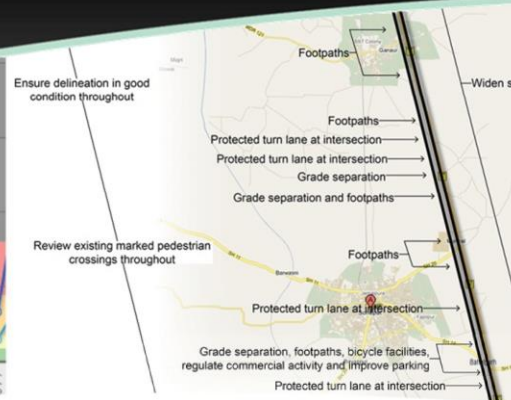


iRAP Methodology Fact Sheet #9

Star Rating worked example



This factsheet is part of a series that describes the iRAP methodology. It includes a worked example of the way in which Star Ratings are calculated.

Related documents

This factsheet should be read in conjunction with:

- Other factsheets in the [iRAP Methodology Fact Sheet](#) series.
- [iRAP Road Attribute Risk Factor Fact Sheets](#).
- [Road Safety Toolkit](#).

Example road

This worked example is based on the 100 metre segment of road shown in the image below.



Supporting data

Attribute	Data / category
Vehicle flow (AADT)	15000
Motorcycle %	21% - 40%
Pedestrian peak hour flow across the road	26 to 50
Pedestrian peak hour flow along the road driver-side	101 to 200
Pedestrian peak hour flow along the road passenger-side	101 to 200
Bicycle peak hour flow	51 to 100
Speed - 85th percentile	50km/h

Vehicle occupant Star Rating Scores

Run-off road (driver side)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Lane Width	Narrow ($\geq 0\text{m}$ to $< 2.75\text{m}$)	1.10	
Curvature	Straight or gently curving	1.00	
Quality of curve	Not applicable	1.00	
Delineation	Poor	1.20	
Shoulder rumble strips	Not present	1.25	
Road condition	Good	1.00	
Grade	0% to $< 7.5\%$	1.00	
Skid resistance / grip	Sealed - medium	1.40	
<i>Product of road attribute (likelihood) risk factors</i>			2.310
Road attribute (severity)			
Roadside severity - distance	$\geq 10\text{m}$	0.100	
Roadside severity - object	Tree $\geq 10\text{cm}$	60.000	
Paved shoulder width	None	1.000	
<i>Product of road attribute (severity) risk factors</i>			6.000
External flow influence	15000 vehicles per day		0.500
Median traversability	Traversable		1.000
Operating speed	50km/h		0.064
Run-off road (driver side) Star Rating Score			0.444

Run-off road (passenger side)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Lane Width	Narrow ($\geq 0\text{m}$ to $< 2.75\text{m}$)	1.10	
Curvature	Straight or gently curving	1.00	
Quality of curve	Not applicable	1.00	
Delineation	Poor	1.20	
Shoulder rumble strips	Not present	1.25	
Road condition	Good	1.00	
Grade	0% to $< 7.5\%$	1.00	
Skid resistance / grip	Sealed - medium	1.40	
<i>Product of road attribute (likelihood) risk factors</i>			2.310
Road attribute (severity)			
Roadside severity - distance	1 to $< 5\text{m}$	0.80	

Roadside severity - object	Tree \geq 10cm	60.00	
Paved shoulder width	None	1.00	
<i>Product of road attribute (severity) risk factors</i>			48.000
External flow influence	15000 vehicles per day		0.500
Operating speed	50km/h		0.064
Run-off road (driver side) Star Rating Score			3.548

Head-on (loss-of-control)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Lane Width	Narrow (\geq 0m to $<$ 2.75m)	1.10	
Curvature	Straight or gently curving	1.00	
Quality of curve	Not applicable	1.00	
Delineation	Poor	1.20	
Centreline rumble strips	Not present	1.20	
Road condition	Good	1.00	
Grade	0% to $<$ 7.5%	1.00	
Skid resistance / grip	Sealed - medium	1.40	
<i>Product of road attribute (likelihood) risk factors</i>			2.218
Road attribute (severity)			
Median type	Physical median width \geq 0m to $<$ 1.0m	90.00	
<i>Product of road attribute (severity) risk factors</i>			90.000
External flow influence	15000 vehicles per day		0.185
Median traversability	Traversable		1.000
Operating speed	50km/h		0.021
Head-on (loss-of-control) Star Rating Score			0.775

