MEMORANDUM

TO: VDOT HIGHWAY SAFETY PARTNERS

FROM: MARK A. COLE, P.E.
VDOT TRAFFIC ENGINEERING
ASSISTANT DIVISION ADMINISTRATOR (HIGHWAY SAFETY)

DATE: 3/2/2022

RE: VDOT TRAFFIC CRASH COSTS – VERSION 1

Virginia Traffic Crash Costs

This memo provides Virginia-specific comprehensive crash costs that have been developed for use in highway safety project evaluation. This memo documents the current crash costs that practitioners should use and the methodology to develop these costs. The Comprehensive Crash Costs in **Table 1** should be used by practitioners in Virginia when calculating the benefit-cost ratio for specific safety treatments. The weighted costs for combinations of crash severity levels is shown in **Table 2**.

Table 1. Virginia KABCO Crash Unit Costs (2020)

Severity	Economic Crash Unit Costs	QALY Crash Unit Costs	Comprehensive Crash Costs
K	$1,896,295	$11,561,359	**$13,457,654**
A	$144,164	$646,077	**$790,242**
B	$63,486	$195,333	**$258,819**
C	$44,414	$101,330	**$145,744**
O	$13,743	$0	**$13,743**

Table 2. Virginia Weighted Crash Unit Costs (2020)

Severity	Weighted Costs
K/A	$2,214,590
K/A/B	$684,050
K/A/B/C	$550,747
K/A/B/C/O	$194,546
A/B/C	$308,895
B/C	$225,341

Background

The Virginia-specific comprehensive crash unit costs are based on the Federal Highway Administration's (FHWA) *Crash Costs for Highway Safety Analysis*[1], which translates the maximum abbreviated injury scale (MAIS) person-injury unit costs from the National Highway Traffic Safety Administration's *The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised)*[2] to KABCO crash unit costs. These crash unit costs, which are referred to as comprehensive crash unit costs, include a combination of two separate costs – economic crash unit costs (tangible impacts) and quality-adjusted life years (QALY) crash unit costs (monetarized pain and suffering)[1].

Economic costs are the "monetary impacts of crashes including goods and services related to the crash response, property damage, and medical costs. Economic costs are the direct and indirect costs to individuals and society from a decline in general health of crash victims[1]." They consist of the following components:

- Medical services (emergency room, out of hospital costs, EMS costs)
- Market productivity loss (lost wages and fringe benefits over remaining lifespan)
- Household productivity loss (value of hiring someone to accomplish same tasks that the killed or injured person would be responsible for)
- Insurance administration and cost for defense attorneys
- Workplace costs due to loss of an employee
- Legal costs for operating courts and civil ligation fees
- Congestion impacts (delay, fuel consumption, pollution)

QALY costs are intangible consequences of an injury, referred to as lost quality-of-life[1]. QALY costs are based on the duration and severity of a health problem[1]. The lost quality-of-life costs are "quantified by estimating the value that people put on their lives (i.e., by determining the price they would pay to avoid risk of death or injury, often based on revealed preferences from marketplace choices such as deciding to purchase safer, more expensive protective gear or equipment) and then quantifying the portion of a full life lost due to the crash[1]."

Federal Highway Administration's *Crash Costs for Highway Safety Analysis*[1] developed national comprehensive crash costs, shown in **Table 3**, and a spreadsheet tool that can be used to adjust the comprehensive crash costs for specific states.

Table 3. National KABCO Crash Unit Costs (2016 Dollars) [1]

Severity	Economic Crash Unit Costs	QALY Crash Unit Costs	Comprehensive Crash Unit Costs
K	$1,722,991	$9,572,411	$11,295,402
A	$130,068	$524,899	$654,967
B	$53,700	$144,792	$198,492
C	$42,536	$83,026	$125,562
O	$11,906	$0	$11,906

[1] https://safety.fhwa.dot.gov/hsip/docs/fhwasa17071.pdf
[2] https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812013

In the FHWA cost spreadsheet tool, the national crash costs in **Table 3** can be adjusted to a specific year using updated economic indicators, including consumer price index (CPI), median usual weekly earnings (MUWE), and per capita income (PCI), and adjusted to a specific jurisdiction (e.g., Virginia), using jurisdiction-specific crash severity distributions and a jurisdiction-specific PCI value. The national crash costs were adjusted to develop Virginia-specific crash costs using Virginia crashes and person-injuries (**Table 4**), number of and vehicles in PDO crashes (**Table 5**), and 2020 economic indicators for either the United States or Virginia (**Table 6**).

Table 4. Virginia Crashes and Person-Injuries (2016-2020)

Severity	Crashes	K Persons	A Persons	B Persons	C Persons	O Persons
K	3,849	4,097	1,247	1,131	358	1,577
A	30,382		35,880	9,144	5,812	14,409
B	123,208			161,986	27,722	88,969
C	51,820				74,217	42,530
O	412,261					752,440
Total	621,520	4,097	37,127	172,261	108,109	899,925

Table 5. Number of Vehicles Involved in PDO Crashes (2016-2020)

Crash Severity	Crashes	Vehicles
PDO	412,261	752,445

Table 6. 2020 Economic Indicators

Economic Indicator	Value
CPI[3]	258.811
MUWE[4]	984.25
PCI[5]	$59,729 (United States) $62,362 (Virginia)

Table 7. Crash Costs and Number of Crashes Used to Develop Weighted Crash Costs

Severity	Cost by Severity	Crashes
K	$13,457,654	3,849
A	$790,242	30,382
B	$258,819	123,208
C	$145,744	51,820
O	$13,743	412,261

The information in **Table 4** through **Table 7** was used in the FHWA crash cost spreadsheet tool to calculate the crash costs shown in **Table 1** and **Table 2**.

For more information, please contact Tracy Turpin, HSIP Program Delivery Manager, at (804) 786-6610 or Tracy.Turpin@VDOT.Virginia.gov.

[3] https://www.bls.gov/cpi/tables/supplemental-files/historical-cpi-u-202101.pdf
[4] https://www.bls.gov/news.release/pdf/wkyeng.pdf
[5] https://www.bea.gov/sites/default/files/2021-03/spi0321_3.pdf