## I. TITTLE

Traffic Collisions Involving Pedestrians in Winnipeg (*2012-2020*): A Transportation Equity Analysis

***AN INTERIN REPORT***

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## II. PURPOSE OF THE REPORT

This *Interim* Traffic Collisions Involving Pedestrians in Winnipeg (2012-2020): A Transportation Equity Analysis study was advanced to:

a) Increase our community, policy-makers and users' understanding of the various factors involved in fatal and severe injury causing pedestrian's traffic collisions;

b) Identify historical and potential problem areas for pedestrians by accounting for location characteristics, pedestrian and driver behavior, vehicle characteristics and environmental-related collision factors; and

c) Identify deficiencies and existing barriers in the transportation system that could lead to pedestrian fatalities and serious injuries that curtail mobility and present obstacles to access and connectivity activities.

## III. SUMMARY

According to tabular data included in the 2012-2020 Annual Collision Reports and published by the Public Works Department, City of Winnipeg, the 5-years rolling average trend analysis for total collisions by severity, analysis in the following tables reveals:

Table 1. Reported Collisions

- Steady increase in the total number of reported collisions,
- Steady increase in the number of reported collisions causing property damage; but
- Relatively consistent number of fatalities per year, which average 12.56.

Table 2. Total Number Registered Vehicles, Reported Collisions & Population

- Steady increase on the total number of registered vehicles (all types)
- Steady increase of registered collisions per 1000 registered vehicles
- Steady increase on the population of Winnipeg; and
- Steady increase on the collisions per 1000 people.

Table 3. Total Number of Collision Victims by Injury Type and Mode of Travel (2012-2020)

- Steady increase per year on the number of pedestrian collisions resulting in fatal injuries,

- Steady increase per year on the number of pedestrian collisions resulting in major injuries
- Steady increase per year on the number of pedestrian collisions resulting in minimal injuries, and a,
- Steady increase per year on the number of pedestrian's collision resulting in minor injuries.

Table 3B. Total Number of Reported Collisions by Severity and Road Location (Al Modes Travel)

- There was an increase per year of the number of total collisions (including pedestrians and bicyclist) at the intersection causing property damage.

- There was an increase per year of the number of the number of total collisions (including pedestrians and bicyclist) at the non-intersection causing injury

- There was an increase per year of the number of the number of total collisions (including pedestrians and bicyclist) at the non-intersection causing property damage.

Table 4. Pedestrian Fatalities and All Injuries by Age, 2012-2020

- Age 20-24 is the age-group showing the largest number of fatalities (7) and the largest number of non-fatal injuries (94) over the entire period from 2012-2020, representing approximately 13% of fatalities and all other injuries combined;

Table 5. Number of Pedestrians by Pedestrian Action by All Injury Type, 2012-2020

- From 2012 to 2020 about 42.3% of reported fatal and severe injuries combined involved pedestrians At the Intersection crossing with right of way.
- Regretfully, about 34.1% of pedestrian actions were reported as *Unknown*;

Table 6. Number of Pedestrians by Pedestrian Action by Age, (2012-2020)

- At Intersection crossing with right of way.
  Those performing this action were pedestrians predominantly in the age groups ranging from: 15-19 (8.1%), 20-24 (12.6%) and 25-29 (9.2%).
- Pedestrians in those groups account for about 30.0% of all fatalities and severe injuries.

Table 15 . Total Number of Non-Motorized Collision Victims by Injury Type and Mode of Travel, 2012-2020

Pedestrians

- There was an increase per year of pedestrian collisions resulting in fatal injuries,
- There was an increase per year of pedestrian collisions resulting in all injuries,

Bicyclists

Bicycle related fatalities have experienced a -16.7% drastic annual decrease from 2012 to 2020. However, considering 2016-2020 compared to 2012-2016, the study reveals that all bicycle

related injuries increased by 41. % annually over the five periods. It appears that both pedestrians (39.9%) and bicyclist (41.0%) are getting involved in collisions causing all injuries at *almost* similar rates. This observation demands more attention to the issue of bicycle safety as it is part of the concept of *non-motorized* or active transportation.

The data analysis for Non-Motorized Transportation Total (Fatal All Injuries), indicates that there was an increase of 8.8% per year of Non-Motorized (Fatal All Injuries: Bicycle and Pedestrian) collisions resulting in fatal injuries,

Also, considering 2016-2020 compared to 2012-2016, the study reveals that:

- Non-Motorized total collisions resulting in fatal+all injuries increased by 38.4%.

The findings, in our opinion, strongly emphasize the need for improved focus on pedestrian safety on the existing multi-modal transportation system in Winnipeg.

## IV. RECOMMENDATIONS

The nature of motor-vehicle collisions resulting in fatalities and severe pedestrian and bicyclist injuries is on the rise. This exacts a heavy toll in, and disrupts community order. Death, severe injuries and disabilities whether permanent or temporary, hospitalization cost, direct and indirect health and economic costs, all these factors place a heavy burden in administrative agencies responsible for road safety, enforcement and emergency management, health providers, and driver and vehicle insurance in our communities.

Regrettably, as pedestrian fatalities increase, pedestrian safety deteriorates and their mobility is compromised.

The following recommendations are outlined in this report to enhance or complement those recommendations included in adopted transportation, land use and active transportation planning documents, including the Winnipeg Road Safety Strategic Action Plan, adopted by Council (July, 2022), for improving road safety culture in Winnipeg:

1. Assess the impact and curtail the practice of filing incomplete Traffic Accident Reports (TAR).

Traffic Accident Reports (TAR) with “unknown” actions, fail to include driver, vehicle, roadway user’s characteristics and related infrastructure issues. Consequently, incomplete Traffic Accident Reports (TAR) may contribute to the failure to understand what happened at the collision event. Establish a level of dialogue and cooperation with the local agencies responsible for collecting and organizing collision data leading to the establishment of performance measures to reduce the incidence of incomplete collision reports.

2. Consider enhancing the Annual Collision Report.

This recommendation is currently underway. However, this report suggest avoiding the practice of lumping pedestrian and bicycle collision data as reported in Figure 2.11 Total number of reported collisions by severity and road location.

The objective is to facility the evaluation of the severity level of collisions involving pedestrians in relation to the location (Intersection or Non-Intersection) where the collision occurred.

3. Improve pedestrian safety and crossing behavior at crosswalk facilities

Rigorous pedestrian and driver education is necessary to complement improved design for pedestrian crossing treatments. Safety performance of pedestrian behavior should also be evaluated when considering pedestrian accessibility to those facilities. Local road safety advocates have been raising awareness on the need to improve pedestrian safety at pedestrian crosswalks.

4. Conduct Walkability Assessments (*Audits*) in proximity to identified collision locations with a high number of collisions and pedestrian injuries.

As part of the public involvement and supported by community members and volunteers, conduct Walkability Assessments in proximity to identified collision locations, and provide suggested recommendations to improve perceived infrastructure deficiencies.

The objective is to assure that the basic existing pedestrian and bicycle network infrastructure is completely safe, secure, and comfortable and that it allows caregivers and people of all ages and abilities to travel independently while supporting their mobility and access to their daily destinations, opportunities and services.

5. Advance Equity and Pedestrian Safety Analysis in areas showing a high concentration of severe injury causing collisions involving pedestrians.

6. Establish Safety Performance Measures and Annual Targets[1]

Manitoba is unique in that both the insurance company and the health system are government administered; in this regard making every effort to drastically reduce pedestrian fatalities and severe injuries; and tracking life-altering injuries in data collection reporting would provide a beneficial service to our community.

Similar to those safety performance measures in place in other jurisdictions, this reports recommends that the city in cooperation with the Province of Manitoba and Manitoba Public Insurance (MPI) give serious consideration to the establishment of Safety Performance Measures to significantly reduce non-motorized traffic fatalities and serious injuries on all public roads.

The adoption of safety performance measures requires that safety targets be established annually for each of the safety performance measures. Targets are based on the number of non-motorized fatalities and number of non-motorized serious injuries combined; and each safety performance measure is based on a 5-year rolling average.

[1] Safety Performance Measures Fact Sheet. FHWA-SA-16-044

## V. BACKGROUND

This report primarily evaluates data from the *2020Annual Collision Report* generated by the Department of Public Works using data provided by Manitoba Public Insurance (MPI).

The analysis is supported by the 5-years rolling average technique promoted by the U.S. Federal Highway Administration (FHWA). Accordingly, *the 5-year rolling average provides a better understanding of the overall data over time without eliminating years with significant increases or decreases*.[2]The 5-years rolling technique is the average of 5 individual, consecutive points of data.

A benefit of the 5-years rolling average technique is that '*if a particularly high or low number of fatalities and/or serious injuries occur in one year, a return to a level consistent with the average in the previous year may occur*."[3]

In this regard, data concerning pedestrian fatalities and injuries resulting from traffic collisions from the 2012 to 2020 Annual Collision Reports is evaluated and presented based on sequential 5-year rolling average values.

