Japan International Cooperation Agency

THE REPUBLIC OF TAJIKISTAN

THE PROJECT FOR IMPROVEMENT OF ROAD MAINTENANCE

Project Completion Report

December 2016

CTI Engineering International Co., Ltd.

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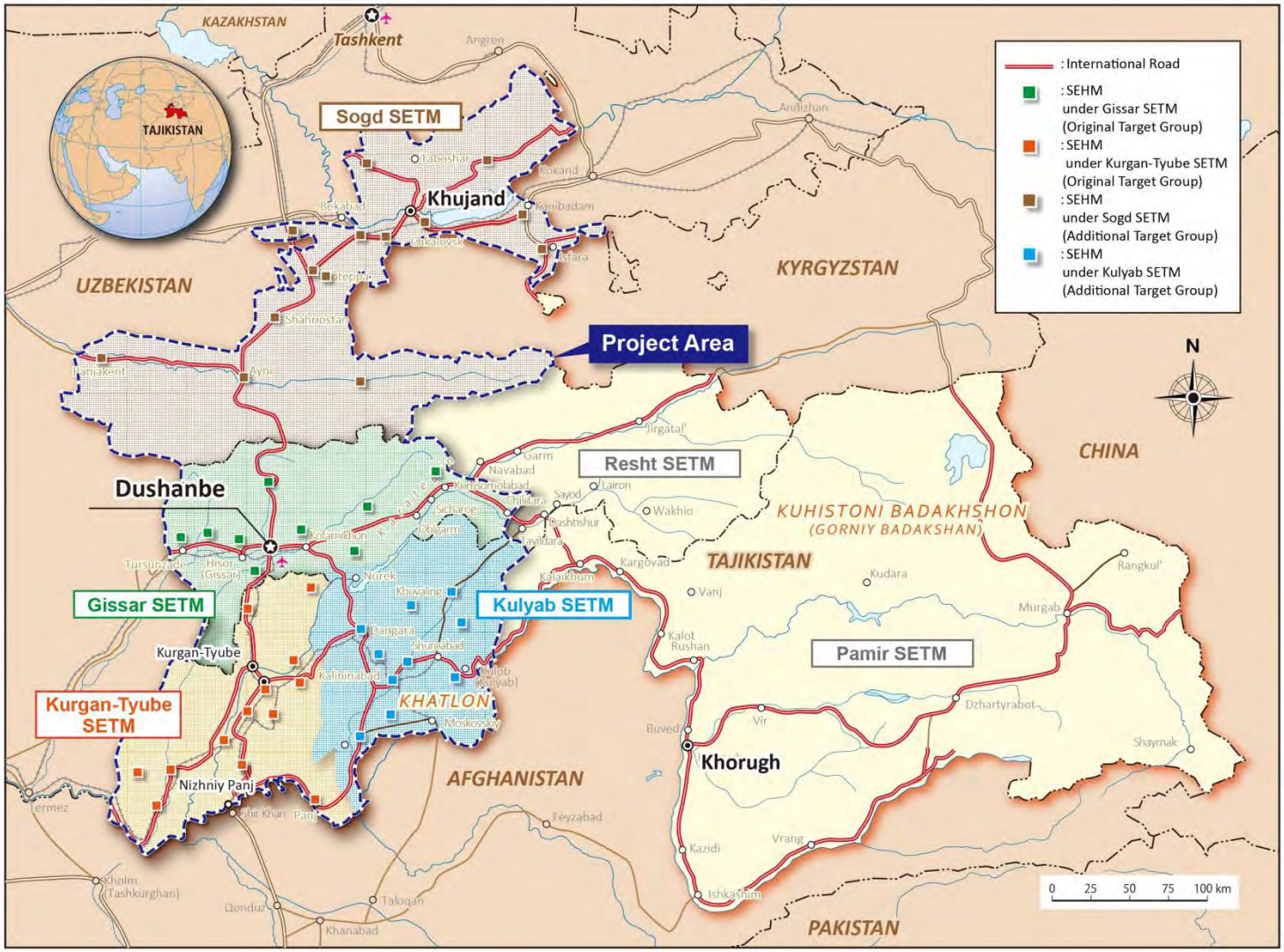

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ABBREVIATIONS

CAREC	Central Asia Regional Economic Cooperation
CP	Counterpart
DRIMS	Dynamic Reaction Intellectual Monitoring System
GDP	Growth Domestic Production
IRI	International Roughness Index
IMF	International Monetary Fund
JICA	Japan International Cooperation Agency
JTEM	JICA Terminal Evaluation Mission
JCC	Joint Coordinating Committee
LSIS	Living Standard Improvement Strategy
MOT	Ministry of Transport
M/M	Minutes of Meeting
NDS	National Development Strategy
ODA	Official Development Assistance
PDM	Project Design Matrix
PO	Plan of Operation
PRS	Poverty Reduction Strategy
RRI	Road Repair Index
RD	Record of Discussion
SETM	State Enterprises on Transport Management
SEHM	State Enterprises for Highway Maintenance

Project Activity Photos

	
Baseline Survey SETM Conditions(2013.12)	Baseline Survey SEHM Conditions(2014.01)
	
1st JCC Meeting (2014.01.08)	Kick-off Seminar(2014.03.27)
	
Pavement Inspection(2014.4)	Qumsangir Bitumen test (2014.05)
	
2nd JCC Meeting(2014.06.05)	Mini-workshop on Pavement Inspection and Repair （2014.08.04-05）

	
JICA Supply handover ceremony (2014 .10.07)	Pilot Project#1 in Gissar SETM (2014.11.03)
	
Pilot Project#1 in Kurgan-tyube SETM (2014.11.13)	The 3rd JCC Meeting (2014.11.26)
	
Inspection and Repair workshop (2014.12.02-03)	Mid Term Seminar (2015.03.11)
	
4th JCC Meeting (2015.03.18)	Flooding in Jilikul Asphalt Plant (2015.07)

	
Quality Control Lab equipment handover (2015.07.29)	5th JCC Meeting（2015.11.24）
	
JTE Kick-off Meeting（2015.12.01）	JTE Site Visit(2015.12.08)
	
6th JCC Meeting (2016.05.24)	Pavement Inspection for Kulyab and Sogd SETMs(2016.06)
	
Quality Control Training（2016.06）	Quality Control Basic Training for Kulyab and Sogd SETMs (2016.07)

	
Bridge overlay （2016.08.10）	Pavement Repair for Kulyab and Sogd SETMs (2016.09)
	
Special Seminar for Tajik Technical University (2016.09.23)	Pavement Inspection and Repair Workshop(2016.09.27-28)
	
Pavement Inspection for Gissar and Kurgan-tyube SETMs	Pavement Repair for Gissar and Kurgan-tyube SETMS
	
Final Seminar (2016.10.13)	7th JCC Meeting (2016.11.22)

1. OUTLINE OF THE PROJECT

1.1 Project Background

Republic of Tajikistan is an inland country surrounded by China, Kyrgyz Republic, Republic of Uzbekistan and Islamic Republic of Afghanistan. Tajikistan has an area of 143,000 sq. km, a population of 7.10 million and a road network of 30,000km. The road network has a vital role for the socio economic growth of the country with 65% of domestic freight and 99% passenger transport relying on roads. Moreover, the north-south international corridor (north is connected to Uzbekistan and south is connected to Afghanistan) and the east-west international corridor (west is connected to Uzbekistan and east is connected to China and Kyrgyz) are a part of the Asian Highway and CAREC Corridor (Central Asia Regional Economic Cooperation Corridor) which is an international corridor for development of effective Asian regional transportation. Because Tajikistan is located in the connective point between the central Asia and the south Asia, construction and maintenance of these international corridors are expected to contribute to the social growth of the whole central Asia countries including Afghanistan. However, the majority of the roads were constructed in the former Soviet Union period and damage from the independent war in 1991 and deterioration by age are evident. Furthermore, road maintenance work by the MOT has always had difficulties to maintain due to insufficient numbers of equipment, engineers and engineering skills. This caused sometimes even the road rehabilitated under the international cooperation suffers from damage and deterioration. Such damaged road results in the increase in transportation cost and travel time, leading to the obstacle for the socio economic growth of Tajikistan.

The road connecting between Dushanbe, the capital, and Nizhniy Pyandzh, the border city between Afghanistan, is one of the most important international roads. The improvement of road maintenance by Gissar State Enterprises for Transport Management (hereinafter referred to SETM) and Kurgan-Tyube SETM as well as offices of State Enterprises on Highway Maintenance (hereinafter referred to as SEHM) who is responsible for the maintenance of the said road under the respective SETM is of utmost importance. Khatlon State is next to Afghanistan which has not only direct influence of Afghanistan but also notes high poverty ratio of 50% comparing to the one in Dushanbe, 19%. As such, stability of Khatlon State is vital, in order to prevent dissemination of disorder to other parts of the society within Tajikistan by the influence of Afghanistan. For such, the road network development of the area connecting Khalton State and Dushanbe is of major importance.

The government of Tajikistan in the National Development Strategy (NDS, 2007) and NDS's mid-term strategy, the Poverty Reduction Strategy, 2010-2012 (PRS, 2010), emphasizes the importance of the international road network development as well as improvement of legal framework of the sector. Also, in the latest mid-term action plan, Living Standard Improvement Strategy (LSIS, 2013), it emphasizes the importance of the socio economic environmental improvement by the transport infrastructure development for regional linkage and improvement of the level of life. As the road sector policy, National Target Development Strategy for Transport Sector of the Republic of Tajikistan to the Year 2025 was prepared in 2011. In the policy it emphasized the importance of the rehabilitation of the deteriorated road built under the former Soviet Union period as well as the damaged road during the civil war.

JICA is promoting rehabilitation of the highway and improvement of road maintenance capacity, following the policy adopted by the government of Tajikistan. Japan's grant aid project rehabilitated 83.6km out of 176.6km between Dushanbe and Nizhniy Pyandzh by (1) Rehabilitation of the road between Kurgan-Tyube and Dusti (Grant Aid 2008) , (2) Phase II Rehabilitation of the road between Kurgan-Tyube and Dusti (Grant Aid 2011), (3) Rehabilitation of the road between Dusti and Nizhniy Pyandzh (Grant Aid ,2006), (4) Phase II Rehabilitation of the road between Dusti and Nizhniy

Pyandzh. Procurement of the road maintenance equipment to Gissar SETM and Kurgan-Tyube SETM has been completed in October 2014 under the project for improvement of equipment for road maintenance in Khatlon Region and Districts of Republican Subordination in the Republic of Tajikistan.

Based on such background the government of Tajikistan requested to the government of Japan the technical assistance for the improvement of the road maintenance involving road inspection and repair skills. According to the request, JICA concluded the scope of works of the project under the pre-study in December 2012, and reached an agreement in June 2013 with MOT thus exchanging the Record of Discussions (hereinafter referred to as the R/D). Based on such agreement, the project is being conducted under the technical assistance scheme with the title of The Project for Improvement of Road Maintenance with the Ministry of Transport together with Gissar SETM and Kurgan-Tyube SETM being designated as the Counterparts (hereinafter refer as the CPs).

1.2 Change of Project Plan

The Project commenced from October 2013 and was progressing smoothly. However, occurrence of major Vaksh River flooding in July 2015 necessitated MOT to utilize the fund allocated for the Project towards recovery works forcing suspension of Pilot Project #2. Under such a circumstance, Output 2 (Project Purpose under version 1 and version 2 of the Project Design Matrix) had become virtually unachievable.

The government of Tajikistan strongly requested for the extension of the Project. In addition, the Evaluation Team of the JICA Terminal Evaluation Mission summarized the above situation as the following;
"The Evaluation Team believes that sustainability of the Project would have been enhanced if engineers from more SEHMs had participated in Pilot Project#2. The Evaluation Team also recognizes that implementation of suspended activities such as Pilot Project #2 is necessary for completion of the technology transfer, which will contribute to enhancement of the sustainability. Therefore, the Evaluation Team reached the conclusion that the extension of the project period is relevant."
Following such a recommendation, JICA initiated in exchanging the Minutes of Meeting (M/M) dated 25 January 2016 amending the contents of the Project originally agreed upon based on the exchange of the Record of Discussion (R/D) dated 3 June 2013. As such, the Project will be implemented taking into consideration such modifications to the Project.

1.3 Objectives of the Project (Original)

(1) Overall Goal

Pavement condition of the international and republican roads under the jurisdiction of Gissar SETM and Kurgan Tyube SETM is improved

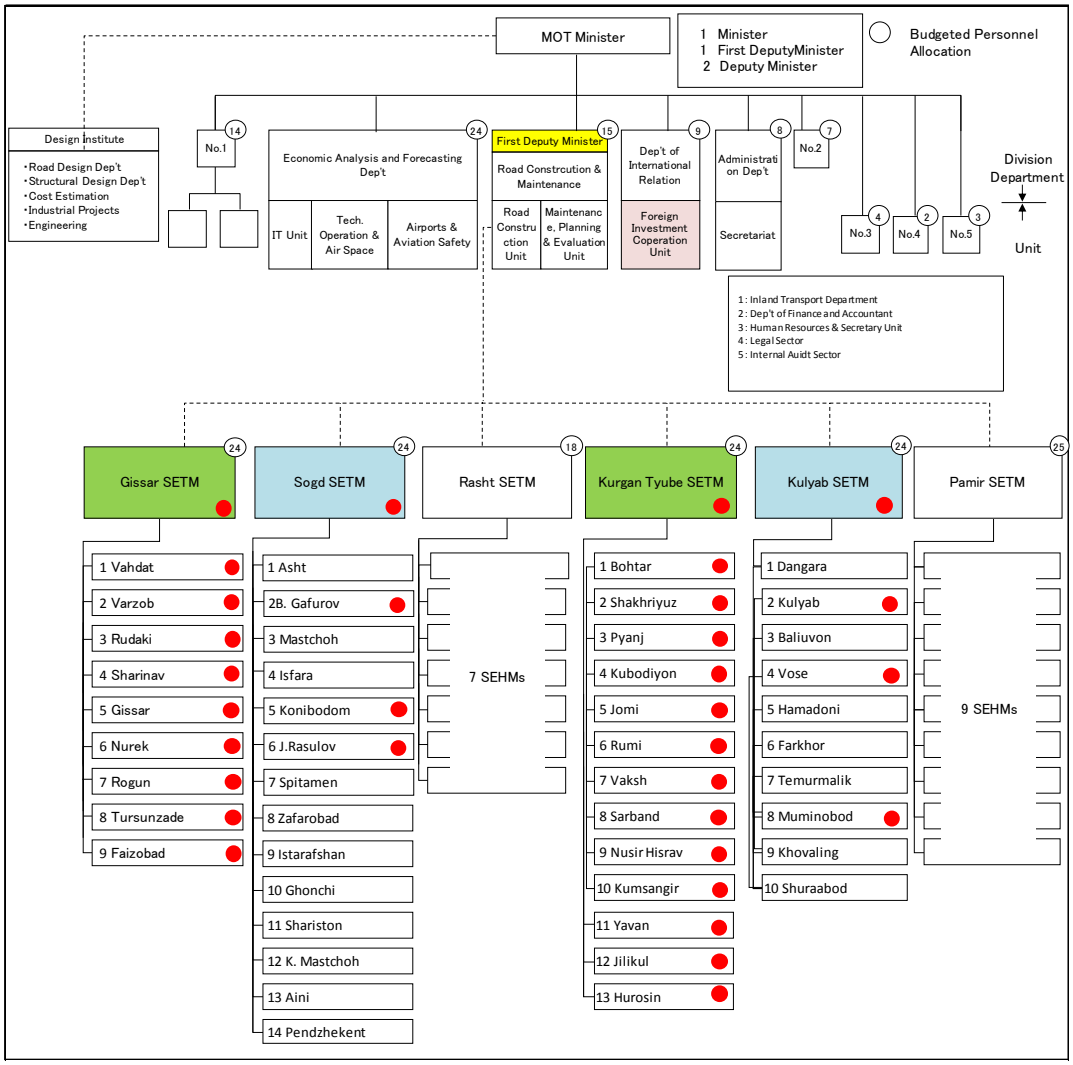
(2) Project Purpose (Project Objectives)

Implementation capacity of Gissar SETM and Kurgan Tyube SETM for road maintenance is improved.

(3) Target Entity

- Ministry of Transport
- Gissar SETM and SEHM under its umbrella
- Kurgan-Tyube SETM and SEHM under its umbrella

Figure 1.3-1 illustrates the organizational structure of Target Entity.



		Gissar SETM	Sogd SETM	Rasht SETM	Kurgan Tyube SETM	Kulyab SETM	Pamir SETM
	Total Km	Km	Km	Km	Km	Km	Km
International	3,339.8	287.2	732.0	299.1	435.2	289.0	1,297.3
Republican	2,140.7	410.2	414.2	174.6	325.8	432.4	383.5
S.Total	5,480.5	697.4	1,146.2	473.7	761.0	721.4	1,680.8
Local	8,665.9	1,213.4	2,306.5	466.2	1,979.3	1,669.3	1,031.2
Total	14,146.4	1,910.8	3,452.7	939.9	2,740.3	2,390.7	2,712.0

Figure 1.3-1 Organization Structure of Target Entity

(4) Target Group

22 SEHMs and 2 SETMs in Gissar and Kurgan Tyube and the Ministry of Transport (MOT) There are 9 SEHMs under Gissar SETM and 13 SEHMS under Kurgan Tyube SETM for maintaining roads.

【Reference】

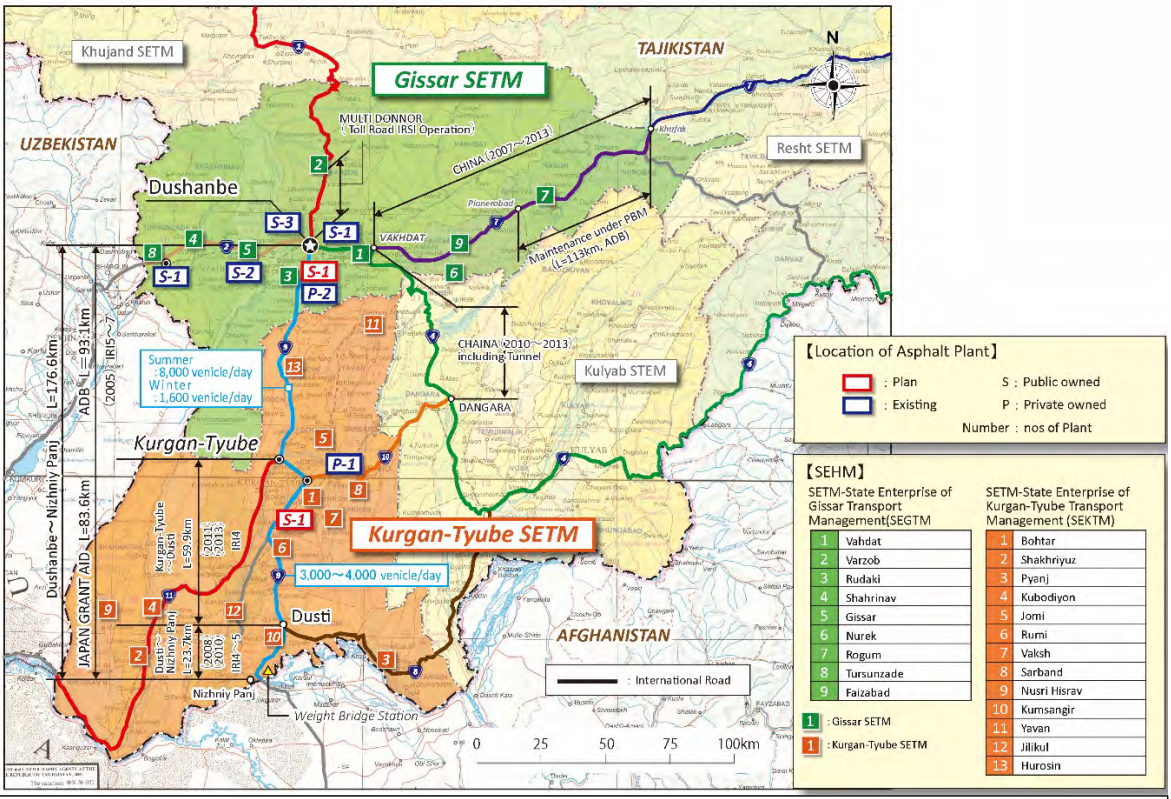
MOT is responsible for the international roads, repub1ican roads and local roads for the total length of 14,146km, which is 47% of the entire national road network. Main Department for Road Construction and Maintenance under the MOT is responsible for the overall road maintenance with key roles for formulation of the road maintenance plan, budget control and procurement management. SETM and SEHM, are the implementation body of the road maintenance. SEHM is also responsible for the inspection and maintenance of road pavement, bridges and road furniture. SETM manages the road maintenance plan and budget control for all SEHMs under its umbrella.

There are six (6) SETMs and sixty two (62) SEHMs in the entire country. The project targets at Gissar SETM and Kurgan-Tyube SETM as well as twenty two (22) SEHMs under them (Gissar 9, Kurgan-Tyube 13).

(5) Target Area

As indicated below in Figure 1.3-2 Gissar and Kurgan-Tyube Road Network and Office Locations, target area of this project is international and republican roads in Gissar and Kurgan Tyube.

There are 9 SEHMs under Gissar SETM and 13 SEHMS under Kurgan Tyube SETM for maintaining roads. The project covers international roads and republican roads. However, SETMs and SEHMs are responsible for maintaining local roads as well.



- Gissar SETM and Kurgan-Tyube SETM and 22 SEHMs under these two (2) SETMs.
- The road network under above mentioned SETMs and SEHMs (International Road L= 722.4km, National Highway (Republican Road)736.0km)

Figure 1.3-2 Gissar and Kurgan-Tyube Road Network and Office Locations

(6) Project Period

October 2013 to May 2016 (32 months of the activity in Tajikistan)

1.4 Objectives of the Project (As Amended)

(1) Overall Goal

Pavement condition of the roads under control of MOT in the target area is improved.

(2) Project Purpose (Project Objectives)

Implementation capacity of Gissar SETM and Kurgan Tyube SETM for road maintenance is improved.

(3) Target Entity

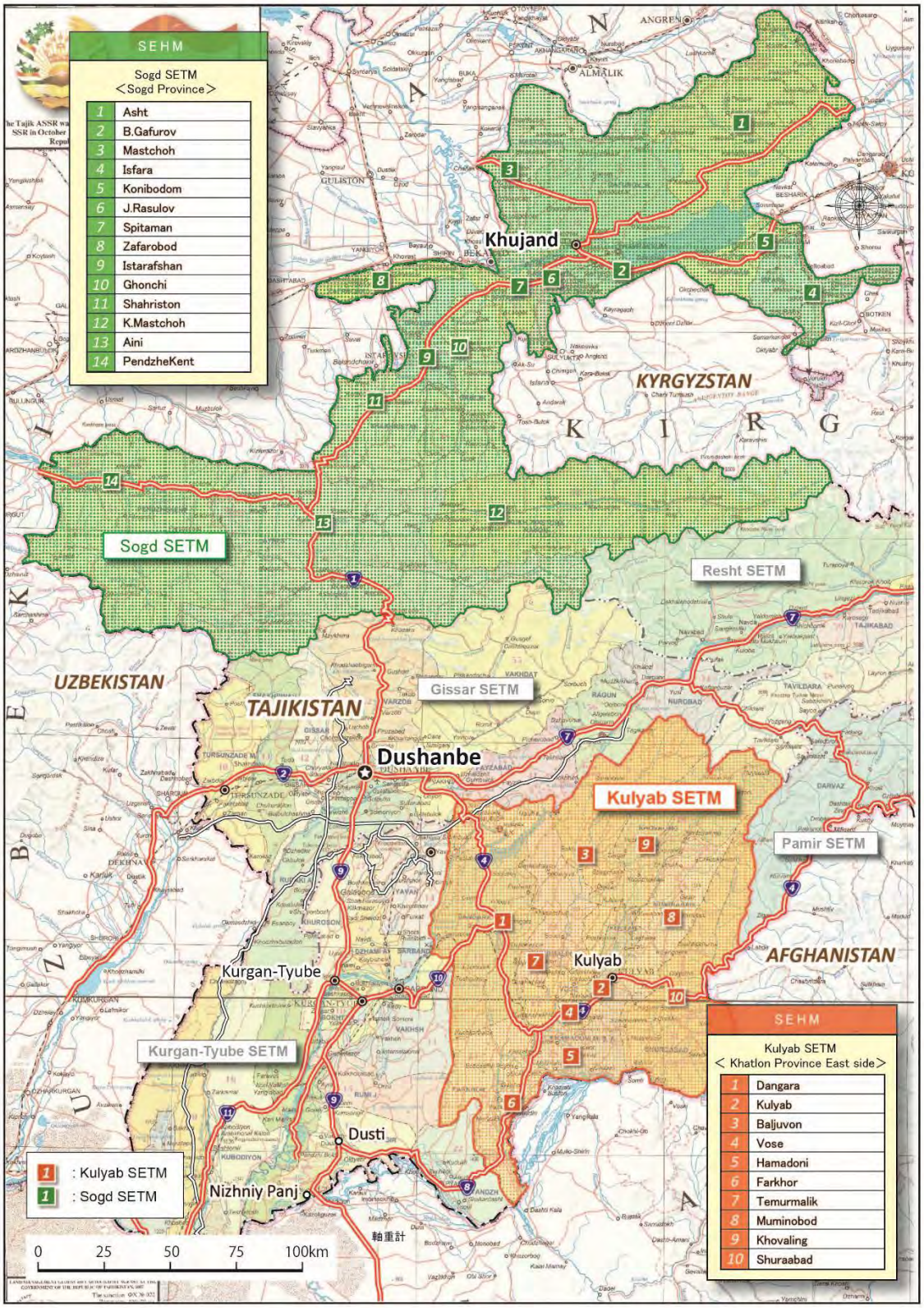
- Ministry of Transport
- Gissar SETM and SEHM under its umbrella
- Kurgan-Tyube SETM and SEHM under its umbrella
- Sogd SETM and 3 SEHMs under its umbrella
- Kulyab SETM and 3 SEHMs under its umbrella

(4) Target Group

22 SEHMs and 2 SETMs in Gissar and Kurgan Tyube and the Ministry of Transport (MOT) (original target group). 6 SEHMs and 2 SETMs in Sogd and Kulyab (additional target group in the extended period). There are 14 SEHMs under Sogd SETM and 10 SEHMs under Kulyab SETM. 3 SEHMs, namely B. Gafurov, J. Rasulov and Kanibadam are selected for Sogd SETM and 3 SEHMs, namely Vose, Kulyab and Muminobod are selected for Kulyab SETM as additional target groups. The project covers international roads and republican roads. However, SETMs and SEHMs are responsible for maintaining local roads as well.

(5) Target Area

International and republican roads in Sogd and Kulyab as indicated below in Figure 1.4-1 were added to the Gissar and Kurgan Tyube (original target area).



- Gissar SETM and Kurgan-Tyube SETM and 22 SEHMs under these two (2) SETMs.
- The road network under above mentioned SETMs and SEHMs (International Road L= 722.4km, National Highway (Republican Road)736.0km)
- Sogd SETM and Kulyab SETM and 3 SEHMs under each SETM.
- The road network under above mentioned SETMs (International Road L=1,021.0km, National Highway (Republican Road) 846.6km)

Figure 1.4-1 Sogd and Kulyab Road Network and Office Locations

(6) Project Period

October 2013 to November 2016 (38 months of the activity in Tajikistan)

1.5 Scope of the Project

(1) General Scope

a) The project will be implemented based on the items stipulated in the R/D signed on 3 June, 2013 and the M/M signed on 25 January 2016.
b) The JICA Experts Team (hereinafter referred to as the Experts) will carry out the project operation based on the Project Purpose and Outputs as indicated hereunder.
c) The Experts will prepare the reports listed hereunder in accordance with the progress of the project and submit these reports after explanations and discussions with the Tajikistan counterparts.

Table 1.5-1 List of Reports and Documents

Item	Submission Period	Copies
Work Plan	January 2014	English : 15 copies of which 10 copies to MOT
Project Implementation Report	5 instances as below: June 2014, December 2014, April 2015, December 2015 and June 2016	English : 15 copies of which 10 copies to MOT
Final Report	December 2016	English : 17 copies of which 10 copies to MOT Japanese : 7 copies CD-R : 2 pieces

(2) Project Design Matrix

The project was implemented according to the agreed Version 3 Project Design Matrix dated 24 May 2016 until the end of the Project. This version was agreed on the 6th JCC Meeting held on the same day reflecting the modifications to the Project. In addition, a further modification was agreed on the 7th JCC Meeting held on 22 November 2016 as Version 4 Project Design Matrix taking into consideration on the project sustainability and emphasis on importance of maintenance of local roads as presented here below. All versions (Version 1,2 3 and 4) are attached as Attachment GP-4.

(3) Outputs

(1) Output 1

Road inspection skills of the target SEHMs are improved.

Activities

1.1 To review the existing Road Inspection Guidelines.
1.2 To revise the Road Inspection Guidelines with the attached Roughness Survey Manual.
1.3 To conduct trainings (in each region) on Roughness Survey for the original target 2 SETMs and 22 SEHMs.
1.4 To carry out Roughness Survey on the roads in the original target area according to the revised Guidelines by the target 2 SETMs in coordination with the original target 22 SEHMs.
1.5 To organize a workshop (in Dushanbe) to summarize the results of Roughness Survey with the original target 2 SETMs, 22 SEHMs and MOT.
1.6 To file the results of Roughness Survey (IRI data) by the original target 2 SETMs in the prescribed form of the revised Guidelines.

1.7 To conduct trainings (in each region) on road inspection according to the revised Road Inspection Guidelines for the original target 2 SETMs and 22 SEHMs.
1.8 To conduct visual inspection on the roads in the original target area at the original target 22 SEHMs, according to the revised Guidelines.
1.9 To revise the Road Inspection Guidelines based on the results of the road inspection works (Act. 1.4 & 1.8).
1.10 To organize workshops (in each region) to introduce the revised Guidelines for the original target 22 SEHMs, 2 SETMs and MOT.
1.11 To conduct road inspection (i.e. roughness survey, including filing results, and visual inspection) in the original target area at the original target 22 SEHMs, according to the revised Guidelines.
1.12 To finalize the Road Inspection Guidelines based on the results of the road inspection works (Act. 1.11).
1.13 To organize workshops (in each original region) to summarize the results of road inspection and to introduce the finalized Road Inspection Guidelines for the target SEHMs, SETMs and MOT.
1.14 To certify Master Trainers for road inspection from the staff of the original target SETMs/SEHMs.
1.15 To monitor and give technical advice on training conducted by the Master Trainers for additional target 2SETMs and 6SEHMs on basic elements of road inspection at the additional target area.

(2) Output 2:

Road repairing skills of the target SEHMs are improved.

Activities

2.1. To review the existing Road Repairing Guidelines.
2.2. To revise the Road Repairing Guidelines to improve pavement maintenance.
2.3. To conduct trainings (in each region) on road repairing according to the revised Road Repairing Guidelines for the original target 22 SEHMs.
2.4. To provide support and advice on planning of the road repairing work #1(in each region) according to the revised Road Repairing Guidelines.
2.5. To implement an on-site technical instruction (in each region) for the road repairing work #1 according to the revised Guidelines at the selected SEHMs from the original target 2 SETMs.
2.6. To analyze the results of the road repairing works #1, such as repairing materials and procedures.
2.7. To revise the Road Repairing Guidelines further based on the results of the analysis (Act. 2.6).
2.8. To organize workshops (in each region) to introduce the revised Guidelines with the original target 22 SEHMs, 2 SETMs and MOT.
2.9. To plan the road repairing work #2 in the original target area by the selected target SEHMs according to the revised Road Repairing Guidelines, reflecting the results of road inspection (Act. 1.8).
2.10. To monitor and give technical advice on the road repairing works #2.
2.11. To finalize the Road Repairing Guidelines based on the results of the road repairing works #2.
2.12. To organize workshops (in each region) to give feedbacks on the results of road repairing works #2, such as repairing materials and procedures, and to introduce the finalized Road Repairing Guidelines for the target SEHMs, SETMs and MOT.
2.13. To carry out training on appointed laboratory technicians from each target SETM to be able to conduct day to day quality control tests at the asphalt plants.
2.14. To assist the original target SETMs/SEHMs in training additional 2 SETMs and 6 SEHMs on basic elements of pavement repair using road repairing works #2 in 2016.

2.15. Certify trainers for specific techniques for road repairing from the staff of the original target SETMs/SEHMs.

(4) Coordination Ministry

Ministry of Transport (MOT)

1.6 Project Schedule

The project follows the project schedule shown below in Figure 1.6-1 in accordance with project modifications as amended by the Minutes of Meeting signed on 25 January 2016. Figure 1.6-2 is the original project schedule.

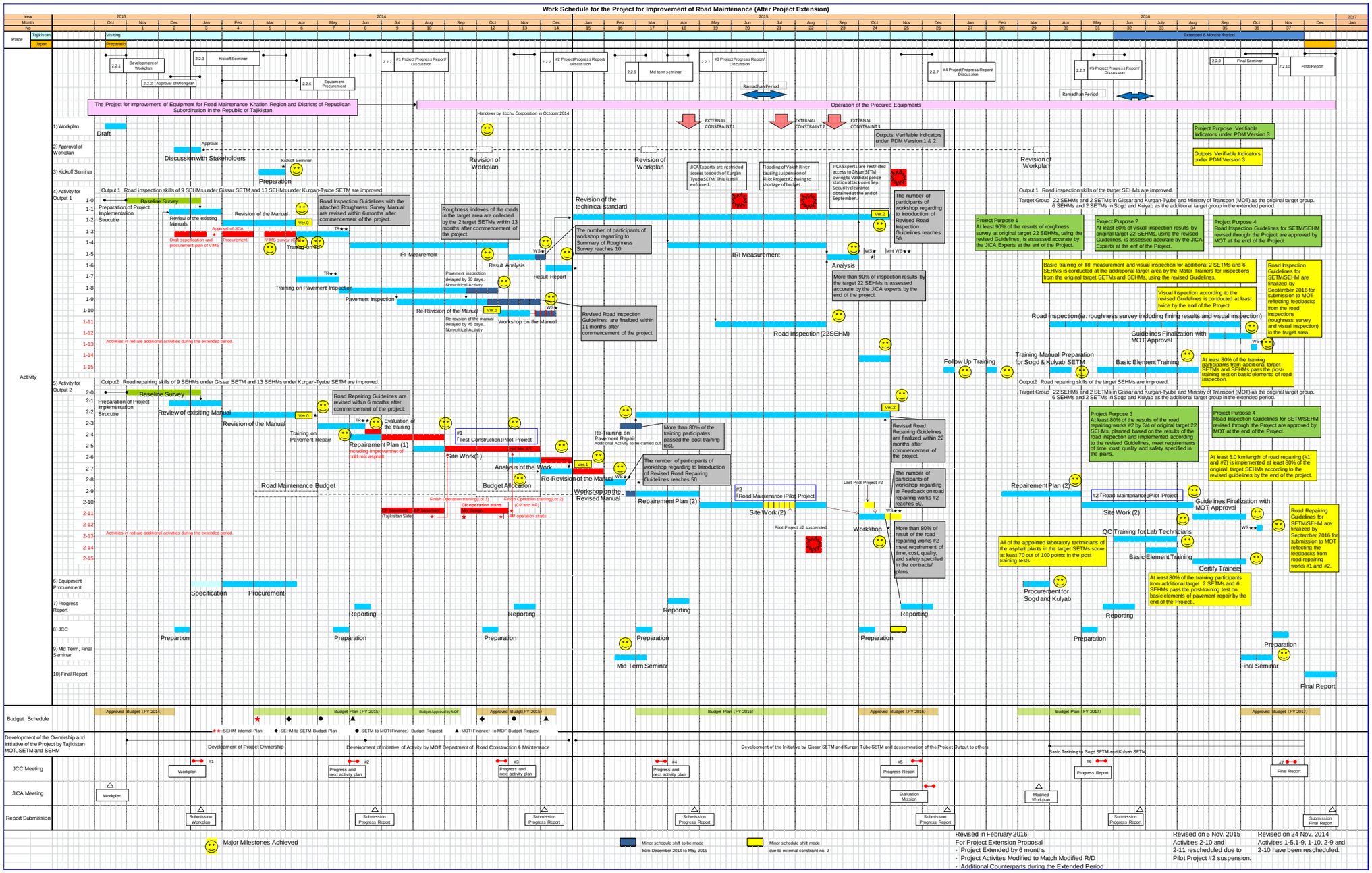


Figure 1.6-1 Project Schedule (current)

The project schedule attached herewith is the original schedule which was used until 5th JCC Meeting held on 24 November 2015.

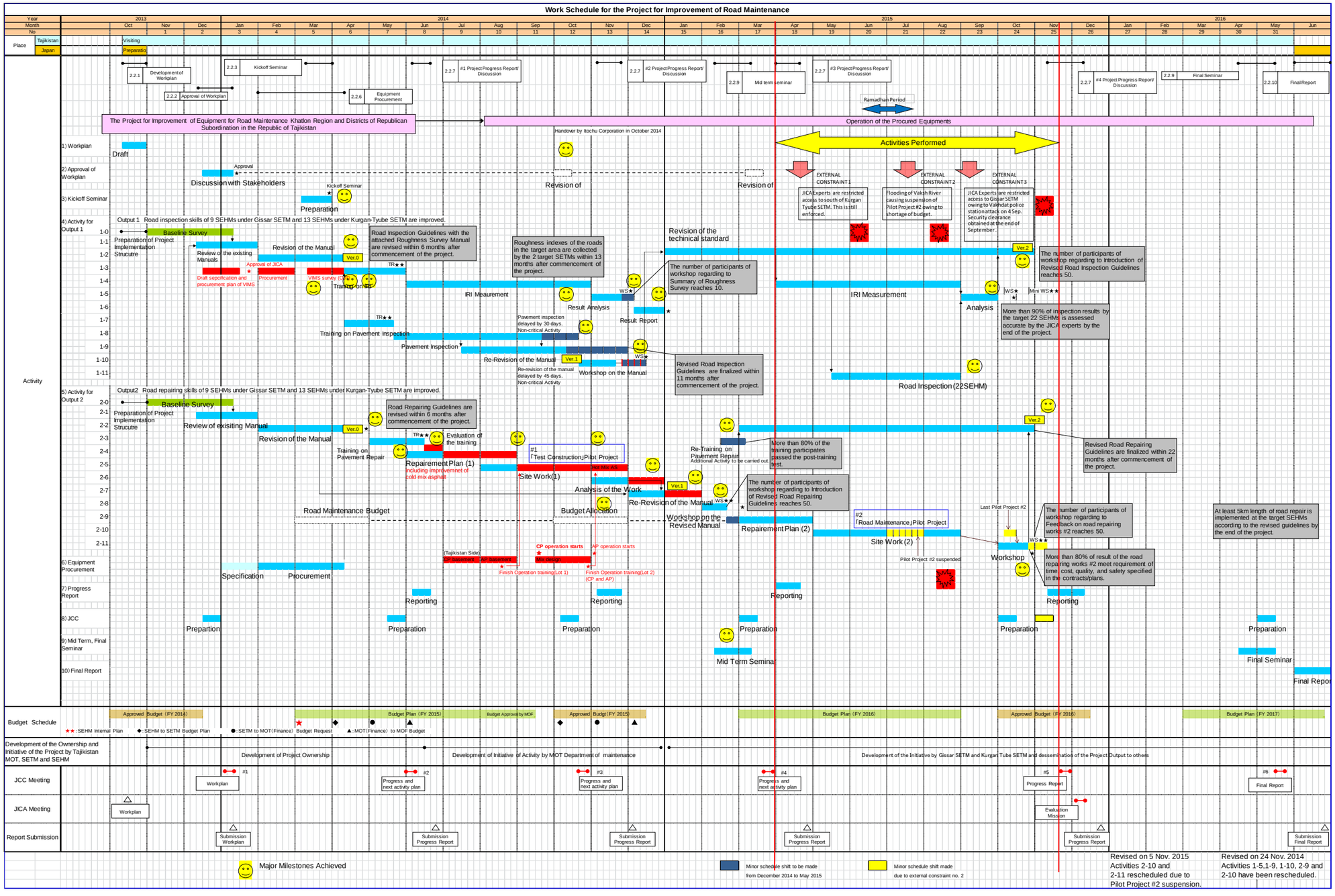


Figure 1.6-2 Project Schedule (original)

1.7 Project Organization

1.7.1 Joint Coordinating Committee

(1) Function

The Joint Coordinating Committee (JCC) was held seven times in total during the project period to fulfill the following functions.

- To discuss and approve the work Plan of the project in line with the tentative schedule of the implementation formed under the framework of the Record of Discussion;
- To review the overall progress of the project as well as the achievement of the Work Plan mentioned above; and
- To review and exchange views on major issues from or in connection with the project.

