

# 1 GLOSSARY

2 This chapter defines the terms used in the manual. The following terms are used  
3 interchangeably throughout the HSM:

- 4 • Accident and Crash

5 **85th-percentile speed** - the speed at or below which 85 percent of the motorists drive  
6 a given road. The speed is indicative of the speed that most motorists consider to be  
7 reasonably safe under normal conditions.

8 **acceleration lane** - a paved auxiliary lane, including tapered areas, allowing vehicles  
9 to accelerate when entering the through-traffic lane of the roadway.

10 **acceptable gap** - the distance to nearest vehicle in oncoming or cross traffic that a  
11 driver will accept to initiate a turning or crossing maneuver 50 percent of the time it  
12 is presented, typically measured in seconds.

13 **access management** - the systematic control of the location, spacing, design, and  
14 operation of driveways, median openings, interchanges, and street connections to a  
15 roadway, as well as roadway design applications that affect access, such as median  
16 treatments and auxiliary lanes and the appropriate separation of traffic signals.

17 **accessible facilities** - facilities where persons with disabilities have the same degree  
18 of convenience, connection, and safety afforded to the public in general. It includes,  
19 among others, access to sidewalks and streets, including crosswalks, curb ramps,  
20 street furnishings, parking, and other components of public rights-of-way.

21 **accident/crash** - a set of events not under human control that results in injury or property  
22 damage, due to the collision of at least one motorized vehicle and may involve collision with  
23 another motorized vehicle, a bicyclist, a pedestrian or an object. The terms accident and  
24 crash are used interchangeably in this manual.

25  
26 **accident modification factor (AMF)** - an index of how much crash experience is  
27 expected to change following a modification in design or traffic control. AMF is the  
28 ratio between the number of crashes per unit of time expected after a modification or  
29 measure is implemented and the number of crashes per unit of time estimated if the  
30 change does not take place.

31 **accident severity** - the most severe injury sustained in an accident (e.g., in a fatal  
32 accident, two fatalities and three severe injuries were reported). Not to be confused  
33 with injury severity that refers to all the different injury levels sustained by drivers  
34 and passengers involved in an accident.

35 **accommodation (visual)** - the ability to change focus from instruments inside the  
36 vehicle to objects outside the vehicle.

37 **all-way STOP-controlled** - an intersection with stop signs at all approaches.

38 **AADT** - annual average daily traffic. (*See traffic, average annual daily*).

39 **approach** - a lane or set of lanes at an intersection that accommodates all left-turn,  
40 through, and right-turn movements from a given direction.

41 **auxiliary lane** - a lane marked for use, but not assigned for use by through traffic.

42 **base model** - a regression model for predicting the expected average crash frequency  
43 in each HSM prediction procedure given a set of site characteristics. The base model,  
44 like all regression models, predicts the value of a dependent variable as a function of  
45 a set of independent variables. The expected average crash frequency is adjusted for  
46 changes to set site characteristics with the use of an AMF.

- 47 **Bayesian statistics** - statistical method of analysis which bases statistical inference on  
48 a number of philosophical underpinnings that differ in principle from frequentist or  
49 classical statistical thought. First, this method incorporates knowledge from history  
50 or other sites. In other words, prior knowledge is formally incorporated to obtain the  
51 “best” estimation. Second, the method considers the likelihood of certain types of  
52 events as part of the analysis process. Third, it uses Bayes’ theorem to translate  
53 probabilistic statements into degrees of belief (e.g., the belief that we are more certain  
54 about something than others), instead of the classical confidence interval  
55 interpretation.
- 56 **before-after study** - the evaluation of implemented safety treatments, accomplished  
57 by comparing frequency or severity of crashes before and after implementation.  
58 There are several different types of before-after studies. These studies often develop  
59 AMFs for a particular treatment or group of treatments. Also known as BA studies.  
60
- 61 **bicycle facility** - a road, path, or way specifically designated for bicycle travel,  
62 whether exclusively or with other vehicles or pedestrians.
- 63 **breakaway support** - a design feature which allows a device such as a sign, luminary,  
64 or traffic signal support to yield or separate upon impact.
- 65 **bus lane** - a highway or street lane designed for bus use during specific periods.
- 66 **calibration factor** - a factor to adjust crash frequency estimates produced from an  
67 safety prediction procedure to approximate local conditions. The factor is computed  
68 by comparing existing accident data at the state, regional, or local level to estimates  
69 obtained from predictive models.
- 70 **channelization** - the separation of conflicting traffic movements into definite travel  
71 paths. Often part of access management strategies.
- 72 **clear zone** - the total roadside border area, starting at the edge of the traveled way,  
73 available for use by errant vehicles.
- 74 **climbing lane** - a passing lane added on an upgrade to allow traffic to pass heavy  
75 vehicles whose speeds are reduced.
- 76 **closing speed** - movement of objects based on their distance as observed from the  
77 driver.
- 78 **coding** - organization of information into larger units such as color and shape (e.g.,  
79 warning signs are yellow, regulatory signs are white).
- 80 **collision diagram** - a schematic representation of the crashes that have occurred at a  
81 site within a given time period.
- 82 **comparison group** - a group of sites, used in before-and-after studies, which are  
83 untreated but are similar in nature to the treated sites. The comparison group is used  
84 to control for changes in crash frequency not influenced by the treatment.
- 85 **comparison ratio** - the ratio of expected number of “after” to the expected number of  
86 “before” target accidents on the comparison group.
- 87 **condition diagram** - a plan view drawing of relevant site characteristics.
- 88 **conflict-to-crash ratio** - number of conflicts divided by the number of crashes  
89 observed during a given period.
- 90 **conspicuity** - relates to the ability of a given object or condition to attract the  
91 attention of the road user.

