

**Ministry of Road Transport and Highways
Republic of India**

Capacity Development Project on Highways in Mountainous Regions

Project Completion Report

February 2022

Japan International Cooperation Agency (JICA)

Oriental Consultants Global Co., Ltd.

Kokusai Kogyo Co., Ltd.

East Nippon Expressway Co., Ltd.

Japan Conservation Engineers Co., Ltd.

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JR
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Republic of India**

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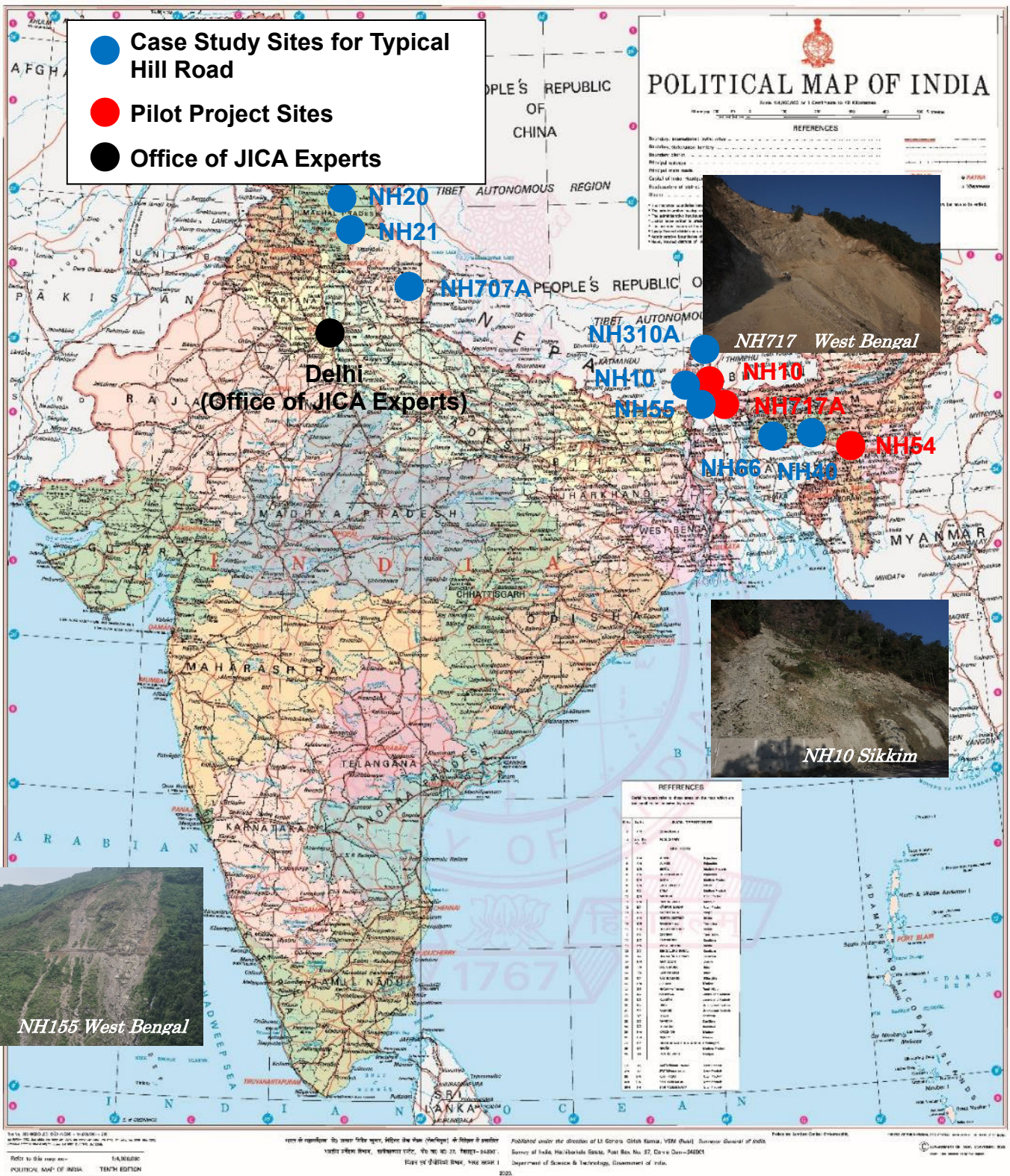
Japan International Cooperation Agency (JICA)

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Japan Conservation Engineers Co., Ltd.



Source: Survey of India Website (<https://www.surveyofindia.gov.in/>)

Project Location Map

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List of Abbreviations and Acronyms

ADG	Additional Director General
BRO	Border Roads Organization
CE	Chief Engineer
CGM	Chief General Manager
C/P	Counterpart
C/R	Completion Report
CRRRI	Central Road Research Institute
DG(RD)&SS	Director General (Road Development) and Special Secretary
DPR	Detail Project Report
ED	Executive Director
EE	Executive Engineer
EPC	Engineering, Procurement and Construction
GM	General Manager
GoI	Government of India
IAHE	Indian Academy for Highway Engineers
IRC	Indian Road Congress
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
MoRTH	Ministry of Road Transport and Highways
MS	Monitoring Sheet
NHAI	National Highways Authority of India
NHDP	National Highways Development Project
NHIDCL	National Highways and Infrastructure Development Corporation Ltd.
OJT	On-the-Job Training
PDM	Project Design Matrix
PO	Plan of Operation
PPP	Public Private Partnership
P/P	Pilot Project
PWD	Public Works Department
R/D	Record of Discussion
SARDP-NE	Special Accelerated Road Development Programme for North Eastern Region
SE	Superintending Engineer
TG	Technical Group
WP	Work Plan

CHAPTER 1 Introduction

1.1 Country of Implementation of Project

India

1.2 Name of Project

Capacity Development Project on Highways in Mountainous Regions of India

1.3 Project Period

Project implementation period:	April 2016 to March 2021 (60months)
Dispatch period of Long-term Experts:	April 2016 to March 2021 (60months)
Dispatch period of Short-term Experts:	September 2017 to March 2021 (55months)

1.4 Background

India had around 5.47 million km-length of the road/highway network nation-wide (Annual Report 2016-2017, MoRTH: Ministry of Road Transport and Highways) including approximately 104 thousand km-length of national highways (Annual Report 2016-2017, MoRTH). The road network was an important transportation infrastructure which shares 85% of passenger transport and 65% of freight transport. And according to the Annual Report, the traffic volume increased by 7% to 10% per year, and the number of registered vehicles increased by approximately 12% per year, and consequently the demand for highway development was high.

Therefore, the Government of India (GoI) developed a large-scale highways development programme, namely National Highways Development Project (NHDP), of which targeted approximately 54 thousand km-length of national highways development nationwide. National Highways Authority of India, who is implementing agency of NHDP, commenced highway development nationwide including “Golden Quadrilateral” and “North-South and East-West Corridor”. And about 49% (same as above) of the national highways and expressways development was completed under NHDP as of December 2014 (Annual Report 2016-2017, MoRTH).

The developed highways under NHDCP were mainly located in the plain area in India, and MoRTH especially emphasized the promotion of highways development in border, mountainous regions such as North region (i.e. Uttarakhand, Himachal Pradesh and Jammu & Kashmir) and North-East regions (i.e. Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland, Tripura, Sikkim) aiming to improve connectivity of inter-states and with neighboring countries in future.

However, MoRTH, NHAI and NHIDCL (National Highways and Infrastructure Development Corporation Limited) didn't have sufficient experiences for development of mountainous highways and were facing technical issues for planning, design, construction, operation and maintenance of highway structures

on mountainous highways such as tunnels, high-pier bridges, slope protections, and poor-quality mountainous highways had become significant bottlenecks of economic activities in rural areas in India.

Under these circumstances, GoI requested JICA (Japan International Cooperation Agency) the technical cooperation project, namely “Capacity Development Project on Highways in Mountainous Regions” (hereinafter referred to as the “Project”) for economical and high-quality development of mountainous highways composed of tunnels, high-pier bridges, slope protections, and high embankment etc., by enhancing capacity development related to planning, survey, construction, operation and maintenance, disaster management, safety management, environmental consideration, etc. Based on this request, JICA conducted the detailed planning survey for the Project in September 2015, and signed R/D (Record of Discussions) of the Project in December 2015 after the agreement between both governments.

1.5 Overall Goal and Project Purpose

Table 1-1 Outline of the Project

Overall Goal
Mountainous highways are properly developed and maintained by using guidelines developed by the Project
Project Purpose
Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened
Outputs
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed
Output 2: Guidelines on design and construction for mountainous highways are developed.
Output 3: Foundation for operation and maintenance for mountainous highways is built.
Activities
< Activities for Output 1 >
1-1. Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.
1-2 Conduct field surveys to the typical mountainous highways.
1-3 Improve survey and planning guidelines on mountainous highways.
1-4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.
1-5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE) ¹ . (also conduct in output2 and 3)
< Activities for Output 2 >
2-1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.
2-2 Improve a tunnel guideline.
2-3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).
2-4 Develop a high pier bridge guideline.

¹ IAHE: Indian Academy of Highway Engineers, Training Center for Road Engineers in India, under MoRTH

< Activities for Output 3>

- 3-1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues
- 3-2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.

Project Objective Areas

All over India. (Main activities are implemented at Delhi)

1.6 Relevant Organizations in India

Ministry of Road Transport and Highways (MoRTH)

National Highways Authority of India (NHAI)

National Highways and Infrastructure Development Corporation Ltd. (NHIDCL)

Public Works Department (PWD) of each State Government, and others

1.7 Project Implementation Schedule

Schedule of activities by Long-term/Short-term Experts is shown below;

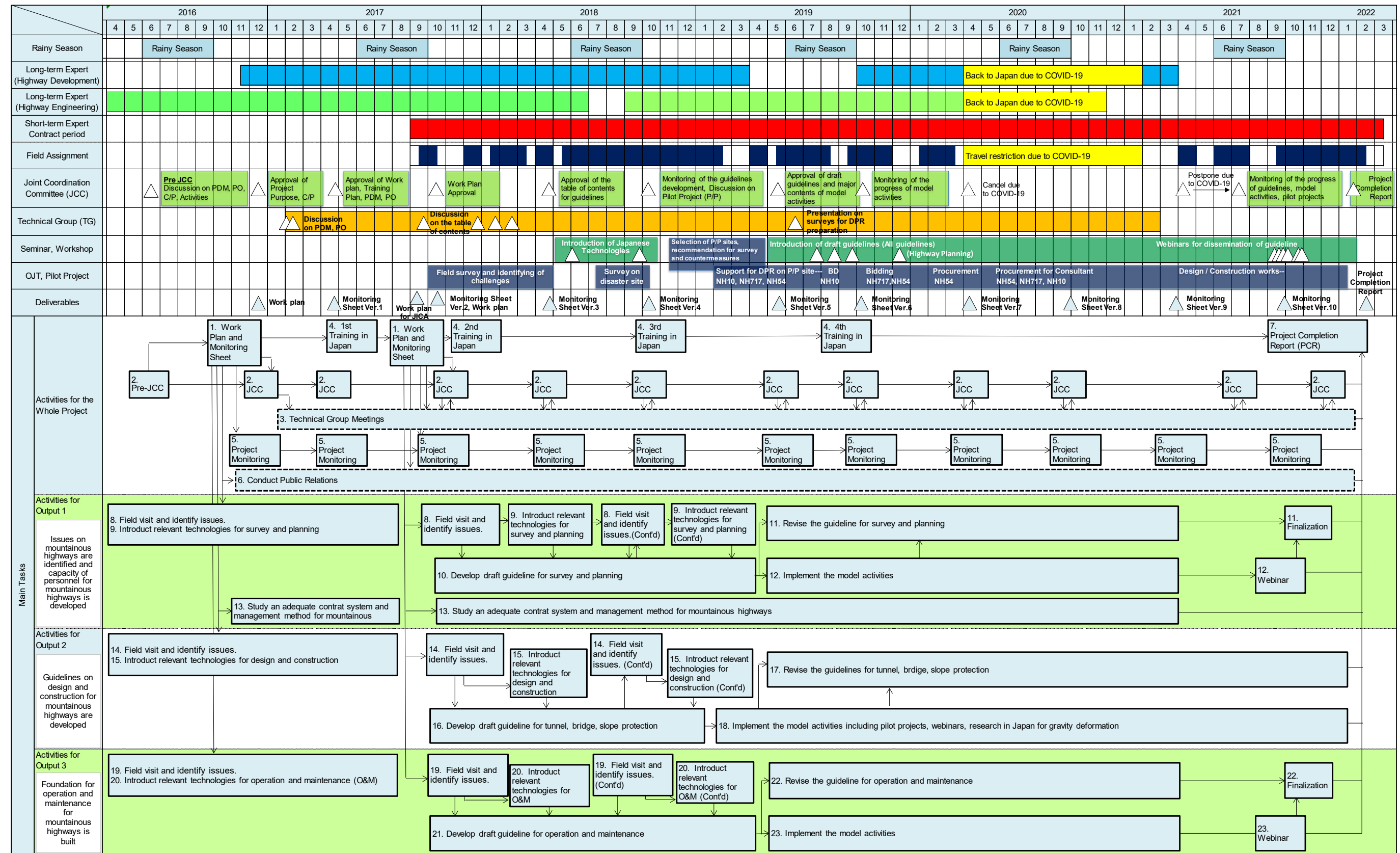


Figure 1-1 Work Flowchart

CHAPTER 2 Activity and Output

2.1 Input and Activity to Project

2.1.1 Input from the Japanese side

Table 2-1 to Table 2-5 show summary of the inputs by Japanese side to the Project.

Table 2-1 Input from Japan

Plan (PDM Ver.0)	Actual	Remarks
[Long-term Experts] 1) Chief Advisor/Highway Development 2) Highway Engineering/Coordinator	[Long-term Experts] 1) Chief Advisor/Highway Development 2) Highway Engineering/Coordinator	No change
[Short-term Experts] 1) Tunnel 2) Tunnel Facilities 3) Earthwork 4) Bridge 5) Monitoring and Evaluation 6) Other Fields, as necessity	[Short-term Experts] 1) Team Leader/Slope Countermeasure I 2) Deputy Team Leader/ Slope Countermeasure III 3) Mountain Bridge 4) Mountain Tunnel 5) Slope Countermeasure II/ High Embankment 6) Facility of Mountain Roads 7) Operation & Maintenance of Mountain Road 8) Natural Condition (Topography/Geology) 9) Drainage Plan 10) Plan and Survey of Mountain Road/ Coordinator 11) Monitoring/Evaluation 12) Highway Engineering of Mountain Road 13) Slope Countermeasure Construction	
[Training in Japan] 1) 5 times (Once a year, about 10 people for 2 weeks)	[Training in Japan] 1) 4 times (Once a year, about 10 people for 2 weeks)	Cancel is due to the COVID-19

Table 2-2 List of Long-term Experts

No.	Name	Position under the Project	Organization
1	Mr. Shu MORIYAMA	Chief Advisor/ Highway Development	Ministry of Land, Infrastructure, Transport and Tourism
2	Dr. Eisuke NAKAMURA		
3	Mr. Denichiro YAMADA	Highway Engineering/ Coordinator	East Nippon Expressway Co., Ltd.
4	Michiya KITAYAMA		

Table 2-3 List of Short-term Experts

No.	Name	Expertise	Affiliation	India	Japan	Total
1	Mr. Yoshinori KAWAMURA	Team Leader/ Slope Countermeasure I	OCG	12.87	5.30	18.17
2	Mr. Seiji KADOOKA / Dr. Yoshizumi GONAI	Deputy Team Leader/ Slope Countermeasure III	OCG	4.53	1.50	6.03
3	Dr. Hidetoshi NAKANO	Mountain Bridge	OCG	5.70	1.75	7.45
4	Mr. Fumihiko YOKOO	Mountain Tunnel	KKC	5.97	0.70	6.67
5	Dr. Takayuki MAYUMI	Slope Countermeasure II/ High Embankment	JCE	10.57	5.90	16.47
6	Mr. Susumu MURASE	Facility of Mountain Roads	OCG	3.83	0.00	3.83
7	Mr. Michiya KITAYAMA / Mr. Denichiro YAMADA / Dr. Tatsuo TAKANO	Operation & Maintenance of Mountain Road	NEXCO East	7.83	3.35	11.18
8	Mr. Makoto TOKUDA	Natural Condition (Topography/Geology)	KKC	3.33	0.50	3.83
9	Mr. Takashi NISHIJIMA	Drainage Plan	OCG	2.97	0.65	3.62
10	Mr. Masaaki GOTO	Plan and Survey of Mountain Road/Coordinator	OCG	4.67	0.50	5.17
11	Ms. Panganayi Cleopatra	Monitoring/Evaluation	OCG	2.10	1.85	3.95
12	Mr. Naoki ISHIKAWA	Highway Engineering of Mountain Road	NEXCO East	1.50	0.30	1.80
13	Mr. Masahide TANAKA	Slope Protection Construction	OCG	2.50	0.50	3.00

OCG: Oriental Consultants Global Co., Ltd.

KKC: Kokusai Kogyo Co., Ltd.

NEXCO East: East Nippon Expressway Co., Ltd.

JCE: Japan Conservation Engineers Co., Ltd.

Table 2-4 Training in Japan Conducted by Project

No.	Period	Number of Participants	Content	Organizations
1	16 th May - 6 th June 2017	10 Trainees	Sustainable development and O&M of hill roads	MLIT, PWRI, NEXCO East, NEXCO Central, NEXCO West, Shutoko, Hanko, Honshi, OCG, JFE Eng, NSMP
2	24 th October - 13 th November 2017	10 Trainees	Sustainable development of hill roads and related technologies	MLIT, NEXCO East, NEXCO Central, NEXCO RI, Shutoko, Honshi, OCG, NSMP
3	15 th October - 5 th November 2018	9 Trainees	Design and construction of slope protection, bridges, and tunnels of hill roads	MLIT, PWRI, NEXCO East, NEXCO Central, NEXCO RI, NSMP, Raito, Aso FC, NS

No.	Period	Number of Participants	Content	Organizations
4	7 th - 9 th August, 18 th August - 2 nd September 2019	9 Trainees	Best practices for sustainable development and O&M of hill roads	MLIT, PWRI, NEXCO East, NEXCO Central, NEXCO West, NEXCO RI, Hanko, Honshi, Kobe, OCG, Raito, Aso FC, JFE Eng, NSMP,

MLIT: Ministry of Land, Infrastructure, and Transport

PWRI: Public Works Research Institute

NEXCO East: East Nippon Expressway Company Limited

NEXCO Central: Central Nippon Expressway Company Limited

NEXCO West: West Nippon Expressway Company Limited

NEXCO RI: Nippon Expressway Research Institute Company Limited.

Shutoko: Metropolitan Expressway Company Limited

Hanko: Hanshin Expressway Company Limited

Honshi: Honshu-Shikoku Bridge Expressway Company Limited

OCG: Oriental Consultants Global Co., LTD.

JFE Eng: JFE Engineering Cooperation

NSMP: Nippon Steel Metal Products Co., LTD.

Raito: Raito Kogyo Co., LTD.

Aso FC: Aso Foam Crete Co., LTD.

NS: Nippon Steel Corporation

Kobe: City of Kobe

Table 2-5 List of Equipment

Item	Q'ty	Location	Description / Specification
Multipurpose Laser Photocopier	1	MoRTH	Xerox Versalink C7020
Wifi Router	1	MoRTH	CISCO Air-CAP17021-D-K9
Safe	1	NHAI	Yale YFM/420/FG2
Inkjet Printer	1	NHAI	Canon MB5370
Shredder	1	NHAI	NB-11X
Digital Compact Camera	1	NHAI	Nikon Coolpix B600
Laptop Computer	1	NHIDCL	Dell laptop Inspiron 3567
Multipurpose Inkjet Printer	1	NHIDCL	Epson L6190

2.1.2 Input from the Indian side

Table 2-6 to Table 2-31 show summary of inputs by Indian side to the Project.

Table 2-6 Main Members of the Project

Plan (PDM Ver.0)	Actual		
	Name	Position	Period
Chairperson	Mr. S.N. Das	DG (RD) & SS	April 2016 - February 2017
	Mr. Manoj Kumar		March 2017 - June 2018
	Mr. B.N. Singh		July 2018 - February 2019
	Mr. I.K. Pandey		March 2019 - March 2022
Project Director	Ms. Leena Nandan	JS (Highways)	April 2016 - September 2017

Plan (PDM Ver.0)	Actual		
	Name	Position	Period
	Mr. Amit Kumar Ghosh		October 2017 - February 2019
	Mr. Khushal Chand	CE (EAP)	March 2019 - March 2021
	Mr. Kailash Chand Gupta	Addl. Secretary	April 2021 - March 2022
Project Manager	Mr. Kishor Chandwani	SE (EAP)	April 2016 - September 2017
	Mr. Khushal Chand	CE (EAP)	October 2017 - March 2021
	Mr. Rakesh Kumar	SE (EAP)	April 2021 - March 2022
Project Co-Manager (NHAI)	Mr. B.S. Singla	CGM (T)	April 2016 - March 2017
	Mr. M.K. Jain		April 2017 - September 2017
	Mr. Navin Kumar		October 2017 - March 2021
	Mr. L.P. Padhy		April 2021 - March 2022
Project Co-Manager (NHIDCL)	Mr. Rahul Gupta	ED	December 2016 - March 2021
	Mr. W. Blah		April 2021 - March 2022

Table 2-7 Member List of 1st JCC (14th December 2016)

No.	Name	Position in Project	Position/Organization
1	Mr. S.N. Das	Chairperson	DG (RD) & SS, MoRTH
2	Mr. Kishor Chandwani	Project Manager	SE (EAP), MoRTH
3	Mr. Khushal Chand	Project Manager	SE (EAP), MoRTH
4	Mr. Rahul Gupta	Project Co-Manager	ED, NHIDCL
5	Mr. A.K. Srivastava	Project Member	CE (P-2), MoRTH
6	Mr. I.K. Pandey	Project Member	CE (P-4), MoRTH
7	Mr. V.K. Rajawat	Project Member	CE (NER), MoRTH
8	Mr. Virendra Koul	Project Member	CE (P-6), MoRTH
9	Mr. Sudip Chaudhuary	Project Member	CE (Monitoring&Planning), MoRTH
10	Mr. A.D. James	Observer	Deputy Secretary (IC), MoRTH
11	Mr. Takayoshi Tange	JICA India Office	Senior Representative
12	Mr. Toshiaki Shinozaki	JICA India Office	Representative
13	Mr. Shu Moriyama	JICA Long-term Expert	Chief Advisor/ Highway Development
14	Mr. Denichiro Yamada	JICA Long-term Expert	Highway Engineering/ Coordinator

Table 2-8 Member List of 2nd JCC (28th April 2017)

No.	Name	Position in Project	Position/Organization
1	Mr. Manoj Kumar	Chairperson	DG (RD) & SS, MoRTH
2	Mr. Kishor Chandwani	Project Manager	SE (EAP), MoRTH
3	Mr. M.K. Jain	Project Co-Manager	CGM (T), NHAI
4	Mr. Rahul Gupta	Project Co-Manager	ED, NHIDCL
5	Mr. T.T. Negi	Project Member	CE (P-1), MoRTH
6	Mr. A.K. Srivastava	Project Member	CE (P-2), MoRTH
7	Mr. I.K. Pandey	Project Member	CE (P-4), MoRTH

No.	Name	Position in Project	Position/Organization
8	Mr. Sudip Chaudhuary	Project Member	CE (Planning), MoRTH
9	Mr. A.P. Pathak	Project Member	CE (Monitoring), MoRTH
10	Mr. Rajender Kumar	Project Member	GM (T), NHAI
11	Mr. Y.C. Srivastava	Project Member	GM (T), NHIDCL
12	Mr. Ashok Kumar Gupta	Project Member	GM (T), NHIDCL
13	Mr. V.L. Patankar	IAHE	Director, IAHE
14	Mr. A.D. James	Observer	Deputy Secretary (IC), MoRTH
15	Mr. Takayoshi Tange	JICA India Office	Senior Representative
16	Mr. Anurag Sinha	JICA India Office	Lead Development Specialist
17	Mr. Hidetaka Sakabe	JICA HQ	Acting Director
18	Mr. Shu Moriyama	JICA Long-term Expert	Chief Advisor/ Highway Development
19	Mr. Denichiro Yamada	JICA Long-term Expert	Highway Engineering/ Coordinator
20	Mr. Kiyoshi Furuhashi	Observer	Embassy of Japan in India

Table 2-9 Member List of 3rd JCC (11th October 2017)

No.	Name	Position in Project	Position/Organization
1	Mr. Manoj Kumar	Chairperson	DG (RD) & SS, MoRTH
2	Mr. Amit Kumar Ghosh	Project Director	JS (EAP), MoRTH
3	Mr. Khushal Chand	Project Manger	SE (EAP), MoRTH
4	Mr. Sudip Chaudhuary	Project Member	CE (Planning), MoRTH
5	Mr. T.T. Negi	Project Member	CE (P-1), MoRTH
6	Mr. Sanjeev Kumar	Project Member	SE (S&R(Pavement & Bridges)), MoRTH
7	Mr. M.S. Sisodia	Project Manager	SE (Monitoring), MoRTH
8	Mr. Nishoo Gupta	Project Member	GM (HP, J&K), NHAI
9	Mr. Vinay Kumar Singh	Project Member	ED, NHIDCL
10	Mr. Ashok Kumar Gupta	Project Member	GM (T), NHIDCL
11	Mr. Saurabh Singh	Observer	AEE (EAP), MoRTH
12	Mr. Ajmer Singh	Observer	CGM (T), NHAI
13	Mr. Yoshiyuki Mihoki	JICA HQ	Senior Advisor to the Director General
14	Ms. Kanako Senda	JICA HQ	Assistant Director
15	Mr. Takayoshi Tange	JICA India Office	Senior Representative
16	Mr. Norihito Kaigai	JICA India Office	Representative
17	Mr. Anurag Sinha	JICA India Office	Lead Development Specialist
18	Ms. Mizuki Kaneda	Observer	JICA India Office
19	Mr. Shu Moriyama	JICA Long-term Expert	Chief Advisor/ Highway Development
20	Mr. Denichiro Yamada	JICA Long-term Expert	Highway Engineering/ Coordinator
21	Mr. Yoshinori Kawamura	JICA Short-term Expert	Team leader/ Slope Protection I
22	Dr. Takayuki Mayumi	JICA Short-term Expert	Slope Protection III/ High Embankment
23	Mr. Michiya Kitayama	JICA Short-term Expert	O&M of Mountain Roads

No.	Name	Position in Project	Position/Organization
24	Mr. Masaaki Goto	JICA Short-term Expert	Plan and Survey Mountain Roads
25	Ms. Cleopatra Panganayi	JICA Short-term Expert	Monitoring/ Evaluation
26	Mr. Kiyoshi Furuhashi	Observer	Counsellor, Embassy of Japan in India

Table 2-10 Member List of 4th JCC (8th April 2018)

No.	Name	Position in Project	Position/Organization
1	Mr. Manoj Kumar	Chairperson	DG (RD)&SS, MoRTH
2	Mr. Amit Kumar Ghosh	Project Director	JS(EAP), MoRTH
3	Mr. Sanjeev Kumar	Project Member	SE(S&R, Pavement & Bridge), MoRTH
4	Mr. W.Blah	Project Member	ED, NHIDCL
5	Mr. M.S. Deol	Project Member	GM(T), NHIDCL
6	Mr. Abhishek Siddharth	Observer	AEE(EAP), MoRTH
7	Mr. Takayoshi Tange	JICA India Office	Senior Representative
8	Mr. Norihito Kaigai	JICA India Office	Representative
9	Mr. Anurag Sinha	JICA India Office	Lead Development Specialist
10	Mr. Shu Moriyama	JICA Long-term Expert	Chief Advisor/ Highway Development
11	Mr. Denichiro Yamada	JICA Long-term Expert	Highway Engineering/ Coordinator
12	Mr. Yoshinori Kawamura	JICA Short-term Expert	Team leader/ Slope Protection I
13	Dr. Hidetoshi Nakano	JICA Short-term Expert	Mountain Bridge
14	Ms. Cleopatra Panganayi	JICA Short-term Expert	Monitoring/ Evaluation
15	Mr. Kiyoshi Furuhashi	Observer	Counsellor, Embassy of Japan in India

Table 2-11 Member List of 5th JCC (10th October 2018)

No.	Name	Position in Project	Position/Organization
1	Mr. B.N. Singh	Chairperson	DG (RD) & SS, MoRTH
2	Mr. Rahul Gupta	Project Co-Manager	ED, NHIDCL
3	Mr. I.K. Pandey	Project Member	ADG, MoRTH
4	Mr. S.C. Mondal	Project Member	CE (Zone-V), MoRTH
5	Mr. P.R. Meena	Project Member	CE (Zone-I), MoRTH
6	Mr. B.K. Sinha	Project Member	CE (Zone-II), MoRTH
7	Mr. Sudip Chaudhary	Project Member	CE (Planning), MoRTH
8	Mr. T.T. Negi	Project Member	CE (P-1), MoRTH
9	Mr. Khushal Chand	Project Member	SE (EAP), MoRTH
10	Mr. W. Blah	Counterpart (Guideline)	ED (T), NHIDCL
11	Mr. Sanjeev Kumar	Counterpart (Guideline)	CE (S&R, Pavement & Bridge), MoRTH
12	Mr. Sanjay Garg	Counterpart (Guideline)	CE (Zone-IV), MoRTH
13	Mr. J.K. Goyal	Observer	CGM (T), NHAI
14	Mr. Manish Rastogi	Observer	CGM (T), NHAI
15	Mr. V. Sambyal	Observer	GM (T), NHAI
16	Mr. Takayoshi Tange	JICA India Office	Senior Representative

No.	Name	Position in Project	Position/Organization
17	Mr. Norihito Kaigai	JICA India Office	Representative
18	Mr. Anurag Sinha	JICA India Office	Lead Development Specialist
19	Mr. Shu Moriyama	JICA Long-term Expert	Chief Advisor/ Highway Development
20	Mr. Michiya Kitayama	JICA Long-term Expert	Highway Engineering/ Coordinator
21	Mr. Yoshinori Kawamura	JICA Short-term Expert	Team leader/ Slope Protection I
22	Dr. Takayuki Mayumi	JICA Short-term Expert	Slope Protection II/ High Embankment
23	Dr. Tatsuo Takano	JICA Short-term Expert	O&M of Mountain Roads
24	Ms. Cleopatra Panganayi	JICA Short-term Expert	Monitoring/ Evaluation
25	Mr. Kazuhiro Kiyose	Observer	Counsellor, Embassy of Japan in India

Table 2-12 Member List of 6th JCC (10th May 2019)

No.	Name	Position in Project	Position/Organization
1	Mr. I.K. Pandey	Chairperson	DG (RD)&SS, MoRTH
2	Mr. Khushal Chand	Project Manager	CE (EAP), MoRTH
3	Mr. Rahul Gupta	Project Co-Manager	ED, NHIDCL
4	Mr. S.S. Nahar	Project Member	ADG, MoRTH
5	Mr. O.P. Shrivastava	Project Member	CE (Zone-I), MoRTH
6	Mr. Sajeev Kumar	Counterpart (Guideline)	CE (S&R, Pavement & Bridge), MoRTH
7	Mr. Trivendra Kumar	Counterpart (Guideline)	SE, MoRTH
8	Mr. Sanjay Garg	Counterpart (Guideline)	CE (Zone-IV), MoRTH
9	Mr. W. Blah	Counterpart (Guideline)	ED (T), NHIDCL
10	Mr. Ashok Kumar Gupta	Counterpart (Guideline)	GM (T), NHIDCL
11	Mr. Ashok Kumar Singh	Observer	GM (T), NHIDCL
12	Mr. L.P. Padhy	Observer	CGM (T), NHIDCL
13	Mr. Avdesh Gupta	Observer	EE (EAP), MoRTH
14	Mr. Vikas Kirar	Observer	AEE (EAP), MoRTH
15	Mr. Kengo Akamine	JICA India Office	Senior Representative
16	Ms. Arisa Watanabe	JICA India Office	Representative
17	Mr. Anurag Sinha	JICA India Office	Lead Development Specialist
18	Mr. Michiya Kitayama	JICA Long-term Expert	Highway Engineering/ Coordinator
19	Mr. Yoshinori Kawamura	JICA Short-term Expert	Team leader/ Slope Protection I
20	Mr. Fumihiko Yokoo	JICA Short-term Expert	Tunnel
21	Ms. Cleopatra Panganayi	JICA Short-term Expert	Monitoring/ Evaluation
22	Mr. Kazuhiro Kiyose	Observer	Counsellor, Embassy of Japan in India

Table 2-13 Member List of 7th JCC (10th October 2019)

No.	Name	Position in Project	Position/Organization
1	Mr. S.S. Nahar	Chairperson	ADG, MoRTH
2	Mr. Khushal Chand	Project Manager	CE (EAP), MoRTH
3	Mr. P.R. Meena	Project Member	CE (Zone-I), MoRTH

4	Mr. Sanjay Garg	Counterpart (Guideline)	CE (S&R), MoRTH
5	Mr. Trivendra Kumar	Counterpart (Guideline)	SE (Zone-III), MoRTH
6	Mr. Shashank Kumar	Counterpart (Guideline)	GM (T), NHIDCL
7	Mr. L.P. Padhy	Observer	CGM (T), NHAI
8	Mr. Avdesh Gupta	Observer	EE (EAP), MoRTH
9	Mr. B. Mohanta	Observer	DGM, NHIDCL
10	Mr. Vivek Singh Negi	Observer	Manager, NHIDCL
11	Mr. Siddharth Sahal	Observer	Engineer, NHIDCL
12	Mr. Mahinder Singh	Observer	Director (IC), MoRTH
13	Mr. Shinsuke Nagai	JICA India Office	Senior Representative
14	Mr. Subroto Talukdar	JICA India Office	Additional Chief Development Specialist
15	Dr. Eisuke Nakamura	JICA Long-term Expert	Chief Advisor/ Highway Development
16	Mr. Michiya Kitayama	JICA Long-term Expert	Highway Engineering/ Coordinator
17	Mr. Yoshinori Kawamura	JICA Short-term Expert	Team leader/ Slope Protection I
18	Dr. Takayuki Mayumi	JICA Short-term Expert	Slope Protection II/ High Embankment
19	Ms. Cleopatra Panganayi	JICA Short-term Expert	Monitoring/ Evaluation
20	Mr. Kazuhiro Kiyose	Observer	Counsellor, Embassy of Japan in India

Table 2-14 Member List of 8th JCC (13th July 2021)

No.	Name	Position in Project	Position/Organization
1	Mr. I.K. Pandey	Chairperson	DG (RD) & SS, MoRTH
2	Mr. K.C. Gupta	Project Director	Additional Secretary, MoRTH
3	Mr. Rakesh Kumar	Project Manager	SE (EAP), MoRTH
4	Mr. Navin Kumar	Co-Project Member	CGM (T), NHAI
5	Mr. D Sarangi	Project Member	ADG, MoRTH
6	Mr. S.K. Nirmal	Project Member	ADG, MoRTH
7	Mr. Vipin Kumar	Project Member	EE (EAP), MoRTH
8	Mr. Sanjeev Kumar	Counterpart (Guideline)	Director, IAHE
9	Mr. L.P. Padhy	Counterpart (Pilot Pro.)	CGM (T), NHAI
10	Mr. W. Blah	Counterpart (Pilot Pro.)	ED, NHIDCL
11	Mr. V. Jaiswal	Counterpart (Pilot Pro.)	DGM(T), NHIDCL
12	Mr. M.S. Sodhi	Counterpart (Pilot Pro.)	ED(P), NHIDCL
13	Mr. Shankar Bhowmik	Counterpart (Pilot Pro.)	GM(P), PMU-Ranipool, NHIDCL
14	Mr. S.K. Tomar	Counterpart (Pilot Pro.)	GM(P), Kalimpong Office, NHIDCL
15	Mr. Shuntaro Kawahara	JICA HQ	Senior Advisor (Road)Engineer
16	Mr. Yoshimoto Koyanagi	JICA HQ	Director
17	Ms. Kanako Senda	JICA HQ	Deputy Director
18	Mr. Shinsuke Nagai	JICA India Office	Senior Representative
19	Ms. Arisa Watanabe	JICA India Office	Representative
20	Mr. Subroto Talukdar	JICA India Office	Additional Chief Development Specialist

No.	Name	Position in Project	Position/Organization
21	Mr. Yoshinori Kawamura	JICA Short-term Expert	Team leader/ Slope Protection I
22	Dr. Yoshimizu Gonai	JICA Short-term Expert	Deputy Team leader/ Slope Protection III
23	Dr. Takayuki Mayumi	JICA Short-term Expert	Slope Protection II/ High Embankment
24	Mr. Denichiro Yamada	JICA Short-term Expert	O&M of Mountain Roads
25	Ms. Cleopatra Panganayi	JICA Short-term Expert	Monitoring/ Evaluation
26	Mr. Masahide Tanaka	JICA Short-term Expert	Slope Countermeasure Construction
27	Mr. Kazuhiro Kiyose	Observer	Counsellor, Embassy of Japan in India

Since the 8th JCC was held online, the members confirmed attending are shown in the table.

Table 2-15 Trainees of 1st Training in Japan

Organization	Name	Position
MoRTH	Om Prakash Shrivastava	Superintending Engineer (Chardham)
	Vijya Kumar Sirivella	Superintending Engineer (P-1)
	Mohd Nusrullah Khan	Assistant Engineer
	Kailash Chander Joshi	Assistant Engineer, RO-Uttarakhand
NHAI	Mahendra Kumar Jain	Chief General Manager (J&K, HP)
NHIDCL	Ashok Kumar Gupta	General Manager (T)
State PWD	Imnameren	Executive Engineer, Nagaland
	Shkti Kumar Negi	Assistant Engineer, Himachal Pradesh
	Subrata Banik,	Superintending Engineer, Tripura
	Dilip Kumar Goswami	Under Secretary, Assam

Table 2-16 Trainees of 2nd Training in Japan

Organization	Name	Position
MoRTH	W. Blah	Superintending Engineer (NER)
	P.K. Shakya	Superintending Engineer (P-6)
	M.S. Sisodia	Superintending Engineer (Monitoring)
	Pankaj Kr. Mourya	Project Director, RO-Uttarakhand
NHIDCL	Sanjive Jain	General Manager (P)
NHAI	B.N. Sahay	General Manager (T)
State PWD	Toli Bashar	Chief Engineer (Highway Eastern Zone), Arunachal Pradesh
	Hari Om Sharma	Chief Engineer (National Highway), Uttarakhand
	Y. Joykumar Singh	Superintending Engineer (National Highway), Manipur
	Jefferson Lyngdoh	Superintending Engineer (Roads), Meghalaya

Table 2-17 Trainees of 3rd Training in Japan

Organization	Name	Position
MoRTH	Prem Raj Meena	Chief Engineer (Zone-I)
	Khushal Chand	Superintending Engineer (EAP)
	Trivendra Kumar	Executive Engineer (NFSG)

	Anand Mohan Prasad	Superintending Engineer (NHIDCL Cell)
NHAI	Aman Kumar Rohilla	Deputy General Manager, PIU-EPE
NHIDCL	Jagat Narayan	General Manager
	Bivek Joishi	Manager (Project), RO-Sillong
State PWD	Raj Chakrabarty	Commissioner & Special Secretary, Assam
	Rajesh Chandra	Superintending Engineer, Uttarakhand

Table 2-18 Trainees of 4th Training in Japan

Organization	Name	Position
MoRTH	U.J. Chamargore	Superintending Engineer (Zone-III)
	Adelbert Susangi	Superintending Engineer (Zone-II)
	Gulshan	Executive Engineer (Zone-V)
	Avdesh Gupta	Executive Engineer (EAP)
	Sourabh Singh	Executive Engineer, RO-Dehradun
	Vipin Kumar	Assistant Executive Engineer (EAP)
	Santosh Prakash	Assistant Engineer (Zone-I)
NHAI	Karge Kamki	Deputy General Manager, PIU-Haflong
NHIDCL	Jayashree Sahoo	Manager (P), PIU-Gangtok

Table 2-19 Counterparts for Preparing Guidelines

Name of Guideline	Name	Position/Organization
Overall Management	Mr. Khushal Chand	CE (EAP), MoRTH
	Mr. Sanjeev Kumar	CE (SR&T), MoRTH
Planning Guideline	Mr. Trivendra Kumar	SE, MoRTH
	Mr. Rajesh Kumar	SE, MoRTH
Slope Protection and Embankment Guideline	Mr. W. Blah	ED, NHIDCL
Bridge Guideline	Mr. Sanjay Garg	SE, MoRTH
Tunnel Guideline	Mr. Ashok Kumar Gupta	GM (T), NHIDCL
	Mr. Shashank Kumar	GM (T), NHIDCL
Operation and Maintenance Guideline	Mr. Nishoo Gupta	GM (T), NHAI
	Mr. V.K. Joshi	GM (T), NHAI

Table 2-20 Counterparts for Pilot Project Implementation

Pilot Project Site	Name	Position/Organization
Overall Management	Mr. Rakesh Kumar	SE (EAP), MoRTH
	Mr. Vipin Kumar	EE (EAP), MoRTH
NH54	Mr. L.P. Padhy	CGM(T), NHAI
	Mr. K.K. Arora	GM (T), NHAI
	Mr. Alok Kumar	RO-NE, NHAI
	Mr. Karge Kamki	PD PIU-Haflong, NHAI
	Mr. S.K. Verma	PD PIU-Haflong, NHAI

NH717A & NH10	Mr. W. Blah	ED, NHIDCL
	Mr. V. Jaiswal	DGM (T), NHIDCL
	Mr. M.S. Sodhi	ED (P), Ro-Gangtok, NHIDCL
NH717A	Mr. S.K. Tomar	GM (T), Kalimpong office, NHIDCL
NH10	Mr. Shankar Bhowmik	GM (P), PMU-Ranipool, NHIDCL

Table 2-21 Member List of 1st TG Meeting (10th February 2017)

No.	Name	Position in Project	Position/Organization
1	Mr. I.K. Pandey	Chair of TG meeting	CE (P-4), MoRTH
2	Mr. A.D. James	Observer	Duputy Secretary (IC), MoRTH
3	Mr. Rahul Gupta	Project Co-Manager	ED-II, NHIDCL
4	Mr. Kishor Chandwani	Project Manager	SE (EAP), MoRTH
5	Mr. Khushal Chand	Project Manager	SE (EAP), MoRTH
6	Mr. D.K. Sharma	Observer	SE (NER), MoRTH
7	Mr. Sandeep Gaur	Observer	EE (P-2), MoRTH

Table 2-22 Member List of 2nd TG Meeting (13th February 2017)

No.	Name	Position in Project	Position/Organization
1	Mr. V.L. Patankar	Chair of TG meeting	Director, IAHE
2	Mr. A.K. Srivastava	Project Member	CE (P-2), MoRTH
3	Mr. I.K. Pandey	Project Member	CE (P-4), MoRTH
4	Mr. A.D. James	Observer	Deputy Secretary (IC), MoRTH
5	Mr. Kishor Chandwani	Project Manager	SE (EAP), MoRTH
6	Mr. Saurabh Singh	Observer	AEE (EAP), MoRTH
7	Mr. W. Blah	Observer	SE (NER), MoRTH

Table 2-23 Member List of 3rd TG Meeting (26th September 2017)

No.	Name	Position in Project	Position/Organization
1	Mr. Kishor Chandwani	Project Manager	SE (EAP), MoRTH
2	Mr. Khushal Chand	Project Manager	SE (EAP), MoRTH
3	Mr. W. Blah	Trainee of country focused training	SE (NER), MoRTH
4	Mr. P.K. Shakya	Trainee of country focused training	SE (P-6), MoRTH
5	Mr. M.S. Sisodia	Trainee of country focused training	SE (Monitoring)
6	Mr. B.N. Sahay	Trainee of country focused training	GM (T), NHAI
7	Mr. A.D. James	Observer	Deputy Secretary (IC), MoRTH

Table 2-24 Member List of 4th TG Meeting (19th December 2017)

No.	Name	Position in Project	Position/Organization
1	Mr. A.K. Shrivastava	Chair of TG meeting	ADG, MoRTH
2	Mr. Khushal Chand	Project Manager	SE (EAP), MoRTH
3	Mr. M.S. Sisodia	Trainee of country focused training	SE (Monitoring), MoRTH
4	Mr. Nishoo Gupta	Counterpart (Guideline)	GM (T), NHAI
5	Mr. Rahul Gupta	Co-Project Manager	ED, NHIDCL
6	Mr. Ashok Kumar Gupta	Counterpart (Guideline)	GM (T), NHIDCL

Table 2-25 Member List of 5th TG Meeting (30th January 2018)

No.	Name	Position in Project	Position/Organization
1	Mr. A.K. Shrivastava	Chair of TG meeting	ADG, MoRTH
2	Mr. Rahul Gupta	Co-Project Manager	ED, NHIDCL
3	Mr. Ashok Kumar Gupta	Counterpart (Guideline)	GM (T), NHIDCL
4	Mr. Sanjeev Kumar	Counterpart (Guideline)	SE (S&R (P&B)), MoRTH
5	Mr. Saurabh Singh	Observer	AEE (EAP), MoRTH

Table 2-26 Member List of 6th TG Meeting (22nd February 2018)

No.	Name	Position in Project	Position/Organization
1	Mr. A.K. Shrivastava	Chair of TG meeting	ADG, MoRTH
2	Mr. Sanjeev Kumar	Counterpart (Guideline)	SE (S&R (P&B)), MoRTH
3	Mr. Khushal Chand	Project Manager	CE (EAP), MoRTH
4	Mr. Rahul Gupta	Co-Project Manager	ED, NHIDCL
5	Mr. Ashok Kumar Gupta	Counterpart (Guideline)	GM (T), NHIDCL
6	Mr. O.P. Shrivastava	Trainee of country focused training	CE, RO-Dehradun, MoRTH
7	Mr. Saurabh Singh	Observer	AEE (EAP), MoRTH

Table 2-27 Member List of 7th TG Meeting (6th June 2018)

No.	Name	Position in Project	Position/Organization
1	Mr. I.K. Pandey	Chair of TG meeting	ADG, MoRTH
2	Mr. Khushal Chand	Project Manager	CE (EAP), MoRTH

No.	Name	Position in Project	Position/Organization
3	Mr. Rahul Gupta	Co-Project Manager	ED, NHIDCL
4	Mr. Y. Balakrishna	Project Member	CE (S&R (P&B)), MoRTH
5	Mr. B.K. Sinha	Project Member	CE (Zone-V), MoRTH
6	Mr. Sanjeev Kumar	Counterpart (Guideline)	SE (S&R (P&B)), MoRTH
7	Mr. Sanjay Garg	Counterpart (Guideline)	SE (Zone-III), MoRTH
8	Mr. Trivendra Kumar	Counterpart (Guideline)	EE, MoRTH
9	Mr. W. Blah	Counterpart (Guideline)	ED, NHIDCL
10	Mr. Ashok Kumar Gupta	Counterpart (Guideline)	GM (T), NHIDCL
11	Mr. Nishoo Gupta	Counterpart (Guideline)	GM (T), NHAI
12	Mr. A.K. Nagpal	Observer	ADG, MoRTH
13	Mr. Akhilesh Srivastava	Observer	CGM (T), NHAI

Table 2-28 Member List of 8th TG Meeting (28th September 2018)

No.	Name	Position in Project	Position/Organization
1	Mr. I.K. Pandey	Chair of TG meeting	ADG, MoRTH
2	Mr. Khushal Chand	Project Manager	CE (EAP), MoRTH
3	Mr. Rahul Gupta	Co-Project Manager	ED, NHIDCL
4	Mr. P. R. Meena	Project Member	CE (Zone-I), MoRTH
5	Mr. V.S. Khaira	Project Member	CE (Zone-I), MoRTH
6	Mr. Trivendra Kumar	Counterpart (Guideline)	EE (Zone-I), MoRTH
7	Mr. Ashok Kumar Gupta	Counterpart (Guideline)	GM (T), NHIDCL
8	Mr. Varun Aggarwal	Observer	SE (S&R), MoRTH
9	Mr. L.P. Padhy	Observer	CGM (T), NHAI
10	Mr. J.K. Goyal	Observer	CGM (T), NHAI

Table 2-29 Member List of 9th TG Meeting (17th July 2019)

No.	Name	Position in Project	Position/Organization
1	Mr. S.S. Nahar	Chair of TG meeting	ADG, MoRTH
2	Mr. Khushal Chand	Project Manager	CE (EAP), MoRTH
3	Mr. U.C. Katara	Project Member	CE (Monitoring), MoRTH
4	Mr. B.K. Sinha	Project Member	CE (Zone-II), MoRTH
5	Mr. Sanjeev Kumar	Counterpart (Guideline)	CE (S&R), MoRTH
6	Mr. Sanjay Garg	Counterpart (Guideline)	CE (Bridge), MoRTH
7	Mr. Trivendra Kumar	Counterpart (Guideline)	SE, MoRTH
8	Mr. W. Blah	Counterpart (Guideline)	ED, NHIDCL
9	Mr. Shashank Kumar	Counterpart (Guideline)	GM (T), NHIDCL
10	Mr. Pankaj Aggarwal	Observer	SE, MoRTH
11	Mr. L.P. Padhy	Observer	CGM (T), NHIDCL
12	Mr. B. Mahanta	Observer	DGM, NHIDCL
13	Mr. A.Susing	Observer	SE (Zone-II), MoRTH

No.	Name	Position in Project	Position/Organization
14	Mr. S. Varshney	Observer	SE, MoRTH
15	Mr. S. Sisodia	Observer	SE, MoRTH
16	Mr. Vipnesh Sharma	Observer	RO-Shimla, MoRTH
17	Mr. A.K. Sabharwal	Observer	GM (T), NHAI
18	Mr. P.C Arya	Observer	CGM (T), NHAI
19	Mr. Vivek Anand Sharma	Observer	AEE (Zone-II), MoRTH
20	Mr. Avdesh Gupta	Observer	EE, MoRTH
21	Mr. Gulshan	Observer	EE, MoRTH
22	Mr. Sanjeev Kumar Sharma	Observer	GM (T), NHAI
23	Mr. Vipin Kumar	Observer	EE (EAP), MoRTH
24	Mr. Rakesh	Observer	AEE (Zone-III), MoRTH
25	Mr. Ravi Chanchal	Observer	AEE (Zone-III), MoRTH
26	Mr. Amrit Meena	Observer	AEE (Zone-V), MoRTH
27	Mr. Vikas Kumar Verma	Observer	AEE (Zone-V), MoRTH
28	Mr. U.J Chamargore	Observer	SE (Zone-III), MoRTH
29	Mr. Shashank S Rai	Observer	AEE (Zone-I), MoRTH

Table 2-30 List of Attendees of Webinars

No.	Guideline	Date	Presenter	Attendee
1	Planning of Hill Road	15 th September 2021	Mr. Takashi Nishijima	Details are given in Appendix 06
2	Mountain Bridge	22 nd September 2021	Mr. Hidetoshi Nakano	
3	O&M of Hill Road	29 th September 2021	Mr. Naoki Ishikawa	
4	Slop Protection	6 th of October 2021	Mr. Yoshinori Kawamura Dr. Takayuki Mayumi	
5	Mountain Tunnel	22 nd of October 2021	Mr. Denichiro Yamada	
6	Construction of Slope Protection	29 th of October 2021	Mr. Masahide Tanaka	

Table 2-31 List of Relevant Organization

No.	Organization	Role	Role in Project
1	Ministry of Road Transport and Highway: MoRTH	Responsible for policy making and planning for development of all roads in entire India.	Counterpart
2	National Highways Authority of India: NHAI	Responsible for development and O&M of major highways in entire India	Counterpart
3	National Highways and Infrastructure Development Corporation Ltd.: NHIDCL	Responsible for development and O&M of roads and highways in boundary areas as well as north and northeast states of India	Counterpart
4	Public Works Department of each State Government: State PWDs	Responsible for planning, development, and O&M of states roads and roads under state government custody	Counterpart


No.	Organization	Role	Role in Project
5	Indian Academy of Highway Engineers: IAHE	Dissemination of technologies of highways through seminars	Liaison partner for training in Japan
6	Indian Road Congress: IRC	Preparation and publication of technical standards and guidelines. Dissemination of technologies of highways through publication	Liaison partner for public relations of the activities of the project and update of technical standards and guidelines


2.2 Activities of the Project (Planned and Actual)


2.2.1 Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.




Table 2-32 shows the activities regarding the Output 1.


Table 2-32 Activities (Plan and Actual) for Output 1


Planned	Actual
1-1. Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.	
<ul style="list-style-type: none"> Review of standards and guidelines 	<ul style="list-style-type: none"> Standards and guidelines, including IRC codes, were collected, reviewed, and analyzed, including sorting out the issues to improve, by February 2018.
<ul style="list-style-type: none"> Joined Training at IAHE 	<ul style="list-style-type: none"> Joined the training of IAHE from 25th to 29th June 2016 to collect information of and understand technology level of hill roads in India. The training “Planning, Design, Construction and Maintenance of Hill Roads” was held twice a year by IAHE. <div style="text-align: center;">  <p>Indian Academy of Highway Engineers (IAHE) <i>Training Programme on Planning, Design, Construction and Maintenance of Hill Roads</i> (25-29, July 2016) भारतीय राजमार्ग अभियन्ता अकादमी</p> <p>Indian Academy of Highway Engineers Established by Ministry of Road Transport & Highways, Government of India in 1953 A-2, Institutional Area, Sector 62, NH-24 Gurgaon, Haryana-122002, India</p> <p>Certificate Certified that Shri Demichiro Yamada JICA Expert, National Highways Authority of India, New Delhi, has participated in the training programme on <i>“Planning, Design, Construction and Maintenance of Hill Roads”</i> Organised by IAHE from 25 - 29, July 2016</p> <p>M Riten Kumar Singh Course Co-ordinator & Joint Director, IAHE</p> <p>V. L. Patankar Director, IAHE</p> </div>
<ul style="list-style-type: none"> Reviewing existing technical documents and conducting site survey 	<ul style="list-style-type: none"> Through reviewing existing technical documents and conducting site surveys, sorted out the issues to improve in hill road development in India. Upon the requests from MoRTH and NHAI, JICA Experts reviewed one DPR of a hill road, conducted site surveys at 2 sites of roadside slope collapse, and issued recommendations for each. <ol style="list-style-type: none"> In July 2017, upon the request by NHAI, reviewed the DPR of NH48, Shiradi Ghat Bypass. On 15th February 2018, upon the request by MoRTH, visited NH94, Yamunotri highway, in Uttarakhand, inspected the massive slope failure near

Planned	Actual																																																																												
	<p>Ojiri village, and prepared the report including recommendations on possible countermeasures.</p> <p>3) On 1st August 2018, upon the request by NHAI, visited Kiratpur~Nerchowk section of NH21 in Himachal Pradesh, inspected slope failure sites, and prepared the report including recommendations on possible countermeasures.</p>  <p style="text-align: center;"><u>Site visit of NH94 (February 2018)</u></p>																																																																												
1-2. Conduct field surveys to the typical mountainous highways.																																																																													
<ul style="list-style-type: none"> • Site Surveys 	<ul style="list-style-type: none"> • Through the discussion with C/P, selected the case study sites (CS sites) of typical hill road sections in the following 4 regions. <ol style="list-style-type: none"> 1) North regions (J&K, Himachal Pradesh, Uttarkhand, etc.) 2) Northeast regions (Sikkim and the 7 sisters) 3) West Bengal (North) 4) South regions (Maharashtra, Karnataka, and Tamil Nadu) • From the above 4 regions, selected 10 NHs suffering from slope disasters and conducted site surveys in cooperation with C/Ps. • In addition to the CS sites, conducted site surveys for 11 NHs, which are quested by C/P or considered as typical Indian hill roads with typical Indian technologies. <p style="text-align: center;"><u>Studied National Highways</u></p> <table border="1"> <thead> <tr> <th>States</th> <th>NH</th> <th>Section</th> <th>Agency</th> <th>CS sites</th> </tr> </thead> <tbody> <tr> <td rowspan="5">Himachal Pradesh,</td> <td>NH20</td> <td>Patankot-Mandi</td> <td>NHAI</td> <td>✓</td> </tr> <tr> <td>NH21</td> <td>Kiratpur-Ner chowk</td> <td>NHAI</td> <td>✓</td> </tr> <tr> <td>NH21</td> <td>Ner chowk-Manali</td> <td>NHAI</td> <td>✓</td> </tr> <tr> <td>NH21</td> <td>Rohtang TN</td> <td>BRO</td> <td></td> </tr> <tr> <td>NH22</td> <td>Parwanoo-Solan</td> <td>NHAI</td> <td></td> </tr> <tr> <td rowspan="3">Uttarakhand</td> <td>NH707A</td> <td>Mussoorie-Chamba</td> <td>PWD</td> <td>✓</td> </tr> <tr> <td>NH58</td> <td>Rishikesh-Srinagar</td> <td>PWD</td> <td></td> </tr> <tr> <td>NH94</td> <td>Yamunotri highway</td> <td>PWD</td> <td></td> </tr> <tr> <td rowspan="2">West Bengal</td> <td>NH55</td> <td>Siliguri-Darjeeling</td> <td>PWD</td> <td>✓</td> </tr> <tr> <td>NH10</td> <td>Sevoke-Gangtok</td> <td>PWD</td> <td>✓</td> </tr> <tr> <td>Sikkim</td> <td>NH310A</td> <td>Mangan-Lachung</td> <td>NHIDCL</td> <td>✓</td> </tr> <tr> <td rowspan="3">Meghalaya</td> <td>NH40</td> <td>Sillong-Dawki</td> <td>NHIDCL</td> <td>✓</td> </tr> <tr> <td>NH51</td> <td>Tura-Dalu</td> <td>NHIDCL</td> <td></td> </tr> <tr> <td>NH66</td> <td>Assam/Meghalaya border - Dalu</td> <td>NHIDCL</td> <td>✓</td> </tr> <tr> <td>Assam</td> <td>—</td> <td>Dhubri-Phulbari Bridge</td> <td>NHIDCL</td> <td></td> </tr> <tr> <td>Mizoram</td> <td>NH54</td> <td>Aizawl-Tuipang</td> <td>NHIDCL</td> <td></td> </tr> </tbody> </table>	States	NH	Section	Agency	CS sites	Himachal Pradesh,	NH20	Patankot-Mandi	NHAI	✓	NH21	Kiratpur-Ner chowk	NHAI	✓	NH21	Ner chowk-Manali	NHAI	✓	NH21	Rohtang TN	BRO		NH22	Parwanoo-Solan	NHAI		Uttarakhand	NH707A	Mussoorie-Chamba	PWD	✓	NH58	Rishikesh-Srinagar	PWD		NH94	Yamunotri highway	PWD		West Bengal	NH55	Siliguri-Darjeeling	PWD	✓	NH10	Sevoke-Gangtok	PWD	✓	Sikkim	NH310A	Mangan-Lachung	NHIDCL	✓	Meghalaya	NH40	Sillong-Dawki	NHIDCL	✓	NH51	Tura-Dalu	NHIDCL		NH66	Assam/Meghalaya border - Dalu	NHIDCL	✓	Assam	—	Dhubri-Phulbari Bridge	NHIDCL		Mizoram	NH54	Aizawl-Tuipang	NHIDCL	
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Planned	Actual				
	Rajasthan	NH11	Existing Tunnel	JDA	
	Maharashtra	—	Mumbai-Pune Expressway	MSRDC	
		NH211	Aurangabad Tunnel	NHAI	
	Karnataka	NH48	Siradhi Ghat Bypass	NHAI	✓
		NH66	Karnataka/Goa border - Kundapur	NHAI	
1-3. Improve survey and planning guidelines on mountainous highways.					
<ul style="list-style-type: none"> Preparation of Planning Guideline 	<ul style="list-style-type: none"> Finalized the contents of the guideline at the TG meeting on 30th January 2018, which was approved by the JCC in April 2018. Prepared the guideline based on the review of the existing standards and guidelines and site surveys. Completed drafting by April 2019. Submitted the draft to MoRTH on 22th of May 2019. Held the technical workshop to explain the guideline on 14th of December 2019 and collected feedback to the draft. Submitted the final version to MoRTH in March 2020. Held the webinar to disseminate the guideline on 15th September 2021 and collected comments. After incorporating the comments at the Webinar, finalized the guideline and submitted to MoRTH in November 2021. Approved by MoRTH on 31st January 2022. <div style="text-align: center;">  </div> <p style="text-align: center;"><u>TG meeting</u></p>				
1-4. Examine suitable contract system and management on mountainous highways after reviewing existing issues.					
<ul style="list-style-type: none"> Issuing recommendation 	<ul style="list-style-type: none"> Studied practical issues in the current contract system through the interviews with the C/P (8 times) and the review of the contract documents of EPC mode. On 16th January 2019, issued the recommendation regarding contract management system. On 28th May 2019, issued the recommendation regarding the contract mode recommended for implementation of the pilot project at NH10. 				

Planned	Actual
	 <p style="text-align: center;"><u>Interview with Officials of West Bengal</u></p>
1-5. Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE), in relation with the activities of Output 2 and 3.	
<ul style="list-style-type: none"> • Trainings in Japan 	<ul style="list-style-type: none"> • Provided four times as follows. Details are given in Table 2-4. <ul style="list-style-type: none"> 1st training: 10 attendees, from 16th May to 6th June 2017 2nd training: 10 attendees, from 24th October to 13th November 2017 3rd training: 9 attendees, from 15th October to 5th November 2018 4th training: 9 attendees, from 7th to 9th August and from 18th August to 2nd September 2019 • To increase effects by the training, liaising with IAHE, startup and follow up trainings were held in India with lectures and site visits before and after the trainings in Japan. • The 5th training planned in May 2020 was canceled due to the worldwide pandemic of Covid-19. <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p style="text-align: center;"><u>Trainings in Japan (left: in India, right: in Japan)</u></p>
<ul style="list-style-type: none"> • Technical Seminars 	<ul style="list-style-type: none"> • Provided two technical seminars. <ul style="list-style-type: none"> 1st technical seminar held on 19th June 2018 at MoRTH Presentations were made for cutting-edge technologies of bridges and construction and O&M of tunnels for 30 attendees from MoRTH, NHAI, and NHIDCL. 2nd technical seminar held on 25th September 2018 at MoRTH Presentations were made for slope protection, mountain tunnel, and O&M of hill roads for 40 attendees from MoRTH, NHAI, and NHIDCL.

Planned	Actual
	 <p style="text-align: center;"><u>Technical seminar (September 2018)</u></p>
<ul style="list-style-type: none"> • Selection of the sections for Pilot project (P/P) 	<ul style="list-style-type: none"> • The section for P/P on NH22 was selected in the JCC in April but canceled in the JCC in October 2018. • For the P/P on NH22, visited the construction sites at the Parwanoo-Solan section in Himachal Pradesh twice, on 8th and 20th June 2018, and drafted an implementation plan. • P/P were proposed from MoRTH on 29th November 2018. • By the end of March 2019, JICA Experts conducted site surveys for 7 times at the proposed 3 sites and issued recommendations to MoRTH including survey plans for design and possible countermeasures. • In the JCC in May 2019, implementation of P/P at the following 3 sites are decided. NH10 in Sikkim: Recommendations on survey and design and technical transfer for construction of countermeasure works NH717A in West Bengal: Recommendations on survey and design NH54 in Assam: Recommendations on survey and design
<ul style="list-style-type: none"> • Implementation of P/P on NH10 	<ul style="list-style-type: none"> • P/P on NH10 provided recommendations on survey and design as well as technical transfer for construction technique of cast-in-situ concrete crib works and horizontal drainage boring, which were newly introduced to India. • Based on the topographic survey and geological investigation by NHIDCL, JICA Experts issued the recommendations on 8th August 2019, including design of Japanese countermeasures of cast-in-situ concrete crib works and horizontal drainage boring. • May 2020, NHIDCL signed the contract with the Contractor. • On 22th October 2020, JICA Experts issued the recommendations on technical documents. • On 15th December 2020, JICA Experts issued the recommendations on design drawings. • On 11th August 2021, JICA Experts issued recommendations including advice to the drawings and the method statements submitted from the Contractor and the model method statements prepared by Japanese Contractors. • In October and December 2021, technical transfer for construction was made on the site of NH10 in Sikkim. On 7th of January 2022, issued recommendations on construction.

Planned	Actual
	 <p style="text-align: center;"><u>Discussion of design and technical transfer for P/P on NH10</u></p>
<ul style="list-style-type: none"> • Implementation of P/P on NH54 	<ul style="list-style-type: none"> • P/P on NH54 provided recommendations to NHAI on survey and design of countermeasures against gravity deformation affecting the roadside slope of the highway in service. The recommendations aimed to provide support on DPR for the section. • On 23rd of December 2019, NHAI selected the DPR consultant. • On 25th February 2020, the lecture of map reading was presented to NHAI. • By May 2020, JICA Experts issued recommendations for three times regarding the survey method and plan submitted by the DPR consultant to NHAI. • By December 2020, JICA Experts issued 11 recommendations regarding the method and results of the site survey and landslide monitoring using slope stakes. • On 13th October 2021, based on the results of topographic survey, geological investigation, and landslide monitoring, JICA Experts issued recommendations on design of countermeasures. • On 25th November 2021, JICA Experts provided samples of technical specification for drainage well, which were proposed in the recommendation. • NHAI finalized the DPR based on the recommendation.
<ul style="list-style-type: none"> • Implementation of P/P on NH717A 	<ul style="list-style-type: none"> • P/P on NH717A provided recommendations to NHIDCL on survey and design of countermeasures against gravity deformation affecting the roadside slope of the highway in service. The recommendations aimed to provide support on DPR for the section. • In October 2019, JICA Experts issued recommendations on the TOR for hiring a DPR consultant • On 27th May 2020, NHIDCL selected the DPR consultant. • On 20th July 2020, JICA Experts issued recommendations on the implementation plan and quality assurance plan submitted from the DPR consultant to NHIDCL. • By July 2021, JICA Experts issued several recommendations on the methods as well as results of the survey conducted by the DPR consultant. • On 28th September 2021, based on the results of topographic survey, geological investigation, and landslide monitoring, JICA Experts issued recommendations on design of countermeasures. • On 25th November 2021, JICA Experts provided samples of technical specification for the works proposed in the recommendation. • NHIDCL finalized the DPR based on the recommendation.


Planned	Actual
	 <p style="text-align: center;"><u>Technical transfer for P/P on NH717A</u></p>
<ul style="list-style-type: none"> • Holding webinars 	<ul style="list-style-type: none"> • To disseminate the guidelines prepared in the project, from September to October 2021, six webinars were held to explain the guidelines and collect comments from Indian engineers. The details are given in Table 2-30.
<ul style="list-style-type: none"> • Presentation and discussion at IRC annual conferences 	<ul style="list-style-type: none"> • JICA Experts attended annual conferences (AC) of Indian Road Congress (IRC), in which numbers of highly ranked officials, professors, and engineers in the field of highways in India join. JICA Experts made presentations and discussions relating to the project and Japanese technologies regarding hill roads. <ul style="list-style-type: none"> 77th AC: from 15th to 18th December 2016 in Hyderabad 78th AC: from 3rd to 6th November 2017 in Bangalore 79th AC: from 22nd to 25th November 2018 in Nagpur 80th AC: from 19th to 21st December 2019 in Patna  <p style="text-align: center;"><u>Presentation at IRC annual conference (left: at 78th right: at 79th)</u></p>
<ul style="list-style-type: none"> • Joining IRC H-10 Committee 	<ul style="list-style-type: none"> • H-10 Committee of IRC updates the hill road manual and mountain tunnel manual. Mr. Yamada joined H-10 Committee as the sole member outside India and provided technical recommendations including the activities of the project.
<ul style="list-style-type: none"> • Joining IRC H-4 Committee 	<ul style="list-style-type: none"> • Upon the request from IRC, JICA Experts joined H-4 Committee as an observer. H-4 Committee is responsible for preparing technical standard and guidelines for slope protection. JICA Experts provided technical recommendations including the activities of the project.
<ul style="list-style-type: none"> • Discussion in Japan India joint working group 	<ul style="list-style-type: none"> • Japan India joint working group is held jointly and annually by MoRTH in India and MLIT in Japan. JICA Experts joined the following working groups to have discussion and promotion of technologies of hill roads. <ul style="list-style-type: none"> 3rd WG: on 24th October 2016 in Delhi 4th WG: on 7th November 2017 in Tokyo, jointly held with the 2nd training in Japan. 5th WG: on 13th November 2018 in Delhi 6th WG: on 27th January 2020 in Tokyo




Planned	Actual
	 <p><u>Japan India joint working group (left: 5th WG, right: 6th WG)</u></p>
<ul style="list-style-type: none"> • Collaboration with the Project for Natural Disaster Management in Forest Areas in Uttarakhand 	<ul style="list-style-type: none"> • In February 2019, JICA Experts joined the workshop held by another JICA T/C project in India, the Project for Natural Disaster Management in Forest Areas in Uttarakhand, and made presentation of O&M of hill roads. JICA Experts discussed the issues relating to hill roads in India with the officials and engineers involved in the project.  <p><u>Workshop in Uttarakhand (February 2019)</u></p>
<ul style="list-style-type: none"> • Joining other workshops 	<p>[International workshops on resilient infrastructure for disaster prevention]</p> <ul style="list-style-type: none"> • Joined the workshop held by the National Disaster Management Authority of India and made presentation and discussions regarding the project and disaster prevention technologies for hill roads. <p>[The 5th construction festival]</p> <ul style="list-style-type: none"> • A private think-tank in India “The FIRST Construction Council” held the 5th construction festival. JICA Experts joint the festival and made presentation regarding the project and its activities.  <p><u>Left: international workshop, right: construction festival</u></p>


2.2.2 Output 2: Guidelines on design and construction for mountainous highways are developed.

Table 2-33 shows the activities regarding the Output 2.

Table 2-33 Activities (Plan and Actual) for Output 2

Planned	Actual
2-1. Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	
<ul style="list-style-type: none"> Data collection and site survey. 	<ul style="list-style-type: none"> By February 2018, the existing design standards and guidelines, including IRC codes, for slope protection and landslide countermeasures, mountain tunnel, and mountain bridge were collected and analyzed and issues were identified. Through the site surveys and inspections, issues of design/construction of highways in mountainous regions were identified. <div style="text-align: center;">  <p><u>Construction site inspection (left: Tunnel in Goa – Karnataka, right: Countermeasures against landslide in West Bengal)</u></p> </div>
2-2. Improve a tunnel guideline.	
<ul style="list-style-type: none"> Preparation of mountain tunnel guideline 	<ul style="list-style-type: none"> Table of contents (TOC) of the guideline was discussed. TOC was finalized in the TG meeting on 30th January 2018 and then approved in JCC in April 2018. Conducted the technical seminar on Japanese tunnel technology was on 19th June 2018. Based on the review of the existing standards and site investigation, the tunnel guideline was prepared. The draft guideline was finalized by April 2019 and submitted to MoRTH on 22nd May 2019. On 14th August 2019, conducted the technical workshop to explain the guideline and to collect feedback. Submitted the finalized guideline to MoRTH in March 2020. Held the webinar to disseminate the guideline on 22nd October 2021 and collected comments. After incorporating the comments at the Webinar, finalized the guideline and submitted to MoRTH in November 2021. Approved by MoRTH on 31st January 2022.

Planned	Actual
	 <p style="text-align: center;"><u>Workshop of tunnel guideline (August 2019)</u></p>
2-3. Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).	
<ul style="list-style-type: none"> • Preparation of slope protection and embankment guideline 	<ul style="list-style-type: none"> • TOC of the guideline was discussed. TOC was finalized in the TG meeting on 22nd February 2018 and then approved in JCC in April 2018. In the JCC, the name of guideline was changed to GUIDE-LINE FOR SLOPE PROTECTION AND EMBANKMENT WITH ADVANCED TECHNOLOGY. • Held the technical seminar on landslide countermeasures and embankment with advanced technology in Japan on 27th September 2018. • Based on the review of the existing standards and site investigation, the guideline was developed. The draft guideline was finalized by April 2019 and submitted to MoRTH on 22nd May 2019. • On 17th July 2019, conducted the TG meeting to explain the necessary investigation for making DPR of highways in mountainous regions. • On 25th September 2019, conducted the technical workshop to explain the guideline and to collect feedback. • Submitted the finalized guideline to MoRTH in March 2020. • Held the webinar to disseminate the guideline on 6th October 2021 and collected comments. • Held the webinar to disseminate the construction technique in the guideline in on 29th October 2021 and collected comments. • After incorporating the comments at the Webinar, finalized the guideline and submitted to MoRTH in November 2021. • Approved by MoRTH on 31st January 2022. <div style="display: flex; justify-content: space-around; margin-top: 10px;">   </div> <p style="text-align: center;"><u>Left: TG meeting (July 2019) right: technical workshop (September 2019)</u></p>



Planned	Actual
2-4. Develop a high pier bridge guideline.	
<ul style="list-style-type: none"> Preparation of mountain bridge guideline 	<ul style="list-style-type: none"> Collection and analysis of existing design standards of bridge, and identification of issues were finished by December 2017. TOC of the guideline was discussed. TOC was finalized in the TG meeting on 19th December 2017 and approved in JCC in April 2018. Held the technical seminar on Japanese bridge technology on 19th June 2018. Based on the review of the existing standards and site investigation, the mountain bridge guideline was developed. The draft guideline was finalized by April 2019 and submitted to MoRTH on 22nd May 2019. Conducted the technical workshop to explain the guideline to collect feedback on 29th July 2019. Submitted the finalized guideline to MoRTH in March 2020 Held the webinar to disseminate the guideline on 22nd September 2021 and collected comments. After incorporating the comments at the Webinar, finalized the guideline and submitted to MoRTH in November 2021. Approved by MoRTH on 31st January 2022.
	
<p><u>Left: technical seminar (June 2018) right: technical workshop(July 2019)</u></p>	

2.2.3 Output 3: Foundation for operation and maintenance for mountainous highways is built.

Table 2-34 shows the activities regarding the Output 3

Table 2-34 Activities (Plan and Actual) for Output 3

Planned	Actual
3-1. Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	
<ul style="list-style-type: none"> Data collection and site survey. 	<ul style="list-style-type: none"> By February 2018, the existing design standards and guidelines, including IRC codes, for operation and maintenance of hill roads were collected and analyzed and issues were identified. Through the site surveys and inspections, issues of operation and maintenance of highways in mountainous regions were identified.

Planned	Actual
	 <p style="text-align: center;"><u>Site survey (left; interview with road administrator, right: control and operation system of mountain tunnel)</u></p>
<p>3-2. Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	
<ul style="list-style-type: none"> • Preparation of mountain operation and maintenance guideline 	<ul style="list-style-type: none"> • Collection and analysis of existing design standards and guidelines for operation and maintenance and identification of issues were completed by December 2017. • TOC of the guideline was discussed. TOC was finalized in the TG meeting on 19th December 2017 and approved in JCC in April 2018. • Held the technical seminar on O&M technology for mountain tunnels on 19th June 2018. • Held the technical seminar on cutting edge O&M technology for hill roads on 28th September 2018. • Based on the review of the existing standards and site investigation, the mountain bridge guideline was developed. The draft guideline was finalized by April 2019 and submitted to MoRTH on 22nd May 2019. • Conducted the technical workshops to explain the guideline to collect feedback on 29th July for mountain bridge, on 14th August for mountain tunnel, and on 25th September 2019 for slope protection. • Submitted the finalized guideline to MoRTH in March 2020 • Held the webinar to disseminate the guideline on 29th September 2021 and collected comments. • After incorporating the comments at the Webinar, finalized the guideline and submitted to MoRTH in November 2021. • Approved by MoRTH on 31st January 2022.  <p style="text-align: center;"><u>Explanation of O&M guideline (September 2019 in a workshop)</u></p>

2.3 Achievement of the Project

2.3.1 Approach and Methodologies to Confirm the Achievement

Achievement of the Project was confirmed by and between MoRTH and JICA Experts by means of interviews to JCC Members prior to JCCs and reviewing Monitoring Sheets (Ver.1 to 10: See Appendix 5). List of interviewees of JCC members is shown below.

Table 2-35 List of Interviewee of JCC Members

Name	Position/Organization	Role in Project
Mr. S.N. Das	DG (RD) & SS, MoRTH	Chairperson of JCC
Mr. Manoj Kumar	DG (RD) & SS, MoRTH	
Mr. B.N. Singh	DG (RD) & SS, MoRTH	
Mr. I.K. Pandey	DG (RD) & SS, MoRTH	
Mr. A.K. Shrivastava	ADG, MoRTH	Project Member
Mr. Kishor Chandwani	SE (EAP), MoRTH	Project Manager
Mr. Khushal Chand	CE (EAP), MoRTH	
Mr. Rakesh Kumar	SE (EAP), MoRTH	
Mr. M.K. Jain	CGM (T), NHAI	Co-Project Manager
Mr. L.P. Padhy	CGM (T), NHAI	
Mr. Rahul Gupta	ED, NHIDCL	Co-Project Manager
Mr. W. Blah	ED, NHIDCL	

2.3.2 Outputs and Indicators

Major deliveries under these outputs were shown below. Each achievement was confirmed in accordance with “Means of Verification” specified in PDM. (Text in [] show the Means of Verification.)

Table 2-36 Major Deliveries under Each Output

Indicators	Achievement
Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed	
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<p>[GUIDELINE FOR PLANNING]</p> <ul style="list-style-type: none"> • Through Monitoring Sheets (Ver.1~10), the following activities are confirmed. <ol style="list-style-type: none"> 1) Collection and analyses of the existing standards and guidelines. Identification of the issues to be solved. 2) Site surveys for 10 CS Sites 3) Finalization of TOC for Planning Guideline (January 2018) 4) Submission of draft Planning Guideline (May 2019) 5) Technical seminar for Planning Guideline (December 2019) 6) Submission of finalized Planning Guideline(March 2020) 7) Webinar to disseminate Planning Guideline (September 2021)

Indicators	Achievement
	8) After incorporating comments from Indian C/P, finalization and submission of Planning Guideline (November 2021) 9) Approval of Planning Guideline by MoRTH (January 2022) (Achieved)
1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	[RECORD OF PROJECT] <ul style="list-style-type: none"> • Through Monitoring Sheets (Ver.1~10), the following activities are confirmed. <ol style="list-style-type: none"> 1) Trainings in Japan (4 times) 2) Technical seminars (2 times) 3) Technical seminar for Planning Guideline (December 2019) 4) Invitation program to Japan 5) Webinar for dissemination of Planning Guideline (September 2021) <ol style="list-style-type: none"> a) Interviews to implementation agencies for understanding an optimal contract mode and its administration for hill roads (in total 8 times) b) Review of contract documents for EPC mode (2 times) c) Based on a) and b), JICA Experts issued recommendations. (January 2019) (Achieved)
Output 2: Guidelines on design and construction for mountainous highways are developed.	
2-1 Improved tunnel guideline is completed by June 2019.	[GUIDELINE FOR TUNNEL ON ARTERIAL ROADS IN HILL AREA] [RECORD OF PROJECT] <ul style="list-style-type: none"> • Through Monitoring Sheets (Ver.1~10), the following activities are confirmed. <ol style="list-style-type: none"> 1) Collection and analyses of the existing standards and guidelines. Identification of the issues to be solved. 2) Finalization of TOC for Tunnel Guideline (January 2018) 3) Submission of draft Tunnel Guideline (May 2019) 4) Technical seminar for Tunnel Guideline (August 2019) 5) Submission of finalized Tunnel Guideline (March 2020) 6) Webinar to disseminate Tunnel Guideline (October 2021) 7) After incorporating comments from Indian C/P, finalization and submission of Tunnel Guideline (November 2021) 8) Approval of Tunnel Guideline by MoRTH (January 2022) (Achieved)
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	[GUIDELINE FOR SLOPE PROTECTION AND EMBANKMENT WITH ADVANCED TECHNOLOGY] [RECORD OF PROJECT] <ul style="list-style-type: none"> • Through Monitoring Sheets (Ver.1~10), the following activities are confirmed. <ol style="list-style-type: none"> 1) Collection and analyses of the existing standards and guidelines. Identification of the issues to be solved. 2) Finalization of TOC for Slope Guideline (February 2018) 3) Submission of draft Slope Guideline (May 2019) 4) Technical seminar for Slope Guideline (September 2019) 5) Submission of finalized Slope Guideline (March 2020) 6) Webinar to disseminate Slope Guideline (October 2021) 7) After incorporating comments from Indian C/P, finalization and submission of Slope Guideline (November 2021) 8) Approval of Slope Guideline by MoRTH (January 2022) (Achieved)

Indicators	Achievement
2-3 High pier bridge guideline is completed by June 2019.	<p>[GUIDELINE FOR MOUNTAIN BRIDGE WITH ADVANCED TECHNOLOGY] [RECORD OF PROJECT]</p> <ul style="list-style-type: none"> • Through Monitoring Sheets (Ver.1~10), the following activities are confirmed. <ol style="list-style-type: none"> 1) Collection and analyses of the existing standards and guidelines. Identification of the issues to be solved. 2) Finalization of TOC for Bridge Guideline (December 2017) 3) Submission of draft Bridge Guideline (May 2019) 4) Technical seminar for Bridge Guideline (July 2019) 5) Submission of finalized Bridge Guideline(March 2020) 6) Webinar to disseminate Bridge Guideline (October 2021) 7) After incorporating comments from Indian C/P, finalization and submission of Bridge Guideline (November 2021) 8) Approval of Bridge Guideline by MoRTH (January 2022) <p style="text-align: right;">(Achieved)</p>
2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	<p>[RECORD OF PROJECT]</p> <ul style="list-style-type: none"> • Through Monitoring Sheets (Ver.1~10), the following activities are confirmed. <ol style="list-style-type: none"> 1) Trainings in Japan (4 times) 2) Technical seminars (2 times) 3) Pilot Projects <ul style="list-style-type: none"> * NH22: Draft implementation plan was prepared but canceled. * NH10: <ul style="list-style-type: none"> - Recommendations on survey and design of countermeasures against slope disaster (July 2019) - Technical transfer for construction of slope protection (October and December 2021) * NH54: <ul style="list-style-type: none"> - Recommendations on survey and design of countermeasures against slope disaster (October 2021) * NH717A: <ul style="list-style-type: none"> - Recommendations on survey and design of countermeasures against slope disaster (September 2021) 4) Site survey and inspection upon requests from MoRTH and NHAI (in total 2 times) 5) Technical seminars for tunnel , slope protection, and bridge (in total 3 times, from July to September 2019) 6) Invitation program to Japan 7) Webinar for dissemination of Tunnel , Slope, and Bridge Guidelines (in total 4 times, September and October 2021) <p style="text-align: right;">(Achieved)</p>
Output 3: Foundation for operation and maintenance for mountainous highways is built.	
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p>[GUIDELINE FOR OPERATION AND MAINTENANCE] [RECORD OF PROJECT]</p> <ul style="list-style-type: none"> • Through Monitoring Sheets (Ver.1~10), the following activities are confirmed. <ol style="list-style-type: none"> 1) Collection and analyses of the existing standards and guidelines. Identification of the issues to be solved. 2) Finalization of TOC for O&M Guideline (December 2017) 3) Submission of draft O&M Guideline (May 2019)

Indicators	Achievement
	4) Workshop of O&M Guideline in the technical seminars for Tunnel, Slope, and Bridge Guidelines (July ~ September 2019) 5) TG meeting for O&M Guideline (September 2019) 6) Submission of finalized O&M Guideline(March 2020) 7) Webinar to disseminate O&M Guideline (September 2021) 8) After incorporating comments from Indian C/P, finalization and submission of O&M Guideline (November 2021) 9) Approval of O&M Guideline by MoRTH (January 2022) (Achieved)
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	[RECORD OF PROJECT] • Through Monitoring Sheets (Ver.1~10), the following activities are confirmed. <ol style="list-style-type: none"> 1) Trainings in Japan (4 times) 2) Technical seminars (2 times) 3) Workshop of O&M Guideline in the technical seminars for Tunnel, Slope, and Bridge Guidelines (July ~ September 2019) 4) TG meeting for O&M Guideline (September 2019) 5) Invitation program to Japan 6) Webinar for dissemination of O&M Guideline (September 2021) (Achieved)

2.3.3 Project Purpose and Indicators

Achievement of the Project Purpose was observed as follows. Texts in [] show the Means of Verification specified in PDM.

Table 2-37 Status of Achievement of Project Purpose

Indicators	Achievement
Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.	
Model activities are conducted applying the developed guidelines by the Project.	[RECORD OF PROJECT] • Through Monitoring Sheets (Ver.1~10), the following activities are confirmed. <ol style="list-style-type: none"> 1) Implementation of Pilot Project (P/P) (NH22) <ul style="list-style-type: none"> - Planned in the 4th JCC in April 2018. - Conducted site surveys at Parwanoo-Solan section in Himachal Pradesh (in total 2 times in June 2018). Prepared draft implementation plan. - Canceled in the 5th JCC in October 2018. 2) Implementation of Pilot Project (P/P) (NH10) <ul style="list-style-type: none"> - Made technical transfer to NHIDCL, the implementation agency, of cast-in-situ concrete crib works and horizontal drainage boring, which are newly introduced to India - On 8th August 2019, issued recommendations on survey and design of countermeasures including cast-in-situ concrete crib works and horizontal drainage boring, which are to support DPR preparation by NHIDCL.

Indicators	Achievement
	<ul style="list-style-type: none"> - From October to December 2021, made technical transfer on construction technique of the said countermeasures at the P/P site on NH10. Issued recommendations on the said technical transfer on 7th January 2022. <p>3) Implementation of Pilot Project (P/P) (NH54)</p> <ul style="list-style-type: none"> - In December 2019, NHAI selected a DPR consultant through the selection process with TOR supported by JICA Experts. - JICA Experts issued recommendations on survey and study on site for preparation of design. NHAI instructed the DPR consultants to survey and study the P/P section. - Based on the results of survey and study, JICA Experts issued recommendations on countermeasures in October 2021. - Based on the recommendation, NHAI finalized the DPR. <p>4) Implementation of Pilot Project (P/P) (NH717A)</p> <ul style="list-style-type: none"> - In June 2020, NHIDCL selected a DPR consultant through the selection process with TOR supported by JICA Experts. - JICA Experts issued recommendations on survey and study on site for preparation of design. NHIDCL instructed the DPR consultants to survey and study the P/P section. - Based on the results of survey and study, JICA Experts issued recommendations on countermeasures in September 2021. - Based on the recommendation, NHIDCL finalized the DPR. <p>5) Holding technical seminars and workshops</p> <ul style="list-style-type: none"> - Held technical workshops to disseminate the guidelines and to collect feedback from Indian engineers (in total 3 times). - Held technical seminars to disseminate the Planning and O&M Guidelines and to collect feedback from Indian engineers (in total 2 times). - Held webinars to disseminate the guidelines and to collect comments from Indian engineers (in total 2 times). <p>6) Provision of Training in Japan liaising with IAHE</p> <ul style="list-style-type: none"> - Liaising with IAHE, held start up and wrap up sessions in India (in total 4 times). In the sessions, to understand the current situation and issues in hill roads as well as hill road projects in India correctly, lectures and site inspections were made to facilitate the trainings in Japan and to disseminate the guidelines developed in the project. <p>[OBSERVATION / EVALUATION BY JAPANESE EXPERTS]</p> <ul style="list-style-type: none"> • With the guidelines developed in the project, held technical seminars, workshops, and webinars and implemented model activities including three P/Ps on NH54, NH717A, and NH10. • In the P/Ps on NH54 and NH717A, through a series of discussions with C/Ps, selection of DPR consultants were made with the TOR incorporating the recommendations from JICA Experts. NHAI and NHIDCL also incorporated the recommendations from JICA Experts to the DPRs for NH54 and NH717A for selecting contractors for the projects. The C/Ps well understood the technologies included in the guidelines and spontaneously utilized such knowledge and skills. Thus, institutional capacity of the C/P organization is considered strengthened.

Indicators	Achievement
	<ul style="list-style-type: none"> • In the P/P on NH10, technical transfer was made for construction of the countermeasures newly introduced to India. Through the technical transfer, the C/Ps, the Consultant, and the Contractor well understood the construction method and techniques and improved the site condition. <p>[INTERVIEW TO SUPERVISORS]</p> <ul style="list-style-type: none"> • Through the interviews with the core members of Indian side, implementation of the model activities including P/P was confirmed. • Following the development of the guidelines, implementation of the P/Ps facilitate the understanding by Indian C/Ps of practical application of the guidelines as well as the new technologies in India. • Based on the experience in the P/P site on NH10, the slope protection introduced by the guidelines will be applied to the neighboring packages. • The guidelines were well disseminated through the technical seminars as well as webinars. The guidelines are to be applied to the hill road development projects in Himachal Pradesh funded by WB. <p style="text-align: right;">(Achieved)</p>
Core officers are able to give lectures on development of mountainous highways in the training courses.	<p>[RECORD OF PROJECT]</p> <ul style="list-style-type: none"> • Through Monitoring Sheets (Ver.1~10), the following activities are confirmed for enhancing the capacity of the core officers. <ol style="list-style-type: none"> 1) Technical seminars for introducing the cutting-edge technologies for hill road development (in total 2 times). 2) Trainings in Japan liaising with IAHE (in total 4 times) and invitation program to Japan for core officers (in total 1 time). 3) Technical seminars for disseminating the Tunnel, Slope and Bridge Guidelines, in which core officers of C/Ps made lectures for the relating technical topics (in total 3 times). 4) Technical workshops for the Planning and O&M Guidelines (in total 2 times). 5) Technical meetings for discussing the surveys to prepare DPRs for slope countermeasures. 6) Training for map reading to detect the risks of slope disasters (in total 1 times). 7) Project Manager delivered a lecture for hill road development in an international conference in New Zealand. <p>[OBSERVATION / EVALUATION BY JAPANESE EXPERTS]</p> <ul style="list-style-type: none"> • JICA Experts had a series of discussions with IAHE, the training academy for highway engineers, for planning a training course with the guidelines developed in the project. Due to the disturbance of international travels by COVID-19, however, establishing such taring course was canceled. • On the other hand, in some extent, capacity of the core officers was confirmed enhanced from the following facts: <p>The core officers of C/Ps delivered lectures in the technical seminars for Tunnel, Slope, and Bridge Guidelines.</p> <p>Project manager delivered a lecture regarding hill road development in an international conference.</p> • Along the progress of the projects, more engineers attended the technical seminars and webinars. The discussion became more technically detailed and the numbers of questions and comments increased.

Indicators	Achievement
	<p>[INTERVIEW TO SUPERVISORS]</p> <ul style="list-style-type: none"> • Through the interviews with the core members of Indian side, understanding by C/Ps of planning, survey and study , design, construction, and O&M of hill roads was confirmed enhanced. • The review and discussion in the session in India after the trainings in Japan deepened the understanding by C/Ps of the technologies. • The Webinars enhanced the understanding of the guidelines by the C/Ps located in the remote districts. • Mr. Khushal Chand (Project Manager) delivered a lecture in an international conference. C/Ps are prepared for delivering similar lectures if provided such occasions. • C/Ps are prepared for delivering lectures on the P/Ps on NH10 in the training course of hill roads by IAHE, if requested. <p style="text-align: right;">(Achieved)</p>

2.3.4 Revision of PDM

PDM was revised based on the requirement that was confirmed according to the progress of the Project. The history of the revision is shown below.

Table 2-38 Revision Record of PDM

Version	Contents of Revision
Version 0	<ul style="list-style-type: none"> • Established on 31st December 2015 (by signing the R/D)
Version 1	<ul style="list-style-type: none"> • Revised on 14th December 2016 (by approved in the 1st JCC) • Revised points <ol style="list-style-type: none"> 1) Revision of Output 1 (to clarify the targets to identify the issues) <p>Output 1</p> <p>Before) Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p> <p>After) Issues on <u>development of</u> mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p> 2) Revision of the indicators for the outputs (to clarify the target date for guideline preparation) <p>OVI 1-1</p> <p>Before) Survey and Planning guidelines for mountainous highways is completed by (mm/yyyy).</p> <p>After) Survey and Planning guidelines for mountainous highways is completed by <u>June 2019</u>.</p> <p>OVI 2-1</p> <p>Before) Improved tunnel guideline is completed by (mm/yyyy).</p> <p>After) Improved tunnel guideline is completed by <u>June 2019</u>.</p> <p>OVI 2-2</p> <p>Before) Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by (mm/yyyy).</p> <p>After) Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by <u>June 2019</u>.</p>

Version	Contents of Revision
	<p>OVI2-3 Before) High pier bridge guideline is completed by (mm/yyyy). After) High pier bridge guideline is completed by <u>June 2019</u>.</p> <p>OVI 3-1 Before) Operation and maintenance guideline for mountainous highways is completed by (mm/yyyy). After) Operation and maintenance guideline for mountainous highways is completed by <u>June 2020</u>.</p> <p>3) Revision of Activity 1.1 (to clarify the activity is made by the project, not solely by Japanese experts) Before) Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services for disaster sites upon requests. After) Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including <u>identification of appropriate solutions</u> for disaster sites upon requests.</p>
Version 2	<ul style="list-style-type: none"> • Revised on 28th April 2017 (by approved in the 2nd JCC) • Revised points <ol style="list-style-type: none"> 1) Revision of the indicators for Overall Goal (to revise the numbers of the project to use the guidelines prepared in the project) <ul style="list-style-type: none"> OG1 <ul style="list-style-type: none"> Before) At least three* sections of road development projects are planned/ constructed/ improved by using guidelines developed by the Project. After) At least <u>four</u> sections of road development projects are planned/ constructed/ improved by using guidelines developed by the Project. OG2 <ul style="list-style-type: none"> Before) At least three* sections of roads are conducted by using the operation and maintenance guideline developed by the Project. After) At least <u>four</u> sections of roads are conducted by using the operation and maintenance guideline developed by the Project.
Version 3	<ul style="list-style-type: none"> • Revised on 11th October 2017 (by approved in the 3rd JCC) • Revised points <ol style="list-style-type: none"> 1) Revision of the inputs by the Japanese Side (to incorporate the technical fields of the Short-term Experts) <ul style="list-style-type: none"> Inputs (The Japanese Side) <ul style="list-style-type: none"> Before) - Tunnel <ul style="list-style-type: none"> - Tunnel Facilities - Earthwork - Bridge - Monitoring and Evaluation - Other Fields, as necessity After) - <u>Team Leader/Slope Protection I</u> - <u>Deputy Team Leader/Slope Protection III</u> - <u>Mountain Tunnel</u> - <u>Slope Protection II/High Embankment</u> - <u>Mountain Bridge</u>

Version	Contents of Revision
	<ul style="list-style-type: none">- <u>Facility of Mountain Roads</u>- <u>Maintenance & Operation of Mountain Roads</u>- <u>Natural Condition (Topography/Geology)</u>- <u>Drainage Plan</u>- <u>Plan and Survey of Mountain Roads/Coordinator</u>- <u>Monitoring and Evaluation</u>- Other Fields, as necessity

CHAPTER 3 Results of Joint Review

3.1 Results of Review based on DAC Evaluation Criteria

In accordance with the Project Monitoring and Evaluation System of JICA, the Project was evaluated in light of five evaluation criteria of Relevance, Effectiveness, Efficiency, Impact and Sustainability by the joint review used the following categories; Very High, High, Fair, Low.

Then the total project evaluation rate would be given by Highly Satisfactory/Satisfactory/Partially satisfactory/Unsatisfactory. Based on joint evaluation for DAC Evaluation Criteria, the Project was rated as Highly Satisfactory. (Evaluation result of sub-criteria, Relevance: Very High, Effectiveness: High, Efficiency: High, Impact: Very High, Sustainability: High)

3.1.1 Relevance

The Project remained relevant to India's development policies and Japanese ODA policies. It also corresponds to needs of C/P organizations. Thus, relevance is "Very High".

(1) Relevance with the Policy of India

According to the Strategy for New India @ 75, 2018 which shows the strategic goals of India, published by National Institution for Transforming India Commission (hereinafter referred to as "NITI Aayog"), road sector is a one of the 41 necessary sector for economic growth, and the following goals are held up in the strategy; promotion of the Bharatmala Pariyojana, promotion of PMGSY (Pradhan Mantri Gram Sadak Yojana), extension of national road length to 200,000 km, improvement of road network linkage by reducing the percentage of double lane road less than 10% of the total.

Given the above, road in India is developed by NHAI, NHIDCL and State PWD which are implementation agencies, based on the plan made by MoRTH. There are NHDP (National Highways Development Project) started in 1998 and the Bharatmala Pariyojana started in 2017 as the national road development plans in India. Bharatmala Pariyojana inherits the remaining projects of NHDP and focuses on the road development of North India and mountainous area of Northeast India, along with development of Economic Corridor/Expressway, lane expansion to 4/6 in plain field, development of access road to the ports, ring road, and bypass highway. In the total 34,800km of the Bharatmala Pariyojana (Phase 1), approx. 13,171km (approx. 38%) is started the project, approx. 2,587km (approx. 7%) is under bidding, approx. 13,233km (approx. 38%) is in the phase of making DPR, as of December 2020 (source: Annual Report 2020-2021, MoRTH).

MoRTH established NHIDCL as a government owned company in January 2015 for road development of national border area to improve the road linkage of neighboring countries and states (which are mainly mountainous area), promotion of SARDP-NE (Special Accelerated Road Development Programme for North Eastern Region), and they allocated 10% of national road development budget to the road development for Northeast India in 2020. This reflects that the GoI places emphasis on mountainous highway development in

North/Northeast/other area in India and promote the current effort diligently, and this has not been changed from beginning of the Project.

Therefore, the Project Purpose is consistent with development policy of India.

(2) Relevance with the Assistance Policy of Japan

The Country Assistance Policy of Japan for India (April, 2018) has the basic policy of cooperation for realization towards "faster, more inclusive and sustainable growth"(long-term objective). The cooperation for the sustainable growth of India is implemented through various financial/technical cooperation based on the three priority areas (medium-term objectives) of the policy, which consists 1) enhancing connectivity, 2) strengthening industrial competitiveness and 3) supporting sustainable and inclusive growth.

The Project is expected to contribute to the following two development issues; development issue 1-2 (short-term objectives) "strengthen regional connectivity" in "enhancing connectivity" (medium-term objectives), and the development issue 3-3 (short-term objectives) "tackle environment and climate change issues" in "supporting sustainable and inclusive growth" (medium-term objectives). And, the Project is highly related to the loan aid project "North East Road Network Connectivity Improvement Project" and technical cooperation project in the forest preservation sector "The Project for Natural Disaster Management in Forest Areas in Uttarakhand" (the Project conducted the exchange of opinions with stakeholders of "North East Road Network Connectivity Improvement Project", presentation in the workshop of "The Project for Natural Disaster Management in Forest Areas in Uttarakhand" and the exchange of opinions). Additionally, the Project is expected to contribute to the development issue "Productive industrial development by connectivity improvement such as economic corridor, comprehensive growth in the rural area by improvement of accessibility to the market through road development" which is shown in JICA Country Analysis Paper (March, 2018).

Therefore, the Project Purpose is consistent with Assistance Policy of Japan for India.

(3) Relevance with the Needs of C/P

GoI places emphasis on mountainous highway development as described in the above (1), on the other hand, the implementation agency of road development in India, NHAI, NHIDCL and state PWD need the technical capabilities and know-how of the mountainous highway development. Some guidelines for mountainous highway development and maintenance were published by IRC, but those don't contain the enough contents of necessary technology and methodology actually. These have been confirmed by information collection of the existing mountain road development projects and technical standards, and analyzing issues, which were conducted in the first and second years of this project. In addition, participants from MoRTH, NHAI, and NHIDCL actively exchanged opinions on various mountain road technologies at seminars, workshops, webinars and others held in the 3rd to 6th years of the project. Due to the strong needs of the C/P, the guidelines made by the Project were used in the pilot project, which was implemented as part of the model activities from the 4th year of the Project. In the pilot project, practical technical transfer was conducted at the phase of planning, design, and construction in the field of slope protection.

Therefore, it is considered that the Project is consistent with needs of C/P and demonstrates relevance.

3.1.2 Effectiveness

Based on following observation, the Effectiveness of the Project was evaluated as “High”.

(1) Guidelines Development and Pilot Project Implementation

The Project conducted the followings as a main activities; 1) development of five guidelines of planning, tunnel, slope protection, bridge and operation/maintenance, 2) Webinar for dissemination of the guidelines, 3) Implementation of three pilot projects focusing on slope protection planning, design and construction support using the guidelines. Development of the guideline is an effective approach for the technical support, because there are many related organizations/stakeholders for the national road development such as MoRTH, NHAI, NHIDCL, State PWDs and BRO in India. And there are also so many transfers of related personnel. In addition, as a result of interview of C/Ps, related persons of the Project who are interested in the guidelines have actively distributing the guidelines because of the dissemination activities of webinar and others.

In addition, the pilot project based on the developed guidelines was able to provide practical technical support such as quality/safety management of India's first concrete crib works and horizontal drainage boring, preparation of bidding document of drainage well works.

These activities by the Project are consistent with actual situation in India and it is effective.

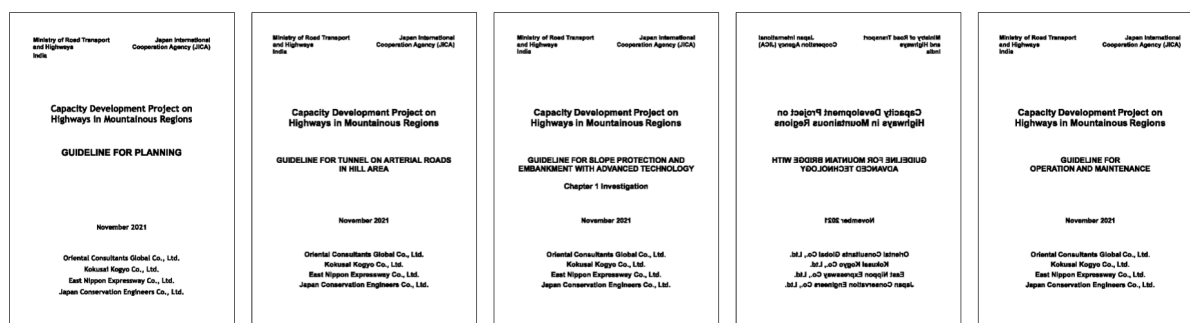


Figure 3-1 Developed Guidelines

(2) Understanding Level of C/P

There were many participants from MoRTH, NHAI and NHIDCL, and lively discussions took place under the leadership of Director General of road in MoRTH (DG (RD) & SS) or Deputy Director (ADG) in the technical seminars, workshops and webinars held in the 3rd to 6th years of the Project. According to the observations/evaluations of Japanese experts, it is considered that the awareness of the Project by C/Ps has increased toward the latter half of the activity period of the project, because the participants of seminars and workshops were on the increase. C/Ps and participants of seminars/workshops commented and discussed about the five guidelines deeply. From these facts, it is considered that the understanding level of technical contents of the guidelines were increased as the project progressed.

(3) Figure Other Effect

The developed guidelines in the Project were approved by MoRTH in 2022 and are widely shared with Indian stakeholders through Project Manager. Indian Roads Congress (IRC), which formulates and publishes

technical standards for road development and operation/maintenance, has a technical small group for developing and reviewing the domestic technical standards by domestic experts and engineers in India. JICA experts shared information and responded to deliberations with IRC through MoRTH. And, JICA expert attended the IRC's regular meeting of the committee as a member of the technical subcommittee H-10 Committee and carried out the following activities; introduction of the activity by this project, explanation of guidelines, dissemination of Japanese mountainous highway technology, and responding to inquiries from the committee. In this way, the effects of the Project are spreading to related organizations on the Indian side other than MoRTH, NHAI and NHIDCL.

3.1.3 Efficiency

Efficiency of the Project was evaluated as "High" based on following aspects.

(1) Efficiency of Inputs from Japanese Side

- Input of JICA Long-term/Short-term Experts

The Project have built a relationship of trust which is necessary for project implementation with C/P based on the appropriate input and division of roles between long-term experts and short-term experts. Chief Advisor/Highway Development of Long-term Expert has an office in MoRTH or NHIDCL, and Highway Engineering/Coordinator of Long-term Expert has an office in NHAI, and they has been working with C/P in mind on a daily communication. Based on the practical experience of the experts, they flexibly provided technical support for various issues in India, not only directly related to the activities of the Project but also the indirectly related to the Project. During the period when there were no Short-term Experts in India, the Long-term Experts acted as a liaison and coordinator with the C/P to ensure that the activities of the Project proceed smoothly.

Short-term Experts efficiently carried out activities such as site investigation, guideline development, model activities and opinions exchange/discussion with C/P by their high expertise and experiences within the limited assignment period in India based on the support of Long-term Experts such as information sharing and coordination with C/P. The efficient project management was realized by taking the advantages of each expert's strength and exchanging information regularly.

- Implementation of Training in Japan Cooperated with IAHE

The session in Indian was held in collaboration with the Indian Academy of Highway Engineers (IAHE) before and after the four training in Japan (Japan session).



Figure 3-2 Implementation of Session in India (left: lecture in IAHE, right: site visit)

The session in India was held for the following purposes; 1) to understand the current technical level and local situation of mountainous highways in India, 2) to understand the actual situation of mountainous highways in the states of India where are not knew by trainees, 3) to understand the technology in the developed guideline by the Project through the comparison about mountainous highways technology and situation between Japan and India, 4) to feedback the training achievement to the trainee’s organization. Before the Japan session, the lecture in IAHE and site visit of mountainous highways was conducted. After the Japan session, the review of the series of training, opinion exchange, and information sharing were conducted. The implementation scheme of training in Japan cooperated IAHE was generally highly evaluated.

- Cooperation with Other JICA’s Projects

“The Project for Natural Disaster Management in Forest Areas in Uttarakhand” was stated in April 2017, which is mainly conducted by Long-term Experts dispatched from Ministry of Agriculture, Forestry and Fisheries, Japan. It was expected the cross-sectoral collaboration between the road disaster prevention field of the Project and the forest conservation field in mountainous area’s disaster risk management. The Long-term Experts of the Project delivered presentations about the progress of the Project and maintenance technology of mountainous highways from view point of “road” (such as traffic control by rainfall data in advance, etc.). And, actual situation of the Project and operation plan of model activities were shared and opinions were exchanged. Cooperation of both projects were coordinated for the participation to the workshops and others, it was cancelled under the influence of COVID-19.

- Influence of COVID-19

Due to the influence of the COVID-19 that is prevalent worldwide, the Long-term Experts returned to Japan temporarily, and Short-term Experts were also restricted from traveling, the activities of the Project could not be carried out and the project period was extended one year. The pilot projects during the period was conducted between JICA experts and C/P by online communication as much as possible, but it was hard to conduct enough opinion exchange due to the lockdown in India, communication environment with the remote area, personnel changes and others.

- Delayed Assignment of Long-term Experts

The start of this project was delayed about half a year due to the delay in the screening committee's review, which was newly started in India (Examination system for foreigners working in the central ministries of India). Apart from the project members listed in the R/D, corresponding C/P of the guidelines in each field were placed.

(2) Efficiency of Inputs from India Side

- Guidelines, C/P Assignment of Pilot Project

Due to the organizational structure of the implementation agency and the past background, there are many cases that Japanese experts take the lead in developing guidelines for technical cooperation projects in India, and then move on to the approval process on the Indian side in the Project. Apart from the project members listed in the R/D, corresponding C/P of the guidelines in each field were assigned, additionally, a C/P who is in charge of overall management of guideline creation has been assigned in the Project. In the pilot project, both the person in charge of the central organization of the implementation agency and the person in charge of the site were assigned as C/Ps at each site. By involving the engineers of the C/Ps to develop guidelines and implement pilot projects, the Project were able to strengthen the ownership of the Indian side and help promote technical transfer.

- Utilization of TG Meeting

In addition to the JCC meetings held twice a year, the Project held TG meetings as a place to discuss with stakeholders, share information and discuss/decide the direction of activities by practical level. TG meeting was chaired by MoRTH's influential Deputy Director (ADG) or Road Director (CE) on an irregular basis and served as a forum for solving technical issues and making decisions on the Project. Holding TG meetings contributed to improving the efficiency of the project in terms of facilitating decision-making within the organization and facilitating information sharing.

- Personnel Changes of C/P of the Project

Personnel changes are carried out on a regular basis at MoRTH, NHAI, and NHIDC. JCC Chairperson (DG (RD) & SS, MoRTH) was replaced three times, and Project Manager was replaced twice in the Project, There was no significant impact on the overall operation of the Project because of cooperation of successor, but it is difficult to secure a consistent counterpart in a 5 year (6 years after the change contract) project due to constrain of the institutional system of the implementation agency, therefore, consideration of the Project Purpose and Outputs will be required based on the above situation in India.

3.1.4 Impact

Impact was rated as "Very High" due to following observations.

(1) Prospect for Achievement of Overall Goal

Overall Goal of the Project is “Mountainous highways are properly developed and maintained by using guidelines developed by the Project”. The indicators are “At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.” and “At least four sections of roads are conducted by using the operation and maintenance guide-line developed by the Project.”

The Project provided practical technical support in collaboration with C/P by investigating, designing, and constructing slope protection works as part of the model activities using the developed guidelines, as a pilot project on three project routes of the Indian Mountain National Highway. The pilot projects also carried out activities such as disseminating guidelines and collecting feedback, therefore it is considered that it will contribute to the achievement of Overall Goal. According to interviews with JCC members, it was confirmed that in addition to the pilot project, the developed guidelines in the Project will be used in the mountain highway project supported by the World Bank (WB) in Himachal Pradesh. Furthermore, the guidelines are shared with IRC through MoRTH, and discussions are being held on how they will be reflected in the IRC guidelines that will be published and revised in the future (Some contents have already been reflected to their guidelines, such as the standards for placement of disaster prevention equipment in tunnels).

From the above, it is considered that Overall Goal "Mountainous highways are properly developed and maintained by using guidelines developed by the Project" will be achieved.

(2) Other Impacts

The guidelines developed in the Project are five field: planning, tunnel, slope protection, bridge, and operation and maintenance. It is directly expected that appropriate mountainous highway development and maintenance will be implemented by applying these guidelines to future mountainous highway projects. And it is also indirectly expected to reduce maintenance costs, ensure traffic safety, save driving costs, and shorten driving time. On the other hand, the Project provided technical support for natural disaster sites such as NH94, NH21 and NH54 based on the request from the Indian side. The support included providing reports of short-term emergency countermeasure and mid/long-term fundamental solution by site investigation and confirmation of existing materials and then meeting with C/P for explanation and discussion. In particular, technical support for solutions to natural disasters such as cut slopes was highly evaluated by C/P and contributed to the improvement of the relationship of trust, because the implementation agency such as C/P strongly expected the above support from Japanese experts.

As mentioned above, it is confirmed that the impact of the Project is expanding other than achieving the Overall Goal.

3.1.5 Sustainability

Sustainability of the Project shall be rated as “High” based on following observations.

(1) Policy Aspects

MoRTH, which is responsible for the formulation of road policies for the Government of India, is promoting road development nationwide, including road development to improve connectivity in

mountainous areas and areas around borders based on Bharatmala Pariyojana formulated in 2017 and SARDP-NE formulated in 2005. Bharatmala Pariyojana is a long-term road improvement plan established by GoI. The disclosure progress of Bharatmala Pariyojana Plan Phase-1 for 2022 is about 83% (38% in progress, 7% in bidding, 38% in DPR preparation, MoRTH Annual Report 2020-2021). SARDP-NE is being promoted by three phases, Phase-A, Phase-B, and Arunachal Pradesh Package, and Phase-A and Arunachal Pradesh packages are targeted for completion by the end of FY2023. In this way, road development which supports India's economic growth is being actively promoted at the speed that the Indian government is proud to be the best in the world, and it is considered that the achievement of the Project are extremely sustainable from a policy perspective. However, it should be noted that long-term road development plans and policy trends in India are uncertain depending on the political situation. The BJP administration, which has been in power since 2014, has virtually abolished the NHDP formulated during the former Congress administration, and has formulated Bharatmala Pariyojana as a new national highway development plan which is umbrella program (comprehensive program) includes NHDP. The influence on the sustainability of the Project from policy aspects is limited, as the needs for road maintenance in northern/northeastern India and other mountainous areas remains the same regardless of the political situation.

Based on the above, it is expected that the policy impact on the sustainability of the Project will continue, while leaving uncertainty due to the political situation in India.

(2) Institutional and Technical Aspects

JCC members and C/Ps of the Project are engineers of MoRTH's DG (RD) & SS, ADG, CE, SE, NHAI's CGM, GM, NHIDCL's ED, GM, and others, those have the responsibility of road administration and road project implementation. At these organizations, personnel changes are often made in a few years. But, the technical staff of central road administration are generally the holders of IES (Indian Engineering Service), which is a national technical examination. Therefore, there is basically no transfer to other than road-related departments. Although there is a possibility that C/Ps will be transferred even after the completion of the Project, the departments after the transfer will also be road administration and road related projects. It is considered that the impact on sustainability is small based on the above.

Indian session was held in collaboration with IAHE before and after the Japan session of all Training in Japan. Work experiences and related guidelines were introduced and disseminated by Indian experts/engineers in India Session owing to IAHE ownership. Due to the spread of the COVID-19 worldwide, it was not possible to conduct training using the guidelines developed in the Project at IAHE. But, according to the interview with the Director of IAHE, it was confirmed that there is a strong intention to cooperate with the Project in the future implementation of IAHE training.

(3) Financial Aspects

Mountainous highway maintenance in India is not profitable, so it is generally carried out under contract (EPC contract) or BOT (HAM) contract, which is a heavy burden on the government among PPP projects. And, road maintenance budget is secured based on the upper plans. MoRTH, NHAI and others are implementing measures to secure a budget for huge road maintenance projects such as TOT projects and infrastructure investment trusts (InvITs). Road maintenance projects of Bharatmala Pariyojana and SARDP-

NE, including mountain road development, have been implemented without financial problems, and there are no budget problems.

3.2 Key Factors Affecting Implementation and Outcomes

Followings are the affecting factors observed in the Project implementation.

3.2.1 Approval of the Guidelines by MoRTH

The developed guidelines by the Project (road plan, tunnel, slope protection, bridge and operation/maintenance) submitted in November 2021 were approved in January 2022.

3.2.2 Policy Change by Gol regarding the Mountainous Highway

As shown in 3.1.5(1), the policy for mountainous highway development has not changed from the start of the Project to the present. Although there is uncertainty, it is unlikely that the policy will change significantly in the future.

3.2.3 Assignment of Human Resource for the Project Activities

Due to personnel changes, JCC chairman DG (RD) & SS was changed three times and Project Manager was changed twice, and it was not possible to secure consistent C/P throughout the project period, but the necessary personnel were continuously assigned, therefore there was no major obstacle to the activities of the project. Engineers in charge of each guideline and overall supervision are assigned as C/P on both the Japanese and Indian side. In the pilot project, the ownership of the Indian side was enhanced and the work was carried out effectively by assigning engineers from both the central government side and field office side of each project.

3.2.4 Securing Budget for the Project Activities

MoRTH and other organizations continued to make necessary inputs such as C/P assignment on the Indian side, and the necessary expenses were also spent, therefore there was no major obstacle to the project activities throughout the project period. The necessary budget was secured by the C/P and the expenses were spent, smooth technical support was implemented in the pilot project that was carried out as part of the model activity.

3.3 Evaluation on the Results of the Project Risk Management

3.3.1 Change in personnel in JCC Member

JCC Chairman DG (RD) & SS has been replaced three times, and Project Manager has been replaced twice since the start of this project. The issue was consistent C/P placement by the same person. However,

Project Managers Mr. Khushal Chand and Mr. Rakesh Kumar keeps to understand and contribute to the purpose of the Project. They have participated in the activities of the Project as Project Members before Mr. I.K. Pandey, the 4th Chairman, and have continued to participate as Chairman after the 4th year. The activities of the Project could be implemented effectively by their contribution.

3.3.2 Security Issues

There are ethnic minority conflicts and separatist movements in northeastern India, where many mountainous highway maintenance projects are implemented. The NH54 site of the pilot project was around Haflong City in central Assam, the Safety where designated Level 2 by the Ministry of Foreign Affairs, Japan. In the activities of the Project, Japanese Experts complied with the safety management protocol by JICA when traveling to the site. Additionally, the following measures were conducted; always being with C/P, arrangement of the necessary security, use of proven rental cars, moving in bright hours/day time, arrangement of accommodation by C/P. Due to these efforts, no security problems have occurred.

3.3.3 Delay due to COVID-19

Due to the influence of the COVID-19 that is prevalent worldwide, the Long-term Experts returned to Japan temporarily early April 2020, and Short-term Experts were also restricted from traveling. In addition, from the end of March 2020 to around September 2020, GoI took measures of lockdown and restriction of moving across states. This effect caused a significant delay in the activities of the Project because it was difficult to conduct the activities of the Project and access to the pilot sites by C/P and contractor (consultant and contractor). The period of the Project was extended by one year as a countermeasure.

3.4 Lessons Learnt

3.4.1 Training in Japan cooperated with IAHE

The Project held a training in India for about 3 days to 1 week before the training in Japan, and a wrap-up meeting to share the training achievements after the training in Japan, in collaboration with IAHE. These were held for the following purposes; 1) to understand the current technical level and local situation of mountainous highways in India, 2) to understand the actual situation of mountainous highways in the states of India where are not knew by trainees, 3) to understand the technology in the developed guideline by the Project through the comparison about mountainous highways technology and situation between Japan and India, 4) to feedback the training achievement to the trainee's organization. The trainings were highly evaluated by trainee, and the effect of lectures/site visit by training in Japan had been enhanced

3.4.2 Organizational Response by Japanese and Indian Sides

MoRTH's EAP zone, which is in charge of external support projects, served as a comprehensive focal point in practice in the Project, and MoRTH's regional project departments, Standard Research and

Technology (SR & T), NHAI and NHIDCL mainly participated in the activities. On the Japanese side, two Long-term Experts and 13 Short-term Experts (about 91MM) participated in the activity. It was necessary to secure sufficient time and resources to coordinate activities because there are a wide variety of people involved on Indian and Japanese sides, there are many activities, and it takes time to move between the offices of MoRTH, NHAI and NHIDCL. Therefore, two Long-term Experts required for the technical cooperation project to be implemented in the future.

3.4.3 Personnel Changes of C/P

JCC Chairman DG (RD) & SS has been replaced three times, and Project Manager has been replaced twice since the start of this project. The issue was consistent C/P placement by the same person. In the case of a long-term project such as the Project, it is necessary to plan Overall Goal, Project Purpose, Outputs and Activities based on personnel changes.

MoRTH's EAP zone took a role of comprehensive focal point for practical work, it is desirable to consider the followings from viewpoints of the technical activities; 1) to make a plan that the SR&T zone can be more proactively involved in the activities (e.g. assignment of SR&T CE class in Project Manager or Project Co-Manager), 2) In the long term, it will be better that MoRTH takes initiatives for increase of SR&T staff and establish a systematic organizational structure for responding to a wide range of technical issues.

