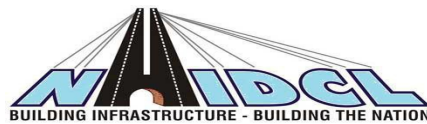


# **Technical Schedules**

## **For**

“Construction & up-gradation to 2-Lane with paved shoulder from Km 95+550 to Km 111+066 of length 15.516 Km on Khellani – Kishtwar – Chattroo - Khanabal section of NH-244 in the Union Territory of Jammu and Kashmir on EPC Mode”



**NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT  
CORPORATION LTD.  
(NHIDCL)**

## **SCHEDULES**

## **Schedule-A**

(See Clauses 2.1 and 8.1)

### **Site of the Project**

#### **1. The Site**

- (i) Site of the 2-lane project highway shall include land, buildings, structures and road works as described in **Annex-I** of thisSchedule-A.
- (ii) The dates of handing over the Right of Way to the Contractor are specified in **Annex-II** of thisSchedule-A.
- (iii) 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 (i) of thisAgreement.
- (iv) The alignment plans of the Project Highway are specified in **Annex-III**. 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, improve/upgrade the Road Profile as indicated in Annex-III based on site/design requirement.
- (v) The status of the environment clearances obtained or awaited is given in**Annex-IV**.

**Annex - I**  
**(Schedule-A)**

**Site**

**1. Site**

The site of the 2-lane project highway comprises section of National Highway-244commencing fromKm 95+550 (Existing km 123+035) to Km 111+066 (Existing km 138+725) of length 15.516 Kmi.e.Khellani-Kishtwar-Chattoo\_Khanabal section in the Union Territory of Jammu &Kashmir. The land, carriageway and structures comprising the Site are described below.

**2. Land**

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

Sr. No.	Design Chainage in km		Length in m	EROW in m
	From	To		
1	95+550	97+370	1820	8
2	97+370	98+815	1445	8
3	98+815	98+913	98	8
4	98+913	99+000	87	8
5	99+000	99+620	620	8
6	99+620	100+938	1318	8
7	100+938	101+816	878	8
8	101+816	101+890	74	8
9	101+890	102+183	293	8
10	102+183	102+718	535	8
11	102+718	102+805	87	8
12	102+805	102+875	70	12
13	102+875	102+993	118	12
14	102+993	103+035	42	8
15	103+035	103+174	139	8
16	103+174	103+240	66	8
17	103+240	109+000	5760	8

**3. Carriageway**

The existing carriage way of the Project Highway is two lane. The type of the existing pavement is flexible.

**4. Major Bridges**

The Site includes the following Major Bridges:

Sr. No.	Ex Chainage (km)	Type of Structure			No. of Spans with span length (m)	Overall 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):

Sr. No.	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)	ROB/ RUB
		Foundation	Superstructure			
Nil						

## 6. Grade separators

The Site includes the following grade separators:

Sr. No.	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:

Sr. No.	Ex Chainage (km)	Type of Structure			No. of Spans with span length (m)	Overall Width (m)
		Foundation	Sub-structure	Super-structure		
1	123+800	Open	Masonry	Steel Truss	1x50.2	5.2
2	127+900	Open	Masonry	Semi through Truss	1x32.6	5.2
3	130+690	Open	Masonry	Bailey Bridge	1x39.6	4.9

## 8. Railway level crossings

The Site includes the following railway level crossings:

Sr. No.	Location (km)	Remarks
Nil		

## 9. Underpasses (vehicular, non-vehicular)

The Site includes the following underpasses:

Sr. No.	Chainage (km)	Type of Structure	No. of Spans with span length (m)	Width (m)
Nil				

## 10. Culverts

The Site has the following culverts:

Sr. No.	Existing Chainage in km	Type of Culvert	Thickness of Slab (m)	Span Arrangement (No.X span) in m		Width in (m)
				No	Clear Span	
1	123+200	Slab	0.3	1	2	10
2	123+600	Slab	0.3	1	2	10.1
3	124+000	Slab	0.3	1	2	10
4	124+980	Slab	0.3	1	2	10.1
5	126+065	Slab	0.2	1	1.2	10.1
6	126+550	Slab	0.2	1	1	10
7	126+685	Slab	0.3	1	2	10
8	127+010	Slab	0.3	1	2	10
9	127+410	Slab	0.3	1	2	10
10	127+485	Slab	0.3	1	2	10
11	127+650	Slab	0.3	1	2	10
12	127+800	Slab	0.2	1	1	10
13	128+065	Slab	0.3	1	2	10
14	128+255	Pipe	-	1	0.6	10
15	128+765	Slab	0.3	1	2	10
16	129+515	Slab	0.3	1	2	10
17	130+750	Slab	0.3	1	2	10
18	130+840	Slab	0.3	1	2	10

Sr. No.	Existing Chainage in km	Type of Culvert	Thickness of Slab (m)	Span Arrangement (No.X span) in m		Width in (m)
				No	Clear Span	
19	131+990	Slab		1	2	10.1
20	132+150	Slab	0.3	1	2	10
21	132+990	Slab	0.3	1	2	10.1
22	133+580	Slab	0.3	1	2	10.1
23	133+740	Slab	0.3	1	2	10
24	135+260	Slab	0.3	1	1.6	10
25	135+660	Slab	0.3	1	2	10
26	135+960	Slab	0.3	1	1.6	10
27	136+225	Slab	0.3	1	2	10
28	136+600	Slab	0.3	1	1.6	10
29	136+945	Slab	0.3	1	2	10
30	137+000	Slab		1	4	10
31	137+400	Slab	0.3	1	2.5	10

#### 11. Bus bays

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

Sr. No.	Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
Nil				

#### 12. Truck Lay byes

The details of truck lay byes are as follows:

Sr. No.	Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
Nil				

#### 13. Roadside drains

The details of the roadside drains are as follows:

Sr. No.	Location		Type	
	From km	to km	Masonry/cc (Pucca)	Earthen (Kutch)
Nil				

#### 14. Major junctions

The details of major junctions are as follows:

Sr. No.	Existing Chainage in km	At grade	Separated	Category of Cross Road			
				NH	SH	MDR	Others
1	136+900	✓					✓

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

#### 15. Minor junctions

The details of the minor junctions are as follows:

Sr. No.	Existing Chainage in km	Remarks	Side	Type
1	123+170	Minor Junction	RHS	T
2	124+385	Minor Junction	LHS	T
3	127+870	Minor Junction	LHS	T

Sr. No.	Existing Chainage in km	Remarks	Side	Type
4	131+680	Minor Junction	LHS	T
5	132+155	Minor Junction	LHS	T
6	133+770	Minor Junction	LHS	T

**16. Bypasses**

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

Sr. No.	Name of bypass (town)	Chainage (km) From km to km	Length (in Km)
Nil			

**17. Others**

Nil

## Annex – II

(As per Clause 8.3 (i))

### (Schedule-A)

#### Dates for providing Right of Way of Construction Zone

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

Sr. No.	Design Chainage		Length (Km)	Width (m)	Date of providing ROW
	From (Km)	To (Km)			
1	2		3	4	5
<b>(i) Full Right of Way (Full Width)</b>	109+000	111+066	2066	22	<b>150 (One hundred and fifty) days after the Appointed Date</b>
<b>(ii) Part Right of Way (part width)</b>	95+550	97+370	1820	8	<b>On Appointed date</b>
	97+370	98+815	1445	8	
	98+815	98+913	98	8	
	98+913	99+000	87	8	
	99+000	99+620	620	8	
	99+620	100+938	1318	8	
	100+938	101+816	878	8	
	101+816	101+890	74	8	
	101+890	102+183	293	8	
	102+183	102+718	535	8	
	102+718	102+805	87	8	
	102+805	102+875	70	12	
	102+875	102+993	118	12	
	102+993	103+035	42	8	
	103+035	103+174	139	8	
	103+174	103+240	66	8	
	103+240	109+000	5760	8	
<b>(iii) Balance Right of way (width)</b>	95+550	97+370	1820	16	<b>150 (One hundred and fifty) days after the Appointed Date</b>
	97+370	98+815	1445	13	
	98+815	98+913	98	9	
	98+913	99+000	87	4	
	99+000	99+620	620	12	
	99+620	100+938	1318	14	
	100+938	101+816	878	15	
	101+816	101+890	74	13	
	101+890	102+183	293	19	



Sr. No.	Design Chainage		Length (Km)	Width (m)	Date of providing ROW
	From (Km)	To (Km)			
1	2		3	4	5
	102+183	102+718	535	15	
	102+718	102+805	87	13	
	102+805	102+875	70	6	
	102+875	102+993	118	2	
	102+993	103+035	42	9	
	103+035	103+174	139	13	
	103+174	103+240	66	12	
	103+240	109+000	5760	14	

\*The dates specified herein shall in no case be beyond 150 (one hundred and fifty) days after the Appointed Date.

### **Annex - III**

(Schedule-A)

#### **Alignment Plans**

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

- (i) The alignment of the Project Highway is enclosed in alignment plan and indicated below. Finished road level indicated in the alignment plan shall be followed by the contractor as minimum FRL. In any case, the finished road level of the project highway shall not be less than those indicated in the alignment plan. The contractor shall, however, improve/upgrade the Road profile as indicated in Annex-III based on site/design requirement.
- (ii) Traffic Signage plan of the Project Highway showing numbers & location of traffic signs is enclosed. The contractor shall, however, improve/upgrade upon the traffic signage plan as indicated in Annex-III based on site/design requirement as per the relevant specifications/IRC Codes/Manual.



## **Annex – IV**

(Schedule-A)

### **Environment Clearances**

As per EIA notification 2006 and its amendment S.O.2559 (E) Dt 22<sup>nd</sup> August 2013, S.O 996(E) Dt 10<sup>th</sup> April 2015, S.O 382(E) Dt 3<sup>rd</sup> February 2015 Environmental Clearance Exempted from the purview of the Environmental Impact Assessment.

**[To be published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section(ii)]**

#### **MINISTRY OF ENVIRONMENT AND FORESTS NOTIFICATION**

New Delhi, the 22<sup>nd</sup> August, 2013

S.O. 2559 (E).- Whereas by notification of the Government of India in the Ministry of Environment and Forests vide number S.O.1533(E), dated the 14<sup>th</sup> September, 2006 issued under sub-section (1) and clause (v) of sub-section (2) of section (3) of the Environment (Protection) Act, 1986 read with clause (d) of sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986, the Central Government directed that on and from the date of its publication, the required construction of new projects or activities or the expansion or modernization of existing projects or activities listed in the Schedule to the said notification entailing the capacity addition with change in process or technology and or product mix shall be undertaken in any part of India only after prior environmental clearance from the Central Government or as the case may be, by the State level Environmental Impact Assessment Authority, duly constituted by the Central Government under sub-section (3) of section 3 of the said Act, in accordance with the procedure specified therein;

And whereas the Government of India in the Ministry of Environment and Forests had constituted a High Level Committee under the Chairmanship of Member (Environment and Forests and Science and Technology), Planning Commission, vide OM No.21-270/2008-IA.III dated the 11<sup>th</sup> December, 2012 to review the provisions of Environmental Impact Assessment Notification, 2006 relating to granting Environmental Clearances for Roads, Buildings and Special Economic Zone projects and provisions under the OM dated the 7<sup>th</sup> February, 2012 issued by the Ministry of Environment and Forests regarding guidelines for High Rise Buildings;

And whereas one of the terms of reference (ToR) of the Committee was to review the requirement of Environmental Clearance for highway expansion projects upto the right of way of 60 meters and length of 200 kms under Environmental Impact Assessment notification;

And whereas the Committee has submitted its report to the Ministry and on this ToR, the Committee has recommended exempting highway expansion projects from the requirement of scoping and that Environmental Impact Assessment or Environment Management Plan for highway expansion projects may be prepared on the basis of model ToRs to be posted on Ministry's website and in respect of requirement of environmental clearance, the Committee has recommended that expansion of National Highway projects up to 100 kms involving additional right of way or land acquisition upto 40 mts on existing alignments and 60 mts on re-alignments or by-passes may be exempted from the preview of the notification;

## **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 augmentation**

Rehabilitation and augmentation shall include Two-Laning and Strengthening 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 the Project**

Construction & up-gradation to 2-Lane with paved shoulder from Km 95+550 (Existing km 123+035) to Km 111+066(Existing km 138+725) of length 15.516 Km on Khellani – Kishtwar – Chattroo - Khanabal section of NH-244 in the Union Territory of Jammu and Kashmiron EPC Mode.

**1. Widening of Existing Highway**

- i. 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 hill/mountainous terrain to the extent land is available.

Sr. No.	Design Chainage in km		Length in m	Remark
	From	To		
1	95+550	98+990	3440	Widening with 2- lane with PS
2	98+990	99+123	133	New 2-lane with PS
3	99+198	101+590	2392	Widening with 2- lane with PS
4	101+590	101+670	80	New 2-lane with PS
5	101+670	101+792	122	Widening with 2- lane with PS
6	101+838	103+630	1792	Widening with 2- lane with PS
7	103+630	103+660	30	New 2-lane with PS
8	103+660	106+980	3320	Widening with 2- lane with PS
9	106+980	107+070	90	New 2-lane with PS
10	107+070	107+400	330	Widening with 2- lane with PS
11	107+400	107+450	50	New 2-lane with PS
12	107+450	107+760	310	Widening with 2- lane with PS
13	107+760	107+840	80	New 2-lane with PS
14	107+840	108+981	1141	Widening with 2- lane with PS
15	110+231	111+066	835	Widening with 2- lane with PS
<b>Total Length</b>			<b>15516</b>	

- ii. Width of Carriageway

- (a) 2-Laning with paved shoulders shall be undertaken for main road. The paved carriageway shall be 10m wide accordance with the typical cross section's drawings attached along with Schedule B.
- (b) 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**

**(i) General**

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

**(ii) Design speed**

The design speed shall be the maximum design speed of 60 Km/hr. and minimum design speed of 40 km/hr. for mountainous/hilly terrain as per IRC: SP-73:2018.

**(iii) Improvement of the existing road geometrics**

In the following sections, where improvement of the existing road geometrics to the

prescribed standards.

Sl. No.	Stretch (from km to km)	Type of deficiency	Remarks
Nil			

**(iv) Right of Way**

Details of the Right of Way are given in Annex II of Schedule-A.

**(v) Type of shoulders**

(a) In built-up sections, footpaths/fully paved shoulders shall be provided in the following stretches:

Sl. No.	Stretch (from km to km)	Fully paved shoulders/ footpaths	Reference to cross section
Nil			

(b) In open country/hilly areas, paved shoulders of 1.5m width shall be provided on either side and balance 1.0m width earthen shoulder at valley side only shall be covered with 150 mm thick compacted layer of granular material for main road.

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

**(vi) Lateral and vertical clearances at underpasses**

(a) Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per the provision of relevant Manual.

(b) Lateral clearance: The width of the opening at the underpasses shall be as follows:

Sl.No.	Location (Chainage) (from km to km)	Span/ opening (m)	Remarks
NIL			

**(vii) Lateral and vertical clearances at overpasses**

(a) Lateral and vertical clearances at overpasses shall be as per the provision of relevant Manual.

(b) Lateral clearance: The width of the opening at the overpasses shall be as follows:

Sl.No.	Location (Chainage) (from km to km)	Span/ opening (m)	Remarks
Nil			

**(viii) Service roads**

Service roads shall be constructed at the locations and for the lengths indicated below:

Sl.No.	Location of service road (from km to km)	Right hand side (RHS)/Left hand side (LHS)/ or Both sides	Length (m) of service road
NIL			

**(ix) Grade separated structures**

(a) Grade separated structures shall be provided as per provision of the relevant Manual. The requisite particulars are given below:

Sl. No.	Location of structure	Length (m)	Number and length of spans (m)	Approach gradient	Remarks, if any
Nil					

In the case of grade separated structures, the type of structure and the level of the Project Highway and the crossroads shall be as follows:

Sl. No.	Location	Type of structure Length (m)	Cross road at			Remarks, if any
			Existing Level	Raised Level	Lowered Level	
Nil						

**(x) Cattle and pedestrian underpass/overpass**

Cattle and pedestrian underpass/ overpass shall be constructed as follows:

Sl. No.	Location	Type of crossing
Nil		

**(xi) Typical cross-sections of the Project Highway**

Following typical cross sections shall be provided for the Project Highway However to be designed as per manual.

Sr. No.	TCS Detail	TCS Type	Design Length in m
1	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (New Construction)	TCS-1	203
2	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (Reconstruction)	TCS-1A	482
3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (New Construction)on Hill Side(New Construction)	TCS-2	70
4	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)	TCS-3	10708.486
5	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable with Wire Mesh/Cable Net Slope Protection on Hill Side(Reconstruction)	TCS-3A	2492
6	Two Lane C/W With PS With Both Side Cut & Protection As Applicable (New Construction)	TCS-4	80
7	Two Lane C/W With PS With Both Side Cut & Protection As Applicable With Wire Mesh/Cable Net Slope Protection on One Side of Hill(New Construction)	TCS-4A	110
8	Major Bridge	1no.	75
9	Minor Bridge	1 no.	46
10	Viaduct	1 no.	1250
<b>Total Length in m</b>			<b>15516.486</b>

**3. Intersections and Grade Separators**

All intersections and grade separators shall be as per the provision of relevant Manual.

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

**(i) At-gradeintersections**

SL No	Location in Km	Type of intersection	Cross Road Direction To Village	Remarks
1	99+010	T	To Village	Minor
2	99+240	T	To Village	Minor
3	102+250	T	To Village	Minor

SL No	Location in Km	Type of intersection	Cross Road Direction To Village	Remarks
4	107+290	Y	To Village	Minor
5	108+580	Y	To Village	Minor
6	108+960	T	To Chatroo	Major
7	110+250	Y	To Chatroo	Major
8	111+060	Y	To Village	Minor

(ii) Grade separated intersection with/without ramps

Sl. 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

(i) 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.

(ii) Raising of the existing road.

The existing road shall be raised in the following sections:

Sl.No.	Section(from km to km)	Length	Extent of raising [Top of finished road level]
Nil			

#### 5. Pavement Design

(i) Pavement design shall be carried out in accordance with the provision of relevant Manual.

(ii) Type of pavement

Flexible pavement is proposed for the project highway in accordance with IRC: 37-2018.

Layer	Thickness (mm)
BC	40
DBM	70
WMM (Upper layer)	125
WMM (Bottom layer)	125
GSB (Upper layer)	100
GSB (Bottom Layer)	100
Subgrade	500
<b>Total Thickness</b>	<b>1060</b>

(iii) Design requirements

(a) Design Period and strategy

Flexible pavement for new pavement or for widening & strengthening of the existing pavement shall be designed for a minimum period of 20 years and rigid pavement shall be designed for a minimum design period of 30 years. Stage construction shall not be permitted.

(b) Design Traffic

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



(iv) Reconstruction of stretches

The following stretches of the existing road shall be reconstructed. These shall be designed as a new pavement.

Sr. No.	Design Chainage in Km		Length in m
	From	To	
1	95+550	99+060	3510
2	99+198	101+590	2392
3	101+670	101+792	122
4	101+838	103+630	1792
5	103+660	106+980	3320
6	107+070	107+400	330
7	107+450	107+760	310
8	107+840	108+981	1141
19	110+231	111+066	835
Total Length			13752

6. Roadside Drainage

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

PCC Drain List					
Sr No	Design Chainage in Km		Length (m)	Side	Roadside Drain Length (m)
	From	To			
1	95+550	98+020	2470	RHS	2470
2	98+090	98+140	50	RHS	50
3	98+210	98+850	640	RHS	640
4	98+990	99+060	70	RHS	70
5	99+230	100+780	1550	RHS	1550
6	100+780	101+280	500	RHS	500
7	101+280	101+590	310	RHS	310
8	101+590	101+670	80	LHS+RHS	160
9	101+670	101+792	122	RHS	122
10	101+838	102+080	242	RHS	242
11	102+080	102+380	300	RHS	300
12	102+380	103+280	900	RHS	900
13	103+280	103+630	350	RHS	350
14	103+630	103+660	30	LHS+RHS	60
15	103+660	104+180	520	RHS	520
16	104+180	104+580	400	RHS	400
17	104+580	105+280	700	RHS	700
18	105+280	106+980	1700	RHS	1700
19	107+070	107+400	330	RHS	330
20	107+450	107+710	260	RHS	260
21	107+760	107+840	80	LHS+RHS	160
22	107+840	108+981	1141	RHS	1141
23	110+231	110+640	409	RHS	409
24	110+690	110+940	250	RHS	250
25	111+010	111+066	56.486	RHS	56.486
Total Length					13650.486

Catch Water Drain List					
Sr No	Design Chainage in km		Length (m)	Side	Roadside Drain Length (m)
	From	To			

Catch Water Drain List					
Sr No	Design Chainage in km		Length (m)	Side	Roadside Drain Length (m)
	From	To			
1	95+550	98+020	2470	RHS	2470
2	98+090	98+140	50	RHS	50
3	98+210	98+850	640	RHS	640
4	98+990	99+060	70	RHS	70
5	99+230	100+780	1550	RHS	1550
6	100+780	101+280	500	RHS	500
7	101+280	101+590	310	RHS	310
8	101+590	101+670	80	LHS+RHS	160
9	101+670	101+792	122	RHS	122
10	101+838	102+080	242	RHS	242
11	102+080	102+380	300	RHS	300
12	102+380	103+280	900	RHS	900
13	103+280	103+630	350	RHS	350
14	103+630	103+660	30	LHS+RHS	60
15	103+660	104+180	520	RHS	520
16	104+180	104+580	400	RHS	400
17	104+580	105+280	700	RHS	700
18	105+280	106+980	1700	RHS	1700
19	107+070	107+400	330	RHS	330
20	107+450	107+710	260	RHS	260
21	107+760	107+840	80	LHS+RHS	160
22	107+840	108+981	1141	RHS	1141
23	110+231	110+640	409	RHS	409
24	110+690	110+940	250	RHS	250
25	111+010	111+066	56.486	RHS	56.486
<b>Total Length</b>					<b>13650.486</b>

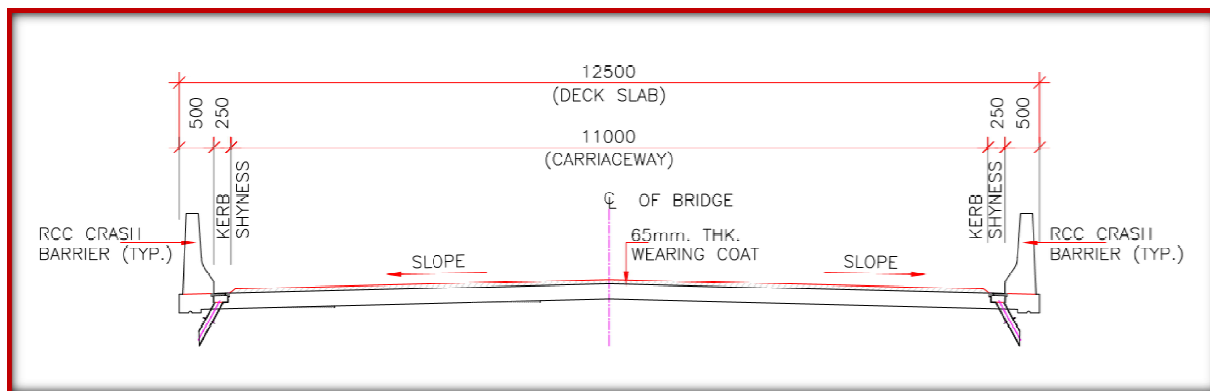
## 7. Design of Structures

### (i) General

(a) All bridges, culverts and structures shall be designed and constructed in accordance with the provision of relevant Manual and shall conform to the cross- sectional features and other details specified therein.

