



**Government of Odisha (GOO)
Chief Engineer, World Bank Projects, Odisha
Odisha State Roads Project**

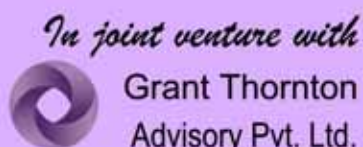
**Consultancy Services for
Road Sector Institutional Development
Loan # 7577-IN**



**ROAD INFRASTRUCTURE
SAFETY MANAGEMENT REVIEW
VOLUME II - APPENDICES**



**Intercontinental Consultants
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APPENDIX I
ROAD SAFETY ASSESSMENT FORM -
MAIN ROADS AND JUNCTIONS





APPENDIX II

SUMMARY OF ROADS ASSESSED



SUMMARY OF ROADS ASSESSED



1. Road No: SH-19	2. Road Section: Serghati - Nilgiri-Jernaghati
3. OWD Officer accompanied: Dr. N.C.Pal.,EE, PMU, OWD, AE, Nilagiri R&B Sub Division, AE, Jaleswar R&B Sub Division	
4. Date of Assessment: 30-Nov 2012	5. Assessor: HariKrishnaKondamuru, ICT Chandan, Arkitechno Jitender, Arkitechno
6. Length: 32 Km	7. Road Geometry: intermediate / single lane road in a plain terrain with earthen shoulder (width 1-2 m).
8. Road surface: Bituminous	9. Land use along road: Largely Agricultural, Reserve Forests and Small Hamlets,
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) The absence of delineation viz. pavement markings, advance warning signs, delineator posts at sharp curves with high deflection angles, sometimes before a junction also. (ii) No provisions for vulnerable road users like cycle paths, foot paths, pedestrian crossings, advance warning signs in spite of presence of lot of schools along the road. (iii) The side road joining the main road at an unsafe gradient along with some hazardous road side objects like utility poles and the sight triangle of the intersection obstructed because of the encroachments. 	
Photo A	Photo B
	
Ch: 6+700, Unsafe junction of the side road	Ch: 23+050, Sharp curve after a bridge, with a side road on the outside of the curve, approaching a village

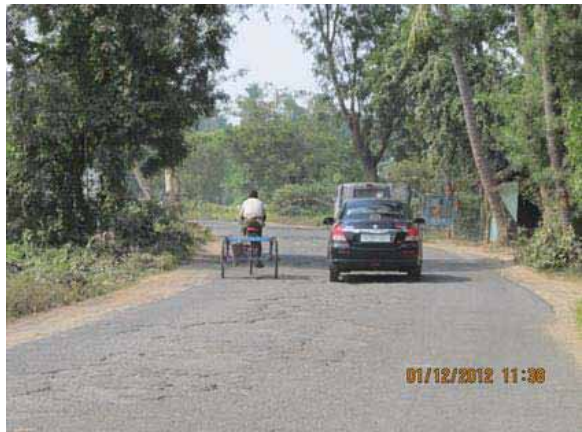

<p>1. Road No: MDR</p>	<p>2. Road Section: Jaleshwar - Chandaneswar</p>
<p>3. OWD Officer accompanied: Mr.Mihir Kumar Patra, JE, Kamarda</p>	
<p>4. Date of Assessment: 01-Dec 2012</p>	<p>5. Assessor: HariKrishnaKondamuru, ICT Jeeban Kumar Behera, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 35.7 Km</p>	<p>7. Road Geometry: Intermediate / two lane road in plain terrain with earthen shoulder (1 – 2m wide).</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Largely Agricultural, and Small Hamlets,</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) The absence of delineation viz. advance warning signs, pavement markings, delineator posts on sharp curves with high deflection angles. (ii) The absence of protection / delineation viz. pavement markings, delineator posts etc on high embankments. (iii) The intersection of side road is happening at a very unsafe gradient and the obstruction of the sight triangle by the encroachments. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p>Ch: 10+100, The road on high embankment doesn't have any run-off protection.</p>	<p>Ch: 26+550, the road on high embankment with side road joining with minimum sight distance. Another side road also joining here.</p>



<p>1. Road No: MDR 6</p>	<p>2. Road Section: Sorro – Kopari - Ranital</p>
<p>3. OWD Officer accompanied: JE, Gandibed R & B Section, JE, Sorro</p>	
<p>4. Date of Assessment: 07-Dec 2012</p>	<p>5. Assessor: HariKrishnaKondamuru, ICT Jeeban Kumar Behera, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 50 Km</p>	<p>7. Road Geometry: single lane road in plain terrain with earthen shoulder (0.5 – 1 m wide) in high embankment</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Largely Agricultural, Mines, and Small Hamlets,</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) The presence of sharp curves with high deflection angles, sometimes before a junction also. (ii) The absence of protection / delineation viz. pavement markings, delineator posts for the high embankment (1.5 – 2 m) along the road. (iii) The poor condition of the road with pot holes and ruts can decrease the operational efficiency of the road and may lead to unsafe conditions during day and especially night times. 	



SUMMARY OF ROADS ASSESSED



1. Road No.: SH-65	2. Road Section Khuntuni to Maniyabandh, Cuttack
3. OWD Officer accompanied –	
4. Date of Assessment: 2-Dec and 5- Dec -2012	5. Assessor: Tony Mathew and Amit Agarwal, ICT
6. Length (km) – 76km	7. Road Geometry:Intermediate lane
8. Road Surface:Bituminous	9. Land use along road Mixed, Commercial,Residential and Agriculture
10. List three major safety deficiencies of this road <ul style="list-style-type: none"> (i) Absence of road marking and traffic signs (ii) Absence of protection on outside curve at high embankment and broken parapet walls on culverts/minor bridges. (iii) Absence of provisions for VRUs in Built up and commercial areas 	
Photo A	Photo B
	
Sharp Curve and Broken Parapet wall	Unprotected and unwarned approach to Major bridge at high embankment

1. Road No.: SH-12	2. Road Section: OMP Chhakh to Jagatpur Border, Cuttack
3. OWD Officer accompanied – none	
4. Date of Assessment: 30-Nov -2012	5. Assessor: Tony Mathew and Amit Agarwal, ICT
6. Length (km) – 14km	7. Road Geometry: Two lane with PS
8. Formation width: Cement concrete	9. Land use along road Mixed, Commercial and Residential
10. List three major safety deficiencies of this road <ul style="list-style-type: none"> (i) Absence of road marking and traffic signs (ii) Absence of protection on outside curve at high embankment (iii) Absence of provisions for VRUs in Built up and commercial areas 	
Photo A	Photo B
	
Sharp curve with gradient; approaching to major bridge	Busy intersection with high encroachments and on street parking



<p>1. Road No.:SH-9A</p>	<p>2. Road Section: Jagatpur to Asureswar, Cuttack</p>
<p>3. OWD Officer accompanied –</p>	
<p>4. Date of Assessment 1-Dec2012</p>	<p>5. Assessor: Tony Mathew and Amit Agarwal, ICT</p>
<p>6. Length (km) – 34km</p>	<p>7. Road Geometry:Intermediate lane</p>
<p>8. Road Surface:Bituminous</p>	<p>9. Land use along road Mixed, Commercial, Residential and Agriculture</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Absence of road marking and traffic signs (ii) Absence of protection on outside curve at high embankment and broken parapet walls on culverts/minor bridges. (iii) Absence of provisions for VRUs in Built up and commercial areas 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
 <p style="text-align: right; color: orange; font-size: small;">01/12/2012 11:38</p>	 <p style="text-align: right; color: orange; font-size: small;">01/12/2012 11:44</p>
<p style="text-align: center;">Sharp curve and dangerous overtaking</p>	<p style="text-align: center;">Skewed side road with poor visibility</p>

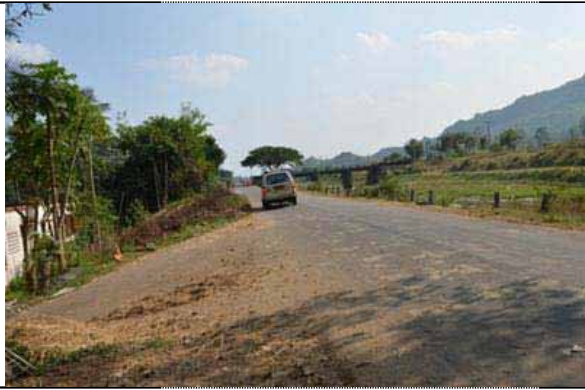

<p>1. Road No.: ODR</p>	<p>2. Road Section: Salipur to Chhatia,, Cuttack</p>
<p>3. OWD Officer accompanied –</p>	
<p>4. Date of Assessment: 1-Dec and 4- Dec -2012</p>	<p>5. Assessor: Tony Mathew and Amit Agarwal, ICT</p>
<p>6. Length : 28km</p>	<p>7. Road Geometry: Single lane</p>
<p>8. Road Surface: Bituminous</p>	<p>9. Land use along road: Mixed, Commercial, Residential and Agriculture</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Absence of road marking and traffic signs (ii) Absence of protection on outside curve at high embankment and broken parapet walls on culverts/minor bridges. (iii) Absence of provisions for VRUs in Built up and commercial areas 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p style="text-align: center;">Sharp Curve and high encroachment</p>	<p style="text-align: center;">Absence of OHM at approach of bridge</p>



<p>1. Road No.:ODR</p>	<p>2. Road Section: Paga to Tangi, Cuttack</p>
<p>3. OWD Officer accompanied –</p>	
<p>4. Date of Assessment: 30-Nov-2012</p>	<p>5. Assessor: Tony Mathew and Amit Agarwal, ICT</p>
<p>6. Length (km) – 12km</p>	<p>7. Road Geometry: Single lane</p>
<p>8. Road Surface: Bituminous</p>	<p>9. Land use along road– Mixed, Commercial, Residential and Agriculture</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Absence of road marking and traffic signs (ii) Absence of protection on outside curve at high embankment and broken parapet walls on culverts/minor bridges. (iii) Absence of provisions for VRUs in Built up and commercial areas 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p style="text-align: center;">Broken and unwarned parapet walls at major intersection</p>	<p style="text-align: center;">Unprotected and unwarned approach to bridge</p>



<p>1. Road No.: ODR</p>	<p>2. Road Section: Kuanpal to Balichandrapur, Cuttack</p>
<p>3. OWD Officer accompanied –</p>	
<p>4. Date of Assessment: 4-Dec-2012</p>	<p>5. Assessor: Amit Agarwal, ICT</p>
<p>6. Length (km) – 7km</p>	<p>7. Road Geometry: Intermediate lane</p>
<p>8. Road Surface: Bituminous</p>	<p>9. Land use along road– Mixed, Commercial, Residential and Agriculture</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Absence of road marking and traffic signs (ii) Absence of protection on outside curve at high embankment and broken parapet walls on culverts/minor bridges. (iii) Absence of provisions for VRUs in Built up and commercial areas 	
<p>Photo A</p>	<p>Photo B</p>
	
<p>High pedestrian and cyclists volume at Commercial Area of Balichandrapur</p>	<p>Side road approaching to minor bridge at high embankment</p>



SUMMARY OF ROADS ASSESSED



<p>1. Road No: MDR 64</p>	<p>2. Road Section: Chattarapur to Hinjilicut</p>
<p>3. OWD Officer accompanied: Mr. A. K. Subdhy, AE, Chattarapur division and Mr Samanthara, AE, Behrampur division</p>	
<p>4. Date of Assessment: 15 Dec 2012</p>	<p>5. Assessor: Ashif Hussain, ICT</p>
<p>6. Length: 40.20 Km</p>	<p>7. Road Geometry: Intermediate lane road with 0.5m earthen shoulder, mainly mix of Plain and rolling terrain.</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Mixed, Commercial and Agriculture</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Absence of protection on high embankment and broken parapet walls on culverts/minor bridges. (ii) Absence of provisions for VRUs in built-up and commercial areas (iii) Trees and Road side villages are on the edge of the road which needs protection. 	
<p>Photo A</p>	<p>Photo B</p>
	



<p>1. Road No: NH 59</p>	<p>2. Road Section: Sorada to Hinjilicut</p>
<p>3. OWD Officer accompanied: Mr P.K Sahu</p>	
<p>4. Date of Assessment: 14 Dec 2012</p>	<p>5. Assessor: Ashif Hussain, ICT</p>
<p>6. Length: 50 Km</p>	<p>7. Road Geometry: Single lane to 2-lane road with 0.5-1 m earthen shoulder in plain terrain.</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Mixed, Commercial and Agriculture</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Culverts/Bridges very near to road edge. Also there is no any protection on bridges/culverts and also broken parapet walls on culverts/minor bridges. (ii) Absence of provisions for VRUs in built-up and commercial areas (iii) On the road edges many trees and high embankment are seen, which needs protection. 	
<p>Photo A</p>	<p>Photo B</p>
	



<p>1. Road No: SH17</p>	<p>2. Road Section: Dighapandi to Taptapani</p>
<p>3. OWD Officer accompanied: Mr S Padhy, AE</p>	
<p>4. Date of Assessment: 12 Dec 2012</p>	<p>5. Assessor: Ashif Hussain, ICT</p>
<p>6. Length: 10 Km</p>	<p>7. Road Geometry: 2-lane road with 0.5 m earthen shoulder. The road is mix of Plain and ghat terrain</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Forest, Commercial and Agriculture</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Centre line & Edge line is missing on the road. Traffic signage is missing or improper. (ii) Absence of warning or cautionary sign near sharp curve and also there is no any protection on bridges/culverts and also broken parapet walls on culverts/minor bridges. (iii) Absence of provisions for VRUs in built-up and commercial areas 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	

<p>1. Road No: SH29</p>	<p>2. Road Section: Dighapandi to Sheragada</p>
<p>3. OWD Officer accompanied: Mr S Padhy, AE</p>	
<p>4. Date of Assessment: 12 Dec 2012</p>	<p>5. Assessor: Ashif Hussain, ICT</p>
<p>6. Length: 26 Km</p>	<p>7. Road Geometry: 2-lane road with 1-2 m earthen shoulder in plain terrain.</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Forest, Commercial and Agriculture</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Culverts/Bridges very near to road edge. Also there is no any protection on bridges/culverts and also broken parapet walls on culverts/minor bridges. (ii) Absence of provisions for VRUs in built-up and commercial areas (iii) Trees are on the edge of the road which needs protection. 	
<p>Photo A</p>	<p>Photo B</p>
	



<p>1. Road No: SH32</p>	<p>2. Road Section: Purushottampur to Jagannathpur</p>
<p>OWD Officer accompanied: Mr.A.K.Subdhy, AE, chattrapur division, Mr P Samanthara, AE, behrampur division, Mr Umashankar Padhy, JE, Purushottampur section</p>	
<p>4. Date of Assessment: 16 Dec 2012</p>	<p>5. Assessor: Ashif Hussain, ICT</p>
<p>6. Length: 24.70 Km</p>	<p>7. Road Geometry: Intermediate lane with 0.5-1 m earthen shoulder in plain terrain.</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Mixed, Commercial and Agriculture</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Culverts/Bridges very near to road edge. Also there is no any protection on bridges/culverts and also broken parapet walls on culverts/minor bridges. (ii) Absence of provisions for VRUs in built-up and commercial areas (iii) Few access roads having poor visibility to the main road. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	



<p>1. Road No: SH-31</p>	<p>2. Road Section: Huma to Boirani</p>
<p>3. OWD Officer accompanied: Mr.Umashankar Padhy, JE, Purushottampur section, Mr. Phakir Mohan Misra, JE, Huma to Purushottampur section</p>	
<p>4. Date of Assessment: 17 Dec 2012</p>	<p>5. Assessor: Ashif Hussain, ICT</p>
<p>6. Length: 39.20 Km</p>	<p>7. Road Geometry: Intermediate lane road with 0.5 m earthen shoulder in plain terrain.</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Mixed, Commercial and Agriculture</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Culverts/Bridges very near to road edge. Also there is no any protection on bridges/culverts and also broken parapet walls on culverts/minor bridges. (ii) Absence of provisions for VRUs in built-up and commercial areas (iii) On the road edges many trees and road side villages are seen which has no any protection. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	



<p>1. Road No: SH36</p>	<p>2. Road Section: Sheragada to Sorada</p>
<p>3. OWD Officer accompanied: Mr. P. K. Das, AE, Mr Rajgopal, JE, Bhanjanagar</p>	
<p>4. Date of Assessment: 13 Dec 2012</p>	<p>5. Assessor: Ashif Hussain, ICT</p>
<p>6. Length: 41.80 Km</p>	<p>7. Road Geometry: Single lane road with 0.5-1 m earthen shoulder with mix of plain and hilly terrain</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Mixed, Commercial and Agriculture</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Culverts/Bridges very near to road edge. Also there is no any protection on bridges/culverts and also broken parapet walls on culverts/minor bridges. (ii) Absence of provisions for VRUs in built-up and commercial areas (iii) On the road edges many bushes are seen by which visibility is not clear. Also Trees are on the edge of the road which needs protection. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	



1. Road No. : ODR	2. Road Section: Kanteipalli to Sorada
3. OWD Officer accompanied: Mr.P.K.Das,AE	
4. Date of Assessment: 13 Dec 2012	5. Assessor: Ashif Hussain, ICT
6. Length : 22.00 km	7. Road Geometry: Single lane road with 0.5-1 m earthen shoulder
8. Road surface: Bituminous	9. Land use along road: Mixed, Commercial and Agriculture
10. List three major safety deficiencies of this road <ul style="list-style-type: none"> (i) Culverts/Bridges very near to road edge. Also there is no any protection on bridges/culverts and also broken parapet walls on culverts/minor bridges. (ii) Absence of provisions for VRUs in built-up and commercial areas (iii) Few curves are seen which requires delineation. 	
Photo A	Photo B
	



SUMMARY OF ROADS ASSESSED



<p>1. Road No: MDR</p>	<p>2. Road Section: Chorodha – Duburi Road</p>
<p>3. OWD Officer accompanied: Mr. Pradhan, JE, Choroda</p>	
<p>4. Date of Assessment: 08-Dec2012</p>	<p>5. Assessor: HariKrishna Kondamuru, ICT Chandan, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 15 km</p>	<p>7. Road Geometry: Two / four lane road in plain terrain with earthen shoulder (less than 1 m).</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Towns, Industrial</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) The absence of delineation of sharp curves could be hazardous for night time driving. (ii) No provisions for vulnerable road user facilities like cycle paths, foot paths & pedestrian crossings leads to road-side friction at major junctions. (iii) The absence of protection / delineation viz. object hazard markers etc. to the approach of the bridge could lead to hazardous situation. 	
<p>Photo A</p>	<p>Photo B</p>
	
<p>Ch: 0+000, Unsafe behaviour of parking vehicles in the middle of junction.</p>	<p>Ch: 7+000, the absence of delineation of the approach of the bridge parapet.</p>

<p>1. Road No: EH</p>	<p>2. Road Section: Duburi – Tomka Road</p>
<p>3. OWD Officer accompanied: Mr. Pradhan, JE, Choroda</p>	
<p>4. Date of Assessment: 08-Dec 2012</p>	<p>5. Assessor: HariKrishna Kondamuru, ICT Chandan, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 19 km</p>	<p>7. Road Geometry: Four lane divided road in plain terrain with earthen shoulder (less than 1 m).</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Towns, Forests and Industries</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) The presence of non-breakaway parapet of the culvert too close to the road is a safety hazard without proper delineation. (ii) The two approaches of the road have a significant difference in elevation especially on the curves without any run-off protection is a potential safety hazard. (iii) The presence of a horizontal curve after a vertical curve with decreased sight distance is a safety hazard. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p>Ch: 7+500, the presence of non-breakaway parapet of the culverts close to the road with proper delineation.</p>	<p>Ch: 15+800, absence of run-off protection on curves.</p>



<p>1. Road No: ODR</p>	<p>2. Road Section: Panikoili – Ragadi Road</p>
<p>3. OWD Officer accompanied: Mr. Jena,JE, Panikoili</p>	
<p>4. Date of Assessment: 10-Dec 2012</p>	<p>5. Assessor: HariKrishna Kondamuru, ICT Chandan, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 19 km</p>	<p>7. Road Geometry: Single lane in plain terrain with earthen shoulder (less than 1 m width).</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Agricultural lands, Villages</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Presence of ribbon developments / roadside friction along the ribbon developments decreasing the operational efficiency of the roads, especially at the junctions could lead to accidents. (ii) Absence of delineation viz. advance warning signs, pavement markings, and delineator posts for night time visibility along the curves. (iii) Road side objects, like high embankments and utility poles, close to the road could be a potential safety hazard. 	
<p>Photo A</p>	<p>Photo B</p>
	