3.4.4 Standardization for Practical Use of Elemental Technologies Introduced in the Guidelines

Road projects in India generally use the standardized technology of IRC. It is necessary the sufficient deliberation by experts/engineers in IRC technical subcommittee on applicability in India to standardize and utilize as IRC's technical standards even though the technology has been used for many years in Japan. In the pilot project of the Project, technical support for survey, design and construction was provided in order to collect feedback on the slope protection guideline and confirm the applicability to the site in India by consultation with Indian side. It is required to be able to continue to support elemental technologies in other fields as appropriate, based on the latest needs of Indian side.

3.4.5 Procedures on the Indian Side for the Assignment of Long-term Experts

Four Long-term Experts have been assigned to the Project, but three Long-term Experts were delayed from the scheduled time due to procedures on Indian side and application of the screening committee system. There was an impact such as a delay in the start time of the Project. When dispatching long-term experts in the future, the continuous works to ensure the prompt procedures are required. And it is necessary to select personnel in consideration of the procedure period.

CHAPTER 4 For the Achievement of Overall Goals after the Project Completion

4.1 Prospects to Achieve Overall Goal

This chapter is jointly prepared by JICA Experts and the core member of the JCC from Indian side to summarize on prospects to achieve overall goal of the Project as well as the necessary actions to be taken after completion of the Project.

Overall goal is predetermined in PDM as below.

<p><<Overall Goal>> Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p> <p><< Indicator >> 1) At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project. 2) At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>
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Table 4-1 Prospects for Achievement to the Overall Goal

Indicators	Actual Situation
At least four sections of road development projects are planned/constructed/ improved by using guidelines developed by the Project	<ul style="list-style-type: none"> • The completed guidelines (planning guideline, mountain tunnel, slope protection, high-pier bridge, operation and maintenance) was submitted to MoRTH on November 2021, and obtained the approval from MoRTH on January 2022. • The guidelines were disseminated to Indian side widely through workshops, technical seminars, webinars, IRC annual sessions, Facebook posts etc. • The three pilot projects were conducted for the technical transfer of planning, design, construction works of slope protection technologies at the projects on NH10, NH717A and NH54 based on the developed guidelines. And it is planned to apply countermeasures in the guideline to neighboring slope disaster sites in future, based on the interviews with C/P. • According to the interviews with the core member of JCC, the developed guidelines are also planned to be applied to the mountainous highway development projects in Himachal Pradesh assisted by WB. • Similarly, the introduced technologies through P/P will be applied to the neighboring section of NH10. • The aforementioned two actions by C/P suggest that the technologies introduced through the guidelines as well as P/P are expected to be settled in India. • Based on these circumstances, there are “High” prospects to satisfy this indicator.
At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.	<ul style="list-style-type: none"> • As described above, the operation and maintenance guideline was also approved by MoRTH in January 2022, and the guideline has started to use gradually by the ownership of the Indian side. • The standard for the arrangement of tunnel facilities described in the guideline has been standardized by IRC and introduced in the “Guideline for Road Tunnels” (IRC: SP-2019).

Indicators	Actual Situation
	<ul style="list-style-type: none"> • In fact, the description of existing technical standards for operation and maintenance of mountainous highways is usually ambiguous in practical, therefore it is considered that there is “High” possibility to utilize the developed O&M guideline at the phase after the construction and/or improvement of mountainous highways by utilizing the developed guidelines. • However many new technologies are introduced to India through the guidelines such as slope protection technologies, it is considered that further technical assistance may be necessary for operation and maintenance of mountainous highways.

4.2 Plan of Operation and Implementation Structure of the Indian Side to Achieve Overall Goal

Following to the challenges for overall goal, actions to be taken were discussed with MoRTH as concluded in Table 4-2.

Table 4-2 Target Setting and Actions to Take for Overall Goal

Indicators	Activities to achieve the indicator	Actions to be taken by MoRTH
At least four sections of road development projects are planned/ constructed/ improved by using guidelines developed by the Project	Evaluation of the indicator for the overall goal of the Project, and selection of at least four sections of road development projects.	<ul style="list-style-type: none"> • To select appropriate four or more road development projects from the list of highway projects in India, then to instruct the use of the guidelines, and to monitor the implementation of the selected projects.
	Arrangement of engineers from the client, and management of mountainous highway projects including allocation of appropriate budget.	<ul style="list-style-type: none"> • To manage the budget, schedule, human resources by MoRTH for appropriate management of mountainous highway development projects utilizing the guidelines. • To share and disseminate the outputs of the Project such as the guidelines to concerned engineers.
	Continuous trainings for engineers for improvement of engineering capacity of planning, construction and improvement of mountainous highways.	<ul style="list-style-type: none"> • To share and disseminate the outputs of the Project such as the guidelines, recommendations etc. at the training session of IAHE based on the experience of Indian session of Country-focused training conducted in the Project.
At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.	Evaluation of the indicator for the overall goal of the Project, and selection of at least four sections of road operation and maintenance projects.	<ul style="list-style-type: none"> • To select appropriate four or more road development and/or operation and maintenance projects from the list of highway projects in India, then to instruct the use of the guidelines, and to monitor the implementation of the selected projects.

Indicators	Activities to achieve the indicator	Actions to be taken by MoRTH
	Arrangement of engineers from the client, and management of mountainous highway projects including allocation of appropriate budget.	<ul style="list-style-type: none"> • To manage the budget, schedule, human resources by MoRTH for appropriate management of operation and maintenance projects of mountainous highways utilizing the guidelines. • To share and disseminate the outputs of the Project such as the guidelines to concerned engineers.
	Continuous trainings for engineers for improvement of engineering capacity of operation and maintenance of mountainous highways.	<ul style="list-style-type: none"> • To share and disseminate the outputs of the Project such as the guidelines, recommendations etc. at the training session of IAHE based on the experience of Indian session of Country-focused training conducted in the Project.

4.3 Recommendations for the India Side

To keep the appropriate implementation of appropriate planning, survey, design, construction, operation and maintenance of mountainous highways, and to realize sustainable mountainous highway development, operation and maintenance, it is highly required not only to enhance the capability of individual engineers, but also to develop the institutional momentum to achieve the target. Followings are to introduce the recommendations to enhance sustainability of the Project effect.

4.3.1 Enhancement of Operation and Maintenance Technologies for Mountainous Highways

In this project, mainly the activities for capacity development of C/P agencies related to planning, slope protection, high embankment, mountain tunnel, high-pier bridge, operation and maintenance were implemented such as guideline development, training in Japan, technical seminars, workshops, pilot projects, webinars etc. And the pilot projects were implemented to enhance more practical engineering skills and know-hows for planning, design and construction works of slope protection based on the slope protection guideline as the result of several discussion among JICA Experts and C/P. It is certain that the development of the guidelines and the implementation of the pilot projects conducted in the Project was the starting point for the promotion of mountainous highway development, including slope protections, under the initiative of the executing agencies.

However, regarding actual works of operation and maintenance of mountainous highways after development applying new technologies, since operation and maintenance required certain volume and specific technologies in each field of slope protections, high embankment, tunnels, and bridges etc., it is desirable to provide continuous technical supports to C/P such as development of handbooks, OJT (On-the-Job-Training), trials etc. that are useful for operation and maintenance activities of implementing agencies.

4.3.2 Establishment of the Framework to Roll Technologies Out by the Ownership of Indian Side

In this chapter, (1) to share and disseminate the outputs of the Project such as the guidelines, recommendations to concerned engineers, and (2) to share and disseminate the outputs of the Project at the training session of IAHE based on the experience of Indian session of Country-focused training, were proposed as the action plans to achieve the overall goal of the Project.

In fact, IAHE who is the center commando in India for the training of highway engineers and spread of technologies, plays an important role to roll technologies out to other engineers as well as agencies through the ownership of MoRTH, NHAI, NHIDC, etc. And it is considered that the benefits of the Project will be further enhanced by the cooperation of Japanese experts in planning, material preparation, and training implementation of the trainings.

4.3.3 Regular Update of the Guidelines

The guidelines developed in the Project aim to develop, operate and maintain mountainous highways appropriately by introducing practical technologies to solve technical issues and problems including latest technologies usually applicable in Japan, considering the situations of status, issues, technical levels, and technical standards for planning, survey, design, construction, operation and maintenance of mountainous highways in India during the Project. Therefore it is highly recommended to review the guideline regularly and update them as necessary, with the development and diversification of mountainous highway technologies in India in the future.

4.4 Monitoring Plan from the End of the Project to Ex-Post Evaluation

Monitoring to ex-post evaluation after the Project is recommended to be implemented by JICA India Office in consultation with JICA Headquarter. The Monitoring plan is proposed as below:

Table 4-3 Monitoring Plan (Proposal)

Indicators	Monitoring Method	Monitoring Item
Overall Goal: Mountainous highways are properly developed and maintained by using guidelines developed by the Project		
Monitoring Schedule	April 2025 (3 years after completion of the Project)	
Indicators	Monitoring Method	Monitoring Item
At least four sections of road development projects are planned/ constructed/ improved by using guidelines developed by the Project	Confirmation of the contents of feasibility study report, DPR, bidding document of mountainous highway development projects	<ul style="list-style-type: none"> • Methods and detailed contents of planning, survey, design in Feasibility Study report, DPR, bidding document of mountainous highway development project • Methods and detailed contents of planning, survey, design in work plan, detailed design report prepared by consultants
	Site Inspection	<ul style="list-style-type: none"> • Planning, construction, improvement of mountainous highways are conducted applying the outputs such as the guidelines developed by the Project or not.

Indicators	Monitoring Method	Monitoring Item
		<ul style="list-style-type: none"> • Technical levels for planning, survey, design, construction of geometric design, slope protection, bridge, tunnel etc. are improved or not.
	Interviews to implementing agencies for development projects	<ul style="list-style-type: none"> • Situation of sharing and dissemination of the guidelines • Understanding of the guidelines by implementing agencies in India • Situation of implementation of trainings for mountainous highways at IAHE
At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.	Confirmation of the contents of relevant document, bidding document of mountainous highway development and / or O&M projects	<ul style="list-style-type: none"> • Methods and detailed contents of operation and maintenance in O&M work plan prepared by mountainous highway development projects after completion of construction. • Methods and detailed contents of operation and maintenance in O&M work plan prepared by mountainous highway O&M projects.
	Site Inspection	<ul style="list-style-type: none"> • Operation and maintenance of mountainous highways are conducted applying the outputs such as the guidelines developed by the Project or not. • Technical levels for operation and maintenance of slope protection, bridge, tunnel etc. are improved or not.
	Interviews to implementing agencies for operation and maintenance projects	<ul style="list-style-type: none"> • Situation of sharing and dissemination of the guidelines • Understanding of the guidelines by implementing agencies in India • Situation of implementation of trainings for mountainous highways at IAHE

Appendix

Appendix 1 Result of the Project

Appendix 2 List of Products Produced by the Project

Appendix 3 Project Design Matrix and Plan of Operation

Appendix 4 R/D, M/M, Minutes of JCC

Appendix 5 Monitoring Sheet (Version 1 - Version 10) + Final Ver.

Appendix 6 Attendee Lists of the Webinar in 2021

Appendix 1

Results of the Project

1-1 List of JICA Experts

(1) Long-term Experts

No.	Name	Expertise
1	Mr. Shu MORIYAMA / Dr. Eisuke NAKAMURA	Chief Advisor/Highway Development
2	Mr. Denichiro YAMADA / Mr. Michiya KITAYAMA	Highway Engineering/Coordinator

(2) Short-term Experts

No.	Name	Expertise
1	Mr. Yoshinori KAWAMURA	Team Leader/Slope Countermeasure (1)
2	Mr. Seiji KADOOKA / Dr. Yoshizumi GONAI	Deputy Team Leader/Slope Countermeasure (3)
3	Dr. Hidetoshi NAKANO	Mountain Bridge
4	Mr. Fumihiko YOKOO	Mountain Tunnel
5	Dr. Takayuki MAYUMI	Slope Countermeasure(2)/ High Embankment
6	Mr. Susumu MURASE	Facility of Mountain Roads
7	Mr. Michiya KITAYAMA / Mr. Denichiro YAMADA / Dr. Tatsuo TAKANO	Operation & Maintenance of Mountain Road
8	Mr. Makoto TOKUDA	Natural Condition (Topography/Geology)
9	Mr. Takashi NISHIJIMA	Drainage Plan
10	Mr. Masaaki GOTO	Plan and Survey of Mountain Road/Coordinator
11	Ms. Panganayi Cleopatra	Monitoring/Evaluation
12	Mr. Naoki ISHIKAWA	Highway Engineering of Mountain Road

1-2 List of Counterparts (C/P)

Refer to Table 2-6 of the main report.

1-3 List of Training

(1) Seminars / Webinars

S-01	The 1 st Technical Seminar for Advanced Technologies for Hill Road under Capacity Development Project on Highways in Mountainous Regions
Date & Time	19 th June 2018, 10:00 ~ 14:00
Venue	Media Center, Ground Floor, Transport Bhawan
Organization	MoRTH and JICA
Participants	35
Presentation	<ol style="list-style-type: none"> 1. Technology used in Hill Road in India by Mr. U.C.Katara, SE (ZoneV), MoRTH 2. Advanced Technology for Bridges on Hill Road by Dr. Hidetoshi Nakano, JICA Expert 3. History of Tunnel Construction and O&M Technology in Japan by Mr. Denichiro Yamada, JICA Expert

S-02	The 2 nd Technical Seminar for Advanced Technologies for Hill Road under Capacity Development Project on Highways in Mountainous Regions
Date & Time	27 th September 2018, 10:00 ~ 14:00
Venue	Media Center, Ground Floor, Transport Bhawan
Organization	MoRTH and JICA
Participants	50
Presentation	<ol style="list-style-type: none"> 1. Slope Protection and Embankment with Advanced Technology by Mr. Yoshinori Kawamura and Dr. Takayuki Mayumi, JICA Expert 2. Challenges and solutions in tunnel construction in India by Mr. Fumihiko Yokoo, JICA Expert 3. Smart Maintenance Highway Initiative in Japan by Mr. Michya Kitayama, JICA Expert

S-03	The 1 st Webinar for Disseminating Guidelines : Planning of Hill Road
Date & Time	15 th September 2021, 14:30 ~ 16:00
Venue	Webinar
Organization	MoRTH and JICA
Participants	65 (confirmed) / 163 (log in count)
Presentation	<ol style="list-style-type: none"> 1. Guideline for Planning: Introduction of Guideline by Mr. Takashi Nishijima, JICA Expert 2. Use of Interferometry SAR Technology for Planning and O&M of Hill Road Challenges and solutions in tunnel construction in India by Mr. Yoshinori Kawamura, JICA Expert

S-04	The 2 nd Webinar for Disseminating Guidelines : Mountain Bridge
Date & Time	22 th September 2021, 14:30 ~ 16:00
Venue	Webinar
Organization	MoRTH and JICA
Participants	35 (confirmed) / 112 (log in count)
Presentation	1. Introduction of Guideline for Mountain Bridge by Dr. Hidetoshi NAKANO, JICA Expert

S-05	The 3 rd Webinar for Disseminating Guidelines : Operation & Maintenance of Hill Road
Date & Time	29 th September 2021, 14:30 ~ 16:00
Venue	Webinar
Organization	MoRTH and JICA
Participants	35 (confirmed) / 90 (log in count)
Presentation	1. Guideline for Operation & Maintenance: Introduction of Guideline by Mr. Naoki ISHIKAWA, JICA Expert

S-06	The 4 th Webinar for Disseminating Guidelines : Slope Protection
Date & Time	06 th October 2021, 14:30 ~ 16:00
Venue	Webinar
Organization	MoRTH and JICA
Participants	44 (confirmed) / 101 (log in count)
Presentation	1. JICA Slope Guideline for Slope Protection and Embankment with Advanced Technology by Mr. Yoshinori Kawamura and Dr. Takayuki Mayumi, JICA Expert

S-07	The 5 th Webinar for Disseminating Guidelines : Mountain Tunnel
Date & Time	21 st October 2021, 14:30 ~ 16:00
Venue	Webinar
Organization	MoRTH and JICA
Participants	31 (confirmed) / 64 (log in count)
Presentation	1. Guideline for Tunnel on Arterial Roads in Hill Area: Introduction of Guideline by Mr. Denichiro YAMADA, JICA Expert

S-08	The 6 th Webinar for Disseminating Guidelines : Construction of Slope Protection
Date & Time	27 th October 2021, 14:30 ~ 16:00
Venue	Webinar
Organization	MoRTH and JICA
Participants	35 (confirmed) / 76 (log in count)
Presentation	1. Construction of Slope Protection: Crib Works and Horizontal Drainage Boring Works by Mr. Masahide TANAKA, JICA Expert

(2) Workshop

W-01	Technical Workshop for Bridge under Capacity Development Project on Highways in Mountainous Regions: Bridge Guideline and Relevant O&M
Date & Time	29 th July 2019, 10:00 ~ 13:00
Venue	Media Center, Ground Floor, Transport Bhawan
Organization	MoRTH and JICA
Participants	30
Presentation	<ol style="list-style-type: none">1. Introduction of Guideline for Mountain Bridge by Dr. Hidetoshi Nakano, JICA Expert2. Introduction of Bridge Inspection in O&M Guideline by Mr. Michiya Kitayama, JICA Expert3. Application of Guideline of Mountain Bridge to India by Mr. Sanjay Garg, CE(IV), MoRTH

W-02	Technical Workshop for Tunnel under Capacity Development Project on Highways in Mountainous Regions: Tunnel Guideline and Relevant O&M
Date & Time	14 th August 2019, 10:30 ~ 13:10
Venue	Media Center, Ground Floor, Transport Bhawan
Organization	MoRTH and JICA
Participants	30
Presentation	<ol style="list-style-type: none">1. Tunnels in India by Mr. Sajeew Malik, ED(III), NHIDCL2. Introduction of Guideline for Mountain Tunnel by Mr. Fumihiko Yokoo, JICA Expert3. Introduction of O&M Guideline for Tunnel Operation by Mr. Michiya Kitayama, JICA Expert

W-03	Technical Workshop for Tunnel under Capacity Development Project on Highways in Mountainous Regions: Slope Protection Guideline and Relevant O&M
Date & Time	25 th September 2019, 10:00 ~13:00
Venue	Media Center, Ground Floor, Transport Bhawan
Organization	MoRTH and JICA
Participants	60
Presentation	<ol style="list-style-type: none">1. Landslide in Hilly Roads by Mr. W Blah, ED, NHIDCL2. Introduction of Guideline for Slope Protection by Mr. Yoshinori Kawamura & Dr. Takayuki Mayumi, JICA Expert3. Introduction of O&M Guideline for Slope Protection by Mr. Michiya Kitayama, JICA Expert

(3) TG-Meeting

TG-01	Open Discussion for Mountainous Road Development
Date & Time	26 th September 2017, 11:00 ~ 13:00
Venue	Conference Hall, Ground Floor of Transport Bhawan
Organization	MoRTH and JICA Expert
Participants	10
Presentation	1. Open Discussion for Mountainous Road Development by Mr. Seiji Kadooka JICA Expert

TG-02	Table of Contents for Bridge and O&M Guideline
Date & Time	19 th December 2017, 15:00 ~ 17:00
Venue	Conference Hall, Ground Floor of Transport Bhawan
Organization	MoRTH and JICA Expert
Participants	10
Presentation	1. Guidelines to be developed in the Project by Mr. Kadooka 2. Contents of Bridge Guideline by Dr. Nakano 3. Contents of Operation and Maintenance Guideline by Mr. Kitayama

TG-03	Table of Contents for Road Planning and Tunnel Guideline
Date & Time	30 th January 2018, 15:00 ~ 17:00
Venue	ADG's Room, Transport Bhawan
Organization	MoRTH and JICA Expert
Participants	10
Presentation	1. Contents of Guideline for Planning by Mr. Goto 2. Contents of Guideline for Tunnels by Mr. Yokoo

TG-04	Table of Contents for Slope Protection Guideline
Date & Time	22 th February 2018, 15:00 ~ 16:00
Venue	ADG's Room, Transport Bhawan
Organization	MoRTH and JICA Expert
Participants	10
Presentation	1. Contents of Guideline for Slope Protection & Embankment by Mr. Kawamura and Dr. Mayumi

TG-05	Discussion for Model Activities
Date & Time	6 th June 2018, 11:00 ~ 13:00
Venue	Conference Hall, Ground Floor of Transport Bhawan
Organization	MoRTH and JICA Expert
Participants	15
Presentation	<ol style="list-style-type: none"> 1. Progress of the Guidelines Development by Mr. Kadooka 2. Outline of Model Activities by Mr. Yamada 3. Information for Country-Focused Training with IAHE by Mr. Moriyama

TG-06	Discussion for Model Activities and Progress of Guideline Development
Date & Time	28 th September 2018, 11:00 ~ 13:00
Venue	Conference Hall, Ground Floor of Transport Bhawan
Organization	MoRTH and JICA Expert
Participants	25
Presentation	<ol style="list-style-type: none"> 1. Progress of the Guidelines Development by Mr. Kawamura 2. Outline of Model Activities by Mr. Kitayama 3. Information for Country-Focused Training with IAHE by Mr. Moriyama

TG-07	Surveys Required for DPR of Hill Roads Projects to Minimize Damage by Landslides
Date & Time	17 th July 2019, 15:00 ~ 17:00
Venue	Conference Hall, Ground Floor of Transport Bhawan
Organization	MoRTH and JICA Expert
Participants	35
Presentation	<ol style="list-style-type: none"> 1. Surveys Required for DPR of Hill Roads Projects to Minimize Damage by Landslides by Mr. Yoshinori Kawamura & Dr. Takayuki Mayumi, JICA Expert

TG-08	Technical Meeting on O&M Guideline for Bridge Inspection and Tunnel Operation
Date & Time	17 th September 2019, 16:00 ~ 18:00
Venue	6 th Floor Board Room, NHAI Head Quarter
Organization	NHAI and JICA Expert
Participants	20
Presentation	<ol style="list-style-type: none"> 1. Introduction of Bridge Inspection in O&M Guideline by Mr. Naoki Ishikawa, JICA Expert 2. Introduction of O&M Guideline for Tunnel Operation by Mr. Michiya Kitayama, JICA Expert

TG-09	Technical Meeting on Road Planning Guideline
Date & Time	17 th September 2019, 16:00 ~ 18:00
Venue	6 th Floor Board Room, NHAI Head Quarter
Organization	MoRTH and JICA Expert
Participants	10
Presentation	1. Introduction of Road Planning Guideline by Dr. Eisuke Nakamura and Mr. Masaaki Goto, JICA Expert

(4) Other Training

TI-01	Lecture on Map Reading
Date & Time	25 th February 2020, 16:00 ~18:00
Venue	NHAI
Organization	NHAI, JICA Long-term and Short-term Experts (JICA Experts)
Participants	12
Presentation	Lecture on Map Reading by Mr. Yoshinori Kawamura and Dr. Takayuki Mayumi, JICA Expert

Appendix 2

List of Products Produced by the Project

1 Manuals and Guidelines

- Guideline for Planning
- Guideline for Slope Protection and Embankment with Advanced Technology
- Guideline for Tunnel on Arterial Roads in Hill Area
- Guideline for Mountain Bridge with Advanced Technology
- Guideline for Operation and Maintenance

Appendix 3

Project Design Matrix and Plan of Operation

PDM/PO Original Version

Project Design Matrix

Version: 0
Dated September 18th, 2015

Project Title: Capacity Development Project on Highways in Mountainous Regions.
Target Group: Officers of MoRTH, NHAI, NHIDCL and State PWDs
Period of Project: (month) 2016 - (month) 2021 (5 years)
Project Site: Whole India

Overall Goal	Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<p>Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>		<p>OG1 At least 10 sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p> <p>OG2 At least 10 sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report</p> <p>Contract Document Completion Report by the operation and maintenance contractor</p>	
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>		<p>PP1 Model activities are conducted applying the developed guidelines by the Project.</p> <p>PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, interviews to supervisors</p> <p>Project records, Evaluation/Observation by the Japanese Experts, interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH</p> <p>- Government policy to develop mountainous highways will not change.</p> <p>- MoRTH has enough finance to develop mountainous highways.</p>
<p>Outputs Output 1: Issues on development of mountainous highways are identified and the foundation for development of mountainous highways is built.</p>		<p>1-1 Survey and Planning guidelines for mountainous highways is completed by (mm/yyyy).</p> <p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Survey and planning guidelines</p> <p>Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>
<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>		<p>2-1 Improved tunnel guideline is completed by (mm/yyyy).</p> <p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by (mm/yyyy).</p> <p>2-3 High pier bridge guideline is completed by (mm/yyyy).</p> <p>2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p>Improved tunnel guideline, Project records</p> <p>Earthwork guideline, Project records</p> <p>High pier bridge guideline, Project records</p> <p>Project records</p>	
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>		<p>3-1 Operation and maintenance guideline for mountainous highways is completed by (mm/yyyy).</p> <p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Operation and maintenance guideline, Project records</p> <p>Project records</p>	

Activities	Inputs	The Indian Side	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Propose suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including with IAHE.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>2.5 Conduct model activities such as seminars and trainings, including with IAHE.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p> <p>3.3 Conduct model activities such as seminars and trainings, including with IAHE.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Tunnel - Tunnel Facilities - Earthwork - Bridge - Monitoring and Evaluation - Other Fields, as necessary</p> <p>(2) Training for Counterpart Personnel (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment Equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterpart Personnel - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>- Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Condition</p> <p>Counterpart personnel from the relevant organizations are assigned immediately after the Project starts.</p>

Note: "●" will be decided after commencement of the Project.

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Tentative Plan of Operation

Capacity Development Project on Highways in Mountainous Regions

Activities	1st Year				2nd Year				3rd Year				4th Year				5th Year				
	Year	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Output 1. Issues on development of mountainous highways are identified and the foundation for development of mountainous highways is built																					
1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services for disaster sites upon requests.	Plan																				
	Actual																				
1.2 Conduct field surveys to the typical mountainous highways.	Plan																				
	Actual																				
1.3 Improve survey and planning guidelines on mountainous highways.	Plan																				
	Actual																				
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan																				
	Actual																				
1.5 Conduct model activities such as seminars and trainings, including activities jointly with IAHE.	Plan																				
	Actual																				
Output 2. Guidelines on design and construction for mountainous highways are developed																					
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan																				
	Actual																				
	Plan																				
2.2 Improve a tunnel guideline.	Actual																				
	Plan																				
	Actual																				
2.3 Develop an earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan																				
	Actual																				
	Plan																				
2.4 Develop a high pier bridge guideline.	Actual																				
	Plan																				
	Actual																				
2.5 Conduct model activities such as seminars and trainings, including activities jointly with IAHE.	Plan																				
	Actual																				
	Plan																				
Output 3. Guideline on operation and maintenance for mountainous highways is developed																					
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan																				
	Actual																				
3.2 Develop an operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan																				
	Actual																				
3.3 Conduct model activities such as seminars and trainings, including activities jointly with IAHE.	Plan																				
	Actual																				
Duration / Phasing																					
Plan																					
Actual																					

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Monitoring Plan	1st Year				2nd Year				3rd Year				4th Year				5th Year						
	Year	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV		
Joint Coordination Committee	Plan																						
	Actual																						
Set-up the Detailed Plan of Operation	Plan																						
	Actual																						
Submission of Monitoring Sheet	Plan																						
	Actual																						
Reports/Documents	Plan																						
	Actual																						
Project Completion Report	Plan																						
	Actual																						
Remarks																							

 Actual implementation.
 Preparation, revision and action upon request or proposal.

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PDM Ver. 1

Project Design Matrix (Version.0 / Version.1)

Project Title: Capacity Development Project on Highways in Mountainous Regions.

Target Group: Officers of MoRTH, NHAI, NHIDCL and PWD

Period of Project: April 2016 - March 2021 (5 years)

Project Site: Whole of India

Dated: September 18th, 2015

Dated: December 14th, 2016

Overall Goal	Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<p>Maintainable highways are properly developed and maintained by using guidelines developed by the Project</p>		<p>OG1 At least three* sections of road development projects are planned/constructed/improved by using guidelines developed by the Project. OG2 At least three* sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report Contract Document Completion Report by the operation and maintenance contractor</p>	
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>		<p>PP1 Model activities are conducted applying the developed guidelines by the Project. PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.</p>
<p>Outputs Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>		<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019. 1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Survey and planning guidelines Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>
<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>		<p>2-1 Improved tunnel guideline is completed by June 2019. 2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019. 2-3 High pier bridge guideline is completed by June 2019. 2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p>Improved tunnel guideline, Project records Earthwork guideline, Project records High pier bridge guideline, Project records Project records</p>	
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>		<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020. 3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Operation and maintenance guideline, Project records Project records</p>	

Activities	Inputs		Important Assumption
	The Japanese Side	The Indian Side	
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision-of-technical-advisory-services-identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Tunnel - Tunnel Facilities - Earthwork - Bridge - Monitoring and Evaluation - Other Fields, as necessity</p> <p>(2) Training for Counterpart Personnel (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment Equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterpart Personnel - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>Majority of trained officials continues to work for counterpart agencies.</p> <p>Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p>
<p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>		<p>Pre-Condition</p> <p>Counterpart personnel from the relevant organizations are assigned immediately after the Project starts.</p>	

*Note: The number of projects will be discussed and confirmed in the 1st JCC Meeting.

**Note : This activity corresponds to not only output 1 but also output 2 and 3.

PDM Ver. 2

Project Design Matrix (Version.1 / Version.2)

Project Title: Capacity Development Project on Highways in Mountainous Regions

Target Group: Officers of MoRTH, NHAI, NHIDCL and PWD

Period of Project: April 2016 - March 2021 (5 years)

Project Site: Whole of India

Dated December 14th, 2016

Dated April 28th, 2017

Overall Goal	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<p>Narrative Summary</p> <p>Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p> <p>OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report</p> <p>Contract Document</p> <p>Completion Report by the operation and maintenance contractor</p>	
<p>Project Purpose</p> <p>Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project.</p> <p>PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p> <p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<ul style="list-style-type: none"> - Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.
<p>Outputs</p> <p>Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p> <p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Survey and planning guidelines</p> <p>Project records</p>	<ul style="list-style-type: none"> - MoRTH coordinate all related government organizations and other agencies.
<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019.</p> <p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p> <p>2-3 High pier bridge guideline is completed by June 2019.</p> <p>2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p>Improved tunnel guideline, Project records</p> <p>Earthwork guideline, Project records</p> <p>High pier bridge guideline, Project records</p> <p>Project records</p>	
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p> <p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Operation and maintenance guideline, Project records</p> <p>Project records</p>	

Activities	Inputs		Important Assumption
	The Japanese Side	The Indian Side	
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Tunnel - Tunnel Facilities - Earthwork - Bridge - Monitoring and Evaluation - Other Fields, as necessary</p> <p>(2) Training for Counterpart Personnel (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment Equipment and/or Material, as necessary.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessary</p>	<p>(1) Allocation of Counterpart Personnel - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>- Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Condition Counterpart personnel from the relevant organizations are assigned immediately after the Project starts.</p>

*Note: The number of projects will be discussed and confirmed in the 1st JCC Meeting.

**Note : This activity corresponds to not only output 1 but also output 2 and 3.

PDM Ver. 3

Project Design Matrix (Version.2 / Vers ion. 3)

Project Title: Capacity Development Project on Highways in Mountainous Regions

Target Group: Officers of MoRTH, NHAI, NHIDCL and PWD

Period of Project: April 2016 - March 2021 (5 years)

Project Site: Whole of India

Dated April 28th, 2017

Dated October 11th, 2017

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<p>Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report Contract Document Completion Report by the operation and maintenance contractor</p>	
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project. PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.</p>
<p>Outputs Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019. 1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Survey and planning guidelines Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>
<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019. 2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019. 2-3 High pier bridge guideline is completed by June 2019. 2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p>Improved tunnel guideline, Project records Earthwork guideline, Project records High pier bridge guideline, Project records Project records</p>	
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020. 3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Operation and maintenance guideline, Project records Project records</p>	

Activities	Inputs	The Indian Side	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III - Mountain Tunnel - Tunnel Facilities - Earthwork - Slope Protection II/High Embankment - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessity</p> <p>(2) Training for Counterpart Personnel (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment Equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterpart Personnel - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>- Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Condition</p> <p>Counterpart personnel from the relevant organizations are assigned immediately after the Project starts.</p>
<p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>			

**Note : This activity corresponds to not only output 1 but also output 2 and 3.

PO Ver. 1

After PO ver.1, since PO is frequently changed, the modification on PO was recorded in the Monitoring Sheets.

Plan of Operation (Version-0 / Version. 1)

Dated September 18th, 2015 / December 14th, 2016

Capacity Development Project on Highways in Mountainous Regions

Activities	1st Year				2nd Year				3rd Year				4th Year				5th Year				
	Year	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Output 1. Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed																					
1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions-provision-of technical-advisory services for disaster sites upon requests.	Plan																				
	Ver.1																				
	Actual																				
1.2 Conduct field surveys to the typical mountainous highways.	Plan																				
	Ver.1																				
	Actual																				
1.3 Improve survey and planning guidelines on mountainous highways.	Plan																				
	Ver.1																				
	Actual																				
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan																				
	Ver.1																				
	Actual																				
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*	Plan																				
	Ver.1																				
	Actual																				

Output 2. Guidelines on design and construction for mountainous highways are developed

2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan																				
	Ver.1																				
	Actual																				
2.2 Improve a tunnel guideline.	Plan																				
	Ver.1																				
	Actual																				
2.3 Develop an earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan																				
	Ver.1																				
	Actual																				
2.4 Develop a high pier bridge guideline.	Plan																				
	Ver.1																				
	Actual																				

Output 3. Guideline on operation and maintenance for mountainous highways is developed

3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan																				
	Ver.1																				
	Actual																				
3.2 Develop an operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan																				
	Ver.1																				
	Actual																				

Duration / Phasing

	Plan																				
	Ver.1																				
	Actual																				

Monitoring Plan	Year	1st Year				2nd Year				3rd Year				4th Year				5th Year																			
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV																
Monitoring																																					
Joint Coordination Committee	Plan																																				
	Ver.1																																				
	Actual																																				
Set-up the Detailed Plan of Operation	Plan																																				
	Ver.1																																				
	Actual																																				
Submission of Monitoring Sheet	Plan																																				
	Ver.1																																				
	Actual																																				
Reports/Documents																																					
Project Completion Report	Plan																																				
	Ver.1																																				
	Actual																																				

*Note : This activity corresponds to not only output 1 but also output 2 and 3.

Remarks



Actual implementation.



Preparation, revision and action upon request or proposal.

Appendix 4

R/D, M/M, Minutes of JCC

R/D

RECORD OF DISCUSSIONS
ON
CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN
MOUNTAINOUS REGIONS
IN
INDIA
AGREED UPON BETWEEN
MINISTRY OF ROAD TRANSPORT AND HIGHWAYS
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

New Delhi, 31/12/2015

Takema SAKAMOTO
Chief Representative
India Office
Japan International Cooperation Agency

Niraj VERMA
Joint Secretary
Ministry of Road Transport and Highways

Witness

S Selvakumar, Joint Secretary (ABC)
Department of Economic Affairs
Ministry of Finance

Based on the Minutes of Meetings on the Detailed Planning Survey on the Capacity Development Project on Highways in Mountainous Regions (hereinafter referred to as "the Project") signed on September 18th, 2015 between Ministry of Road Transport and Highways (hereinafter referred to as "MoRTH") and the Japan International Cooperation Agency (hereinafter referred to as "JICA"), JICA held a series of discussions with MoRTH and relevant organizations to develop a detailed plan of the Project.

Both parties agreed the details of the Project and main points discussed as described in the Appendix 1 and the Appendix 2, respectively, and to request their respective governments to proceed with the necessary procedures for implementation of the Project.

Both parties also agreed that MoRTH, National Highways Authority of India (hereinafter referred to as "NHAI") and National Highways and Infrastructure Development Corporation Ltd. (hereinafter referred to as "NHIDCL"), the counterpart to JICA, will be responsible for the implementation of the Project in cooperation with JICA, coordinate with other relevant organizations and ensure that the self-reliant operation of the Project is sustained during and after the implementation period in order to contribute toward social and economic development of India.

The Project will be implemented within the framework of the Note Verbales to be exchanged between the Government of Japan (hereinafter referred to as "GOJ") and the Government of India (hereinafter referred to as "GOI").

Appendix 1: Project Description

Appendix 2: Minutes of Meetings on the Detailed Planning Survey on "Capacity Development Project on Highways in Mountainous Regions"



PROJECT DESCRIPTION

Both parties confirmed that there is no change in the Project Description in the Minutes of Meetings for Detailed Planning Survey on the Project signed on September 18th, 2015 (Appendix 2).

I. BACKGROUND

Road Development is a primary concern in the economic development of India. The National Highways Development Program (NHDP) is under way, and as on March 2014, approximately 45% of the highways under the program was completed according to NHAI.

MoRTH has been paying special attention to the development of National Highways in mountainous areas such as North-East Region, Uttarakhand, Himachal Pradesh and Jammu & Kashmir because of need for local connectivity as well as for national border connectivity.

In India, however, MoRTH and NHAI/NHIDCL require capacity improvement in technical issues such as planning, construction and management of mountainous highways including tunnels, bridges and earthwork etc. The poor quality of mountainous highways is a serious bottleneck in the economic development of the regions.

Under these circumstances, MoRTH and NHAI/NHIDCL need to develop the capacity of disaster-resistant planning, cost saving construction and safety management of mountainous highways consisting of tunnels, bridges and slope stabilization etc.

Accordingly, the Project is herein requested by MoRTH, GOI, to develop technical guidelines for highways in mountainous regions, and to provide technical training programs in order to enhance capacity of the planning, the construction and the management of mountainous highways consisting of tunnels, bridges and earthworks etc.

II. OUTLINE OF THE PROJECT

Details of the Project are described in the Logical Framework (Project Design Matrix: PDM) (Attachment 1) and the Plan of Operation (Attachment 2).

1. Title of the Project

Capacity Development Project on Highways in Mountainous Regions

2. Expected Goals which will be attained after implementing the Proposed Plan

Institutional capacity of organizations concerned for sustainable development of mountainous highways is strengthened.



3. Outputs

- (1) Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.
- (2) Guidelines on design and construction for mountainous highways are developed.
- (3) A Guideline on operation and maintenance for mountainous highways is developed.

4. Activities

- (1-1) Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services for disaster sites upon requests.
- (1-2) Conduct field surveys of the typical mountainous highways.
- (1-3) Improve survey and planning guidelines on mountainous highways.
- (1-4) Examine suitable contract system and management for mountainous highways after review of existing systems.
- (1-5) Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineers (hereinafter referred to as "IAHE"). *Note that this activity corresponds to not only output (1) in II-3 but also output (2) and (3) in II-3.*
- (2-1) Collect and analyze existing design and construction standards for mountainous highways, and identify issues.
- (2-2) Improve the tunnel guidelines.
- (2-3) Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).
- (2-4) Develop a high pier bridge guideline.
- (3-1) Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.
- (3-2) Develop an operation and maintenance guideline for mountainous highways which will cover issues on disaster management.

5. Input

- (1) Input by JICA
 - (a) Dispatch of Experts
 - (Long-term Experts)
 - Chief Advisor/Highway Development
 - Highway Engineering/Coordinator
 - (Short-term Experts)
 - Tunnels
 - Tunnel Facilities
 - Earthwork
 - Bridges
 - Monitoring and Evaluation
 - Other fields, as necessary
 - (b) Training
 - Training on Highways in Mountainous Regions
 - Other issues as necessary
 - (c) Equipments



- Equipments and/or Materials, as necessary
- (d) Local cost for the Project activities
 - Office management cost
 - Local consultants
 - Other local cost as necessary

In case of importation, the machinery, equipments and other materials under II-5 (1) (c) above will become the property of GOI upon being delivered C.I.F. (cost, insurance and freight) to Indian authorities concerned at the ports and/or airports of disembarkation.

Input other than indicated above will be determined through mutual consultations between JICA and MoRTH during the implementation of the Project, as necessary.

(2) Input by GOI

GOI will take necessary measures to provide at its own expense:

- (a) Services of GOI's counterpart personnel and administrative personnel as referred to in II-6;
- (b) Suitable office spaces with necessary equipments;
- (c) Supply or replacement of machinery, equipments, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the equipments provided by JICA;
- (d) Facilitate official travel for the JICA experts within India;
- (e) Information as well as support in obtaining medical services;
- (f) Credentials or identification cards;
- (g) Available data (including maps and photographs) and information related to the Project;
- (h) Running expenses necessary for the implementation of the Project; and
- (i) Necessary facilities to the JICA experts for the remittance as well as utilization of the funds introduced into India from Japan in connection with the implementation of the Project

6. Implementation Structure

The project organization chart is given in the Attachment 3. The roles and assignments of relevant organizations are as follows:

(1-1) MoRTH

- (a) Chair Person: Director General for Road Development and Special Secretary will be in charge.
- (b) Project Director: A representative Chief Engineer (External Aided Project) will be responsible for overall administration and implementation of the Project.
- (c) Project Manager: A representative Superintending Engineer will be responsible for the administration of the project.
- (c) Project Members: Relevant Chief Engineers will be responsible for the managerial and technical matters of the Project.



(1-2) NHAI

- (a) Project Co-Manager: Chief General Manager (Technical) will be responsible for the administration of the Project.
- (b) Project Members: General Managers (Technical) will be responsible for the managerial and technical matters of the Project.

(1-3) NHIDCL

- (a) Project Members: Executive Director (Technical) and General Manager (Technical) will be responsible for the managerial and technical matters of the Project.

(2) JICA Experts

The JICA experts will give necessary technical guidance, advice and recommendations to MoRTH, NHAI, NHIDCL and Public Works Departments of State Governments (hereinafter referred to as "PWD") on any matters pertaining to the implementation of the Project.

(3) Joint Coordinating Committee

Joint Coordinating Committee (hereinafter referred to as "JCC") will be established in order to facilitate inter-organizational coordination. JCC meeting will be held at least twice a year and whenever deems it necessary.

JCC will review the progress, revise the overall plan when necessary, approve an annual work plan, conduct evaluation of the Project, and exchange opinions on major issues that arise during the implementation of the Project. In addition, important matters raised in JCC meeting will be authorized by the Secretary of MoRTH.

A list of proposed members of JCC is shown in the Attachment 4.

7. Project Sites and Beneficiaries

- (1) Project Sites: Whole of India
- (2) Project Office: Transport Bhawan, MoRTH, in New Dehi and Headquarter Office, NHAI, in New Delhi.
- (3) Beneficiaries: Technical Officials in MoRTH, NHAI, NHIDCL and PWD.

8. Duration

5 (five) years from the arrival of the first expert.

9. Reports

MoRTH and JICA experts will jointly prepare the following reports in English.

- (1) Monitoring Sheet on semiannual basis until the project completion
- (2) Project Completion Report 1 (one) month before the termination of the Project.

10. Environmental and Social Considerations

MoRTH will abide by 'JICA Guidelines for Environmental and Social Considerations' and the relevant guidelines of India for environmental and



social issues in order to ensure that appropriate considerations will be made for the environmental and social impacts of the Project.

III. UNDERTAKINGS OF GOI

1. GOI will take necessary measures to:

- (1) ensure that the technologies and knowledge acquired by Indian nationals as a result of Japanese technical cooperation contributes to the economic and social development of India, and that the knowledge and experience acquired by the personnel of India from technical training as well as the equipments provided by JICA will be utilized effectively in the implementation of the Project;
- (2) grant privileges, exemptions and benefits to the JICA experts referred to in II-5 above and their families, which are no less favorable than those granted to experts and members of the missions and their families of third countries or international organizations performing similar missions in India;
- (3) provide security-related information as well as measures to ensure the safety of the JICA experts;
- (4) permit the JICA experts to enter, leave and sojourn in India their assignments therein and exempt them from foreign registration requirements and consular fees;
- (5) exempt the JICA experts from taxes and any other charges on the equipments, machinery and other materials necessary for the implementation of the Project;
- (6) exempt the JICA experts from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to them and/or remitted to them from abroad for their services in connection with the implementation of the Project; and
- (7) meet taxes and any other charges on the equipments, machinery and other materials, referred to in II-5 above, necessary for the implementation of the Project.

2. GOI will bear claims, if any arises, against the JICA experts resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Project, except when such claims arise from gross negligence or willful misconduct on the part of the JICA experts.

IV. MONITORING AND EVALUATION

JICA and MoRTH will jointly and regularly monitor the progress of the Project through the Monitoring Sheets based on the Project Design Matrix (PDM) and Plan of Operation (PO). The Monitoring Sheets will be reviewed every 6 (six) months.

Also, Project Completion Report will be drawn up 1 (one) month before the termination of the Project.

JICA will conduct the following evaluations and surveys to verify sustainability



and impact of the Project for drawing lessons. MoRTH is required to provide necessary support for them.

1. Ex-post evaluation 3 (three) years after the project completion, in principle
2. Follow-up surveys on necessity basis

V. PROMOTION OF PUBLIC SUPPORT

For the purpose of promoting support for the Project, MoRTH will take appropriate measures to make the Project widely known to the people of India.

VI. MISCONDUCT

If JICA receives information related to suspected corrupt or fraudulent practices in the implementation of the Project, MoRTH and relevant organizations will provide JICA with such information as JICA may reasonably request, including information related to any concerned official of the government and/or public organizations of India.

MoRTH and relevant organizations will not, unfairly or unfavorably treat the person and/or company which provided the information related to suspected corrupt or fraudulent practices in the implementation of the Project.

VII. MUTUAL CONSULTATION

JICA and MoRTH will consult with each other whenever any major issues arise in the course of Project implementation.

VIII. AMENDMENTS

The record of discussions may be amended by the minutes of meetings between JICA and MoRTH. However, PO may be amended in the Monitoring Sheets.

The minutes of meetings will be signed by authorized persons of each side who may be different from the signers of the record of discussions.

- Attachment 1 Logical Framework (Project Design Matrix: PDM)
- Attachment 2 Plan of Operation
- Attachment 3 Organization Chart of the Project
- Attachment 4 List of Proposed Members of Joint Coordinating Committee



Project Design Matrix

Project Title: Capacity Development Project on Highways in Mountainous Regions

Target Group: Officers of MoRTH, NHAI, NHIDCL and PWD

Period of Project: (month) 2016 - (month) 2021 (5 years)

Project Site: Whole of India

Dated: September 18th, 2015

Overall Goal				
Project Purpose				
<p>Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>				
<p>Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>				
<p>Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>				
<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>				
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>				
<p>OG1 At least three* sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p> <p>OG2 At least three* sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>				
<p>PP1 Model activities are conducted applying the developed guidelines by the Project.</p>				
<p>PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>				
<p>1-1 Survey and Planning guidelines for mountainous highways is completed by (mm/yyyy).</p> <p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>				
<p>2-1 Improved tunnel guideline is completed by (mm/yyyy).</p> <p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by (mm/yyyy).</p> <p>2-3 High pier bridge guideline is completed by (mm/yyyy).</p> <p>2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>				
<p>3-1 Operation and maintenance guideline for mountainous highways is completed by (mm/yyyy).</p> <p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>				
<p>Detailed Project Report (DPR) / Feasibility Study Report</p> <p>Contract Document</p> <p>Completion Report by the operation and maintenance contractor</p>				
<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>				
<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>				<p>- Developed guidelines are approved by the MoRTH</p> <p>- Government policy to develop mountainous highways will not change.</p> <p>- MoRTH has enough finance to develop mountainous highways.</p>
<p>Survey and planning guidelines</p> <p>Project records</p>				<p>- MoRTH coordinate all related government organizations and other agencies.</p>
<p>Improved tunnel guideline, Project records</p> <p>Earthwork guideline, Project records</p> <p>High pier bridge guideline, Project records</p> <p>Project records</p>				
<p>Operation and maintenance guideline, Project records</p> <p>Project records</p>				



Activities	Inputs	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Tunnel - Tunnel Facilities - Earthwork - Bridge - Monitoring and Evaluation - Other Fields, as necessity</p> <p>(2) Training for Counterpart Personnel (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment Equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterpart Personnel - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p> <p>Pre-Condition</p> <p>Counterpart personnel from the relevant organizations are assigned immediately after the Project starts.</p>

*Note: The number of projects will be discussed and confirmed in the 1st JCC Meeting.

**Note : This activity corresponds to not only output 1 but also output 2 and 3.

Plan of Operation

Capacity Development Project on Highways in Mountainous Regions Dated September 18th, 2015

Activities	1st Year				2nd Year				3rd Year				4th Year				5th Year				
	Year	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Output 1. Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed																					
1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services for disaster sites upon requests.	Plan																				
	Actual																				
1.2 Conduct field surveys to the typical mountainous highways.	Plan																				
	Actual																				
1.3 Improve survey and planning guidelines on mountainous highways.	Plan																				
	Actual																				
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan																				
	Actual																				
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*	Plan																				
	Actual																				

Output 2. Guidelines on design and construction for mountainous highways are developed																					
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan																				
	Actual																				
2.2 Improve a tunnel guideline.	Plan																				
	Actual																				
2.3 Develop an earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan																				
	Actual																				
2.4 Develop a high pier bridge guideline.	Plan																				
	Actual																				

Output 3. Guideline on operation and maintenance for mountainous highways is developed																					
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan																				
	Actual																				
3.2 Develop an operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan																				
	Actual																				

Duration / Phasing																					
	Plan																				
	Actual																				

Monitoring Plan	1st Year				2nd Year				3rd Year				4th Year				5th Year						
	Year	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV		
Monitoring																							
Joint Coordination Committee	Plan																						
	Actual																						
Set-up the Detailed Plan of Operation	Plan																						
	Actual																						
Submission of Monitoring Sheet	Plan																						
	Actual																						
Reports/Documents																							
Project Completion Report	Plan																						
	Actual																						

*Note : This activity corresponds to not only output 1 but also output 2 and 3.

Remarks



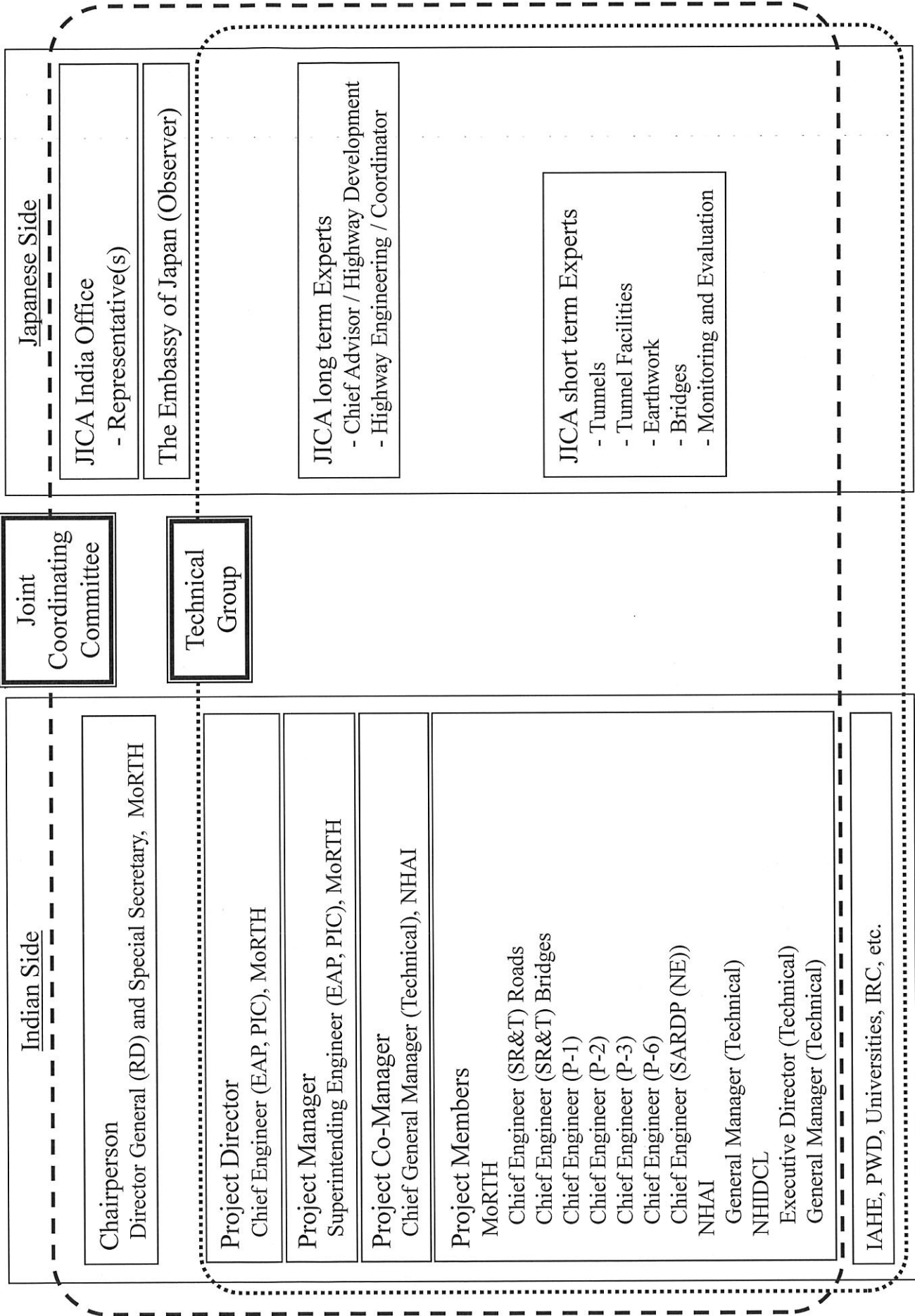
Actual implementation.



Preparation, revision and action upon request or proposal.

Organization chart of the Project

Attachment 3



*Roles of the related organizations, e.g. IAHE, PWDs, Universities, IRC, etc., will be discussed and confirmed through JCC meetings.

LIST OF PROPOSED MEMBERS OF JOINT COORDINATING COMMITTEE

Chairperson: Director General (RD) and Special Secretary, MoRTH

Members:

(1) Indian Side

- 1) Project Director: Chief Engineer (EAP, PIC), MoRTH
- 2) Project Manager: Superintending Engineer (EAP, PIC), MoRTH
- 3) Project Co-Manager: Chief General Manager (Technical), NHAI
- 4) Project Members:
 - MoRTH Chief Engineer (SR&T) Roads
 - Chief Engineer (SR&T) Bridges
 - Chief Engineer (P-1)
 - Chief Engineer (P-2)
 - Chief Engineer (P-3)
 - Chief Engineer (P-6)
 - Chief Engineer (SARDP-NE)
 - NHAI General Manager (Technical)
 - NHIDCL Executive Director (Technical)
 - General Manager (Technical)
- 5) Relevant personnel accepted by the Chairperson, if necessary.

(2) Japanese Side

- 1) JICA India Office
 - Representative(s)
- 2) JICA Long Term Experts
 - Chief Advisor / Highway Development
 - Highway Engineering / Coordinator
- 3) JICA Short Term Experts
 - Tunnels
 - Tunnel Facilities
 - Earthwork
 - Bridges
 - Monitoring and Evaluation
- 4) Representative of the Embassy of Japan (Observer)
- 5) Other personnel, if necessary

JCC meeting will be scheduled twice a year based on the maximum availability of the members listed above.



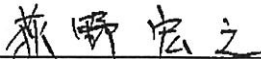
**MINUTES OF MEETINGS
BETWEEN
JAPANESE DETAILED PLANNING SURVEY TEAM
AND
MINISTRY OF ROAD TRANSPORT AND HIGHWAYS,
THE GOVERNMENT OF INDIA
ON
JAPANESE TECHNICAL COOPERATION
FOR
CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN MOUNTAINOUS REGIONS**

In response to the request from India, the Detailed Planning Survey Team (hereinafter referred to as 'the Team') organized by Japan International Cooperation Agency (hereinafter referred to as 'JICA') and headed by Hiroyuki Ogino, visited India from September 6th to September 18th, 2015 for the purpose of working out the details of the technical cooperation concerning "Capacity Development Project on Highways in Mountainous Regions".

During its stay in India, the Team exchanged views and had a series of discussions with Ministry of Road Transport and Highways (hereinafter referred to as 'MoRTH') with respect to necessary measures to be taken by JICA and the Government of India represented by MoRTH for the successful implementation of the above mentioned project.

As a result of the discussions, both sides agreed to convey to their respective government the matters referred to in the documents attached hereto.

New Delhi, September 18th, 2015



Mr. Hiroyuki Ogino
Leader
Detailed Planning Survey Team
Japan International Cooperation Agency
(JICA)



Mr. Niraj Verma
Joint Secretary
Ministry of Road Transport and Highways
The Government of India

ATTACHED DOCUMENT

I. SUMMARY OF THE PROJECT'S FRAMEWORK

Both sides jointly discussed and agreed the basic design of the Project. The Project Design Matrix (hereinafter referred to as 'PDM') version 0 is shown in ANNEX I.

The main points of discussions are follows;

1. Definition of "Highways in Mountainous Regions"

Both sides confirmed that the definition of "Highways in Mountainous Regions" is highways in and around the mountain regions throughout the country, which is not limited to specific states.

2. Project Period

Both sides confirmed that the Project period is 5 (five) years considering the scope of the Project.

3. Working Environment

As shown in PDM, 2 (two) long-term Japanese experts will be assigned in the Project as an input by the Japanese side. Both sides understood to keep the rooms occupied by the Japanese experts under the ongoing Technical cooperation program in MoRTH and National Highways Authority of India (NHAI) for use by the long-term Japanese experts assigned in the Project for continuous close relationships among the Japanese experts, MoRTH and NHAI.

II. PLAN OF OPERATIONS

Both sides had jointly prepared and agreed Plan of Operation (PO) as shown in ANNEX II. The activities of the Project are subject to change when necessity arises in the course of implementation.

III. RECORD OF DISCUSSIONS

The Record of Discussions will be signed between JICA India Office and MoRTH prior to the commencement of the Project to determine the framework of the Project. The Record of Discussions will include the contents of this Minutes of Meetings.

IV. OTHER RELEVANT ISSUES

1. The Team took note the following requests from Indian side.

(1) Cooperation with Indian Academy of Highway Engineers (IAHE)

It is proposed to implement joint seminars and trainings as a part of the Project by strengthening existing programmes of IAHE.



(2) Technical Advisory Services

It is requested technical advices from Japanese experts under the Project on urgent and permanent countermeasures at typical disaster sites on the routes such as Mumbai-Pune Expressway in Maharashtra State, National Highway No. 55 in West-Bengal State, Shiradi Ghat Section on National Highway No. 48 in Karnataka State, and National Highway No. 58 in Uttarakhand State.

(3) Consideration of Various Methodologies

It is requested that various methodologies of development of mountainous highways be considered in developing guidelines including advanced technologies and methodologies utilizing local materials, etc.

(4) Office Spaces for Short-term Experts

It is proposed that office space with basic facilities and equipment for short-term experts would be provided at either MoRTH, NHAI or National Highways and Infrastructure Development Corporation Limited (NHIDCL).

2. Indian side requested to conduct a pilot project applying guidelines developed by the Project. The Team responded that model activities would be conducted as pilot projects such as utilizing existing and planned road projects.

3. Indian side mentioned that related and useful information existed in other Ministries and organizations, such as geological maps in the Ministry of Mines, and topographic maps in the Ministry of Arts and Science, thus the Japanese side should coordinate with such organizations to collect them. However the Team considered such coordination would require assistance from the counterparts for the Project.

ANNEX

ANNEX I.	PROJECT DESIGN MATRIX (PDM), VERSION 0
ANNEX II.	PLAN OF OPERATIONS (PO), VERSION 0
ANNEX III.	RECORD OF DISCUSSIONS (DRAFT)



Project Design Matrix

Project Title: Capacity Development Project on Highways in Mountainous Regions.
 Target Group: Officers of MoRTH, NHAI, NHIDCL and State PWDs
 Period of Project: (month) 2016 – (month) 2021 (6 years)
 Project Site: Whole India

Version: 0

Dated September 18th, 2015

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<p>Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least ● * sections of road development projects are planned/constructed/improved by using guidelines developed by the Project. OG2 At least ● * sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report Contract Document Completion Report by the operation and maintenance contractor</p>	
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project. PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.</p>
<p>Outputs Output 1: Issues on development of mountainous highways are identified and the foundation for development of mountainous highways is built.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by (mm/yyyy). 1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Survey and planning guidelines Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>
<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by (mm/yyyy). 2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by (mm/yyyy). 2-3 High pier bridge guideline is completed by (mm/yyyy). 2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p>Improved tunnel guideline, Project records Earthwork guideline, Project records High pier bridge guideline, Project records Project records</p>	
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by (mm/yyyy). 3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Operation and maintenance guideline, Project records Project records</p>	

Activities	The Japanese Side	Inputs	The Indian Side	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Propose suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including with IAHE.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>2.5 Conduct model activities such as seminars and trainings, including with IAHE.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p> <p>3.3 Conduct model activities such as seminars and trainings, including with IAHE.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Tunnel - Tunnel Facilities - Earthwork - Bridge - Monitoring and Evaluation - Other Fields, as necessary</p> <p>(2) Training for Counterpart Personnel (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment Equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterpart Personnel - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>- Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p>	<p>Pre-Condition</p> <p>Counterpart personnel from the relevant organizations are assigned immediately after the Project starts.</p>

Note: "●" will be decided after commencement of the Project.

Tentative Plan of Operation

Capacity Development Project on Highways in Mountainous Regions

Activities	1st Year				2nd Year				3rd Year				4th Year				5th Year			
	Year	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III

Output 1. Issues on development of mountainous highways are identified and the foundation for development of mountainous highways is built

1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services for disaster sites upon requests.	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
1.2 Conduct field surveys to the typical mountainous highways.																										
1.3 Improve survey and planning guidelines on mountainous highways.																										
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.																										
1.5 Conduct model activities such as seminars and trainings, including activities jointly with IAHE.																										

Output 2. Guidelines on design and construction for mountainous highways are developed

2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
2.2 Improve a tunnel guideline.																										
2.3 Develop an earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).																										
2.4 Develop a high pier bridge guideline.																										
2.5 Conduct model activities such as seminars and trainings, including activities jointly with IAHE.																										

Output 3. Guideline on operation and maintenance for mountainous highways is developed

3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
3.2 Develop an operation and maintenance guidelines for mountainous highways including issues on disaster management.																										
3.3 Conduct model activities such as seminars and trainings, including activities jointly with IAHE.																										

Duration / Phasing

Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
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Monitoring Plan		1st Year				2nd Year				3rd Year				4th Year				5th Year				
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	
Monitoring	Plan																					
	Actual																					
	Remarks																					
Reports/Documents	Plan																					
	Actual																					
	Remarks																					
Project Completion Report																						

Actual implementation.
 Preparation, revision and action upon request or proposal.

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(Draft)

RECORD OF DISCUSSIONS

ON

**CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN
MOUNTAINOUS REGIONS**

IN

INDIA

AGREED UPON BETWEEN

MINISTRY OF ROAD TRANSPORT AND HIGHWAYS

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

New Delhi, [date]

Chief Representative
India Office
Japan International Cooperation Agency

Director General (RD) and Special
Secretary
Ministry of Road Transport and Highways

Witness

Department of Economic Affairs
Ministry of Finance



Based on the Minutes of Meetings on the Detailed Planning Survey on the Capacity Development Project on Highways in Mountainous Regions (hereinafter referred to as "the Project") signed on September 18th, 2015 between Ministry of Road Transport and Highways (hereinafter referred to as "MoRTH") and the Japan International Cooperation Agency (hereinafter referred to as "JICA"), JICA held a series of discussions with MoRTH and relevant organizations to develop a detailed plan of the Project.

Both parties agreed the details of the Project and main points discussed as described in the Appendix 1 and the Appendix 2, respectively, and to request their respective governments to proceed with the necessary procedures for implementation of the Project.


Both parties also agreed that MoRTH, National Highways Authority of India (hereinafter referred to as "NHA") and National Highways and Infrastructure Development Corporation Ltd. (hereinafter referred to as "NHIDCL"), the counterpart to JICA, will be responsible for the implementation of the Project in cooperation with JICA, coordinate with other relevant organizations and ensure that the self-reliant operation of the Project is sustained during and after the implementation period in order to contribute toward social and economic development of India.

The Project will be implemented within the framework of the Note Verbales to be exchanged between the Government of Japan (hereinafter referred to as "GOJ") and the Government of India (hereinafter referred to as "GOI").

Appendix 1: Project Description

Appendix 2: Main Points Discussed

Appendix 3: Minutes of Meetings on the Detailed Planning Survey on "Capacity Development Project on Highways in Mountainous Regions"



PROJECT DESCRIPTION

Both parties confirmed that there is no change in the Project Description in the Minutes of Meetings for Detailed Planning Survey on the Project signed on September 18th, 2015 (Appendix 3).

I. BACKGROUND

Road Development is a primary concern in the economic development of India. The National Highways Development Program (NHDP) is under way, and as March 2014, approximately 45% of the highways under the program was completed according to NHAI.

MoRTH has been paying special attention to the development of National Highways in mountainous areas such as North-East Region, Uttarakhand, Himachal Pradesh and Jammu & Kashmir because of local connectivity as well as national boarder connectivity.

In India, however, MoRTH and NHAI requires capacity improvement in technical issues such as planning, construction and management of mountainous highways such as tunnel, bridge and earthwork etc. The poor quality of mountainous highways is a serious bottleneck in the economic development of the regions.

Under these circumstances, MoRTH and NHAI need to develop the capacity of disaster-resistant planning, cost saving construction and safety management of mountainous highways consisting of tunnels, bridges and slope stabilization etc.

Accordingly, the Project is herein requested by MoRTH, GOI, to develop technical guidelines for highways in mountainous regions, and to provide technical training programs in order to enhance capacity of the planning, the construction and the management of mountainous highways consisting to tunnels, bridges and earthworks etc.

II. OUTLINE OF THE PROJECT

Details of the Project are described in the Logical Framework (Project Design Matrix: PDM) (Attachment 1) and the Plan of Operation (Attachment 2).

1. Title of the Project
Capacity Development Project on Highways in Mountainous Regions
2. Expected Goals which will be attained after implementing the Proposed Plan
Institutional capacity of organizations concerned for sustainable development of mountainous highways is strengthened.



3. Outputs

- (1) Issues on development of mountainous highways are identified and the foundation for development of mountainous highways is built.
- (2) Guidelines on design and construction for mountainous highways are developed.
- (3) A Guideline on operation and maintenance for mountainous highways is developed.

4. Activities

- (1-1) Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services for disaster sites upon requests.
- (1-2) Conduct field surveys to the typical mountainous highways.
- (1-3) Improve survey and planning guidelines on mountainous highways.
- (1-4) Examine suitable contract system and management on mountainous highways after reviewing existing issues.
- (1-5) Conduct model activities such as seminars and trainings, including activities jointly with IAHE.
- (2-1) Collect and analyze existing design and construction standards for mountainous highways, and identify issues.
- (2-2) Improve a tunnel guideline.
- (2-3) Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).
- (2-4) Develop a high pier bridge guideline.
- (2-5) Conduct model activities such as seminars and trainings, including activities jointly with IAHE.
- (3-1) Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.
- (3-2) Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.
- (3-3) Conduct model activities such as seminars and trainings, including activities jointly with IAHE.

5. Input

- (1) Input by JICA
 - (a) Dispatch of Experts
 - (Long-term Experts)
 - Chief Advisor/Highway Development
 - Highway Engineering/Coordinator
 - (Short-term Experts)
 - Tunnel
 - Tunnel Facilities
 - Earthwork
 - Bridge
 - Monitoring and Evaluation
 - Other fields, as necessity
 - (b) Training
 - Training on Highways in Mountainous Regions
 - Other issues as necessity



- (c) Equipment
 - Equipment and/or Material, as necessity
- (d) Local cost for the Project activities
 - Office management cost
 - Local consultants
 - Other local cost as necessity

In case of importation, the machinery, equipment and other materials under II-5 (1) (c) above will become the property of GOI upon being delivered C.I.F. (cost, insurance and freight) to Indian authorities concerned at the ports and/or airports of disembarkation.

Input other than indicated above will be determined through mutual consultations between JICA and MoRTH during the implementation of the Project, as necessary.

(2) Input by GOI

GOI will take necessary measures to provide at its own expense:

- (a) Services of GOI's counterpart personnel and administrative personnel as referred to in II-6;
- (b) Suitable office spaces with necessary equipment;
- (c) Supply or replacement of machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the equipment provided by JICA;
- (d) Facilitate official travel for the JICA experts within India;
- (e) Information as well as support in obtaining medical service;
- (f) Credentials or identification cards;
- (g) Available data (including maps and photographs) and information related to the Project;
- (h) Running expenses necessary for the implementation of the Project; and
- (i) Necessary facilities to the JICA experts for the remittance as well as utilization of the funds introduced into India from Japan in connection with the implementation of the Project

6. Implementation Structure

The project organization chart is given in the Attachment 3. The roles and assignments of relevant organizations are as follows:

(1-1) MoRTH

- (a) Chair Person: Director General for Road Development and Special Secretary will be in charge.
- (b) Project Director: Additional Director General for Road Development will be responsible for overall administration and implementation of the Project.
- (c) Project Manager: A representative Chief Engineer (External Added Project) will be responsible for the administration of the project.
- (d) Project Members: Relevant Chief Engineers will be responsible for the managerial and technical matters of the Project.




(1-2) NHAI

- (a) Project Co-Manager: Chief General Manager (Technical) will be responsible for the administration of the Project.
- (b) Project Members: General Managers (Technical) will be responsible for the managerial and technical matters of the Project.

(1-3) NHIDCL

- (a) Project Members: Executive Director (Technical) and General Manager (Technical) will be responsible for the managerial and technical matters of the Project.

(2) JICA Experts

The JICA experts will give necessary technical guidance, advice and recommendations to MoRTH, NHAI, NHIDCL and Public Works Department of State Governments (PWD) on any matters pertaining to the implementation of the Project.

(3) Joint Coordinating Committee

Joint Coordinating Committee (hereinafter referred to as "JCC") will be established in order to facilitate inter-organizational coordination. JCC will be held at least twice a year and whenever deems it necessary.

JCC will review the progress, revise the overall plan when necessary, approve an annual work plan, conduct evaluation of the Project, and exchange opinions on major issues that arise during the implementation of the Project. In addition, important matters raised through JCC will be authorized by the Secretary of MoRTH.

A list of proposed members of JCC is shown in the Attachment 4.

7. Project Sites and Beneficiaries

- (1) Project Sites: Whole India
- (2) Project Office: Transport Bhawan, MoRTH, in New Dehi and Headquarter Office, NHAI, in New Delhi.
- (3) Beneficiaries: Technical Officials in MoRTH, NHAI, NHIDCL and State PWDs.

8. Duration

5 (five) years from the arrival of the first long term expert.

9. Reports

MoRTH and JICA experts will jointly prepare the following reports in English.

- (1) Monitoring Sheet on semiannual basis until the project completion
- (2) Project Completion Report 1 (one) month before the termination of the Project.

10. Environmental and Social Considerations



MoRTH will abide by 'JICA Guidelines for Environmental and Social Considerations' and the relevant guidelines of India for environmental and social issues in order to ensure that appropriate considerations will be made for the environmental and social impacts of the Project.

III. UNDERTAKINGS OF GOI

1. GOI will take necessary measures to:

- (1) ensure that the technologies and knowledge acquired by Indian nationals as a result of Japanese technical cooperation contributes to the economic and social development of India, and that the knowledge and experience acquired by the personnel of India from technical training as well as the equipment provided by JICA will be utilized effectively in the implementation of the Project;
- (2) grant privileges, exemptions and benefits to the JICA experts referred to in II-5 above and their families, which are no less favorable than those granted to experts and members of the missions and their families of third countries or international organizations performing similar missions in India;
- (3) provide security-related information as well as measures to ensure the safety of the JICA experts;
- (4) permit the JICA experts to enter, leave and sojourn in India their assignments therein and exempt them from foreign registration requirements and consular fees;
- (5) exempt the JICA experts from taxes and any other charges on the equipment, machinery and other material necessary for the implementation of the Project;
- (6) exempt the JICA experts from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to them and/or remitted to them from abroad for their services in connection with the implementation of the Project; and
- (7) meet taxes and any other charges on the equipment, machinery and other material, referred to in II-5 above, necessary for the implementation of the Project.

2. GOI will bear claims, if any arises, against the JICA experts resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Project, except when such claims arise from gross negligence or willful misconduct on the part of the JICA experts.

IV. MONITORING AND EVALUATION

JICA and MoRTH will jointly and regularly monitor the progress of the Project through the Monitoring Sheets based on the Project Design Matrix (PDM) and Plan of Operation (PO). The Monitoring Sheets will be reviewed every 6 (six) months.

Also, Project Completion Report will be drawn up 1 (one) month before the termination of the Project.

JICA will conduct the following evaluations and surveys to verify sustainability and impact of the Project for drawing lessons. MoRTH is required to provide necessary support for them.

1. Ex-post evaluation 3 (three) years after the project completion, in principle
2. Follow-up surveys on necessity basis

V. PROMOTION OF PUBLIC SUPPORT

For the purpose of promoting support for the Project, MoRTH will take appropriate measures to make the Project widely known to the people of India.

VI. MISCONDUCT

If JICA receives information related to suspected corrupt or fraudulent practices in the implementation of the Project, MoRTH and relevant organizations will provide JICA with such information as JICA may reasonably request, including information related to any concerned official of the government and/or public organizations of India.

MoRTH and relevant organizations will not, unfairly or unfavorably treat the person and/or company which provided the information related to suspected corrupt or fraudulent practices in the implementation of the Project.

VII. MUTUAL CONSULTATION

JICA and MoRTH will consult each other whenever any major issues arise in the course of Project implementation.

VIII. AMENDMENTS

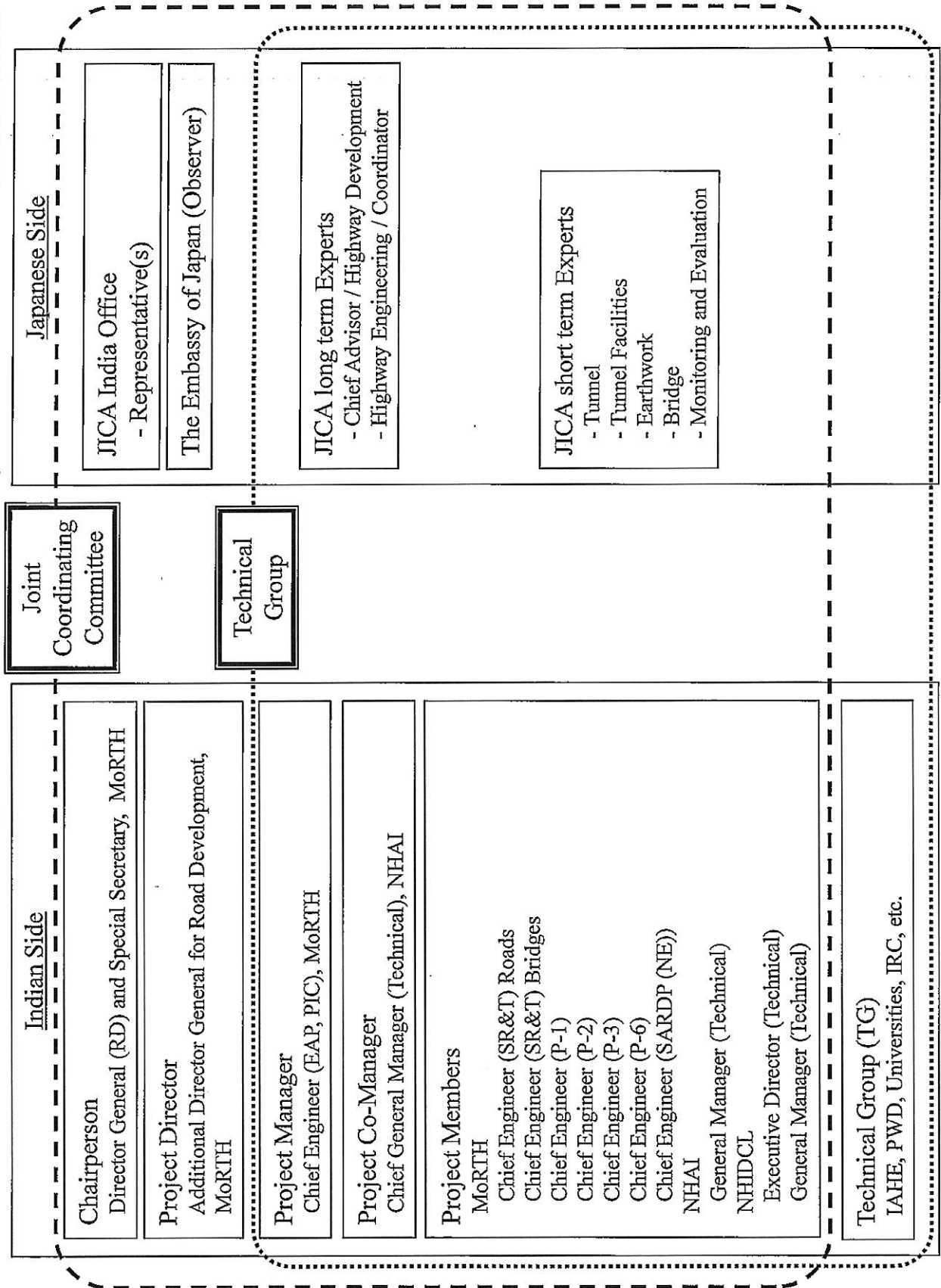
The record of discussions may be amended by the minutes of meetings between JICA and MoRTH. However, PO may be amended in the Monitoring Sheets.

The minutes of meetings will be signed by authorized persons of each side who may be different from the signers of the record of discussions.

- Attachment 1 Logical Framework (Project Design Matrix: PDM) (as same as the ANNEX I of Minutes of the Meetings)
- Attachment 2 Tentative Plan of Operation (as same as the ANNEX II of Minutes of the Meetings)
- Attachment 3 Project Organization Chart
- Attachment 4 A List of Proposed Members of Joint Coordinating Committee

Organization chart of the Project

Attachment 3



LIST OF PROPOSED MEMBERS OF JOINT COORDINATING COMMITTEE

Chairperson: Director General (RD) and Special Secretary, MoRTH

Members:

(1) Indian Side

1) Project Director: Additional Director General (RD), MoRTH

2) Project Manager: Chief Engineer (EAP, PIC), MoRTH

3) Project Co-Manager: Chief General Manager (Technical), NHAI

4) Project Members:

- MoRTH Chief Engineer (SR&T) Roads
- Chief Engineer (SR&T) Bridges
- Chief Engineer (P-1)
- Chief Engineer (P-2)
- Chief Engineer (P-3)
- Chief Engineer (P-6)
- Chief Engineer (SARDP-NE)
- NHAI General Manager (Technical)
- NHIDCL Executive Director (Technical)
- General Manager (Technical)

5) Relevant personnel accepted by the Chairperson, if necessary.

(2) Japanese Side

1) JICA India Office

- Representative(s)

2) JICA Long Term Experts

- Chief Advisor / Highway Development
- Highway Engineering / Coordinator

3) JICA Short Term Experts

- Tunnel
- Tunnel Facilities
- Earthwork
- Bridge
- Monitoring and Evaluation

4) Representative of the Embassy of Japan (Observer)

5) Other personnel, if necessary

JCC will be scheduled twice a year based on the maximum availability of the members listed above.

Nm

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M/M (on 22nd February 2021 to Extend Project Period)

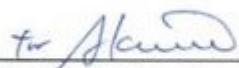
**MINUTES OF MEETINGS
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
MINISTRY OF ROAD TRANSPORT AND HIGHWAYS
FOR
AMENDMENT OF THE RECORD OF DISCUSSIONS
ON
CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN MOUNTAINOUS REGIONS**

The Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Road Transport and Highways (hereinafter referred to as "MORTH") hereby agree that the Record of Discussions on the Capacity Development Project on Highways in Mountainous Regions signed on December 31st, 2015 is amended as follows;

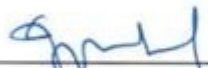
1. Appendix 1 Project Description

Before	Amended Version
<p>8. Duration 5 (five) years from the arrival of the first expert.</p>	<p>8. Duration 6 (six) years from the arrival of the first expert.</p>
<p>Reason: Because of the global spread of the coronavirus disease 2019 (COVID-19), some of the project activities have been suspended. In order to achieve the project purpose after the project team resume the activities, project duration needs to be extended. The duration may be further amended (shortened or extended) depending on the COVID-19 situation.</p>	

New Delhi, February 22, 2021



Mr. NAGAI Shinsuke
Senior Representative
Japan International Cooperation Agency
Japan



Mr. Kailash Chand Gupta
Additional Secretary
Ministry of Road Transport and Highways
Government of India, India

Minutes of 1st JCC

THE MINUTES OF JOINT COORDINATION COMMITTEE MEETING

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

AND

MINISTRY OF ROAD TRANSPORT & HIGHWAYS (MORTH)

ON


CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN MOUNTAINOUS REGIONS

In accordance with Section No. 6, Point No. 3 of the Record of Discussions of "Capacity Development Project on Highways in Mountainous Regions (hereinafter referred to as "the Project")" signed on December 31, 2015 between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Ministry of Road Transport and Highways (hereinafter referred to as "MoRTH"), a Joint Coordination Committee (JCC) meeting was held in the office of Director General (Road Development) & Special Secretary (DG(RD)&SS), MoRTH, New Delhi on December 14, 2016.

The purpose of the meeting was to discuss the outline and activities of the Project and other related issues.

As a result of the discussions, both sides mutually confirmed the matters referred to in the documents attached hereto.

New Delhi, December 14, 2016



TAKEMA SAKAMOTO

Chief Representative
India Office
Japan International Cooperation Agency



S.N. DAS

Director General (Road Development) &
Special Secretary (DG(RD)&SS)
Ministry of Road Transport and Highways

Minutes of the meeting of the Joint Coordination Committee (JCC)

Date: December 14, 2016

Time: 11.00- 13.00 hrs

Venue: Office of DG (RD) & SS, 2nd Floor, Transport Bhawan, New Delhi

Representatives from Indian Side

- 1) Mr. S.N. Das, DG (RD) & SS, MoRTH- In Chair
- 2) Mr. A.K. Srivastava, CE (P-2), MoRTH
- 3) Mr. I.K. Pandey, CE (P-4), MoRTH
- 4) Mr. V.K Rajawat, CE (NER), MoRTH
- 5) Mr. Virendra Koul, CE (P-6), MoRTH
- 6) Mr. Sudip Chaudhuary, CE (Monitoring & Planning), MoRTH
- 7) Mr. A. D. James, Deputy Secretary (IC), MoRTH
- 8) Mr. Kishor Chandwani, SE (EAP), MoRTH
- 9) Mr. Khushal Chand, SE (EAP), MoRTH
- 10) Mr. Rahul Gupta, ED, NHIDCL

Representatives from Japanese Side

- 1) Mr. Takayoshi Tange, Senior Representative, JICA India office
- 2) Mr. Shu Moriyama, Chief Advisor for Highway Development
- 3) Ms. Denichiro Yamada, JICA Expert for Highway Engineering
- 4) Mr. Toshiaki Shinozaki, Representative, JICA India Office
- 5) Mr. Anurag Sinha, Lead Development Specialist, JICA India Office

MINUTES:

- 1) The DG (RD) & SS, MoRTH extended a warm welcome to the Japanese delegates and the meeting started with the introduction of the participants. DG (RD) & SS, MoRTH expressed his appreciation towards Government of Japan for technical support for development of mountainous roads in the country.
- 2) Mr. Tange, Senior Representative, JICA India thanked MoRTH for organizing the first JCC meeting of the Project and reiterated that the Project is a joint undertaking between MoRTH and the Japanese side.

3) Mr. Shu Moriyama, Chief Advisor for Highway Development provided a brief introduction on his professional qualification and experiences as technical official of Ministry of Land, Infrastructure, Transport, and Tourism (MLIT) in Japan.

4) Review of the Meeting held on June 20, 2016

Both sides confirmed that the basic concept of the Project is “Do everything jointly by India and Japan” and both sides also confirmed that a core group for the Project implementation will be set up by both India and Japan sides, and a core group of officers and experts shall be created to jointly work on specialized matters such as soil structure, tunnels etc. pertaining to mountainous roads.

5) Discussion on the Outline of the Project and the progress of the Project activities

The Japanese side made a presentation on the purpose, overall goal, outputs, relevant activities, and organization of the Project. Both sides confirmed that continuous review will be made on the Project in accordance with goal, outputs and activities of the Project in accordance with “Project Design Matrix (PDM)” of the Project. It was also confirmed that any change in the PDM would have to be approved by the JCC of the Project.

Both sides also confirmed that the JCC shall review, in the next meeting, the objectively verifiable Indicator (OVI) for the overall goal of the Project to assess the achievability of these indicators during the Project period and also plan necessary actions in this regard.

Both sides confirmed that the wording of “Output 1” and “Activity 1-1” on PDM of the Project is revised to meet the concept of the Project “Do everything jointly”. Revised PDM is attached as the “Attachment 1”

The Japanese side stated that on account of the delay in acceptance of Chief Advisor (Long Term Expert) owing to new procedures of Government of India side, there has been a delay in the launch of the Project and the “Plan of Operation (PO)” of the Project needs to be revised. The JCC approved the revised PO presented by JICA Expert and it was also discussed that JCC would also review the necessity of extension of the Project at a later date. The revised PO is attached as the “Attachment 2”

The JICA Expert shared that it is envisaged that 3 guidelines namely tunnel guidelines, earthwork guidelines and high pier bridge guidelines shall be developed under the Project. Indian side agreed to it.

Mr. AK Srivastava, Chief Engineer (P-2) stated that various guidelines developed under the Project should cover stages of planning, execution as well as operation and maintenance. Mr. Srivastava further stated that the guidelines could include case studies

of road projects in India to highlight the gaps in mountainous roads in India. The Japanese side concurred to it.

Mr. IK Pandey, Chief Engineer (P-4) stated that after the development of various guidelines under the Project, trainings are required for officers of MoRTH, NHAI, NHIDCL and state PWD using developed guidelines. Japanese side concurred to it.

Both sides confirmed that Ms. Leena Nandan, Joint Secretary in charge of EAP wing in MoRTH, will function as "Project Director" for the Project. And also Mr. Kishor Chandwani, Superintending Engineer (EAP), MoRTH and Dr. B.S. Singla, CGM (Technical), NHAI are appointed as the Manager of the Project.

Both sides confirmed that a representative of NHIDCL should also be added as "Project Manager" for the Project. DG (RD) & SS, MoRTH nominated Mr. Rahul Gupta, ED, NHIDCL as the Project Manager from NHIDCL. Japanese side concurred to it.

Both sides also confirmed that a core group of officials for the Project implementation as well as for sustainability of initiatives beyond the life of the Project will be constituted. DG (RD) & SS, MoRTH stated that Chief Engineers of MoRTH working in mountainous regions as well as senior officials from state PWD of mountainous states (Meghalaya, Mizoram, Sikkim, Himachal Pradesh and Uttarakhand) should be included in the core group for development of various guidelines under the Project. It was discussed that the guidelines developed under the Project shall be reviewed and approved by MoRTH and should be subsequently referred to IRC for adoption.

6) Country-focused Training on 2017

The Japanese side proposed that a Country-focused training be conducted twice (May and November) in 2017. Indian side confirmed the timelines. Chief Advisor proposed that a new training model should be formulated under the Project wherein the training should be organized in 2 phases (one phase in India and another phase in Japan). It was also confirmed that JICA will bear all training expenses (including international travel between India and Japan) in Japan and MoRTH shall bear the expenses for the training to be held in India.

Both sides confirmed that apart from officials of MoRTH, NHAI and NHIDCL, engineers from state PWD of mountainous states should be considered as participants for the training.

8) It was discussed that the next JCC meeting be conducted in April, 2017.

9) The meeting ended with a Vote of Thanks to the Chair.

Attachments:

- the Attachment 1 Project Design Matrix (Version.1)
- the Attachment 2 Plan of Operation (Version.1)

Project Design Matrix (Version.0 / Version.1)

Project Title: Capacity Development Project on Highways in Mountainous Regions.

Target Group: Officers of MoRTH, NHAI, NHIDCL and PWD

Period of Project: April 2016 - March 2021 (5 years)

Project Site: Whole of India

Dated September 18th, 2015

Dated December 14th, 2016

Overall Goal	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<p>Narrative Summary</p> <p>Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least three* sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p> <p>OG2 At least three* sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report</p> <p>Contract Document</p> <p>Completion Report by the operation and maintenance contractor</p>	
<p>Project Purpose</p> <p>Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project.</p> <p>PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p> <p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH</p> <p>- Government policy to develop mountainous highways will not change.</p> <p>- MoRTH has enough finance to develop mountainous highways.</p>
<p>Outputs</p> <p>Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p> <p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Survey and planning guidelines</p> <p>Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>
<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019.</p> <p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p> <p>2-3 High pier bridge guideline is completed by June 2019.</p> <p>2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p>Improved tunnel guideline, Project records</p> <p>Earthwork guideline, Project records</p> <p>High pier bridge guideline, Project records</p> <p>Project records</p>	
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p> <p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Operation and maintenance guideline, Project records</p> <p>Project records</p>	

Activities	Inputs	The Indian Side	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision-of-technical-advisory-services-identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Tunnel Facilities - Earthwork - Bridge - Monitoring and Evaluation - Other Fields, as necessity</p> <p>(2) Training for Counterpart Personnel (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment Equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterpart Personnel - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>Majority of trained officials continues to work for counterpart agencies.</p> <p>Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Condition</p> <p>Counterpart personnel from the relevant organizations are assigned immediately after the Project starts.</p>
<p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>			

**Note: The number of projects will be discussed and confirmed in the 1st JCC Meeting.

**Note : This activity corresponds to not only output 1 but also output 2 and 3.

Plan of Operation (Version.0 / Version. 1)

Capacity Development Project on Highways in Mountainous Regions																	
Dated September 18th, 2015 / December 14th, 2016																	
Activities	1st Year			2nd Year			3rd Year			4th Year			5th Year				
	Year	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Output 1. Issues on development-of-mountainous highways are identified and capacity of personnel for mountainous highways is developed																	
1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions-provision-of-technical-advisory-services for disaster sites upon requests.	Plan																
	Ver.1																
	Actual																
1.2 Conduct field surveys to the typical mountainous highways.	Plan																
	Ver.1																
	Actual																
1.3 Improve survey and planning guidelines on mountainous highways.	Plan																
	Ver.1																
	Actual																
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan																
	Ver.1																
	Actual																
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*	Plan																
	Ver.1																
	Actual																
Output 2. Guidelines on design and construction for mountainous highways are developed																	
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan																
	Ver.1																
	Actual																
2.2 Improve a tunnel guideline.	Plan																
	Ver.1																
	Actual																
2.3 Develop an earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan																
	Ver.1																
	Actual																
2.4 Develop a high pier bridge guideline.	Plan																
	Ver.1																
	Actual																
Output 3. Guideline on operation and maintenance for mountainous highways is developed																	
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan																
	Ver.1																
	Actual																
3.2 Develop an operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan																
	Ver.1																
	Actual																
Duration / Phasing																	
	Plan																
	Ver.1																
	Actual																

Monitoring Plan	1st Year				2nd Year				3rd Year				4th Year				5th Year				
	Year	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Monitoring																					
Joint Coordination Committee	Plan																				
	Ver.1																				
	Actual																				
Set-up the Detailed Plan of Operation	Plan																				
	Ver.1																				
	Actual																				
Submission of Monitoring Sheet	Plan																				
	Ver.1																				
	Actual																				
Reports/Documents																					
Project Completion Report	Plan																				
	Ver.1																				
	Actual																				

*Note : This activity corresponds to not only output 1 but also output 2 and 3.

Remarks



Actual implementation.
Preparation, revision and action upon request or proposal.

Minutes of 2nd JCC

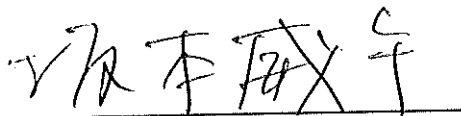
THE MINUTES OF JOINT COORDINATION COMMITTEE MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
AND
MINISTRY OF ROAD TRANSPORT & HIGHWAYS (MORTH)
ON
CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN MOUNTAINOUS REGIONS

In accordance with Section No. 6, Point No. 3 of the Record of Discussions of "Capacity Development Project on Highways in Mountainous Regions (hereinafter referred to as "the Project")" signed on December 31, 2015 between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Ministry of Road Transport and Highways (hereinafter referred to as "MoRTH"), a Joint Coordination Committee (JCC) meeting (hereinafter referred to as "the Meeting") was held in the Room No.419, 4th Floor, MoRTH, New Delhi on April 28, 2017.


The purpose of the meeting was to review the progress of the Project and also discuss the semi-annual activities after the Meeting and other related issues of the Project.

As a result of the discussions, both sides mutually agreed upon the matters referred to in the documents attached hereto.

New Delhi, April 28, 2017



TAKEMA SAKAMOTO
Chief Representative
India Office
Japan International Cooperation Agency



MANOJ KUMAR
Director General (Road Development) &
Special Secretary (DG(RD)&SS)
Ministry of Road Transport and Highways

Minutes of the meeting of the Joint Coordination Committee (JCC)

Date: April 28, 2017

Time: 14.30- 15.30 hrs

Venue: The Room No.419, 4th Floor, Transport Bhawan, New Delhi

Representatives from Indian Side

- 1) Mr. Manoj Kumar, DG (RD) & SS, MoRTH - Chairperson
- 2) Mr. T.T. Negi, CE (P-1), MoRTH
- 3) Mr. A.K. Srivastava, CE (P-2), MoRTH
- 4) Mr. I.K. Pandey, CE (P-4), MoRTH
- 5) Mr. Sudip Chaudhuary, CE (Planning), MoRTH
- 6) Mr. A.P. Pathak, CE (Monitoring), MoRTH
- 7) Mr. A. D. James, Deputy Secretary (IC), MoRTH
- 8) Mr. Kishor Chandwani, SE (EAP), MoRTH – Project Manager
- 9) Mr. M.K. Jain, CGM (T), NHAI
- 10) Mr. Rajender Kumar, GM (T), NHAI
- 11) Mr. Rahul Gupta, ED-II, NHIDCL – Co-Project Manager
- 12) Mr. Yogesh Chandra Srivastava, GM (T), NHIDCL
- 13) Mr. Ashok Kumar Gupta, GM (T), NHIDCL
- 14) Mr. V.L. Patankar, Director, IAHE

Representatives from Japanese Side

- 1) Mr. Takayoshi Tange, Senior Representative, JICA India office – Co-Chairperson
- 2) Mr. Shu Moriyama, Chief Advisor / Highway Development
- 3) Mr. Denichiro Yamada, JICA Expert for Highway Engineering
- 4) Mr. Hidetaka Sakabe, Acting Director, JICA Headquarter
- 5) Mr. Anurag Sinha, Lead Development Specialist, JICA India Office
- 6) Mr. Kiyoshi Furuhashi, Counsellor, Embassy of Japan in India– Observer

MINUTES:

- 1) Mr. Manoj Kumar, DG (RD) & SS, MoRTH extended a warm welcome to the Japanese delegates and the meeting started with the introduction of the representatives.
- 2) Mr. Tange, Senior Representative, JICA India Office thanked MoRTH for continuous cooperation of the Project and reiterated that the Project is a joint undertaking between MoRTH and the Japanese side.

3) Overall goal and OVI

Both Japanese and Indian sides concurred that there shall be no change in the overall goal of the project. It was also agreed that the objectively verifiable indicator (OVI) of the overall goal of the project shall be modified to state that at least **4 sections** (as opposed to 3 sections in the original project Design Matrix) of road development projects are planned/constructed/improved by using the guidelines developed by the project. Both sides also agreed that the Project Design Matrix (PDM) (Version.1) shall be revised to indicate the modification in the OVI of overall goal of the Project. The revised PDM is attached as the "Appendix 1".

The JCC also decided that these sections shall be selected from West Bengal, North East Region (NER) of India, North India and South India.

4) Monitoring sheet

Both sides concurred the contents of the Monitoring sheet (Version.1) attached as the "Appendix 2". Both sides also concurred that the Monitoring sheet (Version.1) will be submitted to Chief Representative of JICA India office from chief adviser on behalf of the Project team.

In addition, Japanese side proposed that the Monitoring sheet (Version.1) will also be submitted to DG (Road) & SS, MoRTH from the Project team. The Indian side agreed to it.

5-1) Work plan - Selection of Case Study Sites

The JICA experts requested the Indian side to select sites as case studies for the project. The JCC agreed with the shortlisting of NH-55 (Siliguri to Darjeeling) and NH-10 (Sevoke to Sikkim) in West Bengal, NH-40 (Shillong to Dawki) in Meghalaya, NH-707A (Mussoorie to Chamba) in Uttarakhand and NH-310A (Mangan to Nakura) in Sikkim.

The Indian side proposed 3 (three) additional sites namely "Kiratpur to Ner Chowk on NH21" and "Ner Chowk to Manali on NH21" in implementation stage and "Pathankot to

Mandi on NH20” in planning stage” that could be included in the Project from NHAI. The Indian side stated that the case study sites from South India will be proposed at the earliest. The Japanese side agreed to it.

The Japanese side also requested to NHIDCL to replace the proposed site in Arunachal Pradesh state due to security issues and travel restrictions for Japanese Nationals in Arunachal Pradesh. The Indian side agreed to the request of the JICA Experts..

5-2) Work plan – Activities on this half year

The JICA experts explained that the following activities will be conducted on this half year (April to September, 2017).

- To designate case study sites and conduct site visits of the sites.
- To conduct 1st training and prepare 2nd training on October or November, 2017
- To dispatch Japanese short term experts additionally and start to develop new guidelines etc.

Both side agreed to the above work plan.

6) Program of country-focused training in 2017

The JICA experts stated that, as agreed in the 1st JCC meeting, the 1st country-focused training will be conducted in collaboration with IAHE to enable the training participants to compare situations/issues/problems of Indian and Japanese mountainous highways.

The JICA experts informed that the Kiratpur to Ner chowk section on NH21 has been selected as the construction site of typical mountainous highway project to be visited during the training session in India as the construction work is at peak at this site and the scope of work includes tunnels, high pier bridges, slope protections and high embankment etc.

The JICA experts also announced that the kick-off meeting of the training will be held at IAHE on 16th May and the wrap-up meeting will be held on 6th June. Mr. Patankar, Director, IAHE invited the MoRTH officials and other engineers from NHAI and NHIDCL to participate in the kick-off meeting and the wrap-up meeting.

7) Project Co-Manager of NHAI

The JICA experts proposed that Chief General Manager (CGM) of NHAI in charge of Jammu & Kashmir (J&K) and Himachal Pradesh (HP) states could also be assigned as Project Co-Manager as NHAI has many ongoing mountainous highway projects in J&K and HP states. The JCC agreed to the proposal of the JICA experts.

8) Office Space for Japanese Short Term Experts

Japanese side explained the current plan of newly coming 7 (seven) Japanese short term experts who will be assigned 3 (three) years (August 2017 to July 2020) and will stay in India and Japan alternately.

Therefore Japanese side requested the Indian side to provide adequate office space with basic facilities and equipments for Japanese short term experts from August 2017 in MoRTH/NHIDCL/NHAI. The Indian side agreed to consider taking necessary action and requested the Japanese side to prepare detailed plan of the assignment of Japanese short term experts.

9) It was discussed that the next JCC meeting will be held in October, 2017.

10) The meeting ended with a Vote of Thanks to the Chair.

Appendixes:

- Appendix 1 : Project Design Matrix (Version.2)
- Appendix 2 : Monitoring sheet (Version.1)

Project Design Matrix (Version.1 / Version.2)

Project Title: Capacity Development Project on Highways in Mountainous Regions

Target Group: Officers of MoRTH, NHAI, NHIDCL and PWD

Period of Project: April 2016 – March 2021 (5 years)

Project Site: Whole of India

Dated: December 14th, 2016

Dated: April 28th, 2017

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<p>Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project. OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report Contract Document Completion Report by the operation and maintenance contractor</p>	
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project. PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.</p>
<p>Outputs Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019. 1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Survey and planning guidelines Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>
<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019. 2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019. 2-3 High pier bridge guideline is completed by June 2019. 2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p>Improved tunnel guideline, Project records Earthwork guideline, Project records High pier bridge guideline, Project records Project records</p>	
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020. 3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Operation and maintenance guideline, Project records Project records</p>	

Activities	Inputs		Important Assumption
	The Japanese Side	The Indian Side	
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Tunnel - Tunnel Facilities - Earthwork - Bridge - Monitoring and Evaluation - Other Fields, as necessary</p> <p>(2) Training for Counterpart Personnel (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment Equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterpart Personnel - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts (4) Pilot Project Cost, if required construction works.</p>	<p>Important Assumption</p> <p>- Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Condition Counterpart personnel from the relevant organizations are assigned immediately after the Project starts.</p>

**Note: The number of projects will be discussed and confirmed in the 1st JCC Meeting.

**Note : This activity corresponds to not only output 1 but also output 2 and 3.

TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions
Version of the Sheet: Ver.1 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Kishor Chandwani

Shu MORIYAMA

Title: Superintending Engineer (EAP)

Chief Advisor

Submission Date: 28th/Apr/2017

I. Summary

1 Progress

1-1 Progress of Inputs

(1) Inputs from JICA

Long Term Experts

Shu MORIYAMA,

Long Term Expert, Chief Advisor / Highway Development, 2016.11-

Denichiro YAMADA,

Long Term Expert, Highway Engineering / Coordinator, 2016.4-

(2) Inputs from MoRTH, Gol

[MoRTH]

Manoj Kumar, Chairperson, 2017.3-

S. N. Das, Chairperson, 2016.12-2017.2

Leena Nandan, Project Director, 2016.12-

Kishor Chandwani, Project Manager, 2016.12-

[NHAI]

B. S. Singla, Project Co-Manager, 2016.12-

[NHIDCL]

Rahul Gupta, Project Co-Manager, 2016.12-

1-2 Progress of Activities

(1) Conduct model activities such as training, including collaboration with Indian Academy for Highway Engineer (IAHE)

- Program of Training for Counter Personnel collaborated with IAHE was drafted.

(2) Conduct field surveys to the typical mountainous highways.

- Field surveys in NH55, NH40 and others are being conducted.

1-3 Achievement of Output

N/A

1-4 Achievement of the Project Purpose

N/A

1-5 Changes of Risks and Actions for Mitigation

N/A

1-6 Progress of Actions undertaken by JICA

Actions undertaken by JICA were carried out as planned.

1-7 Progress of Actions undertaken by MoRTH, Gov. of India

Actions undertaken by MoRTH, Gov. of India were carried out as planned.

1-8 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

N/A

2 Delay of Work Schedule and/or Problems (if any)

N/A

3 Modification of the Project Implementation Plan

N/A

4 Preparation of MoRTH Gov. of India toward after completion of the Project

N/A

II. Project Monitoring Sheet I & II as Attached

Project Monitoring Sheet I (Revision of Project Design Matrix)

Version 1
Dated 28th,4,2017

Project Title: Capacity Development Project on Highways in Mountainous Regions
Implementing Agency: Ministry of Road Transport and Highways (MoRTH)
Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD
Period of Project: Apr, 2016 – Mar, 2021 (Five (5) years)

Model Site:		Means of Verification		Important Assumption		Achievement		Remarks	
Narrative Summary		Objectively Verifiable Indicators		Detailed Project Report (DPR) / Feasibility Study Report					
<p>Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p>	<p>OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project</p>	<p>Contract Document Completion Report by the operation and maintenance contractor</p>						
	<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project.</p> <p>PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p> <p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH</p> <p>- Government policy to develop mountainous highways will not change.</p> <p>- MoRTH has enough finance to develop mountainous highways.</p>				
<p>Outputs Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p> <p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p> <p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways.</p> <p>2-1 Improved tunnel guideline is completed by June 2019.</p>	<p>Survey and planning guidelines</p> <p>Project records</p> <p>Improved tunnel guideline, Project records</p>	<p>Survey and planning guidelines</p> <p>Project records</p> <p>Improved tunnel guideline, Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>					
	<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p> <p>2-3 High pier bridge guideline is completed by June 2019.</p> <p>2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p> <p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p> <p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous</p>	<p>Earthwork guideline, Project records</p> <p>High pier bridge guideline, Project records</p> <p>Project records</p> <p>Operation and maintenance guideline, Project records</p> <p>Project records</p>	<p>Earthwork guideline, Project records</p> <p>High pier bridge guideline, Project records</p> <p>Project records</p> <p>Operation and maintenance guideline, Project records</p> <p>Project records</p>					

Activities	The Japanese Side	The Indian Side	
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <Short-term Experts/Consultants> - Tunnel - Tunnel Facilities - Earthwork - Bridge - Monitoring and Evaluation - Other Fields, as necessity</p> <p>(2) Training for Counterpart Personnel (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterpart Personnel - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>- Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterpart personnel from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures></p> <p>Office space of Short-term Experts/Consultants will be secured in MoRTH/NHAI/NHIDCL.</p>

Task	FY 2016		FY 2017				FY 2018				FY 2019				FY 2020				Remarks	Issue	Solution	
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV						
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.																			Standards is being collected and is being reviewed (TN manual etc.).			
2.2 Improve a tunnel guideline.																				Superintending Engineer (EAP) MoRTH		
2.3 Develop an earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).																				Superintending Engineer (EAP) MoRTH		
2.4 Develop a high pier bridge guideline.																				Superintending Engineer (EAP) MoRTH		
Output 3: Guideline on operation and maintenance for mountainous highways is developed.																						
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.																				Superintending Engineer (EAP) MoRTH		
3.2 Develop an operation and maintenance guidelines for mountainous highways including issues on disaster management.																				Superintending Engineer (EAP) MoRTH		
Duration / Phasing																						
Monitoring Plan																						
Monitoring																						
Joint Coordination Committee																						
Set-up the Detailed Plan of Operation																						
Submission of Monitoring Sheet																						
Reports/Documents																						
Project Completion Report																						
Public Relations																						

Minutes of 3rd JCC

JICA (ID) 29 - 867
December 28, 2017

Mr. Manoj Kumar
DG (RD) & SS,
MoRTH,
New Delhi

Sub: Capacity Development project on Highways in Mountainous Regions

Dear Mr. Kumar,

This has reference to the meeting of the Joint Coordination Committee (JCC) of the captioned project held on October 11, 2017. We have received the Minutes of the JCC meeting, which has already been signed by you on behalf of MoRTH.

We have also signed the minutes and are retaining one set of the signed document and are returning the second set of the signed minutes to MoRTH for your reference and records.

Your kind cooperation in the matter shall be highly appreciated.

Yours sincerely,



Takayoshi Tange
Senior Representative

CC:

Mr. Shu Moriyama, Chief Advisor for Highway Development

Enclosure:

- 1) Signed Minutes of JCC Meeting

THE MINUTES OF JOINT COORDINATION COMMITTEE MEETING

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

AND

MINISTRY OF ROAD TRANSPORT & HIGHWAYS (MORTH)

ON

CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN MOUNTAINOUS REGIONS

In accordance with Section No. 6, Point No. 3 of the Record of Discussions of "Capacity Development Project on Highways in Mountainous Regions (hereinafter referred to as "the Project")" signed on December 31st, 2015 (hereinafter referred to as "R/D") between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Ministry of Road Transport and Highways (hereinafter referred to as "MoRTH"), a Joint Coordination Committee (JCC) meeting (hereinafter referred to as "the Meeting") was held at Conference hall, Ground floor, Transport Bhawan, New Delhi on October 11th, 2017.

The purpose of the meeting was to review the progress of the Project and also discuss the semi-annual activities after the Meeting and other related issues of the Project.

As a result of the discussions, both sides mutually agreed upon the matters referred to in the documents attached hereto.

New Delhi, October 11th, 2017



TAKAYOSHI TANGE

Senior Representative
India Office
Japan International Cooperation Agency



MANOJ KUMAR

Director General (Road Development) &
Special Secretary (DG(RD)&SS)
Ministry of Road Transport and Highways

Minutes of the Joint Coordination Committee (JCC) meeting

Date: October 11th, 2017

Time: 15.00PM - 17:00PM

Venue: Conference Hall, Ground Floor, Transport Bhawan, New Delhi

Representatives from Indian Side

- 1) Mr. Manoj Kumar, DG (RD) & SS, MoRTH - Chairperson
- 2) Mr. Amit Kumar Ghosh, JS (EAP), MoRTH - Project Director
- 3) Mr. Sudip Chaudhury, CE (Planning), MoRTH
- 4) Mr. T.T. Negi, CE (P-1), MoRTH
- 5) Mr. Khushal Chand, SE (EAP), MoRTH - Project Manager
- 6) Mr. Sanjeev Kumar, SE (S&R(Pavements & Bridges)), MoRTH
- 7) Mr. M.S. Sisodia, SE (Monitoring), MoRTH
- 8) Mr. Saurabh Singh, AEE (EAP), MoRTH
- 9) Mr. Ajmer Singh, CGM (T), NHAI
- 10) Mr. Nishoo Gupta, GM (HP, J&K), NHAI
- 11) Mr. Vinay Kumar Singh, ED-IV, NHIDCL
- 12) Mr. Ashok Kumar Gupta, GM (T), NHIDCL

Representatives from Japanese Side

- 1) Mr. Yoshiyuki Mihoki, Senior Advisor to the Director General, JICA HQ
- 2) Mr. Takayoshi Tange, Senior Representative, JICA India office
- 3) Ms. Kanako Senda, Assistant Director, JICA HQ
- 4) Mr. Anurag Sinha, Lead Development Specialist, JICA India Office
- 5) Mr. Norihito Kaigai, Representative, JICA India Office
- 6) Ms. Mizuki Kaneda, JICA India Office
- 7) Mr. Shu Moriyama, Chief Advisor / Highway Development
- 8) Mr. Denichiro Yamada, JICA Expert for Highway Engineering
- 9) Mr. Yoshinori Kawamura, Team Leader / Slope Protection I
- 10) Mr. Takayuki Mayumi, Slope Protection III / High Embankment
- 11) Mr. Michiya Kitayama, Maintenance & Operation of Mountain Roads

- 12) Mr. Masaaki Goto, Plan and Survey Mountain Roads / Coordinator
- 13) Ms. Cleopatra Panganayi, Monitoring / Evaluation
- 14) Mr. Kiyoshi Furuhashi, Counsellor, Embassy of Japan in India - Observer

MINUTES:

1) Introduction

Mr. Manoj Kumar, DG (RD) & SS, MoRTH, the Chairman of the Meeting, opened the Meeting by welcoming all delegates and the Meeting started with the introduction of the participants.

Mr. Takayoshi Tange, Senior Representative, JICA India Office expressed his appreciation to MoRTH for their continuous cooperation of the Project and reiterated that the Project is a joint undertaking between MoRTH and the Japanese side.

2) Activities of JICA short term experts

Mr. Yoshinori Kawamura, the Leader of JICA short term experts team (hereinafter referred to as "the Team") expressed his appreciation to all delegates for the support to the team, and introduced the short term experts who were dispatched to India through the Project in September 2017.

The Team submitted their work plan in the coming 3 years to the JCC, which is attached as the "Attachment 1" and explained its outline as shown in below.

- Preparation of the guidelines listed in the Project Design Matrix (PDM)
- Implementation of model activities
- Approach for guidelines preparation
- Timeline of the activities of the Team

The Team emphasized that the contributions for the preparation of guidelines from Indian side is vital and also requested for the participation of engineers from the Indian side. The Indian side agreed to it and the JCC made no objection to the work plan for short term experts.

3) Project Design Matrix (PDM)

The Japanese side explained that the Team consists of 11 experts with different areas of expertise instead of 5 experts which originally agreed as the short term experts input by Japanese side on the PDM.

Both Japanese and Indian sides agreed that the short term experts input by Japanese side on PDM is revised to meet the current assignment of the Team. The revised PDM is attached as the "Attachment 2".

4) Monitoring Sheet (Version. 2)

The JICA experts described the activities of the JICA experts in the last 6 months i.e. April 2017 to September 2017. The outline of the activities is shown below.

- Field survey: Conducted 3 out of 10 case study sites and other sites upon the request from Indian side
- Joint training: Completed 1st training and drafted the program of 2nd training
- Technical guidelines: Collected existing information and being drafted the framework of the new guidelines
- Japanese experts: Dispatched new Japanese short term experts

Both sides concurred with the Monitoring sheet (Version.2) attached as "Attachment 3", which summarized the activities in the previous half year. Both sides also concurred with the submission of the Monitoring sheet (Version. 2) to Chief Representative, JICA India office, and DG (RD) & SS, MoRTH by the Project team.

5) Work Plan on this half year (October 2017 to March 2018)

The JICA experts explained that the following 5 major activities will be conducted in this half year i.e. October 2017 to March 2018.

Both sides agreed to the following work plan.

(1) Field Survey

The JICA experts described the following 10 typical mountainous highway projects designated by Indian side. The JICA experts also explained to conduct field surveys and discussions with site engineers on 8 out of 10 sites in this half year.

- | | |
|---------------------------------|------------------------|
| - NH55 (Siliguri to Darjeeling) | West Bengal state |
| - NH10 (Sevoke to Sikkim) | West Bengal state |
| - NH707A (Mussoorie to Chamba) | Uttarakhand state |
| - NH21 (Kiratpur to Ner chowk) | Himachal Pradesh state |
| - NH21 (Ner chowk to Manali) | Himachal Pradesh state |
| - NH20 (Pathankot to Mandi) | Himachal Pradesh state |
| - NH48 (Shiradi Ghat section) | Karnataka state |
| - NH62 (Assam border to Dalu) | Megalaya state |
| - NH310A (Mangan to Nakura) | Sikkim state |
| - NH40 (Shillong to Dawki) | Megalaya state |

The JCC concurred with these sites as the case study sites of the Project. However, it was also agreed that revisions to the above mentioned sites could be made through mutual discussions by the both sides.

(2) 2nd Joint Training in 2017

The JICA experts informed that the 2nd country-focused training (hereinafter referred to as “the Training”), comprising lectures and site visits, is scheduled to be conducted in collaboration with IAHE following the same framework established for the 1st country-focused training. The Experts informed that training consists of 3 sessions covering India session from October 24th to October 27th (4 days), Japan session from October 30th to November 10th (12 days) and the post training session on November 13th (1 day), and that a total of 10 engineers (4 from MoRTH, 1 from NHAI and NHIDCL respectively, 4 from state PWDs) have been nominated to participate from Indian side.

The JICA experts invited MoRTH officials and other engineers from NHAI and NHIDCL to participate in the kick-off meeting of the Training at IAHE on October 24th, and the wrap-up meeting at Transport Bhawan on November 13th. The Indian side agreed to support the program and participate in the aforementioned meetings.

(3) Technical Guidelines

The JICA experts stated that the framework of the new technical guidelines including development of the table of contents shall be deeply discussed with the Indian side and shall be submitted for approved in the next JCC meeting in April 2018. The JICA experts again reiterated the need for deep cooperation between the Indian side and Japanese side to realize relevant outputs under the Project.

(4) Invitation Program in Japan

The JICA experts informed that the invitation programme (hereinafter referred to as “the Programme”) for 6 high ranking officials from the Indian side and the 4th meeting of the Japan-India joint working group on roads and road transport between the ministries of both countries are scheduled from November 6th to November 8th, 2017. The Experts stated that the participants shall consist of 6 high ranking officials from MoRTH, NHAI, NHIDCL and Department of Economic affairs, Ministry of Finance and that the aim of the Programme is to deepen understanding about the technical cooperation project, policies and technologies on roads and road transport as well as JICA's Yen loan projects. The JCC took note of the Programme.

(5) Other Activities

The JICA experts explained that other activities as necessary are conducted under the Project and this includes participation and presentation at the 78th IRC annual session in Bangalore (November 3rd to November 6th).

6) Project Members of Indian Side

The JICA experts announced that the following new assignment of the Project members from Indian side due to the personnel shifts of MoRTH and NHAI.

- Project Director: Mr. Amit Kumar Ghosh, JS (EAP), MoRTH
- Project Manager: Mr. Khushal Chand, SE (EAP), MoRTH
- Co-Project Manager: Mr. Navin Kumar, CGM (T), NHAI

The changes were concurred by the JCC.

7) Dedicated Counterparts assigned for the Project

The JICA experts requested the Indian side to assign the dedicated counterparts for the Project in order to develop the technical guidelines as well as to transfer the technologies to be involved in the new guidelines.

The Indian side responded that it was difficult to assign the dedicated counterparts. However Mr. Sanjeev Kumar, the representative of S&R (Pavements & Bridges) section of MoRTH was nominated by the Chairman to ensure active involvement of officials from MoRTH in the Project activities. Both sides agreed to discuss the issue further more.

8) Office space of the Project

The JICA experts requested the Indian side to provide appropriate office space for JICA experts including 10 to 12 short term experts from January 2018, when most of the short term experts are to be dispatched again to India. The Indian side agreed to secure the office space for JICA experts near Transport Bhawan including NHIDCL and to inform JICA about the same by December 2017.

9) Participation of Indian Officers in the Monthly Technical Group Meetings

The JICA experts reiterated to the Indian side about the necessity of participation of the Indian officers in the monthly technical group meetings during the course of guidelines preparation. The Indian side agreed to the request of the Experts.

10) Findings of the Team

The team Leader of the Short Term Experts shared his initial impression about the Project and highlighted the following points:

- Both similarities and differences exist in Japanese and Indian approach to mountainous highways
- Despite the differences, Japanese technologies can be applied to Indian highway constructions with appropriate modifications, including mountainous highways
- Selection of appropriate technologies is a process that requires careful consideration

The JICA experts suggested that after the new guidelines have been developed, pilot projects could be taken up by adopting the specifications indicated in the guidelines and the results could be disseminate to all relevant agencies and departments.

11) Other Issues Discussed

(1) Application of Relevant Aspects of NH 55 Feasibility Study to this Project

The JICA India office proposed to the Indian side to review the feasibility study report of NH55, which was developed by the Japanese side and is closely related to this technical Cooperation project. The JICA experts suggested that a seminar can be organized in which the state of the art technologies, including the technologies proposed in the NH 55 report, can be shared with the Indian side. The Indian side agreed to the proposal of the JICA Experts.

(2) Cost Implication of the Japanese Technologies

The Indian side enquired about the cost implication of introducing the new Japanese technologies in comparison to the technologies currently in use in India. The JICA experts highlighted that, based on the feasibility study of NH55, it can be stated that while the technologies are different, the cost of using state of the art technologies from Japan are comparable to the technologies currently in use in India.

12) Closing

Mr. Takayoshi Tange, concluded his remarks by announcing the date of the next JCC meeting. The next JCC meeting is to be held in April 2018 and the Indian side is to fix the actual date.

The meeting ended with a Vote of Thanks to the Chair.

