Safe & Inclusive Road Designs in Central Asia

Uzbekistan

Tajikistan

Kyrgyzstan

iRAP Star Rating Assessment Results of Standard Cross Sections

June 2025

DECADE OF ACTION FOR ROAD SAFETY 2021 - 2030

UN ROAD SAFETY FUND

east

IRF | INTERNATIONAL ROAD FEDERATION

iRAP

ESCAP Economic and Social Commission for Asia and the Pacific

IRAP ASSESSMENT RESULTS

Introduction

The overall objective of the “Safe and Inclusive Road Design in Central Asia” project is to contribute to reducing road traffic crashes, injuries and fatalities in three Central Asian countries – Kyrgyzstan, Tajikistan and Uzbekistan through improved design standards that align with the UN Global Plan, Global Road Safety Performance Targets, and international good practice and reflect the inputs of a broad range of stakeholders.The expected impact of the project on road safety within the participating project countries is focused on improving the current road design standards to include internationally recognized road safety features.

The current road design standards used in the participating countries are commonly referred to as the GOST (Gosudarstvennyy Standart) and SNiP (Stroitelnye Normy i Pravila) standards, with some of the content dating back to the former Soviet Union period. GOST standards control uniformity and quality in material production, while SNiP regulations govern construction practices including planning and design of roads.

The internationally recognized road safety features suggested to improve the existing road design standards include treatments such as paved shoulders, roadside safety barriers, delineation improvements, streetlighting, footpath provision, pedestrian crossing facilities and facilities for other vulnerable road users such as motorcyclists and cyclists where necessary. Standard road cross sections and safe design speeds/speed limits have also been reviewed with the results shown in this report.

The use of the iRAP Star Rating methodology to assess the risk of death and serious injury in the current design standards and the recommended updates will provide a systematic and research-based assessment of the proposed improvement in safe road design. iRAP Star Ratings are based on the engineering features of the road and the degree to which they impact on the likelihood and severity of crashes. The focus is on the features which influence the most common and severe types of road crash for motor vehicles, motorcyclists, pedestrians and bicyclists. Star Ratings provide a simple and objective measure of the relative level of risk associated with road infrastructure for an individual road user. 5-star (green) roads are the safest, while 1-star (black) roads are the least safe. A Star Rating Score (SRS) is calculated for each cross section, these scores are then allocated to Star Rating bands to determine the Star Rating.

The Star Rating Score (SRS) is an objective measure of the level of safety 'built-in' to a road for the various road users. It is calculated for every 100-metre section of a road for the different possible crash types based on factors such as likelihood, severity, operating speed, and external flow influence. Star Ratings are determined by assigning Star Rating Scores to the bands as shown in the table below.

Star Rating	Star Rating Score				
	Vehicle occupants and motorcyclists	Bicyclists	Pedestrians		
			Total	Along	Crossing
5	0 to < 2.5	0 to < 5	0 to < 5	0 to < 0.2	0 to < 4.8
4	2.5 to < 5	5 to < 10	5 to < 15	0.2 to < 1	4.8 to < 14
3	5 to < 12.5	10 to < 30	15 to < 40	1 to < 7.5	14 to < 32.5
2	12.5 to < 22.5	30 to < 60	40 to < 90	7.5 to < 15	32.5 to < 75
1	22.5 +	60+	90 +	15 +	75 +

1. Star Rating of Major Inter Urban Standard Cross Sections

The standard cross sections of Category 1, Category 2 and Category 3 roads (as per SNIP) which are the major inter urban road categories, have been Star Rated to demonstrate their safety levels at different operating speeds. The sub-sections below also present recommended improvements to the standard cross sections which can improve their Star Ratings.

The recommended improvements for the inter-urban roads include provision of paved shoulders, roadside safety barriers and median improvements. These treatments help to reduce the risk of run-off road and head-on crashes on such high-speed highways. The improvements shown are indicative to demonstrate the positive effects of roadside barriers, median barriers and shoulders on the safety of high-speed roads in comparison to the existing standards where such elements may be absent. Treatments such as shoulder widths are suggested based on the hierarchy of the road. For Category 1A and 1B roads, a 2.5 m shoulder is suggested on the passenger side (which falls in to the wide shoulder category in the iRAP coding), for Category 2 and Category 3 roads, 1.5m and 1m shoulders respectively are suggested.

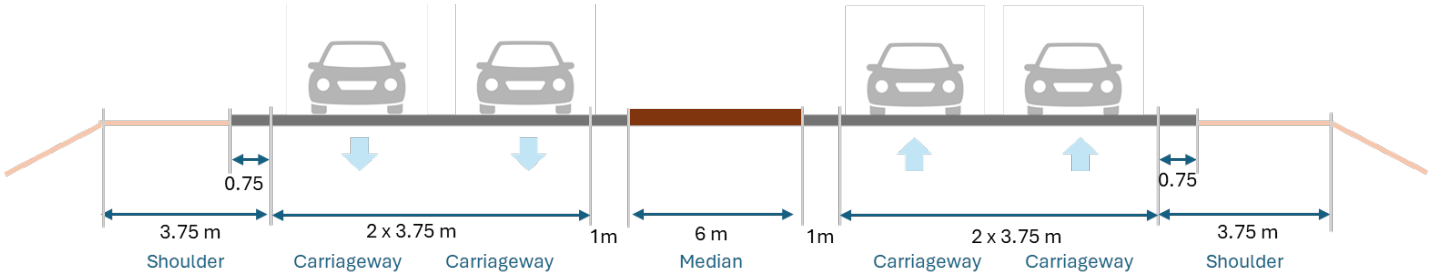
Category 1, Category 2 and Category 3 roads being inter-urban high-speed roads are not expected to have significant pedestrian and bicycle flow. However, if such roads have pedestrian or bicycle flow demand, facilities with adequate segregation should be provided for their safe movement.

As per the existing design standards, Category 1A and Category 1B roads (high-speed multi-lane motorways) would achieve 1-star rating for pedestrians at operating speeds of 80km/h and above. Category 2 and Category 3 roads would achieve 3-star rating for pedestrians at 60km/h and 1-star rating at all speeds of 80km/h and above.

Category 1A roads would achieve 2-star rating for bicyclists at operating speeds of 80km/h and 100km/h, and 1-star rating for speeds of 120km/h and above. Category 1B roads would achieve 2-star rating for bicyclists at an operating speed of 80km/h and 1-star rating for speeds of 100km/h and above. Category 2 and Category 3 roads would achieve for bicyclists 3-star rating at 60km/h, 2-star rating at 80km/h and 1-star rating for speeds of 100km/h and above.

1.1 Category 1A (4 Lane)

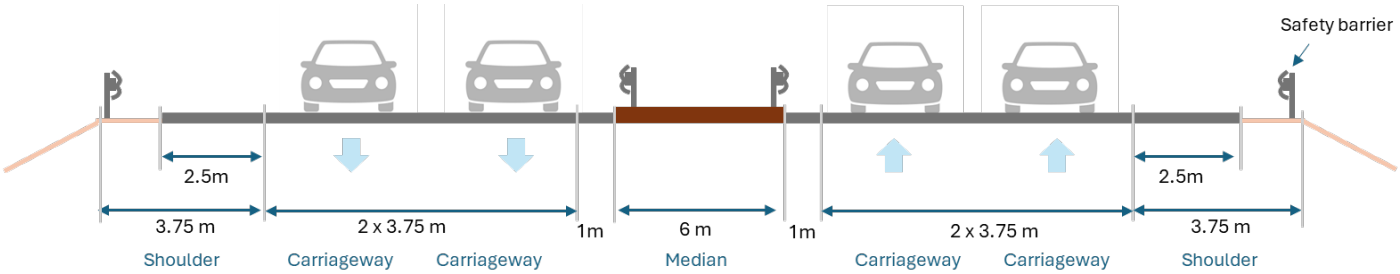
Standard cross section



Key elements:	○ **Dual carriageway road with 6m wide median (dividing strip)** ○ **4 lanes, each 3.75m wide** ○ **0.75m wide paved shoulders on passenger sides**			
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	4 *(4.78)*	3 *(9.32)*	2 *(16.12)*	1 *(25.59)*
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(6.30)*	3 *(12.28)*	2 *(21.28)*	1 *(33.72)*

