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FOR HIGHWAY SAFETY

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Architectural and Transportation Barriers Compliance Board
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Architectural and Transportation Barriers Compliance Board
Draft Guidelines for Accessible Public Rights-of-Way

In response to the Draft Guidelines for Accessible Public Rights-of-Way (June 17, 2002) proposed by the Architectural and Transportation Barriers Compliance Board (Access Board, 2002), the Insurance Institute for Highway Safety opposes the provisions that would mandate installation of traffic signals on pedestrian crosswalks at all roundabouts.

Background
Modern roundabouts are designed to function safely and efficiently without traffic signals and, in most cases, are constructed to replace less safe and less efficient stop sign-controlled intersections. Roundabouts are circular intersections with specific design and traffic control features that eliminate the need for traffic signals. These features include yield control of all entering traffic, channelized approaches with raised splitter islands, and geometric curvature to ensure slow travel speeds for vehicles entering into and within the roundabout.

Roundabouts are relatively new in the United States. Las Vegas, Nevada, built the first modern U.S. roundabout in 1990 (Jacquemart, 1998), and since then only 200-300 roundabouts have been constructed nationwide. In comparison, Australia and many European countries have been installing roundabouts extensively for decades, with, for example, more than 2000 roundabouts built in the Australian state of Victoria alone.

Effects on road safety of converting intersections to roundabouts has been the subject of extensive research in the United States and abroad. Results clearly indicate that roundabouts are an extremely safe form of intersection traffic control. For example, an Institute-supported evaluation of 23 U.S. intersections converted from stop sign or traffic signal control reported large reductions in motor vehicle crashes after roundabouts were installed (Persaud et al., 2001). Overall, crashes were reduced by an estimated 40 percent, injury crashes declined by 80 percent, and crashes resulting in fatal or incapacitating injuries were reduced by 90 percent. A recent meta-

analysis of 28 separate roundabout safety evaluations from outside the United States concluded that roundabouts were associated with a 30-50 percent reduction in the number of injury crashes and a 50-70 percent reduction in fatal crashes (Elvik, in press).

Although these studies do not provide conclusive evidence of the safety of pedestrians at roundabouts (primarily because of small samples of pedestrian crashes), available research suggests roundabouts can provide a relatively high degree of safety compared with intersections with stop sign and traffic signal control. For example, in the Persaud et al. (2001) study, four pedestrian crashes were reported during the before period and one was reported during the period after roundabouts were built (this difference was not significant due to the small sample size). Brude and Larsson (2000) analyzed pedestrian crash data at 72 roundabouts in Sweden and concluded that roundabouts pose no problems for pedestrians compared with conventional signal control intersections. For single-lane roundabouts, the observed numbers of pedestrian crashes were 3-4 times lower than for comparable signalized intersections, controlling for pedestrian volumes and traffic flow. Jordan (1985) examined pedestrian crash patterns at roundabouts in Victoria, Australia for the 4-year period 1980-83. A total of 35 pedestrian crashes were reported (average 9 crashes per year) at approximately 800 roundabouts. The author characterized this as an extremely low rate of pedestrian crashes and concluded that "concern for pedestrian safety at roundabouts, while well intentioned, is unfounded." Tumber (1997) conducted a review of pedestrian safety at roundabouts, also in Australia. The study focused on roundabouts constructed on arterial roads within the Melbourne metropolitan area during 1987-94. During this period, 64 pedestrian crashes were reported at approximately 400 roundabouts, for an average crash rate of 0.02 crashes per roundabout per year. The severity of pedestrian crashes (as indicated by the proportion of injuries classified as either serious or fatal) also was lower for roundabouts than for intersections with other forms of traffic control.