Head-on (overtaking)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Grade	0% to $<$ 7.5%	1.00	
Skid resistance / grip	Sealed - medium	1.40	
Differential speeds	Present	1.20	
Number of lanes	Two	0.02	
<i>Product of road attribute (likelihood) risk factors</i>			0.034
Road attribute (severity)			
Median type	Physical median width \geq 0m to $<$ 1.0m	0.00	
<i>Product of road attribute (severity) risk factors</i>			0.000
External flow influence	15000 vehicles per day		0.000
Operating speed	50km/h		0.021
Head-on (overtaking) Star Rating Score			0.000

Intersection

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Intersection type	3-leg unsignalised with no protected turn lane	16.00	
Intersection quality	Poor	1.20	
Grade	0% to $<$ 7.5%	1.00	
Street lighting	Not present	1.15	
Skid resistance / grip	Sealed - medium	1.40	

Sight distance	Adequate	1.00	
Intersection channelisation	Not present	1.20	
Speed management / traffic calming	Not present	1.25	
<i>Product of road attribute (likelihood) risk factors</i>			46.368
Road attribute (severity)			
Intersection type	3-leg unsignalised with no protected turn lane	45.00	
<i>Product of road attribute (severity) risk factors</i>			45.000
External flow influence	1,000 to 5,000 vehicles		0.125
Operating speed	50km/h		0.064
Intersection Star Rating Score			16.692

Property access

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Property access points	Commercial Access 1+	2.00	
Median type	Physical median width $\geq 0\text{m}$ to $< 1.0\text{m}$	0.70	
Service road	Not present	1.50	
<i>Product of road attribute (likelihood) risk factors</i>			2.100
Road attribute (severity)			
Property access points	Commercial Access 1+	50.00	
<i>Product of road attribute (severity) risk factors</i>			50.000
External flow influence	External flow influence - Default flow		0.010
Operating speed	50km/h		0.064
Intersection Star Rating Score			0.067

Vehicle occupant Star Rating Score and Star Rating

Crash type	Star Rating Score	Star Rating
Run-off road (driver side)	0.444	
Run-off road (passenger side)	3.548	
Head-on (loss-of-control)	0.775	
Head-on (overtaking)	0.000	
Intersection	16.692	
Property access	0.067	
Total Score / Star Rating	21.527	2

Motorcyclist Star Rating Scores

Run-off road (driver side)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Lane Width	Narrow ($\geq 0\text{m}$ to $< 2.75\text{m}$)	1.10	
Curvature	Straight or gently curving	1.00	
Quality of curve	Not applicable	1.00	
Delineation	Poor	1.20	
Shoulder rumble strips	Not present	1.25	
Road condition	Good	1.00	
Grade	0% to $< 7.5\%$	1.00	
Skid resistance / grip	Sealed - medium	1.60	

<i>Product of road attribute (likelihood) risk factors</i>			2.640
Road attribute (severity)			
Roadside severity - distance	≥ 10m	0.10	
Roadside severity - object	Tree ≥ 10cm	60.00	
Paved shoulder width	None	1.00	
<i>Product of road attribute (severity) risk factors</i>			6.000
External flow influence	15000 vehicles per day		0.500
Median traversability	Traversable		1.000
Operating speed	50km/h		0.064
Run-off road (driver side) Star Rating Score			0.507

