BUILDING INFRASTRUCTURE - BUILDING THE NATION

NATIONAL HIGHWAYS AND INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED

A GOVT. OF INDIA UNDERTAKING

Consultancy Services for Feasibility Study and Detailed Project Report for Four / Six Laning from Km 38.000 to Km 168.167 of Daboka-Dimapur Section of NH-36 & 39 in the State of Assam & Nagaland under NHDP, Phase – III B, Pkg. No. NHDP – III/DL5/21, Group - G

Dimapur Bypass (Nagaland Part)

Final Detailed Project Report

VOLUME V : Tech. Specification & Schedules

Archtech Consultants Pvt. Ltd.
CONSULTANTS & ENGINEERS
11, Shakespeare Sarani, Kolkata-700071

August 2016

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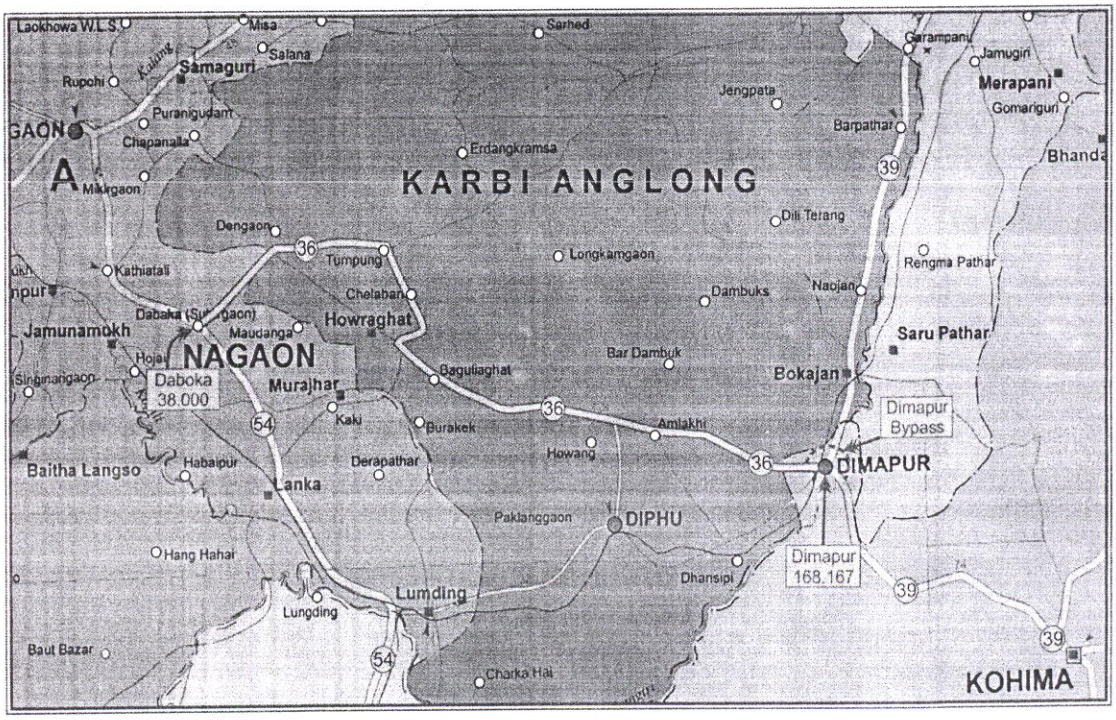

FINAL DETAILED PROJECT REPORT

VOLUME V : TECH. SPECIFICATION & SCHEDULES

Archtech Consultants Pvt. Ltd.
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AUGUST 2016

Schedule - A

(See Clause 2.1 and 8.1)

SITE OF THE PROJECT

1 **The Site**

1.1 Site of the 4-lane with Paved Shoulder Project Highway shall include the land, buildings, Structures and road works as described in Annex-I of this Schedule-A.

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

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

1.4 The alignment plans of the Project Highway are specified in Annex-III.

1.5 The status of the Environmental Clearances obtained or awaited is given in Annex-IV.

Annex - I
(Schedule-A)

SITE FOR FOUR-LANING

1. Site

The Site of the 4-lane with Paved Shoulder Project Highway comprises the section of National Highway 36 & 39 commencing from Km 132.375 to Km 153.058 (design chainage) i.e. the Nagaland part of Dimapur Bypass in the State of Nagaland. The construction package for the project includes developing the new Bypass carriageway to 4-lane with paved shoulder carriageway. The land, carriageway and structures comprising the Site are described below.

2. Land

The Site of the Project Highway comprises the land described below:

Sl No	Existing Chainage (Km)		Proposed Chainage (Km)		ROW (M)			Remarks
	From	To	From	To	LHS	RHS	Total	
1	-	-	132+375	153+058	Varying	Varying	60.000	

3. Carriageway

There is no carriageway of the Project Highway and it will be a new one. The type of the pavement will be flexible.

4. Major Bridges

The Site includes the following Major Bridges:

Sl. No	Existing Chainage (KM)	Type of Structure	No. of Spans	Width (M)
1	NIL	NIL	NIL	NIL

5. **Railway Over Bridges and Road Under Bridge**

The Site includes the following Railway Over Bridges:

Sl. No.	Existing Chainage (Km)	Type of Structure	No. of Spans	Width (M)
NIL				

6. **Grade Separators**

The Site includes the following Grade Separators:

Sl. No	Existing Chainage (KM)	Type of Structure	No. of Spans	Width (M)
NIL				

7. **Minor Bridges**

The Site includes the following Minor Bridges:

Sl. No	Existing Chainage (KM)	Type of Structure	No. of Spans	Width (M)
NIL				

8. **Railway Level Crossings**

The site includes the following railway level crossings.

Sl. No	Existing Chainage (KM)	Type of Structure	No. of Spans	Width (M)
NIL				

9. Culvert

The Site has the following culverts

Sl.No	*Existing Chainage (Km)*	*Type of Existing Culvert*	*Existing culvert span Arrangement (M)*	*Remarks*
1	-	Pipe	1 x φ900mm	Bypass Portion
2	-	Pipe	1 x φ600mm	
3	-	Pipe	1 x φ600mm	
4	-	Box	1 X 1.5.	

10. Bus bays

The details of Bus bays on the site are as follows:

Sl. No.	Existing Chainage (Km)	Length (m)	Left Hand Side	Right Hand Side
NIL				

11. Truck Lay Byes

The details of truck lay byes are as follows:

Sl. No.	Existing Chainage (Km)	Length (m)	Left Hand Side	Right Hand Side
NIL				

12. Road Side Drains

The details of roadside drains are as follows:

Sl No	Location		Type	
	From (Km)	To (Km)	Masonry/CC (Pucca)	Earthen (Kutcha)
NIL				

13. Major Junction

The details of major junctions are as follows:

SL No	Chainage (Km)		Side	Type of Junction	Remarks
	Existing	Proposed			
NIL					

14. Minor Junction

The details of minor junctions are as follows:

SL No	Chainage (Km)		Side	Type of Junction	Remarks
	Existing	Proposed			
NIL					

15. Bypasses

The details of bypasses are as follows:

SL No	Name of Bypass	Existing Chainage (Km)		Length (Km)	Carriageway	
		From	To		Width (M)	Type
NIL						

16. Detail of any Other Structures

The details of any other structures are as follows:

SL No	Existing Chainage (Km)	Type of Structure	No. of Spans with Span Length (M)	Width (M)
NIL				

17. Existing References corresponding to Design Chainages

There is no "Existing Chainage" and so "Design Chainage" will be followed.

