PEDESTRIAN CRASH ANALYSIS

2005

TRANSPORTATION DIVISION
STUDIES GROUP

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INTRODUCTION

The **2005 PEDESTRIAN CRASH ANALYSIS** is a statistical review of the 109 pedestrian crashes and 116 related injuries that occurred on the City of Mesa streets in 2005. It focuses on crashes involving pedestrians identified in the 2005 Police Accident Reports (PARs) investigated and reported by the City of Mesa Police Department. Crashes occurring on the Superstition Freeway (US 60), the Price Freeway (Loop 101) and the Red Mountain Freeway (Loop 202) which are under the jurisdiction of the Arizona Department of Public Safety, were not included in the analysis.

The database used to prepare this report was compiled and maintained by the Traffic Records Section of the Arizona Department of Transportation. Definitions and terms were extracted from the Arizona Traffic Accident Report Instruction Manual and Glossary, 7th Edition, dated December 2000.

The purpose of analyzing pedestrian traffic crashes is to better understand the underlying causes of conflicts between pedestrians and automobiles. Analysis of the crashes reveals facts about the types of streets where accidents happened, behavior of pedestrians and motorists that caused the accidents, the times of day and year accidents occur, and age and sex of pedestrians involved in pedestrian/motor vehicle crashes. Once an understanding of the root causes of pedestrian crashes is gained, the Transportation Division can do further analysis to determine if the traffic environment in the City of Mesa can be made safer for pedestrians. Analysis of pedestrian crashes also helps in developing appropriate messages for educating the public on safer walking habits and how pedestrians and motorists can best share the streets in the City of Mesa.

Questions or comments concerning this report should be directed to City of Mesa, Transportation Division, P.O. Box 1466, Mesa, Arizona, 85211-1466, (480) 644-2160.

EXECUTIVE SUMMARY

An analysis of the pedestrian crashes in 2005 did not identify any significant changes in the trends from 2004 in the City of Mesa; although, the number of pedestrian fatalities increased by 183.3%.

With a decrease in the total number of fatalities in 2005, the five-year trend now reflects a decrease in the normalized crash frequency which is a reversal from 2004.

When the data is normalized, the 15 - 19 year old group had the highest over-representation in crashes for all age groups.

The average age of pedestrians involved in crashes was 31.3 and the median age was 24.5 which was a slight increase from 2004.

Motorists' failure to observe pedestrians in crosswalks while executing right or left turns or motorists' failure to observe pedestrians on sidewalks while exiting private driveways comprised 38.5% of all pedestrian/motor vehicle crashes.

Pedestrians' failure to observe the motor vehicle comprised 49.5% of all pedestrian related crashes which was an increase from 2004.

Pedestrians attempting to cross midblock accounted for 33.0% of all pedestrian crashes.

Pedestrian conveyances (skateboards, scooters, go-peds, etc.) accounted for 14.7% of all pedestrian crashes.

Pedestrian crashes occurring within a 2-1/2 mile radius of downtown Mesa accounted for 49.5% of all pedestrian crashes which was a decrease from 2004.

Alcohol/drugs was a contributing factor in 9.2% of all pedestrian crashes which was a decrease from 2004. Of these, 60.0% of the pedestrians were under the influence.

DEFINITIONS

Head-On. A collision involving vehicles traveling in opposite directions wherein at least one of the vehicles crosses the roadway centerline.

Intersection Related Accident. A traffic accident where the first harmful event (1) occurs on an approach to, movement through or exit from an intersection and (2) has resulted from an activity, behavior, or control related to the intersection.

Left-Turn. A traffic accident that occurs when a left-turning vehicle collides with a through vehicle on the opposite approach of the left-turning vehicle.

Pedestrian. Any person who is not an occupant or driver of a motor vehicle or other road vehicle. Includes: person walking, sitting, lying, working or operating a pedestrian conveyance.

Pedestrian Conveyance. Human powered device, other than pedaling, by which a pedestrian may move himself or other pedestrians. Includes, but not limited to: baby carriage, child's wagon, roller skates, sleds, push carts, non-motorized wheel chairs, scooters, skateboards, etc.

Possible Injury. Any injury reported or claimed which is not a fatal, incapacitating, or non-incapacitating evident injury. Includes such situations as nausea, hysteria, complaint of pain, and injuries not evident.

Rear-End. A collision with the rear of another vehicle, either moving or stopped (excluding parked vehicles).

Sideswipe, Same Direction. A collision with another vehicle or bicyclist traveling in the same direction.

Traffic Unit. A traffic unit is a vehicle, pedestrian, pedalcyclist, or rider on an animal involved in a motor vehicle traffic accident. It is **preferred** that police jurisdictions assign traffic **unit number 1** to the vehicle, pedestrian, pedalcyclist, or animal rider causing the collision, however, this procedure is not mandatory.

Unit Action. The action at the moment of and/or which most directly affected the accident.

PEDESTRIAN CRASH RATE

In 2005, the total number of pedestrian crashes decreased to their lowest level in the past five years as the total number of motor vehicle crashes remained relatively constant. The percentage of pedestrian crashes to total motor vehicle crashes also decreased from 2004. However, the number of fatal pedestrian crashes increased by 183.3%. When the number of crashes is normalized by looking at how many pedestrian crashes occur per every 1,000 people in Mesa's population in a given year (Chart 2), the crash rate declined while the fatality rate increased. Normalization puts into perspective an increase or decrease in the number of pedestrian crashes when there is a concurrent rise in the number of drivers, pedestrians and automobiles due to population growth (and a consequent increase in opportunities for pedestrian/motor vehicle conflicts). When a linear trendline is added to the normalized 5-year crash chart (Chart 3), a decreasing trend is seen. This is a change from 2004 when it was increasing. A linear trendline usually shows an occurrence that is increasing or decreasing at a steady rate.

TABLE 1: PEDESTRIAN CRASH RATE - FIVE YEAR TREND

YEAR	PEDESTRIAN CRASHES	FATAL PEDESTRIAN CRASHES	TOTAL CRASHES	PEDESTRIAN CRASHES AS PERCENT OF TOTAL	PEDESTRIAN CRASHES PER 1,000 POPULATION	PEDESTRIAN FATALITIES PER 100,000 POPULATION	ESTIMATED POPULATION
2001	112	8	9,928	1.1%	0.26	1.87	428,883
2002	122	3	9,155	1.3%	0.28	0.68	438,181
2003	116	1	8,520	1.4%	0.26	0.23	440,404
2004	126	6	9,184	1.4%	0.28	1.34	449,017
2005	109	17	9,205	1.2%	0.24	3.75	452,856