- 92 **context sensitive design (CSD)** - a collaborative, interdisciplinary approach that  
93 involves all stakeholders to develop a transportation facility that fits its physical  
94 setting and preserves scenic, aesthetic, historic, and environmental resources, while  
95 maintaining safety and mobility.
- 96 **continuous variable** - a variable that is measured either on the interval or ratio scale.  
97 A continuous variable can theoretically take on an infinite number of values within  
98 an interval. Examples of continuous variables include measurements in distance,  
99 time, and mass. A special case of a continuous variable is a data set consisting of  
100 counts (e.g. crashes), which consist of non-negative integer values.
- 101 **contrast sensitivity** - the ability to distinguish between low contrast features. Ability  
102 to detect slight differences in luminance (level of light) between an object and its  
103 background (e.g. worn lane lines, concrete curbs).
- 104 **control group** - a set of sites randomly selected to not receive safety improvements.
- 105 **control task** - a major subtask of the driving task model consisting of keeping the  
106 vehicle at a desired speed and heading within the lane. Drivers exercise control  
107 through the steering wheel, accelerator or brake.
- 108 **cost-effectiveness** - a type of economic criteria for assessing a potential  
109 implementation of a countermeasure or design to reduce accidents. This term is  
110 generally expressed in terms of the dollars spent per reduction of accident frequency  
111 or accident severity.
- 112 **cost-effectiveness index** - ratio of the present value cost to the total estimated  
113 accident reduction.
- 114 **count data** - data that are non-negative integers.
- 115 **countermeasure** - a roadway based strategy intended to reduce the crash frequency  
116 or severity, or both at a site.
- 117 **countermeasure, proven** - countermeasures that are considered proven for given site  
118 characteristics because scientifically-rigorous evaluations have been conducted to  
119 validate the effectiveness of the proposed countermeasure for the given site  
120 characteristics.
- 121 **countermeasure, tried and experimental** - countermeasures for which a  
122 scientifically-rigorous evaluation has not been conducted or because an evaluation  
123 has not been performed to assess the effectiveness of such countermeasures.
- 124 **corner clearance** - minimum distance required between intersections and driveways  
125 along arterials and collector streets.
- 126 **cost effectiveness** - the annual cost per crash reduced.
- 127 **crash** - (*See accident*).
- 128 **crash cushion (impact attenuator)** - device that prevents an errant vehicle from  
129 impacting fixed objects by gradually decelerating the vehicle to a safe stop or by  
130 redirecting the vehicle away from the obstacle in a manner which reduces the  
131 likelihood of injury.
- 132 **crash estimation** - any methodology used to forecast or predict the crash frequency  
133 of an existing roadway for existing conditions during a past period or future period;  
134 an existing roadway for alternative conditions during a past or future period; a new  
135 roadway for given conditions for a future period.

- 136 **crash evaluation** - determining the effectiveness of a particular treatment or a  
137 treatment program after its implementation. The evaluation is based on comparing  
138 results obtained from crash estimation.
- 139 **crash frequency** - number of crashes occurring at a particular site, facility, or  
140 network in a one year period and is measure in number of crashes per year.
- 141 **crash mapping** - the visualization of crash locations and trends with computer  
142 software such as GIS.
- 143 **crash prediction algorithm** - procedure used to predict average crash frequency,  
144 consisting of three elements. It has two analytical components: baseline models and  
145 accident modification factors, as well as a third component: accident histories.
- 146 **crash rate** - the number of crashes per unit of exposure. For an intersection, this is  
147 typically the number of crashes divided by the total entering AADT; for road  
148 segments, this is typically the number of crashes per million vehicle-miles traveled on  
149 the segment. Also known as accident rate.
- 150 **crash rate method** - a method that normalizes the frequency of crashes against  
151 exposure (i.e. traffic volume for the study period for intersections, and traffic volume  
152 for the study period and segment length for roadway segments). Also known as  
153 accident rate method.
- 154 **crash reduction factor (CRF)** - the percentage crash reduction that might be  
155 expected after implementing a modification in design or traffic control. The CRF is  
156 equivalent to (1-AMF).
- 157 **crash severity** - the level of injury or property damage due to a crash, commonly  
158 divided into categories based on the KABCO scale.
- 159 **Critical Rate Method (CRM)** - a method in which the observed crash rate at each site  
160 is compared to a calculated critical crash rate that is unique to each site.
- 161 **cross-sectional studies** - studies comparing the crash frequency or severity of one  
162 group of entities having some common feature (e.g., STOP controlled intersections) to  
163 the crash frequency or severity of a different group of entities not having that feature  
164 (e.g., YIELD controlled intersections), in order to assess difference in crash experience  
165 between the two features (e.g., STOP versus YIELD sign).
- 166 **cycle** - a complete sequence of signal indications (phases).
- 167 **cycle length** - the total time for a traffic signal to complete one cycle.
- 168 **dark adaptation (visual)** - the ability to adjust light sensitivity on entering and  
169 exiting lighted or dark areas.
- 170 **deceleration lane** - a paved auxiliary lane, including tapered areas, allowing vehicles  
171 leaving the through-traffic lane of the roadway to decelerate.
- 172 **decision sight distance (DSD)** - the distance required for a driver to detect an  
173 unexpected or otherwise difficult-to-perceive information source, recognize the  
174 object, select an appropriate speed and path, and initiate and complete the maneuver  
175 efficiently and without a crash outcome.
- 176 **delay** - the additional travel time experienced by a driver, passenger, or pedestrian in  
177 comparison to free flow conditions.
- 178 **delineation** - methods of defining the roadway operating area for drivers.
- 179 **dependent variable** - in a function given as  $Y = f(X_1, \dots, X_n)$ , it is customary to refer to  
180  $X_1, \dots, X_n$  as independent or explanatory variables, and  $Y$  as the dependent or  
181 response variable. In each crash frequency prediction procedure, the dependent