Table 1.7-1 Records of JCC Meetings

No.	Date
1st	8 Jan. 2014
2nd	5 June 2014
3rd	26 November 2014
4th	25 March 2015
5th	24 November 2015
6th	24 May 2016
7th	22 November 2016

(2) Member Composition

Table 1.7-2 JCC Members

No.	Name	Position	Responsibility
1.	Mr. Ganjalzoda Sherali (upto March 2015) Mr. Shamsimuhammad Nazri (from March 2015) Mr. Mirzoev Suhrob (from July 2015)	The Minister of Transport, MOT Deputy Minister, MOT First Deputy Minister, MOT	Chairman
2.	Mr. Kazuya Sueta (upto June 2014) Mr. Kazuya Suzuki (upto Dec. 2014) Mr. Kiyoshi Ishii (from Jan. 2015)	Resident Representative, JICA Tajikistan Office Acting Resident Representative, JICA Tajikistan Office Resident Representative, JICA Tajikistan Office	Vice Chairman
3.	Mr. Ziyoev Abdullo (from March 2015 and upto March 2016) Mr. Nuriddin Kurbonov (from March 2016)	Head of Main Department of Road Construction and Maintenance, MOT Ditto	Member

4.	Mr. Alovudin Anoyatshoev	Deputy Head of Main Department of Road Construction and Maintenance, MOT	Member
5.	Mr. Olim Yatimov	Head of Department on Cooperation with Foreign Investment, MOT	Secretary
6.	Mr. Odil Mirzoev	Head of Gissar SETM	Member
7.	Mr. Nurulloev Bahrullo(uptoSep 2015) Mr. Faizaliev Nasrullo (from Sep 2015)	Head of Kurgan Tyube SETM	Member
8.	Mr. Bahrullo Nurulloev (from March 2016)	Head of Sogd SETM	Member
9.	Ms. Latify Khojaroy (from March 2016)	Head of Kulyab SETM	Member
10.	Ms. Masayo Murakami	Representative, JICA Tajikistan Office	Member
11.	Mr. Hiroshi Mita	Chief Advisor, JICA Experts Team	Member
12.	Mr. Takashi Nakajima	Deputy Chief Advisor, JICA Experts Team	Member
13.	Mr. Masaru Okamoto (upto March 2015)	Team Member, JICA Experts Team	Member
	Mr. Akihiko Kasahara (from June 2015)	Team Member, JICA Experts Team	Member
14.	Mr. Junichiro Ogawa	Team Member, JICA Experts Team	Member
15.	Dr. Tomonori Nagayama (upto March 2015)	Team Member, JICA Experts Team	Member
16.	Mr. MasakazuFukushima	Team Member, JICA Experts Team	Member
17.	Mr. Ryuichi Kenchi	Team Member, JICA Experts Team	Member

1.7.2 Tajikistan Counterparts and JICA Experts Team

(1) Tajikistan Counterparts

Table 1.7-3 List of Counterparts

Counterpart	Name	Position
Project Director	Mr. Ganjalzoda Sherali	Transport Minister, MOT
	Mr. Shamsmuhammad Nazri	Deputy Minister, MOT (from March 2015)
	Mr. Mirzoev Suhrob	First Deputy from July 2015)
Project Manager	Mr Olim Yatimov	Head of Department on Cooperation with Foreign Investment, MOT
Counterparts	Mr. Ziyoev Abdullo	Head of Main Department of Road Construction Maintenance, MOT (from March 2015 upto March 2016)
	Mr. Nuriddin Kurbonov	Ditto (from March 2016)
	Mr. Alovudin Anoyatshoev	Deputy Head of Main Department of Road Construction and Maintenance, MOT
	Mr. Odil Mirzoev	Head of Gissar SETM
	Mr. Odinaev Ismoil	Technical Production Manager, Gissar SETM
	Mr. Nurulloev Bahrullo	Head of Kurgan Tyube SETM (upto Sep.2015)
	Mr. Faizaliev Nasrullo	Ditto (from Sep. 2015)
	Mr. Kholikov Muzaffar	Chief Engineer, Kurgan Tyube SETM
	Mr. Bahrullo Nurulloev	Head of Sogd SETM (from March 2016)
	Ms. Latify Khojaroy	Head of Kulyab SETM (from March 2016)

(2) JICA Experts Team (the Experts)

Table 1.7-4 List of the Experts

	Task/Work Item	Name	Organization
1	Chief Advisor	Hiroshi MITA	CTII
2	Deputy Chief Advisor/Road Inspection 1	Takashi NAKJIMA	CTII
3.	Road Inspection 2, later adding QC Equipment Supervision for Mr. Kasahara	Masaru OKAMOTO (upto March 2015) Akihiko KASAHARA (from June 2015)	CTII
4.	Road Inspection 3/IRI Survey 1	Junichiro OGAWA	CTII
5.	IRI Survey 2	Tomonori NAGAYAMA	CTII
6.	Road Maintenance Repair 1	Masakazu FUKUSHIMA	CTII
7.	Road Maintenance Repair 2	Ryuichi KENCHI	CTII

1.7.3 Assignment Schedule

Fig.1.7-1 shows the assignment schedule of the JICA Experts Team showing actual assignment completed.

Upper Row: Assignment Plan Reflecting Contract Modifications Dated 7 March 2016
Bottom Row: As Assigned to End May 2016 Refliecting Contract Modifications 7 March 2016

Experts Assignment Schedule (Modification to 2015 First Half, Modification to 31 March 2015 JICA Memo No. 10 and 9 April 2015 JICA Memo No. 11and 12 and Contract Modification dated 7 March 2016)

Prepared on 10 Dec 2016

	Position	Name	Firm Name	FY 2013 TJK	FY 2013 JPN	FY 2014 TJK	FY 2014 JPN	FY 2015 TJK	FY 2015 JPN	FY 2016 TJK	FY 2016 JPN	Total TJK	Total JPN
Work in Tajikistan	Chief Advisor	Hiroshi Mita	CTII	1.57		5.10		1.80		3.37		11.83	
				1.57		5.10		1.80		3.30		11.77	
	Deputy Chief Advisor/ Road Inspection 1	Takashi Nakajima	CTII	1.90		3.13		2.33		1.63		9.00	
				1.90		3.13		2.33		1.60		8.97	
	Road Inspection 2	Masaru Okamoto replaced by Akihiko Kasahara from June 2015	CTII	1.57		5.07		4.37		2.00		13.00	
				1.57		5.07		4.37		1.97		12.97	
	IRI Survey 1	Junichiro Ogawa	CTII	1.00		5.10		2.33		3.23		11.67	
				1.00		5.10		2.33		3.20		11.63	
	IRI Survey 2	Tomonori Nagayama	CTII	0.43		0.27		0.00		0.00		0.70	
				0.43		0.27		0.00		0.00		0.70	
	Road Repair 1	Masakazau Fukushima	CTII	2.63		4.53		1.80		2.03		11.00	
				2.63		4.53		1.80		2.03		11.00	
	Road Repair 2	Ryuichi Kenchi	CTII	1.57		4.03		3.37		4.53		13.50	
				1.57		4.03		3.57		4.33		13.50	
				Work in Tajikistan 10.67		27.23		16.00		16.80		70.70	
				10.67		27.23		16.20		16.43		70.53	
Work in Japan	Chief Advisor	Hiroshi Mita	CTII		0.00		0.00		0.30		0.50		0.80
					0.00		0.00		0.20		0.66		0.86
	Deputy Chief Advisor/ Road Inspection 1	Takashi Nakajima	CTII		0.70		0.00		0.00		0.80		1.50
					0.70		0.00		0.00		0.83		1.53
	Road Repair 2	Ryuichi Kenchi	CTII		0.00		1.00		0.00		0.00		1.00
					0.00		1.00		0.00		0.00		1.00
	IRI Survey 1	Junichiro Ogawa	CTII		0.00		0.00		0.00		0.00		0.00
					0.00		0.00		0.00		0.08		0.08
					MM Total in Japan 0.70		1.00		0.30		1.30		3.30
					0.70		1.00		0.20		1.49		3.47
	Reports and Deliverables (Submission date by △)			△	△ Work Plan		△JICA Progress Report ①		△JICA Progress Report ②		△JICA Progress Report ③		△JICA Progress Report ④
				△ JICA Progress Report ⑤	△ JICA Final Report								
												Grand Total	74.00
													74.00
													100.0 %

Legend: Work in Tajikistan; Work in Japan

Figure 1.7-1 Experts Assignment Schedule

2. GENERAL ACHIEVEMENT OF THE PROJECT

2.1 Successful Implementation

The Experts commenced its services in accordance with the contract concluded between JICA from 13 October 2013. The Work Plan was agreed in the first Joint Coordination Committee (JCC) Meeting held on 8 January 2014. JICA conducted the Terminal Evaluation in December 2015. Based on the result of the evaluation, the Project was extended to complete activities in Tajikistan by the end of November 2016.

Implementation generally followed the schedule indicated in Fig. 2.1-1 below. The detailed Project Chart is attached as Attachment GP-1.

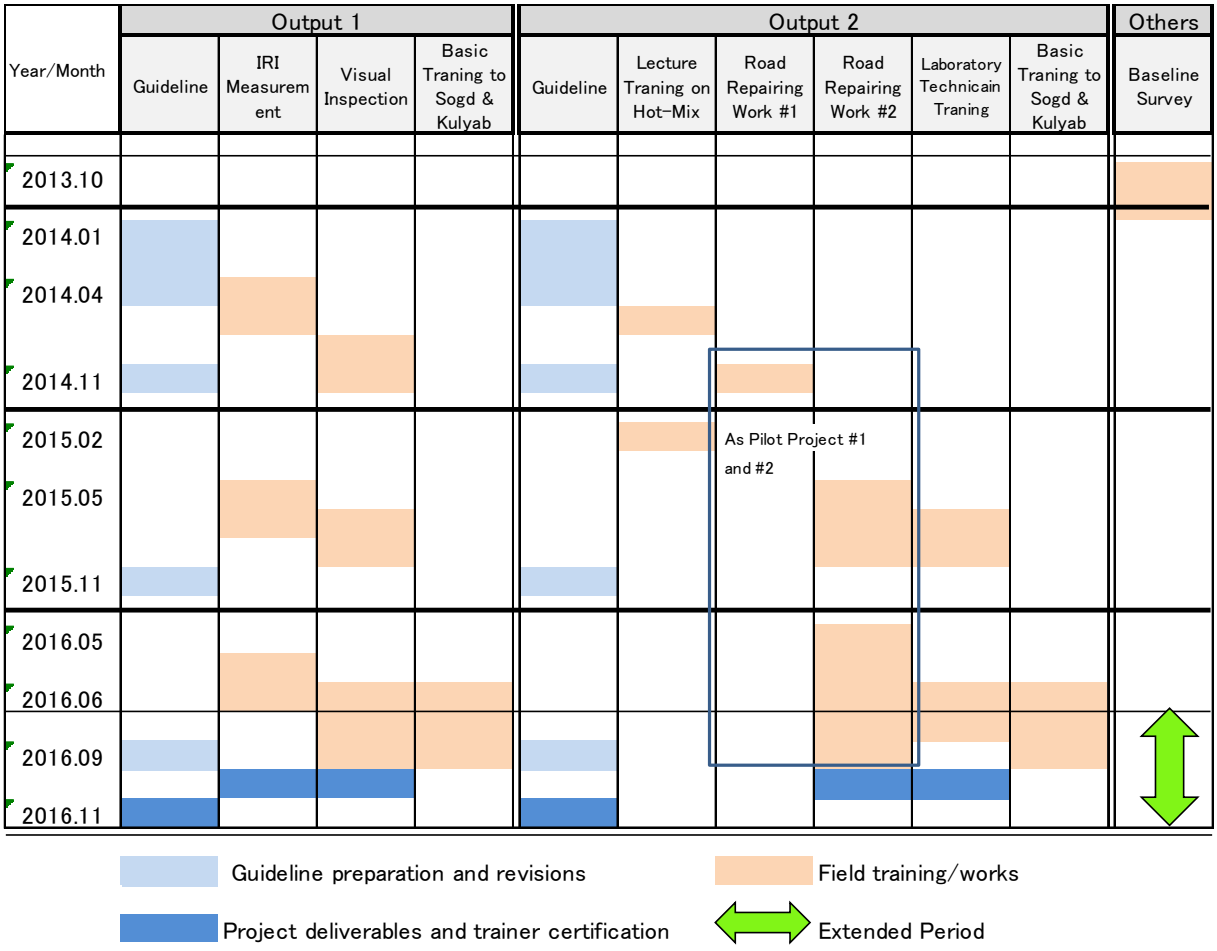


Figure 2.1-1 Project Implementation Schedule

Following documents are attached to the Appendices:

GP-1 Project Flow Chart
GP-2 Work Plan
GP-3 Project Training Program
GP-4 PDM Version 1, 2, 3 and 4
GP-5 Post Project Strategy Paper
GP-6 Minutes of JCC Meeting
GP-7 List of Master Trainers and Trainers Certified under the Project
GP-8 List of Equipment Procured (including Handover Certificate)

2.2 Project Deliverables

Following are the project deliverables (PD) attached to this project completion report. The other documents which were compiled and utilized by the Experts during the project (PS-1 to PS-9)were attached to the nearest JCC Meeting Progress Report. In this report, PS-1 to PS-9 are attached only in the electronic file only.

Table 2.2-1 List of Project Deliverables

No.	Contents
PD-1	Pavement Inspection Guideline (October 2016, MOT Published Version)
PD-2	Pavement Repair Guideline (October 2016, MOT Published Version)
PD-3	English translation of major technical specifications used for road maintenance in Tajikistan
PD-4	Powerpoint hands out for pavement inspection training 2014
PD-5	Powerpoint hands out for pavement inspection workshop 2016
PD-6	DRIMS survey result 2016
PD-7	Powerpoint hands out for pavement repair training 2014
PD-8	Powerpoint hands out for pavement repair workshop 2016
PD-9	Powerpoint hands out for quality control at asphalt plant training 2015
PD-10	Powerpoint hands out for quality control at asphalt plant workshop 2016
PD-11	Technical study on Kumsangir bitumen for pavement repair
PD-12	Hot-mix asphalt applicability map

2.3 Project Outputs

The major outputs of the Short Term Expert Team are the following. Detailed activities are described in the following chapters.

1. Reports and Guidelines

- 1st JCC Meeting Progress Report and approval of Work Plan (8 Jan. 2014)
- Pavement Inspection Guideline (Ver. 0, 16 April 2014)
- Pavement Repair Guideline (Ver.0, 12 May 2014)
- 2nd JCC Meeting Progress Report (5 June 2014)
- 3rd JCC Meeting Progress Report (26 November 2014)
- Pavement Inspection Guideline (Ver. 1, 15 December 2014)
- Pavement Repair Guideline (Ver.1, 5 February 2015)
- 4th JCC Meeting Progress Report (25 March 2015)
- Pavement Inspection Guideline (Ver. 2, 1 October 2015)
- Pavement Repair Guideline (Ver.2, 3 November 2015)
- 5th JCC Meeting Progress Report (24 November 2015)
- 6th JCC Meeting Progress Report (24 May 2016)
- Pavement Inspection Guideline (JICA Final Version, 27 September 2016)
- Pavement Repair Guideline (JICA Final Version, 27 September 2016)
- Pavement Inspection Guideline (MOT Published Version, October 2016)
- Pavement Repair Guideline (MOT Published Version, October 2016)
- 7th JCC Meeting Progress Report (22 November 2016)

2. Trainings

- Pavement Inspection Training (1-3 April 2014)
- Pavement Repair Training (3-4, 9-10, 17-20 June 2014)
- Pavement Repair Training (Repeat, 10-13, 17-20 February 2014)

3. Seminars and Workshops

- Kick Off Seminar (27 March 2014 at Capital Business Center, Dushanbe)
- Mid Term Seminar (11 March 2015 at Capital Business Center, Dushanbe)
- Final Seminar (13 October 2016 at Capital Business Center, Dushanbe)
- Special Seminar to Tajik Technical University Students (23 September 2016 at TTU)
- Pavement Inspection Workshop (2-3 December 2014 at Gissar and Kurgan Tyube SETMs)
- Pavement Inspection Mini-Workshop (4-5 August 2014 at Gissar and Kurgan Tyube SETMs)
- Pavement Inspection Workshop (13 October 2015 at MOT)
- Pavement Inspection Workshop (27-28 September 2016 at Gissar and Kurgan Tyube SETMs)
- Pavement Repair Mini-Workshop (4-5 August 2014 at Gissar and Kurgan Tyube SETMs)
- Pavement Repair Workshop (24-26 February 2015 at Gissar and Kurgan Tyube SETMs)
- Pavement Repair Workshop (10 November 2015 at MOT)
- Pavement Repair Mini-Workshop (7 July 2016 at MOT)
- Pavement Repair Workshop (27-28 September 2016 at Gissar and Kurgan Tyube SETMs)

3. OUTPUT 1: ROAD INSPECTION SKIILS OF THE TARGET SEHMS ARE IMPROVED

3.1 Activity 1.1. To review the existing Road Inspection Guidelines

The Experts commenced the initial activity under the Baseline Survey stage from October to December 2013 and identified the following points on the existing documents related to road inspection guidelines;

(1) SETMs and SEHMs used Russian specifications VSN10-87 for pavement inspection. The frequency and the timing of inspection are based on the Defect Act, under which the inspection was conducted together with representatives from the traffic police usually once a year in March.

(2) However, this inspection was focused primarily on traffic safety and since, no check list or other standard forms for pavement inspection were prepared by SETM. Visual inspection was conducted and as such the inspection took considerable time. Therefore, many aspects of pavement inspection depended on the experience of each engineer in charge. It was also understood that no standardized training on pavement inspection was carried out under each SETM and skills were passed on from veteran engineers to junior engineers through on site works.

The other particularity of how day to day operation was conducted at SETMs and SEHMs were as follows. Such particularity affected both pavement inspection and pavement repair.

(1) SETMs and SEHMs had full understanding on the lengths of roads to be maintained under their responsibility as such information was modified as the reporting to MOT was required every month.

(2) The monthly reporting was prepared in the paper form and sent to MOT either directly by hand or by use of fax machines.

Understanding the above, the Experts summarized that the guideline revision must take into consideration on the following;

- Standardization of inspection method: Succession of the techniques is not well organized and only limited to 'person to person' basis. Introduction of manuals is most effective.
- Visual inspection has a performance limit as it is time consuming.
- Results of inspection rested upon each inspector and this led to inconsistent results: Inspection results depended on the individual inspector without calibration which might have caused misjudgment of the result.

The Experts concluded upon completion of the Baseline Survey stage to revise the guideline by taking actions as outlined from the next page.

Action 1 : Two steps inspection method: Combination of automatic IRI measurement and visual inspection

Action 2 : IRI measurement techniques and database collection method introduced

Action 3 : Numeric quantification of visual inspection result and standardization of inspection methodology (by application of the Japan's technology (MCI: Maintenance Control Index)), Preparation of two steps inspection manual

Action 4 : Pricritization system on road pavement maintenance using IRI introduced

The relationship on applying Roughness Survey (IRI measurement survey using DRIMS (formerly VIIMS equipment) as 1st inspection and conducting visual inspection (by full use of vehicles provided under the JICA grant aid equipment) as 2nd inspection became the basis of the new road inspection guideline, which is officially named as Pavement Inspection Manual. The relationship is indicated the Figure 3.1-1.

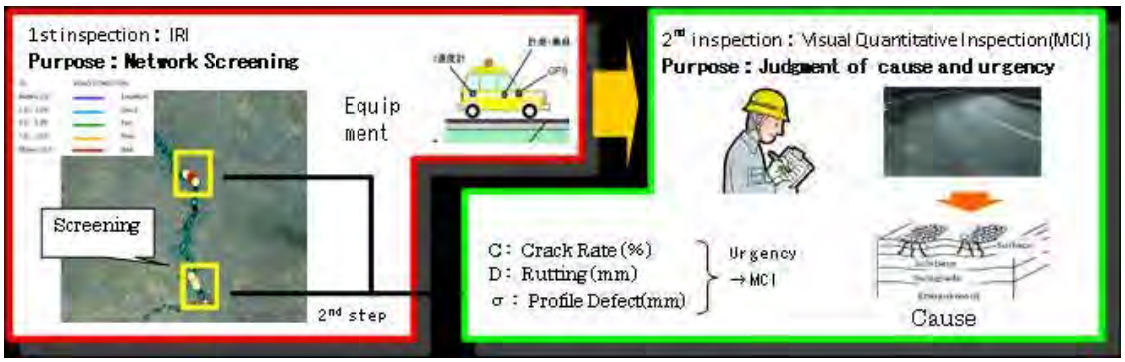
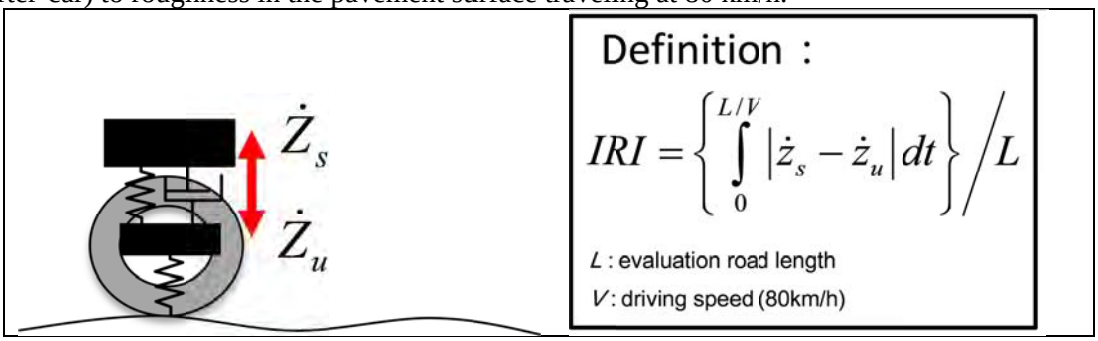


Figure 3.1-1 Relationship between IRI Survey and Visual Inspection

■Introduction of IRI measurement survey

The international roughness index (IRI) was developed by the World Bank in the 1986 in order to address specifics of roughness measurement, or issues of accuracy. IRI is used to define a characteristic of the longitudinal profile of a traveled wheeltrack and constitutes a standardized roughness measurement. The commonly recommended units are meters per kilometer (m/km) or millimeters per meter (mm/m).

The IRI is developed mathematically to represent the reaction of a single tire on a vehicle suspension (quarter-car) to roughness in the pavement surface traveling at 80 km/h.



The many approaches for measuring road roughness in use throughout the world can be grouped into four generic classes on the basis of how directly their measures pertain to the IRI, which in turn affects the calibration requirements and the accuracy associated with their use.

A Class 1 and 2 method require that the longitudinal profile of a wheeltrack be measured (as a series of accurate elevation points closely-spaced along the travelled wheelpath) as a basis for calculating the IRI value. Class 3, includes other roughness measuring instruments capable of generating a roughness numeric reasonably correlated to the IRI. The measures obtained can be used to estimate IRI through regression equations if a correlation experiment is performed. Class 4 is a subjective evaluation involving either a ride experience on the road or a visual inspection could be used.

Dynamic Response Intelligent Monitoring System (DRIMS) equipment which was introduced into this project is a one of the tool categorized into Class 3.

Hereinafter, obtaining and evaluating IRI estimated by using DRIMS is called 'IRI measurement'.

3.2 Activity 1.2 To revise the Road Inspection Guidelines with the attached Roughness Survey Manual

The Experts completed to introduce the Pavement Inspection Manual Version 0 on 16 April 2014 for the intended use in the training in 2014 as well as the on the job training taking into consideration all points indicated in the previous section. The manual was used for IRI measurement survey and visual inspection from May 2014.

3.3 Activity 1.3 To conduct trainings (in each region) on Roughness Survey for the original target 2 SETMs and 22 SEHMs

TOT Training for Roughness Survey commenced on 1 April and lasted until 18 April 2014 with participation of 10 from Gissar SETM (1 from SETM and 9 from SEHM) and 15 from Kurgan Tyube SETM (2 from SETM and 13 from SEHM). The main objective of the training in April was to introduce the DRIMS equipment, learn the equipment operation and perform the basic analysis/assessment from the measurement. The trainees are now capable of performing IRI measurement and basic analysis on their own, whilst difference of progress has been witnessed due to computer operation skill. It is noteworthy that active participation by SEHMs was observed during the training.

3.4 Activity 1.4 To carry out Roughness Survey on the international and republican roads under the jurisdiction of Gissar SETM and Kurgan-Tyube SETM

Roughness survey using IRI measurement commenced by SETM and SEHM counterparts from the end of May 2014 and completed in early August 2014, with suspension in between from the end of June until the end of July for the Ramadhan period. A national staff of the Experts was involved for advice and support for 19 and 13 days respectively for Gissar and Kurgan Tyube SETMs. The Experts allocated a car with a driver each to both SETMs. Fuel was provided by SETMs. The cars were later used for the purpose of carrying out visual inspection and filling in Form 1.

During performance of activities, the following points were noted by the Experts.
At the initial stage of IRI measurement (including data analysis), although all counterparts took an interest in PC operation required, owing to the fact that PC operation skills were not fully sufficient, smooth PC operation required for IRI measurement posed as a problem. This was overcome by the Experts providing many face to face tutorial lessons together with counterparts.
In addition to the above, the Experts arranged an additional training during the Ramadhan suspension period to offer further tutorial lessons on PC operation skills.
At the same time, requests were raised by many counterparts that more PCs were necessary to enable continuation of training on PC operation skills.

It was the understanding of both MOT and the Experts to only use single set of DRIMS equipment together with a PC to conduct IRI measurement in 2014 at each SETM and provide the next set after attainment of satisfactory results in 2014.

In 2015, IRI measurement commenced from April 2015 based on a stand-alone basis by counterparts from SETM and SEHMs. The second set was provided for this activity. The national staff of the Experts assisted the survey as required. All measurement survey was completed in August due to various down times required for conducting other duties. It is noted that necessary arrangement of fuel and drivers as well as the budget were secured prior to commencement. Pick-up trucks provided under JICA Equipment Supply were used for IRI measurement survey.

3.5 Activity 1.5 To organize a workshop (in Dushanbe) to summarize the results of Roughness Survey with the original target 2 SETMs, 22 SEHMs and MOT.

In 2014, the workshop was held at Kurgan Tyube SETM and Gissar SETM on 2 and 3 Dec. 2014 to summarize the results of Roughness survey using IRI measurement. Participants were 23 and 13 respectively.
The Experts summarized as per below.

(1) Owing to full support, the results were obtained for the entire 22 SEHMs.
(2) The Experts assessed the accuracy of IRI measurement as 63% for Kurgan Tyube SETM and 84 % for Gissar SETM. The major reasons attributed to incorrectness of the results were incorrectness of the start/end points and incorrectness of the orientation. CPs understood importance of such points before commencing IRI measurement.

In 2015, the workshop combining Activity Numbers 1-5 and 1-10 for summarizing the results of Roughness Survey using DRIMs and for introducing the revised Pavement Inspection Guideline (Version 2) was held on 13 Oct. 2015 at Conference Room of MOT. Participants were 36.

3.6 Activity 1.6 To file the results of Roughness Survey (IRI data) by the original target 2 SETMs in the prescribed form of the revised Guidelines.

CPs for both Gissar SETM and Kurgan Tyube SETM filed the result of Roughness Survey using IRI measurement in November 2014 utilizing Form 1 introduced by the Experts. The Experts also assisted CPs at the initial stage on how to file the result into Form 1.

Both SETMs completed the filing of the results in September 2015 together with various SEHMs with support from the Experts utilizing Form 1 of Pavement Inspection Guideline Version 2.

3.7 Activity 1.7 To conduct trainings (in each region) on road inspection according to the revised Road Inspection Guidelines for the original target 2 SETMs and 22 SEHMs

Road inspection training consisted of two elements. How to conduct visual inspection and how to carry out Form 1 filling as outlined in Pavement Inspection Manual Ver 2014 March. For Activity Number 1-7, 1-4 and 1,8, the following training was conducted by the Experts.

9 June 2014	Visual Inspection Training for Gissar SETM 11 participants from all SEHMs (9SEHMs)
19 June 2014	Visual Inspection Training for Kurgan Tyube SETM 14 participants from 12 SEHMs
8-11 July 2014	Visual Inspection Field Training for Gissar SETM, including Form 1 filling 14 participants from all SEHMs (9SEHMs)
17-18 July 2014	Visual Inspection Field Training for Kurgan Tyube SETM including Form 1 filling 16 participants from 12 SEHMs
31 July 2014	Visual Inspection Field Training for Gissar SETM including Form 1 filling 9 participants from 7 SEHMs
1 August 2014	Visual Inspection Field Training for Kurgan Tyube SETM including Form 1 filling 10 participants from 7 SEHMs

During performance of activities, the following points were explained by the Experts to CPs.
The Visual Inspection is aimed for determining structural defects of the pavement while IRI measurements only indicates the pavement surface condition from riding comfort.
The visual inspection will complement various structural defects which cannot be obtained by IRI measurement and the use of crack rate and pothole rank justifies structural severity of the road condition.

3.8 Activity 1.8 To conduct visual inspection on the roads in the original target area at the original target 22 SEHMs, according to the revised Guidelines

Road inspection based on visual inspection and filling in Form 1 commenced by SETM and SEHM counterparts from early August and completed in late October 2014, with suspension in September to concentrate towards training offered by Messrs Itochu Corporation for JICA Equipment Supply Contract. A national staff of the Experts was involved for advice and support for 33 and 27 days respectively for Gissar and Kurgan Tyube SETMs.
The Experts noted that the composition of counterparts were mostly experienced personnel representing Kurgan Tyube SETM and combination of relatively young and experienced personnel representing Gissar SETM. It appeared to the Experts that the experienced counterparts have had sufficient experience in identifying crack ratio at ease whilst longer time was necessary for the relatively young counterparts.

Since, the counterparts were essentially same as for Roughness Survey, a big contrast exhibited between visual inspection and Roughness Survey in that the counterpart who excelled in one aspect had difficult time on the other. The relatively young excelled in PC operation skills whereas the experienced excelled in determining crack ratio at ease.

Visual inspection commenced from August 2015 based on a stand-alone basis by counterparts from SETM and SEHMs. The national staff of the JICA Experts Team assisted the survey as required. All measurement survey was completed in September. It is noted that necessary arrangement of fuel and drivers as well as the budget were secured prior to commencement. Pick-up trucks provided under JICA Equipment Supply were used for visual inspection also.

3.9 Activity 1.9 To revise the Road Inspection Guidelines based on the results of the road inspection works (Act. 1.4 & 1.8).

Based on collection of data in IRI measurement and visual inspection in 2014, Pavement Inspection Manual was revised later in the year and Version 1 was issued on 15 December 2014.

Revisions were made to incorporate the following;

(1) Introduction of pavement repair work unit prices, cost calculation breakdowns and standard forms 2 and 3 to allow the manual to be used for building up of the annual pavement repair budget at each SEHM.
(2) Inclusion of road list and road management map
(3) Inclusion of pavement inspection results collected in 2014

Repeated activities were held in 2015 using the Pavement Inspection Manual Version 1.

Then, further revisions were made and Version 2 was issued on 1 October 2015. The revision was mainly to include a sample of the pavement maintenance plan and introduction of virtual Kilo Post.

3.10 Activity 1.10 To organize workshops (in each region) to introduce the revised Guidelines for the original target 22 SEHMs, 2 SETMs and MOT

Workshops were held at Kurgan Tyube SETM and Gissar SETM on 2 and 3 Dec. 2014 on the same days as for the workshop on Roughness Survey to introduce the revised Road Inspection Guideliens (Version 1) to the entire 22 SEHMs, Gissar SETM and Kurgan Tyube SETM. Participants were 23 and 13 respectively for Kurgan Tyube and Gissar SETMs. Similarly for the workshop on Roughness Survey, the results of correctness of visual inspection were also presented by the Experts on crack rates and the number of potholes at each inspected roads.

In 2015, the workshop combining Activity Numbers 1-5 and 1-10 was held on 13 Oct. 2015. For the session on introducing the revised Road Inspection Guidelines (Version 2), the Experts presented revisions made from version 1.

3.11 Activity 1.11 To conduct road inspection (i.e. roughness survey, including filing results, and visual inspection) in the original target area at the original target 22 SEHMs, according to the revised Guidelines.

The third year of IRI measurement commenced from April 2016 based on a stand-alone basis by counterparts from SETM and SEHMs. The national staff of the Experts assisted the survey but very little compared to the previous two years. Physical activity of IRI measurement was completed in May 2016. Visual inspection commenced from July and filling in of the required forms was completed in early September. The records were checked for correctness in September 2016 by the Experts.

3.12 Activity 1.12 To finalize the Road Inspection Guidelines based on the results of the road inspection works (Act. 1.11).

Upon completion of IRI measurement and visual inspection in 2016, JICA Final Version of Road Inspection Manual was submitted to MOT for approval for its use on 27 September 2016. Only minor modifications were made so that any costing presented would be on the basis of use of unit prices applicable at mid-2016 and more definitive descriptions on landmark objects to be included during the data collection.

3.13 Activity 1.13 To organize workshops (in each original region) to summarize the results of road inspection and to introduce the finalized Road Inspection Guidelines for the target SEHMs, SETMs and MOT

On 27 and 28 Sep. 2016, workshops were held at Gissar SETM and Kurgan Tyube SETM respectively. The topics covered were the results of 2016 road inspection works and introduction of the JICA Final version of the Road Inspection Guideline. 11 engineers and managers from Gissar SETM and SEHMs participated at the workshop in Gissar and 18 engineers and managers from Kurgan Tyube SETM and SEHMs participated at the workshop in Kurgan Tyube.

3.14 Activity 1.14 To certify Master Trainers for road inspection from the staff of the original target SETMs/SEHMs

Based on recommendations from both Gissar and Kurgan Tyube SETMs and the evaluation conducted by the Experts, Master Trainers and Trainers were certified as shown in Table 3.14-1.

Table 3.14-1 Number of Master Trainer for Road Inspection

SETM	2015			2016			Total		
	Master Trainer	Trainer	Total	Master Trainer	Trainer	Total	Master Trainer	Trainer	Total
Gissar	4	5	9			0	4	5	9
Kurgan Tyube	4	7	11		1	1	4	8	12
Total	8	12	20	0	1	1	8	13	21

3.15 Activity 1.15 To monitor and give technical advice on training conducted by the Master Trainers for additional target 2SETMs and 6SEHMs on basic elements of road inspection at the additional target area

Basic elements of road inspection involved IRI measurement using DRIMS, performing visual inspection and filling in Forms 1, 2 and 3 in accordance with the Road Inspection Guideline. This training was conducted by Master Trainers certified in 2015 from Gissar and Kurgan Tyube SETMs. The session commenced in Kulyab SETM from 13 June 2016 participated by Kulyab, Vose and Muminobod SEHMs and completed on 24 Aug. 2016. Similarly, B. Gafulov, J. Rasulov and Konibodom SEHMs represented Sogd SETM. The session commenced from 22 June 2016 and completed on 31 Aug. 2016. The Experts supported the activity when the session was held either in Gissar or Kurgan Tyube by direct involvement of the Japanese experts, whilst the national staff of the Experts assisted the Master Trainer when the session was held either in Kulyab or Khujand.

4. OUTPUT 2: ROAD REPAIRING SKILLS OF THE TARGET SEHMS ARE IMPROVED

4.1 Activity 2.1 To review the existing Road Repairing Guidelines

The Experts commenced the initial activity under the Baseline Survey stage from October to December 2013 and identified the following points on the existing documents related to road repairing guidelines;

(1) SETMs and SEHMs used Russian specifications VSN24-88 for the method of pavement repair and SNIP3.06.03-85 for construction standards. In addition, through collection of specifications as advised by SETMs and SEHMs, the Experts found that Russian standards GOST9128-09 specifies classification of asphalt mixtures including physical and mechanical properties in general and VSN93-73 specifies further detailed requirements such as pavement structural composition, mix design, paving work regulations and testing methods.

(2) However, owing to lack of machineries, equipment and budget, SETMs and SEHMs had been repairing roads using cold-mix asphalt mixed on site based on visual confirmation without any quantitative confirmation on materials used. Many engineers and technicians who had experience of hot-mix asphalt had to leave SETMs and SEHMs due to more lucrative offers from private companies. No check list or other standard forms for pavement repairing works were prepared by SETM. Therefore, many aspects of pavement repair depended on the experience of each engineer in charge. It was also understood that no standardized training on pavement repair was carried out under each SETM and skills were passed on from veteran engineers to junior engineers through on site works.

The other particularity of how day to day operation was conducted at SETMs and SEHMs were as follows. Such particularity affected both pavement inspection and pavement repair.

(1) SETMs and SEHMs had full understanding on the lengths of roads to be maintained under their responsibility as such information was modified as the reporting to MOT was required every month.

(2) The monthly reporting was prepared in the paper form and sent to MOT either directly by hand or by use of fax machines.

The Experts concluded upon completion of the Baseline Survey stage to commence revising the guideline by taking actions as outlined below.

Point 1: Summarize and integrate technical information in the form of a manual so that the pavement repair requirements are outlined under one manual without referring to various technical specifications and codes which have been prepared to cover all conditions which apply in Russia and not necessarily to Tajikistan. Especially, emphasis would be placed on meteorological conditions and road categories.

Point 2: Since pavement repair would be conducted using locally available materials as much as possible, the manual would be reflected so that materials critically not available locally would be delisted.

Point 3: Quality control for day to day operation at the asphalt plant would play an important role. However, GOST standard had numerous tests specified which the Experts felt should be streamlined and simplified to adapt to the current condition in Tajikistan.

4.2 Activity 2.2 To revise the Road Repairing Guidelines

The Experts completed to introduce the Pavement Repair Manual Version 0 on 12 May 2014 for the intended use in Pilot Project #1 in 2014. All 3 points as indicated in the previous section were reflected. The manual was used for pavement repair training held from June 2014 as well as Pilot Project #1 in November 2014.

4.3 Activity 2.3 To conduct trainings (in each region) on road repairing according to the revised Road Repairing Guidelines for the original target 22 SEHMs

Road repair training consisted of two elements. Deskwork training on comprehensive subjects and on the field training on planning and actual implementation of Pilot Project #1.For Activity Number 2-3, 2-4 and 2-5, the following training was conducted by the Experts.

3-10 June 2014	Road Repair Training for Gissar SETM 11 participants from all SEHMs (9SEHMs)
17-20 June 2014	Road Repair Training for Kurgan Tyube SETM 14 participants from all SEHMs (9SEHMs)
3 Nov. 2014	Training on Planning for Pilot Project #1 for Gissar SETM 13 participants from 5 SEHMs and from Gissar SETM
4-5 Nov. 2014	Pilot Project #1 at Gissar SETM
11 Nov. 2014	Training on Planning for Pilot Project #1 for Kurgan Tyube SETM 12 participants from 6 SEHMs and from Kurgan Tyube SETM
12-14 Nov. 2014	Pilot Project #1 at Kurgan Tyube SETM

For deskwork trainings carried out in June, a post-training test was carried out in each SETM. The result was not as satisfactory as expected by the Experts with only 65% of trainees successfully achieving the test mark of over 80% altogether.
The Experts believed that the test result was attributable on the following;

(1) Hot mix asphalt production and the related road repair work were new topics to the relatively young engineers and supervisors.
(2) The training period did not coincide with actual delivery of JICA equipment.
(3) Hence, there was only little motivation as well as necessity generated by engineers and supervisors from distant SEHMs to aggressively secure the knowledge.

The Experts conducted repeat deskwork training in February 2015 so that engineers and supervisors gain necessary knowledge on the subject before the commencement of Pilot Project #2. This training ended with successful results. It was believed that having actually seen the equipment operate on site in November 2014 gave participants motivation on acquiring such knowledge and skills.

4.4 Activity 2.4 To provide support and advice on planning of the road repairing work #1(in each region) according to the revised Road Repairing Guidelines

The Experts produced the document titled Planning and Method Statement on Road Pavement Repair for Pilot Project #1 so that SETM and SEHM engineers may use the material for planning actual pavement repair work under Pilot Project #1.

4.5 Activity 2.5 To implement an on-site technical instruction (in each region) for the road repairing work #1 according to the revised Guidelines at the selected SEHMs from the original target 2 SETMs.

As one of the major activity for the Project in 2014, Pilot Project #1 was conducted in early to middle of November 2014, utilizing machineries and equipment provided by JICA under the Project for Improvement of Equipment for Road Maintenance in Khatlon Region and Districts of Republican Subordination.

Pilot Project #1 in Gissar SETM

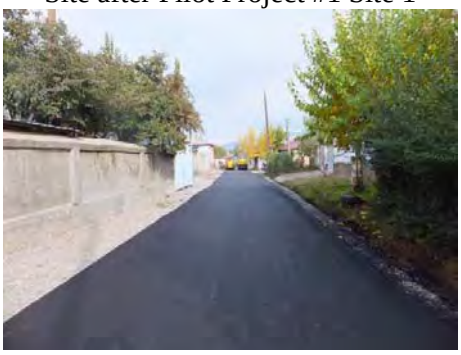
Two locations were selected by SETM, Gissar SEHM and the Experts with due consideration of the request from the local government.

Site 1 New Placing of Asphalt Pavement of Rohati Street, near Kofarnihon River
designated as a local road on 4 Nov. 2014
L=160m, W=4.3 m, thickness of 40mm
Site 2 Overlay of Jarboshi Road designated as a republican road
L=210m, W=7m, thickness of 40mm on 5 Nov 2014

Pilot Project #1 was conducted from 3 to 5 November 2014. On the first day on 3 Nov. 2014, all members took part in the training to understand the nature of the works and vital elements for the works required by the Expert. On 4 and 5 Nov. 2014, the actual pilot project for pavement work was carried out. The Experts took charge of asphalt pavement operation and asphalt production supervision, providing on-site instruction as required. The entire operation was observed by trainees from 4 SEHMs for the first two days and 2 SEHM on the last day. Necessary on-site training was provided by the other experts and the experienced national staff towards these trainees.

