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PERSPECTIVES

What Is the Clear Zone and Why Is It Critical to Roadway Safety?

Our perspectives feature the viewpoints of our subject matter experts on current topics and emerging trends.

INTRODUCTION

The Federal Highways Administration (FHWA) defines a "Clear Zone" as an unobstructed, traversable roadside area that allows a driver to stop safely or regain control of a vehicle that has left the roadway (1). While the recommended clear zone distance depends on many factors, it is generally based on the design speed of the road and slope of the roadside.

Accident reconstruction experts are regularly asked to investigate roadway conditions that existed at the time of an incident. Whether it be multiple vehicle impacts, pedestrians, scooters, or bicyclists involved in roadway incidents, it is critical to evaluate the roadway and roadside for any foreseeable adverse conditions which should have been corrected before the traffic incident. In this article we will discuss why the clear zone is important to the safety of roadway users and provide examples of commonly experienced violations that have resulted in personal injury litigation.

CLEAR ZONE AS DEFINED BY THE ROADSIDE DESIGN GUIDE

There are many challenges experienced by roadway users. This is why a forgiving roadside concept is promoted by the American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide. The clear zone distance is measured from the edge of the through traveled way and is provided to errant vehicles as an area for recovery. Understanding the clear zone is important to a proper application of these concepts, which at times can lead to multiple possible solutions to the field conditions encountered.

The Roadside Design Guide has established the design speed of the roadway and slope of the roadside as determining factors for clear zone requirements. The tables pictured in Figures 1 and 2 (below; from the Roadside Design Guide) list the suggested clear zone distances and illustrate the roadside to be used when designing a roadway. Required distances are dependent on jurisdiction, roadway status, traffic volumes, slopes, and speed.

U.S. Customary Units

Design Speed (mph)	Design ADT	Foreslopes			Backslopes		
		1V:6H or flatter	1V:5H to 1V:4H	1V:3H	1V:3H	1V:5H to 1V:4H	1V:6H or flatter
≤40	UNDER 750[c]	7–10	7–10	[b]	7–10	7–10	7–10
	750–1500	10–12	12–14	[b]	12–14	12–14	12–14
	1500–6000	12–14	14–16	[b]	14–16	14–16	14–16
	OVER 6000	14–16	16–18	[b]	16–18	16–18	16–18
45–50	UNDER 750[c]	10–12	12–14	[b]	8–10	8–10	10–12
	750–1500	14–16	16–20	[b]	10–12	12–14	14–16
	1500–6000	16–18	20–26	[b]	12–14	14–16	16–18
	OVER 6000	20–22	24–28	[b]	14–16	18–20	20–22
55	UNDER 750[c]	12–14	14–18	[b]	8–10	10–12	10–12
	750–1500	16–18	20–24	[b]	10–12	14–16	16–18
	1500–6000	20–22	24–30	[b]	14–16	16–18	20–22
	OVER 6000	22–24	26–32[a]	[b]	16–18	20–22	22–24
60	UNDER 750[c]	16–18	20–24	[b]	10–12	12–14	14–16
	750–1500	20–24	26–32[a]	[b]	12–14	16–18	20–22
	1500–6000	26–30	32–40[a]	[b]	14–18	18–22	24–26
	OVER 6000	30–32[a]	36–44[a]	[b]	20–22	24–26	26–28
65–70[d]	UNDER 750[c]	18–20	20–26	[b]	10–12	14–16	14–16
	750–1500	24–26	28–36[a]	[b]	12–16	18–20	20–22
	1500–6000	28–32[a]	34–42[a]	[b]	16–20	22–24	26–28
	OVER 6000	30–34[a]	38–46[a]	[b]	22–24	26–30	28–30

Figure 1 *- Suggested clear zone distances in feet from edge of through traveled lane (6) (Source: Roadside Design Guide).*