- 182 variable estimated in the base model is the annual accident frequency for a roadway  
183 segment or intersection.
- 184 **descriptive analysis** - methods such as frequency, crash rate, and equivalent  
185 property damage only (EPDO), which summarize in different forms the history of  
186 crash occurrence, type and/or severity at a site. These methods do not include any  
187 statistical analysis or inference.
- 188 **design consistency** - (1) the degree to which highway systems are designed and  
189 constructed to avoid critical driving maneuvers that may increase crash risk; (2) the  
190 ability of the highway geometry to conform to driver expectancy; (3) ensures that  
191 successive geometric elements are coordinated in a manner to produce harmonious  
192 driver performance without surprising events.
- 193 **design speed** - a selected speed used to determine the various geometric design  
194 features of the roadway. The assumed design speed should be a logical one with  
195 respect to the topography, anticipated operating speed, the adjacent land use, and the  
196 functional classification of highway. The design speed is not necessarily equal to the  
197 posted speed or operational speed of the facility.
- 198 **diagnosis** - the identification of factors that may contribute to a crash.
- 199 **diamond interchange** - an interchange that results in two or more closely spaced  
200 surface intersections, so that one connection is made to each freeway entry and exit,  
201 with one connection per quadrant.
- 202 **discount rate** - an interest rate that is chosen to reflect the time value of money.
- 203 **dispersion parameter** - (See *overdispersion parameter*).
- 204 **distribution (data analysis and modeling related)** - the set of frequencies or  
205 probabilities assigned to various outcomes of a particular event or trail. Densities  
206 (derived from continuous data) and distributions (derived from discrete data) are  
207 often used interchangeably.
- 208 **driver expectancy** - the likelihood that a driver will respond to common situations in  
209 predictable ways that the driver has found successful in the past. Expectancy affects  
210 how drivers perceive and handle information and affects the speed and nature of  
211 their responses.
- 212 **driver workload** - surrogate measure of the number of simultaneous tasks a driver  
213 performs while navigating a roadway.
- 214 **driveway density** - the number of driveways per mile on both sides of the roadway  
215 combined.
- 216 **driving task model** - the simultaneous and smooth integration of a number of sub-  
217 tasks required for a successful driving experience.
- 218 **dynamic programming** - a mathematical technique used to make a sequence of  
219 interrelated decisions to produce an optimal condition.
- 220 **economically valid project** - a project in which benefits are greater than the cost.
- 221 **Empirical Bayes (EB) methodology** - method used to combine *observed* crash  
222 frequency data for a given site with *predicted* crash frequency data from many similar  
223 sites to estimate its *expected* crash frequency.
- 224 **entrance ramp** - a ramp that allows traffic to enter a freeway.
- 225 **equivalent property damage only (EPDO) method** - assigns weighting factors to  
226 crashes by severity (fatal, injury, property damage only) to develop a combined  
227 frequency and severity score per site. The weighting factors are calculated relative to

- 228 Property Damage Only (PDO) crash costs. Crash costs include direct costs such as  
229 ambulance service, police and fire services, property damage, insurance and other  
230 costs directly related to the crashes. Crash costs also include indirect costs, which are  
231 the value society would place on pain and suffering or loss of life associated with the  
232 crash.
- 233 **exit ramp** - a ramp that allows traffic to depart a freeway.
- 234 **expected average crash frequency** - the estimate of long term expected average crash  
235 frequency of a site, facility or network under a given set of geometric conditions and  
236 traffic volumes (AADT) in a given period of years. In the EB methodology this  
237 frequency is calculated from observed accident frequency at the site, and predicted  
238 accident frequency at the site based on accident frequency estimates at other similar  
239 sites.
- 240 **expected average crash frequency, change in** - the difference between the expected  
241 average crash frequency in the absence of treatment and with the treatment in place.
- 242 **expected crashes** - an estimate of long range average number of crashes per year for a  
243 particular type of roadway or intersection.
- 244 **expected excess crash method** - method in which sites are ranked according to the  
245 difference between the adjusted observed crash frequency and the expected crash  
246 frequency for the reference population (e.g., two-lane rural segment, multilane  
247 undivided roadway, or urban stop-controlled intersection).
- 248 **experimental studies** - studies where sites are randomly assigned to a treatment or  
249 control group and the differences in accident experience can then be attributed to a  
250 treatment or control group.
- 251 **explanatory variable (predictor)** - a variable which is used to explain (predict) the  
252 change in the value of another variable. An explanatory variable is often defined as  
253 an independent variable; the variable which it affects is called the dependent  
254 variable.
- 255 **facility** - a length of highway that may consist of connected sections, segments, and  
256 intersections.
- 257 **first harmful event** - the first injury or damage-producing event that characterizes  
258 the crash.
- 259 **freeway** - a multilane, divided highway with a minimum of two lanes for the  
260 exclusive use of traffic in each direction and full control of access without traffic  
261 interruption.
- 262 **frequency method** - a method that produces a ranking of sites according to total  
263 crashes or crashes by type and/or severity.
- 264 **frequentist statistics** - statistical philosophy that results in hypothesis tests that  
265 provide an estimate of the probability of observing the sample data conditional on a  
266 true null hypothesis. This philosophy asserts that probabilities are obtained through  
267 long-run repeated observations of events.
- 268 **gap** - the time, in seconds, for the front bumper of the second of two successive  
269 vehicles to reach the starting point of the front bumper of the first vehicle. Also  
270 referred to as headway.
- 271 **gap acceptance** - the process by which a vehicle enters or crosses a vehicular stream  
272 by accepting an available gap to maneuver.
- 273 **geometric condition** - the spatial characteristics of a facility, including grade,  
274 horizontal curvature, the number and width of lanes, and lane use.