<p>Ch: 6+300, The obstructed sight triangle of the side road joining the main road.</p>	<p>Ch: 19+000, The presence of road side friction could lead to accidents.</p>

<p>1. Road No: ODR</p>	<p>2. Road Section: Kuakhia - Kalamatia Road</p>
<p>3. OWD Officer accompanied: Mr. S. K. Mohanty, JE, Baruan Mr. Bivekananda Singh, Representative of JE, Jajpur Town</p>	
<p>4. Date of Assessment: 10 and 12-Dec 2012</p>	<p>5. Assessor: HariKrishna Kondamuru, ICT Chandan, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 23 km</p>	<p>7. Road Geometry: Single / intermediate lane in plain terrain with earthen shoulder (less than 1 m width).</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Villages</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Absence of vulnerable road user facilities like cyclepaths / footpaths, pedestrian crossings (atleast wide shoulders) etc. (ii) Absence of protection / delineation viz. pavement markings, object hazard markers, etc. to the approaches to the bridges / culverts. (iii) Road side friction because of village markets decreasing the operational efficiency of the roads and an unsafe situation. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p>Ch: 10+100, the absence of cycle paths for the school children.</p>	<p>Ch: 22+100, On-street parking, jaywalking pedestrians decreasing operational efficiency of road and an unsafe situation.</p>



<p>1. Road No: MDR 14</p>	<p>2. Road Section: Satipur – Kayongola Road</p>
<p>3. OWD Officer accompanied: Mr. Alek Behera, JE, Mangalpur R & B section</p>	
<p>4. Date of Assessment: 11 and 12-Dec 2012</p>	<p>5. Assessor: HariKrishna Kondamuru, ICT Chandan, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 45 km</p>	<p>7. Road Geometry: Single / intermediate / two lane in plain terrain with earthen shoulder (less than 1 m width).</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Agricultural lands, Villages</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) The absence of run-off protection and delineation viz. pavement markings, delineator posts on sharp curves on high embankment. (ii) No provision of Vulnerable Road User Facilities like Cycle paths / footpaths (atleast wide shoulders), pedestrian crossings, advance warning signs etc in villages / built-up areas. (iii) Road side friction due to on-street parking, market area decreasing the operational efficiency of the road. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p>Ch: 37+500, The absence of segregated right-of-way for school children</p>	<p>Ch: 47+600, The absence of delineation / protection on high embankment.</p>



<p>1. Road No: ODR</p>	<p>2. Road Section: Jajpur – Baruan Road</p>
<p>3. OWD Officer accompanied: Mr. Upendra Ojha, OWD Staff</p>	
<p>4. Date of Assessment: 12-Dec 2012</p>	<p>5. Assessor: HariKrishna Kondamuru, ICT Chandan, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 8 km</p>	<p>7. Road Geometry: Intermediate lane in plain terrain with earthen shoulder (less than 1m width).</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Agricultural lands, Villages</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) The absence of run-off protection / delineation viz. pavement markings, object hazard markers, delineator posts etc. for stretches of road with high embankment. (ii) The side roads join the main roads at a very unsafe gradient. (iii) The absence of delineation viz. delineator posts, pavement markings on the reverse curves etc. enhancing their night visibility. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p>Ch: 3+000, the absence of crash-protection of the road on high embankment.</p>	<p>Ch: 7+200, the unsafe gradient at which the side road joins the main road</p>

SUMMARY OF ROADS ASSESSED



<p>1. Road No.:NH-49</p>	<p>2. Road Section: Kanjipani Ghat to Keonjhar, Keonjhar</p>
<p>3. OWD Officer accompanied – Mr. A. K. Sahoo, JE PMU and Mr. Pattnaik AE, Keonjhar Sub-Division II</p>	
<p>4. Date of Assessment: 7-Dec-2012</p>	<p>5. Assessor:Tony Mathew and Amit Agarwal, ICT</p>
<p>6. Length : 46km</p>	<p>7. Road Geometry:Two lane</p>
<p>8. Road Surface:Bituminous</p>	<p>9. Land use along road Mixed,Residential, commercial</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Absence of traffic signs and road marking throughout the project road (ii) Absence of warning signs, traffic islands near major and minor junctions and sharp curves (iii) Absence of provisions for VRUs in Built up and commercial areas 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p style="text-align: center;">Unprotected sharp curve and Valley on outside Curve</p>	<p style="text-align: center;">Trucks negotiating Reverse Curve</p>



Annexure II: Keonjhar District


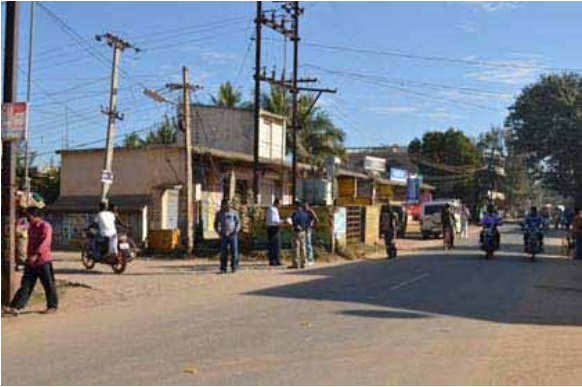
1. Road No.: NH-49	2. Road Section: Keonjhar to Turmunga, Keonjhar
3. OWD Officer accompanied – Mr. A. K. Sahoo, JE PMU and Mr. Pattnaik AE, Keonjhar Sub-Division II	
4. Date of Assessment: 7-Dec-2012	5. Assessor: Tony Mathew and Amit Agarwal, ICT, ICT
6. Length : 30 km	7. Road Geometry: Two lane
8. Road Surface: Bituminous	9. Land use along road– Mixed, Residential, commercial
10. List three major safety deficiencies of this road (i) Absence of traffic signs and edge line (ii) Absence of approach protection and/or broken/absent parapet wall of major/minor bridges and culverts (iii) Absence of provisions for VRUs in Built up and commercial areas	
Photo A	Photo B
	
Side road with level difference and poor visibility	Unprotected approach of Major bridge

1. Road No.: EW2	2. Road Section: Joda to Bamberi, Keonjhar
3. OWD Officer accompanied : Mr. A. K. Sahoo, JE PMU and Mr. A. K. Mishra AE, Barbil Sub-Division	
4. Date of Assessment: 5-Dec-2012	5. Assessor: Tony Mathew, ICT
6. Length : 18km	7. Road Geometry: Two lane
8. Road Surface: Bituminous	9. Land use along road: Mixed, Commercial, Residential and Agriculture
10. List three major safety deficiencies of this road: <ul style="list-style-type: none"> (i) Absence of road marking and traffic signs (ii) Absence of warning signs, traffic islands near major and minor junctions (iii) Absence of provisions for VRUs in Built up and commercial areas 	
Photo A	Photo B
	
Poor junction layout	Unwarned Sharp Curve

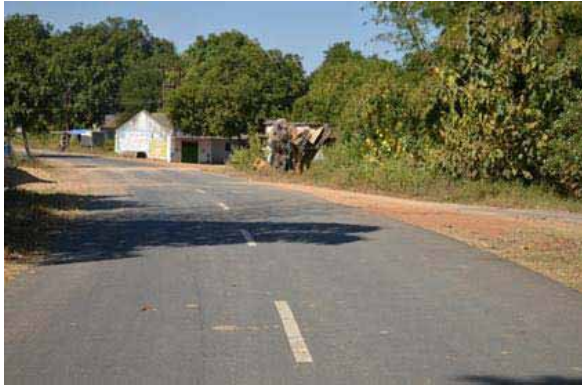

Annexure II: Keonjhar District

1. Road No.: SH49	2. Road Section: Gurandijodi to Dhenkikot, Keonjhar
3. OWD Officer accompanied: Mr. A. K. Sahoo, JE PMU and Mr. Jena JE, Keonjhar Sub-Division II	
4. Date of Assessment: 8-Dec-2012	5. Assessor: Tony Mathew and Amit Agarwal, ICT
6. Length: 33.15 km	7. Road Geometry: Two lane
8. Road Surface: Bituminous	9. Land use along road Mixed, Residential and Commercial
10. List three major safety deficiencies of this road <ul style="list-style-type: none"> (i) Absence of traffic signs near side roads, curves, major junctions, built up areas (ii) Absence of approach protection and/or broken/absent parapet wall of major/minor bridges and culverts (iii) Absence of provisions for VRUs in Built up and commercial areas 	
Photo A	Photo B
	
Houses very near to the pavement edge	Side road with poor visibility



1. Road No.: MDR	2. Road Section: Naranpur to NH16, Keonjhar
3. OWD Officer accompanied – Mr. A. K. Sahoo, JE PMU, Mr. Pradhan AE Keonjhar and Mr. Marandi PA to SE, Keonjharl	
4. Date of Assessment: 9-Dec-2012	5. Assessor: Tony Mathew and Amit Agarwal, ICT
6. Length: 48.8km	7. Road Geometry: Two lane with PS
8. Road Surface: Bituminous	9. Land use along road Mixed, Residential and Agriculture
10. List three major safety deficiencies of this road <ul style="list-style-type: none"> (i) Level difference between the side roads and the project road is more than 3-4 m at several locations thus enforces minor road traffic to come on major road without stopping (ii) Absence of warning signs, traffic islands near major and minor junctions and reverse curves (iii) Absence of provisions for VRUs in Built up and commercial areas 	
Photo A	Photo B
	
Road side trees hampering the visibility	Unsafe side road with higher level difference



1. Road No.: ODR	2. Road Section: Keonjhar to Saharpada, Keonjhar
3. OWD Officer accompanied: Mr. A. K. Sahoo, JE PMU, Mr. G. C. Ray AE, Keonjhar Sub-Division I and Mr.K. K. Pradhan AE, Keonjhar Sub-Division II	
4. Date of Assessment: 6-Dec-2012	5. Assessor: Tony Mathew, ICT
6. Length : 17km	7. Road Geometry: Intermediate/Two lane
8. Road Surface: Bituminous	9. Land use along road: Mixed, Residential and Commercial
10. List three major safety deficiencies of this road (i) Absence of traffic signs and edge line (ii) Absence of approach protection and/or broken/absent parapet wall of major/minor bridges and culverts (iii) Absence of provisions for VRUs in Built up and commercial areas	
Photo A	Photo B
	
Sharp curve with poor visibility	Side road with poor visibility and high encroachments



Annexure II: Keonjhar District



1. Road No.: ODR	2. Road Section: Bansuli to Patna, Keonjhar
3. OWD Officer accompanied: Mr. A. K. Sahoo, JE PMU, Mr. G. C. Ray AE, Keonjhar Sub-Division I and Mr.K. K. Pradhan AE, Keonjhar Sub-Division II	
4. Date of Assessment: 6-Dec-2012	5. Assessor: Tony Mathew, ICT
6. Length : 28.3km	7. Road Geometry: Intermediate lane
8. Road Surface: Bituminous	9. Land use along road: Mixed, Residential and Commercial
10. List three major safety deficiencies of this road <ul style="list-style-type: none"> (i) Absence of traffic signs and edge line (ii) Absence of approach protection and/or broken/absent parapet wall of major/minor bridges and culverts (iii) Absence of provisions for VRUs in Built up and commercial areas 	
Photo A	Photo B
	
Sharp Curve and skewed side road with poor visibility due to overgrown vegetation	Major Junction with poor junction layout

SUMMARY OF ROADS ASSESSED



<p>1. Road No: SH-25</p>	<p>2. Road Section: Jeypore – Mahuli Road</p>
<p>OWD Officer accompanied: Er. N.R. Sabara, AE,Jeypore PWD, Er. Bijaya ku. Behera, JE, Jeypore PWD</p>	
<p>4. Date of Assessment: 20-Dec2012</p>	<p>5. Assessor: HariKrishna Kondamuru, ICT Chandan, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 18.2 Km</p>	<p>7. Road Geometry: Single lane road with in rolling terrain with earthen shoulder (more than 1m)</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Agricultural lands, Forests</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) The presence of reverse curves without any pavement markings makes night time driving a potential road safety hazard. (ii) The presence of a horizontal curve after a vertical curves without proper delineation decreases the sight distance and could lead to an accident. (iii) The intersection of the side roads joining the main road at an unsafe gradient leads to a potential accident. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p>Ch: 4+900, The presence of a reverse curve on a varying elevation and no run-off protection on the curves.</p>	<p>Ch: 10+000, The presence of a horizontal curve after a vertical curves, without proper delineation decreases the sight distance and could lead to an accident.</p>

<p>1. Road No: MDR</p>	<p>2. Road Section: Boipariguda – Malkangiri Road</p>
<p>3. OWD Officer accompanied: Er. Basanta Ku. Dash, AE, R&B subdivision, Koraput , Er. Shyam Sundar Giri, JE, R&B section, Boipariguda</p>	
<p>4. Date of Assessment: 20-Dec 2012</p>	<p>5. Assessor: HariKrishna Kondamuru, ICT Jeeban Kumar Behera, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 22 Km</p>	<p>7. Road Geometry: Single / intermediate / two lane roads in hilly terrain with earthen shoulder (less than 1 m width).</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Agricultural lands, Forests</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Absence of adequate delineation viz. pavement markings advanced warning signs, delineator posts for horizontal alignment in the hilly terrain. (ii) Absence of protection for the approaches of the parapet of the bridge / culvert / depressed causeways. (iii) Absence of delineation viz. pavement markings, delineator posts, advanced warning signs for the vertical curves in the hilly terrain. 	
<p>Photo A</p>	<p>Photo B</p>
	
<p>Ch: 37+300, the absence of delineation on the curves in hilly terrain.</p>	<p>Ch:40+500, the presence of a horizontal curve after a vertical curve leads to limited sight distances.</p>



<p>1. Road No: MDR</p>	<p>2. Road Section: Koraput – Laxmipur Road</p>
<p>3. OWD Officer accompanied: Er. Basanta Ku. Dash, AE, R&B subdivision, Koraput, Er. S.K. Panda, JE, Laxmipur R&B Section</p>	
<p>4. Date of Assessment: 21-Dec 2012</p>	<p>5. Assessor: HariKrishna Kondamuru, ICT Jeeban Kumar Behera, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 43 Km</p>	<p>7. Road Geometry: Single / intermediate / two lane road in rolling terrain with earthen shoulder (less than 1 m width).</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Agricultural lands, Reserve Forests, Small Villages</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) The absence of delineation viz. advance warning signs, pavement markings, and delineator posts on the sharp / reverse curve could be a hazardous situation for the night time driving. (ii) The absence of run-off protection along the valley side of the roads on the hilly terrain is a potential hazardous situation. (iii) The absence of proper delineation on the hair pin bends / sag curves, where the alignment is depressed to accommodate the causeway is a potential accident situation. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p>Ch: 30+000, The absence of delineation on vertical sag curves</p>	<p>Ch: 43+000, The absence of delineation / protection on the approaches to the bridge / culvert.</p>



<p>1. Road No: NH-26</p>	<p>2. Road Section: Jeypore – Koraput Road</p>
<p>3. OWD Officer accompanied: Er.B.C. Panda, AE, NH subdivision, Jeypore Er.P.K. Sethi, JE, NH subdivision, Jeypore</p>	
<p>4. Date of Assessment: 21-Dec 2012</p>	<p>5. Assessor: HariKrishna Kondamuru, ICT Jeeban Kumar Behera, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 43 Km</p>	<p>7. Road Geometry: Single / intermediate / two lane road in rolling terrain with earthen shoulder (less than 1 m width).</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Agricultural lands, Reserve Forests, Small Villages</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Major portion of the road in hilly terrain without run-off / crash protection on the valley side is a potential safety hazard. (ii) The absence of adequate delineation viz. advanced warning signs, pavement markings, delineator posts on the curves is a hazardous situation. (iii) The presence of village markets and the absence of separate facilities for the vulnerable road users like cyclepaths, footpaths or pedestrian crossings has created a situation of conflicting right-of-ways of all these vehicles which leads to decreased operational efficiency of the road. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p>Ch: 392+700, the absence of delineation of the sharp curves.</p>	<p>CH: 401+100, the absence of vulnerable road user facilities leads to conflicts during village markets on the roads.</p>

Annexure II: Koraput District

1. Road No: NH-26	2. Road Section: Pottangi – Andhra Border
3. OWD Officer accompanied: Er. S.K. Panda, JE, Sumkigarh R&B Section	
4. Date of Assessment: 24-Dec 2012	5. Assessor: HariKrishna Kondamuru, ICT Jeeban Kumar Behera, Arkitechno Jitender, Arkitechno
6. Length: 24 Km	7. Road Geometry: Two lane road in hilly terrain with earthen shoulder (less than 1 m width).
8. Road surface: Bituminous	9. Land use along road: Agricultural lands, Reserve Forests, Hilly Terrain
10. List major safety deficiencies of this road <ul style="list-style-type: none"> (i) The absence of delineation viz. pavement markings, advance warning signs, delineator posts on the sharp curves could be a hazardous situation for the night time driving. (ii) The absence of delineation on the horizontal curve occurring after a crest doesn't provide for adequate sight distance and could be a potential hazardous situation. (iii) The absence of delineation / protection of the approaches to the bridge / culvert. 	
Photo A	Photo B
	
Ch: 457+000, The absence of delineation on blind / sharp curves with valley on one side with no crash protection.	Ch: 466+500, The absence of protection / delineation of the approaches to the bridge / culvert.

SUMMARY OF ROADS ASSESSED



1. Road No: NH-18	2. Road Section: Neharpatna – Jharkhoparia Road
3. OWD Officer accompanied: Mr. Das, JE, Neharpatna, JE, NH Section, Betnati, JE, NH Section, Baripada, Mr. Mohapatra, JE, Baripada	
4. Date of Assessment: 03 and 04-Dec2012	5. Assessor: HariKrishna Kondamuru, ICT Chandan, Arkitechno Jitender, Arkitechno
6. Length: 80.44 km	7. Road Geometry: Two lane road in plain terrain with earthen shoulder (upto 2 m width).
8. Road surface: Bituminous	9. Land use along road: Agricultural lands and small villages
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) The absence of delineation on the sharp curves could be a hazardous situation for the night time driving. (ii) The absence of vulnerable road user facilities like cycle paths, footpaths & pedestrian crossings leading to conflicting right-of-ways of different road user groups and resulting road side friction resulting in decreased operational efficiency. (iii) The absence of delineation / protection of the approaches and the parapets to the bridges / culverts could lead to a hazardous situation. 	
Photo A	Photo B
	
Ch: 0+000, The unsegregated pedestrians, cyclist occupying the road along with vehicles parked on road.	Ch: 29+500, The non-delineated / unprotected parapet walls of the bridges / culverts.

<p>1. Road No: SH-19</p>	<p>2. Road Section: Baripada – Udala Road</p>
<p>3. OWD Officer accompanied: Mr. Sethi, JE, Udala R&BJE, Khunta R&B</p>	
<p>4. Date of Assessment: 08-Dec 2012</p>	<p>5. Assessor: HariKrishna Kondamuru, ICT Chandan, Arkitechno Jitender, Arkitechno</p>
<p>6. Length: 46 km</p>	<p>7. Road Geometry: Single / intermediate lane road in plain terrain with earthen shoulder.</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Agricultural lands, and small villages</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) The absence of delineation on the sharp curves could be a hazardous situation for the night time driving. (ii) The absence of vulnerable road user facilities like cycle paths, footpaths & pedestrian crossings leading to conflicting right-of-ways of different road user groups and resulting road side friction resulting in decreased operational efficiency. (iii) The absence of delineation / protection of the approaches to the bridges / culverts could lead to a hazardous situation. 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p>Ch: 49+700, the absence of delineation on sharp curves</p>	<p>Ch: 86+500, the absence of run-off protection and delineation at the approaches of the culvert.</p>



Annexure II: Mayurbhanj District

1. Road No: SH-19,	2. Road Section: Udala – Baisinga Road
3. OWD Officer accompanied: Mr. Praful Kumar Das, JE, Betnati R&B Section JE II, Udala	
4. Date of Assessment: 06-Dec 2012	5. Assessor: HariKrishna Kondamuru, ICT Chandan, Arkitechno Jitender, Arkitechno
6. Length: 40 km	7. Road Geometry: Single / intermediate lane in plain terrain with earthen shoulder (less than 1 m width).
8. Road surface: Bituminous	9. Land use along road: Agricultural lands, Village
10. List major safety deficiencies of this road <ul style="list-style-type: none">(i) The absence of delineation on the sharp curves could be a hazardous situation for the night time driving.(ii) The absence of vulnerable road user facilities like cycle paths, footpaths & pedestrian crossings leading to conflicting right-of-ways of different road user groups and resulting road side friction resulting in decreased operational efficiency.(iii) The absence of delineation / protection of the approaches and the parapets to the bridges / culverts could lead to a hazardous situation.	