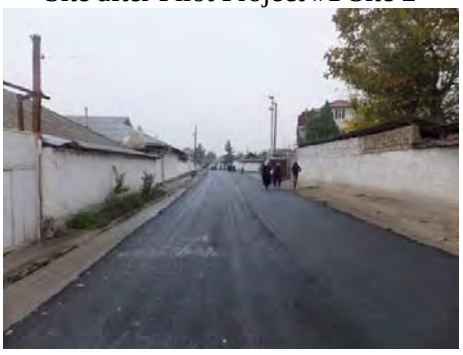
Site before Pilot Project #1 Site 1

Site after Pilot Project #1 Site 1



Site before Pilot Project #1 Site 2

Site after Pilot Project #1 Site 2



On-site works 1

On-site works 2

The Experts and Counterparts 1

The Experts and Counterparts 2

Asphalt Production Plant – QC Sampling

Asphalt Production Plant – Marshall stability test

Pilot Project #1 in Kurgan Tyube SETM

Two locations were selected by SETM and the Experts.

Site 1 Overlay of Uzun-Jilikul Road designated as a republican road
L=150m, W=7m, thickness of 50mm on 12 and 13 Nov. 2014
Site 2 New placing of asphalt on Uzun-Jilikul Road designated as a republican road
L=140m, W=6.0m, thickness of 30mm on 14 Nov. 2014

Pilot Project #1 was conducted from 10 to 14 November. The Experts took charge of asphalt pavement operation and asphalt production, providing on-site instruction as required. Various SEMS workers as well as SETM and SEHM engineers and supervisors took part. On the first day, a training to understand the nature and vital elements of the works was held.

Site before Pilot Project #1 Site 1

Site after Pilot Project #1 Site 1

Site before Pilot Project #1 Site 2

Site after Pilot Project #1 Site 2

On-site works 1

On-site works 2

The Experts and Counterparts 1

The Experts and Counterparts 2

Asphalt Production Plant – Aggregate condition

Asphalt Production Plant – Melting by kettle

4.6 Activity 2.6 To analyze the results of the road repairing works #1, such as repairing materials and procedures

The following was observed during Pilot Project #1 in 2014 at Gissar SETM by the Experts for further improvement.

(1) Small tools and equipment are necessary for proper cleaning work before pavement and edge treatment. Equipment would include an air-compressor and plate compactors. Others necessary are sufficient number of rakes and blooms. Preparation of the surface to be paved is of prime importance**.**

(2) It is recommended that the tire roller should be prevented to run over areas other than the pavement area to minimize collection of unwanted debris on the tires. In case such debris are collected on the tires, removal of debris need to be carried out using sharp edges**.**

(3) Temperature supervision is a process not to be missed out. Engineers and supervisors must confirm the temperature on delivery of hot mix asphalt. This was strictly carried out during the pilot project.

The following was observed during Pilot Project #1 in Kurgan Tyube SETM by the Experts for further improvement.

(4) Similarly for Gissar SETM, melting process of the bitumen hand sprayer was troublesome. If on site melting is to be performed instead of plant mixing, at least 2 hours advance time is required.

(5) A necessary planning and arrangement for procurement of materials for hot-mix production such as diesel, straight asphalt and diesel as well as advance melting using the kettle proves to be very important for efficient asphalt production and hot-mix placement on site.

(6) Temperature supervision is a process not to be missed out. Engineers and supervisors must confirm the temperature on delivery of hot mix asphalt. This was strictly carried out during the pilot project.

4.7 Activity 2.7 To revise the Road Repairing Guidelines further based on the results of the analysis (Act. 2.6).

Based on the result of Pilot Project #1 in 2014, Pavement Repair Manual was revised later in the year and Version 1 was issued on 5 February 2015.

Revisions were made to incorporate the following;

(1) Harmonization with Version 1 of Pavement Inspection Manual.
(2) Inclusion of hot-mix asphalt applicability map covering Gissar and Kurgan Tyube SETMs
(3) Inclusion of technical information collected during Pilot Project #1 in 2014

Repeated activities were held in 2015 using the Pavement Repair Manual Version 1 for Pilot Project #2 in 2015.

Then, further revisions were made and Version 2 was issued on 3 November 2015. The revision was mainly to include technical information collected during Pilot Project #1 in 2014.

4.8 Activity 2.8 To organize workshops (in each region) to introduce the revised Guidelines with the original target 22 SEHMs, 2 SETMs and MOT

The Experts organized a workshop at Kurgan Tyube SETM and Gissar SETM to present the outline on the revised Road Repairing Guideline (Version1) on 26 and 27 February 2015. The workshops had participants of 32 and 20 people respectively. 2 participants from Kulyab SETM and 2 participants from Pamir SETM also attended the event on respective days. An unofficial workshop was held on 24 February 2015 in Dushanbe for 4 participants who attended from Sogd SETM. In addition to the outline on the revised guideline, participants were provided with presentation on Review of Pilot Project #1, Use of Cold Mix Bitumen from Kumsangir and Importance on Quality by the Experts as well as a presentation by each SETM on action towards Pilot Project #2 to commence from May 2015.

The Experts organized a workshop at Gissar SETM and Kurgan Tyube SETM to present the feedbacks on the results of Pilot Project #2 as well as presenting the outline on the revision made on Road Repairing Guideline (Version2) on 10 and 17 November 2015. 3 participants from Kulyab SETM attended the Kurgan Tyube session. For the feedbacks on the results of Pilot Project #2, counterparts presented the review of achievement made under Pilot Project #2 and their own evaluation.

The Experts then provided suggestions as per below.

(1) Schedule coordination between SEHMs through SETM is very important for full utilization of necessary equipment for pavement repair

(2) Importance of proper tack coat/prime coat must be understood and skills must be improved. The skill of pre cleaning before tack coat/prime coat by air compressor and other means surely improves the durability of asphalt overlay.

(3) Use of distributor is emphasized as the tank can be used as a storage tank.

(4) Sufficient compaction is imperative using JICA equipment provided.

(5) Attention must be focused on the edge treatment at shoulders.

4.9 Activity 2.9 To plan the road repairing works #2 in the original target area by the selected target SEHMs according to the revised Road Repairing Guidelines, reflecting the results of road inspection (Act. 1.8)

(1) Road Repairing Works #2 in 2015

This activity initiated by both SETMs together with relevant SEHMs commenced in March and completed at the end of April 2015. The Experts provided the original template for planning Pilot Project #2 and Counterparts themselves prepared the plan according to each requirement. The plan took into consideration for necessary arrangement of fuel and procurement of materials as well as the budget needs to be secured by both SETMs through coordination with MOT.

(2) Road Repairing Works #2 in 2016

This activity initiated by both SETMs together with relevant SEHMs commenced in March and completed at the end of April 2016 utilizing the experience gained in 2015..

However, considerable changes were made in Gissar SETM sections in June 2016 as the originally accepted 2 locations (Rudaki-09 and Gissar-02) needed to be changed to another 2 locations (Rudaki-02 and Rudaki-03) and later in August 2016, Rudaki-02 location was opted for emergency asphalt over lay over the nearby bridge which the Experts believed was not suitable as the Pilot Project #2 site. The reason was that the bridge required immediate attention and sufficient time was not available for various SEHMs to participate from the planning stage

4.10 Activity 2.10 To monitor and give technical advice on the road repairing works #2

(1) Road Repairing Works #2 in 2015

This activity initiated by the Experts commenced from May and continued until October 2015. Pilot Project #2 commenced at Rudaki-06 road section in Gissar SETM as planned. However for Kurgan Tyube SETM, the original plan to commence from Jilikul-01 section had to be replaced with a section in Khuroson, owing to the worsening of security situation in Tajikistan. The training activity in Jilikul Asphalt Plant was maintained at minimal utilizing the capacity of the national staff at fullest.
Following such, Pilot Project #2 had to be suspended in July due to occurrence of Vaksh river flooding causing numerous damages to shift the budget allocated for Pilot Project #2 for more prioritized recovery measures.
In 2015, a 2.9km length of road has been repaired under Pilot Project in comparison with the targeted 5.0km under the Project Purpose.

The Experts were concerned on the progress of Pilot Project #2 in July and calculated the cost for continuing Pilot Project #2 in 2016. This cost information became the basis of necessary budget requested by MOT for 2016 National Budget. MOT sent a letter to JICA Tajikistan Office on 1 September 2015 informing JICA on action taken by MOT on the subject.

(2) Road Repairing Works #2 in 2016

This activity followed Activity No. 2-9 and the activity commenced from May and completed in September 2016. The notable improvement was observed on how SETM/SEHM engineers can plan and implement pavement repair works including use of machineries and equipment for their intended use.

4.11 Activity 2.11 To finalize the Road Repairing Guidelines based on the results of the road repairing works #2.

From mid August to September 2016, finalization of the Road Inspection Guidelines was carried out. Subsequently, the JICA Final version was submitted to MOT on 27 Sep. 2016. The JICA Final version reflects feedbacks from 2016 road repairing works and also the outcome of the investigation undertaken by the Experts for the appropriate use of the guideline in Sogd and Kulyab regions from 2017. In addition, modifications were made to include quality control training manuals and standard test forms including test sieve analysis and Marshall Stability tests so that SEHM site engineers may be able to understand the knowledge on quality control requirements for hot-mix asphalt production.

4.12 Activity 2.12 To organize workshops (in each region) to give feedbacks on the results of road repairing works #2, such as repairing materials and procedures, and to introduce the finalized Road Repairing Guidelines for the target SEHMs, SETMs and MOT

Workshops were held at Gissar SETM and Kurgan Tyube SETM respectively on 27 and 28 Sep. 2016. The topics covered were the results of 2016 road inspection works and introduction of the JICA Final version of the Road Inspection Guideline. 11 engineers and managers from Gissar SETM and SEHMs participated at the workshop in Gissar and 18 engineers and managers from Kurgan Tyube SETM and SEHMs participated at the workshop in Kurgan Tyube.


4.13 Activity 2.13 To carry out training on appointed laboratory technicians from each target SETM to be able to conduct day to day quality control tests at the asphalt plants

This activity was conducted between June to August 2016. This activity provided the appointed technicians with extra boost. The performance was satisfactory.


4.14 Activity 2.14 To assist the original target SETMs/SEHMs in training additional 2 SETMs and 6 SEHMs on basic elements of pavement repair using road repairing works #2 in 2016.

Basic elements of road repairing works involved understanding of hot-mix asphalt material, production of asphalt, how to carry out patching and overlay, and day to day quality control in accordance with the Road Repairing Guideline. In order that the training is conducted in the conducive manner, the training was held in conjunction with the pavement inspection training. This training was conducted by the Experts and the session commenced in Kulyab SETM from 6 June 2016 participated by Kulyab, Vose and Muminobod SEHMs and completed on 30 June. 2016. Similarly, B. Gafulov, J. Rasulov and Konibodom SEHMs represented Sogd SETM. The session commenced from 20 June 2016 and completed on 2 Sep. 2016.

4.15 Activity 2.15 Certify trainers for specific techniques for road repairing from the staff of the original target SETMs/SEHMs.

Based on recommendations from both Gissar and Kurgan Tyube SETMs and the evaluation conducted by the Experts, Master Trainers and Trainers were certified as shown in Table 4.15-1 and Table 4.15-2.

Table 4.15-1 Number of Master Trainer for Road Repairing

SETM	Master Trainer	Trainer	Total
Gissar	3	8	11
Kurgan Tyube	3	17	20
Total	6	25	31

Day to Day Quality Control – In order to appreciate aggressiveness shown by representatives from Kulyab and Sogd SETMs, certification was provided to all 4 participants from these 2 SETMs as well.

Table 4.15-2 Number of Master Trainer for Quality Control

SETM	Master Trainer	Trainer	Total
Gissar	2		2
Kurgan Tyube	2		2
Kulyab		2	2
Sogd		2	2
Total	4	4	8

5. ACHIEVEMENT OF VERIFIABLE INDICATORS

Following Sections 4 and 5, achievement based on verifiable indicators are presented in this section. The titles of each section match with the objectively verifiable indicators of Project Purpose and Outputs 1 and 2.

5.1 Project Purpose

(1) At Least 90% of the Results of Roughness Survey at Original Target 22SEHMs, Using the Revised Guidelines is Assessed Accurate by the JICA Experts by the End of the Project

During the Project, Roughness Survey was conducted by obtaining IRI measurement using DRIMS equipment three times, once each year. The details of the mechanism on IRI measurement and how to use the equipment are all indicated in the Revised Guidelines. The Experts conducted OJT training as required since 2014.
All original target SEHMs conducted Roughness Survey except for N. Khusrav SEHM in 2016 due to the closure of the road as summarized in Table 5.1-1 below.

Table 5.1-1 Number of SEHMs Participating Roughness Survey

	OJT Training Roughness Survey number of SEHM				Remarks
SETMs	Target	2014	2015	2016	
Gissar	9	9	9	9	
Kurgan Tyube	13	13	13	12	*
Total	22	22	22	21	*

* In 2016 N. Khusrav SEHM in Kurgan SETM no measurement due to road closure by military order.

The Experts assessed the accuracy each year using the results of IRI measurement at both Gissar SETM and Kurgan Tyube SETM as indicated in Table 5.1-2.

Table 5.1-2 Results of Roughness Survey

	Accuracy IRI measurament results %				Remarks
SETM	Target	2014	2015	2016	
Gissar		84%	95%	94%	
Kurgan Tyube		63%	95%	95%	
Total	More than 90%	72%	95%	95%	

Based on the above results, the Experts assessed that the Project Purpose has been achieved

(2) At Least 80% of Visual Inspection Results by Original Target 22SEHMs, Using the Revised Guidelines is Assessed Accurate by the JICA Experts by the End of the Project

During the Project, Visual Inspection was conducted using the prescribed method and forms in the Revised Guidelines in 2015 and 2016, once each year. The Experts conducted OJT training as required since 2015.

All original target SEHMs conducted Visual Inspection except for N. Khusrav SEHM in 2016 due to the reason indicated for Roughness Survey as summarized in Table 5.1-3 below.

Table 5.1-3 Number of SEHMs Participating Visual Inspection

SETM	OJT Training for Visual inspection number of SEHM				Remarks
	Target	2014	2015	2016	
Gissar	9	9	9	9	
Kurgan Tyube	13	13	13	12	*
Total	22	22	22	21	*

* In 2016 N. Khusrav SEHM in Kurgan SETM no measurement due to road closure.

The Experts assessed the accuracy each year using the results at both Gissar SETM and Kurgan Tyube SETM as indicated in Table 5.1-4.

Table 5.1-4 Visual Inspection Results

SETM	Accuracy of Visual Inspection %				Remarks
	Target	2014	2015	2016	
Gissar		84%	84%	94%	
Kurgan Tyube		75%	91%	94%	
Total	More than 80%	79%	88%	94%	

Based on the above results, the Experts assessed that the Project Purpose has been achieved.

(3) At Least 80% of Results of the Road Repairing Works #2 by Three Fourths of Original Target SEHMs, Planned Based on the Results of the Road Inspection and Implemented According to the Revised Guidelines, Meet Requirements of Time, Cost, Quality, and Safety Specified in the Plans

Road Repairing Works #2 was planned based on the results of the Road Inspection Guidelines and implemented according to the Revised Road Repairing Guidelines as Pilot Project #2 in 2015 and 2016. The Experts were on site provided technical assistance and advice as required.

The results of participation of SEHMs in Pilot Project#1 and #2 are summarized in Table 5.1-5 below. The host SEHM is the designated SEHM under which jurisdiction the PP#1 and PP#2 are carried out. The guest SEHMs are the SEHMs to whom a part of the supervision delegation was handed over for PP#1 and PP#2. This concept was utilized in 2016 based on the recommendations from JTE. In 2015, many SEHMs participated in 2015 PP#2 as observers.

Table 5.1-5 Number of SEHMs Participating Pilot Project

SETM	Result of Pilot Project # 1 and # 2												Remark
	2014(PP#1)				2015(PP#2)				2014(PP#1)				
Implementation Status	Host	Guest	Host+ Guest	Obser ver	Host	Guest	Host+ Guest	Obser ver	Host	Guest	Host+ Guest	Obser ver	
Gissar	1	0	1	0	1	0	1	5	2	6	8	0	
Kurgan Tyube	2	0	2	0	2	0	2	4	1	12	13	0	
Total	3	0	3	0	3	0	3	9	3	18	21	0	

Total Number of SEHM in Gissar SETM 9, in Kurgan Tyube 13
3/4 of 22 = 17

The Experts assessed that the results of Pilot Project #2 in 2016 by 21 SEHMs out of 22 SEHMs were satisfactory and met requirements of time, cost, quality and safety at both Gissar SETM and Kurgan Tyube SETM as indicated in Table 5.1-6.

Table 5.1-6 Results of Pilot Project #2

SETM	Target	2015 Nos. of Sites	2015 Results Passed	2015 % of Passing	2016 Nos. of Sites	2016 Results Passed	2016 % of Passing	Remarks
Gissar		4	4	100	2	2	100	
Kurgan Tyube		4	5	80	4	4	100	
Total	More than 80%	8	9	89	6	6	100	

Based on the above results, the Experts assessed that the Project Purpose has been achieved.

(4) Road Inspection and Repairing Guidelines for SETM/SEHM Revised Through the Project are Approved by the End of the Project

Both guidelines were submitted to MOT as the JICA Final Version on 27 September 2016. The subsequent review of the guideline was conducted by MOT in October. The results of such review was reflected into the MOT Approved Versions. The approval was made by the Head of Road Construction and Maintenance Department of MOT on 31 October 2016.

Please refer to Attachment PS-1 in the electronic file for the letters from MOT to the Experts indicating the dates of approval.

5.2 Output 1 (for Road Pavement Inspection)

(1) 1a. Road Inspection Guidelines for SETM/SEHM are revised with the newly developed Roughness Survey Manual by April 2014.

The output was delivered on March 2014. The Experts designated this document as Version 0 and submitted to MOT on 16 April 2014.
Please refer to Attachment PS-2 in the electronic file for Version 0 of the Pavement Inspection Guideline and submission letter.

(2) 1b. International Roughness Index (IRI) of the roads in the original target area is collected according to the revised Guidelines by the original target 2 SETMs in coordination with the original target 22 SEHMs at least twice by the end of the Project.

IRI measurement was taken using DRIMS equipment since April 2014. Data collection was made in accordance with the revised Guideline applicable at the time of each data collection.

Gissar SETM and Kurgan Tyube SETM in coordination with 22 SEHMs carried out the task with the full support of the Experts in 2014, but with little assistance in 2015/2016. As such, they were able to carry out the task three times during the Project.

(3) 1c. Visual inspection according to the revised Guideline is conducted at least twice by all original target SEHMs by the end of the Project.

Visual inspection was carried out using Form 1 of the Guideline since July 2014.Both Gissar SETM and Kurgan Tyube SETM combined efforts together with 22 SEHMs to carry out the task with the full support of the Experts in 2014, but with little assistance in 2015/2016 similarly as in IRI measurement. As such, they were able to carry out the task three times during the Project.

The Experts provided assistance in the form of provision of cars required to carry out both IRI measurement and visual inspection in 2014. In 2015 and 2016, the tasks were carried out using the pick-ups provided under the JICA Equipment Supply Grant Aid.

Please refer to Attachment PS-3 in the electronic file for pavement inspection record in 2014, 2015 and 2016.

(4) 1d. Road Inspection Guidelines for SETM/SEHM are finalized by September 2016 for submission to MOT, reflecting feedbacks from the road inspections (roughness survey and visual inspection) in the target area.

JICA Final Version of the Road Inspection Guideline, reflecting feedbacks from the 2016 road inspection was submitted to MOT for its review on 27 September 2016.

Please refer to Attachment PD-1 for MOT Version of Road Inspection Guidelines.

(5) 1e. Training of IRI measurement and visual inspection for additional 2 SETMs and 6 SEHMs were conducted at the additional target area by the Master Trainers for inspection from the original target SETM/SEHMs, using the revised Guidelines.

Participants from SEHMs for training under Kulyab SETM were from Kulyab, Vose and Muminobod SEHMs. Under Sogd SETM, they were from B. Gafulov, J. Rasulov and Konibodom SEHMs.

Training for Kulyab SETM was conducted by Mr. Muzaffar from Kurgan Tyube SETM and training for Sogd SETM was conducted by Mr. Isomoil from Gissar SETM. Both are certified Master Trainer under the Project.

Please refer to Attachment PS-4 in the electronic file for the training record.

(6) 1f. At least 80% of the training participants from additional target SETMs and SEHMs pass the post-training test on basic elements of road inspection.

The results of training are summarized in Table 5.2-1 below.

Table 5.2-1 Number of Participants and Result of Training on Road Inspection

	Basic Training on Pavement Inspection				Remarks
SETMs	Target	Nos of Trainees Taking Test	Results Passed	% of Passing	
Sogd		3	3	100	
Kulyab		2	2	100	
Total	more than 80%	5	5	100	

There were 6 trainees, but one trainee had to forfeit the final testing due to unexpected poor health on the day of testing. Owing to the time constraint, this trainee was unable to receive another opportunity to show his skills and understanding on basic elements of training.

Please refer to Attachment PS-5 in the electronic file for the test record.

5.3 Output 2 (for Road Pavement Repair)

(1) 2a. Road repairing guidelines for SETM/SEHM are revised by April 2014.

The output was delivered on April 2014. The Experts designated this document as Version 0 and submitted to MOT on 12 May 2014.

Please refer to Attachment PS-6 in the electronic file for Version 0 of the Pavement Repair Guideline.

(2) 2b. At least 80% of the training participants from original target SETM passes the post-training test on road repairing to use hot mix asphalt.

There were 2 post-training tests, one each in 2014 and 2015. In the first training in 2014, this indicator was not achieved to the surprise of the Experts. The second training was performed and this repeated effort enabled participants to achieve the required indicator. The results of the tests are summarized below in Table 5.3-1.

Table 5.3-1 Number of Participants and Result of Training on Road Repairing

		2014 – 1st Training			2015 – 2nd Training			Remarks
SETM	Target	Nos. of Participants	Results Passed	% of Passing	Nos. of Participants	Results Passed	% of Passing	
Gissar		12	9	75	9	9	100	
Kurgan Tyube		15	9	60	21	19	90	
Total	More than 80%	27	18	67	30	28	93	

Please refer to Attachment PS-7 in the electronic file for the test record.

(3) 2c. At least 5.0km length of road repairing (#1 and #2) is implemented by at least 80% of the original target SEHMs according to the revised Guidelines by the end of the Project.

Road repairing #1 was conducted in 2014 and #2 was conducted in 2015 and 2016.

The lengths of road repaired under #1 (Pilot Project #1) and #2 (Pilot Project #2) are summarized below in Table 5.3-2 Summary of Pilot Project

		Pilot Project #1(2014)			Pilot Project #2(2015&2016)			Remarks
SETM	Year Performed	Actual Length(m)	Width(m)	Converted 7.0m length(m)	Actual Length(m)	Width(m)	Converted 7.0m length(m)	
Gissar SETM								
Vahdat-Rohati	2014	160	4.3	98				
Vahdat-Jarboshi	2014	210	7.0	210				
Rudaki-06	2015				1,203	6.0	1,031	
Rudaki-03	2016				150	7.0	150	
Vahdat	2016				80	7.0	80	* quasi PP#2
Sub Total		370		308	1,433		1,261	
Kurgan Tyube SETM								
Uzen Jilikul -1	2014	150	7.0	150				
Uzen Jilikul -2	2014	140	6.0	120				
Khuroson-01	2015				428	8.0	489	
Jilikul-01	2015				771	7.0	771	
Zargar	2016				1,380	5.0	985	
Sub Total		290		270	2,579		2,245	
Total		660		578	4,012		3,506	
at least 5.0km		Total actual length(m) = 4,672m, Total converted length(m) = 4,084m						
At Gissar SETM, an overlay over the bridge was carried out by Rudaki SEHM for the length of 130m in 2016. The converted 7.0m width length was 301m. As this was an emergency action, it is not classified as a part of PP#2.								

Table 5.3-2 Summary of Pilot Project

SETM	Year Performed	Pilot Project #1(2014) Actual Length(m)	Width(m)	Converted 7.0m length(m)	Pilot Project #2(2015&2016) Actual Length(m)	Width(m)	Converted 7.0m length(m)	Remarks
Gissar SETM								
Vahdat-Rohati	2014	160	4.3	98				
Vahdat-Jarboshi	2014	210	7.0	210				
Rudaki-06	2015				1,203	6.0	1,031	
Rudaki-03	2016				150	7.0	150	
Vahdat	2016				80	7.0	80	* quasi PP#2
Sub Total		370		308	1,433		1,261	
Kurgan Tyube SETM								
Uzen Jilikul -1	2014	150	7.0	150				
Uzen Jilikul -2	2014	140	6.0	120				
Khuroson-01	2015				428	8.0	489	
Jilikul-01	2015				771	7.0	771	
Zargar	2016				1,380	5.0	985	
Sub Total		290		270	2,579		2,245	
Total		660		578	4,012		3,506	
at least 5.0km		Total actual length(m) = 4,672m, Total converted length(m) = 4,084m						
At Gissar SETM, an overlay over the bridge was carried out by Rudaki SEHM for the length of 130m in 2016. The converted 7.0m width length was 301m. As this was an emergency action, it is not classified as a part of PP#2.								

The SEHMs participated in the Pilot Projects #1 and #2 are categorized into various participation status as shown in Table 5.3-3.

Table 5.3-3 Number of SEHMs Participating Pilot Project by Status

SETM	Result of Pilot Project # 1 and # 2												Remark
	2014(PP#1)				2015(PP#2)				2014(PP#1)				
Implementation Status	Host	Guest	Host+ Guest	Obser ver	Host	Guest	Host+ Guest	Obser ver	Host	Guest	Host+ Guest	Obser ver	
Gissar	1	0	1	0	1	0	1	5	2	6	8	0	
Kurgan Tyube	2	0	2	0	2	0	2	4	1	12	13	0	
Total	3	0	3	0	3	0	3	9	3	18	21	0	

Total Number of SEHM in Gissar SETM 9, in Kurgan Tyube 13
3/4 of 22 = 17

As such the Experts agree that 21 SEHMs out of 22 entire SEHMs implemented either Pilot Project #1 or #2 by the end of the Project.

(4) 2d. Road Repairing Guidelines for SETM/SEHM are finalized by September 2016 for submission to MOT, reflecting feedbacks from road repairing works #1 and #2.

JICA Final Version of the Road Repairing Guideline, reflecting feedbacks from road repairing works #1 and #2 was submitted to MOT for its review on 27 September 2016.

Please refer to Attachment PD-2 for MOT Version of Road Repair Guidelines.

(5) 2e. All the appointed laboratory technicians of the asphalt plants in the target SETMs score at least 70 out of 100 points in the post-training tests.

The results of the tests by the appointed laboratory technicians are shown in Table 5.3-4. All four technicians passed the test in both 2015 and 2016. Please refer to Attachment PS-9 in the electronical file for the training record.

Table 5.3-4 Number of Laboratory Technicians and Result of Training on Quality Training

SETM	Target	Quality Control Training						Remarks
		2015 – 1st Training			2016 – 2nd Training			
		Nos. of Participants	Results Passed	% of Passing	Nos. of Participants	Results Passed	% of Passing	
Gissar		2	2	100	2	2	100	
Kurgan Tyube		2	2	100	2	2	100	
Total	100%, score of 70 or higher	4	4	100	4	4	100	

(6) 2f At least 80% of the training participants from additional target SETMs and SEHMs passes the post-training test on basic elements of pavement repair by the end of the Project.

The results of training are summarized in Table 5.3-5 and Table 5.3-6. Table 5.3-5 is for pavement repair in general and Table 5.3-6 for quality control at asphalt plant.

Table 5.3-5 Number of Participants and Result of Training on Road Repair

SETM	Basic Training on Pavement Repair				Remarks
	Target	Nos of Trainees Taking Test	Results Passed	% of Passing	
Sogd		4	4	100	
Kulyab		3	3	100	
Total	more than 80%	7	7	100	

There were 8 trainees, but one trainee had to forfeit the final testing due to urgent commitment on the day of testing. Owing to the time constraint, this trainee was unable to receive another opportunity to show his skills and understanding on basic elements of training.

Table 5.3-6 Number of Participants and Result of Training on Quality Training

SETM	Basic Training on Quality Control				Remarks
	Target	Nos of Trainees Taking Test	Results Passed	% of Passing	
Sogd		2	2	100	
Kulyab		2	2	100	*
Total	100%, score of 70 or higher	4	4	100	*

Please refer to Attachment PS-8 in the electronic file for the training record and test record.

6. ISSUES AND LESSONS LEARNT FROM PROJECT IMPLEMENTATION

6.1 Implementation Policy

The Experts implemented the Project based on the following implementation policies and also placed emphasis on understanding the history and background as well as in Tajikistan.

(1) Place importance of understanding road pavement maintenance cycle and develop a cycle for a single fiscal year then consider further mid-term and long term cycles.

(2) Establish a pavement inspection system combining IRI data and visual inspection to improve the level of pavement inspection.

(3) Position road pavement repair works required under the Project as pilot projects so that such works are carried out as scheduled with necessary budget allocation by MOT.

(4) Place importance on effective use of JICA equipment supply. Provide advice and support to enable the Counterparts to attain skills and knowledge for plant and machineries operation and maintenance.

(5) Obtain cooperation from various project stakeholders so that the Project can be implemented smoothly and maintain a vision for sustainable management and operation by the Tajikistan side after completion of the project.

6.2 Collaboration between Counterparts and Experts in Teamwork Spirit

The Experts had strong support from Tajikistan staff that had experience in the previous road construction projects under the JICA grant aid scheme. This was one of the reasons that communication between the Experts and the Counterparts proceeded smoothly. This setup worked satisfactory since the beginning of the Project. The Experts also placed emphasis on developing a sense of teamwork between the Experts and the Counterparts. The Experts strived to deliver such spirit which was one of the most important elements in successful implementation of a Project. The Experts witnessed and experienced a considerable build up of teamwork spirit as well as development of project ownership from various levels of the Counterparts since commencement of Pilot Project #1 and #2.

6.3 A New Surge of Demand to MOT/SETMs/SEHMs from Local Governments

By actually witnessing various roads being repaired using hot mix asphalt, various local governments started ordering production of hot-mix asphalt and road pavement works from Gissar and Kurgan Tyube SETMs and SEHM offices under them since 2014. This was based on understanding that a reliable hot-mix asphalt plant commenced operation in each of two regions where no commercial plants were available before and that training on production and pavement works were provided by the Experts under pilot projects since 2014.

Based on information obtained from two asphalt plants, 27,200 and 18,400 tons of hot mix asphalt mixture were produced respectively in 2015 and 2016. Approximately 90% of supply was used for use by local governments and by others. The plants are used fairly extensively during the two years of full operation.

It was MOT's requirement that a fixed percentage of road maintenance must be carried out for local roads as well each year. However, this had not been done due to lack of equipment and skills required. This will not be the case any more as the surge for pavement repair by hot-mix asphalt will steadily increase by local governments.

6.4 Use of Locally Available Liquid Bitumen

The Experts identified that SETMs and SEHMs were using liquid bitumen MG70-130 produced in Kumisangir by LLC Salosa. The Experts took collection of material samples and uncovered hidden potentials of the materia.

The basic characteristic of the sample appeared to be similar to'cut back' asphalt, a material originally a straight asphalt mixed with a portion of diesel etc to enhance plasticity.

By applying MG 70-130 bitumen and mixing with aggregates and sand using a hot mix asphalt plant instead of using a motor grader as a cold-mix as practiced by SEHMs, the Experts believes produced new cold-mix materials will have higher quality as a road repair material.

In order to confirm such potential of the material, the Experts conducted a material property test using Marshal Stability Test. This test has been selected as no other tests would provide specific values to verify such quality improvement.

A material property test using Marshal Stability Test was conducted from May 2014 and continued until July 2014.

Based on the result of such tests, the Experts submitted

1) **Draft Technical Study Report on Kumsangir Bitumen for Pavement Repair**

2) **Draft Technical Guideline for use of Kumsangir Bitumen for Pavement Repair**

to MOT on 1 August 2014 for recommendations for use on roads with low heavy traffic volume.

Kurgan Tyube SETM commenced actual use of the new cold-mix materials using the hot-mix asphalt plant for asphalt production and pavement as a part of training offered under the Project for Improvement of Equipment for Road Maintenance in Khatlon Region and Districts of Republican Subordination in September and October.

Pavement using MG70/130 by Kurgan Tyube SETM nearby Jilikul Plant

The Experts believe by introduction of use of hot-mix asphalt production plant and provision of such new cold-mix materials, pothole repair works will actually last considerably longer in comparison with the material produced by the traditional method.

Unfortunately, due to the fact that the existing bitumen tank cannot replace the liquid material inside so easily, there is still a hope that such a constraint maybe overcome.

6.5 Preparation of Visually Illustrative Guidelines and Certification by MOT

The Project required preparation of guidelines for both Pavement Inspection and Pavement Repair and during the extended period, MOT was required to certify such guidelines. As such the guidelines were able to be utilized not only for the target groups, but by all SETMs and SEHMs in Tajikistan. The certified guidelines had the core element of technical standards and specifications, but were augmented by visual illustrations formulated originally for the use in trainings and workshops.
As the guidelines became very popular not only by MOT senior management staff, but also by SETM/SEHM managers and engineers, Road Construction and Maintenance Division of MOT requested the Experts to consider printing 200 copies through use of an official publishing shop in lieu of preparing 100 copies by the project office staff. Having accepted such a request, the Experts were able to provide 200 copies which were circulated not only to all MOT departments, but also to all 6 SETMs and 62 SEHMs as well, contributing towards strengthening the foundation of MOT road maintenance.

7. RESULT OF JICA TERMINAL EVALUATION AND SUBSEQUENT MODIFICATIONS TO THE PROJECT

7.1 Objectives of JICA Terminal Evaluation

The JICA Terminal Evaluation Mission (hereinafter referred to as the JTEM) conducted the evaluation from 29 November to 13 December 2015. The joint terminal evaluation team was formed by this JTEM consisting of three members named as the Japanese Team and the three member representatives of Tajikistan counterparts named as the Tajikistan Team.

The objectives of the evaluation were the following 5 points;

(1) To verify the accomplishments of the Project compared to those planned;

(2) To identify obstacles and/ or facilitating factors that have affected the implementation process;

(3) To analyze the Project in terms of the five evaluation criteria (i.e. Relevance, Effectiveness, Efficiency, Impact, and Sustainability); and

(4) To discuss the plan for the remaining period and the post-project period together among Tajikistan and Japanese sides based on the evaluation and analysis results and to discuss about solutions for any problems that may arise through the reviews and observations.

(5) To present the results in form of a Joint Terminal Evaluation Report.

The joint evaluation confirmed that “the Project Purpose – Implementation Capacity of Gissar SETM and Kurgan Tyube SETM for Road Maintenance is Improved” has moderately been achieved but is not likely to be achieved by the end of the Project because the period of repairing starts in May in Tajikistan.

7.2 Result of JICA Terminal Evaluation

The summary of evaluation is as shown on the next page.

Table 7.2-1 Summary of JICA Terminal Evaluation

Relevance	The Project is still relevant with the needs of Target Group and Tajikistan. It is also relevant with the National Plan of Tajikistan and ODA policies of Japan. Technical advantage of Japan has been confirmed.
Effectiveness	Effectiveness is moderate. The Project Purpose has been moderately achieved but is not likely to be achieved by the end of the Project. Meanwhile, both of the Outputs, although their level of achievement is different, have contributed to the achievement of the Project Purpose.
Efficiency	Efficiency is moderate. Output 1 has been produced almost as planned. Production of Output 2 is delayed primarily due to suspension of RRW#2 in 2015 resulted from the budget diversion to more urgent flood relief. Output 2 is unlikely to be fully produced before the end of the Project. Inputs from Tajikistan and Japanese sides have been mostly appropriate in producing Outputs except for shortage of the budget secured for RRW # 2 in 2015.
Impacts	Overall Goal is likely to be achieved to some extent. Various positive impacts have been already observed.
Sustainability	Sustainability is moderate.Technical capacity of the Target Group has been enhanced. The target SEHMs will be able to conduct road inspection according to the revised Guidelines as part of their routine work. However, transfer of road repairing technique is on the way because considerable on-site trainings of RRW#2 could not be completed in 2015. In addition, the number of SETMs participated in RRW #1 and RRW #2 as trainees was limited. It is unlikely that most of the target SEHMs will be able to conduct road repairing according to the revised Guidelines for themselves after the end of the Project due to lack of proper practical training. Sustainability would have been enhanced if engineers from more SETMs had participated in RRW #2.

As explained under Efficiency of Table 7.2-1 Summary of JICA Terminal Evaluation, Road Repairing Works #2 in 2015 were suspended in July 2015 owing to the devastating floods of Vaksh River which caused the diversion of the budget allocated for Road Repairing Works #2 to the flood relief. The consequence of such was that only 2.9 km of road repairing was completed against the target implementation of 5 km. the joint evaluation confirmed that achievement of Output 2 was severely constrained and that the Project Purpose was moderately achieved but it was not likely to be achieved by the end of the Project. Based on the summarization of all 5 elements of evaluation by JTEM, the extension of the project period was accepted as relevant and JTEM recommended the following 9 points to be implemented during the extended period.

(1) Completion of the activities under Output 2

- Continuation of Pilot Project #2
- Training of SEHM engineers by more than 3/4 of the original target 22 SSEHMs
- At least 5.0km of road is repaired under Pilot Project #1 and #2

(2) Continuation of road inspection according to the Guidelines as a routine work

- At least 90% of the results of roughness survey for the original target 22 SEHMs is assessed accurate.
- At least 80% of visual inspection for the original target 22 SEHMs is assessed accurate

(3) Expansion of the target group and the target area

- Training of IRI measurement and visual inspection for the additional target area is conducted by Master Traners

- At least 80% of training participants from the additional target group pass the post-training test for both pavement inspection and pavement repair.

(4) Development of a simple database for road maintenance at MOT

- A simple database for road maintenance, similar to the one developed at the target SETM should be developed at MOT based on the inspection results from the target SETMs by the end of the Project.

(5) Assignment of additional counterparts

- As additional counterparts, the following officers are included.

  Heads and chief engineers of Kulyab SETM and Sogd SETM

  Technical production manager of Gissar SETM and chief engineer of Gissar SETM and Kurgan Tyube SETM

  A technical personnel at Main Department of Road Construction and Maintenance, MOT

(6) Approval and publication of the Guidelines

- Pavement inspection and pavement guidelines for SETM/SEHM revised through the Project are approved by MOT by the end of the Project.

(7) Development of post project strategy

- By the end of the Project, MOT should develop a post project strategy for improvement of road conditions in the target area. Development of simple database would also contribute to developing such strategy.

(8) Allocation of budget

- For the remaining period of the Project, necessary budget should be allocated by MOT as per the PDM.

(9) Modification of PDM and PO

- The PDM and PO should be modified, reflecting the recommendations, Some of the Indicators , including those for the Project Purpose, should be modified in order to reflect the contents of the Project more properly. Indicators of the Overall Goal should be specified by the 6th JCC scheduled in May 2016, reflecting the post-project strategy.

The PDM (Version 3) and PO as mentioned above are attached from the following pages.