- 275 **goodness-of-fit (GOF) statistics** - the goodness of fit of a statistical model describes  
276 how well it fits a set of observations. Measures of goodness of fit typically summarize  
277 the discrepancy between observed values and the values expected under the model  
278 in question. There are numerous GOF measures, including the coefficient of  
279 determination  $R^2$ , the F test, and the chi-square test for frequency data, among others.  
280 Unlike F-ratio and likelihood-ratio tests, GOF measures are not statistical tests.
- 281 **gore area** - the area located immediately between the edge of the ramp pavement and  
282 the edge of the roadway pavement at a merge or diverge area.
- 283 **guidance task** - a major subtask of the driving task model consisting of interacting  
284 with other vehicles (following, passing, merging, etc.) through maintaining a safe  
285 following distance and through following markings, traffic control signs, and signals.
- 286 **Haddon Matrix** - a framework used for identifying possible contributing factors for  
287 crashes in which contributing factors (i.e. driver, vehicle, and roadway/environment)  
288 are cross-referenced against possible crash conditions before, during, and after a  
289 crash to identify possible reasons for the events.
- 290 **headway** - (See gap).
- 291 **Heinrich Triangle** - concept founded on the precedence relationship that “no injury  
292 accidents” precedes “minor injury accidents.” This concept is supported by two basic  
293 ideas: (1) events of lesser severity are more numerous than more severe events, and  
294 events closer to the base of the triangle precede events nearer the top; and (2) events  
295 near the base of the triangle occur more frequently than events near the triangle’s top,  
296 and their rate of occurrence can be more reliably estimated.
- 297 **high-occupancy vehicle (HOV)** - a vehicle with a defined minimum number of  
298 occupants (may consist of vehicles with more than one occupant).
- 299 **high proportion of crashes method** - the screening of sites based on the probability  
300 that their long term expected proportion of crashes is greater than the threshold  
301 proportion of crashes.
- 302 **Highway Safety Improvement Program (HSIP)** - SAFETEA-LU re-established the  
303 Highway Safety Improvement Program (HSIP) as a core program in conjunction with  
304 a Strategic Highway Safety Plan (SHSP). The purpose of the HSIP is to reduce the  
305 number of fatal and serious/life-changing crashes through state-level engineering  
306 measures.
- 307 **holistic approach** - a multidisciplinary approach to the reduction of crashes and  
308 injury severity.
- 309 **homogeneous roadway segment** - a portion of a roadway with similar average daily  
310 traffic volumes (veh/day), geometric design, and traffic control features.
- 311 **human factors** - the application of knowledge from human sciences such as human  
312 psychology, physiology, and kinesiology in the design of systems, tasks, and  
313 environments for effective and safe use.
- 314 **incremental benefit-cost ratio** - the incremental benefit/cost ratio is an extension of  
315 the benefit/cost ratio method. Projects with a benefit/cost ratio greater than one are  
316 arranged in increasing order based on their estimated cost.
- 317 **Indiana Lane Merge System (ILMS)** - advanced dynamic traffic control system  
318 designed to encourage drivers to switch lanes well in advance of the work zone lane  
319 drop and entry taper.
- 320 **independent variables** - a variable which is used to explain (predict) the change in  
321 the value of another variable.

