Schedule B

Development of the Project Highway

1 Development of the Project Highway

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

2 Rehabilitation and augmentation

Rehabilitation and augmentation shall include Four-Laning and strengthening of the Project Highway as described in Annex-I of this Schedule-B and in Schedule-C.

3 Specifications and Standards

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

Annex – I

(Schedule-B)

Description of Four laning and strengthening

1. Widening of the Existing Highway

1.1 The Project Highway shall follow the existing alignment unless otherwise specified by the Authority and shown in the alignment plans specified in Annex III of Schedule-A. Geometric deficiencies, if any, in the existing horizontal and vertical profiles shall be corrected as per the prescribed standards for plain terrain to the extent land is available.

1.2 Width of carriageway

1.2.1 The paved carriageway shall be 18.0 (Eighteen) m wide as per IRC: SP: 84-2014. (Figure 2.4)

Provided that in following Built-up/urban stretches, the service road shall be provided with the main carriageway as per IRC: SP: 84-2014. (Figure 2.6)

S. No.	Name of Township	Existing Chainage (km)		Side
		From	To	
1	Amoni	301+800	302+850 (BHS) 2100 m	As per Fig 2.6 of the manual
2	Misa	305+850	306+850 (LHS) 1000 m	
		306+050	306+850 (RHS) 800 m	

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

1.2.3 Design Chainage corresponding to Existing Chainage

Kilometer stones are existed in entire length of the project highway. It is called the "Existing Chainage". During topography survey with Total Station, observations are made to these km stones and after finalization of alignment by improving the existing geometry the chainage has been referred to "Design Chainage". The relationship between the "Existing Chainage" and the "DesignChainage" as per field surveys of the location of existing Km stones using the total station for the "Project Highway" is given below:

Existing Chainage (m)	Design Chainage (m)	Name of Place
300023.329	299737.570	Cement Factory
301040.351	300753.156	
302045.649	301756.927	Petrol Pump
303040.999	302754.998	Aamlokhi School
304043.986	303748.333	Near Army Camp
305044.134	304749.916	Near Army Camp
306044.977	305749.995	Assam Road TravelOffice
307045.324	306749.587	Central Bank

308044.812	**307745.013**	**Marey Sand School**
310045.000	**309745.000**	
311043.221	**310743.221**	
312021.584	**311721.584**	
313047.429	**312726.549**	
314025.479	**313714.979**	

1.3 Median shall be as per section 2.5 of the manual.

2. Geometric Design and General Features

2.1 General

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

2.2 Design Speed

The design speed shall be the ruling design speed of 100 km per hour for plain/rolling terrain except at the following location where minimum design speed of 80 km per hour shall be adopted.

S. No.	Chainage km Location	Minimum Design Speed in km/h	Curve Type
NIL			

2.3 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.

Design Chainage in km		Length in m	Type of Deficiency	Remarks
From	To			
NIL				

Minimum FRL as per longitudinal section given in enclosed drawing at Annexure-III of Schedule-A shall have to be achieved by Contractor.

2.4 Right of Way

The proposed ROW is as below:

S. No.	Design Chainage (km)		Proposed ROW (m)
	From	To	
1	297.900	301.800	45
2	301.800	302.850	60
3	302.850	305.850	45
4	305.850	306.050	53
5	306.050	306.850	60
6	306.850	314.300	45

7	314.300	315.315	60

2.5 Type of Shoulders

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

S. No	Design Chainage (km)		Reference to cross section	Remarks	Side
	From	To			
1	301.800	302.850	Figure 2.6	Amoni	BHS
2	305.850	306.850	Figure 2.6	Misa	LHS
3	306.050	306.850	Figure 2.6		RHS

Note: For Figure 2.6 refer to Manual IRC: SP: 84-2014 of clause 2.17

(b) In built-up section and approaches to grade separated structures, the shoulder should be paved in full width.

(c) Earthen shoulders of 2m wide shall be covered with150 mm thick compacted layer of granular material confirming to the requirements given in clause 401 of MORTH.

(d) Design and specifications of paved shoulders and granular material shall conform to the requirement specified in paragraphs 5.10 of the Manual

2.6 Lateral and Vertical Clearances at Underpasses

2.6.1 Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per the paragraph 2.10 of the Manual.

2.6.2 Lateral clearance: The width/size of the opening at the underpasses shall be as follows:

S. No.	Existing Chainage	Design Chainage	Span (No. x length x ht.) in m	Minimum Length of RE wall	Remarks
NIL					

Note: RE wall length includes wall in front of abutments.

