Schedules

SCHEDULE - A

(See Clauses 2.1 and 8.1)

SITE OF THE PROJECT

1. The Site

1.1 Site of the 2-lane Project Highway shall include the land, buildings, structure and road works as described in Annex-I of this Schedule –A.

1.2 The dates of handing over Right of Way to the Contractor are specified in the Annex-II of this Schedule-A.

1.3 An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Contractor, and such inventory shall form part of the memorandum referred to in Clause 8.2.1 of this Agreement.

1.4 The alignment plans of the Project Highway are specified in Annex-III. In the case of sections where no modification in the existing alignment of the Project Highway is contemplated, the alignment plan has not been provided. Alignment plans have only been given for sections where the existing alignment is proposed to be upgraded. The proposed profile of the Project Highways shall be followed by the contractor with minimum FRL as indicated in the alignment plan. The contractor, however, has to improve/upgrade the Road Profile as indicated in Annexure-III based on site/design requirement.

1.5 The status of the environment clearances obtained or awaited is given in Annex - IV.

Annexure - I

(Schedule-A)

Site

Note: Through suitable drawings and description in words, the land, buildings, structures and road works comprising the Site are specified briefly but precisely in this Annex-I. All the chainages/location referred to in Annex-I to Schedule A are existing chainages.

1. Site

The Site of the Two-Lane with paved shoulder Project Highway comprises the section of National Highway-54 commencing from km 208.000 to 250.000 i.e. Aizawl-Tuipang Section in the state of Mizoram. The land, carriageway and structures comprising the Site are described below.

2. Land

The Site of the Project Highway comprises the land (sum total of land already in possession and land to be possessed) as described below:

S. No.	Existing Chainage (km)		ROW (m)		Total (m)	Remarks
	From	To	LHS	RHS		
1	208.000	250.000	varying	varying	20-24	

3. Carriageway

The present carriageway of the Project Highway is Single Lane/ Intermediate Lane. The type of the existing pavement is flexible.

4. Major Bridges

The Site includes the following Major Bridges:

S. No.	Existing Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Super-Structure		
NIL						

5. Road over-bridges (ROB)/ Road under-bridges (RUB):

The Site includes the following ROB (road over railway line)/RUB (road under railway line):

S.No.	Existing Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)	ROB/ RUB
		Foundation	Super Structure			
NIL						

6. Grade separators

The Site includes the following grade separators:

S. No	Existing Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)
		Foundation	Superstructure		
NIL					

7. Minor Bridges

The Site includes the following minor bridges

S. No.	Existing Chainage (km)	Type of Structure			No. of Spans with span length (c/c of exp gap)	Total Width (m)
		Foundation	Sub-Structure	Super-Structure		
1	216.460				1 (8m)	12.9

8. Railway level crossings

The Site includes the following level crossings:

S. No.	Location (km)	Remarks
NIL		

9. Underpasses (Vehicular, Non Vehicular)

The Site includes the following underpasses:

S. No.	Chainage (km)	Type of Structure	No. of Spans with span length (m)	Width (m)
NIL				

10. Culverts

The Site has the following culverts:

S. No	Design Chainage (km)	Type of culvert	Span X Depth (m)	Width (m)
1.	208+095	Pipe	1.2	
2.	208+425	Pipe	1.2	
3.	208+645	Pipe	1.2	
4.	208+810	Pipe	1.2	
5.	208+965	Pipe	1.2	
6.	209+200	Pipe	1.2	
7.	209+360	Pipe	1.2	
8.	209+600	Pipe	1.2	
9.	209+690	Pipe	1.2	
10.	209+790	Pipe	1.2	
11.	209+990	Pipe	1.2	
12.	210+150	Pipe	1.2	
13.	210+420	Pipe	1.2	
14.	210+575	Pipe	1.2	
15.	210+880	Pipe	1.2	
16.	211+090	Pipe	1.2	
17.	211+300	Pipe	1.2	
18.	211+440	Pipe	1.2	
19.	211+630	Pipe	1.2	
20.	211+770	Pipe	1.2	
21.	211+940	Pipe	1.2	
22.	212+040	Pipe	1.2	
23.	212+205	Pipe	1.2	
24.	212+305	Pipe	1.2	
25.	212+560	Pipe	1.2	
26.	212+745	Pipe	1.2	
27.	213+010	Pipe	1.2	
28.	213+185	Pipe	1.2	
29.	213+500	Pipe	1.2	

S. No	Design Chainage (km)	Type of culvert	Span X Depth (m)	Width (m)
30.	213+680	Pipe	1.2	
31.	213+880	Pipe	1.2	
32.	214+105	Pipe	1.2	
33.	214+425	Pipe	1.2	
34.	214+715	Pipe	1.2	
35.	214+790	Pipe	1.2	
36.	214+980	Pipe	1.2	
37.	215+125	Pipe	1.2	
38.	215+400	Pipe	1.2	
39.	215+700	Pipe	1.2	
40.	215+960	Pipe	1.2	
41.	216+190	Pipe	1.2	
42.	216+340	Pipe	1.2	
43.	216+710	Pipe	1.2	
44.	216+820	Pipe	1.2	
45.	216+940	Pipe	1.2	
46.	217+025	Box	2	
47.	217+170	Pipe	1.2	
48.	217+430	Pipe	1.2	
49.	217+615	Pipe	1.2	
50.	217+705	Pipe	1.2	
51.	217+800	Box	2	
52.	217+920	Box	2	
53.	218+140	Pipe	1.2	
54.	218+210	Pipe	1.2	
55.	218+350	Pipe	1.2	
56.	218+490	Pipe	1.2	
57.	218+670	Pipe	1.2	
58.	218+820	Pipe	1.2	
59.	218+955	Pipe	1.2	
60.	219.020	Pipe	1.2	

S. No	Design Chainage (km)	Type of culvert	Span X Depth (m)	Width (m)
61.	219.100	Pipe	1.2	
62.	219.160	Pipe	1.2	
63.	219.430	Pipe	1.2	
64.	219.780	Pipe	1.2	
65.	219.910	Pipe	1.2	
66.	220.220	Pipe	1.2	
67.	220.540	Pipe	1.2	
68.	220.860	Pipe	1.2	
69.	220.980	Pipe	1.2	
70.	221.220	Pipe	1.2	
71.	221.430	Pipe	1.2	
72.	221.670	Pipe	1.2	
73.	221.970	Pipe	1.2	
74.	222.025	Pipe	1.2	
75.	222.116	Pipe	1.2	
76.	222.222	Pipe	1.2	
77.	222.340	Pipe	1.2	
78.	222.495	Pipe	1.2	
79.	222.760	Pipe	1.2	
80.	222.950	Pipe	1.2	
81.	223.080	Pipe	1.2	
82.	223.200	Pipe	1.2	
83.	223.320	Pipe	1.2	
84.	223.540	Pipe	1.2	
85.	223.620	Pipe	1.2	
86.	223.735	Pipe	1.2	
87.	223.806	Pipe	1.2	
88.	223.990	Pipe	1.2	
89.	224.162	Pipe	1.2	
90.	224.350	Pipe	1.2	
91.	224.467	Pipe	1.2	

S. No	Design Chainage (km)	Type of culvert	Span X Depth (m)	Width (m)
92.	224.575	Pipe	1.2	
93.	224.960	Pipe	1.2	
94.	225.100	Pipe	1.2	
95.	225.280	Pipe	1.2	
96.	225.340	Pipe	1.2	
97.	225.490	Box	3	
98.	225.600	Box	3	
99.	225.800	Box	3	
100.	225.920	Pipe	1.2	
101.	226.155	Pipe	1.2	
102.	226.290	Pipe	1.2	
103.	226.460	Pipe	1.2	
104.	226.600	Pipe	1.2	
105.	226.820	Pipe	1.2	
106.	226.990	Pipe	1.2	
107.	227.140	Pipe	1.2	
108.	227.300	Pipe	1.2	
109.	227.550	Pipe	1.2	
110.	227.700	Pipe	1.2	
111.	227.900	Pipe	1.2	
112.	228.060	Pipe	1.2	
113.	228.150	Pipe	1.2	
114.	228.340	BOX	2	
115.	228.370	Pipe	1.2	
116.	228.525	Pipe	1.2	
117.	228.725	Pipe	1.2	
118.	228.820	Pipe	1.2	
119.	229.105	Pipe	1.2	
120.	229.270	Pipe	1.2	
121.	229.530	Pipe	1.2	
122.	229.570	BOX	2	

S. No	Design Chainage (km)	Type of culvert	Span X Depth (m)	Width (m)
123.	229.740	Pipe	1.2	
124.	229.900	BOX	2	
125.	230.035	Pipe	1.2	
126.	230.258	Pipe	1.2	
127.	230.298	Pipe	1.2	
128.	230.480	Pipe	1.2	
129.	230.640	Pipe	1.2	
130.	230.780	Pipe	1.2	
131.	230.935	Pipe	1.2	
132.	231.110	Pipe	1.2	
133.	231.310	Pipe	1.2	
134.	231.400	Pipe	1.2	
135.	231.590	Pipe	1.2	
136.	231.780	Pipe	1.2	
137.	232.057	Pipe	1.2	
138.	232.160	Pipe	1.2	
139.	232.355	Pipe	1.2	
140.	232.500	Pipe	1.2	
141.	232.690	Pipe	1.2	
142.	232.840	Pipe	1.2	
143.	233.000	Pipe	1.2	
144.	233.120	Box	2	
145.	233.280	Pipe	1.2	
146.	233.460	Pipe	1.2	
147.	233.650	Pipe	1.2	
148.	233.790	Pipe	1.2	
149.	233.980	Pipe	1.2	
150.	234.230	Pipe	1.2	
151.	234.420	Pipe	1.2	
152.	234.540	Pipe	1.2	
153.	234.735	Pipe	1.2	

S. No	Design Chainage (km)	Type of culvert	Span X Depth (m)	Width (m)
154.	234.880	Pipe	1.2	
155.	234.890	Pipe	1.2	
156.	235.040	Pipe	1.2	
157.	235.270	Box	2	
158.	235.460	Box	4	
159.	235.540	Pipe	1.2	
160.	235.650	Box	6	
161.	235.830	Box	2	
162.	236.030	BOX	2	
163.	236.300	Pipe	1.2	
164.	236.410	Pipe	1.2	
165.	236.540	Pipe	1.2	
166.	236.670	Pipe	1.2	
167.	236.770	Pipe	1.2	
168.	236.880	BOX	2	
169.	237.090	Pipe	1.2	
170.	237.320	Pipe	1.2	
171.	237.440	Pipe	1.2	
172.	237.680	Pipe	1.2	
173.	237.820	Pipe	1.2	
174.	237.890	Pipe	1.2	
175.	238.120	BOX	2	
176.	238.280	Pipe	1.2	
177.	238.370	Pipe	1.2	
178.	238.590	BOX	3	
179.	238.640	BOX	2	
180.	238.710	Pipe	1.2	
181.	238.760	Pipe	1.2	
182.	238.950	Pipe	1.2	
183.	239.110	Pipe	1.2	
184.	239.220	Pipe	1.2	

S. No	Design Chainage (km)	Type of culvert	Span X Depth (m)	Width (m)
185.	239.420	Pipe	1.2	
186.	239.540	Pipe	1.2	
187.	239.640	Pipe	1.2	
188.	239.770	Pipe	1.2	
189.	239.820	Box	2	
190.	239.840	Pipe	1.2	
191.	240.100	Pipe	1.2	
192.	240.160	Pipe	1.2	
193.	240.300	Pipe	1.2	
194.	240.470	Pipe	1.2	
195.	240.570	Box	2	
196.	240.750	Pipe	1.2	
197.	240.920	Pipe	1.2	
198.	241.080	Pipe	1.2	
199.	241.170	Box	2	
200.	241.450	Pipe	1.2	
201.	241.630	Pipe	1.2	
202.	241.750	BOX	6	
203.	241.810	BOX	2	
204.	241.870	BOX	2	
205.	241.950	BOX	2	
206.	242.080	Pipe	1.2	
207.	242.120	Box	2	
208.	242.380	Pipe	1.2	
209.	242.580	Pipe	1.2	
210.	242.640	Pipe	1.2	
211.	242.760	Pipe	1.2	
212.	242.980	Pipe	1.2	
213.	243.035	Box	3	
214.	243.260	Box	4	

11. Bus bays/Bus Shelters

The details of bus shelters on the Site are as follows:

S. No.	Chainage (km)	Length (m)	Village Name
1.	210.200		ZOBAWK
2.	214.685		HRANGCHALKAWN
3.	223.475		BUALTE
4.	233.650		THUALTHU

12. Truck Lay byes

The details of truck lay byes are as follows:

S. No.	Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
NIL				

13. Road side drains

The details of the roadside drains are as follows:

S. No.	Location (Existing)		Type	
	From km	To km	Masonry/cc (Pucca)	Earthen (Kutcha)
1.	201.820	208.600	Lined Drain	
2.	208.600	211.800	RCC Rectangular Drain	
3.	211.800	214.470	Lined Drain	
4.	214.470	214.900	RCC Rectangular Drain	
5.	214.900	223.200	Lined Drain	
6.	223.200	223.750	RCC Rectangular Drain	
7.	223.750	233.100	Lined Drain	
8.	233.100	234.200	RCC Rectangular Drain	
9.	234.200	237.860	Lined Drain	

14. Major junctions

The details of major junctions are as follows:

S. No	Chainage (km)		At Grade	Side	Remarks
	Existing Chainage	Design Chainage			
1		214.700			NH

(NH: National Highway, SH: State Highway, MDR: Major District Road.)

15. Minor junctions

The details of the minor junctions (all at grade) are as follows:

S. No	Location (km)	Type of Junction	
	Design Chainage	T-Junction	Cross Road
NIL			

16. Bypasses

The details of the existing road sections proposed to be bypassed are as follows:

S. No	Name of bypass (Town)	Chainage (Km)		Length (Km)
		From	To	
NIL				

17. Other Structures : NIL

18. Design Chainages corresponding to Existing References

S. No	Existing Design Chainage (Km)	Proposed Design Chainage (Km)
NIL		

Annex - II

(Schedule-A)

Dates for providing Right of Way

The dates on which the Authority shall provide Right of Way to the Contractor on different stretches of the Site are stated below:

S.No.	Design Chainage (Km)		Length (km)	Width (Meter)	Dates of Providing ROW
	From	To			
1	2	3	4	5	6
	Full Right of Way As per Clause 2 of Annex-I of Schedule A				Minimum 90% on Appointed Date. Remaining within 90 days of Appointed Date.

Annex-III

(Schedule-A)

Alignment Plans

The existing alignment of the Project Highway shall be modified in the following sections as per the alignment plan indicated below:

The alignment plan of the Project Highway is available on CPP Portal i.e. https://eprocure.gov.in/cppp/ and NHIDCL website i.e. https://nhidcl.com/ .

Annex - IV

(Schedule-A)

Environment Clearances

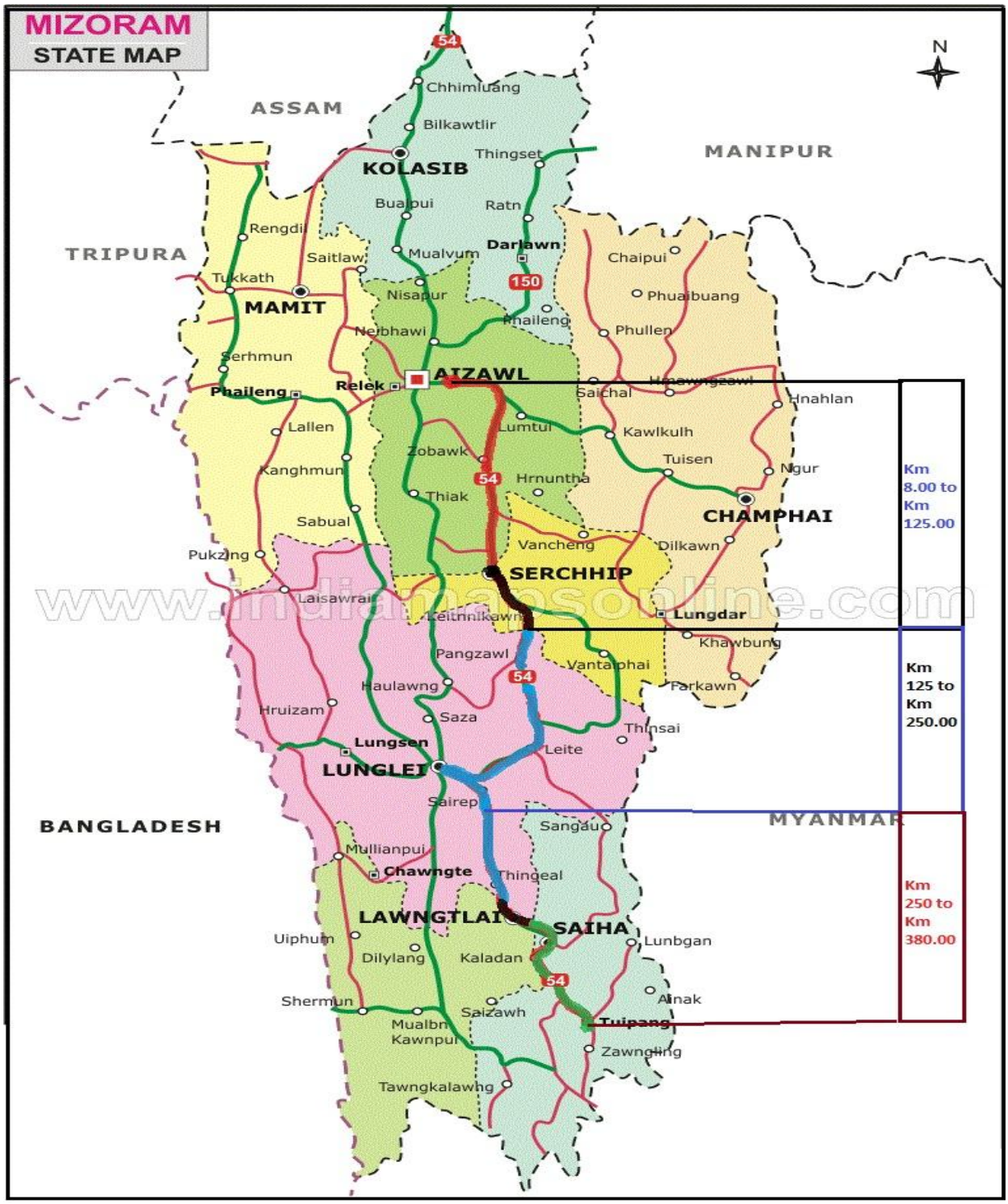
The project highway does not require environment clearance as per MoEF circular dated 22.08.2013.

In addition, application for the stage-I Forest Clearance is applied online on 04.02.2017 and 07.02.2017 which is likely to be received shortly. Money will be deposited with State Forest Department for final approval on receipt of stage-I clearance. Temporary working provision will be ensured before appointed date. All conditions imposed by MoEF/ State Forest Department while issuing the approval in principle (AIP) and final Forest Clearance (FC) to be adhered during construction stage and after construction stage are to be complied with.

The muck dumping sites in forest area stand identified and freezed by forest department to be abided by agency during dumping of muck as stated in Schedule F.

Annex-V
(Schedule-A)

Index Map of Project Highways



SCHEDULE - B

(See Clause 2.1)

Development of the Project Highway

1. Development of the Project Highway

Development of the Project Highway shall include design and construction of the Project Highway as described in this Schedule-B and in Schedule-C.

2. Rehabilitation and Upgradation

Widening and Upgradation shall include Two-Laning with Paved shoulder of the Project Highway as described in Annex-I of this Schedule-B and in Schedule-C.

3. Specifications and Standards

The Project Highway shall be designed and constructed in conformity with the Specifications and Standards specified in Annex-I of Schedule-D.

Annex - I

(Schedule-B)

Description of Two-Laning with Paved Shoulder

1. WIDENING OF THE EXISTING HIGHWAY

1.1 The Project Highway shall follow the existing alignment unless otherwise specified by the Authority and shown in the alignment plans specified in Annex III of Schedule-A. Geometric deficiencies, if any, in the existing horizontal and vertical profiles shall be corrected as per the prescribed standards for plain/rolling/mountainous/steep terrain to the extent land is available. Additional land if required to meet the specifications may be acquired as per the provisions of the Contract Agreement.

