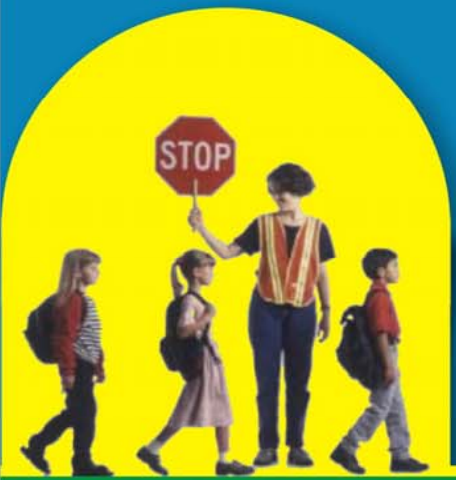
Adapting Walking Security Index Concepts and Procedures to Serve and Promote the Mobility of Children

Dr. Barry Wellar, President
Wellar Consulting Inc
Distinguished Research Fellow
Transport 2000 Canada
wellarconsulting.com

Improving the Mobility of Children
Session 4238



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Adapting Walking Security Index Concepts and Procedures to Serve and Promote the Mobility of Children

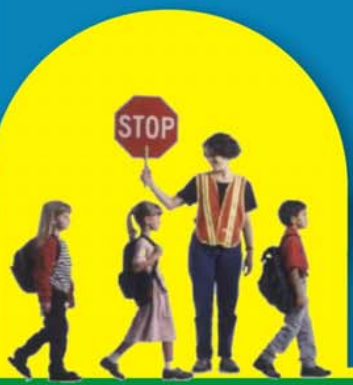
Abstract

The Walking Security Index (WSI) project was approved in 1994 as an element of the Transportation Environment Action Plan of the Region of Ottawa-Carleton. During the design phase (1995-1998) ten indexes were developed to measure the levels of safety, comfort and convenience expected and experienced by pedestrians at intersections. In the pilot study phase (1999-2002) three macro indexes were tested for operationality. Over the course of the project more than 25 documents were published, including Perspectives on Pedestrian Safety (1995), Walking Security Index (1998), Newspapers as a Source of Fact and Opinion on Pedestrians' Safety, Comfort and Convenience (2000), and Walking Security Index Pilot Study (2002).

In this presentation the origins of the WSI project are briefly summarized, and the index formulation processes for the Intersection Volume and Design Index (IVDI), the Quality of Intersection Condition Index (QICI), and the Driver Behaviour Index (DBI) are outlined. Consideration is then given to how each of the macro indexes (IVDI, QICI, and DBI) can be used directly or modified to explicitly represent the interests of children in road and intersection designs and operations, and in motor vehicle safety and enforcement programs.

The presentation is concluded by discussing how the indexes can be applied by parents and advocacy groups, as well as by law enforcement, planning engineering and other agencies, to ensure that the levels of convenience, comfort and safety experienced by children while walking or biking exceed those of private motor vehicle operators, and thereby actively serve and promote the mobility of children.

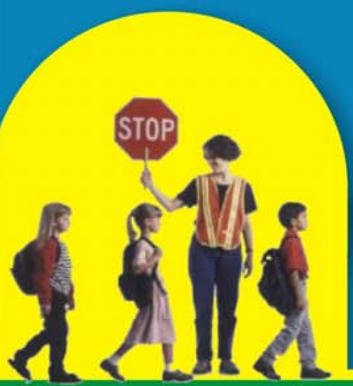
Keywords: transportation, mobility, walking security index, children