Appendix 1Logical Framework (PDM) 3

PROJECTTITLE: Project for Improvement of Road Maintenance	DURATION:Originally,31 months fromOct-2013 to May-2016., Extended for6 months to November 2016	PDM Ver.3
TARGETGROUP:22 SEHM*1's and 2 SETMs*2 in Gissar andKurgan-Tyube and Ministry of Transport(MOT) (original target group). 6 SEHMs and 2 SETMs in Sogd and Kulyab (additional target group in the extended period)	TARGETAREA:International & Republican roads in Gissar and Kurgan-Tyube (original target area)and in Sogd and Kulyab (additional target area)	DATE: 11-Dec-2015

*1 SEHM: State Enterprise on Highway Management, *2 SETM: State Enterprise of Transport Management

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Pavement condition of the roads under control of MOT in the target area is improved	1. By the end of 2019, at least ●kmand● km of lengthof roadrepairing is implemented byhot-mix asphaltat the original and additional target areas respectivelyaccording to the RoadRepairing Guidelines 2. The average Road RepairIndex (RRI) ofroads repaired under 1. above in the original target areahas areduction of at least●%compared to the same before repairing 3. The average IRI of the roads repaired under 1 above in the additional target area has a reduction of at least●% compared to the same before repairing Note: Target value (●) would be determinedby 6the JCC meeting schedule in May 2016.	1 Road maintenance recordsheet of each SETM (monthlyand yearly) 2 &3Form 1 of RoadInspection Guideline FinalVersion	
Project Purpose Implementation capacity for road maintenance*3 is improved	1. At least90 % of the results of roughness surveyatoriginal target 22 SEHMs, using the revised Guidelines,is assessed accurate by the JICA experts by the end of the Project. 2. At least 80 % of visual inspection results by original target 22 SEHMs, using the revised Guidelines,is assessed accurate by the JICA experts by the end of the Project. 3. At least80% of results of the road repairing works #2by three fourths oforiginal target SEHMS, planned based on the results of the road inspection and implemented according to the revised Guidelines, meet requirements of time, cost, quality, and safety specified in theplans. 4. Road Inspection and Repairing Guidelines for SETM/SEHM revised through the Project are approved by MOT by the end of the Project.	1&2 Road Inspection Record and its assessment summary 3. Repairing record and its assessment summary 4Date of approval by the First Deputy Minister Head of Main Depart, MOT	-Current socio-political situation is not changed drastically. -: Policy including the budget allocation for the road maintenance and repair is maintained. -Road repairing equipment to use hot-mix asphalt is available for additional 2 SETMs by the end of 2017
Outputs 1 Road inspection*4 skills of the target SEHMs are improved	1a Road inspection guidelines for SETM/SEHM are revisedwith the newly developed Roughness Survey Manualby April 2014. 1b International Roughness Index(IRI) of the roads in the original target area is collected according to the revised Guidelinesby the original target 2 SETMs in coordination with the original target 22 SEHMs at least twiceby the end of the Project. 1c Visual inspectionaccording to the revised Guidelinesis conducted at least twice by all original target SEHMs by the end of the Project. 1d Road Inspection Guidelines for SETM/SEHM are finalized by September 2016for submission to MOT, reflecting feedbacks from the road inspections (roughness survey and visual inspection) in the target area. 1e Training of IRI measurement and visual inspection for additional 2 SETMs and 6 SEHMs was conducted at the additional target area by the Master Trainers for inspectionfrom the original target SETMs/SEHMs, using the revised Guidelines. 1f At least 80% of the training participants from additional target SETM and SEHMs pass the post-training test on basic elements of pavement inspection.	1a Revised Inspection Guidelines 1b Roughness Survey Report 1c Inspection Record and its assessment summary 1d Final version of revised Guidelines submitted to MOT 1e Inspection Record 1f Test record and report	-Sufficient number of the engineers and operators of the target SEHMs is kept.
2 Road repairing*5 skills of the target SEHMs are improved	2a Road repairing guidelines for SETM/SEHMare revisedby April 2014. 2b At least 80 % of the training participants from original target SETM passes the post-training test on road repairing to use hot-mix asphalt 2c At least 5.0 km length of road repairing (#1 and #2) is implemented byat least 80% of the original targetSEHMs according to the revised Guidelines by the end of the Project 2d Road Repairing Guidelines for SETM/SEHM are finalizedby September 2016 for submission to MOT reflecting the feedbacks from road repairing works #1 and #2. 2e All of the appointed laboratorytechnicians of the asphalt plants in the target SETMs score at least 70 out of 100 points in the post-training tests. 2f At least 80% of the training participants from additional target 2 SETM and 6 SEHMs passes the post-training test on basic elements of pavement repair by the end of the Project	2a Revised Road and Repairing Guidelines 2b Test record and report 2c Road Repairing Record 2d Final version of revised Guidelines submitted to MOT 2e&2fTest record and report	

*3Road maintenance means pavement maintenance.*4Road inspection means pave inspection. *5 Roadrepairing means pavement repairing.

Table 7.2-3 PDM (Version 3) Page 2

Appendix 1Logical Framework (PDM) 3

Activities	Inputs		
1.1 Review the existing Road Inspection Guidelines 1.2 Revise the Road Inspection Guidelines with the attached Roughness Survey Manual. 1.3 Conduct trainings (in each region) on Roughness Survey for theoriginal target 2 SETMs and 22 SEHMs 1.4 Carry out Roughness Survey on the roads in the original target areaaccording to the revisedGuidelines by thetarget 2 SETMs in coordination withthe original target 22 SEHMs. 1.5 Organize a workshop (in Dushanbe) to summarize the results of Roughness Survey with the target 2 SETM, 22 SEHMs and MOT. 1.6 File the results of Roughness Survey(IRI data) by the original target 2 SETM inthe prescribed form of the revised Guidelines 1.7 Conduct trainings (in each region) on road inspection according to the revised Road Inspection Guidelines for the original target22 SEHMs and 2 SETMs. 1.8 Conduct visual inspection on the roads in the original target area at the originaltarget 22 SEHMs, according to the revised Guidelines. 1.9 Revise the Road Inspection Guidelines based on the results of the road inspection works (Act.1.4 &1.8). 1.10 Organize workshops (in each region) to introduce the revised Guidelines for the original target 22 SEHMs, 2SETMs and MOT. 1.11 Conduct road inspection (i.e.roughness survey, including filing results, and visual inspection)in the original target area at the originaltarget 22 SEHMs, according to therevisedGuidelines 1.12 Finalize the Road Inspection Guidelines based on the results of the road inspection works (Act.1.11). 1.13 Organize workshops (in each region) to summarize the results of road inspection and to introduce the finalized Road Inspection Guidelines for the target SEHMs, SETMs and MOT. 1.14 Certify Master Trainers for road inspection from the staff of the original target SETMs /SEHMs 1.15 Monitor and give technical advice on training conducted by the Master Trainers for additional target 2 SETMsand 6 SEHMs on basic elements of road inspectionat the additional target area 2.1 Review the existing Road Repairing Guidelines. 2.2 Revise the Road Repairing Guidelines to improve pavement maintenance. 2.3 Conduct trainings (in each region) on road repairing according to the revised Guidelines for the original target 22SEHMs 2.4 Provide support and advice on planning of the road repairing work #1(in each region)according the revisedGuidelines. 2.5 Implement an on-site technical instruction (in each region) for a road repairing work #1according the revisedGuidelinesat the selected SEHMs from the originaltarget 2 SETMs 2.6 Analyze the results of road repairing works #1, such as repairing materials and procedures. 2.7 Revise the Road Repairing Guidelines further based on the results of the analysis (Act.2.6). 2.8 Organize workshops (in each region) to introduce the revised Guidelines with the original target 22 SEHMs, 2 SETMs and MOT. 2.9 Plan the road repairing work #2in the original target area bytheselected target SEHMs according to the revisedGuidelines, reflecting the results of road inspection (Act.1.8) 2.10 Monitor and give technical advice on the road repairing works #2 2.11 Finalize the Road Repairing Guidelines based on the results of the road repairing works #2 2.12 Organize workshops (in each region) to give feedbacks on the results of road repairing works #2, such as repairing materials and procedures, and to introduce the finalized Road Repairing Guidelines for the target SEHMs, SETMs and MOT 2.13 Carry out training on appointedlaboratory technicians from each target SETM to be able toconduct day to day quality control testsat the asphalt plant 2.14 Assist the original target SETMs/SEHMs in training additional 2 SETMs and 6 SEHMs on basic elements of pavement repair using road repairing works #2 in2016 2.15 Certifytrainers for specific techniques for road repairing from the staff of the original target SETMs /SEHMs	<Japanese Side> **1. Experts** a) Leader /Road Maintenance Expert1 b) Road Inspection Expert 1 c) Roughness Survey Expert d) Road Repairing Supervision Expert 1 e) Road Repairing Supervision Expert 2 f) Road Maintenance Expert 2/ Road Inspection Expert 2 g) Interpreters **2. Equipment** Equipment for roughness survey (2 sets) **3. Expenses for kick-off, mid-term and final seminars** (Inputs other than indicated here will be determined through mutual consultation between JICA and MOT during the implementation of the Project, as necessary.)	<Tajikistan Side> **1. Counterparts for the Project** a) Project Director b) Project Manager c) Counterparts **2. Office Facilities** a) In the building of MOT for the Project with office furniture and utilities as telephone line, electricity, etc. b) In the building of SETM located in Kurgan-Tyube with office furniture and utilities such as telephone line, electricity, etc. **3. Running Expenses** necessary for the implementation of the Project including travel expenses and allowances for the participants of the trainings and workshops and expenses for road repairing works.	-Natural disaster which affect the activities of the Project does not occur -Security situation of Tajikistan, which limits the activities of the JICA experts, especially in the target area, does not deteriorate compared with the same in December 2015. **Pre -Condition** Tajikistan, especially the target area, is continuously safe enough for JICA Experts to implement the activities.

Table 7.2-4 PO Page 1

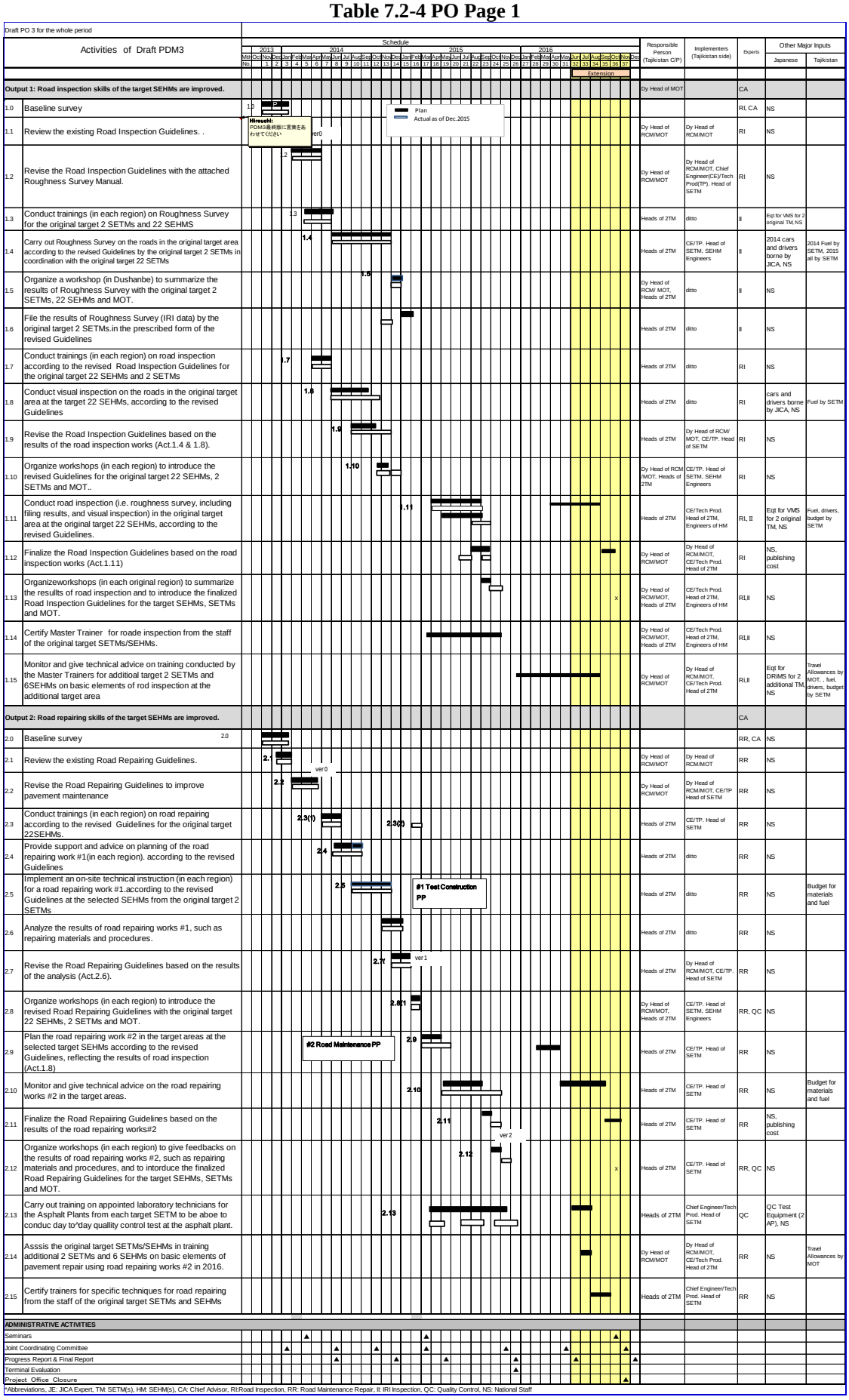
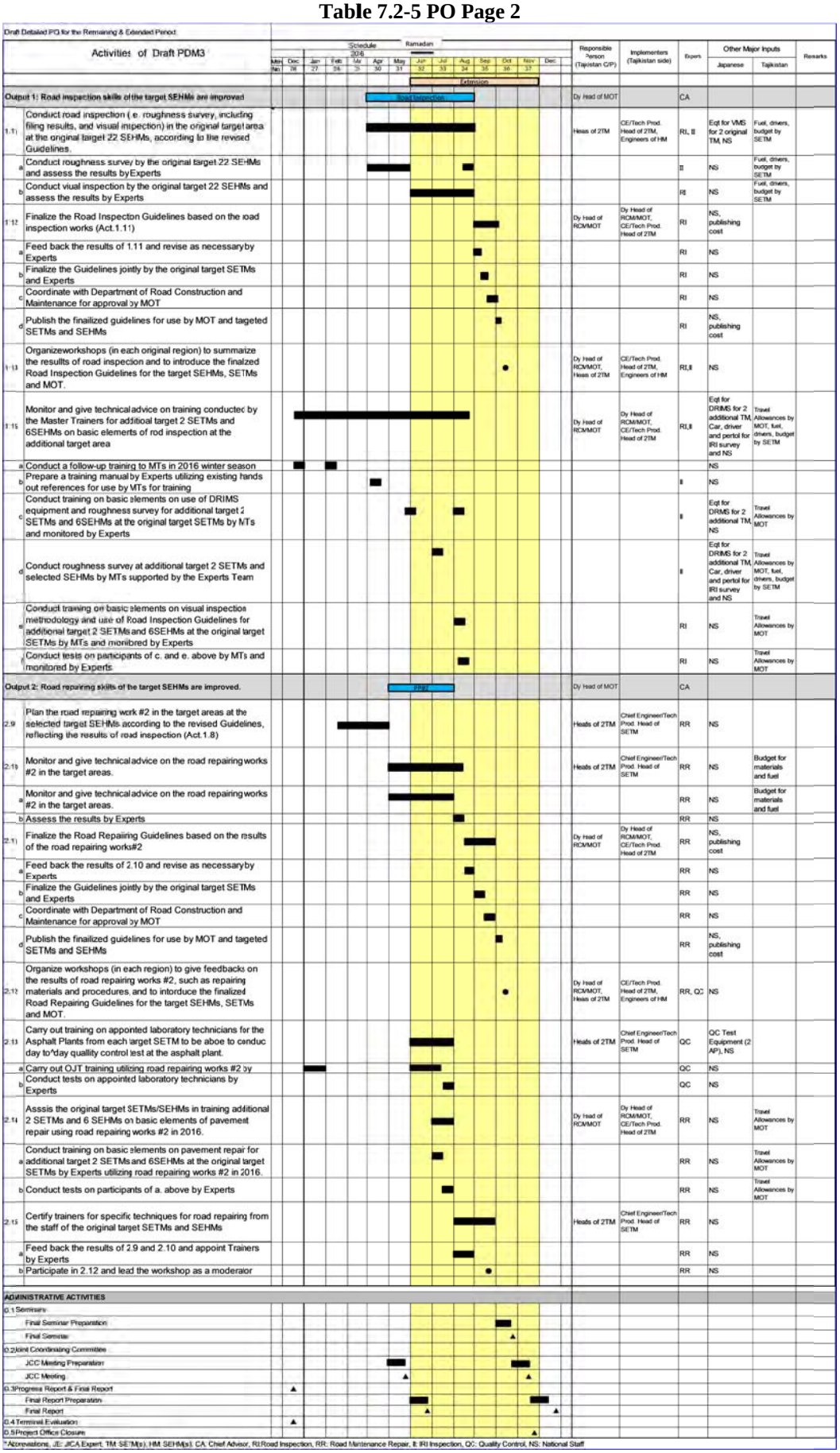


Table 7.2-5 PO Page 2



On the basis of the recommendations made by the joint evaluation team, the Minutes of Meeting was signed by JICA Tajikistan Office and MOT on 25 January 2016. The Project is amended accordingly and subsequent modifications were made.

8. RECOMMENDATION FOR OVERALL GOAL

Based on the completed activities under the Project and as indicated under PDM Version 4 dated 22 November 2016, the overall goal is as described below.

Overall Goal: Pavement condition of the roads in Tajikistan is improved.

Verifiable Indicators:

1. By the end of 2019, at least 30km and 15km of lengths of road repairing is implemented by hot-mix asphalt by the original and the additional target group respectively at International, Republican and local road according to the Road Repairing Guidelines.

2. The average Road Repairing Index (RRI) of roads repaired under 1 above in the original target area has a reduction of at least 60% compared to the same before repairing.

3. The average IRI of the roads repaired under 1 above in the additional target area has a reduction of at least 50% compared to the same before repairing.

On the 7th Joint Coordination Committee Meeting held on 22 November 2016, all members agreed to adopt the Post Project Strategy Paper to be the basis of project sustainability projecting to year 2021 in line with the Overall Goal. Hence, the contents of the paper will also enable MOT, SETMs and SEHMs to achieve the overall goal targeting the end of 2019.

It is therefore understood by all parties that steadfast continuation of action and decision making as indicated in the paper is the fastest and surest approach towards achieving the overall goal targeting the end of 2019.

The Experts will highlight some points here below.

For the original target group of Gissar and Kurgan Tyube SETM, all technical transfer was completed under the Project and steadfast action and appropriate budget funding will enable the goal to be achieved. For the case of the additional target group of Sogd and Kulyab SETM, strong and continuous support from Master Trainers certified under the Project will be necessary in addition to the appropriate budget funding. MOT will need to continuously monitor the progress and provide any assistance required so that all 4 SETMs achieve Overall Goal.

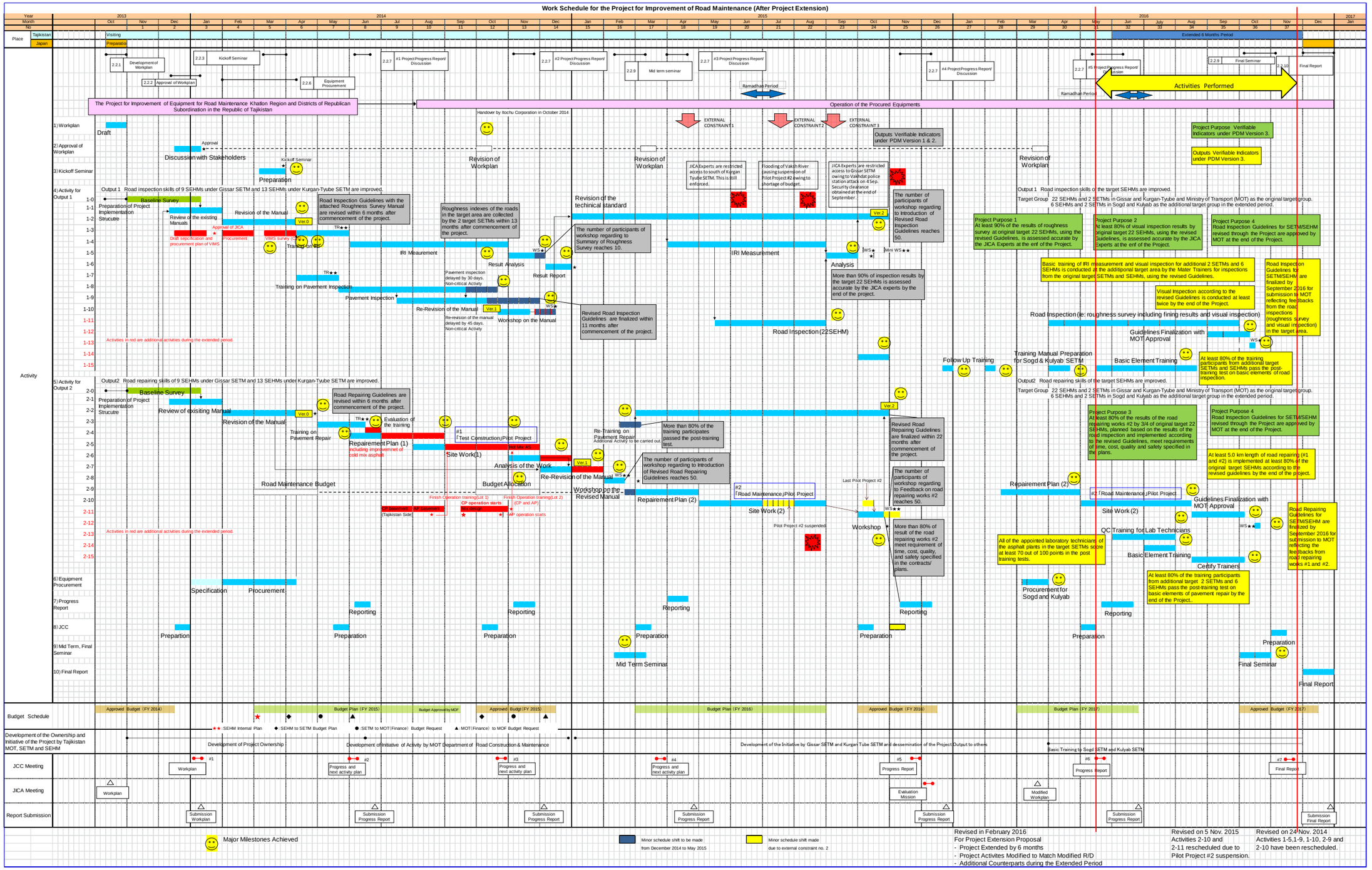
The Post Project Strategy Paper is attached as GP-5.

Attachments

Attachment GP-1

Project Flow Chart

Work Schedule for the Project for Improvement of Road Maintenance (After Project Extension)



Attachment GP-2

Work Plan

Japan International Cooperation Agency

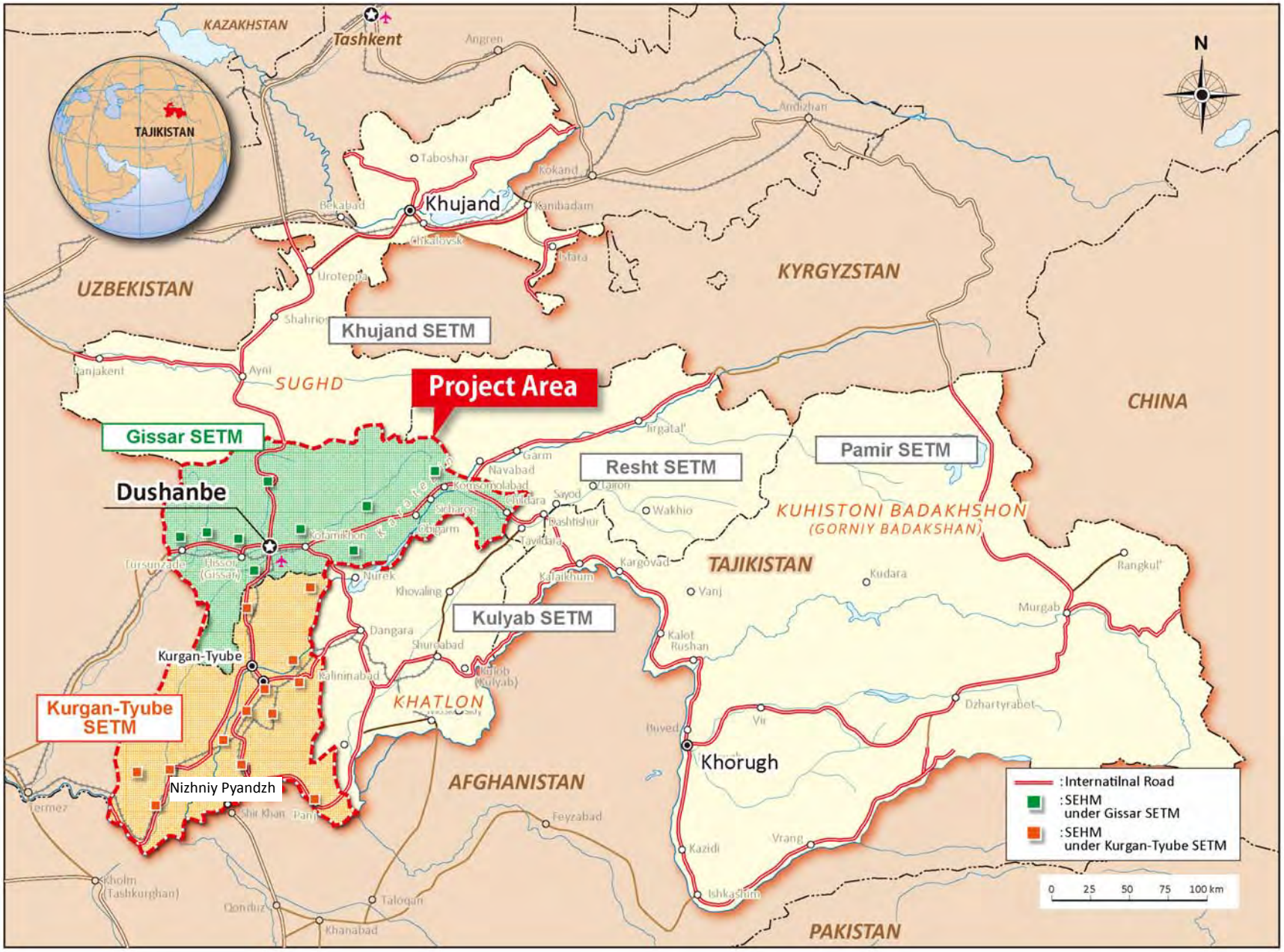
Republic of Tajikistan

The Project for Improvement of Road Maintenance

Work Plan

January 2014

CTI Engineering International Co.,Ltd.



Project Location

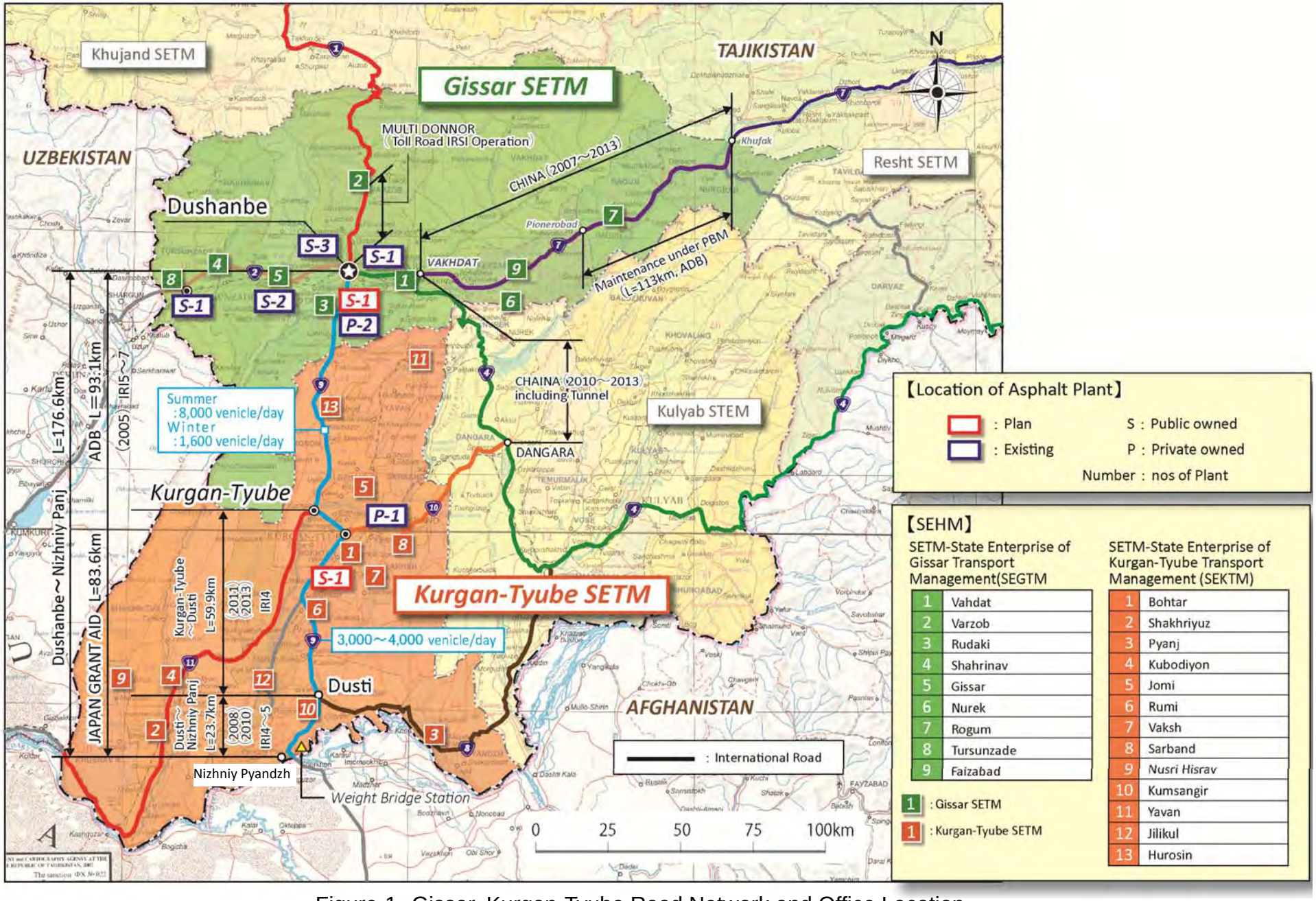


Figure-1 Gissar, Kurgan-Tyube Road Network and Office Location

Finance/Budget

❑ Table-1 National Budget, MOT and Road Maintenance【Graph1】

[unit：M somoni]

	2006	2007	2008	2009	2010	2011	2012
NATIONAL BUDGET	2,510	3,195	4,478	6,008	6,537	8,292	10,860
MOT BUDGET	54.0	58.1	78.1	616.0	638.0	918.9	936.2
MOT ROAD MAINTENANCE	21.5	22.2	25.2	33.0	34.0	39.0	46.8
ANNUAL GROWTH RATIO		102.9%	113.4%	131.2%	103.0%	114.7%	120.0%

Source：JICA Study, 2012

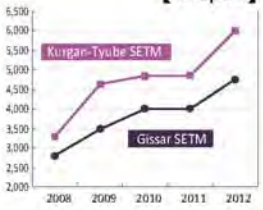
❑ Table-2 Budget Road Maintenance Cost【Graph2】

[unit：thousand somoni]

SETM	2008	2009	2010	2011	2012
Gissar SETM	2,808	3,503	4,005	4,005	4,772
Kurgan-Tyube SETM	3,310	4,656	4,847	4,847	6,003

Source：JICA Study, 2012

【Graph2】



❑ Table-3 Breakdawn of Budget 2012 of SETM (approved)【Graph3】

[unit：thousand somoni]

	Road Maintenance	Rehabilitation	Contingency	Salary	Total
Gissar SETM	2,059 [43.1%]	556 [11.7%]	366 [7.7%]	1,791 [37.5%]	4,772 [100.0%]
Kurgan-Tyube SETM	2,762 [46.0%]	229 [3.8%]	473 [7.9%]	2,538 [42.3%]	6,003 [100.0%]

(※15,000,000 Somoni was requested amount for both SETM)
Source：JICA Study, 2012

【Graph1】Road Maintenance Cost

【Graph3】Break down of SETM Budget

Road Maintenance Equipment

❑ Table-4 List of Existing Equipment in Gissar SETM and Kurgan-Tyube SETM

G：Gissar SETM, K：Kurgan-Tyube SETM [unit：nos]

	Equipment	G	K		Vehicle	G	K		Others	G	K
1	Tractor	11	11	8	Track	5	5	15	Asphalt heater	11	2
2	Bulldozer	4		9	Dump Track	14	11	16	Scarifier		
3	Motor Grador	11 (8)	10 (9)	10	Bus	3	1	17	Welder	7	7
4	Excavator	4 (1)	2 (1)	11	Trailer Head	3	1	18	Generator/welder	8	13
5	Wheel Loader	10 (9)	5 (5)	12	Crane			19	Generator	3	1
6	Asphalt Finisher			13	Sand Splayer	3	1	20	Trailer Head	11	8
7	Road Roller			14	Chep Sealer			21	Low bed	7	9
	Sub Total (1－7)	40 (18)	28 (15)		Sub Total (8－14)	28	19	22	Asphalt Cutter	5	10
								23	Vibration Compactor	4	7
									Sub Total (15－23)	56	57
									Total	124 (18)	104 (15)

NOTE：( ) nos of equipments procured under EBRD (Chinese)

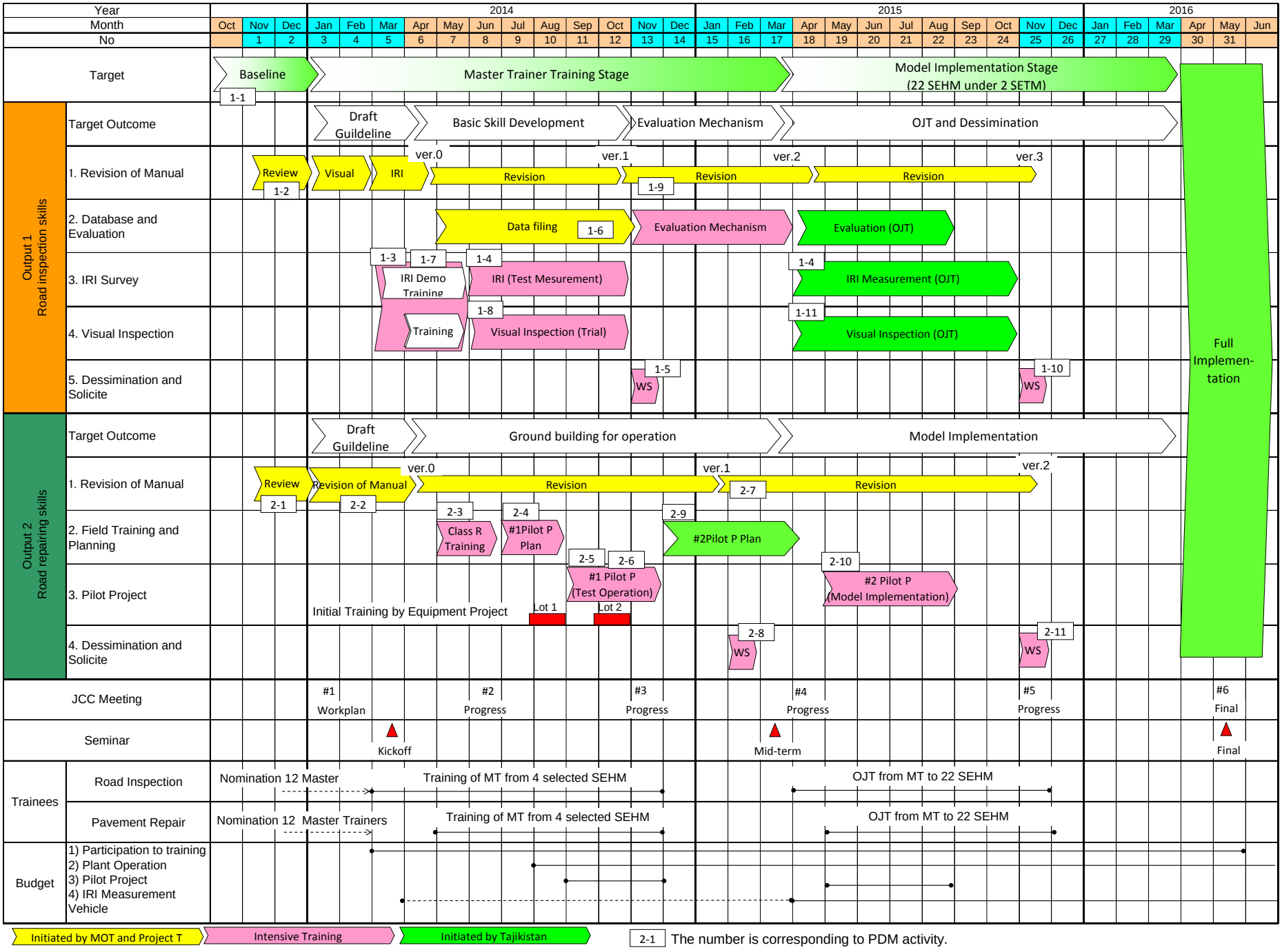
❑ Table-5 List of Equipment by JAPAN Grant Aid

G：Gissar SETM, K：Kurgan-Tyube SETM

No	Equipment	Specification		M/D G	M/D K	M/D Total
1	Asphalt Cutter	Cut Depth	150 mm	4	6	10
2	Vibration Compactor	Weight	70 kg	4	6	10
3	Hand Breaker	Weight	7 kg	4	6	10
4	Air Compressor	Air Pressor	5.1 m³/minute	2	3	5
5	Asphalt Sprayer	Tank Volume	400 Litter class	2	3	5
6	Hand Guide Roller	Weight	650 kg class	2	3	5
7	Asphalt Distributer	Tank Volume	6,000 Litter class	1	1	2
8	Asphalt Finisher	Width	4.5 m class	1	1	2
9	Road Roller	Weight	10 ton class	1	1	2
10	Tire Roller	Weight	15 ton class	1	1	2
11	Water Tank Truck	Tank Volume	8,000 Litter class	1	1	2
12	Motor Grader	Brade Width	3.7 m class	4	6	10
13	Crawler Excavator	Backet Volume	0.8 m³ class	3	3	6
14	Wheel Excavator	Backet Volume	0.8 m³ class	Deleted		－
15	Wheel Loader	Backet Volume	2.5 m³ class	1	2	3
16	Bulldozer	Weight	20 ton class	1	1	2
17	Dump Truck	Loading Weight	14 ton class	6	8	14
18	Asphalt Plant	Production	35 ton/h class	1	1	2
19	Aggregate Plant	Production	35 ton/h class	1	1	2
20	Multi-Purpose Vehicle	4WD		1	1	2
21	Snow Plough Attachment	Brade Width	3.0 m class	1	1	2
22	Rotary Blower Attachment	Diameter	750 mm class	1	1	2
23	Salt Spreader Attachment	Volume	2.0 m³ class	1	1	2
24	Truck with Crane	5 ton,2.8 ton Crane		1	1	2
25	Truck Trailer	25 ton Low bed		1	1	2
26	Pick-Up	4WD		2	2	4
27	Line Marker	Vehicle		1	0	1
28	Mobile Workshop	4WD,8 ton,Aluminum,Crane,workshop		1	1	2
29	Maintenance Equipment	Welder, generator, battery Charger		2	2	4
30	Axle Load/Vehicle Scale	L=18m Axleload and Gross weight measurment		0	1	1

Figure-3 Outline of Budget Condition for the Road Maintenance and SETM under the Project, Equipment List

Figure -1 Project Training Schedule



Republic of Tajikistan
The Project for Improvement of
Road Maintenance

Table of Contents

ABBREVIATIONS

CP	Counterparts
IRI	International Roughness Index
JCC	Joint Coordination Committee
JICA	Japan International Corporation Agency
MCI	Maintenance Control Index
R/D	Record of Discussion
SETM	State Enterprise of Transport Management
SEHM	State Enterprise of Highway Maintenance
TJS	Tajikistan Somoni

1. Project Outline

1.1 Back Ground of the Project

Republic of Tajikistan is the inland country surrounded by China, Kyrgyz Republic, Republic of Uzbekistan and Islamic Republic of Afghanistan. Tajikistan has an area of 143,000 sq. km, a population of 7.10 million and a road network of 30,000km. The road network has a vital role for the socio economic growth of the country with 65% of domestic freight and 99% passenger transport relying on roads. Moreover, the north-south international corridor (north is connected to Uzbekistan and south is connected to Afghanistan) and the east-west international corridor (east is connected to Uzbekistan and west is connected to China and Kyrgyz) are a part of the Asian Highway and CAREC Corridor (Central Asia Regional Economic Cooperation Corridor) which is an international corridor for development of effective Asian regional transportation. Because Tajikistan is located in the connective point between the central Asia and the south Asia, construction and maintenance of these international corridors are expected to contribute to the social growth of the whole central Asia countries including Afghanistan. However, the majority of the roads were constructed in the former Soviet Union period and damage from the independent war in 1991 and deterioration by age are evident. Furthermore, road maintenance work by the Ministry of Transport has always had difficulties to maintain due to insufficient numbers of equipment, engineers and engineering skills. This caused sometimes even the road rehabilitated under the international cooperation suffers from damage and deterioration. Such damaged road results in the increase in transportation cost and travel time, leading to the obstacle for the socio economical growth of Tajikistan.

The road connecting between Dushanbe, the capital, and Nizhniy Pyandzh, the border city between Afghanistan, is one of the most important international roads. The improvement of road maintenance by Gissar State Enterprises for Transport Management (refer as SETM) and Kurgan-Tyube SETM as well as State Enterprises on Highway Maintenance (refer as SEHM) under them who is responsible for the maintenance of the said road is of utmost importance. Khatlon State is next to Afghanistan which has not only direct influence of Afghanistan but also notes high poverty ratio of 50% comparing to the one in Dushanbe, 19%. As such, stability of Khatlon State is vital, in order to prevent dissemination of disorder to other parts of the society within Tajikistan by the influence of Afghanistan,. For such, the road network development of the area connecting Khalton State and Dushanbe is of major importance.