- 322 **indirect measures of safety** - (See surrogate measures).
- 323 **influence area (freeway)** - an area that incurs operational impacts of merging  
324 (diverging) vehicles in Lanes 1 and 2 of the freeway and the acceleration  
325 (deceleration) lane for 1,500 ft from the merge (diverge) point downstream.
- 326 **influence area (intersection)** - functional area on each approach to an intersection  
327 consisting of three elements (1) perception-reaction distance, (2) maneuver distance,  
328 and (3) queue storage distance.
- 329 **integer programming** - a mathematical optimization technique involving a linear  
330 programming approach in which some or all of the decision variables are restricted  
331 to integer values.
- 332 **interchange** - intersections that consist of structures that provide for the cross-flow of  
333 traffic at different levels without interruption, thus reducing delay, particularly when  
334 volumes are high.
- 335 **interchange ramp terminal** - a junction with a surface street to serve vehicles  
336 entering or exiting a freeway.
- 337 **intersection** - general area where two or more roadways or highways meet, including  
338 the roadway, and roadside facilities for pedestrian and bicycle movements within the  
339 area.
- 340 **intersection functional area** - area extending upstream and downstream from the  
341 physical intersection area including any auxiliary lanes and their associated  
342 channelization.
- 343 **intersection related accident** - an accident that occurs at the intersection itself or an  
344 accident that occurs on an intersection approach within 250 ft (as defined in the  
345 HSM) of the intersection and is related to the presence of the intersection.
- 346 **intersection sight distance** - the distance needed at an intersection for drivers to  
347 perceive the presence of potentially conflicting vehicles in sufficient time to stop or  
348 adjust their speed to avoid colliding in the intersection.
- 349 **KABCO** - an injury scale developed by the National Safety Council to measure the  
350 observed injury severity for any person involved as determined by law enforcement  
351 at the scene of the crash. (Fatal injury (K), Incapacitating Injury (A), Non-  
352 Incapacitating Injury (B), Possible Injury (C), and No Injury (O).) The scale can also  
353 be applied to crashes: for example, a K crash would be a crash in which the most  
354 severe injury was a fatality, and so forth.
- 355 **lateral clearance** - lateral distance from edge of traveled way to a roadside object or  
356 feature.
- 357 **level of service of safety (LOSS) method** - the ranking of sites according to their  
358 observed and expected crash frequency for the entire population, where the degree of  
359 deviation is then labeled into four level of service classes.
- 360 **median** - the portion of a divided highway separating the traveled ways from traffic  
361 in opposite directions.
- 362 **median refuge island** - an island in the center of a road that physically separates the  
363 directional flow of traffic and that provides pedestrians with a place of refuge and  
364 reduces the crossing distance of a crosswalk.
- 365 **meta analysis** - a statistical technique that combines the independent estimates of  
366 crash reduction effectiveness from separate studies into one estimate by weighing  
367 each individual estimate according to its variance.



- 368 **method of moments** - method in which a site's observed accident frequency is  
369 adjusted based on the variance in the crash data and average crash counts for the  
370 site's reference population.
- 371 **minor street** - the lower volume street controlled by stop signs at a two-way, or four-  
372 way stop-controlled intersection; also referred to as a side street. The lower volume  
373 street at a signalized intersection.
- 374 **Model Minimum Inventory of Roadway Elements (MMIRE)** - set of guidelines  
375 outlining the roadway information that should be included in a roadway database to  
376 be used for safety analysis.
- 377 **Model Minimum Uniform Crash Criteria (MMUCC)** - set of guidelines outlining  
378 the minimum elements in crash, roadway, vehicle, and person data that should  
379 ideally be in an integrated crash database .
- 380 **most harmful event** - event that results in the most severe injury or greatest property  
381 damage for a crash event.
- 382 **motor vehicle accident** - any incident in which bodily injury or damage to property  
383 is sustained as a result of the movement of a motor vehicle, or of its load while the  
384 motor vehicle is in motion. Also referred to as a motor vehicle crash.
- 385 **multilane highway** - a highway with at least two lanes for the exclusive use of traffic  
386 in each direction, with no control, partial control, or full control of access, but that  
387 may have periodic interruptions to flow at signalized intersections.
- 388 **multivariate statistical modeling** - statistical procedure used for cross-sectional  
389 analysis which attempts to account for variables that affect crash frequency or severity,  
390 based on the premise that differences in the characteristics of features result in  
391 different crash outcomes.
- 392 **navigation task** - activities involved in planning and executing a trip from origin to  
393 destination.
- 394 **net benefit** - a type of economic criteria for assessing the benefits of a project. For a  
395 project in a safety program, it is assessed by determining the difference between the  
396 potential crash frequency or severity reductions (benefits) from the costs to develop  
397 and construct the project. Maintenance and operations costs may also be associated  
398 with a net benefit calculation.
- 399 **net present value (NPV) or net present worth (NPW)** - this method is used to  
400 express the difference between discounted costs and discounted benefits of an  
401 individual improvement project in a single amount. The term "discounted" indicates  
402 that the monetary costs and benefits are converted to a present-value using a  
403 discount rate.
- 404 **network screening** - network screening is a process for reviewing a transportation  
405 network to identify and rank sites from most likely to least likely to benefit from a  
406 safety improvement.
- 407 **non-monetary factors** - items that do not have an equivalent monetary value or that  
408 would be particularly difficult to quantify (i.e., public demand, livability impacts,  
409 redevelopment potential, etc.).
- 410 **observational studies** - often used to evaluate safety performance. There are two  
411 forms of observational studies: before-after studies and cross-sectional studies.  
412
- 413 **offset** - lateral distance from edge of traveled way to a roadside object or feature.  
414 Also known as lateral clearance.

