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Reporting on Economy, Efficiency & Effectiveness in the use of Public Resources

AIN: 15955

AUDIT REPORT
OF
“NORTHERN EAST-WEST HIGHWAY PROJECT”
IMPLEMENTED BY
REGIONAL OFFICE, LINGMETHANG, DEPARTMENT OF ROADS,
MINISTRY OF WORKS AND HUMAN SETTLEMENT

PERIOD: INCEPTION TO 30 JUNE 2017

MAY 2019

*Every individual must strive to be principled. And individuals in positions of responsibility must even strive harder’
- His Majesty the King Jigme Khesar Namgyel Wangchuck*

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རྒྱལ་ཁུངས་ཚུལ་ཞིབ་དབང་འཛིན།

ROYAL AUDIT AUTHORITY

Bhutan Integrity House

Reporting on Economy, Efficiency & Effectiveness in the use of Public Resources



RAA/AR/ DSA-SCID/RO-L/thang/2019/1387

Dated: 29th May 2019

The Hon'ble Minister,
Ministry of Works and Human Settlement
Thimphu.

Subject: Audit Report of “Northern East west Highway Project” of Regional Office, Lingmethang for the period from inception to 30.6.2017

Your Excellency,

Enclosed herewith please find the audit report in respect of Northern East West Highway Project implemented by the Regional Office, Lingmethang, covering periods from inception to 30.06.2017 along with the *Audit Findings & Recommendations* on the accounts and operations, internal controls, and contract managements. The RAA has conducted audit as required under the Audit Act of Bhutan 2018.

Audit Findings and Recommendations

The auditor's review of the operations, accounting records, internal controls and contract managements of the East West Up-gradation Project revealed deficiencies and lapses of significant nature involving improper planning and preparation of estimates and BOQs, inappropriate tender evaluations, claims of inflated quantities through RA bills, acceptance of substandard and defective works, excess and inadmissible payments. The lapses also involved violations and non-enforcement of provisions of technical specifications and contract agreements, decisions of coordination meetings and government directives, provisions of PRR 2009 as well awards of substantial value of additional works despite slow progress of works that were detrimental to the economic, efficient and effective contract management and uses of public funds.

The audit findings along with recommendations is provided in detail in the main report. **Part A** contains General observations with and without the accountability; **Part B** contains specific observations pertaining to contract packages with accountability and **Part C** with specific observations without accountability but requiring remedial actions to prevent occurrence of similar deficiencies and lapses for similar project in future.

The audit findings under **Part A** of the report contains those issues, which are recommendatory in nature and intended to bring improved compliances through appropriate interventions and as such no accountability has been fixed for the findings as decided in the Audit Exit Meeting. However, in the event the DOR and the Ministry do not take measures and actions on the recommendations within appropriate time period from the date of the issue of the report, the RAA would fix the accountability for appropriate action

Some of the findings of significant nature involving wasteful expenditures are briefly mentioned below for kind reference and appropriate action:

1. Adhoc Change of design/drawings and increase of 1m width carriageway after awards of contracts resulted in extra financial burden to the Government Exchequer with financial implication of Nu. 73.860 million (**Refer Para No. 2.1**).
2. The enhancement of the rate for formation cutting works by 15% for requiring execution of works at night to accommodate traffic had tantamount to violation of provisions of technical specification and double payment as well as resulted into wasteful payment Nu. 8.546 million (**Refer Para No.2.2**).
3. Inconsistency in the fixation of construction durations for contract packages having same design and scope of construction works within the Regional Office indicated absence of standard procedures and processes for the fixation of contract durations resulted into abnormal time overruns (**Refer Para No.2.7**).
4. Adoption of varying practices of rate analysis by contractors and wrong application of coefficient for 80mm, instead of 75mm design thickness of DBM and for 50mm thick Asphalt resulted wasteful payment of Nu. 10.985 million (**Refer Para No.2.9**).
5. Flawed rate analysis through incorporation of transportation cost of bitumen as percentage to the overall derived cost of the item of work by the winning bidders and failure to take cognizance by the evaluation committee resulted into wasteful payment of Nu. 2.960 million (**Refer Para No.2.10**).
6. Award of three work packages in violation to the Ngalam Resolution of 23 December 2014 and subsequent Project Management Team decision taken on 12 January 2015 have resulted into abnormal delays and time overruns of the project (**Refer Para No. 2.11**).
7. Flaws in the allowable wastage of 5% on the bitumen consumption fixed for manual executions despite mechanized execution of works (**Refer Para No.2.18**).
8. Excessive engagement and payment of hired charges of machineries not complying with coefficient specified in LMC for departmentally executed formation cutting works Nu. 24.055 million resulted into wasteful payments (**Refer Para No.2.19**).
9. Non-insurance for cost of bitumen issued to contractors Nu. 412.055 million (**Refer Para No. 2.20**).
10. Non-stacking/recording of excavated rock materials from rock cutting works and non-recovery of cost from the contractors with resultant financial loss Nu. 94.444 million (**Refer Para No. 2.21**).
11. Non-maintenance of 1.5m/1m width shoulder at Valley as per drawings and technical specifications and non-adjustment of cost to the extent of shoulder width not maintained resulted into payments for works not executed (**Refer Para No.2.24**).
12. Over/excess payments due to wrong measurements and improper verification of RA bills indicating absence of proper measurement system and certification of RA Bills prior to settlement of RA bills.
13. Acceptance of defective and substandard works indicating poor supervisions and monitoring by the site engineers and RO.

The RAA has reviewed the replies furnished by the RO, Lingmethang, DOR and the Ministry and incorporated in the report. Some of the audit findings were resolved in view of reply and related supporting documents and evidences furnished subsequently. The Ministry, DOR and the RO, Lingmethang have fixed the accountability for the observations incorporated in this report.

In view of significant of the audit findings, the Ministry and the DOR is requested to further review the whole process followed in the preparation of drawings, estimates, BOQS, tendering and evaluation processes, changes of drawings in deviations to standards and soon after awards of contracts, executions of substandard infrastructures works, awarding of foreseeable permanent works as additional works.

The Ministry is requested to review the deficiencies and lapses pointed out and institute appropriate check and balance systems to curb such lapses in future. The Royal Audit Authority would appreciate receiving an Action Taken Report (ATR) **within three months** from the date of issuance of this report.

The Royal Audit Authority acknowledges the kind co-operation and assistance extended to the audit team by the officials of the RO, Lingmethang, DOR and the Ministry, which facilitated smooth completion of the audit.

Yours sincerely,



(Tshering Kezang)
Auditor General

Copy to:

1. The Secretary, Ministry of Finance, Tashichho-Dzong, Thimphu for kind information and necessary action
2. The Secretary, Ministry of Works and Human Settlement, Thimphu for kind information and necessary action
3. The Director, Department of Roads, MoWHS, Thimphu kind information and necessary action
4. The Director, Directorate of Finance Service, MoWHS, Thimphu kind information and necessary action
5. The Chief Engineer, Regional Office, Lingmethang for necessary action
6. The AAG, PPAARD, Royal Audit Authority, Thimphu
7. The AAG, Follow-Up & Clearance Division, Royal Audit Authority, Thimphu

'Every individual must strive to be principled. And individuals in positions of responsibility must even strive harder.'
- His Majesty The King Jigme Khesar Namgyel Wangchuck

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TITLE SHEET

1	Title	:	Audit Report of “Northern EastWest Highway Project”, RO, Lingmethang
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3	Drawing and Disbursing Officer	:	1. Karma Rinzin, Chief Engineer, EID:8909095 2. Nado Dukpa, Account Asstt.III, EID:9709042
4	Finance Personnel	:	1. Nado Dukpa, Account Asstt.III, EID:9709042 2. KInzang Dema, Account Asstt IV, EID No. 9604088
5	Period Audited	:	From Inception to 30 June 2017
6	Schedule of Audit	:	Planning : 01.08.2017 to 31.08.2017 Actual : 03.10.2017 to 30.11.2017 Reporting :
7 7	Composition of teams	:	<u>Team Leader:</u> Karma Wangchuk, Dy. Chief Auditor (EID No. 9209042) <u>Team Member:</u> 1.Tashi, Audit Officer (EID No. 20130101110) 2. Jamtsho, Audit Officer (EID No.20170107993) 3. Wangchuk T, Senior Auditor (EID No.9610090)
8	Supervising Officer	:	Tempa Gyeltshen, Assistant Auditor General, EID No.7701018
9	Overall Supervising Officer	:	P. M. Pradhan, Joint Auditor General, DSA (EID No. 8304036), B.B. Chhetri,Audit Specialist
10	Engagement Letter No	:	AA/DSA-SCID/MoWHS/int-01/17-18/2203 dated 08/08/2017
11	Focal Person	:	Jamtsho
12	Date of Exit Conference	:	3.4.2019 & 4.1.2019



Disclaimer Note

The coverage of this report is based on the facts, figures and information made available and accessible to the audit team by the **RO, Lingmethang**. The opinion of the auditors shall confine to the period covered and information made available till the time of issue of this report.

This is also to certify that the auditors during the audit had neither yielded to pressure, nor dispensed any favour or resorted to any unethical means that would be considered as violation of the Royal Audit Authority's Oath of Good Conduct, Ethics and Secrecy of Auditors.

Glossary of Abbreviations & Acronyms

AAG	: Assistant Auditor General
AC	: Asphalt Concrete
AE	: Assistant Engineer
AFD	: Administration & Finance Division
AIN	: Audit Information Number
AR	: Audit Report
ARA	: Audit Recoveries Account
ATR	: Action Taken Report
BSR	: Bhutan Schedule of Rates
BOQ	: Bills of Quantity
CDB	: Construction Development Board
CE	: Chief Engineer
DBM	: Dense Bitumen Macadam
DS	: Directorate Services
DES	: Department of Engineering Services
DHS	: Department of Human Settlement
DSA	: Department of Sectorial Audit
DOR	: Department of Roads
EID	: Employee Identification Number
FUCD	: Followup & Clearance Division
GCC	: General Condition of Contract
GSB	: Granular sub base
HR	: Human Resource
ITB	: Instruction to Bidder
JE	: Junior Engineer
LTD	: Limited
MoF	: Ministry of Finance
Pvt	: Private
PP&AARD	: Policy Planning & Annual Audit Report Division
RAA	: Royal Audit Authority
RO	: Regional Office
RRM	: Rubble Ransom Masonry
SCID	: Social, Communication & Information Division
SCC	: Special Condition of Contract
TS	: Technical Specification
WMM	: Wet Mix Macadam

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PART A: GENERAL AUDIT FINDINGS

Report on the Audit of Up-gradation Project Northern East-West Highway implemented by the Ministry of Works & Human Settlement

1. Introduction

The Up-Gradation Project Northern East West Highway is the most important road construction activity undertaken during the 11th five year plan period both in terms of financial outlay and scope of works. Considering its significance and nature of risks involved in such a large project, the Royal Audit Authority conducted the Audit of the Up-Gradation Project - Northern East West Highway covering the period inception (end of 2014) to 30th June 2017.

- 1.1 The audit was primarily directed towards ascertaining whether the implementation of the project complied with Procurement Rules and Regulations, Financial Rules and Regulations and approved Design Standard envisaged in the Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009.
- 1.2 The up-gradation project was proposed under the Project Tied Assistance (PTA) and tabled for discussion during the 3rd Plan Talk held with the Government of India in Thimphu on September 11, 2014.
- 1.3 The Government of India concurred to finance the up-gradation from Semtokha to Trashigang with the total budget of Nu 4,636.646 in the 11th Five Year Plan period although the total estimated cost is Nu. 7,284.211 million.
- 1.4 During the discussion it was agreed that Project DANTAK to carry out the up-gradation works of 52 km from Trashigang to Yadi. The survey and design for the up-gradation works to be provided by the Ministry of Works & Human Settlement.
- 1.5 The Department of Roads, Ministry of Works and Human Settlement is mandated to implement the project within 3 years of time period starting 1st January 2015.
- 1.6 The composition of the Project Management Team (PMT) were as follows:
 - Hon'ble Secretary, MoWHS (Chairman)
 - Director, DoR
 - Chief Engineer, Construction Division
 - Chief Engineer, Design Division
 - Project Coordinator, GoI Projects
- 1.7 The composition of the Technical Management Team (TMT) were as follows:
 - Kunzang Wangdi, Specialist, DoR
 - C.K. Pradhan, PE, Const. Division, DoR

Karma Tenzin, EE, Design Division
 Tempa Thinley, Geotech Unit, Design Division, DoR

1.8 The composition of the Ministerial Level Tender Committee were as follows:

- Phuntsho Wangdi, Secretary (Chairman)
- Dhak Tshering, Director, Secretariat
- Karma Galay, Director, DOR
- Tenzin, Director, DES
- Karma Sonam, Director, DHS
- Karma Ugyen, Dy. Chief Accounts Officer
- Lungten Jamtsho, CE, Construction Division
- Ugyen Dorji, EE, Construction Division

1.9 The up-gradation of Northern East West Highway (NEWH) works started towards the end of 2014.

1.10 The rationale and benefit of the project are as follows:

- Shortening travel time between Thimphu and Trashigang
- Enhance the socio-economic wellbeing of the people of Bhutan
- Facilitates timely transportation of heavy electro-mechanical equipment for Hydro- Electric projects
- Serve smooth and convenient access for tourist, VVIPs and to the road users

1.11 The Projects were implemented by the Four Regional Offices of DOR and Project DANTAK as tabulated below:

Table 1.11: Project implementing Agency			
Regional Office	Scope of work distance in Km	Locations	Total Estimates in million
Thimphu and Lobeyasa	65	Semtokha-Wangdue	764.217
Lobeyasa	82	Wangdue-Chuserbu	1,156.061
Trongsa	100	Chuserbu-Trongsa-Nangar	2,454.575
Lingmethang	39	Yadi-Lingmithang	1,763.745
Project DANTAK	52	T/gang –Yadi	1,145.613
Total			7,284.211

1.12 As of 30 June 2017, GOI releases amounted to **Nu. 3,605.21 million** against committed fund of **Nu. 4,636.646 million** and expenditures amounted to **Nu. 4,293.12 million** exceeding the releases by **Nu.687.91 million**.

Table 1.12: GOI Releases and Expenditure				
Regional Office	Scope of work distance in Km	Locations	GOI release Nu. in million	Total Estimates in million
Thimphu and Lobeyasa	65	Semtokha-Wangdue	1,197.50	1,166.31
Lobeyasa	82	Wangdue-Chuserbu	693.64	1,031.74

Trongsa	100	Chuserbu-Trongsa-Nangar	643.64	882.31
Lingmethang	39	Yadi-Lingmithang	383.06	525.39
Project DANTAK	52	T/gang –Yadi	687.37	687.37
Total			3,605.21	4,293.12

1.13 The status of work progress as of 15th November 2018 were as highlighted below:

Regional Office	Scope of work distance in Km	Locations	Overall progress	
Thimphu & Lobeysa	65	Semtokha-Wangdue	-	All 7 Contract Packages Completed
Lobeysa	82	Wangdue-Chuserbu	2 Contract Packages On-going	12 Contract Packages completed
Trongsa	100	Chuserbu-Trongsa-Nangar	11 Contract Packages still On-going	Only 3 Contract Packages completed
Lingmethang	39	Yadi-Lingmithang	All 7 Contract Packages On-going	1 Packages yet to be retendered out
Total				

The status of work progress as of 20th April 2019 were as highlighted below:

Regional Office	Length Km	No. of Contract Packages	Locations	Overall progress	Status as of 20 th April 2019
Thimphu & Lobeysa	65	7	Semtokha-Wangdue	Nil	All 7 Contract Packages Completed
Lobeysa	82	14	Wangdue-Chuserbu	2 Contract Packages On-going	12 Contract Packages completed
Trongsa	100	14	Chuserbu-Trongsa-Nangar	4 Contract Packages still On-going including 1 Contract Package terminated	Only 10 Contract Packages completed
Lingmethang	39	7	Yadi-Lingmithang	2 Contract Packages terminated and On-going 1 Package executed Departmentally	5 Packages completed

1.14 Time overruns as from the initial contract periods, revised completion time and time lapsed from the revised time periods for completed contract packages:

Name of Contractors	Time to complete the road Packages						Remarks
	Planned months	Actual months	Time overruns in months	% Time overruns	No. of revisions		
RO, Thimphu							
M/s. Raven Builders & Company (P) LTD	Simtokha-Dochula Package 1	15	33	18	120	2	

M/s Yangkhil Construction Pvt Ltd	Simtokha-Dochula& Olakha Package 2	15	22	7	47	2	
RO, Lobeysa							
M/s Chogyal Construction Pvt. Ltd.	Dochula-Lampari Package 1	15	14.9	(0.1)	-	-	
M/s Chogyal Construction Pvt. Ltd.	Lampari-Menchuna Package 2	15	16.9	1.9	13	-	
M/s Chogyal Construction Pvt. Ltd.	Menchuna-Chasagang Package 3	15	16.8	1.8	12	-	
M/s Singye Construction Pvt. Ltd	Chasagang-Langkena Package 4	15	29.2	14.2	71	-	
M/s Etho Metho Construction Pvt. Ltd.	Langkena-Tekizam Package 5	20	34.5	14.5	72.5	2	
M/s Tshering Tobgyel Construction Pvt. Ltd. Wangdue	Tekizampa-Khelekha Package 6	25	32.5	17.5	70	2	
M/s Loden Construction Pvt. Ltd, Thimphu	Khelekha-Rachau Package 7	20	32.4	12.4	62	2	
M/s Welfare Construction, Pvt. Ltd, Thimphu	Bumilo-Rukubji Package 9	25	30.4	5.4	22	2	
M/s Rigsar Const. Pvt .Ltd	Rukubji-Chuserbu Package 10	24	39.7	15.7	65	2	
M/s Hi Tech Company Pvt. Ltd, Punakha	Pelela-Dungdungnyelsa Package 11	25	34.8	9.8	39	2	
M/s Tagsingchungd ruk Construction Pvt. Ltd, Thimphu	Wangdue-Langkena Package 12	11	14.9	3.9	36	1	
M/s Empire Construction Pvt. Ltd, Punakha	Nobding-Dungdungnyelsa	10	23.2	13.2	132	1	
M/s Empire Construction Pvt. Ltd, Punakha	Nobding-Dungdungnyelsa	12	19.4	7.4	62	1	
RO, Trongsa							
M/s Rigsar Const. Pvt .Ltd	Chuserbu-Nyelazam Package 1	30	37	7	23	2	
M/s Gaseb Const. Pvt .Ltd	Nyelazam-Sakachawa Package 2	30	35	5	17	2	
M/s Rinson Const. Pvt .Ltd	Sakachawa-Tsangka Package 3	30	42	12	40	2	
M/s Druk Lamsel Const. Pvt. Ltd	Trongsa-Punzhi Package 7						

M/s Dungkar Const. Pvt .Ltd	Punzhi-Tashipokto Package 8	28	40	12	43	2	
M/s Welfare Const. Pvt .Ltd	Tashipokto–Dorji Gonpa Package 8	28	40	12	43	2	
M/s Dungkar Const. Pvt .Ltd	Bongzam-Gyatsazam package 12	28	40	12	43	1	
M/s Rinson Const. Pvt .Ltd	Gyatsazam-Nangar Package 13	28	40	12	43	1	
M/s Lamneka Const. Pvt. Ltd	Sonam Kuenphen-Hurjee bypass	15	17	2	13	1	Scope reduced
RO, Lingmithang							
M/s. Bhutan Zeocrete Pavement Technologies (JV)	Between Yadi & Ngatsang Package 1	18	28.5	10.5	58	3	
M/s. KD Builders Pvt. Ltd, Gelephu	Pangser & Kilikhar Package 3	24	37	13	54	2	
M/s. Gongphel Construction Pvt. Ltd, Samdrup Jongkhar	Kilikhar & Mongar Package 4	30	38	18	60	2	
M/S Norbu Construction Company Pvt Ltd, Gelephu	Mongar and Gangola Package 5	30				1	Contract terminated
M/s Rigsar Const. Pvt .Ltd	Gangola & Kurizam Package 6	28	30	2	7	2	
M/s. Tshering Construction Pvt Ltd, Bumthang	Kurizampa & Lingmethang Package 7	15	28	13	87	1	

Time overruns from the initial contract periods for completed contract packages as of **15th November 2018** are as highlighted below:

Name of Contractor	Time to complete the road				Remarks
	Packages	Planned months	Actual months	Time overruns in months	
RO, Thimphu	2 Contract packages	15	22 & 33	7 & 18	
RO, Lobeysa	5 Contract Packages	11 to 25	14.9 to 30.4	1.8 to 5.4	
	8 Contract Packages	10 to 25	19.4 to 39.7	7.4 to 17.5	
RO, Trongsa	1 Contract Package	15	17	2	
	8 Contract Packages	28 to 30	35 to 42	5 to 12	
RO, Lingmithang	1 Contract Package	30			Contract terminated
	4 Contract Packages	15 to 30	28 to 38	13 to 18	

All contract packages have exceeded the original set time and the extension is quite significant for most packages. This was also the case for those contract packages that were completed after a decision to reduce the scope of the works. All of contract periods were revised under the construction phase.

1.15 Northern East-West Highway GOI funded Project Financial statement/Requirements as of 15th November 2018, prepared by ROs, DOR, MoWHS:

Table 1.15: Financial Status							
Sl.No.	Stretches NEWH	FIC	Initial Committed Fund 6th PT	Total Revised Committed Amount (M)	Total Revised Contract Amount (M)	Expenditure as of 15/11/2018 (M)	Pre-Financing requests beyond committed fund to the extent of contract Amount (M)
1	Semtokha - Wangdue	3036	1,197.602	1,233.358	1,035.047	1,225.739	
2	Wangdue-Chuserbu	3037	1,293.291	1,510.567	1,844.012	1,519.115	
3	Chuserbu-Trongsa	3038	744.440	744.440	1,022.282	599.322	
4	Trongsa-Nangar	3039	835.668	835.668	1,277.348	763.921	
5	Lingmithang - Yadi	3040	1,018.600	1,018.600	1,351.663	751.221	
		Total	5,089.601	5,342.633	6,530.352	4,859.318	1, 187.72

1.16 Tendering processes and contract awards, change orders in terms of designs/drawings, acceptance of new technology, time extensions, and awards of additional works were carried out by the Ministerial Level Tender Committee (MLTC) under the Chairmanship of the Secretary, Ministry of Works & Human Settlement (MoWHS). However, the contract managements and overseeing of project works were carried out by the four Regional Offices of Thimphu, Lobeysa, Trongsa and Lingmethang.

1.17 It was apparent from letter No. MoWHS/Sec-29/2015-2016/524 dated 16th October 2015 that the Secretary, MoWHS had conveyed the decisions on the meeting held on **16th June 2015** with the contractors and directed the Regional Offices for issuance of amendments to the contract agreements on the decisions subsequently taken on the following areas:

✓ **15% extra on FC Works**

Since the contractors executing the widening works are required to work at night (7pm to 8AM) to allow undisturbed flow of traffic during the day, it has been decided to enhance the rate of FC work by 15%.

✓ **Increase in pavement width from 6.50mtr to 7.50mtr**

It has also been decided to increase the width of pavement by 1meter from 6.5 meters to 7.5 meters.

✓ **Enhancement of Defect Liability Period from 1year to 3 years**

During the meeting held between the Hon'ble Prime Minister & the contractors working on NEWH on 24th August 2015, the contractors have agreed to the proposal of increasing the defect liability period for the works from one to three years.

1.18 Ineligible advances of Nu.250.110 million were sanctioned to 13 contractors by the ROs on the strength of approval of the Ministry and the MLTC exclusive of all other normal

entitled advances like Mobilization advance, Secured advance etc. as detailed in table 1.18 below:

Table 1.18: Payment of Ineligible Advances				
Sl.No.	Name of contractor	Contract Package	Date of Payment	Amount (Nu.)
RO, Trongsa				
1	M/s welfare Construction Pvt. Ltd.	Package IX	12.4.2017	20,000,000.00
2	M/s Dungkar Construction Pvt. Ltd.	Package VIII, XI & XII	9.12.2017	20,000,000.00
3	M/s Gyalcon Construction Pvt. Ltd.	Package IV	28.6.2017 & 26.10.2017	15,000,000.00
4	M/s Druk Lhayul Construction Pvt. Ltd.	Package V	19.5.2017 & 14.6.2017	20,000,000.00
5	M/s Rinson Construction Company Pvt. Ltd.	Package III, X & XII		30,000,000.00
6	M/s Raven Construction Company (P) Ltd.	Package VI		9,410,000.00
		Total		114,410,000.00
RO, Lobeysa				
7	M/s Chogyal Construction Pvt. Ltd	(Packages I, II and III)	2015/2016	46,000,000.00
8	M/s Singye Construction Pvt. Ltd (CDB No. 2148)	Package IV	12/2015	39,700,000.00
9	M/s welfare Construction Pvt. Ltd.	Package IX	12.11.2017	10,000,000.00
10	M/s Rigsar Construction Pvt. Ltd	Package X	6.6.2017 & 22.12.2017	4,500,000.00
11	M/s TT construction Pvt. Ltd	Package VI	7.2.2017 & 20.12.2017	19,000,000.00
		Total		119,200,000.00
RO, Lingmethang				
12	M/s Gongphel Construction Pvt. Ltd.	Package IV	9.4.2017 & 22.12.2017	10,000,000.00
13	M/s Rigsar Construction Pvt. Ltd	Package VI	8.2.2017 & 9.5.2017	6,500,000.00
		Total		16,500,000.00
RO, Thimphu				
14	M/s Raven Construction Company (P) Ltd.	Package I		4,000,000.00
		Total		4,000,000.00
		Grand Total		254,110,000.00

1.19 In terms of the Technical specifications under Clause 502 -“Dismantling Culverts, other Structures and Pavements” categorically stipulates as “All salvaged or un-salvaged materials shall be the property of the employer”. It also stipulates that prior to commencement of dismantling, the work of dismantling structures shall be measured in unit given under the clause of section (6). While all the contract packages included permanent works viz. culvert extensions, catchpits, gabion walls, RRM & CRM walls, etc. involving huge cost to the project, the ROs and the DOR had neither taken stock of all existing permanent structures nor accounted for all the salvaged materials. Thus, in the absence of stock accounts for the existing permanent structures, the RAA was not in a position to verify and ensure proper accountal and disposal thereon. Thus, non-accountal of salvaged materials from the existing permanent structures had resulted in substantial financial loss to the Government. The Ministry and the Government should look into the issue for appropriate decisions and actions.

1.20 In terms of the Technical specifications under Clause 107, “Survey and Setting Out” amongst others categorically stipulated as “ During the period of commencement of works the contractor shall resurvey the Base lines, Traverse Points, Bench Marks and confirm the co-ordinates and levels of the stations. All stations and reference points shall be clearly marked and protected to the satisfaction of the Engineer. Where survey station point is likely to be disturbed during construction operations, the contractor shall establish suitable reference stations at locations where they will not be disturbed during construction. The existing profile and cross-sections shall be taken jointly by the Engineer and the contractor. These shall form the basis for the measurements and payments”. However, the ROs have not conducted the final survey on completion of formation cutting as to ascertain actual quantum of earthwork excavations and the extent of formation cutting works carried out by the contractors.

The RAA in its attempt to carry out the final survey of the formation cutting works, engaged survey officials from the National Land Commission(NLC) for a month but failed to conduct the survey in the absence of the initial survey stations and reference points as the same were found disturbed and not protected during the construction operations. Thus, the extent of formation cutting and the actual quantum of earthwork excavations could not be verified and cross checked with the estimated quantum reflected in the estimates and BOQs.

1.21 The status of budgetary releases and expenditures incurred as of 30.06.2017 are a summarized in the table below:

Stretches NEWH	FIC	Initial Committed Fund 6th PT	Total Revised Committed Amount (M)	Total Revised Contract Amount (M)	Expenditure as of 5/9/2018 (M)	Advances O/S (M)	Exp + Adv	Name of Ros
Semtokha – Wangdue	3036	1,197.602	1,233.358	1,035.047	1,225.739	-	1,225.739	Thimphu & Lobeysa
Wangdue-Chuserbu	3037	1,293.291	1,510.567	1,844.012	1,514.813	2.112	1,516.925	Lobeysa
Chuserbu- Trongsa	3038	744.440	744.440	1,022.282	578.612	110.989	689.601	Trongsa
Trongsa-Nangar	3039	835.668	835.668	1,277.348	727.057	88.198	815.255	Trongsa
Lingmithang – Yadi	3040	1,018.600	1,018.600	1,351.663	736.337	327.843	1,064.180	Lingmethang
	Total	5,089.601	5,342.633	6,530.352	4,782.558	529.142	5,311.700	

2. DEFICIENCIES AND LAPSES

Review of the related records and documents including designs and drawings, estimates and BOQs, tendering processes, contract documents, supervision and monitoring controls, contract management, and physical visits and verification of works done at sites with reference to technical specifications indicated inadequacies, irregularities and deficiencies resulting from inadequacies in planning, weak supervisory and monitoring controls and lack of proper contract management system. Major issues observed in planning, tendering processes, implementation of contracts and taking over of works from contractors are as discussed below:

2.1 Increase of 1meter width carriageway due to change in design and drawing with resultant cost implication of Nu. 317.637 million

The initial approved design and drawing attached with the bidding documents were prepared as per the approved **Technical Standard and Road Classification and Standard 2009**.

The design provided standard carriageway width of 6.5m, 1m L-drain at hill and hard shoulder of 1.50 m between L-Drain and carriage way and 1.50m at valley side with granular sub soil drain to be provided in marshy areas.

The shoulders provided at both side of the carriage pavement width of 1.50m each was generally to provide for the Safety and efficient traffic operations, emergency storage of disabled vehicles, space for law enforcement activities, an area for drivers to maneuver to avoid crashes, space for maintenance activities and for bicycle accommodation.

The typical cross section of approved drawing which was instrumentally used in conceiving the estimates and BOQs to derive estimated cost of the project as well as obtaining competitive bids and awards of contracts is as depicted in the photograph below:

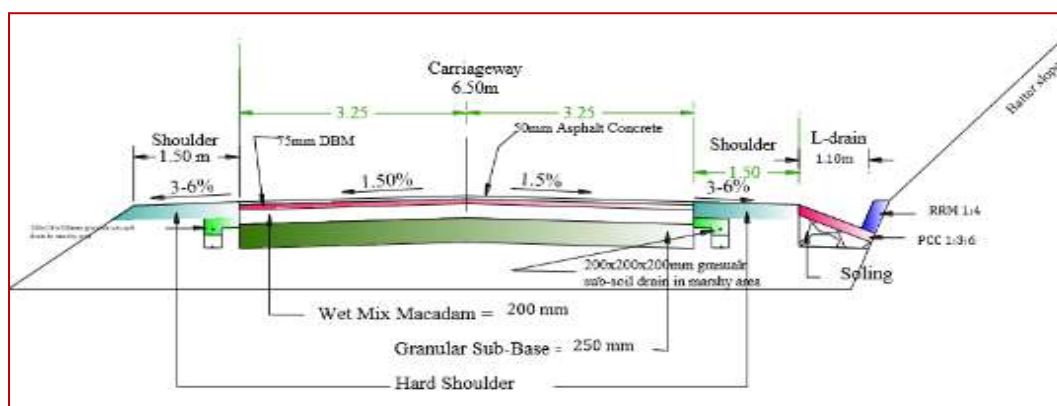


Fig: 2.1 –Initial approved design and drawings

However, vide letter No. MoWHS/Sec-29/2015-2016/524 dated 16th October 2015, the Secretary, MoWHS had conveyed the meeting held on **16th June 2015** with the contractors and directed the Regional Offices for issuance of amendment to the contract agreements based on the decisions subsequently taken to increase the carriageway width from 6.5m to 7.5 m. Reasons for increase of carriageway width was found not documented.

In addition, vide letter No. DoR/ROL/16/15-16/481 dated 21/10/15, all Regional Offices were informed to increase the pavement width from 6.5 meters to 7.5 meters. In line with change order, the revised drawing developed and circulated by Design Division, DoR Thimphu was as depicted in the photograph below:

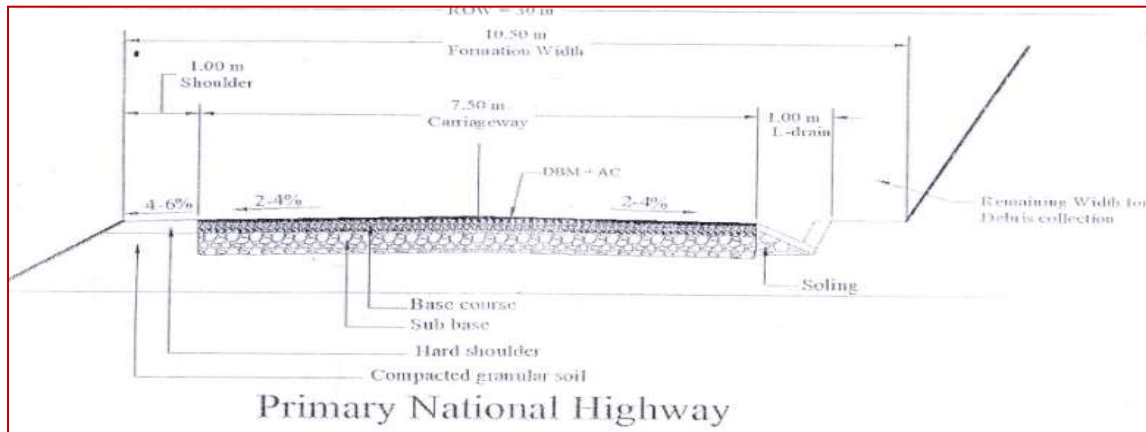


Fig: 2.1(1)-Revised design and drawing

Thus, the increase of pavement width of 1m from the initial carriageway width of 6.5m to 7.5m after a time lapse of almost eight months from the dates of awards of contract works was irrational and inappropriate as it had not only distorted the drawings, estimates, BOQs, Projected Cost and funding modality but also adversely impacted the overall project cost by **Nu. 317,636,875.54** as summarized in table 2.1 below:

Sl. No.	Regional Office	No. of Packages	Amount (Nu. in Million)	Remarks
1	RO, Lobeysa	15 contract packages	119,519,393.84	
2	RO, Thimphu	2 Packages	11,504,832.70	
3	RO Trongsa	13 Contract Packages	112,753,111.00	
4	RO Lingmethang	7 contract packages	50,638,059.00	
5	RO Lingmethang	1 package	23,221,479.00	ZeoCrete pavement works contract
	Total		317,636,875.54	

In addition, the change in design also impeded the following benefits to government and the commuters:

- The provision of 1m width between hillside and L-drain technically benefited the contractors as 1m width were not insisted upon to be maintained as the contractors were allowed to construct L-Drains attaching the hillside.
- Doing away of 1.5m shoulder width between L-Drain and carriageway and reduction of 1.50m to 1m at valley sides had resulted in compromising necessary safety measures and safety of commuters.
- The Physical verifications indicated that overall formation width were not achieved in certain stretches of roads and no cost adjustments were carried out for non-achievement of formation width and non-maintenance of 1m width at hillsides. As a result, contractors benefited financially since the payments were made on the basis of running meters and not based on the quantum of works executed.

The Regional Offices in consultation with the Ministry should comment on the changes of drawings and technical specifications after the awards of contract works that had resulted in additional avoidable financial implication to the extent of **Nu. 317,636,875.54**.

Auditee's Response:

Increasing of Pavement width from 6.5m to 7.5m came from the need to upgrade our very important Primary National Highway of the country spanning East to West by gradually improving its basic specifications to meet with the growing demands by ever increasing road users and to ensure traffic reliability, passenger comfort and their safety when the opportunity existed for such an intervention under GOI funding.

From over several decades of experiences in the construction and maintenance of roads in Bhutan and learning from experiences of many developed countries, it has been established that ingress of water is the top most factor for premature damages to road pavements (especially the flexible pavement system). Factors such as environmental conditions, traffic intensity and increased loadings, and the design inadequacies are some other contributing factor for premature pavement damages. Based on this premise, since pavement works were not commenced in all of the contracts awarded for all stretches from Simtokha to Korilla, the intervention was deemed timely. DoR also appraised this ministry that under GOI funding on NEWH project, it expected huge savings then.

Therefore, instead of providing 1.5m wide earthen shoulder on the hillside of the pavement the ministry proposed increasing the pavement width from 6.5m to 7.5m taking up 1.0m of the 1.5m shoulder and fixing the 1.0m wide L-shaped/U-shaped side drains next to the pavement structure only. This intervention brought following improvements and benefits to the overall flexible pavement system.

- 1. Earthen shoulders are a porous medium that will allow gradual seepage of surface run off water and the normal rainwater. The water percolates into underlying pavement layers of DBM, WMM and GSB that are fairly porous in nature. When ground temperatures reach 40 degrees centigrade, the bitumen strips off the aggregates causing segregation of bituminous concrete. During winter in high altitude areas, the water in the pavement layers undergo freezing / icing breaking open the bituminous concrete and when weather warms up in Spring and after, the thawing of frozen ice takes place melting it into water leaving cracks in the bituminous concrete. This phenomenon of icing and thawing leads to crushing of cracked road surfaces under wheels of trucks and vehicles, forming cracks of all kinds and potholes. Addition of this 1.0m extra blacktop instead of earthen shoulder definitely prevents this undesirable phenomenon - saving huge recurrent expenditures.*
- 2. The side drain running parallel to the centerline of the pavement next to the pavement structure not only ensures that road surface is impervious to ingress of water enhancing the life of the pavement, the aesthetics of the pavement alignment improves to a great extent.*
- 3. The 1.0m extra pavement width will allow much desired unrestricted speed of the traffic flow in both directions preventing the pulling force that will otherwise develop between vehicles crossing past in opposite directions close to each other. In fact, to enhance safety, if space permits there should be a solid divider between lanes in opposite directions to avoid pulling (vacuum) force and the glares from headlights.*

4. *The extra wide road will compensate for the absence of super-elevation at curves as the introduction of which is not possible in our highways due to lack of space to lay the transition curves that precedes the Super-elevation. Super-elevation counter acts the centrifugal force of speeding vehicles.*
5. *This initiative allows leaving a 1.0m space between the hillside slope toe and the side's L-drain, which not only will hold back the first slides getting into the drain directly from slope erosion under rains, but also improves the sight distance for the drivers at the curves and sharp corners. It also ensured a relatively dust and mud free highway pavement as only valley side shoulder exists.*
6. *The introduction of 1.0m extra avoided payment for 1.5m wide shoulder, although an additional expenditure was required to be made for 1.0m wide DBM and AC layers. A certain percentage on the cost for BT would have been compensated.*

The 1.0m extra wide black top pavement did not affect any fundamental geometrics or integrity of the national highway. In fact it definitely has enhanced the longevity of the pavement life, improved the safety and riding comfort of road users, the long desired national highway specification upgraded with aesthetics significantly improved and all of these are vital for the growth and sustenance of our economy.

With these positive outcomes in the perspective, the proposal thus submitted was endorsed by the MLTC members and recommendations duly approved jointly by the Ministers for Finance and Works & Human Settlement ministries vide MoWHS/SEC/29/2015/476 dated 5/8/2015 (Copy enclosed). The RAA is therefore requested to consider the submission favorably given the benefits and many positive outcomes from the initiative by not pursuing the matter further please.

RAA's Further Comments & Recommendations:

*The RAA had noted that the initial design and drawings incorporated in the tender and contract documents were as per the Road Designs outlined in the **Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009 approved by the Cabinet.***

In addition, in line with the responses, it was evident that the Ministry despite having several decades of experiences in the construction and maintenance of roads in Bhutan and learning from experiences of many developed countries and having established that ingress of water is the top most factor for premature damages to road pavements (especially the flexible pavement system) had failed to consider such factors in the initial design and drawings. It also indicated that the Ministry had failed to exercise due diligence while preparing the project plans, designs, and specifications to ensure that all information are accurate and complete and prevent changes including time and cost overruns.

It is thus evident that the change of designs and drawing and technical specification on the increase of Impavement width after award of contracts and during execution phase of contracts was an adhoc decision and was also not aligned to the approved design and technical specification of the Guidelines. The change of designs by doing away the

1.5m shoulder width between L-Drain and carriageway and reduction of 1.50 m to 1m at valley sides had resulted in compromising necessary safety measures and safety of commuters.

In addition, the extra financial burden to the government due to change in design and technical specification particularly due to increase of 1m carriage way alone after the contract awards amounted to Nu. 317.637 million (**Ministerial Level Committee were responsible for the changes**)

The Ministry should not only strengthen the Design Divisions for accurate designing of road structures but also institute a technical team to review project plans, designs, and specifications to ensure that the same are accurate and complete including verification of the accuracy of surveys for future projects as to prevent changes in designs as well as time and cost overruns.

The huge financial loss to the extent of Nu. 317.637 million to the government Exchequer is brought to the notice of the Government for appropriate decisions and actions.

2.2 Decisions in violation to the technical specification and huge cost implication due to enhancement of 15% over the quoted rate for FC work as well as ambiguity in the maintenance of records to support the claims of night working allowances of Nu. 44.275 million

The rate for FC works was enhanced by 15% on the grounds that the contractors executing the widening works are required to work at night (7pm to 8AM) to allow undisturbed flow of traffic during the day as conveyed by the Secretary, MoWHS under letter No. MoWHS/Sec-29/2015-2016/524 dated 16/10/15 on the basis of the decision taken during the meeting held on **16th June 2015** with the contractors.

Accordingly, project cost on account of 15% enhanced rate for contractors executing the widening works increased by **Nu. 44,274,922.00** as shown in table 2.2 below:

Sl. No.	Regional Office	No. of Packages	Amount (Nu. in Million)
1	RO, Lobeysa	6 contract packages	11,666,449.74
2	RO Trongsa	13 Contract Packages	24,061,503.00
3	RO Lingmethang	5 contract packages	8,546,469.45
	Total		44,274,922.00

However, the Technical Specifications categorically stipulated on Traffic Safety & Control under Section 100-General Requirement, Clause 105, Sub Clause (2) General Requirements that, “*The Contractor shall at all times carry out works on the road in a manner creating least interferences to the flow of traffic. For all works involving improvement of the existing road, the Contractor shall provide and maintain a passage for traffic either along a part of the existing carriageway under improvement, or along a temporary diversion constructed close to the road. The Contractor shall take prior approval of the Engineer regarding traffic arrangements during construction Traffic Safety & Control. The Contractor may be allowed to stop traffic temporarily. The period of such closure shall be as agreed by the engineer. For this the Contractor shall submit the time and period of the closure to the Engineer at least 14 days in advance, to enable the Engineer to issue the relevant notices*”

In addition, clause 105(5) Traffic Safety & Control, and under sub para on **Measurement and Payment**, stipulated as *“No separate measurement and payment shall be made for the works described in this clause. All the costs in connection with the work specified herein shall be considered included in the related item of work specified in the bill of quantities”*

Thus, in terms of the technical specifications, bidders were to in-built the cost on the “Traffic Safety & Control” as well as hindrances expected to hamper the execution of FC works in rates in the related item of work specified in the bill of quantities.

The enhancement of the rate for formation cutting works by 15% and payment of Nu. 44,274,922.00 as of date of audit for requiring works to be done at night tantamount to double payments to the contractors as the quoted rates of the contractors were inclusive of cost for ensuring least interference to the flow of traffic during execution of works.

Further, the audit team noted that there were no properly defined working procedures for execution of works at night. In addition, maintenance of subsidiary records to substantiate the works done at night for eligibility of claiming of 15% night working allowances and any other related records if maintained were not available on records. In the absence of such records, the correctness of the claims were not susceptible for audit scrutiny.

Considering the huge magnitude and cost of formation cutting works, decision of paying extra 15% having enormous amount of additional financial implication certainly warranted a detailed analysis of incremental cost arising from night work. However, there were no evidence produced indicating analysis carried out to ascertain the cost elements and extent of additional cost entailed in executing the formation cutting works at night that necessitated the compensation payment beyond what was already covered as stipulated under the Technical Specifications.

The Regional Offices in consultation with Ministry should revisit the decisions in terms of the provisions of the contract documents and technical specifications and should recover the built up cost for “traffic safety and control cost” in the quoted rates of contractors. Besides, the Ministry should also direct the site engineer and the contractor to provide documentary evidences of work done at night.

Auditee’s Response:

The DoR Regional Offices would like to thank the RAA for carrying out the detailed auditing of all the NEWH project packages and for the observations.

With great concern to the public travelling on our NEWH projects having to wait at the time of FC work during daytime, the meeting of 16th June 2015 chaired by Hon’ble Secretary in presence of all contractors decided to carry out FC work during the night to avoid disturbances to the traffic flow. The contractors had submitted their incentive requirement to the Ministry and it was decided at 15% of FC cost vide order no. DoR/CD GoI PMU/NEWH 19/1522 dated 31st July 2015. The RO then issued the letter no. RO/DoR/Trongsa/E-01/2015-2016/85 dated 3rd Aug 2015 in line to the above order to contractors to carry out FC work during night time (i.e. 7 PM – 8 AM). However, RO accepts on the ground stated that there was no record keeping for FC done at night but we made sure that FC works were carried out during night ONLY mostly in presence of our site engineers without any incentives working both day and night after the order had been circulated.

The improvement works on the Northern East West highway beyond Wangdue was about to be started with 36 contract packages of which 21 have even the widening of existing road widths to 10.5m. Each of these contract packages spanning anywhere from 6 to 10 km in length were located immediately next to each other with men and machines. Crossing past one package and then through the rest was the biggest challenge DoR and the contractors together foresaw since commuters cannot be blocked at series of locations separated by a maximum of five to ten kilometers. We say five to ten kms because most widening operations took place mostly with two sets of machines in each contract package.

The objective of the 16th June 2015 meeting was therefore to bring about a slight change to the execution methodology of the Formation Cutting (FC) item and also to improve the pavement specification of the Primary National Highway. The very interactive discussion finally came to an agreement that contracts having FC works would thenceforth work at night from 7PM until 8AM next morning. To this change, contractors submitted a joint application demanding 20% raise in the FC work item for night works, overtime payment to cover risks, and to provide lighting systems. After intense arguments that followed in pursuit for negotiations where the Ministry and DoR actually desired to pay for lights only, contractors finally stayed put with 15% only as against 20%. This 15% on FC item accounts for only 3.29% raise in the overall contractual allocation.

International experiences and researches indicate that, “the general opinion is that costs are significantly higher at night than daytime. Night shifts are theoretically more expensive due to overtime and night-premium pay, lighting expense, use of additional traffic control devices, and higher bids. Hinze and Carlisle (6) said that overall contracts costs increase by 10%. In 1990 they (Hinze and Carlisle) found that contract cost was 9% higher at night. Hacher and Taylor (2001) and Al-Kaisy and Nassar (2002) conclude that cooler temperature at night and longer undisturbed working hours can actually increase nighttime work quality.”

While the contract stipulates a requirement that contractor shall ensure traffic flow with least interferences requiring the contractor to allow unhindered flow of traffic, the contractor (if lone) as a single entity would easily fulfill this requirement with specific timings for blockings and openings. The next contractor/s at every 6 to 10km distance will have to set yet another timings and so forth by all the 21 widening contractors. It may be perhaps possible with just one direction traffic, but with both directions traffic and added by those with emergency commuters, the permutation and combination coordination set ups would have brought in much commotion and frustration to both contractors and the general road users and the most undesirable complaints and reports to the headquarters in Thimphu on a daily basis. Even with just the two blocks on over 40km stretch between Dochula and Wangdue had caused every road user to sacrifice one to two hours of his/her one-way travel time. The contractors would have also found valid reasons for delaying their work resulting in justifiable cost escalations and time extensions.

The night work therefore definitely resulted in many positive outcomes such as inculcating the culture of night work for the construction industry, eased travelers with uninterrupted flow of daytime safe travel, enabled continuation of the conduct of socio-economic activities by one and all, and allowed the administrative functions to continue by local governments served by East West highway corridor in particular without let or hindrances. This initiative also served the contractors with unrestricted amount of time and working spaces for the contractors themselves, which greatly enhanced their work progress. The many indirect benefits thus

accrued by this initiative would have far outweighed the cost for 15% extra paid for night FC works.

The contract further stipulates, “For all works involving improvement of the existing road, the contractor shall provide and maintain a passage for traffic either along part of the existing carriageway under improvement, or along a temporary diversion constructed close to the road”. Provisionally, and in general the clause makes sense, but in the current situation, unlike for projects plain areas, the requirement cannot be met, as each widening contract location had neither the extra carriageway nor any convenient space for making a temporary diversion, because the widening works were contracted where none of these two conditions existed.

The stipulation continues, “the contractor shall take prior approval of engineer at least 14 days in advance, to enable engineer to issue the relevant notices”. Since the fixation of timings for blocks and openings for a series of block points spread over a long distance in a single stretch was not possible, which are perhaps possible for block points that are fairly isolated or lonely, for reasons stated in the foregoing paragraphs, taking engineer’s permission or issuing of relevant notices by engineer obviously did not arise. Supposedly, despite issuance of such notices as per contract requirement, should any of the contract package default in sticking to set timings, the occurrence of which are inevitable given the nature of works in a hostile terrain as ours and the unpredictability nature of equipment’s performance etc. – the whole chain of timings for both direction traffic would get completely distorted. In most times, due to varying speeds of vehicles, a car will cross one block only to meet with series of subsequent blocks in such a long stretch of multiple block points.

RAA would consider favorably based on the merits of the initiative and not pursue the matter further la. This initiative was implemented only with the kind approval of the Honorable Ministers for Works & Human Settlement and the Ministry of Finance on the Note vide No. MoWHS/SEC/29/2015/476 dated 5.8.2015 (Copy enclosed for reference please). In view of above justifications, RAA is kindly requested to drop the memo.

RAA’s Further Comments & Recommendations:

The RAA while noting the rationale of the compensation payments for executing formation works at night, reiterates that the technical specification categorically incorporated the Traffic Safety & Control under Section 100-General Requirement, Clause 105, Sub Clause (2) General Requirements and regulation of payments under Clause 105(5) Traffic Safety & Controls. It was very clear that the contractors were to in-built the cost on the “Traffic Safety & Control” as well as hindrances expected to hamper the execution of FC works in rates in the related item of work specified in the bill of quantities.

Further, decisions for the payment of 15% did not outline the procedures and modality of working at night and regulating payments. No documentary evidences were maintained either by the site engineers of ROs or by the contractors to support widening works executed at night. It is also to reiterate that the Director, DOR vide letter No. DOR/CD/GOI-PMU/NEWH19/1522 dated 3.8.2015, had informed ROs that the widening works were being executed as usual with traffic disruption during the day and instructed to notify the contractors to abide by the decisions. Indicating that execution of FC was done during day time in some locations.

It is noted that the flat increase of 15% for FC works at night hours was not supported by detailed analysis of additional cost involved in working during night hours which were not

specifically covered by the existing contract rates. Thus, the Ministry failed to pursue a prudent and sound financial management practice in utilizing the public resources. Further, Ministry should note that payment were made not in line with the signed contract agreement.

Considering the above fact and events, the Ministry should revisit the decisions in terms of the provisions of the contract documents and technical specifications and should recover the built up cost for “traffic safety and control cost” in the quoted rates of contractors. It is also to reiterate that payments amounting to Nu. 44,274,922.00 without regulating to technical terms would tantamount to double payments to the contractor and ineligible expenditures by the government.

The huge financial loss to the extent of Nu. 44.275 million to the government Exchequer is bought to the notice of the Government for appropriate decisions and actions.

2.3 Inadmissible Payments of 15% enhanced rate for completed FC works prior to approval of Nu. 5.329million – (5.1.19)

The rate for Formation Cutting (FC) works was enhanced by 15% as per the executive order vide letter No. MoWHS/Sec-29/2015-2016/524 dated 16/10/15. However, the letter did not specify the effective date of the order.

On verification of contractor’s bills, MB recording, it was noted that enhanced rate of 15% was paid to those contractors, who had completed the FC works prior to the date of the Secretary’s letter No. MoWHS/Sec-29/2015-2016/524 dated 16/10/15 conveying the approval for rate enhancement of 15%.

The payment of RA bill although was made on 14.11.2015, the actual works were carried out prior to the approval conveyed under letter dated 16th October 2015. Thus, the contractor was not eligible for enhanced rate of 15% for the completed works prior to the approval Order issued.

The enhanced rate for FC works paid to contractors who had completed the FC works prior to the approval of the enhanced rates resulted in ineligible payments and undue favour to the contractors to the extent of Nu. 5,328,975.00 as detailed in table 2.3 below:

Table 2.3: Ineligible payments				
Sl. No.	Regional Office	No. of Packages	Amount (Nu. in Million)	Remarks
1	RO, Lobeysa	(Package V) by M/s Etho Metho Construction Pvt. Ltd	191,070.00	As per work plan, FC of 1.061km should have been completed prior to issuance of the order
2	RO Trongsa	Package II M/s Gaseb construction Ltd	1,224,405.00	RA Bill Amount paid before 16/10/2015
3	RO Trongsa	M/s Rigsar Construction Pvt Ltd	1,190,250.00	RA Bill Amount paid before 16/10/2015
4	RO Lingmethang	M/s Tshering Construction Pvt Ltd	546,750.00	RA Bill Amount paid before 16/10/2015
5	RO Lingmethang	M/s Norbu Construction Pvt Ltd	1,462,500.00	RA Bill Amount paid before 16/10/2015
6	RO Lingmethang	M/s KD Builders Pvt Ltd	714,000.00	RA Bill Amount paid before 16/10/2015
Total			5,328,975.00	

The RO should comment on payment of 15% on FC works prior to issuance of Executive order besides recovering the inadmissible payment of Nu. 5,328,975.00 and the same deposited to Audit Recoveries Account.

Auditee's Response:

Though the execution of FC work has been started prior to approval of 15% incentive, the complete FC width was not achieved due to arrangement for traffic to ply without hindrance during daytime. The actual execution of FC works has been carried out after the announcement of night execution i.e. from 7PM to 8AM was broadcast on BBS TV & Radio for a week w.e.f. 23rd July 2015. The RO took the date of the above advertisement as eligible for 15% incentive for carrying out FC works at night. The contractors were instructed to strictly follow the order to provide disturbance free movement of vehicles during daytime. The Order of Director, DoR vide letter no. DoR/CD GoI PMU/NEWH 19/1522 dated 31st July 2015 is attached for ready reference please.

In view of above justifications, RAA is kindly requested to drop the memo.



RAA's Further Comments & Recommendations:

The RAA while taking note of the response on the airing of decision on the payment of 15% enhance rate and requiring execution of formation works at night from 7PM to 8AM on BBS TV & Radio for a week w.e.f. 23rd July 2015, reiterates that the executive order for the enhancement of rate for FC works by 15% was notified and instructed the ROs to amend the contract only in October 2015 in terms of the Secretary, MoWHS letter No. MoWHS/Sec-29/2015-2016/524 dated 16/10/15. In addition, the letter did not specify the effective date of the order and in terms of normal practice, in absence of specified effective date, the date of issuance of order should be considered as the effective date.

Further, the ROs had not amended the contract agreement in line with the executive order. Thus, payment of 15% enhance rate on the RA bills payments was not justifiable. It is also reiterated that the Director vide letter No. DOR/CD/GOI-PMU/NEWH19/1522 dated 3.8.2015, had informed ROs that the widening works were being executed as usual with traffic disruption

during the day and instructed to notify the contractors to abide by the decisions. The audit team during site visits had also noted execution of formation works during day time in some locations

Considering the above fact and events, the Ministry should revisit the payments made by ROs for those completed FC works prior to the executive order of the Secretary and without amendment of the contract agreements and recover payments of Nu. 5.329million.

Who is accountable?

Direct Accountability	: Refer Accountability Statement attached
Supervisory Accountability	:Refer Accountability Statement attached

2.4 Non amendment of contract document pertaining to enhancement of defective liability period - (4.4.69)

One of major component of works for double Lanning of Northern East West Highway Project was FC works by extension of existing pavement roads to facilitate smooth ride to commuters and particularly for the flow of traffic.

The Secretary, MoWHS vide letter No. MoWHS/Sec-29/2015-2016/524 dated 16th October 2015, had conveyed the decisions of the meeting held on **16th June 2015** with the contractors and directed the Regional Offices for issuance of amendment to the contract agreements on the decisions subsequently taken on the following areas:

- ✓ **Enhance rate of 15% on FC Works**
Since the contractors executing the widening works are required to work at night (7pm to 8AM) to allow undisturbed flow of traffic during the day, it has been decided to enhance the rate of FC work by 15%
- ✓ **Increase in pavement width from 6.50mtr to 7.50mtr**
It has also been decided to increase the width of pavement by 1meter from 6.5m- 7.5m.
- ✓ **Enhancement of Defect Liability Period from 1year to 3 years**
During the meeting held between the Hon`ble Prime Minister and the contractors working on NEWH on 24/8/15, the contractors have agreed to the proposal of increasing the defect liability period for the works from one to three years.

However, the audit team noted that while no amendments were made in the contract documents, the decisions on the payment of 15% extra on FC works, and execution of additional 1m Increase in pavement widthfrom 6.50m to 7.50m were found implemented, the defect liability from 1year to 3 years were found not implemented.

The Ministry besides commenting on the failure to amend the contract agreements should investigate the circumstances leading to non amendments of contract agreement as of date. In addition, the Ministry should take action to recover all the rectification and road maintenance cost incurred by the ROs through award of additional works to the contractors from the FC contractors as these were to be covered under 3 years defect liability periods.

Auditee’s Response:

Based on the decision of MLTC which was held on 16th June 2015 with the eleven contractors of NEWH vide reference no. MoWHS/Sec/29/2.15-2016/ the RO has written a letter of amendment vide letter no. DoR/ROL/16/2015-2016/481 dt. 21/10/2015.

However, none of the contractors whose defect liability period of 1 year enshrined in the initial contract agreement agreed to amend the contract as per the instruction of Ministry. The contractors stated that they have not built probable defect's cost beyond one year, as the initial bidding document did not have the provision of three years DLP. Should they need to increase the DLP to 3 years, they even hinted to compensate the risk factor. The issue of non-acceptance to amend the DLP was made known to the Department and Ministry.

It is to inform that three decisions taken during the meeting with the NEWH contractors and MoWHS, chaired by Hon'ble Lyonchoen, Prime Minister of Bhutan are to be understood differently. The 15% extra on FC works is for night allowance, odd hour working time, high risk involved at night working, additional lighting systems required etc. Whilst 1m increase in the pavement width is to prevent the seepage of water through the unpaved shoulder between the paved surface and the L-drain.

ROs concern of non- acceptance by the contractors to amend the DLP to 3years, the MLTC that held on 28th May 2018 (attached as supporting documents) holistically deliberated at length and in line with the signed contract agreement, which is the mother document for reference in case of litigation, decided to do away with the amendment of defect liability period. However, the DLP of 3 years already incorporated in the later contract agreement shall remain as it since the bidder might have incorporated the risk factor. Therefore, RO requests the RAA to kindly drop the memo & not to pursue further.

Response RO, Lingmethang

However, the RO has received a letter of acceptance from only one contractor out of six contractors working under RO (attached for reference). The rest of the firms did not submit their acceptance hence; defect liability period could not be amended. Moreover if the defect liability period has to be increased, contractor could have inbuilt the rates and accordingly the cost of construction would increase substantially. (Refer the letter from Ministry to do away with the 3 yrs defect liability period).

Therefore, RO request the RAA to kindly drop the memo & not to pursue further.

RAA's Further Comments & Recommendations:

While noting the response, the RAA would like to reiterate that "In terms of letter No. MoWHS/Sec-29/2015-2016/524 dated 16th October 2015, the Secretary, MoWHS, had explicitly conveyed the decisions of the meeting held on 16th June 2015 with the contractors and directed the Regional Offices for issuance of amendment to the contract agreements on the decisions subsequently taken on the 15% extra on FC Work, Increase in pavement width from 6.50mtr to 7.50mtr and Enhancement of Defect Liability Period from 1year to 3 years". Thus, the decisions were to be read in conjunction to each other and not in isolation.

Further, decision on the 15% extra on FC Work and Increase in pavement width from 6.50mtr to 7.50mtr were also not in line with the signed contract agreement and stands recoverable

either from the contractors or executives responsible for the unilateral decisions. It is also construed that Enhancement of Defect Liability Period from 1 year to 3 years was to support the decision on the payment of 15% extra on FC Work and Increase in pavement width from 6.50mtr to 7.50mtr.

Further, the decision of the MLTC held on 28th May 2018 to do away with the amendment of defect liability period was not in the interest of the Government since huge government funds to the extent of Nu. 361.912 million were spent by way of refinancing process towards payments of 15% extra on FC works and execution of 1m increase pavement width.

The decisions for the payment of 15% extra on FC was in contrary to the technical specifications where the contractors were required to built-up their rates for Traffic Safety & Controls envisaged under Technical Specifications Section 100-General Requirement, Clause 105, Sub Clause (2) General Requirements. In addition, the increase of pavement width from 6.5m to 7.5m by doing way the Hard Shoulder between the L-Drain and Carriageway was also in contravention to Road Design Standard outlined in the Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009 approved by the Cabinet as well as had compromised the safety of the commuters.

In the light of the decision of the MLTC of doing away with the amendment of defect liability period from 1 year to 3 years which was dully approved by the Government in conjunction to payment of 15% extra on FC Work and 1m increase in carriage width as well as at the verge of the completion of contracts is bought to the notice of the Government for appropriate decisions and actions.

Who is accountable?

<i>Direct Accountability</i>	<i>: Refer Accountability Statement attached</i>
<i>Supervisory Accountability</i>	<i>:Refer Accountability Statement attached</i>

2.5 Inconsistency in the implementation of Double Lanning works

The *Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009* prepared by MoWHS in collaboration with relevant stakeholders (GNHC, MoHCA, MoAF, Dzongkhag Administrations and Department of Roads) was approved by Lhengye Zhungtshog on 24th February 2009.

The road classifications and its design standards and drawing approved are as shown below:

Road Design Standards

Road Classification	Primary National Highway				Secondary National Highway				Dzongkhag Road				Farm Road			
	L	R	M	S	L	R	M	S	L	R	M	S	L	R	M	S
Design speed (km/h)	60	50	40	30	50	40	30	20	40	30	20	15	30	25	15	10
Traffic volume (vpd)	≤200				100-200				30-100				≤30			
Width (m)	Right of way				30				30				30			
	Carriageway				6.5				3.5				3.5			
	Shoulder				1.5x2				1.5x2				0.5x2			
	Drain				1.0				1.0				0.6			
Min. radii of horizontal curve (m)	115	80	50	30	75	75	25	15	75	25	15	15	15 Exceptional =10			
Pavement slope (%)	2-5				2-5				4				4			
Shoulder slope (%)	3-6				4				5				5			
Type of pavement	Double bituminous treatment				Dense bituminous premix				Base Course				Single Layer Base Course			
Max. super-elevation (%)	10				10				10				10			
Max. vertical grade (%)	4	5	6	7	5-9				6-10				6-10			
Structure loading (minimum)	HS20-44				As per DoR standard				As per DoR standard				As per DoR standard			

Fig: 2.5- Approved Road Design Standards

NEWH is classified as the Primary National Highway, the Ministry had prepared the design/drawing and estimation for carriageway of 6.5 m with 1.5m hard shoulder each on both side of carriageway and 1m L drain at hillside as depicted below:

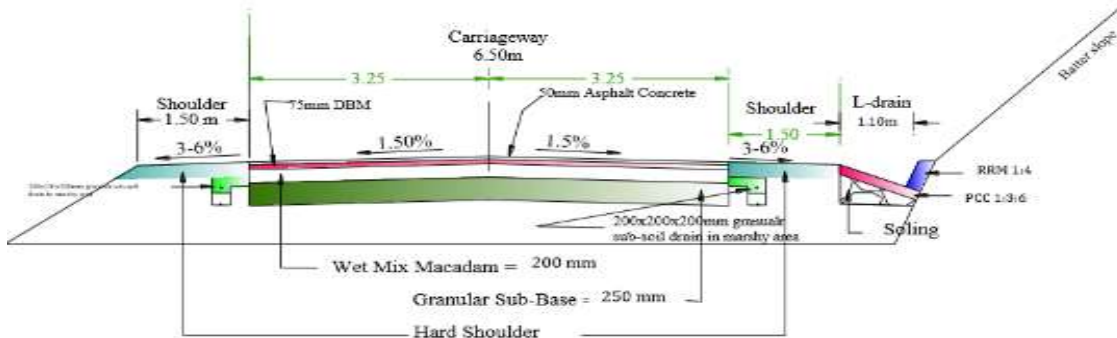
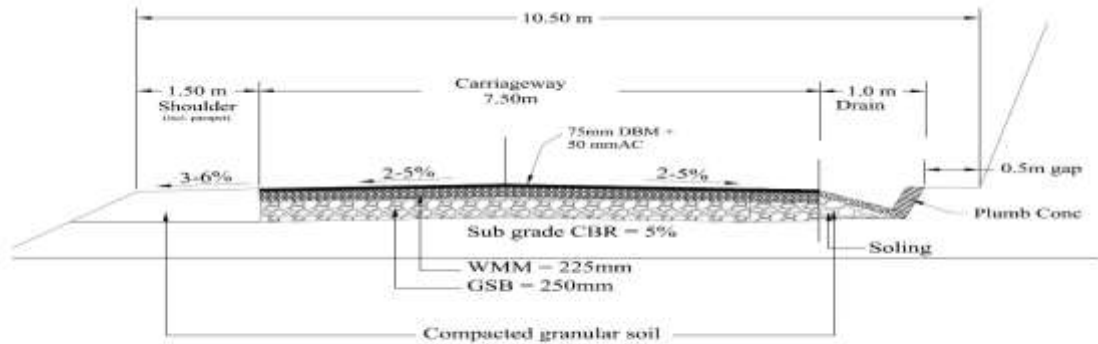


Fig 2.5(1)- Design and Drawing aligned to Road Design Standard

However, the Secretary, MoWHS vide letter No. MoWHS/Sec-29/2015-16/524 dated 16th October 2015 amongst others, directed all the Regional Offices on the decisions taken during the meeting held on February, 2016, after a time elapse of more than eight months from the commencement of the contract works, to increase pavement width from 6.5 m to 7.5 m and to issue amendment to the contract agreement signed with the contractors under respective jurisdictions.

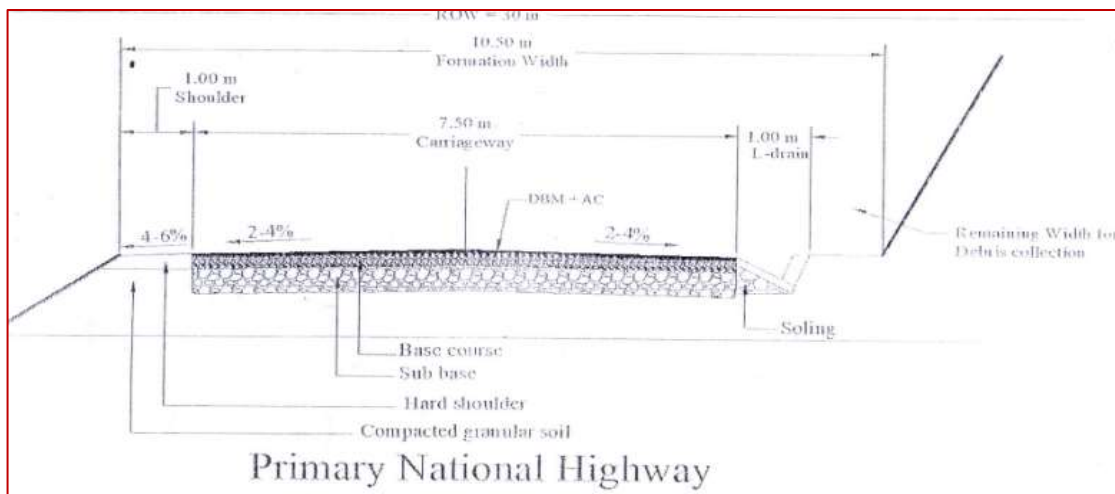
In line with change order, the revised drawing was developed and circulated by Design Division, DoR Thimphu. However, during the course of the review of drawings implemented by the four Regional Offices, and site verifications, the audit team noted two (2) different drawings with difference technical specification for the same NEWH Up-gradation works.

It was noted that RO Thimphu and Trongsa were following one drawing and RO Lobeysa and Lingmethang were following a different as shown in Figure 1 & 2 below:



Typical Pavement X-Section

Figure 1.5(2): Revised drawing No. 1: Pavement drawing followed by RO Lobeysa and Lingmethang



Primary National Highway

Figure 2.5(3): Revised drawing No. 2: Pavement drawing followed by RO Thimphu and Trongsa

Thus, for the Primary National Highway, two different types of pavement drawings and specification were applied resulting in inconsistency in the implementation of Double Lanning works as well as non-adherence to the Road Design Standards specified in the *Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009*.

Adoption of two different drawings with varying pavement specifications and non-adherence to the approved Road Design Standard indicated improper planning and lack of due diligence in the preparation of drawings and specifications. Such mismatches in technical specification of road works would inevitably result in execution of two different type of pavement works for the same NEWH double lanning works.

The Ministry should review the adoption of two different types of drawings in the execution of road pavement works besides taking measures to ensure adoption of one type of drawings and technical specifications as outlined in the Road Design Standard to avoid inconsistencies and other impacts on the execution of road works.

Auditee's Response:

DoR ROs would like to acknowledge the observation of RAA and would like to submit the following justifications.

The widening & up-gradation of the NEWH was approved in September 2014. A total of 385 kms of the road was to be widened & up-graded to PNH standard & completed within a period of three years by Dec 2017. By any standards, it is a huge task and time was of essence.

We partly agree to the observation of RAA regarding improper planning & lack of due diligence in the preparation of drawings & specifications. To be honest, there was not enough time to carry out proper survey, design and drawings. RAA has already noted the fact that the pavement width for PNH was originally 6.5 mtr as per the Guidelines on Road Classification System & Delineation of Construction & Maintenance Responsibilities, 2009. This was however revised later to have a pavement width of 7.5 mtr.

As recommended by RAA, the Guidelines on Road Classification System & Delineation of Construction & Maintenance Responsibilities, 2009 has been revised and the new Road Classification System, June 2017 has been circulated to all the Regional Offices of DoR. We hope that uniformity can be achieved in 12th FYP projects. In view of the above justifications, RAA is requested to drop the memo.

RAA's Further Comments & Recommendations:

While the initial design was prepared as per the Road Design Standard provided in the Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009 and was adopted by all the ROs, the adhoc changes in design including technical specification was the main factor for executing NEWH project by the ROs applying two different sets of road designs.

It also indicated absence of design review process within the Design Division of the Ministry to review that any changes made in design complies with good practices and relevant standards and guidelines.

The ministry should review the circumstances leading to the implementation of two different sets of designs by the ROs besides instituting design review process to ensure consistent and uniform implementation of designs and drawing for similar projects in future.

In addition, the Ministry should also revisit the revised designs circulated to ROs, as the requisite gap between hillside and drains was found not maintained in majority of the work due to site specific and alignment problem of the drain works. Further, the Ministry should also relook on doing away of 1.5m Hard shoulders between the L-Drain and Carriageway in terms of risks towards safety of the commuters.

2.6 Ambiguities and flaws in the change of Road designs & Drawings with resultant deviations from the approved Design Standard envisaged in the Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009 and almost doing away of 1m formation width vis-à-vis compromising necessary safety measures and safety of commuters

The *Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009* for various categories of roads were as tabulated below:

Road Design Standards

Road Classification		Primary National Highway				Secondary National Highway				Dzongkhag Road				Farm Road			
Terrain classification		L	R	M	S	L	R	M	S	L	R	M	S	L	R	M	S
Design speed (km/h)		60	50	40	30	30	40	30	20	40	30	20	15	30	25	15	10
Traffic volume (vpd)		>200				100-200				30-100				<30			
Width (m)	Right of way	30				30				30				30			
	Carrigeway	6.5				3.5				3.5				3.5			
	Shoulder	1.5x2				1.5x2				0.5x2				0.5x2			
	Drain	1.0				1.0				0.6				0.6			
Min. radii of horizontal curve (m)		115	80	50	30	75	75	25	15	75	25	15	15	15 Exceptional =10			
Pavement slope (%)		2-5				2-5				4				4			
Shoulder slope (%)		3-6				4				5				5			
Type of pavement		Double bituminous treatment				Dense bituminous premix				Base Course				Single Layer Base Course			
Max. super-elevation (%)		10				10				10				10			
Max. vertical grade (%)		4	5	6	7	5-9				6-10				6-10			
Structure loading (minimum)		HS20-44				As per DoR standard				As per DoR standard				As per DoR standard			

Note:

1. Thromde Roads – Design standards to be prepared by DUDES in consultation with DoR.
 2. Access Road - Design standard to be set by DoR in consultation with the concerned agencies
 3. The Design standards for AH are at par with the design standards for PNH.
 4. Design standard of Farm Roads are equivalent to the design standards of Dzongkhag Roads.
- vpd = vehicles per day
L= Level terrain (0 to 10 per cent)
R= Rolling terrain (10 to 25 per cent)
M= Mountainous terrain (25 to 60 per cent)
S = Steep terrain (More than 60 per cent)

Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities

Fig: 2.6- Road Design standard

The Guidelines also stipulates that “All AHs, PNHs and SNHs shall have necessary safety measures including road signs and guardrails as per the DoR standards”.

The initial approved drawings attached with the bidding documents were found designed by the Design Division, DOR in line with the approved technical standard and road classification and standard of 2009 as depicted in the photograph below:

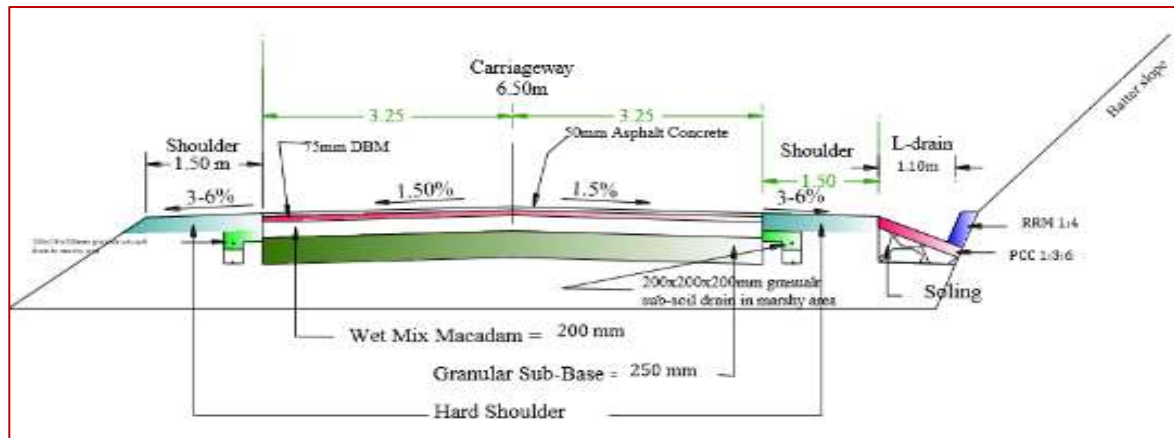


Fig:2.6(1)- Initial Approved drawing

The drawings outlined the following technical specifications and standards of the road:

- i. Overall Formation width 10.5m
- ii. Carriage paved width 6.5m;
- iii. Hard shoulder of 1.5m between 1m L-drain and carriage paved width and 1.5m hard shoulder at valley side; and
- iv. Line Drain 1m width at hill side
- v. 200X200X200mm granular sub soil drain in marshy area:

In terms of the technical standards of Road Design, the Shoulders provide a number of important functions. Safety and efficient traffic operations can be adversely affected if any of the following functions are compromised:

- *Shoulders provide space for emergency storage of disabled vehicles. Particularly on high-speed, high-volume highways such as urban freeways, the ability to move a disabled vehicle off the travel lanes reduces the risk of rear-end crashes and can prevent a lane from being closed, which can cause severe congestion and safety problems on these facilities.*
- *Shoulders provide space for enforcement activities. This is particularly important for the outside (right) shoulder because law enforcement personnel prefer to conduct enforcement activities in this location. Shoulder widths of approximately 8 feet or greater are normally required for this function.*
- *Shoulders provide space for maintenance activities. If routine maintenance work can be conducted without closing a travel lane, both safety and operations will be improved. Shoulder widths of approximately 8 feet or greater are normally required for this function. In northern regions, shoulders also provide space for storing snow that has been cleared from the travel lanes.*
- *Shoulders provide an area for drivers to maneuver to avoid crashes. This is particularly important on high-speed, high-volume highways or at locations where there is limited stopping sight distance. Shoulder widths of approximately 8 feet or greater are normally required for this function.*

- *Shoulders improve bicycle accommodation. For most highways, cyclists are legally allowed to ride on the travel lanes. A paved or partially paved shoulder offers cyclists an alternative to ride with some separation from vehicular traffic. This type of shoulder can also reduce risky passing maneuvers by drivers.*
- *Shoulders increase safety by providing a stable, clear recovery area for drivers who have left the travel lane. If a driver inadvertently leaves the lane or is attempting to avoid a crash or an object in the lane ahead, a firm, stable shoulder greatly increases the chance of safe recovery. However, areas with pavement edge drop-offs can be a significant safety risk. Edge drop-offs occur where gravel or earth material is adjacent to the paved lane or shoulder. This material can settle or erode at the pavement edge, creating a drop-off that can make it difficult for a driver to safely recover after driving off the paved portion of the roadway. The drop-off can contribute to a loss of control as the driver tries to bring the vehicle back onto the roadway, especially if the driver does not reduce speed before attempting to recover.*
- *Shoulders improve stopping sight distance at horizontal curves by providing an offset to objects such as barrier and bridge piers.*
- *On highways with curb and enclosed drainage systems, shoulders store and carry water during storms, preventing water from spreading onto the travel lanes.*
- *On high-speed roadways, shoulders improve capacity by increasing driver comfort.*

All the estimates and BOQ's were prepared based on the above drawings. Accordingly, the contract works for all packages were awarded based on the initial approved drawings and works commenced from July /August 2015.

However, it was apparent from the records that based on the decisions taken during the meeting held in **February, 2016, after a time elapse of more than eight month from the commencement of the contract works**, drawings were found revised for different category of Road in Bhutan as depicted in the photograph below:

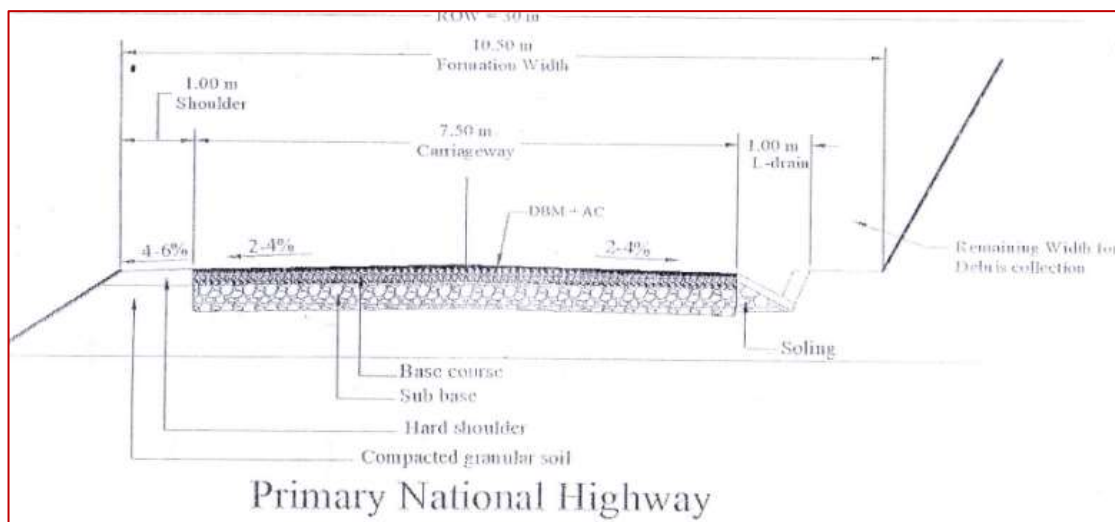


Fig: 2.6(2)- Revised design and drawing

As per the record of discussion dated 26/02/2016, the revised drawing and design were circulated to respective ROs vide letter No. MoWHS/Sec-29/2015-16/524 dated 16/10/2015 for adoption. The drawings outlined the following technical specifications and standards of the road:

- i. Overall Formation width of 10.5m;
- ii. Carriage width 7.5m;
- iii. 1m width maintained for Debris collection on hillside;
- iv. Line drain of 1m between the paved carriage way and 1m width at hill side;

In line with the directive, the Regional Office, Lobeysa had conveyed to all Sub-Division to implement the work as per standard drawing vide letter No. DoR/ROL/2015-2016/Plg-05/1828 dated 11/5/2016.

While the subsequent design and drawing had maintained increased carriage pavement width of 7.5m, other structural drawings were also changed from the initial designs and drawings as evident from the above photograph.

The above changes in the design and drawing not only resulted in extra financial implication to the government exchequer for increase of 1m carriage width to the extent of approximately Nu.317.637 million but also impeded timely completion of work due to grant of time extension for the increased scope of work as well as compromised safety measures by doing away Hard shoulders of 1.5m width between the L-Drain and Paved carriageway width including reduction of 0.5m hard shoulder at valley side. Besides, due to design changes, overall formation width of 10.5m were found not achieved as 1m width supposedly maintained for Debris collections between hillside and L-Drain were found not maintained in entirety for all stretches of the roads as majority of the L-Drain was found constructed attached to the hillside. Further, 1m shoulder width on the valley sides were also found not maintained as in some stretches of roads the pavement road were found executed at the edge of the road width.

In this connection, the Ministry may also comment on the following aspects:

- The design deviation from the approved design stipulated in the Guidelines 2009 and approval of the Lhengye Zhungtshog, if any, obtained as “The *Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009 prepared by the Ministry of Works and Human Settlement (MoWHS)* was dully approved in the 31st Session of Meeting of Lhengye Zhungtshog held on 24th February 2009;
- Doing away of 1.50 m Hard shoulder width between the L-Drain and Paved carriage way;
- Non-achievement and non-maintenance of 1m width for Debris collection at the hillside;
- Non/inconsistent maintenance of 1m width at valley sides; and
- Approval for deviation of design from approved designs and sources for additional funds to the extent of Nu. 317.637million.

Besides, the Ministry must hold the officials responsible for design changes after the award of the contract as well as deviations from the approved design for appropriate decisions and action.

Auditee's Response:

Increasing of Pavement width from 6.5m to 7.5m came from the need to upgrade our very important Primary National Highway of the country spanning East to West by gradually improving its basic specifications to meet with the growing demands by ever increasing road users and to ensure traffic reliability, passenger comfort and their safety when the opportunity existed for such an intervention under GOI funding.

From over several decades of experiences in the construction and maintenance of roads in Bhutan and learning from experiences of many developed countries, it has been established that ingress of water is the top most factor for premature damages to road pavements (especially the flexible pavement system). Factors such as environmental conditions, traffic intensity and increased loadings, and the design inadequacies are some other contributing factor for premature pavement damages. Based on this premise, since pavement works were not commenced in all of the contracts awarded for all stretches from Simtokha to Korilla, the intervention was deemed timely. DoR also appraised this ministry that under GOI funding on NEWH project, it expected huge savings then.

Therefore, instead of providing 1.5m wide earthen shoulder on the hillside of the pavement the ministry proposed increasing the pavement width from 6.5m to 7.5m taking up 1.0m of the 1.5m shoulder and fixing the 1.0m wide L-shaped/U-shaped side drains next to the pavement structure only. This intervention brought following improvements and benefits to the overall flexible pavement system.

- 1. Earthen shoulders are a porous medium that will allow gradual seepage of surface run off water and the normal rainwater. The water percolates into underlying pavement payers of DBM, WMM and GSB that are fairly porous in nature. When ground temperatures reach 40 degrees centigrade, the bitumen strips off the aggregates causing segregation of bituminous concrete. During winter in high altitude areas, the water in the pavement layers undergo freezing / icing breaking open the bituminous concrete and when weather warms up in Spring and after, the thawing of frozen ice takes place melting it into water leaving cracks in the bituminous concrete. This phenomenon of icing and thawing leads to crushing of cracked road surfaces under wheels of trucks and vehicles, forming cracks of all kinds and potholes. Addition of this 1.0m extra blacktop instead of earthen shoulder definitely prevents this undesirable phenomenon - saving huge recurrent expenditures.*
- 2. The side drain running parallel to the centerline of the pavement next to the pavement structure not only ensures that road surface is impervious to ingress of water enhancing the life of the pavement, the aesthetics of the pavement alignment improves to a great extent.*
- 3. The 1.0m extra pavement width will allow much desired unrestricted speed of the traffic flow in both directions preventing the pulling force that will otherwise develop between vehicles crossing past in opposite directions close to each other. In fact, to enhance safety, if space permits there should be a solid divider between lanes in opposite directions to avoid pulling (vacuum) force and the glares from headlights.*
- 4. The extra wide road will compensate for the absence of super-elevation at curves as the introduction of which is not possible in our highways due to lack of space to lay the*

transition curves that precedes the Super-elevation. Super-elevation counter acts the centrifugal force of speeding vehicles.

