BICYCLE CRASH TYPES: A 1990'S INFORMATIONAL GUIDE
FOREWORD

Approximately one out of six highway fatalities in the United States is a bicyclist or pedestrian each year. Estimates for 1995 indicate that 61,000 bicyclists were injured and 830 were killed in traffic crashes. These crashes can be classified or “typed” by their precipitating actions, predisposing factors, and characteristic populations and/or location that can be targeted for intervention.

The information provided in the following guide is the result of a Federal Highway Administration (FHWA) research study that applied the basic National Highway Traffic Safety Administration (NHTSA) bicycle and pedestrian typologies to a sample of bicycle- and pedestrian-motor vehicle crashes from six States with the purpose of refining and updating the crash type distributions. Particular attention was given to roadway and locational factors in order to identify situations where engineering, educational, and/or regulatory countermeasures might be effectively implemented to reduce the frequency of the crashes.

This informational guide should be of interest to State and local bicycle and pedestrian coordinators, transportation planners, and transportation engineers involved in safety and risk management. Other interested parties include those in education, enforcement, and the medical profession.

A. George Ostensen, Director
Office of Safety and Traffic Operations
Research and Development

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16. Abstract  
This bicycle crash type informational guide is a supplement to the research report FHWA-RD-95-163 entitled, "Pedestrian and Bicycle Crash Types of the Early 1900's" (Hunter, Stutts, Pein, and Cox, 1995). The purpose of the research was to apply the basic National Highway Safety Administration (NHTSA) pedestrian and bicyclist typologies to a sample of recent crashes and to refine and update the crash type distributions with particular attention to roadway and locational factors. Five thousand pedestrian- and 3,000 bicycle-motor vehicle crashes were coded in a population-based sample drawn from the States of California, Florida, Maryland, Minnesota, North Carolina, and Utah. The bicycle-motor vehicle crash types distributed as: (1) parallel path events - 36 percent, (2) crossing path events - 57 percent, and (3) specific circumstances - 6 percent. This particular informational guide provides detail on specific bicycle-motor vehicle crash types (e.g., motorist left turn facing the cyclist) through two-page layouts that contain a sketch, description and summary of the crash type, various graphs, and "bullet" information boxes. A similar informational guide, "Pedestrian Crash Types: A 1990's Information Guide" (FHWA-RD-96-163), is available for pedestrian-motor vehicle crashes.

17. Key Words  
Pedestrian, bicycle, motor vehicle, crashes, crash types, safety

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# SI* (Modern Metric) Conversion Factors

## Approximate Conversions to SI Units

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**NOTE:** Volumes greater than 1000 L shall be shown in m³.

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<td></td>
<td>temperature</td>
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### Illumination

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### Force and Pressure or Stress

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<td>m</td>
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<td>3.28</td>
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<td>m</td>
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### Mass

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<td>lb</td>
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<td>1.103</td>
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### Temperature (exact)

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### Illumination

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<td>lux</td>
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### Force and Pressure or Stress

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<thead>
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* SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.

(Revised September 1993)
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<td>Light condition, number of lanes, and speed limit in “Bicyclist Left Turn In Front Of Traffic”</td>
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<td>Positions in “Bicyclist Left Turn In Front Of Traffic”</td>
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<td>Bicyclist age in “Bicyclist Left Turn—Facing Traffic”</td>
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<td>Light condition, number of lanes, and speed limit in “Bicyclist Left Turn—Facing Traffic”</td>
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<td>Positions in “Bicyclist Left Turn—Facing Traffic”</td>
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<td>Bicyclist age in “Bicyclist Right Turn”</td>
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<td>Positions in “Bicyclist Right Turn”</td>
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<td>Bicyclist age in “Wrong Way Bicyclist”</td>
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<td>Light condition, number of lanes, and speed limit in “Wrong Way Bicyclist”</td>
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<td>25</td>
<td>Positions in “Wrong Way Bicyclist”</td>
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<td>Bicyclist age in “Motorist Overtaking—Failed To Detect”</td>
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<td>Light condition, number of lanes, and speed limit in “Motorist Overtaking—Failed To Detect”</td>
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<td>Positions in “Motorist Overtaking—Failed To Detect”</td>
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<td>29</td>
<td>Bicyclist age in “Motorist Overtaking—Counteractive Evasive Actions”</td>
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<td>Light condition, number of lanes, and speed limit in “Motorist Overtaking—Counteractive Evasive Actions”</td>
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<tr>
<td>31</td>
<td>Positions in “Motorist Overtaking—Counteractive Evasive Actions”</td>
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<td>32</td>
<td>Bicyclist age in “Motorist Overtaking—Misjudged Passing Space”</td>
<td>40</td>
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<td>Light condition, number of lanes, and speed limit in “Motorist Overtaking—Misjudged Passing Space”</td>
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<td>Positions in “Motorist Overtaking—Misjudged Passing Space”</td>
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<td>Positions in “Motorist Overtaking—Bicyclist Path Obstructed”</td>
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<td>36</td>
<td>Bicyclist age in “Motorist Overtaking—Other”</td>
<td>44</td>
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<tr>
<td>37</td>
<td>Light condition, number of lanes, and speed limit in “Motorist Overtaking—Other”</td>
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<td>Positions in “Motorist Overtaking—Other”</td>
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<td>Positions in “Bicyclist Overtaking”</td>
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<td>Bicyclist age in “Bicyclist Strikes Parked Vehicle”</td>
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<td>Light condition, number of lanes, and speed limit in “Bicyclist Strikes Parked Vehicle”</td>
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<td>Positions in “Bicyclist Strikes Parked Vehicle”</td>
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<td>Bicyclist age in “Motorist Lost Control”</td>
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<td>Light condition, number of lanes, and speed limit in “Motorist Lost Control”</td>
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<td>Positions in “Motorist Lost Control”</td>
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<td>Light condition, number of lanes, and speed limit in “Trapped”</td>
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<td>53</td>
<td>Positions in “Trapped”</td>
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<td>Bicyclist age in “Multiple Threat”</td>
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<td>Light condition, number of lanes, and speed limit in “Multiple Threat”</td>
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<td>56</td>
<td>With traffic positions in “Multiple Threat”</td>
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<td>57</td>
<td>Facing traffic positions in “Multiple Threat”</td>
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<td>58</td>
<td>Bicyclist age in “Drive-Out At Midblock”</td>
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<td>Light condition, number of lanes, and speed limit in “Drive Out At Midblock”</td>
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<td>Bicyclist age in “Bicyclist Turning Error”</td>
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<td>Light condition, number of lanes, and speed limit in “Bicyclist Turning Error”</td>
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<td>Bicyclist age in “Controlled Intersection—Other”</td>
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<td>Light condition, number of lanes, and speed limit in “Uncontrolled Intersection—Other”</td>
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<td>Positions in “Uncontrolled Intersection—Other”</td>
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<td>Bicyclist age in “Weird”</td>
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<td>Light condition, number of lanes, and speed limit in “Weird”</td>
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<td>105</td>
<td>Bicyclist age in “Play Vehicle”</td>
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<tr>
<td>106</td>
<td>Light condition, number of lanes, and speed limit in “Play Vehicle”</td>
<td>105</td>
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<tr>
<td>107</td>
<td>Positions in “Play Vehicle”</td>
<td>105</td>
</tr>
<tr>
<td>108</td>
<td>Bicyclist age in “Backing”</td>
<td>106</td>
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<tr>
<td>109</td>
<td>Light condition, number of lanes, and speed limit in “Backing”</td>
<td>107</td>
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<tr>
<td>110</td>
<td>Roadway positions in “Backing”</td>
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<tr>
<td>111</td>
<td>Bicyclist age in “Non-Roadway”</td>
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<tr>
<td>112</td>
<td>Light condition, number of lanes, and speed limit in “Non-Roadway”</td>
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<td>113</td>
<td>Positions in “Non-Roadway”</td>
<td>109</td>
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<tr>
<td>114</td>
<td>Bicyclist age in “Unknown”</td>
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<tr>
<td>115</td>
<td>Light condition, number of lanes, and speed limit in “Unknown”</td>
<td>111</td>
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</table>
ABOUT THIS INFORMATIONAL GUIDE

Background

This publication provides information about bicycle-motor vehicle crash types of the early 1990's. The crash types follow closely the current National Highway Traffic Safety Administration (NHTSA) coding convention used with the General Estimates System (GES) data, whereby a stratified sample of crashes reported by police from across the United States is used to make national estimates of the occurrence and severity of bicycle-motor vehicle crashes. The crash types are based on research carried out by Cross and Fisher in the mid-1970's. Forty-five distinct crash types are identified in the NHTSA typology. Examples include:

- Motorist left turn facing the cyclist.
- Cyclist left turn in front of traffic.
- Motorist drive out from a driveway or alley.
- Cyclist ride out from a stop sign or flashing red signal.

The data for the publication are part of a research project carried out for the Centers for Disease Control, with funding provided by the Federal Highway Administration (FHWA). The purpose of this research was to apply the basic NHTSA crash typologies to a sample of recent crashes and to refine and update the crash type distributions with particular emphasis on roadway and locational factors. The parent research project covers 5,000 pedestrian- and 3,000 bicycle-motor vehicle crashes selected equally from six States (California, Florida, Maryland, Minnesota, North Carolina, and Utah) and reports findings pertinent to primary groups of crashes (see Hunter, Stutts, Pein and Cox, "Pedestrian and Bicycle Crash Types of the Early 1990's, FHWA-RD-95-163, February 1995). This informational guide provides detail on specific crash types and is concerned with only the 3,000 bicycle-motor vehicle crashes from the six States. The bicycle sample was derived by selecting 500 police-reported crashes from small, medium, and large communities within each State.