The government of Tajikistan in the National Development Strategy (NDS, 2007) and NDS's mid-term strategy, the Poverty Reduction Strategy,2010-2012 (PRS, 2010), emphasizes the importance of the international road network development as well as improvement of legal framework of the sector. Also, in the latest mid-term action plan, Living Standard Improvement Strategy (LSIS, 2013), it emphasizes the importance of the socio economic environmental improvement by the transport infrastructure development for regional linkage and improvement of the level of life. As the road sector policy, National Target Development Strategy for Transport Sector of the Republic of Tajikistan to the Year 2025 was prepared in 2011. In the policy it emphasized the importance of the rehabilitation of the deteriorated road built under the former Soviet Union period as well as the damaged road during the civil war.

Japan International Cooperation Agency (refer as JICA) is promoting rehabilitation of the highway and improvement of road maintenance capacity, following the policy adopted by the government of Tajikistan. Japan's grant aid project rehabilitated 83.6km out of 176.6km between Dushanbe and Nizhniy Pyandzh by (1) Rehabilitation of the road between Kurgan-Tyube and Dusti (Grant Aid 2008) , (2) Phase II Rehabilitation of the road between Kurgan-Tyube and Dusti (Grant Aid 2011), (3) Rehabilitation of the road between Dusti and Nizhniy Pyandzh (Grant Aid ,2006), (4) Phase II Rehabilitation of the road between Dusti and Nizhniy Pyandzh. Procumbent of the road maintenance equipment is signed under the project for improvement of

equipment for road maintenance in Khatlon Region and Districts of Republican Subordination in the Republic of Tajikistan.

Based on such background the government of Tajikistan requested to the government of Japan the technical assistance for the improvement of the road maintenance involving road inspection and repair skills. According to the request, JICA concluded the scope of works of the project under the pre-study in December 2012, and reached an agreement in June 2013 with MOT thus exchanging the Record of Discussions (refer as R/D). Based on such agreement, the project is being conducted under the technical assistance scheme with the title of The project for Improvement of Road Maintenance with the Ministry of Transport (refer as MOT) being designated as the Counterparts (refer as CPs).

【Reference】

MOT is responsible for the international roads, repub1ican roads and local roads for the total length of 13,800km, which is 46% of the entire national road network. Main Department for Road Construction and Maintenance under the MOT is responsible for the overall road maintenance with key roles for formulation of the road maintenance plan, budget control and procurement management. The State Enterprise for Transport Management : SETM, and State Enterprise on Highway Maintenance : SEHM, are the implementation body of the road maintenance. SEHM is also responsible for the inspection and maintenance of road pavement, bridges and road furniture. The SETM manages the road maintenance plan and budget control for all SEHMs under its umbrella.

There are six (6) SETMs and sixty two (62) SEHMs in the entire country. The project targets at Gissar and Kurgan-Tyube SETM as well as twenty two (22) SEHMs under them (Gissar 9, Kurgan-Tyube 13).

1.2 Outline of the Project

(1) Overall goal

Pavement condition of the international and republican roads under the jurisdiction of Gissar SETM and Kurgan-Tyube SETM is improved.

(2) Project Objective

Implementation capacity of Gissar SETM and Kurgan-Tyube SETM for road maintenance is improved.

(3) Project Design Matrix

The project is implemented according to the agreed Project Design Matrix. (Appendix 1)

(4) Outputs

1) Output 1

Road inspection skills of 9 SEHMs under Gissar SETM and 13 SEHMs under Kurgan-Tyube SETM are improved.

Activities

1-1. To review the existing Road Inspection Guidelines.

1-2. To revise the Road Inspection Guidelines with the attached Roughness Survey Manual.

1-3. To conduct trainings (in each region) on Roughness Survey for Gissar SETM and Kurgan-Tyube SETM.

1-4. To carry out Roughness Survey on the international and republican roads under the jurisdiction of Gissar SETM and Kurgan-Tyube SETM.

1-5. To organize a workshop (in Dushanbe) to summarize the results of Roughness Survey with Gissar SETM, Kurgan-Tyube SETM and MOT.

1-6. To file the results of Roughness Survey

1-7. To conduct trainings (in each region) on road inspection according to the revised Road Inspection Guidelines for the selected 2 SEHMs from each of Gissar SETM and Kurgan-Tyube SETM.

1-8. To conduct road inspection on the international and republican roads under the jurisdiction of the selected 4 SEHMs.

1-9. To revise the Road Inspection Guidelines based on the results of the road inspection works (1-8)

1-10. To organize workshops (in each region) to introduce the revised Road Inspection Guidelines for 18 SEHMs, Gissar SETM, Kurgan-Tyube SETM and MOT.

1-11. To conduct road inspection on the international and republican roads under the jurisdiction of al1 the 22 SEHMs under Gissar SETM and Kurgan-Tyube SETM.

2) Output 2:

Road repairing skills of 9 SEHMs under Gissar SETM and 13 SEHMs under Kurgan-Tyube SETM are improved.

Activities

2-1. To review the existing Road Repairing Guidelines.

2-2. To revise the Road Repairing Guidelines.

2-3. To conduct trainings (in each region) on road repairing according to the revised Road Repairing Guidelines for a11 the 22 SEHMs under Gissar SETM and Kurgan-Tyube SETM.

2-4. To provide support and advice on planning of the road repairing works #1 (in each region).

2-5. To implement an on-site technical instruction (in each region) for the road repairing works #1.

2-6. To analyse the results of the road repairing works #1, such as repairing materials and procedures.

2-7. To revise the Road Repairing Guidelines based on the results of the analysis (2-6).

2-8. To organize workshops (in each region) to introduce the revised Road Repairing Guidelines with 20 SEHMs, Gissar SETM, Kurgan-Tyube SETM and MOT

2-9. To plan the road repairing works #2 on the international and republican roads under the jurisdiction of Gissar SETM and Kurgan-Tyube SETM.

2-10. To monitor and give technical advice on the road repairing works #2.

2-11. To organize workshops (in each region) to give feedbacks on the results of road repairing works #2, such as repairing materials and procedures for all the 22 SEHMs, Gissar SETM, Kurgan-Tyube SETM and MOT.

(5) Project Sites

- Ministry of Transport
- Gissar SETM and Kurgan-Tyube SETM and 22 SEHMs under these two (2) SETMs.
- The road network under above mentioned SETMs and SEHMs (International Road L= 719.2km, National Highway 703.4km)

(6) Coordination Ministry

Ministry of Transport (MOT)

(7) Project Period

October 2013 to May 2016 (32 months of the activity in Tajikistan)

1.3 Objectives of the Project and Target Area

(1) Objectives

The objectives of the project are to enhance the implementation capacity of road maintenance at Gissar SETM and Kurgan-Tyube SETM by training and strengthening both on inspection and execution capabilities on road pavement maintenance.

(2) Target Area

Road Pavement Maintenance

(3) Target Entity

Ministry of Transport

Gissar SETM and SEHM under its umbrella

Kurgan-Tyube SETM and SEHM under its umbrella

JICA Experts Team shall take proper steps to consider fully all the points indicated from the next page, following the objectives of the project. The monitoring report shall be submitted and coordination meetings shall be held regularly amongst the JICA Experts Team, Tajikistan Counterparts and JICA Tajikistan Office.

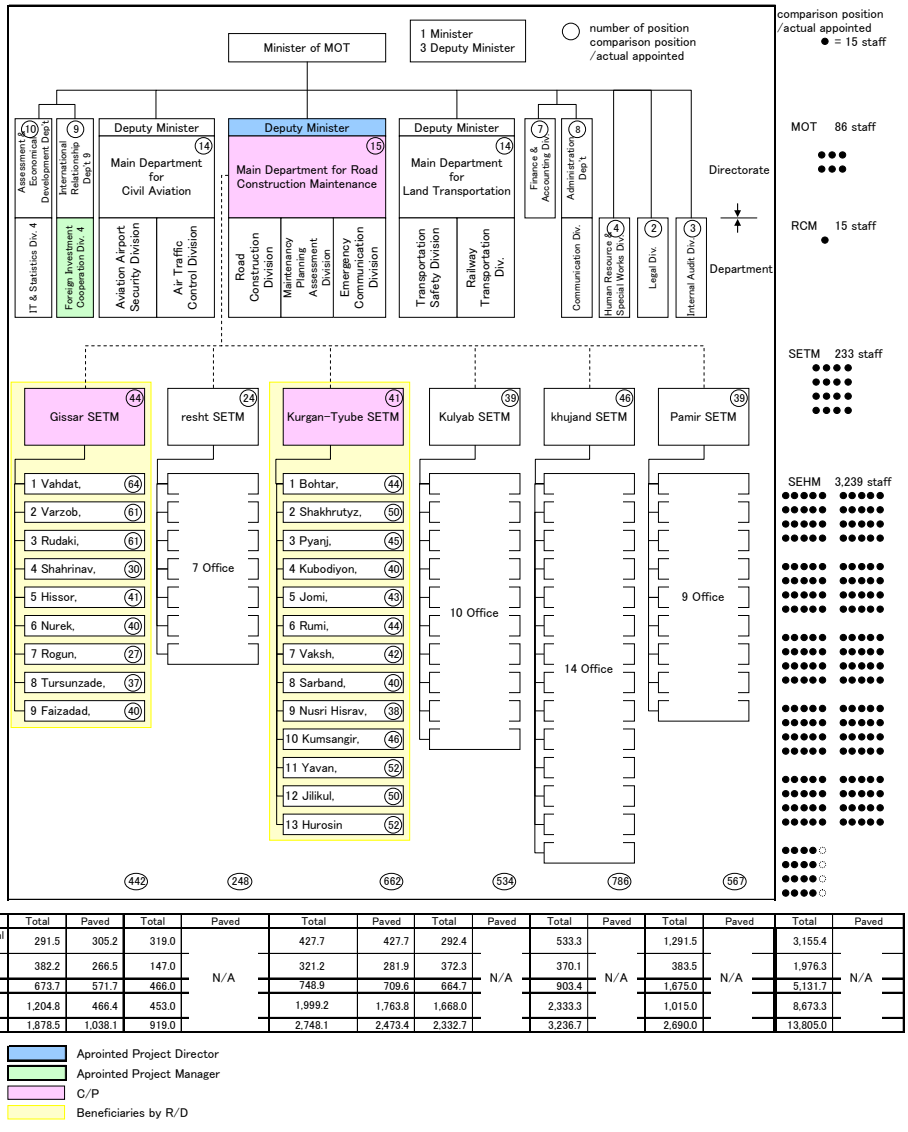
2. Technical Approach

2.1 Current Condition and Challenges

2.1.1 General Condition of the Road Maintenance Work Execution

(1) Organizational Structure and Staff

Main Department for Road Construction and Maintenance of MOT is in charge of formulation of the road maintenance plan, budget control and procurement management. The total number of the officials appointed is fifteen (15).Figure 2.1.1-1 illustrates the organizational structure of MOT and related entities.



	Total	Paved	Total	Paved	Total	Paved	Total	Paved	Total	Paved	Total	Paved	Total	Paved
International Highway	291.5	305.2	319.0		427.7	427.7	292.4		533.3		1,291.5		3,155.4	
Ntional Highway	382.2	266.5	147.0	N/A	321.2	281.9	372.3	N/A	370.1	N/A	383.5	N/A	1,976.3	N/A
Sub Total	673.7	571.7	466.0		748.9	709.6	664.7		903.4		1,675.0		5,131.7	
Regiond Highway	1,204.8	466.4	453.0		1,999.2	1,763.8	1,668.0		2,333.3		1,015.0		8,673.3	
Total	1,878.5	1,038.1	919.0		2,748.1	2,473.4	2,332.7		3,236.7		2,690.0		13,805.0	

Source：CTII

Figure 2.1.1-1 Organizational Structure of MOT

There are six (6) SETMs and 62 SEHMs which are in charge of road maintenance work in the entire Tajikistan. The field work such as inspection and repairing works for road pavements and bridges etc., are executed by SEHMs. SETMs are in charge of planning and budgeting for maintenance.

The target entity for the project is the two (2) SETMs (Gissar and Kurgan-Tyube) and the 22 SEHMs under them (9 under Gissar SETM and 13 under Kurgan-Tyube SETM).

In road maintenance works, SETMs and SEHMs are not only performing execution of the work but also conducting activities related to guideline review, inventory rporting, equipment management and maintenance, training of labors, and technical development as well. The total number of staff (nation wide) is 230 for SETMs, and 3,200 for SEHMs and they maintain the road network of 13,800km.

MOT and Kurgan-Tyube SETM has been involved in road rehabilitation projects under Japan's grant aid scheme.

(2) Finance and Budget

Followings are the general trend of the budget related to road maintenance on MOT and the target entity. (Figure -3, Source, JICA study, 2012)

- Regarding to the road maintenance budget of MOT, the budget allocation to road maintenance remained very low from 1990 till 2000. However, in parallel with the strong socio economic growth of the country, 4 to 5 % of the national budget is now allocated to the road maintenance. Therefore, the annual growth rate of the budget allocation to road maintenance is now keeping 20% continuously.
- Same to MOT, the road maintenance budget of Gissar SETM and Kurgan-Tyube SETM maintains also continuous growth for the last 5 years. However, even with such favorable growth of the budget allocation, the amount actually spent was 2,600,000TJS (approximately 53,520,000yen) for Gissar SETM、3,000,000TJS (61,750,000 yen) per year.
- Considering the increase of investment to the road development by international donor agencies, the budget for road maintenance still faces serious restriction.

(3) Equipment for Road Maintenance

It is to note that the existing equipment in the SEHMs under the two SETMs is only available for urgent repair and emergency purpose works. They are not sufficient for regular road maintenance works. (Figure 3, Source JICA Study 2012) The use of the equipment to be procured by JICA is important for improvement on road maintenance works.

2.1.2 Challenges for Road Maintenance Improvement

The major challenges for road maintenance improvement can be summarized as below;

(1) Organizational Challenge： Enhancement of " Road Maintenance Cycle"

Maintaining the skill for road inspection and maintenance repair is limited in terms of the level of technical competence due to shortage of equipment and trainings. On the other hand, needs for on-time maintenance is increasing whilst deterioration of roads accelerates. The Road Maintenance Cycle is a cyclic link of inspection, plan and implementation. On the grounds, according to the baseline survey, SETM and SEHM practice this cycle with a standard schedule, criteria and participation of other related entities. The Experts Team will accommodate this work manner and will incorporate additional concepts to enhance the road maintenance cycle which would be more effective for the situation in two SETMs.

(2) Budgetary Challenge : Optimizing the Road Maintenance Work

The current road maintenance work appears to be performed under a “ad-hoc” manner with use of cold mix asphalt due to shortage of equipment and the budgetary constraint. It is important that the maintenance work manner shifts towards the idea of “preventative” and “preplanned” manner.

For this shift towards the new idea, it is required to prolong the life of the pavement by introduction of hot mix asphalt, to monitor the pavement condition more effectively to locate defects in earlier time and to evaluate the condition based on a technical criteria so that optimization of the road maintenance work is achieved to maintain the road infrastructure investment even under a budgetary constraint.

(3) Challenge on Use of New Equipment : Recognition of Existing Competence and Newly Acquired Competence for New Equipment

Procurement of road maintenance equipment is planned for delivery in June 2014 under another project by JICA. Most equipment is for works which can be performed with the existing competence available in the SEHM staff. However, for the equipment for pavement repairing works by hot mix asphalt concrete such as asphalt concrete plant and paving equipment, the JICA Experts Team will carefully scrutinize availability of the existing competence and identify the area newly acquired competence is required. Technical guidelines including safety operation manuals for proper operation and maintenance may be prepared for training of such new skills,

(4) Challenge on Succession of Maintenance Skills : Expansion of Training Outputs for Improvement of SETMs and SEHMs

Succession of maintenance skills and knowledge is important for sustainability. The JICA Experts Team believes that it is important to enhance the concept of Road Maintenance Cycle amongst younger generations in SETMs and SEHMs and develop further skills on use of new equipment to achieve a harmonious balancing of skills and knowledge between all generations of staff in SETMs and SEHMs. Such skills and knowledge will be offered through desk works, lectures, equipment operation training and management training in the pilot project.

2.2 Technical Approach of the Project

The JICA Experts Team sets out three (3) key points on the technical approach for the project as shown below;

Key Technical Point

1. Share the concept of " Road Maintenance Cycle" with the Counterparts and achieve the required improvement
2. Ahieve technical transfer considering " Harmonious Balancing of Capacity in SETMs and SEHMs on road maintenance work"
3. Improve maintenance skills matching to Tajikistan conditions and supervise use of new equipments from JICA

2.2.1 Technical Aspect

2.2.1.1 Improvement on Road Pavement Maintenance Cycle

For the sustainable socio economic development, it is important that the road pavement condition is maintained at a reasonably good condition based on the level of importance of the road. In order to achieve such, 1) the repair methodology should match with the cause of the damage, 2) the repair methodology which offers the maximum road durability with the least investment must be sought, 3) the method to select the priority section for repair with a rational evaluation system even under a budget constraint must be sought, and 4) the entire maintenance related work links and formulates a cyclic work.

Four (4) important points are shown in the box Figure 2.2.1-1.

Point－1: First target is to develop a cycle for a single fiscal year then consider expansion to mid and long term cycle
Point－2:【Output 1】Improvement of Road Pavement Inspection
Point－3:【Output 2】Improvement of Road Maintenance Skill
Point－4: Link Output 1 and Output 2 as a cycle and obtain a simple pilot database. Then use such database for management purpose.

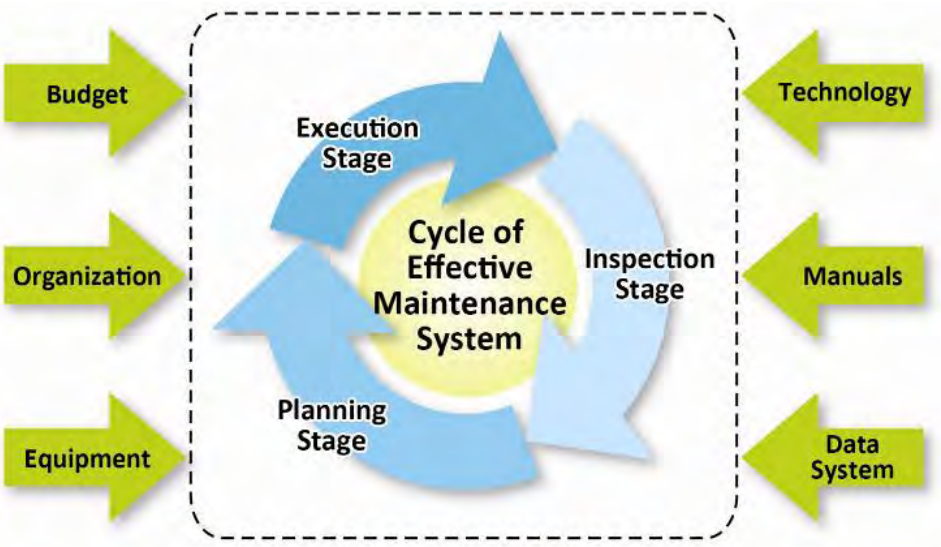


Figure 2.2.1-1 Concept of the Road Maintenance Cycle

2.2.1.2 Improvement of Road Pavement Inspection【Output 1】

Road inspection is done according to the existing documents developed during the former Soviet period. The following points may be raised as present issues for improvement. Considering such, the key technical approach is shown in the box below;

- Standardization of inspection method: Succession of the techniques appears to be not well organized and only limited to 'person to person' basis. Use of manuals is not popular.
- Visual inspection has a performance limit as it is time consuming.
- Results of inspection is rested upon each individual who perform inspection. Inconsistent inspection result: Inspection results depend on the individual inspector which may cause misjudgment of the result and become an obstacle when used for future planning.

Action 1 : Two steps inspection method: Combination of automatic IRI measurement and visual inspection
Action 2 : IRI measurement techniques and database collection method introduced
Action 3 : Numeric quantification of visual inspection result and standardization of inspection methodology (by application of the Japan's technology (MCI: Maintenance Control Index)), Preparation of two steps inspection manual
Action 4 : Prioritization system on road pavement maintenance using IRI introduced
Action 5 : Database and Management of IRI

(1) Automatic IRI Measurement and Two Steps Inspection Method

IRI is an index internationally used to measure the "smoothness" of the road surface. The data can be collected in a short period and the result is uniquely independent to the inspector's skill and experience. This methodology is useful for "scanning " the road network condition.

On the other hand, judgment by the traditional site inspection remains important to identify the cause of the damage and investigating the maintenance method.

Au such combination and two steps inspection methodology by using VIMS is proposed. (Figure 2.2.1-2)。**（Additional reference of IRI（Appendix-2））**

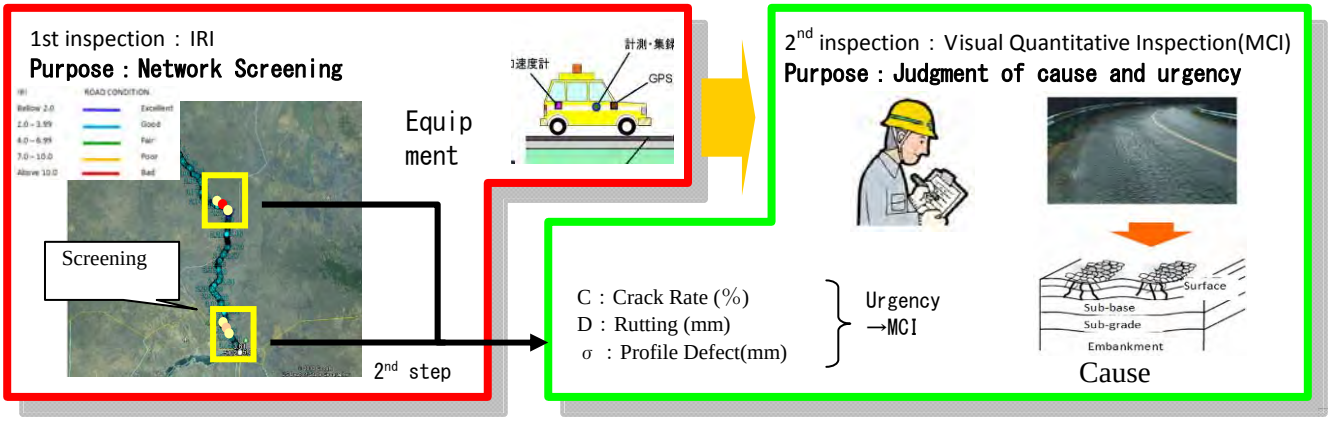


Figure 2.2.1-2 Two Steps Inspection Method using IRI

(2) IRI Measurement and Data Use

1) Important Points for IRI Measurement

The important points for IRI measurements are shown in Table 2.2.1-1.

Important points for IRI measurement training

① The target group of IRI training is MOT and SETM

② Nominate master trainees to be involved in the actual training of the project. They must be responsible to transfer the techniques (skills and knowledge) to other technical staff of the same office.

③ Correct calibration method must be understood and standardization of the criteria by using the IRI measurement result (coordinate the existing evaluation method in Tajikistan with the IRI result)

※ The technical transfer shall be target to the nominated counterparts from SEHM. The nominated trainees will be the "master trainee" who are expected to transfer the techniques to other staff as an instructor..

Table 2.2.1-1 Important points for IRI measurements

No	STEP		Points
1	Preparation of IRI measurement equipment	① Selection of the equipment	• Operability, easiness of maintenance, cost effective
		②Transfer	• engineers • road network operator • Easy for future expansion
2	IRI technical transfer	③Lecture	• Lecture and training by JICA Experts • Training by trainees to others • Training to other SETM
		④Operation	• Proper callibration, operation and analysis
3	IRI data application	⑤Data use	• Evaluation of the road condition • Monitoring of the rehabilitation and construction • Technical service by IRI, Standardization by using IRI result
4	IRI equipment maintenance	⑥Sustainability	• Easiness of maintenance and repair, After care • Participation of the training • Organizational structure for regular measurement
5	IRI expansion to other area	⑦ Technical transfer	• Development of the tool for training

(3) Quantify the Visual Inspection Result and Standardization of the Methodology

In Tajikistan, evaluation methodology of road inspection is stated in the technical guideline "Instructions for Evaluating the Quality of the Current Repair and Maintenance of Roads VSN10-87". Based on this document, the project will improve the methodology integrating newly deployed methodology, IRI. Following are the two (2) points to be focused;

1) Quantify the Visual Inspection

Maintenance Control Index(refer as MCI) which is widely applied in Japan to be studied for application in Tajikistan with discussion and agreements with counterparts. **（Additional reference of MCI（Appendix-3）**

The sample of MCI index is shown in Table 2.2.1-2.

2) Standardize the Methodology

The methodology standardized during the project will be designated as an official technical standard for use by MOT.

Table 2.2.1-2 Visual inspection of the pavement and quantify method (MCI)

Damage	Visual Inspection	Quantify				MCI (sample)＊			
	Traditional	Index			Method and tool	MCI	MCI_0	MCI_1	MCI_2
Profile	Pass/ not pass	Profile(σ)	(○mm)	⇒	Profile meter (measurement)	○			
Rutting	Subjective	Rutting(D)	(○mm)	⇒	Profile meter (measurement)	○	○		○
Crack	(Not unified)	Crack Rate(C)	(○%)	⇒	Sketching	○	○	○	
Visual ⟷		Quantify the result (proposition) ⟷							

＊MCI：Evaluation by 3 index、MCI_0：by 2 index、MCI_1 : by 1 index (crack ratio)、MCI_2：by 1 index (Rutting)

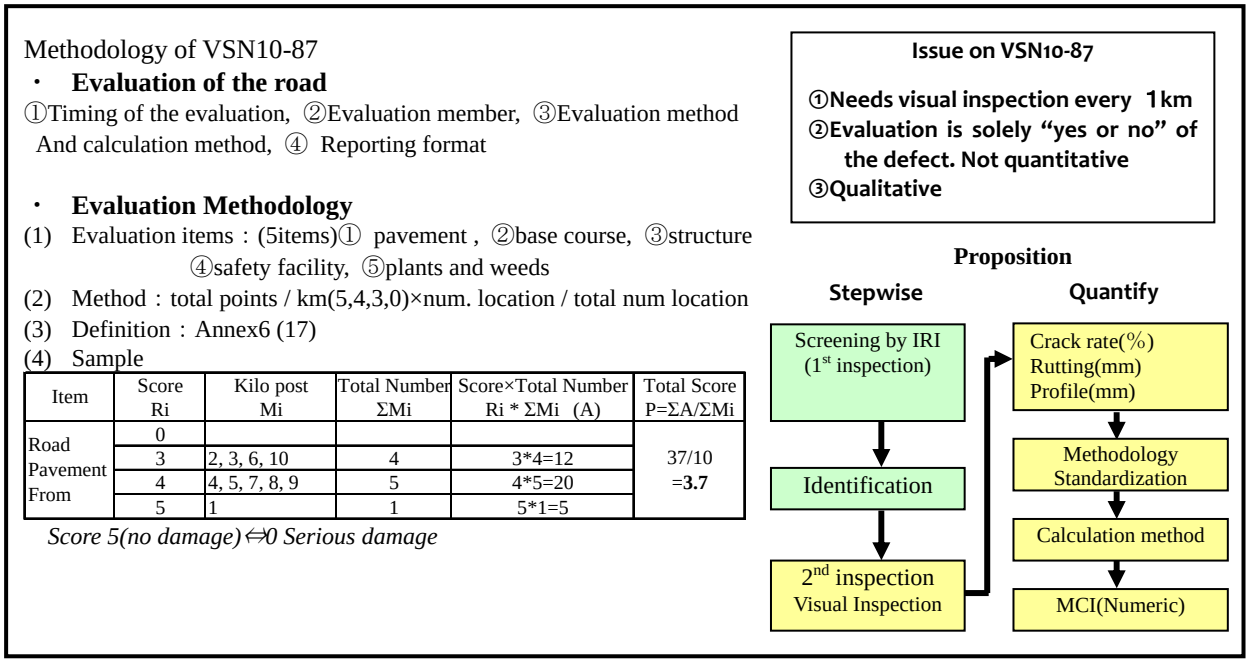


Figure 2.2.1-3 Technical Approach for improvement of VSN10-87

(4) Prioritization by Using IRI and Application to Road Maintenance Budget

The evaluation method needs to be checked and coordinated with VSN 10-87 which is use in Tajikistan. Priority can be evaluated by combination of IRI measurement and traffic volume data (Figure 2.2.1-4). Considering that the overloading is one of the major cause for the pavement damage (serious overloading is reported such as a vehicle with a gross weight of 100 ton and an axle load of 15 ton). Considering such a situation, the JICA Experts Team believes that the traffic volume of large/heavy vehicles and IRI measurement can be used as the major index for such evaluation.

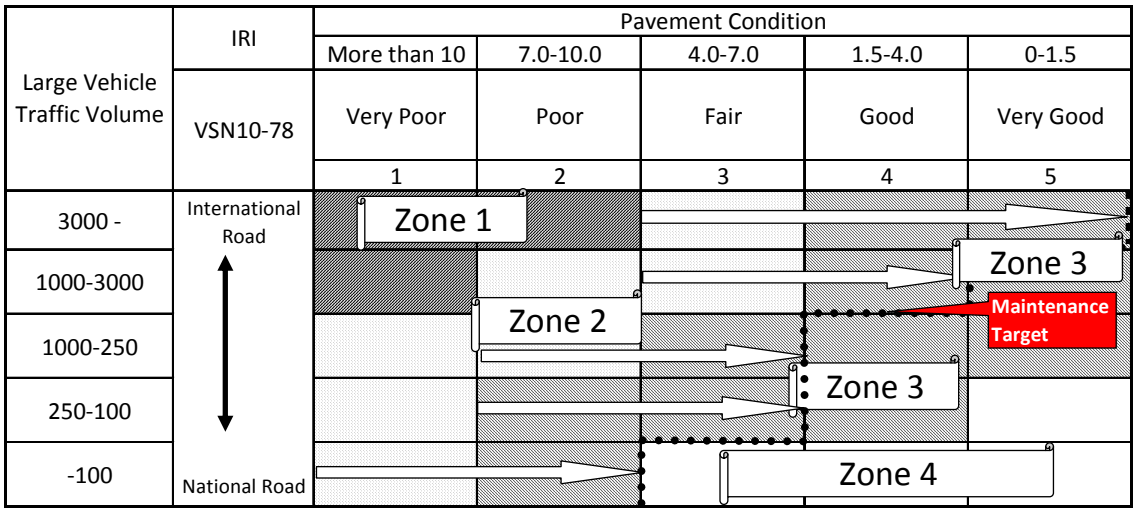


Figure 2.2.1-4 Sample of the Prioritization Model by IRI

Table 2.2.1-3 Sample of Maintenance Target Level by Zone

Zone	Definition	Priority	Recommended timing of maintenance work	Budget Allocation
1	Maintenance urgently required	1	This year	Most priority
2	Careful monitoring and daily maintenance required	2	Next year	Second priority
3	Routine Monitoring	3	in 3 to 5 years	
4	Routine Monitoring	4	in 5 to 10 years	

(5) IRI Measurement and Data Management

Introducing the database system is recommended for managing the IRI data.

The IRI data shall be collected by SETMs for monitoring work as well as data management. (Figure 2.2.1-5)。

On the other hand, SEHMs shall conduct visual inspection as conducted currently. Table 2.2.1-4 shows a draft responsibility and road inspection work scheme among MOT, SETMs and SEHMs.

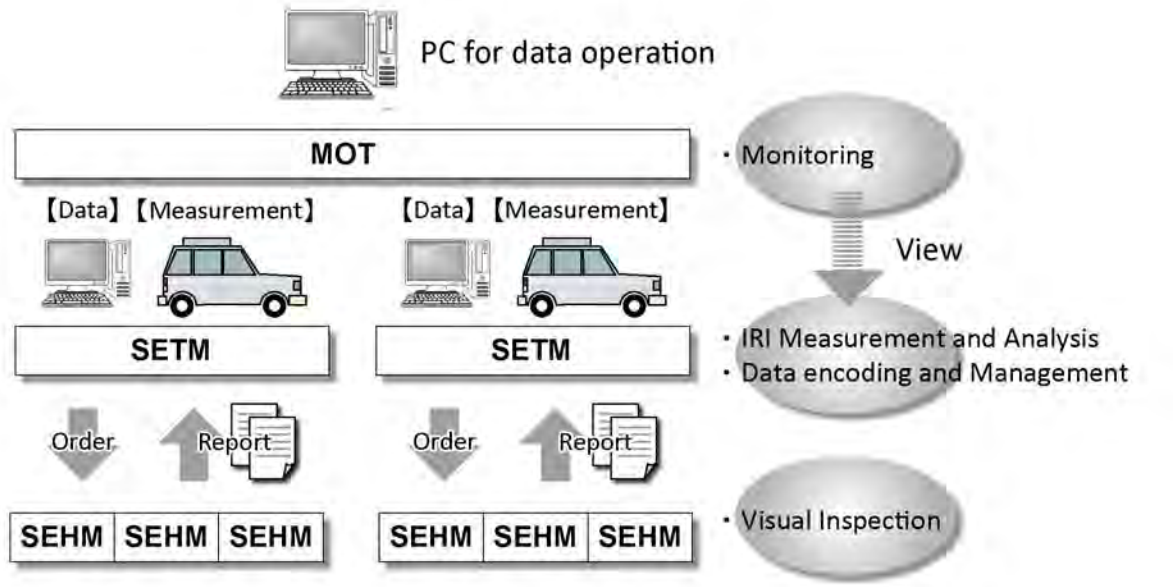


Figure 2.2.1-5 IRI measurement and data management system

Table 2.2.1-4 Concerned organization and responsibility

Organization	Current Role	Road Maintenance Work (new)
MOT (1)	Policy, Standards, Research and Budget	Standard Data Format Data Analysis, Statistics IRI Statistics
SETM(6)	Regional Level Project Plan Budget Plan Data Filing	IRI Measurement and Analysis Database System Management
SEHM (62)	Road Inspection Road Inventory (2 times／year) Road Investigation Budget Proposal daft Road Maintenance Execution Equipment Operation and Management	Visual Inspection (MCI) Quantitative Evaluation
National Institute of Design	Design of Structure	

2.2.1.3 Improvement of Road Maintenance Skill【Output 2】

Table 2.2.1-5 shows the typical pavement repair method and current condition of SEHMs. The pavement maintenance method improvement by hot mix asphalt concrete is one of the key challenges to shift to regular preventive maintenance manner. The required equipment is planned to be procured under another JICA project.

Table 2.2.1-5 Typical Pavement Repair Method and Current Condition

Category	Urgent Repair			Routine Repair		
Method	①Rectify gap	②Crack sealing	③Patching	④Patching	⑤Overlay	⑥Resurfacing
Timing	Early	Early	Middle(urgent)	Middle	Middle – Life End	Life End
Cost	Small	←	←	←	→	Large
Force	Labor	Labor	Labor	Equipment	Equipment	Equipment
Contents	Rectify the gap to less than 2cm	Inject bitumen into cracks	**Patching by cold mix asphalt concrete**	**Patching by hot mix asphalt concrete**	Overlay onto the existing pavement	Remove existing pavement and construct new pavement
Objective and Effective	Safety and smoothness of the traffic	Urgent Repair and prevent extension of the damage	Urgent Repair	Permanent repair	Replacement	Upgrading To meet requirement by the increase of the traffic and axle loads
Area to be applied	Gap more than 3cm	Surface related damage	1 ㎡／location	1 ㎡／location	Not applied to the place base course has problem	
Current Condition	○	○	○	×	×	**○(Contract)**
Issues			Quality control Method	Equipment Experience	Equipment Experience	Contract-out
Target of equipment by JICA	△	○	◎	◎◎	◎◎	○

(1) Improvement of Preventive Maintenance

Asphalt pavement damage grows with the process of “emergence of crack” → ” penetration of water” → ” damage of base-course” → “Pot hole” → “Destruction”. It is to note that frigid weather of Tajikistan affect seriously to the pavement condition such as frost heaving, penetration of water from melted snow and weakening of base course through the seasonal change. It is important to master maintenance work method upon understanding of these typical engineering conditions.

(2) Improvement of Routine Maintenance

Figure 2.2.1-6 outlines important aspect for the training of hot mix asphalt concrete.

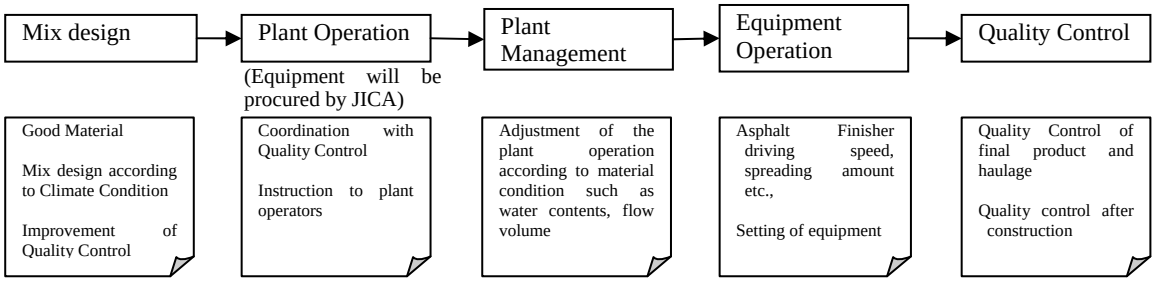


Figure 2.2.1-6 Important Points for hot mix asphalt concrete production

(3) Pilot Project

1) Outline of the Pilot Project

In the project, two (2) pilot projects will be conducted by using the newly introduced methodology for the training purpose. The result of such training will also be referred for verification of the technical guidelines developed earlier under the project (Table 2.2.1-6)

Table 2.2.1-6 Technical Approach of the Pilot Project

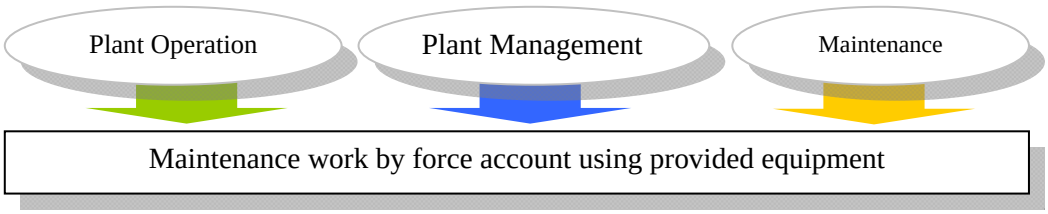
	1st Pilot Project	2nd Pilot Project
Activity Item	2-4(planning)、2-5(execution)	2-9(planning)、2-10(execution)
Timing	Sep to Nov 2014	May to Aug 2015
Target CP	1 SEHM each SETM (Total 2 SEHM)	22 SEHM
Objectives	**Model Construction and Technical Specification** - Maintenance Planning - Test construction with new equipments - Verification of draft Guideline	**Implementation** - Maintenance Planning - Maintenance work according to the plan - Verification of the Guideline
Role of Japanese Experts	Training of Master Trainers - Asphalt Mixing Plant Operation - Site construction method	Monitoring of maintenance planning Monitoring of repairing work Training of Trainers
Pilot project items	• Repair by Hot Mix Asphalt • Asphalt Plant Operation • Instruction of the repair work (equipment operation and quality control)	Same as 1st Pilot Project but implementation is initiated by Tajikistan side.

2) Important Points for the Pilot Project Implementation

1. The Pilot Project will be planned so that not to provide any negative pressure to the current maintenance work by SEHMs.
2. Coordinate together with MOT for allocation of the budget for the pilot project.
3. The detailed contents of the 1st Pilot Project will be studied based on allocation of the budget by MOT.
4. 2nd Pilot Project will be carried out on a much larger scale because the target group will be all SEHMs. Therefore, allocation of the budget will be a vital element. It requires good coordination with MOT and the target SEHMs.

2.2.1.4 Training for Equipment Operation for Pavement Maintenance work

The training for equipment which is planned to be procured under another project of JICA operation and management shall be conducted considering the following three (3) aspects.



(1) Training of Operator and Assistance for Plant Management

The target group of the training will be technicians of SEHMs. Trainees will be divided into three (3) groups according to their "Operator's Experience" and "Operator's Skill" (Table 2.2.1-7).

The training will be taken TOT (Training of Trainers) method. In the first place the training will be concentrated to the selected Master Trainers from SETM and SEHM. In the second place, it will be the Mater Trainers who will train others of the techniques learnt from the Expert Team.

The training will focus on not only on operation of the asphalt plant operation but will be extended towards QA/QC control inspector of the plant facilities and safety operation.

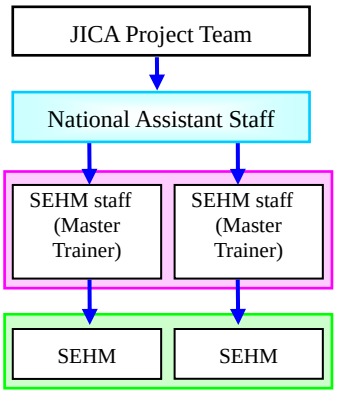


Figure 2.2.1-7 Training of the Asphalt Plant Operation

Table 2.2.1-7 Grouping of the Trainees of the Equipment Operator

Group	Level	Equipment	Training Period	Training Method
A	Skill of the operator directly affect quality and performance of the work	Asphalt Finisher Asphalt Plant Crashing Plant Motor Grader	3～6 month under skilled operator Basic operation; 1 week and needs experience of actual maintenance sites	Direct training by Japanese experts Training support by attaching national staff during absence of the experts.
B	Not much as Group A but the operators skill affect quality of the work	Road Roller Tire Roller Wheel Excavator Wheel Roader	1～2 months under skilled operator Scarifying of pavement needs skill which can be a bench mark of the training	Mater trainer training
C	Rather easy to learn	Other equipment	―	Training should be covered by the equipment project

※ 15 working days/ month

(2) Maintenance of Equipment

Training will also cover equipment maintenance and management. However, this requires proper initial training under another JICA project to produce satisfactory training manuals and operation manuals for all equipment.