- 5. This initiative allows leaving a 1.0m space between the hillside slope toe and the side's L-drain, which not only will hold back the first slides getting into the drain directly from slope erosion under rains, but also improves the sight distance for the drivers at the curves and sharp corners. It also ensured a relatively dust and mud free highway pavement as only valley side shoulder exists.*
- 6. The introduction of 1.0m extra avoided payment for 1.5m wide shoulder, although an additional expenditure was required to be made for 1.0m wide DBM and AC layers. A certain percentage on the cost for BT would have been compensated.*

The 1.0m extra wide black top pavement did not affect any fundamental geometrics or integrity of the national highway. In fact it definitely has enhanced the longevity of the pavement life, improved the safety and riding comfort of road users, the long desired national highway specification upgraded with aesthetics significantly improved and all of these are vital for the growth and sustenance of our economy.

With these positive outcomes in the perspective, the proposal thus submitted was endorsed by the MLTC members and recommendations duly approved jointly by the Ministers for Finance and Works & Human Settlement ministries vide MoWHS/SEC/29/2015/476 dated 5/8/2015 (Copy enclosed). The RAA is therefore requested to consider the submission favorably given the benefits and many positive outcomes from the initiative by not pursuing the matter further please.

The Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009 prepared by the Ministry of Works and Human Settlement (MoWHS) approved in the 31st Session of the Lhengye Zhungtshog Meeting held on 24th February 2009.

RAA's Further Comments & Recommendation:

It is to reiterate that "The Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009" prepared by the Ministry of Works and Human Settlement (MoWHS) was approved in the 31st Session of the Lhengye Zhungtshog Meeting held on 24th February 2009. As the Guidelines was approved by the Cabinet, the approval, if any, obtained on the changes in technical specification of road was not available on records.

It is also to reiterate that the changes in technical specification for providing 1m gap between the Drain works and hill side were found not achieved in all contract packages as the L-Drains were found executed attaching to hills as provided in the initial designs/drawings. Thus, given the present scenario, the RAA is of the opinion, that non-achieving of or maintaining the required gaps was a result of technical flaws.

As discussed in the exit meeting, the DOR in consultation with the Ministry should revisit the revised drawing for appropriate decisions and taking measures to address any technical flaws and ambiguities. Besides, the Ministry should also look in to the requirement of approval of

Cabinet on the revised designs as it had deviated from “The Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009”.

2.7 Inconsistency in the fixation of construction duration for the same design and scope of construction works within and among the Regional Offices

The Construction of East West double lanning works followed the same design and specifications. However, the quoted rates and project durations had huge variations as tabulated in table 2.7 below:

Table 2.7: Inconsistency in fixation of construction durations							
RO	Packages	Type of works	Scope of work in terms of Chainage coverage	Estimated Cost (in millions of Nu)	Quoted rates (in millions of Nu)	Project Duration (in months)	Duration in month per Km
Lobeysa	I, II, III	Pavement works	10 Km each	119,590,876.28	102,286,495.00	15	1.5
Lobeysa	IV	Pavement works	11 Km	127,642,926.26	107,120,422.00	15	1.364
Lobeysa	VI	Pavement works	12.14 km	131,989,514.38	112,652,539.00	25	2.06
Lobeysa	XII	Pavement works	7 km	100,267,497.37	66,128,323.00	11	1.571
Lobeysa	XIII	Pavement works	8 km	126,747,002.70	69,441,930.00	17	2.125
Lobeysa	XIV	Pavement works	3.25 km	46,552,814.61	27,808,65.00	10	3.077
Lobeysa	XV	Pavement works	2.75 km	39,390,946.46	39,390,946.46	12	4.364
Lobeysa	V	Widening & Pavement works	7 Km	92,439,003.48	72,680,325.00	20	2.857
Lobeysa	VII	Widening & Pavement works	6.86 km	90,091,287.54	71,417,679.10	20	2.915
Lobeysa	VIII	Widening & Pavement works	7 km	87,463,950.28	78,967,074.00	25	3.571
Lobeysa	IX	Widening & Pavement works	7 Km	92,798,931.12	93,263,506.00	25	3.571
Lobeysa	X	Widening & Pavement works	6 Km	84,881,450.38	56,974,612.41	24	4.00
Lobeysa	XI	Widening & Pavement works	10 km	153,688,193.47	107,568,025.00	25	2.5
Lingmethang	PKG - VII	Pavement works	4 Km	70,459,887.01	37,106,895.00	15	3.75
Lingmethang	I(a)	Pavement works with ZeoCrete Technology	10 Km	166,708,500.00	166,708,500.00	18	1.8 (Estimated cost higher only due to cost of ZeoCrete materials)
Lingmethang	II	Widening & Pavement works	5.70 Km	82,050,303.45	62,478,155.55	24	4.2
Lingmethang	III	Widening & Pavement works	6 Km	94,700,240.00	73,783,024.22	24	4
Lingmethang	IV	Widening & Pavement works	5 Km	77,382,142.43	59,469,881.70	30	6

Lingmethang	V	Widening & Pavement works	11.56 km	131,001,271.16	111,902,235.00	30	2.6
Lingmethang	VI	Widening & Pavement works	12 Km	140,282,847.00	125,555,774.00	28	2.33
Trongsa	TR-VII	Pavement works	6.4 Km	95,574,000.00	70,131,698.00	18	2.81
Trongsa	TR-XII	Pavement works	5 Km	100,267,497.37	78,928,350.00	20	4.00
Trongsa	TR-I	Widening & Pavement works	12 Km	191,662,477.46	147,882,777.62	30	2.5
Trongsa	TR-II	Widening & Pavement works	7.5 Km	171,993,910.77	111,563,269.46	30	4.0
Trongsa	TR-III	Widening & Pavement works	7.5 Km	151,041,704.92	97,306,916.89	30	4.0
Trongsa	TR-IV	Widening & Pavement works	5 Km	146,426,379.15	94,860,888.47	30	6.0
Trongsa	TR-V	Widening & Pavement works	5.7 Km	131,935,342.62	77,150,269.45	30	5.26
Trongsa	TR-VI	Widening & Pavement works	6.7 Km	138,898,344.12	79,151,909.00	30	4.48
Trongsa	TR-VIII	Widening & Pavement works	7.2 Km	105,297,611.69	73,239,890.20	28	3.89
Trongsa	TR-IX	Widening & Pavement works	7.98 Km	127,405,641.48	120,072,191.07	28	3.51
Trongsa	TR-X	Widening & Pavement works	6.02 Km	150,325,008.00	85,883,906.60	28	4.65
Trongsa	TR-XI	Widening & Pavement works	8 Km	117,475,584.76	89,839,558.00	28	3.5
Trongsa	TR-XIII	Widening & Pavement works	10.10 Km	129,964,945.98	124,174,327.15	28	2.77
Trongsa	TR-XIV	Widening & Pavement works	2.18 Km	55,771,219.28	45,714,110.00	15	6.88
Thimphu	TH-I	Pavement works	8.7 Km	115,642,860.00	81,088,430.15	15	1.72
Thimphu	TH-II	Pavement works	6.5 km +2 km	108,362,690.31	84,347,137.15	15	1.74

It would be apparent from the table above varying construction durations have been derived as the construction durations were neither based on Chainage coverage nor the estimated cost. The construction durations had been estimated differently within the ROs and amongst the ROs indicating absence of systems and procedures for estimation of contract durations.

The Ministry should comment on the adoption of varying practices for the fixation of construction durations and any systems or procedures put in place vis-à-vis Rules of thumb required to be used by engineers for estimating the construction durations on a more realistic, transparent and fair manner.

Auditee's Response:

Internationally there is hard formula stating definite contract duration. And no two projects are identical in nature, size and conditions. Therefore, the contract duration is either fixed based on the past experiences or considering many factors such as scope of work, unseen

geological conditions, availability of resources (materials), process to obtain environmental clearances, settlement nearby the project, availability of suitable machinery etc. Sometimes, the contract duration is even governed by the urgency of the infrastructure needed, like construction of extended class room after the earthquake. In cases, the work can be accomplished by doubling the resources and usually comes at higher cost.

In the hill roads, unexpected geological conditions, apart from many factors is predominate factor that often delays the project completion and cost overrun. A good example is Punachangchu Hydro power project.

Therefore, please drop the memo.

RAA's Further Comments & Recommendations:

While acknowledging the responses on the fixation of contract duration based on experiences and work related factors, the analysis carried out by the RAA indicated flaws and ambiguities as differing durations were determined by ROs for various constructions packages. The contract durations per KM for Pavement Works ranged from as low as 1.4 months to as high as 4.4 months. Similarly, for Formations and Pavement work contracts, the contract duration per km ranged from as low as 2.5 months to as high as 6.8 months.

Thus, there is a need for determination of contract duration in an objective manner based on scheduling major quantum of works expected to be executed and assigning activity durations and the minimum resources expected to be committed during the execution including factors such as full work season of the year, weather limitations, concrete curing times, rainfalls, locally available materials and lead time involved in transportation materials from base towns.

One of the main reasons for time and cost overruns of most of the construction works is apparently due to fixing of unreasonable contract durations. Besides, there is also possible risk of compromising the quality of works in an effort to complete the contract work within unreasonable deadline.

The MoWHS should, therefore, formulate specific guidelines or a Rule of thumb to provide reasonable and consistent basis for determining the construction duration for all construction works undertaken by government agencies.

2.8 Inconsistencies in the incorporation of cost of Bitumen in the preparation of estimates

The Four Regional Offices had prepared two cost estimates for each contract packages of double Lanning works. One cost estimate prepared is inclusive of cost of bitumen and other one without including the cost of bitumen. The cost estimates without the cost of bitumen were considered for cost comparison with the quoted prices of the bidders as well as for the realization of the differential amount in cases of abnormally low quoted bids.

The RAA made an attempt to cross verify the consistencies in the incorporation of cost of bitumen in the estimates in terms of cost per kilometer since the technical specification including DBM and AC thickness were same for all the contract packages. On review of the cost estimates prepared by the Regional Offices for various contract packages, it was noted that bitumen cost per kilometer within and among the ROs were varying as shown in table 2.8 below:

Table 2.8: Inconsistencies in the incorporation of cost of bitumen in the estimates							
RO Trongsa							
Packages	Estimate without bitumen	Estimate with bitumen	Cost of Bitumen	Chainage Awarded	Total Km awarded	Cost per KM	% Variations
1	191,662,477.46	279,895,177.46	88,232,700.00	0.00 to 12 = 12 Kms.	12	7,352,725.00	87.72
2	171,993,910.77	227,139,348.27	55,145,437.50	12 - 19.5 = 7.5 Kms.	7.5	7,352,725.00	87.72
3	151,041,704.92	206,187,000.00	55,145,295.08	19.5 - 27 = 7.5 Kms	7.5	7,352,706.01	87.72
4	146,426,379.15	187,701,324.56	41,274,945.41	27 - 32 = 5 Kms	5	8,254,989.08	110.75
5	131,935,342.62	171,648,867.12	39,713,524.50	32 - 37.7 = 5.7Kms	5.7	6,967,285.00	77.88
6	138,898,344.12	185,370,135.07	46,471,790.95	37.7 - 44.4 = 6.7 Kms	6.7	6,936,088.20	77.08
7	95,574,000.00	119,467,000.00	23,893,000.00	44.7 - 50.8 = 6.10Kms	6.1	3,916,885.25	0.00
8	105,297,611.69	155,462,063.69	50,164,452.00	50.8 - 58 = 7.2Kms	7.2	6,967,285.00	77.88
9	127,405,641.48	183,004,575.78	55,598,934.30	58 - 65.98 = 7.98 Kms	7.98	6,967,285.00	77.88
10	150,325,008.00	182,465,053.60	32,140,045.60	65.98 - 72 = 6.02Kms	6.02	5,338,878.01	36.30
11	117,475,584.76	174,263,864.76	56,788,280.00	72 - 80 = 8 Kms	8	7,098,535.00	81.23
12	98,619,592.00	130,933,412.42	32,313,820.42	80 - 85 = 5 Kms	5	6,462,764.08	65.00
13	129,964,945.98	201,016,750.70	71,051,804.72	85 - 97.3 = 10.10 Kms	10.10	7,034,832.15	79.60
14	55,771,219.28	65,277,109.28	9,505,890.00	87.62 - 89.8 = 2.18 Kms	2.18	4,360,500.00	11.33
Table 2.8.1: Inconsistencies in the incorporation of cost of bitumen in the estimates							
RO, Lobeysa							
Packages	Estimate without bitumen	Estimate with bitumen	Cost of Bitumen	Chainage Awarded	Total Km awarded	Cost per KM	% Variations
1	114,155,909.36	197,346,703.07	83,190,793.71	477-467 (10 Kms)	10	8,319,079.37	44.92
2	118,573,848.79	201,764,642.50	83,190,793.71	467-457 (10 Kms)	10	8,319,079.37	44.92
3	119,590,876.28	202,781,669.99	83,190,793.71	457-447 (10 Kms)	10	8,319,079.37	44.92
4	127,642,926.26	201,169,182.50	73,526,256.24	447-436 (11 Kms)	11	6,684,205.11	16.44
5	92,439,003.48	150,265,331.42	57,826,327.94	429-422 (7 Kms)	7	8,260,903.99	43.90
6	131,989,272.17	231,546,557.29	99,557,285.12	422-409.86 (12.14)	12.14	8,200,764.84	42.86
7	90,091,287.54	146,348,534.32	56,257,246.78	409.86-403 (6.86 Kms)	6.86	8,200,764.84	42.86
8	87,463,950.28	144,869,304.13	57,405,353.85	379-372 (7 Kms)	7	8,200,764.84	42.86
9	92,978,931.12	150,384,284.98	57,405,353.86	379-389 (10 kms)	10	5,740,535.39	0.00
10	84,881,450.38	134,086,039.40	49,204,589.02	365-359 (6 Kms)	6	8,200,764.84	42.86
11	153,688,193.47	236,339,379.80	82,651,186.33	379-389 (10 kms)	10	8,265,118.63	43.98
12	100,267,497.37	158,692,087.37	58,424,590.00	436-429 (7 Kms)	7	8,346,370.00	45.39
13	126,747,002.70	193,517,962.70	66,770,960.00	403-395 (8 Kms)	8	8,346,370.00	45.39

14	46,552,814.61	73,678,517.11	27,125,702.50	392.25-389 (3.25 Kms)	3.25	8,346,370.00	45.39
15	39,390,946.46	62,343,463.96	22,952,517.50	395-392.25 (2.75 Kms)	2.75	8,346,370.00	45.39

Note: Under Lobeysa, DBM and AC thickness for contract packages 12, 13, 14, and 15 were reduced from 75mm to 60 and 50mm to 40mm respectively.

Table 2.8.2: Inconsistencies in the incorporation of cost of bitumen in the estimates							
RO, Lingmethang							
Packages	Estimate without bitumen	Estimate with bitumen	Cost of Bitumen	Chainage Awarded	Total Km awarded	Cost per KM	% Variations
1 (B)	88,210,000.00	144,900,000.00	56,690,000.00	51.00-61.50 = 10.50 km	10.50	5,399,047.62	0.00
2	82,050,303.45	127,410,000.00	45,359,696.55	73.19-78.89 = 5.79 km	5.79	7,834,144.48	45.10
3	94,700,240.00	142,445,000.00	47,744,760.00	78.89-84.89 = 6.00 km	6	7,957,460.00	47.39
4	77,382,142.43	117,169,000.00	39,786,857.57	84.89-89.89 = 5.00 km	5	7,957,371.51	47.38
5	131,001,271.16	222,969,000.00	91,967,728.84	90.89-102.45 = 11.56 km	11.56	7,955,685.89	47.35
6	140,282,847.00	235,773,000.00	95,490,153.00	102.45- 114.45 = 12.00 Km	12	7,957,512.75	47.39
7	70,459,887.01	96,717,000.00	26,257,112.99	114.45-118.45 = 4 Km	4	6,564,278.25	21.58

Note: Under Lingmethang, DBM and AC thickness for contract package 7 was reduced from 75mm to 60 and 50mm to 40mm respectively

Table 2.8.3: Inconsistencies in the incorporation of cost of bitumen in the estimates							
RO, Thimphu							
Packages	Estimate without bitumen	Estimate with bitumen	Cost of Bitumen	Chainage Awarded	Total Km awarded	Cost per KM	% Variations
1	115,642,860.00	169,193,479.02	53,550,619.02	527 to 527.7 & 530 to 538	8.7	6,155,243.57	0.00
2	108,362,690.31	163,597,831.25	55,235,140.94	538 to 544.5 & Simtokha Olakah 2Km	8.5	6,498,251.88	5.57

In consideration to the equal thickness of DBM and AC for all contract packages except 5 packages where DBM and AC thickness were reduced, the bitumen cost per kilometer should have been comparable. It is apparent from the tables above that cost of bitumen incorporated in the cost estimates varied from Nu. 3,916,885.25 per km to as high as Nu. 8,346,370.00 per km indicating flaws and ambiguity in the cost estimates for bitumen.

The Ministry should review the cost estimates and ascertain the circumstances leading to substantial bitumen cost differences in the estimates.

Auditee's Response:

In compliance to the existing policy, the bitumen required for road works is being procured centrally by the Directorate Services, MoWHS.

The cost of bitumen at source is not constant due to fluctuation of price of petroleum products in the international market. In addition, there is also the transportation cost for the bitumen from the source to the Central Stores in P'ling. Also, the cost of transportation of bitumen from Central Stores to the respective Regional offices varies based on the distance from P'ling.

As recommended by RAA, DoR RO Trongsa will request the Ministry to review the cost estimates to ascertain the facts leading to substantial difference in the cost of bitumen in the cost estimates.

RAA's Further Comments & Recommendation:

While taking note of the response on the fluctuation of price of petroleum products in the international market and the transportation cost for the bitumen from Central Stores to RO Regional Stores and project sites, the fact remains that the bitumen cost per kilometer varied from as low as Nu. 3,916,885.25 per km to as high as Nu. 8,346,370.00 per km representing more than 113% variations indicated flaws and ambiguity in the cost estimates for bitumen.

However, as discussed during the exit meeting, the DOR and Ministry should review all the estimates prepared by the ROs to validate the correctness of the estimates and ascertain existence of any systemic flaws and ambiguities in the preparation of estimates for initiating corrective measures for future project works. The Ministry should furnish the outcome of the review and measures put in place to address flaws and ambiguities in the preparation of estimates for future projects.

2.9 Adoption of varying practices of rate analysis by contractors and wrong application of coefficient for 80mm, instead of 75mm design thickness of DBM and also for 50mm thick Asphalt and recoverable amount aggregating to Nu. 69.334 million

Special Conditions of Contract, Point No. 2, stipulates as ***“The bidder must attach the detail rate analysis for DBM and AC along with the bidding document”***. It was made to understand that submission of rate analysis by contractor was to ensure that the cost of bitumen was not included and that rates incorporated for design thickness for DBM and Asphalt concrete did not exceed 75mm and 50mm thick respectively.

On review of contractor's rate analysis attached with the tender documents, lapses and discrepancies were observed in the application of co-efficient for the item of work 75mm DBM & 50mm AC as the LMC provided were only for 70mm and 80mm, DBM work and 40mm AC work. Thus, the co-efficient used for 75mm DBM was considered for 80mm thick and co-efficient for 50mm thick AC works was randomly worked out by contractors. In addition clerical errors were also found on deriving the analyzed rates.

Thus, due to wrong application of Co-efficient and clerical errors, the rates accepted by the Evaluation Committee and reflected in the BOQs were found inflated. The overall financial implication due to wrong acceptance of rates for the two item of works amounted to Nu. 69,334,409.38 as shown in table 2.9 below:

Sl. No.	Regional Office	No. of Packages	Amount (Nu. in Million)	Remarks
1	RO, Lobeyisa	8 Contract packages	20,782,438.38	
2	RO Trongsa	7 Contract Packages	28,468,525.00	

3	RO Lingmethang	73 Contract packages	10,984,878.00	
4	RO, Lobeyasa	M/s Chogyal Construction Pvt. Ltd (Packages I, II and III)	7,104,603.83	Acceptance of inflated rate analysis due to inclusion of rate for Bitumen Spreader. The Bitumen Spreader was not specified in the LMC for DBM and Asphalt concrete works.
5	RO, Lobeyasa	M/s Welfare Construction Pvt. Ltd –	9,098,568.00	Inclusion of cost for Generator & Control Panel not Complying to LMC and 5% for mobilization and installation of Labour Camps, Machinery yard, tools and plants
6	RO Trongsa	M/s Druk Lamsel Construction Pvt. Ltd(Package 7A) (AM18.6)	1,488,000.00	Acceptance of inflated rate analysis due to inclusion of rate for Bitumen Spreader. The Bitumen Spreader was not specified in the LMC for DBM and Asphalt concrete works
Total			69,334,409.38	

The Ministry must thoroughly review the aforementioned discrepancies involving substantial amounts of financial implication to the Government and also ascertain the circumstances leading to failure on the part of the Evaluation Committee and MLTC despite obtaining the rate analysis from the prospective bidders. The Ministry should also fix the officials responsible for such unwarranted lapses for appropriate decisions and actions.

Besides, the Ministry must either recover the amount of **Nu.69,334,409.38** if already paid or correct the quoted rates to prevent ineligible payments in the upcoming RA Bills.

Auditee's Response:

The pavement thickness was derived from the pavement chart based on the average traffic in msa and CBR value. For NEWH Project, based on the traffic count and traffic forecast including future traffic, the DBM and AC were determined to be 80mm and 50mm thickness respectively. However, there is no coefficient in the BSR for above thickness. Therefore, the coefficients were interpolated and extrapolated in the departmental estimates.

The main objective of asking the rate analysis for DBM and AC with the bid is to ensure that the bidder has not included the cost of bitumen since the bitumen is to be provided by the client. The rate analysis and pricing of the contractor varies from one contractor to another. Also to inform RAA that the issuance of the bitumen is based on the Job Mix Formula and not as per the coefficient of the rate analysis.

As per the ABSD recommendation, bitumen has been listed as one of the central procurement materials to ensure quality and the study found that there is substantial saving if it is procured centrally. Initially, there was a practice in the Department to recover the cost of the bitumen issued based on the prevailing rates. However, many bidders did not appreciate the deduction being done from their running bill and also there was contention in using different bitumen rates in the recovery.

Therefore, in order to streamline the process and reduce contention in the interpretation, the Department through the approval of the Ministry has decided to issue the bitumen free of cost to the contractors executing the BT works.

Since the main objective of the rate analysis was to check the cost of the bitumen as “zero” in the quote, the evaluation team neither the award committee felt necessary to check the LMC of the DBM & AC. In the competitive tender, rate will definitely vary and internationally it is

never practiced to increase the coefficient of those items that are less and similarly cutting down the coefficient of those items where the LMC is high. Contractor's rate vary from item to item.

Therefore, RAA is requested to kindly drop the memo based on the justifications provided above.

RAA's Further Comments & Recommendations:

While taking note of the response, it is clear that the Ministry has failed to incorporate appropriately in the tender documents and TOR of Evaluation Committee on the requirement of Rate analysis to be aligned with the Labour and Material Co-efficient (LMC) and BSR not just to check that the cost of bitumen is "Zero" in the rate analysis.

The wrong application of Co-efficient and clerical errors by the contractor in its rate analysis had inflated the quoted rates of the above item of works. The failure on the part of the Evaluation Committee to ensure application of correct labour and material co-efficient during rate analysis had resulted in overall financial implication to the Government Exchequer to the extent of Nu. 60,235,841.38.

In view of huge financial implication, the Ministry should consider forming a dedicated technical team to review all the rate analysis of the contractors and measures taken to correct the discrepancies to avoid similar lapses in future contract works.

The huge financial loss to the extent of Nu. 69.334 million to the government Exchequer is brought to the notice of the Government for appropriate decisions and actions.

2.10 Flawed rate analysis through incorporation of transportation cost of bitumen as percentage to the overall derived cost of the item of work with resultant avoidable cost to the project Nu. 12.323 million

Under SCC (Additional Clause) and Addendum issued vide letter DoR/ROL/Plg-15 (A)14-15/3439 dated 16/4/15, No. R0-T/DoR/2014-2015/W-9/1469 dated April 14, 2015, Clauses amongst others were amended as below:-

- i. *The Department will procure Bitumen(VG-10) and supply to the contractors*
- ii. *The Bidder(s) shall apply "0" Zero for the cost of Bitumen (VG-10) in their rate analysis for Dense Bituminous Macadam (DBM) and Asphalt concrete(AC) as department is to supply bitumen (VG-10)*
- iii. *In order to authenticate the above point No ii, the Bidder (s) should compulsorily submit the details of rate analysis for DBM & AC along with the bids.*
- iv. *The contractor shall lift the required bitumen (VG-10) from Store, Regional Offices, DoR, and transport it to their respective sites(s) at his or her own cost.*

On review, the Rate analysis for the DBM and Asphalt works submitted with the tender documents revealed that eight (8) Contract packages had included transportation cost for lifting of Bitumen from Regional Store to work site either as cost component of the item work or as percentage to the overall analyzed cost of the item work.

Thus, the inclusion of transportation charges as a part of the component of cost in lieu of cost of bitumen in addition to loading, wastage and overhead charges applied for deriving the item rates for the item works was not in compliance to the aforementioned Addendum issued.

The cost implication based on estimated quantities of DBM & AC works for transportation of bitumen from the Regional store to site alone amounted to Nu. 12,322,823.58 as computed in table 2.10 below:

Sl.No.	Regional Office	No. of Packages	Amount (Nu. in Million)	Rate charged	Remarks
1	RO, Lobeysa	M/s Taksing Chungdruk Construction Pvt. Ltd. (Packages 12)	1,758,512.08.	DBM= Nu.19 per Sqm AC= Nu. 14 per Sqm	Added 10% as transportation charges for lifting of bitumen on over cost
2	RO Lingmethang	M/s K.D Builder Pvt Ltd. Bumthang (Packages 3)	803,300.00	DBM= Nu.11.31 per Sqm AC= Nu. 6.63 per Sqm	Acceptance of inflated rate analysis due to inclusion of rate for transportation cost of Bitumen in the rate analysis for the DBM and AC item of work
3		M/s Rigsar Construction Pvt. Ltd (Package 6)	2,156,400.00	DBM= Nu.13.31 per Sqm AC= Nu. 10.65 per Sqm	Acceptance of inflated rate analysis due to inclusion of rate for transportation cost of Bitumen in the rate analysis for the DBM and AC item of work
4	RO Trongsa	M/s Rinson Construction Pvt. Ltd (Package 13) (AM25.9)	2,053,582.50	DBM= Nu.15.98 per Sqm AC= Nu. 11.13 per Sqm	Acceptance of inflated rate analysis due to inclusion of rate for transportation cost of Bitumen in the rate analysis under the DBM and AC item of work
5		M/s Rigsar Construction Pvt. Ltd (Package 1)	2,156,400.00	DBM= Nu.13.31 per Sqm AC= Nu. 10.65 per Sqm	Acceptance of inflated rate analysis due to inclusion of rate for transportation cost of Bitumen in the rate analysis under the DBM and AC item of work
6		M/s Rinson Construction Pvt. Ltd (Package 3)	2,032,875.00	DBM = Nu. 21.30 per Sqm AC= Nu. 14.84 per Sqm	Acceptance of inflated rate analysis due to inclusion of rate for transportation cost of Bitumen in the rate analysis under the DBM and AC item of work
7		M/s Welfare Construction Pvt. Ltd (Package 9)	239,400.00	DBM= Nu. 2.00 per Sqm AC= Nu. 2.00 per Sqm	Acceptance of inflated rate analysis due to inclusion of rate for transportation cost of Bitumen in the rate analysis under the DBM and AC item of work
8		M/s Rinson Construction Pvt. Ltd (Package 10)	1,122,354.00	DBM= Nu. 15.98 per Sqm AC= Nu. 11.13 per Sqm	Acceptance of inflated rate analysis due to inclusion of rate for transportation cost of Bitumen in the rate analysis under the DBM and AC item of work
	Total		12,322,823.58		

It is apparent that the Evaluation Committee and MLTC had failed to review the rate analysis submitted by the contractors in line with the addendum and for appropriateness and to take corrective measures prior to acceptance of the rates. The RO in consultation with the Ministry should revisit the analyzed rates. Cost implication due to inclusion of transportation cost as a component of cost of the item work in addition to the wastages and overhead charges applied on the overall item rates should be worked out and recovery effected deposited into ARA.

The Ministry besides commenting on the deficiencies and lapses on the part of the Evaluation Committee and MLTC members should hold the responsible officials accountable to make good the loss in the event contractor disagree to refund the cost implication.

Auditee's Response:

As per the section VI of the SCC: the additional clause reads:

i) Bitumen VG-10 shall be supplied by the client and no recovery shall be made. However, the contractor shall lift the bitumen from the Regional Offices, DoR, and transport it to respective work site at their own cost.

ii) The bidders are required to submit rate analysis for the following items:

- a. Providing & Laying DBM*
- b. Providing and laying AC.*

Note: The rate of bitumen VG-10 must be “0” (Zero) in the above rate analysis: however, the transportation cost of bitumen from above store to the respective work site must be included in relevant items of the rate analysis.

From the above clauses, it is understood that contractor has to submit the rate analysis for DBM and AC. The contract document also highlights that contractor can add transportation cost of bitumen from RO store to work site in relevant items of the rate analysis. In compliance to the tender document, the contractor has submitted the rate analysis and added the transportation cost in the relevant coefficient.

RAA’s Further Comments & Recommendations:

Evaluation committee plays a crucial role in procurement as it is their due diligence and decision that determines the outcome of the tendering process. The members have to be competent and charged with the responsibility to uphold the core principles of procurement to ensure procurements at most competitive manner.

It was the responsibility of the Evaluation Committee to present the facts correctly to the MLTC on the incorporation of transportation charges as component cost of the item of works against the cost of bitumen though was to be “Zero” in the rate analysis. The cost of transportation should have been covered under overheads and profit charges as incorporated by other contractors. The decisions on the evaluation committee to ignore such flaws in the rates analysis had resulted in overall financial implication to the Government Exchequer to the extent of Nu.12,322,823.58.

Failure of evaluation committee members seem to be a major cause for most procurement errors or non-compliances. The absence of consistent structures in place in different procuring agencies leave room for isolated approach and differing practices undermining the PRR’s objective of achieving uniformity and effectiveness of procurement procedures.

Considering huge financial implication, the Ministry should institute technical team to review all the rate analysis of contractors and formulate specific guidelines in carrying out rate analysis by the ROs and contractors detailing the processes for incorporating transportation and other related cost if construction materials are to be supplied to the contractors by the executing agencies to avoid flaws, ambiguities and complications in future project works.

The huge financial loss to the extent of Nu. 12.323 million to the government is bought to the notice of the Government for appropriate decisions and actions.

2.11 Award of three work packages in contravention to the Nganglam Resolution

The review of documents relating to the construction of the NEWH indicated following pre-construction decisions taken by the Ministry as discussed below:

☞ *Coordination Meeting held at Nganglam on 23rd December, 2014 deliberated series of issues on management of Double Lanning of NEWH, such as formation of Project Management Team(PMT), Division of contract packages, Monitoring and Supervision issue, Requirement of sign boards. Amongst other decisions, the procurement of contract was decided that only two work packages were to be awarded to each contractor.*

☞ *Subsequently, the Project Management Team met on 12th January 2015 at Thimphu with the objective to follow-up and take immediate action on the resolutions of Nganglam's meeting held on 23rd December, 2014.*

During the Meet, besides formation of the Technical team and assigning the tasks to the GoI project coordinator on the maintenance of keep updated financial information, manpower & HR issues again reiterated on the award of two work packages each to the individual contractor by the Chief Engineer of Regional Office of Trongsa, Lobeysa & Lingmithang.

☞ *75 mm thick Dense Bituminous Macadam and 50mm Asphalt concrete was designed by Design Division, Ministry of Works & Human Settlement, Thimphu to withstand the plying of heavy traffic.*

However, the approved design particularly was beyond the purview of Bhutan Schedule of Rates 2015, thus bidder was ask to submit separate rate analysis with bidding documents, further, it was stipulated in additional clause in the Special Condition of Contract to analyze the rate for the said item excluding the cost of bitumen.

However, it was noted that four contractors were awarded three contract packages each in contravention to the resolutions of the Nganglam Meet **23rd December 2014** and Project Management Team **12th January 2015** at Thimphu to award maximum of two packages to each contractor.

The three contract packages awarded with a total road stretch ranging from 13 km to 30 km along with contract amounts are as tabulated below:

Table 2.11: Award of three contract packages							
M/s Chogyal Construction Pvt. Limited, Thimphu holding trade license No.1032785, CDB No.7640							
Package (RO, Lobeysa)	Estimated amount (Nu)	Contract Amount (Nu)	% of deviation (Estimate-Contract value)	Contract duration in month(s)	Work done value (Nu)	% of Deviation (Contract value – Work done value)	
I-(Ch:477-467) (10km)	114,155,909.36	100,376,501.11	-12.07	15	116,399,663.99	15.97	
II- Ch: 467-457)(10km)	118,573,848.79	102,070,100.40	-13.92	15	115,511,304.38	13.17	
III-(Ch:457-447)(10km)	119,590,876.28	102,286,495.00	-14.48	15	115,504,285.38	12.93	

Total stretch of 30Km		304,733,096.51			
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Table 2.11.1: Award of three contract packages					Delays in months from the initial completion periods
M/s Chogyal Construction Pvt. Limited, Thimphu holding trade license No.1032785, CDB No.7640					
Package (RO, Trongsa)	Estimated amount (Nu)	Contract Amount (Nu)	% of deviation (Estimate-Contract value)	Contract duration in month(s)	
VIII Ch: 50.8-58 (7.2km)	150,298,000.00	73,239,890.20	-30.45%	28	12
XI Ch: 72-80 (8 km)	117,475,584.76	89,839,558.00	-23.52%	28	12(Ongoing)
XII Ch: 80-85 (5km)	106,509,159.36	78,928,350.00	-25.89%	20	12
Total road stretch of 20.2 Km		242,007,798.20			

Table 2.11.2: Award of three contract packages					Delays in months from the initial completion periods
M/s Rigsar Construction Pvt. Limited, Trashigang holding trade license 6004726, CDB No. 2435					
Package	Estimated amount (Nu)	Contract Amount (Nu)	% of deviation (Estimate-Contract value)	Contract duration in month(s)	
X- Ch 365-359 (6Km) (Lobeysa)	78,073,915.54	56,974,612.41	-27.03%	24	15.7
I- Ch 0-12 (12 Km) (Trongsa)	191,662,477.46	147,882,777.62	-22.84%	30	7
VI- Ch:102.45-114.45 (12Km) (Lingmithang)	140,282,847.00	125,557,813.70	-10.49%	28	2
Total road stretch of 30 Km		330,415,203.73			

Table 2.11.3: Award of three contract packages					Delays in months from the initial completion periods
M/s Rinson Construction Pvt. Limited holding trade license No.1000488 and CDB No.1965					
Package (RO, Trongsa)	Estimated amount (Nu)	Contract Amount (Nu)	% of deviation (Estimate-Contract value)	Contract duration in month(s)	
III-(Ch: 19.5-27) (7.5km)	151,041,704.92	97,306,916.89	-35.58	30	12
X- Ch: 65.98 -72)(6.02km)	150,325,008.00	85,883,906.60	-42.87	28	13 (On-going)
XIII-(Ch:85-97.3)(12.3km)	139,964,945.98	124,174,327.15	-11.28	28	12
Total road stretch of 25.82 Km		307,365,150.60			

Table 2.11.4: Award of three contract packages					Delays in months from the initial completion periods
M/s Empire Construction Pvt. Ltd, Punakha					
Package (RO, Lobeysa)	Estimated amount (Nu)	Contract Amount (Nu)	% of deviation (Estimate-Contract value)	Contract duration in month(s)	
XIV-Ch-392.25-389 (3.25 Kms)	46,552,814.61	27,808,65.00	-40.26%	10	13.2
XV-Ch-395-392.25 (2.75 Kms)	39,390,946.46	39,390,946.46	Direct on estimated cost	12	7.4
VIII_Ch-379-372 (7 Kms)	87,463,950.28	78,967,074.00	-9.71%	25	17(Ongoing)
Total road stretch of 13 Km		118,358,020.46			

While the other contract works were in progress, the contract packages awarded to M/s Chogyal Construction Pvt. Limited, Thimphu were found completed prior to start of the audit. On review, the RAA noted that the contract works including additional works were found completed with delays by more than 3.8 months except one package as tabulated below:

Table 2.11.5: Award of three contract packages with resultant delay completion of contract						
M/s Chogyal Construction Pvt. Limited, Thimphu holding trade license No.1032785, CDB No.7640						
	Chainage	Contract Amount (Nu)	Work done value (Nu)	Due completion Date	Actual Completion Date	Delays in Months
	477-467 (10 Kms)	100,376,501.11	116,399,663.99	28/9/2016	26/09/2016	-
	467-457 (10 Kms)	102,070,100.40	115,511,304.38	28/9/2016	20/01/2017	3.8
	457-447 (10 Kms)	102,286,495.00	115,504,285.38	9/11/2016	03/01/2017	3.8

The Regional Office in consultation with the MTLC should comment on the circumstances leading to award of three packages disregarding the critical resolution of the Nganglam Coordination Meet of Ministry, Departments and Regional Offices, besides, the Regional Offices should also comment on the decision taken to scope in pavement works with stretches in packages ranging from 5km to 12.3km deviating from the projected average allotment of 6.7 Kms per package.

Auditee's Response:

During the 1st Coordination meeting for NEWH held in Nganglam on 23rd Dec 2014, it was discussed & resolved to award only two packages to one bidder in order to ascertain timely completion of the works & to the desired quality. However, in subsequent discussions with CDB & PPPD, MoF it was pointed out by the two agencies that a contractor can have a minimum of five works in hand at any given time. Therefore, the decision to award only two works could not be adhered to.

Widening & improvement works on the NEWH was a major project of the DoR, MoWHS. The duration for completion of the project was 3 years only until Dec 2017. So, for the project time was of essence.

The e-tool system allows the contractors to bid for several packages using the same set of equipment & human resources; these resources do not get blocked until the contract is formally signed between the contractor & the procuring agency.

The decision to award the three packages to the same contractor (lowest evaluated) was taken by the MLTC in view of the financial advantages. Moreover, awarding the three packages to the same contractor made sense as the management of the works on the part of the contractor would be easier & more productive on the same stretch of road. Timely completion & quality deliverance of the work was anticipated. In view of the above justifications, the para may please be dropped.

Response of RO, Lobeysa

The up-gradation of the 385 km Northern East West Highway (NEWH) from Semtokha to Trashigang was a priority project of the Government then and started from 1st January 2015 with three years' time period. The first coordination meeting between the Ministry and Department including Regional Offices was held in Nganglam, Pema Gatshel on 23rd December 2014 under the chairmanship of Zhabtog Lyonpo. Issues pertaining to project implementation such as contract packaging & size, tendering, uniform bidding document, quality control etc. were discussed in the coordination meeting. Following the first coordination meeting in Nganglam, the first Project Management Team Meeting was convened

on 12th January 2015 at Thimphu and one of the issues discussed was to award only two contract packages of double lanning of east west highway per contractor. The meeting also decided that approval of Ministry of Finance would be sought for change in the procurement standard.

Based on the recommendation of the first Project Management Meeting, a separate consultative meeting was held on 14th January 2015 under the chairmanship of Hon'ble Zhabtog Lyonpo. Officials from ACC, CDB and MoF were present during the meeting (a copy of minutes attached for ready reference). The meeting discussed many issues including the proposal to award only two NEWH works to one contractor.

Although, it is not captured in the minutes of the meeting, the meeting indeed discussed and decided that the proposal of MoWHS to award only two works to one contractor is a violation of PRR 2009 and CDB e-tool work in hand information. Therefore, the MLTC had to follow the existing procurement rules and regulations i.e. maximum of five works in hand as per the e-tool report.

Based on above stated facts and justifications submitted, RAA is requested to kindly drop the memo.

RAA's Further Comments & Recommendations:

While the RAA takes note of the responses, the fact remains that the Ministry had failed to strictly adhere to its own decisions taken during the Coordination Meeting held at Nganglam on 23rd December, 2014 and affirmation of the decision taken during the Project Management Team met on 12th January, 2015 at Thimphu. It is to put on records that contractors who were awarded one or two contract packages had failed to complete projects in time let alone those contractors who were awarded three contract packages.

The maximum of five works in hand as allowed by CDB e-tool is for evaluation purpose. Decision as to how many packages should be awarded to each contractor must be based on the capacity of contractor to undertake and complete the work within the prescribed contract period. A maximum of five works in hand would not mean that the Contractors without any work in hand should be awarded five works as otherwise it would constitute violation of procurement norms as suggested in the response.

Thus, the decisions of MLTC to award of three contact packages to the five firms were not in the interest of project as the contractors failed to complete the packages on time with overall delays in completion of the Project.

In the light of the failure to implement its own decisions on the award only two contract packages due to overriding of decisions by the MLTC, it is imperative for the Government and the authority concern to review the existing policy and system of MLTC functions and responsibilities and take measures to prevent overriding of decisions for future similar project.

2.12 Flawed decision on the realization of differential amount between estimated and quoted value net of 20% with resultant non- realization of Nu. 446.142 million as well as short realization of Nu. 52.150 million due to application of approved percentage on the quoted contract price and subsequently non-renewal of BG for approved differential amount of Nu. 203.406 million

Clause 5.4 Evaluation of Bids sub clause 5.4.5 Abnormally Low Bid of Procurement Manual 2009, states as “Where the prices in a particular bid appear abnormally low or the bid appears seriously unbalanced, the Procuring Agency may reject it only after seeking written explanations from the bidder submitting the low or seriously unbalanced bid. In the case of a bid which appears seriously unbalanced, the procuring agency shall request from the bidder an analysis of rates of the relevant items”.

“If the Procuring Agency decides to accept the abnormally low bid or the bid with the seriously unbalanced rates after considering the above factors, the bidder shall be required to provide additional differential security equivalent to the difference between the estimated amount and the quoted price in addition to the performance security”.

In addition, ITB Clause 29.6 stipulates as “If the Bid which results in the lowest evaluated Bid price is abnormally low, seriously unbalanced and/or front loaded in the opinion of the Employer, the Employer shall require the Bidder to produce written explanation of, justifications and detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices if the Procuring Agency decides to accept the abnormally low, seriously unbalanced and /or front loaded price, the bidder shall be required to provide additional differential security equivalent to the difference between the estimated amount and the quoted price in addition to the performance security”.

On review of the documents and accounting records relating to realization of differential amounts, flaws and deficiencies were observed as discussed below:

2.12.1 Non-realization of differential amounts to the extent of Nu. 446.142 million

On review of the bidding processes and tender evaluation reports, the contract packages were found awarded to the lowest evaluated bidders. It was noted that on the basis of tender evaluation reports, the MLTC had passed decisions to award the contract to the lowest evaluated bidder on realization of differential amounts. However, the Awarding Committee had taken decisions to realize the differential amounts net of 20% variations.

In line with the decisions of the MLTC and Awarding Committee, the ROs had realized differential amounts net of 20% amounting to Nu. 203,406,293.05 as against the actual differential amounts of Nu. 649,557,598.08 as detailed below:

Table 2.12.1: Short realization of differential amounts						
Name of contractor	Estimated Amount (Nu.)	Quoted Amount (Nu.)	Differential Amount (Nu.)	% Differential Amount	% Differential Amount realized	Total Amount realized (Nu.)
RO, Trongsa						
(Package 1) M/s Rigsar Construction Pvt. Ltd.	191,662,477.46	147,882,777.62	43,779,699.84	22.84%	2.84%	4,199,870.88
(Package 2) M/s Gaseb Construction Pvt. Ltd	171,993,910.77	111,563,269.46	60,430,641.31	35.14%	15.14%	16,890,000.00
(Package 3) M/s Rinson Construction Pvt. Ltd	151,041,704.92	97,306,916.89	53,734,788.03	35.58%	15.58%	15,160,417.65
(Package 4) M/s Gyalcon Infrastructure Pvt. Ltd	146,426,379.15	94,860,888.47.	51,565,490.68	35.22%	15.22%	14,437,827.23
(Package 5) M/s Druk Lhayul Construction Pvt. Ltd	131,935,342.62	77,150,269.45.	54,785,073.17	41.52%	21.52%	16,602,737.99

(Package 6) M/s Raven Construction Pvt. Ltd	138,898,344.12.	79,151,909.00	59,746,435.12	43.01%	23.01%	18,212,854.26
(Package 7A) M/s Druk Lamsel Construction Pvt. Ltd	95,574,000.00	70,131,689.00.	25,442,311.00	26.62%	6.62%	6,326,100.00
(PKG-8) M/s. Dungkar Construction Pvt Ltd. Thimphu	105,297,611.69.	73,239,890.20.	32,057,721.49	30.44%	10.44%	10,993,070.66
(Package 10) M/s Rinson Construction Pvt. Ltd	150,325,008.00	85,883,906.60.	64,441,101.40	42.87%	22.87%	34,379,329.33
(Package 11) M/s Dungkar Construction Pvt. Ltd	117,475,585.00	89,839,558.00.	27,636,027.00	23.52%	3.52%	4,135,140.59
(Package 12) M/s. Dungkar Construction Pvt Ltd. Thimphu	98,620,000.00	78,930,000.00.	19,690,000.00	19.97%		-
RO, Lobeysa						
(Package VII) M/s Loden Construction Pvt. Ltd	90,091,287.54	71,417,679.10.	18,673,608.44	20.73%	0.73%	657 666.40
(Package XI) M/s Hi-Tech Company Pvt. Ltd	153,688,193.47	107,568,025.00	46,120,168.47	30.01%	10.01%	15,369,197.50
(Package XII) M/s Taksing Chungdruk Construction Pvt. Ltd	100,267,497.37	66,128,323.00.	34,139,174.37	34.05%	14.05%	14,087,583.38
(Package XIII) M/s U.P Construction Pvt. Ltd	126,747,002.70.	69,441,930.80	57,305,072.7	45.21%	25.21%	31,953,919.38
Total			649,547,312.22			203,405,715.25
	Short realization					446,141,596.97

Thus, differential amounts to the extent of Nu. 446.151 million were not realized thereby failing to safeguard the interest of the Government. In addition, the decisions of the Awarding Committee to realize net of 20% variations was in deviation to Clause 29.6 of ITB of Standard Bidding Document which clearly stipulated requirement to realize the differential amount between the estimated amount and the quoted price in addition to the performance security.

2.12.2 Short realization of differential amount to the extent of Nu. 52.150 million due to wrong application of differential percentages on contract prices

On cross check on the differential amounts realized in terms of the approved differential percentages with that of the estimated cost, it was noted that the differential percentages were found applied to the contract prices instead of estimated costs. Thus, wrong application of differential percentages had resulted in short realization of differential amounts to the extent of Nu. 52,150,092 which benefited six contractor to that extent.

The short realization of differential amounts is as tabulated below:

Name of contractor	Estimated Amount (Nu.)	Quoted Amount (Nu.)	% Differential percentage realized	Differential amount on estimated cost (Nu.)	Amount realized on contract price (Nu.)	Total Amount short realized (Nu.)
RO, Trongsa						
(Package 1) M/s Rigsar Construction Pvt. Ltd.	191,662,477.46	147,882,777.62	2.84%	5,443,214.36	4,199,870.88	1,243,343.48
(Package 2) M/s Gaseb Construction Pvt. Ltd	171,993,910.77	111,563,269.46	15.14%	26,039,878.09	16,890,000.00	9,149,199.09
(Package 3) M/s Rinson Construction Pvt. Ltd	151,041,704.92	97,306,916.89	15.58%	23,532,297.63	15,160,417.65	8,371,879.98
(Package 4) M/s Gyalcon Infrastructure Pvt. Ltd	146,426,379.15	94,860,888.47.	15.22%	22,286,094.91	14,437,827.23	7,848,267.68
(Package 5) M/s Druk Lhayul Construction Pvt. Ltd	131,935,342.62	77,150,269.45.	21.52%	28,392,485.73	16,602,737.99	11,789,747.75

(Package 6) M/s Raven Construction Pvt. Ltd	138,898,344.12.	79,151,909.00	23.01%	31,960,508.98	18,212,854.26	13,747,654.72
Total				137,654,479.70	85,504,387.00	52,150,092.69

Wrong application of differential percentages indicated existence of either weak management system or possible unhealthy practices.

The Ministry should to recover short realization of differential amounts of Nu.52.150 million and deposited into Audit Recoveries Accounts, besides taking action against the responsible official for wrong computation of differential amount for six contract packages..

2.12.3 Non-renewal of Bank Guarantees/Cash warrants obtained against differential amounts on expiry of the initial validity periods

Provisions of PRR 2009 and SBD provides that, “*the bidder shall be required to provide additional differential security equivalent to the difference between the estimated amount and the quoted price in addition to the performance security*”.

In addition Clause 51, sub-clause 51.1 state that, “The Performance security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount specified in the SCC by a bank or surety acceptable to the Employer, and in denominated in the types and proportions of the currencies in which the Contract Price is payable. The Performance security shall be valid until a date 30 days from the date of issue of the Certificate of Completion”.

Thus, in terms of the above provisions, the security for the differential amounts was to be obtained with validity period aligned to the performance security validity periods.

On review of the Bank Guarantee and Cash Warrant related records, it was noted that while the contractors had renewed the Performance Guarantees, the ROs had failed to renew the Bank Guarantees for the differential amounts of **Nu. 203,406,293.05** initially obtained in the form of Bank Guarantee/Cash Warrant on expiry of the validity periods as detailed below:

Name of contractor	Contract Duration in month	Total Amount realized (Nu.)	Bank Guarantees/ Cash warrants validity period	Validity periods in months	Expiry date of the BG/ CW	Remarks
RO, Trongsa						
(Package 1) M/s Rigsar Construction Pvt. Ltd.	5 th December 2017	4,199,870.88	BG No. PG/TG/2015-10 of 2.6.2015 that too with validity till 31st May, 2016.	12 month	31st May, 2016.	Only Bank Guarantee for performance security renewed on 20 th June 2016
(Package 2) M/s Gaseb Construction Pvt. Ltd	30 months i.e., until 05.12.2017 with time extension granted up to 18 th March 2018	16,890,000.00	No. PG/PL2015-50 &51 of 1.6.2015 with validity period of just 6 months up to 30 th November 2015	6 months	30 th November 2015	Only BG for performance security renewed on 1 st December 2015 with validity period of 12 months up to 29 th November 2016 as evident from BG No.. G/PL2015-50 E of 1.12.2015.
(Package 3) M/s Rinson Construction Pvt. Ltd	contract duration of up to 15.12.2017	15,160,417.65	Bank Guarantee that too with validity till 26th June, 2016	12 months	26th June, 2016	Only Performance Guarantee (PS) PG/HO/2016-447E amounting to Nu. 9,715,000.00(that too less by Nu.30,691.69)

						representing performance security of 9.98% only on 27/06/2017 which was valid till 31 st December 2017
(Package 4) M/s Gyalcon Infrastructure Pvt. Ltd	30 months up to 17 th December 2017	14,437,827.23	BG No. PREGRNTEE/2015/4300 dated 18/6/2015) that too valid till 15/6/2016	12 months	15/6/2016	Only Bank Guarantee PS was renewed on 8 th October 2016 up to 3 rd October 2017 for a period of another 12 months
(Package 5) M/s Druk Lhayul Construction Pvt. Ltd	30 months up to 12 th December 2017.	16,602,737.99	BG No. 00101150115 dated 11.6.15) that too valid till 15/6/2016	12 months	15/6/2016	Only Bank Guarantee (PRFGRNTEE/2017/6443 dt.20/4/2017) for performance security amounting to Nu 8,000,000.00 on 20 th April 2017 up to 31 st December 2017 that too after a time lapse of almost 10 months
(Package 6) M/s Raven Construction Pvt. Ltd	30 months up to 21.11.2017	18,212,854.26	Bank Guarantee obtained with validity period of just 12 months up to 9.6.2016	12 months	9.6.2016	only BG for PS renewed on 19.8.2016 with validity period up to 19.8.2017
(Package 7A) M/s Druk Lamsel Construction Pvt. Ltd	18 months up to 12.1.2018	6,326,100.00	Cash Warrant with validity period of just 6 months up to 10.1.2017	6 months	10.1.2017	only BG for PS renewed on 6.6.2017 as evident from BG/CORP/2017-326 OF 6.6.2017 with validity till 2.2.2018
(PKG-8) M/s. Dungkar Construction Pvt Ltd. Thimphu		10,993,070.66				Not realized
(Package 10) M/s Rinson Construction Pvt. Ltd	28 months up to 31.12.2017	34,379,329.33	Bank guarantee which was valid till 28th February 2016 under BG No. BH/HO/2015-892 of 29.8.2015	6 months	28th February 2016	PS expired on 28 th February 2016 and renewed only the PS on 28 th March 2017 with validity till 31 st December 2017 as evident form the BG No. PG/HO/2017-160 of 28.3.2017 after a delay of 13 months
(Package 11) M/s Dungkar Construction Pvt. Ltd	28 months up to 31.01.2018.	4,135,140.59	Bank guarantee which was valid till 30th September 2016 under BG No. 000101150223of 16/9/2015 & 000101150224 of 16/9/2015	12 months	30th September 2016	Only PS was renewed on 18 th April 2017 with validity of just 9 months till 31 st January 2018 as evident form the BG No. 00001170109 of 18.4.2017 that too after delays of 6 1/2 months
RO, Lobeysa						
(Package VII) M/s Loden Construction Pvt. Ltd	3 rd August 2015 to 24 th March 2017	657 666.40	Bank Guarantee vide BG No. 167801/PG/PL/2015/11(E) dated 18 th April 2017.			
(Package XI) M/s Hi-Tech Company Pvt. Ltd	26 th Nov 2015 to 14 th December 2017	15,369,197.50	Bank Guarantee vide BG No. 126603 dated 16 th November 2015.			
(Package XII) M/s Taksing Chungdruk Construction Pvt. Ltd	3 rd March, 2016 to 26 th January, 2017	14,087,583.38	Bank Guarantee vide BG No.			
(Package XIII) M/s U.P Construction Pvt. Ltd	22 nd February 2016 to 15 th July 2017	31,953,919.38	Guarantee vide BG No. PRFGRNTEE1/ 2016/23 of 13.2.16.			

non-renewal of BG		203,406,293.05				

The Ministry should investigate the circumstances leading to the failure to renew the Bank Guarantee for differential amounts after expiry of initial validity period along with the renewal of Performance Guarantee. Besides, the Ministry must recover the interest on the differential amounts for time periods not renewed including one month period for issuance of certification of completion.

In addition, the Ministry should take appropriate action against the ROs for laxity and extension of undue favour to the contractor. The inaction on the part of the ROs to recover the differential amounts indicated apathy towards enforcement of contract provisions and safeguards the government interest.

Auditee's Response:

In the case of NEWH project, the MLTC in its wisdom had decided that the additional performance security would only be imposed for bids after allowing for deduction of 20% from their quoted amount.

Clause 5.4.5.3 under Abnormally Low Bid of PRR 2009 (revised July 2015) allows the Procuring Agency to accept abnormally low bid or bid with seriously unbalanced rates after considering factors specified under clause 5.4.5.2. The bidder shall be required to provide additional bid security equivalent to the difference between estimated amount & the quoted price in addition to the performance security.

In the Ministry, it is a generally accepted fact that bids within the range of +/- 20% of the departmental estimated cost is workable.

In view of the above, the decision of MLTC to ask the lowest evaluated bidders to submit the additional differential security beyond (-) 20% only may be considered by RAA.

Also, as RAA is aware of, Bhutanese contractors in their effort to win the bids quote low rates to the tune of (-) 40% also. However, if the full (-) 40% is to be deposited by the bidder as differential security, the bidder would be seriously constrained with working capital. Thus, the decision of MLTC to get the differential security beyond (-20)% only.

The Ministerial Tender Committee (MLTC) is the highest decision making body in the Ministry for procurement of goods, services & works. MLTC takes decisions based on consensus in the best interest of the works and the Government. Therefore, the decision of MLTC may kindly be reviewed holistically & honored. In view of the above justifications, the para may please be dropped.

RAA's Further Comments & Recommendations:

While taking note of the response, it is reiterated that under Instructions to Bidder ITB under section "Evaluation and Comparison of Bids, the decisions and actions on the part of the MLTC and Awarding Committee to realize net of 20% variations were in violation to the provisions of the PRR and Standard Bidding Documents (SBD). There is no scope provided in the PRR to adjust +/- 20% for the purpose of depositing differential security.

The Ministry in consultation with the Ministry Finance should take immediate decisions and measures to either amend the provisions in the PRR and SBD for consistency and uniform adoptions by all government agencies or take actions against the MLTC and Awarding Committees for the violations which had resulted in non-realization of differential amounts to the extent of Nu. 446.151 million to ensure timely completion of contracts and safeguard the interest of the Government in the event of the failure to fulfil the contractual obligations by the contractors.

Regarding the wrong application of approved differential percentages with resultant short realization of differential amounts of Nu. 52.150 million, the Ministry should ascertain the circumstances leading to such lapses only for 6 contract packages besides taking actions against the officials responsible for the failure to appropriately apply the percentage to the estimated amounts.

Further, the Ministry should investigate the circumstances leading to the failure to renew the Bank Guarantee for differential amounts after expiry of initial validity period along with the renewal of Performance Guarantee. Besides, the Ministry must recover the interest on the differential amounts for time periods not renewed either from the contractors or officials responsible for the violation of the Procurement norms.

Furthermore, in the light of flaws and deficiencies in the applications and realization of security for differential amounts and performance security, the Ministry should institute a mechanism to create responsiveness on the procedures and process for the realization and disposal of bank Guarantees in the best interest of the Government.

2.13. Non-deployment/Mismatch of Personnel at site as per the requirements and non-deduction of penalty approximately - Nu. 40,579,000.00 (4.4.15)

As per the bidding data sheet, Section II, Employer's Requirements (ERQ) key personnel requirements on the widening and pavement construction works were found met by contractors in terms of the declared individual CV submitted along with the project profile.

During the site verification conducted by the joint team comprising of audit team and officials from RO, an attempt was made to cross check the personnel present at site with that of committed key personnel in the contract documents. It revealed that the personnel committed were not present but different set of key personnel were found deployed at site. The status of key personnel committed as per bidding document and actual employment at work sites as noted during the physical verification for all the contract packages were as tabulated and discussed below:

RO, Lobeysa

2.13.1 Dochula to Chasagang (Packages I, II and III) executed by M/s Chogyal Construction Pvt. Ltd recoverable penalty Nu.7.144 million (RO, Lobeysa)

The joint verification of site conducted on *29 September 2017 & 2 October 2017* revealed the following lapses:

- On reviewing associated HR and equipment aspects in new point based system of evaluation in e-tools through hard copy of e-tools report noted few HR and Equipment were used commonly to evaluate in system all the three packages I, II and III. However, the evaluation committee used same HR & Equipment for evaluation in e-tools system for contract packages II & III.
- This particular concern was presented to in MLTC meeting convened on 3rd June, 2015 wherein, MLTC unanimously decided that contractor should allocate separate HR & Equipment considering the work being separate package and also on contractor's commitment to provide separate HR & Equipment as per letter No. CCCPLT/T&Q-11/2015/11 dated June 19, 2015.
- Following the decisions of the MLTC convened on 3rd June, 2015, the Regional Office vide letter No. DOR.ROL/Plg-15/2014-2015/3721 dated June 9, 2015 had directed the contractor to submit the letter of commitment for deployment of separate resources for the two packages.
- In response, the contractor had sought one-week time extension for submission of additional resources vide letter **No. CCCPLT/T&Q-11/2015/10 dated June 12, 2015** and had subsequently assure availability of adequate resources for the deployment of separate HR and equipment **vide letter No. CCCPLT/T&Q-11/2015/11 dated June 19, 2015.**
- The audit team could not verify the documentary evidences as Regional Office had failed to produce documents relating the deployment of separate HR and equipment in particular for package III despite repeated request.
- On probing further, the RO stated the contractor had used the same HR & Equipment for package II & III. This scenario proved that the contractor had failed to allocate separate HR & Equipment for package II & III, resulting in fundamental breach of contractual obligation.
- The Regional Office have neither invoked the termination clause nor enforced the penalty clause GCC 10.1

Particular of HR	Penalty amount /month (Nu)	penalty amount for the duration of the contract 18.8 months
Project Engineer	50,000.00	940,000.00
Materials Engineer	40,000.00	752,000.00
Project Manager	50,000.00	940,000.00
Junior Engineer	25,000.00	470,000.00
Laboratory Technician	15,000.00	282,000.00
Site Supervisor	15,000.00	282,000.00
Total:		3,666,000.00

Similarly, the contractor had failed to deploy separate HR and equipment against the same HR and equipment committed for the three packages. Thus, in line with the penalty provisions under Clauses GCC 10.1 and SCC and failure to terminate the contract, the Regional Office should recover the salaries of such personnel and hire charges of equipment at a rate stipulated

in the Special Condition of Contract per month per personnel and equipment for the duration of the contract amounting to Nu. 3,478,000.00 as computed below:

Particular of HR	Name	Packages	Penalty amount /month (Nu) (II)	Penalty amount for the duration of the contract 18.8 months (Nu.)
Project Manager	Biren Thapa	Same for all packages (I,II, & III)	50,000.00	940,000.00
Project Engineer	Babu Madhavan Puthenpurayil	Same for all packages (I,II, & III)	50,000.00	940,000.00
Material Engineer	Sonam Tobgay Dorji	Same for all packages (I,II, & III)	40,000.00	752,000.00
Surveyor	Karchung	Same for all packages (I,II, & III)	15,000.00	282,000.00
Lab Technician	Megraj Gurung	Same for all packages (I,II, & III)	15,000.00	282,000.00
Site supervisor	Nidup Lhamo	Same for all packages (I,II, & III)	15,000.00	282,000.00
Site supervisor	Lhendup Tshering Lepcha	Same for all packages (I,II, & III)	15,000.00	282,000.00
Total:				3,478,000.00

- The following correspondences apparently indicated failure of the Pavement works for Packages II and III valuing Nu. 26.490 million and additional compensation payment of Nu. 3.593 million in addition to the insurance claim of Nu. 19.453 million.
 - DoR/CE(TMT)/2015-16/8 date 1st June 2016
 - CCCPL/ROL-(III)/Works-09/2016-2017/002 dated 7th January 2017
 - DoR/Lobeysa/construction Division(09)/2016-2017/037 dated 24th January 2017
 - CCCPL/ROL-(II)/Works-07/2016-2017/049 dated 13th April 2017
 - DoR/CE(CD)/2016-2017/W-7/3795 dated 17th April 2017
 - DoR/CD/7/2016-2017/4059 dated 26th June 2017
 - DoR/CD/28/2017-2018/4245 dated 8th August 2017

The failure of such magnitude of pavement works is a clear evidence of non-deployment of separate HR by the contractor as well as laxity on the part of the Regional Office and MLTC in allowing the contractor to execute three packages with the same HR for all the three works.

2.13.2 Langkena-Tekizampa (Package V) executed by M/s Etho Metho Construction Pvt. Ltd (RO, Lobeysa)

HR requirement/employed as per bidding documents				HR as per physical verification at site			
Sl. No.	Key Personnel Required	Qualification Required	Nos.	Nos.	Key Personnel Stated in Proposal	Present at site Qualification & Experience	Remarks
1	Project Manager	Degree in any field or Diploma in Civil Engineering	1	1	J.D Karchung	Sonam Dorji, Degree in Tourism	
2	Project Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Ashok Maheswari	Nil	Not present at site

3	Material Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Phuntsho Wangdi Diploma in Civil Engg		Not present at site
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Kinley Penjor	Bhawana, Degree in Civil Engg	
5	Surveyor	Diploma in Survey or trained surveyors	1	1	Mr. Gurung	Surya Bdr Chettri	
6	Lab Technician	Class X pass with experience	1	1	Kinley Chopel	Choki, Class X passed	
7	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1	Sangay Phuntsho	Lok Bdr	
8	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1	Tshering Tobgay	Pema Wangchuk	

- The site engineer was also not aware of unauthorized replacements
- The Project Engineer and Material Engineer were not at site during physical verifications.

The Regional Office should work out the penalty amounts as per the above-referred clause for non-deployment of project engineer and other key personnel and accordingly deposit into Audit Recoveries Account.

2.13.3 Pelela to Bumilo (Package VIII) executed by M/s Empire Construction Pvt. Ltd, recoverable penalty Nu. 1,125,000.00 (RO, Lobeysa)

Designation	Name & CID at site	Qualification	Working Experience	Remarks
Project Manager	Ugyen Dorji, CID No. 11909000813			Documents produced for Dawa Tenzin, graduate of 2008, but person available at site is Ugyen Dorji
Project Engineer	Lobzang Chodup, CID No. 11007001278	Degree	May - 2014 - 2016 (2 yrs)	Not meeting the criteria
Material Engineer	Kinga, CID No. 10306001264	Diploma	9 years	
Junior Engineer	Yejay, CID No. 11506005017	Diploma	pass out in 29.6.15 from JNEP	Not meeting the criteria
Surveyor	Sonam Tshering, CID No. 11909000811	Certificate in survey		Not at site
Laboratory Tech.	Jigme Dawa, CID No. 11405001432	12 pass	5 years	Not at site
Work Supervisor	Jigme Wangdi, CID No. 11806001347			Documents not produced
Work Supervisor	1. Sonam Tshewang, CID No. 10904000060	VTI	3 years	Not at site

- Set of key personnel committed in the bid documents were replaced without meeting the criteria stated in the GCC and without appropriate approvals of the client.
- During physical verification conducted at site, Mr. Ugyen Dorji, bearing CID No. 11909000813 present at work site was stated as Project Manager. However, the available

documents submitted by the company for verification showed Mr. Dawa Tenzin, bearing CID No. 11007001276 as Project Manager.

- The Project Engineer & Junior Engineer were replaced by personnel having less working experience. The Project Engineer has 1-year working experience (i.e. 2015 with M/s D Builders) and Mr. Yejay, JE had just passed out from JNP, Deothang.
- The contractor had failed to deploy the Surveyor, Laboratory Technicians and one work supervisor, as they were not available at site.

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Particular of HR	Penalty amount /month (Nu)	Amount	Remarks
Surveyor	15,000.00	375,000.00	Deduction for 25 months
Laboratory Technician	15,000.00	375,000.00	Deduction for 25 months
Work Supervisor	15,000.00	375,000.00	Deduction for 25 month
Total:		1,125,000.00	

2.13.4 Pelela to Dungdungnesa (Package XI) executed by M/s Hi-Tech Company Pvt. Ltd and recoverable penalty Nu. 2,125,000.00 (RO, Lobeysa)

Sl. No.	Key Personnel Required	Qualification Required	Nos.	HR Committed	HR recruited at site	
				Key Personnel Stated in Proposal	Present at site Qualification & Experience	Remarks
1	Project Manager	Degree in any field or Diploma in Civil Engineering	1	Kharka Prasad Upreti	Tshewang Norbu, Diploma in civil Eng.	Owner
2	Project Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	Tshewang Norbu, Diploma	Mon Bhadur Subba,	Not at site
3	Material Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	Karma Renzin	Not available	-
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	Pema Wangchey	Karchung, Diploma in civil	
5	Surveyor	Diploma in Survey or trained surveyors	1			
6	Lab Technician	Class X pass with experience	1			
7	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	Mon Bdr. Mongar	Sherub, VTI	
8	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	Not mentioned	Not available	

- Set of key personnel committed in the bid documents were changed without meeting the criteria stated in the GCC and made without approval of appropriate authority.
- During physical verification conducted at site, except the site supervisor, all the HR personnel were engaged on Gasa Secondary National Highway (SNH) work site.
- The contractor had failed to deploy separate personnel for two different contract works.

- All the committed key personnel were replaced with lesser qualification and working experiences.
- The contractor had not deployed the Material Engineer, Surveyor, Laboratory Technicians and one work supervisor

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Particular of HR	Penalty amount /month (Nu)	penalty amount for the duration of the contract 25 months
Materials Engineer	40,000.00	1,000,000.00
Laboratory Technician	15,000.00	375,000.00
Surveyor	15,000.00	375,000.00
Site Supervisor	15,000.00	375,000.00
Total:		2,125,000.00

2.13.5 Razhau to Nobding (Package XIII) executed by M/s U.P Construction Pvt. Ltd and recoverable penalty Nu. 1,190,000.00 (RO, Lobeyssa)

- The contractor had failed to recruit Material Engineer, Lab-Technician and Site supervisor as committed in the contract documents.
- The site engineer was not aware of absence of HR personnel at site.
- The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Particular of HR	Penalty amount /month (Nu)	penalty amount for the duration of the contract 17 months
Materials Engineer	40,000.00	680,000.00
Laboratory Technician	15,000.00	255,000.00
Site Supervisor	15,000.00	255,000.00
Total:		1,190,000.00

RO, Trongsa

2.13.6 Chuserbu to Nyelazam (Package 1) executed by M/s Rigsar Construction Pvt. Ltd-recoverable penalty - Nu.195,000.00 (RO, Trongsa)

HR requirement/employed as per bidding documents				HR recruited at site			
Sl. No.	Key Personnel Required	Qualification Required	Nos.	Nos.	Key Personnel Stated in Proposal	Present at site Qualification & Experience	Remarks
1	Project Manager	Degree in any field or Diploma in Civil Engineering	1	1	Pema Khenrub, B.Com 10yrs	Sonam Chogyel BA with 23 years' experience	Not at site

2	Project Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Jampel, BE Civil, 7yrs	Nidup Chong, BE civil with 12 years' experience	Not at site, and also the project engineer was overseeing all the 3 packages awarded to the firm
3	Material Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Sachitra Pokhrel, BE Civil	Phuntsho Wangdi, BE Civil 3years experience	
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Ram Bhadur Rai, Diploma in civil	Namgay Tshering, Diploma in Civil with 3 years' experience	
5	Surveyor	Diploma in Survey or trained surveyors	1	1	Phuntsho, Diploma in Civil	Puran Ghalley Class XII with locally trained surveyor with 7 years' experience	
6	Lab Technician	Class X pass with experience	1	1	Tashi Dorji, Class X passed	Tashi Dorji, Class X	Not at site
7	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1	Dechen Yangden, VTI graduate	Sacha, Class 12 with 7 years' experience	
8	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1		Thinley Yoezer, X pass with 9 years' experience	

- All committed key personnel except Lab Technician, Tashi Dorji, were substituted with different sets of key personnel without approval.
- Project Manager, Project Engineer and Lab-Technician were not at work site during the physical verification of key personnel.
- The Site Engineer, RO was also not aware of unauthorized replacements and absence of the Project Engineer.
- Mr. Nidup Chong, the Project Engineer was handling all the three 3 packages awarded to the firm

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Particular of HR	Penalty amount /month (Nu)	Amount	Remarks
Project Manager	50,000.00	150,000.00	Deduction for 3 months
Laboratory Technician	15,000.00	45,000.00	Deduction for 3 months
Project Engineer			Separately worked out under different audit memo
Total:		195,000.00	

2.13.7 Nyelazam to Sakachawa (Package 2) executed by M/s Gaseb Construction Pvt. Ltd (RO, Trongsa)

Table 2.13.7: HR committed as per Agreement			Present at Work site on		
Sl/No	Name of HR Personnel with Designation	Qualification &No. of years' experience	Name of HR Personnel with Designation	Qualification &No. of years' experience	Remarks
1	Kumar Poudyel, Project Manager	Degree in Civil engg. 25 years	Not present		Stated on leave
2	Sonam Kuenga Tshering, PE	Master in Geitech & Degree in CE, 24 years	Saji Thomas	Diploma in civil engg. 23 years	
3	Kinley Wangchuk, ME	Degree in Civil Engg	Indraman Limby	Diploma in Civil engg. 2.5 years	
4	Saji Thomas, JE	Diploma in civil engg. 23 years	Bhim Kumar Gurung, SE	Diploma in civil engg. No experience	
5	Doten, Surveyor	Degree in civil engg. Trained surveyor	No present		
6	Yam Kumar Pradhan, laboratory	Class 12 passed out	Not present		
7	Tandin Wangchuk	VTI Graduate	Bhim Mukha, VTI	6 years	
8	Tshering	VTI Graduate	Tshering	3 years	

- All committed key personnel except three personnel were substituted with different sets of key personnel without approval.
- Project Manager, Material Engineer, Surveyor and Lab-Technician were not present at work site during the physical verification of key personnel.
- The Site Engineer, RO was also not aware of unauthorized replacements and absence of the key personnel
- Mr. Saji Thomas, JE, Diploma in civil engineering with 23 years of experiences was designated as Project Engineer in place Mr. Sonam Kuenga Tshering, PE with Master in Geitech & Degree in CE, having 24 years experiences.

2.13.8 Sakachawa to Tsangkha (Package 3) executed by M/s Rinson Construction Pvt. Ltd –recoverable penalty Nu. 1,765,000.00 (RO, Trongsa)

Table 2.13.8: HR requirement/employed as per bidding documents				HR recruited at site			
Sl. No	Key Personnel Required	Qualification Required	Nos	Nos	Key Personnel Stated in Proposal	Present at site Qualification & Experience	Remarks
1	Project Manager	Degree in any field or Diploma in Civil Engineering	1	1	Tity Varu Ghese, Degree in civil, 29 yrs.	Rinzin Dorji Diploma in Electrical	Not qualified to become Project Manager
2	Project Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Sonam Dorji, Dip. In civil, 19 yrs.	Sonam Dorji, Dip. In civil, 19 yrs.	
3	Material Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Tara Rai, Dip. In civil, 14 yrs.	No.	-
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Pema Dorji Wangdi, Diploma in civil	No	
5	Surveyor	Diploma in Survey or trained surveyors	1	1	Kumar Pradhan, Surveyor	Kumar Pradhan, Surveyor	

6	Lab Technician	Class X pass with experience	1	1	Lachimi Narayan	Thinley Tenzin...General Degree	
7	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1	Wangchuk, VIT, 8 yrs.	Wangdi. Class VIII passed	Inexperienced for site supervision
8	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1	Rinzin Dorji, VTI, 8 yrs.	Surjaman Rai, Class 12 passed	Inexperienced for site supervision

- Material Engineer and Junior Engineer not recruited.
- The Project Manager and Site Supervisors were substituted with lesser qualification and experiences.
- Except the Project Engineer and Surveyor, all other committed Key personnel were replaced without approval.

The Site engineer not aware of absence of HR personnel at site. The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Particular of HR	Penalty amount /month (Nu)	Amount	Remarks
Materials Engineer	40,000.00	240,000.00	Deduction for 6 months
Project Manager	50,000.00	1,500,000.00	Deduction for 30 months
Junior Engineer	25,000.00	25,000.00	Deduction for 1 month
Total:		1,765,000.00	

2.13.9 Tshangkha to View Point (Package 4) executed by M/s Gyalcon Infrastructure Pvt. Ltd-recoverable penalty Nu. 750,000.00 (RO, Trongsa)

Sl/ No	Name of HR Personnel with Designation	Qualification &No. of years' experience	Present at Work site on		
			Name of HR Personnel with Designation	Qualification &No. of years' experience	Remarks
Jun 1	Thinley Dem, Project Manager	Master in Environment Engg.	Ugyen Dorji	Diploma in Civil Engg	Replaced with low qualifications
2	Ugyen Dorji, PE	Diploma in Civil Engineering	Mewash Gurung	Degree in Civil Engg	only 1 and ½ years' experience
3	Passang Dorji, ME	Diploma in Civil Engineering	Tshering Dorji,	Diploma in Civil Engg. Years	Replaced with less work experience (Fresh graduate)
4	Kamal Chhetri, JE	Diploma in Civil Engineering			Not present
5	Kaamba Singh Singdhan, w/s	RBIT	GB Gurung	No qualification	Working experience 25 years
6	Rinzin Wangchuk, WS	VTI	Sonam Tobgay	12 passed	2 years

- Junior Engineer not recruited.
- The Project Manager and Site Supervisors were substituted with lesser qualification and experiences.
- All Committed Key Personnel were replaced without approval.
- The Site engineer not aware of absence of HR personnel at site.

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Table 2.13.9.1: Penalty deductions			
Particular of HR	Penalty amount /month (Nu)	Amount	Remarks
Junior Engineer	25,000.00	750,000.00	Deduction for 30 months
Total:		750,,000.00	

2.13.10 View Point- BjeeZam (Package 5) executed by M/s Druk Lhayul Construction Pvt. Ltd-recoverable penalty Nu. 1,200,000.00 (RO, Trongsa)

Table 2.13.10: HR committed as per Agreement			Present at Work site on		
Sl/ No	Name of HR Personnel with Designation	Qualification &No. of years' experience	Name of HR Personnel with Designation	Qualification &No. of years' experience	Remarks
1	Karma Phuntsho, Project Manager	Degree in Civil Engineering, Experience around 15 years	Kuenzang Wangchuk, PM	BBA with 2.5 years	Replaced with no experience and required qualification
2	Choki Dorji, Material Engineer	Diploma in Civil Engineering, 15 years' Experience			Not deployed at site
3	Kinley Penjor, Junior Engineer	Diploma in Civil Engineering, 16 years' Experience	Sonam Dendup, JE	Diploma in Civil Engg. 3 years	Replaced with less work experience
4	Deo Prakash Rai, Project Engineer	Diploma in Civil Engineering, 16 years' Experience	Jigme Tashi, PE	B.Tech Civil, 1 year	Replaced with no experience and required qualification
5	Nil		Yeshe Wangmo, SS	Class X, 2 years	
6	Nil		Sunjok Subha, SS	Class X, 2 years	

- Material Engineer not recruited.
- The Project Manager, Project Engineer and Junior Engineer were substituted with lesser qualification and experiences.
- All Committed Key Personnel were replaced without approval.
- The Site engineer not aware of absence of HR personnel at site.

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Table 2.13.10.1: Penalty deductions			
Particular of HR	Penalty amount /month (Nu)	Amount	Remarks
Material Engineer	40,000.00	1,200,000.00	Deduction for 30 months
Total:		1,200,000.00	

2.13.11 Bjezam- Trongsa (Package 6) executed by M/s Raven Builders & Company Pvt. Ltd recoverable penalty Nu. 3,210,000.00 (RO, Trongsa)

Table 2.13.11: HR requirement /employed as per bidding documents				HR recruited at site			
Sl. No	Key Personnel Required	Qualification Required	Nos	Nos	Key Personnel Stated in Proposal	Present at site Qualification & Experience	Remarks
1	Project Manager	Degree in any field or Diploma in Civil Engineering	1	1	Sangay Dorji, B.Com, 11years expel	Phub Tshering, Diploma in Civil	Fresh graduate
2	Project Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Dorji Tshering, BE Civil, 35 yrs	-	Not present
3	Material Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Tenzin Wangdi, BE Civil, 15 yrs	-	Not present since start of the project
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Kinley, Diploma in Civil, 7yrs	Yogita, B.E Civil	
5	Surveyor	Diploma in Survey or trained surveyors	1	1	Sonam Phuntsho, Survey Engg	-	Not present
6	Lab Technician	Class X pass with experience	1	1	Cheku, Class 12 passed, 7yrs	-	Not present since start of the project
7	Site Supervisor	VTI Graduate or equivalent with more than 2 years' experience	1	1	Choten, VTI Civil, 4yrs	Karma Tshomo, VTI, 1year graduate	
8	Site Supervisor	VTI Graduate or equivalent with more than 2 years' experience	1	1	Neten Dorji, VTI Civil, 5yrs	-	Not present since September 2017

- The Project Manager was found substituted with fresh graduate.
- All Committed Key Personnel were replaced without approval.
- Except Project Manager, Junior Engineer and one site supervisor, all other key personnel were not present at work site during the physical verification of key personnel's
- The Site engineer not aware of absence of HR personnel at site.

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Table 2.13.11.1: Penalty deductions			
Particular of HR	Penalty amount /month (Nu)	Amount	Remarks
Project Engineer	50,000.00	1,500,000.00	Deduction for 30 months
Materials Engineer	40,000.00	1,200,000.00	Deduction for 30 months
Project Manager	50,000.00	-	
Junior Engineer	25,000.00	-	
Laboratory Technician	15,000.00	450,000.00	Deduction for 30 months
Site Supervisor	15,000.00	60,000.00	Deduction for 4 months
Total:		3,210,000.00	

2.13.12 Pinzhi-Tashipokto (PKG-8) executed by M/s. Dungkar Construction Pvt Ltd. Thimphu -recoverable penalty Nu. 5,180,000.00 (RO, Trongsa)

Table 2.13.12: HR committed as per Agreement			Present at Work site on		
Sl/ No	Name of HR Personnel with Designation	Qualification &No. of years' experience	Name of HR Personnel with Designation	Qualification &No. of years' experience	Remarks
1	Sherab Penjor, Project Manager	B.Com (computer Science)			Not present at site
2	Om Kumar Pradhan, project Engineer	Diploma in Civil Engineering			Not present at site
3	MD. Alludin Aanasari, Material Engineer	Degree in Civil Engineering			Not present at site
4	Yonten Dorji, Laboratory	Class 12 passed			Not present at site
5	Patitapaban Jagamohan, Junior Engineer	Diploma in Civil Engineering	Sanvir Singh, Junior Engineer	Diploma in Civil Engineering	
6	Karma Wangchuk, Work Supervisor	VTI Graduate			Not present at site
7	Pema Lethro, Work supervisor	VTI Graduate			Not present at site

- All Committed Key Personnel were either not recruited or deployed for the three packages
- Except Junior Engineer, all other key personnel were not present at work site during the physical verification of key personnel's
- The Site engineer not aware of absence of HR personnel at site.

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Table 2.13.12.1: Penalty deductions				
Sl/No	Name of HR Personnel with Designation	Penalty deductible per month Nu.	No. of months	Amount Nu.
1	Sherab Penjor, Project Manager	50,000.00	28	1,400,000.00
2	Om Kumar Pradhan, project Engineer	50,000.00	28	1,400,000.00
3	MD. Alludin Aanasari, Material Engineer	40,000.00	28	1,120,000.00
4	Yonten Dorji, Laboratory	15,000.00	28	420,000.00
5	Karma Wangchuk, Work Supervisor	15,000.00	28	420,000.00
6	Pema Lethro, Work supervisor	15,000.00	28	420,000.00
	Total			5,180,000.00

2.13.13 Tashipokto to Dorjigonpa (Package 9) executed by M/s Welfare Construction Pvt. Ltd-recoverable penalty Nu. 2,665,000.00 (RO, Trongsa)

Table 2.13.13: HR requirement/employed as per bidding documents				HR recruited at site			
Sl. No	Key Personnel Required	Qualification Required	Nos	Nos	Key Personnel Stated in Proposal	Present at site Qualification & Experience	Remarks
1	Project Manager	Degree in any field or Diploma in Civil Engineering	1	1	Tshelthrim Dukar, Degree in science, 10yrs	Dradul, Degree in geology	Not present since December 2017

2	Project Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Sujith N.S, Diploma in C.Engg, 10yrs	Karma, B.E Civil, 18yrs	
3	Material Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Chandra Kumar Giri, Diploma in C.Engg, 7yrs	Nil	Not present since start of project
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1		Nil	Was at site only for 5 months
5	Surveyor	Diploma in Survey or trained surveyors	1	1	DD Gurung, Certificate in Surveying, 20yrs	Nil	Not present since start of project
6	Lab Technician	Class X pass with experience	1	1	Mon Maya Tamang, Class X, 10yrs	Nil	Not present since start of project
7	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1	Yeshey Kuenzang, VTI, 7yrs	Tshering Dorji,	Not at site since December 2017
8	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1	Pema Tshering, Class 12, 10yrs	Nil	Not present since start of project

- Committed Key Personnel viz. Material Engineer, Surveyor, Lab Technician and One Site Supervisor were not recruited since the start of the contract works
- Project Manager, Project Engineer and One Site Supervisor though deployed were substitute of committed key personnel and were replaced without approval and verification of qualifications and experiences
- Project Manager and One Site Supervisor was stated to have been deployed but were not present since December 2017.
- Junior Engineer stated to have been deployed for just 5 months
- The Site engineer not aware of absence of HR personnel from the site.

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Particular of HR	Penalty amount /month (Nu)	Amount	Remarks
Project Manager	50,000.00	100,000.00	Deduction for 2 months
Material Engineer	40,000.00	1,120,000.00	Deduction for 28 months
Junior Engineer	25,000.00	575,000.00	Deduction for 23 months
Lab Technician	15,000.00	420,000.00	Deduction for 28 months
Site Supervisor I	15,000.00	30,000.00	Deduction for 2 months
Site Supervisor II	15,000.00	420,000.00	Deduction for 28 months
Total:		2,665,000.00	

2.13.14 Dorji Gonpa to Yotongla (Package 10) executed by M/s Rinson Construction Pvt. Ltd-recoverable penalty Nu. 2,670,000.00 (RO, Trongsa)

Table 2.13.14: HR requirement/employed as per bidding documents	HR recruited at site
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Sl. No	Key Personnel Required	Qualification Required	Nos	Nos	Key Personnel Stated in Proposal	Present at site Qualification & Experience	Remarks
1	Project Manager	Degree in any field or Diploma in Civil Engineering	1	1	Angela Alexander, B.Com, 8yrs	Tara Rai, Diploma in Civil	On leave
2	Project Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Tity Varu Ghese, Degree in civil, 29 yrs.	Ugyen, B.E.Civil	On leave
3	Material Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Tara Rai, Diploma in Civil, 14yrs	Jigme Wangchuk, Diploma in Civil, 2yrs	
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Sonam Dorji, Diploma in Civil, 19yrs	Som Bdr Rai, Diploma in Civil, 1 yr	Transferred to Package 13
5	Surveyor	Diploma in Survey or trained surveyors	1	1	Pema Namgyel, Class 12	Nil	Not present since start of project
6	Lab Technician	Class X pass with experience	1	1	Bir Bdr Adikari, VTI	Nil	Not present since start of project
7	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1	Rinzin Dorji, RBIT pass, 8yrs	Wangdi, 10yrs	Only present for 4 months
8	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1	Wangchuk, VTI, 3 yrs	Nil	Not present since start of project

- Committed Key Personnel viz. Surveyor, Lab Technician and One Site Supervisor were not recruited since the start of the contract works
- All key personnel deployed at work site were substitutes of committed key personnel and replaced without approval and verification of qualifications and experiences
- Project Manager, Project Engineer and One Site Supervisor was stated to have been deployed but were either on leave and not present at work during the physical verifications of the key personnel
- One Site Supervisor was stated to have been deployed for just 4 months
- Junior Engineer was not present at work site during physical verification but stated to have been transferred to Package 13.
- The Site engineer not aware of absence of HR personnel from the site.