Sl No.	*Existing Chainage (Km)*	*Proposed Chainage (Km)*
NIL		

18. Stretch passing through forest area*

The project stretch is passing through the forest area at the following locations.

SL No	Existing Chainage (Km)		Length (M)
	From	To	
NIL			

Annex II

(Schedule-A)

Dates for Providing Right of Way

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

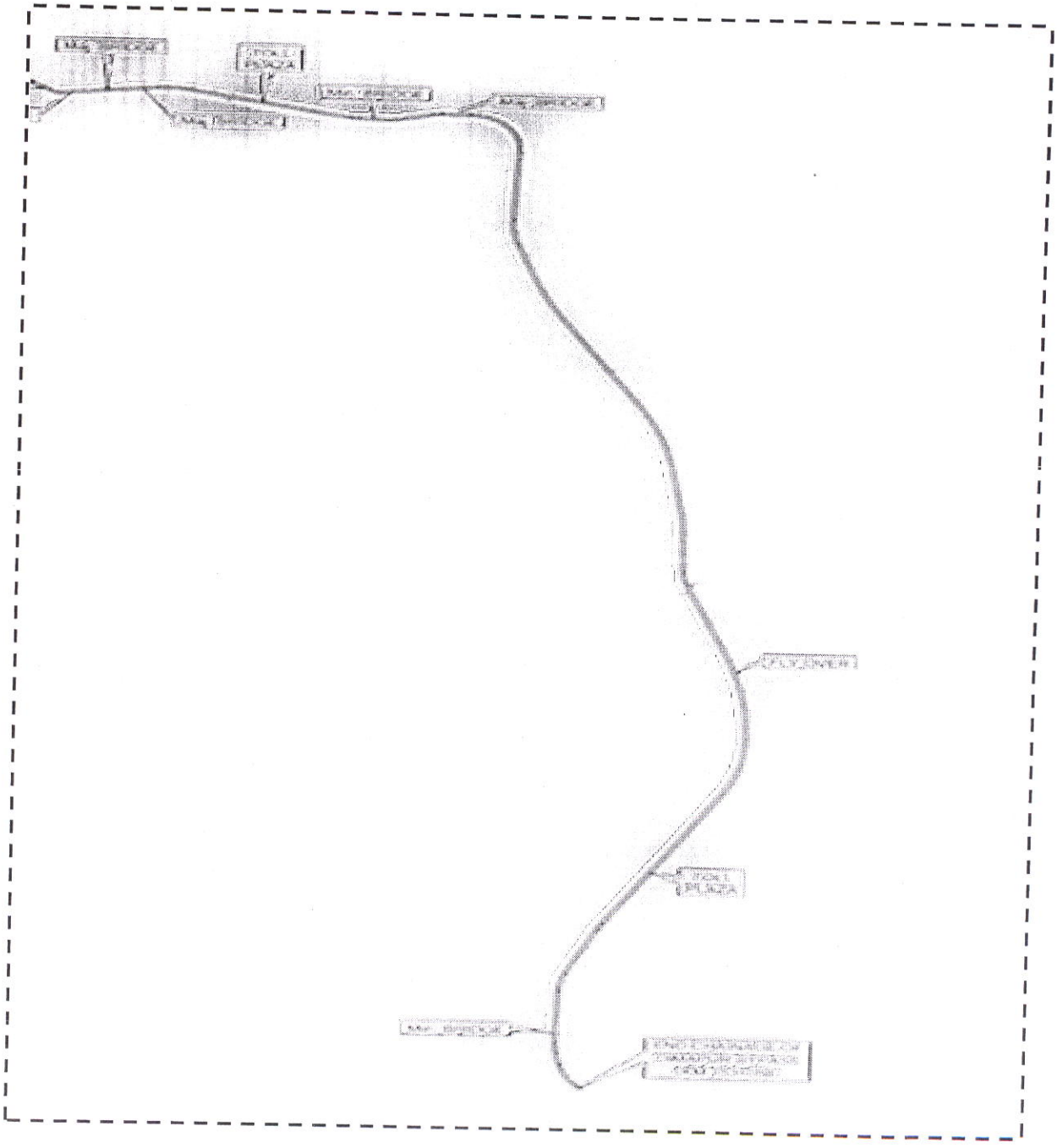
SL No	Existing Chainage (Km)		Length (Km)	Width (M)	Date of Providing ROW
	From	To			
As Decided By NHIDCL					

Annex – III
(Schedule-A)

Alignment Plans

The existing alignment of the Project Highway shall be modified as per the alignment plan.

The alignment plan of the Project Highway is enclosed in digital form in CD.



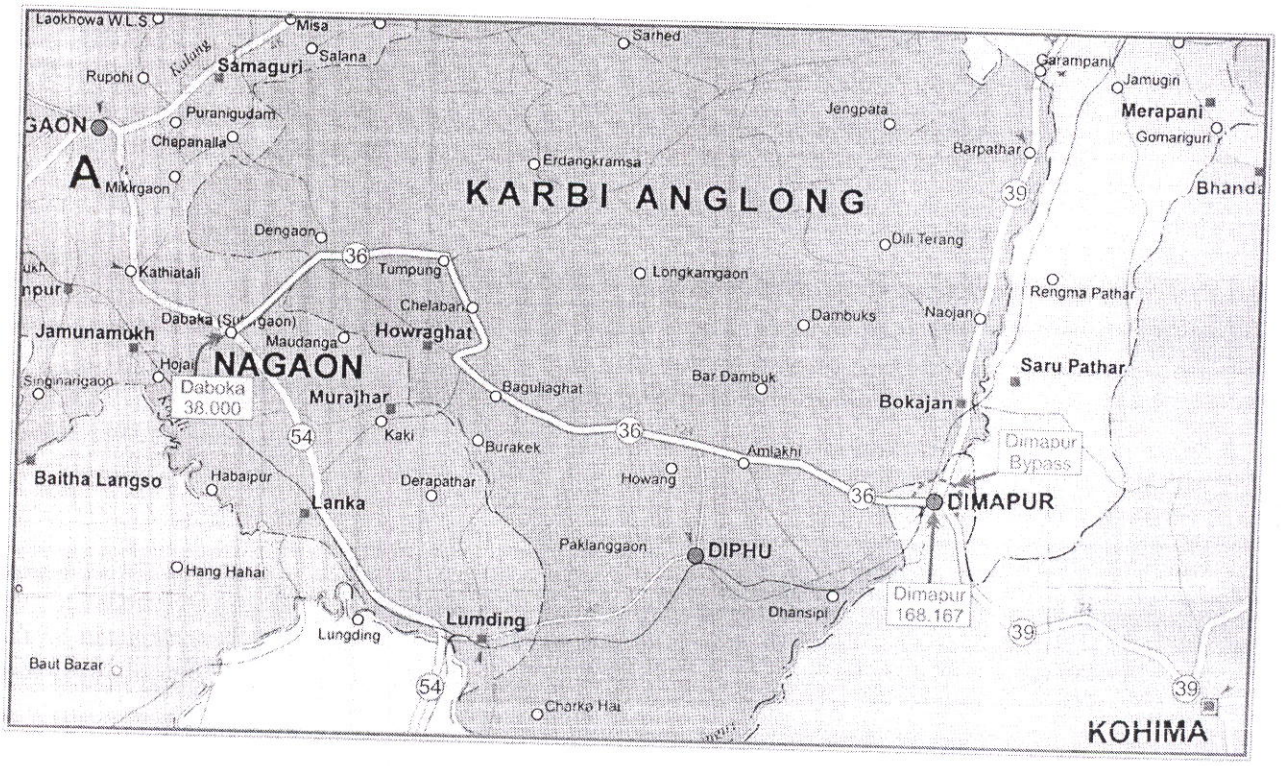
Annex – IV
(Schedule-A)