Attachments:

- Attachment 1 : Work Plan for Short Term Experts
- Attachment 2 : Project Design Matrix (PDM) (Version.3)
- Attachment 3 : Monitoring Sheet (Version.2)

**Ministry of Road Transport
and Highways
Republic of India**

**Japan International
Cooperation Agency (JICA)**

Capacity Development Project on Highways in Mountainous Regions

Work Plan for Short Term Experts

September 2017

**Oriental Consultants Global Co., Ltd.
Kokusai Kogyo Co., Ltd.
East Nippon Expressway Co., Ltd.
Japan Conservation Engineers Co., Ltd.**

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List of Abbreviations and Acronyms

BRO	Border Roads Organization
C/P	Counterpart
C/R	Completion Report
EPC	Engineering, Procurement and Construction contract
GNSS	Global Navigation Satellite System
GoI	Government of India
IAHE	Indian Academy for Highway Engineer
JCC	Joint Coordination Committee
JICA	Japan International Cooperation Agency
MoRTH	Ministry of Road Transport and Highways
MS	Monitoring Sheet
NHDP	National Highways Development Project
NHIDCL	National Highways and Infrastructure Development Corporation Ltd.
OJT	On-the-Job Training
OSV	On Site Visualization system
PDM	Project Design Matrix
PO	Plan of Operation
PPP	Public Private Partnership
PWD	Public Works Department
R/D	Record of Discussion
TG	Technical Group
TOT	Training of Trainers
WP	Work Plan

CHAPTER 1 INTRODUCTION

1.1 Project Outline

The outline of the project is shown in Table 1-1. The short-term experts mainly engage in Output 1 and 2 and work closely with the long-term experts for the whole project. Review and analyze existing technologies by October 2017 and prepare technical guidelines by March 2019. The Project carries out model activities until around March 2020, and finalizes the guidelines from April 2020. The details of the model activities will be materialized while proceeding with the Project to ensure its flexibility.

Table 1-1: Outline of the Project

Overall Goal	Mountainous highways are properly developed and maintained by using guidelines developed by the Project
Project Purpose	Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.
Outputs	
Output 1	Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed.
Output 2	Guidelines on design and construction for mountainous highways are developed.
Output 3	Foundation for operation and maintenance for mountainous highways is built.
Activities	
Activities for Output 1	
1-1	Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests
1-2	Conduct field surveys to the typical mountainous highways.
1-3	Improve survey and planning guidelines on mountainous highways.
1-4	Examine suitable contract system and management on mountainous highways after reviewing existing issues.
1-5	Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)
Activities for Output 2	
2-1	Collect and analyze existing design and construction standards for mountainous highways, and identify issues.
2-2	Improve a tunnel guideline.
2-3	Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).
2-4	Develop a high pier bridge guideline.
Activities for Output 3	
3-1	Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.
3-2	Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.
Project Objective Areas	
	Whole India. (Main activities are implemented at MoRTH, NHAI and NHIDCL)

CHAPTER 2 APPROACH AND METHODOLOGY

2.1 Approach

Figure 2-1 shows the project approach which consists of 2 main approaches. Approach 1 is to develop useful guidelines in consideration of the local situations of mountainous roads in India, and Approach 2 is to effectively transfer the technologies based on the guidelines to be developed. Each approach comprises three sub-approaches. The details are presented in the following sections.

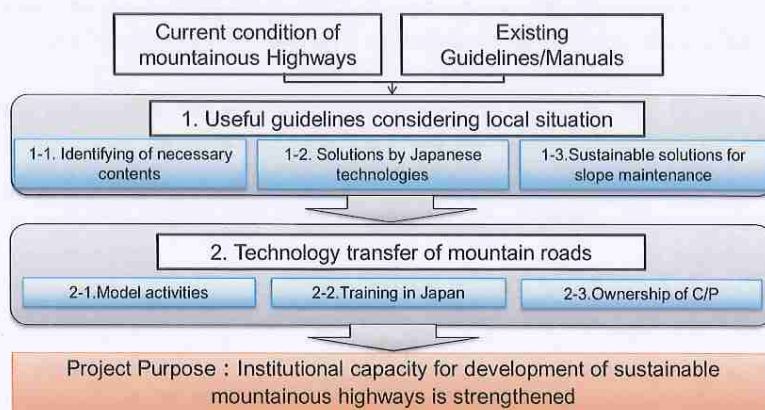


Figure 2-1: The Project Approach

2.1.1 Approach 1: Development of useful and practical guidelines/manuals in consideration of local conditions of mountainous roads in India

This section presents sub-approach 1-1 ~ 1-3 which constitute Approach 1 “Development of useful and practical guidelines/manuals in consideration of local conditions of mountainous roads in India”.

(1) Sub-approach 1-1: Identify necessary contents

The project team, in collaboration with counterpart engineers in India, develops the guidelines to address the challenges of mountainous roads in India with the introduction of high-quality technology in consideration of the current conditions. The guidelines of India, Japan, and other countries where mountain roads technology has been developed are reviewed to incorporate charts, specific design methods and calculation examples into the newly-developed guidelines. The counterpart engineers and the project team determine the content of guidelines through discussion as well as current situation analysis including site surveys.

In regards to maintenance and operations, concept of preventive maintenance is to be considered to minimize life cycle cost and to extend the lives of structures by using management system and preparing adequate maintenance plan.

(2) Sub-approach 1-2: Extract applicable Japanese technologies

The existing guidelines for slope protection in India are generally based on the technologies of Europe where the geology is relatively stable and the climate is cool and dry. However, these guidelines may be unsuitable for areas where the orogeny is active in hot and humid climate such as mountainous areas in India. Conversely, Japan has developed numerous slope protection technologies under high temperature, humid climate and active fault movement. Such Japanese technologies are expected to contribute to address the challenges in mountainous roads in India.

(3) Sub-approach 1-3: Introduce sustainable solutions

Rainfall is one of the major causes for landslide disasters. Rainfall monitoring is an essential element to take preventive actions against the disasters. The Project Team proposes to introduce the equipment for monitoring rainfall and to conduct trials to examine the effectiveness of equipment in India. Such introduction of rainfall monitoring equipment on mountain roads will be the first step for technology transfer to establish a sustainable early warning system against landslide disasters.

Introduction of equipment will be determined through discussion between Indian counterpart engineers and the JICA project team in consultation with the JICA Headquarters.

2.1.2 Approach 2: Technology transfer and capacity development for counterpart engineers and officials in the relevant organizations

This section presents sub-approach 2-1 ~ 2-3 which constitute Approach 2 “Technology transfer and capacity development for counterpart engineers and officials in the relevant organizations”.

(1) Sub-approach 2-1: Utilize model activities

The JICA Project Team regards not only model activities after guidelines preparation but also On-the-Job Training (OJT) and seminars to be conducted after the commencement of project as part of model activities. Technology transfer is conducted through such activities by actively assisting the long-term experts.

It is proposed that the counterpart engineers and the JICA Project Team jointly conduct a field survey as a part of OJT and extract challenges on mountainous road development. As a technology dissemination measure, a series of seminars are to be held in collaboration with IAHE and technology is transferred by implementing such activities.

The ideas for model activities are shown in Table 2-1. The model activities will be materialized through discussion between the counterpart engineers and the JICA Project Team in light of the requirement for capacity development and technology transfer.

Table 2-1: Ideas of Model Activities

1)	In the model sites selected to apply the draft guideline, through implementation of the activities, identify points to improve from the draft guideline.
2)	Conduct maintenance and operations in the model sites to experience the methodologies for monitoring and management by using equipment procured in the Project.
3)	Convene a series of seminars, of which participants are expected to be MoRTH, NHAI, NHIDCL, Public Works Department (PWD) in each region, consultant, contractors, etc., in collaboration with IAHE to introduce and disseminate the guidelines developed.

(2) Sub-approach 2-2: Utilize trainings in Japan

Trainings in Japan are prime opportunities for participants to experience the cutting-edge technologies and knowledges which are not available in India.

(3) Sub-approach 2-3: Encourage the ownership of the counterparts

The overall goal of the project is not only to formulate guidelines but also to improve the capacity for mountain road development technology using them as well as to create the benefits for road users and residents along the roads by construction of high-quality mountain roads. Many states in India have mountain roads, and a huge number of organizations are related to development of mountainous roads. Therefore, even after the completion of the project, it is required to continue the dissemination of the technologies and research for mountain roads. In order to realize the above objectives, it is essential to secure the ownership of the counterparts and to create a sustainable technical transfer system.

The Training of Trainers (TOT) system is proposed to formulate a sustainable technology transfer framework. For instance, “Meister Certificate Program” is launched to educate lecturer-class engineers for mountainous road development as shown in Figure 2-2. Those “meisters” will transfer the technologies to PWD, Border Roads Organization (BRO), consultants and relevant organizations to disseminate the technologies. The full-time counterpart for the project is supposed to be the very first “meisters”. To realize such system, cooperation from Indian side is required.

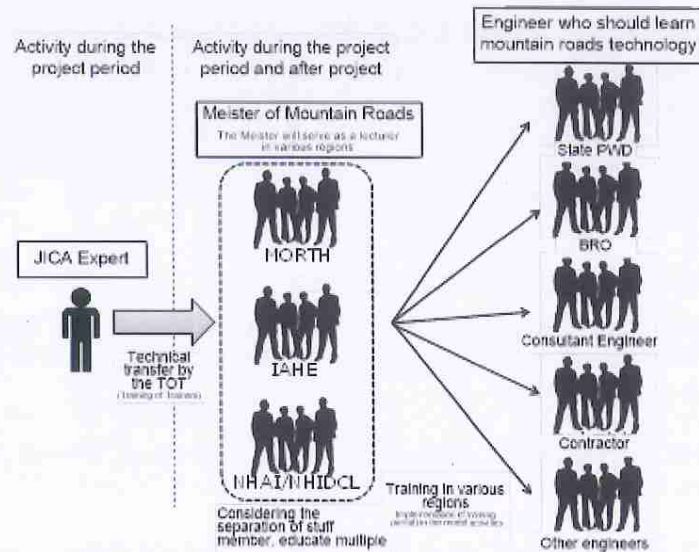


Figure 2-2: Image of Training of Trainers (TOT)

2.2 Methodology

This chapter presents the methodologies for each activity to achieve the project purpose.

2.2.1 Activities of Short Term Experts

Task 1 ~ 7 are the activities to manage and monitor the Project. The respective methodologies are described in the following sections.

Task [1]: Prepare and Discuss the Work Plan and Monitoring Sheets

The contents and schedule of the project are discussed among C/P, long-term experts and short-term experts of JICA Project Team after reviewing the existing reports and documents. The Work Plan (WP) for whole project and the Monitoring Sheet (MS) Ver.2 are prepared by JICA Project Team in cooperation with C/P. The W/P for short-term experts is presented in Joint Coordination Committee (JCC). MS is updated every six months and submitted to the JICA India Office.

Task [2]: Convene Joint Coordination Committee (JCC)

JCC is held in April and October every year at the initiative of C/P. Additional JCC may be held if necessary. DG (RD) & SS of MoRTH chairs the JCC. The objectives of JCC are shown as follows;

- ✓ To discuss and approve the Work Plan (for whole project) based on the PDM
- ✓ To monitor the progress of the project, and modify the PDM and the plan if necessary.

- ✓ To discuss critical topics for implementation of the project.

Task [3]: Convene Technical Group (TG)

The TG members are organized by the engineers from the main C/P. The relevant organizations are invited if necessary. The objectives are to discuss technical matters and to develop the guidelines. TG is held once a month. TG is expected to play important roles to discuss essential technical challenges and to disseminate the guidelines to the country. The short-term experts cooperated with the long-term experts assist the counterpart to convene TG.

Task [4]: Assist the Implementation of Training in Japan

The trainings in Japan are planned to be held five times during the project period of 5 years. Approximately 10 participants and two weeks of duration in one time are expected. The first training was held in May 2017 and the second will be in November 2017. Other trainings in Japan are conducted yearly basis. The short-term experts assist the two long-term experts to plan content and schedule of the trainings.

Task [5]: Monitor the Project

Monitoring Sheets (MS) are prepared in collaboration of the counterparts and the JICA Project Team based on the result of regular monitoring of project progress such as activities conducted, challenges, impacts, etc.

MS is prepared in April and October every year followed by its presentation in JCC for the approval. The finalized MS is submitted to the JICA India office.

The preparation of MS is initiated by the the JICA Project Team and counterpart engineer prepare his/her responsible section. In case necessity of revision of PDM is recognized through monitoring activities, JCC discusses the content of PDM in consultation with JICA.

Task [6]: Conduct Public Relations

The various activities such as the field visit and the model activities are supposed to disseminate through media. The JICA Project Team also discusses PR methods with C/P, such as posting the activities of the project on the official website of MoRTH and the annual report published by MoRTH. SNS sites such as Facebook and YouTube may be used for public relations.

Task [7]: Prepare The Project Completion Report

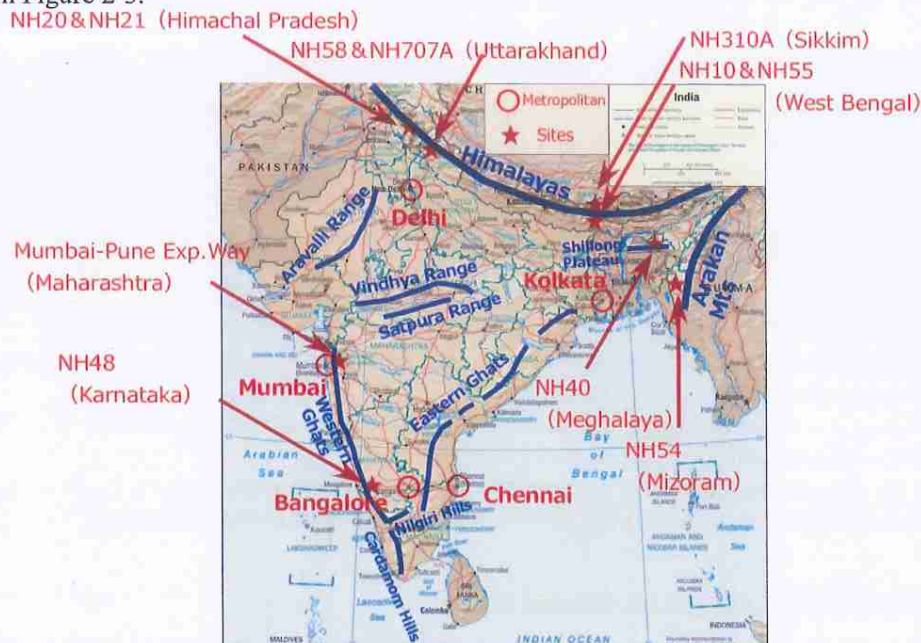
The project completion report is prepared on the completion of the project in cooperation with the long-term experts

2.2.2 Activities for Output 1, 2, and 3

Task 8 ~ 13 are the activities to produce "Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed.", "Output 2: Guidelines on design and construction for mountainous highways are developed." and "Output 3: Foundation for operation and maintenance for mountainous highways is built". The respective methodologies are described in the following sections.

Task [8]: Conduct Field Visit and Extract Challenges on Mountainous Road; Collect Information on Mountainous Roads and Extract Challenges

Field visits on existing mountainous roads are conducted to extract the challenges. The optimum solutions are investigated to consider the guideline contents to be incorporated in. Eight to ten mountainous roads are expected to be selected as objective roads from the Northern State, North-East State, West Bengal State and Southern State. The prospective objective mountainous roads are shown in Figure 2-3.



Source: JICA Project Team based on CIA World Fact Book 2001

Figure 2-3: Prospective Objective Mountainous Roads

Table 2-2: Main viewpoints of Field Visit

Field	Viewpoints	Relevant Challenges
Slope Protection /High Embankment	<ul style="list-style-type: none"> ✓ Historical records on landslide and debris flow ✓ Gradient of slopes ✓ Terrace shaped fields or gentle slopes ✓ Geology ✓ Weathering, stream erosion, and gully ✓ Spring and wet land ✓ Abnormalities on existing structures ✓ Existing countermeasures 	<ul style="list-style-type: none"> ✓ Possibility of landslide and debris flow ✓ Landslide situation and prospective impact ✓ Effectiveness of existing countermeasures ✓ Necessity of countermeasure
Tunnel	<ul style="list-style-type: none"> ✓ Slope condition on portal locations ✓ Cracks on internal structure ✓ Other facilities 	<ul style="list-style-type: none"> ✓ Selection of portal locations ✓ Adequacy of falsework
Bridges with high-pier	<ul style="list-style-type: none"> ✓ Geotechnical condition ✓ Water level ✓ Material transport route ✓ Impact on landscape 	<ul style="list-style-type: none"> ✓ Confirmation of transport route ✓ Scale of temporary work
Drainage	<ul style="list-style-type: none"> ✓ Water condition ✓ Existing drainage structure ✓ Maintenance situation 	<ul style="list-style-type: none"> ✓ Adequacy of drainage design ✓ Effectiveness of maintenance
Maintenance	<ul style="list-style-type: none"> ✓ Situation on relevant structures ✓ Frequency of maintenance 	<ul style="list-style-type: none"> ✓ Adequacy of maintenance

The existing technical standards/manuals for design and construction as well as operation and maintenance of mountainous roads are also surveyed and analyzed followed by identification of challenges.

Task [9]: Introduce Relevant Technologies in Japan and Other Countries

The relevant technologies for mountainous roads in Japan and other countries are introduced in seminars. Introduction includes the advantages/disadvantages, effectiveness and pre-conditions for application as well as how to apply the technology under the conditions of India.

Task [10]: Develop a Draft Guidelines for Mountainous Roads

Draft guidelines for mountainous roads for survey and planning, design and construction for tunnel, earth work and high pier bridges, and operation and maintenance are developed by the counterpart engineers and JICA Project Team. The draft guidelines are expected to present to relevant organizations such as MoRTH, NHAI, NHIDCL, the State Governments and IAHE so as to receive their comments/feedback through workshops and seminars.

Task [11]: Revise the Guidelines

The guidelines for mountainous roads are revised based on the comments /feedbacks by the relevant organization collected in Task [10].

The guidelines are finalized through the model activities and disseminated to IAHE, PWD, BRO and other relevant organizations through seminars and trainings.

The final guidelines are planned to be distributed to the relevant organizations by June 2020. The guideline is preferably approved by the government of India prior to the distribution.

Task [12]: Implement the Model Activities

The model activities such as trainings, seminars and pilot projects are implemented based on the guidelines to be developed. The pilot project is selected from the project list of the government of India which is supposed to be implemented for the adequate period. Therefore, the JICA Project Team recognized that the team does not assist the cost to implement the pilot projects. The guideline is revised based on the result of the model activities, if necessary.

The equipment suggested in "Sub-approach 1-3", such as gauge and extensometer, is introduced after obtaining the consensus among the stakeholders. The equipment is operated as trial so that the counterpart engineers experience such monitoring equipment. It is expected to be the first step to introduce weather observation equipment for the purpose of slope monitoring and to establish an early warning system for slope disaster in India. A video camera with Global Navigation Satellite System (GNSS) may also be introduced to assist setup of slope inventory.

Task [13]: Study Adequate Contract Systems for Mountainous Roads and Contract Management Method

Adequate contract systems for development of mountainous roads and contract management method are studied. The information on contract system in India, Japan and other countries are collected and analyzed in light of the conditions of India.

Since traffic demand for mountainous roads is not so expected, application of Public Private Partnership (PPP) scheme is limited. In addition, the bidding price for projects on mountainous roads with Engineering, Procurement and Construction (EPC) contract is often high because uncertain risks for contractors are large compared to roads on flat areas. Adequate contract system for maintenance is also investigated in consideration of large risks such as landslide.

2.3 Work Flowchart

The project is implemented in accordance with Figure 2-4.

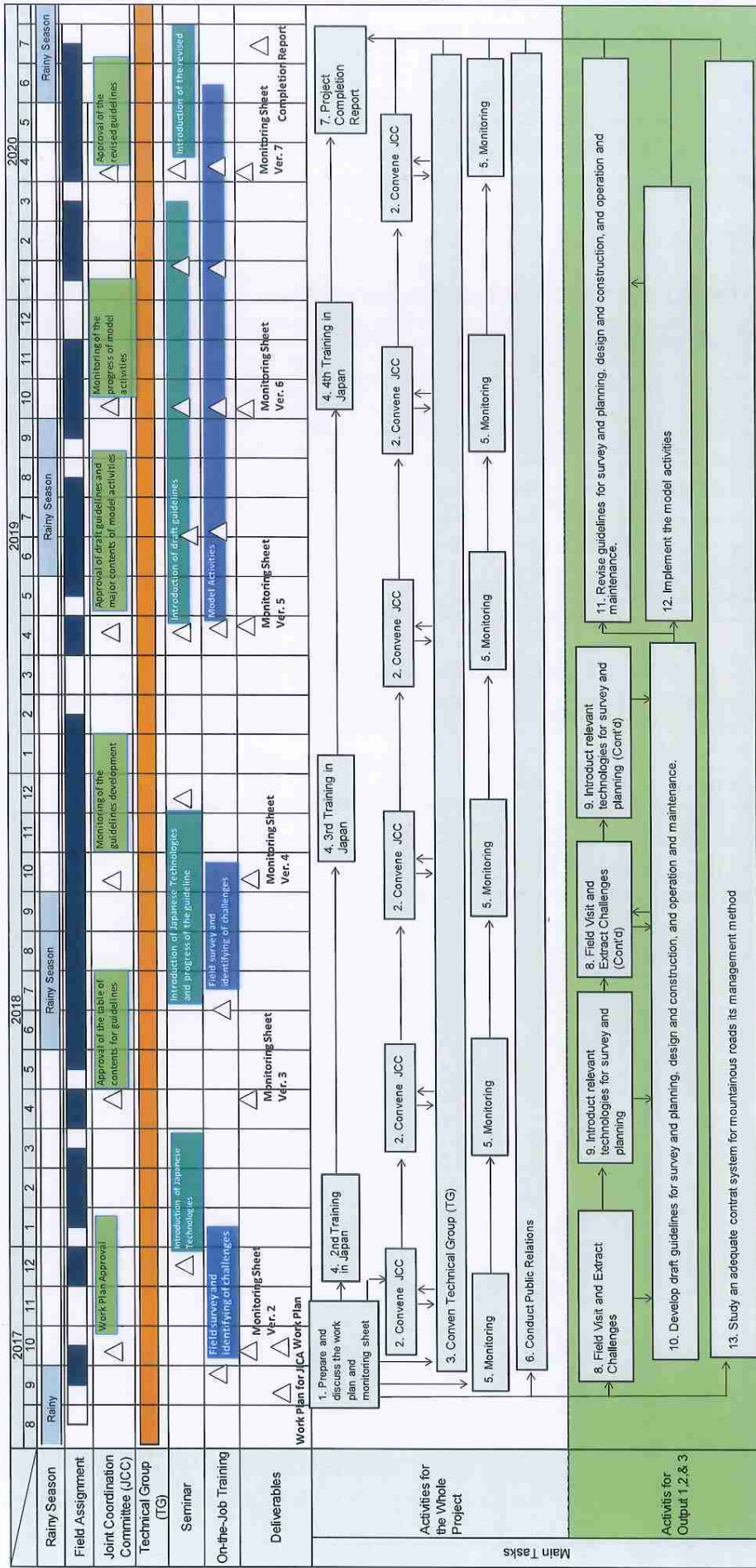


Figure 2-4: Work Flowchart

2.4 Deliverables

Table 2-3 and Table 2-4 show the list of deliverables for project management and technical deliverables, respectively. The deliverables are drafted in collaboration of Indian counterpart engineers and JICA experts. The drafts are reviewed by the Team Leader and Deputy Team Leader to check the logical flow and to harmonize proper nouns, unit, symbol, etc. as well as control the quality of the deliverables.

Table 2-3: Project Management Deliverables

Deliverables	Submission	Language/Number
Work Plan	Commencement of the Service	English, 10 copies
Monitoring Sheet Ver.2	October 2017	English, 5 copies
Monitoring Sheet Ver.3	April 2018	English, 5 copies
Monitoring Sheet Ver.4	October 2018	English, 5 copies
Monitoring Sheet Ver.5	April 2019	English, 5 copies
Monitoring Sheet Ver.6	October 2019	English, 5 copies
Monitoring Sheet Ver.7	April 2020	English, 5 copies
Project Completion Report (C/R) (Technical Deliverables attached)	Completion of the Project	English, 15 copies Japanese Summary, 10 copies CD-R, 5 copies

Table 2-4: Technical Deliverables

Guideline	Output
a) Guideline for Plan and Survey of Mountainous Roads	Output 1
b) Guideline for Tunnel Design and Construction c) Guideline for Earthwork Design and Construction of Mountainous Roads d) Guideline for Bridges with High-Pier Design and Construction	Output 2
e) Guideline for Maintenance and Operations of Mountainous Roads	Output 3

* The contents of guidelines are subject to change through project implementation

CHAPTER 3 IMPLEMENTATION STRUCTURE

3.1 Implementation Structure

The implementation structure of the Project is shown in Figure 3-1. The structure consists of both Indian and Japanese personnel and works jointly to achieve the project purpose.

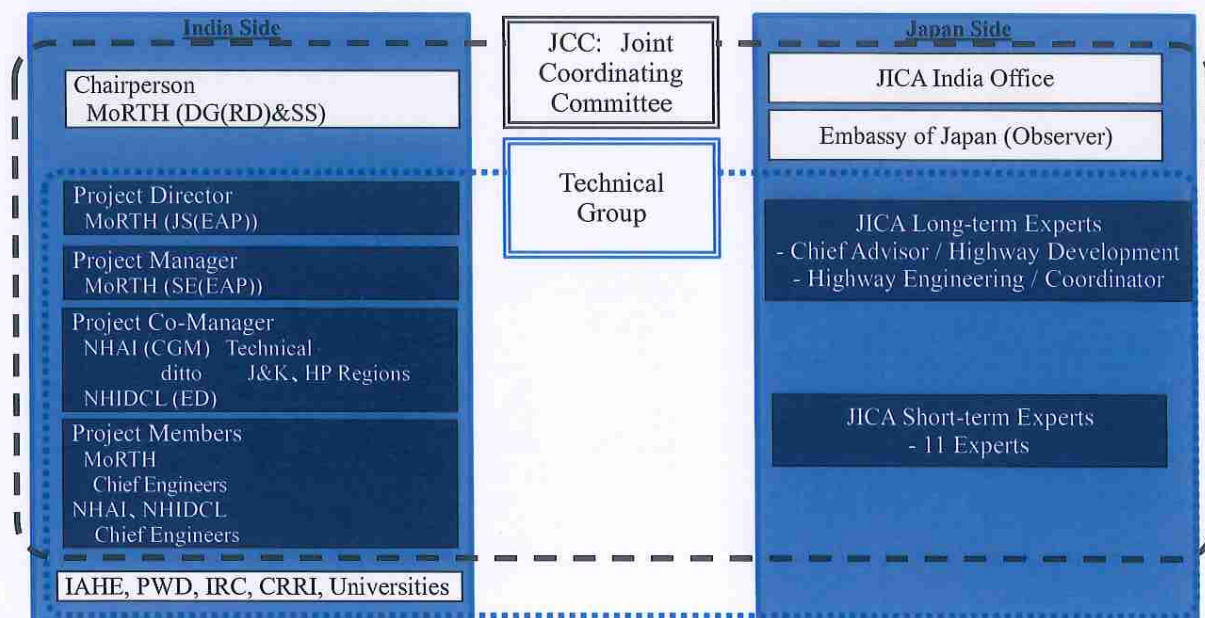


Figure 3-1: Implementation Structure

3.2 Short-term Experts

The short-term experts who engage in the project are listed in Table 3-1.

Table 3-1: List of Short-term Experts

Name	Affiliation	Position
Yoshinori KAWAMURA	OCG	Team Leader/Slope Protection I
Seiji KADOOKA	OCG	Deputy Team Leader/Slope Protection III
Hidetoshi NAKANO	OC	Mountain Bridge
Fumihiko YOKOO	KKC	Mountain Tunnel
Takayuki MAYUMI	JCE	Slope Protection II/High Embankment
TBN	OC	Facility of Mountain Roads
Michiya KITAYAMA	E-NEXCO	Maintenance & Operation of Mountain Roads
Makoto TOKUDA	KKC	Natural Condition (Topography/Geology)
Takashi NISHIJIMA	OC	Drainage Plan
Masaaki GOTO	OCG	Plan and Survey of Mountain Roads/Coordinator
Cleopatra PANGANAYI	OCG	Monitoring/Evaluation

OCG: Oriental Consultants Global Co., Ltd., OC: Oriental Consultants Co., Ltd.

KKC: Kokusai Kogyo Co., Ltd.

E-NEXCO: East Nippon Expressway Co., Ltd.

JCE: Japan Conservation Engineers & Co., Ltd.

Project Design Matrix (Version.2 / Version.3)

Project Title: Capacity Development Project on Highways in Mountainous Regions.

Target Group: Officers of MoRTH, NHAI, NHIDCL and PWD

Period of Project: April 2016 - March 2021 (5 years)

Project Site: Whole of India

Dated April 28th, 2017

Dated October 11th, 2017

	Objective Verifiable Indicators	Means of Verification	Important Assumption
<p>Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p> <p>OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report</p> <p>Contract Document</p> <p>Completion Report by the operation and maintenance contractor</p>	
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project.</p> <p>PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p> <p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH</p> <p>- Government policy to develop mountainous highways will not change.</p> <p>- MoRTH has enough finance to develop mountainous highways.</p>
<p>Outputs Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p> <p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p> <p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Survey and planning guidelines</p> <p>Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019.</p> <p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p> <p>2-3 High pier bridge guideline is completed by June 2019.</p> <p>2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p> <p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p> <p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Improved tunnel guideline, Project records</p> <p>Earthwork guideline, Project records</p> <p>High pier bridge guideline, Project records</p> <p>Project records</p> <p>Operation and maintenance guideline, Project records</p> <p>Project records</p>	

Activities	Inputs	The Indian Side	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III - Mountain Tunnel - Tunnel-Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessity</p> <p>(2) Training for Counterpart Personnel (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment Equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterpart Personnel - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>- Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Condition</p> <p>Counterpart personnel from the relevant organizations are assigned immediately after the Project starts.</p>

**Note : This activity corresponds to not only output 1 but also output 2 and 3.

TO DG (RD) & SS of MoRTH
TO CR of JICA INDIA OFFICE

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.2 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: **Khushal Chand**

Shu MORIYAMA

Title: Superintending Engineer (EAP)

Chief Advisor

Submission Date: **Oct 11th, 2017**

I. Summary

1 Progress

1-1 Progress of Inputs

(1) Inputs from JICA

Long Term Experts

Shu MORIYAMA,

Long Term Expert, Chief Advisor / Highway Development, 2016.11-

Denichiro YAMADA,

Long Term Expert, Highway Engineering / Coordinator, 2016.4-

Short Term Experts

Yoshinori KAWAMURA

Short Term Expert, Team Leader / Slope Protection I , 2017.9-

Seiji KADOOKA

Short Term Expert, Deputy Team Leader / Slope Protection III, 2017.9

Takayuki MAYUMI

Short Term Expert, Slope Protection II / High Embankment, 2017.9-

Michiya KITAYAMA

Short Term Expert, Maintenance & Operation of Mountain Roads, 2017.9-

Masaaki GOTO

Short Term Expert, Plan and Survey of Mountain Roads / Coordinator, 2017.9-

Cleopatra PANGANAYI

Short Term Expert, Monitoring / Evaluation, 2017.10-

(2) Inputs from MoRTH, Gol

[MoRTH]

Manoj Kumar, Chairperson, 2017.3-

S. N. Das, Chairperson, 2016.12-2017.2

Amit Kumar Ghosh, Project Director, 2017.10-

Leena Nandan, Project Director, 2016.12-2017.9

Khushal Chand, Project Manager, 2017.10-

Kishor Chandwani, Project Manager, 2016.12-2017.9

[NHAI]

B. S. Singla, Project Co-Manager, 2016.12-

Navin Kumar, Project Co-Manager, 2017.10-

M.K. Jain, Project Co-Manager, 2017.4-2017.6

[NHIDCL]

Rahul Gupta, Project Co-Manager, 2016.12-

1-2 Progress of Activities

(1) Conduct model activities such as training, including collaboration with Indian Academy for Highway Engineer (IAHE)

- 1st Program of Training for Counterparts collaborated with IAHE was implemented.
- **2nd Program of Training for Counterparts Personnel collaborated with IAHE was drafted.**

(2) Conduct field surveys to the typical mountainous highways.

- Field surveys in NH55, NH40 and others was conducted.
- **Field surveys in NH48, NH21 and NH707A and others was conducted.**

1-3 Achievement of Output

N/A

1-4 Achievement of the Project Purpose

N/A

1-5 Changes of Risks and Actions for Mitigation

N/A

1-6 Progress of Actions undertaken by JICA

Actions undertaken by JICA were carried out as planned.

1-7 Progress of Actions undertaken by MoRTH, Gov. of India

Actions undertaken by MoRTH, Gov. of India were carried out as planned.

1-8 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

N/A

2 Delay of Work Schedule and/or Problems (if any)

N/A

3 Modification of the Project Implementation Plan

N/A

4 Preparation of MoRTH Gov. of India toward after completion of the Project

N/A

II. Project Monitoring Sheet I & II *as Attached*

Project Monitoring Sheet I (Revision of Project Design Matrix)

Version 2
Dated 11th Oct, 2017

Project Title: Capacity Development Project on Highways in Mountainous Regions

Implementing Agency: Ministry of Road Transport and Highways (MoRTH)

Target Group: Officials of MoRTH, NHAI, NHIDOL and PWD

Period of Project: Apr, 2016 - Mar, 2021 (Five (5) years)

Project Site: Whole India

Narrative Summary		Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project	OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project. OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project	Detailed Project Report (DPR) / Feasibility Study Report Contract Document Completion Report by the operation and maintenance contractor				
Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.	PP1 Model activities are conducted applying the developed guidelines by the Project. PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors	- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to			
Outputs Output 1 : Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.	1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019. 1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	Survey and planning guidelines Project records				
Output 2: Guidelines on design and construction for mountainous highways are developed.	2-1 Improved tunnel guideline is completed by June 2019. 2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019 2-3 High pier bridge guideline is completed by June 2019. 2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	Improved tunnel guideline, Project records Earthwork guideline, Project records High pier bridge guideline, Project records Project records	- MoRTH coordinate all related government organizations and other agencies.			
Output 3: Foundation for operation and maintenance for mountainous highways is built.	3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020. 3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous	Operation and maintenance guideline, Project records Project records				

Activities	The Japanese Side	The Indian Side	Important Assumption	Achievement	Remarks
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III - Mountain Tunnel - Tunnel Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessary</p> <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment Equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterparts - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>Majority of trained officials continues to work for counterpart agencies.</p> <p>Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures></p> <p>Additional office space of Short-term Experts/Consultants will be secured in MoRTH/NHA/NHIDCL.</p>	<p>1. Field Surveys were conducted in 5 of 10 case study sites i.e. NH40, NH55, NH48, NH21, NH707A etc.</p> <p>2. 1st Program of Training for Counterparts collaborated with IAHE was implemented in May 2017.</p>	

Activities Sub-Activities	2016		2017		2018		2019		2020		Responsible Organization	Achievements	Issue & Countermeasures
	I	II	III	IV	I	II	III	IV	I	II			
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed.													
1.1 Identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.	Plan												
1.2 Conduct field surveys to the typical mountainous highways.	Actual												
1.3 Improve survey and planning guidelines on mountainous highways.	Plan												
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Actual												
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*	Plan												
Output 2: Guidelines on design and construction for mountainous highways are developed.													
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan												
2.2 Improve a tunnel guideline.	Actual												
2.3 Develop an earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan												
2.4 Develop a high pier bridge guideline.	Actual												
Output 3: Guideline on operation and maintenance for mountainous highways is developed.													
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan												
3.2 Develop an operation and maintenance guidelines for mountainous highways including issues on disaster management.	Actual												
Duration / Phasing	Plan												
Monitoring Plan	Actual												
Monitoring													
Joint Coordination Committee	Plan												
Set-up the Detailed Plan of Operation	Actual												
Submission of Monitoring Sheet	Plan												
Reports/Documents	Actual												
Project Completion Report	Plan												
Public Relations	Actual												
	Plan												
	Actual												

Minutes of 4th JCC

24027/4/2016

THE MINUTES OF JOINT COORDINATION COMMITTEE MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
AND
MINISTRY OF ROAD TRANSPORT & HIGHWAYS (MORTH)
ON
CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN MOUNTAINOUS REGIONS

In accordance with Section No. 6, Point No. 3 of the Record of Discussions of "Capacity Development Project on Highways in Mountainous Regions (hereinafter referred to as "the Project")" signed on December 31st, 2015 (hereinafter referred to as "R/D") between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Ministry of Road Transport and Highways (hereinafter referred to as "MoRTH"), a Joint Coordination Committee (JCC) meeting (hereinafter referred to as "the Meeting") was held at Conference hall, Ground floor, Transport Bhawan, New Delhi on April 18th, 2018.

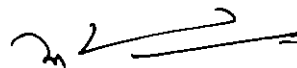
The purpose of the meeting was to review the progress of the Project and also discuss the semi-annual activities after the Meeting and other related issues of the Project.

As a result of the discussions, both sides mutually agreed upon the matters referred to in the documents attached hereto.

New Delhi, April 18th, 2018



TAKAYOSHI TANGE
Senior Representative
India Office
Japan International Cooperation Agency



MANOJ KUMAR
Director General (Road Development) &
Special Secretary (DG(RD)&SS)
Ministry of Road Transport and Highways

Minutes of the Joint Coordination Committee (JCC) meeting

Date: April 18th, 2018

Time: 14.00PM - 16:00PM

Venue: Conference Hall, Ground Floor, Transport Bhawan, New Delhi

Representatives from Indian Side

- 1) Mr. Manoj Kumar, DG (RD) & SS, MoRTH - Chairperson
- 2) Mr. Amit Kumar Ghosh, JS (EAP), MoRTH - Project Director
- 3) Mr. Sanjeev Kumar, SE (S&R, Pavement & Bridge), MoRTH
- 4) Mr. W Blah, NHIDCL
- 5) Mr. M.S. Deol, GM(T), NHIDCL
- 6) Mr. Abhishek Siddharth, AEE (EAP), MoRTH

Representatives from Japanese Side

- 1) Mr. Takayoshi Tange, Senior Representative, JICA India office - Co-Chairperson
- 2) Mr. Anurag Sinha, Lead Development Specialist, JICA India Office
- 3) Mr. Norihito Kaigai, Representative, JICA India Office
- 4) Mr. Shu Moriyama, Chief Advisor / Highway Development
- 5) Mr. Denichiro Yamada, JICA Expert for Highway Engineering
- 6) Mr. Yoshinori Kawamura, Team Leader / Slope Protection I
- 7) Dr. Hidetoshi Nakano, Mountain Bridge
- 8) Ms. Cleopatra Panganayi, Monitoring / Evaluation
- 9) Mr. Kiyoshi Furuhashi, Counsellor, Embassy of Japan in India - Observer

MINUTES:

1) Introduction

Mr. Manoj Kumar, DG (RD) & SS, MoRTH, the Chairman of the Meeting, called the meeting to order and welcomed all delegates. Since all representatives were familiar with each other from the previous JCC, no new introductions were done and the Chairman called for the presentation from the Project side.

Mr. Moriyama, the Chief Advisor for the Project, commenced the presentation by explaining the materials supplied to the JCC by the Project including monitoring sheets and minutes of Technical Group (TG) meetings.

2) Semi Annual Report

The Chief Advisor summarized the activities undertaken by the Project in the last 6 months since the 3rd JCC meeting held in Oct 2017. He reported that the JICA experts conducted field surveys and held discussions with site engineers in 8 sites. This means all scheduled field surveys (10 in total) have been completed. Other major activities included conducting 2nd joint training between JICA and IAHE, engaging in activities to introduce Japanese experience and technologies of highway tunnels, namely participating in the 78th IRC annual session, and opening a Facebook Page for the Project. The Chairman informed that IRC conference is scheduled in Mizoram in May, 2018 and members of the JICA expert team expressed interest in attending the conference.

3) Framework of New Guidelines

The Chief Advisor highlighted that the main topic to be deliberated in the Meeting was the Framework of New Guidelines and Model Activities under the project.

The Chairman stated that the guidelines under the project must be prepared in collaboration with IRC and IRC is the custodian of all guidelines pertaining to road sector. The Chairman stated that the existing Hill Road Manual (IRC:SP-48-1998) is under revision by the committee of IRC chaired by the Chairman as DG&SS of MoRTH. The Chairman stated that the output from the guidelines developed under the Project could be incorporated in revising the Hill Road Manual and recommended that the information sharing is ensured between JICA Experts and the said committee involved in revising the Hill Road Manual.

The Indian side requested that for each guideline to be prepared, the deviations from existing manuals and IRC manuals must be systematically listed in the document and necessary justifications for the deviations must be subsequently discussed with MoRTH.

Mr. Kawamura, the Team Leader and Slope Protection I in the Project, stated that the JICA Experts were reviewing the existing manuals of MoRTH to identify issues and topics that shall be incorporated in the new guidelines.

Mr. Tange, Senior Representative, JICA India underscored that the new guidelines will be correlated with each other and also highlighted that more clarity is needed on the procedure involved in the approval of these guidelines by MoRTH and IRC.

4) Findings of Field Surveys and Review of Existing Manuals

The Team Leader explained that the information collected during the 10 field surveys would be input to the 5 guidelines that are being prepared in the Project i.e. guidelines for Planning, Slope Protection & Embankment, Bridge, Tunnel and Operation and Maintenance (O&M). The Team Leader shared the key issues to be addressed, basic approach/principle and the draft contents of the 5 guidelines. After review and discussions, the JCC approved the framework and the contents of the guidelines to be developed by the Project.

5) Semi Annual Work Plan (Apr. 2018 – Sept. 2018)

The JICA experts presented the semi-annual work plan from April, 2018 to September, 2018 for approval by JCC as outlined below:

(1) Technical Guidelines

The draft of new guidelines will be developed by the end of March 2019. The progress of the drafting of new guidelines will be monitored by the TGs.

(2) Field Surveys

Field surveys will be conducted to provide further input for guidelines, model activities and as requested from Indian side.

(3) Technical Seminars by the Project

Technical Seminars will be conducted to introduce advanced technologies in June and Sept of 2018.

(4) 3rd Joint Training between JICA and IAHE

The program of the 3rd joint training is proposed to be held in October 2018 will be developed through discussion with the Indian side.

(5) Model Activities

The contents of Model Activities to be implemented from April 2019 will be discussed between Japanese and Indian sides in the coming half a year till the next JCC in October 2018. The JICA Experts proposed Seminars, Training, Trial of Technologies, and Pilot Projects (if possible) as Model Activities.

In response to the proposed ideas, the Indian side proposed that the 'Training' must be revised to 'Discussion' under model activities as trainings must be conducted only after the finalization of the guidelines and that 'Discussions' could be conducted to obtain comments and feedback to input in the final guidelines. The JICA Experts accepted the

suggestion of MoRTH. The Indian side emphasized that draft guidelines will be widely circulated and also be put on the website of MoRTH to obtain comprehensive feedback. The JICA Experts reiterated that the contents of the Model Activities will be discussed between Japanese and Indian sides till the next JCC.

The Indian side stated that 'Trial of Technologies' cannot be completed in one year (after preparation of draft guidelines by March 2019) and suggested that review/pilot of these technologies will be started at an earlier date. Mr. Tange highlighted that the preparatory survey report on NH-55 lists a catalogue of activities and technologies pertaining to mountainous highways. The Indian side requested JICA Experts and Team Leaders to identify some technologies/activities which could be taken up by the Research or EAP wing of MoRTH. It was agreed that the JICA Experts and Team Leader shall prepare a note on each of the some technologies/activities indicating features, advantage and disadvantage, and possibility to be done in a pilot project to enable MoRTH to pursue these activities as part of 'Trial of Technologies'.

(6) Other Topics

JICA Expert informed that officials from NHAI, MoRTH & NHIDCL including Chairman, NHAI, shall visit Japan to observe wayside amenities and advanced O/M technologies from 10th to 14th May, 2018.

The JCC approved the Work Plan subject to the comments and suggestions as mentioned above.

6) Counterpart for Guidelines

The Project proposed the representatives to develop 5 new guidelines as shown in below.

(1) Overall control of 5 guidelines

India side: Mr. Sanjeev Kumar, SE (S&R), MoRTH
Mr. Kushal Chand, SE (EAP), MoRTH

Japan side: Mr. Shu Moriyama, Chief Advisor / Highway Development
Mr. Denichiro Yamada, JICA Expert for Highway Engineering
Mr. Yoshinori Kawamura, Team Leader of JICA Short Term Experts

(2) Guideline for Planning on Arterial Roads in Hilly Area

India side: Mr. Trivendra Kumar, EE, MoRTH
Japan side: Mr. Shu Moriyama, Chief Advisor / Highway Development

(3) Guideline for Slope Protection and Embankment on Arterial Roads in Hilly Area

India side: Mr. W.Blah, NHIDCL

Japan side: Mr. Yoshinori Kawamura, JICA Expert for Slope Protection

(4) Guideline for Bridge on Arterial Roads in Hilly Area

India side: Mr. Sanjay Garg, SE, MoRTH

Japan side: Dr. Hidetoshi Nakano, JICA Expert for Mountain Bridge

(5) Guideline for Tunnel on Arterial Roads in Hilly Area

India side: Mr. Ashok Kumar Gupta, GM (T), NHIDCL

Japan side: Mr. Fumihiko Yokoo, JICA Expert for Tunnel

(6) Guideline for O/M on Arterial Roads in Hilly Area

India side: Mr. Nishoo Gupta, GM (T), NHAI

Japan side: Mr. Denichiro Yamada, JICA Expert for Highway Engineering

The JCC made no further comments on the counterparts for the guidelines and hence the same was duly approved by the JCC.

7) The Chairperson of the TGs

The Japanese side highlighted the need to replace the retired Chairperson of the TGs, Mr. A.K. Srivastava. The Chairman nominated I.K. Pandey as the next Chairperson of the TG.

8) Office space of the Project

The JICA side highlighted the need for an independent room in Transport Bhawan for the Chief Adviser of the Project, Mr. Moriyama, in order to secure JICA assets and hold meetings with Indian counterparts and the Japanese delegations etc. DG (RD) & SS responded that the Indian side would prepare the required independent room in Transport Bhawan in May or June 2018.

9) Closing

At the end of the meeting, Mr. Tange announced that JICA long term expert for NHAI (Mr. Yamada) will complete his term and return to Japan in June 2018 and that the Japanese government will promptly provide a replacement of Mr. Yamada. The JCC expressed its appreciation for the services rendered by Mr. Yamada.

It was agreed that the next JCC meeting would be held in October 2018.

Attachments:

- Attachment 1: Monitoring Sheet (Version.3)
- Attachment 2: Minutes of Meeting of the TGs in December 2017 and January 2018 and meeting material of the TG in February 2018.

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.3 (Term: 60 Month, Apr./2016 – Mar./2021)

**Name: Khushal Chand, Superintending
Engineer (EAP) of MoRTH**

Shu MORIYAMA, Chief Advisor

Submission Date: April 18th, 2018

I. Summary

1 Progress

1-1 Progress of Inputs

(1) Inputs from JICA

Long Term Experts

Shu MORIYAMA,

Long Term Expert, Chief Advisor / Highway Development, 2016.11-

Denichiro YAMADA,

Long Term Expert, Highway Engineering / Coordinator, 2016.4-

Short Term Experts

Yoshinori KAWAMURA

Short Term Expert, Team Leader / Slope Protection I , 2017.9-

Seiji KADOOKA

Short Term Expert, Deputy Team Leader / Slope Protection III, 2017.9

Takayuki MAYUMI

Short Term Expert, Slope Protection II / High Embankment, 2017.9-

Michiya KITAYAMA

Short Term Expert, Operation & Maintenance of Mountain Roads, 2017.9-

Masaaki GOTO

Short Term Expert, Plan and Survey of Mountain Roads / Coordinator, 2017.9-

Fumihiko YOKOO

Short Term Expert, Mountain Tunnel, 2017.9-

Cleopatra PANGANAYI

Short Term Expert, Monitoring / Evaluation, 2017.10-

Hidetoshi NAKANO

Short Term Expert, Mountain Bridge, 2017.11-

Makoto TOKUDA

Short Term Expert, Natural Conditions, 2018.1-

Susumu MURASE

Short Term Expert, Facilities of Mountain Roads, 2018.1-

Takashi NISHIJIMA

Short Term Expert, Drainage Plan, 2018.1-

(2) Inputs from MoRTH, Gol

[MoRTH]

Manoj Kumar, Chairperson, 2017.3-

S. N. Das, Chairperson, 2016.12-2017.2

Amit Kumar Ghosh, Project Director, 2017.10-

Leena Nandan, Project Director, 2016.12-2017.9

Khushal Chand, Project Manager, 2017.10-

Kishor Chandwani, Project Manager, 2016.12-2017.9

[NHAI]

B. S. Singla, Project Co-Manager, 2016.12-

Navin Kumar, Project Co-Manager, 2017.10-

M.K. Jain, Project Co-Manager, 2017.4-2017.6

[NHIDCL]

Rahul Gupta, Project Co-Manager, 2016.12-

1-2 Progress of Activities

(1) Collect and analyze existing information, design and construction standards and operation and maintenance guidelines for mountainous highways.

- Existing standards for mountainous highways have been collected and analyzed

(2) Conduct model activities such as training, including collaboration with Indian Academy for Highway Engineer (IAHE)

- 1st Program of Training for Counterpart Personnel collaborated with IAHE was implemented.
- 2nd Program of Training for Counterpart Personnel collaborated with IAHE was

implemented.

(3) Conduct field surveys to the typical mountainous highways.

- Field surveys in NH48, NH22 and NH707A were conducted.
- Field surveys in NH10, NH20, NH21, NH40, NH55, NH62 and NH310A were conducted

(4) Improve/Develop survey and planning, tunnel, earthwork, high pier bridge, and operation and maintenance guidelines

- Tables of contents were drafted.

1-3 Achievement of Output

N/A

1-4 Achievement of the Project Purpose

N/A

1-5 Changes of Risks and Actions for Mitigation

N/A

1-6 Progress of Actions undertaken by JICA

Actions undertaken by JICA were carried out as planned.

1-7 Progress of Actions undertaken by MoRTH, Gov. of India

Actions undertaken by MoRTH, Gov. of India were carried out as planned.

1-8 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

2 Delay of Work Schedule and/or Problems (if any)

N/A

3 Modification of the Project Implementation Plan

N/A

4 Preparation of MoRTH Gov. of India toward after completion of the Project

N/A

II. Project Monitoring Sheet I & II as Attached

Project Monitoring Sheet I (Revision of Project Design Matrix)

Version 3

Dated 18th April, 2018

Project Title: Capacity Development Project on Highways in Mountainous Regions

Implementing Agency: Ministry of MoRTH, NHAI, NHIDCL and PWD

Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD

Period of Project: Apr, 2016 – Mar, 2021 (Five (5) years)

Project Site: Whole India

Narrative Summary		Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<p>Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.	Detailed Project Report (DPR) / Feasibility Study Report				
	OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.	Contract Document Completion Report by the operation and maintenance contractor				
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	PP1 Model activities are conducted applying the developed guidelines by the Project.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors		- Developed guidelines are approved by the MoRTH		
	PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors		- Government policy to develop mountainous highways will not change. - MoRTH has enough finance to		
<p>Outputs Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	Survey and planning guidelines				
	1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	Project records				
<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	2-1 Improved tunnel guideline is completed by June 2019.	Improved tunnel guideline, Project records		- MoRTH coordinate all related government organizations and other agencies.		
	2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	Earthwork guideline, Project records				
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	2-3 High pier bridge guideline is completed by June 2019.	High pier bridge guideline, Project records				
	2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	Project records				
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	Operation and maintenance guideline, Project records				
	3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	Project records				

Activities	Inputs		Important Assumption	Achievement	Remarks
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services for identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III</p> <p>III</p> <p>- Mountain Tunnel - Tunnel Facilities - Slope Protection: II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessity</p> <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterparts - Chairperson - Project Director - Project Manager - Project Co-Manager - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MORTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts (4) Pilot Project Cost, if required construction works.</p>	<p>Majority of trained officials continues to work for counterpart agencies.</p> <p>Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures></p> <p>An independent room for Chief Advisor shall be secured in Transport Bhawan</p> <p>The office space for Short-term Experts in Jeevan Tara shall be available soon for the use.</p>	<p>1.1, 2.1 & 3.1 Existing standards for mountainous highways collected and analyzed</p> <p>1.2 Field Surveys were conducted in 10 of 10 case study sites.</p> <p>1.3, 2.2, 3.2, 4.8, 3.2 TOC for new guidelines drafted</p> <p>1.5 1st and 2nd Training for Counterparts collaborated with IAHE was Implemented</p>	

Project Monitoring Sheet II (Revision of Plan of Operation)

		FY 2017												FY 2018												FY 2019												FY 2020												Issue	Solution
		Plan			I			II			III			IV			I			II			III			IV			I			II			III			IV													
Inputs from JICA		Expert																																																	
Chief Advisor / Highway Development																																																			
Highway Engineering / Coordinator																																																			
Team Leader/Slope Protection I																																																			
Deputy Team Leader/Slope Protection III																																																			
Mountain Tunnel																																																			
Slope Protection III/High Embankment																																																			
Mountain Bridge																																																			
Facility of Mountain Roads																																																			
Maintenance & Operation of Mountain Roads																																																			
Natural Condition (Topography/Geology)																																																			
Drainage Plan																																																			
Plan and Survey of Mountain Roads/Coordinator																																																			
Monitoring and Evaluation																																																			
Equipment																																																			
Training in Japan																																																			
Counterpart Training in Japan																																																			
In-country/Third country Training																																																			
Inputs from India																																																			
Expert																																																			
Chairperson																																																			
Project Director																																																			
Project Manager																																																			
Project Co-Manager																																																			
Project Co-Manager																																																			
Project Co-Manager																																																			
Counterparts (9)																																																			
Equipment																																																			
Remarks		Clearance from screening committee is required yearly Dispatched Sept 14th, 2017 Dispatched Sept 14th, 2017 Dispatched Sept 28th, 2017 Dispatched Sept 14th, 2017 Dispatched Nov 19th, 2017 Dispatched Jan 10th, 2018 Dispatched Sept 24th, 2017 Dispatched Jan 14th, 2018 Dispatched Jan 14th, 2018 Dispatched Sept 26th, 2017 Dispatched Oct 1st, 2017 1st and 2nd Program of Training with IAHE was completed. New Chairperson from March 2017 New Project Director from October 2017 New Project Manager from October 2017 New Project Co-Manager from Oct 2017																																																	

Activities Sub-Activities	2016		2017		2018		2019		2020		Responsible Organization	Achievements	Issue & Countermeasures
	I	II	III	IV	I	II	III	IV	I	II			
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is													
1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster areas upon requests.	Plan	Actual									SE (EAP), MoRTH	Information collected and analyzed	
1.2 Conduct field surveys to the typical mountainous highways.	Plan	Actual									SE (EAP), MoRTH	Field surveys completed in all (10 of 10) case study sites	
1.3 Improve survey and planning guidelines on mountainous highways.	Plan	Actual									SE(S&R), SE(EAP) & EE, MoRTH	Table of Contents(TOC) drafted	
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan	Actual									SE (EAP), MoRTH	Review of existing issues commenced	
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*	Plan	Actual									SE (EAP), MoRTH	1st and 2nd Training with IAHE were completed	
Output 2: Guidelines on design and construction for mountainous highways are developed.													
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan	Actual									SE (EAP), MoRTH	Standards collected and analyzed	
2.2 Improve tunnel guidelines.	Plan	Actual									SE(S&R), SE(EAP) & GM(Technical) NHIDCL	TOC drafted	
2.3 Develop earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan	Actual									SE(S&R), SE(EAP) & ED, NHIDCL	TOC drafted	
2.4 Develop high pier bridge guidelines.	Plan	Actual									SE(S&R), SE(EAP) & SE, MoRTH	TOC drafted	
Output 3: Guideline on operation and maintenance for mountainous highways is developed.													
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan	Actual									SE (EAP), MoRTH	Standards collected and analyzed	
3.2 Develop operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan	Actual									SE(S&R), SE(EAP) & GM(T), NHA	TOC drafted	
Duration / Phasing	Plan	Actual											
Monitoring Plan													
Monitoring													
Joint Coordination Committee	Plan	Actual											
Set-up the Detailed Plan of Operation	Plan	Actual											
Submission of Monitoring Sheet	Plan	Actual											
Reports/Documents													
Project Completion Report	Plan	Actual											
Public Relations													
Setting up & Updating Project Facebook Page	Plan	Actual											
Published article on Project Activities in MORTH Annual Report	Plan	Actual											

Minutes for Meetings of
Technical Group (TG)
For
Capacity Development Project on Highways in
Mountainous Regions

Date: 19th Dec, 2017

Start Time: 15:00

Place: Conference Hall,
Ground Floor of Transport Bhawan,
New Delhi-110001

Introduction:

Mr. Moriyama made an opening remark and then explained an idea of a framework of the 5 guidelines. He then declared the agenda of this TG; discussion of contents of the guidelines for bridge and O&M. He added a TG for discussing contents of the guidelines for planning and tunnel would be held in January next year and that for slope protection & embankment would be in February.

Attendee:

Japanese Side:

Mr. Shu MORIYAMA, Long Term Expert, Chief Advisor/Highway Development
Mr. Denichiro YAMADA, Long Term Expert, Highway Engineering
Mr. Seiji KADOOKA, Short Term Expert, Deputy Team Leader/Slope Protection III
Dr. Hidetoshi NAKANO, Short Term Expert, Mountain Bridge
Mr. Fumihiko YOKOO, Short Term Expert, Mountain Tunnel
Mr. Michiya KITAYAMA, Short Term Expert, Maintenance & Operation of Mountain Roads

Indian Side:

Mr. A K Shrivastava, ADG, MoRTH - Chairperson of this TG
Mr. Khushal Chand, SE (EAP), MoRTH - Project Manager
Mr. M S Sisoodia, SE (Monitoring), MoRTH
Mr. Nishoo Gupta, GM (T), NHAI
Mr. Rahul Gupta, ED-II, NHIDCL - Co-Project Manager
Mr. Ashok Kumar Gupta, GM(T), NHIDCL

Framework of the entire guideline:

Mr. Kadooka made a presentation on framework of the entire guideline with PPT (see attached).

Mr. Kadooka focused key challenges on developing arterial roads in hilly areas, schedule for developing draft guidelines, and highlights in guideline development including advanced technology which may be applied to hill roads. He explained that draft guidelines would be prepared by March 2019 and to meet that schedule, a framework and contents of guidelines should be approved in Joint Coordination Committee (JCC) meeting scheduled in April 2018.

Mr. Kadooka also explained persons in charge in Japanese side for the guidelines:

Planning: Mr. Moriyama

Slope protection & embankment: Mr. Kawamura

Tunnel: Mr. Yokoo

Bridge: Dr. Nakano

O&M: Mr. Yamada

Mr. Kadooka highlighted the necessity of local knowledge and experience in developing the guidelines and sincerely requested Indian side to designate a counterpart (C/P) for each guideline in order to facilitate discussions with Japanese experts.

Mr. A K Shrivastava, the Chairperson, asked why maldistribution of knowledge occurred even though the guidelines and specifications for the hill roads are already in practice. He also asked how the Project could deal with such maldistribution.

Mr. Kadooka answered that maldistribution of knowledge on hill road development occurs not only one cause, but a couple of points are considered. For example;

- 1) We may need knowledge distribution activities. For example if a guideline or manual exists but the person doesn't recognize the importance of that document, they cannot reflect the guideline on the actual design/construction.
- 2) Some existing guidelines are little too old and based on old technology and methodology. They need to be updated as latest technology.
- 3) Hill road development requires comprehensive knowledges from alignment, slope protection, embankment, bridge, tunnel and even operation and maintenance. Thus, comprehensive and practical guideline/manual is required for hill road development

Mr. A K Shrivastava, the Chairperson, pointed out that the word of "maldistribution" disregarded the efforts and contributions made by Indian official so far and Japanese side should carefully select the words for what you intended.

Japanese side reiterated the necessity of allocating C/P for each guideline; 5 C/Ps are necessary for 5 guidelines.

Mr. A K Shrivastava, the Chairperson, stated counterpart engineers will be allocated for each guideline to interact with Japanese experts.

Framework of the bridge guideline:

Dr. Nakano made a presentation about contents of the guideline for bridge with PPT (see attached).

Mr. A K Shrivastava, the Chairperson, requested what would be the additions and proposals to the existing guidelines so that Indian side could deliberate those additions and proposals.

Indian side opined that the difference between manual and guideline is coverage of contents; a guideline contains a specific topic while a manual covers wider contents. For instance, the hill road manual covers not only road engineering, but also slope protection, maintenance, safety facilities, etc.

Mr. Khushal chand, the Project Manager (PM) of the Project, mentioned that, regarding the newly developed ones, firstly guidelines would be prepared, and then afterwards those guidelines would be compiled into one as a manual.

Mr. A K Shrivastava, the Chairperson, commented that, in Hilly regions, precast technology should be introduced because traffic diversion is basic problem in bridge construction and precast technology often reduces construction period.

Japanese side noted this comment.

Framework of the operation & maintenance guideline:

Mr. Kitayama made a presentation about contents of the guideline for O&M with PPT (see attached).

Indian side requested to incorporate advanced technology to the O/M guideline, especially in tunnels and bridges in hilly area. Japanese side agreed to include them into the O/M guideline.

Mr. Khushal Chand, the PM of the Project, requested that the guideline should include a check list of safety features / measures for workers and engineers working at site during construction and maintenance period. Japanese side agreed to include it into the O/M guideline.

Mr. Khushal Chand also stated that this was not comment just for operation and maintenance, but we could try to give guides for maintenance-free structure such as arch type bridges etc. in hilly terrain.

Mr. Yamada responded that unfortunately structures without any maintenance do not exist in the world, but we should try to minimize the maintenance especially on hill roads where alternative routes do not exist.

Indian side requested that the guideline should consider different type of contract as well as defect liability period; the contract modes of BOT, EPC, and others should have different type of management for maintenance. Maintenance should be different during and after the end of defect liability period.

Japanese side explained that the maintenance for BOT and EPC is the same. But the bodies of maintenance, whether it is done by government or private, may make some difference.

Japanese side also suggested that the O&M guideline be attached to request for proposal for BOT and EPC mode procurement so that bidders, concessionaires or contractors could clearly understand the scope of O&M.

Both sides basically concurred with the contents of the guidelines for bridge and O&M discussed in the TG and commencement of drafting the said guidelines.

-----Concluded-----



(Shu Moriyama)

Chief Advisor, JICA Expert



(Khushal Chand)

SE(EAP), MoRTH

Witness



(A K Shrivastava)

ADG, MoRTH



Technical Group (TG)

For

Capacity Development Project on Highways in Mountainous Regions

1. Date

19th December 2017, 15:00 ~ 17:00

2. Venue

Conference Hall, Ground Floor of Transport Bhawan

3. Agenda

- 1) Opening Remarks.....Chairperson
- 2) Guidelines to be developed in the Project.....Mr. Kadooka
- 3) Contents of Bridge Guideline.....Dr. Nakano
- 4) Contents of Operation and Maintenance Guideline.....Mr. Kitayama
- 5) Closing Remarks.....Chairperson

Technical Group

~ The Guidelines to be developed in the Project ~

December 2017

Contents

1. Key Challenges on Developing Arterial Roads in Hilly Area
2. Objectives
3. Approach
4. Type of Guidelines
5. Guideline Development Schedule
6. Implementation Structure for Guideline Development

1. Key Challenges on Developing Mountainous Roads

Key challenges extracted from the previous TG and a series of interviews are as follows;

- **Maldistribution of knowledge:** Some organizations introduce adequate technologies, but some are not - standardization
- **Introduction of Advanced technologies:** The existing guidelines /manuals cover most contents, but advanced/detailed information should be distributed
- **DPR/design level variation:** In some cases, DPR output is not adequate which results in inadequate project cost estimates
- **Risk assessment:** The risks prospected in hill road development may not necessarily be fully assessed

These challenges should be addressed by developing guidelines!



2. Objectives of the Guidelines

Objectives of the guidelines are as follows;

- To provide knowledges for developing arterial roads in hilly area from planning and design to construction and O&M

The objective roads of the guidelines is “National Expressways and Highways” in addition to some arterial state highways and major district roads



3. Approach

Key approaches of the guidelines are as follows;

- Guide necessary knowledge for arterial hill roads development
- Introduce advanced technologies applicable to India
- Specify the level of DPR/design (D&C Guidelines)
- Visualize prospective hazards to be assessed beforehand (D&C Guidelines)

The objective roads of the guidelines is “National Expressways and Highways” in addition to some arterial state highways and major district roads



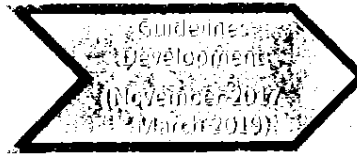
4. Type of Guidelines

Guideline (Tentative)	B, C and D are collectively called “design and construction guidelines”	Stage
(A) Guideline for <u>Planning</u> on Arterial Roads in Hilly Area i) Characteristics and Basic Approach of Hill Road Projects in India, ii) Survey /Investigation for Road Planning iii) Planning and Alignment Design, vi) General Risks on Hill Road Development, v) Introduction of Major Advanced Technologies		Initial ~ DPR
(B) Guideline for <u>Slope Protection and Advanced Embankment</u> on Arterial Roads in Hilly Area i) Type of Hazard , ii) Basic Approach, iii) Survey, Identification and Prioritization of Hazardous Slope, iv) Selection of Method iv) Slope Protection, v) Embankment, vi) Drainage, vii) Case Studies		DPR ~ D/D, Construction
c) Guideline for <u>Bridge</u> on Arterial Roads in Hilly Area i) Bridge Planning and Investigation, ii) Design (including selection of bridge type, construction method, etc.), iii) Construction (Foundation, substructure, superstructure, etc.), iv) Reinforcement methods		DPR ~ D/D, Construction
d) Guideline for <u>Tunnel</u> on Arterial Roads in Hilly Area i) Planning and Investigation (including geology categorization), ii) Design (Excavation method, support system, supporting excavation method, etc.) iii) Construction, iv) Observation and Measurement, v) Tunneling in Difficult Grounds, vi) Tunnel facilities		DPR ~ D/D, Construction
e) Guideline for <u>Operation and Maintenance</u> on Arterial Roads in Hilly Area i) Operation (Traffic management, early warning system, accident management, tunnel operation, etc.), ii) Maintenance (inspection, assessment, maintenance planning and implementation)		After Construction

5. Schedule

Project Phases

Guideline Development
(October 2017)



Model Activities
(April 2019 -)

Guideline Development Schedule

Milestones	Period (tentative)
Technical Group (TG) for Bridge and O&M Guidelines	December 2017
TG for Planning and Tunnel Guidelines	January 2018
TG for Slope Protection and Advanced Embankment Guideline	February 2018
JCC for Confirmation on the Contents	April 2018
TG for Progress and Discussions (1 st)	July 2018
JCC for Progress Report	October 2018
TG for Progress and Discussions (2 nd)	December 2018
Draft Guidelines	March 2019

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Capacity Development Project on Highways in Mountainous Regions in the Republic of India



6. Implementation Structure for Guideline Development

Guideline	India Side	Japan Side
A) Guideline for Planning on Arterial Roads in Hilly Area	????	Mr. Moriyama +91-84485-09589 shumoriyamatiefbau@yahoo.co.jp
B) Guideline for Slope Protection and Advanced Embankment on Arterial Roads in Hilly Area	????	Mr. Kawamura +91-95605-36158 kawamuray@oriconsul.com
C) Guideline for Bridge on Arterial Roads in Hilly Area	????	Dr. Nakano +91-88003-26239 nakanoh@oriconsul.com
D) Guideline for Tunnel on Arterial Roads in Hilly Area	????	Mr. Yokoo +91-84484-65798 yokoof@outlook.jp
E) Guideline for Operation and Maintenance on Arterial Roads in Hilly Area	????	Mr. Yamada +91-88009-58190 d.yamada.aa@gmail.com

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Capacity Development Project on Highways in Mountainous Regions in the Republic of India



***Thank you very much for your contribution!
Your continuous supports are much appreciated.***



CONTENTS OF GUIDELINE FOR BRIDGE ON ARTERIAL ROADS IN HILLY AREA (DRAFT)

Contents (Draft)	Outline	Contents to be Described	Existing Indian manuals to be referred
PREFACE			
list of abbreviation and figures			
CHAPTER 1 GENERAL			
1-1 Background	<ul style="list-style-type: none"> Describe the background of this project and needs of this guideline 	<ul style="list-style-type: none"> History and policy of road implementation in India Current situation and issues in implementing bridges on the arterial roads in hilly area 	TBA from various existing manuals listed below
1-2 Scope	<ul style="list-style-type: none"> Explain the scope of this guideline 	<ul style="list-style-type: none"> Describes the scope of this guidelines, what to be written and what not to be written 	
1-3 Objective	<ul style="list-style-type: none"> Explain the objective of this guideline, what to aim with this guideline 	<ul style="list-style-type: none"> Describes the objective and goal which this guideline aims. Try to describe as specific as possible 	
1-4 Types of Projects	<ul style="list-style-type: none"> Explains the different projects which includes bridge implementation 	<ul style="list-style-type: none"> Explains two main projects, such as road project and bridge project, its characteristics and differences. Current situation and issues of road projects and bridge projects. 	
CHAPTER 2 PROJECT PREPARATION			
2-1 General	<ul style="list-style-type: none"> Describes the general aspects of project preparation 	<ul style="list-style-type: none"> Explains the scope, objective and etc. of Feasibility Study and Detailed Project Report preparation 	TBA from various existing manuals listed below
2-2 Feasibility Study	<ul style="list-style-type: none"> Describes the procedure and what to do in Feasibility Study 	<ul style="list-style-type: none"> Explains the procedure of Feasibility Study for bridge planning in hilly area Explains what and how to do in feasibility study stage for bridge planning in hilly area 	
2-3 Detailed Project Report	<ul style="list-style-type: none"> Describes the procedure and what to do in Detailed Project Report preparation. 	<ul style="list-style-type: none"> Explains the procedure of Detailed Project Report preparation for bridge planning in hilly area Explains what and how to do in Detailed Project Report preparation stage for bridge planning in hilly area. Introduce the Know-how of Bridge Type Study of Japan 	
CHAPTER 3 DESIGN			
3-1 General	<ul style="list-style-type: none"> Describes the general aspects of design stage 	<ul style="list-style-type: none"> Explains the scope, objective and etc. of Design stage 	TBA from various existing manuals listed below
3-2 Data Collection	<ul style="list-style-type: none"> Describes the procedure and what to do in Data Collection in design stage 	<ul style="list-style-type: none"> Explains the procedure of in Data Collection in design stage of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in Data Collection in design stage of bridges in hilly area. 	
3-3 Survey and Investigation	<ul style="list-style-type: none"> Describes the procedure and what to do in Survey and Investigation in design stage 	<ul style="list-style-type: none"> Explains the details of Survey and Investigation in design stage of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in Survey and Investigation in design stage of bridges in hilly area. 	

3-4 Engineering Design	<ul style="list-style-type: none"> Describes the procedure and what to do in Designing stage 	<ul style="list-style-type: none"> Explains the details of engineering design of bridges in hilly area. Explains the important points, dos and don'ts, and etc. of engineering design of bridges in hilly area. Introduce High-pier Design Method of Japan Introduce the method of seismic analysis of Japan Explains the details of Construction Planning of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in construction planning of bridges in hilly area. Introduce the example of construction planning in Japan Explains the details of Cost Estimation of bridges in hilly area. Explains the important points, dos and don'ts, and etc. of Cost Estimation of bridges in hilly area. Explains the details of required reports and necessity of approvals Highlights the specific points in the hilly area.
3-5 Construction Planning	<ul style="list-style-type: none"> Describes the procedure and what to do in Construction Planning 	
3-6 Cost Estimation	<ul style="list-style-type: none"> Describes the procedure and what to do in Cost estimation 	
3-7 Required Reports	<ul style="list-style-type: none"> Describes the reports to be submitted and approved. 	
CHAPTER 4 CONSTRUCTION		
4-1 General	<ul style="list-style-type: none"> Describes the general aspects of construction stage 	<ul style="list-style-type: none"> Explains the scope, objective and etc. of construction stage
4-2 Data Collection	<ul style="list-style-type: none"> Describes the procedure and what to do in Data Collection in construction stage 	<ul style="list-style-type: none"> Explains the details of each procedure in Data Collection in construction stage of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in Data Collection in construction stage of bridges in hilly area.
4-3 Survey and Investigation	<ul style="list-style-type: none"> Describes the procedure and what to do in Survey and Investigation in construction stage 	<ul style="list-style-type: none"> Explains the details of Survey and Investigation in construction stage of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in Survey and Investigation in construction stage of bridges in hilly area.
4-4 Foundation	<ul style="list-style-type: none"> Describes the procedure and what to do in construction stage by types of foundation 	<ul style="list-style-type: none"> Explains the details of construction of foundation of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in construction by types of foundation of bridges in hilly area. Introduce the Bamboo Split Type Earth Retaining method
4-5 Substructure	<ul style="list-style-type: none"> Describes the procedure and what to do in construction stage by types of substructure 	<ul style="list-style-type: none"> Explains the details of construction by types of substructure of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in construction by types of substructure of bridges in hilly area. Introduce the high pier construction methods of Japan
4-6 Superstructure	<ul style="list-style-type: none"> Describes the procedure and what to do in construction stage by types of superstructure 	<ul style="list-style-type: none"> Explains the details of construction by types of superstructure of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in construction by types of superstructure of bridges in hilly area. Introduce the weathering steel for bridges
4-7 River Protection	<ul style="list-style-type: none"> Describes the procedure and what to do in construction stage by types of river protection 	<ul style="list-style-type: none"> Explains the details of construction by types of river protection of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in construction by types

TBA from various existing manuals listed below

4-8 Required Reports	<ul style="list-style-type: none"> Describes the reports to be submitted and approved. 	<p>of river protection of bridges in hilly area.</p> <ul style="list-style-type: none"> Explains the details of required reports/design drawings and necessity of approvals of bridges in hilly area. Specify the survey/investigation/testing to be conducted at the construction stage of bridges in hilly area. 	
CHAPTER 5 BRIDGE REPAIR			
5-1 General	<ul style="list-style-type: none"> Describes the general aspects of bridge reinforcement 	<ul style="list-style-type: none"> Explains the scope, objective and etc. of construction stage Explains the details by types of reinforcement Explains the procedures of bridge reinforcement 	
5-2 Superstructure	<ul style="list-style-type: none"> Describes the procedure and what to do in reinforcement of superstructure 	<ul style="list-style-type: none"> Explains the details of reinforcement of superstructure of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in reinforcement of superstructure of bridges in hilly area. Introduce the example of superstructure reinforcement (methods, materials) in Japan 	TBA from various existing manuals listed below
5-3 Substructure	<ul style="list-style-type: none"> Describes the procedure and what to do in reinforcement of substructure 	<ul style="list-style-type: none"> Explains the details of reinforcement of substructure of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in reinforcement of substructure of bridges in hilly area. Introduce the example of substructure reinforcement (methods, materials) in Japan 	

The existing specification published by IRC

IRC 005	1998	Standard Specifications and Code of Practice for Road Bridges, Section I (General Features of Design) (Seventh Revision)
IRC 006	2014	Standard Specifications and Code of Practice for Road Bridges, Section II Loads and Stresses (Fourth Revision)
IRC 018	2000	Design Criteria for Prestressed Concrete Road Bridges (Post-Tensioned Concrete) (Third revision)
IRC 021	2000	Standard Specifications and Code of Practice for Road Bridges, Section III Cement Concrete (Plain and Reinforced) (Third Revision)
IRC 022	2015	Standard Specifications and Code of Practice for Road Bridges, Section VI – Composite Construction (Limit States Design) (Third Revision)
IRC 024	2010	Standard Specifications and Code of Practice for Road Bridges, Section V Steel Road Bridges (Limit State Method) (Third Revision)
IRC 040	2002	Standard Specifications and Code of Practice for Road Bridges, Section IV (Brick, Stone and Cement Concrete Block Masonry) (Second Revision)
IRC 045	1972	Recommendations for Estimating the Resistance of Soil Below the Maximum Scour Level in the Design of Well Foundations of Bridges
IRC 078	2014	Standard Specifications and Code of Practice for Road Bridges, Section VII, Foundations and Substructure (Revised Revision)
IRC 083-1	2015	Standard Specifications and Code of Practice for Road Bridges, Section IX (Bearings), Part I (Metallic Bearings) (Second Revision)
IRC 083-2	2015	Standard Specifications and Code of Practice for Road Bridges, Section IX (Bearings), Part II (Elastomeric Bearings) (First Revision)
IRC 083-3	2002	Standard Specifications and Code of Practice for Road Bridges, Section IX (Bearings), Part III (Pot, Pot-Cum-PTEE, Pin and Metallic Guide Bearings)
IRC 083-4	2014	Standard Specifications and Code of Practice for Road Bridges, Section IX (Bearings), Part IV (Spherical and Cylindrical)
IRC 083	2014	Standard Specifications and Code of Practice for Road Bridges, Section IX Bearings, Part I : Metallic Bearings
IRC 089	1997	Guidelines for Design and Construction of River Training and Control Works for Road Bridges (First Revision)
IRC 112	2011	Code of Practice for Concrete Road Bridges
IRC SP 013	2004	Guidelines for the Design of Small Bridges and Culverts
IRC SP 064	2016	Guidelines for the Analysis and Design of Cast-in-Place Voided Slab Superstructure (First Revision)
IRC SP 065	2005	Guidelines for Design and Construction of Segmental Bridges
IRC SP 066	2016	Guidelines for Design of Continuous Bridges (First Revision)
IRC SP 067	2005	Guidelines for Use of External and Unbonded Prestressing Tendons in Bridge Structures
IRC SP 069	2011	Guidelines & Specifications for Expansion Joints (First Revision)
IRC SP 070	2016	Guidelines for the Use of High Performance Concrete in Bridges (First Revision)
IRC SP 071	2006	Guidelines for Design and Construction of Prestensioned Girder of Bridges
IRC SP 082	2008	Guidelines for Design of Causeways and Submersible bridge
IRC SP 104	2015	Guidelines for Fabrication and Erection of Steel Bridges
IRC SP 105	2015	Explanatory Handbook to IRC:112 "Code of Practice for Concrete Road Bridges"
IRC SP 109	2015	Guidelines for Design and Construction of Small Diameter Piles for Road Bridges

CONTENTS OF GUIDELINE FOR BRIDGE ON ARTERIAL ROADS IN HILLY AREA (DRAFT)



Dr. Hidetoshi NAKANO

19th December 2017

CHAPTER 1 GENERAL

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Contents (Draft)	Outline	Contents to be Described
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1.4 Types of Projects	<ul style="list-style-type: none"> Explains the different projects which includes bridge implementation 	<ul style="list-style-type: none"> Explains two main projects, such as road project and bridge project, its characteristics and differences. Current situation and issues of road projects and bridge projects.

1-2 Scope

- Indicates the procedures of planning, designing, and construction of BRIDGES on ARTERIAL ROADS in HILLY AREA.
- Describes the details of the procedures and confirms the references that the specifications have already been issued by IRC.
- Important points will be highlighted, which need to be practiced for BRIDGES on ARTERIAL ROADS in HILLY AREA.
- Basically refers the existing specification published by IRC
- Introduces some Japanese Technologies as state-of-art technology.

The existing specification published by IRC

IRC 005	1998	Standard Specifications and Code of Practice for Road Bridges, Section I (General Features of Design) (Seventh Revision)
IRC 006	2014	Standard Specifications and Code of Practice for Road Bridges, Section II Loads and Stresses (Fourth Revision)
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IRC SP 104	2015	Guidelines for Fabrication and Erection of Steel Bridges
IRC SP 105	2015	Explanatory Handbook to IRC:112 "Code of Practice for Concrete Road Bridges"
IRC SP 109	2015	Guidelines for Design and Construction of Small Diameter Piles for Road Bridges

1-3 Objective

- Aims to improve the planning, design, and construction quality of BRIDGES on ARTERIAL ROADS in HILLY AREA.
- Aims to improve the seismic capacity of BRIDGES on ARTERIAL ROADS in HILLY AREA.
- Aims to prolong the life span of BRIDGES on ARTERIAL ROADS in HILLY AREA.
- Aims to make the BRIDGES on ARTERIAL ROADS in HILLY AREA Resilient.

1-4 Types of Projects

- Explains the trends of which the procedures differ by the types of projects, and scope of projects.

- Types of Project

Type	Cost Ratio of Bridge	Investigation/Design for Bridge	Bridge Eng's Status	Flexibility of Design
Road	Small	Rough	Minor	Standardized
Bridge	Big	Detailed	Major	Various

- Scope of Project

Type	Time before opening	Investigation/Design for Bridge	Bridge Eng's Status	Flexibility of Design
BOT/EPC	Short	Rough	Minor	Standardized
DB	Case by case	Case by case	Case by case	Case by case
DD & Const.	Long	Detailed	Major	Various

1-4 Types of Projects

- Explains the trends of which the procedures differ by the types of projects, and scope of projects.
- Importance of Cost Reduction of Bridge Planning, Design and Construction

Type \ Scope	BOT/EPC	DB	DD & Const.
Road	Not very Important	Not very Important	Fair
Bridge	Important	Important	Very Important

CHAPTER 2 Project preparation

CHAPTER 2 Project preparation

Section	Content	Key Points
2-1 General	<ul style="list-style-type: none"> Describes the general aspects of project preparation 	<ul style="list-style-type: none"> Explains the scope, objective and etc. of Feasibility Study and Detailed Project Report preparation
2-2 Feasibility Study	<ul style="list-style-type: none"> Describes the procedure and what to do in Feasibility Study 	<ul style="list-style-type: none"> Explains the procedure of Feasibility Study for bridge planning in hilly area Explains what and how to do in feasibility study stage for bridge planning in hilly area
2-3 Detailed Project Report	<ul style="list-style-type: none"> Describes the procedure and what to do in Detailed Project Report preparation. 	<ul style="list-style-type: none"> Explains the procedure of Detailed Project Report preparation for bridge planning in hilly area Explains what and how to do in Detailed Project Report preparation stage for bridge planning in hilly area. Introduce the Know-how of Bridge Type Study of Japan

2-2 Feasibility Study

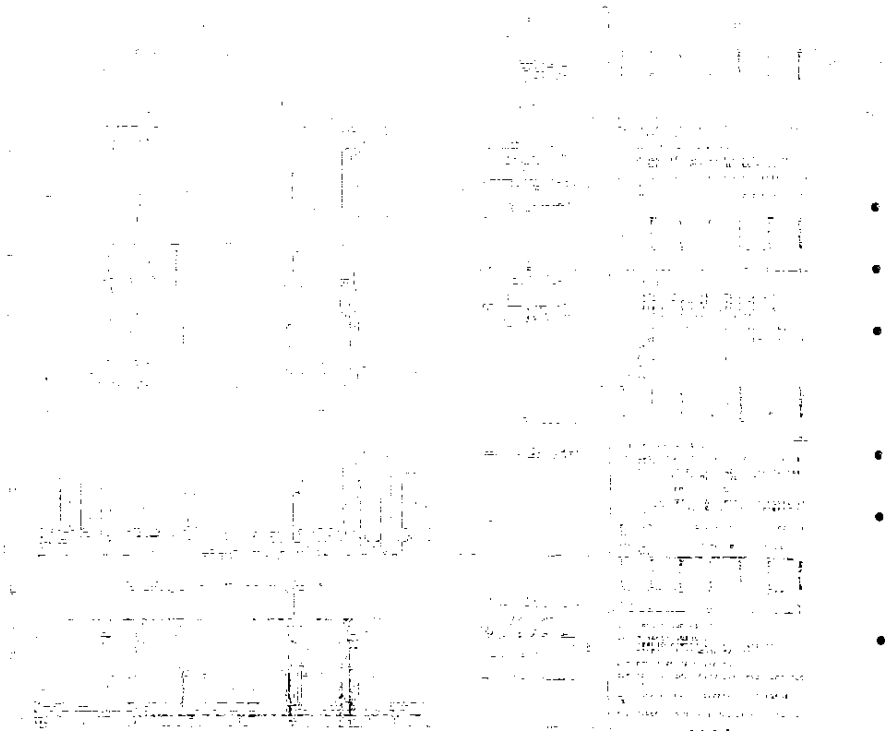
- Rough design and cost estimation of BRIDGES in HILLY AREA.
- ⇒ Bridges in Hilly Area has more unforeseen factors than those of Plain Area
Procurement of Material and Machinery tends to be more difficult.
- ⇒ Cost and Construction Period tends to be more expensive and longer.
- ★ **Checking the cost per bridge area requires to be checked.**

- ⇒ Length and Area of BRIDGES in HILLY AREA tends to increase in further stages (DPR, DD)
- ★ **Contingency of bridge Q'ty must be taken into account.**

2-3 Detailed Project Report

- Points to be carefully studied in Basic design for BRIDGES in HILLY AREA.
- ✓ Access Road Alignment
- ✓ How to secure the construction yard
- ✓ Construction Method
- ✓ Procurement of Material
- ★ **Above factors needs to be taken into account in Bridge Type Study**

Bridge Type Study of Japan



- Economically
- Structural
- Construction Constraints
- Aesthetic
- Maintenance Constraints
- Comfort

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19th Dec. 2017

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Chapter 3 DESIGN

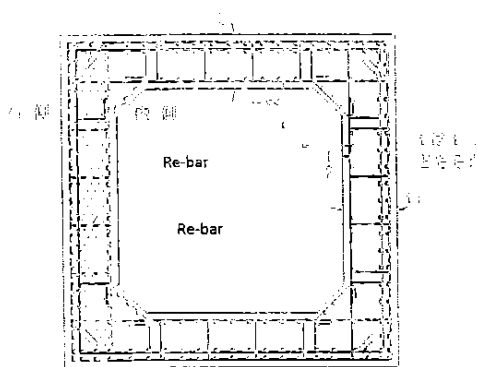
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Chapter 3 DESIGN

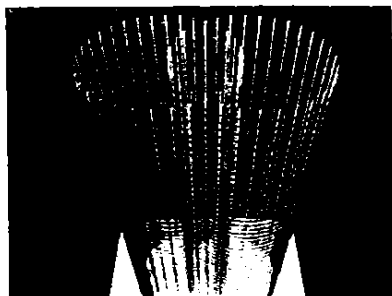
Contents (Draft)	Outline	Contents to be Described
3-1 General	• Describes the general aspects of design stage	• Explains the scope, objective and etc. of Design stage
3-2 Data Collection	• Describes the procedure and what to do in Data Collection in design stage	• Explains the procedure of in Data Collection in design stage of bridges in hilly area. • Explains the important points, dos and don'ts, and etc. in Data Collection in design stage of bridges in hilly area.
3-3 Survey and Investigation	• Describes the procedure and what to do in Survey and Investigation in design stage	• Explains the details of Survey and Investigation in design stage of bridges in hilly area. • Explains the important points, dos and don'ts, and etc. in Survey and Investigation in design stage of bridges in hilly area. • Explains the details of engineering design of bridges in hilly area.
3-4 Engineering Design	• Describes the procedure and what to do in Designing stage	• Explains the important points, dos and don'ts, and etc. of engineering design of bridges in hilly area. • Introduce High-pier Design Method of Japan • Introduce the method of seismic analysis of Japan
3-5 Construction Planning	• Describes the procedure and what to do in Construction Planning	• Explains the details of Construction Planning of bridges in hilly area. • Explains the important points, dos and don'ts, and etc. in construction planning of bridges in hilly area. • Introduce the example of construction planning in Japan
3-6 Cost Estimation	• Describes the procedure and what to do in Cost estimation	• Explains the details of Cost Estimation of bridges in hilly area. • Explains the important points, dos and don'ts, and etc. of Cost Estimation of bridges in hilly area.
3-7 Required Reports	• Describes the reports to be submitted and approved.	• Explains the details of required reports and necessity of approvals • Highlights the specific points in the hilly area.

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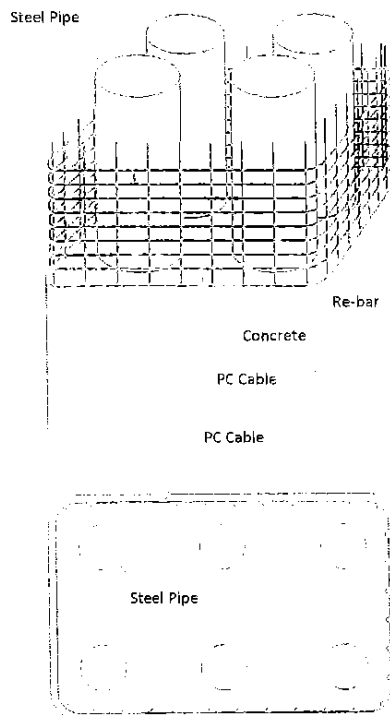
High-pier Design Method of Japan



Hollow Cross Section



Inter-Locking Rebar Arrangement

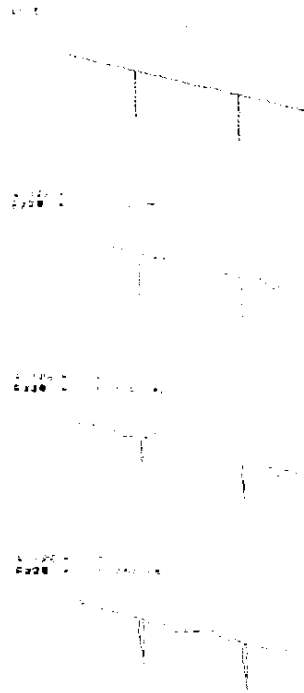
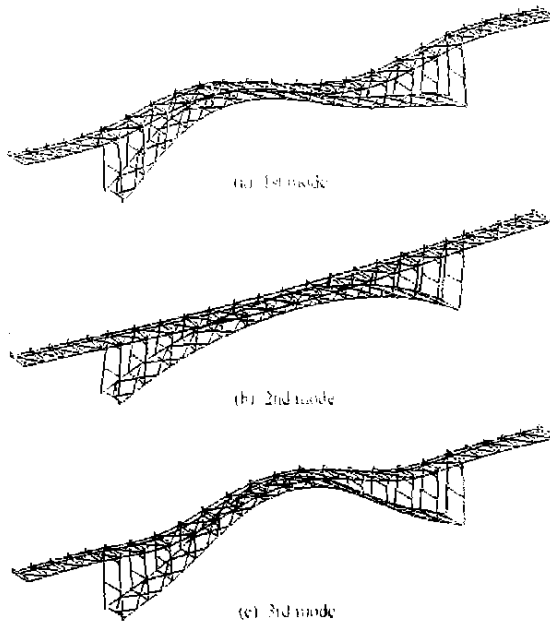


Hybrid Cross Section

There will be more Variations of Cross Section for High-Pier

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Dynamic Analysis against Earthquakes



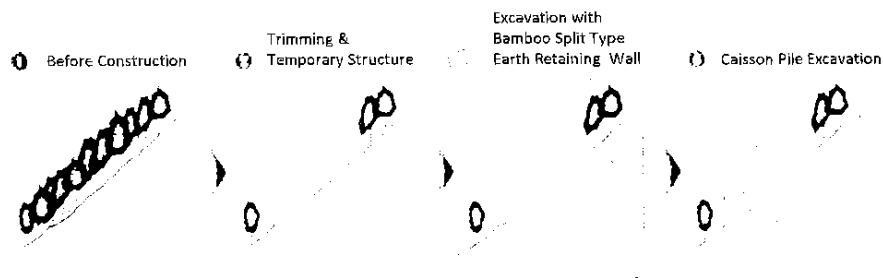
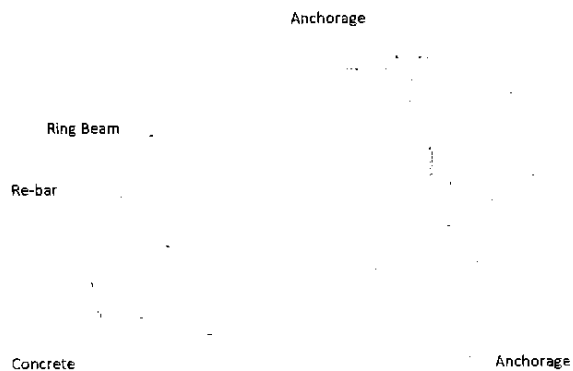
★ **Rigid Type has more Seismic Capacity in Dynamic Analysis**

CHAPTER 4 Construction

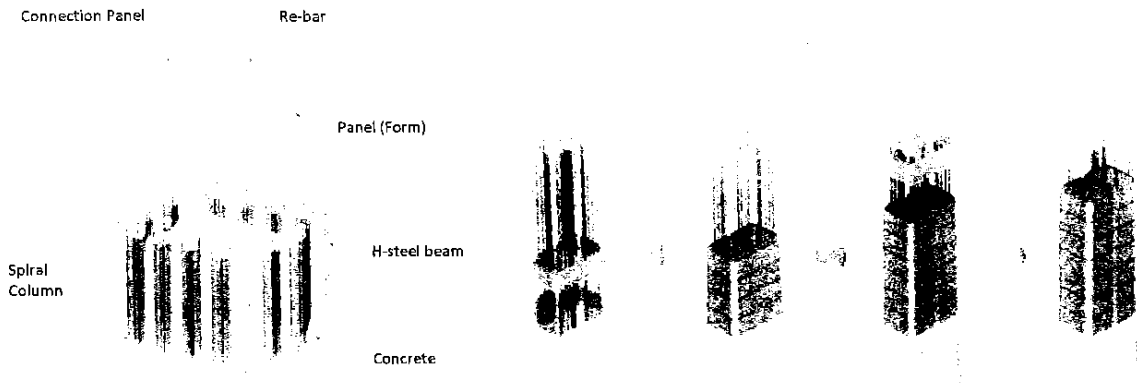
CHAPTER 4 Construction

Contents (Draft)	Outline	Contents to be Described
4-1 General	<ul style="list-style-type: none"> Describes the general aspects of construction stage 	<ul style="list-style-type: none"> Explains the scope, objective and etc. of construction stage
4-2 Data Collection	<ul style="list-style-type: none"> Describes the procedure and what to do in Data Collection in construction stage 	<ul style="list-style-type: none"> Explains the details of each procedure in Data Collection in construction stage of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in Data Collection in construction stage of bridges in hilly area.
4-3 Survey and Investigation	<ul style="list-style-type: none"> Describes the procedure and what to do in Survey and Investigation in construction stage 	<ul style="list-style-type: none"> Explains the details of Survey and Investigation in construction stage of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in Survey and Investigation in construction stage of bridges in hilly area.
4-4 Foundation	<ul style="list-style-type: none"> Describes the procedure and what to do in construction stage by types of foundation 	<ul style="list-style-type: none"> Explains the details of construction of foundation of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in construction by types of foundation of bridges in hilly area. Introduce the Bamboo Split Type Earth Retaining method Explains the details of construction by types of substructure of bridges in hilly area.
4-5 Substructure	<ul style="list-style-type: none"> Describes the procedure and what to do in construction stage by types of substructure 	<ul style="list-style-type: none"> Explains the important points, dos and don'ts, and etc. in construction by types of substructure of bridges in hilly area. Introduce the high pier construction methods of Japan
4-6 Superstructure	<ul style="list-style-type: none"> Describes the procedure and what to do in construction stage by types of superstructure 	<ul style="list-style-type: none"> Explains the details of construction by types of superstructure of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in construction by types of superstructure of bridges in hilly area. Introduce the weathering steel for bridges
4-7 River Protection	<ul style="list-style-type: none"> Describes the procedure and what to do in construction stage by types of river protection 	<ul style="list-style-type: none"> Explains the details of construction by types of river protection of bridges in hilly area. Explains the important points, dos and don'ts, and etc. in construction by types of river protection of bridges in hilly area.
4-8 Required Report	<ul style="list-style-type: none"> Describes the reports to be submitted and approved. 	<ul style="list-style-type: none"> Explains the details of required reports/design drawings and necessity of approvals of bridges in hilly area. Specify the survey/investigation/testing to be conducted at the construction stage of bridges in hilly area.

Bamboo Split Type Earth Retaining



High Pier Construction Methods



Construction with Half Pre-cast material

Hybrid-Hollow Cross Section

Self-Climbing Form/Scaffolding



Weathering Steel



Maintenance Free Steel Bridges
No repainting forever

19th Dec 2017 19:00:00

19th Dec 2017

23/31

CHAPTER 5 Bridge Repair

24/31

CHAPTER 5 Bridge Repair

Contents (Outline)

- 1 General
- 5-2 Superstructure
- 5-3 Substructure

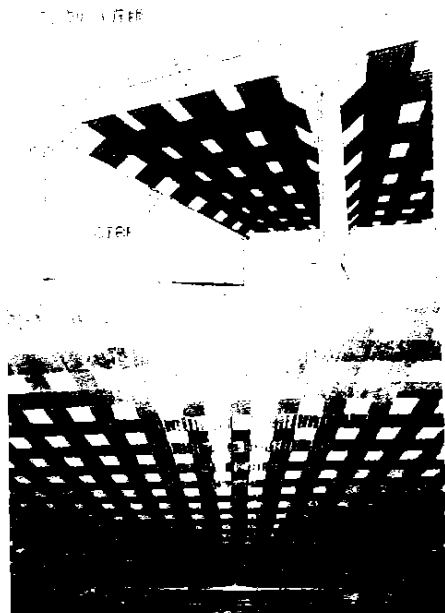
Outline

- Describes the general aspects of bridge reinforcement
- Describes the procedure and what to do in reinforcement of superstructure
- Describes the procedure and what to do in reinforcement of substructure

Contents to be Described

- Explains the scope, objective and etc. of construction stage
- Explains the details by types of reinforcement
- Explains the procedures of bridge reinforcement
- Explains the details of reinforcement of superstructure of bridges in hilly area.
- Explains the important points, dos and don'ts, and etc. in reinforcement of superstructure of bridges in hilly area.
- Introduce the example of superstructure reinforcement (methods, materials) in Japan
- Explains the details of reinforcement of substructure of bridges in hilly area.
- Explains the important points, dos and don'ts, and etc. in reinforcement of substructure of bridges in hilly area.
- Introduce the example of substructure reinforcement (methods, materials) in Japan

CFRP (Carbon-Fiber Reinforced Plastic)



RC-Slab Repair



RC-Pier Repair

CONTENTS OF GUIDELINE FOR OPERATION AND MAINTENANCE (DRAFT)

CONTENTS (DRAFT)	OUTLINE	CONTENTS TO BE REFERRED	EXISTING INDIAN MANUALS TO BE REFERRED
CHAPTER 1 OPERATION			
1-1 Introduction	<ul style="list-style-type: none"> ● Introduce characteristics and importance of operation 	<ul style="list-style-type: none"> ● Importance of road operation on arterial roads in hilly area 	
1-2 Traffic Management	<ul style="list-style-type: none"> ● Explain the traffic management on the objective roads from information collection to information provision 	<ul style="list-style-type: none"> ● Minimum requirement of highway patrol and ITS system ● Information collection system by road side facilities (e.g. weather monitoring equipment, CCTV camera) and patrolling team etc. ● Information advertisement system to road users with roadside facilities, SMS, radio, TV programs, websites, etc. ● Role and responsibility of traffic control center ● Advanced technologies and system 	(7) Section 17.8 Weather information system (14) Volume III, Chapter-2 Traffic Management
1-3 Early Warning System	<ul style="list-style-type: none"> ● Explain the necessity of early warning system in hilly area and its use of the information collected 	<ul style="list-style-type: none"> ● Provision of weather information (e.g. rainfall, fog, wind, etc.) ● Minimum system requirement and required configuration and architecture ● Criteria of road closure, speed limit, and reinforcing patrol according to predetermined thresholds of weather monitoring data including accumulated rainfall, rainfall intensity, wind velocity and visibility. 	
1-4 Monitoring of Slopes	<ul style="list-style-type: none"> ● Introduce the techniques for monitoring high risk slope 	<ul style="list-style-type: none"> ● Basic method of slope monitoring for high risk slopes (Extensometer, GPS, ground surface inclinometer, water level gauges, and etc.) ● Designation of high risk slope 	
1-5 Accident/Incident Management	<ul style="list-style-type: none"> ● Explain how to deal with accidents/incident occur and prevention method 	<ul style="list-style-type: none"> ● Analysis of historical accident/incident data ● Identification of black spots ● Usage of analyzed data for countermeasure planning 	
1-6 Control of Overloaded/Oversized Vehicle	<ul style="list-style-type: none"> ● Explain the necessity and procedure of overload/oversize control 	<ul style="list-style-type: none"> ● Standard procedures of overloaded/oversized vehicle control ● Minimum requirement for concessionaires/contractors of BOT/OMT/EPC projects 	(14) Volume III, Chapter-1, Toll Plaza Operation

<p>1-7 Tunnel Operation</p>	<ul style="list-style-type: none"> Describe normal/emergency tunnel operation and operation facilities 	<ul style="list-style-type: none"> Minimum system requirement and required configuration and architecture Categorization of tunnels and required facilities inside tunnel Contractor/concessionaire's obligation for proper tunnel operation and road users' safety Standard operation requirement under normal/emergency situation Role and responsibility of facility control room Monitoring of tunnels and facilities Required organization and equipment Training (disaster drill at site etc.) 	<p>(10) Section 14, Tunnels (12) Section 14, Tunnels (13) Section 8, Operation and Maintenance (14) Volume II, Chapter-6, Tunnels</p>
<p>1-8 Work Zone Safety</p>	<ul style="list-style-type: none"> Describe necessity of better safety measures during construction and maintenance in hilly area and introduce adequate work zone safety method 	<ul style="list-style-type: none"> Standard contractor/concessionaire's obligation of work zone safety Planning of work zone Devices for work zone control Safety goods for workers Road work information to road users 	<p>(7) Section 14.8.1, Safety of labor and road user during maintenance, Section 17, Traffic Management (9) Section 1, 3, 4, 5, 7, 9 (10) Section 9.9 Work Zone Traffic Management Plans(WTMPs) (12) Section 9.9 Work Zone Traffic Management Plans(WTMPs) (14) Volume IV, Section 5.1.2, Work zone safety</p>
<p>1-9 Toll Collection</p>	<ul style="list-style-type: none"> Introduce toll collection methods/system and improvement work at toll plaza 	<ul style="list-style-type: none"> Toll collection methods and system, including manual collection, touch & go, and ETC Improvement work for traffic safety/traffic flow at toll plaza 	<p>(14) Volume III, Chapter-1, Toll Plaza Operation</p>
<p>CHAPTER 2 MAINTENANCE</p>			
<p>2-1 Introduction</p>	<ul style="list-style-type: none"> Explain the importance and basic approach of road maintenance 	<ul style="list-style-type: none"> Importance of road maintenance on arterial roads in hilly area Relationship between inspection, assessment, maintenance planning, maintenance work, and rehabilitation work Philosophy of Plan-Do-Check-Action(PDCA) Cycle Importance of preventive maintenance 	<p>(1) Section 1.1, Basic Maintenance Objective and Policies (7) Section 14.1, General: 14.2, Basic Maintenance Objective and Policies: and 14.5 Planning and Financing (14) Volume IV, Maintenance</p>

2-2 Inspection	<ul style="list-style-type: none"> Describe the type of inspection and inspection method in consideration of context of the objective roads 	<ul style="list-style-type: none"> Categories of inspection: (e.g. initial inspection, daily inspection, periodic inspection, detailed inspection, supplemental inspection, emergency inspection) Basic framework of required inspection (method, frequency, etc.) Inspection Planning Explanation of typical damage and distresses Record and analysis of inspection data Input to data management system (IBMS etc.) Advanced inspection method 	<ul style="list-style-type: none"> (6) Section 3.4 (7) Section 14.6, Inspection (14) Volume IV, Section 3.1.2, Types of Inspection (1) Section 3.1, Frequency; Appendix 2 and 3 (4) Section 12, Maintenance of Signs (6) Section 3.4; Section 3.7; Appendix 4, 5, 6, 7, and 8 (7) Appendix-12, Check list (8) Appendix 1, List of Equipment; Appendix 3, Standard Inspection Form (14) Volume IV, Section 3.1.3, Frequency of Inspection; Section 3.2, Inspection work
2-3 Assessment	<ul style="list-style-type: none"> Explain how to assess the distress data collected through inspection 	<ul style="list-style-type: none"> Standard assessment procedure Standard ranking criteria of damage in association with degree and size of defect 	<ul style="list-style-type: none"> (1) Section 4, Maintenance Criteria (7) Section 14.7, Maintenance Criteria (14) Volume IV, Section 3.2.2 Assessment (1) Section 9, Problems of Special Areas (5) Section 4, Symptoms, causes, and treatment of defects (7) Section 14.8.2, Symptoms, causes, and treatment of surface defects (8) Section 5, Type of damages; Section 7, Sketches (11) Section 3.7 Diagnosis of Structural Defects and Distresses
2-4 Maintenance Plan and Works	<ul style="list-style-type: none"> Describe procedure of maintenance planning and implementation 	<ul style="list-style-type: none"> Up-to-date and practical maintenance standard Standard performance criteria for cleaning and planing work etc. Development of annual maintenance plan, based on inspection results Methods of traffic accident repair and maintenance repair (pavement, road marking, bridge, road furniture, and etc.) 	<ul style="list-style-type: none"> (1) Section 5.6, Maintenance of Drains, Shoulders, Slopes and CD works; Section 5.7, Maintenance of Road Furniture (2) Schedule F, Maintenance requirements (3) Schedule K, Maintenance requirements (4) Section 12, Maintenance of Signs (5) Section 4, Symptoms, causes, and treatment of defects (6) Section 4, Maintenance Techniques

		<p>(7) Section 14.4, Components of Maintenance Activities; 14.5 Planning and Financing (14) Volume IV, Section4.2, Maintenance Works</p>
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Notes: EXISTING INDIAN MANUALS TO BE REFERRED

- (1) MORTH-1983-Manual for maintenance of roads
- (2) Public Private Partnership in operation and maintenance of highways (2006)
- (3) Public Private Partnership in national highways (2006)
- (4) IRC-67-2012 Code of practice for road signs
- (5) IRC-82-1982 Code of practice for maintenance of bituminous surfaces of highways
- (6) IRC-SP-35-1990 Guidelines for inspection and maintenance of bridges
- (7) IRC-SP-48-1998 Hill road manual
- (8) IRC-SP-52-1999 Bridge inspector reference manual
- (9) IRC-SP-55-2014 Guidelines on traffic management in work zones
- (10) IRC-SP-73-2015 Manual of specifications and standards for two laning of highways with paved shoulder
- (11) IRC-SP-83-2008 Guidelines for maintenance, repair and rehabilitation of cement concrete pavements
- (12) IRC-SP-84-2014 Manual of specifications & standards for four laning of highways through PPP
- (13) IRC-SP-91-2010 Guidelines for road tunnels
- (14) IRC-SP-99-2013 Manuals of specification and standards for expressways



Presentation Outline

2

- Introduction
- Basic Principle of new O/M Guideline
- Issues on Existing Guidelines/Manuals
- Major Topics on new O/M Guideline

Introduction of Expert

3

Denichiro YAMADA

JICA Expert for NHAI (from Apr. 2016)
Highway Engineering



Manager, International Department,
East Nippon Expressway Co., Ltd. (NEXCO-East)

- Obtain master's degree of civil engineering, Saitama University (2002)
- Management of planning, design, construction, O/M of expressways and international activities at NEXCO-East over 15 years
- Management of Tokyo Outer Ring Exp. construction (2006-2008)
- Comprehensive management of O/M and environment (2008-2011)
- International activities for road development including India (2011-2016)
- Presentation on "Environmental Management in Japan (Indore, 2015)" and "Green Highway (Hyderabad, 2016)"

Introduction of Expert

4

Michiya KITAYAMA

JICA Short Term Expert
in charge of Operation & Maintenance

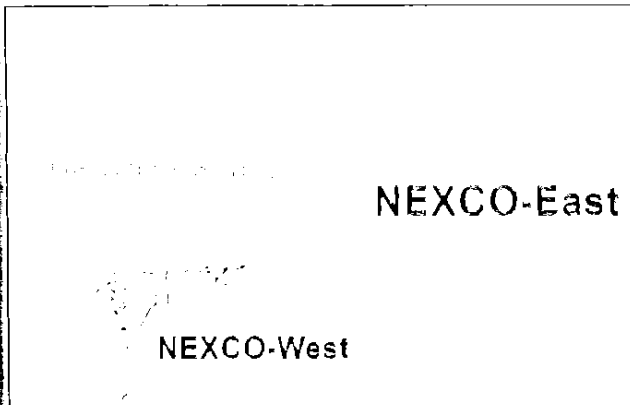


Deputy Manager, International Department,
East Nippon Expressway Co., Ltd. (NEXCO-East)

- Obtained M.S. in civil engineering, University of Washington, USA (2017)
- Obtained B.S. in civil engineering, Kyoto University, Japan (2005)
- Worked for NEXCO-East over 10 years
 - Management of O&M works in Niigata Region (2012-2015)
 - International work, including PIARC activities and JICA expressway O/M project in Sri Lanka, (2010-2012)
 - Management of bridge strengthening work (2009-2010)
 - Management of expressway construction work (2007-2009)

Company Profile (NEXCO-East) ⁵

Largest Expressway Management Company in Japan



	NEXCO East	Whole Japan
in Operation*1	3,871 km (38%)	10,122 km (100%)
under Construction*1	147 km (30%)	502 km (100%)
Rest Areas*1	321 Nos	-
Traffic Volume*2	2.86 Mil Veh./day	-
Toll Revenue*2	2.25 Bil YEN/day (1.3 Bil INR/day)	-

*1 : As of Mar, 2017
*2 : FY2016

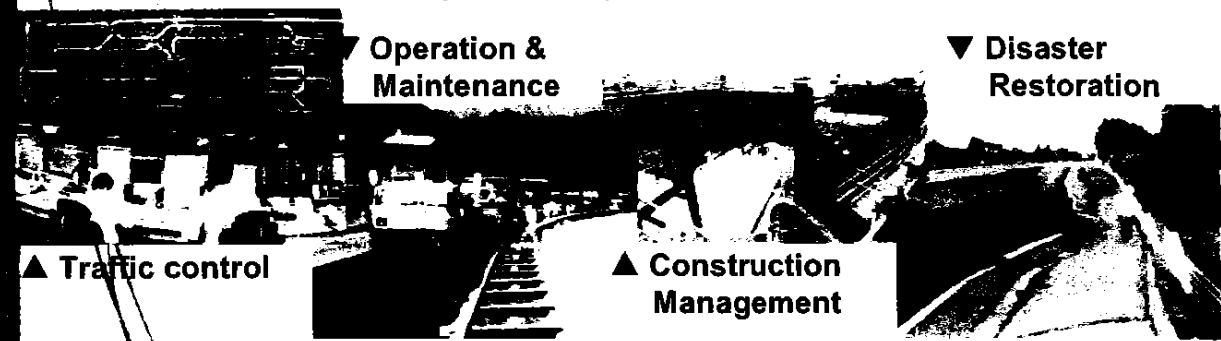
Tokyo metropolitan area

Company Profile (NEXCO-East) ⁶

Various areas : Mountainous, Coastal, Urban, Rural etc.



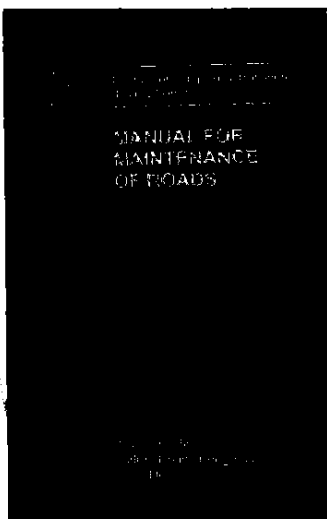
Various activities : Development, O/M, Disaster management, Service area (Rest area) etc.