SUMMARY OF ROADS ASSESSED

1. Road No: SH21	2. Road Section: Nayagarh to Bhanjanagar
3. OWD Officer accompanied: None	
4. Date of Assessment:	5. Assessor: Ashif Hussain, ICT
6. Length: 82 Km	7. Road Geometry: intermediate lane to 2-lane which is mainly plain terrain and few section of the road is a hilly terrain.
8. Road surface: Bituminous	9. Land use along road: Commercial, Residential and Agriculture
10. List major safety deficiencies of this road <ul style="list-style-type: none"> (i) Edge line is missing on the road except few km section and signage is missing or improper (ii) Absence of protection on bridges/culverts and also broken parapet walls on culverts/minor bridges. (iii) Maximum number of trees is on the edge of the road. 	
Photo A	Photo B
	



SUMMARY OF ROADS ASSESSED

1. Road No: SH4	2. Road Section: Rupkona to Bangi
3. OWD Officer accompanied: Mr.G.Sahu (EE Raygada), Mr Bhabugrahi Mohanty (AE) & Mr Budhi Marandi(JE)-Km 78+000 to Km 109+000. Mr.Uma Prasad Patra (AE) & Mr Sushant Shetty (JE)- Km 109+000 to Km 160+800	
4. Date of Assessment: 19 Dec and 20 Dec 2012	5. Assessor: Ashif Hussain, ICT
6. Length: 82.80 Km	7. Road Geometry: 2-lane & 4-lane carriageway viz. from km 99+000 to km 106+000 and Km 112+000 to Km 120+000 are 2-lane carriageway while from km 106+000 to km 112+000 are 4-lane carriageway near Raygada city. The road is mix of Plain and hilly terrain.
8. Road surface: Bituminous	9. Land use along road: Mixed, Commercial, Residential and Agriculture
10. List major safety deficiencies of this road <ul style="list-style-type: none"> (i) Centre line & Edge line is missing on the road except few km near Raygada city road marking is present. Traffic signage is missing or improper. (ii) Absence of warning or cautionary sign near sharp curve and hair pin bend and also there is no any protection on bridges/culverts and also broken parapet walls on culverts/minor bridges. (iii) Absence of provisions for VRUs in built-up and commercial areas 	
Photo A	Photo B
	



Annexure II: Raygada District

<p>1. Road No: SH46</p>	<p>2. Road Section: Tandikona Chowk to Bissam Cuttack</p>
<p>3. OWD Officer accompanied: S.D.Patra (AE) & Mr Sushant Shetty (JE)-Km 0+000 to Km 10+000. Mr.Himanshu shekhar Sahu(AE) & Mr Prashant kr Patra (JE)-Km 10+000 to Km 33+200</p>	
<p>4. Date of Assessment: 20 Dec and 21 Dec 2012</p>	<p>5. Assessor: Ashif Hussain, ICT</p>
<p>6. Length: 33.20Km</p>	<p>7. Road Geometry: single lane with 0.5m shoulder, mix of Plain and hilly terrain</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Mixed, Commercial, Residential and Agriculture</p>
<p>10. List major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Centre line & Edge line is missing throughout the road. Traffic signage is missing or improper. (ii) Absence of warning or cautionary sign near curves and also there is no any protection on bridges/culverts. (iii) Absence of provisions for VRUs in built-up and commercial areas 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	



Annexure II: Raygada District

1. Road No: MDR 48B	2. Road Section: Raygada to Kerada
3. OWD Officer accompanied: Mr Bhabugrahi Mohanty,AE	
4. Date of Assessment:	5. Assessor: Ashif Hussain, ICT
6. Length: 25 Km	7. Road Geometry: single lane with 0.5m shoulder, mix of Plain and hilly terrain
8. Road surface: Bituminous	9. Land use along road: Mixed, Commercial, Residential and Agriculture
10. List major safety deficiencies of this road <ul style="list-style-type: none"> (i) Centre line & Edge line is missing in many sections of the road. Traffic signage is missing or improper. (ii) Absence of warning or cautionary sign near curves and also there is no any protection on bridges/culverts. (iii) Absence of provisions for VRUs in built-up and commercial areas 	
Photo A	Photo B
	



SUMMARY OF ROADS ASSESSED

<p>1. Road No: SH-15</p>	<p>2. Road Section: Maneshwar - Dhama</p>
<p>3. OWD Officer accompanied: Mr. Pradhan, JE, Sambalpur</p>	
<p>4. Date of Assessment: 29-Nov and 30-Nov-2012</p>	<p>5. Assessor: Jigesh Bhavsar, ICT</p>
<p>6. Length: 25 Km</p>	<p>7. Road Geometry: Intermediate lane</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Largely Agricultural and few Villages</p>
<p>10. List major safety deficiencies of this road (i) Access roads merging main road without proper treatment (ii) Sharp curves without delineation and warning signs (iii) Lack of traffic calming measures in BUA</p>	
<p>Photo A</p>	<p>Photo B</p>
	
<p>Culvert at Km 0+400, sharp curve at the approach, no delineation, and no parapets</p>	<p>No parapets on Culvert/Bridge highly unsafe for VRUs as well as other traffic, Km 20+000</p>



Annexure II: Sambalpur District

<p>1. Road No.: SH-10</p>	<p>2. Road Sector: Sambalpur – Sundargarh – Rourkela, Sambalpur, Jharsuguda, and Sundargarh</p>
<p>3. OWD Officer accompanied: Mr. Pradhan, JE Sambalpur; Mr. Bohidar, EE Bhubaneswar; and Mr. Naik, JE Sundargarh;</p>	
<p>4. Date of Assessment: 30-Nov, 1-Dec, 2-Dec, and 3-Dec 2012</p>	<p>5. Assessor: Jigesh Bhavsar, ICT</p>
<p>6. Length: 162.50 Km</p>	<p>7. Road Geometry: 2-lane with paved shoulders</p>
<p>8. Road surface: Bituminous</p>	<p>9. Land use along road: Agricultural, Residential, Commercial, and Industrial</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Unprotected high embankments on bridge approaches and curves (ii) Broken or missing parapets on major bridges (iii) Lack of traffic calming measures and provision for VRUs in BUA 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p>Sharp curve with high embankment without any protection on outer edge, Km 93+600</p>	<p>Lack of edge protection and delineation on approaches of ROB at Km 49+900</p>



Annexure II: Sambalpur District

1. Road No.: SH24	2. Road Sector: Bamra to Kuchinda,Sambalpur
3. OWD Officer accompanied: Mr. Moriskar, JE Kuchinda	
4. Date of Assessment: 4-Dec-2012	5. Assessor: Jigesh Bhavsar, ICT
6. Length: 42.40 km	7. Road Geometry: Single/Intermediate lane
8. Road surface: Bituminous	9. Land use along road: Agricultural, Forest, and Villages
10. List three major safety deficiencies of this road (i) Unprotected high embankments on bridge approaches and curves (ii) Poor layout and lack of delineation at junctions (iii) Lack of traffic calming measures and provision for VRUs in BUA	
Photo A	Photo B
	
Unprotected approach to bridge with high embankment at Km 164+700	Sharp curve on high embankment without edge protection near railway crossing at Bamra (Km 198+700)



Annexure II: Sambalpur District



1. Road No.: NH49	2. Road Sector: Kuchinda to Bhojpur, Sambalpur
3. OWD Officer accompanied: None	
4. Date of Assessment: 5-Dec-2012	5. Assessor: Jigesh Bhavsar, ICT
6. Length: 18.10 km	7. Road Geometry: Single/Intermediate lane
8. Road surface: Bituminous	9. Land use along road:
10. List three major safety deficiencies of this road (i) Severe encroachment and no traffic calming measures in Kuchinda town (ii) Lack of delineation and unprotected high embankments of bridge approaches (iii) Access roads merging with main road without proper treatment	
Photo A	Photo A
	
Unprotected high embankments of bridge approach and bridge parapets close to road edge not delineated at Km 313+300	On-street parking and commercial activities on road in Kuchinda, Km 14+000 to 16+000



SUMMARY OF ROADS ASSESSED

<p>1. Road No.: SH31</p>	<p>2. Road Section: Karamdihi to Lulkidihi: Km 0+000 to Km 39+300, Sundargarh</p>
<p>3. OWD Officer accompanied: Mr. Parekh, JE Sundargarh</p>	
<p>4. Date of Assessment: 2-Dec-2012</p>	<p>5. Assessor: Jigesh Bhavsar, ICT</p>
<p>6. Length: 40 Km</p>	<p>7. Road Geometry: Intermediate/2-lane</p>
<p>8. Road Surface: Bituminous</p>	<p>9. Land use along road: Agricultural, Forest, and few Villages</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Sharp curves without delineation and warning signs in BUA, and without protection on outer edge in the ghat section (ii) Lack of traffic calming measures in BUA (iii) Unprotected high embankments on approaches of bridges/culverts and horizontal curves 	
<p>Photo A</p>	<p>Photo B</p>
	
<p>Image 1.1: Sharp curve with gradient, side road, and restricted visibility in BUA at Km 16+200</p>	<p>Sharp curve on high embankment without edge protection near approaching culvert (under construction), Km 31+800</p>



Annexure II: Sundargarh District

<p>1. Road No.: SH31</p>	<p>2. Road Section: Gariamal to Bamra: Km 0+000 to Km 14+000, Sundargarh</p>
<p>3. OWD Officer accompanied: Mr. Naik, JE Sundargarh</p>	
<p>4. Date of Assessment: 4-Dec-2012</p>	<p>5. Assessor: Jigesh Bhavsar, ICT</p>
<p>6. Length: 14 Km</p>	<p>7. Road Geometry: 2-lane</p>
<p>8. Road Surface:Bituminous</p>	<p>9. Land use along road: Agricultural, Open/unused</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Lack of signs, delineators, illumination at the construction site of a culvert at Km 9+200 (ii) Lack of traffic calming measures and provision for VRUs in BUA (iii) Unprotected high embankments on approaches of bridges/culverts and horizontal curves 	
<p>Photo A</p>	<p>Photo B</p>
	
<p>Unprotected approach to bridge with high embankment, Km 6+500</p>	<p>Unprotected approach to culvert under construction – lack of warning signs and barricades, Km 9+200</p>



<p>1. Road No.: MDR26</p>	<p>2. Road Section: SH10 to Tumran Village: Km 0+000 to Km 14+000, Sundargarh</p>
<p>3. OWD Officer accompanied: None</p>	
<p>4. Date of Assessment: 6-Dec-2012</p>	<p>5. Assessor: Jigesh Bhavsar, ICT</p>
<p>6. Length: 14 Km</p>	<p>7. Road Geometry:2-lane</p>
<p>8. Road Surface:Bituminous</p>	<p>9. Land use along road: Agricultural, Residential, and Industrial</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Lack of signs, delineation, and traffic control at intersection with SH-10 (Km 0+000) (ii) Lack of traffic calming measures and provision for VRUs in BUA (iii) Lack of delineation of parapets of bridge/culverts, and buildings in the BUA which are very near to the road edge 	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p>Km 0+000, intersection of MDR-26 with SH-10 with poor layout and no control over traffic movement</p>	<p>Parapets of Culvert/Bridge close to the road edge and not delineated, Km 3+300 and Km 9+300</p>

<p>1. Road No.: RD Road</p>	<p>2. Road Section: Garjan Road (Km 0+000 to Km 7+000), Sundargarh</p>
<p>3. OWD Officer accompanied: None</p>	
<p>4. Date of Assessment: 6-Dec-2012</p>	<p>5. Assessor: Jigesh Bhavsar, ICT</p>
<p>6. Length: 7 Km</p>	<p>7. Road Geometry: Single lane</p>
<p>8. Road Surface: Bituminous</p>	<p>9. Land use along road: Agricultural, Residential, and Industrial</p>
<p>10. List three major safety deficiencies of this road</p> <ul style="list-style-type: none"> (i) Access roads merging the main road without signs, and road markings (ii) Lack of traffic calming measures and provision for VRUs in BUA (iii) Lack of delineation of parapets of bridge/culverts, and buildings in the BUA which are very near to the road edge 	
<p>Photo A</p>	<p>Photo B</p>
	
<p>Sharp curve with restricted visibility and lack of delineation at Km 2+400</p>	<p>Lack of footpaths and pedestrian crossing, and trees/buildings very near the road edge in BUA at Km 7+300</p>



Annexure II: Sundargarh District

1. Road No.: SH10A	2. Road Section: Lahunipada to Muchurunali: Km 48+500 to Km 17+900, Sundargarh
3. OWD Officer accompanied: Mr. Patel, JE Lahunipara (visited)	
4. Date of Assessment: 6-Dec, and 8-Dec-2012	5. Assessor: Jigesh Bhavsar, ICT
6. Length: 30.6 Km	7. Road Geometry: 2-lane
8. Road Surface: Bituminous	9. Land use along road: Agricultural, Residential, and Industrial
10. List three major safety deficiencies of this road <ul style="list-style-type: none"> (i) Lack of signs, delineation, and traffic control at intersections with NH-520 and Koida Road (ii) Lack of traffic calming measures and provision for VRUs in BUA (iii) Lack of delineation of parapets of bridge/culverts, and buildings in the BUA which are very near to the road edge 	
Photo A	Photo B
	
Poor junction layout, lack of road markings, and encroachment on approaches of intersection with NH-520, Km 48+500	Parapets of Culvert/Bridge very near the road edge with lack of delineated, Km 30+200



Annexure II: Sundargarh District

1. Road No.: ODR	2. Road Section: Koida-Kaleiposh- via Tensa Km 41+200 to Km 0+000, Sundargarh
3. OWD Officer accompanied: Mr. Mohanto, Representative of JE Lahunipara (Mr. Patel)	
4. Date of Assessment: 7-Dec-2012	5. Assessor: Jigesh Bhavsar, ICT
6. Length: 41.2 Km	7. Road Geometry: 2-lane
8. Road Surface: Bituminous	9. Land use along road: Residential, Forest, and Industrial
10. List three major safety deficiencies of this road (i) Sharp curves and hairpin bends with lack of delineation and edge protection in ghat section (ii) Major junctions with poor layout, and lack of signs and delineation	
<p align="center">Photo A</p>	<p align="center">PhotoB</p>
	
<p align="center">Sharp curve in ghat section with restricted visibility at Km 30+200</p>	<p align="center">Dangerous hairpin bend in ghat section with lack of delineation and outer edge protection at Km 19+250</p>



Annexure II: Sundargarh District



1. Road No.: RD Road	2. Road Section: Koida – Patmunda, and Koida – Khajurdihi, Sundargarh
3. OWD Officer accompanied: Mr. Sahoo, Representative of RD Koida(Mr. A.K.Lenka)	
4. Date of Assessment: 7-Dec-2012	5. Assessor: Jigesh Bhavsar, ICT
6. Length: 9 Km	7. Road Geometry: Intermediate lane/2-lane
8. Road Surface: Bituminous (in very poor condition)	9. Land use along road: Agricultural, Residential, and Industrial
10. List three major safety deficiencies of this road <ul style="list-style-type: none"> (i) Sharp curves with lack of delineation and signs in BUA (ii) Lack of provision for VRUs, like footpath or wide shoulders in BUAs (iii) Poor road condition, which may result into frequent or sudden braking by motorized traffic 	
Photo A	Photo B
	
Lack of delineation and signs at sharp curve, Km 7+900 (in BUA) on Koida-Patmunda Road	Lack of footpath or wide shoulders in BUA at Km 7+700 on Koida-Patmunda Road



Annexure II: Sundargarh District

1. Road No.: RD Road	2. Road Section: KDK Waterfall Road (Km 0+000 to Km 15+000), Sundargarh
3. OWD Officer accompanied: None	
4. Date of Assessment: 8-Dec-2012	5. Assessor: Jigesh Bhavsar, ICT
6. Length: 15 Km	7. Road Geometry: Intermediate lane/2-lane
8. Road Surface: Bituminous (in very poor condition)	9. Land use along road: Agricultural, Residential, and Open/unused
10. List three major safety deficiencies of this road (i) Sharp curves with restricted visibility and lack of delineation and signs (ii) Lack of provision for VRUs, like footpath or wide shoulders in BUAs (iii) Poor road condition, which may result into frequent or sudden braking by motorized traffic	
Photo A	Photo B
	
Sharp curve with restricted visibility at Km 14+900	Road side hazards (poles and building) close to road edge and lack of facilities for pedestrians in BUA

SUMMARY OF ROADS ASSESSED

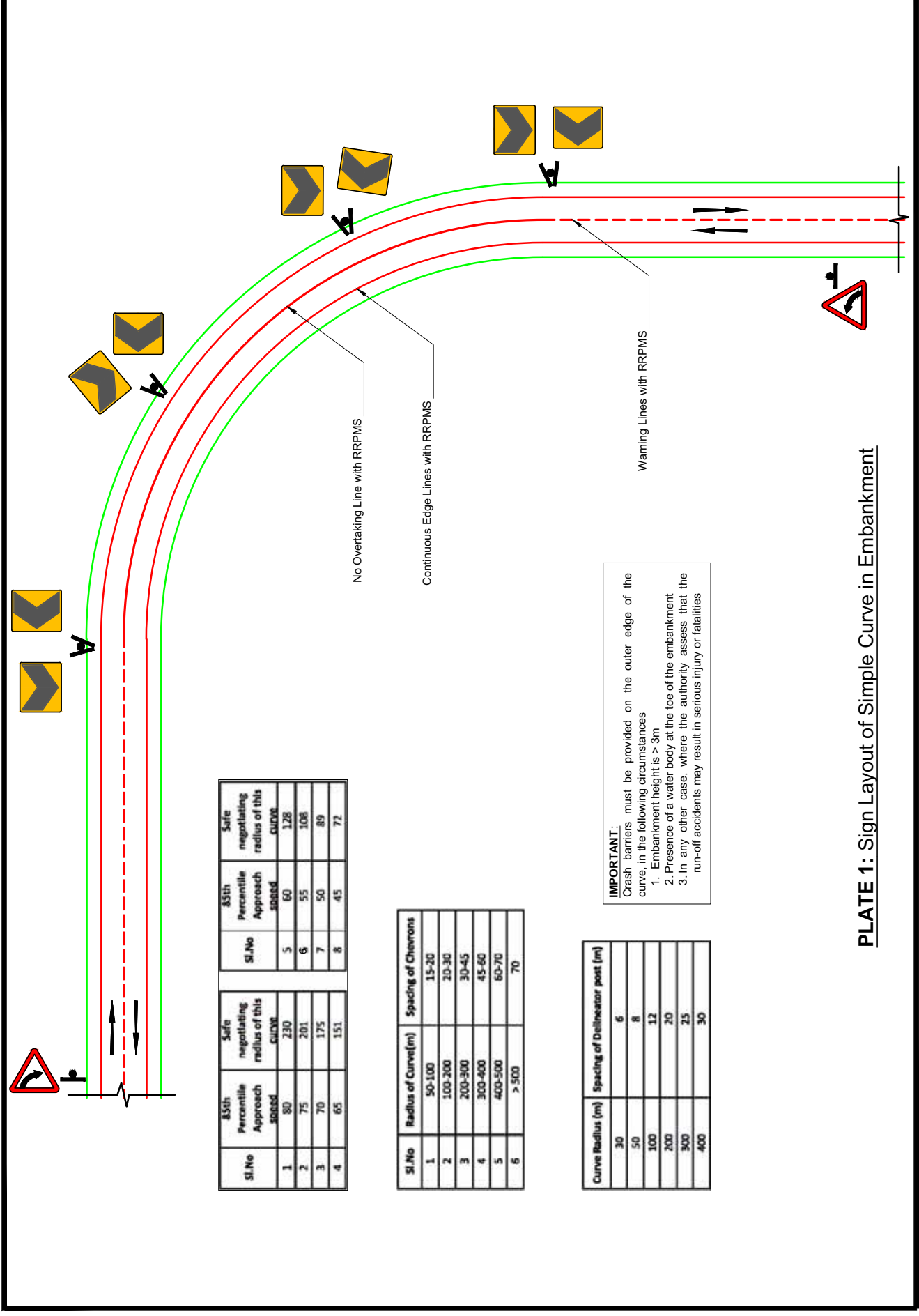
1. Road No. : NH16	2. Road Section: Chhandikhoh Chhak to Rasulgarh Chhak, Khurda
3. OWD Officer accompanied	
4. Date of Assessment: 16-Feb 2013	5. Assessor: Tony Mathew, ICT
6. Length : 53km	7. Road Geometry:4 lane divided with PS
8. Road Surface: Bituminous	9. Land use along road Mixed, Commercial, Residential and Agriculture
10. List three major safety deficiencies of this road <ul style="list-style-type: none"> (i) Poorly design median openings (ii) Poorly design 'T' Junctions and level difference between side road and main road (iii) Absence of provisions for VRUs in Built up and commercial areas 	
Photo A	Photo B
	
