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# Glossary G

**AASHTO**—American Association of State Highway and Transportation Offi cials.

**arrow board/arrow panel**—A lighted board with moving or fl ashing arrows to direct traffi c out of a lane or away from a hazard or work zone.

**ACI**—American Concrete Institute. **AISC**—American Institute of Steel Construction. **AISI**—American Iron and Steel Institute. **ASI**—Acceleration Severity Index. **ASTM**—American Society for Testing and Materials.

**ballast**—Mass added to vehicle, other than simulated occupant(s) and instrumentation, to simulate cargo and/or to achieve desired test inertial mass.

**barrier height**—The height of a longitudinal barrier measured from the surface of the ground at its face to the top of the highest longitudinal element.

**bogie**—A device used as a surrogate for a production model test vehicle. Existing bogies are four- wheeled devices that are towed into the test article. They are typically designed to replicate the dynamic response of a vehicle for specifi c tests, e.g., tests of breakaway features. Bogies typically can be used for both low- and high-speed tests.

**center of gravity (c. g.)**—Point within test vehicle at which its total mass can be assumed to be concentrated.

**clear zone**—The roadside border area, starting at the edge-of-the-traveled way, available for safe use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a nonrecoverable slope, and/or a clear run-out area. Although it is desirable to maximize the available clear zone, minimum width requirements are dependent on the traffi c volumes and speeds and on the roadside geometry.

**crash cushion**—A device designed primarily to safely stop a vehicle within a relatively short dis- tance. A redirective crash cushion is designed to contain and redirect a vehicle impacting downstream

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from the nose of the cushion. A non-redirective crash cushion is designed to contain and capture a vehicle impacting downstream from the nose of the cushion.

**crash test**—A test in which a production model test vehicle or a surrogate test vehicle impacts or traverses a highway feature.

**critical impact angle (CIA)**—For a given test and the attendant range of vehicular impact angles, the CIA is the angle within this range judged to have the greatest potential for causing a failure when the test is assessed by the recommended evaluation criteria.

**critical impact point (CIP)**—For a given test, the CIP is the initial point(s) of vehicular contact with a feature judged to have the greatest potential for causing a failure when the test is assessed by the recommended evaluation criteria.

**curb mass**—Mass of test vehicle with standard equipment; maximum capacity of engine fuel, oil and coolant; and, if so equipped, air conditioning and additional optional mass engine. It does not include occupants or cargo.

**device**—Refers to a design or a specifi c part thereof, such as a breakaway device. Note that the terms “device” and “feature” are often synonymous.

**evaluation criteria**—Criteria used to assess the results of a crash test or to assess the in-service performance of a feature.

**exit box**—As defi ned in Chapter 5, the exit box is a rectangular region placed at the point where a vehicle exits from a longitudinal barrier impact. The exit box is utilized to evaluate the vehicle’s trajectory upon exiting a longitudinal barrier installation. It is desirable that an impacting vehicle exits the end of the box rather than the side of the box.

**feature**—Refers to a specifi c element of a highway. It may be a hardware item and its associated foundation, such as a sign or barrier installation, or it may be a geometric element, such as a sides- lope or a ditch cross section.

**FHWA**—Federal Highway Administration.

**fi ll material—**Soil placed around roadside safety device during the embedment process.

**fl ail space**—Hypothetical space in which a hypothetical occupant is permitted to move during impact.

**gating device**—A device designed to allow controlled penetration of a vehicle when impacted up- stream of the beginning of the length of need (LON). Note there is some distance between the end of a gating device and the beginning of the LON of the device.

**geometric feature**—A roadside cross-section element such as a ditch section, an embankment, a driveway, a median crossover, or a curb. It also includes drainage structures, such as inlets and cul- vert ends, and devices such as grates used to improve the safety of these features.

**gross static mass**—Sum of test inertial mass and mass of surrogate occupant(s).

**HVOSM**—Highway-Vehicle-Object-Simulation-Model computer program.

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**Hybrid III dummy**—An anthropomorphic dummy, representing the 50th percentile male, the speci- fi cations of which are contained in part 572, Subpart E, Title 49 of the Code of Federal Regulations, Chapter V-(10-1-88 Edition).