Run-off road (passenger side)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Lane Width	Narrow (≥ 0m to < 2.75m)	1.10	
Curvature	Straight or gently curving	1.00	
Quality of curve	Not applicable	1.00	
Delineation	Poor	1.20	
Shoulder rumble strips	Not present	1.25	
Road condition	Good	1.00	
Grade	0% to < 7.5%	1.00	
Skid resistance / grip	Sealed - medium	1.60	
<i>Product of road attribute (likelihood) risk factors</i>			2.640
Road attribute (severity)			
Roadside severity - distance	1 to <5m	0.80	
Roadside severity - object	Tree ≥ 10cm	60.00	
Paved shoulder width	None	1.00	
<i>Product of road attribute (severity) risk factors</i>			48.000
External flow influence	15000 vehicles per day		0.500
Operating speed	50km/h		0.064
Run-off road (driver side) Star Rating Score			4.055

Head-on (loss-of-control)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Lane Width	Narrow (≥ 0m to < 2.75m)	1.10	
Curvature	Straight or gently curving	1.00	
Quality of curve	Not applicable	1.00	
Delineation	Poor	1.20	
Centreline rumble strips	Not present	1.20	
Road condition	Good	1.00	
Grade	0% to < 7.5%	1.00	
Skid resistance / grip	Sealed - medium	1.60	
<i>Product of road attribute (likelihood) risk factors</i>			2.534
Road attribute (severity)			
Median type	Physical median width ≥ 0m to < 1.0m	90.00	
<i>Product of road attribute (severity) risk factors</i>			90.000
External flow influence	15000 vehicles per day		0.185
Median traversability	Traversable		1.000
Operating speed	50km/h		0.021
Head-on (loss-of-control) Star Rating Score			0.886

Head-on (overtaking)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Grade	0% to < 7.5%	1.00	
Skid resistance / grip	Sealed - medium	1.60	
Differential speeds	Present	1.20	
Number of lanes	Two	0.02	
<i>Product of road attribute (likelihood) risk factors</i>			<i>0.038</i>
Road attribute (severity)			
Median type	Physical median width \geq 0m to < 1.0m	0.00	
<i>Product of road attribute (severity) risk factors</i>			<i>0.000</i>
External flow influence	15000 vehicles per day		<i>0.000</i>
Operating speed	50km/h		<i>0.064</i>
Head-on (overtaking) Star Rating Score			0.000

Intersection

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Intersection type	3-leg unsignalised with no protected turn lane	20.00	
Intersection quality	Poor	1.20	
Grade	0% to < 7.5%	1.00	
Street lighting	Not present	1.15	
Skid resistance / grip	Sealed - medium	1.60	
Sight distance	Adequate	1.00	
Intersection channelisation	Not present	1.20	
Speed management / traffic calming	Not present	1.25	
<i>Product of road attribute (likelihood) risk factors</i>			<i>66.240</i>
Road attribute (severity)			
Intersection type	3-leg unsignalised with no protected turn lane	45.00	
<i>Product of road attribute (severity) risk factors</i>			<i>45.000</i>
External flow influence	1,000 to 5,000 vehicles		<i>0.125</i>
Operating speed	50km/h		<i>0.064</i>
Intersection Star Rating Score			23.846

Property access

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Property access points	Commercial Access 1+	1.10	
Service road	Not present	1.50	
<i>Product of road attribute (likelihood) risk factors</i>			<i>1.650</i>
Road attribute (severity)			
Property access points	Commercial Access 1+	50.00	
<i>Product of road attribute (severity) risk factors</i>			<i>50.000</i>
External flow influence	External flow influence - Default flow		<i>0.010</i>
Operating speed	50km/h		<i>0.064</i>
Intersection Star Rating Score			0.053

Along

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Motorcycle facilities	None	2.00	
<i>Product of road attribute (likelihood) risk factors</i>			<i>2.000</i>
Road attribute (severity)			
Motorcycle facilities	None	50.00	
<i>Product of road attribute (severity) risk factors</i>			<i>50.000</i>
External flow influence	External flow influence - non M/C AADT per Lane		<i>0.100</i>
Operating speed	50km/h		<i>0.064</i>
Intersection Star Rating Score			0.640

Motorcyclist Star Rating Score and Star Rating

Crash type	Star Rating Score	Star Rating
Run-off road (driver side)	0.507	
Run-off road (passenger side)	4.055	
Head-on (loss-of-control)	0.886	
Head-on (overtaking)	0.000	
Intersection	23.846	
Property access	0.053	
Along	0.640	
Total Score / Star Rating	29.987	1