Police report hard copies were examined to code the specific crash type, as well as many other items. Additional items coded and analyzed included:

- Crash descriptors (motor vehicle/bicycle pre-crash maneuvers, time of day, etc.).
- Locational descriptors (road feature, private property details, etc.).
- Bicyclist characteristics (age, special equipment used, etc.).
- Intersection action details (bicyclist intended maneuver, crossing approach, etc.).
- Driver contributing factors (yield violation, alcohol use, etc.).
- Bicyclist contributing factors (stop sign violation, riding against traffic, etc.).
- Motor vehicle contributing factors (defective brakes, unclear windshield, etc.).
- Bicycle contributing factors (no lights, defective brakes, etc.).
- Roadway/environment contributing factors (weather condition, sun glare, etc.).
- Fault (driver only, bicyclist only, neither, etc.).

In addition to coding the crash type and other variables discussed above, the cases were linked to the basic crash file for each State. This enabled the use of many more variables in the analysis, such as age and gender of cyclist and driver, other roadway descriptors, and motor vehicle variables. Upon completion of clean-up and file linkage, 2,990 cases were available for analysis.

**The Crash Typology**

The crash types are broadly distributed into three main categories: **parallel path**, **crossing path**, and **specific circumstance** crashes. In **parallel path** crashes, the bicycle and motor vehicle were approaching each other on parallel paths, either heading in the same or opposite direction. In **crossing path** crashes, the bicycle and motor vehicle were on intersecting paths. **Specific circumstance** crashes cover four groups of events:

- "Weird" crashes (e.g., cyclist struck by falling cargo).
- Cyclist riding a play vehicle such as a "big wheel" type tricycle.
- A motor vehicle which was backing.
- Non-roadway (e.g., parking lot) locations.

[Note: The appendix of this informational guide contains coding guidelines for bicycle crash typing. These guidelines were adapted from NHTSA's "Manual Accident Typing for Bicyclist Accidents - Coder's Handbook." The Coder's Handbook can be found in Appendix A of the parent document, "Pedestrian and Bicycle Crash Types of the Early 1990's (FHWA-RD-95-163)." ]
The bicycle-motor vehicle crashes distributed into the three main categories as follows:

<table>
<thead>
<tr>
<th>Crash Category</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel paths</td>
<td>1,061</td>
<td>35.5</td>
</tr>
<tr>
<td>Crossing paths</td>
<td>1,720</td>
<td>57.5</td>
</tr>
<tr>
<td>Specific circumstances</td>
<td>209</td>
<td>7.0</td>
</tr>
<tr>
<td>Total</td>
<td>2,990</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Within the NHTSA crash typology, the 3 major categories further subdivide into 15 groups. The most frequent **parallel path** groups were:

<table>
<thead>
<tr>
<th>Crash Group</th>
<th>n</th>
<th>% of Parallel Path Crashes</th>
<th>% of All Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorist turned or merged into the cyclist's path</td>
<td>365</td>
<td>34.4</td>
<td>12.2</td>
</tr>
<tr>
<td>Motorist overtaking the cyclist</td>
<td>257</td>
<td>24.2</td>
<td>8.6</td>
</tr>
<tr>
<td>Cyclist turned or merged into the motorist's path</td>
<td>219</td>
<td>20.6</td>
<td>7.3</td>
</tr>
</tbody>
</table>

Thus, the "Motorist turned or merged into the cyclist's path" group accounted for 34.4 percent of the parallel path crashes and 12.2 percent of all crashes combined.

The most frequent **crossing path** groups were:

<table>
<thead>
<tr>
<th>Crash Group</th>
<th>n</th>
<th>% of Crossing Path Crashes</th>
<th>% of All Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorist failed to yield to cyclist</td>
<td>648</td>
<td>37.7</td>
<td>21.7</td>
</tr>
<tr>
<td>Cyclist failed to yield to motorist at an intersection</td>
<td>501</td>
<td>29.1</td>
<td>16.8</td>
</tr>
<tr>
<td>Cyclist failed to yield to motorist, midblock</td>
<td>353</td>
<td>20.5</td>
<td>11.8</td>
</tr>
</tbody>
</table>

Detailed results about these groups of crash types are contained in the final report for the project (Hunter, Stutts, Pein and Cox, 1995).
Individual Crash Types

Within the 15 crash groups are 45 individual crash types. For example, the group of parallel path crashes entitled "Motorist turned or merged into the cyclist's path" is made up of the following individual crash types:

- Drive out from on-street parking—Motorist was exiting or entering on-street parking.
- Motorist left turn in front of bicyclist—Motorist turned left into the path of a bicyclist going in the same direction.
- Motorist left turn—facing cyclist—Motorist turned left into the path of an approaching cyclist.
- Motorist right turn—Motorist turned right into the path of a cyclist going in the same or opposite direction.

The focus of the remainder of this document is detailed information about each of the 45 individual crash types. Two-page layouts (i.e., left and right facing pages) are used for each individual crash type to convey a variety of information. The order of the presentation is parallel path crashes, crossing path crashes, and specific circumstance crashes.

An Orientation to the Individual Crash Type Information

Each two-page layout basically contains the information presented below (a few differ because of small numbers of crashes). Examine the example pages for "Motorist Right Turn" that follow for a more thorough orientation.

Left Side Page

- A title bar, with additional information about the frequency and severity of the crash. The severity is based on the typical "KABCO" scale used by police, where "K" is killed, an "A" injury is defined as serious, "B" moderate, "C" minor, and "O" no injury.
- A sketch that shows a simple depiction of the event. Various backgrounds are used, such as an urban intersection, a rural intersection, a suburban location, a residential location, a rural location, etc.
- A description of the crash type.
- A summary of the crash type that includes a variety of information. Generally there
are comments about the ages of the involved cyclists, the light condition, number of lanes, speed limit, crash severity, alcohol use, etc. No exposure data were available for the analysis, so comparisons for a variable within a particular crash type are often made with all crashes combined (e.g., ages of cyclists involved in "Motorist Right Turn" compared with cyclist age for all crashes). The same would be true for the other variables mentioned above. Overall, slightly over 18 percent of the crashes resulted in severe and fatal (A+K) injuries to the cyclist. The summary usually comments on whether the individual crash type was more or less severe than this average. It was normally the case that lower speed crashes (e.g., those occurring primarily in neighborhoods) resulted in less severity than higher speed crashes (e.g., those occurring more often on rural highways).

- A bar chart of the ages of the involved cyclists for the particular crash type versus all crash types combined. Information for the crash type discussed on the two pages is always shown in red and the "all crash type" comparison is always shown in black.

**Right Side Page**

- Graphs of the light condition, the number of lanes, and the speed limit for the particular crash type versus all crash types combined. Again, the information for the crash type discussed on the two pages is shown in red and the "all crash type" comparison is shown in black.

- "Bullet" boxes that pertain to variables of interest for this particular crash type. "Development Character" (urban versus rural) and "Road Feature" generally appear with some frequency in this area.

- A "Positions" sketch of the cyclist and motor vehicle that depicts their relative locations. Sometimes multiple positions are shown (e.g., near side versus far side of street).

All two-page layouts are generally similar for ease in comparison. However, differences may appear depending on the amount of detail available for a particular crash type. As an example, the crash type labeled as "Weird" contains no drawing of the event because circumstances could be so variable from one "Weird" crash to another that a "typical" drawing is very difficult to define. The appendix describes the process followed in assigning a crash type code to the individual crash reports examined.
Motorist Right Turn

Frequency: 143 cases; 4.7% of all crashes
Severity: 11% resulted in serious or fatal injuries

Sketch

Description: The motorist was making a right turn and the bicyclist was riding in either the same or opposing direction.

Summary: In comparison to all crashes, this crash was more likely to involve young adults (age 20 to 24) and adult (age 25 to 44) bicyclists and take place on multilane roads (4, 5, and 6+ lanes).

More than 60 percent were on roads with a 50 to 60 km/h speed limit.

For the 113 cases in which the bicyclist was riding the same direction as traffic, the motorist was overtaking the bicyclist 74 percent of the time and the bicyclist was overtaking the motorist on the right 11 percent. The overtaking action was undetermined 15 percent of the time.

Bicyclists were riding in a bicycle lane in 8 percent of these crashes. Bicycle lanes were present in only 2 percent of all the crash types combined.

Figure 8. Bicyclist age in “Motorist Right Turn.”

Age Chart

Layout diagram - left side.
Figure 9: Light condition, number of lanes, and speed limit in "Motorist Right Turn."

Figure 10: Positions in "Motorist Right Turn."

Nearly 1/3 of the bicyclists were in mid-riding with traffic. About 1/3 were in the "off-road" position.

Positions

5% unknown

52% 10%

28% 10%

Development Character

Urban..........77%
Rural..........23%

Traffic Control

None..........57%
Traffic Signal..28%
Stop Sign......10%
Other..........5%

Road Feature

Intersection....59%
Public Driveway.27%
Private Driveway.12%
Other..........2%

Bullet Boxes

Positions

Sketch

Chart

Layout diagram - right side.
Parallel Paths

The Motorist Turned Or Merged Into The Path Of The Bicyclist
Drive Out From On-Street Parking

**Frequency:** 10 cases; 0.3% of all crashes

**Severity:** 11% resulted in serious or fatal injuries

**Description:** The motorist was exiting or entering on-street parking. Does not include any backing events from on-street parking.

**Summary:** For the few (n=10) crashes of this type, the vast majority involved a motorist pulling out from a parking space. Teen (age 15 to 19), young adult (age 20 to 24) and adult (age 25 to 44) bicyclists were represented.

Four of the ten crashes occurred under low light conditions. All took place in urban areas and half on streets with a speed limit of 40 km/h or less.

This crash tended to be less severe than the average. There were no fatalities.

