# SCHEDULES

## Schedule-A

*(See Clauses 2.1 and 8.1)*

## Site of the Project

**1 The Site**

(i) Site of the Two-Lane Project Highway shall include the land, buildings, structures and road works as described in Annex-I of this Schedule-A.

(ii) The dates of handing over the Right of Way to the Contractor are specified in Annex-II of this Schedule-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 this Agreement.

(iv) The alignment plans of the Project Highway are specified in Annex-III. In the case of sections where no modification in the existing alignment of the Project Highway is contemplated, the alignment plan has not been provided. Alignment plans have only been given for sections where the existing alignment is proposed to be upgraded. The proposed profile of the Project Highways shall be followed by the contractor with minimum FRL as indicated in the alignment plan. The Contractor, however, 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 of the Project*

### 1. Site

The Site of the Two-Lane Project Highway comprises the section of National Highway 06 commencing **from km 50+360(Rulchawm) to km 69+015 (Dulte) i.e. the Rulchawm - Dulte (Pack-IV) section of Champai Seling NH-6 road in the State of Mizoram**. The land, carriageway and structures comprising the Site are described below.

| S No | Package No. | Existing Chainages | Design Chainages | Design Length |
|---|---|---|---|---|
| **Economic Corridor** | | | | |
| **1** | **Package IV** | From. Km 50+360 to Km 69+015 | From De. Ch 45.040 to Ch. 62.200 | 17.16 |
| | | | **Total Length (km)** | **17.16** |

### 2. Land

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

| S. No. | Chainage (km) | | Right of Way (m) | Remarks |
|---|---|---|---|---|
| | From | To | | |
| 1 | 50+360 | 50+400 | 9.00 | **Economic Corridor-Package IV Starts At Km 50+360** |
| 2 | 50+400 | 51+200 | 8.00 | |
| 3 | 51+200 | 51+600 | 8.70 | |
| 4 | 51+600 | 52+600 | 8.00 | |
| 5 | 52+600 | 52+800 | 7.80 | |
| 6 | 52+800 | 53+000 | 8.00 | |
| 7 | 53+000 | 53+400 | 9.00 | |
| 8 | 53+400 | 53+800 | 8.00 | |
| 9 | 53+800 | 54+000 | 8.50 | |
| 10 | 54+000 | 54+200 | 8.00 | |
| 11 | 54+200 | 54+400 | 8.50 | |
| 12 | 54+400 | 55+200 | 8.00 | |
| 13 | 55+200 | 55+400 | 9.00 | |
| 14 | 55+400 | 56+400 | 8.00 | |
| 15 | 56+400 | 57+200 | 9.00 | |
| 16 | 57+200 | 59+000 | 8.00 | |
| 17 | 59+000 | 59+400 | 8.50 | |
| 18 | 59+400 | 60+000 | 8.00 | |
| 19 | 60+000 | 60+200 | 9.00 | |
| 20 | 60+200 | 60+800 | 8.00 | |
| 21 | 60+800 | 61+000 | 7.00 | |
| 22 | 61+000 | 67+800 | 8.00 | |

| S. No. | Chainage (km) | | Right of Way (m) | Remarks |
|---|---|---|---|---|
| | From | To | | |
| 23 | 67+800 | 68+600 | 9.00 | |
| 24 | 68+600 | 68+800 | 8.70 | |
| 25 | 68+800 | 69+015 | 8.50 | **Economic Corridor- Package IV Ends At Km 69+015** |

## 3. Carriageway

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

## 4. Major Bridges

The Site includes the following Major Bridges:

| S.No. | Chainage (km) | Type of Structure | | | No. of Spans with span length (m) | Width (m) |
|---|---|---|---|---|---|---|
| | | Foundation | Sub-structure | Super-structure | | |
| **Package IV** | | | | | | |
| **01** | **55+095** | Open Foundation | RCC | PSC | 1 x 71.20m | 11.80 |

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

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

| S.No | Chainage (km) | Type of Structure | | No. of Spans with span length (m) | Width (m) | ROB/ RUB |
|---|---|---|---|---|---|---|
| | | Foundation | Superstructure | | | |
| **Package IV** | | | | | | |
| **-----NIL-----** | | | | | | |

## 6. Grade separators

The Site includes the following grade separators:

| S.No. | Chainage (km) | Type of Structure | | No. of Spans with span length (m) | Width (m) |
|---|---|---|---|---|---|
| | | Foundation | Superstructure | | |
| **Package IV** | | | | | |
| **-----NIL-----** | | | | | |

## 7. Minor bridges

The Site includes the following minor bridges:

| S. No. | Chainage (km) | Type of Structure | | | No. of Spans with span length (m) | Width (m) |
|---|---|---|---|---|---|---|
| | | Foundation | Sub-structure | Super-structure | | |
| **Package IV** | | | | | | |
| 1 | 53+885 | Open Foundation | RCC | PSC | 1 x 24.50 | 12.00 |
| 2 | 54+230 | Open Foundation | RCC | PSC | 1 x 24.50 | 12.00 |

## 8. Railway level crossings

The Site includes the following railway level crossings:

| S. No. | Location (km) | Remarks |
|---|---|---|
| **Package IV** | | |
| **-----NIL-----** | | |

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

The Site includes the following underpasses:

| S. No. | Chainage (km) | Type of Structure | No. of Spans with span length (m) | Width (m) |
|---|---|---|---|---|
| **Package IV** | | | | |
| **-----NIL-----** | | | | |

## 10. Culverts

The Site has the following culverts:

### (a) Slab/Box Culverts: - 78 Nos.

| S. No. | Chainage (km) | Type of Culvert | Span /Opening with span length (m) | Width (m) |
|---|---|---|---|---|
| **Package IV** | | | | |
| 1 | 50+503 | Slab Culvert | 1 x 1.00 | 5.60 |
| 2 | 50+585 | Slab Culvert | 1 x 1.00 | 5.70 |
| 3 | 50+660 | Slab Culvert | 1 x 3.20 | 6.00 |
| 4 | 50+889 | Slab Culvert | 1 x 1.00 | 5.60 |
| 5 | 50+954 | Slab Culvert | 1 x 1.30 | 5.40 |
| 6 | 51+056 | Slab Culvert | 1 x 2.00 | 5.50 |
| 7 | 51+314 | Slab Culvert | 1 x 1.20 | 5.50 |
| 8 | 51+493 | Slab Culvert | 1 x 1.00 | 5.30 |
| 9 | 51+580 | Slab Culvert | 1 x 1.50 | 5.80 |
| 10 | 51+735 | Slab Culvert | 1 x 3.50 | 6.20 |
| 11 | 51+800 | Slab Culvert | 1 x 1.50 | 5.80 |
| 12 | 51+925 | Slab Culvert | 1 x 1.50 | 5.50 |
| 13 | 52+070 | Slab Culvert | 1 x 2.00 | 5.60 |
| 14 | 52+377 | Slab Culvert | 1 x 1.00 | 5.60 |
| 15 | 52+472 | Slab Culvert | 1 x 2.00 | 5.40 |
| 16 | 52+870 | Slab Culvert | 1 x 3.00 | 6.10 |
| 17 | 53+095 | Slab Culvert | 1 x 1.00 | 6.00 |

| S. No. | Chainage (km) | Type of Culvert | Span /Opening with span length (m) | Width (m) |
|---|---|---|---|---|
| 18 | 53+371 | Slab Culvert | 1 x 1.50 | 5.00 |
| 19 | 54+143 | Slab Culvert | 1 x 1.50 | 5.30 |
| 20 | 54+466 | Slab Culvert | 1 x 1.50 | 5.40 |
| 21 | 54+854 | Slab Culvert | 1 x 1.50 | 5.50 |
| 22 | 55+317 | Slab Culvert | 1 x 1.50 | 5.80 |
| 23 | 55+530 | Slab Culvert | 1 x 3.50 | 6.20 |
| 24 | 55+640 | Slab Culvert | 1 x 1.50 | 5.60 |
| 25 | 55+841 | Slab Culvert | 1 x 3.70 | 5.90 |
| 26 | 56+133 | Slab Culvert | 1 x 1.50 | 5.50 |
| 27 | 56+590 | Slab Culvert | 1 x 4.00 | 6.20 |
| 28 | 57+048 | Slab Culvert | 1 x 1.50 | 6.10 |
| 29 | 57+205 | Slab Culvert | Chock-up | 5.60 |
| 30 | 57+525 | Slab Culvert | Chock-up | 6.10 |
| 31 | 57+722 | Slab Culvert | 1 x 2.00 | 6.40 |
| 32 | 57+800 | Slab Culvert | 1 x 2.00 | 6.20 |
| 33 | 57+913 | Slab Culvert | 1 x 1.50 | 6.00 |
| 34 | 58+180 | Slab Culvert | 1 x 2.00 | 6.10 |
| 35 | 58+330 | Slab Culvert | 1 x 2.00 | 6.20 |
| 36 | 58+990 | Slab Culvert | 1 x 2.00 | 6.10 |
| 37 | 59+083 | Slab Culvert | 1 x 1.50 | 6.20 |
| 38 | 59+156 | Slab Culvert | 1 x 1.50 | 6.50 |
| 39 | 59+245 | Slab Culvert | 1 x 1.50 | 6.10 |
| 40 | 59+397 | Slab Culvert | 1 x 2.00 | 6.00 |
| 41 | 59+575 | Slab Culvert | 1 x 2.00 | 5.90 |
| 42 | 59+744 | Slab Culvert | Chock-up | 5.60 |
| 43 | 59+975 | Slab Culvert | 1 x 2.00 | 5.90 |
| 44 | 60+040 | Slab Culvert | 1 x 2.00 | 6.00 |
| 45 | 60+277 | Slab Culvert | 1 x 2.00 | 6.00 |
| 46 | 60+817 | Slab Culvert | 1 x 2.00 | 6.00 |
| 47 | 60+967 | Slab Culvert | 1 x 1.50 | 6.20 |
| 48 | 61+047 | Slab Culvert | 1 x 2.00 | 6.10 |
| 49 | 61+197 | Slab Culvert | 1 x 1.50 | 6.00 |
| 50 | 61+247 | Slab Culvert | Chock-up | 6.20 |
| 51 | 61+670 | Slab Culvert | Chock-up | 6.00 |
| 52 | 61+998 | Slab Culvert | 1 x 1.50 | 6.20 |
| 53 | 62+177 | Slab Culvert | 1 x 1.50 | 6.20 |
| 54 | 62+338 | Slab Culvert | 1 x 1.50 | 5.80 |
| 55 | 62+465 | Slab Culvert | 1 x 1.50 | 6.00 |
| 56 | 62+621 | Slab Culvert | 1 x 1.50 | 6.10 |
| 57 | 62+930 | Slab Culvert | 1 x 1.50 | 6.20 |
| 58 | 63+385 | Slab Culvert | Chock-up | 5.80 |
| 59 | 63+465 | Slab Culvert | 1 x 1.50 | 6.00 |
| 60 | 63+545 | Slab Culvert | 1 x 1.50 | 6.10 |
| 61 | 63+898 | Slab Culvert | 1 x 1.50 | 5.80 |
| 62 | 64+105 | Slab Culvert | Chock-up | 6.20 |
| 63 | 64+257 | Slab Culvert | 1 x 1.50 | 6.20 |
| 64 | 64+518 | Slab Culvert | Chock-up | 6.20 |
| 65 | 64+674 | Slab Culvert | Chock-up | 6.20 |
| 66 | 64+965 | Slab Culvert | Chock-up | 6.20 |
| 67 | 65+679 | Slab Culvert | 1 x 1.70 | 5.90 |
| 68 | 65+951 | Slab Culvert | 1 x 1.20 | 6.00 |
| 69 | 66+161 | Slab Culvert | 1 x 2.00 | 6.20 |
| 70 | 66+439 | Slab Culvert | 1 x 1.50 | 5.90 |

| S. No. | Chainage (km) | Type of Culvert | Span /Opening with span length (m) | Width (m) |
|---|---|---|---|---|
| 71 | 66+623 | Slab Culvert | 1 x 2.00 | 6.00 |
| 72 | 67+124 | Slab Culvert | 1 x 1.50 | 6.10 |
| 73 | 67+243 | Slab Culvert | 1 x 1.00 | 5.90 |
| 74 | 67+435 | Slab Culvert | 1 x 2.00 | 6.00 |
| 75 | 67+684 | Slab Culvert | 1 x 1.50 | 6.20 |
| 76 | 67+768 | Slab Culvert | 1 x 1.50 | 5.80 |
| 77 | 68+545 | Slab Culvert | 1 x 1.50 | 9.00 |
| 78 | 68+695 | Slab Culvert | 1 x 1.00 | 7.00 |

**(b) HP Culverts: - Nil**

| S. No. | Chainage (km) | Type of Culvert | Span /Opening with span length (m) | Width (m) |
|---|---|---|---|---|
| **Package IV** | | | | |
| **-----NIL-----** | | | | |

## 11. Bus bays

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

| S. No. | Chainage (km) | Length (m) | Left Hand Side | Right Hand Side |
|---|---|---|---|---|
| **Package IV** | | | | |
| 1 | 51+170 | - | LHS | - |
| 2 | 63+700 | - | - | RHS |
| 3 | 65+580 | - | - | RHS |
| 4 | 66+410 | - | - | RHS |
| 5 | 66+900 | - | - | RHS |

## 12. Truck Lay byes

The details of truck lay byes are as follows:

| S. No. | Chainage (km) | Length (m) | Left Hand Side | Right Hand Side |
|---|---|---|---|---|
| **Package IV** | | | | |
| **-----NIL-----** | | | | |

## 13. Road side drains

The details of the roadside drains are as follows:

| S. No | Location | | Type | |
|---|---|---|---|---|
| | From Km | to Km | Masonry/CC (Pucca) | Earthern (Kutcha) |
| **Package – IV** | | | | |
| 1 | 53+000 | 53+400 | - | RHS |
| 2 | 55+200 | 55+400 | - | LHS |
| 3 | 55+800 | 61+600 | - | LHS |
| 4 | 62+600 | 65+000 | - | LHS |
| 5 | 65+000 | 68+800 | - | RHS |

## 14. Major junctions

The details of major junctions are as follows:

| S. No. | Location | | At grade | Separated | Category of Cross Road | | | |
|---|---|---|---|---|---|---|---|---|
| | Chainage | Location | | | NH | SH | MDR | Others |
| Package – IV | | | | | | | | |
| -----NIL----- | | | | | | | | |

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

## 15. Minor junctions

The details of the minor junctions are as follows:

| S. No. | Location | | Type | |
|---|---|---|---|---|
| | Chainage | Location | T -junction | Cross road |
| Package – IV | | | | |
| 1 | 69+000 | LHS:-Village | - | X |

## 16. Bypasses

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

| S. No. | Name of bypass (town) | Chainage (km) From km to km | Length (in Km) |
|---|---|---|---|
| -----NIL----- | | | |

## 17. Other structures- 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:

| S.No | Design Chainage | | Design Length | PROW | Remark |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 45.040 | 45.920 | 0.88 | 24 | |
| 2 | 45.920 | 45.980 | 0.060 | 42 | |
| 3 | 45.980 | 46.190 | 0.210 | 24 | |
| 4 | 46.190 | 46.220 | 0.030 | 29 | |
| 5 | 46.220 | 47.120 | 0.900 | 24 | |
| 6 | 47.120 | 47.140 | 0.020 | 28 | |
| 7 | 47.140 | 52.490 | 5.350 | 24 | |
| 8 | 52.490 | 52.500 | 0.010 | 27 | |
| 9 | 52.500 | 54.260 | 1.760 | 24 | |
| 10 | 54.260 | 54.300 | 0.040 | 35 | |
| 11 | 54.300 | 55.290 | 0.990 | 24 | |
| 12 | 55.290 | 55.300 | 0.010 | 42 | |
| 13 | 55.300 | 55.570 | 0.270 | 24 | |
| 14 | 55.570 | 55.580 | 0.010 | 28 | |
| 15 | 55.580 | 60.310 | 4.730 | 24 | |
| 16 | 60.310 | 60.330 | 0.020 | 42 | |
| 17 | 60.330 | 61.140 | 0.810 | 24 | |
| 18 | 61.140 | 61.640 | 0.500 | 12 | |
| 19 | 61.640 | 61.720 | 0.080 | 24 | |
| 20 | 61.720 | 62.200 | 0.520 | 12 | |

*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 existing 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. 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, imp

(iii) rove/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

Environmental Clearance is not required as per new Notification of MoEF dated 22/08/2013.

## 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, upgradation and augmentation shall include Two-Laning with Paved Shoulder and widening/reconstruction/ new construction 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 Two-Laning with Paved Shoulder

### 1. Widening of the 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 mountainous and steep terrain to the extent land is available.

### (ii) Width of Carriageway

(a) Two-Laning with paved shoulders shall be undertaken. The paved carriageway shall be 10 (ten) m wide in accordance with the typical cross sections drawings in the Manual (IRC: SP 73-2018).

Provided that in the built-up areas the width of the carriageway shall be as specified in the following table:

| S.No. | Built-up stretch (Township) | Location (km to km) | | Width (m) | Typical cross section (Ref. to Manual) |
|---|---|---|---|---|---|
| | | From | To | | |
| Package IV | | | | | |
| 1 | Dulte | 61.100 | 62.200 | 10.00 | Fig No.06 |

(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 IRC: SP 73-2018.

### (ii) Design speed

The design speed shall be the minimum design speed of 30/40 km per hour for mountainous and steep terrain.

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

In the following sections, where improvement of the existing road geometrics to the prescribed standards is not possible, the existing road geometrics shall

be improved to the extent possible within the given right of way and proper road signs and safety measures shall be provided:

| S. No. | Stretch/Design Chainages (HIP Chainage) | Type of deficiency | | Remarks |
|---|---|---|---|---|
| | | Radius of curve | Design Speed | |
| 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:

| S.No. | Stretch (from km to km) | | Fully paved shoulders/ footpaths | Reference to cross section |
|---|---|---|---|---|
| **Package IV** | | | | |
| 1 | 61.100 | 62.200 | 1.5m Footpath | Fig No.06 |

(b) In open country, paved shoulders of 1.5 m width shall be provided and balance 1.0m width shall be covered with 150 mm thick compacted layer of granular material.