Basic Principle

- 1) O/M guideline aims to standardize O/M level required for arterial highways in hilly area
- 2) O/M guideline should achieve maximum usage of practical situation
- 3) O/M guideline should be "Standard Bidding Document" of BOT/OMT/EPC projects
- 4) O/M guideline would be targeted "Arterial hill roads", but not limited to
- 5) O/M guideline would be used for O/M activities by outsourcing to the private sector

Issues on the existing guideline



[Manual for Maintenance of Roads ; MoRTH, 1983]

- Old guideline
- Not meet today's requirements

[Other Manuals]

- No comprehensive maintenance manuals ; Not user friendly
- Concessionaires/Contractors are following their independent manuals

- Develop only, ultimate, absolute and comprehensive O/M guideline for arterial highways in hilly area
- Standardize O/M levels in each highway
- Introduce advanced O/M technologies



Major Topics on new guideline

9

1) Operation

- Traffic Management and ITS system
- Early Warning System
- Monitoring of Slopes
- Accident / Incident Management
- Control of Overloaded/Oversized vehicles
- Tunnel Operation
- Work Zone Safety (Traffic Regulation)
- Toll Collection

2) Maintenance

- Inspection
- Maintenance Plan & Works

10



1) Operation

Traffic Management

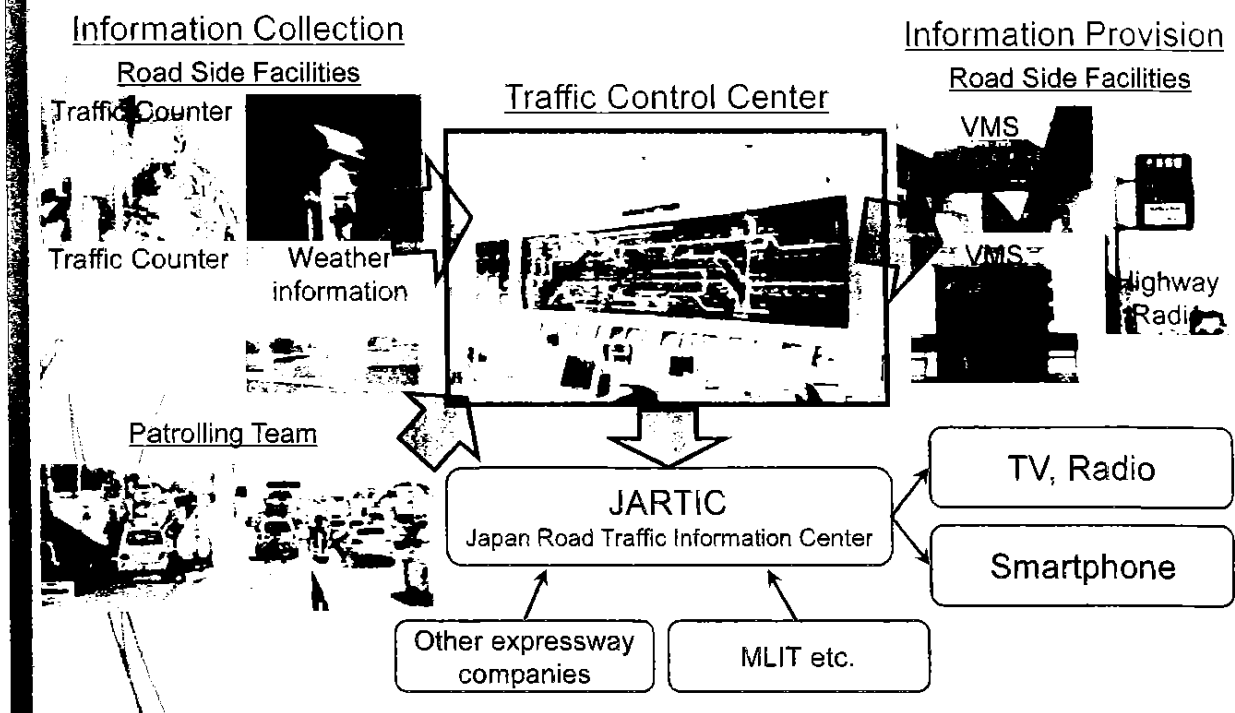
11

- The chapter of traffic management describes minimum requirement of highway patrol and ITS system for arterial highways in hilly area
- The chapter aims to optimize traffic on highways and give comfort and convenience to road users
- Establishment of traffic information collection and provision system
- The chapter also shows the role and responsibility of traffic control center
- The chapter may refer to existing guidelines, however add advanced technologies and system

Traffic Management

12

Example of Traffic Management

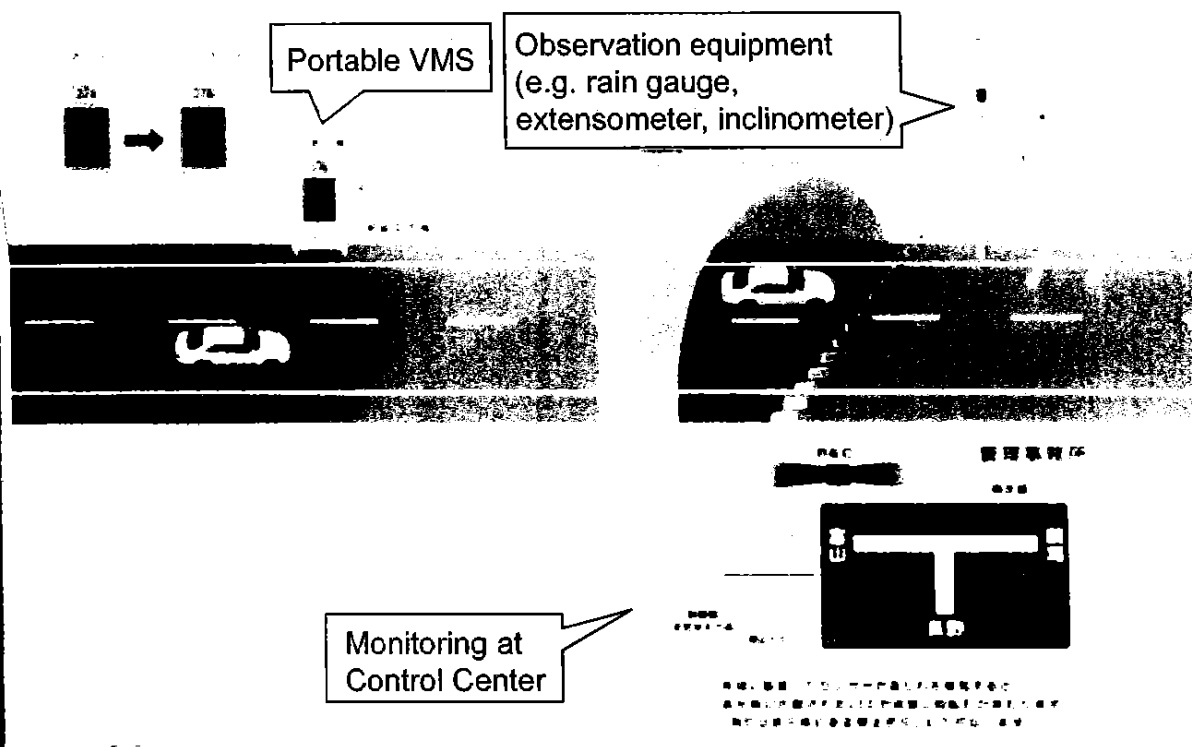


Early Warning System

- The chapter of early warning system shows safety measures for highways by providing weather information (rainfall, fog, wind etc.)
- This chapter also shows minimum system requirement and required configuration and architecture
- The system monitors weather and road slope condition 24/7
- Appropriate measures (road closure, speed limit, strengthen patrol etc.) should be taken, in case measured data exceed predetermined thresholds
- Model activities (rainfall measurement) will be conducted parallel to develop the guideline

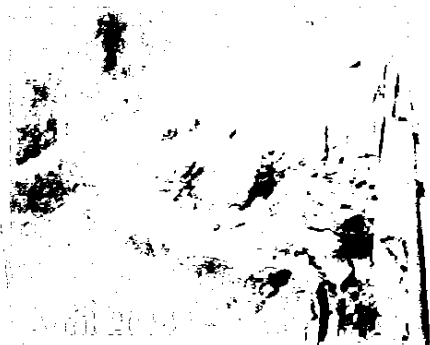
Early Warning System

Example of Early Warning System



Monitoring of Slopes

- This chapter includes basic method of slope monitoring designated as high risk slopes
- Designation of high risk slopes
=> new slope guideline

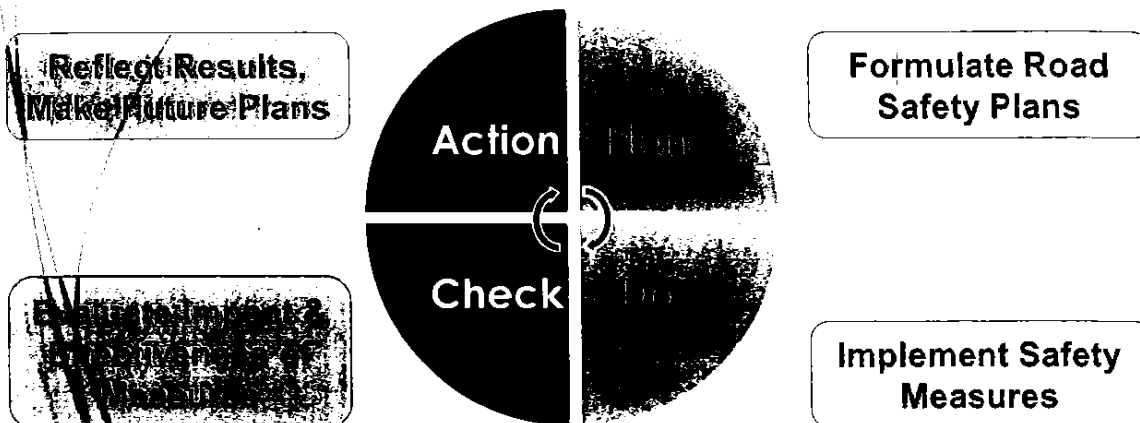


- Caused by rainwater and snowmelt water
- A month after deformation was found

- Constant monitoring (Extensometer, GPS, Ground surface inclinometer, Water level gauges)
- Periodic monitoring (1/month) (Ground displacement gauge)

Accident/Incident Management ¹⁶

- This chapter describes standard procedures of
 - (i) accident/incident data analysis
 - (ii) identification of black spots
 - (iii) usage of analyzed data on planning
- Specific road safety facilities (barriers, markings etc.)
=> planning guideline



Control of Overloaded/Oversized Vehicle

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- This chapter describes standard procedures of control of overloaded/oversized vehicles
- Minimum requirement for concessionaires and contractors of BOT/OMT/EPC projects
- The chapter also shows minimum system requirement and required configuration and architecture

Load Violation

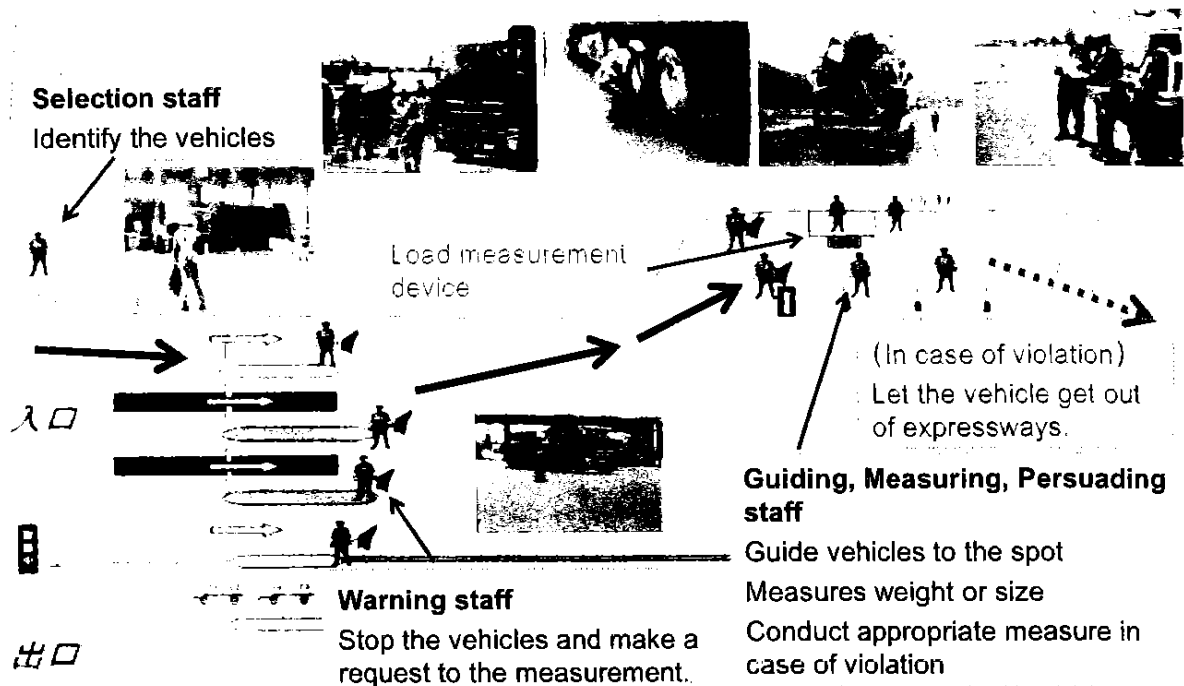
Size Violation



Control of Overloaded/Oversized Vehicle

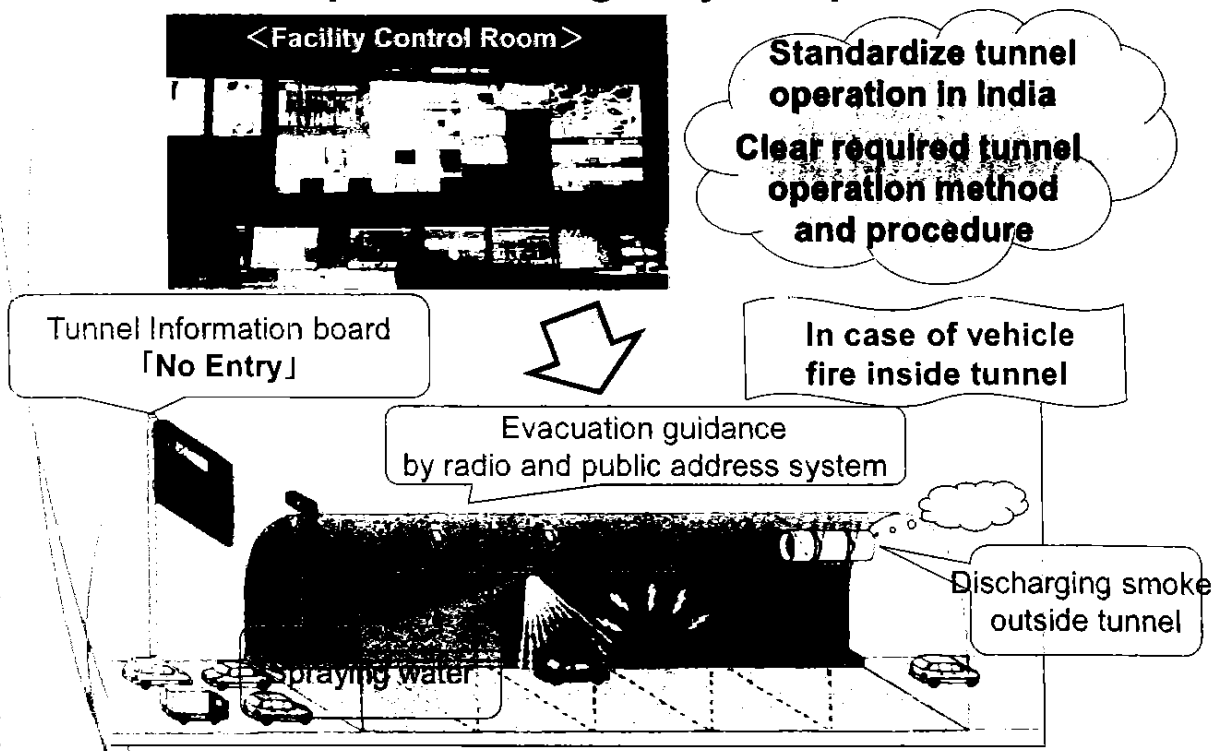
18

Example of Overloaded/sized Vehicle Control



- **Categorization of tunnels**
 - => Existing guideline / New tunnel guideline
- **The chapter of tunnel operation shows contractor/concessionaire's obligations for proper tunnel operation and road users safety**
 - => Normal operation (Ventilation, Lighting etc.)
 - => Emergency operation (Response for fire & accident, necessary actions)
 - => Facility Control Room
 - => Monitoring of Tunnel and Facilities
 - => Required organization & equipment
 - => Training (Drill at site etc.)
- **Required facilities inside tunnels**
 - => New tunnel guideline

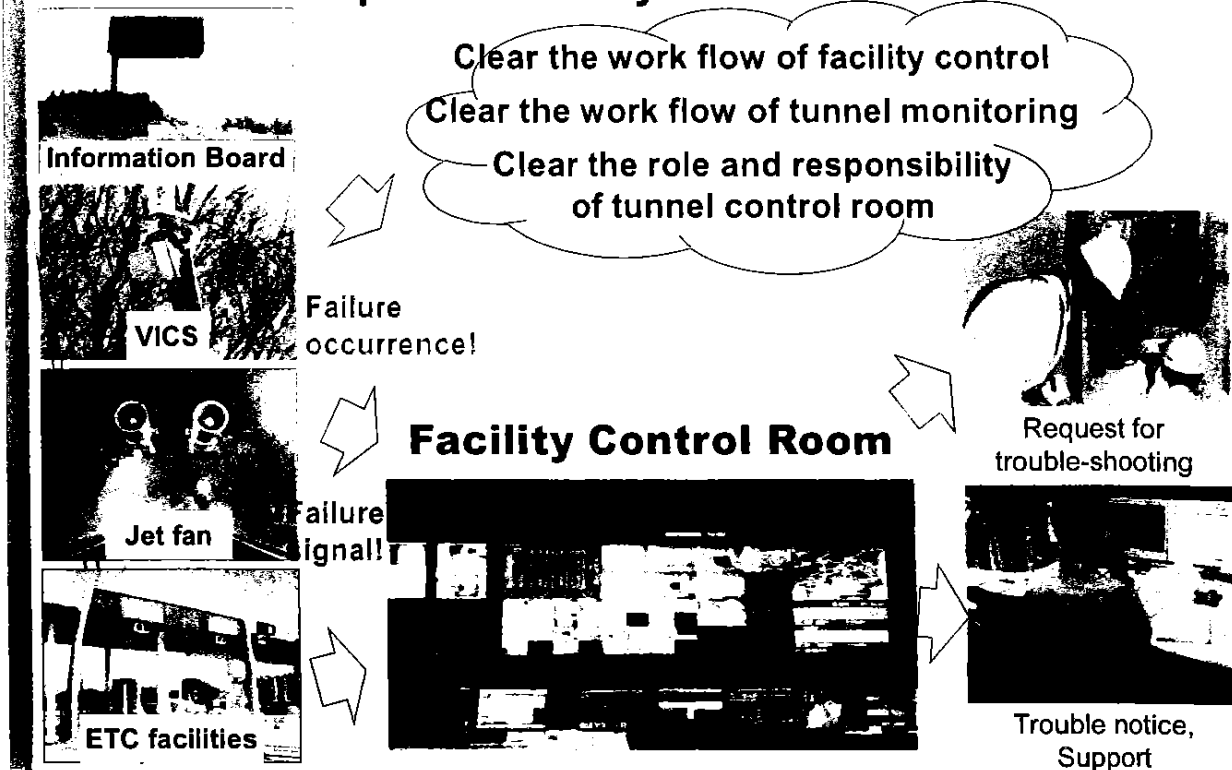
Example of Emergency Response



Tunnel Operation

21

Example of Facility Control Room



Work Zone Safety

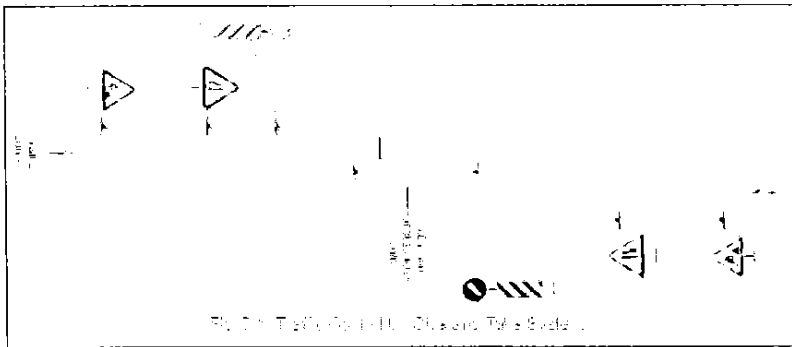
22

- Many of actual works do NOT follow existing manuals during site surveys
- The chapter of work zone safety shows concessionaires/contractors' obligation to divide work zone and traffic zone in order to avoid unnecessary accidents and keep safe traffic on highways during construction and operation
- Basically this chapter refers to existing manual (IRC-SP-55-2014, etc.)
- However the chapter may describe additional measures for work zone safety

Issues on Existing Construction Works

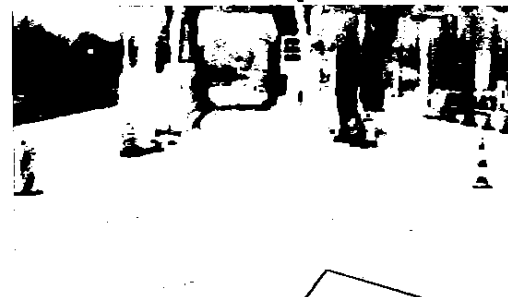


Example of Work Zone Safety



Toll collection

- The chapter of toll collection summarize toll collection methods and system including manual collection, touch & go, and ETC
- Toll collection is practical use in India, so this chapter basically refers to existing manuals
- However the chapter may describe improvement work for traffic safety/ traffic flow at toll plaza



Color paving for dedicated ETC lane

2) Maintenance

Inspection

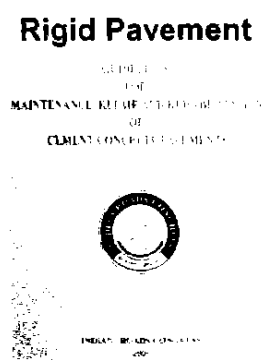
- Existing manuals describe inspection in the area of bridge, pavement, road sign, and etc., however no comprehensive inspection manuals
- This chapter describes basic framework of required inspection (methods, frequency etc.)
- Refer to existing manuals, where appropriate



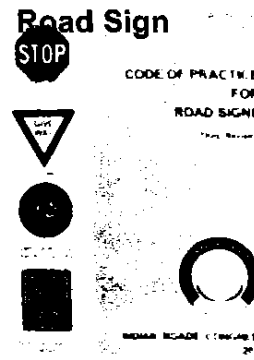
IRC:SP-35-1990



IRC:SP-52-1999



IRC:SP-83-2008



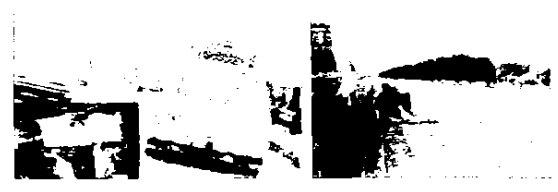
IRC:67-2012

Initial Inspection

- > Close visual check, hammering check, etc.
- > When tunnels are constructed and reformed

Daily Inspection

- > 2 to 4 times per week
- > Visual check from a car, in most of cases



Periodic Inspection

- > 1 time per year
- > Visual check from a distance

Detailed Inspection

- > 1 time per 5 years
- > Close visual check, hammering, non-destructive inspection. etc.



Supplemental Inspection

- > When severe damages are founded etc.

Emergency Inspection

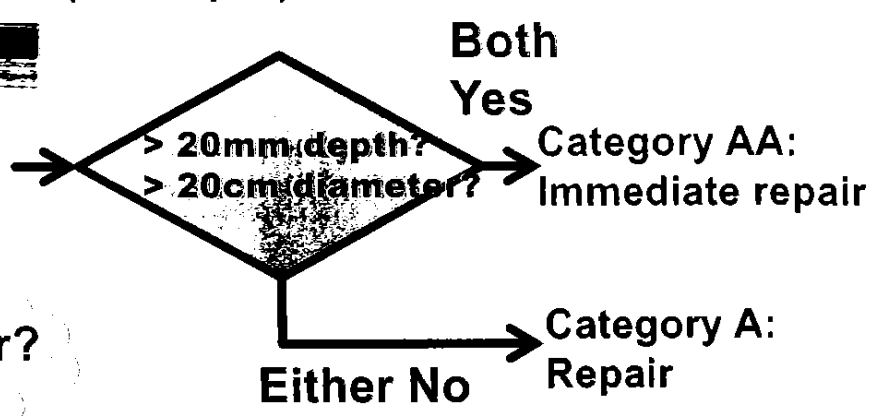
- > Natural disaster, abnormal climate etc.
- > Mainly visual (sensory) inspections from a car

- Describe standard assessment procedure
- Describe standard ranking criteria of damages in order to utilize data for maintenance planning

Standard criteria
(Example)



When repair?
Priority?

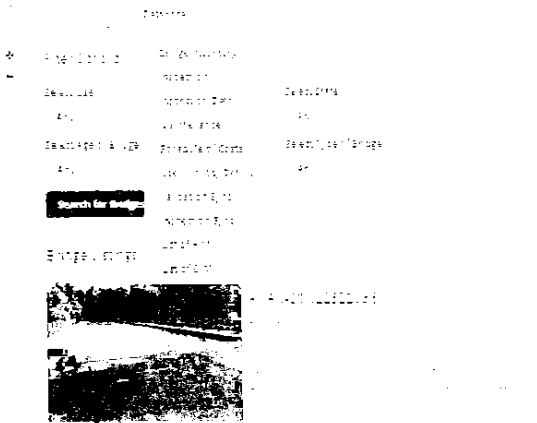


Inspection

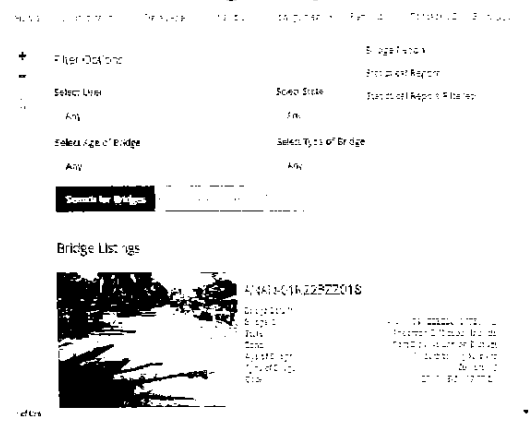
- This chapter coordinates closely with IBMS and other inspection data accumulation system
- This chapter would specify data accumulation as the obligation of contractors/concessionaires



Database



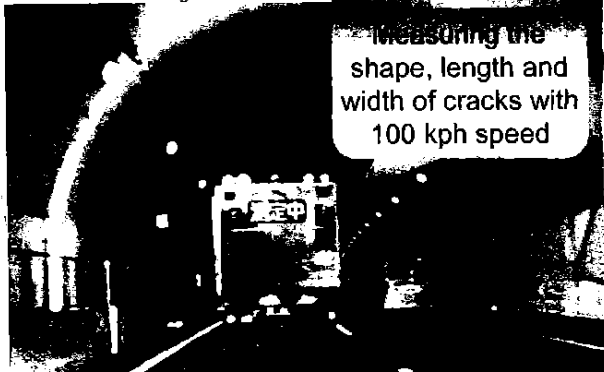
Bridge Report



Inspection

- This chapter may describe state-of-the-art (SoA) technologies of inspection as showcase

High speed inspection by Line sensor digital camera



Measuring the shape, length and width of cracks with 100 kph speed

Improvement of inspection

- The length, width, locations of cracks
- Extract the locations which need inspections
- Reduce the period of lane closures



Cracking diagram



Maintenance plan and works

- Existing manuals are out of date
- Criteria of maintenance standard is not clearly stated in current bidding document

<Model Concession Agreement>

Name of defect or deficiency	Time limit for repair/rectification
(iii) Potholes	- 48 hours

- Concessionaire shall repair potholes within 48 hours, regardless of size/depth
- However, actual project may not follow this standard



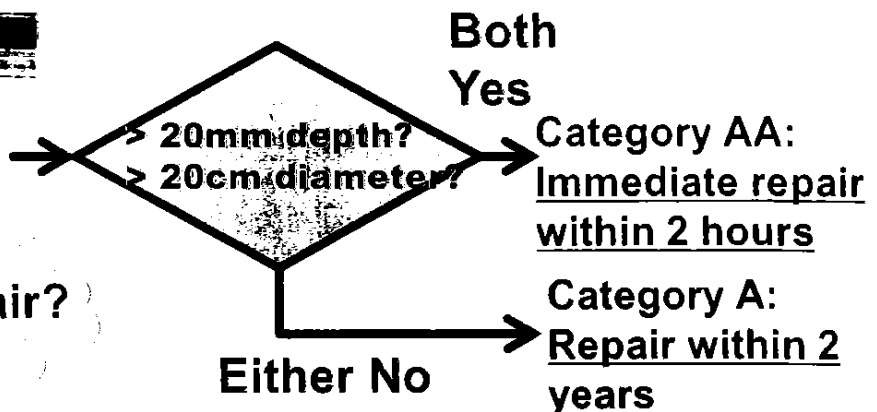
Maintenance plan and works

- Create up-to-date and practical guideline which can be easily used by highway projects

Example of pothole repair

<Inspection> <Assessment> <Maintenance>

Pothole



When repair?
Priority?

Maintenance plan and works

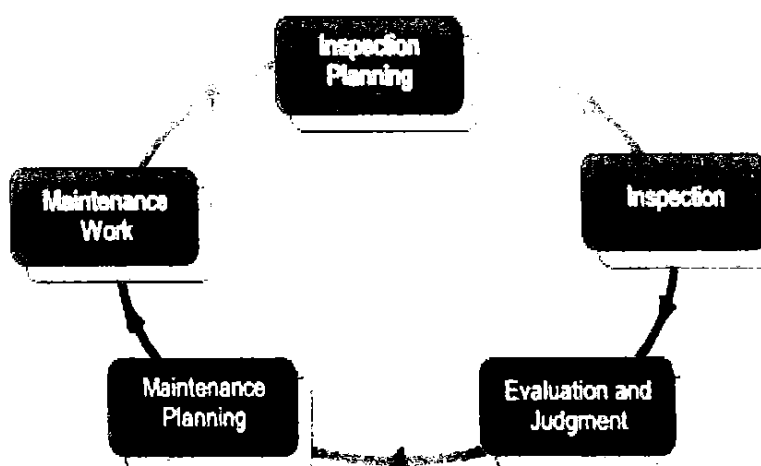
- Include performance criteria for such as cleaning and planting work, for example:
 - To ensure sufficient visibility for road users to drive safely and smoothly by maintaining trees and grasses on the shoulder, slope, and central median
 - To prevent drain system from being clogged by weed
 - To prevent weed or brush from being an obstacle to visibility of road signs

How to achieve performance criteria is left to concessionaire/contractor

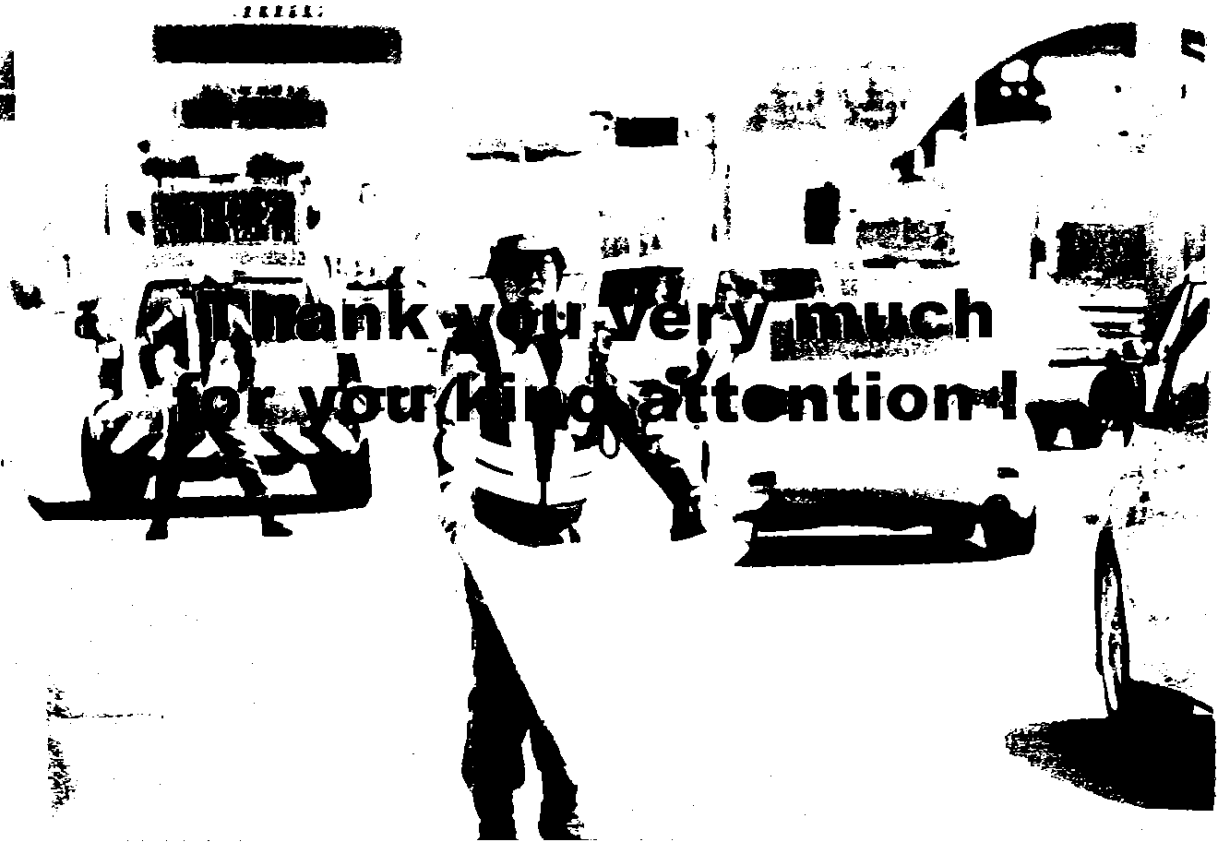


Maintenance plan and works

- This chapter includes development of annual maintenance plan, based on inspection results
- The maintenance planning would be contractors / concessionaires' duty in BOT/OMT/EPC project



Typical Maintenance Cycle



**Thank you very much
for your kind attention!**

Minutes for Meetings of
Technical Group (TG)
For
Capacity Development Project on Highways in
Mountainous Regions

Date: 30th Jan, 2018

Start Time: 15:00

Place: Room No. – 220,
Second Floor of Transport Bhawan,
New Delhi-110001

Introduction:

Mr. Kawamura made an opening remark and then explained a brief idea of group meeting. He then stated that contents of guidelines for bridge and for operation and maintenance were discussed and being fixed in TG meeting in December, 2017. He then declared the agenda of this TG, i.e. discussion of contents of the guidelines for Planning and Tunnels.

Attendee:

Japanese Side:

Mr. Shu MORIYAMA, Long Term Expert, Chief Advisor/Highway Development
Mr. Denichiro YAMADA, Long Term Expert, Highway Engineering
Mr. Yoshinori KAWAMURA, Short Term Expert, Team Leader/Slope Protection I
Mr. Fumihiko YOKOO, Short Term Expert, Mountain Tunnel
Mr. Makato TOKUDA, Short Term Expert, Natural Condition
Mr. Masaaki GOTO, Short Term Expert, Road Planning
Mr. Takashi NISHIJIMA, Short Term Expert, Drainage
Mr. Susumu MURASE, Short Term Expert, Tunnel Facility

Indian Side:

Mr. A K Shrivastava, ADG, MoRTH - Chairperson of this TG
Mr. Rahul Gupta, ED-II, NHIDCL - Co-Project Manager (NHIDCL)
Mr. Ashok Kumar Gupta, NHIDCL, GM(T)
Mr. Sanjeev Kumar, SE (S & R, Pavement & Bridge), MoRTH
Mr. Saurabh Singh, AEE (EAP), MoRTH

Demarcation of each guideline

Mr. Kawamura made a present the demarcation of each guideline with flow chart (See attached).

Framework of the Planning Guidelines

Mr. Goto made a presentation about contents of the guidelines for planning with PPT (See attached)

Mr. A K Srivastava, the chairperson, pointed that Mr. Goto has quoted a very important point that in India, in the EIRR evaluation, vehicle operating cost is account for 60% and driving time is for 30% and accident cost is for 10% in comparison with those of developed countries of 9%, 90%, 1%.

Indian side asked to provide the basis of these figures; if we enter these figures into guidelines, the figures need to be validated / authenticated. Indian side also requested to provide these figures in

correlation to hilly roads as these data provided for all of India which includes plain roads as well and give a comparison with some other countries like Japan.

(On 30th January, the day after the TG meeting, Japanese side provided the basis of these figures to Mr. A K Srivastava. The figures were quoted from "VEHICLE OPERATING COST UPDATE FOR MONETARY EVALUATION OF ROAD PROJECTS IN INDIA (Kunal Jain: Indian Institute of Technology, Roorkee, India 2013 IJPC - International Journal of Pavements Conference, São Paulo, Brazil)").

Japanese side has no plan to describe the ratio of RUC (road user cost) to the guideline (draft). Regarding the RUC, the basic values classified by vehicle type are data of each country including Japan, but there is no data for which the RUC is aggregated for each terrain type.

Mr. A K Srivastava, the chairperson, also requested to introduce the new technology to be used for the purpose of survey on hill roads.

Mr. Kawamura provided the information about the survey that it shall be included at the planning stage and engineering stage. So, at planning stage we should cover that type of survey technology to be used for alignment study. The importance of drone survey was also put up.

Mr. A K Srivastava, the chairperson, requested to mention the general scaling practice in India in comparison with the scale recommended to incorporate in the guideline.

Japanese side agreed with the comments.

Indian side asked whether Japan had any technology on the environmental problem and how this could be used in planning selection of road alignment.

Mr. Moriyama replied that regarding environmental problem we in Japan have to evaluate the importance of the site through natural condition survey. And as a result of survey, if it is not possible to cutting trees then we have to consider change of alignment as well as design. Thus we might want to include eco-friendly design to the guideline.

Mr. Goto explained an idea to separate outbound and inbound carriageways in an attempt to minimize cut and fill for hilly regions and mentioned in Japan we sometimes use this idea.

Indian side questioned that with separated outbound and inbound carriageways, it would be difficult to avoid a dead large vehicle or to make an U-turn because of limited width of a carriageway.

Mr. Goto responded when outbound and inbound carriageways were separated, the width should be that of intermediate lane of 5.5 meters widths.

Mr. A K Srivastava, the chairperson, added that this proposition would be reviewed / checked as this would be a costly affair in India.

Japanese side agreed with the comments will describe not only the adoption of the intermediate lane width but also the adoption of Truck Lay-by and Gate System according to regional characteristics.

Mr. A K Srivastava, the chairperson, pointed out the word of "Flow". This word did not justify the intention and ask to use some different terminology.

Mr. Goto agreed to come up with different word instead of "Flow". (Note the word "Flow" was substituted by a word "Sequence").

Mr. A K Srivastava, the chairperson, also, asked to specify the latest technology which is to be applied. That technology may or may not be used but please specify the same for information purpose.

Japanese side agreed with the comments.

Framework of the Tunnel Guidelines

Mr. Yokoo made a presentation about contents of the guidelines for tunnels on arterial roads in Hill area with PPT (See attached).

Mr. A K Srivastava, the chairperson, also agreed with Mr. Yokoo's presentation that in IRC:SP 91-2010 (Guideline of tunnels) very less information is given in this standard and a lot of inputs are required to be obtained.

Mr. A K Srivastava, the chairperson, asked that whether we could capture some more details in requirement for new guideline. Examples given by him like Norwegian type of tunnel or Heading and benching method.

Mr. Yokoo replied that we would add this thing at the later stage when we discuss detail of the guideline.

Indian side, requested to add the design of the emergency tunnel out of the two ways.

- 1) Parallel to a main tunnel
- 2) Lower part of a main tunnel

Japanese side agreed to incorporate description of emergency tunnels to the contents.

Framework of the Tunnel Facility Guidelines

Mr. Murase made a presentation about contents of tunnel facility part in the guidelines for tunnels on arterial roads in Hill road with PPT (See attached).

Mr. A K Srivastava, the chairperson, requested to include all types of tunnel extinguishing equipment (fire extinguisher and fire hydrant) in the guideline along with their advantages and disadvantages. So that correct method can be adopted at the time of design.

Mr. A K Srivastava, the chairperson, wanted Japanese side to include or capture the information on the international experience of tunnelling from another country including Japan.

Japanese side agreed to the mention that was requested by the chairperson.

Conclusion

Mr. Kawamura added that a TG for discussing the guidelines for slope protection and advance embankment would be in February and after that we would have a meeting of Joint Coordination Committee (JCC) to approve the content of the guidelines. And then we will have several TG meetings for progress control and discussion for the contents of the guidelines.

He also added that we will discuss model activities with Indian side after April, 2018 (JCC Meeting). After discussing the contents of model activities for one year, we will finalise it by April, 2019.

Mr. Kawamura also specified that model activities should be done by Indian side budget, except a couple of equipment for the activity of early warning system (EWS).

Mr. A K Srivastava, the chairperson, asked some example of the model activities.

Mr. Kawamura specifies the example of model activities like pilot project.

Mr. A K Srivastava, the chairperson, agrees the situation.

Indian side requested the availability of expertise technology and indigenous material of the country should also be kept in view and also should be generic and not patented by only one or two.

Mr. Kawamura agreed with the request but insisted that appropriate countermeasures against landslide should be explained in the guideline as options or alternatives so as to provide optimistic solution for hazards along hill roads. He also reiterated that to fulfil the request it requires discussion with Indian side in details and prescribe some names as Indian counterpart to discuss the specific guidelines.

Indian side stated that each counterpart engineers would be allocated for discussion to interact with Japanese counterpart after a brief discussion within Indian side.

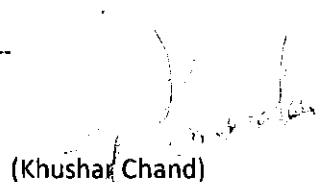
Both sides basically concurred with the contents of the guidelines for planning and tunnel discussed in the TG and commencement of drafting the said guidelines.

-----Concluded-----



(Shu Moriyama)

Chief Advisor, JICA Expert



(Khushal Chand)

SE(EAP), MoRTH

Witness



(A K Shrivastava)

ADG, MoRTH



Technical Group (TG)

For

Capacity Development Project on Highways in Mountainous Regions

1. Date

30th January 2018, 15:00 ~ 17:00

2. Venue

Room No.220, of Transport Bhawan

3. Agenda

- 1) Opening Remarks.....Chairperson
- 2) Introduction Mr. Kawamura
- 3) Contents of Guideline for PlanningMr. Goto
- 4) Contents of Guideline for TunnelsMr. Yokoo
- 5) Closing Remarks.....Chairperson

Technical Group (No.3)
~ The Guidelines to be developed in the Project ~

- 01 Guideline for Road Planning on Arterial Roads in Hilly areas
- 02 Guideline for Tunnels on Arterial Roads in Hilly areas

January 2018

Introduction

- Review: Type of Guidelines (No.2 TG meeting 19, December, 2017)
- Flowchart of Hill Road Project and Demarcation of each Guideline

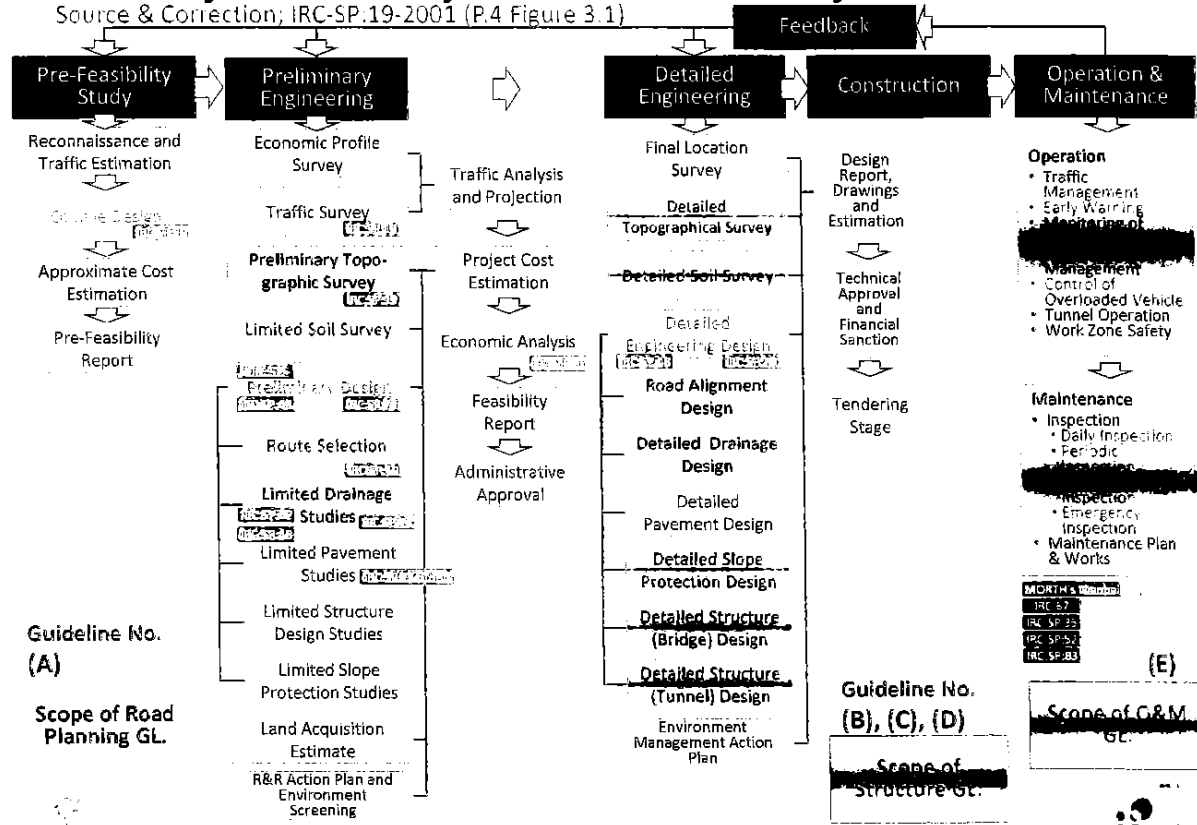
Review: Type of Guidelines (Source: No.2 TG meeting 19, December, 2017)

Guideline (Topic)	Stage	Schedule
(A) Guideline for Planning on Arterial Roads in Hilly Area i) Characteristics and Basic Policy of Hill Road Projects in India, ii) Survey/Investigation for Hill Road Planning iii) Planning and Alignment/Preliminary Design, vi) General Risks on Hill Road Development (To be determined), v) Introduction of Major Advanced Technologies (outline)	Feasibility	Today's TG (No.3)
(B) Guideline for Slope Protection and Advanced Embankment on Arterial Roads in Hilly Area i) Type of Hazard, ii) Basic Approach, iii) Survey, Identification and Prioritization of Hazardous Slope, iv) Selection of Method iv) Slope Protection, v) Embankment, vi) Drainage, vii) Case Studies	GPR: D/D, Construction	15.12.2017 16.12.2017 20.12
(C) Guideline for Bridge on Arterial Roads in Hilly Area i) Bridge Planning and Investigation, ii) Design (including selection of bridge type, construction method, etc.), iii) Construction (Foundation, substructure, superstructure, etc.), iv) Reinforcement methods	GPR: D/D, Construction	15.12.2017 16.12.2017 20.12
(D) Guideline for Tunnel on Arterial Roads in Hilly Area i) Planning and Investigation (including geology categorization), ii) Design (Excavation method, support system, supporting excavation method, etc.) iii) Construction, iv) Observation and Measurement, v) Tunneling in Difficult Grounds, vi) Tunnel facilities	GPR: D/D, Construction	Today's TG (No.3)
(E) Guideline for Operation and Maintenance on Arterial Roads in Hilly Area i) Operation (Traffic management, early warning system, accident management, tunnel operation, etc.), ii) Maintenance (inspection, assessment, maintenance planning and implementation)	After Construction	✓ TG (No.4) December, 2017

Capacity Development Project on Highways in Mountainous Regions in the Republic of India

Flowchart of Hill Road Project and Demarcation of each Guideline

Source & Correction; IRC-SP.19-2001 (P.4 Figure 3.1)



Capacity Development Project on Highways in Mountainous Regions in the Republic of India

Contents

1. **Expectations for guidelines of Hill Road to be prepared in the JICA Project**
2. **Road Planning Guideline**
 - 2.1 Existing Manuals and Guidelines
 - 2.2 Preliminary Topo-graphic Survey and Soil Survey
 - 2.3 Route Selection (including Road Alignment Design)
 - 2.4 Hill Road Planning
 - 2.5 Limited Drainage Studies (including Detailed Drainage Design)
 - 2.6 Introduction of representative advanced technology for Hill Roads

Appendix (attached sheets)

Table of Contents for **Hill Road Planning Guideline**

1. Expectations for guidelines of Hill Road to be prepared in the JICA Project

- Conditions of Existing Manuals/Guidelines
 - Hill road development requires comprehensive knowledges from road alignment, slope protection, high embankment, bridge, tunnel and even operation and maintenance. Thus, comprehensive and practical guideline/manual is required for hill road development.
 - Some existing guidelines are little too old and those to be reflected on guidelines. (Hill Road Manual-1998 etc.)
 - Others
- Challenges in Hill Road Planning (personal viewpoint)
 - In the Planning of Hill Roads, in the calculation of RUC , the time cost unit (Rs/minute) has been set relatively lower than the vehicle operating cost unit (Rs/km) in India.

Ratio of Road User Cost	Vehicle Operating Cost	Time Cost	Accident Cost
INDIA*	60% (55-70%)	30% (20-40%)	10% (5-10%)
Advanced Nations of Europe and America	9 %	90%	1 %

* VEHICLE OPERATING COST UPDATION FOR MONETARY EVALUATION OF ROAD PROJECTS IN INDIA 2013 IJPC Paper 158-2

- Therefore, on roads in mountainous regions, improvement of Roughness of road is the main subject, so, the development/construction of roads with high standard will become negative??

1. Expectations for guidelines of Hill Road to be prepared in the JICA Project

○ Necessity of preparation of revised Hill Road Guidelines

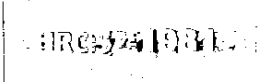
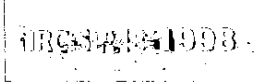
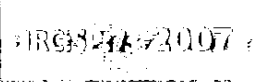
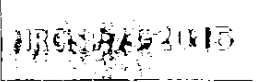
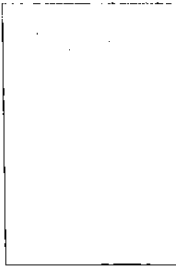
- It is expected that the ratio of the time cost evaluation unit in India will increase with the development of the socioeconomic system in the near future.
- Not only improvement of Roughness of road but also improvement of long-section road alignment and development of bypass road are expected.
- Along with the improvement of the quality of Hill Road, improvement of road function, improvement of vehicle safety, stability of road structure are expected.
- Increasing cases of installing road structures such as tunnels, bridges and slope protections are increasing. Furthermore, strategic operation/maintenance of Hill Roads will be essential.

In consideration to meet the needs of the times, revised guidelines will be prepared with the goal of becoming guidelines for the new development of Hill Roads.

2. Road Planning Guideline

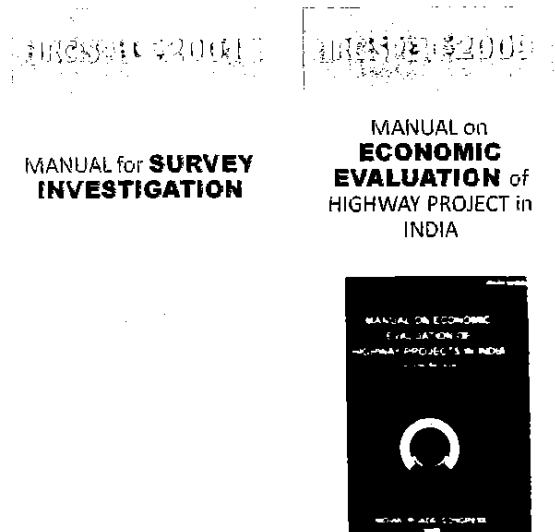
2.1 Existing Manuals and Guidelines

In India, multiple Manuals/Guidelines/Design Standards related to Hill Roads have been published and revised.

		SP:73 First published in August, 2007	SP:73 First revision in June, 2015
			
RECOMMENDATIONS about the ALIGNMENT SURVEY and GEOMETRIC DESIGN of HILL ROADS (First Revision)	HILL ROAD MANUAL	MANUAL of STANDARDS & SPECIFICATIONS for TWO LANING of STATE HIGHWAYS on B.O.T. BASIS	MANUAL of SPECIFICATIONS & STANDARDS for TWO LANING of HIGHWAYS with PAVED SHOULDER (First Revision)
			

2. Road Planning Guideline

2.1 Existing Manuals and Guidelines



The description of "Hill Road Planning/Route Selection" in these existing guidelines are considered to be necessary and sufficient description.

Therefore, the Guideline to be revised shall keep introducing the contents of concerning the plan and add an introduction of advanced Technologies for supporting Hill Road improvement.



Capacity Development Project on Highways in Mountainous Regions in the Republic of India



2.2 Preliminary Topo-graphic Survey and Soil Survey

● Reconnaissance Survey

The main objective of reconnaissance survey is of examine the general character of the area for the purpose of **determining the most feasible alternatives**.

● Survey Method

- Study of topographical survey sheets, agricultural, soil, geological and meteorological maps, and aerial photographs, if available.
- Aerial reconnaissance (where necessary and feasible)
- Ground reconnaissance (including another round of aerial reconnaissance for inaccessible and difficult stretches, where called for).
- Small format aerial photography (SFAP)
- Satellite remote sensing
- Geology, geomorphology and ground water prospecting
- Environmental factors (e.g., vegetation, soil conditions, land use etc.)

Source; IRC:SP:19



Capacity Development Project on Highways in Mountainous Regions in the Republic of India



2.3 Route Selection (including Road Alignment Design)

Contents to be described in the Guideline

- Contents of Route Selection (Alternative)
- Conditions for route selection
- Principles of route selection
- Control points on route selection
 - Topography and Geological Matter
 - Weather Conditions
 - Consideration of Related/Existing Facilities
 - Parks, Historical Sites, etc.
- ④ Control Points in Planning and Design Stages
- Route selection work

2.3 Route Selection (including Road Alignment Design)

Outline of Route Selection and Design (sample) 1/2

Category	Map of Scale	Target	Details of Work	Viewpoints	
Route Selection	1/50,000 to 1/25,000	Setting up several candidate routes			
		a. Whether or not the candidate routes corresponding to the design speed is acceptable b. Determination of comparable planning zones (belts) including the scope of earthwork, bridges and tunnels	Flat Area Hilly Area	Plan several lines (belts) of candidates that conform to the design standard, assuming a socially appropriate/acceptable route location, a railroad, an intersection with an arterial road, and a planned location of a long/huge bridge. Based on the contour line, assuming the average vertical gradient including the tunnel, define the approximate horizontal alignment and plan several kinds of candidate routes.	<ul style="list-style-type: none"> ○ Judgment from a macroscopic overall viewpoint ○ Effect of vertical gradient of tunnel on ventilation ○ Field survey by engineers with experience in alignment, structure, geology etc is essential
Outline Design	1/5,000 to 1/2,500	Comparison and determination of candidate routes	Horizontal Alignment	Considering the control points along the candidate route, insert the horizontal alignment while assuming the vertical gradient. Then, adjust the horizontal alignment.	<ul style="list-style-type: none"> ○ Securing the design standards to ensure the level of design ○ Securing the balance of alignments combinations ○ Securing the continuity of design values
		a. Design of basic Horizontal/Vertical alignment b. Calculation of estimated project cost c. Understanding the characteristics of comparison routes	Vertical Alignment	Insert the vertical alignment taking into consideration the combination of the existing ground height of the road center, the control points, and the horizontal alignment. Then, adjust the vertical alignment.	<ul style="list-style-type: none"> ○ Consideration of the alignment for tunnels and long-bridges ○ Consideration of the countermeasures against geological issues
			Cross Section	After confirming the above alignments, design the cross sections at intervals of 50 to 100 m.	<ul style="list-style-type: none"> ○ Correction of the alignments based on cross sections at unique topography site ○ Establishment of the basic policies for earthwork/drainage network planning

2.3 Route Selection (including Road Alignment Design)

Outline of Route Selection and Design (sample) 2/2

Category	Scale	Task	Method	Notes	
Detailed Design	1/1,000 to 1/300	Confirmation of basic items necessary for project implementation	Horizontal Alignment	Based on the outline design, horizontal alignment will be designed based on more detailed control points conditions.	
		a. Determination of road center alignment	Vertical Alignment	Based on the outline design, vertical alignment will be minimized earthwork and structure scale.	<ul style="list-style-type: none"> Consideration of the comparison of the locations for long-slope, tunnel portal and bridge using detailed topographical data Considering the balance of earthworks Others
		b. Determination of basic policies of various type of structures	Adjustment	Based on the cross sections of the main parts, horizontal/vertical alignments will be corrected.	
		c. Calculation/estimation of project cost	Cross Section	Design the cross sections every 20 m along the determined road alignment.	

2.4 Hill Road Planning

2.4.1 Characteristics of Hill Road

- Types of Hill Roads
- Classification of Hill Roads in India

Hill Road is a road passing through mountainous or steep terrain. As in the case of other roads, hill roads may be classified as per IRC: 52-1981 and IRC: 48-1998, as one of the following:

(1) According to general classification

National Highways	State Highways	Major District Roads
Other District Roads	Village Roads	

(2) According to use

Major Road for fast vehicle	Bridle Road for pedestrian, horse	Village Track
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Source; IRC:48-1998, para 3.2.1

○ Definition of terrain conditions and gradient of Hill Roads

No.	Type of terrain	Cross slope	Category of Hill Road
1	Plain or Level terrain	0 to 10 %	
2	Rolling terrain	10 to 25 %	
3	Mountainous terrain	25 to 60 %	
4	Steep terrain	Above 60 %	

○ Gradient

- **Ruling gradient** is a gradient which in the normal course must never be exceeded in any part of a road.
- **Limiting gradient** is a gradient steeper than the ruling gradient which may be used in restricted lengths where keeping within the ruling gradient is not feasible.
- **Exceptional gradient** is a gradient steeper than the limiting gradient which may be used in short stretches only in extra-ordinary situation.

※Roads located in terrain having cross slope of **25%** or more considered **Hill road or Ghat road.**

Reference (Japan's experience)

○ Classification of Hill Roads in Japan

(1) According to management organization

National Government <i>MLIT</i> : Ministry of Land, Infrastructure and Transport	District Governments 47-Prefectures	Municipalities 1,718-Municipalities
Private Expressway Companies (3) <i>NEXCO</i> East, Central and West	Other Private Companies	

(2) According general road classification (Type and Grade)

Expressways	National Highways	District Highways
Major District Roads	Other District Roads	Municipality Roads

Reference (Japan's experience)

● Classification of Hill Roads in Japan

Hill terrain

(3) According general Road type and grade (1/2)

Expressways/Toll Roads

Area	Type #	Grade #	Design Speed km/hr	Design Daily Traffic Volume vehicle/day							
				Above 20,000	20,000 - 10,000	10,000 - 4,000	4,000 - 1,500	1,500 - 500	Up to 500		
Expressways / Toll Roads	Rural	1	120	100	Expressways Plain terrain						
			100	80	Expressways Hill terrain	Expressways	Plain terrain				
		1	80	60	Toll Roads	Expressways	Hill terrain	Expressways	Plain terrain		
			60	50	Toll Roads	Hill terrain	Toll Roads	Plain terrain			
	Urban	2	80	60			Expressways/Toll Roads				
			60	40			Toll Roads/inside of BCD				

Reference (Japan's experience)

● Classification of Hill Roads in Japan

Hill terrain

(3) According general Road type and grade (2/2)

General Roads

Area	Type #	Grade #	Design Speed km/hr	Design Daily Traffic Volume vehicle/day							
				Above 20,000	20,000 - 10,000	10,000 - 4,000	4,000 - 1,500	1,500 - 500	Up to 500		
General Roads	Rural	1	80	60	National Roads Plain terrain						
			60	40	National Roads Hill terrain	National Roads	Plain terrain				
		3	60	30	District Roads, Village Roads	Plain terrain					
			40	30	National Roads	Hill terrain	National Roads, District Roads	Plain terrain			
		4	50	20	District Roads, Village Roads	Hill terrain	Village Roads	Plain terrain			
			30	20	National Roads	District Roads	Hill terrain				
	Urban	4	1	60	40	National Roads					
				30	20	District Roads, Town Roads					
		2	60	30			National Roads				
			40	30			District Roads, Town Roads				
		3	50	20			District Roads				
			30	20			Town Roads				
4	1	40	20								
		20	NA			1-Lane ⇒	Town Roads				

* Design speed has been revised in "MANUAL of SPECIFICATIONS & STANDARDS for TWO LANEING of HIGHWAYS with PAVED SHOULDER (First Revision)" SP:73-2015 published in 2015.

e Design speed of Hill Roads in (INDIA) and in (JAPAN)

Road classification of India	India				Japan			Road classification of Japan
	Mountainous terrain		Steep terrain		Hill terrain		Number of lanes	
	Ruling	Min	Ruling	Min	Ruling	Min		
National Highways and State Highways	60 ^{SP}		60 ^{SP}	40 ^{SP}	100	80	Above 4 lanes	Expressways
	40	40	40	30	60	60	Above 4 lanes	
	50		40	30	60	50	2 lanes	
Major District Roads	40	30	30	20	60	30	2 lanes	Major District Roads and Other District Roads
Other District Roads	30	25	25	20	50	20	1.5 to 2 lanes	District Roads and Municipality Roads
Village Roads	25	20	25	20	40	NA	1 lane	
					50			
					30			
					40			

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2.4.2 Planning/Design of Hill Roads

● General

Review of INDIAN Manuals/Guidelines

Hilly regions in India, generally, have extremes of climatic conditions, difficult and hazardous terrain, topography and vast high altitude areas. The region is sparsely populated and basic infrastructural facilities available in more developed plains of hinterland are mostly absent. The areas and, therefore, the roads are affected by floods consequent to torrential rainfall, land-slide, snow-fall, avalanche etc., compelling certain roads to be kept closed in part of the year, especially in winter months. However, the areas are rich in natural resources, flora and fauna, and are important to launch development projects, industries, tourism etc.

Source; para. 1.2, SP:48

Coming soon: Winter access to Lahaul-Spiti

● Importance of Hill Roads

- Economic development
- Industrial development
- Forest wealth
- Strategic consideration
- Tourism

ALMOST THERE

Just 4m of the 8.21 km Rohtang pass tunnel remains to be dug. The final 2m will be dug in presence of defence minister Nirmala Sitharaman on Oct 24. The tunnel, longest in India, is scheduled to open in 2015. It will reduce Manali-Kargil distance by 45k.

Related report: P 14

Lahaul and Spiti District, Himachal Pradesh
Source; The Times of INDIA, 10/Oct./2017

● **Transportation demands and Road capacity of Hill Roads**

● **Transportation demands**

In the near **absence of network** of railways in interior hill areas, **roads are the main**, if not the only, means of communications. Hill areas, by and large have remained to an extent remote, in spite of a large network of roads to interior areas constructed since independence, due to **inadequate road system** connecting far interior and remote villages. The **need for roads in the hill areas will be ever increasing** considering the vastness of the hill areas and the density of roads required to cater all infrastructural development and strategic needs.

Source; para. 4.1, SP:48

● **Road capacity**

Capacity analysis is **fundamental to the planning, design and operation** of roads and provides among other things the basis for **determining the carriageway width** to be provided at any point in a road network with respect to the volume and composition of traffic.

The capacity of two lane roads can be increased by providing paved and surfaced shoulders at least 1.5m width on either side.

Source; para. 4.3, SP:48

Road capacity of Hill Roads

No.	Type of Road	Carriageway Width	for Low Curvature (0-200 degrees per km)	for High Curvature (above 200 degrees per km)
1	Single Lane	3.75	1,600	1,400
2	Intermediate Lane	5.5	5,200	4,500
3	Two Lanes	7.0	7,000	5,000

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● **Planning of Roads in Hill Areas** Source; para. 4.4, SP:48

● **Precondition of Plan/Design for Hill Roads**

- Much different from plain areas
 - Routes cannot be connected by straight roads
- The population of each village may be very low
 - Isolated villages having population of more than 500; connected by all-weather paved links
 - Isolated villages having population of less than 500; connected by fine-weather paved links within 5 km to all-weather paved links
- Topographical constraints and location of small isolated villages
 - There is a need to connect all villages for the development of the area and its economic growth
- Safe route
- Economy route
- Less VOC (Vehicle operating cost)
- Less maintenance
- Ecological considerations

● Design of Hill Roads 1/2

● Geometric design

The main themes in geometric design are as follows. Also these themes are also the same as those in Japan- manuals.

- Design speed
- Geometric design and alignment
 - Sight distance
 - Horizontal alignment
 - Vertical alignment
- Width of road land, roadway, carriageway and shoulders
 - Lane width of carriageway
 - Median
 - Shoulders
 - Roadway width
 - Right of way (ROW)
- Camber or cross fall
- Clearance
- Co-ordination of horizontal and vertical alignments
- Bridle road and bridle path

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● Design of Hill Roads 2/2

● Geometric design

The main themes in geometric design are as follows. Also these themes are the same as those in Japan- manuals, too.

- Road structural design
 - Structures and protective works
 - Slope stability, erosion control and landslide correction
 - Drainage and cross-drainage
 - Pavement design
 - Tunnels, etc.

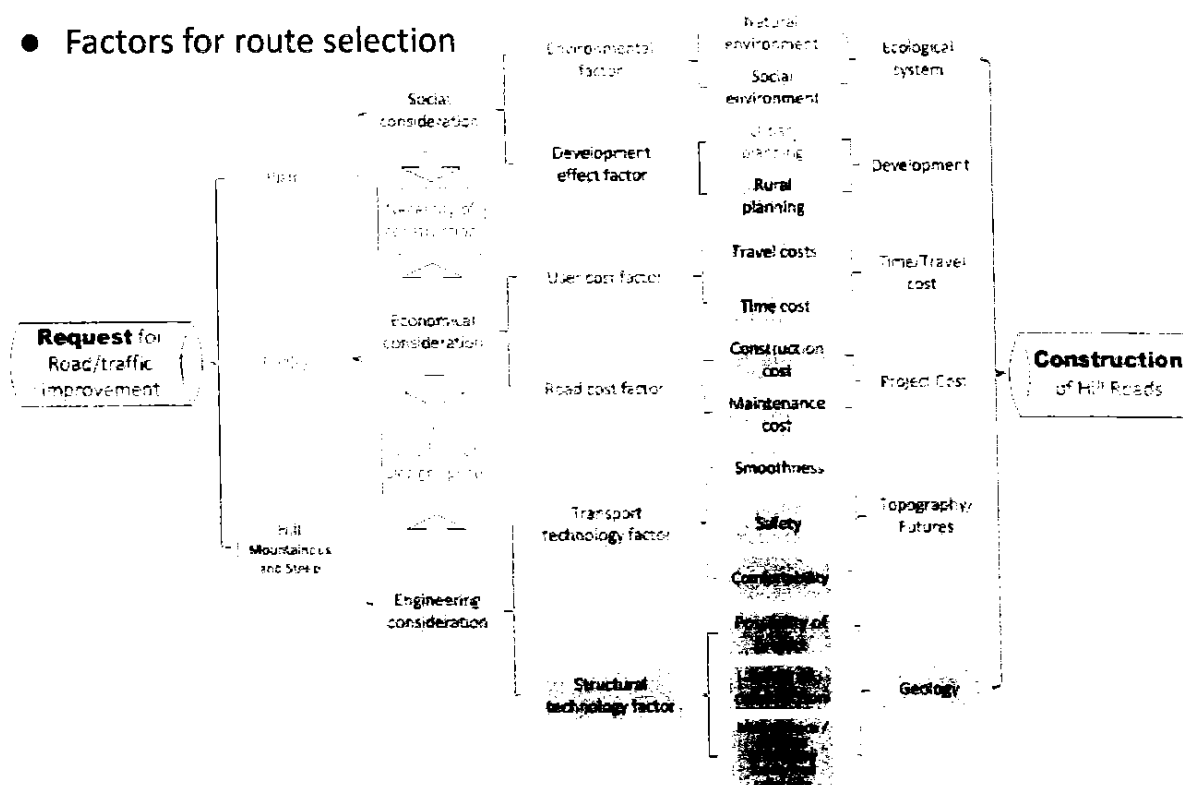
22

Reference (Japan's experience)

- Planning/Design and Construction the roads should respond to the traffic improvement demanded as part of **benefits and welfare** for people to live their lives. So the Planning/design and construction should be done for the **road users and residents**.
- To plan/design roads (Hill Roads), it is reasonable to ensure that the following conditions are **moderately balanced**.
 - Consideration for **social conditions** related to people's lives
 - **Technical solution** to natural conditions received from topography and features
 - Adjust the above and to **harmonize** from the **economical issue**

Reference (Japan's experience)

● Factors for route selection



Reference (Japan's experience)

④ Selected route location

○ Setting up candidate routes

Secure Safety, Smooth, Economical and Comfortable travel and logistics

>> Based on the above principle, select multiple routes while avoiding obstacles

- Determine road specifications and design speed, and
 - Draw horizontal alignments with a minimum curve radius or more
 - Draw vertical alignments with a maximum gradient or less
 - Consider long bridges, tunnels and major structures, and
- Selection of multiple possible routes
- Technical evaluation on landscape, safety and comfort at this stage does not become a major problem
- Estimate the approximate construction cost
- Calculate approximate time/travel cost

25

Reference (Japan's experience)

④ Outline design

Outline design is designing technical and economic levels using data on topographic map (approx. 1/5,000 to 1/2,500) or aerial **photographs** of multiple routes selected according to the candidate routes. Normally, the route will become the optimum route has been often selected at this stage.

- Design preparation
 - Collect topographic maps and aerial photographs
 - Collect weather information data
 - Collect geology information data, etc.
- Design work
 - Understand key control points
 - Considering the limit value of the geometric design value, the width of the road, embankment/cutting height, select the road center line
 - Consider long bridges, tunnels and major structures, etc,
- Comparison and evaluation of routes

26

Reference (Japan's experience)

● Preliminary design

Preliminary design is the basic design of the detailed engineering design of the next stage. Although there has been many cases which direct design shifts from outline design to detailed design, when **bridges, tunnels and high slopes** are planned/ designed a lot, preliminary design will be submitted more **reasonable outputs**.

● Design preparation

- Prepare a topographical map on the order of approx. 1/1,000 scale
- Prepare detailed weather information data
- Prepare detailed geology information data, etc.

● Design work

Also, since the preliminary design has been performed to **confirm the validity** of the planning/design, it is necessary to determine the **location and scale** of the **structures** of bridges, tunnels, and slope works and to **estimate the cost** of the project.

27

Reference (Japan's experience)

● Considerations when selecting a route

There are some considerations when locating route of Hill Roads.

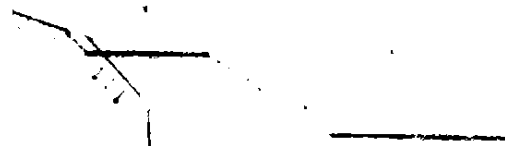
● Multi-section road

The roads on the slopes of hill roads generally will be large **cut-slopes, embankment-slopes and structures**

>

In such a case, it is necessary to **separate the upper and lower lines**

> blue lines



28

Reference (Japan's experience)

○ Considerations when selecting a route (1/2)

● Passing through the mountains/hills and canyons

In the hill roads, the steeper the topography, the higher the road classification (higher design speed), the road alignments will be not conform to the terrain and the more bridges and tunnels will be designed.

- Environment issue
 - Landscape
 - Disaster prevention
- require the expensive countermeasures

○ Consideration of improvement the existing route

Even in the hill roads, it will be reasonable to plan/design a bypass road from the viewpoint of traffic safety and environmental conservation and to improve the existing roads in the village areas.

- Economic loss
 - Noise
 - Vibration
- Influence of road construction

29

Reference (Japan's experience)

● Considerations when selecting a route (2/2)

● Controlling of cutting height regulation

Reasonable planning/design of the road should be a harmonization of geometric and road structure.

- Radius of Curvature \propto Height/Length of Slope

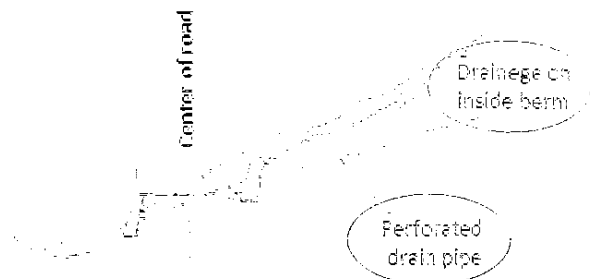
In Japan, it is common to limit the total height to 15m (within 7m in two slopes) of the slope has been allowed.

● Arrangement of road alignment of landslide and slope failure site

The important thing in a route location is to consider/avoid landslides and the slope failure site. Hill roads will be impossible to prevent disasters from occurring the topography and geological conditions, absolutely.



Countermeasures to Secure Safety Transport



Countermeasure for landslide

30

Reference (Japan's experience)

- Design and route selection

- General

Road design is a work of drawing **horizontal alignment** and **vertical alignment** of the road, and **drawing three-dimensional shape** combining them.

Also, based on restricted topography and economic efficiency, it will be a key-point to improve the **safety and comfort** of transportation.

- Safe and comfortable in terms of vehicle transportation
- No visual or psychological problem
- Good harmony with the surrounding environment
- Reasonable from the viewpoint of terrain and economy

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Reference (Japan's experience)

- Horizontal alignment

Horizontal alignment used for road design consists of the following elements.

- Straight line
- Circle curve
- Transition curve

In the horizontal alignment design of the road, a straight line connecting the two points is mainly connected, with a line which is partially shortest while avoiding obstacles, and a curve is inserted in the middle.

32

Reference (Japan's experience)

○ Vertical alignment

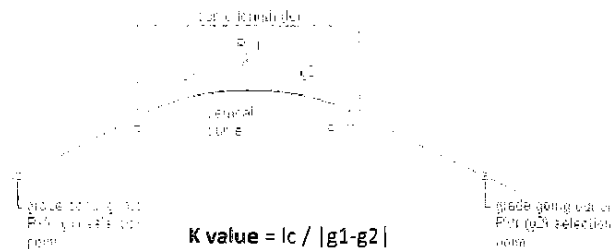
The vertical alignment used for road design consists of the following elements.

- Straight line of the basis of vertical gradient
- Curve of smoothly connects point of variation for vertical gradients

The vertical curve is calculated with a parabolic transition curve easy to set the proposed height.

- Radius of Curve
- Length of Curve
- K value

In the design stage, it is a circular curve showing the degree of relaxation, and displays the radius/length of the curve and K value.



Reference (Japan's experience)

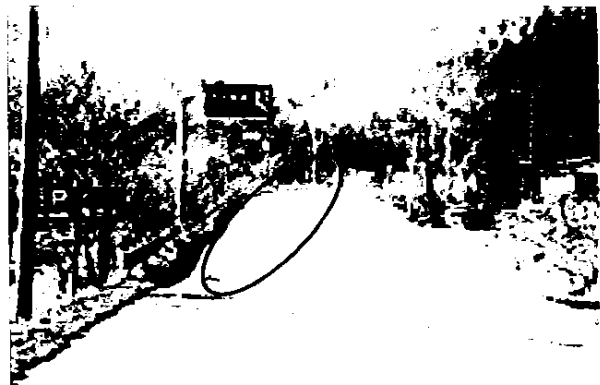
○ Vertical alignment

The horizontal alignment is not affected by the performance of vehicles, but the vertical alignment/gradient greatly affects their travel speed depending on the performance of vehicles.

- Passenger vehicles
- Trucks | travel speed decreases signally

The decrease in the travel speed of the truck obstructs the driving of the passenger vehicle, confuses it, and reduces traffic safety. In addition, it causes the traffic capacity of the road to decrease.

It is desirable to design as a medium vertical gradient and additional climbing lane as possible.



Additional climbing lane in Japan (District Road in Fukushima Pref.)

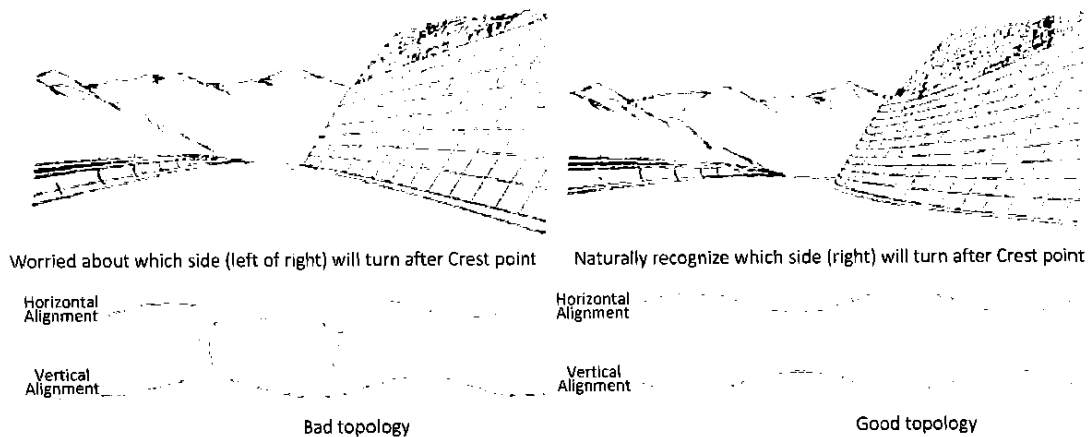
Reference (Japan's experience)

● Alignment design

● Harmonizing of horizontal and vertical alignment

Good or bad of the combination of two alignments is one of evaluation indices.

Due to the widespread use of **3D-CAD**, current trend is not only to combine these two alignments but also to perform alignment design as a stereo alignments.



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Reference (Japan's experience)

● Economic Evaluation of Hill Road project

In the planning/design of route location, the best one route will be selected out of multiple candidate routes.

For that purpose, in addition to **technical evaluation**, it is necessary to evaluate the **construction/maintenance cost** of the road and **various benefits**.

- Evaluation Methods
- Expense of road construction/maintenance and so on
- Expense of road users
- General evaluation

The evaluation method of Economic Evaluation of Road Project in Japan is almost the same as India's method (IRC:SP:30-2009).

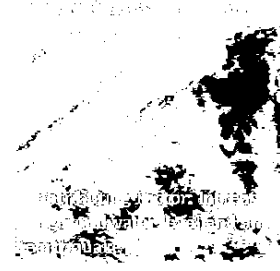
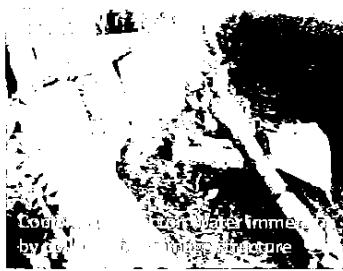
36

2.5 Limited Drainage Studies (including Detailed Drainage Design)

- Manuals and Guidelines of road drainage have already been issued by IRC-SP.

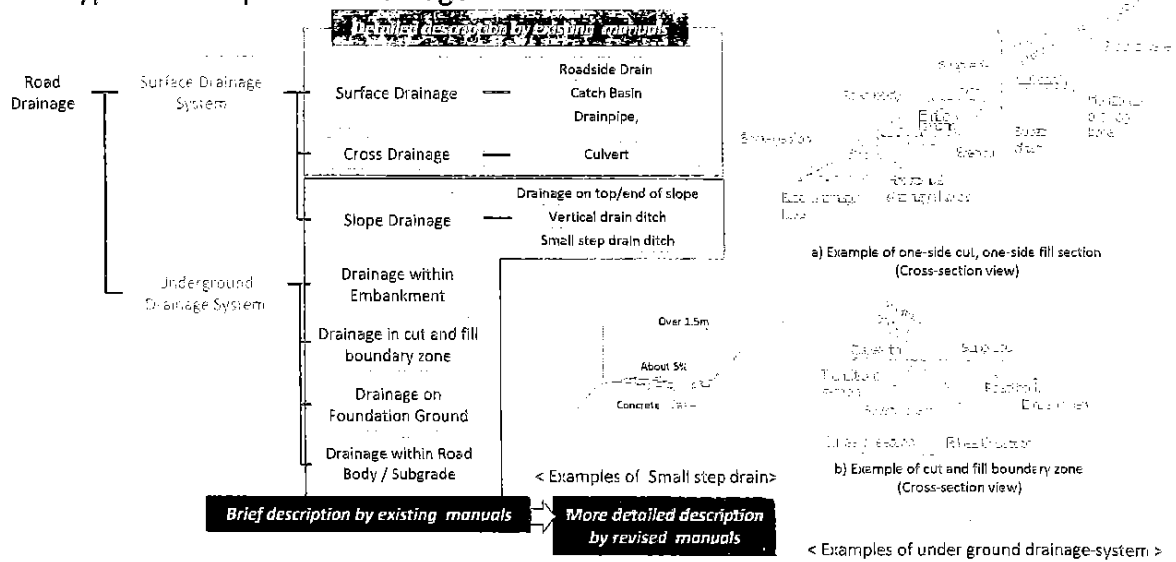
IRC SP 48 1998 / Hill Road Manual
 "Section 8: Drainage and Cross-Drainage"
 IRC SP 73 2007/ Manual of Standards & Specifications for Two Laning of Highways with Paved Shoulder
 "Section 6: Road Side Drainage"
 IRC SP 42 2014/ Guidelines of Road Drainage

- Basically refers the existing specification published by IRC SP.
- Important points will be highlighted, which need to be practiced for Drainage on Hill Road.
- Aims to provide road drainage of improves safety of Hill Road.



Capacity Development Project on Highways in Mountainous Regions in the Republic of India

- Basic of Drainage
- Type and Purpose of Drainage



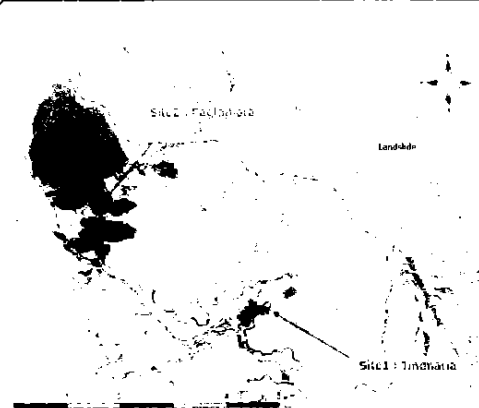
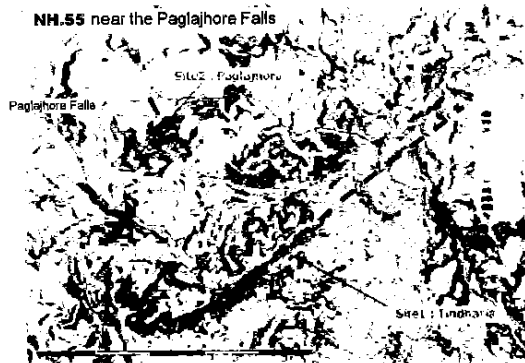
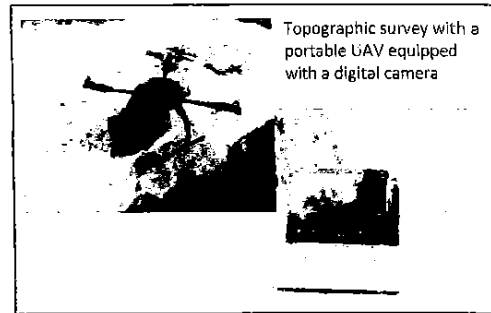
- Hydrological Study on Rain and Snowfall
- Surface Drainage System (Surface Drainage, Cross Drainage, Slope Drainage)
- Underground Drainage System

"Important Points"

2.6 Introduction of representative advanced technologies for Hill Roads (1)

• Topographic Analyses/Use of UAV (Unmanned aerial vehicle)

Portable UAV (Unmanned aerial vehicle) with digital camera may provide much detailed DEM (Digital Elevation Model) and topographic maps through advanced photogrammetry process. Through interpretation of particular topographic features, topographic data provide fundamental information for spotting landslides and unfavorable geological conditions. Besides aerial photo readings, digital topographic data processed with PCs, such as DEM, provide valuable information for finding unfavorable geological conditions. The figure on the lower left shows an example of processed data in India. The degrees of gradient shown in the graded colors helped the engineers locate the landslides along a mountainous national highway, which are shown in the lower right.

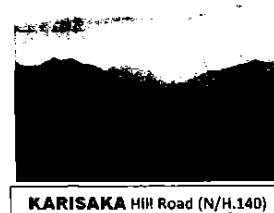


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2.6 Introduction of representative advanced technologies for Hill Roads (2)

The Longest Tunnel on the National H/W in Japan

Vehicle traveling movie of KARISAKA Hill Road

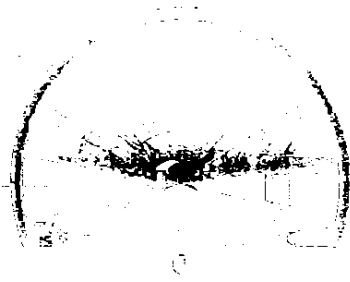


Saitama Pref.
Yamanashi Pref.
Tokyo Metropolitan

KARISAKA Hill Road is located 90 km far from Tokyo-Metropolitan.

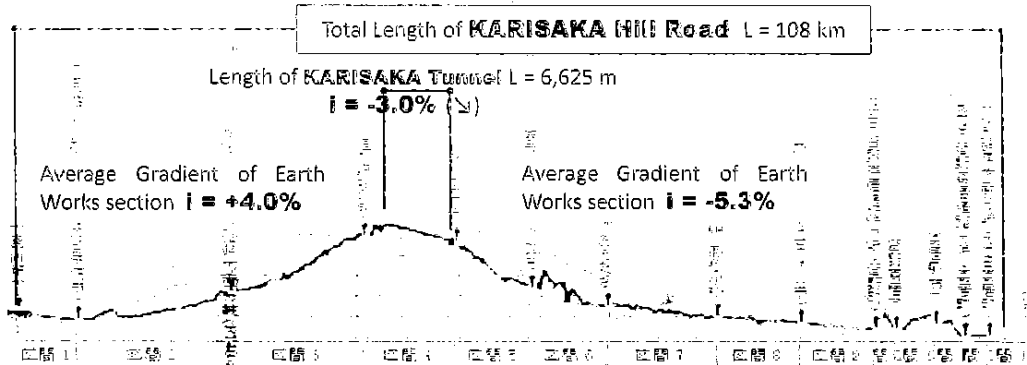
40

Vehicle traveling movie of KARISAKA Hill Road



Characteristics of KARISAKA Hill Road	
Name of Road	National H/W No.140
Classification	Type-Grade: 3-3
Design Speed	40 km/hr
Width of Road	3.0m x 2
Length of main Tunnel	6,625 m
Completion year	1998
Project Cost (approx.)	47 Billion JPY (27 Billion Rs)

Profile of KARISAKA Hill Road



Next TG's Contents (No.4 TG meeting February, 2018)

Guideline (Tentative)	Stage	Schedule
(B) Guideline for Slope Protection and Advanced Embankment on Arterial Roads in Hilly Area i) Type of Hazard, ii) Basic Approach, iii) Survey, Identification and Prioritization of Hazardous Slope, iv) Selection of Method iv) Slope Protection, v) Embankment, vi) Drainage, vii) Case Studies	DRB: D/F, Construction	TG (No.4) February, 2018

Overall Schedule



Guideline Development Schedule

Milestones	Period (Tentative)
Finalization of the contents of the Guidelines	January 2018
TG for Slope Protection and Advanced Embankment Guideline	February 2018
JCC for Confirmation on the Contents	April 2018
TG for Progress and Discussions (1 st)	July 2018
JCC for Progress Report	October 2018
TG for Progress and Discussions (2 nd)	December 2018
Draft Guidelines	March 2019

Counterpart for Guideline Development

Guideline	Indian Side	Japan Side
<u>Overall control of 5 guidelines</u>	Khushal Chand Sanjeev Kumar	Mr. Moriyama, Mr. Yamada, Mr. Kawamura
A) Guideline for Planning on Arterial Roads in Hilly Area	Khushal Chand SE(EAP), MoRTH	Mr. Moriyama +91-98183-82067 shumoriyamati@leftbau@yahoo.co.jp
B) Guideline for Slope Protection and Advanced Embankment on Arterial Roads in Hilly Area	W. Blah SE(North East Region) MoRTH	Mr. Kawamura +91-95605-36158 kawamura@oriconsul.com
C) Guideline for Bridge on Arterial Roads in Hilly Area	Sanjeev Kumar SE(S&R-Pavement & Bridge), MoRTH	Dr. Nakano +91-88003-26239 nakanoh@oriconsul.com
D) Guideline for Tunnel on Arterial Roads in Hilly Area	Ashok.Kumar.G upta GM(Technical), NHIDCL	Mr. Yokoo +91-84484-65798 yokoof@outlook.jp
E) Guideline for Operation and Maintenance on Arterial Roads in Hilly Area	Nishoo Gupta GM(Technical), NHAI	Mr. Yamada +91-88009-58190 d.yamada.aa@gmail.com

***Thank you very much for your contribution!
Your continuous supports are much appreciated.***



CONTENTS OF GUIDELINE for HILL ROAD PLANNING (Draft)

CONTENTS (DRAFT)	OUTLINE	CONTENTS TO BE DESCRIBED	EXISTING INDIAN MANUALS TO BE REFERED
Preface			
Chapter 1 Preface			
1.1	Introduction	● Demarcation and scope of each Guidelines	
1.2	Scope of application of the guidelines		
1.3	Abbreviations and list of figures/tables		List of Symbols and Abbreviations
1.4	Definition of terms relating to Hill Roads (To be determined)	● Explanation of terms relating to Hill Roads project	3. DEFINITIONS OF TERMS RELATING TO HILL ROADS (p.3-p.10)
Chapter 2 Planning and Survey/Investigation of Hill Roads			
2.1	Basic policy of Hill Roads project in India	2.1.1 Classification of Hill Roads 2.1.2 Work Sequence of Hill Roads project 2.1.3 Definition of Hill Roads	3.2 Classification (p.3)
2.2	Survey/Investigation of Hill Roads (Describe the contents of 'Preliminary Topo-graphic Survey' and 'Limited Soil Survey')	2.2.0 General 2.2.1 Outline contents of survey/investigation 2.2.2 Reconnaissance 2.2.3 Ground Survey 2.2.4 Field Survey and settlement of road centerline/alignment 2.2.5 Meteorological investigation 2.2.6 River/Hydrological survey 2.2.7 Geological survey 2.2.8 Material survey 2.2.9 Other surveys (Environmental survey)	5.2 Sequence of Survey and Survey Methods (p.17) 5.3 Reconnaissance (p.18) 5.4 Ground Survey (p.21) 5.5 Final Location Survey (p.24) 8. MATERIALS AND SPECIFICATIONS FOR STRUCTURES (p.69) 19. ECOLOGY AND ENVIRONMENT (p.288)

2.3	Planning of Hill Roads	<p>2.3.0 General</p> <p>2.3.1 Concept of bases (towns, villages) connection and traffic demand</p> <p>2.3.2 Road capacity</p> <p>2.3.3 Design speed and geometrics</p> <p>2.3.4 Route selection</p> <p>2.3.5 Planning of horizontal alignment, vertical alignment and cross section</p> <p>2.3.6 Planning of structures (<i>rough sketch</i>)</p> <p>2.3.7 Planning of drainage and cross-drainage</p>	<ul style="list-style-type: none"> ● Describes the summary of Hill Roads planning ● Describes the necessity of connecting the bases with the road and the basic policy of the traffic demand. Explains the method of traffic demand forecast as necessary ● Describes the policy of traffic capacity (planning traffic volume, standard design traffic volume, etc.) which defines the typical cross section of the Hill Roads and the number of lanes of road ● Describes the outlines the design speed and geometric criteria which are the basis of road design (details will be described in the "Design"- section) ● Describes the policy of route location of Hill Roads based on the connectivity, obligatory point and the harmony with the topography and so on ● Based on the above, describes the policy of the plan, profile and cross section of the Hill Roads ● Describes the policy on the structures of Hill Roads such as bridges, culverts, slope protections and subsidiary works and so on ● Describes the policy of road drainage system including frontage drainage and surface drainage of Hill Roads 	<p>4.3 Capacity of Roads (p.14)</p> <p>2.16 Capacity of two-lane highway (p.15)</p> <p>6.2 Basic Principles of Geometric Design (p.26)</p> <p>6.3 Design Speed (p.28)</p> <p>2.2 Design Speed (p.9)</p> <p>2.GEOMETRIC DESIGN AND GENERAL FEATURES (p.9-)</p> <p>6.8 Horizontal Alignment (p.32)</p> <p>6.9 Vertical Alignment (p.43)</p> <p>6.5 Width of Road Lard, Roadway, Carriageway; and Shoulders (p.29)</p> <p>9. STRUCTURES AND PROTECTIVE WORKS (p.96)</p> <p>7. DESIGN OF STRUCTURES (p.55)</p> <p>8. DRAINAGE AND CROSS • DRAINAGE (p.65)</p>
2.4	Preliminary Design of Hill Roads	<p>2.4.0 General</p> <p>2.4.1 Earth Works (Embankment and Cutting)</p> <p>2.4.3 Road side Drainage Design</p> <p>2.4.4 Road Side Facilities and Road Safety devices Design</p>	<ul style="list-style-type: none"> ● Describes the summary of Hill Roads design ● Describes the contents of design for the road embankment and road cutting and so on ● Describes concretely the policy of the road drainage system including the Surface Drainage System and Underground Drainage System of the Hill Road. ● Describes the contents of design for the road side facilities, safety devices and miscellaneous work 	<p>4. Road Embankment (p.38)</p> <p>6. Road Side Drainage (p.48)</p> <p>9. Traffic Control Devices and Road Safety Works (p.71) & 12. Project Facilities (p.124) especially 12.10 Rest:area4)</p>
2.5	Introduction of representative advanced technologies for Hill Roads (outline)	<p>2.5.1 Planning and survey stage of Hill Roads</p> <p>2.5.2 Design stage of Hill Roads</p> <p>2.5.3 Construction stage of Hill Roads</p> <p>2.5.4 Operation and maintenance stage of Hill Roads</p>	<ul style="list-style-type: none"> ● Describes the outline of contents of new technologies to be introduced for "Planning and survey"-stage, "Engineering design"-stage, "Construction"-stage and "Maintenance and management"-stage 	

Notes : The manual to be referred to be as follows.

IRC_SP 48-1998_Hill ROAD MANUAL

ICR_SP 73-2007_MANUAL OF STANDARDS & SPECIFICATIONS FOR TWO LANING OF STATE HIGHWAYS ON B.O.T BASIS

IRC_SP 30-2009_MANUAL ON ECONOMIC EVALUATION OF HIGHWAY PROJECTS IN INDIA

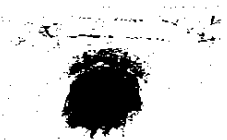


CONTENTS OF GUIDELINES FOR TUNNEL ON ARTERIAL ROADS IN HILL AREA

Presentation

- 1 What we have found at tunneling sites in India.
- 2 Existing Road Tunnel Guideline in India.
- 3 New tunneling technology should be introduced.
- 4 Contents of new tunnel guideline we will prepare in this project.

Tunneling in India



T1 Tunnel
Keratpur Ner Chowk Project, NH-21
Himachal Pradesh



T5 Tunnel
Keratpur Ner Chowk Project, NH-21
Himachal Pradesh



T1 Tunnel
Section Haryana Border to Shimla Package I,
NH-22, Himachal Pradesh



Rohtang Tunnel
Project by Border Roads Organization (BRO)
Himachal Pradesh

from web site

Tunneling in India



T1 Tunnel
Goa-Karnataka Border to Kundapur Section of
NH-17 Project, Karnataka



T2 Tunnel
Goa-Karnataka Border to Kundapur Section of
NH-17 Project, Karnataka



Ghat Ki Guni Tunnel in Jaipur
Alternate Route to Ghat-Ki-Guni by Construction
of Tunnel in Jahalana Hills (NH-11), Rajasthan
(in service)



Autram Ghat Tunnel
Rehabilitation and upgradation of NH Stretches
Maharashtra
(planning / designing stage)

Capacity of Tunneling in India

- Basic technology of NATM may have been acquired in India
- Tunneling in good rocks may not be difficult for local contractors.
- Tunneling technology level is high as using $\phi 15\text{m}$ of TBM

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Matters to be Improved

- Tunneling Experience in only good condition (except Rohtang Tunnel)
 - Increase in tunneling in the orogenic area (Himalayan area) which contains faults, folds or shear zones is expected.
 - Detailed and accurate geotechnical Investigation before tunneling will be required.
- Design/Construction without NATM Theory
 - Excessive support design
 - Monitoring of the ground deformation for NATM is not executed
- Problems in Portal Zone
 - Karatpur Ner Chowk Project, NH-21 (T4 Tunnel)
 - Goa-Karnataka Border to Kundapur Section of NH-17 Project

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Tunneling in Difficult Conditions



High Water Pressure (Large Water Inflow)
 $35 \sim 50 \text{ kg/cm}^2$, $3 \sim 9 \text{ m}^3/\text{min}$

New Yongchun Tunnel (Taiwan Railway)



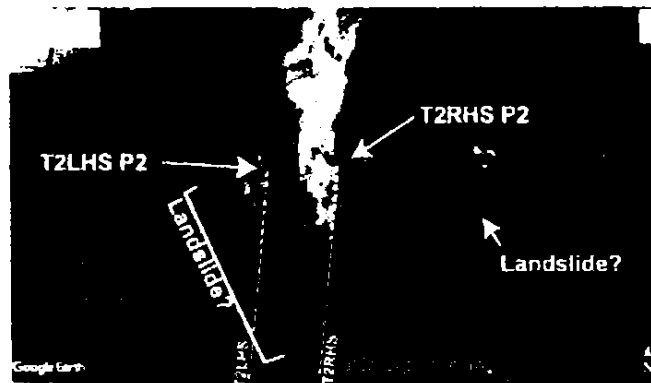
Tunnel in Swelling Rocks

Haruki Tunnel
(Highway Tunnel in Japan)

Problems at Portals



T4 Tunnel
Karatpur Ner Chowk
Project, NH-21



T2 Tunnel
Goa-Karnataka
Border to Kundapur
Section, NH 17

Indian Guidelines for Road Tunnels

IRC SP 91-2010

contents

- 1 Introduction
- 2 Planning of Road Tunnels
- 3 Geo-Technical Investigations
- 4 Structural Design
- 5 Tunnel Construction Methodology
- 6 Safety During Construction of Tunnels
- 7 Ventilation and Lighting
- 8 Operation and Maintenance

- *The guide covers almost all of tunneling technology,*
- *The guide is general*

Indian Guidelines for Road Tunnels IRC SP 91-2010

1 Introduction

1.1 – 1.4 Preamble

1.5 Classification of road tunnels

1.5.1 Location wise

1.5.2 Shape wise

1.5.3 Construction method wise

1.5.4 Length wise

1.5.5 Side coverage wise

1.6 Distinctive features of tunneling

1.7 Open Cut vis –a-vis Tunnel Option

2 Planning of Road Tunnels

- 2.1 Assessment of functional Requirements
- 2.2 Conceptual Planning
- 2.3 Rough setting-out of alternative layouts at site reconnaissance survey
- 2.4 Preliminary assessment of geotechnical conditions
- 2.5 Assessment of impact on environment
- 2.6 Assessment of socio-economic environment
- 2.7 Geometric of the tunnels
 - 2.7.1
 - 2.7.2 Cross-section of the tunnel
 - 2.7.2.1 Width of the tunnel
 - 2.7.2.2 Height of the tunnel
 - 2.7.2.3 Shape of the tunnel
 - 2.7.2.4 Bi-directional / uni-directional traffic tunnel
 - 2.7.2.5 Finished section of tunnel
 - 2.7.3 Vertical alignment
 - 2.7.4 Horizontal alignment

2 Planning of Road Tunnels

- 2.9 Preliminary assessment of tunnel support system
- 2.10 Collection of data on construction costs prevailing in the area
- 2.11 Preliminary estimation of cost
- 2.12 Selection of alternative for detailed studies
- 2.13 Detailed survey
- 2.14 Detailed geotechnical assessment
- 2.15 Detailed design of the tunnel supporting system
- 2.16 Detailed design of permanent ventilation and lighting system
- 2.17 Design of drainage system
- 2.18 Tunnel furnishing system
- 2.19 Aesthetics
- 2.20 Selection of suitable construction technology
- 2.21 Statutory clearances and approvals
- 2.22 Detailed estimation of project costs
- 2.23 Project implementation

3 Geo-Technical Investigations

3.1 Preamble

3.2 Relevant strata

3.3 Geotechnical investigations

3.3.1 Collection of available data regarding regional and local geology of the area

3.3.2 Detailed mapping of surface geology of the tunnel area

3.3.3 Exploratory boring and drilling

3.3.3.1 Determination of locations of bore holes

3.3.3.2 Geo-technical assessment by exploratory borings

3.3.3.3 Observations and tests to be made during boring operations

3.3.3.4 Preservation of cores samples

3.3.3.5 Observations to be made on the core samples

3.3.3.6 Tests on core samples

3.3.3.7 Geo-technical assessment by excavation of exploratory drifts

3 Geo-Technical Investigations

3.3.4 Ge-technical assessment by geophysical methods

3.3.4.1 (Necessity of geophysical studies)

3.3.4.2 Methods of geophysical studies

3.3.4.3 (Seismic methods)

3.3.4.4 (Electrical resistivity method)

3.4 Corroboration of during construction

3.4.1 Advance probing hole

3.4.2 (Seismic method)

3.4.3 Tunnel instrumentation

3.5 Assessment of RMR and Q

3.6 Drawing to be prepared

4 Structural Design

- 4.1 Preamble
- 4.2 Study of relevant strata
- 4.3 Various parameters to be considered
 - 4.3.1 From observations made during exploratory boring
 - 4.3.2 From observations made on core samples
 - 4.3.3 From data obtained from testing of core samples
- 4.4 Assessment of rock mass
- 4.5 Methodologies of design of tunnel supports
 - 4.5.1 Empirical methods
 - 4.5.1.2 Shortcomings in the empirical methods
 - 4.5.1.3 Stand up time
 - 4.5.1.4 Relation between rock mass rating, stand-up time and unsupported span
 - 4.5.1.5 Inter-relation 'Q' and 'RMR'
 - 4.5.2 Analytical methods
 - 4.5.3 Numerical methods
 - 4.5.4 Observational approach
- 4.6 Loads to be considered for Design of Ultimate Supports
- 4.7 Concrete Lining

5 Tunnel Construction Methodology

- 5.1 General
- 5.2 Stages in Tunnel Construction
 - 5.2.1 Surveying and profile making
 - 5.2.2 Excavation of open/approach cuts and location of portals
 - 5.2.3 Advancement of tunnel face by excavation
 - 5.2.3.1 No-blast techniques
 - Tunneling Shields
 - Roadheaders
 - Tunnel Boring Machines
 - Splitting Techniques
 - Immersed Tube/Sunken Tube Tunnels
 - Cut & Cover Tunnels
 - 5.2.3.2 Conventional technique of drilling and blasting

5 Tunnel Construction Methodology

5.2.4 Methods of driving the tunnel

5.2.4.1 Full face method

5.2.4.2 Heading and benching method

5.2.4.3 Multi-drift method

5.2.4.4 Multi section method

5.2.4.5 Advance probing & treatment

5.2.5 Scaling

5.2.6 Disposal of excavated muck

5.2.7 Installation of temporary and permanent support

5.2.8 New Austrian Tunneling Method (NATM)

5.2.9 Grouting

5.2.10 Plotting of excavated profiles and geotechnical mapping

5.2.11 Monitoring

5 Tunnel Construction Methodology

5.3 Drilling and blasting

5.3.1 Drilling

5.3.2 Blasting

5.3.2.1 Charging of blast holes

5.3.2.2 Choice of explosives

5.3.2.3 Requirement of explosive

5.3.2.4 Choice of initiation system and selection of delay sequence

5.3.2.5 Type of initiation systems

5.3.2.6 Misfires

5.3.2.7 Controlled blasting

5.3.2.9 Efficiency of blasting

5 Tunnel Construction Methodology

5.4 Non-structural works in the tunnel

5.5 Tunnel furnishing

5.6 Half tunnel

5.6.1 Feasibility

5.6.2 Design of half tunnels

5.6.3 Construction methodology for half tunnels

5.7 Quality assurance and quality control

6 Safety During Construction of Tunnels

6.1 general

6.2 Basic aspects

6.3 Drilling and blasting

6.4 Ventilation and Noise Protection

6.5 Lighting

6.6 Communication system

6.7 Protection against fire

6.8 Housekeeping

6.9 Emergency management system

7 Ventilation and Lighting

7.1 Ventilation

7.2 Tunnel lighting

8 Operation and Maintenance

8.1 introduction

8.2 Operation and maintenance functions / activities

8.3 Organization for operation and maintenance

8.4 documentation

8.5 Safety requirements

Annex / Appendix

Annex-A Terminology

Annex-B Environment management Plan for Road Tunnels

Annex-C Core Log-1

Annex-D Tunnel Instrumentation

Appendix-I Classification & Characteristics of Rock

Appendix-II Data Sheet of Geomechanical Classification of Rock Masses for Assessment of Rock Mass Rating (RMR) (After Bieniwaski 1989)

Appendix-III Data Sheet of Geomechanical Classification of Rock Masses for Assessment of Tunnelling Quality Index (After Barton ET AL 1974)

Appendix-IV Example for Determination of RMR & Q Values & Support Requirements

Appendix-V Supports in The Tunnel

Requirements for New Guide Line

- NATM Theory
- Instrumentation / Monitoring for NATM
- Detail of Geotechnical Investigation
- Reinforcement Works
- Tunneling Technology in Peculiar Condition
- Quality Control

1.1 AFAJ Team

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Proposed New Guidelines

- I Guideline of Planning and Investigation
- II Guideline of Design
- III Guideline of Reinforcement Works
- IV Guideline of Tunneling in Peculiar Condition
- V Guideline of Work Control

1.1 AFAJ Team

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I Guideline of Planning and Investigation for Road Tunnel

I-1 Planning

1.1 Alignment and Inner Section of Tunnels

- Horizontal Alignment of Tunnels
- Vertical Alignment of Tunnels
- Tunnel Cross-Section

1.2 Work Plan

- Establishment of construction sections
 - Construction methods and schedule planning
 - Working drifts
 - Access roads, muck disposal yards
 - Environment preservation measures
-

I-2 Geotechnical Investigation

2.1 Geotechnical Investigation

- Survey for feasibility study
- Geological survey for design and work plan
- Geological survey during construction
- Hydrological research
- Geotechnical reports
- Environmental Issues

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II Guideline of Design for Road Tunnel

II-1 Design

1.1 General

- Basic of design
- Design method
- Design procedure
- Design changes

1.2 Selection of cross section and construction method

- Cross section
- Selection of excavation method
- Selection of tunnel driving method

1.3 Design conditions

- Ground properties
 - Impact of surrounding structure and environment
 - Impact by neighboring construction
 - Impact of earthquakes, water pressure and other factors
-

II-2 Rock Classification & Tunnel Support

2.1 Rock Classification

2.2 Design concept for tunnel supports

- Shotcrete, - Rock bolts, - Steel supports, - Lining, - Invert

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III Guideline of Reinforcement Works for Road Tunnel

III-1 Reinforcement Works

1.1 General

- Role of reinforcement works
- Application of reinforcement works

1.2 Reinforcement works for safety of tunneling

- Heading face stabilization
- Water inflow control

1.3 Reinforcement works for preservation of surrounding environment

- Ground surface settlement
 - Reinforcement works for construction close to existing structures
-

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IV Guideline of Tunnelling in Peculiar Condition for Road Tunnel

IV-1 Difficult Ground Tunnelling

- 1.1 General
 - 1.2 Unconsolidated ground
 - 1.3 Swelling rocks
 - 1.4 Rock burst
 - 1.5 Geothermal heat, hot springs, toxic gases
 - 1.6 High water pressure or large water inflow
 - 1.7 Waterproofing
 - 1.8 Drainage
-

IV-2 Design of Portals on Peculiar Slopes

- 2.1 Design of portal zones
 - 2.2 Design of portals
-

IV-3 Tunneling Close to Other Structures

- 3.1 Existing structures
 - 3.2 Proximity to each other
 - 3.3 Effected by neighboring construction
-

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V Guideline of Work Control for Road Tunnels

V-1 Quality Control

1.1 Shotcrete

- Materials, weighing and mixing of shotcrete
- Thickness and strength of shotcrete

1.2 Rock bolts

- Material of rock bolts
- Arrangement and bonding of rock bolts

1.3 Steel supports

- Materials of steel supports
- Erecting of steel supports

1.4 Lining

- Material, mixture and strength of lining
- Installation of forms and inspection of lining

1.5 Waterproofing and crack protection

- Quality control of waterproofing and crack protection

1.6 Drainage

- Quality control of drainage

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V Guideline of Work Control for Road Tunnels

V-2 Instrumentation & Monitoring

2.1 Planning of instrumentation & monitoring

- Items of monitoring
- Positions of monitoring
- Frequency of monitoring
- Selection of instruments

2.2 Execution of monitoring

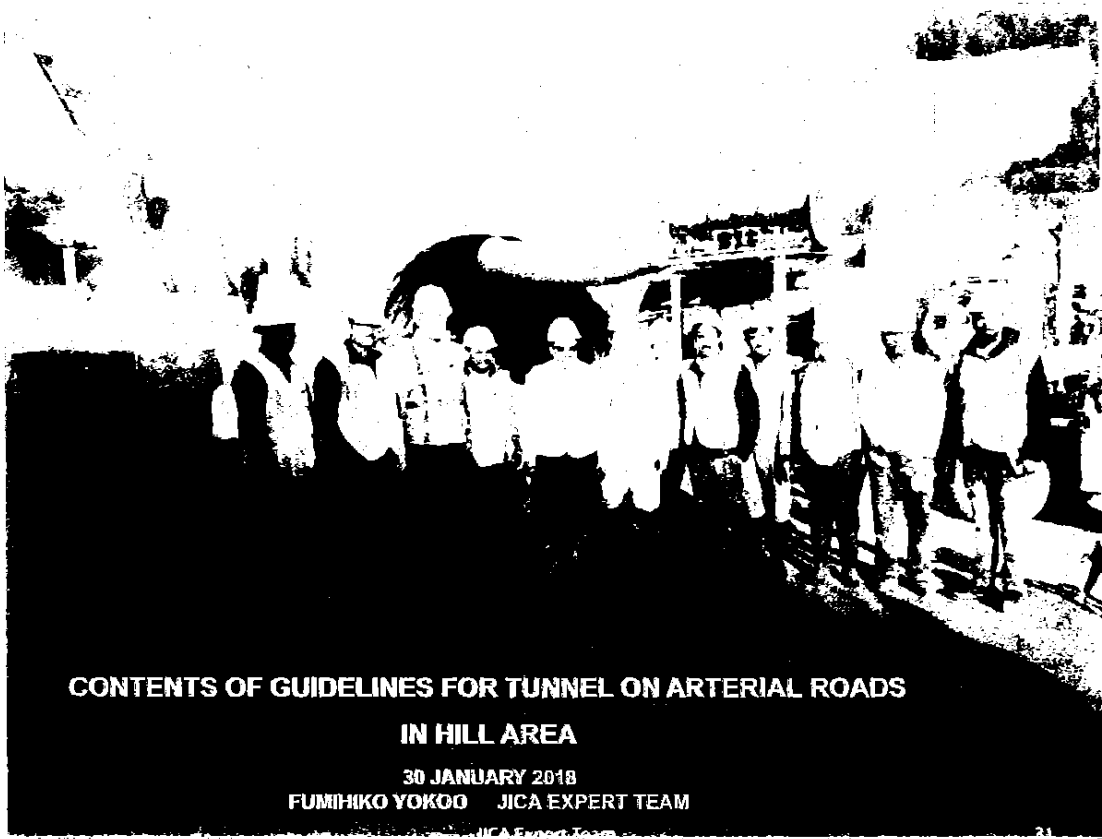
- Observation monitoring
- Instrumentation
- Processing of monitoring results

2.3 Feedback of monitoring

- Fundamental approach
- Evaluation of monitoring results
- Feedback to design, construction and maintenance

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**CONTENTS OF GUIDELINES FOR TUNNEL ON ARTERIAL ROADS
IN HILL AREA**

**30 JANUARY 2018
FUMIHIKO YOKOO JICA EXPERT TEAM**



Contents

- Chapter 1. Introduction
- Chapter 2. Ventilation
- Chapter 3. Lighting
- Chapter 4. Emergency facilities
- Chapter 5. Facility control room

Chapter 1. Introduction

Existing Indian guideline

- < IRC SP 91-2010 : Guidelines for Road Tunnels
- < IRC SP 84-2014 : Manual of specifications & standards for four laning of HIGHWAYS through public private partnership
- < IRC SP 73-2015 : Manual of specifications & standards for two laning of HIGHWAYS with paved shoulder

New guideline for Arterial Roads in Hill area

- 1) Follow the existing guidelines basically.
- 2) Define new requirement and design criteria if there is insufficient definition in existing guidelines.
- 3) Installation case of facilities will be described in each chapter using recently technology.

2

Chapter 2. Ventilation

- Natural Ventilation
- Mechanical Ventilation



2.1 Requirement

Requirement follows existing guideline. (*1)

Because Requirement in existing guideline is clear.
Therefore, other guideline also has followed it.

(*1) IRC SP 91-2010 : Guidelines for Road Tunnels

7.1.7.2 In case of all tunnels more than 500 m. in length, Mechanical System of Ventilation should be provided unless the traffic volume is very low.

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Chapter 2. Ventilation

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2.2 Design

Design for Both Ventilation system.

- > Basically, refer to an existing guideline. (*1)
- > Additionally, Point of concern about the arterial roads in hill area is mentioned.

(*1) IRC SP 91-2010:Guidelines for Road Tunnels

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Chapter 3. Lighting

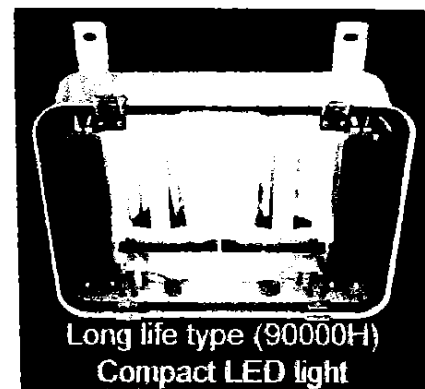


3.1 Requirement

Requirement follows existing guideline. (*1)

Because Requirement in existing guideline is clear.

Therefore, other guideline also has followed it.



(*1) IRC SP 91-2010 : Guidelines for Road Tunnels

7.2.3 Zoning of a long tunnel, There are five (5) types of Zone in the tunnel. Requirement of each Zones are defined in this chapter clearly.

6

Chapter 3. Lighting

3.2 Design

Design for Lighting system.

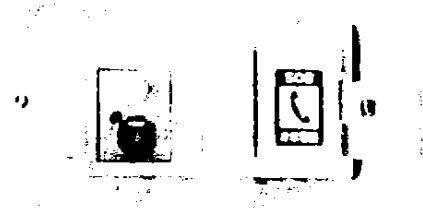
> Basically, refer to an existing guideline. (*1).

> Additionally, Point of concern about the arterial roads in hill area is mentioned.

(*1) IRC SP 91-2010:Guidelines for Road Tunnels

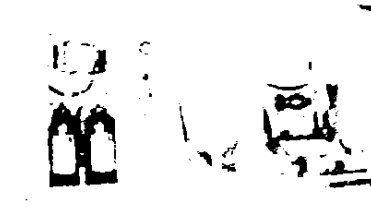
Chapter 4. Emergency Facilities

Information and Alarm Equipment



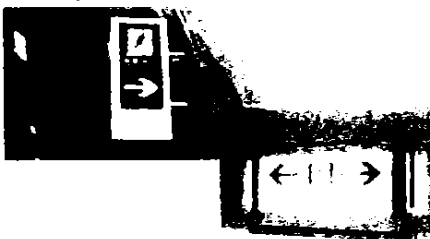
Push-button type report device
Emergency telephone

Fire Extinguishing Equipment



Fire hydrant & Fire extinguisher

Escape and Guidance facilities



Evacuation route

Other Equipment



Re-broadcasting radio (LCX cable)
CCTV camera

Chapter 4. Emergency Facilities 10

4.1 Requirement

Requirement follows existing guideline. (*2)

As installation criteria, the Classification based on traffic volume and length of tunnel is redefined for arterial roads in hill area.

(*2) IRC SP 73-2015 : MANUAL OF SPECIFICATIONS & STANDARDS FOR TWO LANING OF HIGHWAYS WITH PAVED SHOULDER

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Chapter 4. Emergency Facilities 11

4.2 Design

Design for the following facilities

- 1) Information and Alarm Equipment
- 2) Fire Extinguishing Equipment
- 3) Escape and Guidance Facilities
- 4) Other Equipment

> Basically, refer to an existing guideline. (*2)

> Additionally, Point of concern about the arterial roads in hill area is mentioned.

(*2) IRC SP 73-2015 : MANUAL OF SPECIFICATIONS & STANDARDS FOR TWO LANING OF HIGHWAYS WITH PAVED SHOULDER

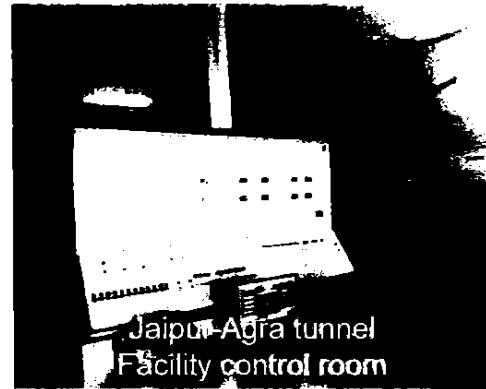
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Chapter 5. Facility control room

5.1 Requirement

Requirement of the following items must be defined to install the Tunnel facility's control and operation.

- 1) Power distribution system and backup power system
- 2) Arrangement of facility equipment
- 3) Cable wiring



5.2 Design

Design of these items so that the Tunnel facilities are disposed appropriately in Facility control room.