**Figure 1.** Positions in “Drive Out From On-Street Parking.”
**Light Condition**

- Dark, no lights
- Dark, lighted
- Dawn/dusk
- Daylight

<table>
<thead>
<tr>
<th>Percent</th>
<th>Drive Out</th>
<th>All crashes</th>
</tr>
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<tbody>
<tr>
<td>0-10</td>
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<td>10-20</td>
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<td>70-80</td>
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**Number of Lanes**

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<table>
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<th>All crashes</th>
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<tr>
<td>60-70</td>
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</table>

**Speed Limit (km/h)**

- 0-10
- 10-20
- 20-30
- 30-40
- 40-50
- 50-60
- 60+ 

<table>
<thead>
<tr>
<th>Percent</th>
<th>Drive Out</th>
<th>All crashes</th>
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<tbody>
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<tr>
<td>60+</td>
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</table>

**Development Character**

- Urban: 100%
- Rural: 0%

**Figure 1.** Light condition, number of lanes, and speed limit in "Drive Out From On-Street Parking."

**Positions**

- 9 out of 10 motorists were exiting on-street parking.

**Figure 1.** Positions in "Drive Out From On-Street Parking."
Motorist Left Turn In Front Of Bicyclist

**Description:** Both parties were traveling in the same direction and the motorist turned left in front of the bicyclist.

**Summary:** In comparison to all crashes, this crash was more likely to involve young adult (age 20 to 24) bicyclists and take place on multilane roads (4, 5, and 6+ lanes).

Seventy five percent of these crashes took place at an intersection.

Almost 4 out of 5 bicyclists were riding facing traffic either in the roadway or in the "off road" position.

This crash tended to be less serious than the average. There were no fatalities.

**Frequency:** 36 cases; 1.2% of all crashes

**Severity:** 9% resulted in serious or fatal injuries

**Figure 2.** Bicyclist age in “Motorist Left Turn In Front Of Bicyclist.”
**Light Condition**

- Dark, no lights
- Dark, lighted
- Dawn/dusk
- Daylight

<table>
<thead>
<tr>
<th>Condition</th>
<th>Left Turn</th>
<th>All crashes</th>
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<tbody>
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<td>Percent</td>
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<tr>
<td>80-100</td>
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</table>

**Development Character**

- Urban ............ 71%
- Rural ............ 29%

**Traffic Control**

- None ............. 56%
- Traffic Signal ... 33%
- Stop Sign ....... 8%
- Other ............ 3%

**Road Feature**

- Intersection .... 75%
- Public Driveway .. 11%
- Private Driveway .. 5%
- Other ............ 9%

**Speed Limit (km/h)**

- 80+                | Left Turn | All crashes |
- 60-70              |           |             |
- 50-60              |           |             |
- <=40               |           |             |

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<tr>
<th>Limit</th>
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<td>60-80</td>
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<tr>
<td>80+</td>
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</tbody>
</table>

**Figure 3.** Light condition, number of lanes, and speed limit in “Motorist Left Turn In Front Of Bicyclist.”

**Figure 4.** Positions in “Motorist Left Turn In Front Of Bicyclist.”

Almost 4 out of 5 bicyclists were riding facing traffic.

8% unknown
Motorist Left Turn—Facing Bicyclist

**Frequency:** 176 cases; 5.9% of all crashes  
**Severity:** 24% resulted in serious or fatal injuries

**Description:** The motorist made a left turn while facing the approaching bicyclist.

**Summary:** In comparison to all crashes, this crash was more likely to involve young adult (age 20 to 24) and adult (age 25 to 44) bicyclists who accounted for more than 70 percent.

More than 50 percent took place on multilane roads (4, 5, and 6+ lanes). More than 60 percent were on roads with a 50 to 60 km/h speed limit. Twenty percent took place under dark, lighted conditions.

Sun glare was a factor for 6 percent of drivers, and a moving or stopped vehicle was a visual obstruction for 9 percent.

Bicyclists were riding in a bicycle lane in 5 percent of these crashes. Bicycle lanes were present in 2 percent of all crash types combined.

**Figure 5.** Bicyclist age in “Motorist Left Turn—Facing Bicyclist.”
Motorist Left Turn—Facing Bicyclist

![Bar chart showing Light Condition]

**Light Condition**

- **Motorist Left Turn**
- **All crashes**

![Bar chart showing Number of Lanes]

**Number of Lanes**

- **Motorist Left Turn**
- **All crashes**

![Bar chart showing Speed Limit (km/h)]

**Speed Limit (km/h)**

- **Motorist Left Turn**
- **All crashes**

---

**Development Character**

- Urban ............... 77%
- Rural ............... 23%

---

**Traffic Control**

- None ............... 56%
- Traffic Signal ...... 30%
- Stop Sign .......... 14%
- Other ............... 1%

---

**Road Feature**

- Intersection ....... 77%
- Public Driveway ... 17%
- Private Driveway ... 5%

---

**Positions**

Almost 4 out of 5 bicyclists were riding in the “in road” position.

**Figure 6.** Light condition, number of lanes, and speed limit in “Motorist Left Turn—Facing Bicyclist.”

**Figure 7.** Positions in “Motorist Left Turn—Facing Bicyclist.”
**Motorist Right Turn**

**Frequency:** 143 cases; 4.7% of all crashes  
**Severity:** 11% resulted in serious or fatal injuries

---

**Description:** The motorist was making a right turn and the bicyclist was riding in either the same or opposing direction.

**Summary:** In comparison to all crashes, this crash was more likely to involve young adult (age 20 to 24) and adult (age 25 to 44) bicyclists and take place on multilane roads (4, 5, and 6+ lanes).

More than 60 percent were on roads with a 50 to 60 km/h speed limit.

For the 113 cases in which the bicyclist was riding the same direction as traffic, the motorist was overtaking the bicyclist 74 percent of the time and the bicyclist was overtaking the motorist on the right 11 percent. The overtaking action was undetermined 15 percent of the time.

Bicyclists were riding in a bicycle lane in 8 percent of these crashes. Bicycle lanes were present in only 2 percent of all the crash types combined.

---

**Figure 8.** Bicyclist age in “Motorist Right Turn.”
Figure 9. Light condition, number of lanes, and speed limit in "Motorist Right Turn."

Figure 10. Positions in "Motorist Right Turn."

Development Character
- Urban: 77%
- Rural: 23%

Traffic Control
- None: 57%
- Traffic Signal: 28%
- Stop Sign: 10%
- Other: 5%

Road Feature
- Intersection: 59%
- Public Driveway: 27%
- Private Driveway: 12%
- Other: 2%

Positions
- 5% unknown
- 53% left
- 10% right
- 22% center

Nearly 2/3 of the bicyclists were in road riding with traffic. About 1/3 were in the "off road" position.
Parallel Paths

The Bicyclist Turned
Or Merged Into The Path
Of The Motorist
Ride Out From Sidewalk

**Description:** Initially riding along a sidewalk, the bicyclist entered the roadway from a driveway or alley cut.

**Summary:** In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) and youth (age 10 to 14) bicyclists. More than half of these crashes occurred on streets with a speed limit of 40 km/h or less.

Seventy percent were on 2-lane roads.

More than 75 percent happened in urban areas and 90 percent under daylight conditions.

About 70 percent of the bicyclists were riding on the sidewalk facing traffic.

**Frequency:** 21 cases; 0.7% of all crashes
**Severity:** 18% resulted in serious or fatal injuries

---

**Figure 11.** Bicyclist age in “Ride Out From Sidewalk.”
Figure 12. Light condition, number of lanes, and speed limit in “Ride Out From Sidewalk.”

Figure 13. Positions in “Ride Out From Sidewalk.”

Development Character
Urban ............... 77%
Rural ............... 23%

Almost 7 out of 10 bicyclists were riding facing traffic when on the sidewalk.
**Bicyclist Left Turn In Front Of Traffic**

**Frequency:** 130 cases; 4.3% of all crashes  
**Severity:** 28% resulted in serious and fatal injuries

**Description:** The bicyclist made a left turn in front of traffic traveling in the same direction.

**Summary:** In comparison to all crashes, this crash was more likely to involve youth (age 10 to 14) bicyclists and occur on high-speed, 2-lane roads.

Slightly more than 60 percent of these events took place at a midblock location which had no special feature.

These crashes tended to be more severe than the average.

![Bicyclist Age](image)

**Figure 14.** Bicyclist age in "Bicyclist Left Turn In Front Of Traffic."
Bicyclist Left Turn In Front Of Traffic

**Light Condition**
- dark, no lights
- dark, lighted
- dawn/dusk
- daylight

**Number of Lanes**
- 6+
- 5
- 4
- 3
- 2
- 1

**Speed Limit (km/h)**
- 80+
- 60-70
- 50-60
- <=40

---

**Development Character**
- Urban: 64%
- Rural: 36%

---

**Traffic Control**
- None: 92%
- Traffic Signal: 4%
- Stop Sign: 2%
- Other: 2%

---

**Road Feature**
- No special feature: 62%
- Intersection: 27%
- Driveway/Alley: 8%
- Other: 3%

---

**Positions**

*More than 3 out of 5 occurred at a midblock location with no special feature.*

---

**Figure 15.** Light condition, number of lanes, and speed limit in “Bicyclist Left Turn In Front Of Traffic.”

**Figure 16.** Positions in “Bicyclist Left Turn In Front Of Traffic.”
Bicyclist Left Turn—Facing Traffic

**Description:** The bicyclist made a left turn in front of facing approach traffic.

**Summary:** In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) bicyclists.

Almost 50 percent occurred on high-speed (60 to 70 km/h) and very high-speed (80+ km/h) roads combined. More than 50 percent took place in rural areas.

A moving or stopped vehicle was a vision obstruction in 16 percent of the crashes. The road condition was wet in 13 percent.

This event tended to be more severe than the average.

**Frequency:** 25 cases; 0.8% of all crashes  
**Severity:** 26% resulted in serious or fatal injuries

**Figure 17:** Bicyclist age in “Bicyclist Left Turn—Facing Traffic.”
Figure 18. Light condition, number of lanes, and speed limit in "Bicyclist Left Turn—Facing Traffic."

Figure 19. Positions in "Bicyclist Left Turn—Facing Traffic."