1.2 WIDTH OF CARRIAGEWAY

1.2.1 Two-Laning with paved shoulders shall be undertaken. The paved carriageway shall be 7m wide plus shoulders/footpath in accordance with the typical cross sections drawings in the Manual.

The Project Highway passes through the following built up areas. (Proposed carriageway width in these areas shall not be less than existing carriageway width; however, four laning is not required):

Sr. No.	Built up areas	Design Chainage (km)	
		From	To
1	Lunglei	208.000	250.000

1.2.2 Except as otherwise provided in this Agreement, the width of the paved carriageway and cross-sectional features shall conform to paragraph 1.1 above.

2. GEOMETRIC DESIGN AND GENERAL FEATURES

2.1 General

Geometric design and general features of the Project Highway shall be in accordance with section 2 of the manual.

2.2 Design Speed

The design speed shall be Ruling 100 km per hr & Minimum 80 km per hr for Plain and Rolling terrain, and Ruling 40 km per hr & Minimum 30 km per hr for the mountainous and steep terrain, wherever applicable.

2.3 Improvement of the existing road geometry

In the following sections, where improvement of the existing road geometrics to the prescribed standards is not possible, the existing road geometrics shall be improved to the extent possible within the given right of way and proper road signs and safety measures shall be provided:

Deficient Curves:-

S. No	Stretch (km)		Type of Deficiency	Remarks
	From	To		
NIL				

The proposed horizontal and vertical alignment is available in digital format and this is for information and the Authority shall not be held responsible for any implications of the contract. EPC contractor shall carry out his own survey and investigations and due diligence both during bidding and during design and construction.

2.4 Right of Way

The Site of the Project Highway comprises the land as described in Annexure-II of Schedule-A.

2.5 Type of Shoulders

(a) In built-up sections, footpaths/ paved shoulders shall be provided in the stretches mentioned at clause 1.2.1 above.

(b) In open country, paved shoulders shall be provided in accordance with the typical cross sections drawings in the Manual.

(c) Design and specifications of paved shoulders and granular material shall conform to the requirements specified in paragraphs 5.10 and 5.11 of the Manual.

2.6 Lateral and vertical clearances at underpasses

No underpass is proposed in the Project Highway.

2.7 Lateral and vertical clearances at overpasses

No overpass is proposed in the Project Highway.

2.8 Service roads

No service road is proposed in the Project Highway.

2.9 Grade separated structures

No grade separated structure is proposed in the Project Highway.

2.10 Cattle and pedestrian under pass / over pass

No cattle and pedestrian underpass is proposed in the Project Highway.

2.11 Typical cross-sections of the Project Highway

Indicative typical cross sections along with different types of cross-sections required to be developed in different segments of the project highway are indicated in Figure 2.11 shown below**.**

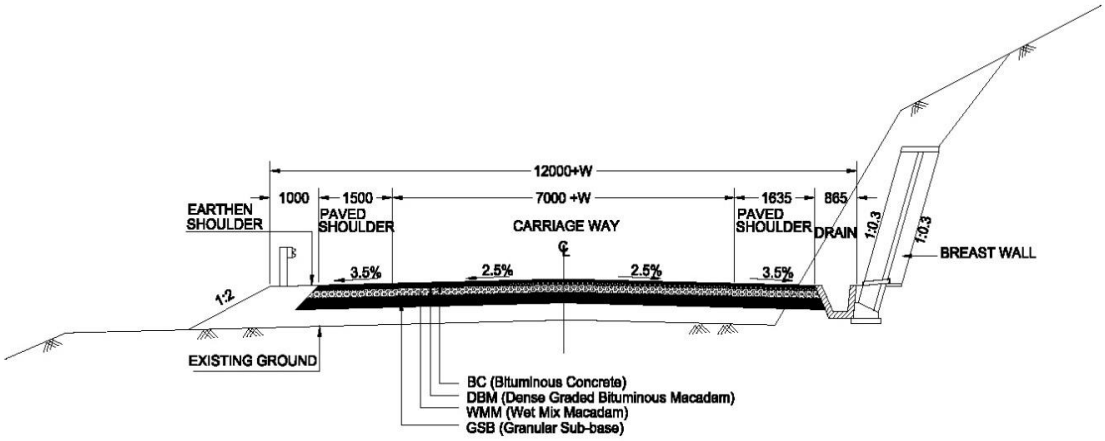


Figure 2.11(1): Typical Cross Section for Widening Primarily to Hill Side

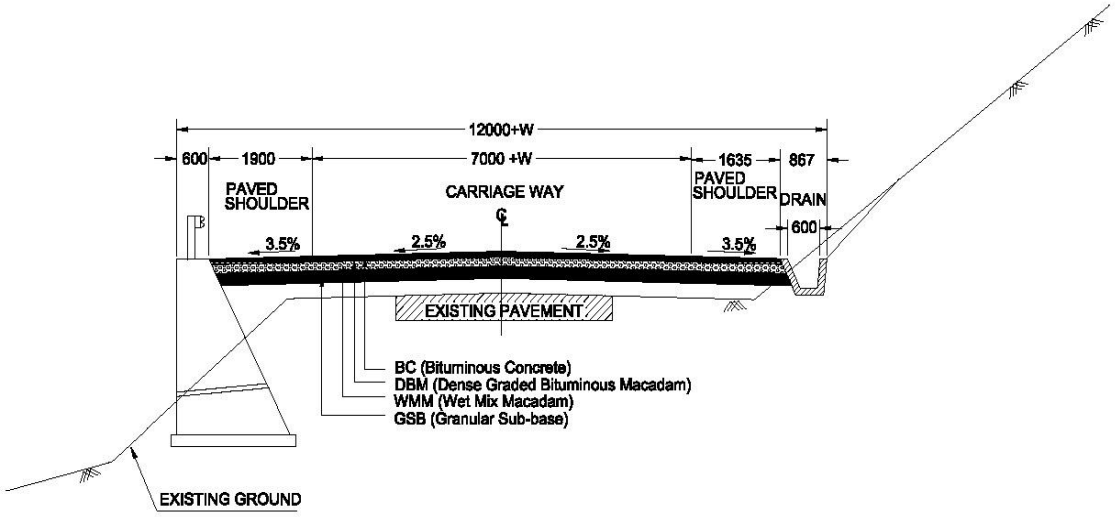


Figure 2.11(2): Typical Cross Section for Widening Primarily to Valley Side

3. INTERSECTIONS AND GRADE SEPARATORS

All intersections and grade separators shall be as per section 3 of the Manual. Existing intersections which are deficient shall be improved to the prescribed standards.

Properly designed intersections shall be provided at the locations and of the types and features given in the table below:

a) At-grade intersections (Major Junctions)

S. No.	Location of Intersection	Type of Intersection	Other features	
			LHS	RHS
1	214.700	Y		-

b) At-grade intersections (Minor Junctions)

S. No.	Location of Intersection	Type of Intersection	Name of Road
NIL			

c) Grade separated intersection without ramps

S. No.	Location	Salient features	Minimum length of viaduct to be provided	Road to be carried over/under the structures
NIL				

4. ROAD EMBANKMENT AND CUT SECTION

4.1 Widening and improvement of the existing road embankment/cuttings and construction of new road embankment/ cuttings shall conform to the Specifications and Standards given in section 4 of the Manual and the specified cross sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.

4.2 Raising of the existing road

The existing road shall be raised at the required locations as per proposed plan and profile or further raised to meet the requisite specifications.

4.3 All of surplus cutting soils shall be transported and be disposed to the Spoil Banks in accordance with the Clause 2 f (iii) of Schedule C (Project Facilities).

5. PAVEMENT DESIGN

5.1 Pavement design shall be carried out in accordance with Section 5 of the Manual.

5.2 Type of pavement

The contractor is to adopt flexible pavement for the project highway as per manual and technical specifications.

5.3 Design Requirements

Pavement design shall be as per section 5 of the Manual and technical specifications.

5.3.1 **Design Period and strategy**

Flexible pavement for new pavement or for widening and strengthening of the existing pavement shall be designed for a minimum design period of 15 years. Stage construction shall not be permitted.

5.3.2 **Design Traffic**

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement for minimum design traffic of 20 million standard axles.

5.4 Reconstruction of stretches

Reconstruction of stretches for matching the proposed plan & profile or meeting the technical specifications and standards shall be taken up as per actual requirements.

6. ROADSIDE DRAINAGE

Drainage system including surface and subsurface drains for the Project Highway shall be provided as per Section 6 of the Manual.

7. DESIGN OF STRUCTURES

7.1 General

7.1.1 All bridges, culverts and structures shall be designed and constructed in accordance with section 7 of the manual and shall conform to the cross-sectional features and other details specified therein.

7.1.2 Width of the carriageway of new bridges and structures shall be as per the manual and technical specifications.

7.1.3 The structures shall be provided with footpaths, if required as per the provisions of the manual and technical specifications.

7.1.4 All bridges shall be high-level bridges.

7.1.5 The structures shall be designed to carry utility services as per the requirement of site.

7.1.6 Cross-section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross-sections given in section 7 of the Manual.

7.2 Culverts

7.2.1 Overall width of all culverts shall be equal to the roadway width of the approaches.

7.2.2 ***Reconstruction of existing culverts***:

The existing culverts at the following locations shall be re-constructed as new culverts. These are guidelines for minimum provisions; however, the Contractor has to design as per requirement of road in accordance with manual.

S. No	Proposed Chainage (km)	Span opening (m)	Remarks
1.	208+095	1.2	Pipe
2.	208+645	1.2	Pipe
3.	208+810	1.2	Pipe
4.	208+965	1.2	Pipe
5.	209+600	1.2	Pipe
6.	209+690	1.2	Pipe
7.	209+790	1.2	Pipe
8.	210+150	1.2	Pipe
9.	210+420	1.2	Pipe
10.	210+575	1.2	Pipe
11.	210+880	1.2	Pipe
12.	211+090	1.2	Pipe
13.	211+300	1.2	Pipe
14.	211+440	1.2	Pipe
15.	211+630	1.2	Pipe
16.	211+770	1.2	Pipe
17.	211+940	1.2	Pipe
18.	212+040	1.2	Pipe
19.	212+205	1.2	Pipe
20.	212+305	1.2	Pipe
21.	212+560	1.2	Pipe
22.	212+745	1.2	Pipe
23.	213+185	1.2	Pipe
24.	213+880	1.2	Pipe
25.	214+105	1.2	Pipe
26.	214+425	1.2	Pipe
27.	214+715	1.2	Pipe
28.	215+125	1.2	Pipe
29.	215+400	1.2	Pipe
30.	215+700	1.2	Pipe
31.	216+190	1.2	Pipe
32.	216+710	1.2	Pipe
33.	216+820	1.2	Pipe
34.	216+940	1.2	Pipe
35.	217+025	2	Box
36.	217+170	1.2	Pipe
37.	217+430	1.2	Pipe
38.	217+615	1.2	Pipe
39.	217+705	1.2	Pipe
40.	217+800	2	Box
41.	217+920	2	Box
42.	218+140	1.2	Pipe
43.	218+210	1.2	Pipe

44.	218+350	1.2	Pipe
45.	218+670	1.2	Pipe
46.	218+820	1.2	Pipe
47.	218+955	1.2	Pipe
48.	219+020	1.2	Pipe
49.	219+100	1.2	Pipe
50.	219+160	1.2	Pipe
51.	219+430	1.2	Pipe
52.	219+780	1.2	Pipe
53.	219+910	1.2	Pipe
54.	220+220	1.2	Pipe
55.	220+540	1.2	Pipe
56.	220+860	1.2	Pipe
57.	221+430	1.2	Pipe
58.	221+970	1.2	Pipe
59.	222+025	1.2	Pipe
60.	222+116	1.2	Pipe
61.	222+222	1.2	Pipe
62.	222+340	1.2	Pipe
63.	222+495	1.2	Pipe
64.	222+760	1.2	Box
65.	222+950	1.2	Pipe
66.	223+080	1.2	Pipe
67.	223+200	1.2	Pipe
68.	223+320	1.2	Pipe
69.	223+540	1.2	Pipe
70.	223+620	1.2	Pipe
71.	223+735	1.2	Pipe
72.	223+806	1.2	Pipe
73.	224+162	1.2	Pipe
74.	224+350	1.2	Pipe
75.	224+467	1.2	Pipe
76.	224+575	1.2	Pipe
77.	224+960	1.2	Pipe
78.	225+100	1.2	Pipe
79.	225+280	1.2	Pipe
80.	225+340	1.2	Pipe
81.	225+490	1.2	Pipe
82.	225+600	1.2	Pipe
83.	225+800	1.2	Pipe
84.	225+920	1.2	Pipe
85.	226+155	1.2	Pipe
86.	226+290	1.2	Pipe
87.	226+460	1.2	Pipe
88.	226+820	1.2	Pipe
89.	227+140	1.2	Pipe
90.	227+700	2	Box
91.	227+900	1.2	Pipe

92.	228+060	1.2	Pipe
93.	228+150	1.2	Pipe
94.	228+340	1.2	Pipe
95.	228+370	1.2	Pipe
96.	228+525	1.2	Pipe
97.	228+725	1.2	Pipe
98.	228+820	2	Box
99.	229+105	1.2	Pipe
100.	229+270	1.2	Pipe
101.	229+530	1.2	Pipe
102.	229+570	1.2	Pipe
103.	229+740	1.2	Pipe
104.	229+900	1.2	Pipe
105.	230+035	1.2	Pipe
106.	230+258	1.2	Pipe
107.	230+298	1.2	Pipe
108.	230+480	1.2	Pipe
109.	230+640	1.2	Pipe
110.	230+780	1.2	Pipe
111.	230+935	1.2	Pipe
112.	231+110	1.2	Pipe
113.	231+310	1.2	Pipe
114.	231+400	1.2	Pipe
115.	231+590	1.2	Pipe
116.	231+780	3	Box
117.	232+057	3	Box
118.	232+160	1.2	Pipe
119.	232+355	1.2	Pipe
120.	232+500	1.2	Pipe
121.	232+690	1.2	Pipe
122.	233+000	1.2	Pipe
123.	233+120	1.2	Pipe
124.	233+280	1.2	Pipe
125.	233+460	6	Box
126.	233+650	1.2	Pipe
127.	233+790	1.2	Pipe
128.	233+980	1.2	Pipe
129.	234+230	1.2	Pipe
130.	234+420	1.2	Pipe
131.	234+540	1.2	Pipe
132.	234+735	1.2	Pipe
133.	234+880	1.2	Pipe
134.	234+890	1.2	Pipe
135.	235+270	1.2	Pipe
136.	235+460	1.2	Pipe
137.	235+540	1.2	Pipe
138.	235+650	1.2	Pipe
139.	235+830	1.2	Pipe

140.	236+030	1.2	Pipe
141.	236+300	1.2	Pipe
142.	236+410	1.2	Pipe
143.	236+540	1.2	Pipe
144.	236+670	1.2	Pipe
145.	236+770	1.2	Pipe
146.	236+880	1.2	Pipe
147.	237+090	1.2	Pipe
148.	237+320	1.2	Pipe
149.	237+440	1.2	Pipe
150.	237+680	1.2	Pipe
151.	237+820	1.2	Pipe
152.	237+890	1.2	Pipe
153.	238+120	1.2	Pipe
154.	238+280	1.2	Pipe
155.	238+370	1.2	Pipe
156.	238+590	1.2	Pipe
157.	238+640	1.2	Pipe
158.	238+710	1.2	Pipe
159.	238+760	2	Box
160.	238+950	1.2	Pipe
161.	239+110	1.2	Pipe
162.	239+220	1.2	Pipe
163.	239+420	1.2	Pipe
164.	239+540	1.2	Pipe
165.	239+640	1.2	Pipe
166.	239+770	1.2	Pipe
167.	239+820	1.2	Pipe
168.	239+840	1.2	Pipe
169.	240+100	1.2	Pipe
170.	240+160	1.2	Pipe
171.	240+300	1.2	Pipe
172.	240+470	1.2	Pipe
173.	240+570	1.2	Pipe
174.	240+750	1.2	Pipe
175.	240+920	1.2	Pipe
176.	241+080	1.2	Pipe
177.	241+170	1.2	Pipe
178.	241+630	1.2	Pipe
179.	241+750	1.2	Pipe
180.	241+810	1.2	Pipe
181.	241+870	1.2	Pipe
182.	241+950	1.2	Pipe
183.	242+080	1.2	Pipe
184.	242+120	1.2	Pipe
185.	242+380	1.2	Pipe
186.	242+580	1.2	Pipe
187.	242+640	1.2	Pipe

188.	242+980	1.2	Pipe
189.	243+035	1.2	Pipe
190.	243+260	1.2	Pipe

*Road level may be suitably raised to meet the requirement of site as per the standards and specifications.

7.2.3 ***Widening of Existing Culverts***

All existing culverts, which are not to be reconstructed, shall be widened up to the roadway width of the Project Highway & as per the typical cross section given in section 7 of the Manual. Repairs and strengthening of existing structures where required shall be carried out.