2.2.2 Management Aspect

2.2.2.1 Project Implementation and Coordination

Project implementation organization is shown in Figure 2.2.2-1.

Joint Coordination Committee (JCC) will be formulated for the project monitoring and decision making.

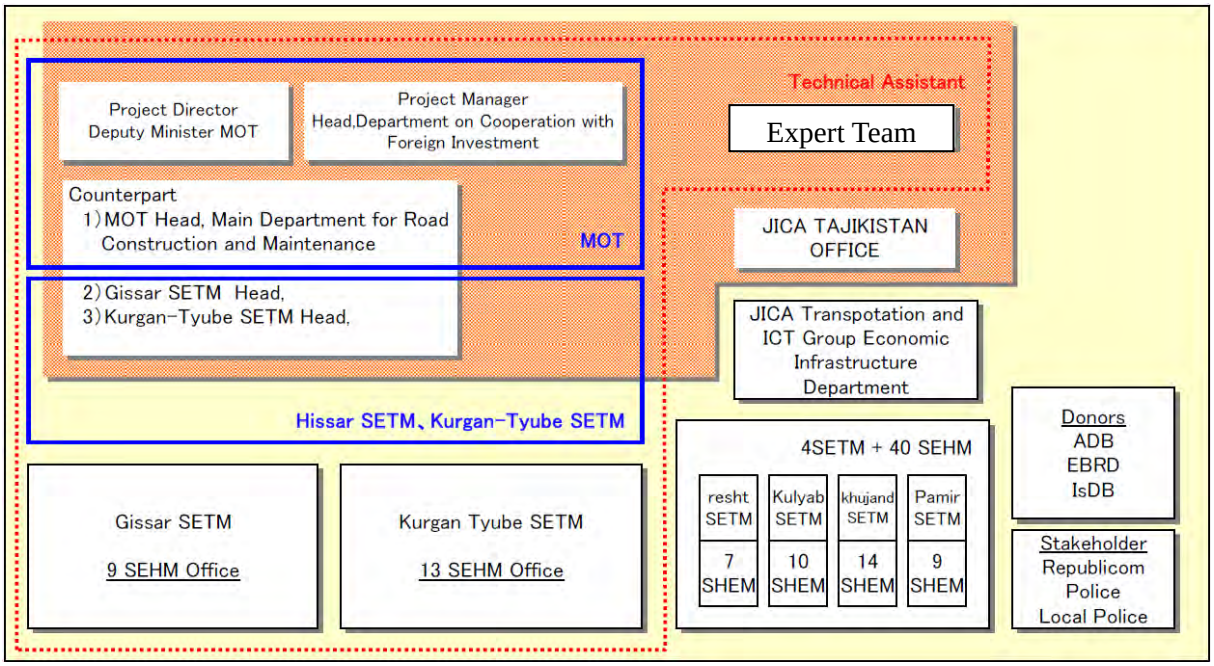


Figure 2.2.2-1 Project Implementation Organization

2.2.2.2 Coordination with the Project for Improvement of Equipment for Road Maintenance in Khatlon Region and Districts of Republican Subordination in the Republic of Tajikistan

Equipment for the road maintenance under the captioned title is planned for delivery in August 2014. Provision of equipment allows maintenance work by use of hot mixed asphalt concrete. In addition to the basic training on operation by this project, more detailed and operational (site oriented) training will be performed under our project. This will cover advice and supervision on selection on road pavement maintenance method, on formulation of road pavement maintenance team, and on safety and other reminders on equipment operation. Similarly, monitoring activities will be performed on availability of the budget and material procurement. Asphalt concrete design mix and material selection will have a vital factor on hot mix asphalt concrete quality and this will also be monitored.

2.3 Methodology

The project is aiming to enhance the capacity on the road inspection and road repair techniques specifically on pavement through technical trainings. The project is divided into following four (4) stages as below. (see **Figure 1** after the cover page for detailed training schedule.) ;

Detailed methodology is described in the following chapters;

No	Stage	Training Purpose	Period
1	Preparation Stage	Development of the work plan	Oct-Dec 2013
2	Master Trainer Training Stage	1. TOT (Training of Master Trainers) 2. Guideline Development 3. Basic Skill Training 4. Creating environment	Jan 2014-Feb 2015
3	Model Implementation Stage	1. TFT (Training from Master Trainers) 2. Implementation of new work method 3. Improvement for the full implementation	Mar 2015- Mar 2016
4	Full Implementation Stage	1. Full implementation by Tajikistan CP	Apr 2016 -

2.3.1 Work Plan

After study of the application and related documents, the JICA Experts Team will draft a work plan. The work plan will consider the following points.

① Baseline survey
② Winter season availability (May to September)
③ Budget allocation schedule (November)
④ Timing on manual drafting and implementation of the Pilot Project
⑤ Formal endorsement of manual

Baseline Survey
- Data Collection
- Technical Specification
- Gap Study
- Capacity Assessment
- Skill Assessment
- Analysis on Staffing of Organization
- Setting of Index

2.3.2 Approval of Work Plan

The Work Plan will be presented to the members of Joint Coordination Committee on the First JCC Meeting to be held in January 2014 in order to share the idea, discuss and make any amendments necessary. All monitoring index in the PDM will also be agreed with by considering target groups and objectives during this committee meeting.

After any necessary amendment, the Work Plan will be put into action.

2.3.3 Kickoff Seminar

After agreement of the Work Plan, at the end of March 2014, a kick off seminar shall be organized. The seminar is aiming to disseminate information related to the project and to solicit understanding and support from various stakeholders in Tajikistan for road maintenance.

2.3.4 Activity for Output 1 "Road inspection skills of 9 SEHMs under Gissar SETM and 13 SEHMs under Kurgan－Tyube SETM are improved. "

(1) General Activity Schedule

Based on the study result on the manuals and guidelines on the road inspection including interview to the engineers on the ground, " Road Inspection Guidelines" will be drafted. Actual practical method for the implementation of the said-guidelines will be studied.. In this activity, the measurement of IRI (International Roughness Index) will be introduced in order to monitor the road condition , to give priority for the maintenance plan and to make more rational way of budget allocation considering to the technical approach mentioned in 2.2.1.2.

The schedule for Activity 1 is proposed considering to following four (4) points;

① The proposed "Road Inspection Guidelines" will be reviewed considering to the feedback from the Pilot Project. (Activity 1-2 and 1-9)

② The simple data filing system will be studied to facilitate the inspection results of both IRI and visual inspection . The result of the visual inspection will be studied to quantitatively evaluate by points. (Activity 1-6)

③ Visual inspection result will be planned to reflect the IRI survey result in order to built combined mechanism of both "IRI" and "Visual Inspection." (Activity 1-8)

④ The Mid Term Seminar will be for finalization of the guideline.(Activity 1-5,1-10)

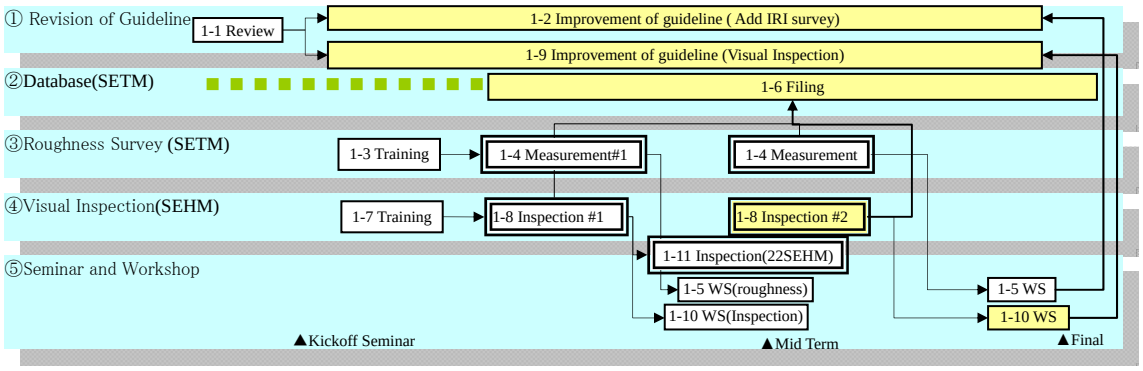


Figure 2.3.4-1 Work Flow of the Activity 1

(2) Detailed Training Program and required trainees

The detailed training program and requirement of the trainees is provided in Appendix-4

2.3.5 Activity for Output 2 "Road repairing skills of 9 SEHMs under Gissar SETM and 13 SEHMs under Kurgan－Tyube SETM are improved. "

(1) General Activity Schedule

Based on the study result on the manuals and guidelines on the road repair including interview to the engineers on the ground, " Pavement Repair Guidelines" will be drafted. The practical methodology to implement the said guideline to accommodate the construction condition (ex climate

etc.,) will be studied.

The pavement repair method using the equipment procured under “the Project for Improvement of Equipment for Road Maintenance Khatlon Region and Districts of Republican Subordination in the Republic of Tajikistan” will be included in the “Pavement Repair Guildlines”. The technical training will be planned for the implementation of the guideline. The technical transfer for the equipment operation will be followed by the technical approach mentioned in 2.2.1.4.

The schedule for Activity 2 is proposed considering to following four (4) points;

① The proposed “Road Repair Guidelines” will be reviewed considering to the feedback from the Pilot Project. (Activity 2-2 and 2-7)

② The First (1st) Pilot Project is aimed at test the guideline to feedback the result.

③ The Second(2nd) Pilot Project is planned at participate 22 SEHM (Activity 2-11)

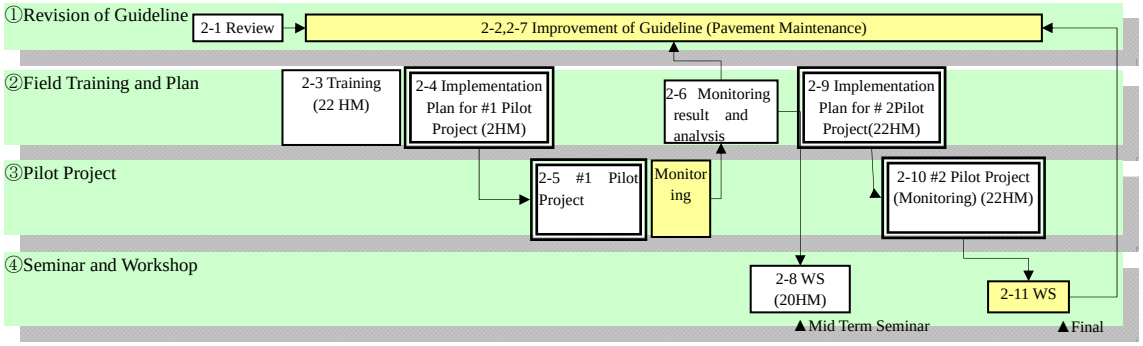


Figure 2.3.5-1 Work Flow of the Activity 2

(2) Detailed Training Program and required trainees

The detailed training program and requirement of the trainees is provided in Appendix 4.

The activity schedule for the 1st year needs to coordinate with the equipment provision schedule. Currently the Experts have been informed that the Lot 1 equipment is planned for delivery and acceptance by the Tajikistan side around middle of August 2014. This implies that the activities to be performed by the Experts may commence from the middle of August 2014. For the Lot 2 equipment, necessary training for the crushing plant and the asphalt plant would only be completed at the end of October 2014. This implies that such plants may commence operation from early November 2014, if the specific hot asphalt mix design for operation is already decided or the hot asphalt mix design of the past will be used for the initial operation. It is the current opinion of the Experts that in case a specific hot asphalt mix design for operation is required for such plant, a priority must be placed on accepting delivery of the crushing plant to allow operation of this plant from the middle of September 2014 to perform initial sampling of the required aggregates, This opinion has been set from reviewing the project schedule of the JICA equipment procurement in which shipping from Japan is scheduled from March 2014.

（1） Activities for Improvement of Preventive and Routine Maintenance (Activity 2-3)

The training for pavement repair and understanding preventive maintenance is scheduled to be conducted in June 2014. Damages inflicted on roads, the cause for such damage, the repair method, selection of equipment, safety at site, and upgrading of the existing repair method will be presented to participants. Details of such training will be discussed and agreed with representatives of the responsible SETM and SEHM in order to offer excellent training. As such, the Experts will take time to review, check and understand the existing repair method performed by SETM and SEHM.

（2） Road Repair Plan Leading to No. 1 Pilot Project (Activity 2-4)

In July and August 2014, the Experts will prepare a road repair plan together with Counterparts. Full consideration will be made to reflect the result of IRI survey to be conducted. The repair plan must also consider availability of the fund allocated by the Tajikistan side. The road repair plan will be a realistic plan from the budget aspect as well as from availability of JICA equipment.

It is the intention of the Experts to provide additional assistance as required for operation and maintenance of equipment delivered under the Lot 1 from the middle of August 2014 and operation and maintenance including quality control methodologies of the hot asphalt plant to be delivered and operational from November 2014. Should there be any unforeseen event occuring to the activities required from the Tajikistan side for preparing footings and foundations for the crushing plant and the hot asphalt plant, further advice maybe made by the Experts to mitigate schedule delay if required. Advice will also be extended on procedures and methodologies required for selection of the hot asphalt mix design including collection of aggregate samples to meet the plat operation target date of November 2014.

（3） Performing No. 1 Pilot Project (Activity 2-5)

It is the intention of the Experts to perform No. 1 Pilot Project in the duration from September to November 2014. This schedule has been set from the latest project schedule of the Project for Improvement of Equipment for Road Maintenance on Khalton Region and Districts of Republican Subordination. Based on the review of equipment to be provided, equipment required for asphalt cutting, excavation and earthwork, material laying, and rolling/compaction is available in the Lot 1. It is necessary to complete such works prior to commencement of hot asphalt production and asphalt surfacing work in November 2014. This is also applicable if any replacement work for basecourse is required for such road repair.

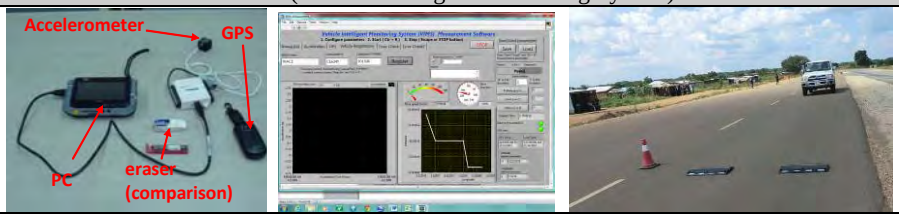
The pilot project will allow the Experts to provide technical assistance to Counterparts on hot asphalt production, quality control, road repair methodologies and equipment operation. At the same time, countercheck will be made with the revised Road Repairing Guidelines

2.3.6 Procurement of Equipment

All the equipment procured under the project shall be in accordance with JICA guideline 2012.

VIMS including personal computer for operation and analysis is to be procured under the project.

Table 2.3-1 VIMS for IRI measurement

Equipment	VIMS (Vehicle Intelligent Monitoring System)
Photos	
Measurement Item	Latitude and Altitude by GPS, Travel Speed, IRI
Other country	Japan, Kyrgyz, Kenya, Laos, Tanzania, Uganda etc.,
Technical Aspects	Estimate IRI from vertical acceleration of the vehicle. Simple equipment and detachable. Easy operation and data analysis. Connectivity with Google Earth for mapping the measurement result. Low cost
Maintenance	Portable. Easy to maintenance and repair. Consortium of several university of Japan take care the operational support.

2.3.7 Progress Report and Discussion

During the project four (4) Progress Reports will be submitted as shown in Table 2.3.7-1. The contents of the report will be presented in JCC for comments and agreement.

Table 2.3.7-1 Submission schedule of the Progress Report

1st	2nd	3rd	4th
June 2014	December 2014	April 2015	December 2015

2.3.8 Joint Coordination Committee Meeting (JCC)

According to R/D, JCC meeting will be hold at lease once a year. The chairman of the meeting shall be from Tajikistan. If necessary, JCC can be organized for a specific reason.

Prior to each JCC meeting, an agenda and the meeting material needs to be confirmed both by the JICA head quarter and JICA Tajikistan Office for comments. The JICA Experts Team will conclude the discussion in a Minutes of Meeting format and report such to JICA .

2.3.9 Mid Term Seminar and Final Seminar

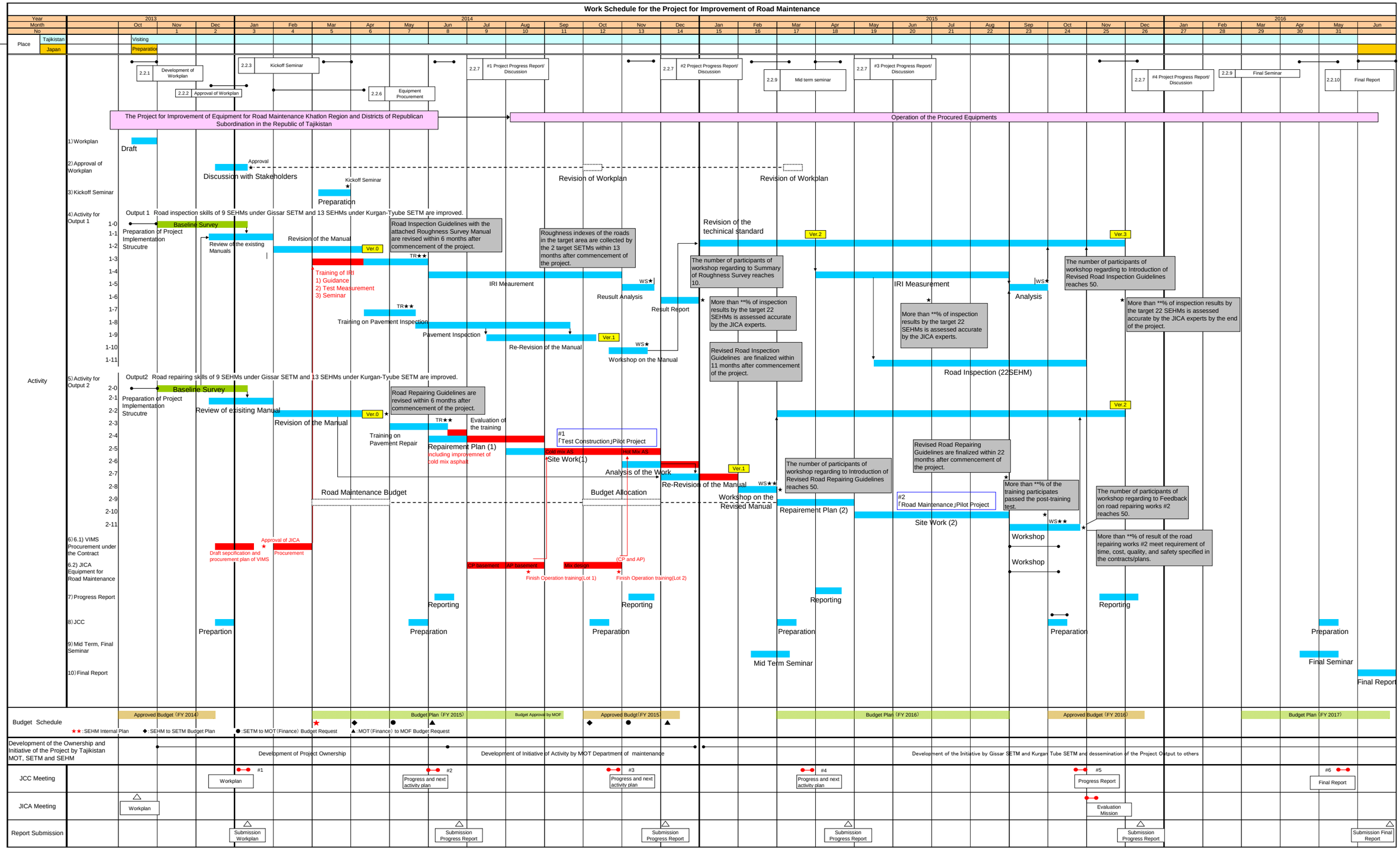
A Mid Term Seminar will be organized in the middle of the project and a Final Seminar will be organized about one (1) month before completion of the project. For both seminars, the same participants of the Kickoff Seminar (Counter parts, stakeholders and other authorities related to the road sector) will be invited to discuss outputs of the project and share the challenges.

2.3.10 Final Report and Discussion

Outputs and lessons leant shall be concluded in the Final Report scheduled in June 2016. The final appraisal mission is to be dispatched in November 2015.

The contents of the Final Report shall be reported in the final JCC meeting for agreement.

2.4 Project Flow Chart



2.5 Work Procedure

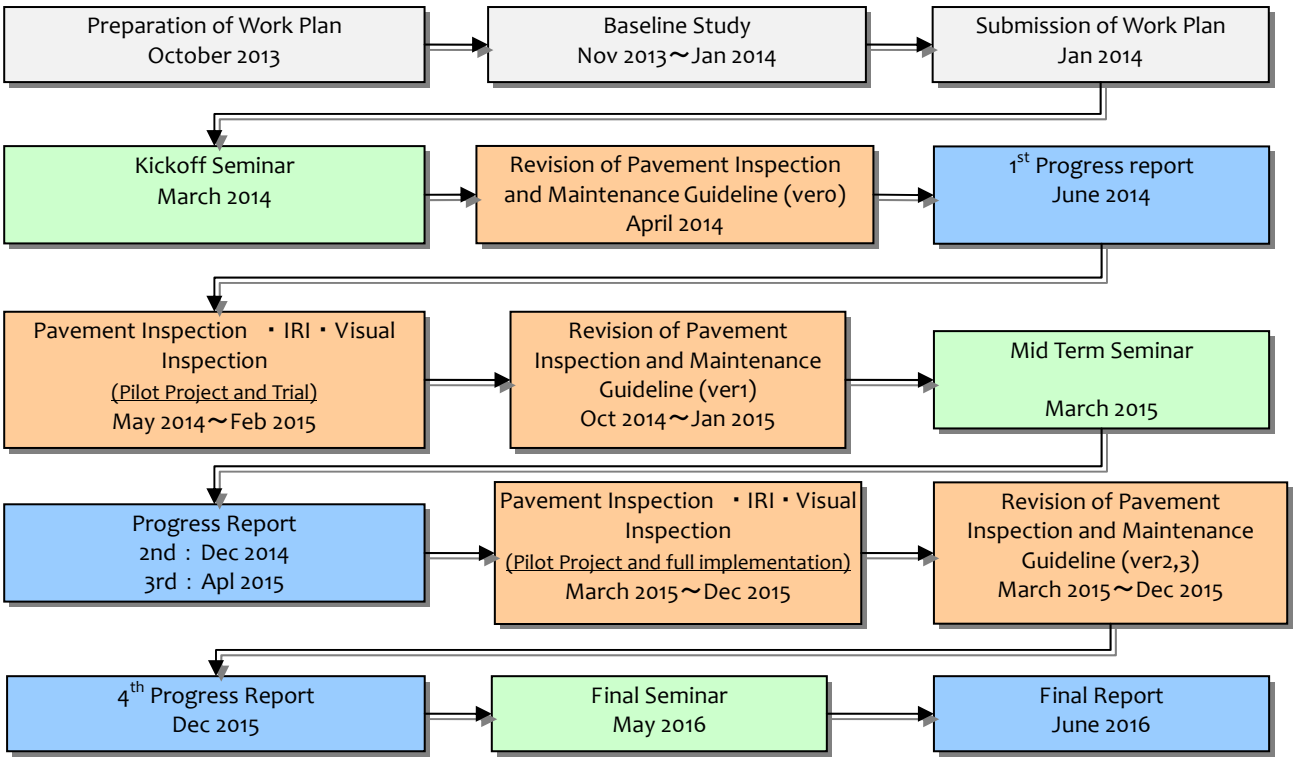


Figure 2.5-1 Work Procedure

2.6 Staffing Schedule

Staffing schedule of the project is in Appendix -5.

2.7 Project Evaluation

2.7.1 Terminal Evaluation

The project achievement will be evaluated by independent evaluator together with representative from GOT and a JICA representative in November 2015.

2.7.2 Verifiable Indicator

The verifiable indicators to evaluate the achievement of the project are shown in Table 2.7-1.

Table 2.7-1 Verifiable Indicator

<table>
<tr><th>Narrative Summary</th><th>Verifiable Indicator</th></tr>
<tr><td>Project Purpose:
Implementation capacity for road maintenance is improved.</td><td>1. Road inspection according to the revised guidelines is conducted at least 3 times by all SEHMs by the end of the project.
2. At least 5.0km length of road repairing is implementing at the target SEHMs according to the revised guidelines by the end of the project.</td></tr>
<tr><td>Output 1:
Road inspection skills of the target SEHMs are improved.</td><td>1. Road Inspection Guidelines with the attached Roughness Survey Manual are revised within 6 months after commencement of the project.
2. Revised Road Inspection Guidelines are finalized within 11 months after commencement of the project.
3. Roughness indexes of the roads in the target area are collected by the 2 target SETMs within 13 months after commencement of the project.
4. More than 90% of inspection results by the target 22 SEHMs is assessed accurate by the JICA experts by the end of the project.
5. The number of participants of each workshop reaches as follows:
<table>
<tr><th>Workshop (Activity No)</th><th>No</th></tr>
<tr><td>Summary of Roughness Survey</td><td>10</td></tr>
<tr><td>Introduction of Revised Road Inspection Guidelines (1.10)</td><td>50</td></tr>
</table></td></tr>
<tr><td>Output 2:
Road repairing skills of the target SEHMs are improved.</td><td>1. Road Repairing Guidelines are revised within 6 months after commencement of the project.
2. Revised Road Repairing Guidelines are finalized within 22 months after commencement of the project.
3. More than 80% of the training participants passes the post-training test.
4. More than 80% of result of the road reparing works #2 meet requirement of time, cost, quality and safety specified in the contracts/plans.
5. The number of participants of each workshop reaches as follows;
<table>
<tr><th>Workshop (Activity No)</th><th>No</th></tr>
<tr><td>Introduction of Revised Road Repairing Guidelines (2.8)</td><td>50</td></tr>
<tr><td>Feedback on road repairing works #2 (2.11)</td><td>50</td></tr>
</table></td></tr>
</table>

Note: the table is made in accordance with PDM dated 11 December 2012.

3. Project Organization

3.1 Organization Chart

The Project Organization Chart is shown in Figure 3.1-1.

Table 3.1-1 Member List

No	Name	Specialty	Belongings	Remark
1	Hiroshi MITA	Chief Advisor	CTI Engineering International Co., Ltd.	Professional Engineer Project Management Professional (PMP) 1st grade certified civil construction supervisor
2	Takashi NAKAJIMA	Deputy Chief Advisor/ Road Inspection 1	CTI Engineering International Co., Ltd.	Professional Engineer Professional Engineer
3	Masaru OKAMOTO	Road Inspection 2	Green Consultant Co.,Ltd	Professional Engineer
4	Junichiro OGAWA	IRI Survey 1	CTI Engineering International Co., Ltd.	Professional Engineer
5	Tomonori NAGAYAMA	IRI Survey 2	Tokyo University	Assistant Professor
6	Masakazu FUKUSHIMA	Road Maintenance Execution 1	QSC Consultant Co., Ltd	Professional Engineer
7	Ryuichi KENCHI	Road Maintenance Execution 2	Global Co., Ltd	1st grade certified civil construction supervisor

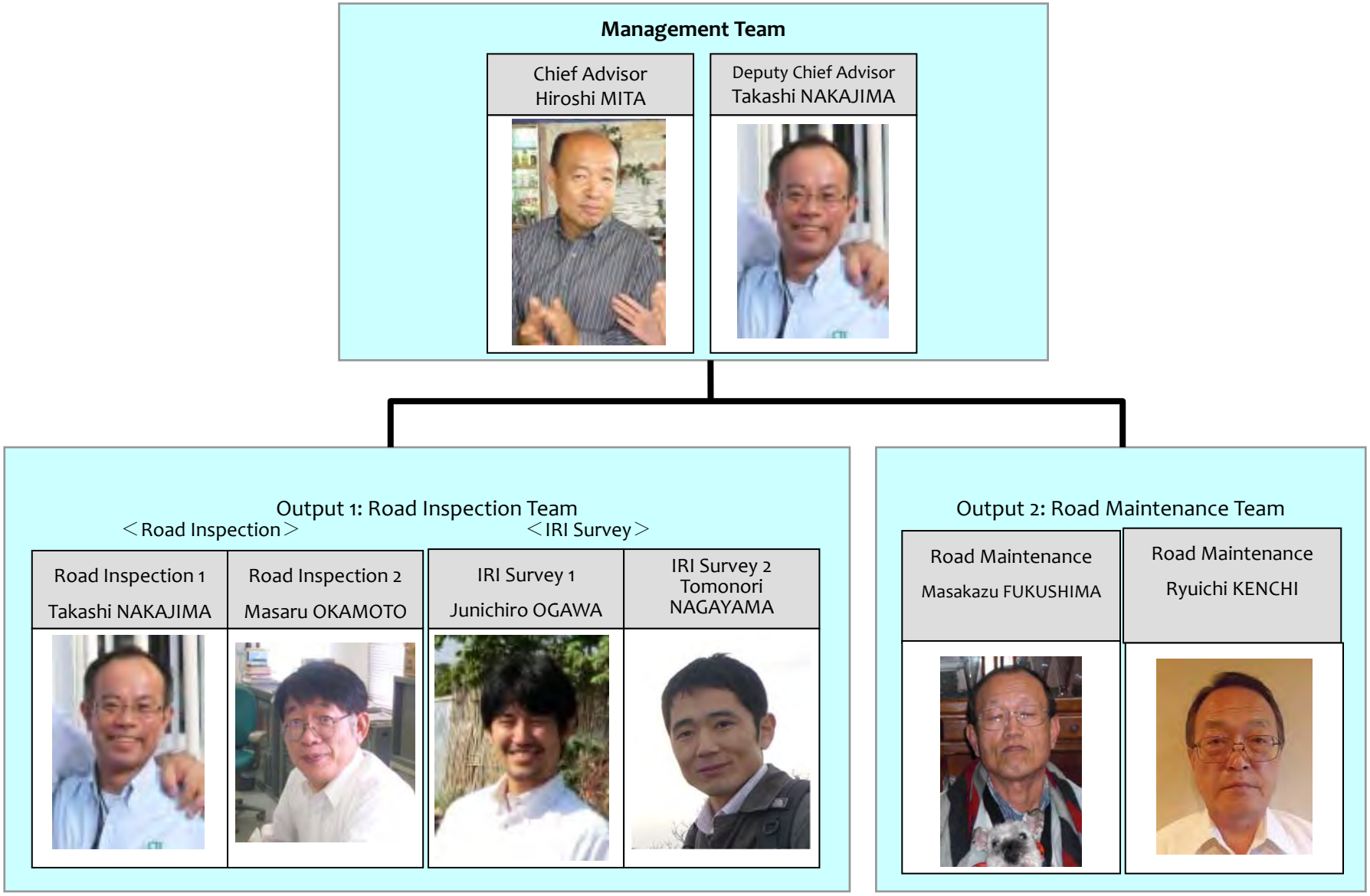


Figure 3.1-1 Project Organization Chart

3.2 Support to the Project

3.2.1 Support from Japan

The JICA Experts Team will be provided with the following support from HQ in Japan.

Expert Team

Task		Supportive Member	Supporting Item
Leader		**Minoru MIURA** (Senior Advisor)	General advisor based on project experience in Tajikistan
Technical Aspects	**Project Operation**	**Shingo GOSE** (Executive Director, Land Transport Division)	Advisor for the operation of the project from his long experience of technical assistance project.
		Yuzo Misota (Director)	Advisor for the operation of the project. He has project experience of project manager in the former Soviet countries such as Kyrgyz.
		Toshiki Kawakami (Senior Advisor)	Advisor of the operation of the project. He has an experience of project manager of Pyanzhe River Disaster Prvention plan in 2006.
	Road Inspection	**Hideaki Tanaka** (Chief Asset Management Center CTIE)	Executive director of mother company of CTI group in the road and bridge section.
	Pavement Maintenance	**Ryohei Watanabe** (Director)	Advisor on road maintenance. He also has project experience in Tajikistan.
	IRI measurement	**Tomonori Nagayama** (Assistant Professor of Tokyo University)	Advisor for IRI measurement. He is one of the academic research group who developed VIMS. Technical and academic support
Quality Control		**Makoto Yajima** (Quality Management Division)	Chief of the quality control
Safety and Management		**Kimio Shimomura** (Executive Director)	Advisor for the safe project operation and support from Japan to the Experts.
Review		**Dr. Jovito Santos** (Senior Expert)	Advise on reporting in English.

Figure 3.2.1-1 Support Organization

3.2.2 Emergency Communication

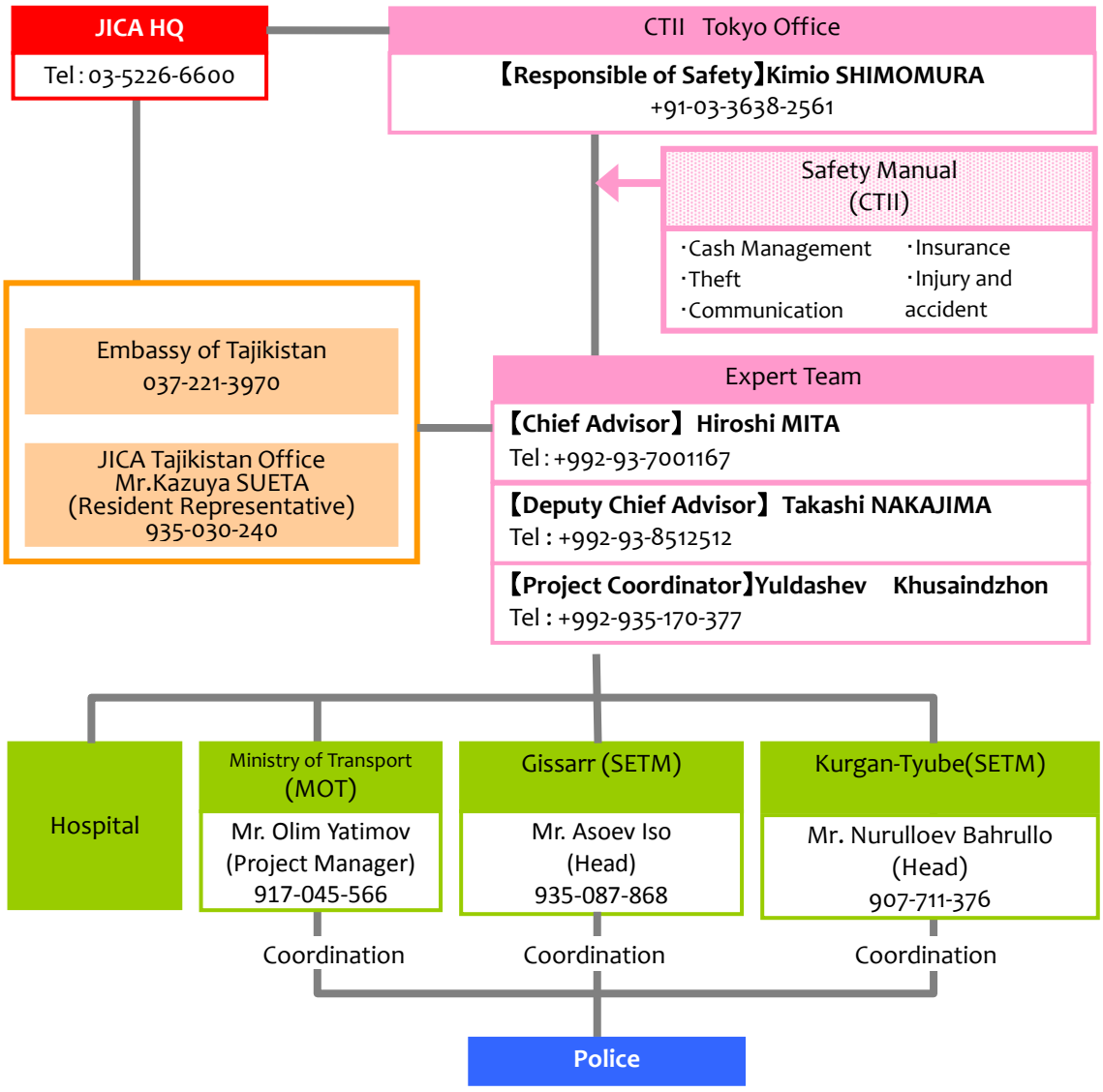


Figure 3.2.2-1 Safety Communication Network

Appendix 1

Project Design Matrix

LOGICAL FRAMEWORK (PROJECT DESIGN MATRIX: PDM)

PROJECT TITLE: Project for Improvement of Road Maintenance	DURATION: 31Months	PDM Ver.0
TARGET GROUP: 22 SEHM*1s and 2 SETMs*2 in Gissar and Kurgan-Tyube and Ministry of Transport	TARGET AREA: International & Republican roads in Gissar and Kurgan-Tyube	DATE: 11-Dec-12

*1 SEHM: State Enterprise on Highway Management, *2 SETM: State Enterprise of Transport Management

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Pavement condition of the roads under control of MOT in the target area is improved.			
Project Purpose. Implementation capacity for road maintenance is improved.	1. Road inspection according to the revised guidelines is conducted at least 3 times by all target SEHMs by the end of the project. 2. At least XXX km length of road repairing is implemented at the target SEHMs according to the revised guidelines by the end of the project.	1. Road Inspection Record 2.Road Repairing Record	-Current socio-political situation is not changed drastically. -Policy including the budget allocation for the road maintenance and repair is maintained.
Outputs 1. Road inspection skills of the target SEHMs are improved.	1.1 Road Inspection Guidelines with the attached Roughness Survey Manual are revised within 6 months after commencement of the project. 1.2 Revised Road Inspection Guidelines are finalized within 11 months after commencement of the project. 1.3 Roughness indexes of the roads in the target area are collected by the 2 target SETMs within 13 months after commencement of the project. 1.4 More than XX % of inspection results by the target 22 SEHMs is assessed accurate by the JICA experts by the end of the project. 1.5 The number of participants of each workshop reaches as follows: Workshop [Activity No.] | No.	1.1 Revised Inspection Guidelines 1.2 Final version of revised Inspection Guidelines 1.3 Roughness Survey Report 1.4 Inspection Record and its assessment summary 1.5 Attendance records of workshops	-Sufficient number of the engineers and operators of the target SEHMs is kept.

	Summary of Roughness Survey[1.5] 10 Introduction of Revised Road Inspection Guidelines [1.10] 50		
2. Road repairing skills of the target SEHMs are improved.	2.1 Road Repairing Guidelines are revised within 6 months after commencement of the project. 2.2 Revised Road Repairing Guidelines are finalized within 22 months after commencement of the project. 2.3 More than XX % of the training participants passes the post-training test. 2.4 More than XX% of result of the road repairing works #2 meet requirements of time, cost, quality, and safety specified in the contracts/plans 2.5 The number of participants of each workshop reaches as follows: Workshop [Activity No.] / No. Introduction of Revised Road Repairing Guidelines [2.8] 50 Feedback on road repairing works #2 [2.11] 50	2.1 Revised Road and Repairing Guidelines 2.2 Final version of revised Road Repairing Guidelines 2.3 Test record and report 2.4 Repairing record and its assessment summary 2.5 Attendance records of workshops	
Activities	**Inputs**		
1.1 To review the existing road inspection guidelines. 1.2 To revise the Road Inspection Guidelines with the attached Roughness Survey Manual. 1.3 To conduct trainings (in each region) on Roughness Survey for the target 2 SETMs. 1.4 To carry out Roughness Survey on the roads in the target area. 1.5 To organize a workshop (in Dushanbe) to summarize the results of Roughness Survey with the target 2 SETMs and MOT. 1.6 To file the results of Roughness Survey. 1.7 To conduct trainings (in each region) on road inspection according to the revised Road	**Inputs from the Japanese Side** **1. Experts** a) Leader / Road Maintenance Expert1 b) Road Inspection Expert 1 c) Roughness Survey Expert d) Road Repairing Supervision Expert 1 e) Road Repairing Supervision Expert 2 f) Road Maintenance Expert 2 / Road Inspection Expert 2 g) Interpreters **2. Equipment** Equipment for roughness survey (2 sets)	**Inputs from the Tajikistan Side** **1. Counterparts for the Project** a) Project Director b) Project Manager c) Counterparts **2. Office Facilities** a) In the building of MOT for the Project with office furniture and utilities such as telephone line, electricity, etc. b) In the building of SETM located in Kurgan-Tyube with	

Inspection Guidelines for the selected 2 SEHMs from each target SETM. 1.8 To conduct road inspection on the international and republican roads under the jurisdiction of the selected 4 SEHMs. 1.9 To revise the road inspection guidelines based on the results of the road inspection works (1.8). 1.10 To organize workshops (in each region) to introduce the revised Road Inspection Guidelines for the target 18 SEHMs, 2SETMs and MOT. 1.11 To conduct road inspection on the roads in the target area at the target 22 SEHMs.	**3. Expenses for kick-off, mid-term and final seminars** (Inputs other than indicated here will be determined through mutual consultation between JICA and MOT during the implementation of the Project, as necessary.)	office furniture and utilities such as telephone line, electricity, etc. **3. Running Expenses** necessary for the implementation of the Project including travel expenses and allowances for the participants of the trainings and workshops and expenses for road repairing works.	
2.1 To review the existing Road Repairing Guidelines. 2.2 To revise the Road Repairing Guidelines. 2.3 To conduct trainings (in each region) on road repairing according to the revised Road Repairing Guidelines for the target 22SEHMs. 2.4 To provide support and advice on planning of the road repairing work #1(in each region). 2.5 To implement an on-site technical instruction (in each region) for a road repairing work #1. 2.6 To analyze the results of road repairing works #1, such as repairing materials and procedures. 2.7 To revise the Road Repairing Guidelines based on the results of the analysis (2.6). 2.8 To organize workshops (in each region) to introduce the revised Road Repairing Guidelines with the target 20 SEHMs, 2 SETMs and MOT. 2.9 To plan the road repairing work #2 in the target areas. 2.10 To monitor and give technical advice on the road repairing works #2 in the target areas. 2.11To organize workshops (in each region) to give feedbacks on the results of road repairing works #2, such as repairing materials and procedures for the target 22 SEHMs, 2 SETMs and MOT.			**Pre-conditions** Tajikistan, especially the target area, is continuously safe enough for JICA Experts to implement the activities.

