

2019 Standardized Crash Cost Estimates for North Carolina

Rounded to nearest thousand (with exception of PDO)

The Transportation Mobility and Safety Division periodically updates costs associated with traffic crashes for use by division personnel for cost analyses. Starting with the 2017 update, the division is now using the final recommendation from FHWA’s *Crash Costs for Highway Safety Analysis*. The comprehensive crash costs presented in this guide are based on the values provided in the FHWA report. These provided values have not been updated since the report’s initial release in January 2018.

Table 1a Cost per Crash – Total Crashes

Crash Type	Cost Per Crash 2019 Dollars
Fatal Crash	\$10,310,000
A Injury Crash	\$613,000
B Injury Crash	\$206,000
C Injury Crash	\$120,000
Property Damage Only Crash	\$12,500
Average Crash	\$106,000
Injury Crash (F+A+B+C)	\$338,000
Non-Fatal Injury Crash (A+B+C)	\$168,000
Severe Injury Crash (F+A)	\$3,123,000
Moderate Injury Crash (B+C)	\$145,000

The crash costs were also summarized for urban and rural areas. The crash cost for each severity category is very similar across the board for urban, rural, and combined (Total) categories. There is little change because the number of injuries per crash for each severity category changes very little when looking at rural and urban crashes. The big difference comes in the average costs. The average rural crash costs are higher because severe crashes make up a higher percentage of the total rural crashes when compared to the urban crash costs.

Table 2 Crash Costs for Urban and Rural Area

Crash Type	Rural	Urban
	Cost Per Crash	Cost Per Crash
Fatal Crash	\$10,519,000	\$9,924,000
A Injury Crash	\$621,000	\$598,000
B Injury Crash	\$200,000	\$212,000
C Injury Crash	\$115,000	\$122,000
Property Damage Only Crash	\$12,500	\$12,500
Average Crash	\$160,000	\$78,000
Injury Crash (F+A+B+C)	\$502,000	\$246,000
Non-Fatal Injury Crash (A+B+C)	\$189,000	\$156,000
Severe Injury Crash (F+A)	\$3,152,000	\$3,067,000
Moderate Injury Crash (B+C)	\$146,000	\$144,000

In addition to total statewide crashes, crash costs are also calculated for seven specific crash types. The crash cost categories are:

- a) Total Crashes
- b) Frontal Impact Crashes
- c) Lane Departure Crashes
- d) Rear End Crashes
- e) Pedestrian Crashes
- f) Bicycle Crashes
- g) Train Crashes
- h) Truck Crashes

Table 1b Cost per Crash – Frontal Impact Crashes
(Angle, Left turn same road, Left turn different road, Right turn same road, Right turn different road, and Head on crashes)

Crash Type	Cost Per Crash 2019 Dollars
Fatal Crash	\$11,052,000
A Injury Crash	\$713,000
B Injury Crash	\$245,000
C Injury Crash	\$133,000
Property Damage Only Crash	\$12,500
Average Crash	\$140,000
Injury Crash (F+A+B+C)	\$354,000
Non-Fatal Injury Crash (A+B+C)	\$191,000
Severe Injury Crash (F+A)	\$3,288,000
Moderate Injury Crash (B+C)	\$166,000

Table 1c Cost per Crash – Lane Departure Crashes
(Run off road –Straight, Right, and Left, Fixed Object, Overturn/Rollover, Sideswipe opposite direction, parked motor vehicle, and Head on crashes)

Crash Type	Cost Per Crash 2019 Dollars
Fatal Crash	\$10,479,000
A Injury Crash	\$589,000
B Injury Crash	\$174,000
C Injury Crash	\$96,000
Property Damage Only Crash	\$12,500
Average Crash	\$188,000
Injury Crash (F+A+B+C)	\$523,000
Non-Fatal Injury Crash (A+B+C)	\$173,000
Severe Injury Crash (F+A)	\$3,202,000
Moderate Injury Crash (B+C)	\$128,000

Table 1d Cost per Crash – Rear End Crashes
(Rear end slow or stop and Rear end turn crashes)

Crash Type	Cost Per Crash 2019 Dollars
Fatal Crash	\$10,271,000
A Injury Crash	\$676,000
B Injury Crash	\$230,000
C Injury Crash	\$126,000
Property Damage Only Crash	\$12,500
Average Crash	\$64,000
Injury Crash (F+A+B+C)	\$185,000
Non-Fatal Injury Crash (A+B+C)	\$152,000
Severe Injury Crash (F+A)	\$2,325,000
Moderate Injury Crash (B+C)	\$144,000

Table 1e Cost per Crash – Pedestrian Crashes

Crash Type	Cost Per Crash 2019 Dollars
Fatal Crash	\$9,659,000
A Injury Crash	\$497,000
B Injury Crash	\$147,000
C Injury Crash	\$80,000
Property Damage Only Crash	\$12,500
Average Crash	\$1,037,000
Injury Crash (F+A+B+C)	\$1,061,000
Non-Fatal Injury Crash (A+B+C)	\$160,000
Severe Injury Crash (F+A)	\$4,779,000
Moderate Injury Crash (B+C)	\$115,000

Note: Due to having a relatively small yearly sample size, the costs for pedestrian crashes were calculated based on five years of crash data (2015-2019)