The analysis links the pedestrian fatalities and severe injuries data from year 2020 to results from our examination of collisions involving pedestrians from years 2012 to 2019. Over the period, a number of important findings and observations emerge regarding pedestrian fatalities, severe injuries, and property damages. This analysis also evaluates pedestrian fatalities and severe injuries as they relate to the pedestrian's action and driver's behaviour immediately prior to the collision.

## VI. REGIONAL IMPACTS OF THE PANDEMIC & ITS CHARACTERISTICS

The advent of the Corona Virus Disease (COVID-19) has been the largest pandemic afflicting the globe since the Flu Pandemic of 1918. COVID-19 has considerably impacted the lives of Canadians and revealed a profound and disruptive impact on global and regional transportation travel, public health, safety and security.

The existing multimodal transportation system was not immune to the ravages and devastations spread by the disease in our communities. Similar situation happened on the management of critical facilities and services supporting our community's way of life.

The impact of the disease in transportation planning and operations was global. It resulted in "*decreased travel by ground, air and water transportation modes(…) In addition to loss of life and illness, there have been significant economic losses, business closures, job losses, and widespread disruption of educational, religious, cultural, and social activities, with resulting negative impacts to our quality of life*."[4]

[2] Safety Performance Measures Fact Sheet. FHWA-SA-16-044
[3] Safety Performance Measures Fact Sheet. FHWA-SA-16-044
[4] Kim, Karl. "Impacts of COVID-19 on transportation: Summary and synthesis of interdisciplinary research." Transportation research interdisciplinary perspectives vol. 9 (2021): 100305

## A. Canada

In Canada, for example, the notable long-term impact of COVID-19 on the transportation system was felt prominently in personal vehicle, transit commuting trips and traveling patterns as a result of enacted government restrictions to curtail the spread of COVID-19 by limiting its transmission and by striving to reduce number of cases and deaths.

Commuting and leisure trips came to an abrupt halt. Ridership in public transit and taxis and car sharing decreased. There was also a decrease in the number of workers having a job and using private vehicle and or public transit.[5]

Physical distancing requirements, changing commuting patterns, and increased remote work activities resulted in new mobility options for pedestrians and bicyclists. Whether the impact of the Pandemic is temporary or permanent, there was a change in urban mobility; thus, resulting in changes in travel patterns and in urban residents walking behaviour.

## B. United States

Smart Growth America, in its recently released *Dangerous by Design Report, 2022* argues that 2020 was a year showing a significant increase in all traffic fatalities, even with less driving overall. The report outlines that the Pandemic exacerbated existing disparities regarding the demographics of those being killed in pedestrian-related collisions and their neighbourhoods.

The report also maintains that "*one of the most noticeable changes during the pandemic's onset was the decrease in vehicle traffic across America's cities*." Although during the Pandemic there was an observed decrease in the number of vehicles on the road, a decrease in driving and congestion, and a decrease in commuting trips; it is noted that motorized vehicle speeds and reckless driving noticeably contributed to the severity and loss of lives.

The Pandemic provided more opportunities for walking across many communities. Relevant research agrees that walking trips for all purposes increased and that many commuters replaced motorized trips by more walking trips.

However, an interesting observation is that "*the pandemic magnified what we've always known: Our nation's streets are dangerous by design, designed primarily to move cars quickly at the expense of keeping everyone safe.*"[6]

An article published by NBC news discussing pedestrian deaths in 2020 in the United States, calls the situation "*mind-boggling*" and argues that "*fewer cars on the road cleared the way for fast driving, providing more opportunities to strike and kill pedestrians*." Exhibiting a perplexing tone, the article is concerned with the facts that there were fewer vehicles on the road, the wrecks are occurring at higher speeds, and when "*bigger vehicles with higher front ends, such SUV's hit pedestrians at higher speeds, the results are almost always devastating*."[7]

[5] Savage, Katherine, Turcotte, Martin (August 10, 2020) Commuting to work during COVID-19. Statistics Canada
[6] Dangerous by Design (2022). Smart Growth America. https://smartgrowthamerica.org/dangerous-by-design/
[7] Edwards, Erika (May 21, 2021). 'Mind-boggling': Pedestrian deaths surged in 2020, despite fewer cars on the road. NBC News.

## C. Manitoba

Winnipeg's code red restrictions can bring pandemic fatigue — here's how to cope
Peggy Lam · CBC News · Posted: Nov 02, 2020

*Seeing driving go down while deaths went up should call into question the long-held belief that traffic fatalities are inextricably linked to the amount of driving.*[8]



A nearly empty Portage Avenue intersection during the early weeks of the coronavirus pandemic. Starting Nov. 2, many businesses in Winnipeg will shut down for two weeks for code red restrictions. (Trevor Brine/CBC)

Although the Province of Manitoba works hard to improve roadway safety and to reduce the number of serious injuries, still those unfortunate, yet preventable collisions involving pedestrians deserve further consideration.

The Manitoba Public Insurance 2020 Traffic Collision Statistics Report provided the details surrounding a traffic collision in Manitoba and highlights that:

- Pedestrians accounted for 17% of the people killed and 7% of people seriously injured in traffic collisions (page iv);
- The involvement rate of (100,000 people in the general population) pedestrians in 2020 (8.6) in traffic collisions has decreased by nearly 45% and by 39% compared to the previous five years (2015-2019) annual average (13.5%) (page 99);
- 27% of most collisions-related pedestrian casualties most frequently occurred in January and February (page 99); and
- Manitobans aged 20-24 had the highest pedestrian involvement rate (100000 people) in traffic collisions at 14.6 in 2020 (…) (page 99).
- 40% of pedestrian casualties happened At *the Intersection, crossing with the right of way* was the known pedestrian action prior to the collision (page 99).

Pedestrians are not homogenous in their ability to walk; thus, while seeking to realize their independent mobility; many pedestrians depend on the availability of universally designed and accessible infrastructure. Hence, it appears that members of the populations and communities that rely on walking for everyday needs are the ones bearing the brunt of unequal burdens of the negative impacts on walking created by the existing transportation system.

[8] Dangerous by Design (2022). Smart Growth America. https://smartgrowthamerica.org/dangerous-by-design/

A concerning observation is that of the 13 pedestrians killed in traffic collisions in Manitoba in 2020:

- 6 were walking on the roadway,
- 1 was walking along the roadway and
- 1 was lying on the roadway (page 99).

The Manitoba Public Insurance 2020 Traffic Collision Statistics Report indicates that vehicle involvement in collisions decreased in 2020 compared to 2019; and outlined the contributing factors to collisions in 2020.

However, a random search for the words Pandemic and COVID-19 appears to indicate neither the pandemic, nor COVID-19 were considered as possible environmental factors contributing to the number of collisions in general. The impact of the Pandemic in our community transportation patterns and behaviours had profound, devastating, long lasting and change inducer effects.

It is within this background that the Traffic Collisions Involving Pedestrians in Winnipeg (2012-2020): A Transportation Equity Analysis: *AN INTERIM REPORT* is presented.

## VII. COMPLETE EXECUTIVE SUMMARY[9] [10]

According to tabular data included in the 2012-2020 Annual Collision Reports and published by the Public Works Department, City of Winnipeg, the 5-years rolling average trend analysis for total collisions by severity (Table 1.) reveals:

### 1. Summary Reported Total Number of Collisions by Severity, 2012-2020

| Table 1. Summary Total Number Reported Collisions & Reported Collisions by Severity (All Modes Travel) | | | | | 5-YEARS ROLLING AVERAGE 2012-2020 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| YEAR | REPORTED COLLISIONS | TOTAL NUMBER FATAL COLLISIONS | TOTAL NUMBER COLLISIONS CAUSING INJURY | TOTAL NUMBER COLLISIONS CAUSING PROPERTY DAMAGE | YEARS | REPORTED COLLISIONS | TOTAL NUMBER FATAL COLLISIONS | TOTAL NUMBER COLLISIONS CAUSING INJURY | TOTAL NUMBER COLLISIONS CAUSING PROPERTY DAMAGE |
| 2012 | 16024 | 19 | 4581 | 11424 | 2012-2016 | 16879.2 | 13.4 | 4951.00 | 11918.80 |
| 2013 | 17530 | 9 | 4683 | 12838 | 2013-2017 | 17714.8 | 11.8 | 5143.00 | 12564.00 |
| 2014 | 16668 | 10 | 5072 | 11606 | 2014-2018 | 18089.6 | 12.4 | 5282.60 | 12798.60 |
| 2015 | 16630 | 11 | 5080 | 11539 | 2015-2019 | 18862.4 | 13.0 | 5300.40 | 13549.00 |
| 2016 | 17544 | 18 | 5339 | 12187 | 2016-2020 | 18298.4 | 12.2 | 4911.4 | 13374.8 |
| 2017 | 20202 | 11 | 5541 | 14650 | | | | | |
| 2018 | 19404 | 12 | 5381 | 14011 | ANALYSIS | | | | |
| 2019 | 20532 | 13 | 5161 | 15358 | SLOPE | 398.6 | N/A | N/A | 389.7 |
| 2020 | 13810 | 7 | 3135 | 10668 | INTERSECT | -784811.52 | N/A | N/A | -772014.76 |
| | | | | | r2 | 0.73100 | * | * | 0.885420515 |
| | | | | | MEAN | 17968.88 | 12.56 | 5117.68 | 12841.04 |
| | | | | | Avg% per 5yr Period | 2.2% | | | 3.0% |
| Total | 158344 | 110 | 43973 | 114281 | * r2 value is low, with F-statistic <1.0, meaning no relationship | | | | |

Sources: Fig. 1.1 Total Number of Reported Collisions/Fig. 1.7 Reported Collissions by Severity --Annual Collision Reports (2012-2020). Public Works Department

[9] Tables 1, 2, 3, 5, 6, 7, 8, and 15 included in this report follow the sequence established in the Traffic Collisions Involving Pedestrians in Winnipeg (2012-2019): A Transportation Equity Analysis at https://clkapps.winnipeg.ca/dmis/ViewDoc.asp?DocId=21967&SectionId=&InitUrl=

[10] Statistical and data analysis assistance kindly provided by Dr. Robert V. Parsons.