Poorly design median opening and level difference between side road and major road	High on street commercial parking and absence of provisions for pedestrians

1. Road No.: NH224	2. Road Section: Khurda and Nayagarh
3. OWD Officer accompanied –	
4. Date of Assessment: 17-Feb 2013	5. Assessor: Tony Mathew, ICT
6. Length : 52km	7. Road Geometry: Intermediate lane
8. Formation width: Bituminous	9. Land use along road Mixed, Commercial and Residential
10. List three major safety deficiencies of this road (i) Absence of road marking and traffic signs (ii) Absence of protection on outside curve at high embankment (iii) Absence of provisions for VRUs in Built up and commercial areas	
<p style="text-align: center;">Photo A</p>	<p style="text-align: center;">Photo B</p>
	
<p style="text-align: center;">Negotiation of Sharp curve</p>	<p style="text-align: center;">High encroachments and on street parking due to commercial activities</p>

1. Road No.: MDR77	2. Road Section: Barang to Peetapalli , Khurda
3. OWD Officer accompanied –	
4. Date of Assessment 28-Nov2012	5. Assessor: Tony Mathew, Jigesh Bhavsar, Hari Krishna and Amit Agarwal, ICT
6. Length : 30km	7. Road Geometry: Two lane
8. Road Surface: Bituminous	9. Land use along road Mixed, Commercial, Residential and Agriculture
10. List three major safety deficiencies of this road <ul style="list-style-type: none"> (i) Absence of road marking and traffic signs (ii) Poorly designed 3-leg major junction (iii) Absence of provisions for VRUs in Built up and commercial areas 	
Photo A	Photo B
	
Sharp curve with vertical gradient	Poorly designed 3-leg junction



APPENDIX III
DRAWINGS OF RECOMMENDED ENGINEERING
COUNTERMEASURES



SI No	85th Percentile Approach speed	Safe negotiating radius of this curve	SI No	85th Percentile Approach speed	Safe negotiating radius of this curve
1	80	230	5	60	128
2	75	201	6	55	108
3	70	175	7	50	89
4	65	151	8	45	72

SI No	Radius of Curve(m)	Spacing of Chevrons
1	50-100	15-20
2	100-200	20-30
3	200-300	30-45
4	300-400	45-60
5	400-500	60-70
6	>500	70

Curve Radius (m)	Spacing of Delineator post (m)
30	6
50	8
100	12
200	20
300	25
400	30

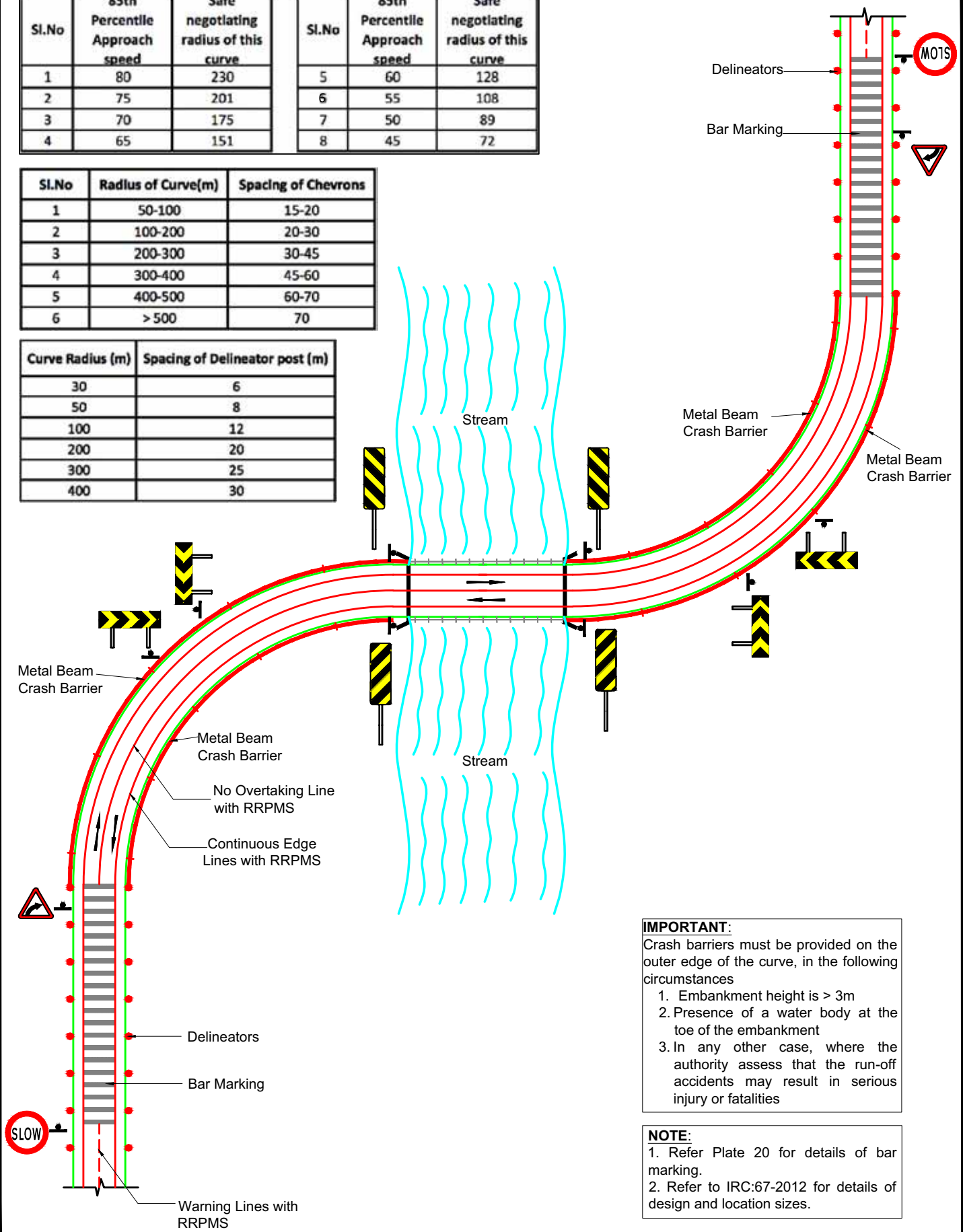
IMPORTANT:
 Crash barriers must be provided on the outer edge of the curve, in the following circumstances
 1. Embankment height is > 3m
 2. Presence of a water body at the toe of the embankment
 3. In any other case, where the authority assess that the run-off accidents may result in serious injury or fatalities

PLATE 1: Sign Layout of Simple Curve in Embankment

Sl.No	85th Percentile Approach speed	Safe negotiating radius of this curve	Sl.No	85th Percentile Approach speed	Safe negotiating radius of this curve
1	80	230	5	60	128
2	75	201	6	55	108
3	70	175	7	50	89
4	65	151	8	45	72

Sl.No	Radius of Curve(m)	Spacing of Chevrons
1	50-100	15-20
2	100-200	20-30
3	200-300	30-45
4	300-400	45-60
5	400-500	60-70
6	> 500	70

Curve Radius (m)	Spacing of Delineator post (m)
30	6
50	8
100	12
200	20
300	25
400	30



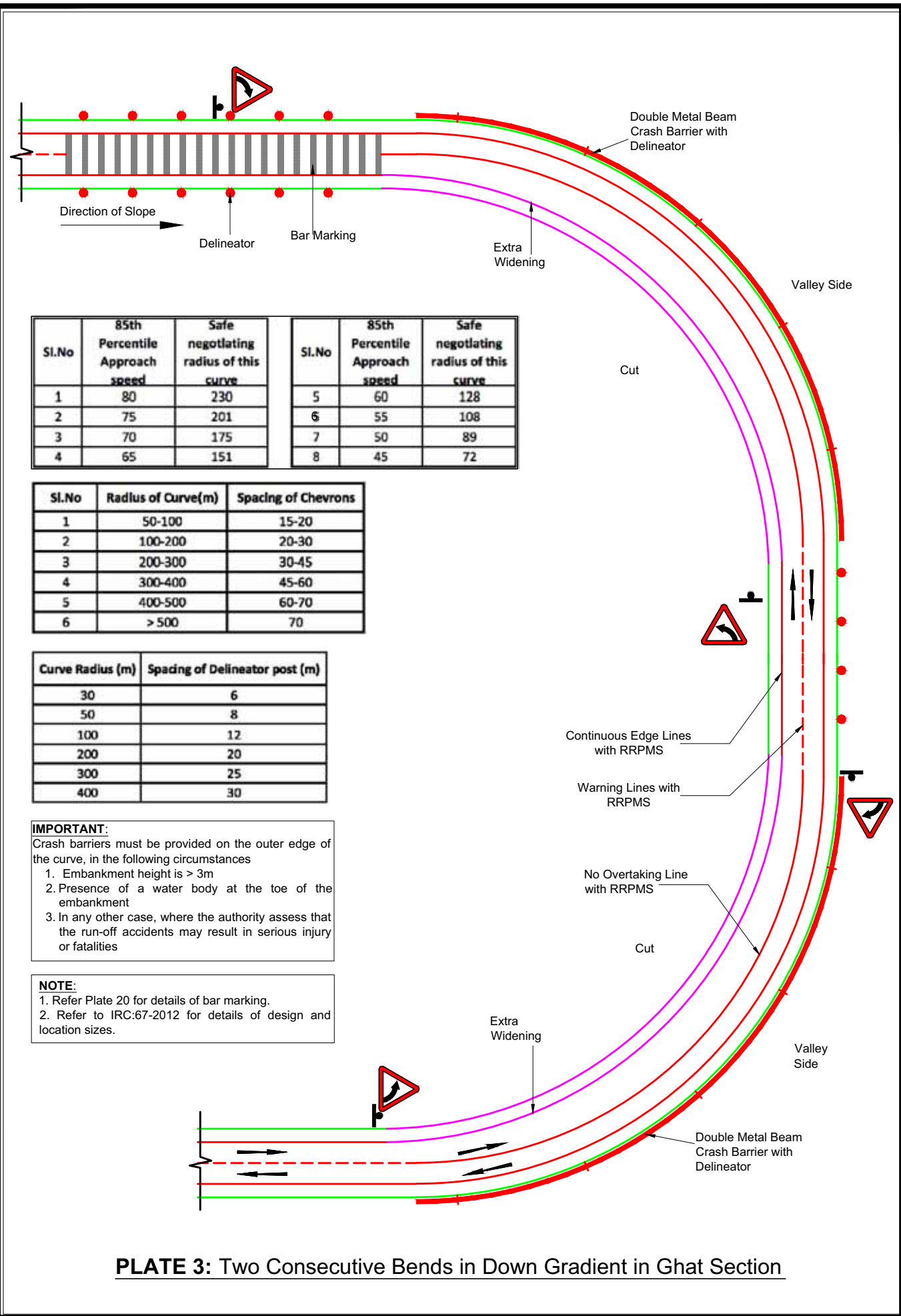
IMPORTANT:
Crash barriers must be provided on the outer edge of the curve, in the following circumstances

1. Embankment height is > 3m
2. Presence of a water body at the toe of the embankment
3. In any other case, where the authority assess that the run-off accidents may result in serious injury or fatalities

NOTE:

1. Refer Plate 20 for details of bar marking.
2. Refer to IRC:67-2012 for details of design and location sizes.

PLATE 2: Safer Treatment for Curves Approaching Structure / Bridge



Sl.No	85th Percentile Approach speed	Safe negotiating radius of this curve	Sl.No	85th Percentile Approach speed	Safe negotiating radius of this curve
1	80	230	5	60	128
2	75	201	6	55	108
3	70	175	7	50	89
4	65	151	8	45	72

Sl.No	Radius of Curve(m)	Spacing of Chevrons
1	50-100	15-20
2	100-200	20-30
3	200-300	30-45
4	300-400	45-60
5	400-500	60-70
6	> 500	70

Curve Radius (m)	Spacing of Delineator post (m)
30	6
50	8
100	12
200	20
300	25
400	30

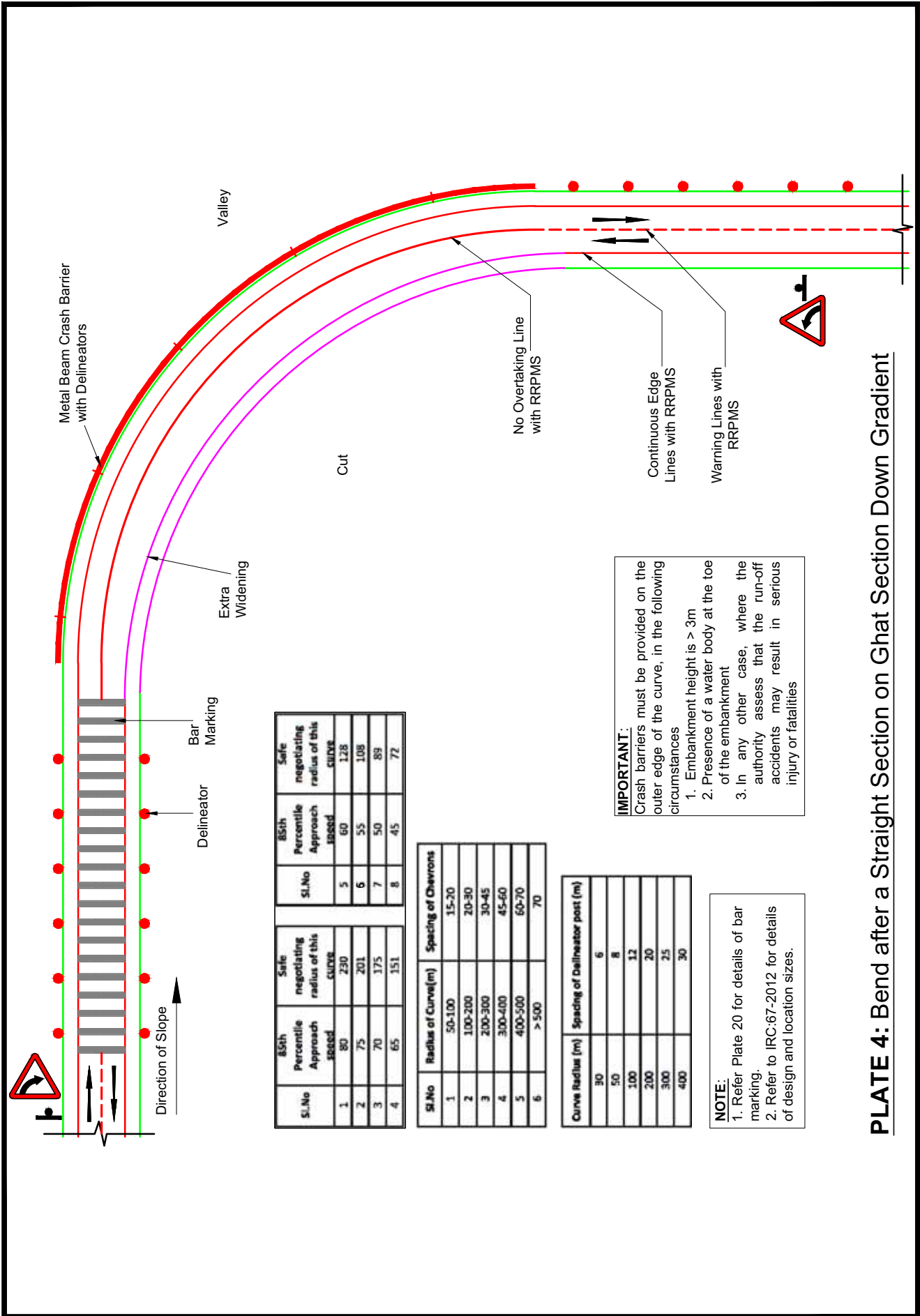
IMPORTANT:
 Crash barriers must be provided on the outer edge of the curve, in the following circumstances

1. Embankment height is > 3m
2. Presence of a water body at the toe of the embankment
3. In any other case, where the authority assess that the run-off accidents may result in serious injury or fatalities

NOTE:

1. Refer Plate 20 for details of bar marking.
2. Refer to IRC:67-2012 for details of design and location sizes.

PLATE 3: Two Consecutive Bends in Down Gradient in Ghat Section



Sl.No	85th Percentile Approach Speed	Safe negotiating radius of this curve	Sl.No	85th Percentile Approach Speed	Safe negotiating radius of this curve
1	80	230	5	60	128
2	75	201	6	55	108
3	70	175	7	50	89
4	65	151	8	45	72

Sl.No	Radius of Curve(m)	Spacing of Chevrons
1	50-100	15-20
2	100-200	20-30
3	200-300	30-45
4	300-400	45-60
5	400-500	60-70
6	> 500	70

Curve Radius (m)	Spacing of delineator post (m)
30	6
50	8
100	12
200	20
300	25
400	30

IMPORTANT:
 Crash barriers must be provided on the outer edge of the curve, in the following circumstances

1. Embankment height is > 3m
2. Presence of a water body at the toe of the embankment
3. In any other case, where the authority assess that the run-off accidents may result in serious injury or fatalities

NOTE:

1. Refer Plate 20 for details of bar marking.
2. Refer to IRC:67-2012 for details of design and location sizes.

PLATE 4: Bend after a Straight Section on Ghat Section Down Gradient

PLATE 5: Safer Vertical Profile of Side Roads at Junctions

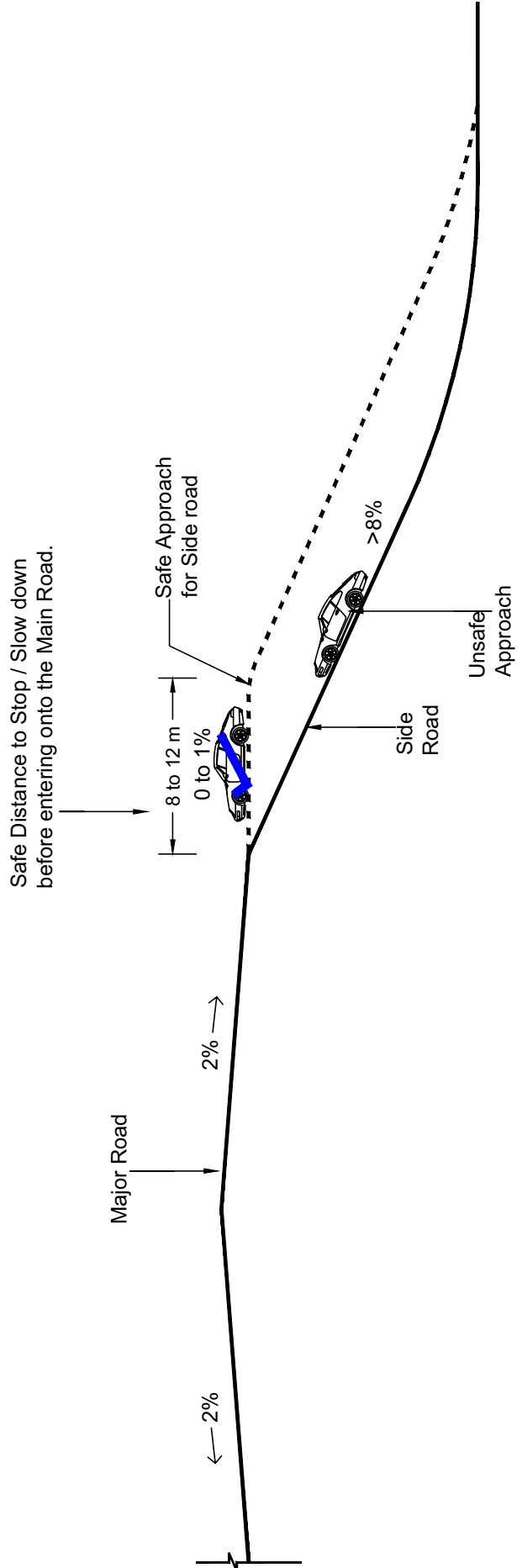
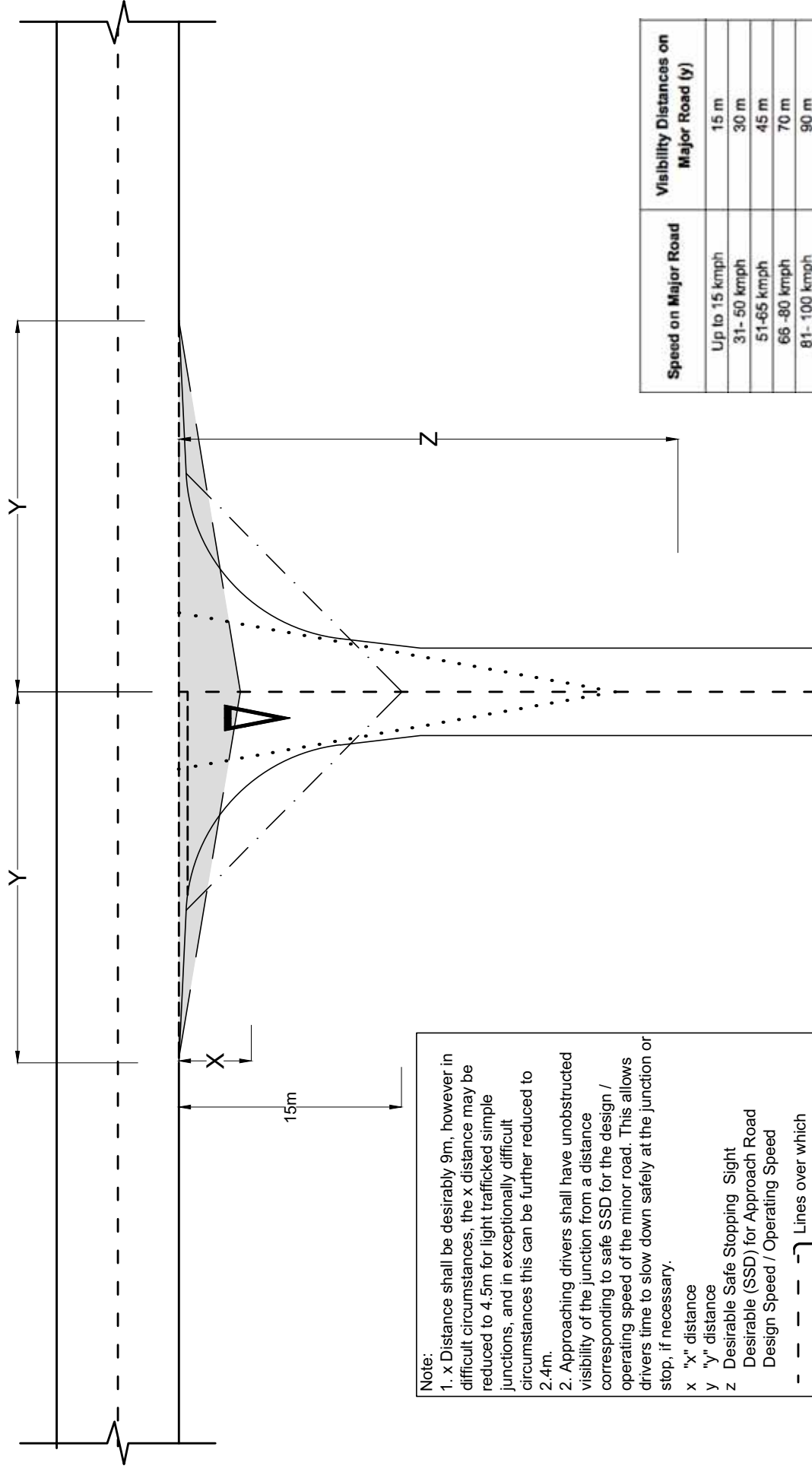


PLATE 6: Visibility Standards at Three Arm Junctions



Note:

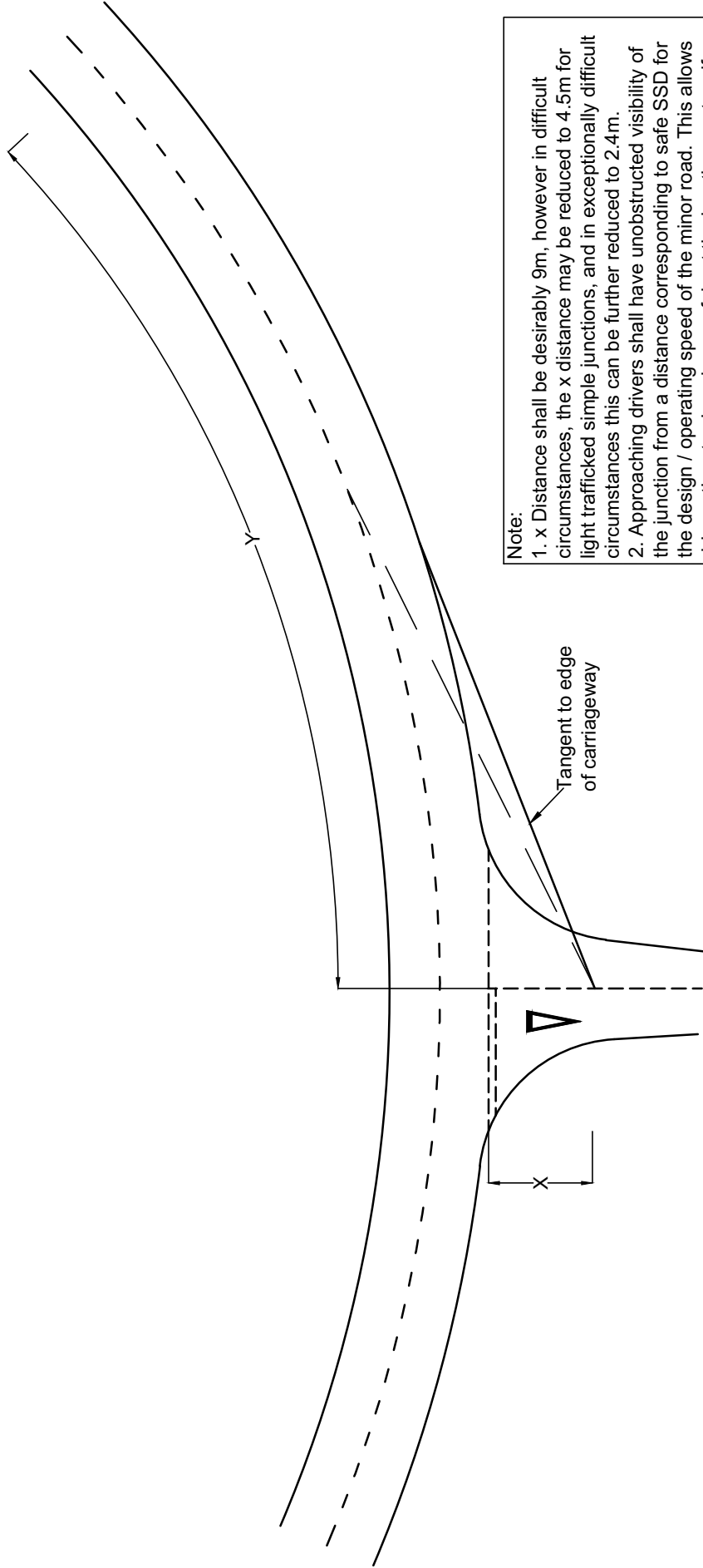
- x Distance shall be desirably 9m, however in difficult circumstances, the x distance may be reduced to 4.5m for light trafficked simple junctions, and in exceptionally difficult circumstances this can be further reduced to 2.4m.
- Approaching drivers shall have unobstructed visibility of the junction from a distance corresponding to safe SSD for the design / operating speed of the minor road. This allows drivers time to slow down safely at the junction or stop, if necessary.

x "x" distance
y "y" distance
z Desirable Safe Stopping Sight Desirable (SSD) for Approach Road Design Speed / Operating Speed

--- Lines over which unobstructed visibility should be provided
- - - - -

Refer with IRC: 67-2012, Table no. 14.2 Visibility Furned

PLATE 7: Visibility Standards at Three Arm Junction on Curved Major Road



Note:

1. x Distance shall be desirably 9m, however in difficult circumstances, the x distance may be reduced to 4.5m for light trafficked simple junctions, and in exceptionally difficult circumstances this can be further reduced to 2.4m.
2. Approaching drivers shall have unobstructed visibility of the junction from a distance corresponding to safe SSD for the design / operating speed of the minor road. This allows drivers time to slow down safely at the junction or stop, if necessary.

x "x" distance
 y "y" distance
 z Desirable Safe Stopping Sight
 Desirable (SSD) for Approach Road
 Design Speed / Operating Speed
 ——— Lines over which unobstructed
 visibility should be provided

Speed on Major Road	Visibility Distances on Major Road (Y)
Up to 15 kmph	15 m
31- 50 kmph	30 m
51- 65 kmph	45 m
66 -90 kmph	70 m
91- 100 kmph	90 m
> 100 kmph	120 m

Refer with IRC: 67:2012, Table no. 14.2, Visibility Furnnel

PLATE 8: Major Three Arm Junction

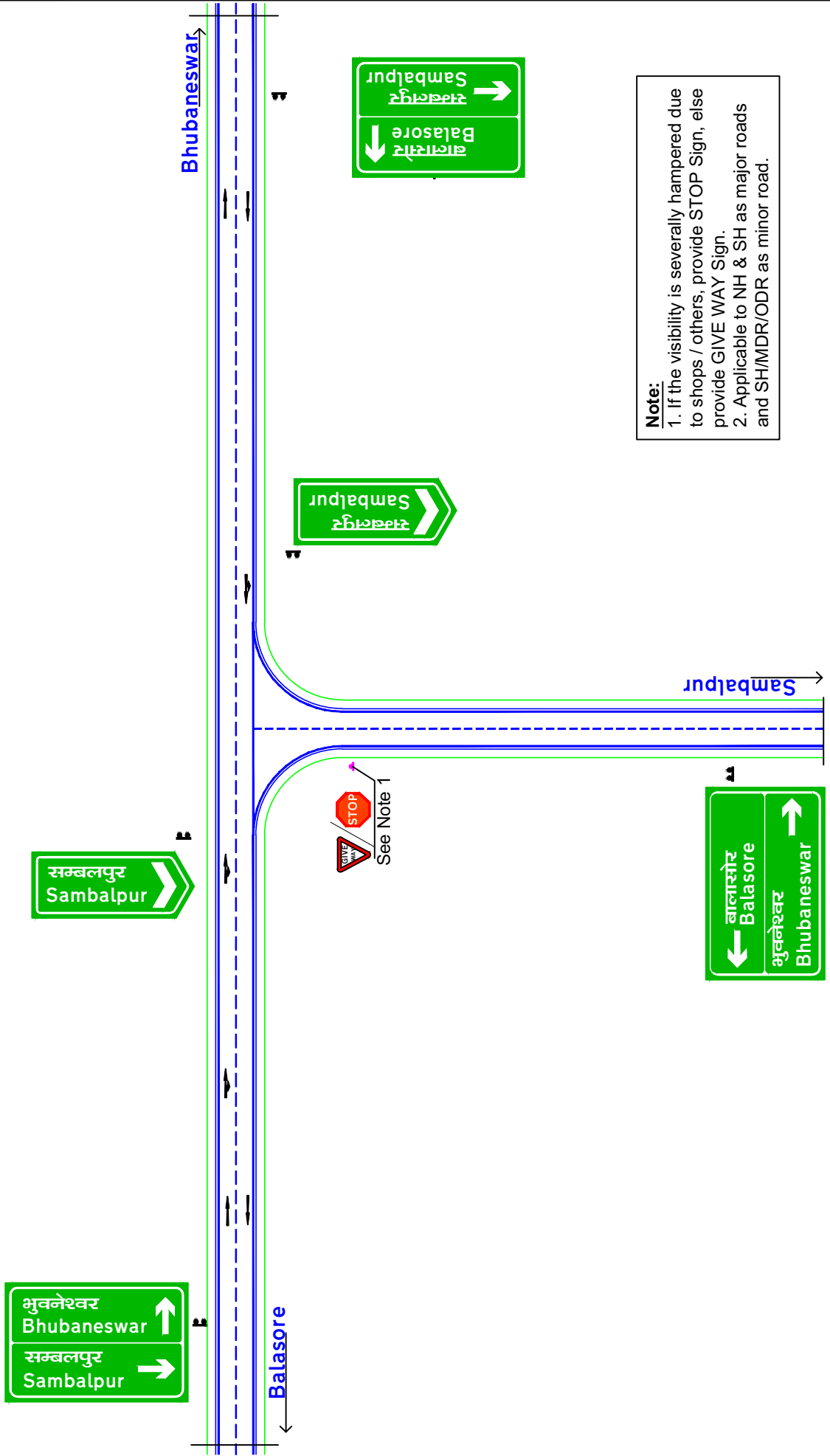
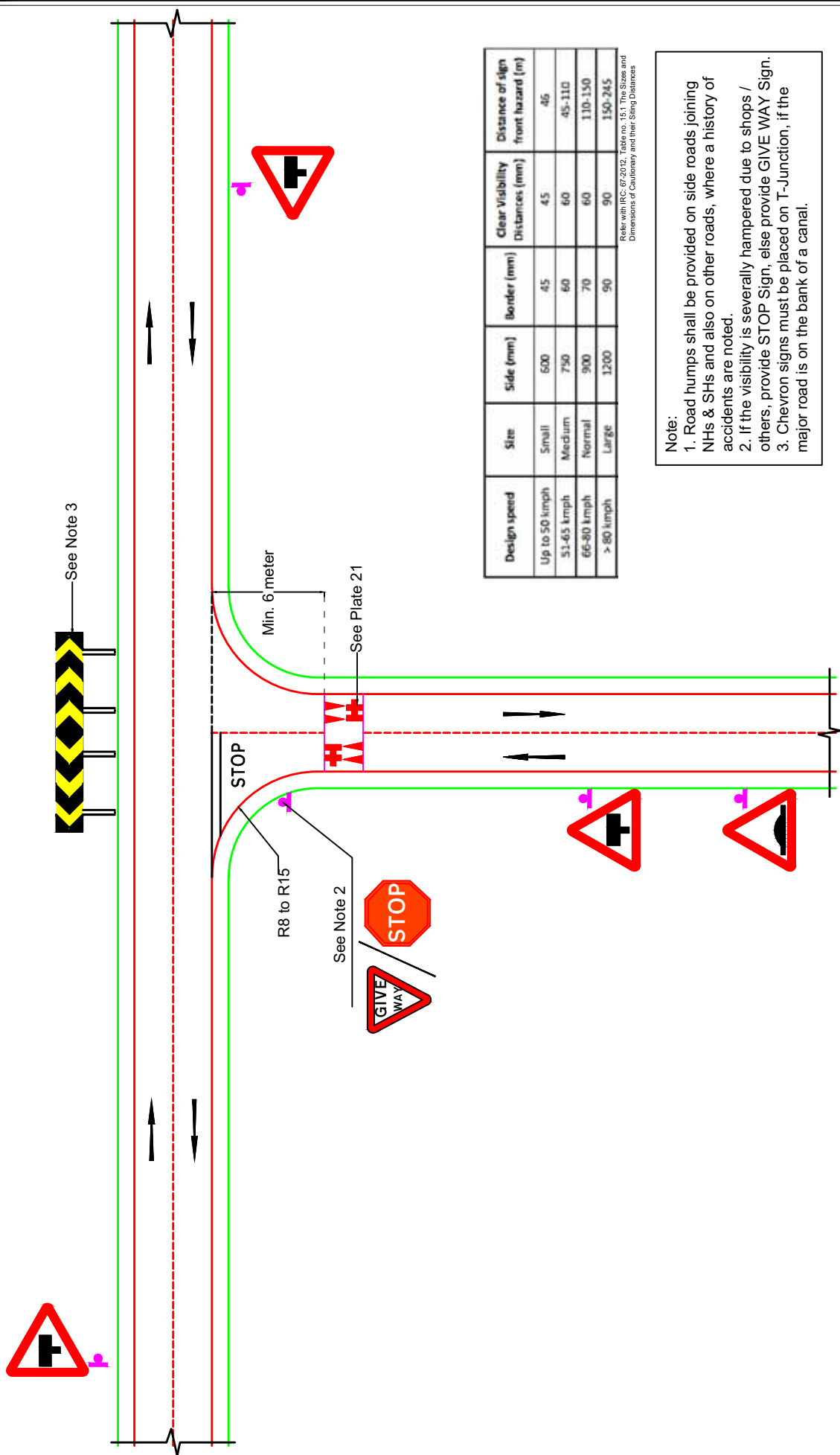


PLATE 9: Traffic Control Measures at Side Road



See Note 3

STOP

Min. 6 meter

R8 to R15

See Note 2

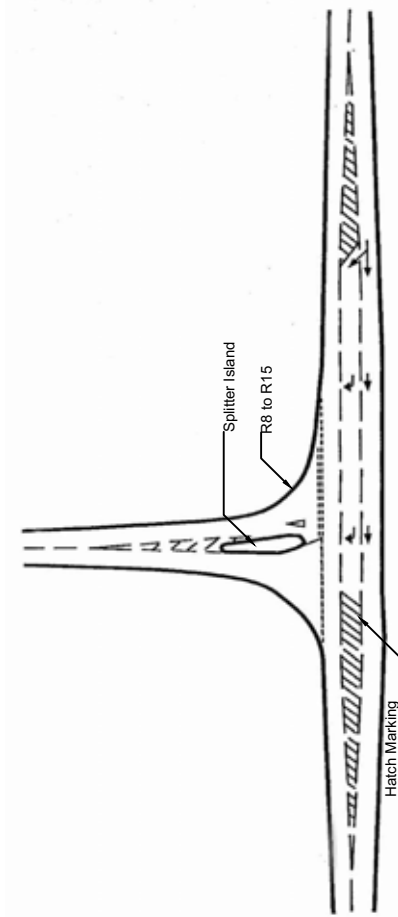
See Plate 21

Design speed	Size	Side (mm)	Border (mm)	Clear Visibility Distances (mm)	Distance of sign front hazard (m)
Up to 50 kmph	Small	600	45	45	46
51-65 kmph	Medium	750	60	60	45-110
66-80 kmph	Normal	900	70	60	110-150
> 80 kmph	Large	1200	90	90	150-245

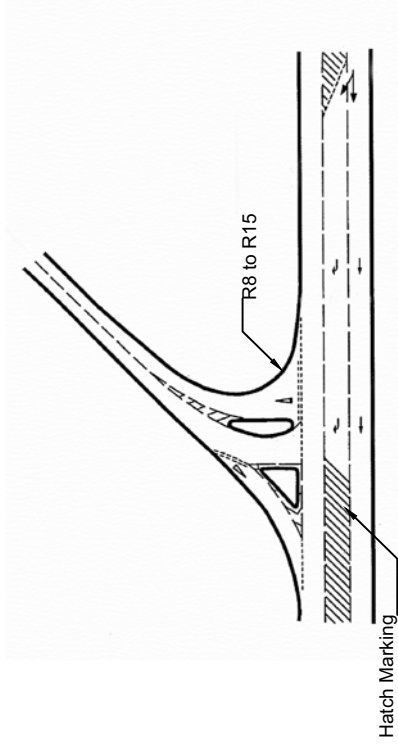
Refer with IRC: 67-2012, Table no. 15.1 The Sizes and Dimensions of Conventional and Road Signs

Note:
 1. Road humps shall be provided on side roads joining NHs & SHs and also on other roads, where a history of accidents are noted.
 2. If the visibility is severely hampered due to shops / others, provide STOP Sign, else provide GIVE WAY Sign.
 3. Chevron signs must be placed on T-Junction, if the major road is on the bank of a canal.