Standard cross section with additional recommended improvements

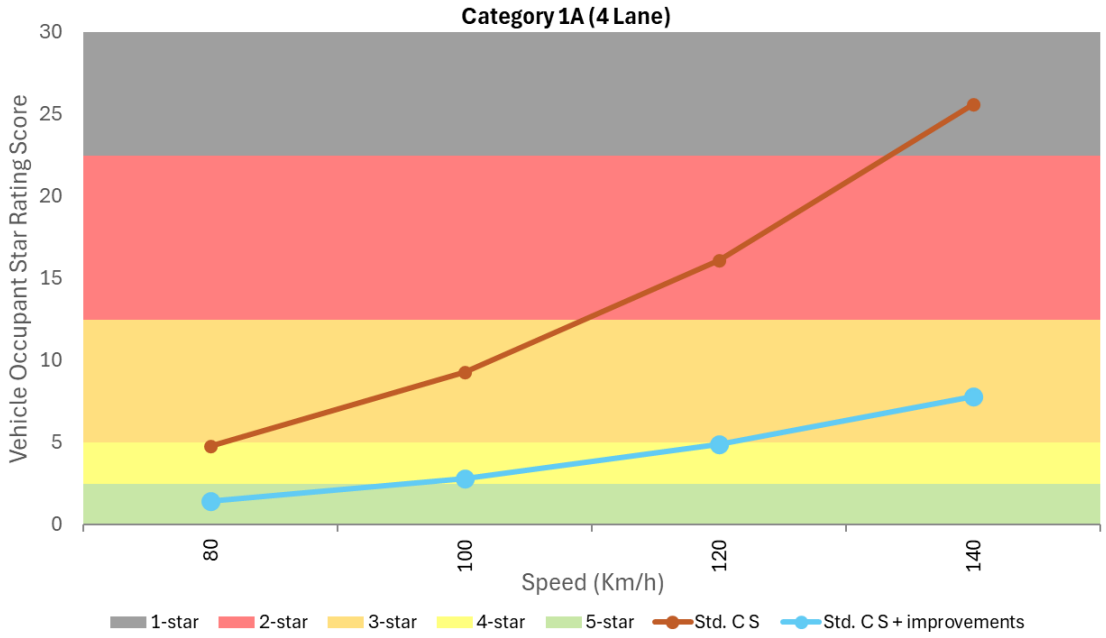
Presented below are additional recommendations that can improve the Star Rating of the standard cross section. Improvements in the Star Rating with the additional treatments is also shown.



Recommended improvements	○ **Safety barriers along median** ○ **Roadside safety barriers** ○ **2.5m wide paved shoulders on passenger sides**			
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.46)*	4 *(2.84)*	4 *(4.92)*	3 *(7.80)*
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(5.17)*	3 *(10.06)*	2 *(17.45)*	1 *(27.64)*

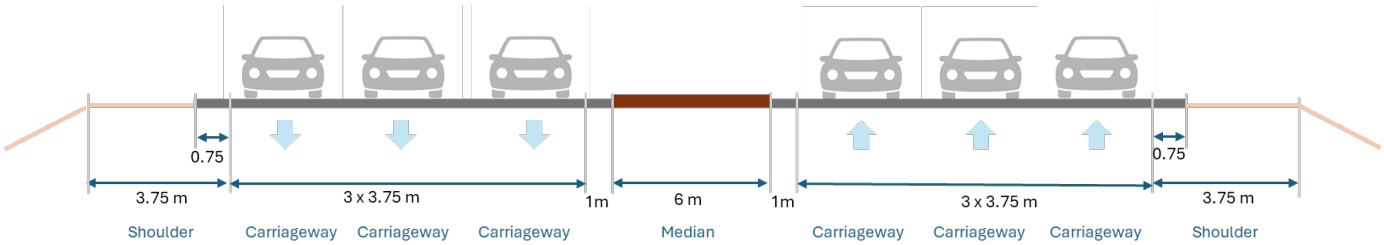
Star Rating comparison chart – Vehicle occupants

The chart below shows a comparison of the iRAP vehicle occupant Star Ratings for the standard cross section, along with the results for the standard cross section with additional recommended improvements at various operating speeds of 80 km/h, 100 km/h, 120 km/h and 140 km/h. The Star Rating Scores are shown on the y-axis (with 0 being the lowest risk) and the operating speeds are shown on the x-axis. The coloured background represents the Star Rating with green being the lowest risk (5-star) and black being the highest risk (1-star).



1.2 Category 1A (6 Lane)

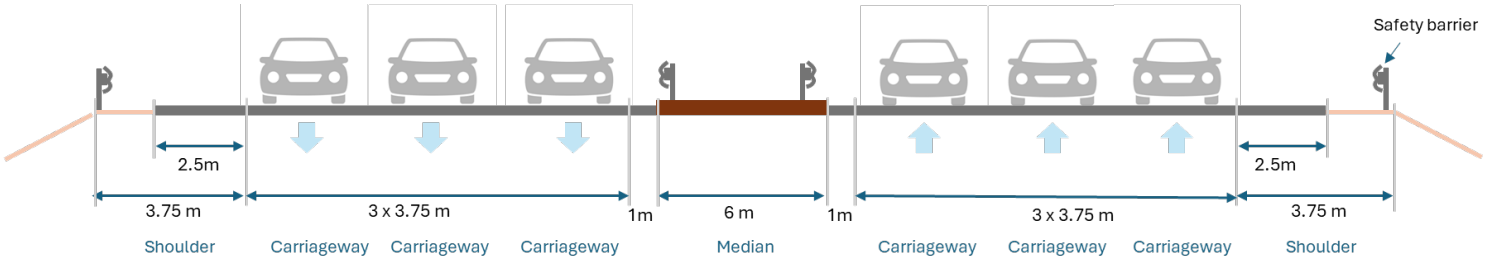
Standard cross section



Key elements:	○ **Dual carriageway road with 6 m wide median (dividing strip)** ○ **6 lanes, each 3.75m wide** ○ **0.75m wide paved shoulders on passenger sides**			
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	3 *(5.17)*	3 *(10.08)*	2 *(17.43)*	1 *(27.68)*

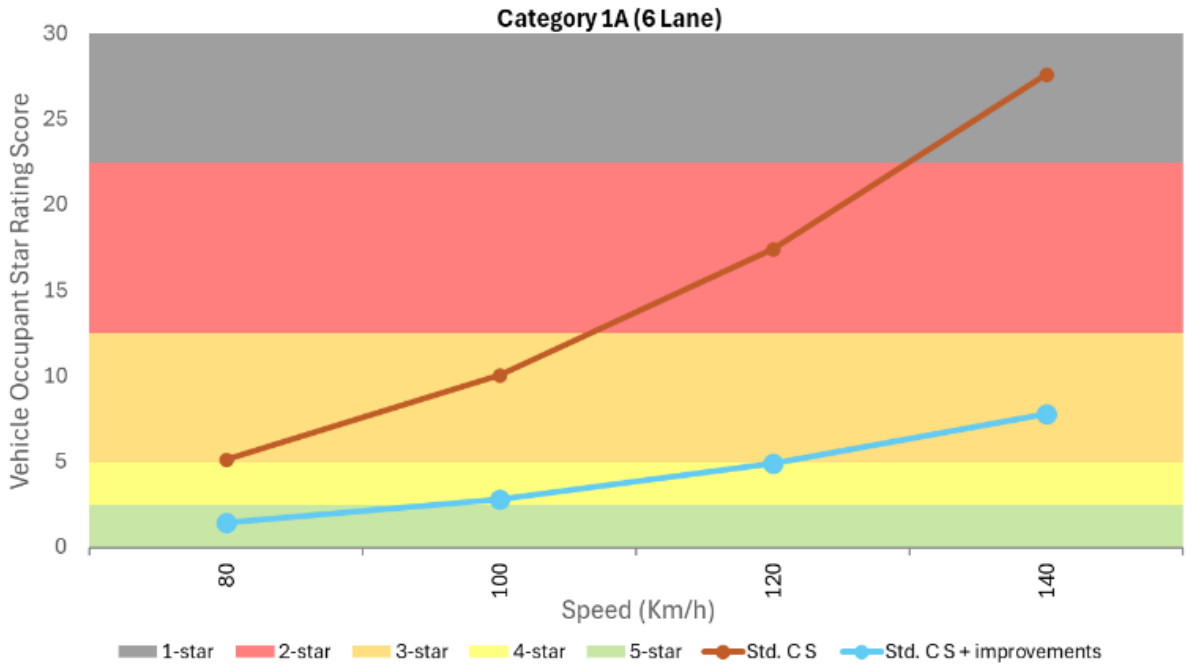
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(6.69)*	2 *(13.04)*	1 *(22.59)*	1 *(35.81)*

Standard cross section with additional recommended improvements



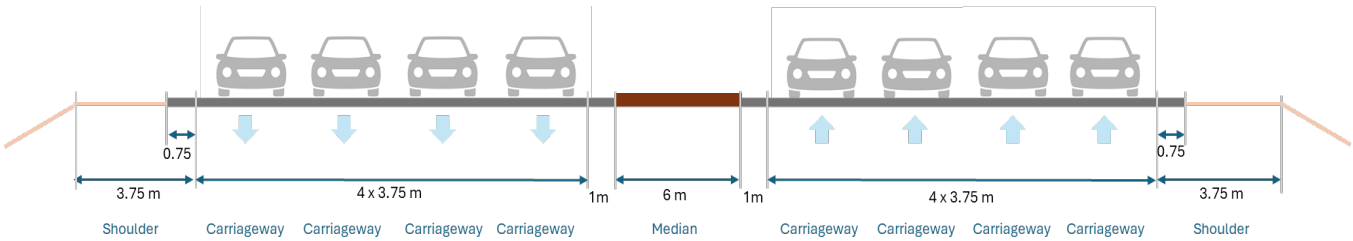
Recommended improvements	○ **Safety barriers along median** ○ **Roadside safety barriers** ○ **2.5m wide paved shoulders on passenger sides**			
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.46)*	4 *(2.84)*	4 *(4.92)*	3 *(7.80)*
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(5.17)*	3 *(10.06)*	2 *(17.45)*	1 *(27.64)*