Environment Clearances

Environment Clearance to be obtained by NHIDCL

Appendix A-I

Index Map of Project Highway



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 Four-Laning with Paved Shoulder

Four laning shall include widening 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 with Paved Shoulder

Four laning with paved shoulder of NH-36 & NH-39 Km 132.375 to Km 153.058 (Nagaland part of Dimapur Bypass) (Length = 20.683 Km)

1. Widening of the Existing Highway

1.1 There is no existing highway.

The Project Highway shall follow the alignment 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/rolling terrain to the extent land is available.

1.2 Width of Carriageway

1.2.1 The construction of Four Lane with paved shoulder from Km.132.375 to Km.153.058 km. of NH-36 & NH-39 shall be undertaken. The width of carriageway in open country, built up areas and approaches of grade separated structures shall be as per the Manual refer to in the Schedule-D (herein after called the 'Manual') unless otherwise specified in this Schedule-B and Schedule-D.

1.2.2 Locations of built-up areas as under. The cross section of carriageway to be adopted in the built-up areas shall be as indicated in the table below:

Sl. No.	Built-up areas	Design Chainage (Km)		Typical cross section of the Manual
		From	To	
NIL				

1.2.3 Except as otherwise provided in this Agreement, the width of the paved carriageway and cross-sectional features shall conform to paragraph 1.2.

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 30 km per hr for mountainous /rolling terrain. In plain terrain the ruling design speed will be 100 km per hr.

2.3 Improvement of the Existing Road Geometrics

There is no existing road.

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	Type of deficiency	Remark
NIL			

2.3.1 Details of proposed Realignments

Sl. No.	*Design Chainage (Km)*		*Design Length (M)*	*Side*	Remarks
	From	*To*			
NIL					

2.3.2 Details of proposed bypasses:

Sl. No.	Bypass Name	Bypass location w.r.t Project Alignment	Take off Chainage(km)	Merging Chainage(km)	Approx. Length (Km)
This is a new Bypass.					

2.4 Right of Way

Details of Right of Way are given in below:

Sl. No.	Design Chainage (Km)		Proposed ROW (Meters)	Remarks
	From	To		
1	132+375	153+058	60.00	

2.5 Service/Slip Roads

2.5.1 Service Roads:

Details of Service roads are given below:

Details of Service Roads

S. No.	Location of Service Road (Design Chainage)		RHS/LHS or Both Sides	Design Length (Km)
	From (Km.)	To (Km.)		
1	137+807	138+131	LHS	0.324
2	138+131	138+308	RHS	0.177
3	145+220	146+150	Both Sides	1.860
4	150+150	150+595	LHS	0.445
5	150+595	150+919	RHS	0.324
TOTAL				**3.130**

2.5.2 Slip Roads:

NIL

2.6 Typical Cross-sections of the Project Highway

Typical cross sections alongwith different types of cross-section required to be developed in different segments of the project highway are indicated in **Appendix B-I.**

3 Intersections and Grade Separated structures

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

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

(A) At-grade Intersections

Major Intersections

SL No	Location of Intersection, Km of Project High way		Type of Intersection	Other Features		Junction Layout as per the Manual
	Existing Chainage (Km)	Proposed Chainage (Km)		LHS	RHS	
1	-	153+054	T	NH-39	-	Fig 3.1

Minor Junctions

SL No	Location of Intersection, Km of Project High way		Type of Intersection	Other Features		Junction Layout as per the Manual
	Existing Chainage (Km)	Proposed Chainage (Km)		LHS	RHS	
1	-	132+630	X	Village Road	Purana Bazar	As per Manual
2	-	133+305	X	Village Road	Purana Bazar	As per Manual
3	-	140+569	X	Nihoto	Henivi	As per Manual
4	-	144+272	X	Kobutak	Showuba	As per Manual
5	-	150+325	X	Seithekema C	Village Road	As per Manual
6	-	152+625	T	Patkai Christian College	-	As per Manual

(B) Grade Separated Intersection

a) Vehicular Underpass

S. No.	Location of structure (km)	Junction layout below the structure
NIL		

b) Pedestrian Underpass

S. No.	Location of structure (km)	Vertical Clearance (m)
1	150+595	3.00

c) Cattle Underpass

S. No.	Location of structure (km)	Vertical Clearance (m)
1	133+100	3.00
2	138+131	3.00

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 applicable and the specified cross sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.

4.2 Raising of the Existing Road

As per the Drawing

5 Pavement Design

5.1 Pavement shall be designed in accordance with Section 5 of the Manual.

5.2 Type of Pavement

Rigid pavement shall be provided on entire project

5.3 Design Requirements

Pavement design shall be as per section 5 of the Manual and IRC: 58: 2002.

5.3.1 Design Period and strategy

Pavement shall be designed for a minimum 103.92 msa design period of 30 years. Stage construction shall not be permitted. The volume of traffic is 103.92 msa in 30 year projection.

5.3.2 Design Traffic

Pavement shall be designed for 25.98 msa design of traffic.

5.4 Reconstruction of Stretches

The entire project length is to be of Rigid Pavement.

6 Roadside Drainage

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

7 Design of Structures

7.1 General

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

7.1.2 The width of carriageway of new structures shall be as per provisions of the Manual

7.1.3 The following structures shall be provided with footpaths:
Provision of footpath on structures shall be governed by the provision of Manual.

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
As per Site condition and locations identified in consultation with independent consultant during the execution of the project highway.			

