	Intermediate	A	B	A	B
Application	16	14	7	13	9	12
Recommendation	14	13	7	12	8	12
Decision	14	13	7	12	9	12
Participation	14	13	6	10	8	12
Remarks		In addition, one long-term participant (foreign student) participated.	One participant did not participate.	Finally, two participants did not participate. In addition, 3 long-term (international) students participated.	One participant did not participate due to COVID-19.	One participant abstained in the middle of the program.

Table 2-2 summarizes of participants by country and by course. A total of 60 participants from 29 countries participated in seminar courses conducted over the past three years, for a total of 41 countries.

In terms of the total number of participants by country, the Philippines had the largest number with 6, followed by Mozambique with 5, Cambodia and Zambia with 4. 3 participants were sent from 3 countries and 2 from 10 countries. 2 countries, the Philippines and Ghana, participated for 3 consecutive years out of the 3 years, and 9 countries participated for 2 years. The number of countries that have participated in the program in the past two years was nine.

The largest number of participants applied/participated in the seminar was when it was held in Japan, followed by the third year when the seminar was extended from 5 days to 8 days while being conducted remotely. It can be inferred that the more lectures are given in this seminar program, whether face-to-face or remotely, the better the number of participants.

The participants by country, in terms of number of people, was highest in the African region (57%), followed by Southeast Asia (32%), indicating a high interest in road asset management in the African region. Figure2-1 shows the distribution of dispatched countries.

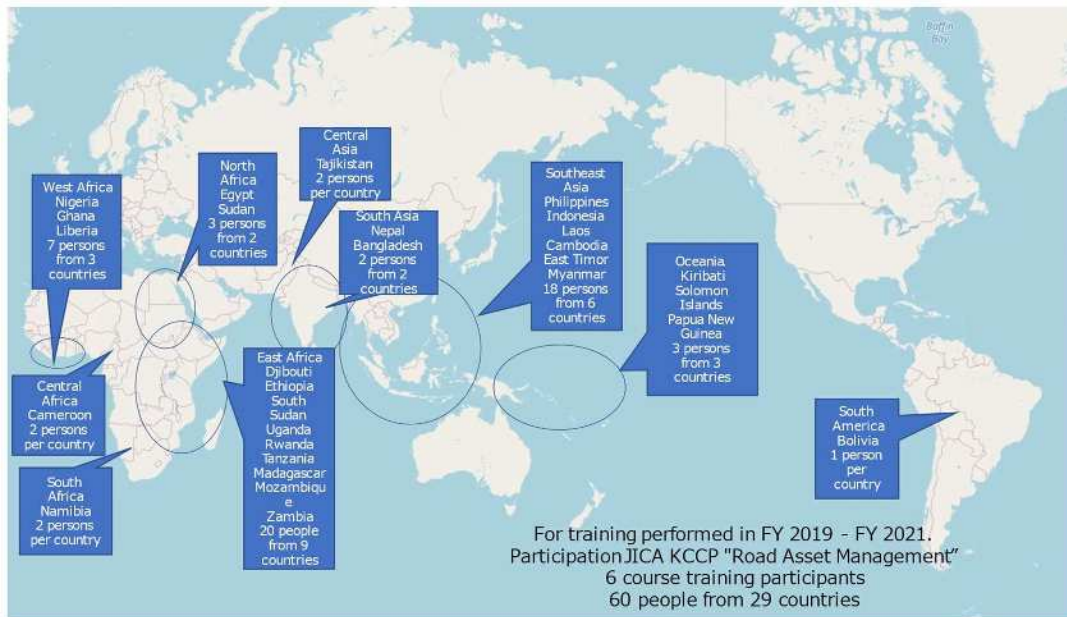


Figure 2-1 Dispatch of Participants

Table 2-2 Participants' Participation by Country and Course

Area	Country	Fiscal Year 2019		FY2020		FY2021		Participants Country Total
		Basic	Intermediate	A	B	A	B	
South America	Bolivia		1					1
Pacific Island countries	Kiribati	1						1
	Solomon Islands	1						1
Southeast Asia	Philippines		1	2		3		6
	Indonesia			2				2
	Cambodia		2			2		4
	Laos					3		3
	Papua New Guinea	1						1
	East Timor		1	1				2
	Myanmar	1						1
South Asia	Nepal				1			1
	Bangladesh		1					1
central Asia	Tajikistan		1		1			1
Africa	Egypt					2		2
	Ethiopia		1			1		2
	Sudan				1			1
	South Sudan					1		1
	Djibouti	1						1
	Uganda				1			1
	Rwanda	1			1			2
	Tanzania				1			1
	Madagascar	3						3
	Mozambique		3				2	5
	Zambia		2				2	4
	Namibia	1					1	2
	Cameroon				2			2
	Nigeria	2						2
	Ghana		1		1		1	3
Liberia				1		1	2	

Number of countries dispatched: 29	Number of participants by course	12	14	5	10	8	11	60
	Number of Countries sending participants by Course	9	9	3	9	3	8	41

2.5. Country Report

The country report was prepared and submitted in written form at the time of application, and those participating as participants were asked to prepare a PowerPoint presentation based on the country report.