- 415 **operating speed** - the 85th percentile of the distribution of observed speeds operating  
416 during free-flow conditions.
- 417 **overdispersion parameter** - an estimated parameter from a statistical model that  
418 when the results of modeling are used to estimate accident frequencies, indicates  
419 how widely the accident counts are distributed around the estimated mean. This  
420 terms is used interchangeably with *dispersion parameter*.
- 421 **p-value** - the level of significance used to reject or accept the null hypothesis  
422 (whether a result is valid statistically or not).
- 423 **passing lane** - a lane added to improve passing opportunities in one or both  
424 directions of travel on a two-lane highway.
- 425 **peak searching algorithm** - a method to identify the segments that are most likely to  
426 benefit from a safety improvement within a homogeneous section.
- 427 **pedestrian** - a person traveling on foot or in a wheelchair.
- 428 **pedestrian crosswalk** - pedestrian roadway crossing facility that represents a legal  
429 crosswalk at a particular location.
- 430 **pedestrian refuge** - an at-grade opening within a median island that allows  
431 pedestrians to wait for an acceptable gap in traffic.
- 432 **pedestrian traffic control** - traffic control devices installed particularly for pedestrian  
433 movement control at intersections; it may include illuminated push buttons,  
434 pedestrian detectors, countdown signals, signage, pedestrian channelization devices,  
435 and pedestrian signal intervals.
- 436 **perception-reaction time (PRT)** - time required to detect a target, process the  
437 information, decide on a response, and initiate a response (it does not include the  
438 actual response element to the information). Also known as perception-response  
439 time.
- 440 **perception-response time** - (*See perception-reaction time*).
- 441 **performance threshold** - a numerical value that is used to establish a threshold of  
442 expected number of crashes (i.e. safety performance) for sites under consideration.
- 443 **perspective, engineering** - the engineering perspective considers crash data, site  
444 characteristics, and field conditions in the context of identifying potential engineering  
445 solutions that would address the potential safety concern. It may include  
446 consideration of human factors.
- 447 **perspective, human factors** - the human factors perspective considers the  
448 contributions of the human to the contributing factors of the crash in order to  
449 propose solutions that might break the chain of events leading to the crash.
- 450 **peripheral vision** - the ability of people to see objects beyond the cone of clearest  
451 vision.
- 452 **permitted plus protected phase** - compound left-turn protection that displays the  
453 permitted phase before the protected phase.
- 454 **phase** - the part of the signal cycle allocated to any combination of traffic movements  
455 receiving the right-of-way simultaneously during one or more intervals.
- 456 **positive guidance** - when information is provided to the driver in a clear manner  
457 and with sufficient conspicuity to allow the driver to detect an object in a roadway  
458 environment that may be visually cluttered, recognize the object and its potential  
459 impacts to the driver and vehicle, select an appropriate speed and path, and initiate  
460 and complete the required maneuver successfully.

- 461 **potential for safety improvement (PSI)** - estimates how much the long-term accident  
462 frequency could be reduced at a particular site.
- 463 **predicted average crash frequency** - the estimate of long-term average crash  
464 frequency which is forecast to occur at a site using a predictive model found in Part C  
465 of the HSM. The predictive models in the HSM involve the use of regression models,  
466 known as Safety Performance Functions, in combination with Accident Modification  
467 Factors and calibration factors to adjust the model to site specific and local  
468 conditions.
- 469 **predictive method** - the methodology in Part C of the manual used to estimate the  
470 'expected average crash frequency' of a site, facility or roadway under given  
471 geometric conditions, traffic volumes and period of time.
- 472 **primacy** - placement of information on signs according to its importance to the  
473 driver. In situations where information competes for drivers' attention, unneeded  
474 and low priority information is removed. Errors can occur when drivers shred  
475 important information because of high workload (process less important information  
476 and miss more important information).
- 477 **programming, linear** - a method used to allocate limited resources (funds) to  
478 competing activities (safety improvement projects) in an optimal manner.
- 479 **programming, integer** - an instance of linear programming when at least one  
480 decision variable is restricted to an integer value.
- 481 **programming, dynamic** - a mathematical technique used to make a sequence of  
482 interrelated decisions to produce an optimal condition. Dynamic programming  
483 problems have a defined beginning and end. While there are multiple paths and  
484 options between the beginning and end, only one optimal set of decisions will move  
485 the problem from the beginning to the desired end.
- 486 **project development process** - typical stages of a project from planning to post-  
487 construction operations and maintenance activities.
- 488 **project planning** - part of the project development process in which project  
489 alternatives are developed and analyzed to enhance a specific performance measure  
490 or a set of performance measures, such as, capacity, multimodal amenities, transit  
491 service, and safety.
- 492 **quantitative predictive analysis** - methodology used to calculate an expected  
493 number of crashes based on the geometric and operational characteristics at the site  
494 for existing conditions, future conditions and/or roadway design alternatives.
- 495 **queue** - a line of vehicles, bicycles, or persons waiting to be served by the system in  
496 which the flow rate from the front of the queue determines the average speed within  
497 the queue.
- 498 **randomized controlled trial** - experiment deliberately designed to answer a research  
499 question. Roadways or facilities are randomly assigned to a treatment or control  
500 group.
- 501 **ranking methods, individual** - the evaluation of individual sites to determine the  
502 most cost-effective countermeasure or combination of countermeasures for the site.
- 503 **ranking methods, systematic** - the evaluation of multiple safety improvement  
504 projects to determine the combination of projects that will provide the greatest crash  
505 frequency or severity reduction benefit across a highway network given budget  
506 constraints.
- 507 **rate** - (See crash rate).