Star Rating comparison chart – Vehicle occupants



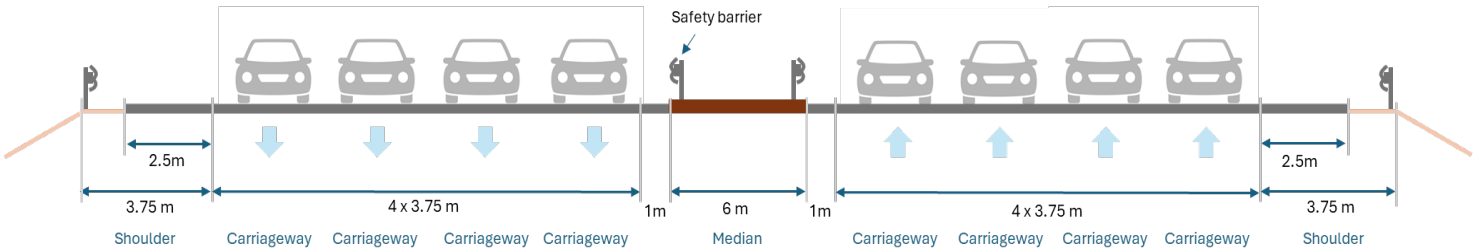
1.3 Category 1A (8 Lane)

Standard cross section



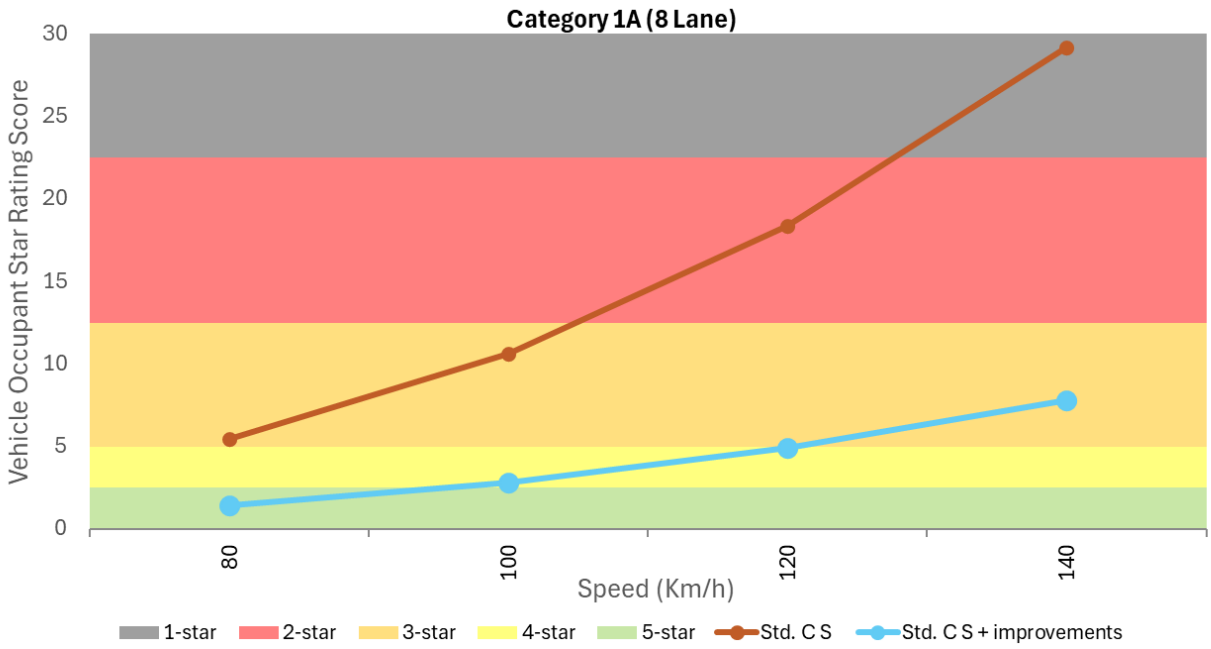
Key elements:	○ **Dual carriageway road with 6 m wide median (dividing strip)** ○ **8 lanes, each 3.75m wide** ○ **0.75m wide paved shoulders on passenger sides**			
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	3 *(5.46)*	3 *(10.64)*	2 *(18.40)*	1 *(29.21)*
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(6.98)*	2 *(13.60)*	1 *(23.56)*	1 *(37.34)*

Standard cross section with additional recommended improvements



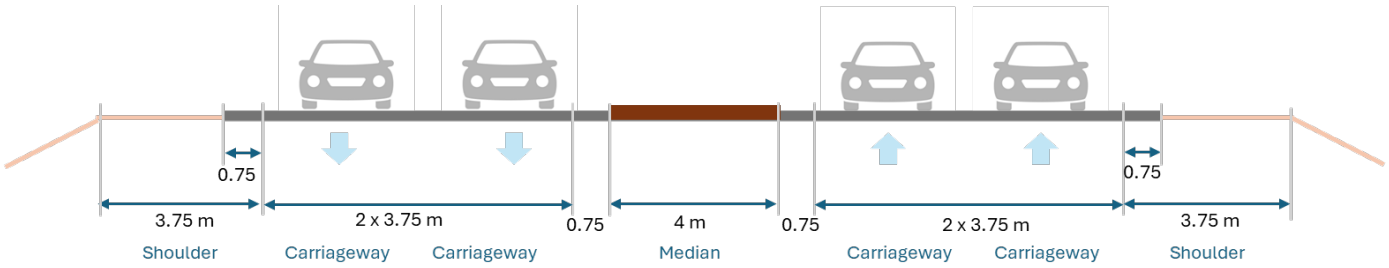
Recommended improvements	○ **Safety barriers along median** ○ **Roadside safety barriers** ○ **2.5m wide paved shoulders on passenger sides**			
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.46)*	4 *(2.84)*	4 *(4.92)*	3 *(7.80)*
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(5.17)*	3 *(10.06)*	2 *(17.45)*	1 *(27.64)*

Star Rating comparison chart – Vehicle occupants



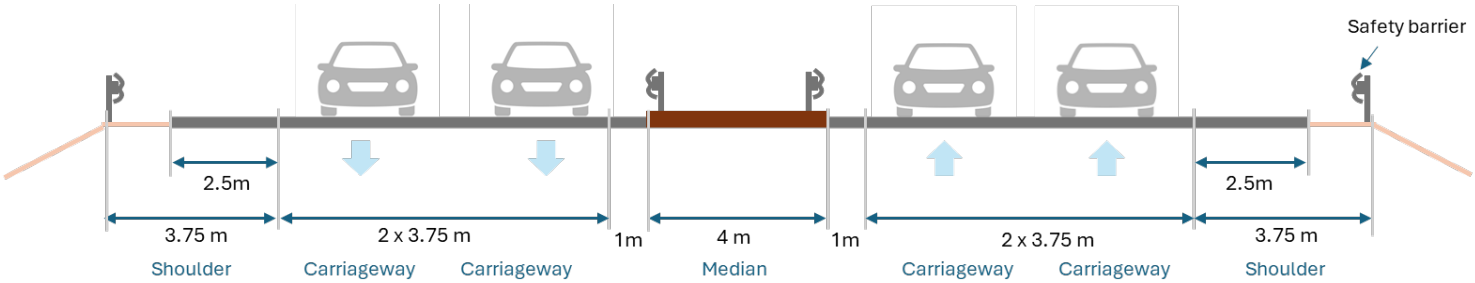
1.4 Category 1B (4 Lane)

Standard cross section



Key elements:	○ **Dual carriageway road with 4 m wide median (dividing strip)** ○ **4 lanes, each 3.75m wide** ○ **0.75m wide paved shoulders on passenger sides**			
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	3 *(6.35)*	3 *(12.37)*	2 *(21.41)*	1 *(33.99)*
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(7.87)*	2 *(15.33)*	1 *(26.57)*	1 *(42.12)*