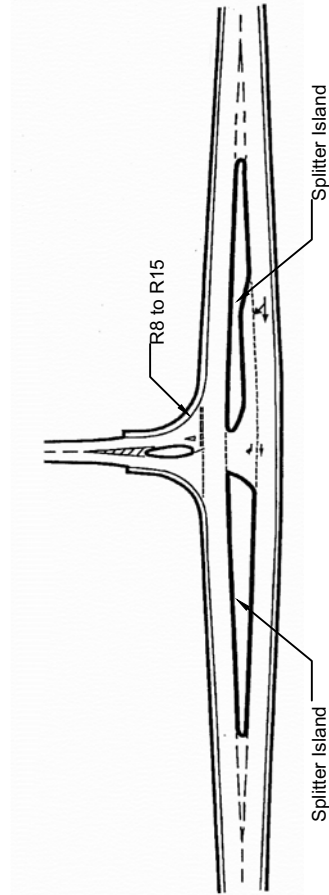
PLATE 10: Typical Layouts of Three Arm Junctions



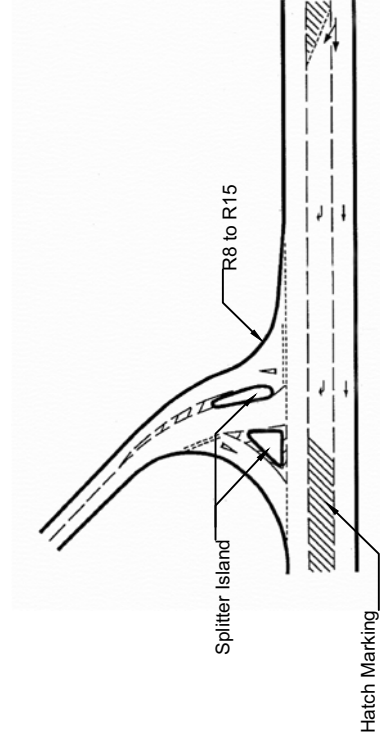
Ghost Island Junction



Major / Minor Priority Junction with Right Hand Skew Minor Road

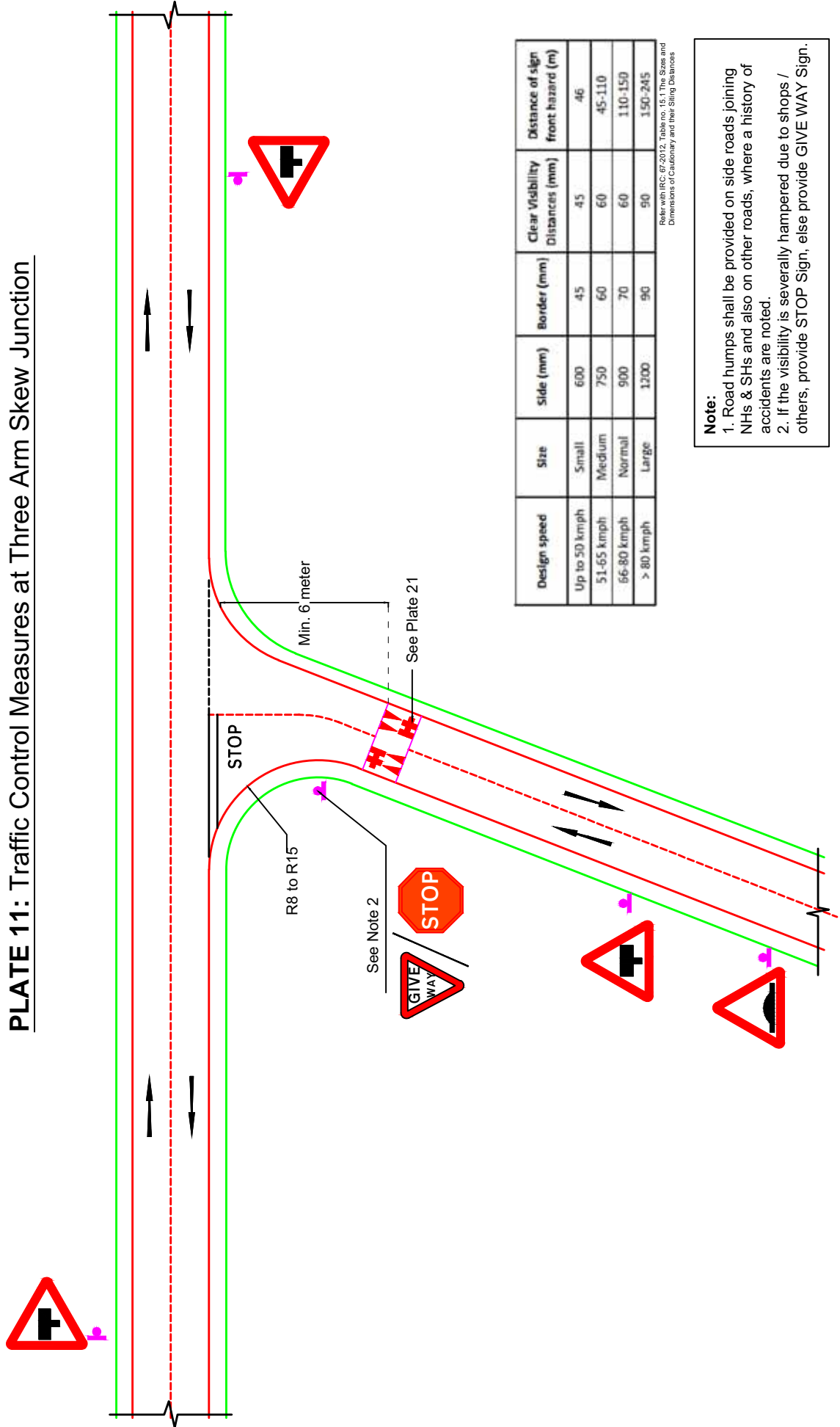


Single lane Dualling



Major / Minor Priority Junction with Left Hand Skew Minor Road

PLATE 11: Traffic Control Measures at Three Arm Skew Junction

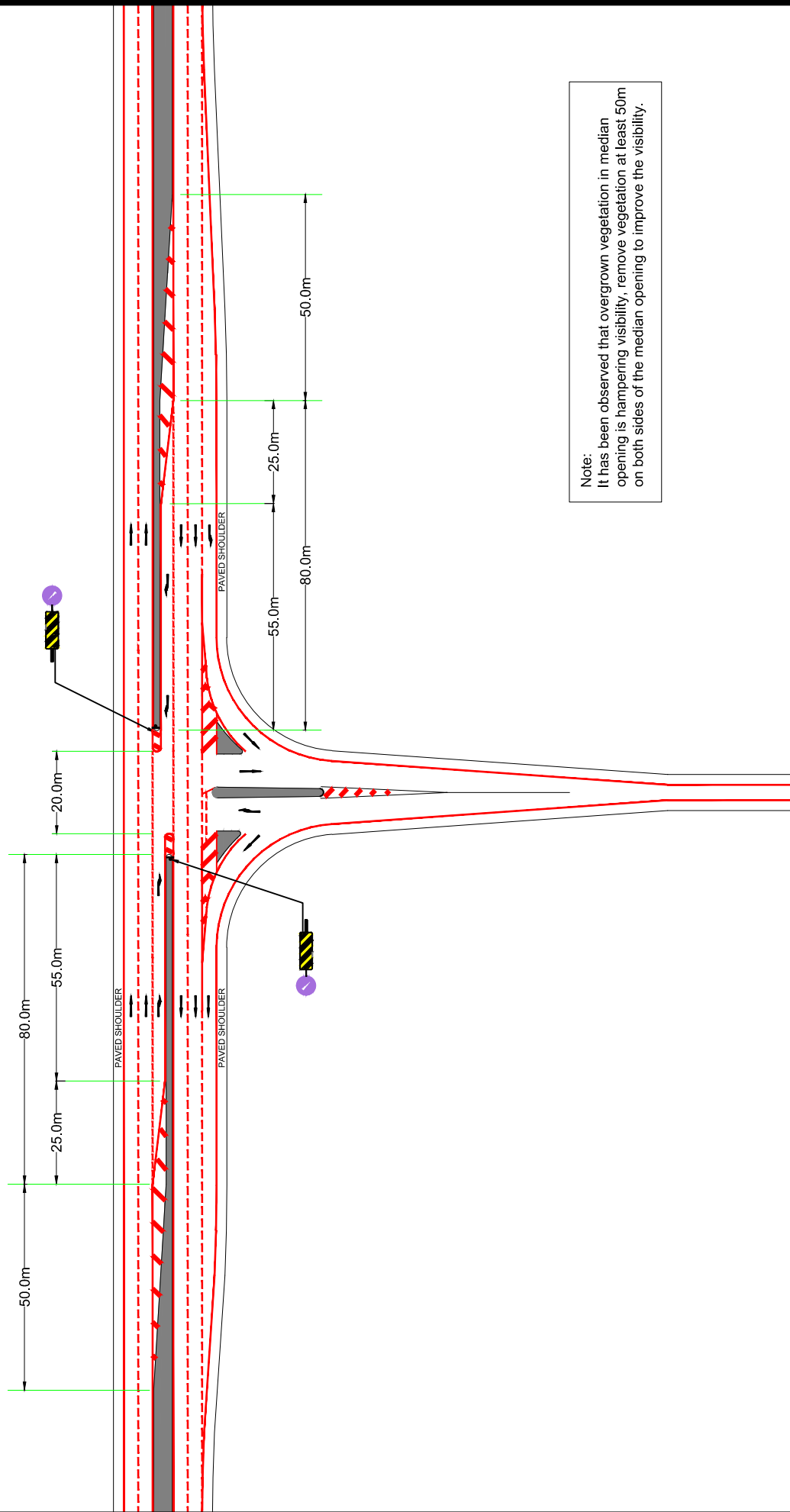


Design speed	Size	Side (mm)	Border (mm)	Clear Visibility Distances (mm)	Distance of sign front hazard (m)
Up to 50 kmph	Small	600	45	45	46
51-65 kmph	Medium	750	60	60	45-110
66-80 kmph	Normal	900	70	60	110-150
> 80 kmph	Large	1200	90	90	150-245

Refer with IRC: 67-2012, Table no. 15.1 The Size and Dimensions of Cautionary and their Siting Distances

Note:
 1. Road humps shall be provided on side roads joining NHs & SHs and also on other roads, where a history of accidents are noted.
 2. If the visibility is severely hampered due to shops / others, provide STOP Sign, else provide GIVE WAY Sign.

PLATE 12: Three Arm Junction with Median Opening on Four Lane (Divided Carriageway) Road



Note:
It has been observed that overgrown vegetation in median opening is hampering visibility, remove vegetation at least 50m on both sides of the median opening to improve the visibility.

PLATE 13: Median Opening on Four Lane (Divided Carriageway) Road

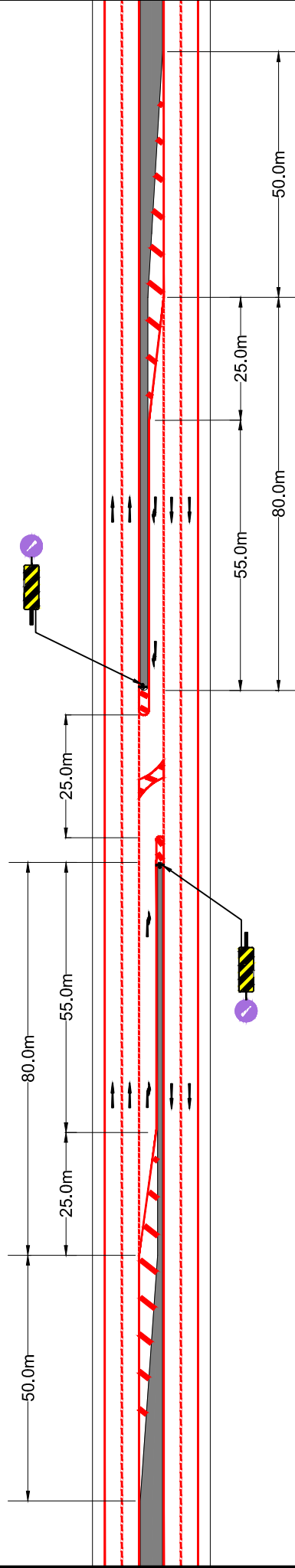
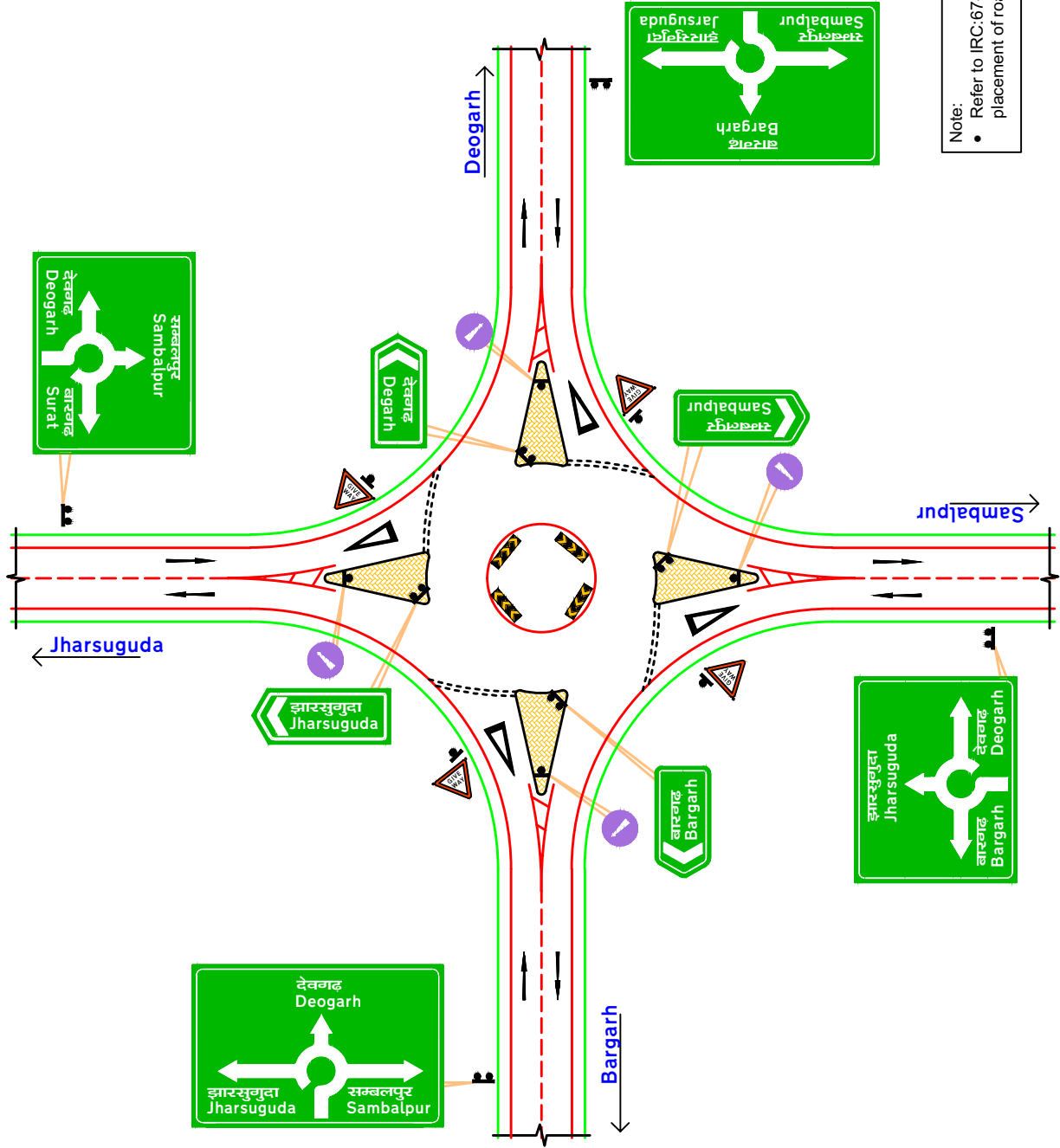
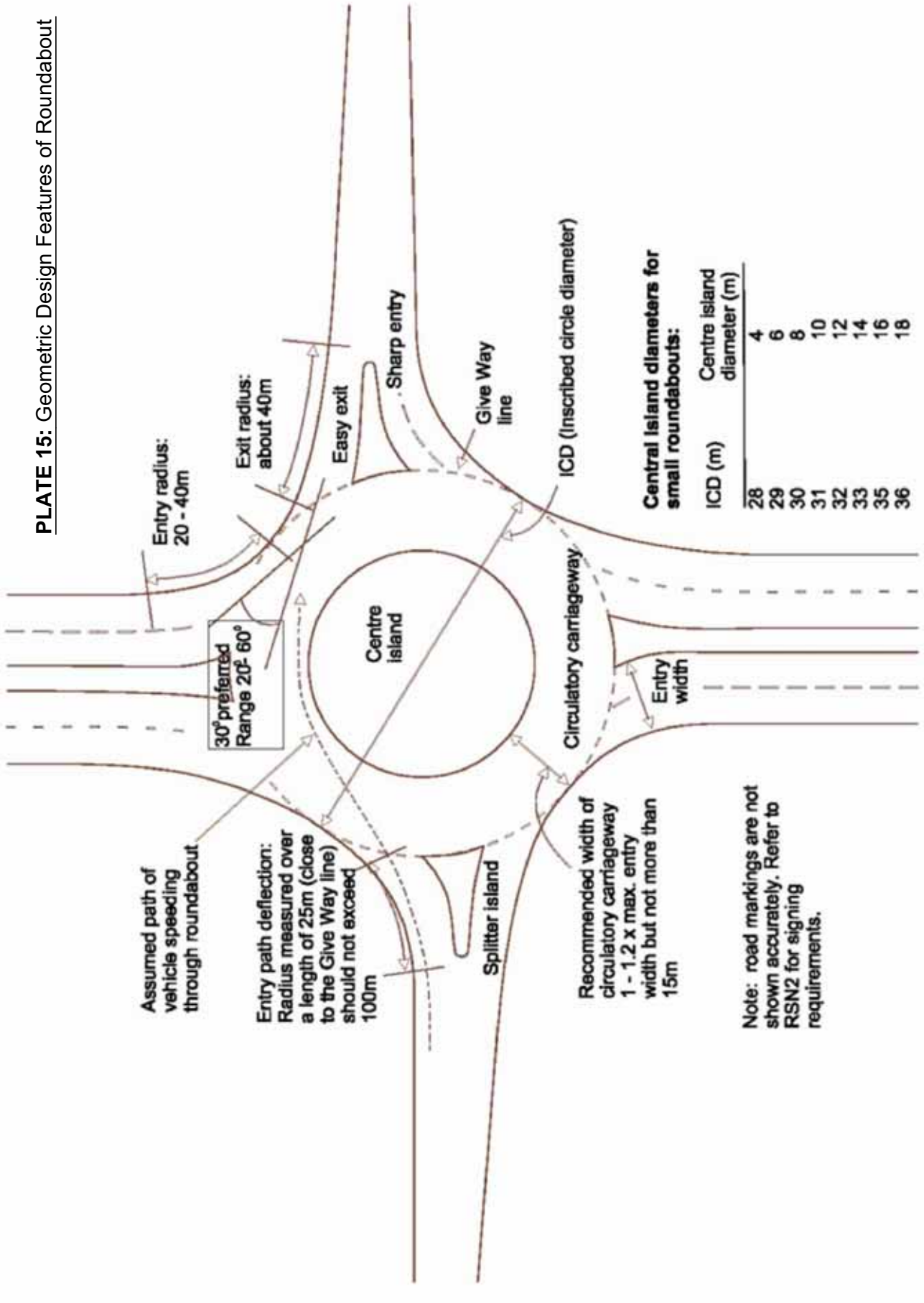


PLATE 14: Placement of Signs at Four Arm Roundabout



Note:
 • Refer to IRC:67-2012 for detail design and placement of road signs.