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:

All the existing culverts at the following locations shall be re-constructed as new culverts: - ***to be replaced with New One***

Sl.No	*Proposed Chainage (Km)*	*Span Arrangement (M)*	*Type of Culvert*	*Remarks*
1	144+271	1/2X2	BOX	
2	148+136	1/2X3	BOX	
3	148+951	1/2X2	BOX	
4	152+746	1/2X3	BOX	

7.2.3 Widening of Existing Culverts

NIL

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

Sl.No	*Proposed CH (Km)*	*Type of Proposed Culvert*	*Proposed culvert span arrangement (M)*	*Remarks*
1	132+537	BOX	1/2X2	
2	132+695	BOX	1/2X2	
3	132+828	BOX	1/2X2	
4	133+327	BOX	1/2X2	
5	133+483	BOX	1/2X2	

6	133+667	BOX	1/2X2	
7	133+804	BOX	1/2X2	
8	133+954	BOX	1/2X3	
9	134+202	BOX	1/2X2	
10	134+385	BOX	1/2X2	
11	134+592	BOX	1/2X3	
12	134+748	BOX	1/2X3	
13	135+028	BOX	1/2X3	
14	135+253	BOX	1/2X2	
15	135+476	BOX	1/2X2	
16	136+054	BOX	1/2X2	
17	136+248	BOX	1/2X2	
18	136+455	BOX	1/2X2	
19	136+634	BOX	1/2X2	
20	136+847	BOX	1/2X2	
21	137+074	BOX	1/2X2	
22	137+257	BOX	1/2X2	
23	137+473	BOX	1/2X2	
24	137+681	BOX	1/2X2	
25	137+891	BOX	1/2X2	
26	138+498	BOX	1/2X3	
27	138+678	BOX	1/2X3	
28	138+812	BOX	1/2X2	
29	138+970	BOX	1/2X2	
30	139+173	BOX	1/2X2	
31	139+367	BOX	1/2X2	
32	139+580	BOX	1/2X2	
33	139+890	BOX	1/2X3	
34	140+315	BOX	1/2X2	
35	140+425	BOX	1/2X2	
36	140+696	BOX	1/2X2	
37	140+858	BOX	1/2X2	
38	141+015	BOX	1/2X3	
39	141+154	BOX	1/2X3	
40	141+335	BOX	1/2X2	
41	141+578	BOX	1/2X2	
42	141+947	BOX	1/2X3	
43	142+147	BOX	1/2X2	
44	142+359	BOX	1/2X2	
45	142+591	BOX	1/2X2	
46	142+929	BOX	1/2X2	
47	143+046	BOX	1/2X2	
48	143+321	BOX	1/2X2	
49	143+620	BOX	1/2X2	
50	143+848	BOX	1/2X3	

51	144+555	BOX	1/2X3	
52	144+778	BOX	1/2X2	
53	144+929	BOX	1/2X2	
54	145+090	BOX	1/2X2	
55	145+257	BOX	1/2X2	
56	146+112	BOX	1/2X2	
57	146+328	BOX	1/2X2	
58	146+719	BOX	1/2X3	
59	146+975	BOX	1/2X2	
60	147+150	BOX	1/2X2	
61	147+350	BOX	1/2X3	
62	147+605	BOX	1/2X2	
63	147+900	BOX	1/2X2	
64	148+410	BOX	1/2X2	
65	148+685	BOX	1/2X2	
66	149+115	BOX	1/2X2	
67	149+350	BOX	1/2X2	
68	149+561	BOX	1/2X2	
69	149+825	BOX	1/2X2	
70	150+120	BOX	1/2X2	
71	151+041	BOX	1/2X2	
72	151+182	BOX	1/2X2	
73	151+309	BOX	1/2X2	
74	151+635	BOX	1/2X3	
75	151+846	BOX	1/2X2	
76	152+428	BOX	1/2X2	
77	152+608	BOX	1/2X2	

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

Sl. No.	Location (Km.)	Type of repair required
NIL		

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

7.3 Bridges

7.3.1 There are no existing bridges in the stretch.

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

S. No.	Bridge Location (km)	*Span Arrangement (M)*	Adequacy or otherwise of the existing waterway, vertical clearance, etc.	Remarks
NIL				

7.3.2 **Additional New Bridges**

There will be 1 No. Major Bridge and 2 Nos. Minor Bridges to be constructed new.

(i) The additional bridges at the following locations shall be constructed as new structures:

S. No.	Bridge Location (km)	*Span Arrangement (M)*	Remarks
1	135+781	3 X 21	Major Bridge
2	134+845	1 X 24	Minor Bridge
3	152+093	1 X 16	Minor Bridge

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

S. No.	Location at km	Remarks
NIL		

7.3.4 Repairs/Rehabilitation of the existing bridges shall be undertaken as follows:

NIL

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**

S. No.	Location at km	Remarks
NIL		

7.4 **Rail-road bridges**

There is no ROB/RUB.

7.4.1 Road over bridges (road over rail) shall be provided at the following location.

Road Over Bridges

S. No.	Location of Level Crossing (Km)	Proposed span arrangement (m)	Total Width of the Structure (m)
NIL			

7.4.2 There is no RUB.

Road Under Bridges

S. No.	Location of level crossing	Number and length of span
NIL		

7.4.3 **Location where Railway Level Crossings not to be Replaced with ROBs/RUBs**

NIL

7.5 Grade Separated Structures

There is one Grade Separated Structures/ Flyover.

S. No.	Bridge Location (km)	*Span Arrangement (M)*	Remarks
1	145+700	1 X 12	Flyover

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

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

B – ROB / RUB

Sl. 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

The following is the list of the Major Bridges:

S. No.	Location Design Chainage (Km)	Remarks
1	135+781	Major Bridge

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.

a) Traffic Signs:

Traffic signs include roadside signs, overhead signs and curb mounted signs along the entire Project Highway.

b) Pavement Marking: Pavement markings shall cover road marking for the entire Project Highway.

c) Safety Barrier:

Provide W-beam crash barrier along the project highway at the locations as suggested in the Manual.

8.2 Specifications of the Reflective Sheeting

Retro reflective sheeting should be of high intensity grade with encapsulated lens or with micro prismatic retro reflective element in accordance with ASTM Standard D 4956-04.

9 Roadside Furniture

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

a) Road Boundary Stone: for the entire Project Highway.

b) Pedestrian Guard Rail:

The pedestrian facilities shall include the provision of the;

- Pedestrian guardrail: Provide pedestrian guardrail at each bus stop location.
- Pedestrian Crossings: Provide pedestrian crossing facilities on service roads.

c) Overhead traffic signs: location and size

- Full width Overhead signs: 2 nos. (Start and end of Project road)

d) Delineators: Delineators for the entire Project Highway at the locations as suggested in Schedule D.

e) MS Railing: MS Railing for separation of main carriageway and the service road along the urban sections given below and at the locations as suggested in Schedule D.