(b) Width of the carriageway of new bridges and structures shall be as follows:

Sr. No.	Design Chainage in km	Width of carriageway and cross-sectional features*	Remarks
1	99+161	12.50 m	Major Bridge
2	101+815	12.50 m	Minor Bridge
3	109+606	12.50 m	Viaduct



(c) The following structures shall be provided with footpaths:

Sl. No.	Location at km	Span Arrangement No. x Length (m)	Remarks
Nil			

(d) All bridges shall be high-level bridges.

Refer to the provision of relevant Manual and state if there is any exception.

(e) The following structures shall be designed to carry utility services specified in table below:

Sr. No.	Design Chainage in km	Utility service to be carried	Remarks
1	99+161	Electricity cables, OFC cables etc.	Major Bridge
2	101+815	Electricity cables, OFC cables etc.	Minor Bridge
3	109+606	Electricity cables, OFC cables etc.	Viaduct

(f) Cross-section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross-sections given in the provision of relevant Manual.

## (ii) Culverts

(a) Overall width of all culverts shall be equal to roadway width of the approaches.

(b) Reconstruction of existing culverts:

The existing culverts at the following locations shall be re-constructed as new culverts:

Sr. No.	Design chainage in km	Span arrangement (Clear Span x Clear Height) in m	Structure Type	Remarks
1	95+665	2x2	RCC BOX	
2	96+740	2x2	RCC BOX	
3	97+230	2x2	RCC BOX	
4	97+355	4x4	RCC BOX	
5	97+675	2x2	RCC BOX	
6	98+070	2x2	RCC BOX	
7	98+270	2x2	RCC BOX	
8	98+665	2x2	RCC BOX	
9	98+855	2x2	RCC BOX	
10	99+325	2x2	RCC BOX	
11	100+070	2x2	RCC BOX	
12	101+300	2x2	RCC BOX	
13	101+390	2x2	RCC BOX	

Sr. No.	Design chainage in km	Span arrangement( Clear Span x Clear Height) in m	Structure Type	Remarks
14	102+530	2x2	RCC BOX	
15	102+715	2x2	RCC BOX	
16	103+520	2x2	RCC BOX	
17	104+050	2x2	RCC BOX	
18	105+695	2x2	RCC BOX	
19	106+085	2x2	RCC BOX	
20	106+395	2x2	RCC BOX	
21	106+658	2x2	RCC BOX	
22	107+315	4X4	RCC BOX	
23	107+745	2x2	RCC BOX	
24	110+845	2x2	RCC BOX	

\*Specify modifications, if any, required in the road level, etc.

(c) Widening of existing culverts:

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

Sl. No.	Culvert location	Type, span, height and width of existing culvert (m)	Repairs to be carried out [specify]
Nil			

(d) Additional new culverts shall be constructed as per particulars given in the table below:

Sr. No.	Design chainage in km	Span arrangement (Clear Span x Clear Height) in m	Structure Type	Remarks
1	96+375	2x2	RCC BOX	
2	97+925	2x2	RCC BOX	
3	98+165	3x3	RCC BOX	
4	98+445	4X3	RCC BOX	
5	98+955	2x2	RCC BOX	
6	100+380	2x2	RCC BOX	
7	100+770	2x2	RCC BOX	
8	101+550	2x2	RCC BOX	
9	102+205	2x2	RCC BOX	
10	102+270	2x2	RCC BOX	
11	102+600	2x2	RCC BOX	
12	103+200	2x2	RCC BOX	
13	103+315	2x2	RCC BOX	
14	103+570	3X3	RCC BOX	
15	103+760	2x2	RCC BOX	
16	103+820	4X4	RCC BOX	
17	104+210	2x2	RCC BOX	
18	104+525	2x2	RCC BOX	
19	104+970	2x2	RCC BOX	
20	105+100	2x2	RCC BOX	

Sr. No.	Design chainage in km	Span arrangement (Clear Span x Clear Height) in m	Structure Type	Remarks
21	105+150	2x2	RCC BOX	
22	105+225	3X3	RCC BOX	
23	105+285	2x2	RCC BOX	
24	105+475	2x2	RCC BOX	
25	105+585	2x2	RCC BOX	
26	105+620	2x2	RCC BOX	
27	105+785	2x2	RCC BOX	
28	105+860	2x2	RCC BOX	
29	105+960	4X4	RCC BOX	
30	106+165	2x2	RCC BOX	
31	106+330	4X4	RCC BOX	
32	106+540	2x2	RCC BOX	
33	107+035	2x2	RCC BOX	
34	107+420	2x2	RCC BOX	
35	108+090	2x2	RCC BOX	
36	108+295	2x2	RCC BOX	
37	108+395	2x2	RCC BOX	
38	108+540	3X3	RCC BOX	
39	108+670	2x2	RCC BOX	
40	108+860	2x2	RCC BOX	
41	110+330	2x2	RCC BOX	
42	110+410	2x2	RCC BOX	
43	110+530	2x2	RCC BOX	
44	110+935	2x2	RCC BOX	
45	110+990	2x2	RCC BOX	

(e) Repairs/replacements of railing/parapets, flooring and protection works of the existing culverts shall be undertaken as follows:

Sl. No.	Location at km	Type of repair required
Nil		

(f) Floor protection works shall be as specified in the relevant IRC Codes and Specifications.

### (iii) Bridges

(a) Existing bridges to be re-constructed/widened

(i) The existing bridges at the following locations shall be re-constructed as new Structures

\*Attach GAD

(ii) The following narrow bridges shall be widened:

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

@ Attach cross-section

(b) 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.

**Major Bridge: -**

Sr. No.	Design Chainage in km	Span arrangement (No.xLength) in m	Total length in m	Overall Width in m	Type of Superstructure
1	99+161	3x25	75	1 x 12.5	Type of structure to be adopted by the EPC contractor as per best engineering practice & IRC, Mort&H specifications by using innovative technologies approved the authority RCC VOIDED SLAB

**Minor Bridge: -**

Sr. No.	Design Chainage in km	Span arrangement (No.xLength) in m	Total length in m	Overall Width in m	Type of Superstructure
1	101+815	2X23 (Skew)	46	1 x 12.5	Type of structure to be adopted by the EPC contractor as per best engineering practice & IRC, Mort&H specifications by using innovative technologies approved the authority

**Viaduct: -**

Sr. No.	Design Chainage	Span arrangement (No. xLength)	Total length in m	Overall Width in m	Type of Superstructure
1	109+606	30 x 40m + 1 x 30m + 1 x 20m	1250	1 x 12.5	Type of structure to be adopted by the EPC contractor as per best engineering practice & IRC, Mort&H specifications by using innovative technologies approved the authority

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

Sl. No.	Location at km	Remarks
Nil		

(d) Repairs/replacements of railing/parapets of the existing bridges shall be undertaken as follows:

Sl. No.	Location at km	Remarks
Nil		

(e) Drainage system for bridgedecks

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

(f) Structures in marineenvironment

Refer to the provision of relevant Manual and specify the necessary measures/ treatments for protecting structures in marine environment, where applicable.

(iv) Rail-roadbridges

(a) Design, construction and detailing of ROB/RUB shall be as specified in the provision of

relevant Manual. [Refer to the provision of relevant Manual and specify modification, if any]

(b) Roadover-bridges

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

Sl.No.	Location of Level crossing (Chainage km)	Length of bridge (m)
Nil		

(c) Roadunder-bridges

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

Sl. No.	Location of Level crossing (Chainage km)	Number and length of span (m)
Nil		

(v) Grade separated structures

The grade separated structures shall be provided at the locations and of the type and length specified in paragraphs 2 (ix) and 3 of this Annex-I.

(vi) 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

Sl.No.	Location of bridge (km)	Nature and extent of repairs /strengthening to be carried out
Nil		

(b) ROB /RUB

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

(c) Overpasses/Underpasses and other structures

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

(vii) List of Bridges and Structures

The following is the list of the Bridges and Structures:

Sr. No.	Design Chainage in km	Type of Structure
<b>Major Bridge</b>		
1	99+161	Major Bridge
<b>Minor Bridge</b>		
1	101+815	Minor Bridge
<b>Viaduct</b>		
1	109+606	Viaduct

**8. Traffic Control Devices and Road Safety Works**

(i) Traffic control devices and road safety works shall be provided in accordance with the section

9 of the manual referred to in Schedule D.

- (ii) Specification of the reflective sheeting as per IRC :67-2012 has been provided.

### 8.1 Crash Barrier

- (a) Three beam crash barrier shall be provided along the project highway as per section 9 of the manual. It shall be provided at Culvert/ bridge approaches on both sides and at location of embankment with height greater than or equal to 3m
- (b) The concrete crash barrier/ railing of bridge and culvert shall be painted in black and white stripes in general.

### 8.2 Transverse Rumble strip

Transverse rumble strips in the form of thermoplastic bar marking shall be provided to warn the drivers to reduce the speed for safety. Stripes shall be in full width of pavement. The stripes shall be provided at sharp curves, village approaches, location approaching access road, intersections and any other hazardous locations on the project highway. Guidelines of IRC-35 shall be followed.

## 9. Roadside Furniture

- (i) Roadside furniture shall be provided in accordance with the provision of relevant Manual.
- (ii) Overhead traffic sign: Full Gantry with 2nos.
- (iii) Road Marking and Signage

The following road marking, signage and safety device shall be used on the project which is minimum. Further if any shall be in accordance with the section 9 of the manual referred to in Schedule D.

**The minimum quantity of Traffic signages and pavement marking as per IRC: 35-2015 are tabulated here:**

Sl. No.	Traffic Signages, Road Marking and other appurtenances	unit	Quantity
1	Road Marking: -Lines, dashes, arrows	Sq. m	4526.250
2	900 mm triangular	Nos.	41
3	600 mm circular	Nos.	26
4	Rectangular 900 X 300 mm	Nos.	160
5	Rectangular 600x500 mm	Nos.	325
6	Rectangular 800x600 mm	Nos.	32
7	5th Km Stone	Nos.	3
8	Ordinary Km Stone	Nos.	13
9	Hectometer Stone	Nos.	62
10	Raised Road Marker (Studs)	Nos.	8609
11	Boundary pillars	Nos.	155
12	Utility Duct with 300mm dia HDPE pipe	Rm	28291
12.1	Utility Chambers	Nos.	142
13	Delinator	Nos.	1317

## 10. Compulsory Afforestation

Refer to the provision of relevant Manual and 9309 number of trees which are required to be planted by the Contractor as compensatory afforestation.

## 11. Hazardous Locations

The safety barriers shall also be provided at the following hazardous locations:

Sl. No.	Location stretch from (km) to (km)	LHS/RHS
---------	------------------------------------	---------



Sl. No.	Location stretch from (km) to (km)	LHS/RHS
Nil		

## 12. Special Requirement for Hill Road

This shall be provided accordance with section 13 of the Manual.

The side slope shall be protected by using suitable slope protection measures all along the highway on Hill side and valley side. The retaining wall/Toe wall, gabion wall and Soil nailing or Rock Bolting shall be constructed as per requirement of site condition in accordance with manual requirement. However, minimum length of protection works shall be construction as per details given below and the typical section of protection work are given in **Schedule B-1**.

- a) Retaining wall/Toe wall shall be constructed with minimum length is 750m (LHS) and 300 m (RHS) with 2.5 m to 5.0m ht. as per site condition of stone masonry in cement mortar 1:3 or any other better material acceptable to the Authority Engineer. Contractors need to access the same and bid accordingly.

Retaining/Toe Wall: Left Hand Side			
Design Chainage in km		Length in (m)	Height Adopted in m
From	To		
98+950	98+970	20	2.50
99+210	99+220	10	3.50
100+760	100+800	40	3.50
102+170	102+190	20	3.00
102+270	102+300	30	3.00
102+710	102+740	30	3.50
102+950	102+960	10	3.00
103+010	103+020	10	2.50
103+290	103+330	40	3.00
103+580	103+620	40	3.00
104+960	104+970	10	4.00
105+280	105+310	30	2.50
105+430	105+440	10	2.50
105+480	105+500	20	2.50
105+940	105+980	40	3.00
106+070	106+090	20	3.00
106+160	106+200	40	3.00
106+470	106+480	10	2.50
107+000	107+010	10	3.50
107+300	107+340	40	3.00
108+660	108+670	10	2.50
108+830	108+890	60	3.50
110+240	110+300	60	3.00
110+500	110+530	30	3.50
110+640	110+680	40	4.00
110+930	110+960	30	3.00
110+980	111+020	40	3.50
Total Length		750	

Retaining/Toe Wall: Right Hand Side			
Design Chainage in (km)		Length in (m)	Height Adopted in m
From	To		
95+570	95+580	10	3.50
96+160	96+180	20	5.00
96+290	96+320	30	3.00

Retaining/Toe Wall: Right Hand Side			
Design Chainage in(km)		Length in (m)	Height Adopted in m
From	To		
96+620	96+630	10	2.50
97+060	97+080	20	3.00
97+110	97+130	20	4.00
97+150	97+170	20	5.00
97+250	97+270	20	3.00
98+150	98+160	10	3.50
98+440	98+450	10	3.00
98+740	98+770	30	3.00
98+920	98+990	70	3.50
99+060	99+070	10	3.00
107+020	107+040	20	3.50
Total Length		300	

- b) Breast wall shall be constructed with minimum length is 9140 m (Both sides) on Main Road with 3 m of height, as per site condition of stone masonry in cement mortar or any other better material acceptable to the Authority Engineer. Contractor need to access the same and bid accordingly.

Breast Wall: Left Hand Side			
Design Chainage in(km)		Length in (m)	Height Adopted in m
From	To		
95+550	95+650	100	3
95+680	95+690	10	3
95+710	95+810	100	3
95+850	95+860	10	3
95+920	95+990	70	3
96+080	96+130	50	3
96+160	96+290	130	3
96+360	96+590	230	3
96+680	96+770	90	3
96+840	97+050	210	3
97+150	97+340	190	3
97+400	97+590	190	3
97+610	97+640	30	3
97+720	97+730	10	3
97+800	97+810	10	3
98+110	98+120	10	3
98+220	98+250	30	3
98+290	98+400	110	3
98+520	98+570	50	3
98+690	98+710	20	3
101+650	101+660	10	3
107+780	107+810	30	3
Total Length		1690	

Breast Wall: Right Hand Side			
Design Chainage in(km)		Length in (m)	Height Adopted in m
From	To		
99+610	100+740	1130	3

Breast Wall: Right Hand Side			
Design Chainage in(km)		Length in (m)	Height Adopted inm
From	To		
100+810	100+880	70	3
100+940	101+290	350	3
101+310	101+370	60	3
101+400	101+580	180	3
101+680	101+730	50	3
101+880	101+890	10	3
101+910	102+160	250	3
102+310	102+520	210	3
102+540	102+690	150	3
102+760	102+770	10	3
103+040	103+090	50	3
103+210	103+300	90	3
103+350	103+510	160	3
103+540	103+580	40	3
103+620	103+860	240	3
103+900	104+020	120	3
104+070	104+190	120	3
104+250	104+860	610	3
104+880	104+890	10	3
104+910	104+950	40	3
104+990	105+080	90	3
105+100	105+130	30	3
105+150	105+270	120	3
105+310	105+480	170	3
105+530	105+570	40	3
105+600	105+680	80	3
105+740	105+920	180	3
106+000	106+060	60	3
106+110	106+180	70	3
106+200	106+670	470	3
106+690	106+970	280	3
107+080	107+390	310	3
107+460	107+480	20	3
107+500	107+690	190	3
107+770	108+250	480	3
108+310	108+380	70	3
108+400	108+530	130	3
108+590	108+740	150	3
108+780	108+820	40	3
108+890	108+950	60	3
110+250	110+460	210	3
110+540	110+620	80	3
110+720	110+830	110	3
110+870	110+920	50	3
111+040	111+050	10	3
<b>Total Length</b>		<b>7450</b>	

- c) Gabion wall shall be in wire crates in accordance with applicable clause of section 1980 of MoRTH specification for road and bridge works (fifth revision) and accordance with IRC: SP:

48-1998 and IRC: 56-2011. Minimum length is 140 m on Main road(ht. from 5.5 m to 9.5 m). Contractor need to access the same and bid accordingly.

<b>Gabion Wall: Left Hand Side</b>			
<b>Design Chainage in(km)</b>		<b>Length in (m)</b>	<b>Height Adopted in(m)</b>
<b>From</b>	<b>To</b>		
99+090	99+120	30	7.00
104+200	104+220	20	9.00
107+020	107+050	30	7.00
<b>Total Length</b>		<b>80</b>	

<b>Gabion Wall: Right Hand Side</b>			
<b>Design Chainage in(km)</b>		<b>Length in (m)</b>	<b>Height Adopted in(m)</b>
<b>From</b>	<b>To</b>		
97+180	97+190	10	5.50
98+170	98+180	10	6.00
99+080	99+120	40	7.50
<b>Total Length</b>		<b>60</b>	

- d) Wire mesh with bio engineering and barbed wire must be provided as per site condition as per design and specification. Contractor need to access the same and bid accordingly.

<b>Wire Mesh with Bio Engineering (RHS)</b>			
<b>Sr. No.</b>	<b>Design Chainage in m</b>		<b>Length in m</b>
	<b>To</b>	<b>From</b>	
1	100810	100880	70
2	100940	101280	340
3	101680	101730	50
4	102080	102160	80
5	102310	102380	70
6	103280	103300	20
7	103350	103510	160
8	103540	103580	40
9	103620	103860	240
10	103900	104020	120
11	104070	104180	110
12	104580	104860	280
13	104880	104890	10
14	104910	104950	40
15	104990	105080	90
16	105100	105130	30
17	105150	105270	120
<b>Total Length</b>			<b>1870</b>

### 13. SAFETY AND TRAFFIC MANAGEMENT DURING CONSTRUCTION: -

#### (a) Temporary of Diversion existing road/Bridge portion including maintenance existing road:

Diversion road at bridge locations & main road

1) Portable Type Barricade in Construction Zone-1946m

2) Traffic Signs & making for Diversion- Road Work ahead, Man at work, Hazard Marker, Traffic Diversion, Chevron, Speed Limit, Restriction Ends, Flag Man, Overtaking Prohibited,

Work Traffic Exit, Drum Delineator

3) Maintenance of existing road in traffic worthy condition (filling potholes, patches etc.)

**b) clearance of land slide & snow**

1) Rock fall protection during construction period (Providing and fixing 2.5 metres high fencing with vertical angle iron posts 150 mm x 150 mm x 10 mm placed & every 0.5 metres center to center founded in M15 grade cement concrete, 0.6 metre below ground level and three horizontal iron angle 50mm x 50mm x 6mm for connecting vertical post-600m

5) Temporary shed for Landslide – 2 Nos.

**Note: Contractor must use Standard Specification/ given Annexure B or better in accordance with IRC & Mort&H Specification**

**14. Environment Management and Muck Disposal management:**

**a) Muck Disposal and management:**

The muck to be generated shall be appropriately dumped in tips at various suitable locations with providing site suitable engineering structure so that it does not degrade the various elements of the natural environment. For final disposal of the material convenient locations have been identified viz-a-viz to environmental aspects. The most suitable locations for dumping of the muck that would be generated from the Khellani-Kishtwar-Chattroo-Khanabal road.

Location specified in the Schedule is tentative and approximate assessment. The actual 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 specified in this Schedule B shall not constitute a Change of Scope

**Details of Environment Management and Muck Disposal Management are as under:**

Sl. No.	Area Name	Muck Dumping no.	Coordinates
1	km 96+100	P1	33°22'43.45"N 75°42'56.39"E
2	km 98+300	P2	33°23'11.06"N 75°41'52.99"E
3	km 109+700	P3	33°25'45.86"N 75°36'42.53"E
5	km 110+800	P4	33°26'13.14"N 75°36'16.77"E

**b) Environment Management Plan:**

Contractor shall submit their Environmental Management Plan in accordance with the latest guidelines of MoEF&CC. And same will be checked and approved by the Authority Engineer.