A summary of the preparation is as follows.

Table 2-3 Country Reporting Summary

Proposer	Submission details	Format and number of sheets	Submission Deadline
All applicants	Country Report	About 5 MS-Word pages	time of application
Students only	Country Report Presentation Materials	MS-PowerPoint about 15 pages	Approximately one week prior to the start of the seminar

In addition, the description shall, in principle, cover the following items.

① Basic Information (Participant Information)

Name, e-mail address, country, name of organization, position or title, educational background, work experience in the road sector, work experience in the road maintenance sector

② Organization Profile

Organization name, number of people in the organization, maintenance budget (in dollars, for the year in question through the past three years), and organizational chart

③ Current Status and Issues in Maintenance and Management

Map of road network under jurisdiction, managed extensions (by road standard and pavement type), status of bridge assets, current status of maintenance management in pavements and bridges, and maintenance management issues

The deadline for submission of the PowerPoint presentation, which is intended for participants only,

is one week prior to the start of the seminar, but the reality is that the submissions are not always received. Especially when the seminar was conducted by remote, some of participants did not submit submissions by the due date. In particular, it was difficult to confirm that the required information was included, and the secretariat requested that additions and corrections be made when the action plans were submitted. In the second session of the third year, a remote orientation was held for a small number of participants in advance of the seminar, and a briefing session was held to explain the policy for preparing country reports and other documents to be submitted as well as the implementation of the seminar. Although some of the participants were apprehensive about the remote seminar, JICA's evaluation of the seminar was positive. The secretariat believes that such advance notice is important for remote seminars, especially when output is required or when group work is required while remote.

3. Seminar Contents

3.1. Seminar Activities

Seminar periods for each year are listed below.

Table 3-1 Course Period

Year	Course	Period
First year	Basic	January 14-January 31, 2019
	Intermediate	February 25-March 17, 2019
2nd year	Course A	January 19-January 26, 2020
	Course B	March 2- March 8, 2020
3rd year	Course A	January 17-January 26, 2021
	Course B	February 21-March 3, 2021

The following is a summary of the first year and third year of seminars.

The curriculum is the same for the second-year A and B courses and the third-year A and B courses, respectively.

《Seminar in Japan》

1st year, Basic

[Lecture]

- Week 1: Maintenance of Expressway
- Week 2: Bridge maintenance management and human resource development system
- Week 3: Lecture on methods of organizing inspection data

[Exercises]

- Week 2: At Nagasaki University, practical exercises on inspection techniques using the practical facilities at the university and practical exercises to inspect actual bridges.
- Week 3 Perform bridge DB analysis using Excel.

[Technical visit]

- Week 1 Observation of actual concrete slabs and pavement model structures at Community Center Kawasaki, a public relations facility of NEXCO Central Japan, Kawasaki expressway Operation Center, and seminar facilities of Central Nippon Highway Engineering Co., Ltd.

[Presentations]

- Country report presentation: Participants are asked to prepare a report according to a predetermined format in advance and give a 10-minute presentation to explain the status of maintenance and management in their country.

- Road Asset Management Achievement Evaluation: Using the 5-level achievement evaluation sheet currently being used in RAMP support operations, the status of road asset management in the participants' own countries was evaluated, and the causes and reasons for high and low scoring items were analyzed and presented.
- Action Plan Presentation: As with Country Report, prepare a report in advance according to the prescribed format, give a 10-minute presentation, and set 3 items that you should do upon your return to your home country.

1st year, Intermediate

[Lecture]

- Week 1 Maintenance of bridge and road
- Week 2 Use of data for management of structural objectives and bridge inspection
- Week 3 Mid- to long-term budget planning
- Week 4 Lecture on maintenance and management of expressway

[Exercises]

- Week 2 Exercises on inspection of structures at N²U Bridge on a visit of the Nagoya University campus, data tabulation, analysis and graphing using Excel by Associate Professor Nagai (the University of Tokyo), and exercises using QGIS software, which is free software.