10 Compulsory Afforestation

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

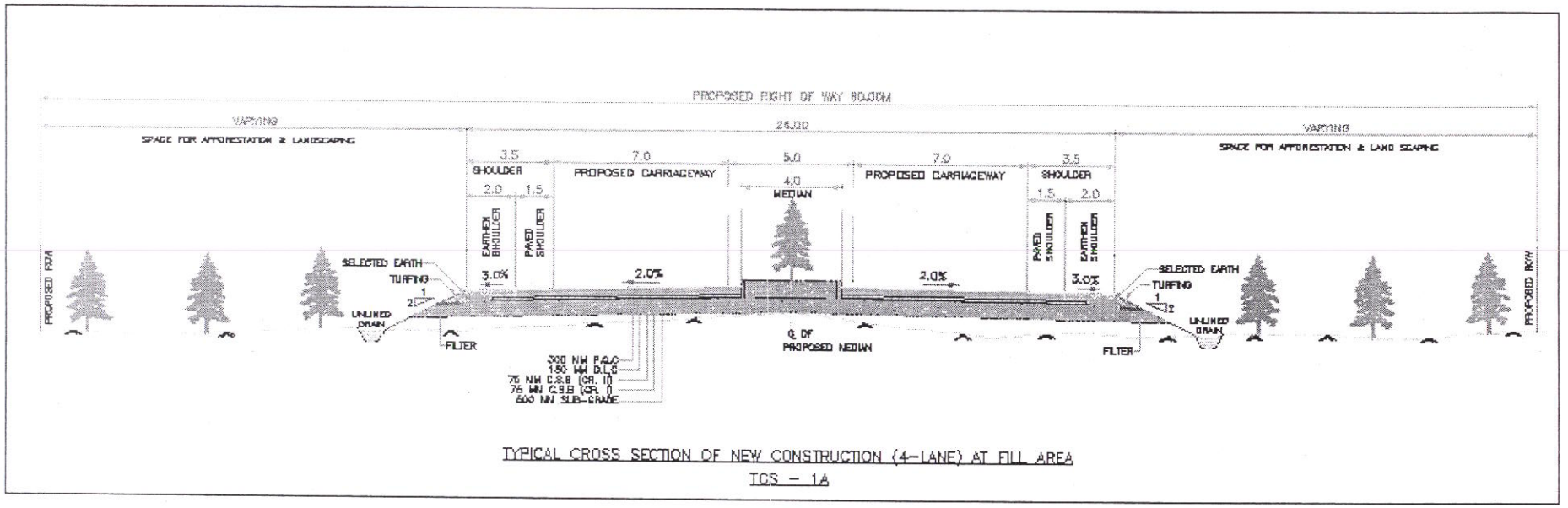
11 Hazardous Locations

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

S. No.	Design Chainage (km.)		LHS/RHS
	From	To	
NIL			

12 Change of Scope

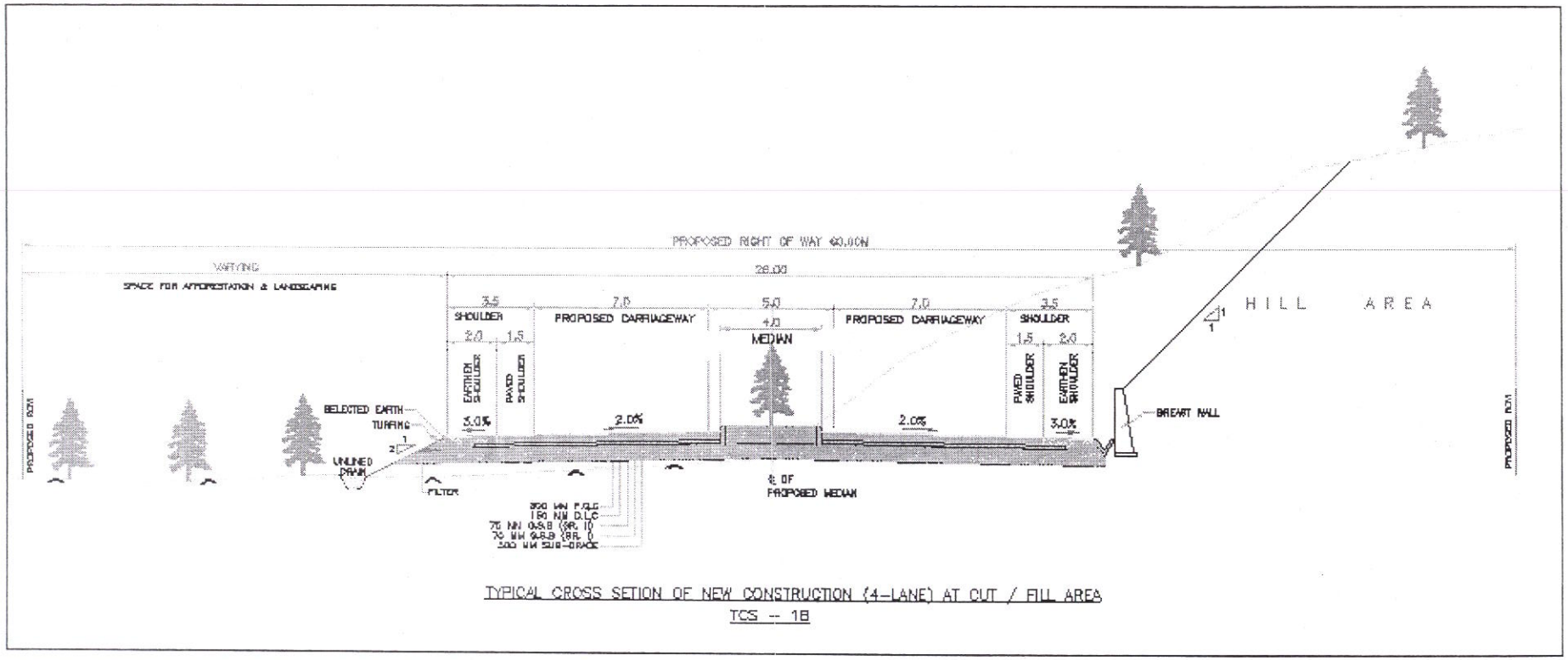
The length of structures and bridges specified hereinabove shall be treated as an approximate assessment. The actual lengths as required on the basis of detailed investigations shall be determined by the Contractor in consultation with Authority Engineer and in accordance with the Specifications and 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.