**15. 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**.

**16. Chainagewise indicative widening scheme with applicable typical Cross section**

SL. No.	Design Chainage in km		Length in m	TCS Type	TCS DETAILS
	From	To			

SL. No.	Design Chainage in km		Length in m	TCS Type	TCS DETAILS
	From	To			
1	95+550	98+020	2470	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
2	98+020	98+090	70	TCS-1A	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (Reconstruction)
3	98+090	98+140	50	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
4	98+140	98+210	70	TCS-1A	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (Reconstruction)
5	98+210	98+850	640	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
6	98+850	98+990	140	TCS-1A	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (Reconstruction)
7	98+990	99+060	70	TCS-2	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (New Construction)
8	99+060	99+123	63	TCS-1	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (New Construction)
9	99+123	99+198	75	Major Bridge	
10	99+198	99+230	32	TCS-1A	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (Reconstruction)
11	99+230	100+780	1550	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
12	100+780	101+280	500	TCS-3A	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable with Wire Mesh/Cable Net Slope Protection on Hill Side(Reconstruction)
13	101+280	101+590	310	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
14	101+590	101+670	80	TCS-4A	Two Lane C/W With PS With Both Side Cut & Protection As Applicable With Wire Mesh/Cable Net Slope Protection on One Side of Hill(New Construction)
15	101+670	101+792	122	TCS-3A	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable with Wire Mesh/Cable Net Slope Protection on Hill Side(Reconstruction)
16	101+792	101+838	46	Minor Bridge	
17	101+838	102+080	242	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
18	102+080	102+380	300	TCS-3A	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable with Wire Mesh/Cable Net Slope Protection on Hill Side(Reconstruction)
19	102+380	103+280	900	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)

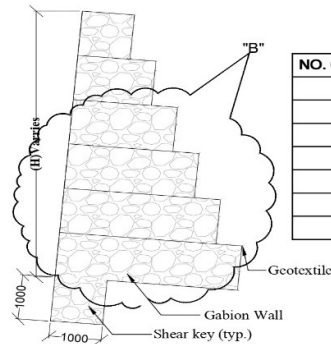
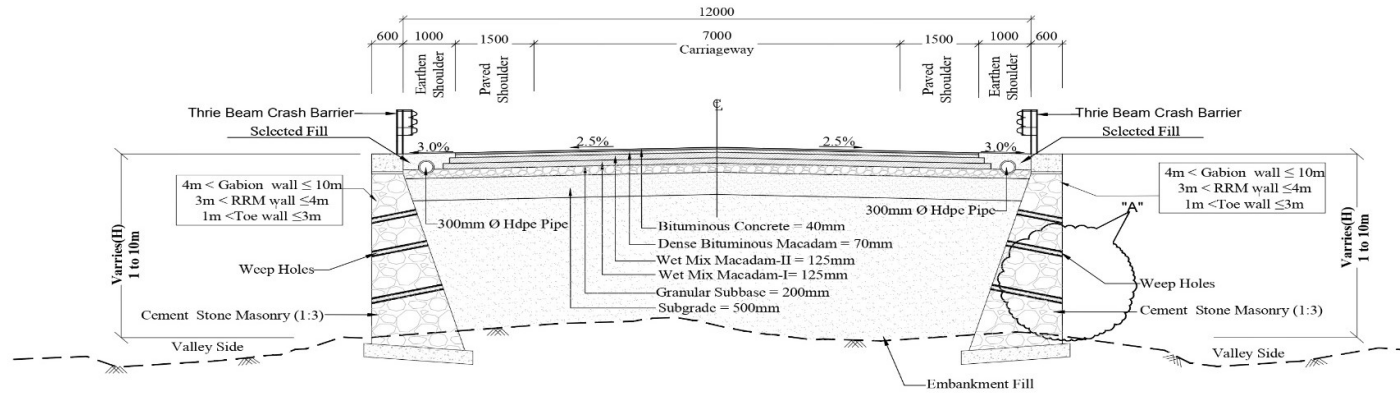
SL. No.	Design Chainage in km		Length in m	TCS Type	TCS DETAILS
	From	To			
20	103+280	103+630	350	TCS-3A	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable with Wire Mesh/Cable Net Slope Protection on Hill Side(Reconstruction)
21	103+630	103+660	30	TCS-4A	Two Lane C/W With PS With Both Side Cut & Protection As Applicable With Wire Mesh/Cable Net Slope Protection on One Side of Hill(New Construction)
22	103+660	104+180	520	TCS-3A	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable with Wire Mesh/Cable Net Slope Protection on Hill Side(Reconstruction)
23	104+180	104+580	400	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
24	104+580	105+280	700	TCS-3A	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable with Wire Mesh/Cable Net Slope Protection on Hill Side(Reconstruction)
25	105+280	106+980	1700	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
26	106+980	107+070	90	TCS-1	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (New Construction)
27	107+070	107+400	330	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
28	107+400	107+450	50	TCS-1	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (New Construction)
29	107+450	107+710	260	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
30	107+710	107+760	50	TCS-1A	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (Reconstruction)
31	107+760	107+840	80	TCS-4	Two Lane C/W With PS With Both Side Cut & Protection As Applicable (New Construction)
32	107+840	108+981	1141	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
33	108+981	110+231	1250	Viaduct	
34	110+231	110+640	409	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
35	110+640	110+690	50	TCS-1A	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (Reconstruction)
36	110+690	110+940	250	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
37	110+940	111+010	70	TCS-1A	Two Lane C/W With PS With Both Side Fill & Protection As Applicable (Reconstruction)

SL. No.	Design Chainage in km		Length in m	TCS Type	TCS DETAILS
	From	To			
38	111+010	111+066	56.486	TCS-3	Two Lane C/W With PS With one side cut & one Side Fill & Protection As Applicable (Reconstruction)
<b>Total Length</b>			<b>15516.49</b>		

**Note:** Utility duct shall be laid with 300mm dia. HDPE pipe all along the project length as per applicable TCS and cross sectional in accordance with IS: 4984/14333 or any other relevant code with inspection chambers at acceptable interval as approved by Authority Engineer/ Employer.



# TCS

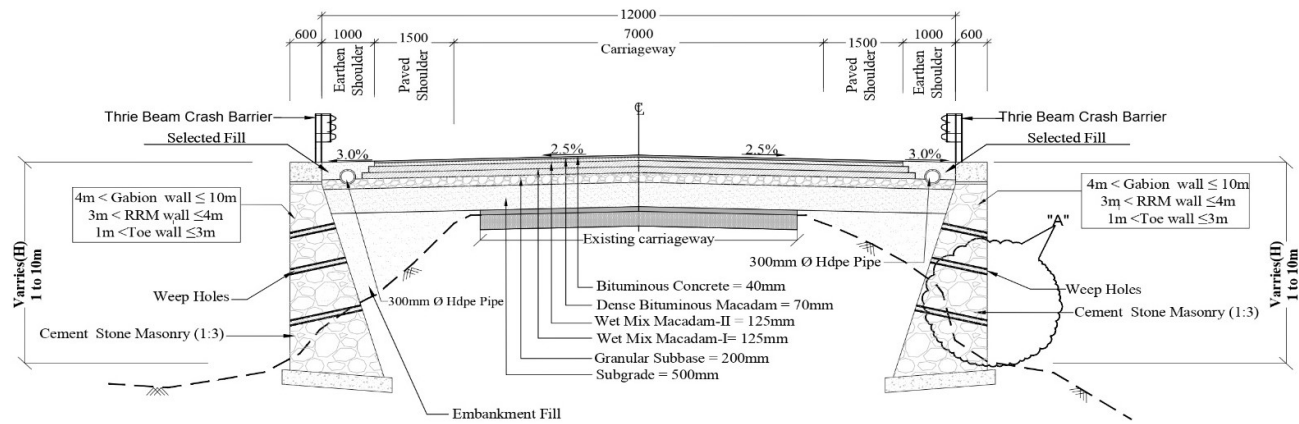


NO. OF COURSES	H (M)	B (M)
5	4	3
6	5	3.5
7	6	4
8	7	4.5
9	8	5
10	9	5.5
11	10	6

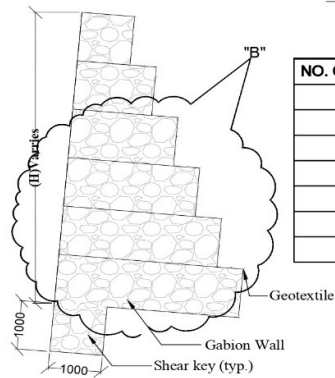
## NOTE:-

1. All Dimension are in millimeters except otherwise specified
2. Extra widening will be provided where radius of horizontal curve is less than 300m.
3. Toe wall Shall be provided where height of embankment is less than 3m. & greater than 1m.
4. Retaining wall Shall be provided where height of embankment is greater than 3m. & less than 4m.
5. Gabion wall shall be provided where height of embankment is greater than 4 m.
6. Breast wall Shall be provided where height of cut is greater than 3m.
7. No protection is required when height of fill is less than 1 m and height of cut is less than 3 m.
8. Refer Standard drawing for Details of Section - A" B" C" D" E" F"
9. Wire mesh shall be provided in presence of unstable of strata
10. Shear key will be adopted where ht. of gabion wall is more than 5m.

REVISION	DATE	AMENDMENT / ISSUE DESCRIPTION	CLIENT	CONSULTANT	PROJECT	PROJECT
R0	Dec. 2020		NATIONAL HIGHWAY & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD. (MINISTRY OF ROAD TRANSPORT & HIGHWAY) GOVERNMENT OF INDIA	RODICI CONSULTANTS PVT. LTD. 1, JAI SINGH MARG (FIRST FLOOR), YMCA CULTURAL CENTRE (BUILDING HEID DELHI - 110001 (INDIA) In Association with Monarch Surveyors and Engineering Consultants Pvt. Ltd.	DETAILED PROJECT REPORT PACKAGE-V From km. 95+550 to Km. 111+066	Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing Pre-Construction Services for upgradation to 2 lane with paved shoulder from Km 44.50 to Km 142.00 of Chattroo Village of Khellani - Kishtwar - Chattrao Section of NH 244 in the UT of Jammu and Kashmir.
					Scale N.T.S.	Drawing Title TYPICAL CROSS SECTION
					Sheet size: A2	RHEDCJ.RH244NH244E11 A81 - CHATTRAO/CS/01/01



**Type - 1A - Typical Cross-Section for Two Lane Carriageway With Paved Shoulder  
In Mountainous Terrain With Both Side Fill & Protection As Applicable  
(Reconstruction)**

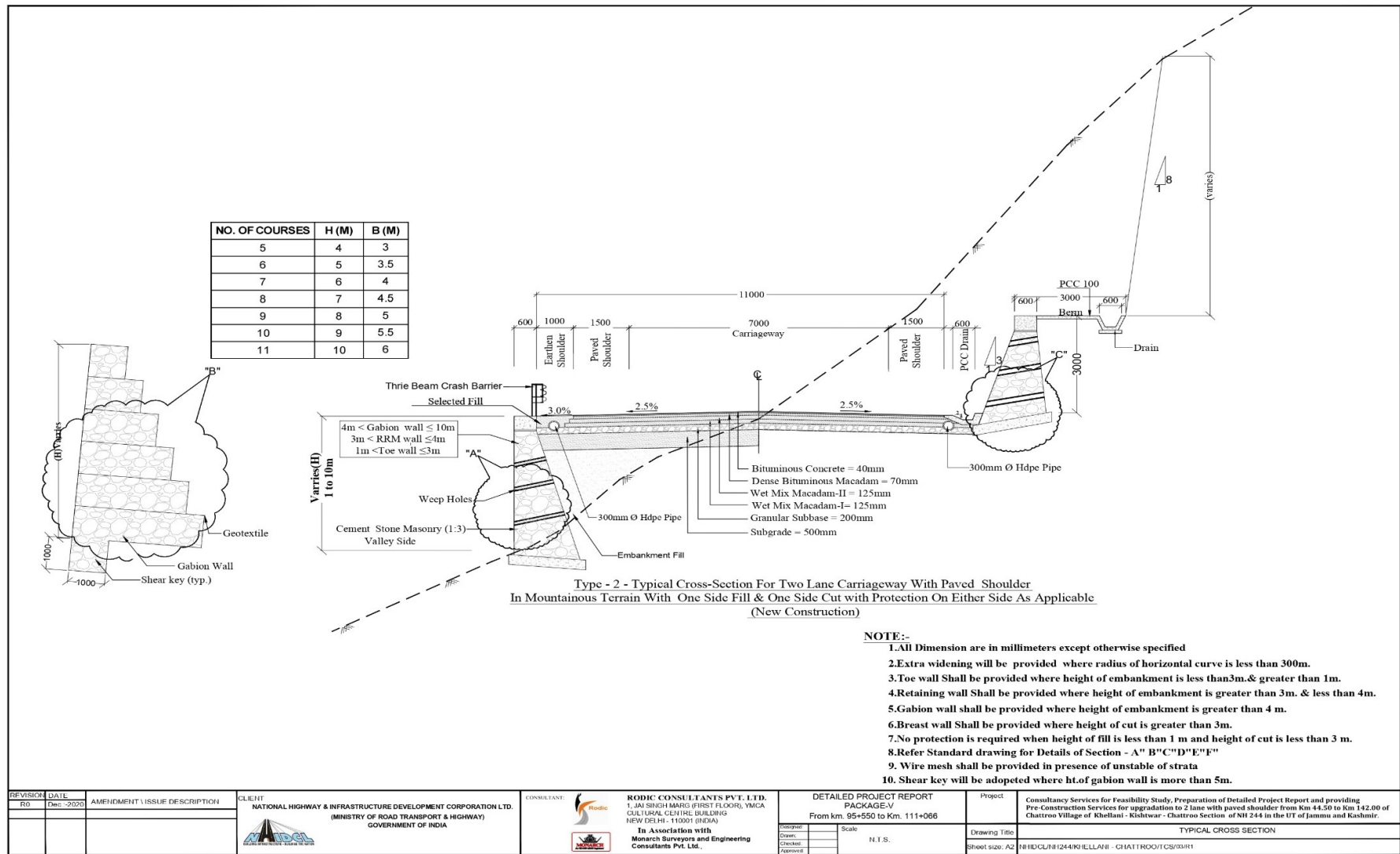


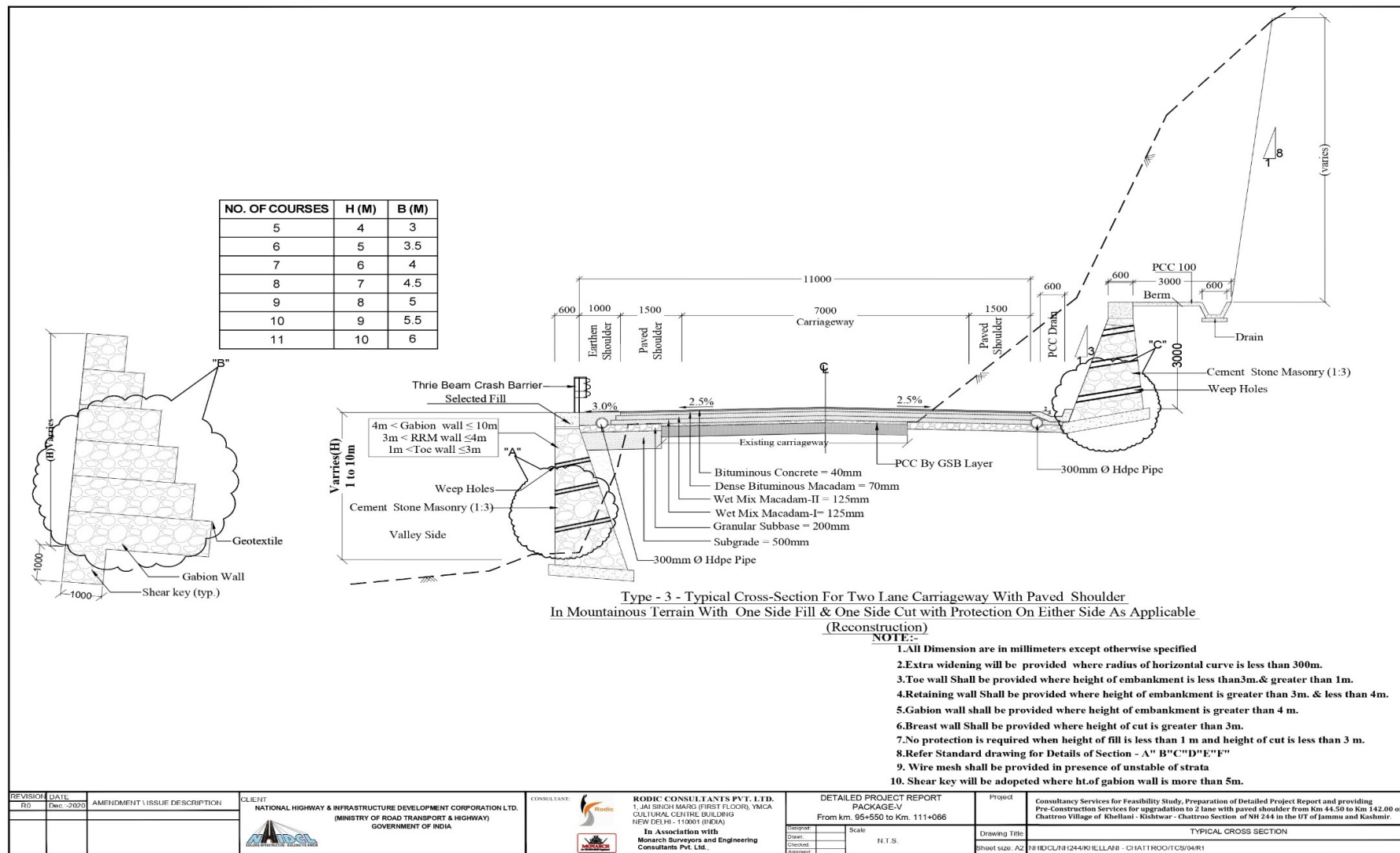
NO. OF COURSES	H (M)	B (M)
5	4	3
6	5	3.5
7	6	4
8	7	4.5
9	8	5
10	9	5.5
11	10	6

**NOTE:-**

1. All Dimension are in millimeters except otherwise specified
2. Extra widening will be provided where radius of horizontal curve is less than 300m.
3. Toe wall shall be provided where height of embankment is less than 3m. & greater than 1m.
4. Retaining wall shall be provided where height of embankment is greater than 3m. & less than 4m.
5. Gabion wall shall be provided where height of embankment is greater than 4 m.
6. Breast wall shall be provided where height of cut is greater than 3m.
7. No protection is required when height of fill is less than 1 m and height of cut is less than 3 m.
8. Refer Standard drawing for Details of Section - "A" "B" "C" "D" "E" "F"
9. Wire mesh shall be provided in presence of unstable of strata
10. Shear key will be adopted where ht. of gabion wall is more than 5m.

REVISION	DATE	AMENDMENT / ISSUE DESCRIPTION	CLIENT	CONSULTANT	DETAILED PROJECT REPORT PACKAGE-V	Project	Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing Pre-Construction Services for upgradation to 2 lane with paved shoulder from Km 44.50 to Km 142.00 of Chattru Village of Khellani - Kishitwar - Chattru Section of NH 244 in the UT of Jammu and Kashmir.
R0	Dec-2020		NATIONAL HIGHWAY & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD. (MINISTRY OF ROAD TRANSPORT & HIGHWAY) GOVERNMENT OF INDIA	RODIC CONSULTANTS PVT. LTD. 1, JAI SRIKSH MARG (FIRST FLOOR), YMCA CULTURAL CENTRE BUILDING NEW DELHI - 110001 (INDIA) In Association with Monarch Surveyors and Engineering Consultants Pvt. Ltd.	From km. 95+550 to Km. 111+066	Scale N.T.S.	Drawing Title TYPICAL CROSS SECTION
						Sheet size: A2	NHIDC/IRH244/KHELLANI - CHATTRU/TC/S/02/R1





**Howeer details**

Use 3 building grips

16 diameter, galvanised wire rope (minimum breaking load 15 tonnes)

25 diameter hot dip galvanised high yield steel hook ground into rock at 3000 c/p pre-drilled holes

Minimum 15° to the horizontal or normal to slope surface whichever is steeper

Bend down and lace

16 diameter, galvanised wire rope (minimum breaking load 15 tonnes)

**Fixing mesh to face and at bottom of face**

16 diameter, hot dip galvanised high yield steel hook at 3000 c/p or equivalent anchor bolts

Minimum 15° to the horizontal or normal to slope surface whichever is steeper

2.2 diameter nominal galvanised and PVC coated binding wire

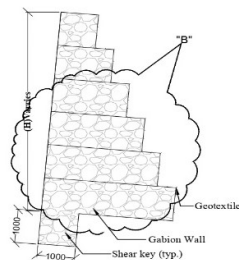
**Lacing of adjacent mesh sheets**

16 diameter, hot dip galvanised high yield steel hook with extension connector ground into rock at 3000 c/p or equivalent anchor bolts

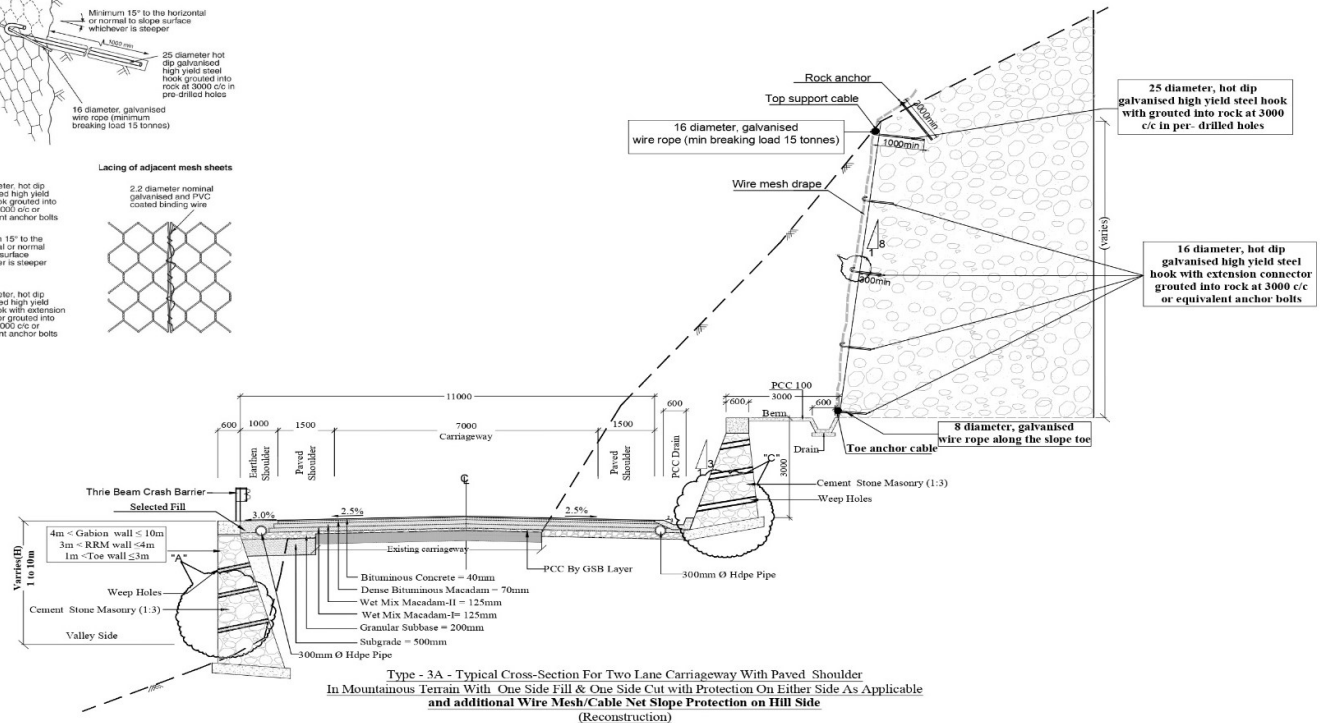
8 diameter galvanised wire rope along the slope face