(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:

| S.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:

| S.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:

| S.No | Location of service road (from km to km) | Right hand side (RHS)/Left hand side (LHS)/ or Both sides | Length (km) 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:

| S. No. | Location of structure | Length (m) | Number and length of spans (m) | Approach gradient | Remarks, if any |
|---|---|---|---|---|---|
| NIL | | | | | |

(b) In the case of grade separated structures, the type of structure and the level of the Project Highway and the cross roads shall be as follows:

| S. 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:

| S. No. | Location | Type of crossing |
|---|---|---|
| NIL | | |

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

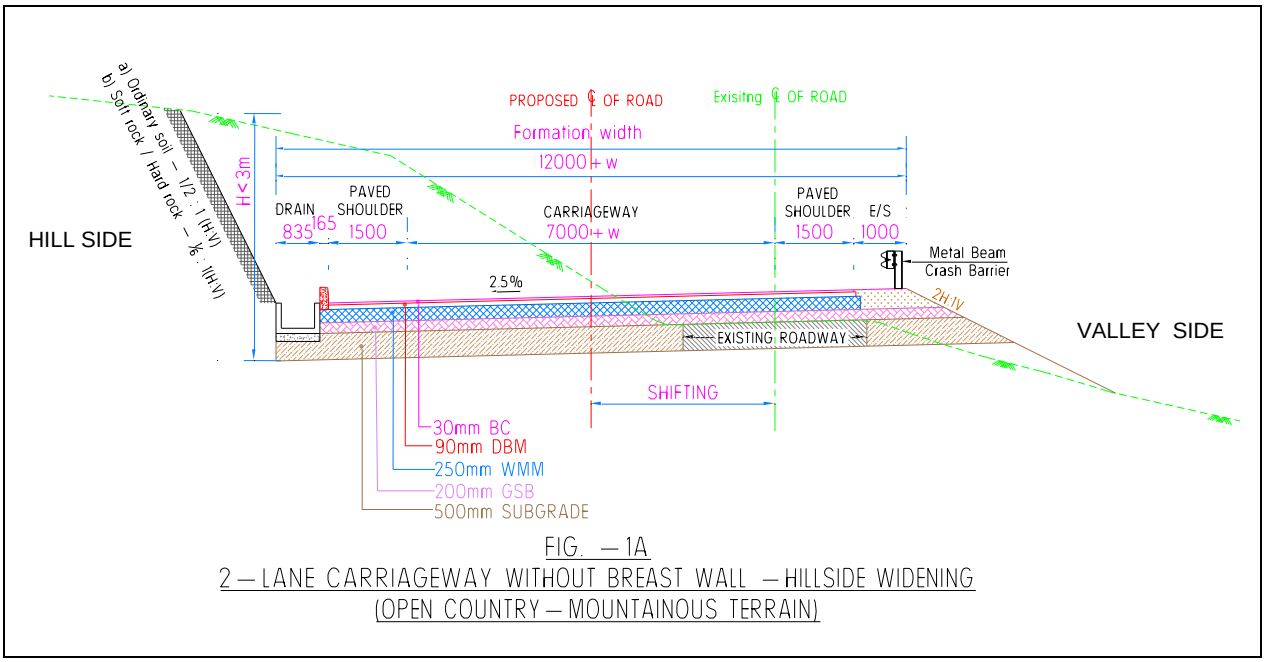


FIG. – 1A
2 – LANE CARRIAGEWAY WITHOUT BREAST WALL – HILLSIDE WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

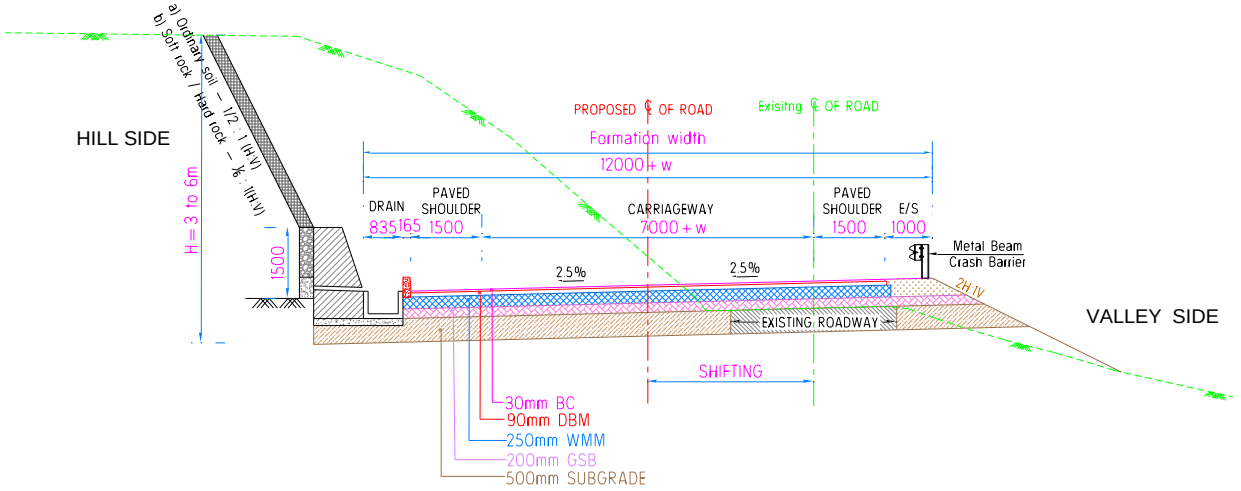


FIG. – 1B
2 – LANE CARRIAGEWAY WITH BREAST WALL OF 1.5M HEIGHT – HILLSIDE WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

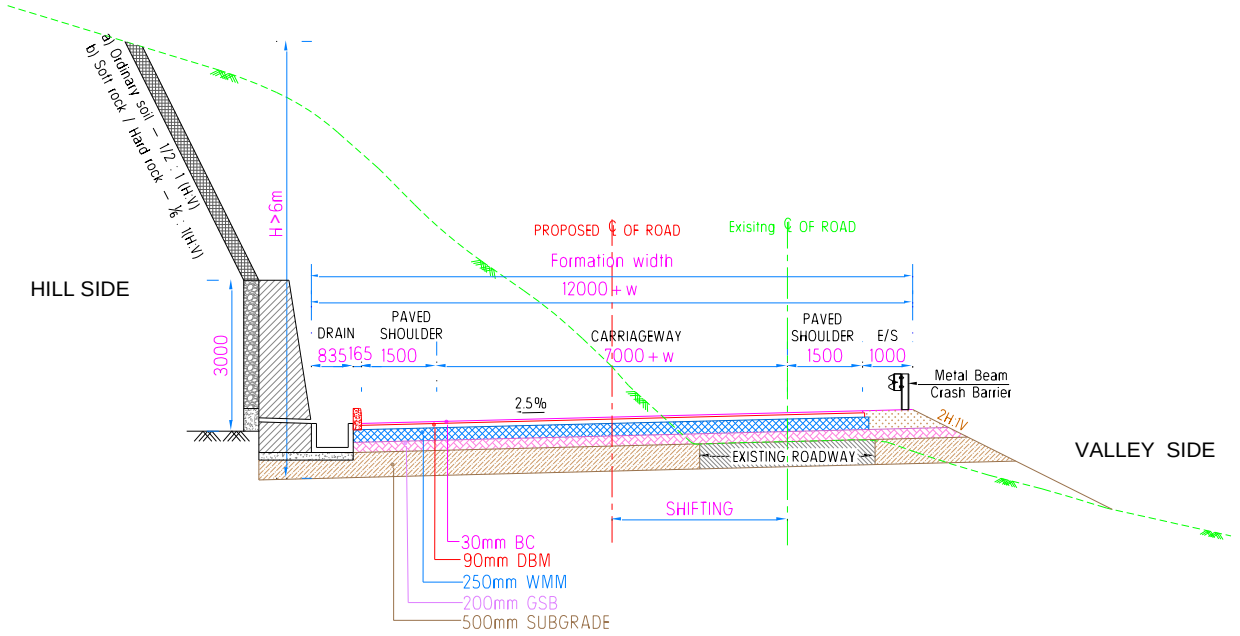


FIG. – 1C

2 – LANE CARRIAGEWAY WITH BREAST WALL OF 3M HEIGHT – HILLSIDE WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

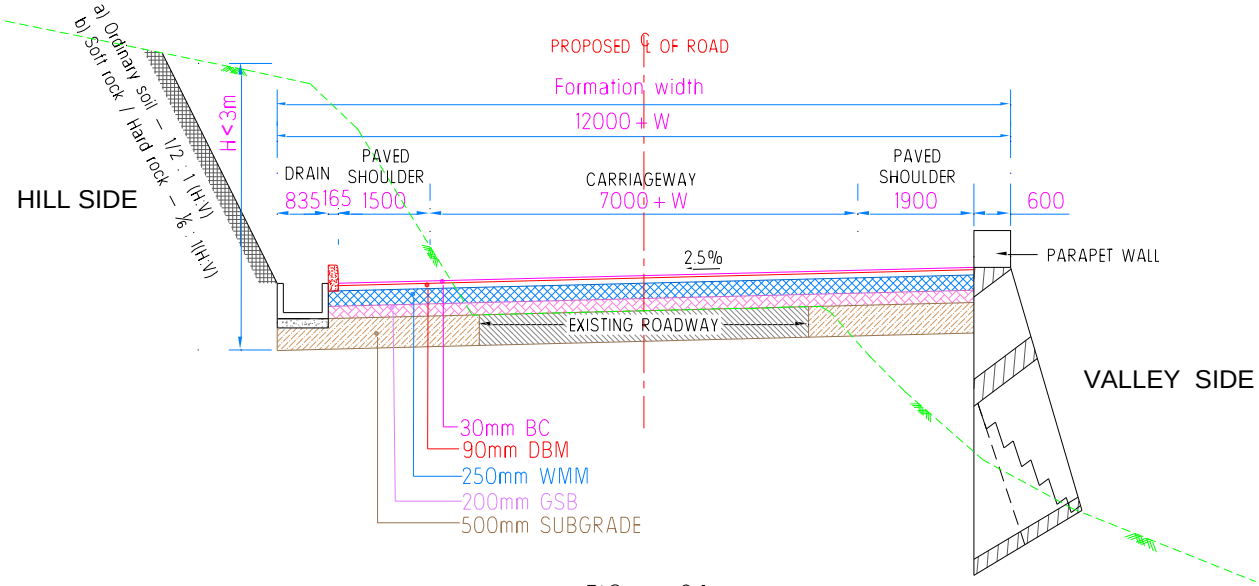


FIG. – 2A

2 – LANE CARRIAGEWAY WITHOUT BREAST WALL
AND WITH RETAINING WALL ON VALLY SIDE – CONCENTRIC WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

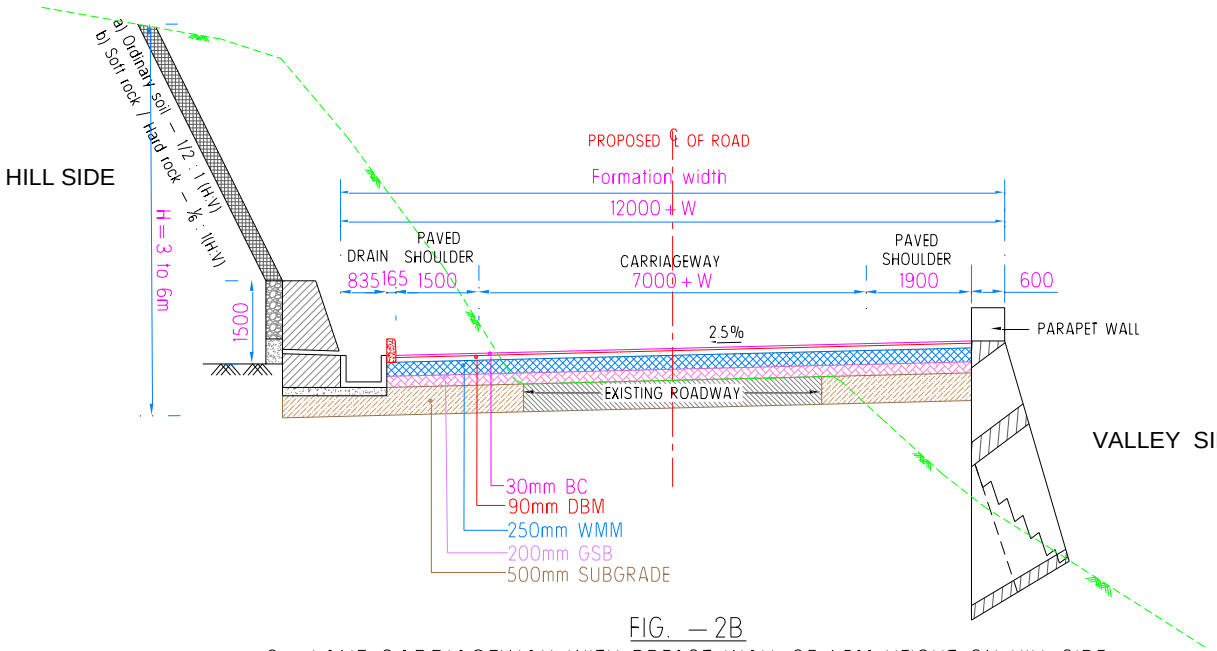


FIG. – 2B

2 – LANE CARRIAGEWAY WITH BREAST WALL OF 1.5M HEIGHT ON HILL SIDE AND RETAINING WALL ON VALLY SIDE – CONCENTRIC WIDENING (OPEN COUNTRY – MOUNTAINOUS TERRAIN)

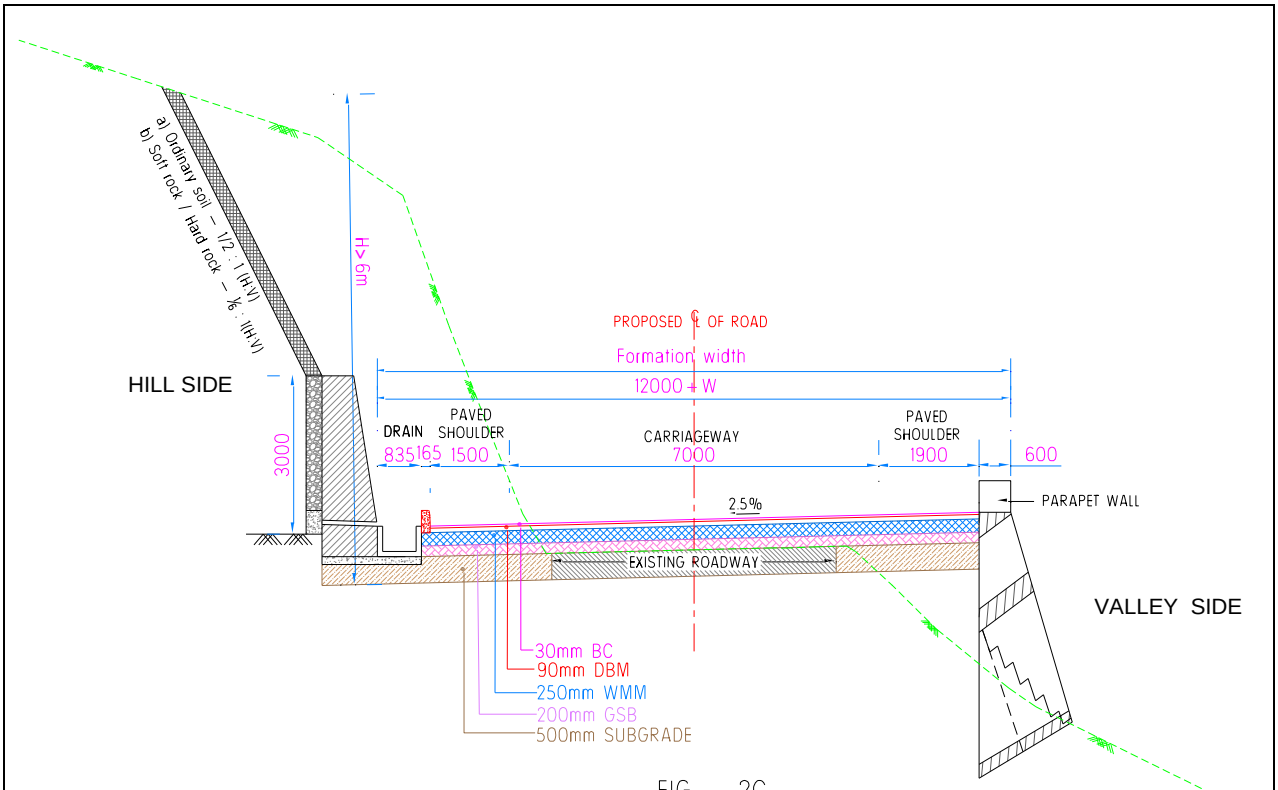


FIG. – 2C

2 – LANE CARRIAGEWAY WITH BREAST WALL OF 3M HEIGHT ON HILL SIDE AND RETAINING WALL ON VALLY SIDE – CONCENTRIC WIDENING (OPEN COUNTRY – MOUNTAINOUS TERRAIN)