While most occurred at intersections, more than 1/3 took place at a midblock location with no special feature.
Bicyclist Right Turn

Frequency: 43 cases; 1.4% of all crashes  
Severity: 27% resulted in serious or fatal injuries

Description: The bicyclist was making a right turn while riding facing traffic.

Summary: In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) and youth (age 10 to 14) bicyclists.

More than 20 percent occurred on very high-speed (80+ km/h) roads.

More than 40 percent occurred in rural areas.

Only 1/3 occurred at roadway intersections.

This event tended to be more severe than the average.

Figure 20. Bicyclist age in “Bicyclist Right Turn.”
Bicyclist Right Turn

**Light Condition**
- Dark, no lights
- Dark, lighted
- Dawn/dusk
- Daylight

<table>
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<th>Condition</th>
<th>Bicyclist Right Turn</th>
<th>All Crashes</th>
</tr>
</thead>
<tbody>
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<td>Dawn/dusk</td>
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<tr>
<td>Daylight</td>
<td>[Diagram]</td>
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**Number of Lanes**
- 6+
- 5
- 4
- 3
- 2
- 1

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<th>Lanes</th>
<th>Bicyclist Right Turn</th>
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**Speed Limit (km/h)**
- 80+  
- 60-70
- 50-60
- <=40

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<th>Speed Limit</th>
<th>Bicyclist Right Turn</th>
<th>All Crashes</th>
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**Development Character**
- Urban: 59%
- Rural: 41%

**Traffic Control**
- None: 92%
- Traffic Signal: 5%
- Stop Sign: 3%

**Road Feature**
- No special feature: 68%
- Intersection: 32%

**Positions**

Figure 21. Light condition, number of lanes, and speed limit in “Bicyclist Right Turn.”

Figure 22. Positions in “Bicyclist Right Turn.”

More than 2/3 occurred at a midblock location with no special feature.
The Operator Was On The Wrong Side Of The Street
Wrong Way Motorist

Frequency: 3 cases; 0.1% of all crashes
Severity: 33% resulted in serious or fatal injuries

Description: The motorist was on a parallel path with the bicyclist and was driving against traffic.

Summary: For the few (n=3) crashes of this type, two occurred during daylight and one during darkness, no lights.

All three were in urban areas.

One was hit and run.

There were no fatalities.
Wrong Way Bicyclist

**Description:** The bicyclist was on a parallel path with the motorist and was riding in the roadway against traffic.

**Summary:** The bicyclist age distribution for this crash generally followed the pattern for all crashes combined.

More than 1/4 happened under conditions of darkness, with and without street lights.

Twenty two percent of adult bicyclists age 25 and older had been drinking. Twenty two percent were motorist hit & run.

In 7 percent of these events, the pre-crash evasive actions of both parties were counteractive.

This crash tended to be more severe than the average.

**Frequency:** 81 cases; 2.7% of all crashes
**Severity:** 32% resulted in serious or fatal injuries

![Bicyclist Age](image)

*Figure 23. Bicyclist age in “Wrong Way Bicyclist.”*
Wrong Way Bicyclist

**Development Character**
- Urban ............... 59%
- Rural ............... 41%

**Road Feature**
- No special feature .... 80%
- Intersection .......... 14%
- Driveway/Alley ....... 5%
- Other ................. 1%

**Light Condition**
- dark, no lights
- dark, lighted
- dawn/dusk
- daylight

**Number of Lanes**
- 6+
- 5
- 4
- 3
- 2
- 1

**Speed Limit (km/h)**
- 80+
- 60-70
- 50-60
- <=40

Figure 24. Light condition, number of lanes, and speed limit in “Wrong Way Bicyclist.”

Figure 25. Positions in “Wrong Way Bicyclist.”
The Motorist Was Overtaking The Bicyclist
Motorist Overtaking—Failed To Detect

**Frequency:** 39 cases; 1.3% of all crashes
**Severity:** 54% resulted in serious or fatal injuries

**Description:** The motorist was overtaking and failed to detect the bicyclist.

**Summary:** This crash involved almost exclusively adult bicyclists age 20 and above.

High-speed (60 to 70 km/h) and very high-speed (80+ km/h) roads were strongly represented. More than 60 percent of the crashes took place in rural areas.

About 60 percent occurred under low light conditions, with 4 out of 10 happening during darkness with no street lights. Drivers were blinded by the sun in 28 percent of the daylight and dawn/dusk events.

Seventeen percent of adult bicyclists age 25 and older and 11 percent of motorists had been drinking. Almost 1 out of 6 were hit & run.

More than half resulted in serious or fatal injuries.

**Bicyclist Age**

![Bicyclist Age Chart]

*Figure 26. Bicyclist age in “Motorist Overtaking—Failed To Detect.”*
Motorist Overtaking—Failed To Detect

**Light Condition**

- dark, no lights
- dark, lighted
- dawn/dusk
- daylight

**Number of Lanes**

- 6+
- 5
- 4
- 3
- 2
- 1

**Speed Limit (km/h)**

- 80+
- 60-70
- 50-60
- <=40

**Development Character**

- Urban ............ 38%
- Rural ............ 62%

**Road Feature**

- No special feature . . 97%
- Intersection ........ 3%

**Figure 27.** Light condition, number of lanes, and speed limit in “Motorist Overtaking—Failed To Detect.”

**Figure 28.** Positions in “Motorist Overtaking—Failed To Detect.”

4 out of 10 bicyclists were undetected during daylight conditions.
Motorist Overtaking—Counteractive Evasive Actions

**Description:** The motorist was overtaking the bicyclist and the evasive actions were counteractive. The bicyclist swerved left (or, very rarely, right).

**Summary:** In comparison to all crashes, this crash was more likely to involve youth (age 10 to 14) bicyclists.

Almost all occurred on 2-lane roads, and very high-speed (80+ km/h) roads were strongly represented, accounting for 35 percent of the crashes.

Almost 60 percent occurred in rural areas.

This crash was about average in severity. There were no fatalities.

**Frequency:** 59 cases; 2.0% of all crashes

**Severity:** 22% resulted in serious or fatal injuries

Figure 29. Bicyclist age in “Motorist Overtaking—Counteractive Evasive Actions.”
Figure 30. Light condition, number of lanes, and speed limit in “Motorist Overtaking—Counteractive Evasive Actions.”
Motorist Overtaking—
Misjudged Passing Space

**Frequency:** 37 cases; 1.2% of all crashes  
**Severity:** 22% resulted in serious or fatal injuries

**Description:** The motorist was overtaking and misjudged the width or length required to pass the bicyclist.

**Summary:** In comparison to all crashes, this crash was more likely to involve adult (age 25 to 44), middle adult (age 45 to 64), and elder adult (age 65+) bicyclists. High-speed (60 to 70 km/h) and very high-speed (80+ km/h) roads were strongly represented.

While most of these crashes occurred at midblock locations, more than 20 percent occurred at or near an intersection.

Fourteen percent of the bicyclists were on the shoulder and 5 percent were in a bike lane. Sixteen percent were on a curve.

Seventeen percent of these events were motorist hit & run.

**Figure 32.** Bicyclist age in “Motorist Overtaking—Misjudged Passing Space.”
Motorist Overtaking—Misjudged Passing Space

**Light Condition**
- dark, no lights
- dark, lighted
- dawn/dusk
- daylight

<table>
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<tr>
<th>Condition</th>
<th>Misjudged</th>
<th>All crashes</th>
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<tr>
<td>daylight</td>
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</tbody>
</table>

**Development Character**
- Urban ............ 57%
- Rural ............ 43%

**Road Feature**
- No special feature . . 70%
- Intersection ........ 22%
- Driveway ............ 3%
- Other ............... 5%

**Number of Lanes**
- 6+  
- 5  
- 4  
- 3  
- 2  
- 1

**Speed Limit (km/h)**
- 80+  
- 60-70  
- 50-60  
- <=40

**Figure 33.** Light condition, number of lanes, and speed limit in “Motorist Overtaking—Misjudged Passing Space.”

**Figure 34.** Positions in “Motorist Overtaking—Misjudged Passing Space.”
Motorist Overtaking—
Bicyclist Path Obstructed

Frequency: 5 cases; 0.2% of all crashes
Severity: None resulted in serious or fatal injuries

Description: The motorist was overtaking a bicyclist whose path was obstructed. The bicyclist struck the obstruction or overtaking motorist.

Summary: For the few (n=5) crashes of this type, four took place under daylight conditions, and one was on a road with a speed limit of 80+ km/h.

None of these crashes resulted in serious or fatal injuries.

Figure 35. Positions in “Motorist Overtaking—
Bicyclist Path Obstructed.”
Motorist Overtaking—Bicyclist Path Obstructed

Light Condition
- Dark, no lights
- Dark, lighted
- Dawn/dusk
- Daylight

Development Character
- Urban: 60%
- Rural: 40%

Road Feature
- No special feature: 100%

Number of Lanes
- 6+
- 5
- 4
- 3
- 2
- 1

Speed Limit
- 50+
- 40-45
- 30-35
- <=25

Positions
Motorist Overtaking—Other

Description: The motorist was overtaking a bicyclist and the circumstances could not be specified.

Summary: In comparison to all crashes, this crash was more likely to involve young adult (age 20 to 24), adult (age 25 to 44) and middle adult (age 45 to 64) bicyclists, take place at night, and occur on very high-speed (80+ km/h) roads. Almost 40 percent occurred during darkness.

While the large majority occurred at midblock, 15 percent occurred at or near an intersection. Twelve percent of bicyclists were on the shoulder and 3 percent were in a bike lane. Nine percent were on a curve.

Sixteen percent of adult bicyclists age 25 and older and 6 percent of motorists had been drinking.

Forty-one percent were hit & run. Injury severity was worse than the average of all crashes.

Frequency: 117 cases; 3.9% of all crashes
Severity: 28% resulted in serious or fatal injuries

Figure 36. Bicyclist age in “Motorist Overtaking—Other.”
Figure 37. Light condition, number of lanes, and speed limit in “Motorist Overtaking—Other.”