- Steady increase in the total number of reported collisions
- Steady increase in the number of reported collisions causing property damage; but
- Relatively consistent number of fatalities per year, which average 12.56.

Analysis in this case shows an F-statistic value of less than 1.0, which clearly indicates that there is no statistically significant relationship for collisions involving a fatality with respect to time. In this case it is thus better to use the mean and standard deviation values based on 5-year rolling averages, translating to annual collisions involving a fatality of 12.56 per year.

Data analysis for the parameters described in Table 1 further show:

a) A steady increase of approximately 2.2% per year on the total number of reported collisions (for all modes of travel);

b) A relative consistent number of reported fatal collisions per year, which translate to about 3.0%

c) A steady increase of approximately 3.0% per year on the total number of collisions causing property damage (for all modes of travel).

Also, considering the 5-year average data for 2016-2020 compared to 2012-2016:

i. There was an 8.4% increase on the total number of reported collisions (all modes of travel);
ii. There was a no indicative trend for the total number of reported fatal collisions, with values increasing or decreasing more randomly.

However, these numbers are concerning because according to the tabular data, there were fewer vehicles registered in 2020 than in 2019. Yet, the data show an increase of on the number of registered collisions. Similarly, although there were fewer registered property damage collisions in 2020 compared to 2019; still there was an increase on the total number of registered property damage collisions in the 2016-2020 period.

These two observations deserve our attention, despite the fact that during the COVID-19 Pandemic, there was a reduction of work-related commuting trips, fewer vehicles on the road, and many employees stop commuting to their workplaces. Concerning increases in reported property damages, as indicated previously, *the wrecks are occurring at higher speeds, and when "bigger vehicles with higher front ends, such SUV's hit pedestrians at higher speeds, and the results are almost always devastating*."[11]

[11] Edwards, Erika (May 21, 2021). 'Mind-boggling': Pedestrian deaths surged in 2020, despite fewer cars on the road. NBC News.

## 2. Relating collision data to number of registered vehicles and population

| Table 2. Total Number Registered Vehicles, Reported Collisions & Population | | | | | | 5-YEARS ROLLING AVERAGE 2012-2020 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| YEAR | REGISTERED VEHICLES | TOTAL REPORTED COLLISIONS | COLLISIONS PER 1000 REGISTERED VEHICLES | POPULATION WINNIPEG | COLLISIONS PER 1000 PEOPLE | YEARS | REGISTERED VEHICLES | TOTAL REPORTED COLLISIONS | COLLISIONS PER 1000 REGISTERED VEHICLES | POPULATION WINNIPEG | COLLISIONS PER 1000 PEOPLE |
| 2012 | 503120 | 16024 | 31.85 | 687400 | 23.31 | 2012-2016 | 520640.8 | 16879.2 | 32.42 | 704800 | 23.95 |
| 2013 | 512472 | 17530 | 34.21 | 695000 | 25.22 | 2013-2017 | 529253.0 | 17714.8 | 33.45 | 715500 | 24.74 |
| 2014 | 522005 | 16668 | 31.93 | 703900 | 23.68 | 2014-2018 | 537579.8 | 18089.6 | 33.61 | 727180 | 24.85 |
| 2015 | 527806 | 16630 | 31.51 | 711600 | 23.37 | 2015-2019 | 544803.4 | 18862.4 | 34.58 | 739180 | 25.49 |
| 2016 | 537801 | 17544 | 32.62 | 726100 | 24.16 | 2016-2020 | 553061.8 | 18298.4 | 33.14 | 750240 | 24.41 |
| 2017 | 546181 | 20202 | 36.99 | 740900 | 27.27 | | | | | | |
| 2018 | 554106 | 19404 | 35.02 | 753400 | 25.76 | | | | | | |
| 2019 | 558123 | 20532 | 36.79 | 763900 | 26.88 | ANALYSIS | | | | | |
| 2020 | 569098 | 13810 | 24.27 | 766900 | 18.01 | SLOPE | 8039.24 | 398.6 | N/A | 11456 | N/A |
| | | | | | | INTERSECT | -15653962 | -784811.52 | N/A | -22345004 | N/A |
| | | | | | | r2 | 0.9991755 | 0.73099796 | * | 0.999656442 | ** |
| Total | 4830712 | 158344 | 295.18 | 6549100 | 217.65 | MEAN | 537067.8 | 17968.9 | 33.4 | 727380.0 | 24.7 |
| | | | | | | Av % per 5yr Period | 1.5% | 2.2% | | 1.6% | |
| | | | | | | % Increase over 5 periods | 6.2% | 8.4% | | 6.4% | |
| | | | | | | | * r2 value is low, with F-statistic less than F-critical required, meaning no relationship | | | | |
| | | | | | | | ** r2 value is low, with F-statistic <1.0, meaning no relationship | | | | |

Source: Fig. 1.3 Tabular Summary of Reported Collisions per 1000 Registered Vehicles/Fig. 1.5 Tabular Summary of Reported Collisions per 1000 population. Annual Collision Reports (2012-2020). Public Works Department

According to tabular data included in the 2012-2020 Annual Collision Reports and published by the Public Works Department, City of Winnipeg, the 5-years rolling average trend analysis for total collisions by severity (Table 2.) reveals:

There has been a steady increase on the total number of registered vehicles (all types); a steady increase of registered collisions per 1000 registered vehicles; a steady increase on the population of Winnipeg; and a steady increase on the collisions per 1000 people.

a) There was a 1.5% increase per year on the number of registered vehicles (based on general design),

b) There was a 2.2% increase per year on the number of reported collisions per year,

c) There was a 1.6% increase on per year on the total population; and

Also, considering the 5-year average data for 2016-2020 compared to 2012-2016:

i. There was a 6.2% increase on the number of registered vehicles ( based on general design),
ii. There was an 8.4% increase on the number of reported collisions per year,
iii. There was a 6.4% increase on the total population.

As discussed in the Traffic Collisions Involving Pedestrians in Winnipeg (2012-2019): A Transportation Equity Analysis report, the number of registered vehicles in Canada is on the increase. Moreover, "*Reporting collision rates by number of registered vehicles, does not emphasize the composition of the fleet (curb weight, class/axle or type); thus becoming prone to causing a distortion in the estimation and comparison of fatality rates*.[12]

[12] Péter Holló, habil, D. Sc. Methods and examples of road accident data analysis. Improving the Safety of Road

Figure 1. Light Trucks Vehicle's Characteristics*
*Illustrations for Educational Purposes Only.



| | | |
|---|---|---|
| Kea Wilson, (Mar 8, 2022). "Fed. Vehicle Safety Rating Update Won't Get Megacars Off the Road." Streetsblog, USA. | An aftermarket lifted Ford truck (left) and a new stock model Chevrolet truck on display at the 2020 Washington Auto Show. Photos by Stephen Lee Davis. Dangerous by Design, 2021 | Photo: Angie Schmitt. The Atlantic (December 29, 2021). "Big Cars Are Killing Americans." |

Passenger cars (sedans, hatchbacks, and station wagons) and light trucks (vans, pickups, and sport utility vehicles) have been prominent in pedestrian related collisions. The accepted method of reporting collisions could potentially obscure the data, particularly in regions where the number of "*big*" trucks and SUVs has been expanding.

Increasing dimensions such as tall hoods, large blind spots, and stiff body-on-frame designs of pick-up trucks and other design considerations including weight, size and visibility; all these factors have been indicated as contributing factors in deadly collisions, especially when small children, pedestrians and bicyclists are involved. [13]

The article argues that "*the increasing dimensions and changing design of pickup trucks over the past two decades may be contributing to the deadliness of crashes*."