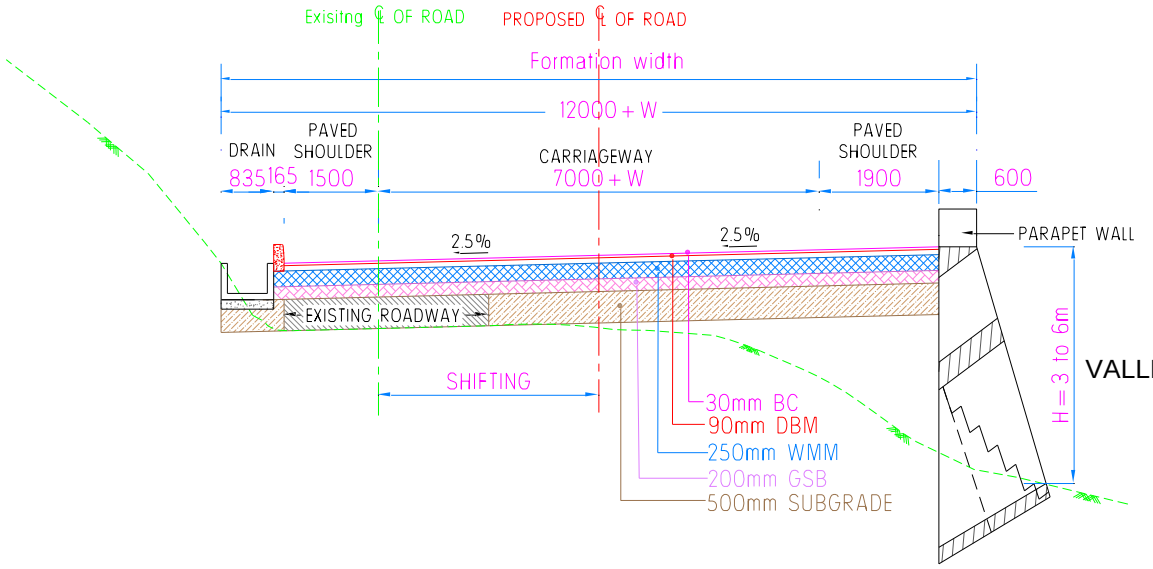


FIG. – 3A

2 – LANE CARRIAGEWAY WITH RETAINING WALL – VALLY SIDE WIDENING

(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

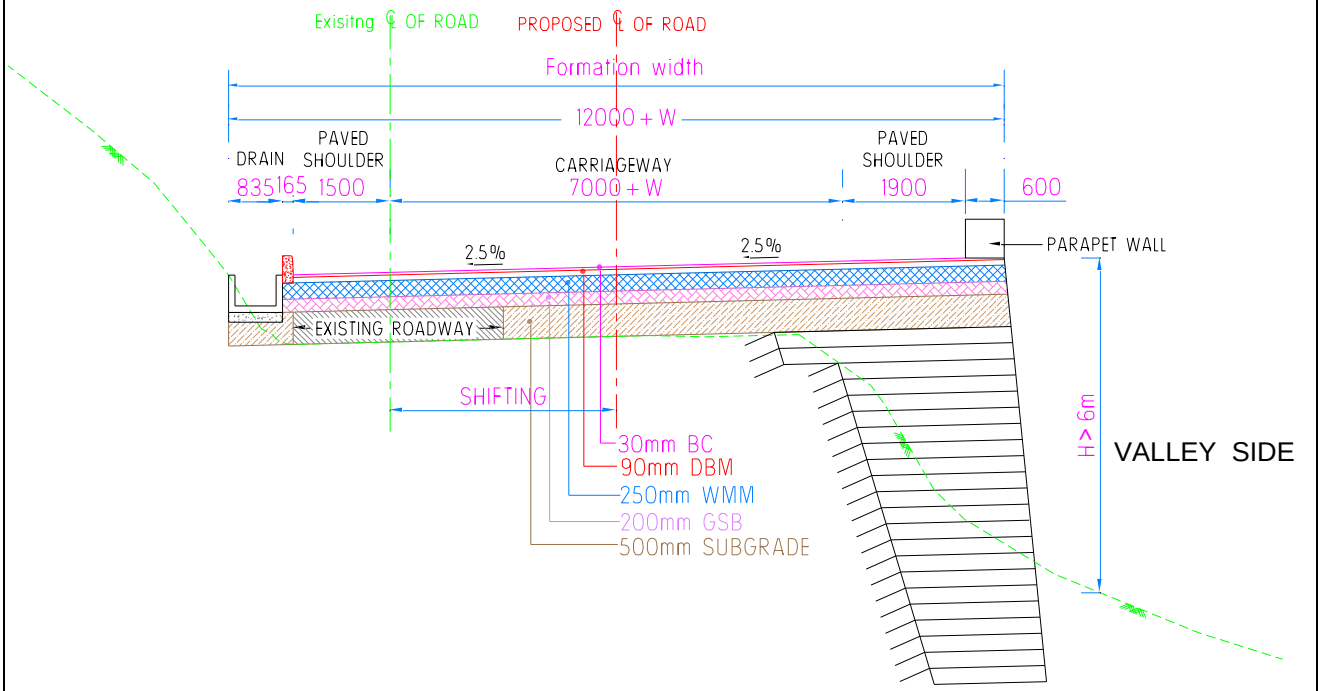


FIG. – 3B

2 – LANE CARRIAGEWAY WITH REINFORCED EARTH RETAINING WALL – VALLY SIDE WIDENING

(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

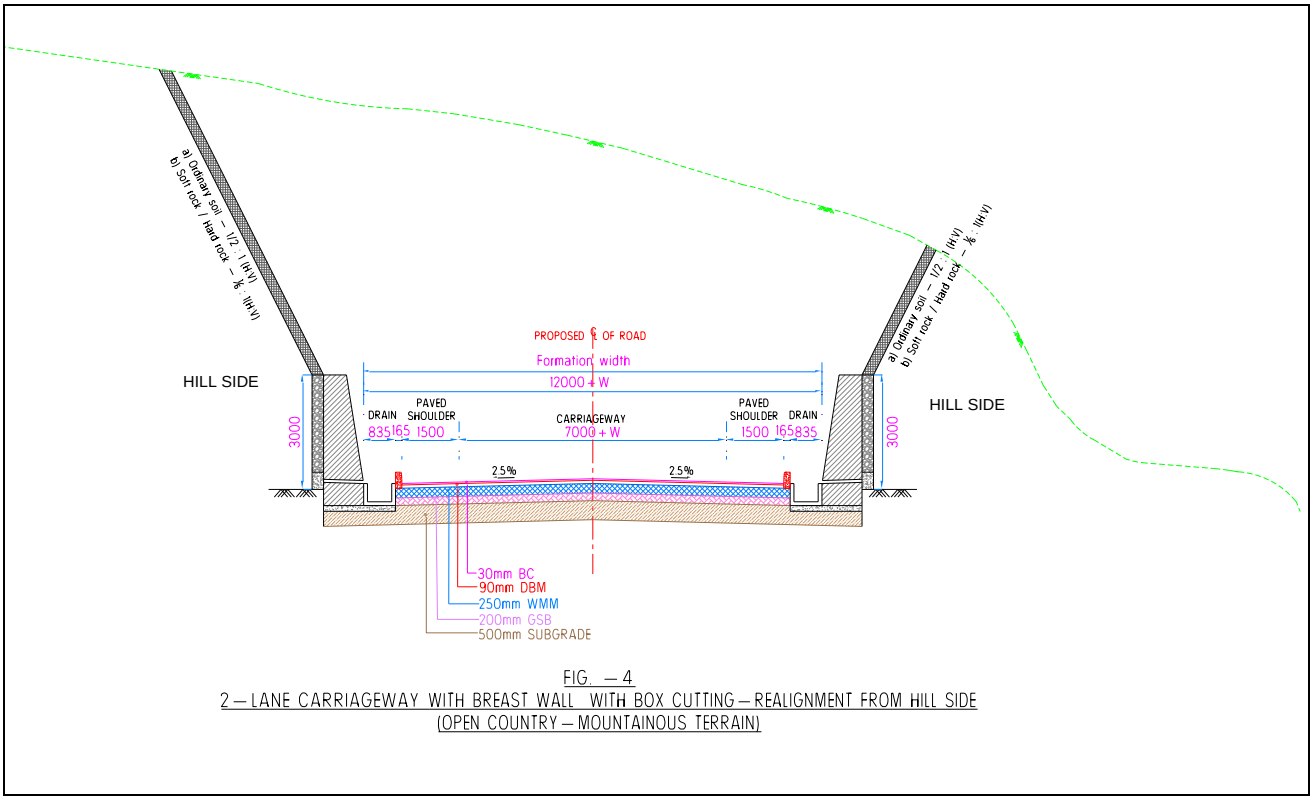


FIG. – 4
2 – LANE CARRIAGEWAY WITH BREAST WALL WITH BOX CUTTING – REALIGNMENT FROM HILL SIDE
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

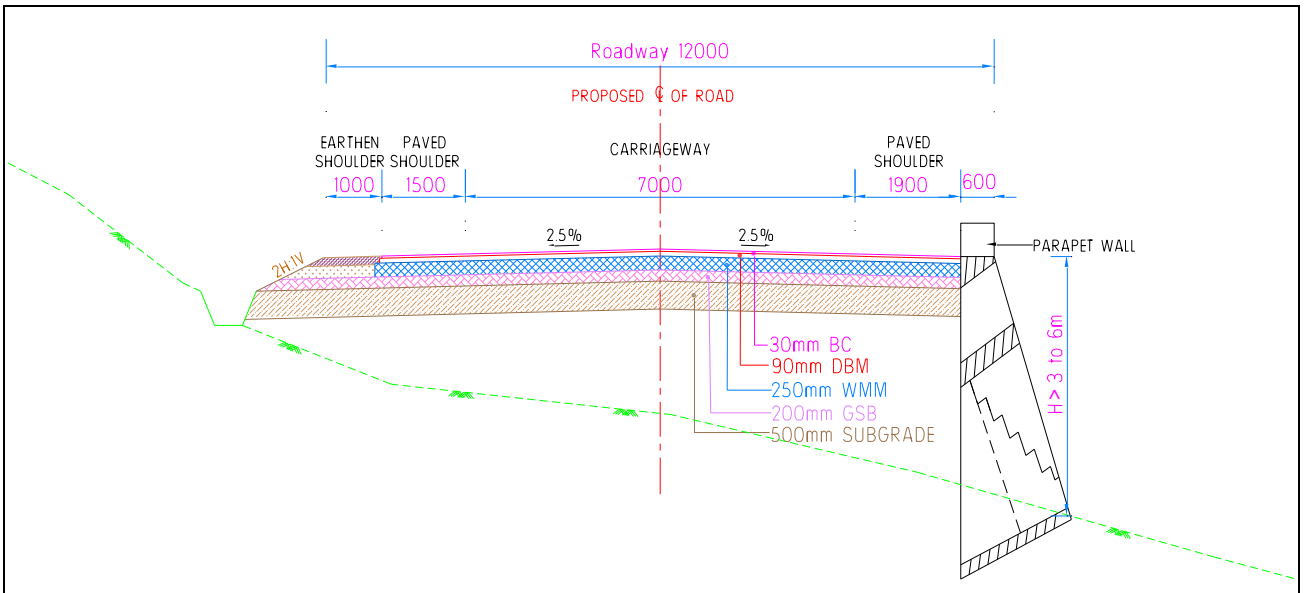


FIG. – 5A
2 – LANE CARRIAGEWAY WITH RETAINING WALL/REINFORCED EARTH RETAINING WALL – REALIGNMENT FROM VALLEY SIDE
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

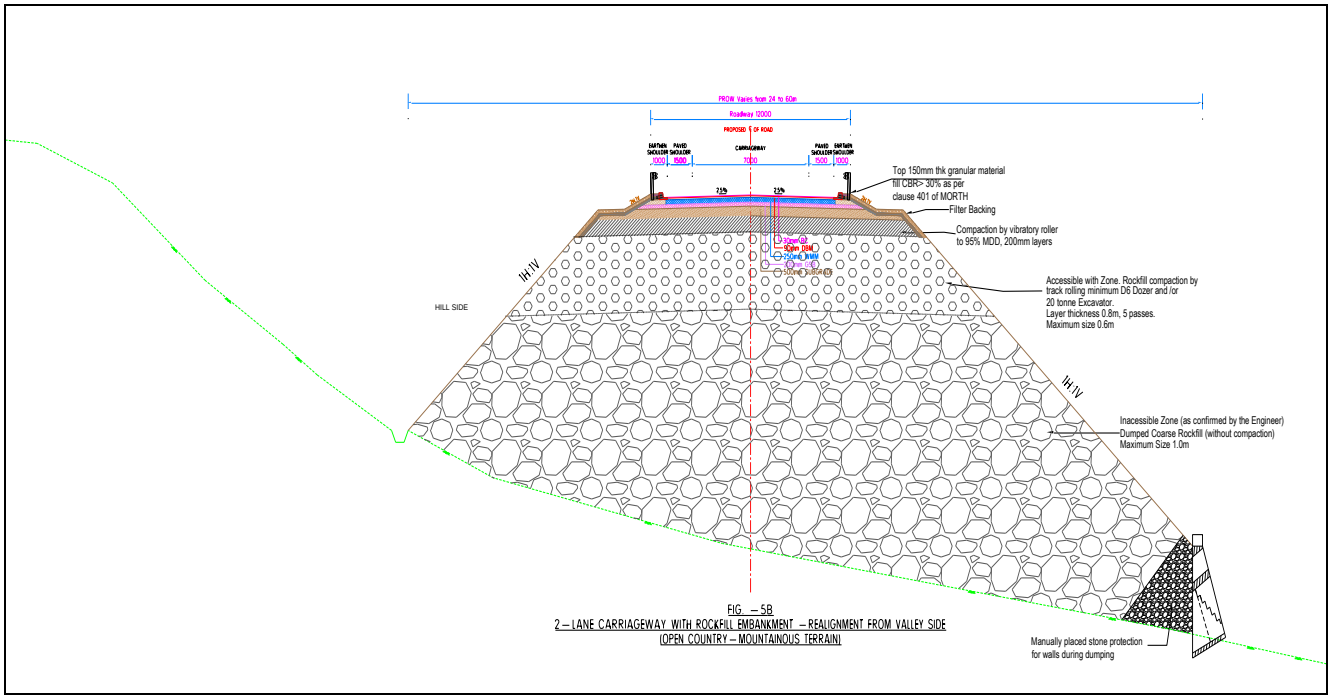


FIG. – 5B
2–LANE CARRIAGEWAY WITH ROCKFILL EMBANKMENT – REALIGNMENT FROM VALLEY SIDE
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

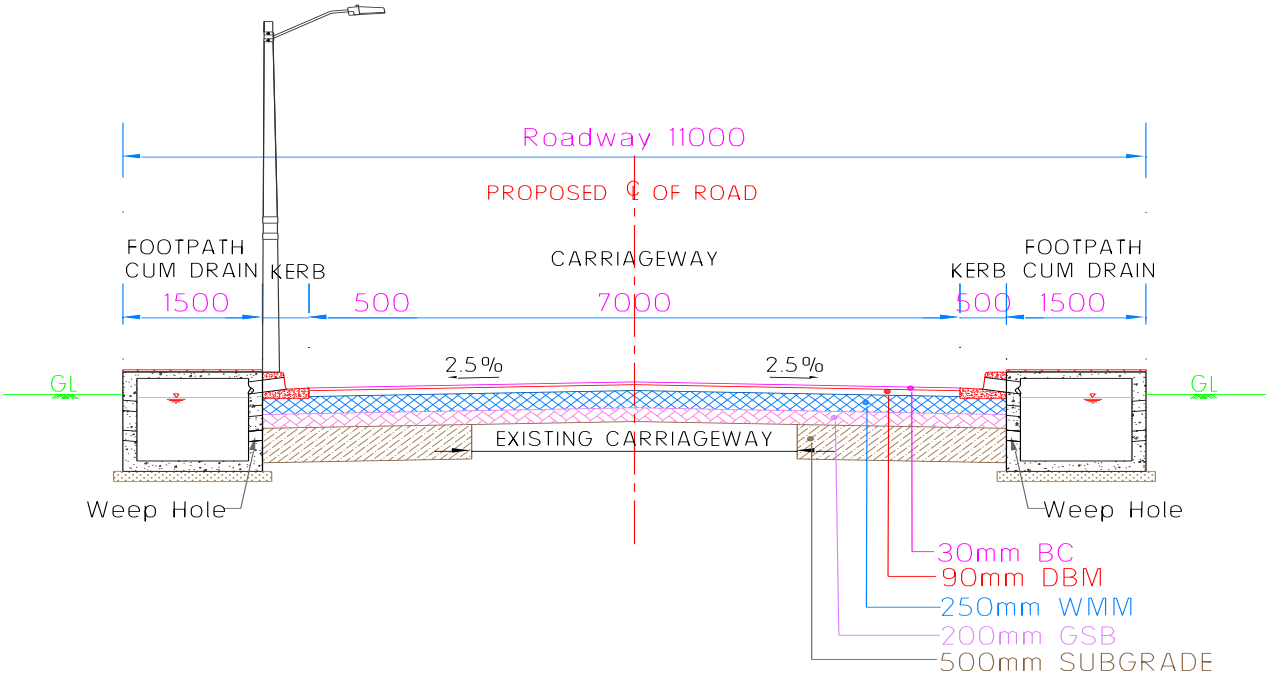


FIG. – 6
2 – LANE CARRIAGEWAY WITHOUT BREAST AND RETAINING WALL
(BUILT UP AREA – MOUNTAINOUS TERRAIN)

## 3. Intersections and Grade Separators

All intersections and grade separators shall be as per the provision of Section 3 of the Manual (IRC: SP 73-2018). Existing intersections which are deficient shall be

improved to the prescribed standards.

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

**(i) At-grade intersections**

**(a) Major Junction – NIL**

| S. No. | Location of intersection | Type of intersection | Other features |
|---|---|---|---|
| **Package IV** | | | |
| NIL | | | |

**(b) Minor Junction – 03 Nos.**

| S. No. | Location of intersection | Type of intersection | Other features |
|---|---|---|---|
| **Package IV** | | | |
| 1 | 52.600 | T | - |
| 2 | 60.000 | T | - |
| 3 | 61.840 | X | Dulte |

(ii) **Grade separated intersection with/without ramps**

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

**4. Road Embankment and Cut Section**

(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:

| S.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 Section 5 of the Manual (IRC: SP 73-2018), IRC relevant codes and International Standards.

**(ii) Type of pavement**

**Flexible Pavement –** Flexible Pavement shall be constructed in entire length of the project highway.

Flexible Pavement shall be constructed in full length of Main Carriageway of project highway.

