

## **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 Manual of Specifications and Standards for Two-Laning of Highways (IRC: SP: 73-2018) referred to as the Manual, and MORTH Specifications for Road and Bridge Works 5th Revision 2013 or latest version. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer. The Hill Road Manual IRC SP 48 -1998 and IRC:52-2019 should also be referred.

#### **THE NATIONAL GREEN TRIBUNAL PRINCIPAL BENCH, NEW DELHI on 01th Nov, 2018**

Following recommendations and suggestions have been made for dumping muck & dumping yard:-

- a. Before dumping muck at the dumping yard first of all retaining/ gabion walls of specified capacity and suitable design should be constructed.
- b. All the dumping sites should be properly designed with retaining wall/gabion structures and should be maintained regularly in order to check the spillage of the muck down the slope and into the rivers and other places.
- c. Wherever boulders are rolling down along with much, gabion structures/retaining wall should have sufficient foundation and bottom width should be 4-5 m. Length of one gabion structure should not be more than 6-8 m. Wherever more length of gabion structure is required one gabion structure should be bound with another.
- d. If any new dumping sites are identified in future, then the retaining / gabion structures should be constructed at suitable vertical interval of 5-6 m so that entire disposed muck may not exert pressure only at one wall/ toe wall rather the load of muck should be distributed on different walls.
- e. Angle of repose of muck should be maintained between 30 to 45°. Long slopes should be intercepted to several short ones with the help of 1.5 to 2.0 m wide berms / terraces/ benches in between in order to maintain less than critical velocity for runoff water and simultaneously mass erosion with be controlled.
- f. The capacity/ volume of muck disposal site should be more than volume of muck to be disposed.
- g. Proper sign boards indicating the name, number, location, dumping capacity, etc. should be installed at all the dumping sites.
- h. Dumping sites which are full of their capacity they should be rehabilitated with local grass or shrubs. Jute geo textile (JGT) may also be used for establishment of vegetation at vulnerable sites.

- i. Gabion walls should be constructed above HFL of River. If slope is very high to construct a gabion wall then a RCC/stone masonry retaining wall should be given at bank of River after proper design including foundation. Height of this wall should be well above the HFL of River.
- j. All construction sites should follow and comply with the provisions of the Construction and Demolition Waste Management Rules, 2016”.

## Annex – I

(Schedule-D)

### Specifications and Standards for Construction

#### 1. Specifications and Standards

All Materials, works and construction operations shall conform to the Manual of Specifications and Standards for [Two-Laning of Highways (IRC:SP:73-2018)], 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:]
- (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.]

Item	Manu Claus Refere	Provision as per Manual	Modified Provision
		<b>Mountainous or Steep Terrain:</b>	<b>Mountainous or Steep Terrain:</b>
Design Speed	2.2	As per IRC SP 73: 2018 Ruling: 60 km/ hr Minimum: 40 km/ hr As per IRC SP 48: 1998/IRC 52: 2019 Ruling: 40 km/ hr Minimum: 30 km/ hr	Minimum design speed of 30 km/hr has been taken as per IRC SP 48: 1998/IRC 52: 2019 in steep terrain and at some locations, design speed has been reduced to 20 km/ hr at hair pin bend. (Refer Horizontal Alignment Drawing and Table 2.1 below)

Extra Widening	2.7	Extra Widening has been proposed as per IRC: SP: 73-2018		Extra Widening has been proposed as per IRC:52: 2019 (Table 6.10) of Hill Road Manual.	
		<b>Radius (in m)</b>	<b>Extra Widening (in m)</b>	<b>Radius (in m)</b>	<b>Extra (in m)</b>
		75-100	0.9	21-40	1.5
		101-300	0.6	41-60	1.2
				61-100	0.9
				75-100	0.9
				101-300	0.6
				Above 300	NIL
Radii of Horizontal Curve	2.9.4	<b>Mountainous Terrain:</b> Desirable Minimum Radius: 150 m Absolute Minimum Radius: 75 m		Radius below 75 m has been provided in the location listed in table 2.2.	
Shoulder	2.6	In open country (Table-2.3) Hill side –Paved shoulder-1.5m Valley side - Paved shoulder-1.5m & Earthen shoulder- 1.0m		In open country Hill side –Hard shoulder-1.5m Valley side - Hard shoulder-1.5m & Earthen shoulder- 1.0m	

