

A14 Accident cost savings

Introduction

This appendix provides accident rate analysis worksheets that may be used in place of worksheet A6.4 (volume 1) for routes consisting of a number of road sections of different types.

The worksheets in this appendix should be read in conjunction with appendix A6 in volume 1.

Worksheet	Description
A6.7a	Accident rate analysis – urban routes
A6.7b	Accident rate analysis – urban routes
A6.8a	Accident rate analysis – rural routes
A6.8b	Accident rate analysis – rural routes

A14 Accident cost savings, continued

Explanation sheet for worksheet A6.7a

Accident rate analysis - urban routes

Worksheets A6.7a and b may be used for accident rate analysis in place of worksheet A6.4 for urban routes consisting of a number of road types. One set of worksheets A6.7a and b shall be used for each option.

Worksheet A6.7a

1	Mid-block road type	Break the urban route being analysed into the various mid-block types, in accordance with the official road hierarchy in the urban area. An urban route has a commercial land use when over 50 percent of the adjoining land use is either commercial or industrial, otherwise it is an 'other' land use. Where possible separate out mid-block sections in commercial and industrial areas.
2	AADT range	Checked that the traffic flow in each mid-block section falls within the AADT range specified. Where traffic flows are outside these ranges then this should be specified in the evaluation report, as this will affect the accuracy of the evaluation.
3	Length in km (L)	Enter the length of mid-block section of each road type. If there is a significant difference in traffic flows on various mid-block sections of each road type then add extra rows to bottom of table.
4	Current AADT, Q_c	Enter average annual daily traffic (AADT) volume for do minimum at time zero. Where AADTs vary between mid-block sections, use the average.
5	AADT after implementation, Q_d	Enter average annual daily traffic (AADT) volume for each option at time zero. Where AADTs vary between mid-block sections, use the average.
6	Do minimum link accident rate, A_c	For each mid-block road type calculate do minimum accident rate (A_c) using current AADT (Q_c) and equation provided. Transfer A_c volumes to worksheet A6.7b.
7	Option link accident rate, A_d	For each mid-block road type calculate option accident rate (A_d) using AADT after implementation (Q_d) and equation provided. Transfer A_d to worksheet A6.7b.

A14 Accident cost savings, continued

Accident rate analysis - urban routes

Worksheet A6.7a

Option: _____

Mid-block road type	AADT range	Length in km	Current AADT	AADT after implementation	Parameter	Parameter	Do minimum link accident rate	Option link accident rate
		L	Q_c	Q_d	b_0	b_1	$A_c = b_0 Q_c b_1 L$	$A_d = b_0 Q_d b_1 L$
Local street	< 3,000				2.87 E-04	0.98		
Collector – Commercial land use	2,000 – 8,000				2.55 E-05	1.08		
Collector – Other land use	2,000 – 8,000				3.93 E-05	1.08		
2 and 4 lane arterial – Commercial land use	3,000 – 24,000				8.71 E-06	1.20		
2 and 4 lane arterial – Other land use	3,000 – 24,000				1.52 E-04	0.88		
Motorway (each direction)	15,000 – 68,000				3.08 E-07	1.45		

A14 Accident cost savings, continued

Explanation sheet for worksheet A6.7b

Accident rate analysis - urban routes

8	Change in link accident rate, A_L	For each mid-block road type calculate the difference between the do minimum (A_c) and option (A_d) accident rates.
9	Intersection adjustment factor	For collectors and arterials add in the accident rate for intersections by multiplying mid-block accident rates by 2.0. This assumes that approximately 50 percent of accidents occur at intersections. If there is information that is contrary to this assumption then it is permissible, with supporting evidence, to use a factor other than 2.0.
10	Cost per reported injury accident, A_z	Obtain cost per reported injury accident from table A6.13 'all other sites' in appendix A6 of volume 1. Where there is more than one speed limit for each road type, then use the cost associated with most prevalent speed limit. Alternatively, break road types into each speed limit zone.
11	Accident cost per link type, C	Calculate accident cost per link type using the change in accident rate, adjusted for intersections (A_T) and cost per reported injury accident (A_z).
12	Accident cost saving for urban section of proposal per year	Sum the accident cost per link type (C) to obtain the accident cost saving for the urban section of the proposal per year. If extra worksheets used or rows added to bottom of table then all values need to be summed.