[Technical visit]

- Week 1: Demonstration of drone inspection technology for the Kakamigahara Bridge, inspection of long span bridges in jurisdiction of NEXCO-Central, and inspection of the Nagoya Daini-Kanjo (2nd Ring Route) expressway construction project

[Presentation]

- Country Report Presentation: As in the Basic Course, participants are required to prepare a report in advance according to the prescribed format distributed prior to their arrival in Japan. Presentation using the PowerPoint presentation materials prepared in advance, explaining the current status of infrastructure development in their countries.
- Road Asset Management Achievement Evaluation: Using the 5-level achievement evaluation sheet currently being used in RAMP support operations, the status of road asset management in the participants' own countries was evaluated, and the causes and reasons for high and low scoring items were analyzed and presented.
- Action Plan Presentation: Due to the shortened seminar period caused by COVID-19, the Action Plan Presentation was cancelled, and the participants were asked to submit their pre-prepared presentation materials.
- The schedule was originally planned to last until March 19 (Thursday), but the schedule was suddenly revised, and the NEXCO-Central facility inspection and site visit were

cancelled during the final week, and the Action Plan presentation meeting was not held.

《Online Seminar》

Second and third year (common to both A and B courses)

[Lecture]

- Week 1 In addition to an overview of road asset management, bridge maintenance and other bridge-related inspection, diagnosis, and repair plans, as well as the status of local government maintenance and management efforts and analysis of issues for creating action plans.
- Week 2 Knowledge Transfer for Road Asset Management, Introduction to Pavement Maintenance and Management, Pavement Maintenance and Repair, Introduction to JICA Technical Cooperation Project "Road and Bridge Maintenance and Management Capacity Building Activities".

[Exercises]

- Week 1 Problem Analysis exercise to create an action plan.

[Presentations]

- Country Report Presentation: As in the Basic Course, participants are required to prepare a report in advance according to the prescribed format distributed prior to their arrival in Japan. Using the PowerPoint presentation materials prepared in advance, participants explain the current status of infrastructure development in their countries.
- Road Asset Management Achievement Evaluation: Using the 5-level achievement evaluation sheet currently being used in RAMP support operations, the status of road asset management in the participants' own countries was evaluated, and the causes and reasons for high and low scoring items were analyzed and presented.
- Action Plan Presentation: As with the Country Report, prepare a report in advance according to the prescribed format, give a 10-minute presentation, and set 3 items that participants should practice in their own country.

The detailed schedule for each year is shown in the below part of the original version.

First year: Chapter 2 Table 2-6 and 2-7. Detailed seminar plan (actual version)

Second year: Chapter 3 Table 3-9 and 3-10. Detailed seminar plan (actual version)

Third year: Chapter 4 Table 4-9 and 4-10. Detailed seminar plan (actual version)

(1) Curriculum

The standard curriculum for this seminar program does not exist due to changes in seminar methods (from seminar in Japan to remote seminar) and changes (extension) of the seminar period for remote seminar due to COVID-19.

1st year, Basic

Style	Activity	Contents
Lecture	Maintenance on Expressways	Understand the institution and systems required for management of maintenance, which covers the series of steps from inspection to repair work to recording.
Lecture	Road Asset Management Human Resource Development Case Study	Acquire knowledge of maintenance management implementation systems and programs
Lecture	Road and Bridge Maintenance in Nagasaki	Understand the current status and issues of maintenance management through Japanese case studies
Lecture	Maintenance of concrete bridges	Overview of deterioration and causes, inspection and diagnosis, repair, and reinforcement of concrete structures - Understand basic maintenance and management related to concrete bridges
Exercise	Maintenance of concrete bridges	Understand basic maintenance and management related to concrete bridges - Concrete Structure Inspection Exercise
Lecture	Maintenance of steel bridges	Cases of steel bridge deterioration and their causes, inspection and diagnosis of steel structures, overview of repair and reinforcement of steel bridges - understanding of basic maintenance and management related to steel bridges.
Exercise	Maintenance of steel bridges	Steel Structure Inspection Exercise - Understand basic maintenance and management related to steel bridges
Lecture	Bridge Inspection and Diagnosis	Key Points for Bridge Inspection and Diagnosis - Understanding Basic Inspection and Diagnostic Techniques
Exercise	Bridge Inspection and Diagnosis	Bridge Inspection Exercise Preparation, Bridge Inspection Exercise I (steel bridges), Bridge Inspection Exercise II (concrete bridges) - Understand basic inspection and diagnosis techniques

Exercises	Evaluation of bridge integrity (Nagasaki Prefecture method)	Understand the evaluation process from inspection to diagnosis - Understand the need and concept of road asset management
Exercises	Estimated repair cost of bridges (Nagasaki Prefecture method)	Implement budget plan based on evaluation results - Understand the need and concept of road asset management
Lecture	Structure Management	Case studies from the Ministry of Land, Infrastructure, Transport and Tourism and the City of Niigata - Understand the current status and issues of maintenance management through Japanese case studies
Exercises	Inspection Data Analysis Flow	General description of the analytical method - Understand the sequence of steps for inspection data analysis
Exercises	Inspection data organization	Data analysis, graphing, etc. using Excel - Utilize sample data and perform actual analysis
Discussion/ Exercises	Country Report Finalization	Review the status and issues of road asset management in the country where the participants are dispatched and identify and finalize any shortcomings.
Discussion/ Exercises	Conducting achievement evaluations	Quantitatively evaluate the implementation status of road asset management in the country where the participants are dispatched, objectively understand the situation in their own country, analyze causes, examine issues, and consider areas for improvement
Presentation / Discussion	Presentation of achievement evaluation	Based on the above analysis, presentations on the highest and lowest achievement statuses in the countries where the participants were dispatched will be made on the analysis of causes, issues to be considered and points to be improved, and questions will be asked to share and deepen understanding of the issues.
Discussion/ Exercises	Creating an Action Plan	Set up three items in advance according to the prescribed form, including issues in the country where the participant will be sent, and what the participant should do after returning home.
Presentation/ Discussion	Presentation of Action Plan	Present the above action plan and discuss it with other participants and the seminar organizers to improve a participant's own action plan.

