

International Development of Japan's Pavement Technology

Technical cooperation through the development of pavement technical standards in Myanmar



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Introduction

As an example of international development in the field of pavement technology, we would like to introduce a technical cooperation project for Myanmar that has been carried out by Japan Infrastructure Partners (JIP), a non-profit organization, with the full support of the Japan Road Association, using JICA's Grassroots Technical Cooperation Project since 2012.

1. Overview of the project

This project was initiated in 2012 by Japan Infrastructure Partners (JIP) using JICA's Grassroots Technical Cooperation Project, after Mr. U Hanzoo, then President of the Myanmar Engineering Society (currently Minister of Construction of Myanmar), expressed his wish for Myanmar to establish its own pavement technology standards with the cooperation of Japan after participating in the 2011 Road Conference. In Phase 1 of the project, which was conducted from 2012 to 2014, a technical manual was prepared for the pervious macadam construction method, which has been widely used in Myanmar, referring to the simplified pavement guidelines of Japan. In Phase 2, which has been conducted since 2016, a technical manual for so-called high-grade pavements in Japan using heated asphalt mixtures and ready-mixed

concrete produced in plants was prepared. Both manuals have been translated into Myanmar language with high appreciation and expectation from the Myanmar side and printed and bound in parallel with the English text.

In this way, the Japanese technology is fully considered. because of the development of Myanmar's original pavement technical standards, it is expected to make a significant contribution to pavement maintenance and management in Myanmar, which has enormous maintenance needs in the future.

In this project, test paving was carried out in the field based on the contents of each manual. During the test paving, we were able to not only confirm the contents of the manual, but also to conduct effective technology transfer by directly teaching the engineers and workers in Myanmar the rational and efficient methods of quality control, etc., necessary in the respective processes of manufacturing at the plant and construction at the site. Furthermore, during the test paving, it was confirmed that the engineers and workers in Myanmar still lacked basic knowledge. Therefore, although it was not initially planned, we have prepared and handed over to the Myanmar side a construction guide for field engineers (in English), which shows in an easy-to-understand manner, using photographs, etc., the technical items that should be acquired to perform quality control,

verification, and efficient construction at the site. We believe that this guide will be of great help in improving the skills of the engineers in Myanmar.

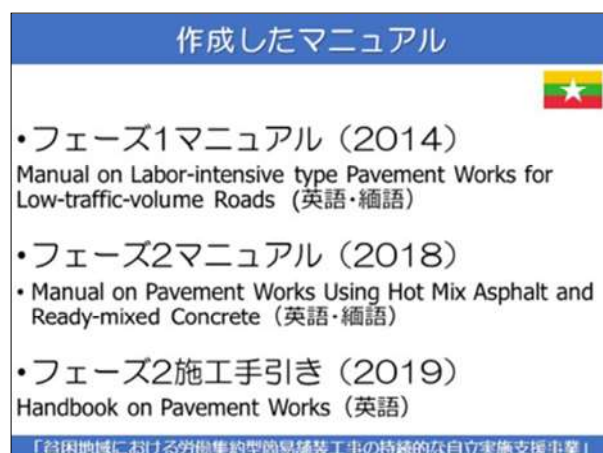


Figure 1 Manuals, etc. created

2. Results of the project

The ultimate objective of this project is to ensure that the pavements in Myanmar will be of high quality in the future by utilizing the pavement technical standards of Myanmar that were prepared under the technical cooperation of Japan.

For this purpose, technical committees were established in Myanmar and Japan, respectively, and the Japanese side first prepared a draft of the technical standards, etc., which were then discussed and examined at a joint technical committee meeting of the parties concerned in both countries, and the results were compiled after adjusting the views of both sides. As a domestic committee in Japan, the Myanmar Road Surface Treatment Technical Committee was established within the Pavement Committee of the Road Association of Japan, and specific work was carried out mainly with the participation of current and former engineers of private pavement companies.

The joint technical committee meetings were held four times in Phase 1 and four times in Phase 2, and in two of these meetings, the main members from Myanmar were invited to Japan and the committee meetings were held in Japan. In two of these meetings, key members from Myanmar were

invited to Japan, and the committee meetings were held in Japan. During these meetings, the committee was able to introduce to Myanmar the advanced pavement technologies developed and introduced in Japan.