[13] Barry, Keith (June 08, 2021). The Hidden Danger of BIG Trucks. Consumer Reports. https://www.consumerreports.org/car-safety/the-hidden-dangers-of-big-trucks/

## 3. Examining the Data According to Collision Severity

| Table 3. Total Number of Collision Victims by Injury Type and Mode of Travel (2012-2020) | | | | | | | | 5-YEARS ROLLING AVERAGE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pedestrians Injuries by Severity 2012-2021 | | | | | | | | | | Pedestrians by Severity 2012-2021 | | | | |
| YEAR | Reported collisions per 1000 registered vehicles | Fatal | Major | Minimal | Minor | Unspecified | TOTAL | YEARS | Reported collisions per 1000 registered vehicles | Fatal | Major | Minimal | Minor | Unspecified |
| 2012 | 16024 | 4 | 15 | 23 | 54 | 1 | 97 | 2012-16 | 16879.2 | 4.0 | 12.0 | 21.2 | 32.2 | 4.2 |
| 2013 | 17530 | 1 | 7 | 14 | 23 | 2 | 47 | 2013-17 | 17714.8 | 4.4 | 10.8 | 24.4 | 30.8 | 5.0 |
| 2014 | 16668 | 5 | 7 | 14 | 32 | 0 | 58 | 2014-18 | 18089.6 | 4.8 | 13.2 | 30.4 | 38.8 | 5.4 |
| 2015 | 16630 | 6 | 13 | 26 | 24 | 6 | 75 | 2015-19 | 18862.4 | 5.6 | 15.6 | 34.2 | 43.6 | 5.8 |
| 2016 | 17544 | 4 | 18 | 29 | 28 | 12 | 91 | 2016-20 | 18298.4 | 5.0 | 15.0 | 32.2 | 45.4 | 4.8 |
| 2017 | 20202 | 6 | 9 | 39 | 47 | 5 | 106 | 2017-21 | | | | | | |
| 2018 | 19404 | 3 | 19 | 44 | 63 | 4 | 133 | 2018-22 | | | | | | |
| 2019 | 20532 | 9 | 19 | 33 | 56 | 2 | 119 | ANALYSIS | | | | | | |
| 2020 | 13810 | 3 | 10 | 16 | 33 | 1 | 63 | SLOPE | 398.6 | 0.32 | 1.08 | 3.18 | 3.92 | N/A |
| 2021 | | | | | | | | INTERSECT | -784811.5 | -639.7 | -2161.8 | -6376 | -7856.7 | N/A |
| 2022 | | | | | | | | r2 | 0.730998 | 0.719 | 0.7232 | 0.8435 | 0.8928 | * |
| Total | 158344 | 41 | 117 | 238 | 360 | 33 | 789 | MEAN | 17968.9 | 4.8 | 13.3 | 28.5 | 38.2 | 5.0 |
| | | | | | | | | Avg% per Period | 2.2% | 6.7% | 8.1% | 11.2% | 10.3% | |
| | | | | | | | | % Increase over 5 periods | 8.4% | 25.0% | 25.0% | 51.9% | 41.0% | |
| | | | | | | | | | * r2 value is low, with F-statistic <1.0, meaning no relationship | | | | | |

Source: Fgure 3.3 Total number of collision victims by injury type and mode of travel--Annual Collision Reports (2012-2019), Public Works Department, City of Winnipeg.

Table 3 discusses information on the total number of collision victims by injury type and mode of travel (2012-2020)

Considering the total number of reported collisions from Years 2012 to 2020, **41** pedestrians were involved in fatal traffic collisions; 117 suffered major injuries; 238 suffered minimal and 360 suffered minor injuries, as earlier defined. In addition, 33 Injuries were reported as "*unspecified*."

The 5-years rolling average trend analysis reveals that –according to their severity - the number of collisions involving pedestrians resulting in fatal, major, minimal, minor injuries, all increased, with demonstrable and statistically significant upward linear trends in all cases.

a) There was an increase of 2.2% per year on the number of reported collisions per 1000 registered vehicles

b) There was an increase of 6.7% per year of pedestrian collisions resulting in fatal injuries,

c) There was an increase of 8.1 % per year of pedestrian collisions resulting in major injuries,

d) There was an increase of 11.2 % per year of pedestrian collisions resulting in minimal Injuries,

e) There was an increase of 10.2% per year of pedestrian collisions resulting in minor injuries.

Also, considering the 5-year average data for 2016-2020 compared to 2012-2016, the study reveals:

i. Pedestrian collisions resulting in fatal injuries increased by 25.0%,
ii. Pedestrian collisions resulting in major injuries increased by 25.0%,
iii. Collisions resulting in minimal injuries increased by 51.0% and
iv. Minor and unspecified injuries increased by 41.0% per year.

The increase in the number of pedestrian collisions resulting in fatal and major injuries deserves further attention.

## 3. Pedestrian Fatalities as a Proportion of Total Number of Fatal Collisions

**Table 3A. Pedestrian Fatalities as a Proportion of Total Number of Fatal Collisions**

| Sources | **Table1** 5-Years Rolling Average | **Table 1** 5-Years Rolling Average | **Table 3** 5-Years Rolling Average | Total Fatal Collisions |
|---|---|---|---|---|
| YEARS | Reported collisions per 1000 registered vehicles | Total Number of Fatal Collisions | Fatal Pedestrian Collision | Proportion Pedestrian Fatalities |
| 2012-16 | 16879.2 | 13.40 | 4.00 | 0.30 |
| 2013-17 | 17714.8 | 11.80 | 4.40 | 0.37 |
| 2014-18 | 18089.6 | 12.40 | 4.80 | 0.39 |
| 2015-19 | 18862.4 | 13.00 | 5.60 | 0.43 |
| 2016-20 | 18298.4 | 12.2 | 5.00 | 0.41 |

Readers are encouraged to look at Table 1, where the total number of fatal collisions over the 2012- 2020 period are equal to 110; while in Table 3, the total number of pedestrian fatalities are equal to 41; in this regard, the overall proportion pedestrian fatalities is equal to approximately 37%. The analysis suggests that well over one-third (1/3) of fatalities in Winnipeg over the entire period (2012- 2020) are pedestrians.

In our opinion, that is a high figure. This observation alone suggests a need for urgent consideration of pedestrian related safety counter-measures and the implementation of ***6E***s (*E*ngineering, ***E***nforcement, ***E***quity, *E*ducation, ***E***valuation, ***E***ngagement) in safety program initiatives.

Increasingly, street design, posted speeds, size and weight coupled with the deadly impact of vehicles are factors having an impact on the deadliness of the traffic collisions involving pedestrians.

## 4. Examining Number of Collisions by Severity and Road Location

**Table 3B. Total Number of Reported Collisions by Severity and Road Location (All Modes Travel)**

| | | ROAD LOCATION INTERSECTION | | | ROAD LOCATION NON-INTERSECTION | | | |
|---|---|---|---|---|---|---|---|---|
| YEAR | REGISTERED VEHICLES | TOTAL NUMBER FATAL COLLISIONS | TOTAL NUMBER COLLISIONS CAUSING INJURY | TOTAL NUMBER COLLISIONS CAUSING PROPERTY DAMAGE | TOTAL NUMBER FATAL COLLISIONS | TOTAL NUMBER COLLISIONS CAUSING INJURY | TOTAL NUMBER COLLISIONS CAUSING PROPERTY DAMAGE | TOTAL REPORTED COLLISIONS |
| 2012 | 503120 | 16 | 4395 | 10896 | 3 | 186 | 528 | 16024 |
| 2013 | 512472 | 7 | 4471 | 12144 | ) | 212 | 694 | 17528 |
| 2014 | 522005 | 9 | 4884 | 10990 | 1 | 188 | 616 | 16688 |
| 2015 | 527806 | 11 | 4875 | 10973 | 0 | 205 | 566 | 16630 |
| 2016 | 537801 | 17 | 5108 | 11549 | 1 | 231 | 638 | 17544 |
| 2017 | 546181 | 10 | 5213 | 13683 | 1 | 328 | 967 | 20202 |
| 2018 | 554106 | 12 | 5148 | 13248 | 0 | 233 | 763 | 19404 |
| 2019 | 558123 | 11 | 4915 | 14404 | 2 | 246 | 954 | 20532 |
| 2020 | 569098 | 7 | 3006 | 10059 | 1 | 129 | 609 | 13811 |
| | | | | | | | | |
| | | 100 | 42015 | 107946 | 9 | 1958 | 6335 | 158363 |