TYPICAL CROSS SECTION OF NEW CONSTRUCTION (4–LANE) AT FILL AREA

TCS – 1A

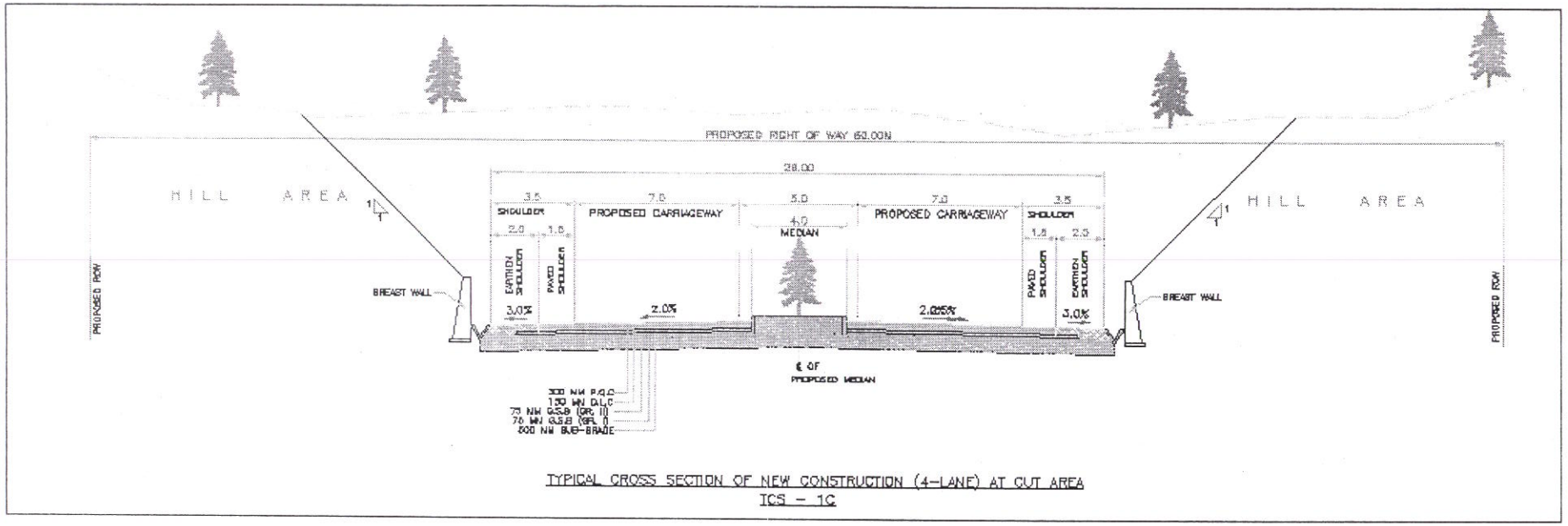
TCS - 1A



TYPICAL CROSS SETION OF NEW CONSTRUCTION (4-LANE) AT CUT / FILL AREA

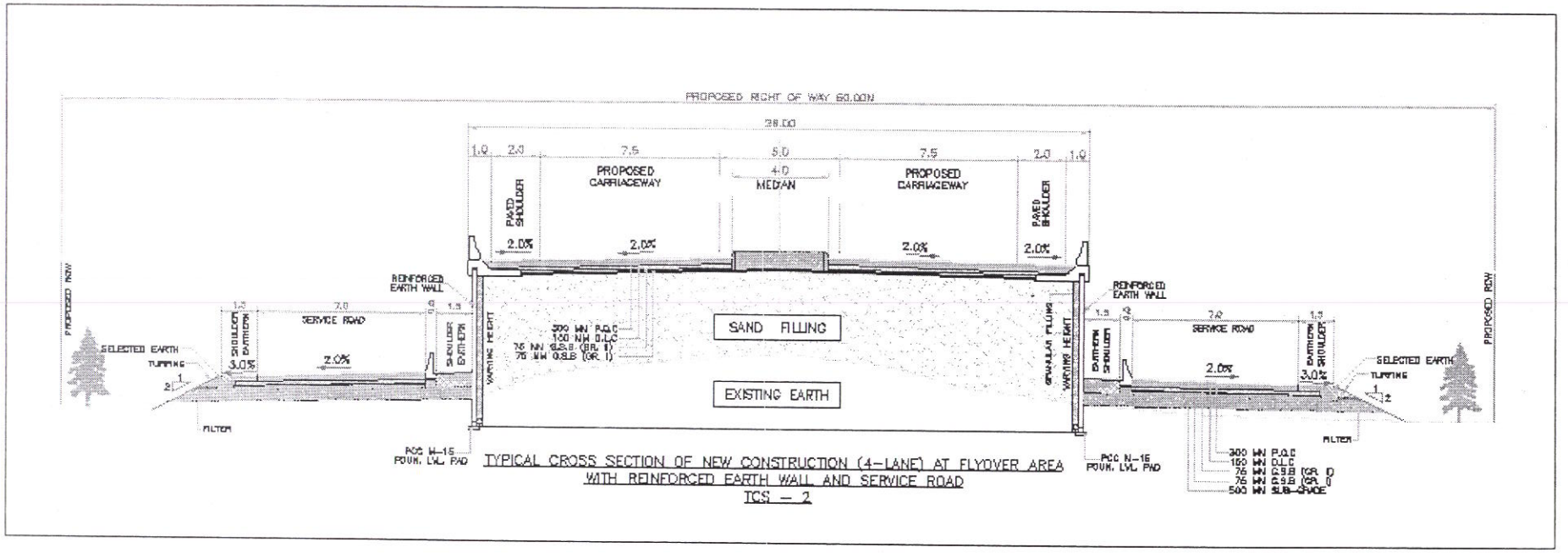
TCS -- 1B

TCS – 1B



TYPICAL CROSS SECTION OF NEW CONSTRUCTION (4-LANE) AT CUT AREA
TCS – 1C

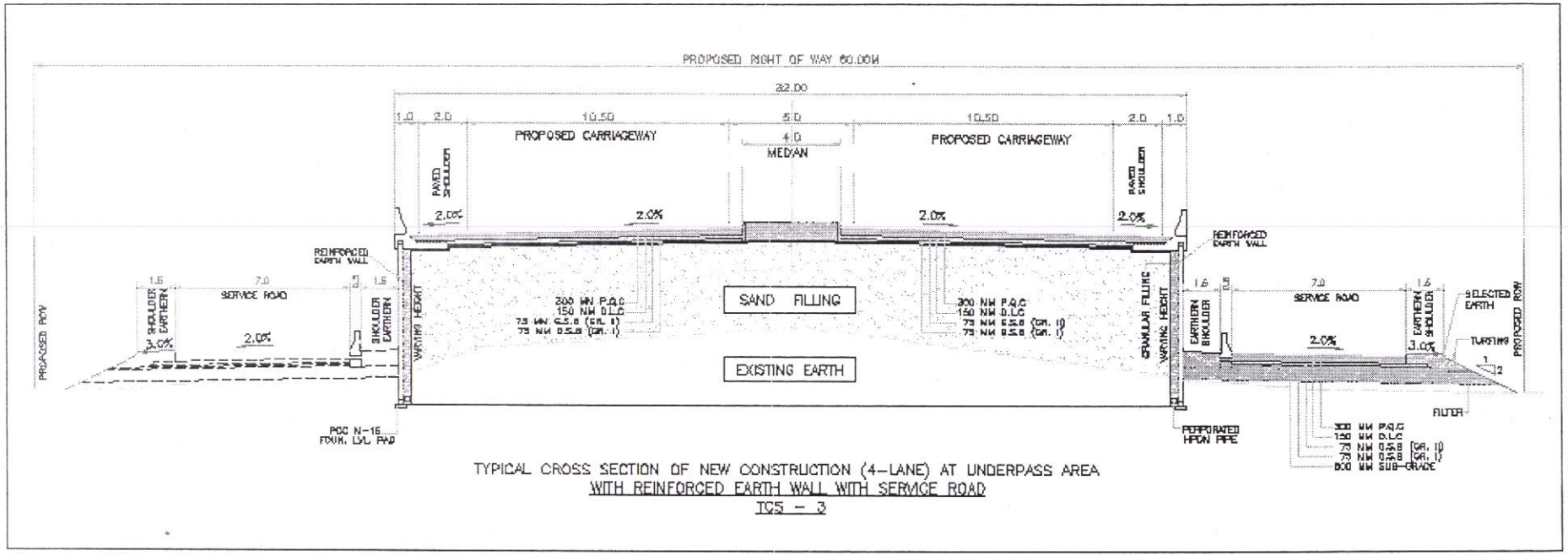
TCS – 1C



TYPICAL CROSS SECTION OF NEW CONSTRUCTION (4-LANE) AT FLYOVER AREA WITH REINFORCED EARTH WALL AND SERVICE ROAD

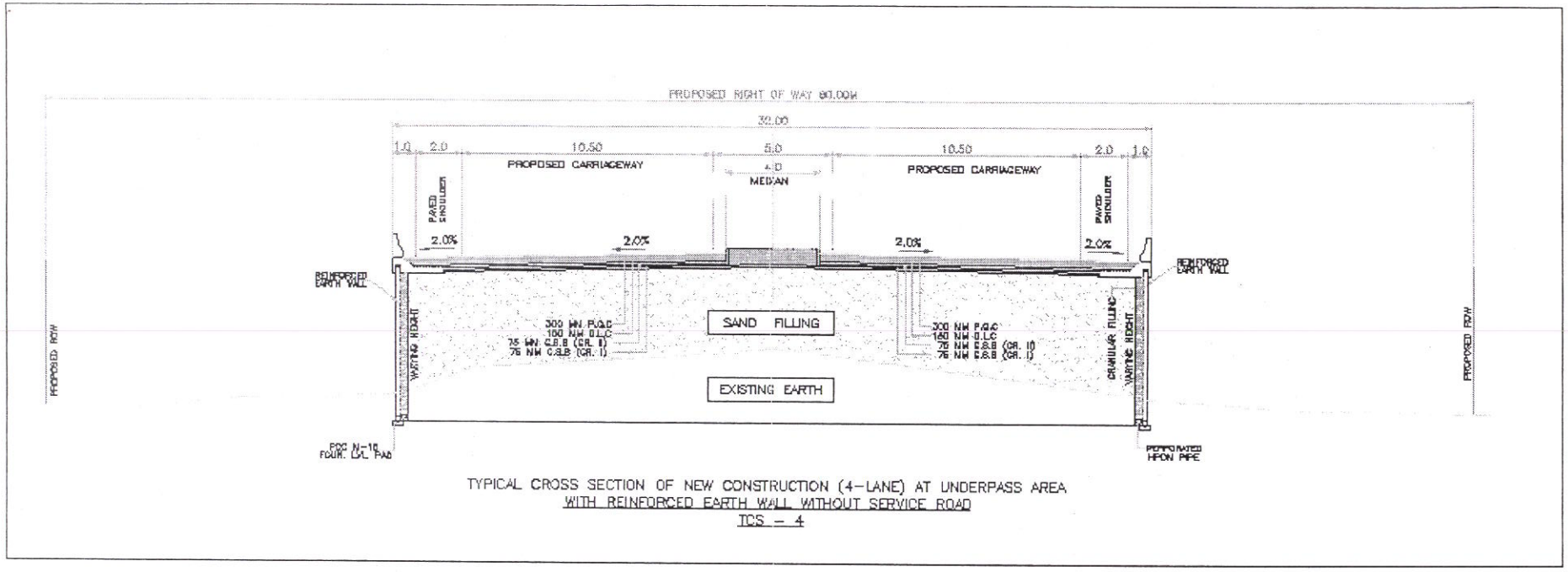
TCS – 2

TCS - 2



TYPICAL CROSS SECTION OF NEW CONSTRUCTION (4–LANE) AT UNDERPASS AREA
WITH REINFORCED EARTH WALL WITH SERVICE ROAD
TCS – 3

TCS - 3



TYPICAL CROSS SECTION OF NEW CONSTRUCTION (4-LANE) AT UNDERPASS AREA
WITH REINFORCED EARTH WALL WITHOUT SERVICE ROAD
TCS – 4

TCS - 4

Appendix B1

Applicable Stretches of Typical Cross-section

Sl No	Chainage (Km)		Length (M)	TCS Type	Remarks
	From	To			
1	132+375	132+975	600.000	TCS - 1A,1B & 1C	
2	132+975	133+093	118.000	TCS - 4	
3	133+093	133+106	13.440	STRUCTURE PORTION	
4	133+106	133+266	159.560	TCS - 4	
5	133+266	134+829	1563.000	TCS - 1A,1B & 1C	
6	134+829	134+861	31.840	STRUCTURE PORTION	
7	134+861	135+745	884.160	TCS - 1A,1B & 1C	
8	135+745	135+816	71.440	STRUCTURE PORTION	
9	135+816	137+947	2130.560	TCS - 1A,1B & 1C	
10	137+947	138+124	177.000	TCS - 3	
11	138+124	138+137	13.440	STRUCTURE PORTION	
12	138+137	138+308	170.560	TCS - 3	
13	138+308	145+360	7052.000	TCS - 1A,1B & 1C	
14	145+360	145+690	330.000	TCS - 2	
15	145+690	145+709	19.440	STRUCTURE PORTION	
16	145+709	146+012	302.560	TCS - 2	
17	146+012	150+336	4324.000	TCS - 1A,1B & 1C	
18	150+336	150+588	252.000	TCS - 3	
19	150+588	150+601	13.440	STRUCTURE PORTION	
20	150+601	150+778	176.560	TCS - 3	
21	150+778	152+081	1303.000	TCS - 1A,1B & 1C	
22	152+081	152+105	23.840	STRUCTURE PORTION	