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CONTENTS OF GUIDELINES FOR TUNNEL ARTERIAL ROADS IN HILL AREA (DRAFT)

CONTENTS (DRAFT)	OUTLINE	CONTENTS TO BE DESCRIBED	EXISTING INDIAN MANUALS TO BE REFERED
OUTLINE			
1 OUTLINE	<p>These guides supplements the existing "Indian Guidelines for Road Tunnels (IRC:SP:91-2010)" and other guides related to tunneling in India. Especially this guide emphasizes the following important matters which the existing guides does not contain or contain a little.</p> <ul style="list-style-type: none"> - planning & geotechnical/environmental investigation - basic of design - reinforcement works - tunneling in peculiar conditions - work control 	<p>The contents of guidelines is;</p> <ol style="list-style-type: none"> I. Guideline of Planning and Investigation for Road Tunnel II. Guideline of Basic Design for Road Tunnel III. Guideline of Reinforcement Works for Road Tunnel IV. Guideline of Tunneling in Peculiar Condition for Road Tunnel V. Guideline of Work Control for Road Tunnels 	IRC:SP:91-2010, Indian Guidelines for Road Tunnels
I GUIDELINE OF PLANNING AND INVESTIGATION FOR ROAD TUNNEL			
I-1 Planning	<p>This chapter provides the following: horizontal and vertical alignments; clearance envelopes; and cross section elements. Geometrical requirements for the tunnel approaches and portals are also provided. In addition, the geometrical configurations of a road tunnel are also governed by its functionality and locality, as well as the subsurface conditions. It often takes several iterative processes from planning, environmental study, configuration, and preliminary investigation and design to eventually finalize the optimum alignment and cross section layout.</p> <p>This chapter discusses the subsurface investigation techniques typically used for planning, design and construction of road tunnels.</p> <p>To successfully plan, design and construct a road tunnel project requires various types of investigative techniques to obtain a broad spectrum of pertinent topographic, geologic, subsurface, geo-hydrological, and structure information and data.</p>	<ul style="list-style-type: none"> ● Alignment and Inner Section of Tunnels <ul style="list-style-type: none"> - Horizontal Alignment of Tunnels - Vertical Alignment of Tunnels - Tunnel Cross-Section - Tunnel Facilities including Escape Tunnels ● Work Plan <ul style="list-style-type: none"> - Establishment of construction sections - Construction methods and schedule planning - Working drifts - Access roads, muck disposal yards - Environment preservation measures 	IRC:SP:91-2010, Indian Guidelines for Road Tunnels 2 Planning of Road Tunnels
I-2 Geotechnical Investigation		<ul style="list-style-type: none"> ● Geotechnical Investigation <ul style="list-style-type: none"> - Survey for feasibility study - Geological survey for design and work plan - Geological survey during construction - Hydrological research - Geotechnical reports - Environmental Issues 	IRC:SP:91-2010, Indian Guidelines for Road Tunnels 3 Geo-Technical Investigations

II GUIDELINE OF BASIC DESIGN FOR ROAD TUNNEL		
II-1 Design	<p>This chapter present design recommendations and requirements for road tunnels in all types of grounds. This chapter addresses basic of tunnel design, analysis, design and construction issues for rock tunneling including rock mass classification, excavation methods, excavation supports, and design considerations for permanent lining, groundwater control, and other ground control measures.</p>	<p>General</p> <ul style="list-style-type: none"> - Basic of design - Design method - Design procedure - Design changes <p>● Selection of cross section and construction method</p> <ul style="list-style-type: none"> - Cross section - Selection of excavation method - Selection of tunnel driving method <p>● Design conditions</p> <ul style="list-style-type: none"> - Ground properties - Impact of surrounding structure and environment - Impact by neighboring construction - Impact of earthquakes, water pressure and other factors
II-2 Rock Classification & Tunnel Support	<p>This chapter shows how rock classification can be used to begin to develop and apply numerical ratings to the selection of rock tunnel support and lining. This chapter discusses various rock mass classification systems mainly used for rock tunnel design and construction projects.</p>	<p>● Rock Classification</p> <p>● Design concept for tunnel supports</p> <ul style="list-style-type: none"> - Shotcrete - Rock bolts - Steel supports - Lining - Invert
III GUIDELINE OF REINFORCEMENT WORKS FOR ROAD TUNNEL		
III-1 Reinforcement Works	<p>Reinforcement works are construction methods of secondary or special measures adopted to ensure face stability and tunnel safety and to preserve the environment in cases where either conventional support patterns or division of heading section can not provide effective solutions or where they are not advantageous.</p>	<p>General</p> <ul style="list-style-type: none"> - Role of reinforcement works - Application of reinforcement works <p>● Reinforcement works for safety of tunneling</p> <ul style="list-style-type: none"> - Heading face stabilization - Water inflow control <p>● Reinforcement works for preservation of surrounding environment</p> <ul style="list-style-type: none"> - Ground surface settlement - Reinforcement works for construction close to existing structures

IRC:SP:91-2010, Indian Guidelines for Road Tunnels
4 Structural Design

IRC:SP:91-2010, Indian Guidelines for Road Tunnels

IRC:SP:91-2010, Indian Guidelines for Road Tunnels
(not applicable)

IV GUIDELINE OF TUNNELLING IN PECULIAR CONDITION FOR ROAD TUNNEL

<p>IV-1 Difficult Ground Tunneling</p>	<p>In many cases special approaches or arrangements must be made to safely and efficiently drive and stabilize the tunnel as it passes through this "Difficult Ground" such as the follows,</p> <ul style="list-style-type: none"> - Unconsolidated ground - Swelling rock - Rock burst - Geothermal heat, hot springs, toxic gases - High water pressure or large inflow volumes 	<ul style="list-style-type: none"> ● Unconsolidated ground ● Swelling rocks ● Rock burst ● Geothermal heat, hot springs, toxic gases ● High water pressure or large inflow volumes <ul style="list-style-type: none"> - Waterproofing - Drainage 	<p>IRC:SP:91-2010, Ind:an Guidelines for Road Tunnels (not applicable)</p>
<p>IV-2 Design of Portals on Peculiar Slopes</p>	<p>Portals are frequently located in a generally weak geologic zone, where erosion develops and a complicated topography is created. Thus tunneling or construction of the portal is likely to cause landslides. While the tunnel is in service, portals are susceptible to natural disasters such as rock falls, avalanches, debris flows and earthquakes. Portals sometimes may be subjected to overburden loads or earth pressure after being placed into service.</p>	<ul style="list-style-type: none"> ● Design of portal zones ● Design of portals 	<p>IRC:SP:91-2010, Ind:an Guidelines for Road Tunnels (not applicable)</p>
<p>IV-3 Tunneling Close to Other Structures</p>	<p>Tunnel could effects on neighboring structures include a deformation of the surrounding ground, blasting vibrations, and lowering of the ground water. Structures such as roads, railways, water channels and buildings near a tunnel and buried structures such as gas lines and service water and sewerage conduits.</p>	<ul style="list-style-type: none"> ● Existing structures ● Proximity to each other ● Effected by neighboring construction 	<p>IRC:SP:91-2010, Ind:an Guidelines for Road Tunnels (not applicable)</p>

V GUIDELINE OF WORK CONTROL FOR ROAD TUNNELS

<p>V-1 Quality Control</p>	<p>For stability of tunnel and construction safety, quality of material must be kept securely. Since low quality material can be seen sometimes in India, quality control is important.</p>	<ul style="list-style-type: none"> ● Shotcrete <ul style="list-style-type: none"> - Materials, weighing and mixing of shotcrete - Thickness and strength of shotcrete ● Rock bolts <ul style="list-style-type: none"> - Material of rock bolts - Arrangement and bonding of rock bolts ● Steel supports <ul style="list-style-type: none"> - Materials of steel supports - Erecting of steel supports ● Lining <ul style="list-style-type: none"> - Material, mixture and strength of lining - Installation of forms and inspection of lining ● Waterproofing and crack protection <ul style="list-style-type: none"> - Quality control of waterproofing and crack protection ● Drainage <ul style="list-style-type: none"> - Quality control of drainage 	<p>IRC:SP:91-2010, Indian Guidelines for Road Tunnels (not applicable)</p>
<p>V-2 Instrumentation & Monitoring</p>	<p>Monitoring is made for reviewing the appropriateness of the design and to ensure the safety and cost efficiency of the work by understanding the conditions of the face, the behavior of the surrounding ground and the effect of each support member which vary with the progress of the excavation. In addition, for work safe, the monitoring of air pollution and toxic gas in the tunnel is important.</p>	<ul style="list-style-type: none"> ● Planning of instrumentation & monitoring <ul style="list-style-type: none"> - Items of monitoring - Positions of monitoring - Frequency of monitoring - Selection of instruments ● Execution of monitoring <ul style="list-style-type: none"> - Observation monitoring - Instrumentation - Processing of monitoring results ● Feedback of monitoring <ul style="list-style-type: none"> - Fundamental approach - Evaluation of monitoring results - Feedback to design, construction and maintenance 	<p>IRC:SP:91-2010, Indian Guidelines for Road Tunnels Annex-D Tunnel Instrumentation</p>

VI GUIDELINE OF TUNNELING FACILITIES FOR ROAD TUNNELS

<p>VI-1 Introduction</p> <p>1.1 Introduction</p>	<ul style="list-style-type: none"> • As Introduction, this guideline is a guideline concerning the tunnel facilities for arterial road of hilly area. The guideline of tunnel facilities is composed as follows; <ul style="list-style-type: none"> - Ventilation - Lighting - Emergency facilities - Facility control room • This guideline reinforces an insufficient requirement and criteria referring to an existing India guideline. Moreover, the installation case of facilities will be described in each chapter. 	<ul style="list-style-type: none"> - Introduction of Tunnel facilities for arterial road of hilly area 	
<p>VI-2 Ventilation</p> <p>2.1 Requirement</p> <p>2.2 Design</p>	<ul style="list-style-type: none"> • Explain Requirement for ventilation systems • Explain Design of ventilation system 	<ul style="list-style-type: none"> • Requirement for Natural ventilation and Mechanical system of ventilation • Design for Natural ventilation and Mechanical system of ventilation - Basically, refer to an existing guideline. Points of concern are mentioned specially. 	<p>IRC SP 91-2010 Guide lines for road tunnels</p>
<p>VI-3 Lighting</p> <p>3.1 Requirement</p> <p>3.2 Design</p>	<ul style="list-style-type: none"> • Explain Requirement for lighting system • Explain Design of lighting system 	<ul style="list-style-type: none"> • Requirement for lighting system • Design for lighting system - Basically, refer to an existing guideline. Points of concern are mentioned specially. 	<p>IRC SP 91-2010 Guide lines for road tunnels</p>
<p>VI-4 Emergency Facilities</p> <p>4.1 Requirement</p> <p>4.2 Design</p>	<ul style="list-style-type: none"> • Explain Requirement for Emergency facilities • Explain the Classification for installation • Explain Design of the following facilities <ol style="list-style-type: none"> 1) Information and Alarm Equipment 2) Fire Extinguishing Equipment 3) Escape and Guidance Facilities 4) Other Equipment 	<ul style="list-style-type: none"> • Requirement for Emergency facilities • Classification based on traffic volume and length of tunnel • Design for Information and Alarm Equipment, Fire Extinguishing Equipment, Escape and Guidance Facilities and other equipment classified as detail type of an emergency facilities. 	<p>IRC SP 73-2015 Manual of specifications & standards for two laning of highways with paved shoulder</p>

<p>VI-5 Facility Control Room</p>	<p>5.1 Requirement</p>	<ul style="list-style-type: none"> • Explain Requirement of Facility control room 	<ul style="list-style-type: none"> • Requirement of the following items must be defined to install the Tunnel facility's control and operation. <ol style="list-style-type: none"> 1) Power distribution system and Backup power system 2) Arrangement of Facility equipment 2) Cable wiring • Tunnel facilities (Ventilation, Lighting, Emergency facilities) is always connected with Facility control room.
	<p>5.2 Design</p>	<ul style="list-style-type: none"> • Explain Design of these items so that the Tunnel facilities are disposed appropriately in Facility control room. <ol style="list-style-type: none"> 1) Power distribution system and Backup power system 2) Arrangement of Facility equipment 2) Cable wiring 	



Technical Group (TG)
For
Capacity Development Project on Highways in
Mountainous Regions

1. Date

22th February 2018, 15:00 ~ 17:00

2. Venue

Conference Room, Ground Floor, Transport Bhawan

3. Agenda

- 1) Opening Remarks.....Chairperson
- 2) Introduction Mr. Moriyama
- 3) Contents of Guideline for Slope Protection & Advanced Embankment.....
.....Mr. Kawamura, Dr. Mayumi
- 4) Closing Remarks.....Chairperson



Ministry of Road
Transport and Highways

*Capacity Development Project on Highways in
Mountainous Regions in the Republic of India*



Technical Group (No.4) ~ The Guidelines to be developed in the Project ~

Guideline for Slope Protection and Advanced Embankment on Arterial Roads in Hilly areas

February 2018

Introduction

- Review: Type of Guidelines (No.3 TG meeting 30, January, 2018)
- Sequence of Hill Road Project and Demarcation of each Guideline
- Guidelines developing schedule
- Counterpart Guideline Development



Capacity Development Project on Highways in Mountainous Regions in the Republic of India



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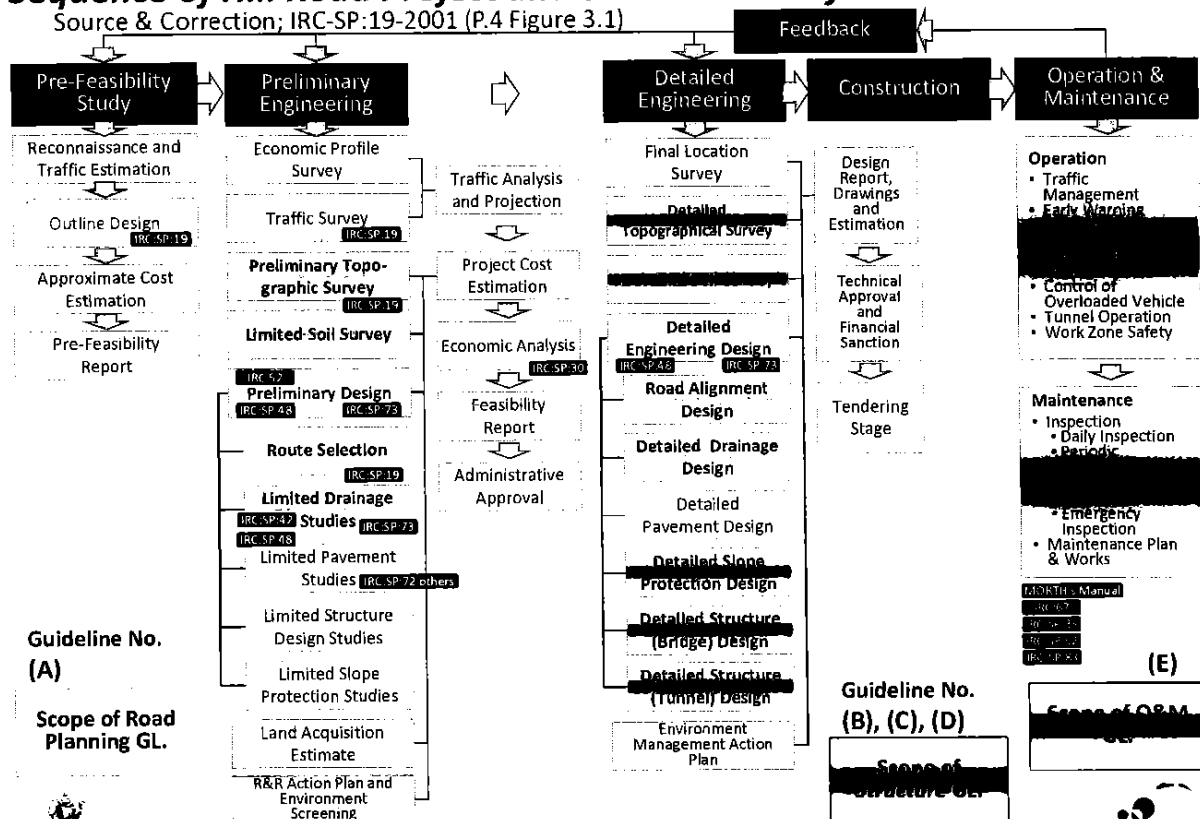
Review: Type of Guidelines (Source: No.2 TG meeting 30, January, 2018)

Guideline (Tentative)	B, C and D are collectively called "design and construction guidelines"	Stage	Schedule
(A) Guideline for Planning on Arterial Roads in Hilly Area i) Characteristics and Basic Policy of Hill Road Projects in India, ii) Survey /Investigation for Hill Road Planning iii) Planning and Alignment/Preliminary Design, vi) General Risks on Hill Road Development (To be determined), v) Introduction of Major Advanced Technologies (outline)		Outline ~ DPR	✓ TG (No.3) January, 2018
(B) Guideline for Slope Protection and Advanced Embankment on Arterial Roads in Hilly Area i) Type of Hazard , ii) Basic Approach, iii) Survey, Identification and Prioritization of Hazardous Slope, iv) Selection of Method iv) Slope Protection, v) Embankment, vi) Drainage, vii) Case Studies		DPR ~ D/D, Construction	TG (No.4) February, 2018
(C) Guideline for Bridge on Arterial Roads in Hilly Area i) Bridge Planning and Investigation, ii) Design (including selection of bridge type, construction method, etc.), iii) Construction (Foundation, substructure, superstructure, etc.), iv) Reinforcement methods		DPR ~ D/D, Construction	✓ TG (No.2) December, 2017
(D) Guideline for Tunnel on Arterial Roads in Hilly Area i) Planning and Investigation (including geology categorization), ii) Design (Excavation method, support system, supporting excavation method, etc.) iii) Construction, iv) Observation and Measurement, v) Tunneling in Difficult Grounds, vi) Tunnel facilities		DPR ~ D/D, Construction	✓ TG (No.3) January, 2018
(E) Guideline for Operation and Maintenance on Arterial Roads in Hilly Area i) Operation (Traffic management, early warning system, accident management, tunnel operation, etc.), ii) Maintenance (inspection, assessment, maintenance planning and implementation)		After Construction	✓ TG (No.2) December, 2017



Sequence of Hill Road Project and Demarcation of each Guideline

Source & Correction; IRC-SP:19-2001 (P.4 Figure 3.1)



Overall Schedule



Guideline Development Schedule

Milestones	Period (Tentative)
Technical Group (TG) for Bridge and O&M Guidelines	December 2017
TG for Planning and Tunnel Guidelines	January 2018
TG for Slope Protection and Advanced Embankment Guideline	February 2018
JCC for Confirmation on the Contents	April 2018
TG for Progress and Discussions (1 st)	July 2018
JCC for Progress Report	October 2018
TG for Progress and Discussions (2 nd)	December 2018
Draft Guidelines	March 2019

☞ We are here

Next JCC (Joint Coordinating Committee meeting April, 2018)

All Contents of guidelines will be reported to JCC based on the result of discussion in TGs.

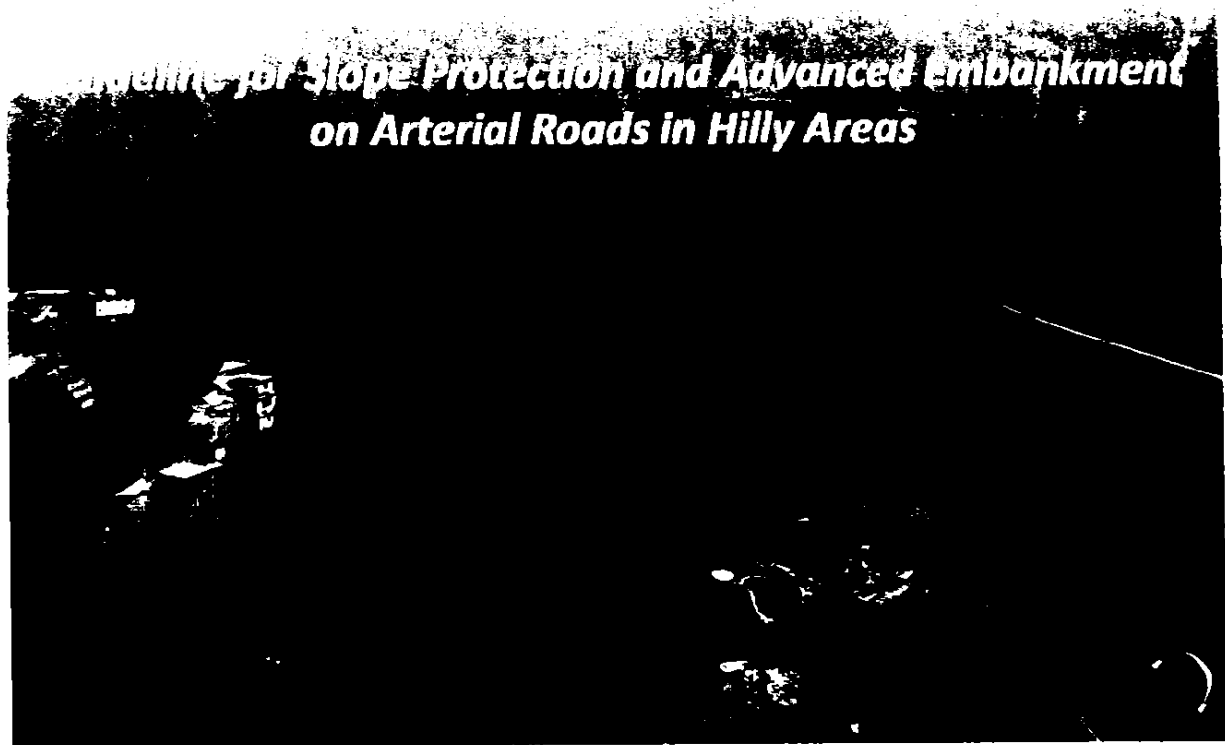


Capacity Development Project on Highways in Mountainous Regions in the Republic of India



Counterpart for Guideline Development (Draft)

Guideline	India Side	Japan Side
<u>Overall control of 5 guidelines</u>	Khushal Chand Sanjeev Kumar	Mr.Moriyama, Mr. Yamada, Mr. Kawamura
A) Guideline for Planning on Arterial Roads in Hilly Area	Khushal Chand SE(EAP), MoRTH	Mr. Moriyama +91-98183-82067 shumoriyamatiefbau@yahoo.co.jp
B) Guideline for Slope Protection and Advanced Embankment on Arterial Roads in Hilly Area	W.Blah SE(North East Region) MoRTH	Mr. Kawamura +91-95605-36158 kawamuray@oriconsul.com
C) Guideline for Bridge on Arterial Roads in Hilly Area	Sanjeev Kumar SE(S&R-Pavement & Bridge), MoRTH	Dr. Nakano +91-88003-26239 nakanoh@oriconsul.com
D) Guideline for Tunnel on Arterial Roads in Hilly Area	Ashok.Kumar.G upta GM(Technical), NHIDCL	Mr. Yokoo +91-84484-65798 yokoof@outlook.jp
E) Guideline for Operation and Maintenance on Arterial Roads in Hilly Area	Nishoo Gupta GM(Technical), NHAI	Mr. Yamada +91-88009-58190 d.yamada.aa@gmail.com



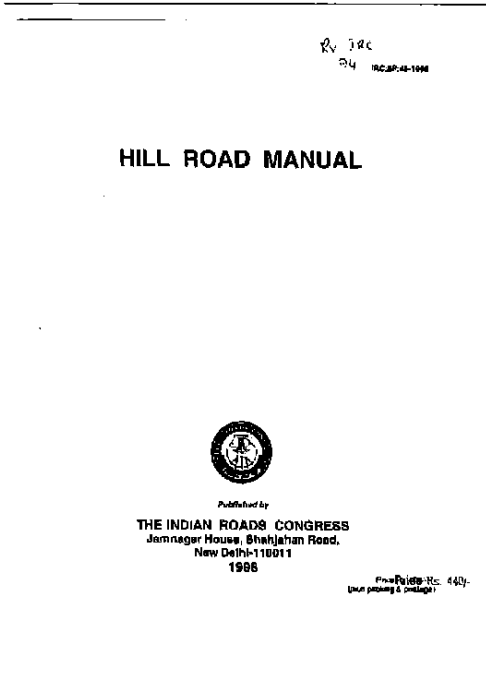
Contents

- 1. Review of Existing Guidelines and Actual Works on Site**
 - 2. Concept of New Guideline**
 - 2.1 Highlights of New Guideline
 - 2.2 Investigation for hazards
 - 2.3 Sequence of Selection for Countermeasures / Mitigation
 - 2.4 Prioritization
 - 2.5 Physical countermeasures and EWS
 - 2.6 Advanced Technologies to be applied.
 - 3. Contents of New Guideline**
 - 3.1 Investigation
 - 3.2 Design
 - 3.3 Construction
 - 3.4 Maintenance
- Appendix (attached sheets)
Table of Contents for *Slope Protection and Advanced Embankment*



1. Review of Existing Guidelines and Actual Works on Site

IRC:SP48-1996 Hill Road Manual



Chapter and Section title	
1	INTRODUCTION
2	SCOPE
3	DEFINITIONS OF TERMS RELATING TO HILL ROADS
4	PLANNING CRITERIA
5	SURVEY AND ALIGNMENT OF HILL ROADS
6	GEOMETRIC DESIGN
7	FORMATION WORKS
8	DRAINAGE AND CROSS-DRAINAGE
9	STRUCTURES AND PROTECTIVE WORKS
10	PAVEMENT DESIGN
11	SLOPE STABILITY, EROSION CONTROL AND LANDSLIDE CORRECTION
12	SNOW CLEARANCE AND AVALANCHE TREATMENT
13	ROAD CONSTRUCTION TOOLS, PLANTS AND EQUIPMENTS
14	MAINTENANCE OF HILL ROADS
15	ROADSIDE AMENITIES
16	SAFETY ON HILL ROADS
17	TRAFFIC MANAGEMENT
18	ROCK BLASTING
19	ECOLOGY AND ENVIRONMENT
20	PREPARATION AND PRESENTATION OF PROJECT DOCUMENTS

■ Planning, investigation for hill road, geometrical road structure, earthwork, drainage, structures, and pavement are covered.

■ Avalanche protections, slope stability, erosion preventions and landslide mitigations as well as construction work and machinery for hill road, maintenance, incidental facilities, safety measures, traffic control, rock blasting, environmental issues and documentation are described.

■ Comprehensive but limited to conceptual descriptions.

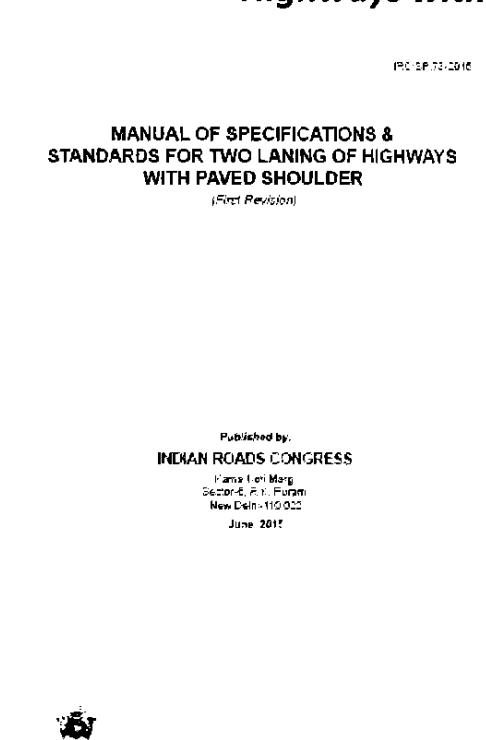


Capacity Development Project on Highways in Mountainous Regions in the Republic of India



1. Review of Existing Guidelines and Actual Works on Site

IRC:SP73-2015 Manual of Specifications & Standards for Two Laning of Highways with Paved Shoulder (First Version)



Chapter and Section title	
1	General
2	Geometric Design and General Features
3	Intersections and Grade Separators
4	Road Embankment
5	Pavement Design
6	Roadside Drainage
7	Design of Structures
8	Materials and Specifications for Structures
9	Traffic Control Devices and Road Safety Works
10	Toll Plazas
11	Landscaping and Tree Plantation
12	Project Facilities
13	Special Requirements for Hill Roads
14	Tunnels

■ Prevailing standard for design, construction and maintenance of 2 lane national highway.

■ Description for hill road design and construction is limited.

■ Especially, road widening and construction on steep hilly terrain with advanced technologies, which are essential for developing high standard highways in hilly region, are necessary.

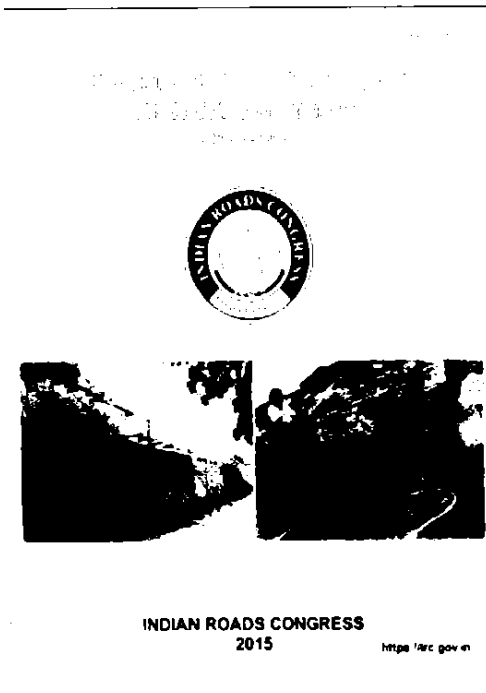


Capacity Development Project on Highways in Mountainous Regions in the Republic of India



1. Review of Existing Guidelines and Actual Works on Site

IRC:SP75-2015 Guidelines for the Design of High Embankments



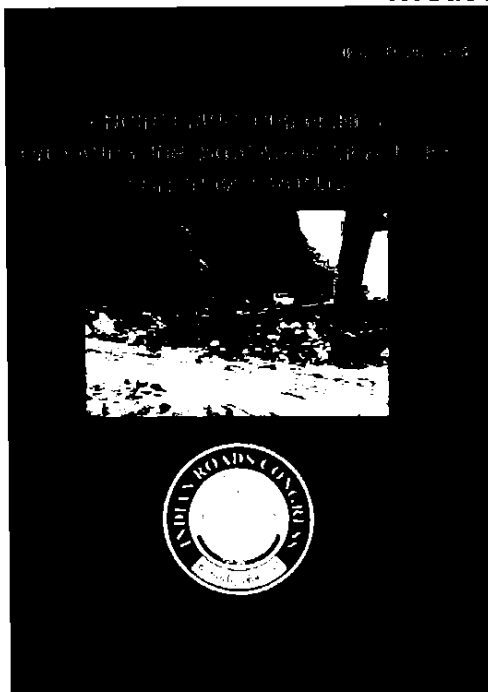
Chapter and Section title	
1	General Considerations
2	Geotechnical Investigations
Annexure 2.1	Requirements for Adequate Soil Description
Annexure 2.2	Important Instructions for Obtaining Undisturbed Samples:
Annexure 2.3	Geophysical Characterization for Design of High Embankments
3	Stability Analysis
4	Settlement Analysis
5	Ground Improvement
Annexure 5.1	Additional Ground Improvement Methods
6	Instrumentation and Monitoring of Embankment on Soft Soils
Appendix A	Solved Examples

- Important point of design and construction of high embankment as well outline of investigation, lab test, stability analysis and settlement analysis are explained.
- Contents of slope stability are elaborated and soft soil treatment including reinforced earthwork with soil nailing is detailed.
- Use of geotextile is elaborated.
- All contents are for embankments on soft ground in plain area.



1. Review of Existing Guidelines and Actual Works on Site

IRC:SP106-2015 Engineering Guidelines on Landslide Mitigation Measures for Indian Roads



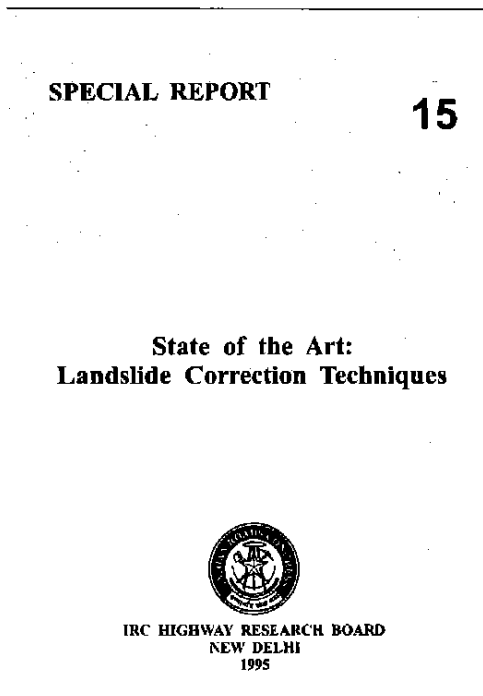
Chapter and Section title	
1	Overview of Land slide Hazards In India
2	Landslide Features and Geometry
3	Classification
4	Landslide Hazard Mapping, Vulnerability and Risk Assessment
5	Methods of Scientific Investigation of Slopes and Landslides
6	Instrumentation, Monitoring, Forecasting and Early Warning of Landslides
7	Landslide Risk Reduction through Improved Planning, Design and Construction Practices
8	Technology for Landslide Prevention and Remediation

- The only IRC standard for landslide.
- Investigations to identify landslide areas and to assess its risk as well as mitigation methods outlined.
- Necessity of preparing slope inventories for hill road is mentioned in the aim of collecting, organizing and analyzing information of slopes.
- Features of mitigation works / countermeasures are described to the level of arranging the works on plan view.
- Information to prepare detail design of mitigation works / countermeasures is insufficient.
- No description for investigation and analysis to assume landslide mechanism and to assess sliding force of landslide are confirmed. So is design of countermeasures.



1. Review of Existing Guidelines and Actual Works on Site

State of the Art: Landslide Correction Techniques



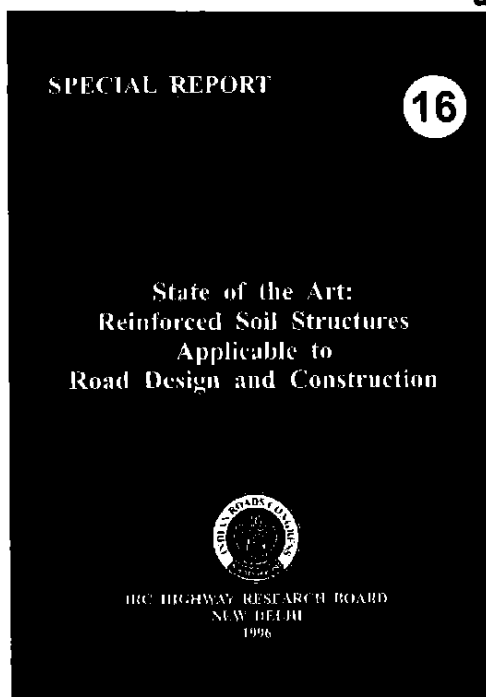
Chapter and Section title	
1	Introduction
2	Site Investigation
3	Causes of Landslides
4	Stability Analysis of Soil Slopes
5	Stability of Rock Slopes
6	Hazard Zonation
7	Corrective Measures and Design Considerations
8	Case Histories
9	Instrumentation for Monitoring Landslides
10	General Description and Evolution of Himalayas

- The oldest publication among the landslide-related ones from IRC.
- Rich contents in terms of technical aspects of landslide investigation, compared with IRC: SP106-2015.
- Reinforced earth work as well as micro piling are highlighted.
- Drainage works including groundwater drainage were also highlighted. Horizontal drainage boring is outlined but insufficient for detailed design.
- Proper understanding for strength of rock mass is mentioned; strength of discontinuity limits that of rock mass rather than that of intact rock does.



1. Review of Existing Guidelines and Actual Works on Site

State of the Art: Reinforced Soil Structures Applicable to Road Design and Construction



Chapter and Section title	
1	Introduction
2	Theory and Design
3	Laboratory and Field Model Studies
4	Materials of Construction
5	Construction of Reinforced Earth Structures
6	Case Studies
A	Solved Example of Design of Retaining Structure with Metallic Reinforcements and with Geosynthetic Reinforcements - A Comparative Study

- Based on detailed experimental data, the principal of bend reinforcement effect generated by mutual interference between the ground and tensile strips is elaborated.
- In design chapter, selection of materials and compaction methods for embankment as well as arrangements of drainage are also elaborated .
- Examples of design with calculation procedure are attached to appendix and help engineers produce a detailed design.
- Use of reinforced embankment are elaborated.
- Nailing and micro-pile are explained.
- Useful publication.



1. Review of Existing Guidelines and Actual Works on Site

State of the Art: Design and Construction of Rock fall Mitigation Systems

SPECIAL REPORT 23

STATE OF THE ART:
DESIGN AND CONSTRUCTION OF ROCKFALL
MITIGATION SYSTEMS



1	Introduction
2	Selection Criteria of Suitable Rock fall Mitigation Systems
3	Analysis and Design of Rock fall Mitigation Systems
4	Testing : Field and Laboratory Methods
5	Specifications
6	Construction and Installation Aspects
7	Case Studies
Annexure A	Drainage Measures
Annexure B	Instrumentation Techniques

- Design and construction procedures of rock fall prevention works are elaborated with some field studies.
- Well organized publication of rock fall mitigation covering definition of technical terms, rock fall hazard rating system, selection and design of rock fall mitigation works, numerical analysis, quality control including pull-out test of rock bolts and resistance test of nets, specifications of works, construction methods, rock fall monitoring, and case studies.
- Comprehensively described excluding maintenance.

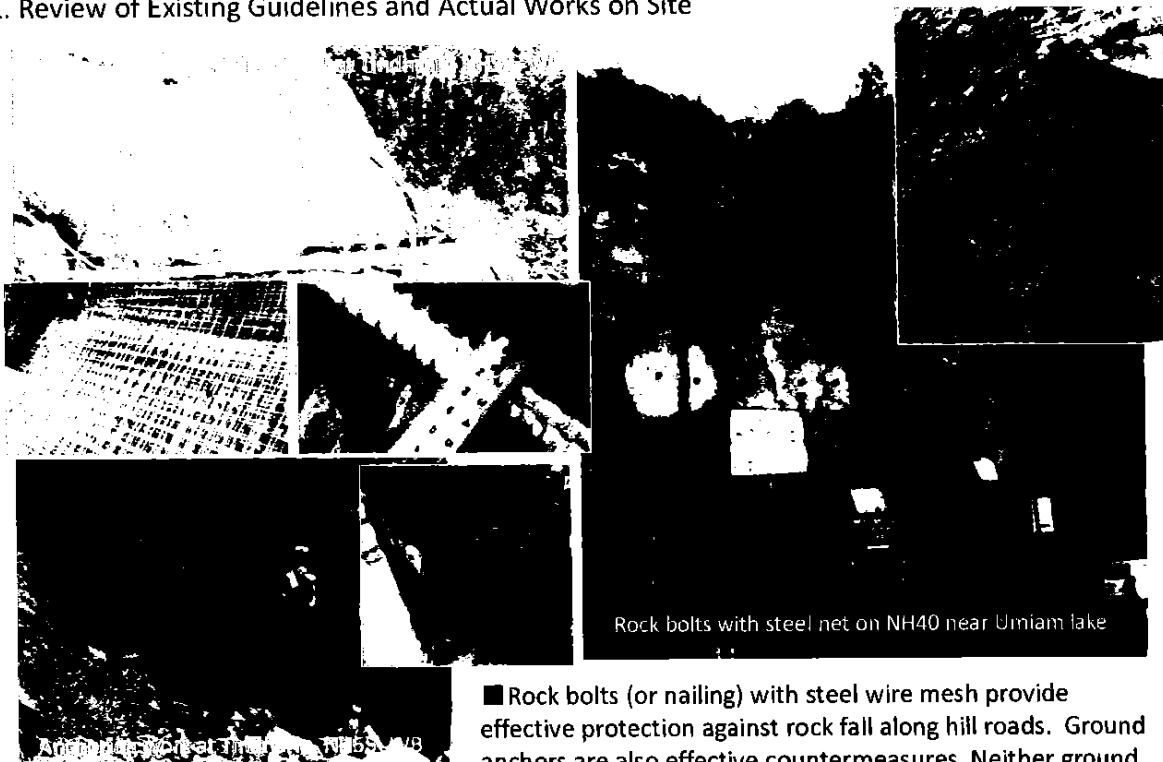
IRC HIGHWAY RESEARCH BOARD
NEW DELHI
2014



Capacity Development Project on Highways in Mountainous Regions in the Republic of India



1. Review of Existing Guidelines and Actual Works on Site



Rock bolts with steel net on NH40 near Umiam lake

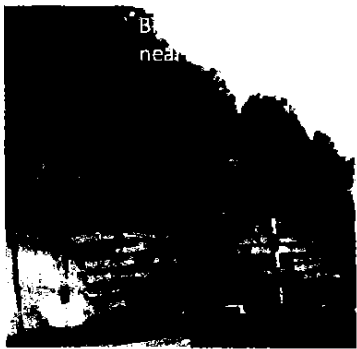
- Rock bolts (or nailing) with steel wire mesh provide effective protection against rock fall along hill roads. Ground anchors are also effective countermeasures. Neither ground anchors or nailing is prevailing in hilly region we visited, however.



Capacity Development Project on Highways in Mountainous Regions in the Republic of India



1. Review of Existing Guidelines and Actual Works on Site



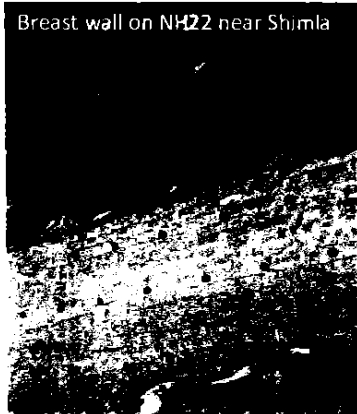
Breast wall on NH22 near Shimla



Breast wall on NH94 near Mussoorie



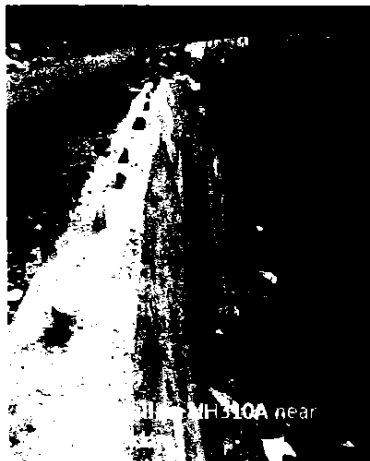
Breast wall of Kalijhora collapse on NH10



■ Breast wall made of gabions is a popular method as cut slope protection. Breast walls are normally installed along foot of cut slopes. But huge unprotected areas are remaining unprotected above breast walls.



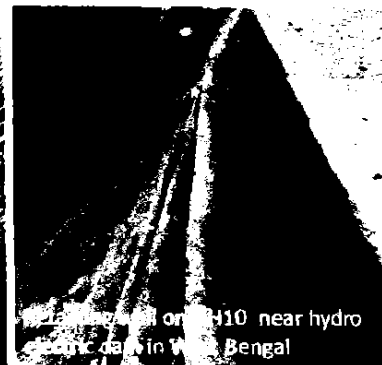
1. Review of Existing Guidelines and Actual Works on Site



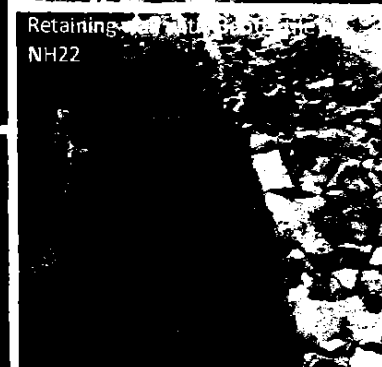
Retaining wall on NH310A near



High embankment of New airport in Sikkim

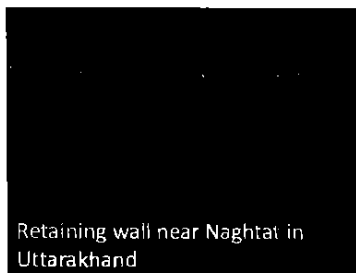


Retaining wall on NH10 near hydro electric dam in West Bengal



Retaining wall on NH22

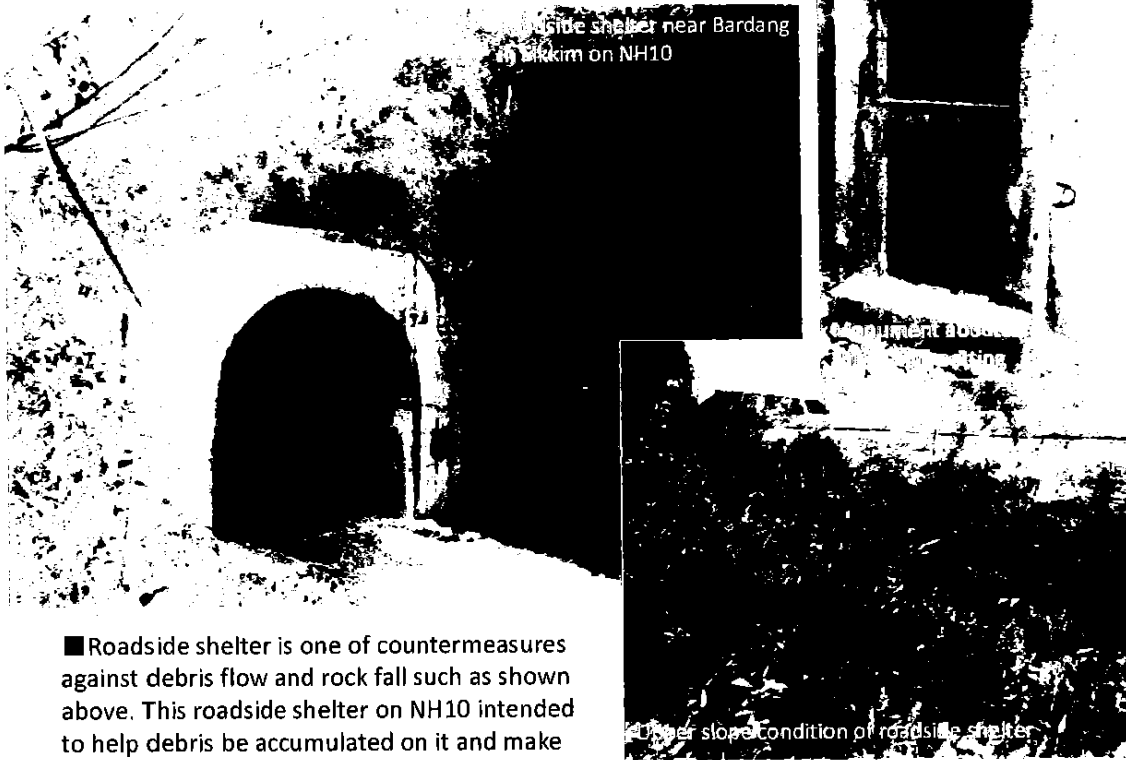
■ For most of protection works for high embankment slope, retaining wall method is employed. Some are composed of gabion's network with reinforcing by Geotextile.



Retaining wall near Naghtat in Uttarakhand



1. Review of Existing Guidelines and Actual Works on Site



■ Roadside shelter is one of countermeasures against debris flow and rock fall such as shown above. This roadside shelter on NH10 intended to help debris be accumulated on it and make accumulated debris as cushion against impact force of large debris flow.

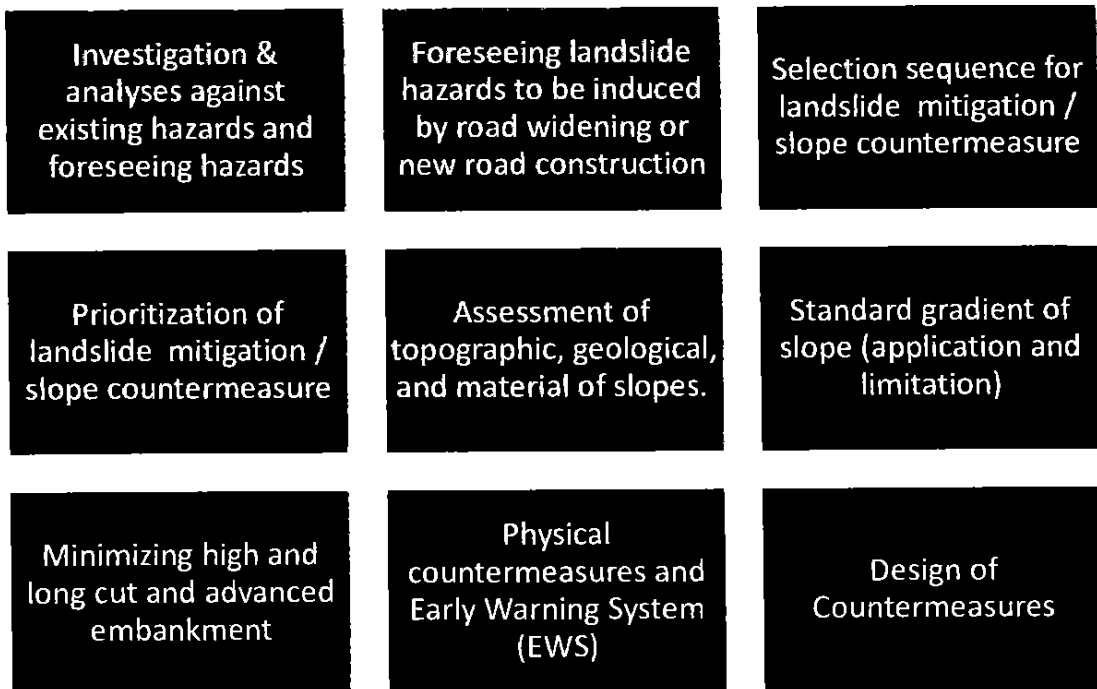


Capacity Development Project on Highways in Mountainous Regions in the Republic of India



2. Concept of New Guideline

2.1 Highlights of New Guideline



Capacity Development Project on Highways in Mountainous Regions in the Republic of India



2. Concept of New Guideline

2.2 Investigation for Hazards

Possible Hazards along Hill Roads

Type of Hazards

- Landslide
- Slope Failure (Collapse)
- Rock Fall / Slide
- Debris Flow
- Deep Sheeted Landslide (Gravitational Deformation)

Geological Condition

- Hardness of rock (hard / soft rock)
- Structure (joint, bedding, foliation, dip slope, wedge slide)
- Weathering and alteration
- Faults and fractured / sheered zone

Topographic Condition

- Landslide topography
- Escarpment
- Lineament
- Sinking zone (displacement of road)
- Abnormality, such as twin ridges, kerncol, kernbut

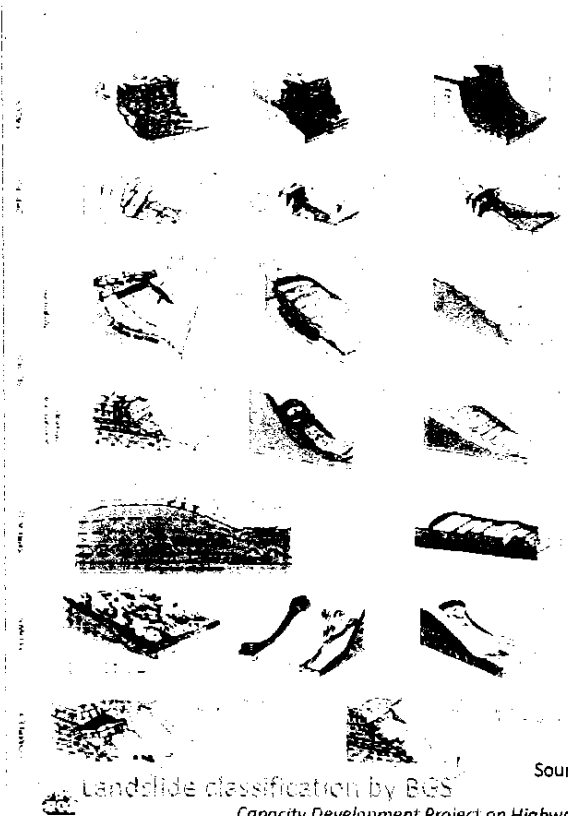
Surface / Ground Water

- Catchment area, gathering slope
- Spring
- Erosion
- Freezing
- Rise of groundwater level



2. Concept of New Guideline

2.2 Investigation for Hazards



Classification of Landslides

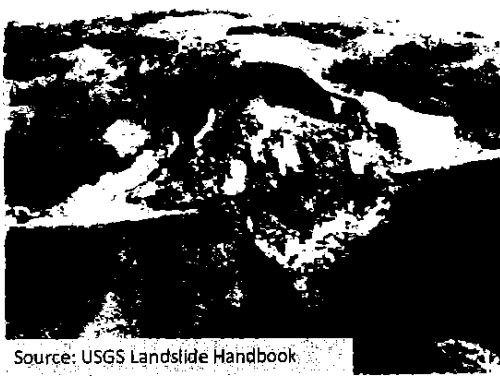
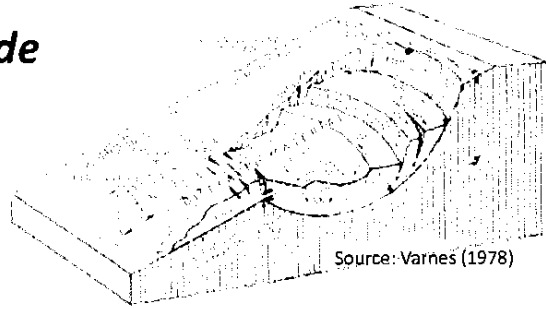
- For landslide, various types of classifications have been proposed so far.
- Usually, landslides can be categorized by:
 - ✓ types and properties of materials
 - ✓ speed of movement
 - ✓ feature of topographic conditions
 - ✓ gradient of slopes
 - ✓ and others...
- In the mountain road projects, for practical purpose, it would be recommended that landslides be classified into 5 main categories:
 - Landslide
 - Slope failure (or collapse, including natural slope as well as cut/fill slope failures)
 - Rock fall / slide
 - Debris flow
 - Deep sheeted landslide (gravitational deformation)

Source: British Geological Survey

- Landslide

Landslide

- Often triggered by heavy rainfall or increased pore water pressure, involving medium to large area, landslide mass occurs in slopes with moderate to gentle gradient.
- Velocity of slide depends on material and varies widely among quick ~ moderate ~ slow range.
- Movements often repeats in rainy seasons, due to rise of groundwater.
- Sometimes occurs around dam sites caused by changes in water levels of dam lakes.
- Earthquakes also cause landslides by actions of shaking & liquefaction



Source: USGS Landslide Handbook



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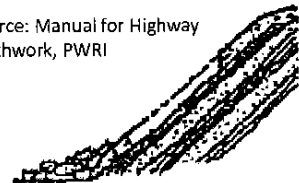
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Slope Failure (Collapse)

- Slope Failure (or Collapse)
 - Often triggered by heavy rainfall or increased pore water pressure, involving relatively small area, soil and rock mass slide down in steep slopes.
 - Velocity of collapse is usually quick.
 - Occurs in natural slopes as well as artificial ones such as cut and fill slopes.
 - Sometimes triggered by human activities, such as construction of roads and other facilities.

Source: Manual for Highway Earthwork, PWRI



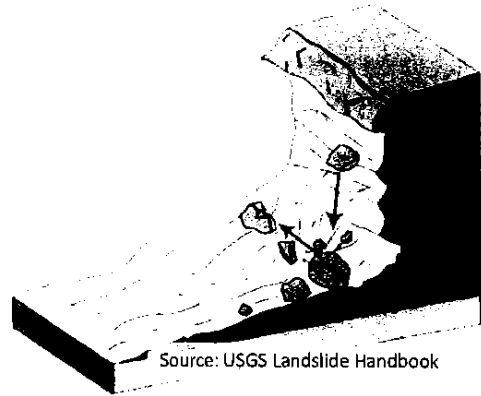
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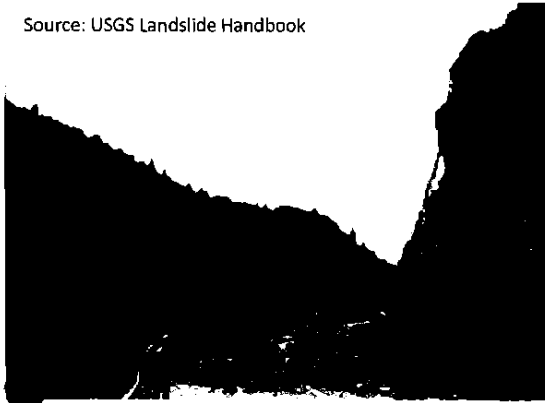


Rock Fall / Slide

- Rock Fall / Slide
 - Boulder or detached rock on upper slopes or rock mass exfoliated from middle of slopes fall down to roads with very high speed and cause damage to roads and its users.
 - Triggered by heavy rain involving erosion and earthquakes as well as human activities, such as construction of roads and other facilities.



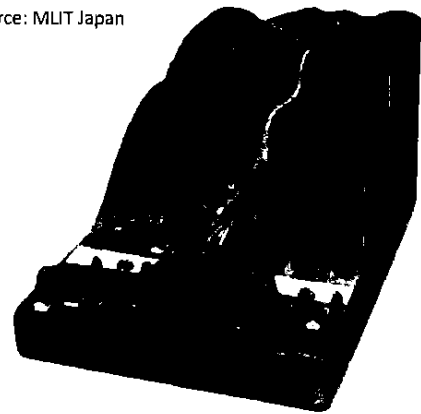
Source: USGS Landslide Handbook



Debris Flow

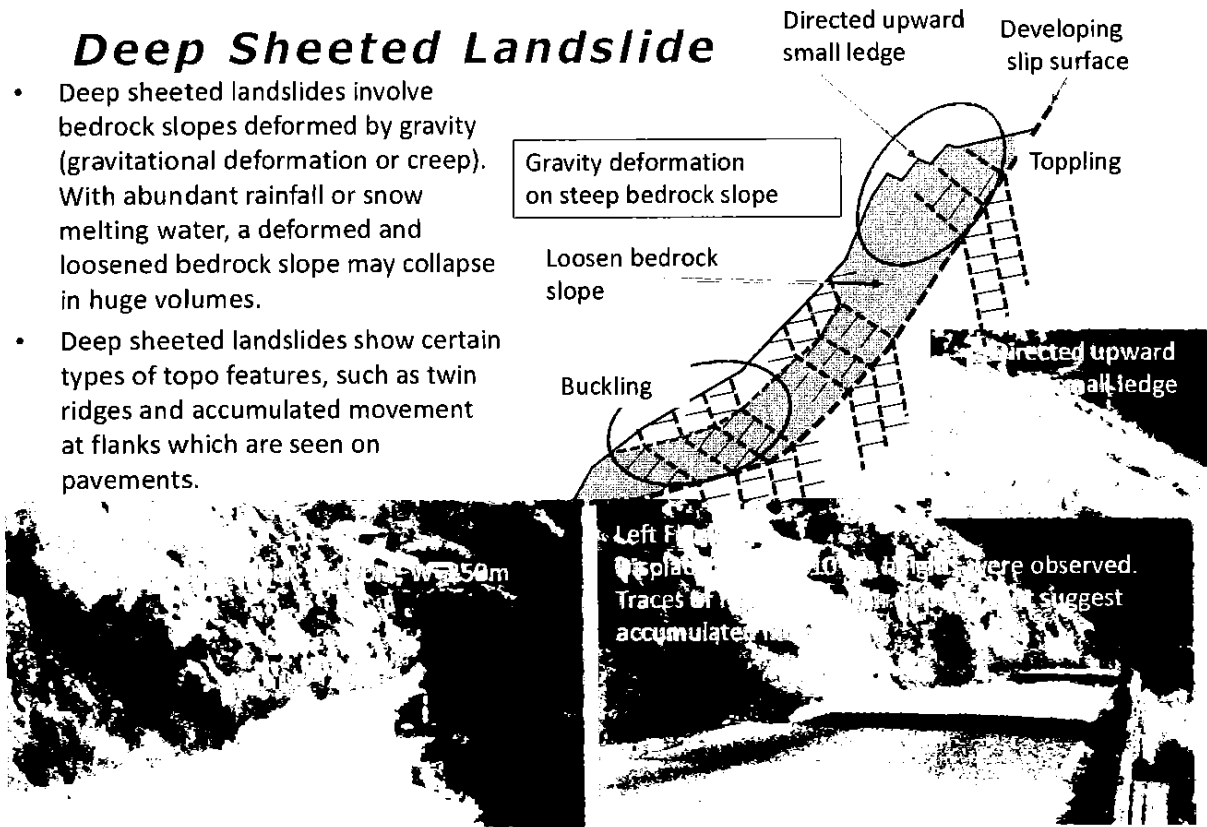
Source: MLIT Japan

- Debris Flow
 - Debris provided by collapse of hill slopes, usually triggered by heavy rain, flow down along mountain stream with high velocity, involving river bed deposits and mud water, including boulders and trees. Debris flow causes severe damage on anything on its flow pass. Debris and river bed deposit transported by debris flow then are deposited on gentler slopes at toe of hills.



Deep Sheeted Landslide

- Deep sheeted landslides involve bedrock slopes deformed by gravity (gravitational deformation or creep). With abundant rainfall or snow melting water, a deformed and loosened bedrock slope may collapse in huge volumes.
- Deep sheeted landslides show certain types of topo features, such as twin ridges and accumulated movement at flanks which are seen on pavements.

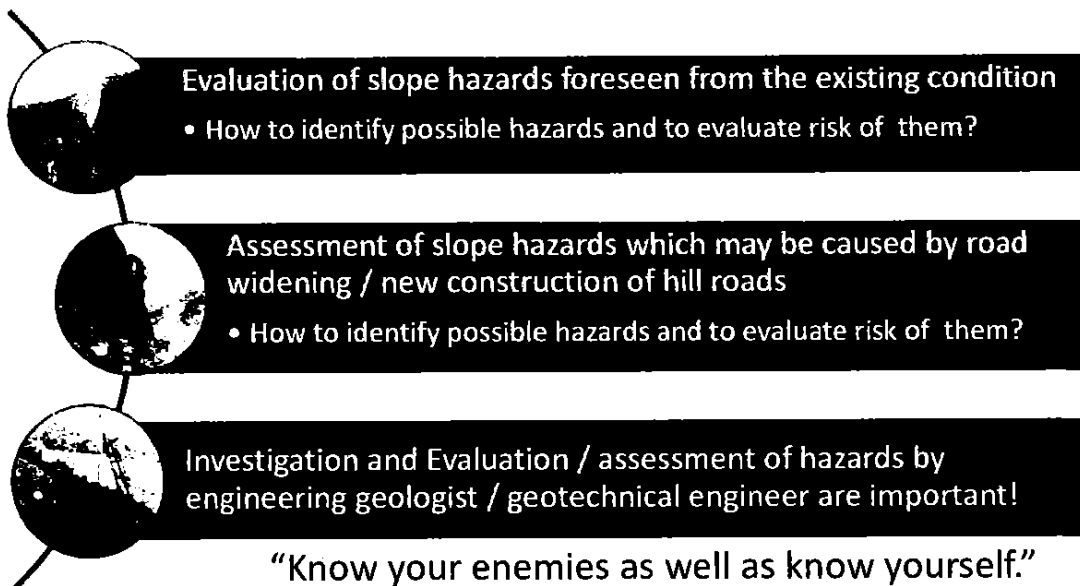


Capacity Development Project on Highways in Mountainous Regions in the Republic of India

2. Concept of New Guideline

2.2 Investigation for Hazards

Evaluation / Assessment of Hazards on Slopes along Hill Roads



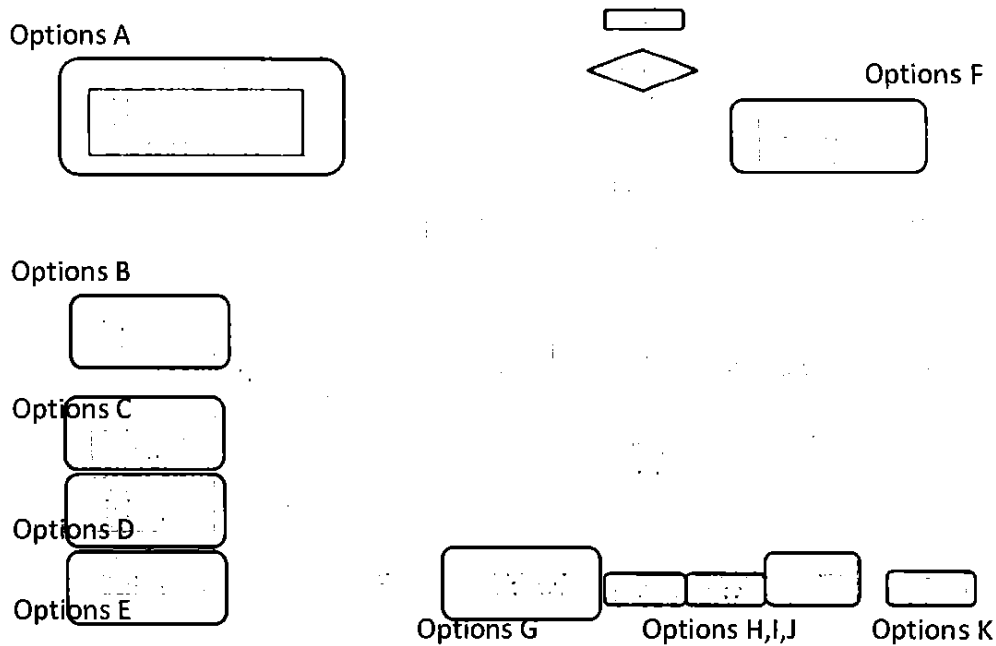
**“Know your enemies as well as know yourself.”
Know your enemy; investigation is important.**

Capacity Development Project on Highways in Mountainous Regions in the Republic of India

2. Concept of New Guideline

2.3 Sequence of Selection for Countermeasures / Mitigation

Sequence of Selection



An optimal option will be selected through prioritization from the options end of the flow.

2. Concept of New Guideline

2.4 Prioritization

Prioritization



2. Concept of New Guideline

2.5 Physical countermeasures and EWS

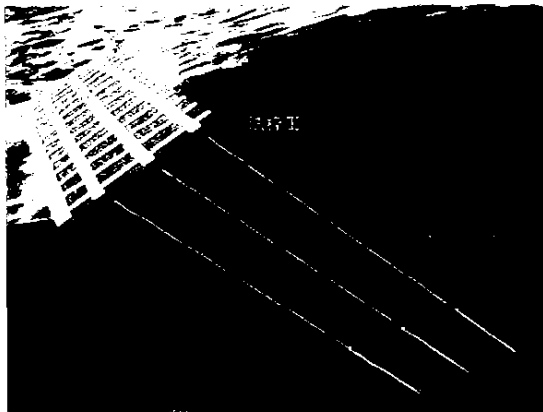
Treatment with countermeasures			
<u>Physical Works</u> High cost & effect To minimize damage to road users as well as road blockade and cost of recovery by hazards.	<u>Physical Works</u> Reasonable but middle effect To minimize damage to road users by hazards. But road blockade or cost of recovery might occur.	<u>EWS</u> To minimize damage to road users by hazards. But road blockade and cost of recovery inevitably occur.	<u>No treatment</u> Damage to road users as well as road blockade and cost of recovery by hazards inevitably occur.



2. Concept of New Guideline

2.6 Advanced Technologies to be applied

Anchor Works



Ground anchor is one of the representing prevention measures and dominantly used for countermeasures against landslide as well as slope failures.

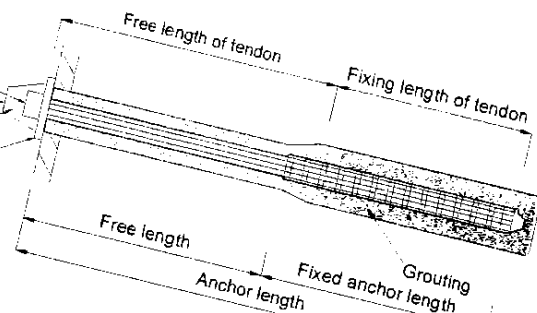
Basically three main parts compose ground anchor works; anchor heads together with loading plates (or anchor pillow) to apply tension to the surface of the ground, free length of anchor to convey tension from anchor head to anchorage part, and fixing length of anchor to be fixed to the stable ground.

Loading plate
Anchor head

Nut
Protection cup
Antirust oil
Loading plate

Tension part

Anchor body



Structure of ground anchor

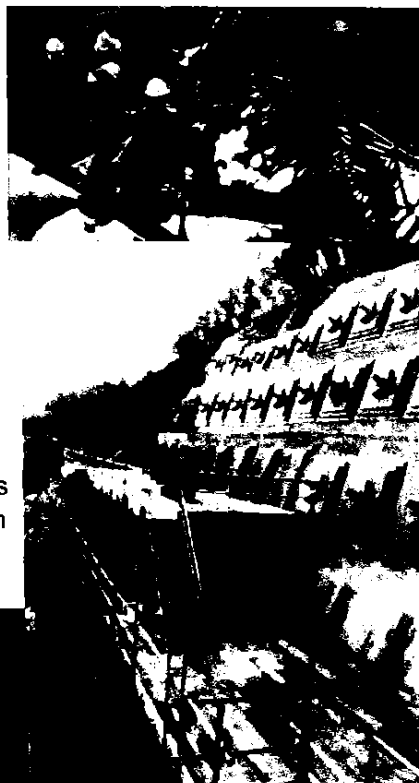
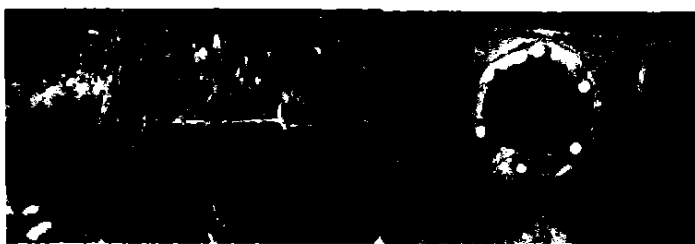
2. Concept of New Guideline

2.6 Advanced Technologies to be applied **Anchor Works**

Corrosion of anchor head as well as free length of tendon is one of the major problems in operation and maintenance of ground anchor works, because corrosion of such bearing parts leads to loss of function of and eventually destruction of anchor works.

Japan has a long history of use of ground anchor works and enormous numbers of anchors are being used in many landslide and slope failure sites

Japan, therefore, accumulated knowledge and advanced technologies in maintenance of ground anchor works, such as against deterioration of and loss of function of anchors. Japan also established a method of inspection as well as guidelines for maintenance of anchors.



Capacity Development Project on Highways in Mountainous Regions in the Republic of India

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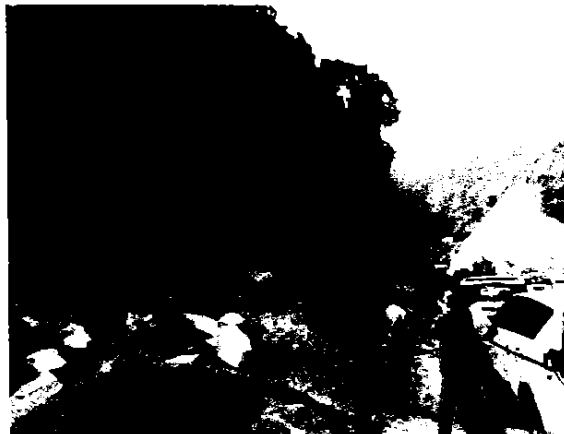
2. Concept of New Guideline

2.6 Advanced Technologies to be applied **Anchor Works**



NH22 in HP, observed in September 2017

Anchor works are to be applied to the site where retaining force is required to stabilize the slope. Anchor works are often used for the slopes with relaxed dip slope structure as well as fractured and relaxed states.



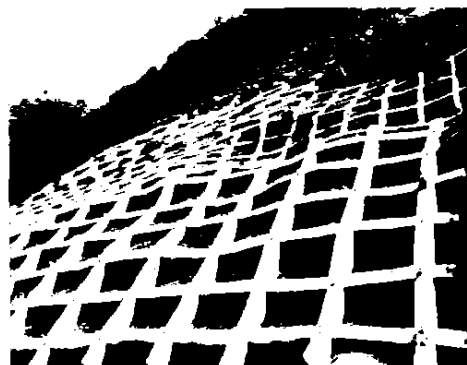
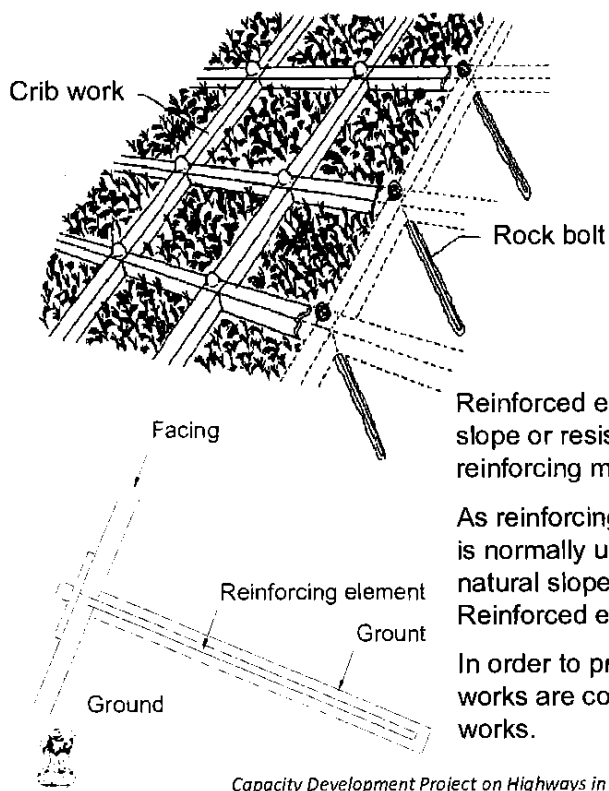
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2. Concept of New Guideline

2.6 Advanced Technologies to be applied

Reinforced Earth+ Concrete Crib Work



Reinforced earth works aim to increase shear strength of the slope or resistance against possible failures by embedding reinforcing material to the ground.

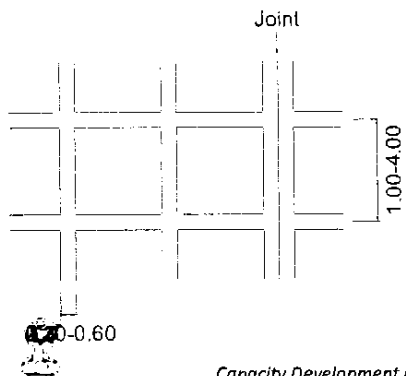
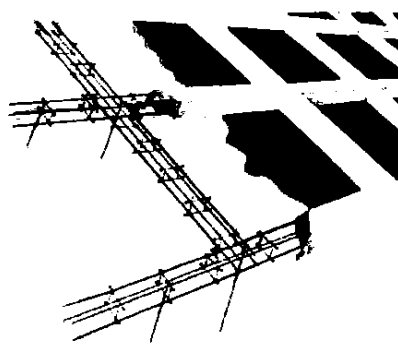
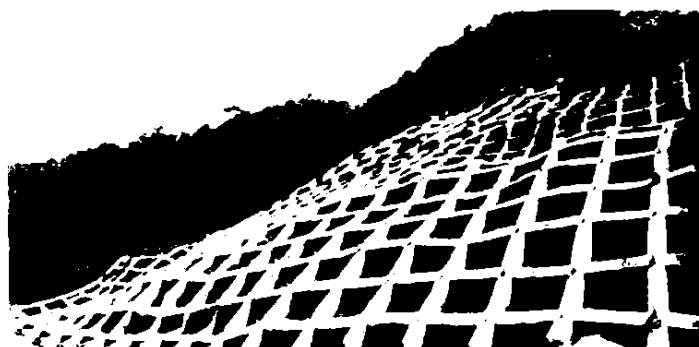
As reinforcing material, composite of grout and reinforcing bar is normally used. Reinforcing earth works can be applied to natural slopes as well as cut and embankment slopes. Reinforced earth work includes nailing and rock bolt works.

In order to protect slopes of certain areas, reinforced earth works are commonly used in combination with concrete crib works.

2. Concept of New Guideline

2.6 Advanced Technologies to be applied

Concrete Crib Work



Crib works are to protect the slope of certain areas with grid shaped structure. Crib works aim to prevent surface slope failure and erosion and to provide base for vegetation.

For the application to natural slopes and steep slopes, shotcrete is widely used to construct crib works because of its ability to follow erratic and irregular shape of slopes.

In combination with reinforced earth works and ground anchor works, concrete crib works are often used as supporting structures on the slope.

2. Concept of New Guideline

2.6 Advanced Technologies to be applied



NH10 in WB, observed in February 2018



**Reinforced Earth+
Concrete Crib Work**

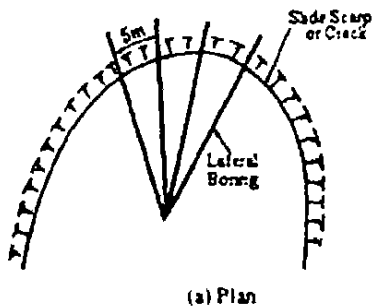
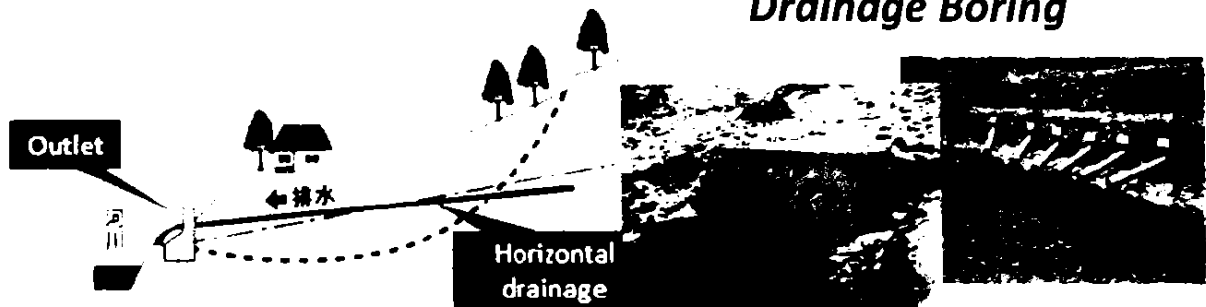


Capacity Development Project on Highways in Mountainous Regions in the Republic of India

2. Concept of New Guideline

2.6 Advanced Technologies to be applied

**Horizontal
Drainage Boring**



Since increase of groundwater level, sometimes referred to as "increase of pore water pressure", is one of the major triggers of landslides, deep-sheeted landslides, and slope failures, draining groundwater from the subsurface is an effective countermeasure.

Horizontal drainage boring is an essential and effective mitigation work against landslides. Horizontal drainage boring is to drill several boreholes to the ground where landslides, deep-sheeted landslides, and slope failures are anticipated, with inclination of 5 to 10 degrees from the horizontal plane.

Horizontal drainage boring requires knowledge and technologies in operation and maintenance because the drainage pipes are often clogged or damaged by many reasons.



Capacity Development Project on Highways in Mountainous Regions in the Republic of India

2. Concept of New Guideline

2.6 Advanced Technologies to be applied



NH55 Paglajhora in WB, observed in February 2018 (above)

NH707A in UK, observed in September 2017 (right)

Horizontal Drainage Boring

Horizontal drainage boring is an essential and versatile countermeasure with its function of "draining ground water".

It is often used to stabilize landslides. It is also an effective countermeasure against deep-sheeted landslide (gravitational deformation).



2. Concept of New Guideline

2.6 Advanced Technologies to be applied

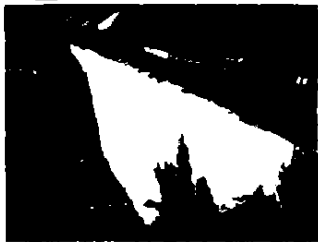
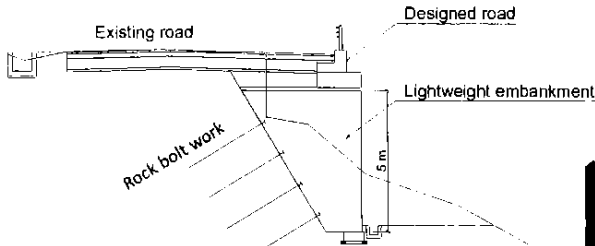
Road Widening with Advanced Tech.

- For road widening of hill roads, two methods are applied.
- Cutting on hill side and filling on valley side is a conventional method. If it is poorly designed, however, it often involves landslides on both side of the road.
- Utilizing light weight embankment or steel jetty is a new method for road widening, which can minimize landslide problems induced by road widening.
- With its light weight, light weight embankment or steel jetty can be a countermeasure against landslide by reducing weight from the head of landslide mass.



2. Concept of New Guideline
2.6 Advanced Technologies to be applied

Lightweight Embankment



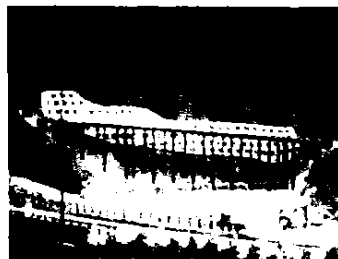
Light Weight Embankment uses lighter materials than soil, such as formed cement or expanded polystyrene form, to construct embankment so that bearing force required to the ground can be reduced. With such feature of lighter weight, light weight embankment is applied for embankment on soft ground and head of landslide, embankment behind abutment of bridges, remedial works and road widening of mountainous roads, and embankment on steep slopes.

Air mixed cement/mortal, which employs lighter materials with formed mortar or formed cement, is one of representative methods of light weight embankment. Air mixed cement/mortal can use materials available on site and thus have an advantage in remedial works and road widening of mountainous roads.



2. Concept of New Guideline
2.6 Advanced Technologies to be applied

Steel Jetty



This method constructs a jetty mainly made of steel pipes and steel beams on steep slopes and thus can be applied to remedial works of road damaged by landslides on steep slopes and widening of roads running through steep hilly slopes.



No special materials such as HTSS are required for this method. Jetty on steep slopes may require longer steel pipes and beams. For that case, steel pipes and beams are manufactured in a factory into shorter sections, a length which enables easy transportation to the site. The shorter sections are then connected each other on site to the required length for construction.

With well considered construction plan, this method allows traffic opened while construction is ongoing.



2. Concept of New Guideline

2.6 Advanced Technologies to be applied

Application of Lightweight Embankment and Steel Jetty



NH10 in WB, observed in February 2018
(Upper left and lower left) NH707A in UK,
observed in September 2017

Light weight embankment and steel jetty shall be used with slope stabilization work in landslide areas.



Capacity Development Project on Highways in Mountainous Regions in the Republic of India



3. Contents of New Guideline

3.1 Investigation

1-1 Investigation of hill slope condition

- Highlight importance of investigation of topographic, geological conditions including faults and fractured zone as well as weathering and alteration of hill slopes from engineering points of view.
- Investigation for topographic, geological, surface / groundwater condition
- Evaluation of slope including slope stability analysis

1-2 Landslides/hazards affecting the hill road in service

- Explain Investigation and analysis for landslide hazards which occurred along the existing hill road.
- How to decide probable slip surface (sliding plane) of existing landslide/slope failure.



Capacity Development Project on Highways in Mountainous Regions in the Republic of India



3. Contents of New Guideline

3.1 Investigation

1-3 Landslides/hazards foreseen from current condition of hill road in service

- Explain landslides/hazards along the existing hill roads that engineers should foresee from the existing slope/road condition and results of investigation
- How to decide probable slip surface (sliding plane) of existing landslide/slope failure.

1-4 Landslides/hazards foreseen from road widening by cutting/filling

- Explain landslides/hazards along existing hill roads that engineers should foresee when roads are widened by cutting and/or filling, based on the results of investigation
- How to decide possible slip surface (sliding plane) of possible landslide/slope failure.

1-5 Landslides/hazards foreseen from new road construction

- Explain landslides/hazards along new hill roads that engineers should foresee when roads are constructed, based on the results of investigation
- How to decide possible landslide/slope failure along with possible slip surface (sliding plane).



3. Contents of New Guideline

3.2 Design

2-1 Standard gradient of slope (application and limitation)

- Explain standard gradient for cut slope with its application and limitation
- Limitations, such as unfavorable topographic, geological, geotechnical, and groundwater conditions, are highlighted.

2-2 Minimizing high and long cut and advanced embankment

- Explain necessity and method to minimize high and long cut
- Explain advanced embankment which enable minimizing high embankment.

2-3 Selection sequence for landslide mitigation / slope countermeasure works

- Explain the sequence of selecting landslide mitigation methods / slope countermeasure works.
- Countermeasures / mitigations shown at the end of each sequence include higher and lower options. Options shall be selected in light of priority of the site.



3. Contents of New Guideline

3.2 Design

2-4 Consideration of priority of landslide mitigation / slope countermeasure works

- Explain prioritization in selecting appropriate countermeasures / mitigation for a certain section of highways from viewpoints of technical and budgetary requirements.

2-5 Physical countermeasures and Early Warning System (EWS)

- Explain advantage and disadvantage of physical countermeasures and EWS. Physical countermeasures can be divided into high/low capability.

2-6 Design of countermeasures / mitigation with advanced technology

- Explain design of countermeasures / mitigation with advanced technology.



3. Contents of New Guideline

3.3 Construction

3-1 Cutting / Slope Protection / Stabilization Works

- Explain important points in construction for major slope works and additional information to the existing guidelines.
- Highlight concrete crib works and horizontal drainage boring, which are useful and versatile countermeasures against various types landslides along hill roads in India

3-2 Embankment Works

- Elaborate important points in embankment construction, such as compaction, foundation ground, and drainage.
- Introduce advanced embankment methods, which enable smaller and lighter embankment on unstable hill slope.
- Elaborate important points in embankment construction for hill road.



3. Contents of New Guideline

3.4 Maintenance

4-1 Assessment of Slope Stabilization

- Explain "Slope Stabilization Assessment Chart (SSAC)".

4-2 Maintenance for Slopes

- Explain Disaster Prevention Inspection (daily / periodical inspection)
- Explain emergency inspection for irregular conditions such as heavy rains and earthquakes and emergency countermeasures.
- Introduce Slope Inventory and Disaster Record.

4-3 Vegetation on Slopes

- Explain important items of study and inspection.

4-4 Maintenance of Countermeasure / Mitigation Works

- Elaborate important points of maintenance for major countermeasure / mitigation works and additional information to the existing guidelines.



Thank you!
Your continuous supports are much appreciated.

CONTENTS OF GUIDELINE FOR SLOPE PROTECTION AND ADVANCED EMBANKMENT (DRAFT)

CONTENTS TO BE CONTAINED	CONTENTS TO BE DESCRIBED	EXISTING INDIAN MANUALS TO BE REFERRED	
PREFACE			
LIST OF ABBREVIATION AND FIGURES			
CHAPTER 1 INVESTIGATION			
1-1 Investigation of hill slope condition	<ul style="list-style-type: none"> Highlight importance of investigation of topographic, geological conditions including faults and fractured zone as well as weathering and alteration of hill slopes from engineering points of view. 	<ul style="list-style-type: none"> Summary of investigation method for topographic and geological study. Topographic condition relating to hazards: landslide topography, steep cliff, subsidence, abnormal topography such as double ridge Geological condition relating to hazards: soft rock, geological structure (dip slope, wedge slide), weathering, alteration, faults and fractured/sheared zone Surface water/groundwater condition relating to hazards: catchment area, spring, erosion, freezing Evaluation / assessment of slope stability including slope stability analysis 	Relevant IRC standards
1-2 Landslides/hazards affecting the hill road in service	<ul style="list-style-type: none"> Explain Investigation and analysis for landslide hazards which occurred along the existing hill road. 	<ul style="list-style-type: none"> Hazards: Landslide, slope failure, deep-sheeted landslide, debris flow. Slope inventory (disaster record) How to decide probable slip surface (sliding plane) of existing landslide/slope failure. 	
1-3 Landslides/hazards foreseen from current condition of hill road in service	<ul style="list-style-type: none"> Explain landslides/hazards along the existing hill roads that engineers should foresee from the existing slope/road condition and results of investigation 	<ul style="list-style-type: none"> Hazards: Landslide, slope failure, deep-sheeted landslide, debris flow. Slope inventory including potential of hazards How to decide possible slip surface (sliding plane) of foreseen landslide/slope failure. 	
1-4 Landslides/hazards foreseen from road widening by cutting/filling	<ul style="list-style-type: none"> Explain landslides/hazards along existing hill roads that engineers should foresee when roads are widened by cutting and/or filling, based on the results of investigation 	<ul style="list-style-type: none"> Hazards to be triggered by cutting or filling; Landslide, slope failure, deep-sheeted landslide, embankment failure, and subsidence. How to decide possible slip surface (sliding plane) of possible landslide/slope failure. 	
1-5 Landslides/hazards foreseen from new road construction	<ul style="list-style-type: none"> Explain landslides/hazards along new hill roads that engineers should foresee when roads are constructed, based on the results of investigation 	<ul style="list-style-type: none"> Hazards to be triggered by road construction; Landslide, slope failure, deep-sheeted landslide, debris flow., embankment failure, and subsidence. How to decide possible landslide/slope failure along with possible slip surface (sliding plane). 	
CHAPTER 2 DESIGN			
2-1 Standard gradient of slope	<ul style="list-style-type: none"> Explain standard gradient for cut slope with its application 	<ul style="list-style-type: none"> Limitations, such as unfavorable topographic, geological, 	Relevant IRC standards

CONTENTS (DRAFT)	OUTLINE	CONTENTS TO BE DESCRIBED	EXISTING INDIAN MANUALS TO BE REFERRED
(application and limitation)	and limitation	<ul style="list-style-type: none"> geotechnical, and groundwater conditions, are highlighted. Importance of investigation, especially for unfavorable conditions, is highlighted. 	Relevant IRC standards
2-2 Minimizing high and long cut and advanced embankment	<ul style="list-style-type: none"> Explain necessity and method to minimize high and long cut Explain advanced embankment which enable minimizing high embankment. 	<ul style="list-style-type: none"> Minimizing high and long cut with slope stabilizing technology, such as ground anchors and piles, and advanced embankment as well as applying bridge and tunnel. Light weight embankment including EPS, air-mixed mortar, and urethane form is focused as advanced technology. Steel jetty is also introduced as substitution of high embankment. 	Relevant IRC standards
2-3 Selection sequence for landslide mitigation / slope countermeasure works	<ul style="list-style-type: none"> Explain the sequence of selecting landslide mitigation methods / slope countermeasure works. 	<ul style="list-style-type: none"> All types of countermeasures and mitigation should be covered by the sequence. Countermeasures / mitigations shown at the end of each sequence include higher and lower options. Options shall be selected in light of priority of the site. Combination of countermeasures/mitigations to remove/stop existing hazards or to prevent foreseeable hazards, to prevent development of new hazards, and to minimize damage by hazards will be explained. 	Relevant IRC standards
2-4 Consideration of priority of landslide mitigation / slope countermeasure works	<ul style="list-style-type: none"> Explain prioritization in selecting appropriate countermeasures / mitigation for a certain section of highways from viewpoints of technical and budgetary requirements. 	<ul style="list-style-type: none"> Importance of highways / sections shall be evaluated in prioritization. Countermeasures / mitigation with high effect often cost high. Thus such works shall be applied to the most prioritized section. 	
2-5 Physical countermeasures and Early Warning System (EWS)	<ul style="list-style-type: none"> Explain advantage and disadvantage of physical countermeasures and EWS. Physical countermeasures can be divided into high/low capability. 	<ul style="list-style-type: none"> Countermeasures / mitigation with modest effect may cause damage and recovery cost when struck by hazards. Selection of such works may reduce initial cost but cause occasional cost and damage by hazards, affecting operation cost. EWS is reasonable and may reduce danger of road users by issuing warning. Recovery cost by hazards remains the same excluding avoidable damage of road users. No countermeasures / mitigation minimize initial cost but operation cost remains high. 	
2-5 Design of countermeasures / mitigation with advanced technology	<ul style="list-style-type: none"> Explain design of countermeasures / mitigation with advanced technology. 	<ul style="list-style-type: none"> Design methods of selected countermeasures / mitigation with advanced technology will be described. Introduction of design technologies for concrete crib works (concrete frame) and horizontal drainage boring. Explanation of difference between "ground anchor work" 	

CONTENTS (DRAFT)	OUTLINE	CONTENTS TO BE DESCRIBED	EXISTING INDIAN MANUALS TO BE REFERRED
		<p>and "soil nailing work" in terms of purpose, function, specification, and arrangements.</p> <ul style="list-style-type: none"> ● Introduction of design technologies for ground anchor works. ● Explanation of training wall, rock shed, and sabo dam (check dam) ● Introduction of design technologies for light weight embankment. ● Case study of actual example of design, specification, and cost may be added to Appendix of the guideline. 	
CHAPTER 3 CONSTRUCTION			
3-1 Cutting / Slope Protection / Stabilization Works	<ul style="list-style-type: none"> ● Explain important points in construction for major slope works. ● Highlight concrete crib works and horizontal drainage boring, which are useful and versatile countermeasures against various types landslides along hill roads in India 	<ul style="list-style-type: none"> ● Additional information to the existing guidelines will be added for cutting, slope drainage, slope protection, slope stabilization including nailing and ground anchor, rock fall / slide prevention, landslide mitigation, and debris flow countermeasure works, will be explained. ● Cutting works controlled with slat indicator, which enable constant gradient of slope, will be explained. ● Construction of concrete crib works and horizontal drainage boring, which are useful in hill roads in India, will be elaborated. 	
3-2 Embankment Works	<ul style="list-style-type: none"> ● Elaborate important points in embankment construction, such as compaction, foundation ground, and drainage. ● Introduce advanced embankment methods, which enable smaller and lighter embankment on unstable hill slope. ● Elaborate important points in embankment construction for hill road. 	<ul style="list-style-type: none"> ● Construction of embankment on slope and high embankment will be explained. Foundation treatment and drainage, which are important for embankment of hill road, are also mentioned. ● Construction of embankment with polystyrene form, air-mixed cement, and urethane form will be elaborated. ● Construction of attached embankment for widening, embankment on soft ground, with boulders, and with material of high water contents will be explained. 	
CHAPTER 4 MAINTENANCE			
4-1 Assessment of Slope Stabilization	<ul style="list-style-type: none"> ● Explain "Slope Stabilization Assessment Chart (SSAC)". 	<ul style="list-style-type: none"> ● SSAC is included in Slope inventory. ● SSAC for "rock fall / slide", "slope failure (collapse)", "landslide / gravitational deformation (deep sheeted landslide)", "debris flow (debris avalanche)", and "deformation around structure" is explained. ● Planning for slope maintenance based on SSAC is introduced. 	
4-2 Maintenance for Slopes	<ul style="list-style-type: none"> ● Explain Disaster Prevention Inspection (daily / periodical inspection) 	<ul style="list-style-type: none"> ● Slope inventory will be explained. ● Change of slope condition as time goes, based on and 	

CONTENTS (DRAFT)	OUTLINE	CONTENTS TO BE DESCRIBED	EXISTING INDIAN MANUALS TO BE REFERRED
	<ul style="list-style-type: none"> ● Explain emergency inspection for irregular conditions such as heavy rains and earthquakes and emergency countermeasures. ● Introduce Slope Inventory and Disaster Record. 	<ul style="list-style-type: none"> ● quantified in inspection records, will be explained. ● Utilization of GIS will be explained. ● Estimation and organization of cause of deformation and damage of slope, road, and structure, which are recorded in Slope Inventory and Disaster Record, will be explained. 	
4-3 Vegetation on Slopes	<ul style="list-style-type: none"> ● Explain important items of study and inspection. 	<ul style="list-style-type: none"> ● Control of growth of vegetation will be explained. ● Control of maintenance of vegetation will be explained. 	
4-4 Maintenance of Countermeasure / Mitigation Works	<ul style="list-style-type: none"> ● Elaborate important points of maintenance for major countermeasure / mitigation works. 	<ul style="list-style-type: none"> ● Additional information to the existing guidelines will be added for cutting, slope drainage, slope protection, slope stabilization including nailing and ground anchor, rock fall / slide prevention, landslide mitigation, and debris flow countermeasure works, will be explained. 	

Minutes of 5th JCC

THE MINUTES OF JOINT COORDINATION COMMITTEE MEETING

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

AND

MINISTRY OF ROAD TRANSPORT & HIGHWAYS (MORTH)

ON

CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN MOUNTAINOUS REGIONS

In accordance with Section No. 6, Point No. 3 of the Record of Discussions of "Capacity Development Project on Highways in Mountainous Regions (hereinafter referred to as "the Project")" signed on December 31st, 2015 (hereinafter referred to as "R/D") between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Ministry of Road Transport and Highways (hereinafter referred to as "MoRTH"), a Joint Coordination Committee (JCC) meeting (hereinafter referred to as "the Meeting") was held at Conference hall, Ground floor, Transport Bhawan, New Delhi on October 10th, 2018.

The purpose of the meeting was to review the progress of the Project and also discuss the semi-annual activities after the Meeting and other related issues of the Project.

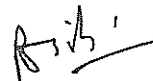
As a result of the discussions, both sides mutually agreed upon the matters referred to in the documents attached hereto.

New Delhi, October 10th, 2018



TAKAYOSHI TANGE

Senior Representative
India Office
Japan International Cooperation Agency



SHRI BN SINGH

Director General (Road Development) &
Special Secretary (DG(RD)&SS)
Ministry of Road Transport and Highways

Minutes of the Joint Coordination Committee (JCC) meeting

Date: October 10th, 2018

Time: 11:00AM - 1:00PM

Venue: Conference Hall, Ground Floor, Transport Bhawan, New Delhi

Representatives from Indian Side

Mr. BN Singh, DG RD&SS, MoRTH - Chairperson

Mr. IK Pandey, ADG, MoRTH

Mr. Sanjeev Kumar, CE, MoRTH

Mr. SC Mondal, CE, MoRTH

Mr. PR Meena, CE Zone-I, MoRTH

Mr. Sanjay Garg, CE, MoRTH

Mr. BK Sinha, CE, MoRTH

Mr. Sudip Chaudhary, CE, MoRTH

Mr. TT Negi, CE, MoRTH

Mr. Kushal Chand, SE, MoRTH -Project Manager

Mr. JK Goyal, CGM (T), NHAI

Mr. Manish Rastogi, CGM (T), NHAI

Mr. V Sambyal, GM, NHAI

Mr. W. Blah, ED (T), NHIDCL

Mr. Rahul Gupta, ED (T), NHIDCL

Representatives from Japanese Side

Mr. Takayoshi Tange, Senior Representative, JICA India office - Co-Chairperson

Mr. Anurag Sinha, Lead Development Specialist, JICA India Office

Mr. Norihito Kaigai, Representative, JICA India Office

Mr. Shu Moriyama, Chief Advisor / Highway Development

Mr. Michiya Kitayama, JICA Expert for Highway Engineering

Mr. Yoshinori Kawamura, Team Leader / Slope Protection I

Mr. Takayuki Mayumi, Slope Protection II/High Embankment

Mr. Tatsuo Takano, Maintenance & Operation of Mountain Roads

Ms. Cleopatra Panganayi, Monitoring / Evaluation

Mr. Kazuhiro Kiyose, Counsellor, Embassy of Japan in India - Observer

MINUTES

1) Introduction

Mr. BN Singh, DG (RD) & SS in MoRTH and new Chairperson of the JCC, called the meeting to order. Mr Tange, Senior Representative, JICA India office and Co-Chairperson of JCC briefly explained to the chairman the structure of the technical cooperation project and role of the JCC in the project organization. The Chief Advisor for the Project, Mr. Shu Moriyama presented the agenda of the meeting and highlighted that the main topic to be deliberated by the JCC was the implementation of the pilot project as a model activity of the project.

2) Semi Annual Report

The Chief Advisor summarized the activities undertaken by the Project in the last 6 months since the 4th JCC meeting held in April 2018:

(1) Technical Seminars

Two technical seminars were held between the JICA Experts and Indian side in June and September.

(2) Technical Groups

As previously agreed, technical groups were held to discuss contents and progress of the guidelines. The contents of model activities were also discussed.

(3) Drafting of New Guidelines

Mr. Kawamura, the Team Leader and Slope Protection I Expert in the Project reported the progress made in preparation of the 5 guidelines as follows: (1) Planning - 60% (2) Slope Protection - 30% (3) Tunnel – 60% (4) Bridge – 25% (5) O&M – 35%.

(4) Field Surveys

Following the request by Indian side in the April 2018 JCC meeting for early implementation of a pilot project , the JICA Experts undertook field surveys to prepare an implementation plan for trials of slope works in the existing project on NH22 in the state of Himachal Pradesh.

A field survey was also conducted at a site on NH21 in the state of Himachal Pradesh, upon another request by NHAI as a response to a disaster.

2) Semi Annual Work Plan (Oct. 2018 - Apr. 2019)

The JICA experts presented the semi-annual work plan from Oct. 2018 to April 2019 for approval by JCC:

(1) Drafting of Technical Guidelines

The JICA experts projected that drafting of all guidelines will be completed by the end of March 2019 as scheduled and the Indian side had no objection. Further discussions on the content for each guideline are scheduled to continue in the respective technical groups. Mr. Kitayama, the JICA Expert for Highway Engineering / Coordinator, informed the meeting that since the position of the counterpart responsible for Operation and Maintenance Guideline fell vacant after the transfer of Mr. N Gupta, a replacement is required. The Indian side made an undertaking to promptly provide a replacement.

(2) Model Activities

The JICA Experts reiterated that the purpose of the model activities was to facilitate trial of the technologies in the new guidelines through pilot project so as to elicit feedback for reviewing the guidelines. Following the request by Indian side to prepone the pilot projects and discussions held thereafter, trial of slope works on existing project on NH22 are currently under consideration and JICA experts have already conducted site surveys as already reported.

Japanese side proposed that the pilot project would be implemented by the Indian Contractor with advice and material supply by Japanese sub-contractor identified by Japan side. DG (RD&SS), MoRT&H observed that such an arrangement does not benefit the Indian side and hence not agreed.

The Indian side stated that it is willing to provide funding for extra scope of work in order to undertake pilot activities if the Japanese side could provide support for basic design and construction supervision for the trial project. JICA Experts further indicated that the proposals from Indian side have implications on the current scope of JICA Short-term Expert and would require further consideration and consultation with the JICA HQ. The Indian side and the Japanese side agreed to engage in further discussion on this matter at the earliest.

(3) 3rd Joint Training between JICA and IAHE

The 3rd joint training between JICA and IAHE is to be held from 15th October to 5th November 2018 in India and Japan. The program of the 4th joint training to be held in May 2019 will be developed through discussion between the two sides.

(4) Technical Seminars

The Indian side requested future seminars to be scheduled on Saturdays to increase participants and avoid interfering with other scheduled duties. Furthermore, seminar materials must be provided about a week in advance.

3) Other Topics

The JICA side confirmed attendance of upcoming events including the Traffic Infra Tech Expo in Mumbai, 5th Japan-India Joint Working Group and IRC's 79th Annual Session and Committees.

4) Office space in Transport Bhawan for Chief Adviser

Though scheduled on the agenda, the outstanding issue of the provision of independent office in Transport Bhawan for the Chief Adviser as undertaken in previous JCC meetings was not discussed.

5) Closing

With the resolution that the JICA side would reengage the India side with revised proposals on the pilot project issue before the next JCC meeting, the Chairman closed the meeting.

The next JCC meeting is to be held in April 2019.

Attachments

- Attachment 1: Monitoring Sheet (Version.4)

TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.4 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Khushal Chand

Shu MORIYAMA

Title: Superintending Engineer (EAP)

Chief Advisor

Submission Date: 10th Oct., 2018

I. Summary

1 Progress

1-1 Progress of Inputs

- PDM related to Input were authorized on Dec 14th, 2016 as a ver.1

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of September 2018
A. Japanese side		
(1)Experts	<Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <Short -term Experts/Consultants> <u>Total: 65.95M/M</u> -Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III -Mountain Tunnel -Tunnel Facilities -Slope Protection II/High Embankment - Earthwork -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation	<u><Long-term Experts></u> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <u><Short -term Experts></u> Progress: (29.77/65.95 MM: 45.54 %) Between Nov 2017 and Sept 2018, the following short term experts were dispatched: -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Slope Protection II/High Embankment - Mountain Bridge - Facility of Mountain Roads -Maintenance & Operation of Mountain Roads - Natural Condition(Topography/Geology) - Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of September 2018
(2) Training for Counterpart's Personnel	<Training in Japan> (Once a year, about 10 people for 2 weeks (5 times))	<Training in Japan> (1) Country Focused Training was conducted in collaboration with IAHE Progress: 2/5 times -1st Country Focused Training held on 16th May -6th June 2017 (22 days) -2nd Country Focused Training/ Invitation held on 24th Oct -13th Nov 2017(21 days) (2) 3rd Country Focused Training (planned) 24th Oct -13th Nov 2018 (20 days)
		<Training in India> Seminars held in India -1st technical seminar held on 19th June 2018 -2nd technical seminar held on 27th Sep 2018
(3) Equipment	Equipment and/or Material, as necessary	None
(4) Local Costs	<Local Costs> - Office management cost - Local consultants - Other Local cost as necessity	<Local Costs> - Project Assistant for Short Term Experts - Communication (internet and mobile phone) -No local consultants - Car rental (including driver)
B. Indian Side		
(1) Indian Side Counterparts	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager -Project Members - Participants for training in Japan	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager(3) -Project Members (9) - Participants for training in Japan (34) 1st Training(10); 2nd Training(10); 3rd Training(9) (planned); 1st Invitation Program (5) -Counterparts for guidelines (7) Overall control of 5 guidelines (2) Guideline for Planning(1) Guideline for Slope Protection and Embankment(1) Guideline for Bridge(1) Guideline for Tunnel(1) Guideline for Operation and Maintenance(1)

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of September 2018
		<JCC Members> As specified in the Project Organizational Chart in Record of Discussion
(2) Operational Expenses	<Facilities> -Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively	<Facilities> -An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) was provided in NHAI HQ -Office space for Short-term Experts was provided in Jeevan Tara Building.
(3) Administrative cost	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses provided as required 2) Domestic travel cost for counterparts provided as required
(4) Pilot Project Cost	<Pilot Project Cost> Pilot Project Cost, if required construction works.	<Pilot Project Cost> Pilot Project Planned at 2 sites of Parwanoo to Solan section on NH22 in Himachal Pradesh

1-2 Progress of Activities

- Progress of activities is indicated in Monitoring Sheet II (PO) and Project Design Matrix (PDM)
- Basically no crucial bottlenecks in progress have been observed.

1-3 Achievement of Output

The deliverables achieved by the Project as per the TOR are given in the table below:

-PDM related to Output were authorized on Dec 14th, 2016 as a ver.1

*Completed, Ongoing, Scheduled for later

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept 2018	Status*
Output1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed		
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<p><progress 90%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p>(1) 6th Feb 2018 : Siliguri to Darjeeling on NH55 in West Bengal (2) 7th Feb 2018 : Sevoke to Sikkim on NH10 in West Bengal (3) 28th Sep 2017 : Mussoorie to Chamba on 707A in Uttarakahnd (4) 10th Apr 2018 : Kiratpur to Ner chowk on NH21 in Himachal (5) 10th Apr 2018 : Ner chowk to Manali on NH21 in Himacha (6) 9th Apr 2018 : Pathankot to Mandi on NH20 in Himachal (7) 15th Feb 2017 : Shiradi Ghat bypass on NH48 in Karnataka (8) 20th March 2018 : Assam border to Dalu on NH62 in Megalaya (9) 9th Feb 2018 : Mangan to Nakura on NH310 in Sikkim (10) 13th Oct 2017 : Shillong to Dawki on NH40 in Megalaya</p> <p><progress 100%></p> <p>3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018 followed by approval in April 2018 JCC Meeting.</p> <p><progress 60 %></p> <p>4) Development of survey and planning guideline is in progress, based on review of existing standards and field surveys.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept 2018	Status*
1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	<p><progress 20%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 2 times out of 5, and knowledge and skills in the area of road planning are being enhanced</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times in total.</p> <ul style="list-style-type: none"> - Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June 2018. - Parwanoo~Solan section of NH22 in Himachal Pradesh on 20th June 2018. <p>4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted 2 times in total.</p> <ul style="list-style-type: none"> -Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uattarakhand on 15th Feb 2018 -Upon the request from NHAI, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018 -Based on the findings from the site visits, JICA experts prepared and presented a report containing countermeasures recommendations to the Indian side. <p><progress 50%></p> <p>5) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) were held 2 times.</p> <ul style="list-style-type: none"> -Meeting with state PWD of Karnataka in Feb 2017 -Meeting with state PWD of West Bengal in Feb 2018 -Tender documents for EPC contract from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement)) 	Ongoing
Output2: Guidelines on design and construction for mountainous highways are developed.		
2-1 Improved tunnel guideline is completed by June 2019.	<p><progress 90%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100 %></p> <p>2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018</p> <p><progress 60 %></p> <p>3) Development of tunnel guideline is in progress, based on review of existing standards and field surveys</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept 2018	Status*
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	<p><progress 90%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for earthwork guideline drafted and finalized at the TG meeting on 22nd February 2018</p> <p><progress 30%></p> <p>3) Development of earthwork guideline is in progress, based on review of existing standards and field surveys</p>	Ongoing
2-3 High pier bridge guideline is completed by June 2019.	<p><progress 90%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 25%></p> <p>3) Development of high pier bridge guideline is in progress, based on review of existing standards and field surveys</p>	Ongoing
2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	<p><progress 20%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 2 times out of 5, and knowledge and skills in the area of design and construction are being enhanced</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times in total.</p> <p>4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted 2 times in total. Also, based on the findings from the site visits, JICA experts prepared and presented a report containing countermeasures recommendations to the Indian side.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept 2018	Status*
Output3: Foundation for operation and maintenance for mountainous highways is built.		
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p><progress 90%></p> <p>1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 35%></p> <p>3) Development of O/M guideline is in progress, based on review of existing standards and field surveys</p>	Ongoing
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	<p><progress 20%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 2 times out of 5, and knowledge and skills in the area of operation and maintenance are being enhanced</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times in total.</p> <p>4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted 2 times in total. Also, based on the findings from the site visits, JICA experts prepared and presented a report containing countermeasures recommendations to the Indian side.</p> <p><progress 50%></p> <p>5) Meeting for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) was conducted 2 times in total. Also, Tender documents for EPC contract from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement))</p>	Ongoing

1-4 Achievement of the Project Purpose

The deliverables achieved by the Project as per the TOR are given in the table below:

*Completed, Ongoing, Scheduled for later

Project Purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.		
Indicators	Major Results	Status*
(1) Model activities are conducted applying the developed guidelines by the Project.	<ul style="list-style-type: none"> - Request for pilot project was made by India side in April 2018 JCC -Field survey for pilot project was conducted 2 times in total by JICA experts: <ul style="list-style-type: none"> (1) Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June 2018 (2) Parwanoo~Solan section of NH22 in Himachal Pradesh on 20th June 2018 -In TG held on 28th Sept 2018 model activities were discussed 	Ongoing
(2) Core officers are able to give lectures on development of mountainous highways in the training courses.	<ul style="list-style-type: none"> - The following actions taken to enhance the knowledge of the core officers: <ul style="list-style-type: none"> (1) 2 Technical seminars conducted in India (2) 2 country focused training and one Invitation Program conducted in Japan 	Ongoing

1-5 Changes of Risks and Actions for Mitigation

- N/A

1-6 Progress of Actions undertaken by JICA

- JICA Project Team conducted activities related to Output 1, 2 and 3. The progress is monitored as stated in section 1-3 "Achievement of Output".

1-7 Progress of Actions undertaken by Gov. of India

PDM ver.1 approved on Dec. 14th 2016	Actual as of Sept 2018	Status
1. Allocation of Counterpart Personnel from GOI	1. Allocated Counterpart Personnel from GOI	India side has availed all the required counterparts. However, the counterpart responsible for Guideline for Operation and Maintenance was transferred and his position is now vacant from Aug 2018
1.1 Chairperson	1.1 Chairperson	
1.2 Project Director	1.2 Project Director	
1.3 Project Manager	1.3 Project Manager	
1.4 Project Co-Manager	1.4 Project Co-Manager(3)	
1.5 Project Members	1.5 Project Members (9)	

PDM ver.1 approved on Dec. 14th 2016	Actual as of Sept 2018	Status
1.6 Participants for Training in Japan	<p>1.6 Participants for Training in Japan (34) 1st Training(10); 2nd Training(10); 3rd Training(9) (planned); 1st Invitation Program (5)</p> <p>1.7 Allocated Counterparts for guidelines</p> <ul style="list-style-type: none"> -Overall control of 5 guidelines -Guideline for Planning -Guideline for Slope Protection and Embankment -Guideline for Bridge -Guideline for Tunnel -Guideline for Operation Maintenance 	
<p>2. JCC Organization</p> <p>Establishment of JCC as per the Project Organizational Chart in Record of Discussion and holding of meetings at least twice a year</p>	<p>2. JCC Organization</p> <p>JICC was established and members attended the 1st JCC meeting held in MORTH on Dec. 14th, 2016 followed by holding JCC meetings in April 2017, October 2017 and April 2018 as scheduled.</p> <p>2.1 JCC Members</p> <ul style="list-style-type: none"> (1) Chairperson (2) Project Director (3) Project Manager (4) Project Co-Manager(3) (5) Project Members (9) <p>CE(s) of MoRTH, GM(s) of NHAI, GM(s) of NHIDCL</p>	<p>JCC establishment complete</p> <p>JCC meetings ongoing</p>
<p>3. Facilities</p> <p>Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p>	<p>3. Land, buildings and facilities</p> <p>a. An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) has been secured in NHAI HQ</p> <p>b. The office space for Short-term Experts has been availed in Jeevan Tara Building.</p>	<p>Not Completed</p> <p>- An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) in Transport Bhawan has not yet been secured.</p>
<p>4. Administrative cost and other expenses</p> <p>1) Personnel cost for counterparts and other running expenses</p>	<p>4. Administrative cost and other expenses</p> <p>1) Personnel cost for counterparts and other running expenses being provided as required</p>	<p>Ongoing</p>

PDM ver.1 approved on Dec. 14th 2016	Actual as of Sept 2018	Status
2) Domestic travel cost for counterparts	2) Domestic travel cost for counterparts being provided as required	
5. Pilot Project Cost, if required construction works.	5. Pilot Project (1) Plan for the pilot project at 2 sites of Parwanoo to Solan section on NH22 in Himachal Pradesh was prepared. (2) Field surveys for the pilot project with Japanese special contractors were conducted on 8th and 20th June.	Ongoing

1-8 Progress of Environmental and Social Considerations (if applicable)

- N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

- N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

- 1) An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) has not yet been secured in Transport Bhawan, therefore, it is necessary for JICA and MoRTH to continue to discuss.
- 2) The counterpart responsible for operation and maintenance guideline is no longer available due to job transfer in NHAI in July 2018. It was decided in JCC in October 2018 that the replacement will be informed by MoRTH shortly.
- 3) The early implementation of the pilot project on NH22 was suspended / temporarily canceled because the current implementation plan requires involvement of Japanese firms which Gov. of India is unable to accept in terms of transparency and fair competition of its procurement process. A plan for a pilot project which does not require nominating Japanese firms is necessary.
- 4) The outline of model activities were not discussed or decided in JCC in October 2018 but the discussion for it should be continued and concluded before the next JCC. The

model activities should be, however, commenced after the completion of draft guidelines which Indian side will check through.

- 5) Indian side is requesting at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the current project scheme, however, the team of JICA Short-term Experts does not have resources to supervise the implementation of civil work. The contract period for the team does not accommodate the necessary period for the civil work either. In order to respond the request for a pilot project with civil work, the team needs additional resources and contract period. On the other hand, MoRTH should propose appropriate site for pilot project which can be incorporated within the project period.

2 Delay of Work Schedule and/or Issues (Problems) (if any)

2-1 Issues/Problems

- A) Selection of the sites for early implementation of a pilot project for trial of countermeasures in actual construction delayed progress of guideline preparation.

2-2 Cause

- A) Pilot projects are supposed to commence after draft guidelines are prepared in April 2019. Early implementation of a pilot project for trial of countermeasures in actual construction was requested in JCC held in April 2018. JICA Experts needed to spend substantial time to select appropriate sites for the trial to suit budgetary and other requirement from MoRTH and this unplanned activity caused a delay in the progress of the draft guideline for slope protection.

2-3 Action to be taken

- A) Further delay shall be avoided. If the pilot project on NH22 is canceled, an appropriate site of pilot project should be proposed by Indian side. At the same time, if a pilot project with civil work should be implemented, JICA Short-term Expert Team should have additional experts in charge of design and supervision. The team requires relevant extension of the contract period to incorporate a pilot project with civil work as well. (Note: JICA Experts are unable to assume liability of design if the experts are requested to provide design)

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of India)

- A) JICA and Gov. of India

3 Modification of the Project Implementation Plan

3-1 PO

1) PO ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

3-2 Other modifications on detailed implementation plan (Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HQ. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)

1) PDM ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

2) The amendment R/D and PDM will be authorized by JICA HQ

II. Project Monitoring Sheet I & II as Attached

Project Monitoring Sheet I (Revision of Project Design Matrix)

Project Title: Capacity Development Project on Highways in Mountainous Regions
Implementing Agency: Ministry of MoRTH, NHAI, NHIDCL and PWD
Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD
Period of Project: Apr, 2016 – Mar, 2021 (Five (5) years)
Project Site: Whole India
Model Site:

Version 4
 Dated 10th October, 2018

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<p>Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project. OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report Contract Document Completion Report by the operation and maintenance contractor</p>			
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project. PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.</p>	<p>-Request for pilot project was made by India side in April 2018 JCC -Field survey for pilot project was conducted 2 times in total by JICA experts: (1)Parwanoo-Solan section of NH22 in Himachal Pradesh on 8th June 2018 (2)Parwanoo-Solan section of NH22 in Himachal Pradesh on 20th June 2018 -In TG held on 28th Sept 2018 model activities were discussed</p>	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<p>Outputs</p> <p>Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p>	<p>Survey and planning guidelines</p>		<p><progress 90%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p><progress 100%></p> <p>3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018, followed by approval in April 2018 JCC Meeting.</p> <p><progress 60%></p> <p>4) Development of survey and planning guideline is in progress, based on review of existing standards and field surveys.</p>	
	<p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Project records</p>		<p><progress 20%> for items 1) - 4)</p> <p>1) 2 Country focused trainings including invitation program were conducted and 1 country focused training was planned</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times in total.</p> <p>4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted 2 times in total.</p> <p><progress 50%></p> <p>5) Meeting for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) was conducted 2 times in total. Also, tender documents for EPC contract from 2 projects were collected and studied.</p>	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Output 2: Guidelines on design and construction for mountainous highways are developed.	2-1 Improved tunnel guideline is completed by June 2019.	Improved tunnel guideline, Project records	- MoRTH coordinate all related government organizations and other agencies.	<p><progress 90%> 1) Existing design and construction standards were collected and analyzed, and issues were identified</p> <p><progress 100 %> 2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018</p> <p><progress 60 %> 3) Development of tunnel guideline is in progress, based on review of existing standards and field surveys</p>	
	2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	Earthwork guideline, Project records		<p><progress 90%> 1) Existing design and construction standards were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for earthwork guideline drafted and finalized at the TG meeting on 22nd February 2018</p> <p><progress 30%> 3) Development of earthwork guideline is in progress, based on review of existing standards and field surveys</p>	
	2-3 High pier bridge guideline is completed by June 2019.	High pier bridge guideline, Project records		<p><progress 90%> 1) Existing design and construction standards were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 25%> 3) Development of high pier bridge guideline is in progress, based on review of existing standards and field surveys</p>	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
	2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	Project records		<p><progress20%> for items 1) - 4)</p> <p>1) 2 Country focused trainings including invitation program were conducted and 1 country focused training was planned</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times.</p> <p>4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted 2 times.</p>	
Output 3: Foundation for operation and maintenance for mountainous highways is built.	3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	Operation and maintenance guideline, Project records		<p><progress 90%></p> <p>1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 35%></p> <p>3) Development of O/M guideline is in progress, based on review of existing standards and field surveys</p>	
	3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	Project records		<p><progress20%> for items 1) - 4)</p> <p>1) 2 Country focused trainings including invitation program were conducted and 1 country focused training was planned</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times.</p> <p>4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted 2 times.</p> <p><progress 50%></p> <p>5) Meeting for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) was conducted 2 times in total. Also, tender documents for EPC contract from 2 projects were collected and studied.</p>	

Activities	The Japanese Side	Inputs	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p>	<p>(1) Dispatch of Japanese Experts: <ul style="list-style-type: none"> - Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator </p> <p><Short-term Experts/Consultants></p> <ul style="list-style-type: none"> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection II - Mountain Tunnel - Tunnel Facilities - Slope Protection III/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessary <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessary.</p> <p>(4) Local cost for the Project activities <ul style="list-style-type: none"> - Office management cost - Local consultants - Other Local cost as necessary </p>	<p>The Indian Side</p> <p>(1) Allocation of Counterparts <ul style="list-style-type: none"> - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan </p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>Majority of trained officials continues to work for counterpart agencies.</p> <p>Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures></p> <p>-An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) has not yet been secured in Transport Bhawan, therefore, it is necessary for JICA and MoRTH to continue to discuss.</p> <p>-The counterpart personnel responsible for operation and maintenance guideline is now vacant due to job transfer in NHAI in July 2018, replacement at the 5th JCC on 10th October 2018 necessary.</p> <p>- Selection of the sites for early implementation of a pilot project for in actual construction delayed progress of guideline preparation. Further delay to be avoided.</p>
<p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p>			
<p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>			

Project Monitoring Sheet II (Revision of Plan of Operation)

Version 4

Dated 10th Oct, 2018

Project Title: Capacity Development Project on Highways in Mountainous Regions		Monitoring																										
		Inputs from JICA		FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				Remarks	Issue	Solution		
Short Term	Expert	Plan	Actual	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV					
			Chief Advisor / Highway Development																								Clearance from screening committee is required yearly	Independent office pending
	Highway Engineering / Coordinator																								New Expert from Sept 1st, 2018			
	Team Leader/Slope Protection I																								4.52/10.2 MM (44%)			
	Deputy Team Leader/Slope Protection III																								2.37/5.27MM (45%)			
	Mountain Tunnel																								2.57.13 MM (35%)			
	Slope Protection II/High Embankment																								3.06/6.8 MM(45%)			
	Mountain Bridge																								3.6/8 MM (45%)			
	Facility of Mountain Roads																								2.85/4.83 MM (59%)			
	Maintenance & Operation of Mountain Roads																								2.49/5.67 MM (44%) Expert changed from Sept 2018			
	Natural Condition (Topography/Geology)																								1.99/3.83 MM (52%)			
	Drainage Plan																								1.17/2.33 MM (50%)			
	Plan and Survey of Mountain Roads/Coordinator																								2.66/4.67 MM(57%)			
	Monitoring and Evaluation																								1.02/3 MM (34%)			
	Equipment																											
	Training in Japan																											
	Counterpart Training in Japan																									1st and 2nd Program of Training with IAHF was completed.3rd & 4th Training scheduled for Oct. 2018 and May 2019		
	In-country/Third country Training																											
	Inputs from India																											
	Expert																											
	Chairperson																											
	Project Director																									Chairperson changed from July 2018		
	Project Manager																									New Project Director from October 2017		
	Project Co-Manager																									New Project Manager from October 2017		
	Project Co-Manager																											
	Project Co-Manager																											
	Counterparts (9)																											
	Equipment																											

Activities	2016		2017		2018		2019		2020		Responsible Organization	Achievements	Issue & Countermeasures
	Plan	Actual	I	II	III	IV	I	II	III	IV			
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed													
1.1 Conduct and improve training program for mountainous highways, including identification of appropriate solutions for disaster relief upon occurrence	Plan	Actual										Information collected and analyzed (80%)	
1.2 Conduct field surveys to the typical mountainous highways.	Plan	Actual										Field Surveys completed in all (10 of 10) case study sites. 4 additional surveys conducted upon MoRTH request (100%)	
1.3 Improve survey and planning guidelines on mountainous highways.	Plan	Actual										60% progress	
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan	Actual										50% progress	
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)	Plan	Actual										20% progress	Request to prepare pilot projects offered guideline preparation. To avoid further delay
Output 2: Guidelines on design and construction for mountainous highways are developed.													
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan	Actual										Standards collected and analyzed (90%)	
2.2 Improve tunnel guidelines.	Plan	Actual										60% progress	
2.3 Develop earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan	Actual										30% progress	
2.4 Develop high pier bridge guidelines.	Plan	Actual										25% progress	
Output 3: Guideline on operation and maintenance for mountainous highways is developed.													
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan	Actual										Standards collected and analyzed (90%)	
3.2 Develop operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan	Actual										35% progress	O&M counterpart is not available. Need for replacement
Duration / Phasing													
Monitoring Plan													
Monitoring	Plan	Actual											
Joint Coordination Committee													
Set-up the Detailed Plan of Operation													
Submission of Monitoring Sheet													
Reports/Documents													
Project Completion Report	Plan	Actual											
Public Relations													
Setting up & Updating Project Facebook Page	Plan	Actual											
Published article on Project Activities in MORTH Annual Report	Plan	Actual											
											Remarks	Issue	Solution

Minutes of 6th JCC

THE MINUTES OF JOINT COORDINATION COMMITTEE MEETING

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

AND

MINISTRY OF ROAD TRANSPORT & HIGHWAYS (MORTH)

ON

CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN MOUNTAINOUS REGIONS

In accordance with Section No. 6, Point No. 3 of the Record of Discussions of "Capacity Development Project on Highways in Mountainous Regions (hereinafter referred to as "the Project")" signed on December 31st, 2015 (hereinafter referred to as "R/D") between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Ministry of Road Transport and Highways (hereinafter referred to as "MoRTH"), a Joint Coordination Committee (JCC) meeting (hereinafter referred to as "the Meeting") was held at Conference hall, Ground floor, Transport Bhawan, New Delhi on May 10th, 2019.

The purpose of the meeting was to review the progress of the Project and also discuss incoming semi-annual activities and other related issues of the Project.

As a result of the discussions, both sides mutually agreed upon the matters referred to in the documents attached hereto.