Figure 38. Positions in “Motorist Overtaking—Other.”

15% of bicyclists were on the shoulder or in a bike lane.
Parallel Paths

The Bicyclist Was Overtaking A Motor Vehicle
Bicyclist Overtaking

**Description:** The bicyclist struck a slow or stopped motor vehicle in a travel lane.

**Summary:** In comparison to all crashes, this crash was more likely to involve young adult (age 20 to 24) and adult (age 25 to 44) bicyclists. Elder adults (age 65+) were not represented.

Almost 60 percent occurred on streets with a 40 km/h or less speed limit. Almost 80 percent occurred in urban areas.

Some type of road/environmental contributing factor such as weather, vision obstruction, glare, etc. was noted in 30 percent of these crashes.

This crash had a far lower incidence of serious injuries than the average. There were no fatalities.

**Frequency:** 39 cases; 1.3% of all crashes
**Severity:** 5% resulted in serious or fatal injuries

---

![Bicyclist Age Chart](image)

**Figure 39.** Bicyclist age in “Bicyclist Overtaking.”
**Light Condition**

- Dark, no lights: Bicyclist Overtaking: 20%, All crashes: 30%
- Dark, lighted: Bicyclist Overtaking: 10%, All crashes: 20%
- Dawn/dusk: Bicyclist Overtaking: 5%, All crashes: 10%
- Daylight: Bicyclist Overtaking: 90%, All crashes: 90%

**Number of Lanes**

- 1 lane: Bicyclist Overtaking: 10%, All crashes: 10%
- 2 lanes: Bicyclist Overtaking: 30%, All crashes: 30%
- 3 lanes: Bicyclist Overtaking: 20%, All crashes: 20%
- 4 lanes: Bicyclist Overtaking: 10%, All crashes: 10%
- 5 lanes: Bicyclist Overtaking: 10%, All crashes: 10%
- 6+ lanes: Bicyclist Overtaking: 10%, All crashes: 10%

**Speed Limit (km/h)**

- <= 40: Bicyclist Overtaking: 20%, All crashes: 20%
- 40-50: Bicyclist Overtaking: 20%, All crashes: 20%
- 50-60: Bicyclist Overtaking: 30%, All crashes: 30%
- 60-70: Bicyclist Overtaking: 10%, All crashes: 10%
- 80+: Bicyclist Overtaking: 5%, All crashes: 5%

**Development Character**

- Urban: 79%
- Rural: 21%

**Road Feature**

- Intersection: 41%
- No Special Feature: 38%
- Public Driveway: 10%
- Private Driveway: 8%
- Other: 3%

**Positions**

- 49% 21% 31%

Almost 1/3 of the bicyclists were overtaking on the right.

**Figure 40.** Light condition, number of lanes, and speed limit in “Bicyclist Overtaking.”

**Figure 41.** Positions in “Bicyclist Overtaking.”
Bicyclist Strikes Parked Vehicle

**Frequency:** 43 cases; 1.4% of all crashes

**Severity:** 10% resulted in serious or fatal injuries

**Description:** The bicyclist struck a motor vehicle parked within the roadway right-of-way.

**Summary:** In comparison to all crashes, this crash was more likely to involve young adult (age 20 to 24) and adult (age 25 to 44) bicyclists. Almost 90 percent occurred in urban areas.

The motor vehicle was in a marked parking lane in 19 percent of the crashes, an unmarked parking “lane” 64 percent, on the shoulder 7 percent, in a bike lane 9 percent, and in the travel lane 1 percent.

Some type of road/environmental contributing factor such as weather, vision obstruction, glare, etc. was noted in 39 percent of these events.

These crashes tended to be less severe than the average. There were no fatalities.

---

### Bicyclist Age

![Bicyclist Age Graph](image_url)

**Figure 42.** Bicyclist age in “Bicyclist Strikes Parked Vehicle.”
Bicyclist Strikes Parked Vehicle

**Light Condition**
- dark, no lights
- dark, lighted
- dawn/dusk
- daylight

**Number of Lanes**
- 6+
- 5
- 4
- 3
- 2
- 1

**Speed Limit (km/h)**
- 80+
- 60-70
- 50-60
- <=40

---

**Development Character**
- Urban ........... 86%
- Rural ............ 14%

---

**Figure 43.** Light condition, number of lanes, and speed limit in “Bicyclist Strikes Parked Vehicle.”

---

**Figure 44.** Positions in “Bicyclist Strikes Parked Vehicle.”

About 1/2 of the bicyclists struck an extended door.

---

51
Parallel Paths

The Operator
Lost Control
Motorist Lost Control

**Frequency:** 19 cases; 0.6% of all crashes
**Severity:** 37% resulted in serious or fatal injuries

**Description:** The motorist lost control and inadvertently swerved into the path of the bicyclist.

**Summary:** In comparison to all crashes, this crash was much more likely to involve middle adult (age 45 to 64) bicyclists.

More than 40 percent occurred during low light conditions (dark with or without street lights, dawn/dusk). High-speed (60 to 70 km/h) and very high-speed (80+ km/h) roads accounted for 45 percent of the crashes.

Sixty-five percent of drivers had been drinking.

Almost one in five were hit & run.

This crash tended to be much more serious than the average.

**Figure 45.** Bicyclist age in “Motorist Lost Control.”
Figure 46. Light condition, number of lanes, and speed limit in “Motorist Lost Control.”

Figure 47. Positions in “Motorist Lost Control.”
Bicyclist Lost Control

**Description:** The bicyclist lost control and inadvertently swerved into the path of the motorist.

**Summary:** In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) and adult (age 25 to 44) bicyclists.

The light condition, number of lanes, and speed limit parameters generally followed the results for all crashes combined.

Forty two percent of adult bicyclists age 25 and older had been drinking.

Fourteen percent of these crashes occurred on a curve. “Bicyclist Lost Control” crashes were much more serious than the average.

**Figure 48.** Bicyclist age in “Bicyclist Lost Control.”

**Frequency:** 35 cases; 1.2% of all crashes

**Severity:** 33% resulted in serious or fatal injuries
Figures 49. Light condition, number of lanes, and speed limit in “Bicyclist Lost Control.”

Figures 50. Positions in “Bicyclist Lost Control.”
The Bicyclist Did Not Clear The Intersection Before The Signal Turned Green For Cross Traffic
Trapped

**Frequency**: 15 cases; 0.5% of all crashes  
**Severity**: 7% resulted in serious or fatal injuries

---

**Description**: The bicyclist did not clear the intersection before the traffic signal turned green for cross traffic, and the motorist's view of the bicyclist was **not** obstructed.

**Summary**: In comparison to all crashes, this crash was more likely to involve youth (age 10 to 14), teen (age 15 to 19), and elder adult (age 65+) bicyclists. Child (age 0 to 9) and middle adult (age 45 to 64) bicyclists were not represented.

Multilane roads (4, 5, 6+ lanes) accounted for more than 4/5 of these events and the speed limit was 50 to 60 km/h for 70 percent. None took place on 40 km/h roads.

This crash had a lower incidence of serious injuries than the average. There were no fatalities.

**Figure 51**: Bicyclist age in “Trapped.”
Figure 52. Light condition, number of lanes, and speed limit in “Trapped.”

Figure 53. Positions in “Trapped.”

Development Character

Urban ............... 60%
Rural ............... 40%
**Multiple Threat**

**Frequency:** 27 cases; 0.9% of all crashes  
**Severity:** 15% resulted in serious or fatal injuries

**Description:** The bicyclist did not clear the intersection before the light turned green for cross traffic, and the motorist's view of the bicyclist was obstructed by standing traffic.

**Summary:** In comparison to all crashes, this crash was more likely to involve youth (age 10 to 14), teen (age 15 to 19), and young adult (age 20 to 24) bicyclists. Middle (age 45 to 64) and elder adults (age 65+) were not represented.

All of these crashes took place on multilane roads (4, 5, 6+ lanes), and high-speed (60 to 70 km/h) and very high-speed (80+ km/h) roads accounted for about 55 percent. None took place on roads of 40 km/h or less.

![Bicyclist Age](image)

**Figure 54.** Bicyclist age in “Multiple Threat.”
Multiple Threat

Light Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Multiple Threat</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>dark, no lights</td>
<td></td>
<td></td>
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<tr>
<td>dark, lighted</td>
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<td></td>
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<tr>
<td>dawn/dusk</td>
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<tr>
<td>daylight</td>
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</tbody>
</table>

Number of Lanes

<table>
<thead>
<tr>
<th>Lanes</th>
<th>Multiple Threat</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>5</td>
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</table>

Speed Limit (km/h)

<table>
<thead>
<tr>
<th>Speed Limit</th>
<th>Multiple Threat</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>80+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-70</td>
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<td>50-60</td>
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<tr>
<td>&lt;=40</td>
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</tbody>
</table>

Development Character

Urban ............ 52%
Rural ............ 48%

With traffic positions

RED to GREEN

Almost 70% of the bicyclists were riding with traffic.

Figure 56. With traffic positions in “Multiple Threat.”

Facing traffic positions

RED to GREEN

23% of the bicyclists were riding facing traffic.

Figure 57. Facing traffic positions in “Multiple Threat.”

Figure 55. Light condition, number of lanes, and speed limit in “Multiple Threat.”
The Motorist Failed
To Yield
To The Bicyclist
Drive Out At Midblock

**Description:** The motorist was entering the roadway from a driveway or alley.

**Summary:** In comparison to all crashes, this event was more likely to involve teen (age 15 to 19) and all adult (age 20+) bicyclists.

More than 55 percent occurred on multilane roads, and almost 30 percent took place on roads with a speed limit of 60 to 70 km/h.

More than 3/4 occurred at public driveways. Almost one in five bicyclists were on a sidewalk that was continuous over the driveway.

Slightly more than 2/3 of the bicyclists, including those on a sidewalk, were riding against traffic.