CHART 1: TOTAL NUMBER OF PEDESTRIAN CRASHES

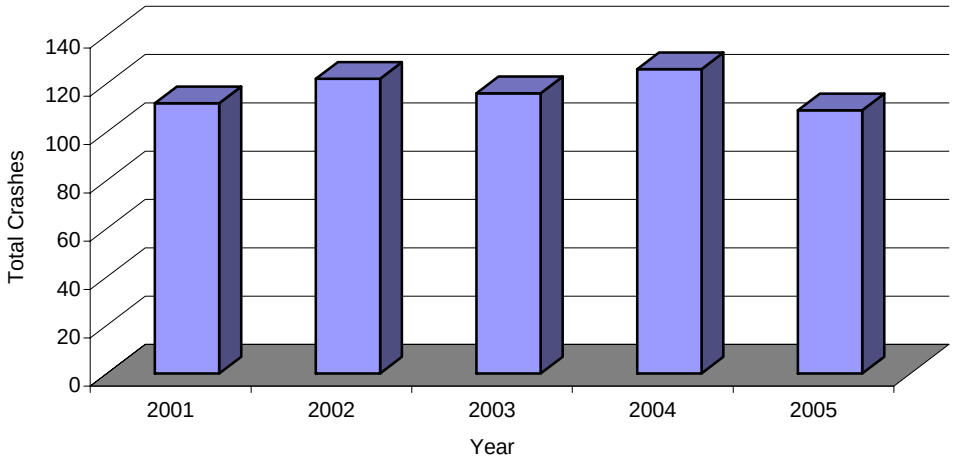


CHART 2: PEDESTRIAN CRASHES NORMALIZED

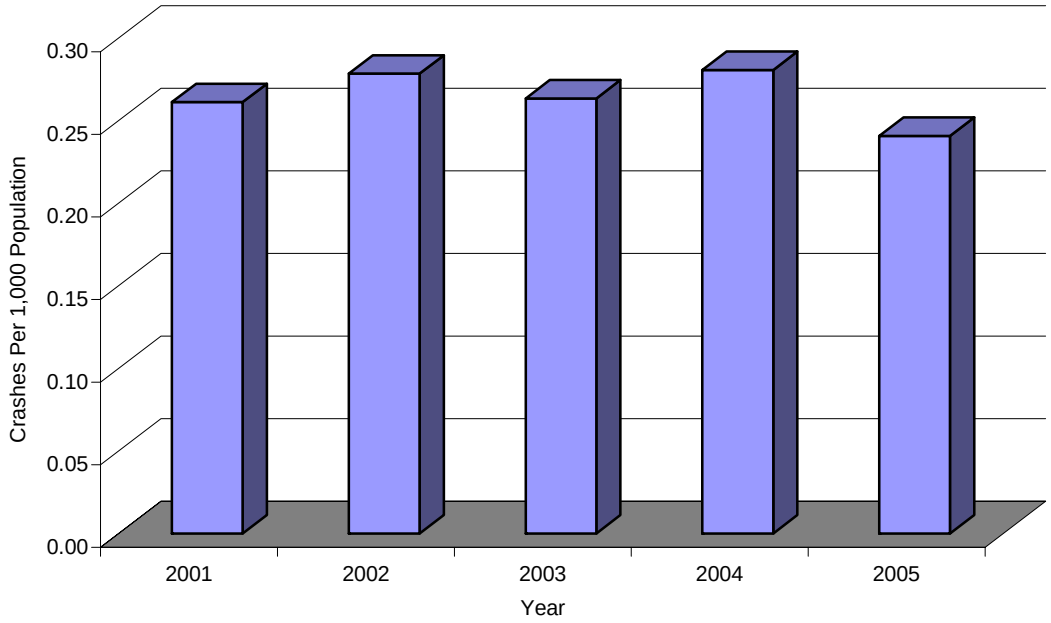
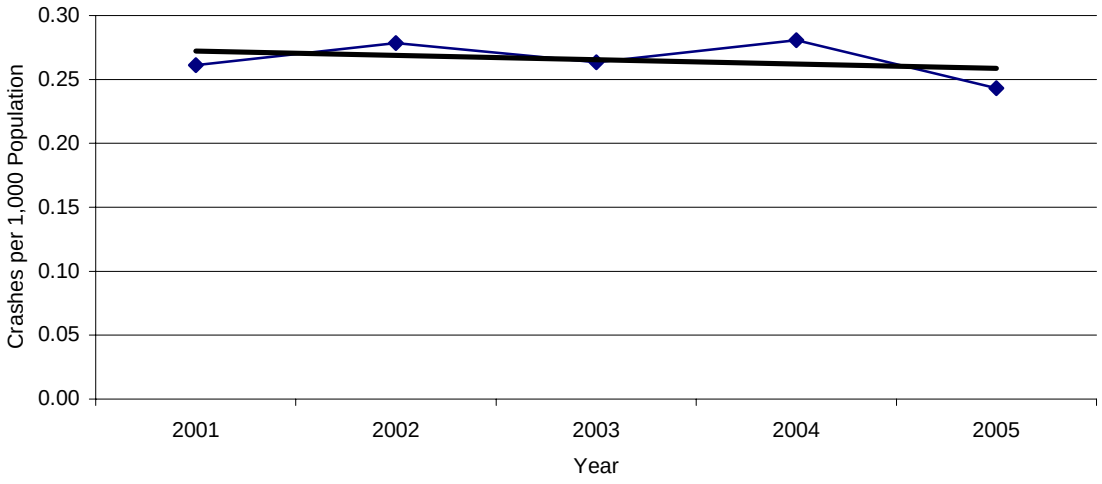


CHART 3: PEDESTRIAN CRASHES NORMALIZED: 5-YEAR TREND



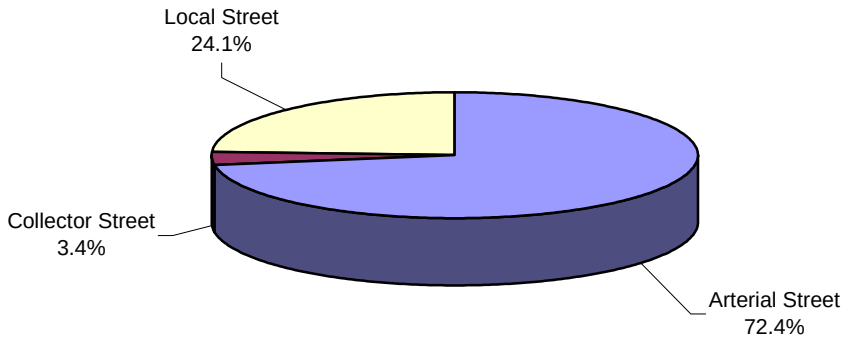
STREET CLASSIFICATION

Of the 58 mid-block crashes, 75.8% occurred on arterial or collector streets. Arterial streets are roadways that often extend across city boundaries, carry large volumes of traffic, and may have limited access to properties along the roadway. Country Club Drive and Southern Avenue are examples of arterial streets. Collector streets typically funnel traffic from local streets. Examples of collector streets are Longmore, Alta Mesa and 8th Street. The remainder of pedestrian crashes occurred on local streets. Local streets are low volume streets in residential and commercial areas. Because of higher speeds associated with arterial and collector roadways, the potential for more severe injuries exists.