1st year, Intermediate

Style	Activity	Contents
Lecture	ME (Maintenance Expert) System and Road Asset Management Overview	Understand the flow of maintenance management through the ME system
Lecture	Management of Structures (1)	Lecture on overall maintenance management from diagnosis of damage to repair work - Deepen understanding of the need to establish a maintenance management cycle
Discussion	Management of Structures (2)	Q&A and exchange of opinions based on the above lecture
Lecture	Inspection data organization (1)	Overview of analytical methods - understand the sequence of steps in inspection data analysis
Exercises	Inspection data organization (2)	Data analysis and graphing using Excel - utilize sample data and perform hands-on analysis
Exercises	Inspection data organization by GIS	Using GIS to Visualize Inspection Data - Understand how to visualize inspection data using GIS
Lecture	Medium- to long-term budget planning ①.	Outline the analytical methodology - Understand the sequence of steps in mid- to long-term budget planning
Exercises/ Discussion	Medium- to long-term budget plan (2)	Data analysis, graphing, etc. using Excel - Actual analysis using sample data - Presentation of results
Lecture	Structural Maintenance Technology	Overview of the Structural Maintenance Technology Center and its initiatives - Understanding structural management through Japanese case studies
Lecture	Maintenance on Highways	Understand the structure and systems required for highway maintenance management
Inspection	Large-scale renewal Site visit	Understand the structure and systems required for highway maintenance management
Inspection	Kakamigahara Ohashi Site visit Bus required	Understand bridge inspections utilizing drones and other equipment. Kakamigahara Ohashi Project
Inspection	Site visit to N2U-Bridge	Observation of inspection exercise facility using full-scale bridge models jointly operated by NEXCO-Central, Central Nippon Highway Engineering Nagoya Co., Ltd and Nagoya University
Discussion	Country Report Finalization	Confirm the status and issues of road asset management in participant's country, participants

		will identify and finalize any shortcomings with lecturers.
Discussion/ Exercises	Conducting Achievement Evaluations	Quantitatively evaluate the implementation status of road asset management in participant's country, objectively understand the situation in their own country, analyze causes, examine issues, and consider areas for improvement
Presentation/ Discussion	Presentation of Achievement Level Evaluation	Based on the above analysis, presentations on the highest and lowest achievement statuses in the participant's country will be made on the analysis of causes, issues to be considered and points to be improved, and questions will be asked to share and deepen understanding of the issues.
Discussion/ Exercises	Creating an Action Plan	Set up three items in advance according to the prescribed form, including issues which the participant should practice after returning home.
Presentation/ Discussion	Presentation of Action Plan	Present the above action plan and discuss it with other participants and the seminar organizers to improve participant's own action plan.

2nd and 3rd year

Style	Activity	Contents
Lecture	Introduction to Road Asset Management	Comprehensive understanding of road asset management in Japan, including its overview, approaches, and systems for inspections, etc.
Lecture	Introduction to Bridge Maintenance and Management	Lecture on overall maintenance management from inspection to diagnosis and repair work - Deepen understanding of the need to establish a maintenance management cycle
Lecture	Bridge maintenance and repair	Deepen understanding of basic inspection, diagnosis, and repair planning for steel and concrete bridges
Lecture	Bridge Maintenance and Management Initiatives in Local Governments	Introduction of collaborative efforts by local governments and universities to train and secure inspection experts

Lecture	Problem Analysis	To deepen the understanding of systematic thinking regarding the analysis of the situation and planning of (counter)measures to solve problems in creating an action plan through small exercises using the flow software.
Lecture	Introduction to Inspection and Diagnosis	Introduce structural inspection techniques and gain an understanding of the advantages of these inspection techniques and their combination with diagnostic methods
Lecture	Knowledge Transfer for Road Asset Management	Deepen understanding of how to effectively communicate the seminar findings within the organization
Lecture	Introduction to Pavement Maintenance	Develop an understanding of the fundamentals of design, inspection, diagnosis, and maintenance and repair of pavements
Lecture	Pavement maintenance and repair	To deepen technical knowledge of pavement rehabilitation and understanding of pavement construction in Japan, including the state of recycling of generated materials
Lecture	JICA Technical Cooperation Project "Road and Bridge Maintenance and Management Capacity Building Activities	Introduction of JICA technical assistance projects. Deepen your understanding of what can be achieved through technical assistance projects.
Discussion /Exercises	Country Report Finalization	Review the status and issues of road asset management in the country where the participants identify and finalize any shortcomings.
Discussion /Exercises	Conducting achievement level evaluations	Quantitatively evaluate the implementation status of road asset management objectively understand the situation in their own country, analyze causes, examine issues, and consider areas for improvement
Exercises	Problem Analysis	Confirmation of issues, clarification and finalization of shortcomings