**Table 2.1: Locations where Design Speed is less than 40 kmph due to Sharp Bend**

SL. No	Stretch		Design speed in
	From	To	
1	283081.856	283091.203	30
2	283135.309	283163.162	30
3	283197.300	283229.230	30
4	283254.269	283269.110	30
5	283634.660	283682.610	30
6	283740.236	283752.253	30
7	286221.964	286262.239	30
8	286326.716	286447.284	30
9	286570.813	286608.601	30
10	286911.163	286951.413	30
11	286987.833	287012.023	30
12	287043.069	287053.729	30

SL. No	Stretch		Design speed in
	From	To	
13	287379.728	287385.828	30
14	287440.766	287449.370	30
15	287489.482	287505.298	30
16	287552.712	287576.360	30
17	287615.985	287629.901	30
18	287679.295	287699.752	30
19	287793.115	287839.211	30
20	287898.803	287907.918	30
21	287952.820	287978.404	30
22	288017.662	288042.782	30
23	288368.658	288414.140	30
24	288455.926	288539.609	30
25	288611.313	288647.164	30
26	288741.955	288881.040	30
27	288980.553	288994.925	30
28	289057.700	289063.188	30
29	289136.573	289145.620	30
30	289223.455	289232.677	30
31	289291.219	289333.294	30
32	289433.997	289474.157	30
33	289511.792	289555.671	30
34	290093.500	290115.341	30
35	290206.354	290243.584	30
36	290266.217	290308.367	30
37	290331.302	290415.474	30
38	290469.239	290510.897	30
39	290566.858	290585.213	30
40	291116.955	291147.555	30
41	291197.162	291228.178	30
42	291305.275	291317.321	30
43	291396.160	291412.906	30
44	291459.251	291486.616	30
45	291527.239	291598.907	30
46	291635.322	291652.285	30
47	291708.223	291724.702	30
48	291847.172	291861.458	30
49	291921.766	291928.742	30
50	291990.686	292015.353	30
51	292067.245	292076.739	30
52	292114.829	292187.068	20
53	292258.841	292286.977	30
54	292516.802	292539.483	30
55	292739.993	292768.669	30
56	292792.523	292851.413	30
57	292911.676	292963.686	30
58	293038.477	293053.934	30
59	293169.807	293237.690	30
60	293883.283	293906.602	30

SL. No	Stretch		Design speed in
	From	To	
61	293975.296	294016.368	30
62	294090.889	294099.384	30
63	294857.681	294862.930	30
64	294944.731	294975.355	30
65	295035.643	295087.184	30
66	295174.270	295174.841	30
67	295602.386	295658.855	30
68	295708.413	295796.282	30
69	295884.937	295890.260	30
70	295953.880	295961.340	30
71	296043.130	296070.174	30
72	296305.763	296348.559	30
73	296409.594	296419.004	30
74	296466.229	296474.020	30
75	296510.002	296525.291	30
76	296599.730	296652.223	30
77	296780.207	296811.624	30
78	296870.964	296878.573	30
79	297112.339	297131.071	30
80	297979.134	297997.326	30
81	298056.909	298068.945	30
82	298432.219	298446.145	30
83	298489.751	298498.601	30
84	298560.901	298575.000	30
85	298948.117	298954.510	30
86	299005.870	299039.236	30
87	300148.155	300178.537	30
88	300590.174	300611.714	30
89	300908.595	300914.476	30
90	300970.787	300990.664	30
91	301011.239	301035.009	30
92	301060.047	301073.991	30
93	301156.154	301197.937	30
94	301281.297	301319.670	30
95	301357.649	301369.254	30
96	301414.318	301425.877	30
97	301465.553	301474.035	30
98	301526.516	301536.525	30
99	301580.135	301611.549	30
100	301704.654	301751.027	30
101	301802.446	301849.568	20
102	301913.522	301930.130	20
103	302289.242	302306.924	30
104	302359.695	302368.608	30
105	302480.240	302525.990	30
106	302586.075	302625.750	30
107	302874.393	302891.050	30
108	302932.974	302947.121	30