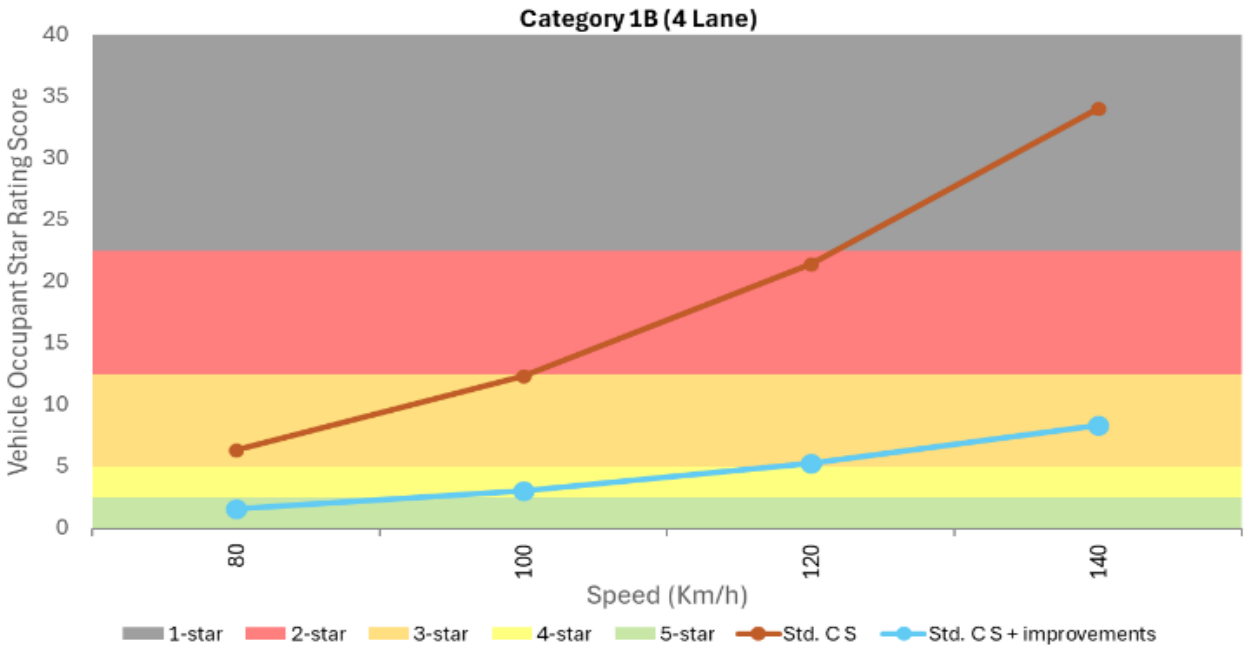
Standard cross section with additional recommended improvements



Recommended improvements	○ **Safety barriers along median** ○ **Roadside safety barriers** ○ **2.5m wide paved shoulders on passenger sides**

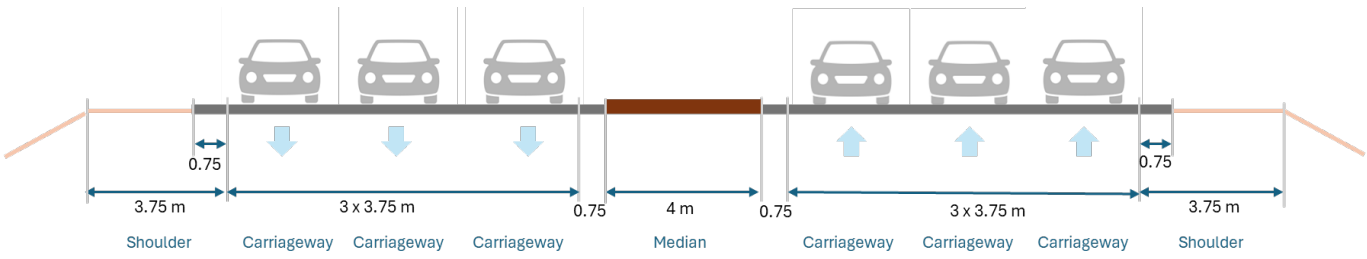
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.57)*	4 *(3.05)*	3 *(5.28)*	3 *(8.39)*
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(5.44)*	3 *(10.60)*	2 *(18.37)*	1 *(29.11)*

Star Rating comparison chart – Vehicle occupants



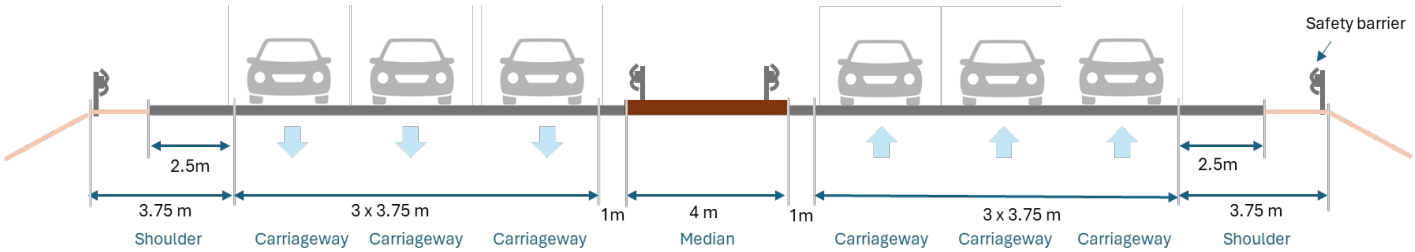
1.5 Category 1B (6 Lane)

Standard cross section



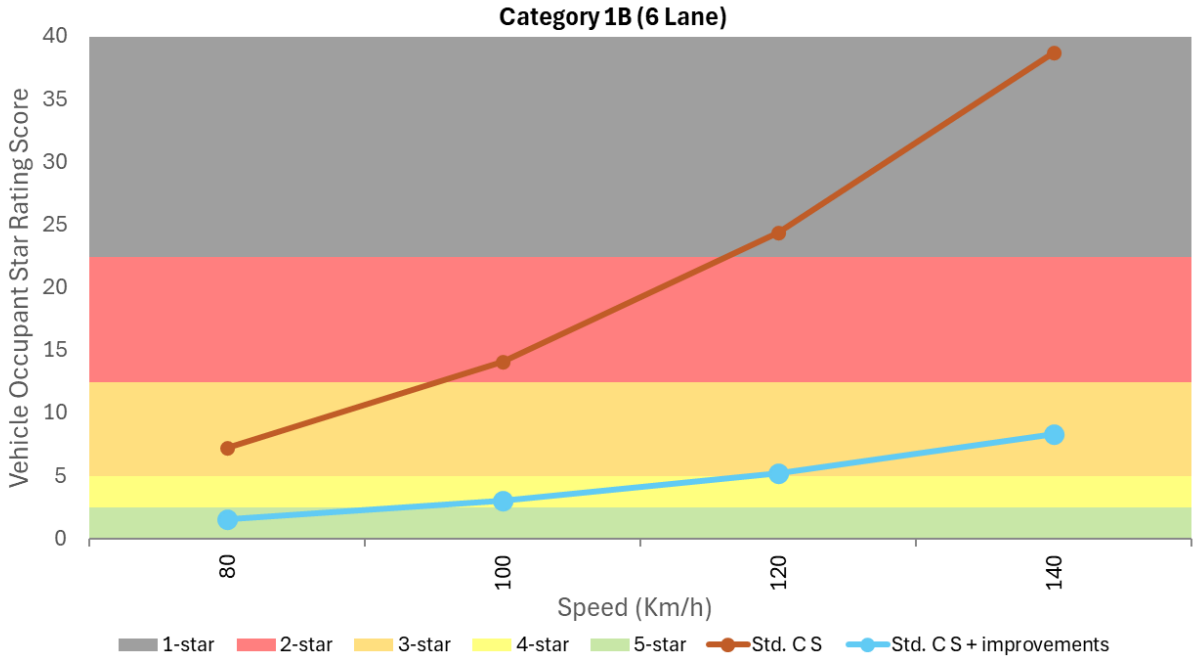
Key elements:	○ **Dual carriageway road with 4 m wide median (dividing strip)** ○ **6 lanes, each 3.75m wide** ○ **0.75m wide paved shoulders on passenger sides**			
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	3 *(7.24)*	2 *(14.11)*	1 *(24.4)*	1 *(38.75)*
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(8.76)*	2 *(17.07)*	1 *(29.56)*	1 *(46.88)*

Standard cross section with additional recommended improvements



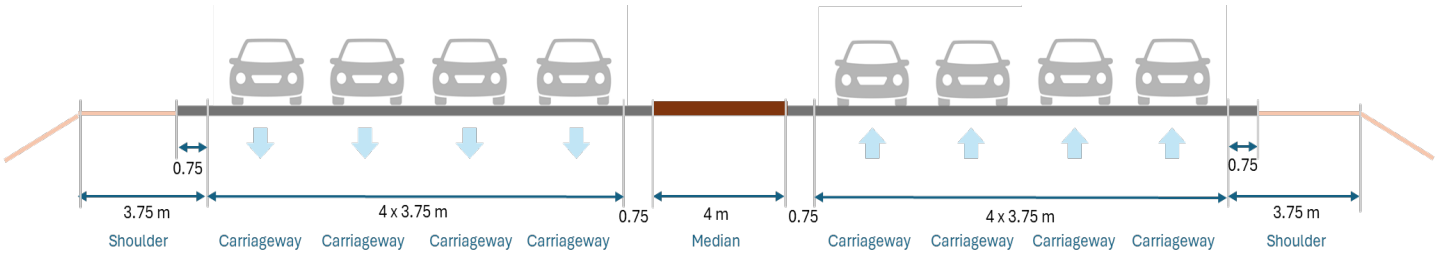
Recommended improvements	○ **Safety barriers along median** ○ **Roadside safety barriers** ○ **2.5m wide paved shoulders on passenger sides**			
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.57)*	4 *(3.05)*	3 *(5.28)*	3 *(8.39)*
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(5.44)*	3 *(10.60)*	2 *(18.37)*	1 *(29.11)*