The safety of blind pedestrians at roundabouts has been questioned by some advocates of the visually impaired, but direct evaluations of crash data are not available. In an indirect evaluation of the issue, Guth et al. (2002) collected data regarding the ability of blind pedestrians to use their hearing to distinguish "crossable" gaps in traffic at roundabouts from gaps that were considered by the authors too short to afford a safe crossing. This work was supported by the Access Board. Three study sites in Maryland included a low-volume, single-lane roundabout; a large, urban, high-volume, two-lane roundabout; and an urban, intermediate-volume, two-lane roundabout. Six blind and four sighted pedestrians observed traffic at roundabout

crosswalks and indicated by pressing a button whenever they believed they could complete a crossing before the arrival of the next vehicle. For the low-volume, single-lane roundabout, gaps between vehicles longer than 10 seconds were very common. Pedestrians observed frequent periods of "all quiet" and concluded that listening for such periods appeared to be "an effective strategy for identifying acceptable gaps." In addition, "risky" judgments (ones where there would not have been sufficient time to reach the splitter island before the arrival of the next vehicle) were few and not significantly different across the two groups (blind and sighted pedestrians). For the two high-volume, two-lane roundabouts, the average duration of the gaps between vehicles was about 6 seconds, and most gaps were judged too brief to allow pedestrians to fully cross before the next vehicle arrived at the crosswalk. Also at these two roundabouts, blind pedestrians were more than twice as likely as sighted pedestrians to indicate there was an acceptable gap when approaching vehicles were 2-3 seconds away.

Despite the finding by Guth et al. (2002) that blind pedestrians can adequately judge gaps at single-lane roundabouts with little difficulty and as well as sighted individuals, the Access Board is proposing guidelines that would require signalization of pedestrian crosswalks at all roundabouts on the basis that the safety of blind pedestrians mandates such devices. This proposed requirement would apply even in rural settings where pedestrian activity is infrequent and where blind pedestrians may be nonexistent. However, traffic signals appear to be unnecessary at single-lane roundabouts and, if mandated, actually could be detrimental to highway safety. It is likely that the arbitrary addition of traffic signals to well designed roundabouts could increase the risk of injury crashes due to disruptions in traffic flow. Also, substantial costs associated with installation and maintenance of traffic signals might discourage some communities from constructing roundabouts. Even for high-volume, two-lane roundabouts, the Guth et al. field study does not make a compelling case for traffic signals because of weaknesses in the research methodology. Blind pedestrians were driven to roundabouts and then observed after minimal exposure to these unfamiliar locations. This is unrealistic because blind pedestrians typically do not wander into such areas without a guide to provide initial orientation. Guth et al. merely provides evidence of the *perception* of risk, not actual risk. The blind pedestrians may have been more willing to press a button when they believed they could complete a crossing than to begin crossing, thus inflating the numbers of "risky" judgments. Also, comparable data were not collected for intersections controlled by traffic signals or stop signs.

Compared with conventional intersections, roundabouts can provide improved access and safety for blind pedestrians as well as sighted individuals because of specific roundabout design and operational characteristics. First and foremost, traffic speeds within roundabouts are very low -- typically 15-20 mph -- compared with considerably higher traffic speeds at most traffic signal and stop sign-controlled intersections. Pedestrian refuge islands at roundabouts provide for short crossing distances. Also, roundabouts are relatively simple intersections that eliminate left turns, right turns, and the associated turning-vehicle conflicts common at conventional intersections. By comparison, conventional intersections are characterized by higher traffic speeds, longer crossing distances, and are more complex due to two-way traffic flow and frequent vehicle turning movements. Preusser et al. (2002) reported that 25 percent of motor vehicle-pedestrian collisions in Washington D.C. involve turning vehicles.

The combination of low traffic speeds, short crossing distances, and absence of turning vehicles in conjunction with White Cane Laws – laws in 47 states that require drivers to yield the right-of-way to a person carrying a white cane or accompanied by a guide dog --- provide safe crosswalks for blind pedestrian at many roundabouts. Additional measures that could enhance safety include textured pavement in conjunction with ramps to help lead blind pedestrians to crosswalks, raised crosswalks that can further slow entering and exiting traffic, and pedestrian yield signs in both directions of the crossing that require drivers to stop for pedestrians waiting on the crosswalk. Also, specific training can be developed and provided to help the visually impaired perceive gaps in traffic and to give drivers cues to stop.