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Particular of HR	Penalty amount /month (Nu)	Amount	Remarks
Junior Engineer	25,000.00	50,000.00	Deduction for 2 months
Lab Technician	15,000.00	435,000.00	Deduction for 29 months
Surveyor	15,000.00	375,000.00	Deduction for 29 months
Site Supervisor I	15,000.00	375,000.00	Deduction for 25 months

Site Supervisor II	15,000.00	435,000.00	Deduction for 29 months
Total:		2,670,000.00	

2.13.15 Yotongla to Bongzam (Package 11) executed by M/s Dungkar Construction Pvt. Ltd-recoverable penalty Nu. 6,440,000.00 (RO, Trongsa)

Table 2.13.15: Human Resource required as per ITB 4.3 (e) of Section II, Bidding Data sheet					Status at site during physical verification
SL. No.	Position	Name of personnel	Qualification	No.	No separate HR deployed at site but HR same as HR deployed for Contract Package XII
1	Project Manager	Ms. Pema Lhadon	Degree in any field OR Diploma in Civil Engineering	1	
2	Project Engineer	Mr.Prasant Kumar	Degree in civil Engineering OR Diploma in Civil Engineering	1	
3	Material Engineer	Mr. Namgay Dorji	Degree in Civil Engineering OR Diploma in Civil Engineering	1	
4	Engineer/Junior Engineer	Not provided	Degree in Civil Engineering OR Diploma in Civil Engineering	1	
5	Surveyor	Ms. Sonam Zam	Diploma in Survey Or trained surveyors	1	
6	Laboratory Technician	Mr. Sonam Tashi	Class X pass with experience	1	
7	Work/Site supervisor	Mr. Namdak Rinchen	VTI graduate	2	
	Work/Site supervisor	Not Provided	VTI graduate		

- No separate HR deployed at site but same HR deployed for Contract Package XII were used for the management of the contract works
- The Site engineer and RO had failed to ensure deployment of separate HR personnel for the contract package

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Table 2.13.15.1: Penalty deductions				Remarks
Particular of HR	No.	Penalty amount /month (Nu)	Penalty amount for the duration of the contract 28 months (XI)	
Project Engineer	1	50,000.00	1,400,000.00	On Completion of works, the RO should work out and recover the deductions for the extended contract periods
Materials Engineer	1	40,000.00	1,120,000.00	
Project Manager	1	50,000.00	1,400,000.00	
Junior Engineer	1	25,000.00	700,000.00	
Surveyor	1	20,000.00	560,000.00	
Laboratory Technician	1	15,000.00	420,000.00	
Site Supervisor	2	15,000.00	840,000.00	
Total:			6,440,000.00	

2.13.16 Bongzam to Gyatsa Zam (Package 12) by M/s Dungkar Construction Pvt. Ltd-recoverable penalty Nu. 2,380,000.00 (RO, Trongsa)

Table 2.13.16: Human Resource required as per ITB 4.3 (e) of Section II, Bidding Data sheet						Status at site during physical verification
SL. No.	Position	Qualification	Name of personnel	Qualification	No.	No separate HR deployed at site but HR same as HR deployed for Contract Package XI
1	Project Manager		Ms. Pema Lhadon	BA Eco	1	
2	Project Engineer	Degree in any field OR Diploma in Civil Engineering	Mr. Prasant Kumar	Degree in civil Engineering	1	
3	Material Engineer	Degree in civil Engineering OR Diploma in Civil Engineering	Mr. Namgay Dorji	Diploma in Civil Engineering	1	
4	Engineer/Junior Engineer	Degree in Civil Engineering OR Diploma in Civil Engineering	Not provided		1	
5	Surveyor	Degree in Civil Engineering OR Diploma in Civil Engineering	Ms. Sonam Zam	Bachelor in Architecture	1	
6	Laboratory Technician	Class X pass with experience	Mr. Sonam Tashi	Degree in Electrical Engineering	1	
7	Work/Site supervisor	VTI graduate	Mr. Namdak Rinchen	Class XII passed	2	
			Not Provided			

- No separate HR deployed at site but same HR deployed for Contract Package XII were used for the management of the contract works
- All key personnel deployed at work site were substitutes of committed key personnel and replaced without approval and verification of qualifications and experiences
- Material engineer, Laboratory Technician and two Work Site Supervisors, if deployed, were not present at work site during the physical verification of the key personnel conducted on 3rd January 2018.
- The Site engineer and RO had failed to ensure deployment of separate HR personnel for the contract package .

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Table 2.13.16.1: Human Resource required as per ITB 4.3 (e) of Section II, Bidding Data sheet					HR personnel available at site		
Sl/ No	Position	Name of personnel	Qualification	No.	Name & Qualification	Penalty Amount (Nu.)	Remarks
1	Project Manager	Ms. Pema Lhadon	BA Eco	1	Tharpa Tashi, Ph.D Economics		Present
2	Project Engineer	Mr. Prasant Kumar	Degree in civil Engineering	1	Prabat Rai, Master in Engg.		Present
3	Material Engineer	Mr. Namgay Dorji	Diploma in Civil Engineering	1		Nu. 1,120,000.00 (i.e., 40,000.00 * 28)	Not present
4	Engineer/Junior Engineer	Not provided		1	Dipak Galey, Diploma in Civil Engg.		Present
5	Surveyor	Ms. Sonam Zam	Bachelor in Architecture	1	Ms. Sonam Zam		Present

6	Laboratory Technician	Mr. Sonam Tashi	Degree in Electrical Engineering	1		Nu. 420,000.00(i.e. , 15,000.00 *28)	Not present
7	Work/Site supervisor	Mr. Namdak Rinchen	Class XII passed	2		Nu.840,000.00 (i.e.,15,000.00 *28*2)	Not present
			Total			2,380,000.00	

2.13.17 Gyatsazam to Ngangar (Package 13) executed by M/s Rinson Construction Pvt. Ltd-recoverable penalty Nu. 2,240,000.00 (RO, Trongsa)

Table 2.13.17: HR requirement/employed as per bidding documents				HR recruited at site		
Sl. No.	Key Personnel Required	Qualification Required	Nos.	Nos.	Key Personnel Stated in Proposal	Present at site Qualification & Experience
1	Project Manager	Degree in any field or Diploma in Civil Engineering	1	1	Angela Alexander, BCom., 8 years	Tashi Norbu, Diploma in civil, 8 years
2	Project Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Tity Varu Ghese, Degree in civil, 29 yrs.	Som Raj Rai, Diploma in civil, 1 yr.
3	Material Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Tara Rai, Dip. In civil, 14 yrs.	No.
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1	Sonam Dorji, Dip. In civil, 19 yrs.	No
5	Surveyor	Diploma in Survey or trained surveyors	1	1	Pema Namgyel, class XII with certificate	No
6	Lab Technician	Class X pass with experience	1	1	Bir Bdr. Adhikari, VTI, 15 yrs.	No
7	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1	Wangchuk, VIT, 8 yrs.	Wangchuk, VIT, 8 yrs.
8	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1	Rinzin Dorji, VTI, 8 yrs.	Sher Bdr. Tamang, work experience

- Committed Key Personnel viz. Material Engineer, Junior Engineer, Surveyor, Lab Technician were not recruited since the start of the contract works
- All key personnel except One Site Engineer deployed at work site were substitutes of committed key personnel and replaced without approval and verification of qualifications and experiences
- The Site engineer not aware of absence of HR personnel from the site.

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Table 2.13.17.1: Penalty deductions		
Particular of HR	Penalty amount /month (Nu)	28 months (Nu.)
Materials Engineer	40,000.00	1,120,000.00
Laboratory Technician	15,000.00	420,000.00
Junior Engineer	25,000.00	700,000.00
Total:		2,240,000.00

2.13.18 Sonam Kuenphen to Hurjee (Package 14) executed by M/s Lamnekha Construction Pvt. Ltd-recoverable penalty Nu. 1,050,000.00 (RO, Trongsa)

Table 2.13.18: HR requirement/employed as per bidding documents				HR recruited at site			
Sl. No	Key Personnel Required	Qualification Required	Nos.	Nos.	Key Personnel Stated in Proposal	Present at site Qualification & Experience	Remarks
1	Project Manager	Degree in any field or Diploma in Civil Engineering	1	1		Tshering Wangdi, Ex- policemen	No qualification
2	Project Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1		Yonten Tobgay, Degree in civil	
3	Material Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1		No	-
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	1		Karma Tsundru, Diploma in Civil	
5	Surveyor	Diploma in Survey or trained surveyors	1	1		No	
6	Lab Technician	Class X pass with experience	1	1		No	
7	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	1	1		Tshering Dorji, VIT	

- The RO and the project manager had failed to produce the companies' profile. In the absence of which the committed key personnel in the proposal, tender as well as in put in e-tool could not be verified in audit.
- The Project Manager should have bachelor degree in any field with 7 years' experience or diploma in civil engineer with 10 years' work experience but had deployed ex-policeman and no profile of the official was made available on record.
- Key personnel viz. Material Engineer, Junior Engineer & Lab-Technician were not recruited since the start of the contract works.

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed below:

Table 2.13.18.1: Penalty deductions		
Particular of HR	Penalty amount /month (Nu)	15 months (Nu.)
Materials Engineer	40,000.00	600,000.00
Surveyor	15,000.00	225,000.00
Laboratory Technician	15,000.00	225,000.00
Total:		1,050,000.00

RO, Lingmethang

2.13.19 Korila-Pangser (Package-2) executed by M/s. Tshering Construction Pvt Ltd. Bumthang (RO, Lingmethang)

The status of key personnel required and committed by the Contractor as per bidding document are as tabulated below:

S l. N o .	Key Personnel Required	Qualification Required	Number require	Name of committed personal	Qualification
1	Project Manager	Degree in any field with 1 to 7 years or more work experience or Diploma in Civil Engineering with 3 to 10 years or more work experience and Any other qualification	1	Sonam Jamtsho	Bachelors in Commerce
2	Project Engineer	Degree in Civil Engineering and and with 1 to 5 years or more work experience or Diploma in Civil Engineering and also with 3 to 10 years or more work experience in road/bridge works and Any other qualification	1	Karsang Norbu	Post graduate diploma in water supply and treatment engineering
3	Material Engineer	Degree in Civil Engineering with 3 to 5 years' experience or Diploma in Civil Engineering with 3 to 10 years' experience and Any other qualification	1	Binod Rana Mongar	Degree in Civil Engg
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering with experience 5 to 10 years or more other than road work	1	Vinod Kumar Lal	Diploma in Civil Engg
5	Surveyor	Diploma in Survey and also with 3 to 7 or more work experience or Certified/trained surveyor with 1 to 10 years or more work experience and Any other qualification	1	Dilli Ram Baraily	Diploma in Survey
6	Lab Technician	Class XII pas with 5 years experiences as lab technician or Class X pass with 3 to 5 years' experience as Lab Technician and Any other qualification	1	Nill	
7	Work/Site Supervisors	VTI Graduate or equivalent with 1 to 5 years or more work experience ans Any other level of qualification or experience	2	Tshitrim Dorji	Diploma in electrical
				Lham Chenzom	VTI

The status of key personnel committed as per bidding document and actual employment at work site as noted during the physical verification are as tabulated below:

Sl. No .	Key Personnel Required	Name of the committed personal	Qualification	Personnel Engaged At Site as per record	Qualificatio n & Experience	Status during physical verification	Remarks
1	Project Manager	Sonam Jamtsho	Bachelors in Commerce	Sonam Jamtsho	Bachelors in Commerce	Present	
2	Project Engineer	Karsang Norbu	Post graduate diploma in water supply and treatment engineering	Jucdeep,	Degree in Civil	Not Present	Need to review the score assigned
3	Material Engineer	Binod Rana Mongar	Degree in Civil Engg	Phub Dorji,	Diploma in Civil, 1 year experience		Need to review the score assigned as replacement is by diploma holder

							as against Degree holder
4	Junior Engineer	Vinod Kumar Lal	Diploma in Civil Engg	Surja Ghalley,	Diploma in Civil, 2 years		Review experience of Vinod Kumar Lal and score assigned
5	Surveyor	Dilli Ram Baraily	Diploma in Survey	Nil		Not Available/engaged	
6	Lab Technician	Nil		Narayan,	Class 12 Passed		
7	Site Supervisors	Tshitrim Dorji	Diploma in electrical	Tashi Tshering,	VTI		Review the score assigned during evaluation
8	Site Supervisors	Lham Chenzom	VTI	Nil		Not available /engaged	

- Set of key personnel committed in the bid documents were replaced without meeting the criteria stated in the GCC and without appropriate approvals of the client.
- The contractor had failed to deploy the Surveyor, Laboratory Technicians and one work supervisor, as they were not available at site.

2.13.20 Pangser-Kilikhar (Package-3) executed by M/s. K. D Builder Pvt Ltd (RO, Lingmethang)

The status of key personnel required and committed by the Contractor as per bidding document are as shown in table 2.13.20 below:

Sl. No.	Key Personnel Required	Qualification Required	Number require	Name of committed personal	Qualification
1	Project Manager	Degree in any field with 1 to 7 years or more work experience or Diploma in Civil Engineering with 3 to 10 years or more work experience and Any other qualification	1	Dorji Wangda	B.Com, 8 years
2	Project Engineer	Degree in Civil Engineering and with 1 to 5 years or more work experience or Diploma in Civil Engineering and also with 3 to 10 years or more work experience in road/bridge works and Any other qualification	1	Chencho Tshering	Diploma in Civil Engg, 26yrs
3	Material Engineer	Degree in Civil Engineering with 3 to 5 years' experience or Diploma in Civil Engineering with 3 to 10 years' experience and Any other qualification	1	Prasenjit Mukhoadhyay	Diploma in Civil Engg, 23 yrs
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering with experience 5 to 10 years or more other than road work	1	Ranjan Kumar	Diploma in Civil Engg, 23 yrs
5	Surveyor	Diploma in Survey and also with 3 to 7 or more work experience or Certified/trained surveyor with 1 to 10 years or more work experience and Any other qualification	1	Nil	
6	Lab Technician	Class XII pas with 5 years experiences as lab technician or Class X pass with 3 to 5 years' experience as Lab Technician and Any other qualification	1	Kuenzang Wangmo	Class XII, 8 years

7	Work/Site Supervisors	VTI Graduate or equivalent with 1 to 5 years or more work experience and Any other level of qualification or experience	2	Tshering	VTI, 8 years
				Sonam Choden	VTI, 7 years

The status of key personnel committed as per bidding document and actual employment at work site as noted during the physical verification is shown in table 2.13.20.1 below:

Sl. No.	Key Personnel Required	Name of committed personal	Qualification	Personnel Engaged At Site as per record	Qualification & Experience	Status during physical verification	Remarks
1	Project Manager	Dorji Wangda	B.Com, 8 years	Karma Dema	BBM	Present	Need to furnish documents to validate Experience met the requirement and score assigned during evaluation
2	Project Engineer	Chencho Tshering	Diploma in Civil Engg, 26yrs	Chencho Tshering	Diploma in Civil Engg	Present	
3	Material Engineer	Prasenjit Mukhoadhyay	Diploma in Civil Engg, 23 yrs	Dorji Wangdi	Diploma in Civil Engg	Present	Need to furnish documents to validate Experience met the requirement and score assigned during evaluation
4	Junior Engineer	Ranjan Kumar	Diploma in Civil Engg, 23 yrs	Tenzin Norbu	BE Civil engg	Present	Need to furnish documents to validate Experience though replaced by a Degree holder.
5	Surveyor	Nil		Ram Chandra	Diploma in Survey	Present	Need to furnish documents to validate qualification and experience met the requirements
6	Lab Technician	Kuenzang Wangmo	Class XII, 8 years	Norbu	VTI	Present	Need to furnish documents to validate Experience met the requirement.
7	Work/Site Supervisors	Tshering	VTI, 8 years	Bikash Rai,	Class X passed	Present	Need to furnish documents to validate Experience met the requirement
		Sonam Choden	VTI, 7 years	Ganga Raj,	Class X passed	Present	Need to furnish documents to validate Experience met the requirement

Set of key personnel committed in the bid documents were replaced without meeting the criteria stated in the GCC and without appropriate approvals of the client.

2.13.21 Kilikhar to Mongar (Package 4) executed by M/s Gongphel Construction Pvt. Ltd

The status of key personnel required and committed by the Contractor as per bidding document are as tabulated in table 2.13.21 below:

Sl. No.	Key Personnel Required	Qualification Required	Number require	Name of committed personal	Qualification
1	Project Manager	Degree in any field with 1 to 7 years or more work experience or Diploma in Civil Engineering with 3 to 10 years or more work experience and Any other qualification	1	Dawa Rinchen	BA
2	Project Engineer	Degree in Civil Engineering and and with 1 to 5 years or more work experience or Diploma in Civil Engineering and also with 3 to 10 years or more work experience in road/bridge works and Any other qualification	1	Parimal Das Gupta	Diploma in Civil Engg
3	Material Engineer	Degree in Civil Engineering with 3 to 5 years' experience or Diploma in Civil Engineering with 3 to 10 years' experience and Any other qualification	1	Paltu Datta	Diploma in Civil Engg
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering with experience 5 to 10 years or more other than road work	1	Partha Partim Basu	Diploma in Civil Engg
5	Surveyor	Diploma in Survey and also with 3 to 7 or more work experience or Certified/trained surveyor with 1 to 10 years or more work experience and Any other qualification	1	A.K.Mohana n	Diploma in Civil Engg
6	Lab Technician	Class XII pas with 5 years experiences as lab technician or Class X pass with 3 to 5 years' experience as Lab Technician and Any other qualification	1	Pema Luwang	Class 12 passed
7	Work/Site Supervisors	VTI Graduate or equivalent with 1 to 5 years or more work experience ans Any other level of qualification or experience	2	Ugyen Tobgay	BBA
				Mon Bdr Rai	Class 6 pass

The status of key personnel committed as per bidding document and actual employment at work site as noted during the physical verification is shown in table 2.13.21.1 below:

Sl. No.	Key Personne l Required	Number required	Name of committed personal	Qualification	Personnel Engaged At Site as per record/	Qualification & Experience	Remarks
1	Project Manager	1	Dawa Rinchen	BA	Dawa		
2	Project Engineer	1	Parimal Das Gupta	Diploma in Civil Engg	Sherab Phuntsho	Master in transportation engineering	Need to furnish documents to validate Experience met the requirement and score assigned during evaluation
3	Material Engineer	1	Paltu Datta	Diploma in Civil Engg	Jambay	BE Civil Engg	Need to furnish documents to validate Experience met the requirement and score assigned during evaluation

4	Junior Engineer	1	Partha Partim Basu	Diploma in Civil Engg	Parimal Das	Diploma in Civil Engg	Need to furnish documents to validate Experience met the requirement and score assigned during evaluation
5	Surveyor	1	A.K.Mohanan	Diploma in Civil Engg	AK Mohanan		Need to furnish documents to validate Experience met the requirement and score assigned during evaluation
6	Lab Technician	1	Pema Luwang	Class 12 passed	Divanath Sharma	Class X passed	Need to furnish documents to validate Experience met the requirement and score assigned during evaluation
7	Work/Site Supervisors	2	Ugyen Tobgay	BBA	Kinley Penjor,	Class X passed	Need to furnish documents to validate Experience met the requirement and score assigned during evaluation
			Mon Bdr Rai	Class 6 pass	Wangchuk	Certificate in Civil	Need to furnish documents to validate Experience met the requirement and score assigned during evaluation

- The cross check revealed that the personnel committed were not present but different set of key personnel were found deployed at site and without appropriate approvals of the client.
- The contractor had failed to deploy the Surveyor, as was not present at site.

2.13.22 Mongar-Gongola (Package-5) executed by M/s. Norbu Construction Company Pvt. Ltd, Gelephu (RO, Lingmethang)

The status of key personnel required and committed by the Contractor as per bidding document are as shown in table 1.13.22 below:

Sl. No.	Key Personnel Required	Qualification Required	Number require	Name of committed personal	Qualification
1	Project Manager	Degree in any field with 1 to 7 years or more work experience or Diploma in Civil Engineering with 3 to 10 years or more work experience and Any other qualification	1	Sangay Rinzin	Bachelor of Arts
2	Project Engineer	Degree in Civil Engineering and with 1 to 5 years or more work experience or Diploma in Civil Engineering and also with 3 to 10 years or more work experience in road/bridge works and Any other qualification	1	Karthik Muthu	BE Civil Engineering
3	Material Engineer	Degree in Civil Engineering with 3 to 5 years' experience or Diploma in Civil Engineering with 3 to 10 years' experience and Any other qualification	1	Pankaj Baruwa	Diploma in Civil Engg
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering with experience 5 to 10 years or more other than road work	1	Abdur Rahman	Diploma in Civil Engineer
5	Surveyor	Diploma in Survey and also with 3 to 7 or more work experience or Certified/trained surveyor with 1 to 10 years or more work experience and Any other qualification	1	Suren Pradhan	Trained Surveyor
6	Lab Technician	Class XII pas with 5 years experiences as lab technician or Class X pass with 3 to 5	1	Phuentsho Wangdi	VTI Graduate

		years' experience as Lab Technician and Any other qualification			
7	Work/Site Supervisors	VTI Graduate or equivalent with 1 to 5 years or more work experience and Any other level of qualification or experience	2	Tsheten Dorji	VTI Graduate
				Yonton Jamtsho	VTI Graduate

The status of key personnel committed as per bidding document and actual employment at work site as noted during the physical verification is shown in table 2.13.22.1 below:

Sl. No.	Key Personnel Required	Name of committed personal	Qualification	Personnel Engaged At Site as per record	Qualification & Experience	Status during physical verification	Remarks
1	Project Manager	Sangay Rinzin	Bachelor of Arts	Karma Dema	Sangay Rinzin	Present	
2	Project Engineer	Karthik Muthu	BE Civil Engineering	Karthik Muthu	BE Civil Engg	Present	
3	Material Engineer	Pankaj Baruwa	Diploma in Civil Engg	Dhendup Tshering	BE Civil Engg	Present	Need to review the score assigned as replacement is by a Degree holder (Experience need to be reviewed)
4	Junior Engineer	Abdur Rahman	Diploma in Civil Engineer	Nil		Not Engaged	Need to review the score assigned
5	Surveyor	Suren Pradhan	Trained Surveyor	Suren Pradhan		Present	Need to review the score assigned and Experience need to be reviewed.
6	Lab Technician	Phuentsho Wangdi	VTI Graduate	Pema Tshewang,	VTI	Stated on leave	Experience to be reviewed
7	Work/Site Supervisors	Tsheten Dorji	VTI Graduate	Pema Lhamo	VTI	Present	Score assigned and Experience to be reviewed
		Yonton Jamtsho	VTI Graduate	Nil		Not Engaged	Score assigned to be reviewed

- The cross check revealed that the personnel committed were not present but different set of key personnel were found deployed at site and without appropriate approvals of the client.
- The contractor had failed to deploy the Junior Engineer, one Work Site Supervisor.
- The Lab Technician was stated to be on leave as was not present at site.

2.13.23 Gangola-Kurizampa (Package 6) executed by M/s. Rigzar Construction Pvt Ltd. Trashigang (RO, Lingmethang)

The status of key personnel required and committed by the Contractor as per bidding document is as tabulated below:

Sl. No.	Key Personnel Required	No. of Personnel Required	Present Personnel At Site,	Qualification & Experience	Remarks

1	Project Manager	Degree in any field or Diploma in Civil Engineering	1	Karma Wangchuk	Bachelor of Arts
2	Project Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	Nidup Chong	BE Civil Engineering
3	Material Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	Karma Tenzin	Diploma in Civil Engg
4	Junior Engineer	Degree in Civil Engineering or Diploma in Civil Engineering	1	Karma Dizang	Diploma in Civil Engineer
5	Surveyor	Diploma in Survey or trained surveyors	1	Pema Wangchuk	Trained Surveyor
6	Lab Technician	Class X pass with experience	1	Rinzin Pelden	VTI Graduate
7	Site Supervisors	VTI Graduate or equivalent with more than 2 years' experience	2	Yani Maya Newar	VTI Graduate
				Khandu Wangmo	VTI Graduate

The status of key personnel committed as per bidding document and actual employment at work site as noted during the physical verification is shown in table 2.13.23.1 below:

Sl. No.	Key Personal Required	No. of Personnel Required	Present Personnel At Site,	Qualification & Experience	Remarks
1	Project Manager	1	Karma Wangchuk,	General Degree	
2	Project Engineer	1	Nidup Chong,	Degree in Civil Engg	Not present at site
3	Material Engineer	1	Dorji Dhendup,	Diploma in Civil Engg	
4	Junior Engineer	1	Om Prakash Puri,	Diploma in Civil Engg	
5	Surveyor	1	Puran Ghalley,	Class XII Passed	
6	Lab Technician	1	Rinzin Pelden,	Class X passed	
7	Site Supervisor	1	Tashi Phuntsho		Not present at site
8	Site Supervisor	1	Karma Tshering,	Class XII passed	

- The cross check revealed that the personnel committed were not present but different set of key personnel were found deployed at site and without appropriate approvals of the client.
- The contractor had failed to deploy one Work Site Supervisor.
- The Project Engineer was not present at site during the physical verification.

As per General Conditions of Contract (GCC) clauses 10 – Personal, 10.1 “ *the Contractor shall employ the key personnel named in the Schedule of Key Personnel, as referred to in the SCC, to carry out the functions stated in the Schedule or other personnel approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel listed in the schedules. If the contractor fails to deploy the personnel as committed in the Bid documents, the employer shall stop the work if the quality of work is going to suffer or otherwise deduct the salaries of such personnel at a rate stipulated in the SCC per month per personnel for every month of absence of such personnel from the site. Such deductions shall continue till such time that the contractor deploys the key personnel acceptable to the employer. If the contractor fails to deploy such key personnel within one to four months, the deduction shall be discontinued and the contractor’s failure to deploy such personnel shall be treated as a fundamental breach of contract*”.

As evident from above tables all the contractors had violated the aforementioned terms and condition of the contract. In this context, the audit had observed following lapses:

- Set of key personnel committed in the bid documents were changed without following due process as outlined in the GCC of the contract documents. The replacements and substitutions were also found made without the approval of appropriate authority.
- Committed key personnel were found replaced by those having less qualification and working experiences. The replacements were in contrary to the contractual provisions wherein it categorically stipulated that their relevant qualifications and abilities are substantially equal to or better than those of the personnel listed in the Schedules of key personnel.
- The contractors had failed to recruit and deploy key personnel since the start of the contract works.
- The personnel deployed were not available at site during the physical verifications of key personnel.
- The RO and the Site Engineer had allowed the contractors to deploy same key personnel for two or three contract packages instead of ensuring deployment of separate key personnel for each contract package.
- The RO and the Site Engineers had failed to either ensure deployment of committed key personnel by the contractors or take action as per the provisions of the contract agreements against the defaulting contractors.

Non-deployment of committed key personnel was in total violation of the contract with reference to clause GCC 10.1 GCC and keeping in view that the firms had qualified the technical category by obtaining scores based on the proposed deployment of key personnel. Further, it was the responsibility of site engineer to report the matter to Regional Office for appropriate decisions and actions. The inaction on the part of the site engineer indicated laxity and complacency as well as extension of undue favour to the contractor

The RO, should comment on the basis of accepting the key personnel other than those committed in the contract including acceptance of same Project Engineer for all 3 packages whose service is critical for providing technical support to construction staff under the supervision of the Project Manager, overseeing progress of work, scheduling and ensuring execution of works as per drawings and technical specifications.

Besides, the RO must also comment on course of action taken against the contractors in term of the contract Clause SCC 10.1 of the GCC for deployment of different set of key personnel in the event no approval were sanctioned for change of key personnel.

The Regional Office besides recovering the penalties computed by the RAA should also work out the exact penalty amounts deductible taking into consideration the revised and actual completion dates, and non deployment of committed key personnel and deposited in to Audit Recoveries Account.

Auditee's Response:

It is to inform RAA that M/s. Chogyal construction had deployed separate set of machineries and human resources for all three packages during the execution. RAA was provided with the set of resources deployed for two packages during the auditing time itself. However, RO could

not able to produce documentation for one package due to its misplacement. We regret for not having produced the documents as required during the auditing. Finally, after hard work of searching every day, finally RO could able to find the documents for the third package. The copy of HR and equipment for package II & III attached for reference and record, please. Therefore, RAA is requested to kindly drop the memo. Further RO also assures RAA that such important documents shall be kept under safe custody for future works.

The Project Engineer, Mr. Ashok Maheshwari was replaced by Mr. Ugyen Penden, Degree in Civil Engineering. However, during the site visit by RAA Mr. Ugyen Penden & Mr. Phuntsho Wangdi, Material Engineer may not have been present. The deduction of penalty for non-enrolment of key personnel is found not applicable. Therefore, please drop the memo. (His signatory attested for reference in the annexure)

During the initial stage of pavement strengthening works, the precise requirement of Key personnel was not felt necessary. However, during the actual execution the required key personnel are deployed and as per work requirement. Actually, Mr. Ugyen Dorji is Site Supervisor and Mr. Dawa Tenzin is Project Manager. However, during the visit of RAA team it was erroneously acknowledged Ugyen Dorji as Project Manager although both of them were present at site.

During the field visit by RAA team, it was peak winter season (December) during which almost all the works were stopped due to adverse climatic conditions. The required HR personnel were engaged by the contractor for execution of work when the weather favored.

RAA's Further Comments & Recommendations:

While taking note of the response, the fact remains that timely deployment of committed key personnel is a critical factor for project success in terms of time, cost, and quality. The RO had failed to ensure not only deployment of requisite and committed personnel at work site but also replacement of personnel in line with the procedures and process outlined in the contract document. The change of entire or partial key personnel by the contractor without following due process and the failure on the part of the RO and the Site Engineer to ensure deployment of all committed personnel at work site and adoption of due processes for replacements as envisaged in the contract documents indicated laxity and complacency as well as existence of systemic flaws, deficiencies and poor contract management.

It is apparent that abnormal delays of the contract works beyond the original contract period and revised completion period were attributed by the absence of deployment of adequate and committed key personnel by the contractor for the works as well as replacement of personnel with lower qualification and experiences to save cost. The contract delays were also possible due to engagement of same key personnel for the both contract packages II and VII.

Non- enforcement of contract clauses strictly and non-levy of penalty as envisaged in the contract document tantamount to extension of undue favour as the contractors not only benefit financially from not having to entirely deploy personnel at site and incur associated cost but also annulling the payment of penalty for non- deployment of personnel at site. It is to reiterate that the quoted rates of contractor for the related items of works is built up cost inclusive of cost of committed key personnel and all risks factors.

However, as agreed during the exit meeting, DOR and RO should work out the amount to be deducted for non-deployment of key personnel and recover within three months from the date

of issue of the report beyond which penalty @ 24% per annum shall be levied as per Chapter IV, Section 4.5.1.4 of the Finance and Accounting Manual 2016.

Further DoR and the Ministry should review and analyze the impact of poor human resource management particularly in relation to non-deployment of key committed personnel on delays in completion of work as well as quality of work executed. Besides, the DoR and the Ministry should also conduct appropriate studies in terms of skills and experiences required for key personnel and labourer including number requirements, as well as adequate human resources deployment plan in relation to the quantum of works and cost of the project for effective human resource management by both the site engineer and the contractor.

The studies conducted and actions and measures initiated to improve the human resource management system to prevent such flaws and lapses intimated to RAA for records and follow-up in future audits.

Who is accountable?

Direct Accountability	: Refer Accountability Statement attached
Supervisory accountability	:Refer Accountability Statement attached

2.14 Non-deployment of equipment at site as per the requirements and non-deduction of penalty approximately - Nu.94,388,400.00 (4.4.15)

As per the bidding data sheet, Section II, “Employer’s Requirements (ERQ)”, Equipment requirements on the widening and pavement construction works were found met by contractors in terms of the declared individual CV submitted along with the project profile.

A joint team comprising of audit team and officials from RO visited the construction sites for carrying out measurements of completed structures. During the course of the site visits, an attempt was made to cross check the equipment deployed at site with that of committed equipment in the contract documents. The status of equipment committed as per bidding document and actual deployment at work sites as noted during the physical verification for all the contract packages were as tabulated and discussed below:

RO, Lobeysa

2.14.1 Dochula to Chasagang (Packages I, II and III) executed by M/s Chogyal Construction Pvt. Ltd recoverable penalty Nu. 57.302 million (RO, Lobeysa)

The joint verification of site conducted on **29 September 2017 & 2 October 2017** revealed the following lapses:

- On reviewing associated HR and equipment aspects in new point based system of evaluation in e-tools through hard copy of e-tools report noted few HR and Equipment were used commonly to evaluate in system all the three packages I, II and III. However, the evaluation committee used same HR & Equipment for evaluation in e-tools system for contract packages II & III.

- This particular concern was presented to in MLTC meeting convened on 3rd June, 2015 wherein, MLTC unanimously decided that contractor should allocate separate HR & Equipment considering the work being separate package and also on contractor's commitment to provide separate HR & Equipment as per letter No. CCCPLT/T&Q-11/2015/11 dated June 19, 2015.
- Following the decisions of the MLTC convened on 3rd June, 2015, the Regional Office vide letter No. DOR.ROL/Plg-15/2014-2015/3721 dated June 9, 2015 had directed the contractor to submit the letter of commitment for deployment of separate resources for the two packages.
- In response, the contractor had sought one-week time extension for submission of additional resources vide letter No. CCCPLT/T&Q-11/2015/10 dated June 12, 2015 and had subsequently assure availability of adequate resources for the deployment of separate HR and equipment vide letter No. CCCPLT/T&Q-11/2015/11 dated June 19, 2015.
- The audit team could not verify the documentary evidences as Regional Office had failed to produce documents relating to the deployment of separate HR and equipment in particular for package III despite repeated request.
- On probing further, the RO stated the contractor had used the same HR & Equipment for package II & III. This scenario proved that the contractor had failed to allocate separate HR & Equipment for package II & III, resulting in fundamental breach of contractual obligation.
- The Regional Office have neither invoked the termination clause nor enforced the penalty clause GCC 10.1

Particular of Equipment	Penalty/day of non-deployment	Total contract duration in Months	Total Contract duration in Days	Penalty calculated as per approved work schedule (Nu)
Asphalt plant	10,000.00	18.8	564	5,640,000.00
Excavator	10,000.00	18.8	564	5,640,000.00
Backhoe Loader	7,000.00	18.8	564	3,948,000.00
Motor Grader	10,000.00	18.8	564	5,640,000.00
Paver	8,000.00	18.8	564	4,512,000.00
Static Roller	4,000.00	18.8	564	2,256,000.00
Concrete Mixer	500	18.8	564	282,000.00
Water tanker	1,000.00	18.8	564	564,000.00
Four Tipper truck	1,500.00	18.8	564	3,384,000.00
Vibrator roller	5,000.00	18.8	564	2,820,000.00
Total station	500	18.8	564	282,000.00
Tandem Roller	6,000.00	18.8	564	3,384,000.00
Bitumen Sprayer	3,000.00	18.8	564	1,692,000.00
Plate compactor	300	18.8	564	169,200.00
Air compressor	5,000.00	18.8	564	2,820,000.00
Total:				43,033,200.00

Similarly, the contractor had failed to deploy separate HR and equipment against the same HR and equipment committed for the three packages. Thus, in line with the penalty provisions under Clauses GCC 10.1 and SCC and failure to terminate the contract, the Regional Office should recovered the salaries of such personnel and hire charges of equipment at a rate stipulated in the Special Condition of Contract per month per personnel and equipment for the duration of the contract amounting to Nu. 14,269,200.00 as computed below:

Particular of Equipment	Name	Packages	Penalty/day of non-deployment	Total Contract duration of 18.8 month in Days (II)	penalty amount for the duration of the contract 18.8 months
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Backhoe Loader	BP-1-1124	Same for Packages I, II & III	7,000.00	564	3,948,000.00
Concrete Mixer	Inv. 365 of 22.12.05	Same for Packages I, II & III	500.00	564	282,000.00
Tipper truck	BP-2-A5481	Same for Packages I, II & III	1,500	564	846,000.00
Tipper truck	BP-1-A1910	Same for Packages I, II & III	1,500	564	846,000.00
Tipper truck	BP-2-A5479	Same for Packages I, II & III	1,500	564	846,000.00
Tipper truck	BP-2-A5480	Same for Packages I, II & III	1,500	564	846,000.00
Vibratory roller	BP-1-A1918	Same for Packages I, II & III	5,000	564	2,820,000.00
Total station		Same for Packages I, II & III	500	564	282,000.00
Tandem Roller	BP-2-A7572	Same for Packages I, II & III	6,000	564	3,384,000.00
Plate compactor	Inv. 165 of 1.2.12	Same for Packages I, II & III	300	564	169,200.00
Total:					14,269,200.00

- The following correspondences apparently indicated failure of the Pavement works for Packages II and III valuing Nu. 26.490 million and additional compensation payment of Nu. 3.593 million in addition to the insurance claim of Nu. 19.453 million.
- DoR/CE(TMT)/2015-16/8 date 1st June 2016
- CCCPL/ROL-(III)/Works-09/2016-2017/002 dated 7th January 2017
- DoR/Lobeysa/construction Division(09)/2016-2017/037 dated 24th January 2017
- CCCPL/ROL-(II)/Works-07/2016-2017/049 dated 13th April 2017
- DoR/CE(CD)/2016-2017/W-7/3795 dated 17th April 2017
- DoR/CD/7/2016-2017/4059 dated 26th June 2017
- DoR/CD/28/2017-2018/4245 dated 8th August 2017

The failure of such magnitude of pavement works is a clear evidence of non-deployment of separate equipment by the contractor as well as laxity on the part of the Regional Office and MLTC in allowing the contractor to execute three packages with the same equipment for all the three works.

2.14.2 Langkena-Tekizampa (Package V) executed by M/s Etho Metho Construction Pvt. Ltd (RO, Lobeysa)

Equipment	Numbers Required	Numbers Committed	Remarks
Excavator	5	5	Available
Total Station	1	0	Not committed
Asphalt Plant	1	1	Available
Paving Machine	1	1	Available
Vibrating Road Roller	1	1	Not Available
Tandem Roller	1	1	Available
Motor Grader	1	1	Available
Backhoe	1	1	Available
Static Road Roller	1	1	Available
Bitumen Sprayer	1	1	Not Available
Tripper Truck	6	6	Available
Concrete Mixer	1	1	Available
Water Tanker	1	1	Available
Plate Compactor	1	1	Not Available
Air Compressor	2	2	Only 1 Available

- The Contractor had failed to deploy some critical equipment/plants namely vibrating road roller, bitumen sprayer, plate compactor and one air compressor at work site at work site.
- One number Total Station was not committed as per the tender document. The contract did not deploy the equipment at site.

RO, Trongsa

2.14.3 Chuserbu to Nyelazam (Package 1) executed by M/s Rigsar Construction Pvt. Ltd (RO, Trongsa)

Table 2.14.3: Status of Equipment			Present at Work site on		
Equipment committed as per Agreement			Present at Work site on		
Sl/ No	Name of Equipment's	Qty (Nos.)	Name of Equipment's	Qty (Nos.)	Remarks
1	Excavator	4 Nos.	Excavator	4	
2	Excavator with rock breaker	2 Nos.	Excavator with bucket	2	
3	Trucks Tripper	6 Nos	Trucks Tripper	4	2 Nos. not available
4	Pay Loader	2 No.	Pay Loader	1	1 No. not available
5	Asphalt plant	1 No.	Asphalt plant	1	
6	Paver finisher	1 No.	Paver	1	
7	Static Roller	1 No.	Static Roller	1	
8	Air Compressor	2 No	Air Compressor	1	1 No. not available
9	Bitumen sprayer	1 No.	Bitumen sprayer	1	
10	Pneumatic Roller	1 No.	Pneumatic Roller	1	
11	Water Tanker	1 No.	Water Tanker	1	
12	Plate Compactor	2 No.	Plate Compactor	1	1 No. not available
13	Motor Grader	1 No.	Motor Grader	1	
14	Crusher plant	1 No	Crusher plant	1	
15	Vibratory road roller	1 No	Vibrator	1	
16	Total station	1 No	Total station	1	

- Two trippers and one each of Pay Loader, Air Compressor and Plate Compactor were not deployed at site.

2.14.4 Nyelazam to Sakachawa (Package 2) executed by M/s Gaseb Construction Pvt. Ltd (RO, Trongsa)

Table 2.14.4: Status of Equipment			Present at Work site on (7 th December 2017)		
Equipment committed as per Agreement			Present at Work site on (7 th December 2017)		
Sl/ No	Name of Equipment's	Qty (Nos.)	Name of Equipment's	Qty (Nos.)	Remarks
1	Asphalt plant	1 No.	Asphalt plant	Not available	
2	Paver	1 No.	Paver	Not available	
3	Bitumen sprayer	1 No.	Bitumen sprayer	Not available	
4	Pneumatic Roller	1 No.	Pneumatic Roller	Not available	
5	Water Tanker	1 No.	Water Tanker	Not available	

The Contractor had failed to deploy some critical equipment/plants namely Asphalt Plant, Paver, Pneumatic Roller, Bitumen Sprayer, at work site.

2.14.5 Sakachawa to Tsangkha (Package 3) executed by M/s Rinson Construction Pvt. Ltd (RO, Trongsa)

Table 2.14.5: Status of Equipment			Present at Work site on 7.12.2017		
Equipment committed as per Agreement			Present at Work site on 7.12.2017		
Sl/ No	Name of Equipment's	Qty (Nos.)	Name of Equipment's	Qty (Nos.)	Status/Remarks
1	Excavator	4 Nos.	Excavator	4	2 off road
2	Excavator with rock breaker	2 Nos.	Excavator with bucket	2	1 off road
3	Trucks Tripper	6 Nos	Trucks Tripper	4	3 off road
4	Pay Loader	2 No.	Pay Loader	1	Off road
5	Asphalt plant	1 No.	Asphalt plant	0	
6	Paver finisher	1 No.	Paver	0	
7	Static Road Roller	1 No.	Static Roller	1	Off road
8	Air Compressor	2 No	Air Compressor	3	2 off road
9	Bitumen sprayer	1 No.	Bitumen sprayer	0	
10	Pneumatic Roller	1 No.	Pneumatic Roller	0	
11	Water Tanker	1 No.	Water Tanker	0	
12	Plate Compactor	2 No.	Plate Compactor	0	
13	Motor Grader	1 No.	Motor Grader	0	
14	Crusher plant	1 No	Crusher plant	1	Manual crusher not as per the requirement
15	Vibratory road roller	1 No	Vibrator	1	Off road
16	Total station	1 No	Total station	0	

- Majority of machineries and equipment deployed were found off road during the physical verification.
- Machineries and equipment required for bituminous works were found not deployed
- Manual Crusher plant was installed instead of requisite Crusher plant
- Committed machineries were not deployed but deployed different machineries

2.14.6 Tshangkha to View Point (Package 4) executed by M/s Gyalcon Infrastructure Pvt. Ltd (RO, Trongsa)

Table 2.14.6: Status of Equipment			Present at Work site on 3/1/2018		
Equipment committed as per Agreement			Present at Work site on 3/1/2018		
Sl/ No	Name of Equipment's	Qty (Nos.)	Name of Equipment's	Qty (Nos.)	Remarks
1	Asphalt plant	1 No.	Asphalt plant	0	
2	Paver Machines	1 No.	Paver	0	
3	Static Roller (8-10MT)	1 No.	Static Roller	1	Off road
4	Vibratory Road Roller	1 No	Vibratory Road Roller	1 No	
5	Pneumatic Roller	1 No.	Pneumatic Roller	0	
6	Water Tanker	1 No.	Water Tanker	1	Off road
7	Bitumen sprayer	1 No.	Bitumen sprayer	0	
8	Motor Grader	1 No.	Motor Grader	0	

- Machineries and equipment required for bituminous works were found not deployed
- Static Roller and Water Tanker deployed were found off road during the physical verification.

2.14.7 View Point- BjeeZam (Package 5) executed by M/s Druk Lhayul Construction Pvt. Ltd (RO, Trongsa)

Table 2.14.7: Status of Equipment					
Equipment committed as per Agreement			Present at Work site on 7th December, 2017		
Sl/ No	Name of Equipment's	Qty (Nos.)	Name of Equipment's	Qty (Nos.)	Remarks
1	Excavator	4 Nos.	Excavator	2	
2	Excavator with bucket	2 Nos.	Excavator with bucket	1	Off road
3	Trucks Tripper	6 Nos	Trucks Tripper	2 Nos.	Primer equivalent to 2 trippers
5	Asphalt plant	1 No.	Asphalt plant	0	
6	Paver	1 No.	Paver	0	
9	Bitumen sprayer	1 No.	Bitumen sprayer	0	
10	Pneumatic Roller	1 No.	Pneumatic Roller	0	
11	Water Tanker	1 No.	Water Tanker	0	
12	Plate Compactor	1 No.	Plate	0	

- Asphalt plant and paver machine and related equipment which are critically required at site for bituminous works were not deployed at work site.
- One out of two excavators deployed was found off road during the physical verification
- Two tripper trucks were deployed against Six committed as per contract agreement

2.14.8 Bjezam- Trongsa (Package 6) executed by M/s Raven Builders & Company Pvt. Ltd (RO, Trongsa)

Table 2.14.8: Status of Equipment					
Equipment committed as per Agreement			Present at Work site on 14.12.2017		
Sl/No	Name of Equipment's	Qty (Nos.)	Name of Equipment's	Qty (Nos.)	Remarks
1	Excavator	4 Nos.	Excavator	3	1 off road
2	Excavator with rock breaker	2 Nos.	Excavator with bucket	1	
3	Trucks Tripper	6 Nos	Trucks Tripper	3	
4	Pay Loader	2 No.	Pay Loader	1	
5	Asphalt plant	1 No.	Asphalt plant	0	
6	Paver finisher	1 No.	Paver	0	
7	Static Roller	1 No.	Static Roller	0	
8	Air Compressor	2 No	Air Compressor	1	
9	Bitumen sprayer	1 No.	Bitumen sprayer	0	
10	Pneumatic Roller	1 No.	Pneumatic Roller	1	
11	Water Tanker	1 No.	Water Tanker	1	
12	Plate Compactor	2 No.	Plate Compactor	0	
13	Motor Grader	1 No.	Motor Grader	0	
14	Crusher plant	1 No	Crusher plant	1	
15	Vibratory road roller	1 No	Vibrator	1	
16	Total station	1 No	Total station	0	

- Asphalt plant and paver machine and related equipment which are critically required for bituminous works were not deployed at work site.
- One out of three excavators deployed was found off road during the physical verification
- Three tripper trucks were deployed against Six committed as per contract agreement
- One Excavator with rock breaker was deployed against two required and committed
- One each of Pay Loader and Air Compressor were deployed against two required and committed.

2.14.9 Pinzhi-Tashipokto (PKG-8) executed by M/s. Dungkar Construction Pvt Ltd. Thimphu (RO, Trongsa)

Table 2.14.9: Status of Equipment			Present at Work site on 18 th January, 2018		
Equipment committed as per Agreement			Present at Work site on 18 th January, 2018		
Sl/No	Name of Equipment's	Qty (Nos.)	Name of Equipment's	Qty (Nos.)	Remarks
1	Excavator	4 Nos.	Excavator	2	2 Nos not available at site
2	Excavator with rock breaker	2 Nos.	Excavator with rock breaker	1	1 Nos not available at site
3	Trucks Tripper	6 Nos	Trucks Tripper	1	5Nos not available at site
4	Water Tanker	1 No	Water Tanker	0	Not available at site
5	Asphalt plant	1 No.	Asphalt plant	0	Not available at site
6	Paving Machine (Paver)	1 No.	Paving Machine (Paver)	1	Not available at site
7	Vibratory roller (8-10mt)	1No	Vibratory roller (8-10mt)	0	Not available at site
8	Static Road Roller (8-10Mt)	1No	Static Road Roller (8-10Mt)	0	Not available at site
9	Bitumen sprayer	1 No.	Bitumen sprayer	0	Not available at site
10	Pneumatic Roller	1 No.	Pneumatic Roller	0	Not available at site
11	Water Tanker	1 No.	Water Tanker	0	Not available at site
12	Plate Compactor	1 No.	Plate Compactor	0	Not available at site
13	Crusher (min 30TPH)	1 No.	Crusher (min 30TPH)	0	Not available at site
14	Pay loader/back hoe	2 Nos.	Pay loader/back hoe	0	Not available at site

- Asphalt plant and paver machine and related equipment which are critically required for bituminous works were not deployed at work site.
- Majority of key machineries and equipment were found not deployed at work site during the physical verification.

2.14.10 Tashipokto to Dorjigonpa (Package 9) executed by M/s Welfare Construction Pvt. Ltd. (RO, Trongsa)

Table 2.14.10: Status of Equipment			Present at Work site on	
Equipment required as per Agreement			Present at Work site on	
Sl/No	Name of Equipment's	Qty (Nos.)	Name of Equipment's	Qty (Nos.)
1	Excavator	4 Nos.	Excavator	4
2	Excavator with rock breaker	2 Nos.	Excavator with rock breaker	1
3	Tripper Trucks	6 Nos	Tripper Trucks	2
4	Pay Loader	2 No.	Pay Loader	0
5	Asphalt plant	1 No.	Asphalt plant	0
6	Paver finisher	1 No.	Paver	0
7	Static Road Roller	1 No.	Static Roller	0
8	Air Compressor	2 No	Air Compressor	2
9	Bitumen sprayer	1 No.	Bitumen sprayer	0
10	Pneumatic Roller	1 No.	Pneumatic Roller	0
11	Water Tanker	1 No.	Water Tanker	0
12	Plate Compactor	2 No.	Plate Compactor	0
13	Motor Grader	1 No.	Motor Grader	0
14	Concrete Mixer	1 No.	Concrete Mixer	1
15	Crusher plant	1 No	Crusher plant	1
16	Vibratory road roller	1 No	Vibratory road roller	0
17	Total station	1 No	Total station	1

- Asphalt plant and paver machine and related equipment which are critically required for bituminous works were not deployed at work site.
- Majority of key machineries and equipment were found not deployed at work site during the physical verification

2.14.11 Dorji Gonpa to Yotongla (Package 10) executed by M/s Rinson Construction Pvt. Ltd (RO, Trongsa)

Table 2.14.11: Status of Equipment					
Equipment committed as per Agreement			Present at Work site on 18.1.2018		
Sl/No	Name of Equipment's	Qty (Nos.)	Name of Equipment's	Qty (Nos.)	Remarks
1	Excavator	4 Nos.	Excavator	4	2 off road
2	Excavator with rock breaker	2 Nos.	Excavator with bucket	1	off road
3	Tripper Trucks	6 Nos	Tripper Trucks	6	5 off road
4	Pay Loader	2 No.	Pay Loader	1	
5	Asphalt plant	1 No.	Asphalt plant	0	
6	Paver finisher	1 No.	Paver	0	
7	Static Road Roller	1 No.	Static Roller	0	
8	Air Compressor	2 No	Air Compressor	2	
9	Bitumen sprayer	1 No.	Bitumen sprayer	0	
10	Pneumatic Roller	1 No.	Pneumatic Roller	0	
11	Water Tanker	1 No.	Water Tanker	1	Same for Package 13
12	Plate Compactor	2 No.	Plate Compactor	0	
13	Motor Grader	1 No.	Motor Grader	0	
14	Concrete Mixer	1 No.	Concrete Mixer	1	
15	Crusher plant	1 No	Crusher plant	1	
16	Vibratory road roller	1 No	Vibratory road roller	1	Same for Package 13
17	Total station	1 No	Total station	0	

- Same machineries and equipment committed for Package 10 and package 13.
- Majority of machineries and equipment deployed were found off road during the physical verification.
- Machineries and equipment required for bituminous works were found not deployed.
- One Water Tanker and one Vibratory Road Roller deployed was also used for package 13 instead of separate deployment
- One Excavator with rock breaker, One Pay Loader were deployed against requirements/commitment of two each.

2.14.12 Yotongla to Bongzam (Package 11) executed by M/s Dungkar Construction Pvt. Ltd. recoverable penalty Nu. 37,086,000.00 (RO, Trongsa)

Table 2.14.12: Status of Equipment					
Machinery/Equipment required as per ITB 4.3 (a) of Section – II, Bidding Data Sheet			Commitment as per tender document	Status at site during physical verification on 03/1/2018	
Sl/No	Name of Equipment's	Qty. (Nos.)	Qty. (Nos.)	Qty (Nos.)	Remarks
1	Excavator	4	2	Nil	No separate Machinery/equipment deployed at site but same as Machinery/equipment deployed for Contract Package XII
2	Excavator with rock breaker	2		Nil	
3	Total Station set	1	1	Nil	
4	Asphalt Plant (Min 30TPH)	1		Nil	
5	Paving Machine (Paver)	1		Nil	
6	Vibratory Road Roller (8-10 ton Capacity)	1	1	Nil	
7	Pneumatic Tyred Roller	1		Nil	
8	Motor Grader	1	1	Nil	
9	Pay Loader/Backhoe	2	1	Nil	
10	Static Road Roller (8-10 ton capacity)	1		Nil	
11	Air Compressor	2		Nil	
12	Bitumen sprayer	1	1	Nil	
13	Tipper Trucks	6	3	Nil	
14	Concrete Mixer 7/5 cft. capacity or more	1	1	Nil	

15	Water Tanker	1		Nil
16	Plate Compactor	2		Nil
17	Crusher (Min 30 TPH)	1		Nil

- On reviewing associated machineries and equipment aspects in new point based system of evaluation in e-tools through hard copy of e-tools report noted that for both the packages XI and XII, awarded to the firm, same HR and Equipment were used for evaluation in e-tools system.
- The contractor had failed to allocate separate HR & Equipment for package XI & XII, resulting in fundamental breach of contractual obligation.

The Site Engineer had failed to enforce the contract Clause SCC 10.1 of the GCC on the deduction of amounts as specified in the SCC for absence of officials at site as computed in table 2.14.12.1 below:

Particular of Machinery/Equipment	No.	Penalty/day of non-deployment	Total contract duration in Months	Total Contract duration in Days (III)	Penalty calculated as per approved work schedule (Nu)
Asphalt plant	1	10,000.00	28	420	4,200,000.00
Excavator	4	10,000.00	28	420	4,200,000.00
Excavator with rock breaker	2	10,000.00	28	420	4,200,000.00
Backhoe Loader	2	7,000.00	28	420	2,940,000.00
Motor Grader	1	10,000.00	28	420	4,200,000.00
Paver	1	8,000.00	28	420	3,360,000.00
Static Roller	1	4,000.00	28	420	1,680,000.00
Concrete Mixer	1	500.00	28	420	210,000.00
Water tanker	1	1,000.00	28	840	840,000.00
Tipper truck	6	1,500.00	28	840	1,260,000.00
Vibrator roller	1	5,000.00	28	420	2,100,000.00
Total station	1	500.00	28	420	210,000.00
Pneumatic Tyred Roller	1	5,000.00	28	420	2,100,000.00
Bitumen Sprayer	1	3,000.00	28	420	1,260,000.00
Plate compactor	2	300.00	28	420	126,000.00
Air compressor	2	5,000.00	28	840	4,200,000.00
Crusher (Min 30 TPH)	1	5,000.00	28	840	4,200,000.00
Total:					37,086,000.00

2.14.13 Bongzam to Gyatsa Zam (Package 12) by M/s Dungkar Construction Pvt. Ltd (RO, Trongsa)

Equipment required as per ITB 4.3 (a) of Section – II, Bidding Data Sheet			Commitment as per tender document	Status at site during physical verification on 03/1/2018	
Sl/No	Qty. (Nos.)	Qty. (Nos.)	Qty. (Nos.)	Qty (Nos.)	Remarks
1	Excavator	2	2	2	
2	Excavator with rock breaker				
3	Total Station set	1	1	1	

4	Asphalt Plant (Min 30TPH)	1	1	0	Not available
5	Paving Machine (Paver)	1	1	0	Not available
6	Vibratory Road Roller (8-10 ton Capacity)	1	1	1	
7	Pneumatic Tyred Roller				
8	Motor Grader	1	1	1	
9	Pay Loader/Backhoe	1	1	1	
10	Static Road Roller (8-10 ton capacity)				
11	Air Compressor				
12	Bitumen sprayer	1	1	0	Not available
13	Tipper Trucks	3	3	3	
14	Concrete Mixer 7/5 cft. capacity or more	1	1	1	
15	Water Tanker	1	Nil	0	Not available
16	Plate Compactor	1	Nil	0	Not available
17	Crusher (Min 30 TPH)	1	Nil	1	

- On reviewing associated machineries and equipment aspects in new point based system of evaluation in e-tools through hard copy of e-tools report noted that for both the packages XI and XII, awarded to the firm, same HR and Equipment were used for evaluation in e-tools system
- Machineries and equipment which are critically required for bituminous works were not provided as on the date of physical verification.
- The contractor has been allowed to execute three contract packages with the same HR and equipment and that too without adequate deployment of HR and machinery/equipment for contract packages VIII and XI.

2.14.14 Gyatsazam to Ngangar (Package 13) executed by M/s Rinson Construction Pvt. Ltd (RO, Trongsa)

Table 2.14.14: Status of Equipment			Present at Work site on 18.1.2018		
Equipment committed as per Agreement			Present at Work site on 18.1.2018		
Sl/No	Name of Equipment's	Qty (Nos.)	Name of Equipment's	Qty (Nos.)	Remarks
1	Excavator	4 Nos.	Excavator	2	1 off road
2	Excavator with rock breaker	2 Nos.	Excavator with bucket	0	
3	Tripper Trucks	6 Nos	Tripper Trucks	3	
4	Pay Loader	2 No.	Pay Loader	1	
5	Asphalt plant	1 No.	Asphalt plant	0	
6	Paver finisher	1 No.	Paver	0	
7	Static Road Roller	1 No.	Static Roller	1	
8	Air Compressor	2 No	Air Compressor	2	
9	Bitumen sprayer	1 No.	Bitumen sprayer	0	
10	Pneumatic Roller	1 No.	Pneumatic Roller	0	
11	Water Tanker	1 No.	Water Tanker	1	Same for Package 10
12	Plate Compactor	2 No.	Plate Compactor	0	
13	Motor Grader	1 No.	Motor Grader	0	
14	Concrete Mixer	1 No.	Concrete Mixer	0	
15	Crusher plant	1 No	Crusher plant	0	
16	Vibratory road roller	1 No	Vibratory road roller	1	Same for Package 10
17	Total station	1 No	Total station	0	

- On reviewing associated machineries and equipment aspects in new point based system of evaluation in e-tools through hard copy of e-tools report noted that for both the packages X and XIII, awarded to the firm, same machineries and Equipment were used for evaluation in e-tools system

- Machineries and equipment which are critically required for bituminous works were not provided as on the date of physical verification.
- One Excavator deployed was found off road during the physical verification.
- One Water Tanker and one Vibratory Road Roller deployed was also used for package 10 instead of separate deployment
- Deployed: Two Excavators against 4 committed, three trippers against 6 committed and one Pay Loader against 2 committed.
- Different sets of machineries and equipment were found deployed at site as against committed as per contract documents.

RO, Lingmethang

2.14.15 Korila-Pangser (Package-2) executed by M/s. Tshering Construction Pvt Ltd. Bumthang (RO, Lingmethang)

Type of Equipment	Equipment Numbers Required/ and Committed	Status of availability of equipment during physical verification at site	
		Available at site	Not Available at site
Excavator	2	Available	
Excavator with rock breaker	2	Available	
Total Station	1	Available	
Asphalt Plant	1		Not Available
Paving Machine	1	Available	
Vibrating Road Roller	1	Available	
Pneumatic Tyred Roller	1		Not Available
Motor Grader	1	Available	
Backhoe	2	Available	
Static Road Roller	1		Not Available
Bitumen Sprayer	1		Not Available
Tripper Truck	6	Available	
Concrete Mixer	1		Not Available
Water Tanker	1	Available	
Crusher	1	Available	
Plate Compactor	1		Not Available
Air Compressor	2	1 Available	1 Not Available

The Contractor had failed to deploy some critical equipment/plants namely Asphalt plant, Pneumatic Tyred Roller, Static Road Roller, bitumen sprayer, Concrete Mixer, plate compactor and one air compressor at work site.

2.14.16 Pangser-Kilikhar (Package-3) executed by M/s. K. D Builder Pvt Ltd (RO, Lingmethang)

Equipment	Numbers Required	Numbers Committed	Status of availability of equipment during physical verification at site	
			Available at site	Not Available at site
Excavator	2	2	Available	
Excavator with rock breaker	2	-		Not Available
Total Station	1	1	Available	
Asphalt Plant	1	1		Not Available
Paving Machine	1	1	Available	
Vibrating Road Roller	1	1	Available	
Pneumatic Tyred Roller	1	-		Not Available

Motor Grader	1	1		Not Available
Backhoe	1	1	Available	
Static Road Roller	1	-		Not Available
Bitumen Sprayer	1	1		Not Available
Tripper Truck	6	6	Only Available 4	2 No. Not Available
Concrete Mixer	1	1	Available	
Water Tanker	1	1	Available	
Crusher	1	1	Available	
Plate Compactor	1	1		Not Available
Air Compressor	2	2	Only Available 1	1 No. Not Available

- The contractor had failed to deploy some critical equipment/plants namely Excavator with rock breaker, Asphalt Plant, Pneumatic Tyred Roller, Motor Grader, Static Road Roller, Bitumen Sprayer, Plate compactor, two Tripper Trucks and one air compressor at work site.
- Two numbers Excavator with rock breaker, Pneumatic Tyred Roller and Static Road Roller were not committed as per the tender document. Accordingly, the contractor did not deploy the plant and equipment at site.

2.14.17 Kilikhar to Mongar (Package 4) executed by M/s Gongphel Construction Pvt. Ltd (RO, Lingmethang)

Equipment	Numbers Required	Equipment Committed	Status of availability of equipment during physical verification at site	
Excavator	4	4	4	Available
Excavator with rock breaker	2	2	2	Available
Total Station	1	1	1	Available
Asphalt Plant	1	1	-	Not Available
Paving Machine	1	1	-	Not Available
Vibrating Road Roller	1	1	1	Available
Pneumatic Tyred Roller	1	2	-	Not Available
Motor Grader	1	1	1	Available
Backhoe	1	1	1	Available
Static Road Roller	1	1	-	Not Available
Bitumen Sprayer	1	1	-	Not Available
Tripper Truck	6	6	5	One tripper truck not available
Concrete Mixer	1	1	1	Available
Water Tanker	1	1	1	Available
Crusher	1	1	1	Available
Plate Compactor	2	2	-	Not Available
Air Compressor	2	2	2	Available

- The contractor had failed to deploy some critical equipment/plants namely Asphalt Plant, Paving Machine, Pneumatic Tyred Roller, Static Road Roller, Bitumen Sprayer, Plate compactor and one number tripper truck at work site.

2.14.18 Gangola-Kurizampa (Package 6) executed by M/s. Rigzar Construction Pvt Ltd. Trashigang (RO, Lingmethang)

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Equipment	Numbers Required	Numbers Committed	Remarks
Excavator	4	4	Available
Excavator with rock breaker	2	2	Available
Total Station	1	1	Available
Asphalt Plant	1	1	Available
Paving Machine	1	1	Available
Vibrating Road Roller	1	1	Available
Pneumatic Tyred Roller	1	1	Not Available
Motor Grader	1	1	Available
Exca drill	1	1	Available
Backhoe	2	2	Available
Steel Road Roller	1	1	Available
Bitumen Sprayer	1	1	Available but off road
Tripper Truck	6	7	Available
Concrete Mixer	1	1	Available
Water Tanker	1	1	Available
Crusher	1	1	Available
Plate Compactor	1	1	Available

- The contractor had failed to deploy some critical equipment/plants namely Pneumatic Tyred Roller and the Bitumen Sprayer though available at site was found off road.

2.14.19 Kurizampa-Lingmethang Highway (Package-7) executed by M/s Tshering Construction Pvt. Ltd, Bumthang (RO, Lingmethang)

Equipment	Numbers Required	Equipment Committed	Remarks
Excavator	2	2	Available
Total Station	1	1	Available
Rock Breaker	1	1	Available
Asphalt Plant	1	1	Available
Paving Machine	1	1	Not Available
Vibrating Road Roller	1	1	Available
Tandem Roller	1	1	Available
Motor Grader	1	1	Available
Backhoe	1	1	Available
Static Road Roller	1	1	Available
Bitumen Sprayer	1	1	Not Available
Tripper Truck	6	6	Available
Concrete Mixer	1	1	Available
Water Tanker	1	1	Available
Plate Compactor	1	1	Not Available
Air Compressor	2	2	Available

The contractor had failed to deploy some critical equipment/plants namely Paving Machine, Bitumen Sprayer and Plate compactor at work site.

As per General Conditions of Contract (GCC) clauses 10 – Personal, 10.1 “ *the Contractor shall employ the key personnel named in the Schedule of Key Personnel, as referred to in the SCC, to carry out the functions stated in the Schedule or other personnel approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel listed in the schedule. If the contractor fails to deploy the personnel as committed in the Bid documents, the employer shall stop the work if the quality*

of work is going to suffer or otherwise deduct the salaries of such personnel at a rate stipulated in the SCC per month per personnel for every month of absence of such personnel from the site. Such deductions shall continue till such time that the contractor deploys the key personnel acceptable to the employer. If the contractor fails to deploy such key personnel within one to four months, the deduction shall be discontinued and the contractor's failure to deploy such personnel shall be treated as a fundamental breach of contract".

"This shall also apply to the commitment of employment to Vocational Training Institute Graduates (VTI)/skilled local labourers and commitment to provide internship to VTI graduates. However, in this case, Contract may not be terminated but wage rates as mentioned in the SCC shall be deducted for the duration of the contract".

"Similarly, if the committed equipment are not available at site, the hiring charges of such equipment shall be deducted at a rate stipulated in the SCC per month for every month of absence for a period of one to four months after which the deductions shall be discontinued and the contractor's failure to produce such equipment at site shall be treated as a fundamental breach of contract".

As evident from above tables all the contractors had violated the aforementioned terms and condition of the contract. In this context, the audit had observed following lapses:-

- Machineries and equipment were not deployed as committed in the bid documents and were replaced without the approval of appropriate authority.
- The contractors had failed to deploy Machineries and equipment since the start of the contract works.
- Few of Machineries and equipment deployed at work sites were found Off Road and no actions were taken to either repair or replace as on the date of audit.
- The RO and the Site Engineer had allowed the contractors to deploy same machineries and equipment for two or three contract packages instead of ensuring deployment of separate equipment for each contract package.
- Different sets of machineries and equipment were found deployed at site as against committed as per contract documents.
- Few Contractors had failed to commit the machineries and equipment viz. Water Tanker, Plate Compactor and Crusher Plant, which were critical equipment, required for the smooth execution of road works. The Evaluation Committee and MLTC/DLTC had not taken decisions to address the non-commitment of the equipment despite the work was awarded to the firm. During the physical verification of the machinery /equipment, revealed that contractors had not deployed such equipment and the RO had failed to take action on the issue.
- The RO and the Site Engineers had failed to either ensure deployment of committed machineries and equipment by the contractors or take action to deduct the hiring cost as per the provisions of the contract agreements against the defaulting contractors.

Non-deployment of committed machineries and equipment were in total violations with reference to Clause SCC 10.1 of the GCC of the contract agreements and keeping in view that the firms had qualified the technical category by obtaining scores based on the proposed deployment of key equipment and machineries. Further, it was the responsibility of site engineer to report the matter to Regional Office for appropriate decisions and actions. The inaction on the part of the site engineer indicated laxity and complacency as well as extension of undue favour to the contractors.

The RO, should comment on the basis of accepting machineries and equipment other than those committed in the contracts including acceptance of same equipment for contractors executing two or three contract packages as different work plans and completion deadlines were set against each contract package. Besides, the RO must also comment on course of action taken against the contractors in term of the contract Clause SCC 10.1 of the GCC for deployment of different set of machineries and equipment in the event no approval were accorded for replacements.

The Regional Office besides recovering the penalties computed by the RAA should also work out the exact penalty amounts deductible taking into consideration the revised and actual completion dates, substitutions with lesser capacity of machineries and equipment and deposited in to Audit Recoveries Account.

The DOR and the Ministry should hold the RO and the Site Engineer accountable for the failure to ensure deployment of machineries and equipment as per bidding documents for appropriate decisions and action.

Auditee's Response:

It is to inform RAA that M/s. Chogyal construction had deployed separate set of machineries and human resources for all three packages during the execution. RAA was provided with the set of resources deployed for two packages during the auditing time itself. However, RO could not able to produce documentation for one package due to its misplacement. We regret for not having produced the documents as required during the auditing. Finally, after hard work of searching every day, finally RO could able to find the documents for the third package. The copy of HR and equipment for package II & III attached for reference and record, please. Therefore, RAA is requested to kindly drop the memo. Further RO also assures RAA that such important documents shall be kept under safe custody for future works.

M/s Etho Metho Construction has deployed machineries as per the agreement. However, the Bitumen Sprayer was not brought to site yet the BT works was successfully executed by spraying the bitumen manually to the required specification. The RO thus accepted the work and penalty for not deploying the bitumen sprayer was not imposed. Therefore, RO requests RAA to consider and drop the memo, please.

RAA's Further Comments & Recommendations:

While taking note of the response, the fact remains that timely deployment of committed machinery and equipment is a critical factor for project success in terms of time, cost, and quality. The RO had failed to draw appropriate time schedule for the deployment of machinery and equipment in line with the work programs to enable the site engineer to monitor and direct the contractors for deployment of equipment as scheduled. It is apparent that abnormal delays of the contract works beyond the contract and revised completion periods were in the absence of predetermined schedules for deployment of equipment by the contractor for the works. The contract delays was also possible due for engagement of same equipment for the both contract packages II and VII.

Non-levy of penalty as envisaged in the contract document tantamount to extension of undue favour as the contractors not only benefit financially from not having to bring the equipment at site and incur associated cost but also on annulling the payment of penalty for non-

deployment of equipment at site. It is to reiterate that the quoted rates of contractor for the related items of works is built up cost inclusive of cost of equipment and all risks factors.

The failure on the part of the RO and the Site Engineer to ensure deployment of all committed Plants and Equipment at work site indicated laxity and complacency as well as existence of systemic faults, deficiencies and poor contract management.

However, as asserted in the response on the deployment of all machinery and equipment at site on readying the bituminous works, the RO should submit the list equipment and machinery deployed along with documentary evidences for both the contract packages for records and verification in audit. In the event of failure to furnish the requisite records, the RO should recover the penalty as envisaged in the contract documents. In addition, it is to reiterate that non-deployment of one concrete mixture and one air compressor as noted during the physical verification were require throughout constructions not just for bituminous works.

However, as agreed during the exit meeting, DOR and RO, should work out the exact penalty amounts deductible for non-deployment of equipment as per contract document and amounts be recovered within three months from the date of issue of the report beyond which penalty @ 24% per annum shall be levied as per Chapter IV, Section 4.5.1.4 of the Finance and Accounting Manual 2016.

Further DoR and the Ministry should study on the impact of poor plant and equipment management existing within the present system and practices on the progress and quality of works. Besides, the DOR and the Ministry should also conduct appropriate studies in terms of types of plant and equipment and efficiency requirements, numbers of plant and equipment requirements, adequate machinery and equipment deployment plan in relation to the quantum of works and cost of the project for effective equipment management by both the site engineer and the contractor. In addition, the Ministry should also review on the non-commitment of critical and requisite machineries and equipment by the winning bidders and appropriate measures and system put in place to address such flaws in the tender process as well as avoid complication in the contract management for similar project in future.

The studies conducted and actions and measures initiated to improve the equipment management system as well as to prevent such flaws and lapses intimated to RAA for records and follow-up in future audits.

Who is accountable?

<i>Direct Accountability</i>	<i>: Refer Accountability Statement attached</i>
<i>Supervisory Accountability</i>	<i>:Refer Accountability Statement attached</i>

2.15 Non-installation of laboratory at site as per BOQ (5.1.15)

The Regional Office, Trongsa and Lingmethang, despite clear instruction in the technical specification that no separate measurements and payment to be made on the provisions and maintenance of Camps, Offices, Stores, Equipment Yards and Workshops, had prepared detailed estimates for *Installation of Labour camps, contractors' site office, accommodation with proper toilets and sanitation, stores signage, water supply, electricity, lab facilities including equipment etc.* and included as a separate “**item of work**” in the BOQ.

For this item of work, the contractors had quoted lump sum amounts and were paid for including establishment of laboratory at work sites as detailed below:

RO, Trongsa-Table 2.15: details of estimated cost, quoted price and payments thereon				
Packages	Name of Contractor	Departmental estimate (Nu.)	Quoted Amount (Nu.)	Amount paid (Nu.)
Package 1	M/s Rigsar Construction Pvt. Ltd	200,000.00	200,000.00	200,000.00
Package 2	M/s Gaseb Construction Pvt. Ltd	200,000.00	2,000,000.00	2,000,000.00
Package 3	M/s Rinson Construction Pvt. Ltd	200,000.00	1,000,000.00	1,000,000.00
Package 4	M/s Gyalcon Infrastructure Pvt. Ltd	200,000.00	1,200,000.00	1,200,000.00
Package 5	M/s Druk Lhayul Construction Pvt. Ltd	200,000.00	500,000.00	500,000.00
Package 6	M/s Raven Builders & Company Pvt. Ltd	200,000.00	400,000.00	400,000.00
Package 7	M/s Druk Lamsel Construction Pvt/ Ltd	300,000.00	600,000.00	600,000.00
Package 8	M/s. Dungkar Construction Pvt Ltd. Thimphu	200,000.00	150,000.00	150,000.00
Package 9	M/s Welfare Construction Pvt. Ltd	200,000.00	2,000,000.00	1,800,000.00
Package 10	M/s Rinson Construction Pvt/ Ltd	200,000.00	750,000.00	675,000.00
Package 11	M/s Dungkar Construction Pvt/ Ltd	200,000.00	150,000.00	150,000.00
Package 12	M/s Dungkar Construction Pvt Ltd	300,000.00	150,000.00	150,000.00
Package 13	M/s Rinson Construction Pvt/ Ltd	200,000.00	500,000.00	500,000.00
Package 14	M/s Lamnekha Construction Pvt Ltd	300,000.00	50,000.00	50,000.00
	Total	3,100,000.00	9,650,000.00	9,325,000.00

RO, Lingmethang-Table 2.15(a): details of estimated cost, quoted price and payments thereon				
Packages	Name of Contractor	Departmental estimate (Nu.)	Quoted Amount (Nu.)	Amount paid (Nu.)
Package 2	M/s Tshering Construction Pvt. Ltd	1,744,875.00	2,500,000.00	2,500,000.00
Package 3	M/s KD Builders Pvt. Ltd.)	1,794,875.00	4,800,000.00	4,800,000.00
Package 4	M/s Gongphel Construction Pvt. Ltd.	2,194,875.00	1,000,000.00	1,000,000.00
Package 5	M/s Norbu Construction Pvt. Ltd)	2,294,875.00	700,000.00	700,000.00
Package 6	M/s Rigsar Construction Pvt. Ltd.	2,294,875.00	250,000.00	200,000.00
Package 7	M/s Tshering Construction Pvt. Ltd	1,225,175.00	2,500,000.00	2,000,000.00
	Total	11,549,550.00	11,750,000.00	11,200,000.00

During site visit, the audit team in the presence of the Officials from Regional Offices and contractors, physically verified the establishment of proper camps, toilets, water supply and equipment etc. as defined in the estimates and contract document. The team observed that while the payments were made, some contractors had not installed laboratory and some had failed to procure necessary equipment for the laboratory as discussed below:

RO, Trongsa

2.15.1 Nyelazam to Sakachawa (Package 2) executed by M/s Gaseb Construction Pvt. Ltd (RO, Trongsa)

M/s Gaseb Construction Pvt. Ltd had quoted Nu. 2,000,000.00 and was paid accordingly. However, during site verification by the audit team along with the site engineer and the contractor, observed that while most of the lab equipment were available, no separate

laboratory facilities was found established. The following equipments were not made available for verification:

Table 2.15.1: Lab Equipment not available at site			
Procurement of lab equipment and other related items		No.	Remark
I	Bitumen thermometer – digital	1	No
II	CBR testing machine	1	No
III	Flakiness & elongation Index	1	No

2.15.2 Sakachawa to Tsangkha (Package 3) executed by M/s Rinson Construction Pvt. Ltd (RO, Trongsa)

M/s Rinson Construction Pvt. Ltd had quoted Nu. 1,000,000.00 and was paid accordingly. However, during the site visit made on 12.01.2017 by the audit team along with the site engineer and the contractor, observed that the laboratory was not installed at site as laboratory equipment as detailed in the table below were not available for verification:

Table 2.15.2: Lab Equipment not available at site			
Installation of labor camps, contractor’s site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. as per Technical Specification.			
Procurement of lab equipment and other related items		No	Remarks
I	Sand Replacement Equipment	1	No
II	Sieve - all sizes	1	No
III	Flakiness & elongation Index	1	No
IV	Moisture content (speedometer)	1	No
V	Slump Cone	1	No
VI	Cube moulds	1	No
VII	Bitumen thermometer – digital	1	No
VII	Marshall equipment/apparatus	1	No
IX	Bituminous Oven	1	No
X	Water bath	1	No
XI	Centrifuge extractor	1	No
XII	Digital balance	1	No
XIII	Jaw crusher (small)	1	No
XIV	Triple Beam balance 1 set	1	No
XV	Density wire basket	1	No
XVI	CBR testing machine	1	No

On enquiry, the project engineer stated that only one laboratory was installed for package 3 (III) and for Package 10 (X) although installation of camp and laboratory for individual packages were paid separately.

2.15.3 Tshangkha to View Point (Package 4) executed by M/s Gyalcon Infrastructure Pvt. Ltd (RO, Trongsa)

M/s Gyalcon Infrastructure Pvt. Ltd. had quoted Nu. 1,200,000.00 and was paid accordingly. However, during site verification by the audit team along with the site engineer and the contractor, observed that the contractor had not established laboratory since the start of the project.

2.15.4 View Point- BjeeZam (Package 5) executed by M/s Druk Lhayul Construction Pvt. Ltd (RO, Trongsa)

M/s Druk Lhayel Construction Pvt. Ltd had quoted Nu. 1,000,000.00 and was paid accordingly. However, during the site visit by the audit team along with the site engineer and the contractor, observed that the laboratory was not installed at site as laboratory equipment as detailed in the table below were not available for verification:

Table 2.15.4: Lab Equipment not available at site			
Installation of labor camps, contractor's site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. as per Technical Specification.			
Procurement of lab equipment and other related items		No.	Remark
I	Sand Replacement Equipment	1	No
II	Sieve - all sizes	1	Only fine aggregates equipment present
III	Flakiness & elongation Index	1	No
IV	Moisture content (speedometer)	1	No
V	Slump Cone	1	Yes
VI	Cube moulds	1	Yes
VII	Bitumen thermometer – digital	1	Yes
VII	Marshall equipment/apparatus	1	No
IX	Bituminous Oven	1	No
X	Water bath	1	No
XI	Centrifuge extractor	1	No
XII	Digital balance	1	No
XIII	Jaw crusher (small)	1	No
XIV	Triple Beam balance 1 set	1	No
XV	Density wire basket	1	No
XVI	CBR testing machine	1	No

Sieve of all sizes, Slump Cone and Bitumen thermometer – digital only were made available for verification

2.15.5 Bjeezam- Trongsa (Package 6) executed by M/s Raven Builders & Company Pvt. Ltd (RO, Trongsa)

M/s. Raven Builders & Company (P) LTD had quoted Nu. 400,000.00 and was paid accordingly. However, during the site verification by the audit team along with the site engineer and the contractor, observed that no laboratory facilities was found established.

2.15.6 Pinzhi-Tashipokto (PKG-8) executed by M/s. Dungkar Construction Pvt Ltd. Thimphu (RO, Trongsa)

M/s Dungkar Construction Pvt. Ltd quoted only Nu. 150,000.00 and was paid accordingly. However, during site verification by the audit team along with the site engineer and the contractor, observed while most of the lab equipment were available, no separate laboratory facilities was found established.

2.15.7 Tashipokto to Dorjigonpa (Package 9) executed by M/s Welfare Construction Pvt. Ltd (RO, Trongsa)

M/s Welfare Construction Pvt. Ltd had quoted Nu. 2,000,000.00 and was paid accordingly. However, during site verification on 19.01.2017 by the audit team along with the site engineer and the contractor, the team was informed that the contractor had not established laboratory since the start of the project.

On pointing out, the RO, stated that Nu. 200,000.00 representing 10% of the quoted amount for non-installation of laboratory was deducted.

2.15.8 Dorji Gonpa to Yotongla (Package 10) executed by M/s Rinson Construction Pvt. Ltd (RO, Trongsa)

M/s Rinson Construction Pvt. Ltd had quoted Nu. 750,000.00 and was paid Nu. 675,000.00. However, during the site visit on 18.01.2017 by the audit team along with the site engineer and the contractor, observed that the laboratory was not installed at site as laboratory equipment as detailed in the table below were not available for verification:

Table 2.15.8: Lab Equipment not available at site			
Installation of labor camps, contractor's site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. as per Technical Specification.			
Procurement of lab equipment and other related items		No.	Remarks
I	Sand Replacement Equipment	1	No
II	Sieve - all sizes	1	Yes
III	Flakiness & elongation Index	1	Yes
IV	Moisture content (speedometer)	1	No
V	Slump Cone	1	Yes
VI	Cube moulds	1	Yes
VII	Bitumen thermometer – digital	1	No
VII	Bitumen Penetration	1	No
IX	Marshall equipment/apparatus	1	No
X	Lab Oven	1	Yes
XI	Water bath	1	No
XII	Centrifuge extractor	1	No
XIII	Digital balance	1	Yes
XIV	Jaw crusher (small)	1	No
XV	Triple Beam balance 1 set	1	No
XVI	Density wire basket	1	Yes
XVII	CBR testing machine	1	Yes

On enquiry, the project engineer stated that only one laboratory was installed for package 3 (III) and for Package 10 (X) although installation of camp and laboratory for individual packages were paid separately.

On pointing out, the RO, stated that Nu. 75,000.00 representing 10% of the quoted amount was deducted for not fully establishing the laboratory.

2.15.9 Yotongla to Bongzam (Package 11) executed by M/s Dungkar Construction Pvt. Ltd (RO, Trongsa)

M/s Dungkar Construction Pvt. Ltd have quoted Nu. 150,000.00 and was paid accordingly. However, during the site verification by the audit team along with the site engineer and the contractor, observed that the no separate laboratory facilities was found established except for Package 8.

2.15.10 Bongzam to Gyatsa Zam (Package 12) by M/s Dungkar Construction Pvt. Ltd (RO, Trongsa)

M/s Dungkar Construction Pvt. Ltd have quoted Nu. 150,000.00 and was paid accordingly. However, during the site verification by the audit team along with the site engineer and the contractor, observed that the no separate laboratory facilities was found established except for Package 8.

2.15.11 Gyatsazam to Ngangar (Package 13) executed by M/s Rinson Construction Pvt. Ltd (RO, Trongsa)

M/s Rinson Construction Pvt. Ltd had quoted Nu. 500,000.00 and was paid accordingly. However, during the site verification on 21.12.2017 by the audit team along with the site engineer and the contractor, observed that the no separate laboratory facilities was found established as laboratory equipment as detailed in the table below were not available for verification:

Table 2.15.11: Lab Equipment not available at site			
Installation of labor camps, contractor's site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. as per Technical Specification.			
Procurement of lab equipment and other related items		No.	Remarks
I	Sand Replacement Equipment	1	No
II	Sieve - all sizes	1	No
III	Flakiness & elongation Index	1	No
IV	Moisture content (speedometer)	1	No
V	Slump Cone	1	No
VI	Cube moulds	1	No
VII	Bitumen thermometer – digital	1	No
VIII	Marshall equipment/apparatus	1	No
IX	Bituminous Oven	1	No
X	Water bath	1	No
XI	Centrifuge extractor	1	No
XII	Digital balance	1	No
XIII	Jaw crusher (small)	1	No
XIV	Triple Beam balance 1 set	1	No
XV	Density wire basket	1	No

XVI	CBR testing machine	1	No
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On enquiry, the project engineer stated that only one laboratory was installed for package 10 (X) and for Package 13 (XIII) although installation of camp and laboratory for individual packages were paid separately.