Star Rating comparison chart – Vehicle occupants



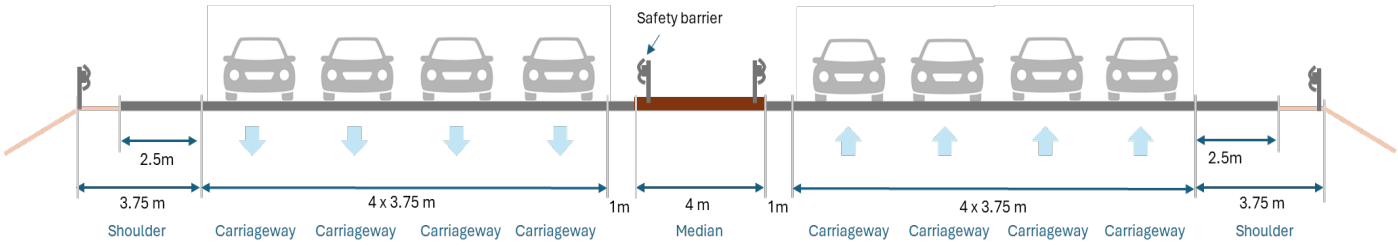
1.6 Category 1B (8 Lane)

Standard cross section



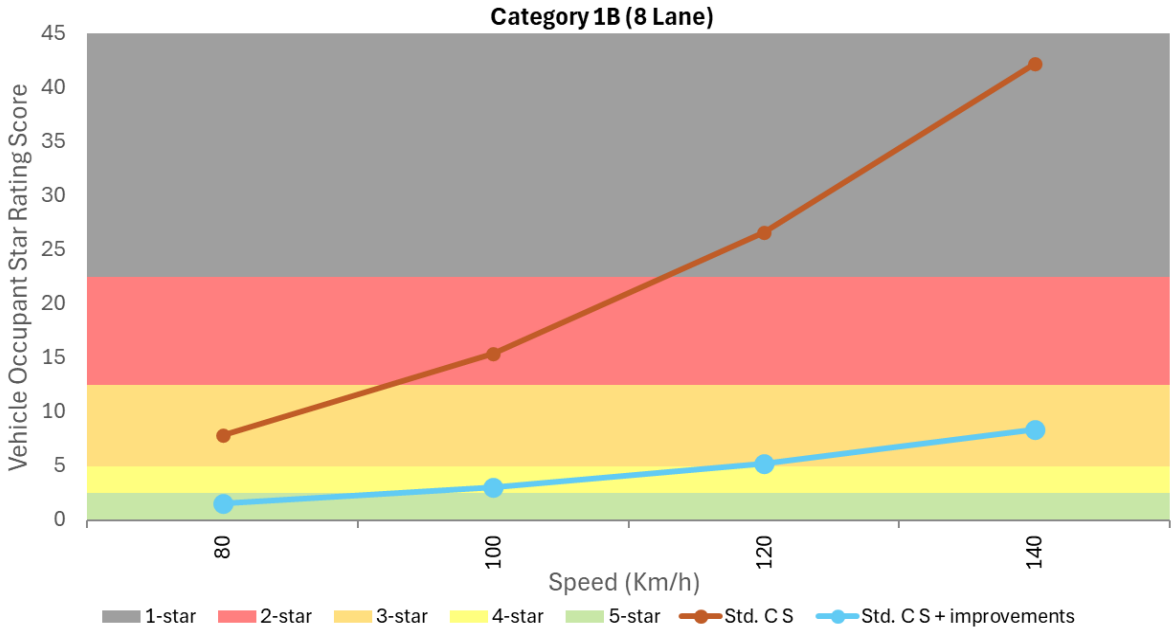
Key elements:	○ **Dual carriageway road with 4 m wide median (dividing strip)** ○ **8 lanes, each 3.75m wide** ○ **0.75m wide paved shoulders on passenger sides**			
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	3 *(7.90)*	2 *(15.39)*	1 *(26.62)*	1 *(42.26)*
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(9.42)*	2 *(18.35)*	1 *(31.78)*	1 *(50.39)*

Standard cross section with additional recommended improvements



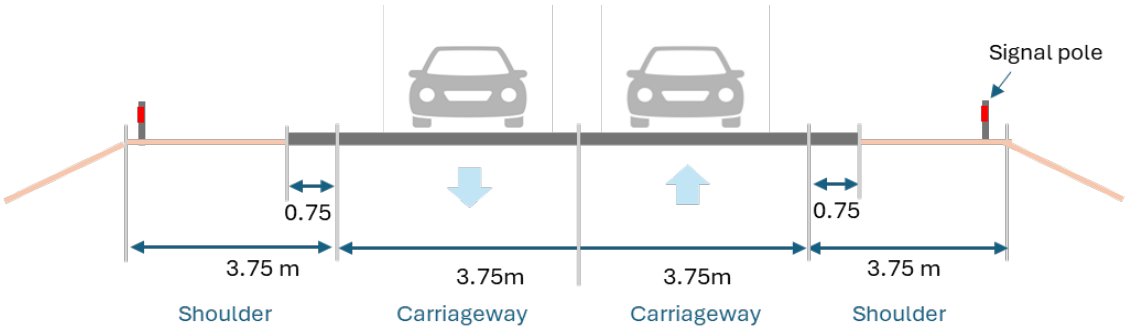
Recommended improvements	○ **Safety barriers along median** ○ **Roadside safety barriers** ○ **2.5m wide paved shoulders on passenger sides**			
Operating Speeds	*80 km/h*	*100 km/h*	*120 km/h*	*140 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.57)*	4 *(3.05)*	3 *(5.28)*	3 *(8.39)*
Star Rating – Motorcyclists *(Star Rating Score)*	3 *(5.44)*	3 *(10.60)*	2 *(18.37)*	1 *(29.11)*

Star Rating comparison chart – Vehicle occupants



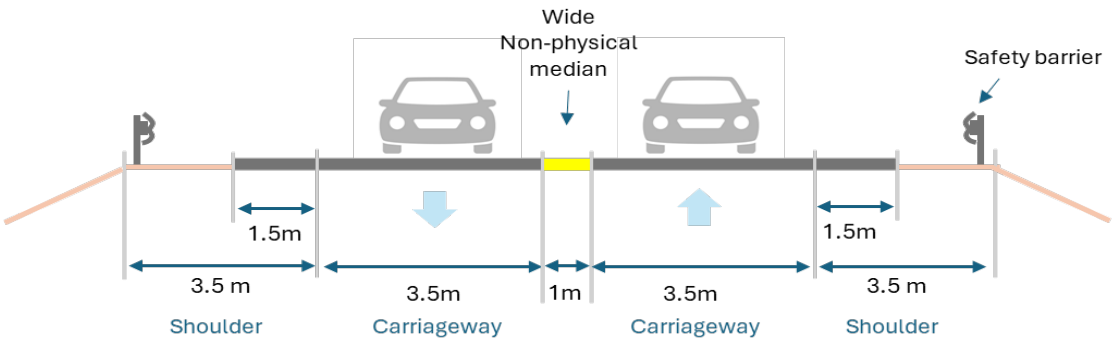
1.7 Category 2 (2 Lane)

Standard cross section



Key elements:	○ **Single carriageway road with centreline median** ○ **2 lanes, each 3.75m wide** ○ **0.75m wide paved shoulders along both sides**			
Operating Speeds	*60 km/h*	*80 km/h*	*100 km/h*	*120 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	4 *(3.38)*	3 *(8.02)*	2 *(15.62)*	1 *(27.03)*
Star Rating – Motorcyclists *(Star Rating Score)*	4 *(4.02)*	3 *(9.54)*	2 *(18.58)*	1 *(32.19)*