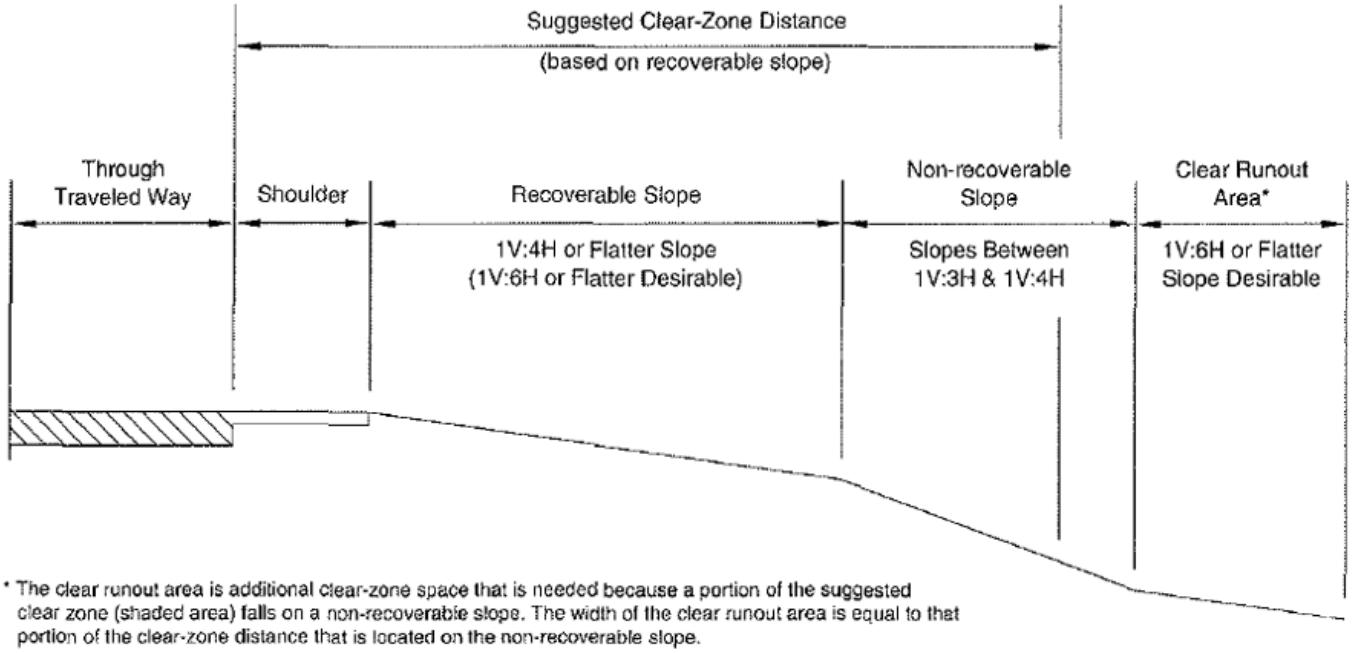

Figure 2 *- Clear zone for non-recoverable parallel foreslope (Source: Roadside Design Guide).*

It is important to understand the requirements as they can also vary between permanent and temporary conditions. When a roadway is under construction the Maintenance of Traffic (MOT), or Temporary Traffic Control, must be planned, designed, and executed in such a way as to safely protect the public from construction related equipment and activities.

As it relates to accident reconstruction, roadway conditions are highly relevant. Explaining these issues is complex and requires guidance as to the relevant specifications and standards. These requirements are mainly determined by location and the design standards that existed at the time the roadway was designed and/or constructed.

COMMONLY EXPERIENCED ROADSIDE VIOLATIONS TO THE CLEAR ZONE

Two commonly experienced violations to the clear zone are drop-offs and above ground hazards.

Drop-Offs

Generally, drop-offs are defined as steep and sudden changes to roadside slopes. Preventing these rapid slope changes is a key factor in preventing rollover crashes and can also prevent vehicles from reentering the road. Figures 3 and 4 are two examples of drop-off conditions that would be problematic for vehicles to encounter. They also violate the clear zone requirements.