**5-YEARS ROLLING AVERAGE 2012-2020**

| | | ROAD LOCATION: INTERSECTION | | | ROAD LOCATION: NON-INTERSECTION | | |
|---|---|---|---|---|---|---|---|
| YEARS | REGISTERED VEHICLES | TOTAL NUMBER FATAL COLLISIONS | TOTAL NUMBER COLLISIONS CAUSING INJURY | TOTAL NUMBER COLLISIONS CAUSING PROPERTY DAMAGE | TOTAL NUMBER FATAL COLLISIONS | TOTAL NUMBER COLLISIONS CAUSING INJURY | TOTAL NUMBER COLLISIONS CAUSING PROPERTY DAMAGE |
| 2012-2016 | 520640.8 | 12.0 | 4746.6 | 11310.4 | 1.3 | 204.4 | 608.4 |
| 2013-2017 | 529253 | 10.8 | 4910.2 | 11867.8 | 0.8 | 232.8 | 696.2 |
| 2014-2018 | 537579.8 | 11.8 | 5045.6 | 12088.6 | 0.6 | 237.0 | 710.0 |
| 2015-2019 | 544803.4 | 12.2 | 5051.8 | 12771.4 | 0.8 | 248.6 | 777.6 |
| 2016-2020 | 553061.8 | 11.4 | 4678.0 | 12588.6 | 1.0 | 233.4 | 786.2 |
| | | | | | | | |
| **ANALYSIS** | | | | | | | |
| SLOPE | 8039.24 | N/A | N/A | 346 | N/A | 7.38 | 43.7 |
| INTERSECT | -15653962 | N/A | N/A | -684718.6 | N/A | -14632.1 | -87296.12 |
| r2 | 0.9991755 | * | * | 0.8778073 | * | ** | 0.9213143 |
| MEAN | 537067.76 | 11.6 | 4886.4 | 12125.4 | 0.9 | 231.2 | 715.7 |
| Avg% per Period | 1.50% | | | 2.85% | | 3.19% | 6.11% |
| % Increase over 5 periods | 6.23% | | | 11.30% | | 14.19% | 29.22% |

Source: Figure 2.11 Total number of reported collisions by severity and road location. (2012-2020). Public Works Department.

* r2 value very low, with F-statistic less than one showing no correlation

** In this case r2 = 0.52 and F-statistic only 3.2, with lower confidence of only 82%

Table 3B is a new table in the analysis. It was created to evaluate the severity level of the collision in relation to the location (Intersection or Non-Intersection) where the collision occurred. The rationale supporting this analysis comes from the fact that intersections –given their importance-in the transportation system as a point of confluence are regarded as the location with the most collision potential. In this case, the total numbers of collisions whether at the intersection or non-intersection shows a correlation with the collisions causing property damages.

The data reveals that:

a) There was an increase of 2.85% per year on the number of total (including pedestrians and bicyclist) collisions at the intersection causing property damage.

b) There was an increase of 3.19% per year on the number of the number of total collisions (including pedestrians and bicyclist) at the non-intersection causing injury

c) There was an increase of 6.11% per year of the number of the number of total collisions (including pedestrians and bicyclist) at the non-intersection causing property damage.

Also, considering the 5-year average data for 2016-2020 compared to 2012-2016, the study reveals:

a) An increase of 11.30% on the number of total collisions (including pedestrians and bicyclist) at the intersection causing property damage.

b) There was an increase of 14.19% on the number of the number of total collisions (including pedestrians and bicyclist) at the non-intersection causing injury

c) There was an increase of 29.22% on the number of total collisions (including pedestrians and bicyclist) at the non-intersection causing property damage.

Although three variables showed good correlations, non-motorized data (pedestrian and bicycle) data may require further analysis because it is lumped together with motorized data. This approach appears to obscure existing opportunities to further understand pedestrian mobility and inherent safety challenges including location and movement.

In addition, road safety issues affecting pedestrians are related to proximity to bus stops, school zones or when crossing multi-lane roads. The Traffic and Injury Foundation (TIRF) quoting a study by the Ontario Office of Chief Coroner (2012)[14] accounting for the circumstances that put pedestrians at risk, it mentions, among others:

- Pedestrian hit at a mid-block location while crossing
- Pedestrian hit at the sidewalks and/or shoulder of the road
- Vehicle was going straight through the intersection while the pedestrian crossed without the right of way

Unfortunately, some collisions involving pedestrians in Winnipeg account for those characteristics.

### 5. Identifying Reported Actions Taken by the Pedestrian Immediately Prior to Impact

As it is shown in Table 5., most pedestrians (42.3%) where involved in a collision *At Intersection crossing with right of way*. Unfortunately, *unknown* action by the pedestrian was reported for about 36.9% of the collisions involving a pedestrian.

[14] Robertson, Robyn D. Pedestrians What Do We know? Safety Road Issues. Traffic Injury Research Institute. https://tirf.ca/wp-content/uploads/2017/01/TIRF_Toolkit_Factsheets_Pedestrian-Issue.pdf

Table 5. Number of Pedestrians by Pedestrian Action by All Injury Type, 2012-2020

| | Reported Pedestrian Action | 2012 | | | 2013 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | TOTAL 2012-2020 | | | TOTAL 2012-2021 | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | | |
| 1 | At Intersection crossing with right of way | 0 | 34 | 34 | | 21 | 21 | 1 | 23 | 24 | 2 | 32 | 34 | | 38 | 39 | 2 | 48 | 50 | | 54 | 54 | 1 | 48 | 49 | | 30 | 30 | 6 | 328 | 334 | 334 | 42.3 |
| 2 | At Intersection crossing without right of way | | 5 | 5 | | 1 | 1 | | 3 | 3 | | 2 | 2 | | 3 | 3 | | 8 | 8 | | 5 | 5 | 3 | 3 | 6 | | 4 | 4 | 3 | 34 | 37 | 37 | 4.69 |
| 3 | At intersection crossing, no traffic control | | 3 | 3 | | 4 | 4 | | 1 | 1 | | 5 | 5 | | 2 | 2 | | 6 | 6 | | 4 | 4 | 1 | 4 | 5 | | 1 | 1 | 1 | 30 | 31 | 31 | 3.93 |
| 4 | Between intersections crossing roadway | | 6 | 6 | | 2 | 2 | | 4 | 4 | | 3 | 3 | | 9 | 9 | | 7 | 7 | 1 | 9 | 10 | | 13 | 13 | | 2 | 2 | 1 | 55 | 56 | 56 | 7.1 |
| 5 | Walking along roadway against traffic | | 1 | 1 | | | | 1 | | 1 | | | | | | | | | | | | | | | | | 0 | 1 | 1 | 2 | 2 | 0.25 |
| 6 | Walking Along roadway with traffic | | | | | | | | 2 | 2 | | | | | | | | | | | | | | | | | 0 | 0 | 2 | 2 | 2 | 0.25 |
| 7 | On sidewalk/median/safety zone | | 2 | 2 | | 2 | | | 2 | 2 | | 3 | 3 | | 2 | 2 | | 2 | 2 | | 7 | 7 | | 2 | 2 | 1 | 3 | 4 | 1 | 25 | 26 | 26 | 3.3 |
| 8 | Walking on roadway ( traveled portion) | | 2 | 2 | | | | | | | | | | | 1 | 1 | | 2 | 2 | | | | 1 | | 1 | | 0 | 1 | 5 | 6 | 6 | 0.76 |
| 9 | Coming from behind vehicle/object on roadside | | 1 | 1 | | | | | | | | 1 | 1 | 1 | | 1 | | 2 | 2 | | 2 | 2 | 1 | 1 | 1 | | 3 | 3 | 2 | 10 | 12 | 12 | 1.52 |
| 10 | Running into traffic | | 2 | 2 | | | | | | | 1 | | 1 | | 2 | 2 | 1 | 2 | 3 | | | | | 2 | 3 | 1 | | 1 | 3 | 8 | 11 | 11 | 1.39 |
| 11 | Getting on/off another Vehicle | | | | | | | | | | | 1 | 1 | | | | 1 | | 1 | | | | | | | | | 0 | 1 | 1 | 2 | 2 | 0.25 |
| 12 | Lying on Roadway | | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 | 1 | 1 | 1 | 0.13 |
| 13 | Unknown | 4 | 36 | 41 | 1 | 16 | 17 | 3 | 18 | 21 | 3 | 22 | 25 | 3 | 30 | 34 | 2 | 23 | 25 | 2 | 49 | 51 | 2 | 37 | 39 | 1 | 17 | 18 | 21 | 248 | 269 | 269 | 34.1 |
| | Total | 4 | 93 | 98 | 1 | 46 | 47 | 5 | 53 | 58 | 6 | 69 | 75 | 4 | 87 | 93 | 6 | 100 | 106 | 3 | 130 | 133 | 9 | 110 | 119 | 3 | 60 | 63 | 41 | 748 | 789 | 789 | 100 |

Source: Table 5.4 Annual Collision Reports (2012-2020). Public Works Department, City of Winnipeg.

Collisions involving pedestrians *At the Intersection crossing with right of way* deserve more attention. Intersections are the gathering places where all roadway users converge. Not all the intersections were created equal! There are various types of at-grade intersections. Each one responds to particular design functions such access and mobility.

Intersections are meant to provide a safe and convenient crossing for pedestrians. From 2012 to 2020 about 42.3% of reported fatal and severe injuries combined involved pedestrians *At the Intersection crossing with right of way.*

Table: Selected Intersection with 10 to 17 collision counts shows a historical pattern of collisions for a number of intersections begging for technical counter-measures and roadway enhancements to improve pedestrian safety.