2.7 Lateral and vertical clearance at overpasses

2.7.1 Lateral and vertical clearances at over passes shall be as per paragraph 2.11 of the Manual.

2.7.2 Lateral clearance: The size of the opening at the overpasses shall be as follows:

S. No.	Location (chainage) From km to km	Number and length of spans	Remarks
Nil			

2.8 Service roads/ Slip Road

Service roads, as per clause 2.12.2 of the manual, shall be constructed at the locations and for the lengths indicated below:

S. No.	Design Chainage		Length (m)	Side
	From	To		
1	301+800	302+850	2100	BHS
2	305+850	306+850	1000	LHS
3	306+050	306+850	800	RHS

2.9 Grade separated structures

2.9.1 Grade separated structures shall be provided as per paragraph 2.13 of the Manual. The requisite particulars are given below

S. No.	Location of Structure	Design Chainage	Length (m)	Number and length of spans	Approach gradient	Remarks
1	**Kaliabhomra**	**314.745**	**740.682**	2x(7x30)+**30 m Central Span**	**1:50**	**2 lane new structure**

2.9.2 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 of Structure	Design Chainage	Length (m)	Number and length of spans	Approach gradient	Remarks
As per drawing enclosed at Annex – I						

2.10 Cattle and Pedestrian under pass / over pass

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

S. No.	Existing Chainage	Design Chainage	Proposed span arrangement	width in m	Minimum length of RE wall
NIL					

2.11 Typical cross-sections of the Project Highway

Different type of cross sections for different segments of Four Lane stretch shall be developed as provided in 'Manual of Specifications & Standard for Four Laning of Highways through Public Private Partnership' (IRC:SP:84-2014) referred in Schedule D.

Design Chainage in km		Length in m	Widening Side/ Scheme
From	To		
297+700	298+450	1450	Eccentric (RHS) widening
298+500	298+950	450	Eccentric (LHS) widening
299+000	299+050	50	Eccentric (RHS) widening
299+100	301+900	2800	Eccentric (LHS) widening
301+950	302+850	900	Eccentric (LHS) widening with service road
302+900	305+700	2800	Eccentric (LHS) widening
305+750	305+800	50	Eccentric (LHS) widening
305+850	306+450	600	Eccentric (LHS) widening with service road
306+500	306+850	350	Eccentric (LHS) widening with service road
306+900	307+700	800	Eccentric (LHS) widening
307+750	308+850	1100	Eccentric (RHS) widening
308+900	308+950	50	Eccentric (LHS) widening

309+000	315+150	6150	Eccentric (RHS) widening
315+200	315+300	100	Eccentric (LHS) widening

3.0 Intersections and grade separators

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

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

(a) At-grade intersections

i) Major Junction

S. No.	Location (km)	Type	Category of Cross Road(NH/ SH/ MDR/Others)	Remarks
1	303.050	T	Others (Amoni -Salna Road)	
2	314.747	T	NH	Only 2-lane flyover along NH-37 is to be constructed and rest is to be developed as T Junction.

ii) Minor Intersection

Sl no.	Location of intersection	Type of intersection	Other features
1	297.900	T	DRDA Road
2	298.000	T	DRDA Road
3	298.800	T	FC Ins.Road
4	298.950	T	DRDA Road
5	299.100		DRDA Road
6	299.200	X	PWD
7	299.950	T	PWD
8	300.200	T	DRDA Road
9	300.800	T	DRDA Road
10	301.300	T	DRDA Road
11	302.550	T	PWD
12	303.100	T	PWD
13	304.300	T	DRDA Road
14	304.500	X	Army Camp
15	304.800	T	DRDA Road
16	305.120		DRDA Road
17	305.300	T	Army Camp
18	305.700	T	DRDA Road
19	306.500	T	PWD
20	306.800	T	DRDA Road
21	307.130	T	DRDA Road
22	307.200	T	PWD
23	307.800	T	DRDA Road

24	308.800	T	PWD
25	309.000	T	PWD
26	309.500	T	DRDA Road
27	309.750	T	DRDA Road
28	309.900	T	DRDA Road
29	310.200	T	DRDA Road
30	310.430	T	DRDA Road
31	311.230		DRDA Road
32	311.600	X	DRDA Road
33	313.900	T	PWD
34	314.100	T	PWD
35	314.350		PWD
36	314.600	T	PWD
37	314.770	T	PWD