Signalizing roundabout crossings can be justified when the combined volumes of pedestrians and vehicles are high or at locations with complex geometry such as high-volume school zones. In Australia and Europe, the vast majority of roundabouts are unsignalized, but some roundabouts in urban areas do have pedestrian signals. The recommended threshold for signalizing pedestrian crossings in the United Kingdom is:

$$PV2 > 1 \times 108,$$

where
P = Pedestrian volumes per hour (average of peak 4 hours)
V = entering vehicles per hour (average of peak 4 hours)

Rather than adopting the Access Board’s recommendation to require signalization on pedestrian crosswalks at all roundabouts, regardless of need or justification, the Institute supports the Australian and

European practice of installing pedestrian signals at appropriate locations based on objective criteria.

Opposition to Draft Guidelines

The Access Board indicates that the absence of stopped traffic presents a problem for pedestrians with vision impairments in crossing streets. It is true that traffic signals at conventional intersections establish a stop-and-go pattern that can assist blind and visually impaired pedestrians in crossing busy streets by producing audible cues about vehicle movements. However, a large majority of U.S. intersections are not controlled by traffic signals. Most intersections are governed by one-way or two-way stop sign control, which only require vehicles traveling on minor intersection approaches to stop. At most stop sign-controlled intersections, vehicles traveling on major intersection approaches are not required to stop, and at such locations travel speeds often can exceed 40-50 mph. So clearly, the absence of stopped traffic, while potentially problematic for pedestrians with vision impairments, is a frequently encountered condition. Like countless other crossings where traffic does not stop, blind pedestrians primarily rely on hearing to identify gaps in traffic.

The draft guidelines also suggest that crossing at a roundabout requires a pedestrian to visually select a safe gap between cars that may not stop. This statement is inaccurate as well as insulting to pedestrians who are blind. With proper training, blind pedestrians use their hearing to identify and select gaps in traffic at a wide range of unsignalized crossings where traffic may not stop. Even the Access Board-sponsored research by Guth et al. (2002) reported that blind individuals can cross single-lane roundabouts with relatively little difficulty and with few “risky” judgments (and more than half of U.S. roundabouts are single-lane, as reported by Jacquemart (1998)).

The Access Board claims that people who are blind or visually impaired are unable to make eye contact with drivers making it impossible to “claim the intersection.” Blind pedestrians obviously are unable to make eye contact with drivers, regardless of the type of intersection traffic control. However, because roundabouts produce low travel speeds, short crossing distances, and eliminate turning vehicles, pedestrian crossings at roundabouts should be safer for blind pedestrians relative to many other unsignalized crossings. White Cane Laws, which require drivers to yield the right-of-way, further enable blind pedestrians to claim the intersection at roundabout crossings despite the inability to make eye contact.

Summary

The Institute opposes provisions of the draft guidelines that would require installation of traffic signals on pedestrian crosswalks at all roundabouts. The Access Board has provided no scientific evidence in support of this proposed requirement and, furthermore, it is likely that the arbitrary addition of traffic signals to well-designed roundabouts could increase the risk of motor vehicle crashes, in particular rear-end collisions, due to disruptions in traffic flow. Substantial costs associated with installation and maintenance of traffic signals might discourage some communities from constructing roundabouts or installing pedestrian crossings. Compared with conventional intersections, roundabout design and operational characteristics can provide improved access and safety for blind as well as sighted pedestrians, and additional measures can be taken to further improve the safety of blind pedestrians at unsignalized roundabout crossings such as textured pavement, raised crosswalks (speed tables), and increased lighting. Rather than adopting the Access Board's recommendation to mandate signalization on pedestrian crosswalks at all roundabouts -- regardless of need or justification -- the Institute supports the practice of installing pedestrian signals at appropriate locations where needed, based on objective criteria.

Sincerely,

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