**See howeer details**

All dimensions in mm



NO. OF COURSES	H (M)	B (M)
5	4	3
6	5	3.5
7	6	4
8	7	4.5
9	8	5
10	9	5.5
11	10	6

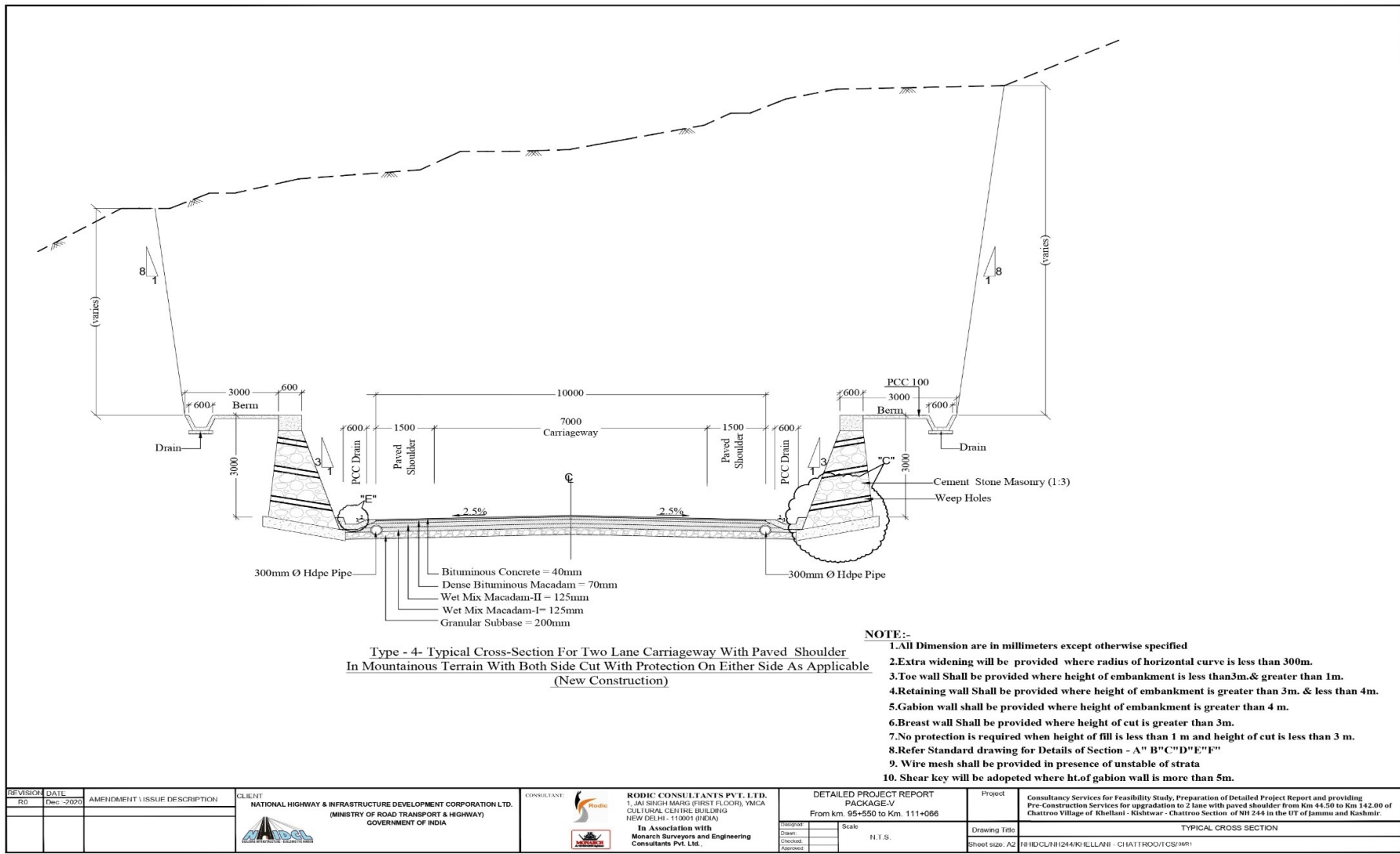


**NOTE:-**  
1.All Dimension are in millimeters except otherwise specified

- 2.Extra widening will be provided where radius of horizontal curve is less than 300m.
- 3.Toe wall Shall be provided where height of embankment is less than 3m & greater than 1m.
- 4.Retaining wall Shall be provided where height of embankment is greater than 3m. & less than 4m.
- 5.Gabion wall shall be provided where height of embankment is greater than 4 m.
- 6.Breast wall Shall be provided where height of cut is greater than 3m.
- 7.No protection is required when height of fill is less than 1 m and height of cut is less than 3 m.
- 8.Refer Standard drawing for Details of Section - A' B'C'D'E''F'''
9. Wire mesh shall be provided in presence of unstable of strata
10. Shear key will be adopted where ht.of gabion wall is more than 5m.

37







**Annex - III**  
(Schedule-A)  
Tender Drawings



Schedule - C  
(See Clause 2.1)

**Project Facilities**

**1. ProjectFacilities**

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

- (a) tollplaza[s];
- (b) roadside furniture;
- (c) pedestrian facilities;
- (d) tree plantation;
- (e) truck lay-byes;
- (f) bus-bays/ bus shelters/ bus stop;
- (g) rest areas
- (h) rainwater harvesting; and
- (i) others to be specified

**2. Description of ProjectFacilities**

Each of the Project Facilities is described below:

- (a) Rainwater Harvesting: As per Ministry of Environment and Forest notification, dated 8 October 2019 and 23 April 2010, construction of rainwater harvesting structure has been adopted accordingly. 31 nos. of recharge shaft of 0.5 m dia. for 10 to 15 m depth one on each side of the carriageway are proposed.
- (b) Bus Stops: In order to promote the use of public transport and facilitate the travel for passengers 11 nos. of bus stops have been proposed at 11 locations along the project road.

S.No.	Design Chainage in Km	
	LHS	RHS
1	-	97+830
2	98+930	-
3	-	99+280
4	100+630	-
5	101+700	-
6	102+680	-
7	-	103+240
8	104+260	-
9	107+180	-
10	-	108+930
11	110+280	-

**(c) High Mast Lighting & Electric Pole:**

Provision of Electric Pole (Street Lighting) as per specification or as per the instruction of the Authority:

## **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:

## **Annex – I**

(Schedule-D)

### **Specifications and Standards for Construction**

#### **1. Specifications and Standards**

All Materials works and construction operations shall conform to the Manual of Specifications and Standards for Two-Laning of Highways IRC: SP:73-2018, Hill Road Manual (IRC:SP: 48-1998) Guidelines 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 Authority's Engineer.

#### **2. Deviations from the Specifications and Standards**

- (i) 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.
- (ii) 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:

<b>Sr. No.</b>	<b>Item</b>	<b>Clause referred in Manual</b>	<b>Provision as per Manual</b>	<b>Modified Provision</b>
1	Typical Cross section	2.16		These clauses are deemed to be amended as shown in the typical cross section (refer Schedule B).
2	Typical Cross Section	2.6.1, 2.7 and 2.16		
3	Radii of Horizontal Curves	2.9.4	Mountainous & steep terrain, desirable min. radii and absolute min. shall be 150 m and 75 m, respectively.	Mountainous and steep terrain, desirable minimum radii and absolute minimum shall be 150 m and 75 m, respectively except at the location given in alignment drawing (refer Annex-III, schedule A).
4	Width of New Bridge	7.3		To be amended as shown in the typical Cross section (refer Schedule B)
5	Utility Duct	2.16	Utility duct with 600mm dia.....	Utility duct shall be laid in accordance with IS: 4984/14333 or any other relevant code with inspection chambers at acceptable interval as approved by Authority Engineer/ Employer

**ATTACHMENT-DI**  
**TECHNICAL SPECIFICATIONS FOR ROAD & BRIDGE**

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Sub-Clause 401.2.2 Physical Requirements

CLAUSE 406 WET MIX MACADAM SUB -BASE/BASE

Sub-Clause 406.4 Opening to Traffic

SECTION 500 Base and Surface Courses (Bituminous)

Sub-Clause 501.2 Materials

Sub clause 501.2.1 Binder

Binder of VG-30 grade shall be used or if available viscosity grade of bitumen shall be used in accordance with IS: 73

CLAUSE 505 DENSE BITUMINOUS MACADAM

CLAUSE 507 BITUMINOUS CONCRETE

Binder of CRMB-60 grade shall be used.

SECTION 800 Traffic Signs, Markings and Other Road Appurtenances

CLAUSE 803 ROAD MARKINGS

CLAUSE 806 ROAD DELINATORS

## **TECHNICAL SPECIFICATIONS**

- 1** The Technical Specifications contained herein shall be read in conjunction with the other Bidding Documents as specified in Volume-IX.

### **1.1 Site Information General**

- 1.1.1** The information given hereunder and provided elsewhere in these documents is given in good faith by the Employer, but the Contractor shall satisfy himself regarding all aspects of site conditions and no claim will be entertained on the plea that the information supplied by the Employer is erroneous or insufficient.

The area in which the works are located is in hilly/mountainous terrain, the project road starts from 33°22'25.82"N, 75°42'59.44"E and ends at 33°26'21.12"N, 75°36'15.94"E in the UT of Jammu & Kashmir.

### **1.1.2 Climatic Conditions**

- 1.1.2.1** The temperature in this region is as under:

- i)** During summer months, the average maximum temperature recorded is 30°C
- ii)** During winter months, the minimum average temperature is -2°C.
- iii)** The location receives about 920 mm of average annual rainfall, with March being the wettest month.

### **1.1.3 Seismic Zone**

The stretch lies in Seismic Zone-IV as defined in Fig. 18 of IRC: 6-2017.

## **2 GENERAL REQUIREMENTS**

The Technical Specifications in accordance with which the entire work described hereinafter shall be constructed and completed by the Contractor shall comprise of the following:

### **2.1 Part-I: General Technical Specifications**

The General Technical Specifications shall be the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS" (Fifth Revision, April 2013), issued by the Ministry of Road Transport and Highways, Government of India and published by the Indian Roads Congress, henceforth called MORT&H Specifications and deemed to be bound into this document.

### **2.2 Part-II: Supplementary Technical Specifications**

The Supplementary Technical Specifications shall comprise of various Amendments/Modifications/ Additions to the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS" referred to in Part-I above and Additional Specifications for item of works which are not covered in Part-I.

- 2.3** A clause or a part thereof in "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (Fifth Revision April 2013)", referred in Part-I above, where Amended/Modified/Added upon, and incorporated in Part-II, referred to above, such Amendment/Modification/ Addition supersedes the relevant Clause or part of the Clause.

- 2.3.1** The Additional Specifications shall comprise of specifications for item of works which not covered in Part-I.

- 2.3.2** When an Amended/Modified/Added Clause supersedes a Clause or part thereof in the said Specifications, then any reference to the superseded Clause shall be deemed to refer to the Amended/Modified/Added Clause or part thereof.

- 2.3.3** In so far as Amended/Modified/Added Clause may come in conflict or be inconsistent with any of the provisions of the said MORT&H Specifications under reference; the Amended/Modified/Added Clause shall always prevail.

- 2.3.4** The following Clauses in the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (Fifth Revision

April 2013”), have been Amended/Modified/Added upon

Sr. No.	Section No.	Section Title	Clause No.
1.	100	General	102,106,108,109, 111,112,114,115 and 121
2.	200	Site Clearance	201 and 202
3.	300	Earthwork, Erosion Control and Drainage	301,304,305 and 306
4.	400	Sub-base, Bases (Non-Bituminous) and Shoulders	401and 406
4.	500	Bases and Surface Courses (Bituminous)	501,505 and 507
5.	800	Traffic signs, Markingsand other RoadAppurtenances	803,806 and 811
6.	2100	Open Foundations	2104

## 2.4 PART-III Specifications for Miscellaneous Works

Technical Specifications for Miscellaneous works shall be the latest “Specifications volume I to VI, 1996 for Civil Works and General Specifications for Electrical Works PART I – INTERNAL, PART – II, EXTERNAL for electric work 1994 as published by the Central Public Works Department (CPWD), Government of India” and deemed to be bound into this document.

- 2.5** The latest edition till 60 days before the final date of submission of the bid of all specifications / standard shall be applicable.



## **SCOPE OF WORKS**

### **Road Works**

Site clearance; setting-out and layout; widening of existing carriageway and strengthening including camber corrections; construction of new road/ parallel service road; bituminous pavements remodelling/construction of junctions, intersections, bus bays, lay bays; supplying and placing of drainage channels, flumes, guard posts, guard rails and other related items; construction/extension of cross drainage works, bridges, approaches and other related works; road markings, road signs and kilometer/ hectometrestones; protective works for roads/ bridges; all aspects of quality assurance of various components of works; rectification of the defects in the completed works during the Defect Liability Period; submission of "As built" drawings and any other related documents; and other items of work as may be required to be carried out for completing the works in accordance with the drawings and provisions of the Contract to insure safety.

### **Other Items**

Execution of any other items of work for the construction and completion of the Works in accordance with the provisions of the Contract including all incidental items as well as preparation and submittal of reports, plans as may be required.

During the period of the Contract the right of way and all existing roads shall be kept open for traffic and maintained in a safe and usable condition. Residents along and adjacent to the works are always to be provided with safe and convenient access to their properties. Traffic control and traffic diversions shall be used as necessary to protect the works and maintenance will be carried out as directed by the Engineer and provided in the Contract.

Any other items as required to fulfil all contractual obligations as per the Bid Documents.

**PART II**  
**SUPPLEMENTARY TECHNICAL SPECIFICATION**  
**AMENDMENTS/MODIFICATIONS/ADDITIONS TO EXISTING CLAUSES OF GENERAL**  
**TECHNICAL SPECIFICATIONS**

**SECTION 100 General**

**CLAUSE 102**                      **DEFINITIONS**

The following abbreviations shall be added in this Clause: "MORT&H" :  
Ministry of Road Transport & Highways

(Previously known as 'MOST', Ministry of Surface Transport)

"NHAI" : National Highways Authority of India

**CLAUSE 106**                      **CONSTRUCTION EQUIPMENT**

Add the following sub para (g) and (h) after sub para (f)

- Adequate standby equipment including spare parts shall be available.
- All measuring devices and gauges shall be in good working condition. Measuring devices that can affect product quality shall be calibrated prior to use and at prescribed intervals against certified equipment. Calibration procedures shall be established, maintained and documented and corrective actions taken when results are unsatisfactory. Accuracy and fitness of measuring devices shall be ensured by proper maintenance.

**CLAUSE 108**                      **SITE INFORMATION**

**Sub-Clause 108.4**              This clause shall be as follows:

"Identification of quarry sites and borrow areas shall be the responsibility of the Contractor. Materials procured from quarry sites and borrow areas identified by Contractor and to be used in Works must comply with the requirements of quality as stipulated in the Technical Specification for particular items of work."

**CLAUSE 109**                      **SETTING OUT**

**Sub-Clause 109.8**              Delete the 2<sup>nd</sup> and 3<sup>rd</sup> sentences in Clause 109.8 and substitute the following:  
"Setting out of the road alignment and measurement of angles shall be done by using Total Station."

**CLAUSE 111**                      **PRECAUTIONS FOR SAFEGUARDING THE ENVIRONMENT**

**Sub-Clause 111.1**              **General**

Delete the text of Clause 111.1 in its entirety and substitute the following:

"The Contractor shall take all necessary measures and precautions and otherwise ensure that the execution of the Works and all associated operations on site or off-site are carried out in conformity with statutory and regulatory requirements including those prescribed elsewhere in this document.

The Contractor shall take all measures and precautions to avoid any nuisance or disturbance arising for the execution of the Works. This shall wherever possible be achieved by suppression of the nuisance at source rather than abatement of the nuisance once generated. All vehicles deployed for material haulage shall be spillage proof.

Haul roads shall be inspected at least once daily to clear any accidental spillage. In the event of any spoil, debris, wastes or any deleterious substance

from the Site being deposited on any adjacent land, the Contractor shall immediately remove all such material at no cost to the Contract and restore the affected area to its original state to the satisfaction of the Engineer."

Sub-Clause 111.2 Borrow Pits for Embankment Construction

Delete the text of Clause 111.2 and substitute the following:

"Prior approval shall be sought from the concerned State Authorities, and the Contractor shall comply with all local environmental regulations. For all borrow areas, the actual extent of area/zones to be excavated shall be demarcated with the signboards and the operational areas shall be access controlled.

In the case of borrow from tank beds, a regrade/improvement of the inlet channels (at least up to 100m stretch) shall be undertaken in consultation with the concerned state government departments (the Minor Irrigation department of the State PWD) and local bodies. The Contractor shall ensure that excavation of tank beds is uniform over the entire area and that the finished profile of the bed is smooth.

In the case of borrow from the dry highlands, all borrow areas shall be reinstated by the formation gentle side slopes, re-vegetated and connected to the nearest drainage channel to avoid the formation of pools during/after the rainy seasons.

Plant and machinery used in the borrow areas shall conform to State noise emission regulations. All operation areas shall be water sprinkled to contain dust levels to the National Ambient Air Quality Standards."

Sub-Clause 111.3 Quarry Operations

Delete the text of Clause 111.3 and substitute the following:

"Aggregates shall be sourced only from quarry sites that comply with the local/state environmental and other applicable regulations. Occupational safety procedures/practices for the work force in all quarries shall be in accordance with applicable laws. Quarry and crushing units shall have adequate dust suppression measures, such as sprinklers, in work areas and along all approach roads to the quarry sites. These shall preferably be located on the upwind side."

Sub-Clause 111.5 Pollution from Hot-Mix Plant and Batching Plants

Delete the 1<sup>st</sup> sentence of Clause 111.5 and substitute the following:

"Bituminous hot mix plant and concrete batching plants shall be located at least one (1) km away from the sensitive receptors (schools, hospitals, etc.) and at least 500m from urban settlements, unless otherwise required by the statutory requirements."

Sub-Clause 111.8.1 Environmental Protection:

Add the following sentences in the first paragraph of Sub Clause 111.8.1:

Water tankers with suitable sprinkling system shall be deployed along the haulage roads and in the work sites. Water shall be sprinkled regularly all along the routes to suppress airborne dusts from truck/dumper movements particularly on unpaved roads. Actual frequency will be agreed with the Engineer to suit site conditions."

Sub-Clause 111.8.2 Air Quality

The Contractor shall devise and implement methods of working to minimize dust, gaseous and other air-borne emissions and carry out the Works in such a

manner as to minimize adverse impacts on the air quality. Construction camps shall have facilities for LPG fuel. The use of firewood shall not be permitted.

The Contractor shall utilize effective water sprays during delivery, manufacture, processing and handling of materials when dust is likely to be created, and to dampen stored materials during dry and windy weather. Stockpiles of friable materials shall be covered with clean tarpaulins, with applications of sprayed water during dry and windy weather. Stockpiles of materials or debris shall be dampened prior to their movement, except where this is contrary to the Specification.

Any vehicle with an open load-carrying area used for transporting potentially dust-producing material shall have properly fitting side and tail boards. Materials having the potential to produce dust shall not be loaded to a level higher than the side and tail boards and shall be covered with clean tarpaulins in good condition. The tarpaulin shall be properly secured and extend at least 300mm over the edges of the side of the side and tailboards.

The Contractor shall monitor air-quality once weekly in all operational areas under the project and take the necessary steps to comply with the specified requirements. Air quality parameters will include SPM, RPM, SO<sub>2</sub>, NO<sub>x</sub>, HC and CO. operational areas include work sites, haulage roads, hot mix plants, quarries, crushing plants, stockpiles, borrow sites and spoil disposal sites.

#### Sub-Clause 111.8.3 Water Sources and Water Quality

The Contractor shall provide independent sources of water supply, such as bore wells, for use in the Works and for associated storage, workshop and work force compounds. Prior approval shall be obtained from the relevant State Authorities and all installations shall follow local regulations. Bore wells installed and used for the project shall be left in good operating condition for the use of NHAI and local communities. The Contractor shall prevent any interference with the supply to or abstraction from and prevent any pollution of water resources (including underground percolating water) as a result of the execution of the Works.

Areas where water is regularly or repetitively used for dust suppression purposes shall be laid to fall to specially constructed settlement tanks to permit sedimentation of particulate matter. After settlement, the water may be re-used for dust suppression and rinsing. The Contractor shall protect all watercourses, waterways, ditches, canals, drains, lakes and the likes from pollution as a result of the execution of the Works.

All water and other liquid waste products arising on the Site shall be collected and disposed of at a location on or off the Site and in a manner that shall not cause either nuisance or pollution.

The Contractor shall at all times ensure that all existing stream courses and drains within, and adjacent to, the Site are kept safe and free from any debris and any materials arising from the Works. The Contractor shall not discharge or deposit any matter arising from the execution of the Works into any water except with the permission of the Engineer and the regulatory authority concerned.

Work force camps shall have septic tank and soak away pits. Operational areas like POL storage areas/hot mix plant areas shall comply with local/state environmental regulations and safety procedures. Storage and handling areas shall be impervious and surrounded by an impervious lined drain to catch any accidental spills. Storm water shall be stored in lined holding tanks with oil, grease-tapping facility prior to disposal in to nearby watercourses. The

trappings and sludge of holding tanks shall be disposed off in accordance with the procedures approved by the local regulatory authority.

Sub-Clause 111.20      Control and Disposal of Wastes

The Contractor shall control the disposal of all forms of waste generated by the construction operations and in all associated activities. No uncontrolled deposition or dumping shall be permitted. Wastes to be so controlled shall include, but shall not be limited to, all forms of fuels and engine oils, all types of bitumen, cement, and surplus aggregates, gravels, bituminous mixtures etc. The Contractor shall make specific provision for the proper disposal of these and any other waste products, conforming to local regulations and acceptable to the Engineer.

Spilling of oil and bituminous products during construction and transport shall be avoided to reduce the chances of contamination of surface as well as ground water.

Degraded materials shall be disposed of in a manner as approved by the Engineer and wastewater shall be disposed into septic tanks and soak pits etc. The Contractor shall make arrangements to clean-up spoil as soon as the work finishes in a stretch. If such sites are located outside the ROW, restoration of the site to a level acceptable to the land owner(s) will be carried out within a time period agreed between landowner(s) and the Contractor. Separators shall be used to separate POL materials from wastewater prior to discharging to the watercourses or as approved by the Engineer in conformance with directives and guidelines.

Disposal of solid waste materials shall be outlined in a plan for which environmental clearances shall be obtained from State environmental regulatory authorities. Potential locations for solid waste disposal are the natural depressions and borrow areas. The areas used for dumping of uncontaminated debris shall be covered with 300mm soil and shall be planted. Contaminated debris shall be dumped in depressions whose bed must be impervious e.g., stone quarry sites or depressions made impervious with 450mm thick impervious floor apron as per MORT&H Technical Specifications. Each successive 1.0m layers shall be covered with 500mm thick soil layer, and the area will be covered with 300mm thick layer and planted.