Appendix -2 Reference Information of IRI

IRI (International Roughness Index)

IRI is an index developed by the World Bank for evaluating the smoothness of road surface. IRI can be calculated from road profile data by applying mathematical simulation called "quarter car simulation". With this method, the road surface smoothness can be evaluated with a single standard criteria.

Major characteristics of the method can be summarized as below;

Table 1 IRI and its application

Characteristics of IRI	1. The larger the number reflects larger movement of the suspension of the vehicle namely, less smoothness of the surface. 2. The measurement can be automatically taken by equipment
Application of IRI	1. Evaluation of service level of the road 2. Identification of the damaged location by such pothole and cracks 3. Monitoring and evaluation of the finishing condition of the construction 4. Statistics for the monitoring of the roads

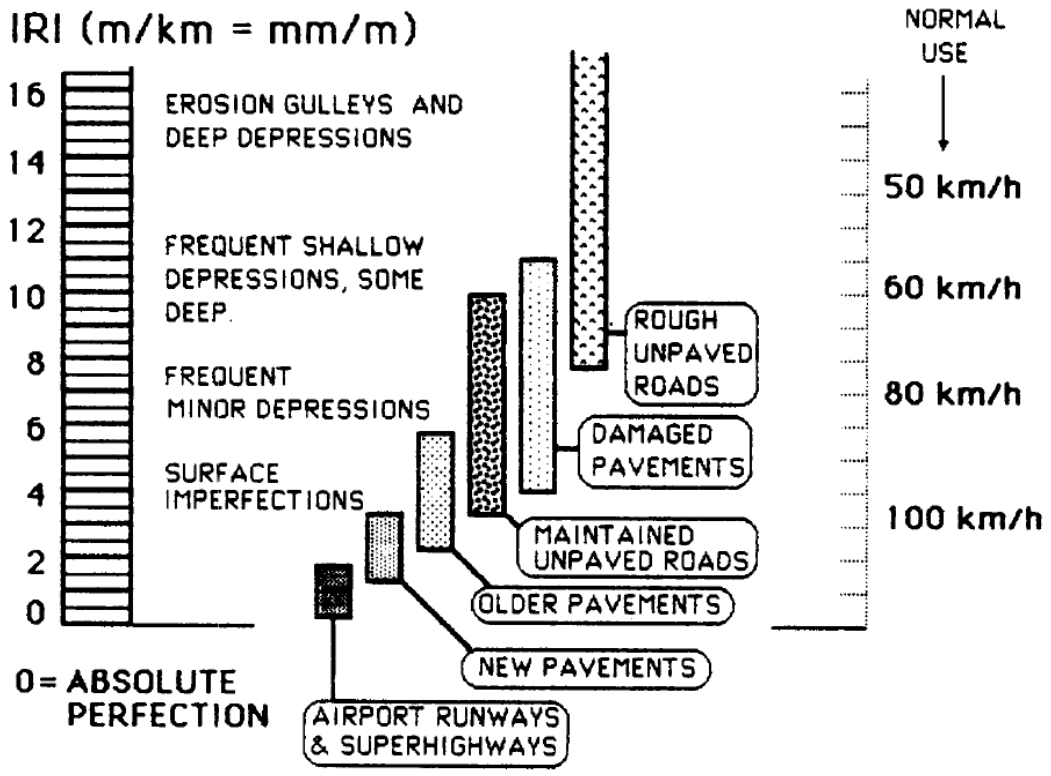


Figure 1 IRI and Typical Surface Condition

Table 2 Sample of Criteria of Road Condition by IRI (KeNHA)

	Road and Bridge Inventory and Conditions Survey Procedure Manual	Annual Road Inventory Condition Survey(ARICS)		IRI Range	
		Paved Roads	Unpaved roads	Paved Roads	Unpaved roads
Excellent (Very Good)	To receive an Excellent rating, the feature must be new or in like-new, well-maintained condition, and fully functional in all respects.	Maintainable road with no potholes and no cracks.	Maintainable road with camber and drainage intact.	0.0-3.0	0.0-7.0
Good	A Good rating indicates that the feature is in nearly new condition and only needs some minor additional maintenance work. There should be no more than a 10 percent reduction in serviceability, functionality, or capacity of the feature.	Maintainable road with some cracks and under 5% potholes.	Maintainable road. Camber and drainage require light maintenance. Or flat sandy road.	3.0-5.0	7.0-9.0
Fair	A Fair rating indicates that the feature is exhibiting occasional signs of distress or damage that are causing a noticeable reduction in serviceability, functionality, or capacity, in the order of 10 to 25 percent. Substantial additional maintenance or repair effort is	Maintainable road with many cracks and potholes (more than 5%)	Maintainable road. Camber and drainage require some reshaping	5.0-8.0	9.0-12.0
Poor	A Poor rating indicates that the feature is exhibiting frequent signs of distress or damage that is causing a significant reduction in serviceability, functionality, or capacity, in the order of 25 to 50 percent. Major maintenance or reconstruction effort is required to restore the feature.	Un-maintainable	Passable but Un-maintainable . No camber Requires reinstatement.	8.0-	12.0-
Very Poor	A Very Poor rating indicates that more than 50 percent of the feature is beyond the point of restoration by routine maintenance and reconstruction or replacement is required.	Un-maintainable, failed	Impassable	Un-measurable	Un-measurable

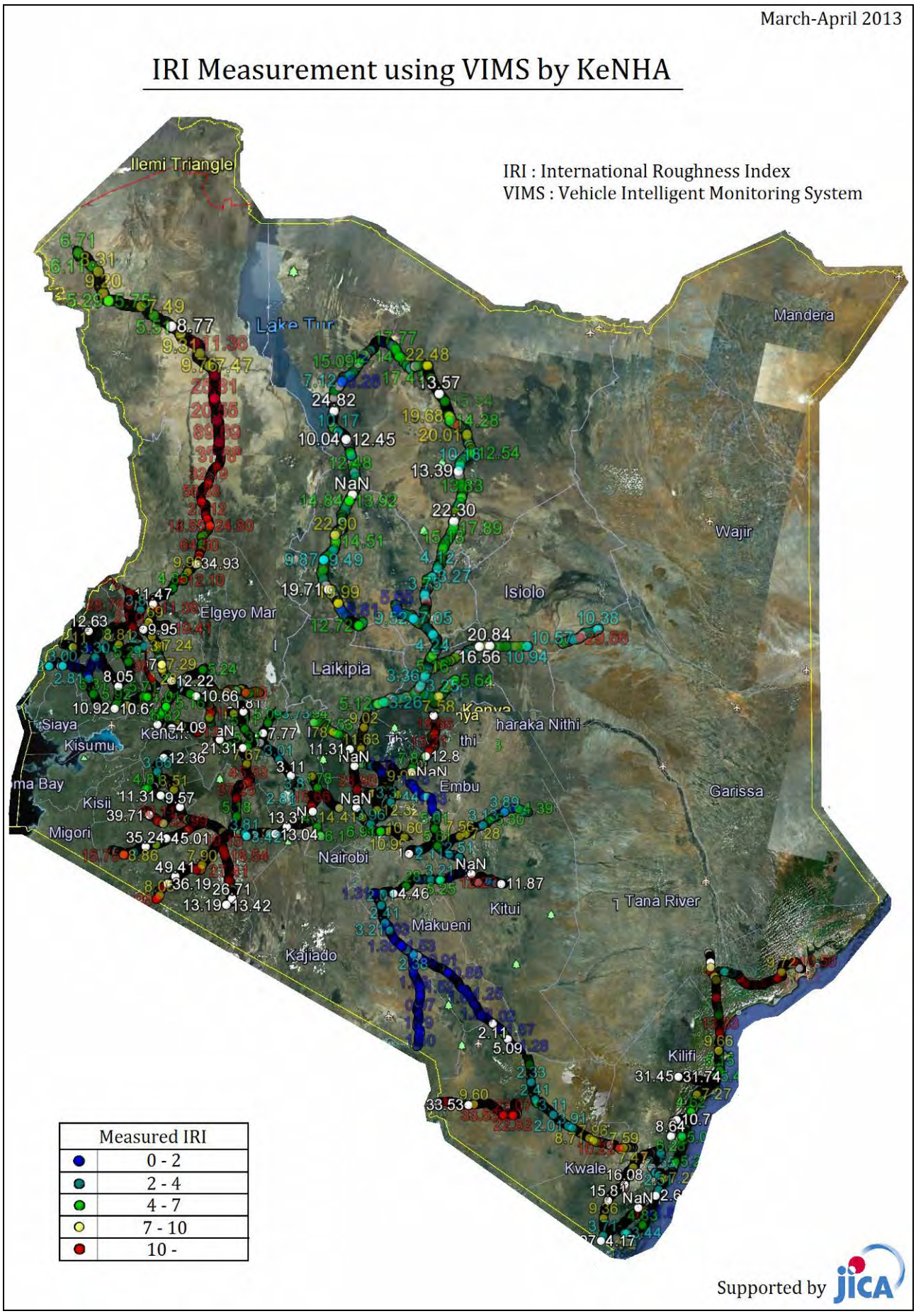


Figure 2 Sample of IRI measurement result （Source : KeNHA, Kenya）

Appendix - 3 Reference Information on MCI

MCI (Maintenance Control Index)

MCI (Maintenance Control Index) is developed by the Ministry of Land, Infrastructure and Transport of Japan for evaluation of the urgency for road pavement repairing by emergence of three (3) typical damages namely cracks, rutting and profile defect.

$$MCI = 10 - 1.48C^{0.3} - 0.29D^{0.7} - 0.47\sigma^{0.2} \quad \cdots\cdots(1)$$

$$MCI_0 = 10 - 0.51C^{0.3} - 0.30D^{0.7} \quad \cdots\cdots(2)$$

$$MCI_1 = 10 - 2.23C^{0.3} \quad \cdots\cdots(3)$$

$$MCI_2 = 10 - 0.54D^{0.7} \quad \cdots\cdots(4)$$

ここに，MCI ：維持管理指数

C ：ひびわれ率（%）

D ：わだち掘れ量（mm）

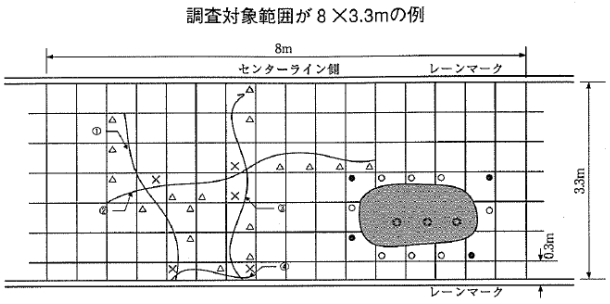
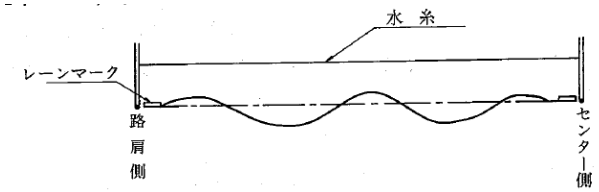
σ ：縦断凹凸量（mm）

Engineer can select a most suitable formula from the three (3) formulas depending on the site condition. For example, if cracking is mostly observed, the maintenance engineer can select MCI1 to calculate the MCI index. Evaluation criteria are judged according to Table 1.

Table 1 Urgency of the Pavement Maintenance by MCI

MCI	Evaluation
Less than 3	Repair Urgently needs
3～5	Repair needs
More than 5	Favorable Condition
(8～9)	New Pavement

Table 2 Typical Pavement Defect and Measurement Method

Crack Rate	【Defect】 Rate of the crack observed on the pavement surface 【Measurement】 Set- up grid of 50cm, record number of crack in each grid per lane. Evaluation by 6. 0% - 25% 7. 25% - 75% 8. 75% - 【Unit】%	
Rutting	【Defect】 Depth of rutting per carriage lane 【Measurement】 By solid scale or taut line 【Unit】mm	
Profile Defect	【Defect】 Depth of profile defect 【Measurement】 By 3m profile meter 【Unit】mm	

Source: Japan Road Association

Appendix 4

Detailed Training Schedule and Requirement of Trainees

Training Program and Trainees' requirement (Output 1)

Year	1st year		
Training	【1-3】【1-7】 IRI Measurement and Road Inspection Start-up Training	【1-4】 IRI (Test Measurement) Training	【1-8】 Visual Inspection (Trial) Training
Period	March to May , 2014	June to Oct 2014	June to Oct 2014
Target Entities	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6	Gissar SETM 1 Kurgan Tyube SETM 1 Total 2	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6
Training Purpose	TOT (Training of Master Trainers) for IRI measurement by VIMS Visual Inspection	TOT Learning by doing for selected 4 SEHM for IRI measurement by VIMS	TOT Learning by doing for selected 4 SEHM for Road Inspection
Training Activity	1. Demonstration of IRI measurement 2. VIMS equipment setting up (April) ♦ Calibration method ♦ Software 3. IRI Measurement and Analysis ♦ IRI measurement by VIMS ♦ Data Analysis ♦ Mapping 4. Visual Inspection ♦ Detailed pavement inspection ♦ Maintenance Control Index	1. Equipment and measurement ♦ Software set-up ♦ Hump calibration ♦ Speed calibration ♦ IRI measurement ♦ IRI estimation ♦ IRI plot on the google earth 2. Evaluation of the Road Condition 3. Road Network Statistics *Measurement of IRI of all road under SETM (road condition of year 2014)	1. Detailed pavement inspection ♦ Survey form ♦ Measurement of pavement crack ♦ Survey Safety 2. Maintenance Control Index (MCI) ♦ Calculation of MCI ♦ Evaluation Method
Instructor	JICA Expert	JICA Expert	JICA Expert
Number and Requirement of the trainees	**Master Trainers (MT)** Senior Engineer of SETM 2x2SETM= 4 Senior Engineer of SEHM 2x4SEHM=8 Total 12 *Master Trainer (MT) is to be a instructor to other staff*	**1. Senior Engineer of SETM (MT) 2x2SETM=4** 2. Technical staff of IRI measurement 2x2SETM=4 (needs PC operation skill) 3. Technical staff for Data Analysis 2x2SETM=4 (needs PC operation skill) 4. Total 12	**1. Senior Engineer of SEHM(MT) 2x4SEHM = 8** 2. Inspection Engineer of SEHM 2x4SEHM = 8 3. Total 16

*1 One IRI Survey team minimum: 1 IRI Survey Technician, 1 IRI Data Annalist, 1 Supervisor, 1 Driver
*2 One Visual Inspection team: 1 Inspection Engineer, 1 record keeper, 2 measurement assistants, 1 driver

Training Program and Trainees' requirement (Output 1)

Year	2nd year		
Training	【1-4】 IRI Measurement On the Job Training (OJT)	【1-11】 Visual Inspection On the Job (OJT) Training	
Period	April to October, 2015	April to October, 2015	
Target Entities	Gissar SETM 1 SEHM under Gissar SETM 9 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 13 Total 24	Gissar SETM 1 SEHM under Gissar SETM 9 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 13 Total 24	
Training Purpose	Training from MT to other staff Expansion from 4 SEHM to 22 SEHM on IRI measurement by VIMS Visual Inspection	Training from MT to other staff Expansion from 4 SEHM to 22 SEHM on IRI measurement by VIMS	
Training Activity	Achievement of 1st year shall be transferred from MT to other SEHM 1. Equipment and measurement ♦ Software set-up ♦ Hump calibration ♦ Speed calibration ♦ IRI measurement ♦ IRI estimation ♦ IRI plot on the google earth 2. Evaluation of the Road Condition 3. Road Network Statistics *Measurement of IRI of all road under SETM (road condition of year 2015)	Achievement of 1st year shall be transferred from MT to other SEHM 1. Detailed pavement inspection ♦ Survey form ♦ Measurement of pavement crack ♦ Survey Safety 2. Maintenance Control Index (MCI) ♦ Calculation of MCI ♦ Evaluation Method	
Instructor	Master Trainer (with JICA Expert Support)	Master Trainer (with JICA Expert Support)	
Number and Requirement of the trainees	**1. Senior Engineer of SETM(MT) 2x2SETM=4** 2. Senior Engineer of SEHM 1x18SEHM=18 3. Total 22	**1. Senior Engineer of SEHM(MT) 2x4SEHM = 8** 2. Inspection Engineer of SEHM 2x18SEHM = 36 3. Total 44	

Training Program and Trainees' requirement (Output 2)

Year	1st year		
Training	【2-3】 Training related to pavement repairing	【2-4】 Planning for pilot project #1	【2-5】OJT by actual pavement repairing (Pilot project#1)
Period	June , 2014 (May for preparation)	July to August , 2014	September to November 2014
Target Entities	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6
Training Purpose	Training of Master trainers (TOT) for a. Management of Asphalt mixing plant b. Maintenance of machineries. c. Pavement construction and repairing	Training of Master trainers (TOT) for a. Training and arrangements/preparation for pilot project#1 b. Material mixing design. c. Detail Construction plan	Training of Master trainers (TOT) for a. Training for Master Trainers by actual pavement repairing by using of newly provided machineries.(2 locations: Gissar 1, Kurgan Tyube 1)
Training Activity	a. *Quality control *Staff assignment and there duty in asphalt mixing plant *Material Mix design *Material control *Production procedures b. *Daily maintenance *Periodic maintenance c. *Pavement construction /repairing *Site construction planning *Pavement method	Location to be repaired will determine according to the discussion with ESTM and MOT a. *Traffic survey *Current condition survey(detail) *Pavement structure survey *Identification of the cause of damage *Determination of repairing method b. *Material selection and sampling. * Material mixing design (Laboratory) c. *Safety *Material to use *Machinery to use *Work flow,*Quality Control	a. Production of bituminous hot mixture. *Plant Mixing *Test Production *Production b. Pavement repairing at site *Test Construction *Quality Control *Type of works and volume will determine by activity of 【2-4】according to discussion with ESTM and MOT*
Number and Requirement of the trainees	1. Senior Engineer of SETM 1x2SETM= 2 2. Senior Engineer of SEHM 4*SEHMx2=8 3. Material testing engineer 1x2AP =2 **1 of 4 shall from the SEHM that AP/CP will be located.* Total 12	1. Senior Engineer of SETM 1x2SETM= 2 2.Senior Engineer of SEHM 4*SEHMx2=8 **1 of 4 shall from the SEHM that AP/CP will be located.* Total 10 3. 2QC team*3 to Execute mixing design	1. Senior Engineer of SETM 1x2SETM= 2 2.Senior Engineer of SEHM 4SEHMx2=8 *1 of 4 shall from the SEHM that AP/CP will be located.* Total 10 3. 2 pavement team from each SETM*1 4. 2.AP team*2 5.2QC team*3 **Other 18 SEHM should observe the pavement,*

*1 One Pavement team minimum: 1 operator of asphalt paver,2 rollers,1small roller, 1adjustman, 3 rake man, 3 hand shovel man,3 or4 cleaning and other task.
*2 One AP team: 1 AP manager(can be 1 of Senior engineer),1 AP operator,1 electrician,1 AP mechanic,1 wheel loader ope,3 or 4 workers.
*3 One QC team: 1 material testing engineer,1 assistant material testing engineer,3 or4 workers

Training Program and Trainees' requirement (Output 2)

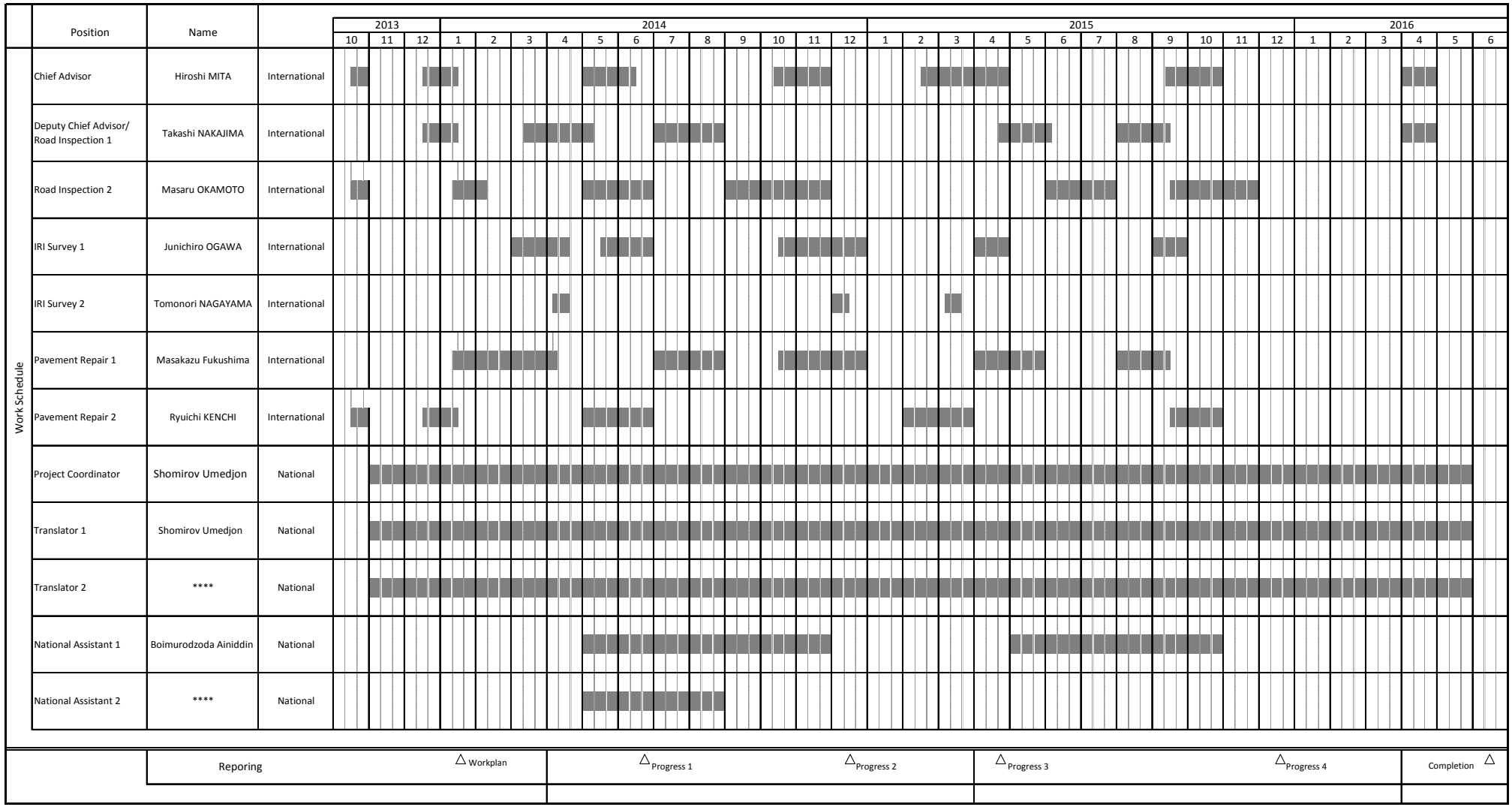
Year	2nd year		
Training	【2-9】Planning for pilot project #2	【2-10】OJT by actual pavement repairing (Pilot project#2)	
Period	March and April 2015	May to August , 2015	
Target Entities	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6	Gissar SETM 1 SEHM under Gissar SETM 9 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 13 Total 24	
Training Purpose	Training FROM Master Trainers on a. Training and arrangements/preparation for pilot project#2 b. Detail Construction plan	Training FROM Master Trainers on a. Asphalt production b. Training from Master Trainers by actual pavement repairing by using of newly provided machineries.(2 locations : Gissar SETM 1, Kurgan Tyube SETM 1)	
Training Activity	Location to be repaired will determine according to the result of IRI survey and discussion with ESTM and MOT a. *Traffic survey *Current condition survey(detail) *Pavement structure survey *Identification of the cause of damage *Determination of repairing method b, *Material selection and sampling. * Execute mixing design (Review of the 1st year design) c. *Safety *Material to use *Machinery to use *Work flow, *Quality Control	a. Production of bituminous hot mixture. b. Pavement repairing at site Type of works and volume will determine by activity of【2-9】according to discussion with ESTM and MOT	
Number and Requirement of the trainees	1. Senior Engineer of SETM 1x2SETM= 2 2.Senior Engineer of SEHM 4*SEHMx2=8 *1 of 4 shall from the SEHM that AP/CP will be located. Total 10	1. Senior Engineer of SETM 1x2SETM= 2 2.Senior Engineer of SEHM 4SEHMx2=8 *1 of 4 shall from the SEHM that AP/CP will be located.* Total 10 3. 2 pavement team from each SETM*1 4. 2.AP team*2 5.2QC team*3 **Other 18 SEHM should observe the pavement,*	

*One Pavement team shall observe and study the pavement procedure from other team's workmanship.

Appendix 5

Staffing Schedule

Staffing Schedule



Attachment GP-3

Project Training Program

Training Program between 2013 and 2015 – All Training Programs Completed

Training Program and Trainees' requirement (Output 1)

Year	1st year		
Training	【1-3】【1-7】 IRI Measurement and Road Inspection Start-up Training	【1-4】 IRI (Test Measurement) Training	【1-8】 Visual Inspection (Trial) Training
Period	March to May , 2014	June to Oct 2014	June to Oct 2014
Target Entities	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6	Gissar SETM 1 Kurgan Tyube SETM 1 Total 2	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6
Training Purpose	TOT (Training of Master Trainers) for IRI measurement by VIMS Visual Inspection	TOT Learning by doing for selected 4 SEHM for IRI measurement by VIMS	TOT Learning by doing for selected 4 SEHM for Road Inspection
Training Activity	1. Demonstration of IRI measurement 2. VIMS equipment setting up (April) • Calibration method • Software 3. IRI Measurement and Analysis • IRI measurement by VIMS • Data Analysis • Mapping 4. Visual Inspection • Detailed pavement inspection • Maintenance Control Index	1. Equipment and measurement • Software set-up • Hump calibration • Speed calibration • IRI measurement • IRI estimation • IRI plot on the google earth 2. Evaluation of the Road Condition 3. Road Network Statistics *Measurement of IRI of all road under SETM (road condition of year 2014)	1. Detailed pavement inspection • Survey form • Measurement of pavement crack • Survey Safety 2. Maintenance Control Index (MCI) • Calculation of MCI • Evaluation Method
Instructor	JICA Expert	JICA Expert	JICA Expert
Number and Requirement of the trainees	**Master Trainers (MT)** Senior Engineer of SETM 2x2SETM= 4 Senior Engineer of SEHM 2x4SEHM=8 Total 12 *Master Trainer (MT) is to be a instructor to other staff*	**1. Senior Engineer of SETM (MT) 2x2SETM=4** 2. Technical staff of IRI measurement 2x2SETM=4 (needs PC operation skill) 3. Technical staff for Data Analysis 2x2SETM=4 (needs PC operation skill) 4. Total 12	**1. Senior Engineer of SEHM(MT) 2x4SEHM = 8** 2. Inspection Engineer of SEHM 2x4SEHM = 8 3. Total 16

*1 One IRI Survey team minimum: 1 IRI Survey Technician, 1 IRI Data Annalist, 1 Supervisor, 1 Driver **Grey Colored Section : Completed**
*2 One Visual Inspection team: 1 Inspection Engineer, 1 record keeper, 2 measurement assistants, 1 driver

Training Program between 2013 and 2016 – All Training Programs Completed

Training Program and Trainees' requirement (Output 1)

Year	2nd year		
Training	【1-4】 IRI Measurement On the Job Training (OJT)	【1-11】 Visual Inspection On the Job (OJT) Training	
Period	April to October, 2015	April to October, 2015	
Target Entities	Gissar SETM 1 SEHM under Gissar SETM 9 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 13 Total 24	Gissar SETM 1 SEHM under Gissar SETM 9 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 13 Total 24	
Training Purpose	Training from MT to other staff Expansion from 4 SEHM to 22 SEHM on IRI measurement by VIMS Visual Inspection	Training from MT to other staff Expansion from 4 SEHM to 22 SEHM on IRI measurement by VIMS	
Training Activity	Achievement of 1st year shall be transferred from MT to other SEHM 1. Equipment and measurement • Software set-up • Hump calibration • Speed calibration • IRI measurement • IRI estimation • IRI plot on the google earth 2. Evaluation of the Road Condition 3. Road Network Statistics *Measurement of IRI of all road under SETM (road condition of year 2015)	Achievement of 1st year shall be transferred from MT to other SEHM 1. Detailed pavement inspection • Survey form • Measurement of pavement crack • Survey Safety 2. Maintenance Control Index (MCI) • Calculation of MCI • Evaluation Method	
Instructor	Master Trainer (with JICA Expert Support)	Master Trainer (with JICA Expert Support)	
Number and Requirement of the trainees	1. Senior Engineer of SETM(MT) 2x2SETM=4 2. Senior Engineer of SEHM 1x18SEHM=18 3. Total 22	1. Senior Engineer of SEHM(MT) 2x4SEHM = 8 2. Inspection Engineer of SEHM 2x18SEHM = 36 3. Total 44	

Training Program between 2013 and 2016 – All Training Programs Completed

Training Program and Trainees' requirement (Output 2)

Year	1st year		
Training	【2-3】 Training related to pavement repairing	【2-4】 Planning for pilot project #1	【2-5】 OJT by actual pavement repairing (Pilot project#1)
Period	June , 2014 (May for preparation)	July to August , 2014	September to November 2014
Target Entities	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6
Training Purpose	Training of Master trainers (TOT) for a. Management of Asphalt mixing plant b. Maintenance of machineries c. Pavement construction and repairing	Training of Master trainers (TOT) for a. Training and arrangements/preparation for pilot project#1 b. Material mixing design c. Detail Construction plan	Training of Master trainers (TOT) for a. Training for Master Trainers by actual pavement repairing by using of newly provided machineries.(2 locations: Gissar 1, Kurgan Tyube 1)
Training Activity	a. *Quality control *Staff assignment and there duty in asphalt mixing plant *Material Mix design *Material control *Production procedures b. *Daily maintenance *Periodic maintenance c. *Pavement construction /repairing *Site construction planning *Pavement method	Location to be repaired will determine according to the discussion with ESTM and MOT a. *Traffic survey *Current condition survey(detail) *Pavement structure survey *Identification of the cause of damage *Determination of repairing method b. *Material selection and sampling * Material mixing design (Laboratory) c. *Safety *Material to use *Machinery to use *Work flow,*Quality Control	a. Production of bituminous hot mixture. *Plant Mixing *Test Production *Production b. Pavement repairing at site *Test Construction *Quality Control *Type of works and volume will determine by activity of 【2-4】 according to discussion with ESTM and MOT*
Number and Requirement of the trainees	1. Senior Engineer of SETM 1x2SETM= 2 2. Senior Engineer of SEHM 4*SEHMx2=8 3. Material testing engineer 1x2AP =2 *1 of 4 shall from the SEHM that AP/CP will be located.* Total 12 This training has been repeated in February 2015	1. Senior Engineer of SETM 1x2SETM= 2 2.Senior Engineer of SEHM 4*SEHMx2=8 *1 of 4 shall from the SEHM that AP/CP will be located.* Total 10 3. 2QC team*3 to Execute mixing design	1. Senior Engineer of SETM 1x2SETM= 2 2.Senior Engineer of SEHM 4SEHMx2=8 *1 of 4 shall from the SEHM that AP/CP will be located.* Total 10 3. 2 pavement team from each SETM*1 4. 2.AP team*2 5.2QC team*3 *Other 18 SEHM should observe the pavement.*

*1 One Pavement team minimum: 1 operator of asphalt paver,2 rollers,1small roller, 1adjustman, 3 rake man, 3 hand shovel man,3 or4 cleaning and other task.
*2 One AP team: 1 AP manager(can be 1 of Senior engineer),1 AP operator,1 electrician,1 AP mechanic,1 wheel loader ope,3 or 4 workers.
*3 One QC team: 1 material testing engineer,1 assistant material testing engineer,3 or4 workers **Grey Colored Section: Completed**

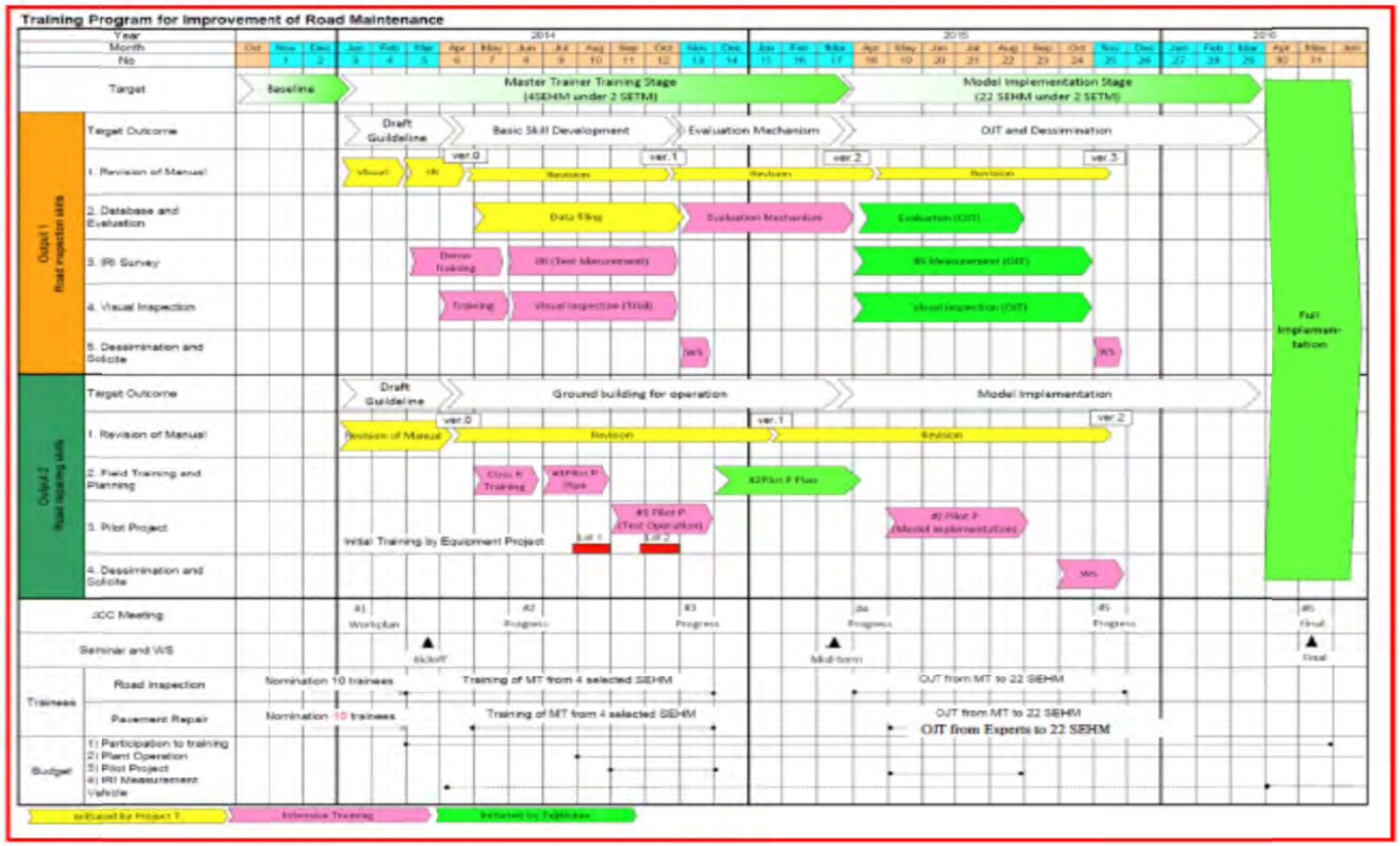
Training Program between 2013 and 2016 – All Training Programs Completed

Training Program and Trainees' requirement (Output 2)

Year	2nd year		
Training	【2-9】Planning for pilot project #2	【2-10】OJT by actual pavement repairing (Pilot project#2)	
Period	March and April 2015	May to August , 2015	
Target Entities	Gissar SETM 1 SEHM under Gissar SETM 2 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 2 Total 6	Gissar SETM 1 SEHM under Gissar SETM 9 Kurgan Tyube SETM 1 SEHM under Kurgan Tyube SETM 13 Total 24	
Training Purpose	Training FROM Experts on a. Training and arrangements/preparation for pilot project#2 b. Detail Construction plan	Training FROM Experts on a. Asphalt production b. Training from Experts by actual pavement repairing by using of newly provided machineries.(2 locations : Gissar SETM 1, Kurgan Tyube SETM 1)	
Training Activity	Location to be repaired will determine according to the result of IRI survey, Pavement Inspection Guideline and discussion with S ETM and MOT a. *Traffic survey *Current condition survey(detail) *Pavement structure survey *Identification of the cause of damage *Determination of repairing method b, *Material selection and sampling. * Execute mixing design (Review of the 1st year design) c. *Safety *Material to use *Machinery to use *Work flow, *Quality Control	a. Production of bituminous hot mixture. b. Pavement repairing at site Type of works and volume will determine by activity of【2-9】according to discussion with SETM and MOT	
Number and Requirement of the trainees	1. Senior Engineer of SETM 1x2SETM= 2 2.Senior Engineer of SEHM 4*SEHMx2=8 *1 of 4 shall from the SEHM that AP/CP will be located. Total 10	1. Senior Engineer of SETM 1x2SETM= 2 2.Senior Engineer of SEHM 4SEHMx2=8 *1 of 4 shall from the SEHM that AP/CP will be located.* Total 10 3. 2 pavement team from each SETM*1 4. 2 AP team*2 5.2QC team*3 **Other 18 SEHM should observe the pavement.*	

*One Pavement team shall observe and study the pavement procedure from other team's workmanship.