SL. No	Stretch		Design speed in
	From	To	
109	303254.076	303286.274	30
110	303491.151	303502.360	30
111	303570.295	303582.811	30
112	304336.902	304343.630	30
113	304569.877	304615.538	30
114	304695.312	304718.908	30
115	305010.826	305053.857	30
116	305105.534	305184.325	30
117	305254.057	305273.695	30
118	305367.255	305396.362	30
119	305449.230	305491.758	30
120	305542.011	305556.704	30
121	305645.647	305658.263	30
122	305708.939	305736.649	30
123	305789.959	305805.249	30
124	305834.203	305887.142	30
125	305933.170	305951.244	30
126	305973.266	305996.961	30
127	306030.214	306035.983	30
128	306084.641	306101.472	30
129	306777.955	306817.958	30
130	307342.110	307379.972	30
131	307421.815	307434.088	30
132	307492.512	307535.349	30
133	307590.600	307624.712	30
134	308074.120	308095.803	30
135	308134.044	308138.397	30
136	308192.859	308200.503	30
137	308548.507	308561.514	30
138	309563.309	309589.856	30
139	309642.580	309655.007	30
140	309720.255	309743.398	30
141	309799.795	309816.879	30
142	309838.582	309852.424	30
143	309906.667	309909.273	30
144	309943.127	310065.559	20
145	310098.083	310137.880	30
146	310153.975	310199.566	30
147	310268.415	310296.568	30
148	310377.523	310392.281	30
149	310610.579	310613.898	30
150	310661.829	310699.271	20
151	310760.229	310766.220	35
152	311548.968	311560.993	30
153	311613.330	311651.715	20
154	312088.714	312098.497	30
155	312153.067	312160.292	30
156	312212.422	312257.416	30

SL. No	Stretch		Design speed in
	From	To	
157	312321.240	312332.638	30
158	312379.476	312449.698	30
159	312660.202	312674.349	30
160	312743.062	312792.622	30
161	312868.175	312921.85	30
162	313186.412	313207.293	30
163	313256.744	313262.231	30
164	313310.131	313366.117	30
165	313398.549	313411.759	30
166	313473.833	313480.749	30
167	314168.328	314183.15	30
168	314259.413	314272.74	30
169	314411.223	314445.907	30
170	314485.364	314498.002	30
171	314556.216	314596.015	20
172	314649.4	314670.278	30
173	314741.993	314760.587	30
174	314800.292	314832.514	30
175	314906.518	314920.196	30
176	314939.431	314961.69	30
177	314983.767	315018.425	30
178	315079.036	315119.267	20
179	315193.479	315200.808	30
180	315251.646	315264.395	30
181	315313.2	315329.464	30
182	315370.017	315377.207	30
183	315415.398	315438.32	30
184	315504.648	315510.88	30
185	315773.859	315784.555	30
186	315827.042	315833.276	30
187	315908.974	315939.47	30
188	315984.384	316007.85	30
189	316073.108	316097.007	30
190	316145.565	316186.567	20
191	316220.29	316256.085	30
192	316342.222	316383.979	30
193	316414.595	316467.865	30
194	316674.116	316705.968	30
195	317267.193	317275.134	30
196	317372.788	317380.689	30
197	317436.809	317482.468	30
198	317540.911	317547.1	30
199	317607.141	317619.839	30
200	317915.918	317930.619	30
201	317972.24	317977.689	30
202	318040.682	318060.069	30
203	318180.909	318202.939	30
204	318256.671	318267.348	30



SL. No	Stretch		Design speed in
	From	To	
205	318322.403	318336.385	30
206	318382.907	318413.725	30
207	319324.616	319333.245	30
208	319401.49	319436.462	20
209	319526.786	319542.425	20
210	319601.878	319674.496	30
211	319729.582	319754.694	30
212	319803.892	319810.617	30
213	319859.703	319869.194	30
214	319919.752	320010.551	30
215	320060.759	320082.183	30
216	320318.016	320331.285	30
217	320377.219	320438.093	30
218	320492.226	320498.414	30
219	320969.682	320981.928	30
220	321171.438	321179.049	30
221	321210.422	321217.022	30
222	321247.361	321261.741	30
223	321326.888	321338.649	30
224	321407.948	321424.095	30
225	321482.328	321522.373	20
226	321595.841	321602.134	30
227	321649.364	321654.623	30
228	321702.379	321725.056	30
229	322385.437	322402.896	30
230	322851.163	322858.43	30
231	322904.71	322956.609	30
232	323631.739	323646.137	30
233	323718.375	323737.19	30
234	324075.111	324085.323	30
235	324121.672	324136.124	30
236	325402.922	325413.484	30