Photo -1 The 1st Joint Technical Committee Meeting



Photo 2 Myanmar engineers participating in the Joint Technical Committee Meeting held in Japan

The main results of this project are the preparation of technical standards for pavement in Myanmar and the technology transfer of material preparation, manufacturing, and on-site construction to the field engineers and workers in Myanmar through test paving.

(1) Preparation of pavement technical standards, etc.

Through the sincere discussions of pavement engineers on both sides of Myanmar and Japan throughout Phase 1 and Phase 2, the technical standards for pavements that meet the various conditions peculiar to Myanmar, such as climate, topography, geology, etc., have been developed in the

form of two manuals, making maximum use of the technical knowledge accumulated in Japan in the form of the Simple Pavement Manual, the Asphalt Pavement Manual, and the Cement Concrete Pavement Manual. These two manuals have been prepared in the form of two technical standards for pavements that meet the specific conditions of Myanmar such as climate, topography, and geology. These manuals will be translated into Myanmar language, printed, bound, and distributed widely.

① Results of the manual created in Phase 1

- The design method is the TA-CBR method, which is commonly used in Japan.
- $CBR < 2$ is defined as soft ground, and countermeasures such as improvement are indicated.
- The use of asphalt emulsion, which is not common in Myanmar at present, will be positioned and the amount to be sprayed will be shown in detail to encourage its active use. (In the test pavement, there was a section using asphalt emulsion, and it was understood that there was no problem in serviceability after construction.
- Based on the method used in Japan, concrete measures such as surveying, drainage measures, and road shoulder maintenance are shown.
- The importance of the evaluation of the aggregates to be used and the appropriate adjustment of the particle size is also shown.

In particular, the manual for Phase 1 was used for the paving work conducted by the Myanmar Ministry of Construction after its completion, and 44 miles before and after the section where the test paving was conducted were maintained in two years.



Figure 2: Results of Phase 1 manual development

② The results of the manual created in Phase 2.

The manual prepared in Phase 2 covers the design and construction of As and Co pavements using heated asphalt mixtures or ready-mixed concrete produced at the plant, and the main features are as follows.

- In the case of both As and Co pavements, the importance of quality control at the manufacturing plant is emphasized.
- For As pavements, it is important to ensure the correct aggregate particle size, and in order to properly control the fine particles in particular, a provision for the amount of aggregate passing through a 2.36 mm sieve has been incorporated.
- Describe the points to be considered when constructing As and Co pavements in the field.
- Although not highly necessary in Myanmar for the time being, provisions for modified asphalt will also be described at the strong request of the Myanmar side.

While preparing the manual for Phase 2, it was found that the basic items that the workers at the site should know were not understood, so a construction manual was prepared in English and handed over to the Myanmar side with easy-to-understand explanations using photographs, etc., so that the engineers at the site could easily understand.

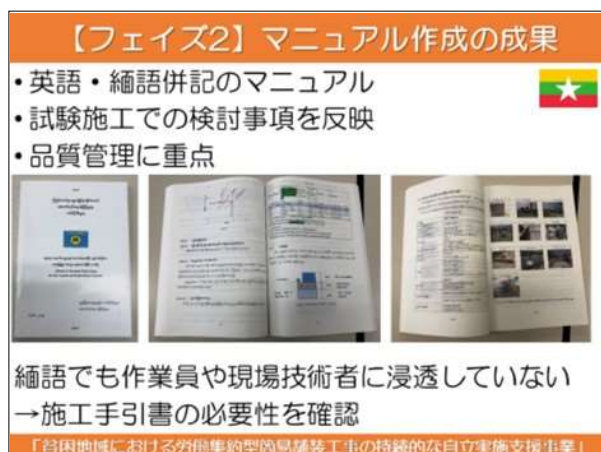


Figure 3: Results of Phase 2 manual development

(2) Technology transfer through test paving

For this project, test paving sites were selected in the Ayeyarwady area, which consists of an alluvial plain at the mouth of the Ayeyarwady River. In Phase 1, Yelegale, and Pyapon in Phase 2.