RO, Lingmethang

2.15.12 Korila-Pangser (Package-2) executed by M/s. Tshering Construction Pvt Ltd. Bumthang (RO, Lingmethang)

M/s. Tshering Construction Pvt Ltd. had quoted Nu. 2,500,000.00 and was paid accordingly. However, during site visit, the audit team in the presence of the Officials from Regional Office and contractor physically verified the establishment of proper camps, toilets, water supply etc. as defined in the estimates and contract document. The team noted that while the payments were made, some necessary equipment were found not procured by the contractor as detailed below:

Procurement of lab equipment and other related items		No.	Remark
I	Marshall equipment/apparatus	1	No
II	Bituminous Oven	1	No
III	Water bath	1	No
IV	Centrifuge extractor	1	No
V	Sand equivalent test apparatus	1	No
VI	Jaw crusher (small)	1	No
VII	Triple Beam balance 1 set	1	No
VIII	Density wire basket	1	No
IX	CRB testing machine	1	No

2.15.13 Pangser-Kilikhar (Package-3) executed by M/s. K. D Builder Pvt Ltd (RO, Lingmethang)

M/s. K. D Builder Pvt Ltd. had quoted Nu. 4,800,000.00 and was paid accordingly. However, during site visit, the audit team in the presence of the Officials from Regional Office and contractor physically verified the establishment of proper camps, toilets, water supply etc. as defined in the estimates and contract document. The team noted that while the payments were made, some necessary equipment were found not procured by the contractor as detailed below:

Installation of labor camps, contractor's site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. as per Technical Specification.			
Procurement of lab equipment and other related items		No.	Remark
I	Marshall equipment/apparatus	1	No
II	Bituminous Oven	1	No
III	Centrifuge extractor	1	No

IV	Jaw crusher (small)	1	No
V	Triple Beam balance 1 set	1	No
VI	Density wire basket	1	No
VII	CBR testing machine	1	No
VIII	Safety goggles	1	No

On enquiry, the project engineer stated that only one laboratory was installed for package 3 (III) and for Package 10 (X) although installation of camp and laboratory for individual packages were paid separately.

2.15.14 Kilikhar to Mongar (Package 4) executed by M/s Gongphel Construction Pvt. Ltd (RO, Lingmethang)

M/s Gongphel Construction Pvt. Ltd had quoted Nu. 1,000,000.00 and was paid accordingly. However, during site visit, the audit team in the presence of the Officials from Regional Office and contractor physically verified the establishment of proper camps, toilets, water supply etc. as defined in the estimates and contract document. The team noted that while the payments were made, some necessary equipment were found not procured by the contractor as detailed below:

Table 2.15.14: Lab Equipment not available at site			
Installation of labor camps, contractor's site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. as per Technical Specification.			
Procurement of lab equipment and other related items		No.	Remark
I	Bituminous Oven	1	No
II	Centrifuge extractor	1	No
III	Water bath	1	No
IV	Density wire basket	1	No
V	CBR testing machine	1	No
VI	Safety goggles	1	No
VII	Safety Belts	1	No

2.15.15 Mongar-Gongola (Package-5) executed by M/s. Norbu Construction Company Pvt. Ltd, Gelephu (RO, Lingmethang)

M/s. Norbu Construction Company Pvt. Ltd, Gelephu had quoted Nu. 700,000.00 and was paid accordingly. However, during site visit, the audit team in the presence of the Officials from Regional Office and contractor physically verified the establishment of proper camps, toilets, water supply etc. as defined in the estimates and contract document. The team noted that while the payments were made, no separate lab facilities was found established at site as laboratory equipment as detailed in the table below were not available for verification:

Table 2.15.15: Lab Equipment not available at site		
Installation of labor camps, contractor's site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. as per Technical Specification.		
Procurement of lab equipment and other related items	No.	Remark

I	Flakiness & elongation Index	1	No
II	Moisture content (speedometer)	1	No
III	Bitumen thermometer – digital	1	No
IV	Marshall equipment/apparatus	1	No
V	Bituminous Oven	1	No
VI	Water bath	1	No
VII	Centrifuge extractor	1	No
VIII	Jaw crusher (small)	1	No
IX	Triple Beam balance 1 set	1	No
X	Density wire basket	1	No
XI	CBR testing machine	1	No

2.15.16 Gangola-Kurizampa (Package 6) executed by M/s. Rigsar Construction Pvt Ltd. Trashigang (RO, Lingmethang)

M/s. Rigsar Construction Pvt Ltd had quoted Nu. 250,000.00 and was paid Nu. 200,000.00. However, during the site verification by the audit team along with the site engineer and the contractor, observed that while most of the lab equipment were available, no separate lab facilities was found established at site as laboratory equipment as detailed in the table below were not available for verification:

Table 2.15.16: Lab Equipment not available at site			
Installation of labour camps, contractor's site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. as per Technical Specification.			
Procurement of lab equipment and other related items		Qty. in No.	Remarks
I	Marshall equipment/apparatus	1	No
II	Bitumen Oven	1	No
III	Water bath	1	No
IV	Centrifuge extractor	1	No
V	Jaw crusher (small)	1	No
VI	Triple Beam balance 1 set	1	No
VII	Density wire basket	1	No
VIII	CBR testing machine	1	No
IX	Insurance		documents not available

2.15.17 Kurizampa-Lingmethang Highway (Package-7) executed by M/s Tshering Construction Pvt. Ltd, Bumthang (RO, Lingmethang)

M/s Tshering Construction Pvt. Ltd, Bumthang had quoted Nu. 2,500,000.00 and was paid Nu.2,000,000.00. However, during the site verification by the audit team along with the site engineer and the contractor, observed that the no separate laboratory facilities was found established as laboratory equipment as detailed in the table below were not available for verification:

Table 2.15.17: Lab Equipment not available at site			
Installation of labor camps, contractor's site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. as per Technical Specification.			
Procurement of lab equipment and other related items		No.	Remarks
I	Sand Replacement Equipment	1	No
II	Flakiness & elongation Index	1	No
III	Moisture content (speedometer)	1	No
IV	Slump Cone	1	No
V	Bitumen thermometer – digital	1	No
VI	Marshall equipment/apparatus	1	No
VII	Bituminous Oven	1	No
VIII	Water bath	1	No
IX	Centrifuge extractor	1	No
X	Sand equivalent test apparatus	1	No
XI	Digital balance	1	No
XII	Jaw crusher (small)	1	No
XIII	Triple Beam balance 1 set	1	No
XIV	Density wire basket	1	No
XV	CBR testing machine	1	No

The Regional Office should comment on the non-establishment of lab facilities which is a critical component of contract obligations for ensuring execution of contract works with quality materials and testing of executed works to validate that works met the required technical standards and specifications.

The Regional Office should comment as to how such technical requirements on the execution of works were achieved without laboratory facilities. Besides, the RO should recover the proportionate amount from the contractor for not installing laboratory at site or installation of combined laboratory, if any, and the amount recovered deposited into Audit Recoveries Account. Further, the Regional Office should also comment on non availability of lab equipments at site.

Auditee's Response:

The Regional Office acknowledges the observations issued by Royal Audit Authority and we have great concerns and high regards for the observation made by Royal Audit Authority. We would like to furnish the following facts and evidences as comprehensive explanations for kind consideration by Royal Audit Authority.

From the list of equipment enclosed, RO acknowledges that though the firm has not brought all the requisite equipment at site, the minimal pre-requisite testing equipment are present at site.

More over the firm carries out the required test at site as demanded by the nature of work from the neighboring contractor's laboratory.

For some equipment made not available at site during the course of testing, proportionate amount will be worked out and will be recovered and deposited to ARA

We would like to request the Royal Audit Authority to kindly review above detailed explanations and consider dropping the above Para.

Other Responses:

As long as many contractors getting their materials tested from APECs and nearby contractor with their own expenses, RO could not do anything despite several instructions.

With every bill submission, contractors are instructed to attach test reports/results and each & every contractor is complying with this requirement

RAA's Further Comments & Recommendations:

The response of the RO that request test were conducted by the contractors from APECs and neighboring contractors' laboratories is not tenable as the incorporation of such extra item of works in the estimates and BOQs was made in violation of the provisions of the technical specifications and also such decisions should have been taken prior to incorporation of the lab requirements in the estimates/BOQs, tendering and awarding the contract works. The incorporation of installation of laboratory facilities in the estimates/BOQs would have cost implications which bidders are expected to include in their rates.

It is apparent from the response that the RO had not adhered to the contract provisions by allowing the contractors to conduct the test in APECs and neighboring contractors' laboratories instead of directing the contractors to establish own laboratory as per the contract agreement. It also indicated laxity and complacency on the part of the RO to enforce the provisions of the contract agreement.

Non-enforcement of contract clauses strictly and non-levy of penalty tantamount to extension of undue favour as the contractors benefits financially on not having to procure and install the lab facilities and incur associated cost. It is to reiterate that the quoted rates of contractors for the related items of works is built up cost inclusive of cost of lab equipment and all risks factors.

However, as agreed during the exit meeting, DOR and RO should work out the exact penalty amounts deductible for non-establishment of laboratories and non-furnishing of full laboratory facilities in terms of the total payments made to Contractors as the deduction of just 10% made by the RO from few contractors were not justified. The deductible amounts should be recovered within three months from the date of issue of the report beyond which penalty @ 24% per annum shall be levied as per Chapter IV, Section 4.5.1.4 of the Finance and Accounting Manual 2016. Besides, the details of recoveries affected and accounted for in the books of accounts should be furnished to RAA for review and record.

Further, in the light of the failure not only to establish laboratory facilities by majority of the contractors but also on the part of the RO and Site Engineer to strictly enforced the provisions as per contract agreement, the DoR and the Ministry should revisit the estimates/BOQs and technical specifications for appropriate decisions and action on the requirement for inclusion of installation of separate laboratory facilities by contractors for similar future works. The outcome of the decisions should be intimated to RAA for records and follow-up in future audits.

Who is accountable?

Direct Accountability	: Refer Accountability Statement attached
Supervisory Accountability	: Refer Accountability Statement attached

2.16 Flaws in the BOQ and technical Specification on the transportation of Spoil materials in designated dumping yards (4.4.69)

The Nomenclature provided in the BOQ for item work RW0024 for dumping of spoil materials were as under:

“Transportation of loose spoil materials in designated locations including loading/unloading, Dressing of dump sites and plantation of vegetation after completion of dumping beyond 500 up to 1210 m.”

While the bidder was required to bid in lump sum amount for FC works comprising item of works “RW0014 for exaction of all kinds of rocks”, RW0013 for “excavation of all kinds of soil” and RW0024 for “transportation of loose soil”, the nomenclature categorically provided under RW0024 transportation of loose spoil materials beyond 500m up to 1210m indicating that the designated dumping sites were beyond 500m distances.

Accordingly, the quotes though obtained as lump sum amount for formation works, had invariably built up rates for the transportation of loose soil beyond 500m up to 1210 m. It was apparent from the records and documents that the Regional Office had obtained NEC clearance for dumping yards for all contract packages prior to estimations and awards of contracts.

The designated dumping yards for the various contract packages were approved as detailed in table 2.16 below:

Table 2.16: Flaws in the BOQ and technical Specification			
Name of contractor	Contract Chainage	Designated Dump Yard Chainage	Remark
M/s Empire Construction (Package VIII) – Lobeyasa	372km to 379km (7km) Pelela- Bumilo	379.10KM,378.70KM,377.90KM 377.80KM,376.5KM,375.50KM,374.50KM,374.3KM&372.6KM	Analysis based on the designated dumping yards indicated that from a less than a kilometer, transportation of loose materials were required beyond 500m. (M/s Empire Construction Pvt. Ltd. as evident from the NEC clearance letter No. NECS/ESD/DOR/3023/2014/1018 dated 18/12/2014).
M/s Gaseb Construction Pvt. Ltd - (Package 2) Trongsa	12.00km to 19.50km (7.5km) Nyelazam – Sakachawa	13960-14020, 14420-14490, 14700-14750, 15000-15040, 15520-15580, 15720-15790, 16220-16280	Analysis based on the designated dumping yards indicated that in between Chainage 12000 to 13460m and 16780 to 19500m , transportation of loose material beyond 500m were required only for about 1460m and 2720m respectively.
M/s Druk Gyalcon Construction Pvt. Ltd (Package 4) -Trongsa	27km to 32.00km (5km) Tsangkha to Trongsa View point	27274m, 27372m, 2772m, 28794m, 28956m, 29120m, 29256m, 29500m, 29709m, 31743m	Analysis based on the designated dumping yards indicated that transportation of loose materials beyond 500m were required only for 1313m
M/s Druk Lhayul Construction Pvt. Ltd (Package 5) Trongsa	32.00km to 37.70km (5.7km) View Point-Bjee Zam	32160-32240m, 32380-32440m, 33610-33640m	Analysis based on the designated dumping yards indicated that transportation of loose materials beyond 500m were required only for 3730m

M/s Raven Construction Pvt. Ltd (Package 6) Trongsa	37.7km-44.4km(6.7 km) Bjeezam-Trongsa	37,960m-38,000m, 39,540m-39,620m, 41,520m-41,600m, 43,260m-43,300m	Analysis based on the designated dumping yards indicated that transportation of loose materials beyond 500m were required only for 2700m
M/s. Dungkar Construction Pvt Ltd. Thimphu (Package 8) Trongsa	50.80km to 58.00km (7.2km) to Pinzhi-Tashipokto	53310m, 56569m	Analysis based on the designated dumping yards indicated that transportation of loose materials beyond 500m were required only for 5200m
M/s Welfare Lamsel Construction Pvt. Ltd (Package 9) Trongsa	58km to 65.98km (7.98km) Dorjigonpa to Tashipokto	58.76 - 58.82km, 60.66 - 60.80km, 61.29 - 61.39km, 63.22 - 63.36km, 63.85 - 63.91km	Analysis based on the designated dumping yards indicated that transportation of loose materials beyond 500m were required only for 4.5km
M/s Rinson Construction Pvt. Ltd (Package 10) Trongsa	65.98km to 72km (6.02km) Dorjigonpa to Yotongla	71353-71763m, 70823-71001m, 68061-68106m	Analysis based on the designated dumping yards indicated that transportation of loose materials beyond 500m were required only for 3298m
M/s. Dungkar Construction Pvt Ltd. Thimphu (Package 11) Trongsa	72km to 80km (8km) Yotongla to Bongzam	81.2-81.26km, 81.78-81.84km, 84.76- 84.81	Analysis based on the designated dumping yards indicated that transportation of loose materials beyond 500m were required only for 2.61km

Further, it was evident from the documents that the NEC clearance for dumping yards in respect of contract package VIII (Lobeysa) awarded to M/s Empire Construction was obtained seven months ahead of the award of the contract on 23/07/2015.

The audit in an attempt to validate the requirement for the transportation of loose materials beyond 500 up to 1210 m carried out an analysis based on the approved designated dumping yards and observed that transportation of loose materials beyond 500m lead were not required in most of chainages as the dumping yards were well within 500m lead. The extent of transportation of loose materials required beyond 500m were as depicted in the table 2.16 above in respect of each packages.

The specification in the BOQ requiring transportation beyond 500m up to 1210m of excavated loose spoil materials indicated flawed BOQs specification. The Regional Offices should have taken into consideration the approved dump yards and to the extent of loose materials actually required to be transported beyond 500m lead quantified and incorporated in the departmental estimates and specified in the BOQ of the tender documents. Thus, inclusion of a standard nomenclature in the BOQ on the transportation of spoil materials indicated requirement of transportation of all excavated materials beyond lead of 500m which adversely impacted the departmental estimates as well as bid prices.

The Regional Offices and the DOR besides commenting on the lapses should also hold the concerned officials accountable for preparation of flawed estimates, BOQs and technical specification relating to the transportation of loose spoil materials despite knowing that designated dumping yards were approved by NEC for each contract packages. The DoR and the Ministry should revisit the departmental estimates and ascertain the financial implications due to flawed estimation and nomenclature in the BOQs of the tender documents.

Auditee's Response:

The lead for transportation of spoils were anticipated within the lead of 500.00M-1,210.00M in the estimates. The NEC visited the sites and identified the dumping yards which fell distance lesser than the above lead which were assumed during the time of estimates. In reality, the actual lead for transportation is more than 500M. Therefore, please drop the memo.

RAA's Further Comments & Recommendations:

While taking note of the response, it is reiterated that the approvals for dumping yards were obtained prior to the awards of the contracts by ROs from respective authorities and known to the ROs. The analysis carried out in terms of approved dumping yards as detailed in the table of the report revealed that for 9 contract packages, the requirement of transportation of spoil materials beyond 500m lead ranged just from half a kilometer to 5.2 kms against allotted road stretches ranging from 5km to 8km. The transportation of spoil materials incorporated in the departmental estimated cost in respect of Lobeyasa ranged from 40% to 65% in respect of contract packages and the departmentally executed formation cutting works showed as high as 98.74%.

Thus, in consideration to the above facts, there exist flaws in the departmental estimations and nomenclatures in the BOQs.

However, as discussed during the exit meeting, the DOR and Ministry should revisit all the departmental estimates prepared by the ROs and flaws and ambiguities, if any, remedial measures taken to prevent unrealistic preparation of estimates and inclusion of flawed nomenclatures in the BOQs for similar projects in future. The outcome of the review and remedial measures put in place intimated to RAA for records and follow-up in future audits.

2.17 Damages to Environment due to Dumping of muck in unidentified areas and push/freely rolling of mucks over the valley

The dump yards were found identified and dully approved by Dzongkhags NEC, and the National Environment Commission Secretariat for each contract packages. The NEC clearances clearly stipulated the following terms and conditions amongst many others:

1. The holders shall ensure that Environmentally Friendly Road Construction (EFRC) techniques are adopted for the widening of this road to minimize adverse environmental impacts;
2. The holder shall ensure that excavated materials are never pushed downhill and are loaded, Hauled and dumped at the pre-identified/approved spoil dumpsites to avoid downstream environmental damages; and
3. The holder shall ensure that dusts generated during widening of the road are adequately suppressed by spraying water.

However, during the joint physical verification of construction sites comprising officials from respective ROs, and audit team, spoil materials were found dumped at various locations by the contractors despite allocation of designated dumping yards within the contract Chainages. The excavated spoil materials found either dumped in places other than the designated dump sites or freely rolled/pushed over the hills causing downstream environmental damages in the chainages are as discussed below:

RO, Lobeysa

2.17.1 Pelela to Bumilo (Package VIII) executed by M/s Empire Construction Pvt. Ltd

During the joint site verification of the construction site, spoil materials were also found dumped at locations viz. chainages 378.94km, 378.52 and 377.69KM by the contractor despite allocation of nine designated dumping yards within the contract scope of works of seven Kilometers (*Refer audit memo 15.6*) as depicted in the Photograph below:



Fig: 2.17.1- Spoil materials rolled down the cliff in places other than *designated areas*

RO, Trongsa

2.17.2 Trongsa Nyelazam – Sakachawa executed by M/s Gaseb Construction Pvt. Ltd - (Package 2) Trongsa

The dump yard identified by RO, Trongsa for the excavated soil are in between Chainages 14450 to 17005 meters and 17973 to 24058 meters for 7.5km FC works. However, the audit team noted that excavated soil were not transported to dump yard but rolled/pushed over the hills in the following chainages:

Table 2.17.2: Soil rolled/pushed over the hills and not dump in designated dumping yards				
Sl. No.	Identified dump yard (Chainage)	Chainages where muck are dumped/rolled over	Remarks	Chainages requiring transportation of spoil materials to dump yards
1	13960-14020			12000-13960
2	14420-14490			14020-14420
3	14700-14750	12123-12369	Rolled over	14490-14700
4	15000-15040	12595-13683	Rolled over	14750-15000
5	15520-15580	13727-15496	Rolled over	15040-15520
6	15720-15790	13956-16072	Rolled over	15580-15720
7	16220-16280			15790-16220
				16280-19500

As would be transpired from the table above that against the 7 identified dump yards, loose materials were found directly rolled over/ pushed down the hills from additional 4 places

without the approval causing downstream environmental damages as depicted in the photographs below:



Fig: 2.17.2-Spoil materials dumped and freely rolled/pushed over the hill causing damaged to the environment

Thus, inclusion of a standard nomenclature in the BOQ on the transportation of spoil materials indicated requirement of transportation of all excavated materials beyond the lead of 500m which adversely impacted the bid price.

2.17.3 Tsangkha to View Point (Package 4) executed by M/s Druk Gyalcon Construction Pvt. Ltd (RO, Trongsa)

During the joint physical verification of site along with officials from RO, Trongsa and contractor’s staff, it was observed that the excessive earth excavated from the formation cutting were not transported to dump yard but rolled/pushed over the hills in the following chainages:

Table 2.17.3: Soil rolled/pushed over the hills and not dump in designated dumping yards			
SL. No	Identified dump yard (Chain age)	Chainages where muck are dumped	Remarks
1	27274	27372	Roll over
2	27372	27619	Roll over
3	27724	27737	Roll over
4	28794	28842	Dump yard
5	28956	29014	Dump yard
6	29120	29168	Roll over
7	29256	29486	Roll over
8	29500	29595	Dump yard
9	29709	29861	Dump yard
10	31743	31843	Roll over

It would be noted that against the 10 identified dump yards, additional 3 places were used as dump yards without the approval. The spoil materials directly rolled/push over the hills are as shown in the photographs below:



Fig: 2.17.3- Spoil materials dumped and freely rolled/pushed over the hill causing damaged to the environment

2.17.4 View Point- Bjee Zam (Package 5) executed by M/s Druk Lhayul Construction Pvt. Ltd (RO, Trongsa)

During the joint physical verification of site along with officials from RO, Trongsa it was observed that dumping of muck were done in haphazard manner or freely rolled/pushed over the hills in unidentified areas causing downstream environmental damages in the following chainages:

Table 2.17.4: Soil rolled/pushed over the hills and not dump in designated dumping yards			
SL. No	Identified dump yard (Chain age)	Chainages where muck are dumped	Remarks
1	32160-32240	32160-32247	Dump at identified place
2	32380-32440	32530-32685	Dump at identified place
3		32916-33068	Roll over
4		33080-33212	Dump yard though not identified
5		33220-33305	Roll over
6		33433-33448	Dump yard though not identified
7	33610-33640	33588-33702	Dump at identified place
8		34513-34600	Roll over
9		34677-34850	Dump yard though not identified
10		35097-35147	Dump yard though not identified
11		35297-35412	Dump yard though not identified
12		35503-35651	Roll over
13		35691-35916	Roll over
14		36117-36297	Roll over
15		36848-36927	Dump yard though not identified
16		36950-37110	Roll over
17		37138-37178	Roll over

It was also noted that against the 3 identified dump yards, additional 6 places were used as dump yards without the approval. The spoil materials directly rolled/push over the hills are as shown in the photographs below:



Fig: 2.17.4- Spoil materials dumped and freely rolled/pushed over the hill causing damaged to the environment

2.17.5 Bjeezam-Trongsá (Package 6) executed by M/s Raven Construction Pvt. Ltd (Package 6) Trongsá

During the joint physical verification of sites comprising officials from RO, Trongsá and audit team on 14th December 2017, it was observed that despite assigning specific dump sites for stretch between Bjeezam -Trongsá, the excavated spoil materials were found either dumped in places other than the designated dump sites or freely rolled/pushed over the hills causing downstream environmental damages in the chainages detailed below:

SL. No	Ch. From (m)	Ch. To (m)	Length (m)	Remarks
1	40476	40535	59	Not identified as dumping areas by NEC
2	41318	41446	128	Not identified as dumping areas by NEC
3	41612	41665	53	Not identified as dumping areas by NEC
4	41864	41910	46	Not identified as dumping areas by NEC
5	42250	42275	25	Not identified as dumping areas by NEC

In addition, photographic evidences of spoil materials dumped and freely rolled/pushed over the hills are as depicted below:



Fig: 2.17.5-Roll over of mucks over the valley

2.17.6 Pinzhi-Tashipokto (Package8) executed by M/s. Dungkar Construction Pvt Ltd. Thimphu (RO, Trongsa)

During the joint physical verification of site along with officials from RO, Trongsa and contractor's staff, it was observed that the dumping of excessive earth excavated from the formation cutting were either not done in the identified dumping yards/areas or freely rolled/pushed over the hills causing downstream environmental damages in following chainages:

Table 2.17.6: Soil rolled/pushed over the hills and not dump in designated dumping yards		
SL. No	Identified dump yard (Chain age)	Chainages where muck are dumped/rolled over
1	53310	57798-57876
2	56569	57603-57674
3		57474-57509
4		57372-57427
5		55818-55975
6		55754-55791
7		55576-55632
8		55417-55494
9		54475-54565

As against 2 identified dump yards, additional 9 places were used at dump yards/rolled over without the approval. The spoil materials directly rolled/push over the hill are as depicted in the photographs below:



Fig: 2.17.6-Spoil materials dumped and freely rolled/pushed over the hill causing damaged to the environment

2.17.7 Dorjigonpa to Tashipokto (Package 8) executed by M/s Welfare Lamsel Construction Pvt. Ltd (RO, Trongsa)

The dump yard identified by RO, Trongsa for the disposal of excavated soil are in between Chainages 58.76 km to 63.91km as indicated below:

Table 2.17.7: Identified dumping yards	
Identified dump yard (Chain age)	Chainages where muck are dumped/rolled over
58.76 - 58.82	- dumping yard
60.66 - 60.80	- dumping yard
61.29 - 61.39	- dumping yard
63.22 - 63.36	- dumping yard
63.85 - 63.91	- dumping yard

However, the audit team during site visit along with the officials of Regional Office, noted that all the excavated soil from chainages 65581 to 65096 were not transported to the designated dump yards instead rolled/pushed over the hills in the following chainages:

Table 2.17.7.1: Soil rolled/pushed over the hills and not dump in designated dumping yards				
Sl. No.	Chainage		Total length	Remarks
	From	To		
1	65980			

2	65581	65513	68	399-467 Rolling over
3	65270			
4	65167	65096	71	813 – 884 – Roll over

Further, out of five designated dumping yards, the contractor had dumped at various locations as shown below:

Sl. No.	Chainage	Remarks
1	65980	
2	65581	399-467 Rolling over
3	65270	
4	65167	813 – 884 – Roll over
	63850 – 63910	Dumping yard designated
5	63631	Box cutting
6	63460	Camp
	63220 - 63360	Dumping yard designated
7	62840	
8	61498	
	61290 – 61390	Dumping yard designated
9	60961	Filling
10	60871	
11	60782	Dumping Yard
	60660 - 60800	Dumping yard designated
12	60128	
13	60000	
14	59167	
15	58908	
	58760 – 58820	Dumping yard designated
16	58661	
17	58055	

2.17.8 Dorjigonpa to Yotongla (Package 10) executed by M/s Rinson Construction Pvt. Ltd (RO, Trongsa)

The dump yards identified by RO, Trongsa for the disposal of excavated soil are in between Chainages 53310 meters and 56569 meters for 6.02km FC works. However, the audit team noted that all excavated soil are not transported to dump yards and instead rolled/pushed over the hills in the following chainages:

Sl. No	Identified dump yard (Chain age)	Chainages where muck are dumped/rolled over	Remarks
1		71726-7200	Roll over/muck dump
2	71353-71763	71353-71763	Identified dump yard
3	70823-71001	70823-71001	Identified dump yard
4		70506-70705	Roll over/muck dump

5		70272-70514	Roll over/muck dump
6		70062-70198	Roll over/muck dump
7		69877-69942	Roll over/muck dump
8		69739-69810	Roll over/muck dump
9		69503-69739	Roll over/muck dump
10		69291-69478	Roll over/muck dump
11		69111-69169	Roll over/muck dump
12		68149-68852	Roll over/muck dump
13	68061-68106	68061-68106	Identified dump yard
14		67554-67680	Roll over/muck dump
15		66925-67189	Roll over/muck dump
16		66668-66831	Roll over/muck dump
17		66494-66504	Roll over/muck dump

As against 3 identified dump yards, additional 14 places were used at dump yards/rolled over without the approval. The spoil materials are directly rolled over the hill as shown in the photographs depicted below:



Fig: 2.17.8- Spoil materials dumped and freely rolled/pushed over the hill causing damaged to the environment

2.17.9 Yotongla to Bongzam (Package 11) executed by M/s. Dungkar Construction Pvt Ltd. Thimphu (RO, Trongsa)

The joint physical verification of site along with officials from RO, Trongsa revealed that dumping of muck are either not done in identified areas or freely rolled/pushed over the hills causing downstream environment damages in the following chainages:

SL. No	Approximate chainages (in meter)	Remarks
1	1110-1166	Rolled over
2	1303-1358	Muck dumped
3	1483-1551	Rolled over
4	6505-6611	Rolled over
5	7007-7249	Rolled over
6	7249-8000	Muck dumped

As against 6 identified dump yards, additional place was used as dump yard without the approval. The spoil materials are directly rolled over the hill as shown in the photographs below:



Fig: 2.17.9-Spoil materials dumped and freely rolled/pushed over the hill causing damaged to the environment

RO, Lingmethang

2.17.10 Korila-Pangser (Package-2) executed by M/s. Tshering Construction Pvt Ltd. Bumthang (RO, Lingmethang)

The dump yard identified by RO, Lingmethang for the disposal of excavated soil are in at Chainage 36.4km, 36.6km, and 36.9km.

During the joint physical verification of sites comprising of officials from RO, Lingmethang on 17th November 2017, it was observed that despite assigning specific dump sites for stretch between Korila to Pangsar, the excavated spoil materials were found either dumped other than the designated dump sites or freely rolled/pushed over the hills causing downstream environment damages as detailed below:-

Table 2.17.10: Soil rolled/pushed over the hills and not dump in designated dumping yards		
SL. No	Approximate chainages (in meter)	Remarks
1	37324	Rolled over
2	37372	Muck dumped
3	37647	Rolled over
4	37883	Rolled over
5	38090	Rolled over
6	39374	Muck dumped
7	40687	Muck dumped
8	41228	Rolled over
9	41295	Muck dumped
10	41518	Muck dumped

The spoil materials directly rolled/push over the hill are as depicted in the photographs below:



Fig: 2.17.10-Spoil materials dumped and freely rolled/pushed over the hill causing damaged to the environment

2.17.11 Pangser-Kilikhar (Package-3) executed by M/s. K. D Builder Pvt Ltd (RO, Lingmethang)

The dump yard identified by RO, Lingmethang for the disposal of excavated soil are in at Chainage Identification of dumpsite at Chainage 29.5 km, and 32.8km.

During the joint physical verification of sites comprising of officials from RO, Lingmethang on 13th November 2017, observed that despite assigning specific dump sites for stretch between Korila to Pangsar, the excavated spoil materials were found either dumped other than the designated dump sites or freely rolled/pushed over the hills causing downstream environment damages as detailed in the table below:

Table 2.17.11: Soil rolled/pushed over the hills and not dump in designated dumping yards			
SL. No.	Approx. chainages (in meter)		Approx. length (in meter)
	From	To	
1	29376	29595	219
2	29607	30035	428
3	30099	30200	101
4	30219	30359	140
5	31188	31213	25
6	31378	31401	23
7	32648	32707	59
8	33496	33814	318
9	34715	34797	82

Photograph evidences of spoil materials dumped and freely rolled/pushed over the hills are as depicted below:



Fig: 2.17.11- Spoils materials dumped and freely rolled/pushed over the hill

2.17.12 Kilikhar-Mongar (Package-4) executed by M/s. Gongphel Construction Pvt. Ltd. (RO, Lingmethang)

The dump yard identified by RO, Lingmethang for the disposal of excavated soil are in at Chainage 27.3 km, and 28km.

However, during the joint physical verification of site along with officials from DoR, Lingmethang on 8th November 2017, it was observed that between Chainages 25.735km to 25.818km, all the excavated spoil materials were freely rolled/pushed over the hills causing downstream environment damages. Photograph evidences of spoil materials dumped and freely rolled/pushed over the hills are as depicted below:



Fig: 2.17.12- Freely rolled/pushed down of excavated materials over the hill

2.17.13 Mongar-Gongola (Package-5) executed by M/s. Norbu Construction Company Pvt. Ltd, Gelephu (RO, Lingmethang)

The dump yard identified by RO, Lingmethang for the disposal of excavated soil are in at Chainage 13.7km, 21 km, and 22.6km.

During the joint physical verification of sites comprising of officials from RO, Lingmethang on 4th November 2017, observed that despite assigning specific dump sites for stretch between Korila to Pangsar, the excavated spoil materials were found either dumped other than the designated dump sites or freely rolled/pushed over the hills causing downstream environment damages pertaining to Chainages detailed in the table below:-

SL. No.	Chainages (approximately in meter)
1	1185m
2	2605m
3	5100m
4	5130m

2.17.14 Kurizam to Gongola ((Package 6)) executed by M/s. Rigzar Construction Pvt Ltd. Trashigang (RO, Lingmethang)

The dump yard identified by RO, Lingmethang for the disposal of excavated soil are in at Chainages 2.3km, 3 km, 9.3km, 10.3km, and 12.3km.

However, during the joint physical verification of site along with officials from RO, Lingmethang on 30th October 2017, it was observed that excavated muck materials were found dumped in unidentified areas along the stretches/chainages as detailed below:

SL. No.	Chainages (approximately in meter)
1	4480m
2	5000m
3	5100m
4	5130m
5	8880m
6	8960m
7	9780m
8	10440m
9	10640m
10	11900m

Similarly, in some chainages viz. 1,425m, 1,443m, 1,570m-1,705m and 10,000m (approx.) excavated materials were freely rolled/pushed over the hill causing downstream environment damages as shown in the photographs below:



Fig.: 2.17.14- Freely rolled/pushed down of excavated materials over the hill

2.17.15 Kurizampa-Lingmethang (Package-7) executed by M/s Tshering Construction Pvt. Ltd, Bumthang (RO, Lingmethang)

The dump yard identified by RO, Lingmethang for the disposal of excavated soil are in at Chainages 2.3km, 3 km, 9.3km, 10.3km, and 12.3km.

During the joint physical verification of sites comprising of officials from RO, Lingmethang on 25th October 2017 observed that despite assigning specific dump sites for stretch between Kurizampa-Lingmethang, the excavated spoil materials were found dumped other than the designated dump sites in Chainages detailed in the table below:-

Table 2.17.15: Soil not dump in designated dumping yards		
SL. No.	Chainage	Remarks
1	115.25 Km	Not identified as dumping area by NEC
2	115.90 Km	Not identified as dumping area by NEC
3	116.45 Km	Not identified as dumping area by NEC
4	116.95 Km	Not identified as dumping area by NEC

Similarly, in Chainages 114.95Km, 115.85Km, 116.4Km and 116.75Km, the excavated materials were freely rolled/push over the hill causing downstream environment damages as evident form the Photographs depicted below:



Fig: 2.17.15-Roll over of mucks over the valley

2.17.16 Kurizampa-Yadi executed departmentally (RO, Lingmethang)

The dump yard identified by RO, Lingmethang for the disposal of excavated soil are in Chainages 43.8km, 50km, 51.7km, 55.7km, 56.1km and 64km in between Yadi-Korila.

During the joint physical verification of sites comprising of officials from RO, Lingmethang on 18th November 2017, observed that despite assigning specific dump sites for stretch between Yadi-Korila, the excavated spoil materials were dumped in unidentified areas along the stretches/chainages as detailed below:

Table 2.17.16: Soil not dump in designated dumping yards		
SL. No.	Soil dump in various Chainages (approximately in Km)	Dump Yard Identified at Chainages as per Environment Management Plan
1	43.4km	43.8km
2	44.6km	
3	46.1km	
4	48.1km	
5	48.5km	
6	48.9km	
8	54.9km	50km, 51.7km, 55.7km
10	58.49km	56.1km
11	59.1km	
12	59.7km	
13	63.5km	64km

In addition, the excavated materials were freely rolled/push over the hill in chainages 47.4km, 47.5km,51.1km,55.2km,55.5km,57.5km,59.1km,59.8km, and 63.8km (approx.) causing downstream environment damages as depicted in the photographs below:



Fig: 2.17.16-Freely rolled/pushed down of excavated materials over the hill

The extent of volume of mucks dumped in unidentified areas and rolled over the hills could not be ascertained in audit. Further, during the site visit, it was also observed that dusts generated from the widening of the road were not adequately suppressed by spraying water. As such, all of the above have breached the terms and conditions laid down in the renewed Environmental Clearance issued by the Dzongkhag Environment Committee/NEC which needs to be justified. Therefore, the ROs, Lobeysa and Trongsa should justify for failing to comply with the provisions contained in the Environment Clearance.

It is to reiterate that since the lump sum contract included transportation of spoil materials at designated places, the disposal of spoil materials in places other than the designated places were not only in violation of the environment regulations but also benefited the contractors by way of not having to transport spoil materials to the dump yards. Further, designated dumping sites were also not found dressed and planted with vegetation as per the technical specification of the BOQs wherein it categorically stipulated *as “Dressing of dump sites and plantation of vegetation after completion of dumping”*.

The Regional Office should comment for non adherence to environmental regulations. Besides, the Regional Office should ascertain the volume of spoil materials dumped/roll down the cliff in the aforementioned chainages and cost recovered including the environment penalty liable as per environment norms and deposit into ARA.

In addition, the Regional Office, should fix the site engineers accountable for allowing the contractor to dump/roll over the cliff the spoil materials and dumping in unidentified places. In the event the site engineer had taken any measures/action against the contractor the same should be furnished to audit for verification and record.

Auditee’s Response:

The Contractor as far as possible followed the directives of National Environment Commission and action taken in consultation with the NEC officials. But at times due to unavoidable circumstances especially working at night and continuous flow of rain water, some of the spillage over the valley side could not be controlled. In-fact, NEC has imposed fines and penalty to the contractors for failing to adhere to the rules and regulations of NEC. Therefore, please drop the memo.

RAA’s Further Comments & Recommendations:

While taking note of the response, the fact remains that though the lump sum contract price for formation cutting included transportation of spoil materials at designated dump yards, the contractors were allowed to not only dump spoil materials indiscriminately in unidentified areas but also freely roll/push spoil materials down the hills causing damaged to the environment as evident from the Physical verification of sites. The disposal of spoil materials in areas other than the designated areas and rolling over the hills had benefited the contractors at the cost of the Government and damage to pristine environment.

Further, designated dumping sites were also not found dressed and planted with vegetation as per the technical specification of the BOQs wherein it categorically stipulated as **“Dressing of dump sites and plantation of vegetation after completion of dump”**.

However, as discussed during the exit meeting, the DOR and Ministry should depute a technical team or direct the ROs to quantify the extent of spoil materials dumped in areas other than the designated dump yards as well as rolled/pushed over hills in the aforementioned chainages and cost recovered and deposited into ARA. Besides, the Ministry in consultant with the NEC should thoroughly investigate all constructions sites to ascertain the extent of environmental damages by the contractors to timely address and measures put in place to avoid future complications. The outcome of the review and remedial measures put in place intimated to RAA for record and follow-up in future audits.

2.18 Flaws in the allowable wastage of 5% on the bitumen consumption with resultant financial loss to the Government exchequer of Nu. 13,956,639.07

On review of the documents and records relating to the **Theoretical consumption of bitumen worked out based on the Job Mix Formula and test results by the ROs**, it was noted that for comparison of the Theoretical consumption with that of actual consumption, the ROs have allowed bitumen wastages of 5% on the total theoretical consumptions. Cases where **Theoretical consumption of bitumen were worked out based on the Job Mix Formula and test results by allowing 5% bitumen wastages** by the ROs including huge financial loss to the Government Exchequer are detailed below:

Name of Contractor	Total issue as per register (MT)	Total No. of barrels	Theoretical consumption (MT)	5% Wastage on Theoretical consumption (MT)	Rate per MT	Amount (Nu.)	Remarks
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M/s Chogyal Construction Pvt. Ltd (Packages I,II,III) (RO, Lobeyasa)	3680.664	22866	3447.20	172.36	42,401.87	7,308,386.31	
M/s Raven Builder & Co. Pvt. Ltd, RO, Thimphu	1265.248		1,106.0393	55.3019	35,951.17	1,988,168.01	
M/s Yangkhil Construction Pvt. Ltd(Package 2)RO, Thimphu	1284.2066		1,199.4285	59.9714		2,156,041.99	
M/s SL Construction Pvt. Ltd (M/s Raven) RO, Thimphu	370.4617		352.996	17.6498	35,951.17	634,530.96	
Package X) by M/s Rigsar Construction Pvt. Ltd., RO, Lobeyasa	632.891			27.7206	35,951.17	996,558.93	Actual wastage 4.38%
M/s KD Builder Pvt. Ltd.	809.36			24.2808		872,923.17	Actual wastage 3%
						13,956,639.07	

It was reported that 5% bitumen wastages were allowed for the following contract packages. It would be apparent that in terms of bitumen issued to the contractors, the total wastages amounts to Nu. 13,956,639.07 for six contracts alone in consideration to the present mechanized method of execution of bitumen works.

The RAA in an attempt to confirm the admissibility of the 5% wastage for bitumen, had referred the Financial Manual 1988 where Allowance variations percentage were given on the following selected items as detailed below:

Sl.No	Item	Variation	Allowance variation
1	Cement	+/-	3%
2	Steel	+/-	10%
3	Bitumen	+/-	5%
4	M.S Sheet/G.I Pipe	+/-	10%

Thus, it was apparent that the RO had applied the same allowance variations percentage for bitumen stipulated in the 1988 Financial Manual.

The RAA is of the opinion that taking into cognizance the present scenario where execution of bituminous works are carried out through mechanized processes with the deployment of advance plants, machineries and equipment with minimum wastages as compared to the manual processes where wastages were high, the application of same wastage percentage on bituminous works was not rationale and justified.

It was evident from the analysis carried out by the RO, on the theoretical consumption and bitumen issued as per stock ledger in respect of the following contractors that the wastages of

bitumen varied from minus 6.70% to just plus 0.962% except M/s Rigsar Construction Pvt. Ltd. with plus 4.38% and M/s Tshering construction Pvt .Ltd. with plus 3% as tabulated below.

Table 2.18.2 : Detailing Bitumen wastage percentages allowed for various contract packages						
Name of Contractors	Issue in barrel as per stock register/MT	Return in barrel	Total consumption in barrel/MT	Theoretical consumption computed based on JMF and quantity of works done(Barrel.MT)	Total variation in barrel /MT	% of wastage
RO, Lobeysa						
M/s Singye Construction Pvt. Ltd.	8224	223	8001	7924.31	76.69	0.962%
RO, Trongsa						
(Package V) by M/s TT Construction Pvt. Ltd.	777.702					-2.24%
(Package VI) by M/s Etho Metho Construction Pvt. Ltd.	1436.788					0.51%
(Package VII) by M/s Loden Construction Pvt. Ltd.	811.027					-1.78%
(Package IX) by M/s Welfare Construction Pvt. Ltd.	741.904					-6.70%
Package X) by M/s Rigsar Construction Pvt. Ltd.	632.891					4.38%
(Package XI) by M/s Hi-Tech Company Pvt. Ltd.	1201.409					0%
(Package XII) executed by M/s Taksing Chungdruk Construction Pvt. Ltd.	671.47					0.75%
(Package XIV & XV) executed by M/s Empire Construction Pvt. Ltd.	557.976					0%
RO, Lingmethang						
M/s KD Builder Pvt. Ltd.	809.36					3%
M/s Rigsar Construction Pvt. Ltd.	1446.18					0%
M/s Tshering Construction Pvt.. Ltd.	377.17					0%

Thus, in the light of bitumen wastages of minus % to less than 1% as tabulated above, it is obvious that the application of 5% wastage based on old allowable percentage was not rationale and tantamount to extension of undue financial benefit of Nu. 13,956,639.07 to six contractors.

The RO should comment on the application of 5% wastages on the bituminous works as no proper analysis had been carried out by the RO prior to entertainment of such wastages. It is also reiterated that consideration of 5% wastages despite having adopted mechanized methods, will have huge cost implication to the Project and Governments besides benefiting the contractors.

The RO in consultation with the Ministry should relook on the admissibility of the 5% wastages on the bituminous works in consideration to the vast difference in the execution of bituminous works through mechanized method as compared to the conventional methods.

Auditee's Response:

The RO, Lobeyasa agrees that mechanized bituminous works would lessen the wastages in comparison to manual way of bituminous works. However, the wastage of bitumen at site occurred due to the following reasons.

Transportation: The transportation of bitumen has to transit/load & unload multiple times from the factory till work site (example losses in the transportation of bitumen from Mumbai to Falakata, unloading and reloading at Falakata yard, unloading and loading at the central store, unloading and loading at the regional store).

- *There are leakages in the stock yard despite efforts to safeguard the barrels.*
- *The extreme heat due to global warming have major impact on viscosity.*
- *The wastages after the mix rejected at site due to unforeseen machinery breakdown.*

Above all, the RO had sought the consensus of HQ and was accordingly approved by DCC vide letter No.DOR/CD/7/2016-2017/3909 dated 4th May 2017. RO Lobeyasa also would like to inform that, we have not sought approval for uniform application of plus 5% wastages. The wastages could be plus or minus 5% which is practically unavoidable during the execution of bituminous works at site and furthermore we have not issued excess bitumen more than actual requirement at site. The wastages reflected in the consumption statement is due to site conditions. Therefore, RAA is requested to kindly drop the said memo.

RAA's Further Comments & Recommendations:

Considering the fact that the allowable wastage of 5% were fixed for the execution of bituminous works manually, the application of same wastage percentage for mechanized bituminous works was not justified and decisions of the HQ and DCC has caused adverse financial implication to the Government Exchequer.

It is noted that the approval accorded for application of 5% wastage by the HQ & DCC was not supported by detailed analysis on the application of same wastage percentage for both manual and mechanized method. The variation percentage was also not specifically covered by the existing contract provisions. Thus, the Ministry did not pursue a prudent and sound financial management practice in allowing 5% wastage for the bitumen issued by the Government free of cost.

Considering the above fact and events, the Ministry should revisit its decision of allowing 5% bitumen wastage keeping in view the actual wastage of just 1% worked out in respect of M/s Singye Construction Pvt. Ltd. and determine the allowable wastage for the mechanized bituminous works.

It is also to reiterate that allowing 5% bitumen wastages without proper analysis just for six contract packages alone have adversely impacted Project funds to the extent of Nu. 13.957 million.

The huge financial loss to the extent of Nu. 13.957 million to the government Exchequer is brought to the notice of the Government for appropriate decisions and actions.

2.19 Excessive engagement and payment of hired charges of machineries not complying with coefficient specified in LMC for departmentally executed formation cutting works of Nu. 89.061million

The earthwork quantity for the formation cutting for the departmentally executed works was derived based on the survey report. The ROs had prepared estimates detailing excavation of all kind of soil and rocks including quantum of spoil materials to be dumped beyond 500m up to 1210m amounting to Nu. 131.352 million as submitted below:

Code	Particular of item	Estimated Qty (Cu.m)	Amount (Nu)
	RO, Lobeysa, (a total of 7Kms), RO, Trongsa (a total of 6.1Kms and 5km) RO, Thimphu (a total 19.5 km) and RO, Lingmethang (a total of 21.19 km)		
RW0014	Excavation of road formation cutting/trace/box cutting, with excavator including separate deposition of soil, rock and stone within 50m for reuse-all kind of rocks	321,632.89	69,074,709.70
RW0013	Excavation of road formation cutting/trace/box cutting, with excavator including separate deposition of soil, rock and stone within 50m for reuse-all kind of soil	446,549.57	21,389,857.93
EW0096	Banking with granular material for road, flood banks, guide banks, back filling for walls & depressions, in layers <200mm depth, including watering, rolling & dressing up within 50m lead & 1.5m lift - All kind of soil	37,235.69	3,076,629.26
	Sub total	825,418.15	93,541,196.89
RW0021	Transport of loose spoil materials in designated locations including loading, unloading. Dressing of dump sites and plantation of vegetation after completing of dumping-beyond 500 up to 1210m	443,036.80	37,811,295.33
	Total	1,268,454.95	131,352,492.22

The actual expenditure for formation cutting as compared to the estimated amount had substantially exceeded as detailed below:

Particular of item	Amount (Nu)	Amount (Nu)	Amount (Nu)	Amount (Nu)	Amount (Nu)
	RO, Lobeysa	RO, Trongsa	RO, Trongsa	RO Lingmethang	RO, Thimphu
Particular of item	Amount (Nu)	Amount (Nu)	Amount (Nu)	Amount (Nu)	Amount (Nu)
Estimated Amount	17,432,935.40	21,161,521.78	8,718,671.79	54,345,523.29	29,693,839.95
Total Expenditure	22,631,933.00	54,344,376.50	15,700,590.00	53,412,867.00	8,190,441.50*
Excess expenditure over the Estimated cost (Nu.)	5,198,997.60	33,182,854.72	6,981,918.21	(932,656.29)	
Increase in terms of %	29.82 %	156.81%	80%	(1.72%)	

*Note: Expenditure pertained to financial year 2016-2017 and not comparable

Based on the Labour and Material Co-efficient (LMC), the actual machinery hours required to be hired and deployed were worked out and cross checked with the total hours of equipment and machinery engaged in terms of hiring charges paid. The comparison indicated excessive engagement of machine hours amounting to Nu. 89,061,496.31 as detailed below:

Particulars	Amount (Nu.)	Excess expenditure in terms of LMC Amount (Nu.)

RO, Lobeysa, (Chainages 44.7km to 50.8km, a total of 6.1Kms)-Trongsa to Punzhi		
Actual expenditures incurred as per bills and MB	17,841,512.16	
Less: Expenditure to be incurred based on the LMC Co-efficient	<u>9,275,174.16</u>	8,566,338.00
RO, Trongsa, (Chainages 44.7km to 50.8km, a total of 6.1Kms)-Trongsa to Punzhi		
Actual expenditures incurred as per bills and MB	54,344,376.50	
Less: Expenditure to be incurred based on the LMC Co-efficient	<u>13,785,775.07</u>	40,558,601.43
RO, Trongsa (Chainages 80 to 85km, a total of 5km) Bongzam-Gaytszam		
Actual expenditures incurred as per bills and MB	15,700,590.00	
Less: Expenditure to be incurred based on the LMC Co-efficient	<u>4,624,568.04</u>	11,076,021.96
RO, Lingmethang, (Chainages 52km to 73.19km, a total of 21.19 km)- Yadi-Korila		
Actual expenditures incurred as per bills and MB	53,412,867.00	
Less: Expenditure to be incurred based on the LMC Co-efficient	<u>29,358,343.36</u>	24,054,523.64
RO, Thimphu: 19.5 km road from Simtokha-Dochula,		
Actual expenditures incurred as per bills and MB	8,190,441.50	
Less: Expenditure to be incurred based on the LMC Co-efficient	<u>3,384,430.17</u>	4,806,011.33
Total cost impact		89,061,496.31

The payments of hiring charges also included payments of Nu. 5,416,382.00 for machineries which were not defined in the LMC 2015 for the execution of formation works as presented below:

Types of machine engaged	Work done volume (m3)	Nos. of days	Nos. of hrs. engaged	Rate (Nu)	Amount (Nu)
RO, Lobeysa					
Backhoe loader	119,630.84	216	1,723.00	670.64*	1,152,822.00
Pay loader	119,630.84	210	1,674.00	2,000.00	3,348,000.00
Tailor	119,630.84	4	24.00	1,732.67*	40,840.00
Total					4,541,662.00
RO, Thimphu					
Deployment of machineries and materials not in LMC with resultant inadmissible payment					874,720.00
Grand Total					5,416,382.00

Note: * Average rates of hiring charges

The deployment of machineries that were not in the LMC and huge difference between the required hours of deployment of machineries in terms of estimated volume of works and actual hours deployed and paid, indicated either flaws in deployment of machineries or inefficient deployment of machineries due to poor monitoring and supervision.

Auditee's Response:

Basically, the departmentally executed works are based on LMC. However, due to the following unavoidable circumstances, the actual expenditures have deviated as compared to the LMC.

- 1. In our country we do not have diversion road where vehicle movement can be diverted in one direction and work site would be in free of vehicle movement disturbance. In such cases we are not able to achieve work done by machine as per LMC but machine will be in start while passing vehicles.*

2. *Due to difficult terrain of road cutting.*
3. *Movement of VVIP and AMBULANCES.*
4. *Working with difference types of Machineries of Horse power.*
5. *The backhoe and pay loader were engaged to push the dumped materials and clear the road during the emergency hours which is not captured in the initial estimates.*
6. *Trailer was engaged to transport the machineries from one location to another mainly to save time and allow smooth flow of traffic congestion which is not incorporated in the LMC.*
7. *FC works were executed during night hours to expedite the progress of the works whereby the efficiency of the work done is comparatively low due to risk involved and poor visibility at night.*
8. *The soil strata are unstable in nature and the slips were occurred at various locations at all times. These lead to marching of machineries for clearance which ultimately lead to loss of resources.*
9. *Frequent usage of machineries to clear the slips which was not envisaged during the initial estimation.*
10. *The usage of explosives was prohibited due to settlement below the road and earthen irrigation channel above whereby the more numbers of days for machinery had to be engaged. Therefore, please drop the memo.*

During the detailed survey detail geotechnical studies are not carried out and the identification of soil type cannot be studied accurately whereby It was based upon visual judgment of the surface. During execution of the FC work, more rock was discovered thereby increasing the quantity of rock cutting volume.

Moreover, in some stretches due to cutting height being too high the quantity of rock excavation was increased. It was also noticed that during the cutting from design fixed batter peg, the total width of 10.5m was not achieved so in order to achieve the width of the FC, the batter peg were moved 1-1.5m outward. Due to which the volume of cutting had been increased.

At times FC work being involved for two monsoon seasons and the cutting being fresh, several slide occurred which also increased the volume of excavation. Thus the difference in estimated quantity and executed quantity was noticed as per the site condition.

In view of the above justifications, RAA is requested to drop the memo.

RAA's Further Comments & Recommendations:

The quantum of formation works exceeded allowable variations of +/- 20% from estimated quantities and excess payment of hiring charges to the extent of Nu. 89.061 million indicated either flaws in the deployment of machineries or inefficient deployment of machineries due to poor monitoring and supervision. The violations and deviations from the procurement norms, financial rules and regulations and BSR are due to absence of standard guidelines and procedures for departmentally executed works including monitoring controls over execution of works from appropriate authorities.

As discussed in the exit meeting, the DoR and the Ministry are advised to review and investigate excessive deployment of machineries and deployment of machineries not in LMC to the extent of Nu. 94.477 million (Nu.89.061+5.416) computed in audit and work out the quantum of works executed by the RO to regulate the expenditures accordingly.

The Ministry is also advised to review the present practices and procedures adopted by ROs in conducting survey, preparation of drawings, estimates, BOQs and executions including hiring and deployment of machineries and equipment and execution of permanent works and develop standard guidelines and procedures to prevent such irregularities and lapses in future.

2.20 Bitumen issued to contractors not covered by insurance - Nu. 2,237.655 million

The Contract Document stipulates following conditions to be complied by contractor and/or employer on insurance of contract works:

- Clause 14.1 under Section V: General Conditions of Contract stipulated that the Contractor shall provide, in the joint names of the Employer and Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the SCC for the following events which are due to the Contractor's risks:
 - (a) Loss of or damages to the Works, Plant, and Materials to be built into the works.
- As per Clause 14.2, Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.
- Clause 14.3 provides that if the Contractor does not provide any of the policies and certificates required, the Employer may affect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due from the Contractor to the Employer.
- Clause 14.4 stipulates that alterations to the terms of insurance shall not be made without the approval of the Project Manager.
- As per Clause 14.5, both the parties shall comply with any conditions of the insurance policies.
- Further, the requirement of insurance was reiterated under Section VI: Special Conditions of contract (Clause GCC 14.1).
- Section 103 of the Technical Specification, it also stipulates as under:
 - "The Contractor shall provide and maintain the insurance cover in accordance with Clause 14 of the General Conditions of Contract from an approved insurance company from the start date to the end of the Defects Liability Period."

- “No separate payment shall be made for insurance. All costs involved in connection with the work insurance herein shall be considered included with other related items of the work in the Bill of Quantities”.

Contrary to the above clauses in the contract document, both the contractor and the employer had failed to maintain insurance coverage for the bitumen issued to the various contractors. An abstract of bitumen issued to various contractors by ROs are tabulated below:

Regional Office:	Qty. of Bitumen Issued (in Metric tonne)	Estimated cost of bitumen (Nu.) in million
RO, Thimphu	2,549.75	108.237
Ro, Lobeyesa	10,714.70	977.037
RO, Trongsa	2,881.91	740.326
RO, Lingmethang	5199.08	412.055
Grand Total	16,146.36	2,237.655

Accordingly, it was noted that the contractor had insured Works, Plant and Material for the minimum contract amount only as evident from the insurance coverage of **M/s Chogyal Construction for Package I, II & III**). Thus, insurance did not cover the cost of bitumen that were issued by the Regional Office as the insurance claims and compensation payments received by the contractor were solely used by the contractor as the RO had not deducted the cost of bitumen although the claims and compensation pertained to bituminous works. Further, it was evident from the records that the RO had issued the bitumen for redoing the damaged works.

The RO should comment on the circumstances leading to non-insurance of the cost of bitumen by the contractor as bituminous works are executed by the contractor and damages and loss to works are contractor’s risks. Besides, the RO should comment on the measures put in place to safeguard against such loss.

Auditee’s Response:

The bitumen was procured departmentally and was issued to the contractor free of cost as per the Job Mix Formula/consumption thereon. However, insurance for bitumen was not covered since the contract amount in the BOQ is exclusive of bitumen. The insurance company while insuring the work takes into account the contract amount/work order amount only, which is determined from the signed contract agreement.

The bitumen is transported from the Regional Store and adjustment is made with the central store, Pl’ing. Till now there is no system of insuring the bitumen during the transportation.

The additional clause in the SCC also states that the cost of the bitumen should be ‘zero’, which means that the employer is asking the bidder to quote for the execution of work only excluding the cost of bitumen. Since the cost of bitumen is not included in the contract price, and the premium (determined from the contract amount) paid to the insurance company by the contractor, the RO did not find a base to recover the cost of bitumen for redoing the damaged work.

The issuance of bitumen free of cost has increased the workload of the site engineers and often the site engineers complain that they had to literally take care and monitor the bitumen issued

to the contractor till the BT work is completed. In view of this, RO is proposing to discuss this issue with DoR HQ during the upcoming DoR Quarterly Meeting. Hence, RAA is requested to kindly drop the memo.

RAA’s Further Comments & Recommendations:

It is apparent from the response that the ROs and DOR failed to enforce the provisions stipulated under SBD on the requirement of insurance coverage for loss of or damage to the Works, Plant and Materials to be built into the works from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the SCC.

The non-insurance of cost of bitumen either by the Contractors or ROs also clearly indicated flaws in the tender documents and contract agreements. The failure to insure the bitumen cost with the cost of bituminous works had resulted in avoidable reissuance of bitumen valuing Nu. 7,085,432.30 for redoing the damaged bituminous works for two packages (I & II) executed by M/s Chogyel Construction Company Private Ltd. under RO, Lobeyasa.

The DOR and the Ministry should investigate the circumstances leading to failure of insuring cost of bitumen with the bituminous works by the contractors as well as non-incorporation of such requirements in the tender and contract documents which had cost the Government Nu. 7.085 million for reissuing the bitumen for redoing the damaged pavement works.

The DOR in consultation with the Ministry should immediately direct all the contractor to insure the cost of bitumen for all completed pavements works to safeguard the interest of the Government and avoid complications in future. Besides, the Ministry should come up with clear policy and procedures for insuring the cost of bitumen by the contractors even if the bitumen is issued free of cost by the Government as otherwise the Ministry should consider the desirability of allowing the contractors to include the cost of bitumen in the contract price but recovery is to be made at the prescribed departmental rates to enable the contractors insuring the cost of bituminous works with bitumen cost and avoid complications.

The decisions and measures taken on the issue should be furnished to RAA for record and follow-up in future audits. The non-insurance of substantial cost of bitumen by the contractors and ROs resulting in loss of Nu. 7.085 million to the Project for reissuance of Bitumen for redoing the damaged bituminous works for three packages is brought to the notice of the Government for appropriate decisions and actions.

2.21 Non-stacking/recording of excavated rock materials with resultant loss of Nu. 674,501,379.27

The works of Northern East-West Highway include Formation Cutting, Permanent works and Pavement works. One of the major works is the formation cutting work, for which the department had quantified the volume of earthwork excavations on the basis of survey reports.

In line with the survey report, the departmental estimates projected excavation of rock of 2,489,385.58 m³ involving Nu. 674,501,379.27 as detailed in table 2.21 below:

Table 2.21: Substantial cost for rock excavation and Non-stacking of Boulder				
Name RO	No. of Contracts	Qty(m³)	Amount (Nu.)	Remarks
Execution through Contracts				
Regional Office Lobeyasa	Six Contractors	256,342.71	46,659,927.29	

Regional Office Trongsa	Twelve Contractors	1,412,406.578	440,596,648.44	No stock accountal were made on records
Regional Office Lingmethang	Six Contractors	320,725.21	68,945,647.21	
Departmental Executions				
Regional Office Lobeyasa		68,360.48	12,252,248.83	
Regional Office Trongsa		184,655.44	57,662,354.25	
Regional Office Lingmethang		118,836.84	25,497,632.39	
Regional Office Thimphu		107,289.84	19,848,620.40	
	Total	2,489,385.58	674,501,379.27	

During the physical verification of the work sites, it was noted that the rocks excavated from the roadside excavation works were found used by the contractors responsible for formation cutting works for construction of permanent structures without accounting the excavated boulder and recovering the cost of used boulders. In addition, the excavated materials were found not properly stacked along the road causing inconvenience to the commuters.

As per the GCC A20.2 of the contract document *“All materials obtained during excavation from the site and that have not been accounted for in the bid shall be the property of the Employer and the contractor shall take care of useful materials obtained during the execution of the Works and stack at place designated by the Employer”*.

Further, the technical specifications Clause 605-Execution in Cutting states as *“All suitable excavated materials shall be used in construction of the roadway to the extent as required”*.

Thus the use of usable excavated materials without accounting in the books of account and also without recovering the equivalent cost was in violation of the contract terms.

Further, in terms of the Specification for Building and Road Works, Clause 21.3.2 Excavations, *“The contractor shall take all precautions necessary to preserve the materials or existing structures below and beyond any line of excavations in the soundest possible conditions”*. It also states as *“the contractors controlled blasting and other operations in excavation shall be such that they will yield as much materials as possible suitable for use in the work”*.

Proper retrieval of stone boulder from the rock excavation would not only have saved the cost on the permanent structures but also benefited the RO through cost recovery of recovered boulders through disposals in the best interest of the Project.

The contractors are paid for excavation and transportation of spoil materials besides payments for execution of permanent structures. Thus, allowing the contractors to use the useful materials free of cost tantamount to extending double benefits to contractors.

The ROs and DOR should comment on the circumstances leading to non-accountal of excavated useful materials and investigate whereabouts of excavated materials and ascertain the extent of materials used by the contractors on permanent works. The DOR and ROs should recover the cost of the material to the extent of quantum of materials used by contractor for permanent works. Besides, the DOR should also investigate whereabouts of excavated materials for the departmentally executed formation works.

Auditee’s Response:

DoR, RO Trongsa would like to thank the RAA for the observation and would like to submit the following justifications. The total quantity of earthwork by the twelve contractors is 1,412,406.58 cum valued at Nu. 440,596,648.44 and for departmental works it was 186,655.44

cum valued at Nu. 57,662,354.25. In view of the above justifications, RAA is requested to drop the memo.

RAA's Further Comments & Recommendations:

The ROs and DOR have not appropriately provided the response on the observation. The RAA would invite reference to provisions of the General Conditions of Contract (GCC) under "Discoveries Clause" which categorically states as under:

"Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Employer's instructions for dealing with them. All materials obtained during excavation from the site and that have not been accounted for in the bid shall be the property of the Employer and the contractor shall take care of useful materials obtained during the execution of the Works and stack at place designated by the Employer. An arrangement shall be made between the Contractors".

Thus, in view of the specific provisions under Technical specifications as well as GCC as highlighted above, non-accountal of materials(Boulder) obtained from the formation cutting works (Projected rock excavation of proximately Nu.674.501million executed either by contractors or departmentally, was in violation of the provisions of the contract. This has also deprived the Government of the benefit to the extent of boulders retrieved and used in the permanent and pavement works by the contractors and department.

The DOR and the Ministry should investigate and ascertain the quantum of boulder retrieved and used by the contractors and ROs, and recover the cost as per the existing provisions of the technical specifications and SBD and the amount recovered deposited into ARA. Besides, the Ministry should also take appropriate action on the officials responsible for non-accountal of boulders despite huge amount of of Nu.674.501 million projected towards cost for excavation of rocks.

The Ministry should not only strengthen the Design Divisions for accurate designing of road structures but also institute a technical team to review project plans, designs, and specifications to ensure that the same are accurate and complete including verification of the accuracy of surveys for future projects to prevent changes in designs as well as time and cost overruns.

*The huge financial loss to the extent of excavated boulders not accounted against the projected rock excavation of **Nu. 674.501 million** to the government Exchequer is brought to the notice of the Government for appropriate decisions and actions.*

2.22 Irregular release of additional advances of Nu.254.110 million

Huge amounts of inadmissible additional advances were paid and payment for POL and release of retention money were made to contractors despite availing all financial benefits entitled as per the contractual agreement.

The ROs, DOR and the MLTC had failed to ensure utilization of available Credit line to the extent committed as per the bidding documents. Non-utilization of Credit line extended by the financial institutions by the contractors raises doubts on the genuineness and validity of Credit

Lines. Besides, extension of such financial support to the extent of Nu. 254,110,000.00 were in violation to the provisions of the contract agreements and Financial Rules and Regulations.

Table 2.51: Detailing huge releases of irregular advances to the contractors				
Sl.No.	Name of contractor	Contract Package	Date of Payment	Amount (Nu.)
Thimphu & Trongsa				
1	M/s Raven Builder & Company (P) Ltd	Package 1	21.9.2016	4,000,000.00
2	M/s Raven Builder & Company (P) Ltd	Package VI	various dates during fiscal years 2016,2017 and 2018	9,410,000.00
Total				13,410,000.00
Trongsa				
1	M/s welfare Construction Pvt. Ltd.	Package IX	12.4.2017	20,000,000.00
2	M/s Dungkar Construction Pvt. Ltd.	Package VIII, XI & XII	9.12.2017	20,000,000.00
3	M/s Gyalcon Construction Pvt. Ltd.	Package IV	28.6.2017& 26.10.2017	15,000,000.00
4	M/s Druk Lhayul Construction Pvt. Ltd.	Package V	19.5.2017 & 14.6.2017	20,000,000.00
5	M/s Rinson Construction Company Pvt. Ltd.	Package III,X & XII		30,000,000.00
Total				105,000,000.00
RO, Lobeysa				
1	M/s Chogyal Construction Pvt. Ltd	(Packages I, II and III)	2015/2016	46,000,000.00
2	M/s Singye Construction Pvt. Ltd (CDB No. 2148)	Package IV	12/2015	39,700,000.00
3	M/s welfare Construction Pvt. Ltd.	Package IX	12.11.2017	10,000,000.00
4	M/s Rigsar Construction Pvt. Ltd	Package X	6.6.2017 & 22.12.2017	4,500,000.00
5	M/s TT construction Pvt. Ltd	Package VI	7.2.2017 &20.12.2017	19,000,000.00
Total				119,200,000.00
RO, Lingmethang				
1	M/s Gongphel Construction Pvt. Ltd.	Package IV	9.4.2017 & 22.12.2017	10,000,000.00
2	M/s Rigsar Construction Pvt. Ltd	Package VI	8.2.2017 &9.5.2017	6,500,000.00
Total				16,500,000.00
Grand Total				254,110,000.00

Auditee's Response:

The ROs responded that advances not within the provisions of the contracts were released based on verbal instruction and approval accorded by Minister and Secretary, MoWHS to extend necessary support to the contractor in the interest of works. The RO also mentioned that the financial support rendered is purely to expedite the progress of works.

RAA's Further Comments & Recommendations:

The Granting of advances beyond the provisions of the contract is in violation of the contract agreements and Financial Rules and Regulations and clear indication of undue financial support extended to the contractors. The failure on the part of the ROs, DOR and Ministry to direct the contractors to avail the credit facilities indicated existence of poor contract management system.

As discussed during the exit meeting, the DOR and the Ministry are advised to recover all the irregular and ineligible advances from the contractors with penal interest.

The Ministry besides directing officials in positions to strictly abide by the Financial Rules and Regulations and provisions of the contract documents is also advised to institute appropriate control mechanism over the sanctioning of construction advances to prevent payments of advances in violations of rules and contract agreements.

The huge financial payments of Nu. 254.110 million from project funds in violation to the provisions of the contract documents and financial Rules and Regulations by the authority in position is brought to the notice of the Government for appropriate decisions and actions.

2.23 Irregular Change of pavement thickness with resultant inconsistency in the execution of pavement works

Northern East-West Highway being the Primary National Highway, both the initial and revised drawings has specified a total pavement thickness of 600mm as shown in the diagram and in the table below:

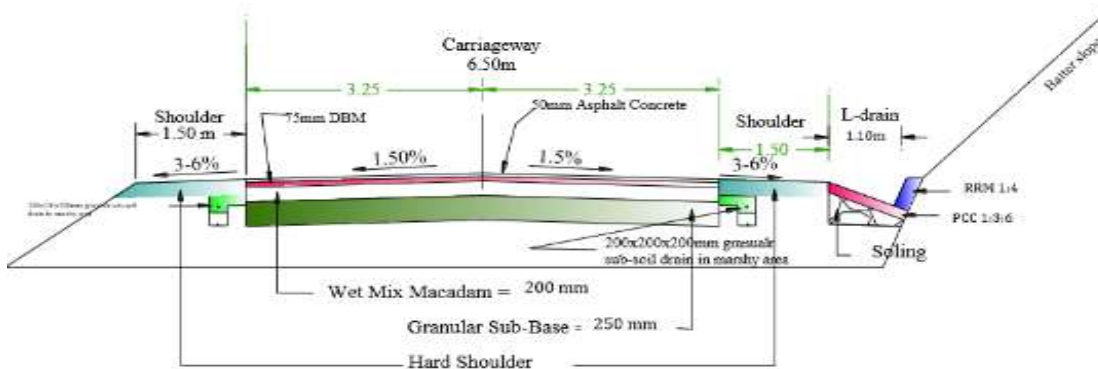


Fig: 2.22- Initial approved design and drawing

Table 2.22: Pavement thickness	
The pavement thickness of various layers is as follows:	
Item works	Thickness
GSB	250mm
WMM	225mm
DBM	75mm
AC	50mm
Total:	600mm

In all contract packages the above design parameters were required to be followed. However, on 7th DoR Quarterly Meeting held on 27-29 July, 2015, the meeting discussed and decided to reduce the thickness of DBM from 75mm to 60mm and AC from 50mm to 40mm thereby reducing the overall pavement thickness to 575mm against initial pavement thickness of 600mm for the NEWH work.

Accordingly, under RO Lobeysa, out of 15 contract packages, four (4) packages were awarded with the new pavement design thickness as detailed in table 2.22.1 below:

Package No	Location	Chainage	Contractor
12	Wangdue-Langkena	436-429 (7 Kms)	M/s Tagsing Chungdruk Construction Pvt. Ltd, Thimphu
13	Razhau-Nobding	403-395 (8 Kms)	M/s U.P Construction, Thimphu
14	Nobding-Dungdungnyelsa	392.25-389 (3.25 Kms)	M/s Empire Construction Pvt. Ltd, Punakha
15	Nobding-Dungdungnyelsa	395-392.25 (2.75 Kms)	M/s Empire Construction Pvt. Ltd, Punakha

Under RO, Lingmethang, out of 6 packages only one (1) was awarded with the new pavement design thickness as detailed below:

Package No	Location	Chainage	Contractor
7	Between Kurizampa & Lingmethang	114.45-118.45 = 4 Km	M/s. Tshering Construction Pvt Ltd, Bumthang

However, although the revised pavement design thickness was approved during the 7th DoR Quarterly Meeting held on 27-29 July, 2015, the RO Trongsa had failed to comply with the resolution as the work for up gradation of pavement of 2.18Km from Chainage 87.62-89.8 (Sonam Kuenphen to Hurjee (bypass)) was found awarded to M/s Lamnekha Construction Pvt. Ltd during April 2016 with the initial pavement design thickness of 600mm instead of revised thickness of 575mm.

The reason stated in changing of pavement thickness was low volume of traffic between Wangdue and Trashigang. Thus, the decision of DOR and the Ministry to change pavement design thickness to 575 mm just for five packages with Chainage coverage of just 25 km was found impetuous and in violation to the *Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009 as the traffic volume of Primary National Highway is standardized as >200vpd (Vehicle per day)*.

The Ministry should comment on the change of pavement design thickness just for Five (5) contract packages despite the fact that the decisions were taken in July 2015 just after the awards of contracts when all contractors were carrying out only the formation cutting and permanent works. The DOR and Ministry should have issued changed order on the pavement thickness of all contract packages if the changes were made on the basis of low volume of traffic between Wangdue and Trashigang. Besides, the Ministry should also comment on the fact that if the revised pavement thickness were to suffice the low volume traffic, why the decisions and approval for the initial thickness were taken which had substantially impacted the construction cost.

The Ministry should also comment on the failure of the RO, Trongsa to abide by the revised design thickness of pavement works awarded after the decision of the Meeting.

Auditee's Response:

Initially, the pavement width was to be 6.5 mtr wide with total 600 mm thickness of various layers. However, as per policy decision taken at a later stage, the pavement width was increased from the original 6.5 mtr to 7.5 mtr in the larger interest of the Government. Similarly, as discussed & decided during the 7th DoR Quarterly meeting held on 27-29th July 2015, the thickness of DBM & AC was reduced from the original 75 mm to 60 mm and for AC from 50 mm to 40 mm respectively.

The reason for reducing the pavement thickness from 600 mm to 575 mm was due to the consideration of lesser traffic volume plying from Wangdue Bridge towards Trongsa & further. In view of the above justifications, RAA is requested to drop the memo.

RAA's Further Comments & Recommendations:

While taking not of the response on the reduction of pavement thickness due to low traffic volume between Wangdue and Trashigang, the fact remains that the reduced pavement thickness from 600mm to 575mm (reduction of DBM thickness from 75mm to 60mm and AC thickness from 50mm to 40mm) was just for a stretch of 25km. For all remaining road stretches, the initial DBM thickness of 75mm and AC thickness of 50mm was maintained.

It is also to reiterate that the changes in DBM and AC thickness were approved during the meeting held on 27-29th July 2015 when formation cutting and permanent works were being carried out and it would have been possible to issue change orders for the revised DBM and AC thickness. The changes of DBM and AC thickness on the ground of low volume of traffic within the same stretches of roads indicated flaws and deficiencies in the decisions as the decisions were not supported by adequate study carried out, if any, on the technical merit of such changes only in stretches covered in the five contract packages. Such decisions and actions indicated adhoc changes of designs, lacked coordination amongst ROs and DOR and monitoring controls by the DOR.

The varying pavement thickness approved by the DOR and Ministry within the same stretches of roads as well as deviations from the Guidelines on Road Classification System and Delineation of Construction and Maintenance Responsibilities 2009 is brought to the notice of the Government.

2.24 Non-deduction of cost for reduced 1.5 m Hard Shoulders between Paved carriageway and L-Drain and 0.50m at valley side

The initial and revised design/drawings for pavement works provided the following specifications:

Initial Drawing

- ✓ Formation cutting width 10.5m
- ✓ Carriage width 6.5m
- ✓ L-Drain hillside 1m
- ✓ Shoulder between L-Drain and Carriage Way 1.5m
- ✓ Shoulder at valley side 1.5m

The execution of required 1.50m Hard Shoulders between the L-Drain and Paved Carriageway and 0.5m at valley side was done away due to change in the design and drawing of the double lanning works.

However, in terms of the initial designs, the contractors were required to executive the Hard Shoulder. As no separate item of works were provided in the BOQs for Hard Shoulder, the cost was required to be built up in the item rates quoted for the execution of pavement items of works. Thus, doing away the execution of Hard Shoulders and paying for execution of increased carriage way of 1m width separately tantamount to payments made without execution at site.

The Ministry should comment on the circumstances leading to non-deduction/non-adjustment of cost for Hard Shoulders from payment for increased scope of 1m pavement works. Besides, the Ministry must thoroughly review the execution of hard shoulder at valley sides and cost to the extent of hard shoulders not maintained and executed at valley sides including cost of 1.5m hard shoulders not executed between L-Drain and Paved Carriageway should be worked out and deposited into ARA.

Auditee's Response:

The item for hard shoulder was not incorporated in the BOQ and the specification was not mentioned in the document. The contractors were paid as per the actual measurement for the rest of the items whereby the double payment by RO has not been made. Since the other items in the BOQ are in cubic meter, the payments were done for actual work done only. Hence deduction of cost for not constructing hard shoulder was not applicable. Hence the memo may be dropped.

RAA's Further Comments & Recommendations:

In view of the requirement to execute Hard Shoulders in terms of the initial drawings, even though the item was not incorporated in the BOQ, the contractors were required to either built up the rates with the relevant item of works or the contingencies such as overhead cost was to cover up variety of possible risks or events that are not specifically identified or quantified in the BOQs. Thus, non-deduction or adjustment of cost for Hard shoulders from the payments on the increased pavement width of 1m tantamount to financial benefit to the contractors.

However, the Ministry should institute a technical team to review the cost implication in terms of the initial design/ drawings where the contractors were required to execute and maintain Hard Shoulders between the L-Drain and Carriageways and at valley site in terms of the contractual documents and appropriate decisions and action taken on the issue intimated to the RAA.

2.25 Non-maintenance of 1.5m/1m width shoulder at Valley side

The initial and revised design/drawings for pavement works provided the following specifications:

Initial Drawing

- ✓ Formation cutting width 10.5m

- ✓ Carriage width 6.5m
- ✓ L-Drain hillside 1m
- ✓ Shoulder between L-Drain and Carriage Way 1.5m
- ✓ Shoulder at valley side 1.5m

Revised Drawing

- ✓ Formation cutting width 10.5m
- ✓ Carriage width 7.5m
- ✓ Shoulder hillside 0.5m
- ✓ L-Drain between shoulder hillside and Carriageway 1m
- ✓ Shoulder at valley side 1.5m/1m

In terms of the technical specifications, the contractors responsible for Formation Works were required to achieve formation width of 10.5m and contractor for Pavement works were to execute and maintain Hard Shoulder at valley side of 1.5m/1m respectively as per the revised drawings.

The quantum of work was required to be executed as per initial and revised drawings and cost thereof either built up with “Providing and Laying GSB” or other pavement related works.

During the physical verification of sites with the ROs site engineers and officials, the RAA observed that the Hard Shoulders of 1.5 m/1m width at valley side were found not maintained homogeneously throughout the stretches of the road. The RAA noted that DBM and AC works were found executed at the edge of the roads at the valley side to achieve the 7.5m carriageway.

Thus, the failure to maintain the hard should of 1.5m/1m at valley side by the contractors responsible for Pavement works indicated the failure on the part of the contractors and ROs to achieve the overall formation width of 10.5m.

In addition, non-provisioning of the 1.5m/1m width Hard Shoulder at the valley side again had financially benefited the contractor as no adjustment of the amount was found made for area where Hard shoulders width were not maintained.

The Ministry should comment on the revisions of the designs/drawings and non-adjustment of cost thereof for works not required to be executed and works not actually executed. Besides, the Ministry should institute a technical team to carry out measurements of the formation width and pavement works to regulate payments to the extent of actual works done as per designs/drawings and technical specification as well as adjust cost for the hard shoulders not executed at site.

Auditee's Response:

The shoulder width of 1.5 m has been maintained where ever possible. However, in some of the stretches where there was requirement of huge rock cutting and some stretches highly vulnerable to major slide have been left out to save future maintenance cost. Further RO was also instructed verbally by the then Hon'ble Lyonpo, MoWHS that formation width can be reduced in rocky stretches as long as required pavement width is achieved to speed up the completion of the project.

Copy of the mail is attached below. Therefore, the memo may be kindly dropped.

2. Contract packaging of the east-west highway should be carefully prepared to engage all levels of contract categories including CDCL and Department works; and also to ensure efficiency with regard to sequencing and site management.

3. While the national highway standard specifications will be applied, site specific flexibility that will save us substantially in money and time should be permitted. (for example, no need to get the full specified formation width at rocky/cliff stretches; no blacktopping needed on the wet and unstable stretches; choices to adopt "V" or box drain as per the site condition - for wet stretches, box drain is said to be more effective; etc..)

4. To address problems with asphalt surfacing on wet and moist stretches, it may be worthwhile to experiment concrete pavement. DoR Director was instructed to look at this through a desk top research and prepare presentation to see the possibility of piloting few stretches on the lateral east west highway works.

RAA's Further Comments & Recommendations:

Notwithstanding the instructions issued through e-mail as well as verbal instruction of the then Hon'ble Lyonpo, MoWHS, it was the responsibility of the ROs and the Site Engineers to regulate and adjust the cost for the formation width not achieved since the quoted rates for formation works were running meters with overall formation width of 10.5m.

Thus, non-deduction or adjustment of cost to the extent of formation width not achieved from the payments tantamount to payments to the contractors for works not executed. In addition, the achievement of formation width had led to non-maintenance of Hard Shoulders at valley side by the Contractors responsible for Pavement works. This has also resulted in payments for Hard Shoulders not executed at site.

However, the Ministry as agreed during the exit meeting should institute a technical team to review the cost implication in terms of non-achievement of formation width and non-maintaining of Hard Shoulders at valley site in terms of the contractual documents and appropriate decisions and action taken on the issue intimated to the RAA.

2.26 Non-achievement of formation width 10.50 meters and non-execution of FC works

As per the approved revised drawing and design, the technical specifications required maximum Formation road width of 10.50 meter (m) comprising 1.5 m width shoulder on the valley side, 0.50 m width on hill side behind the L Drain for the purpose of debris collection, and 1m width L-drain and Carriageway width of 7.50 m.

In terms of the contract documents, the quoted rates in lump sum for formation cutting works was to achieve overall road width of 10.50 m for ensuring achievement of technical specifications defined for pavement works.