Presentation /Discussion	Presentation of Achievement Level Evaluation Results	Based on the above analysis, presentations on the highest and lowest achievement statuses of the participants' country will be made on the analysis of causes, issues to be considered, points to be improved, and questions will be asked to share and deepen understanding of the issues.
Discussion /Exercises	Creating an Action Plan	Set up three items in advance according to the prescribed form, including issues in participant's country what the participant should practice after the seminar.
Presentation /Discussion	Presentation of Action Plan	Present the above action plan and discuss it with other participants and the seminar organizers to improve participant's own action plan.

3.2. Lectures, Exercises and Observation

[Lectures]

Due to COVID-19, for the three years from 2019 to 2021, the first year of the seminar was conducted in Japan, but the second year was the remote seminars, which the secretariat had no experience with. The third year will be the remote seminar as well, so the curriculum and schedule was a trial from the second year onward.

The initial concept of this seminar course was to conduct it by proficiency levels, basic and intermediate, with the basic level focusing on understanding road asset management and acquiring basic skills based on theory, hands-on experience, and exercises in the inspection, diagnosis, and repair planning cycle, mainly for structures. The intermediate level focuses on acquiring the basic skills to utilize and analyze the obtained data, and to formulate and implement deterioration forecast and long-term repair plans to maximize the service life and level project imbursements over years.

In the second year, the seminar was changed to a remote seminar program, and the following lectures and presentations were held as a curriculum of about 4 hours over 5 days. The seminar was lecture-based, and participation was spread over a wide range of time zones.

- ① Introduction to Road Asset Management
- ② Introduction to Bridge Maintenance and Management
- ③ Maintenance and repair of steel bridges
- ④ Maintenance and repair of concrete bridges
- ⑤ Bridge Maintenance and Management Initiatives in Local Governments
- ⑥ Introduction to Inspection and Diagnosis
- ⑦ Knowledge Transfer for Road Asset Management

- ⑧ Pavement maintenance and repair
- ⑨ Introduction to Pavement Maintenance

Lectures ⑦ to ⑨, which are not included in the first year seminar (seminar in Japan), have been added from the second year seminar. Since remote seminar does not offer the same opportunities for exercises and drills as the seminar held in Japan, lectures on pavement-related topics have been added to provide a broader perspective on road asset management, while lectures on "Knowledge Transfer for Road Asset Management" have been added to provide useful knowledge in communicating information and findings obtained in the seminar as part of human resource development. Knowledge Transfer for Asset Management" lecture was added to provide useful knowledge in communicating the information and findings gained from the seminar as part of human resource development.

Furthermore, group work (active learning) consisting of two to three participants was conducted remotely after the lecture, to foster the participants' independence as in the seminar program held in Japan. To exchange opinions and compile presentation materials within a limited time, the secretariat assigned a facilitator to each group and employed Google Slides, which allows multiple participants to write at the same time, to promote efficient group work.

In the third year, the actual seminar period was extended from 5 to 8 days, and lectures are as bellow.

- JICA Technical Cooperation Project "Road and Bridge Maintenance and Management Capacity Building Activities

Furthermore, as exercises, review sessions, and presentations

- ① Road Asset Management Achievement Assessment
- ② Analysis of issues to create an action plan
- ③ Instructional meetings on action plan development

was added.

The achievement evaluation in ① was conducted because it is an evaluation method that will be helpful for participants to objectively evaluate and understand the status of road asset management in their home countries and to take necessary improvement measures, and because it was deemed possible to add it based on the situation in the second year of seminar.

② and ③ can be prepared in consultation with other participants, lecturers, and the secretariat, as the period of the seminar in Japan is long enough for such preparation. However, in the second year, although the plan was explained at the orientation, the participants were not able to fully consult with each other, the lecturers, and the secretariat before creating and presenting the plan. Reflecting on the challenges in improving the plan's maturity, the lecturers suggested additional exercises in problem analysis and instructional sessions. A small-group orientation was provided to all participants prior to the start of the seminar to increase the proficiency of the submissions and to ensure that participants

felt comfortable participating in the seminar. This orientation was well received by the participants, and the secretariat believe it will be an effective way to foster a smooth seminar environment for future remote seminar programs.