PLATE 15: Geometric Design Features of Roundabout

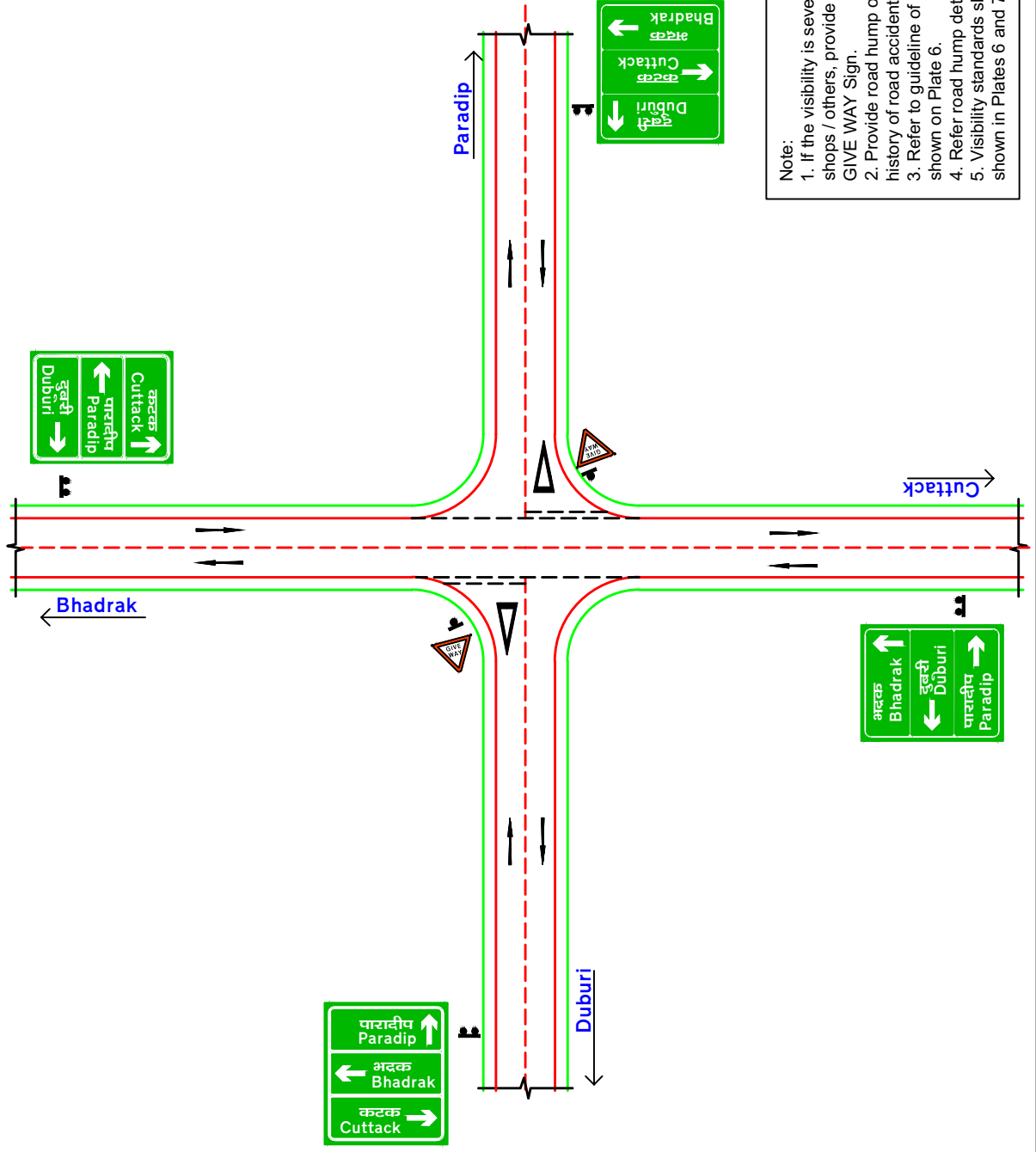


Central Island diameters for small roundabouts:

ICD (m)	Centre island diameter (m)
28	4
29	6
30	8
31	10
32	12
33	14
35	16
36	18

Note: road markings are not shown accurately. Refer to RSN2 for signing requirements.

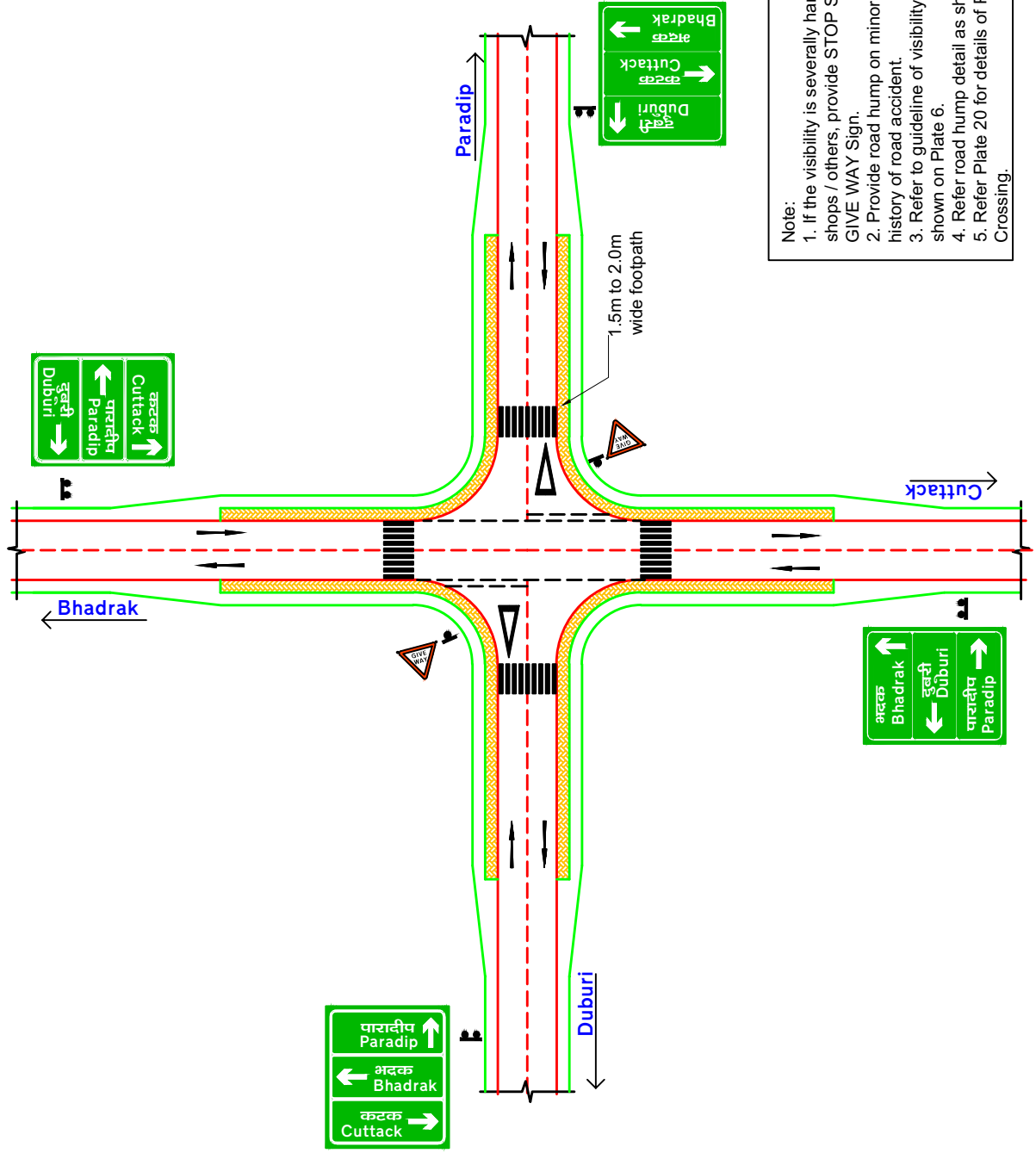
**PLATE 16: General Layout for Four Armed Priority Junction
(Rural Areas)**



Note:

1. If the visibility is severely hampered due to shops / others, provide STOP Sign, else provide GIVE WAY Sign.
2. Provide road hump on minor roads in case of history of road accident.
3. Refer to guideline of visibility triangle as shown on Plate 6.
4. Refer road hump detail as shown on Plate 21.
5. Visibility standards shall be achieved as shown in Plates 6 and 7

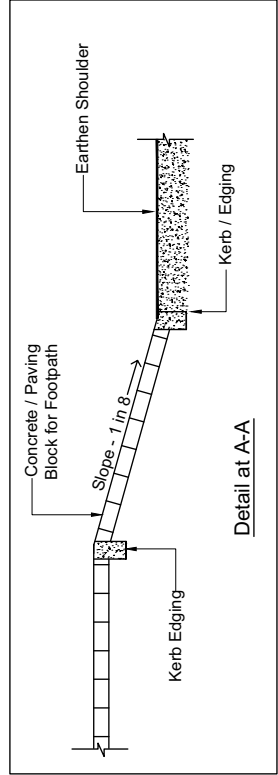
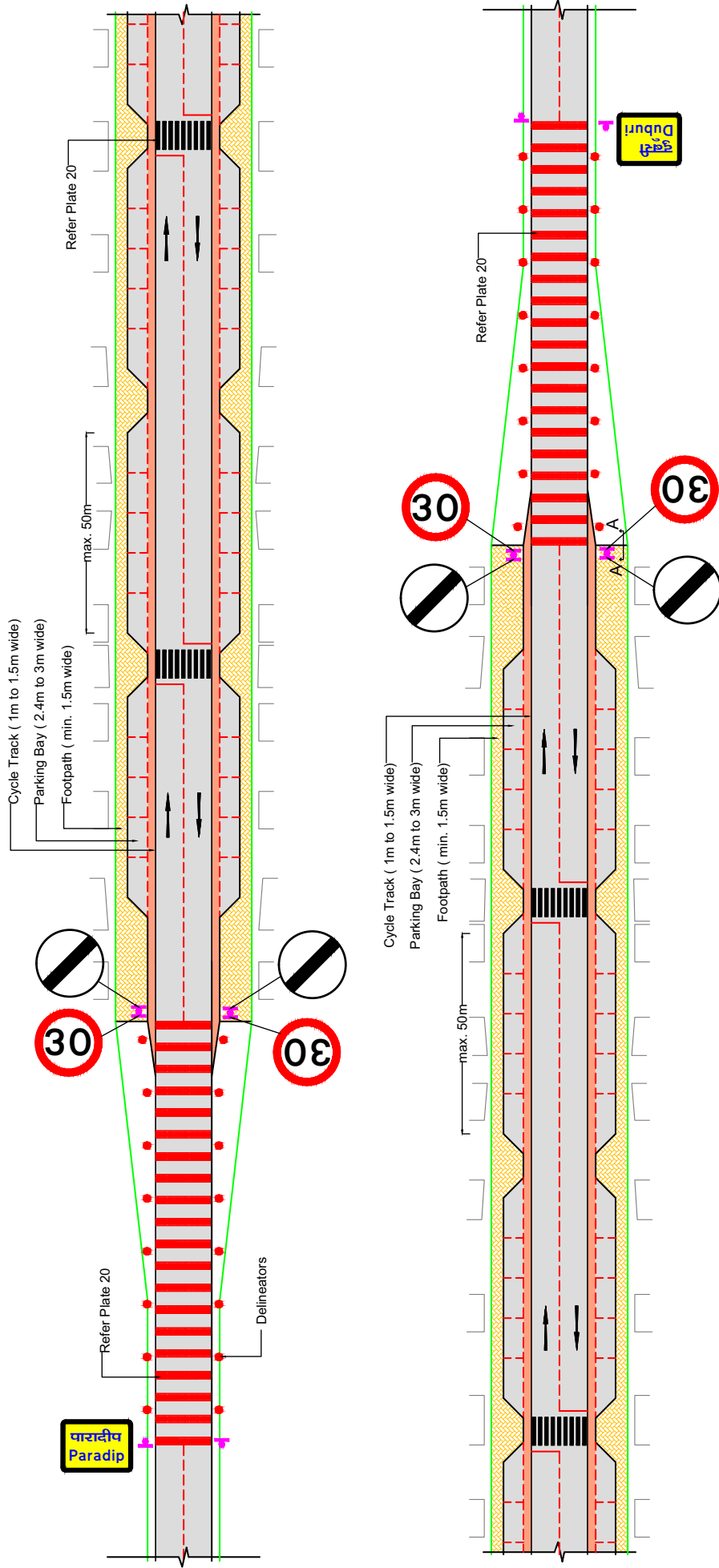
**PLATE 17: General Layout for Four Armed Priority Junction
(Urban Areas)**



Note:

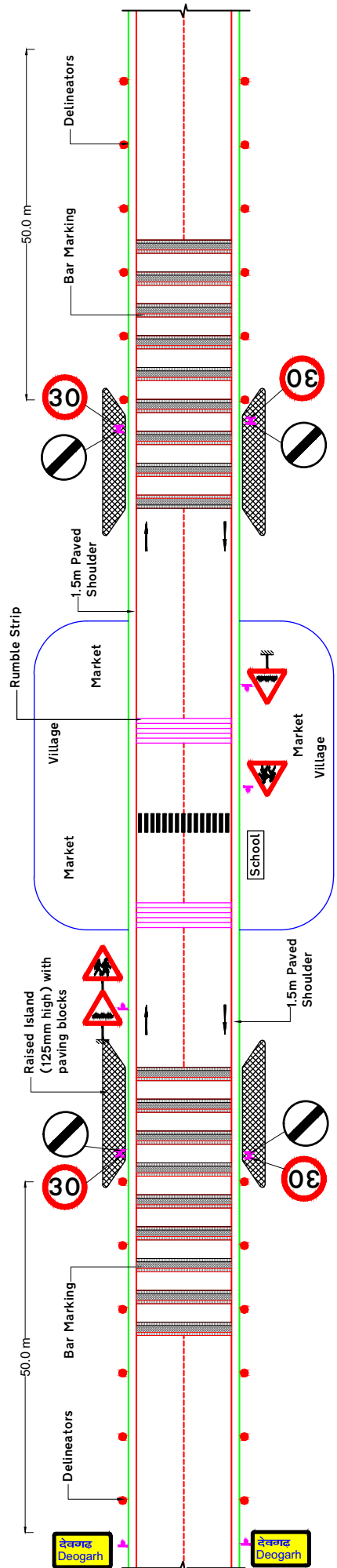
1. If the visibility is severely hampered due to shops / others, provide STOP Sign, else provide GIVE WAY Sign.
2. Provide road hump on minor roads in case of history of road accident.
3. Refer to guideline of visibility triangle as shown on Plate 6.
4. Refer road hump detail as shown on Plate 21.
5. Refer Plate 20 for details of Pedestrian Crossing.

PLATE 18: Safer Treatment in Commercial Areas



- Note:**
1. Speed limit has to be decided after public consultation with roads authorities, traffic police & district administration
 2. Provide warning signs as appropriate for hazards observed within range of commercial area.
 3. Refer Plate 20 for details of Pedestrian Crossing.

PLATE 19: Safer Road Treatment on Zones Near Road Side Villages
 (Gateway Treatment)

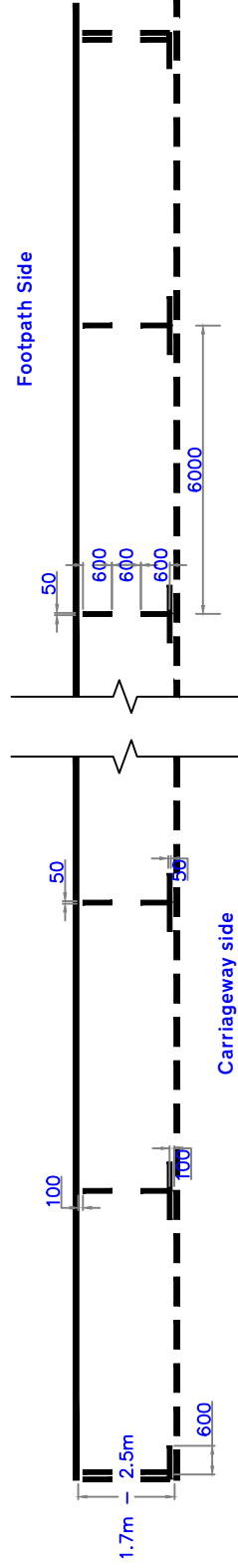
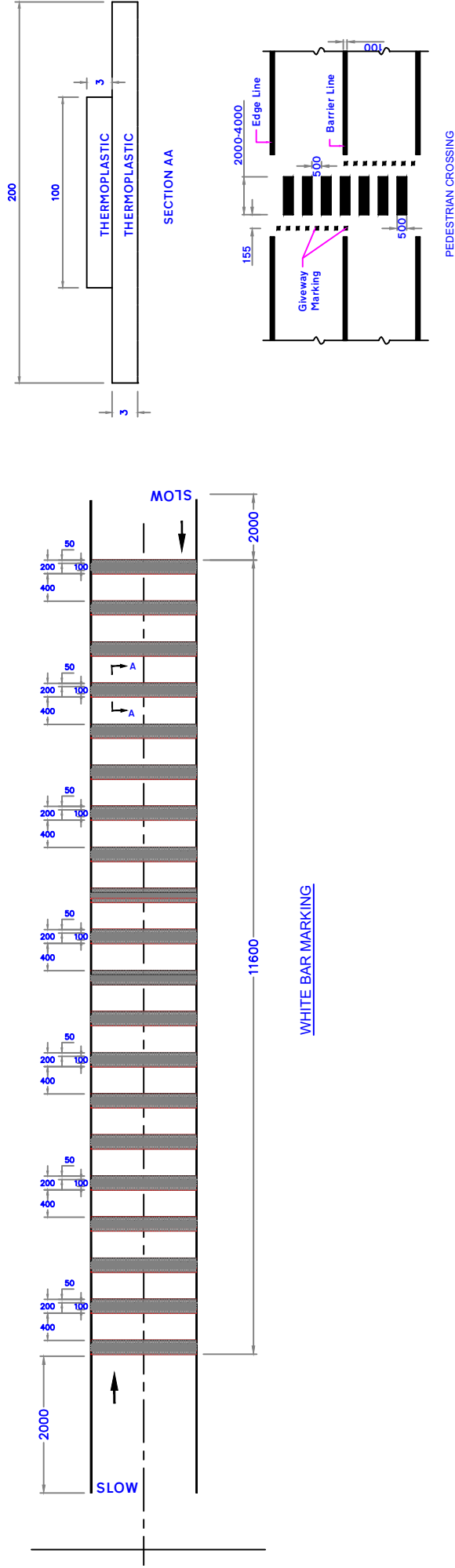


Note:
 1. Refer Plate 20 for details of Bar Marking & Pedestrian Crossing.
 2. Refer Plate 21 for details of Delineator Posts in Earthen Shoulder.