After Clause 111.12      add the following new Clauses 111.13 to 111.17

Sub-Clause 111.13      Haulage Roads

Existing roads used for hauling shall be strengthened and/ or widened by the Contractor in accordance with the requirements for normal and construction traffic.

Where such roads are not existing, the Contractor shall construct project specific single lane paved roads in settlement areas and gravel roads in open areas conforming to the Ministry of Road Transport and Highways (MORT&H) specifications.

The alignment of the haulage roads shall be fixed to avoid agricultural land to the extent possible. In unavoidable circumstances, suitable compensation shall be paid to the people whose land will be temporarily acquired for the duration of the operations. The compensation shall cover for loss of income for the duration of temporary acquisition and land restoration. Prior to the

construction of the haul roads, topsoil shall be stripped and stockpiled for re-use.

Material dumping sites shall be access controlled to prevent the unauthorized entry of the people, grazing cattle and stray animals.

Haulage roads shall be reinstated upon completion of hauling for the use of local communities.”

Sub-Clause 111.14      Equipment and Vehicles used for the Works

Equipments and vehicles deployed for the construction activities shall not be older than 5 years. Equipments used for road and bridge works shall be based on new technology and shall generate noise and pollutants not exceeding the limits specified by the relevant State Authorities. Vehicles and machineries used for road and bridge works are to be regularly maintained to conform to the National Air Quality Standards. Blasting, if any, will be carried out using small charges.

Sub-Clause 111.15      Noise Control

The Contractor shall consider noise as an environmental constrain in the planning and execution of the Works.

The Contractor shall take all necessary measures so that the operation of all mechanical equipment and construction processes on and off the site shall not cause any unnecessary or excessive noise, taking in to account applicable environmental requirements. The Contractor shall use all necessary measures and shall maintains all plant and silencing equipment in good conditions so as to minimize the noise emission during construction works.

Any member of the work force likely to be exposed to beyond their threshold noise levels shall be provided with protective equipment, such as earplugs, and shall be rotated every four hours.

Construction operations shall be limited to daytime hours only, particularly in the settlement areas.

Sub-Clause 111.16      Vibration Control

The Contractor shall take measures during construction activities to control the movement of the work force and construction machinery/equipment, and to avoid/ minimize activities, which produce vibrations.

Sub-Clause 111.17      Measurement

Monitoring of Air/Water/Noise and Soil quality shall be paid as per numbers of samples tested. For Compliance of all other provisions made in this Clause 111, it shall be deemed to be incidental to the work and no separate measurements shall be made. The Contractor shall be deemed to have made allowance for such compliance with these provisions in the preparations of his prices for items of work included in the Bills of Quantities and full compensation for such compliance shall be deemed to be covered by them.”

CLAUSE 112              ARRANGEMENT FOR TRAFFIC DURING CONSTRUCTION

Sub-Clause 112.4      Traffic Safety and Control

Last line of Para 5 shall be read as under:

“The signs shall be of approved design and of reflector type.” **Add the following paragraph at the end of the clause:**

“Before commencement of any construction, the Contractor shall prepare and

submit details of the arrangements for passing traffic during construction, design of barricades, signs, markings, lights, flags etc. conforming and satisfying the requirements of the "Guidelines on Safety in Road Construction Zones" of IRC: SP 55-2001 and get the same approved by the Engineer.

Sub-Clause 112.6

Measurement for Payment and Rates

- a) The provision of treated shoulder including construction of temporary cross drainage structures, if required, as described in Clause 112.2 including their maintenance, dismantling and clearing debris, where necessary, shall be considered as incidental to the works and shall be Contractor's responsibility.
- b) The Construction of temporary diversion including temporary cross drainage structures as described in subclause 112.3, shall be measured in linear meter and the unit contract rate shall be inclusive of full compensation for construction (including supply of material, labor, tools, etc.), maintenance as per sub clause 112.5, final dismantling, and disposal.
- c) All Traffic safety and control devices during construction as per sub clause 112.4 including providing, erecting and maintaining barrier, signs, markings, flags, lights and providing flag men etc. is included in item rate.

CLAUSE 114

SCOPE OF RATES FOR DIFFERENT ITEMS OF WORK

Sub-Clause 114.2

Item (ii) of Clause 114.2 shall read as follows:

A detailed resource-based construction programme including resources planning using computerized critical path network method/PERT in a form, which facilitates control of the progress of the works and consequences of any changes in terms of time. The programme shall also include detailed network, activities for the submission and approval of materials, procurement of critical materials and equipment, fabrication of special products/ equipment and their installation and testing and for all activities of the Contractor that are likely to affect the progress of work etc. including updating all such activities on the basis of decisions taken at the periodic site review meetings or as directed by the Engineer. The Contractor shall submit data via electronic media to the Engineer in a form readily compatible with Engineer's planning system.

The first issue of the detailed construction programme including the detailed description of the system and the procedures shall be submitted to the Engineer for acceptance not later than 28 days after the date of receipt of the letter of acceptance.

The contractor shall submit to the Engineer for approval & consent, the updated & revised programme at every three months interval or as such as directed by the Engineer. The updated & revised programme shall be submitted showing the actual progress achieved (physical & financial) and the effects of the progress achieved on the timing of the remaining work including any change to the sequence of the activities

CLAUSE 115

METHODOLOGY AND SEQUENCE OF WORK

The Clause shall be substituted as follows:

Sub-Clause 115.1

Submission of Method Statement

The Contractor shall submit methods statement within 28 days after the date of letter of acceptance. The methods statement shall be submitted in two parts.

The General part of the methods statement shall describe the Contractor's proposals regarding preliminary works, common facilities, and items that

require consideration at the early stage of the Contract. The General part shall be furnished along with the first issue of the construction programme (refer clause 114.2) and shall include information on:

- a) Sources of materials like coarse aggregate and fine aggregate, quantity and quality of materials available in different sources;
- b) Sources of manufactured materials like cement, steel, bitumen reinforcement, prestressing strands and bearings. Wherever possible the Contractor shall identify at least two sources for each of the items; he shall also submit test certificates of recently manufactured materials for the consideration of the Engineer.
- c) Locations of site facilities like batching plant, hot mix plant, aggregate processing plant, crushing plant etc.
- d) Details of facilities/approaches for transportation of men, equipment and materials for construction of pavements, foundations and substructure in riverbed, and plan for free traffic flow and safe drainage.
- e) Information on procedures to be adopted by the Contractor for prevention and mitigation of negative environmental impact due to construction activities.
- f) Any other information required by the Engineer subsequent to the scrutiny of method statement

The General part of the Q.A. Programme shall accompany the method statement under sub-clause 105.3.

The Special part of the methods statement shall be submitted to the Engineer by the Contractor for each important item of work like construction of embankments and subgrade, pavements, pile/well foundations, concreting, prestressing, repair and rehabilitation of existing structures, concrete superstructure, dismantling of structures and pavement and for any other item as directed by the Engineer.

These statements shall give information on

- i) Details of personnel both for execution and quality control of the work.
- ii) Equipment deployment with details of number of units, capacity, standby arrangements
- iii) Sequence of construction, details of temporary or enabling works like, diversions, cofferdams, formwork including specialized formwork for superstructure, details of borrow areas, method of construction of embankment and subgrade, pavements, piles, wells, concreting procedures, details of proprietary process and products (e.g. details of prestressing systems, proprietary piling systems, bearings, expansion joints etc.) and details of equipment to be deployed. Wherever necessary, technical literature, design calculations and drawings shall be included in the method statement.
- iv) Testing and acceptance procedures including documentation.
- v) Special part of the Q.A. Programme referred in clause 105.3 for the particular item of work shall be submitted along with the method statement for the concerned activity.
- vi) Engineer shall examine and approve the method statement or direct the Contractor to resubmit the statement with required modifications. The modified statement shall be submitted within 14 days of receipt of Engineer's comments.



The sole responsibility for the safety and adequacy of the methods adopted by the Contractor shall rest on the Contractor irrespective of any approval given by the Engineer.

Sub-Clause 115.2

Approval of Proprietary Product/Process/System

Only proprietary products proven by International usage in comparable projects shall be permitted to be used. Fully authenticated details of licensing and collaboration arrangement shall be submitted by the manufacturer, where relevant.

Within 90 days of award of work the Contractor shall submit the following information for all proprietary products for approval by the Engineer.

i) Name of manufacturer and name of product/ process/system.

Complete details of the manufacturer of the product/ process/ system shall be furnished. Details of projects where similar product/process/system has been successfully used shall be furnished. Authenticated copies of license/collaboration agreement shall be furnished.

ii) General features of the product/product process/system.

Detailed write up with methods statements shall be furnished for each product/ process/ system. This shall include complete working drawings & installation drawings, technical specifications covering fabrication, materials, system of corrosion protection etc.

i) Details of product development and development testing.

ii) Acceptance test and criteria.

Manufacturer shall submit a quality assurance system document. Details of acceptance test and criteria of acceptance shall be furnished in this document.

i) Installation procedure.

ii) Maintenance procedure and schedule.

iii) Warranty proposal.

The Engineer may instruct any additional tests for the purpose of accepting the product. The charges of these additional tests shall be borne by the Employer only in case the product satisfies the specifications.

CLAUSE 120

FIELD LABORATORY

Sub-Clause 120.2

Description

Replace the words "indicated in the drawings" in the first sentence of second paragraph of this Clause with the words "per provisions indicated in this Clause and at a location approved by the Engineer."

Replace "electric supply etc." to the second sentence of first paragraph by "including uninterrupted power supply etc."

Delete the first sentence of second paragraph "The floor space in the drawing" and substitute the following:

"The floor space required for the field laboratory shall be not less than 200 sq.m.

"The fourth sentence of second paragraphs "The furnishing in Table 100-2" shall read as under.

"A good semi furnished office accommodation shall be provided to the Material Engineers of the Supervision Team as per the direction of the Engineer."

Add the following at the end of this Clause:

“There shall also be provided a concrete paved area, for storing samples adjacent to the laboratory, of about 100 sq.m and another 75 sq.m shall be suitably roofed with open sides giving protection against sun and rain.

Within 14 (fourteen) days of the commencement date, the Contractor shall prepare and submit a layout plan and details of the laboratory building and make/supplier of the equipment to the Engineer for his approval.

The field laboratory to be provided under the Contract shall be handed over to the Engineer in finished and fully equipped condition not later than 2 months after the receipt of Notice to Commence Work, and the field laboratory with all equipment/instrument shall be to the entire satisfaction of the Engineer. During the 2-month period starting from the Notice to Commence work, the laboratory tests shall be performed in another laboratory proposed by the Contractor and approved by the Engineer.

### **Laboratory Equipment**

#### **General**

The items of laboratory equipment shall be provided in the field laboratory depending upon the items to be executed as per Table mentioned below instead of Table 100-2 shown in MORTH:

The following items of laboratory equipment shall be provided in the field laboratory:

The equipment and instruments shall be new and shall be quality certified by Bureau of Indian Standards (BIS).

<b>Sr. No.</b>	<b>Sub No.</b>	<b>Item, Specifications</b>	<b>Nos. required</b>
<b>A: General</b>			
(i)	<b>Balance</b>		
	(a)	7 kg to 10 kg capacity semi -self indicating Electronic Type –Accuracy 1 gm	2
	(b)	500 gm capacity semi-self-indicating Electronic Type – Accuracy 0.01 gm	2
	(c)	Chemical balance 100gm capacity - Accuracy 0.0001gm	1
	(d)	Pan balance 5 kg capacity - Accuracy 0.5 gm	2
	(e)	Platform Scale – 300 kg capacity	1
	(f)	Triple Beam balance-25kg capacity Accuracy 1gm	2
(ii)	<b>Ovens – Electrically operated, thermostatically controlled</b>		
	(a)	From 100°C to 220°C – Sensitivity	2
(iii)	<b>Sieves, as per IS 460-1962</b>		
	(a)	IS Sieves 450 mm internal dia. of sieve sets as per BIS of required sieve sizes complete with lid and pan	2 set
	(b)	IS sieve 200 mm internal dia. (brass frame and steel or brass wire cloth mesh) consisting of sieve sets of required sieve sizes complete with lid and pan	2 set
(iv)	Sieve shaker capable of taking 200 mm and 450 mm dia. Sieves electrically operated with time switch assembly (As per BIS)		1
(v)	200 tones compression testing machine		1
(vi)	Stop watches 1/5 sec. Accuracy		2
(vii)	Glassware comprising of Beakers, Pipettes, dishes, measuring cylinders (100 to 1000		1 Dozen

	cc capacity) glass rods and funnels, glass thermometers range 0°C to 100°C and metallic thermometers range 300°C	each
(viii)	Hot plates 200 mm dia (1500 watt)	6
(ix)	<b>Enamel trays</b>	
	(a) 600 mm x 450 mm x 50 mm	10
	(b) 450 mm x 300 mm x 40 mm	10
	(c) 300 mm x 250 mm x 40 mm	6
	(d) Circular plates of 250 mm dia.	6
(x)	Water Testing Kit	1
(xi)	First Aid Box	1
(xii)	Spatula Set of 100 and 200 long	3
(xiii)	Digging Tools (pixels, shovel, fork etc.)	As reqd.
(xiv)	Miscellaneous tools (sledge hammer, lump hammer, wooden pegs etc.)	As reqd.
(xv)	Maximum and Minimum Thermometer	2 Set
(xvi)	Rain Gauge	1 Set
(xvii)	Timer 0-60 minutes with alarm & 1/5 sec accuracy.	3 Sets

<b>B: For Soils and Aggregates</b>		
(i)	Water still, 3 litre/hr with fittings and accessories	1
(ii)	Liquid limit device with Casagrande and ASTM grooving tools as per IS: 2720	1
(iii)	Sampling pipettes fitted with pressure and suction inlets, 10 mlCapacity	2 set
(iv)	Compaction apparatus (Proctor) as per IS: 2720 (Part 8) complete with collar, base plate and hammer	1 set
(v)	Modified AASHTO compaction apparatus as per IS. 2720 (Part 7) 1980 or Heavy Compaction Apparatus as per IS complete with collar, base plate and hammer	1 set
(vi)	Sand pouring cylinder with conical funnel and tap and complete as per IS 2720 (Part 28) 1980 including modified equipment	4
(vii)	Sampling tins with lids 100 mm dia x 75 mm ht½ kg capacity and miscellaneous items like moisture,tins with lid (50 grams) etc.	12
(viii)	Lab CBR testing equipment for conducting CBR testing, load frame with 5 Ton capacity, electrically operated with speed control as per IS: 2720 (Part 16), and consisting of following:	<b>1 set</b>
	(a) CBR moulds 150-mm dia- 175-mm htcomplete with collar, base plateetc.	<b>24</b>
	(b) Tripod stands for holding dial gauge holder	<b>24</b>
	(c) CBR plunger with settlement dial gauge holder	<b>1</b>
	(d) Surcharge weight 147-mm dia2.5 kg weight with centralhole	48
	(e) Spacer disc 148-mm dia, 47.7-mm ht. With handle	3
	(f) Perforated plate (Brass)	24
	(g) Soaking tank for accommodating 24 CBR moulds	
	(h) Provingringsof1000kg,2500kgand5000kgcapacity	1 each
	(i) Dial gauges, 25 mm travel- 0.01 mm/division	10
	(j) <b>Aluminium Tis</b>	
	50x30m	36 nos
	55x35m	36 nos
	70x45m	36 nos
	70x50m	36 nos
	80x50m	36 nos
(ix)	Standard Penetration test equipment	1
(x)	Nuclear Moisture Density Meter or equivalent	2
(xi)	Speedy moisture meter complete with chemicals	2

(xii)	Unconfined compression test apparatus	1 set
(xiii)	Aggregate Impact Test Apparatus	1
(xiv)	Aggregate Impact Test Apparatus as per IS 2386 (Part 4)1963	1
(xv)	Los Angeles abrasion Test Apparatus as per IS 2386 (Part 4)1963	1
(xvi)	Riffle Box of Slot size of 50mm as per ASTM C-136	1

<b>C: For Bitumen and Bituminous Mixes</b>		
(i)	Constant temperature bath for accommodating bitumen	2
	Test specimen electrically operated and thermostatically controlled, 50-liter capacity temp. range ambient 80o C	
(ii)	Penetrometer automatic type, adjustable weight arrangement and needles as per IS. 1203 – 1978	2
(iii)	Solvent extraction or centrifuge type apparatus complete (AASHTO, T-164) with extraction thimbles with stocks of solvent and filter paper	1
(iv)	Laboratory mixer including required accessories about .02 cum capacity electrically operated fitted with heating jacket	1
(v)	Marshall compaction apparatus automatically operated as per ASTM 1559-62 T and complete with electrically operated loading unit, compaction pedestal heating head assembly, dial micrometre and bracket for flow measurement, load transfer bar, specimen mould 100 mm dia. (4 in) with base plate, collars, specimen extractor, compaction hammer 4.53 kg (10 lb.) x457 mm (18 in) fall	1 set
(vi)	Distant Reading Digital Thermometer for Measuring Temperatures in Asphaltic Mixes	As required
(vii)	Riffle Box	1
(viii)	Automatic Asphalt Content Gauge [Nuclear are equivalent]	1
(ix)	Thin film Oven test apparatus to the requirement of AASHTO T 179, including accessories	1
(x)	Ring Ball Apparatus as per IS 1205- 1978	1
(xi)	Asphalt Institute Vacuum Viscometer as per IS 1206(part II) – 1978	1
(xii)	BS U- Tube Modified Reverse Floro Viscometer IS 1206(Part III) – 1978	1
(xiii)	Apparatus for Determination of Ductility Test as per IS 1208 – 1978	1
(xiv)	Pen Sky – Martars closed Tester for testing flashandfire point as per IS 1209 – 1978.	1
(xv)	Apparatus for Float Test – IS – 1210 – 1978	1
(xvi)	Apparatus for Determination of water content (Deanand Shark Method) IS – 1211 – 1978	1
(xvii)	Apparatus for Determination of Loss on Heading IS– 1212-1978.	1
(xviii)	Apparatus of Determination of specified Gravity IS- 1202-1978	1
(xix)	Core cutting machine with 100mm dia. Diamond cutting Edge	1
(xx)	Apparatus for Elastic Recovery test for Modified Bitumen	1
(xxi)	Apparatus for Storage Stability test for Modified Bitumen	1
(xxii)	Apparatus for Separation test for modified bitumen	1

<b>D: For Cement, Cement Concrete and Materials</b>		
(i)	Water still	1

(ii)	Vicat needle apparatus for setting time with plungers, as per IS. 269-1967		1
(iii)	Moulds		
	(a)	150 mm x 300 mm ht cylinder with capping component	As required
	(b)	150mmx150 mm x150mm cubical for compressive strength	As required
	(c)	150mmx100 mm x600mm beam for flexural strength	As required
(iv)	Concrete permeability apparatus		1
(v)	High frequency mortar cube vibrator for cement testing		1
(vi)	Concrete mixer power driven, 1 cu ft. capacity		1
(vii)	Variable frequency and amplitude vibrating table size 1 metre x 1 metre, as per the relevant British Standard		1
(viii)	Flakiness & Elongation test apparatus		2each
(ix)	Aggregate impact test apparatus as per IS 2386 (Part 4) 1963		2
(x)	Los Angeles abrasion apparatus as per IS. 2386 (Part 4) 1963		1
(xi)	Flow table as per IS 712-1973		1
(xii)	(a)	Equipment for slump test	2
	(b)	Compaction factor test equipment	1
(xiii)	Equipment for determination of specific gravity for fine and coarse aggregate as per IS 2386 (Part 3) 1963		2
(xiv)	Flexural attachment to compression testing machine		1
(xv)	Core cutting machine with 150 mm dia. Diamond cutting edge		1
(xvi)	Needle vibrator		1
(xvii)	Vibrating hammer as per BS specification		1
(xviii)	Air entrainment meter ASTM C - 231		1
(xix)	0.5 Cft, 1 Cft cylinder for checking bulk density of aggregate with tamping rod		1
(xx)	Soundness testing apparatus for cement		1
(xxi)	Flexural Beam testing machine with accessories		1
(xxii)	Chemicals solutions and consumable		As reqd.
(xxiii)	Chloride Testing kit for chemical analysis of chloride content.		1
(xxiv)	ION Exchange kit for rapid determination of sulphate content.		1

E: For Control of Profile and Surface Evenness			
(i)	Digital Level complete with all accessories		2 sets
(ii)	Distomat or equivalent		2 Nos.
(iii)	Theodolite – Electronically operated with computerized output attachment		2 sets
(iv)	Total Station with all accessories		2 sets
(v)	Towed Fifth Wheel Bump Indicator		1 set
(vi)	3meter straight edge and measuring wedge		2 sets
	Camber templates 2 lane		
(vii)	String line Arrangement with paver and sensor powers		1
	(a)	Crown type cross-section	2 sets
	(b)	Straight run cross-section	2 sets
(viii)	Steel tape		
	(a)	5 m long	as reqd

	(b)	10 m long	as reqd
	(c)	20 m long	as reqd
	(d)	30 m long	as reqd
	(e)	50 m long	As reqd
	(e)	50 m long	As reqd
(ix)	Precision Staff		3 Sets

**Note:** The laboratory set-up must be complete including a set of reference standards, adequately staffed and operational to the satisfaction of the Engineer not later than 2 months from the date of receipt of Notice to commence the works.

Sub-Clause 120.3      Ownership

This Clause shall read as under:

“Land for the laboratory shall be provided by the Contractor.”

Sub-Clause 120.4      Maintenance

This Clause shall read as under:

“The Contractor shall arrange to maintain the field laboratory including sample store yards in a satisfactory manner until the issue of Taking over Certificate for the whole work. Maintenance includes all activities described in Clause 120.4 and maintenance of equipment and running of the same including chemicals and consumables.”

Sub-Clause 120.5      Rate

The construction, supply, installation, maintenance, and operation including all consumables like chemicals & reagents etc., and all other expenses involved in connection thereto for the field laboratory shall be incidental to the work, and shall not be paid for separately.

SECTION 200      Site Clearance

CLAUSE 201      CLEARING AND GRUBBING

Sub-Clause 201.1      Scope

Replace with following Para:

This work shall consist of cutting, excavating, removing, and disposing of all materials such as trees of girth up to 300 mm, bushes, shrubs, stumps, roots, grass weeds, rubbish etc. and top soil up to 150 mm, which in the opinion of Engineer is unsuitable for incorporation in the work including draining out stagnant water if any from the area of road land, drain, cross drainage structure and other area as specified in the drawing or instructed by Engineer. It shall include necessary excavation by harrow discs or any other suitable equipment, backfilling of the pits by suitable soil, resulting from uprooting of trees & stumps and making the surface in proper grade by suitable equipment and compacted by power roller to required compaction as per Clause 305.3.4. The work also includes handling, salvaging and disposal of cleared material. Clearing and grubbing shall be performed less than one month in advance of earthwork operation and in accordance with requirement of these specifications.