This crash tended to be less severe than the average.

**Frequency:** 207 cases; 6.9% of all crashes

**Severity:** 7% resulted in serious and fatal injuries

**Bicyclist Age**

Figure 58. Bicyclist age in “Drive Out At Midblock.”
Light Condition

- Dark, no lights
- Dark, lighted
- Dawn/dusk
- Daylight

<table>
<thead>
<tr>
<th>Light Condition</th>
<th>Drive Out At Midblock</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
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<tr>
<td>100</td>
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</tr>
</tbody>
</table>

Number of Lanes

- 1
- 2
- 3
- 4
- 5
- 6+

<table>
<thead>
<tr>
<th>Number of Lanes</th>
<th>Drive Out At Midblock</th>
<th>All crashes</th>
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<td>Percent</td>
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<tr>
<td>60</td>
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</tbody>
</table>

Speed Limit (km/h)

- <=40
- 50-60
- 60-70
- 80+

<table>
<thead>
<tr>
<th>Speed Limit (km/h)</th>
<th>Drive Out At Midblock</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
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<td>70</td>
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<tr>
<td>80</td>
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</tr>
</tbody>
</table>

Figure 59. Light condition, number of lanes, and speed limit in "Drive Out At Midblock."

Development Character

- Urban ............ 75%
- Rural ............ 25%

Road Feature

- Public Driveway ... 77%
- Private Driveway .. 17%
- Alley ............. 5%

Positions

- 1%                 
- 12%                
- 7%                 
- 41%

Two thirds of the bicyclists were riding facing traffic. Almost 1/2 were in the "off road" position.

Figure 60. Positions in "Drive Out At Midblock."
Drive Through

**Description:** At a controlled intersection, the motorist ran a sign or signal.

**Summary:** In comparison to all crashes, this crash was more likely to involve teen (age 15 to 19) and young adult (age 20 to 24) bicyclists, take place on multilane roads (4, 5, 6+ lanes), and occur during conditions of darkness with street lights.

More than 70 percent occurred on roads with a 50 to 60 km/h speed limit.

Thirty four percent were hit & run.

This type of crash tended to be less severe than the average.

**Figure 61.** Bicyclist age in “Drive Through.”
Drive Through

Light Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Drive Through</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark, no lights</td>
<td></td>
<td></td>
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<tr>
<td>Dark, lighted</td>
<td></td>
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<tr>
<td>Dawn/dusk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daylight</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of Lanes

<table>
<thead>
<tr>
<th>Lanes</th>
<th>Drive Through</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6+</td>
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<td>5</td>
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</table>

Speed Limit (km/h)

<table>
<thead>
<tr>
<th>Limit</th>
<th>Drive Through</th>
<th>All crashes</th>
</tr>
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<tbody>
<tr>
<td>80+</td>
<td></td>
<td></td>
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<tr>
<td>60-70</td>
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<td>50-60</td>
<td></td>
<td></td>
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<tr>
<td>&lt;=40</td>
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</tbody>
</table>

Figure 62. Light condition, number of lanes, and speed limit in “Drive Through.”

Development Character

<table>
<thead>
<tr>
<th>Character</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>70%</td>
</tr>
<tr>
<td>Rural</td>
<td>30%</td>
</tr>
</tbody>
</table>

Traffic Control

<table>
<thead>
<tr>
<th>Control</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Signal</td>
<td>49%</td>
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<tr>
<td>Stop Sign</td>
<td>47%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
</tr>
</tbody>
</table>

Figure 63. Positions in “Drive Through.”

About 3 out of 5 bicyclists were in the first half of the roadway relative to the motorist.
Drive Out
At Stop Sign

**Description:** The crash occurred at an intersection at which the motorist was facing a stop sign.

**Summary:** In comparison to all crashes, this crash was more likely to involve teen (age 15 to 19) and adult (age 25 to 44) bicyclists. More than 3/4 of these events occurred in urban areas.

The light condition, number of lanes, and speed limit parameters closely followed the results for all crashes combined.

About 60 percent of the bicyclists were riding facing traffic, whether “in road” or “off road.”

This type of crash tended to be less severe than the average.

**Bicyclist Age**

![Bicyclist Age Chart](Image)

**Figure 64.** Bicyclist age in “Drive Out At Stop Sign.”
Drive Out At Stop Sign

Light Condition
- dark, no lights
- dark, lighted
- dawn/dusk
- daylight

Percent

Number of Lanes
- 6+
- 5
- 4
- 3
- 2
- 1

Percent

Speed Limit (km/h)
- 80+
- 60-70
- 50-60
- ≤40

Percent

Development Character
Urban .............. 78%
Rural .............. 22%

Facing Traffic Positions
- <1%
- <1%
- 35%
- 22%
- 3% other/unknown

Almost 60% of bicyclists were riding facing traffic.

Figure 66. Facing traffic positions in “Drive Out At Stop Sign.”

With Traffic Positions
- 9%
- 27%
- 2%

Most of the bicyclists riding with traffic were in the “in road” position.

Figure 67. With traffic positions in “Drive Out At Stop Sign.”

Figure 65. Light condition, number of lanes, and speed limit in “Drive Out At Stop Sign.”
Right On Red

**Description:** At an intersection controlled by a signal, the motorist struck the bicyclist while making a right turn on red.

**Summary:** In comparison to all crashes, this crash was likely **not** to involve child (age 0 to 9) bicyclists.

More than 1/2 occurred at larger multilane intersections (5 and 6+ lanes). Almost 85 percent took place on roads with a speed limit between 50 to 70 km/h.

Eighty percent of bicyclists were riding facing traffic whether “in road” or “off road.”

Bicyclists were riding in a **marked** crosswalk in 45 percent. A marked crosswalk was involved in only 7 percent of all crashes combined.

This crash had a far lower incidence of serious injuries than the average. There were no fatalities.

**Figure 68.** Bicyclist age in “Right On Red.”
Figure 69. Light condition, number of lanes, and speed limit in "Right On Red."

Figure 70. Positions in "Right On Red."
Drive Out At Intersection—Other

**Frequency:** 16 cases; 0.5% of all crashes  
**Severity:** 9% resulted in serious or fatal injuries

**Description:** The crash occurred at an intersection, signalized or uncontrolled, at which the motorist failed to yield. The circumstances did not conform to any other crash type.

**Summary:** In comparison to all crashes, this crash was more likely to involve adult (age 25 to 44) and middle adult (age 45 to 64) bicyclists.

Four and five-lane roads were heavily represented, combined accounting for 70 percent of crashes.

All of these crashes occurred on roads with a speed limit of 50 to 60 or 60 to 70 km/h.

This type of crash tended to be less severe than the average. There were no fatalities.

**Figure 71.** Bicyclist age in “Drive Out At Intersection—Other.”
Figure 72. Light condition, number of lanes, and speed limit in "Drive Out At Intersection—Other."

Figure 73. Positions in "Drive Out At Intersection—Other."
The Bicyclist Failed To Yield To The Motorist At A Midblock Location
**Ride Out At Residential Driveway**

**Description:** The bicyclist entered the roadway from a residential driveway or alley.

**Summary:** In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) bicyclists who accounted for more than 1/2 of these events. Child and youth (age 10 to 14) combined accounted for 85 percent.

More than 90 percent occurred on two-lane roads.

A parked vehicle was a vision obstruction in 11 percent. "Other" vision obstructions were present in an additional 10 percent. Thus, more than one in five of these crashes involved some type of vision obstruction.

This crash tended to be slightly more severe than the average.

**Figure 74.** Bicyclist age in “Ride Out At Residential Driveway.”

**Frequency:** 153 cases; 5.1% of all crashes

**Severity:** 24% resulted in serious or fatal injuries
Development Character
Urban ............... 67%
Rural ............... 33%

Road Feature
Driveway ............ 71%
Alley ............... 29%

Figure 75. Light condition, number of lanes, and speed limit in “Ride Out At Residential Driveway.”

Figure 76. Positions in “Ride Out At Residential Driveway.”

Two thirds of the bicyclists were struck in the first half of the roadway.
Ride Out At Commercial Driveway

Frequency: 68 cases; 2.3% of all crashes
Severity: 22% resulted in serious or fatal injuries

Description: The bicyclist was entering the roadway from a commercial driveway.

Summary: In comparison to all crashes, this crash was more likely to involve younger bicyclists, particularly youths (age 10 to 14).

The light condition, number of lanes, and speed limit variables closely followed the results for all crashes combined.

A moving or stopped vehicle was a vision obstruction in 8 percent of these crashes. Overall, there was some type of vision obstruction in 16 percent.

Bicyclist Age

Figure 77. Bicyclist age in “Ride Out At Commercial Driveway.”
Figure 78. Light condition, number of lanes, and speed limit in “Ride Out At Commercial Driveway.”

Figure 79. Positions in “Ride Out At Commercial Driveway.”

Development Character

- Urban ............ 71%
- Rural ............ 29%

Traffic Control

- None ............ 91%
- Stop Sign ......... 6%
- Other ............ 3%

More than 7 out of 10 bicyclists were struck in the first half of the roadway.
Ride Out At Midblock

**Description:** The bicyclist entered the roadway at a shoulder or curb midblock location.

**Summary:** In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) bicyclists.

A parked vehicle was a vision obstruction in 9 percent of these crashes and a moving or stopped vehicle in 8 percent. Including other vision obstructions, almost one in five of these events had some form of vision obstruction. In addition, 8 percent occurred on a curve in the roadway.

Forty-five percent of adult bicyclists age 25 and older had been drinking.

**Figure 80.** Bicyclist age in "Ride Out At Midblock."
**Light Condition**

- dark, no lights
- dark, lighted
- dawn/dusk
- daylight

**Number of Lanes**

- 6+
- 5
- 4
- 3
- 2
- 1

**Speed Limit (km/h)**

- 80+
- 60-70
- 50-60
- <=40

---

**Development Character**

- Urban: 63%
- Rural: 37%

---

**Positions**

- Figure 82. Positions in “Ride Out At Midblock.”