Drop-offs can be created by both maintenance and construction activities. It is important to maintain the roadside to prevent these types of hazards from developing. These maintenance tasks can be performed by the owner or be contracted out to private companies using an asset maintenance contract. The party responsible for a roadway's maintenance can change throughout the lifetime of a road, and this is an issue that requires careful research and understanding to determine.

Figure 3 *- Shoulder drop-off due to construction activities.*

Figure 4 *- Roadside drop-off due to lack of maintenance.*

Above Ground Hazards

Above ground hazards are unyielding objects that do not meet the required crashworthiness and breakaway criteria. These are objects with the potential to increase the severity of a crash when vehicles run off the road.

Examples of above ground hazards include overpass bridge support systems, boulders, monuments, construction equipment, utility poles, sign supports, and trees. These objects should be removed from the clear zone, or protected, to provide a safe traveling experience for all roadway users. If the objects mentioned above (an example of one is shown in Figure 5) are left near the roadway, vehicles are restricted when responding to emergency run-off road situations.

It is the goal of the roadway designer to ensure only crash tested devices are permanently placed within the clear zone. The Manual on Uniform Traffic Control Devices (MUTCD) requires sign supports within the clear zone to have breakaway bases or be shielded by a barrier (3). These devices should have passed accepted crash testing requirements and been approved by the governing agency for use on the roadway.

Roadway construction zones provide a specific formula for both above ground hazards and drop-off conditions. Encountering a piece of roadway equipment on the side of the road can lead to minor problems at minimum, or, in the worst cases, devastating consequences for the roadway user. Above ground hazards and drop-off conditions can result in difficult and hazardous problems for any vehicle that may be forced to leave the road.

Figure 5 *- Construction equipment creating an above ground hazard.*

CONCLUSION: PROPER APPLICATION OF THE CLEAR ZONE CONCEPT

As the Roadside Design Guide states, "to include every recommendation or design value […] on every future highway project is neither feasible nor possible." That is why it is important to work with a knowledgeable professional who can review the relevant information and use their engineering judgement to determine the appropriateness of the design and conditions on a case-by-case basis.

The number of roadway hazards a driver needs to navigate is beyond measure. As a transportation engineer the goal is to eliminate or minimize these hazards as best as possible. The designer and/or construction contractor of the roadway has little control over an individual's decision making, but they can provide positive guidance to reduce any confusion for the everyday user of the road.

Even when drivers make a mistake or when they must respond to others making mistakes, it should be the goal of any engineer to provide an area—the clear zone—for roadway users to recover and safely enter back onto the roadway. This area should be free of any hazards so errant vehicles aren't faced with conditions which could lead to a roll-over or other crash event.

ACKNOWLEDGMENTS

John Carlton is a Senior Engineer in J.S. Held's Accident Reconstruction practice. John has over 10 years of experience investigating and performing reconstruction analyses on passenger vehicle, commercial vehicle, motorcycle, pedestrian, and bicycle crashes. John holds both a B.S. in Civil Engineering and a Master of Engineering with a concentration in Transportation Engineering from the University of Florida. He is licensed by the State of Florida as a Professional Engineer. He has completed Traffic Crash Reconstruction I and II at Northwestern University's Center for Public Safety and is an ACTAR Accredited Traffic Accident Reconstructionist. John is certified in Temporary Traffic Control (Maintenance of Traffic) at the advanced level and has expertise in the preparation and analysis of "Temporary Traffic Control Plans" for use on FDOT projects. In addition to his transportation safety experience, John has design and construction experience in residential and commercial facilities including roadway and infrastructure. He provides accident reconstruction analysis and consulting services to legal, insurance, governmental, and corporate systems throughout the United States.

John can be reached at +1 954 982 8081 or jcarlton@jsheld.com.

REFERENCES

1. https://highways.dot.gov/safety/rwd/provide-safe-recovery/clear-zones/clear-zones
2. https://store.transportation.org/item/collectiondetail/105?AspxAutoDetectCookieSupport=1
3. https://mutcd.fhwa.dot.gov/