**(iii) Design requirements**

**(a) Design Period and strategy**

Flexible pavement for new pavement or for widening and reconstruction of the existing pavement shall be designed for a minimum design period of 15 (Fifteen) years and minimum CBR of subgrade should be 8%. 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 design traffic of 20 million standard axles. Minimum pavement composition should be adopted for new pavement/reconstruction of road as below:-

**i. Main Carriageway:-**

| S. No. | Description | Minimum Crust Composition of Flexible Pavement ( For 20 msa) |
|---|---|---|
| 1 | BC | 30 mm |
| 2 | DBM | 90 mm |
| 3 | WMM | 250 mm |
| 4 | GSB | 200 mm |
| | **Total** | **570 mm** |

**ii.** The Crust Composition for Truck Lay Byes shall be as per Main Carriageway Clause 5.3.2 (a) above.

**iii.** The Crust composition for Minor roads, Bus bay shall be as per section 5 of IRC:SP:73-2018.

**(iv) Reconstruction of stretches**

The following stretches of the existing road shall be reconstructed from GSB full layer and above. These shall be designed as new pavement.

| Design Chainages | | Design Length (Km) | Remarks |
|---|---|---|---|
| From | To | | |
| 45.040 | 45.100 | 0.060 | LHS Widening |
| 45.180 | 45.220 | 0.040 | RHS Widening |
| 45.360 | 45.440 | 0.080 | LHS Widening |

| Design Chainages | | Design Length (Km) | Remarks |
|---|---|---|---|
| From | To | | |
| 45.720 | 45.760 | 0.040 | Concentric Widening |
| 45.860 | 45.900 | 0.040 | RHS Widening |
| 46.000 | 46.080 | 0.080 | Concentric Widening |
| 46.320 | 46.420 | 0.100 | LHS Widening |
| 46.540 | 46.600 | 0.060 | LHS Widening |
| 46.600 | 46.700 | 0.100 | RHS Widening |
| 46.920 | 47.000 | 0.080 | Concentric Widening |
| 47.280 | 47.340 | 0.060 | LHS Widening |
| 47.460 | 47.560 | 0.100 | LHS Widening |
| 47.620 | 47.720 | 0.100 | Concentric Widening |
| 48.020 | 48.080 | 0.060 | Concentric Widening |
| 48.160 | 48.180 | 0.020 | Concentric Widening |
| 48.240 | 48.260 | 0.020 | RHS Widening |
| 48.400 | 48.460 | 0.060 | Concentric Widening |
| 48.500 | 48.560 | 0.060 | LHS Widening |
| 48.620 | 48.680 | 0.060 | LHS Widening |
| 48.680 | 48.760 | 0.080 | Concentric Widening |
| 48.820 | 48.960 | 0.140 | Concentric Widening |
| 49.040 | 49.140 | 0.100 | Concentric Widening |
| 49.200 | 49.420 | 0.220 | Concentric Widening |
| 49.560 | 49.620 | 0.060 | LHS Widening |
| 49.640 | 49.700 | 0.060 | LHS Widening |
| 50.040 | 50.140 | 0.100 | RHS Widening |
| 50.220 | 50.260 | 0.040 | RHS Widening |
| 50.380 | 50.460 | 0.080 | RHS Widening |
| 50.840 | 51.080 | 0.240 | Concentric Widening |
| 51.160 | 51.220 | 0.060 | Concentric Widening |
| 51.320 | 51.380 | 0.060 | RHS Widening |
| 51.440 | 51.480 | 0.040 | LHS Widening |
| 51.480 | 51.570 | 0.090 | RHS Widening |
| 51.570 | 51.620 | 0.050 | LHS Widening |
| 51.620 | 51.680 | 0.060 | Concentric Widening |
| 51.980 | 52.060 | 0.080 | LHS Widening |
| 52.220 | 52.280 | 0.060 | Concentric Widening |
| 52.280 | 52.340 | 0.060 | RHS Widening |
| 52.340 | 52.370 | 0.030 | Concentric Widening |
| 52.540 | 52.620 | 0.080 | LHS Widening |
| 52.660 | 52.700 | 0.040 | Concentric Widening |
| 52.700 | 52.740 | 0.040 | RHS Widening |
| 52.790 | 52.840 | 0.050 | RHS Widening |

| Design Chainages | | Design Length (Km) | Remarks |
|---|---|---|---|
| From | To | | |
| 52.880 | 52.940 | 0.060 | Concentric Widening |
| 53.260 | 53.280 | 0.020 | Concentric Widening |
| 53.360 | 53.400 | 0.040 | Concentric Widening |
| 53.880 | 53.940 | 0.060 | Concentric Widening |
| 54.000 | 54.060 | 0.060 | RHS Widening |
| 54.580 | 54.740 | 0.160 | RHS Widening |
| 54.740 | 54.840 | 0.100 | Concentric Widening |
| 54.900 | 54.960 | 0.060 | LHS Widening |
| 54.960 | 55.160 | 0.200 | Concentric Widening |
| 55.800 | 55.900 | 0.100 | Concentric Widening |
| 55.940 | 56.000 | 0.060 | Concentric Widening |
| 56.140 | 56.220 | 0.080 | Concentric Widening |
| 56.360 | 56.420 | 0.060 | RHS Widening |
| 56.580 | 56.620 | 0.040 | RHS Widening |
| 56.760 | 56.820 | 0.060 | RHS Widening |
| 56.920 | 57.020 | 0.100 | RHS Widening |
| 57.080 | 57.200 | 0.120 | RHS Widening |
| 57.800 | 57.840 | 0.040 | Concentric Widening |
| 58.140 | 58.380 | 0.240 | RHS Widening |
| 58.480 | 58.540 | 0.060 | Concentric Widening |
| 58.700 | 58.780 | 0.080 | LHS Widening |
| 58.900 | 58.940 | 0.040 | Concentric Widening |
| 58.980 | 59.020 | 0.040 | Concentric Widening |
| 59.260 | 59.380 | 0.120 | RHS Widening |
| 59.500 | 59.560 | 0.060 | RHS Widening |
| 59.560 | 59.700 | 0.140 | Concentric Widening |
| 59.700 | 59.780 | 0.080 | LHS Widening |
| 59.780 | 59.900 | 0.120 | RHS Widening |
| 60.000 | 60.180 | 0.180 | RHS Widening |
| 60.240 | 60.280 | 0.040 | RHS Widening |
| 60.360 | 60.580 | 0.220 | RHS Widening |
| 60.940 | 61.060 | 0.120 | Concentric Widening |
| 61.140 | 61.200 | 0.060 | LHS Widening |
| 61.200 | 61.240 | 0.040 | RHS Widening |
| 61.320 | 61.360 | 0.040 | Concentric Widening |
| 61.420 | 61.620 | 0.200 | Concentric Widening |
| 61.720 | 61.820 | 0.100 | LHS Widening |
| 61.880 | 62.020 | 0.140 | Concentric Widening |
| 62.020 | 62.200 | 0.180 | RHS Widening |
| **Total Length (Km)** | | **6.860** | |

## 6. Roadside Drainage

Drainage system including surface and subsurface drains for the Project Highway shall be provided as per the provision of Section 6 of the Manual (IRC:SP 73-2018).

| S. No. | Package Detail | Design Length (Km) |
|---|---|---|
| 1 | Package IV | 18.128 |
| | **Total (Km)** | **18.128** |

On hill side open CC Drain with kerb shall be provided for typical cross sections mentioned in Clause 2.11 of Schedule B and as per cross section type given at Schedule D. In all built up areas RCC covered drains with Footpath shall be provided. Suitable crossing shall be provided at approaches to properties etc. invert levels of drains shall be decided on the basis of ground slopes of adjoining properties and open grounds.

In cutting portions CC open drain of suitable size shall be constructed for a minimum length of **7.508 Km** as per typical cross sections mentioned in Clause 2.11 of Schedule B in consultation with Authority Engineer.

## 7. Design of Structures

### (i) General

(a) All bridges, culverts and structures shall be designed and constructed in accordance with the provision of section 7 of the Manual (IRC: SP 73-2018) 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:

| S. No. | Bridge at km | Width of carriageway and cross-sectional features* |
|---|---|---|
| **Package IV** | | |
| NIL | | |

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

| S. No. | Location at km | Remarks |
|---|---|---|
| NIL | | |

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

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

| S. No. | Bridge at km | Utility service to be carried | Remarks |
|---|---|---|---|
| **NIL** | | | |

(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 section 7 of the Manual (IRC:SP: 73-2018) and deviations given at Schedule D.

**(ii) Culverts**

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

**(b) Reconstruction of existing culverts:**

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

Refer to the provision of 7.3 (ii) of the Manual (IRC: SP 73-2018)

**Slab Culverts: 11 Nos**

| S.No. | Culvert location | | Proposed Span/ Opening (m.) | Proposed Width (m) | Remark |
|---|---|---|---|---|---|
| | Existing Chainage (Km) | Design Chainage (Km) | | | |
| **Package IV** | | | | | |
| 1 | 50+889 | 45.580 | 1 x 3.0 x 3.0 | 12.00 | |
| 2 | 51+314 | 45.960 | 1 x 3.0 x 3.0 | 12.00 | |
| 3 | 51+493 | 46.080 | 1 x 3.0 x 3.0 | 12.00 | |
| 4 | 52+070 | 46.470 | 1 x 4.0 x 4.0 | 12.00 | |
| 5 | 53+095 | 47.335 | 1 x 3.0 x 3.0 | 12.00 | |
| 6 | 55+530 | 49.530 | 1 x 4.0 x 4.0 | 12.00 | |
| 7 | 55+841 | 49.857 | 1 x 4.0 x 4.0 | 12.00 | |
| 8 | 56+590 | 50.627 | 1 x 4.0 x 4.0 | 12.00 | |
| 9 | 58+180 | 52.390 | 1 x 2.0 x 2.0 | 12.00 | |
| 10 | 58+990 | 52.805 | 1 x 2.0 x 2.0 | 12.00 | |
| 11 | 60+040 | 53.645 | 1 x 2.0 x 2.0 | 12.00 | |

**Pipe Culverts: 43 Nos**

| S. No. | Existing Chainage (Km) | Design Chainage (Km) | Proposed Span/ Opening (No. x Dia.) (m) | Proposed Width (m) | Remark |
|---|---|---|---|---|---|
| **Package IV** | | | | | |
| 1 | 50+503 | 45.074 | 1 x 1200 | 12.00 | |
| 2 | 50+954 | 45.625 | 1 x 1200 | 12.00 | |
| 3 | 51+056 | 45.710 | 1 x 1200 | 12.00 | |
| 4 | 51+925 | 46.325 | 1 x 1200 | 12.00 | |
| 5 | 53+371 | 47.600 | 1 x 1200 | 12.00 | |
| 6 | 54+143 | 48.305 | 1 x 1200 | 12.00 | |
| 7 | 54+466 | 48.562 | 1 x 1200 | 12.00 | |
| 8 | 54+854 | 48.847 | 1 x 1200 | 12.00 | |
| 9 | 55+317 | 49.312 | 1 x 1200 | 12.00 | |
| 10 | 55+640 | 49.636 | 1 x 1200 | 12.00 | |
| 11 | 56+133 | 50.170 | 1 x 1200 | 12.00 | |
| 12 | 57+048 | 51.085 | 1 x 1200 | 12.00 | |
| 13 | 57+205 | 51.237 | 1 x 1200 | 12.00 | |

| S. No. | Existing Chainage (Km) | Design Chainage (Km) | Proposed Span/ Opening (No. x Dia.) (m) | Proposed Width (m) | Remark |
|---|---|---|---|---|---|
| 14 | 57+525 | 51.560 | 1 x 1200 | 12.00 | |
| 15 | 59+083 | 52.888 | 1 x 1200 | 12.00 | |
| 16 | 59+156 | 52.958 | 1 x 1200 | 12.00 | |
| 17 | 59+744 | 53.374 | 1 x 1200 | 12.00 | |
| 18 | 60+967 | 54.390 | 1 x 1200 | 12.00 | |
| 19 | 61+197 | 54.568 | 1 x 1200 | 12.00 | |
| 20 | 61+247 | 54.615 | 1 x 1200 | 12.00 | |
| 21 | 61+670 | 55.080 | 1 x 1200 | 12.00 | |
| 22 | 61+998 | 55.300 | 1 x 1200 | 12.00 | |
| 23 | 62+177 | 55.467 | 1 x 1200 | 12.00 | |
| 24 | 62+338 | 55.580 | 1 x 1200 | 12.00 | |
| 25 | 62+621 | 55.815 | 1 x 1200 | 12.00 | |
| 26 | 62+930 | 56.113 | 1 x 1200 | 12.00 | |
| 27 | 63+385 | 56.550 | 1 x 1200 | 12.00 | |
| 28 | 63+465 | 56.627 | 1 x 1200 | 12.00 | |
| 29 | 63+545 | 56.692 | 1 x 1200 | 12.00 | |
| 30 | 64+105 | 57.260 | 1 x 1200 | 12.00 | |
| 31 | 64+518 | 57.635 | 1 x 1200 | 12.00 | |
| 32 | 64+674 | 57.790 | 1 x 1200 | 12.00 | |
| 33 | 64+965 | 58.058 | 1 x 1200 | 12.00 | |
| 34 | 65+679 | 58.685 | 1 x 1200 | 12.00 | |
| 35 | 66+161 | 59.275 | 1 x 1200 | 12.00 | |
| 36 | 66+439 | 59.495 | 1 x 1200 | 12.00 | |
| 37 | 66+623 | 59.682 | 1 x 1200 | 12.00 | |
| 38 | 67+124 | 60.210 | 1 x 1200 | 12.00 | |
| 39 | 67+435 | 60.507 | 1 x 1200 | 12.00 | |
| 40 | 67+684 | 60.787 | 1 x 1200 | 12.00 | |
| 41 | 67+768 | 60.860 | 1 x 1200 | 12.00 | |
| 42 | 68+545 | 61.730 | 1 x 1200 | 12.00 | |
| 43 | 68+695 | 61.880 | 1 x 1200 | 12.00 | |

**(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.

| S.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:**

## Box Culvert: 13 Nos

| S.No. | Design Chainage (Km) | Proposed Span/ Opening (m.) | Proposed Width (m) | Type | Remark |
|---|---|---|---|---|---|
| **Package – IV** | | | | | |
| 1 | 46.210 | 1 x 4.0 x 4.0 | 12.00 | Box Culvert | New Construction |
| 2 | 46.750 | 1 x 3.0 x 3.0 | 12.00 | Box Culvert | New Construction |
| 3 | 47.140 | 1 x 4.0 x 4.0 | 12.00 | Box Culvert | New Construction |
| 4 | 51.710 | 1 x 6.00 | 12.00 | Box Culvert | New Construction |
| 5 | 51.930 | 1 x 2.0 | 12.00 | Box Culvert | New Construction |
| 6 | 52.500 | 1 x 3.0 | 12.00 | Box Culvert | New Construction |
| 7 | 53.040 | 1 x 2.00 | 12.00 | Box Culvert | New Construction |
| 8 | 53.160 | 1 x 2.00 | 12.00 | Box Culvert | New Construction |
| 9 | 53.220 | 1 x 2.00 | 12.00 | Box Culvert | New Construction |
| 10 | 53.575 | 1 x 2.00 | 12.00 | Box Culvert | New Construction |
| 11 | 53.860 | 1 x 2.00 | 12.00 | Box Culvert | New Construction |
| 12 | 54.300 | 1 x 2.00 | 12.00 | Box Culvert | New Construction |
| 13 | 54.460 | 1 x 3.00 | 12.00 | Box Culvert | New Construction |

## Pipe Culvert: 23 Nos

| S.No. | Design Chainage (Km) | No. x Dia.(mm) | Proposed Width (m) | Type | Remark |
|---|---|---|---|---|---|
| **Package – IV** | | | | | |
| 1 | 45.270 | 1 x 1200 | 12.00 | HPC | New Construction |
| 2 | 46.830 | 1 x 1200 | 12.00 | HPC | New Construction |
| 3 | 47.770 | 1 x 1200 | 12.00 | HPC | New Construction |
| 4 | 48.160 | 1 x 1200 | 12.00 | HPC | New Construction |
| 5 | 48.725 | 1 x 1200 | 12.00 | HPC | New Construction |
| 6 | 50.465 | 1 x 1200 | 12.00 | HPC | New Construction |
| 7 | 50.780 | 1 x 1200 | 12.00 | HPC | New Construction |
| 8 | 50.905 | 1 x 1200 | 12.00 | HPC | New Construction |
| 9 | 52.070 | 1 x 1200 | 12.00 | HPC | New Construction |
| 10 | 52.142 | 1 x 1200 | 12.00 | HPC | New Construction |
| 11 | 54.900 | 1 x 1200 | 12.00 | HPC | New Construction |
| 12 | 55.680 | 1 x 1200 | 12.00 | HPC | New Construction |
| 13 | 55.980 | 1 x 1200 | 12.00 | HPC | New Construction |
| 14 | 56.855 | 1 x 1200 | 12.00 | HPC | New Construction |
| 15 | 57.050 | 1 x 1200 | 12.00 | HPC | New Construction |
| 16 | 57.165 | 1 x 1200 | 12.00 | HPC | New Construction |
| 17 | 57.410 | 1 x 1200 | 12.00 | HPC | New Construction |
| 18 | 57.520 | 1 x 1200 | 12.00 | HPC | New Construction |
| 19 | 58.220 | 1 x 1200 | 12.00 | HPC | New Construction |
| 20 | 58.860 | 1 x 1200 | 12.00 | HPC | New Construction |
| 21 | 59.070 | 1 x 1200 | 12.00 | HPC | New Construction |
| 22 | 60.325 | 1 x 1200 | 12.00 | HPC | New Construction |
| 23 | 61.110 | 1 x 1200 | 12.00 | HPC | New Construction |

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

| S. 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

Refer to the provision of 7.3.2 of the Manual (IRC: SP 73-2018)

| S.No | Bridge location (km) | Salient details of existing bridge | Adequacy or otherwise of the existing waterway, vertical clearance, etc* | Remarks |
|---|---|---|---|---|
| **NIL** | | | | |

### (ii) The following narrow bridges shall be widened:

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

### (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 Bridges: NIL**

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

**Minor Bridges: NIL**

| S. No. | Location km (Design Ch.) | Total Length of bridge (m) | Total Width (m) |
|---|---|---|---|
| **Package IV** | | | |
| NIL | | | |

(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:

| S. No. | Location at km | Remarks |
|---|---|---|
| NIL | | |

(e) Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as specified in the provision of paragraph 7.21 of the Manual IRC SP 73 2018.