Table 1f Cost per Crash – Bicycle Crashes

Crash Type	Cost Per Crash 2019 Dollars
Fatal Crash	\$9,476,000
A Injury Crash	\$480,000
B Injury Crash	\$142,000
C Injury Crash	\$78,000
Property Damage Only Crash	\$12,500
Average Crash	\$396,000
Injury Crash (F+A+B+C)	\$412,000
Non-Fatal Injury Crash (A+B+C)	\$139,000
Severe Injury Crash (F+A)	\$3,088,000
Moderate Injury Crash (B+C)	\$112,000

Note: Due to having a relatively small yearly sample size, the costs for bicycle crashes were calculated based on five years of crash data (2015-2019)

Table 1g Cost per Crash – Train Crashes

Crash Type	Cost Per Crash 2019 Dollars
Fatal Crash	\$10,961,000
A Injury Crash	\$1,124,000
B Injury Crash	\$179,000
C Injury Crash	\$95,000
Property Damage Only Crash	\$12,500
Average Crash	\$888,000
Injury Crash (F+A+B+C)	\$2,508,000
Non-Fatal Injury Crash (A+B+C)	\$275,000
Severe Injury Crash (F+A)	\$7,384,000
Moderate Injury Crash (B+C)	\$125,000

Note: Due to having a relatively small yearly sample size, the costs for train crashes were calculated based on five years of crash data (2015-2019)

Table 1h Cost per Crash – Truck Crashes

Crash Type	Cost Per Crash 2019 Dollars
Fatal Crash	\$10,417,000
A Injury Crash	\$627,000
B Injury Crash	\$202,000
C Injury Crash	\$114,000
Property Damage Only Crash	\$12,500
Average Crash	\$154,000
Injury Crash (F+A+B+C)	\$599,000
Non-Fatal Injury Crash (A+B+C)	\$183,000
Severe Injury Crash (F+A)	\$3,864,000
Moderate Injury Crash (B+C)	\$142,000

Appendix

How crash costs are calculated (using final recommendation from FHWA’s *Crash Costs for Highway Safety Analysis*):

- The cost per injury data was obtained by using the methodology outlined in FHWA’s report “Crash Costs for Highway Safety Analysis”. This report provides recommended National Person-Injury Unit Costs in 2010 dollar amounts (in Table 29 in the report).

Severity	Economic Person-Injury Unit Costs	QALY Person-Injury Unit Costs	Comprehensive Person-Injury Unit Cost
K	\$1,398,916	\$7,747,082	\$9,145,998
A	\$84,507	\$363,324	\$447,832
B	\$32,105	\$97,974	\$130,079
C	\$21,749	\$49,926	\$71,675
O	\$5,717	\$2,563	\$8,280

Source: FHWA report, *Crash Costs for Highway Safety Analysis*, January 2018, page 59

- The person-injury unit costs in the above table are provided in 2010 dollar amounts and need to be converted into current year dollar values. The person-injury unit costs are also provided on a nationwide scale and they need to be adjusted for NC-specific values. The Economic costs are updated to current year values via a Consumer Price Index (CPI) Ratio and the QALY costs are updated to current year values via a Median Usual Weekly Earnings Ratio. The equations for these ratios are shown in the FHWA report in Figures 8 and 9 (formula for 2016 is shown).

$$\text{CPI ratio}_{\frac{2016}{2010}} = \frac{\text{CPI}_{2016}}{\text{CPI}_{2010}}$$

Figure 8. Equation. CPI adjustment ratio calculation.

$$\text{MUWE ratio}_{\frac{2016}{2010}} = \frac{\text{MUWE}_{2016}}{\text{MUWE}_{2010}}$$

Figure 9. Equation. MUWE adjustment ratio calculation.

Source: FHWA report, *Crash Costs for Highway Safety Analysis*, January 2018, page 51

- The adjustment from National costs to State-specific costs is done by multiplying the crash costs by a ratio of the Nationwide per capital income (PCI) by the NC PCI. This is shown in Figure 7 of the FHWA report.

$$\text{State Crash Cost}_{\text{sev.Type}} = \text{National Crash Cost}_{\text{sev.Type}} \left(\frac{\text{State PCI}}{\text{National PCI}} \right)$$

Figure 7. Equation. State-specific crash cost adjustment.

Source: FHWA report, Crash Costs for Highway Safety Analysis, January 2018, page 50

- The North Carolina Database is then used to determine the average number of each type of injury in each severity category. Table 6 shows the results of this for the 2017 crash data (Total Crashes).

Table 6 Average Number of Injuries by Severity Category – Total Crashes

Crash Type	Average Number of Fatal Injuries	Average Number of A Injuries	Average Number of B Injuries	Average Number of C Injuries	Average Number of O Injuries
Fatal Crash	1.08	0.27	0.27	0.32	0.42
A Injury Crash	0	1.16	0.32	0.33	0.55
B Injury Crash	0	0	1.25	0.41	0.85
C Injury Crash	0	0	0	1.49	1.37

In this example, in 2017 a fatal crash averaged 1.08 fatalities, 0.27 A injuries, 0.27 B injuries, 0.32 C injuries, and 0.42 O injuries.

- The final cost for each severity category includes the costs associated with the average number of injuries in each crash type. Table 7 shows an example computation of the cost of an average fatal crash in 2017.

Table 7 Computation of Cost Per Fatal Crash

Injury	Number of Injuries (1)	Cost Per Injury (2)	Crash Cost (1) X (2)
Fatal Injury	1.08	\$8,889,874	\$9,641,034
A Injury	0.27	\$434,916	\$116,989
B Injury	0.27	\$126,151	\$33,640
C Injury	0.32	\$69,416	\$21,901
O Injury	0.42	\$7,944	\$3,362
TOTAL (rounded to nearest thousand)			\$9,817,000