TABLE 2: MIDBLOCK PEDESTRIAN CRASHES BY TYPE OF ROADWAY

TYPE OF ROADWAY	NUMBER OF CRASHES	PERCENT OF MIDBLOCK
Arterial Street	42	72.4%
Collector Street	2	3.4%
Local Street	14	24.1%
TOTAL	**58**	**100.0%**

CHART 4: MIDBLOCK PEDESTRIAN CRASHES BY TYPE OF ROADWAY



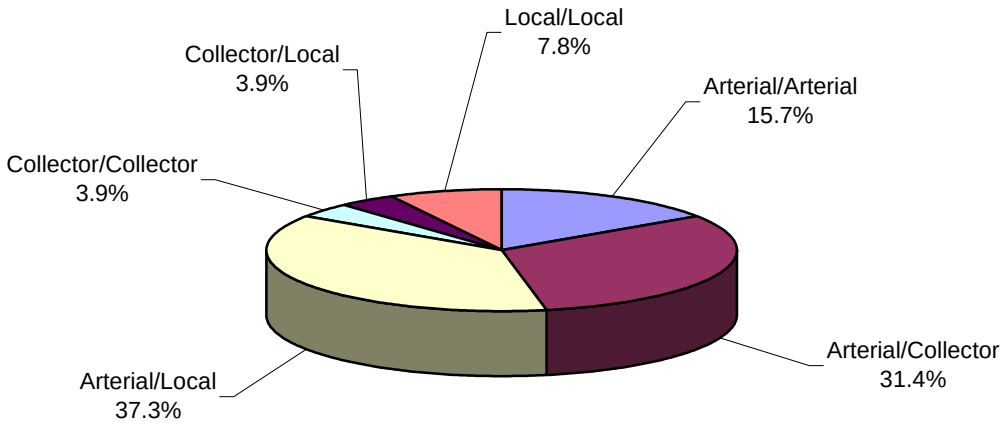
INTERSECTION CLASSIFICATION

Of the 51 intersection related crashes, 92.2% occurred at intersections having one approach classified as either an arterial or collector street.

TABLE 3: TYPE OF INTERSECTION

TYPE OF INTERSECTION	NUMBER OF CRASHES	PERCENT OF INTERSECTION CRASHES
Arterial/Arterial	8	15.7%
Arterial/Collector	16	31.4%
Arterial/Local	19	37.3%
Collector/Collector	2	3.9%
Collector/Local	2	3.9%
Local/Local	4	7.8%
TOTAL	**51**	**100.0%**

CHART 5: TYPE OF INTERSECTION



GEOGRAPHIC LOCATION

Of all pedestrian crashes, 49.5% occurred within a 2-1/2 mile radius of downtown Mesa. Additionally, 64.2% of all crashes occurred west of or on Gilbert Road. Both percentages decreased from prior years as the population center of Mesa continues to move eastward. Of all surface streets, Broadway Road had the highest frequency of pedestrian crashes with fourteen crashes, ten occurring west of or on Gilbert Road and six of those between Mesa Dr. and Stapley Dr. See map on page 13.

GENDER AND AGE OF PEDESTRIANS

Certain groups of pedestrians, defined by gender and age, have a greater probability of being involved in pedestrian crashes.

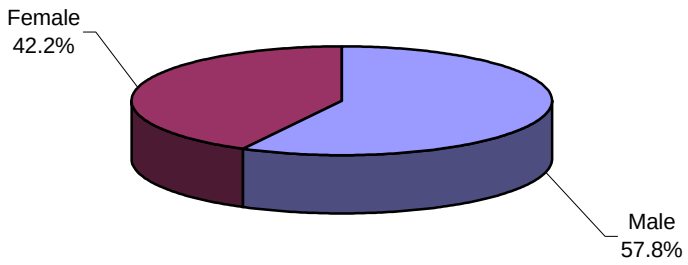
GENDER. Consistently, year after year, males have a much greater rate of involvement in pedestrian crashes than do females**.** Males comprise 49.5% of Mesa's population, but accounted for 57.8% of all pedestrians involved in crashes in 2005.

TABLE 4: GENDER OF PEDESTRIANS INVOLVED IN PEDESTRIAN CRASHES

GENDER	PERSONS INVOLVED	PERCENT OF TOTAL	PERCENT OF ESTIMATED POPULATION
Male	67	57.8%	49.5%
Female	49	42.2%	50.5%
TOTAL	**116***	**100.0%**	**100.0%**

* The total number of individuals involved in crashes was greater than the total number of crashes.