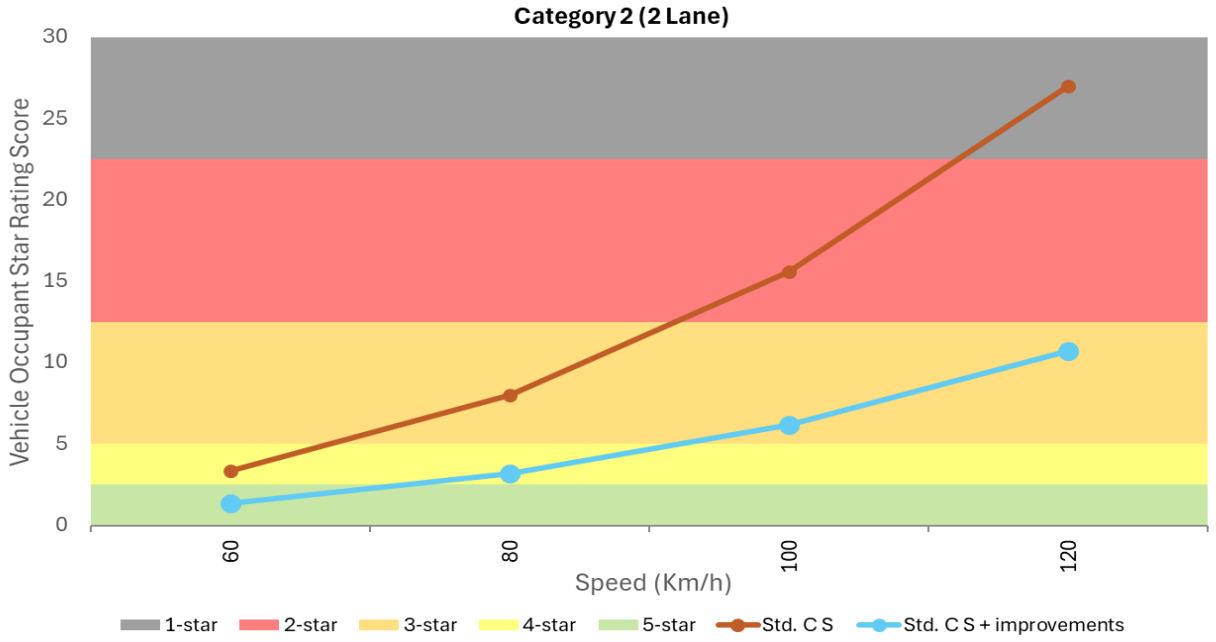
Standard cross section with additional recommended improvements



Recommended improvements	○ **Central hatching median** ○ **Roadside safety barriers** ○ **1.5m wide paved shoulders along both sides**			
Operating Speeds	*60 km/h*	*80 km/h*	*100 km/h*	*120 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.34)*	4 *(3.18)*	3 *(6.20)*	3 *(10.72)*

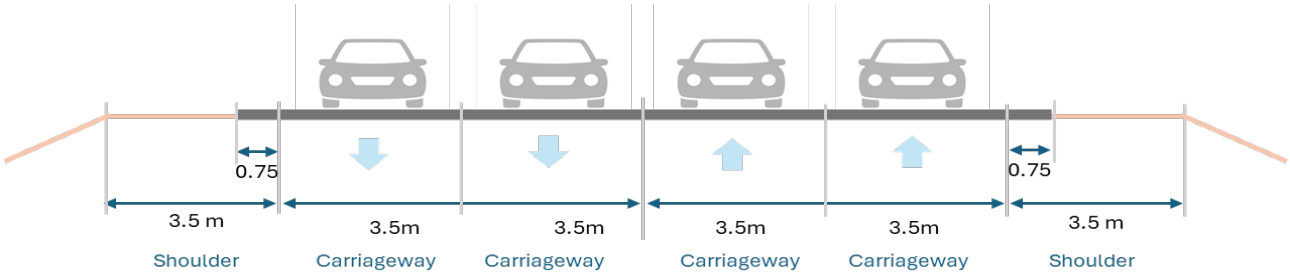
Star Rating – Motorcyclists *(Star Rating Score)*	4 *(2.84)*	3 *(6.74)*	2 *(13.12)*	1 *(22.74)*

Star Rating comparison chart – Vehicle occupants



1.8 Category 2 (4 Lane)

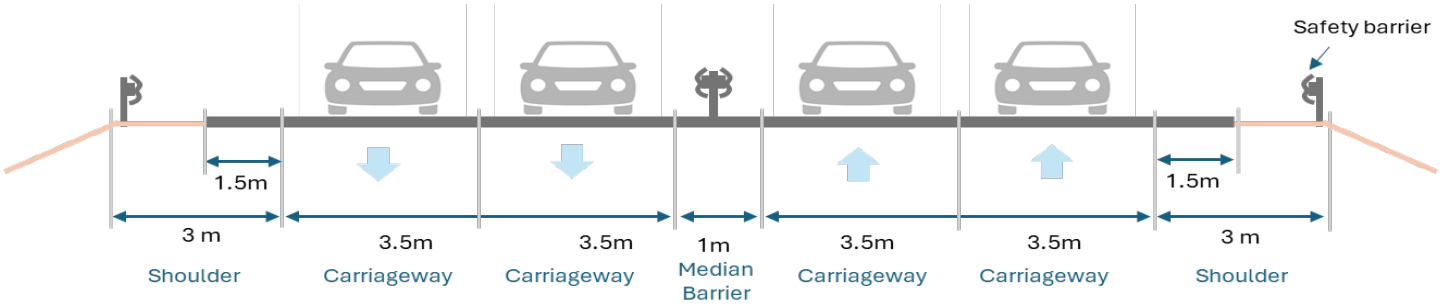
Standard cross section



Key elements:	○ **Single carriageway road with centreline median** ○ **4 lanes, each 3.5m wide** ○ **0.75m wide paved shoulders along both sides**			
Operating Speeds	*60 km/h*	*80 km/h*	*100 km/h*	*120 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	4 *(3.66)*	3 *(8.68)*	2 *(16.91)*	1 *(29.25)*

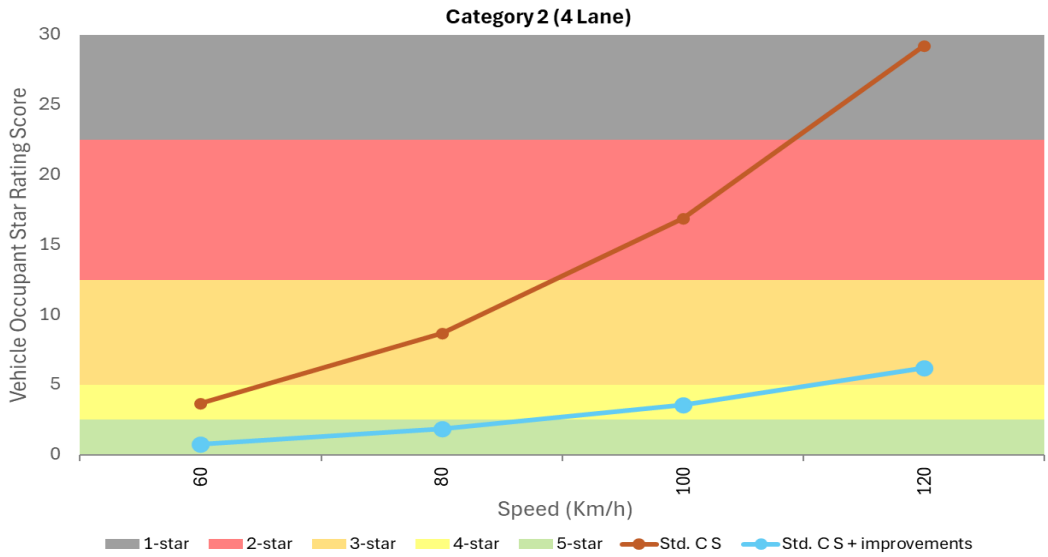
Star Rating – Motorcyclists *(Star Rating Score)*	4 *(4.30)*	3 *(10.20)*	2 *(19.87)*	1 *(34.41)*

Standard cross section with additional recommended improvements



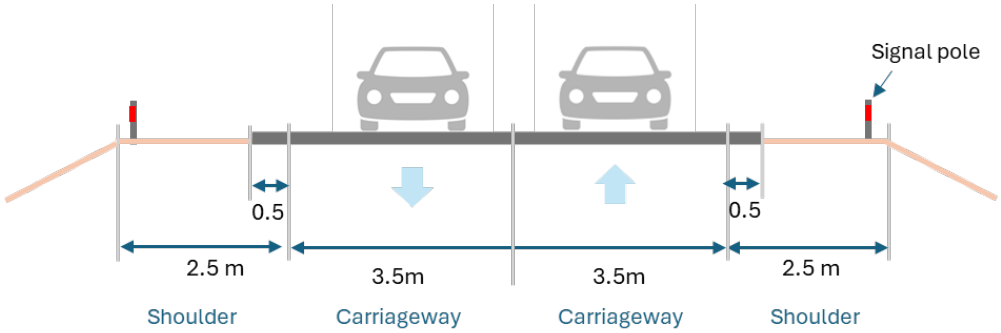
Recommended improvements	○ **Safety barrier median** ○ **Roadside safety barriers** ○ **1.5m wide paved shoulders**			
Operating Speeds	*60 km/h*	*80 km/h*	*100 km/h*	*120 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(0.77)*	5 *(1.84)*	4 *(3.58)*	3 *(6.20)*
Star Rating – Motorcyclists *(Star Rating Score)*	4 *(2.58)*	3 *(6.12)*	3 *(11.92)*	2 *(20.65)*