Bicyclist Star Rating Scores

Along

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Bicycle facility	None	20.00	
Curvature	Straight or gently curving	1.00	
Quality of curve	Not applicable	1.00	
Sight distance	Adequate	1.00	
Lane Width	Narrow ($\geq 0\text{m}$ to $< 2.75\text{m}$)	1.10	
Delineation	Poor	1.20	
Grade	0% to $< 7.5\%$	1.00	
Road condition	Good	1.00	
Speed management / traffic calming	Not present	1.25	
Shoulder rumble strips	Not present	1.25	
Vehicle parking	One side	1.20	
Skid resistance / grip	Sealed - medium	1.60	
Street lighting	Not present	1.25	
<i>Product of road attribute (likelihood) risk factors</i>			<i>99.000</i>
Road attribute (severity)			
Bicycle facility	Road attribute (likelihood)	90.00	
<i>Product of road attribute (severity) risk factors</i>			<i>90.000</i>
External flow influence	15000 vehicles per day		<i>0.030</i>
Operating speed	50km/h		<i>0.140</i>
Along Star Rating Score			37.422

Run-off

Type of risk factor	Category	Risk factor	Score
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Road attribute (likelihood)			
Lane Width	Narrow ($\geq 0\text{m}$ to $< 2.75\text{m}$)	1.10	
Curvature	Straight or gently curving	1.00	
Quality of curve	Not applicable	1.00	
Delineation	Poor	1.20	
Street lighting	Not present	1.25	
Road condition	Good	1.00	
Grade	0% to $< 7.5\%$	1.00	
Skid resistance / grip	Sealed - medium	1.60	
<i>Product of road attribute (likelihood) risk factors</i>			2.640
Road attribute (severity)			
Roadside severity - driver-side distance	$\geq 10\text{m}$	0.01	
Roadside severity - driver-side object	Tree $\geq 10\text{cm}$	60.00	
Roadside severity - passenger-side distance	1 to $< 5\text{m}$	0.60	
Roadside severity - passenger-side object	Tree $\geq 10\text{cm}$	60.00	
<i>Product of road attribute (severity) risk factors (and average of driver and passenger sides)</i>			18.300
External flow influence	15000 vehicles per day		0.030
Operating speed	50km/h		0.011
Run-off Star Rating Score			0.016

Intersection

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Intersection type	3-leg unsignalised with no protected turn lane	55.00	
Intersection quality	Poor	1.20	
Grade	0% to $< 7.5\%$	1.00	
Skid resistance / grip	Sealed - medium	1.60	
Bicycle facility	None	1.20	
Street lighting	Not present	1.25	
Sight distance	Adequate	1.00	
Intersection channelisation	Not present	1.20	
Speed management / traffic calming	Not present	1.25	
Pedestrian crossing facilities - inspected road	No facility	1.00	
<i>Product of road attribute (likelihood) risk factors</i>			237.600
Road attribute (severity)			
Intersection type	3-leg unsignalised with no protected turn lane	45.00	
<i>Product of road attribute (severity) risk factors</i>			45.000
External flow influence	1,000 to 5,000 vehicles		0.020
Operating speed	50km/h		0.140
Intersection Star Rating Score			29.938

Bicyclist Star Rating Score and Star Rating

Crash type	Star Rating Score	Star Rating
Along	37.422	
Run-off	0.016	
Intersection	29.938	
Total Score / Star Rating	67.376	1

Pedestrian Star Rating Scores

Along (driver side)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Sidewalk - driver-side	None	20.00	
Curvature	Straight or gently curving	1.00	
Quality of curve	Not applicable	1.00	
Sight distance	Adequate	1.00	
Lane Width	Narrow ($\geq 0\text{m}$ to $< 2.75\text{m}$)	1.10	
Delineation	Poor	1.20	
Grade	0% to $< 7.5\%$	1.00	
Road condition	Good	1.00	
Speed management / traffic calming	Not present	1.25	
Vehicle parking	One side	1.20	
Shoulder rumble strips	Not present	1.25	
Skid resistance / grip	Sealed - medium	1.40	
Street lighting	Not present	1.25	
<i>Product of road attribute (likelihood) risk factors</i>			86.625
Road attribute (severity)			
Sidewalk - driver-side	None	90.00	
<i>Product of road attribute (severity) risk factors</i>			90.000
External flow influence	15000 vehicles per day		0.030
Operating speed	50km/h		0.228
Along (driver side) Star Rating Score			53.326