(b) Grade separated intersection with/without ramps

Sl. No	Location(Km)	Minimum length of viaduct to be provided	Road to be carried over/ under the structures	Salient features
1	314.747 Kaliabhomra	2X7X30m + 30m central span	Only 2-lane flyover along NH-37 is to be constructed	Approaches shall be in E/w in Embankment

4. Road embankment and cut section

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

4.2 Raising of existing road. The existing road shall be raised wherever required as per section 4 of the manual.

5. Pavement design

5.1 Pavement design shall be carried out in accordance with Section 5 of the Manual. Contractor has to provide additional performance bank guarantee of 10% of the contract price valid up to a period 5 years from completion of construction of highway in case the Contractor intends to use any alternative material,technology/method,whether patented or otherwise, that is not specificallycovered in the Indianor International Standards.

5.2 Type of pavement

Flexible pavement shall be constructed.

5.3 Design requirements

5.3.1 Design Period and Strategy

Flexible pavement for new pavement and for widening and strengthening of the existing pavement shall be designed as per relevant paragraphs of Section 5 of the Manual pertaining to flexible pavements, for a minimum design period of 15 years. Stage construction shall not be permitted.

5.3.2 Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the contractor shall design the pavement for design traffic of not less than 70 million standard axles (msa) from km 297.000 to km 315.315.

5.4 Reconstruction of stretches

Construction/ Reconstruction of the Project Highway shall be as per 'Manual of Specifications & Standard for Four Laning of Highways through Public Private Partnership' (IRC: SP: 84-2014) referred in Schedule D.

6. Roadside drainage

Drainage system including surface and subsurface drains for the Project Highway shall be provided as per section 6 of the Manual. Covered Drains and lined drain shall be provided in the following stretches:

Location of Covered Drain

Sl No	Design chainage		Length in m	Side
	From (km)	To (km)		
1	301+800	302+850	2100	BHS
2	305+850	306+850	1000	LHS
3	306+050	306+850	800	RHS
Total			**3900 m**	

7. Design of structures

7.1 General

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

7.1.2 Width of the carriageway of new bridges and structures shall be as follows:

Sl No	location	Deck Width	Carriageway Width	Span Arrangement
1	303.200	12.50 m	8.5 m	2 x 10 m + 1x27 m
2	306.917	12.50 m	8.5 m	1x27 m

7.1.3 The following structures shall be provided with footpaths

S. No.	Bridge at km	Utility service to be carried	Remarks
All New Bridges/ bridges proposed to be widened shall have provisions for footpath			

7.1.4 All bridges shall be high-level bridges

7.1.5 Utility services to be carried over the structures

The following structures shall be designed to carry utility services specified in the table below:

S. No.	Bridge at km	Utility service to be carried	Remarks
All New Bridges shall have provisions for utility services to be carried over			

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

7.2 Culverts

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

7.2.2 Reconstruction of existing culverts:

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

Sl. No.	Culvert Location	Span/Opening	Remarks
1	298.960	Box cul (2x2)	Re-construction
2	300.800	Box cul (2x2)	Re-construction
3	301.043	Box cul (6x4)	Re-construction
4	302.730	Box cul (2x2)	Re-construction
5	303.930	Box cul (2x2)	Re-construction
6	304.590	Box cul (2x2)	Re-construction
7	305.445	Box cul (2x2)	Re-construction
8	305.780	Box cul (2x2)	Re-construction
9	306.180	Box cul (2x2)	Re-construction

7.2.3 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 section 7 of the Manual. Repairs and strengthening of existing structures where required shall be carried out.

S. No.	Existing Chainage	Design Chainage	Proposed Type of Structures	Recommend ation	Proposed Span (m)	Overall width in m
NIL						

7.2.4 Additional new culverts shall be constructed, as per figure 7.1A/7.1B of the manual, particulars given below:

S. No.	Design Chainage (km)	Proposed Type of Culvert	Span Arrangement No. x Length / No. x Dia (m)
1	298.400	HPC	1.200
2	298.880	HPC	1.200
3	300.770	HPC	1.200

4	303.620	HPC	1.200
5	308.765	HPC	1.200
6	310.880	HPC	1.200
7	312.030	HPC	1.200
8	313.165	HPC	1.200
9	314.170	HPC	1.200
10	315.240	HPC	1.200

7.2.5 Repairs/ replacements of railing /parapets, flooring and protection works of the existing culverts shall be undertaken as follows:
Repairs/Replacement of railings/ parapets and any other defects noticed at the time of construction shall be undertaken by the contractor for all the retained culverts along with repair/construction of flooring and protection works.