About the Walking Security Index (WSI) Project

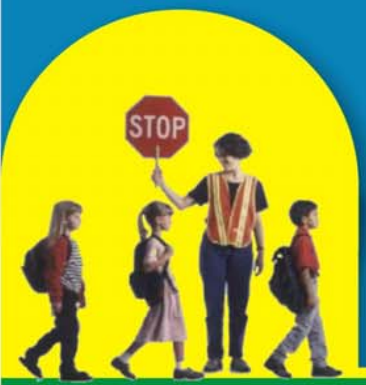
The WSI project was initiated in 1994, and the phase funded by the Region of Ottawa-Carleton/City of Ottawa was completed in 2002. Since 2002 WSI project activities include advising active transportation advocates, publishing journal and proceedings articles, making presentations and holding workshops on index design, testing and implementation, commenting on thesis proposals, providing media commentary on issues related to pedestrians' safety, comfort and convenience, providing opinions and expert witness testimony on civil and criminal matters related to pedestrians' safety, investigating conflicts between vehicle operators and pedestrians, and exploring the relationship between transportation infrastructure, area planning and children's mobility. Hardcopy publications from the WSI project are available from various libraries and government agencies in Canada, the United States, and abroad. A limited number of reports from the design phase of the WSI project are available for sale at cost to individuals and organizations, and a limited number of reports from the pilot study phase are available for sale to public libraries or other open-access organizations. Inquiries about WSI publications should be sent to B. Wellar: wellarb@uottawa.ca.

Readers who wish to learn more about the Walking Security Index are directed to the following websites: aix1.uottawa.ca/~wellarb/; wellarconsulting.com/; geomatics.uottawa.ca/wellarweb/home.htm; www.pedestrian.org; fhwa.dot.gov/environment/sidewalk2/sidewalks2ah.htm



About Barry Wellar and the WSI Project

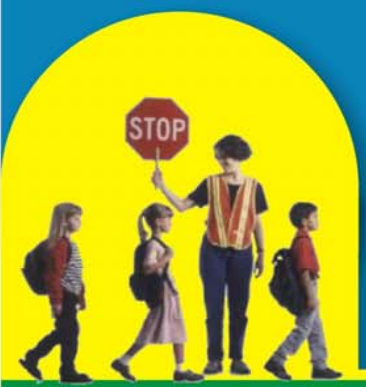
The WSI project was presented in 1994 as a research proposal to be undertaken as part of the Transportation Environment Action Plan, Region of Ottawa-Carleton. Barry Wellar was Principal Investigator for the Walking Security Index project, and Director of the Walking Security Index Program while Professor, Department of Geography and Environmental Studies, University of Ottawa. Upon retirement in 2005 he formed Wellar Consulting Inc., and was appointed Distinguished Research Fellow in 2006 by Transport 2000 Canada Dr. Wellar is a Member of the Canadian Association of Geographers, and the Canadian Institute of Planners, and is a Registered Professional Planner (RPP). His research on the Walking Security Index has been referenced in successful applications to have him qualified as an expert witness in civil trials involving pedestrians' safety.



Index Design Guiding Principle: Apply a Reality Test to Potential Variables

Variable Evaluation Criteria Used to Design and Assess Walking Security Index Research

General	*Particular*
Support Pertinence Degree of Difficulty	Enforceability Data Availability

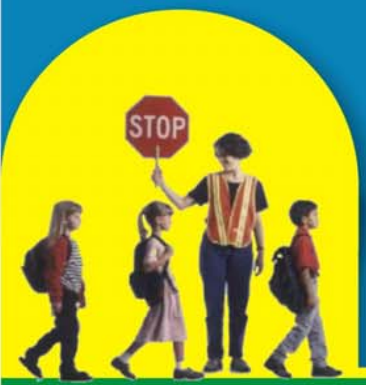


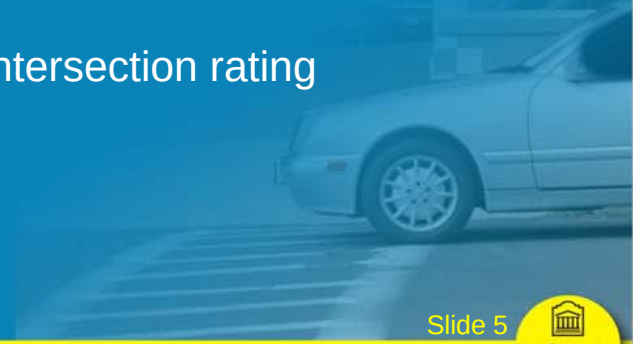
Intersection and Volume Design Index (IVDI)