The joint physical verification of site revealed that in many stretches of roads, the formation width was not achieved as well as formation works were found not executed as detailed below:

RO, Lingmethang

2.26.1 Korila-Pangser (Package-2) executed by M/s. Tshering Construction Pvt Ltd. Bumthang

SL. No.	Approx. Chainage (in meter)	Approx. length (in meter)	Approx. width measured (in meter)	Width Deficit
1	36605-36641, 37244-37251	43	9	1.5
2	36753-36786, 37212-37217 37594-37598,39435-39445	52	10	0.5
3	37190-37194	4	9.5	1.0
Total		99		

2.26.2 Pangser-Kilikhar (Package-3) executed by M/s. K. D Builder Pvt Ltd.

Sl.No.	Approx. Chainage (in meter)	Approx. length (in meter)	Approx. widths measured (in meter)	Width Deficit (in Meter)
	From			
1	29284-29319, 29878-29889, 31659-31675, 31926-31956, 34108-34121, 34443-34466, 34912-34938,	154	10	0.5
2	29618-29649, 29679-29708	60	10.3	0.2
3	29752-29786, 29817-29828, 29965-30001	81	9.4	1.1
4	29845-29864, 32707-32720, 34965-34989, 35018-35033	71	9	1.5
5	32410-32427	17	9.7	0.8
6	33039-33051	12	9.9	0.6
Total		395		

2.26.3 Kilikhar to Mongar (Package 4) executed by M/s Gongphel Construction Pvt. Ltd

SL. No.	Chainage/ total length (in m)	Approx. length (in meter)	Physically measured width (approx. in meter)	Width Deficit
1	25377m-25320m and 26291m-26114m	234	9	1.5
2	26588m-26569m	19	10	0.5
3	27384m-27347m	37	9.7	0.8
4	29058m-29028m	30	9.5	1.0
Total		320		

2.26.4 Mongar-Gongola (Package-5) executed by M/s. Norbu Construction Company Pvt. Ltd , Gelephu

SL.No	Chainage/ total length (in meter)	Approx. length (in meter)	Physically measured width (approx. in meter)	Width Deficit
1	15m-0m, 120m-103m, 899m-890m , and 1410m-1400m	51	9.5	1.0
2	3382m-3350m	32	10	0.5
3	5450m-5400m	50	9	1.5
Total		133		

2.26.5 Kurizampa-Lingmethang Highway (Package-7) executed by M/s Tshering Construction Pvt. Ltd, Bumthang

Sl. No	Chainages (in km)	Length in M	Physically measure width (approx. in m)	Width Deficit (in m)
1	114.526-114.562, 115.019--115.048, 115.07-115.089, 115.113-115.144, 116.372-116.401, 116.523,116.448-116.462, 116.523-116.543	178	10	0.5
2	114.735-114.816, 116.795-116.839	125	9	1.5
3	116.719-116.747	28	9.5	1.0
Total		331		

RO, Trongsa

2.26.6 Chuserbu to Nyelazam (Package 1) executed by M/s Rigzar Construction Pvt. Ltd

SL. No.	Chainage/ total length (in meter)	Length in (M)	Physically measured width (approx. in meter)	Width Deficit in (m)
1	125m-90m, 506m-440m, 1050m-1040m, 1985m-1978m, 3270m-3246m	142	10	0.5
2	1187m-1175m	12	9.7	0.8
3	2890m-2883m	7	9.5	1.0
Total		161		

SL. No.	Chainage	Meter	Length	Width Measured in (m)	Width deficit in (m)
1	2147	2147	10	7.4	0.01
2	2156	2156	9	7.2	0.30
3	5145	968	8	7.25	0.25
4	7629	3452	81	7.15	0.35
Total			108		

2.26.7 Nyelazam to Sakachawa (Package 2) executed by M/s Gaseb Construction Pvt. Ltd

SL. No.	Chainage	Approx. length (in meter)	Approx. width measured (in meter)	Width Deficit (in m)	FC not carried (in m)
1	12360-12324, 13596-13610, 13641-13650	79	10.0	0.5	
2	14666-14688	22	9.9	0.6	
3	12000-12059				50
4	16031-16068				37
Total		101			87

2.26.8 Sakachawa to Tsangkha (Package 3) executed by M/s Rinson Construction Pvt. Ltd

Sl. No.	Chainage	Meter	Length in (m)	Width	Width Deficit (in m)	Chainage in (m)	FC not carried in (m)
1	21271	1600	59	10.4	0.1	1047-1168	121
2	21586	1915	73	9.5	1.0	1886-1915	29
3	22145	2474	559	8.8	1.7	5259-5409	150
4	22638	2967	227	10.0	0.5	536-556	20
5	23158	3487	189	9.7	0.8	223-402	179
6	25206	5535	40	9.3	1.2		
Total			1147				459

2.26.9 Tshangkha to View Point (Package 4) executed by M/s Gyalcon Infrastructure Pvt. Ltd

SL. No.	Approx. chain age (in meter)	Approx. length (in meter)	Approx. width measured (in meter)	Width Deficit (in m)
1	27435-27460	25	8.0	2.5
2	27724-27737	13	9.5	1.0
3	30039-33042, 30168-30238, 30667-30673	79	10.0	0.5
Total		117		

2.26.10 View Point- BjeeZam (Package 5) executed by M/s Druk Lhayul Construction Pvt. Ltd

SL. No.	Approx. chain age (in meter)	Approx. length (in meter)	Approx. width measured (in meter)	Width Deficit (in m)	FC not carried in (m)
1	33276-33305	29	4.7	5.8	
2	33305-33352	47	7.3	3.2	
3	34164-34198, 35445-35487, 36648-36686	114	9.0	1.5	
4	34541-34594, 36786-36806	73	10.0	0.5	
5	35351-35387	36	7.0	3.5	
6	35564-35619, 35792-35916,	179	8.5	2.0	
7	36067-36099	32	8.7	1.8	
8	36273-36416	143	8.0	2.5	
8	3200-32053				53
9	34316-34361				45
10	37627-37710				83
Total		653			181

2.26.11 Bjeezam- Trongsa (Package 6) executed by M/s. Raven Builders & Company (P) LTD

SL. No	Ch. From (in m)	Length (in m)	Physically measure width (approx. in m)	Width Deficit (in m)	FC not carried (in m)
1	37811-37930, 40172-40192, 39384-39410, 39317-39338	186	9.3	1.2	
2	38153-38231, 39233-39291	136	9.0	1.5	
3	38556-38646, 42821-42851	120	8.0	2.5	
4	40284-40324, 41637-41665, 41819-41837, 42073-42145, 43033-43087	212	10.0	0.5	
5	40728-40836, 41954-41983	137	7.0	3.5	
6	40856-40980, 42645-42702, 39849-39860	192	9.7	0.8	
7	42393-42441, 42730-42768, 41495-41513	104	7.5	3.0	
8	43441-43465, 43570-43638	92	8.5	2.0	
9	37700, 40324, 40531, 42536, 43548, 43785				992

Total	1179		992
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2.26.12 Gyatsazam to Ngangar (Package 13) by M/s Rinson Construction Pvt. Ltd

Sl. No.	Chainage	Wheel Meter reading	Width measured	Width Deficit (in m)
1	85418,	438	10.3	0.2
2	85706, 99527,	3661	10.0	0.5
3	87118	2138	9.7	0.8
4	87288, 99244	4960	9.5	1.0
5	89881	81	7.7	2.8
6	90558, 96675,	841	9.0	1.5
7	96592	4060	8.0	2.5
8	97655, 98592, 99080	5551	10.2	0.3
Total		21,730		

2.26.13 Sonam Kuenphen to Hurjee (Package 14) executed by M/s Lamnekha Construction Pvt. Ltd

Sl. No.	Chainage	Wheel meter reading	Length (in m)	Width (in m)	Width deficit (in m)	FC not carried (in m)
1	87917	159- 297				138
2	88220	549-600				51
3	88376	687-756				69
4	88622	889-1002				113
5	88695.9	1002-1075.9	73.9	10.2	0.3	
6	88803	1098.9- 1183				84.1
7	88892	1183- 1272	89	9.9	0.6	
8	89011.7	1272-1391.7	119.7	9.0	1.5	
9	89190.7	1391.7-1570.7	179	7.6	2.9	
10	89234.6	1570.7-1614.6	43.9	8.8	1.7	
11	89268.2	1614.6-1648.2				33.6
12	89606.6	1810.4-1986.6				176.2
13	89791.6	1986.6- 2171.6	185	8.6	1.9	
Total			690.5			664.9

The non-achievement of formation width requirement of 10.50 m as per revised drawings and technical specifications as well as non-execution of formation works indicated execution of works in deviation to the technical design and specification and inadequate monitoring and supervision by the site engineers over the execution works.

Further, the non-achievement of the required widening width and non-execution of formation works entailed payments for unexecuted works as the quotes for FC works were on lump sum basis.

Auditee's Response:

The DOR and the Ministry responded that while almost all the stretches completed have width 10.5m, the road width were not achieved only in areas where there is local resident, private properties, water tanks, permanent structures, public utilities, Religious, cultural, Historic and ecologically important sites.

The ROs also responded that the Minister, during her visit to sites and during meetings instructed that there was no need to get full specified formation width at rocky and cliff

stretches as well as black topping on the wet and unstable stretches to save substantially in money and time. The ROs also responded that the FC width not achieved shall be deducted and payment will be made accordingly on pro rata-basis.

RAA's Further Comments and Recommendations

There were inadequacies in the site feasibility studies for formation cutting works as well as lack of proper planning as the ROs had failed to consider in the preparation of design, estimates and BOQs, the limitations for formation works expected in locations where there were local resident, private properties, permanent structures, public utilities, Religious, Historic and ecologically important sites as well as rocky and cliff areas. The non-execution of formation works, and non-achievement of formation width would defeat the very objective of up-gradation project of the NEWH.

The lump sum payments for formation cutting works in running meter without adjustment of the cost for road stretches where requisite formation width were not achieved and FC works not carried out tantamount to payments for unexecuted works.

As agreed during the Audit Exit meeting, the ROs and DOR are advised to regulate the payments for FC works on pro rata basis for road stretches where FC width were not achieved and FC not carried out and amounts recovered within three months from the date of issue of the report.

The Ministry is also advised to institute a technical team to conduct site verification on the non-achievement of formation width, the extent of FC works not carried out, non-maintenance of specified Hard Shoulder width at hillside and valley side under all contract packages, and ascertain the actual cost implication on the project and also to ascertain the remedial actions that may be required to improve the road conditions in such stretches.

2.27 Procurement and irregular issue of extension kits to the non-field officials - Nu. 311,900.00 (5.9.3)

An amount of Nu. 311,900.00 was paid to M/s Kinley & Sonam Manufacturing, Thimphu for the supply of extension kits to the Technical Monitoring Team. Since the NEWH activities are spread over 4 Regional Offices, expenditures are allocated amongst four ROs at equal amount of Nu. 77,975.00 each. Further review of the related documents revealed the following irregularities:

As per the approved note dated 02.02.2016, the following extension kits were approved for the procurement by the Secretary:

Table 2.27: Procurement of extension kits		
Sl/No	Description	Qty
1	Sleeping bags	9 Nos
2	Expedition mats	9 Nos
3	Safety boots	9 Nos
4	Torch lights	4 Nos
5	Tent (A or E type)	3 Nos

The audit team noted another note sheet dated 2.2.2016 approving the procurement of following extension kits by the Secretary:

Sl/No	Description	Qty
1	Sleeping bags	12 Nos
2	Expedition mats	12 Nos
3	Safety boots	12 Nos (not approved)
5	Tent (A or E type)	12 Nos

It is also noted that no dispatch numbers for both the Note sheets were available and the two note sheets were approved on the same day. Therefore, the audit team could not ascertain as to whether both the above two note sheets were approved for procurement.

Further, the procurement was made during the FY 2016-2017, though the procurement was approved for procurement during the FY 2015-2016 indicating flaws in the approval and procurements of extension kits. On review of the records made available, the RAA noted procurement of the following extension kits:

Sl/No.	Items	Qty	Total Qty.	Rate (Nu.)	Amount (Nu.)
1	Sleeping bag A	2		10,990.00	21,980.00
2	Sleeping bag 2	8		9,990.00	79,920.00
3	Sleeping bag 3	7	17	5,990.00	41,930.00
4	Safety boots A	9		3,890.00	35,010.00
5	Safety boots B	7	16	1,990.00	13,930.00
6	Rain Gear A	8		3,690.00	29,520.00
7	Rain Rear B	6	14	1,450.00	8,700.00
8	Tent D/type	9	9	8,990.00	80,910.00
	Total				311,900.00

On further review on the issue of extension kits, it was noted that extension kits were also issued to officials other than the TMT Officials as shown below:

Sl/No	Name	sleeping bag	Safety boot steel	Rain Gear	Tent D/type	Total cost Nu
1	Karma Ugyen, DCAO	1	1	1	1	26,560.00
2	Kinzang Norbu, Budget officer	1	1	1	1	26,560.00
3	Ugyen Thinley, AFD	1	1	1	1	26,560.00
4	Thinley Dorji, MTO	1	1	1	1	24,660.00
5	Sonam Dorji, Store	1	1	1	1	26,560.00
6	Pema Eden	1	1	1	0	17,570.00
7	TMT officials	11	10	8	4	163,430.00
						311,900.00

Further, following irregularities were also observed:

- The extensions kits were excessively procured as noted from the stock balances as on the date of audit.

- Procurement of 8 Nos Rain Gears valuing Nu. 38,220.00 were not in the list of extension kits listed in both the approved Note sheets.
- In terms of approved Note Sheets, Tent A or E type was to be procured but tent D types were found procured. Thus the procurement was in violation of the approved note sheets
- As per available records, the **Technical Monitoring Team (TMT)** comprise the following team members:
 - ✓ Tshering Wangdi A (TMT Leader)
 - ✓ C.K. Pradhan, PE, Const. Division, DoR
 - ✓ Karma Tenzin, EE, Design Division
 - ✓ Tempa Thinley, Geotech Unit, Design Division, DoR

Thus, the reasons for issuing extension kits to other than TMT officials was not understood in audit.

- The issue of tents to individual was not rational and correct as the tents could be used by other field officials as and when required.
- The charging of expenditure to the Project was not justified as such expenditure could have been booked under normal LC accounts.
- The necessity of the extension kits to the above officials including TMT officials are found not genuine since the TMT official visits are not regular. Further, all ROs have established transit camps well equipped with all necessary items.

Taking into the consideration of the above facts, the DOR and Ministry should recover the amount from the above officials besides the Ministry should also hold the approving authority accountable for approving such procurements from project funds.

Auditee's Response:

We would like to furnish our reply as detailed below:

0. *In order to monitor the work progress and quality of the NEWH Project, a Technical Monitoring Team (TMT) comprising Chief Engineers, Principle Engineers and other senior engineers from HQ have been formed during the 8th DoR Quarterly Meeting held in 28th – 30th, 2015. A copy of minutes attached for reference. As per ToR, TMT is mandated to check the quality of work and carry out the field tests.*
1. *Although the core TMT members were from the Department, at times there was a requirement of finance and procurement officials to visit the project sites to evaluate the financial and procurement processes and constraints faced by the bidders. Since there was no separate fund for purchase of extension kits, the stuffs were procured and booked under the project head only.*
2. *An amount of Nu. 311,900.00 were paid to M/s Kinley and Sonam Manufacturing, Thimphu for the supply of extension kits to the Technical Monitoring Team.*
3. *Since the NEWH activities are spread over four Regional Offices, expenditures are divided among the ROs and each RO has incurred an amount of Nu. 77,975.00.*

The above amount of Nu. 77,975.00 was paid based on the directive of ministry and DOR, HQ vide note sheet approval no. DOR/TMT/2016-2017/3522 on February 2017.

We would like to submit the Royal Audit Authority to kindly review above details explanations and requested to consider the above Para.

RAA’s Further Comments & Recommendations:

The RAA has taken note of the response. It is to reiterate that in terms of budgetary norms, separate budget allocation are approved for procurement of extension kits for the field staff under the normal budgetary system (LC). The procurement of extension kits from the project fund in addition to budgetary fund is in violation of the budgetary norms. Besides, the issuance of extension kit to non-field staff is unjustified.

However, as discussed during the exit meeting, the ROs and DOR should get back the tents and account for in stock ledger and intimated to RAA for verifications and record. Besides, the Ministry should direct the DOR and ROs to refrain from such decisions and action in future.

Who is Accountable?

Direct Accountability	: Refer Accountability Statement
Supervisory Accountability	: Refer Accountability Statement

2.28 Non-aligning of pavement thickness with the item of works provided in the Bhutan Schedule of Rates (BSR) with resultant cost implication by way of applying built up rates through rate analysis

In terms of BSR, the item of work “Providing and Laying Dense Bituminous Macadam (DBM) to required degree of compaction based on mixture design (Job mix formula) approved by the supervising engineer including preparation of surface with road broom, application of prime coat @0.75 kg/sq. m by mechanized method using asphalt plant, paver, steel roller, tyre roller etc. complete” – outlines built-up rates for the execution of pavement works only for the varying thickness as shown below:

Item Code	DBM thickness
RW0132	50mm
RW0133	60mm
RW0134	70mm
RW0135	80mm

Similarly, for the item of works “Providing and Laying Asphalt/Bituminous Concrete to required degree of compaction based on the job mixture design approved by the supervising engineer using asphalt plant, paver, steel roller, tyre roller etc. as per material gradation and aggregate quality specified” also outlines built-up rates for the execution of pavement works only for the varying thickness as shown below:

Item Code	AC thickness
------------------	---------------------

RW0136	25mm
RW0137	30mm
RW0138	35mm
RW0139	40mm

However, for the double lanning of Northern East-West National Highway, the Ministry has prepared the designs/drawings with a total pavement thickness of 600mm as shown below:

The pavement thickness of various layers is as follows:

GSB	=	250mm
WMM	=	225mm
DBM	=	75mm
AC	=	50mm
Total:		600mm

It was apparent that DBM and AC thickness were not aligned to the thickness provided in the BSR but maintained as design thickness for DBM as 75mm in-between the defined thickness of 70mm and 80mm and 50mm for AC against maximum thickness of 40mm provided in the BSR.

Thus, specifying different DBM and AC thickness had resulted in requirement of carrying out rate analysis both by the ROs in the preparation of estimates and contractors while submitting the rates for the two item works. On review of contractor's rate analysis attached with the tender documents, lapses and discrepancies in the application of co-efficient for the item of work 75mm DBM & 50mm AC were noted as the LMC provided only for 70mm and 80mm DBM work and 40mm AC work. Thus, the co-efficient used for 75mm DBM was considered for 80mm thick and co-efficient for 50mm thick AC works was randomly worked out by contractors.

However, the varying rates used by the RO through rate analysis in the preparation of estimates including rates applied for departmentally executed works and BSR rates are detailed in table 2.26.2 below:

Packages	BSR Code reference	DMB rate without bitumen	AC rate without bitumen	Departmental		BSR Rates	
				DMB rate with bitumen for 75 mm	AC rate with Bitumen for 50mm	DBM with bitumen 80mm (BSR 2015-Thimphu Base)	AC with bitumen 40 mm (BSR 2015-Thimphu Base)
VI, VII, VIII, IX, X	AR	213.14	159.14	839.65	648.22	891.92	521.27
XI	AR	252.43	153.15				
I, II, III, IV, V	AR	205.85	140.87				
XII, XIII, XIV, XV	RW0133	247.47	148.2				

Further, it was noted from the Minutes of the 7th DoR Quarterly Meeting held on 27-29 July, 2015, the meeting discussed and decided to reduce the thickness of DBM from 75mm to 60mm and AC from 50mm to 40mm aligning to the thickness provided in the BSRs. However, the

execution of pavement thickness was found maintained in line with the initial approved design thickness in majority of the contract packages.

The Ministry in particular the Design Division should comment on designing of bitumen thickness not provided in the BSR for the preparation of estimates and subsequently reducing the bitumen thickness in line with the thickness provided in the BSR.

Auditee's Response:

The Regional Office acknowledges the observations issued by Royal Audit Authority. While BSR is prepared as a tool to assist in the estimation of project costs, it is to inform you that it does not cover every items in detail. For instance, laying of WMM is done with the use of motar grader while it is not reflected in the labour coefficient.

The required items are incorporated based on site specific as and when required and found necessary. Likewise, varying thickness for DBM & AC for NEWH is based on design traffic volume and site requirement. There is no added cost on the application of present DBM & AC thickness adopted for the above work. In view of the above justification, RAA is kindly requested to drop the memo.

RAA's Further Comments & Recommendations:

While taking note of the response that the pavement design thickness is guided by the traffic volume, the fact remains that the change in design thickness of DBM from 75mm to 60mm and AC from 50mm to 40mm were made only for 25km stretch of road between Wangdi and Trongsa and Yadi to Lingmethang despite having same traffic volume. Thus, adhoc change of design thickness of DBM to 60mm and AC to 40mm on the basis of traffic volume, indicated that the Design Division, DOR could have designed the DBM and AC thickness within thickness provided in the BSR and LMC. The providing of design thickness of 75mm for DBM and 50mm for AC not provided in the BSR and LMC had resulted in application of varying rates by the ROs in the preparation of estimates and wrong application of material co-efficient in the analysis of rates for items of works by the contractors inflating the quoted rates with overall financial implication to the extent of Nu.60.236 million as reported under Para 2.4 of the report.

However, as discussed in the exit meeting the DOR in consultation with the Ministry should take measures to maintain the design thickness of DBM and AC and other item of works as per the thickness provided and available in the BSR and LMC or incorporate in the BSR and LMC varying design thickness requirements in terms of traffic volume and site specific conditions to minimize wrong application of labour and Material Co-efficient in carrying out rate analysis in future.

The decisions and measures taken by the Ministry to address the issue intimated to the RAA for record and follow-up in future audits.

2.29 Irregularities in supply of lab equipment for NEWH (5.6.8)

As noted from Kuensel issue of 7/10/15, the NIT for procurement of laboratory Testing Equipment for road works was found invited with completion period of supply of 3 months. Details of laboratory testing equipment required were as shown below:

i.	Proctor Compaction Test Apparatus	4 sets
ii.	California Bearing Ratio (CBR) Test Apparatus	4 sets
iii.	Field Density (Sand Cone Method) Test Apparatus	4 sets
iv.	Binder Determination(Centrifuge Extractor Method) Test apparatus	4 sets
v.	Compaction of Bituminous Marshall Test Apparatus	4 sets
vi.	Core Cutting Machine (Portable& diesel/petro engine operated)	4 sets

As per evaluation reports, M/s GS Traders were the lowest evaluated bidder with bid amount of Nu. 2,462,660.00. The contract agreement was found drawn accordingly between the Director, DoR and M/s GS Traders, Olakha, Thimphu.

During the review of the documents, the following lapses were observed:

2.29.1 Non-supply of testing equipment in full quantity

The supply order was issued vide order No. DoR/CE(CD)/2015-2016/W-47/1994datex 5/1/16 for supply and delivery of Lab Testing Equipment for Road Works valuing Nu.2,462,660.00. The supply order amongst others categorically stipulated that ***“inferior quality or re-conditioned product must be avoided. The joint inspection of supply delivery shall be carried by the procuring agency”***.

As per the Handing taking letter No. DoR/CE(CD)15-16/W-7/ dated 23/8/16, the demonstration of core cutting machine was conducted on 22/8/16 in the presence of the following officials:

- i. Tshering Wangdi A (TMT Leader)
- ii. Karma Wangdi, CE Construction Division
- iii. Sonam Jamtsho, Engineer, Construction Division
- iv. Pema Tshewang, Lab Tech, RO, Lingmithang
- v. Tshejyamo, Lab Tech, RO, Trongsa
- vi. Gagan Lama, CEO, M/s GS Traders &
- vii. Binod Ghalley, Manager, M/s GS Traders 17629259

After demonstration, it was decided not to accept the core cutting machine since it was not as per specification. The supplier agreed to supply the whole set of core cutting machine within 1st week of September 2016. However, as of date of audit i.e.17/5/2018 even after a time lapse of almost two years the supplier had failed to replace core cutting machine. In addition, the DOR had also failed to take any action against the supplier. Further, some equipment items were also found not supplied by the supplier as shown in **Appendix “A”**.

2.29.2 Irregular payment of advance Nu. 560,000.00

Minutes of DLTC meeting held on 30/8/16 after deliberations had endorsed following decisions:

- The supplier is eligible for the payment only after supplying all the equipment as per the contract agreement. However, since his bills are pending the committee decided to make advance payment of Nu. 560,000.00.
- Payment of the quoted amount for 4 sets of core cutting machine and Nu. 246,266.00 being the 10% mobilization advance payment as per contract agreement on furnishing BG from the reputed bank. This is to facilitate the supplier to replace the core cutting machine at the earliest.
- The supplier shall supply the core cutting machine within 2 weeks after making the above payment by the department.

In accordance with the decisions of the DLTC, payment of Nu. 560,000.00 was found released to the supplier as advance payment since the bills are kept pending as the supply was not fully completed. The advance payments were made from four ROs as shown below:

Sl/No	Name of ROs	Amount Nu.
1	RO, Thimphu	140,000.00
2	RO, Lobeyasa	140,000.00
3	RO, Trongsa	140,000.00
4	RO, Lingmithang	140,000.00
	Total	560,000.00

The decision of DLTC for payment of advance amounting to Nu. 560,000.00 was not justified as the supplier failed to supply the equipment even on the date of the audit.

2.29.3 Supply of testing equipment not as per specification and acceptance thereof - Nu. 1,902,660.00

M/s GS Traders, Thimphu had supplied lab testing equipment amounting to Nu. 1,902,660.00 except the Core Cutting Machines. Accordingly, RO, Thimphu had paid an amount of Nu. 475,665.00 vide dv No.6.134 dated 20/6/17 for cost of 5 Nos. (1 set testing equipment) as the balance amounts were to be met by ROs Lobeyasa, Trongsa and Lingmithang as detailed below:

Sl/No	Name of ROs	Amount paid Nu.	Vr. No & date	Remarks
1	RO, Thimphu	475,665.00	6.134 of 20/6/17	After adjustment

RO, Thimphu informed that equipment received were tested as required and payment released based on the stock entry and verification of bills by head sub division. However, the audit team noted that balance amounts were found not released by the three ROs.

On enquiry with the Lab In- charge of RO, Lobeyasa, Trongsa & Lingmithang, it was stated that though they have received the equipment, payments were not released as the equipment did not meet the specification requirements. This indicated that the payment by RO, Thimphu had been released without inspecting the equipment by the joint team.

It was also apparent that the ROs had not initiated actions either to return the equipment or to obtain replacement as on the date of audit. The Ministry should investigate the circumstances leading to acceptance of the equipment without prior inspection and certification of the same and retaining as of the date of audit. Such retention of equipment may complicate the issue

further. The Ministry should immediately direct the ROs to return the equipment and direct the supplier to replace the equipment along with the core testing machines. Further, any Bank Guarantee available should be renewed.

The inaction on the part of the Ministry and ROs also indicates procurement of testing equipment on the bases of to make use of funds and not based on actual requirements.

Auditee's Response:

M/s GS Traders, Thimphu has supplied lab testing equipment amounting to Nu. 1,902,660.00 except the Core Cutting Machines. According However, the audit team noted that balance amounts were found not released by the three RO offices equipment's are tastes as required and payment released based on the stock entry and verification of bills by head sub division.

- *M/S GS Traders, Thimphu supplier was placed with the supply order No. DOR/CE(CD)/2015-2016/W-47/1994 on Date 5/1/16 for supply and delivery of Lab Testing Equipment for Road Works*
- *M/S GS Traders, Thimphu has failed to supply the above lab testing equipment and Core Cutting Machines as per the specification as per terms and conditions of contract within the duration of three months date line issued by DOR, HQ, accordingly LD has been imposed based on terms and condition of contract agreement, imposed full amount LD 10% vide DV.06.134 on Dated 20/6/17 amounting to Nu. 47,567.00.*
- *We would like to put way forward to further substantiate that M/S GS Traders, Thimphu has supply the above lab testing equipment and Core Cutting Machines, while supplying to other ROS*
- *It is to submit here because of time lost while making twice procurement of lab testing equipment and Core Cutting Machines from third country by M/S GS Traders, Thimphu, the supplier could not supplied on time and therefore, the supplier was imposed penalty i.e., LD 10% of the contract value.*

Further, we would like to furnish our reply as detail below:

- i. *It is to submit here all the tendering process has been undertaken at DOR, HQ, as per the directive of DOR, HQ, we have received the lab testing equipment 4nos and Core Cutting Machines 1 no was received from M/S GS Traders, Thimphu.*
- ii. *It is to further substantiate the quality of lab testing equipment 4nos and Core Cutting Machines 1 no was found satisfactory while performing its output at our various field.*
- iii. *The quality of lab testing equipment 4nos and Core Cutting Machines 1 no was verified accordingly to specification in contract document jointly by our Executive Engineer and Sub-Store In-charge based on the instruction of Chief Engineer Bridge Division DOR, HQ, instructed on the body of letter.*

- iv. *The note sheet put up by Finance and Administration Division under RO-T, clear remarks has been noted payment of bill has been process after verification with other ROS, involved on NEWH.*
- v. *Accordingly the payment had been released amounting to Nu. 475,665.00 vide DV.06.134 on Dated 20/6/17 for cost of lab testing equipment 4nos and Core Cutting Machines 1 no.*
- vi. *M/S GS Traders, Thimphu has failed to supply the above lab testing equipment and Core Cutting Machines as per the supply order date line issued by DOR, HQ, accordingly LD has been imposed based on terms and condition of contract agreement, imposed LD 10% vide DV.06.134 on Dated 20/6/17 amounting to Nu. 47,567.00.*
- vii. *It is to further substantiate that M/S GS Traders, Thimphu has supply the above lab testing equipment and Core Cutting Machines, while supplying to other ROs, however our Executive Engineer SD No. I, and Sub-Store In charge has rejected and returned back the equipment to M/S GS Traders, Thimphu.*
- viii. *It is to submit here because of time lost while making twice procurement of lab testing equipment and Core Cutting Machines by M/S GS Traders, Thimphu, the supplier was imposed LD 10% vide DV.06.134 on Dated based on terms and condition of contract agreement.*

We would like to submit the Royal Audit Authority to kindly review above details explanations and requested to reconsider dropping the above Para.

RAA’s Further Comments & Recommendations:

It is apparent that the ROs, and DOR had failed to take action against the supplier either to get all the equipment replaced as per technical specification or recover the payments including the Liquidated damages as per the terms and conditions of the supply contract even after a time lapse of almost two years as on the date of audit.

The DOR should immediately return the equipment retained by the ROs/DOR to the supplier and obtain replacement of the same. Besides, the DOR should also investigate the circumstances leading to non-return of the rejected equipment for almost two years and those responsible should be made accountable in event of any complications arising in future. The DOR must also test the equipment accepted by the RO, Thimphu by the joint inspection team.

The decisions and actions initiated by the DOR and the Ministry on the issues and outcome thereof intimated to RAA for records and follow-up in future audits.

Who is Accountable?

Direct Accountability	: Refer Accountability Statement
Supervisory Accountability	: Refer Accountability Statement

2.30 Unsafe Storage of explosives materials

In the light of the explosive materials being hazardous in nature and government controlled items, the audit team during site visits had also visited explosive storage facilities installed by the contractor at site offices. During the physical verification of site, the team noted that in

most cases, explosive materials were found stored in open space, temporary sheds and in office instead of storing the materials in the designated explosive Magazines or designated stores constructed for the purposes. The status of explosives received, issued and balances of explosives in respect of RO, Lingmethang are shown in **Appendix “B”**.

The storing of explosive in open space and temporary shed compromises safety and security requirements as materials were exposed to possible risk to theft, pilferage and deterioration and health hazard to employees, labourers and general public and in particular commuters. While no major accidents related to explosives were reported as of date, considering the hazardous nature of explosive materials it is imperative for RO, Lingmethang to ensure proper storage arrangement and physical safe guards of materials.

Auditee’s Response

RAAs observations on storage of explosives at various contractors of NEWH is well noted by the RO and the project officials. Despite several reminders through monthly coordination meetings and field visits has briefed about the risk of explosives and the rules and regulations and possible impacts for keeping in exposed condition and safety aspects. But many contractors in due process have improved a lot while still some fails to do so. In this regards, strict monitoring will be done by the RO and defaulters will be penalized accordingly in future. Therefore, the RAAs advice will be strictly noted for future guidance and strict implementation.

RAA’s Further Comments & Recommendations:

While taking note of the response the fact remains that explosives are hazardous in nature and government controlled items, and exposed to possible risk to theft, pilferage and deterioration and health hazard to employees, labourers and general public and in particular commuters and were found not stored in designated explosive Magazines or designated stores constructed for the purposes.

However, as agreed during the Audit Exit Meeting, the DoR and the Ministry should immediately direct all the ROs and contractors for proper storage of the hazardous explosives. The DOR and Ministry should also direct the ROs to take stock of the explosives in terms of approval accorded by the Ministry, accountal of receipts, usages for the works and stock balances to prevent mishandling, misuses and ensure proper disposal of balance stocks. Besides, the DOR an the Ministry should institute proper procedures in the accountal, usages and disposal of unutilized explosives as well as monitoring mechanism to ensure enforcement of related explosives rules and regulations to prevent untoward complications in future.

PART B: PACKAGE SPECIFIC OBSERVATIONS WITH ACCOUNTABILITY

3 Irregularities noted in Formation Cutting and Pavement works for Double Lanning of Northern East-West Highway from Korila-Pangser (Package-2) executed by M/s. Tshering Construction Pvt Ltd. Bumthang

The contract for formation cutting and pavement works from Korila-Pangser covering a total of 5.7 kilometer from chainages 73.19km to 78.89 km (Chainage 36.20 to 42.60 in terms of Mgt. Plan) was awarded to M/s. Tshering Construction Pvt Ltd. Bumthang, being the lowest evaluated bidder. The contract agreement No.*DoR/ROL/Plg.-17/2015-2016/2071 dated 26.06.2015* signed between the RO and the contractor, amongst other matters, included the following important details:

- Quoted amount : Nu.62,478,155.55
- Actual Exp. : Nu.41,162,988.81 (30th June 2017)
- Duration of contract : Twenty Four (24) months
- Start date : 10th July, 2015
- Due date of completion : 9th July, 2017
- Actual date of completion : 29th July 2017 (Revised)
- Number of days delayed : 123 days (as of 29th November 2017)
- Work status : On-going
- Name of site engineer : Tashi Penjor, JE

As per revised design and drawing issued by the MoWHS, following technical specifications were required to be abided by the contractor and the site engineer for the construction of NEWH:

- i. The maximum Formation road width of 10.50 meter (m) comprising 1m width shoulder on the valley side, 1m width on hill side for the purpose of debris collection and 1m width L-drain; and
- ii. Carriageway width of 7.50m.

In term of the contract documents, the build-up/quoted rates in lump sum for formation cutting were to achieve overall road width of 10.50m.

Detailed verification of drawings, estimates, bill of quantities, contractor's bill, technical specification and physical verification of the construction sites revealed over payments and other irregularities as discussed below:

3.1 Non-achievement of formation width 10.50 meters (4.4.37)

During the joint physical verification of site comprising officials from the Regional Office, Department of Roads, Lingmethang and RAA team on 30th October 2017, it was noted that in few chainages/stretches along 5.7 km of roads, the formation width were not obtained as indicated below:

SL. No.	Approx. Chainage (in meter)		Approx. length (in meter)	Approx. width measured (in meter)	Width Deficit
	From	To			
1	36605	36641	36	9	1.5m
2	36753	36786	33	10	0.5m
3	37190	37194	4	9.5	1.0m
4	37212	37217	5	10	0.5m
5	37244	37251	7	9	1.5m
6	37594	37598	4	10	0.5m
7	39435	39445	10	10	0.5m

From the above table, it is clear that overall formation width requirement of 10.50m as per revised drawings and technical specifications were not achieved. It also indicated existence of inadequate monitoring and supervision by the site engineer over the execution works as well as breach of contract obligation by the contractor with resultant execution of works in deviation to the technical design and specification.

Further, the non-achievement of the required widening width entailed payments for unexecuted works as the quotes for FC works were on lump sum basis. Thus the payments on the basis of lump sum contract had resulted in payments for unexecuted works. The Regional Office should comment on taking over of FC works without achieving the design width and for payments thereon.

The Regional Office should also hold the site engineer and contractor accountable for appropriate action for execution of works in deviation to approved drawings and technical specification. In addition, the Regional office should immediately recover the cost difference for the deficit width and deposited into audit recoveries accounts.

Auditee's Response

A Joint Team comprising of officials from Regional Office, and RAA team conducted joint physical verification of the site on 30th October 2017. During the physical verification, it was noted that in few chainages/stretches along Korila – Pangser (5.7Km) of the roads, the formation width were not obtained as low as 0.5m to high as 1.5m in different locations.

In this case, the following were the reasons & justification for non- achievement of formation cutting width 10.5m incorporated in design & drawings.

- 1. During the visit of RAA, we are in the process of rectifying the site and now almost all the stretches were completed width 10.5m and even we have serve written notice to have 10.5m width in all stretches vide no. DOR/KS/2017-2018/0053 dated 28th December 2017.*
- 2. Places where there is local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site, we could not achieve road width of 10.5m.*
- 3. Rock Cutting: In some stretches, the height of cut is very high and to obtain full width by carrying out excavation even beyond the batter peg, the required width could not be achieved due to sudden fall of boulder/rock (impact action) on the road edges, thereby eroding the base width on the valley side reducing the road width.*
- 4. The limitations to achieve full road width requiring high rock cuts and displacement of settlements were highlighted to TMT from Thimphu and to H.E Minister, MOWHS*

during her visit to site and in many meetings. The instruction to this effect is highlighted and attached for reference.

“While the National highway standard specifications will be applied, site specific flexibility that will save substantially money and time should be permitted. (eg., No need to get full specified formation width at rocky/ cliff stretches; no black topping needed on the wet and unstable stretches; choices to adopt “V” or box drain as per the site condition-for wet stretches, box drain is said to be more effective; -etc...)”

RAA’s Further Comments & Recommendations:

It is apparent from the response that there were deficiencies in the site feasibility studies for formation cutting works besides improper planning as the RO had failed to consider in the preparation of design and estimates/BOQs the limitations for formation works expected in locations where there were local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site and in rock areas. Thus the payments for formation cutting works in running meter without adjustment of the cost for road stretches where requisite formation width were not achieved were not justified.

However, as agreed during the Audit Exit meeting, the DRO and DOR should regulate the payments for FC works on pro rata basis for road stretches where FC width were not achieved and amounts recovered within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Besides, the recoveries affected and accounted for in the books of accounts should be furnished for review and records. The RO, Lingmithang should not entertain the full payment unless the work are executed complete in all respects in future.

The DOR and Ministry besides reviewing the circumstances leading to payment at full quoted rate for formation works where requisite FC width were not achieved should institute measures and procedures to prevent payments for work not executed or achieved in future. The measures put in place should be intimated to RAA for record and follow-up during future audits.

Who is accountable?

Direct Accountability	<ol style="list-style-type: none"> 1.Tenzin, Project Manager, EID No.200307010 2.Kinzang Dendup, JE, EID No.201001739 3. Tashi Penjore, JE, EID No. 20130103739 4. M/s Tshering Construction Pvt Ltd, CDB No.2379
Supervisory Accountability	<ol style="list-style-type: none"> 1. Lungten Jamtsho, Chief Engineer, EID No.2101064 2.Karma Rinzin, Chief Engineer, EID No. 8909095

3.2 Acceptance of Defective construction works RRM Walls for Catch pits-4.4.63

A joint team comprising officials from the Regional office and Contractor and audit team conducted the physical verification of site on 14th November, 2017. The physical verification of works revealed execution of substandard RRM works pertaining to catch pits, parapets and R/wall as well as damages along Pangser-Korila road works as depicted in the photographs below:



Fig: 3.2- Parapets with honey comb



Fig: 3.2(1)- Damaged RRM



Fig: 3.2(2)- Sub-standard Catch pits

The above pictorial evidences indicated existence of inadequate supervision and monitoring controls over the execution of works by the Site Engineer and Regional Official. The acceptance and taking over of poor quality or substandard works despite investment of huge Government scarce resources indicated laxity on the part of the Regional Office.

The Ministry should consider the desirability of establishing a dedicated technical committee to thoroughly inspect and certify all completed works to prevent taking over of poor workmanship/quality works from the contractor. Besides, the Ministry must fix the site engineer accountable for such lapses and direct immediately the contractor to redo the defective and substandard works and rectification carried out intimated to RAA for review and records.

Auditee's Response

The contract works were still progressing and few catch pits, parapets and R/Wall has been reported damage due to the natural calamities. Contractors have already started with rectification works for damaged portions and moreover we will ensure them to complete at the earliest.

As per the specification and standards, drawing the work has been monitored and supervised for entire site, the wall that was constructed is on emergency basis as the double main line of electricity pole is almost in the falling condition due to the widening works and loosening of the hill side slope. Because of mass movement of the surcharge above road, the cracks were also developed; due to active water pressure by soil mass & surcharge, during monsoon seasons. The damages shall be reinstated immediately by the contractor and the structure will be taken formally once it is restored.

To this effect, the contractor has been already informed about the error vide letter no. DoR/LSD/02/2018-2019/56 dated 09th November, 2018. In future, we will be more careful and such error shall not be repeated.



Fig:3.2- The above images shows the emergent need of restoration works to protect the transmission line

RAA's Further Comments & Recommendations:

The damages and defects noted in the newly constructed road indicated poor quality of road works and workmanships that led to early development of honey combs and damages of RRM walls and also indication of lack of proper supervision and monitoring of works by the site engineers.

However, as agreed in the audit exit meeting, the DoR should direct the RO to rectify the defective works immediately as per technical specifications at the cost of the contractor and intimate RAA along with the photographic evidence for further review and records. The Ministry should hold the site engineer responsible for execution and acceptance of substandard works.

Further, DOR should come up with proper control mechanism to oversee that the Site Engineers constantly monitor and supervise the works executed by contractors to ensure

execution of quality works and facilitate timely detection and rectification of defective and substandard works within the defect liability periods at the cost of the contractors. The control mechanism and measures put in place should be intimated to RAA for record and follow up in future.

Who is accountable?

Direct Accountability	: 1.Tenzin, Project Manager, EID No.200307010 2. Tashi Penjore, JE, EID No. 20130103739 3. M/s Tshering Construction Pvt Ltd, CDB No.2379
Supervisory Accountability	:1.Karma Rinzin, Chief Engineer, EID No. 8909095

3.3 Execution of substandard RRM wall and excess payment Nu. 7,072.00(5.1.18)

The contractor had claimed and was paid Nu. 633,138.00 (287.79m³ @ Nu. 2200) for the construction of R/wall and B/Wall at Chainage 13020m (refer MB 846 Page no 55). The B/wall were not found at site since it was completely washed off by landslides and the R/wall was constructed was not as per technical drawings and standards evidencing execution of sub-standard works.



Fig: 3.3- B/Wall washed off by slide

Further, the payment of Nu.7,072.00 was made for coping (refer MB 846 page no 057) although not provided at site as evident from the Photographs depicted below:



Fig: 3.3(a): Sub-standard R/wall without coping

The above pictorial evidences indicated absence of adequate supervision and monitoring controls over the execution of works by the Site Engineer and Regional Official. The

acceptance and taking over of poor quality or substandard works despite investment of huge Government scarce resources indicated laxity on the part of the Regional Office. Further, non-reconstruction of damaged B/wall by the landslides also indicated existence of poor monitoring and contract management process.

The Ministry should consider the desirability of instituting a dedicated technical committee to thoroughly inspect and certify all completed works to prevent taking over of poor workmanship and quality from the contractor. Besides, the Ministry should fix the site engineer accountable for such lapses and immediately direct the contractor to redo the washed away B/wall as well as rectification of defective and substandard works and reconstruction and rectification carried out intimated to RAA for review and records. The Ministry must also recover the cost for coping works not executed at site and the amount deposit into ARA.

Auditee's Response

The wall constructed at chainage 13020m, was executed as per the technical specification. However, due of seepage of water with mass movement of earth, it has failed to serve the purpose. Regarding the coping for the wall, we will direct the contractor immediately to do the coping for walls along with necessary rectification and will intimate to RAA for review and records. In view of above justification, RAA is requested to drop the memo.

RAA's Further Comments & Recommendations:

The RAA has taken note of the response on the recovery of excess payment and rectification of the damaged RRM walls. It was apparent that the contractor would have not rectified the damaged walls if not observed by RAA. The failure to timely inspect and rectify the damaged walls by the RO and site Engineer indicated existence of inadequate monitoring controls over the executed and completed works to prevent taking over of defective and damaged structures.

However, as agreed during the exit meeting, the DoR and RO should institute strict supervision and monitoring controls to prevent execution and acceptance of defective and damaged works as well as regulate payment on the actual works executed at site.

The measures and procedures proposed to be put in place intimated to RAA for record and follow-up during future audits. Besides, the details of recoveries affected and accounted for in the books of accounts should be furnished for review and records

Who is accountable?

Direct Accountability	: 1.Tenzin, Project Manager, EID No.200307010 2. Tashi Penjore, JE, EID No. 20130103739 3. M/s Tshering Construction Pvt Ltd, CDB No.2379
Supervisory Accountability	:1.Karma Rinzin, Chief Engineer, EID No. 8909095

3.4 Over payment in providing & fixing Thermo Mechanically Treated reinforcement bar Nu. 31,581.94(5.1.18)

The verification of contractor's bill with reference to drawings, the works executed at site and conversion coefficient used for TMT revealed overpayment due to wrong application of conversion coefficient for 12mm TMT bar. The conversion coefficient for the 12mm TMT bar was used as 1.58kg/m instead of 0.89kg/m. Thus, entertainment of wrong coefficient for TMT bars had resulted in overpayment of Nu. 31,581.94 as detailed in **Appendix 'C'**.

The Regional Office should comment on the application of wrong conversion coefficient besides taking immediate steps to recover and deposit the overpayment into Audit Recoveries Account (ARA).

Auditee's Response

It is to inform RAA that despite many challenges, both site specific and planning and management, it is to put into record that DoR has not handled such magnitude and volume of work its history. Apart from unintentional lapses here and there, that are unintentional, RO is proud to inform RAA that we could at least accomplish major contract packages and uplifted the road riding quality.

It is to inform that our site engineer has overlooked the particular rebar coefficient while passing the running bills same was recorded in our Measurement Book (MB). Therefore, the amount reflected in the para shall be recovered from the contractor and deposited in the Audit Recoveries Account (ARA). To this effect, the contractor has been already informed about the error vide letter no. DoR/LSD/02/2018-2019/56 dated 9th November, 2018. In future, we will be more careful and such error shall not be repeated.

RAA's Further Comments & Recommendations:

The RAA has taken note of the response on the recovery of the excess payment, which had occurred apparently due to failure of the Site Engineer and the Supervising Engineer to exercise necessary checks on the correctness of amounts claimed. This indicated existence of weak internal controls over the measurements of work executed, verifications of bills and passing and settlement of RA bills.

However, as agreed during the exit meeting, the overpayment of Nu. 31,581.94 should be recovered and accounted for in the books of accounts within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual.

The DoR and RO should institute effective controls over processing and approval of contractor's bills and regulate payments correctly to avoid inadmissible/over payments in future.

The measures and procedures proposed to be put in place along with the details of recoveries affected and accounted for in the books of accounts should be furnished to RAA for review and record.

Who is accountable?

	: I.Tenzin, Project Manager, EID No.200307010
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Direct Accountability	2. Tashi Penjore, JE, EID No. 20130103739 3. M/s Tshering Construction Pvt Ltd, CDB No.2379
Supervisory Accountability	:Karma Rinzin, Chief Engineer, EID No. 8909095

3.5 Ineligible payment in providing and laying PCC (M25) under the slab as per drawing Nu. 18,641.25(5.1.18)

The verification of contractor's bill with reference to drawings and the actual works executed at site revealed payment of PCC (M25) works for inflated quantities of 34 deck slab as against 22 deck slabs actually constructed resulting in ineligible payment of **Nu. 18,641.25** as detailed in **Appendix "D"**.

The Regional Office should ascertain the circumstances leading to ineligible payments as the actual executions at site was just 22 deck slabs against the claims of 34 deck slabs besides taking immediate steps to recover and deposit the overpayment into ARA.

Auditee's Response

During the process of handing taking of the packages between the site engineers on transfer case, the number of Culvert slabs recorded in the measurement book happened due to oversight. The contractor has been intimated and the excess payment shall be recovered from the contractor and deposited into Audit Recoveries Account (ARA).

To this effect, the contractor has been already informed about the error vide letter no. DoR/LSD/02/2018-2019/56 dated 09th November, 2018. In future, we will be more careful and such error shall not be repeated.

RAA's Further Comments & Recommendations:

The RAA has taken note of the response on the recovery of ineligible payment which had occurred due to oversight. It is to reiterate that the ineligible payment is a clear indication of existence of weak internal controls over the measurements of work executed, verifications of bills and passing and settlement of RA bills as well as absence of standard procedures on handing/taking over of works between incoming and outgoing engineers.

*However, as agreed during the exit meeting, the ineligible payment of **Nu. 18,641.25** should be recovered and accounted in the books of accounts within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual.*

The DoR and RO should institute proper system for handing/taking over of works as well as strict supervision and monitoring controls to prevent ineligible payments in future.

The measures and procedures proposed to be put in place intimated to RAA for record and follow-up during future audits. Besides, the details of recoveries affected and accounted for in the books of accounts should be furnished to the RAA for review and record.

Who is accountable?

	: 1.Tenzin, Project Manager, EID No.200307010
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Direct Accountability	2. Tashi Penjore, JE, EID No. 20130103739 3. M/s Tshering Construction Pvt Ltd, CDB No.2379
Supervisory Accountability	:Karma Rinzin, Chief Engineer, EID No. 8909095

3.6 Excess payment in providing and laying RCC (M25 grade) works in suspended floor Nu. 4,614.07(5.1.18)

The verification of contractor's bill with reference to drawings and the works executed at site revealed overpayment in RCC slab works to the extent of 0.62 cum amounting to Nu. 4,614.07. The details of excess payments are shown in **Appendix "E"**.

The Regional Office should ascertain the circumstances leading to overpayments besides taking immediate steps to recover and deposit the overpayment into ARA.

Auditee's Response

The minor human error was occurred as the tape reading differ from different measurement team personnel and in the time of measurement slight points variation has happened in the detail record entry. The minor changes occurred with accumulation of quite number of culvert slabs constructed within the project site is just 0.62m³. The entry in the measurement book was reflected based on the joint measurement sheet.

Thus the above amount of Nu.4614.07 will be recovered from the contractor's bill and will be deposited into RAAs recoverable account soon. To this effect, the contractor has been already informed about the error vide letter no. DoR/LSD/02/2018-2019/56 dated 09th November, 2018

In future, we will be more careful and such error shall not be repeated. Therefore, the memo may kindly be dropped.

RAA's Further Comments & Recommendations:

The RAA has taken note of the response on the recovery of excess payment. It is to reiterate that the excess payment is a clear indication of existence of weak internal controls over the measurements of work executed, verifications of bills and passing and settlement of RA bills.

*However, as agreed during the exit meeting, the excess payment of Nu. **4614.07** should be recovered and accounted in the books of accounts within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual.*

The DoR and RO should institute strict supervision and monitoring controls to prevent excess payments in future. The measures and procedures proposed to be put in place intimated to RAA for record and follow-up during future audits. Besides, the details of recoveries affected and accounted for in the books of accounts should be furnished for review and record.

Who is accountable?

	: 1.Tenzin, Project Manager, EID No.200307010
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Direct Accountability	2. Tashi Penjore, JE, EID No. 20130103739 3. M/s Tshering Construction Pvt Ltd, CDB No.2379
Supervisory Accountability	:Karma Rinzin, Chief Engineer, EID No. 8909095

4 Irregularities noted in Formation Cutting and Pavement works for Double Lanning of Northern East-West Highway from Pangser-Kilikhar (Package-3) executed by M/s. K. D Builder Pvt Ltd.

The contract for formation cutting and pavement works from Pangser-Kilikhar covering a total of 6 (Six) kilometers from chainages 78.89km to 84.89km (**Chainage 29.20 to 36.20 as per Mgt. Plan**) was awarded to M/s. K.D Builders Pvt Ltd, being the lowest evaluated bidder. The contract agreement No. [DoR/ROL/Plg.-17/2015-2016/037 dated 07.07.2015](#) included the following details:

- Quoted amount : Nu.73,783,024.22
- Actual Exp. : 51,474,508.66 (23rd August 2017)
- Duration of contract : Twenty four (24) months
- Start date : 14th July, 2015
- Due date of completion : 13th July 2017
- Actual date of completion :30th July 2017 (Revised)
- Number of days delayed : 122 days (as of 29th November 2017)
- Work status : On going
- Name of site engineer : Tashi Penjor, JE

As per revised design and drawing issued by the MoWHS, following technical specifications were required to be abided by the contractor and the site engineer for the construction of NEWH:

- i. The maximum Formation road width of 10.50 meter (m) comprising 1m width shoulder on the valley side, 1m width on hill side for the purpose of debris collection, and 1m width L-drain; and
- ii. Carriageway width of 7.50m.

In term of the contract documents, the build-up/quoted rates in lump sum for formation cutting were to achieve overall road width of 10.50m.

Detailed verification of drawings, estimates, bill of quantities, contractor's bill, technical specification and physical verification of the construction sites revealed over payments and other irregularities as discussed under:

4.1 Non-achievement of formation road width, 1meter gap between L drain & hill side & 1meter hard shoulder at valley side in deviating to standard drawing and design (4.4.37)

During the joint physical verification of site comprising officials from the Regional Office and audit team on 30th October 2017, it was noted that in few chainages/stretches along 6 km of roads, the formation width were found not obtained as illustrated below:

SL. No.	Approx. Chainage (in meter)		Approx. length (in meter)	Approx. widths measured (in meter)	Width Deficit (in Meter)
	From	To			

1	29284	29319	35	10	0.5m
2	29618	29649	31	10.3	0.2m
3	29679	29708	29	10.2	0.3m
4	29752	29786	34	9.5	1.0m
5	29817	29828	11	9.4	1.1m
6	29845	29864	19	9	1.5m
7	29878	29889	11	10	0.5m
8	29965	30001	36	9.2	1.3m
9	31659	31675	16	10	0.5m
10	31926	31956	30	10	0.5m
11	32410	32427	17	9.7	0.8
12	32707	32720	13	9	1.5m
13	33039	33051	12	9.9	0.6m
14	34108	34121	13	10	0.5m
15	34443	34466	23	10	0.5m
16	34912	34938	26	10	0.5m
17	34965	34989	24	9	1.5m
18	35018	35033	15	9	1.5m

The above table clearly indicates that overall formation width requirement of 10.50m as per revised drawings and technical specifications along aforementioned chainages/stretches were not achieved. It also indicated existence of inadequate monitoring and supervision by the site engineer over the execution works as well as breach of contract obligation by the contractor with resultant execution of works in deviation to the technical design and specification.

Further, the non-achievement of the required widening width entailed payments for unexecuted works as the quotes for FC works were on lump sum basis. Thus the payments on the basis of lump sum contract had resulted in payments for unexecuted works. The Regional Office may comment on taking over of FC works without achieving the design width and non-adjustment of payments for rge shortfall. . The Regional Office should also hold the site engineer and contractor accountable for appropriate action for execution of works in deviation to approved drawings and technical specification. In addition, the Regional office should immediately recover the cost difference for the deficit width and the amount deposited into audit recoveries account.

Auditee's Response:

A joint Team comprising of officials from Regional Office, and RAA team conducted joint physical verification of the site on 30th October 2017. During the physical verification, it was noted that in few chainages/stretches along Pangser-Kilikhar (6.0Km) of the roads, the formation width were not obtained as low as 0.3m to high as 1.5m in different locations.

In this case, the following were the reasons & justification for non- achievement of formation cutting width 10.5m were it is incorporated in design & drawings.

- 1. During the visit of RAA, we are in the process of rectifying the site and now almost all the stretches were completed width 10.5m and even we have serve written notice to have 10.5m width in all stretches vide no. DOR/KS/2017-2018/0052 dated 28th December 2017.*

2. *Places where there is local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site, we could not achieve road width of 10.5m.*
3. *Rock Cutting: In some stretches, the height of cut is very high and to obtain full width by carrying out excavation even beyond the batter peg, the required width could not be achieved due to sudden fall of boulder/rock (impact action) on the road edges, thereby eroding the base width on the valley side reducing the road width.*

The limitations to achieve full road width requiring high rock cuts and displacement of settlements were highlighted to TMT from Thimphu and to H.E Minster, MOWHS during her visit to site and in many meetings. The instruction to this affect is highlighted and attached for reference.

“ While the National highway standard specifications will be applied, site specific flexibility that will save us substantially in money and time should be permitted. (foreg., No need to get full specified formation width at rocky/ cliff stretches; no black topping needed on the wet and unstable stretches; choices to adopt “V” or box drain as per the site condition-for wet stretches, box drain is said to be more effective; -etc...)”

4. *Regarding the non-achievement of the 1m gap between L-drain and the hill slope, the geometric of road passes through hill cutting, the maintaining of the said design & drawing make very difficult in practical point of view at site. This is because of high hill rock cutting results in damaging of road shoulder and affecting the aesthetic & geometric of the roads. However, RO had instructed to maintain one meter gap between hill slope to drain and one meter on shoulder side, it was found difficult to maintain one meter gap in all stretches as the road alignment was guided by geometrics of the road and drain needs to follow the contour of the road alignment. However, to align with the design & drawing, the project officials have executed wherever it is possible.*

RAA requested to drop the memo, considering the above justification.

RAA’s Further Comments & Recommendations:

*It is apparent from the response that there were inadequacies in the site feasibility studies for formation cutting works as well as lack of proper planning as the RO had failed to consider **in the preparation of design and estimates/BOQs the limitations for formation works expected in locations where there were local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site and in rock areas. Thus the payments for formation cutting works in running meter without adjustment of the cost for road stretches where requisite formation width were not achieved were not justified.***

However, as agreed during the Audit Exit meeting, the RO and DOR should regulate the payments for FC works on pro rata basis for road stretches where FC width were not achieved and amounts recovered within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Besides, the recoveries affected and accounted for in the books of

accounts should be furnished for review and record. The RO, Lingmithang should not entertain the full payment unless the works executed are complete in all respect in future.

In addition, the Ministry should institute a technical team to review the cost implication in terms of non-achievement of formation width and non- maintaining of Hard Shoulders at valley site and appropriate decisions and action taken on the issue intimated to the RAA. It may also be necessary to review and evaluate the implications of non-achievement of requisite design width and ascertain the remedial actions that may be required to improve the road conditions in such stretches.

Who is accountable?

Direct Accountability	: 1. Tenzin, Project Manager, EID No.200307010 2. Tashi Penjore, JE, EID No. 20130103739 3. M/s KD Builder Pvt Ltd, CDB No.1811
Supervisory Accountability	: Karma Rinzin, Chief Engineer, EID No. 8909095

4.2 Excess payment in P/L RRM in CM 1:6 Nu. 289,119.19 (5.1.18)

The verification of contractor's bill with reference to drawings and the works executed at site revealed overpayments of **Nu. 289,119.19** on the item of work “Providing and Laying RRM walls in RC culvert, retaining walls and B/Wall” due to arithmetical errors and application of wrong formula etc. as detailed in *Appendix “F”*.

The Regional Office should ascertain the circumstances leading to arithmetical errors and application of wrong formula besides taking immediate steps to recover and deposit the overpayments into ARA.

Auditee’s Response

Due to the arithmetical error during the preparation of bills the error was overlooked and the amount Nu.65, 226.33 was paid excess to the contractor as per Annexure F, Table 1, thus the amount will be recovered from the contractor and deposited to the ARA. The contractor has been informed vide letter no. DOR/LSD/02/2018-2019/57 dated 09th November, 2018.

Item 3.5 (A/R) Providing & laying RRM in CM 1:6 road side job incl. headwalls, wingwalls, catch pit, channels. Weep holes to be provided as per drawing.				
1st step -	$26 \times \frac{(2.2+0.76)}{2} \times 4.19 =$	217.88 m^3		
Triangular Portion -	$\frac{1}{2} \times 26 \times 2.2 \times 0.6 =$	17.16 m^3		
(-) Deduction for rock (-)	$2 \text{ nos.} \times 2 \times 1 \times 1 =$	$(-4) \text{ cu. m}$		
2nd Step -	$26 \times \frac{(0.76+1.25)}{2} \times 2.05 =$	53.57 m^3		
Triangular Portion -	$\frac{1}{2} \times 26 \times 1.25 \times 0.15 =$	2.44 m^3		
			287.04	
			$(\text{COP} - 33 \text{ TMB})$	

However for the Table 2 of Annexure F, we wanted to construct the wall of uniform base but we feared to disturb the stable earth slope from two wall edges that would further aggravate the failing slope. The slope of wall is steep since we cannot excavate towards the hillside or towards carriage way which would affect the road geometry. During the construction, we stopped the construction at 4.19m and provided second step of smaller size to reduce the construction cost. So as result the first step wall was constructed with base 2.2m (average width $(1.98+2.42+2.42+1.98)/4$) with the top width of 1.76m. However, during the entering in measurement book, it was mistakenly wrote 0.76m instead of 1.76m, but the quantity entering in the MB wasn't mistaken. (attached joint measurement sheet). Therefore, the memo may be kindly dropped looking at the site situation and condition of the retained material and obligation by the structure above. With above justification, RAA is requested to drop the memo.

RAA's Further Comments & Recommendations:

The RAA has taken note of the response on the recovery of the excess payment, which had occurred apparently due to failure of the Site Engineer and the Supervising Engineer to exercise necessary checks on the admissibility and correctness of amounts claimed by the contractor. It is to reiterate that the overpayment is a clear indication of existence of weak internal controls over the measurements of work executed, verifications of bills and passing and settlement of RA bills.

However, as agreed during the exit meeting, the overpayment of **Nu.65,226.33** should be recovered and accounted in the books of accounts within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual.

The DoR and RO should institute strict supervision and monitoring controls to prevent execution and acceptance of defective and damaged works as well as regulate payment as per the actual works executed at site. The measures and procedures proposed to be put in place intimated to RAA for record and follow-up during future audits. Besides, the details of

recoveries affected and accounted for in the books of accounts should be furnished for review and record.

Who is accountable?

Direct Accountability	: 1. Tenzin, Project Manager, EID No. 200307010 2. Tashi Penjore, JE, EID No. 20130103739 3. M/s KD Builder Pvt Ltd, CDB No. 1811
Supervisory Accountability	: Karma Rinzin, Chief Engineer, EID No. 8909095

4.3 Acceptance of defective RRM Walls and payments for works not executed Nu. 4,400.00 (4.4.63)

The contractor had claimed and was paid Nu. 788,032.00 for the construction RRM wall along the Pangser-Kilikhar highway (*refer MB 848 Page no 33*). The RRM walls were found damaged and had developed cracks which indicated improper laying of stones and use of weak cement mortar losing proper bonding between stones. In addition, the contractor was paid Nu. 4,400 for P&L PCC 1:3:6, which was found not executed at site as shown in the picture below:



Fig: 4.6: Acceptance of defective RRM Walls and payments for works not executed

Further, the contractor had claimed and was paid Nu. 442,962.00 for the construction RRM wall at Chainage 9700m (*refer MB 848 Page no 85*). Similarly, the RRM walls were found damaged and had developed cracks and one of the wall panels was found completely damaged by the landslide. The photographic evidences are presented below:

The above pictorial evidences indicated absence of adequate supervision and monitoring controls over the execution of works by the Site Engineer and Regional Official. The acceptance and taking over of poor quality or substandard works despite investment of huge



Fig: 4.6(a) Damaged RRM wall

Government scarce resources indicated laxity on the part of the Regional Office. Further, non-reconstruction of damaged RRM walls by the landslides also indicated existence of poor monitoring and contract management process.

The Ministry should constitute a dedicated technical committee to thoroughly inspect and certify all completed works to prevent taking over of poor workmanship/quality works from the contractor. Besides, the Ministry should fix the site engineer accountable for such unwarranted lapses and immediately direct the contractor to redo the washed away RRM walls as well as to rectify the defective and substandard works and reconstruction and rectification carried out intimated to RAA for review and record. The Ministry must also recover the cost for works not executed at site and the amount deposited into ARA.

Auditee's Response

The structure was constructed to provide the support to one of the resident at Yakpugang village. During the formation cutting, the landslide was triggered below the house and even cracks were developed around the house. After receiving complaint from the owner and Mongar Gewog office, the RRM wall was immediately constructed to prevent further damages. As we can see from photograph, the width of the wall varies from center towards edges and it happens due to the earth status at this stretches. The failure occurred in mid-section of the wall and decreases towards edges. We wanted to construct the uniform base but we feared that disturbing the stable slope from two edges would further aggravate in failing the slope. The slope of wall is steep since we cannot excavate towards the hillside or towards carriageway, which would affect the road geometry. The cracks on the wall were developed due to constant active earth pressure before the structure is fully set/stable. The structure was closely monitored after construction to see whether further cracks developed after full setting time. As of now, the project officials have not seen any further development of cracks. However, if the cracks develop further in future, it shall be rectified within their defect liability period.



Response to Para 4.6- defective RRM Walls

Regarding the RRM wall at Chainage 9700m (MB 848/P-85), this stretches falls within landslide prone area and somehow we manage to construct the wall within short durations as per the drawing and specifications. During the monsoon seasons due to the backward pressure we noticed and found that the cracks have been developed on one panel and having seen the site, we have stopped the construction of walls and instead opted for boulder walls. However, the damaged wall shall be rectified and contractor has been informed about the defective works vide letter no. DOR/LSD/02/2018-2019/57 dated 09th November, 2018.

Thus the work will be executed and the rectification done will be informed to RAA. Kindly please drop the memo.

RAA's Further Comments & Recommendations:

The RAA has taken note of the response on the recovery of overpayment and rectification of the damaged RRM walls. It was apparent that the contractor would have not rectified the damaged walls if not observed by RAA. The failure to timely inspect and rectify the damaged walls by the RO and site Engineer indicated absence of adequate monitoring controls over the executed and completed works to prevent taking over of defective and damaged structures.

However, as agreed, the overpayment of Nu. 4,400.00 should be recovered and accounted for in the books of accounts within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Regarding the damaged gabion wall, the RO, as agreed should reinstate at the cost of the concerned contractor.

The DoR and RO should institute strict supervision and monitoring controls to prevent execution and acceptance of defective and damaged works as well as to regulate the payment on the basis of actual works executed at site. The measures and procedures proposed to be put in place intimated to RAA for record and follow-up during future audits. Besides, the details of recoveries affected and accounted for in the books of accounts should be furnished for review and record.

Who is accountable?

Direct Accountability	: 1.Tenzin, Project Manager, EID No.200307010 2. Tashi Penjore, JE, EID No. 20130103739 3. M/s KD Builder Pvt Ltd, CDB No.1811
Supervisory Accountability	:Karma Rinzin, Chief Engineer, EID No. 8909095

5. Irregularities noted in Formation Cutting and Pavement works for Double Lanning of Northern East-West Highway from Kilikhar to Mongar (Package 4) executed by M/s Gongphel Construction Pvt. Ltd

The Regional Office, Lingmethang had prepared estimates of Nu. 77,382,142.43 for the double lanning works from Kilikhar to Mongar covering Chainages from 84.89 to 89.89 Kms (Chainage 29.20-29.20 in terms of Mgt. Plan) totaling to 5 KMs.

In line with the estimates, the tender was floated vide notice inviting tender No. DoR/ROL/Plg-10/2014-2015/1218 dated 14/04/2015. Accordingly, the evaluation committee had evaluated M/s Gongphel Construction Pvt. Ltd as the lowest evaluated bidder. In line with the evaluation report, the Awarding Committee awarded the work vide work order No. DoR/RO/Plg-17/2015-2016/19 dated 01/09/2015 which contained the following pertinent contract details:

- Tendered Amount : Nu. 59,469,881.70
- Work order No. : DoR/RO/Plg-17/2015-2016/19 dated 01/09/2015
- Estimated Amount : Nu. 77,382,142.43
- Contract duration : 30 Months
- Start date : 01st September 2015
- Due date of completion : 01st March 2018
- Work Status : On-going
- Site Engineer : Tashi Penjor, JE

As per revised design and drawing issued by the MoWHS, following technical specifications were required to be abided by the contractor and the site engineer for the construction of NEWH:

- i. The maximum Formation road width of 10.50 meter (m) comprising of 1m width shoulder on the valley side, 1m width on hill side for the purpose of debris collection, and 1m width L-drain; and
- ii. Carriageway width of 7.50m.

In term of the contract documents, the build-up/quoted rates is in lump sum for formation cutting were to achieve overall road width of 10.50m.

Detailed verification of drawings, estimates, bill of quantities, contractor's bill, technical specification and physical verification of the construction sites revealed following irregularities and lapses:

5.1 Non - achievement of formation road width, 1meter gap between L drain & hill side & 1meter hard shoulder at valley side in deviating to standard drawing and design-(4.4.37)

During the joint physical verification of site comprising officials from the Regional Office, Department of Roads, Lingmethang and RAA team on 8th November 2017, it was observed that in few chainages/stretches along 5.00 km of roads, the formation width were not obtained as indicated below:

SL. No.	Chainage/ total length (in m)	Physically measured width (approx. in meter)	Width Deficit
1	25377m-25320m =57m	9 m	1.5m
2	26291m-26114m = 177m	9 m	1.5m
3	26588m-26569m = 19m	10 m	0.5m
4	27384m-27347m = 37m	9.7 m	0.8m
5	29058m-29028m = 30m	9.5 m	1.0m

The above table clearly indicates that overall formation width requirement of 10.50m as per revised drawings and technical specifications along aforementioned chainages/stretches were not achieved. This indicated existence of inadequate monitoring and supervision by the site engineer over the execution works as well as breach of contract obligation by the contractor with resultant execution of works in deviation to the technical design and specification.

Further, the non-achievement of the required widening width entailed payments for unexecuted works as the quotes for FC works were on lump sum basis. The Regional Office may comment on taking over of FC works without achieving the design width and making payments with adjusting for the shortfall in achieving the design width. The Regional Office should also hold the site engineer and contractor accountable for appropriate action for execution of works in deviation to approved drawings and technical specification. In addition, the Regional office should immediately recover the cost difference for the deficit width and the amount deposited into audit recoveries accounts.

Auditee's Response

(a) Non-achievement of formation width 10.50 meters

A Joint Team comprising officials from the Regional Office, and RAA team conducted joint physical verification of the site on 8th November 2017. During the physical verification, it was noted that in some chainages/stretches along Kilikhar-Mongar (5.00Km) of the roads, the shortfall in formation width achieved were from 0.5m to 1.5m in different locations.

In this case, the following were the reasons & justification for non- achievement of formation cutting width of 10.5m incorporated in design & drawings.

- 1. During the visit of RAA, we are in the process of rectifying the site and now almost all the stretches were completed width 10.5m and even we have served written notice to have 10.5m width in all stretches vide no. DOR/KS/2017-2018/0053 dated 28th December 2017.*
- 2. Places where there is local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site, we could not achieve road width of 10.5m.*
- 3. Rock Cutting: In some stretches, the height of cut is very high and to obtain full width by carrying out excavation even beyond the batter peg, the required width could not be*

achieved due to sudden fall of boulder/rock (impact action) on the road edges, thereby eroding the base width on the valley side reducing the road width.

The limitations to achieve full road width requiring high rock cuts and displacement of settlements were highlighted to TMT from Thimphu and to H.E Minster, MOWHS during her visit to site and in many meetings. The instruction to this affect is highlighted and attached for reference.

“While the National highway standard specifications will be applied, site specific flexibility that will save us substantially in money and time should be permitted. (for eg., No need to get full specified formation width at rocky/ cliff stretches; no black topping needed on the wet and unstable stretches; choices to adopt “V” or box drain as per the site condition-for wet stretches, box drain is said to be more effective; -etc...)”

(b) 1meter gap between L drain & hill side & 1meter hard shoulder at valley side

Regarding the non-achievement of the 1m gap between L-drain and the hill slope, the geometric of road passes through hill cutting, the maintaining of the said design & drawing make very difficult in practical point of view at site. This is because of high hill rock cutting, resulted the damage of road shoulder and affecting the aesthetic & geometric of the roads. However, RO had instructed to maintain one meter gap between hill slope to drain and one meter on shoulder side, it was found difficult to maintain one meter gap in all stretches as the road alignment was guided by geometrics of the road and drain needs to follow the contour of the road alignment. However, to align with the design & drawing, the project officials have executed wherever it is possible.

RAA requested to drop the memo, considering the above justification.

RAA’s Further Comments & Recommendations:

It is apparent from the response that there were inadequacies in planning and conducting the site feasibility studies for formation cutting works. The RO had failed to consider in the preparation of design and estimates/BOQs the limitations for formation works expected in locations where there were local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site and in rock areas. Thus the payments for formation cutting works in running meter without adjustment of the cost for road stretches where requisite formation width were not achieved were not justified.

However, as agreed during the Audit Exit meeting, the DRO and DOR should regulate the payments for FC works on pro rata basis for road stretches where FC width were not achieved and amounts recovered within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Besides, the recoveries affected and accounted for in the books of accounts should be furnished for review and record. The RO, Lingmithang should not entertain the full payment unless the work executed are complete in all respect in future.

In addition, the Ministry should institute a technical team to review the cost implication in terms of non-achievement of formation width and non- maintaining of Hard Shoulders at valley

site in terms of the contract documents and appropriate decisions and action taken on the issue intimated to the RAA.

Who is accountable?

Direct Accountability	: 1.Tenzin, Project Manager, EID No.200307010 2. Tashi Penjore, JE, EID No. 20130103739 3. M/s KD Builder Pvt Ltd, CDB No.1811
Supervisory Accountability	: Karma Rinzin, Chief Engineer, EID No. 8909095

5.2 Acceptance of defective work and excess in providing and laying PCC 1:3:6- Nu. 7,669.43-(5.1.18)

On comparison of drawing and measurement of works done as recorded in MB for the item of work “Providing and laying PCC 1:3:6”, excess payment of Nu. 7,669.43 was noted.

It was noted that the volume of the work done was calculated by multiplying length and thickness instead of calculating by Length * width * thickness. The details of resultant overpayments of Nu.7,669.43 are shown in **Appendix “G”**.

The Regional Office, besides recovering the excess payments and depositing in ARA should comment on the circumstances leading to such lapses in the computation of volume of work done.

Auditee’s Response

The human error are unavoidable and also due to over burden of the site engineer, the measurement noted by the joint measurement team is wrongly noted in the Measurement Book. The error occurred mainly during the entry of records due to oversight. The contractor has been intimated about the lapses vide letter no. DOR/LSD/02/2018-2019/58 dated 09th November, 2018 and accordingly the amount of Nu.7669.43 will be recovered and will be deposited in Audit Recovery Account (ARA).

RAA’s Further Comments & Recommendations:

The RAA has taken note of the response on the recovery of the excess payment which had occurred apparently due to failure of the Site Engineer and the Supervising Engineer to exercise necessary checks on the admissibility of contractor’s claims.

*However, as agreed during the exit meeting, the overpayment of Nu. 7,669.43 **should** be recovered and accounted in the books of accounts within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Besides, the details of recoveries affected and accounted for in the books of accounts should be furnished for review and record.*

The DoR and RO should institute strict supervision and monitoring controls to prevent execution and acceptance of defective and damaged works as well as regulate payment as per the works executed at site.

Who is accountable?

Direct Accountability	: 1. Tenzin, Project Manager, EID No. 200307010 2. Tashi Penjore, JE, EID No. 20130103739 3. M/s KD Builder Pvt Ltd, CDB No. 1811
Supervisory Accountability	: Karma Rinzin, Chief Engineer, EID No. 8909095

6 Irregularities noted in Formation Cutting and Pavement works for Double Lanning of Northern East-West Highway from Mongar-Gongola (Package-5) executed by M/s. Norbu Construction Company Pvt. Ltd , Gelephu

The contract for formation cutting and pavement works from Mongar-Gongola covering a total of 11.56 kilometers from chainages 102.45km to 90.89km (corresponding Chainage 12.7 to 24.2 in terms of Mgt. Plan) was awarded to M/s. Norbu Construction Company Pvt. Ltd , Gelephu being the lowest evaluated bidder. The contract signed vide agreement No. DoR/ROL/Plg.-17/2015-2016/036 dated 07.07.2015 included the following details:

- Quoted amount : Nu. 111,902,235.00
- Actual Exp. : Nu. 46,924,793.30 (30th June 2017)
- Duration of contract : Twenty Four (24) months
- Start date : 23th July, 2015
- Actual date of completion : 22nd January, 2018
- Work Status : On-going
- Name of site engineer : Tshering Phuntsho, AE

As per approved revised drawing and design issued by the MoWHS the following technical specifications were required to be abided by the contractor and the site engineer for the construction of NEWH:

The maximum Formation road width of 10.50 meter (m) comprising of 1m width shoulder on the valley side, 1m width on hill side for the purpose of debris collection, and 1m width L-drain and Carriageway width of 7.50m.

In terms of the contract documents, the build-up/quoted rates in lump sum for formation cutting were to achieve overall road width of 10.50m.

Detailed verification of drawings, estimates, bill of quantities, contractor's bill, technical specification and physical verification of the construction sites revealed following irregularities and lapses:

6.1 Non-achievement of formation road width, 1 meter gap between L drain & hill side and one meter hard shoulder at valley side in deviation to standard drawing and design-(4.4.37)

During the joint physical verification of site comprising officials from Regional Office, Department of Roads, Lingmethang and RAA team on 4th November 2017, it was observed that in some chainages/stretches along 11.56 km of roads, the formation width were not achieved as indicated below:

SL. No.	Chainage/ total length (in meter)	Physically measured width (approx. in m)	Width Deficit
1	15m-0m = 15m	9.5m	1 m
2	120m-103m = 17m	9.5m	1 m
3	899m-890m = 9m	9.5m	1 m
4	1410m-1400m = 10m	9.5m	1 m
5	3382m-3350m = 32m	10m	0.5m
6	5450m-5400m = 50m	9m	1.5 m

From the above table it is apparent that overall formation width requirement of 10.50m as per revised drawings and technical specifications along aforementioned chainages/stretches were not achieved. It also indicated existence of inadequate monitoring and supervision by the site engineer over the execution works as well as breach of contract obligation by the contractor with resultant execution of works in deviation to the technical design and specification.

Further, the non-achievement of the required widening width entailed payments for unexecuted works as the quotes for FC works were on lump sum basis. Thus the payments on the basis of lump sum contract without carrying out any adjustment for the shortfall in achievement of width had resulted in payments for unexecuted works. The Regional Office should comment on taking over of FC works without achieving the design width and for the resultant excess payments.

The Regional Office should also hold the site engineer and contractor accountable for appropriate action for execution of works in deviation to approved drawings and technical specification. In addition, the Regional office should immediately recover the cost difference for the deficit width and the amount deposited into audit recoveries account.

Auditee's Response

(a) Non-achievement of formation width 10.50 meters

A Joint Team comprising of officials from Regional Office, and RAA team conducted joint physical verification of the site on 4th November 2017. During the physical verification, it was noted that in few chainages/stretches along Mongar-Gangola (11.56Km) of the roads, the formation width were not obtained as low as 0.5m to high as 1.5m in different locations.

In this case, the following were the reasons & justification for non- achievement of formation cutting width 10.5m were it is incorporated in design & drawings.

During the visit of RAA, we are in the process of rectifying the site and now almost all the stretches were completed width 10.5m and even we have serve written notice to have 10.5m width in all stretches vide no. DOR/KS/2017-2018/0052 dated 28th December 2017.

Places where there is local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site, we could not achieve road width of 10.5m.

Rock Cutting: In some stretches, the height of cut is very high and to obtain full width by carrying out excavation even beyond the batter peg, the required width could not be achieved

due to sudden fall of boulder/rock (impact action) on the road edges, thereby eroding the base width on the valley side reducing the road width.

The limitations to achieve full road width requiring high rock cuts and displacement of settlements were highlighted to TMT from Thimphu and to H.E Minster, MOWHS during her visit to site and in many meetings. The instruction to this affect is highlighted and attached for reference.

“While the National highway standard specifications will be applied, site specific flexibility that will save us substantially in money and time should be permitted. (for eg., No need to get full specified formation width at rocky/ cliff stretches; no black topping needed on the wet and unstable stretches; choices to adopt “V” or box drain as per the site condition-for wet stretches, box drain is said to be more effective; -etc...)”

(b) 1.0 meter gap between L drain & hill side & 1meter hard shoulder at valley side

Regarding the non-achievement of the 1m gap between L-drain and the hill slope, the geometric of road passes through hill cutting, the maintaining of the said design & drawing make very difficult in practical point of view at site. This is because of high hill rock cutting results in damaging of road shoulder and affecting the aesthetic & geometric of the roads. However, RO had instructed to maintain one meter gap between hill slope to drain and one meter on shoulder side, it was found difficult to maintain one meter gap in all stretches as the road alignment was guided by geometrics of the road and drain needs to follow the contour of the road alignment. However, to align with the design & drawing, the project officials have executed wherever it is possible. RAA requested to drop the memo, considering the above justification.

RAA’s Further Comments & Recommendations:

*It is apparent from the response that there were deficiencies in the site feasibility studies for formation cutting works as well as absence of proper planning as the RO had failed to consider **in the preparation of design and estimates/BOQs the limitations for formation works expected in locations where there were local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site and in rock areas. Thus the payments for formation cutting works in running meter without adjustment of the cost for road stretches where requisite formation width were not achieved were not justified.***

However, as agreed during the Audit Exit meeting, the RO and DOR should regulate the payments for FC works on pro rata basis for road stretches where FC width were not achieved and amounts recovered within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Besides, the recoveries effected and accounted for in the books of accounts should be furnished for review and records. The RO, Lingmithang should not entertain the full payment unless the work executed are complete in all respect in future.

In addition, the Ministry should constitute a technical team to review the cost implication in terms of non-achievement of formation width and non- maintaining of Hard Shoulders at valley site as per the contractual documents and appropriate decisions and action taken on the issue intimated to the RAA.

Who is accountable?

Direct Accountability	: 1. Tenzin, Project Manager, EID No. 200307010 2. Kinzang Dendup, JE, EID No. 200307010 3. M/s Norbu Construction Pvt Ltd, CDB No. 1957
Supervisory Accountability	: Karma Rinzin, Chief Engineer, EID No. 8909095

7 Irregularities noted in construction of Formation cutting and Payment works for Double Lanning of Northern East-West Highway from Gangola-Kurizampa (Package 6) executed by M/s. Rigsar Construction Pvt Ltd. Trashigang

The contract for formation cutting and pavement works from Gangola-Kurizampa covering a total of 12 (Twelve) kilometer from chainages 102.45km to 114.45km was awarded to M/s. Rigsar Construction Pvt Ltd. Trashigang holding CDB No. 2435 being the lowest evaluated bid. The contract signed vide agreement No. DoR/ROL/Plg.-17/2015-2016/17 dated included the following details:

- Quoted amount : Nu. 125,555,774.00
- Actual Exp. : Nu. 68,937,000.00
- Duration of contract : Twenty Eight (28) months
- Start date : 28th August, 2015
- Due date of completion : 27th December, 2017
- Number of days delayed : No delay as of audit date
- Name of site engineer : Karma Wangdi, AE

As per approved revised drawing and design issued by the MoWHS the following technical specifications were required to be abided by the contractor and the site engineer for the construction of NEWH:

- The maximum Formation road width of 10.50 meter (m) comprising of 1m width shoulder on the valley side, 1m width on hill side for the purpose of debris collection, and 1m width L-drain; and
- Carriageway width of 7.50m.

The Bill of Quantities reflected measurements in running meters and lump sum payment modality.

Detailed verification of drawings, estimates, bill of quantities, contractor's bill, technical specification and physical verification of the construction showed irregularities and lapses as discussed below:

7.1 Inadmissible payment for stripping of road Nu. 354,195.00 (5.1.20)

On verification of Measurement Book No. 40, it was noted that stripping of existing pavement works (previous blacktopping) were measured and recorded in the MB under pages from 017 to 044 and 054 to 121. Accordingly, the contractor was found paid Nu. 354,195.00 towards stripping cost under the nomenclature as detailed below:

Description of items	Qty. (Cum)	Rate (Nu.)	Amount (Nu.)
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Preparation of sub grade with proper camber by excavating earth to depth equal to pavement thickness, consolidation with roller, disposal of surplus earth up to 50m. All kind of soil/rock - (stripping of previous pavement works)	(2002.36 +3446.79) = 5,449.15	65	354,195.00
Total	5449.15	65	354,195.00

However, SCC (GCC 1.1 (ff)) stipulates categorically as ***“The Works consist of: Road widening work, construction of retaining wall, construction of lined drain, sub-grade preparation, laying of granular sub-base, wet mix macadam, dense bituminous macadam and asphalt concrete”***. In addition, the technical specification under Section 1003 also outlines as under:

“the work shall consist of laying and compacting clean, graded crushed aggregate material, premixed with water, to a dense mass on a prepared subgrade/sub-base/base or existing pavement as the case may be in accordance with the requirements of the technical specifications”.

Thus, the rate for the works is covered under the item of works either ***“preparation of sub grade”*** or ***laying of wet mix macadam*** and separate payment had resulted in double benefit to the contractor.

The Regional Office should recover and deposit Nu.354,195.00 into Audit Recoveries Account besides holding the responsible officials accountable for such inadmissible payments.

Auditee’s Response

As pointed out by RAA, as per the SCC (GCC1.1(ff)) “ The work scope consist of Road widening work, construction of R/wall, lined drain, sub-grade preparation, Laying of GSB, WMM, DBM and AC”. However, the stripping/Ripping of existing bituminous surface using excavator is not included in the BOQ as initially it was agreed that base course will be directly laid on the existing bituminous surface. Later it was observed that there did not exist bonding between existing surface and the new layer. Accordingly, during the 10th DoR Quarterly meeting held at Lobeyasa, the contractors were advised to carry out stripping of existing bituminous surface before laying of WMM. Accordingly upon receipt of minutes, the contractor was instructed to carry out stripping of bituminous surface before laying of WMM. Whilst carrying out the stripping works, it was found additional cost involved it was felt that contractor should be paid according to Technical specification 804, “The existing bituminous surface shall be ripped off using excavator/manual. The same shall be treated placed back on full width of the sub grade and rolled as per section 900 to construct improved sub-base of nominal 75-100mm thickness”. If in accordance to the above specifications, the contractor is eligible for payment for the additional cost incurred as per section 900 of TS.



Response to Para 7.1: Complete stripping of existing bituminous in progress

As the stripping of existing bituminous surface was similar to work like sub-grade preparation, the payment to that effect was made, however the cost of carrying out section 900 was not paid although we have received letter from the contractor to make the payment as it involved additional operational and materials cost. Thus we would like to clarify that contractor has not double benefitted.

RAA’s Further Comments & Recommendations:

While taking note of the response, the fact remains that the technical specification under section 115- (2) Scope of Rates for different items of works and sub-section 2.2 categorically stipulated that item rates quoted by the contractor includes amongst others “Any item of works which is not specifically provided in the Bill of Quantities but which is necessary for complying with the provisions of the Contract”. Thus the payment to the single contractor was in deviation to the technical specification and nomenclature specified in the BOQ.

However, as agreed during the exit meeting, the RO should recover the inadmissible payment of Nu. 354,195.00 and accounted in the books of accounts within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Besides, the details of recoveries affected and accounted for in the books of accounts should be furnished to RAA for review and record.

In addition, the Ministry should institute a technical team to review RA bills of all contract packages to validate that payments were made in line with BOQs line items and compliance to technical specifications and no similar payments were entertained. The outcome of the review should be intimated to RAA for review and record.

Who is accountable?

Direct Accountability	: 1. Wangdi, Project Manager, EID No.9907161 2. Karma Wangdi, JE, EID No. 200507201 3. M/s Rigsar Construction Pvt Ltd, CDB No.2435
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Supervisory Accountability	:Karma Rinzin, Chief Engineer, EID No. 8909095
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7.2 Excess payment on RRM wall Nu. 125,923.81 (5.1.18)

The verification of contractor's bill with reference to drawings and the works actually executed at site showed overpayment of **Nu. 125,932.81** (59.98m³ @Nu. 2100) as detailed in **Appendix "H"**.

Therefore, Regional Office, should recover the amount and deposit into Audit Recoveries Account besides holding the responsible officials accountable for such excess payments.