Table 2.2: Locations where Radii of Horizontal Curve is less than 75 m

Sl. NO.	Stretch		Radius (m)
	From	To	
1	283135.309	283163.162	50
2	283254.269	283269.110	70
3	283634.660	283682.610	40
4	283740.236	283752.253	30
5	284072.029	284132.944	60
6	284452.327	284512.483	55
7	284834.315	284856.083	70
8	284968.483	284990.721	50
9	285404.535	285412.948	70
10	285784.753	285805.415	50
11	286221.964	286262.239	30

Sl. NO.	Stretch		Radius (m)
	From	To	
12	286570.813	286608.601	30
13	286766.251	286781.508	50
14	286911.163	286951.413	45
15	287043.069	287053.729	60
16	287379.728	287385.828	30
17	287440.766	287449.370	50
18	287489.482	287505.298	60
19	287552.712	287576.360	30
20	287793.115	287839.211	30
21	287952.820	287978.404	60
22	288017.662	288042.782	60
23	288172.154	288223.556	70
24	288368.658	288414.140	50
25	288455.926	288539.609	50
26	288611.313	288647.164	30
27	288980.553	288994.925	30
28	289057.700	289063.188	30
29	289136.573	289145.620	70
30	289223.455	289232.677	70
31	289291.219	289333.294	30
32	289433.997	289474.157	30
33	289511.792	289555.671	60
34	290093.500	290115.341	30
35	290206.354	290243.584	50
36	290331.302	290415.474	70
37	290469.239	290510.897	30
38	290566.858	290585.213	50
39	290949.881	290962.271	70
40	291023.220	291047.522	70
41	291116.955	291147.555	70
42	291197.162	291228.178	30
43	291305.275	291317.321	30
44	291396.160	291412.906	60
45	291459.251	291486.616	30
46	291635.322	291652.285	40
47	291708.223	291724.702	30
48	291847.172	291861.458	30
49	291921.766	291928.742	30
50	291990.686	292015.353	30
51	292067.245	292076.739	60
52	292114.829	292187.068	30
53	292258.841	292286.977	30
54	292516.802	292539.483	30
55	292739.993	292768.669	60
56	292911.676	292963.686	30
57	293169.807	293237.690	40
58	293627.532	293637.397	70
59	293883.283	293906.602	30

Sl. NO.	Stretch		Radius (m)
	From	To	
60	293975.296	294016.368	30
61	294090.889	294099.384	40
62	294281.766	294290.136	50
63	294551.360	294555.603	70
64	294857.681	294862.930	70
65	295035.643	295087.184	30
66	295357.777	295383.063	70
67	295602.386	295658.855	30
68	295884.937	295890.260	30
69	295953.880	295961.340	35
70	296043.130	296070.174	40
71	296171.113	296195.516	70
72	296305.763	296348.559	30
73	296409.594	296419.004	35
74	296510.002	296525.291	70
75	296599.730	296652.223	30
76	296780.207	296811.624	30
77	297112.339	297131.071	30
78	297281.297	297348.883	50
79	297979.134	297997.326	40
80	298056.909	298068.945	30
81	298369.007	298380.263	70
82	298432.219	298446.145	50
83	298489.751	298498.601	50
84	298560.901	298575.000	40
85	298948.117	298954.510	50
86	299005.870	299039.236	30
87	300148.155	300178.537	30
88	300498.420	300515.022	50
89	300590.174	300611.714	40
90	300831.188	300842.170	50
91	300908.595	300914.476	40
92	300970.787	300990.664	50
93	301060.047	301073.991	40
94	301156.154	301197.937	30
95	301357.649	301369.254	40
96	301414.318	301425.877	50
97	301465.553	301474.035	60
98	301526.516	301536.525	40
99	301580.135	301611.549	60
100	301802.446	301849.568	30
101	301913.522	301930.130	30
102	302289.242	302306.924	30
103	302359.695	302368.608	50
104	302480.240	302525.990	30
105	302586.075	302625.750	30
106	302874.393	302891.050	40
107	302932.974	302947.121	70