(f) Structures in marine environment: **NIL**

**(iv) Rail-road bridges: NIL**

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

**(b) Road over-bridges**

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

| S.No. | Location of Level crossing (Chainage km) | Length of bridge (m) |
|---|---|---|
| NIL | | |

**(c) Road under-bridges**

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

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

**(v) Grade separated structures: NIL**

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**

**Major Bridges:**

| S. No. | Location of bridge (km) | Nature and extent of repairs /strengthening to be carried out |
|---|---|---|
| **Package IV** | | |
| 1 | 49.095 | Replacement of expansion joints & wearing coat, providing crash barrier and approach slab on bridge, painting & bed protection work. |

**Minor Bridges:**

| S. No. | Location of bridge (km) | Nature and extent of repairs /strengthening to be carried out |
|---|---|---|
| **Package IV** | | |
| 1 | 48.050 | Replacement of expansion joints & wearing coat, providing crash barrier and approach slab on bridge, painting & bed protection work. |
| 2 | 48.420 | Replacement of expansion joints & wearing coat, providing crash barrier and approach slab on bridge, painting & bed protection work. |

**(b) ROB / RUB**

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

**(c) Overpasses/Underpasses and other structures**

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

**(vii) List of Major Bridges and Structures**

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

| S. No. | Location |
|---|---|
| **Package IV** | |
| 49.095 | |

## 8. Traffic Control Devices and Road Safety Works

(i) Traffic control devices and road safety works shall be provided in accordance with the provision of Section 9 of the Manual.

(ii) Specifications of the reflective sheeting shall be provided in accordance with Section 9 of the Manual.

## 9. Roadside Furniture

(i) Roadside furniture shall be provided in accordance with the provision of Section 9 of the Manual.

(ii) Overhead traffic signs: location and size

| S. No | Location (Design Chainage) | Type | Remark |
|---|---|---|---|
| NIL | | | |

## 10. Compulsory Afforestation

Deleted.

## 11. Hazardous Locations

The safety barriers shall be provided at the hazardous locations as per Clause 7.18 of the Manual (IRC:SP 73-2018). W-Beam metal crash barriers shall however be provided for a minimum length of (0.390+1.240) =1.630 Km. at all hazardous locations. All hazardous locations shall be finalized in consultation with the Authority Engineer.

Above length of the W-Beam metal crash barriers is indicative and minimum specified. The actual length of the W-Beam metal crash barriers shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length specified in this Clause of Schedule B shall not constitute a Change of Scope.

**a) Stone Masonry Retaining Wall:** Retaining Wall shall be constructed as per typical cross sections as per Schedule D and at other locations mentioned below:

| RHS | | | LHS | | |
|---|---|---|---|---|---|
| From | To | Length | From | To | Length |
| Package – IV : From De. Ch 45.040 to Ch. 62.200 (Rulchawm to Dulte) | | | | | |
| 45+120 | 45+130 | 10.000 | 45+100 | 45+130 | 30.000 |
| 45+920 | 45+940 | 20.000 | 45+250 | 45+320 | 70.000 |
| 46+180 | 46+190 | 10.000 | 45+340 | 45+370 | 30.000 |
| 46+460 | 46+470 | 10.000 | 45+380 | 45+400 | 20.000 |
| 46+730 | 46+750 | 20.000 | 46+070 | 46+080 | 10.000 |
| 47+140 | 47+150 | 10.000 | 46+190 | 46+200 | 10.000 |
| 49+510 | 49+520 | 10.000 | 46+220 | 46+230 | 10.000 |
| 49+970 | 49+980 | 10.000 | 46+490 | 46+510 | 20.000 |
| 50+120 | 50+130 | 10.000 | 46+560 | 46+570 | 10.000 |
| 51+330 | 51+340 | 10.000 | 46+730 | 46+760 | 30.000 |
| 51+420 | 51+440 | 20.000 | 46+810 | 46+820 | 10.000 |
| 51+690 | 51+720 | 30.000 | 46+830 | 46+840 | 10.000 |
| 51+920 | 51+940 | 20.000 | 47+120 | 47+130 | 10.000 |
| 52+060 | 52+090 | 30.000 | 47+520 | 47+530 | 10.000 |
| 52+120 | 52+130 | 10.000 | 47+740 | 47+770 | 30.000 |
| 52+140 | 52+150 | 10.000 | 49+080 | 49+090 | 10.000 |
| 52+380 | 52+400 | 20.000 | 49+520 | 49+530 | 10.000 |
| 52+470 | 52+490 | 20.000 | 51+700 | 51+720 | 20.000 |
| 53+040 | 53+050 | 10.000 | 51+920 | 51+930 | 10.000 |
| 53+170 | 53+230 | 60.000 | 52+130 | 52+140 | 10.000 |

| RHS | | | LHS | | |
|---|---|---|---|---|---|
| From | To | Length | From | To | Length |
| 53+460 | 53+470 | 10.000 | 52+480 | 52+500 | 20.000 |
| 53+560 | 53+580 | 20.000 | 53+030 | 53+050 | 20.000 |
| 53+860 | 53+870 | 10.000 | 53+560 | 53+570 | 10.000 |
| 54+000 | 54+020 | 20.000 | 53+840 | 53+860 | 20.000 |
| 54+100 | 54+120 | 20.000 | 54+260 | 54+270 | 10.000 |
| 54+120 | 54+140 | 20.000 | 55+290 | 55+300 | 10.000 |
| 54+290 | 54+300 | 10.000 | 55+280 | 55+310 | 30.000 |
| 55+170 | 55+190 | 20.000 | 55+570 | 55+590 | 20.000 |
| 55+310 | 55+320 | 10.000 | 57+030 | 57+050 | 20.000 |
| 55+450 | 55+460 | 10.000 | 57+400 | 57+410 | 10.000 |
| 55+580 | 55+590 | 10.000 | 57+500 | 57+520 | 20.000 |
| 56+110 | 56+130 | 20.000 | 59+050 | 59+070 | 20.000 |
| 56+280 | 56+290 | 10.000 | 60+330 | 60+340 | 10.000 |
| 56+830 | 56+850 | 20.000 | 61+100 | 61+110 | 10.000 |
| 57+040 | 57+060 | 20.000 | | | |
| 57+390 | 57+430 | 40.000 | | | |
| 57+490 | 57+500 | 10.000 | | | |
| 57+530 | 57+540 | 10.000 | | | |
| 57+630 | 57+660 | 30.000 | | | |
| 58+120 | 58+140 | 20.000 | | | |
| 58+170 | 58+190 | 20.000 | | | |
| 58+380 | 58+400 | 20.000 | | | |
| 58+440 | 58+470 | 30.000 | | | |
| 58+840 | 58+850 | 10.000 | | | |
| 58+860 | 58+880 | 20.000 | | | |
| 59+040 | 59+050 | 10.000 | | | |
| 59+060 | 59+070 | 10.000 | | | |
| 60+000 | 60+040 | 40.000 | | | |
| 60+050 | 60+080 | 30.000 | | | |
| 60+090 | 60+120 | 30.000 | | | |
| 60+290 | 60+300 | 10.000 | | | |
| 60+340 | 60+350 | 10.000 | | | |
| 61+070 | 61+080 | 10.000 | | | |
| 61+110 | 61+120 | 10.000 | | | |
| | **TOTAL** | **950.000** | | **TOTAL** | **600.000** |

Above length of the Retaining Wall is indicative and minimum specified. The actual length of the Retaining Wall shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length specified in this Clause of Schedule B shall not constitute a Change of Scope.

**b) Breast Wall:** Breast Retaining Wall shall be constructed as per typical cross sections as per Schedule D and at other locations mentioned below:

**Breast Wall Chainages (HT 1.5m)**

| RHS | | | LHS | | |
|---|---|---|---|---|---|
| From | To | Length | From | To | Length |
| **Package – IV : From De. Ch 45.040 to Ch. 62.200 (Rulchawm to Dulte)** | | | | | |
| 45+180 | 45+220 | 40.000 | 45+230 | 45+240 | 10.000 |
| 45+430 | 45+440 | 10.000 | 45+440 | 45+450 | 10.000 |

| RHS | | | LHS | | |
|---|---|---|---|---|---|
| From | To | Length | From | To | Length |
| 45+500 | 45+510 | 10.000 | 45+490 | 45+500 | 10.000 |
| 45+690 | 45+720 | 30.000 | 45+630 | 45+650 | 20.000 |
| 45+750 | 45+760 | 10.000 | 45+670 | 45+680 | 10.000 |
| 45+850 | 45+880 | 30.000 | 45+810 | 45+820 | 10.000 |
| 45+890 | 45+900 | 10.000 | 46+100 | 46+110 | 10.000 |
| 46+000 | 46+010 | 10.000 | 46+120 | 46+160 | 40.000 |
| 46+040 | 46+050 | 10.000 | 46+250 | 46+260 | 10.000 |
| 46+080 | 46+090 | 10.000 | 46+410 | 46+430 | 20.000 |
| 46+140 | 46+160 | 20.000 | 46+450 | 46+460 | 10.000 |
| 46+380 | 46+400 | 20.000 | 46+880 | 46+890 | 10.000 |
| 46+440 | 46+450 | 10.000 | 47+010 | 47+020 | 10.000 |
| 46+600 | 46+640 | 40.000 | 47+400 | 47+410 | 10.000 |
| 46+650 | 46+660 | 10.000 | 47+570 | 47+580 | 10.000 |
| 46+770 | 46+780 | 10.000 | 48+080 | 48+090 | 10.000 |
| 46+920 | 46+940 | 20.000 | 48+310 | 48+320 | 10.000 |
| 46+950 | 46+960 | 10.000 | 48+990 | 49+000 | 10.000 |
| 46+990 | 47+000 | 10.000 | 49+020 | 49+030 | 10.000 |
| 47+420 | 47+430 | 10.000 | 49+150 | 49+160 | 10.000 |
| 47+610 | 47+630 | 20.000 | 49+180 | 49+190 | 10.000 |
| 47+790 | 47+800 | 10.000 | 49+230 | 49+240 | 10.000 |
| 47+900 | 47+910 | 10.000 | 49+270 | 49+290 | 20.000 |
| 48+000 | 48+010 | 10.000 | 49+300 | 49+310 | 10.000 |
| 48+140 | 48+190 | 50.000 | 49+330 | 49+340 | 10.000 |
| 48+240 | 48+250 | 10.000 | 49+440 | 49+450 | 10.000 |
| 48+380 | 48+390 | 10.000 | 49+560 | 49+570 | 10.000 |
| 48+480 | 48+500 | 20.000 | 49+580 | 49+610 | 30.000 |
| 48+610 | 48+620 | 10.000 | 49+650 | 49+690 | 40.000 |
| 48+700 | 48+710 | 10.000 | 49+840 | 49+860 | 20.000 |
| 48+720 | 48+730 | 10.000 | 49+930 | 49+940 | 10.000 |
| 48+740 | 48+750 | 10.000 | 50+350 | 50+370 | 20.000 |
| 48+820 | 48+840 | 20.000 | 50+430 | 50+440 | 10.000 |
| 48+870 | 48+880 | 10.000 | 50+640 | 50+650 | 10.000 |
| 48+890 | 48+900 | 10.000 | 50+700 | 50+710 | 10.000 |
| 48+980 | 48+990 | 10.000 | 50+790 | 50+800 | 10.000 |
| 49+730 | 49+760 | 30.000 | 50+810 | 50+820 | 10.000 |
| 49+780 | 49+790 | 10.000 | 50+980 | 51+010 | 30.000 |
| 49+800 | 49+830 | 30.000 | 51+080 | 51+090 | 10.000 |
| 49+910 | 49+920 | 10.000 | 51+150 | 51+160 | 10.000 |
| 50+090 | 50+100 | 10.000 | 51+170 | 51+180 | 10.000 |
| 50+550 | 50+560 | 10.000 | 51+190 | 51+210 | 20.000 |
| 51+090 | 51+100 | 10.000 | 51+220 | 51+240 | 20.000 |
| 52+180 | 52+190 | 10.000 | 51+290 | 51+310 | 20.000 |
| 52+630 | 52+660 | 30.000 | 51+440 | 51+470 | 30.000 |
| 52+670 | 52+690 | 20.000 | 51+570 | 51+580 | 10.000 |
| 52+770 | 52+780 | 10.000 | 51+640 | 51+660 | 20.000 |
| 52+980 | 52+990 | 10.000 | 51+790 | 51+800 | 10.000 |
| 53+300 | 53+310 | 10.000 | 51+830 | 51+840 | 10.000 |
| 53+330 | 53+340 | 10.000 | 51+880 | 51+890 | 10.000 |
| 53+980 | 53+990 | 10.000 | 51+970 | 51+980 | 10.000 |
| 54+200 | 54+210 | 10.000 | 52+010 | 52+020 | 10.000 |
| 54+360 | 54+370 | 10.000 | 52+040 | 52+050 | 10.000 |
| 54+460 | 54+470 | 10.000 | 52+220 | 52+230 | 10.000 |

| RHS | | | LHS | | |
|---|---|---|---|---|---|
| From | To | Length | From | To | Length |
| 54+540 | 54+550 | 10.000 | 52+260 | 52+290 | 30.000 |
| 55+610 | 55+620 | 10.000 | 52+420 | 52+440 | 20.000 |
| 55+750 | 55+770 | 20.000 | 52+530 | 52+540 | 10.000 |
| 56+010 | 56+030 | 20.000 | 52+660 | 52+690 | 30.000 |
| 56+500 | 56+510 | 10.000 | 52+730 | 52+740 | 10.000 |
| 56+640 | 56+650 | 10.000 | 52+840 | 52+850 | 10.000 |
| 57+220 | 57+240 | 20.000 | 52+860 | 52+870 | 10.000 |
| 57+280 | 57+330 | 50.000 | 53+270 | 53+290 | 10.000 |
| 57+360 | 57+370 | 10.000 | 53+330 | 53+360 | 30.000 |
| 57+680 | 57+690 | 10.000 | 53+380 | 53+400 | 20.000 |
| 57+860 | 57+870 | 10.000 | 53+410 | 53+420 | 10.000 |
| 57+910 | 57+920 | 10.000 | 53+500 | 53+520 | 20.000 |
| 57+990 | 58+000 | 10.000 | 53+590 | 53+610 | 20.000 |
| 58+070 | 58+090 | 20.000 | 53+630 | 53+640 | 10.000 |
| 58+800 | 58+810 | 10.000 | 53+660 | 53+710 | 50.000 |
| 59+440 | 59+450 | 10.000 | 53+730 | 53+740 | 10.000 |
| 59+460 | 59+470 | 10.000 | 53+780 | 53+790 | 10.000 |
| 61+660 | 61+670 | 10.000 | 53+820 | 53+830 | 10.000 |
| 61+700 | 61+710 | 10.000 | 53+890 | 53+900 | 10.000 |
| 62+060 | 62+090 | 30.000 | 53+940 | 53+950 | 10.000 |
| 62+170 | 62+190 | 20.000 | 54+220 | 54+230 | 10.000 |
| | | | 54+310 | 54+320 | 10.000 |
| | | | 54+440 | 54+450 | 10.000 |
| | | | 54+740 | 54+760 | 20.000 |
| | | | 54+830 | 54+850 | 20.000 |
| | | | 54+960 | 55+020 | 60.000 |
| | | | 55+040 | 55+130 | 90.000 |
| | | | 55+260 | 55+270 | 10.000 |
| | | | 55+330 | 55+350 | 20.000 |
| | | | 55+360 | 55+380 | 20.000 |
| | | | 55+600 | 55+610 | 10.000 |
| | | | 55+710 | 55+720 | 10.000 |
| | | | 55+820 | 55+830 | 10.000 |
| | | | 55+870 | 55+880 | 10.000 |
| | | | 55+920 | 55+930 | 10.000 |
| | | | 55+950 | 55+960 | 10.000 |
| | | | 55+970 | 55+990 | 20.000 |
| | | | 56+050 | 56+060 | 10.000 |
| | | | 56+070 | 56+080 | 10.000 |
| | | | 56+190 | 56+210 | 20.000 |
| | | | 56+290 | 56+310 | 20.000 |
| | | | 56+350 | 56+360 | 10.000 |
| | | | 56+410 | 56+430 | 20.000 |
| | | | 56+630 | 56+670 | 40.000 |
| | | | 56+710 | 56+730 | 20.000 |
| | | | 57+190 | 57+200 | 10.000 |
| | | | 57+250 | 57+260 | 10.000 |
| | | | 57+350 | 57+380 | 30.000 |
| | | | 57+460 | 57+470 | 10.000 |
| | | | 57+550 | 57+560 | 10.000 |
| | | | 57+590 | 57+600 | 10.000 |
| | | | 57+920 | 57+930 | 10.000 |

| RHS | | | LHS | | |
|---|---|---|---|---|---|
| From | To | Length | From | To | Length |
| | | | 57+980 | 57+990 | 10.000 |
| | | | 58+100 | 58+110 | 10.000 |
| | | | 58+220 | 58+230 | 10.000 |
| | | | 58+500 | 58+520 | 10.000 |
| | | | 58+680 | 58+690 | 10.000 |
| | | | 58+730 | 58+750 | 20.000 |
| | | | 58+770 | 58+780 | 10.000 |
| | | | 58+790 | 58+800 | 10.000 |
| | | | 58+810 | 58+820 | 10.000 |
| | | | 58+930 | 58+960 | 30.000 |
| | | | 58+970 | 59+020 | 50.000 |
| | | | 59+110 | 59+130 | 20.000 |
| | | | 59+170 | 59+180 | 10.000 |
| | | | 59+230 | 59+250 | 20.000 |
| | | | 59+460 | 59+480 | 20.000 |
| | | | 59+560 | 59+580 | 20.000 |
| | | | 59+600 | 59+640 | 40.000 |
| | | | 59+680 | 59+700 | 20.000 |
| | | | 59+740 | 59+770 | 30.000 |
| | | | 59+920 | 59+930 | 10.000 |
| | | | 60+720 | 60+730 | 10.000 |
| | | | 60+760 | 60+770 | 10.000 |
| | | | 60+780 | 60+790 | 10.000 |
| | | | 60+800 | 60+810 | 10.000 |
| | | | 60+820 | 60+830 | 10.000 |
| | | | 60+870 | 60+880 | 10.000 |
| | | | 60+920 | 60+930 | 10.000 |
| | | | 60+990 | 61+010 | 20.000 |
| | | | 61+150 | 61+180 | 30.000 |
| | | | 61+240 | 61+250 | 10.000 |
| | | | 61+300 | 61+310 | 10.000 |
| | | | 61+320 | 61+330 | 10.000 |
| | | | 61+350 | 61+360 | 10.000 |
| | | | 61+370 | 61+420 | 50.000 |
| | | | 61+570 | 61+590 | 20.000 |
| | | | 61+610 | 61+620 | 10.000 |
| | | | 61+640 | 61+650 | 10.000 |
| | | | 61+740 | 61+770 | 30.000 |
| | | | 61+840 | 61+870 | 30.000 |
| | **TOTAL** | **1130.000** | | **TOTAL** | **2360.000** |