Auditee's Response

The project management has written a letter to the contractor vide letter no. DoR/SSD/2018-2019/07/62 dated 25.10.2018 to refund the amount as the joint verification along with RAA officials and contractor was carried out. The amount will be deposited to ARA as and when contractor refunds.

RAA's Further Comments & Recommendations:

The RAA has taken note of the response on the recovery of the excess payment which had occurred apparently due to failure of the Site Engineer and the Supervising Engineer to exercise necessary checks on the admissibility of claims. It is to reiterate that the overpayment is a clear indication of existence of weak internal controls over the measurements of work executed, verifications of bills and passing and settlement of RA bills.

However, as agreed during the exit meeting, the DOR and RO should recover the overpayment of Nu. 125,932.81 and the amount deposited in the Audit Recoveries Account within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. The DOR and Ministry should fix responsibility on the officials responsible for such overpayments.

The DoR and RO should institute strict check and balance system including supervision and monitoring controls over the measurement and recording of actual work done at site and settlement of RA bills to prevent overpayments.

The measures and procedures proposed to be put in place intimated to RAA for record and follow-up during future audits. Besides, the details of recoveries affected and accounted for in the books of accounts should be furnished for review and record.

Who is accountable?

Direct Accountability	: 1.Wangdi, Project Manager, EID No.9907161 2. Karma Wangdi, JE, EID No. 200507201 3. M/s Rigsar Construction Pvt Ltd, CDB No.2435
Supervisory Accountability	:Karma Rinzin, Chief Engineer, EID No. 8909095

7.3 Over payment due to wrong computation of payable amount for TMT bars Nu.133,712.20 (5.1.18)

The verification of contractor's bill with reference to drawings and the actual execution at site showed that 1.58kg/m was used as the conversion coefficient for 12mm TMT bar instead of 0.89kg/m, which resulted in overpayment of **Nu. 133,712.20** (2057.111 @Nu. 65). As detailed in **Appendix "I"**.

Therefore, Regional Office should recover the amount and deposit into Audit Recoveries Account besides holding the responsible officials accountable for such excess payments.

Auditee's Response

The project official regret to mention that the over payment has occurred mainly due to entry of different size of TMT bars and mistakenly noted the unit weight of 16mm diameter bar instead of 12mm diameter. The mistake is being committed unintentionally. Hence, the contractor has been intimated letter no. DoR/SSD/2018-2019/07/62 dated 25.10.2018 which shall be deposited as and when contractor refunds the amount.

RAA's Further Comments & Recommendations:

The RAA has taken note of the response on the recovery of the excess payment which had occurred apparently due to failure of the Site Engineer and the Supervising Engineer to exercise necessary checks on the correctness of the conversion coefficient for 12mm TMT bar. This indicated existence of weak internal controls over the verifications of claims and settlement of RA bills.

However, as agreed during the exit meeting, the DOR and RO should recover the overpayment of Nu. 133,712.20 and accounted for in the books of accounts within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Besides, the details of recoveries affected and accounted for in the books of accounts should be furnished for review and record. The DOR and Ministry should fix responsibility on the officials responsible for such overpayments.

The DoR and RO should institute proper check and balance system including supervision and monitoring controls over the verification and certification of claims and settlement of RA bills to prevent overpayments.

The proper control mechanism instituted intimated to RAA for record and follow-up during future audits.

Who is accountable?

Direct Accountability	: 1.Wangdi, Project Manager, EID No.9907161 2. Karma Wangdi, JE, EID No. 200507201 3. M/s Rigzar Construction Pvt Ltd, CDB No.2435
Supervisory Accountability	:Karma Rinzin, Chief Engineer, EID No. 8909095

8 Irregularities noted in Formation Cutting and Pavement works for Double Lanning of Northern East-West Highway from Kurizampa-Lingmethang Highway (Package-7) executed by M/s Tshering Construction Pvt. Ltd, Bumthang

A total estimate of Nu. 70,459,887.01 was prepared by the RO, Lingmethang for the double lanning works from Kurizampa-Lingmethang covering a total of 4 km from Chainages 114.45km to 118.45 km.

In line with the estimates, the tender was floated vide notice inviting tender No. DoR/RO/Plg-1/2015-2016/1024 dated 20/02/2016. In respond to NIQ, 10 bidders had submitted their competitive offers as indicated below:

Sl. No	Name of Bidder	Bid price (Nu.)
1	M/s Gayjur Construction Company Pvt. Ltd	56,016,140.40
2	M/s Vajra Builders Pvt Ltd	68,528,530.00
3	M/s Druk Lamsel Construction Pvt. Ltd	76,791,246.64
4	M/s S.L Construction Pvt. Ltd	65,361,793.00
5	M/s Joenshing Construction	49,327,929.70
6	M/s Diamond Construction Pvt. Ltd	46,925,993.08
7	M/s Druk Phunsum Const. Pvt. Ltd	89,175,000.00
8	M/s Tacho Const. Pvt. Ltd	47,443,094.70
9	M/s Somson Group Construction	34,642,711.00
10	M/s Tshering Construction Pvt. Ltd	37,106,895.00

Accordingly, the evaluation committee had evaluated M/s Tshering Construction Pvt. Ltd, Bumthang as the lowest evaluated bidder. In line with the evaluation report, the Tender Committee awarded the work vide work order No. DoR/CE (CD)/2015-2016/W-32/2522 dated 09/05/2016. The estimated amount, contract amount, contract duration and other important contract details were as follows:

- Tendered Amount : Nu. 37,106,895.00
- Estimated Amount : Nu. 70,459,887.01
- Contract duration : 15 Months
- Start date : 06th September 2016
- Actual date of completion : 06th August 2017
- Work Status : On-going
- Name of Site Engineer : Karma Wangdi

As per revised design and drawing issued by the MoWHS, following technical specifications were required to be abided by the contractor and the site engineer for the construction of NEWH:

- i. The maximum Formation road width of 10.50 meter (m) comprising 1m width shoulder on the valley side, 1m width on hill side for the purpose of debris collection, and 1m width L-drain; and
- ii. Carriageway width of 7.50m.

In terms of the contract documents, the build-up/quoted rates is in lump sum for formation cutting works were to achieve overall road width of 10.50m.

Detailed verification of drawings, estimates, bill of quantities, contractor's bill, technical specification and physical verification of the construction showed following irregularities and lapses:

8.1 Non-Achievement of formation road width, 1.0 meter gap between L-drain and hill side and 1.0 meter hard shoulder at valley side in deviation to standard drawing am design-(4.4.37)

During the joint physical verification of site comprising officials from Regional Office, Department of Roads, Lingmethang and RAA team on 30th October 2017, it was noted that in some chainages/stretches along 4 km of roads, the formation width were not achieved as indicated below:

Sl. No	Chainage/ total length (in km)			Physically measure width (approx. in m)	Width Deficit (in m)
	From	To	Length in M		
1	114.52 6	114.562	36	10m	0.5m
2	114.73 5	114.816	81	9m	1.5m
3	115.01 9	115.048	29	10m	0.5m
4	115.07	115.089	19	10m	0.5m
5	115.11 3	115.144	31	10m	0.5m
6	116.37 2	116.401	29	10m	0.5m
7	116.44 8	116.462	14	10m	0.5m
8	116.52 3	116.543	20	10m	0.5m
9	116.71 9	116.747	28	9.5m	1.0m
10	116.79 5	116.839	44	9m	1.5m

The above table clearly indicates that overall formation width requirement of 10.50m as per revised drawings and technical specifications along aforementioned chainages/stretches were not achieved. It indicated existence of inadequate monitoring and supervision by the site engineer over the execution works as well as breach of contract by the contractor which resulted in execution of works in deviation to the technical design and specification.

Further, payments for FC works were made in lump sum basis and no adjustments were made for non-achievement of the required widening width there by which resulted in excess payments to the contractor. The Regional Office should comment on taking over of FC works without achieving the design width and for making payments without adjustment for the design width not achieved. The Regional Office should also hold the site engineer and contractor accountable for appropriate action for execution of works in deviation to approved drawings and technical specification. In addition, the Regional office should immediately recover the cost difference for the width not achieved and the amount deposited into audit recoveries account.

Auditee's Response:

It is to apprise that the project officials involved in double lanning of NEWH has been constantly monitoring the entrusted works to execute the works as per the standard drawings and design. The formation cutting were carried out based on the survey line fixed by the Department, however it failed to achieve the standard road width despite carrying out the works as per the requirements.

Moreover, the road traverses through private land between Kurizampa-lingmethang which would cost the department with land compensation. In such cases it is felt that if the road structure can be accommodated within the achieved road width, it is understood that road shoulder on valley side is compromised thus reducing the cost of land compensation which has to be borne by the Department and has to be paid in huge amount. The project management would like to high light that road is designed with cut and fill method and wherever applicable embankment has to be carried out for which payment is not made. In view of above submission, RAA is requested to drop the memo.

RAA's Further Comments & Recommendations:

*It is apparent from the response that there were inadequacies in the site feasibility studies for formation cutting works as well as lack of proper planning as the RO had failed to consider **in the preparation of design and estimates/BOQs** the limitations for formation works expected in locations where there were local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site and in rock areas. Thus the payments for formation cutting works in running meter without adjustment of the cost for road stretches where requisite formation width were not achieved were not justified.*

However, as agreed during the Audit Exit meeting, the RO and DOR should regulate the payments for FC works on pro rata basis for road stretches where FC width were not achieved and amounts recovered within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Besides, the recoveries affected and accounted for in the books of accounts should be furnished for review and record. The RO, Lingmithang should not entertain the full payment unless the works executed are complete in all respect in future.

In addition, the Ministry should institute a technical team to review the cost implication in terms of non-achievement of formation width and non- maintaining of Hard Shoulders at valley site and appropriate decisions and action taken on the issue intimated to the RAA.

It may also be necessary to review and evaluate the implications of non-achievement of requisite design width and ascertain the remedial actions that may be required to improve the road conditions in such stretches.

Who is accountable?

Direct Accountability	: 1.Wangdi, Project Manager, EID No.9907161 2. Karma Wangdi, JE, EID No. 200507201 3. M/s Tshering Construction Pvt Ltd, CDB No.2379
Supervisory Accountability	:Karma Rinzin, Chief Engineer, EID No. 8909095

9 Deficiencies, irregularities and lapses on the direct award of contract for demonstration of Zeocrete pavement construction Technology on execution of In-situ cementitious pavement work on Yadi-Korila PNH covering 10km chainage (Package-01)


The demonstration of ZeoCrete Pavement Construction Technology works from Yandi to Ngatshang covering the distance of 10 Kilometers was awarded directly to a Joint Venture Company captioned as M/s Bhutan ZeoCrete Pavement Technologies (JV) comprising M/s Yarkay Group of Companies Ltd & M/s LongYea e-solution Pvt Ltd, New Delhi at the Departmental estimated cost of **Nu. 159,921,000.00**. While no work order was issued but a copy of the contract signed between the Ministry of Works and Human Settlement, Thimphu and JV of Long Yea e-Solution (P) Ltd. & Yarkay Group Pvt. Ltd (Bhutan ZeoCrete Pavement Technology, JV) on 2nd June 2016 was found forwarded to the Chief Engineer, Regional Office, Lingmethang, DOR by the Secretary, MoWHS vide letter No. MoWHS/Sec/29/2015-16/625 dated 2nd June 2016. The contract duration was 18months commencing from 6th June 2016 with completion deadline of 6th December 2017.

Subsequent to the signing of the contract agreement on 2nd June 2016, contract amount was found revised to Nu. 166,704,750.00 based on the submission by the JVC firm vide letter No. BZPT-JVC/MW&HS-Agreement /01 dated 10th June 2016 that levy of Bhutan VAT/Duty of 10% on the ZeoCrete material was payable to Revenue & Custom Office, P'ling. Accordingly, the contract amount was found revised under contract agreement No. MoWHS/Sec/29/2015-16/639 dated 29th June 2016.

The Direct Contract award was found based on letter No. No. MoF/PPPD-09/15-16/277 dated 15/4/16 of the Ministry of Finance received in response to Ministry's letter No. MoWHS/23/2015-16/646 dated 14th March 2016. The Ministry of Finance in its letter had specifically made the the following stipulations:

“In view of the justification, direct contracting could be done as per Clause 4.2.5.1(c) of the Procurement Rules and Regulations 2009. The Ministerial Level Tender Committee may be advised to ensure that all necessary prior assessment is carried out to ascertain that there are no other contractors in the market with the required technical capability”.


From the review of the related documents and records, the RAA observed following chronology of events of discussions and correspondences on the Demonstration of the ZeoCrete Pavement Construction Technology:


 *M/s Bhutan ZeoCrete Bhutan Technologies had submitted the proposal for use of ZeoCrete Technology for **construction of in-situ Cementitious Pavements** for Base and Sub-Base Layers and improvement of Sub-Grades for Roads in Bhutan following series of Meetings for last 2-3 months held between the Secretary, Director and team of DOR engineers and the JVC firm including technical presentation and live demonstration on the construction of road along Jamina-Jimithanka 3.1 KM long stretch under Project Dantak to the Secretary, MoWHS vide letter No. BZPT-JVC/MoWHS/01 dated 18/9/15.. The proposal amongst others highlighted the following advantages of the Zeocrete Technology:*


- *High speed construction up to 1km per day-Faster completion of Works*
- *Conservation of Natural Resources due to least aggregate dependency*
- *Highly Mechanistic Construction ensuring consistency in quality output and least dependency on labour*
- *Encouraging the local supplier and manufacturers*
- *ZeoCrete technology offers preparation of a durable bound layer which is:*
 - *impervious in nature*
 - *Offers high E-Value to meet design criteria*
 - *Enables uniform load transfers with low deflections*
 - *Results in uniform deflections even in dynamic climatic conditions*
 - *Enhanced Strength & Durability*
 - *Increase PI of the soil and*
 - *Make unusable soil to usable soil as the basic construction mass*


In addition:


- *DBM is eliminated, direct saving of bitumen by 60%*
- *Eliminating and saving huge amount of INR flowing out from the country*
- *Eliminating construction time and establishment of huge Crushing Plants and aggregate requirements*
- *Economical, durable & exhibits long maintenance free life*
- *100% recycle & re-usable*

 *Proposal for use of ZeoCrete Technology for construction of in-situ Cementitious Pavement to improve sub grades for road was submitted to Hon'ble Minister, MoWHS by the Secretary vide letter No. MoWHS/Sec/2015/Nil dated 13/11/15 highlighting various advantages of the new technology compared to the conventional methods for approval. Accordingly the proposal was found approved on trial and demonstration basis. **The Hon'ble Minister, however, had stressed that the cost and the quality is comparable to the existing system and also to explore the technology to GC Rods. The proposal submitted by the Secretary is detailed as Appendix 1.***

 *After the approval was accorded, MLTC was held on 1/3/2016 and the adoption of ZeoCrete Technology by DoR, MoWHS was discussed in length. The concerns like direct contracting, reducing length i.e., 1km to 3 km, approval from MOF for direct award to JV, cost sharing between contractor and DoR were found discussed. Accordingly, Joint Venture Company, M/s Bhutan ZeoCrete Pavement Technologies (JV) (M/s Yarkay Group of Companies Ltd & M/s LongYea e-solution Pvt Ltd, New Delhi) was awarded the contract for 10km stretches as proposed.*

 *Subsequently, Letter of intent to award the Contract of Demonstration of the Zeocrete Pavement Construction Technology on Yadi –Korila PNH 10KM was issued to Managing Director, BZPT vide letter No. MoWHS/Sec-29/15-16/610 dated 27/4/16.*

 *The signed contract agreement between MoWHS and BZPT was sent to Managing Director, BZPT Vide MoWHS letter No. MoWHS/Sec/29/15-16/625 dated 2/6/16. The letter also stated the company to submit the revised rates for ZeoCrete material inclusive of all the applicable taxes as per Sales Tax, Custom & Excise Act of Kingdom of Bhutan.*

 *M/s Bhutan ZeoCrete Pavement Technology (BZPT) Vide letter No. BZP-JVC/MoWHS-Agreement/01 dated 10/6/16, informed MoWHS that the contract*

amount is revised to Nu. 166,704,750.00 from 159,921,000.00 as the item ZeoCrete Cementitious Chemical binder is subject to 10% VAT/import duty. The tax was found calculated only on the Zeocrete item which amounted to Nu. 6,783,750.00 (67,837,500.00*10%).

☞ So far as appeared from the sub ledger & memorandum register, 2nd running account bill valuing Nu.27,261,942.20 was disbursed which was 16.35% of revised contract value. Out of total advance payments of Nu.83,829,975.00 an amount of Nu. 5,000,000.00 was found recovered till date of audit.

☞ Minister Level Tender Committee meeting held on 8/9/17 decided the award of L drain & box drain to M/s BZPT (JV) on the same stretches as the department could not execute the same due to delay in formation cutting. The rate analysis done was found 9% and 18.86% respectively lower than the departmental estimates. The MLTC approved additional time of 1.5 months for the construction of L drain.

From scrutiny of related documents, following deficiencies and lapses were observed:

9.1 Direct award without carrying prior assessment on availability of other similar technologies in the market out as required by the MoF (4.4.1)

The Ministry of Works & Human Settlement vide letter No. MoWHS/23/15-16/646 dated 24/3/16 had sought approval from the Ministry of Finance for directly awarding the contract to M/s Bhutan ZeoCrete Pavement Technologies (JV), a Joint Venture Company, formed by M/s Yarkay Group of Companies Ltd & M/s LongYea e-solution Pvt Ltd, New Delhi on the use of ZeoCrete Pavement Technology. In response, the Ministry of Finance vide letter No. MoF/PPPD-09/15-16/277 dated 15/4/16 while approving the direct award had categorically required the MLTC as 'while regulating the direct award as per Clause 4.2.5.1(c) of the Procurement Rules and Regulations 2009, the Ministerial Level Tender Committee should ensure that all necessary prior assessment was carried out to ascertain that there were no other contractors in the market with the required technical capability'.

The Ministry of Works & Human Settlement, based on the above letter had directly awarded the contract at the departmental estimated cost of Nu. 166,704,750.00. However, the assessment carried out by the MLTC and the Ministry to ascertain availability of other contractors in the market with the required technical capability, if any, was not produced for verification.

In the light of new technology and involvement of substantial cost as compared to contracts awarded under conventional methods of execution of Pavement works, the RAA has attempted to ascertain the existence of other contractors having same technology or suitable substitutes as required under Clause 4.2.5.1(c) of the Procurement Rules and Regulations 2009 through internet. The study revealed that technologies existed on the use of other materials for the soil stabilizations for pavement works besides one firm in New Delhi dealing in the same technology. The firms having technology in soil stabilizations for pavement works as noted from the internet are as indicated below:

Table :9.1-Firms having technology in soil stabilization

Sl.No.	Contact Address of Manufacturer/ Promoter	Usage	Name of the New Material/ Technology/ Equipment/ Product
1	M/s Infra Innovation Marketing Solutions	environmental friendly acrylic –based copolymer soil stabilizer	Envirotac
2	M/s Avijeet Agencies Pvt. Ltd., H 25(5), Subramanian Manor, Ground Floor, H Block, 1ST Main Road, Anna Road(E), Chennai-600102	Soil Stabilizing material used in construction of roads	Terrazyme
3	M/s Eco Green Infrastructure & Development Pvt. Ltd. 103, Hallmark Business Plaza, Gurunanak Hospital Road, Bandra East, Mumbai – 400 051	Soil Stabilized Pavement System Technology	Ecogreen Probase Road System
4	M/s Hindustan Zinc Ltd, Zinc Smelter, Debari, Udaipur, 313 024	Used in embankment, sub-base and bituminous/concrete pavement 08	Waelz Kiln (WK) Slag
5	M/s Cleantech International Foundation 156 Mount Kailash Apartments, New Delhi – 110065	For enhancing the performance for bituminous mixtures for road construction.	C1,C2,C3 & NANOFILL C1,C2,C3 (CLEANTECH (C-90 Grade of Nono Carbon)
6	M/s ZeoCrete Technologies India Pvt. Ltd. UG-40, Ansals Chambers-II, 6, Bhikaji Cama Place, New Delhi 110 066	Technology for design and construction of Pavements	ZeoCrete

In the light of existence of other technologies, the direct award of contract without assessments and comparisons of cost prior to award of the contract indicated flaws not only in the award for implementing such new technology for a stretch of 10km as a demonstration but also awarding at the estimated cost submitted by the JV firm of Nu. 159.921 million without ascertaining the reasonableness of the cost offered by the JV firm.

The Ministry should comment on the non-ascertainment of the availability of other technologies in the market for soil stabilization for pavement works as directed by the Ministry of Finance and also the basis considered on the reasonableness of the estimated cost of Nu. 159.921 million of the JV Firm. Besides, the Ministry should also comment on the reasonableness of Nu. 737.00 per kg charged by the Joint Venture Company for the ZeoCrete Binder Admixture.

Auditee's Response

Brief Background:

Roads aligned through high passes of Dochongla, Pelela, Yotongla, Thrumsengla and through water saturated / bound marshy areas including those alignments facing North always remain ridden with potholes & patches and cracks of all description requiring expensive surface treatment every year as the road has to be maintained at satisfactorily levels of ride-ability, passenger comfort, safety and reliability. But due to paucity of necessary resource (fund) with the government, the required treatment is not always possible to be made. This is currently the situation with conventional road pavements methodology adopted across the country.

The recent experience at locations such as Lumitsawa, Thinleygang and Mendelgang areas where M/s Chogyal and Singye Constructions carried out BT works under contract, had to carry

out major remedial actions such as embedding sub surface drainages including French drains under the pavement and side drains at huge costs. We have countless similar locations across the country.

Having lived with above experiences for many decades, we at the Ministry of Works & Human Settlement have been exploring for new ideas and state of art technologies to provide road pavement solutions against the challenges posed by the high altitude cold weather actions and along alignments passing through water saturated areas having poor subgrades. The DGBR of GOI brought the Cementitious Technology to Bhutan, which is now being applied extensively in our highways (under technical and administrative jurisdiction of the Project Dantak), specifically to enhance durability and to achieve cost efficiency in the construction and maintenance of highway pavements.

Following are some of the benefits that DoR-MoWHS and the government in general can accrue from implementing the Cementitious technology for road pavements:

The Cementitious technology is basically an environment friendly cement-based technology that primarily employs locally produced cement and the in-situ soil with an addition of soil specific admixture (binder) at the rate ranging from 1.15kg to 1.35kg/m² to a soil bed of approximately 250mm thick in-situ soil mixed with crushed rock mass for the construction of highway pavements. The admixture, which is said to be 100% inorganic is produced under different brand names and the one we use currently is called “ZeoCrete”.

“The ZeoCrete Admixtures are manufactured from naturally existing salts and minerals and is 100% inorganic, non-toxic and non-hazardous in nature. ZeoCrete Admixtures are manufactured based on the soil characterization viz., its Chemical and Physical Properties, besides OMC, PL, LL, CBR etc. Each soil is different and shall have different composition of Admixture mix and dosage. The dosage is set from the lab tests for 7d, 28d curing for the E-values achieved and confirmation of designed values. ZeoCrete Admixtures when homogenized with soil / SMB pulverized material in the presence of controlled moisture and OPC followed by compaction, results in a very characteristic behavior”

This technology substitutes a significant quantity of bitumen - a binder exclusively used in the contemporary construction (both new and periodic resurfacing) of road pavements commonly known as Black Topping. The Cementitious technology has many benefits over the contemporary bitumen rich technology as enumerated below:

1. An Environment friendly technology (chemicals in admixture are free of environmental hazards and particularly smoke free – needs no heating at high temperatures). On the other hand, the preparation of asphalt concrete requires a mechanical process that emits huge quantity of fumes and heating bitumen with temperatures ten uncontrolled thereby compromising the final product quality.
2. Excellent performance in marshy and water saturated areas. Whereas the BT pavements are highly susceptible to damages if the structure especially (WMM + DBM) come in contact with water. Most North facing road alignments face this challenge as the alignment runs through sun-shaded areas that remain moist (due to ground water saturation) in all the four seasons.

3. *Use of local construction material (in-situ soil and crushed rocks). These locally available construction materials significantly replace the ironically very scarce raw material for a mountainous country; the rocks and its by-product – the 20mm aggregates by over 65%.*
4. *Replaces bitumen by almost 42% by cement. Bitumen needs to be imported, which is getting more and more cumbersome by the day, whereas cement is domestically manufactured. Use of locally produced construction material is still a strong policy of the government, which needs very strict enforcement to boost our socio welfare and economic development.*
5. *Design calculations demonstrate enhancement in the life of the Cementitious pavement even with a SAMI system (as against 100mm WMM layer) over the CTB layer, by 29.37% as compared to conventional technology. This is because the technology offers a highly durable base layer which are:*
 - a. *Impervious to water ingress being Cementitious in nature,*
 - b. *Offers high E-values that meet design criterions,*
 - c. *Enables uniform load transfer with low deflections,*
 - d. *Enhances strength and durability,*
 - e. *Increases PI value of soil, and*
 - f. *Converts unusable soil to usable soil as the basic construction mass.*

[SAMI is a crack relief layer laid on the CTB by an application of 0.25 to 0.50kg/m² of emulsion as primer and topped with spraying of 1.0 to 1.5kg/m² of bitumen. On this emulsion primer is sprayed a thin film of 10mm aggregates to prevent sticking of emulsion to rollers and design calculations show that this layer enhances pavement life by 29.37% in terms of durability compared to conventional technology].
6. *In the Cementitious Technology, the load is distributed from CTB layer to subgrades in widely distributed manner leading to very low deflections. It is also not affected by the dynamic weathering process and severe environmental conditions. Whereas, in the conventional mode, load is transferred in a vertical line, resulting in higher deflections of the structural layers below leading to premature failures of the bituminous pavement. Because of CTB layer in Cementitious pavement, the AC (asphalt concrete) laid over CTB layer is compressive in nature, whereas the AC layer laid over DBM in conventional pavement is in tension, which is susceptible to damages under loads.*
7. *Cementitious technology is especially meant for cold climate pavement solutions. References of the certified completed works at high altitudes at the borders of India are testimonial in terms of benefits that this technology provides. The Black Top pavement built applying the current bitumen rich technology at high altitudes has been proven to be repeatedly inefficient. Broken road surfaces on our snow bound highway passes are testimonial to the cold climate actions on our pavements.*
8. *Time for construction is found to be significantly shorter than that of the conventional one (also cited in the list of benefits) since the mixing, laying, rolling and compacting of the CTB layer is done at one go. However, the efficient management of work / project is always the key. Huge amount of time is saved from avoiding establishment of quarry operations and HMP set ups, besides over 60% of rocks available across length and breadth of our highway network are substandard in quality. We also avoid the time consuming NEC and other clearance processes for quarries besides others.*

9. *One of many intangible benefits that we can accrue is the employment that our youth can avail in the manufacturing companies to the extent that we consume cement for our road works. Recalling of products (cement) is easier, prevent use of rupees in huge quantities; and help boost the trade / businesses of our local manufacturing industries.*

Submitted to RAA so much about the Cementitious Technology for use as alternative option to Bitumen rich technology, which has numerous shortcomings and challenges.

Since the technology was introduced by Longyea-e-Solutions Pvt. Ltd, India together with local partner M/s Yarkay Constructions Company, a 10km stretch from Yadi to Ngatshang was recommended for direct award as a contract for demonstration of the technology. For this, necessary processes of obtaining prior approvals to award the work were carried out and the approvals obtained from the Ministry of Finance.

The proposal contained 44 other companies that are in association with and under authorization by the technology owner M/s FAE GROUP S.p.A Italy. Among the lot the nearest one was from China. Given the proximity with ZeoCrete Company in India and the company already in Bhutan implementing the technology under project Dantak gave this ministry every reason and ground to give this JV company the demonstration task of the technology for DoR, Bhutan for which direct work order approval was sought from the Ministry of Finance.

If DoR/MoWHS was to explore companies from sources such as internet for the sake of carrying out cost comparison etc, in the first place the company must be under the authorized list of the technology owner so that confirming the company's authenticity from FAE Group S.p.A Italy is avoided. Further we need to confirm that the company is accredited to demonstrate that its technology is a proven one from reputed accreditation bodies. For example the company—Young e-Solutions being Indian has ZeoCrete technology accredited from IRC, India and so forth technology confirmation from ISO systems of accreditation bodies will be required if the companies are outside India and their document verifications, would definitely require time by weeks and months.

As for the cost, ZeoCrete technology already has rates offered to Project Dantak. The rate offered by the JV Company to DoR was 10% less than that applied for Dantak and this rate for the binder admixture is the only integral component contributing to the overall cost for the technology. The rates from similar companies would have no basis for comparison unless exact technology exists with that of the ZeoCrete.

It is to report that MoF's advice to carry out prior assessment was construed primarily for detailed verification and assessment of the proposing JV Company's competence, professionalism, and reliability as against exploring existence of similar companies elsewhere. If ever a second or third company was to be inducted for competitive bidding purposes, it must have been from the list maintained by the technology owner - FAE Group S.p.A Italy in order to maintain consistency of technology and associated technical, professional, and administrative requirements.

To this end we looked at the 44 companies submitted by the proponent BZPT JV Company, but found none feasible in terms of proximity (all third country firms) and therefore would impact on the cost too. However, amongst 44 firms there was one company from China that was closest to M/s LongYea e-Solutions in terms of distance. Given the scenario, MLTC was confident with BZPT JV Company for the technology demonstration purposes and to avoid the expected complications involved in soliciting proposals from third countries.

Since adequate due diligence was carried out by MLTC in the assessment of the JV Company and its competence, professionalism, and reliability for the purpose of the technology demonstration only, RAA is earnestly requested to drop the memo please.

RAA’s Further Comments & Recommendations:

While taking note of the response, the RAA at the outset applaud the Ministry for **exploring the new state of art ZeoCrete technology to provide road pavement solutions against the challenges posed by the high altitude cold weather actions along alignments passing through water saturated areas.**

However, the Ministry had not carried out market studies to assess existence of suitable substitute for the ZeoCrete Technology in line with Clause 4.2.5.1(c) of the Procurement Rules and Regulations 2009. It is to reiterate that while there is no company in dealing with the same ZeoCrete technology in India, there are companies in India dealing with “Soil stabilization for pavement works” with other technologies as a substitute to ZeoCrete Technology. In addition, the Ministry had not carefully evaluated the RO’s and DOR’s capacity and its readiness to supervise and monitor the execution through deployment of new technology. Further, the Ministry also had not constituted project steering committee to oversee and monitor the execution pavement works by the contractor with the new technology. Thus, the contractor (JV) was primarily responsible for the execution of the works in terms of technical specification and quality as well as project **success.**

Further, the Ministry has not commented on the basis as to how the reasonableness of rates of Nu. 737.00 per kg charged by the Joint Venture Company for the ZeoCrete Binder Admixture was validated and accepted.

The Ministry should review the implementation of new technology in terms of time, cost and quality as well as achievement of its intended objective of low maintenance cost as compared to huge recurrent maintenance cost under conventional method of pavement construction. The review report on the new technology should be furnished to audit for review and to enable to form a final opinion on the new technology.

Who is accountable?

Direct Accountability	: 1.Phuntsho Wangdi, Ex Secretary, EID No.8403049 2.Karma Galey, Former Director, EID No.9507059 3. Tenzin, Director, EID No.9801115 4. Ugyen Thinley, Adm Officer, EID No.9511047 5. Karma Ugyen, CAO, EID No.2101187
Supervisory Accountability	: Dasho Dorji Choden, Ex Lyonpo, MoWHS

9.2 Non-incorporation of cost and risk factor for carrying out the demonstration of technology in the contract agreement (4.4.69)

The proposal for the use of ZeoCrete Technology submitted to the Hon'ble Lyonpo, by the Secretary, MoWHS under letter No. MoWHS/Sec/2015 dated 13/11/15 categorically stated that 'If approved, the JV Company will be given the opportunity to carry out the demonstration of the technology at their costs and risks under strict supervision of DoR engineers'. In the event the technology fails they will be required to redo the pavement works by conventional system".

However, the RAA noted that the above condition proposed by the Secretary was not incorporated in the agreement. Further, the proposal did not specify whether the redoing of works by conventional system was at the cost of the contractor.

The Ministry should comment on the failure to incorporate such vital conditions as approved by the Hon'ble Minister in line with the proposals submitted by the Secretary. Besides, measures should be taken to incorporate the above condition immediately in the contract agreement for covering the cost and risks of such new technology including redoing the work by conventional system at the cost of the JV firm.

Auditee's Response

The Zeocrete pavement technology was something new and none of the engineers in DoR were experienced in the technology. Contract document for the demonstration package was prepared using the Standard Contract document for Works and modified wherever it was felt necessary. As mentioned under reply to para 16.1, the introduction of the new technology was based on the "Techno-Commercial Offer" submitted by the "Bhutan Zeocrete Pavement Technology" JV company of M/s LongYea e-Solutions, India & Yarkay Group, Bhutan.

As far as the Department of Roads is concerned, we would like to submit that necessary cautions & risk factors were taken into consideration. Should there be any flaws in the contract agreement, it is purely due to inexperience in the new technology. The failure to incorporate the clause regarding re-doing the works by conventional method is not deliberate & we regret the omission. In view of the above justifications, RAA is requested to drop the memo.

RAA's Further Comments & Recommendations:

While taking note of the response, the fact remains that the proposal of the JV firms on the new technology though new to the Ministry was found duly endorsed by the Secretary under Proposal No. MoWHS/Sec/2015 dated 13.11.2015 wherein it categorically mentioned as under:

"If approved, the Joint Venture Company will be given the opportunity to carry out the demonstration of the technology at their costs and risks under strict supervision of the DOR engineers. In the event the technology fails they will be required to redo the pavement works by our conventional system".

Thus, the omission to incorporate such vital clause in the contract agreement on obtaining approval from the Minister for direct award to the JV firms may indicate possibility of existence of collusive practice. The Ministry should investigate thoroughly the proposals vis-à-vis

clauses incorporated in the contract document that all aspects safeguarding the interest of the Government were dully incorporated in the contract documents.

Who is accountable?

Direct Accountability	: 1. Phuntsho Wangdi, Ex Secretary, EID No.8403049 2. Karma Galey, Former Director, EID No.9507059 3. Tenzin, Director, EID No.9801115 4. Ugyen Thinley, Adm Officer, EID No.9511047 5. Karma Ugyen, CAO, EID No.2101187
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No.8403049

9.3 Flawed decision in the revision of contract amount subsequent to signing of agreement with resultant undue benefit to the contractor and recoverable amount Nu. 6,683,750.00 (2.2.7)

In terms of the Initial proposal of M/s BZPT and the signed contract agreement, (MoWHS letter No.MoWHS/Sec/-29/15-16/625 dated 2/6/16), the agreed contract amount was Nu. 159,921,000.00. The Bill of Quantities attached with the contract document had also specifically highlighted as a foot note, the rates of ZeoCrete binder Admixture as Nu.670 per kg.

It was apparent that the Secretary vide his letter No. MoWHS/Sec/-29/15-16/625 dated 2/6/16, while forwarding the duly signed contract agreement of 2nd June 2016 to the JV firm, had specifically directed the firm to submit the revised rates for ZeoCrete material inclusive of all applicable taxes as per Sales Tax, Customs & Excise Act of Kingdom of Bhutan.

In line with the directive of the Secretary, Phub Zam, Director, Yarkay Group Pvt. Ltd. vide letter No. BZPT-JVC/MW&HS-Agreement/01 dated 10th June 2016 had submitted a revised ZeoCrete rate of Nu.737 per kg by applying applicable VAT/Import Duty of 10% on the ZeoCrete Material. Subsequently, the contract cost was revised to Nu.166,704,750.00. However, the revised contract agreement or amendment if any made was not made available on record except a note was added in the BOQs attached with the contract agreement as revised to Nu. 166.705 million. Thus, extra financial implication of Nu.6,683,750.00 (Nu.67,837,500*10) was found approved by the Secretary after signing the Contract agreement.

Further, the General Conditions of Contract (GCC) under Clause 45(Tax), clearly stipulates that the prices of the contractor shall include all duties, taxes and levies that may be levied in accordance with the laws and regulations in being as of 30 days prior to the closing date for submission of bid. Thus the bid price was inclusive of all applicable duties, taxes and levies at that time. While clause 43.1 of the contract agreement allows for adjustment of payments including taxes, considering GCC, Clause 45 (Tax) which stipulated prices to be inclusive of duties, taxes and levies, the adjustment can be made only for differential amount of duties and

taxes that the contractor had paid provided that the original receipt of tax authorities is produced to support the payment.

Thus, considering the aforementioned facts, the approval of additional contract price of Nu.6,683,750.00 on account of taxes/duties after signing the contract was not justified. The Ministry should recover the amount of Nu. 6,683,750.00 and the same deposited into Audit Recoveries Account(ARA) besides obtaining the manufacturer price to validate the reasonableness of the rates charged for the ZeoCrete materials by the JVC firm.

Auditee's Response

The question of seeking revised rates as Secretary vide MoWHS/Sec-29/15-16/625 dated 2/6/16 from BZPT JV Company on account of levy of taxes to ZeoCrete material was presumably prompted by the unconfirmed information provided by the JV Company on the levy of 10% BST on the ZeoCrete binder admixture. Whoever initiated the note / letter should have first referred the provisions available in the contract where the GCC clause 45 (tax) had clear stipulation that "the prices of the contractor shall include all duties, taxes and levies that may be levied in accordance with the laws and regulations as of 30 days prior to closing date for submission of bid".

Since I had been grossly misguided in the delivery of my responsibilities as Secretary to the MoWHS by the BZPT JV Company, in retrospect I would accept my failure to exercise the due diligence in cross checking for availability of such important provisions in the contract (contract documents were never submitted with either the letter or the note). Appraisal of the existence of such a provision is a must by appraising entity for the competent authority to make informed decisions such as the one in the current case, the instructions for submission of revised rates on account of levy of 10% BST on the binder admixture by the BZPT JV Company.

Since the work is still ongoing (probably around 75% complete), I as the Advisor to the DoR hereby direct the Director DoR and the Chief Engineer at Regional Office, Lingmethang to disregard the approval accorded vide the revised Bill of Quantities and therefore the contract amount of Nu. 166,704,750.00 stands null and void and remain committed to the original contract amount of Nu. 159,921,000.00. Of course in due course of time the elements of cost escalations and extra items if any would come into force as per normal contractual provisions and circumstances. The 10% BST amounting to Nu. 6,683,750.00 (also as stipulated by RAA), may have to be absorbed in the overall contract cost by the JV Company or that DoR helps BZPT to avail waiver from the Ministry of Finance.

Based on the withdrawal of the revised BoQ by the ex-Secretary, MoWHS vide letter No. MoWHS/2017-18/Per-file/427 dated 21st Nov 2018, RO Lingmethang will write to the BZPT JV & make efforts to realize the 10% tax amount (Nu. 6.684 million) on the Zeocrete admixture.

RAA's Further Comments & Recommendations:

While the RAA has taken note of the response and withdrawal of the approval accorded on the payment of 10%, the fact remains that the decisions and action of the Secretary was in violation of the PRR and FRR as well as tantamount to extension of undue favour to the JV firms.

However, in line with the withdrawal of the approval, the DOR and Ministry should recover the tax amount of Nu. 6,683,750.00 with penal interest from the date of payment till recovery and deposit into Audit Recoveries Account. The Ministry should also investigate existence of possible collusive practices.

The Ministry besides instituting proper control mechanism should put in place appropriate procedures for approval processes to prevent undue use of authority in position in future.

Who is accountable?

Direct Accountability	1. Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.4 Non-deployment of committed testing machineries, equipment and key personnel at site (4.4.15)

Annexure 5 of the proposal submitted by M/s BZPT under letter No. BZPT-JVC/MW&HS/01 dated 18th September 2015, in addition to the outlining of construction stages, categorically stipulated testing stages as under:

A) Cementitious Base Layer

1) Prior to start of works on site

Virgin soil samples at min 2 locations/KM shall be extracted at 0.50m below the formation level and tested for USC after treating with the admixture ratio as declared by the successful bidder in his tender Technical Bid to verify achieving the required E-values as per the design submitted by the contractor.

2) Post Completion of works

Stage wise cores shall be extracted from each layer for verifying achieving the designed USC and E-values as reported by the contractor in the its Technical Offer.

3) Testing Machine

The contractor shall deploy electrical/digital brand new calibrated USC moulds making –Cum- USC testing machine from a NABL approve vendor deployed at field laboratory.

B) Marshall Testing Machine

MTM shall be deployed by the contractor for carrying out the tests for the 40mm thick BC Layer.

All the tests shall be conducted by the contractor in the presence of DOR engineers. The contractor shall be responsible for preparation of moulds in the presence of the DOR engineers, extraction of cores and deployment of requisite machinery.

In addition, it had categorically stipulated that the “*construction of Cementitious sub-base and base layers is very specialized in nature*” and following resources to be deployed at site:

- Insitu boulder crusher-cum- pulverize-homogenizer-paver implements by the heavy duty prime mover with infinite variable transmission system;
- Vibratory Soil Compactor & roller compactors, JCB earth mover, paver etc.:
- spare parts for all the materials with trained operators:
- **Testing and measuring devices/machines:**
- Adequate storage facility with security: and
- **One supervisor-cum-resource manager**, one operator for each of the machines and 10-12 helpers to complete 01 km stretch.

Further, it was noted from the proposal of the JVC firm, stipulating that two brand new Insitu Rock/Boulder Crusher-Cum-Pulverisers-Cum-Homogenisers with integrated Paving shall be deployed by the JV Company for carrying out works for DOR Roads. A mobile HMP Plant and Paver shall be purchased and deployed on receipt of orders. Only Plant mixed Aggregates CRLy shall be used.

During the joint verification of the work site comprising site engineers and the audit team it was noted that the Testing and measuring device/machines were not deployed at site which were very crucial when executing the work. Soil Test, Core test and durability test (14 Nos. CTB layer along Yadi- Ngatshang road 10 Km) were found conducted at Dr. Ghuman & Gupta geotech Consultant, NABL approved laboratory (T-3732) Chandigarh, India in deviation to the commitments proposed in the proposals which were the basis for awarding the work directly.

The test results were found satisfactory, however, the correctness of the test could not be ascertained in audit as the tests were carried out in India.

Further, one supervisor-cum- resource manager was found not deployed as committed in the proposal for overseeing the “construction of cementitious sub-based and base layers with new technology except one project manager, one site supervisor and one site engineer from M/s Yarkay Group Pvt. Ltd having no required expertise for the works. In addition, the audit team noted that the site engineer of RO also lacked knowledge in new technology. Thus quality of execution of work was found left in the hand of the operator of the machines. Moreover, the agreement did not specify the deductions to be made from the RA Bills on the non-deployment of key machineries and personnel.

The RO, in consultation with the Ministry should comment on execution of work without the availability of the requisite resources and non-stipulation of penalties for non-deployment of

machineries and personnel. Further, the Ministry should comment on the monitoring of quality and workmanship of works executed in the absence of expertise in the technology.

Auditee's Response

In reply to audit observation, RO, Lingmethang would like to clarify that, almost all the committed equipment/Machineries were deployed at site as committed. The auditors might have not seen few types of equipment like Asphalt plant & Paver at site during their visit, since at that point of time, the BT works are not scheduled to take place and keeping such equipment at site prior to onset of work will remain idle and company cannot afford to station those machineries at site. With regards to key technical personnel at site, almost all the earmarked officials as per agreement were there at site and definitely few changes in the key technical have taken place over the past months which is allowed as per contract clause no: GCC 10.1.

The contract agreement signed between the two parties only reflects the key personnel requirement at site for which the contractor has engaged those on full time basis.

In view of the above justifications, RO L/thang would like to request the RAA to kindly drop the memo and not to pursue further.

RAA's Further Comments & Recommendations:

While taking note of the response, the fact remains that non-establishment of lab facilities as per contract document was in breach of the contract. In the absence of the testing machine and the field marshall testing machine, core test was done in India by the JV firm and no officials of DoR was found involved when core test was conducted in India. The acceptance of test result could not be validated in audit. In addition, the JVC had failed to deploy as committed in the proposal one supervisor-cum- resource manager having expertise for overseeing the "construction of Cementitious sub-based and base layers with new technology except one site engineer from M/s Yarkay Group Pvt. Ltd having no required expertise for the works.

Non- enforcement of contract clauses strictly and non-levy of penalty as envisaged in the contract document tantamount extension of undue favour as the contractors not only benefitted financially from not having to bring the equipment at site and incur associated cost but also from annulling the payment of penalty for non- deployment of equipment at site. It is to reiterate that the quoted rates of contractor for the related items of works is built up cost inclusive of cost of equipment and all risk factors.

The failure on the part of the RO and the Site Engineer to ensure deployment of all committed Plants and Equipment and key personnel at work site indicated laxity and complacency as well as existence of systemic flaws and poor contract management.

However, as discussed during the exit meeting, DOR and RO should work out the amount to be deducted for non-deployment of equipment pointed out in audit as per clause of the contract document and amount recovered within three months from the date of issue of the report beyond which penalty @ 24% per annum shall be levied as per Chapter IV, Section 4.5.1.4 of the Finance and Accounting Manual 2016. Besides, the details of recoveries affected and accounted for in the books of accounts should be furnished to RAA for review and record.

The RO, Lingmithang should further comment on the non-issuance of instruction to the JV firm to establish laboratory at sites as well as accepting the test result conducted by JV firm independently without involving the concerned officials from RO, Lingmithang. Besides, the RO should also comment on the supervision and monitoring mechanism put in place over the execution of pavement works with new technology as per the technical specification in the absence of expertise deployed by the JVC firms.

Further DoR and the Ministry should study the causes and impact of poor management of plant and equipment and human resources on the progress and quality of construction works. Besides, the DOR and the Ministry should also conduct appropriate studies on the types of plant and equipment and efficiency requirements, numbers of plant and equipment requirements, adequate machinery and equipment as well as human resource deployment plan requirements in relation to the quantum of works and cost of the project for effective equipment management both by the site engineer and the contractor in future projects.

The studies conducted and actions and measures initiated to improve the equipment management system as well as to prevent such flaws and lapses intimated to RAA for record and follow-up in future audits.

Who is accountable?

Direct Accountability	: 1.Tenzin, Project Manager, EID No.200307010 2. Tshewang Dorji, JE, EID No. 20130103739 3.M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
Supervisory Accountability	:Karma Rinzin, Chief Engineer, EID No. 8909095

9.5 Mismatch of Key equipment/Machinery and personnel as proposed and requirement schedules attached with the agreement (4.4.15)

In terms of the proposal submitted by M/s BZPT vide letter No. BZPT-JVC/MW&HS/01 dated 18th September 2015, following machineries and key personnel were committed:

- Two Bank New Insitu Rock/Boulder Crushers-Cum-Pulverisers-Cum-Homogenisers with integrated Paving for carrying out road works
- For General Purpose : Soil Compactor, Excavators, JCBs, Road Rollers, Trippers on hire basis
- A mobile HMP Plant and Paver to be purchased on receipt of orders,
- Only Plant mixed Aggregate CRLy to be used

In addition, Annexure 5 of the Proposal also highlight the following process of testing:

1. Testing Machine

The contractor shall deploy electrical/digital brand new calibrated USC moulds making –Cum- USC testing machine from a NABL approve vendor deployed at field laboratory

2. Marshall Testing Machine

MTM shall be deployed by the contractor for carrying out the tests for the 40mm thick BC Layer

All the tests shall be conducted by the contractor in the presence of DOR engineers. The contractor shall be responsible for preparation of moulds in the presence of the DOR engineers, extraction of cores and deployment of requisite machinery

In addition, it had categorically stipulated that the “construction of Cementitious sub-based and base layers is very specialized in nature” and following resources in particular to be deployed at site:

- **One supervisor-cum-resource manager**, one operator for each of the machines and 10-12 helpers to complete 01 km stretch.

However, on review of the contract agreement and relevant conditions of Contract viz. GCC and SCC, the above proposed machineries and testing processes as committed by the JVC firms were found either not incorporated or incorporated with different conditions as highlighted below:

A) Schedule of key Personnel

Sl. No	Key Personnel	Number	Remarks
1	Project Engineer	1	One person was deployed as Project manager cum engineer from JVC Yarkay Group Pvt. Ltd. who did not have experience in such technology
2	Project Manager	1	
3	Laboratory Technician	2	No field laboratory was established as tests were conducted in laboratory in India
4	Site Supervisor	2	
5	Surveyor	1	

One supervisor-cum-resource manager, as committed was found not listed in the Schedule of Key Personnel requirement and the JVC firm had not deployed at site except one person as Project manager cum engineer from Yarkay Group Pvt. Ltd who did not have expertise in such technology. Similarly, Laboratory Technician was not deployed as no field laboratory was established as tests were conducted in laboratory in India.

B) Schedule of Equipment and Machineries

Sl. No	Equipment	Number	Remarks
1	Asphalt Plant	1	
2	Pay Loader/Excavator	1	
3	Motor Grader	1	
4	Paver	1	
5	Static Roller	1	
6	Concrete Mixer		
7	Water Tanker		
8	Tripper Truck	3	
9	Vibratory Roller	1	
10	Rock/Boulder Crusher cum Pulverisers cum Homogenisers	1	2 numbers were proposed but the Ministry had scheduled only 1 requirement. It was a deviation to the proposal submitted by the JVC firms
11	Total Station	1	

In term of the proposal of the JVC firms, all the tests are to be conducted by the contractor in the presence of DOR engineers. The contractor is responsible for preparation of moulds in the presence of the DOR engineers, extraction of cores and deployment of requisite machinery. However, Clause incorporated in the contract agreement under SCC (GCC 34.1) were as under:

“In addition to GCC 34.1 the tests for the cementitious base (CTB) Layer shall be carried out by extracting cores after 28 days of laying and curing and shall be sent to the laboratory approved by the client. The test report shall provide E-Values for the CTB layer constructed”.

Thus, it is apparent that the clause incorporated in the contract agreement was not in line with the proposal submitted and accepted by the Ministry.

The mismatch in commitments of key personnel and equipment/machineries as well as tests to be conducted as indicated in the proposals and the contract agreement prove to showed flawed proposals by the JVC firms to get the direct contract of the new technology as well as undue favour extended by the Ministry to the JVC firms.

The Ministry should comment on the non-incorporation of key personnel and equipment/machineries as proposed in the proposals in the contract agreement as the contract works were found in progress as on the site visit of audit team on 2nd December 2017 though the contract was scheduled to be completed on 6th December 2017.

Auditee's Response

In reply to audit observation, RO, Lingmethang would like to clarify that, almost all the committed equipment/Machineries were deployed at site as committed. The auditors might have not seen few types of equipment like Asphalt plant & Paver at site during their visit, since at that point of time, the Bt works are not scheduled to take place and keeping such equipment at site prior to onset of work will remain idle and company cannot afford to station those machineries at site.

With regards to key technical personnel at site, almost all the earmarked officials as per agreement were there at site and definitely few changes in the key technical have taken place over the past months which is allowed as per contract clause no: GCC 10.1.

The contract agreement signed between the two parties only reflects the key personnel requirement at site for which the contractor has engaged those on full time basis.

In view of the above justifications, RO L/thang would like to request the RAA to kindly drop the memo and not to pursue further.

RAA's Further Comments & Recommendations:

While taking note of the response, the fact remains that the key personnel and equipment listed in the Schedule of Key Personnel and Schedule of Equipment and Machineries attached with the contract document were not aligned to the requirements highlighted in the Proposals of the

JV firm on the basis that construction of Cementitious Sub-base and Base layers was very specialized in nature as discussed below:

- *Under Proposal No. BZPT-JVC/MW&HS/01 dated 18th September 2015, committed to deploy two Band New Insitu-Rock/Boulder Crushers-Cum-Pulverisers but in the schedule reflected just one the schedule reflected just one only;*
- *Deployment of Excavators and JCBs were committed but only one number (Pay Loader/Excavator) was found reflected in the schedule.*
- *Testing and measuring devices/machines though committed was not reflected in the schedule.*
- ***One supervisor-cum-resource manager*** *having expertise in the new technology was not clearly specified but list as requirement of one Project engineer and Project manager.*

The Ministry should investigate the circumstances leading to non-aligning of key personnel and equipment requirements as per the Proposal submitted by the JVC firms. Besides, the Ministry should also fix responsibility on the officials responsible for the preparation of contract documents including flawed key personnel and equipment requirements for such specialized works involving new technology for appropriate actions.

In addition, the Ministry should also review the quality control mechanism instituted by the RO and DOR to ensure execution of works in terms of requisite technical specification and causes of abnormal delays in the contract completion. The Ministry should also take action on the JVC firm for non-deployment of technical expertise to oversee the works as committed in the proposal. The action taken against the officials and JVC firm should be intimated to RAA for record and follow-up in next audit.

Who is accountable?

<i>Direct Accountability</i>	<i>1. Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2. Karma Galey, Former Director, DoR, EID No.9507059 3. Tenzin, Former Director, DES, EID No.9801115 4. Ugyen Thinely, Adm Officer, EID No.9511047 5. Karma Ugyen, CAO, EID No.2101187 6. MN Lamichaney, Specialist, EID No.9002018 7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company</i>
<i>Supervisory Accountability</i>	<i>: Phuntsho Wangdi, Ex Secretary, EID No. 8403049</i>

9.6 Substantial cost impact to the Government on the use of new technology outweighing expected advantages and maintenance free life in terms of three years defect liability periods stipulated in the agreement - Extra financial burden to the extent of Nu. 18.321 million for a stretch of 10kms of road (4.4.65)

The direct award of contract for 10Km stretch of pavement roads to JV firm at a total contract cost of Nu. 166,704,750.00 indicated cost of Nu. 16,670,475.00 per Km of road. However, using the actual cement rate and 10% BST the contract cost becomes Nu. 175,971,000.00 with Nu. 17,597,100.00 per km of road.

An attempt was made to ascertain the actual cost implications to the Government Exchequer on the use of new technology over the conventional system through cost comparisons in terms of cost per Kilometer based on the Departmental estimates and quoted prices by various contractors for pavement works.

The analysis indicated that the cost per kilometer on the use of new technology was higher than the cost under conventional system. The abstract of estimated cost worked out by the Department and reworked out by RAA for 7.5m width of road along with cost per Kilometer including average cost per kilometer is as summarized in the table below:

Table : 9.6-Detailing average cost per kilometer							
Name of Contractors	Departmental estimates for pavement work (overall) (Nu.)	Estimate for Zeocrete Pavement (Nu.)	Department's Cost per km (Nu.)	Zeocrete cost per km for 10km (Nu.)	Cost difference per km	Remarks	
M/s. Norbu Construction Pvt. Ltd (Mongar - Gangola (90.89 - 102.45 = 11.56 km) [PKG - 5] (Package 5)	176,435,030.37	175,971,000.00	15,262,545.88	17,597,100.00	2,334,554.12	For ZeoCrete cement rate at Nu. 379.2 and 10% BST taken.	
M/s. Rigsar Construction Pvt. Ltd Widening of NEWH Gongola-Kurizampa (102.45-114.45 = 12.00 km) PNH (Package 06)	184,328,099.35	175,971,001.00	15,360,674.95	17,597,101.00	2,236,426.05		
M/s. Gongphel Construction Pvt. Ltd Double Lanning of NEWH from Killikhar - Mongar (84.89 - 89.89 = 5.00 km) [PKG - 4]	77,714,410.53	175,971,002.00	15,542,882.11	17,597,102.00	2,054,219.89		
M/s. KD Builders Pvt. Ltd Double Lanning of NEWH from Pangser - Kellikhar (78.89 - 84.89 = 6.00 km) [PKG - 3]	93,423,311.06	175,971,003.00	15,570,551.84	17,597,103.00	2,026,551.16		
M/s. Tshering Construction Pvt. Ltd Double Lanning of NEWH from Korila - Pangser (73.19 - 78.89 = 5.70 km) [PKG - 2]	89,211,862.05	175,971,004.00	15,651,203.87	17,597,104.00	1,945,900.13		
M/s. Tshering Construction Pvt. Ltd Double Lanning of NEWH from Kurizampa - Lingmethang (114.45 - 118.45 = 4 km) [PKG - 7]	66,358,804.05	175,971,005.00	16,589,701.01	17,597,105.00	1,007,403.99		
Average Cost difference per km	1,934,175.89						
Financial impact for 10km	19,341,758.90						

It would be apparent from the aforementioned analysis of cost per kilometer that in terms of the departmental estimated cost, the average cost difference per kilometer is Nu. 1.934 with additional financial burden of Nu. 19.342 million for a stretch of 10km.

It is a clear indication that the Ministry had not properly assessed the cost implication on the use of such new technology. The Ministry may comment on the basis of consideration of the new technology in terms of cost effectiveness over the conventional system. It may be mentioned that the comparison of costs between conventional method and proposed ZeoCrete technology as carried out by the Contractor in the proposal submitted by them was accepted without ascertaining the average cost of pavement works as incurred by the Ministry in road works executed by contractors and departmentally. This led to acceptance of flawed proposal which rendered the cost comparison misleading.

The acceptance of new technology on the basis of flawed cost comparison which led higher cost implication is also brought to the notice of the Government for appropriate decisions and actions.

Auditee's Response

The comparison of costs is normally done for the finished products and not on the selected individual items although they constitute as vital parts and parcels of a product. A cost offered (since the new technology would have no item rates established as yet in the country of application) for a new intervention (here ZeoCrete technology) has to be compared with government established norms for rates that are generally applied for estimation of government funded works (here the relevant document the BSR) for the purpose of delivering justice to one and all.

The only input I as Secretary made to DoR was my expression of opinion (therefore verbal) that if only the costs are comparable to that of the conventional technology, the new technology should go ahead. I emphasized that it is only from considerations of cost competitiveness, durability, reliability, and quality new initiatives / technology should be adopted. Please refer the cost comparison at Annex 4 (enclosed).

The comparative table prepared by the RAA is therefore focused on the all items that constitute construction of a road pavement. However, the element of the cost of bitumen, the item that was to be supplied by DoR has been left out, to form the complete cost of the finished product. During the currency of the procurement processes in 2016-17, the DoR's established figure for bitumen consumption (approved by the quarterly meeting held in Bumthang) for 75mm DBM and 50mm AC together was Nu. 15.50/meter square and the cost of bitumen then was Nu. 53/kg.

For 1 km highway of 7.5m wide the cost of bitumen itself works out to: $7,500 \times 15.50 \times 53.00 =$ Nu. 6,161,250.00 only for 1 km. The overall DoR cost (without Bitumen) for 11.56 km on contract with Ms. Norbu Construction Pvt. Ltd was Nu. 131,001,271.16. To complete the cost for the finished product we must include cost for bitumen, which is worked out as under:

[11.56km long x 7,500m wide x Nu.15.50 x Nu.53.00 = Nu. 71,224,050.00]. Therefore DoR cost for the 11.56 km long NEWH is (Nu. 131,001,271.16 + Nu. 71,224,050.00) = Nu. 202,225,321.16 only which works out to Nu. 17,493,539.90 for one kilometer.

After the withdrawal of the approval from levy of 10% BST on binder, the per km cost of Cementitious pavement is Nu. 15.993 million only. (Even with 10% BST included the, per kilometer cost would be Nu. 16.67 million only).

Name of Contractors	Departmental cost for pavement work including cost of bitumen (Nu.)	Estimate for Zeocrete Pavement (Nu.)	Department's Cost per km for 11.56 (Nu.)	Zeocrete cost per km for 10km (Nu.)
M/s Norbu Construction Pvt Ltd, Gelephu (Mongar - Gangola (90.89 - 102.45 = 11.56 km) [PKG - 5]	202,225,321.16	159,921,000.00	17,493,539.90	15,992,100.00
Cost difference per km	Nu. 1,501,439.90			
Financial saving for 10km	Nu. 15,014,399.00			

If only CTB and the just the BT item for conventional is compared, then the cost savings we accrue from using CTB on items like 100mm only for WMM as against normal 225mm WMM and 40mm only for AC as against normal 50mm AC, the cost of bitumen saved from 75mm DBM and the saving from 10mm from the AC item and the cost incurred for production of 20mm chips etc. get left out from cost incorporation. Again comparing costs with that of average costs bided by contractors under competitive bidding processes is generally not done as today some contractors quote even zero for certain items to gain competitive edge, leaving no basis or established grounds for comparison.

A significant degree of due diligence was carried out to introduce the new technology and the above cost analysis is demonstrative of the fact. In no way extra burden to the government in terms of costs, arduous efforts required for mobilizing resource such as 20mm aggregates, cement business enhancement, and damage to environment and so forth have not been exerted but in fact their challenges off loaded to a great extent.

RAA's Further Comments & Recommendations:

The response of the Ministry is noted. Accordingly, RAA had redone the analysis considering the cost of bitumen and increased pavement width. During the analysis, the conventional method is found still cheaper compared to the new technology used with departmental estimates. The average cost difference per kilometer is Nu. 1.832million with additional financial burden of Nu. 18.321million for a stretch of 10km as shown below:

Name of Contractors	Departmental estimates for pavement work (overall) (Nu.)	Estimate for Zeocrete Pavement (Nu.)	Department's Cost per km for 11.56 (Nu.)	Zeocrete cost per km for 10km (Nu.)	Remarks
M/s Norbu Construction Pvt Ltd, Gelephu (Mongar - Gangola (90.89 - 102.45 = 11.56 km) [PKG - 5]	176,435,030.37	170,946,000.00	15,262,545.88	17,094,600.00	For ZeoCrete cement rate at Nu. 379.2 as against Nu. 232 per bag considered in the estimated cost
Cost difference per km	Nu. 1,832,054.12				
Financial impact for 10km	Nu. 18,320,541.20				

The cost comparison are done on the estimates instead of completed cost using the same basis as adopted by the Ministry. The likely total avoidable financial implication works out to Nu.18.321 million with the use of new technology.

The DoR and the Ministry should conduct proper study while adopting the new technology in future.

Who is accountable?

Direct Accountability	: 1. Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2. Karma Galey, Former Director, DoR, EID No. 9507059 3. Tenzin, Former Director, DES, EID No. 9801115 4. Ugyen Thinely, Adm Officer, EID No. 9511047 5. Karma Ugyen, CAO, EID No. 2101187 6. MN Lamichaney, Specialist, EID No. 9002018 7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.7 Flaws in the fixation of Defect liability period of 3 yrs (4.4.69)

The proposal for the use of ZeoCrete Technology submitted to the Hon’ble Lyonpo, categorically stated that the Cementitious Pavement Using ZeoCrete Technology is a proven system of providing simpler, faster, durable and the most vital parameter the ‘impervious layer’ for better performance resulting in savings in millions of scarce resources over the life of the pavement which is expected to be well over 10 years. As for the cost, the estimated expenditure is comparable to the convention one and estimated about 3.7% higher, which will be compensated by reduced maintenance requirement, the benefit the government will accrue is immense.

Further, Annexure-I of the proposal submitted by M/s BZPT under letter No. BZPT-JVC/MW&HS/01 dated 18th September 2015 also stressed that the ZeoCrete pavement technology is “Economical, Durable & Exhibits Long Maintenance Free Life.

However, the contract agreement under SCC (GCC 35.1) stipulated the defect liability period of just 36 months same as the revised defect liability period fixed for contractors executing the pavement works under the conventional construction method and that too at lower contract cost.

The audit team opines that defect liability period for the contract using the new technology and at higher cost should have been increased to at least between five to ten years (10 years being maximum expected life) as stressed by the Secretary and the JVC firms in the proposals.

The Ministry may comment on the fixation of defect liability period similar to contracts executed under conventional methods at lower cost. Immediate steps should be taken to revise the defect liability periods in consideration to the benefit accrued to the JVC firms in terms of direct award and higher contract cost as the technology was accepted on the grounds of economy, durability and long maintenance free Life.

Auditee’s Response:

In terms of fixing Defect Liability Period, the normal one year DLP was fixed and most contracts were already signed before my arrival in the ministry as the prevailing contract documents were prepared without enhancement of the DLP irrespective the quality and expected lives of the pavement. The enhancement of the DLP from one year to three years was personally initiated by the then Prime Minister in his meeting with engineers and contractors in the conference hall of the MoWHS in 2015 and with great difficulty the assembly of contractors agreed with PM's proposal for three years.

In fact PM wanted more years of DLP commensurate to the expected lives of the product. The contractors expressed reservations to this DLP enhancement as no premiums were incorporated in their quoted rates, for the three years guarantee period desired by the government at much later date. The same period was applied even for the new technology to avoid debates and arguments. Any further increase would trigger cost enhancement by the affected entity, which would be a legitimate claim for contractors.

It is to inform RAA that the defect liability period of three (3) years was discussed extensively during the meeting with the NEWH contractors chaired by Hon'ble Prime Minister of Bhutan. There is no minutes of meeting recorded, however it has been captured in the media (a copy of Kuensel report attached for reference). Hon'ble Lyonchen insisted on increasing the defect liability period in line with the EDP 2016 and to ensure that the works are done to the quality and specifications and to instill sense of responsibility to the contractors.

Based on the meeting, the ROs were instructed to increase the defect liability period from 1 year to 3 years for those contracts already signed and to incorporate the same in the new tenders. Accordingly, RO Lingmethang has issued to increase the defect liability period to those contractors who have already signed the contract. It was also incorporated in the new tenders. In view of the above justifications, the memo may kindly be dropped & not pursued further.

RAA's Further Comments & Recommendations:

While taking note of the response, the fact remains that fixation of same defect liability for works executed under different technology, method and cost as well as without undergoing competitive bidding process was found not rational and justified.

It is to reiterate that the Secretary under his proposal note categorically submitted that the proposed ZeoCrete technology "is proven system of providing simpler, faster, durable, and the most vital parameter the impervious layer for better performance resulting in savings in millions of scarce resources over the life for the pavement which is expect to be over 10 years".

The Ministry should relook on the defect liability period in consideration to the technology, cost and direct award as the estimated cost prepared by the JVC firms and outcome intimated to audit. The Ministry should also institute appropriate system to facilitate proper conduct of evaluation and assessment of any new technology in consideration to in-house capacity and readiness for the system to avoid complication and failure of the new technology in future.

Who is accountable?

Direct Accountability	: 1. Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2. Karma Galey, Former Director, DoR, EID No. 9507059 3. Tenzin, Former Director, DES, EID No. 9801115 4. Ugyen Thinely, Adm Officer, EID No. 9511047 5. Karma Ugyen, CAO, EID No. 2101187 6. MN Lamichaney, Specialist, EID No. 9002018 7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.8 Non-production of records (5.3.19)

The Contract Agreement signed on 2nd June 2016, outlined documents forming the contract and to be interpreted in the following order of priority:

- a) The signed Contract Agreement
- b) The Letter of Acceptance
- c) The Complete Bid Form as submitted by the bidder
- d) The Special Conditions of Contract
- e) The General Conditions of Contract
- f) The Technical Specification
- g) The Bill of Quantities (BOQ)
- h) Design Drawing
- i) Any other documents listed in SCC as forming part of the contract

However, the documents relating to Technical Specification & Performance Requirements and Drawings were found not attached with the Contract Agreement but reflected as available as separate volumes. On enquiry and request, the Regional Office failed to produce the documents. Thus, in the absence of the technical specification and drawings, the executions of works at site could not be cross checked with the technical specification and drawings.

The Regional Office in consultation with the Ministry should furnish the relevant documents for verification besides commenting the basis considered for executing and monitoring of works by the site engineers without technical specification and drawings.

Auditee's Response

The Project management and the Regional Office Lingmethang regrets to mention any lapse on our part during the time of auditing. However, as far as the Regional Office is concerned, all documents pertaining to the Zeocrete pavement works on Yadi-Ngatshang stretch were made available during the period of auditing such as contract agreement which comprise of following:

General conditions of contract

Special conditions of contract

Bill of Quantities

Technical proposal for Zeocrete pavement technology by the BZPT JV

*Experience certificates
Requirement of key technical personnel.*

With regard to letter of acceptance and Bid form, the RO would like to clarify that since the technology is new the work was awarded based on the Proposal submitted to the Ministry & the department. In view of above justifications, RAA is kindly requested to drop the memo.

RAA's Further Comments & Recommendations:

The response furnished by RO, is reviewed and noted. However, the Technical specification is critical component of any contract to guide execution of works and ensuring quality workmanships on the completed works.

The Ministry should revisit the contract document and comment on the basis considered for supervisions and monitoring of pavement works executed under new technology without drawing up proper technical specification on the component of works to be executed by the JVC firms.

Who is accountable?

Direct Accountability	: 1. Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2. Karma Galey, Former Director, DoR, EID No.9507059 3. Tenzin, Former Director, DES, EID No.9801115 4. Ugyen Thinely, Adm Officer, EID No.9511047 5. Karma Ugyen, CAO, EID No.2101187 6. MN Lamichaney, Specialist, EID No.9002018 7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.9 Ambiguity in the technical specification of CTB layer of 210-250mm thick

In terms of the proposal submitted by M/s BZPT under letter No. BZPT-JVC/MW&HS/01 dated 18th September 2015, under Annexure 4, -the thickness of Cementitious base layer (CBTLy) was provided as 210-250 mm and under Comparative Pavement Behavior as 210mm thick.

Section V-Bill of Quantities attached with the contract agreement also provided as P & L 210-250 mm thick CTB Layer comprising laying soil/stone(SMB) bed to required thickness duly levelled Insitu crushing and pulverising followed by spreading of admixtures homogenizing compaction and curing.

Further, the test report on the virgin soil test conducted against the soil sample supplied to Lab on 1st March 2016 conveyed under reference letter No. GGGC/D-040416/2016-17 dated 4th April 2016 indicated that test was carried out after treating soil with ZeoCrete admixtures for upto 250mm thick soil/Sqm of soil mass under the following considerations:

- Grd. 43 OPC=40Kg/m² per 225-250mm thick CTB Layer

- ZeoCrete Binder Admixture =1.35kg/ m² per 225-250mm thick CTB Layer

Thus, there was ambiguity in the technical specification of thickness of Cementitious base layer (CBTLy) of 210-250 mm as the test conducted was for 225-250mm thick CTB Layer per m² soil of mass. The Ministry should comment on the inclusion of technical specification of CBT layer thickness less than 225mm. Besides, the Ministry should also comment on the cost impact on the item works for appropriate decision and action.

Auditee’s Response

The thickness of 210-250mm specified is the range within which CTB layer has to be laid over the GSB layer. The finally compacted thickness should not be lesser than 210mm in any case. Checking the correctness of the CTB thickness on the ground is the responsibility of the Regional office. Core drilling was carried out.

With regard to required tests, all the tests were carried out, however, the tests like soil tests & durability tests has to be carried outside the country as we have no such facilities to carry out the tests within the RO/country. With regard to correctness of tests, RO is of opinion that it has fulfilled all the requirements & even the correctness of the test results are no doubt even though it was performed outside the country, the institute name is Dr. Ghuman & Gupta Geotech Consultants, NABL Approved Laboratory) T-3732) is well recognized and accredited to ISO. So the doubt in compromise in the test results is completely ruled out. (Refer copy of tests report).

In view of above justifications submitted, RAA is requested to kindly drop the memo.

RAA’s Further Comments & Recommendations:

*While taking note of the response, the fact remains that the technical specification provided **CTB layer of 210-250mm thick** whereas the test conducted was for 225-250mm thick CTB Layer per m² soil of mass. Thus, there is mismatch of stipulated technical specification for CTB layer and test conducted as CTB layer thickness less than 225mm have impact on the quality of the pavement works as well as on the usage of cement of 40Kg/m² and ZeoCrete Binder Admixture of 1.35kg/ m² as being pegged with 225-250mm thickness CTB Layer.*

In consideration to above factors, the Ministry should furnish stage wise cores extracted from each layer and test results duly checked and verified by the site engineer for verifying that the designed UCS and E-values are as reported by the contractor in its technical report (Refer Annexure 5 of the Proposal). Besides, the Ministry should also furnish the test result of CTB thickness achieved for verification.

The Ministry should also review the consumption of cement and ZeoCrete in respect of CTB Layers of less than the 225-250mm thickness for taking appropriate action.

Who is accountable?

Direct Accountability	: 1.Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2.Karma Galey, Former Director, DoR, EID No.9507059 3.Tenzin, Former Director, DES, EID No.9801115
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	4. Ugyen Thinely, Adm Officer, EID No.9511047 5. Karma Ugyen, CAO, EID No.2101187 6. MN Lamichaney, Specialist, EID No.9002018 7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.10 Flaws in the Design mix of OPC 40 kg and Zeocrete Admixture of 1.35 kg/sqm of soil mass

The proposal submitted by M/s BZPT under letter No. BZPT-JVC/MW&HS/01 dated 18th September 2015, under Design & Validation Software categorically mentioned that Design mix for combination of ZeoCrete Cementitious Binder Admixture along with OPC Grd. 43 in ratios and quantity is to be deduced from the Lab tests for the required E-Values. In addition, under Role of ZeoCrete Admixture, it is also mentioned as **“Each soil is different and shall have different composition of Admixture mix and dosage. The dosage is set from the Lab tests for 7d, 28d, curing for the E-Values achieved and confirmation to designed values”**.

Further, the test report samples attached with the proposals highlight soil tests report on the following elements:

- ✓ Elements
 - ✚ Lead(Pb)
 - ✚ Arsenic(As)
 - ✚ Cromium(Cr)
 - ✚ Nickel(Ni)
 - ✚ Zinc (Zn)
 - ✚ Cobalt (Co)
 - ✚ Mercury (Hg)
 - ✚ Thorium(Cd)
 - ✚ Uranium(U)
 - ✚ Copper (Cu)
 - ✚ Iron(Fe)
- ✓ Test for Leachability
 - ✚ Copper (Cu)
 - ✚ Iron(Fe)

The Unconfirmed Compressive Strength & corresponding E-Values with OPC 40kg and ZeoCrete/SoilCrete of 2kg for equivalent of 0.25cum for cementitious sub-layer was found carried out for UCS and E-Values for 7 days un-soaked and soaked, 14days, 28 days respectively.

However, the test for the elements if carried out was not made available on record. The unconfirmed Compressive Strength & corresponding E-values for 14days and 28days were found not carried out as the report indicate N/A. The ratios and dosage deduced from the lab test was also not available but the sample reported indicated the composition of OPC 40kg and Zeocrete 2kg for equivalent of 0.25 cum for cementitious base layer as recommended by you indicating the reason as dosage were fixed by the JVC firms . Further, the test report while indicated material loss as under did not report the water absorption percentage as reported in the proposals and noted in the sample test reports attached with the proposal:

Layer and Sample No.	Material loss (After 12 Wet –Dry	Material Loss (After 12 Freeze-Thaw
CBT-1	<2.5%	<3.5%

CBT-2	<2.0%	<3.5%
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Note: Conclusion: Above test results exhibit material loss <14% as permissible in IRC37:2012/IRC-SP89:2010, hence safe.

- ✓ The sample soil test reports of Unconfined Compressive Strength and corresponding E-values after treatment using OPC 40kg and ZeoCrete 2 kgs/Sqm were as under:

Sample	UCS (in MPa)				E-Values (E=1000xUCS)				
	7 days	7 days soaking	14 days	28 days	7 days	7 days soaking	14 days	28 days	
A	2.9	3.1	3.7	4.3	2900	3100	3700	4300	Test for KM 43-44 MS Road
B	2.3	2.4	3.1	3.9	2300	2400	3100	3900	
A	5.1	5.4	5.9	7.3	5100	5400	5900	7300	
B	5.3	5.5	6.1	7.4	5300	5500	6100	7400	
A	2.8	3.2	3.7	4.4	2800	3200	3700	4400	Test for KM 05-5 SKTT Road
B	2.6	3.0	3.5	3.9	2600	3000	3500	3900	
A	5.2	5.5	5.8	7.2	5200	5500	5800	7200	
B	5.3	5.6	6.2	7.4	5300	5600	6200	7400	

- ✓ The test report also indicated that the 12 Cycle Durability Tests of Tw Cores with ZeoCrete and OPC as per above ratios reveal surface material loss <1%.

It was noted that the soil test report of Unconfined Compressive Strength and corresponding E-values after treatment using OPC 40kg and ZeoCrete 1.35 kgs/Sqm for YADI-Nagatshang Road stretch between KM 0.00 to KM 10.00 applying factor 1125 instead of 1000 were as under:

TSl. No	UCS in MPa				E-Values(E=1125xUCS)			
	7 days	7day soaking	14days	28 days	7 days	7day soaking	14days	28 days
1	5.05	5.00	N/A	N/A	5681	5625	N/A	N/A
2	5.15	5.10	N/A	N/A	5793	5737	N/A	N/A
3	5.10	5.05	N/A	N/A	5737	5681	N/A	N/A

The result indicates achievement of higher UCS values despite just use of ZeoCrete material of 1.35kg per Sqm of soil mass. The Durability test of cores indicated material loss of <2.5% for 12 Wet-Dry and <3.5% after 12 Freeze –Thaw although reported that the material loss <14% as permissible in IRC37:2012.

Thus absence of the basis considered for the CTB layer for OPC 40kg and ZeoCrete 1.35 kg per Sqm indicated flaws in the design mix. The Ministry should comment on the consideration of design mix including the test conducted for elements as mentioned above on the virgin soil as well as non-carrying out of tests for UCS and E-Values for 14days and 28 Days respectively. Besides, the Ministry should comment not only on the achievement of high UCS values despite less use of ZeoCrete materials but also test results for material loss which was found 2.5% and 2.0% after 12 durability cycle (Wet-Dry) and <3.5% after 12 durability cycle (Freeze-Thaw) higher than material loss <1% stated in the proposal through use of the ZeoCrete Technology.

Auditee's Response

The contract for the construction of Cementitious Base pavement on Yadi – Ngatshang stretch (10 km) was awarded to the BZPT JV by the Ministry /Department based on the Proposal submitted by the JV. Since, the technology was new to DoR engineers was new, we had to depend on the design mix proposed by the BZPT JV.

RAA's Further Comments & Recommendations:

While taking note of the response, the fact remains that “under Role of ZeoCrete Admixture’ submitted in the proposal, it is mentioned that **Each soil is different and shall have different composition of Admixture mix and dosage. The dosage is set from the Lab tests for 7d, 28d, curing for the E-Values achieved and confirmation to designed values.**

Thus, it was the responsibility of the Ministry to obtain the test report and accepted the admixture mix and dosage. However, the Ministry should direct the JVC firms to furnish the relevant test reports supporting the design mix for verification and forming final opinion in audit.

The Ministry should fix the responsibility on the officials responsible for accepting the design mix without verification of relevant supporting test reports.

Who is accountable?

Direct Accountability	: 1. Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2. Karma Galey, Former Director, DoR, EID No.9507059 3. Tenzin, Former Director, DES, EID No.9801115 4. Ugyen Thinely, Adm Officer, EID No.9511047 5. Karma Ugyen, CAO, EID No.2101187 6. MN Lamichaney, Specialist, EID No.9002018 7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.11 Application of different factor for achieving the E-Values leading to positive result for CTB layer

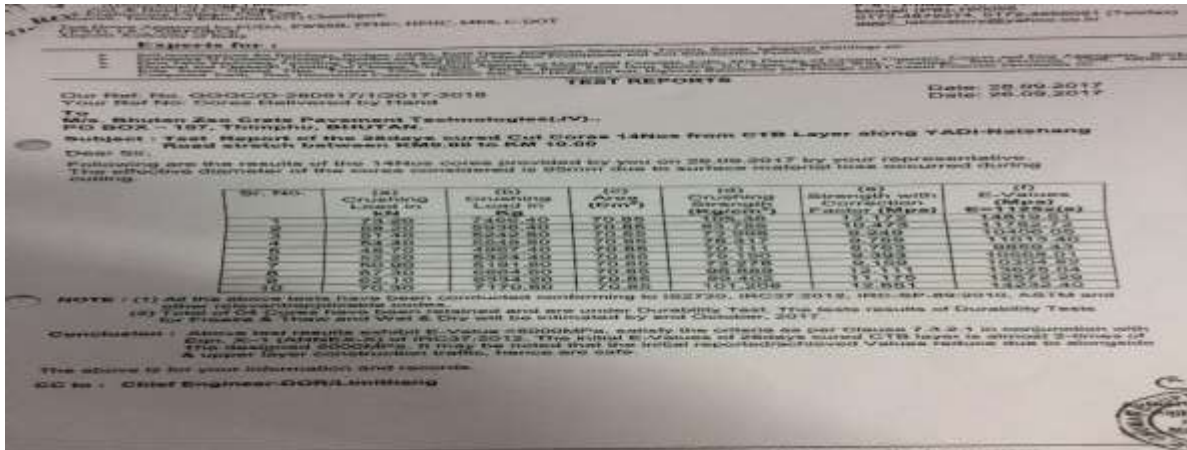
In terms of the proposal submitted by M/s BZPT under letter No. BZPT-JVC/MW&HS/01 dated 18th September 2015, the test reports of soil carried out for strength and durability test of Cementitious Base & Cementitious Sub-Base Layers indicated use of the value of Unconfined Comprehensive Strength (UCS) times the standard factor of 1000 for deriving the E-values.

However, the test reports for UCS of 7 days un-soaked and 7 days soaked for treated virgin soil with OPC and ZeoCrete admixture as well as 28 days cured cut cores from CTB layer of YADI-Nagtshang Road stretch between KM 0.00 to KM 10.00 provided by Dr. Ghuman and Gupta Geotech Consultant Ref No. GGGC/D-280917/1/2017-2018 dated 28/09/2017 had applied factor of 1125 for deriving the E-values as shown below:

The E-values for soil treated with OPC and ZeoCrete were as tabulated below:

Sl. No	UCS in MPa				E-Values(E=1125xUCS)			
	7 days	7day soaking	14days	28 days	7 days	7day soaking	14days	28 days
1	5.05	5.00	N/A	N/A	5681	5625	N/A	N/A
2	5.15	5.10	N/A	N/A	5793	5737	N/A	N/A
3	5.10	5.05	N/A	N/A	5737	5681	N/A	N/A

The test report of the 28days cured cut cores was as shown below:



While the tests were conducted conforming to IRC37:2012, the test results furnished by the Laboratory showed application of standard factor of 1125 times the values of UCS to compute the E-Values in both the test reports. In addition, it would be apparent from the above test results of 28 days cured cut cores from CTB layer of YADI-Nagshang Road stretch between KM 0.00 to KM 10.00 that a correcting factor of 1.27459 was used for arriving UCS values and obtaining E-values by multiplication of standard factor 1125.

Clause 7.3.2.1 of IRC 37:2012 on Cementitious Base provided as below:

7.3.2 Cementitious bases

7.3.2.1 Cemented base layers may consist of aggregates or soils or both stabilized with chemical stabilizers such as cement, lime, lime-flyash or other stabilizers which are required to give a minimum strength of 4.5 to 7 MPa in 7/28 days. While the conventional cement should attain the above strength in seven days(IRC: SP-89-2010(30)), lime or lime-flyash stabilized granular materials and soils should meet the above strength requirement in 28 days since strength gain in such materials is a slow process. Though the initial modulus of the cementitious bases may be in the range 10000 to 15000 MPa, the long term modulus of the cemented layer may be taken as fifty per cent of the initial modulus due to shrinkage cracks and construction traffic (65, 66). Australian guidelines recommend use of Equation 7.2 for the cemented layer. Curing of cemented bases after construction is very important for achieving the required strength as described in IRC: SP-89 and curing should start immediately by spraying bitumen emulsion or periodical mist spray of water without flooding or other methods.

$$E_{cgsb} = 1000 * UCS \quad \dots 7.2$$

Where UCS = 28 day strength of the cementitious granular material

As clearly shown above, the formula to calculate E-value is 1000 * UCS. Therefore, the corrected E-values for cores tested are as tabulated below:

Sl no	A) Crushing Strength (kg/cm ²)	B) Crushing Strength without correction factor (Mpa)	C) Strength with correction factor 1.27459 (Mpa)	E-values (Mpa) E=1000*C)
1	105.38	10.334	13.172	13,172
2	83.788	8.217	10.473	10,473
3	73.998	7.257	9.249	9,249
4	78.317	7.680	9.789	9,789
5	70.111	6.876	8.763	8,763
6	75.150	7.370	9.393	9,393

7	73.278	7.186	9.159	9,159
8	96.889	9.502	12.111	12,111
9	89.402	8.767	11.175	11,175
10	101.208	9.925	12.651	12,651

Similarly, the E-values for soil treated with OPC and ZeoCrete would be as tabulated below:

Sl. No	UCS in MPa		E-Values(E=1000xUCS)	
	7 days	7day soaking	7 days	7day soaking
1	5.05	5.00	5050	5000
2	5.15	5.10	5150	5100
3	5.10	5.05	5100	5050

It would be noted that pavement configuration with 250mm GSB +225-250mmCTB+ 100mm WMM (SAMI layer as Crake Relief Layer) and 40mm BC layer were deduced from the derived E-values using factor 1125*UCS and considered safe as per the results. Thus the use of factor 1000 *UCS has resulted in lower E-Values as computed in above table. The Ministry should comment on the impact of use of higher factor on the test results as well as on the strength and durability of the pavement configuration.

Further, the required initial E-values of the cementitious bases comes in the ranges of 10000 to 15000 MPa, and of 10 cores, 5 cores have failed to achieve 50% of the tested cores E-values. If such consideration is not applicable, the achievement of E-Values of 2 times of the designed 5000MPa were indicative of inappropriate mix design with resultant overdose of soil treatment with OPC and ZeoCrete materials and extra cost to the Government.