Table: Selected Intersections with 10 to 17 Collision Counts Involving Pedestrians (2012-2020)

| Street 1 | Street 2 | Crash Count | Total Pedestrians Injured |
|---|---|---|---|
| Donald St | Ellice Ave | 17 | 17 |
| Marion St | Tache Ave | 16 | 17 |
| Dalhousie Dr | Pembina Hwy | 15 | 16 |
| Osborne St | River Ave | 15 | 16 |
| Morley Ave | Osborne St | 12 | 11 |
| Arlington St | Notre Dame Ave | 12 | 12 |
| Leila Ave | McPhillips St | 11 | 10 |
| Balmoral St | Sargent Ave | 11 | 12 |
| Portage Ave | Valour Rd | 11 | 11 |
| Arlington St | Portage Ave | 10 | 9 |
| Broadway | Donald St | 10 | 10 |
| Portage Ave | Vaughan St | 10 | 10 |
| | | | |

Source: Manitoba Public Insurance (MPI), 2022

However, more concerning is the observation that about 34.1% of pedestrian actions were reported as *Unknown*; thus, accounting for the second highest number of pedestrian involvement. In this regard pedestrian actions most likely resulting in 21 fatalities plus 248 all injuries (269) were recorded as "*unknown*."

There could be many *unknown* reasons. For instance, hits and runs collisions or unidentified vehicle could be part of the actions reported as unknown. However, the rationale supporting some roadway and pedestrian safety initiatives derives in part from collision information gathered through the Traffic Accident Reports (TAR).

The lack of information on collisions involving pedestrians deprives interested parties from knowing more about the traffic characteristics of the location (*intersection or mid-block*), driver behaviour, whether the collision was a '*hit and run*,' historical frequency of collisions at a given location and other important elements required to provide a rational for safety programs, develop counter-measure initiatives and to improve pedestrian safety.

## 6. Number of Pedestrians by Action by Age, (2012-2020)

**Table 6. Summary Number of Pedestrians by Pedestrian Action by Age, 2012-2020 (All Injuries)**

| ACTION | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGE PEDESTRIAN | At Intersection crossing with right of way | At Intersection crossing without right of way | At Intersection Crossing, No Traffic Control | Between Intersections Crossing Roadway | Walking along roadway against traffic | Walking Along roadway with traffic | On sidewalk/median/safety zone | Walking on Roadway(Traveled Portion) | Coming from Behind Vehicle/Object on Roadside | Running Into Roadway | Getting On/Off Another Vehicle | Lying on Roadway | Unknown | TOTAL | Percent Participation |
| 1-4 | 4 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 3 | 11 | 1.4 |
| 5-9 | 1 | 3 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 14 | 1.8 |
| 10-14 | 10 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 26 | 3.3 |
| 15-19 | 21 | 7 | 2 | 6 | 0 | 0 | 3 | 0 | 1 | 2 | 0 | 0 | 22 | 64 | 8.1 |
| 20-24 | 42 | 4 | 1 | 9 | 1 | 0 | 5 | 3 | 0 | 2 | 0 | 0 | 33 | 100 | 12.6 |
| 25-29 | 35 | 1 | 2 | 6 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 27 | 73 | 9.2 |
| 30-34 | 22 | 5 | 3 | 3 | 0 | 1 | 2 | 0 | 2 | 1 | 0 | 0 | 18 | 57 | 7.2 |
| 35-39 | 37 | 2 | 3 | 5 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 0 | 14 | 66 | 8.3 |
| 40-44 | 19 | 1 | 2 | 3 | 0 | 0 | 3 | 1 | 0 | 1 | 0 | 0 | 17 | 47 | 5.9 |
| 45-49 | 22 | 1 | 1 | 5 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 0 | 16 | 50 | 6.3 |
| 50-54 | 34 | 3 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 22 | 65 | 8.2 |
| 55-59 | 22 | 2 | 5 | 3 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 1 | 15 | 53 | 6.7 |
| 60-64 | 23 | 1 | 2 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 12 | 41 | 5.2 |
| 65-69 | 15 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 31 | 3.9 |
| 70-74 | 15 | 1 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 15 | 37 | 4.7 |
| 75+ | 8 | 1 | 0 | 3 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 18 | 32 | 4.0 |
| Unknown | 5 | 1 | 1 | 3 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 9 | 24 | 3.0 |
| TOTAL | 335 | 37 | 31 | 56 | 2 | 2 | 26 | 6 | 11 | 12 | 2 | 2 | 271 | 791 | 100.0 |

Source: Figure 5.4 Number of Pedestrians by Pedestrian Action and Age. Annual Collision Report. Public Works Department

According to the pedestrian action by age, approximately 791 pedestrians were involved in all collision related events in 2012-2020. (41) Pedestrians were involved in fatal collisions; and about 750 suffered major, minimal and reported minor injuries combined in Winnipeg.

However, when considering the reported pedestrian action immediately prior to the collision by age, the most frequent type of collision happened at:

- At Intersection crossing with right of way.

This action was performed by 335 pedestrians from 2012-2020. Those performing this action were pedestrians predominantly in the age groups ranging from: 15-19 (8.1%), 20-24 (12.6%) and 25-29 (9.2%). Pedestrians in those groups account for about 30.0% of all fatalities and severe injuries.

City of Winnipeg Community Area Profiles (2016) reveals that about 4.9% of Winnipeggers 15 years and over employed in the labour force commute to work by walking.

Those commuting to work in equal or greater numbers than the total percent for the city are productive community members that for many reasons have chosen walking as their preferred mode of transportation. They count on the presence of a barrier-free access to the pedestrian

infrastructure including sidewalks, walkways, curb ramps, crosswalks, and pedestrian Islands/medians, transit stops/shelters, and trail systems.

A closer look at the 2020 data reveals that four pedestrians were injured '*on the Sidewalk/Median/Safety Zone'*. Regretfully, snow-obstructed or poorly maintained sidewalks and pedestrian facilities negatively affect safety, accessibility, and mobility for many residents around the city.

Another safety and equity concern is the proliferation of incomplete reports where pedestrian actions immediately prior to the collision by age, are reported as *Unknown*.

Incomplete Traffic Accident Reports (TAR) do have data collection, data analysis and policy implications. "*Unknowns*" whether pedestrian age or action or location may distort the tally of the frequency of certain collisions and could prevent agencies from understanding basic characteristics associated with fatal and injury causing types of collisions.

Historically, collision analysis heavily relies on important characteristics of the location such as (intersection, non-intersection, mid-block, frequency, and severity), the availability of accurate and complete data describing those collisions is essential.

Table B: 10 to 41 Pedestrians Injured--- Sample Incomplete Location of Collisions, 2012-2020

| Street 1 | Street 2 | Non-Intersection | Crash Count | Total Pedestrian Fatalities | Total Pedestrians Injured |
|---|---|---|---|---|---|
| Main St | | N | 41 | 0 | 41 |
| Portage Ave | | N | 37 | 1 | 37 |
| Pembina Hwy | | N | 35 | 0 | 36 |
| Henderson Hwy | | N | 26 | 2 | 24 |
| Regent Ave E | | N | 21 | 0 | 21 |
| St James St | | N | 19 | 0 | 20 |
| Notre Dame Ave | | N | 18 | 0 | 18 |
| Osborne St | | N | 18 | 0 | 18 |
| Ellice Ave | | N | 17 | 1 | 16 |
| McPhillips St | | N | 15 | 1 | 15 |
| St Mary's Rd | | N | 15 | 1 | 15 |
| William Ave | | N | 14 | 1 | 13 |
| Kenaston Blvd | | N | 13 | 0 | 14 |
| Marion St | | N | 13 | 2 | 11 |
| Regent Ave W | | N | 13 | 0 | 14 |
| Sherbrook St | | N | 11 | 0 | 11 |
| St Anne's Rd | | N | 10 | 0 | 10 |
| Grant Ave | | N | 9 | 0 | 10 |
| Leila Ave | | N | 9 | 0 | 10 |
| Logan Ave | | N | 9 | 1 | 8 |
| Selkirk Ave | | N | 9 | 0 | 10 |
| | | | | **10** | **372** |

Source: Manitoba Public Insurance (MPI), 2022

Table: 10 to 40 Pedestrians Injured--- Sample Incomplete Location of Collisions, 2012-2020, shown above, illustrates a number of pedestrian injuries where the location is not clearly stated.

It is regrettable that despite many concerted efforts by the Province of Manitoba and of the local agencies responsible for gathering collision data; unfortunately, pedestrians are still being either killed or severely injured; yet, neither the location; nor the roadway characteristics are known.

As the City embarks on the execution the Winnipeg Road Safety Strategic Action Plan, adopted by Council (July, 2022), the implementation of the Recommendation 04 *'improve quality of safety data,'* Recommendation R18 *'Conduct safety and equity analysis'* and related recommendations to improve safety culture become imperative.