**impact angle (θ)**—Angle between normal direction of traffi c and approach path of test vehicle into the test article. The impact angle is the actual vector angle of the vehicle’s c. g. with respect to the normal direction of travel at the time of contact with the test article. Note that the reported impact angle is not necessarily the same as the vehicle heading angle at the time of impact. The test article should be oriented as it would typically be in service with respect to the normal direction of traffi c.

**impact point**—The initial point on a test article contacted by the impacting test vehicle.

**impact severity (IS)**—A measure of the impact severity of a vehicle of mass *M*, impacting at a speed

*V*, at an impact angle θ. It is defi ned as follows: IS = 1/2*M*(*V*sinθ)2.

**installation length—**The entire length of a safety feature installation. The installation length is mea- sured parallel to the roadway and includes end treatments.

**length of need (LON)**—That part of a longitudinal barrier or terminal designed to contain and redi- rect an errant vehicle.

**longitudinal barrier**—A device whose primary function is to safely redirect an errant vehicle away from a roadside or median hazard. The three types of longitudinal barriers are roadside barriers, me- dian barriers, and bridge rails.

**longitudinal channelizers**—A line of longitudinal elements that are connected together to provide delineation of the edge of the travelway. These systems are normally used to provide a clear indica- tion of the appropriate route through a work zone or an area with temporary lane deviations. Most longitudinal channelizers utilize plastic water-fi lled barrier elements with only a small amount of water to assure that they remain in placed under environmental loadings. Longitudinal channelizers are not positive barriers and should never be utilized where a positive barrier is warranted.

**non-gating device**—A device with redirectional capabilities along its entire length. Note that the end of a non-gating device is the beginning of the length of need for the device.

**occupant impact velocity (OIV)**—Velocity at which a hypothetical “point mass” occupant impacts a surface of a hypothetical occupant compartment.

**pendulum**—A device used as a surrogate for a production model test vehicle. A mass is attached to cables, which are in turn suspended from a fi xed point. The mass is raised to a selected height and released, allowing gravity to accelerate the mass as it swings into the test article. The structure of the mass can be designed to replicate the dynamic crush properties of a production model test vehicle. It is basically a low-speed test device.

**permanent feature**—A feature with an anticipated long duration of service, as opposed to those used in a work or construction zone having a relatively short duration of service.

**pocketing**—An undesirable behavior of a redirective device involving relatively large lateral dis- placements within a relatively short longitudinal distance. The behavior tends to generate large

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longitudinal decelerations as the front of the vehicle contacts a portion of a barrier deformed at a sharp angle relative to the vehicle’s path.

**post-impact head deceleration (PHD)**—The resultant acceleration experienced by a hypotheti- cal “point mass” occupant subsequent to impact with a hypothetical occupant compartment. Differs

from ridedown acceleration due to the occupant contact being calculated based on the combination of vehicle deceleration and yaw motion, and the acceleration is a resultant of both the lateral and longi- tudinal acceleration values after occupant impact.

**production model test vehicle**—A commercially available vehicle with properties matching those required in a given test.

**ridedown acceleration**—Acceleration experienced by a hypothetical “point mass” occupant subse- quent to impact with a hypothetical occupant compartment.

**SAE**—Society of Automotive Engineers.

**SI**—International System of Units.

**sprung mass**—All mass that is supported by a vehicle’s suspension system, including portions of the mass of the suspension members.

**snagging**—Contact between a portion of a vehicle, such as a wheel or frame element and a barrier system component that is approximately perpendicular to the normal direction of vehicle travel. The most common type of snagging is when a wheel engages the side of a post. The degree of snag- ging depends on the degree of engagement. Snagging can cause large and unacceptable vehicular decelerations.

**soil strength**—A measure of the support of the surrounding soil provided to ground mounted safety devices. As described in Appendix B, soil strength is measured in terms of the lateral resistance pro- vided by soil for a standardized guardrail post subjected to static and dynamic loading.