A14 Accident cost savings, continued

Accident rate analysis - urban routes

Worksheet A6.7b

Option: _____

Mid-block road type	Do minimum accident rate A_c (from worksheet A6.7a)	Option rate A_d (from worksheet A6.7a)	Change in link accident rate $A_L = A_c - A_d$	Intersection adjustment factor $A_T = A_L \times 2$	Cost per reported injury accident A_Z table A6.13	Accident cost per link type $C = A_T \times A_Z$
Local street				$A_T = A_L$		
Collector – Commercial land use						
Collector – Other land use						
2 and 4 lane arterial – Commercial land use						
2 and 4 lane arterial – Other land use						
Motorway (each direction)				$A_T = A_L$		
Accident cost saving for urban section of proposal per year						

A14 Accident cost savings, continued

Explanation sheet for worksheet A6.8a

Accident rate analysis - rural routes

Worksheets A6.8a and b may be used for accident rate analysis in place of worksheet A6.4 for rural routes consisting of a number of different terrain and AADT volume types. One set of worksheets A6.8a and b shall be used for each option.

Worksheet A6.8a

1	Name of road section	Break the rural route up into a number of sections, according to terrain type (flat, rolling and mountainous) and average annual daily traffic (AADT) volume (see 2 and 3). This is repeated in worksheet A6.8b.
2	AADT	Specify the AADT for each rural road section. A distinction should be made between road sections with $AADT < 4,000$ and those with $AADT \geq 4,000$, as different accident rates apply. This is repeated in worksheet A6.8b.
3	Terrain type	Specify the terrain type for each rural road section. A road section is specified as flat when the gradient typically varies from zero to three percent. A road section is rolling when the gradient is typically in the range three to six percent. Above six percent the terrain type is mountainous. In mountainous sections, low gradients, between three and six percent, are acceptable, as long as they are short and occur within a predominantly mountainous section of road.
4	Current number of heavy commercial vehicles (HCVs) per day, T_c	For each road section specify the current number of HCVs per day from classified traffic counts.
5	Number of heavy commercial vehicle (HCVs) after implementation, T_d	For each road section calculate the number of HCVs that will be removed from the rural route (generally this will be the same over the entire route). Subtract this from the current number of HCVs per day to get the number of HCVs after implementation of the proposal.
6	Length in km, L	Calculate the length of each road section.
7	Do minimum truck exposure, X_c	The do minimum truck exposure is the current number of HCV kilometres of travel per year for each road section, expressed in 100 million HCV kilometres of travel. It is calculated using the formula provided.
8	Option truck exposure, X_d	The option heavy vehicle exposure is the number of HCV kilometres of travel per year on each road section following implementation of the proposal. It is also expressed in 100 million HCV kilometres of travel. It is calculated using the formula provided.

A14 Accident cost savings, continued

Explanation sheet for worksheet A6.8b

Accident rate analysis - rural routes

9	Accident rate parameter, b_0	The accident rate parameter b_0 , for each road section is selected from table A6.5c below, based on terrain type and AADT.
10	Do minimum injury accidents per year, A_c	The do minimum injury accident rate per year is calculated by multiplying the accident rate parameter, b_0 , by the do minimum HCV exposure (X_d).
11	Option injury accidents per year, A_d	The option injury accident rate per year is calculated by multiplying the accident rate parameter, b_0 , by the option HCV exposure (X_d).
12	Change in link accident rate, A_L	The change in the link accident rate is the difference between the do minimum and option injury accident rate per year (from steps 10 and 11).
13	Cost per reported injury accident, A_z	Obtain cost per reported injury accident from table A6.13 'all other sites' in appendix A6 of volume 1. Where there is more than one speed limit in each road section, use cost associated with the most prevalent speed limit. Alternatively, break route up into further sections by speed limit.
14	Accident cost per section, C	Calculate accident cost per road section using the change in accident rate (12) and cost per reported injury accident (13).
15	Accident cost saving for rural section of proposal per year	Sum the accident cost per road section type (C) to obtain accident cost savings for the rural section of the proposal per year.

Heavy vehicle reported injury accidents/year = b_0X

Where X is the exposure in 100 million vehicle kilometres, and the coefficient b_0 is given in the following table.

Table A6.5c Rural mid-block equation coefficients (b_0) by terrain type for heavy vehicle accidents

AADT	Level (0 to 3%)	Rolling (3 to 6%)	Mountainous (>6%)
≤ 4,000	20	42	52
> 4,000	20	20	43