CLAUSE 202      DISMANTLING CULVERTS, BRIDGES AND OTHER STRUCTURES/ PAVEMENTS

Sub-Clause 202.5      Disposal of Materials

The first paragraph of the sub clause shall read as below:

All materials obtained of dismantling/milling shall be the property of the

Contractor for which he shall quote a rate for rebate in BOQ Bill No. 1, and the Contractor shall be free to use this material in work, or he may sell/dispose the material to as desired / deemed fit by him.

The existing pavement crust shall be reused as indicated below:

Contractor shall be free to use dismantled / milled material, as is where basis is, or by suitably modifying the material, or by crushing the material, or by breaking the material, and screening the same, provided it meets the specifications and is approved by the Engineer.

SECTION 300 Earthwork, Erosion Control and Drainage

CLAUSE 301 EXCAVATION FOR ROADWAY AND DRAINS

Sub-Clause 301.1 Scope

Add the following as second paragraph under this clause:

“The work shall also include excavation for channel training at culverts/bridges, excavation of existing shoulders and medians for purposes of widening the pavement and excavation of existing embankment for reconstruction to specification.”

CLAUSE 304 EXCAVATION FOR STRUCTURES

Sub-Clause 304.3.2 Excavation

At the end of 1<sup>st</sup> paragraph of Clause 304.3.2 inserts the following additional sentences:

“The Contractor shall ensure the stability and structural integrity of adjacent existing foundations and structures and if necessary shall, at his own expense, install temporary or permanent sheet piles, coffer dams, shoring or similar as support or protection to the satisfaction of the Engineer.”

CLAUSE 305 EMBANKMENT CONSTRUCTION

Sub-Clause 305.2 Material and General Requirements

Sub-Clause 305.2.1 Physical Requirements:

Sub-Clause 305.2.1.2 Add the following after second paragraph:

“Soils having medium and high swelling potential shall be defined based on Liquid Limit, Plastic Limit, Shrinkage Limit, Gradation, Free swelling Index, Field dry Density and Field Moisture Content and types of Clay minerals present in the soil and as directed by the Engineer. The location and the extent of these soils with medium to high swelling potential should be defined as directed by the Engineer.”

Sub-Clause 305.2.2.2 Borrow Materials

Para 1 of this Clause shall read as under:

“ No borrow area shall be made available by the Employer for this work. The arrangement for the source of supply of the material for embankment and sub-grade as well as compliance to the different environmental requirements in respect of excavation and borrow areas as stipulated, from time to time, by the Ministry of Environmental and Forest, Government of India and the local bodies, as applicable, shall be the sole responsibility of the Contractor.”

Sub-Clause 305.2.2.4 Compaction Requirements

In Clause 305.2.2.4 delete Table 300-2 and substitute the following:

**Table 300-2**

**Compaction Requirements of Embankment and Subgrade**

Sr. No.	Type of Work/Material	Relative Compaction as %age of maximum laboratory dry density as per IS 2720 (Part 8)
1	Subgrade and earthen shoulders	Not less than 97%
2	Embankment	Not less than 95%
3	Expansive clays	Not allowed
4	Design CBR of Subgrade & Shoulder has been taken 8. The borrow earth used for subgrade material must satisfied the requirement of the design CBR of 8 %	

Para 2 of this Clause given below Table 300-2 shall read as under:

The contractor shall at least 21 working days before commencement of construction of embankment and the subgrade; submit the following to the Engineer for approval:

- (i) The values of maximum dry density and optimum moisture content obtained in accordance with IS: 2720 (Part 8) for each fill material proposed to be used in the construction of embankment and subgrade.
- (ii) The graphs of Density plotted against moisture content from which each of the values in (i) above of maximum dry density and optimum moisture content were determined.
- (iii) The dry density-moisture content-CBR relationships, heavy comp active efforts conforming to the IS 2770 (part 8) for each of the fill material proposed to be used in the subgrade.

The above information shall form the basis for compaction only upon its approval by the Engineer."

Sub-Clause 305.3 Construction Operations

Sub-Clause 305.3.4 Compacting Ground Supporting Embankment/Subgrade

Para 1 of this clause shall be read as

"Where necessary the original ground shall be levelled, scarified, mixed with water and then compacted by rolling to facilitate placement of first layer of embankment so as to achieve minimum dry density as given in Table 300-2.

Sub-Clause 305.8 Measurement for Payment

Substitute Clause 305.8.1 shall be read as

"Earth embankment/sub-grade construction shall be measured separately by taking cross sections at intervals after clearing and grubbing and if necessary compaction of original ground before the embankment work starts and after its completion and computing the volumes of earthwork in cubic metres by the method of average and areas."

CLAUSE 306 SOIL EROSION AND SEDIMENTATION CONTROL

Sub-Clause 306.4 Measurements for Payment

Substitute Clause 306.4 as follows:

"All temporary sedimentation and pollution control works shall be deemed as incidental to the earthwork and other items of work and as such no separate payment shall be made for the same."

SECTION 400 Sub-Bases, Bases (Non-Bituminous) and Shoulders

CLAUSE 401 GRANULAR SUB BASE

Sub-Clause 401.1 Scope



	Add the following at the end of this Clause: "A site trial shall be performed in accordance with Clause 901.16."
Sub-Clause 401.2.2	Physical Requirements  Add at the end of this clause as under:  The Contractor shall, at least 21 working days before the commencement of the construction of the sub-base course, submit to the Engineer, the results for approval of the laboratory testing on the physical properties defined above. The construction of the sub-base course shall be taken up only upon the Engineer's approval of the material.  Grading-I of table 400-1 shall be adopted at site.
CLAUSE 406	WET MIX MACADAM SUB BASE/BASE
Sub-Clause 406.4	Opening to Traffic  The Clause shall be read as follows:  No vehicular traffic of any kind shall be allowed on the finished wet mix macadam surface.
SECTION 500	Base and Surface Courses (Bituminous)
Sub-Clause 501.2	Materials
Sub clause 501.2.1	Binder  Binder of VG-10 grade shall be used or if available viscosity grade of bitumen shall be used in accordance with IS: 73
Sub-Clause 501.2.2	Delete "Crushed gravel or other hard material" from first Line of Para 1."  Para 3 is deleted.
CLAUSE 505	DENSE BITUMINOUS MACADAM
Sub-Clause 505.2.1	Bitumen  Binder of VG-10 grade shall be used or if available viscosity grade of bitumen shall be used in accordance with IS: 73.
CLAUSE 507	BITUMINOUS CONCRETE
Sub-Clause 507.2.1	Bitumen  Binder of VG-10 grade shall be used.
SECTION 800	Traffic Signs, Markings and Other Road Appurtenances
CLAUSE 803	ROAD MARKINGS
Sub-Clause 803.2	Materials  This clause shall read as under:  "Road markings shall be hot applied thermoplastic compound and the materials shall meet the requirements as specified in Clause 803.4.  The road markings shall be laid in one layer with appropriate road marking machine approved by the Engineer. Before the road-marking machine is used on the permanent works, the satisfactory working of the machine shall be demonstrated on a suitable site, which is not part of the permanent works. The rate of application shall be checked and adjusted as necessary before application on a large scale is commenced, and thereafter daily."
CLAUSE 806	ROAD DELINATORS

Sub-Clause 806.2

This clause shall read as follows:

- a) Triangular Object Marker shall be 300mm side with four red reflectors, made out of 2mm thick aluminium sheet, face to be fully covered by high intensity grade white retro reflective sheeting of encapsulated lens type as per clause 801. The background/border/symbols shall be made by screen-printing of desired colour as per sign details. The sign plate shall be fixed with 6mm dia. aluminium rivets on MS angle iron frame. The angle iron frame shall be made with angle of size 40mmx40mmx5mm. The sign shall be fixed with nut-bolts & welding on MS pipe 50mm dia (NB-MW) and 500mm high.
- b) Rectangular hazard marker 600mm x 300mm made out of 2mm thick aluminium sheet, face to be fully covered by high intensity grade white retro reflective sheeting of encapsulated lens type. The background/ border/ symbols shall be made by screen-printing of desired colour as per sign details. The sign plate shall be fixed with 6mm dia aluminium rivets on MS angle iron frame. The angle iron frame shall be made with angle of size 40mmx40mmx5mm. The sign shall be fixed to 80mm dia (NB-MW) MS pipe.
- c) Roadway Indicators shall be 1000mm high made with 100 mm dia. NB medium weight MS pipe. One reflector of high intensity grade retro reflective sheeting with encapsulated lens shall be provided on top of the reflector. The white & red reflector shall be provided alternatively of 40mm width, so that total width of reflector shall be 120mm. A wire mesh cover of 150mm height shall be provided on top.
- d) All components of signs & supports shall be thoroughly descaled, cleaned, primed and painted with two coats of epoxy paint. The sign backside shall be with grey colour and post shall be white colour/ alternate white & black bands. The post below ground shall be painted with three coats of red lead.

Clause 2100

Open Foundation

Sub-Clause 2104.1

Preparation of Foundation

Please add the following as a last para-

Considering the soil SBC as per Geotechnical report, 1 m of depth below the founding level of bridges shall be removed and replaced with granular sand. The cost of the excavation and sand shall be made from respective items.

## **Schedule - E**

(See Clauses 2.1 and 14.2)

### **Maintenance Requirements**

#### **1. Maintenance Requirements**

- (i) The Contractor shall, at all times maintain the Project Highway in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permits.
- (ii) 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-fulfilment 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.
- (iii) All Materials works and construction operations shall conform to the MORTH Specifications for Road and Bridge Works, and the relevant IRC publications. Where the specifications for a work are not given, Good Industry Practice shall be adopted.

[Specify all the relevant documents]

#### **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: SP35. 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**

- (a) All damages occurring to the Project Highway on account of a Force Majeure Event or wilful default or neglect of the Authority shall be undertaken by the Authority at its own cost. The Authority may instruct the Contractor to undertake the repairs at the rates agreed between the Parties

**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.

**Table -1: Maintenance Criteria for Pavements:**

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/Repair	Maintenance Specifications
		Desirable	Acceptable					
Flexible Pavement (Pavement of MCW, Service Road, Approaches of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Potholes	Nil	< 0.1 %of area and subject to limit of 10 mm in depth	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC 82: 2015 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA2003( <a href="http://www.tfhr.com/pavement/http/reports/03031/">http://www.tfhr.com/pavement/http/reports/03031/</a> )	24-48 hours	MORT&H Specification 3004.2
	Cracking	Nil	< 5 %subject to limitof0.5 sq.m for any 50 m length	Daily			7-15 days	MORT&H Specification 3004.3
	Rutting	Nil	< 5 mm	Daily	Straight Edge		15 -30 days	MORT&H Specification 3004.2
	Corrugations and Shoving	Nil	< 0.1% ofarea	Daily	Length Measurement Unit like		2-7 days	IRC:82- 2015
	Bleeding	Nil	< 1 % of area	Daily	Scale, Tape, odometer etc.		3-7 days	MORT&H Specification 3004.4
	Ravelling/Stripping	Nil	< 1 % of area	Daily			7-15 days	IRC:82- 2015 read with IRC SP 81
	Edge Deformation/ Breaking	Nil	< 1 m for any 100 m section and width<0.1 matanylocation, restricted to 30 cm from the edge	Daily			7- 15 days	IRC:82-2015
	Roughness BI	2000mm/km	2400mm/km	Bi- Annually	Class I Profilometer SCRIM(Sideway- force CoefficientRoutine Investigation Machine or equivalent)		Class I Profilometer: ASTM E950 (98) :2004 –Standard Test Method for measuring Longitudinal Profile of Travelled Surfaces with Accelerometer Established Inertial Profiling Reference ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement	180 days
	Skid Number	60SN	50SN	Bi- Annually		180 days		BS: 7941-1: 2006
	Pavement Condition Index	3	2.1	Bi- Annually		180 days		IRC:82- 2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/Repair	Maintenance Specifications	
		Desirable	Acceptable						
							Condition Survey Equipment		
	Other Pavement Distresses			Bi- Annually				2-7 days	IRC:82- 2015
	Deflection/ Remaining Life			Annually	Falling Weight Deflectometer	IRC 115: 2014	180 days	IRC:115- 2014	
Rigid Pavement (Pavement of MCW, Service Road, Grade structure, approaches of connecting road, slip roads, lay byes etc. as applicable)	Roughness BI	2200m m/km	2400mm /km	Bi- Annually	Class I Profilometer	ASTM E950 (98) :2004 and ASTM E1656 - 94: 2000	180 days	IRC:SP:83- 2018	
	Skid	Skid Resistance no. at different speed of vehicles		Bi- Annually	SCRIM (Sideway- force	IRC:SP:83-2018	180 days	IRC:SP:83- 2018	
		Minimum SN		traffic Speed (Km/h)	Coefficient Routine Investigation Machine or equivalent)				
		36							
		33							
	32								
		31		95					
		31		110					
Embankment/ Slope	Edge drop at shoulders	Nil	40m m	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC	7-15 days	MORT&H Specification 408.4	
	Slope of camber/cross fall	Nil	<2%variation inprescribedslope of camber/cross fall	Daily			7-15 days	MORT&H Specification 408.4	
	Embankment Slopes	Nil	<15 %variation inprescribe side slope	Daily			7-15 days	MORT&H Specification 408.4	
	Embankment Protection	Nil	Nil	Daily	NA		7-15 days	MORT&H Specification	
	Rain Cuts/ Gullies in slope	Nil	Nil	DailySpecialy During Rainy Season	NA		7-15 days	MORT&H Specification	

In addition to the above performance criterion, the contractor shall strictly maintain the rigid pavements as per requirements in the following table

**Table -2:Maintenance Criteria for Rigid Pavements:**

Sr.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
CRACKING						
1	SingleDiscreteCracksNotintersecting with any joint	w = width of crack L = length of crack d = depth of crack D = depth ofslab	0	Nil, not discernible	No Action	Not applicable
			1	w < 0.2 mm. hair cracks		
			2	w = 0.2 - 0.5 mm, discernible from slow-movingcar	Seal without delay	Seal, and stitch if L >1m. Within 7days
			3	w = 0.5 - 1.5 mm, discernible from fast-movingcar		
			4	w = 1.5 - 3.0 mm	Seal, and stitch if L > 1 m. Within 7 days	Staple or Dowel Bar Retrofit, FDR for affected portion. Within 15days
			5	w > 3 mm.		
2	Single Transverse (or Diagonal) Crack intersecting with one or morejoints	w = width of crack L = length of crack d = depth of crack D = depth ofslab	0	Nil, not discernible	No Action	
			1	w < 0.2 mm, hair cracks	Route and seal with epoxy. Within 7 days	Staple or Dowel Bar Retrofit. Within 15days
			2	w = 0.2 - 0.5 mm, discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route, seal and stitch, if L > 1m. Within 7 days	
			4	w = 3.0 - 6.0 mm	Dowel Bar Retrofit. Within 15 days	Full Depth Repair Dismantle and reconstructaffected. Portion with norms and specifications - See Para 5.5 & 9.2Within 15days
			5	w > 6 mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may befull depth	
3	Single Longitudinal Crack intersecting with one or more joints	w = width of crack L = length of crack d = depth of crack D = depth ofslab	0	Nil, not discernible	No Action	
			1	w < 0.5 mm, discernable from slow movingvehicle	Seal with epoxy, if L > 1 m. Within 7 days	Staple or dowel bar retrofit. Within 15days
			2	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route seal and stitch, ifL> 1 m. Within 15 days	-
			3	w = 3.0 - 6.0 mm	Staple, if L > 1 m. Within 15 days	Partial Depth Repair withstapling.Within 15 days
			4	w = 6.0 - 12.0 mm, usually associated withspalling	Not Applicable, as it may befull depth	
			5	w > 12 mm, usually associated with spalling, and/or slab rocking under traffic		Full Depth Repair Dismantle and reconstruct affected portion as pernorms And specifications - See Para 5.6.4 Within 15 days

Sr.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
4	MultipleCracks intersecting with one or morejoints	w = width of crack	0	Nil, not discernible	No Action	
			1	w < 0.2 mm, hair cracks	Seal, and stitch if L > 1 m. Within 15 days	
			2	w = 0.2 - 0.5 mm. discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Full depth repair within 15 days	Dismantle, Reinstatesubbase, Reconstruct whole slab as per specifications within 30 days
			4	w = 3.0 - 6.0 mm panel broken into 2 or 3pieces		
			5	w > 6 mm and/or panelbroken into more than 4 pieces		
5	Corner Break	w = width of crack L = length of crack	0	Nil, not discernible	No Action	-
			1	w < 0.5 mm; only 1 corner broken	Seal with low viscosity epoxy to secure broken parts Within 7 days	Seal with epoxy seal withepoxy Within 7days
			2	w < 1.5 mm; L < 0.6 m, only one cornerbroken		
			3	w < 1.5 mm; L < 0.6 m, two corners broken	Partial Depth (Refer Figure 8.3 of IRC: SP: 83-2008) Within 15 days	Full depth repair Reinstatesub-base, and reconstructthe slab as per norms and specifications within 30days
			4	w > 1.5 mm; L > 0.6 m or three corners broken		
			5	three or four corners broken		
6	Punch out (Applicable to Continuous Reinforced Concrete Pavement only)	w = width of crack L = length(m/m2)	0	Nil, not discernible		No Action
			1	w < 0.5 mm; L < 3 m/m <sup>2</sup>	Applicable, as it may be fulldepth	Seal with low viscosity epoxy to secure broken parts. Within 15days
			2	either w > 0.5 mm or L < 3 m/m <sup>2</sup>		
			3	w > 1.5 mm and L < 3 m/m <sup>2</sup>		Full depth repair - Cut out and replace damaged area taking care not to damage reinforcement. Within30days
			4	w > 3 mm, L < 3 m/m <sup>2</sup> and deformation		
			5	w > 3 mm, L > 3 m/m <sup>2</sup> and deformation		
7	RavellingorHoneycombttype surface	r = area damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	Short Term	Long Term
			1	r < 2 %	Local repair of areas damaged and liable to be damaged. Within 15 days	Not Applicable
			2	r = 2 - 10 %		
			3	r = 10-25%	Bonded Inlay, 2 or 3 slabs if affecting. Within 30 days	
			4	r = 25 - 50 %		
			5	r > 50% and h > 25 mm	Reconstruct slabs, 4 or more slabs ifaffecting.	



Sr.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
8	Scaling	r = damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	Within 30 days <b>Short Term</b>	Long Term  Not Applicable
			1	r <2 %	No action.	
			2	r = 2 - 10 %	Local repair of areas damaged and liable to be damaged. Within 7 days	
			3	r = 10 - 20%	Bonded Inlay within 15 days	
			4	r = 20 - 30 %		
			5	r > 30 % and h > 25 mm	Reconstruct slab within 30 days	
9	Polished Surface/Glazing	t = texture depth, sand patch test	0		No action.	Not Applicable
			1	t > 1 mm		
			2	t = 1 - 0.6 mm	Monitor rate of deterioration	
			3	t = 0.6 - 0.3 mm		
			4	t = 0.3 - 0.1 mm		
			5	t < 0.1 mm	Diamond Grinding if affecting 50% or more slabs in a continuous stretch of minimum 5 km. Within 30 days	
10	Pop out (Small Hole), Pothole Refer Para 8.4	n = number/m <sup>2</sup> d = diameter h = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m <sup>2</sup>	No action.	Not Applicable
			1	d=50-100mm;h<50mm;n<1 per 5 m <sup>2</sup>	Partial depth repair 65 mm deep. Within 15 days	
			2	d=50-100mm;h>50mm;n<1 per 5 m <sup>2</sup>		
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5m <sup>2</sup>		
			4	d = 100 - 300 mm; h > 100 mm; n < 1 per 5m <sup>2</sup>		
			5	d > 300 mm; h > 100 mm: n > 1 per 5 m <sup>2</sup>		
Joint Defects						
11	Joint Seal Defects	loss or damage L = Length as % total joint length	0	Difficult to discern.	Short Term No action.	Long Term  Not Applicable
			1	Discernible, L< 25% but of little immediate consequence with regard to ingress of water or trapping incompressible material.	Clean joint, inspect later.	