**support structure**—A system used to support a sign panel, chevron panel, luminaire, utility line, mailbox, or emergency call box. The system includes the post(s), pole(s), structural elements, founda- tion, breakaway mechanism if used, and accompanying hardware used to support the given feature.

**surrogate occupant**—A dummy, set of sand bags, or other artifact used to simulate the mass effects, to study the dynamic response of an occupant in a vehicle, or both.

**surrogate test vehicle**—A bogie, pendulum, or other substitute device designed to replicate the dy- namic response of a production model vehicle when in collision with a roadside feature.

**temporary feature**—A feature used in a work, construction, or maintenance zone. Its duration of use is normally relatively short, usually one year or less.

**terminal**—A device designed to treat the end of a rigid hazard or longitudinal barrier. A terminal may function by (1) decelerating a vehicle to a safe stop within a relatively short distance, (2) permitting controlled penetration of the vehicle behind the device, (3) containing and redirecting the vehicle, or

(4) a combination of 1, 2, and 3.

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**test article (test feature)**—All components of a system, including the foundation, being evaluated in a crash test. Note that the system may be a geometric feature such as a ditch or driveway slope.

**test inertial mass**—Mass of test vehicle and all items rigidly attached to vehicle’s structure, includ- ing ballast and instrumentation. Mass of surrogate occupant(s), if used, is not included in test inertial mass.

**Test Level (TL)**—A set of conditions, defi ned in terms of vehicular type and mass, vehicular impact speed, and vehicular impact angle, that quantifi es the impact severity of a matrix of tests.

**test vehicle**—A commercially available production model vehicle or an approved surrogate vehicle used in a crash test to evaluate the impact performance of a test article.

**Theoretical Head Impact Velocity (THIV)**—The resultant velocity at which a hypothetical “point mass” occupant impacts the surface of a hypothetical occupant compartment. Differs from occupant impact velocity due to the occupant contact being calculated based on the combination of vehicle deceleration and yaw motion and the impact velocity is a result of both the lateral and longitudinal occupant velocity values at the time of occupant impact.

**track width**—Center-of-tire-to-center-of-tire distance for a given axle of a vehicle.

**transition**—That part of a longitudinal barrier system between and connecting sections of differing lateral stiffness and/or sections of differing design or geometry.

**trailer-mounted attenuator**—A cushioning device, attached to the rear of the changeable message sign trailer, which reduces the severity of impacts on the trailer for both the impacting vehicle and for others in the work zone.

**truck-mounted attenuator (TMA)**—An energy-absorbing device attached to the rear of a truck or utility vehicle. A TMA is designed to bring a vehicle impacting the rear of the truck to a controlled stop.

**TMA support vehicle**—The vehicle to which a truck-mounted attenuator is attached. Because the support vehicle often rolls forward during an impact with the TMA, the mass of the support truck can affect the performance of the safety device.

**unsprung mass**—All mass which is not carried by the suspension system, but is supported directly by the tire or wheel and considered to move with it.

**utility pole**—A support structure used to support power transmission or communication lines.

**variable message sign (VMS)**—A mobile sign system that utilizes a lighted display board to present virtually any message. VMS devices are often used in work zones to provide important information to motorists.

**vehicle rebound**—The distance that a vehicle rebounds from an impact with a crash cushion or end treatment. Vehicle rebound is intended to provide a measure of the risk that a vehicle will bounce off of an attenuator and roll backwards into the travelway.

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**working width**—The distance between the traffi c face of the test article before the impact and the maximum lateral position of any major part of the system or vehicle after the impact.

**work-zone traffi c control device**—A device used in a work zone to regulate, warn, and guide road users and advise them how to traverse a section of highway or street in the proper manner. Work- zone traffi c control devices of interest herein include signs, plastic drums, and lights that may be used thereon; cones, barricades, chevron panels, and their support system; and any other such device(s) commonly exposed to traffi c that may pose a hazard to occupants of a vehicle, to work-zone personnel, or to both.

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