## 7. Motorized Vehicles Colliding with Pedestrians by Driver's Maneuver, 2012-2020

**Table 7. Number of Motorized Vehicles Colliding with Pedestrians by Maneuver and Type of Injury, 2012-2020**

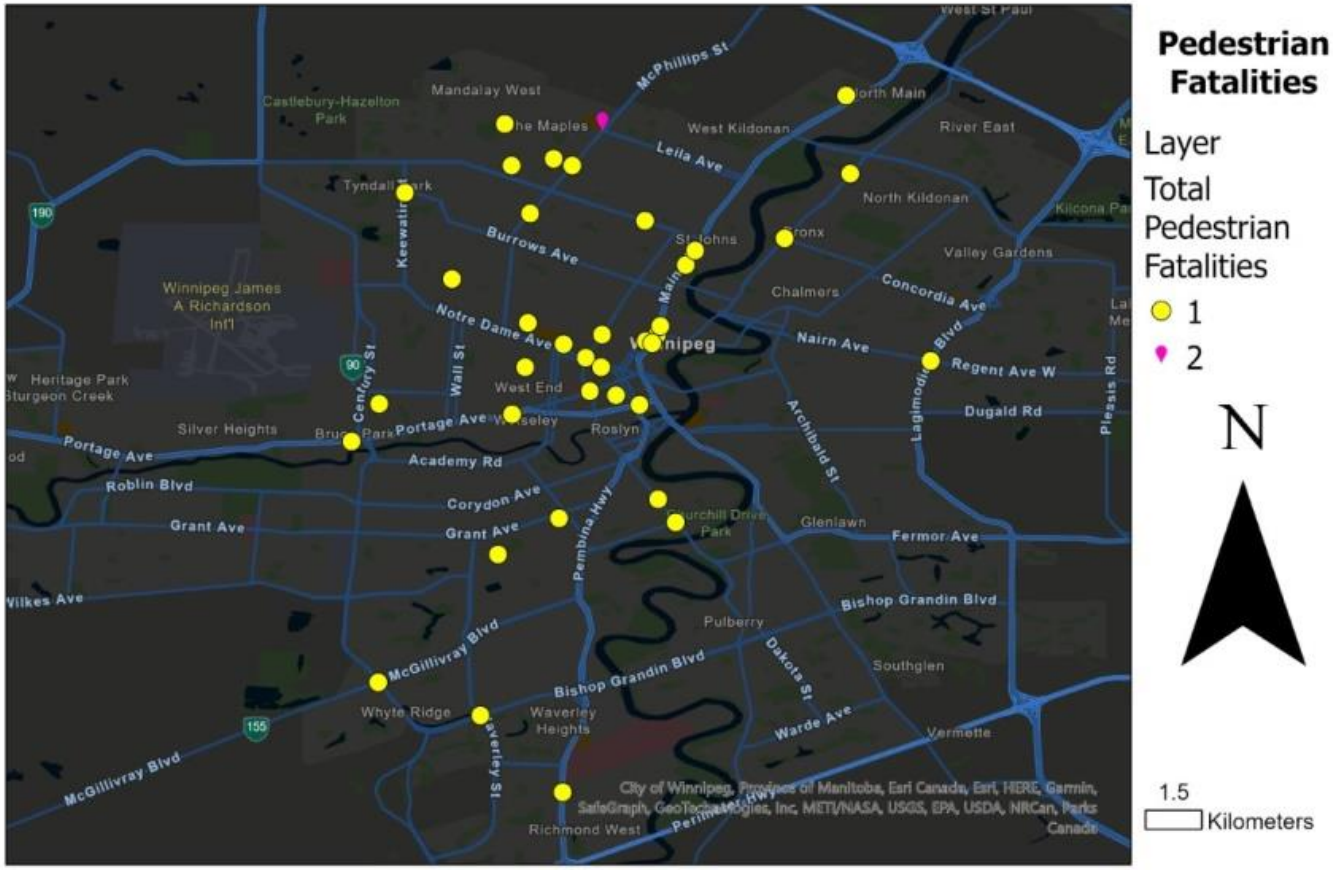
| | Reported Motorized Vehicle Driver | 2012 | | | 2013 | | | 2014 | | | 2015 | | | 2016 | | | 2017 | | | 2018 | | | 2019 | | | 2020 | | | TOTAL | Percent Participation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | Fatal | Injury | Total | | |
| 1 | Changing Lanes to the Left | | | | | | 1 | | | | | | | | | | | | | | | 1 | | | | | 1 | 1 | 3 | 0.4 |
| 2 | Changing Lanes to the Right | | | | | | | | | 1 | | | | | | | | | | | | 2 | | | | | | | 3 | 0.4 |
| 3 | Going Straight Ahead | | | 19 | | 1 | 6 | | | 9 | | 2 | 12 | | 2 | 27 | | 4 | 33 | | 1 | 32 | | 4 | 35 | | 1 | 14 | 187 | 24.0 |
| 4 | Overtaking | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | | 1 | 0.1 |
| 5 | Merging | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | 1 | 0.1 |
| 6 | Parked Legally | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0.0 |
| 7 | Reversing | | | | | | 1 | | | 2 | | | 1 | | | | | | 1 | | | 3 | | | 2 | | | | 10 | 1.3 |
| 8 | Making a U-Turn | | | | | | | | | | | | | | | 1 | | | 1 | | | | | | | | | | 2 | 0.3 |
| 9 | Slowing/Stopping in Traffic | | 1 | 2 | | 1 | 2 | | | 2 | | | 1 | | | | | | 2 | | | 1 | | | 4 | | | 3 | 17 | 2.2 |
| 10 | Starting in Traffic | | | 1 | | | | | | 1 | | | 1 | | | 1 | | 1 | 2 | | | 1 | | | 1 | | | 2 | 10 | 1.3 |
| 11 | Starting from Parked position/Leaving | | | | | | | | | | | | 1 | | | 1 | | | | | | 2 | | | | | | | 4 | 0.5 |
| 12 | Stopped in Traffic | | | | | | | | | 1 | | | | | | 1 | | 1 | 3 | | | | | | | | | | 5 | 0.6 |
| 13 | Swerving | | | 1 | | | | | | | | | | | | 1 | | | | | | | | | | | | 1 | 3 | 0.4 |
| 14 | Turning Left | | | 13 | | | 6 | | 1 | 10 | | 3 | 16 | | | 16 | | | 24 | | | 34 | | 2 | 22 | | 1 | 10 | 151 | 19.4 |
| 15 | Turning Right | | 1 | 5 | | | 3 | | | 2 | | | 3 | | | 7 | | 1 | 15 | | 3 | 20 | | | 8 | | | 6 | 69 | 8.9 |
| 16 | Unknown | | | 55 | | | 28 | | | 28 | | | 36 | | 1 | 38 | | 1 | 23 | | | 37 | | | 42 | | | 26 | 313 | 40.2 |
| | Total | | 2 | 96 | | 2 | 47 | | 1 | 56 | | 5 | 72 | 0 | 3 | 93 | 0 | 8 | 104 | 0 | 4 | 133 | | 6 | 115 | | 3 | 63 | 779 | 100.0 |

Source: Figure 5.3 Number of Motorized Vehicles Colliding with Pedestrians by Maneuver and Age of Vehicle Drivers (2012-2020). Public Works Department, City of Winnipeg.

It is observed that most pedestrians are involved in collisions with motorized vehicles when the driver is *'Going Straight Ahead*.' (24.0%). Please notice that Table 6., indicates that when considering the reported pedestrian action immediately prior to the collision by age, the most frequent type of collision happened at '*At Intersection crossing with right of way*.'

Once again, the issue of Incomplete Traffic Accident Reports (*TAR*s) comes to our attention as about 40.2% of the actions taken by the driver immediately prior to the collision were reported as *Unknown*.

This is a pressing issue. For instance, according to collision data from 2012 to 2020 about 25 out of 64 pedestrian fatalities and about 819 out of about 2641 pedestrians injured in collisions cannot be visualized in Pedestrian Injuries Maps because key location information is not available. For instance, the Total Pedestrian Fatalities by Intersection, 2012-2020 does not account for about 25 fatalities occurred during the period.