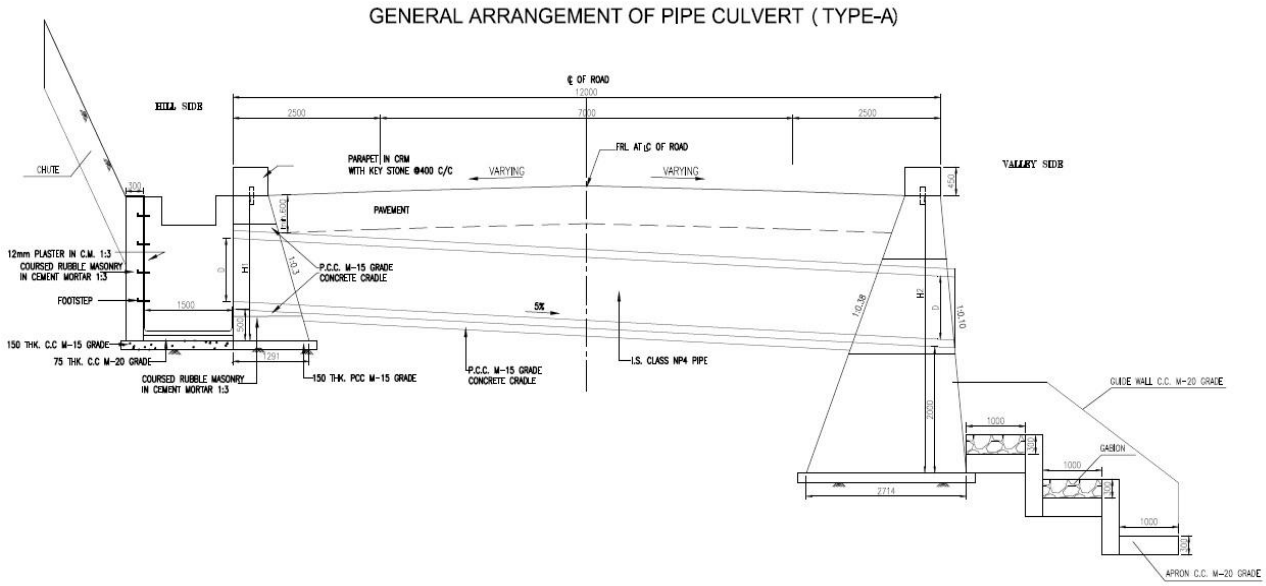
Sl. No	Culvert Location	Span opening (m)	Remarks
NIL			

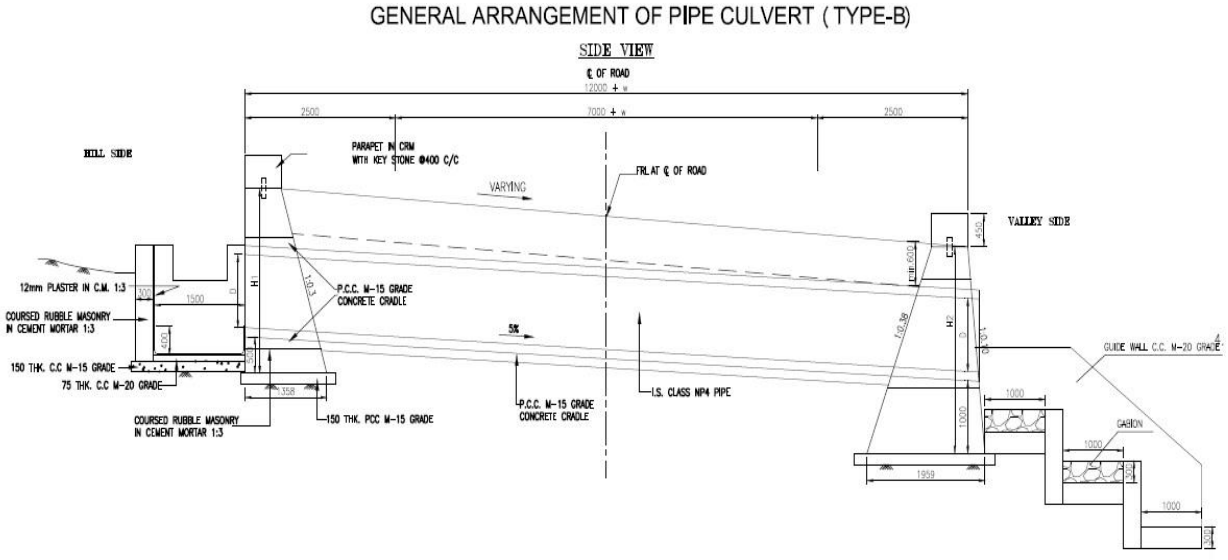
7.2.4 Additional new culverts shall be constructed as per particulars given in the table below:

S. No.	Culvert Location (Proposed Chainage)	Span/Opening (m)	Remarks (Type of Culvert)
1.	208+425	1.2	Pipe
2.	209+200	1.2	Pipe
3.	209+360	1.2	Pipe
4.	209+990	1.2	Pipe
5.	213+010	1.2	Pipe
6.	213+500	1.2	Pipe
7.	213+680	1.2	Pipe
8.	214+790	1.2	Pipe
9.	214+980	1.2	Pipe
10.	215+960	1.2	Pipe
11.	216+340	1.2	Pipe
12.	218+490	1.2	Pipe
13.	220+980	1.2	Pipe
14.	221+220	1.2	Box
15.	221+670	1.2	Pipe
16.	223+990	1.2	Pipe
17.	226+600	1.2	Pipe
18.	226+990	1.2	Pipe
19.	227+300	1.2	Pipe

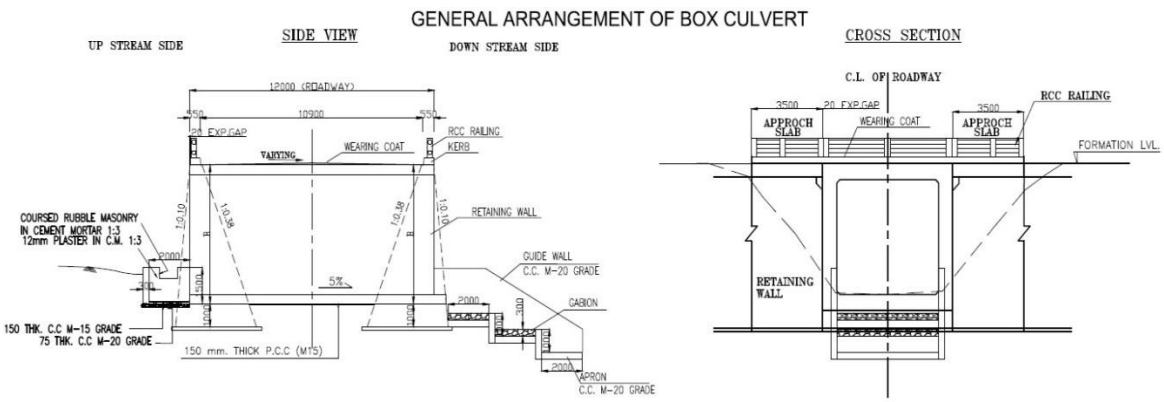
S. No.	Culvert Location (Proposed Chainage)	Span/Opening (m)	Remarks (Type of Culvert)
20.	227+550	1.2	Pipe
21.	232+840	1.2	Pipe
22.	235+040	1.2	Pipe
23.	241+450	1.2	Pipe
24.	242+760	1.2	Pipe

Typical Cross Section for Pipe Culverts:





Typical Cross Section for Box Culverts:



7.2.5 Repairs/replacements of railing/parapets, flooring and protection works of the existing culverts shall be undertaken as required as per standards and specifications.

S. No.	Location at km	Remarks
NIL		

7.2.6 Floor protection works shall be as specified in the relevant IRC Codes and Specifications

7.3 Bridges

7.3.1 Existing bridges to be re-constructed/widened:

(i) The Existing bridges at the following locations shall be reconstructed:

S. No	Bridge Location (in Km)	Salient details of Existing Bridge	Adequacy or otherwise of the existing waterway, vertical clearance, etc	Remarks
NIL				

(ii) The following narrow bridges shall be widened:

S. No.	Location (km)	Existing width (m)	Extent of widening (m)	Cross-section at deck level for widening @
NIL				

7.3.2 ***Additional new bridges***

New bridges at the following locations on the project highway shall be constructed. GADs for the new bridges are attached in the drawings folder.

S. No.	Location (km)	Total length (m)	Remarks, if any
NIL			

7.3.3 The railings of existing bridges shall be replaced by crash barriers at the following locations:

S. No.	Location at km	Remarks
NIL		

7.3.4 Repairs/replacements of railing/parapets of the existing bridges shall be undertaken as follows

S. No.	Location at km	Remarks
NIL		

7.3.5 *Drainage system for bridge deck*

An effective drainage system for bridge decks shall be provided as specified in paragraph 7.20 of the Manual

7.3.6 *Structures in marine environment*

The Project Alignment does not lie in Marine Alignment

7.4 Rail-road bridges

7.4.1 Design, construction and detailing of ROB/RUB shall be as specified in section 7 of the Manual. [Refer to paragraph 7.19 of the Manual and specify modification, if any].

S. No.	Location of Level crossing (chainage km)	Length of bridge (m)
NIL		

7.4.2 **Road over-bridges**

Road under-bridges (road under railway line) shall be provided at the following level crossings, as per GAD drawings attached:

S. No.	Location of Level crossing (chainage km)	Length of bridge (m)
NIL		

7.4.3 **Road under-bridges**

Road under-bridges (road under railway line) shall be provided at the following level crossings, as per GAD drawings attached:

S. No.	Location of Level crossing (chainage km)	Number and length of span (m)
NIL		

7.5 Grade separated structures

The grade separated structures shall be provided at the locations and of the type and length specified in paragraphs 2.9 and 3 of this Annex-I. **NIL**.

7.6 Repairs and strengthening of bridges and structures

The existing bridges and structures to be repaired / strengthened, and the nature and extent of repairs /strengthening required are given below:

A. Bridges

S. No.	Location of bridge Existing Chainage (km)	Nature and extent of repairs /strengthening to be carried out
NIL		

B. ROB / RUB

S. No.	Location of ROB/RUB (km)	Nature and extent of repairs /strengthening to be carried out
NIL		

C. Overpasses/Underpasses and other structures

S. No.	Location of Structure (km)	Nature and extent of repairs /strengthening to be carried out
NIL		

7.7 List of Major Bridges and Structures

The following is the list of the Major Bridges and Structures:

Sl. No.	Location of bridge Existing Chainage (km)	Remarks
NIL		

Note: - *1. The location and vent size of all the culverts proposed for irrigation purposes shall be decided in consultation with Authority's Engineer.*

2. Width of culvert shall be reconciled as per cross section at that location

3. Cross road culvert to be provided at the location of Major Junction/ Minor Junctions or utility purposes etc. shall be decided with independent Engineer shall not be treated as change of scope.

7.8 Slope Protection Structures

7.8.1 Structures for Slope protection and Retaining Walls shall be designed and constructed as stipulated in Schedule-D: Specification and Standards.

7.8.2 Structures for Retaining Walls and other works for slope protection shown in the following Table shall be constructed:

S. No.	Description	Unit	Qty.
SLOPE PROTECTION			
1.	Wet Masonry Retaining Wall (H=3m)	metre	19,150
2.	Wet Masonry Retaining Wall (H=7m)	metre	1,840
3.	Gravity Wall (H=1.5m)	metre	1,480
4.	Gravity Wall (H=2m)	metre	1,520
5.	Gravity Wall (H=3m)	metre	3,960
6.	Gravity Wall (H=4m)	metre	3,940
7.	Gravity Wall (H=5m)	metre	2,600
8.	Gravity Wall (H=6m)	metre	3,940
9.	Reinforced Earth Retaining Wall (H=7m)	metre	280
10.	Reinforced Earth Retaining Wall (H=8m)	metre	380
11.	Reinforced Earth Retaining Wall (H=9m)	metre	260
12.	Reinforced Earth Retaining Wall (H=10m)	metre	1,300
13.	Gabion Wall (1:0.3)	cum	1,470
14.	Rockfall Prevention Wall (H=3m)	metre	4,900

15.	Rockfall Prevention Fence (H=2m)	metre	700
16.	Hydroseeding (t=5cm)	sqm	0
17.	Seeding and Mulching (Soil Cut Slope)	sqm	150,663
18.	Turfing (Embankment)	sqm	28,562
19.	Vegetation Mat (Steep Slope)	sqm	0
20.	Crib Work (F300)	sqm	0
21.	Crib Work (F500)	sqm	0
22.	Non-frame	sqm	0
23.	Anchor Work	metre	0
24.	Rock-bolt Work	metre	0

Note: 1. The Contractor shall be responsible for accurate assessment of the actual requirement as per site situation and prepare design for slope protection and stabilization as per specification and standards stipulated in Schedule-D and submit the same to the Authority's Engineer/ Authority for review through the Proof Consultant and implement it accordingly thereafter.

2. Any increase in quantity over and above the tentative quantity as mentioned in above table or through change in specifications will not be considered as change of scope. Therefore, Contractor shall make through investigation at site and assess the requirement of slope protection and slide prone zone and other safety features at his own before submission of bid.

3. For executing any of the above type of Slope Protection Works, the Contractor should have the experience of having executed, in last 5 (five) financial years from the date of signing of Agreement, atleast 40% quantity of that type of Slope Protection Work(s) and provide requisite certificates/ documents to verify the same to the Authority/ Authority Engineer.

If the Contractor does not have requisite experience for any/ some of the above type of Slope Protection Works, then he has to engage specialized firm(s) as sub-contractor(s) who has/ have successfully completed in last 5 (five) financial years atleast 40% quantity of such work(s). The Contractor shall submit the credentials and the qualifying experience of the specialized sub-contractor(s) for the approval of Authority before the commencement of such Slope Protection Works.

7.8.3 The cutting slope surface except on Hard Rock classified as per Clause 301.2 of MoRTH Specifications for Road and Bridge Works shall be protected by the Seeding and Mulching as per Clause 308 of MORTH Specification, and the embankment slope shall be protected by Turfing as per Clause 307 of MORTH Specification.

8. TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORK.

8.1 Traffic control devices and road safety works including traffic signs, overhead signs, pavement marking, safety barriers etc. shall be provided in accordance with Section 9 of the Manual.

8.2 Specifications of the reflective sheeting shall be as per Section 9 of the Manual

9. ROAD SIDE FURNITURE

9.1 Road side furniture including Road Boundary Stone, Pedestrian Guard Rail, Pedestrian Crossings, Delineators, MS Railing etc. shall be provided in accordance with the provisions of the Manual and Scheduled D.

9.2 Overhead traffic signs: location and size

Full width overhead signs 2 nos. (Start and end of Project road) and at other locations shall be provided as per requirement of site in consultation with the Authority's Engineer.

9.3 COMPULSORY AFFORESTATION

The number of trees which are required to be planted by the Agency as compensatory afforestation should be as per Forest Conservation Act, thrice the number of trees to be cut.

9.4 HAZARDOUS LOCATIONS

Provide W-beam crash barrier along the project highway at the locations as suggested in the Manual. The safety barriers shall also be provided at all hazardous locations in consultation with the Authority's Engineer.

9.5 SPECIAL REQUIREMENTS FOR HILL ROAD

[Refer to paragraphs 14.5 and 14.8 of the Manual and provide details where relevant and required.]

9.6 CHANGE OF SCOPE

The length of Structures and bridges specified hereinabove shall be treated as an approximate assessment. The actual lengths as required on the basis of detailed investigations shall be determined by the Contractor in accordance with the Specifications and Standards. Any variations in the lengths specified in this Schedule-B

shall not constitute a Change of Scope, save and except any variations in the length arising out of a Change of Scope expressly undertaken in accordance with the provisions of Article 13.

SCHEDULE - C

(See Clause 2.1)

PROJECT FACILITIES

1. Project Facilities

The Contractor shall construct the Project Facilities in accordance with the provisions of this Agreement. Such Project Facilities shall include:

(a) roadside furniture;

(b) pedestrian facilities;

(c) tree plantation;

(d) truck lay-byes;

(e) bus-bays and bus shelters; and

(f) others

(i) View Point

(ii) Highway Lighting

(iii) Spoil Bank

2. Description of Project Facilities

Each of the Project Facilities is described below:

(a) Roadside Furniture/Traffic control devices/Road safety devices

Road side furniture/Traffic control devices/Road safety devices shall be provided in accordance with the Manual of Specifications and Standards as referred in schedule "D" including the provisions mentioned in Schedule "B".

(b) Pedestrian Facilities

Pedestrian Facilities shall be provided in accordance with the Manual of Specifications and Standards as referred in schedule "D".

(c) Landscaping and Tree Plantation

Landscaping of the highway shall be done in accordance with the Manual of Specifications and Standards as referred in schedule "D".

(d) Truck Lay-byes

No truck Lay-bye has been proposed. However, if any Truck Lay-bye(s) are required as per the requirement of site, then Contractor shall provide the same as per suitability of location and site requirement in consultation with the Authority's Engineer/ Authority

(e) Bus-Bays and Bus Shelters

The Contractor shall provide minimum 5 nos. of Bus Bays with Bus Shelter on one side along the project highway. Tentative locations for Bus Bays shall be finalized as per suitability of location and site requirement in consultation with the Authority's Engineer/ Authority.

S. No.	Existing Chainage (km)	Design Chainage (km)	Location	Side	Number of Buses at stop	Length (m)
1		210.200	ZOBAWK			
2		214.685	HRANGCHALKAWN			
3		223.475	BUALTE			
4		233.650	THUALTHU			

(f) Others:

(i) View Point

The Contractor shall construct minimum 1 nos. of View Points along the project highway. Tentative locations for View Points are indicated below, however, the same shall be finalized as per suitability of location and site requirement in consultation with the Authority's Engineer/ Authority:

(ii) Highway Lighting

High Mast Lighting shall be provided as per Schedule D at all requisite areas including built-up areas except for Minor Junctions where Solar lighting may be provided.

(iii) Spoil Banks

In following earmarked places excess spoil is to be carried, spread and compacted. The areas are to be surrounded by Breast/Retaining wall all round in cement Rubble Masonry of height as necessary to accommodate to required level & as per specification:

S. No.	Design Chainage (km)	Side
1.		

Note: Provide adequate details of each Project Facility to ensure their design and completion in accordance with the project-specific requirements and the provisions of the Manual.

(iv) Other Facilities

(a) Supply of project record in digital format in two copies (one for the Engineer and the other for the Employer) including video recording updated on monthly basis throughout the construction period.

(b) As per the direction of Engineer-in-charge.

3. Facilities for the Authority and the Authority's Engineer

The facilities to be provided for the Authority and the Authority's Engineer, comprehending the Site Offices and Accommodation shall be as follows:

Table 1: Facilities for the Authority and the Authority's Engineer to be provided by the Contractors

Section	**Package**	**Offices** *(Note 1)*	**Accommodation** *(Note 2)*	
			Staff	**Period** (months)
Phase-I NH54 Section 2	S2-3: Package 5	Site Office Type 2 Location: Hrangchalkawn Period: 48 months	- National Experts ..... 3 - Sub-Professional Staff ..... 7 - Office Supporting Staff..... 3 - Authority (Site Staff) 1	General ..... 42 Surveyor 2: 48

Note (1): *Site Office*: The layout shall be prepared by the Contractor and submitted for review and approval by the Authority's Engineer. The locations shown in this table are tentative and shall be confirmed by the Authority's Engineer.
Note (2): *Accommodation*: Depending upon the Authority's Engineer acceptance, rental of existing buildings will be allowed depending the proximity of the works to the nearby cities or towns, and comfortability.

3.1 Site Office for the Authority and the Authority's Engineer

3.1.1 Construction of Site Offices

The basic layout of each site office shall be prepared by the Contractor and submitted to the Authority's Engineer for review and respective acceptance.

The building shall comply with India's applicable specifications for architectural and structural works for buildings.

a. Basic Layout

The layout shall be prepared in accordance with the number of staff shown in Table-1 to accommodate properly the following (note: the plan area shown below is the minimum requirement to be considered):

(1) Core Office – Office Type 1: (to be provided by Package-4 near Lunglei)

(2) Site Office – Office Type 2 (to be located nearby Hrangchalkawn)*:

- Minimum Area: 270 sqm
  - One office room for Resident Engineer.....20 sqm
  - One office room for the Authority's representative (private arrangement).....25 sqm
  - One office room for experts visiting the Site or meetings for coordination.....30 sqm
  - One office room for National Experts.....40 sqm
  - One office room for Sub-Professional Staff.....60 sqm
  - One reception/administration office room.....40 sqm
  - A kitchen (Pantry) plan area well equipped with sink, draining board, cupboards, shelving, etc. .....12 sqm
  - Male (1) and Female (1) toilets with shower and wash-hand basin facilities for the sole use of the Authority's representative, International Experts, National Experts, and administration staff (office manager and secretary)..... 2 units
  - Male (2) toilets for Sub-Professional and Supporting staff ..... 2 units
  - Corridor for connecting all rooms (approx..20 sqm) .....1.50 m width
  - Parking for the vehicles used by the Authority's Engineer and visitor's vehicles..... 6 veh.

b. Basic Requirements

The Contractor shall, not later than 7 days after the starting date, submit full details of the Design Drawings to the Authority's Engineer, including floor plans, elevations, construction principles and materials, before commencing the erection of the facilities.

The Contractor shall be responsible for raising the ground (if necessary), grading and drainage in the vicinity of the building(s), with suitable access and walkways. The Contractor shall construct a covered hard-standing parking area, for the exclusive use of the Authority's Engineer and his visitors and respective access road to the parking area. The access road shall be paved and hard enough in order to be transited even during heavy rains. Outside lighting shall be installed around the buildings and the parking area, and appropriate signs shall be erected to indicate the purpose of the facilities.

All facilities shall conform to current fabrication standards for the required types. The facilities described above shall represent the minimum requirements. The Contractor shall provide all additional incidentals and

* Location is of tentative and final location may be decided in consultation with Authority/ Authority's Engineer

necessary items, so that the facilities will be completely adequate and satisfactory in every respect for their intended use. Painting both the exterior and the interior shall be as agreed with the Authority's Engineer.

The building shall be completed with all services connected with clean water supply by water bowser (including elevated water tank and the tower for capacity of 2,000 liters for Office Type 2), electricity and sewerage. Each room shall be provided with at least four electrical outlet sockets. All power shall be 220V-240V, 50Hz except where otherwise agreed by the Authority's Engineer. All rooms shall be illuminated by fluorescent lighting. Each toilet shall be provided with a flushing toilet and warm water hand washing and shower facilities and extractor fans.

Telephone services (minimum 1 telephone line and 3 extension lines completed with equipment for the office), including international direct dialing shall be provided. In addition, extra lines shall be provided for facsimile and internet connections. Each office shall be equipped with a telephone connected to the main reception telephone.

Offices and meeting rooms shall be air-conditioned. The air-conditioning may be either individual units or a central ducted system and shall be adequate to maintain temperature of not more than 24°C (dry bulb) at a relative humidity of 50% during the hottest season of the year. The noise level of the air-conditioning while working should be sufficiently low to allow normal voice level discussions to take place.