Sr.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
			3	Notable. $L > 25\%$ insufficient protection against ingress of water and trapping incompressible material.	Clean and reapply sealant in selected locations. Within 7 days	
			5	Severe; $w > 3$ mm negligible protection against ingress of water and trapping incompressible material.	Clean, widen and reseal the joint. Within 7 days	
12	Spalling of Joints	$w$ = width on either side of the joint $L$ = length of spalled portion (as % joint length)	0	Nil, not discernible	No action.	Not Applicable
			1	$w < 10$ mm	Apply low viscosity epoxy resin/ mortar in cracked portion. Within 7 days	
			2	$w = 10 - 20$ mm, $L < 25\%$		
			3	$w = 20 - 40$ mm, $L > 25\%$	Partial Depth Repair. Within 15 days	
			4	$w = 40 - 80$ mm, $L > 25\%$	30 - 50 mm deep, $h = w + 20\%$ of $w$ , within 30 days	
			5	$w > 80$ mm, and $L > 25\%$	50 - 100 mm deep repair. $H = w + 20\%$ of $w$ . Within 30 days	
13	Faulting (or Stepping) in Cracks or Joints	$f$ = difference of level	0	not discernible, $< 1$ mm	No action.	No action.
			1	$f < 3$ mm		
			2	$f = 3 - 6$ mm	Determine cause and observe, take action for diamond grinding	Replace the slab as appropriate.
			3	$f = 6 - 12$ mm	Diamond Grinding	Within 30 days
			4	$f = 12 - 18$ mm	Raise sunken slab.	Replace the slab as appropriate.
			5	$f > 18$ mm	Strengthen subgrade and sub-base by grouting and raising sunken slab	Within 30 days
14	Blow-up or Buckling	$H$ = vertical displacement from normal profile	0	Nil, not discernible	Short Term	Long Term
			1	$h < 6$ mm	No Action	
			2	$h = 6 - 12$ mm	Install Signs to Warn Traffic within 7 days	
			3	$h = 12 - 25$ mm		
			4	$h > 25$ mm	Full Depth Repair. Within 30 days	
			5	shattered slabs, i.e. 4 or more pieces	Replace broken slabs. Within 30 days	
15	Depression	$H$ = negative vertical displacement from normal profile $L$ = length	0	Not discernible, $h < 5$ mm	No action.	Not Applicable
			1	$h = 5 - 15$ mm		
			2	$h = 15 - 30$ mm, Nos $< 20\%$ joints	Install Signs to Warn Traffic within 7 days	

Sr.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20% joints	Strengthen subgrade. Reinstate pavement at normal level	
			5	h > 100 mm	If L < 20 m. Within 30 days	
16	Heave	h = positive vertical displacement from normal profile.  L = length	0	Not discernible. h < 5 mm	Short Term	Long Term
					No action.	
			1	h = 5 - 15 mm	Follow up.	
			2	h = 15 - 30 mm, Nos <20% joints	Install Signs to Warn Trafficwithin 7 days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20% joints	Stabilise subgrade. Reinstate pavement at normal level if length < 20 m. Within 30 days	
			5	h > 100 mm		scrabble
17	Bump	H =vertical displacement from normalprofile	0	h < 4 mm	No action	
			1	h = 4 - 7 mm	Grind, in case of new construction within 7 days	Construction Limit for New Construction.
			3	h = 7 - 15 mm	Grind, in case of ongoing Maintenance within 15 days	Replace in case of new construction.  Within 30days
			5	h > 15 mm	Full Depth Repair. Within 30 days	Full Depth Repair. Within 30days
18	Lane toShoulder Drop-off	f = difference of level	0	Nil, not discernible < 3mm	Short Term	Long Term
					No action.	
			1	f = 3 - 10 mm	Spot repair of shoulder within 7 days	
			2	f = 10 - 25 mm		
			3	f = 25 - 50 mm	Fill up shoulder within 7 days	For any 100 mstretch Reconstruct shoulder, if affecting 25% or more ofstretch. Within 30days
			4	f = 50 - 75 mm		
5	f > 75 mm					
Drainage						
19	Pumping	quantity of fines and water expelled through open joints and cracks Nos Nos/100 m stretch	0	not discernible	No Action	
			1 to 2	slight/ occasional Nos < 10%	Repair cracks and joints Without delay.	Inspect and repair sub-drainage at distressed sections and upstream.
			3 to 4	appreciable/ Frequent 10 -25%	Lift or jack slab within 30 days.	
			5	abundant,crack development >25%	Repair distressed pavement	

Sr.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
					sections. Strengthen subgrade and subbase. Replace slab. Within 30 days	
20	Ponding	Ponding on slabs due to blockage of drains	0-2	Nodiscernible problem	No action.	
			3 to 4	Blockages observed in drains, but water flowing	Clean drains etc. within 7 days, Follow up	Action required to stop water damaging foundation within 30 days.
			5	Ponding, accumulation of water observed	-do-	

**Table -3: Maintenance Criteria for Safety Related Items and Other Furniture Items:**

Asset Type	Performance Parameter	Level of Service (LOS)			Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Highway	Availability of Safe Sight Distance	As per IRC SP: 84-2019, a minimum of safe stopping sight distance shall be available throughout.			Monthly	Manual Measurements with Odometer along with video/image backup	Removal of obstruction within 24 hours, in case of sight line affected by temporary objects such as trees, temporary encroachments. In case of permanent structure or design deficiency: Removal of obstruction/improvement of efficiency at the earliest Speed Restriction boards and suitable traffic calming measures such as transverse bar marking, blinkers, etc. shall be applied during the period of rectification.		IRC: SP 84-2019
		Design Speed, kmph	Desirable Minimum Sight Distance (m)	Safe Stopping Sight Distance (m)					
		100	360	180					
		80	260	130					
Pavement Marking	Wear	<70% of marking remaining			Bi- Annually	Visual Assessment as per Annexure-F of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect within 2 months-	IRC:35-2015
	Day Night Time Visibility	During expected life Service Time Cement Road - 130 mcd/m <sup>2</sup> /lux			Monthly	As per Annexure-D of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect –	IRC:35-2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		BituminousRoad-100mcd/m <sup>2</sup> /lux					within 2 months	
	Nightime Visibility	<u>Initial and Minimum Performancefor Dry Retro reflectivity during nighttime:</u>		Bi-Annually	As per Annexure-E of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect – within 2 months	IRC:35-2015
		Design Speed	(RL) Retro Reflectivity (mcd/m <sup>2</sup> /lux)					
			Minimum Threshold level (TL) & warranty period required up to 2 years					
		Up to 65	200      80					
		65 - 100	250      120					
		Above 100	350      150					
		<u>Initial and Minimum Performance for Night Visibility under wet condition(Retro reflectivity):</u>						
		Initial 7 days Retro reflectivity: 100 mcd/m <sup>2</sup> /lux						

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		Minimum Threshold Level: 50 mcd/m <sup>2</sup> /lux					
	Skid Resistance	Initial and Minimum performance for SkidResistance: Initial (7days): 55BPN Min. Threshold: 44BPN *Note: shall be considered under urban/city traffic condition encompassing the locations like pedestrian crossings, bus bay, bus stop, cycle track intersection delineation, transverse bar markingsetc.	Bi-Annually	As per Annexure-G of IRC:35-2015		Within 24 hours	IRC:35-2015
Road Signs	Shape Position and	Shape and Position as per IRC: 67- 2012. Signboard should be clearly visible for the design speed of the section.	Daily	Visual with video/image backup		48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs)	IRC:67-2012
	Retro reflectivity	As per specifications in IRC:67-2012	Bi-Annually	Testing of each Signboard using Retro Reflectivity Measuring Device. In accordance with ASTM D 4956-09.	Improvement of shape, in case if shape is Damaged.  Relocation as per requirement change of signboard	15 Days in case of Gantry/Cantilever Sign boards 48 hours in case of Mandatory Signs, Cautionary	IRC:67-2012

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
						and Informatory Signs (Single and Dual postsigns)  1 Month in case of Gantry/Cantilever Sign boards	
<b>Kerb</b>	Kerb Height	As per IRC 86:2018 depending upon type of Kerb	Bi-Annually	Use of distance measuring tape	Raising Kerb Height	Within 1 Month	IRC 86:2018
	Kerb Painting	<u>Functionality:</u> Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	IRC 35:2015
<b>Other Road Furniture</b>	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP:84-2019 and IRC: 35-2015, unless specified in Schedule-B.	Daily	Counting	New Installation	Within 2 months	IRC:SP:84-2019,IRC:35-2015
	Pedestrian Guardrail	<u>Functionality:</u> Functioning of guardrail as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:SP:84-2019
	Traffic Safety Barriers	<u>Functionality:</u> Functioning of Safety Barriers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2014, IRC:119-2015
	End Treatment	<u>Functionality:</u> Functioning of End Treatment as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2019,
	Traffic Safety Barriers			backup			IRC:119-2015

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Attenuators	<u>Functionality:</u> Functioning of Attenuators as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP-2014, IRC:119-2015
	Guard Posts and Delineators	<u>Functionality:</u> Functioning of Guard Posts and Delineators as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:79-2019
	Overhead Sign Structure	Overhead sign structure shall be structurally adequate	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:67-2012
	Traffic Blinkers	<u>Functionality:</u> Functioning of Traffic Blinkers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2019
<b>Highway Lighting System</b>	Highway Lights	Illumination: Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84-2019
		No major failure in the lighting system	Daily	-	Rectification of failure	24 hours	IRC:SP:84-2019
		No minor failure in the lighting system	Monthly	-	Rectification of failure	8 hours	IRC:SP:84-2019
	Toll Plaza Canopy Lights	Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84-2019
		No major/minor failure in the lighting system	Daily	-	Rectification of failure	8 hours	IRC:SP:84-2019
Trees and Plantation	Obstruction in a minimum head-room of 5.5 m above carriageway	No obstruction due to trees	Monthly	Visual with video/image backup	Removal of trees	Immediate	IRC:SP:84-2019



Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
including median plantation	or obstruction in visibility road signs						
	Deterioration in health of trees and bushes	Health of plantation shall be as per requirement of specifications & instructions issued by Authority from time to time	Daily	Visual with video/image backup	Timely watering and treatment. Or Replacement of Trees and Bushes.	Within 90 days	IRC:SP:84-2019
	Vegetation affecting sight line and road structures	Sight line shall be free from obstruction by vegetation	Daily	Visual with video/image backup	Removal of Trees	Immediate	IRC:SP:84-2019
Rest Areas	Cleaning toilets	-	Daily	-	-	Every 4 hours	
	Defects in electrical, water and sanitary installations	-	Daily	-	Rectification	24 hours	
Other Project Facilities and Approach roads	Damage or deterioration in Approach Roads, pedestrian facilities, truck lay-bys, bus-bays, bus-shelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts and other works		Daily	-	Rectification	15 days	IRC:SP:84-2019

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Pipe/box/slab culverts	Free waterway/unobstructed flow section	85% of culvert normal flow area to available.	2 times in a year (before and after rainy season)	Inspection by Bridge Engineer as per IRC SP: 35-1990 and recording of depth of silting and area of vegetation.	Cleaning silt up soils and debris in culvert barrel after rainy season, removal of bushes and vegetation, U/s of barrel, under barrel and D/s of barrel before rainy season.	15 days before onset of monsoon and within 30 days after end of rainy season.	IRC:5-2015, IRC:SP:40-2019 and IRC:SP:13-2004
	Leak-proof expansion joints if any	No leakage through expansion joints	Bi-Annually	Physical inspection of expansion joints as per IRC SP: 35- 1990 if any, for leakage strains on walls at joints.	Fixing with sealant suitably	30 days or before onset of rains whichever comes earlier	IRC:SP:40-2019 and IRC SP:69-2011
	Structurally sound	Spalling of concrete not more than 0.25 sqm	Bi-Annually	Detailed inspection of all components of culvert as per IRC SP:35-1990 and recording the defects	Repairs to spalling, cracking, delamination, rusting shall be followed as per IRC:SP:40-2019.	15 days	IRC:SP:40-2019 and MORTH Specifications clause 2800
		Delamination of concrete not more than 0.25 sq.m.					
		Cracks wider than 0.3 mm not more than 1m aggregate length					
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron (concrete apron) not more than 1 sqm	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-2019 and IRC:SP:13-2004.
Bridges including ROBs	Riding quality	No pothole in wearing coat on bridge deck	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC or wearing coat	15 days	MORT&H Specification 2811

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Flyover etc. as applicable	user comfort						
Bridge Super Structure	Bumps	No bump at expansion joint	Daily	Visual inspection as per IRC SP:35- 1990	Repairs to BC on either side of expansion joints, profile correction course on approach slab in case of settlement to approach embankment	15 days	MORT&H Specification 3004 & 2811.
	User safety (condition of crash barrier and guardrail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	Daily	Visual inspection and detailed condition survey as per IRC SP: 35- 1990.	Repairs and replacement of safety barriers as the case may be	3 days	IRC: 5-2015, IRC SP: 84-2019 and IRC SP: 40-2019.
	Rusted reinforcement Spalling of concrete Delamination	Not more than 0.25 sq.m Not more than 0.50 sq.m Not more than 0.50 sq.m	Bi- Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out the repairs to affected concrete portion with epoxy mortar / concrete.	15 days	IRC SP: 40-2019 <sup>a</sup> and MORTH Specification 1600.
	Cracks wider than 0.30 mm	Not more than 1m total length	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Grouting with epoxy mortar, investigating causes for cracks development and carry out necessary	48 Hours	IRC SP: 40-2019 <sup>a</sup> and MORTH Specification 2800.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
					rehabilitation.		
	Rainwater seepage through deck slab	Leakage - nil	Quarterly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Grouting of deck slab at leakage areas, waterproofing, repairs to drainage spouts	1 months	MoRTH specifications 2600 & 2700.
	Deflection due to permanent loads and live loads	Within design limits.	Once in Every 10 Years for spans more than 40 m	Load test method	Carry out major rehabilitation works on bridge to retain original design load capacity	6 months	IRC SP: 51-2015.
	Vibrations in bridge deck due to moving trucks	Frequency of vibrations shall not be more than 5 Hz	Once in every 5 years for spans more than 30m and Every 10 Years for spans between 15 to 30 m	Laser displacement sensors or laser vibrometers	Strengthening structure of super	4 months	AASHTO LRFD specifications
	Leakage in Expansion joints	No damage to elastomeric sealant compound in strip seal expansion joint, no leakage of rain water through expansion joint in case of buried and	Bi-Annually	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit	Replace of expansion joint seal in	15 days	MORTH specifications 2600 and IRC SP: 40-2019.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		asphalt plug and copper stripjoint.					
	Debris and dust in strip seal expansion joint	No dust debris expansion or in joint gap.	Monthly	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge InspectionUnit	Cleaning of expansion joint gapthoroughly	3 days	MORTH specifications 2600 and IRC SP: 40-2019.
	Drainage spouts	No down take pipe missing/broken below soffit of the deck slab. No silt, debris, clogging of drainage spout collection chamber.	Monthly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge InspectionUnit	Cleaning of drainage spouts thoroughly. Replacement of missing/broken down take pipes with a minimum pipe extension of 500mm below soffit of slab. Providing sealant around the drainagespout if any leakages observed.	3 days	MORTH specification n 2700.
<b>Bridge-substructure</b>	Cracks/spalling of concrete/rusted steel	No cracks, spalling of concrete and rusted steel	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge InspectionUnit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with defect noticed	30 days	IRC SP: 40-2019 and MORTH specification n 2800.
	Bearings	Delamination of bearing reinforcement not more than 5%, cracking or tearing of rubber not more than 2 locations per side, no rupture of reinforcement	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge InspectionUnit	In case of failure of even one bearing on any pier/abutment, all the bearings on that pier/abutment shall be replaced, in order to get uniform load transfer on to bearings.	3 months	MORTH specification n 2810 and IRC SP: 40-2019.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		or rubber					
<b>Bridge Foundations</b>	Scouring around foundations	Scouring shall not be lower than maximum scour level for the bridge	Bi-Annually	Condition survey and visual inspection as per IRC SP:35-1990 Using Mobile Bridge Inspection Unit. In case of doubt, use Underwater camera for inspection of deep wells in major Rivers.	Suitable protection works around pier/abutment	1 month	IRC SP: 40-2019, IRC 83-2014, MORTH specification 2500
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35- 1990	Repairs to damaged aprons and pitching.	30 days after defect observation or 2	IRC: SP 40-2019 and IRC: SP: 13-2004.
		sq.m, damage to solid apron (concrete apron) not more than 1 sq.m				weeks before onset of rainy season whichever is earlier.	
<b>Note:</b> Any Structure during the entire contract period which is found that does not comply with all requirements of this Table will be prepared, rehabilitated or even reconstructed under the scope of the contractor.							

Construction & Up-gradation to 2 Lane with paved shoulder from km 95+550 To Km 111+066 of design length 15.516 km on Khellani – Kishtwar – Chattroo - Khanabal section of NH-244 in the Union Territory of Jammu and Kashmir.

**Table 4: Maintenance Criteria for Hill Roads**

In addition to above, for hill roads the following provisions for maintenance is also to be done.

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: For all tables 1 to 5 above, latest BIS & IRC standards (even those not indicated herewith) along with MoRT&H specifications shall be binding for all maintenance activities.**

**A. Flexible Pavement**

Nature of Defect or deficiency		Time limit for repair/ rectification
<b>(b) Granular earth shoulders, side slopes, drains and culverts</b>		
(i)	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
(ii)	Edge drop at shoulders exceeding 40 mm	7 (seven) days
(iii)	Variation by more than 15% in the prescribed side (embankment) slopes	30 (thirty) days
(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 (twenty-four) hours
(vii)	Railing, parapets, crash barriers	7 (seven) days (Restore immediately if causing safety hazard)
<b>(c) Roadside furniture including road sign and pavement marking</b>		
(i)	Damage to shape or position, poor visibility or loss of retro-reflectivity	48 (forty-eight) hours
(ii)	Painting of km stone, railing, parapets, crash barriers	As and when required/ Once every year
(iii)	Damaged/missing signs road requiring replacement	7 (seven) days
(iv)	Damage to road mark ups	7 (seven) days
<b>(d) Road lighting</b>		
(i)	Any major failure of the system	24 (twenty-four) hours
(ii)	Faults and minor failures	8 (eight) hours
<b>(e) Trees and plantation</b>		
(i)	Obstruction in a minimum head- room of 5 m above carriageway or obstruction in visibility of road signs	24 (twenty-four) hours
(ii)	Removal of fallen trees from carriageway	4 (four) 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
<b>(f) Rest area</b>		
(i)	Cleaning of toilets	Every 4 (four) hours
(ii)	Defects in electrical, water and sanitary installations	24 (twenty-four) hours
<b>(g) [Toll Plaza]</b>		
<b>(h) Other Project Facilities and Approach roads</b>		

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(i)	Damage in approach roads, pedestrian facilities, truck lay-byes, 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 crane	4 (four) hours
<b>Bridges</b>		
<b>(a) Superstructure</b>		
(i)	Any damage, cracks, spalling/ scaling Temporary measures Permanent measures	within 48 (forty-eight) hours within 15 (fifteen) days or as specified by the Authority's Engineer
<b>(b) Foundations</b>		
(i)	Scouring and/or cavitation	15 (fifteen) days
<b>(c) Piers, abutments, return walls and wingwalls</b>		
(i)	Cracks and damages including settlement and tilting, spalling, scaling	30 (thirty) days
<b>(d) Bearings (metallic) of bridges</b>		
(i)	Deformation, damages, tilting or shifting of bearings	15 (fifteen) days Greasing of metallic bearings once in a year
<b>(e) Joints</b>		
(i)	Malfunctioning of joints	15 (fifteen) days
<b>(f) Other items</b>		
(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 to 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
<b>(g) Hill Roads</b>		
(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 4.1 (vii) (a))

**Applicable Permits**

**1. Applicable Permits**

- (i) 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 Panchayats and Pollution Control Board for installation of crushers;
  - (c) Licence for use of explosives;
  - (d) Permission of the State Government for drawing water from river/reservoir;
  - (e) Licence 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 or clearances required under Applicable Laws.
- (ii) Applicable Permits, as required, relating to environmental protection and conservation shall have been procured by the Authority in accordance with the provisions of this Agreement.

Construction & Up-gradation to 2 Lane with paved shoulder from km 95+550 To Km 111+066 of design length 15.516 km on Khellani – Kishtwar – Chattroo - Khanabal section of NH-244 in the Union Territory of Jammu and Kashmir.

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**Schedule – G**

(See Clauses 7.1 and 19.2)

**Annex-I**

(See Clause 7.1)

**Form of Bank Guarantee**

**[Performance Security/Additional Performance Security]**

[MD, National Highways & Infrastructure Development Corporation Limited, New Delhi] WHEREAS:

- (A) \_\_\_\_ [name and address of contractor] (Hereinafter called the “**Contractor**”) and [name and address of the authority], (hereinafter called the “**Authority**”) have entered into an agreement (hereinafter called the “**Agreement**”) for the construction & upgradation to 2-lane with paved shoulder from km 95+550 To Km 111+066 of design length 15.516 km on Khellani–Kishtwar–Chattroo-Khanabal section of National Highway No. 244 in Union Territory of Jammu & Kashmir on Engineering, Procurement and Construction (the “**EPC**”) basis, 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/ Defects Liability Period and Maintenance Period} (as defined in the Agreement) in a sum of Rs. .... cr. (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 the {Construction Period/ Defects Liability Period and Maintenance 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 National Highways Authority of India], 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 differences 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

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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, fulfilment 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 fulfilment, 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 \*\*\*\*\$. 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 authorised 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 paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

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.

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 19.2)

**Form for Guarantee for Advance Payment**

[MD, National Highways & Infrastructure Development Corporation Limited, New Delhi] WHEREAS:

- (A) [name and address of contractor] (hereinafter called the “**Contractor**”) has executed an agreement (hereinafter called the “**Agreement**”) with the [name and address of the authority], (hereinafter called the “**Authority**”) for construction & upgradation to 2-lane with paved shoulder km 95+550 To Km 111+066 of design length 15.516 km on Khellani–Kishtwar–Chattroo–Khanabal section of National Highway No. 244 in Union Territory of Jammu & Kashmir on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement.
- (B) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest bearing @ Bank Rate + 3% advance payment (herein after called “**Advance Payment**”) equal to 10% (ten percent) of the Contract Price; and that the Advance Payment shall be made in two instalments 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 instalment to remain effective till the complete and full repayment of the instalment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second} instalment of the Advance Payment is Rs. ----- cr. (Rupees crore) and the amount of this Guarantee is Rs. ----- cr. (Rupees ----- crore) (the “**Guarantee Amount**”) <sup>\$</sup>.
- (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 irrevocably, guarantees and affirms as follows:

The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid instalment 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.

1. A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the National Highways Authority of India], that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the instalment 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 differences 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.
2. 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.
3. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed

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against the Contractor before presenting to the Bank its demand under this Guarantee.

<sup>\$</sup> The Guarantee Amount should be equivalent to 110% of the value of the applicable instalment.

4. 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.
5. 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.
6. 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.
7. The Guarantee shall cease to be in force and effect on \*\*\*\*\$ 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.
8. 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.
9. 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 authorised 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.
10. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

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.

\$ 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).

- (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.