Training Program between 2013 and 2016 – All Training Programs Completed



Training Program in 2016 – Basic Training for Sogd/Kulyab SETM's Engineers

Proposed Schedule of Basic Training for Sogd/Kulyab SETM's Engineers

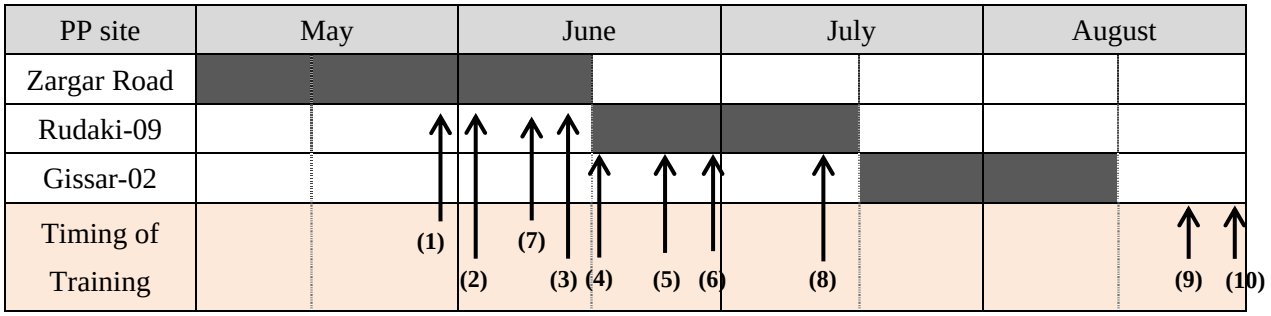
Assumption

PP is being conducted during below period;

- ✓ Zargar Road in KT: Early May to Middle of June (1.5 month)
- ✓ Rudaki-09 in Gissar: Middle of June to Middle of July (1.0 month)
- ✓ Gissar-02 in Gissar: Middle of July to Middle of August (0.8 month)

Time	Training ID	Location	Subject	Target SETM	Period	Remarks
1st	(1)	Kurgan Tyube	Pavement Repair	Kulyab	May 30 ~ May31	1st Travel from Kulyab to Kurgan Tyube
	(2)	Kurgan Tyube	Pavement Inspection	Kulyab	June 1 ~ June3	
	(3)	Dushanbe	Pavement Repair	Sogud	June 13 ~ June 14	1st Travel from Sogud to Dushanbe
	(4)	Dushanbe	Pavement Inspection	Sogud	June 15 ~ June 17	
Follow-up	(5)	Kulyab	Pavement Inspection	Kulyab	June 22 ~ June 24	A Master Trainer and project national staff will travel to both SETMs for pavement inspection training.
	(6)	Sogud	Pavement Inspection	Sogud	June 29 ~ July 1	
2nd	(7)	Kurgan Tyube	Pavement Repair	Kulyab	June 6 ~ June 8	2nd Travel from Kulyab to Kurgan Tyube
	(8)	Dushanbe	Pavement Repair	Sogud	July 11 ~ July 13	2nd Travel from Sogud to Dushanbe
	(9)	Kurgan Tyube	Pavement Inspection	Kulyab	August 23 ~ August 25	3rd Travel from Kulyab to Kurgan Tyube
	(10)	Dushanbe	Pavement Inspection	Sogud	August 30 ~ September 1	3rd Travel from Sogud to Dushanbe

Timing of Training



Basic Pavement Repair Training Program for Sogd and Kulyab SETM

- **1st Training: Class Room Lecture**

Day	Date		Menu	Time
	Training ID: (1)	Training ID: (3)		
1	May 30 (Mon)	June 13 (Mon)	Lecture-01: Introduction to Pavement Repair	10:00 - 14:00
			Lecture-02: Crushing Plant	
			Lecture-03: Quality Control	
			Lecture-04: Material Control at Asphalt Plant	
			Lecture-05: On-Site Lecture at Asphalt Plant	14:00 - 1600
2	May 31 (Tue)	June 14 (Tue)	Lecture-06: Pavement Method	10:00 - 16:00
			Lecture-07: Maintenance and Pavement Repair	
			Lecture-08: Quality control on Site	
			Lecture-09: Method Statement	

- **2nd Training: On-Site Lecture**

Day	Date		Menu	Time
	Training ID: (7)	Training ID: (8)		
1	June 6 (Mon)	July 11 (Mon)	Lecture-01: On the Job Training on PP Site	10:00 - 12:00
2	June 7 (Tue)	July 12 (Tue)	Lecture-02: On the Job Training on PP Site	10:00 - 16:00
3	June 8 (Wed)	July 13 (Wed)	Q&A, Skill and Knowledge Test	10:00 - 16:00

Basic Pavement Inspection Training Program for Sogd and Kulyab SETM

- **1st Training: IRI Measurement**

Day	Date		Menu	Time
	Training ID: (2)	Training ID: (4)		
1	June 1 (Wed)	June 15 (Wed)	Lecture-01: Introduction to IRI Measurement	10:00 - 12:00
			Lecture-02: Device Setup and Operation Check	13:00 - 14:00
			Lecture-03: Hump Calibration	14:00 - 16:00
2	June 2 (Thu)	June 16 (Thu)	Lecture-04: Speed Calibration	10:00 - 15:00
			Lecture-05: Analysis	15:00 - 16:00
3	June 3 (Fri)	June 17 (Fri)	Lecture-06: IRI Measurement Demonstration	10:00 - 12:00:
			Lecture-07: Analysis and Form1 Making	13:00 - 16:00

- **Follow-up Training**
  Training ID: (5) (6)

Day	Date		Menu	Time
	Training ID: (5)	Training ID: (6)		
1	June 22 (Wed)	June 29 (Wed)	Lecture-01: Hump Calibration and Speed Calibration	10:00 - 16:00
2	June 23 (Thu)	June 30 (Thu)	Lecture-02: IRI Measurement and Analysis	10:00 - 16:00
3	June 24 (Fri)	July 1 (Fri)	Lecture-03: IRI Measurement and Analysis	10:00 - 16:00

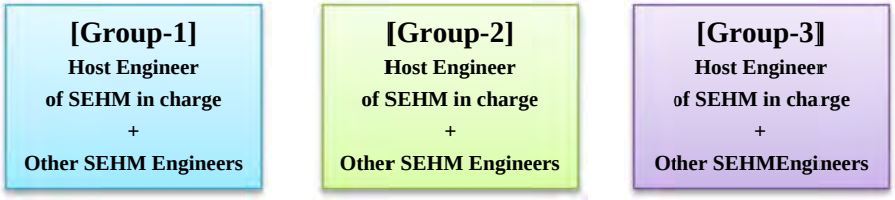
- **2nd Training: Visual Inspection**
  Training ID: (9) (10)

Day	Date		Menu	Time
	Training ID: (9)	Training ID: (10)		
1	August 23 (Tue)	August 30 (Tue)	Lecture-01: Review of IRI measurement Result	10:00 - 12:00
			Lecture-02: Visual Inspection Demonstration	13:00 - 16:00
2	August 24 (Wed)	August 31 (Wed)	Lecture-03: Visual Inspection Demonstration	10:00 - 12:00
			Lecture-04: Form 1 Completion and Graph Making	13:00 - 16:00
3	August 25 (Thu)	September 1 (Thu)	Lecture-05: Form 2 and 3 Completion	10:00 - 12:00
			Q&A, Skill and Knowledge Test	13:00 - 16:00

Training Program in 2016 – Technical Training through PP for SEHM Engineers

1 General Outline

During PP, engineers from all SEHM will participate in OJT training. In order for the training to be effective in a limited time, Grouping System will be applied. Thegrouping system image is illustrated below. A group is composed of a host engineer who is the engineer of SEHM in charge of PP.Other engineers who are not in charge of PP will actively take part in collaboration with the host engineer and SETM engineers who will also be supervising the operation.



Work Item	Work Schedule			
Cleaning				
Patching				
Leveling				
Paving				
Trainees	G-1 G-2 G-3	G-1 G-2 G-3	G-1 G-2 G-3	G-1 G-2 G-3
Supported by	SETM engineers JICA Experts	SETM engineers JICA Experts	SETM engineers JICA Experts	SETM engineers JICA Experts

2 Sharing of Supervisory Responsibility

Major Works (Levelling and Paving)

As the role of engineering supervision is heavier compared to Minor Works, the supervisory responsibility will be shared amongst the engineers of each group on a day to day basis. For an example if the road is required to have an overlay of 4 days and assume that 3 groups are participating, the host engineer will be in charge of day 1 and this will be followed by other SEHM engineers of Group 1 for day2, other SEHM engineers of Group 2 for day 3 and other SEHM engineers of Group 3 for day 4. However, the host engineer will be responsible for the entire work. The work will be supported by SETM engineers and JICA Experts during the entire operation. Within the Group, other SEHM engineers may split the supervisory responsibility within themselves upon discussion with the host engineer, SETM engineers and JICA Experts so that more engineers may share supervisory experience.

Minor Works (Cleaning and Patching)

Compared to Major Works, the role of engineering supervision is lighter and the entire operation will be implemented under the supervisory responsibility of the host engineer. However, other SEHM engineers will be trained with support from SETM engineers and JICA Experts on the work involved.

3 Grouping System

The grouping system will be as follows;

Kurgan Tyube SETM for Zargar Road- 4 groups

Trainer	SETM Chief Engineer	Mr. KholiqovMuzaffar
Host Engineer:	Bokhtar SEHM	Mr. Negmatov Hakim
Group A	Vaksh SEHM	Mr. SalimovFakhriddin
	Sarband SEHM	Mr. HazratqulovOdil
	J. balkhi (Rumi) SEHM	Mr. GhoibnazarovMahmadsharif
Group B	Khuroson SEHM	Mr. GulmurodovNurali
	Jomi SEHM	Mr. HikmatovKhairullo
	Yovon SEHM	Mr. AliqulovTaghoi
Group C	Jilikul SEHM	Mr. AnorovRajabali
	Qumsangir SEHM	Mr. KholiqovMahmadkarim
	Pyandzh SEHM	Mr. KholovSaidahmad
Group D	Qubodiyon SEHM	Mr. MuqadamiQubod
	Shahrituz SEHM	Mr. QurbonovMahmadrahim
	N. Khusrav SEHM	Mr. MurudovRuziboy

Gissar SETM for Rudaki- 03– 1 group

Trainer	SETM Production Manager	Mr. OdinavIsmoil
Host Engineer:	Rudaki SEHM	Ms. QodirovaZulkhumor
Group A	Gissar SEHM	Mr.Ismoilov Umed
	Varzob SEHM	Mr.Izatulloev Maqsud
	Tursunzoda SEHM	Mr.Nuralliev Minbobo
	Norak SEHM	Mr.Fayzalov Sharofiddin

Gissar SETM for Vahdat local road – 2 group

Trainer	SETM Production Manager	Mr. OdinavIsmoil
Host Engineer:	Vahdat SEHM	Mr. Tabarov Hakimali
Group B	Fayzobod SEHM	Mr. Nematov Odil
	Rogun SEHM	Mr. Raupov Dosti
	Sharinav SEHM	Mr. Rustamov Ibodullo

Attachment GP-4

PDM Version 1, 2, 3 and 4

LOGICAL FRAMEWORK (PROJECT DESIGN MATRIX: PDM) Version 1

PROJECT TITLE: Project for Improvement of Road Maintenance	DURATION: 31 months	PDM Ver.1
TARGET GROUP: 22 SEHM[*1]s and 2 SETMs [*2] in Gissar and Kurgan – Tyube and Ministry of Transport	TARGET AREA: International & Republican roads in Gissar and Kurgan-Tyube	DATE: 8-Jan.-2014

[*1]SEHM: State Enterprise on Highway Management, [*2] SETM: State Enterprise of Transport Management

Narative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Pavement Condition of the roads under control of MOT in the target area is improved.			
Project Purpose Implementation capacity for road maintenance is improved.	1. Road inspection according to the revised guidelines is conducted at least 3 times by all target SEHMs by the end of the Project. 2. At least 5.0 Km length of road repairing is implemented at the target SEHMs according to the revised guidelines by the end of the project.	1. Road Inspection Record 2. Road repairing Record	-Current socio-political situation is not changed drastically. -Policy including the budge allocation for the road maintenance and repair is maintained.
Outputs 1. Road inspection skills of the target SEHMs are improved.	1.1 Road Inspection Guidelines with the attached Roughness Survey Manual are revised within 6 months after commencement of the project. 1.2 Revised Road Inspection Guidelines are finalized within 11 months after commencement of the project. 1.3 Roughness indexes of the roads in the target area are collected by the 2 target area are collected by the 2 target SETMs within 13 months after commencement of the project. 1.4 More than 90% of	1.1 Revised Inspection Guidelines 1.2 Final version of revised Inspection Guidelines 1.3 Roughness Survey Report 1.4 Inspection Record and its assessment summary 1.5 Attendance records of	- Sufficient number of the engineers and operators of the target SEHMs is kept.

<table>
<tr>
<td></td>
<td>inspection results by the target 22 SEHMs is assessed accurate by the JICA experts by the end of the project.
1.5 The number of participants of each workshop reaches as follows:
<table>
<tr><td>Workshop [Activity No]</td><td>No.</td></tr>
<tr><td>Summary of Roughness Survey [1.5]</td><td>10</td></tr>
<tr><td>Introduction of Revised Road Inspection Guidelines [1.10]</td><td>50</td></tr>
</table>
</td>
<td>workshops</td>
<td></td>
</tr>
<tr>
<td>2. Road repairing skills of the target SEHMs are improved.</td>
<td>2.1. Road Repairing Guidelines are revised within 6 months after commencement of the project.
2.2. Revised Record Repairing Guidelines are finalized within 22 months after commencement of the project.
2.3. More than 80% of the training participants passes the post-training test.
2.4. More than 80% of the result of the road repairing works #2 meet requirements of time, cost, quality, and safety specified in the contracts/plans
2.5. The number of participants of each workshop reaches as follows:
<table>
<tr><td>Workshop [Activity No.]</td><td>No.</td></tr>
<tr><td>Introduction of Revised Road Repairing Guidelines [2.8]</td><td>50</td></tr>
<tr><td>Feedback on road repairing works #2 [2.11]</td><td>50</td></tr>
</table>
</td>
<td>2.1 Revised Road and Repairing Guidelines

2.2 Final version of revised Road Repairing Guidelines

2.3 Test record and report

2.4 Repairing record and its assessment summary

2.5 Attendance records of workshops</td>
<td></td>
</tr>
</table>

Activities	**Inputs**		
1.1 To review the existing road inspection guidelines. 1.2 To revise the Road inspection Guidelines with the attached Roughness Survey Manual. 1.3 To conduct trainings (in each region) on Roughness Survey for the target 2 SETMs. 1.4 To carry out Roughness Survey on the roads in the target area. 1.5 To organize a workshop (in Dushanbe) to summarize the results of Roughness Survey with the target 2 SETMs and MOT. 1.6 To file the results of Roughness Survey 1.7 To conduct trainings (in each region) on road inspection according to the revised Road Inspection Guidelines for the selected 2 SEHMs from each target SETM. 1.8 To conduct road inspection on the international and republican roads under the jurisdiction of the selected 4 SEHMs. 1.9 To revise the road insection guidelines based on the results of the road inspection work (1.8) 1.10 To organize workshops (in each region) to introduce the revised Road inspection Guidelines for the target 18 SEHMs, 2 SETMs and MOT. 1.11 To conduct road inspection on the roads in the target area at the target 22 SEHMs.	**Inputs from the Japanese side** **1. Experts** a) Leader/Road Maintenance Expert 1 b) Road inspection Expert 1 c) Roughness Survey Expert d) Road Repairing Supervision Expert 1 e) Road Repairing Supervision Expert 2 f) Road Maintenance Expert 2/ Road Inspection Expert 2 g) Interpreters **2. Equipment** Equipment for roughness survey (2 sets) **3. Expenses for kick-off, mid-term and final seminars** **(Inputs other than indicated here will be determined through mutual consultation between JICA and MOT during the implementation of the Project, as necessary.)**	**Inputs from the Tajikistan side** **1. Counterparts for the Project** a) Project Director b) Project Manager c) Counterparts **2. Office Facilities** a) In the building of MOT for the Project with office furniture and utilities such as telephone line, electricity, etc. b) In the building of SETM located in Kurgan-Tyube with office furniture and utilities such as telephone line, electricity, etc. **3. Running Expenses** Necessary for the implementation of the Project including travel expenses and allowances for the participants of the trainings and workshops and expenses for the road repairing works.	

2.1 To review the existing Road Repairing Guidelines. 2.2 To revise the Road Repairing Guidelines 2.3 To conduct trainings (in each region) on road repairing according to the revised Road repairing Guidelines for the target 22SEHMs. 2.4 To provide support and advice on planning of the road repairing work #1 (in each region). 2.5 To implement an on-site technical instruction (in each region) for a road repairing work #1 2.6 To analyze the results of road repairing works #1, such as repairing materials and procedures. 2.7 To revise the Road repairing Guidelines based on the results of the analysis (2.6) 2.8 To organize workshops (in each region) to introduce the revised Road Repairing Guidelines with the target 20 SEHMs, 2 SETMs and MOT. 2.9 To plan the road repairing work #2 in the target areas. 2.10 To monitor and give technical advice on the road repairing works #2 in the target areas. 2.11 To organize workshops (in each region) to give feedbacks on the results of read repairing works #2, such as repairing materials and procedures for the target 22 SEHMs, 2 SETMs and MOT.			**Pre-conditions Tajikistan, especially the target area, is continuously safe enough for JICA experts to implement the activities.**

LOGICAL FRAMEWORK (PROJECT DESIGN MATRIX: PDM) Version 2

PROJECT TITLE: Project for Improvement of Road Maintenance	DURATION: 31 months	PDM Ver.2
TARGET GROUP: 22 SEHM[*1]s and 2 SETMs [*2] in Gissar and Kurgan – Tyube and Ministry of Transport	TARGET AREA: International & Republican roads in Gissar and Kurgan-Tyube	DATE: 24-Nov.-2015

[*1]SEHM: State Enterprise on Highway Management, [*2] SETM: State Enterprise of Transport Management

Narative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Pavement Condition of the roads under control of MOT in the target area is improved.			
Project Purpose Implementation capacity for road maintenance is improved.	1. Road inspection according to the revised guidelines is conducted at least 3 times by all target SEHMs by the end of the Project. 2. At least 5.0 Km length of road repairing is implemented at the target SEHMs according to the revised guidelines by the end of the project.	1. Road Inspection Record 2. Road repairing Record	-Current socio-political situation is not changed drastically. -Policy including the budge allocation for the road maintenance and repair is maintained.
Outputs 1. Road inspection skills of the target SEHMs are improved.	1.1 Road Inspection Guidelines with the attached Roughness Survey Manual are revised within 6 months after commencement of the project. 1.2 Revised Road Inspection Guidelines are finalized within 11 months after commencement of the project. 1.3 Roughness indexes of the roads in the target area are collected by the 2 target area are collected by the 2 target SETMs within 13 months after commencement of the project. 1.4 More than 90% of inspection results by the target 22 SEHMs is	1.1 Revised Inspection Guidelines 1.2 Final version of revised Inspection Guidelines 1.3 Roughness Survey Report 1.4 Inspection Record and its assessment summary 1.5 Attendance records of workshops	- Sufficient number of the engineers and operators of the target SEHMs is kept.

<table>
<tr>
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<td>assessed accurate by the JICA experts by the end of the project.
1.5 The number of participants of each workshop reaches as follows:
<table>
<tr><td>Workshop [Activity No]</td><td>No.</td></tr>
<tr><td>Summary of Roughness Survey [1.5]</td><td>10</td></tr>
<tr><td>Introduction of Revised Road Inspection Guidelines [1.10]</td><td>50</td></tr>
</table>
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<td></td>
<td></td>
</tr>
<tr>
<td>2. Road repairing skills of the target SEHMs are improved.</td>
<td>2.1. Road Repairing Guidelines are revised within 6 months after commencement of the project.
2.2. Revised Record Repairing Guidelines are finalized within 22 months after commencement of the project.
2.3. More than 80% of the training participants passes the post-training test.
2.4. More than 80% of the result of the road repairing works #2 meet requirements of time, cost, quality, and safety specified in the contracts/plans
2.5. The number of participants of each workshop reaches as follows:
<table>
<tr><td>Workshop [Activity No.]</td><td>No.</td></tr>
<tr><td>Introduction of Revised Road Repairing Guidelines [2.8]</td><td>50</td></tr>
<tr><td>Feedback on road repairing works #2 [2.11]</td><td>50</td></tr>
</table>
</td>
<td>2.1 Revised Road and Repairing Guidelines

2.2 Final version of revised Road Repairing Guidelines

2.3 Test record and report

2.4 Repairing record and its assessment summary

2.5 Attendance records of workshops</td>
<td></td>
</tr>
</table>

Activities	**Inputs**		
1.1 To review the existing road inspection guidelines. 1.2 To revise the Road inspection Guidelines with the attached Roughness Survey Manual. 1.3 To conduct trainings (in each region) on Roughness Survey for the target 2 SETMs. 1.4 To carry out Roughness Survey on the roads in the target area. 1.5 To organize a workshop (in Dushanbe) to summarize the results of Roughness Survey with the target 2 SETMs and MOT. 1.6 To file the results of Roughness Survey 1.7 To conduct trainings (in each region) on road inspection according to the revised Road Inspection Guidelines for the selected 2 SEHMs from each target SETM. 1.8 To conduct road inspection on the international and republican roads under the jurisdiction of the selected 4 SEHMs. 1.9 To revise the road insection guidelines based on the results of the road inspection work (1.8) 1.10 To organize workshops (in each region) to introduce the revised Road inspection Guidelines for the target 18 SEHMs, 2 SETMs and MOT. 1.11 To conduct road inspection on the roads in the target area at the target 22 SEHMs.	**Inputs from the Japanese side** **1. Experts** a) Leader/Road Maintenance Expert 1 b) Road inspection Expert 1 c) Roughness Survey Expert d) Road Repairing Supervision Expert 1 e) Road Repairing Supervision Expert 2 f) Road Maintenance Expert 2/ Road Inspection Expert 2 g) Interpreters **2. Equipment** Equipment for roughness survey (2 sets) Equipment for test equipment for day to day quality control tests at asphalt plant (2sets) **3. Expenses for kick-off, mid-term and final seminars** **(Inputs other than indicated here will be determined through mutual consultation between JICA and MOT during the implementation of the Project, as necessary.)**	**Inputs from the Tajikistan side** **1. Counterparts for the Project** a) Project Director b) Project Manager c) Counterparts **2. Office Facilities** c) In the building of MOT for the Project with office furniture and utilities such as telephone line, electricity, etc. d) In the building of SETM located in Kurgan-Tyube with office furniture and utilities such as telephone line, electricity, etc. **3. Running Expenses** Necessary for the implementation of the Project including travel expenses and allowances for the participants of the trainings and workshops and expenses for the road repairing works.	

2.1 To review the existing Road Repairing Guidelines. 2.2 To revise the Road Repairing Guidelines 2.3 To conduct trainings (in each region) on road repairing according to the revised Road repairing Guidelines for the target 22SEHMs. 2.4 To provide support and advice on planning of the road repairing work #1 (in each region). 2.5 To implement an on-site technical instruction (in each region) for a road repairing work #1 2.6 To analyze the results of road repairing works #1, such as repairing materials and procedures. 2.7 To revise the Road repairing Guidelines based on the results of the analysis (2.6) 2.8 To organize workshops (in each region) to introduce the revised Road Repairing Guidelines with the target 20 SEHMs, 2 SETMs and MOT. 2.9 To plan the road repairing work #2 in the target areas. 2.10 To monitor and give technical advice on the road repairing works #2 in the target areas. 2.11 To organize workshops (in each region) to give feedbacks on the results of read repairing works #2, such as repairing materials and procedures for the target 22 SEHMs, 2 SETMs and MOT. 2.11 To carry out training on appointed laboratory technicians to be able to conduct day to day quality control tests using testing equipment provided by JICA			**Pre-conditions** **Tajikistan, especially the target area, is continuously safe enough for JICA experts to implement the activities.**

LOGICAL FRAMEWORK (PROJECT DESIGN MATRIX: PDM) Version 3

PROJECT TITLE: Project for Improvement of Road Maintenance	DURATION: Originally 31 months from Oct 2013 to May 2016, Extended for 6 months to November 2016	PDM Ver.3
TARGET GROUP: 22 SEHM[*1]s and 2 SETMs [*2] in Gissar and Kurgan – Tyube and Ministry of Transport (MOT) (original target group), 6 SEHMs and 2 SETMs in Sogd and Kulyab (additional target group in the extended period)	TARGET AREA: International & Republican roads in Gissar and Kurgan-Tyube (original target area) and in Sogd and Kulyab (additional target area)	DATE: 24-May-2015

[*1]SEHM: State Enterprise on Highway Management, [*2] SETM: State Enterprise of Transport Management

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Pavement condition of the roads under control of MOT in the target area is improved.	1. By the end of 2019, at least 30 km and 15 km of lengths of road repairing is implemented by hot-mix asphalt at the original and additional target areas respectively according to the Road Repairing Guidelines 2. The average Road Repair Index (RRI) of roads repaired under 1 above in the original target area has a reduction of at least 60% compared to the same before repairing 3. The average IRI of the roads repaired under 1 above in the additional target area has a reduction of at least 50 % compared to the same before repairing	1. Road maintenance record sheet of each SETM (monthly and yearly) 2. 2&3 Form 1 of Road Inspection Guideline Final Version	
Project Purpose Implementation capacity for road maintenance is improved.	1. At least 90% of the results of roughness survey at original target 22 SEHMs, using the revised Guidelines is assessed accurate by the JICA experts by the end of the Project 2. At least 80% of visual inspection results by original	1. & 2. Road Inspection Record and its assessment summary 3. Repairing record and its assessment	-Current socio-political situation is not changed drastically. -Policy including the budget

	target 22 SEHMs, using the revised Guidelines is assessed accurate by the JICA experts by the end of the Project 3. At least 80% of results of the road repairing works #2 by three fourths of original target SEHMS, planned based on the results of the road inspection and implemented according to the revised Guidelines, meet requirements of time, cost, quality, and safety specified in the plans 4. Road Inspection and Repairing Guidelines for SETM/SEHM revised through the Project are approved by MOT by the end of the Project	summary 4. Date of approval by the First Deputy Minister Head of Main Depart, MOT	allocation for the road maintenance and repair is maintained. -Road repairing equipment to use hot-mix asphalt is available for additional 2SETMs by the end of 2017
Outputs 1. Road inspection[*4] skills of the target SEHMs are improved.	1a.Road Inspection Guidelines for SETM/SEHM are revised with the newly developed Roughness Survey Manual by April 2014 1b. International Roughness Index (IRI) of the roads in the original target area is collected according to the revised Guidelines by the original target 2 SETMs in coordination with the original target 22 SEHMs at least twice by the end of the Project 1c. Visual inspection according to the revised Guideline is conducted at least twice by all original target SEHMs by the end of the Project 1d. Road Inspection Guidelines for SETM/SEHM are finalized by September 2016	1a Revised Inspection Guidelines 1b. Roughness Survey Report 1c. Inspection Record and its assessment summary 1d. Final version of revised Guidelines submitted to MOT 1e. Inspection Record 1f. Test record and report	-Sufficient number of the engineers and operators of the target SEHMs is kept.

	for submission to MOT, reflecting feedbacks from the road inspections (roughness survey and visual inspection) in the target area 1e. Training of IRI measurement and visual inspection for additional 2 SETMs and 6 SEHMs were conducted at the additional target area by the Master Trainers for Inspection from the original target SETMs/SEHMs, using the revised Guidelines 1f. At least 80% of the training participants from additional target SETM and SEHMs pass the post-training test on basic elements of pavement inspection		
2. Road repairing[*5] skills of the target SEHMs are improved.	2a. Road repairing guidelines for SETM/SEHM are revised by April 2014 2b. At least 80% of the training participants from original target SETM passes the post-training test on road repairing to use hot-mix asphalt 2c. At least 5.0 km length of road repairing (#1 and #2) is implemented by at least 80% of the original target SEHMs according to the revised Guidelines by the end of the Project 2d. Road Repairing Guidelines for SETM/SEHM are finalized by September 2016 for submission to MOT reflecting the feedbacks from road repairing works #1 and #2	2a. Revised Road and Repairing Guidelines 2b. Test record and report 2c. Road Repairing record 2d. Final version of revised Guidelines submitted to MOT 2e&2f. Test record and report	

	2e. All the appointed laboratory technicians of the asphalt plants in the target SETMs score at least 70 out of 100 points in the post-training tests 2f. At least 80% of the training participants from additional target 2 SETM and 6 SEHMs passes the post-training test on basic elements of pavement repair by the end of the Project		

*[3] Road maintenance means pavement maintenance, *[4] Road inspection means pavement inspection
*[5] Road repairing means pavement repairing

Activities	**Inputs**		
1.1 To review the existing Road Inspection Guidelines. 1.2 To revise the Road Inspection Guidelines with the attached Roughness Survey Manual. 1.3 Conduct trainings (in each region) on Roughness Survey for the original target 2 SETMs and 22 SEHMs. 1.4 Carry out Roughness Survey on the roads in the original target area according to the revised Guidelines by the target 2 SETMs in coordination with the original target 22 SEHMs. 1.5 Organize a workshop (in Dushanbe) to summarize the results of Roughness Survey with the target 2 SETMs, 22 SEHMs and MOT. 1.6 File the results of	**<Japanese side>** **1. Experts** a) Leader/Road Maintenance Expert 1 b) Road inspection Expert 1 c) Roughness Survey Expert d) Road Repairing Supervision Expert 1 e) Road Repairing Supervision Expert 2 f) Road Maintenance Expert 2/ Road Inspection Expert 2 g) Interpreters **2. Equipment** Equipment for roughness survey (2 sets) **3. Expenses for kick-off, mid-term and final seminars** (Inputs other than indicated here will be	**<Tajikistan side>** **1. Counterparts for the Project** a) Project Director b) Project Manager c) Counterparts **2. Office Facilities** a) In the building of MOT for the Project with office furniture and utilities such as telephone line, electricity, etc. b) In the building of SETM located in Kurgan-Tyube with office furniture and utilities such as telephone line, electricity, etc. **3. Running Expenses**	-Natural disaster which affect the activities of the Project does not occur -Security situation of Tajikistan which limits the activities of the JICA experts, especially in the target area, does not deteriorate compared with the same in December 2015 <u>Pre-Condition</u> Tajikistan especially the target area is continuously

Roughness Survey (IRI data) by the original target 2 SETM in the prescribed form of the revised Guidelines 1.7 Conduct trainings (in each region) on road inspection according to the revised Road Inspection Guidelines for the original target 22 SEHMs and 2 SETMs. 1.8 Conduct visual inspection on the roads in the original target area at the original target 22 SEHMs, according to the revised Guidelines. 1.9 Revise the Road Inspection Guidelines based on the results of the road inspection works (Act. 1.4 & 1.8) 1.10 Organize workshops (in each region) to introduce the revised Guidelines for the original target 22 SEHMs, 2 SETMs and MOT. 1.11 Conduct road inspection (i.e. roughness survey, including filing results, and visual inspection) in the original target area at the original target 22 SEHMs according to the revised Guidelines. 1.12 Finalize the Road Inspection Guidelines based on the results of the road inspection works (Act. 1.11). 1.13 Organize workshops (in each region) to summarize	determined through mutual consultation between JICA and MOT during the implementation of the Project, as necessary.)	Necessary for the implementation of the Project including travel expenses and allowances for the participants of the trainings and workshops and expenses for the road repairing works.	safe enough for JICA experts to implement the activities

the results of road inspection and to introduce the finalized Road Inspection Guidelines for the target SEHMs, SETMs and MOT. 1.14 Certify Master Trainers for road inspection from the staff of the original target SETMs/SEHMs 1.15 Monitor and give technical advice on training conducted by the Master Trainers for additional target 2 SETMs and 6 SEHMs on basic elements of road inspection at the additional target area.			
2.1 Review the existing Road Repairing Guidelines. 2.2 Revise the Road Repairing Guidelines to improve pavement maintenance 2.3 Conduct trainings (in each region) on road repairing according to the revised Guidelines for the original target 22SEHMs. 2.4 Provide support and advice on planning of the road repairing work #1 (in each region) according the revised Guidelines. 2.5 Implement an on-site technical instruction (in each region) for a road repairing work #1 according the revised Guidelines at the selected SEHMs from the original target 2 SETMs. 2.6 Analyze the results of road repairing works #1, such as			

repairing materials and procedures. 2.7 Revise the Road Repairing Guidelines further based on the results of the analysis (Act. 2.6) 2.8 Organize workshops (in each region) to introduce the revised Guidelines with the original target 22 SEHMs, 2 SETMs and MOT. 2.9 Plan the road repairing work #2 in the original target area by the selected target SEHMs according to the revised Guidelines reflecting the results of road inspection (Act. 1.8). 2.10 Monitor and give technical advice on the road repairing works #2. 2.11 Finalize the Road Repairing Guidelines based on the results of the road repairing works #2. 2.12 Organize workshops (in each region) to give feedbacks on the results of road repairing works #2, such as repairing materials and procedures, and to introduce the finalized Road Repairing Guidelines for the target SEHMs, SETMs and MOT. 2.13 Carry out training on appointed laboratory technicians from each target SETM to be able to conduct day to day quality control test at the asphalt plant. 2.14 Assist the original target			

SETMs/SEHMs in training additional 2 SETMs and 6 SEHMs on basic elements of pavement repair using road repairing works #2 in 2016. 2.15 Certify trainers for specific techniques for road repairing from the staff of the original target SETMs/SEHMs.			

LOGICAL FRAMEWORK (PROJECT DESIGN MATRIX: PDM) Version 4

PROJECT TITLE: Project for Improvement of Road Maintenance	DURATION: Originally 31 months from Oct 2013 to May 2016, Extended for 6 months to November 2016	PDM Ver.4
TARGET GROUP: 22 SEHM[*1]s and 2 SETMs [*2] in Gissar and Kurgan – Tyube and Ministry of Transport (MOT) (original target group), 6 SEHMs and 2 SETMs in Sogd and Kulyab (additional target group in the extended period)	TARGET AREA: International & Republican roads in Gissar and Kurgan-Tyube (original target area) and in Sogd and Kulyab (additional target area)	DATE: 22-Nov.-2016

[*1]SEHM: State Enterprise on Highway Management, [*2] SETM: State Enterprise of Transport Management

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Pavement condition of the roads in Tajikistan is improved.	1. By the end of 2019, at least 30 km and 15 km of lengths of road repairing is implemented by hot-mix asphalt by the original and additional target groups respectively at International, Republican and Local roads according to the Road Repairing Guidelines 2. The average Road Repair Index (RRI) of roads repaired under 1 above in the original target area has a reduction of at least 60% compared to the same before repairing 3. The average IRI of the roads repaired under 1 above in the additional target area has a reduction of at least 50 % compared to the same before repairing	1. Road maintenance record sheet of each SETM (monthly and yearly) 2. 2&3 Form 1 of Road Inspection Guideline Final Version	
Project Purpose Implementation capacity for road maintenance is improved.	1. At least 90% of the results of roughness survey at original target 22 SEHMs, using the revised Guidelines is assessed accurate by the JICA experts by the end of the Project 2. At least 80% of visual inspection results by original target 22 SEHMs, using the revised Guidelines is assessed accurate by the JICA experts	1. & 2. Road Inspection Record and its assessment summary 3. Repairing record and its assessment summary 4. Date of	-Current socio-political situation is not changed drastically. -Policy including the budget allocation for

	by the end of the Project 3. At least 80% of results of the road repairing works #2 by three fourths of original target SEHMS, planned based on the results of the road inspection and implemented according to the revised Guidelines, meet requirements of time, cost, quality, and safety specified in the plans 4. Road Inspection and Repairing Guidelines for SETM/SEHM revised through the Project are approved by MOT by the end of the Project	approval by the First Deputy Minister Head of Main Depart, MOT	the road maintenance and repair is maintained. -Road repairing equipment to use hot-mix asphalt is available for additional 2SETMs by the end of 2017
Outputs 1. Road inspection[*4] skills of the target SEHMs are improved.	1a.Road Inspection Guidelines for SETM/SEHM are revised with the newly developed Roughness Survey Manual by April 2014 1b. International Roughness Index (IRI) of the roads in the original target area is collected according to the revised Guidelines by the original target 2 SETMs in coordination with the original target 22 SEHMs at least twice by the end of the Project 1c. Visual inspection according to the revised Guideline is conducted at least twice by all original target SEHMs by the end of the Project 1d. Road Inspection Guidelines for SETM/SEHM are finalized by September 2016 for submission to MOT, reflecting feedbacks from the road inspections (roughness survey and visual inspection) in the target area 1e. Training of IRI measurement and visual inspection for additional 2 SETMs and 6 SEHMs were conducted at the additional target area by the Master Trainers for Inspection from the original target SETMs/SEHMs, using the revised Guidelines	1a Revised Inspection Guidelines 1b. Roughness Survey Report 1c. Inspection Record and its assessment summary 1d. Final version of revised Guidelines submitted to MOT 1e. Inspection Record 1f. Test record and report	-Sufficient number of the engineers and operators of the target SEHMs is kept.

	1f. At least 80% of the training participants from additional target SETM and SEHMs pass the post-training test on basic elements of pavement inspection		
2. Road repairing*5 skills of the target SEHMs are improved.	2a. Road repairing guidelines for SETM/SEHM are revised by April 2014 2b. At least 80% of the training participants from original target SETM passes the post-training test on road repairing to use hot-mix asphalt 2c. At least 5.0 km length of road repairing (#1 and #2) is implemented by at least 80% of the original target SEHMs according to the revised Guidelines by the end of the Project 2d. Road Repairing Guidelines for SETM/SEHM are finalized by September 2016 for submission to MOT reflecting the feedbacks from road repairing works #1 and #2 2e. All the appointed laboratory technicians of the asphalt plants in the target SETMs score at least 70 out of 100 points in the post-training tests 2f. At least 80% of the training participants from additional target 2 SETM and 6 SEHMs passes the post-training test on basic elements of pavement repair by the end of the Project	2a. Revised Road and Repairing Guidelines 2b. Test record and report 2c. Road Repairing record 2d. Final version of revised Guidelines submitted to MOT 2e&2f. Test record and report	

*3 Road maintenance means pavement maintenance, *4 Road inspection means pavement inspection

*5 Road repairing means pavement repairing

Activities	**Inputs**		
1.1 To review the existing Road Inspection Guidelines. 1.2 To revise the Road Inspection Guidelines with the attached Roughness Survey Manual. 1.3 Conduct trainings (in each region)	**<Japanese side>** **1. Experts** a) Leader/Road Maintenance Expert 1 b) Road	**<Tajikistan side>** **1. Counterparts for the Project** a) Project Director b) Project Manager	-Natural disaster which affect the activities of the Project does not occur -Security

on Roughness Survey for the original target 2 SETMs and 22 SEHMs. 1.4 Carry out Roughness Survey on the roads in the original target area according to the revised Guidelines by the target 2 SETMs in coordination with the original target 22 SEHMs. 1.5 Organize a workshop (in Dushanbe) to summarize the results of Roughness Survey with the target 2 SETMs, 22 SEHMs and MOT. 1.6 File the results of Roughness Survey (IRI data) by the original target 2 SETM in the prescribed form of the revised Guidelines 1.7 Conduct trainings (in each region) on road inspection according to the revised Road Inspection Guidelines for the original target 22 SEHMs and 2 SETMs. 1.8 Conduct visual inspection on the roads in the original target area at the original target 22 SEHMs, according to the revised Guidelines. 1.9 Revise the Road Inspection Guidelines based on the results of the road inspection works (Act. 1.4 & 1.8) 1.10 Organize workshops (in each region) to introduce the revised Guidelines for the original target 22 SEHMs, 2 SETMs and MOT. 1.11 Conduct road inspection (i.e. roughness survey, including filing results, and visual inspection) in the original target area at the original target 22 SEHMs according to the revised Guidelines. 1.12 Finalize the Road Inspection	inspection Expert 1 c) Roughness Survey Expert d) Road Repairing Supervision Expert 1 e) Road Repairing Supervision Expert 2 f) Road Maintenance Expert 2/ Road Inspection Expert 2 g) Interpreters **2. Equipment** Equipment for roughness survey (2 sets) **3. Expenses for kick-off, mid-term and final seminars** (Inputs other than indicated here will be determined through mutual consultation between JICA and MOT during the implementation of the Project, as necessary.)	c) Counterparts **2. Office Facilities** a) In the building of MOT for the Project with office furniture and utilities such as telephone line, electricity, etc. b) In the building of SETM located in Kurgan-Tyube with office furniture and utilities such as telephone line, electricity, etc. **3. Running Expenses** Necessary for the implementation of the Project including travel expenses and allowances for the participants of the trainings and workshops and expenses for the road repairing works.	situation of Tajikistan which limits the activities of the JICA experts, especially in the target area, does not deteriorate compared with the same in December 2015 <u>Pre-Condition</u> Tajikistan especially the target area is continuously safe enough for JICA experts to implement the activities

Guidelines based on the results of the road inspection works (Act. 1.11). 1.13 Organize workshops (in each region) to summarize the results of road inspection and to introduce the finalized Road Inspection Guidelines for the target SEHMs, SETMs and MOT. 1.14 Certify Master Trainers for road inspection from the staff of the original target SETMs/SEHMs 1.15 Monitor and give technical advice on training conducted by the Master Trainers for additional target 2 SETMs and 6 SEHMs on basic elements of road inspection at the additional target area.			
2.1 Review the existing Road Repairing Guidelines. 2.2 Revise the Road Repairing Guidelines to improve pavement maintenance 2.3 Conduct trainings (in each region) on road repairing according to the revised Guidelines for the original target 22SEHMs. 2.4 Provide support and advice on planning of the road repairing work #1 (in each region) according the revised Guidelines. 2.5 Implement an on-site technical instruction (in each region) for a road repairing work #1 according the revised Guidelines at the selected SEHMs from the original target 2 SETMs. 2.6 Analyze the results of road repairing works #1, such as repairing materials and procedures. 2.7 Revise the Road Repairing Guidelines further based on the results of the analysis (Act. 2.6) 2.8 Organize workshops (in each			

region) to introduce the revised Guidelines with the original target 22 SEHMs, 2 SETMs and MOT. 2.9 Plan the road repairing work #2 in the original target area by the selected target SEHMs according to the revised Guidelines reflecting the results of road inspection (Act. 1.8). 2.10 Monitor and give technical advice on the road repairing works #2. 2.11 Finalize the Road Repairing Guidelines based on the results of the road repairing works #2. 2.12 Organize workshops (in each region) to give feedbacks on the results of road repairing works #2, such as repairing materials and procedures, and to introduce the finalized Road Repairing Guidelines for the target SEHMs, SETMs and MOT. 2.13 Carry out training on appointed laboratory technicians from each target SETM to be able to conduct day to day quality control test at the asphalt plant. 2.14 Assist the original target SETMs/SEHMs in training additional 2 SETMs and 6 SEHMs on basic elements of pavement repair using road repairing works #2 in 2016. 2.15 Certify trainers for specific techniques for road repairing from the staff of the original target SETMs/SEHMs.			