DRAFT RESULTS

Establishing Pedestrian Walking Speeds

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1.0 Introduction

As baby boomers move into retirement concern has grown for seniors' transportation options. One of such concerns is crossing clearance times. Relatively little is known about pedestrian crossing characteristics, especially for older users. The Portland State University (PSU) student chapter submitted a proposal in response to an RFP from Institute of Transportation Engineers (ITE) District 6 to further study this issue and generate technical data on the subject in question.

The assumptions governing the expected crossing speed have changed considerably [1]. In 1948, the *Manual on Uniform Traffic Control Devices* (MUTCD) only offered a 5 second start-up time as a guideline [2]. The 1961 Edition offered a standard crossing time of 4.0 ft/second [3]. In the latest edition (2003) MUTCD adopted a standard of 4.0 ft/second to allow users to walk from the curb to the far side of the traveled way [4]. The *Traffic Engineering Handbook* suggests 3 to 3.25 ft/second as appropriate [5]. An ITE study at a location with higher senior use suggested 2.5 ft/second for areas with high senior concentrations [6].

Little discussion has been given to variation in users and the corresponding variation in crossing speeds. Several user and environmental factors influence pedestrian speeds. In *Field Studies of Pedestrian Walking Speed and Start-Up Time* by Knoblauch et al, several of these factors were studied and the corresponding crossing speeds for "younger" and "older" pedestrians were studied in Richmond Virginia; Washington, D.C.; Baltimore, Maryland; and Buffalo, New York. In order to expand on this existing information a series of studies was conducted in Portland, Oregon to compare with the available data.

2.0 Methodology

Eight sites in Portland, Oregon were picked for their varying land use, crossing distances, and traffic flow. Several factors were studies including: gender, age, group size, signal compliance, initial speed, and pace consistency. Older users were defined as appearing over 60 years old. Group size is to evaluate whether the user in question crossed alone or with others (regardless of whether or not they appeared "together"). For signal compliance, users either started walking during the WALKING sign or the flashing DON'T WALK sign. The initial speed characteristic defines the users state before entering the roadway as either "stopped" or "walking." Pace consistency was checked to ascertain whether or not the users speed changed while crossing.

Jaywalkers, people running, and people crossing outside of the crosswalk were not counted. Also, data was not collected for users pushing carts or carrying lots of bags. At each site 100 crossing times were recorded along with the above characteristics and crossing distances. The crossing times were

measured with a hand-held, digital stopwatch. Crossing time was defined as curb-to-curb distance. The data was analyzed in Excel

3.0 Results

The mean and 15th percentile walking speeds in feet per second for varying pedestrians and sites is summarized in Table 1. 815 pedestrians were observed, including 194 pedestrians that appeared over 60 years old. The characteristics in Table 1 show significant differences in speed.

The average walking speed for younger pedestrians was 4.85 ft/second and 4.33 ft/second for older pedestrians. The corresponding 15th percentile speeds were found to be 4.07 and 3.50 ft/second, respectively.

Similar to the *Field Studies of Pedestrian Walking Speed and Start-Up Time*, younger males were the fastest (4.96 ft/second average) and older females were the slowest (4.15 ft/second). Pedestrians who start during the flashing DON'T WALK sign typically cross faster than those who start during the WALK sign. This is likely because they know they are running out of time. Similarly, pedestrians who started from a stand still had a slower average speed than those who entered the roadway already moving. With the exception of the 15th percentile for older pedestrians, users moved slightly slower when crossing with others instead of alone. Pedestrians who changed their pace had a faster average crossing speed possibly because they perceived a smaller clearance time than they did initially.

Table 1: Summary of Mean and 15th Percentile Walking Speeds in Feet per Second for Younger and Older Pedestrians

Factors	Number		Mean		15th Percentile	
	Older Peds	Younger Peds	Older Peds	Younger Peds	Older Peds	Younger Peds
GENDER						
Female	99	298	4.15	4.73	3.34	3.95
Male	95	323	4.52	4.96	3.74	4.18
GROUP SIZE						
Alone	120	331	4.38	5.04	3.43	4.21
With Others	74	292	4.26	4.63	3.60	3.94
SIGNAL COMPLIANCE						
Start on Walk	154	493	4.30	4.81	3.47	4.05
Start on Flashing Don't Walk	38	130	4.44	5.01	3.71	4.20
INITIAL SPEED						
Stopped	136	381	4.21	4.75	3.36	4.05
Walking	57	243	4.58	5.00	3.91	4.11
PACE CONSISTENCY						
Pace change	6	32	4.61	5.36	3.60	4.28
No pace change	188	592	4.32	4.82	3.51	4.06

4.0 Summary

There is still a lack of data on the subject in question. Pedestrian clearance times have a significant impact on roadway design and safety. The battle between traffic flow and pedestrian safety will likely continue. However, this can be better addressed with more information on pedestrian characteristics and crossing speeds. It is recommended that areas of higher senior concentrations use a 3.34 ft/second walking speed (curb-to-curb) as a guideline.

5.0 References

1. Knoblauch, Richard L, Martin T. Pietrucha and Marsha Nitzburg, "Field Studies of Pedestrian Walking Speed and Start-Up Time". *Transportation Research Record*, No. 1538.
2. *Manual on Uniform Traffic Control Devices for Streets and Highways*. Washington, DC, USA: Public Roads Administration, August 1948.
3. *Manual on Uniform Traffic Control Devices for Streets and Highways*. Washington, DC: Bureau of Public Roads, June 1961.
4. *Manual on Uniform Traffic Control Devices for Streets and Highways*. 2003 Edition. Washington, DC: FHWA, November 2003.
5. Dewar, R.E. Driver and Pedestrian Characteristics. In *Traffic Engineering Handbook* (4th edition, J. Pline, ed), Prentice Hall, Englewood Cliffs, N.J., 1992.
6. ITE Committee 4A-6, Pedestrians. *Traffic Control Devices for Elderly and Handicapped Pedestrians*. Institute of Transportation Engineers, Washington, D.C., undated.