Office rooms shall be capable of providing at all times environmental conditions suitable for the operation of specified electronic office equipment.

The building shall be weather proof, fire protected, heat-insulated and secured. Windows shall give adequate light and ventilation and be protected with metal mosquito-proof gauze and have security bars and Venetian, or other approved sun blinds. Ceiling height above the floor level shall be at least 2.75 m. All internal walls shall be sound insulated. Floors shall be PVC tile covered. In toilets and other washing areas the floors shall have drains to assist cleaning.

3.1.2 Maintaining and Servicing of the Offices

The construction of the new office building for the Authority's Engineer shall be completed within 60 days since the date of commencement of the Contract and shall be equipped and maintained by the Contractor to the satisfaction of the Authority's Engineer until 3 months after the issue of a Completion Certificate for the Works or such earlier time as instructed by the Authority's Engineer whereupon the furniture shall be removed and any internal partition walls modified as required by the Authority's Engineer.

The Contractor shall provide all laborers, materials and equipment for maintaining and cleaning offices, furniture and fittings. The Contractor shall replace and/or restore, as directed, any facilities or parts thereof that become damaged, worn out, lost or stolen. The Contractor shall provide an adequate stock of all expendable and consumable items including refreshments, clean

water supply and drinking water, paper towels, toilet rolls, soaps, washing up liquid, brooms/mops and shall ensure proper and continuing functioning of all components and parts of the facilities during the contract period.

The Offices shall be provided with waste disposal material and these shall be emptied and disposed of daily by the Contractor.

3.1.3 Equipment and Expenses for Running-Off the Offices

The Contractor shall provide the following furniture and equipment to be used by the Authority's Engineer at Site.

Furniture and Equipment for Site Offices (each office)

Item	Unit	Quantity	Remarks
Refrigerator (deodorizer and no-frost system)	unit	1	Office Type 2: 150liters' minimum capacity
Water Dispenser (19 liters capacity including bottles and 6 spares bottles/gallon)	set	1	Office Type 2
Electric Kitchen Stove	unit	1	Size and model shall be discussed
Electric Kettle	unit	1	
Diesel Generator Set		1	Office Type 2: 60 KVA

3.2 Accommodation for the Authority and the Authority's Engineer Staff

3.2.1 Temporary Accommodation (initial period)

(1) General

Immediately after the date for Commencement of Works, during the first 3 months or until the permanent installations are prepared and approved, the Contractor shall provide rented houses as per the accommodation for all staff of the Authority's Engineer.

The accommodation shall be equipped with security grilles and mosquito netting, and shall be fully furnished and equipped with new items by the Contractor to the satisfaction of the Authority's Engineer, including curtains, linen, blankets, glassware, cutlery, crockery and kitchen utensils.

Each house shall be wired to permit the use of standby generators as well as mains for the supply of electricity. The generators shall be fitted with automatic starting switchgear if so directed by the Engineer. Covered, hard standing areas for positioning generators and storing fuel shall be provided.

Each house designated for the Engineer's International Experts and National Experts shall be provided with one telephone line and internet connection. Telephone installation shall be made by the Contractor but the cost of calls shall be paid by the Authority's Engineer staff.

Each house shall be provided with a TV (including cable and satellite connection). The installation shall be made by the Contractor but the cost of calls shall be paid by the Authority's Engineer staff.

Each house shall be provided with hot and cold water in the kitchen and the bathrooms.

The Contractor shall provide watchmen for security purposes to the approval of the Authority's Engineer.

The accommodation shall be available and ready for occupation within the number of days approved by the Authority's Engineer after the Commencement Date.

In the event that the Contractor fails to provide the required accommodation within the time specified or subsequently agreed by the Authority's Engineer, the Contractor shall provide, at no cost to the Employer, suitable hotel accommodation until such time as the accommodation is ready for occupation.

When a house is no longer required by the Authority's Engineer, all furniture, fittings and equipment provided by the Contractor for that house shall become the property of the Contractor.

(2) Housing Types

- ✧ House for the Authority near to Core Office (Central Team: 1 per 1 person)

  (to be provided by Package-4 nearby Lunglei)
- ✧ Team Leader (Authority's Engineer)

  (to be provided by Package-4 nearby Lunglei)
- ✧ International Experts (1 per 3 experts)

  (to be provided by Package-4 nearby Lunglei)

- ✧ House for the Authority near to Site Office (Site Staff: 1 per 1 person)

  One detached house, internal floor area approximately 60sqm, comprising 1 x sitting room, 1 x dining room, 1 x bedroom with attached bathrooms, 1 x kitchen. Split type air-conditioners to the sitting room, dining room and bedrooms. Moreover, a garage for one vehicle and fully equipped quarters for two servants shall be provided.
- ✧ National Experts (1 per 3 experts)

  One detached house, internal floor area approximately 80sqm, comprising 1 x sitting room, 1 x dining room, 1 x bedroom with attached bathrooms, 1 x kitchen. Split type air-conditioners to the sitting room, dining room and bedrooms. Moreover, a fully equipped quarter for one servants shall be provided.
- ✧ Sub-Professional Staff and Office Supporting Staff (1 per 3 persons)

One detached house, internal floor area approximately 60sqm, comprising 1 x sitting room, 1 x dining room, 3 x bedroom, 1 x bathroom, 1 x kitchen. Split type air-conditioners to the sitting room, dining room and bedrooms. Moreover, a fully equipped quarter for one servants shall be provided.

- ✧ Secretary or Ladies Staff (1 per 3 persons)

  One detached house, internal floor area approximately 60sqm, comprising 1 x sitting room, 1 x dining room, 3 x bedroom, 1 x bathroom, 1 x kitchen. Split type air-conditioners to the sitting room, dining room and bedrooms. Moreover, a fully equipped quarter for one servants shall be provided.

(3) Maintenance

The Contractor shall be responsible for supplying all utilities, including electricity (whether by mains or generator), water, timber for open fires, drainage and telephone services, and shall meet the cost of these services, except the cost of telephone calls.

The Contractor shall maintain the accommodation, and all furniture, fittings and equipment, whether supplied by him or not, in good repair and to the satisfaction of the Authority's Engineer as long as such accommodation is occupied by the staff of the Authority's Engineer for the purposes of the Contract.

3.2.2 Construction of Houses for Accommodation (after lasted the initial period)

The procedures and standards for construction approved for the construction of the Site Offices will be applied for the construction of houses for accommodation of the staff of the Authority's Engineer.

The layout and design of the houses shall maintain equivalency with the houses approved for the Initial Period.

The location and house type shall be submitted for review and approval to Authority's Engineer.

The Initial Period will be defined and proposed by the Contractor based on the approved Construction Programme but not later than 3 months or the period accepted by the Authority's Engineer.

SCHEDULE – D

(See Clause 2.1)

SPECIFICATIONS AND STANDARDS

1. Construction

The Contractor shall comply with the Specifications and Standards set forth in Annex-I of this Schedule-D for construction of the Project Highway.

2. Design Standards

The Project Highway including Project Facilities shall conform to design requirements set out in the following documents:

Manual of Specifications and Standards for Two- Laning of Highways (IRC: SP: 73-**latest version**), referred to herein as the Manual.

Annex - I

(Schedule-D)

Specifications and Standards for Construction

4. Specification and Standards

All Materials, works and construction operations shall conform to the Manual of Specifications and Standards for Two-Lanning of Highways (IRC: SP: 73-2015), referred to as the Manual, and MORTH Specifications for Road and Bridge Works. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Engineer in charge.

5. Deviations from the Specifications and Standards

5.1. The terms "Concessionaire", "Independent Engineer" and "Concession Agreement" used in the Manual shall be deemed to be substituted by the terms "Contractor", "Authority's Engineer" and "Agreement" respectively.

5.2. Notwithstanding anything to the contrary contained in Paragraph 1 above, the following Specifications and Standards shall apply to the Project Highway, and for purposes of this Agreement, the aforesaid Specifications and Standards shall be deemed to be amended to the extent set forth below:

S. No.	Clause Referred in Manual	Provisions as per Manual	Modified Provision
1	7.3 (iv)	If the width of additional widening is less than 0.5 m on either side, the widening of the structure may be dispensed with and traffic shall be guided with the help of crash barriers in a transition of 1 in 30 on either side approaches	The existing bridge proposed to be repaired and rehabilitated as specified and to be retained without widening.

S. No.	Clause Referred in Manual	Provisions as per Manual	Modified Provision
2	12.6.3 (ii)	For hilly areas, where there is a general constraint on space, the layout indicated in fig 12.3 may be adopted for Bus bay	The width & length has been designed as available in field.
3	12.5.2	A typical lay out is given in **Fig. 12.1**.	The width & length has been designed as available in field.
4		View Point	The width & length has been designed as available in field.
5		Rock Anchor Work	As the site needs this type of Typical arrangement, necessary typical drawing has been given in drawing volume to be executed by Manufacturer / expert designer as per their design standard needed as per site condition
6		Design Standard	As per Clause 3 given below

6. Table for Clause 3

Geometric design criteria of the Project Highway shall be in accordance with the Table below.

Table: Summary of Geometric Design Criteria for Highway

Design Elements			Type/Value	Remarks
1	Highway Classification		National Highway	
2	Terrain Classification		Steep	
3	Design Speed (km/h)			
		Ruling (km/h)	40	
		Minimum (km/h)	30	
4	Cross-Sectional Elements	Basic Lane Width (m)	3.5	
		Number of Lanes	2	
		Formation Width (m)	12.0	
		Carriageway Width (m)	2 x 3.5	
		Outer Shoulder Paved Width (m)	2 x 1.5	
		Outer Shoulder Earthen Width (m)	2 x 1.0	
		Crossfall of Roadway (%)	2.5	
		Slope of Earthworks		
		Fill	V : H = 1:1.75	
		Cut (soil)	V : H = 1:1.2	Varies
		Cut (rock)	V : H = 1:0.2-0.5	Varies
5	Sight	Stopping Sight Distance, SSD (m)	30 (45)	Figures in () corresponds to speed of 40km/h
		Intermediate Sight Distance, ISD (m)	60 (90)	
		Overtaking Sight Distance, OSD (m)	(165)	
6	Horizontal Alignment	Horizontal Curve		
		Absolute Minimum Radius of Horizontal Curve (m)	30	
		Ruling Minimum Radius of Horizontal Curve (m)	50	
		Widening of Carriageway on Horizontal Curves		
		Widening for Absolute Minimum Radius (20m-	1.5	
		Widening for Ruling Minimum Radius (41m-60m)	1.2	
		Widening for Radius (61m-100m)	0.9	
		Widening for Radius (101m-300m)	0.6	
		Superelevation (Se)		
		Maximum Se for Absolute Minimum Radius (%)	7.0	
		Superelevation Runoff Rate	1/60	
		Transition Curve		
		Minimum Length for Absolute Minimum Radius	30	
		Minimum Length for Ruling Minimum Radius (m)	20	
7	Vertical Alignment	Vertical Gradient		
		Ruling Gradient (%)	6.0	
		Critical length of continuous Ruling Gradient (m)	2000	120m rise in 2km
		Limiting Gradient (%)	7.0	
		Exceptional Gradient (%)	8.0	
		Critical Length for Exceptional Gradient (m)	100	
		Minimum Gradient for Drainage (%)	0.5	Cut sections with
		Vertical Curve		
		Minimum Length of Vertical Curve (m)	15	
		Minimum Radius of Summit (Crest) Curve (m)		
		Absolute Minimum Radius (m)	205	From SSD
		Minimum Radius (m)	375	From ISD
		Desirable Minimum Radius (m)	1500	From OSD
		Minimum Radius of Valley (Sag) Curve (m)		
		Absolute Minimum Radius (m)	355	

7. Environment Management Plan

4.1 Overview

Descriptions of environment management measures during different stages of the project are provided in this chapter.

7.1.1. Pre-construction Stage

Required management measures during the pre-construction stage include the clearance of the ROW, plantation of trees, the measures for protecting/replacing community resources such as electric poles, public urinals and water points that are likely to be impacted. Their enhancement shall also be completed before construction work starts so that the community can start using these when the construction activity begins.

7.1.2. Construction Stage

This will be most crucial and active stage for the Environmental Management Plan (EMP). In addition to the monitoring of the construction activity itself to ensure that the environment is not damaged beyond permissible limits, the enhancement of cultural and community properties, mitigation and enhancement measures for water bodies through proper treatment of spoil soils will be undertaken as the construction progresses. To facilitate implementation of the enhancement and mitigation measures suggested, working drawings of the same have been provided in the Appendices. In addition, the provision of proper risk management with respect to construction activities such as accidental spillage is critical at this stage to avoid damage to flora and fauna, agricultural land and other sensitive resources. Typical locations of concerns include the locations of hot-mix plants (spillage of fuel, bitumen etc.) and labor camp sites.

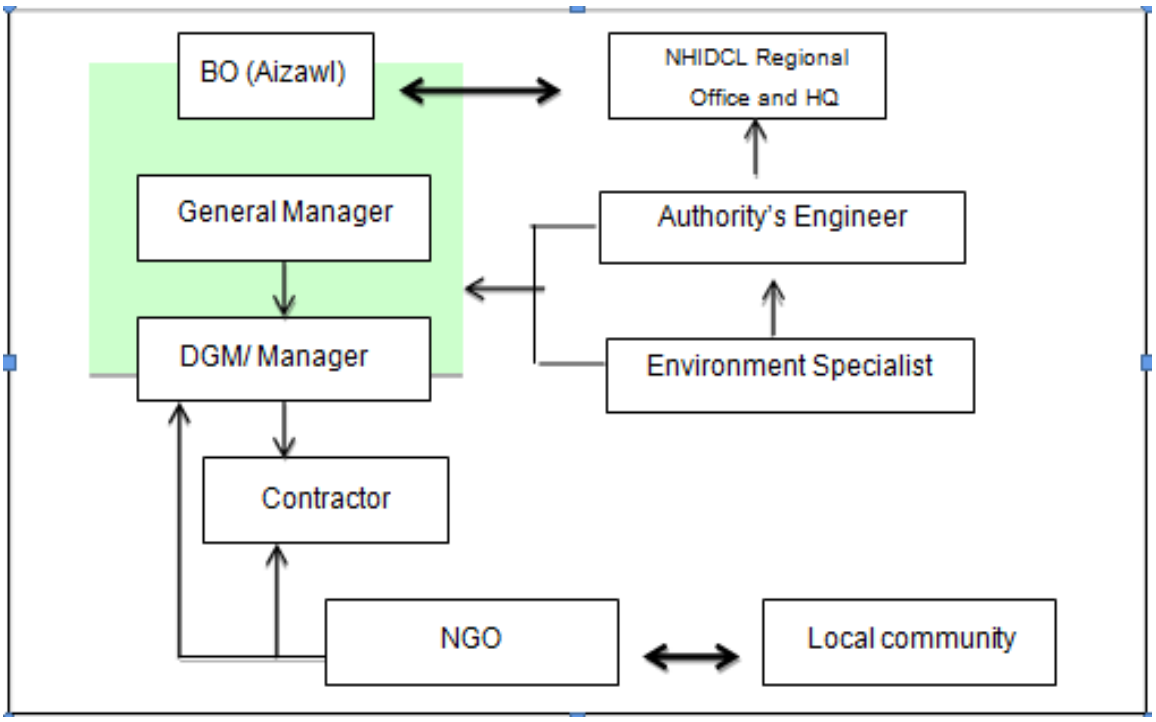
7.1.3. Operation Stage

The operation stage will essentially entail monitoring activity along the project area. In addition to checking the efficacy of the protection/ mitigation/ enhancement measures implemented, this will help verify or refuse the predictions made as a part of the impact assessment. Thus, it will complete a very important feedback loop for the project.

7.2. Environment Management Plan for Mitigation of Negative Impacts

The detailed measures adopted and/or to be adopted during different stages of the project to mitigate negative impacts and enhance positive aspects are shown in Table. The responsibility for implementation and supervision of EMPs are vested with three agencies, namely Contractors, Branch Office (BO), and Authority's Engineer (AE). The Contractors herein mean the agency hired for execution of the construction works for the respective

contract packages. BO would be implementation agency. The Figure below



indicates implementation structure of the EMP.

Fig: Institutional Arrangement for EMP Implementation

It has been proposed that General Manager (Projects) based in Aizawl will be in charge for the implementation of EIA and EMP for this project. General Manager will be assisted by Deputy General Manager/Manager by Authority's Engineer (and Environment Specialist) and contractor.

The Authority's Manager are expected to have in-house capacity to advise on and supervise the implementation of the EMP including suggesting enhancement design options and modifications, as necessary. For this purpose, the Authority's Engineer will employ a full-time environmental specialist.

The NGO will be one of the stakeholders in the entire project cycle with primary responsibility of facilitating the implementation of RAP and help NHIDCL/State Government in mitigating the adverse impacts of the project. Meanwhile, they can play a role in successful implementation of EMP, for example by supporting afforestation activity and awareness-raising campaign for traffic safety/risk of HIV/AIDS among others. Compensatory plantation and maintenance and protection of vegetation will be required as part of environmental mitigation and enhancement works. Likewise, spoil soils shall be used, where possible, to create community assets such as playground as per request of the community. In these types of works, the project may engage NGO to liaise with local community for effective implementation of the project.

Table 4.1 Environmental Management Plan for Pre-Construction Stage

Sl. No	Environmental Impacts/Issues	Mitigation Measures	Location	Time Frame	Responsibility	
					Implementation	Supervision
P1	Relocation of Project Affected Persons (PAP)	• All requirements of the RAP as applicable shall be complete before start of construction stage. The activities broadly include acquisition of land and structures, relocation of utilities, payment of compensation and provision assistance	All areas	Before construction begins	Government of Mizoram, District Revenue authorities, Village Councils, NGO	BO, AE
P2	Removal of vegetation	• Minimize the scale of vegetation clearing by factoring vegetation/forest cover in the final design of the road alignment process • Removal of trees to be carried out after forest clearance is obtained • Reforestation/replantation of trees at a term as instructed by the Forest Dept. or by the Forest Dept. • Activity shall be supervised to avoid poaching of animals	All areas	Before construction begins (Reforestration/replan tation may extend to during/after construction)	BO,Contractor, Forest Dept.	BO, AE, Forest Dept.