New Delhi, May10th, 2019



KENGO AKAMINE

Senior Representative
India Office
Japan International Cooperation Agency



I.K PANDEY

Director General (Road Development) &
Special Secretary (DG(RD)&SS)
Ministry of Road Transport and Highways

Minutes of the Joint Coordination Committee (JCC) meeting

Date: May 10th, 2019

Time: 11:00AM – 1:00PM

Venue: Conference Hall, Ground Floor, Transport Bhawan, New Delhi

Representatives from Indian Side

Mr. IK Pandey, DG RD&SS, MoRTH - Chairperson

Mr. SS Nahar, ADG , MoRTH

Mr. Khushal Chand, CE, MoRTH -Project Manager

Mr. Sanjeev Kumar, CE, MoRTH

Mr. OP Shrivastava, CE, MoRTH

Mr. Sanjay Garg, CE, MoRTH

Mr. Rahul Gupta, ED (T), NHIDCL

Mr. W. Blah, ED (T), NHIDCL

Mr. Ashok Kumar Singh, GM (T), NHIDCL

Mr. Ashok Kumar Gupta, GM (T), NHIDCL

Mr. L P Padhy, CGM, NHAI

Mr. Avdesh Gupta, EE (EAP), MoRTH

Mr. Trivendra Kumar, SE, MoRTH

Mr. Vikas Kirar, AEE (EAP), MoRTH

Representatives from Japanese Side

Mr. Kengo Akamine, Senior Representative, JICA India office - Co-Chairperson

Mr. Anurag Sinha, Lead Development Specialist, JICA India Office

Ms. Arisa Watanabe, Representative, JICA India Office

Mr. Michiya Kitayama, JICA Expert for Highway Engineering

Mr. Yoshinori Kawamura, Team Leader / Slope Protection I Expert

Mr. Fumihiko Yokoo, Tunnel Expert

Ms. Cleopatra Panganayi, Monitoring / Evaluation Expert

Mr. Kazuhiro Kiyose, Counsellor, Embassy of Japan in India - Observer

MINUTES

1) Introduction

Mr. SS Nahar, Addl. Director General, MoRTH welcomed all the delegates for the meeting and invited Mr. Khushal Chand, Chief Engineer (EAP), MoRTH (the Project Manager) and Mr. Kitayama, JICA Long Term Expert for Highway Engineering to outline the purpose of the meeting. Mr. Khushal Chand explained that the main purpose of the meeting was to discuss project implementation issues in details within implementation period (2 years) before the end of the entire Project. Mr. Kitayama added that the meeting would also discuss the plan for workshops, which shall be arranged to explain the draft guidelines and elicit feedback from concerned parties. Mr Kitayama then proceeded to introduce the presentation from the Japanese side, which highlighted the key decisions in the 5th JCC meeting, semi-annual report, semi-annual work plan and requests to Indian side.

2) Semi Annual Report, Semi-Annual Work Plan

(1) Selection and Preparation for Pilot Projects

The Team Leader of the JICA Short Term Experts (Mr. Kawamura) outlined the progress of the pilot project. Mr. Kawamura reiterated that three sites for pilot project (NH717, NH54 and NH10) were proposed in November 2018 with a view to select one of the three sites as the site for civil work. Mr. Kawamura explained that JICA Experts and Indian counterparts conducted several joint site surveys, from December 2018 onwards, to confirm the actual conditions of the site and to select a suitable site for civil work. The findings and recommendations were subsequently submitted to the Indian side along with requests for necessary surveys for design and possible landslide countermeasures.

Based on the findings, it was agreed by both sides that selected site on NH 10 (Sikkim) shall be taken up for pilot civil work activities under this technical cooperation project. Furthermore, it was agreed that technical advice shall be provided by JICA Experts for conducting additional survey and investigations by DPR consultants for sites on NH 717 (West Bengal) and NH 54 (Assam).

Mr. Kawamura updated that the recommended topographic survey on NH10 has been completed and the drilling surveys are underway.

With regard to NH-54, Mr. Kitayama explained that ToR for additional survey has been submitted by JICA Expert to NHAI and CGM, NHAI informed that it shall float tender for DPR after election code of conduct is lifted. In reference to NH-717, Executive Director, NHIDCL informed that existing scope of DPR will be changed to incorporate the comments of JICA Experts.

(2) Progress of Guideline Preparation

Mr. Kawamura provided an update on the progress of the preparation of the guidelines. The drafts of the 5 guidelines were submitted to the Indian side for review on March 15th, 2019. As of the date of JCC meeting, 3 of the 5 draft guidelines i.e. Planning, Tunnel and O&M had been completed as scheduled. The draft Slope Protection and Bridge guidelines are scheduled to be completed by June and July (2019) respectively. The updated drafts of the 5 guidelines would be resubmitted by JICA Experts on May 17th, 2019 for further comments from the Indian side.

(3) Feedback on the Draft Guidelines

The Japanese side stated that comments on the draft guidelines are awaited from the Indian side and that workshops shall be organized to elicit more feedback on the guidelines. Director General & Special Secretary (DG&SS), MoRTH stated that all the sub-committees formed for preparation of Guidelines should be called to make presentations to the Chief Engineers of MoRTH as well as other senior officials of NHAI and other agencies. DG&SS also stated that guidelines must be uploaded on MORTH website to obtain public feedback from experts, consultants and other stakeholders. It was also agreed that a series of workshop shall be organized to obtain feedback on the guidelines.

(4) Procedure for Approval of Guidelines

The Japanese side requested the Indian side to outline the procedure and timeline for approval of the guidelines. The Indian side confirmed that approval would be done before the completion of the Project i.e. by Mar. 2021. It was agreed that the Indian side would provide comments to the draft guidelines and discuss issues during TGs. The guidelines would also be applied to the pilot project to obtain practical feedback. After incorporating necessary comments, final guidelines would be confirmed by the Indian side and approved by the DG&SS, MoRTH. DG&SS also instructed that the guidelines must be shared with the technical committee of IRC to obtain their comments.

3) Issues of Pilot Project

Mr. Rahul Gupta, ED (T), NHIDCL presented the Status of the Pilot Project on NH-10 and outlined the project implementation schedule recommended by JICA Experts for investigations/surveys, DPR preparation, bidding and construction. Mr. Rahul Gupta highlighted the necessary surveys recommended by JICA Experts and confirmed that topographical survey on NH-10 have been completed, as also reported earlier by the Japanese side, and he also informed that drilling of boreholes had been completed at one of the 5 earmarked locations. Mr. Gupta updated that while the drilling investigations continues, continuous sliding induced by rain fall was hampering progress at one of the 5 planned locations. Based on the current progress, the Indian side confirmed that bidding was expected to commence as scheduled in Sept. 2019.

The Indian side and the Japanese side jointly confirmed that the revised estimate cost shall be prepared and sanctioned by competent authorities and revised budget would be secured within the expected period. Furthermore, necessary measures shall be taken by MoRTH to inform potential bidders about the proposed pilot project to ensure successful bidding and award of works as per the agreed schedule.

JICA Experts recommended that as Japanese Experts shall provide the design of pilot civil works to ensure transfer of technology, **Item- rate mode** is the appropriate mode for executing the pilot project. MoRTH agreed to it, and further discussion shall be held between Indian side and JICA experts.

4) Closing Remarks

Mr. Kengo Akamine, Senior Representative, JICA India delivered the closing remarks on behalf of the Japanese side by commending the progress made in the Project and highlighted that approval and adoption of the guidelines is contingent on close cooperation from both sides. He also reiterated the usefulness of the co-organized country focused training program being provided by the Project and requested the Indian side to nominate participants by the end of May for the scheduled training in August 2019. After requesting for support for the mobilization of new Chief Adviser from Japan, Mr Akamine expressed gratitude and appreciation for the long standing partnership between India and Japan in the road sector.

From the Indian side, Mr I.K Pandey, DG&SS, MoRTH expressed the Indian side's appreciation for the collaboration between India and Japan and stated that the technical cooperation project shall definitely benefit the Indian road sector.

The next JCC meeting is to be held in October 2019.

Attachments

- Attachment 1: Monitoring Sheet (Version.5)

TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.5 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Khushal Chand

Michiya KITAYAMA

Title: Chief Engineer (EAP)

Highway Engineering/Coordinator

Submission Date: 10th May, 2019

I. Summary

1 Progress

1-1 Progress of Inputs

- PDM related to Input were authorized on Dec 14th, 2016 as a ver.1

Inputs	PDM ver.1 approved on Dec 14 th 2016	Actual as of Mar. 31 st 2019
A. Japanese side		
(1)Experts	<Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <Short -term Experts/Consultants> <u>Total: 65.95M/M</u> -Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III -Mountain Tunnel -Tunnel Facilities -Slope Protection II/High Embankment - Earthwork -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation	<Long-term Experts> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <Short -term Experts> Progress: (40.43/65.95 MM: 61.31%) Between Nov 2017 and Mar.2019, the following short term experts were dispatched: -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Slope Protection II/High Embankment - Mountain Bridge - Facility of Mountain Roads -Maintenance & Operation of Mountain Roads - Natural Condition(Topography/Geology) - Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of Mar. 31 st 2019
(2) Training for Counterpart's Personnel	<Training in Japan> (Once a year, about 10 people for 2 weeks (5 times))	<Training in Japan> (1) Country Focused Training was conducted in collaboration with IAHE Progress: 3/5 times -1st Country Focused Training held on 16th May -6th June 2017 (22 days) -2nd Country Focused Training/ Invitation held on 24th Oct -13th Nov 2017(21 days) -3rd Country Focused Training/ Invitation held on 16th Oct -5th Nov 2018(21 days)
		<Training in India> Seminars held in India -1st technical seminar held on 19th June 2018 -2nd technical seminar held on 27th Sep 2018
(3) Equipment	Equipment and/or Material, as necessary	None
(4) Local Costs	<Local Costs> - Office management cost - Local consultants - Other Local cost as necessity	<Local Costs> - Project Assistant for Short Term Experts - Communication (internet and mobile phone) -No local consultants - Car rental (including driver)
B. Indian Side		
(1) Indian Side Counterparts	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager -Project Members - Participants for training in Japan	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager(3) -Project Members (9) - Participants for training in Japan (34) 1st Training(10); 2nd Training(10); 3rd Training(9) 1st Invitation Program (5) -Counterparts for guidelines (7) Overall control of 5 guidelines (2) Guideline for Planning(1) Guideline for Slope Protection and Embankment(1) Guideline for Bridge(1) Guideline for Tunnel(1) Guideline for Operation and Maintenance(1)

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of Mar. 31 st 2019
		<JCC Members> As specified in the Project Organizational Chart in Record of Discussion
(2) Operational Expenses	<Facilities> -Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively	<Facilities> -An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) was provided in NHAI HQ -Office space for Short-term Experts was provided in Jeevan Tara Building.
(3) Administrative cost	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses provided as required 2) Domestic travel cost for counterparts provided as required
(4) Pilot Project Cost	<Pilot Project Cost> Pilot Project Cost, if required construction works.	<Pilot Project Cost> Pilot Project Planned at 3 sites i.e. NH10 (Sikkim), NH717 (West Bengal), and NH54 (Assam) -NH10: topographic surveys almost completed, drilling investigation under planning -NH717 and NH54: selection of consultants for topographic survey and drilling investigation in preparation

1-2 Progress of Activities

- Progress of activities is indicated in Monitoring Sheet II (PO) and Project Design Matrix (PDM)
- Basically no crucial bottlenecks in progress have been observed.

1-3 Achievement of Output

The deliverables achieved by the Project as per the TOR are given in the table below:

-PDM related to Output were authorized on Dec 14th, 2016 as a ver.1

*Completed, Ongoing, Scheduled for later

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Mar.31 st ,2019	Status*
Output1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed		
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<p><progress 100%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p>(1) 6th Feb 2018 : Siliguri to Darjeeling on NH55 in West Bengal (2) 7th Feb 2018 : Sevoke to Sikkim on NH10 in West Bengal (3) 28th Sep 2017 : Mussoorie to Chamba on 707A in Uttarakahnd (4) 10th Apr 2018 : Kiratpur to Ner chowk on NH21 in Himachal (5) 10th Apr 2018 : Ner chowk to Manali on NH21 in Himacha (6) 9th Apr 2018 : Pathankot to Mandi on NH20 in Himachal (7) 15th Feb 2017 : Shiradi Ghat bypass on NH48 in Karnataka (8) 20th March 2018 : Assam border to Dalu on NH62 in Megalaya (9) 9th Feb 2018 : Mangan to Nakura on NH310 in Sikkim (10) 13th Oct 2017 : Shillong to Dawki on NH40 in Megalaya</p> <p><progress 100%></p> <p>3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018 followed by approval in April 2018 JCC Meeting.</p> <p><progress 95%></p> <p>4) Draft of survey and planning guideline based on review of existing standards and field surveys is now complete. Review is in progress.</p>	Ongoing

Output/Indicators (Based on PDM ver. 1)	Major Results Achievement as of Mar.31 st ,2019	Status*
1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	<p><progress 55%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 3 times out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project: Refer to OVI (Objectively Verifiable Indicators) 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p><progress 95%></p> <p>5) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) were held 8 times.</p> <p>-Meeting with state PWD of Karnataka in Feb 2017</p> <p>-Meeting with state PWD of West Bengal in Feb 2018</p> <p>-Meeting with PIU of NHAI in Dec 2018</p> <p>-Meeting with SBO of NHIDCL in Dec 2018</p> <p>-Meeting with State PWD of West Bengal in Dec 2018</p> <p>-Meeting with NHAI HQ in Jan 2019</p> <p>-Meeting with NHIDCL HQ in Jan 2019</p> <p>-Meeting with MoRTH in Jan 2019</p> <p>-Tender documents for EPC contract from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement))</p> <p>-Based on the review of the current status, JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019.</p>	Ongoing
Output2: Guidelines on design and construction for mountainous highways are developed.		
2-1 Improved tunnel guideline is completed by June 2019.	<p><progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100 %></p> <p>2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018</p> <p><progress 95%></p> <p>3) Draft of tunnel guideline based on review of existing standards and field surveys is now complete. Reviewing is in progress</p>	Ongoing
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	<p><progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for earthwork guideline drafted and finalized at the TG meeting</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Mar.31 st ,2019	Status*
	<p>on 22nd February 2018</p> <p><progress 80%></p> <p>3) Development of earthwork guideline is in progress, based on review of existing standards and field surveys</p>	
<p>2-3 High pier bridge guideline is completed by June 2019.</p>	<p><progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 80%></p> <p>3) Development of high pier bridge guideline is in progress, based on review of existing standards and field surveys.</p>	<p>Ongoing</p>
<p>2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p><progress 45%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 3 times out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project</p> <p>a. NH22 (initially requested but cancelled)</p> <p>-Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, 5th JCC in Oct 2018 cancelled this pilot project site.</p> <p>- Field surveys: Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018</p> <p>- The draft implementation plan was prepared for NH22</p> <p>b. Candidate sites proposed in Nov 2018</p> <p>-Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov, 2018 and site surveys were conducted for 7 times in total:</p> <p>NH717 (West Bengal): on 21st to 22nd Dec 2018, 22nd Jan, and 31st Jan 2019</p> <p>NH54 (Assam): on 17th to 19th Dec 2018 and 21st to 23rd Feb 2019</p> <p>NH10 (Sikkim): on 23rd to 24th Jan and 1st to 2nd Feb 2019</p> <p>-Based on survey findings, recommendations were prepared including necessary surveys for design and possible measures against landslide, and submitted them to Indian side</p> <p>- NHIDCL improved topographic survey results based on</p>	<p>Ongoing</p>

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Mar.31 st ,2019	Status*
	<p>recommendations for NH10.</p> <p>- NHA and NHIDCL were preparing for selection of consultants for topographic surveys and drilling investigations for NH54 and NH717, respectively.</p> <p>4) Upon the requests from MoRTH, NHA or NHIDCL, field surveys for disaster affected sites were conducted twice in total.</p> <p>-Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018</p> <p>-Upon the request from NHA, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018</p> <p>-Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.</p>	
Output3: Foundation for operation and maintenance for mountainous highways is built.		
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p><progress 100%></p> <p>1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 95%></p> <p>3) Draft of O/M guideline based on review of existing standards and field surveys is now complete. Reviewing is in progress.</p>	Ongoing
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	<p><progress 55%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 3 times out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project: Refer to OVI 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p>	Ongoing

1-4 Achievement of the Project Purpose

The deliverables achieved by the Project as per the TOR are given in the table below:

*Completed, Ongoing, Scheduled for later

Project Purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.		
Indicators	Major Results	Status*
(1) Model activities are conducted applying the developed guidelines by the Project.	- Refer to 1-3 Achievement of Output, OVI 2-4, 3)Pilot Project	Ongoing
(2) Core officers are able to give lectures on development of mountainous highways in the training courses.	- The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 3 country focused training and one Invitation Program conducted in Japan	Ongoing

1-5 Changes of Risks and Actions for Mitigation

- N/A

1-6 Progress of Actions undertaken by JICA

- JICA Project Team conducted activities related to Output 1, 2 and 3. The progress is monitored as stated in section 1-3 "Achievement of Output".

1-7 Progress of Actions undertaken by Gov. of India

PDM ver.1 approved on Dec. 14th 2016	Actual as of Mar. 2019	Status
1. Allocation of Counterpart Personnel from GOI	1. Allocated Counterpart Personnel from GOI	- India side has availed all the required counterparts.
1.1 Chairperson	1.1 Chairperson	- The position of TG chairperson, however, fell vacant after the promotion of Shri I.K Pandey to DG(RG)&SS in Feb.2019.
1.2 Project Director	1.2 Project Director	
1.3 Project Manager	1.3 Project Manager	
1.4 Project Co-Manager	1.4 Project Co-Manager(3)	A new TG Chairperson is required
1.5 Project Members	1.5 Project Members (9)	
1.6 Participants for Training in Japan	1.6 Participants for Training in Japan (34) 1st Training(10); 2nd Training(10); 3 rd Training(9) 1st Invitation Program (5)	
	1.7 Allocated Counterparts for guidelines -Overall control of 5 guidelines -Guideline for Planning -Guideline for Slope Protection and Embankment	

PDM ver.1 approved on Dec. 14th 2016	Actual as of Mar. 2019	Status
	<ul style="list-style-type: none"> -Guideline for Bridge -Guideline for Tunnel -Guideline for Operation Maintenance 	
<p>2. JCC Organization</p> <p>Establishment of JCC as per the Project Organizational Chart in Record of Discussion and holding of meetings at least twice a year</p>	<p>2. JCC Organization</p> <p>JICC was established and members attended the 1st JCC meeting held in MORTH on Dec. 14th, 2016 followed by holding JCC meetings in April 2017, October 2017, April 2018 and October 2018 as scheduled.</p> <p>2.1 JCC Members</p> <ul style="list-style-type: none"> (1) Chairperson (2) Project Director (3) Project Manager (4) Project Co-Manager(3) (5) Project Members (9) <p>CE(s) of MoRTH, GM(s) of NHAI, GM(s) of NHIDCL</p>	<p>JCC establishment complete</p> <p>JCC meetings ongoing</p>
<p>3. Facilities</p> <p>Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p>	<p>3. Land, buildings and facilities</p> <p>a. An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) has been secured in NHAI HQ</p> <p>b. The office space for Short-term Experts has been availed in Jeevan Tara Building.</p>	<p>Not Completed</p> <p>- An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) in Transport Bhawan has yet been secured.</p>
<p>4. Administrative cost and other expenses</p> <ul style="list-style-type: none"> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts 	<p>4. Administrative cost and other expenses</p> <ul style="list-style-type: none"> 1) Personnel cost for counterparts and other running expenses being provided as required 2) Domestic travel cost for counterparts being provided as required 	<p>Ongoing</p>
<p>5. Pilot Project Cost, if required construction works.</p>	<p>5. Pilot Project</p> <ul style="list-style-type: none"> (1) Field surveys for the pilot project on NH22 with JICA Experts were conducted on 8th and 20th June 2018 (2) Plan for the pilot project at 2 sites of Parwanoo to Solan section on NH22 in 	<p>Ongoing</p>

PDM ver.1 approved on Dec. 14th 2016	Actual as of Mar. 2019	Status
	<p>Himachal Pradesh was prepared.</p> <p>(3) 5th JCC in Oct 2018 cancelled this pilot project site, however.</p> <p>(4) Upon further discussions between Indian side and JICA Experts, instead of NH22, three candidate sites were proposed; NH717 (West Bengal), NH54 (Assam), and NH10 (Sikkim).</p> <p>(5) Indian side presented existing documents and reports to JICA Experts for their review, and arranged officials and consultants for site surveys, which were conducted 7 times in total together with JICA Experts.</p> <p>(6) Upon the recommendations by JICA Experts for surveys and design, Indian side took the following actions:</p> <ul style="list-style-type: none"> -For NH10, topographic surveys were almost complete and drilling investigation was under planning. -For NH717 and NH54, selection of consultants for topographic surveys and drilling investigations was under preparation. 	

1-8 Progress of Environmental and Social Considerations (if applicable)

- N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

- N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors,

private sectors, NGOs etc.)

- 1) An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) has yet been secured in Transport Bhawan, therefore, it is necessary for JICA and MoRTH to continue to discuss.
- 2) The Chairperson of the TG meetings was promoted to DG (RD) & SS. Nomination of a replacement is required.
- 3) Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.
 - i. Among three candidate sites proposed in Dec 2018, one site should be selected for civil work after site visits by JICA Experts. For the selected one site for civil work, JICA Experts would give technical advice for updating DPR and guidance for construction. For remaining two sites, JICA Experts would give technical advice for updating DPR.
 - ii. Based on the survey results available for the project, NH10 was recommended as the site for civil work. NH10 is the only site which may be completed by the end of the project period of March 2021.
 - iii. The contract period of the Short-term experts is not enough to accommodate implementation of the civil work of NH10. But extension of the contract period depends on the results of bidding of the pilot project on NH10. In case a contractor is successfully awarded for the pilot project and Letter of Acceptance is issued, JICA may extend the contract period of the Short-term experts. The maximum extension is until December 2020, however. In addition, JICA Short-term Expert Team should have additional experts in charge of support for design and supervision. (Note: JICA Experts are unable to assume liability of design)

2 Delay of Work Schedule and/or Issues (Problems) (if any)

2-1 Issues/Problems

- N/A

2-2 Cause

- N/A

2-3 Action to be taken

- N/A

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of India)

- N/A

3 Modification of the Project Implementation Plan

3-1 PO

- 1) PO ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

3-2 Other modifications on detailed implementation plan (Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HQ. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)

- 1) PDM ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.
- 2) The amendment R/D and PDM will be authorized by JICA HQ

II. Project Monitoring Sheet I & II as Attached

Project Monitoring Sheet I (Revision of Project Design Matrix)

Project Title: Capacity Development Project on Highways in Mountainous Regions

Implementing Agency: Ministry of Road Transport and Highways (MoRTH)

Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD

Period of Project: Apr. 2016 – Mar. 2021 (Five (5) years)

Project Site: Whole India

Version 5

Dated 10th May, 2019

Model Site:

Narrative Summary		Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<p>Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report</p>				
	<p>OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Contract Document Completion Report by the operation and maintenance contractor</p>				
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP-1 Model activities are conducted applying the developed guidelines by the Project.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.</p>	<p>- Refer to OVI (Objectively Verifiable Indicators) 2-4, 3)Pilot Project</p>		
	<p>PP-2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, interviews to supervisors</p>		<p>- The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 3 country focused training and 1 Invitation Program conducted in Japan</p>		

<p>Outputs Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p> <p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Survey and planning guidelines</p> <p>Project records</p>		<p><progress 100%> 1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><progress 100%> 2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p><progress 100%> 3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018, followed by approval in April 2018 JCC Meeting.</p> <p><progress 95%> 4) Draft of survey and planning guideline based on review of existing standards and field surveys is now complete. Review is in progress.</p> <p><progress 55%> for items 1) - 4) 1) Country focused trainings were conducted 3 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI(Objectively Verifiable Indicators) 2-4 4) Survey for disaster: Refer to OVI 2-4</p> <p><progress 95%> 5) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWDs were conducted 8 times in total. Also, tender documents for EPC contract from 2 projects were collected and studied. JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019.</p>
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<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019.</p>	<p>Improved tunnel guideline. Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018 <progress 95%> 3) Development of tunnel guideline based on review of existing standards and field surveys is now complete. Reviewing is now in progress.</p>
<p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p>	<p>2-3 High pier bridge guideline is completed by June 2019.</p>	<p>Earthwork guideline, Project records High pier bridge guideline, Project records</p>		<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for earthwork guideline drafted and finalized at the TG meeting on 22nd February 2018 <progress 80%> 3) Development of earthwork guideline based on review of existing standards and field surveys is in progress. <progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017 <progress 80%> 3) Development of high pier bridge guideline based on review of existing standards and field surveys is in progress.</p>

2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.

Project records

<p><progress 45%> for items 1) - 4)</p> <ol style="list-style-type: none"> 1) Country focused trainings were conducted 3 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project <ol style="list-style-type: none"> a. NH22 (initially requested but cancelled) <ul style="list-style-type: none"> -Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, 5th JCC in Oct 2018 cancelled this pilot project site. -Field surveys: Parwanoo~Solani section of NH22 in Himachal Pradesh on 8th June and 20th June 2018 b. Candidate sites proposed in Nov 2018 <ul style="list-style-type: none"> -Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov, 2018 and site surveys were conducted for 7 times in total: <ul style="list-style-type: none"> NH717 (West Bengal): on 21st to 22nd Dec 2018, 22nd Jan, and 31st Jan 2019 NH54 (Assam): on 17th to 19th Dec 2018 and 21st to 23rd Feb 2019 NH10 (Sikkim): on 23rd to 24th Jan and 1st to 2nd Feb 2019 <p>-Based on survey findings, recommendations were prepared including necessary surveys for design and possible measures against landslide, and submitted them to Indian side</p> <p>-NHIDCL improved topographic survey results based on recommendations for NH10.</p> <p>-NHAI and NHIDCL were preparing for selection of consultants for topographic surveys and drilling investigations for NH54 and NH717, respectively.</p> <ol style="list-style-type: none"> 4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted twice in total. <ul style="list-style-type: none"> -Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018 -Upon the request from NHAI, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018 <p>-Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.</p>

<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p> <p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Operation and maintenance guideline, Project records</p> <p>Project records</p>	<p><progress 100%> 1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 95%> 3) Development of O/M guideline based on review of existing standards and field surveys is now complete. Reviewing is in progress.</p> <p><progress 55%> for items 1) - 4) 1) Country focused trainings were conducted 3 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI 2-4 4) Surveys for disaster: Refer to OVI 2-4</p>
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Activities	The Japanese Side	Inputs	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III - Mountain Tunnel - Tunnel Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessity</p> <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterparts - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures></p> <p>-An independent room for JICA Long-term Expert (Chief Advisor) has not yet been secured in Transport Bhawan, therefore, JICA and MoRTH need to continue to discuss.</p> <p>-The Chairperson of the TG meetings was promoted to DG (RD) & SS. Nomination of a replacement is required.</p> <p>-Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.</p>

Project Title: Capacity Development Project on Highways in Mountainous Regions											Monitoring														
Inputs from JICA											Issue	Solution													
Expert	Long Term	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				Remarks	Issue	Solution	
		I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV				
Inputs from JICA	Expert	Chief Advisor / Highway Development	Plan																			Clearance from screening committee is required yearly	Chief Advisor's assignment ended on Mar. 31st, 2019.	New Chief Adviser from Japan is being mobilized	
		Highway Engineering / Coordinator	Actual																				New Expert from Sept 1st, 2018		
		Team Leader/Slope Protection I	Plan																				6.62/11.02 MM (60%)		
		Deputy Team Leader/Slope Protection III	Actual																				2.65/5.77MM (46%)		
		Mountain Tunnel	Plan																				4.60/7.5 MM (61%)		
		Slope Protection II/High Embankment	Actual																				5.25/8.5 MM(62%)		
		Mountain Bridge	Plan																				3.83/7.83 MM (62%)		
		Facility of Mountain Roads	Actual																				3.83/3.83 MM (100%)		
		Maintenance & Operation of Mountain Roads	Plan																				3.88/6.17 MM (44%) Expert Changed from Sept. 2018		
		Natural Condition (Topography/Geology)	Actual																				2/3.83 MM (52%)		
		Drainage Plan	Plan																				2.33/3.33 MM (70%)		
		Plan and Survey of Mountain Roads/Coordinator	Actual																				3.93/5.17 MM(76%)		
		Monitoring and Evaluation	Plan																				1.5/3 MM (50%)		
		Equipment	Actual																						
		Training in Japan	Plan																						
Counterpart Training in Japan	Actual																				1st, 2nd, and 3rd Program of Training with JAHE was completed.				
In-country/Third country Training	Plan																								
Actual																									
Inputs from India	Plan																								
Expert	Actual																								
Chairperson	Plan																				Chairperson changed from Feb 2019				
Project Director	Actual																				New Project Director from October 2017				
Project Manager	Plan																				New Project Manager from October, 2017				
Project Co-Manager	Actual																								
Project Co-Manager	Plan																								
Project Co-Manager	Actual																								
Counterparts (9)	Plan																								
Equipment	Actual																								

Activities Sub-Activities	2016				2017				2018				2019				2020				Responsible Organization	Achievements	Issue & Countermeasures																					
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual																										
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed																																												
1.1 Collect and analyze existing information on mountainous highways, including identification of maintenance activities, road conditions, and other issues.																																												
1.2 Conduct field surveys to the typical mountainous highways.																																												
1.3 Improve survey and planning guidelines on mountainous highways.																																												
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.																																												
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Output 2: Guidelines on design and construction for mountainous highways are developed.																																												
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.																																												
2.2 Improve tunnel guidelines.																																												
2.3 Develop earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).																																												
2.4 Develop high pier bridge guidelines.																																												
Output 3: Guideline on operation and maintenance for mountainous highways is developed.																																												
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.																																												
3.2 Develop operation and maintenance guidelines for mountainous highways including issues on disaster management.																																												
Duration / Phasing																																												
Monitoring Plan																																												
Joint Coordination Committee																																												
Set-up the Detailed Plan of Operation																																												
Submission of Monitoring Sheet																																												
Reports/Documents																																												
Project Completion Report																																												
Public Relations																																												
Setting up & Updating Project Facebook Page																																												
Published article on Project Activities in MORTH Annual Report																																												
Remarks																																												
Set up and Updated 17 times																																												
Issue																																												
Request to prepare pilot projects affected guideline preparation																																												

Minutes of 7th JCC

THE MINUTES OF JOINT COORDINATION COMMITTEE MEETING

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

AND

MINISTRY OF ROAD TRANSPORT & HIGHWAYS (MORTH)

ON

CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN MOUNTAINOUS REGIONS

In accordance with Section No. 6, Point No. 3 of the Record of Discussions of "Capacity Development Project on Highways in Mountainous Regions (hereinafter referred to as "the Project")" signed on December 31st, 2015 (hereinafter referred to as "R/D") between the Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Ministry of Road Transport and Highways (hereinafter referred to as "MoRTH"), a Joint Coordination Committee (JCC) meeting (hereinafter referred to as "the Meeting") was held at Conference hall, Ground floor, Transport Bhawan, New Delhi on October 16th, 2019.

The purpose of the meeting was to review the progress of the Project and also discuss the semi-annual activities after the Meeting and other related issues of the Project.

As a result of the discussions, both sides mutually agreed upon the matters referred to in the documents attached hereto.

New Delhi, October 16th, 2019



SHINSUKE NAGAI
Senior Representative
India Office
Japan International Cooperation Agency



I.K. PANDEY
Director General (Road Development) &
Special Secretary (DG(RD)&SS)
Ministry of Road Transport and Highways

Minutes of the Joint Coordination Committee (JCC) meeting

Date: Oct 16th, 2019

Time: 11:00AM – 1:00PM

Venue: Conference Hall, Ground Floor, Transport Bhawan, New Delhi

Representatives from Indian Side

- 1) Mr. S. S. Nahar, ADG, MoRTH – Chairperson
- 2) Mr. Khushal Chand, CE (EAP), MoRTH – Project Manager
- 3) Mr. Sanjay Garg, CE (Bridge), MoRTH
- 4) Mr. L.P. Padhy, CGM, NHAI
- 5) Mr. P.R. Meena, CE Zone-III, MoRTH
- 6) Mr. Trivendra Kumar, SE, MoRTH
- 7) Mr. Avdesh Gupta, EE (EAP), MoRTH
- 8) Mr. Shashank Kumar, GM, NHIDCL
- 9) Mr. B. Mohanta, DGM, NHIDCL
- 10) Mr. Vivek Singh Negi, Manager, NHIDCL
- 11) Mr. Siddharth Sahal, Engineer, NHIDCL
- 12) Mr. Mahinder Singh, Director (IC), MoRTH

Representatives from Japanese Side

- 1) Mr. Shinsuke Nagai, Senior Representative, JICA India office, Co-Chairperson
- 2) Mr. Subroto Talukdar, Additional Chief Development Specialist, JICA India
- 3) Dr. Eisuke Nakamura, Chief Advisor, JICA Expert
- 4) Mr. Michiya Kitayama, JICA Expert for Highway Engineering
- 5) Mr. Yoshinori Kawamura, Team Leader / Slope Protection I Expert
- 6) Dr. Takayuki Mayumi, JICA Expert / Slope Protection
- 7) Ms. Cleopatra Panganayi, Monitoring / Evaluation Expert
- 8) Mr. Kazuhiro Kiyose, Counsellor, Embassy of Japan in India - Observer

MINUTES

1) Introduction

Mr. S S Nahar, Addl. Director General in MoRTH, acting on behalf of the JCC Chairman D.G. I.K Pandey, called the meeting to order and invited the Project Manager (Mr. Khushal Chand) and Chief Adviser for the Project (Dr. Nakamura) to brief the JCC on the project status and agenda for the meeting.

Mr. Khushal Chand briefed the JCC that drafting of all 5 guidelines by JICA Experts was complete and reviewing by the Indian side was ongoing including explanatory workshops. On the other hand,

planning of the 3 related pilot projects was ongoing and their detailed progress and implementation plans would be discussed in the meeting, in view of the current status and project deadline of March 2021.

After a brief introduction of himself, the new JICA Long Term Expert and Chief Adviser for the project, Dr. Nakamura outlined the topics to be presented in the meeting by JICA experts. JICA Expert for Highway Engineering, Mr. Kitayama then commenced the presentation from the Japanese side comprising key decisions from the 6th JCC meeting, semi-annual report, semi-annual work plan and requests to Indian side.

2) Semi Annual Report and Semi Annual Work Plan

(1) Pilot Projects

a. NH10

Site surveys for developing recommendations for detailed design for NH10 pilot project were conducted by JICA Experts in May and June 2019. JICA Experts then submitted to Indian side recommendations on design of countermeasures on July 17th and 24th as well as reference documents on technical specifications and typical drawing for Japanese technology on July 24th and 30th. Based on the decision by MoRTH on September 27th, 'item-rate' mode of contract was selected for civil works, after which JICA Experts again submitted supplemental documents on technical specifications to suit the 'item-rate' mode.

As of the JCC, the Detailed Project Report (DPR) was under preparation by Indian consultant based on the recommendations by JICA Experts. The initial approval target of DPR was the end of August 2019, which was not realised due to change of site conditions and considerations of proper mode of contract. Given the project deadline of March 2021, technical transfer for new technology of concrete crib works and horizontal drainage boring should be done before December 2020. This condition requires the decisive milestones be duly monitored and achieved, including Tender Invitation in the 1st week of November 2019, Letter of Acceptance in the middle of February 2020, and Commencement of the Work in the middle of March 2020. After the tender float, amendments would be issued to incorporate the change of site conditions into the design, which would be done by Indian consultant based on the correction survey being done on the site. Amendments should be made one week before the end of tender period. Both Japanese and Indian sides confirmed that tender floating is expected by Nov 7th, 2019.

The Pilot Project site of NH 10 is composed of three sliding zone of Slide1, Slide2 and Slide3. Slide1 and Slide2 are small with one-year construction period, while Slide3 is high and huge with three-years construction period. Keeping in view of time constraint and size of landslide, Slide1 and Slide2 are taken up under this Pilot Project and Slide3 is to be constructed by Indian contractor with transferred technology.

b. NH717

On August 13th, 2019, JICA Experts submitted recommendations on survey plan for gravity deformation on NH717, based on which TOR for DPR consultants was being prepared with tendering for DPR consultants scheduled thereafter. JICA Experts submitted comments on the Draft TOR prepared by NHIDCL on October 15th and Indian side expected to complete review and incorporating

comments within 15 days of receipt of comments from JICA experts. Both Japanese and Indian sides confirmed that the tender for hiring consultant would be floated by Nov 7th, 2019.

c. NH54

JICA Experts reviewed the TOR for DPR consultants and submitted recommendations to Indian side on August 1st, 2019. The award for the DPR Consultant contract is scheduled by the end of October 2019 and Letter of Acceptance would be issued in the 1st week of November.

JICA Experts requested NHAI that the DPR Consultant should be specifically asked to prepare a method statement at inception and the Indian side reiterated that close coordination will be ensured among all parties.

Both Japanese and Indian sides confirmed that the required surveys for the Pilot Project sites on both NH717 and NH54 should be completed by DPR consultants by March 2020, excluding landslide monitoring and resistivity survey in rainy season which should be completed by the 1st week of September 2020.

(2) Progress of Guideline Preparation

Drafting of all 5 guidelines by JICA Experts was completed and 2nd submission for review was made on May 22nd, 2019. For the preparation of technical workshop, corresponding guidelines were submitted accordingly to Indian officials for further review and feedback.

After incorporating comments from Indian side, JICA experts would finalize the draft guidelines and submit them before March 2020, excluding Slope Guideline which is to be practically reviewed through the Pilot Project.

(3) Workshops on the Draft Guidelines

Workshops chaired by DG(RD)&SS or ADG to explain and discuss the draft guidelines were conducted on July 29th, Aug 14th, and Sept 25th for Bridge, Tunnel and Slope Guidelines respectively in New Delhi. The corresponding sections of Operation & Maintenance (O&M) guideline were discussed as applicable to each guideline.

The outstanding workshop for the Planning guideline is scheduled in December 2019.

Another technical workshop to further disseminate the guidelines and elicit feedback from local engineers in hilly regions was planned in the last week of January 2020 for planning, slope, and O&M, after the Republic Day of India. The appropriate venue was briefly discussed in the meeting and finalization on venue and actual dates was left to the Indian side.

3) Other Topics

(1) Procedure for Approval of Guidelines and Feedback from Indian side

The Japanese side requested the Indian side to organize and issue written feedback to the guidelines for clear process of reviewing. The Indian side would continue eliciting for feedback from local engineers through ongoing workshops and would also post the draft guidelines on the MORTH website for public review in a week for at least one month. The Japanese side requested the Indian

side to provide the feedback by December 2019 before JICA Short-term Experts' return to India for finalizing the guidelines.

The Japanese side requested the Indian side to reconfirm the procedure and timeline for approval of the guidelines. The Indian side confirmed that the final authority for approving the guidelines is the MORTH Director General (JCC Chairman) assisted by subcommittees of his choice. While normal approval period in MORTH is 2-3 months, effort would be made to expedite approval within 2 months of receiving the final draft and meet the project deadline of March 2021.

(2) Country Focused Training and Joint Working Group Meeting

a. 5th Country Focused Training with JICA & IAHE

The 5th Country focused training with JICA & IAHE was planned for May 2020. The Japanese side would send a 'General Information Booklet' to MORTH early next year outlining training details and procedures for the training. The training would be organized by the Japanese side in collaboration with IAHE. The Indian side was requested to follow the timelines specified in the booklet for nomination of participants.

b. 6th Meeting of the India-Japan Joint Working Group

The Joint Working Group which focuses on the technical issues on roads and road transportation in India and Japan has been held alternatively in New Delhi and Tokyo, Japan, every year from 2014. The Japanese side informed the JCC that the next meeting was scheduled December 2019 or January 2020 in Tokyo. The Indian side was requested to propose the actual dates for the meeting. Planning would be done by the Japanese side in close consultation with the Indian side.

4) Closing

Mr. Nagai, JCC Co-Chairperson and Senior Representative in JICA India office gave closing remarks on behalf of the Japanese side. In view of the approaching deadline for the project, Mr. Nagai reiterated the importance of close cooperation between both the Indian and Japanese sides by emphasizing the need to keep deadlines in the final stages. He then requested support from Indian side for successful completion of procurement for the pilot projects and timely receipt of feedback on guidelines from local experts and the public. The Acting Chairperson, Mr. SS Nahar expressed the Indian side's resolve to meet targets and achieve project goals and closed the meeting by reiterating Indian side's appreciation for Japanese technology transfer by JICA experts.

The next JCC meeting is to be held in April 2020.

Time Bound Action Plan

<i>Action</i>	<i>Responsible Agency</i>	<i>Target Date</i>	<i>Actual</i>
The award of DPR consultant contract for NH 54	NHAI	End of October, 2019	
Tender floating for NH10	NHIDCL	Nov 7 th , 2019	
Tender floating for hiring consultant for NH717	NHIDCL	Nov 7 th , 2019	
Issue of the letter of acceptance for NH54	NHAI	1 st of Week of November, 2019	
Required survey for the Pilot Project sites for both NH717 and NH54 is complete	DPR consultant	March, 2020	
Finalization of the draft guidelines	JICA Experts	March, 2020	
Land slide monitoring and resistivity survey in rainy season are completed	DPR Consultant	1 st Week of September, 2020	
Initiating Permanent Works at site of NH10 for technical transfer	The Contractor	Middle of September, 2020	
Approval of the guidelines	MORTH Director General	March, 2021	

Attachments

- Attachment 1: Monitoring Sheet (Version.6)

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.5 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Khushal Chand

Eisuke Nakamura

Title: Chief Engineer (EAP)

Chief Advisor/ Highway Development

Submission Date: 16th October, 2019

I. Summary

1 Progress

1-1 Progress of Inputs

- PDM related to Input were authorized on Dec 14th, 2016 as a ver.1

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of Sept. 30 th , 2019
A. Japanese side		
(1)Experts	<Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <Short -term Experts/Consultants> <u>Total: 65.95M/M</u> -Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III -Mountain Tunnel -Tunnel Facilities -Slope Protection II/High Embankment - Earthwork -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation	<u><Long-term Experts></u> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <u><Short -term Experts></u> Progress: (52.66/69.45 MM: 75.8%) Between Nov 2017 and Sept.2019, the following short-term experts were dispatched: -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Slope Protection II/High Embankment -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation -Highway Engineering for Mountain Road

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of Sept. 30 th , 2019
(2) Training for Counterpart's Personnel	<Training in Japan> (Once a year, about 10 people for 2 weeks (5 times))	<Training in Japan> (1) Country Focused Training was conducted in collaboration with IAHE Progress: 4/5 times -1st Country Focused Training held on 16th May -6th June 2017 (22 days) -2nd Country Focused Training/ Invitation held on 24th Oct -13th Nov 2017(21 days) -3rd Country Focused Training/ Invitation held on 16th Oct -5th Nov 2018(21 days) -4th Country Focused Training held on 7th Aug -2nd Sept 2019 (20 days)
		<Training in India> Seminars held in India -1st technical seminar held on 19th June 2018 -2nd technical seminar held on 27th Sep 2018
(3) Equipment	Equipment and/or Material, as necessary	None
(4) Local Costs	<Local Costs> - Office management cost - Local consultants - Other Local cost as necessity	<Local Costs> -Project Assistant for Short Term Experts -Communication (internet and mobile phone) -No local consultants -Car rental (including driver)
B. Indian Side		
(1) Indian Side Counterparts	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager -Project Members - Participants for training in Japan	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager (3) -Project Members (9) - Participants for training in Japan (43) 1st Training (10); 2nd Training (10); 3rd Training (9); 4th Training (9) 1st Invitation Program (5) -Counterparts for guidelines (7) Overall control of 5 guidelines (2) Guideline for Planning (1) Guideline for Slope Protection and Embankment (1) Guideline for Bridge(1) Guideline for Tunnel (1) Guideline for Operation and Maintenance(1)

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of Sept. 30 th , 2019
		<p><JCC Members></p> <p>As specified in the Project Organizational Chart in Record of Discussion</p>
(2) Operational Expenses	<p><Facilities></p> <p>-Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively</p>	<p><Facilities></p> <p>-An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) was provided in NHAI HQ</p> <p>-Office space for Short-term Experts was provided in Jeevan Tara Building.</p>
(3) Administrative cost	<p><Administrative cost and other expenses></p> <p>1) Personnel cost for counterparts and other running expenses</p> <p>2) Domestic travel cost for counterparts</p>	<p><Administrative cost and other expenses></p> <p>1) Personnel cost for counterparts and other running expenses provided as required</p> <p>2) Domestic travel cost for counterparts provided as required</p>
(4) Pilot Project Cost	<p><Pilot Project Cost></p> <p>Pilot Project Cost, if required construction works.</p>	<p><Pilot Project Cost></p> <p>Pilot Project Planned at 3 sites i.e. NH10 (Sikkim), NH717 (West Bengal), and NH54 (Assam)</p> <p>-For NH10, topographic surveys and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, recommendations for countermeasures for landslide were prepared by JICA Experts.</p> <p>-NH717 and NH54: selection of consultants for topographic survey and drilling investigation for NH54 in progress while tender documentation for NH717 is under preparation</p>

1-2 Progress of Activities

- Progress of activities is indicated in Monitoring Sheet II (PO) and Project Design Matrix (PDM)
- Basically, no crucial bottlenecks in progress have been observed.

1-3 Achievement of Output

The deliverables achieved by the Project as per the TOR are given in the table below:

-PDM related to Output were authorized on Dec 14th, 2016 as a ver.1

*Completed, Ongoing, Scheduled for later

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept. 30 th ,2019	Status*
Output1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed		
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<p><progress 100%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p>(1) 6th Feb 2018: Siliguri to Darjeeling on NH55 in West Bengal (2) 7th Feb 2018: Sevoke to Sikkim on NH10 in West Bengal (3) 28th Sep 2017: Mussoorie to Chamba on 707A in Uttarakahnd (4) 10th Apr 2018: Kiratpur to Ner chowk on NH21 in Himachal (5) 10th Apr 2018: Ner chowk to Manali on NH21 in Himacha (6) 9th Apr 2018: Pathankot to Mandi on NH20 in Himachal (7) 15th Feb 2017: Shiradi Ghat bypass on NH48 in Karnataka (8) 20th March 2018: Assam border to Dalu on NH62 in Megalaya (9) 9th Feb 2018: Mangan to Nakura on NH310 in Sikkim (10) 13th Oct 2017: Shillong to Dawki on NH40 in Megalaya</p> <p><progress 100%></p> <p>3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018 followed by approval in April 2018 JCC Meeting.</p> <p><progress 100%></p> <p>4) Draft of survey and planning guideline based on review of existing standards and field surveys is now complete.</p> <p><progress 75%></p> <p>5) Review of draft guideline is in progress. Preparation for related Technical Workshops is planned for Dec 2019.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept. 30 th ,2019	Status*
1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	<p><progress 65%> (for items 1)-4))</p> <ol style="list-style-type: none"> 1) Country focused trainings were conducted 4 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI (Objectively Verifiable Indicators) 2-4 4) Survey for disaster: Refer to OVI 2-4 5) Technical Workshops for Planning Guideline to be held in Dec 2019. <p><progress 100%></p> <ol style="list-style-type: none"> 5) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) were held 8 times. <ul style="list-style-type: none"> -Meeting with state PWD of Karnataka in Feb 2017 -Meeting with state PWD of West Bengal in Feb 2018 -Meeting with PIU of NHAI in Dec 2018 -Meeting with SBO of NHIDCL in Dec 2018 -Meeting with State PWD of West Bengal in Dec 2018 -Meeting with NHAI HQ in Jan 2019 -Meeting with NHIDCL HQ in Jan 2019 -Meeting with MoRTH in Jan 2019 -Tender documents for EPC contracts from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement)) -Based on the review of the current status, JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019. -Recommendations for Procurement modes for Pilot Project (NH10) were submitted to India side on 28th May 2019 by JICA Experts. <p>Based on that recommendation, NHIDCL is preparing tender documentation for NH10</p>	Ongoing
Output2: Guidelines on design and construction for mountainous highways are developed.		
2-1 Improved tunnel guideline is completed by June 2019.	<p><progress 100%></p> <ol style="list-style-type: none"> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified <p><progress 100 %></p> <ol style="list-style-type: none"> 2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018 <p><progress 100%></p> <ol style="list-style-type: none"> 3) Draft of tunnel guideline based on review of existing standards and field surveys is now complete. <p><progress 90%></p> <ol style="list-style-type: none"> 4) Reviewing is in progress and related technical workshop was held on 14th August 2019. 	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept. 30 th ,2019	Status*
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	<p><progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for earthwork guideline drafted and finalized at the TG meeting on 22nd February 2018</p> <p><progress 100%> 3) Draft of earthwork guideline based on review of existing standards and field surveys is now complete.</p> <p><progress 90%> 4) Reviewing is in progress and related technical workshop was held on 25th September, 2019.</p>	Ongoing
2-3 High pier bridge guideline is completed by June 2019.	<p><progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 100%> 3) Draft of high pier bridge guideline based on review of existing standards and field surveys is now complete.</p> <p><progress 90%> 4) Reviewing is in progress and related technical workshops was held on 29th July 2019.</p>	Ongoing
2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	<p><progress 75%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 4 times out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project</p> <p>a. NH22 (initially requested but cancelled)</p> <p>-Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, the 5th JCC in Oct 2018 cancelled this pilot project site.</p> <p>- Field surveys: Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018</p> <p>- The draft implementation plan was prepared for NH22</p> <p>b. Candidate sites proposed in Nov 2018</p> <p>-Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov,</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept. 30 th ,2019	Status*
	<p>2018 and site surveys were conducted for 7 times in total.</p> <ul style="list-style-type: none"> - Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide. -On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design. -For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. DPR preparation by DPR consultant is ongoing. Tender floating is scheduled after DPR approval by NHIDCL -For NH717/NH54, JICA Experts prepared and submitted recommendations on survey plan for gravity deformation on NH717, and reviewed and suggested TOR for DPR consultants on NH54. Selection of consultants for topographic surveys and drilling investigations is now under preparation. <p>4) Upon the requests from MoRTH, NHA or NHIDCL, field surveys for disaster affected sites were conducted twice in total.</p> <ul style="list-style-type: none"> -Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018 -Upon the request from NHA, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018 -Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side. <p>5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively.</p>	
Output3: Foundation for operation and maintenance for mountainous highways is built.		
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p><progress 100%></p> <p>1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 100%></p> <p>3) Draft of O/M guideline based on review of existing standards and field surveys is now complete.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept. 30 th , 2019	Status*
	<progress 90%> 4) Reviewing is in progress. O&M workshops are included under each related guideline.	
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	<progress 75%> (for items 1)-4)) 1) Country focused trainings were conducted 4 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI 2-4 4) Survey for disaster: Refer to OVI 2-4 5) O&M workshops were included under each related guideline for bridge, tunnel and slope protection works.	Ongoing

1-4 Achievement of the Project Purpose

The deliverables achieved by the Project as per the TOR are given in the table below:

*Completed, Ongoing, Scheduled for later

Project Purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.		
Indicators	Major Results	Status*
(1) Model activities are conducted applying the developed guidelines by the Project.	-Refer to 1-3 Achievement of Output, OVI 2-4, 3)Pilot Project	Ongoing
(2) Core officers are able to give lectures on development of mountainous highways in the training courses.	-The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 4 country focused training and one Invitation Program conducted in Japan (3) 3 Technical Workshops for draft bridge, tunnel and slope protection guidelines were held	Ongoing

1-5 Changes of Risks and Actions for Mitigation

- N/A

1-6 Progress of Actions undertaken by JICA

- JICA Project Team conducted activities related to Output 1, 2 and 3. The progress is monitored as stated in section 1-3 "Achievement of Output".

1-7 Progress of Actions undertaken by Gov. of India

PDM ver.1 approved on Dec. 14th 2016	Actual as of Sept. 2019	Status
<p>1. Allocation of Counterpart Personnel from GOI</p> <p>1.1 Chairperson</p> <p>1.2 Project Director</p> <p>1.3 Project Manager</p> <p>1.4 Project Co-Manager</p> <p>1.5 Project Members</p> <p>1.6 Participants for Training in Japan</p>	<p>1. Allocated Counterpart Personnel from GOI</p> <p>1.1 Chairperson</p> <p>1.2 Project Director</p> <p>1.3 Project Manager</p> <p>1.4 Project Co-Manager (3)</p> <p>1.5 Project Members (9)</p> <p>1.6 Participants for Training in Japan (43)</p> <p>1st Training (10); 2nd Training (10); 3rd Training (9) 4th Training (9)</p> <p>1st Invitation Program (5)</p> <p>1.7 Allocated Counterparts for guidelines</p> <ul style="list-style-type: none"> -Overall control of 5 guidelines -Guideline for Planning -Guideline for Slope Protection and Embankment -Guideline for Bridge -Guideline for Tunnel -Guideline for Operation Maintenance 	<p>-India side has availed all the required counterparts.</p>
<p>2. JCC Organization</p> <p>Establishment of JCC as per the Project Organizational Chart in Record of Discussion and holding of meetings at least twice a year</p>	<p>2. JCC Organization</p> <p>JICC was established and members attended the 1st JCC meeting held in MORTH on Dec. 14th, 2016 followed by holding JCC meetings in April 2017, October 2017, April 2018, October 2018 and May 2019 as scheduled.</p> <p>2.1 JCC Members</p> <ul style="list-style-type: none"> (1) Chairperson (2) Project Director (3) Project Manager (4) Project Co-Manager (3) (5) Project Members (9) <p>CE(s) of MoRTH, GM(s) of NHAI, GM(s) of NHIDCL</p>	<p>JCC establishment complete</p> <p>JCC meetings ongoing</p>
<p>3. Facilities</p> <p>Office spaces and facilities necessary for the Project implementation in</p>	<p>3. Land, buildings and facilities</p> <p>a. An independent room for JICA Long-term Expert (Highway</p>	<p>Not Completed</p> <p>- An independent room for JICA Long-term Expert (Chief Advisor/</p>

PDM ver.1 approved on Dec. 14th 2016	Actual as of Sept. 2019	Status
MoRTH and NHAI respectively.	Engineering/Coordinator) has been secured in NHAI HQ b. The office space for Short-term Experts has been availed in Jeevan Tara Building.	Highway Development) in Transport Bhawan has yet been secured.
4. Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	4. Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses being provided as required 2) Domestic travel cost for counterparts being provided as required	Ongoing
5. Pilot Project Cost, if required construction works.	5. Pilot Project - Cost of preparation for DPR and execution of civil work being secured by Indian side as required.	Ongoing

1-8 Progress of Environmental and Social Considerations (if applicable)

- N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

- N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

- 1) An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) has yet been secured in Transport Bhawan, therefore, it is necessary for JICA and MoRTH to continue to discuss.
- 2) Indian side requested at least one pilot project with civil works which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.
 - i. Among three candidate sites proposed in Dec 2018, one site should be selected

for civil work after site visits by JICA Experts. For the selected one site for civil work, JICA Experts would give technical advice for updating DPR and guidance for construction. For remaining two sites, JICA Experts would give technical advice for updating DPR.

- ii. Based on the survey results available for the project, NH10 was recommended as the site for civil work. NH10 is the only site which may be completed by the end of the project period of March 2021.
- iii. For DPR preparation for NH717 and NH54, input from JICA short term experts is necessary up to Dec 2020.
- iv. The current contract period (up to July 2020) of the Short-term experts is not enough to accommodate implementation of the civil work of NH10 as well as DPR preparation for NH717 and NH54 . However, necessity of extension of the contract period depends on the results of bidding of the pilot project on NH10 as well as procurement of DPR Consultant for NH717 and NH54. In case a contractor is successfully awarded for the NH10 pilot project and Letter of Acceptance is issued or if procurement of DPR Consultant for NH717 or NH54 is successful and timely, JICA may extend the contract period of the Short-term experts. The maximum extension is until December 2020, however. In addition, JICA Short-term Expert Team should have additional experts in charge of support for design and supervision. (Note: JICA Experts are unable to assume liability of design)

2 Delay of Work Schedule and/or Issues (Problems) (if any)

2-1 Issues/Problems

- As of 30th September 2019, Pilot Project on NH10 is about 1.5 months behind schedule, while remaining project period is one and a half years. To realize technical transfer for new technology of slope protection, invitation of tender should be done by the middle of Nov 2019, LoA should be issued by NHIDCL in the middle of Feb 2020, and commencement of the civil work should be by the middle of March 2020. Further delay in achieving these key milestones should be avoided.

2-2 Cause

- Preparation of DPR requires more time due to lack of capacity of DPR Consultant.
- Change of contract mode from EPC to BOQ needs additional work.

2-3 Action to be taken

- A) MoRTH and NHIDCL request DPR Consultant to hire a sub-contractor specialized in slope works and to submit DPR by the end of October 2019.
- B) Both Indian and Japanese sides will monitor the progress of Pilot Project regularly and take necessary actions to avoid further delay by setting important milestones.

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of India)

- A) MoRTH and NHIDCL
- B) MoRTH, NHIDCL, JICA Experts

3 Modification of the Project Implementation Plan

3-1 PO

- 1) PO ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

3-2 Other modifications on detailed implementation plan (Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HQ. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)

- 1) PDM ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.
- 2) The amendment R/D and PDM will be authorized by JICA HQ

II. Project Monitoring Sheet I & II as Attached

Project Monitoring Sheet I (Revision of Project Design Matrix)

Version 6
Dated 16th Oct, 2019

Project Title: Capacity Development Project on Highways in Mountainous Regions

Implementing Agency: Ministry of Road Transport and Highways (MoRTH)

Target Group: Officials of MoRTH, NHA, NHIDCL and PWD

Period of Project: Apr, 2016 – Mar, 2021 (Five (5) years)

Project Site: Whole India

Narrative Summary		Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal	Mountainous highways are properly developed and maintained by using guidelines developed by the Project	OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.	Detailed Project Report (DPR) / Feasibility Study Report			
		OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.	Contract Document Completion Report by the contractor and maintenance contractor			
Project Purpose	Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.	PP1 Model activities are conducted applying the developed guidelines by the Project.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors	- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.	- Refer to OVI (Objectively Verifiable Indicators) 2-4, 3) Pilot Project	
		PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors			- The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 4 country focused training and 1 Invitation Program conducted in Japan (3) 3 Technical Workshops for Draft Bridge, Tunnel and Slope Protection Guidelines were held in New Delhi

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<p>Outputs</p> <p>Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p> <p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Survey and planning guidelines</p> <p>Project records</p>		<p><progress 100%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p><progress 100%></p> <p>3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018, followed by approval in April 2018 JCC Meeting.</p> <p><progress 100%></p> <p>4) Draft of survey and planning guideline based on review of existing standards and field surveys is complete.</p> <p><progress 75%></p> <p>5) Review of planning guideline is in progress. Related Technical workshop is planned in Dec 2019</p> <p><progress 65%> for items 1) - 4)</p> <p>1) Country focused trainings were conducted 4 times out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project: Refer to OVI(Objectively Verifiable Indicators) 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) Technical workshops for Draft Bridge, Tunnel and Slope Protection Guideline were held</p> <p><progress 100%></p> <p>5) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWDs were conducted 8 times in total. Tender documents for EPC contract from 2 projects were collected and studied. JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019. Recommendations for Procurement modes for Pilot Project (NH10) were submitted to India side on 28th May 2019 by JICA Experts. Based on that recommendation, NHIDCL is preparing tender documentation for NH10.</p>	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Output 2: Guidelines on design and construction for mountainous highways are developed.	2-1 Improved tunnel guideline is completed by June 2019.	Improved tunnel guideline, Project records	- MoRTH coordinate all related government organizations and other agencies.	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018</p> <p><progress 100%> 3) Development of draft tunnel guideline based on review of existing standards and field surveys is now complete .</p> <p><progress 90%> 4) Reviewing is in progress and related technical workshop for tunnel guideline was held on 14th August 2019.</p>	
	2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	Earthwork guideline, Project records		<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for earthwork guideline drafted and finalized at the TG meeting on 22nd February 2018</p> <p><progress 100%> 3) Development of draft earthwork guideline based on review of existing standards and field surveys is complete.</p> <p><progress 90%> 4) Reviewing is in progress and related technical workshop was held on 25th Sept 2019</p>	
	2-3 High pier bridge guideline is completed by June 2019.	High pier bridge guideline, Project records		<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 100%> 3) Development of draft high pier bridge guideline based on review of existing standards and field surveys is complete</p> <p><progress 90%> 4) Reviewing is in progress and related technical workshops was held on 29th July 2019.</p>	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
	<p>2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p>Project records</p>		<p><progress 75%> for items 1) - 4)</p> <p>1) Country focused trainings were conducted 4 times out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project</p> <p>a. NH22 (initially requested but cancelled)</p> <p>-Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, 5th JCC in Oct 2018 cancelled this pilot project site.</p> <p>-Field surveys: Panwanoo-Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018</p> <p>-The draft implementation plan was prepared for NH22</p> <p>b. Candidate sites proposed in Nov 2018</p> <p>-Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov, 2018 and site surveys were conducted for 7 times in total.</p> <p>-Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide.</p> <p>-On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design.</p> <p>-For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology.</p> <p>DPR preparation by DPR consultant is ongoing. Tender floating is scheduled after DPR approval by NHIDCL</p> <p>-For NH717/NH54, JICA Experts prepared and submitted recommendations on survey plan for gravity deformation on NH717, and reviewed and suggested TOR for DPR consultants on NH54. Selection of consultants for topographic surveys and drilling investigations is now under preparation.</p> <p>4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted twice in total.</p> <p>-Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018</p> <p>-Upon the request from NHAI, Kiratpur-Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018</p> <p>-Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.</p> <p>5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively.</p>	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p>	<p>Operation and maintenance guideline, Project records</p>		<p><progress 100%> 1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified <progress 100%> 2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017 <progress 100%> 3) Development of O/M guideline based on review of existing standards and field surveys is complete. Reviewing is in progress. <progress 90%> 4) Reviewing is in progress. O&M workshops are included under each related guideline.</p>	
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings,</p>	<p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Project records</p>		<p><progress 75%> for items 1) - 4) 1) Country focused trainings were conducted 3 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI 2-4 4) Surveys for disaster: Refer to OVI 2-4 5) O&M workshops were included under each related guideline for bridge, tunnel and slope protection works.</p>	
<p>Activities</p> <p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings,</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III - Mountain Tunnel - Tunnel Facilities - Slope Protection III/High Embankment - Earthwork - Mountain Bridge</p>	<p>Inputs</p> <p>The Indian Side</p> <p>(1) Allocation of Counterparts - Chairperson - Project Director - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses</p>	<p>Important Assumption</p> <p>- Majority of trained officials continues to work for counterpart agencies. - Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p>	<p>Important Assumption</p> <p>- Majority of trained officials continues to work for counterpart agencies. - Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p>	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<p>including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>- Facility of Mountain Roads</p> <ul style="list-style-type: none"> - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessary - Highway Engineering for Mountain Road <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessary.</p> <p>(4) Local cost for the Project activities</p> <ul style="list-style-type: none"> - Office management cost - Local consultants - Other Local cost as necessary 	<p>2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p><Issues and countermeasures></p> <ul style="list-style-type: none"> -An independent room for JICA Long-term Expert (Chief Advisor) has not yet been secured in Transport Bhawan, therefore, JICA and MoRTH need to continue to discuss. -Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works. -Pilot Project on NH10 is about 1.5 months behind schedule, while remaining project period is one and a half years. To realize technical transfer for new technology of slope 		

Project Monitoring Sheet II (Revision of Plan of Operation)

Version 6

Monitoring Sheet' II

Dated 16th Oct, 2019

Project Title: Capacity Development Project on Highways in Mountainous Regions										Monitoring						
Inputs from JICA										Issue	Solution					
Expert	Plan	Actual	FY 2016				FY 2017				Remarks	FY 2020				
			I	II	III	IV	I	II	III	IV			I	II	III	IV
Chief Advisor / Highway Development															Clearance from screening committee is required yearly	New Chief Adviser from Japan to be mobilized from
Highway Engineering / Coordinator															New Expert from Sept 1st, 2018	
Team Leader/Slope Protection I															9.35/13.02 MM (72%)	
Deputy Team Leader/Slope Protection III															2.65/4.77MM (56%)	
Mountain Tunnel															6.27/7.5 MM (84%)	
Slope Protection W/High Embankment															7.98/10.43MM(77%)	
Mountain Bridge															5.57/6.9 MM (81%)	
Facility of Mountain Roads															3.83/3.83 MM (100%)	
Maintenance & Operation of Mountain Roads															4.45/6.17 MM (72%) Expert changed from Sept. 2018	
Natural Condition (Topography/Geology)															2.83/3.83 MM (74%)	
Drainage Plan															2.33/3.33 MM (70%)	
Plan and Survey of Mountain Roads/Coordinator															3.93/5.17 MM(76%)	
Monitoring and Evaluation															1.97/3 MM (66%)	
Highway Engineering for Mountain Road															1.5/1.5MM(100%) (Support)	
Equipment																
Training in Japan																
Counterpart Training in Japan																
In-country/Third country Training																
Inputs from India																
Expert																
Chairperson																Chairperson changed from Feb 2019
Project Director																New Project Director from October 2017
Project Manager																New Project Manager from October 2017
Project Co-Manager																
Project Co-Manager																
Project Co-Manager																
Counterparts (9)																
Equipment																

Minutes of 8th JCC


THE MINUTES OF JOINT COORDINATION COMMITTEE MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
AND
MINISTRY OF ROAD TRANSPORT & HIGHWAYS (MORTH)
ON
CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN MOUNTAINOUS REGIONS

In accordance with Section No. 6, Point No. 3 of the Record of Discussions of “Capacity Development Project on Highways in Mountainous Regions (hereinafter referred to as “the Project”)” signed on December 31st, 2015 (hereinafter referred to as “R/D”) between the Japan International Cooperation Agency (hereinafter referred to as “JICA”) and the Ministry of Road Transport and Highways (hereinafter referred to as “MoRTH”), a Joint Coordination Committee (JCC) meeting (hereinafter referred to as “the Meeting”) was held by web-based video conference on July 13th, 2021.

The purpose of the meeting was to review the progress of the Project and also discuss the semi-annual activities after the Meeting and other related issues of the Project.

As a result of the discussions, both sides mutually agreed upon the matters referred to in the documents attached hereto.

New Delhi, July 13th, 2021



NAGAI Shinsuke
Senior Representative
Japan International Cooperation Agency
India Office



I.K. Pandey
Director General (Road Development) &
Special Secretary (DG (RD) &SS)
Ministry of Road Transport and Highways

Minutes of the Joint Coordination Committee (JCC) meeting

Date: July 13th, 2021

Time: 16:30PM – 17:30PM (IST), 20:00PM – 21:00PM (JST)

Venue: Online Web Meeting

Representatives from Indian Side

- 1) Mr. I.K Pandey, DG (RD)&SS, MoRTH – Chairperson
- 2) Mr. K.C. Gupta, Additional Secretary, MoRTH – Project Director
- 3) Mr. Ravi Prasad, ADG (Zone-I & III), MoRTH
- 4) Mr. D. Sarangi, ADG (Zone-I, IV & S&R), MoRTH
- 5) Mr. S.K. Nirmal, ADG (Zone-II & V), MoRTH
- 6) Mr. Sanjeev Kumar, CE (SR&T), MoRTH
- 7) Mr. Sanjay Garg, CE-II (S&R)
- 8) Mr. Rakesh Kumar, SE (EAP), MoRTH – Project Manager
- 9) Mr. Lalatendu behera, SE (Planning), MoRTH
- 10) Mr. Vipin Kumar, EE (EAP), MoRTH
- 11) Mr. Bharat Johiya, EE (EAP), MoRTH
- 12) Mr. L.P. Padhy, CGM, NHAI
- 13) Mr. Navin Kumar, CGM, NHAI
- 14) Mr. W. Blah, ED, NHIDCL
- 15) Mr. Vivekanand Jaiswal, DGM(T), NHIDCL
- 16) Mr. S.K. Tomar, GM(P) - PMU Kalimpong, NHIDCL
- 17) Mr. Shankar Bhowmik, GM(P) – PMU Ranipool, NHIDCL

Representatives from Japanese Side

- 1) Mr. KAWAHARA Shuntaro , Senior Advisor (Road), Transport Group, JICA HQ
- 2) Mr. KOYANAGAI Yoshimoto , Director, Team 1, Transport Group, Infrastructure Management Department, JICA HQ
- 3) Ms. SENDA Kanako, Deputy Director, Team 1, Transport Group, Infrastructure Management Department, JICA HQ
- 4) Mr. NAGAI Shinsuke , Senior Representative, JICA India office – Co-Chairperson
- 5) Ms. WATANABE Arisa , Representative, JICA India office
- 6) Mr. Subroto Talukdar, Additional Chief Development Specialist, JICA India office
- 7) Mr. KAWAMURA Yoshinori , Team Leader / Slope Protection I Expert
- 8) Mr. GONAI Yoshimizu, Deputy Team Leader / Slope Protection III Expert
- 9) Dr. MAYUMI Takayuki, Slope Protection II / High Embankment Expert
- 10) Mr. YAMADA Denichiro , Operation & Maintenance of Mountain Road Expert
- 11) Ms. Cleopatra Panganayi, Monitoring / Evaluation Expert
- 12) Mr. KIYOSE Kazuhiro, Counsellor, Embassy of Japan in India - Observer

MINUTES

1) Introduction

The meeting was opened with welcome address by Mr. K.C. Gupta, Additional Secretary, MoRTH, and opening remarks by Mr. I.K. Pandey, DG(RD) & SS, MoRTH including a brief overview of the Project status and confirmation of the Project extension to Mar. 2022 due to the COVID-19 pandemic. The Indian side confirmed that the guidelines completed by JICA Experts were currently under further review and consultations with other stakeholders including the IRC.

The JICA Experts then explained the project progress and bi-annual work plan. It was reconfirmed that all guidelines had been completed and submitted to MORTH in March 2020 for its approval.

2) Semi Annual Report and Semi Annual Work Plan

(1) Pilot Project Progress

It was explained that three (3) pilot project sites selected by the Indian side namely NH10, NH54 and NH717 were ongoing.

In NH10, NHIDCL and the Contractor prepared draft working drawings and method statements and submitted to JICA Experts who are currently reviewing them to develop the technical transfer program to NHIDCL planned to be held after the monsoon season.

In NH717, NHIDCL and the Consultant completed the site survey and submitted the results to JICA Experts. JICA Experts are now scrutinizing the survey results. Then, based on the results, JICA Experts will prepare technical recommendations to NHIDCL.

In NH54, NHAI and the Consultant are implementing site survey scheduled for completion by the end of July or August. NHAI submitted substantial amount of survey results, which are now being scrutinized by JICA Experts. JICA Experts are awaiting the remaining survey results to prepare technical recommendations to NHAI.

(2) Timeline of Pilot Projects

JICA Experts reported that progress of the pilot projects was substantially affected by COVID-19 pandemic and fell behind the original timeline. Therefore, the project completion was revised from the end of March 2021 to the end of March 2022 to enable completion of technical transfer through the pilot projects. Trips to India for JICA Experts which had been suspended from April 2020 to March 2021 due to COVID-19 pandemic were temporarily resumed in April 2021 before re-suspension.

In view of these developments, JICA Experts, MoRTH, NHAI and NHIDCL agreed on the revised timeline for each site of the pilot project. Even in this difficult situation, JICA Experts confirmed that NHAI and NHIDCL are striving to keep the timeline. JICA Experts then requested the Indian side to continue to monitor the contractor and the consultants to keep the revised timeline.

3) Other Topics

(1) Guidelines Approval

JICA Experts requested Indian side to expedite MoRTH's approval process of four (4) of the five (5) guidelines. Indian side agreed for approval of the guidelines after webinars delivered by JICA side. Final version of the Slope Protection Guideline, which is to incorporate the feedback from the ongoing pilot project, is to be submitted in early January, 2022 with approval by MoRTH expected by February, 2022.

(2) 5th Country-focused Training

JICA Experts explained that the 5th country-focused training program, which was originally planned to be held in May and June 2020, was cancelled because of COVID-19 pandemic, which is followed by and international flight travel restrictions.

(3) Project Members

It was reported that the tenure of the two (2) JICA Long-term Experts ended in the previous fiscal year and from April 2021, no JICA Long-term Expert is assigned to the Project. Therefore, JICA Short-term Experts would be handling essential project activities. On the Indian side, all positions remained unchanged though changes of office bearers were noted.

(4) Requests from Indian Side

The Indian side requested more activities to enhance the technical transfer of the Project including seminars and training workshops to explain the guidelines. The JICA side sought clarity on the adequacy of seminars that were already conducted to obtain feedbacks for finalizing the submitted guidelines. The Indian side acknowledged receiving the training but requested further training based on the completed guidelines. The JICA side then agreed to discuss the issue further and furnish the Indian side with a plan in due course.

4) Closing

The JICA side requested an update on Covid-19 related travel restrictions in India. The JICA India office confirmed that currently short-term travel to India by JICA Experts is under suspension and will be reviewed based on the situation in India. The Chair then ended the meeting with a vote of thanks to all participants.

The next JCC meeting is to be held in October or November 2021.

Attachments

- Attachment 1: Monitoring Sheet (Version.6)

Minutes of the Final JCC (9th JCC)

To be signed by the senior representative of JICA India and ADG of MoRTH.

The JCC was held on the 11th of February, 2020. On the 14th of the same, the minutes was handed over to MoRTH for the confirmation and signature by the ADG.

THE MINUTES OF JOINT COORDINATION COMMITTEE MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
AND
MINISTRY OF ROAD TRANSPORT & HIGHWAYS (MORTH)
ON
CAPACITY DEVELOPMENT PROJECT ON HIGHWAYS IN MOUNTAINOUS REGIONS

In accordance with Section No. 6, Point No. 3 of the Record of Discussions of “Capacity Development Project on Highways in Mountainous Regions (hereinafter referred to as “the Project”)” signed on December 31st, 2015 (hereinafter referred to as “R/D”) between the Japan International Cooperation Agency (hereinafter referred to as “JICA”) and the Ministry of Road Transport and Highways (hereinafter referred to as “MoRTH”), a Joint Coordination Committee (JCC) meeting (hereinafter referred to as “the Meeting”) was held by web-based video conference on February 11th, 2022.

The purpose of the meeting was to review and confirm the achievement of the Project.

As a result of the discussions, both sides mutually agreed upon the matters referred to in the documents attached hereto.

New Delhi, February 14th, 2022

NAGAI Shinsuke
Senior Representative
India Office
Japan International Cooperation Agency

Mr. S.K. Nirmal
Additional Director General (Zone-II &V)
Ministry of Road Transport and Highways

Minutes of the Joint Coordination Committee (JCC) meeting

Date: February 11th, 2022

Time: 15:00–16:00 (IST), 18:30 – 19:30 (JST)

Venue: Online Web Meeting

Representatives from Indian Side

- 1) Mr. S.K. Nirmal, ADG (Zone-II & V), MoRTH
- 2) Mr. Sanjay Garg, CE-II (S&R), MoRTH
- 3) Mr. Rakesh Kumar, SE (EAP), MoRTH – Project Manager
- 4) Mr. Vipin Kumar, EE (EAP), MoRTH
- 5) Mr. Vikas Kirar, EE(EAP), MoRTH
- 6) Mr. Bharat Johiya, EE (EAP), MoRTH
- 7) Mr. Sandip Krishna Saha, RO-Kolkata, MoRTH
- 8) Mr. Navin Kumar, CGM, NHAI
- 9) Mr. Amarendra Kumar, CGM, NHAI
- 10) Mr. S K Mishra, CGM, NHAI
- 11) Mr. R S Yadav, ED, NHIDCL

Representatives from Japanese Side

- 1) Mr. KAWAHARA Shuntaro, Senior Advisor (Road), Transport Group, JICA HQ
- 2) Mr. KOYANAGI Yoshimoto, Director, Team 1, Transport Group, Infrastructure Management Department, JICA HQ
- 3) Ms. SENDA Kanako, Deputy Director, Team 1, Transport Group, Infrastructure Management Department, JICA HQ
- 3) Mr. OTA Yuki, Deputy Director, Team 1, Transport Group, Infrastructure Management Department, JICA HQ
- 4) Mr. SAITO Mitsunori, Chief Representative, JICA India office
- 5) Mr. NAGAI Shinsuke, Senior Representative, JICA India office – Co-Chairperson
- 6) Ms. WATANABE Arisa, Representative, JICA India office
- 7) Mr. Subroto Talukdar, Additional Chief Development Specialist, JICA India office
- 8) Mr. KAWAMURA Yoshinori, Team Leader / Slope Protection I Expert
- 9) Mr. GONAI Yoshimizu, Deputy Team Leader / Slope Protection III Expert
- 10) Dr. MAYUMI Takayuki, Slope Protection II / High Embankment Expert
- 11) Mr. YAMADA Denichiro, Operation & Maintenance of Mountain Road Expert
- 12) Mr. KIYOSE Kazuhiro, Counsellor, Embassy of Japan in India - Observer

MINUTES

1) Introduction

The meeting was opened with welcome address by Mr. Mr. Rakesh Kumar, Superintending Engineer, MoRTH, from India side and Mr. SAITO Mitsunori, Chief Representative, JICA India, from Japan side.

2) Activity Report for entire project period.

All activities required for the Project namely field surveys, seminars, TG meetings, webinars, guidelines, pilot projects and country-focused training were completed by the end of January, 2022.

(1) Field Surveys

Field surveys and discussions with site engineers were made between FY2017 to FY2018 including case study sites.

(2) Webinars for Guidelines Explanation

All guidelines (Planning, Slope protection, Tunnel, Bridge, O&M) were disseminated and introduced by JICA Experts through webinars from September to October, 2021. Webinars were organized in coordination with EAP, MoRTH and were successfully completed.

(3) Guidelines

The feedback to the Guidelines from Indian side through the webinars and pilot projects was incorporated in the final revision. All five guidelines were successfully submitted to MoRTH on 5th and 8th December 2021. All five guidelines were approved by MoRTH on 31st of January 2022.

(4) Pilot Projects

Pilot projects on NH10 (Sikkim), NH54 (Assam) and NH717 (West Bengal) were completed by December 2021. The scope of the pilot projects involved (1) NH10 - construction of concrete crib works and horizontal drainage boring on 2 slides (2) NH717- design recommendations on countermeasures against gravity deformation and (3) NH54- same as NH717:

(5) Country-Focused Training

Country-Focused Training in collaboration with IAHE was conducted 4 times between 2016 and 2019. A total of 38 Indian engineers and officials participated in the train programs. The 5th training was cancelled because of the COVID-19. The themes covered included (1) sustainable development and O&M of hill roads, (2) sustainable development of hill roads and related technologies, (3) design and construction of slope protection, bridges, and tunnels of hill roads and (4) best practices for sustainable development and O&M of hill roads.

(6) Other activities

- Reference on Gravity Deformation & Textbook for Map Reading

JICA Experts submitted the reference book on gravity deformation & text book for map reading to MoRTH, NHAI, NHIDCL on 1st October, 2021.

- IRC Annual Session

JICA Experts provided technical presentations at the 77th, 78th, 79th and 80th IRC annual sessions.

- Facebook

A total of 42 articles (4 articles in FY2021) were posted on the project page.

<https://www.facebook.com/JICA.INDIA.CDProjectHillRoad/>

3) Confirmation of Project Output and Indicator

All indicators are confirmed achieved for all outputs.

Output1: Issues on the development of mountainous highways were identified and the capacity of personnel for mountainous highways was developed.

Indicator 1-1. Survey and planning guidelines for mountainous highways is completed by June 2019. – Achieved.

Indicator 1-2. Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways. – Achieved.

Output2: Guidelines on design and construction for mountainous highways were developed.

Indicator 2-1. Improved tunnel guideline is completed by June 2019. – Achieved.

Indicator 2-2. Earthwork guideline is completed by June 2019. – Achieved.

Indicator 2-3. High pier bridge guideline is completed by June 2019. – Achieved.

Indicator 2-4. Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways. – Achieved.

Output3: Foundation for operation and maintenance for mountainous highways was built.

Indicator 3-1. Operation and Maintenance guideline for mountainous highways is completed by June 2020. – Achieved.

Indicator 3-2. Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways. – Achieved.

4) Achievement of Project Purpose

All indicators are confirmed achieved for the project purpose.

Project purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.

Indicator PP1. Model activities are conducted applying the developed guidelines by the Project.
– Achieved.

Indicator PP2. Core officers are able to give lectures on development of mountainous highways in the training courses. – Achieved.

5) Prospects to Achieve Overall Goal

Both sides confirmed that the Overall Goal will be achieved with high prospect.

Overall Goal: Mountainous highways are properly developed and maintained by using guidelines developed by the Project.

Indicator OG1. At least four sections of road development projects are planned/ constructed/ improved by using guidelines developed by the Project

Indicator OG2. At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.

And both sides confirmed that, to achieve the Overall Goal, the following actions by Indian Side would be necessary.

(1) Selection and monitoring of at least four sections of road development projects, and at least four sections of road O&M projects.

(2) Arrangement of engineers, and management of hill road projects including allocation of appropriate budget.

(3) Continuous training for engineers for capacity enhancement of hill road development and O&M.

6) Publication of Guidelines

Both sides confirmed that the Guidelines developed in the Project would be published from IRC. Publication from JICA Library Website would be confirmed after the publication from IRC.

JICA Library Website : <https://libportal.jica.go.jp/library/public/Index.html>

7) Closing

The Chair/ S.K. Nirmal, Additional Director General-Nodal Officer, MoRTH, then ended the meeting with a vote of thanks to all participants.

Attachments

- Attachment 1: Monitoring Sheet (No.10, as of 30th September 2021)
- Attachment 2: Monitoring Sheet (Final, as of 15th February 2022)
- Attachment 3: Project Completion Report

Appendix 5

Monitoring Sheet (Version 1 - Version 10)

Final Version at the completion

Monitoring Sheet (Version 1)

TO CR of JICA INDIA OFFICE

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.1 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Shu MORIYAMA

Title: Chief Advisor

Submission Date: 28th/Apr/2017

I. Summary

1 Progress

1-1 Progress of Inputs

(1) Inputs from JICA

Long Term Experts

Shu MORIYAMA,

Long Term Expert, Chief Advisor / Highway Development, 2016.11-

Denichiro YAMADA,

Long Term Expert, Highway Engineering / Coordinator, 2016.4-

(2) Inputs from MoRTH, GoI

S. N. Das, Chairperson, 2016.12-2017.2

Manoy Kumar, Chairperson, 2017.3-

Leena Nandan, Project Director, 2016.12-

Kishor Chandwani, Project Manager, 2016.12-

B. S. Singla, Project Co-Manager, 2016.12-

Rahul Gupta, Project Co-Manager, 2016.12-

1-2 Progress of Activities

(1) Conduct model activities such as training, including collaboration with Indian Academy for Highway Engineer (IAHE)

- Program of Training for Counter Personnel collaborated with IAHE was drafted.

(2) Conduct field surveys to the typical mountainous highways.

- Field surveys in NH40 and NH55 etc. is being conducted.

1-3 Achievement of Output

N/A

1-4 Achievement of the Project Purpose

N/A

1-5 Changes of Risks and Actions for Mitigation

N/A

1-6 Progress of Actions undertaken by JICA

Actions undertaken by JICA were carried out as planned.

1-7 Progress of Actions undertaken by MoRTH, Gov. of India

Actions undertaken by MoRH, Gov. of India were carried out as planned.

1-8 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

N/A

2 Delay of Work Schedule and/or Problems (if any)

N/A

3 Modification of the Project Implementation Plan

N/A

4 Preparation of MoRTH Gov. of India toward after completion of the Project

N/A

II. Project Monitoring Sheet I & II *as Attached*

Project Monitoring Sheet I (Revision of Project Design Matrix)

Version 1

Dated 28th,4,2017

Project Title: Capacity Development Project on Highways in Mountainous Regions

Implementing Agency: Ministry of Road Transport and Highways (MoRTH)

Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD

Period of Project: Apr, 2016 – Mar, 2021 (Five (5) years)

Project Site: Whole India

Narrative Summary		Model Site:		Important Assumption		Achievement	Remarks
Overall Goal	Objectively Verifiable Indicators	Means of Verification	Important Assumption				
Mountainous highways are properly developed and maintained by using guidelines developed by the Project	OG1 At least three 4 sections of road development projects are planned/constructed/improved by using guidelines developed by the Project. OG2 At least three 4 sections of roads are conducted by using the operation and maintenance guideline developed by the Project	Detailed Project Report (DPR) / Feasibility Study Report Contract Document Completion Report by the operation and maintenance contractor					
Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.	PP1 Model activities are conducted applying the developed guidelines by the Project. PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors	- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.				
Outputs Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed. Output 2: Guidelines on design and construction for mountainous highways are developed.	1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019. 1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways 2-1 Improved tunnel guideline is completed by June 2019.	Survey and planning guidelines Project records Improved tunnel guideline, Project records					
Output 3: Foundation for operation and maintenance for mountainous highways is built.	2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019. 2-3 High pier bridge guideline is completed by June 2019. 2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways. 3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020. 3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous	Earthwork guideline, Project records High pier bridge guideline, Project records Project records Operation and maintenance guideline, Project records Project records	- MoRTH coordinate all related government organizations and other agencies.				

Activities	Inputs		
	The Japanese Side	The Indian Side	
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <Short-term Experts/Consultants> - Tunnel - Tunnel Facilities - Earthwork - Bridge - Monitoring and Evaluation - Other Fields, as necessary</p> <p>(2) Training for Counterpart Personnel (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessary.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessary</p>	<p>(1) Allocation of Counterpart Personnel - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>- Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterpart personnel from the relevant organizations are assigned immediately after the Project starts.</p> <p style="background-color: yellow;"><Issues and countermeasures></p> <p>Office space of Chiefadvisor will be temporarily secured in NHIDCL due to no space in MoRTH.</p> <p>Office space of Short-term Experts/Consultants will be secured in MoRTH/NHAI/NHIDCL.</p>

Project Monitoring Sheet II (Revision of Plan of Operation)

Project Title: Capacity Development Project on Highways in Mountainous Regions

Dated 28th, 4, 2017

Inputs from JICA Expert	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				Remarks	Issue	Solution	
	Plan	Actual	2016		2017		2018		2019		2020		Responsible Organization	Achievements	Issue & Countermeasures									
			I	II	III	IV	I	II	III	IV	I	II				III	IV	I	II	III	IV			
Chief Advisor / Highway Development																								
Highway Engineering / Coordinator																								
Geologist / Slope Protection																								
Enbankment / Drainage																								
Tunnel																								
Tunnel Facilities																								
Bridge																								
Monitoring and Evaluation																								
Equipment																								
Training in Japan																								
Counterpart Training in Japan																								
In-country/Third country Training																								
Inputs from India Expert																								
Chairperson																								
Project Director																								
Project Manager																								
Project Co-Manager																								
Project Co-Manager																								
Counterparts (9)																								
Equipment																								
Activities [Sub-Activities]																								
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed																								
1.1 Collect and analyze existing information on mountainous highways and identify issues on development of mountainous highways, including identification of road conditions for disaster risk reduction.																								
1.2 Conduct field surveys to the typical mountainous highways.																								
1.3 Improve survey and planning guidelines on mountainous highways.																								
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.																								
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*																								
Output 2: Guidelines on design and construction for mountainous highways are developed.																								
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.																								
2.2 Improve a tunnel guideline.																								

2.3 Develop an earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.) 2.4 Develop a high pier bridge guideline.	Plan Actual Plan Actual		Superintending Engineer (EAP) MoRTH Superintending Engineer (EAP) MoRTH	
Output 3: Guideline on operation and maintenance for mountainous highways is developed.				
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues. 3.2 Develop an operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan Actual Plan Actual		Superintending Engineer (EAP) MoRTH Superintending Engineer (EAP) MoRTH	Guidelines is being collected (Maintenance guideline etc.)
Duration / Phasing				
Monitoring Plan				
Monitoring				
Joint Coordination Committee	Plan Actual		Remarks	Issue Solution
Set-up the Detailed Plan of Operation	Plan Actual			
Submission of Monitoring Sheet	Plan Actual			
Reports/Documents				
Project Completion Report	Plan Actual			
Public Relations				
Plan Actual				

Monitoring Sheet (Version 2)

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.2 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Khushar Chand

Shu MORIYAMA

Title: Superintending Engineer (EAP)

Chief Advisor

Submission Date: Oct 11th, 2017

I. Summary

1 Progress

1-1 Progress of Inputs

(1) Inputs from JICA

Long Term Experts

Shu MORIYAMA,

Long Term Expert, Chief Advisor / Highway Development, 2016.11-

Denichiro YAMADA,

Long Term Expert, Highway Engineering / Coordinator, 2016.4-

Short Term Experts

Yoshinori KAWAMURA

Short Term Expert, Team Leader / Slope Protection I , 2017.9-

Seiji KADOOKA

Short Term Expert, Deputy Team Leader / Slope Protection III, 2017.9

Takayuki MAYUMI

Short Term Expert, Slope Protection II / High Embankment, 2017.9-

Michiya KITAYAMA

Short Term Expert, Maintenance & Operation of Mountain Roads, 2017.9-

Masaaki GOTO

Short Term Expert, Plan and Survey of Mountain Roads / Coordinator, 2017.9-

Cleopatra PANGANAYI

Short Term Expert, Monitoring / Evaluation, 2017.10-

(2) Inputs from MoRTH, Gol

[MoRTH]

Manoj Kumar, Chairperson, 2017.3-

S. N. Das, Chairperson, 2016.12-2017.2

Amit Kumar Ghosh, Project Director, 2017.10-

Leena Nandan, Project Director, 2016.12-2017.9

Khushar Chand, Project Manager, 2017.10-

Kishor Chandwani, Project Manager, 2016.12-2017.9

[NHAI]

B. S. Singla, Project Co-Manager, 2016.12-

Navin Kumar, Project Co-Manager, 2017.10-

M.K. Jain, Project Co-Manager, 2017.4-2017.6

[NHIDCL]

Rahul Gupta, Project Co-Manager, 2016.12-

1-2 Progress of Activities

(1) Conduct model activities such as training, including collaboration with Indian Academy for Highway Engineer (IAHE)

- 1st Program of Training for Counterpart Personnel collaborated with IAHE was implemented.

- 2nd Program of Training for Counterpart Personnel collaborated with IAHE was drafted.

(2) Conduct field surveys to the typical mountainous highways.

- Field surveys in NH55, NH40 and others was conducted.

- Field surveys in NH48, NH22 and NH707A was conducted.

1-3 Achievement of Output

N/A

1-4 Achievement of the Project Purpose

N/A

1-5 Changes of Risks and Actions for Mitigation

N/A

1-6 Progress of Actions undertaken by JICA

Actions undertaken by JICA were carried out as planned.

1-7 Progress of Actions undertaken by MoRTH, Gov. of India

Actions undertaken by MoRTH, Gov. of India were carried out as planned.

1-8 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

2 Delay of Work Schedule and/or Problems (if any)

N/A

3 Modification of the Project Implementation Plan

N/A

4 Preparation of MoRTH Gov. of India toward after completion of the Project

N/A

II. Project Monitoring Sheet I & II *as Attached*

Project Monitoring Sheet I (Revision of Project Design Matrix)

Version 2

Dated 11th Oct, 2017

Project Title: Capacity Development Project on Highways in Mountainous Regions**Implementing Agency:** Ministry of Road Transport and Highways (MoRTH)**Target Group:** Officials of MoRTH, NHAI, NHIDCL and PWD**Period of Project:** Apr, 2016 – Mar, 2021 (Five (5) years)**Project Site:** Whole India

Model Site:		Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal	Objectively Verifiable Indicators				
Mountainous highways are properly developed and maintained by using guidelines developed by the Project	OG1 At least four sections of road development/projects are planned/constructed/improved by using guidelines developed by the Project. OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.	Detailed Project Report (DPR) / Feasibility Study Report Contract Document Completion Report by the operation and maintenance contractor			
Project Purpose	PP1 Model activities are conducted applying the developed guidelines by the Project. PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.	Project records, Evaluation/Observation by the Japanese Experts. Interviews to supervisors Project records, Evaluation/Observation by the Japanese Experts. Interviews to supervisors	- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to		
Outputs	1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019. 1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways 2-1 Improved tunnel guideline is completed by June 2019. 2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019. 2-3 High pier bridge guideline is completed by June 2019. 2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways. 3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020. 3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	Survey and planning guidelines Project records Improved tunnel guideline, Project records Earthwork guideline, Project records High pier bridge guideline, Project records Project records Operation and maintenance guideline, Project records Project records	- MoRTH coordinate all related government organizations and other agencies.		
Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.					
Output 2: Guidelines on design and construction for mountainous highways are developed.					
Output 3: Foundation for operation and maintenance for mountainous highways is built.					

Activities	Inputs	Important Assumption	Achievement	Remarks
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier-bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III</p> <p>- Mountain Tunnel - Tunnel Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessary</p> <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessary.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessary</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterparts - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHA respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts (4) Pilot Project Cost, if required construction works.</p> <p>Majority of trained officials continues to work for counterpart agencies.</p> <p>Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures></p> <p>Additional office space of Short-term Experts/Consultants will be secured in MoRTH/NHA/NHIDCL.</p>	<p>1. Field Surveys were conducted in 5 of 10 case study sites i.e. NH40, NH55, NH48, NH21, NH707A etc.</p> <p>2. 1st Program of Training for Counterparts collaborated with IAHE was implemented in May 2017.</p>	

Project Monitoring Sheet II (Revision of Plan of Operation)

Project Title: Capacity Development Project on Highways in Mountainous Regions		FY 2016												FY 2017				FY 2018				FY 2019				FY 2020				Remarks	Issue	Solution																	
		I			II			III			IV			I			II			III			IV			I			II				III			IV													
Inputs from JICA	Plan																																																
	Actual																																																
Expert	Plan																																																
	Actual																																																
Chief Advisor / Highway Development	Plan																																																
	Actual																																																
Highway Engineering / Coordinator	Plan																																																
	Actual																																																
Team Leader/Slope Protection I	Plan																																																
	Actual																																																
Deputy Team Leader/Slope Protection III	Plan																																																
	Actual																																																
Mountain Bridge	Plan																																																
	Actual																																																
Tunnel Facilities	Plan																																																
	Actual																																																
Slope Protection III/High Embankment	Plan																																																
	Actual																																																
Facility of Mountain Roads	Plan																																																
	Actual																																																
Maintenance & Operation of Mountain Roads	Plan																																																
	Actual																																																
Natural Condition (Topography/Geology)	Plan																																																
	Actual																																																
Drainage Plan	Plan																																																
	Actual																																																
Plan and Survey of Mountain Roads/Coordinator	Plan																																																
	Actual																																																
Monitoring and Evaluation	Plan																																																
	Actual																																																
Equipment	Plan																																																
	Actual																																																
Training in Japan	Plan																																																
	Actual																																																
Counterpart Training in Japan	Plan																																																
	Actual																																																
In-country/Third country Training	Plan																																																
	Actual																																																
Inputs from India	Plan																																																
	Actual																																																
Expert	Plan																																																
	Actual																																																
Chairperson	Plan																																																
	Actual																																																
Project Director	Plan																																																
	Actual																																																
Project Manager	Plan																																																
	Actual																																																
Project Co-Manager	Plan																																																
	Actual																																																
Project Co-Manager	Plan																																																
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Project Co-Manager	Plan																																																
	Actual																																																
Counterparts (9)	Plan																																																
	Actual																																																
Equipment	Plan																																																
	Actual																																																

Activities Sub-Activities	2016				2017				2018				2019				2020				Responsible Organization	Achievements	Issue & Countermeasures
	Plan	Actual	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV					
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed																							
1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.																							
1.2 Conduct field surveys to the typical mountainous highways.																							
1.3 Improve survey and planning guidelines on mountainous highways.																							
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.																							
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)																							
Output 2: Guidelines on design and construction for mountainous highways are developed.																							
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.																							
2.2 Improve a tunnel guideline.																							
2.3 Develop an earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).																							
2.4 Develop a high pier bridge guideline.																							
Output 3: Guideline on operation and maintenance for mountainous highways is developed.																							
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.																							
3.2 Develop an operation and maintenance guidelines for mountainous highways including issues on disaster management.																							
Duration / Phasing																							
Monitoring Plan																							
Monitoring																							
Joint Coordination Committee																							
Set-up the Detailed Plan of Operation																							
Submission of Monitoring Sheet																							
Reports/Documents																							
Project Completion Report																							
Public Relations																							
Plan																							
Actual																							
Remarks																							
Issue																							
Solution																							

Monitoring Sheet (Version 3)

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.3 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Khushar Chand

Shu MORIYAMA

Title: Superintending Engineer (EAP)

Chief Advisor

Submission Date: April 18th, 2018

I. Summary

1 Progress

1-1 Progress of Inputs

(1) Inputs from JICA

Long Term Experts

Shu MORIYAMA,

Long Term Expert, Chief Advisor / Highway Development, 2016.11-

Denichiro YAMADA,

Long Term Expert, Highway Engineering / Coordinator, 2016.4-

Short Term Experts

Yoshinori KAWAMURA

Short Term Expert, Team Leader / Slope Protection I , 2017.9-

Seiji KADOOKA

Short Term Expert, Deputy Team Leader / Slope Protection III, 2017.9

Takayuki MAYUMI

Short Term Expert, Slope Protection II / High Embankment, 2017.9-

Michiya KITAYAMA

Short Term Expert, Operation & Maintenance of Mountain Roads, 2017.9-

Masaaki GOTO

Short Term Expert, Plan and Survey of Mountain Roads / Coordinator, 2017.9-

Fumihiko YOKOO

Short Term Expert, Mountain Tunnel, 2017.9-

Cleopatra PANGANAYI

Short Term Expert, Monitoring / Evaluation, 2017.10-

Hidetoshi NAKANO

Short Term Expert, Mountain Bridge, 2017.11-

Makoto TOKUDA

Short Term Expert, Natural Conditions, 2018.1-

Susumu MURASE

Short Term Expert, Facilities of Mountain Roads, 2018.1-

Takashi NISHIJIMA

Short Term Expert, Drainage Plan, 2018.1-

(2) Inputs from MoRTH, Gol

[MoRTH]

Manoj Kumar, Chairperson, 2017.3-

S. N. Das, Chairperson, 2016.12-2017.2

Amit Kumar Ghosh, Project Director, 2017.10-

Leena Nandan, Project Director, 2016.12-2017.9

Khushar Chand, Project Manager, 2017.10-

Kishor Chandwani, Project Manager, 2016.12-2017.9

[NHAI]

B. S. Singla, Project Co-Manager, 2016.12-

Navin Kumar, Project Co-Manager, 2017.10-

M.K. Jain, Project Co-Manager, 2017.4-2017.6

[NHIDCL]

Rahul Gupta, Project Co-Manager, 2016.12-

1-2 Progress of Activities

(1) Collect and analyze existing information, design and construction standards and operation and maintenance guidelines for mountainous highways.

- Existing standards for mountainous highways have been collected and analyzed

(2) Conduct model activities such as training, including collaboration with Indian Academy for Highway Engineer (IAHE)

- 1st Program of Training for Counterpart Personnel collaborated with IAHE was implemented.

• 2nd Program of Training for Counterpart Personnel collaborated with IAHE was implemented.

(3) Conduct field surveys to the typical mountainous highways.

• Field surveys in NH48, NH22 and NH707A were conducted.

• Field surveys in NH10, NH20, NH21, NH40, NH55, NH62 and NH310A were conducted

(4) Improve/Develop survey and planning, tunnel, earthwork, high pier bridge, and operation and maintenance guidelines

• Tables of contents were drafted.

1-3 Achievement of Output

N/A

1-4 Achievement of the Project Purpose

N/A

1-5 Changes of Risks and Actions for Mitigation

N/A

1-6 Progress of Actions undertaken by JICA

Actions undertaken by JICA were carried out as planned.

1-7 Progress of Actions undertaken by MoRTH, Gov. of India

Actions undertaken by MoRTH, Gov. of India were carried out as planned.

1-8 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

2 Delay of Work Schedule and/or Problems (if any)

N/A

3 Modification of the Project Implementation Plan

N/A

4 Preparation of MoRTH Gov. of India toward after completion of the Project

N/A

Project Monitoring Sheet I (Revision of Project Design Matrix)

Version 3
Dated 18th April, 2018

Project Title: Capacity Development Project on Highways in Mountainous Regions
Implementing Agency: Ministry of Road Transport and Highways (MoRTH)
Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD
Period of Project: Apr, 2016 – Mar, 2021 (Five (5) years)
Project Site: Whole India

Model Site:		Model Site:		Model Site:		Model Site:	
Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks		
<p>Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project. OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report Contract Document Completion Report by the operation and maintenance contractor</p>					
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project. PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to</p>				
<p>Outputs Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019. 1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Survey and planning guidelines Project records</p>					
<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019. 2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019. 2-3 High pier bridge guideline is completed by June 2019. 2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways</p>	<p>Improved tunnel guideline, Project records Earthwork guideline, Project records High pier bridge guideline, Project records Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>				
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020. 3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways</p>	<p>Operation and maintenance guideline, Project records Project records</p>					

Activities	Inputs	Important Assumption	Achievement	Remarks
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including provision of technical advisory services identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III - Mountain Tunnel - Tunnel Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessary</p> <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment Equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessary</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterparts - Chairperson - Project Director - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>1.1, 2.1 & 3.1 Existing standards for mountainous highways collected and analyzed</p> <p>1.2 Field Surveys were conducted in 10 of 10 case study sites.</p> <p>1.3, 2.2, 3.2, 4 & 3.2 TOC for new guidelines drafted</p> <p>1.5 1st and 2nd Training for Counterparts collaborated with IAHE was implemented</p>	<p>- Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures></p> <p>An independent room for Chief Advisor shall be secured in Transport Bhawan</p> <p>The office space for Short-term Experts in Jeevan Tara shall be available soon for the use.</p>

Project Monitoring Sheet II (Revision of Plan of Operation)

Dated 18th April, 2018

Project Title: Capacity Development Project on Highways in Mountainous Regions		Monitoring											
		Solution											
Inputs from JICA		Issue											
Expert		Remarks											
Short Term	Long Term	FY 2016		FY 2017		FY 2018		FY 2019		FY 2020		Issue	Solution
		I	II	III	IV	I	II	III	IV	I	II		
Chief Advisor / Highway Development		Plan	Actual										
Highway Engineering / Coordinator		Plan	Actual										
Team Leader/Slope Protection I		Plan	Actual										
Deputy Team Leader/Slope Protection III		Plan	Actual										
Mountain Tunnel		Plan	Actual										
Slope Protection II/High Embankment		Plan	Actual										
Mountain Bridge		Plan	Actual										
Facility of Mountain Roads		Plan	Actual										
Maintenance & Operation of Mountain Roads		Plan	Actual										
Natural Condition (Topography/Geology)		Plan	Actual										
Drainage Plan		Plan	Actual										
Plan and Survey of Mountain Roads/Coordinator		Plan	Actual										
Monitoring and Evaluation		Plan	Actual										
Equipment		Plan	Actual										
Training in Japan		Plan	Actual										
Counterpart Training in Japan		Plan	Actual										
In-country/Third country Training		Plan	Actual										
Inputs from India		Plan	Actual										
Expert		Plan	Actual										
Chairperson		Plan	Actual										
Project Director		Plan	Actual										
Project Manager		Plan	Actual										
Project Co-Manager		Plan	Actual										
Project Co-Manager		Plan	Actual										
Project Co-Manager		Plan	Actual										
Counterparts (9)		Plan	Actual										
Equipment		Plan	Actual										

Activities [Sub-Activities]	2016		2017		2018		2019		2020		Responsible Organization	Achievements	Issue & Countermeasures
	Plan	Actual	I	II	III	IV	I	II	III	IV			
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is													
1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests	Plan	Actual										Information collected and analyzed	
1.2 Conduct field surveys to the typical mountainous highways.	Plan	Actual										Field Surveys completed in all (10 of 10) case study sites	
1.3 Improve survey and planning guidelines on mountainous highways.	Plan	Actual										Table of Contents(TOC) drafted	
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan	Actual										Review of existing issues commenced	
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*	Plan	Actual										1st. and 2nd Training with IAHE were completed	
Output 2: Guidelines on design and construction for mountainous highways are developed.													
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan	Actual										Standards collected and analyzed	
2.2 Improve tunnel guidelines.	Plan	Actual										TOC drafted	
2.3 Develop earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan	Actual										TOC drafted	
2.4 Develop high pier bridge guidelines.	Plan	Actual										TOC drafted	
Output 3: Guideline on operation and maintenance for mountainous highways is developed.													
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan	Actual										Standards collected and analyzed	
3.2 Develop operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan	Actual										TOC drafted	
Duration / Phasing	Plan	Actual											
Monitoring Plan	Plan	Actual											
Monitoring													
Joint Coordination Committee	Plan	Actual											
Set-up the Detailed Plan of Operation	Plan	Actual											
Submission of Monitoring Sheet	Plan	Actual											
Reports/Documents													
Project Completion Report	Plan	Actual											
Public Relations													
Setting up & Updating Project Facebook Page	Plan	Actual											
Published article on Project Activities in MORTH Annual Report	Plan	Actual											

Monitoring Sheet (Version 4)

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.4 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Khushal Chand

Shu MORIYAMA

Title: Superintending Engineer (EAP)

Chief Advisor

Submission Date: 10th Oct., 2018

I. Summary

1 Progress

1-1 Progress of Inputs

- PDM related to Input were authorized on Dec 14th, 2016 as a ver.1

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of September 2018
A. Japanese side		
(1)Experts	<p><Long-term Experts></p> <ul style="list-style-type: none"> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <p><Short -term Experts/Consultants></p> <p><u>Total: 65.95MM</u></p> <ul style="list-style-type: none"> -Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III -Mountain Tunnel -Tunnel Facilities -Slope Protection II/High Embankment - Earthwork -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation 	<p><u><Long-term Experts></u></p> <ul style="list-style-type: none"> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <p><u><Short -term Experts></u></p> <p>Progress: (29.77/65.95 MM: 45.54 %)</p> <p>Between Nov 2017 and Sept 2018, the following short term experts were dispatched:</p> <ul style="list-style-type: none"> -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Slope Protection II/High Embankment - Mountain Bridge - Facility of Mountain Roads -Maintenance & Operation of Mountain Roads - Natural Condition(Topography/Geology) - Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of September 2018
(2) Training for Counterpart's Personnel	<p><Training in Japan> (Once a year, about 10 people for 2 weeks (5 times))</p>	<p><Training in Japan> (1) Country Focused Training was conducted in collaboration with IAHE Progress: 2/5 times -1st Country Focused Training held on 16th May -6th June 2017 (22 days) -2nd Country Focused Training/ Invitation held on 24th Oct -13th Nov 2017(21 days) (2) 3rd Country Focused Training (planned) 24th Oct -13th Nov 2018 (20 days)</p>
		<p><Training in India> Seminars held in India -1st technical seminar held on 19th June 2018 -2nd technical seminar held on 27th Sep 2018</p>
(3) Equipment	Equipment and/or Material, as necessary	None
(4) Local Costs	<p><Local Costs> - Office management cost - Local consultants - Other Local cost as necessity</p>	<p><Local Costs> - Project Assistant for Short Term Experts - Communication (internet and mobile phone) -No local consultants - Car rental (including driver)</p>
B. Indian Side		
(1) Indian Side Counterparts	<p><Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager -Project Members - Participants for training in Japan</p>	<p><Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager(3) -Project Members (9) - Participants for training in Japan (34) 1st Training(10); 2nd Training(10); 3rd Training(9) (planned); 1st Invitation Program (5) -Counterparts for guidelines (7) Overall control of 5 guidelines (2)</p>

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of September 2018
		Guideline for Planning(1) Guideline for Slope Protection and Embankment(1) Guideline for Bridge(1) Guideline for Tunnel(1) Guideline for Operation and Maintenance(1)
		<JCC Members> As specified in the Project Organizational Chart in Record of Discussion
(2) Operational Expenses	<Facilities> -Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively	<Facilities> -An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) was provided in NHAI HQ -Office space for Short-term Experts was provided in Jeevan Tara Building.
(3) Administrative cost	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses provided as required 2) Domestic travel cost for counterparts provided as required
(4) Pilot Project Cost	<Pilot Project Cost> Pilot Project Cost, if required construction works.	<Pilot Project Cost> Pilot Project Planned at 2 sites of Parwanoo to Solan section on NH22 in Himachal Pradesh

1-2 Progress of Activities

- Progress of activities is indicated in Monitoring Sheet II (PO) and Project Design Matrix (PDM)
- Basically no crucial bottlenecks in progress have been observed.

1-3 Achievement of Output

The deliverables achieved by the Project as per the TOR are given in the table below:

-PDM related to Output were authorized on Dec 14th, 2016 as a ver.1

*Completed, Ongoing, Scheduled for later

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept 2018	Status*
Output1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed		
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<p><progress 90%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p>(1) 6th Feb 2018 : Siliguri to Darjeeling on NH55 in West Bengal (2) 7th Feb 2018 : Sevoke to Sikkim on NH10 in West Bengal (3) 28th Sep 2017 : Mussoorie to Chamba on 707A in Uttarakahnd (4) 10th Apr 2018 : Kiratpur to Ner chowk on NH21 in Himachal (5) 10th Apr 2018 : Ner chowk to Manali on NH21 in Himacha (6) 9th Apr 2018 : Pathankot to Mandi on NH20 in Himachal (7) 15th Feb 2017 : Shiradi Ghat bypass on NH48 in Karnataka (8) 20th March 2018 : Assam border to Dalu on NH62 in Megalaya (9) 9th Feb 2018 : Mangan to Nakura on NH310 in Sikkim (10) 13th Oct 2017 : Shillong to Dawki on NH40 in Megalaya</p> <p><progress 100%></p> <p>3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018 followed by approval in April 2018 JCC Meeting.</p> <p><progress 60 %></p> <p>4) Development of survey and planning guideline is in progress, based on review of existing standards and field surveys.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept 2018	Status*
1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	<p><progress 20%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 2 times out of 5, and knowledge and skills in the area of road planning are being enhanced</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times in total.</p> <ul style="list-style-type: none"> - Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June 2018. - Parwanoo~Solan section of NH22 in Himachal Pradesh on 20th June 2018. <p>4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted 2 times in total.</p> <ul style="list-style-type: none"> -Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018 -Upon the request from NHAI, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018 -Based on the findings from the site visits, JICA experts prepared and presented a report containing countermeasures recommendations to the Indian side. <p><progress 50%></p> <p>5) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) were held 2 times.</p> <ul style="list-style-type: none"> -Meeting with state PWD of Karnataka in Feb 2017 -Meeting with state PWD of West Bengal in Feb 2018 -Tender documents for EPC contract from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement)) 	Ongoing
Output2: Guidelines on design and construction for mountainous highways are developed.		
2-1 Improved tunnel guideline is completed by June 2019.	<p><progress 90%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100 %></p> <p>2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018</p> <p><progress 60 %></p> <p>3) Development of tunnel guideline is in progress, based on review of existing standards and field surveys</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept 2018	Status*
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	<p><progress 90%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for earthwork guideline drafted and finalized at the TG meeting on 22nd February 2018</p> <p><progress 30%></p> <p>3) Development of earthwork guideline is in progress, based on review of existing standards and field surveys</p>	Ongoing
2-3 High pier bridge guideline is completed by June 2019.	<p><progress 90%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 25%></p> <p>3) Development of high pier bridge guideline is in progress, based on review of existing standards and field surveys</p>	Ongoing
2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	<p><progress 20%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 2 times out of 5, and knowledge and skills in the area of design and construction are being enhanced</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times in total.</p> <p>4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted 2 times in total. Also, based on the findings from the site visits, JICA experts prepared and presented a report containing countermeasures recommendations to the Indian side.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept 2018	Status*
Output3: Foundation for operation and maintenance for mountainous highways is built.		
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p><progress 90%></p> <p>1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 35%></p> <p>3) Development of O/M guideline is in progress, based on review of existing standards and field surveys</p>	Ongoing
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	<p><progress 20%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 2 times out of 5, and knowledge and skills in the area of operation and maintenance are being enhanced</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times in total.</p> <p>4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted 2 times in total. Also, based on the findings from the site visits, JICA experts prepared and presented a report containing countermeasures recommendations to the Indian side.</p> <p><progress 50%></p> <p>5) Meeting for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) was conducted 2 times in total. Also, Tender documents for EPC contract from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement))</p>	Ongoing

1-4 Achievement of the Project Purpose

The deliverables achieved by the Project as per the TOR are given in the table below:

*Completed, Ongoing, Scheduled for later

Project Purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.		
Indicators	Major Results	Status*
(1) Model activities are conducted applying the developed guidelines by the Project.	- Request for pilot project was made by India side in April 2018 JCC -Field survey for pilot project was conducted 2 times in total by JICA experts: (1) Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June 2018 (2) Parwanoo~Solan section of NH22 in Himachal Pradesh on 20th June 2018 -In TG held on 28 th Sept 2018 model activities were discussed	Ongoing
(2) Core officers are able to give lectures on development of mountainous highways in the training courses.	- The following actions taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 2 country focused training and one Invitation Program conducted in Japan	Ongoing

1-5 Changes of Risks and Actions for Mitigation

- N/A

1-6 Progress of Actions undertaken by JICA

- JICA Project Team conducted activities related to Output 1, 2 and 3. The progress is monitored as stated in section 1-3 "Achievement of Output".

1-7 Progress of Actions undertaken by Gov. of India

PDM ver.1 approved on Dec. 14th 2016	Actual as of Sept 2018	Status
1. Allocation of Counterpart Personnel from GOI	1. Allocated Counterpart Personnel from GOI	India side has availed all the required counterparts.
1.1 Chairperson	1.1 Chairperson	However, the counterpart responsible for Guideline for
1.2 Project Director	1.2 Project Director	Operation and Maintenance was
1.3 Project Manager	1.3 Project Manager	transferred and his position is
1.4 Project Co-Manager	1.4 Project Co-Manager(3)	now vacant from Aug 2018
1.5 Project Members	1.5 Project Members (9)	

PDM ver.1 approved on Dec. 14th 2016	Actual as of Sept 2018	Status
1.6 Participants for Training in Japan	<p>1.6 Participants for Training in Japan (34) 1st Training(10); 2nd Training(10); 3rd Training(9) (planned); 1st Invitation Program (5)</p> <p>1.7 Allocated Counterparts for guidelines</p> <ul style="list-style-type: none"> -Overall control of 5 guidelines -Guideline for Planning -Guideline for Slope Protection and Embankment -Guideline for Bridge -Guideline for Tunnel -Guideline for Operation Maintenance 	
<p>2. JCC Organization</p> <p>Establishment of JCC as per the Project Organizational Chart in Record of Discussion and holding of meetings at least twice a year</p>	<p>2. JCC Organization</p> <p>JICC was established and members attended the 1st JCC meeting held in MORTH on Dec. 14th, 2016 followed by holding JCC meetings in April 2017, October 2017 and April 2018 as scheduled.</p> <p>2.1 JCC Members</p> <ul style="list-style-type: none"> (1) Chairperson (2) Project Director (3) Project Manager (4) Project Co-Manager(3) (5) Project Members (9) <p>CE(s) of MoRTH, GM(s) of NHAI, GM(s) of NHIDCL</p>	<p>JCC establishment complete</p> <p>JCC meetings ongoing</p>
<p>3. Facilities</p> <p>Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p>	<p>3. Land, buildings and facilities</p> <p>a. An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) has been secured in NHAI HQ</p> <p>b. The office space for Short-term Experts has been availed in Jeevan Tara Building.</p>	<p>Not Completed</p> <p>- An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) in Transport Bhawan has not yet been secured.</p>
<p>4. Administrative cost and other expenses</p> <p>1) Personnel cost for counterparts and other running expenses</p>	<p>4. Administrative cost and other expenses</p> <p>1) Personnel cost for counterparts and other running expenses being provided as required</p>	<p>Ongoing</p>

PDM ver.1 approved on Dec. 14th 2016	Actual as of Sept 2018	Status
2) Domestic travel cost for counterparts	2) Domestic travel cost for counterparts being provided as required	
5. Pilot Project Cost, if required construction works.	5. Pilot Project (1) Plan for the pilot project at 2 sites of Parwanoo to Solan section on NH22 in Himachal Pradesh was prepared. (2) Field surveys for the pilot project with Japanese special contractors were conducted on 8th and 20th June.	Ongoing

1-8 Progress of Environmental and Social Considerations (if applicable)

- N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

- N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

- 1) An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) has not yet been secured in Transport Bhawan, therefore, it is necessary for JICA and MoRTH to continue to discuss.
- 2) The counterpart responsible for operation and maintenance guideline is no longer available due to job transfer in NHAI in July 2018. It was decided in JCC in October 2018 that the replacement will be informed by MoRTH shortly.
- 3) The early implementation of the pilot project on NH22 was suspended / temporarily canceled because the current implementation plan requires involvement of Japanese firms which Gov. of India is unable to accept in terms of transparency and fair competition of its procurement process. A plan for a pilot project which does not require nominating Japanese firms is necessary.
- 4) The outline of model activities were not discussed or decided in JCC in October 2018 but the discussion for it should be continued and concluded before the next JCC. The

model activities should be, however, commenced after the completion of draft guidelines which Indian side will check through.

- 5) Indian side is requesting at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the current project scheme, however, the team of JICA Short-term Experts does not have resources to supervise the implementation of civil work. The contract period for the team does not accommodate the necessary period for the civil work either. In order to respond the request for a pilot project with civil work, the team needs additional resources and contract period. On the other hand, MoRTH should propose appropriate site for pilot project which can be incorporated within the project period.

2 Delay of Work Schedule and/or Issues (Problems) (if any)

2-1 Issues/Problems

- A) Selection of the sites for early implementation of a pilot project for trial of countermeasures in actual construction delayed progress of guideline preparation.

2-2 Cause

- A) Pilot projects are supposed to commence after draft guidelines are prepared in April 2019. Early implementation of a pilot project for trial of countermeasures in actual construction was requested in JCC held in April 2018. JICA Experts needed to spend substantial time to select appropriate sites for the trial to suit budgetary and other requirement from MoRTH and this unplanned activity caused a delay in the progress of the draft guideline for slope protection.