CHART 6: GENDER OF PEDESTRIANS INVOLVED IN PEDESTRIAN CRASHES

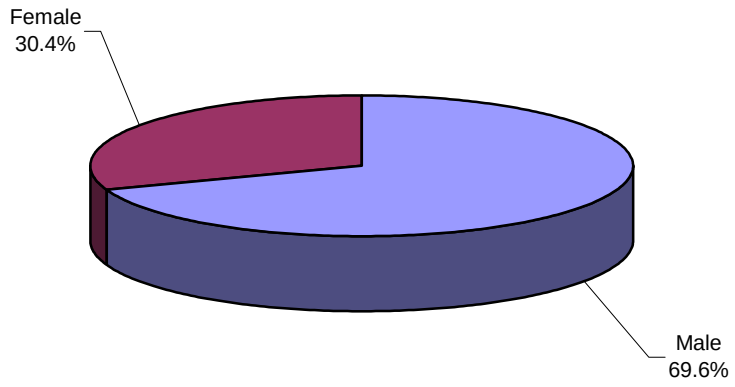


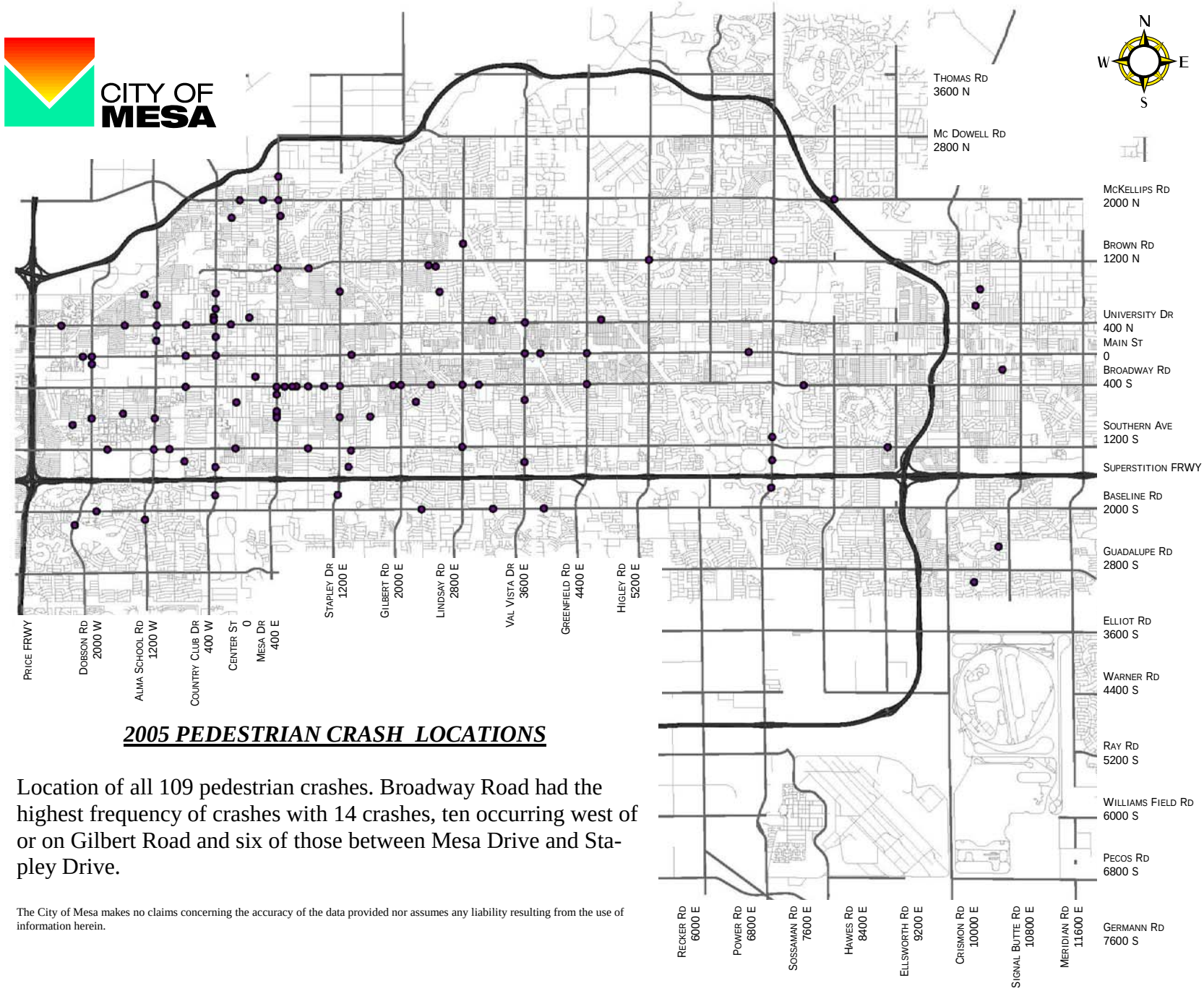
GENDER of UNIT 1. In the Police Accident Reports (PAR), the unit causing the crash or the unit most at fault is supposedly identified as Unit 1 as outlined in the *Arizona Traffic Accident Report Instruction Manual & Glossary*. When Unit 1 is identified as the pedestrian, 69.6% of the pedestrians are male vs. 30.4% being female.

TABLE 5: GENDER OF UNIT 1 PEDESTRIANS

UNIT 1 GENDER	PERSONS INVOLVED	PERCENT OF TOTAL
Male	32	69.6%
Female	14	30.4%
TOTAL	**46**	**100.0%**

CHART 7: GENDER OF UNIT 1 PEDESTRIANS





2005 PEDESTRIAN CRASH LOCATIONS

Location of all 109 pedestrian crashes. Broadway Road had the highest frequency of crashes with 14 crashes, ten occurring west of or on Gilbert Road and six of those between Mesa Drive and Stapley Drive.

AGE. When the total number of pedestrians involved in pedestrian crashes is normalized by looking at how many pedestrian are involved per every 1,000 people in each age group, it is readily apparent that the 15 - 19 year old group was over represented. This group was followed by the 10 - 14 year olds, 55 - 59 year olds and 5-9 year olds. In 2004, the most over represented group was the 10 - 14 year olds.

TABLE 6: AGE OF PEDESTRIANS INVOLVED IN CRASHES

Age	Population*	Percent of Total Population	No. of Pedestrians	% of Total Pedestrians	Pedestrians Involved per 1,000 Persons
Under 5	37,134	8.2%	6	5.2%	0.16
5 - 9	34,417	7.6%	11	9.5%	0.32
10 - 14	33,058	7.3%	11	9.5%	0.33
15 - 19	33,058	7.3%	18	15.5%	0.54
20 - 24	37,134	8.2%	10	8.6%	0.27
25 - 34	70,193	15.5%	12	10.3%	0.17
35 - 44	64,306	14.2%	13	11.2%	0.20
45 - 54	50,267	11.1%	14	12.1%	0.28
55 - 59	18,114	4.0%	6	5.2%	0.33
60 - 64	14,944	3.3%	1	0.9%	0.07
65 - 74	30,341	6.7%	4	3.4%	0.13
75 - 84	23,096	5.1%	4	3.4%	0.17
Over 84	6,793	1.5%	2	1.7%	0.29
TOTAL	**452,856**	**100.0%**	**112**	**96.6%**	
Unreported			4	3.4%	
TOTAL	**452,456**		**116**	**100.0%**	

* Estimated population information provided by the City of Mesa Planning Division.

CHART 8: AGE OF PEDESTRIANS INVOLVED IN CRASHES

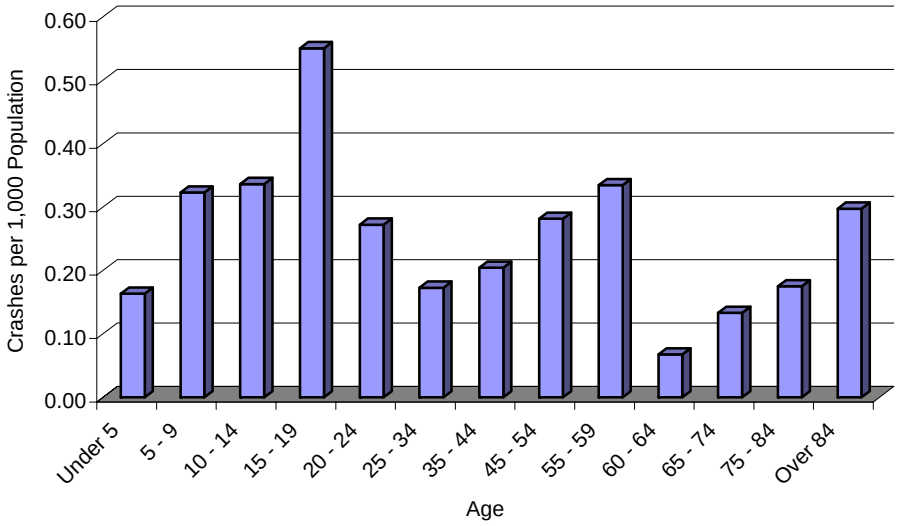
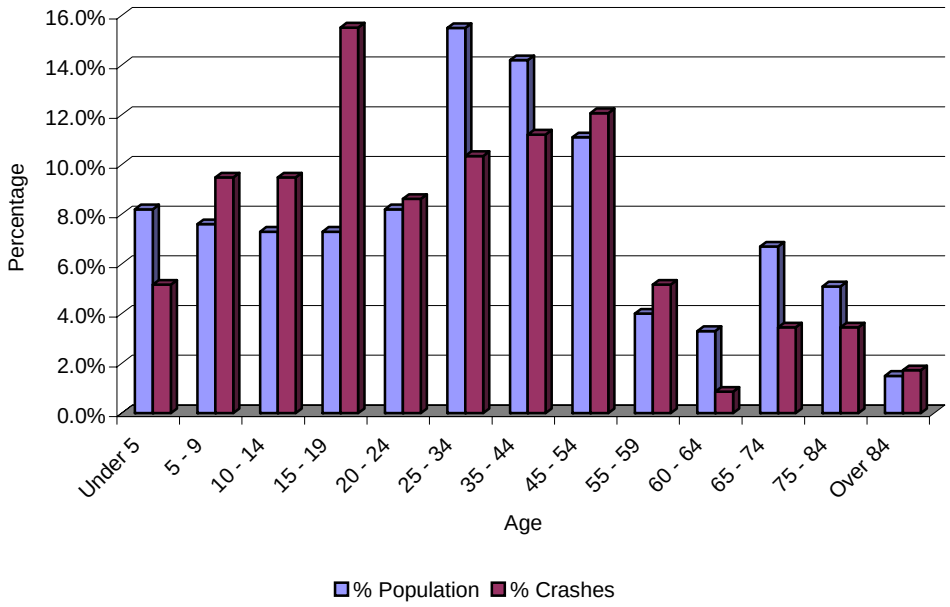