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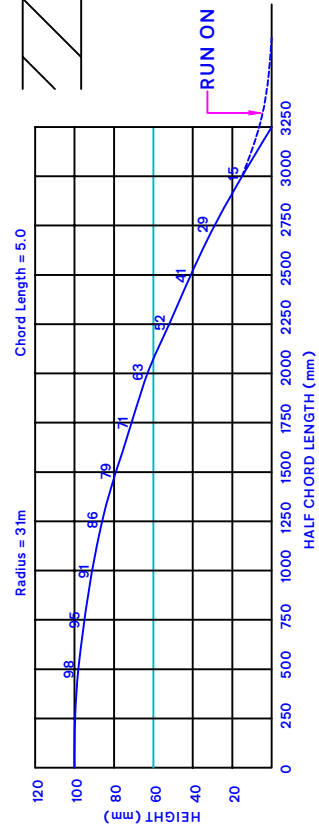
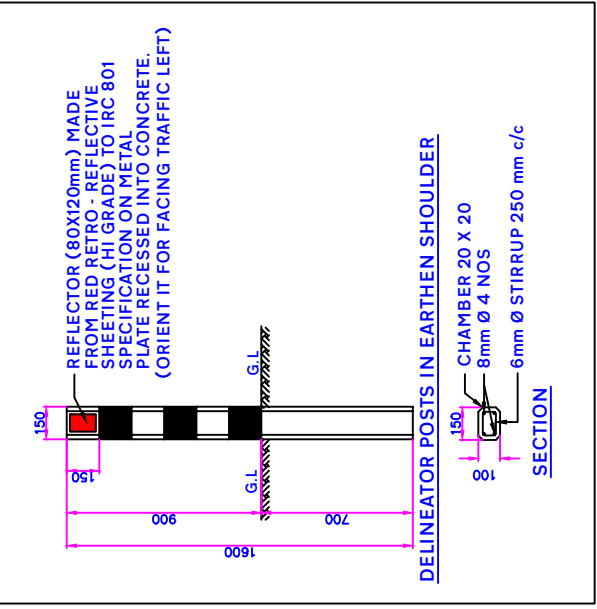
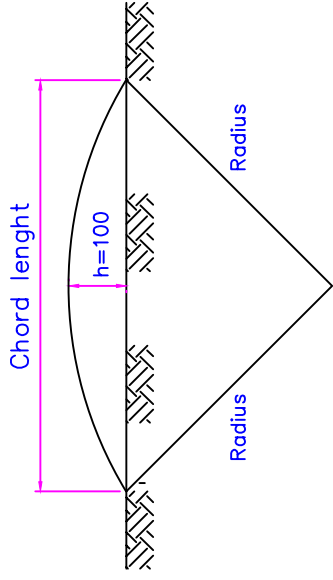
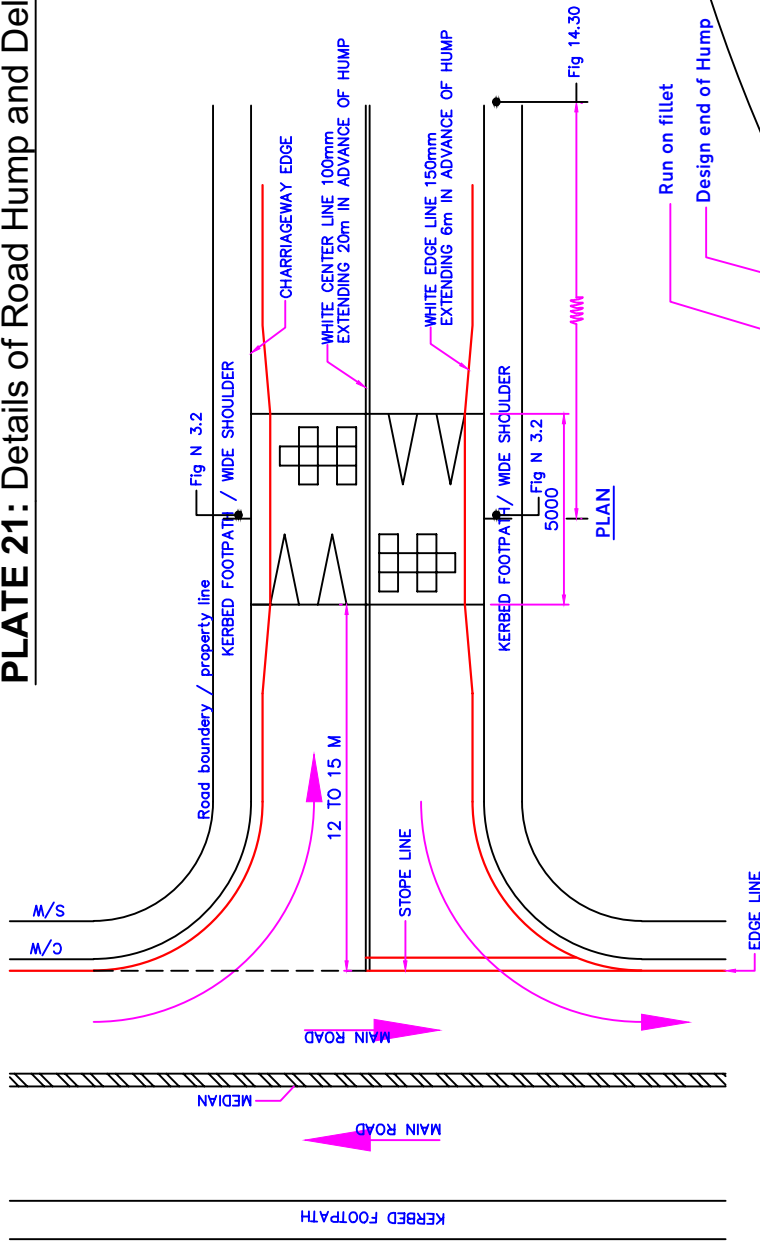
PLATE 20: Details of Bar Marking, Pedestrian Crossing & Parking Bay Lines



NOTE :
1. All dimensions are in millimeter,
unless otherwise specified.

PARKING BAY LINES

PLATE 21: Details of Road Hump and Delineator Posts



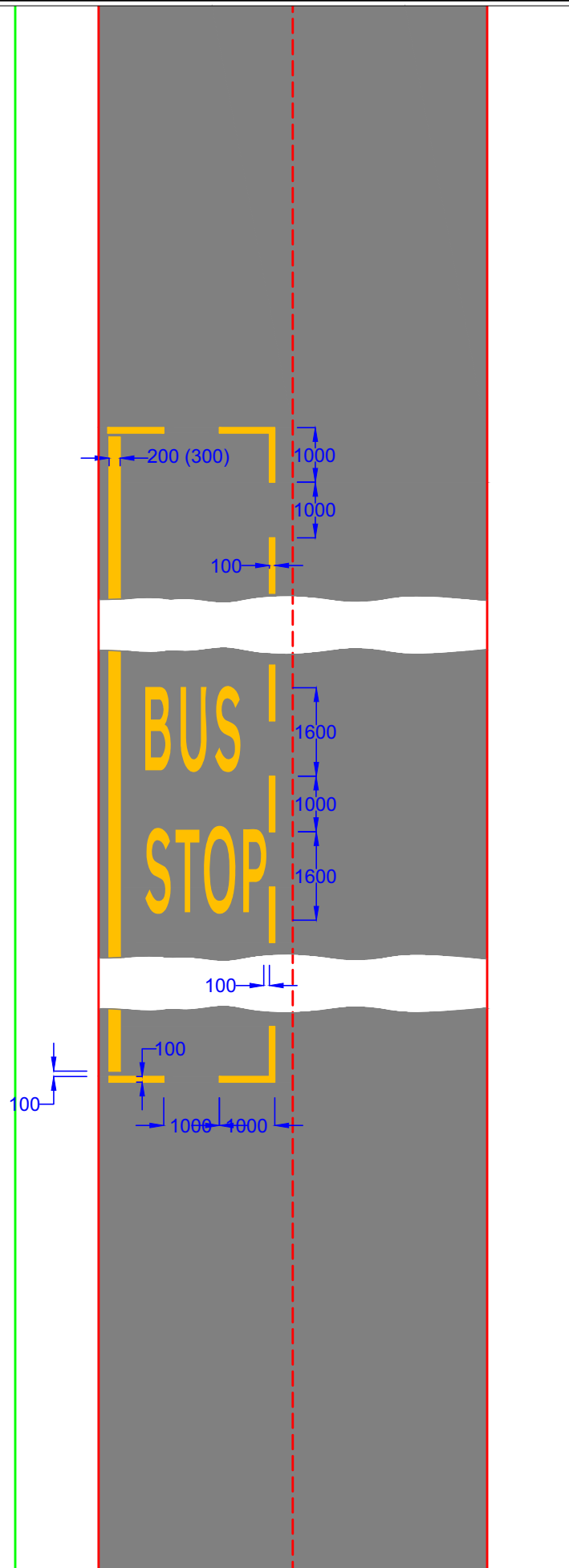
Desired Speed	Chored Length
30km/h	3.7m
35km/h	5.0m
40km/h	6.5m
50km/h	9.5m

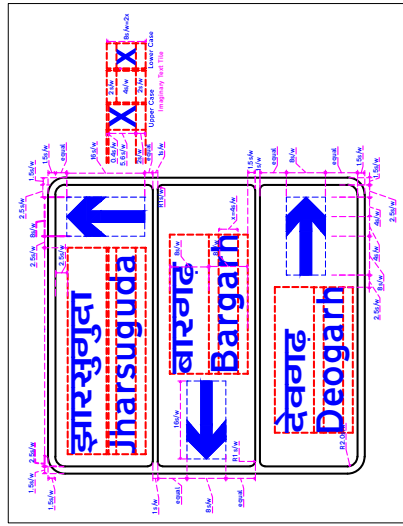


DETAILS OF TRANSITION

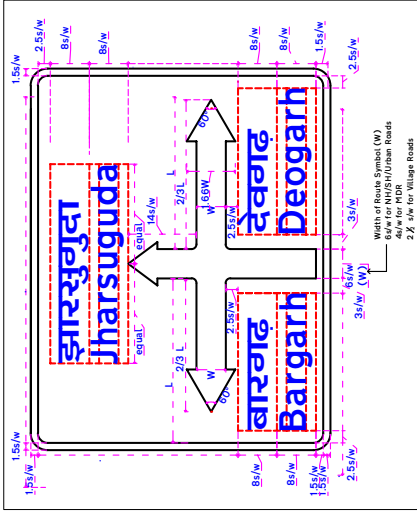
GEOMETRIC DESIGN

PLATE 22: On Street - Bus Stop Marking

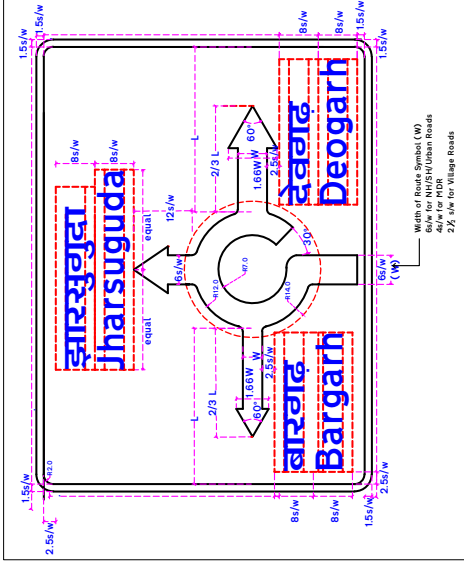




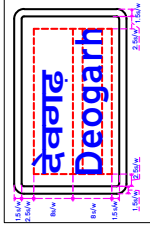
STACK TYPE ADVANCE DIRECTION SIGN
(SHOULDER MOUNTED)



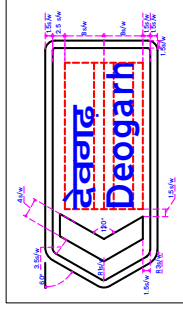
MAP TYPE ADVANCE DIRECTION SIGN
(SHOULDER MOUNTED)



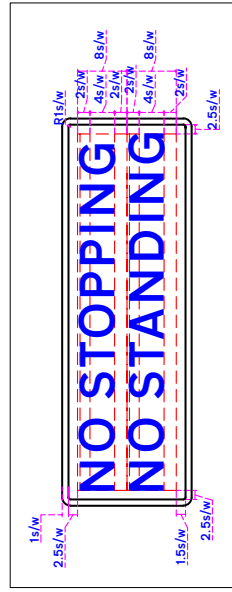
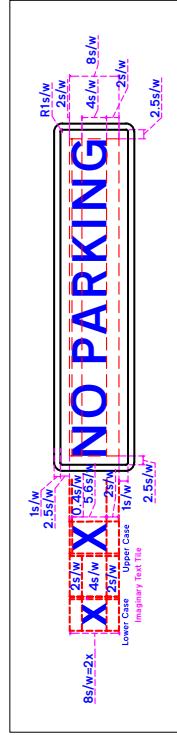
MAP TYPE ADVANCE DIRECTION SIGN ON ROUNDABOUT
(SHOULDER MOUNTED)



PLACE IDENTIFICATION SIGN



FLAG TYPE DIRECTION SIGN



DEFINITION / SUPPLEMENTARY PLATE

Design Speed	Advance Direction Signs (Shoulder Mounted)			Flag Type Direction Signs (Shoulder Mounted)			Place Identification Signs			Gantry Mounted Signs		
	'V' height (mm)	'V' lower case (mm)	'V' upper case (mm)	'V' height (mm)	clearance between 1 st and 2 nd sign (mm)	TWO sign distance from junction (m)	'V' height (mm)	clearance between 1 st and 2 nd sign (mm)	'V' height (mm)	clearance between 1 st and 2 nd sign (mm)	'V' height (mm)	clearance between 1 st and 2 nd sign (mm)
Up to 30 km/h	75	105	50	20	-	90	64	25	100	100	100	100
31-40 km/h	100	140	75	45	45	100	100	45	150	150	150	150
41-50 km/h	125	175	100	60	60	100	140	60	200	200	200	200
51-60 km/h	150	210	125	80	80	100	175	80	250	250	250	250
61-80 km/h	175	240	150	100	100	100	210	100	300	300	300	300
81-100 km/h	200	280	175	125	125	100	240	125	350	350	350	350
101-110 km/h	225	300	200	150	150	100	270	150	400	400	400	400
111-120 km/h	250	320	225	175	175	100	300	175	450	450	450	450
121-130 km/h	275	340	250	200	200	100	330	200	500	500	500	500
131-140 km/h	300	360	275	225	225	100	360	225	550	550	550	550
141-150 km/h	325	380	300	250	250	100	390	250	600	600	600	600

*Note: The values in brackets are the minimum values to be adopted when there are site-specific constraints.

Refer with IRC: 67-2012, Table 11.1 Letter Size and Spacing of Information Signs (Shoulder & Gantry Mounted)

PLATE 23: Design Details of Direction Signs and Definition Plate

PLATE 24: Application of Object Hazard Marker



EXISTING SCENARIO



PROPOSED SCENARIO



APPENDIX IV

LIST OF STAKEHOLDERS CONSULTED

**List of Stakeholder consulted for assessment of road safety management capacity and responsibility
framework
(Stakeholder Workshop: 09th November 2012)**

Sl No.	Name of Personnel	Position Held	Organisation
1	Er. B. C. Padhi	EIC (Retd.), Domain Specialist	CSM Consultants, IT/ICT Consultants
2	Mr. C. R. Manadhata	Executive Engineer	Project Management Unit, OWD
3	Er. Manoranjan Mishra	Executive Engineer	Project Management Unit, OWD
4	Mr. Bijoy Kumar Sahu	Executive Engineer, Asst. to CE, (Roads)	World Bank Project, OWD
5	Mr. Kishore Kumar Mishra	Assistant Engineer	National Highways Division
6	Mr. A. R. Nayak	Assistant Engineer	Project Management Unit, OSRP
7	Mr. Akshay Kumar Sahoo	Assistant Engineer (Civil)	Project Management Unit, OSRP
8	Er. D. N. Pal	Superintending Engineer	Rural Development (RD) Department
9	Mr. R. B. Swain	Superintending Engineer	R&B Circle, Cuttack
10	Mr. Saroj Ku. Parhi	Executive Engineer, Design VI	Project Management Unit, OWD
11	Mr. Anil K. Tripathy	Executive Engineer	Project Management Unit, OWD
12	Mr. Narayan Behera	Junior Engineer	Project Management Unit, OWD
13	Mr. Rabindra Ku. Acharya	Executive Engineer	National Highways (D&P), OWD
14	Mr. F. M. Panigrahi	Executive Engineer	Project Management Unit, OWD
15	Mr. Basudev Bala	Executive Engineer	South Circle National Highways, OWD
16	Mr. P. K. Mishra	Junior Engineer	Project Management Unit, OWD
17	Mr. B. C. Tripathy	Executive Engineer	Project Management Unit, OWD
18	Mr. Ajit Ku. Satapathy	District Forest Officer	World Bank Project, OWD
19	Mr. Narayan Behera	Junior Engineer	Project Management Unit, OWD

**List of high level officials of various departments consulted for assessment of road safety management capacity and responsibility framework
(18 – 30th January 2013)**

Sl No.	Name of Personnel	Position Held	Organisation
1	Mr. Panigrahi	Additional Commissioner	Road Transport Authority, Cuttack
2	Mr. Binod Das	Assistant Commissioner	Traffic Police, Bhubaneswar
3	Mr. K. C. Samal	Assistant Commissioner	Traffic Police, Cuttack
4	Mr. Tapan Misra	Director	Road Transport Authority, Cuttack
5	Mr. Bramhananda Rao	Assistant Director	Transport Department, Cuttack
6	Er. N. K. Pradhan	Chief Engineer	World Bank Projects, OWD
7	Mr. Patnaik	Director	Directorate of Town Planning
8	Mr. G. S. Bhuyan	Associate Town Planner	Bhubaneswar Development Authority
9	Mr. Shroff	City Engineer	Bhubaneswar Municipal Corporation
10	Mr. P. K. Mohapatra	Commissioner cum Secretary	Health Department
11	Mr. V. N. Mohanty	Principal-in-Charge	SCB Hospital, Cuttack
12	Mrs. Usha Patnaik	Secretary	Education Department
13	Dr. Nehar Patnaik	Director	State Council of Educational Research & Training, Odisha
14	Mrs. Nandita Mishra	Additional Director	State Council of Educational Research & Training, Odisha
15	Mr. Bikash Mohapatra	FRPA	Non-Governmental Organization
16	Mr. P. K. Panda	Advocate	Odisha High Court
17	Mr. Rabi Satpathy	General Secretary	Odisha Truck Operators Union



APPENDIX V
WORLD BANK ROAD SAFETY CAPACITY
MANAGEMENT CHECKLIST

World Bank Road Safety Capacity Management Checklist

INSTITUTIONAL MANAGEMENT FUNCTIONS	Checklist	Yes	Partial/ Pending	No
Results focus	Is there an official position on what is an acceptable and achievable level of safety for all road users?			
	Are agency, community and business sector responsibilities and related interventions to help achieve this acceptable level of safety clearly defined?			
	Has a lead agency been formally established to direct the national road safety effort? What form does this lead agency take?			
	Is the lead agency role defined in legislation and/or policy documents and annual performance agreements?			
	Have national and regional targets been set for improved safety performance?			
	Which agencies are responsible for achieving this level of safety and how are they held to account for the performance achieved?			
	Has a vision for improved road safety performance in the longer-term been officially approved?			
	Are regular performance reviews conducted to assess the potential for making short-term improvements to achieve safety targets and longer-term improvements to achieve the safety vision?			
Coordination	Are interventions being coordinated horizontally across central agencies to help achieve the desired focus on results?			
	Are interventions being coordinated vertically between central, regional and local agencies to help achieve the desired focus on results?			
	Have robust delivery partnerships been established where appropriate between agencies, communities and the business sector to help achieve the desired focus on results?			
	Are Parliamentary committees and processes supporting the identified institutional management functions to help achieve the desired focus on results?			
Legislation	Are legislative procedures and instruments supporting interventions and the identified management functions sufficient to help achieve the desired focus on results?			
	Are legislative procedures and instruments regularly			

	reviewed and adjusted to help achieve the desired focus on results?			
Funding and Resource Allocation	Are funding mechanisms and resource allocation procedures sufficient to help achieve the desired focus on results?			
Promotion	Are the government, community and business responsibilities to help achieve the desired focus on results being actively promoted?			
Monitoring and Evaluation	Are systems in place to collect and manage data on road crashes, fatality and injury outcomes, and all related road environment/vehicle/road user factors, to help achieve the desired focus on results??			
	Are systems in place to collect and manage data on vehicle speeds, safety belt and helmet wearing rates, alcohol use in traffic and involvement in crashes, vehicle fleet safety standards and safety rating of road infrastructure, and emergency medical system response times to help achieve the desired focus on results?			
	Are systems in place to collect and manage data on road network traffic to help achieve the desired focus on results?			
	Are systems in place to collect and manage data on quantities of safety interventions implemented (e.g. policing operations, promotional activities, systematic safety engineering treatments, etc) to help achieve the desired focus on results?			
	Are systems in place to regularly monitor and evaluate safety performance against targets to help achieve the desired focus on results?			
Research and Development	Is a national road safety research and development program conducted to help achieve the desired focus on results?			
	Do independent research and professional organizations contribute to policy and program development to help achieve the desired focus on results?			
	Are independent research and professional organizations engaged in road safety knowledge transfer to help achieve the desired focus on results?			
Interventions	Checklist	Yes	Partial/ Pending	No
	Have comprehensive safety standards and rules been set for roads, vehicles, road users and post-crash services to achieve the desired focus on results?			

	Are compliance regimes in place to ensure adherence to identified safety standards and rules for roads, vehicles, road users and post-crash services to achieve results?			
	Do the identified safety standards and rules and related compliance regimes for roads, vehicles, road users and post-crash services clearly address the safety priorities of high-risk road user groups to achieve results?			
	How favorably do identified standards and rules and related compliance regimes for roads, vehicles, road users and post-crash services compare with international good practice to achieve results?			
RESULTS	Checklist	Yes	Partial/ Pending	No
	Are estimates of the social costs of road crashes available?			
	Are data readily and regularly available to identify annual road deaths and injuries?			
	Are data readily and regularly available to identify which road users face the biggest risks of being killed and injured in the road transport system?			
	Are data readily and regularly available to identify which sections of the road network by road function have the highest concentrations of deaths and injuries?			
	Are data readily and regularly available to identify network vehicle speeds, seatbelt wearing rates, motor cycle helmet wearing rates, cycle helmet wearing rates, alcohol use in traffic and involvement in crashes, vehicle fleet safety standards, safety rating of road infrastructure and the recovery of road crash victims?			
	Are data available to readily and regularly identify network traffic volumes?			
	Are data available to readily and regularly identify quantities of safety interventions implemented (e.g. policing operations, promotional activities, systematic safety engineering treatments, etc)?			