- 508 **rate, critical** - compares the observed crash rate at each site with a calculated critical  
509 crash rate unique to each site.
- 510 **reaction time (RT)** - the time from the onset of a stimulus to the beginning of a  
511 driver's (or pedestrian's) response to the stimulus by a simple movement of a limb or  
512 other body part.
- 513 **redundancy** - providing information in more than one way such as indicating a no  
514 passing zone with signs and pavement markings.
- 515 **regression analysis** - a collective name for statistical methods used to determine the  
516 interdependence of variables for the purpose of predicting expected average  
517 outcomes. These methods consist of values of a dependent variable and one or more  
518 independent variables (explanatory variables).
- 519 **regression-to-the-mean (RTM)** - the tendency for the occurrence of crashes at a  
520 particular site to fluctuate up or down, over the long term, and to converge to a long-  
521 term average. This tendency introduces regression-to-the-mean bias into crash  
522 estimation and analysis, which can make treatments at sites with extremely high  
523 crash frequency appear to be more effective than they truly are.
- 524
- 525 **relative severity index (RSI)** - a measure of jurisdiction-specific societal crash costs.
- 526 **relative severity index (RSI) method** - an average crash cost calculated based on the  
527 crash types at each site and then compared to an average crash cost for sites with  
528 similar characteristics to identify those sites that have a higher than average crash  
529 cost. The crash costs can include direct crash costs accounting for economic costs of  
530 the crashes only; or account for both direct and indirect costs.
- 531 **road-use culture** - each individual road user's choices, and the attitudes of society as  
532 a whole towards transportation safety.
- 533 **roadside** - the area between the outside shoulder edge and the right-of-way limits.  
534 The area between roadways of a divided highway may also be considered roadside.
- 535 **roadside barrier** - a longitudinal device used to shield drivers from natural or man-  
536 made objects located along either side of a traveled way. It may also be used to  
537 protect bystanders, pedestrians, and cyclists from vehicular traffic under special  
538 conditions.
- 539 **roadside hazard rating** - considers the clear zone in conjunction with the roadside  
540 slope, roadside surface roughness, recoverability of the roadside, and other elements  
541 beyond the clear zone such as barriers or trees. As the RHR increases from 1 to 7, the  
542 crash risk for frequency and/or severity increases.
- 543 **roadway** - the portion of a highway, including shoulders, for vehicular use.
- 544 **roadway cross-section elements** - roadway travel lanes, medians, shoulders, and  
545 sideslopes.
- 546 **roadway environment** - a system, where the driver, the vehicle, and the roadway  
547 interact with each other.
- 548 **roadway, low speed** - facility with traffic speeds or posted speed limits of 30 mph or  
549 less.
- 550 **roadway, intermediate or high speed** - facility with traffic speeds or posted speed  
551 limits greater than 45 mph.
- 552 **roadway safety management process** - a quantitative, systematic process for  
553 studying roadway crashes and characteristics of the roadway system and those who

- 554 use the system, which includes identifying potential improvements, implementation,  
555 and the evaluation of the improvements.
- 556 **roadway segment** - a portion of a road that has a consistent roadway cross-section  
557 and is defined by two endpoints.
- 558 **roundabout** - an unsignalized intersection with a circulatory roadway around a  
559 central island with all entering vehicles yielding to the circulating traffic.
- 560 **rumble strips** - devices designed to give strong auditory and tactile feedback to  
561 errant vehicles leaving the travel way.
- 562 **running speed** - the distance a vehicle travels divided by running time, in miles per  
563 hour.
- 564 **rural areas** - places outside the boundaries of urban growth boundary where the  
565 population is less than 5,000 inhabitants.
- 566 **Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for**  
567 **Users (SAFETEA-LU)** - a federal legislature enacted in 2005. This legislature  
568 elevated the Highway Safety Improvement Program (HSIP) to a core FHWA  
569 program and created requirement for each state to develop a State Highway Safety  
570 Plan (SHSP).
- 571 **safety** - the number of accidents, by severity, expected to occur on the entity per unit  
572 of time. An entity may be a signalized intersection, a road segment, a driver, a fleet  
573 of trucks, etc.
- 574 **safety management process** - process for monitoring, improving, and maintaining  
575 safety on existing roadway networks.
- 576 **safety performance function (SPF)** - an equation used to estimate or predict the  
577 expected average crash frequency per year at a location as a function of traffic  
578 volume and in some cases roadway or intersection characteristics (e.g. number of  
579 lanes, traffic control, or median type).
- 580 **segment** - a portion of a facility on which a crash analysis is performed. A segment is  
581 defined by two endpoints.
- 582 **selective attention** - the ability, on an ongoing moment-to-moment basis while  
583 driving, to identify and allocate attention to the most relevant information, especially  
584 within a visually complex scene and in the presence of a number of distracters.
- 585 **service life** - number of years in which the countermeasure is expected to have a  
586 noticeable and quantifiable effect on the crash occurrence at the site.
- 587 **severity index** - a severity index (SI) is a number from zero to ten used to categorize  
588 accidents by the probability of their resulting in property damage, personal injury, or  
589 a fatality, or any combination of these possible outcomes. The resultant number can  
590 then be translated into an accident cost and the relative effectiveness of alternate  
591 treatments can be estimated.
- 592 **shoulder** - a portion of the roadway contiguous with the traveled way for  
593 accommodation of pedestrians, bicycles, stopped vehicles, emergency use, as well as  
594 lateral support of the sub base, base, and surface courses.
- 595 **Strategic Highway Safety Plan (SHSP)** - a comprehensive plan to substantially  
596 reduce vehicle-related fatalities and injuries on the nation's highways (AASHTO)
- 597 **sight distance** - the length of roadway ahead that is visible to the driver.
- 598 **sight triangle** - in plan view, the area defined by the point of intersection of two  
599 roadways, and by the driver's line of sight from the point of approach along one leg