## Breast Wall Chainages (HT 3m)

| RHS | | | LHS | | |
|---|---|---|---|---|---|
| From | To | Length | From | To | Length |
| **Package – IV : From De. Ch 45.040 to Ch. 62.200 (Rulchawm to Dulte)** | | | | | |
| 45+440 | 45+500 | 60.000 | 45+450 | 45+490 | 40.000 |
| 45+630 | 45+690 | 60.000 | 45+650 | 45+670 | 20.000 |
| 45+760 | 45+850 | 90.000 | 45+770 | 45+810 | 40.000 |
| 45+880 | 45+890 | 10.000 | 46+260 | 46+290 | 30.000 |
| 46+090 | 46+140 | 50.000 | 46+430 | 46+450 | 20.000 |
| 46+240 | 46+300 | 60.000 | 46+850 | 46+880 | 30.000 |

| RHS | | | LHS | | |
|---|---|---|---|---|---|
| From | To | Length | From | To | Length |
| 46+420 | 46+440 | 20.000 | 47+020 | 47+100 | 80.000 |
| 46+640 | 46+650 | 10.000 | 47+160 | 47+230 | 70.000 |
| 46+660 | 46+700 | 40.000 | 47+350 | 47+400 | 50.000 |
| 46+850 | 46+920 | 70.000 | 47+580 | 47+590 | 10.000 |
| 47+000 | 47+100 | 100.000 | 47+830 | 47+870 | 40.000 |
| 47+160 | 47+260 | 100.000 | 47+930 | 48+000 | 70.000 |
| 47+340 | 47+420 | 80.000 | 48+090 | 48+100 | 10.000 |
| 47+550 | 47+610 | 60.000 | 48+320 | 48+380 | 60.000 |
| 47+800 | 47+900 | 100.000 | 49+000 | 49+020 | 20.000 |
| 47+910 | 48+000 | 90.000 | 49+160 | 49+180 | 20.000 |
| 48+080 | 48+140 | 60.000 | 49+420 | 49+440 | 20.000 |
| 48+190 | 48+240 | 50.000 | 49+450 | 49+500 | 50.000 |
| 48+250 | 48+380 | 130.000 | 49+690 | 49+840 | 150.000 |
| 48+450 | 48+480 | 30.000 | 49+870 | 49+930 | 60.000 |
| 48+560 | 48+610 | 50.000 | 50+320 | 50+350 | 30.000 |
| 48+750 | 48+820 | 70.000 | 50+530 | 50+610 | 80.000 |
| 48+860 | 48+870 | 10.000 | 50+650 | 50+700 | 50.000 |
| 48+990 | 49+030 | 40.000 | 50+800 | 50+810 | 10.000 |
| 49+760 | 49+780 | 20.000 | 51+090 | 51+150 | 60.000 |
| 49+790 | 49+800 | 10.000 | 51+210 | 51+220 | 10.000 |
| 49+890 | 49+910 | 20.000 | 51+240 | 51+290 | 50.000 |
| 50+560 | 50+600 | 40.000 | 51+740 | 51+790 | 50.000 |
| 51+100 | 51+140 | 40.000 | 51+840 | 51+880 | 40.000 |
| 52+170 | 52+180 | 10.000 | 51+980 | 52+010 | 30.000 |
| 52+760 | 52+770 | 10.000 | 52+020 | 52+040 | 20.000 |
| 53+080 | 53+130 | 50.000 | 52+160 | 52+220 | 60.000 |
| 53+310 | 53+330 | 20.000 | 52+540 | 52+660 | 120.000 |
| 53+960 | 53+980 | 20.000 | 52+740 | 52+790 | 50.000 |
| 54+320 | 54+360 | 40.000 | 52+850 | 52+860 | 10.000 |
| 54+470 | 54+540 | 70.000 | 52+970 | 53+000 | 30.000 |
| 54+860 | 54+870 | 10.000 | 53+070 | 53+130 | 60.000 |
| 55+230 | 55+270 | 40.000 | 53+290 | 53+330 | 40.000 |
| 55+480 | 55+550 | 70.000 | 53+610 | 53+630 | 20.000 |
| 55+620 | 55+640 | 20.000 | 53+740 | 53+770 | 30.000 |
| 56+460 | 56+500 | 40.000 | 53+790 | 53+820 | 30.000 |
| 57+560 | 57+590 | 30.000 | 53+950 | 54+000 | 50.000 |
| 57+690 | 57+770 | 80.000 | 54+180 | 54+220 | 40.000 |
| 57+870 | 57+910 | 40.000 | 54+320 | 54+370 | 50.000 |
| 58+000 | 58+030 | 30.000 | 54+420 | 54+440 | 20.000 |
| 58+550 | 58+670 | 120.000 | 54+460 | 54+550 | 110.000 |
| 59+450 | 59+460 | 10.000 | 54+850 | 54+960 | 110.000 |
| 61+670 | 61+700 | 30.000 | 55+020 | 55+040 | 20.000 |
| 62+090 | 62+170 | 80.000 | 55+210 | 55+260 | 50.000 |
| | | | 55+350 | 55+360 | 10.000 |
| | | | 55+480 | 55+550 | 70.000 |
| | | | 55+610 | 55+650 | 40.000 |
| | | | 55+720 | 55+790 | 70.000 |
| | | | 55+900 | 55+920 | 20.000 |
| | | | 55+990 | 56+050 | 60.000 |
| | | | 56+060 | 56+070 | 10.000 |
| | | | 56+310 | 56+350 | 40.000 |
| | | | 56+430 | 56+520 | 90.000 |

| RHS | | | LHS | | |
|---|---|---|---|---|---|
| From | To | Length | From | To | Length |
| | | | 57+200 | 57+250 | 50.000 |
| | | | 57+260 | 57+350 | 90.000 |
| | | | 57+450 | 57+460 | 10.000 |
| | | | 57+560 | 57+590 | 30.000 |
| | | | 57+680 | 57+780 | 100.000 |
| | | | 57+870 | 57+920 | 50.000 |
| | | | 57+990 | 58+100 | 110.000 |
| | | | 58+480 | 58+500 | 20.000 |
| | | | 58+520 | 58+670 | 150.000 |
| | | | 58+690 | 58+730 | 40.000 |
| | | | 58+750 | 58+770 | 20.000 |
| | | | 58+800 | 58+810 | 10.000 |
| | | | 58+960 | 58+970 | 10.000 |
| | | | 59+090 | 59+110 | 20.000 |
| | | | 59+130 | 59+170 | 40.000 |
| | | | 59+430 | 59+460 | 30.000 |
| | | | 60+730 | 60+760 | 30.000 |
| | | | 60+790 | 60+800 | 10.000 |
| | | | 60+810 | 60+820 | 10.000 |
| | | | 60+880 | 60+920 | 40.000 |
| | | | 61+250 | 61+300 | 50.000 |
| | | | 61+360 | 61+370 | 10.000 |
| | | | 61+650 | 61+720 | 60.000 |
| | | | 61+830 | 61+840 | 10.000 |
| | **TOTAL** | **2390.000** | | **TOTAL** | **3630.000** |

Above length of the Breast Wall is indicative and minimum specified. The actual length of the Breast Wall shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length specified in this Clause of Schedule B shall not constitute a Change of Scope.

**RE WALL**

| RHS | | | LHS | | |
|---|---|---|---|---|---|
| From | To | Length | From | To | Length |
| **Package – IV : From De. Ch 45.040 to Ch. 62.200 (Rulchawm to Dulte)** | | | | | |
| 46+190 | 46+200 | 10.000 | 45+920 | 45+940 | 20.000 |
| 46+470 | 46+500 | 30.000 | 45+980 | 45+990 | 10.000 |
| 47+120 | 47+130 | 10.000 | 46+540 | 46+560 | 20.000 |
| 49+980 | 50+010 | 30.000 | 46+820 | 46+830 | 10.000 |
| 52+130 | 52+140 | 10.000 | 47+140 | 47+150 | 10.000 |
| 52+490 | 52+510 | 20.000 | | | |
| 53+030 | 53+040 | 10.000 | | | |
| 53+840 | 53+860 | 20.000 | | | |
| 54+110 | 54+120 | 10.000 | | | |
| 54+240 | 54+270 | 30.000 | | | |
| 55+280 | 55+310 | 30.000 | | | |
| 55+570 | 55+580 | 10.000 | | | |
| 57+500 | 57+530 | 30.000 | | | |
| 58+850 | 58+860 | 10.000 | | | |
| 59+050 | 59+060 | 10.000 | | | |
| 60+300 | 60+310 | 10.000 | | | |

| RHS | | | LHS | | |
|---|---|---|---|---|---|
| From | To | Length | From | To | Length |
| 60+330 | 60+340 | 10.000 | | | |
| 61+080 | 61+110 | 30.000 | | | |
| | **Total** | **320.000** | | **Total** | **70.000** |

**ROCKFILL**

| S. No. | Chainage | | Length |
|---|---|---|---|
| | From | To | |
| **Package – IV : From De. Ch 45.040 to Ch. 62.200 (Rulchawm to Dulte)** | | | |
| 1 | 45+940 | 45+980 | 40.000 |
| 2 | 46+200 | 46+220 | 20.000 |
| 3 | 47+130 | 47+140 | 10.000 |
| 4 | 54+270 | 54+290 | 20.000 |
| 5 | 60+310 | 60+330 | 20.000 |
| | | **TOTAL** | **110** |

## 12. Special Requirement for Hill Roads

The special requirements for Hill road as per Section 13 of Manual IRC: SP-73-2018 and IRC: SP-48-1988 Hill Road Manual, shall be constructed & provided as per requirements with approval from the Authority's Engineer.

## 13. Change of Scope

The length of Structures and bridges specified hereinabove shall be treated as an approximate assessment. The actual lengths as required on the basis of detailed investigations shall be determined by the Contractor in accordance with the Specifications and Standards. Any variations in the lengths specified in this Schedule- B shall not constitute a Change of Scope, save and except any variations in the length arising out of a Change of Scope expressly undertaken in accordance with the provisions of Article 13.

## Schedule - C

*(See Clause 2.1)*

## Project Facilities

### 1. Project Facilities

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

(a) toll plaza[s];

(b) roadside furniture;

(c) pedestrian facilities;

(d) tree plantation;

(e) truck lay-byes;

(f) bus-bays and bus shelters;

(g) rest areas

(h) street lighting & high mast lighting

(i) Advanced Traffic Management System (ATMS)

(j) Rain Water Harvesting

(k) others

### 2. Description of Project Facilities

Each of the Project Facilities is described below:

### a) Toll Plazas : Nil

| Toll Plaza | Design Chainage (in km) |
|---|---|
| **Package IV** | |
| NIL | |

The tentative location is mentioned as above however the exact location identified shall be finalised in consultation with the Authority Engineer.
Specifications and other requirements of the toll plazas shall be strictly as per Section 10 of Manual IRC SP 73-2018. Toll Plaza should be design such that roof canopy fixed with solar panels.

### b) Road side Furniture shall be provided as follows: -

(i) Traffic Signs and Pavement Markings.

Traffic signs and pavement markings shall include road side signs, overhead signs, curve mounted signs and road marking along the project highway. The locations for these provisions shall be finalised in consultation with Authority's Engineer and as per latest IRC Standard.

(ii) Concrete Crash Barrier, Metal beam crash barrier, Separators (MS railings)

The minimum length of 1.630 Km Metal beam crash barrier, shall be provided as per Schedule D and for safety of traffic & users.

(iii) Traffic Safety Devices in consultation with Authority's Engineer & Latest IRC standards

(iv) Boundary Stones shall be placed throughout the project road as per schedule 'D'

(v) Hectometer / Kilometer Stones as per schedule 'D'

(vi) Solar Traffic blinker signal (L.E.D) shall be provided at intersections.

**c) Pedestrian Facilities**

The additional pedestrians' facilities in the form of guard rails, footpath, lighting etc. shall be provided in built-up area.

**d) Landscaping and Tree Plantation**

Landscaping and road side plantation shall be provided in accordance with the Manual of Specifications and Standards as referred in Schedule B and D. Contractor Shall be responsible for implementation of Environment management Plan (EMP) on the project. The cost of EMP shall be Bourne by Contractor.

**e) Truck Lay-byes**

Truck Lay byes shall be provided at locations given below on both side of highway on each location as per Manual.

| S. No. | Existing Chainage (km) | Design Chainage (km) | Side | Remark |
|---|---|---|---|---|
| **Package IV** | | | | |
| NIL | | | | |

The tentative location is mentioned as above however the exact location identified shall be finalised in consultation with the Authority Engineer.

**f) Bus-bays and Bus Shelter,**

Bus Lay bye with bus shelter & bus shelter shall be provided at locations given below.

| S.No. | Existing Chainage (km) | Design Chainage (Km) | Side | Village Name |
|---|---|---|---|---|
| **Package IV** | | | | |
| 1 | 50+480 | 45.100 | RHS | --- |
| 2 | 68+100 | 61.180 | LHS | DULTE |

Note: The locations of Bus Lay byes with bus shelter/ Bus shelter are tentative & shall be got approved / provided in consultation with the Authority / Authority's Engineer.

**g) Rest Area**: **NIL.**

**h) Street Lighting & High Mast Lighting**

**i. Street/Highway Lighting**

Street Light: Street lighting on decorative lamp post with LED /energy efficient lighting system of standard make with minimum 40 Lux capacities shall be provided @ 30m interval for entire project highway. Street lights shall be provided with dual lights on single pole and single lights on single pole. The height of street light pole shall be about 9m above FRL and that of high mast shall be 25m. The street light arrangement is given in following table:

| S. No | Chainage | | Length (km) | Spacing (m) | Height of Pole (m) | No of One way Light Poles | No of Two way Light Poles |
|---|---|---|---|---|---|---|---|
| | From | To | | | | | |
| **Package IV** | | | | | | | |
| --NIL-- | | | | | | | |

**ii. High Mast Lighting**

High mast lighting shall be provided at Major junctions, Flyovers toll plaza and Bus Bay /Truck Lay byes using LED / energy efficient lighting system. The high mast shall be provided at following locations:

| S. No | Design Chainage | Location | Height of HM (m) | Qty (Nos) |
|---|---|---|---|---|
| **Package – IV** | | | | |
| --NIL-- | | | | |

**iii.** Solar lights blinkers shall be provided at major & minor junctions etc.

**iv.** The lighting work shall be got done from the qualified specialised agency.

**v.** The scope include providing entire lighting systems, trenching, underground / building in cabling, transformers etc and obtaining electric supply / approval from concern Govt department etc.

**i) Advanced Traffic Management System (ATMS)**

ATMS shall be provided as per para 12.15 of the Manual (IRS SP 73 2018).

**j) Rain Water Harvesting System**

Rain Water Harvesting System shall be provided at bus bay with bus shelter, truck lay byes locations.

**k) Slope protection**

The slope protection by lawn or any other method using green technology will be provided as per Manual and as directed by Authority.

**l) Utility pipe ducts**

**(18 Nos)** Utility pipe ducts in C.C. Pipe – 600mm @ 1000.00m c/c for rural & urban length of project road across road with proper inlet and chamber for crossing service lines such as irrigation pipe lines and cables. In urban areas the ducts shall be constructed along the project road for linear underground utility lines. The ducts shall be laid at a suitable depth as approved by Authority Engineer

**m) Utilities**

Utilities to be identified at site and certified by the Authority Engineer then shifting may be taken by contractor.

**Note:** In case of any discrepancy in numbers or locations of any of the project facilities mentioned in this Schedule C, shall be constructed and provided in consultation with the Authority Engineer as per site/design requirement**.**

## Schedule - D

*(See Clause 2.1)*

## Specifications and Standards

### 1. Construction

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

### 2. Design Standards

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

Manual of Specifications and Standards for Two Laning of Highways (IRC: SP: 73-2018), referred to herein as the Manual

## 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 with Paved Shoulder of Highways (IRC:SP:73-2018) and Hill Road manual (IRC:SP:48-1988) 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:

| S. No. | Clause No. | Provisions in Clause | Variation Proposed in Brief |
|---|---|---|---|
| 1 | Clause 2.2 | For Mountainous and Steep terrain, Ruling and Minimum Speed is 60kmph and 40kmph respectively. | For Mountainous and Steep terrain, Ruling and Minimum Speed is 40kmph and 30kmph respectively. |
| 2 | Clause 2.16 | Typical Cross Sections | Fig. 1, 2A, 2B, 3, 4 & 5 as Per Schedule-B |

(iii) Note 1: Deviations from the aforesaid Specifications and Standards shall be listed out here. Such deviations shall be specified only if they are considered essential in view of project-specific requirements.