In addition, the provision for application of correction factor of 1.27459 on the crushing strength for calculating E-values was not stated in the IRC37:2012. Further, the sample test reports attached with the proposals of the JVC firm did not indicate application of correcting factor but reflected the UCS value achieved from the test.

The Ministry should comment on the application of factor of 1125 instead of 1000 used by the same laboratory in computing the E-Values for the sample test reports submitted by JV firms with the proposal.

Auditee's Response

The contract for the construction of Cementitious Base pavement on Yadi – Ngatshang stretch (10 km) was awarded to the BZPT JV by the Ministry /Department based on the Proposal submitted by the JV. Since, the technology was new to DoR engineers was new, we had to depend on the design mix proposed by the BZPT JV.

RAA's Further Comments & Recommendations:

*While taking note of the response, the fact remains that under Role of ZeoCrete Admixture submitted in the proposal, it is mentioned that **Each soil is different and shall have different composition of Admixture mix and dosage. The dosage is set from the Lab tests for 7d, 28d, curing for the E-Values achieved and confirmation to designed values.***

Thus, it was the responsibility of the Ministry to obtain the test report and accepted the admixture mix and dosage. However, the Ministry should direct the JVC firms to furnish the relevant test reports supporting the design mix and on the application of correcting factor and factor of 1125 instead of standard factor of 100 for deriving the E-Values for verification and forming final opinion in audit.

The Ministry should fix the responsibility on the officials responsible for accepting the design mix without verification of relevant supporting test reports.

Who is accountable?

<i>Direct Accountability</i>	: 1. Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2. Karma Galey, Former Director, DoR, EID No. 9507059 3. Tenzin, Former Director, DES, EID No. 9801115 4. Ugyen Thinely, Adm Officer, EID No. 9511047 5. Karma Ugyen, CAO, EID No. 2101187 6. MN Lamichaney, Specialist, EID No. 9002018 7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
<i>Supervisory Accountability</i>	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.12 Flawed estimation for CTB layer

In terms of the BOQ, the item of works “**providing 210-250mm thick CTB layer comprising laying soil/stone bed to required thickness dully levelled Insitu crushing and pulverising followed by spreading of admixtures homogenizing compaction and curing**” the volume of work to be executed was quantified as 75,000 Sqm at the rate of Nu. 1,295.00 amounting to Nu. 97,125,000.00.

However, in the footnote of BOQ, it is specifically mentioned that the cost of the OPC Grd 43 has been considered @ Nu. 232 per bag. The RAA while verifying the OPC cost per bag prevailing at the time of the submission of the rates by the JVC firms with M/s Dungsum Cement Corporation Ltd noted market rate of Nu. 379.20 as evident from the published rate for Mongar as on 1st February 2015.

The RAA further reviewed the contract agreement pertaining to price adjustment clauses under GCC 47 and SCC (GCC 47.1) it stipulated as under:

“The contract is subject to price adjustment in accordance with GCC Clause 4. The contract is subject to price adjustment in accordance with clause 47 of the General Conditions of Contract but applicable only after 12 month from date of start of the contract up to the intended completion date”

Considering the aforementioned provisions and flawed incorporation of OPC rates, the JV firm had deliberately applied lower OPC rates not only to minimize estimates and reduce cost gaps for comparability with the estimated cost under conventional method but also to accrue benefits on completion of the execution by way of price adjustment as permissible under the contract. It is also apparent that the Ministry without exercising due diligence had accepted the OPC rates as proposed and with price adjustment clause knowingly that the contract duration was fixed for 18 months.

Thus, based on the rate difference of Nu. 147.20 per bag of cement, the estimated cost submitted by the JVC firms was underestimated by Nu. 8,832,000.00 (estimated Qty. of 60,000 bags X Nu.147.2 per bag).

In addition, with the prevailing market rate for OPC at Mongar of Nu.402.1 per bag as on December 2017, the cost of the works would definitely shoot up on completion of the contract to the extent of price adjustment payable under the contract agreement. Due to flawed estimation, the **cost difference of 3.7% between the conventional method and proposed technology reflected in the proposal submitted** both by the Secretary to the Ministry and JV firms was thus misrepresented.

Further, revising the cost irregularly on account of Import duty after signing of the contract by the Secretary had rendered the cost comparison misleading and resulted in avoidable additional financial implication to the Government.

The Ministry should comment on the underestimation of cost estimates by the JVC firm and the failure on the part of the Ministry to cross verify the correctness of the estimates.

Auditee’s Response

The contract for the construction of Cementitious Base pavement on Yadi – Ngatshang stretch (10 km) was awarded to the BZPT JV by the Ministry /Department based on the Proposal submitted by the JV. Since, the technology was new to DoR engineers, we had to depend on the design mix proposed by the BZPT JV.

RAA’s Further Comments & Recommendations:

It is apparent from the response that while the Ministry had opted for new technology to enhance durability and to achieve cost efficiency in the construction and maintenance of highway pavements, it did not exercise due diligence in ascertaining correctness and reasonableness of the cost estimates including rate of ZeoCrete material, rate for cement, Mixture design, and technical specification and had entirely left at the mercy of the JVC firm.

However, the Ministry should review the price adjustment clauses with reference to the under quoting of cement rate and decisions and action taken to come with appropriate base rate in the event the firm invoke the price adjustment clause in terms of contract agreement. The Ministry should also investigate the circumstances leading to acceptance of cement rate of just Nu.232 per bag when the prevailing market rate at that point of time was Nu.379.20 per bag at Mongar besides ascertaining existence of possible collusive practices. The Ministry should also fix responsibility on the officials responsible for such lapse for appropriate action.

Who is accountable?

Direct Accountability	<p>: 1. Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2. Karma Galey, Former Director, DoR, EID No.9507059 3. Tenzin, Former Director, DES, EID No.9801115 4. Ugyen Thinely, Adm Officer, EID No.9511047</p>
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	<p>5. Karma Ugyen, CAO, EID No.2101187</p> <p>6. MN Lamichaney, Specialist, EID No.9002018</p> <p>7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company</p>
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.13 Non-inclusion of rates for recovery at later dates for Bitumen and Emulsion

In terms of the Bill of Quantities, the rate for the item of work “P&L coated chip for 40mm layer including Bitumen @ 5.06kg/Sqm for 75000 m² was agreed at Nu.488.75 per m². The Note 6(d) under the BOQ, indicated as follows:

“Bitumen Emulsion and Bitumen VG 30 shall be issued by the department and shall be recovered from the running bills against item No. 5 a/a for P & L layer, @ Bitumen & emulsion rates prevailing at the time of issue of work order”

Further, Additional Clause under SCC of the Contract agreement stipulated as under:

“The Department will procure and supply the required quantity of bitumen of 379.50 MT@ consumption rate of 5.06kg/sqm to the JV at Yadi.”

However, the recovery rates for the bitumen and emulsion were not incorporated in the contract agreement but stipulated that recovery to be made from RA bills at rates prevailing at the time of issue of work order. Non-incorporation of rates to be recovered in the contract agreement indicated incorporation of flawed provisions in the contract agreement.

The Ministry should comment on non-incorporation of specific issue rates of bitumen and emulsion in consideration to the rates agreed in the BOQ. Besides, the Ministry may furnish the prevailing rates of bitumen and emulsion at the time of issue of work order and recoveries affected from the RA bills as of date including rate analysis for the item work to ascertain that cost of bitumen included in the analysis of rates is reasonable as compared to cost recovered by the Department against issue of bitumen to contractor.

Auditee’s Response

With regards to deductions of Bitumen VG-10 & emulsion not incorporated in the tender agreement, RO would like to inform RAA that it has been specifically mentioned in the foot note, that the Bitumen emulsion & VG-10 shall be issued by the department and shall be recovered from the running bills against item no. 5 as per the time of issue. Therefore, the memo may kindly be dropped and not to pursued further.

RAA’s Further Comments & Recommendations:

While noting the response, the fact remains that the under Note 6(d) of the BOQ stipulated that recovery of the cost of bitumen and Emulsion from the RA bills to be made at rates prevailing at the time of issue of work order. However, as discussed during the Audit Exit Meeting, the DOR and Ministry should furnish details of bitumen and emulsion quantities issued to the contractor along with the issue rates prevailing at the time of the issue as well as recoveries made from the RA bills as of date for review and record.

The Ministry should revisit the “Foot Note” and take appropriate decisions and action to avoid complications in the recovery of cost of bitumen and emulsion.

Who is accountable?

Direct Accountability	<ul style="list-style-type: none"> : 1. Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2. Karma Galey, Former Director, DoR, EID No. 9507059 3. Tenzin, Former Director, DES, EID No. 9801115 4. Ugyen Thinely, Adm Officer, EID No. 9511047 5. Karma Ugyen, CAO, EID No. 2101187 6. MN Lamichaney, Specialist, EID No. 9002018 7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.14 Flaws in fixation of Contract Duration

The contract agreement signed on 2nd June 2016, stipulated contract duration of 18 months commencing from 6th June 2016 with completion deadline of 6th December 2017.

The proposal submitted by the JV firms, amongst others, indicated following advantages of new technology over the conventional system:

- ❖ High speed of construction, almost 1.0Km per day –Faster completion of works
- ❖ Highly Mechanistic construction-Ensures consistency in quality output and least dependency on labour
- ❖ Workable in all terrains & weathering conditions
- ❖ ZeoCrete homogenised with “As available Soil/SMB along the stretch”
- ❖ Aggregates requirements limited to 30/40mm BC layers
- ❖ Deploy Two Brand New Insitu Rock/boulder Crushers-Cum-Pulverisers-Cum Homogenisers with integrated Paving.
- ❖ Deployment of testing machine for UCS testing and Marshall Testing Machine for 40mm thick BC layer
- ❖ One supervisor-cum-resource manager
- ❖ Spare parts for all the machinery with trained operators

Besides, the Secretary, in its proposal submitted to the Hon’ble Lyonpo further stressed on the following advantages of the proposed technology:

- ☞ In terms of Speed of construction, almost 1.0km per day of progress can be achieved and will ensure timely delivery of works bringing benefits early to the people
- ☞ The system avoids laying of 60 to 75mm thick Dense Bituminous Macadam layer with this around 60% of both Bitumen and High Quality Aggregates requirements are eliminated and saving in particular:
 - ✚ On the need to invest heavily on establishment of huge crushing plants. and
 - ✚ On construction time consumed specially in securing necessary permits and then production of aggregates which is really time consuming.
- ☞ 225mm thick WMM is reduced to 100mm only which results in obvious savings on materials, the cost and time,

- ☞ Construction is highly mechanized-ensures consistency in quality of works delivered & its performance and minimizes dependency on human labour,
- ☞ This will revolutionize the system of doing highway pavements with huge savings on road maintenance programs over a much longer period of its life, and will ensure reliable customer base for our cement manufacturers.

Given the substantial amount of advantages of the new technology over the conventional system proposed by the JV firm and further validated and recommended by the Secretary, the fixation of contract duration of 18 months for a stretch of 10 km roads was found not rational and justified. It was to reiterate that both the JV firm and the Secretary categorically mentioned that the speed of construction was almost 1.0 km per day indicating requirement of minimum contract duration to complete the works.

Further, a comparison of contract durations fixed under the conventional system for Pavement works inclusive of permanent works also indicated unjustified fixation of contract duration of 18 months to the JVC firm for contract work which did not include permanent works. The contract durations fixed under conventional technology for a similar road stretch of 10 km are as tabulated below:

Table:9.14- Detailing fixation of contract durations under conventional execution of works

Type of work	Location	Chainage	Name of works executed by contractors	Contract duration
Lobeysa				
Pavement works	Dochula-Lampari	477-467 (10 Kms)	M/s Chogyal Construction Pvt. Ltd, Thimphu	15
Pavement works	Lamperi-Menchuna	467-457 (10 Kms)	M/s Chogyamethodl Construction Pvt. Ltd, Thimphu	15
Pavement works	Menchuna-Chasagang	457-447 (10 Kms)	M/s Chogyal Construction Pvt. Ltd, Thimphu	15
Pavement works	Chasagang-Wandguezam	447-436 (11 Kms)	M/s Singye Construction Pvt. Ltd, Thimphu	15

Thus, it is apparent that the substantial advantages in particular faster completion of work highlighted in the proposals by both JV firm and Secretary was misleading as the contract duration of 18 months was far more than the contract durations fixed under conventional method of executions.

It was also apparent that the Secretary had not considered the factors considered and recommended in the proposals while drawing up the contract agreement in particular the contract duration. The fixation of contract duration higher than the conventional method of execution defeated the very reasons for direct award of contract at much higher cost entailing additional financial burden to the Government.

The Ministry should comment on the basis considered for the fixation of contract duration of 18 months vis-à-vis the contract duration of 15 months allowed for conventional method of execution of works.

Auditee's Response

For the fixation of contract duration, technological giants the world over have not yet obtained a formula for fixing contract durations. Probably because a contract involves all kinds of factors that are very uncertain or unpredictable and factors such as administration by the management, efficiency of equipment and manpower in relation to the environment and climatic conditions, proximity to basic necessities availability, remoteness of the contract sites, number of resources (men, Machines) and their conditions, and so forth with endless factors complicate the formulation of fixing contract durations.

The Ministry suggested giving only 15 months as is applied for similar lengths along the NEWH contract works, but the JV Company requested for 18 months to incorporate a few occasions of hands-on training for different batches of DoR engineers and to entertain expected visitors from both government and private sectors who wish to learn about the new technology etc. to which Hon'ble Secretary, MoWHS agreed to their earnest request for 18 months as three months may not jeopardize the completion of the demonstration contract and grossly inconvenience the road users.

The 18 months' time was thus given under earnest request from the JV Company based on the genuine reasons as cited above. In view of the above justifications, RAA is requested not to pursue the matter further please.

RAA's Further Comments & Recommendations:

While taking note of the response, the fact remains that contract durations for various contract packages awarded for execution of pavement works under conventional method were fixed by ROs considering related factors such as designs, project scale, project characteristics, field conditions, as well as administrative and other relevant aspects. However, the higher contract duration fixed for the contract awarded to JVC firms as compared to the conventional method of execution was not justified in view of highly mechanized execution in new technology having major advantages in terms of speed of operation and use of Insitu materials. Moreover, as against high speed of construction (almost 1.0km per day) and faster completion of works as indicated in the proposal, fixation of higher contract duration was contrary to the substantial saving of time as emphasized in the proposal and also created doubt and confusion.

*Further, the Ministry should furnish the details of **hands-on training provided to different batches of DoR engineers and as well as expected visitors from both government and private sectors on the new technology to support the extra three months agreed by the Secretary for review and records.***

The DOR and Ministry besides reviewing the flaws, ambiguities and related problems existing within the present practices and procedures on the fixation of contract duration should institute appropriate system and process for fixation of contract duration in relation to project complexity, nature and cost of project as well as methodology of execution to have transparent and uniform basis for the fixation of contract periods for future project.

Who is accountable?

Direct Accountability	<p><i>: 1.Phuntsho Wangdi, Ex Secretary, EID No. 8403049</i> <i>2.Karma Galey, Former Director, DoR, EID No.9507059</i> <i>3.Tenzin, Former Director, DES, EID No.9801115</i> <i>4. Ugyen Thinely, Adm Officer, EID No.9511047</i> <i>5. Karma Ugyen, CAO, EID No.2101187</i></p>
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	6. MN Lamichaney, Specialist, EID No.9002018 7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.15 Irregular time extension against substantial contract delays based on proposal to award drainage works of Nu. 13,655,956.00 with intent to prevent imposition of liquidated damages

In terms of the contract agreement signed on 2nd June 2016, the contract duration was for a period of 18 months commencing from 6th June 2016 with completion deadline of 6th December 2017.

In addition to Clause 58-Termination under the Fundamental breaches of Contract, following additional grounds for termination of contract were stipulated under SCC (GCC 58.2):

- if the contractor fails to sign first the milestone contract agreement within one month of signing the Contract Agreement and the subsequent milestone contract agreement immediately after expiry of preceding milestone contract;
- if the Contractor fails to achieve the milestone contract or its deliverables as specified below at the end of milestones contract period (three milestone contract):
 - i) If the Contractor fails to achieve all the three milestone contracts consecutively or;
 - ii) If the Contractor fails to achieve minimum of 50% of the deliverables specified in the three milestone contract in the event the Contract achieve at least one milestone contract”.

The joint site visits comprising audit team and officials of the Regional Office including the concerned site engineer as well as JV officials on 9th, 10th and 11th November 2017 and on 29th November 2017 at Yadi indicated that ZeoCrete pavement works were under progress. Further the review of the physical and financial progress as at 15th December 2017 furnished by the Regional Office indicated that though the work was required to be completed by 6th December 2017 as per contract agreement, the physical progress achieved was just 30.35% and financial progress of 53.29%. The status of physical and financial progress as of 15th December 2017 is as tabulated below:

Type of Work	Cost Distribution	% wise cost distribution	Physical achievement till date (%) (15/12/2017)		Financial Progress as of 15/12/17
			Work Completed against individual item of Qty.	Actual work completed in terms of % wise cost distribution	
<i>Section 4: Pavement Works</i>					
(a) Subgrade	1,000,500.00	0.59%	97.50%	0.58%	53.29 %
(b) GSB	11,175,000.00	6.59%	97.50%	6.42%	
(c) WMM	12,825,000.00	7.56%	0.00%	0.00%	

(d) CTB Layer	103,908,750.00	62.98%	37.07%	23.35%	
(e) AC	36,656,250.00	21.61%	0.00%	0.00%	
(g) Scarifying	1,139,250.00	0.67%	0.00%	0.00%	
Total Amount	169,633,500.00	100.00%		30.35%	

Further, on review of the milestones contracts signed between the Regional office and the JVC firms, the quarterly progress of works to be achieved were fixed as below:

Table 9.15(1)-Quarterly progress of works

<i>Pavement Works</i>	1 st Qtr.	2 nd Qtr.	3 rd Qtr.	4 th Qtr.	5 th Qtr.	6 th Qtr.	
Activity	July – September 2016	October-December 2016	January-March 2017	April-June 2017	July-September 2017	October-December 2017	Total Qty.
(a) Subgrade		12,500.04	12,500.04	12,500.04			37,500.00
(b) GSB		5,208.35	12,500.04	12,500.04			
(c) WMM							
(d) CTB Layer			1,875.00	11,250.00			
(e) AC							
(g) Scarifying							

As verified from the RA bills, quantities of works executed as of 2nd RA Bill 9, were as under:

Table :9.15(2)-Detailing quantities of work executed

<i>Pavement Works</i>	Qty. as per BOQ	1 st RA Bill	2 nd RA Bill	Total	
Activity					
(a) Subgrade	37,500.00		33,750.00	2,812.50	36,562.50
(b) GSB	9,375.00		5,625.00	3,515.63	9,140.63
(c) WMM	75,000.00				-
(d) CTB Layer	75,000.00		15,108.38	15,133.00	30,241.38
(e) AC	75,000.00				-
(g) Scarifying	37,500.00		3,000.00	26,250.00	29,250.00

It is apparent from the aforementioned tables that the works progress were far behind the agreed milestones and also evident from the physical progress as of 15th December 2017 of just 30.35% against 100% completion of works as per contract agreement.

It is also evident that the Regional Office had not enforced the contract provisions of GCC 58 and additional clause stipulated under SCC (GCC 58.2).

However, the contract duration was found revised up to March 2018 based on the proposal to directly award the Drainage works estimated at **Nu. 13,655,956.00**. The work was found not awarded as of the date of audit i.e. 2nd December 2017 and on the date of decision of the time extension.

Considering the above facts and events, such decisions and action on the part of the DOR and Ministry in particular MLTC was detrimental to the interest of the Government particularly when JVC firm had totally failed to complete the work within the completion deadlines of 6th December 2017. The decisions of the MLTC on the extension of contract durations on the basis of proposal to award the drainage works was in total violation of Section 4.2.5.2(f) of the PRR and an extension of undue favour as it had resulted in waiver of the leviable liquidate damages.

The time extension granted on the basis of proposal to award additional works at the verge of expiry of contract period was not appropriate.

The Ministry should comment on the direct award of drainage works involving Nu.13.656 million on the justification of faster execution of works ensuring timely completion. Besides, the Ministry must immediately issue appropriate order that time extension is approved subject to liquidated damages as otherwise the officials responsible should be held accountable for the same. Since additional works were not awarded as of the dates of audit (2nd December, 2017) and progress of work was not satisfactory and far below the agreed milestones, liquidated damages should be levied.

Auditee's Response

The ambiguity of award of drainage work to the firm & favoritism as ruled out by RAA is completely wrong. Since the drainage work was missing in the contract agreement/BOQ, RO has informed DoR HQ and accordingly it was proposed for either taking up the work departmentally/open tender etc. After lengthy deliberation by the MLTC members, it was decided to award the work to the same contractor viewing the pros and cons: at the implementation stage and shifting of blame game among the contractors. (Stray case about 1 km ahead of the project, where M/s. Yarkay was awarded the Zeocrete work and Project Dantak doing the drainage work). The very firm was not interested to carry out the drainage work and it was the department who forced the contractor to carry out the work. With regards to imposition of LD, it will be definitely imposed as per contract clause. (refer MLTC decision copy for reference). With the reasons as cited above request the RAA to kindly drop the memo and not to pursue further.

RAA's Further Comments & Recommendations:

While taking note of the response, it is to reiterate that the works progress were way far behind the initial contract completion deadline of 6th December 2017 as well as the agreed milestone as the physical progress as of 15th December 2017 stood at just 30.35%. The revision of completion deadline on the basis of proposed additional works by the MLTC at the verge of the expiry of the contract period was unfounded and not in the interest of the government. The decision to award the additional works has not only further exacerbated the work progress of the JVC firms but also added to time overrun of the contract. It was also noted that additional work order was found not issued as of 2nd December 2017 indicating that the decision of the MLTC to award the additional works were driven by urgency to protect the firm from liability of liquidated damages.

Further the direct award of additional works valuing Nu.13.656million was also in violation of provisions of the PRR and had also deprived the Government from obtaining competitive rates as the award was based on departmental estimated cost.

However as agreed in the audit exit meeting liquidated damages levied should be deposited into Audit Recoveries Account within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Besides, the DOR and the Ministry should also furnish the copy of work order along with actual start date and completion date of the additional works.

The DOR and Ministry should also comment on the non- awarding of drainage works on competitive bids as the work could be carried out separately by a different contractor. The Ministry should hold the MLTC accountable for the unfounded award of additional works despite the fact the firm had totally failed to progress the works within the contract time periods.

The unfounded decisions and processes by authority in position existing within the government system in the procurement of works impeding project success in terms of time, cost, and quality are brought to the notice of the Government for appropriate decisions and actions.

Who is accountable?

Direct Accountability	: 1. Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2. Karma Galey, Former Director, DoR, EID No.9507059 3. Tenzin, Former Director, DES, EID No.9801115 4. Ugyen Thinely, Adm Officer, EID No.9511047 5. Karma Ugyen, CAO, EID No.2101187 6. MN Lamichaney, Specialist, EID No.9002018 7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.16 Non-assessment of actual cost savings over the conventional system

From the proposal submitted by M/s BZPT vide letter No. BZPT-JVC/MW&HS/01 dated 18th September 2015 stated that on comparison of the conventional construction method using high aggregates/Bitumen rich input with the ZeoCrete Pavement Technology Crust configuration it was found that not only the cost using ZeoCrete Technology is comparable to what has been provisioned by DOR for Conventional Construction but it also amongst others offered the following:

Sl.N o.	Benefit	Cost saving expected
1	High speed of Construction almost 1.0 Km per day-	Faster Completion of works
2	75mm thick BMD layer is eliminated	Direct saving of INR from Bhutan for sourcing bitumen and saving in high quality chips which is always in scarcity
3	225mm WMM Base Layer is reduced to 100mm	Saving in aggregates
4	50mm thick BC layer is reduced to 40mm	Direct saving in INR outflow from Bhutan for sourcing Bitumen and saving in scarce high quality chips
5	Conservation of natural resources	Due to least aggregates dependency
6	High Mechanistic Construction	Ensures consistency in quality output and least dependency on labour
7	Encouraging the local supplier and manufacturers	

The analysis of cost impact and savings if carried out by the Ministry based on the proposal prior to direct awarding of the contract was not made available on records.

The RAA while comparing the Basic rates for Bitumen 80/100 with the ZeoCrete Materials noted substantial cost difference in terms of cost per kg and metric tonne as tabulated below:

Tablw: 9.16 (1)- Detailing cost variations								
Sl.No	Material Type	Unit in Kg	Unit kgs in tonne	Basic rate as per BSR 2015 (S/J) in tonne (Nu)	Rate charged by the JV firms per kg	Unit rate in Kg	Unit rate in tonne	Remarks
1	Bitumen 80/100 used in DMB/AC	Kg	1000	51,510.00		51.51	51,510.00	Transportation charges up to site to be added only
2	ZeoCrete Admixture material	kg	1000		737.00		737,000.00	
	Cost variation in tonne						685,490.00	Substantial cost difference on the procurement of ZeoCrete materials.

The Ministry besides commenting on the cost impact including cost savings carried out on the above contract works should review the cost benefits of the new technology prior to embanking in such technology for the proposed Chainage between Nagtshang to Korila and in other road constructions as recommended by the Hon'ble Minister in the proposal note submitted by the Secretary. While the technology may revolutionize the system of doing highway pavements works as recommended by the Secretary, it is imperative to ensure its cost effectiveness in terms of use of scarce government resources.

Auditee's Response

Savings Expected by introduction of the Cementitious Technology:

Considering the different life spans of the two pavement construction methods from life cycle cost analysis considering the normal periodic treatment cycle of 5 years for conventional and 6.5 years by 30% derived life enhancement accrued for CTB method, the number of treatments (resurfacing) required by conventional method would be 4 in 20 years whereas by CTB technology the number of treatment required would be 3 only in 19.5years (say for same 20 years). Each periodic treatment to be carried out in the same manner as we do for NEWH today costs Nu. 17.50 million/km]. By this analysis, we save Nu. 0.875million/km/year.

From the recent experience on the procurement process for the employment of the new technology for the remaining stretch from Ngatshang to Korilla (10.50km) we have obtained in terms of cost for instance, for this technology in comparison to conventional technology, from the quotations received from the lowest evaluated bidder (out of eight bidders who participated), the new technology works out cheaper by Nu. 1.263 million/km. The only change we suggested was using the minimum required binder input of 1.15kg/m² as specified in the specification against the existing input of 1.35kg/m² in the demonstration contract.

On account of many observations made so far, as shortfalls (the explanation / justification is being submitted now) of the Cementitious Technology, the work has been dropped from DoR's priority for execution by new technology.

RAA's Further Comments & Recommendations:

While the RAA agrees to disagree on the response as the execution of pavement works with the new technology between Yadi –Ngatshang is in progress and has no known knowledge on the requirement of normal periodic treatment cycle for new technology as compared to conventional method as asserted in the response.

However, after the exit meeting, the team along with the Officials from DOR, HQ and the RO visited various construction sites including the ZeoCrete pavement construction site for verification of rectified defective works. The team noted damages in some stretches of completed ZeoCrete pavement works as depicted in the Photographs below:



Fig 9.16(2)- Damages of ZeoCrete Pavement soon after execution of works

Thus, in the light of the damages of ZeoCrete pavement works within short span of its laying indicated execution of works either not as per technical specification or with poor workmanship. However, the DOR and Ministry should carry out due diligence exercise while embarking on new technologies to safeguard the interest of the Government and its scarce resources in future.

Who is accountable?

Direct Accountability	: 1.Phuntsho Wangdi, Ex Secretary, EID No. 8403049 2.Karma Galey, Former Director, DoR, EID No.9507059 3.Tenzin, Former Director, DES, EID No.9801115 4. Ugyen Thinely, Adm Officer, EID No.9511047 5. Karma Ugyen, CAO, EID No.2101187 6. MN Lamichaney, Specialist, EID No.9002018 7. M/s Bhutan Zeocrete pavement Technology, Joint Venture Company
Supervisory Accountability	: Phuntsho Wangdi, Ex Secretary, EID No. 8403049

9.17 Substantial cost variation in use of Zeocrete Pavement Technology over the conventional Pavement construction in terms of departmental estimates indicating disadvantages of new technology in terms of cost – Nu.9,974,156.25.

The adoption of Zeocrete pavement technology was found discussed in the MLTC meeting dated 01/03/2016 as evident from the minutes of meeting documented under letter No. DoR/CD/GOI/PMU/19/2015-16/2205 dated 01/03/2016. The audit team in line with the direct award of the works also obtained clarification from the Secretary, MOWHS on the adoption of Zeocrete Pavement Technology in Bhutan on 26/12/2017. The Hon’ble secretary highlighted the advantages of Zeocrete Pavement Technology as here under:

- i. Minimize the Bitumen import quantity;
- ii. Minimize the Bitumen burning thereby causing no damage to the environment;
- iii. Reduction in quarry production of aggregates;
- iv. Reduction in construction time;
- v. Cementitious base (CTB) is very effective in cold & marshy areas; and
- vi. **Lower cost compared to the conventional construction.**

In addition, the MOWHS showed cost saving of Nu. 696,306.63 per kilometer by using the Zeocrete pavement technology as depicted in **Appendix J**. The RAA while reviewing the cost comparison and cost savings worked out by the Ministry, noted that cost comparisons were found made by applying BSR 2017 base rates despite the fact that the works were being awarded and executed from June 2016 and up to December 2017. However, cost comparison in consideration to the BSR 2015 base rates alone revealed that the cost of construction of pavement works under the conventional construction system was lower by Nu. 9,974,156.25 (5.98%) as compared to Zeocrete pavement technology as detailed in **Appendix “J2”**.

The substantial cost impact on the Government Exchequer indicated disadvantages of the technology. The Ministry should also take note of existence of other technologies for soil stabilization for road works to ensure cost effectiveness of the construction of pavement works. The Ministry of Works & Human Settlement (MOWHS) should provide comments on the savings while the proposal itself indicated higher cost by 3.7%. The Ministry should consider need for further examining the validity of technical justifications and merits of the new technology as well in the light of above audit findings.

Auditee’s Response

Savings Expected by introduction of the Cementitious Technology:

Considering the different life spans of the two pavement construction methods from life cycle cost analysis considering the normal periodic treatment cycle of 5 years for conventional and 6.5 years by 30% derived life enhancement accrued for CTB method, the number of treatments (resurfacing) required by conventional method would be 4 in 20 years whereas by CTB technology the number of treatment required would be 3 only in 19.5years (say for same 20 years). Each periodic treatment to be carried out in the same manner as we do for NEWH today costs Nu. 17.50 million/km]. By this analysis, we save Nu. 0.875million/km/year.

From the recent experience on the procurement process for the employment of the new technology for the remaining stretch from Ngatshang to Korila (10.50km) we have obtained in terms of cost for instance, for this technology in comparison to conventional technology, from the quotations received from the lowest evaluated bidder (out of eight bidders who participated), the new technology works out cheaper by Nu. 1.263 million/km. The only change we suggested was using the minimum required binder input of 1.15kg/m² as specified in the specification against the existing input of 1.35kg/m² in the demonstration contract. On account of many observations made so far, as shortfalls (the explanation / justification is being submitted now) of the Cementitious Technology, the work has been dropped from DoR's priority for execution by new the technology.

RAA's Further Comments & Recommendations:

The RAA agree to disagree with the response in the absence of pass comparison of time, cost and quality of the new technology, the DOR. However, DOR and the Ministry should appropriately carried out cost benefit analysis on the new technology on completion of the pavement works presently being executed with the new technology as to embark of such technology for all pavement works in the event of quality and normal periodic treatment cycle overrides the initial cost of the project.

The cost benefit analysis carried out on the new technology with that of conventional method and its outcome along with decisions taken for or against the new technology intimated to RAA for records.

Who is accountable?

Direct Accountability	<i>Phuntsho Wangdi, Ex Secretary, EID No. 8403049</i>
Supervisory Accountability	<i>Phuntsho Wangdi, Ex Secretary, EID No. 8403049</i>

9.18 Non-conduct of rate analysis for Cementitious base (CTB) item work Nu. 97,125,000.00

The rates for the Cementitious base (CTB) layer was agreed at Nu.1,295 per square meter for execution of 75000 square meter CTB amounting to Nu.97,125,000.00. Since, item of work is not in BSR, the rate should have been analyzed by the Ministry as required in terms of PRR and BSR for rates not available in the BSR instead of accepting the rates quoted by the JV firm.

The Ministry should furnish justification for not analyzing the rates for CTB layer and also not exploring other manufacturers of binder admixture for road works to ensure reasonableness of the quoted rates by the JV firm.

Auditee's Response

The contract for the construction of Cementitious Base pavement on Yadi -Ngatshang stretch (10 km) was awarded to the BZPT JV by the Ministry /Department based on the Proposal submitted by the JV. Since, the technology was new to DoR engineers, we had to depend on the design mix proposed by the BZPT JV.

RAA's Further Comments & Recommendations:

It is apparent from the response that while the Ministry had opted for new technology to enhance durability and to achieve cost efficiency in the construction and maintenance of highway pavements, it did not exercise due diligence in terms of ascertaining correctness and reasonableness of the rate for the Cementitious base (CTB) layer charged at Nu.1,295 per square meter and had entirely depended on the proposal of the JVC firm.

It is also to reiterate that in terms of IFB floated in the media vide IFB letter No. DoR/ROL/Plg-17/16-17/1161 dated 20/3/17 for the execution of pavement works with the new ZeoCrete Technology between chainage Ngatshang-Korila, eight (8) prospective firms had submitted their bids and the offered their price. The rates quoted particularly for ZeoCrete item of works(CTB) were as tabulated below:

<i>Sl/No</i>	<i>Name of contractors</i>	<i>Quoted Amount Nu.</i>	<i>CTB rates (Nu.)</i>	<i>Remarks</i>
1	<i>M/s Gayjur Construction Co. Pvt Ltd, Mongar</i>	<i>118,648,500.00</i>	<i>900.00</i>	<i>P &L 210-250mm thick CTB layer comprising laying soil/stone (SMB) bed to required thickness duly levelled, Insitu crushing and pulverising followed by spreading of admixtures homogenizing compaction and curing (Admixtures input: ZeoCrete @1.35 kg/M2 & OPC Grd. 43@ 40kg/M2</i>
2	<i>M/s Gyalco Infrastructures Pvt Ltd</i>	<i>189,316,800.00</i>	<i>1,670.39</i>	
3	<i>M/s Somon Company Pvt Ltd, Gelposhing</i>	<i>138,176,887.50</i>	<i>1,000.00</i>	
4	<i>M/s BZPT (JV)</i>	<i>189,072,000.00</i>	<i>1,429.00</i>	
5	<i>M/s Muensl Builder Pvt. Co. Gelephu</i>	<i>108,982,500.00</i>	<i>600.00</i>	
6	<i>M/s Karma Construction Pvt Ltd, S/Jongkhar</i>	<i>170,201,250.00</i>	<i>1,248.00</i>	
7	<i>M/s Kuenga Construction. Pvt ltd, Paro</i>	<i>111,428,250.00</i>	<i>772.00</i>	
8	<i>M/s Diamond Construction Pvt Ltd, Thimphu</i>	<i>126,671,250.00</i>	<i>600.00</i>	

It would be noted that except two bidders, Six (6) bidders had quoted the rates for the CTB item of works as low as Nu. 600 per Sqm to Nu.1248 per Sqm which is indicated that the rate charged by the JVC firm was not realistic and reasonable.

However, the Ministry should review the price charged by the JVC firms in the light of above quoted prices to ascertain the reasons for such substantial variations in the quoted rates. It may be highlighted that the quoted rates for three (3) bidders were either less or minimally higher than cost of ZeoCrete of Nu.670.00 per kg charged by the JVC firm.

The Ministry should intimate the outcome of review on the substantial rate variations to the RAA.

Who is accountable?

<i>Direct Accountability</i>	<i>Phuntsho Wangdi, Ex Secretary, EID No. 8403049</i>
<i>Supervisory Accountability</i>	<i>Phuntsho Wangdi, Ex Secretary, EID No. 8403049</i>

PART C: FINDINGS OF RECOMMENDATORY NATURE WITHOUT ACCOUNTABILITY

The audit findings under this section of the report contains those issues, which are recommendatory in nature and intended to bring improved compliances through appropriate interventions and as such no accountability has been fixed for the findings. However, in the event the DOR and the Ministry do not take measures and actions on the recommendations within three months' time from the issue of the report, as agreed during the exit meeting, the RAA would fix the accountability for appropriate action.

10 Inclusion of irrelevant item cost in departmental estimates with resultant double benefit to the contractors Nu. 13.294 million

Technical Specification for the Double Lanning of Northern East West Highway Section 111, Environment Protection Works section (1) underlines provision and maintenance of Camps, Office, stores, equipment yards and workshops and Section 103-Insurance. It also provides under general requirement that contractor has to comply as stipulated in clause 105(5) Traffic Safety & Control, 110-Erect of Notice board and 311-Laboratory Equipment". In addition,

under relevant Sections on **Measurement and Payment**, it again clearly stipulates, ***“No separate measurement and payment shall be made for the works described in this clause. All the costs in connection with the work specified herein shall be considered included in the related item of work specified in the bill of quantities”***.

Further, the estimates and BOQs prepared by the Regional Office, Lobeysa and Thimphu for the same Double Lanning works had not included such item of works in the BOQs.

On reviewing the departmental estimates and BOQs prepared for the construction of Pavement and FC works, it was noted that in contrary to the technical specification ***“Installation of labor camps, contractor’s site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. as per Technical Specification” including Insurance*** involving Nu.13,294,425.00 were found incorporated in the BOQs as a separate item of works as tabulated below:

Sl/ No	Name of Contractors	Scope of Work in KM	Departmental estimates. Section 1 General	Estimates amount for insurance	Insurance % to total estimated cost of Section 1-General	Estimated Cost without bitumen (Nu.)	General cost % in terms of estimated cost without bitumen
1	Chainage: 52 - 73.19km (Package - 1) Departmental	21.19	1,744,875.00	650,000.00	37.25	249,435,128.13	0.70
2	M/s. Tshering Construction Pvt. Ltd Korila-Pangser(73.19-78.89 [PKG - 2]	5.70	1,744,875.00	650,000.00	37.25	81,880,587.26	2.13
3	M/s. KD Builders Pvt. Ltd Pangser – Kilikhar (78.89-84.89=) [PKG – 3]	6.00	1,794,875.00	700,000.00	39.00	94,540,344.91	1.90
*4	M/s. Gongphel Construction Pvt. Ltd Kilikhar - Mongar (84.89-89.89) [PKG - 4]	5.00	2,194,875.00	1,100,000.00	50.12	77,261,894.35	2.84
5	M/s Norbu Construction Pvt Ltd, Gelephu (Mongar - Gangola (89.89-101.45) [PKG - 5]	11.56	2,294,875.00	1,200,000.00	52.29	130,768,042.79	1.75
6	M/s. Rigzar Construction Pvt. Ltd Gongola-Kurizampa PNH (102.45-114.45) (Package 06)	12.00	2,294,875.00	1,100,000.00	50.12	140,117,332.29	1.57
7	M/s. Tshering Construction Pvt. Ltd Kurizampa - Lingmethang (114.45 - 118.45) (0.00-4000.00) [PKG - 7]	4.00	1,225,175.00	500,000.00	40.81	66,922,899.15	1.83
	Total		13,294,425.00	5,900,000.00			

Inclusion of such item of works by the Regional Office, Lingmethang indicated preparation of flawed BOQs and extension of undue favour to the contractors as the Technical Specification categorically stipulated, ***“No separate measurement and payment shall be made for the works described in this clause. All the costs in connection with the work specified herein shall be considered included in the related item of work specified in the bill of quantities”***.

More so, the inclusion in the BOQs had double benefited the contractors by way inbuilt of cost of such works in the item of works quoted rates and payment as a separate item of works.

Further, it would be apparent from the table above that the cost estimates for the item of works were not align to either chainage coverages or estimated cost of the packages. Such adhoc fixation and incorporation of amounts in estimated cost indicated absence of standard requirements/norms and procedures. The cost estimated for the item of work of just 5Km coverage was Nu. 2.194 million as compared to cost estimates of Nu.1.745 million for 21.19 km coverage. Likewise, the lump sum insurance for 5 km Chainage was provisioned for Nu.1.100 million as against Nu. 0.650million provisioned for 21.19 km coverage. In addition, it is also apparent that the insurance provisional amounts varied from 37.25 % to 52.12% indicating adhoc or discretionary provisioning of insurance amounts.

The Ministry should comment on the inclusion of such item of works in the departmental estimates prepared by the RO, which were in total violation of the provisions of the technical specification as well as resulted into double financial benefit to the contractors. Besides, the Ministry should also comment on the adoption of two different approaches for the preparation of cost estimates and BOQs as the Thimphu and Lobeysa ROs had not incorporated such item of works in the BOQs. The Ministry should also review circumstances leading to application of varying percentages of cost including lump sum insurance amounts not aligning to scope of works in terms of Chainages coverage and cost estimates of the contract works. Further, the Ministry should also fix the accountability on the officials responsible for the preparation of flawed estimates, which had resulted into extra financial burden to the Government Exchequer.

Auditee's Response

In general and internationally practiced, the installation of labor camps, contractors site office, accommodation of sanitary and stores, signage, water supply, electricity and laboratory facilities including equipment etc. are included in the BOQ. Although the technical specifications limits the payment to this effect, the item was included in the BOQ, thus the Regional Office made the payment as per the quoted rate in the BOQ. The Bhutan standard of rates also indicates that such items can be included in the BOQ.

The Regional Office however regrets that enough time was not given to the DoR to go through the imported Technical specifications and thus difference occurred between BOQ and the TS. However care shall be taken not to repeat and therefore request RAA to drop the memo.

RAA's Further Comments & Recommendations:

While taking note of the response that "the installation of labor camps, contractor's site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc' are allowed in RNP-II Project under ADB project and also in BSR 2017, page 105 under the Chapter 21 was not tenable as the bidders are expected to include the said cost in their related rates of item of work.

In addition, the fact remains that the Technical Specification for the Double Lanning of Northern East West Highway, Section 111, Environment Protection Works sub-section (1) underlines "Provision and maintenance of Camps, Office, stores, equipment yards and workshops". It also provides under general requirement that contractor has to comply as stipulated in clause 105(5) Traffic Safety & Control, 110-Erect of Notice board and 311-

Laboratory Equipment”. Further, under sub –sections on *Measurement and Payment*, it again clearly stipulates, *“No separate measurement and payment shall be made for the works described in this clause. All the costs in connection with the work specified herein shall be considered included in the related item of work specified in the bill of quantities”*.

In addition, the ROs of Lobeyisa and Thimphu had not incorporated such item of works as a separate item in the BOQs and had aligned the estimates and BOQs as per the technical specification.

The incorporation of “installation of Provision and maintenance of Camps, Office, stores, equipment yards and workshops” in the estimates/BOQs despite categorically defining in the technical specifications is an indicative of that the RO had deliberately disowned the provisions outlined in the technical specification in the preparation of estimates and BOQs as to favour the prospective bidders. It also indicated laxity and complacency on the part of the RO to enforce and incorporate the provisions defined in the technical specifications in the estimates and BOQs. Thus, the incorporation of such as a separate item of works in the BOQs had resulted in double benefits as the quoted rates of contractor for the related items of works is built up cost inclusive of cost of establishment of Camps, Office, stores, equipment yards and workshops and all risks factors. The violation of the provisions of the technical specification during the preparation of the cost estimates and BOQs had resulted into extra and avoidable financial burden to the project to the extent of Nu.13.294 million. The Ministry should fix the accountability on the officials responsible for the unwarranted violations and laxity for appropriate action.

The huge financial loss to the extent of Nu. 13.294 million to the government Exchequer is bought to the notice of the Government for appropriate decisions and actions.

11 Inclusion of irrelevant item of work in BOQs and inadmissible payment thereof- Nu. 11,750,000.00

Technical Specification for the Double Lanning of Northern East West Highway para 111, Environment Protection Works section (1) underlines provision and maintenance of Camps, Office, stores, equipment yards and workshops. It also provides under general requirement that contractor has to comply as stipulated in clause 105(5) Traffic Safety & Control, 110-Erect of Notice board and 311-Laboratory Equipment”. In addition, under sub para on **Measurement and Payment**, it again clearly stipulates, *“No separate measurement and payment shall be made for the works described in this clause. All the costs in connection with the work specified herein shall be considered included in the related item of work specified in the bill of quantities”* and workers viz-a-vis proper storage of materials and equipment and all related costs included in related item of work specified in the bill of quantities.

Further, the estimates and BOQs prepared by the Regional Office, Lobeyisa and Thimphu for the same Double had not included such item of works in the BOQs.

On reviewing the estimates and BOQs, it was noted that in contrary to the technical specification “the Installation of labor camps, contractor’s site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. were found incorporated in the BOQs as a separate item of works. The details of estimated and quoted amounts, and amounts paid were as tabulated below:

Table:11- Detailing estimated cost and quoted amounts including payments thereon				
SL.No	Name of Contractors	Departmental estimates .Nu	Quoted amount Nu.	Amount paid
1	M/s. Tshering Construction Pvt. Ltd Double Lanning of NEWH from Kurizampa - Lingmethang (114.45 - 118.45 = 4 km) [Package - 7]	1,225,175.00	2,500,000.00	2,500,000.00
2	M/s. Rigsar Construction Pvt. Ltd Widening of NEWH Gongola-Kurizampa PNH [Package 6]	2,194,875.00	250,000.00	250,000.00
3	M/s Norbu Construction Pvt Ltd, Gelephu (Mongar - Gangola (90.89 - 102.45 = 11.56 km) [Package - 5]	2,294,875.00	700,000.00	700,000.00
4	M/s. Gongphel Construction Pvt. Ltd Double Lanning of NEWH from Kilikhar - Mongar (84.89 - 89.89 = 5.00 km) [Package- 4]	2,194,875.00	1,000,000.00	1,000,000.00
5	M/s. KD Builders Pvt. Ltd Double Lanning of NEWH from Pangser - Kilikhar (78.89 - 84.89 = 6.00 km) [Package- 3]	1,794,875.00	4,800,000.00	4,800,000.00
6	M/s. Tshering Construction Pvt. Ltd Double Lanning of NEWH from Korila - Pangser (73.19 - 78.89 = 5.70 km) [Package - 2]	1,744,875.00	2,500,000.00	2,500,000.00
	M/s. Bhutan Zeocrete Pavement Technologies (JV) Double Lanning of NEWH from Yadi - Ngatshang (51.00 - 61.00 = 10.00 km) [PKG - 1 (a)]	1,744,875.00	-	-
	Total			11,750,000.00

Inclusion of such item of works by the Regional Office, Lingmethang in violation to the provisions of the technical specifications had double benefited the contractors by way inbuilt of cost of such works in quoted rates of related item of works *specified in the bill of quantities* and payment as a separate item of works.

The Regional Office besides, justifying the inclusion in the BOQs as items of works in addition to the requirements stipulated in the Technical Specification, should made good the payment of Nu.11,750,000.00 which had resulted in double benefits to contractors and deposit in Audit Recoveries Account.

The Ministry should also investigate the incorporation of such item of works in the BOQs and hold the officials responsible for the incorporation in the BOQs despite clear stipulation in the technical specifications as well as the Thimphu and Lobeysa ROs had not entertained such item of works in the estimates and BOQs.

Auditee's Response

The Regional Office, Lingmethang was entrusted to carry out the Double Lanning of highway from Yadi to Lingmethang (85km) as a part of NEWH Project. As discussed in the first Project Management Meeting held in Thimphu, the DoR HQ has developed standard bidding document, Bill of Quantities (BoQ) and technical specification and distributed to the ROs. In the standard BoQ, the items were more or less kept same for all ROs executing NEWH Project, apart from few site specific requirements. For example, RO Trongsa & RO Lingmethang as more or less same items in the BoQ.

Internationally it is a common practice to have separate item for 'the installation of labor camps, contractor's site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc' in the BoQ. A copy of

BoQ of RNP-II Project under ADB is attached for ready reference. The incorporation of above items as a separate item in the BoQ provides fair quote in the prices amongst the prospective contractors.

Also the BSR 2017, page 105 under the Chapter 21: Road Works, there is a provision to include the cost of installation of labour camps, including water supply etc as separate item. The unit given is lumpsum. A copy of BSR 2017 (page 105) attached for ready reference. As per the contract provision, the contractor is paid only about 80% of the quoted amount once the construction of camps, toilets etc are completed, and 20% after completion of the project and after dismantling the camps, stores, toilets and restoring the site to the original ground level. The 20% provision to pay the end of the completion of work is to ensure that the environment surrounding is fully restored.

RO would like to apprise RAA that the clause 111 - Environment Protection implies environmental requirement for maintaining and safeguarding the environment during the execution of the contract. In particular, the contractor shall fully comply with the Environment Codes of Practice for Highways and Roads.

The NEWH activities were in full swing in Thimphu and Lobeysa RO. From those ongoing projects, DoR HQ learnt that environment protection activities should be included in the BOQ under Lingmethang and Trongsa RO for which sample BOQ was also received from DoR, HQ to be incorporated. Moreover the rate analysis done by the department does not cover the cost of installation of camps, stores, labs etc in various items of the BoQ since it was provided as separate item. Even today, the rates of labour camps, site office, stores, water supply etc are not included in other items of BoQ and neither there is a provision in the LMC to insert these costs. RAA's observation and comment of double benefiting the contractor by way of inbuilt of cost of such works in the items of works quoted rates and payment as a separate item of work may not be true since no bidder will make a mistake of building its components into various items of BoQ and separate item and unnecessarily increasing the bid price and leveraging his/her own chance of being defeated in the competition. Since there was a separate item in the BoQ, the activity was jointly measured by the team and accordingly paid 80% for those executed items. 20% of the cost was retained until completion of the project and restoration of site to its original level.

RAA's observation is seriously noted and shall be discussed further with the department and Ministry to streamline such contradictions in future road project. The RO regrets to inform RAA that technical specification could not be visited thoroughly due to time constraints, hence RAA is requested to kindly drop the memo.

RAA's Further Comments & Recommendations:

*While taking note of the response, the fact remains that under various Sections of the Technical Specifications outlined that **"No separate measurement and payment shall be made for the works described in this clause. All the costs in connection with the work specified herein shall be considered included in the related item of work specified in the bill of quantities"**. In addition, the ROs of Lobeysa and Thimphu had not incorporated such item of works as a separate item in the BOQs and had aligned the estimates and BOQs as per the technical specification.*

The incorporation of inadmissible items of works in the estimates and BOQs despite the fact that such item of works were not entertained by the RO Lobeysa and Thimphu who had initially executed the double lanning work indicated deliberate disowning the provisions outlined in the technical specification by the RO Lingmethang in the preparation of estimates and BOQs as to extent undue favour to the prospective bidders. It also indicated laxity and complacency on the part of the RO to enforce and incorporate the provisions defined in the technical specifications in the estimates and BOQs. Thus, the incorporation of such as a separate item of works in the BOQs had resulted in additional financial benefits to the extent of Nu. 11,750,000.00.

A cross check on the rate analysis submitted for the DBM and AC works, it was noted that in respect of M/s Welfare Construction have specifically incorporated the cost for installation of camps machinery yards, tools as 5% for DBM and 2% of AC to the overall unit cost of the item of work in addition to 26% charged as overhead and profit as tabulated below:

Welfare 9 DBM							
	<i>As per LMC</i>				<i>As per Contractor</i>		
Description	Quant	Unit s	Rate	Amount	Quant	Rate	Amount
Labour	0.05120	day	500	25.60	0.05478	500	27.39
Road Broom	0.00007	day	800	0.06	0.00008	800	0.06
Tractor with trailer	0.00007	day	10000	0.70	0.00008	10000	0.80
Asphalt heating kettle	0.00062	day	10000	6.20	0.00066	10000	6.60
Bitumen sprayer	0.00045	day	4000	1.80	0.00048	4000	1.92
Spot mix plant	0.002475	day	30000	74.25	0.00247	30000	74.10
Generator & control panel	0.00000		0	0.00	0.00247	15000	37.05
Asphalt paver	0.00014	day	14000	1.96	0.00015	14000	2.10
Road roller	0.00045	day	15000	6.75	0.00048	15000	7.20
Pneumatic roller	0.00045	day	15000	6.75	0.00048	15000	7.20
pay loader	0.00091	day	15000	13.65	0.00097	15000	14.55
tata tipper	0.00180	day	4200	7.56	0.00193	4200	8.11
compactor plate type	0.00330	day	950	3.14	0.00393	950	3.73
bitumen 80/100 trans	0.01065	MT	0	2.00	0.00140	0	2.00
crushed rock 20mm	0.02403	cum	1450	34.84	0.02400	1450	34.80
crushed rock 12.5	0.02403	cum	950	22.83	0.02400	950	22.80
Sand	0.03204	cum	900	28.84	0.03199	900	28.79
				236.92			279.20
Add 5% for installation of camps, machinery yards, Tools							293.16
Add 1% Water Charge				239.29			296.10
Add 15% overhead charges				275.18			340.51
Add 10% contractors profit				302.70			374.56
Total				303.00			375.00

Welfare 9 AC							
	<i>As per LMC</i>				<i>As per Contractor</i>		
Description	Quant	Units	Rate	Amount	Quant	Rate	Amount
Labour	0.01671	day	300	5.01	0.0547800	300	16.43
Road Broom	0.00007	day	1000	0.07	0.0000896	1000	0.09
Tractor with trailer	0.00007	day	3000	0.21	0.0000896	3000	0.27
Asphalt heating kettle	0.00044	day	4000	1.76	0.0005632	4000	2.25
Bitumin sprayer	0.00045	day	4000	1.80	0.0005760	4000	2.30
Spot mix plant	0.00158	day	30000	47.40	0.0024700	30000	74.10
Generator & control panel	0.000000		12000	0.00	0.00166	12000	19.97

Asphalt paver	0.00014	day	12000	1.68	0.0001792	12000	2.15
Road roller	0.00045	day	10000	4.50	0.0005760	10000	5.76
Pneumatic roller	0.00045	day	10200	4.59	0.0005760	10200	5.88
pay loader	0.00091	day	10000	9.10	0.0011648	10000	11.65
tata tipper	0.00180	day	3000	5.40	0.0023040	3000	6.91
compactor plate type	0.00330	day	600	1.98	0.0042240	600	2.53
bitumin 80/100	0.00821	MT	0	2.00	0.0014000	0	2.00
crushed rock 20	0	cum	1000	0	0.024	1000	24
crushed rock 12.5	0.02603	cum	900	23.43	0.0266600	900	23.99
Sand	0.02603	cum	700	18.22	0.0266624	700	18.66
				127.15			218.95
Add 2% for installation of camp, Tools							226.03
Add 1% Water Charge				128.42			228.30
Add 10% overhead charges				141.26			264.78
Add 10% contractors profit				155.39			301.26
Total				155.39			300.00

Thus, it is evident that the contractors had taken care of the cost of such items in the unit rates for the related item of works since the overhead and profits charges were ranging from 13.5% to as high as 26%.

However, as agreed during the exit meeting, RO and DOR in consultation with the Ministry should investigate the inclusion of such items as a separate item of works in the BOQs in violation to the provisions of the Technical Specification as to ascertain possible existence of collusive practices. The Ministry should fix the responsibility on the officials for such unwarranted lapses as it had result in double benefits to the Contractors executing contract work under RO Lingmethang since the RO Lobeyisa and RO, Thimphu had not incorporated as a separate item of work in the BOQ and contractors were to inbuilt such cost in the related item of works.

In addition, the Ministry should also investigate, on the Sample BOQs sent to RO, Lingmethang and Trongsa by the DOR, HQ with the instruction on the need to incorporate **environment protection activities in the BOQ under Lingmethang and Trongsa RO. The Ministry should also take appropriate action on the officials responsible of the decisions and actions disowning of the provisions of the technical specifications that were dully drawn up and approved for the enforcement on the double lanning works by the Ministry. . .**

The Ministry should made good the payments of Nu.11,750,000.00 either from the contractors or officials responsible which had resulted in double benefits to contractors. The amounts should be recovered within three months from the date of issue of the report beyond which penalty @ 24% per annum shall be levied as per Chapter IV, Section 4.5.1.4 of the Finance and Accounting Manual 2016 and intimated to RAA along with the documentary evidences of accountal in the books of accounts.

Further, the DoR and the Ministry should carry out appropriate studies on the estimates and BOQs drawn up by the ROs for the contract packages in terms of the provisions of the Technical Specifications as to identify flaws, ambiguities, inconsistencies, deficiencies, violations, irregularities and lapses as to come up with remedial measures and prevent financial implications for similar project in future. The outcome of the studies and measures initiated to put in place should be intimated to RAA for records and follow-up in future audits.

12 Slow progress of the work with result Abnormal delays of project works

The work progress as on 7th November, 2017 as compared to contract deadline and the work schedules showed that only M/s Rigsar Construction Pvt Ltd were able to cope up within contract deadline, while rest of contract works were found far behind the agreed work schedules. The details of physical progress of work achieved by the contractors are as shown below:

SL No	Name of Contractors	Work completion date as per the plan	Revised work completion date	Work Status	Physical progress as on 7/11/17	Remarks
1	M/s Norbu Construction Pvt Ltd, Gelephu (Mongar - Gangola (90.89 - 102.45 = 11.56 km) [PKG - 5]	22/01/2018	12/02/2018	Under progress	WWM started	3 months remaining as per completion deadline
2	M/s. Rigsar Construction Pvt. Ltd Gongola-Kurizampa PNH (Package 06)	27/12/2017	11/01/2018	Under progress	DBM & AC under progress	2 months remaining as per completion deadline
3	M/s. Gongphel Construction Pvt. Ltd Kilikhar - Mongar (84.89 - 89.89 = 5.00 km) [PKG - 4]	01/03/2018	23/03/2018	Under progress	Completed till WWM	4 months remaining as per completion deadline
4	M/s. KD Builders Pvt. Ltd Pangser -Kilikhar (78.89-84.89 = 6.00 km) [PKG -3]	14/07/2017	30/07/2017	Under progress	Completed till WWM	Already delayed by more than 3 months
5	M/s. Tshering Construction Pvt. Ltd Korila - Pangser (73.19 - 78.89 = 5.70 km) [PKG - 2]	09/07/2017	29/07/2017	Under progress	Completed till WWM	Already delayed by more than 3 months
6	M/s. Bhutan Zeocrete Pavement Technologies (JV) Yadi - Ngatshang (51.00 - 61.00 = 10.00 km) [PKG - 1 (a)]	06/12/2017	20/01/2018	Under progress	CTB layer under progress	2 months remaining as per completion deadline
7	M/s. Tshering Construction Pvt. Ltd Double Lanning of NEWH from Kurizampa - Lingmethang (114.45 - 118.45 = 4 km) [PKG - 7]	06/08/2017	22/08/2017	Under progress	Completed till WWM	Already delayed by more than 2 months

It is apparent from the table above, while the completion deadlines for M/s Rigsar Construction Pvt. Ltd. and M/s. Bhutan Zeocrete Pavement Technologies (JV) are still active up to December 2017, all other contractors had failed to complete the contract works as per completion deadlines. It also noted that three contractors had even failed to complete the contract works within the revised completion date. Such delays and failure to complete contract works within and extended timeframe indicated existence of inadequate monitoring and supervision mechanism over the contractor works and approved work program by the site supervisors and engineers. These also is an indicative of poor contract management system instituted within the Regional Office.

Further, the additional advance payments to contractors to speed up the works were defeated and did not provide value for money as completion deadlines are over by delays ranging from four to five months.

The RO, Lingmethang should comment on the circumstances leading to such delays and measures taken to address such delays. Besides, the RO may comment on the course of action against the contractors for the abnormal delays.

Auditee's Response:

We definitely agree the likely delays and slow work progress by the ongoing contractors under the RO and the field officials have left no stone unturned in speeding up the work progress. Following are the mechanisms taken place to ensure that the contractors really do their work and if not strong action will be taken as per the contract document at site with quality and within time frame.

- 1. The contract works are being monitored from time to time by conducting the monthly review meetings both at the field and the RO level with contractor's key personnel.*
- 2. The milestone contract was drawn with the contractor for three consecutive times and it was reviewed on monthly basis by the committee members both from the field and the RO level based on the work plan submitted to the Regional office. During such times, the contractor could cope up with the work progress substantially.*
- 3. Beside that we have the monthly review meeting, quarterly meetings conducted at both the RO and at the HQ level.*
- 4. For the abnormally delayed contractors in term of work progress, the matters are being forwarded to DOR/Ministry (MLTC level). The non-performing contractors are being terminated.*

For now it is to highlight that most of the NEWH project under Lingmethang RO has been completed except Yadi-Korila and Korila-Pangser. The Mongar to Gangola package has been terminated due to poor compliance from the contractor's side.

(Example the case of M/s. Norbu Const. Pvt. Ltd Gelephu has been terminated for non-performing and the contract has been terminated & slapped with a penalty of Nu. 11.190m & deposited into Govt. exchequer).

RAA's Further Comments & Recommendations:

While taking note of the response detailing various initiative taken to speed up the work progress including termination of one of the contractors, the fact remains that the all the contract packages were far behind the completion deadline and in some contract packages had already delayed beyond the completion deadlines. It is also apparent from the response that the RO and DOR including TMT team had not vigorously followed up to expedite the work progress. It was evident from the physical verification of deployment of committed key personnel and machineries and equipment that almost all the contractors had not only failed to deployed in entirety the committed key personnel and equipment but also replaced the key personnel with lesser qualifications and experiences and without appropriate approval of the RO. In addition, the contractors having two or three contract packages were allowed to use same machineries and equipment and personnel and some deployed machineries and equipment were found off roads.

Thus, it was construed that slow progress of works and abnormal delays were mainly due to the fact that the contractors lacked to deploy enough and efficient machineries and equipment and appropriate skilled personnel and possibly ineffective work plan scheduling of project as

well as Poor qualification of the contractors' technical staff exacerbated by poor supervisions and monitoring by the Site Engineer and RO.

Further, RO should imposed liquidated damages to all other contractors as per the contract agreement for abnormal delays and deposited into Audit Recoveries Account. In the event time extensions were granted, the RO should furnish the number of time extension sanctioned along with approving authority as well as documentary evidences supporting the grounds under which the time extensions were sanctioned.

However, as discussed during the exit meeting, the DOR and the Ministry should thoroughly carry out studies on the causes of delays and appropriate contract management system instituted in consideration to the following aspects in relation to the quantum of works and cost of the project as well as contract duration fixed for effective contract management of similar project in future:

- proper work plan scheduling of project ,
- defining types and number of machineries and equipment and efficiency requirements,
- adequate machinery and equipment deployment plan in relation to approve work plan schedules,
- adequate key personnel requirements and deployment plans, and
- Adequate Work force with appropriate technical skills requirements.

The studies conducted and actions and measures initiated to improve the contract management system as well as strict supervisions and monitoring controls over the human resources and machineries and equipment as to prevent laxity and complacency intimated to RAA for records and follow-up in future audits.

13 Ambiguity in Calculation of additional time for grant of time extension for increase scope of works

With the increase in pavement width (carriageway width) from 6.5 meter to 7.5 meter (1 meter), the completion date of the contract period was found revised accordingly. The scope of works in terms of Chainages allotted, initial completion date of the contract, additional time proposed by RO and actual number of days approved by MLTC as well as revised completion date for each contract are as detailed below:

SL. No.	Name of Contractors	Total Km awarded	Work completion date as per the plan	Revised work completion date	No. days proposal submitted by RO, L/thang	No of days revised by MLTC	Remarks
1	M/s Norbu Construction Pvt Ltd, Gelephu (Mongar - Gangola (90.89 - 102.45 km) [PKG - 5]	11.56	22/01/2018	12/02/2018	68	21	30% granted on department estimates.
2	M/s. Rigzar Construction Pvt. Ltd Gongola-Kurizampa PNH (Package 06)	12	27/12/2017	11/01/2018	49	15	
3	M/s. Gongphel Construction Pvt. Ltd Kilikhar - Mongar (84.89 - 89.89km)[PKG - 4]	5	01/03/2018	23/03/2018	71	22	
4	M/s. KD Builders Pvt. Ltd	6	13/07/2017	30/07/2017	55	17	

	Pangser -Kilikhar (78.89-84.89km) [PKG -3]						
5	M/s. Tshering Construction Pvt. Ltd Korila - Pangser (73.19 – 78.89 [PKG - 2]	5.70	09/07/2017	29/07/2017	64	20	
		40.26					

The audit team noted that in the absence of standard process for estimation of contract duration/ additional time for the increase of scope of pavement works by 1m, the RO had worked out the additional time by dividing the initial contract amounts by initial contract duration and obtaining the value of contract price per months and dividing the revised contact amount by value of contract price obtained per month.

The audit team is of the view that calculation of additional time taking in consideration of the whole contact value and initial contract duration was not appropriate as the increase in the scope of works was just 1m and related to only for bituminous pavement works. The initial contract duration was for the entire scope of works comprising of FC works, permanent works and pavement works. Further, while the MLTC had granted just 30% of the additional time computed by the RO, the decision was also found not rational and justified as the scope of work varied for each contractor. It would be noted that for M/s Norbu Construction Pvt Ltd. the scope of works entailed 11.56 km, the additional time work out by the RO was 68 days and MLTC approved just 21 days while the scope of works of M/s. Gongphel Construction Pvt. Ltd, was just for 5kms, the RO had worked out 71 days and approved 22 days. The RAA is on the opinion that in the absence of standardized processes for the estimation of contracture duration and addition time for increase/decrease in scope of works had led to adoption of varying practices by the RO, Lingmethang and MLTC with resultant ambiguity fixation of additional time against each package not aligning to the scope of works for pavement works only.

The Ministry should comment on the adoption of varying practices in the computation of addition time for a given increase of scope of works besides taking measures to come up with an appropriate standard processes for computing additional time rationally, consistently and fairly in relation to specified increase/decrease in the scope of works.

Auditee's Response:

The additional time required by each contractor was once analyzed at Regional Office depending upon the length of the each contract packages and accordingly RO has forwarded the case to the DoR, HQ for approval. However, the DoR, HQ revisited the time extension case and the MLTC as practiced/decided in the past had approved the time extension on Pro-rated basis. The time calculation on the pro-rated basis is purely depended on the rate quoted by the bidder. On the basis of pro-rated basis, 30% of time was given as extension due to following reasons:-

- *Increase in road pavement width was done at later stage and such there is no much of additional mobilization cost for small increase;*
- *There is no substantial increase in the quantity materials for 1m increase;*

RO would like to inform RAA that the observations made hereto shall be forwarded and discussed further with the Department and Ministry for streamlining the time calculation in future projects.

Based on above justification submitted RAA is requested to kindly drop the para.

RAA's Further Comments & Recommendations:

While taking note of the response, the fact remains that additional time computed by the RO and the approved by the MLTC were not consistent and rational in terms of varying scope of works executed by contractors.

It would be noted that the time extension approved in terms of the scope of works, the percentage computed on the total road length awarded, indicated that less additional time were approved for more scope of works and higher additional time for less scope of works as depicted in the table below:

SL. No.	Name of Contractors	Total Km awarded	Initial contract duration	No. days proposal submitted by RO, L/thang	No of days revised by MLTC	% of time extension in terms of Km awarded	Remarks
1	M/s Norbu Construction Pvt Ltd, Gelephu (Mongar - Gangola (90.89 - 102.45 km) [PKG - 5]	11.56	30	68	21	181	30% granted on department estimates.
2	M/s. Rigzar Construction Pvt. Ltd Gongola-Kurizampa PNH (Package 06)	12	28	49	15	125	
3	M/s. Gongphel Construction Pvt. Ltd Kilikhar - Mongar (84.89 - 89.89km)[PKG - 4]	5	30	71	22	440	
4	M/s. KD Builders Pvt. Ltd Pangser -Kilikhar (78.89- 84.89km) [PKG -3]	6	24	55	17	283	
5	M/s. Tshering Construction Pvt. Ltd Korila - Pangser (73.19 – 78.89 [PKG - 2]	5.70	24	64	20	350.88	
		40.26					

In the light of above inconsistencies and partiality in the computation of additional time for addition works, as discussed during the exit meeting, the DOR and the Ministry should put in place appropriate written procedures or thumb rules for the computation of contract durations enabling to appropriately compute additional time in relation to additional scope of works and prevent inconsistencies and partialities for project in future

14 Irregular payment of compensation for drinking water- Nu. 2,505,000.00

In line with the approval accorded by Secretary, MoWHS under Note Sheet No. DoR/CD/32/16-17/4047 dated 6/6/2017, an amount of Nu.2,505,000.00 was paid to Eastern Regional Referral Hospital, Mongar on account of compensation payments for destruction of water pipe lines during the widening works executed by the contractors. The Note also states that budget to be met from the savings of overall maintenance from Kurizampa to Yadi PNH.

However, as per the Section 100 – General Requirements sub section **106- Maintenance of Services** of the Technical Specification amongst other specifies the followings conditions and all costs in connection with the work specified to be considered included in the related items of the work specified in the Bill of Quantities:

- *if any government, publicly and privately owned service for drinking water, electricity, drainage, irrigation channel, sewers, telecommunication cables/line and other services and structures, passing through the site is affected by the works, the Contractor shall provide a satisfactory alternatives service in full working to the satisfaction of the owner of the services and of the Engineer before terminating the existing services.*
- *Drawings and scheduling the affected services like water pipes, sewer, cables, etc. owned by various authorities including government and public undertakings and local authorities shall be verified by the Contractor for the accuracy of the information prior to commencement of any work.*
- *The contractor must also allow for any effect of these service and alternations upon the works and for arranging regular meetings with the various bodies at the commencement of the contract and throughout the period of the works in order to maintain the required co-ordination.*
- *No clearance or alterations to the utility shall be carried out unless ordered by the Engineer.*
- *Any services affected by the works shall be restored immediately by the Contractor who must also take all measures reasonably required by the various bodies to protect their services and property during the progress of works.*
- *The contractor may be required to carry out the permanent removal or shifting or diversion of certain services/utilities o specific orders from the Engineer for which payments shall be made to him. Such works shall be taken up by the contractor only after obtaining clearance from the Engineer and ensuring adequate safety measures.*
- *No separate measurement & payment shall be made for the work of temporarily supporting; maintaining and protecting the government and privately owned services.*

In the light of the aforementioned provisions of the technical specification, the approval accorded by the Secretary was not rational and justified and in total violation of the provisions of the technical specifications as the related cost are already inbuilt in the contract prices. Thus, such payment had double benefited the contractors and stands recoverable either from the contractors or officials responsible for payment despite clear stipulations that no separate measurement and payments to be made for such works and to be considered included with other related items of the works in the Bill of Quantities.

The Ministry besides, thoroughly reviewing the payments in violation of the technical specifications must direct the RO to recover the ineligible payments of Nu.2,505,000.00 and deposited into ARA.

Auditee's Response

RO was many a time's being pressurized both by the Dzongkhag Administration Monggar and Monggar Referral Hospital about damages caused to their main water source and its pipelines. Many a times the water pipe line of Monggar referral hospital was damaged by our contractors and reinstated/ But due to road widening works at night , there was frequent damages to the

pipe lines and pipes are either repaired or replaced with new by the hospital management. The initial cost estimate was almost 5.50m for the damages and later RO has paid only 2.5m as we had lots of financial problems and compensation cost was not included in the estimate. We often received letters about water shortages and risks associated to deal with the patients. (Refer past correspondences with the Hospital & local authorities on the issue). However, the small scale damages and restorations were implemented at the expense of the contractors, the cost which are beyond the capacity of contractor was borne by the client.

Since, such provisions are not inbuilt in the inception of the project estimated cost, RO lands up in making such unforeseen payments to other stake holders. Therefore, RO was compelled to make the payment of Nu.2.5M to compensate for the damages done to the water pipe lines.

Such things will be definitely noted in future projects. Therefore, RO request RAA to kindly drop the memo and not to pursue further.

RAA's Further Comments & Recommendations:

The RAA while taking note of the response and approval accorded by the Secretary, the fact remains that the technical specifications which is the integral part of the contractor documents categorically stipulated under **Section 100 – General Requirements sub section 106-Maintenance of Services amongst others that “ if any government, publicly and privately owned service for drinking water, electricity, drainage, irrigation channel, sewers, telecommunication cables/line and other services and structures, passing through the site is affected by the works, the Contractor shall provide a satisfactory alternatives service in full working to the satisfaction of the owner of the services and of the Engineer before terminating the existing services”**.

It is to reiterate that the quoted rates of contractor for the related items of works is built up cost inclusive of cost of all risks factors involved in terms of requirements stipulated in the technical specifications and provisions in the contract document.

It was also apparent that the Secretary had not only violated the provisions stipulated in the technical specification and contractual documents but also facilitated extension of undue financial favour to the concern contractors.

However, as discussed during the exit meeting and on the basis of the joint physical verifications of sites, and explanation furnished, as well as in the light of the provisions of the technical specifications, the RO and DOR should furnished details of repetitive repairs and maintenance carried out by the contractors on the services affected by the works along with documentary evidences for verification and forming final opinion on the issue. As otherwise, the DOR should direct the RO to recover the compensation amounts within three months from the date of issue of the report beyond which penalty @ 24% per annum shall be levied as per Chapter IV, Section 4.5.1.4 of the Finance and Accounting Manual 2016 and fix responsibility on the officials responsible for the violation and payments.

In addition, in keeping in view the violation of provisions envisaged in technical specifications and contract document as well as overriding of provisions of the technical specifications, the

DOR in consultant with the Ministry should revisit and review the provisions as to assess on the appropriateness and practicability of inclusion of such provisions in the technical specifications and contract documents as to safeguard the interest of the government for similar future projects.

The huge financial payment to the extent of Nu. 2.505 million in violation to the provisions of the technical specifications by the authority in position is brought to the notice of the Government for appropriate decisions and actions.

15 Substantial deviations between the BOQ and Actual Execution Quantity of RRM wall works and payments in deviation to the contractual provisions

As per GCC 38, sub clause 38.1 Changes in the quantities, states that “If the final quantity of the work done differs from the quantity in BoQ for the particular item by more than 20%, provided the cost of variation beyond 20% limit exceeds one percent of the initial Contract Value the employer shall dust the quoted rate up or down to allow for the change. Only when both conditions are met then the quoted rates shall be changed.

- a) *If the quantity of work executed exceeds the quantity of the item in BOQ beyond the higher specified limit the Employer shall fix the market rate (which may be lower or higher than the quoted rate) to be applied for the additional quantity of the work executed.*
- b) *If the quantity of work executed is less than the quantity of the item in BoQ lesser than the lower specified limit, the Employer shall fix the market rate based on the submission of the contractor (which may be lower or higher than the quoted rate) to be applied for whole of the quantity of the work so executed”.*

Sub Clause 38.2 and 38.3 further outlines as under:’

“The rates shall not be adjusted from changes in quantities if thereby the Initial Contract Price is exceeded by more than five percent (5%) except with the prior approval of the Employer in consultation with the Tender Committee.

“If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities”.

RO Lingmethang had made payments for execution of excess quantities of item work “P&L RRM in CM 1:6 in road side structures incl. headwalls, wing walls, catch pit, channels, etc beyond higher specified limit of 20%. The payments were found made at contractors’ quoted rates without invoking the aforementioned provisions of the contracts as detailed below:

Name of Contractor	Qty as per BOQ	Permissible Qty upto 20%	Qty as per actual execution	Diff in Qty.	Quoted Rate	Diff Amount	Variation %	Contract Amount	1% of Contract amount	% variation in terms contract value
Tshering Construc	532.03	638.44	1,987.77	1,349.33	2200	2,968,534.80	67.88	62,478,155.55	624,781.56	4.75

tion (Pkg 2)										
M/s KD Builders	154.76	185.71	1,391.54	1,205.83	2700	3,255,735.60	86.65	73,783,024.22	737,830.24	4.41
M/s Gongphe 1 Constm.	309.47	371.36	2,410.66	2,039.30	2500	5,098,240.00	84.59	59,469,881.70	594,698.82	8.57
M/s Rigsar Constm	3,540.23	4,248.28	5,517.96	1,269.68	2100	2,666,336.40	23.01	125,555,774.00	1,255,557.74	2.12

Considering the availability of stone and sand within the vicinity of the work site except cement, and the payment at the quoted rates without carrying out rate analysis, the reasonableness of quoted rates could not be ascertained in audit. The RO should furnish appropriate documents substantiating that the payments at quoted rates were reasonable in terms of prevailing market rates vis-à-vis on analysis in consideration to the availability of stone and sand within the vicinity of the work site.

Further, it is apparent that in all cases the variations had exceeded ranging from 2.12% to 8.57% indicating improper conduct of survey of sites, poor planning and coordination, unrealistic preparation of estimates and BOQ and or extension of undue favour by allowing execution of works beyond the defined BOQ by the Site Engineers and RO.

The Ministry should direct the RO to furnish appropriate justification on the substantial deviations in quantities executed besides deputing a technical team to investigate site specific requirement of additional RRM works entailing huge deviations in quantities.

Auditee's Response

As highlighted by the RAA team, the GCC 38, sub-clause no. 38.1 defines the allowable limits of the changes in the quantities of the BOQ item. It is only when conditions like executed quantity differs beyond 20% of the BOQ, provided the cost of variation beyond 20% limit exceeds 1% of initial contract price, rates shall be adjusted based on rate analysis. Although the actual executed quantities has exceeded beyond the allowable limits, the clients were of the opinion that proposal to change the rate should be submitted by the contractor. Since the proposal did not come from the bottom line, the project management did not exercise the clause as the rate quoted by the contractors are much below the departmental analyzed rate. For the preparation of estimates, rate analyses were carried out exploring the local market rates unlike the adoption of BSR rate by other Government agencies.

With regard to variation of quantities ranging from 2.12% to 8.57% indicating improper survey conducted at site, the Project Management would like to appraise RAA that the requirement of structures are purely based on the site situation and design computations. While preparing the estimates, the nos and type of structures were computed from the design drawing and site specific as per requirement. Although requisite height and length of the structures were noted during the site assessment before the finalization of estimates, actual ground realities could not be explored. Geotechnical study should have been for major project like this. However, we were given to understand that the government of the day instructed the department to execute the work in three years time period.

The highway which was constructed during the late eighties and early nineties were adopted with cut and fill methods and most of the structures that needed constructions were required

on those fill area which contributes to change in volume of execution. Since the ground reality could not be ascertained during the initial assessment, changes in size of the structure are best known after excavation only.

Moreover in many stretches, the structures were required to be provided to protect the service utilities like electric poles, telephone lines, water pipes and buildings which are above the road. Since the widening activities has de-stabilized the hill slope, the adequate measures has to be taken on ad-hoc basis which resulted in increase in the quantum of works.

RAA's Further Comments & Recommendations:

While taking note of the response, the RAA at the outset would like to reiterate that the widening works were carried out within the existing roads and existing permanent structures. The required permanent structures in terms of length and height as well as types of structures were to be aligned with the existing structures. In addition, the RAA would also reiterate that in terms of the PRR and contractual documents, it stipulates that cost of variation exceeds one percent (1%) of the initial Contract value the Employer shall adjust the quoted rates up or down to allow for the change. Thus, it was imperative for the RO to carry out rate analysis as required to ensure that quote rates were reasonable as compared to analysis of rates. It also outlines that any cost variations beyond five percent (5%) the rates are not to be adjusted from changes in quantities except with the prior approval of the employer in consultation with the tender committee.

However, as discussed during the exit meeting, the DOR should ensure that the payment for variations at the quoted rates were reasonable in terms of the rates if as analyzed as per contract documents. Besides, the DOR and Ministry should institute appropriate control system to ensure that due processes are carried out to prevent such similar lapses in future.

16 Inconsistency in the Evaluation of Bidding Documents

In response to NIQ floated vide No. DoR/RO/Plg-1/2015-2016/1024 dated 20/02/2016 for the works of Double Lanning of Northern East West Highway from Chainages KM 114.45-118.45 = 4 KM, Kurizampa-Lingmethang Highway, a total of 10 prospective bidders had submitted their competitive bids. The bids were opened on 21st March, 2016 at 2:30 PM in the Office of Chief Engineer, Construction Division chaired by Director, DES, MoWHS in the presence of the bidders and/or their authorized representatives.

On review of the tender related bids and Evaluation Report submitted by the Evaluation Committee, it was noted the bid of M/s Druk Phunsum Construction Pvt. Ltd, Sarpang was declared as non-responsive bid and rejected by the Evaluation Committee Members comprising the following:

- Sonam Jamtsho, Engineer, Construction Division,
- Sonam, Asstt. Procurement Officer, AFD,
- Yesgey Tshomo, Engineer, Mtc. Division and
- Jit Bdr. Kami, Engineer, Engineering Service Division.

The grounds of rejection was reported as ***“Non-conformity to the requirement of bidding document since the bid price quoted by the firm is inclusive of bitumen”***.

However, the audit team noted that the bid of M/s Singye Construction who had included the cost of bitumen in the analysis rates for pavement works was declared as responsive bid and

evaluated. Accordingly, the work contract for Package 4 under RO, Lobeysa was awarded to the firm vide letter No. work order No.DoR/ROL/Plg-15/2015-2016/121 dated 23rd July, 2015. Further, the Evaluation Committee and MLTC had failed to adjustment the rates to that extent and ineligible payment amounting to Nu. 4,998,201.79 being the cost of bitumen incorporated in the quoted rates and is yet to be recovered from the firm. The following officials were the Evaluation Committee and MLTC for awarding the work contract:

Sl/No	Name of officials	Remarks
1	Jigme Nidup, Principal Engineer	Evaluation Committee
2	Sanjai Kumar Bonxzan, Junior Engineer	Evaluation Committee
3	Ganga Archarya, Adm. Officer	Evaluation Committee
4	Tika Maya, Road Inspector	Evaluation Committee

Sl/No	Name of officials	Remarks
1	Dasho Phuntsho Wangdi, Hon'ble Secretary	Awarding Committee Members
2	Karma Galey, Director, DoR	Awarding Committee Members
3	Tenzin, Director, DES	Awarding Committee Members
3	Karma Sonam, DHS	Awarding Committee Members
4	Karma Ugyen, DCAO	Awarding Committee Members
5	Tshering Wangdi A, CE, Construction	Awarding Committee Members
6	Lamnichany, GOI coordinator	Awarding Committee Members
7	Jambay Nima, CAO	Awarding Committee Members

In the light of the above facts, it is apparent that there exist inconsistent evaluation process, decisions and actions. In addition, inconsistent decisions also indicate possible existence of biased and unethical practices. The Ministry should thoroughly investigate two difference decisions by the Evaluation Committee and MLTC under the same ambit of the Ministry.

Auditee's Response

RO would like to inform RAA that since the evaluation in this case had been carried out by HQ and the justification provided by HQ is reproduced below:

"It is to inform RAA that an evaluation team from DoR HQ has carried out the bid evaluation for contract package from Kurizampa-Lingmethang. Out of 10 bids, two bids were rejected as "non-responsive" in the preliminary examination namely M/s Druk Lamsel Construction Pvt. Ltd Thimphu and M/s Druk Phunsum Construction Pvt Ltd Sarpang. The reasons for declaring non-responsive are:

- 1. In case of M/s Druk Lamsel Construction: - incomplete integrity pact (signed and sealed without legal stamp) and*
- 2. in case of M/s Druk Phunsum: the bid price quoted for BT work is inclusive of bitumen cost, whereas the invitation for bids (IFB) as well as the additional clause in the SCC states that the bid price should be exclusive of cost of bitumen. Therefore, the bid was declared on the ground i.e non-conformity to the requirement of bidding document, which is an essential part of the document.*

M/s Singye Construction bid was not rejected despite the cost of bitumen is included in the rate analysis. Since the evaluation team in this case is different team i.e engineers from the Regional

Office, Lobeysa, the rationale behind its proposal to award shall be investigated by the department/ministry. The findings of the report shall be shared with the RAA.

RAA's Further Comments & Recommendations:

While agreeing to the response on the rejection of bid as the evaluations were carried out by different Evaluation Committee, the fact remains that, all the tenders and evaluation reports were scrutinized and final approval for awards of contracts were given by MLTC. The failure on the part of the MLTC note the rejection on such grounds indicated flawed and inconsistent decisions. The inconsistent approached in the evaluation process also indicated existence of poor coordination amongst the Ministry, DOR and ROs as well as absence of standard procedures or guidelines in the evaluation of the tenders particularly in relation to any inclusion of cost of bitumen in the rate analysis required to be submitted by the prospective bidder.

However, as discussed during the exit meeting, the Ministry should investigate the circumstance leading to adoption of two different approaches in the evaluation of tenders. Besides, the Ministry should institute appropriate control mechanism to curb such unwarranted lapses on the part of the Evaluation Committee and Awarding Committee in future.

17 Irregularities noted in construction of Formation cutting and Payment works for Double Lanning of Northern East-West Highway from Gangola-Kurizampa (Package 6) executed by M/s. Rigzar Construction Pvt Ltd. Trashigang

17.1 Non-Achievement of formation road width, 1 meter gap between L-drain and hill side and I meter hard shoulder at valley side in deviation to standard drawing and design.

In term of the contract documents, the build-up /quoted rates in lump sum for formation cutting were to achieve overall road width of 10.50m for ensuring standard carriageway of 7.50m, including 1m each shoulder on hill/valley sides and 1m L-drains.