P3	Setting up construction camps	• Camps shall be located at least 500m away from the nearest built-up area. • Sewage system for a construction laborer's camp shall be designed, built and operated so that no pollution to ground or adjacent water bodies/ watercourses takes place. Garbage bins shall be provided in the camps and regularly emptied and the garbage disposed off in a hygienic manner, to the satisfaction of the relevant norms and the Engineer. • In relation to underground water resources, the contractor shall take all necessary precaution to prevent interference with such water resources. • All relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 shall be adhered to.	All construction campsite identified by the contractor and approved by AE	During Establishment, Operation and Dismantling of Such Camps.	Contractor	BO, AE
P4	Setting up hot mix plants	• Hot mix plants and batching plants shall be located sufficiently away from habitation and agricultural operations. • Where possible such plants will be located at least 1000m away from the nearest habitation.	All hot-mix and batching plants	During Erection, Testing, Operation and Dismantling of Such Plants.	Contractor	BO, AE
P5	Finalizing sites for surplus soil dumping	• Location of dumping sites shall be finalized. The sites shall meet following conditions: i) dumping does not impact natural drainage courses; ii) no endangered/rare flora	All areas identified as potential dumping sites	During mobilization	Contractor	BO, AE

		is impacted by such dumping				
P6	Identification of hazard-prone locations	• The contractor shall identify locations sensitive to landslides (in addition to the ones that area already identified) and shall duly report these to the Supervision Consultant (AE) and to BO.	All area	During mobilization	Contractor	BO, AE
P7	Identify and prepare relocation sites	• Location of relocation sites shall be identified in consultation with district/village authorities and PAPs. • Sites to be developed including provision of necessary utilities such as water and electricity.	Near villages with large-scale resettlement		BO	BO

Table 4.2 Environmental Management Plan for Construction Stage

Sl. No	Environmental Impacts/Issues	Mitigation Measures	Location	Time Frame	Responsibility	
					Implementation	Supervision
Soil						
C1	Soil Erosion in Borrow Pits	• The depth of borrow pits shall be restricted so that sides of the excavation shall have a slope not steeper than 1:4, from the edge of the final section of the bank. (if applicable)	On approved locations of borrow pits.	Construction Stage	Contractor and Authority's Engineer	BO
C2	Loss of top soil in Borrow pits	• Agricultural fields or productive land shall be avoided for borrowing earth. If unavoidable topsoil shall be preserved and used for tree plantation. (if applicable)	On approved locations of borrow pits.	Construction Stage	Contractor and Authority's Engineer	BO
C3	Compaction of Soil	• Construction equipment and vehicles shall be restricted to move only within designated area to avoid compaction of productive soil.	Throughout corridor.	Construction Stage	Contractor and Authority's Engineer	BO
C4	Soil erosion in embankments	• Pitching shall be done for slope stabilization as per the IRC guidelines (if applicable)	At the places of embankments	Construction Stage	Contractor and Authority's Engineer	BO
C5	Contamination of soil from fuel and lubricants	• Construction vehicles and equipment shall be operated and maintained in such a manner so that soil contamination due to its spillage shall be minimum. • Fuel storage shall only be done on wasteland and will be kept away from drainages channels and natural water bodies.	Near Labor camp And sites of installation of Construction machineries	Construction Stage	Contractor and Authority's Engineer	BO

C6	Contamination of land from construction waste and quarry materials	• Debris generated due to the dismantling of the existing pavement structure and the cutting of the hillside for the widening shall be suitably reused in the proposed construction, such as for fill materials for embankments. • Debris and other material obtained from existing embankment shall be dumped in approved landfill site already identified by concerned agency. All spoils shall be disposed off as desired and the site shall be fully cleaned before handing over. • Construction waste including non-bituminous and bituminous waste shall be dumped in approved landfill site identified by State Pollution Control Board (SPCB) or competent authority. All spoils shall be disposed off as desired and the site shall be fully cleaned before handing over.	Solid waste dump Site identified and approved by SPCB. or competent authority. Throughout the area	Construction Stage	Contractor and Authority's Engineer	BO
C7	Loss of top soil in land acquisition	• Topsoil shall be stripped, stored and shall be laid on ground for landscaping purpose. (if feasible)	Throughout the area	Construction Stage	Contractor and Authority's Engineer	BO
Water						

C8	Contamination of water by fuel/ oil spillage of vehicle	• Construction vehicles / equipment shall be operated and maintained in such a manner to avoid contamination of water bodies due to oil spillage. • Fuel storage shall only be done on wasteland and will be kept away from drainage channels and natural water bodies.	Near labor camp and sites of installation of Construction machineries.	Construction Stage	Contractor and Authority's Engineer	BO
C9	Contamination of stagnant water body by fecal matters from labor camp.	• Labor camp shall not be allowed near any of the water bodies. • The proper sanitation facilities shall be provided.	Preapproved locations away from the water bodies.	Construction Stage	Contractor and Authority's Engineer	BO

C10	Deposition of dust in open wells near construction site	• The mouth/opening of the well shall be covered with suitable material during any of the construction activity so as to prevent dust entering in the well.	All the wells along the project corridor.	Construction Stage	Contractor and Authority's Engineer	BO
C11	Using drinking water for construction purpose	• The contractor shall make arrangements for water required for construction in such a way that water availability and supply to nearby community is unaffected. • Wastage of water shall be kept minimum during construction.	At respective planned construction sites	Construction Stage	Contractor and Authority's Engineer	BO
C12	Hand pump close to road may get affected in widening	• All the Hand pumps shall be relocated to suitable alternate place.	At the respective locations	Construction Stage	Contractor and Authority's Engineer	BO
C13	Wells or water stoarge system may get affected in widening	• Alternate arrangements will be made for all the Wells or water storage system.	At the respective locations	Construction Stage	Contractor and Authority's Engineer	BO
C14	Altering flow of natural drains	• Drain shall be channelized with Slope protection - Gabion Structure.	At the respective locations	Construction Stage	Contractor and Authority's Engineer	BO
C15	Sanitation of waste disposal in construction camps	• The construction of camps will be done with sufficient buffer from habitation. • At construction sites and labor camps sufficient no of latrines will be provided. • The sewage generated from the camps will be properly disposed off so that it does not affect water bodies	Wherever labor camp is located	Construction Stage	Contractor and Authority's Engineer	BO
Air						

C16	Emission from construction vehicles and machinery.	• All vehicles, equipment and machinery shall be selected to meet recognized international and national standards for emissions and shall be maintained and operated in a manner that ensures relevant air, noise and discharge rules. • Only unleaded petrol and low sulphur diesel or sulphur free diesel shall be used as fuel for vehicles, equipment and machinery.	Wherever the hot mix plant and batching plant is setup.	Construction Stage	Contractor and Authority's Engineer	BO
C17	Air pollution from various plants affecting settlements	• The asphalt plants, crushers and batching plants shall not be sited at least 500 m in leeward direction from nearest human settlement	Locations near Settlement	Construction Stage	Contractor and Authority's Engineer	BO
C18	Air pollution may exceed the limits prescribed by Central Pollution Control Board.	• Regular monitoring or air quality parameters during the construction period as envisaged in the Environmental Monitoring Plan.	Locations given in Environmental Monitoring Plan.	Construction Stage	Contractor and Authority's Engineer	BO
C19	Vehicles will generate dust and suspended particles.	• The dust generated by vehicles on site shall be arrested using a water tanker fitted with sprinkler capable of applying water uniformly with a controllable rate of flow to variable widths of surface but without any flooding.	Wherever the plants are setup and sensitive locations as suggested in monitoring plan.	Construction Stage	Contractor and Authority's Engineer	BO
Noise						

C20	Noise levels from vehicles. Asphalt plants and equipment	• The plants and equipment used for construction shall confirm to CPCB norms. • Vehicles and equipment used shall be fitted with silencer. • Any vehicle and machinery shall be kept in good working order and engines turned off when not in use. • All equipment and plants shall strictly be placed away from educational institutes and hospitals. • Regular monitoring of noise parameters (Leq) during the construction period as envisaged in the Environmental Monitoring Plan.	Wherever the plants are setup.	Construction Stage	Contractor and Authority's Engineer	BO
C21	Noise from blasting operations	• Blasting as per Indian Explosives act will be carried out. • People living near such blasting operation sites shall be informed before the operational hours. • Workers at blasting sites shall be provided with earplugs.	At the sites where the blasting is required and in quarry sites	Construction Stage	Contractor and Authority's Engineer	BO
C22	Noise barriers	• Construction of noise barriers in the form of walls at Sensitive locations upon consultation with stakeholders.	All along the corridor wherever the sensitive locations like schools, hospitals and other community places are located	Construction Stage	Contractor and Authority's Engineer	BO
Flora and Fauna						

C23	Tree cutting for widening.	• Three trees shall replace each tree cut for the purpose. • The Engineer shall approve such felling only when the NHIDCL receives a "clearance" for such felling from the MOEF, as applicable. • Trees felled shall be replaced as per the compensatory afforestation criteria in accordance with the Forests (Conservation) Act, 1980.	Throughout the project area.	Construction stage	Contractor And Authority's Engineer Forest Dept.	BO
C24	Damage or Loss of Important Flora	• During construction, at any point of time, if a rare/ threatened/endangered flora species is found, it shall be conserved in a suitable manner in consultation with authorities. The Engineer shall approve detailed conservation processes, plans and designs as well as associated modification in the project design.	Throughout the project area.	Construction Stage	Contractor and Authority's Engineer	BO
Health and Hygiene						

C25	Health hazard to workers due to bad water and sanitation	• At every workplace, good and sufficient portable water (as per IS 10500) supply shall be ensured to avoid water borne diseases and secure the health of the workers • Adequate drainage, sanitation and waste disposal shall be provided at workplaces. • Preventive medical care shall be provided to the worker.	Wherever labor camp is setup	Construction Stage	Contractor and Authority's Engineer	BO
C26	Health hazard to workers by various construction activity	• Personal protective equipment shall • be provided to worker as per the Factories Act.	Throughout the project area.	Construction Stage	Contractor and Authority's Engineer	BO
C27	Health/ social hazard, sexual harassment to female workers	• Segregation of male and female areas in labor camp shall be executed.	Wherever labor camp is setup	Construction Stage	Contractor and Authority's Engineer	BO

C28	Hygiene at Construction Camps	• The Contractor during the progress of work will provide, erect and maintain necessary (temporary) living accommodation and ancillary facilities for labor to standards and scales approved by the resident engineer. • These shall be provided within the precincts of every workplace, latrines and urinals in an accessible place, and the accommodation, separately for each for these, as per standards set by the Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996. There shall be adequate supply of water, close to latrines and urinals. • All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place. Compliance with the relevant legislation must be strictly adhered to. Garbage bins must be provided in the camp and regularly emptied and the garbage disposed off in a lined landfill sites. Construction camps are to be sited away from vulnerable people and adequate health care is to be provided for the work force.	Wherever labor camp is setup	Construction Stage	Contractor and Authority's Engineer	BO

C29	Hygiene at Construction Camps	• On completion of the works, the whole of such temporary structures shall be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the whole of the site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the Engineer.				
C29	Abandoned Quarry will accumulate water and act as a breading ground for disease vectors.	• Reclamation measure shall be adopted with garland of trees around the periphery. The quarry dust and waste shall be used for refilling. The remaining portion should be covered with trees.	All quarry locations.	Construction Stage	Contractor and Authority's Engineer	BO
Safety						
C30	Safety of vehicles plying on road while the construction activity is going on.	• Prior arrangement/traffic diversion for safe passage of vehicles shall be made with proper direction and signage at the construction site. • Detailed Traffic Control Plans shall be prepared and submitted to the Site Engineer/ Project Director for approval 5 days prior to commencement of works on any section of road. The traffic control plans shall contain details of temporary diversions, details of arrangements for construction under traffic and details of traffic arrangement after cessation of	Throughout the project area.	Construction stage	Contractor and Authority's Engineer	BO

		work each day.				

C31	Risk from Operations	• The Contractor is required to comply with all the precautions as required for the safety of the workmen as far as those are applicable to this contract. • The contractor shall supply all necessary safety appliances such as safety goggles, helmets, masks, etc., to the workers and staff. The contractor has to comply with all regulation regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress.	All construction sites	Construction stage	Contractor and Authority's Engineer	BO

C32	Risk from Electrical Equipment	• Adequate precautions will be taken to prevent danger from electrical equipment. No material or any of the sites will be so stacked or placed as to cause danger or inconvenience to any person or the public. • All necessary fencing and lights will be provided to protect the public. All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provisions and to the satisfaction of the Engineer.	All construction Site	Construction stage	Contractor and Authority's Engineer	BO

C33	Risk at Hazardous Activity	• All workers employed on mixing asphaltic material, cement, lime mortars, concrete etc., will be provided with protective footwear and protective goggles. Workers, who are engaged in welding works, would be provided with welder's protective eye-shields. Stone-breakers will be provided with protective goggles and clothing and will be seated at sufficiently safe intervals. • The use of any herbicide or other toxic chemical shall be strictly in accordance with the manufacturer's instructions. The Engineer shall be given at least 6 working day's notice of the proposed use of any herbicide or toxic chemical. A register of all herbicides and other toxic chemicals delivered to the site shall be kept and maintained up to date by the Contractor. The register shall include the trade name, physical properties and characteristics, chemical ingredients, health and safety hazard information, safe handling and storage procedures, and emergency and first aid procedures for the product. This should comply with Hazardous Material Act.	All construction sites	Construction stage	Contractor and Authority's Engineer	BO

C34	Risk of Lead Pollution	• Nobody below the age of 18 years and no woman shall be employed on the work of painting with products containing lead in any form. No paint containing lead or lead products will be used except in the form of paste or readymade paint. • Facemasks will be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped	All construction sites	Construction stage	Contractor and Authority's Engineer	BO

C35	Risk caused by Force' Majure	● All reasonable precaution will be taken to prevent danger of the workers and the public from fire, flood, drowning, etc. All necessary steps will be taken for prompt first aid treatment of all injuries likely to be sustained during the course of work.	All construction Site	Construction stage	Contractor and Authority's Engineer	BO
C36	Risk from Explosives	● Except as may be provided in the contract or ordered or authorized by the Engineer, the Contractor shall not use explosives. Where the use of explosives is so provided or ordered or authorized, the Contractor shall comply with the requirements of the following Sub-Clauses of this Clause besides the law of the land as applicable. ● The Contractor shall at all times take every possible precaution and shall comply with appropriate laws and regulations relating to the importation, handling, transportation, storage and use of explosives and shall, at all times when engaged in blasting operations, post sufficient warning flagmen, to the full satisfaction of the Engineer. ● The Contractor shall at all times make full liaison with and inform well in advance and obtain such permission as is required from all Government Authorities, public bodies and private parties whatsoever concerned or affected or likely to be concerned or affected by blasting operations.	Place of use of Explosives	Construction stage	Contractor and Authority's Engineer	BO

C37	Malarial risk	• The Contractor shall, at his own expense, conform to all anti-malarial instructions given to him by the Engineer, including filling up any borrow pits which may have been dug by him	All construction sites, particularly beyond Lunglei district	Construction stage	Contractor and Supervision Consultant	BO

C38	First Aid	• At every workplace, a readily available first aid unit including an adequate supply of sterilized dressing material and appliances will be provided.	At the construction site /labor camp	Construction stage	Contractor	BO
Disruption to Users						
C39	Loss of Access	• At all times, the Contractor shall provide safe and convenient passage for vehicles, pedestrians and livestock to and from side roads and property accesses connecting the project road. Work that affects the use of side roads and existing accesses shall not be undertaken without providing adequate provisions to the prior satisfaction of the Engineer. • The works shall not interfere unnecessarily or improperly with the convenience of public or the access to, use and occupation of public or private roads, railways and any other access footpaths to or of properties whether public or private.	Throughout the project area, particularly in built-up areas	During Construction.	Contractor	Authority's Engineer

C40	Traffic Jams and Congestion	• Detailed Traffic Control Plans shall be prepared and submitted to the Site Engineer/ Project Director for approval 5 days prior to commencement of works on any section of road. The traffic control plans shall contain details of temporary diversions, details of arrangements for construction under traffic and details of traffic arrangement after cessation of work each day. • Temporary diversion (including scheme of temporary and acquisition) will be constructed with the approval of the designated Engineer. While approving temporary diversion construction, the Engineer will seek endorsement from the BO. • Special consideration shall be given in the preparation of the traffic control plan to the safety of pedestrians and workers at night. • The Contractor shall ensure that the running surface is always properly maintained, particularly during the monsoon so that no disruption to the traffic flow occurs. As far as possible idling of engines shall be avoided to curb pollution. • The temporary traffic detours shall be kept free of dust by frequent application of water, if necessary.	Throughout Corridor	During Construction.	Contractor	Authority's Engineer

C41	Traffic Control and Safety	• The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades,including signs, markings, flags, lights and flagmen as may be required by the Authority's Engineer for the information and protection of traffic approaching or passing through the section of the highway under improvement. • All signs, barricades, pavement markings shall be as per the MORTH specification. Before taking up construction on any section of the highway, a traffic control plan shall be devised to the satisfaction of the Authority's Engineer as per EMP. Excavated pits shall be filled to avoid falling of animals/ human beings.	Throughout the project area	During Construction.	Contractor	Authority's Engineer
Environment Enhancement						
C42	Hand pumps enhancement/relocation for ground water recharging	• Hand pumps within Right of Way shall be enhanced/relocated.	At the respective locations along the corridor.	Construction Stage	Contractor and Authority's Engineer	BO
C43	Roadside landscape development	• Avenue plantation of foliage trees mixed with flowering trees, shrubs and aromatic plants shall be carried out where ever land is available between ditches and Right of Way.	Throughout the corridor	Construction Stage	Contractor and Authority's Engineer	BO
C44	Providing better bus bays	• Bus shelters shall be provided at given locations	As per traffic plan	Construction Stage	Contractor and Authority's	BO

					Engineer	
C45	Better sitting arrangements where small space is available	• Designed sitting arrangements shall be provided.	As per the design	Construction Stage	Contractor and Authority's Engineer	BO
C46	Landscaping of junctions	• All rotary junctions shall be landscaped suitably	As per landscape design at the respective locations	Construction Stage	Contractor and Authority's Engineer	BO
C47	Abandoned Quarry will accumulate water and act as a breeding ground for disease vectors.	• The abandoned quarry locations shall be planted suitably as the plan	Wherever quarries are located and abandoned	Construction Stage	Contractor and Authority's Engineer	BO
C48	Erosion of embankments, shoulders, side slopes, and pavement leading to deterioration and affecting stability and integrity of road	• Earth works specifications will include provision for stable slope construction, compacting and laying out turf including watering until ground cover is fully established • Proper construction of Breast wall and retaining wall at the locations identified by the design team to avoid soil erosion • The measures proposed for slope stabilization are: Discharge zones of drainage structures (culverts and minor bridges) provided with riprap • Construction in erosion and flood prone areas will not be in monsoon /season. • Side slopes will be kept flatter wherever possible, and in case	At the respective locations throughout the project area.	Construction Stage	Contractor and Authority's Engineer	BO

		of steeper slopes it will be supported by the retaining wall.				

Table 4.3 Environmental Management Plan for Operation Stage

Sl. No	Environmental Impacts/Issues	Mitigation Measures	Location	Time Frame	Responsibility	
					Implementation	Supervision
O1	Water quality degradation due to road-run-off	• Silt fencing, oil & grease traps, etc. shall be provided at sensitive water bodies to ensure that the water quality is not impaired due to contaminants from road run-off • Monitoring shall be carried out as specified in the monitoring plan	As specified in the monitoring plan	As per monitoring plan	BO, SPCB	BO
O2	Soil and water contamination from accidental spills	• Contingency plans to be in place for cleaning up of spills of oil, fuel and toxic chemicals • Monitoring shall be carried out as specified in the Monitoring Plan	All area and as specified in the monitoring plan	Plan to be developed at state/district level by early operation stage	BO, SPCB, Local Government Bodies	BO
O3	Air quality degradation due to increases in traffic volume	• Monitoring shall be carried out as specified in the Monitoring plan • Share air quality data with SPBC and relevant agencies and discuss options for mitigate air quality degradation associated with greater traffic volume	As specified in the monitoring plan	As per monitoring plan	BO, SPCB	BO
Q4	Increases in noise and vibration due to greater traffic volume	• Monitoring shall be carried out as specified in the Monitoring plan • Install noise barrier (wall etc.) in sensitive areas, if necessary	As specified in the monitoring plan	As per monitoring plan	BO, SPCB	BO

O5	Traffic safety	• Traffic control measures including speed limits to be enforced strictly. • Local government bodies and development authorities will be encouraged to control building development along the highway.	All area	Throughout operation stage	BO, Local Government Bodies	BO
O6	Accidents involving hazardous materials	• Compliance with the Hazardous Wastes (Management and Handling) Rules, 1989 including: ✓ For delivery of hazardous substances, permit license, driving license and guidance license will be required. ✓ These vehicles will only be harbored at designated parking lots. ✓ In case of spill of hazardous materials, the relevant departments will be notified at once to deal with it with the spill contingency plan.	All area	Manual/guideline to be prepared during early operation stage	BO	BO
O7	Roadside tree plantation, flora and fauna	• Trees planted along the corridor shall be maintained for a period of three years. Maintenance works include, watering of the saplings, replacement of the bamboo fence every year for 3 years and all necessary measures for survival of the sapling. • Monitoring of flora and fauna along the highway shall be carried out to assess conditions of ecosystem against the baseline	All area and as per the monitoring plan	Immediately from the planting of sapling, and as per monitoring plan	BO, NGO	BO

4.3 Environment Monitoring Plan

To ensure effective implementation of the EMP, it is essential that an effective monitoring plan be designed and carried out. The environmental monitoring plan provides such information on which management decision may be taken during construction and operational phases. It provides basis for evaluating the efficiency of mitigation and enhancement measures and suggest further actions that need to be taken to achieve the desired effect. The monitoring includes: i) Visual observations; ii) Selection of environmental parameters at specific locations; and iii) Sampling and regular testing of these parameters

Monitoring methodology covers the following key aspects: Components to be monitored; parameters for monitoring of the above components; monitoring frequency; monitoring standards; responsibilities for monitoring; direct responsibility, overall responsibility; and monitoring costs. Environmental monitoring of the parameters involved and the threshold limits specified are discussed below.