CHART 9: PERCENTAGE OF POPULATION vs PERCENTAGE OF CRASHES



AGE STATISTICS: Although the 15 - 19 year old age group had the highest representation, the average (mean) age of pedestrians involved in crashes in 2005 was 31.3, and the median age was 24. The average (mean) age of drivers involved in pedestrian crashes was 37.4, and the median age was 32. These ages increased from 2004, but have been relatively constant over the past five years.

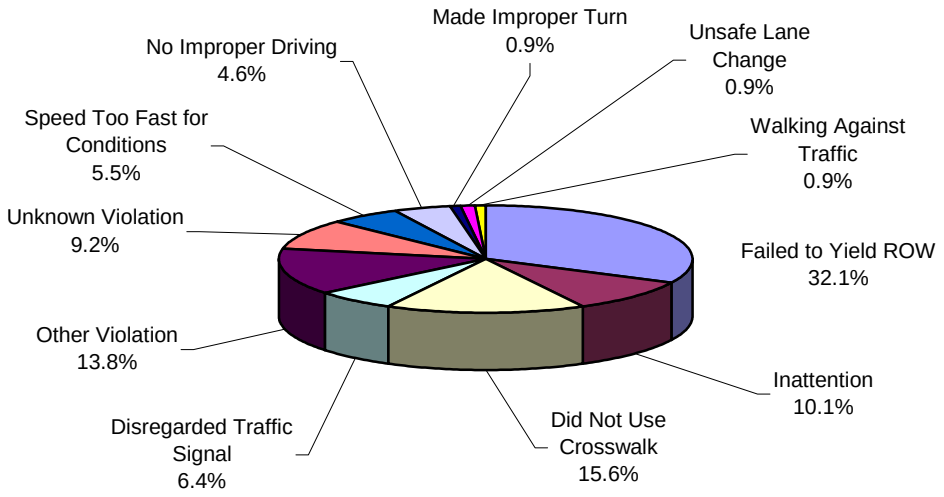
CAUSE OF PEDESTRIAN TRAFFIC CRASHES

As stated earlier, in the Police Accident Reports (PAR), the unit causing the crash or the unit most at fault is supposedly identified as Unit 1 as outlined in the *Arizona Traffic Accident Report Instruction Manual & Glossary*. The table and chart below breaks out the 2005 crashes by the cause of crash from the PARs. Again in 2005, Failed to Yield Right-of-Way was the most frequently listed cause of pedestrian crashes.

TABLE 7: CAUSE OF CRASH - VIOLATION/BEHAVIOR OF UNIT 1

CAUSE OF CRASH	NUMBER OF CRASHES	PERCENT OF CRASHES
Failed to Yield ROW	35	32.1%
Inattention	11	10.1%
Did Not Use Crosswalk	17	15.6%
Disregarded Traffic Signal	7	6.4%
Other Violation	15	13.8%
Unknown Violation	10	9.2%
Speed Too Fast for Conditions	6	5.5%
No Improper Driving	5	4.6%
Made Improper Turn	1	0.9%
Unsafe Lane Change	1	0.9%
Walking Against Traffic	1	0.9%
TOTAL	***109***	***100.0%***

CHART 10: CAUSE OF CRASH - VIOLATION/BEHAVIOR OF UNIT 1



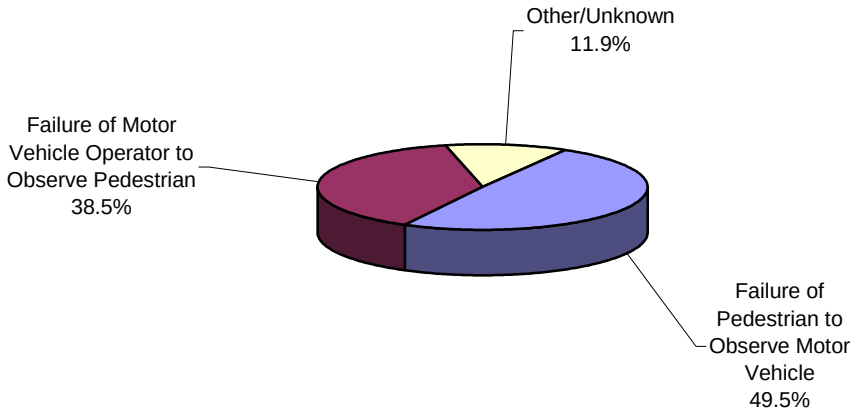
A review of each crash narrative and diagram was performed to obtain a better insight into whether the vehicle driver's or the pedestrian's action was the primary contributing factor. Grouping crashes that involved motorists failing to stop before crossing a sidewalk from a private drive, starting to turn right or turning right on a red signal, turning left or failure to yield (to a pedestrian) into one category called "Failure of motor vehicle operator to observe pedestrian" accounted for 38.5% of all pedestrian crashes.

Grouping pedestrian crashes that had narratives reading - pedestrian darted into the street, pedestrian attempted to cross midblock, pedestrian stepped off curb, pedestrian failed to stop, etc. into a category entitled "Failure of pedestrian to observe motor vehicle," accounted for 49.5% of all pedestrian crashes. The remaining crashes involved pedestrians playing on or around vehicles, not associated with a roadway or driveway, both parties being at fault, or could not be determined.

TABLE 8: CAUSE OF CRASH - NARRATIVE

Cause of Crash	Number of Crashes	Percentage of Crashes
Failure of Pedestrian to Observe Motor Vehicle	54	49.5%
Failure of Motor Vehicle Operator to Observe Pedestrian	42	38.5%
Other/Unknown	13	11.9%
TOTAL	**109**	**100.0%**