23	152+105	153+058	953.160	TCS - 1A,1B & 1C	

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:

(1) Roadside furniture

(2) Tree plantation

(3) Bus-bays 2 sets (both side)

(4) Others to be specified

(a) Arboriculture and Landscaping

(b) Highway Lighting

(c) Rainwater Harvesting

(d) Reinforced Earth wall

2 Description of Project Facilities

Each of the Project Facilities is described below: (SP:84-2014)

Sl No	Project Facility	Location	Design Requirements	Others Essential Details
1	Road Side furniture includes 1] Traffic Signs, Pavement Markings	To be finalised as per site requirement	As per section 9 of Manual	
	2] Concrete Crash Barriers			
	3] Separator / M S Railings Traffic Safety, Devices			
	4] Boundary Stones Hectometer/Kilometer stone, Traffic, Blinker , Studs, Delineator etc.	For entire Road Length		
2	Tree Plantation and Landscaping	To be done for the entire highway	As per section 11 of Manual	
3	Bus-bays 2sets (both side)	As per Appendix C-I & typical drawing	As per section 12 of Manual	
4	Others to be specified (a) Arboriculture and Landscaping	As per Appendix C-II and to be done for the entire highway	As per section 11 of Manual	
	(b) Highway Lighting	As per Appendix C-III and in all major bridges, congested built up areas etc.	As per section 12 of Manual	
	(c) Rainwater Harvesting	As per Appendix C-IV and as per site condition	As per section 11 of Manual	

	(f)Reinforced Earth wall	As per Appendix C-V and to be finalised in Major/ Minor Bridges & Flyover portion	As per section 7 of Manual	

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

Appendix C - I
Locations of Proposed Bus-bays

SL No	Chainage (Km)		Location	Side	Number of Buses at Stop	Length (M)
	Existing	Proposed				
1	-	152+235	Patkai	LHS	2	70.70
2	-	152+365	Patkai	RHS	2	70.70
3	-	146+375	-	LHS	2	70.70
4	-	146+500	Patkai	RHS	2	70.70