Sl. NO.	Stretch		Radius (m)
	From	To	
108	303254.076	303286.274	30
109	303491.151	303502.360	40
110	303570.295	303582.811	50
111	304336.902	304343.630	30
112	304569.877	304615.538	30
113	304695.312	304718.908	30
114	305010.826	305053.857	30
115	305105.534	305184.325	50
116	305367.255	305396.362	50
117	305449.230	305491.758	30
118	305645.647	305658.263	30
119	305708.939	305736.649	60
120	305789.959	305805.249	50
121	305933.170	305951.244	50
122	306030.214	306035.983	50
123	306084.641	306101.472	40
124	306613.639	306625.789	50
125	306777.955	306817.958	30
126	307052.482	307124.048	70
127	307342.110	307379.972	50
128	307421.815	307434.088	70
129	307492.512	307535.349	30
130	307590.600	307624.712	60
131	307860.964	307869.922	50
132	308074.120	308095.803	50
133	308134.044	308138.397	60
134	308192.859	308200.503	60
135	308419.877	308489.514	50
136	308548.507	308561.514	60
137	309265.099	309348.014	60
138	309442.990	309458.686	60
139	309563.309	309589.856	50
140	309642.580	309655.007	50
141	309720.255	309743.398	40
142	309799.795	309816.879	70
143	309906.667	309909.273	70
144	309943.127	310065.559	55
145	310153.975	310199.566	60
146	310377.523	310392.281	30
147	310610.579	310613.898	50
148	310661.829	310699.271	20
149	311005.442	311011.339	50
150	311097.757	311121.252	60
151	311265.118	311272.134	50
152	311548.968	311560.993	50
153	311613.330	311651.715	20
154	311859.825	311873.325	50
155	312088.714	312098.497	40

Sl. NO.	Stretch		Radius (m)
	From	To	
156	312153.067	312160.292	40
157	312212.422	312257.416	60
158	312321.240	312332.638	30
159	312379.476	312449.698	70
160	312660.202	312674.349	30
161	312743.062	312792.622	30
162	312978.924	313074.566	70
163	313186.412	313207.293	70
164	313256.744	313262.231	30
165	313310.131	313366.117	70
166	313398.549	313411.759	60
167	313473.833	313480.749	30
168	313871.271	313950.472	70
169	314026.679	314082.08	70
170	314168.328	314183.15	50
171	314259.413	314272.74	50
172	314485.364	314498.002	40
173	314556.216	314596.015	20
174	314649.4	314670.278	70
175	314741.993	314760.587	50
176	314800.292	314832.514	60
177	314906.518	314920.196	70
178	314983.767	315018.425	60
179	315079.036	315119.267	20
180	315193.479	315200.808	35
181	315251.646	315264.395	50
182	315313.2	315329.464	40
183	315370.017	315377.207	60
184	315415.398	315438.32	60
185	315504.648	315510.88	30
186	315602.59	315639.749	70
187	315773.859	315784.555	70
188	315827.042	315833.276	40
189	315908.974	315939.47	35
190	316145.565	316186.567	20
191	316342.222	316383.979	35
192	316545.871	316555.042	60
193	316674.116	316705.968	50
194	316854.939	316871.454	70
195	317007.303	317015.9	70
196	317267.193	317275.134	40
197	317372.788	317380.689	70
198	317436.809	317482.468	50
199	317540.911	317547.1	30
200	317607.141	317619.839	50
201	317915.918	317930.619	45
202	317972.24	317977.689	50
203	318040.682	318060.069	40

Sl. NO.	Stretch		Radius (m)
	From	To	
204	318256.671	318267.348	35
205	318322.403	318336.385	40
206	318382.907	318413.725	70
207	318956.204	318965.814	70
208	319324.616	319333.245	30
209	319401.49	319436.462	20
210	319526.786	319542.425	20
211	319729.582	319754.694	70
212	319859.703	319869.194	30
213	319919.752	320010.551	55
214	320060.759	320082.183	30
215	320249.778	320255.337	60
216	320318.016	320331.285	40
217	320377.219	320438.093	45
218	320492.226	320498.414	30
219	320725.425	320735.076	50
220	320969.682	320981.928	30
221	321171.438	321179.049	60
222	321247.361	321261.741	60
223	321482.328	321522.373	20
224	321649.364	321654.623	30
225	321702.379	321725.056	70
226	322091.981	322150.979	50
227	322316.505	322324.707	70
228	322385.437	322402.896	30
229	322471.997	322490.16	70
230	322851.163	322858.43	35
231	322904.71	322956.609	60
232	323314.071	323320.332	50
233	323483.144	323511.957	70
234	323631.739	323646.137	30
235	323718.375	323737.19	50
236	323985.571	324000.04	70
237	324075.111	324085.323	50
238	324121.672	324136.124	60
239	324854.113	324860.113	70
240	325402.922	325413.484	50