During the joint physical verification of site comprising of officials from Regional Office, Department of Roads, Lingmethang and RAA team on 30th October 2017, noted that in few chainages/stretches along 12 km of roads, the formation width obtained after the formation cuttings were as illustrated below:

SL. No.	Chainage/ total length (in meter)	Physically measured width (approx. in meter)	Width Deficit
1	125m-90m = 35m	10m	0.5m
2	506m-440m = 66m	10m	0.5m
3	1050m-1040m = 10m	10m	0.5m
4	1187m-1175m = 12m	9.7m	0.8m
5	1985m-1978m = 7m	10m	0.5m
6	2890m-2883m = 7m	9.5m	1.0m
7	3270m-3246m = 24m	10m	0.5m

From the above table, it clearly indicates that overall formation width requirement of 10.50m as per revised drawings and technical specifications along those chainages/stretches were not achieved. It also indicated existence of inadequate monitoring and supervision by the site engineer over the execution works and defeated the core objective of widening works.

It may be reiterate that the quotes for FC works were on lump sum basis and payments should have be regulated accordingly. The Regional Office may comment on the non-achievement of FC width besides holding the site engineer/contractor accountable for non-execution of works as per drawing and technical specification. In addition, the Regional office should recover the cost difference for the deficit width and deposited into audit recoveries accounts.

Auditee's Response

It is to apprise that the project officials involved in double lanning of NEWH has been constantly monitoring the entrusted works to execute the works as per the standard drawings and design. The formation cutting were carried out based on the survey line fixed by the Department, however it failed to achieve the standard road width despite carrying out the works as per the requirements. Moreover the road traverses through private land between Gangola-Kurizampa which would cost the department with land compensation. In such cases it is felt that if the road structure can be accommodated within the achieved road width, it is understood that road shoulder on valley side is compromised thus reducing the cost of land compensation which has to be borne by the Department which needs to be paid in huge amount.

From the illustrated figures by the RAA, it is only 1.34% of the total length where width could not be achieved for which the project management would like to high light that road is designed with cut and fill method and wherever applicable embankment has to be carried out for which payment is not made.

In view of above submission, RAA is requested to drop the memo.

RAA's Further Comments & Recommendations:

*It is apparent from the response that there were deficiencies in the site feasibility studies for formation cutting works and improper planning as the RO had failed to consider **in the preparation of design and estimates/BOQs the limitations for formation works expected in locations where there were local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site and in rock areas.** Thus the payments for formation cutting works in running meter without adjustment of the cost for road stretches where requisite formation width were not achieved were not justified.*

However, as agreed during the Audit Exit meeting, the DRO and DOR should regulate the payments for FC works on pro rata basis for road stretches where FC width were not achieved and amounts recovered within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Besides, the recoveries effected and accounted for in the books of accounts should be furnished for review and records. The RO, Lingmithang should not entertain the full payment unless the work are executed complete in all expects in future.

In addition, the Ministry should institute a technical team to review the cost implication in terms of non-achievement of formation width and non- maintaining of Hard Shoulders at valley site in terms of the contractual documents and appropriate decisions and action taken on the issue intimated to the RAA.

18 Irregularities noted in Formation Cutting and Pavement works for Double Lanning of Northern East-West Highway from Kurizampa-Lingmethang Highway (Package-7) executed by M/s Tshering Construction Pvt. Ltd, Bumthang

A total estimate of Nu. 70,459,887.01 was prepared by the RO, Lingmethang for the double lanning works from Kurizampa-Lingmethang covering a total of 4 km from Chainages 114.45km to 118.45 km.

In line with the estimates, the tender was floated vide notice inviting tender No. DoR/RO/Plg-1/2015-2016/1024 dated 20/02/2016. Accordingly, the evaluation committee had evaluated M/s Tshering Construction Pvt. Ltd, Bumthang as the lowest evaluated bidder with bid amount of Nu. 37,106,895.00. In line with the evaluation report, the Tender Committee awarded the work vide work order No. DoR/CE (CD)/2015-2016/W-32/2522 dated 09/05/2016.

In term of the contract documents, the build-up/quoted rates was in lump sum for formation cutting works and were to achieve overall road width of 10.50m. Detailed verification of drawings, estimates, bill of quantities, contractor's bill, technical specification and physical verification of the construction sites showed irregularities and lapses were discussed under:-

18.1 Inadmissible payment for log and boulder barriers valuing Nu. 177,222.50

M/s. Tshering Construction had claimed and was paid Nu. 177,222.50 for providing and constructing of 35.1m Log Barriers and 259.15m boulder barriers (refer MB70 Page no 005 and 023). The main reason for providing protective works was to stop the over rolling of spoil materials.

However, as per the Section 100 – General Requirements sub section 111- Environment Protection Works of the Technical Specification amongst other specifies the followings condition and all costs in connection with the work specified to be considered included in the related items of the work specified in the Bill of Quantities:

- The contractor shall take all precautions for safeguarding the environment during the execution of the contract
- In particular, the contractor shall fully comply with Environment Codes of Practices for Highways and Roads
- The Contractor shall follow the requirements specified in the Environment Management Plan under the contract
- During clearing activities the contractor shall make efforts not to disturb or destroy the vegetation outside the construction corridor.
- All areas susceptible to erosion shall be protected as soon as possible either by temporary or permanent drainage works. All necessary measures shall be taken to prevent concentration of surface water and to avoid erosion and scouring of slops and other areas.
- Materials in excess of the requirement for permanent works and unsuitable materials shall be disposed off in locations and in the manner as agreed with the engineer.

- The disposal sites shall be designated such as not to promote instability, destruction of properties and public service systems. Exposed areas of such disposal sites shall be suitably dressed and to be planted with suitable vegetation.

The disposal of muck to designated dump yards is also included in Earthwork Excavation item, it was the duty of contractor to transport and properly dump the excavated spoil materials without rolling over. Thus, in line with the technical specification, any preventive measures initiated by the contractor to protect rolling over of spoil materials should be at the cost of the contractor.

Therefore, the payment for log barrier amounting to Nu. 177,222.50 erected particularly to protect roll over of spoil materials during execution of earthwork and pavement was in total deviation to aforementioned provisions the technical specification and contractual provisions.

The Ministry should thorough review all payments in particular to log barriers and stone boulder barrier as the cost involved are to be included in the related items of the work specified in the Bill of Quantities. Besides, the Ministry must recover the ineligible payments as entertainment of such cost results to double benefits to the contractor. In addition, the Ministry must also fix the Officials responsible for such ineligible payments for making the good of the amount in the event contractor fails to refund the amounts.

Auditee's Response

As pointed out by the RAA, the barriers like log and boulder are constructed to stop the rolling over of spoils received from excavation of road formations during the widening process. The project management would like to highlight here that all the excavated materials cannot be transported to dump sites due to high height of cut. Foreseeing such limitations, our estimate also considers 60% of the excavated materials to be transported expecting 40% of the excavated materials cannot be controlled during widening works. Therefore, project management would like to clarify that barriers had to be constructed to retain/stop spillage of spoils to protect the vegetation wherever possible. Thus in the interest to protect the pristine environment and limit the damages of vegetation and slopes down the valley side, barriers had to be constructed.

Since the BOQ includes the construction of barriers, the payments were made accordingly. In view of above submission, RAA is requested to drop the memo as the works are carried out in the interest to protect our environment.

RAA's Further Comments & Recommendations:

*The response and explanation that “log and boulder are constructed to stop the rolling over of spoils received from excavation of road formations during the widening process” are not tenable as the contractor is expected take precaution in terms of the provisions of the **Technical Specification**. The RAA would like to reiterate that the technical specifications which is the integral part of the contractor documents categorically stipulated under **Section 100 – General Requirements** sub-Section 111- Environment Protection Works of the Technical Specification amongst others stipulates that “The contractor shall take all precautions for safeguarding the environment during the execution of the contract and during*

clearing activities the contractor shall make efforts not to disturb or destroy the vegetation outside the construction corridor”.

It is to reiterate that the quoted rates of contractor for the related items of works is built up cost inclusive of cost of all risks factors involved in terms of requirements stipulated in the technical specifications and provisions in the contract document.

However, as discussed during the exit meeting, that in the light of the various provisions stipulated in the technical specifications on the inadmissibility of payments for such works, as well as FC works included payments for the transportation of spoil materials to the designated dumping yards, the DOR and the Ministry should revisit and review on the admissibility of such payments. As otherwise, the DOR should direct the RO to recover the inadmissible amounts within three months from the date of issue of the report beyond which penalty @ 24% per annum shall be levied as per Chapter IV, Section 4.5.1.4 of the Finance and Accounting Manual 2016 and fix responsibility on the officials responsible for the violation and payments.

In addition, in keeping in view the violation of provisions envisaged in technical specifications and contract document as well as overriding of provisions of the technical specifications, the DOR in consultant with the Ministry should revisit and review the provisions as to assess on the appropriateness and practicability of inclusion of such provisions in the technical specifications and contract documents as to safeguard the interest of the government for similar future projects.

18.2 Possible financial implication on deduction of liquidity damages not related to NEWH project from the RA bills M/s Tshering construction

On review of the RA Bills, noted deduction of Nu. 5,288,230.00 from the RA bills of M/s Tshering Construction executing the contract works under Package 7 and Package 1 as detailed below:

RA bill	Bill Amount (Nu.)	Amount Recovered (Nu.)	Remarks
5 th	1,861,451.20	1,500,000.00	From Package 7 RA bills
6 th	2,729,462.00	770,000.00	From Package 7 RA bills
7 th	7,883,019.50	1,000,000.00	From Package 7 RA bills
8 th	3,757,147.62	1000,000.00	From Package 1 RA bills
10 th	4,697,240.02	1,018,230.00	From Package 1 RA bills
Total		5,288,230.00	

On cross reference to the advances released, it was noted that the deductions pertained to liquidated damages of Nu. 18.222 million imposed for contract on the construction of Nangar-Ura bypass highway by the RO, Trongsa. On further review, it was noted that the RO, Trongsa vide letter No. DoR/RO/Trongsa/2016-2017/PL-22/463 dated 2nd Feb 2017 had requested RO, Lingmethang to deduct the amount from the running bills. Accordingly, RO, Lingmethang deducted the amounts from RA bills proportionately and deposit into ARA.

The RAA is of the view that the arrangement made to recover from the current ongoing works would be the only alternative and justify the deductions but has direct impact on the ongoing contract works. The RO, Lingmethang should provide details of measures initiated if any to ensure that such deduction would not hamper timely completion of ongoing contracts. Otherwise, the RO should immediately take measures to prevent undue delays in the completion of works due to financial constraints and other related resources.

Auditee's Response

It is to inform RAA that M/s Tshering Construction has long overdue advance to be deposited. The firm was granted three years' time-period to deposit the penalty amount for the construction of Nangar Ura bypass highway. Accordingly, the firm has agreed to deposit the money in three installments setting the dateline.

Since the contractor has failed to deposit the money on the set dateline and crossed beyond by few months, the regional office, Lingmethang was instructed by DoR, HQ to settle the first installment amount from the ongoing bills of Tshering Construction with RO Lingmethang. The payment were deducted from the running bills of the firm and deposited on installment basis upon close intimation with Regional Office Trongsa.

In view of above justifications submitted RAA is requested to kindly drop the memo.

RAA's Further Comments & Recommendations:

The RAA while taking note of decisions and actions taken by the DOR, HQ, and recoveries effected to the extent of Nu. 5,288,230.00 as against recoverable amounts of Nu.18.22 million, the facts remains that the recovering substantial amounts would definitely have adverse financial impact for the contractor as well as impede work progress of the current contract. It is to reiterate that the contract packages 2 and 7 was under progress (completed till WMM works) despite the fact that the completion deadlines were over and exceeded by three and two months respectively.

It is apparent from the course of action initiated, the DOR, HQ and the Ministry have totally failed to recover the amounts from the contractor within the approved three years periods and despite abnormal time lapses.

However, as discussed during the exit meeting, the DOR and the Ministry besides ascertaining the possible adverse financial impacts on the current contracts should immediately invoke the approved three years' time periods either directing the contractor clear the amounts or take legal course of action for contempt of the laws of the land.

19 Deficiencies and ambiguity in the decisions for Departmental execution of pavement work With ZeoCrete Technology based on the New Technology presently being awarded and executed as "demonstration of the technology" by M/s Bhutan Zeocrete Pavement Technology a JV Party formed by M/s Longyea e-Solutions Pvt Ltd India and M/s Yarkay Group Pvt. Ltd Bhutan.

19.1 Stipulation of flawed and restrictive ITB eligibility criteria in the Tender document with resultant unjustified rejection of bids and wasteful expenditure on NIQs

On review of related records, the audit team noted that initially the IFB for the execution of work with the new ZeoCrete Technology was floated in the media vide IFB letter No. DoR/ROL/Plg-17/16-17/1161 dated 20/3/17. In response to the NIQ, eight (8) prospective firms have submitted their bids. The details of overall quoted prices and rates quoted particularly for ZeoCrete item of works were as tabulated below:-

Table :19.1-Details of quoted prices

Sl/ No	Name of contractors	Quoted Amount Nu.	CTB rates (Nu.)	Remarks
1	M/s Gayjur Construction Co. Pvt Ltd, Mongar	118,648,500.00	900.00	P & L 210-250mm thick CTB layer comprising laying soil/stone (SMB) bed to required thickness duly levelled, Insitu crushing and pulverising followed by spreading of admixtures homogenizing compaction and curing (Admixtures input: ZeoCrete @1.35 kg/M2 & OPC Grd. 43@ 40kg/M2
2	M/s Gyalco Infrastructures Pvt Ltd	189,316,800.00	1,670.39	
3	M/s Somon Company Pvt Ltd, Gelposhing	138,176,887.50	1,000.00	
4	M/s BZPT (JV)	189,072,000.00	1,429.00	
5	M/s Muensl Builder Pvt. Co. Gelephu	108,982,500.00	600.00	
6	M/s Karma Construction Pvt Ltd, S/Jongkhar	170,201,250.00	1,248.00	
7	M/s Kuenga Construction. Pvt ltd, paro	111,428,250.00	772.00	
8	M/s Diamond Construction Pvt Ltd, Thimphu	126,671,250.00	600.00	

In terms of Evaluation Report submitted by the Evaluation Committee, it was noted that while Seven (7) bidders qualified for the technical evaluations, one bidder M/s M/s BZPT (JV) was declared as non-responsive as the bid form was found not completed. However, Five (5) bidders did not qualify for 2nd stage financial evaluation as the bidders failed to obtain the minimum technical qualifying scores of 65%. Thus only Two (2) bidders scored the minimum technical qualifying scores of 65% in the technical evaluations and qualified for the 2nd stage financial evaluations.

The Evaluation Committee had declared the M/s Somon Company Pvt Ltd, Gelposhing as the lowest evaluated bid. The corrected financial bids and percentage variation from the estimated cost were as tabulated in the table below:

Sl/No	Name of contractors	Corrected Bid Amount Nu.	Ranking	Remarks
1	M/s Somon Company Pvt Ltd, Gelposhing	123,029,87.50	1 st	<ul style="list-style-type: none"> ➤ Quoted price was 21.12 % below the departmental estimated cost. ➤ Found that while all requisite equipment owned, except that Required 1 No. Excavator/pay loader and 3 Nos. Tripper were proposed to be hired.
2	M/s Diamond Construction Pvt Ltd, Thimphu	126,671,250.00	2 nd	<ul style="list-style-type: none"> ➤ Quoted price was 18.78 % below the departmental estimated cost; ➤ Found that all requisite equipment owned and reference of invoices and bills mentioned

The Evaluation committee however submitted that in terms of ITB 4.3(d) of the Bidding Data Sheet, wherein it stipulates as **“The bidder must owned below specified minimum requirement of equipment”** none of the bidders actually qualified to process for evaluation.

Equipment	Total No. Required	Equipment	Total No. Required	Equipment	Total No. Required
Asphalt Plant	1	Steel Road Roller	1		1
Excavator/Pay loader	1	Concrete mixture	1	Vibratory Road Roller	1
Motor Grader	1	Trippers	3	Rock/boulder Crusher cum Pulveriser with Homogeniser	1
Paving Machine	1	Bitumen Sprayer	1	Total Station	1

However, it was apparent from the Minutes of the Meeting of MLTC drawn under letter No. DoR/CE/(CD)7/2017-2018/4290 dated 22/6/2017 that both the bids were rejected under the following grounds:

- ✚ Retender the work, Monsoon has begun and anyhow, work would not be able to start immediately even if the work is awarded
- ✚ Modify ITB 4.3 (d) to suit and attract more bidders in the interest of work and competitive bidding.

In line with the decisions of the MLTC, IFB was again floated under letter No. MoWHS/DS/Tender-DoR/2017/4966 dated 22/6/2017. In response to the NIQ, Ten (10) prospective bidders had submitted the bids as detailed below:-

Table 19.1(3)-details of Prospective bidders		
Sl.No.	Name of prospective Bidder	Quoted Amount (Nu.)
1	M/s Loden Construction Pvt. Ltd	163,983,750.00
2	M/s S L Construction Pvt. Ltd	179,994,525.00
3	M/s T Kunzom Construction Pvt. Ltd.	127,871,250.00
4	M/s Karma Construction Pvt Ltd, S/Jongkhar	160,381,875.00
5	M/s Yarkay Group Pvt. Ltd	259,462,350.00
6	M/s OST construction Pvt. Ltd	267,997,875.00
7	M/s NT construction Pvt. Ltd	271,969,650.00
8	M/s Sernyel Zeykhel Construction Pvt Ltd.	121,803,000.00
9	M/s Muensl Builder Pvt. Ltd.	118,072,500.00
10	M/s Ratnapung Construction Pvt. Ltd.	128,418,750.00

However, the audit team noted that instead of awarding the work on contract, the work was executed departmentally and executed up to GSB level as on the date of audit. On obtaining the tender related documents from the Ministry, it was noted that the tender was cancelled by declaring all the 10 prospective bidders as non-responsive both by the Evaluation Committee and the MLTC as evident from the Minutes of Meeting held on 8th August 2017 chaired by the Secretary, MoWHS(Refer Minutes letter No. DoR/CE/(CD)7/2017-2018/4290 dated 15/8/2017.

An in-depth review of the Evaluation Report, the Evaluation Committee had declared all the prospective bidders as non-responsive in the preliminary round of evaluation due to failure to meet the two (2) mandatory Clauses of Standard Bidding document.

In terms of the two ITBs, the requirement were stipulated as under:-

“ITB 4.3(d):

- The bidder must own the following equipment/machinery:-
 - ✓ Asphalt Plant
 - ✓ Motor grader
 - ✓ Paving machine
 - ✓ Vibratory Road Roller
 - ✓ Bitumen sprayer
- The bidders must submit the ownership documents for the above machineries and equipment and they should be in good condition. Bidders who do not own the above

machineries or equipment shall be disqualified and their bids will be declared as non-responsive”.

In addition, the “**ITB 4.3(additional)** states:

- A. The bidders shall submit a signed assurance from the manufacturer of the ZeoCrete Chemical Binder Admixtures for supply of the required quantity of the ZeoCrete Admixture required for the works.
- B. The bidders shall also submit an agreement for the hire of the Rock/Boulder Crusher cum Pulveriser with homogenizer.

Failing to meet the above criteria or both (as stated in A & B above) will result into disqualification and rejection of the bid. These are must submit documents along with the bid”.

Based on the above provisions of the ITB, the prospective bidders were rejected on following grounds as tabulated in the table below:

Sl. No.	Name of Prospective Bidder	Quoted Amount (Nu.)	Ground for Rejection
1	M/s Loden Construction Pvt. Ltd	163,983,750.00	-Assurance letter from GeoCrete Company not from ZeoCrete Company -Motor Grader Missing -Detailed Work plan and proposed methodology missing
2	M/s S L Construction Pvt. Ltd	179,994,525.00	-Assurance letter from Neha InfraCrete
3	M/s T Kunzom Construction Pvt. Ltd.	127,871,250.00	-Assurance letter from Deans InfraCrete
4	M/s Karma Construction Pvt Ltd, S/Jongkhar	160,381,875.00	-Assurance letter from Deans InfraCrete
5	M/s Yarkay Group Pvt. Ltd	259,462,350.00	-Motor grader and bitumen sprayer hired
6	M/s OST construction Pvt. Ltd	267,997,875.00	-Paver, motor grader and bitumen sprayer missing -Addendum not mentioned
7	M/s NT construction Pvt. Ltd	271,969,650.00	Vibratory Road Roller, paver, motor grader bitumen sprayer hired
8	M/s Sernyel Zeykhel Construction Pvt Ltd.	121,803,000.00	-No assurance letter from ZeoCrete Company -no hiring agreement for rock/boulder crusher cum pulveriser with homogenizer -Machineries ordered from Druk Trading Equipment but no invoice submitted - Detailed Work plan and proposed methodology missing
9	M/s Muensl Builder Pvt. Ltd.	118,072,500.00	-No assurance letter from ZeoCrete Company -All the must owned equipment are hired
10	M/s Ratnapung Construction Pvt. Ltd.	128,418,750.00	-Concrete admixture assured by Sika - no hiring agreement for rock/boulder crusher cum pulveriser with homogenizer

In terms of the Standard Bidding Documents (SBD), the ITB 4.3 (d) stipulates as under:

“Equipment: list of construction equipment owned by the contractor and those proposed to be hired to be used for implementation of the Contract”.

In addition, the Ministry had adopted the same stipulation for all other contracts and were awarded the contracts even all prospective bidders did not own the equipment but proposed to be hired.

Thus, the stipulation of restricted criterion in both the IFB in terms of ITB 4.3(d) owning the equipment was in total violation of the PRR and SBD.

- i. The decisions of the MLTC and RO to disallow hiring of equipment/machinery was unmerited, biased and inconsistent in relation to other work packages where the MLTC & RO did not included such criterion of owning the entirety of requisite equipment/machinery. The equipment and machinery proposed to be deployed were either owned or hired except assigning of different scores.
- ii. The rejection of the 1st tender 2nd lowest evaluated bid of M/s Diamond Construction Pvt Ltd, with quoted amount of Nu. 126,671,250.00 representing 18.78 % below the estimated cost was not justified as per the Evaluation report, all the requisite equipment as per bid was found owned by the firm as reference of invoices and bills were also furnished. Thus, the rejection of the bid on the ground of non-owning of equipment was indicative of flawed and deliberated decisions by the MLTC.
- iii. In terms of the ITB 4.3(d) of retender documents, the following requisite equipment were made mandatory to be owned :

Table 19.1(5)- Details of requisite equipment	
Equipment	Total No. Required
Asphalt Plant	1
Steel Road Roller	1
Motor Grader	1
Paving Machine	1
Bitumen Sprayer	1

In the light of the above decision of the MLTC, the 1st tender lowest evaluated bid of M/s Somon Company Pvt Ltd, Gelposhing, whose quote amount to Nu. 123,029,87.50 had met the requisite of owning the equipment as evident from the Evaluation Report. Thus, the rejection of lowest evaluated bid and re-tendering of the works was found irrational as well as wasteful expenditure on the re-tendering of works.

- iv. In addition to ITB 4.3(d), mandatory requirement of owning the requisite equipment, the MLTC had also stipulated under SCC below Clause 60.1 below as under:

Additional Clause 1	<p>a) <i>The bidders shall submit a signed assurance from the Manufacturer of the Zeocrete Chemical Binder Admixture for supply of the required quantity of the Zeocrete admixture required for the work.</i></p> <p>b) <i>The bidders shall also submit an Agreement for the hire of the Rock/Boulder Crusher cum Pulveriser with Homogeniser.</i></p> <p><i>Failing to meet any of the above criteria or both (as stated in a & b above) will result into disqualification and rejection of the bid. These are MUST SUBMIT documents along with the bid.</i></p>
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While on one the hand the MLTC had reduce the requisite equipment to be owned to reduce unnecessary barriers to potential bidders but on other hand had restricted the competition by stipulating submission of signed assurance from the Manufacturer of the ZeoCrete Chemical Admixture. Thus, the preference to certain brand had restricted the competitions

and the bidder who had offered equivalent brands or obtained assurance from other manufacturer or companies had been unfairly declared as non-responsive bids. It is also to reiterate that it would not be possible for a particular manufacturer to provided assurance to each and all prospective bidders unless multiple manufacturers for the same admixture exists. It would have been appropriate to direct the winning bidder to obtain such assurance from the said manufacturer in the event to safeguard the interest of the Ministry.

- v. A cross reference to the terms and conditions stipulated for the deployment of equipment by M/s Bhutan Zeocrete Pavement Technology (JV) for execution of 10km pavement works from Yadi to Ngatshang, it was noted that owning of requisite equipment and obtaining signed assurance from the Manufacturer of ZeoCrete was not stipulated in the contract agreement. The stipulation of such restricted criterion for the national prospective bidders indicated possible existence of vested interest on the part of the officials responsible for stipulating such restrictive criterion in this particular tender.
- vi. It would be apparent from the information provided in the table on the non-fulfilment of criterion and rejection of bids, that prospective bidders had submitted signed assurance letter obtained from other manufacturer of admixtures used for soil stabilization for road works. The decisions of the MLTC to reject the bids indicated absence of due diligent exercise and the Ministry could have procured the ZeoCrete admixture and supplied to the contractor similar to supply of bitumen by the ROs.
- vii. Thus, the stipulation of disqualifying criteria on the grounds of not owning the equipment under ITB 4.3(d) was in total violation of the PRR and SDB. The flawed criteria had unnecessary created barriers to potential bidders thus restricting the competitions and indicative of an attempt by the MLTC to favour a particular contractor since M/s Bhutan Zeocrete Pavement Technology (JV), is the only firm well equipped with requisite resources and machineries as well as authorized JV for the execution of works with the specific ZeoCrete Technology.
- viii. The flawed and restricted ITB criterion had resulted in unjustified rejection of potential bidders who would have delivered the required services/output at lower costs.

In the light of the above facts and events, the Ministry besides commenting on the aforementioned observations should thoroughly reviewed the circumstances leading to stipulation of restrictive criterion particularly in the said tender vis-à-vis tendering twice and decision to executive departmentally despite that fact that the RO also lacks requisite equipment and expertise on the use of the technology.

In addition, in the light of the substantial cost implication on the Government scarce resources, and devoid of in-house expertise in terms of human and machineries resource, the Ministry should consider the desirability of executing the works with the conventional pavement method in the interest of the government.

Auditee's Response

RAA is requested to visit our response in the observation 16.....16.19

RAA's Further Comments & Recommendations:

*While taking note of the response, the RAA at the outset applaud the Ministry for indeed a laudable initiative to explore and introduce **the new state of art ZeoCrete technologies to***

provide road pavement solutions against the challenges posed by the high altitude cold weather actions and along alignments passing through water saturated areas.

However, the fact remains that the Ministry had not carried out comprehensive market studies or research on the cost effectiveness and sustainable adoption of the new technology. Besides, the Ministry has also not carried out market survey on the existence of suitable substitute for the ZeoCrete Technology in line with Clause 4.2.5.1(c) of the Procurement Rules and Regulations 2009 for ensuring economy, efficiency and effective in the procurement and use of ZeoCrete technology from the only JVC firm available in Bhutan with such technology.

It is to reiterate that while there is not company in dealing with the same ZeoCrete technology in India, there are companies in India dealing with “Soil stabilization for pavement works” with other technologies as a substitute to ZeoCrete Technology. In addition, the Ministry had not carefully evaluated the RO’s and DOR’s capacity and its readiness to supervise and monitor the execution through deployment of new technology. Further, the Ministry also had not constituted project steering committee to oversee and monitor the execution pavement works by the contractor with the new technology. Thus, the contractor (JV) was primarily responsible for the execution of the works in terms of technical specification and quality as well as project success.

Thus, in the light of the non-availability of expertise and experiences in the execution of pavement works with the new ZeoCrete technology either in-house or prospective bidders in the country except the JVC firm, the floating of repetitive NIQs with restrictive criterion and subsequent rejections indicated possible deliberate attempt on the part of the DOR and MLTC to subsequently award the contract to M/s Bhutan ZeoCrete Pavement Technologies (JV), a Joint Venture Company, formed by M/s Yarkay Group of Companies Ltd & M/s LongYea e-solution Pvt Ltd, New Delhi, the only JVC firm in the country capable of using ZeoCrete Pavement Technology.

The Ministry should investigate the circumstances leading invitation of NIQ that too with restrictive criterion deviating from the standard criterion of SBD from prospective bidders who did not have expertise and experiences on new technology and subsequently rejecting the bids despite submission of bids. Besides, the Ministry should also ascertain possible existence of collusive practices as the M/s Bhutan ZeoCrete Pavement Technologies (JV), a Joint Venture Company was the only firm with the requisite expertise, experiences and technical resources on the execution of pavement works with the new technology. The Ministry should furnish the outcome of the investigations of the invitations of NIQs and rejections of bids for review and records.

The flawed tendering processes adopted by the DOR and MLTC for the award of contract for the execution of pavement works with the new ZeoCrete Technology and subsequent rejections of bids and resultant waste of time and resources are brought to the notice of the government for appropriate decisions and actions.

19.2 RO not equipped with the requisite machineries, testing facilities & human resources for execution of works with the Zeocrete Technology

In terms of the proposal submitted by M/s Bhutan Zeocrete Pavement Technology (JV) for the construction of Pavement works with the New ZeoCrete Technology, amongst others stipulated

the following resource requirements since the construction of cementitious sub-Base layers is very specialized in nature:

- Two Insitu boulder crusher-cum-pulveriser-homogeniser-paver implements' powered by heavy duty prime mover with infinite variable transmission system;
- Vibratory Soil Compactors & roller compactors, JCB earth mover, pave etc.;
- Spare parts for all the machinery with trained operators;
- Testing and measuring devices/machines;
- On supervisor-cum-resource manager, one operator for each of the machine
- Design & Validation software for design

In addition, it stipulated requirements of several stages of testing as highlighted below:

A) Cementitious Base Layer:

1. Prior to start of the works

- Virgin soil samples at min 2 locations/km below formation level and tested for USC after treating with the admixtures ratio and verify achieving the required E-Value as per the design mix.

2. Post Completion of works:

- Stage wise cores to be extracted from each layer for verifying achieving the designed USC and E-Values

3. Testing machined:

- Deploy electronic/digital brand new calibrated USC mould making-cum-USC testing machine from a NABL approved vendor to be deployed at field laboratory

B) Marshal Testing Machine

In the light of the above requirements in particular the machineries and testing laboratory and expertise in the design mix and laying of CTB layer, the audit was of the view that the RO is devoid of the requisite in-house expertise, machineries and other associated resources to take up pavement works with the new technology. Thus, decisions of the DOR and the Ministry to execute departmentally the CTB works without requisite expertise and related resources would definitely lead to dependency on the resources available with M/s Bhutan Zeocrete Pavement Technology (JV), the only firm well equipped with requisite resources and machineries as well as authorized JV for the execution of works with the specific ZeoCrete Technology. Such dependency of resources to an individual firm would tantamount to indirect process of directly awarding the contract to the JVC firm.

The DOR and the Ministry should comment on the circumstances leading to NIQ and subsequent cancellation and decision for departmental execution without having requisite internal resources. In the event the departmental execution of CTB works are finalized, the Ministry and DOR should provide proposed sources deployments detailing in terms of deployment through procurements of requisite machineries and employment of expertise or hiring of machineries and human resources for the said works.

Auditee's Response

RAA has rightly pointed the lack of requisite machineries, testing facilities & human resources for the execution of works with the Zeocrete Technology. Having anticipated all the difficulties both in terms of man power/ Equipments at the RO level. Beside, lack of expertise in Zeocrete

pavement technologies, The Road stretch from Ngatshang to Korila was tendered out three times and even doing so, the department/Ministry failed to find a suitable contractor having all the requisite qualification & other criteria to carry out the new technology.

The points noted by the RAA will be strictly noted for future guidance and such proposal will be not proposed in future. With the reasons as given above. RAA is being requested to kindly drop the memo and not to pursue further.

RAA's Further Comments & Recommendations:

While the RAA applaud on the introduction of new technology for face lift of road works, it is to reiterates that proper studies and analysis in the terms of cost effectiveness as well as preparedness of the in-house capacity are considered prior to taking off with the new technology as to prevent complications and failure of such projects.

The DOR and the Ministry should evaluate the performance of the ongoing pavement works executed by the JVC firms, in terms of time, cost and quality as to support cost effectiveness as well as to adopt the new technology for future road works. Besides, the DOR and Ministry should develop procedures and processes for facilitating preparedness in terms of resources, enhancing in-house expertise as well as prospective bidders in the new technology.

19.3 Substantial cost impact to the govt. on the construction of pavement works with the New Zeocrete Technology with Extra financial burden to the extent of Nu.15.938 Million for a stretch of 10.50km roads

The departmental estimates for the widening of road including permanent works for 21.19 km stretch road with overall formation width of 10.50m from Yadi to Korila were estimated at Nu. 410,979,325.80 and included estimated cost of pavement works of Nu. 301,076,033.93 inclusive of cost of Bitumen under conventional method of execution of works as detailed below:

Pavement works	Qty.	Unit	Unit Rate	Amount (Nu.)
AR004/RW0121	44,499.00	Cum	112.31	4,997,664.04
RW0130(GSB)	18,541.25	Cum	1,509.93	27,996,030.32
RW0131 (WMM)	30,990.38	Cum	1,564.00	48,469,018.84
AR005 (DBM)	137,735.00	Sqm	839.65	115,648,879.66
AR006 (AC)	137,735.00	Sqm	648.22	89,282,462.83
RW0145 (Scarifying)	137,735.00	Sqm	10.25	1,411,367.13
A/R Road Shoulder	38,142.00	Cum	478.95	18,268,275.16
Total				301,076,033.93

The review of the rates analysis and the departmental estimates for the construction of pavements works for 21.19 km stretch road with carriage width of 6.50m from Yadi to Korila noted errors in the computation. The actual cost estimate works out to Nu. **306,074,295.72** inclusive of cost of Bitumen as detailed below:

Pavement works	Qty.	Unit	Unit Rate	Amount (Nu.)
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AR004/RW0121	44,499.00	Cum	112.31	4,997,682.69
RW0130(GSB)	18,541.25	Cum	1,509.93	27,995,989.61
RW0131 (WMM)	30,990.38	Cum	1,564.00	48,468,954.32
AR005 (DBM)	137,735.00	Sqm	839.65	115,649,192.75
AR006 (AC)	137,735.00	Sqm	648.22	89,282,581.70
RW0145 (Scarifying)	137,735.00	Sqm	10.25	1,411,783.75
A/R Road Shoulder	38,142.00	Cum	478.95	18,268,110.90
Total				306,074,295.72

Based on the increase carriage width to 7.50m from initial 6.50m, the estimated cost inclusive of bitumen cost works out to Nu. **335,596,177.24** as computed in the table below:-

Pavement works	Qty.	Unit	Unit Rate	Amount (Nu.)	Cost per KM with cost of Bitumen (Nu.)
AR004/RW0121	23,838.75	Cum	112.31	2,677,330.01	Total estimated cost: Nu. 335,596,177.24 Divided by total Km:21.19 km
RW0130(GSB)	23,838.75	cum	1,509.93	35,994,843.79	
RW0131 (WMM)	35,758.13	cum	1,564.00	55,925,715.32	
AR005 (DBM)	158,925.00	Sqm	839.65	133,441,376.25	
AR006 (AC)	158,925.00	Sqm	648.22	103,018,363.50	
RW0145 (Scarifying)	158,925.00	Sqm	10.25	1,628,981.25	
A/R Road Shoulder	7,416.50	cum	392.31	2,909,567.12	
Total				335,596,177.24	

The proposed construction of pavement works departmentally at the estimated cost of Nu. 151,838,948.25 with the ZeoCrete Technology for 10.50 km stretch of road were as tabulated below:

Item of work	Unit	Total Qty.	Rate (Nu.)	Amount (Nu.)	Cost per KM without cost of Bitumen (Nu.)
Preparation of sub-Grade comprising of 250mm trenching, watering compaction	Sqm	45900.00	27.46	1,260,414.00	
P & L 250mm thick GSB Layer duly compacted	Sqm	11475.00	1,509.93	17,326,446.75	The rate paid to M/s Bhutan Zeocrete Pavement Technology (JV) for the item of work of Nu. 1,192.00 per Sqm. Indicative of inflated rate for the item of work.
P & L 100mm thick WMM layer over the CTB layer as Crack Relief Layer as per ZeoCrete Technology requirement	Sqm	7875.00	1,564.00	12,316,500.00	The rate paid to M/s Bhutan Zeocrete Pavement Technology (JV) for the item of work of Nu. 171.00 per Sqm. Indicative of inflated rate for the item of work.
P & L 210-250mm thick CTB Layer comprising laying soil/stone (SMB) bed to required thickness dully levelled, in situ crushing and	Sqm	78750.00	1,295.00	101,981,250.00	Same rate as quoted by M/s Bhutan Zeocrete Pavement Technology (JV). Thus OPC cement rate taken as

pulverising followed by spreading of admixtures homogenising-compaction and curing Admixtures inouts : Zeocrete@1.35kg/Sqm & OPC Grd 43 @ 40kg/Sqm					Nu. 232 per bags as against prevailing market price of Nu. 379.20(2/2015) per bag indicating under estimation of amounts. (Nu.402.1 per bag as on December 2017),
P & L coated chips for 40mm layer including Bitumen @ 5.06kg/Sqm	Sqm	78750.00	125.94	9,917,775.00	The rate paid to M/s Bhutan Zeocrete Pavement Technology (JV) for the item of work of Nu. 488.75 per Sqm. Indicative of either under estimation for RO purpose or excess payment to the firm
Scarifying the existing road surface	Sqm	78750.00	24.30	1,913,625.00	Bhutan Zeocrete Pavement Technology (JV) for the item of work of Nu. 30.38 per Sqm per Sqm. Indicative of either under estimation for RO purpose or excess payment to the firm
Total				144,716,010.75	
Add: 10% tax on Zeocrete materials				7,122,937.50	
Total				151,838,948.25	
Add: cement rate difference for 63,000bags @147.20				9,273,600.00	
Add: bitumen cost @5.06kg per sqm and @ of Nu.53 per kg				21,119,175.00	
Total				182,231,723.25	17,355,402.21

Note. Estimated cost would increase in event of increase in cement cost per bag.

The proposed Departmental execution of Pavement works with the use of Zeocrete Technology, the cost per kilometer works out to Nu.17,355,402.21 as against estimated cost per km under convention method of Nu. 15,837,478.87 indicating cost differences.

Thus, despite flaws in the estimated cost, the cost impact on the Government on the execution of pavement works with the new technology works out to Nu. 1,517,923.34 per km of road. The overall cost implication on the Government Exchequer if executed with the Zeocrete Technology works out to Nu. 15,938,195.07 for the 10.50 km stretch of road from Ngatshang to Korila.

On review of the work plan as shown below noted that laying of GSB under progress for the 10.50 km stretch and need to study the extent of adverse financial impact as well as devoid of requisite resources and reconsider the decision to execute the works with the Zeocrete Technology in the interest of the Government.

Work Plan for Financial Year 2017-2018

Work Item	Revised Physical Target	Departmental estimated Amount Nu. in Million	Expdt till November 2017	2018															
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lingmethang -Yadi																			
i) Widening	0.000	155.969	3.698																
ii) Sub-Grade Preparation	10.500																		
iii) Laying of GSB	10.500																		

iv) Laying of CTB Layer	10.500																			
v) Laying of A/C layer	10.500																			
vi) Permanent works (drain)	10.500																			

In addition, the review of NIQ floated vide NIQ letter No. DoR/ROL/Plg-17/16-17/1161 dated 20/3/17, ITBs of the tender documents, Evaluation Report and Minutes of Meeting of the MLTC, all the 10 prospective bidders including M/s Yarkay Group Pvt. Ltd. the JV partner of M/s Bhutan Zeocrete Pavement Technology (JV) were declared as non-response in line with the ITB 4.3(d) and 4.3 (additional). In terms of the two ITBs, the requirement were stipulated as under:-

“ITB 4.3(d): The bidder must own the following equipment/machinery:-

- ✓ Asphalt Plant
- ✓ Motor grader
- ✓ Paving machine
- ✓ Vibratory Road Roller
- ✓ Bitumen sprayer

The bidders must submit the ownership documents for the above machineries and equipment and they should be in good condition. Bidders who do not own the above machineries or equipment shall be disqualified and their bids will be declared as non-responsive”. And

“ITB 4.3(Additional):

- A. The bidders shall submit a signed assurance from the manufacturer of the ZeoCrete Chemical Binder Admixtures for supply of the required quantity of the ZeoCrete Admixture required for the works.
- B. The bidders shall also submit an agreement for the hire of the Rock/Boulder Crusher cum Pulveriser with homogenizer.

Failing to meet the above criteria or both (as stated in A & B above) will result into disqualification and rejection of the bid. These are must submit documents along with the bid”.

In the light of the requisite resource constraint of the RO, and considering the above restricted provisions in the NIQ and declaration of all the prospective bidders as non-responsive, the Ministry’s decision to resort to either award of the works to M/s Bhutan Zeocrete Pavement Technology (JV) or hiring of machineries and expertise from the firm would be construed in audit as predetermined decisions of the Ministry to Award the Contract to the firm vis-a-vis possible existence of collusive processes.

The Ministry should comment besides taking immediate decisions to execute the work under conventional pavement methods to prevent adverse financial impact on the scarce resources of the Government as well as to avoid extension of undue favour to the firm M/s M/s Bhutan Zeocrete Pavement Technology (JV).

Auditee’s Response

Having foreseen lots of hiccups with the ongoing zeocrete pavement technologies work from Ngatshang to Yadi, RO & department has left the idea of implementing the new technology

from Yadi- to Korila. Finally, RO/Department has gone for the conventional system of road construction and the work is under the award stage and may likely to start by end of November 2018 through contract.

With all the reasons as cited above, Ro request RAA to kindly drop the memo and not to pursue further.

RAA's Further Comments & Recommendations:

While the RAA has taken note on the decisions taken to carry out the works with the conventional method, it is to reiterates that proper studies and analysis in the terms of cost effectiveness as well as preparedness of the in-house capacity and prospective bidders are considered prior to taking off with the new technology as to prevent complications and failure of such projects.

However, as discussed during the exit meeting, the DOR and the Ministry should evaluate the performance of the ongoing pavement works executed by the JVC firms, in terms of time, cost and quality as well as achievement of its intended objective of faster completion and low maintenance cost as compared to huge recurrent maintenance cost under conventional method of pavement construction as indeed wider acceptance and adoption of the new technology will largely depend on the successful and cost effective implementation of the ongoing project. Besides, further studies on the feasibility and long run sustainability of the technology would also need to be conducted to facilitate development of procedures and processes to ensure our preparedness in terms of resources, enhancing in-house expertise as well as prospective bidders in the new technology.

The review report on the new technology should be furnish to audit for review and to enable to form a final opinion on the new technology.

20 Adoption of varying analyzed rates for similar item of works indicating possible existence of flaws in carrying out the rate analysis

An attempt was made to ascertain consistencies and uniformities in carrying out rate analysis for item of works not in the BSR. On review of the analyzed rates used for new item of works incorporated in the estimates and BOQs, the RAA noted that the RO, Lingmethang had applied varying analyzed rates for estimation purpose for same items of works. The analyzed rates applied for various items of works and existence of inconsistencies in the analyzed rates for same items of works are as tabulated below:

			21.19 Km stretch	5.0 Km stretch	12.0 Km stretch	4.0 KM stretch
Item Code	Descriptions of items	Unit	Rate (Nu)	Rate (Nu)	Rate (Nu)	Rate (Nu)
A/R	Installation of labor camps, contractor's site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. as per Technical Specification.	LS	1,744,875.00	2,194,875.00	2,294,875.00	1,225,175.00

A/R	Earthworks-Excavation Excavation of road formation with excavator including disposal of muck to designated dump yards and clearing, grubbing and removal of bushes - all kinds of soil and rock. The item to be executed correct to specified batter slope, road width, gradient and to the Technical Specifications.	M	2,564.68	5,585.76	1,607.37	2,601.99
CW00 05	L-Drain Construct L-shaped road side drain clear width 800 mm with 150mm thick PCC 1:3:6, 300mm thick plum concrete (60% PCC 1:3:6 and 40% 75mm down boulder) hill side, including excavation, leveling, backfilling, necessary form works and disposal of surplus earth within 50m lead complete as per drawing.	M	1,071.71	1,032.24	1,079.76	1,168.93
A/R	RRM WALL Providing and Laying Random Rubble Masonry in CM 1:6 in road side structures incl. headwalls, wingwalls, catchpits, channels. Weep holes to be provided as per drawing.	Cum	2,332.75	2,193.10	2,295.43	2,558.65
A/R	Backfilling of structures including masonry walls with graded filter material as directed by Engineer	Cum	621.62	520.34	596.92	289.97
A/R	Selected backfilling behind structures, trenches, sides of foundations with suitable material including lead and lift	Cum	187.61	187.61	191.75	234.58
A/R	RCC Culvert Providing and Laying Random Rubble Masonry in CM 1:4 in road side structures incl. headwalls, wingwalls, catchpit, channels. Weep holes to be provided as per drawing.	Cum		2,193.10	2,295.43	2,947.90
A/R	Backfilling of structures including masonry walls with graded filter material as directed by Engineer	Cum	621.62	520.34	596.92	289.97
A/R	Pavement works Preparation of sub grade with proper camber by excavating earth to depth equal to pavement thickness, consolidation with roller, disposal of surplus earth up to 50m. All kinds of soil/rock.	Cum	112.31	109.82	109.82	127.98
RW01 30	Providing and laying Granular Sub-Base (GSB) Course to required degree of compaction with proper formation of cross fall using motor grader for laying and compacted to required density as per material gradation and aggregate quality specified. 250 mm thick.	Cum	1,509.93	1,355.45	1,492.29	1,899.73
RW01 31	Providing and laying Wet Mix Macadam (WMM) graded aggregate base course to required degree of compaction with proper formation of cross fall by using well graded crushed aggregates premixed with OMC using suitable mixer, motor grader as per material gradation and aggregates quality specified. 225 mm thick.	Cum	1,564.00	1,736.34	1,526.21	2,380.82
A/R	Provide and place road shoulder to required degree of compaction as per technical specification and drawing	Cum	392.31	478.95	478.95	781.66
A/R	Providing and Laying Dense Bituminous Macadam (DBM) to required degree of compaction based on mix design (job mix formula) approved by the supervising engineer including preparation of surface with road broom, application of prime coat @ 0.75 kg/sq.m by mechanized method using asphalt plant, paver, vibratory roller, steel roller, etc. complete – 75mm thick	Sqm	145.13*	831.58	835.9	724.24
A/R	Providing and Laying Asphalt/Bituminous Concrete to required degree of compaction based on the job mix design approved by the supervising engineer using asphalt plant, paver, steel roller, vibratory roller, pneumatic roller etc. as per material gradation and aggregate quality specified. 50 mm thick	Sqm	112.82*	644.28	646.98	542.07

Note: * rate without cost of bitumen

In this regards, following inconsistencies and flaws were observed:

- For the item of works “Installation of labor camps, contractor’s site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc. , it is apparent that the analyzed rates as a lump sum cost was not aligned to the extent of scope of works awarded. It would be noted from the table that for the said item of work, the lumps cost for 5 km stretch was analyzed and estimated at Nu. 2.195 million although only Nu.1.745 million was estimated for 21.19 km stretch of road. Additionally, only Nu. 2.295 million was estimated for 12km stretch road and Nu.1.225 million for 4km stretch of road. Thus, higher fixation of lump sum cost for lesser scope of works indicated flawed adoption of analyzed rates.
- For earthwork excavation, the analyzed rates ranges from Nu 1,607.37 to as high as Nu. 5,585.76 per m.
- Similarly, for item of work “*Providing and Laying **Dense Bituminous Macadam (DBM)** to required degree of compaction based on mix design (job mix formula) approved by the supervising engineer including preparation of surface with road broom, application of prime coat @ 0.75 kg/sq.m by mechanized method using asphalt plant, paver, vibratory roller, steel roller, etc. complete – **75mm thick**”*, the analyzed rates ranges from Nu. 724.24 to as high as Nu.835.90 per Sqm. In addition, the analyzed for item of work “*Providing and Laying **Asphalt/Bituminous Concrete** to required degree of compaction based on the job mix design approved by the supervising engineer using asphalt plant, paver, steel roller, vibratory roller, pneumatic roller etc. as per material gradation and aggregate quality specified. **50 mm thick**”* also ranges from Nu. 542.07 per Sqm to as high as Nu. 646.98 per Sqm.
- It is also evident from item of work “*Selected backfilling behind structures, trenches, sides of foundations with suitable material including lead and lift*” and “*Selected backfilling behind structures, trenches, sides of foundations with suitable material including lead and lift*” the analyzed rates were Nu.187.61 per cum for both 21.19 km stretch and 5km stretch roads. Thus it is apparent that varying analyzed rates applied for same item of work was not rationale and indicated flawed adoption of rate analysis.

In consideration to the above points, and use of varying analyzed rates for same item of works, the RO should comment and justify circumstances leading to computation and use of varying rates for same of item of works.

The Ministry should also review the adoption of different rates for same item of works and institute appropriate system to address such inconsistencies in carrying out the rate analysis for item of works not in the BSR.

Auditee’s Response

It is to inform RAA that no two projects are identical and every project is unique in its nature and site condition. Generally, the rate of the items are governed many factors like lead distance from the source of materials, availability of resources near the vicinity of the project site, site conditions etc.

The rates of the work items differ as per the distance of materials sources to the actual work site of the contract packages. For example the work items of Killikhar to Mongar will not for the contract packages Yadi – Korila since the base town or the sources of materials in Mongar for cement and the Killikhar crushing plant for aggregates respectively.

Earthwork for formation cutting the rates are based on the quantity of earth work quantity which was as per the survey and design and when we convert the total amount to unit length the rates are different. For example earth work rate is Nu. 5,585.76/m for Killikhar – Mongar stretch and Nu.1,607.366/m. The rates comparison are made for DBM and AC.

The auditors had compared the rates for DBM and AC of Yadi – Korila which are rates without adding the cost of bitumen to the rates of Killikhar – Mongar, Gangola – Kurizam and Kurizam- Lingmethang rates with the cost of bitumen.

Item	Unit	21.19 Km Stretch – Yadi to Korila		5.0 Km Stretch – Killikhar to Mongar		12.0 Km Stretch – Gangola to Kurizam		4.0 KM Stretch – Lingmethang to Kurizampa	
		Without Bitumen	With Bitumen	Without Bitumen	With Bitumen	Without Bitumen	With Bitumen	Without Bitumen	With Bitumen
DBM	Sq. m	145.13	839.65	140.22	831.58	144.59	835.9	161.46	724.24
AC	Sq. m	112.82	648.22	111.35	644.28	114.05	646.98	111.7	542.07

As highlight, we would like to clarify that the rates are different as the lead to the project site from the source of materials will determine the final cost of each items.

RAA’s Further Comments & Recommendations:

While taking note of the response that **the rate of the items are governed many factors like lead distance from the source of materials, availability of resources near the vicinity of the project site, site conditions etc.** the fact remains that varying analyzed rates were found used even for the following similar items of works where resources of materials were available within the sites and lead distance was not involved indicating flaws and deficiencies in the rates analysis.

- ✓ “Preparation of sub grade with proper camber by excavating earth to depth equal to pavement thickness, consolidation with roller, disposal of surplus earth up to 50m. All kinds of soil/rock” ;
- ✓ Installation of labor camps, contractor’s site office, accommodation with proper toilets and sanitation, stores, signage, water supply, electricity, lab facilities including equipment etc.as per technical specifications ;
- ✓ **Earthworks-Excavation-** Excavation of road formation with excavator including disposal of muck to designated dump yards and clearing, grubbing and removal of bushes - all kinds of soil and rock. The item to be executed correct to specified batter slope, road width, gradient and to the Technical Specifications;
- ✓ Backfilling of structures including masonry walls with graded filter material as directed by Engineer.

However, as discussed during the exit meeting, the DOR and the Ministry should review the present system and practices involved in the rate analysis carried out by ROs and individual

engineers responsible for preparation of estimates to ascertain the flaws and ambiguities as well as to identify critical factors influencing the rates of individual item of work. Besides, the DOR and Ministry should institute appropriate system to address and prevent such inconsistencies and flaws in carrying out the rate analysis for item of works not in the BSR for future project.

21 Irregularities noted in the departmentally executed formation cutting between Yadi and Korila

21.1 FC work not executed in few stretches

During the joint physical verification of site on 17th November 2017, the widening works (formation cutting) **in between Korila to Yadi**, the following chainages were found not executed as the existing road had required formation width of 10.50m:-

SL. No.	Chainages (approximately in meter)	Approximate Length (in meter)
1	42600m-42722m	122.0m
2	49381m	42.3m
3	51593m	345.0m
	Total	509 .3m

The review of the Survey Report (Data) including the departmental estimates and BOQ noted that the aforementioned Chainages were found incorporated for widened works. It is apparent that the survey was not properly conducted as well that RO failed to exclude these chainages from the estimates and BOQ as well as from the total executed running meters of road works.

The Regional Office should comment on the inclusion of the chainages in the estimates and BOQ and total running meters of works done. Besides, the Regional Office should ascertain volume of excavated earthworks and spoil materials pertaining to the FC works not carried out as the included in the estimated quantities and cost to that extent recovered and deposit into ARA. In addition, the Regional Office, should fix the site engineer accountable for including chainages in the final cost sheet.

The Ministry should also review thoroughly the departmentally executed works for ensuring that cost estimates are not inflated and work done are correct and cost effective in consideration to cost paid for works executed through contracts. Besides, the Ministry should also review the survey data for the whole stretch of the East West Roads to validate correctness of the survey data and subsequent incorporation in the estimates by the Regional Offices.

Auditee's Response

During the field visit made by the RAA on 18th November 2017, around 509.3m of road was not widened in between Korila to Yadi, which was executed by departmentally. However, these many lengths were included in the survey for deriving the types & volume of the earthwork excavated in the preparation of total estimation.

We accept the observation, but that many lengths of road were still remaining uncut as these locations were realigned, that is, near box cutting & Ngatshang bypass. The said lengths were not taken into the account (MB) for recovering the any expenditure and the avenue of leaving

these many lengths will shorten Northern East-West Highway in future. RAA kindly requested to drop the memo.

RAA's Further Comments & Recommendations:

While taking note of the response, it is to reiterate that the inclusion of types and volume of the earthwork excavation in the preparation of total estimates for road stretches where excavation were not required was not correct as it has resulted into overestimation of estimated cost of the widening works in between Korila to Yadi.

However, as discussed during the exit meeting, the RO should furnished relevant documents supporting that the road stretches were not recorded in the MB and adjusted from the expenditures incurred on the widening works executed departmentally for review and records.

The Ministry should also institute appropriate system to prevent such flaws in the preparation of estimates by RO in future projects.

21.2 Providing and laying Granular sub-base course (GSB) to required degree of Compaction

In terms of the technical specifications, the material to be used for the Sub-Base works shall be natural sand, moorum, gravel, crushed stone, or combination thereof depending upon the grading require. The size of the crushed stone shall be not more than 53mm i.e while sieving, stones must pass through 75mm sieve. The sub-base material of grading specified in the contract shall be spread on the prepared subgrade with the help of a motor grader of adequate capacity.

However, the materials used at site were found to be oversized (more than 53mm) and prepared without required degree of compaction as evident in the photographs depicted below:



Fig: 21.2: Oversized GSB materials

Upon enquiry with the site engineer, it was stated that GSB materials are brought directly from the quarry and laid on the prepared sub grade and wherever they find huge stone, the labors crush it using hammer which is not technically sound. The crushing of huge stones while laying shows the materials before laying were not as per the required specifications impacting the quality of works. It is to reiterate that if the departmentally executed works failed to use

materials in line with the technical specifications, it may be impossible for the RO to force contractors to abide use of construction materials as per the technical specifications.

The Ministry may consider the desirability of establishing a dedicated technical committee to thoroughly inspect and certify departmentally executed as per revised designs and drawings and to the required technical specification including quantum of works executed at site as to prevent payment for works not executed and poor quality works. Besides, the Ministry must fix the site engineer and Regional Office accountable for non-compliance to the technical specification in the use of construction materials.

Auditee's Response

During the site visit made by the Auditors observed that, the GSB materials used at site were found to be oversized (more than 53mm) and prepared without required degree of compaction and Upon enquiry with the site engineer, it was stated that GSB materials are brought directly from the quarry and laid on the prepared sub grade and wherever they find huge stone, the labors crush it using hammer which is not technically sound. The crushing of huge stones while laying shows the materials before laying were not as per the required specifications impacting the quality of works.

We accept the observation and the material to be used for the Sub-Base works shall be natural sand, moorum, gravel, crushed stone, or combination thereof depending upon the grading require. The materials which were brought from the site were done pre-requirement test like crushing, impact and abrasion and then it was being screen by screener (Picture). However, during the time of laying, if we come across the bigger or huge sizes, we engage the labors to crush it using hammer into a require sizes. Thereafter, we are conducting the gradation test as conformity, before laying the materials, followed by compaction test after laying. (Pictorial attached)



Response Para 21.2: Screening the materials



Response Para 21.2: Breaking the materials to required sizes

RAA's Further Comments & Recommendations:

While taking note of the response on the execution of works as per technical specification, the fact remains that during the site visit the GSB materials brought directly from the quarry were laid on the prepared subgrade and also noted use of oversize stone in deviation to the laid down technical specifications. The crushing of oversize stone after laying indicated poor workmanship and execution of substandard works.

However, as discussed during the exit meeting, the DOR and the Ministry should constitute a dedicated technical committee to thoroughly inspect and certify departmentally executed as per revised designs and drawings and to the required technical specification including quantum of works executed at site as to prevent payment for works not executed and poor quality works. Besides, the Ministry must fix the site engineer and Regional Office accountable for non-compliance to the technical specification in the use of construction materials.

The DOR and the Ministry should also institute appropriate control mechanism including standing procedures and process to oversee departmentally executed works are aligned to constructions and procurement norms as well as to achieve economy, efficiencies and effectiveness in the execution of works.

21.3 Defective Execution of Parapets

A joint physical verification of site was conducted on 17th November, 2017 and noted that parapets along the Korila-Yadi were found with honey comb cracks and irregular shape which indicates poor workmanship and supervision as depicted in the photographs below:



Fig: 21.3 Parapets with irregular shape and honey comb cracks

It is to reiterate that the departmentally executed works of poor workmanship indicated execution not as per the technical specifications. Thus, expenditure spent was not cost effective and it may be impossible for the RO to force contractors to abide the technical specifications and quality work outputs.

The Ministry besides commenting on the execution of substandard work should fix the site engineer and Regional Office accountable for poor quality works and directed to redo the works at their own cost.

Auditee's Response

During the site visit of Audit on 17th November 2017, the works are under construction and seen some defect on the parapets, due to improper orientation of the form works (centering & sheltering). Since it was under construction, the repairs of parapets were unattended. However, later on it was fully repaired by rich mortar and some are with plastering over the plumb concrete parapets. (as shown in pictures).

Response Para 21.3: Before



Response Para 21.3: After



This stretches of road is under construction of pavement by contractors like ZeoCrete pavement from Yadi to Ngatshang 10.Km and 10.5Km from Ngatshang to Korila was under process of awarding the work, and due to these activities, we were hampering the repair works, however before wing up the construction, we will make sure that, these work are deliver with our department specification.

RAA's Further Comments & Recommendations:

While taking note of the response, the fact remains that departmentally executed structures had failed to achieve the required technical standards as well as execution of substandard works.

However, as discussed during the exit meeting, the DOR and the Ministry should constitute a dedicated technical committee to thoroughly inspect and certify departmentally executed as per revised designs and drawings and to the required technical specification including quantum of works executed at site as to prevent payment for works not executed and poor quality works. Besides, the Ministry must fix the site engineer and Regional Office accountable for non-compliance to the technical specification.

The DOR and the Ministry should also institute appropriate control mechanism including standing procedures and process to oversee departmentally executed works are aligned to constructions and procurement norms as well as to achieve economy, efficiencies and effectiveness in the execution of works.

21.4 Non-achievement of formation road width as per standard drawing and design for implementation of NEWH under respective Regional Offices

A Joint Team comprising of officials from Regional Office, and RAA team conducted joint physical verification of sites on 17th -18th November 2017. During the physical verification, it was noted that in few chainages/stretches along 21.19 km of departmentally executed roads, the formation width were not obtained after the formation cuttings as illustrated below:-

Stretch between Korila to Ngatshang (a total of 11 Km measured in line with Environment Management Plan prepared by RO)					
SL. No.	Approx. chainage (in meter)		Approx. length (in meter)	Approx. width measured (in meter)	Width Deficit (in meter)
	From	To			
1	45571	45593	22	9.7m	0.8m
2	45712	45724	12	9.4m	1.1m
3	50083	50096	13	9.4m	1.1m
4	50151	50240	89	10m	0.5m
5	50757	50784	27	9.5m	1.0m
6	52149	52172	23	10m	0.5m
Stretch between Ngatshang to Yadi measured based on peg used at site (a total of 10 Km)					
1	220	290	70	10.2m	0.3m
2	600	700	100	10.2m	0.3m
3	730	780	50	9m	1.5m
4	1415	1440	25	10m	0.5m
5	1480	1500	20	10m	0.5m
6	1560	1620	60	10m	0.5m
7	1710	1820	110	9m	1.5m
8	2046	2060	14	10.2m	0.3m
9	2074	2104	30	10.2m	0.3m
10	2820	2860	40	10m	0.5m
11	2894	2980	86	10m	0.5m
12	3485	3510	25	10m	0.5m
13	3985	4000	15	9.5m	1.0m

From the above table, it clearly indicates that overall formation width requirement of 10.50m as per revised drawings and technical specifications along those chainages/stretches were not achieved. It indicated that the RO had not only failed to execute the formation works as per technical specification and drawings but also defeated the core objective of widening works initiated by the Government.

The Regional Office should comment on the non-achievement of FC width as per drawing and technical specification.

Further, in departmental estimate, the total cost for widening works for 21.19 km of stretch with width 10.50m were incorporated as detailed as under:

Type of work	Qty. in cum	Rate	Amount (Nu.)	Remarks
All types of soil	178,255.3	46.94	8,366,821.45	Computed as 60%
All types of rock	118,836.8	214.56	25,497,082.25	Computed as 40%
Transportation	118,836.8	172.35	20,481,619.59	Computed as 40%
Total			54,345,523.29	

Thus, the non-achievement of the required widening width entailed payments for unexecuted works as the departmental estimates and BOQ were based on extended road width required to achieve over all formation width of 10.50m. Besides, the RO had not maintained the details of measurements of volume of formation works executed except total running meters executed which evidence payments for unexecuted works to the extent of road width not achieved. Thus the payments on the basis of running meters had resulted into payments for unexecuted works. The Regional Office should comment on the non-achievement of overall formation width as well as payments involved as the MB recorded just Running meters without providing details for the actual works executed. The Ministry should also hold the site engineer and RO accountable for appropriate action for execution of works in deviation to approved drawings and technical specification. In addition, the Ministry should immediately recover the cost difference for the deficit width and deposited into audit recoveries accounts.

Auditee's Response

A Joint Team comprising of officials from Regional Office, and RAA team conducted joint physical verification of the site on 17th -18th November 2017. During the physical verification, it was noted that in few chainages/stretches along Yadi-Korila (21.19Km) of departmentally executed roads, the formation width were not obtained as low as 0.3m to high as 1.1m in different locations.

In this case, the following were the reasons & justification for non-achievement of formation cutting width 10.5m were it is incorporated in design & drawings.

During the visit of RAA, we are in the process of rectifying the site and now almost all the stretches were completed width 10.5m and even we have serve written notice to have 10.5m width in all stretches vide no. DOR/KS/2017-2018/0053 dated 28th December 2017.

Places where there is local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site, we could not achieve road width of 10.5m.

Rock Cutting: In some stretches, the height of cut is very high and to obtain full width by carrying out excavation even beyond the batter peg, the required width could not be achieved due to sudden fall of boulder/rock (impact action) on the road edges, thereby eroding the base width on the valley side reducing the road width.

The limitations to achieve full road width requiring high rock cuts and displacement of settlements were highlighted to TMT from Thimphu and to H.E Minster, MOWHS during her

visit to site and in many meetings. The instruction to this affect is Highlighted and attached for reference.

“While the National highway standard specifications will be applied, site specific flexibility that will save us substantially in money and time should be permitted. (foreg., No need to get full specified formation width at rocky/ cliff stretches; no black topping needed on the wet and unstable stretches; choices to adopt “V” or box drain as per the site condition-for wet stretches, box drain is said to be more effective; -etc...)” In the view of above, RAA is requested to drop the memo.

RAA’s Further Comments & Recommendations:

It is apparent from the response that there were deficiencies in the site feasibility studies for formation cutting works and improper planning.

It is apparent from the response that there were deficiencies in the site feasibility studies for formation cutting works and improper planning as the RO had failed to consider in the preparation of design and estimates/BOQs the limitations for formation works expected in locations where there were local resident, communities, Public, private properties, water tanks, permanent structures (household), public utilities like electricity poles, Telephone cables, water pipeline, Religious, cultural, Historic and ecologically important site and in rock areas. Thus the costing for formation cutting works in running meter without adjustment of the cost for road stretches where requisite formation width were not achieved were not justified.

However, as agreed during the Audit Exit meeting, the DRO and DOR should regulate the payments for FC works on pro rata basis for road stretches where FC width were not achieved and amounts recovered within three months from the date of issue of the report beyond which 24% penalty per annum shall be levied as per FRR 2016, Chapter IV, Section 4.5.1.4 of Finance and Accounting Manual. Besides, the recoveries effected and accounted for in the books of accounts should be furnished for review and records. The RO, Lingmithang should not entertain the full payment unless the work are executed complete in all expects in future.

In addition, the Ministry should institute a technical team to review the cost implication in terms of non-achievement of formation width and non- maintaining of Hard Shoulders at valley site in terms of the contractual documents and appropriate decisions and action taken on the issue intimated to the RAA.

21.5 Non-quantification of volume of excavated earth & Rock in MB on completion of formation cutting works

As per the survey data, total volume of earth and rock to be excavated for 21.19 km formation cutting works from Chainages 52km to 73.19km was worked out to 297,092.09m³. Accordingly, Departmental estimates amounting to Nu.55,852,987.88 was found prepared for the excavation and embankment works. The types and quantum of soil and rocks to be executed and quantum of spoil materials to be transported were projected as detailed below:-

Types of soil/rock	Qty. in m ³	% in terms of total excavated Qty.	Rate per M ³	Amount (Nu.)
All types of soil	178,255.30	60	46.94	8,366,821.45
All types of rock	118,836.80	40	214.56	25,497,082.25

Total	297,092.09			
Transportation	118,836.80	40	172.35	20,481,619.59
Total				54,345,523.29

In terms of FRR 2001, amongst others the following constructed related records are required to be maintained for departmentally executed works:

- Under 6.3.1.3(a)-Measurement Book (MB) in form 6.3 shall be maintained by the Site Engineer to record detailed actual measurement of quantities of work done as well as supplies received. MB shall be the basis of all accounts of quantities of work done by contractors or work-persons engage departmentally or supplies received.
- (b) MBs shall be considered as very important account records and maintained very carefully and accurately as these may have to be produce as evidence in a court of law, if and when required.
- Under (h-vii) of 6.3.1.3-In case of work executed departmentally, if works are susceptible to measurements, detailed measurement of the work done under execution shall be taken and recorded in the MB on the closure of each MR.
- Under (h-viii) - An abstract of measurements giving the totals of measurements by individual items of works as indicated in the sanctioned detailed estimates shall be appended below the detailed measurements.

On review of MB maintained for the works, the audit team noted that types and volume of the earthwork excavated was not measured and recorded in MB. The MB maintained reflected only the quantity of work done in running meters similar to measurements recorded for contract works which were awarded as a lump sum contract for given quantum of works.

Thus, non-maintenance of detailed measurements of the work done and quantifications in terms of types of soil/rock and transportation of spoil materials was not only in violation to the provisions of the FRR 2001 but also defeats the very purpose of estimations and preparation of BOQs.

In the absence of the actual quantification of work done in relation to types of executions as well as transportation of spoil materials, the correctness of the expenditures incurred on earthworks could be validated in audit.

The RO, Lingmethang should quantify the exact volume of earth/rock work done for whole stretches besides justifying the reason for non-quantification of earth/rock work.

Auditee's Response

The road widening work from Yadi-Korila of 21.19Km was proposed initially to contract out by making of two section from Yadi-Ngatshang (10.0Km) and Ngatshang to Korila (11.19Km) to Private large Contractors as these location seem to be quite easy with friendly terrain with almost no rock cutting, thus requiring less time for formation cutting. The initial estimation was prepare in running meters similar to other packages under Lingmethang Regional Office and forwarded to higher authorities for administrative and technical approvals.

However, the road traverse along the private land (90% of total length) consisting of maize fields and orchards. There are also settlements on both sides of the highway and there are lots of road geometrics need to be corrected & improved and we have more than 50 plus NWF/local workers working along the road from Yadi-Lingmethang. In order retain those labours in our

department, we have proposed to carry out the widening work departmentally, where the department will have better control on the widening work in terms of remedial measures & would be less hassles with regard to hindrances in completing of the works on time.

Since, all road stretches from Lingmethang to Yadi was worked out in unit length base on the quantity derived from survey data. We have applied same to the entire road for taking mode of measurement and recording in the measurement Book (MB). However, the quantifications in terms of types & volume of the earthwork excavated in the MB seems another head load or burden to the site engineers as well as more engagement of site labourers & survey officials. Thus it may lead to extra financial implication to the Project. RAA is requested to drop the memo, considering the above view.

RAA's Further Comments & Recommendations:

While taking note of the response, it is to reiterate that in terms of FRR 2001, amongst others the following constructed related records are required to be maintained for departmentally executed works:

- *Under 6.3.1.3(a)-Measurement Book (MB) in form 6.3 shall be maintained by the Site Engineer to record detailed actual measurement of quantities of work done as well as supplies received. MB shall be the basis of all accounts of quantities of work done by contractors or work-persons engage departmentally or supplies received.*
- *(b) MBs shall be considered as very important account records and maintained very carefully and accurately as these may have to be produce as evidence in a court of law, if and when required.*
- *Under (h-vii) of 6.3.1.3-In case of work executed departmentally, if works are susceptible to measurements, detailed measurement of the work done under execution shall be taken and recorded in the MB on the closure of each MR.*
- *Under (h-viii) - An abstract of measurements giving the totals of measurements by individual items of works as indicated in the sanctioned detailed estimates shall be appended below the detailed measurements.*

Thus non-maintenance of measurements in terms types and volume of the earthwork excavated except the quantity of work done in running meters similar to measurements recorded for contract works was in total violation of the provisions of the FRR and standing practices. Further, the final survey on completion of formation cutting was not carried out by the RO to obtain the exact quantum of cut and fills to support that the works were executed to the quantum of works detailed in the departmental estimates and BOQs. In the absence of final survey and quantum of works actually executed, the RAA was not in a position to verify and validate the expenditures incurred for formation cutting by the RO. Further, there was not check and balances in the departmentally executed works since the RO was responsible for the preparation of estimates, execution and settlement of related expenditures.

However, as discussed during the exit meeting as well as in the light of non-achievement of formation widths and non-requirement of formation cuttings in several road stretches, the DOR and the Ministry should immediately carry out the final survey of the departmentally executed works and quantify the exact volume of earthworks executed. Besides, the DOR and the Ministry should take appropriate action for variations in the quantum of works executed and reflected in the departmental estimates including quantum of transportation of spoil materials to the designated dumping yards.

The DOR and the Ministry should also furnish the details of quantum of works executed and expenditures incurred including copy of the final survey report for audit verification and records. Besides, the DOR and Ministry should also review such system adopted by the RO in violation to the FRR and standing practices and appropriate system and control mechanism put in place to prevent unhealthy practices and system.

Deficiencies, irregularities and lapses on the direct award of contract for demonstration of Zeocrete pavement construction Technology on execution of In-situ cementitious pavement work on Yadi-Korila PNH covering 10km chainage

22 Deficiencies, irregularities and lapses on the direct award of contract for demonstration of ZeoCrete pavement construction Technology on execution of In-situ cementitious pavement work at Yadi-Korila covering 10km chainage

22.1 Non-enforcement of contractual provision for technical presentation on the new technology

The additional Clause (4) under SCC stipulated the requirement of technical presentation as stated, *“As and when the CTB layer is being laid, the JV will be required to make a technical presentation and explain the new technology & methodology to the group of DOR & Private sector engineers, bureaucrats, parliamentarians”*.

The presentation of the new technology as and when CTB layer is being laid made if any was not available on record. The Ministry should furnish the details of presentation made to the aforementioned stakeholders when laying the CBT Layers for verification on the enforcement of the provisions.

Auditee Response

It is to inform that as per the contract agreement signed, the JV was required to make a technical presentation to the group of DoR & Private sector engineers, bureaucrats and parliamentarians.

With regards to non-contractual provision for technical presentation on the new technology, we would like to inform RAA that technical presentation was made to group of engineers from RO Trashigang, RO Lobeysa & RO P'ling besides the engineers from RO Lingmethang. (2017 & 2018). However, the BZPT JV failed to make the presentation to bureaucrats & parliamentarians as it was practically not possible to implement it, involving huge costs, logistics arrangements & problems etc. Presentation to DoR engineers on the new technology itself is a great achievement as we are the real implementers in future.

In view of the above justifications, RO L/thang requests RAA to kindly drop the memo and not to pursue further.

RAA's Further Comments & Recommendations:

The RAA while taking noted the response, the fact remains that JVC firms had failed to make presentation of the new technology & methodology to the group of Private sector engineers, bureaucrats, parliamentarians in terms of additional Clause (4) under SCC. Non-enforcement

of the clauses tantamount to extension of undue favour to the contractor as such provisions are tagged with cost of the contract.

However, as agreed during the exit meeting, the RO and DOR should furnish the technical presentations made to DOR engineers along with documentary evidences for review and records. Besides, the Ministry should also look into the possible of directing the JVC firms for technical presentation to private sector engineers and parliamentarians on completion of project.

22.2 Indication of either non-achievement of FC width or Flawed pavement design

The audit team along with the officials from the RO, Lingmethang visited construction site from 9th November to 11th November 2017 at Yadi and noted that ZeoCrete pavement works were executed till edge of the hill side leaving no provisions for 1 meter shoulder and 1 meter drainage works as required in the approved design and drawings for Pavement works. Photographs below provide evidence of ZeoCrete pavement works constructed without drainage and shoulder provisions:



Fig: 22.2: No provision for drains

The above photographs are indicative of either existence of flawed design/drawing or execution of works by the contractor not as per approved design/drawing. It is also indicative that the required formation widths were not achieved to execute works as per the pavement designs/drawings.

The RO, Lingmethang should comment on the flawed execution of works besides fixing responsibility on the site engineer for the failure to take appropriate measures to prevent flawed execution of works. In the event further execution of FC is required for drainage works, damages to the executed pavement works, the contractor and the site engineer should hold accountable to make good the damaged pavement works.

Auditee Response

With regards to non-achievement of FC and flawed pavement design, RO fully agrees the observation made by RAA. However, RO has its own clarification regarding the implementation problems at site during actual execution of works. The geometric of the road has to be maintained which also compromises the standard design width of the pavement. Further, the stretch of PNH from Korila- to Yadi mostly falls in either town area or private individuals' land which further restricts & complicates the matter for the site project officials

to implement things as per rule & specifications. (Refer Yadi town area, road width not achieved due to existence of old town and its buildings.)

Regarding fixing accountability, when things are beyond the control of the project officials/site engineers, fixing accountability to the field project officials has to be properly studied and judged. Further, the scenario is totally different at present & things have improved as compared to last one year. Therefore, revisit by RAA team is being proposed to see actual ground realities by now.

Therefore, with the genuine site related practical problems as narrated above, RO requests RAA, to kindly drop the memo and not to pursue further.

RAA's Further Comments & Recommendations:

The RAA while taking note of the response, it is to reiterate that it is the responsibility of the RO, Site Engineer and the contractor to ensure that adequate gaps for drainage works as specified in the drawing and technical specification are maintained. However, the assertion of the RO that due to geometric of the road to be maintained compromises the standard design width of the pavement is not tenable on the grounds that formation width to be executed was 10.5m to achieve the pavement designs of 1m gab between hill and drain, 1m drain width with 7.5 carriage width and 1m shoulder at valley side. Further, the DOR and RO had already proposed to award the drainage works of 1m width to the firm despite allowing the firm to execute ZeoCrete pavement works till edge of the hill side leaving no provisions for 1 meter shoulder and 1 meter drainage works as required in the approved design and drawings for Pavement works.

However, as discussed during the exit meeting, the DOR and Ministry should look into the issue in the light of the fact that the FC width of 10.5 m if not achieved were due to areas falling in either town area or private individuals' land but allowing the pavement works up to edge of the hill as well as awarding the drainage works for execution.

The DOR and the Ministry should depute a technical to study the situation as to properly regulate the payments for pavement works and departmentally executed widening works. The Ministry should intimate the outcome of the study to RAA for verification and records.

23 Irregularities noted in formation cutting and Pavement works from Mongar – Gongola (Package 5) executed by M/s Norbu Construction company Pvt. Ltd. Gelephu

23.1 Unjustified payment for boulder barrier valuing to Nu. 43,216.00

M/s Norbu Construction had claimed and was paid Nu. 43,216.50 for providing and constructing of 116.8m boulder barriers (*refer MB 773 Page no 003*).

Principally “The boulder barriers should be placed in a row and on top of each other. The boulders shall be placed in such a way that larger boulders will form the first layer and smaller boulders the layers above. The boulder barriers must form a closed line along the road slope so that the barriers will withhold the materials sliding over. The packing of the boulders shall be done in such a way that the barrier can withstand the pressure of the sliding material”.

However, on site verification, boulder barriers were found damaged, covered with slide materials due to placement in random manner in contrary to the principles of construction as depicted in the picture below:



Fig: 23.1: Damaged boulder barriers



The above pictorial evidences indicated existence of inadequate supervision and monitoring controls over the execution of works by the Site Engineer and Regional Official. The acceptance and taking over of poor quality or substandard works despite investment of huge Government scarce resources indicated laxity on the part of the Regional Office. In additional, damages to structures within short span of its construction indicated wasteful expenditures as it has not achieved the desire objective of stabilizing the soil.

The Ministry should consider the desirability of establishing a dedicated technical committee to thoroughly inspect and certify all completed works to prevent taking over of poor workmanship/quality works from the contractor. Besides, the Ministry must fix the site engineer accountable for such unwarranted lapses including contractor for execution of defective works and immediately direct the contractor to redo the defective and substandard works and intimated to RAA for review and records. Further, the Ministry may look into the technical viability of such structures, as incorporations for future projects may not be cost effective.

Auditee Response:

The total length of 116.8mtrs@ Nu. 370/m = Nu. 43,216.00 of boulder barriers were constructed at following different locations depending upon the nature of slopes and soil characteristics.

Ch. 12.1 =30mtrs

Ch. 12.15=10mtrs
Ch. 12.2=29mtrs
Ch. 18.25=16mtrs
Ch. 19.15=23mtrs. &
Ch. 23.5=8.8mtrs. Total = 116.8mtrs

Out of 116.8mtrs of boulder barrier constructed only about 10 to 15 mtrs of boulder barrier at Ch. 12.10km has slightly bulged out due to the mass movement of slope and due unstable and marshy area. Any other structure would have failed at this magnitude of slope movement despite adequate supervision and monitoring controls.

This boulder barrier was provided due to its low cost and upon the instruction of TMT head during one of his site visits. The rest of the boulder barrier constructed had remained intact serving its purpose.

RAA's Further Comments & Recommendations:

While taking noted the response as well as joint site verification conducted after exit meeting, it is to reiterate structures constructed are properly executed in terms of technical specifications and principles of technical norms to prevent damages within short span of time.

However, the Ministry should consider the desirability of establishing a dedicated technical committee to thoroughly inspect and certify all completed works to prevent taking over of defective and substandard works.

23.2 Poor workmanship on construction of parapet and RRM above slabs

During the physical verification of the site by a joint team comprising of officials from RO, Lingmethang, audit team and contractor on 4th November 2017, observed that the construction of parapets and RRM works above the slab of the culverts along 11.56 km of stretches were executed with poor workmanship. During the physical verification of the site by a joint team comprising of officials from RO, Lingmethang, audit team and contractor on 4th November 2017, observed that the construction of parapets and RRM works above the slab of the culverts



Fig: 23.2 Sub-standard construction of parapets & RRM above the slabs



along 11.56 km of stretches were executed with poor workmanship. The poor construction of wall and parapets works noted are as depicted in photographs below:

It also indicated lack of proper supervision and monitoring controls from the concerned engineers as well as Regional Office. The acceptance and taking over of poor quality or substandard works despite investment of huge Government scarce resources indicated laxity on the part of the Regional Office.

Auditee Response

There are 156 nos. of parapet walls constructed on slab culverts and RRM walls along 11.56km stretch of road between Gangola to Mongar. However, only one parapet wall out of above numbers has been constructed with poor workmanship despite our effort in supervising and monitoring. We assure it will be rectified at the earliest.

RAA's Further Comments & Recommendations:

While taking note of the response, it is to reiterate that rectification of defective and substandard works on the instant of audit verification of sites is an indication of laxity on the part of the RO and Site engineer toward works and procedures. It was apparent that the contractor would have been paid for defective and sub-standard works if not observed by RAA.

However, as agreed during the exit meeting the DoR and RO besides furnishing documentary evidence for the rectified works should institute strict supervision and monitoring controls to prevent execution and acceptance of defective and sub-standard works in future. The control mechanism proposed to be put in place intimated to RAA for record and follow-up during future audits.

The Ministry should also consider the desirability of establishing a dedicated technical committee to thoroughly inspect and certify all completed works to prevent taking over of poor workmanship/quality works from the contractor.

23.3 Damaged gabion wall at Ch. 22.9km-Nu. 161,000.00

The contractor had claimed and was paid Nu. 161,000.00 for the construction of gabion walls along the Monger-Gongola road at Chainage 22.9km (*refer MB 773 Page no 002*). The joint team comprising of Officials from RO, Contractor and audit team conducted physical verification of work sits on 03/11/2017 and noted gabion boxes covered with plants and bushes and the fourth layer of 14m gabion wall damaged as depicted in the photographs below:



Fig: 23.3 Defective gabion wall with chain-link mesh torn off and gabion boxes bulging out

The pictorial evidences indicated inadequate supervision and monitoring controls over the execution of works by the concerned engineers as well as Regional Office. The damages within short span of periods indicated acceptance and taking over of poor quality or substandard works despite investment of huge Government scarce resources.

The RO should review all the documents of the contractors to validate that the gabion boxes mesh are procured from the BSB approved manufacturer M/s. Maccaferri Environmental Solutions Private Limited, Pune, Maharashtra. In the event procurements are made from other suppliers, the RO should review to ascertain that the steel wire crates comply with IS 280-197 and the weight of deposition of zinc is in accordance with IS 4826-1979, tolerance on diameter of wire +2.5 percent, tensile strength of gabion wire between 300 and 550M/mm² and all gabions are machine woven with a minimum of 3 twists as defined under section 1500 of the Technical Specification.

The RO should take appropriate actions and measures against those contractors procuring and using other than the approved brand wire mesh vis-à-vis non-complying with the requisite technical specification for ensuring quality execution of works

Auditee Response

The fourth layer of the front face of gabion wall at Ch. 22.9km was damaged by an excavator while trying to level its surface for constructing a drain. The auditors were explained its damage by official of RO during the joint physical verification. However, the above damages will be rectified at the earliest.

RAA's Further Comments & Recommendations:

While taking note of the response, it is to reiterate that rectification of defective and substandard works on the instant of audit verification of sites is an indication of laxity on the part of the RO and Site engineer toward works and procedures. It was apparent that the contractor would have been paid for defective and sub-standard works if not observed by RAA.

However, as agreed during the exit meeting the DoR and RO besides furnishing documentary evidence for the rectified works should institute strict supervision and monitoring controls to prevent execution and acceptance of defective and sub-standard works in future. The control mechanism proposed to be put in place intimated to RAA for record and follow-up during future audits.

The Ministry should also consider the desirability of establishing a dedicated technical committee to thoroughly inspect and certify all completed works to prevent taking over of poor workmanship/quality works from the contractor.

23.4 Execution of defective RRM Steps - Nu. 6,640.50

During the joint physical verification of site conducted on 03/11/2017 noted that 3.5m³ of RRM steps executed at Chainage 13500m was found not executive as per technical specification as well as defective depicted in the picture below:



Para 23.4: Defective RRM steps

The pictorial evidences indicated inadequate supervision and monitoring controls over the execution of works by the concerned engineers as well as Regional Office. The acceptance and taking over of poor quality or substandard works despite investment of huge Government scarce resources indicated laxity on the part of the Regional Office.

Auditee Response

The gap of around 1.2m between the two RRM Walls has purposely been kept upon the request of land owner above to provide access footpath. The steps with dry stone masonry were constructed by that land owner upon his convenience and no payment was made to the contractor. As such there is no question of accepting poor quality works and revisit the site for further verification.

RAA's Further Comments & Recommendations:

While taking note of the response as well as in the light of the joint physical verification of site after the exit meeting, it is to reiterate that structures did not suffice the purpose of the structures put in place as backfilling required were not done due to providing passage way.

However, as discussed during the site visit, the appropriate measures should be taken to achieve the intended objective of the structures and action taken intimated to RAA with documentary evidences. The RO should also ensure proper planning prior to execution of structures to avoid wasteful expenditures in future.