Star Rating comparison chart – Vehicle occupants



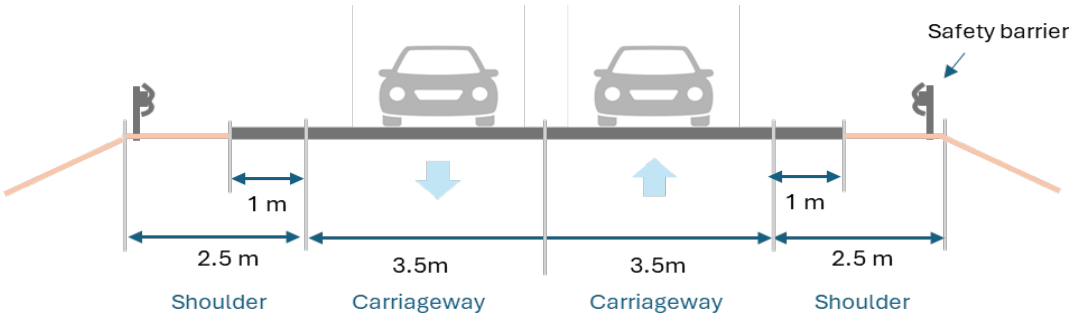
1.9 Category 3

Standard cross section



Key elements:	○ **Single carriageway road with centreline median** ○ **2 lanes, each 3.5m wide** ○ **0.75m wide paved shoulders along both sides**			
Operating Speeds	*60 km/h*	*80 km/h*	*100 km/h*	*120 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	4 *(3.38)*	3 *(8.02)*	2 *(15.62)*	1 *(27.03)*
Star Rating – Motorcyclists *(Star Rating Score)*	4 *(4.02)*	3 *(9.54)*	2 *(18.58)*	1 *(32.19)*

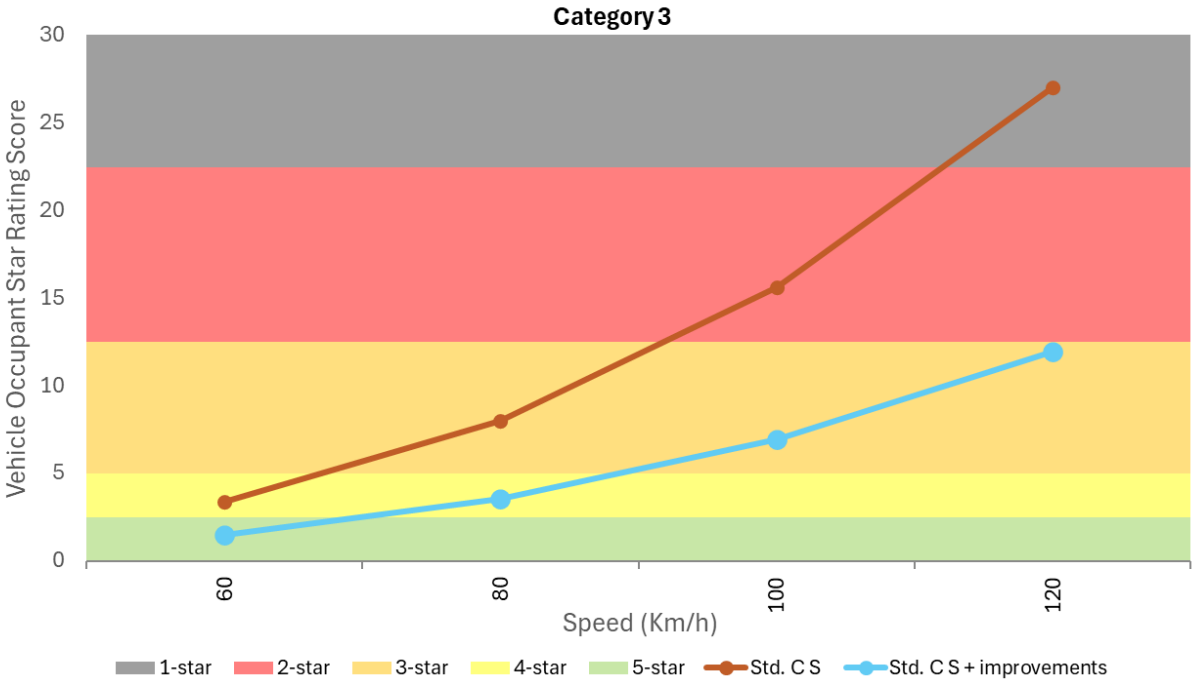
Standard cross section with additional recommended improvements



Recommended improvements	○ **Roadside Safety barriers** ○ **1m wide paved shoulders along both sides**			
Operating Speeds	*60 km/h*	*80 km/h*	*100 km/h*	*120 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.50)*	4 *(3.56)*	3 *(6.93)*	3 *(11.98)*

Star Rating – Motorcyclists *(Star Rating Score)*	4 *(2.99)*	3 *(7.11)*	2 *(13.85)*	1 *(24.00)*

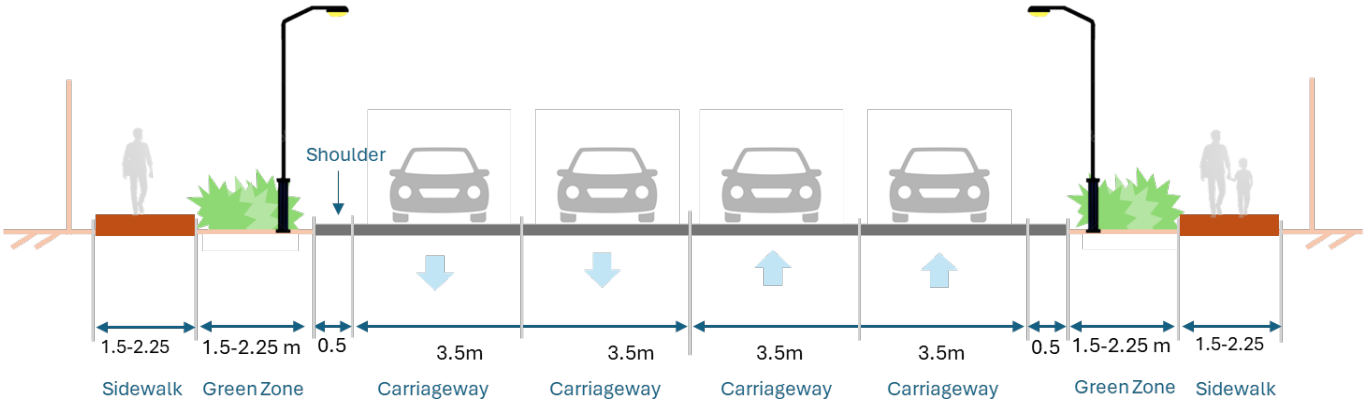
Star Rating comparison chart – Vehicle occupants



2 Star Rating of Urban Cross Sections

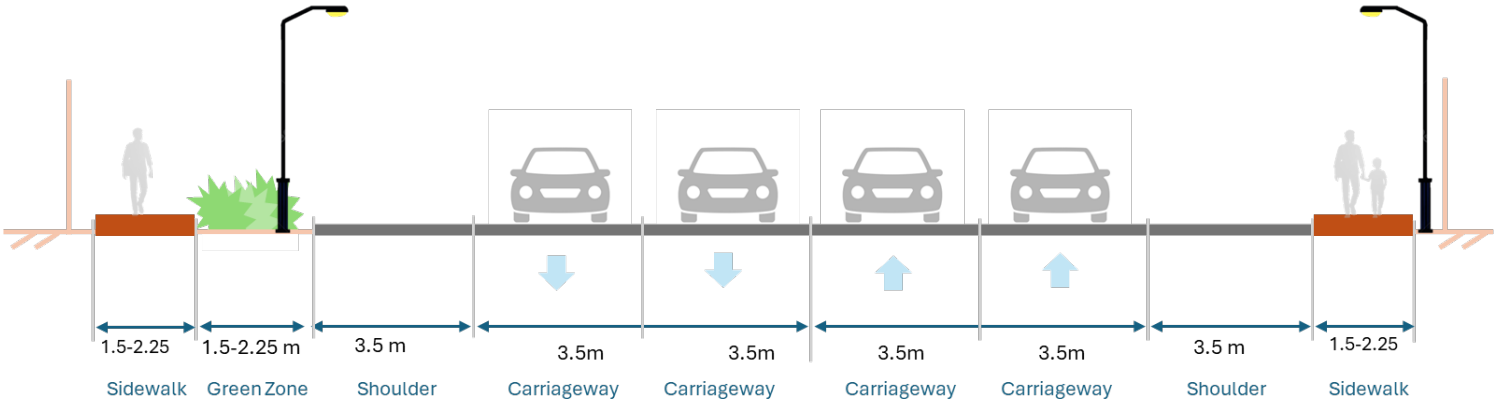
Vehicle occupant, motorcyclist and pedestrian Star Ratings of urban cross sections for Category 2 and Category 3 roads are presented below.