2-3 Action to be taken

- A) Further delay shall be avoided. If the pilot project on NH22 is canceled, an appropriate site of pilot project should be proposed by Indian side. At the same time, if a pilot project with civil work should be implemented, JICA Short-term Expert Team should have additional experts in charge of design and supervision. The team requires relevant extension of the contract period to incorporate a pilot project with civil work as well. (Note: JICA Experts are unable to assume liability of design if the experts are requested to provide design)

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of India)

- A) JICA and Gov. of India

3 Modification of the Project Implementation Plan

3-1 PO

1) PO ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

3-2 Other modifications on detailed implementation plan (Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HQ. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)

1) PDM ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

2) The amendment R/D and PDM will be authorized by JICA HQ

II. Project Monitoring Sheet I & II *as Attached*

Project Monitoring Sheet I (Revision of Project Design Matrix)

Project Title: Capacity Development Project on Highways in Mountainous Regions

Implementing Agency: Ministry of Road Transport and Highways (MoRTH)

Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD

Period of Project: Apr, 2016 – Mar, 2021 (Five (5) years)

Project Site: Whole India

Version 4
Dated 10th October, 2018

Narrative Summary		Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<p>Overall Goal</p> <p>Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report</p>	<p>- Developed guidelines are approved by the MoRTH</p> <p>- Government policy to develop mountainous highways will not change.</p> <p>- MoRTH has enough finance to develop mountainous highways.</p>	<p>-Request for pilot project was made by India side in April 2018 JCC</p> <p>-Field survey for pilot project was conducted 2 times in total by JICA experts: (1)Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June 2018 (2)Parwanoo~Solan section of NH22 in Himachal Pradesh on 20th June 2018</p> <p>-In TG held on 28th Sept 2018 model activities were discussed</p>	<p>- The following actions taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 2 country focused training and one Invitation Program conducted in Japan</p>	
	<p>OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Contract Document Completion Report by the operation and maintenance contractor</p>				
<p>Project Purpose</p> <p>Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>-Request for pilot project was made by India side in April 2018 JCC</p> <p>-Field survey for pilot project was conducted 2 times in total by JICA experts: (1)Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June 2018 (2)Parwanoo~Solan section of NH22 in Himachal Pradesh on 20th June 2018</p> <p>-In TG held on 28th Sept 2018 model activities were discussed</p>	<p>- The following actions taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 2 country focused training and one Invitation Program conducted in Japan</p>		
	<p>PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>				

<p>Outputs</p> <p>Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p>	<p>Survey and planning guidelines</p>	<p><progress 90%> 1) Existing standards for mountainous highways were collected and analyzed, and issues were identified. <progress 100%> 2) Field Surveys were conducted in 10 of 10 case study sites. <progress 100%> 3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018, followed by approval in April 2018 JCC Meeting. <progress 60%> 4) Development of survey and planning guideline is in progress, based on review of existing standards and field surveys.</p>	
<p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Project records</p>		<p><progress 20%> for items 1) - 4) 1) 2 Country focused trainings including invitation program were conducted and 1 country focused training was planned 2) Technical Seminars were held 2 times in total 3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times in total. 4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted 2 times in total. <progress 50%> 5) Meeting for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) was conducted 2 times in total. Also, tender documents for EPC contract from 2 projects were collected and studied.</p>	

<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019.</p>	<p>Improved tunnel guideline, Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>	<p><progress 90%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100 %> 2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018 <progress 60 %> 3) Development of tunnel guideline is in progress, based on review of existing standards and field surveys</p>
<p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p>	<p>Earthwork guideline, Project records</p>	<p>Earthwork guideline, Project records</p>		<p><progress 90%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for earthwork guideline drafted and finalized at the TG meeting on 22nd February 2018 <progress 30%> 3) Development of earthwork guideline is in progress, based on review of existing standards and field surveys</p>
<p>2-3 High pier bridge guideline is completed by June 2019.</p>	<p>High pier bridge guideline, Project records</p>	<p>High pier bridge guideline, Project records</p>		<p><progress 90%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017 <progress 25%> 3) Development of high pier bridge guideline is in progress, based on review of existing standards and field surveys</p>
<p>2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p>Project records</p>	<p>Project records</p>		<p><progress20%> for items 1) - 4) 1) 2 Country focused trainings including invitation program were conducted and 1 country focused training was planned 2) Technical Seminars were held 2 times in total 3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times. 4) Upon the request from MoRTH, NHA or NHIDCL, field surveys for disaster affected site were conducted 2 times.</p>

<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p>	<p>Operation and maintenance guideline, Project records</p>	<p><progress 90%> 1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified <progress 100%> 2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017 <progress 35%> 3) Development of O/M guideline is in progress, based on review of existing standards and field surveys</p>	
	<p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Project records</p>	<p><progress20%> for items 1) - 4) 1) 2 Country focused trainings including invitation program were conducted and 1 country focused training was planned 2) Technical Seminars were held 2 times in total 3) Upon the request from MoRTH, field surveys for pilot project were conducted 2 times. 4) Upon the request from MoRTH, NHAJ or NHIDCL, field surveys for disaster affected site were conducted 2 times. <progress 50%> 5) Meeting for discussion of suitable contract system and management with officials MoRTH, NHAJ, NNIDCL and PWD(s) was conducted 2 times in total. Also, tender documents for EPC contract from 2 projects were collected and studied.</p>	

Activities	The Japanese Side	Inputs	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterparts</p> <ul style="list-style-type: none"> - Chairperson - Project Director - Project Co-Manager - Project Members - Participants for Training in Japan <p>(2) Facilities</p> <p>Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses</p> <ol style="list-style-type: none"> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts 4) Pilot Project Cost, if required construction works. 	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts></p> <ul style="list-style-type: none"> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <p><Short-term Experts/Consultants></p> <ul style="list-style-type: none"> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III - Mountain Tunnel - Tunnel Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessary <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessary.</p> <p>(4) Local cost for the Project activities</p> <ul style="list-style-type: none"> - Office management cost - Local consultants - Other Local cost as necessary 	<p>Majority of trained officials continues to work for counterpart agencies.</p> <ul style="list-style-type: none"> - Budgetary and human resources necessary for the Project are continuously allocated by the Government of India. <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures></p> <p>Long-term Expert (Chief Advisor/ Highway Development) has not yet been secured in Transport Bhawan, therefore, it is necessary for JICA and MoRTH to continue to discuss.</p> <ul style="list-style-type: none"> - The counterpart personnel responsible for operation and maintenance guideline is now vacant due to job transfer in NHAI in July 2018, replacement at the 5th JCC on 10th October 2018 necessary. - Selection of the sites for early implementation of a pilot project for in actual construction delayed progress of guideline preparation. Further delay to be avoided.

Project Monitoring Sheet II (Revision of Plan of Operation)

Project Title: Capacity Development Project on Highways in Mountainous Regions		Monitoring																								
		Inputs from JICA		FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				Issue	Solution	
		Plan	Actual	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV			
Expert																										
Chief Advisor / Highway Development		Plan	Actual																							
Highway Engineering / Coordinator		Plan	Actual																							
Team Leader/Slope Protection I		Plan	Actual																							
Deputy Team Leader/Slope Protection III		Plan	Actual																							
Mountain Tunnel		Plan	Actual																							
Slope Protection II/High Embankment		Plan	Actual																							
Mountain Bridge		Plan	Actual																							
Facility of Mountain Roads		Plan	Actual																							
Maintenance & Operation of Mountain Roads		Plan	Actual																							
Natural Condition (Topography/Geology)		Plan	Actual																							
Drainage Plan		Plan	Actual																							
Plan and Survey of Mountain Roads/Coordinator		Plan	Actual																							
Monitoring and Evaluation		Plan	Actual																							
Equipment																										
Training in Japan																										
Counterpart Training in Japan		Plan	Actual																							
In-country/Third country Training		Plan	Actual																							
Inputs from India																										
Expert																										
Chairperson		Plan	Actual																							
Project Director		Plan	Actual																							
Project Manager		Plan	Actual																							
Project Co-Manager		Plan	Actual																							
Project Co-Manager		Plan	Actual																							
Project Co-Manager		Plan	Actual																							
Counterparts (9)		Plan	Actual																							
Equipment																										
		Plan	Actual																							

Activities Sub-Activities	2016				2017				2018				2019				2020				Responsible Organization	Achievements	Issue & Countermeasures	
	Plan	Actual	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV						
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed																								
Identify issues on development of mountainous highways, including the capacity of personnel for mountainous highways; and identification of appropriate solutions for disaster sites upon requests.																								
1.1	Plan	Actual																					Information collected and analyzed (90%)	
1.2	Plan	Actual																					Field Surveys completed in all (10 of 10) case study sites. 4 additional surveys conducted upon MORTH request (100%)	
1.3	Plan	Actual																					60% progress	
1.4	Plan	Actual																					50% progress	
1.5	Plan	Actual																					20% progress	Request to postpone pilot projects affected guideline preparation. To avoid further delay.
Output 2: Guidelines on design and construction for mountainous highways are developed.																								
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.																								
2.2	Plan	Actual																					Standards collected and analyzed (90%)	
2.3	Plan	Actual																					60% progress	
2.4	Plan	Actual																					30% progress	
Output 3: Guideline on operation and maintenance for mountainous highways is developed.																								
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.																								
3.2	Plan	Actual																					Standards collected and analyzed (90%)	
3.2 Develop operation and maintenance guidelines for mountainous highways including issues on disaster management.																								
Duration / Phasing																								
Monitoring Plan																								
Monitoring																								
Joint Coordination Committee																								
Set-up the Detailed Plan of Operation																								
Submission of Monitoring Sheet																								
Reports/Documents																								
Project Completion Report																								
Public Relations																								
Setting up & Updating Project Facebook Page																								
Published article on Project Activities in MORTH Annual Report																								
Issue																								
Solution																								
Remarks																								
Set up and Updated 5 times																								

Monitoring Sheet (Version5)

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.5 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Khushal Chand

Michiya KITAYAMA

Title: Chief Engineer (EAP)

Highway Engineering/Coordinator

Submission Date: 10th May, 2019

I. Summary

1 Progress

1-1 Progress of Inputs

- PDM related to Input were authorized on Dec 14th, 2016 as a ver.1

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of Mar. 31 st 2019
A. Japanese side		
(1)Experts	<p><Long-term Experts></p> <ul style="list-style-type: none"> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <p><Short -term Experts/Consultants></p> <p><u>Total: 65.95MM</u></p> <ul style="list-style-type: none"> -Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III -Mountain Tunnel -Tunnel Facilities -Slope Protection II/High Embankment - Earthwork -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation 	<p><u><Long-term Experts></u></p> <ul style="list-style-type: none"> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <p><u><Short -term Experts></u></p> <p>Progress: (40.43/65.95 MM: 61.31%)</p> <p>Between Nov 2017 and Mar.2019, the following short term experts were dispatched:</p> <ul style="list-style-type: none"> -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Slope Protection II/High Embankment - Mountain Bridge - Facility of Mountain Roads -Maintenance & Operation of Mountain Roads - Natural Condition(Topography/Geology) - Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of Mar. 31 st 2019
(2) Training for Counterpart's Personnel	<Training in Japan> (Once a year, about 10 people for 2 weeks (5 times))	<Training in Japan> (1) Country Focused Training was conducted in collaboration with IAHE Progress: 3/5 times -1st Country Focused Training held on 16th May -6th June 2017 (22 days) -2nd Country Focused Training/ Invitation held on 24th Oct -13th Nov 2017(21 days) -3rd Country Focused Training/ Invitation held on 16th Oct -5th Nov 2018(21 days)
		<Training in India> Seminars held in India -1st technical seminar held on 19th June 2018 -2nd technical seminar held on 27th Sep 2018
(3) Equipment	Equipment and/or Material, as necessary	None
(4) Local Costs	<Local Costs> - Office management cost - Local consultants - Other Local cost as necessity	<Local Costs> - Project Assistant for Short Term Experts - Communication (internet and mobile phone) -No local consultants - Car rental (including driver)
B. Indian Side		
(1) Indian Side Counterparts	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager -Project Members - Participants for training in Japan	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager(3) -Project Members (9) - Participants for training in Japan (34) 1st Training(10); 2nd Training(10); 3rd Training(9) 1st Invitation Program (5) -Counterparts for guidelines (7) Overall control of 5 guidelines (2) Guideline for Planning(1) Guideline for Slope Protection and Embankment(1) Guideline for Bridge(1) Guideline for Tunnel(1)

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of Mar. 31 st 2019
		Guideline for Operation and Maintenance(1)
		<JCC Members> As specified in the Project Organizational Chart in Record of Discussion
(2) Operational Expenses	<Facilities> -Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively	<Facilities> -An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) was provided in NHAI HQ -Office space for Short-term Experts was provided in Jeevan Tara Building.
(3) Administrative cost	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses provided as required 2) Domestic travel cost for counterparts provided as required
(4) Pilot Project Cost	<Pilot Project Cost> Pilot Project Cost, if required construction works.	<Pilot Project Cost> Pilot Project Planned at 3 sites i.e. NH10 (Sikkim), NH717 (West Bengal), and NH54 (Assam) -NH10: topographic surveys almost completed, drilling investigation under planning -NH717 and NH54: selection of consultants for topographic survey and drilling investigation in preparation

1-2 Progress of Activities

- Progress of activities is indicated in Monitoring Sheet II (PO) and Project Design Matrix (PDM)
- Basically no crucial bottlenecks in progress have been observed.

1-3 Achievement of Output

The deliverables achieved by the Project as per the TOR are given in the table below:

-PDM related to Output were authorized on Dec 14th, 2016 as a ver.1

*Completed, Ongoing, Scheduled for later

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Mar.31 st ,2019	Status*
Output1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed		
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<p><progress 100%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p>(1) 6th Feb 2018 : Siliguri to Darjeeling on NH55 in West Bengal (2) 7th Feb 2018 : Sevoke to Sikkim on NH10 in West Bengal (3) 28th Sep 2017 : Mussoorie to Chamba on 707A in Uttarakahnd (4) 10th Apr 2018 : Kiratpur to Ner chowk on NH21 in Himachal (5) 10th Apr 2018 : Ner chowk to Manali on NH21 in Himacha (6) 9th Apr 2018 : Pathankot to Mandi on NH20 in Himachal (7) 15th Feb 2017 : Shiradi Ghat bypass on NH48 in Karnataka (8) 20th March 2018 : Assam border to Dalu on NH62 in Megalaya (9) 9th Feb 2018 : Mangan to Nakura on NH310 in Sikkim (10) 13th Oct 2017 : Shillong to Dawki on NH40 in Megalaya</p> <p><progress 100%></p> <p>3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018 followed by approval in April 2018 JCC Meeting.</p> <p><progress 95%></p> <p>4) Draft of survey and planning guideline based on review of existing standards and field surveys is now complete. Review is in progress.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Mar.31 st ,2019	Status*
1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	<p><progress 55%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 3 times out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project: Refer to OVI (Objectively Verifiable Indicators) 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p><progress 95%></p> <p>5) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) were held 8 times.</p> <ul style="list-style-type: none"> -Meeting with state PWD of Karnataka in Feb 2017 -Meeting with state PWD of West Bengal in Feb 2018 -Meeting with PIU of NHAI in Dec 2018 -Meeting with SBO of NHIDCL in Dec 2018 -Meeting with State PWD of West Bengal in Dec 2018 -Meeting with NHAI HQ in Jan 2019 -Meeting with NHIDCL HQ in Jan 2019 -Meeting with MoRTH in Jan 2019 <p>-Tender documents for EPC contract from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement))</p> <p>-Based on the review of the current status, JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019.</p>	Ongoing
Output2: Guidelines on design and construction for mountainous highways are developed.		
2-1 Improved tunnel guideline is completed by June 2019.	<p><progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100 %></p> <p>2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018</p> <p><progress 95%></p> <p>3) Draft of tunnel guideline based on review of existing standards and field surveys is now complete. Reviewing is in progress</p>	Ongoing
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	<p><progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for earthwork guideline drafted and finalized at the TG meeting</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Mar.31 st ,2019	Status*
	<p>on 22nd February 2018</p> <p><progress 80%></p> <p>3) Development of earthwork guideline is in progress, based on review of existing standards and field surveys</p>	
2-3 High pier bridge guideline is completed by June 2019.	<p><progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 80%></p> <p>3) Development of high pier bridge guideline is in progress, based on review of existing standards and field surveys.</p>	Ongoing
2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	<p><progress 45%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 3 times out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project</p> <p>a. NH22 (initially requested but cancelled)</p> <p>-Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, 5th JCC in Oct 2018 cancelled this pilot project site.</p> <p>- Field surveys: Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018</p> <p>- The draft implementation plan was prepared for NH22</p> <p>b. Candidate sites proposed in Nov 2018</p> <p>-Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov, 2018 and site surveys were conducted for 7 times in total:</p> <p>NH717 (West Bengal): on 21st to 22nd Dec 2018, 22nd Jan, and 31st Jan 2019</p> <p>NH54 (Assam): on 17th to 19th Dec 2018 and 21st to 23rd Feb 2019</p> <p>NH10 (Sikkim): on 23rd to 24th Jan and 1st to 2nd Feb 2019</p> <p>-Based on survey findings, recommendations were prepared including necessary surveys for design and possible measures against landslide, and submitted them to Indian side</p> <p>- NHIDCL improved topographic survey results based on</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Mar.31 st ,2019	Status*
	<p>recommendations for NH10.</p> <ul style="list-style-type: none"> - NHA and NHIDCL were preparing for selection of consultants for topographic surveys and drilling investigations for NH54 and NH717, respectively. <p>4) Upon the requests from MoRTH, NHA or NHIDCL, field surveys for disaster affected sites were conducted twice in total.</p> <ul style="list-style-type: none"> -Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018 -Upon the request from NHA, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018 -Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side. 	
Output3: Foundation for operation and maintenance for mountainous highways is built.		
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p><progress 100%></p> <p>1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 95%></p> <p>3) Draft of O/M guideline based on review of existing standards and field surveys is now complete. Reviewing is in progress.</p>	Ongoing
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	<p><progress 55%> (for items 1)-4))</p> <ul style="list-style-type: none"> 1) Country focused trainings were conducted 3 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI 2-4 4) Survey for disaster: Refer to OVI 2-4 	Ongoing

1-4 Achievement of the Project Purpose

The deliverables achieved by the Project as per the TOR are given in the table below:

*Completed, Ongoing, Scheduled for later

Project Purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.		
Indicators	Major Results	Status*
(1) Model activities are conducted applying the developed guidelines by the Project.	- Refer to 1-3 Achievement of Output, OVI 2-4, 3)Pilot Project	Ongoing
(2) Core officers are able to give lectures on development of mountainous highways in the training courses.	- The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 3 country focused training and one Invitation Program conducted in Japan	Ongoing

1-5 Changes of Risks and Actions for Mitigation

- N/A

1-6 Progress of Actions undertaken by JICA

- JICA Project Team conducted activities related to Output 1, 2 and 3. The progress is monitored as stated in section 1-3 "Achievement of Output".

1-7 Progress of Actions undertaken by Gov. of India

PDM ver.1 approved on Dec. 14th 2016	Actual as of Mar. 2019	Status
1. Allocation of Counterpart Personnel from GOI 1.1 Chairperson 1.2 Project Director 1.3 Project Manager 1.4 Project Co-Manager 1.5 Project Members 1.6 Participants for Training in Japan	1. Allocated Counterpart Personnel from GOI 1.1 Chairperson 1.2 Project Director 1.3 Project Manager 1.4 Project Co-Manager(3) 1.5 Project Members (9) 1.6 Participants for Training in Japan (34) 1st Training(10); 2nd Training(10); 3 rd Training(9) 1st Invitation Program (5) 1.7 Allocated Counterparts for guidelines -Overall control of 5 guidelines -Guideline for Planning -Guideline for Slope Protection and Embankment	- India side has availed all the required counterparts. - The position of TG chairperson, however, fell vacant after the promotion of Shri I.K Pandey to DG(RG)&SS in Feb.2019. A new TG Chairperson is required

PDM ver.1 approved on Dec. 14th 2016	Actual as of Mar. 2019	Status
	<ul style="list-style-type: none"> -Guideline for Bridge -Guideline for Tunnel -Guideline for Operation Maintenance 	
<p>2. JCC Organization</p> <p>Establishment of JCC as per the Project Organizational Chart in Record of Discussion and holding of meetings at least twice a year</p>	<p>2. JCC Organization</p> <p>JICC was established and members attended the 1st JCC meeting held in MORTH on Dec. 14th, 2016 followed by holding JCC meetings in April 2017, October 2017, April 2018 and October 2018 as scheduled.</p> <p>2.1 JCC Members</p> <ul style="list-style-type: none"> (1) Chairperson (2) Project Director (3) Project Manager (4) Project Co-Manager(3) (5) Project Members (9) <p>CE(s) of MoRTH, GM(s) of NHAI, GM(s) of NHIDCL</p>	<p>JCC establishment complete</p> <p>JCC meetings ongoing</p>
<p>3. Facilities</p> <p>Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p>	<p>3. Land, buildings and facilities</p> <p>a. An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) has been secured in NHAI HQ</p> <p>b. The office space for Short-term Experts has been availed in Jeevan Tara Building.</p>	<p>Not Completed</p> <p>- An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) in Transport Bhawan has yet been secured.</p>
<p>4. Administrative cost and other expenses</p> <ul style="list-style-type: none"> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts 	<p>4. Administrative cost and other expenses</p> <ul style="list-style-type: none"> 1) Personnel cost for counterparts and other running expenses being provided as required 2) Domestic travel cost for counterparts being provided as required 	<p>Ongoing</p>
<p>5. Pilot Project Cost, if required construction works.</p>	<p>5. Pilot Project</p> <ul style="list-style-type: none"> (1) Field surveys for the pilot project on NH22 with JICA Experts were conducted on 8th and 20th June 2018 (2) Plan for the pilot project at 2 sites of Parwanoo to Solan section on NH22 in 	<p>Ongoing</p>

PDM ver.1 approved on Dec. 14th 2016	Actual as of Mar. 2019	Status
	<p>Himachal Pradesh was prepared.</p> <p>(3) 5th JCC in Oct 2018 cancelled this pilot project site, however.</p> <p>(4) Upon further discussions between Indian side and JICA Experts, instead of NH22, three candidate sites were proposed; NH717 (West Bengal), NH54 (Assam), and NH10 (Sikkim).</p> <p>(5) Indian side presented existing documents and reports to JICA Experts for their review, and arranged officials and consultants for site surveys, which were conducted 7 times in total together with JICA Experts.</p> <p>(6) Upon the recommendations by JICA Experts for surveys and design, Indian side took the following actions:</p> <ul style="list-style-type: none"> -For NH10, topographic surveys were almost complete and drilling investigation was under planning. -For NH717 and NH54, selection of consultants for topographic surveys and drilling investigations was under preparation. 	

1-8 Progress of Environmental and Social Considerations (if applicable)

- N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

- N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors,

private sectors, NGOs etc.)

- 1) An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) has yet been secured in Transport Bhawan, therefore, it is necessary for JICA and MoRTH to continue to discuss.
- 2) The Chairperson of the TG meetings was promoted to DG (RD) & SS. Nomination of a replacement is required.
- 3) Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.
 - i. Among three candidate sites proposed in Dec 2018, one site should be selected for civil work after site visits by JICA Experts. For the selected one site for civil work, JICA Experts would give technical advice for updating DPR and guidance for construction. For remaining two sites, JICA Experts would give technical advice for updating DPR.
 - ii. Based on the survey results available for the project, NH10 was recommended as the site for civil work. NH10 is the only site which may be completed by the end of the project period of March 2021.
 - iii. The contract period of the Short-term experts is not enough to accommodate implementation of the civil work of NH10. But extension of the contract period depends on the results of bidding of the pilot project on NH10. In case a contractor is successfully awarded for the pilot project and Letter of Acceptance is issued, JICA may extend the contract period of the Short-term experts. The maximum extension is until December 2020, however. In addition, JICA Short-term Expert Team should have additional experts in charge of support for design and supervision. (Note: JICA Experts are unable to assume liability of design)

2 Delay of Work Schedule and/or Issues (Problems) (if any)

2-1 Issues/Problems

- N/A

2-2 Cause

- N/A

2-3 Action to be taken

- N/A

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of India)

- N/A

3 Modification of the Project Implementation Plan

3-1 PO

- 1) PO ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

3-2 Other modifications on detailed implementation plan (Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HQ. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)

- 1) PDM ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.
- 2) The amendment R/D and PDM will be authorized by JICA HQ

II. Project Monitoring Sheet I & II as Attached

Project Monitoring Sheet I (Revision of Project Design Matrix)

Project Title: Capacity Development Project on Highways in Mountainous Regions

Implementing Agency: Ministry of Road Transport and Highways (MoRTH)

Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD

Period of Project: Apr, 2016 – Mar, 2021 (Five (5) years)

Project Site: Whole India

Version 5

Dated 10th May, 2019

Narrative Summary		Objectively Verifiable	Means of Verification	Important Assumption	Achievement	Remarks
<p>Overall Goal</p> <p>Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report</p>				
	<p>OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Contract Document Completion Report by the operation and maintenance contractor</p>				
<p>Project Purpose</p> <p>Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.</p>	<p>- Refer to OVI (Objectively Verifiable Indicators) 2-4, 3]Pilot Project</p>		
	<p>PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, interviews to supervisors</p>			<p>- The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 3 country focused training and 1 Invitation Program conducted in Japan</p>	

<p>Outputs</p> <p>Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p>	<p>Survey and planning guidelines</p>	<p><progress 100%> 1) Existing standards for mountainous highways were collected and analyzed, and issues were identified. <progress 100%> 2) Field Surveys were conducted in 10 of 10 case study sites. <progress 100%> 3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018, followed by approval in April 2018 JCC Meeting. <progress 95%> 4) Draft of survey and planning guideline based on review of existing standards and field surveys is now complete. Review is in progress.</p>
<p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Project records</p>	<p>Project records</p>	<p><progress 55%> for items 1) - 4) 1) Country focused trainings were conducted 3 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI(Objectively Verifiable Indicators) 2-4 4) Survey for disaster: Refer to OVI 2-4 <progress 95%> 5) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWDs were conducted 8 times in total. Also, tender documents for EPC contract from 2 projects were collected and studied. JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019.</p>

<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019.</p>	<p>Improved tunnel guideline, Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018 <progress 95%> 3) Development of tunnel guideline based on review of existing standards and field surveys is now complete . Reviewing is now in progress.</p>
<p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p>	<p>Earthwork guideline, Project records</p>	<p>Earthwork guideline, Project records</p>		<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for earthwork guideline drafted and finalized at the TG meeting on 22nd February 2018 <progress 80%> 3) Development of earthwork guideline based on review of existing standards and field surveys is in progress.</p>
<p>2-3 High pier bridge guideline is completed by June 2019.</p>	<p>High pier bridge guideline, Project records</p>	<p>High pier bridge guideline, Project records</p>		<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017 <progress 80%> 3) Development of high pier bridge guideline based on review of existing standards and field surveys is in progress.</p>

2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.

Project records

<progress 45%> for items 1) - 4)

- 1) Country focused trainings were conducted 3 times out of 5
- 2) Technical Seminars were held 2 times in total
- 3) Pilot Project
 - a. NH22 (initially requested but cancelled)
 - Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, 5th JCC in Oct 2018 cancelled this pilot project site.
 - Field surveys: Parwanoo-Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018
 - The draft implementation plan was prepared for NH22
 - b. Candidate sites proposed in Nov 2018
 - Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov, 2018 and site surveys were conducted for 7 times in total:
 - NH717 (West Bengal): on 21st to 22nd Dec 2018, 22nd Jan, and 31st Jan 2019
 - NH54 (Assam): on 17th to 19th Dec 2018 and 21st to 23rd Feb 2019
 - NH10 (Sikkim): on 23rd to 24th Jan and 1st to 2nd Feb 2019
 - Based on survey findings, recommendations were prepared including necessary surveys for design and possible measures against landslide, and submitted them to Indian side
 - NHIDCL improved topographic survey results based on recommendations for NH10.
 - NHAI and NHIDCL were preparing for selection of consultants for topographic surveys and drilling investigations for NH54 and NH717, respectively.
 - 4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted twice in total.
 - Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018
 - Upon the request from NHAI, Kiratpur-Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018
 - Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.

<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p>	<p>Operation and maintenance guideline, Project records</p>	<p><progress 100%> 1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified <progress 100%> 2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017 <progress 95%> 3) Development of O/M guideline based on review of existing standards and field surveys is now complete. Reviewing is in progress.</p>
<p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Project records</p>	<p>Project records</p>	<p><progress55%> for items 1) - 4) 1) Country focused trainings were conducted 3 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI 2-4 4) Surveys for disaster: Refer to OVI 2-4</p>

Activities	Inputs	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts></p> <ul style="list-style-type: none"> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <p><Short-term Experts/Consultants></p> <ul style="list-style-type: none"> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection II - Mountain Tunnel - Tunnel Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition - Topography/Geology - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessary <p>(2) Training for Counterparts (in Japan)</p> <p>(Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessary.</p> <p>(4) Local cost for the Project activities</p> <ul style="list-style-type: none"> - Office management cost - Local consultants - Other Local cost as necessary 	<p>The Indian Side</p> <p>(1) Allocation of Counterparts</p> <ul style="list-style-type: none"> - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan <p>(2) Facilities</p> <p>Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses</p> <ul style="list-style-type: none"> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts <p>(4) Pilot Project Cost, if required construction works.</p>
<p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p>		<p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p>
<p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>		<p><Issues and countermeasures></p> <ul style="list-style-type: none"> -An independent room for JICA Long-term Expert (Chief Advisor) has not yet been secured in Transport Bhawan, therefore, JICA and MoRTH need to continue to discuss. -The Chairperson of the TG meetings was promoted to DG (RD) & SS. Nomination of a replacement is required. -Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.

Project Title: Capacity Development Project on Highways in Mountainous Regions	Monitoring																					
	Inputs from JICA																					
	Plan	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				Issue
Expert	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	Remarks	
Chief Advisor / Highway Development	Actual																				Clearance from screening committee is required yearly	New Chief Adviser from Japan is being mobilized
Highway Engineering / Coordinator	Actual																				New Expert from Sept 1st, 2018	
Team Leader/Slope Protection I	Actual																				6.62/11.02 MM (60%)	
Deputy Team Leader/Slope Protection III	Actual																				2.65/5.77MM (46%)	
Mountain Tunnel	Actual																				4.60/7.5 MM (61%)	
Slope Protection II/High Embankment	Actual																				5.25/8.5 MM(62%)	
Mountain Bridge	Actual																				3.83/7.83 MM (62%)	
Facility of Mountain Roads	Actual																				3.83/3.83 MM (100%)	
Maintenance & Operation of Mountain Roads	Actual																				3.88/6.17 MM (44%) Expert changed from Sept 2018	
Natural Condition (Topography/Geology)	Actual																				2/3.83 MM (52%)	
Drainage Plan	Actual																				2.33/3.33 MM (70%)	
Plan and Survey of Mountain Roads/Coordinator	Actual																				3.93/5.17 MM(76%)	
Monitoring and Evaluation	Actual																				1.5/3 MM (50%)	
Equipment	Actual																					
Training In Japan	Actual																					
Counterpart Training in Japan	Actual																				1st, 2nd, and 3rd Program of Training with IAHF was completed.	
In-country/Third country Training	Actual																					
Inputs from India	Actual																					
Expert	Actual																					
Chairperson	Actual																				Chairperson changed from Feb 2019	
Project Director	Actual																				New Project Director from October 2017	
Project Manager	Actual																				New Project Manager from October 2017	
Project Co-Manager	Actual																					
Project Co-Manager	Actual																					
Project Co-Manager	Actual																					
Counterparts (9)	Actual																					
Equipment	Actual																					

Activities Sub-Activities	2016		2017		2018		2019		2020		Responsible Organization	Achievements	Issue & Countermeasures
	Plan	Actual	I	II	III	IV	I	II	III	IV			
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed													
1.1 Collect and analyze existing information on mountainous highways; and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.	Plan	Actual										Information collected and analyzed. (100%)	
1.2 Conduct field surveys to the typical mountainous highways.	Plan	Actual										Field Surveys completed in all (10 of 10) case study sites. 4 additional surveys conducted upon MORTH request. (100%)	
1.3 Improve survey and planning guidelines on mountainous highways.	Plan	Actual										95% progress	
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan	Actual										95% progress	
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*	Plan	Actual										20% progress	Request to postpone pilot projects affected guideline preparation.
Output 2: Guidelines on design and construction for mountainous highways are developed.													
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan	Actual										100%	
2.2 Improve tunnel guidelines.	Plan	Actual										95% progress	
2.3 Develop earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan	Actual										80% progress	
2.4 Develop high pier bridge guidelines.	Plan	Actual										80% progress	
Output 3: Guideline on operation and maintenance for mountainous highways is developed.													
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan	Actual										100%	
3.2 Develop operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan	Actual										95% progress	
Duration / Phasing													
Monitoring Plan	Plan	Actual										Remarks	Solution
	Actual												
Monitoring	Plan	Actual											
Joint Coordination Committee	Plan	Actual											
Set-up the Detailed Plan of Operation	Plan	Actual											
Submission of Monitoring Sheet	Plan	Actual											
Reports/Documents	Plan	Actual											
Project Completion Report	Plan	Actual											
Public Relations	Plan	Actual											
Setting up & Updating Project Facebook Page	Plan	Actual										Set up and Updated 17 times	
Published article on Project Activities in MORTH Annual Report	Plan	Actual											

Monitoring Sheet (Version 6)

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title : Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.6 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Khushal Chand

Eisuke Nakamura

Title: Chief Engineer (EAP)

Chief Advisor/ Highway Development

Submission Date: 16th October, 2019

I. Summary

1 Progress

1-1 Progress of Inputs

- PDM related to Input were authorized on Dec 14th, 2016 as a ver.1

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of Sept. 30 th , 2019
A. Japanese side		
(1)Experts	<p><Long-term Experts></p> <ul style="list-style-type: none"> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <p><Short -term Experts/Consultants></p> <p><u>Total: 65.95M/M</u></p> <ul style="list-style-type: none"> -Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III -Mountain Tunnel -Tunnel Facilities -Slope Protection II/High Embankment - Earthwork -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation 	<p><Long-term Experts></p> <ul style="list-style-type: none"> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <p><Short -term Experts></p> <p>Progress: (52.66/69.45 MM: 75.8%)</p> <p>Between Nov 2017 and Sept.2019, the following short-term experts were dispatched:</p> <ul style="list-style-type: none"> -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Slope Protection II/High Embankment -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation -Highway Engineering for Mountain Road

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of Sept. 30 th , 2019
(2) Training for Counterpart's Personnel	<Training in Japan> (Once a year, about 10 people for 2 weeks (5 times))	<Training in Japan> (1) Country Focused Training was conducted in collaboration with IAHE Progress: 4/5 times -1st Country Focused Training held on 16th May -6th June 2017 (22 days) -2nd Country Focused Training/ Invitation held on 24th Oct -13th Nov 2017(21 days) -3rd Country Focused Training/ Invitation held on 16th Oct -5th Nov 2018(21 days) -4th Country Focused Training held on 7th Aug -2nd Sept 2019 (20 days)
		<Training in India> Seminars held in India -1st technical seminar held on 19th June 2018 -2nd technical seminar held on 27th Sep 2018
(3) Equipment	Equipment and/or Material, as necessary	None
(4) Local Costs	<Local Costs> - Office management cost - Local consultants - Other Local cost as necessity	<Local Costs> -Project Assistant for Short Term Experts -Communication (internet and mobile phone) -No local consultants -Car rental (including driver)
B. Indian Side		
(1) Indian Side Counterparts	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager -Project Members - Participants for training in Japan	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager (3) -Project Members (9) - Participants for training in Japan (43) 1st Training (10); 2nd Training (10); 3rd Training (9); 4th Training (9) 1st Invitation Program (5) -Counterparts for guidelines (7) Overall control of 5 guidelines (2) Guideline for Planning (1) Guideline for Slope Protection and Embankment (1) Guideline for Bridge(1)

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of Sept. 30 th , 2019
		Guideline for Tunnel (1) Guideline for Operation and Maintenance (1)
		<JCC Members> As specified in the Project Organizational Chart in Record of Discussion
(2) Operational Expenses	<Facilities> -Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively	<Facilities> -An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) was provided in NHAI HQ -Office space for Short-term Experts was provided in Jeevan Tara Building.
(3) Administrative cost	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses provided as required 2) Domestic travel cost for counterparts provided as required
(4) Pilot Project Cost	<Pilot Project Cost> Pilot Project Cost, if required construction works.	<Pilot Project Cost> Pilot Project Planned at 3 sites i.e. NH10 (Sikkim), NH717 (West Bengal), and NH54 (Assam) -For NH10, topographic surveys and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, recommendations for countermeasures for landslide were prepared by JICA Experts. -NH717 and NH54: selection of consultants for topographic survey and drilling investigation for NH54 in progress while tender documentation for NH717 is under preparation

1-2 Progress of Activities

- Progress of activities is indicated in Monitoring Sheet II (PO) and Project Design Matrix (PDM)

- Basically, no crucial bottlenecks in progress have been observed.

1-3 Achievement of Output

The deliverables achieved by the Project as per the TOR are given in the table below:

-PDM related to Output were authorized on Dec 14th, 2016 as a ver.1

*Completed, Ongoing, Scheduled for later

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept. 30 th , 2019	Status*
Output1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed		
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<p><progress 100%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p>(1) 6th Feb 2018: Siliguri to Darjeeling on NH55 in West Bengal (2) 7th Feb 2018: Sevoke to Sikkim on NH10 in West Bengal (3) 28th Sep 2017: Mussoorie to Chamba on 707A in Uttarakahnd (4) 10th Apr 2018: Kiratpur to Ner chowk on NH21 in Himachal (5) 10th Apr 2018: Ner chowk to Manali on NH21 in Himacha (6) 9th Apr 2018: Pathankot to Mandi on NH20 in Himachal (7) 15th Feb 2017: Shiradi Ghat bypass on NH48 in Karnataka (8) 20th March 2018: Assam border to Dalu on NH62 in Megalaya (9) 9th Feb 2018: Mangan to Nakura on NH310 in Sikkim (10) 13th Oct 2017: Shillong to Dawki on NH40 in Megalaya</p> <p><progress 100%></p> <p>3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018 followed by approval in April 2018 JCC Meeting.</p> <p><progress 100%></p> <p>4) Draft of survey and planning guideline based on review of existing standards and field surveys is now complete.</p> <p><progress 75%></p> <p>5) Review of draft guideline is in progress. Preparation for related Technical Workshops is planned for Dec 2019.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept. 30 th ,2019	Status*
1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	<p><progress 65%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 4 times out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project: Refer to OVI (Objectively Verifiable Indicators) 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) Technical Workshops for Planning Guideline to be held in Dec 2019.</p> <p><progress 100%></p> <p>5) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) were held 8 times.</p> <ul style="list-style-type: none"> -Meeting with state PWD of Karnataka in Feb 2017 -Meeting with state PWD of West Bengal in Feb 2018 -Meeting with PIU of NHAI in Dec 2018 -Meeting with SBO of NHIDCL in Dec 2018 -Meeting with State PWD of West Bengal in Dec 2018 -Meeting with NHAI HQ in Jan 2019 -Meeting with NHIDCL HQ in Jan 2019 -Meeting with MoRTH in Jan 2019 <p>-Tender documents for EPC contracts from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement))</p> <p>-Based on the review of the current status, JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019.</p> <p>-Recommendations for Procurement modes for Pilot Project (NH10) were submitted to India side on 28th May 2019 by JICA Experts.</p> <p>Based on that recommendation, NHIDCL is preparing tender documentation for NH10</p>	Ongoing
Output2: Guidelines on design and construction for mountainous highways are developed.		
2-1 Improved tunnel guideline is completed by June 2019.	<p><progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100 %></p> <p>2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018</p> <p><progress 100%></p> <p>3) Draft of tunnel guideline based on review of existing standards and field surveys is now complete.</p> <p><progress 90%></p> <p>4) Reviewing is in progress and related technical workshop was held on 14th August 2019.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept. 30 th ,2019	Status*
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	<p><progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for earthwork guideline drafted and finalized at the TG meeting on 22nd February 2018</p> <p><progress 100%> 3) Draft of earthwork guideline based on review of existing standards and field surveys is now complete.</p> <p><progress 90%> 4) Reviewing is in progress and related technical workshop was held on 25th September, 2019.</p>	Ongoing
2-3 High pier bridge guideline is completed by June 2019.	<p><progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 100%> 3) Draft of high pier bridge guideline based on review of existing standards and field surveys is now complete.</p> <p><progress 90%> 4) Reviewing is in progress and related technical workshops was held on 29th July 2019.</p>	Ongoing
2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	<p><progress 75%> (for items 1)-4))</p> <p>1) Country focused trainings were conducted 4 times out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project</p> <p style="padding-left: 20px;">a. NH22 (initially requested but cancelled)</p> <p style="padding-left: 40px;">-Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, the 5th JCC in Oct 2018 cancelled this pilot project site.</p> <p style="padding-left: 40px;">- Field surveys: Parwanoo~Solani section of NH22 in Himachal Pradesh on 8th June and 20th June 2018</p> <p style="padding-left: 40px;">- The draft implementation plan was prepared for NH22</p> <p style="padding-left: 20px;">b. Candidate sites proposed in Nov 2018</p> <p style="padding-left: 40px;">-Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov,</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept. 30 th ,2019	Status*
	<p>2018 and site surveys were conducted for 7 times in total.</p> <ul style="list-style-type: none"> - Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide. -On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design. -For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. DPR preparation by DPR consultant is ongoing. Tender floating is scheduled after DPR approval by NHIDCL -For NH717/NH54, JICA Experts prepared and submitted recommendations on survey plan for gravity deformation on NH717, and reviewed and suggested TOR for DPR consultants on NH54. Selection of consultants for topographic surveys and drilling investigations is now under preparation. <p>4) Upon the requests from MoRTH, NHA or NHIDCL, field surveys for disaster affected sites were conducted twice in total.</p> <ul style="list-style-type: none"> -Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018 -Upon the request from NHA, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018 -Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side. <p>5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively.</p>	
Output3: Foundation for operation and maintenance for mountainous highways is built.		
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p><progress 100%></p> <p>1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 100%></p> <p>3) Draft of O/M guideline based on review of existing standards and field surveys is now complete.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of Sept. 30 th , 2019	Status*
	<progress 90%> 4) Reviewing is in progress. O&M workshops are included under each related guideline.	
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	<progress 75%> (for items 1)-4)) 1) Country focused trainings were conducted 4 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI 2-4 4) Survey for disaster: Refer to OVI 2-4 5) O&M workshops were included under each related guideline for bridge, tunnel and slope protection works.	Ongoing

1-4 Achievement of the Project Purpose

The deliverables achieved by the Project as per the TOR are given in the table below:

*Completed, Ongoing, Scheduled for later

Project Purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.		
Indicators	Major Results	Status*
(1) Model activities are conducted applying the developed guidelines by the Project.	-Refer to 1-3 Achievement of Output, OVI 2-4, 3)Pilot Project	Ongoing
(2) Core officers are able to give lectures on development of mountainous highways in the training courses.	-The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 4 country focused training and one Invitation Program conducted in Japan (3) 3 Technical Workshops for draft bridge, tunnel and slope protection guidelines were held	Ongoing

1-5 Changes of Risks and Actions for Mitigation

- N/A

1-6 Progress of Actions undertaken by JICA

- JICA Project Team conducted activities related to Output 1, 2 and 3. The progress is monitored as stated in section 1-3 "Achievement of Output".

1-7 Progress of Actions undertaken by Gov. of India

PDM ver.1 approved on Dec. 14th 2016	Actual as of Sept. 2019	Status
<p>1. Allocation of Counterpart Personnel from GOI</p> <p>1.1 Chairperson</p> <p>1.2 Project Director</p> <p>1.3 Project Manager</p> <p>1.4 Project Co-Manager</p> <p>1.5 Project Members</p> <p>1.6 Participants for Training in Japan</p>	<p>1. Allocated Counterpart Personnel from GOI</p> <p>1.1 Chairperson</p> <p>1.2 Project Director</p> <p>1.3 Project Manager</p> <p>1.4 Project Co-Manager (3)</p> <p>1.5 Project Members (9)</p> <p>1.6 Participants for Training in Japan (43) 1st Training (10); 2nd Training (10); 3rd Training (9) 4th Training (9) 1st Invitation Program (5)</p> <p>1.7 Allocated Counterparts for guidelines</p> <ul style="list-style-type: none"> -Overall control of 5 guidelines -Guideline for Planning -Guideline for Slope Protection and Embankment -Guideline for Bridge -Guideline for Tunnel -Guideline for Operation Maintenance 	<p>-India side has availed all the required counterparts.</p>
<p>2. JCC Organization</p> <p>Establishment of JCC as per the Project Organizational Chart in Record of Discussion and holding of meetings at least twice a year</p>	<p>2. JCC Organization</p> <p>JICC was established and members attended the 1st JCC meeting held in MORTH on Dec. 14th, 2016 followed by holding JCC meetings in April 2017, October 2017, April 2018, October 2018 and May 2019 as scheduled.</p> <p>2.1 JCC Members</p> <ul style="list-style-type: none"> (1) Chairperson (2) Project Director (3) Project Manager (4) Project Co-Manager (3) (5) Project Members (9) <p>CE(s) of MoRTH, GM(s) of NHAI, GM(s) of NHIDCL</p>	<p>JCC establishment complete</p> <p>JCC meetings ongoing</p>
<p>3. Facilities</p> <p>Office spaces and facilities necessary for the Project implementation in</p>	<p>3. Land, buildings and facilities</p> <p>a. An independent room for JICA</p> <p>Long-term Expert (Highway</p>	<p>Not Completed</p> <p>- An independent room for JICA</p> <p>Long-term Expert (Chief Advisor/</p>

PDM ver.1 approved on Dec. 14th 2016	Actual as of Sept. 2019	Status
MoRTH and NHAI respectively.	Engineering/Coordinator) has been secured in NHAI HQ b. The office space for Short-term Experts has been availed in Jeevan Tara Building.	Highway Development) in Transport Bhawan has yet been secured.
4. Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	4. Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses being provided as required 2) Domestic travel cost for counterparts being provided as required	Ongoing
5. Pilot Project Cost, if required construction works.	5. Pilot Project - Cost of preparation for DPR and execution of civil work being secured by Indian side as required.	Ongoing

1-8 Progress of Environmental and Social Considerations (if applicable)

- N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

- N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

- 1) An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) has yet been secured in Transport Bhawan, therefore, it is necessary for JICA and MoRTH to continue to discuss.
- 2) Indian side requested at least one pilot project with civil works which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.

- i. Among three candidate sites proposed in Dec 2018, one site should be selected for civil work after site visits by JICA Experts. For the selected one site for civil work, JICA Experts would give technical advice for updating DPR and guidance for construction. For remaining two sites, JICA Experts would give technical advice for updating DPR.
- ii. Based on the survey results available for the project, NH10 was recommended as the site for civil work. NH10 is the only site which may be completed by the end of the project period of March 2021.
- iii. For DPR preparation for NH717 and NH54, input from JICA short term experts is necessary up to Dec 2020.
- iv. The current contract period (up to July 2020) of the Short-term experts is not enough to accommodate implementation of the civil work of NH10 as well as DPR preparation for NH717 and NH54 . However, necessity of extension of the contract period depends on the results of bidding of the pilot project on NH10 as well as procurement of DPR Consultant for NH717 and NH54. In case a contractor is successfully awarded for the NH10 pilot project and Letter of Acceptance is issued or if procurement of DPR Consultant for NH717 or NH54 is successful and timely, JICA may extend the contract period of the Short-term experts. The maximum extension is until December 2020, however. In addition, JICA Short-term Expert Team should have additional experts in charge of support for design and supervision. (Note: JICA Experts are unable to assume liability of design)

2 Delay of Work Schedule and/or Issues (Problems) (if any)

2-1 Issues/Problems

- As of 30th September 2019, Pilot Project on NH10 is about 1.5 months behind schedule, while remaining project period is one and a half years. To realize technical transfer for new technology of slope protection, invitation of tender should be done by the middle of Nov 2019, LoA should be issued by NHIDCL in the middle of Feb 2020, and commencement of the civil work should be by the middle of March 2020. Further delay in achieving these key milestones should be avoided.

2-2 Cause

- Preparation of DPR requires more time due to lack of capacity of DPR Consultant.
- Change of contract mode from EPC to BOQ needs additional work.

2-3 Action to be taken

- A) MoRTH and NHIDCL request DPR Consultant to hire a sub-contractor specialized in slope works and to submit DPR by the end of October 2019.
- B) Both Indian and Japanese sides will monitor the progress of Pilot Project regularly and take necessary actions to avoid further delay by setting important milestones.

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of India)

- A) MoRTH and NHIDCL
- B) MoRTH, NHIDCL, JICA Experts

3 Modification of the Project Implementation Plan

3-1 PO

- 1) PO ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

3-2 Other modifications on detailed implementation plan (Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HQ. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)

- 1) PDM ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.
- 2) The amendment R/D and PDM will be authorized by JICA HQ

II. Project Monitoring Sheet I & II as Attached

Project Monitoring Sheet I (Revision of Project Design Matrix)

Project Title: Capacity Development Project on Highways in Mountainous Regions
Implementing Agency: Ministry of Road Transport and Highways (MoRTH)
Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD
Period of Project: Apr. 2016 – Mar. 2021 (Five (5) years)
Project Site: Whole India

Version 6
 Dated 16th Oct, 2019

Narrative Summary		Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project	OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.	Detailed Project Report (DPR) / Feasibility Study Report				
	OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.	Contract Document Completion Report by the operation and maintenance contractor				
Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.	PP1 Model activities are conducted applying the developed guidelines by the Project.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors		- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.	- Refer to OVI (Objectively Verifiable Indicators) 2-4, 3) Pilot Project	
	PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors			- The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 4 country focused training and 1 Invitation Program conducted in Japan (3) 3 Technical Workshops for Draft Bridge, Tunnel and Slope Protection Guidelines were held in New Dehli	

<p>Outputs</p> <p>Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p>	<p>Survey and planning guidelines</p>	<p><progress 100%> 1) Existing standards for mountainous highways were collected and analyzed, and issues were identified. <progress 100%> 2) Field Surveys were conducted in 10 of 10 case study sites. <progress 100%> 3) TOC for survey and planning guideline drafted and finalized at the TG meeting on 30th January 2018, followed by approval in April 2018 JCC Meeting. <progress 100%> 4) Draft of survey and planning guideline based on review of existing standards and field surveys is complete. <progress 75%> 5) Review of planning guideline is in progress. Related Technical workshop is planned in Dec 2019</p>
<p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Project records</p>	<p><progress 65%> for items 1) - 4) 1) Country focused trainings were conducted 4 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI(Objectively Verifiable Indicators) 2-4 4) Survey for disaster: Refer to OVI 2-4 5) Technical workshops for Draft Bridge, Tunnel and Slope Protection Guideline were held <progress 100%> 5) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NHIDCL and PWDs were conducted 8 times in total. Tender documents for EPC contract from 2 projects were collected and studied. JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019. Recommendations for Procurement modes for Pilot Project (NH10) were submitted to India side on 28th May 2019 by JICA Experts. Based on that recommendation, NHIDCL is preparing tender documentation for NH10.</p>	

<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019.</p>	<p>Improved tunnel guideline, Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for tunnel guideline drafted and finalized at the TG meeting on 30th January 2018 <progress 100%> 3) Development of draft tunnel guideline based on review of existing standards and field surveys is now complete. <progress 90%> 4) Reviewing is in progress and related technical workshop for tunnel guideline was held on 14th August 2019.</p>
<p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p>	<p>Earthwork guideline, Project records</p>	<p>Earthwork guideline, Project records</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for earthwork guideline drafted and finalized at the TG meeting on 22nd February 2018 <progress 100%> 3) Development of draft earthwork guideline based on review of existing standards and field surveys is complete. <progress 90%> 4) Reviewing is in progress and related technical workshop was held on 25th Sept 2019.</p>	
<p>2-3 High pier bridge guideline is completed by June 2019.</p>	<p>High pier bridge guideline, Project records</p>	<p>High pier bridge guideline, Project records</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for high pier bridge guideline drafted and finalized at the TG meeting on 19th December 2017 <progress 100%> 3) Development of draft high pier bridge guideline based on review of existing standards and field surveys is complete <progress 90%> 4) Reviewing is in progress and related technical workshops was held on 29th July 2019.</p>	

2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.

Project records

- <progress 75%> for items 1) - 4)
- 1) Country focused trainings were conducted 4 times out of 5
 - 2) Technical Seminars were held 2 times in total
 - 3) Pilot Project
 - a. NH22 (initially requested but cancelled)
 - Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, 5th JCC in Oct 2018 cancelled this pilot project site.
 - Field surveys: Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018
 - The draft implementation plan was prepared for NH22
 - b. Candidate sites proposed in Nov 2018
 - Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov, 2018 and site surveys were conducted for 7 times in total.
 - Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide.
 - On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design.
 - For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology.
 - DPR preparation by DPR consultant is ongoing. Tender floating is scheduled after DPR approval by NHIDCL
 - For NH717/NH54, JICA Experts prepared and submitted recommendations on survey plan for gravity deformation on NH717, and reviewed and suggested TOR for DPR consultants on NH54. Selection of consultants for topographic surveys and drilling investigations is now under preparation.
 - 4) Upon the request from MoRTH, NHA or NHIDCL, field surveys for disaster affected site were conducted twice in total.
 - Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018
 - Upon the request from NHA, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018
 - Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.
 - 5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively.

<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p>	<p>Operation and maintenance guideline, Project records</p>	<p><progress 100%> 1) Existing O/M guidelines for mountainous highways were collected and analyzed, and issues were identified <progress 100%> 2) TOC for O/M guidelines drafted and finalized at the TG meeting on 19th December 2017 <progress 100%> 3) Development of O/M guideline based on review of existing standards and field surveys is complete. Reviewing is in progress. <progress 90%> 4) Reviewing is in progress. O&M workshops are included under each related guideline.</p>	
	<p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Project records</p>	<p><progress 75%> for items 1) - 4) 1) Country focused trainings were conducted 3 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI 2-4 4) Surveys for disaster: Refer to OVI 2-4 5) O&M workshops were included under each related guideline for bridge , tunnel and slope protection works.</p>	

Activities	Inputs	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts></p> <ul style="list-style-type: none"> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <p><Short-term Experts/Consultants></p> <ul style="list-style-type: none"> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection II - Mountain Tunnel - Tunnel Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessary - Highway Engineering for Mountain Road <p>(2) Training for Counterparts (in Japan)</p> <p>(Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessary.</p> <p>(4) Local cost for the Project activities</p> <ul style="list-style-type: none"> - Office management cost - Local consultants - Other Local cost as necessary 	<p>The Indian Side</p> <p>(1) Allocation of Counterparts</p> <ul style="list-style-type: none"> - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan <p>(2) Facilities</p> <p>Office spaces and facilities necessary for the Project implementation in MoRTH and NHA1 respectively.</p> <p>(3) Administrative cost and other expenses</p> <ul style="list-style-type: none"> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts <p>(4) Pilot Project Cost, if required construction works.</p>
<p>Majority of trained officials continues to work for counterpart agencies.</p> <p>Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p>	<p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p>	<p><Issues and countermeasures></p> <p>-An independent room for JICA Long-term Expert (Chief Advisor) has not yet been secured in Transport Bhawan, therefore, JICA and MoRTH need to continue to discuss.</p> <p>-Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.</p> <p>-Pilot Project on NH10 is about 1.5 months behind schedule, while remaining project period is one and a half years. To realize technical transfer for new technology of slope protection, further delay in achieving key milestones should be avoided.</p>

Project Monitoring Sheet II (Revision of Plan of Operation)

Project Title: Capacity Development Project on Highways in Mountainous Regions																									
Inputs from JICA		FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				Monitoring			
Expert	Short Term	Plan	Actual	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	Issue	Solution
Chief Advisor / Highway Development																								Chief Adviser's assignment ended on Mar. 31st, 2019.	New Chief Adviser from Japan to be mobilized from
Highway Engineering / Coordinator																									
Team Leader/Slope Protection I																									
Deputy Team Leader/Slope Protection III																									
Mountain Tunnel																									
Slope Protection III/High Embankment																									
Mountain Bridge																									
Facility of Mountain Roads																									
Maintenance & Operation of Mountain Roads																									
Natural Condition (Topography/Geology)																									
Drainage Plan																									
Plan and Survey of Mountain Roads/Coordinator																									
Monitoring and Evaluation																									
Highway Engineering for Mountain Road																									
Equipment																									
Training in Japan																									
Counterpart Training in Japan																									
In-country/Third country Training																									
Inputs from India																									
Expert																									
Chairperson																									
Project Director																									
Project Manager																									
Project Co-Manager																									
Project Co-Manager																									
Project Co-Manager																									
Counterparts (9)																									
Equipment																									

Activities Sub-Activities	2016		2017		2018		2019		2020		Responsible Organization	Achievements	Issue & Countermeasures	
	Plan	Actual	I	II	III	IV	I	II	III	IV				I
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed.														
Identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.														
1.2 Conduct field surveys to the typical mountainous highways.	Plan	Actual										CE (EAP), MoRTH	Information collected and analyzed (100%)	
1.3 Improve survey and planning guidelines on mountainous highways.	Plan	Actual										CE (EAP), MoRTH	Field Surveys completed in all (10 of 10) case study sites. 4 additional surveys conducted upon MORTH request (100%)	
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan	Actual										CE(S&R), CE(EAP) & SE, MoRTH	95% progress	
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*	Plan	Actual										CE (EAP), MoRTH	100% progress	
	Plan	Actual										CE (EAP), MoRTH	70% progress	Request to prepare pilot projects affected guideline preparation.
Output 2: Guidelines on design and construction for mountainous highways are developed.														
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan	Actual										CE (EAP), MoRTH	100%	
2.2 Improve tunnel guidelines.	Plan	Actual										CE(S&R), CE(EAP), MoRTH & GM(Technical) NHIDCL	95% progress	
2.3 Develop earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan	Actual										CE(S&R), CE(EAP) & ED, NHIDCL	95% progress	
2.4 Develop high pier bridge guidelines.	Plan	Actual										CE(S&R), CE(EAP) & CE, MoRTH	95% progress	
Output 3: Guideline on operation and maintenance for mountainous highways is developed.														
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan	Actual										CE (EAP), MoRTH	100%	
3.2 Develop operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan	Actual										CE(S&R), CE(EAP) & GM(T), NHA	95% progress	
Duration / Phasing														
Monitoring Plan														
Monitoring	Plan	Actual												
Joint Coordination Committee	Plan	Actual												
Set-up the Detailed Plan of Operation	Plan	Actual												
Submission of Monitoring Sheet	Plan	Actual												
Reports/Documents														
Project Completion Report	Plan	Actual												
Public Relations														
Setting up & Updating Project Facebook Page	Plan	Actual												
Published article on Project Activities in MORTH Annual Report	Plan	Actual										Set up and Updated 28 times		

Monitoring Sheet (Version 7)

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title: Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.7 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Khushal Chand

Eisuke Nakamura

Title: Chief Engineer (EAP)

Chief Advisor/ Highway Development

Submission Date: 1st June 2020

I. Summary

1. Progress

1-1 Progress of Inputs

- PDM related to Input were authorized on 14th December 2016 as a ver.1

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of 31 st March 2020
A. Japanese side		
(1) Experts	<Long-term Experts> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <Short -term Experts/Consultants> <u>Total: 65.95M/M</u> -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Tunnel Facilities -Slope Protection II/High Embankment - Earthwork -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation	<Long-term Experts> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <Short-term Experts> Progress: (61.51/69.45 MM: 88.5%) Between Nov 2017 and Mar.2020, the following Short-term Experts were dispatched. -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Slope Protection II/High Embankment -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation -Highway Engineering for Mountain Road

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of 31 st March 2020
(2) Training for Counterpart's Personnel	<Training in Japan> (Once a year, about 10 people for 2 weeks (5 times))	<Training in Japan> (1) Country Focused Training was conducted in collaboration with IAHE Progress: 4/5 times -1st Country Focused Training held on 16 th May -6 th June 2017 (22 days) -2nd Country Focused Training/ Invitation held on 24 th Oct -13 th Nov 2017(21 days) -3rd Country Focused Training/ Invitation held on 16 th Oct -5 th Nov 2018(21 days) -4th Country Focused Training held on 7 th Aug -2 nd Sept 2019 (20 days)
		<Training in India> Seminars held in India -1st technical seminar held on 19 th June 2018 -2nd technical seminar held on 27 th Sep 2018 -Technical meeting for "map reading techniques" held on 25 th Feb 2020
(3) Equipment	Equipment and/or Material, as necessary	None
(4) Local Costs	<Local Costs> -Office management cost -Local consultants -Other Local cost as necessity	<Local Costs> -Project Assistant for Short-term Experts -Communication (internet and mobile phone) -No local consultants -Car rental (including driver)
B. Indian Side		
(1) Indian Side Counterparts	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager -Project Members -Participants for training in Japan	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager (3) -Project Members (9) -Participants for training in Japan (43) 1st Training (10); 2nd Training (10); 3rd Training (9); 4th Training (9) 1st Invitation Program (5) -Counterparts for guidelines (7) Overall control of 5 guidelines (2) Guideline for Planning (1) Guideline for Slope Protection and Embankment (1) Guideline for Bridge (1) Guideline for Tunnel (1) Guideline for Operation and Maintenance (1)

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of 31 st March 2020
		<p><JCC Members></p> <p>-As specified in the Project Organizational Chart in Record of Discussion</p>
(2) Operational Expenses	<p><Facilities></p> <p>-Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively</p>	<p><Facilities></p> <p>-An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) was provided in NHAI HQ</p> <p>-Office space for Short-term Experts was provided in Jeevan Tara Building</p>
(3) Administrative Cost	<p><Administrative cost and other expenses></p> <p>1) Personnel cost for counterparts and other running expenses</p> <p>2) Domestic travel cost for counterparts</p>	<p><Administrative cost and other expenses></p> <p>1) Personnel cost for counterparts and other running expenses provided as required</p> <p>2) Domestic travel cost for counterparts provided as required</p>
(4) Pilot Project Cost	<p><Pilot Project Cost></p> <p>Pilot Project Cost, if required construction works</p>	<p><Pilot Project Cost></p> <p>Pilot Project Planned at 3 sites i.e. NH10 (Sikkim), NH717 (West Bengal), and NH54 (Assam)</p> <p>-For NH10, topographic surveys and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA Experts. Based on the data, recommendations for countermeasures for landslide were prepared by JICA Experts. NHIDCL floated a tender to select a contractor for implementing the countermeasure work for landslide and issued a LoA to the winning bidder.</p> <p>-NH54: Selection of consultants for topographic survey and drilling investigation for NH54 was concluded. Topographic survey data collected by DPR Consultant were submitted to NHAI and JICA Experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA Experts.</p>

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of 31 st March 2020
		NH717: NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation for NH717 and issued a LoA to the winning bidder.

1-2 Progress of Activities

- Progress of activities is indicated in Monitoring Sheet II (PO) and Project Design Matrix (PDM)
- Basically, no crucial bottlenecks in progress have been observed.

1-3 Achievement of Output

The deliverables achieved by the Project as per the TOR are given in the table below:

-PDM related to Output were authorized on December 14th 2016 as a ver.1

*Completed, Ongoing, Scheduled for later

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31 st March 2020	Status*
Output1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed		
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<p><Progress 100%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p>(1) 6th Feb 2018: Siliguri to Darjeeling on NH55 in West Bengal (2) 7th Feb 2018: Sevoke to Sikkim on NH10 in West Bengal (3) 28th Sep 2017: Mussoorie to Chamba on 707A in Uttarakhand (4) 10th Apr 2018: Kiratpur to Ner chowk on NH21 in Himachal (5) 10th Apr 2018: Ner chowk to Manali on NH21 in Himachal (6) 9th Apr 2018: Pathankot to Mandi on NH20 in Himachal (7) 15th Feb 2017: Shiradi Ghat bypass on NH48 in Karnataka (8) 20th March 2018: Assam border to Dalu on NH62 in Meghalaya (9) 9th Feb 2018: Mangan to Nakura on NH310 in Sikkim (10) 13th Oct 2017: Shillong to Dawki on NH40 in Meghalaya</p> <p><Progress 100%></p> <p>3) TOC for survey and planning guideline was drafted and finalized at the TG meeting on 30th January 2018 followed by approval in April 2018</p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31 st March 2020	Status*
	<p>JCC Meeting.</p> <p><Progress 100%></p> <p>4) Draft of survey and planning guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>5) Revision and final submission were completed in March 2020. Related Technical Meeting was held on 14th Dec 2019.</p>	
1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	<p><Progress 85%> (for items 1)-6))</p> <p>1) Country focused trainings were conducted 4 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI (Objectively Verifiable Indicators) 2-4 4) Survey for disaster: Refer to OVI 2-4 5) Technical Meeting for Planning Guideline was held in Dec 2019.</p> <p><Progress 100%></p> <p>6) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) were held 8 times.</p> <ul style="list-style-type: none"> -Meeting with state PWD of Karnataka in Feb 2017 -Meeting with state PWD of West Bengal in Feb 2018 -Meeting with PIU of NHAI in Dec 2018 -Meeting with SBO of NHIDCL in Dec 2018 -Meeting with State PWD of West Bengal in Dec 2018 -Meeting with NHAI HQ in Jan 2019 -Meeting with NHIDCL HQ in Jan 2019 -Meeting with MoRTH in Jan 2019 -Tender documents for EPC contracts from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement)) -Based on the review of the current status, JICA Experts prepared and submitted an advisory report to Indian side on 16th Jan 2019. -Recommendations for Procurement modes for Pilot Project (NH10) were submitted to India side on 28th May 2019 by JICA Experts. <p>Based on that recommendation, NHIDCL prepared tender documentation for NH10.</p>	Ongoing
Output2: Guidelines on design and construction for mountainous highways are developed.		
2-1 Improved tunnel guideline is completed by	<p><Progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31 st March 2020	Status*
June 2019.	<p><Progress 100 %> 2) TOC for tunnel guideline was drafted and finalized at the TG meeting on 30th January 2018.</p> <p><Progress 100%> 3) Draft of tunnel guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. Related technical workshop was held on 14th August 2019.</p>	
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	<p><Progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%> 2) TOC for earthwork guideline was drafted and finalized at the TG meeting on 22nd February 2018.</p> <p><Progress 100%> 3) Draft of earthwork guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. Related technical workshop was held on 25th September 2019.</p>	Completed
2-3 High pier bridge guideline is completed by June 2019.	<p><Progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%> 2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017.</p> <p><Progress 100%> 3) Draft of high pier bridge guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. Related technical workshop was held on 29th July 2019.</p>	Completed
2-4 Enhanced level of knowledge and skills of officers in charge of design	<p><Progress 85%> (for items 1)-5))</p> <p>1) Country focused trainings were conducted 4 times out of 5. 2) Technical Seminars were held 2 times in total.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31 st March 2020	Status*
and construction for mountainous highways.	<p>3) Pilot Project</p> <p>a. NH22 (initially requested but cancelled)</p> <ul style="list-style-type: none"> -Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, the 5th JCC in Oct 2018 cancelled this pilot project site. -Field surveys: Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018. -The draft implementation plan was prepared for NH22 <p>b. Candidate sites proposed in Nov 2018.</p> <ul style="list-style-type: none"> -Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov 2018 and site surveys were conducted for 7 times in total. -Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide. -On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design. -For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. Then, NHIDCL floated a tender for the selection of a contractor to conduct the countermeasure work for landslide and issued LoA to the winning bidder. -For NH717/NH54, JICA Experts prepared and submitted recommendations on survey plan. For NH54, topographic survey data collected by DPR Consultant were submitted to NHAI and JICA Experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA Experts. For NH717, NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation and issued a LoA to the winning bidder. <p>4) Upon the requests from MoRTH, NHAI or NHIDCL, field surveys for disaster affected sites were conducted twice in total.</p> <ul style="list-style-type: none"> -Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018 -Upon the request from NHAI, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018 -Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side. <p>5) Technical Workshops for Bridge, Tunnel and Slope Protection were</p>	

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31 st March 2020	Status*
	held on 29 th July, 14 th Aug and 25 th Sept 2019 respectively. Technical Meetings for Planning and O&M were held on 14 th Dec 2019 and 17 th Sep 2019, respectively.	
Output3: Foundation for operation and maintenance for mountainous highways is built.		
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p><Progress 100%> 1) Existing O&M guidelines for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%> 2) TOC for O&M guidelines was drafted and finalized at the TG meeting on 19th December 2017.</p> <p><Progress 100%> 3) Draft of O&M guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. O&M workshops are included under each related guideline. Technical Meeting for O&M was held on 17th Sep 2019.</p>	Completed
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	<p><Progress 85%> (for items 1)-5))</p> <p>1) Country focused trainings were conducted 4 times out of 5.</p> <p>2) Technical Seminars were held 2 times in total.</p> <p>3) Pilot Project: Refer to OVI 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) O&M workshops were included under each related guideline for bridge, tunnel and slope protection works. Technical Meeting for O&M was held on 17th Sep 2019.</p>	Ongoing

1-4 Achievement of the Project Purpose

The deliverables achieved by the Project as per the TOR are given in the table below:

*Completed, Ongoing, Scheduled for later

Project Purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.		
Indicators	Major Results	Status*
(1) Model activities are conducted applying the developed guidelines by the Project.	-Refer to 1-3 Achievement of Output, OVI 2-4, 3) Pilot Project and 5) Technical Workshop / Technical Meeting	Ongoing

(2) Core officers are able to give lectures on development of mountainous highways in the training courses.	-The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 4 country focused training and one Invitation Program conducted in Japan	Ongoing
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1-5 Changes of Risks and Actions for Mitigation

- N/A

1-6 Progress of Actions undertaken by JICA

- JICA Project Team conducted activities related to Output 1, 2 and 3. The progress is monitored as stated in section 1-3 "Achievement of Output".

1-7 Progress of Actions undertaken by Gov. of India

PDM ver.1 approved on Dec. 14th 2016	Actual as of Mar. 31 st 2020	Status
1. Allocation of Counterpart Personnel from GOI 1.1 Chairperson 1.2 Project Director 1.3 Project Manager 1.4 Project Co-Manager 1.5 Project Members 1.6 Participants for Training in Japan	1. Allocated Counterpart Personnel from GOI 1.1 Chairperson 1.2 Project Director 1.3 Project Manager 1.4 Project Co-Manager (3) 1.5 Project Members (9) 1.6 Participants for Training in Japan (43) 1st Training (10); 2nd Training (10); 3 rd Training (9); 4th Training (9); 1st Invitation Program (5) 1.7 Allocated Counterparts for guidelines -Overall control of 5 guidelines -Guideline for Planning -Guideline for Slope Protection and Embankment -Guideline for Bridge -Guideline for Tunnel -Guideline for Operation Maintenance	-India side has availed all the required counterparts.
2. JCC Organization Establishment of JCC as per the Project Organizational Chart in Record of Discussion and holding of meetings at least twice a year	2. JCC Organization JCC was established and members attended the 1st JCC meeting held in MORTH on Dec 14 th 2016 followed by holding JCC meetings in April 2017,	JCC establishment complete JCC meetings ongoing

PDM ver.1 approved on Dec. 14th 2016	Actual as of Mar. 31 st 2020	Status
	<p>October 2017, April 2018, October 2018, May 2019 and Oct 2019 as scheduled.</p> <p>2.1 JCC Members (1) Chairperson (2) Project Director (3) Project Manager (4) Project Co-Manager (3) (5) Project Members (9) CE(s) of MoRTH, GM(s) of NHAI, GM(s) of NHIDCL</p>	
<p>3. Facilities</p> <p>Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p>	<p>3. Land, buildings and facilities</p> <p>a. An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) has been secured in NHAI HQ</p> <p>b. The office space for JICA Short-term Experts has been availed in Jeevan Tara Building.</p>	<p>Not Completed</p> <p>- An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) in Transport Bhawan has yet been secured.</p>
<p>4. Administrative cost and other expenses</p> <p>1) Personnel cost for counterparts and other running expenses</p> <p>2) Domestic travel cost for counterparts</p>	<p>4. Administrative cost and other expenses</p> <p>1) Personnel cost for counterparts and other running expenses being provided as required</p> <p>2) Domestic travel cost for counterparts being provided as required</p>	<p>Ongoing</p>
<p>5. Pilot Project Cost, if required construction works.</p>	<p>5. Pilot Project</p> <p>-Refer to 1-3 Achievement of Output, OVI 2-4, 3) Pilot Project</p>	<p>Ongoing</p>

1-8 Progress of Environmental and Social Considerations (if applicable)

- N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

- N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

- An independent office room for JICA Long-term Expert (Chief Advisor/Highway Development) has not been secured in Transport Bhawan. It is necessary for JICA and MoRTH to continue to discuss this matter.
- Indian side requested at least one pilot project with civil works which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since the contract period for the team does not accommodate the necessary period for the civil works.
 - i. Among three candidate sites proposed in Dec 2018, one site was selected for civil work after site visits by JICA Experts. For the selected one site for civil work, JICA Experts would give technical advice for updating DPR and guidance for construction. For remaining two sites, JICA Experts would give technical advice for updating DPR.
 - ii. Based on the survey results available for the project, NH10 was recommended as the site for civil work. NH10 was the only site for which technical advice may be completed by the end of the project period. For DPR preparation for NH717 and NH54, JICA Experts would provide input.
 - iii. The current contract period (up to July 2020) of JICA Short-term Expert Team is not enough to accommodate implementation of the civil work of NH10 as well as DPR preparation for NH717 and NH54. JICA is to extend the contract period of JICA Short-term Expert Team. In addition, JICA Short-term Expert Team should have additional experts in charge of support for design and supervision. (Note: JICA Experts are unable to assume liability of design.)

2. Delay of Work Schedule and/or Issues (Problems) (if any)

2-1 Issues/Problems

- The declaration by the World Health Organization designating the COVID-19 outbreak as a 'Public Health Emergency of International Concern' on 30th January 2020 and a pandemic on 11th March 2020 led the Gov. of India to take countermeasures by restricting movement within India including suspension of entry visas of some of JICA Short-term Experts. The COVID-19 pandemic lockdown by the Gov. of India was effective from 25th March 2020. Based on these situations, JICA instructed JICA Long-term Experts to return to Japan in April 2020.
- The global outbreak of COVID-19 has caused 8th JCC meeting and 5th country

focused training program to be suspended. The COVID-19 pandemic lockdown in India has delayed the progress of the Pilot Projects.

2-2 Cause

- Global outbreak of COVID-19
- COVID-19 pandemic lockdown in India from 25th March 2020

2-3 Action to be taken

- Both Japanese and Indian sides will faithfully discuss to arrive at a mutually agreeable solution by such as modifying project activities, project duration, and/or incorporating additional arrangements.

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of India)

- JICA
- Gov. of India

3. Modification of the Project Implementation Plan

3-1 PO

- PO ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

3-2 Other modifications on detailed implementation plan (Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HQ. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)

- PDM ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.
- The amendment R/D and PDM will be authorized by JICA HQ

II. Project Monitoring Sheet I & II as Attached

Project Monitoring Sheet I (Revision of Project Design Matrix)

Version 7

Date: 31st March 2020

Project Title: Capacity Development Project on Highways in Mountainous Regions

Implementing Agency: Ministry of Road Transport and Highways (MoRTH)

Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD

Period of Project: Apr, 2016 – Mar, 2021 (Five (5) years)

Project Site: Whole India

Model Site:

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<p>Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report</p>			
	<p>OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Contract Document Completion Report by the operation and maintenance contractor</p>			
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.</p>	<p>- Refer to OVI (Objectively Verifiable Indicators) 2-4, 3)Pilot Project</p>	
	<p>PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>		<p>- The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars held in India (2) 4 country focused training and 1 Invitation program held in Japan (3) 3 Technical Workshops for Bridge, Tunnel and Slope Protection Guidelines held in New Delhi (4) 2 Technical meeting for Planning & O&M Guidelines held in New Delhi (5) 1 Technical meeting for "map reading techniques" held in New Delhi</p>	

<p>Outputs</p> <p>Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p>	<p>Survey and planning guidelines</p>	<p><progress 100%> 1) Existing standards for mountainous highways were collected and analyzed, and issues were identified. <progress 100%> 2) Field Surveys were conducted in 10 case study sites. <progress 100%> 3) TOC for survey and planning guideline was drafted and finalized at the TG meeting on 30th January 2018, followed by approval in April 2018 JCC Meeting. <progress 100%> 4) Draft of survey and planning guideline based on review of existing standards and field surveys were completed. <progress 100%> 5) Revision and final submission were completed. Related technical meeting was held on 14th December 2019.</p>	
<p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Project records</p>	<p><progress 85%> for items 1) - 5) 1) Country focused trainings were conducted 4 times. 2) Technical Seminars were held 2 times in total. 3) Pilot Project: Refer to OVI (Objectively Verifiable Indicators) 2-4 4) Survey for disaster: Refer to OVI 2-4 5) Technical meeting for survey and planning guidelines was held on 14th December 2019. <progress 100%> 6) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWDs were conducted 8 times in total. Tender documents for EPC contract from 2 projects were collected and studied. JICA experts prepared and submitted an advisory report to India side on 16th Jan 2019. Recommendations for Procurement modes for Pilot Project (NH10) were submitted to India side on 28th May 2019 by JICA Experts. Based on that recommendation, NHIDCL prepared tender documentation for NH10.</p>		

<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019.</p>	<p>Improved tunnel guideline, Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for tunnel guideline was drafted and finalized at the TG meeting on 30th January 2018 <progress 100%> 3) Development of draft tunnel guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshop for tunnel guideline was held on 14th August 2019.</p>
<p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p>	<p>Earthwork guideline, Project records</p>	<p>Earthwork guideline, Project records</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for earthwork guideline was drafted and finalized at the TG meeting on 22nd February 2018 <progress 100%> 3) Development of draft earthwork guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshop was held on 25th September 2019.</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017 <progress 100%> 3) Development of draft high pier bridge guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshops was held on 29th July 2019.</p>
<p>2-3 High pier bridge guideline is completed by June 2019.</p>	<p>High pier bridge guideline, Project records</p>	<p>High pier bridge guideline, Project records</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017 <progress 100%> 3) Development of draft high pier bridge guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshops was held on 29th July 2019.</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017 <progress 100%> 3) Development of draft high pier bridge guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshops was held on 29th July 2019.</p>

2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.

Project records

<progress 85%> for items 1) - 4)

- 1) Country focused trainings were conducted 4 times.
- 2) Technical Seminars were held 2 times in total.
- 3) Pilot Project
 - a. NH22 (initially requested but cancelled)
 - Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, 5th JCC in Oct 2018 cancelled this pilot project site.
 - Field surveys: Parwanoo~Solani section of NH22 in Himachal Pradesh on 8th June and 20th June 2018
 - The draft implementation plan was prepared for NH22
 - b. Candidate sites proposed in Nov 2018
 - Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov, 2018 and site surveys were conducted for 7 times in total.
 - Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide.
 - On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design.
- For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. NHIDCL floated a tender for the selection of a contractor, and issued LoA to winning bidder.
- For NH54, topographic survey data by DPR Consultant were submitted to NHAI and JICA experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA experts.
- For NH717, NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation, and issued LoA to winning bidder.
- 4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted twice in total.
 - Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018
 - Upon the request from NHAI, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018
- Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.
- 5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively. Technical meetings for planning and O&M were held on 14th December 2019 and on 17th September 2019, respectively.

<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p>	<p>Operation and maintenance guideline, Project records</p>	<p><progress 100%> 1) Existing O&M guidelines for mountainous highways were collected and analyzed, and issues were identified <progress 100%> 2) TOC for O&M guidelines was drafted and finalized at the TG meeting on 19th December 2017 <progress 100%> 3) Development of O&M guideline based on review of existing standards and field surveys were complete. <progress100%> 4) Revision and final submission were completed. O&M workshops were held under each related guideline. Technical meeting for O&M was held on 17th September 2019.</p>	
<p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Project records</p>		<p><progress 85%> for items 1) - 4) 1) Country focused trainings were conducted 3 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI 2-4 4) Surveys for disaster: Refer to OVI 2-4 5) O&M workshops were included under each related guidelines for bridge, tunnel and slope protection works. Technical meeting for O&M was held on 17th September 2019.</p>	

Activities	The Japanese Side	Inputs	The Indian Side	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork protection (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III - Mountain Tunnel - Tunnel Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessity - Highway Engineering for Mountain Road</p> <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>Inputs</p> <p>(1) Allocation of Counterparts - Chairperson - Project Director - Project Manager - Project Co-Manager - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>The Indian Side</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures> -An independent room for JICA Long-term Expert (Chief Advisor) has not yet been secured in Transport Bhawan, therefore, JICA and MoRTH need to continue to discuss.</p> <p>-Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.</p> <p>-The progress of the Pilot Project was delayed due to COVID-19 pandemic lockdown. Both Japanese and Indian sides will faithfully discuss to arrive at a mutually agreeable solution by such as modifying project activities, project duration, and/or incorporating additional arrangements.</p>	<p>Important Assumption</p> <p>- Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures> -An independent room for JICA Long-term Expert (Chief Advisor) has not yet been secured in Transport Bhawan, therefore, JICA and MoRTH need to continue to discuss.</p> <p>-Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.</p> <p>-The progress of the Pilot Project was delayed due to COVID-19 pandemic lockdown. Both Japanese and Indian sides will faithfully discuss to arrive at a mutually agreeable solution by such as modifying project activities, project duration, and/or incorporating additional arrangements.</p>

Project Monitoring Sheet II (Revision of Plan of Operation)

Version 7

Date: 31st March 2020

Project Title: Capacity Development Project on Highways in Mountainous Regions		Monitoring												
		Inputs from JICA												
Long Term	Short Term	FY 2016		FY 2017		FY 2018		FY 2019		FY 2020		Remarks	Issue	Solution
		I	II	III	IV	I	II	III	IV	I	II			
Expert														
Chief Advisor / Highway Development	Plan													
	Actual													
Highway Engineering / Coordinator	Plan													
	Actual													
Team Leader/Slope Protection I	Plan													
	Actual													
Deputy Team Leader/Slope Protection III	Plan													
	Actual													
Mountain Tunnel	Plan													
	Actual													
Slope Protection II/High Embankment	Plan													
	Actual													
Mountain Bridge	Plan													
	Actual													
Facility of Mountain Roads	Plan													
	Actual													
Maintenance & Operation of Mountain Roads	Plan													
	Actual													
Natural Condition (Topography/Geology)	Plan													
	Actual													
Drainage Plan	Plan													
	Actual													
Plan and Survey of Mountain Roads/Coordinator	Plan													
	Actual													
Monitoring and Evaluation	Plan													
	Actual													
Highway Engineering for Mountain Road	Plan													
	Actual													
Equipment														
Training in Japan														
Counterpart Training in Japan	Plan													
	Actual													
In-country/Third country Training	Plan													
	Actual													
Inputs from India														
Expert														
Chairperson	Plan													
	Actual													
Project Director	Plan													
	Actual													
Project Manager	Plan													
	Actual													
Project Co-Manager	Plan													
	Actual													
Project Co-Manager	Plan													
	Actual													
Project Co-Manager	Plan													
	Actual													
Counterparts (9)	Plan													
	Actual													
Equipment														
	Plan													
	Actual													

Activities (Sub-Activities)	2016		2017		2018		2019		2020		Responsible Organization	Achievements	Issue & Countermeasure
	Plan	Actual	I	II	III	IV	I	II	III	IV			
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed													
1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.	Plan	Actual									CE(EAP), MoRTH	Information collected and analyzed (100%)	
1.2 Conduct field surveys to the typical mountainous highways.	Plan	Actual									CE(EAP), MoRTH	Field surveys completed in 10 case study sites, 4 additional surveys conducted upon MoRTH request (100%)	
1.3 Improve survey and planning guidelines on mountainous highways.	Plan	Actual									CE(S&R), CE(EAP), MoRTH & SE, MoRTH	100% progress	
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan	Actual									CE(EAP), MoRTH	100% progress	
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*	Plan	Actual									CE(EAP), MoRTH	85% progress	Lockdown due to COVID-19 pandemic affected the progress. To be discussed once the situation is settled down.
Output 2: Guidelines on design and construction for mountainous highways are developed.													
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan	Actual									CE(EAP), MoRTH	100% progress	
2.2 Improve tunnel guidelines.	Plan	Actual									CE(S&R), CE(EAP), MoRTH & GM(Technical) NHIDCL	100% progress	
2.3 Develop earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan	Actual									CE(S&R), CE(EAP), MoRTH & ED NHIDCL	100% progress	
2.4 Develop high pier bridge guidelines.	Plan	Actual									CE(S&R), CE(EAP), MoRTH & CE, MoRTH	100% progress	
Output 3: Guideline on operation and maintenance for mountainous highways is developed.													
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan	Actual									CE(EAP), MoRTH	100% progress	
3.2 Develop operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan	Actual									CE(S&R), CE(EAP), MoRTH & GM(T), NHA	100% progress	
Duration / Phasing													
	Plan	Actual											
Monitoring Plan													
Monitoring													
Joint Coordination Committee	Plan	Actual											
Set-up the Detailed Plan of Operation	Plan	Actual											
Submission of Monitoring Sheet	Plan	Actual											
Reports/Documents													
Project Completion Report	Plan	Actual											
Public Relations													
Setting up & Updating Project Facebook Page	Plan	Actual											
Published article on Project Activities in MoRTH Annual Report	Plan	Actual											
Issue													
	Remarks											Issue	Solution
	8th JCC meeting was suspended due to COVID-19 pandemic.											To be scheduled once the situation is settled down.	
	Set up and Updated 38 times												

Monitoring Sheet (Version 8)

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title: Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.8 (Term: 60 Month, Apr./2016 – Mar./2021)

Name: Khushal Chand

Eisuke Nakamura

Title: Chief Engineer (EAP)

Chief Advisor/ Highway Development

Submission Date: 5th January 2021

I. Summary

1. Progress

1-1 Progress of Inputs

- PDM related to Input were authorized on 14th December 2016 as a ver.1

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of 30th September, 2020
A. Japanese side		
(1) Experts	<p><Long-term Experts></p> <ul style="list-style-type: none"> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <p><Short-term Experts/Consultants></p> <p><u>Total: 65.95M/M</u></p> <ul style="list-style-type: none"> -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Tunnel Facilities -Slope Protection II/High Embankment - Earthwork -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation 	<p><Long-term Experts></p> <ul style="list-style-type: none"> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <p><Short-term Experts></p> <p>Progress: (63.07/69.82 MM: 90.3%)</p> <p>Between Nov 2017 and Mar.2020, the following Short-term Experts were dispatched.</p> <ul style="list-style-type: none"> -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Slope Protection II/High Embankment -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of 30th September, 2020
		-Monitoring/Evaluation -Highway Engineering for Mountain Road
(2) Training for Counterpart's Personnel	<Training in Japan> (Once a year, about 10 people for 2 weeks (5 times))	<Training in Japan> (1) Country Focused Training was conducted in collaboration with IAHE Progress: 4/5 times -1st Country Focused Training held on 16 th May -6 th June 2017 (22 days) -2nd Country Focused Training/ Invitation held on 24 th Oct -13 th Nov 2017(21 days) -3rd Country Focused Training/ Invitation held on 16 th Oct -5 th Nov 2018(21 days) -4th Country Focused Training held on 7 th Aug -2 nd Sept 2019 (20 days) -5th Country Focused Training planned for May/June 2020 was cancelled due to the COVID-19 pandemic travel restrictions.
		<Training in India> Seminars held in India -1st technical seminar held on 19 th June 2018 -2nd technical seminar held on 27 th Sep 2018 -Technical meeting for "map reading techniques" held on 25 th Feb 2020
(3) Equipment	Equipment and/or Material, as necessary	None
(4) Local Costs	<Local Costs> -Office management cost -Local consultants -Other Local cost as necessity	<Local Costs> -Project Assistant for Short-term Experts -Communication (internet and mobile phone) -No local consultants -Car rental (including driver)
B. Indian Side		
(1) Indian Side Counterparts	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager -Project Members -Participants for training in Japan	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager (3) -Project Members (9) -Participants for training in Japan (43) 1st Training (10); 2nd Training (10); 3rd Training (9); 4th Training (9) 1st Invitation Program (5) -Counterparts for guidelines (7)

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of 30th September, 2020
		<p>Overall control of 5 guidelines (2) Guideline for Planning (1) Guideline for Slope Protection and Embankment (1) Guideline for Bridge (1) Guideline for Tunnel (1) Guideline for Operation and Maintenance (1)</p>
(2) Operational Expenses	<p><Facilities> -Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively</p>	<p><Facilities> -An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) was provided in NHAI HQ -Office space for Short-term Experts was provided in Jeevan Tara Building</p>
(3) Administrative Cost	<p><Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p>	<p><Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses provided as required 2) Domestic travel cost for counterparts provided as required</p>
(4) Pilot Project Cost	<p><Pilot Project Cost> Pilot Project Cost, if required construction works</p>	<p><Pilot Project Cost> Pilot Project Planned at 3 sites i.e. NH10 (Sikkim), NH717 (West Bengal), and NH54 (Assam) -For NH10, topographic surveys and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA Experts. Based on the data, recommendations for countermeasures for landslide were prepared by JICA Experts. NHIDCL floated a tender to select a contractor for implementing the countermeasure work for landslide and issued a LoA to the winning bidder. Bid evaluation was completed and NHIDCL signed the contract agreement in May, 2020.</p>

Inputs	PDM ver.1 approved on Dec 14th 2016	Actual as of 30th September, 2020
		<p>-NH54: Selection of consultants for topographic survey and drilling investigation for NH54 was concluded and the contract agreement between NHAI and Consultant was signed on 23rd December, 2019. Topographic survey data collected by DPR Consultant were submitted to NHAI and JICA Experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA Experts.</p> <p>NH717: NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation for NH717 and issued a LoA to the winning bidder. NHIDCL signed the contract agreement on 27th May, 2020.</p>

1-2 Progress of Activities

- Progress of activities is indicated in Monitoring Sheet II (PO) and Project Design Matrix (PDM)
- Basically, no crucial bottlenecks in progress have been observed.

1-3 Achievement of Output

The deliverables achieved by the Project as per the TOR are given in the table below:

-PDM related to Output were authorized on December 14th 2016 as a ver.1

*Completed, Ongoing, Scheduled for later

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30th September, 2020	Status*
Output1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed		
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<Progress 100%> 1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30th September, 2020	Status*
	<p><Progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p>(1) 6th Feb 2018: Siliguri to Darjeeling on NH55 in West Bengal (2) 7th Feb 2018: Sevoke to Sikkim on NH10 in West Bengal (3) 28th Sep 2017: Mussoorie to Chamba on 707A in Uttarakahnd (4) 10th Apr 2018: Kiratpur to Ner chowk on NH21 in Himachal (5) 10th Apr 2018: Ner chowk to Manali on NH21 in Himacha (6) 9th Apr 2018: Pathankot to Mandi on NH20 in Himachal (7) 15th Feb 2017: Shiradi Ghat bypass on NH48 in Karnataka (8) 20th March 2018: Assam border to Dalu on NH62 in Megalaya (9) 9th Feb 2018: Mangan to Nakura on NH310 in Sikkim (10) 13th Oct 2017: Shillong to Dawki on NH40 in Megalaya</p> <p><Progress 100%></p> <p>3) TOC for survey and planning guideline was drafted and finalized at the TG meeting on 30th January 2018 followed by approval in April 2018 JCC Meeting.</p> <p><Progress 100%></p> <p>4) Draft of survey and planning guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>5) Revision and final submission were completed in March 2020. Related Technical Meeting was held on 14th Dec 2019.</p>	
1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	<p><Progress 85%> (for items 1)-5))</p> <p>1) Country focused trainings were conducted 4 times out of 5 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI (Objectively Verifiable Indicators) 2-4 4) Survey for disaster: Refer to OVI 2-4 5) Technical Meeting for Planning Guideline was held in Dec 2019.</p> <p><Progress 100%></p> <p>6) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) were held 8 times.</p> <p>-Meeting with state PWD of Karnataka in Feb 2017 -Meeting with state PWD of West Bengal in Feb 2018 -Meeting with PIU of NHAI in Dec 2018 -Meeting with SBO of NHIDCL in Dec 2018</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30th September, 2020	Status*
	<ul style="list-style-type: none"> -Meeting with State PWD of West Bengal in Dec 2018 -Meeting with NHAI HQ in Jan 2019 -Meeting with NHIDCL HQ in Jan 2019 -Meeting with MoRTH in Jan 2019 -Tender documents for EPC contracts from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement)) -Based on the review of the current status, JICA Experts prepared and submitted an advisory report to Indian side on 16th Jan 2019. -Recommendations for Procurement modes for Pilot Project (NH10) were submitted to India side on 28th May 2019 by JICA Experts. Based on that recommendation, NHIDCL prepared tender documentation for NH10. 	
Output2: Guidelines on design and construction for mountainous highways are developed.		
2-1 Improved tunnel guideline is completed by June 2019.	<p><Progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100 %> 2) TOC for tunnel guideline was drafted and finalized at the TG meeting on 30th January 2018.</p> <p><Progress 100%> 3) Draft of tunnel guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. Related technical workshop was held on 14th August 2019.</p>	Completed
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	<p><Progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%> 2) TOC for earthwork guideline was drafted and finalized at the TG meeting on 22nd February 2018.</p> <p><Progress 100%> 3) Draft of earthwork guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. Related technical workshop was held on 25th September 2019.</p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30th September, 2020	Status*
2-3 High pier bridge guideline is completed by June 2019.	<p><Progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%> 2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017.</p> <p><Progress 100%> 3) Draft of high pier bridge guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. Related technical workshop was held on 29th July 2019.</p>	Completed
2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	<p><Progress 85%> (for items 1)-5))</p> <p>1) Country focused trainings were conducted 4 times out of 5. 2) Technical Seminars were held 2 times in total. 3) Pilot Project</p> <p>a. NH22 (initially requested but cancelled) -Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, the 5th JCC in Oct 2018 cancelled this pilot project site. -Field surveys: Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018. -The draft implementation plan was prepared for NH22</p> <p>b. Candidate sites proposed in Nov 2018. -Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov 2018 and site surveys were conducted for 7 times in total. -Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide. -On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design. -For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. Then, NHIDCL floated a tender for the selection of a contractor to conduct the countermeasure work for landslide and issued LoA to the</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30th September, 2020	Status*
	<p>winning bidder. Bid evaluation was completed and NHIDCL signed the contract agreement in May, 2020. JICA side submitted comments on documents to NHIDCL on 22nd October, 2020. Site survey to prepare working drawings and method statement is currently being conducted by NHIDCL and the Contractor. JICA Experts are awaiting Contractor's working drawings and method statement so as to assist NHIDCL with review and approval.</p> <p>- For NH54, topographic survey data collected by DPR Consultant were submitted to NHAI and JICA Experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA Experts. JICA Experts submitted recommendations on slope stake monitoring on 22nd June, 2020 followed by 8 sets of comments on slope stake monitoring methods and results between 29th Jul, 2020 and 29th October, 2020. NHAI and the Consultant are currently implementing site survey. JICA Experts are awaiting survey results from Consultant so as to prepare technical recommendations.</p> <p>For NH717, NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation and issued a LoA to the winning bidder. NHIDCL signed the contract agreement on 27th May, 2020 and on 20th July, 2020 JICA side submitted comments on the draft Inception Report and draft Quality Assurance report. NHIDCL and the Consultant are currently implementing site survey. JICA Experts are awaiting survey results from the Consultant so as to prepare technical recommendations.</p> <p>4) Upon the requests from MoRTH, NHAI or NHIDCL, field surveys for disaster affected sites were conducted twice in total.</p> <ul style="list-style-type: none"> -Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018 -Upon the request from NHAI, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018 -Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side. <p>5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively. Technical Meetings for Planning and O&M were held on 14th Dec 2019 and 17th Sep 2019, respectively.</p>	

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30th September, 2020	Status*
Output3: Foundation for operation and maintenance for mountainous highways is built.		
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p><Progress 100%> 1) Existing O&M guidelines for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%> 2) TOC for O&M guidelines was drafted and finalized at the TG meeting on 19th December 2017.</p> <p><Progress 100%> 3) Draft of O&M guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. O&M workshops are included under each related guideline. Technical Meeting for O&M was held on 17th Sep 2019.</p>	Completed
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	<p><Progress 85%> (for items 1)-5))</p> <p>1) Country focused trainings were conducted 4 times out of 5.</p> <p>2) Technical Seminars were held 2 times in total.</p> <p>3) Pilot Project: Refer to OVI 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) O&M workshops were included under each related guideline for bridge, tunnel and slope protection works. Technical Meeting for O&M was held on 17th Sep 2019.</p>	Ongoing

1-4 Achievement of the Project Purpose

The deliverables achieved by the Project as per the TOR are given in the table below:

*Completed, Ongoing, Scheduled for later

Project Purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.		
Indicators	Major Results	Status*
(1) Model activities are conducted applying the developed guidelines by the Project.	-Refer to 1-3 Achievement of Output, OVI 2-4, 3) Pilot Project and 5) Technical Workshop / Technical Meeting	Ongoing
(2) Core officers are able to give lectures on development of mountainous highways in the training courses.	-The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India	Ongoing

	(2) 4 country focused training and one Invitation Program conducted in Japan	
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1-5 Changes of Risks and Actions for Mitigation

- N/A

1-6 Progress of Actions undertaken by JICA

- JICA Project Team conducted activities related to Output 1, 2 and 3. The progress is monitored as stated in section 1-3 “Achievement of Output”.

1-7 Progress of Actions undertaken by Gov. of India

PDM ver.1 approved on Dec. 14th 2016	Actual as of 30th September, 2020	Status
<p>1. Allocation of Counterpart Personnel from GOI</p> <p>1.1 Chairperson</p> <p>1.2 Project Director</p> <p>1.3 Project Manager</p> <p>1.4 Project Co-Manager</p> <p>1.5 Project Members</p> <p>1.6 Participants for Training in Japan</p>	<p>1. Allocated Counterpart Personnel from GOI</p> <p>1.1 Chairperson</p> <p>1.2 Project Director</p> <p>1.3 Project Manager</p> <p>1.4 Project Co-Manager (3)</p> <p>1.5 Project Members (9)</p> <p>1.6 Participants for Training in Japan (43)</p> <p>1st Training (10); 2nd Training (10); 3rd Training (9); 4th Training (9); 1st Invitation Program (5)</p> <p>1.7 Allocated Counterparts for guidelines</p> <ul style="list-style-type: none"> -Overall control of 5 guidelines -Guideline for Planning -Guideline for Slope Protection and Embankment -Guideline for Bridge -Guideline for Tunnel -Guideline for Operation Maintenance 	<p>-Indian side has availed all the required counterparts.</p>
<p>2. JCC Organization</p> <p>Establishment of JCC as per the Project Organizational Chart in Record of Discussion and holding of meetings at least twice a year</p>	<p>2. JCC Organization</p> <p>JCC was established and members attended the 1st JCC meeting held in MORTH on Dec 14th 2016 followed by holding JCC meetings in April 2017,</p>	<p>JCC establishment complete</p> <p>JCC meetings ongoing</p>

PDM ver.1 approved on Dec. 14th 2016	Actual as of 30th September, 2020	Status
	<p>October 2017, April 2018, October 2018, May 2019 and Oct 2019 as scheduled.</p> <p>2.1 JCC Members (1) Chairperson (2) Project Director (3) Project Manager (4) Project Co-Manager (3) (5) Project Members (9) CE(s) of MoRTH, GM(s) of NHAI, GM(s) of NHIDCL</p>	
<p>3. Facilities</p> <p>Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p>	<p>3. Land, buildings and facilities</p> <p>a. An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) has been secured in NHAI HQ</p> <p>b. The office space for JICA Short-term Experts has been availed in Jeevan Tara Building.</p>	<p>Not Completed</p> <p>- An independent room for JICA Long-term Expert (Chief Advisor/ Highway Development) in Transport Bhawan has not yet been secured.</p>
<p>4. Administrative cost and other expenses</p> <p>1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p>	<p>4. Administrative cost and other expenses</p> <p>1) Personnel cost for counterparts and other running expenses being provided as required 2) Domestic travel cost for counterparts being provided as required</p>	Ongoing
<p>5. Pilot Project Cost, if required construction works.</p>	<p>5. Pilot Project</p> <p>-Refer to 1-3 Achievement of Output, OVI 2-4, 3) Pilot Project</p>	Ongoing

1-8 Progress of Environmental and Social Considerations (if applicable)

- N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

- N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

- An independent office room for JICA Long-term Expert (Chief Advisor/Highway Development) has not been secured in Transport Bhawan. It is necessary for JICA and MoRTH to continue to discuss this matter.
- Indian side requested at least one pilot project with civil works which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since the contract period for the team does not accommodate the necessary period for the civil works.
 - i. Among three candidate sites proposed in December 2018, one site was selected for civil work after site visits by JICA Experts. For the selected one site for civil work, JICA Experts would give technical advice for updating DPR and guidance for construction. For remaining two sites, JICA Experts would give technical advice for updating DPR.
 - ii. Based on the survey results available for the project, NH10 was recommended as the site for civil work. NH10 was the only site for which technical advice may be completed by the end of the project period. For DPR preparation for NH717 and NH54, JICA Experts would provide input.
 - iii. The current contract period (up to July 2020) of JICA Short-term Expert Team is not enough to accommodate implementation of the civil work of NH10 as well as DPR preparation for NH717 and NH54. JICA is to extend the contract period of JICA Short-term Expert Team. In addition, JICA Short-term Expert Team should have additional experts in charge of support for design and supervision. (Note: JICA Experts are unable to assume liability of design.)

2. Delay of Work Schedule and/or Issues (Problems) (if any)

2-1 Issues/Problems

- The declaration by the World Health Organization designating the COVID-19 outbreak as a 'Public Health Emergency of International Concern' on 30th January 2020 and a pandemic on 11th March 2020 led the Gov. of India to take countermeasures by restricting movement within India including suspension of entry visas of some of JICA Short-term Experts. The COVID-19 pandemic lockdown by the Gov. of India was effective from 25th March 2020. Based on these situations, JICA instructed JICA Long-term Experts to return to Japan in April 2020.

- The global outbreak of COVID-19 has caused 8th JCC meeting and 5th country focused training program to be canceled.
- The COVID-19 pandemic lockdown in India has delayed the progress of the Pilot Projects. The full lockdown started in March 2020 and lasted until the end of May. Since June, some of the lockdown restrictions are gradually being lifted. However, as of the end of September, some restrictions still remain. Interstate travels have been considerably restricted as well. As of the end of September, the restrictions of interstate travels have been eased but some states still require some weeks of quarantine. The lockdown and restrictions of interstate travel including weeks-long quarantine obstruct the site works by the consultants and contractor for the pilot project.
- International travel restrictions are still in place and resumption of JICA Experts' remobilization in India for the project is not expected before April 2021 thereby greatly affecting involvement in and progress of pilot projects.

2-2 Cause

- Global outbreak of COVID-19
- COVID-19 pandemic lockdown in India from 25th March 2020

2-3 Action to be taken

- Both Japanese and Indian sides will faithfully discuss to arrive at a mutually agreeable solution by such as modifying project activities, project duration, and/or incorporating additional arrangements. In view of the foregoing, JICA side is proposing a revised timeline for pilot projects and one-year project period extension.

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of India)

- JICA
- Gov. of India

3. Modification of the Project Implementation Plan

3-1 PO

- PO ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

3-2 Other modifications on detailed implementation plan (Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HQ. If the project team deems it necessary to modify any part of R/D and

PDM, the team may propose the draft.)

- PDM ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.
- The amendment R/D and PDM will be authorized by JICA HQ
- Based on the results of the 8th JCC meeting, revised R/D will be prepared for signing by both parties.
- In view of the necessity to complete remaining projects amidst the continuing pandemic, JICA side suggested application by the Indian side of the proposed revised timeline to manage the technical transfer through the pilot projects. JICA side also suggested applying online communication tools to maintain close collaboration between the two parties

II. Project Monitoring Sheet I & II *as Attached*

Project Monitoring Sheet I (Revision of Project Design Matrix)

Version 8
Date: 5th January 2021

Project Title: Capacity Development Project on Highways in Mountainous Regions
Implementing Agency: Ministry of Road Transport and Highways (MoRTH)
Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD
Period of Project: Apr, 2016 – Mar, 2021 (Five (5) years)
Project Site: Whole India **Model Site:**

Narrative Summary		Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project	OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.	Detailed Project Report (DPR) / Feasibility Study Report				
	OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.	Contract Document Completion Report by the operation and maintenance contractor				
Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.	PP1 Model activities are conducted applying the developed guidelines by the Project.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors		- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.	- Refer to OVI (Objectively Verifiable Indicators) 2-4, 3)Pilot Project	
	PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors		- The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars held in India (2) 4 country focused training and 1 Invitation program held in Japan (3) 3 Technical Workshops for Bridge, Tunnel and Slope Protection Guidelines held in New Delhi (4) 2 Technical meeting for Planning & O&M Guidelines held in New Delhi (5) 1 Technical meeting for "map reading techniques" held in New Delhi		

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<p>Outputs</p> <p>Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p>	<p>Survey and planning guidelines</p>		<p><progress 100%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><progress 100%></p> <p>2) Field Surveys were conducted in 10 case study sites.</p> <p><progress 100%></p> <p>3) TOC for survey and planning guideline was drafted and finalized at the TG meeting on 30th January 2018, followed by approval in April 2018 JCC Meeting.</p> <p><progress 100%></p> <p>4) Draft of survey and planning guideline based on review of existing standards and field surveys were completed.</p> <p><progress 100%></p> <p>5) Revision and final submission were completed. Related technical meeting was held on 14th December 2019.</p>	
	<p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Project records</p>		<p><progress 85%> for items 1) - 5)</p> <p>1) Country focused trainings were conducted 4 times.</p> <p>2) Technical Seminars were held 2 times in total.</p> <p>3) Pilot Project: Refer to OVI(Objectively Verifiable Indicators) 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) Technical meeting for survey and planning guidelines was held on 14th December 2019.</p> <p><progress 100%></p> <p>6) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWDs were conducted 8 times in total. Tender documents for EPC contract from 2 projects were collected and studied. JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019. Recommendations for Procurement modes for Pilot Project NH10(Sikkim) were submitted to India side on 28th May 2019 by JICA Experts. Based on that recommendation, NHIDCL prepared tender documentation for NH10. The tender was floated thereafter, contractor selected and contract agreement signed in May 2020.</p>	<p>The 5th Country Focused Training planned for May/June 2020 was cancelled due to the Covid pandemic travel restrictions.</p>

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Output 2: Guidelines on design and construction for mountainous highways are developed.	2-1 Improved tunnel guideline is completed by June 2019.	Improved tunnel guideline, Project records	- MoRTH coordinate all related government organizations and other agencies.	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for tunnel guideline was drafted and finalized at the TG meeting on 30th January 2018</p> <p><progress 100%> 3) Development of draft tunnel guideline based on review of existing standards and field surveys were completed.</p> <p><progress 100%> 4) Revision and final submission were completed. Related technical workshop for tunnel guideline was held on 14th August 2019.</p>	
	2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	Earthwork guideline, Project records		<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for earthwork guideline was drafted and finalized at the TG meeting on 22nd February 2018</p> <p><progress 100%> 3) Development of draft earthwork guideline based on review of existing standards and field surveys were completed.</p> <p><progress 100%> 4) Revision and final submission were completed. Related technical workshop was held on 25th September 2019.</p>	
	2-3 High pier bridge guideline is completed by June 2019.	High pier bridge guideline, Project records		<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified</p> <p><progress 100%> 2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 100%> 3) Development of draft high pier bridge guideline based on review of existing standards and field surveys were completed.</p> <p><progress 100%> 4) Revision and final submission were completed. Related technical workshops was held on 29th July 2019.</p>	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
	<p>2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p>Project records</p>		<p><progress 85%> for items 1) - 5) 1) Country focused trainings were conducted 4 times. 2) Technical Seminars were held 2 times in total. 3) Pilot Project a. NH22 (initially requested but cancelled) -Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, 5th JCC in Oct 2018 cancelled this pilot project site. -Field surveys: Parwanoo~Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018 -The draft implementation plan was prepared for NH22 b. Candidate sites proposed in Nov 2018 -Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov, 2018 and site surveys were conducted for 7 times in total. -Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide. -On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design. -For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. NHIDCL floated a tender for the selection of a contractor, and issued LoA to winning bidder. -For NH54, topographic survey data by DPR Consultant were submitted to NHAI and JICA experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA experts. -For NH717, NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation, and issued LoA to winning bidder.</p>	<p>Actual implementation of the pilot projects is being hampered by the travel restrictions due to the ongoing coronavirus pandemic.</p>

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
				<p>4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted twice in total.</p> <p>-Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018</p> <p>-Upon the request from NHAI, Kiratpur-Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018</p> <p>-Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.</p> <p>5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively. Technical meetings for planning and O&M were held on 14th December 2019 and on 17th September 2019, respectively.</p>	
<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p>	<p>Operation and maintenance guideline, Project records</p>		<p><progress 100%></p> <p>1) Existing O&M guidelines for mountainous highways were collected and analyzed, and issues were identified</p> <p><progress 100%></p> <p>2) TOC for O&M guidelines was drafted and finalized at the TG meeting on 19th December 2017</p> <p><progress 100%></p> <p>3) Development of O&M guideline based on review of existing standards and field surveys were complete.</p> <p><progress 100%></p> <p>4) Revision and final submission were completed. O&M workshops were held under each related guideline. Technical meeting for O&M was held on 17th September 2019.</p>	
<p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>		<p>Project records</p>		<p><progress 85%> for items 1) - 5)</p> <p>1) Country focused trainings were conducted 4 times out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project: Refer to OVI 2-4</p> <p>4) Surveys for disaster: Refer to OVI 2-4</p> <p>5) O&M workshops were included under each related guidelines for bridge, tunnel and slope protection works. Technical meeting for O&M was held on 17th September 2019.</p>	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
<p>Activities</p> <p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator <Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III - Mountain Tunnel - Tunnel Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Other Fields, as necessity - Highway Engineering for Mountain Road</p> <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessity.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessity</p>	<p>Inputs</p> <p>The Indian Side</p> <p>(1) Allocation of Counterparts - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts (4) Pilot Project Cost, if required construction works.</p>	<p>Important Assumption</p> <p>Important Assumption - Majority of trained officials continues to work for counterpart agencies. - Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures> - An independent room for JICA Long-term Expert (Chief Advisor) has not yet been secured in Transport Bhawan, therefore, JICA and MoRTH need to continue to discuss. - Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works. - The progress of the Pilot Project was delayed due to COVID-19 pandemic lockdown. Both Japanese and Indian sides will faithfully discuss to arrive at a mutually agreeable solution by such as modifying project activities, project duration, and/or incorporating additional arrangements.</p>	<p>Achievement</p>	<p>Remarks</p>

Project Monitoring Sheet II (Revision of Plan of Operation)

Version 8

Date: 5th January 2021

Project Title: Capacity Development Project on Highways in Mountainous Regions		FY 2016												FY 2017												FY 2018												FY 2019												FY 2020												Monitoring										
		I			II			III			IV			I			II			III			IV			I			II			III			IV			Issue	Solution																																	
Inputs from JICA	Plan																																																																							
	Actual																																																																							
Expert	Plan																																																																							
	Actual																																																																							
Chief Advisor / Highway Development	Plan																																																																							
	Actual																																																																							
Highway Engineering / Coordinator	Plan																																																																							
	Actual																																																																							
Team Leader/Slope Protection I	Plan																																																																							
	Actual																																																																							
Deputy Team Leader/Slope Protection III	Plan																																																																							
	Actual																																																																							
Mountain Tunnel	Plan																																																																							
	Actual																																																																							
Slope Protection III/High Embankment	Plan																																																																							
	Actual																																																																							
Mountain Bridge	Plan																																																																							
	Actual																																																																							
Facility of Mountain Roads	Plan																																																																							
	Actual																																																																							
Maintenance & Operation of Mountain Roads	Plan																																																																							
	Actual																																																																							
Natural Condition (Topography/Geology)	Plan																																																																							
	Actual																																																																							
Drainage Plan	Plan																																																																							
	Actual																																																																							
Plan and Survey of Mountain Roads/Coordinator	Plan																																																																							
	Actual																																																																							
Monitoring and Evaluation	Plan																																																																							
	Actual																																																																							
Highway Engineering for Mountain Road	Plan																																																																							
	Actual																																																																							
Equipment	Plan																																																																							
	Actual																																																																							
Training in Japan	Plan																																																																							
	Actual																																																																							
Counterpart Training in Japan	Plan																																																																							
	Actual																																																																							
In-country/Third country Training	Plan																																																																							
	Actual																																																																							
Inputs from India	Plan																																																																							
	Actual																																																																							
Expert	Plan																																																																							
	Actual																																																																							
Chairperson	Plan																																																																							
	Actual																																																																							
Project Director	Plan																																																																							
	Actual																																																																							
Project Manager	Plan																																																																							
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Project Co-Manager	Plan																																																																							
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Project Co-Manager	Plan																																																																							
	Actual																																																																							
Counterparts (9)	Plan																																																																							
	Actual																																																																							
Equipment	Plan																																																																							
	Actual																																																																							
Remarks	New Expert from Oct 1st, 2019																																																																							
Remarks	New Expert from Sept 1st, 2018																																																																							
Remarks	11.42/13.02 MM (87.7%)																																																																							
Remarks	2.65/4.77 MM (56%)																																																																							
Remarks	7.5/7.5 MM (100%)																																																																							
Remarks	8.81/10.43 MM(84.5%)																																																																							
Remarks	6.9/6.9 MM (100%)																																																																							
Remarks	3.83/3.83 MM (100%)																																																																							
Remarks	5.77/6.17 MM (93.5%) Expert changed from Sept 2018																																																																							
Remarks	3.83/3.83 MM (100%)																																																																							
Remarks	2.33/3.33 MM (70%)																																																																							
Remarks	3.93/5.17 MM(76%)																																																																							
Remarks	2.6/3 MM (86%)																																																																							
Remarks	1.5/1.5MM(100%) (Support)																																																																							
Remarks	1st, 2nd, 3rd and 4th Training Program with IAHE were completed. 5th Training Program with IAHE was cancelled due to COVID-19 pandemic.																																																																							
Remarks	Chairperson changed from February 2019																																																																							
Remarks	New Project Director from October 2017																																																																							
Remarks	New Project Manager from October 2017																																																																							

Monitoring Sheet (Version 9)

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title: Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.9 (Term: 72 Month, Apr. 2016 – Mar. 2022)

Name: Rakesh Kumar

Yoshinori Kawamura

Title: Superintending Engineer (EAP)

Team Leader/ JICA Expert team

Submission Date: 13th July 2022

I. Summary

1. Progress

1-1 Progress of Inputs

- PDM related to Input were authorized on 14th December 2016 as a ver.1

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 31 st Mar, 2021
A. Japanese side		
(1) Experts	<Long-term Experts> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <Short -term Experts/Consultants> <u>Total: 65.95M/M</u> -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Tunnel Facilities -Slope Protection II/High Embankment -Earthwork -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator	<u><Long-term Experts></u> -Chief Advisor/Highway Development -Highway Engineering/Coordinator Long-term Experts' tenure was ended at the end of March 2021. <u><Short-term Experts></u> Progress: (69.36/89.79 MM: 77.25%) Between Nov 2017 and Mar.2021, the following Short-term Experts were dispatched. -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Slope Protection II/High Embankment -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology)

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 31 st Mar, 2021
	-Monitoring/Evaluation	-Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation -Highway Engineering for Mountain Road -Slope Countermeasure Construction
(2) Training for Counterpart's Personnel	<Training in Japan> (Once a year, about 10 people for 2 weeks (5 times))	<Training in Japan> Country Focused Training was conducted in collaboration with IAHE Progress: 4 5 times -1st Country Focused Training held on 16 th May -6 th June 2017 (22 days) -2nd Country Focused Training held on 24 th Oct -13 th Nov 2017(21 days) -3rd Country Focused Training held on 16 th Oct -5 th Nov 2018(21 days) -4th Country Focused Training held on 7 th Aug -2 nd Sept 2019 (20 days) -5th Country Focused Training planned for May/June 2020 was cancelled due to the COVID-19 pandemic travel restrictions.
		<Training in India> Seminars held in India -1st technical seminar held on 19 th June 2018 -2nd technical seminar held on 27 th Sep 2018 -Technical meeting for "map reading techniques" held on 25 th Feb 2020
(3) Equipment	Equipment and/or Material, as necessary	None
(4) Local Costs	<Local Costs> -Office management cost -Local consultants -Other Local cost as necessity	<Local Costs> -Project Assistant for Short-term Experts -Communication (internet and mobile phone) -No local consultants -Car rental (including driver)
B. Indian Side		

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 31 st Mar, 2021
(1) Indian Side Counterparts	<p><Counterparts from GOI></p> <ul style="list-style-type: none"> -Chairperson -Project Director -Project Manager -Project Co-Manager -Project Members -Participants for training in Japan 	<p><Counterparts from GOI></p> <ul style="list-style-type: none"> -Chairperson -Project Director -Project Manager -Project Co-Manager (3) -Project Members (9) -Participants for training in Japan (43) 1st Training (10); 2nd Training (10); 3rd Training (9); 4th Training (9); 1st Invitation Program (5) -Counterparts for guidelines (7) Overall control of 5 guidelines (2) Guideline for Planning (1) Guideline for Slope Protection and Embankment (1) Guideline for Bridge (1) Guideline for Tunnel (1) Guideline for Operation and Maintenance (1) -Counterparts for pilot projects (7) Pilot Project on NH54 (3) Pilot Project on NH717 and NH10 (4)
(2) Operational Expenses	<p><Facilities></p> <ul style="list-style-type: none"> -Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively 	<p><Facilities></p> <ul style="list-style-type: none"> -An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) was provided in NHAI HQ -Office space for Short-term Experts was provided in Jeevan Tara Building
(3) Administrative Cost	<p><Administrative cost and other expenses></p> <ol style="list-style-type: none"> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts 	<p><Administrative cost and other expenses></p> <ol style="list-style-type: none"> 1) Personnel cost for counterparts and other running expenses provided as required

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 31 st Mar, 2021
		2) Domestic travel cost for counterparts provided as required
(4) Pilot Project Cost	<p><Pilot Project Cost> Pilot Project Cost, if required construction works</p>	<p><Pilot Project Cost> Pilot Project Planned at 3 sites i.e. NH10 (Sikkim), NH717 (West Bengal), and NH54 (Assam) -For NH10, topographic surveys and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA Experts. Based on the data, recommendations for countermeasures for landslide were prepared by JICA Experts. NHIDCL floated a tender to select a contractor for implementing the countermeasure work for landslide and issued a LoA to the winning bidder. Bid evaluation was completed and NHIDCL signed the contract agreement in May, 2020. On 16th Oct. 2020 NHIDCL shared technical documents with JICA Experts who then submitted comments on 22nd Oct. 2020. On 30th Nov. 2020, NHIDCL shared Design Report with JICA Experts who then submitted comments on Design Report on 15th Dec 2020. Currently, NHIDCL and the Contractor are preparing Working Drawing and Method Statements which they will submit to JICA Experts by the end of May 2021. -NH54: Selection of consultants for topographic survey and drilling investigation for NH54 was concluded and the contract agreement between NHAI and Consultant was signed on 23rd December, 2019. Topographic survey data collected by DPR Consultant were submitted to NHAI and JICA Experts. Based on the data, a</p>

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 31 st Mar, 2021
		<p>recommendation for drilling investigation was prepared and submitted to NHAI by JICA Experts. Between 21st Jan. 2020 and 19th Mar. 2020, JICA Experts submitted three recommendations on survey method and plans. JICA Experts also delivered a lecture on map reading technique to NHAI on 25th Feb. 2020. On 22nd Jun. 2020, JICA Experts submitted recommendations on slope stake monitoring followed by a series of (ten) comments on methods and results of slope stake monitoring submitted between 29th Jul. 2020 and 21st Dec. 2020. Currently, NHAI and the Consultant are implementing site survey scheduled for completion by end of May. JICA Experts are awaiting the survey results to prepare technical recommendations.</p> <p>NH717: NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation for NH717 and issued a LoA to the winning bidder. NHIDCL signed the contract agreement on 27th May, 2020.</p> <p>On 20th Jul. 2020, JICA Experts submitted comments on drafts of Inception Report and Quality Assurance Report and on 5th Oct. 2020, NHIDCL shared the finalized Inception Report and Quality Assurance Report with JICA Experts. Currently, NHIDCL and the Consultant are implementing site survey scheduled for completion by the end of May. JICA Experts are awaiting the survey results to prepare technical recommendations.</p>

1-2 Progress of Activities

- Progress of activities is indicated in Monitoring Sheet II (PO) and Project Design Matrix (PDM)
- Basically, no crucial bottlenecks in progress have been observed.