---

Figure 81. Light condition, number of lanes, and speed limit in “Ride Out At Midblock.”

First or second-half of the roadway was almost equally distributed.
The Bicyclist Failed To Yield To The Motorist At An Intersection
Ride Out At Stop Sign

Frequency: 290 cases; 9.7% of all crashes
Severity: 23% resulted in serious or fatal injuries

Description: The crash occurred at an intersection at which the bicyclist was facing a stop sign or flashing red light.

Summary: In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) and youth bicyclists (age 10 to 14).

Eighty-six percent took place on two-lane roads, and 88 percent were on roads with speed limits less than 60 km/h.

Bicyclist Age

Figure 83. Bicyclist age in “Ride Out At Stop Sign.”
Ride Out At Stop Sign

**Light Condition**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark, no lights</td>
<td>1</td>
</tr>
<tr>
<td>Dark, lighted</td>
<td>2</td>
</tr>
<tr>
<td>Dawn/dusk</td>
<td>3</td>
</tr>
<tr>
<td>Daylight</td>
<td>80</td>
</tr>
</tbody>
</table>

**Number of Lanes**

<table>
<thead>
<tr>
<th>Lanes</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6+</td>
<td>1</td>
</tr>
</tbody>
</table>

**Speed Limit (km/h)**

<table>
<thead>
<tr>
<th>Limit</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤40</td>
<td>30</td>
</tr>
<tr>
<td>50-60</td>
<td>40</td>
</tr>
<tr>
<td>60-70</td>
<td>20</td>
</tr>
<tr>
<td>80+</td>
<td>1</td>
</tr>
</tbody>
</table>

**Development Character**

<table>
<thead>
<tr>
<th>Character</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>72%</td>
</tr>
<tr>
<td>Rural</td>
<td>28%</td>
</tr>
</tbody>
</table>

**First-half of Roadway Positions**

- 4% 0% 11% 47% <1%

7% other/unknown

About 70 percent of bicyclists were struck in their first-half of the roadway.

**Figure 85.** First-half positions in "Ride Out At Stop Sign."

**Second-half of Roadway Positions**

- <1% 8% 21% <1%

About 30 percent of bicyclists were struck in their second-half of the roadway.

**Figure 86.** Second-half positions in "Ride Out At Stop Sign."

---

*Figure 84.** Light condition, number of lanes, and speed limit in "Ride Out At Stop Sign."
Ride Out At
Intersection—Other

**Description:** The crash occurred at an intersection, signalized or uncontrolled, at which the bicyclist failed to yield.

**Summary:** In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) and youth (age 10 to 14) bicyclists.

Almost 50 percent took place on multilane roads (4, 5, and 6+ lanes).

A traffic signal was present in about 60 percent of the crashes.

More than 60 percent of the bicyclists were struck in their first half of the roadway.

**Frequency:** 211 cases; 7.1% of all crashes
**Severity:** 16% resulted in serious or fatal injuries

---

**Figure 87.** Bicyclist age in “Ride Out At Intersection—Other.”

---

88
Figure 88. Light condition, number of lanes, and speed limit in “Ride Out At Intersection—Other.”

Figure 89. First-half positions in “Ride Out At Intersection—Other.”

Figure 90. Second-half positions in “Ride Out At Intersection—Other.”

Development Character
- Urban ............. 67%
- Rural ............. 33%

Traffic Control
- Traffic Signal ...... 58%
- None ............. 36%
- Other ............. 6%

65% of the bicyclists were struck in their first-half of the roadway.

32% of the bicyclists were struck in their second-half of the roadway.
3% were unknown first or second half.
Other Crossing Path Crashes
Motorist
Turning Error

**Description:** The motorist was making a left turn and cut the corner, or a right turn and swung out too wide.

**Summary:** In comparison to all crashes, this crash was more likely to involve adult (age 25 to 44) bicyclists.

Thirty percent took place during darkness, with and without street lights.

Some type of road or environmental condition such as weather, vision obstruction, glare, etc. was noted in 33 percent of these events.

This crash was of average severity. There were no fatalities.

**Figure 91.** Bicyclist age in “Motorist Turning Error.”

---

**Frequency:** 19 cases; 0.6% of all crashes
**Severity:** 17% resulted in serious or fatal injuries
Motorist Turning Error

**Light Condition**

- dark, no lights
- dark, lighted
- dawn/dusk
- daylight

---

**Development Character**

- Urban: 56%
- Rural: 44%

---

**Traffic Control**

- None: 53%
- Stop Sign: 32%
- Traffic Signal: 15%

---

**Road Feature**

- Intersection: 89%
- Driveway/Alley: 11%

---

**Number of Lanes**

- 6+
- 5
- 4
- 3
- 2
- 1

---

**Speed Limit (km/h)**

- 80+
- 60-70
- 50-60
- ≤40

---

**Figure 92.** Light condition, number of lanes, and speed limit in “Motorist Turning Error.”

---

**Figure 93.** Positions in “Motorist Turning Error.”
**Bicyclist Turning Error**

**Frequency:** 21 cases; 0.7% of all crashes  
**Severity:** 24% resulted in serious or fatal injuries

**Description:** The bicyclist was making a left turn and cut the corner, or a right turn and swung out too wide.

**Summary:** In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) and middle adult (age 45 to 64) bicyclists.

Ninety-five percent took place during daylight, and 95 percent occurred on two-lane roads.

Almost 60 percent occurred on roads with a speed limit of 40 km/h or less.

**Figure 94.** Bicyclist age in “Bicyclist Turning Error.”
Bicyclist Turning Error

**Light Condition**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Bicyclist Turn</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>dark, no lights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dark, lighted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dawn/dusk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>daylight</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Number of Lanes**

<table>
<thead>
<tr>
<th>Lanes</th>
<th>Bicyclist Turn</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Speed Limit (km/h)**

<table>
<thead>
<tr>
<th>Limit</th>
<th>Bicyclist Turn</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>80+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;=40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Development Character**

- Urban ............ 90%
- Rural ............ 10%

---

**Traffic Control**

- None ............ 76%
- Stop Sign ........ 24%

---

**Road Feature**

- Intersection ........ 86%
- Driveway/Alley ....... 14%

---

**Figure 95.** Light condition, number of lanes, and speed limit in “Bicyclist Turning Error.”

---

**Figure 96.** Positions in “Bicyclist Turning Error.”

2/3 were turning right and swung too wide.
**Controlled Intersection—Other**

**Description:** The crash occurred at an intersection that was controlled by stop sign or traffic signal, and did conform to any of the other crash types.

**Summary:** The bicyclist age distribution for this crash generally followed the pattern for all crashes combined. Compared to all crashes, multilane roads (4, 5, and 6+ lanes) and roads with a speed limit of 50 to 60 and 60 to 70 km/h were more likely to be involved.

More than 8 out of 10 occurred in urban areas.

The traffic control was approximately equally split between traffic signal and stop sign. Bicyclists were riding in a marked crosswalk in 24 percent of these crashes. A marked crosswalk was involved in only 7 percent of all crashes combined.

This crash was about average in severity. There were no fatalities.

**Bicyclist Age**

![Bicyclist Age Graph]

Figure 97. Bicyclist age in “Controlled Intersection—Other.”
Figure 98. Light condition, number of lanes, and speed limit in “Controlled Intersection—Other.”

Figure 99. Positions in “Controlled Intersection—Other.”

Development Character
- Urban ............. 82%
- Rural ............. 18%

Traffic Control
- Traffic Signal ....... 46%
- Stop Sign .......... 40%
- Other .............. 14%

About 2/3 of the bicyclists were riding facing traffic. Specific locations are unknown.
Note: The motorist may have had the stop sign.
Uncontrolled Intersection—Other

**Description:** The crash occurred at an intersection that had neither stop sign nor traffic signal, and did not conform to any of the other crash types.

**Summary:** In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) bicyclists who accounted for more than 40 percent of these events. Middle (age 45 to 64) and elder adult (age 65+) bicyclists were not represented.

More than 70 percent occurred on two-lane roads, and more than 40 percent were on roads with a speed limit of 40 km/h or less.

More than 40 percent occurred in rural areas.

This crash tended to be less severe than the average. There were no fatalities.

---

**Figure 100.** Bicyclist age in “Uncontrolled Intersection—Other.”
Uncontrolled Intersection—Other

**Light Condition**

- dark, no lights: 10%
- dark, lighted: 20%
- dawn/dusk: 5%
- daylight: 65%

**Number of Lanes**

- 1 lane: 5%
- 2 lanes: 15%
- 3 lanes: 20%
- 4 lanes: 20%
- 5 lanes: 10%
- 6+ lanes: 10%

**Speed Limit (km/h)**

- <=40: 30%
- 50-60: 40%
- 60-70: 20%
- 80+: 10%

**Development Character**

- Urban: 59%
- Rural: 41%

**Positions**

- 67%: Two-thirds of the bicyclists were riding facing traffic. Specific locations are unknown.

**Figure 101.** Light condition, number of lanes, and speed limit in “Uncontrolled Intersection—Other.”

**Figure 102.** Positions in “Uncontrolled Intersection—Other.”
Specific Circumstances
Weird

No drawing

**Description:** The crash was weird because:
- The motorist intentionally caused the crash.
- The bicyclist was struck by falling cargo, extended cargo, construction equipment, etc.
- Of other unusual circumstances.

**Summary:** In comparison to all crashes, this crash was more likely to involve teen (age 15 to 19), young adult (age 20 to 24), and adult (age 25 to 44) bicyclists.

About 30 percent occurred under low light conditions.

Twenty-four percent were hit & run, and 24 percent were assault with motor vehicle.

This crash was slightly more severe than the average. There were no fatalities.