3.3. Textbooks, Materials, Submissions, Facilities, and Internet Connection

[Textbooks, Materials and Submissions]

From the second year onward, special consideration is given to the distribution and sharing of textbooks and teaching materials ("teaching materials, etc.") and the handling of submissions.

In addition, Google drive was used to share teaching materials and submissions, eliminating the need for large volume transmission, and to compensate for the drastic reduction in opportunities to promote understanding through mutual assistance, which is common in face-to-face seminars. In addition, Google Slides, which allows participants to simultaneously write and share information, was used for group work from the second year onward to facilitate the smooth progress of the seminar.

In addition, the secretariat making efforts to compensate for the disadvantages of non-face-to-face seminar by recording lectures and providing opportunities for participants to review them.

[Facility]

In the first year, both basic and intermediate courses were held mainly at JICA Tokyo Center. During the period, there were several occasions when they received lectures at the places they visited. Among them, the basic level participants received lectures, practical seminar, and exercises on maintenance and inspection of various types of bridges at Nagasaki University for one week.

Course A for the second year was held in a rented meeting room and the secretariat and JICA staff gathered there. However, course B was held during the nighttime in Japan and meeting rooms could not be rented. As a result, both the secretariat and JICA participated remotely from their own office buildings.

The third-year course followed the same format as the second-year B course.

[Internet Connection]

Since the seminar is basically conducted at JICA regional centers and other facilities, and from the second year onward, participants are required to participate in the seminar in their own countries (at home or at their affiliated institutions), the secretariat paid attention to the Internet connection environment.

In case of communication inconvenience, it was decided to request JICA overseas offices of participant to secure the communication environment in coordination with JICA Tokyo International Center. The

secretariat asked the participants to consult with JICA overseas offices in their countries on how to handle the situation (e.g., rental of a meeting room, Wi-Fi router, etc.), and JICA Tokyo International Center will ask the overseas offices to respond to the consultation.

In fact, the participants reported a concern that the connection environment for participants in Egypt in Course B in the third year was in danger of becoming unusable due to office renovations, and the secretariat reported the concern to JICA Tokyo International Center and coordinated with JICA Egypt office to ask the participants to take action (such as renting a meeting room and lending a Wi-Fi router)

3.4. Participants

[Attendance status]

This time, the second- and third-year participants were able to take the course remotely, so they were able to take the course at their place of work. Although the secretariat basically asks participants to give priority to the seminar during the period, some participants had to attend the course while performing their regular work duties. However, in general, these participants showed a willingness to work while working remotely, and to make efforts such as taking part in the seminar while traveling on business or in the vehicle they were in during the trip.

Participants' questions tended to differ by region, and, remotely, participants from Southeast Asian countries tended to use the chat function relatively casually and ask a lot of questions. Some lecturers expressed dissatisfaction with this tendency and were asked to respond to it. Therefore, the secretariat would sometimes take the time to screen the chat questions, ask the lecturers to answer them, and send the answers to the participants. The participants from African countries were generally restrained in their attitude, asking questions and participating in group work. In many cases, the session proceeded quietly.

3.5. Seminar Outcomes

As described above, the secretariat aimed for a well-balanced seminar program with lectures and practical exercises in the first year, but from the second year onward, the curriculum became a trial-and-error two-year program with remote seminar. Remote seminar inevitably focused on educational content, and the curriculum was not conducive to the practical inspection/diagnosis skills and data-based planning skills that are desired at the basic and intermediate levels. In addition, it cannot be denied that opportunities for guidance and support in the creation of action plans were greatly reduced. In this regard, with the cooperation of the lecturers, the secretariat was able to improve the quality of the action plans by providing opportunities to conduct problem-identification exercises that could be conducted remotely and to provide individual guidance on action plans. At the suggestion of the secretariat, Google Slides software was used for the exercises, which allows participants to write at

the same time in group work, thereby improving efficiency and facilitation.

However, since the road asset management has a strong policy oriented, there were some of participants who proposed to take action on financial matters, which they were not likely to be able to handle themselves. This is a trend that has been observed since the first year of the seminar, but it is likely that some participants are confused by the fact that organizational goals and individual goals exist side by side in the action plan. In the guidance on action plan creation in the subsequent seminar, it is necessary to set up a guidance policy and method for the creation of action plans, with a view to follow-up at the time of review and monitoring, such as how individuals and the organization, as well as only individuals, can contribute to the creation of the action plan.

4. Seminar Activities Ancillary Activities

4.1. Request and coordination of seminar to external organizations

Based on detailed seminar plan prepared for each year, the selection of lecturers, securing of lecturers, and arrangement of sites to be visited were conducted based on the following criteria. For lectures and site visits, the secretariat selected academic institutions, national and other organizations, expressway companies, and construction companies with proven experience in the relevant fields. When organizational arrangements were necessary, the secretariat requested outside organizations (ministries, local governments, universities, and private companies) for practical exercises, etc., and coordinated their schedules.