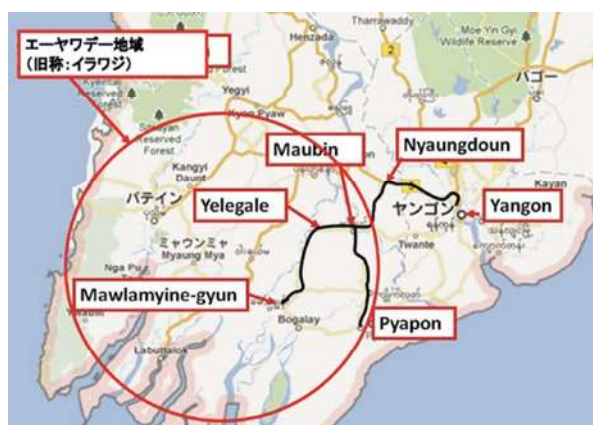


Figure 4 Target area for test pavement

The main items for which the test pavement provided particularly strong guidance were as follows.

○In the test paving, a morning meeting was held every morning for the engineers and workers engaged in the work at the site to share the details of the day's work and to ensure that safety considerations were thoroughly understood.



Photo 3: Reaffirming safety awareness at the morning meeting



Photo 4: "SAFETY FIRST" sign

○In Myanmar, the concept of the planned height was not fully understood, and the necessity of surveying and collaring to set the planned height and how to do it were taught and understood.

○In addition, they were given specific instructions on how to evaluate, properly mix, and adjust the local materials used in the construction of the shoulder, so that they could understand the proper use of the local materials.

○As for the tools used in the field, we tried to use as much as possible those that were available in Myanmar and instructed them to make those that were lacking.

○In the case of construction, the necessity of having a solid construction plan was made clear to the students, and they were instructed at the site on how to make arrangements for efficient and appropriate construction in accordance with the

manual.

○We provided specific guidance on how to check quality after construction at the site.

○In Phase 2, the students were given a solid understanding of the importance of quality control in a plant, as well as a good understanding of how to efficiently handle the main machines such as stabilizers and finishers.

3. Utilization of technical standards and future issues

In Phase 1, the manual for simple pavement was translated into Myanmar language and 1,000 copies were printed and bound, but none of the engineers who gathered at the site during the test paving in Phase 2 knew about the manual. This may be a common occurrence in developing countries, but the results of the hard work are meaningless if they are not used in the actual field.

Therefore, the following two points were strongly requested to the Myanmar side so that the manuals and other documents resulting from this project, including the construction manuals, would be used by the engineers concerned and would be applied to the actual paving work without fail.

① Inclusion in standard specifications

The Ministry of Construction of Myanmar will be requested to refer to the manual prepared this time for construction and quality control of materials in the specifications of pavement works ordered by the Ministry of Construction.

② Application to training for local engineers

From this spring, the Ministry of Construction of Myanmar will set up a training course for the newly developed manual, etc., as part of its existing training program for field engineers, and Japanese experts will provide guidance to the instructors of the course.

The above request was positively accepted at the Joint Technical Committee meeting held in Myanmar

in December last year.

It is hoped that the manuals and other materials resulting from this project will be utilized by pavement engineers in Myanmar and be useful in actual pavement construction sites.

Conclusion.

The results obtained from the new development of Japanese pavement technology in Myanmar introduced here are expected to be steadily utilized for road and pavement maintenance in Myanmar in the future with the understanding and cooperation of the people concerned on the Myanmar side. In addition, during this project, it was strongly felt that the people concerned in Myanmar have great trust in Japanese pavement technology and pavement engineers.

I believe that some members of pavement companies of the Japan Road Association are already developing their business in Myanmar, and some of them may be considering new initiatives in the future. I hope that the trust that Myanmar has placed in Japan, as confirmed by this project, will be used as a springboard for further technology transfer at the private sector level.

Finally, I would like to express my sincere gratitude to those who made various efforts to promote this project. I would like to express my deepest gratitude to the people concerned at the Japan Road Association, JICA, and the Ministry of Construction of Myanmar.

References

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