Total Pedestrian Fatalities by Intersections, 2012-2020
Data Courtesy: Manitoba Public Insurance, March 2023
Map: Jairo Viafara, AICP April 2023

8. Number of Motorized Vehicles Colliding with Pedestrians by Driver's Maneuvers by Age of Driver, (2012-2020)

**Table 8. Number of Motorized Vehicles Colliding with Pedestrians by Maneuver and Age of Vehicle Drivers, 2012-2020**

| | M | A | N | E | U | V | E | R | S | T | U | V | W | X | Z | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maneuver | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | |
| Age Motorist | Changing Lanes to the Left | Changing Lanes to the Right | Going Straigth Ahead | Overtaking | Merging | Parked--Legally | Reversing | Making a U-Turn | Slowing/Stopping in Traffic | Starting in Traffic | Starting from Parked position/Leaving | Stopped in Traffic | Swerving | Turning Left | Turning Right | Unknown | TOTAL | |
| 1-4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | **0** |
| 5-9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | **0** |
| 10-14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | **4** | **0.51** |
| 15-19 | 0 | 0 | 24 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 14 | 6 | 17 | **64** | **8.21** |
| 20-24 | 2 | 0 | 19 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 13 | 5 | 11 | **52** | **6.67** |
| 25-29 | 0 | 1 | 19 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 10 | 12 | 2 | **47** | **6.03** |
| 30-34 | 1 | 0 | 17 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 7 | 6 | **46** | **5.9** |
| 35-39 | 0 | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 8 | 6 | 6 | **35** | **4.49** |
| 40-44 | 0 | 0 | 8 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 2 | 0 | 12 | 5 | 3 | **32** | **4.1** |
| 45-49 | 0 | 1 | 14 | 0 | 0 | 0 | 1 | 0 | 5 | 1 | 1 | 0 | 0 | 15 | 3 | 6 | **47** | **6.03** |
| 50-54 | 0 | 1 | 10 | 0 | 0 | 0 | 1 | 0 | 3 | 2 | 0 | 1 | 1 | 15 | 6 | 8 | **49** | **6.28** |
| 55-59 | 0 | 0 | 21 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 15 | 4 | 2 | **46** | **5.9** |
| 60-64 | 0 | 0 | 17 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 11 | 6 | 7 | **46** | **5.9** |
| 65-69 | 0 | 0 | 9 | 1 | 0 | 0 | 3 | 0 | 1 | 1 | 1 | 0 | 1 | 9 | 1 | 0 | **27** | **3.46** |
| 70-74 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 3 | 4 | **19** | **2.44** |
| 75+ | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 7 | 5 | 3 | **26** | **3.33** |
| Unknown | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 241 | **245** | **31.4** |
| SUMMARY | **3** | **3** | **187** | **1** | **1** | **0** | **11** | **1** | 18 | 10 | **3** | **5** | **3** | **151** | **69** | **319** | **780** | **100** |
| Percent Participation | **0.4** | **0.4** | **26.1** | **0.1** | **0.1** | **0.0** | **1.5** | **0.1** | **2.5** | **1.4** | **0.4** | **0.7** | **0.4** | **21.1** | **9.6** | **44.6** | | |

Source: Figure 5.3 Number of Motorized Vehicles Colliding with Pedestrians by Age of Vehicle Drivers (2012-2020)

*Going Straight Ahead*: This maneuver was reported for 187 drivers. Those reported were drivers in the 15-19 (24), 20-24 (19), 25-29 (19) and 30-34 (17) age groups. These four age groups account for about 42.2% or 73 of the 187 drivers performing this action.

*Turning Left*: This maneuver was reported for 151 drivers. Those reported were mainly drivers in the 25-29 to 55-59 age groups which accounted for about 29.8% of reported actions.

According to the information available, it is difficult to discern whether the location was signalized and the sort of traffic controls-if any- available at the intersection. Left turning movements are difficult to accommodate. They cause a high number of traffic collisions, and require heightened attention and driver's skills.

## 9. Total Pedestrian and Bicycle (Non-Motorized) Number of Collision Victims by Injury, Type and Mode of Travel

| Table 15 . Total Number of Non-Motorized Collision Victims by Injury Type and Mode of Travel, 2012-2019 | | | | | | | 5-YEARS ROLLING AVERAGE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pedestrians Injuries by Severity 2012-2020 | | Bicyclists Injuries by Severity 2012-2020 | | | | | Pedestrians Injuries by Severity 2012-2020 | | Bicicylist Injuries by Severity 2012-2020 | | Total Non-Motorized (Pedestrians + Bicyclists) |
| YEAR | Reported collisions per 1000 registered vehicles | Fatal | All Injuries | Fatal | All Injuries | Total (Fatal+All Injuries) | YEARS | Reported collisions per 1000 registered vehicles | Fatal | All Injuries | Fatal | All Injuries | Total (Fatal+All Injuries) |
| 2012 | 16024 | 4 | 93 | 4 | 45 | 146 | 2012-16 | 16879.2 | 4 | 69.60 | 2.20 | 50.20 | 126.00 |
| 2013 | 17530 | 1 | 46 | 1 | 48 | 96 | 2013-17 | 17714.8 | 4.4 | 71.00 | 1.40 | 58.00 | 134.80 |
| 2014 | 16668 | 5 | 53 | 3 | 56 | 117 | 2014-18 | 18089.6 | 4.8 | 87.80 | 1.40 | 65.40 | 159.40 |
| 2015 | 16630 | 6 | 69 | 0 | 30 | 105 | 2015-19 | 18862.4 | 5.6 | 99.20 | 1.00 | 66.80 | 172.60 |
| 2016 | 17544 | 4 | 87 | 3 | 72 | 166 | 2016-20 | 18298.4 | 5.0 | 97.4 | 1.2 | 70.8 | 174.40 |
| 2017 | 20202 | 6 | 100 | 0 | 84 | 190 | | | | | | | |
| 2018 | 19404 | 3 | 130 | 1 | 85 | 219 | ANALYSIS | | | | | | |
| 2019 | 20532 | 9 | 110 | 1 | 63 | 183 | SLOPE | 398.6 | 0.3 | 8.4 | -0.2 | 5.0 | 13.5 |
| 2020 | 13810 | 3 | 60 | 1 | 50 | 114 | INTERCEPT | -784811.5 | -639.7 | -16792.3 | 484.8 | -10007.8 | -26955.0 |
| | | | | | | | r2 | 0.73 | 0.70 | 0.88 | 0.69 | 0.94 | 0.93 |
| Total | 158344 | 41 | 748 | 14 | 533 | 1336 | MEAN | 17968.9 | 4.8 | 85.0 | 1.4 | 62.2 | 153.4 |
| | | | | | | | Avg % per Period | 9.9% | 6.7% | 9.9% | -16.7% | 8.0% | 8.8% |
| | | | | | | | % Increase over 5 periods | 8.4% | 25.0% | 39.9% | -45.5% | 41.0% | 38.4% |

Source: Fgure 3.3 Total number of collision victims by injury type and mode of travel--Annual Collision Reports (2012-2019), Public Works Department, City of Winnipeg.

The 5-years rolling average trend analysis reveals that –according to their severity - the number of collisions involving pedestrians and bicyclist resulting in all injuries reveal that:

Pedestrians

a) There was an increase of 6.7% per year of pedestrian collisions resulting in fatal injuries,
b) There was an increase of 9.9% per year of pedestrian collisions resulting in all injuries,

Bicyclists

- There was a decrease of -16.7% per year of bicyclist collisions resulting in fatal injuries,
- There was an increase of 8.0% per year of bicyclist collisions resulting in all injuries.

Also, considering 2016-2020 compared to 2012-2016, the study reveals that:

- Pedestrian collisions resulting in fatal injuries increased by 25.0%,
- Pedestrian collisions resulting in all and unspecified injuries increased by 39.9%,
- Bicyclist collisions resulting in fatal injuries decreased by -45.5%, and
- Bicyclist collisions resulting in all and unspecified injuries increased by 41.0%.

Bicycle related fatalities have experienced a -16.7% drastic annual decrease from 2012 to 2020. However, considering 2016-2020 compared to 2012-2016, the study reveals that all bicycle related injuries increased by 41. % annually over the five periods.

The data analysis for Non-Motorized Transportation Total (*Fatal +All Injuries*), indicates that there was an increase of 8.8% per year of Non-Motorized (*Fatal +All Injuries: Bicycle and Pedestrian*) collisions resulting in fatal injuries,

Also, considering 2016-2020 compared to 2012-2016, the study reveals that:

- Non-Motorized total collisions resulting in *fatal+all injuries* increased by 38.4%.

For instance; death, severe injuries and disabilities whether permanent or temporary, hospitalization cost, direct and indirect health and economic costs, all these factors place a heavy burden in administrative agencies responsible for road safety, health and driver and vehicle insurance in our communities. The nature of motor-vehicle collisions resulting in fatalities and severe pedestrian and bicyclist injuries exacts a heavy toll in, and disrupts community order.

## VIII. CONCLUSIONS

Regrettably, in Winnipeg, fatal traffic collisions involving pedestrians are on the rise. As pedestrian fatalities increase, pedestrian safety deteriorates and their mobility is compromised.

Under these conditions, pedestrians greatly appreciate a network that affords them the shortest possible route, while featuring continuity, safe street crossings, visual interest, personal safety and security.

It is our belief that the City of Winnipeg has the policy guidance and the human, technical and financial resources available to make these goals a reality. Safety related engineering improvements are in place in the City of Winnipeg to strengthen road safety, and to advance key strategic goals stated in relevant documents providing directions to ensure access, comfort, and safety for non-motorized users of the transportation network.