CHART 11: CAUSE OF CRASH - NARRATIVE



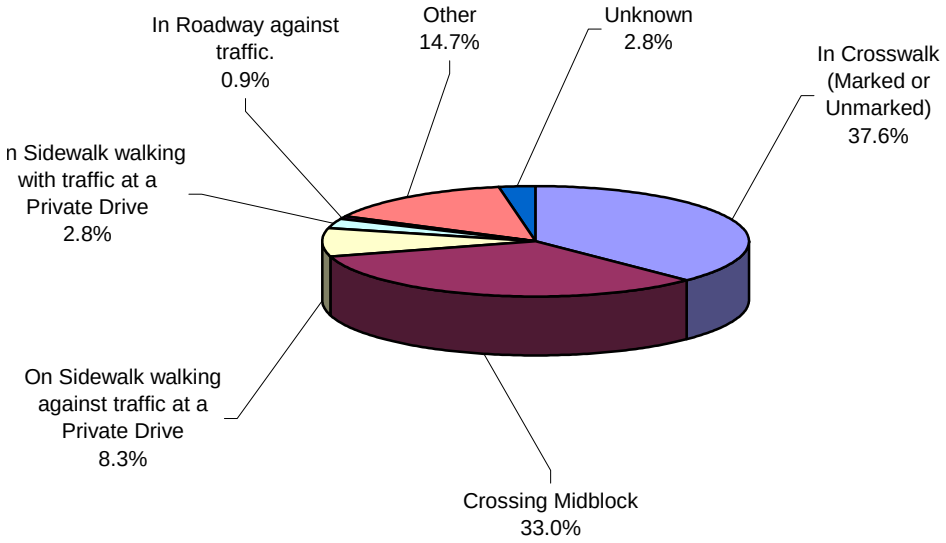
LOCATION OF PEDESTRIAN

Pedestrians attempting to cross streets in either marked or unmarked crosswalks accounted for 37.6% of all pedestrian crashes. Pedestrians attempting to cross streets midblock accounted for 33.0% of all crashes. An additional 8.3% were struck while standing or walking on a sidewalk against traffic. Pedestrians walking on a sidewalk with traffic were only involved in three crashes with motor vehicles departing driveways.

TABLE 9: LOCATION OF PEDESTRIAN

Location	Number	Percentage of All Pedestrian Crashes
In Crosswalk (Marked or Unmarked)	41	37.6%
Crossing Midblock	36	33.0%
On Sidewalk walking against traffic at a Private Drive	9	8.3%
On Sidewalk walking with traffic at a Private Drive	3	2.8%
In Roadway against traffic.	1	0.9%
Other	16	14.7%
Unknown	3	2.8%
TOTAL	***109***	***100.0%***

CHART 12: LOCATION OF PEDESTRIAN



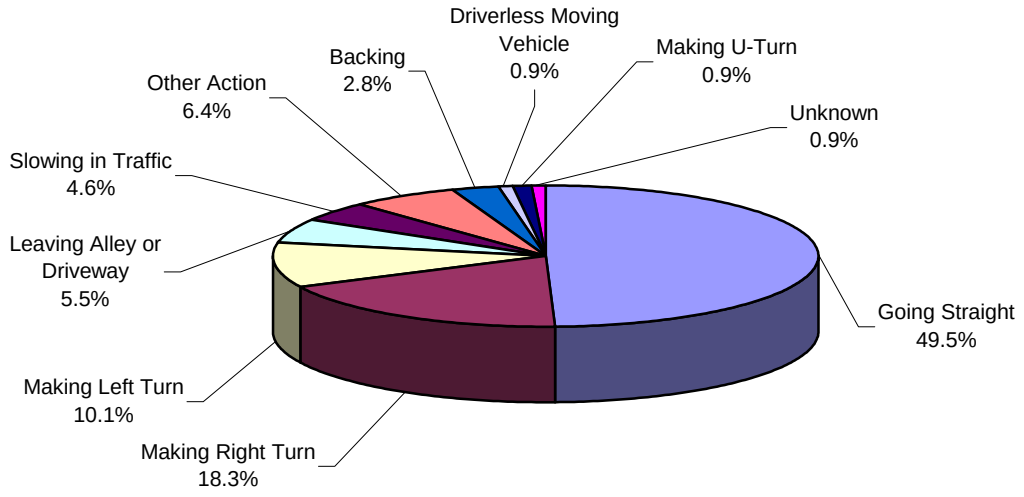
ACTION OF MOTOR VEHICLE

In 49.5% of all pedestrian crashes, the motor vehicle was traveling straight ahead. Another 28.4% involved vehicles making either a right or left turn from either a private drive or at an intersection.

TABLE 10: ACTION OF MOTOR VEHICLE

Motor Vehicle Action	Number of Crashes	Percent of all Pedestrian Crashes
Going Straight	54	49.5%
Making Right Turn	20	18.3%
Making Left Turn	11	10.1%
Leaving Alley or Driveway	6	5.5%
Slowing in Traffic	5	4.6%
Other Action	7	6.4%
Backing	3	2.8%
Driverless Moving Vehicle	1	0.9%
Making U-Turn	1	0.9%
Unknown	1	0.9%
TOTAL	***109***	***100.0%***