1-3 Achievement of Output

The deliverables achieved by the Project as per the TOR are given in the table below:

-PDM related to Output were authorized on December 14th 2016 as a ver.1

*Completed, Ongoing, Scheduled for later

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31st March, 2021	Status*
Output1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed		
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<p><Progress 100%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p>(1) 6th Feb 2018: Siliguri to Darjeeling on NH55 in West Bengal</p> <p>(2) 7th Feb 2018: Sevoke to Sikkim on NH10 in West Bengal</p> <p>(3) 28th Sep 2017: Mussoorie to Chamba on 707A in Uttarakahnd</p> <p>(4) 10th Apr 2018: Kiratpur to Ner chowk on NH21 in Himachal</p> <p>(5) 10th Apr 2018: Ner chowk to Manali on NH21 in Himacha</p> <p>(6) 9th Apr 2018: Pathankot to Mandi on NH20 in Himachal</p> <p>(7) 15th Feb 2017: Shiradi Ghat bypass on NH48 in Karnataka</p> <p>(8) 20th March 2018: Assam border to Dalu on NH62 in Megalaya</p> <p>(9) 9th Feb 2018: Mangan to Nakura on NH310 in Sikkim</p> <p>(10) 13th Oct 2017: Shillong to Dawki on NH40 in Megalaya</p> <p><Progress 100%></p> <p>3) TOC for survey and planning guideline was drafted and finalized at the TG meeting on 30th January 2018 followed by approval in April 2018 JCC Meeting.</p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31st March, 2021	Status*
	<p><Progress 100%></p> <p>4) Draft of survey and planning guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>5) Revision and final submission were completed in March 2020. Related Technical Meeting was held on 14th Dec 2019.</p>	
<p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p><Progress 85%> (for items 1)-6))</p> <p>1) Country focused trainings were conducted 4 times. out of 5</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project: Refer to OVI (Objectively Verifiable Indicators) 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) Technical Meeting for Planning Guideline was held in Dec 2019.</p> <p>6) Invitation Program of was held once in Japan</p> <p><Progress 100%></p> <p>7) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) were held 8 times.</p> <ul style="list-style-type: none"> -Meeting with state PWD of Karnataka in Feb 2017 -Meeting with state PWD of West Bengal in Feb 2018 -Meeting with PIU of NHAI in Dec 2018 -Meeting with SBO of NHIDCL in Dec 2018 -Meeting with State PWD of West Bengal in Dec 2018 -Meeting with NHAI HQ in Jan 2019 -Meeting with NHIDCL HQ in Jan 2019 -Meeting with MoRTH in Jan 2019 <p>-Tender documents for EPC contracts from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement))</p> <p>-Based on the review of the current status, JICA Experts prepared and submitted an advisory report to Indian side on 16th Jan 2019.</p> <p>-Recommendations for Procurement modes for Pilot Project (NH10) were submitted to India side on 28th May 2019 by JICA Experts.</p> <p>Based on that recommendation, NHIDCL prepared tender documentation for NH10.</p>	<p>Ongoing</p>

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31st March, 2021	Status*
Output2: Guidelines on design and construction for mountainous highways are developed.		
2-1 Improved tunnel guideline is completed by June 2019.	<p><Progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100 %> 2) TOC for tunnel guideline was drafted and finalized at the TG meeting on 30th January 2018.</p> <p><Progress 100%> 3) Draft of tunnel guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. Related technical workshop was held on 14th August 2019.</p>	Completed
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	<p><Progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%> 2) TOC for earthwork guideline was drafted and finalized at the TG meeting on 22nd February 2018.</p> <p><Progress 100%> 3) Draft of earthwork guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. Related technical workshop was held on 25th September 2019.</p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31st March, 2021	Status*
2-3 High pier bridge guideline is completed by June 2019.	<p><Progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%></p> <p>2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017.</p> <p><Progress 100%></p> <p>3) Draft of high pier bridge guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>4) Revision and final submission were completed in March 2020. Related technical workshop was held on 29th July 2019.</p>	Completed
2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	<p><Progress 85%> (for items 1)-5))</p> <p>1) Country focused trainings were conducted 4 times out of 5.</p> <p>2) Technical Seminars were held 2 times in total.</p> <p>3) Pilot Project</p> <p>a. NH22 (initially requested but cancelled)</p> <p>-Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, the 5th JCC in Oct 2018 cancelled this pilot project site.</p> <p>-Field surveys: Parwanoo-Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018.</p> <p>-The draft implementation plan was prepared for NH22</p> <p>b. Candidate sites proposed in Nov 2018.</p> <p>-Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov 2018 and site surveys were conducted for 7 times in total.</p> <p>-Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide.</p>	Ongoing

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31st March, 2021	Status*
	<p>-On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design.</p> <p>-For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. Then, NHIDCL floated a tender for the selection of a contractor to conduct the countermeasure work for landslide and issued LoA to the winning bidder. Bid evaluation was completed and NHIDCL signed the contract agreement in May, 2020. JICA Experts submitted comments on documents to NHIDCL on 22nd October, 2020. On 30th Nov. 2020, NHIDCL shared Design Report with JICA Experts who then submitted comments on 15th Dec 2020. Currently, NHIDCL and the Contractor are preparing Working Drawing and Method Statements which they will submit to JICA Experts by the end of May 2021.</p> <p>-For NH54, topographic survey data collected by DPR Consultant were submitted to NHAJ and JICA Experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAJ by JICA Experts. Between 21st Jan. 2020 and 19th Mar. 2020, JICA Experts submitted three recommendations on survey method and plans. JICA Experts also delivered a lecture on map reading technique to NHAJ on 25th Feb. 2020. JICA Experts submitted recommendations on slope stake monitoring on 22nd June, 2020 followed by 10 sets of comments on slope stake monitoring methods and results between 29th Jul, 2020 and 21st Dec, 2020. NHAJ and the Consultant are currently implementing site survey. JICA Experts are awaiting survey results from Consultant so as to prepare technical recommendations.</p> <p>Currently, NHAJ and the Consultant are implementing site survey scheduled for completion by end of May. JICA Experts are awaiting the survey results to prepare technical recommendations.</p>	

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31st March, 2021	Status*
	<p>-For NH717, NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation and issued a LoA to the winning bidder. NHIDCL signed the contract agreement on 27th May, 2020 and on 20th July, 2020 JICA side submitted comments on the draft Inception Report and draft Quality Assurance report and on 5th Oct. 2020, NHIDCL shared the finalized Inception Report and Quality Assurance Report with JICA Experts. Currently, NHIDCL and the Consultant are implementing site survey scheduled for completion by the end of May. JICA Experts are awaiting the survey results to prepare technical recommendations.</p> <p>4) Upon the requests from MoRTH, NHAI or NHIDCL, field surveys for disaster affected sites were conducted twice in total.</p> <p>-Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018</p> <p>-Upon the request from NHAI, Kiratpur-Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018</p> <p>-Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.</p> <p>5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively. Technical Meetings for Planning and O&M were held on 14th Dec 2019 and 17th Sep 2019, respectively.</p> <p>6) 1st Invitation Program was held in Japan from 2017/11/6-2017/11/8 for 6 participants from MORTH, NHAI and DEA</p>	
Output3: Foundation for operation and maintenance for mountainous highways is built.		
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p><Progress 100%></p> <p>1) Existing O&M guidelines for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%></p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 31st March, 2021	Status*
	<p>2) TOC for O&M guidelines was drafted and finalized at the TG meeting on 19th December 2017.</p> <p><Progress 100%></p> <p>3) Draft of O&M guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>4) Revision and final submission were completed in March 2020. O&M workshops are included under each related guideline. Technical Meeting for O&M was held on 17th Sep 2019.</p>	
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	<p><Progress 85%> (for items 1)-5))</p> <p>1) Country focused trainings were conducted 4 times. out of 5.</p> <p>2) Technical Seminars were held 2 times in total.</p> <p>3) Pilot Project: Refer to OVI 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) O&M workshops were included under each related guideline for bridge, tunnel and slope protection works. Technical Meeting for O&M was held on 17th Sep 2019.</p> <p>6) Invitation Program was held once in Japan</p>	Ongoing

1-4 Achievement of the Project Purpose

The deliverables achieved by the Project as per the TOR are given in the table below:

*Completed, Ongoing, Scheduled for later

Project Purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.		
Indicators	Major Results	Status*
(1) Model activities are conducted applying the developed guidelines by the Project.	-Refer to 1-3 Achievement of Output, OVI 2-4, 3) Pilot Project and 5) Technical Workshop / Technical Meeting	Ongoing
(2) Core officers are able to give lectures on development of mountainous highways in the training courses.	-The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India	Ongoing

	(2) 4 country focused training and one Invitation Program conducted in Japan	
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1-5 Changes of Risks and Actions for Mitigation

- N/A

1-6 Progress of Actions undertaken by JICA

- JICA Project Team conducted activities related to Output 1, 2 and 3. The progress is monitored as stated in section 1-3 “Achievement of Output”.

1-7 Progress of Actions undertaken by Gov. of India

PDM ver.1 approved on 14th Dec, 2016	Actual as of 31st Mar, 2021	Status
1. Allocation of Counterpart Personnel from GOI 1.1 Chairperson 1.2 Project Director 1.3 Project Manager 1.4 Project Co-Manager 1.5 Project Members 1.6 Participants for Training in Japan	1. Allocated Counterpart Personnel from GOI 1.1 Chairperson 1.2 Project Director 1.3 Project Manager 1.4 Project Co-Manager (3) 1.5 Project Members (9) 1.6 Participants for Training in Japan (43) 1st Training (10); 2nd Training (10); 3rd Training (9); 4th Training (9); 1st Invitation Program (5) 1.7 Allocated Counterparts for guidelines -Overall control of 5 guidelines -Guideline for Planning -Guideline for Slope Protection and Embankment -Guideline for Bridge -Guideline for Tunnel -Guideline for Operation Maintenance 1.8 Counterparts for pilot projects (7) - Pilot Project on NH54 (3) - Pilot Project on NH717 and NH10 (4)	-Indian side has availed all the required counterparts.
2. JCC Organization Establishment of JCC as per the Project Organizational Chart in Record	2. JCC Organization JCC was established and members attended the 1st JCC meeting held in MORTH on Dec 14th	JCC establishment complete

PDM ver.1 approved on 14th Dec, 2016	Actual as of 31st Mar, 2021	Status
of Discussion and holding of meetings at least twice a year	2016 followed by holding JCC meetings in April 2017, October 2017, April 2018, October 2018, May 2019 and Oct 2019 as scheduled. In 2020, the JCC meetings scheduled for April 2020 and Oct 2020 were cancelled due to the COVID-19 pandemic. 2.1 JCC Members (1) Chairperson (2) Project Director (3) Project Manager (4) Project Co-Manager (3) (5) Project Members (9) CE(s) of MoRTH, GM(s) of NHAI, GM(s) of NHIDCL	JCC meetings ongoing
3. Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.	3. Land, buildings and facilities a. An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) has been secured in NHAI HQ b. Office space for JICA Short-term Experts has been availed in Jeevan Tara Building.	Ongoing
4. Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	4. Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses being provided as required 2) Domestic travel cost for counterparts being provided as required	Ongoing
5. Pilot Project Cost, if required construction works.	5. Pilot Project -Refer to 1-3 Achievement of Output, OVI 2-4, 3) Pilot Project	Ongoing

1-8 Progress of Environmental and Social Considerations (if applicable)

- N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

- N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

~~An independent office room for JICA Long-term Expert (Chief Advisor/Highway Development) has not been secured in Transport Bhawan. It is necessary for JICA and MoRTH to continue to discuss this matter.~~

- Indian side requested at least one pilot project with civil works which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since the contract period for the team does not accommodate the necessary period for the civil works.
 - i. Among three candidate sites proposed in December 2018, one site was selected for civil work after site visits by JICA Experts. For the selected one site for civil work, JICA Experts would give technical advice for updating DPR and guidance for construction. For remaining two sites, JICA Experts would give technical advice for updating DPR.
 - ii. Based on the survey results available for the project, NH10 was recommended as the site for civil work. NH10 was the only site for which technical advice may be completed by the end of the project period. For DPR preparation for NH717 and NH54, JICA Experts would provide input.
 - iii. The current contract period (up to July 2020) of JICA Short-term Expert Team is not enough to accommodate implementation of the civil work of NH10 as well as DPR preparation for NH717 and NH54. JICA is to extend the contract period of JICA Short-term Expert Team. In addition, JICA Short-term Expert Team should have additional experts in charge of support for design and supervision. (Note: JICA Experts are unable to assume liability of design.)

2. Delay of Work Schedule and/or Issues (Problems) (if any)

2-1 Issues/Problems

- The declaration by the World Health Organization designating the COVID-19 outbreak as a 'Public Health Emergency of International Concern' on 30th January 2020 and a pandemic on 11th March 2020 led the Gov. of India to take countermeasures by restricting movement within India including suspension of entry visas of some of JICA Short-term Experts. The COVID-19 pandemic lockdown by the Gov. of India was effective from 25th March 2020. Based on these situations, JICA instructed JICA Long-

term Experts to return to Japan in April 2020.

- The global outbreak of COVID-19 has caused **the JCC meetings scheduled for April 2020 and Oct 2020** and 5th country focused training program **was** canceled.
- The COVID-19 pandemic lockdown in India has delayed the progress of the Pilot Projects. A full lockdown started in March 2020 and lasted until the end of May. **While** some of the lockdown restrictions **were** lifted **from June 2020**, as of the end of **Mar, 2021**, **significant** restrictions still remain. Interstate travel has been considerably restricted as well **and** some states still require some weeks of quarantine. The lockdown and restrictions of interstate travel including weeks-long quarantine obstruct the site works by the consultants and contractor for the pilot project.
- International travel restrictions **were eased and** JICA Experts' remobilization in India for the project **has been planned for** April 2021. **The travel restrictions and quarantine requirements are still** affecting involvement in and progress of pilot projects.

2-2 Cause

- Global outbreak of COVID-19
- COVID-19 pandemic lockdown in India from 25th March 2020

2-3 Action to be taken

- Both Japanese and Indian sides will faithfully discuss to arrive at a mutually agreeable solution by such as modifying project activities, project duration, and/or incorporating additional arrangements. In view of the foregoing, JICA side is proposing a revised timeline for pilot projects and one-year project period extension. **The project extension request was approved and the completion date was revised from March 2021 to March 2022.**

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of India)

- JICA
- Gov. of India

3. Modification of the Project Implementation Plan

3-1 PO

- PO ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

3-2 Other modifications on detailed implementation plan (Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project

purpose, outputs, activities, and input) should be authorized by JICA HQ. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)

- PDM ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.
- In view of the necessity to complete remaining projects amidst the continuing pandemic, JICA side suggested application by the Indian side of the proposed revised timeline to manage the technical transfer through the pilot projects. JICA side also suggested applying online communication tools to maintain close collaboration between the two parties
- On Feb 22nd, 2021, the R/D was amended to reflect the extension of project duration from '5 years from arrival of experts' to '6 years from arrival of experts' as a countermeasure for the delay to project activities due to the COVID-19 pandemic.

II. Project Monitoring Sheet I & II as Attached

Project Monitoring Sheet I (Revision of Project Design Matrix)

Project Title: Capacity Development Project on Highways in Mountainous Regions

Implementing Agency: Ministry of Road Transport and Highways (MoRTH)

Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD

Period of Project: Apr, 2016 – Mar, 2021 (Five (5) years)

Project Site: Whole India

Model Site:

Version 9

Date: 13th July 2021

Narrative Summary		Objectively Verifiable	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project	OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.	Detailed Project Report (DPR) / Feasibility Study Report				
	OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.	Contract Document Completion Report by the operation and maintenance contractor				
Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.	PP1 Model activities are conducted applying the developed guidelines by the Project.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors		- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.	- Refer to OVI (Objectively Verifiable Indicators) 2-4, 3)Pilot Project	
	PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.	Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors			- The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars held in India (2) 4 country focused training and 1 Invitation program held in Japan (3) 3 Technical Workshops for Bridge, Tunnel and Slope Protection Guidelines held in New Delhi (4) 2 Technical meeting for Planning & O&M Guidelines held in New Delhi (5) 1 Technical meeting for "map reading techniques" held in New Delhi	

<p>Outputs</p> <p>Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p>	<p>Survey and planning guidelines</p>	<p><progress 100%> 1) Existing standards for mountainous highways were collected and analyzed, and issues were identified. <progress 100%> 2) Field Surveys were conducted in 10 case study sites. <progress 100%> 3) TOC for survey and planning guideline was drafted and finalized at the TG meeting on 30th January 2018, followed by approval in April 2018 JCC Meeting. <progress 100%> 4) Draft of survey and planning guideline based on review of existing standards and field surveys were completed. <progress 100%> 5) Revision and final submission were completed. Related technical meeting was held on 14th December 2019.</p>	<p>The 5th Country Focused Training planned for May/June 2020 was cancelled due to the Covid pandemic travel restrictions.</p>
<p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Project records</p>	<p>Project records</p>	<p><progress 85%> for items 1) - 5) 1) Country focused trainings were conducted 4 times. 2) Technical Seminars were held 2 times in total. 3) Pilot Project: Refer to OVI(Objectively Verifiable Indicators) 2-4 4) Survey for disaster: Refer to OVI 2-4 5) Technical meeting for survey and planning guidelines was held on 14th December 2019. <progress 100%> 6) Meetings for discussion of suitable contract system and management with officials MoRTH, NHA, NNIDCL and PWDs were conducted 8 times in total. Tender documents for EPC contract from 2 projects were collected and studied. JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019. Recommendations for Procurement modes for Pilot Project NH10(Sikkim) were submitted to India side on 28th May 2019 by JICA Experts. Based on that recommendation, NHIDCL prepared tender documentation for NH10. The tender was floated thereafter, contractor selected and contract agreement signed in May 2020.</p>	<p>The 5th Country Focused Training planned for May/June 2020 was cancelled due to the Covid pandemic travel restrictions.</p>

<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019.</p>	<p>Improved tunnel guideline, Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for tunnel guideline was drafted and finalized at the TG meeting on 30th January 2018 <progress 100%> 3) Development of draft tunnel guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshop for tunnel guideline was held on 14th August 2019.</p>
	<p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p>	<p>Earthwork guideline, Project records</p>		<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for earthwork guideline was drafted and finalized at the TG meeting on 22nd February 2018 <progress 100%> 3) Development of draft earthwork guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshop was held on 25th September 2019.</p>

2-3 High pier bridge guideline is completed by June 2019.

High pier bridge guideline, Project records

<progress 100%>
1) Existing design and construction standards were collected and analyzed, and issues were identified
<progress 100%>
2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017
<progress 100%>
3) Development of draft high pier bridge guideline based on review of existing standards and field surveys were completed.
<progress 100%>
4) Revision and final submission were completed. Related technical workshops was held on 29th July 2019.

2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.

Project records

<progress 85%> for items 1) - 5)

- 1) Country focused trainings were conducted 4 times.
- 2) Technical Seminars were held 2 times in total.
- 3) Pilot Project
 - a. NH22 (initially requested but cancelled)
 - Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, 5th JCC in Oct 2018 cancelled this pilot project site.
 - Field surveys: Parwanoo--Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018
 - The draft implementation plan was prepared for NH22
 - b. Candidate sites proposed in Nov 2018
 - Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov, 2018 and site surveys were conducted for 7 times in total.
 - Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide.
 - On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design.
- For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. NHIDCL floated a tender for the selection of a contractor, and issued LoA to winning bidder.
- For NH54, topographic survey data by DPR Consultant were submitted to NHAI and JICA experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA experts.
- For NH717, NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation, and issued LoA to winning bidder.
- 4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted twice in total.
- Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018
- Upon the request from NHAI, Kiratpur--Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018
- Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.
- 5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively. Technical meetings for planning and O&M were held on 14th December 2019 and on 17th September 2019, respectively.

Actual implementation of the pilot projects is being hampered by the travel restrictions due to the ongoing coronavirus pandemic. The implementation period for the project has been extended by 1 year and completion date revised to Mar 2021

<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p>	<p>Operation and maintenance guideline, Project records</p>	<p><progress 100%> 1) Existing O&M guidelines for mountainous highways were collected and analyzed, and issues were identified <progress 100%> 2) TOC for O&M guidelines was drafted and finalized at the TG meeting on 19th December 2017 <progress 100%> 3) Development of O&M guideline based on review of existing standards and field surveys were complete. <progress 100%> 4) Revision and final submission were completed. O&M workshops were held under each related guideline. Technical meeting for O&M was held on 17th September 2019.</p>	
<p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Project records</p>	<p>Project records</p>	<p><progress 85%> for items 1) - 5) 1) Country focused trainings were conducted 4 times. 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI 2-4 4) Surveys for disaster: Refer to OVI 2-4 5) O&M workshops were included under each related guidelines for bridge, tunnel and slope protection works. Technical meeting for O&M was held on 17th September 2019.</p>	<p>The 5th Country Focused Training planned for May/June 2020 was cancelled due to the Covid pandemic travel restrictions.</p>

Activities	Inputs	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)*.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection II - Mountain Tunnel - Tunnel Facilities - Slope Protection III/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Highway Engineering for Mountain Road - Slope Countermeasure Construction</p> <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessary.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessary</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterparts - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>
<p>Majority of trained officials continues to work for counterpart agencies.</p> <p>Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p>	<p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p>	<p><Issues and countermeasures> An independent room for JICA Long-term Expert (Chief Advisor) has not yet been secured in Transport Bhawan; therefore, JICA and MoRTH need to continue to discuss.</p> <p>-Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.</p> <p>-The progress of the Pilot Project was delayed due to COVID-19 pandemic lockdown. Both Japanese and Indian sides will faithfully discuss to arrive at a mutually agreeable solution by such as modifying project activities, project duration, and/or incorporating additional arrangements.</p>

Project Monitoring Sheet II (Revision of Plan of Operation)

Project Title: Capacity Development Project on Highways in Mountainous Regions										Monitoring																
Inputs from JICA										Issue	Solution															
Expert	Short Term	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				Remarks
		Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	
Chief Advisor / Highway Development																										
Highway Engineering / Coordinator																										
Team Leader/Slope Protection I																										13.37/18.17 MM (73.58%)
Deputy Team Leader/Slope Protection III																										3.26/6.02 MM (54.15%)
Mountain Tunnel																										6.4/6.4 MM (100%)
Slope Protection III/High Embankment																										11.95/16.47 MM(72.55%)
Mountain Bridge																										7.15/7.15MM (100%)
Facility of Mountain Roads																										3.83/3.83 MM (100%)
Maintenance & Operation of Mountain Roads																										6.56/11.18 MM (58.70%)
Natural Condition (Topography/Geology)																										3.83/3.83 MM (100%)
Drainage Plan																										3.32/3.32 MM (100%)
Plan and Survey of Mountain Roads/Coordinator																										5.17/5.17 MM(100%)
Monitoring and Evaluation																										3.05/3.95 MM (77.22%)
Highway Engineering for Mountain Road																										1.5/1.5MM(100%) (Support)
Slope Countermeasure Construction																										0.00/2.5 MM (0.00%)
Equipment																										
Training in Japan																										
Counterpart Training in Japan																										1st, 2nd, 3rd and 4th Training Program with IAHE were completed. 5th Training Program with IAHE was cancelled due to COVID-19 pandemic.
In-country/Third country Training																										
Inputs from India																										
Expert																										
Chairperson																										Chairperson changed from February 2019
Project Director																										New Project Director from October 2017
Project Manager																										New Project Manager from October 2017
Project Co-Manager																										
Project Co-Manager																										
Project Co-Manager																										
Counterparts (9)																										
Equipment																										

Activities (Sub-Activities)	2016		2017		2018		2019		2020		2021		Responsible Organization	Achievements	Issue & Countermeasure	
	Plan	Actual	I	II	III	IV	I	II	III	IV	I	II				III
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed Identify issues on development of mountainous highways, including identification of appropriate solutions for disaster safety from requests.	Plan	Actual												CE(EAP), MoRTH	Information collected and analyzed (100%)	
1.2 Conduct field surveys to the typical mountainous highways.	Plan	Actual												CE(EAP), MoRTH	Field surveys completed in 10 case study sites. 4 additional surveys conducted upon MoRTH request (100%)	
1.3 Improve survey and planning guidelines on mountainous highways.	Plan	Actual												CE(S&R), CE(EAP), MoRTH & SE, MoRTH	100% progress	
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan	Actual												CE(EAP), MoRTH	100% progress	
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*	Plan	Actual												CE(EAP), MoRTH	85% progress	
Output 2: Guidelines on design and construction for mountainous highways are developed.	Plan	Actual												CE(EAP), MoRTH	100% progress	
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan	Actual												CE(S&R), CE(EAP), MoRTH & GM(Technical) NHIDCL	100% progress	
2.2 Improve tunnel guidelines.	Plan	Actual												CE(S&R), CE(EAP), MoRTH & ED, NHIDCL	100% progress	
2.3 Develop earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan	Actual												CE(S&R), CE(EAP), MoRTH & ED, NHIDCL	100% progress	
2.4 Develop high pier bridge guidelines.	Plan	Actual												CE(S&R), CE(EAP), MoRTH & CE, MoRTH	100% progress	
Output 3: Guideline on operation and maintenance for mountainous highways is developed.	Plan	Actual												CE(EAP), MoRTH	100% progress	
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan	Actual												CE(S&R), CE(EAP), MoRTH & GM(T), NHA	100% progress	
3.2 Develop operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan	Actual														
Duration / Phasing	Plan	Actual														
Monitoring Plan	Plan	Actual												Remarks	Issue	Solution
Monitoring	Plan	Actual														
Joint Coordination Committee	Plan	Actual													JCC meeting in 2020 was not held due to COVID-19 pandemic. Planned for 4Q21	
Set-up the Detailed Plan of Operation	Plan	Actual														
Submission of Monitoring Sheet	Plan	Actual														
Reports/Documents	Plan	Actual														
Project Completion Report	Plan	Actual														
Public Relations	Plan	Actual														
Setting up & Updating Project Facebook Page	Plan	Actual														
Published article on Project Activities in MoRTH Annual Report	Plan	Actual													Set up and Updated 43 times	

Monitoring Sheet (Version 10)

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title: Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver.10 (Term: 72 Month, Apr. 2016 – Mar. 2022)

Name: Rakesh Kumar

Yoshinori Kawamura

Title: Superintending Engineer (EAP)

Team Leader/ JICA Expert team

Submission Date: xxx

I. Summary

1. Progress

1-1 Progress of Inputs

- PDM related to Input were authorized on 14th December 2016 as a ver.1

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 30 th Sept, 2021
A. Japanese side		
(1) Experts	<Long-term Experts> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <Short -term Experts/Consultants> <u>Total: 65.95M/M</u> -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Tunnel Facilities -Slope Protection II/High Embankment -Earthwork -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator	<u><Long-term Experts></u> -Chief Advisor/Highway Development -Highway Engineering/Coordinator Long-term Experts' tenure was ended at the end of March 2021. <u><Short-term Experts></u> Progress: (78.66/91.19 MM: 86.3%) Between Nov 2017 and Sep.2021, the following Short-term Experts were dispatched. -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Slope Protection II/High Embankment -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology)

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 30 th Sept, 2021
	-Monitoring/Evaluation	-Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation -Highway Engineering for Mountain Road -Slope Countermeasure Construction
(2) Training for Counterpart's Personnel	<Training in Japan> (Once a year, about 10 people for 2 weeks (5 times))	<Training in Japan> Country Focused Training was conducted in collaboration with IAHE Progress: 4/5 times -1st Country Focused Training held on 16 th May -6 th June 2017 (22 days) -2nd Country Focused Training held on 24 th Oct -13 th Nov 2017(21 days) -3rd Country Focused Training held on 16 th Oct -5 th Nov 2018(21 days) -4th Country Focused Training held on 7 th Aug -2 nd Sept 2019 (20 days) -5th Country Focused Training planned for May/June 2020 was cancelled due to the COVID-19 pandemic travel restrictions.
		<Training in India> Seminars held in India -1st technical seminar held on 19 th June 2018 -2nd technical seminar held on 27 th Sep 2018 -Technical meeting for "map reading techniques" held on 25 th Feb 2020 - Webinars to explain and disseminate the completed guidelines -1st: "Planning" held on 15 th Sep 2021 -2nd: "Bridge" held on 22 nd Sep 2021 -3rd: "O&M" held on 29 th Sep 2021 -4th: "Slope I" held on 6 th Oct 2021 -5th: "Tunnel" held on 22 nd Oct 2021 -6th: "Slope II" held on 27 th Oct 2021

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 30 th Sept, 2021
(3) Equipment	Equipment and/or Material, as necessary	None
(4) Local Costs	<Local Costs> -Office management cost -Local consultants -Other Local cost as necessity	<Local Costs> -Project Assistant for Short-term Experts -Communication (internet and mobile phone) -No local consultants -Car rental (including driver)
B. Indian Side		
(1) Indian Side Counterparts	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager -Project Members -Participants for training in Japan	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager (3) -Project Members (9) -Participants for training in Japan (43) 1st Training (10); 2nd Training (10); 3rd Training (9); 4th Training (9); 1st Invitation Program (5) -Counterparts for guidelines (7) Overall control of 5 guidelines (2) Guideline for Planning (1) Guideline for Slope Protection and Embankment (1) Guideline for Bridge (1) Guideline for Tunnel (1) Guideline for Operation and Maintenance (1) -Counterparts for pilot projects (7) Pilot Project on NH54 (3) Pilot Project on NH717 and NH10 (4)
		<JCC Members> -As specified in the Project Organizational Chart in Record of Discussion
(2) Operational Expenses	<Facilities>	<Facilities>

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 30 th Sept, 2021
	-Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively	-An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) was provided in NHAI HQ -Office space for Short-term Experts was provided in Jeevan Tara Building
(3) Administrative Cost	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses provided as required 2) Domestic travel cost for counterparts provided as required
(4) Pilot Project Cost	<Pilot Project Cost> Pilot Project Cost, if required construction works	<Pilot Project Cost> Pilot Project Planned at 3 sites i.e. NH10 (Sikkim), NH717 (West Bengal), and NH54 (Assam) -For NH10, topographic surveys and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA Experts. Based on the data, recommendations for countermeasures for landslide were prepared by JICA Experts. NHIDCL floated a tender to select a contractor for implementing the countermeasure work for landslide and issued a LoA to the winning bidder. Bid evaluation was completed and NHIDCL signed the contract agreement in May, 2020. On 16 th Oct. 2020 NHIDCL shared technical documents with JICA Experts who then submitted comments on 22 nd Oct. 2020. On 11th Aug. 2021, JICA Experts submitted sample Method Statements for Horizontal Drainage Borings and Cast-in-situ Concrete Crib Works, in which Japanese practice for both works is explained. -NH54: Selection of consultants for topographic survey and drilling investigation

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 30 th Sept, 2021
		<p>for NH54 was concluded and the contract agreement between NHAI and Consultant was signed on 23rd December, 2019.</p> <p>Topographic survey data collected by DPR Consultant were submitted to NHAI and JICA Experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA Experts. Between 21st Jan. 2020 and 19th Mar. 2020, JICA Experts submitted three recommendations on survey method and plans. JICA Experts also delivered a lecture on map reading technique to NHAI on 25th Feb. 2020. On 22nd Jun. 2020, JICA Experts submitted recommendations on slope stake monitoring followed by a series of (ten) comments on methods and results of slope stake monitoring submitted between 29th Jul. 2020 and 21st Dec. 2020. Currently, NHAI and the Consultant completed most of the required sites for the survey to prepare technical recommendations and JICA Experts are preparing a recommendation and will soon submit it.</p> <p>NH717: NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation for NH717 and issued a LoA to the winning bidder. NHIDCL signed the contract agreement on 27th May, 2020.</p> <p>On 20th Jul. 2020, JICA Experts submitted comments on drafts of Inception Report and Quality Assurance Report and on 5th Oct. 2020, NHIDCL shared the finalized Inception Report and Quality Assurance Report with</p>

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 30 th Sept, 2021
		JICA Experts. NHIDCL and the Consultant completed most of the required sites for the survey to prepare technical recommendation. On 30 th Sep.2021, JICA Experts submitted the recommendations

1-2 Progress of Activities

- Progress of activities is indicated in Monitoring Sheet II (PO) and Project Design Matrix (PDM)
- Basically, no crucial bottlenecks in progress have been observed.

1-3 Achievement of Output

The deliverables achieved by the Project as per the TOR are given in the table below:

-PDM related to Output were authorized on December 14th 2016 as a ver.1

*Completed, Ongoing, Scheduled for later

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30 th Sept, 2021	Status*
Output1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed		
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<p><Progress 100%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p>(1) 6th Feb 2018: Siliguri to Darjeeling on NH55 in West Bengal</p> <p>(2) 7th Feb 2018: Sevoke to Sikkim on NH10 in West Bengal</p> <p>(3) 28th Sep 2017: Mussoorie to Chamba on 707A in Uttarakahnd</p> <p>(4) 10th Apr 2018: Kiratpur to Ner chowk on NH21 in Himachal</p> <p>(5) 10th Apr 2018: Ner chowk to Manali on NH21 in Himacha</p> <p>(6) 9th Apr 2018: Pathankot to Mandi on NH20 in Himachal</p> <p>(7) 15th Feb 2017: Shiradi Ghat bypass on NH48 in Karnataka</p> <p>(8) 20th March 2018: Assam border to Dalu on NH62 in Megalaya</p> <p>(9) 9th Feb 2018: Mangan to Nakura on NH310 in Sikkim</p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30 th Sept, 2021	Status*
	<p>(10) 13th Oct 2017: Shillong to Dawki on NH40 in Megalaya</p> <p><Progress 100%></p> <p>3) TOC for survey and planning guideline was drafted and finalized at the TG meeting on 30th January 2018 followed by approval in April 2018 JCC Meeting.</p> <p><Progress 100%></p> <p>4) Draft of survey and planning guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>5) Revision and final submission were completed in March 2020. Related Technical Meeting was held on 14th Dec 2019.</p>	
1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways	<p><Progress 100 %> (for items 1)-7))</p> <p>1) Country focused trainings were conducted 4 times.</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project: Refer to OVI (Objectively Verifiable Indicators) 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) Technical Meeting for Planning Guideline was held in Dec 2019.</p> <p>6) Invitation Program of was held once in Japan</p> <p>7) Webinars for explaining completed guidelines were held on 15th September 2021</p> <p><Progress 100%></p> <p>8) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) were held 8 times.</p> <p>-Meeting with state PWD of Karnataka in Feb 2017</p> <p>-Meeting with state PWD of West Bengal in Feb 2018</p> <p>-Meeting with PIU of NHAI in Dec 2018</p> <p>-Meeting with SBO of NHIDCL in Dec 2018</p> <p>-Meeting with State PWD of West Bengal in Dec 2018</p> <p>-Meeting with NHAI HQ in Jan 2019</p> <p>-Meeting with NHIDCL HQ in Jan 2019</p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30 th Sept, 2021	Status*
	<p>-Meeting with MoRTH in Jan 2019</p> <p>-Tender documents for EPC contracts from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement))</p> <p>-Based on the review of the current status, JICA Experts prepared and submitted an advisory report to Indian side on 16th Jan 2019.</p> <p>-Recommendations for Procurement modes for Pilot Project (NH10) were submitted to India side on 28th May 2019 by JICA Experts.</p> <p>Based on that recommendation, NHIDCL prepared tender documentation for NH10.</p>	
Output2: Guidelines on design and construction for mountainous highways are developed.		
2-1 Improved tunnel guideline is completed by June 2019.	<p><Progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100 %></p> <p>2) TOC for tunnel guideline was drafted and finalized at the TG meeting on 30th January 2018.</p> <p><Progress 100%></p> <p>3) Draft of tunnel guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>4) Revision and final submission were completed in March 2020. Related technical workshop was held on 14th August 2019.</p>	Completed
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	<p><Progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%></p> <p>2) TOC for earthwork guideline was drafted and finalized at the TG meeting on 22nd February 2018.</p> <p><Progress 100%></p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30 th Sept, 2021	Status*
	<p>3) Draft of earthwork guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>4) Revision and final submission were completed in March 2020. Related technical workshop was held on 25th September 2019.</p>	
<p>2-3 High pier bridge guideline is completed by June 2019.</p>	<p><Progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%></p> <p>2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017.</p> <p><Progress 100%></p> <p>3) Draft of high pier bridge guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>4) Revision and final submission were completed in March 2020. Related technical workshop was held on 29th July 2019.</p>	<p>Completed</p>
<p>2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p><Progress 90%> (for items 1)-7))</p> <p>1) Country focused trainings were conducted 4 times out of 5.</p> <p>2) Technical Seminars were held 2 times in total.</p> <p>3) Pilot Project</p> <p>a. NH22 (initially requested but cancelled)</p> <p>-Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, the 5th JCC in Oct 2018 cancelled this pilot project site.</p> <p>-Field surveys: Parwanoo-Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018.</p> <p>-The draft implementation plan was prepared for NH22</p> <p>b. Candidate sites proposed in Nov 2018.</p>	<p>Ongoing</p>

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30 th Sept, 2021	Status*
	<p>-Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov 2018 and site surveys were conducted for 7 times in total.</p> <p>-Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide.</p> <p>-On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design.</p> <p>-For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. Then, NHIDCL floated a tender for the selection of a contractor to conduct the countermeasure work for landslide and issued LoA to the winning bidder. Bid evaluation was completed and NHIDCL signed the contract agreement in May, 2020. JICA Experts submitted comments on documents to NHIDCL on 22nd October, 2020. On 30th Nov. 2020, NHIDCL shared Design Report with JICA Experts who then submitted comments on 15th Dec 2020. NHIDCL and the Contractor submitted Working Drawing and Method Statements to JICA Experts on 09th July, 2021. On 11th Aug. 2021, JICA Experts submitted sample Method Statements for Horizontal Drainage Borings and Cast-in-situ Concrete Crib Works, in which Japanese practice for both works is explained.</p> <p>-For NH54, topographic survey data collected by DPR Consultant were submitted to NHAI and JICA Experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA Experts. Between 21st Jan. 2020 and 19th Mar. 2020, JICA Experts submitted three recommendations on survey method and plans. JICA Experts also delivered a lecture on map reading technique to NHAI on 25th Feb. 2020. JICA Experts submitted recommendations on slope stake monitoring on 22nd June, 2020 followed by 10 sets of comments on slope stake</p>	

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30 th Sept, 2021	Status*
	<p>monitoring methods and results between 29th Jul, 2020 and 21st Dec, 2020. NHAI and the Consultant are currently implementing site survey. Currently, NHAI and the Consultant completed most of the required sites for the survey to prepare technical recommendations and JICA Experts are preparing a recommendation and will soon submit it.</p> <p>-For NH717, NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation and issued a LoA to the winning bidder. NHIDCL signed the contract agreement on 27th May, 2020 and on 20th July, 2020 JICA side submitted comments on the draft Inception Report and draft Quality Assurance report and on 5th Oct. 2020, NHIDCL shared the finalized Inception Report and Quality Assurance Report with JICA Experts. NHIDCL and the Consultant completed most of the required sites for the survey to prepare technical recommendation. JICA experts submitted the recommendations for gravity deformation of the pilot project site on NH717 to NHIDCL on 28th September 2021.</p> <p>4) Upon the requests from MoRTH, NHAI or NHIDCL, field surveys for disaster affected sites were conducted twice in total.</p> <p>-Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018</p> <p>-Upon the request from NHAI, Kiratpur-Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018</p> <p>-Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.</p> <p>5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively. Technical Meetings for Planning and O&M were held on 14th Dec 2019 and 17th Sep 2019, respectively.</p> <p>6) 1st Invitation Program was held in Japan from 2017/11/6-2017/11/8 for 6 participants from MORTH, NHAI and DEA</p> <p>7) Webinars for explaining completed guidelines was / will be held on;</p>	

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 30 th Sept, 2021	Status*
	<p>22nd September 2021 (Mountain Bridge) – Completed</p> <p>6th October 2021 (Slope Protection)</p> <p>22nd October 2021 (Mountain Tunnel)</p> <p>27th October 2021 (Construction of Slope Protection)</p>	
Output3: Foundation for operation and maintenance for mountainous highways is built.		
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p><Progress 100%></p> <p>1) Existing O&M guidelines for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%></p> <p>2) TOC for O&M guidelines was drafted and finalized at the TG meeting on 19th December 2017.</p> <p><Progress 100%></p> <p>3) Draft of O&M guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>4) Revision and final submission were completed in March 2020. O&M workshops are included under each related guideline. Technical Meeting for O&M was held on 17th Sep 2019.</p>	Completed
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	<p><Progress 100 %> (for items 1)-7))</p> <p>1) Country focused trainings were conducted 4 times.</p> <p>2) Technical Seminars were held 2 times in total.</p> <p>3) Pilot Project: Refer to OVI 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) O&M workshops were included under each related guideline for bridge, tunnel and slope protection works. Technical Meeting for O&M was held on 17th Sep 2019.</p> <p>6) Invitation Program was held once in Japan</p> <p>7) Webinar for explaining completed guidelines was held on 29th September 2021</p>	Completed

1-4 Achievement of the Project Purpose

The deliverables achieved by the Project as per the TOR are given in the table below:

*Completed, Ongoing, Scheduled for later

Project Purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.		
Indicators	Major Results	Status*
(1) Model activities are conducted applying the developed guidelines by the Project.	-Refer to 1-3 Achievement of Output, OVI 2-4, 3) Pilot Project and 5) Technical Workshop / Technical Meeting	Ongoing
(2) Core officers are able to give lectures on development of mountainous highways in the training courses.	-The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India (2) 4 country focused training and one Invitation Program conducted in Japan	Ongoing

1-5 Changes of Risks and Actions for Mitigation

- N/A

1-6 Progress of Actions undertaken by JICA

- JICA Project Team conducted activities related to Output 1, 2 and 3. The progress is monitored as stated in section 1-3 "Achievement of Output".

1-7 Progress of Actions undertaken by Gov. of India

PDM ver.1 approved on 14th Dec, 2016	Actual as of 30 th Sept, 2021	Status
1. Allocation of Counterpart Personnel from GOI 1.1 Chairperson 1.2 Project Director 1.3 Project Manager 1.4 Project Co-Manager 1.5 Project Members 1.6 Participants for Training in Japan	1. Allocated Counterpart Personnel from GOI 1.1 Chairperson 1.2 Project Director 1.3 Project Manager 1.4 Project Co-Manager (3) 1.5 Project Members (9) 1.6 Participants for Training in Japan (43) 1st Training (10); 2nd Training (10); 3 rd Training (9); 4th Training (9); 1st Invitation Program (5) 1.7 Allocated Counterparts for guidelines	-Indian side has availed all the required counterparts.

PDM ver.1 approved on 14th Dec, 2016	Actual as of 30 th Sept, 2021	Status
	<ul style="list-style-type: none"> -Overall control of 5 guidelines -Guideline for Planning -Guideline for Slope Protection and Embankment -Guideline for Bridge -Guideline for Tunnel -Guideline for Operation Maintenance 1.8 Counterparts for pilot projects (7) <ul style="list-style-type: none"> - Pilot Project on NH54 (3) - Pilot Project on NH717 and NH10 (4) 	
2. JCC Organization Establishment of JCC as per the Project Organizational Chart in Record of Discussion and holding of meetings at least twice a year	2. JCC Organization JCC was established and members attended the 1st JCC meeting held in MORTH on Dec 14 th 2016 followed by holding JCC meetings in April 2017, October 2017, April 2018, October 2018, May 2019 and Oct 2019 as scheduled. In 2020, the JCC meetings scheduled for April 2020 and Oct 2020 were cancelled due to the COVID-19 pandemic. The 8th JCC meeting was held online on July 13th, 2021. 2.1 JCC Members (1) Chairperson (2) Project Director (3) Project Manager (4) Project Co-Manager (3) (5) Project Members (9) CE(s) of MoRTH, GM(s) of NHAI, GM(s) of NHIDCL	JCC establishment complete JCC meetings ongoing
3. Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.	3. Land, buildings and facilities a. An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) has been secured in NHAI HQ b. Office space for JICA Short-term Experts has been availed in Jeevan Tara Building.	Ongoing

PDM ver.1 approved on 14th Dec, 2016	Actual as of 30 th Sept, 2021	Status
4. Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	4. Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses being provided as required 2) Domestic travel cost for counterparts being provided as required	Ongoing
5. Pilot Project Cost, if required construction works.	5. Pilot Project -Refer to 1-3 Achievement of Output, OVI 2-4, 3) Pilot Project	Ongoing

1-8 Progress of Environmental and Social Considerations (if applicable)

- N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty Reduction (if applicable)

- N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

~~An independent office room for JICA Long-term Expert (Chief Advisor/Highway Development) has not been secured in Transport Bhawan. It is necessary for JICA and MoRTH to continue to discuss this matter.~~

- Indian side requested at least one pilot project with civil works which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since the contract period for the team does not accommodate the necessary period for the civil works.
 - Among three candidate sites proposed in December 2018, one site was selected for civil work after site visits by JICA Experts. For the selected one site for civil work, JICA Experts would give technical advice for updating DPR and guidance for construction. For remaining two sites, JICA Experts would give technical advice for updating DPR.
 - Based on the survey results available for the project, NH10 was recommended as the site for civil work. NH10 was the only site for which technical advice may be

completed by the end of the project period. For DPR preparation for NH717 and NH54, JICA Experts would provide input.

- iii. The contract period of JICA Short-term Expert Team was extended to accommodate implementation of the civil work of NH10 as well as DPR preparation for NH717 and NH54. In addition, JICA Short-term Expert Team assigned additional experts in charge of support for supervision, who is to work in India from October 2022. (Note: JICA Experts are unable to assume liability of design.)

2. Delay of Work Schedule and/or Issues (Problems) (if any)

2-1 Issues/Problems

- The declaration by the World Health Organization designating the COVID-19 outbreak as a 'Public Health Emergency of International Concern' on 30th January 2020 and a pandemic on 11th March 2020 led the Gov. of India to take countermeasures by restricting movement within India including suspension of entry visas of some of JICA Short-term Experts. The COVID-19 pandemic lockdown by the Gov. of India was effective from 25th March 2020. Based on these situations, JICA instructed JICA Long-term Experts to return to Japan in April 2020.
- The global outbreak of COVID-19 caused the JCC meetings scheduled for April 2020 and Oct 2020 and 5th country focused training program to be canceled.
- The COVID-19 pandemic lockdown in India has delayed the progress of the Pilot Projects. A full lockdown started in March 2020 and lasted until the end of May. While some of the lockdown restrictions were lifted from June 2020, as of the end of Mar, 2021, significant restrictions still remain. Interstate travel has been considerably restricted as well and some states still require some weeks of quarantine. The lockdown and restrictions of interstate travel including weeks-long quarantine obstruct the site works by the consultants and contractor for the pilot project.
- International travel restrictions were eased and JICA Experts' remobilized in India for the project in April 2021. However, travel restrictions and quarantine requirements were again required due to the fight against the Delta Variant. From October 2021, International travel restrictions is supposed to be eased and JICA Experts will be remobilized in India for the project.

2-2 Cause

- Global outbreak of COVID-19
- COVID-19 pandemic lockdown in India from 25th March 2020

2-3 Action to be taken

- Both Japanese and Indian sides will faithfully discuss to arrive at a mutually agreeable solution by such as modifying project activities, project duration, and/or incorporating additional arrangements. In view of the foregoing, JICA side is proposing a revised timeline for pilot projects and one-year project period extension. The project extension request was approved and the completion date was revised from March 2021 to March 2022. **The 8th JCC meeting was held online on July 13th, 2021. In order to facilitate continuous communication and timely JCC meetings during the pandemic travel restrictions, it is necessary to continue with online communication by video conferences and other suitable modes.**

2-4 Roles of Responsible Persons/Organization (JICA, Gov. of India)

- JICA
- Gov. of India

3. Modification of the Project Implementation Plan

3-1 PO

- PO ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

3-2 Other modifications on detailed implementation plan (Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HQ. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)

- PDM ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.
- In view of the necessity to complete remaining projects amidst the continuing pandemic, JICA side suggested application by the Indian side of the proposed revised timeline to manage the technical transfer through the pilot projects. JICA side also suggested applying online communication tools to maintain close collaboration between the two parties
- On Feb 22nd, 2021, the amendment of the R/D was agreed by signing the M/M to reflect the extension of project duration from '5 years from arrival of experts' to '6 years from arrival of experts' as a countermeasure for the delay to project activities due to the COVID-19 pandemic.

II. Project Monitoring Sheet I & II as Attached

Project Monitoring Sheet I (Revision of Project Design Matrix)

Project Title: Capacity Development Project on Highways in Mountainous Regions

Implementing Agency: Ministry of Road Transport and Highways (MoRTH)

Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD

Period of Project: Apr, 2016 – Mar, 2022 (Six (6) years)

Project Site: Whole India

Model Site:

Version 10

Date: xxx

Narrative Summary		Objectively Verifiable	Means of Verification	Important Assumption	Achievement	Remarks
<p>Overall Goal</p> <p>Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report</p>				
	<p>OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Contract Document Completion Report by the operation and maintenance contractor</p>				
<p>Project Purpose</p> <p>Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.</p>	<p>- Refer to OVI (Objectively Verifiable Indicators) 2-4, 3)Pilot Project</p>		
	<p>PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars held in India (2) 4 country focused training and 1 Invitation program held in Japan (3) 3 Technical Workshops for Bridge, Tunnel and Slope Protection Guidelines held in New Delhi (4) 2 Technical meeting for Planning & O&M Guidelines held in New Delhi (5) 1 Technical meeting for "map reading techniques" held in New Delhi</p>			

<p>Outputs</p> <p>Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p>	<p>Survey and planning guidelines</p>	<p><progress 100%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><progress 100%></p> <p>2) Field Surveys were conducted in 10 case study sites.</p> <p><progress 100%></p> <p>3) TOC for survey and planning guideline was drafted and finalized at the TG meeting on 30th January 2018, followed by approval in April 2018 JCC Meeting.</p> <p><progress 100%></p> <p>4) Draft of survey and planning guideline based on review of existing standards and field surveys were completed.</p> <p><progress 100%></p> <p>5) Revision and final submission were completed. Related technical meeting was held on 14th December 2019.</p> <p><progress 100%> for items 1) - 5)</p> <p>1) Country focused trainings were conducted 4 times.</p> <p>2) Technical Seminars were held 2 times in total.</p> <p>3) Pilot Project: Refer to OVI(Objectively Verifiable Indicators) 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) Technical meeting for survey and planning guidelines was held on 14th December 2019.</p> <p>6) Invitation Program of was held once in Japan</p> <p>7) Webinars for explaining completed guidelines were held on 15th September 2021</p> <p><progress 100%></p> <p>7) Meetings for discussion of suitable contract system and management with officials MoRTH, NHA, NNIDCL and PWDs were conducted 8 times in total. Tender documents for EPC contract from 2 projects were collected and studied. JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019. Recommendations for Procurement modes for Pilot Project NH10(Sikkim) were submitted to India side on 28th May 2019 by JICA Experts. Based on that recommendation, NHIDCL prepared tender documentation for NH10. The tender was floated thereafter, contractor selected and contract agreement signed in May 2020.</p>	<p>The 5th Country Focused Training planned for May/June 2020 was cancelled due to the Covid pandemic travel restrictions.</p>
<p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Project records</p>			

<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019.</p>	<p>Improved tunnel guideline, Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for tunnel guideline was drafted and finalized at the TG meeting on 30th January 2018 <progress 100%> 3) Development of draft tunnel guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshop for tunnel guideline was held on 14th August 2019.</p> <p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for earthwork guideline was drafted and finalized at the TG meeting on 22nd February 2018 <progress 100%> 3) Development of draft earthwork guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshop was held on 25th September 2019.</p>
	<p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p>	<p>Earthwork guideline, Project records</p>		

2-3 High pier bridge guideline is completed by June 2019.

High pier bridge guideline, Project records

<progress 100%>
1) Existing design and construction standards were collected and analyzed, and issues were identified
<progress 100%>
2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017
<progress 100%>
3) Development of draft high pier bridge guideline based on review of existing standards and field surveys were completed.
<progress 100%>
4) Revision and final submission were completed. Related technical workshops was held on 29th July 2019.

2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.

Project records

<progress 90%> for items 1) - 5)

- 1) Country focused trainings were conducted 4 times.
- 2) Technical Seminars were held 2 times in total.
- 3) Pilot Project
 - a. NH22 (initially requested but cancelled)
 - Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, 5th JCC in Oct 2018 cancelled this pilot project site.
 - Field surveys: Parwanoo--Solani section of NH22 in Himachal Pradesh on 8th June and 20th June 2018
 - The draft implementation plan was prepared for NH22
 - b. Candidate sites proposed in Nov 2018
 - Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov, 2018 and site surveys were conducted for 7 times in total.
 - Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide.
 - On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design.
 - For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. Then, NHIDCL floated a tender for the selection of a contractor to conduct the countermeasure work for landslide and issued LoA to the winning bidder. Bid evaluation was completed and NHIDCL signed the contract agreement in May, 2020. JICA Experts submitted comments on documents to NHIDCL on 22nd October, 2020. On 30th Nov. 2020, NHIDCL shared Design Report with JICA Experts who then submitted comments on 15th Dec 2020. NHIDCL and the Contractor submitted Working Drawing and Method Statements to JICA Experts on 09th July, 2021. On 11th Aug. 2021, JICA Experts submitted sample Method Statements for Horizontal Drainage Borings and Cast-in-situ Concrete Crib Works, in which Japanese practice for both works is explained.

Actual implementation of the pilot projects is being hampered by the travel restrictions due to the ongoing coronavirus pandemic. The implementation period for the project has been extended by 1 year and completion date revised to Mar 2022

-For NH54, topographic survey data collected by DPR Consultant were submitted to NHAI and JICA Experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA Experts. Between 21st Jan. 2020 and 19th Mar. 2020, JICA Experts submitted three recommendations on survey method and plans. JICA Experts also delivered a lecture on map reading technique to NHAI on 25th Feb. 2020. JICA Experts submitted recommendations on slope stake monitoring on 22nd June, 2020 followed by 10 sets of comments on slope stake monitoring methods and results between 29th Jul, 2020 and 21st Dec, 2020. NHAI and the Consultant are currently implementing site survey. **Currently, NHAI and the Consultant completed most of the required sites for the survey to prepare technical recommendations and JICA Experts are preparing a recommendation and will soon submit it.**

-For NH717, NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation and issued a LoA to the winning bidder. NHIDCL signed the contract agreement on 27th May, 2020 and on 20th July, 2020 JICA side submitted comments on the draft Inception Report and draft Quality Assurance report and on 5th Oct. 2020, NHIDCL shared the finalized Inception Report and Quality Assurance Report with JICA Experts. NHIDCL and the Consultant completed most of the required sites for the survey to prepare technical recommendation. **JICA experts submitted the recommendations for gravity deformation of the pilot project site on NH717 to NHIDCL on 28th September 2021.**

4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted twice in total.

-Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018

-Upon the request from NHAI, Kiratpur-Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018

-Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.

5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively. Technical meetings for planning and O&M were held on 14th December 2019 and on 17th September 2019, respectively.

6) 1st Invitation Program was held in Japan from 2017/11/6-2017/11/8 for 6 participants from MoRTH, NHAI and DEA

7) **Webinars for explaining completed guidelines was / will be held on;**
22nd September 2021 (Mountain Bridge) – Completed
6th October 2021 (Slope Protection)
22nd October 2021 (Mountain Tunnel)
27th October 2021 (Construction of Slope Protection)

<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p>	<p>Operation and maintenance guideline, Project records</p>	<p><progress 100%> 1) Existing O&M guidelines for mountainous highways were collected and analyzed, and issues were identified <progress 100%> 2) TOC for O&M guidelines was drafted and finalized at the TG meeting on 19th December 2017 <progress 100%> 3) Development of O&M guideline based on review of existing standards and field surveys were complete. <progress 100%> 4) Revision and final submission were completed. O&M workshops were held under each related guideline. Technical meeting for O&M was held on 17th September 2019.</p>	<p>The 5th Country Focused Training planned for May/June 2020 was cancelled due to the Covid pandemic travel restrictions.</p>
<p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Project records</p>	<p><progress 100%> for items 1) - 5) 1) Country focused trainings were conducted 4 times. 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI 2-4 4) Surveys for disaster: Refer to OVI 2-4 5) O&M workshops were included under each related guidelines for bridge, tunnel and slope protection works. Technical meeting for O&M was held on 17th September 2019. 6) Invitation Program of was held once in Japan 7) Webinar for explaining completed guidelines was held on 29th September 2021</p>		

Activities	The Japanese Side	Inputs	The Indian Side	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection III - Mountain Tunnel - Tunnel Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Highway Engineering for Mountain Road - Slope Countermeasure Construction</p> <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessary.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessary</p>	<p>Inputs</p> <p>(1) Allocation of Counterparts - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>The Indian Side</p> <p>- Majority of trained officials continues to work for counterpart agencies.</p> <p>- Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures></p> <p>An independent room for JICA Long-term Expert (Chief Advisor) has not yet been secured in Transport Bhawan; therefore, JICA and MoRTH need to continue to discuss.</p> <p>-Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.</p> <p>-The progress of the Pilot Project was delayed due to COVID-19 pandemic lockdown. Both Japanese and Indian sides will faithfully discuss to arrive at a mutually agreeable solution by such as modifying project activities, project duration, and/or incorporating additional arrangements.</p>	

Project Monitoring Sheet II (Revision of Plan of Operation)

Project Title: Capacity Development Project on Highways in Mountainous Regions		Inputs from JICA												Monitoring		
		FY 2016		FY 2017		FY 2018		FY 2019		FY 2020		FY 2021		Issue	Solution	
Short Term	Long Term	Plan	Actual	I	II	III	IV	I	II	III	IV	I	II	III	IV	Remarks
		Expert	Chief Advisor / Highway Development													
	Highway Engineering / Coordinator															
	Team Leader/Slope Protection I															
	Deputy Team Leader/Slope Protection III															
	Mountain Tunnel															
	Slope Protection II/High Embankment															
	Mountain Bridge															
	Facility of Mountain Roads															
	Maintenance & Operation of Mountain Roads															
	Natural Condition (Topography/Geology)															
	Drainage Plan															
	Plan and Survey of Mountain Roads/Coordinator															
	Monitoring and Evaluation															
	Highway Engineering for Mountain Road															
	Slope Countermeasure Construction															
	Equipment															
	Training in Japan															
	Counterpart Training in Japan															
	In-country/Third country Training															
	Inputs from India															
	Expert															
	Chairperson															
	Project Director															
	Project Manager															
	Project Co-Manager															
	Project Co-Manager															
	Project Co-Manager															
	Counterparts (9)															
	Equipment															

Activities Sub-Activities	2016		2017		2018		2019		2020		2021		Responsible Organization	Achievements	Issue & Countermeasure
	Plan	Actual	I	II	III	IV	I	II	III	IV	I	II			
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed															
1.1 Collect and analyze existing information on mountainous highways, identify issues on development of mountainous highways, including identification of appropriate solutions for disaster risk reduction.	Plan	Actual											CE(EAP), MoRTH	Information collected and analyzed (100%)	
1.2 Conduct field surveys to the typical mountainous highways.	Plan	Actual											CE(EAP), MoRTH	Field surveys completed in 10 case study sites. 4 additional surveys conducted upon MoRTH request (100%).	
1.3 Improve survey and planning guidelines on mountainous highways.	Plan	Actual											CE(S&R), CE(EAP), MoRTH & SE, MoRTH	100% progress	
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan	Actual											CE(EAP), MoRTH	100% progress	
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)	Plan	Actual											CE(EAP), MoRTH	90% progress	
Output 2: Guidelines on design and construction for mountainous highways are developed.															
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.	Plan	Actual											CE(EAP), MoRTH	100% progress	
2.2 Improve tunnel guidelines.	Plan	Actual											CE(S&R), CE(EAP), MoRTH & GM(Technical) NHIDCL	100% progress	
2.3 Develop earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan	Actual											CE(S&R), CE(EAP), MoRTH & ED, NHIDCL	100% progress	
2.4 Develop high pier bridge guidelines.	Plan	Actual											CE(S&R), CE(EAP), MoRTH & CE, MoRTH	100% progress	
Output 3: Guideline on operation and maintenance for mountainous highways is developed.															
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.	Plan	Actual											CE(EAP), MoRTH	100% progress	
3.2 Develop operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan	Actual											CE(S&R), CE(EAP), MoRTH & GM(T), NHAI	100% progress	
Duration / Phasing															
Monitoring Plan															
Monitoring	Plan	Actual													
Joint Coordination Committee	Plan	Actual													
Set-up the Detailed Plan of Operation	Plan	Actual													
Submission of Monitoring Sheet	Plan	Actual													
Reports/Documents															
Project Completion Report	Plan	Actual													
Public Relations															
Setting up & Updating Project Facebook Page	Plan	Actual													
Published article on Project Activities in MoRTH Annual Report	Plan	Actual													
Remarks															
ICC meeting in 2020 was not held due to COVID-19 pandemic. Held on Zoom in 7/21															
Set up and Updated more than 43 times															
Issue															
Solution															

Monitoring Sheet (Final Version at the completion)

**TO DG (Road) & SS of MoRTH
TO CR of JICA INDIA OFFICE**

PROJECT MONITORING SHEET

Project Title: Capacity Development Project on Highways in Mountainous Regions

Version of the Sheet: Ver. **Final (Term: 72 Month, Apr. 2016 – Mar. 2022)**

Name: Rakesh Kumar

Yoshinori Kawamura

Title: Superintending Engineer (EAP)

Team Leader/ JICA Expert team

Submission Date: **February 11th, 2022**

I. Summary

1. Progress

1-1 Progress of Inputs

- PDM related to Input were authorized on 14th December 2016 as a ver.1

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 11 th Feb 2022
A. Japanese side		
(1) Experts	<Long-term Experts> -Chief Advisor/Highway Development -Highway Engineering/Coordinator <Short-term Experts/Consultants> <u>Total: 65.95M/M</u> -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Tunnel Facilities -Slope Protection II/High Embankment -Earthwork -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology) -Drainage Plan -Plan and Survey of Mountain Roads/Coordinator	<u><Long-term Experts></u> -Chief Advisor/Highway Development -Highway Engineering/Coordinator Long-term Experts' tenure was ended at the end of March 2021. <u><Short-term Experts></u> Progress: (91.19/91.19 MM: 100%) Between Nov 2017 and Feb 2022, the following Short-term Experts were dispatched. -Team Leader/Slope Protection I -Deputy Team Leader/Slope Protection III -Mountain Tunnel -Slope Protection II/High Embankment -Mountain Bridge -Facility of Mountain Roads -Maintenance & Operation of Mountain Roads -Natural Condition (Topography/Geology)

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 11 th Feb 2022
	-Monitoring/Evaluation	-Drainage Plan -Plan and Survey of Mountain Roads/Coordinator -Monitoring/Evaluation -Highway Engineering for Mountain Road -Slope Countermeasure Construction
(2) Training for Counterpart's Personnel	<Training in Japan> (Once a year, about 10 people for 2 weeks (5 times))	<Training in Japan> Country Focused Training was conducted in collaboration with IAHE Progress: 4/5 times -1st Country Focused Training held on 16 th May -6 th June 2017 (22 days) -2nd Country Focused Training held on 24 th Oct -13 th Nov 2017(21 days) -3rd Country Focused Training held on 16 th Oct -5 th Nov 2018(21 days) -4th Country Focused Training held on 7 th Aug -2 nd Sept 2019 (20 days) -5th Country Focused Training planned for May/June 2020 was cancelled due to the COVID-19 pandemic travel restrictions. <Training in India> Seminars held in India -1st technical seminar held on 19 th June 2018 -2nd technical seminar held on 27 th Sep 2018 -Technical meeting for "map reading techniques" held on 25 th Feb 2020 - Webinars to explain and disseminate the completed guidelines -1st: "Planning" held on 15 th Sep 2021 -2nd: "Bridge" held on 22 nd Sep 2021 -3rd: "O&M" held on 29 th Sep 2021 -4th: "Slope I" held on 6th Oct 2021 -5th: "Tunnel" held on 22nd Oct 2021 -6th: "Slope II" held on 27th Oct 2021

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 11 th Feb 2022
(3) Equipment	Equipment and/or Material, as necessary	None
(4) Local Costs	<Local Costs> -Office management cost -Local consultants -Other Local cost as necessity	<Local Costs> -Project Assistant for Short-term Experts -Communication (internet and mobile phone) -No local consultants -Car rental (including driver)
B. Indian Side		
(1) Indian Side Counterparts	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager -Project Members -Participants for training in Japan	<Counterparts from GOI> -Chairperson -Project Director -Project Manager -Project Co-Manager (3) -Project Members (9) -Participants for training in Japan (43) 1st Training (10); 2nd Training (10); 3rd Training (9); 4th Training (9); 1st Invitation Program (5) -Counterparts for guidelines (7) Overall control of 5 guidelines (2) Guideline for Planning (1) Guideline for Slope Protection and Embankment (1) Guideline for Bridge (1) Guideline for Tunnel (1) Guideline for Operation and Maintenance (1) -Counterparts for pilot projects (7) Pilot Project on NH54 (3) Pilot Project on NH717 and NH10 (4)
		<JCC Members> -As specified in the Project Organizational Chart in Record of Discussion
(2) Operational Expenses	<Facilities>	<Facilities>

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 11 th Feb 2022
	-Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively	-An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) was provided in NHAI HQ -Office space for Short-term Experts was provided in Jeevan Tara Building
(3) Administrative Cost	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	<Administrative cost and other expenses> 1) Personnel cost for counterparts and other running expenses provided as required 2) Domestic travel cost for counterparts provided as required
(4) Pilot Project Cost	<Pilot Project Cost> Pilot Project Cost, if required construction works	<Pilot Project Cost> Pilot Project Planned at 3 sites i.e. NH10 (Sikkim), NH717 (West Bengal), and NH54 (Assam) -For NH10, topographic surveys and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA Experts. Based on the data, recommendations for countermeasures for landslide were prepared by JICA Experts. NHIDCL floated a tender to select a contractor for implementing the countermeasure work for landslide and issued a LoA to the winning bidder. Bid evaluation was completed and NHIDCL signed the contract agreement in May, 2020. On 16 th Oct. 2020 NHIDCL shared technical documents with JICA Experts who then submitted comments on 22 nd Oct. 2020. On 11 th Aug. 2021, JICA Experts submitted sample Method Statements for Horizontal Drainage Borings and Cast-in-situ Concrete Crib Works, in which Japanese practice for both works is explained. The Slope Protection Construction Expert newly assigned to the project was mobilized on 4th

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 11 th Feb 2022
		<p>October for the 1st technical transfer for construction of cast-in-situ concrete crib works and horizontal drainage boring. The Slope Protection Construction Expert stayed in India until 29th October both in Sikkim and Delhi. The 2nd technical transfer made by the Slope Protection Construction Expert was from 22nd November to 7th of January, in which he stayed in Sikkim around 2 weeks due to the restriction forced by COVID-19.</p> <p>-NH54: Selection of consultants for topographic survey and drilling investigation for NH54 was concluded and the contract agreement between NHAI and Consultant was signed on 23rd December, 2019.</p> <p>Topographic survey data collected by DPR Consultant were submitted to NHAI and JICA Experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA Experts. Between 21st Jan. 2020 and 19th Mar. 2020, JICA Experts submitted three recommendations on survey method and plans. JICA Experts also delivered a lecture on map reading technique to NHAI on 25th Feb. 2020. On 22nd Jun. 2020, JICA Experts submitted recommendations on slope stake monitoring followed by a series of (ten) comments on methods and results of slope stake monitoring submitted between 29th Jul. 2020 and 21st Dec. 2020. NHAI and the Consultant completed most of the required sites for the survey to prepare technical recommendations. Based on the results, JICA Experts submitted the recommendation on 18th October. JICA</p>

Inputs	PDM ver.1 approved on 14th Dec, 2016	Actual as of 11 th Feb 2022
		<p>Experts followed up the recommendation by explaining the details to NHAI in November and December 2021.. On 25th November, JICA Experts provided a sample technical specification for drainage wells. On 09th December, JICA Experts submitted an additional recommendation on safety of construction of drainage wells. On 27th December, JICA Experts submitted additional recommendation on landslide monitoring.</p> <p>NH717: NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation for NH717and issued a LoA to the winning bidder. NHIDCL signed the contract agreement on 27th May, 2020.</p> <p>On 20th Jul. 2020, JICA Experts submitted comments on drafts of Inception Report and Quality Assurance Report and on 5th Oct. 2020, NHIDCL shared the finalized Inception Report and Quality Assurance Report with JICA Experts. NHIDCL and the Consultant completed most of the required sites for the survey to prepare technical recommendation.</p> <p>On 30th Sep.2021, JICA Experts submitted the recommendations. JICA Experts followed up the recommendation by explaining the details to NHIDCL in November and December 2021. On 25th November, JICA Experts provided a sample technical specification for horizontal drainage boring. On 27th December, JICA Experts submitted additional recommendations on construction procedure.</p>

1-2 Progress of Activities

- Progress of activities is indicated in Monitoring Sheet II (PO) and Project Design Matrix (PDM)
- Basically, no crucial bottlenecks in progress have been observed.

1-3 Achievement of Output

The deliverables achieved by the Project as per the TOR are given in the table below:

-PDM related to Output were authorized on December 14th 2016 as a ver.1

*Completed, Ongoing, Scheduled for later

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 11 th Feb, 2022	Status*
Output1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed		
1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.	<p><Progress 100%></p> <p>1) Existing standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%></p> <p>2) Field Surveys were conducted in 10 of 10 case study sites.</p> <p>(1) 6th Feb 2018: Siliguri to Darjeeling on NH55 in West Bengal</p> <p>(2) 7th Feb 2018: Sevoke to Sikkim on NH10 in West Bengal</p> <p>(3) 28th Sep 2017: Mussoorie to Chamba on 707A in Uttarakahnd</p> <p>(4) 10th Apr 2018: Kiratpur to Ner chowk on NH21 in Himachal</p> <p>(5) 10th Apr 2018: Ner chowk to Manali on NH21 in Himacha</p> <p>(6) 9th Apr 2018: Pathankot to Mandi on NH20 in Himachal</p> <p>(7) 15th Feb 2017: Shiradi Ghat bypass on NH48 in Karnataka</p> <p>(8) 20th March 2018: Assam border to Dalu on NH62 in Megalaya</p> <p>(9) 9th Feb 2018: Mangan to Nakura on NH310 in Sikkim</p> <p>(10) 13th Oct 2017: Shillong to Dawki on NH40 in Megalaya</p> <p><Progress 100%></p> <p>3) TOC for survey and planning guideline was drafted and finalized at the TG meeting on 30th January 2018 followed by approval in April 2018 JCC Meeting.</p> <p><Progress 100%></p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 11 th Feb, 2022	Status*
	<p>4) Draft of survey and planning guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>5) Revision and final submission were completed in March 2020. Related Technical Meeting was held on 14th Dec 2019.</p>	
<p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p><Progress 100 %> (for items 1)-7))</p> <p>1) Country focused trainings were conducted 4 times.</p> <p>2) Technical Seminars were held 2 times in total</p> <p>3) Pilot Project: Refer to OVI (Objectively Verifiable Indicators) 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) Technical Meeting for Planning Guideline was held in Dec 2019.</p> <p>6) Invitation Program of was held once in Japan</p> <p>7) Webinars for explaining completed guidelines were held on 15th September ,2021</p> <p><Progress 100%></p> <p>8) Meetings for discussion of suitable contract system and management with officials MoRTH, NHAI, NNIDCL and PWD(s) were held 8 times.</p> <ul style="list-style-type: none"> -Meeting with state PWD of Karnataka in Feb 2017 -Meeting with state PWD of West Bengal in Feb 2018 -Meeting with PIU of NHAI in Dec 2018 -Meeting with SBO of NHIDCL in Dec 2018 -Meeting with State PWD of West Bengal in Dec 2018 -Meeting with NHAI HQ in Jan 2019 -Meeting with NHIDCL HQ in Jan 2019 -Meeting with MoRTH in Jan 2019 <p>-Tender documents for EPC contracts from 2 projects were collected and studied (West Bengal PWD and NHAI (Agreement))</p> <p>-Based on the review of the current status, JICA Experts prepared and submitted an advisory report to Indian side on 16th Jan 2019.</p> <p>-Recommendations for Procurement modes for Pilot Project (NH10) were submitted to India side on 28th May 2019 by JICA Experts.</p>	<p>Completed</p>

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 11 th Feb, 2022	Status*
	Based on that recommendation, NHIDCL prepared tender documentation for NH10.	
Output2: Guidelines on design and construction for mountainous highways are developed.		
2-1 Improved tunnel guideline is completed by June 2019.	<p><Progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100 %> 2) TOC for tunnel guideline was drafted and finalized at the TG meeting on 30th January 2018.</p> <p><Progress 100%> 3) Draft of tunnel guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. Related technical workshop was held on 14th August 2019.</p>	Completed
2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.	<p><Progress 100%> 1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%> 2) TOC for earthwork guideline was drafted and finalized at the TG meeting on 22nd February 2018.</p> <p><Progress 100%> 3) Draft of earthwork guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%> 4) Revision and final submission were completed in March 2020. Related technical workshop was held on 25th September 2019.</p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 11 th Feb, 2022	Status*
2-3 High pier bridge guideline is completed by June 2019.	<p><Progress 100%></p> <p>1) Existing design and construction standards for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%></p> <p>2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017.</p> <p><Progress 100%></p> <p>3) Draft of high pier bridge guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>4) Revision and final submission were completed in March 2020. Related technical workshop was held on 29th July 2019.</p>	Completed
2-4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.	<p><Progress 100%> (for items 1)-7))</p> <p>1) Country focused trainings were conducted 4 times out of 5.</p> <p>2) Technical Seminars were held 2 times in total.</p> <p>3) Pilot Project</p> <p>a. NH22 (initially requested but cancelled)</p> <p>-Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, the 5th JCC in Oct 2018 cancelled this pilot project site.</p> <p>-Field surveys: Parwanoo-Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018.</p> <p>-The draft implementation plan was prepared for NH22</p> <p>b. Candidate sites proposed in Nov 2018.</p> <p>-Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov 2018 and site surveys were conducted for 7 times in total.</p> <p>-Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide.</p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 11 th Feb, 2022	Status*
	<p>-On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH717 and NH54 were selected as the sites up to recommendation for design.</p> <p>-For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. Then, NHIDCL floated a tender for the selection of a contractor to conduct the countermeasure work for landslide and issued LoA to the winning bidder. Bid evaluation was completed and NHIDCL signed the contract agreement in May, 2020. JICA Experts submitted comments on documents to NHIDCL on 22nd October, 2020. On 30th Nov. 2020, NHIDCL shared Design Report with JICA Experts who then submitted comments on 15th Dec 2020. NHIDCL and the Contractor submitted Working Drawing and Method Statements to JICA Experts on 09th July, 2021. On 11th Aug. 2021, JICA Experts submitted sample Method Statements for Horizontal Drainage Borings and Cast-in-situ Concrete Crib Works, in which Japanese practice for both works is explained. The Slope Protection Construction Expert newly assigned to the project was mobilized on 4th October for the 1st technical transfer for construction of cast-in-situ concrete crib works and horizontal drainage boring. The Slope Protection Construction Expert stayed in India until 29th October both in Sikkim and Delhi. The 2nd technical transfer made by the Slope Protection Construction Expert was from 22nd November to 7th of January, in which he stayed in Sikkim around 2 weeks due to the restriction forced by COVID-19.</p> <p>-For NH54, topographic survey data collected by DPR Consultant were submitted to NHAI and JICA Experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA Experts. Between 21st Jan. 2020 and 19th Mar. 2020, JICA Experts submitted three recommendations on survey method and plans. JICA Experts also delivered a lecture</p>	

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 11 th Feb, 2022	Status*
	<p>on map reading technique to NHA on 25th Feb. 2020. JICA Experts submitted recommendations on slope stake monitoring on 22nd June, 2020 followed by 10 sets of comments on slope stake monitoring methods and results between 29th Jul, 2020 and 21st Dec, 2020. NHA and the Consultant are currently implementing site survey. NHA and the Consultant completed most of the required sites for the survey to prepare technical recommendations. Based on the results, JICA Experts submitted the recommendation on 18th October. JICA Experts followed up the recommendation by explaining the details to NHA in November and December 2021.. On 25th November, JICA Experts provided a sample technical specification for drainage wells. On 09th December, JICA Experts submitted an additional recommendation on safety of construction of drainage wells. On 27th December, JICA Experts submitted additional recommendation on landslide monitoring.</p> <p>-For NH717, NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation and issued a LoA to the winning bidder. NHIDCL signed the contract agreement on 27th May, 2020 and on 20th July, 2020 JICA side submitted comments on the draft Inception Report and draft Quality Assurance report and on 5th Oct. 2020, NHIDCL shared the finalized Inception Report and Quality Assurance Report with JICA Experts. NHIDCL and the Consultant completed most of the required sites for the survey to prepare technical recommendation. On 30th Sep.2021, JICA Experts submitted the recommendations. JICA Experts followed up the recommendation by explaining the details to NHIDCL in November and December 2021. On 25th November, JICA Experts provided a sample technical specification for horizontal drainage boring. On 27th December, JICA Experts submitted additional recommendations on construction procedure. .</p> <p>4) Upon the requests from MoRTH, NHA or NHIDCL, field surveys for disaster affected sites were conducted twice in total.</p>	

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 11 th Feb, 2022	Status*
	<p>-Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018</p> <p>-Upon the request from NHAI, Kiratpur-Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018</p> <p>-Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.</p> <p>5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively. Technical Meetings for Planning and O&M were held on 14th Dec 2019 and 17th Sep 2019, respectively.</p> <p>6) 1st Invitation Program was held in Japan from 2017/11/6-2017/11/8 for 6 participants from MORTH, NHAI and DEA</p> <p>7) Webinars for explaining completed guidelines were held on; 22nd September 2021 (Mountain Bridge) 6th October 2021 (Slope Protection) 22nd October 2021 (Mountain Tunnel) 27th October 2021 (Construction of Slope Protection)</p> <p>8) Reference on Gravity Deformation Textbook for Map Reading was prepared by JICA Experts for further understanding on gravity deformation by Indian engineers and submitted to NHAI and NHIDCL on 01st October 2021.</p>	
Output3: Foundation for operation and maintenance for mountainous highways is built.		
3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.	<p><Progress 100%></p> <p>1) Existing O&M guidelines for mountainous highways were collected and analyzed, and issues were identified.</p> <p><Progress 100%></p> <p>2) TOC for O&M guidelines was drafted and finalized at the TG meeting on 19th December 2017.</p> <p><Progress 100%></p>	Completed

Output/Indicators (Based on PDM ver.1)	Major Results Achievement as of 11 th Feb, 2022	Status*
	<p>3) Draft of O&M guideline based on review of existing standards and field surveys was completed.</p> <p><Progress 100%></p> <p>4) Revision and final submission were completed in March 2020. O&M workshops are included under each related guideline. Technical Meeting for O&M was held on 17th Sep 2019.</p>	
3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.	<p><Progress 100 %> (for items 1)-7))</p> <p>1) Country focused trainings were conducted 4 times.</p> <p>2) Technical Seminars were held 2 times in total.</p> <p>3) Pilot Project: Refer to OVI 2-4</p> <p>4) Survey for disaster: Refer to OVI 2-4</p> <p>5) O&M workshops were included under each related guideline for bridge, tunnel and slope protection works. Technical Meeting for O&M was held on 17th Sep 2019.</p> <p>6) Invitation Program was held once in Japan</p> <p>7) Webinar for explaining completed guidelines was held on 29th September 2021</p>	Completed

1-4 Achievement of the Project Purpose

The deliverables achieved by the Project as per the TOR are given in the table below:

*Completed, Ongoing, Scheduled for later

Project Purpose: Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.		
Indicators	Major Results	Status*
(1) Model activities are conducted applying the developed guidelines by the Project.	-Refer to 1-3 Achievement of Output, OVI 2-4, 3) Pilot Project and 5) Technical Workshop / Technical Meeting	Completed
(2) Core officers are able to give lectures on development of mountainous highways in the training courses.	-The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars conducted in India	Completed

	(2) 4 country focused training and one Invitation Program conducted in Japan	
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1-5 Changes of Risks and Actions for Mitigation

- N/A

1-6 Progress of Actions undertaken by JICA

- JICA Project Team conducted activities related to Output 1, 2 and 3. The progress is monitored as stated in section 1-3 “Achievement of Output”.

1-7 Progress of Actions undertaken by Gov. of India

PDM ver.1 approved on 14th Dec, 2016	Actual as of 11 th Feb, 2022	Status
1. Allocation of Counterpart Personnel from GOI 1.1 Chairperson 1.2 Project Director 1.3 Project Manager 1.4 Project Co-Manager 1.5 Project Members 1.6 Participants for Training in Japan	1. Allocated Counterpart Personnel from GOI 1.1 Chairperson 1.2 Project Director 1.3 Project Manager 1.4 Project Co-Manager (3) 1.5 Project Members (9) 1.6 Participants for Training in Japan (43) 1st Training (10); 2nd Training (10); 3 rd Training (9); 4th Training (9); 1st Invitation Program (5) 1.7 Allocated Counterparts for guidelines -Overall control of 5 guidelines -Guideline for Planning -Guideline for Slope Protection and Embankment -Guideline for Bridge -Guideline for Tunnel -Guideline for Operation Maintenance 1.8 Counterparts for pilot projects (7) - Pilot Project on NH54 (3) - Pilot Project on NH717 and NH10 (4)	-Indian side has availed all the required counterparts.
2. JCC Organization Establishment of JCC as per the Project Organizational Chart in Record	2. JCC Organization JCC was established and members attended the 1st JCC meeting held in MORTH on Dec 14 th	JCC establishment complete

PDM ver.1 approved on 14th Dec, 2016	Actual as of 11 th Feb, 2022	Status
of Discussion and holding of meetings at least twice a year	<p>2016 followed by holding JCC meetings in April 2017, October 2017, April 2018, October 2018, May 2019 and Oct 2019 as scheduled. In 2020, the JCC meetings scheduled for April 2020 and Oct 2020 were cancelled due to the COVID-19 pandemic. The 9th JCC meeting was held online on February 11th, 2022.</p> <p>2.1 JCC Members</p> <p>(1) Chairperson</p> <p>(2) Project Director</p> <p>(3) Project Manager</p> <p>(4) Project Co-Manager (3)</p> <p>(5) Project Members (9)</p> <p>CE(s) of MoRTH, GM(s) of NHAI, GM(s) of NHIDCL</p>	JCC meetings complete
3. Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.	<p>3. Land, buildings and facilities</p> <p>a. An independent room for JICA Long-term Expert (Highway Engineering/Coordinator) has been secured in NHAI HQ</p> <p>b. Office space for JICA Short-term Experts has been availed in Jeevan Tara Building.</p>	Completed
4. Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts	<p>4. Administrative cost and other expenses</p> <p>1) Personnel cost for counterparts and other running expenses being provided as required</p> <p>2) Domestic travel cost for counterparts being provided as required</p>	Completed
5. Pilot Project Cost, if required construction works.	<p>5. Pilot Project</p> <p>-Refer to 1-3 Achievement of Output, OVI 2-4, 3) Pilot Project</p>	Completed

1-8 Progress of Environmental and Social Considerations (if applicable)

- N/A

1-9 Progress of Considerations on Gender/Peace Building/Poverty

Reduction (if applicable)

- N/A

1-10 Other remarkable/considerable issues related/affect to the project (such as other JICA's projects, activities of counterparts, other donors, private sectors, NGOs etc.)

~~An independent office room for JICA Long-term Expert (Chief Advisor/Highway Development) has not been secured in Transport Bhawan. It is necessary for JICA and MoRTH to continue to discuss this matter.~~

- Indian side requested at least one pilot project with civil works which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since the contract period for the team does not accommodate the necessary period for the civil works.
 - Among three candidate sites proposed in December 2018, one site was selected for civil work after site visits by JICA Experts. For the selected one site for civil work, JICA Experts would give technical advice for updating DPR and guidance for construction. For remaining two sites, JICA Experts would give technical advice for updating DPR.
 - Based on the survey results available for the project, NH10 was recommended as the site for civil work. NH10 was the only site for which technical advice may be completed by the end of the project period. For DPR preparation for NH717 and NH54, JICA Experts would provide input.
 - ~~The contract period of JICA Short-term Expert Team was extended to accommodate the implementation of the civil work of NH10 as well as DPR preparation for NH717 and NH54. In addition, JICA Short-term Expert Team assigned additional experts in charge of support for supervision, Slope Protection Construction who are to work in India from October 2022. (Note: JICA Experts are unable to assume liability of design.)~~
 - ~~By mutual efforts by both Japanese and Indian sides, the pilot projects under the project were successfully completed.~~

2. Delay of Work Schedule and/or Issues (Problems) (if any)

2-1 Issues/Problems

- The declaration by the World Health Organization designating the COVID-19 outbreak as a 'Public Health Emergency of International Concern' on 30th January 2020 and a pandemic on 11th March 2020 led the Gov. of India to take countermeasures by

restricting movement within India including suspension of entry visas of some of JICA Short-term Experts. The COVID-19 pandemic lockdown by the Gov. of India was effective from 25th March 2020. Based on these situations, JICA instructed JICA Long-term Experts to return to Japan in April 2020.

- The global outbreak of COVID-19 caused the JCC meetings scheduled for April 2020 and Oct 2020 and 5th country focused training program to be canceled.
- The COVID-19 pandemic lockdown in India has delayed the progress of the Pilot Projects. A full lockdown started in March 2020 and lasted until the end of May. While some of the lockdown restrictions were lifted from June 2020, as of the end of Mar, 2021, significant restrictions still remain. Interstate travel has been considerably restricted as well and some states still require some weeks of quarantine. The lockdown and restrictions of interstate travel including weeks-long quarantine obstruct the site works by the consultants and contractor for the pilot project.

International travel restrictions were eased and JICA Experts' remobilized in India for the project in April 2021. However, travel restrictions and quarantine requirements were again required due to the fight against the Delta Variant. From September 2021, the international flights by JICA Experts were resumed.

2-2 Cause

- Global outbreak of COVID-19
- COVID-19 pandemic lockdown in India from 25th March 2020

2-3 Action taken

- Both Japanese and Indian sides as agreed to modify project activities, project duration, and additional arrangements. JICA side proposed a revised timeline for pilot projects and one-year project period extension. The project extension request was approved and the completion date was revised from March 2021 to March 2022. The 8th JCC meeting was held online on July 13th, 2021. In order to facilitate continuous communication and timely JCC meetings during the pandemic travel restriction, online communication by video conferencing was held. Following the JCC, a series of Webinars were held online. In addition, small meetings and discussions were held online as well in case COVID-19 protocol requires.

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2-4 Roles of Responsible Persons/Organization (JICA, Gov. of India)

- JICA
- Gov. of India

3. Modification of the Project Implementation Plan

3-1 PO

- PO ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.

3-2 Other modifications on detailed implementation plan (Remarks: The amendment of R/D and PDM (title of the project, duration, project site(s), target group(s), implementation structure, overall goal, project purpose, outputs, activities, and input) should be authorized by JICA HQ. If the project team deems it necessary to modify any part of R/D and PDM, the team may propose the draft.)

- PDM ver.1 was approved at 1st JCC and used as a baseline to commence monitoring.
- In view of the necessity to complete remaining projects amidst the continuing pandemic, JICA side suggested application by the Indian side of the proposed revised timeline to manage the technical transfer through the pilot projects. JICA side also suggested applying online communication tools to maintain close collaboration between the two parties
- On Feb 22nd, 2021, the amendment of the R/D was agreed by signing the M/M to reflect the extension of project duration from '5 years from arrival of experts' to '6 years from arrival of experts' as a countermeasure for the delay to project activities due to the COVID-19 pandemic.

II. Project Monitoring Sheet I & II as Attached

Project Monitoring Sheet I (Revision of Project Design Matrix)

Project Title: Capacity Development Project on Highways in Mountainous Regions
Implementing Agency: Ministry of Road Transport and Highways (MoRTH)
Target Group: Officials of MoRTH, NHAI, NHIDCL and PWD
Period of Project: Apr, 2016 – Mar, 2022 (Six (6) years)
Project Site: Whole India
Model Site:

Version: Final
 Date: February 11th, 2022

Narrative Summary		Objectively Verifiable	Means of Verification	Important Assumption	Achievement	Remarks
<p>Overall Goal Mountainous highways are properly developed and maintained by using guidelines developed by the Project</p>	<p>OG1 At least four sections of road development projects are planned/constructed/improved by using guidelines developed by the Project.</p>	<p>Detailed Project Report (DPR) / Feasibility Study Report</p>				
	<p>OG2 At least four sections of roads are conducted by using the operation and maintenance guideline developed by the Project.</p>	<p>Contract Document Completion Report by the operation and maintenance contractor</p>				
<p>Project Purpose Institutional capacity of organizations concerned for development of sustainable mountainous highways is strengthened.</p>	<p>PP1 Model activities are conducted applying the developed guidelines by the Project.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- Developed guidelines are approved by the MoRTH - Government policy to develop mountainous highways will not change. - MoRTH has enough finance to develop mountainous highways.</p>	<p>- Refer to OVI (Objectively Verifiable Indicators) 2-4, 3)Pilot Project</p>		
	<p>PP2 Core officers are able to give lectures on development of mountainous highways in the training courses.</p>	<p>Project records, Evaluation/Observation by the Japanese Experts, Interviews to supervisors</p>	<p>- The following actions were taken to enhance the knowledge of the core officers: (1) 2 Technical seminars held in India (2) 4 country focused training and 1 Invitation program held in Japan (3) 3 Technical Workshops for Bridge, Tunnel and Slope Protection Guidelines held in New Delhi (4) 2 Technical meeting for Planning & O&M Guidelines held in New Delhi (5) 1 Technical meeting for "map reading techniques" held in New Delhi</p>			

<p>Outputs Output 1: Issues on development of mountainous highways are identified and capacity of personnel for mountainous highways is developed.</p>	<p>1-1 Survey and Planning guidelines for mountainous highways is completed by June 2019.</p>	<p>Survey and planning guidelines</p>	<p><progress 100%> 1) Existing standards for mountainous highways were collected and analyzed, and issues were identified. <progress 100%> 2) Field Surveys were conducted in 10 case study sites. <progress 100%> 3) TOC for survey and planning guideline was drafted and finalized at the TG meeting on 30th January 2018, followed by approval in April 2018 JCC Meeting. <progress 100%> 4) Draft of survey and planning guideline based on review of existing standards and field surveys were completed. <progress 100%> 5) Revision and final submission were completed. Related technical meeting was held on 14th December 2019.</p>	<p>The 5th Country Focused Training planned for May/June 2020 was cancelled due to the Covid pandemic travel restrictions.</p>
<p>1-2 Enhanced level of knowledge and skills of officers in charge of planning for mountainous highways</p>	<p>Project records</p>	<p>Project records</p>	<p><progress 100%> for items 1) - 5) 1) Country focused trainings were conducted 4 times. 2) Technical Seminars were held 2 times in total. 3) Pilot Project: Refer to OVI (Objectively Verifiable Indicators) 2-4 4) Survey for disaster: Refer to OVI 2-4 5) Technical meeting for survey and planning guidelines was held on 14th December 2019. 6) Invitation Program of was held once in Japan 7) Webinars for explaining completed guidelines were held on 15th September 2021 <progress 100%> 7) Meetings for discussion of suitable contract system and management with officials MoRTHI, NHAI, NNIDCL and PWDs were conducted 8 times in total. Tender documents for EPC contract from 2 projects were collected and studied. JICA experts prepared and submitted an advisory report to Indian side on 16th Jan 2019. Recommendations for Procurement modes for Pilot Project NH10(Sikkim) were submitted to India side on 28th May 2019 by JICA Experts. Based on that recommendation, NHIDCL prepared tender documentation for NH10. The tender was floated thereafter, contractor selected and contract</p>	<p>The 5th Country Focused Training planned for May/June 2020 was cancelled due to the Covid pandemic travel restrictions.</p>

<p>Output 2: Guidelines on design and construction for mountainous highways are developed.</p>	<p>2-1 Improved tunnel guideline is completed by June 2019.</p>	<p>Improved tunnel guideline, Project records</p>	<p>- MoRTH coordinate all related government organizations and other agencies.</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for tunnel guideline was drafted and finalized at the TG meeting on 30th January 2018 <progress 100%> 3) Development of draft tunnel guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshop for tunnel guideline was held on 14th August 2019.</p>
<p>2-2 Earthwork guideline (i.e. drainage, slope protection, high embankment, etc.) is completed by June 2019.</p>	<p>Earthwork guideline, Project records</p>	<p>Earthwork guideline, Project records</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for earthwork guideline was drafted and finalized at the TG meeting on 22nd February 2018 <progress 100%> 3) Development of draft earthwork guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshop was held on 25th September 2019.</p>	
<p>2-3 High pier bridge guideline is completed by June 2019.</p>	<p>High pier bridge guideline, Project records</p>	<p>High pier bridge guideline, Project records</p>	<p><progress 100%> 1) Existing design and construction standards were collected and analyzed, and issues were identified <progress 100%> 2) TOC for high pier bridge guideline was drafted and finalized at the TG meeting on 19th December 2017 <progress 100%> 3) Development of draft high pier bridge guideline based on review of existing standards and field surveys were completed. <progress 100%> 4) Revision and final submission were completed. Related technical workshops was held on 29th July 2019.</p>	

<p>2.4 Enhanced level of knowledge and skills of officers in charge of design and construction for mountainous highways.</p>	<p>Project records</p>	<p><progress 100%> for items 1) - 5)</p> <ol style="list-style-type: none"> 1) Country focused trainings were conducted 4 times. 2) Technical Seminars were held 2 times in total. 3) Pilot Project <ol style="list-style-type: none"> a. NH22 (initially requested but cancelled) <ul style="list-style-type: none"> -Upon the request from MoRTH in the 4th JCC, field surveys for pilot project on NH22 were conducted 2 times; however, 5th JCC in Oct 2018 cancelled this pilot project site. -Field surveys: Parwanoo--Solan section of NH22 in Himachal Pradesh on 8th June and 20th June 2018 -The draft implementation plan was prepared for NH22 b. Candidate sites proposed in Nov 2018 <ul style="list-style-type: none"> -Upon discussions following 5th JCC meeting, instead of NH22, 3 new candidate sites for pilot projects were proposed on 29th Nov, 2018 and site surveys were conducted for 7 times in total. <p>-Based on survey findings, JICA Experts prepared and submitted recommendations to Indian side, including necessary surveys for design and possible measures against landslide.</p> <p>-On the 6th JCC meeting in May 2019, NH10 was selected as a pilot project site with civil work, while NH17 and NH54 were selected as the sites up to recommendation for design.</p> <p>-For NH10, topographic and drilling surveys data collected by DPR Consultant were submitted to NHIDCL and JICA experts. Based on the data, JICA Experts prepared and submitted recommendations on design of countermeasures as well as reference documents on technical specifications and typical drawing for Japanese technology. Then, NHIDCL floated a tender for the selection of a contractor to conduct the countermeasure work for landslide and issued LoA to the winning bidder. Bid evaluation was completed and NHIDCL signed the contract agreement in May, 2020. JICA Experts submitted comments on documents to NHIDCL on 22nd October, 2020. On 11th Aug. 2021, JICA Experts submitted sample Method Statements for Horizontal Drainage Borings and Cast-in-situ Concrete Crib Works, in which Japanese practice for both works is explained. The Slope Protection Construction Expert newly assigned to the project was mobilized on 4th October for the 1st technical transfer for construction of cast-in-situ concrete crib works and horizontal drainage boring. The Slope Protection Construction Expert stayed in India until 29th October both in Sikkim and Delhi. The 2nd technical transfer made by the Slope Protection Construction Expert was from 22nd November to 7th of January, in which he stayed in Sikkim around 2 weeks due to the restriction forced by COVID-19.</p>	<p>Actual implementation of the pilot projects is being hampered by the travel restrictions due to the ongoing coronavirus pandemic. The implementation period for the project has been extended by 1 year and project completion date revised to Mar 2022</p>
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-For NH54, topographic survey data collected by DPR Consultant were submitted to NHAI and JICA Experts. Based on the data, a recommendation for drilling investigation was prepared and submitted to NHAI by JICA Experts. Between 21st Jan. 2020 and 19th Mar. 2020, JICA Experts submitted three recommendations on survey method and plans. JICA Experts also delivered a lecture on map reading technique to NHAI on 25th Feb. 2020. JICA Experts submitted recommendations on slope stake monitoring on 22nd June, 2020 followed by 10 sets of comments on slope stake monitoring methods and results between 29th Jul, 2020 and 21st Dec, 2020. NHAI and the Consultant are currently implementing site survey NHAI and the Consultant completed most of the required sites for the survey to prepare technical recommendations. Based on the results, JICA Experts submitted the recommendation on 18th October. JICA Experts followed up the recommendation by explaining the details to NHAI in November and December 2021. On 25th November, JICA Experts provided a sample technical specification for drainage wells. On 09th December, JICA Experts submitted an additional recommendation on safety of construction of drainage wells. On 27th December, JICA Experts submitted additional recommendation on landslide monitoring.

-For NH717, NHIDCL floated a tender for the selection of a DPR consultant to conduct the survey and investigation and issued a LoA to the winning bidder. NHIDCL signed the contract agreement on 27th May, 2020 and on 20th July, 2020 JICA side submitted comments on the draft Inception Report and draft Quality Assurance report and on 5th Oct. 2020, NHIDCL shared the finalized Inception Report and Quality Assurance Report with JICA Experts. NHIDCL and the Consultant completed most of the required sites for the survey to prepare technical recommendations. On 30th Sep.2021, JICA Experts submitted the recommendations. JICA Experts followed up the recommendation by explaining the details to NHIDCL in November and December 2021. On 25th November, JICA Experts provided a sample technical specification for horizontal drainage boring. On 27th December, JICA Experts submitted additional recommendations on construction procedure.

4) Upon the request from MoRTH, NHAI or NHIDCL, field surveys for disaster affected site were conducted twice in total.

-Upon the request from MoRTH, near Ojiri village on NH94 (Yamunotri highway) in Uttarakhand on 15th Feb 2018

-Upon the request from NHAI, Kiratpur~Nerchowk section of NH21 in Himachal Pradesh on 1st Aug 2018

-Based on the findings from the site visits, JICA experts prepared and presented reports containing countermeasures and recommendations to the Indian side.

5) Technical Workshops for Bridge, Tunnel and Slope Protection were held on 29th July, 14th Aug and 25th Sept 2019 respectively. Technical meetings for planning and O&M were held on 14th December 2019 and on 17th September 2019, respectively.

6) 1st Invitation Program was held in Japan from 2017/11/6-2017/11/8 for 6 participants from MoRTH, NHAI and DEA

7) Webinars for explaining completed guidelines were held on;
 22nd September 2021 (Mountain Bridge)
 6th October 2021 (Slope Protection)
 22nd October 2021 (Mountain Tunnel)

8) Reference on Gravity Deformation Textbook for Map Reading was prepared by JICA Experts for further understanding on gravity deformation by Indian

<p>Output 3: Foundation for operation and maintenance for mountainous highways is built.</p>	<p>3-1 Operation and maintenance guideline for mountainous highways is completed by June 2020.</p>	<p>Operation and maintenance guideline, Project records</p>	<p><progress 100%> 1) Existing O&M guidelines for mountainous highways were collected and analyzed, and issues were identified <progress 100%> 2) TOC for O&M guidelines was drafted and finalized at the TG meeting on 19th December 2017 <progress 100%> 3) Development of O&M guideline based on review of existing standards and field surveys were complete. <progress 100%> 4) Revision and final submission were completed. O&M workshops were held under each related guideline. Technical meeting for O&M was held on 17th September 2019.</p>	<p>The 5th Country Focused Training planned for May/June 2020 was cancelled due to the Covid pandemic travel restrictions.</p>
<p>3-2 Enhanced level of knowledge and skills of officers in charge of operation and maintenance for mountainous highways.</p>	<p>Project records</p>	<p>Project records</p>	<p><progress 100%> for items 1) - 5) 1) Country focused trainings were conducted 4 times. 2) Technical Seminars were held 2 times in total 3) Pilot Project: Refer to OVI 2-4 4) Surveys for disaster: Refer to OVI 2-4 5) O&M workshops were included under each related guidelines for bridge, tunnel and slope protection works. Technical meeting for O&M was held on 17th September 2019. 6) Invitation Program of was held once in Japan 7) Webinar for explaining completed guidelines was held on 29th September 2021</p>	<p>The 5th Country Focused Training planned for May/June 2020 was cancelled due to the Covid pandemic travel restrictions.</p>

Activities	The Japanese Side	Inputs	Important Assumption
<p>1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster sites upon requests.</p> <p>1.2 Conduct field surveys to the typical mountainous highways.</p> <p>1.3 Improve survey and planning guidelines on mountainous highways.</p> <p>1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.</p> <p>1.5 Conduct model activities such as seminars and trainings, including in collaboration with Indian Academy for Highway Engineer (IAHE)**.</p> <p>2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.</p> <p>2.2 Improve a tunnel guideline.</p> <p>2.3 Develop an earthwork guideline (i.e. drainage, slope protection, high embankment, etc.).</p> <p>2.4 Develop a high pier bridge guideline.</p> <p>3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.</p> <p>3.2 Develop an operation and maintenance guideline for mountainous highways including issues on disaster management.</p>	<p>The Japanese Side</p> <p>(1) Dispatch of Japanese Experts: <Long-term Experts> - Chief Advisor/Highway Development - Highway Engineering/Coordinator</p> <p><Short-term Experts/Consultants> - Team Leader/Slope Protection I - Deputy Team Leader/Slope Protection II - Mountain Tunnel - Tunnel Facilities - Slope Protection II/High Embankment - Earthwork - Mountain Bridge - Facility of Mountain Roads - Maintenance & Operation of Mountain Roads - Natural Condition (Topography/Geology) - Drainage Plan - Plan and Survey of Mountain Roads/Coordinator - Monitoring and Evaluation - Highway Engineering for Mountain Road - Slope Countermeasure Construction</p> <p>(2) Training for Counterparts (in Japan) (Once a year, about 10 people for 2 weeks)</p> <p>(3) Provision of the equipment and/or Material, as necessary.</p> <p>(4) Local cost for the Project activities - Office management cost - Local consultants - Other Local cost as necessary</p>	<p>The Indian Side</p> <p>(1) Allocation of Counterparts - Chairperson - Project Director - Project Manager - Project Co-Manager - Project Members - Participants for Training in Japan</p> <p>(2) Facilities Office spaces and facilities necessary for the Project implementation in MoRTH and NHAI respectively.</p> <p>(3) Administrative cost and other expenses 1) Personnel cost for counterparts and other running expenses 2) Domestic travel cost for counterparts</p> <p>(4) Pilot Project Cost, if required construction works.</p>	<p>Majority of trained officials continues to work for counterpart agencies.</p> <p>Budgetary and human resources necessary for the Project are continuously allocated by the Government of India.</p> <p>Pre-Conditions</p> <p>Counterparts from the relevant organizations are assigned immediately after the Project starts.</p> <p><Issues and countermeasures> At independent room for JICA Long-term Expert (Chief Advisor) has not yet been secured in Transport Bhawan, therefore, JICA and MoRTH need to continue to discuss.</p> <p>Indian side requested at least one pilot project with civil work which may facilitate acceptance of the guidelines by MoRTH. In the original project scheme, the team of JICA Short-term Experts does not have resources to give advice on the implementation of civil work since their contract period for the team does not accommodate the necessary period for the civil works.</p> <p>The progress of the Pilot Project was delayed due to COVID-19 pandemic lockdown. Both Japanese and Indian sides will faithfully discuss to arrive at a mutually agreeable solution by such as modifying project activities, project duration, and/or incorporating additional arrangements.</p>

Project Monitoring Sheet II (Revision of Plan of Operation)

Version: Final
Date: February 11th, 2022

Project Title: Capacity Development Project on Highways in Mountainous Regions		FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			Remarks	Issue	Solution	
		Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual				
Inputs from JICA	Expert																						
	Chief Advisor / Highway Development Highway Engineering / Coordinator																						
Team Leader/Slope Protection III	Plan																						
	Actual																						
Deputy Team Leader/Slope Protection III	Plan																						
	Actual																						
Mountain Tunnel	Plan																						
	Actual																						
Slope Protection II/High Embankment	Plan																						
	Actual																						
Mountain Bridge	Plan																						
	Actual																						
Facility of Mountain Roads	Plan																						
	Actual																						
Maintenance & Operation of Mountain Roads	Plan																						
	Actual																						
Natural Condition (Topography/Geology)	Plan																						
	Actual																						
Drainage Plan	Plan																						
	Actual																						
Plan and Survey of Mountain Roads/Coordinator	Plan																						
	Actual																						
Monitoring and Evaluation	Plan																						
	Actual																						
Highway Engineering for Mountain Road	Plan																						
	Actual																						
Slope Countermeasure Construction	Plan																						
	Actual																						
Equipment	Plan																						
	Actual																						
Training in Japan	Plan																						
	Actual																						
Counterpart Training in Japan	Plan																						
	Actual																						
In-country/Third country Training	Plan																						
	Actual																						
Inputs from India	Plan																						
	Actual																						
Expert	Plan																						
	Actual																						
Chairperson	Plan																						
	Actual																						
Project Director	Plan																						
	Actual																						
Project Manager	Plan																						
	Actual																						
Project Co-Manager	Plan																						
	Actual																						
Project Co-Manager	Plan																						
	Actual																						
Project Co-Manager	Plan																						
	Actual																						
Counterparts (9)	Plan																						
	Actual																						
Equipment	Plan																						
	Actual																						

Activities Sub-Activities	2016		2017		2018		2019		2020		2021		Responsible Organization	Achievements	Issue & Countermeasure	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual				
	I	II	III	IV	I	II	III	IV	I	II	III	IV				I
Output 1: Issues on mountainous highways are identified and capacity of personnel for mountainous highways is developed																
1.1 Collect and analyze existing information on mountainous highways, and identify issues on development of mountainous highways, including identification of appropriate solutions for disaster relief upon requests.																
1.2 Conduct field surveys to the typical mountainous highways.	Plan													Information collected and analyzed (100%)		
	Actual													Field surveys completed in 10 case study sites. 4 additional surveys conducted upon MoRTH request (100%)		
1.3 Improve survey and planning guidelines on mountainous highways.	Plan													100% progress		
	Actual													100% progress		
1.4 Examine suitable contract system and management on mountainous highways after reviewing existing issues.	Plan													100% progress		
	Actual													100% progress		
1.5 Conduct model activities such as seminars and trainings in collaboration with Indian Academy for Highway Engineer (IAHE)*	Plan													100% progress		
	Actual													100% progress		
Output 2: Guidelines on design and construction for mountainous highways are developed.																
2.1 Collect and analyze existing design and construction standards for mountainous highways, and identify issues.																
2.2 Improve tunnel guidelines.	Plan													100% progress		
	Actual													100% progress		
2.3 Develop earthwork guidelines (i.e. drainage, slope protection, high embankment, etc.).	Plan													100% progress		
	Actual													100% progress		
2.4 Develop high pier bridge guidelines.	Plan													100% progress		
	Actual													100% progress		
Output 3: Guideline on operation and maintenance for mountainous highways is developed.																
3.1 Collect and analyze existing operation and maintenance guidelines for mountainous highways, and identify issues.																
3.2 Develop operation and maintenance guidelines for mountainous highways including issues on disaster management.	Plan													100% progress		
	Actual													100% progress		
Duration / Phasing																
Monitoring Plan																
Monitoring																
Joint Coordination Committee	Plan															
	Actual															
Set-up the Detailed Plan of Operation	Plan															
	Actual															
Submission of Monitoring Sheet	Plan															
	Actual															
Reports/Documents																
Project Completion Report	Plan															
	Actual															
Public Relations																
Setting up & Updating Project Facebook Page	Plan															
	Actual															
Published article on Project Activities in MoRTH Annual Report	Plan															
	Actual															
Remarks																
ICC meeting in 2020 was not held due to COVID-19 pandemic																
This 2 ICC meetings in 2021-17 and 2022 were held on Zoom																
Set up and Updated more than 43 times																
Issue																
Solution																

Appendix 6

Attendee Lists of the Webinar in 2021

Webinar Attendee List_20210915

Topic - Planning on Hill Road

S.No.	Name/Position
1	Mr. Samiran Saha, SE MoRTH, Kolkata
2	Md. Abdul Rahman
3	Mr. Rakesh Kumar, SE MoRTH, Delhi
4	Mr. Nishijima (OC)
5	Mr. S S Joshi
6	Mr. Amit Kumar Ghosh
7	Project Director, PIU, Poanta Sahib
8	Mr. Vipin Kumar, MoRTH, Delhi
9	Mr. Pooran Singh, SE MoRTH, NER...
10	Sahina Khan
11	Mr. Ankit Kucchal
12	SO, Bagrakot
13	Syed Abdullah Mujeeb
14	Cleoptra (OCG)
15	Mr. Vishal Bajro
16	Ms. Kusum Ghangas
17	Mr. Bharat Joiya
18	Mr. Shankup Phom, EE
19	Mr. Himanshu Pandey
20	CC Sikkim
21	O/o RO, MoRTH
22	Mr. Ashok Rolaniya
23	Mr. Sanjeev
24	Mr. Yamada, Nexco East
25	PIU, Hamirpur
26	Mr. Rajesh Kumar
27	Nakano san (OCG)
28	Mr. Kapil Singh
29	Mr. Rakesh
30	Mr. Sumit Saurav
31	Mr. HS Linge Gowda
32	Mr. Tanaka
33	Mr. Umesh Katara

Webinar Attendee List_20210915

Topic - Planning on Hill Road

- 34 Mr. Kuldeep Sundli
- 35 Mr. Amarendra
- 36 Mr. Vikas Kirar
- 37 Mr. Ashish Gupta
- 38 Mr. Pradeep Singh
- 39 Mr. Abhay K
- 40 Mr. Rohit
- 41 Er. T Nungsangtemjen
- 42 GM, PMU, Kalimpong
- 43 PD, PIU
- 44 Mr. Rananjay Singh
- 45 Mr. Rahul Gupta
- 46 Er. Kenei
- 47 Mr. Sanjay Garg, CE
- 48 Mr. Pushpendra Kumar, NH05
- 49 MD Patil
- 50 Mr. RK Yadav
- 51 Ms. Nidhi
- 52 Vekhochiyi Rhakho
- 53 Mr. Devansh Nawal, PD, PIU Beawar
- 54 Mr. Naoki ISHIKAWA
- 55 Mr. Anurag Gupta
- 56 Mr. Govindh K
- 57 Mr. Anshul Sharma
- 58 MS Chaithanya
- 59 Mr. Lalit Pratap
- 60 Mr. SK Nirmal, ADG (RD), MoRTH
- 61 PIU, Poanta Sahib
- 62 Kiran G
- 63 Mr. Adarsh, CPWD
- 64 IK Pandey, DG (RD) & SS, MoRTH
- 65 KC Gupta, Additional Secretary, MoRTH

Webinar Attendee List_20210922

Topic - Mountain Bridge

S.No.	Name/Position
1	Nakano san (OCG)
2	AEE PIU PAONTA
3	AEE, RO Kerala
4	Mr. Ankit Kuchhal
5	Mr. Bharat Joiya
6	Chief Engineer (NH) HPPWD, Shimla
7	Cleopatra (OCG)
8	EE NH Rampur
	Er. Anil Sharma Executive Engineer, NH Division,
9	HPPWD Nahan
10	Ishikawa san, NEXCO East
11	Mr. Kulbir EE NH Solan
12	Marikannan
13	NHAI
14	NHAI Amritsar
15	NHAI Tirupati
16	O/o RO MoRTH Shimla
17	PD, NHAI, Khammam
18	PIU, Paonta Sahib
19	PIU, Dhule
20	Mr. Pooran Singh SE
21	Mr. Pradeep Singh (AEE, PIU, Visakhapatnam)
22	Mr. Prithi Pal (iPhone)
23	Mr. Rajeev Sharma
24	Mr. Rakesh Kumar, MoRTH
25	Ms. Renuka
26	RO, Hyderabad
27	RO, MoRTH, Guwahati
28	Mr. S. K. Nirmal, ADG, MoRTH
29	Mr. Sanjeev, Director, IAHE
30	Mr. Santosh Prakash
31	Mr. Saurabh Singh
32	Mr. Sumit, RO DDN
33	Mr. Vikas Kirar

Webinar Attendee List_20210922

Topic - Mountain Bridge

34 Mr. Vikram

35 Mr. Vipin Kumar, MoRTH

Webinar Attendee List_20210929

Topic - Operation and Maintenance of Hill Road

S.No.	Name/Position
1	Mr. Ishikawa, NEXCO East
2	AEE
3	AEE RO DDN
4	Mr. Alok Deepankar, RO, Jaipur MoRTH
5	Mr. Arun Patil
6	Mr. B.K.Sinha
7	Mr. Bharat Joiya
8	Chief Engineer (NH) Karnataka
9	Cleo (OCG)
10	EE NH Shivamoga
11	EE NHD Mangalore
12	Eenhassan
13	m-tanaka san
14	NH Dn Hubli
15	O/o RO MoRTH Shimla
16	PIU Hamirpur
17	PIU Hamirpur MoRTH
18	PIU Paonta Sahib
19	Mr. Pradeep Singh (AEE, PIU Visakhapatnam
20	Mr. Pushpendra Kumar, NH05, Solan
21	Mr. Radhe
22	Mr. Ravishek PD Visakhapatnam MoRTH
23	Mr. Samiran Saha SE, MoRTH, Kolkata
24	Mr. Sanjeev
25	Mr. Saurabh Singh
26	Mr. Shiju
27	Mr. Sunil Kumar
28	Mr. Sushil Thakur
29	Mr. Vasant Naik
30	Mr. Vijaya Kumar Sirivella
31	Mr. Vikas Kirar
32	Mr. Vipin Kumar, MoRTH
33	Mr. Vishnu AEE
34	EE NH Karwar
35	SE, NHC, BNG

Webinar Attendee List_20211006

Topic - Slope Protection

S.No.	Name/Position
1	AEE PIU PAONTA
2	AEE RO DDN
3	Mr. Amarendra
4	Mr. Amarendra Kumar
5	Mr. Ankit Kucchal
6	Mr. Ankur Mani Tripathi
7	Mr. Arun Pathania
8	Mr. Ashish Gupta
9	Mr. Bharat Joiya
10	CE NH Shimla
11	Mr. Devansh Nuwal, PD PIU Beawar
12	EE NH Rampur
13	Executive Engineer, MoRTH
14	GM, PMU, Kalimpong
15	Ishikawa NEXCO
16	Mr. Kulbir EE NH Solan
17	LNM Paonta
18	Mr. Mayur Shindekar
19	m-tanaka
20	Ms. Nidhi
21	O/o RO MoRTH Shimla
22	PD PIU Araku
23	PIU Beawar
24	PIU Hamirpur
25	PIU Hamirpur MoRTH
26	PIU Paonta Sahib
27	Mr. Pooran Singh SE
28	Mr. Pramod Kashyap
29	Mr. Prithi Pal
30	Mr. Rakesh Kumar, MoRTH
31	Mr. Ravishek (PD Visakhapatnam, MoRTH)
32	RO Chennai
33	RO MoRTH Shimla
34	RO MoRTH Guwahati
35	Mr. Samiran Saha SE, MoRTH, Kolkata

Webinar Attendee List_20211006

Topic - Slope Protection

- 36 Mr. Sandip Saha
- 37 SE NH
- 38 Mr. Shiju
- 39 Mr. Sushil Thakur
- 40 Takayuki Mayumi
- 41 Mr. Vikas Kirar
- 42 Mr. Vishal Chopra
- 43 Mr. Vishawjeet Sharma
- 44 Yamada, Nexco East

Webinar Attendee List_20211021

Topic - Tunnel on Arterial Roads

S.No.	Name/Position
1	Mr. Denichiro Yamada
2	Mr. Rajesh Kumar Bhatt
3	Mr. Amarendra
4	Mr. Anurag
5	Mr. Bharat Joiya
6	Mr. Chandra Bhushanb
7	Executive Engineer, MoRTH
8	GM Lunglei
9	HP
10	Mr. Narender Kumar
11	NEXCO EAST
12	Mr. Pankaj Rahi
13	PIU Beawar
14	PIU Hamirpur
15	PIU Paonta Sahib
16	Mr. Pradeep Gusain
17	Mr. Pradeep Singh (AEE, PIU, Visakhapatnam
18	Mr. Praveen
19	Mr. Pravin Bijewar
20	Mr. Purshotam Kumar
21	Mr. Radhe
22	Mr. Rakesh
23	Mr. Rakesh Kumar, MoRTH
24	Mr. Ramshid Padusha NT
25	RJ36
26	RO, MoRTH, Guwahati
27	Sapana Mothiya AEE, MoRTH, RO, Kolkata
28	Mr. Satyabhan Singh
29	Mr. Vikas Kirar
30	Mr. Navin Kumar
31	NEXCO EAST - Overseas Business Division

Webinar Attendee List_20211027

Topic - Construction of Slope Protection

S.No.	Name/Position
1	Mr. Tanaka
2	Mr. AK Shrivastava, GM(P), PMU, Seling
3	Mr. Bharat Joiya
4	Mr. CK Sinha, RO, Uttrakhand
5	GM(P), Lunglei
6	Mr. Gonai
7	Mr. Kapil Singh
8	Mr. Krishna
9	Mr. Naresh Kumar Chopra
10	Mr. Yamada
11	Ms. Nidhi
12	O/o RO MoRTH Shimla
13	PIU Beawar
14	PIU Hamirpur
15	PIU Shahjahanpur
16	PIU Visakhapatnam AEE
17	PIU Paonta
18	Mr. Praveen
19	Mr. Pushpendra Kumar, Geologist, NH 05, Solan
20	Mr. Rahul
21	Mr. Rakesh Kumar, MoRTH
22	Mr. Ravishek (PD Visakhapatnam, MoRTH
23	RJ36
24	RO MoRTH Guwahati
25	Mr. Saurabh Singh
26	Mr. Takayuki Mayumi
27	Mr. VS Khaira, CE, MoRTH, Dehradun
28	Mr. Vikar Kirar
29	Mr. Vipin Kumar, MoRTH
30	AEE, RO, Kolkata
31	Mr. Alok Sharan
32	NHAI, RO - Shimla
33	Mr. Ruchir Agarwal
34	AEE, RO, DDN
35	Watanabe san