## 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-fulfillment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly lump sum payment as set forth in Clause 14.6 of this Agreement, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.

(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**

All damages occurring to the Project Highway on account of a Force Majeure Event or willful 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 Inspect ion | 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, FHWA 2003 | 24-48 hours | MORT&H Specification 3004.2 |
| | Cracking | Nil | < 5 % subject to limit of 0.5 sqm 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 % of area | Daily | Length Measurement Unit like | | 2 -7 days | IRC:82-2015 |
| | Bleeding | Nil | < 1 % of area | Daily | | | | |
| | Ravelling / Stripping | Nil | < 1 % of area | Daily | | | | |
| | Edge Deformation/ Breaking | Nil | < 1 m for any 100m section and | Daily | | | | |

| Asset Type | Performance Parameter | Level of Service (LOS) | | Frequency of Inspect ion | Tools/Equipment | Standards and References for Inspection and Data Analysis | Time limit for Rectification/ Repair | Maintenance Specifications |
|---|---|---|---|---|---|---|---|---|
| | | **Desirable** | **Acceptable** | | | | | |
| | | | width < 0.1 m at any location, restricted to 30 cm from the edge | | | | | |
| | Roughness BI | 2000 mm/km | 2400 mm/km | Bi-Annually | Class I Profilometer SCRIM (Sideway force Coefficient Routine 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 Condition Survey Equipment | 180 days | IRC:82-2015 |
| | Skid Number | 60SN | 50 SN | Bi-Annually | | | 180 days | BS: 7941-1:2006 |
| | Pavement Condition Index | 3 | 2.1 | Bi-Annually | | | 180 days | IRC:82-2015 |
| | Other Pavement Distresses | | | Bi-Annually | | | 2-7 days | IRC:82-2015 |
| | Deflection/ Remaining Life | | | Bi-Annually | Falling Weight Deflectometer | IRC 115: 2014 | | IRC:115-2014 |
| Rigid Pavement (Pavement of MCW, Service Road, Grade structure approaches of connecting roads, Slip roads, lay byes | Roughness BI | 2000 mm/km | 2400 mm/km | Bi-Annually | Class I Profilometer | ASTM E950 (98) :2004 and ASTM E1656 - 94: 2000 | 180 days | IRC:SP:83-2008 |
| | Skid | Skid Resistance no. at different speed of vehicles | | Bi-Annually | SCRIM (Sideway force Coefficient Routine | IRC:SP:83-2008 | 180 days | IRC:SP:83-2008 |
| | | **Minimum SN** | **Traffic Speed** | Bi-Annually | | | 180 days | |

| Asset Type<br><br>etc. as applicable) | Performance Parameter | Level of Service (LOS) | | Frequency of Inspect ion | Tools/Equipment | Standards and References for Inspection and Data Analysis | Time limit for Rectification/ Repair | Maintenance Specifications |
|---|---|---|---|---|---|---|---|---|
| | | Desirable | Acceptable | | | | | |
| | | | (Km/h) | | Investigation Machine or equivalent) | | | |
| | | 36 | 50 | | | | | |
| | | 33 | 65 | | | | | |
| | | 32 | 80 | | | | | |
| | | 31 | 95 | | | | | |
| | | 31 | 110 | | | | | |
| | Edge drop at shoulders | Nil | 40mm | Daily | Length Measurement Unit like Scale, Tape, odometer etc. | **IRC** | 7-15 days | MORT&H Specification 408.4 |
| | | Nil | <2% variation in prescribed slope of camber/cross fall | Daily | | | 7-15 days | MORT&H Specification 408.4 |
| | | Nil | | 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 | Daily Specially 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**

| S. 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 | Single Discrete Cracks Not intersecting with any joint | w = width of crack<br>L = length of crack<br>d = depth of crack<br>D = depth of slab | 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-moving car | Seal without delay | Seal, and stitch if L >lm. 3 Within 7days |
| | | | 3 | w = 0.5 - 1.5 mm, discernible | | |

| S. 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 |
| | | | | from fast-moving car | | |
| | | | 4 | w = 1.5 - 3.0 mm | Seal, and stitch if L > l 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 more joints | w = width of crack L = length of crack d = depth of crack D = depth of slab | 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-moving car | | |
| | | | 3 | w = 0.5 - 1.5 mm, discernible from fast-moving car | Route, seal and stitch, if L > 1 m. Within 7 days | |
| | | | 4 | w = 1.5 - 3.0 mm | Dowel Bar Retrofit Within 15 days | Full Depth Repair Dismantle and reconstruct affected |
| | | | 5 | w > 3 mm. | Not Applicable, as it may be full depth | Portion with norms and specifications - See Para 5.5 & 9.2 Within 15days |
| 3 | Single Longitudinal Crack intersecting with one or more joints | w = width of crack L = length of crack d = depth of crack D = depth of slab | 0 | Nil, not discernible | No Action | |
| | | | 1 | w < 0.5 mm, discernable from slow moving vehicle | Seal with epoxy, if L > 1m. 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, if L > l m. Within 15 days | |
| | | | 3 | w = 3.0 - 6.0 mm | Not Applicable, as it may be full depth | Partial Depth Repair with stapling. Within 15 days |
| | | | 4 | w = 6.0 - 12.0 mm, usually associated with spalling | | |
| | | | 5 | w > 12 mm, usually associated with spalling, and/or slab rocking under traffic | | Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications See Para 5.6.4 Within 15 days |
| 4 | Multiple Cracks intersecting with one or more joints | w = width of crack | 0 | Nil, not discernible | No Action | |
| | | | 1 | w < 0.2 mm, hair cracks | Seal, and stitch if L > l m. Within 15 days | |
| | | | 2 | w = 0.2 - 0.5 mm. discernible from slow vehicle | | |

| S. 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 | w = 0.5 - 3.0 mm, discernible from fast vehicle | Full depth repair within 15 days | Dismantle, Reinstate sub base, Reconstruct whole slab as per specifications within 30 days |
| | | | 4 | w = 3.0 - 6.0 mm panel broken into 2 or 3 pieces | | |
| | | | 5 | w > 6 mm and/or panel broken into more than 4 pieces | | |
| 5 | Corner Break | | 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 with epoxy Within 7days Full depth repair |
| | | | 2 | w < 1.5 mm; L < 0.6 m, only one corner broken | | |
| | | | 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 | |
| | | | 4 | w > 1.5 mm; L > 0.6 m or three corners broken | | |
| | | | 5 | three or four corners broken | | Reinstate sub-base, and reconstruct the slab as per norms and specifications within 30days |
| 6 | Punchout (Applicable to Continuous Reinforced Concrete Pavement (CRCP) only) | w = width of crack L = length (m/m2) | 0 | Nil, not discernible | Not Applicable, as it may be full depth | No Action |
| | | | 1 | w < 0.5 mm; L < 3 m/m2 | | Seal with low viscosity epoxy to secure broken parts. Within 15days |
| | | | 2 | either w > 0.5 mm or L < 3 m/m2 | | |
| | | | 3 | w > 1.5 mm and L < 3 m/m2 | | |
| | | | 4 | w > 3 mm, L < 3 m/m2 and deformation | | Full depth repair - Cut out and replace damaged area taking care not to damage reinforcement. Within 30days |
| | | | 5 | w > 3 mm, L > 3 m/m2 and deformation | | |
| **SURFACE DEFECTS** | | | | | | |
| 7 | | r = area damaged surface/total surface of slab (%) h = maximum depth of damage | | | **Short Term** | **Long Term** |
| | Ravelling or Honeycomb type surface | | 0 | Nil, not discernible | No action. | Not Applicable |
| | | | 1 | r < 2 % | Local repair of areas Damaged and liable to be damaged. Within 15 days | |
| | | | 2 | r = 2 - 10 % | | |
| | | | 3 | r = 10-25% | Bonded Inlay, 2 or 3 | |

| S. 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 | r = 25 - 50 % | slabs if affecting. Within 30 days | |
| | | | 5 | r > 50% and h > 25 mm | Reconstruct slabs, 4 or more slabs if affecting. Within 30 days | |
| 8 | Scaling | r = damaged surface/total surface of slab (%) h = maximum depth of damage | 0 | Nil, not discernible | No action. | Not Applicable |
| | | | 1 | r < 2 % | Local repair of areas Damaged and liable to be damaged Within 7days | |
| | | | 2 | r = 2 - 10 % | | |
| | | | 3 | r = 10-25% | Bonded Inlay within 15 days | |
| | | | 4 | r = 25 - 50 % | | |
| | | | 5 | r > 50% 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 | Popout (Small Hole), Pothole Refer Para 8.4 | n = number/m2 d = diameter h = maximum depth | 0 | d < 50 mm; h < 25 mm; n < 1 per 5 m2 | No action | Not Applicable |
| | | | 1 | d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m2 | Partial depth repair 65 mm deep Within 15 days | |
| | | | 2 | d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m2 | | |
| | | | 3 | d = 100 - 300 mm; h < 100 mm n < 1 per 5 m2 | Partial depth repair 110mm i.e.10 mm more than the Depth of the hole. Within 30 days Full depth repair Within 30 days | |
| | | | 4 | d = 100 - 300 mm; h > 100 mm; n < 1 per 5 m2 | | |
| | | | 5 | d > 300 mm; h > 100 mm: n > 1 per 5 m2 | | |
| **JOINT DEFECTS** | | | | | | |

| S. 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 |
| 11 | Joint Seal Defects | loss or damage L = Length as % total joint length | 0 | Difficult to discern. | No action. | 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. | |
| | | | 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% | | |
| 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 | Determine cause and observe, take action for diamond grinding Diamond Grinding | Replace the slab as appropriate. Within 30days |
| | | | 2 | f = 3 - 6 mm | | |
| | | | 3 | f = 6 - 12 mm | Diamond Grinding | |
| | | | 4 | f = 12 - 18 mm | Raise sunken slab. | |
| | | | 5 | f> 18 mm | | |
| 14 | Blowup 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. | |

| S. 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 |
| | | | | | Within 30 days | |
| | | | 5 | shattered slabs, ie 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 | |
| | | | 3 | h = 30 - 50 mm | Strengthen subgrade Reinstate pavement at normal level if L < 20 m. Within 30 days | |
| | | | 4 | h > 50 mm or > 20% joints | | |
| | | | 5 | h > 100 mm | | |
| 16 | Heave | h = positive vertical displacement from normal profile. L = length | 0 | Not discernible. h < 5 mm | Short Term No action | Long Term scrabble |
| | | | 1 | h = 5 - 15 mm | Follow up. | |
| | | | 2 | h = 15 - 30 mm, Nos <20% joints | Install Signs to Warn Traffic within 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 | | |
| 17 | Bump | h = vertical displacement from normal profile | 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 Full Depth Repair within 30 days | Replace in case of new construction Within 30days Full Depth Repair Within 30days |
| | | | 5 | h > 15 mm | | |
| 18 | Lane to Shoulder Dropoff | f = difference of level | 0 | Nil, not discernible < 3mm | Short Term No action | Long Term |
| | | | 1 | f = 3 - 10 mm | Spot repair of shoulder within 7 days Fill up shoulder within 7 days | For any 100 m Stretch Reconstruct shoulder, if affecting 25% or more of stretch. Within 30days |
| | | | 2 | f = 10 - 25 mm | | |
| | | | 3 | f = 25 - 50 mm | | |
| | | | 4 | f = 50 - 75 mm | | |
| | | | 5 | f > 75 mm | | |
| DRAINAGE | | | | | | |
| 19 | Pumping | quantity of fines and water expelled | 0 | not discernible | No Action | |
| | | | 1 to 2 | slight/ occasional Nos < | Repair cracks and joints | Inspect and repair |

| S. 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 |
| | | through open joints and cracks Nos | | 10% | Without delay. | 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 sections. Strengthen subgrade and subbase. Replace slab. Within 30 days | |
| 20 | Ponding | Ponding on slabs due to blockage of drains | 0 - 2 | No discernible 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 | | |

**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 :84-2014, 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 deficiency 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 84-2014 |
| | | **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 | Re - painting | Cat-1 Defect – within 24 hours Cat-2 | IRC:35-2015 |

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th>Level of Service (LOS)</th><th>Frequency of Measurement</th><th>Testing Method</th><th>Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specifications and Standards</th></tr>
<tr><td></td><td></td><td></td><td></td><td>of IRC:35-2015</td><td></td><td>Defect -within 2 months</td><td></td></tr>
<tr><td></td><td>Day time Visibility</td><td>During expected life Service Time<br>Cement Road - 130mcd/m2/lux<br>Bituminous Road - 100mcd/m2/lux</td><td>Monthly</td><td>As per Annexure-D of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours Cat-2 Defect within 2 months</td><td>IRC:35-2015</td></tr>
<tr><td></td><td>Night Time Visibility</td><td>Initial and Minimum Performance for Dry Retro reflectivity during night time:<br>Design Speed | (RL) Retro Reflectivity (mcd/m2/lux)<br>Initial (7 days) | Minimum Threshold level (TL) & warranty period required up to 2 years<br>Up to 65 | 250 | 80<br>65 - 100 | 250 | 120<br>Above 100 | 300 | 150<br>Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity):<br>Initial 7 days Retro reflectivity: 100 mcd/m2/lux<br>Minimum Threshold Level: 50 mcd/m2/lux</td><td>Bi-Annually</td><td>As per Annexure-E of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours Cat-2 Defect - within 2 months</td><td>IRC:35-2015</td></tr>
<tr><td></td><td>Skid Resistance</td><td>Initial and Minimum performance for Skid Resistance:<br>Initial (7days): 55BPN<br>Min. Threshold: 44BPN<br>*Note: shall be considered under urban/city traffic condition encompassing the locations like</td><td>Bi-Annually</td><td>As per Annexure-G of IRC:35-2015</td><td></td><td>Within 24 hours</td><td></td></tr>
</table>

| Asset Type | Performance Parameter | Level of Service (LOS) | Frequency of Measurement | Testing Method | Recommended Remedial measures | Time limit for Rectification | Specifications and Standards |
|---|---|---|---|---|---|---|---|
| | | pedestrian crossings, bus bay, bus stop, cycle track intersection delineation, transverse bar markings etc | | | | | |
| Road Signs | Shape and Position | Shape and Position as per IRC:67-2012.<br>Signboard should be clearly visible for the design speed of the section. | Daily | Visual with video/image backup | Improvement of shape, in case if shape is damaged.<br>Relocation as per requirement | 48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs)<br>15 Days in case of Gantry/ Cantilever Sign boards | 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. | Change of signboard | 48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs) 1 Month in case of Gantry / Cantilever Sign boards | IRC:67-2012 |
| Kerb | Kerb Height | As per IRC 86:1983 depending upon type of Kerb | Bi-Annually | Use of distance measuring tape | Raising Kerb Height | Within 1 Month | IRC 86:1983 |
| | Kerb Painting | Functionality: Functioning of Kerb painting as intended | Daily | Visual with video/image backup | Kerb Repainting | Within 7-days | IRC 35:2015 |
| Other Road Furniture | Reflective | Numbers and Functionality as per | Daily | Counting | New Installation | Within 2 | IRC:SP:84-2014, |

| Asset Type | Performance Parameter | Level of Service (LOS) | Frequency of Measurement | Testing Method | Recommended Remedial measures | Time limit for Rectification | Specifications and Standards |
|---|---|---|---|---|---|---|---|
| | Pavement Markers (Road Studs) | specifications in IRC:SP:84-2014 and IRC:35-2015, unless specified in Schedule-B. | | | | months | IRC:35-2015 |
| | Pedestrian Guardrail | Functionality: Functioning of guardrail as intended | Daily | Visual with video/image backup | Rectification | Within 15 days | IRC:SP:84-2014 |
| | Traffic Safety Barriers | Functionality: 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 of Traffic Safety Barriers | Functionality: Functioning of End Treatment as intended | Daily | Visual with video/image backup | Rectification | Within 7 days | IRC:SP:84-2014, IRC:119-2015 |
| | Attenuators | Functionality: 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 | Functionality: Functioning of Guard Posts and Delineators as intended | Daily | Visual with video/image backup | Rectification | Within 15 days | IRC: 79 - 1981 |
| | 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 | Functionality: Functioning of Traffic Blinkers as intended | Daily | Visual with video/image backup | Rectification | Within 7 days | IRC:SP:84-2014 |
| Highway Lighting System | Highway Lights | Illumination: Minimum 40 Lux illumination on the road surface | Daily | The illumination level shall be measured with lux meter | Improvement in Lighting System | 24 hours | IRC:SP:84-2014 |
| | | No major failure in the lighting system | Daily | - | Rectification of failure | 24 hours | IRC:SP:84-2014 |
| | | No minor failure in the lighting system | Monthly | - | Rectification of failure | 8 hours | IRC:SP:84-2014 |
| | 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:84-2014 |
| | | No major/minor failure in the lighting system | Daily | - | Rectification of failure | 8 hours | IRC:SP:84-2014 |

| Asset Type | Performance Parameter | Level of Service (LOS) | Frequency of Measurement | Testing Method | Recommended Remedial measures | Time limit for Rectification | Specifications and Standards |
|---|---|---|---|---|---|---|---|
| Trees and Plantation Including median plantation | Obstruction in a minimum head-room of 5.5 m above Carriageway or obstruction in visibility of road signs | No obstruction due to trees | Daily | | Removal of trees | Immediate | IRC:SP:84-2014 |
| | 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:84-2014 |
| | 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:84-2014 |
| Rest Areas | Cleaning of 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:84-2014 |
| 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:40-1993 and IRC SP:13-2004 |
| | Leak-proof expansion joints if | No leakage through expansion joints. | Bi-Annually | Physical inspection of expansion | Fixing with sealant suitably | 30 days or before onset of rains | IRC SP:40-1993 and IRC SP:69-2011 |

