Evidence of Pedestrian Dilemma Zones at Uncontrolled Crossings

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Introduction

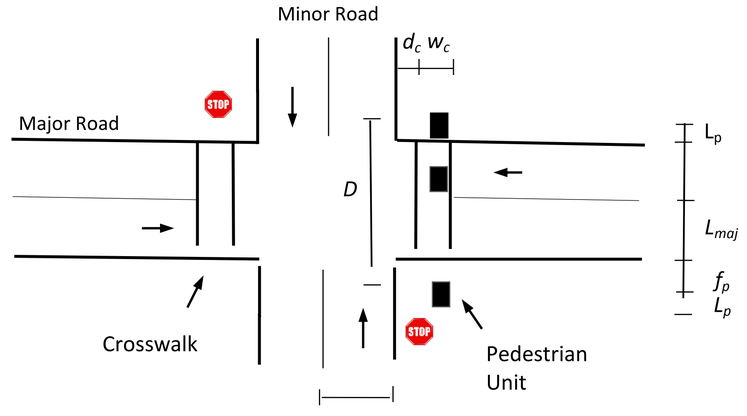
For pedestrians crossing at uncontrolled locations, the pedestrian needs to properly judge the required gap necessary to safely cross all lanes of traffic. This requires the pedestrian to be able to see all the vehicles at enough distance to make the proper decision of when to cross. This can be referred to as pedestrian sight distance (PSD). This PSD is the requirement needed for a pedestrian to be able to view the vehicle at enough distance to safely cross the street. This PSD is only half of the necessary requirement though. There is also a requirement for a driver of a vehicle to be able to see the pedestrian and have the necessary stopping sight distance (SSD) to stop for the pedestrian in the crosswalk in case a pedestrian misjudges the gap or emergently stops while in the crosswalk. In many scenarios, the required SSD can be greater than the available PSD. This creates a dilemma for the pedestrian, where the pedestrian might believe there is an adequate gap, but since the driver cannot see the pedestrian in the required time to stop, that pedestrian is in real danger of getting hit. This paper examines scenarios where this pedestrian dilemma zone occurs. Recognizing that this problem exists can lead to various counter-measures to ensure safe crossings at uncontrolled locations.

Types of Obstacles

1. Static Obstacles: These obstacles are relatively permanent, such as trees, road signs, landscaping, and poles.
2. Semi-Static Obstacles: When a pedestrian is crossing, the obstacle is relatively static, but the obstacle might not always be there. Parked cars are examples of something that is semi-static. A transit stop for a bus, trolley, or train near the intersection could also be considered semi-static.
3. Dynamic Obstacles: Vehicles in motion near the intersection can have a dynamic effect on sight distance. For a two-lane roadway with one lane in each direction, this becomes more of a problem when the near-side vehicles pass the intersection and block the view of the far-side approaching vehicles. If this dynamic obstacle is an issue for the pedestrian to cross, the pedestrian can choose to delay the crossing. However, if a pedestrian chooses to cross at a point where there is no dynamic sight distance issue, it is possible that the far-side approaching vehicle will then have a dynamic SSD issue.

Study

Three scenarios were looked at:



Scenario 1 – Ideal, Open Space, Low Volume

Major-Road Speed (mph)	Near-Side PSD (ft)	Far-Side PSD (ft)	SSD (ft)			
			G = 0%	G = -10%	G = -15%	G = -20%
25	305	430	155	175	200	235
30	370	515	200	230	265	315
35	430	605	250	295	335	405
40	490	690	305	365	420	**510**
45	550	775	360	440	505	**625**
50	610	860	425	520	605	**750**

Scenario 2 – Delayed View of Pedestrian at Beginning of Crosswalk

Major-Road Speed (mph)	Near-Side Approaching Vehicle		Far-Side Approaching Vehicle	
	PSD (ft)	SSD (ft)	PSD (ft)	SSD (ft)
25	305	335	**430**	**460**
30	370	420	**515**	**570**
35	430	505	**605**	**680**
40	490	595	**690**	**795**
45	550	685	**775**	**910**
50	610	785	**860**	**1,035**

Scenario 3 – Delayed View of Pedestrian at Middle of Crosswalk

Speed (mph)	Near-Side Approaching Vehicle		Far-Side Approaching Vehicle	
	PSD (ft)	SSD (ft)	PSD (ft)	SSD (ft)
25	305	405	**430**	**530**
30	370	495	**515**	**645**
35	430	595	**605**	**770**
40	490	700	**690**	**900**
45	550	805	**775**	**1,030**
50	610	920	**860**	**1,170**

Conclusion

This paper showed evidence of a pedestrian dilemma zone at uncontrolled crossings where a pedestrian has the ability to cross a road safely but should anything go wrong in the crossing, a vehicle will not be able to stop in time. This happens in situations where a driver does not see or react to a pedestrian until the pedestrian starts crossing into the vehicle's travel lane or the pedestrian slows or stops in the crosswalk for any reason (e.g. falls, gets injured, gets distracted, or drops something).