4.2. Schedule coordination with seminar ancillary programs

In conducting the seminar, JICA Tokyo International Center coordinated the dates and locations for the following programs.

- Briefing (residence procedures)

Only in the first year.

Not conducted after the second year due to remote seminar.

- General orientation

It was not conducted.

- Evaluation meeting and closing ceremony.

The first-year ceremonies, both basic and intermediate levels, were conducted at JICA headquarters. The president of IDI-Japan also participated in both classes.

After the second year, JICA and the secretariat were each held at a remote site.

5. Review and Monitoring Activities

The "review and monitoring" process is the most distinctive feature of the seminar program.

Approximately three months after the seminar, a review step is conducted for each participant in the seminar, followed by monitoring activities for one countries from each courses approximately another three months later. The reviewer will confirm and compare the status of implementation of the action plans and sharing of the seminar contents with colleagues in their countries, etc., and then follow-up activities, such as local seminars, will be planned and implemented to supplement and advise on the results of the seminar program by directly confirming the review results in the monitoring activities.

This monitoring implementation was considerably more irregular than originally planned due to the impact of COVID-19 from the first year. The status of implementation is as follows.

First year, Basic and Intermediate (Basic: Madagascar) , Intermediate: Mozambique)

➔ confirmation of action plan progress, etc. via e-mail only (no travel)

Second year, both A and B courses (A: Timor-Leste, B: Tanzania)

➔ Remote meetings + remote seminar (no travel)

Third year, A and B course is planned for Cambodia and Liberia respectively.

➔ However, since both C/P and JICA Cambodia office were occupied by additional project with financial support, the plan was cancelled.

Monitoring of Liberia was conducted with traveling to the country.

5.1. Review Activities

The participants were requested to respond to the review by filling a standardized review response form. The deadline for responses was two weeks from the date of the request. The response form includes the challenges in road asset management in each participant, the measures indicated, and their three action plans.

5.2. Review Contents

For the review report, a response format was developed, and reports were requested for the purpose of confirming the items listed below.

5.2.1. Progress on the Action Plan (implementation of the three targets by each participant)

In the final stage of their seminar, each participant identified five issues related to roads and bridges in his/her country, including routine maintenance, inspection and diagnosis,

repair plans, repair works, and records, organization, budget planning, systems, and database (DB), and road asset management, as well as the necessary procedures to improve these issues. The short- and medium-term goals are organized into three specific targets. The secretariat also asked for comments on the progress of the action plan, as well as any challenge to its implementation.

5.2.2. Status of sharing of knowledge and findings learned in the seminar

The participants also confirmed the status of sharing in their own countries of the knowledge and know-how gained from the seminar regarding the maintenance and management of road assets.

5.2.3. Other (free opinion)

The secretariat asked each participant for his/her free opinion on the premise that he/she would continue to promote the action plans that he/she had individually developed.

[Status of Review Submission]

The status of responses at the time of the review is as follows.

Table 5-1 Percentage of Three-Year Review Submissions

	course (route, trail, course of action, course of study, plan)	Number of participants	number of countries	Number of submissions	Percentage of submissions
First year	Basic	12 people	nine countries	11 people	92%.
	Intermediate	14 people	nine countries	9 people	64% (%)
Second year	A	6 people	three countries	5 people	83%.
	B	9 people	nine countries	5 people	56%.
Third year	A	8 people	three countries	5 people	63%.
	B	11 people	eight countries	5 people	45%.

In addition, the status of the horizontal development of the Action Plan is as follows.

Table 5-2 Percentage of Three-Year Action Plans Implemented

	course (route, trail, course of action, course of study, plan)	Number of submissions	Number of people who have implemented the program	Percentage of shared implementation
First year	Basic	11 people	11 people	10% (of the total)
	Intermediate	9 people	8 people	89%.
Second year	A	5 people	4 people	80%.
	B	5 people	5 people	100%.
Third year	A	5 people	2 people	40%.
	B	5 people	2 people*	40%.

*One respondent indicated that preparations for sharing were made, but implementation was not possible due to budget constraints.

5.3. Selection of Countries for Monitoring Activities

When selecting the target countries for monitoring activities, the results of the review after the seminar, participants (Selection criteria 1), the implementation status of cooperation in Japan (Selection criteria2), and the implementation status of road asset management in the participating countries (Selection criteria 3) were comprehensively considered, and the results of each of the three selection criteria were reviewed. After consultation with JICA, one country was selected from each of the Basic Course and Intermediate Course, or Course A and Course B, as the target country where the monitoring activities were highly effective.