IVDI = V1 • V2 • V3 • V4 • V5 • V6 • V7 • V8

where,

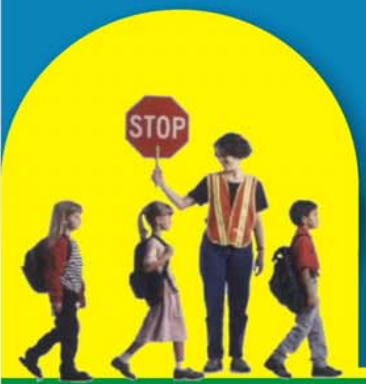
V1 = number of passenger car equivalents[2]/hour
V2 = number of pedestrians/hour
V3 = number of lanes rating
V4 = number of turn lanes by type rating
V5 = intersection geometry rating
V6 = intersection slope rating
V7 = direction(s) of traffic flow rating
V8 = number of channels adjacent to intersection rating





Applying the Indexes: Illustrative Comments on the IVDI

The largest IVDI number identifies the “Intersection from Hell”, relatively speaking, in terms of design, size and vehicle volumes. Simply put, the larger the IVDI number the less likely that an intersection would be deemed ‘pedestrian friendly’. That is, as the IVDI number increases, the safety, comfort and convenience of pedestrians decreases, and to varying degrees so does children’s mobility.

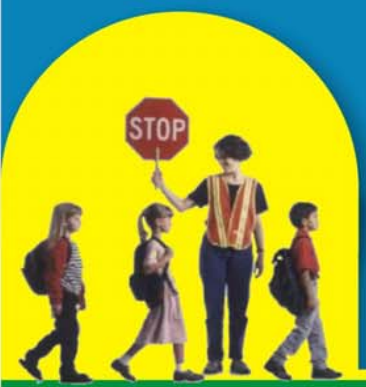


Applying the Indexes: Illustrative Comments on the IVDI

The IVD Index can be used in engineering studies, collision studies, pedestrian movement studies, and numerous other kinds of studies to identify and modify structural or functional features of intersections that directly affect the levels of safety, comfort and convenience experienced by children when crossing an intersection.

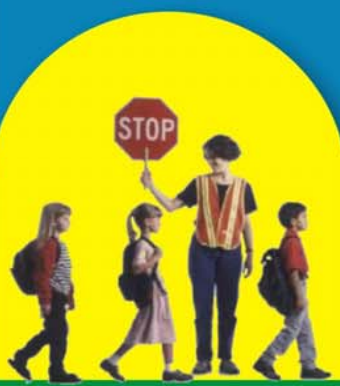
For example, the IVDI formulation can be used to estimate what an intersection will “look like” after a widening. This estimate can then be matched against existing IVDIs to point which out intersections the widened intersection will most resemble should the widening proceed.

Conversely, the variables that comprise the IVDI can be manipulated to reveal the changes to the physical design, or to the amount and type of vehicular traffic, that are necessary to achieve an IVDI score that approximates the number calculated for an intersection that receives a “thumbs up “ from children.



Quality of Intersection Condition Index

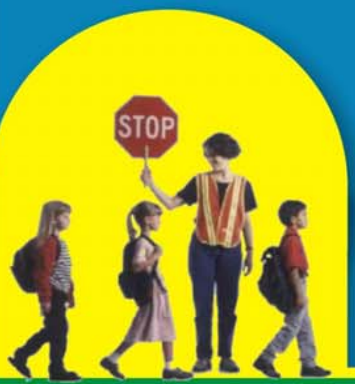
ID	Variable Names for Intersection Design and Maintenance Features	Condition Met ?				
		Yes	No (Quadrant)			
			NW	NE	SE	SW
1	Sidewalk corner capacity					
2	Height of curbing					
3	Condition of curbing					
4	Sidewalk width capacity					
5	Sidewalk condition					
6	Crosswalk surface condition					
7	Median (refuge) capacity					
8	Median (refuge) condition					
9	Traffic calmer(s)					
10	Channel island (refuge) capacity					
11	Crosswalk capacity					
12	Crosswalk signed and painted					
13	Stop bar painted and signed					
14	Pedestrian signage					
15	No sight line obstruction					
16	Street furniture proximal to corner					
17	Ice/snow/slush removal					
18	Water drainage					
	Totals					
	Overall Score (YES – NO)					