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

7.3 Bridges

7.3.1 Existing bridges to be re-constructed/widened /Repairs

i) The existing bridges at the following locations shall be reconstructed

a) Major Bridges: NIL

b) Minor Bridges: NIL

ii) The following narrow bridges shall be widened/Repairs and Strengthened:

a) Major Bridges:

S. No.	Chainage (km)	Width (m)	Span Arrangement	Type of structure			Details of Widening
				Foundation	Sub structure	Super structure	
Nil							

b) Minor Bridges:

Sl.No.	Chainage (km)	Width (m)	Span Arrangement	Type of structure			Details of widening
				Foundation	Sub structure	Super Structures	
1	303.200	12.50	2 x 10 +1x27	Bored cast-in- situ RCC pile	RCC solid abutment	RCC T-beam cum slab	Deck slab ,Approach slab substructure and foundation are required to be widened to the requiredoverall Width (12.50m)
2	306.917	12.50	1x27	Bored cast-in- situ RCC pile	RCC solid abutment	RCC T-beam cum slab	

7.3.2 Additional new bridges

New bridges at the following locations on the Project Highway shall be constructed

a) **Major Bridge:**

S. No.	Name of Bridge	Existing Chainage	Design Chainage	Proposed span arrangement (No. x l)	Remarks
Nil					

b) Minor Bridge:

S No	Design Chainages	Span arrangement	Remarks
1	303.200	2 x 10 + 1x27	New 2-lane Bridge
2	306.917	1x27	New 2-lane Bridge

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

S. No	Location at Km	Type of bridge
1	303.200	R.C.C. T-Beam slab
2	306.917	R.C.C. T-Beam slab

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

S. No.	Location at km	Remarks
1	303.200	
2	306.917	

7.3.5 Drainage system for bridge decks

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

7.3.6 Structures in marine environment: Nil

7.4 Rail-road bridges

7.4.1 Design, construction and detailing of ROB/RUB shall be as specified in section 7 of the Manual.

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

S. No.	Design Chainage (km)	Span Arrangement / length of span in m	Remark
Nil			

7.4.3 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	Number and length of span
NIL		

7.5 Grade separated structures

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

7.6 Repairs and strengthening of structures

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

A – Bridges

i) Minor Bridges

Sl. No.	Location of bridge (km)	Nature and extent of repairs / strengthening to be carriedout
1	303.200	Sealing of cracks in foundation Sub structure, Super Structure etc.Repair/ Replacement of Bearing & Expansion joint & Replacement of wearing coat, drainage spout, waterway & painting of bridge
2	306.917	

ii) Major Bridge:

S. No.	Existing Chainage (km)	Design Chainage (km)	Details of Repairing/Strengthening to be carried out
Nil			

B – ROB / RUB

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

C – Overpasses/Underpasses and other structures

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

7.7 List of Major Bridges and Structures

The following is the list of the Major Bridges and structures

Sl.No.	Location of Structure	Design Chainage	Length (m)	Numberandlength ofspans	Approach gradient	Remarks
1	Kaliabhomra	314.747	740.682m	2X7x30+30m Centralspan	1:50	2-lane new structure

8. Traffic control devices and road safety works

8.1 Traffic control devices and road safety works shall be provided in accordance with Section 9 of the Manual.

8.2 Specifications of the reflecting sheeting: As per the Clause 9.2 of the Manual of Specification and Standards.

9. Roadside furniture

Roadside furniture shall be provided in accordance with the provisions of section 9 of the Manual.

9.1 Overhead traffic signs: location and size

S. No.	Design Chainage (km)	Remarks
1	314+300	4 lane with both side sheeting

10. Compulsory afforestation

The contractor is to plant trees as compensatory forestation as per as per IRC SP 21 and guidelines of the forest department.

11. Hazardous locations

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

S. No.	Location stretch from (km) to (km)	LHS/RHS
This shall be Provided at high embankment and at sharp curve location		

12. Protection work at Major Bridge:- Construction of Guide Bund and its protection work including flexible apron, boulder pitching and filter media.

Bridge No.	Length of guide bund		
	Up-Stream	Down Stream	Total (m)
Nil			

13. Change of Scope

The length of Structures and bridges specified herein above 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.