Appendix C - II
Arboriculture and Landscaping

SL No	Chainage (Km)		Location	Side	Number of Truck at Stop	Length (M)
	Existing	Proposed				
To be done for the Entire Highway						

Appendix C - III
Highway Lighting

SL No	Chainage (Km)		Location	Side	Number of Car at Stop	Length (M)
	Existing	Proposed				
To be done in all major bridges, congested built up areas etc						

Appendix C - IV
Rainwater Harvesting

SL No	Chainage (Km)		Location	Side	Capacity of Soil (Cum)	Remarks
	Existing	Proposed				
To be done as per site condition						

Appendix C - V
Reinforced Earth wall

SL No	Chainage (Km)		Location	Side	Capacity of Soil (Cum)	Remarks
	Existing	Proposed				
To be done in Major/ Minor Bridges & Flyover						

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 Standards & Specification for Four Laning of Highways (IRC: SP-84-2014) referred to herein as the Manual]

[Note: Specify the relevant Manual, Specifications and Standards]

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 Standards & Specification for Four laning of Highways (IRC: SP-84-2014), 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

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

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

[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.]

Sl No	*Clause referred in Manual*	*Item*	*Provisions as per Manual*	*Modified Provisions*
1	12.5	12.5.3(ii)	For hilly areas, where there is a general constraint on space, the layout indicated in fig 12.3 may be adopted for Bus bay.	The width & length has been designed as available in field.
2	7.19	7.19 (ii)	The vertical and lateral clearances shall be as per requirements given in Section 2 of this Manual. Design of structures shall conform to requirements specified in this Manual. The layout indicated in fig 7.8 may be adopted for Flyover cum Vehicular Underpass.	The width has been designed as available in field.
3	7.15	7.15.1 & 7.15.2	Reinforced Earth retaining structures shall not be provided for height more than 6m and near water bodies. Such structures should be given special attention in design, construction, maintenance and selection of system/system design.	As the site needs this type of Typical arrangement, necessary typical drawing has been given in drawing volume to be executed by Manufacturer / expert designer as per their design standard needed as per site condition.

SCHEDULE - H

(See Clauses10.1.4 and 19.3)

Contract Price Weightages

1.1 The Contract Price for this Agreement is Rs. **549.10 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
1	2	3	4
Road works including Junctions , Road Appurtenances/ others Traffic Amenities	57.02 %	**A- Widening and strengthening of existing Road & New/Realignment**	**313.09 Cr**
		(1) Site Clearance and Dismantling	0.99 %
		(2) Earth work	21.46 %
		(3) Sub-Base and Base Courses	10.08 %
		(4) Cement Concrete Pavements	61.69 %
		(5) Junction	1.12 %
		(6) Road Appurtenances/ others Traffic Amenities	4.66 %
Culverts	16.50 %	**B-New Culverts**	**90.58 Cr**
		(1) Box	100.00 %
Drainage & Protection Works	3.94 %	**C-Drainage & Protection Work**	**21.64 Cr**
		(1) Drain	5.40 %
		(2) Protective Work	94.59 %
Structures Bridges, Flyover & Under Pass	6.23 %	**D- New Structures**	**34.18 Cr**
		(1) Foundation	63.70 %
		(2) Sub-structure	15.64 %
		(3)Super-structure	19.15 %
		(4)Miscellaneous	1.51 %
Reinforced Earth Retaining Wall	15.07 %	**E- New Reinforced Retaining Earth Wall**	**82.76 Cr**
		(1) Reinforced Earth Retaining Wall	100.00 %
Other works	1.25 %	**G- Miscellaneous**	**6.84 Cr**
		A. Bus Bays	48.86 %
		B. Rain water Harvesting	14.61 %
		C. Arboriculture and Land Scaping	14.61 %
		D. Others	21.92 %

* The above list is illustrative and may require modification as per the scope of the Work.

1.3 Procedure of estimating the value of work done

1.3.1 Road works including, Junctions, Protection works, Road Appurtenances/ others Traffic Amenities

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

Table 1.3.1

Stage for Payment	Percentage weightage	Payment Procedure
A- Widening and strengthening of existing Road &	**313.09 Cr**	
(1) Site Clearance and Dismantling	0.99 %	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(2) Earth work	21.46 %	
(3) Sub-Base and Base Courses	10.08 %	
(4) Cement Concrete Pavements	61.69 %	
(5) Junction	1.12 %	
(6) Road Appurtenances/ others Traffic Amenities	4.66 %	

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

Cost per km = P x weightage for road work x weightage for Rigid work x (1/L)
Where P= Contract Price
L = Total length in km

1.3.2 New Culverts

Procedure for estimating the value of Culverts table 1.3.2:

Table 1.3.2

Stage for Payment	Percentage weightage	Payment Procedure
B- New Culverts	**90.58 Cr**	Cost of each culvert shall be determined on pro rate basis with respect to the total number of culverts. Payment shall be made on the completion of five culverts in separate bunch of Slab or box culverts.
(1) Box	100.00 %	

1.3.3 Drainage & Protection works

Procedure for estimating the value of Drainage & Protection works done shall be as stated in table 1.3.3:

Table 1.3.3

Stage for Payment	Percentage weightage	Payment Procedure
C-Drainage & Protection Work	**21.64 Cr**	Payment shall be made on pro rata basis for completed facilities. Payment shall be made for completed items.
(1) Drain	5.40 %	
(2) Protective Work	94.59 %	

1.3.4 New Structures (Major & Minor Bridges & Flyover and Under Pass)

Procedure for estimating the value of Structures works table 1.3.4:

Table 1.3.4

Stage for Payment	Percentage weightage	Payment Procedure
D- New Structures	**34.18 Cr**	Cost of each Structures shall be determined on pro rata basis with respect to the total linear length (m) of the Structures. Payment shall be made on completion of each stage of a Structures as per the weightage given in this table.
(1) Foundation: On completion of the foundation work including foundations for curtain , wing and return walls	63.70 %	
(2) Sub-structure: On completion of abutments, piers up to the abutment/pier cap	15.64 %	
(3) Super-structure: On completion of the super structure in all respects including hand rails/crash barriers, wing walls, return walls, guide bunds, if any, tests on completion etc., complete in all respects and fit for use	19.15 %	
(4) Miscellaneous	1.51 %	

1.3.5 New Reinforced Earth Wall

Procedure for estimating the value of Reinforced Earth Wall works table 1.3.5:

Table 1.3.5

Stage for Payment	Percentage weightage	Payment Procedure
E- New Reinforced Earth Wall	**82.76 Cr**	Payment shall be made on pro rata basis for completed facilities. Payment shall be made for completed items.
(1) Reinforced Earth Wall	100.00 %	

1.3.6 Other works

Procedure for estimating the value of other works done shall be as stated in table 1.3.6:

Table 1.3.6

Stage for Payment	Percentage weightage	Payment Procedure
Miscellaneous	**6.84 Cr**	Payment shall be made on pro rata basis for completed facilities. Payment shall be made for completed items.
A. Bus Bays	48.86 %	
B. Rain water Harvesting	14.61 %	
C. Arboriculture and Land Scaping	14.61 %	
D. Others	21.92 %	

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.

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