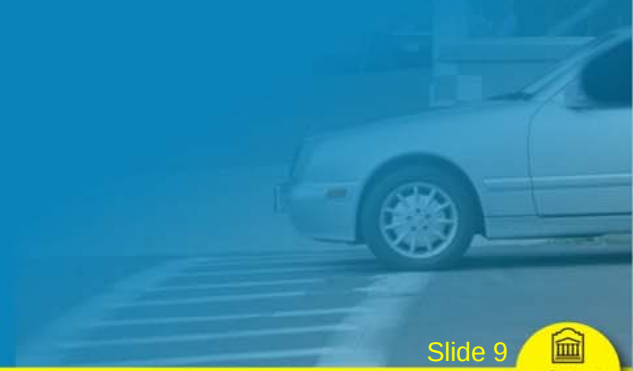


Applying the Indexes: Illustrative Comments on the QICI

It appears that the WSI research was the first in Canada to have serious regard for the fact that there are usually four quadrants to an intersection.

The QICI can be tailored to meet the travel patterns of children by focusing on all quadrants, or particular quadrants, when looking for conditions that affect children's use of intersections.

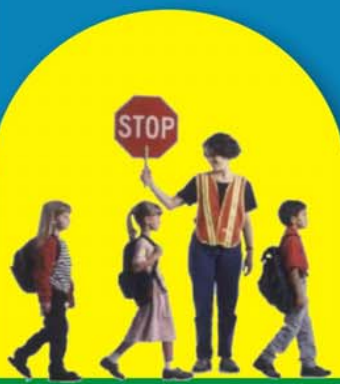




Applying the Indexes: Illustrative Comment on the QICI

There are 18 variables in the QICI. Most if not all of them affect children's mobility. Time allows me to comment on one of them.

The variable 'Stop bar painted and signed' represents a narrow strip of paint, and sometimes but not always there is a posted sign beside the road pointing to the stop bar location. The sign is especially important in locations where snow may cover the painted bar. In the Ottawa research it was confirmed that the vast majority of stop bars are too close to crosswalks, and especially crosswalks near schools. It is our finding that stop bars should be at least six metres from a crosswalk, and that a posted sign is required because many drivers do not seem able to grasp that a stop bar is not always located one metre from a crosswalk.



Driver Behaviour Index

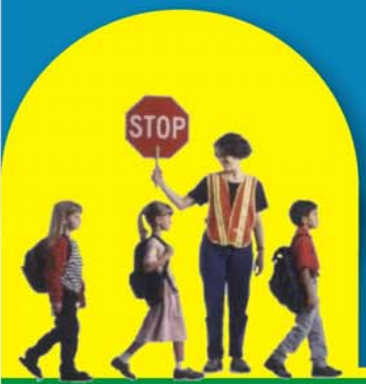
$$\text{Driver Behaviour Index} = \frac{ALI}{P} + \frac{RLI}{P} + \frac{FTYI}{P}$$

where,

$\frac{ALI}{P}$ = amber-light incidents per phase,

$\frac{RLI}{P}$ = red-light incidents per phase,

$\frac{FTYI}{P}$ = fail-to-yield incidents per phase.