CHART 13: ACTION OF MOTOR VEHICLE



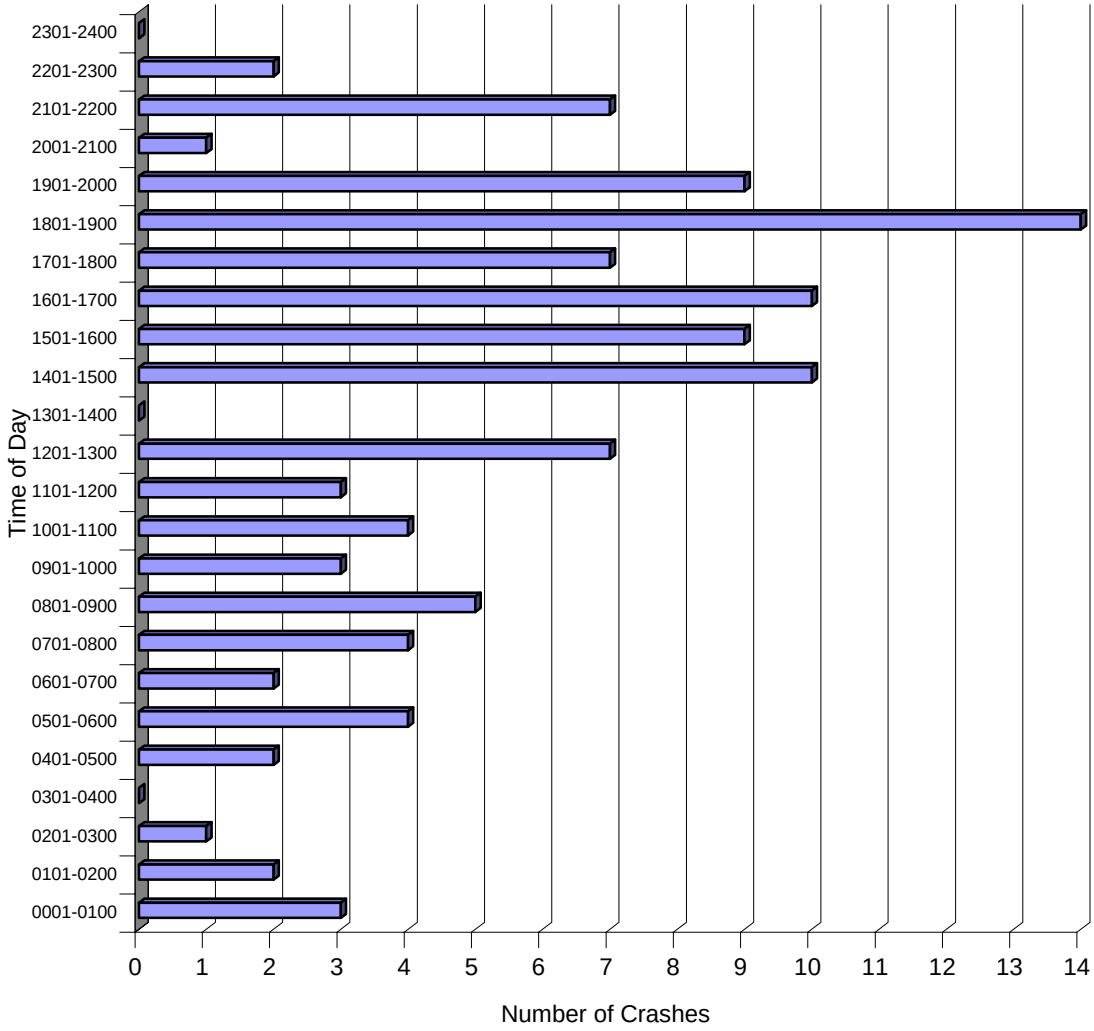
TIME OF CRASHES

TIME OF DAY. The number of cars and trucks on Mesa's streets at any given time of the day has a direct correlation to the likelihood of being involved in a pedestrian traffic crash. As in past years, the weekday evening "rush" hours experienced the highest frequency of pedestrian crashes. Six hours, 2:01 PM - 8:00 PM, experienced 54.2% of all pedestrian crashes. The rise in pedestrian crashes during these hours mirrors increased traffic volumes as people commute to and from work and children travel to and from school.

TABLE 11: PEDESTRIAN CRASHES BY TIME AND DAY

Day / Time	Mon	Tue	Wed	Thur	Fri	Sat	Sun	*TOTAL*	% of Crashes by Time
0001-0100		1					2	**3**	2.8%
0101-0200		1					1	**2**	1.8%
0201-0300				1				**1**	0.9%
0301-0400								**0**	0.0%
0401-0500		1				1		**2**	1.8%
0501-0600	1	2				1		**4**	3.7%
0601-0700				1	1			**2**	1.8%
0701-0800					2	1	1	**4**	3.7%
0801-0900			2	3				**5**	4.6%
0901-1000			1	1	1			**3**	2.8%
1001-1100		1	2				1	**4**	3.7%
1101-1200		1		1			1	**3**	2.8%
1201-1300	2					2	3	**7**	6.4%
1301-1400								**0**	0.0%
1401-1500		4	1	4			1	**10**	9.2%
1501-1600	3		1	1	3		1	**9**	8.3%
1601-1700		2	2	2	1	1	2	**10**	9.2%
1701-1800	2	2	1		1	1		**7**	6.4%
1801-1900	1	5	2	6				**14**	12.8%
1901-2000			2	3	3	1		**9**	8.3%
2001-2100		1						**1**	0.9%
2101-2200		1		2	1	1	2	**7**	6.4%
2201-2300		1					1	**2**	1.8%
2301-2400								**0**	0.0%
TOTAL	**9**	**23**	**14**	**25**	**13**	**9**	**16**	**109**	100.0%
% of Crashes by Day	8.3%	21.1%	12.8%	22.9%	11.9%	8.3%	14.7%	100.0%	

CHART 14: TIME OF THE DAY



DAY OF THE WEEK and MONTH OF THE YEAR: In 2005, Wednesday had the highest number of pedestrian crashes. In 2004, Saturday had the highest number of pedestrian crashes. See Chart 15 on the next page.

April had the highest number of crashes. See Table 12 on the next page and Chart 16 on page 23.

CHART 15: DAY OF THE WEEK

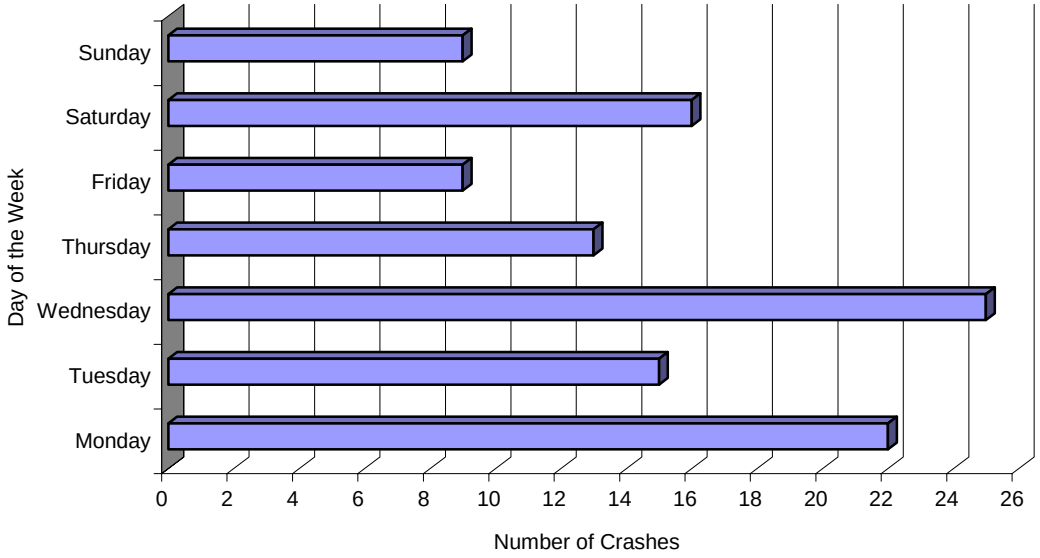
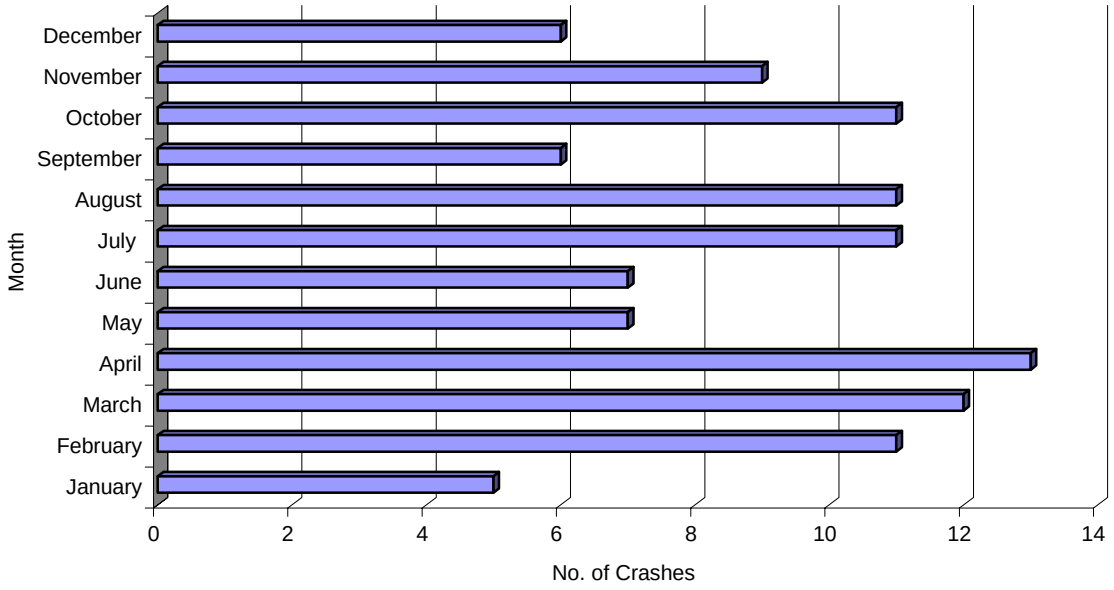