Ambient air quality

Ambient air quality parameters recommended for monitoring road transportation developments are PM10, PM 2.5, Carbon Monoxide (CO), Oxides of Nitrogen (NO_X), Sulphur Dioxide (SO_2) and Lead (Pb). These will be monitored at designated locations starting from the commencement of construction activity. Data should be generated at all identified locations in accordance to the National Ambient Air Quality Standards, 2009. The location, duration and the pollution parameters will be monitored and the responsible institutional arrangements are detailed out in the Monitoring Plan.

Water quality

The physical and chemical parameters recommended for analysis of water quality relevant to road development projects are pH, total solids, total dissolved solids, total suspended solids, oil and grease, COD, chloride, lead, zinc and cadmium. The location, duration and the pollution parameters to be monitored and the responsible institutional arrangements are detailed in the Environmental Monitoring Plan. The monitoring of the water quality is to be carried out at all identified locations in accordance to the Indian Standard Drinking Water Specification – IS 10500: 1991.

Noise

The measurements for monitoring noise levels would be carried out at all designated locations in accordance to the Ambient Noise Standards formulated by Central Pollution Control Board (CPCB) in 1989. Noise should be recorded at an “A” weighted frequency using a “slow time response mode” of the measuring instrument. The location, duration and the noise pollution parameters to be monitored and the responsible institutional arrangements are detailed in the Environmental Monitoring Plan

The monitoring plan for the various performance indicators of the project in the construction and operation stages is summarized in the Table 8.4.

Table 4.4 Environmental Monitoring Plan

Sl. No	Item	Project Stage	Parameters	Guidance	Standards	Location	Frequency	Duration	Responsibility	
									Implementation	Supervision
M1	Air	Construction	SPM, RSMP, SO_2, NOx, CO, HC	• Dust sampler to be located 50m from the plan in the downwind direction. • Use method specified by CPCB for analysis	Air (P&CP) Rules, CPCB, 1994	Hot mix plant/ batching plant	Twice a year for three years	Continuous 24 hours	Contractor through approved monitoring agency	BO
M2		Construction	SPM, RSPM	• Dust sampler to be located 50m from the earthworks site downwind direction. Follow CPCD method for analysis	Air (P&CP) Rules, CPCB, 1994	Stretch of road where construction is underway	Twice a year for three years	Continuous 24 hours	Contractor through approved monitoring agency	BO
M3		Operation	SPM, RSMP, SO_2, NOx, CO, HC	• Use method specified by CPCB for analysis	Air (P&CP) Rules, CPCB, 1994	Sampling location specified in EIA report	Twice a year for one year	Continuous 24 hours	BO	BO
M4	Water	Construction	pH, BOD, COD, TDS, TSS, DO, Oil & Grease and Pb	• Sample collected from source and analyze as per Standard Methods for Examination of Water and Wastewater	Water quality standards by CPCB	Sampling locations specified in EIA report	Twice a year for three years		Contractor through approved monitoring agency	BO
M5		Operation	pH, BOD, COD, TDS, TSS, DO, Oil & Grease and Pb	• Grab sample collected • from source and analyze as per Standard Methods for Examination of Water • and Wastewater	Water quality standards by CPCB	Sampling locations specified in EIA report	Twice a year for one year		BO	BO
M6		Operation	Cleaning of drains and water bodies	• Choked drains, water bodies undergoing siltation and subject to debris disposal should be monitored under cleaning operations	To the satisfaction of the engineer (PWD)	All area	Post-monsoon		BO	BO

M7	Noise and vibration	Construction	Noise levels on dB (A) scale	• Free field at 1m from the equipment whose noise levels are being determined	Noise standards by CPCB	At equipment yard	Once every 3 Month (max) for three years, as required by the Authority's engineer	Reading to be taken at 15 seconds interval for 15 minutes every hour and then averaged	Contractor through approved monitoring agency	BO
M8		Operation	Noise levels on dB (A) scale	• Equivalent Noise levels using an integrated noise level meter kept at a distance of 15 m from edge of Pavement	Noise standards by CPCB	At maximum 15 sites inc. those listed in EIA report for noise monitoring locations	Twice a year for 1 years	Readings to be taken at 15 seconds interval for 15 minutes every hour and then averaged.	BO	BO
M9	Soil erosion	Construction	Turbidity in Storm water; Silt load in ponds, water courses	• Visual observations during site visits	As specified by the Authority's engineer / Water quality standards	At locations of stream crossings and at locations of retaining wall and breast wall	Pre-monsoon and post-monsoon for three years		Contractor	BO
M10		Operation	Turbidity in Storm water; Silt load in ponds, water courses	• Visual observations during site visits	As specified by the Authority's engineer / Water quality standards	As directed by the engineer	Pre-monsoon and post-monsoon for one year		BO	BO
M11	Construction Camp	Construction	Monitoring of: 1.Storage Area; 2. Drainage Arrangement 3. Sanitation in Camps	• Visual Observations and as directed by the Authority's engineer	To the satisfaction of the Authority's engineer and Water quality standards	At storage area and construction workers' camp	Quarterly during construction stage		BO	BO

M12	Affores tation	Construction and operation	Plant survival	• The success of tree planting. Monitor the rate of survival after six months, one year and 18 months in relation to total numbers of trees planted		All area	Minimum three years after planting		NGO, BO	BO
M13	Flora and Fauna	Construction and Operation	Condition of ecosystem	• Comparison to pre-project flora and fauna	As specified in TOR	As specified in TOR	Twice a year for three years		BO	BO

*Any amendment/ Corrigendum/ revision of standards as per latest status shall be applicable.

Schedule – E

(See Clause 2.1 and 14.2)

MAINTENANCE REQUIREMENTS

1. Maintenance Requirements

1.1. The Contractor shall, at all-time maintain the Project Highway in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permits.

1.2 The Contractor shall repair or rectify any Defect or deficiency set forth in Paragraph 2 of this Schedule-E within the time limit specified therein and any failure in this behalf shall constitute non-fulfillment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly lump sum payment as set forth in Clause 14.6 of this Agreement, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.

1.3. All Materials, works and construction operations shall conform to the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (FIFTH REVISION, April 2013)", including latest corrections slips, issued by the Ministry of Surface Transport & Highways, Government of India and published by the Indian Roads Congress.

Where the specifications for a work are not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer.

2. Repair/rectification of Defects and deficiencies

The obligations of the Contractor in respect of Maintenance Requirements shall include repair and rectification of the Defects and deficiencies specified in Annex-I of this Schedule-E within the time limit set forth therein.

3. Other Defects and deficiencies

In respect of any Defect or deficiency not specified in Annex-I of this Schedule-E, the Authority's Engineer may, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards, and any deviation or deterioration beyond the permissible limit shall be repaired or rectified by the Contractor within the time limit specified by the Authority's Engineer.

4. Extension of time limit

Notwithstanding anything to the contrary specified in this Schedule-E, if the nature and extent of any Defect or deficiency justifies more time for its repair or rectification than the time specified herein, the Contractor shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Authority's Engineer and conveyed to the Contractor and the Authority with reasons thereof;

5. Emergency repairs/restoration

Notwithstanding anything to the contrary contained in this Schedule-E, if any Defect, deficiency or deterioration in the Project Highway poses a hazard to safety or risk of damage to property, the Contractor shall promptly take all reasonable measures for eliminating or minimizing such danger.

6. Daily inspection by the Contractor

The Contractor shall, through its engineer, undertake a daily visual inspection of the Project Highway and maintain a record thereof in a register to be kept in such form and manner as the Authority's Engineer may specify. Such record shall be kept in safe custody of the Contractor and shall be open to inspection by the Authority and the Authority's Engineer at any time during office hours.

7. Pre-monsoon inspection / Post-monsoon inspection

The Contractor shall carry out a detailed pre-monsoon inspection of all bridges, culverts and drainage system before [1st June] every year in accordance with the guidelines contained in IRC: SP:35. Report of this inspection together with details of proposed maintenance works as required on the basis of this inspection shall be sent to the Authority's Engineer before the [10th June] every year. The Contractor shall complete the required repairs before the onset of the monsoon and send to the Authority's Engineer a compliance report. Post monsoon inspection shall be done by the [30th September] and the inspection report together with details of any damages observed and proposed action to remedy the same shall be sent to the Authority's Engineer.

8. Repairs on account of natural calamities

All damages occurring to the Project Highway on account of torrential rains, floods, earthquake or other natural disasters shall be undertaken by the Contractor at its own cost and/or out of the proceeds of insurance.

Annex – I

(Schedule-E)

Repair/rectification of Defects and deficiencies

The Contractor shall repair and rectify the defects and deficiencies specified in this Annex-I of Schedule-E within the time limit set forth in the table below.

Nature of Defect or deficiency		Time limit for repair/ rectification
ROADS		
(a)	**Carriageway and paved shoulders**	
(i)	Breach or blockade	Temporary restoration of traffic within 24 hours; permanent restoration within 15 (fifteen) days
(ii)	Roughness value exceeding 2,200 mm in a stretch of 1 km (as measured by a calibrated bump integrator)	120 (one hundred and twenty) days
(iii)	Pot holes	24 hours
(iv)	Any cracks in road surface	15 (fifteen) days
(v)	Any depressions, rutting exceeding 10 mm in road surface	30 (Thirty) days
(vi)	Bleeding/Skidding	7 (seven) days
(vii)	Any other defect/distress on the road	15 (fifteen) days
(viii)	Damage to pavement edges	15 (fifteen) days
(ix)	Removal of debris, dead animals	6 hours
(b)	**Granular earth shoulders, side slopes, drains and culverts**	
(i)	Edge drop at shoulders exceeding 40 mm	7 (Seven) days
(ii)	Variation by more than 1% in the prescribed slope of camber/cross fall (shall not be less than the camber on the main carriageway)	7 (seven) days
(iii)	Variation by more than 15% in the	30 (thirty) days

	prescribed side (embankment) slopes	
(iv)	Rain cuts/gullies in slope	7 (Seven) days
(v)	Damage to or silting of culverts and side drains	7 (Seven) days
(vi)	Desilting of drains in urban/semi-urban areas	24 hours
(vii)	Railing, parapets, crash barriers	7 (Seven) days (Restore immediately if causing safety hazard)
(c)	**Road side furniture including road sign and pavement marking**	
(i)	Damage to shape or position, poor visibility or loss of retro-reflectivity	48 hours
(ii)	Painting of KM stone, railing, parapets, crash barriers	As and when required/Once every year
(iii)	Damaged/missing road signs required replacement	7 (Seven) days
(iv)	Damage to road mark ups	7 (Seven) days
(d)	**Road lighting**	
(i)	Any major failure of the system	24 hours
(ii)	Faults and minor failures	8 hours
(e)	**Trees and plantation**	
(i)	Obstruction in a minimum head-room of 5 m above carriageway or obstruction in visibility of road signs	24 hours
(ii)	Removal of fallen trees from carriageway	4 hours
(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
(iv)	Trees and bushes requiring replacement	30 (Thirty) days
(v)	Removal of vegetation affecting sight line and road structures	15 (fifteen) days
(f)	**Rest area**	

(i)	Cleaning of toilets	Every 4 hours
(ii)	Defects in electrical, water and sanitary installation	24 hours
(g)	**Toll Plaza**	
(h)	**Other Project Facilities, Rest Area and Approach roads**	
(i)	Damage in pedestrian facilities, truck lay-buys, bus-bays, bus-shelters, cattle, crossings, [Traffic Aid Posts, Medical Aid Posts] and service roads	15 (fifteen) days
(ii)	Damaged vehicles or debris on the road	4 (Four) hours
(iii)	Malfunctioning of the mobile cranes	4 (four) hours
Bridges		
(a)	**Superstructure**	
(i)	Any damage, cracks, spalling/scaling Temporary measures Permanent measures	 Within 48 hours Within 15 (fifteen) days or as specified by the Authority's Engineer
(b)	**Foundations**	
(i)	Scouring and/or cavitation	15 (fifteen) days
(c)	**Piers, abutments, return walls and wing walls**	
(i)	Cracks and damages including settlement and tilting, Spalling, scaling	30 (thirty) days
(d)	**Bearings (metallic) of bridges**	
(i)	Deformation	15 (fifteen) days Greasing of metallic bearings once in a year
(e)	**Joints**	
(i)	malfunctioning of joints	15 (fifteen) days

(f)	**Other items**	
(i)	Deforming of pads in elastomeric bearings	7 (seven) days
(ii)	Gathering of dirt in bearings and joints; or clogging of spouts, weep holes and vent-holes	3 (three) days
(iii)	Damage or deterioration in kerbs, parapets, handrails and crash barriers	3 (three) days (immediately within 24 hours if posing danger of safety)
(iv)	Rain-cuts or erosion of banks of the side slopes of approaches	7 (seven) days
(v)	Damage to wearing coat	15 (fifteen) days
(vi)	Damage or deterioration in approach Slabs, pitching, apron, toes, floor or guide bunds	30 (thirty) days
(vii)	Growth of vegetation affecting the structure or obstructing the waterway	15 (fifteen) days
(g)	**Hill Roads**	
(i)	Damage to retaining wall/breast wall	7 (seven) days
(ii)	Landslides requiring clearance	12 (twelve) hours
(iii)	Snow requiring clearance	24 (twenty four) hours

[**Note:** Where necessary, the Authority may modify the time limit for repair/rectification, or add to the nature of Defect or deficiency before issuing the bidding document, with the approval of the competent authority.]

Schedule-F

(See Clause 3.1.5(a))

APPLICABLE PERMITS

1. **Applicable Permits**

The Contractor shall obtain, as required under the Applicable Laws, the following Applicable Permits:

(a) Permission of the State Government for extraction of boulders from quarry;

(b) Permission of Village Panchayat and Pollution Control Board for installation of crushers;

(c) License for use of explosives;

(d) Permission of the State Government for drawing water from river/reservoir;

(e) License from inspector of factories or other competent Authority for setting up batching plant;

(f) Clearance of Pollution Control Board for setting up batching plant;

(g) Clearance of Village Panchayats and Pollution Control Board for setting up asphalt plant;

(h) Permission of Village Panchayats and State Government for borrow earth; and

(i) Any other permits, clearances or approvals required under Applicable Laws.

1.2 Applicable permits, as required, relating to environmental protection and conservation shall have been produced by the Authority in accordance with the provisions of this Agreement

Schedule-G

(See Clause 7.1.1, 7.5.3 and 19.2)

FORM OF BANK GUARANTEE

Annex-I

(See Clause 7.1.1)

PERFORMANCE SECURITY

The Managing Director,
NHIDCL,
3rd Floor, PTI Building, 4, Parliament Street,
New Delhi-110001

WHEREAS:

(A) _____ [name and address of contractor] (hereinafter called "the Contractor") and [**NHIDCL**], (**"the Authority"**) have entered into an agreement (the **"Agreement"**) for "**widening and upgradation to 2 lane with paved shoulder configuration and geometric improvement from km 208.000 to km 250.000 on Aizawl-Tuipang section of NH-54 in the State of Mizoram *on EPC mode (Package 5) with JICA loan assistance***", subject to and in accordance with the provisions of the Agreement.

(B) The Agreement requires the Contractor to furnish a Performance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the Construction Period and Defects Liability Period (as defined in the Agreement) in a sum of Rs. …. Crore (Rupees …. Crore) (the "**Guarantee Amount**").

(C) We, ……..through our branch at ……. (the "**Bank**") have agreed to furnish this bank guarantee (hereinafter called the "**Guarantee**") by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor's obligations during Construction

Period and Defects Liability Period under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the guarantee amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an officer not below the rank of General Manager in the NHIDCL, that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any difference between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other Authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability

and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Agreement or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Agreement.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Guarantee shall cease to be in force and effect on ****[$1]. Unless a demand or claim under this Guarantee is made in writing before expiry of the Guarantee, the Bank shall be discharged from its liabilities hereunder.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in Para 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

12. This guarantee shall also be operable at our…… Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension/ renewal thereof shall be made available on demand. In the

[$] Insert date being 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 7.2 of the Agreement).

contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

13. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication no. 758, except that the supporting statement under Article 15 (a) is hereby excluded.

Signed and sealed this …….. day of ……. 20…….. at ……

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

(i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.

(ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

Annex-II

(Schedule-G)

(See Clause 7.5.3)

Form for Guarantee for Withdrawal of Retention Money

The Managing Director,
NHIDCL,
3rd Floor, PTI Building, 4, Parliament Street
New Delhi-110001

WHEREAS:

(A) [Name and address of contractor] (hereinafter called "**the Contractor**") has executed an agreement (hereinafter called the "Agreement") with the [NHIDCL], (hereinafter called "the Authority") for the "**widening and upgradation to 2 lane with paved shoulder configuration and geometric improvement from km 208.000 to km 250.000 on Aizawl-Tuipang section of NH-54 in the State of Mizoram *on EPC mode (Package 5) with JICA loan assistance***" subject to and in accordance with the provisions of the Agreement.

(B) In accordance with the Clause 7.5.3 of the Agreement, the Contractor may withdraw the retention money (hereinafter called "**Retention Money**") after furnishing to the Authority a bank guarantee for an amount equal to the proposed withdrawal.

(C) We, ……..through our branch at ……. (the "**Bank**") have agreed to furnish this bank guarantee (hereinafter called the "**Guarantee**") for the amount of Rs. ……Cr. (Rs.……. in words) (the "**Guarantee Amount"**).

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an officer not below the rank of General Manager in the NHIDCL, that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any difference between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other Authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Retention Money and any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Retention Money.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the

Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Guarantee shall cease to be in force and effect 90 (ninety) days after the date of the Completion Certificate specified in Clause 12.4 of the Agreement.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in para 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

12. This guarantee shall also be operable at our…… Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension/ renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment there under claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

Signed and sealed this …….. day of ……. 20…….. at ……

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

(i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.

(ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

Annex-III

(Schedule-G)

(See Clause 19.2)

Form for Guarantee for Advance Payment

The Managing Director,
NHIDCL,
3rd Floor, PTI Building, 4, Parliament Street,
New Delhi-110001

WHEREAS:

(A) [name and address of contractor] (hereinafter called "**the Contractor**") has executed an agreement (hereinafter called the "Agreement") with the [**NHIDCL**], (hereinafter called "**the Authority**") for the "**widening and upgradation to 2 lane with paved shoulder configuration and geometric improvement from km 208.000 to km 250.000 on Aizawl-Tuipang section of NH-54 in the State of Mizoram *on EPC mode (Package 5) with JICA loan assistance***"subject to and in accordance with the provisions of the Agreement.

(B) In accordance with the Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest bearing (@ Bank Rate) advance payment (hereinafter called "**Advance Payment**") equal to 10% (ten per cent) of the contract price; and that the Advance Payment shall be made in two installments subject to the Contractor furnishing an irrevocable and unconditional guarantee by a scheduled bank for an amount equivalent to 110% (one hundred and ten percent) of such installment to remain effective till the complete and full repayment of the installment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second} installment of the Advance Payment is Rs. ------ cr. (Rupees ------ crore) and the amount of this Guarantee is Rs. ------- cr. (Rupees ------ crore) (the **"Guarantee Amount")** [$2]**.**

[$]The Guarantee Amount should be equivalent to 110% of the value of the applicable installment.

(C) We, ……..through our branch at ……. (the "**Bank**") have agreed to furnish this bank guarantee (hereinafter called the "**Guarantee**") for the Guarantee Amount.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevoc**ably, guarantee**s and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid installment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the guarantee amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an officer not below the rank of General Manager in the NHIDCL, that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the installment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any difference between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other Authority or body, or by the discharge of the Contractor for any reason whatsoever

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Advance Payment or to extend the time or period of its repayment or to postpone for any time, and from time to time, any of the

rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Advance Payment.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The guarantee shall cease to be in force and effect on ****[$3] Unless a demand or claim under this Guarantee is made in writing on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

[$]Insert a date being 90 (ninety) days after the end of one year from the date of payment of the Advance payment to the Contractor (in accordance with Clause 19.2 of the Agreement).