- 600 of the intersection, to the farthest unobstructed location on another leg of the  
601 intersection.
- 602 **site** - project location consisting of, but not limited to, intersections, ramps,  
603 interchanges, at-grade rail crossings, roadway segments, etc.
- 604 **sites with potential for improvement** - intersections and corridors with potential for  
605 safety improvements and identified as having possibility of responding to crash  
606 countermeasure installation.
- 607 **skew angle, intersection** - the deviation from an intersection angle of 90 degrees.  
608 Carries a positive or negative sign that indicates whether the minor road intersects  
609 the major road at an acute or obtuse angle, respectively.
- 610 **slalom effect** - dynamic illusion of direction and shape used to influence traffic  
611 behavior.
- 612 **sliding-window approach** - analysis method that can be applied when screening  
613 roadway segments. It consists of conceptually sliding a window of a specified length  
614 (e.g. 0.3 mile) along the road segment in increments of a specified size (e.g., 0.1 mile).  
615 The method chosen to screen the segment is applied to each position of the window  
616 and the results of the analysis are recorded for each window. The window that shows  
617 the most potential for safety improvement is used to represent the total performance  
618 of the segment.
- 619 **slope** - the relative steepness of the terrain expressed as a ratio or percentage. Slopes  
620 may be categorized as positive (backslopes) or negative (foreslopes) and as parallel or  
621 cross slopes in relation to the direction of traffic.
- 622 **speed adaptation** - phenomenon experienced by drivers leaving a freeway after a  
623 long period of driving, and having difficulty conforming to the speed limit on a  
624 different road or highway.
- 625 **speed choice** - speed chosen by a driver that is perceived to limit the risk and  
626 outcome of a crash.
- 627 **spreading** - where all the information required by the driver cannot be placed on one  
628 sign or on a number of signs at one location, spread the signage out along the road so  
629 that information is given in small amounts to reduce the information load on the  
630 driver.
- 631 **stopping sight distance (SSD)** - the sight distance required to permit drivers to see a  
632 stationary object soon enough to stop for it under a defined set of worst-case  
633 conditions, without the performance of any avoidance maneuver or change in travel  
634 path; the calculation of SSD depends upon speed, gradient, road surface and tire  
635 conditions, and assumptions about the perception-reaction time of the driver.
- 636 **suburban environment** - an area with a mixture of densities for housing and  
637 employment, where high-density nonresidential development is intended to serve  
638 the local community.
- 639 **superelevation** - the banking of a roadway in a curve to counteract lateral  
640 acceleration.
- 641 **surrogate measure** - an indirect safety measurement that provides the opportunity to  
642 assess safety performance when accident frequencies are not available because the  
643 roadway or facility is not yet in service or has only been in service for a short time, or  
644 when crash frequencies are low or have not been collected, or when a roadway or  
645 facility has significant unique features

- 646 **system planning** - the first stage of the project development process and it is the  
647 stage in which network priorities are identified and assessed.
- 648 **systematic prioritization** - the process used to produce an optimal project mix that  
649 will maximize crash frequency and severity reduction benefits while minimizing  
650 costs, or fitting a mixed budget or set of policies.
- 651 **systematic reviews** - process of assimilating knowledge from documented  
652 information.
- 653 **taper area** - an area characterized by a reduction or increase in pavement width  
654 typically located between mainline and ramp, or areas with lane reductions.
- 655 **total million entering vehicles (TMEV)** - measurement for total intersection traffic  
656 volume calculated from total entering vehicles (TEV) for each intersection approach.
- 657 **total entering volume** - Sum of total major and minor street volumes approaching an  
658 intersection.
- 659 **traffic, annual average daily** - the counted (or estimated) total traffic volume in one  
660 year divided by 365 days/year.
- 661 **traffic barrier** - a device used to prevent a vehicle from striking a more severe  
662 obstacle or feature located on the roadside or in the median or to prevent crossover  
663 median accidents. As defined herein, there are four classes of traffic barriers, namely,  
664 roadside barriers, median barriers, bridge railings, and crash cushions.
- 665 **traffic calming** - measures that are intended to prevent or restrict traffic movements,  
666 reduce speeds, or attract drivers' attention, typically used on lower speed roadways.
- 667 **traffic conflict** - an event involving two or more road users, in which the action of  
668 one user causes the other user to make an evasive maneuver to avoid a collision.
- 669 **Transportation Safety Planning (TSP)** - the comprehensive, system-wide,  
670 multimodal, proactive process that better integrates safety into surface transportation  
671 decision-making.
- 672 **traveled way** - lanes, excluding the shoulders.
- 673 **urban environment** - an area typified by high densities of development or  
674 concentrations of population, drawing people from several areas within a region.
- 675 **useful field of view (UFOV)** - a subset of the total field of view where stimuli can not  
676 only be detected, but can be recognized and understood sufficiently to permit a  
677 timely driver response. As such, this term represents an aspect of visual information  
678 processing, rather than a measure of visual sensitivity.
- 679 **visual acuity** - the ability to see details at a distance.
- 680 **visual demand** - aggregate input from traffic, the road, and other sources the driver  
681 must process to operate a motor vehicle. While drivers can compensate for increased  
682 visual demand to some degree, human factors experts generally agree that increasing  
683 visual demand towards overload will increase crash risk.
- 684 **volume** - the number of persons or vehicles passing a point on a lane, roadway, or  
685 other traffic-way during some time interval, often one hour, expressed in vehicles,  
686 bicycles, or persons per hour.
- 687 **volume, annual average daily traffic** - the average number of vehicles passing a  
688 point on a roadway in a day from both directions, for all days of the year, during a  
689 specified calendar year, expressed in vehicles per day.

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