5.4. Monitoring Activities

Year	Course	Country	Overview of Monitoring Activities
First year	Basic	Madagascar	Method: Confirmation and hearing via e-mail [Activities]
	Intermediate	Mozambique	Checking the progress of the Action Plan Exchange of opinions on the current status and issues in the promotion of national road asset management
Second year	A	East Timor	Method: Confirmation/hearing via e-mail, web conference → remote seminar [Activities] Checking the progress of the Action Plan
	B	Tanzania	Exchange of opinions and advice on the current status and issues in the promotion of national road asset management Remote seminars on road asset management
Third year	A	Cambodia	Method: Web meeting, on-site travel → Preparations were being made with the target participants in coordination with the JICA field office, but after consultation between the JICA field office and JICA headquarters, the program was cancelled.
	B	Liberia	Method: Web meeting, on-site travel implementation [Activities] Checking the progress of the Action Plan Exchange of opinions and advice on the current status and issues in the promotion of national road asset management Confirmation of the current status of road asset management through site visits Joint seminar on road asset management (but Japanese lecturers will participate remotely)

To increase the submission rate of reviews from participants, a common form was created and distributed in a format where only the answers need to be filled out. As a result, the response rate tends to be highest in the first year, and lowest in the remote years. The implementation of sharing with colleagues also tended to be lower, possibly since activities were restricted by the COVID-19 and that

it was difficult to link this to practical actions because it did include only lectures, but not exercises.

In addition, the only monitoring activity that was able to be conducted as initially envisioned in this assignment for 2019-2022 was in Liberia in the third year of the project. The initial meeting with the JICA field office and confirmation of acceptance from the C/P went relatively smoothly, but it took a great deal of time to meet with the participants before departure of monitoring team for preparations and to confirm and finalize the schedule in Liberia. This was partly because the participant had high position and were extremely busy, but also because it took two days to complete one day's worth of communication, by considering the time difference. Considering these factors, the secretariat keenly felt the need to decide on the destination at least three months in advance and begin its coordination.

6. Findings and Precepts

The previous section has outlined the lectures, reviews, and monitoring that have been conducted during the first three years of the seminar program. The secretariat will now describe the lessons learned and findings of the "KCCP: Road Asset Management," which will be continued in the future.

[Seminar program]

Traditionally, face-to-face seminar has been the norm; web meeting has become more common worldwide due to COVID-19, and the seminar is no exception. For this reason, before, Presentation of country reports and other reports were limited so that audiences are only other participants themselves and organizers. However, from now on, the secretariat can expect remote participation of lectures in these presentations as well. This will be mutually beneficial for both the participants and the lecturers, who are aware of the latest issues in the participants' countries, as well as for checking the level of understanding of the lecture content. Not only the presentations, but also the guidance on the preparation of action plans, etc., which was produced in this seminar, can be fully employed in combination with remote participation if only lectures are given. In the future, such a hybrid seminar structure will allow for more flexible management in terms of time and space constraints especially for the lectures.

[Lecture]

Since this seminar is intended for administrative official in engineering, it is important to develop the ability to predict long-term deterioration and implement repair plans with preventive maintenance and leveling of project imbursement at the intermediate and higher levels. In the future, it will be important to develop skills by holding programs similar to this seminar course even in situations such as COVID-19, where face-to-face lectures are not possible due to behavioral restrictions. On the other hand, capacity building must be accompanied by exercises, and remote instruction may cause

communication difficulties. In this regard, it is considered important to reduce the number of groups and coordinate the content of lectures to the level of the participants so that the instruction can be delivered more effectively.

Similarly, as administrative official in engineering, the effective utilization of resources seems to be an important factor. Repair and renewal of concrete structures such as bridges involves a large amount of generated materials, and their utilization and disposal are important issues for the government. It is desirable to add lectures in this seminar program to enlighten participants to understand Japanese approaches and consider measures in their own countries, and to consider the recycling of resources.

Although the focus of the seminar program is on asset management of bridges, there is also a high need for pavements, as evidenced by the post-seminar questionnaire of participants. However, unlike in Japan, pavements in developing countries are mainly made of cold-mix bitumen and DBST, so the content of the lectures needs to be coordinated to developing countries' situation.

[Action Plan]

The Action Plan is the most important deliverable of the seminar and will influence the post-seminar review and monitoring. In the remote seminar, there are few opportunities for the participants to get to know each other or the secretariat and the participants, and it was inevitable that some of the action plans would be unrealistic. It is important to keep in mind that the plan should be developed based on the participant's organizational goals, and how a participant can contribute to the organizational goals and what he/she can do to achieve them. The C/P to which the participant belongs is invested in a construction project, and due to lack of funds, he/she is not able to take care of the maintenance. In several cases, the participants often made suggestions for securing or creating financial resources to solve the financial problems. Although the difficulty in obtaining financial resources is an important factor hindering the progress of road asset management and cannot be denied, the participants are strongly advised to create an action plan based on the understanding that this is management under constrained conditions.