| Asset Type | Performance Parameter | Level of Service (LOS) | Frequency of Measurement | Testing Method | Recommended Remedial measures | Time limit for Rectification | Specifications and Standards |
|---|---|---|---|---|---|---|---|
| | any | | | joints as per IRC SP: 35-1990 if any, for leakage strains on walls at joints. | | whichever comes earlier | |
| | Structurally sound | Spalling of concrete not more than 0.25 sqm<br>Delamination of concrete not more than 0.25 sq.m<br>Cracks wider than 0.3 mm not more than 1m aggregate length | 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:40-1993 | **15 Days** | IRC SP 40-1993 and MORTH Specifications clause 2800 |
| | 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 40-1993 and IRC:SP:13-2004. |
| Bridges including ROBs Flyover etc. as applicable | Riding quality or User comfort | 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 |
| 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 3004.2 & 2811. |
| | User safety | No damaged or missing stretch of | **Daily** | Visual | Repairs and | 3 days | IRC: 5-1998, |

| Asset Type | Performance Parameter | Level of Service (LOS) | Frequency of Measurement | Testing Method | Recommended Remedial measures | Time limit for Rectification | Specifications and Standards |
|---|---|---|---|---|---|---|---|
| | (condition of crash barrier and guard rail) | crash barrier or pedestrian hand railing | | inspection and detailed condition survey as per IRC SP: 35-1990. | replacement of safety barriers as the case may be | | IRC SP: 84-2014 and IRC SP: 40-1993. |
| | Rusted reinforcement | Not more than 0.25 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: 40-1993 and MORTH Specification 1600. |
| | Spalling of concrete | Not more than 0.50 sq.m | | | | | |
| | Delamination | Not more than 0.50 sq.m | | | | | |
| | 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 rehabilitation. | 48 Hours | IRC SP: 40-1993 and MORTH Specification 2800. |
| | 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 month | MORTH specifications 2600 & 2700 |
| | Deflection due to permanent loads and live loads | Within design limits. | Once in every 10 years for spans more | Load test method | Carry out major rehabilitation works on bridge to retain original design loads capacity | 6 months | IRC SP: 51-1999. |
| | Vibrations in bridge deck due to | Frequency of vibrations shall not be more than 5 Hz | Once in every 5 years for spans | Laser displacement sensors or laser | Strengthening of super structure | 4 months | AASHTO LRFD specifications |

| Asset Type | Performance Parameter | Level of Service (LOS) | Frequency of Measurement | Testing Method | Recommended Remedial measures | Time limit for Rectification | Specifications and Standards |
|---|---|---|---|---|---|---|---|
| | moving trucks | | more than 30m and every 10 years for spans between 15 to 30 m | vibro-meters | | | |
| | 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 asphalt plug and copper strip joint | Bi-Annually | Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit | Replace of seal in expansion joint | 15 days | MORTH specifications 2600 and IRC SP: 40-1993 |
| | Debris and dust in strip seal expansion joint | No dust or debris in expansion joint gap | Monthly | Detailed condition survey as per IRCSP:35-1990 using | Cleaning of expansion joint gaps thoroughly | 3 days | MORTH specifications 2600 and IRC SP: 40-1993. |
| | 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 Inspection Unit | 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 drainage spout if any leakages observed. | 3 days | MORTH specification 2700. |
| Bridge substructure | Cracks/spalling of concrete/ rusted steel | No cracks, spalling of concrete and rusted steel | Bi-Annually | Detailed condition survey as per IRC | All the corroded reinforcement shall need to be thoroughly | 30 days | IRC SP: 40-1993 and MORTH specification |

| Asset Type | Performance Parameter | Level of Service (LOS) | Frequency of Measurement | Testing Method | Recommended Remedial measures | Time limit for Rectification | Specifications and Standards |
|---|---|---|---|---|---|---|---|
| | | | | SP: 35-1990 using Mobile Bridge Inspection Unit | cleaned from rusting and applied with anti-corrosive coating before carrying out repairs to substructure by grouting/guniting and micro concreting depending on type of defect noticed | | 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 or rubber | Bi-Annually | Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit | 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 2810 and IRC SP: 40-199. |
| Bridge Foundations | 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: 40-1993, IRC 83-2014, MORTH specification 2500 |
| | Protecton works in | Damaged of rough stone apron or | 2 times in | Condition | Repairs to damaged | 30 days after | IRC: SP 40- |

| Asset Type | Performance Parameter | Level of Service (LOS) | Frequency of Measurement | Testing Method | Recommended Remedial measures | Time limit for Rectification | Specifications and Standards |
|---|---|---|---|---|---|---|---|
| | good condition | bank revetment not more than 3 sq.m, damage to solid apron (concrete apron) not more than 1 sq.m | a year (before and after rainy season) | survey as per IRC SP:35-1990 | aprons and pitching | defect observation or 2 weeks before onset of rainy season whichever is earlier. | 1993 and IRC:SP:13-2004. |
| Note: Any Structure during the entire contract period which is found that does not complies with all requirements of this Table will be prepared, rehabilitated or even reconstructed under the scope of the contractor | | | | | | | |

**Table 4: Maintenance Criteria for Structures and Culverts:**

**Table 5: Maintenance Criteria for Hill Roads**

In addition to above, for hill roads the following provisions for maintenance is also to 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 MoRTH specifications shall be binding for all maintenance activities.

**A. Flexible Pavement**

| Nature of Defect or deficiency | | Time limit for repair/ rectification |
|---|---|---|
| **(b)** | **Granular earth shoulders, side slopes, drains and culverts** | |
| (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) |
| **(c)** | **Road side furniture including road sign and pavement marking** | |
| (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 |
| **(d)** | **Road lighting** | |
| (i) | Any major failure of the system | 24 (twenty four) hours |
| (ii) | Faults and minor failures | 8 (eight) hours |
| **(e)** | **Trees and plantation** | |

| Nature of Defect or deficiency | | Time limit for repair/ rectification |
|---|---|---|
| (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 |
| **(f) Rest area** | | |
| (i) | Cleaning of toilets | Every 4 (four) hours |
| (ii) | Defects in electrical, water and sanitary installations | 24 (twenty four) hours |
| **(g) [Toll Plaza]** | | |
| **(h)** | **Other Project Facilities and Approach roads** | |
| (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 |
| **Bridges** | | |
| **(a) Superstructure** | | |
| (i) | Temporary measures<br>Permanent measures | within 15 (fifteen) days or as specified by the Authority's Engineer |
| **(b) Foundations** | | |
| (i) | Scouring and/or cavitation | 15 (fifteen) days |
| **(c) Piers, abutments, return walls and wing walls** | | |

| Nature of Defect or deficiency | | Time limit for repair/ rectification |
|---|---|---|
| (i) | Cracks and damages including settlement and tilting, spalling, scaling | 30 (thirty) days |
| **(d)** | **Bearings (metallic) of bridges** | |
| (i) | Deformation, damages, tilting or shifting of bearings | 15 (fifteen) days Greasing of metallic bearings once in a year |
| **(e)** | **Joints** | |
| (i) | Malfunctioning of joints | 15 (fifteen) days |
| **(f)** | **Other items** | |
| (i) | Deforming of pads in elastomeric bearings | 7 (seven) days |
| (ii) | Gathering of dirt in bearings and joints; or clogging of spouts, weep holes and vent-holes | 3 (three) days |
| (iii) | Damage or deterioration in kerbs, parapets, handrails and crash barriers | 3 (three) days (immediately within 24 hours if posing danger 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 |
| **(g)** | **Hill Roads** | |
| (i) | Damage to retaining wall/breast wall | 7 (seven) days |
| (ii) | Landslides requiring clearance | 12 (twelve) hours |
| (iii) | Snow requiring clearance | 24 (twenty four) hours |

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

## Schedule - F

*(See Clause 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) License for use of explosives;

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

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

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

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

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

(i) Any other permits 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.

## Schedule – G

*(See Clauses 7.1 and 19.2)*

## Annex-I

*(See Clause 7.1)*

## Form of Bank Guarantee

## [Performance Security/Additional Performance Security]

[DG(RD)&SS,

Ministry of Road Transport & Highways Transport Bhawan, 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 of the ***** section of [National Highway No. **] 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 under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/ or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

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

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

8. The Guarantee shall cease to be in force and effect on ****$. 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.

(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.

---

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

## Annex – II

*(Schedule - G)*

*(See Clause 19.2)*

## Form for Guarantee for Advance Payment

[DG(RD)&SS,

Ministry of Road Transport & Highways Transport Bhawan, 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 the construction of the ***** section of [National Highway No. **] 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 per cent) of the Contract Price; and that the Advance Payment shall be made in two installments subject to the Contractor furnishing an irrevocable and unconditional guarantee by a scheduled bank for an amount equivalent to 110% (one hundred and ten percent) of such installment to remain effective till the complete and full repayment of the installment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second} installment of the Advance Payment is Rs. ------ cr. (Rupees ------ crore) and the amount of this Guarantee is Rs. ------- cr. (Rupees ------ crore) (the **"Guarantee Amount")[$].**

(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:

1. 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

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

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.

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 installment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any 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 against the Contractor before presenting to the Bank its demand under this Guarantee.

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.

(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.

[$] 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).

## SCHEDULE-H

(See Clause 19.3)

## Contract Price Weightages

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

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

| Item | Weightage in percentage to the Contract Price | Stage for Payment | Percentage weightage to Particular item (col.2) |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| Road Works including culverts, widening and repair of culverts | 69.18 % | **A**- Widening and reconstruction of existing road (Flexible Pavement) | |
| | | (1) Earthwork up to top of the sub-grade | 5.96% |
| | | (2) Sub-base Course | 4.90% |
| | | (3) Non Bituminous Base Course | 6.18% |
| | | (4) Bituminous Base Course | 6.93% |
| | | (5) Wearing Coat | 2.57% |
| | | (6) Shoulder | 0.45% |
| | | **TOTAL** | **26.99%** |
| | | **B.1**Reconstruction/New 2 - lane realignment/ bypass (Flexible Pavement) | |
| | | (1) Earthwork up to top of the sub-grade | 24.04% |
| | | (2) Sub-base Course | 7.96% |
| | | (3) Non Bituminous Base Course | 9.27% |
| | | (4) Bituminous Base Course | 10.41% |
| | | (5) Wearing Coat | 3.87% |
| | | **TOTAL** | **55.55%** |
| | | **B.2** Reconstruction/New 2 - lane realignment/ bypass (Rigid Pavement) | 0.00% |
| | | **C.1** - Reconstruction/New Service Road (Flexible Pavement) | 0.00% |
| | | **C.2** - Reconstruction/New Service Road (Rigid Pavement) | 0.00% |

| Item | Weightage in percentage to the Contract Price | Stage for Payment | Percentage weightage to Particular item (col.2) |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| Road Works including culverts, widening and repair of culverts | 69.18 % | **A**- Widening and reconstruction of existing road (Flexible Pavement) | |
| | | **D** - Reconstruction/New Culverts on existing road, | |
| | | Culverts (length <6m) | **17.46%** |
| Minor Bridges/Underpasses/Overpass | 0.00% | **A.1** - Widening and Repair of Minor Bridges (Length > 6m and < 60m) | 0.00% |
| | | **A.2** - New Major Bridges (Length > 6m and < 60m) | 0.00% |
| Major Bridge (length >60m.) works and ROB/RUB/Elevated Sections/flyovers including viaducts, if any | 0.00% | **A.1**- Widening and repairs of Major Bridges | 0.00% |
| | | | |
| | | **A.2** - New Major Bridges | 0.00% |
| | | **B.1** - Widening and repair of | 0.00% |
| | | **B.2** - New ROB/RUB | 0.00% |
| | | **C.1** - Widening and repair of Elevated Section/Flyovers/Grade Separators | 0.00% |
| | | **C.2** - New Elevated Section/Flyovers/Grade Separators | 0.00% |
| Other works | 30.82% | (i) Road side drains | 10.75% |
| | | (ii) Road signs, markings, km stones, safety devices, | 7.47% |
| | | (iii) Project facilities | |
| | | (a) Bus Bays | 0.27% |
| | | (d) others | |
| | | i) Stone Masonry Retaining wall | 15.28% |
| | | ii) Stone Masonry Breast wall (1.50m Height) | 12.70% |
| | | iii) Stone Masonry Breast wall (3.00m Height) | 41.74% |
| | | iv) RE Wall including Anchor Bolts | 6.63% |
| | | v) Stone Masonry Toe wall (1.00m Height) | 0.25% |
| | | vi) Turfing with Sods | 0.09% |
| | | vii) Utility Pipe Ducts | 0.19% |

| Item | Weightage in percentage to the Contract Price | Stage for Payment | Percentage weightage to Particular item (col.2) |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| Road Works including culverts, widening and repair of culverts | 69.18 % | **A**- Widening and reconstruction of existing road (Flexible Pavement) | |
| | | viii) Dismantling of Structures | 4.63% |

1.3 Procedure of estimating the value of work done.

1.3.1 Road works including approaches to Minor bridges, Major Bridges and Structures (excluding service roads).

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

**Table 1.3.1**

| Stage of Payment | Percentage - weightage | Payment Procedure |
|---|---|---|
| **A- Widening and reconstruction of existing road (Flexible Pavement)** | | Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 500 m length. |
| (1) Earthwork up to top of the sub-grade | 5.96% | |
| (2) Sub-base Course | 4.90% | |
| (3) Non Bituminous Base Course | 6.18% | |
| (4) Bituminous Base Course | 6.93% | |
| (5) Wearing Coat | 2.57% | |
| (6) Shoulder | 0.45% | |
| **B.1- Reconstruction/New 2 - lane realignment/ bypass (Flexible Pavement)** | | Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 500 m length. |
| (1) Earthwork up to top of the sub-grade | 24.04% | |
| (2) Sub-base Course | 7.96% | |
| (3) Non Bituminous Base Course | 9.27% | |
| (4) Bituminous Base Course | 10.41% | |
| (5) Wearing Coat | 3.87% | |
| **B.2- Reconstruction/New 2 - lane realignment/ bypass (Rigid Pavement)** | 0.00% | |
| **C.1 - Reconstruction/New Service Road (Flexible Pavement)** | 0.00% | |
| **C.2 - Reconstruction/New Service Road (Rigid Pavement)** | 0.00% | |

| Stage of Payment | Percentage - weightage | Payment Procedure |
|---|---|---|
| **D - Reconstruction/New Culverts on existing road, realignment, bypasses** | | 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 each culvert. |
| Culverts (length <6m) | 17.46% | |

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

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

Where P = Contract Price

L = Total length in km

Similarly, the rates per km for stages (1), (2) and (4) above shall be worked out.

### 1.3.2 Major Bridge works-

Procedure for estimating the value of Major Bridge works shall be as stated in table 1.3.2:

**Table 1.3.2- Deleted**

### 1.3.3 Rail-road bridges

Procedure for estimating the value of Rail-road bridges works shall be as stated in table 1.3.3:

**Table 1.3.3- Deleted**

### 1.3.4 Other Works

Procedure for estimating the value of other work done shall be as stated in table 1.3.4:

**Table 1.3.4**

| Stage of Payment | Percentage - weightage | Payment Procedure |
|---|---|---|
| (i) Road side drains | 10.75% | Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 500 m. |
| (ii) Road signs, markings, km stones, safety devices | 7.47% | |
| (iii) Project facilities | | |
| (a) Bus Bays | 0.27% | Payment shall be made on pro rata basis for completed facilities. |
| (b) others | | Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 500 m. |
| i) Stone Masonry Retaining wall | 15.28% | |
| ii) Stone Masonry Breast wall (1.50m Height) | 12.70% | |

| Stage of Payment | Percentage - weightage | Payment Procedure |
|---|---|---|
| iii) Stone Masonry Breast wall (3.00m Height) | 41.74% | |
| iv) RE Wall including Anchor Bolts | 6.63% | |
| v) Stone Masonry Toe wall (1.00m Height) | 0.25% | |
| vi) Turfing with Sods | 0.09% | Payment shall be made on pro rata basis for completed facilities. |
| vii) Utility Pipe Ducts | 0.19% | |
| viii) Dismantling of Structures | 4.63% | |

## 2. Procedure for payment for Maintenance

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

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

## Schedule - I

*(See Clause 10.2 (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**

[**Note**: The Authority shall describe in this Annex-I, all the Drawings that the Contractor is required to furnish under Clause 10.2.]

## 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 **[35% of the Scheduled Construction Period]** 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 **[60% of the Scheduled Construction Period]** 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 **[85% of the Scheduled Construction Period]** 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 [Scheduled Construction Period] 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

(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 kilometer.

(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.

(v) 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.

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

**3. Agency for conducting Tests**

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

**4. Completion Certificate**

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

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

| S. No. | Key metrics of Asset | Equipment to be used | Frequency of condition survey |
|---|---|---|---|
| 1 | Surface defects of 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.

## 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 of the ****section (km ** to km **) of National Highway No. ***] (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)

## 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 |
|---|---|---|
| **(a)** | **Carriageway/Pavement** | |
| (i) | Potholes, cracks, other surface defects | 15% |
| (ii) | Repairs of Edges, Rutting | 5% |
| **(b)** | **Road, Embankment, Cuttings, Shoulders** | |
| (i) | Edge drop, inadequate cross fall, undulations, settlement, potholes, ponding, obstructions | 10% |
| (ii) | Deficient slopes, raincuts, disturbed pitching, vegetation growth, pruning of trees | 5% |
| **(c)** | **Bridges and Culverts** | |
| (i) | Desilting, cleaning. vegetation growth, damaged pitching, flooring, parapets, wearing course, footpaths, any damage to foundations | 20% |
| (ii) | Any Defects in superstructures, bearings and sub-structures | 10% |

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

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

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

Where,

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

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 [Two-Laning] of the **** section (km ** to km **) of National Highway No. ** in the State of *** 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.

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

## Schedule - O

*(See Clauses 19.4 (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 Works 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. [*****]

(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 Quality test:

Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a calibrated bump integrator and the maximum permissible roughness for purposes of this Test shall be [2,200 (two thousand and two hundred only)] mm for each kilometer.

### 2. Visual and physical test:

The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include measurement of cracking, rutting, stripping and potholes and shall be as per the requirement of maintenance mentioned in Schedule-E.

## 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 [construction of the ****section (km ** to km **) of

****] (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)

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