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### Schedule - H

See Clauses 10.1 (iv) and 19.3

### Contract Price Weightages

- 1.1 The Contract Price for this Agreement is **Rs. Crores**
- 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 of Payment	Percentage Weightage
1	2	3	4
<b>Road works including culverts, widening and repair of culverts.</b>	<b>23.358%</b>	<b>B.1 - Reconstruction/New 2-lane realignment/bypass (Flexible pavement)</b>	
		(1) Earthwork up to top of sub-grade	32.098%
		(2) Sub-Base Course	10.922%
		(3) Non-Bituminous Base Course	14.307%
		(4) Bituminous Base Course	16.665%
		(5) Wearing Coat	10.427%
		<b>C.1 - Reconstruction/New service road/Link Road (Flexible pavement)</b>	
		1) Earthwork up to top of Sub-grade	0.000%
		2) Sub-Base Course	0.000%
		3) Non -Bituminous Base Course	0.000%
		4) Bituminous Base Course	0.000%
		5) Wearing Coat	0.000%
		<b>D - Re-Construction and New culverts on existing road, realignments, bypasses:</b>	
		(1) Culverts (length < 6m)	15.581%
<b>Minor Bridges/ Underpasses/Overpasses</b>	<b>1.110%</b>	<b>A.1-Widening and repair of minor bridges (length &gt; 6m and &lt; 60m)</b>	
		Minor Bridges	0.000%
		<b>A.2- New minor bridges/ Viaduct</b>	
		<b>(i) Foundation +Sub- Structure:</b> On completion of the foundation work including foundations for wing and return walls, abutments, piers up to the abutment/pier cap.	63.404%
		<b>(ii) Super-structure:</b> On completion of the superstructure in all respects including wearing coat, bearings, expansion joints, handrails, crash barriers, road signs & markings, tests on completion etc. complete in all respect.	30.011%
		<b>(iii) Approaches:</b> On completion of approaches including Retaining walls, stone pitching, protection works	6.585%

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Item	Weightage in percentage to the Contract Price	Stage of Payment	Percentage Weightage
1	2	3	4
		complete in all respect and fit for use.	
<b>Major Bridge (Length &gt; 60m) works and ROB/RUB/Elevated sections/Flyovers including Viaducts if any</b>	<b>51.066%</b>	<b>A.1- Widening and repairs of Major Bridges</b>	0.000%
		<b>A.2- New Major Bridges</b>	
		1) Foundation	1.413%
		2) Sub-structure	1.837%
		3) Super-structure (including bearings)	1.047%
		4) Wearing Coat including expansion joints	0.130%
		5) Miscellaneous Items like handrails, crash barriers, road markings etc.)	0.117%
		6) Wing walls/return walls	0.000%
		7) Guide Bunds, River Training works etc.	0.000%
		8) Approaches (including Retaining walls, stone pitching and protection works)	0.042%
		<b>C.2- New Elevated Section/Flyovers/Grade Separators/Viaduct</b>	
		1) Foundation	26.889%
		2) Sub-structure	25.740%
		3) Super-structure (including bearings)	40.419%
		4) Wearing Coat including expansion joints	1.044%
		5) Miscellaneous Items like handrails, crash barriers, road markings etc.)	1.294%
		6) Wing walls/return walls	-
		7) Guide Bunds, River Training works etc.	
		8) Approaches (including Retaining walls, stone pitching and protection works)	0.028%
<b>Other Works</b>	<b>24.466%</b>	(i) Toll plaza	0.000%
		(ii) Roadside drains	8.012%
		(iii) Road signs, markings, km stones, safety devices, ...	10.112%
		(iv) Project Facilities	
		a) Bus bays/Bus Stop	0.229%
		b) Truck lay-byes	0.000%
		c) Rest area	0.000%
		d) Utility Duct	14.087%
		v) Others i.e., Environment & Muck Disposal Management	
		a) Construction of suitable engineering structures like Breast/Gabion Wall etc.	4.346%



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Item	Weightage in percentage to the Contract Price	Stage of Payment	Percentage Weightage
1	2	3	4
		b) Environment Management Plan	0.706%
		(vi) Junctions	1.533%
		(vii) High Mast Lighting & Electric Pole	0.107%
		(viii) Protection works i.e. Retaining wall/Toe wall/Gabion wall etc.	
		a) Retaining wall	9.672%
		b) Gabion wall	2.883%
		c) Breast wall	36.430%
		(d) Special Slope Stabilization Works (Site suitable engineering measures such as shotcrete with wire mesh & rock bolting/soil nailing/bio engineering measures such as hydro seeding etc.	9.101%
		(ix) Safety and traffic management during construction	
		a) Temporary of Diversion existing road portion including maintenance existing road	2.225%
		b) clearance of land slide & snow	0.557%

### 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 of Payment	Percentage - Weightage	Payment Procedure
<b>B.1 - Reconstruction/New 2-lane realignment/bypass (Flexible pavement)</b>		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 10% of total length, whichever is less.
(1) Earthwork up to top of the sub-grade	32.098%	
(2) Sub-base Course	10.922%	
(3) Non-Bituminous Course	14.307%	
(4) Bituminous Base Course	16.665%	
(5) Wearing Coat	10.427%	
(6) Widening and repair of culverts	0.000%	
<b>D - Re-Construction and New culverts on existing road, realignments, bypasses:</b>		
(1) Culverts (length < 6m)	15.581%	Cost of each culvert shall be determined on pro rata basis with respect to the total number of culverts. Payment shall be made on the completion of at least two 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:

$$\text{Cost per km} = P \times \text{weightage for road work} \times \text{weightage for bituminous work} \times (1/L)$$

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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 and Underpasses/Overpasses shall be as stated in table 1.3.2:

**Table 1.3.2**

<u>Stage of Payment</u>	<u>Weightage</u>	<u>Payment Procedure</u>
1	2	3
<b>A.1-Widening and repair of minor bridges</b>	0.000%	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.
(length > 6m and < 60m)		
<b>A.2- New minor bridges</b>		
<b>(i) Foundation +Sub- Structure:</b> On completion of the foundation work including foundations for wing and return walls, abutments, piers up to the abutment/pier cap.	63.404%	<b>(i) Foundation +Sub-Structure:</b> Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length (m) of the minor bridges. Payment against foundation + sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation+ substructure of each bridge subject to completion of at least two foundations along with sub-structure up to abutment/pier cap level of each bridge. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
<b>(ii) Super-structure:</b> On completion of the superstructure in all respects including wearing coat, bearings, expansion joints, handrails, crash barriers, road signs & markings, tests on completion etc. complete in all respect.	30.011%	<b>(ii) Super-structure:</b> Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure of at least one span in all respects as specified in the column of “Stage of Payment” in this sub-clause.
<b>(iii) Approaches:</b> On completion of approaches including Retaining walls, stone pitching, protection works complete in all respect and fit for use.	6.585%	<b>(iii) Approaches:</b> Payment shall be made on pro-rata basis on completion of a stage i.e. completion of approaches in all respect as specified in the column of “Stage of Payment” in this sub-clause.

### 1.3.3 Major Bridge works, ROB/RUB and Structures.

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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**

<b><u>Stage of Payment</u></b>	<b><u>Weightage</u></b>	<b><u>Payment Procedure</u></b>
<b>1</b>	<b>2</b>	<b>3</b>
<b>A.2- New Major Bridges</b>		
<b>(i) Foundation</b>	1.413%	<b>(i) Foundation:</b> Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridge. Payment against foundation shall be made on prorata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the major Bridge subject to completion of at least two foundations of the major Bridge.
<b>(ii) Sub-structure</b>	1.837%	<b>(ii) Sub-Structure:</b> Payment against Substructure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of substructure of the major bridge subject to completion of at least two sub-structures of abutments/piers up to abutment/pier cap level of the major bridge.
<b>(iii) Wing walls/return walls</b>	0.000%	<b>(iii) Wing walls/return walls:</b> Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
<b>(iv) Super-structure: (including bearings)</b>	1.047%	<b>(iv) Super-structure:</b> Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure including bearings of at least one span in all respects as specified.
<b>(v) Wearing Coat including expansion joints</b>	0.130%	<b>(v) Wearing Coat:</b> Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
<b>(v) Miscellaneous Items like handrails, crash barriers, road markings etc.</b>	0.117%	<b>(vi) Miscellaneous:</b> Payments shall be made on completion of all miscellaneous works like handrails, crash barriers, road markings etc. complete in all respects as specified.
<b>(vi) Guide Bunds, River Training works etc.</b>	0.000%	<b>(vii) Guide Bunds, River Training works:</b> Payments shall be made on

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<b><u>Stage of Payment</u></b>	<b><u>Weightage</u></b>	<b><u>Payment Procedure</u></b>
<b>1</b>	<b>2</b>	<b>3</b>
		completion of all guide bunds/river training works etc. complete in all respects as specified.
<b>(viii) Approaches (including Retaining walls, stone pitching and protection works)</b>	0.042%	<b>(viii) Approaches:</b> Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.
<b>C.2- New Elevated Section/Flyovers/Grade Separators/Viaduct</b>		
<b>(i) Foundation</b>	26.888%	<b>(i) Foundation:</b> Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridge. Payment against foundation shall be made on prorata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the major Bridge subject to completion of at least two foundations of the major Bridge.
<b>(ii) Sub-structure</b>	25.740%	<b>(ii) Sub-Structure:</b> Payment against Substructure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of substructure of the major bridge subject to completion of at least two sub-structures of abutments/piers up to abutment/pier cap level of the major bridge.
<b>(iii) Wing walls/return walls</b>	0.000%	<b>(iii) Wing walls/return walls:</b>
		Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
<b>(iv) Super-structure: (including bearings)</b>	40.419%	<b>(iv) Super-structure:</b> Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure including bearings of at least one span in all respects as specified.
<b>(v) Wearing Coat including expansion joints</b>	1.044%	<b>(v) Wearing Coat:</b> Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
<b>(v) Miscellaneous Items like handrails, crash barriers, road markings etc.</b>	1.294%	<b>(vi) Miscellaneous:</b> Payments shall be made on completion of all miscellaneous works like handrails, crash barriers, road markings etc. complete in all respects as

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<b>Stage of Payment</b>	<b>Weightage</b>	<b>Payment Procedure</b>
<b>1</b>	<b>2</b>	<b>3</b>
		specified.
<b>(vi) Guide Bunds, River Training works etc.</b>	0.000%	<b>(vii) Guide Bunds, River Training works:</b> Payments shall be made on completion of all guide bunds/river training works etc. complete in all respects as specified.
<b>(viii) Approaches (including Retaining walls, stone pitching and protection works)</b>	0.028%	<b>(viii) Approaches:</b> Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.

**Note:**

(1) In case of innovate Major Bridge projects like cable suspension/cable stayed/ Extra Dozed and exceptionally long span bridges, the schedule may be modified as per site requirements before bidding with due approval of Competent Authority.

(2) The Schedule for exclusive tunnel projects may be prepared as per site requirements before bidding with due approval of Competent Authority.

#### 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**

<b>Stage of Payment</b>	<b>Weightage</b>	<b>Payment Procedure</b>
(i) Toll plaza	0.000%	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) Road-side drains	8.012%	Unit of measurement is linear length in km./Nos./sqm Payment shall be made on prorate basis on completion of a stage in a length of not less than 10 % (ten per cent) of the scope of work.
(iii) Road signs, markings, km stones, safety devices, ...	10.112%	
(iv) Project Facilities		Payment shall be made on pro rata basis for completed facilities.
a) Bus bays /Bus Stop	0.229%	
b) Truck lay-byes		
c) Rest areas		
d) Utility duct	14.087%	Payment shall be made on pro rata basis for completed facilities.
<b>v) Environment &amp; Muck Disposal Management</b>		
a) Construction of suitable engineering structures like Breast/Gabion Wall etc.	4.346%	On Completion of 20% of length in complete height as per the approved design & drawings.
b) Environment Management Plan	0.706%	<b>Payment shall be made on pro rata basis at half-yearly after complying all the condition of MoEF.</b>
(vi) Junctions	1.533%	Payment shall be made on pro rata basis
(vii) High Mast Lighting & Electric Pole	0.107%	Payment shall be made on pro rata basis
(viii) Protection works		

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a) Retaining wall	9.672%	Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5% (Five per cent) of the total length.
b) Gabion wall	2.883%	
c) Breast wall	36.430%	
(d) Special Slope Stabilization Works (Site suitable engineering measures such as shotcrete with wire mesh & rock bolting/ soil nailing/bio engineering measures such as hydro seeding)	9.101%	
(ix) Safety and traffic management during construction		
a) Temporary of Diversion existing road portion including maintenance existing road	2.225%	Every six monthly after duly certified the work by the AE as per Contractual requirement at site.
b) clearance of land slide & snow	0.557%	Every six monthly after duly certified the work by the AE as per Contractual requirement at site.

## 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 instalments in accordance with the provisions of Clause 19.7.

**Schedule - I**

(See Clause 10.2 (iv))

**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. The Project drawings, as defined in Clause 1.1, Definitions, Article 1, Definitions and Interpretation, Part-I: Preliminary, of the Contract Agreement shall consist:
  - (a) Working Drawings of all the components/elements of the Project as determined by Authority Engineer/Authority, and
  - (b) As-built drawings for the Project components/elements as determined by AE/Authority. As-built drawings shall be duly certified by Authority Engineer.
2. A minimum list of the drawings of the various components/elements of the Project and project facilities required to be submitted by the Contractor is given below:

**A. BRIDGE**

General Arrangement Drawing  
Detailed Drawings of Structures/Bridges

**B. ROAD (PLAN & PROFILE)**

Plan & Profile  
Cross Sections  
Drawings of horizontal alignment, vertical profile and cross sections  
Drawings of cross drainage works  
Drawings of traffic diversion plans and traffic control measures  
Drawings of road drainage measures  
Drawings of typical details slope protection measures  
Drawings of landscaping and horticulture  
Drawings of street lighting

**C. STANDARD DRAWINGS**

Detail of Mandatory Regulatory Signs  
Detail of Mandatory Regulatory Signs & Compulsory Direction Control and Other Signs  
Detail of Informatroy Signs  
Detail of Cautionary Signs-TS  
Detail of cautionary warning signs  
Detail of cautionary warning signs  
Details of route marking (chevron marking)  
Details of road marking  
Details of directional signs  
Details Toe drain  
Details of pitching, filtermaterial, chute drain and energy dissipation basin-std  
Details of double head metal beam crash barrier  
Details for 200meter 1 km & km post  
Detail for boundary stone & guard post  
Drain retaining wall & kerb  
Gabion wall



### **Schedule - J**

(See Clause 10.3 (ii))

#### **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**

- (i) Project Milestone-I shall occur on the date falling on the 190<sup>th</sup> (One Hundred and Ninety) day from the Appointed Date (the “**Project Milestone-I**”).
- (ii) 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**

- (i) Project Milestone-II shall occur on the date falling on the 327<sup>th</sup> (Three Hundred and Twenty-Seven) day from the Appointed Date (the “**Project Milestone- II**”).
- (ii) 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 35% (thirty-five per cent) of the Contract Price and should have started construction of all bridges.

##### **4. Project Milestone-III**

- (i) Project Milestone-III shall occur on the date falling on the 463<sup>th</sup> (Four Hundred & Sixty three) day from the Appointed Date (the “**Project Milestone- III**”).
- (ii) 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 70% (seventy per cent) of the Contract Price and should have started construction of all project facilities.

##### **5. Scheduled Completion Date**

- (i) The Scheduled Completion Date shall occur on the 545<sup>th</sup> (Five Hundred and Forty five) day from the Appointed Date.
- (ii) 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 (ii))

#### **Tests on Completion**

#### **1. Schedule for Tests**

- (i) 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.
- (ii) 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**

##### **A. Road and Bridge**

- (i) 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 [\*\*\*].
- (ii) Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a Network Survey Vehicle (NSV) fitted with latest equipments and the maximum permissible roughness for purposes of this Test shall be [2,000 (two thousand)] mm for each kilometre.
- (iii) 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) metres or more shall also be subjected to load testing.
- (iv) 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, except tests as specified in clause 5, but shall include measuring the reflectivity of road markings and road signs; and measuring the illumination level (lux) of lighting using requisite testing equipment.

##### **B. Other Tests**

- (i) 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.
- (ii) 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.

Construction & Up-gradation to 2 Lane with paved shoulder from km 95+550 To Km 111+066 of design length 15.516 km on Khellani – Kishtwar – Chattroo - Khanabal section of NH-244 in the Union Territory of Jammu and Kashmir.

**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.

5. The Authority Engineer will carry out tests with following equipment at his own cost in the presence of contractor's representative.

Sr.No.	Key metrics of Asset	Equipment to be used	Frequency of condition survey
1	Surface of defects pavement	Network Survey Vehicle (NSV)	At least twice a year (As per survey months defined for the state basis rainy season)
2	Roughness of pavement	Network Survey Vehicle (NSV)	At least twice a year (As per survey months defined for the state basis rainy season)
3	Strength of pavement	Falling Weight Deflectometer (FWD)	At least once a year
4	Bridges	Mobile Bridge Inspection Unit (MBU)	At least twice a year (As per survey months defined for the state basis rainy season)
5	Road signs	Retro-reflectometer	At least twice a year (As per survey months defined for the state basis rainy season)

The first testing with the help of NSV shall be conducted at the time of issue of Completion Certificate.

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**Schedule - L**

(See Clause 12.2)

**Completion 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 & upgradation to 2-lane with paved shoulder from km 95+550 To Km 111+066 of design length 15.516 km on Khellani–Kishtwar–Chattroo-Khanabal section of National Highway No. 244 in Union Territory of Jammu & Kashmir (the "**Project Highway**") on Engineering, Procurement and Construction (EPC) basis 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 safely 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..., Scheduled Completed

Date for which was the ..... day of ..... 20....

SIGNED, SEALED AND DELIVERED

For and on behalf of the Authority's Engineer by:

(Signature)

(Name) (Designation) (Address)

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### 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

- (i) Monthly lump sum payments for maintenance shall be reduced in the case of non-compliance with the Maintenance Requirements set forth in Schedule-E.
- (ii) Any deduction made on account of non-compliance with the Maintenance Requirements shall not be paid even after compliance subsequently. The deductions shall continue to be made every month until compliance is done.
- (iii) 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 on monthly basis

- (i) The following percentages shall govern the payment reduction:

S. No.	Item/Defect/Deficiency	Percentage
<b>(a)</b>	<b>Carriageway/Pavement</b>	
(i)	Potholes, cracks, other surface defects	15%
(ii)	Repairs of Edges, Rutting	5%
<b>(b)</b>	<b>Road, Embankment, Cuttings, Shoulders</b>	
(i)	Edge drop, inadequate cross fall, undulations, settlement, potholes, ponding, obstructions	10%
(ii)	Deficient slopes, rain cuts, disturbed pitching, vegetation growth, pruning of trees	5%
<b>(c)</b>	<b>Bridges and Culverts</b>	
(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 kerb, railings, parapets, guideposts/crash barriers	5%
<b>(d)</b>	<b>Roadside Drains</b>	
(i)	Cleaning and repair of drains	5%
<b>(e)</b>	<b>Road Furniture</b>	
(i)	Cleaning, painting, replacement of road signs, delineators, road markings, 200 m/km/5 <sup>th</sup> km stones	5%
<b>(f)</b>	<b>Miscellaneous Items</b>	
(i)	Removal of dead animals, broken down/accidental vehicles, fallen trees, road blockades or malfunctioning of mobile crane	10%
(ii)	Any other Defects in accordance with paragraph 1.	5%
<b>(g)</b>	<b>Defects in Other Project Facilities</b>	5%

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

$$R = \frac{P}{100} \times (M1 \text{ or } M2) \times \frac{L1}{L}$$

Where,

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

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M1= Monthly lump-sum payment in accordance para 1.2 above of this Schedule M2= Monthly lump-sum payment in accordance para 1.2 above of this Schedule L1= Non-complying length L = Total length of the road,

R= Reduction (the amount to be deducted for non-compliance 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 (i))

**Selection of Authority's Engineer**

**1. Selection of Authority's Engineer**

- (i) 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 shall apply for selection of an experienced firm to discharge the functions and duties of an Authority's Engineer.
- (ii) In the event of termination of the Technical Consultants appointed in accordance with the provisions of Paragraph 1.1, 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**

- (i) 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 [name and address of the Authority] (the "**Authority**") and ..... (the "**Contractor**") for construction & upgradation to 2-lane with paved shoulder from km 95+550 To Km 111+066 of design length 15.516 km on Khellani–Kishtwar–Chattroo–Khanabal section of National Highway No. 244 in Union Territory of Jammu & Kashmir on Engineering, Procurement, Construction (EPC) basis, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

# - In case the bid of Authority's Engineer is invited simultaneously with the bid of EPC project, then the status of bidding of EPC project only to be indicated

- (ii) The TOR shall apply to construction and maintenance of the Project Highway.

**2. Definitions and interpretation**

- (i) 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.
- (ii) 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.
- (iii) The rules of interpretation stated in Article 1 of the Agreement shall apply, mutatis mutandis, to this TOR.

**3. General**

- (i) 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.
- (ii) 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) issuance of Completion Certificate or
  - (e) any other matter which is not specified in (a), (b), (c) or (d) above and which creates a financial liability on either Party.
- (iii) 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.
- (iv) 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.



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

(vi) 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**

(i) During the Construction Period, the Authority's Engineer shall review and approve 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 (vi). The Authority's Engineer shall complete such review and approval 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.

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

(iii) The Authority's Engineer shall review and approve 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.

(iv) The Authority's Engineer shall complete the review and approve 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.

(v) 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.

(vi) 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.

(vii) 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.

(viii) 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.

(ix) 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 (ix), 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

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modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.

- (x) The Authority's Engineer shall test check at least 50 (fifty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.
- (xi) The timing of tests referred to in Paragraph 4 (ix), 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.
- (xii) 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.
- (xiii) 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.
- (xiv) 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.
- (xv) 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 12.2.
- (xvi) 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.
- (xvii) 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.
- (xviii) 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, as the case may be. For carrying out its functions under this Paragraph 4 (xviii) 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**

- (i) 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.
- (ii) The Authority's Engineer shall undertake regular inspections, at least once every month, to

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evaluate compliance with the Maintenance Requirements and submit a Maintenance Inspection Report to the Authority and the Contractor.

- (iii) 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.
- (iv) 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.
- (v) 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**

- (i) The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.
- (ii) The Authority's Engineer shall determine the period of Time Extension that is required to be determined by it under the Agreement.
- (iii) The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 18.5.

#### **7. Payments**

- (i) 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 (iv)(d).
- (ii) 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.
- (iii) 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.
- (iv) 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**

- (i) 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.
- (ii) 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.
- (iii) 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.
- (iv) 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.
- (v) The Authority's Engineers 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 (i), 19.6 (i), and 19.8 (i))

**Forms of Payment Statements**

**1. Stage Payment Statement for Works**

The Stage Payment Statement for Works shall state:

- (a) the estimated amount for the Work executed in accordance with Clause 19.3
- (i) 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 (iii)(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**

- (i) The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of issue of the 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.
- (ii) The insurance under sub para (a) and (b) of paragraph 1(i) above shall cover the Authority and the Contractor against all loss or damage from any 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 of not less than 15% of the Contract Price 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 which arises from a cause occurring prior to the issue of the 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**

- (i) The Contractor shall insure against its liability for any loss, damage, death or bodily injury, or damage to any property (except things insured under Paragraphs 1 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. 2,00,00,000/- (Two Crore only)

- (ii) 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 an 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 Qualitytest**

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 [2,200 (two thousand and two hundred only)] mm for each kilometer.

**2. Visual and physicaltest**

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 shall be as per the requirement of maintenance mentioned in Schedule-E.

Construction & Up-gradation to 2 Lane with paved shoulder from km 95+550 To Km 111+066 of design length 15.516 km on Khellani – Kishtwar – Chattroo - Khanabal section of NH-244 in the Union Territory of Jammu and Kashmir.

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**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 upgradation 2-lane with paved shoulder from km 95+550 To Km 111+066 of design length 15.516 km on Khellani–Kishtwar–Chattroo–Khanabal section of National Highway No. 244 in Union Territory of Jammu & Kashmir (the "**Project Highway**") on Engineering, Procurement and Construction (EPC) basis 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 and designation of Authority's Representative)

(Address)



Conctruction&Up-gradation to 2 Lane with paved shoulder from km 95+550 To Km 111+066of design length 15.516 km on Khellani – Kishtwar – Chattroo - Khanabal section of NH-244 in the Union Territory of Jammu and Kashmir.

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**\*\*\*\*\* End of the Document \*\*\*\*\***