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in Para 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

12. This guarantee shall also be operable at our…… Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension/ renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

13. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication no. 758, except that the supporting statement under Article 15 (a) is hereby excluded.

Signed and sealed this …….. day of ……. 20…….. at ……

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

Schedule-H

(See Clause 10.1.4 and 19.3)

Contract Price Weightages

1.1 The Contract Price for this Agreement is Rs (…….)

1.2 Proportions of the Contract Price for different stages of Construction of the Project Highway shall be as specified below:

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage to Particular item(col.2)
1	2	3	4
Road works including culverts, widening & repair of culverts.	**56.69**	**A- <u>Widening and strengthening of existing road/ Reconstruction/ New 2-lane realignment</u>**	
		(1) Earthwork upto top of the sub-grade	19.32
		(2) Spoil Bank construction by cutting surplus soil	8.92
		(3) Sub-Base Course	15.72
		(4) Non Bituminous Base Course	13.04
		(5) Bituminous Base Course	23.23
		(6) Wearing Coat	9.90
		(7) Widening and repair of culverts/ Re-Construction and New culverts on existing road, realignments	9.87
Minor Bridges/ Underpasses/ Overpasses	**0.28**	**A.1- Widening and Repair of Minor bridges (length > 6 m and < 60 m)** Minor bridges	100.00
		A.2- New Minor bridges (length >6 and <60 m.)	0.00

Major Bridge(length > 60 m.) works and ROB/RUB/ elevated sections/flyovers including viaducts, if any	**0.00**	**A.1- Widening and repairs of Major Bridges** **A.2- New Major Bridges**	0.00 0.00
Other works	**43.03**	(i) Toll Plaza	0.00
		(ii) Drainage/ Road side drains	4.31
		(iii) Road signs, markings, km stones, safety devices, and other road Appurtenances, Safety and traffic management during construction, etc….	1.65
		(iv) Project facilities (a) Bus Bays (b) Truck lay-bys (c) View points (d) Development of Junctions (e) Office & Vehicle for Authority and Office for Authority's Engineer	 1.11 0.00 0.05 0.26 0.66
		(v) Road side plantation	0.00
		(vi) Construction/ Repair of protection works other than approaches to the bridges, elevated sections/ flyovers/ grade separators and ROBs/RUBs	
		a) Wet Masonry Retaining Wall (H=3m)	14.78
		b) Wet Masonry Retaining Wall (H=7m)	5.13
		c) Gravity Wall (H=1.5m)	1.35
		d) Gravity Wall (H=2m)	1.84
		e) Gravity Wall (H=3m)	7.20
		f) Gravity Wall (H=4m)	9.55
		g) Gravity Wall (H=5m)	7.88
		h) Gravity Wall (H=6m)	14.33
		i) Reinforced Earth	2.50

		Retaining Wall (H=7m)	
		j) Reinforced Earth Retaining Wall (H=8m)	3.87
		k) Reinforced Earth Retaining Wall (H=9m)	2.98
		l) Reinforced Earth Retaining Wall (H=10m)	16.56
		m) Gabion Wall (1:0.3)	0.23
		n) Rockfall Prevention Wall (H=3m)	1.52
		o) Rockfall Prevention Fence (H=2m)	0.34
		p) Hydroseeding (t=5cm)	0.00
		q) Seeding and Mulching (Soil Cut Slope)	1.79
		r) Turfing (Embankment)	0.11
		s) Vegetation Mat (Steep Slope)	0.00
		t) Crib Work (F300)	0.00
		u) Crib Work (F500)	0.00
		v) Non-frame	0.00
		w) Anchor Work	0.00
		x) Rock-bolt Work	0.00

1.3 Procedure of estimating the value of work done.

1.3.1 **Road works**

Procedure for estimating the value of road work done shall be as follows:

Table 1.3.1

Stage for Payment	Percentage weightage	Payment Procedure
A- <u>Widening and strengthening of existing road/ Reconstruction/ New 2-lane realignment</u>[$]		
(1) Earthwork upto top of the sub-grade	19.32	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a

[$] if existing road length (excluding bypasses, re-alignment structure) is say **'L' km** and the unencumbered length along the existing road as handed over on the appointed date is **'L_1' km** and the balance length i.e. **'L_2' km (L-L_1)** is to be handed over on a later date as per the memorandum signed under provision of Clause 8.2.1 of the Contract Document, then the stage payment shall be worked out for the **'L_1' km** length handed over on the appointed date. The stage payment for the remaining **'L_2' km** length shall be worked out on prorata basis from the date of handing over the such length.

In order for the above dispensation to come into operation, it is necessary that a suitable mechanism (like escrow account) is evolved between the parties to the effect that the payments released to the contractor under the above dispensation would be used for completion of the project in the first instance and shall be available to the Contractor only after meeting his project related commitments.

		stage in a length of not less than 10 (ten) percent of the total length[$].
(2) Spoil Bank construction by cutting surplus soil	8.92	Unit of measurement is unit. Cost of each Spoil Bank shall be determined on pro-rata basis with respect to the total number of Spoil Banks and the total volume estimated based on the approved "Plan for Earthworks"
(3) Sub-Base Course	15.72	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length[$].
(4) Non Bituminous Base Course	13.04	
(5) Bituminous Base Course	23.23	
(6) Wearing Coat	9.90	
(7) Widening and repair of culverts/ Re-Construction and New culverts on existing road, realignments	9.87	Cost of completed culverts shall be determined pro rata basis with respect to the total no. of culverts. The payment shall be made on the completion of at least five culverts.

@ For example, if the total length of bituminous work to be done is 100 km, the cost per km of bituminous work shall be determined as follows:

Cost per km = P x weightage for road work x weightage for bituminous work x (1/L)

Where P= Contract Price

L = Total length in km

Similarly, the rates per km for other stages shall be worked out accordingly.

Note: The length affected due to law and order problems or litigation during execution due to which the Contractor is unable to execute the work, may be deducted from the total project length for payment purposes. The total length calculated here is only for payment purposes and will not affect and referred in other clauses of the Contract Agreement.

1.3.2 Minor Bridges and Underpasses/Overpasses.

Procedure for estimating the value of Minor bridge andUnderpasses/Overpassesshall be as stated in table 1.3.2:

Table 1.3.2

Stage for Payment	Percentage weightage	Payment Procedure
A.1- Widening and Repair of Minor bridges (length > 6 m and < 60 m) Minor bridges	0.28	Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length of the minor bridges. Payment shall be made on the completion of widening & repair works of a minor bridge.

1.3.3 Major Bridge works ROB/RUB and Structures.

Procedure for estimating the value of Major Bridge works, ROB/RUB and Structures shall be as stated in table 1.3.3:

Table 1.3.3

Stage for Payment	Percentage weightage	Payment Procedure
A.1- Widening and repairs of Major Bridges **A.2- New Major Bridges**	0.00 0.00	Cost of each major bridge shall be determined on pro rata basis with respect to the total linear length of the major bridges. Payment shall be made on the completion of widening & repair works of a major bridge.

1.3.4 Other works.

Procedure for estimating the value of other works done shall be as stated in table 1.3.4.

Table 1.3.4

Stage for Payment	Percentage weightage	Payment Procedure
(i) Toll Plaza	0.00	Unit of measurement is each completed toll plaza. Payment of each toll plaza shall be made on pro rata basis with respect to the total of all toll plazas.

(ii) Drainage/ Road side drains	4.31	Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 % (ten per cent) of the total length.
(iii) Road signs, markings, km stones, safety devices and other road Appurtenances, Safety and traffic management during construction, etc….	1.65	
(iv) Project facilities (a) Bus Bays (b) Truck lay-bys (c) View points (d) Development of Junctions	 1.11 0.00 0.05 0.26	Payment shall be made on pro rata basis for completed facilities.
(e) Office & Vehicle for Authority and Office for Authority's Engineer	0.66	35% of cost shall be paid on completion and handing over of office and vehicle to the Authority/ Authority's Engineer during first quarter; remaining shall be paid on quarterly basis @ 5% per quarter upto completion period.
(v) Roadside plantation	0.00	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten per cent) of the total length.
(vi) Construction/ Repair of protection works other than approaches to the bridges, elevated sections/ flyovers/ grade separators and ROBs/RUBs		
a) Wet Masonry Retaining Wall (H=3m)	14.78	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten per cent) of the total length*.
b) Wet Masonry Retaining Wall (H=7m)	5.13	
c) Gravity Wall (H=1.5m)	1.35	
d) Gravity Wall (H=2m)	1.84	
e) Gravity Wall (H=3m)	7.20	
f) Gravity Wall (H=4m)	9.55	
g) Gravity Wall (H=5m)	7.88	
h) Gravity Wall (H=6m)	14.33	
i) Reinforced Earth Retaining Wall (H=7m)	2.50	

j) Reinforced Earth Retaining Wall (H=8m) k) Reinforced Earth Retaining Wall (H=9m) l) Reinforced Earth Retaining Wall (H=10m)	3.87 2.98 16.56	
m) Gabion Wall (1:0.3)	0.23	Unit of measurement is cum. Payment shall be made on pro rata basis on completion of a stage in a quantity of not less than 10% (ten per cent) of the total quantity; however payment for any reach shall be considered only after work is complete in that reach.
n) Rockfall Prevention Wall (H=3m) o) Rockfall Prevention Fence (H=2m)	1.52 0.34	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten per cent) of the total length*.
p) Hydroseeding (t=5cm) q) Seeding and Mulching (Soil Cut Slope) r) Turfing (Embankment) s) Vegetation Mat (Steep Slope) t) Crib Work (F300) u) Crib Work (F500) v) Non-frame	0.00 1.79 0.11 0.00 0.00 0.00 0.00	Unit of measurement is sqm. Payment shall be made on pro rata basis on completion of a stage in an area of not less than 10% (ten per cent) of the total area; however payment for any reach shall be considered only after work is complete in that reach.
w) Anchor Work x) Rock-bolt Work	0.00 0.00	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten per cent) of the total length.

*If actual height of retaining/ gravity wall constructed at site is different than those mentioned in above table, than height for payment purpose shall be considered as the height of wall from the above table which is just less than the actual height of wall. Similar treatment shall be considered for Rockfall Prevention Wall/ Fence. No Change of Scope shall be considered for increase of length/ height/ quantity of above mentioned slope protection works.

2. Procedure for payment for Maintenance

2.1. The cost for maintenance shall be as stated in Clause 14.1.1.

2.2. Payment for Maintenance shall be made in quarterly installments in accordance with the provisions of Clause 19.7.

Schedule-I

(See Clause 10.2)

DRAWINGS

1. Drawings

In compliance of the obligations set forth in Clause 10.2 of this Agreement, the Contractor shall furnish to the Authority's Engineer, free of cost, all Drawings listed in Annex-I of this Schedule-I.

2. Additional Drawings

If the Authority's Engineer determines that for discharging its duties and functions under this Agreement, it requires any drawings other than those listed in Annex-I, it may by notice require the Contractor to prepare and furnish such drawings forthwith. Upon receiving a requisition to this effect, the Contractor shall promptly prepare and furnish such drawings to the Authority's Engineer, as if such drawings formed part of Annex-I of this Schedule-I.

Annex-I

(Schedule-I)

List of Drawings

1. A minimum list of the drawings of the various components/elements of the project highway and project facility required to be submitted by the Contractor is given below:

(a) Drawing of horizontal alignment, vertical profile and detailed cross sections;

(b) Drawings of cross drainage works, i.e. Bridges/Culverts/Flyovers and Other Structures;

(c) Drawings for River Training works;

(d) Drawings of interchanges, major intersections and underpasses;

(e) Drawing of control centre;

(f) Drawings of road furniture items including traffic signage, marking, safety barriers, etc;

(g) Drawings of traffic diversions plans and traffic control measures;

(h) Drawings of road drainage measures;

(i) Drawings of typical details slope protection measures;

(j) Drawings of landscaping and horticulture;

(k) Drawings of pedestrian crossing;

(l) Drawings of street lighting;

(m) General Arrangement showing Base Camp and Administrative Block;

(n) Any other drawings as per instruction of Authority Engineer.

Schedule-J

(See Clause 10.3.2)

PROJECT COMPLETION SCHEDULE

1. Project Completion Schedule

During Construction period, the Contractor shall comply with the requirements set forth in this Schedule J for each of the Project Milestones and the **Scheduled Completion Date.** Within 15 (fifteen) days of the date of each Project Milestone, the Contractor shall notify the Authority of such compliance along with necessary particulars thereof.

2. Project Milestone-I[$]

2.1 2.1 Project Milestone-I shall occur on the date falling on the 320th (three hundred and twentieth) day from the Appointed Date (the "**Project Milestone-I**").

2.2 Prior to the occurrence of Project Milestone-I, the Contractor shall have commenced construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 10% (ten per cent) of the Contract Price.

3. Project Milestone-II[$]

3.1 Project Milestone-II shall occur on the date falling on the 639th (six hundred and thirty ninth) day from the Appointed Date (the "**Project Milestone-II**").

3.2 Prior to the occurrence of Project Milestone-II, the Contractor shall have continued with construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 30% (thirty per cent) of the Contract Price.

4. Project Milestone-III[$]

4.1 Project Milestone-III shall occur on the date falling on the 958th (nine hundred and fifty eighth) day from the Appointed Date (the "**Project Milestone-III**").

[$] If total project length is say **'L' km** and the unencumbered length along existing road as handed over on the appointed date is **'L_1' km** (including bypasses, re-alignment, structure etc.) and balance length i.e. **'L2' km (L-L1)** is to be handed over on a later date as per the memorandum signed under provision of Clause 8.2.1 of the Contract Document, then the Project Milestone-I, II and III shall be linked to stage payment statement for amount in percentage of the contract price worked out on prorata basis for the **'L_1' km** length handed over of balance length, the subsequent Project Milestone shall be linked to stage payment statement for amount in percentage of the total contract price.

For example:

If the date for Milestone-I and Milestone-II is 180th and 300th day from appointed date and balance **'L_2' km** length is handed over after 300th day from appointed date, then the stage payment statement required for achieving Milestone-I and Milestone-II should be linked to Contract Price worked out on prorata basis for the **L_1 km length** [**i.e. for Contract Price x L_1/L**]. Subsequent Milestone i.e. Milestone-III will be linked to stage payment statement for amount in percentage of the total contract price. **In no case, there shall be any change in the schedule completion date unless extension of time has been granted by the Authority under Clause 10.3 and 10.5 of the contract agreement.**

In order for the above dispensation to come into operation, it is necessary that a suitable mechanism (like escrow account) is evolved between the parties to the effect that the payments released to the contractor under the above dispensation would be used for completion of the project in the first instance and shall be available to the Contractor only after meeting his project related commitments.

4.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 60% (sixty per cent) of the Contract Price.

5 Schedule Completion Date

5.1 The Scheduled Completion Date shall occur on the 1278th (one thousand and two hundred and seventy eighth) day from the Appointed Date.

5.2 On or before the Scheduled Completion Date, the Contractor shall have completed construction in accordance with this Agreement.

6 Extension of time

Upon extension of any or all of the aforesaid Project Milestones or the Scheduled Completion Date, as the case may be, under and in accordance with the provisions of this Agreement, the Project Completion Schedule shall be deemed to have been amended accordingly.

Schedule-K

(See Clause 12.1.2)

Tests on Completion

1. **Schedule for Tests**

1.1 The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority's Engineer and the Authority of its intent to subject the Project Highway to Tests, and no later than 10 (ten) days prior to the actual date of Tests, furnish to the Authority's Engineer and the Authority detailed inventory and particulars of all works and equipment forming part of Works.

1.2 The Contractor shall notify the Authority's Engineer of its readiness to subject the Project Highway to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority's Engineer shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority's Engineer shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 12 and this Schedule K.

2 Tests

2.1 Visual and physical test: The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include all the tests specified in IRC code, manual and MORTH specifications for the road and Bridge works, 5th revision, 2013.

2.2 Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a calibrated bump integrator and the maximum permissible roughness for purposes of this Test shall be [2,000 (two thousand)] mm for each kilometer.

2.3 Tests for bridges: All major and minor bridges shall be subjected to the rebound hammer and ultrasonic pulse velocity tests, to be conducted in accordance with the procedure described in Special Report No. 17: 1996 of the IRC Highway Research Board on Nondestructive Testing Techniques, at two spots in every span, to be chosen at random by the Authority's Engineer. Bridges with a span of 15 (fifteen) meters or more shall also be subjected to load testing.

2.4 Other tests: The Authority's Engineer may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry

Practice, for determining the compliance of the Project Highway with Specifications and Standards.

2.5 Environmental audit: The Authority's Engineer shall carry out a check to determine conformity of the Project Highway with the environmental requirements set forth in Applicable Laws and Applicable Permits.

2.6 Safety Audit: The Authority's Engineer shall carry out or cause to be carried out, a safety audit to determine conformity of the Project Highway with the safety requirements and Good Industry Practice.

3 Agency for conducting Tests

All Tests set forth in this Schedule-K shall be conducted by the Authority's Engineer or such other agency or person as it may specify in consultation with the Authority.

4. Completion Certificate

Upon successful completion of Tests, the Authority's Engineer shall issue the Completion Certificate in accordance with the provisions of Article 12.

Schedule-L

(See Clause 12.2 and 12.4)

PROVISIONAL CERTIFICATE

1. I, …….. (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated …….. (the "**Agreement**"), for construction of the "**widening and upgradation to 2 lane with paved shoulder configuration and geometric improvement from km 208.000 to km 250.000 on Aizawl-Tuipang section of NH-54 in the State of Mizoram *on EPC mode (Package 5)* with JICA loan assistance"** through …….(Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been undertaken to determine compliance of the Project Highway with the provisions of the Agreement.

2. Works that are incomplete on account of Time Extension have been specified in the Punch List appended hereto, and the Contractor has agreed and accepted that it shall complete all such works in the time and manner set forth in the Agreement. In addition, certain minor works are incomplete and these are not likely to cause material inconvenience to the Users of the Project Highway or affect their safety. The Contractor has agreed and accepted that as a condition of this Provisional Certificate, it shall complete such minor works within 30 (thirty) days hereof. These minor works have also been specified in the aforesaid Punch List.

3. In view of the foregoing, I am satisfied that that Project Highway from km 8.000 to km 65.000 can be safety and reliably placed in service of the users thereof, and in terms of the Agreement, the Project Highway is hereby provisionally declared fit for entry into operation on this the …day of……. 20 ……

ACCEPTED, SIGNED, SEALED AND DELIVERED	SIGNED, SEALED AND DELIVERED
For and on behalf of	For and on behalf of
CONTRACTOR by	AUTHORITY's ENGINEER by:
(Signature)	(Signature)

COMPLETION CERTIFICATE

1. I, …….(Name of the Authority's Engineer), acting as Authority's Engineer, under and in accordance with the Agreement dated ……(the "**Agreement**"), for construction of the "**widening and upgradation to 2 lane with paved shoulder configuration and geometric improvement from km 208.000 to km 250.000 on Aizawl-Tuipang section of NH-54 in the State of Mizoram *on EPC mode (Package 5)* with JICA loan assistance"** through ……. (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safety and reliably placed in service of the Users thereof.

2. It is certified that, in terms of the aforesaid Agreement, all works forming part of Project Highway have been completed, and the Project Highway is hereby declared fit for entry into operation on this the…….day of…… 20……..

SIGNED, SEALED AND DELIVERED
For and on behalf of
The Authority's Engineer by:
(Signature)
(Name)
(Designation)
(Address)

Schedule-M

(See Clauses 14.6., 15.2 and 19.7)

PAYMENT REDUCTION FOR NON-COMPLIANCE

1. Payment reduction for non-compliance with the Maintenance Requirements

1.1 Monthly lump sum payments for maintenance shall be reduced in the case of non-compliance with the Maintenance Requirements set forth in Schedule-E.

1.2 Any deduction made on account of non-compliance with the maintenance Requirements shall not be paid even after compliance subsequently. The deduction shall continue to be made every month until compliance is done.