**Figure 103.** Bicyclist age in “Weird.”
Figure 104. Light condition, number of lanes, and speed limit in "Weird."
Play Vehicle

**Frequency:** 16 cases; 0.5% of all crashes  
**Severity:** 28% resulted in serious or fatal injuries

**Description:** The bicyclist was riding a child's vehicle such as a tricycle, a “Big Wheel” type tricycle, or a bicycle with training wheels.

**Summary:** This crash involved 100 percent child (age 0 to 9) bicyclists, daylight conditions, and two-lane roads (for those crashes that were roadway-related).

Sixty-three percent occurred on the roadway and 37 percent were non-roadway. Forty-four percent of motor vehicles were backing.

This crash tended to be more severe than the average.

![Bicyclist Age Chart](chart)

**Figure 105.** Bicyclist age in “Play Vehicle.”
Light Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Play Vehicle</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>dark, no lights</td>
<td>30%</td>
<td>10%</td>
</tr>
<tr>
<td>dark, lighted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dawn/dusk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>daylight</td>
<td>70%</td>
<td>80%</td>
</tr>
</tbody>
</table>

Percent

Number of Lanes

<table>
<thead>
<tr>
<th>Lanes</th>
<th>Play Vehicle</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>50%</td>
<td>80%</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent

Speed Limit (km/h)

<table>
<thead>
<tr>
<th>Speed Limit</th>
<th>Play Vehicle</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=40</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>50-60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent

Development Character

- Urban ............. 67%
- Rural ............ 33%

Location

- Roadway .......... 63%
- Non-roadway ..... 37%

Road Feature

- Driveway/Alley ... 60%
- No special feature .. 30%
- Intersection ...... 10%

Figure 106. Light condition, number of lanes, and speed limit in “Play Vehicle.”

Example Positions

- 44% involved motor vehicles that were backing.

Figure 107. Positions in “Play Vehicle.”
Description: The crash involved a motor vehicle which was backing. Note: Crash type “Play Vehicle” had an additional 7 backing incidents, which would bring the total for “Backing” to 54, or 1.8 percent of all crashes.

Summary: In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) and middle adult (age 45 to 64) bicyclists.

Sixty-two percent occurred on the roadway. Of those, all happened on one- or two-lane roads. More than 40 percent had a speed limit of 40 km/h or less.

Of the 38 percent non-roadway, 19 percent took place in a parking lot, and in 19 percent the bicyclist and motorist were both in a driveway or alley.

This crash had a far lower incidence of serious injuries than the average. There were no fatalities.

Figure 108. Bicyclist age in “Backing.”
Figure 109. Light condition, number of lanes, and speed limit in "Backing."

Figure 110. Roadway positions in "Backing."

Of the bicyclists who were in the roadway, almost 1/3 were riding facing traffic.
Non-Roadway

**Frequency:** 112 cases; 3.7% of all crashes  
**Severity:** 11% resulted in serious or fatal injuries

**Description:** The crash occurred in a non-roadway location such as parking lot, driveway/alley, open area, etc.

**Summary:** In comparison to all crashes, this crash was more likely to involve child (age 0 to 9) and youth (age 10 to 14) bicyclists.

Seventy one percent occurred in a parking lot, and 22 percent in a driveway or alley.

If the non-roadway crashes from the “Weird,” “Play Vehicle,” and “Backing” crashes types are included, the total frequency of “Non-Roadway” amounts to 141 cases and 4.7 percent of all crashes.

This crash had a lower incidence of serious injuries than the average. There were no fatalities.

**Figure 111.** Bicyclist age in “Non-Roadway.”
Non-Roadway

Light Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Non-Roadway</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>dark, no lights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dark, lighted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dawn/dusk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>daylight</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of Lanes

<table>
<thead>
<tr>
<th>Lanes</th>
<th>Non-Roadway</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Speed Limit (km/h)

<table>
<thead>
<tr>
<th>Limit</th>
<th>Non-Roadway</th>
<th>All crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>80+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Development Character

- Urban: 66%
- Rural: 34%

Non-Roadway Location

- Parking lot: 71%
- Driveway/Alley: 22%
- Sidewalk: 4%
- Other: 4%

Example Parking Lot Positions

Parking lot locations accounted for 71% of this crash type.

Figure 112. Light condition, number of lanes, and speed limit in "Non-Roadway."

Figure 113. Positions in "Non-Roadway."
Description: Insufficient information was available to specify a crash type. It was determined that:

- 38 percent were on crossing paths.
- 30 percent were on parallel paths.
- in 32 percent the pre-crash path was unknown.

Summary: The bicyclist age distribution for this crash generally corresponded with that of all crashes combined. About 30 percent occurred during darkness, and 75 percent took place on two-lane roads.

Forty six percent were hit & run.

Some type of road or environmental condition such as weather, vision obstruction, glare, etc. was noted in 44 percent of these crashes.

Figure 114. Bicyclist age in "Unknown."
Figure 115. Light condition, number of lanes, and speed limit in "Unknown."
Coding Guidelines for Bicycle Crash Typing

Adapted from the NHTSA "Manual Accident Typing for Bicyclist Accidents - Coder's Handbook" *

1. Read the police accident report carefully and completely:

   ▶ First, read the narrative. In cases of conflicting stories give:

   ▶ First priority to officer's conclusions.
   ▶ Second priority to witness statements.
   ▶ Third priority to bicyclist and driver statements.

   ![Diagram of bicycle crash]

   ▶ Next, review the information in the specific information categories (i.e., the "check off" boxes) such as light condition, weather condition, bicyclist's age, driver's age, contributing factors, and roadway information.

   ![Diagram of accident scene]

   ![Diagram of contributing circumstances]

* A version of this manual is included as Appendix A in the parent report for this project entitled "Pedestrian and Bicycle Crash Types of the Early 1990's" by William W. Hunter, Jane C. Stutts, Wayne E. Pein and Chante L. Cox (Report No. FHWA-RD-95-163).
- Finally, examine the diagram. Remember that diagrams are seldom drawn to scale. Although a diagram might appear to show an accident occurred at an intersection, for example, check the report form for the actual measurement of the point of impact from the nearest intersection.

Note that for bicycle crashes, an accident is defined as occurring at an intersection if the point of impact is in the center of the intersection or within the crosswalks; all other locations are considered midblock. For pedestrian crashes, the boundaries of an intersection crash extend up to and including 50 feet from the corner. Alleys and driveways are only considered intersections when they are controlled by a traffic signal.

2. Read each of the Specific Circumstances accident types in order (see attached codes). If one of them fits the information contained in the accident report, write the accident code number for that accident type opposite the report number on the data form.

   For the sample case shown, none of the Specific Circumstances categories applies.

3. If none of them apply, determine whether the initial approach paths of the motorist and bicyclist were parallel or crossing and proceed to that page (see attached).

   In this case, the bicyclist and motor vehicle were approaching each other or parallel paths, heading in the same direction.
4. Review each heading in order, and stop at the first one that applies.

   The first heading describes the situation where the motorist turns or merges into the path of the cyclist, and so does not apply. However, the second heading describes the situation where the cyclist turns or merges into the path of the motorist, which does apply.

5. Within the heading, review each accident type description in order and stop at the first one that applies. Record the accident code number beside the report number on the data form.

   Since the bicyclist is not entering the street from the sidewalk or from a driveway or alley, and the bicyclist and motorist are going in the same direction, the most appropriate crash type in this case is #18 - cyclist left turn, in front of traffic. Note that this crash type may or may not occur at an intersection.

6. If no accident type description applies, continue with the next heading and repeat steps 4 and 5.

7. If the Insufficient Information heading is reached without finding a type that applies, record that code number (98 or 99) on the data sheet. Before using an Insufficient Information code, review the report to assure that no information has been missed that would lead to the selection of another accident type.

   As cases are coded, refer to the diagrams accompanying each accident type and the definitions page for additional information. Remember that the diagrams are examples only, and do not represent all possible situations to which the type can be applied.

   If more than one bicyclist is involved in an accident, the first bicyclist struck defines the accident. Consider only the circumstances surrounding the collision with the first bicyclist in determining the type.

   See chart on the following page for an overview of the process for selecting the appropriate crash type code.
Overview of Crash Type Selection Process

Decide if the crash is one of four “Specific Circumstances.”

Choose, in order, from:
- Weird
- Play vehicle
- Backing
- Non-roadway

If none apply, decide if the parties were initially on:

Parallel Paths
Choose, in order, from the following individual crash types:
- Drive Out- On-Street Parking
- Motorist Left Turn In Front Of Cyclist
- Motorist Left Turn - Facing Cyclist
- Motorist Right Turn
- Ride Out From Sidewalk
- Cyclist Left Turn In Front Of Traffic
- Cyclist Left Turn - Facing Traffic
- Cyclist Right Turn From Wrong Side Of Street
- Head On - Counteractive Evasive Actions
- Wrong Way Motorist
- Wrong Way Cyclist
- Motorist Overtakes Undetected Cyclist
- Motorist Overtaking - Counteractive Evasive Actions
- Motorist Overtaking - Misjudges Passing Space
- Motorist Overtaking - Cyclist Path Obstructed
- Motorist Overtaking - Other
- Cyclist Overtaking
- Cyclist Strikes Parked Vehicle
- Motorist Lost Control
- Bicyclist Lost Control
- Parallel Paths - Unknown

Crossing Paths
Choose, in order, from the following individual crash types:
- Trapped
- Multiple Threat
- Drive Out - Driveway/Alley
- Drive Through
- Drive Out - Stop Sign
- Right On Red
- Drive Out - Intersection
- Ride Out - Residential Driveway
- Ride Out - Commercial Driveway
- Ride Out - Midblock
- Ride Out - Stop Sign
- Ride Out - Intersection: Other
- Motorist Cuts Corner
- Motorist Swings Wide
- Cyclist Cuts Corner
- Cyclist Swings Wide
- Controlled Intersection - Other
- Uncontrolled Intersection - Other
- Intersecting Paths - Unknown

Note: Many of these original NHTSA types have been slightly modified in Bicycle Crash Types: A 1990's Informational Guide.
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