2.1 Category 2: Urban cross section type-1 (4 Lane)



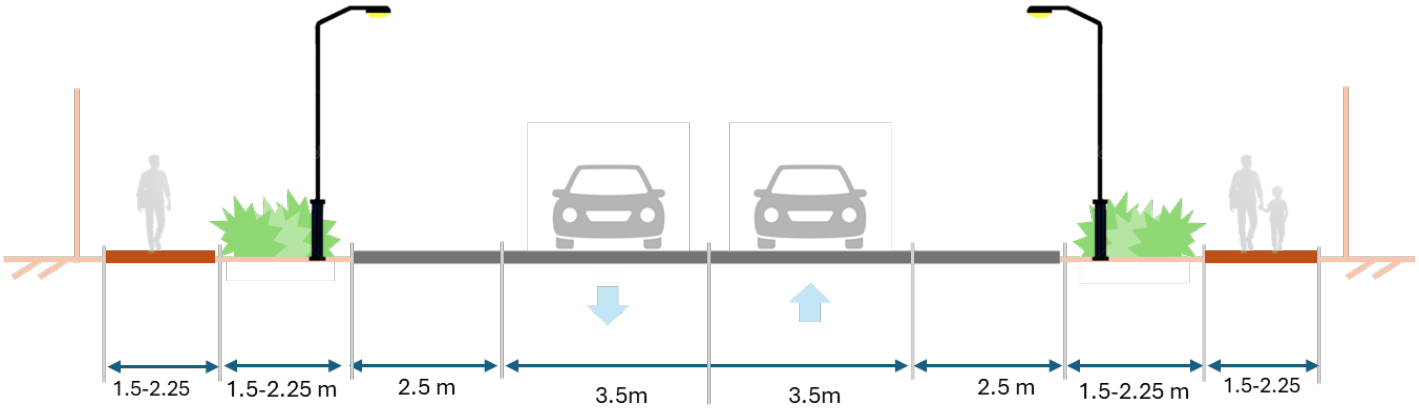
Key elements:	○ **Single carriageway road with 4 lanes, each 3.5m wide** ○ **0.5m wide paved shoulders along both sides** ○ **Pedestrian sidewalks along both sides separated from traffic by green zone** ○ **Street lighting**			
Operating Speeds	*40 km/h*	*60 km/h*	*80 km/h*	*100 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.31)*	4 *(4.40)*	3 *(10.45)*	2 *(20.35)*
Star Rating – Motorcyclists *(Star Rating Score)*	5 *(1.50)*	3 *(5.04)*	3 *(11.97)*	1 *(23.31)*
Star Rating – Pedestrian [without crossing facility] *(Star Rating Score)*	4 *(11.89)*	2 *(54.22)*	1 *(126.75)*	1 *(158.38)*
Star Rating – Pedestrian [with signalised crossing facility] *(Star Rating Score)*	5 *(2.23)*	4 *(10.19)*	3 *(23.81)*	3 *(29.75)*

2.2 Category 2: Urban cross section type-2 (4 Lane)



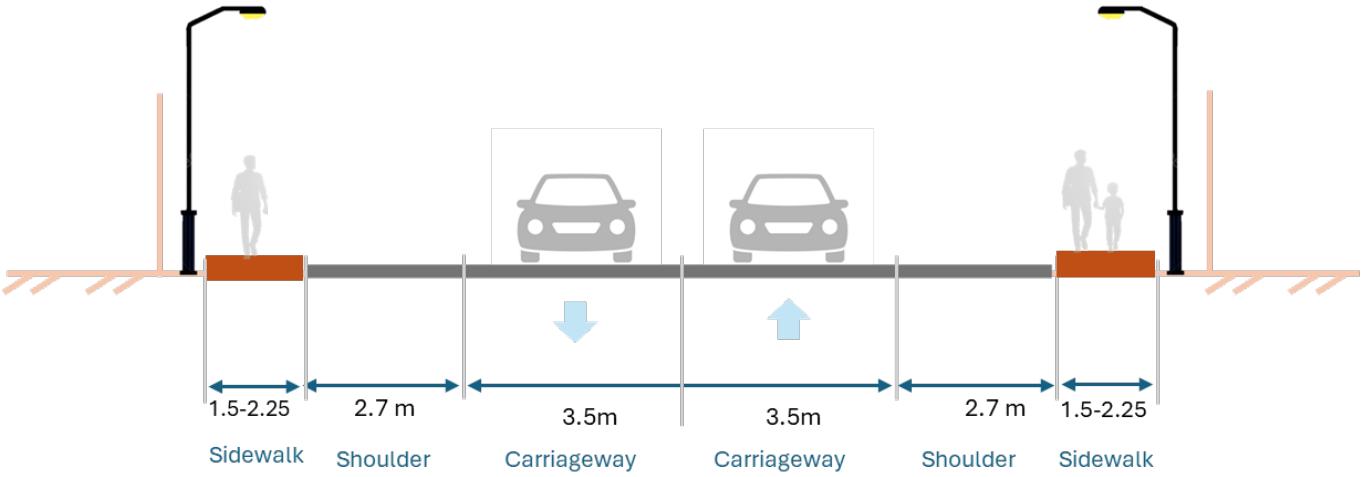
Key elements:	○ **Single carriageway road with 4 lanes, each 3.5m wide** ○ **3.5m wide paved shoulders along both sides** ○ **Pedestrian sidewalks along both sides and green zone on one side** ○ **Street lighting**			
Operating Speeds	*40 km/h*	*60 km/h*	*80 km/h*	*100 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.14)*	4 *(3.84)*	3 *(9.11)*	2 *(17.74)*
Star Rating – Motorcyclists *(Star Rating Score)*	5 *(1.33)*	4 *(4.48)*	3 *(10.63)*	2 *(20.70)*
Star Rating – Pedestrian [without crossing facility] *(Star Rating Score)*	4 *(11.89)*	2 *(54.21)*	1 *(126.72)*	1 *(158.34)*
Star Rating – Pedestrian [with signalised crossing facility] *(Star Rating Score)*	5 *(2.23)*	4 *(10.17)*	3 *(23.78)*	3 *(29.71)*

2.3 Category 3: Urban cross section type-1 (2 Lane)



Key elements:	○ **Single carriageway road with 2 lanes, each 3.5m wide** ○ **2.5m wide paved shoulders along both sides** ○ **Pedestrian sidewalks along both sides separated from traffic by green zone** ○ **Street lighting**			
Operating Speeds	*40 km/h*	*60 km/h*	*80 km/h*	*100 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.06)*	4 *(3.58)*	3 *(8.49)*	2 *(16.54)*
Star Rating – Motorcyclists *(Star Rating Score)*	5 *(1.25)*	4 *(4.22)*	3 *(10.01)*	2 *(19.50)*
Star Rating – Pedestrian [without crossing facility] *(Star Rating Score)*	5 *(4.26)*	3 *(19.46)*	2 *(45.37)*	2 *(56.69)*
Star Rating – Pedestrian [with Table-top type crossing] *(Star Rating Score)*	5 *(2.04)*	4 *(9.31)*	3 *(21.76)*	3 *(27.18)*

2.4 Category 3: Urban cross section type-2 (2 Lane)



Key elements:	○ Single carriageway road with 2 lanes, each 3.5m wide ○ 2.7m wide paved shoulders along both sides ○ Pedestrian sidewalks along both sides ○ Street lighting			
Operating Speeds	*40 km/h*	*60 km/h*	*80 km/h*	*100 km/h*
Star Rating – Vehicle occupant *(Star Rating Score)*	5 *(1.06)*	4 *(3.58)*	3 *(8.49)*	2 *(16.54)*
Star Rating – Motorcyclists *(Star Rating Score)*	5 *(1.25)*	4 *(4.22)*	3 *(10.01)*	2 *(19.50)*
Star Rating – Pedestrian [without crossing facility] *(Star Rating Score)*	5 *(4.26)*	3 *(19.42)*	2 *(45.40)*	2 *(56.73)*
Star Rating – Pedestrian [with Table-top type crossing] *(Star Rating Score)*	5 *(2.04)*	4 *(9.32)*	3 *(21.79)*	3 *(27.23)*

3 Conclusion

The iRAP Star Rating assessment of standard cross sections highlights the critical role that road design plays in determining safety outcomes, particularly in relation to vehicle operating speeds. The analysis shows that as speed increases, the risk of serious and fatal crashes rises significantly. Roads designed to accommodate high-speed travel without adequate safety features contribute to higher crash severity, emphasizing the need for updated design standards and effective speed management strategies and speed limit enforcement. The findings highlight that road designs incorporating internationally recognized best practice safety elements such as traffic-calming measures, median separation, roadside safety barriers and adequate paved shoulder width can significantly improve the Star Ratings and are essential to reducing the likelihood of severe crashes.

Furthermore, road safety must be considered within an inclusive framework that protects all road users, not just vehicle occupants. Vulnerable road users, including pedestrians, cyclists, and motorcyclists, face disproportionately high risks in road environments that prioritize vehicle efficiency over safety. Designing roads with segregated facilities, pedestrian crossings, and dedicated lanes for non-motorized transport ensures safer, more accessible travel for all. Future road design standards should integrate these elements to create equitable and sustainable transport networks that support mobility while reducing injuries and fatalities.

By implementing the recommended design improvements, roads in the participating project countries can achieve higher safety standards, benefiting all road users. The results underscore the importance of adopting safer road infrastructure to align with global best practices and enhance overall road safety. Continued investment in evidence-based road design improvements will contribute to reducing road crash fatalities and serious injuries, supporting national and international road safety goals.