1.3 The Authority's Engineer shall calculate the amount of payment reduction on the basis of weightage in percentage assigned to non-conforming items as given in Paragraph 2.

2. Percentage reductions in lump sum payments

2.1 The following percentages shall govern the payment reduction:

S. No.	Item/Defect/Deficiency	Percentage
(a)	**Carriageway/Pavement**	
(i)	Potholes, cracks, other surface defects	15%
(ii)	Repairs of Edges, Rutting	5%
(b)	**Road, Embankment, Cuttings, Shoulders**	
(i)	Edge drop, inadequate crossfall, undulations, settlement, potholes, ponding, obstructions	10%
(ii)	Deficient slopes, raincuts, disturbed pitching, vegetation growth, pruning of trees	5%
(c)	**Bridges and Culverts**	
(i)	Desilting, cleaning. vegetation growth, damaged pitching, flooring, parapets, wearing course, footpaths, any damage to foundations	20%
(ii)	Any Defects in superstructures, bearings and sub-structures	10%
(iii)	Painting, repairs/replacement kerbs, railings, parapets,	5%

S. No.	Item/Defect/Deficiency	Percentage
	guideposts/crash barriers	
(d)	**Roadside Drains**	
(i)	Cleaning and repair of drains	5%
(e)	**Road Furniture**	
(i)	Cleaning, painting, replacement of road signs, delineators, road markings, 200 m/km/5th km stones	5%
(f)	**Miscellaneous Items**	
(i)	Removal of dead animals, broken down/accidented vehicles, fallen trees, road blockades or malfunctioning of mobile crane	10%
(ii)	Any other Defects in accordance with paragraph 1.	5%
(g)	**Defects in Other Project Facilities**	5%

2.2 The amount to be deducted from monthly lump-sum payment for non-compliance of particular item shall be calculated as under:

R=P/100 x M xL1/L

Where: P = Percentage of particular item//Defect/deficiency for deduction

M = Monthly lump-sum payment in accordance with the Bid

L1 = Non-complying length

L = Total length of the road,

R = Reduction (the amount to be deducted for noncompliance for a particular item/Defect/deficiency)

The total amount of reduction shall be arrived at by summation of reductions for such items/Defects/deficiency or non compliance.

For any Defect in a part of one kilometer, the non-conforming length shall be taken as one kilometer.

Schedule-N

(See Clause 18.1.1)

SELECTION OF AUTHORITY'S ENGINEER

1 Selection of Authority's Engineer

1.1 The provisions of the Model Request for Proposal for Selection of Technical Consultants, issued by the Ministry of Finance in May 2009, or any substitute thereof or 'Guidelines for Employment of Consultants under Japanese ODA Loans' or a combination of certain provisions thereof shall apply for selection of an experienced firm to discharge the functions and duties of an Authority's Engineer.

1.2 The Authority shall invite Expression of Interest from Consulting Engineering firms or bodies corporate to undertake and perform the duties and functions set forth in Annexure-I of Schedule-N and thereupon shortlist qualified firms in accordance with pre-determined criteria.

1.3 The Authority shall invite the aforesaid shortlisted firms to submit their respective technical and financial offers, each in separate sealed cover and/or upload online. All the technical bids so received shall be opened and pursuant to the evaluation thereof, the Authority shall open the financial bids in respect of each shortlisted firm and the order of priority as among these firms shall be determined on the basis of a weighted evaluation where technical and financial score shall be assigned respective weights of 80:20.

1.4 In the event of termination of the Technical Consultants appointed in accordance with the provisions of above Paragraphs 1.1 to 1.3, the Authority shall appoint another firm of Technical Consultants forthwith and may engage a government-owned entity in accordance with the provisions of Paragraph 3 of this Schedule-N.

2 Terms of Reference

The Terms of Reference for the Authority's Engineer (the "**TOR**") shall substantially conform with Annex 1 to this Schedule N.

3 Appointment of Government entity as Authority's Engineer

Notwithstanding anything to the contrary contained in this Schedule, the Authority may in its discretion appoint a government-owned entity as the Authority's Engineer; provided that such entity shall be a body corporate having as one of its primary functions the provision of consulting, advisory and supervisory services for engineering projects; provided further that a government-owned entity which is owned or controlled by the Authority shall not be eligible for appointment as Authority's Engineer.

Annex – I

(Schedule - N)

TERMS OF REFERENCE FOR AUTHORITY'S ENGINEER

1. Scope

1.1 These Terms of Reference (the "**TOR**") for the Authority's Engineer are being specified pursuant to the EPC Agreement dated..... (the "**Agreement**), which has been entered into between the Ministry of Road Transport and Highways (the "**Authority**") and ..... (the "**Contractor**") for "**widening and upgradation to 2 lane with paved shoulder configuration and geometric improvement from km 208.000 to km 250.000 on Aizawl-Tuipang section of NH-54 in the State of Mizoram *on EPC mode (Package 5)* with JICA loan assistance**" and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

1.2 The TOR shall apply to construction and maintenance of the Project Highway.

2. Definitions and interpretation

2.1 The words and expressions beginning with or in capital letters and not defined herein but defined in the Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Agreement.

2.2 References to Articles, Clauses and Schedules in this TOR shall, except where the context otherwise requires, be deemed to be references to the Articles, Clauses and Schedules of the Agreement, and references to Paragraphs shall be deemed to be references to Paragraphs of this TOR.

2.3 The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the Agreement shall apply, *mutatis mutandis*, to this TOR.

3. General

3.1 The Authority's Engineer shall discharge its duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.

3.2 The Authority's Engineer shall perform the duties and exercise the authority in accordance with the provisions of this Agreement, but subject to obtaining prior written approval of the Authority before determining:

(a) any Time extension;

(b) any additional cost to be paid by the Authority to the Contractor;

(c) the Termination Payment; or

(d) any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party for a sum exceeding 0.2% of Contract Price.

3.3 The Authority's Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions under this

Agreement. Such reports shall be submitted by the Authority's Engineer within 10 (ten) days of the beginning of every month.

3.4 The Authority's Engineer shall inform the Contractor of any delegation of its duties and responsibilities to its suitably qualified and experienced personnel; provided, however, that it shall not delegate the authority to refer any matter for the Authority's prior approval in accordance with the provisions of Clause 18.2.

3.5 The Authority's Engineer shall aid and advise the Authority on any proposal for Change of Scope under Article 13.

3.6 In the event of any disagreement between the Parties regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the authority's Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.

4 **Construction Period**

4.1 During the Construction Period, the Authority's Engineer shall review the Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from borrow areas and quarry sites, topographical surveys, and the recommendations of the Safety Consultant in accordance with the provisions of Clause 10.1.6. The Authority's Engineer shall complete such review and send its observations to the Authority and the Contractor within 15 (fifteen) days of receipt of such Drawings; provided, however that in case of a Major Bridge or Structure, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.

4.2 The Authority's Engineer shall review any revised Drawings sent to it by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.

4.3 The Authority's Engineer shall review the Quality Assurance Plan submitted by the Contractor and shall convey its comments to the Contractor within a period of 21 (twenty-one) days stating the modifications, if any, required thereto.

4.4 The Authority's Engineer shall complete the review of the methodology proposed to be adopted by the Contractor for executing the Works, and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor.

4.5 The Authority's Engineer shall grant written approval to the Contractor, where necessary, for interruption and diversion of the flow of traffic in the existing lane(s) of the Project Highway for purposes of maintenance during the Construction Period in accordance with the provisions of Clause 10.4.

4.6 The Authority's Engineer shall review the monthly progress report furnished by the Contractor and send its comments thereon to the Authority and the Contractor within 7 (seven) days of receipt of such report.

4.7 The Authority's Engineer shall inspect the Construction Works and the Project Highway and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. In particular, the Authority's Engineer shall include in its Inspection Report, the compliance of the recommendations made by the Safety Consultant.

4.8 The Authority's Engineer shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured Materials, and such other Materials as the Authority's Engineer may require.

4.9 For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality assurance. For purposes of this Paragraph 4.9, the tests specified in the IRC Special Publication-11 (Handbook of Quality Control for Construction of Roads and Runways) and the Specifications for Road and Bridge Works issued by MORTH (the "Quality Control Manuals") or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.

4.10 The Authority's Engineer shall test check at least 20 (twenty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.

4.11 The timing of tests referred to in Paragraph 4.9, and the criteria for acceptance/ rejection of their results shall be determined by the Authority's Engineer in accordance with the Quality Control Manuals. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.

4.12 In the event that results of any tests conducted under Clause 11.10 establish any Defects or deficiencies in the Works, the Authority's Engineer shall require the Contractor to carry out remedial measures.

4.13 The Authority's Engineer may instruct the Contractor to execute any work which is urgently required for the safety of the Project Highway, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event, the provisions of Clause 21.6 shall apply.

4.14 In the event that the Contractor fails to achieve any of the Project Milestones, the Authority's Engineer shall undertake a review of the progress of construction and identify potential delays, if any. If the Authority's Engineer shall determine that completion of the Project Highway is not feasible within

the time specified in the Agreement, it shall require the Contractor to indicate within 15 (fifteen) days the steps proposed to be taken to expedite progress, and the period within which the Project Completion Date shall be achieved. Upon receipt of a report from the Contractor, the Authority's Engineer shall review the same and send its comments to the Authority and the Contractor forthwith.

4.15 The Authority's Engineer shall obtain from the Contractor a copy of all the Contractor's quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.4.

4.16 Authority's Engineer may recommend to the Authority suspension of the whole or part of the Works if the work threatens the safety of the Users and pedestrians. After the Contractor has carried out remedial measure, the Authority's Engineer shall inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked.

4.17 In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and Users, and requires the Authority's Engineer to inspect such works, the Authority's Engineer shall inspect the suspended works within 3 (three) days of receiving such notice, and make a report to the Authority forthwith, recommending whether or not such suspension may be revoked by the Authority.

4.18 The Authority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-K and issue a Completion Certificate or Provisional Certificate, as the case may be. For carrying out its functions under this Paragraph 4.18 and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-K.

5. Maintenance Period

5.1 The Authority's Engineer shall aid and advise the Contractor in the preparation of its monthly Maintenance Programme and for this purpose carry out a joint monthly inspection with the Contractor.

5.2 The Authority's Engineer shall undertake regular inspections, at least once every month, to evaluate compliance with the Maintenance Requirements and submit a Maintenance Inspection Report to the Authority and the Contractor.

5.3 The Authority's Engineer shall specify the tests, if any, that the Contractor shall carry out, or cause to be carried out, for the purpose of determining that the Project Highway is in conformity with the Maintenance Requirements. It shall monitor and review the results of such tests and the remedial measures, if any, taken by the Contractor in this behalf.

5.4 In respect of any defect or deficiency referred to in Paragraph 3 of Schedule-E, the Authority's Engineer shall, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to

the Specifications and Standards and shall also specify the time limit for repair or rectification of any deviation or deterioration beyond the permissible limit.

5.5 The Authority's Engineer shall examine the request of the Contractor for closure of any lane(s) of the Project Highway for undertaking maintenance/repair thereof, and shall grant permission with such modifications, as it may deem necessary, within 5 (five) days of receiving a request from the Contractor. Upon expiry of the permitted period of closure, the Authority's Engineer shall monitor the reopening of such lane(s), and in case of delay, determine the Damages payable by the Contractor to the Authority under Clause 14.5.

6 Determination of costs and time

6.1 The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.

6.2 The Authority's Engineer shall determine the period of Time Extension that is required to be determined by it under the Agreement.

6.3 The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 18.5.

7. Payments

7.1 The Authority's Engineer shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Authority's Engineer in accordance with the provisions of Clause 10.2.4 (d).

7.2 Authority's Engineer shall -

(a) within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 19.4, determine the amount due to the Contractor and recommend the release of 90 (ninety) percent of the amount so determined as part payment, pending issue of the Interim Payment Certificate; and

(b) within 15 (fifteen) days of the receipt of the Stage Payment Statement referred to in Clause 19.4, deliver to the Authority and the Contractor an Interim Payment Certificate certifying the amount due and payable to the Contractor, after adjustments in accordance with the provisions of Clause 19.10.

7.3 The Authority's Engineer shall, within 15 (fifteen) days of receipt of the Monthly Maintenance Statement from the Contractor pursuant to Clause 19.6, verify the Contractor's monthly statement and certify the amount to be paid to the Contractor in accordance with the provisions of the Agreement.

7.4 The Authority's Engineer shall certify final payment within 30 (thirty) days of the receipt of the final payment statement of Maintenance in accordance with the provisions of Clause 19.16.

8. Other duties and functions

The Authority's Engineer shall perform all other duties and functions as specified in the Agreement.

9 Miscellaneous

9.1 A copy of all communications, comments, instructions, Drawings or Documents sent by the Authority's Engineer to the Contractor pursuant to this TOR, and a copy of all the test results with comments of the Authority's Engineer thereon, shall be furnished by the Authority's Engineer to the Authority forthwith.

9.2 The Authority's Engineer shall retain at least one copy each of all Drawings and Documents received by it, including 'as-built' Drawings, and keep them in its safe custody.

9.3 Within 90 (ninety) days of the Project Completion Date, the Authority's Engineer shall obtain a complete set of as-built Drawings, in 2 (two) hard copies and in micro film form or in such other medium as may be acceptable to the Authority, reflecting the Project Highway as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project Highway and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Authority against receipt thereof.

9.4 The Authority's Engineer, if called upon by the Authority or the Contractor or both, shall mediate and assist the Parties in arriving at an amicable settlement of any Dispute between the Parties.

9.5 The Authority's Engineer shall inform the Authority and the Contractor of any event of Contractor's Default within one week of its occurrence.

SCHEDULE - O

(See Clauses 19.4.1, 19.6.1, and 19.8.1)

Forms of Payment Statements

1. Stage Payment Statement for Works

The Stage Payment Statement for Works shall state:

(a) The estimated amount for the Works executed in accordance with Clause 19.3.1 subsequent to the last claim;

(b) Amounts reflecting adjustments in price for the aforesaid claim;

(c) The estimated amount of each Change of Scope Order executed subsequent to the last claim;

(d) Amounts reflecting adjustment in price, if any, for (c) above in accordance with the provisions of Clause 13.2.3 (a);

(e) Total of (a), (b), (c) and (d) above;

(f) Deductions:

(i) Any amount to be deducted in accordance with the provisions of the Agreement except taxes;

(ii) Any amount towards deduction of taxes; and

(iii) Total of (i) and (ii) above.

(g) Net claim: (e) – (f) (iii);

(h) The amounts received by the Contractor upto the last claim:

(i) For the Works executed (excluding Change of Scope orders);

(ii) For Change of Scope Orders, and

(iii) Taxes deducted

2. Monthly Maintenance Payment Statement

The monthly Statement for Maintenance Payment shall state:

(a) the monthly payment admissible in accordance with the provisions of the agreement;

(b) the deductions for maintenance work not done;

(c) net payment for maintenance due, (a) minus (b);

(d) amounts reflecting adjustments in price under Clause 19.12; and

(e) amount towards deduction of taxes

3. Contractor's claim for Damages

Note: The Contractor shall submit its claims in a form acceptable to the Authority.

Schedule-P

(See Clause 20.1)

INSURANCE

1. Insurance during Construction Period

1.1 The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of issue of the last Completion Certificate, the following insurances for any loss or damage occurring on account of Non Political Event of Force Majeure, malicious act, accidental damage, explosion, fire and terrorism:

(a) insurance of Works, Plant and Materials and an additional sum of [15 (fifteen)] per cent of such replacement cost to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature; and

(b) Insurance for the Contractor's equipment and Documents brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.

1.2 The insurance under paragraph 1.1 (a) and (b) above shall cover the authority and the Contractor against all loss or damage from whatsoever cause arising under paragraph 1.1 other than risks which are not insurable at commercial terms.

2. Insurance for Contractor's Defects Liability

The Contractor shall effect and maintain insurance cover for the works from the date of issue of the Completion Certificate until the end of the Defects Liability Period for any loss or damage for which the Contractor is liable and arises from a cause occurring prior to the issue of Completion Certificate. The Contractor shall also maintain other insurances for maximum sums as may be required under the Applicable Laws and in accordance with Good Industry Practice.

3. Insurance against injury to persons and damage to property

3.1. The Contractor shall insure against each Party's liability for any loss, damage, death or bodily injury which may occur to any physical property (except things insured under Paragraph l and 2 of this Schedule or to any person (except persons insured under Clause 20.9), which may arise out of the Contractor's performance of this Agreement. This insurance shall be for a limit per occurrence of not less than the amount stated below with no limit on the number of occurrences. The insurance cover shall be not less than: Rs. [*****]

3.2 The insurance shall be extended to cover liability for all loss and damage to the Authority's property arising out of the Contractor's performance of this Agreement excluding:

(a) the Authority's right to have the construction works executed on, over, under, in or through any land, and to occupy this land for the Works; and

(b) Damage which is and unavoidable result of the Contractor's obligations to execute the Works.

4. Insurance to be in joint names

The insurance under paragraphs 1 to 3 above shall be in the joint names of the Contractor and the Authority.

SCHEDULE-Q

(See Clause 14.10)

Tests on Completion of Maintenance Period

1. Riding Quality test:

Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a calibrated bump integrator and the maximum permissible roughness for purposes of this Test shall be [2,500 (two thousand five hundred)] mm for each kilometer.

2. Visual and physical test:

The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include measurement of cracking, rutting, stripping and potholes and the permissible values are given below: • Area of cracking not more than 2 % area

• Area of rutting with rut depth more than 10 mm - not more than 1 …. % area

• Area of stripping: not more than 2 % area

• Area of potholes: Nil

• Edge drop – Shall not be more than 15 mm

SCHEDULE-R

(See Clause 14.10)

Taking Over Certificate

I, ……. (Name and designation of the Authority's representative) under and in accordance with the Agreement dated

…… (the "Agreement"), for **widening and upgradation to 2 lane with paved shoulder configuration and geometric improvement from km 208.000 to km 250.000 on Aizawl-Tuipang section of NH-54 in the State of Mizoram *on EPC mode (Package 5) with JICA loan assistance***" (the "**Project Highway**") on Engineering, Procurement and Construction (EPC) mode through

……. (Name of Contractor), hereby certify that the Tests on completion of Maintenance Period in accordance with Article 14 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement and I hereby certify that the Authority has Taken over the Project Highway from the Contractor on this day .....

SIGNED, SEALED AND DELIVERED

(Signature)

(Name of Authority's Engineer)

(Address)

SCHEDULE-S

(See Clause 17.7.2)

Performance Certificate

I, ……. (Name and designation of the Authority's representative) under and in accordance with the Agreement dated …… (the "Agreement"), for [construction and maintenance of the **widening and upgradation to 2 lane with paved shoulder configuration and geometric improvement from km 208.000 to km 250.000 on Aizawl-Tuipang section of NH-54 in the State of Mizoram *on EPC mode (Package 5) with JICA loan assistance*** (the "**Project Highway**") on Engineering, Procurement and Construction (EPC) mode through ……. (Name of Contractor), hereby certify that the Contractor has discharged all its obligations under the Agreement and in accordance with Article 17 of the Agreement I hereby issue Performance Certificate to the Contractor on this day.....

SIGNED, SEALED AND DELIVERED

(Signature)

(Name of Authority's Engineer)

(Address)

SCHEDULE-T

(See Clause 19.1.6)

Name of Currency	**A** **Amount of Currency**	**B** **Rate of Exchange*** **(Local Currency per Unit of Foreign Currency)**	**C** **Local Currency Equivalent**	**D** **Percentage of Net Bid Price (NTP)** **(100 x C) / NTP**
Local Currency (Indian Rupees)				
Foreign Currency 1 (Japanese Yen)				
Foreign Currency 2 (US Dollar)				
Net Bid Price				**100.00**

* The fixed rates of exchange shall be the selling rates 28 days prior to the deadline for submission of bids published by the **Reserve Bank of India**.

1. Change in scope would require agreement between parties on currency.

2. Regarding damages by the Authority, financing charges for a payment delays will be in corresponding currency amounts.

3. Delay damages will be recovered in currencies in proportion which in which contract price is payable.