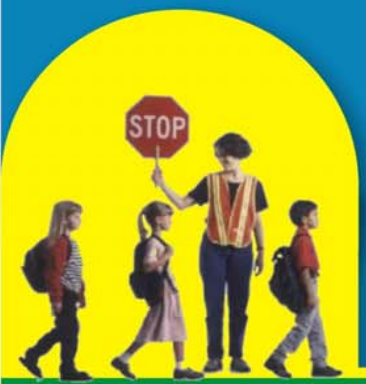


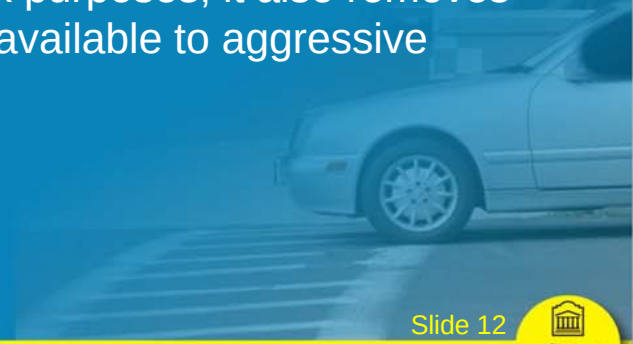
Fitting the DBI to Serve Children's Mobility: Zero Tolerance for Running the Red

For DBI fieldwork purposes, we modified the official version slightly, so that a red-light incident is deemed to occur if either of the following events is observed:

- for left turns and straights, vehicles cross the stop bar after the red shows;
- for right turns on red, vehicles do not come to a full stop before the stop bar.

This tight definition not only serves field work purposes, it also removes the large forgiveness factor that is currently available to aggressive drivers.



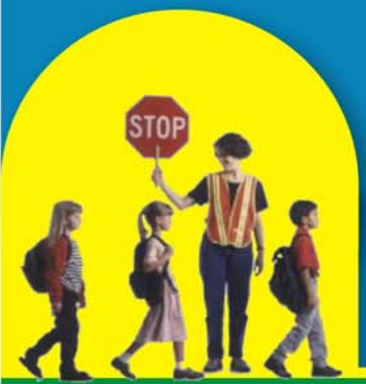


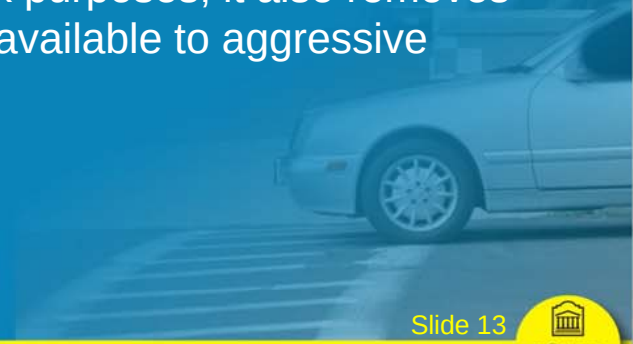
Fitting the DBI to Serve Children's Mobility: Zero Tolerance for Running the Amber

For DBI fieldwork purposes, we again slightly modified the official version, so that an amber-light incident is deemed to occur if either of the following events is observed:

- for left turns and straights, vehicles cross the stop bar after the amber shows;
- for right turns on amber, vehicles cross the stop bar after the amber shows.

This tight definition not only serves field work purposes, it also removes the large forgiveness factor that is currently available to aggressive drivers.

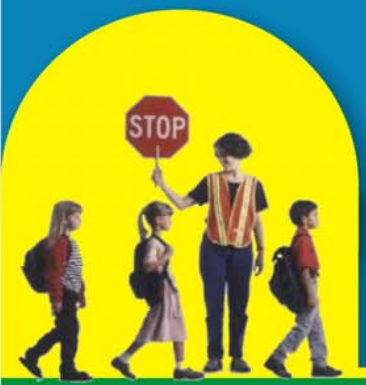




Fitting the DBI to Serve Children's Mobility: Zero Tolerance for Failure-to-Yield

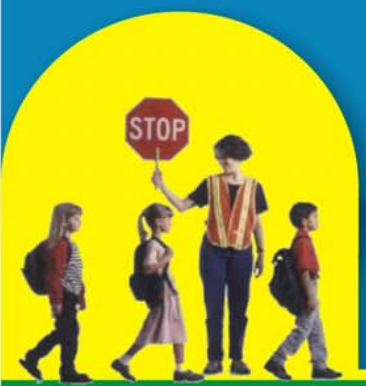
For DBI fieldwork purposes, a failure-to-yield incident is deemed to have occurred if any of the following [nine] events are observed:

1. Vehicle blocks crosswalk when pedestrian signal in walk mode.
2. Vehicle unable to clear intersection before start of pedestrian signal.
3. Vehicle enters crosswalk when pedestrian in lane or about to enter lane.
4. Vehicle accelerates to "beat" pedestrian to crosswalk.
5. Vehicle fails to slow to allow pedestrian to enter crosswalk.
6. Vehicle causes pedestrian to stop or change direction to avoid collision in crosswalk.
7. Vehicle causes pedestrian to delay entering crosswalk.
8. Vehicle changes lanes to cut in front of or behind pedestrian.
9. Vehicle fails to stop before reaching the stop bar.



Applying the Indexes: Illustrative Comments on the DBI

A total of thirteen variables (two for reds, two for ambers, and nine for fail-to-yield) were considered when formulating, testing and refining the DBI. The variables are fully discussed in the project reports, as are the procedures for calculating index scores and rankings. As a result, and in the interests of time, my focus here is on presenting an indicative selection of operations, enforcement, engineering, political, legal, and other initiatives that DBI scores and rankings would point to as means to improve the safety, comfort and convenience, and hence the mobility, of children as pedestrians.

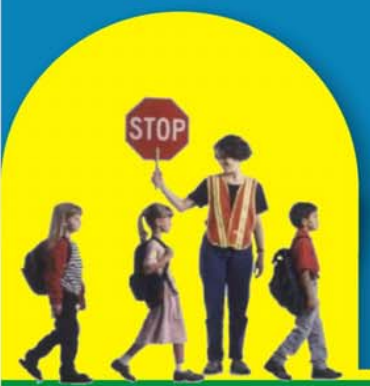


Applying the Indexes: Illustrative Comments on the DBI

1 The DBI is an exceptional means for police services to prioritize the assignment of officers, photo radar and/or red-light cameras at intersections or quadrants to deal with motor vehicle operators who put children at risk.

2 Beginning with the intersections with the worst DBI rankings, photo radar and red-light cameras should be installed at all signalized intersections proximal to schools, libraries and other facilities that attract children as pedestrians. In school zones, infractions should entail triple-rate fines and license suspensions. This recommendation is consistent with the Zero-Tolerance-No Exceptions argument about how to deal with aggressive drivers and their impact on vulnerable road users.

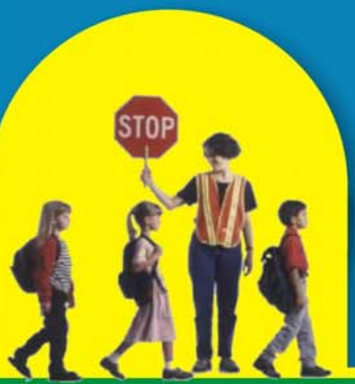
3 Crossing times at intersections proximal to schools and other high-use children destinations should be set at the walking speeds of children.



Applying the Indexes: Illustrative Comments on the DBI

4 Parents and community groups should make it a publicized practice to obtain monthly reports from police departments on citations issued for such offences as speeding, illegal lane changes, tail-gating, failure to stop before stop bar, crosswalk violations, illegal window tints, and failure to execute a complete stop near schools, libraries, parks and other locations frequented by children as pedestrians.

5 Parents and community groups should conduct their own surveillance of quadrants and intersections, compile their own records of violations, and develop their own DBI scores. This body of information is valuable when evaluating law enforcement and traffic engineering performance on a quadrant-by-quadrant or intersection-by intersection basis. In addition, this body of information would no doubt be exceedingly valuable should a legal situation arise involving a vehicle-child collision and lines of questioning in regard to the "effectiveness" of an enforcement program, and/or the conduct of traffic engineers, planners, or other professionals charged with providing safe passage for children.



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In addition, I wish to thank Transport 2000 Canada officials and members for supporting my research and publication activities as Distinguished Research Fellow, and I want to express my appreciation to the many individuals and groups who have contributed support, ideas and encouragement for my work on the Walking Security Index, sustainable transport, and other transportation topics.