Along (passenger side)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Sidewalk - passenger-side	Informal path 0m to $< 1.0\text{m}$	6.00	
Curvature	Straight or gently curving	1.00	
Quality of curve	Not applicable	1.00	
Sight distance	Adequate	1.00	
Lane Width	Narrow ($\geq 0\text{m}$ to $< 2.75\text{m}$)	1.10	
Delineation	Poor	1.20	
Grade	0% to $< 7.5\%$	1.00	
Road condition	Good	1.00	
Speed management / traffic calming	Not present	1.25	
Vehicle parking	One side	1.20	
Shoulder rumble strips	Not present	1.25	
Skid resistance / grip	Sealed - medium	1.40	
Street lighting	Not present	1.25	
<i>Product of road attribute (likelihood) risk factors</i>			25.988
Road attribute (severity)			
Sidewalk - passenger-side	Informal path 0m to $< 1.0\text{m}$	90.00	
<i>Product of road attribute (severity) risk factors</i>			90.000
External flow influence	15000 vehicles per day		0.030
Operating speed	50km/h		0.228
Along (passenger side) Star Rating Score			15.998

Crossing (inspected road)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Number of lanes	Two	2.80	

Median type	Physical median width $\geq 0\text{m}$ to $< 1.0\text{m}$	1.60	
Pedestrian crossing facilities - inspected road	No facility	6.70	
Pedestrian crossing quality	Not applicable	1.00	
Intersection type	3-leg unsignalised with no protected turn lane	1.10	
Intersection quality	Poor	1.20	
Pedestrian fencing	Not present	1.25	
Skid resistance / grip	Sealed - medium	1.40	
Street lighting	Not present	1.25	
Sight distance	Adequate	1.00	
Vehicle parking	One side	1.20	
Speed management / traffic calming	Not present	1.25	
<i>Product of road attribute (likelihood) risk factors</i>			130.007
Road attribute (severity)			
Pedestrian crossing facilities - inspected road	No facility	90.00	
<i>Product of road attribute (severity) risk factors</i>			90.000
External flow influence	External flow influence - through vehicle flow per lane		0.030
Operating speed	50km/h		0.228
Crossing (inspected road) Star Rating Score			80.032

Crossing (side road)

Type of risk factor	Category	Risk factor	Score
Road attribute (likelihood)			
Number of lanes	One	1.00	
Median type	Physical median width $\geq 0\text{m}$ to $< 1.0\text{m}$	3.00	
Pedestrian crossing facilities - side road	No facility	6.70	
Pedestrian crossing quality	Not applicable	1.00	
Intersection type	3-leg unsignalised with no protected turn lane	1.10	
Intersection quality	Poor	1.20	
Pedestrian fencing	Not present	1.25	
Skid resistance / grip	Sealed - medium	1.40	
Street lighting	Not present	1.25	
Sight distance	Adequate	1.00	
Vehicle parking	One side	1.20	
Speed management / traffic calming	Not present	1.25	
<i>Product of road attribute (likelihood) risk factors</i>			87.058
Road attribute (severity)			
Pedestrian crossing facilities - side road	No facility	90.00	
<i>Product of road attribute (severity) risk factors</i>			90.000
External flow influence	External flow influence - through vehicle flow per lane		0.020
Operating speed	50km/h		0.228
Crossing (side road) Star Rating Score			35.729

Pedestrian Star Rating Score and Star Rating

Crash type	Star Rating Score	Star Rating
Along (driver side)	53.326	
Along (passenger side)	15.998	
Along (average of driver and passenger sides)	34.662	
Crossing (inspected road)	80.032	

Crossing (side road)	35.729	
Total Score / Star Rating	150.423	1

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