TABLE 12: MONTH OF THE YEAR

MONTH	NUMBER OF CRASHES	PERCENT OF CRASHES
January	5	4.6%
February	11	10.1%
March	12	11.0%
April	13	11.9%
May	7	6.4%
June	7	6.4%
July	11	10.1%
August	11	10.1%
September	6	5.5%
October	11	10.1%
November	9	8.3%
December	6	5.5%
TOTAL	**109**	**100.0%**

CHART 16: MONTH OF THE YEAR



FATALITIES AND INJURIES TO PEDESTRIANS

After declining to a five year low in 2003, in 2005 pedestrian fatalities climbed to their highest number in the past five years. When normalized to the population, the number of fatalities per 100,000 population rose from 1.34 to 3.79. See Table 1 on page 7 and Chart 18 on page 24.

CHART 17: NUMBER OF FATALITIES - FIVE YEAR HISTORY

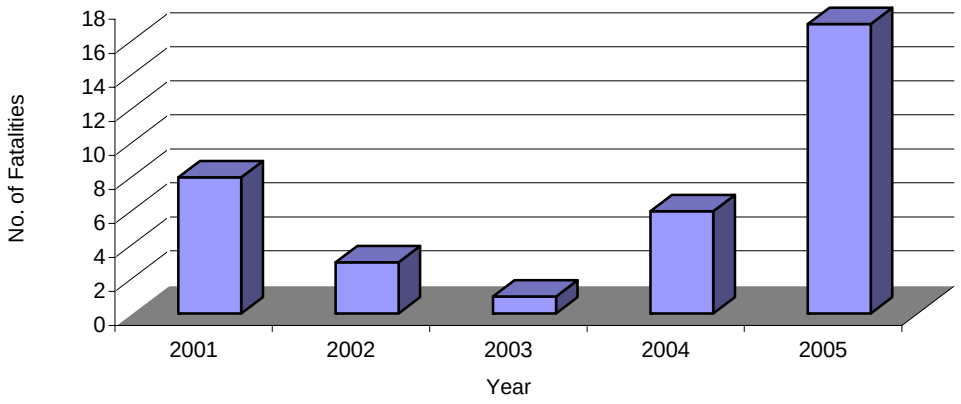
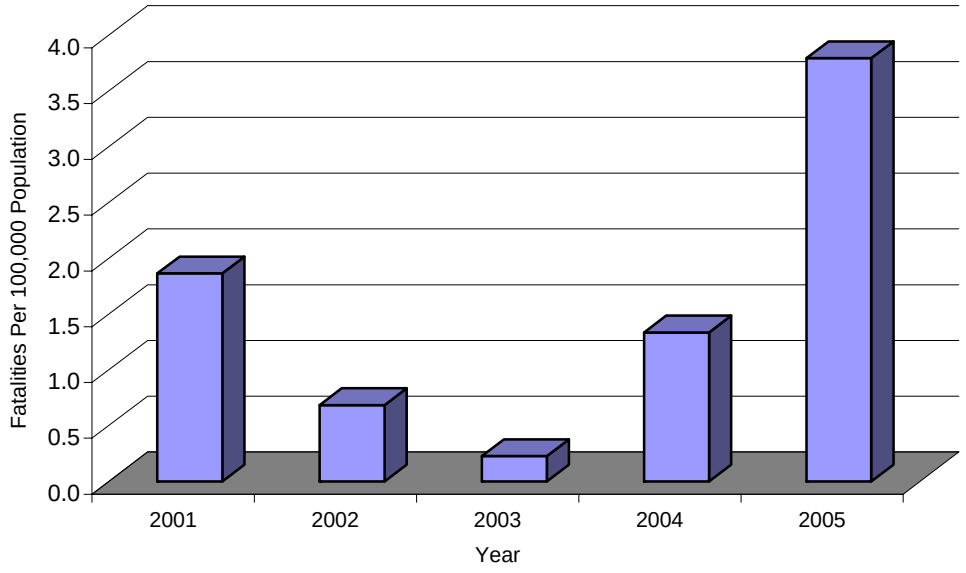


CHART 18: PEDESTRIAN FATALITIES - NORMALIZED TO POPULATION

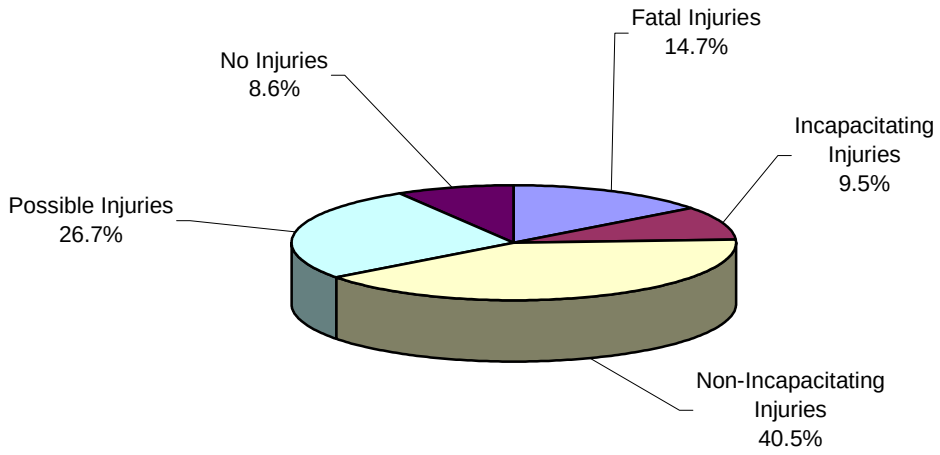


INJURIES: Fatalities and incapacitating injuries comprised 24.2% of all pedestrian injuries. This was a decrease of 14.8% from 2004. However, the percentage of fatalities to the percentage of total pedestrians involved increased by 226.7%.

TABLE 13: SEVERITY OF PEDESTRIAN INJURIES

SEVERITY OF INJURIES	NUMBER OF PEDESTRIANS INVOLVED	PERCENT OF PEDESTRIANS INVOLVED
Fatal Injuries	17	14.7%
Incapacitating Injuries	11	9.5%
Non-Incapacitating Injuries	47	40.5%
Possible Injuries	31	26.7%
No Injuries	10	8.6%
TOTAL	**116**	**100.0%**

CHART 19: SEVERITY OF PEDESTRIAN INJURIES



PEDESTRIAN CONVEYANCES:

Pedestrians on go-peds, skateboards, scooters and motorized wheelchairs were involved in 14.7% of all pedestrian crashes. This was less than a one percent increase from 2004. The pedestrian injury tended to be more severe when these conveyances are involved.

TABLE 14: PEDESTRIAN CONVEYANCES

Type of Conveyance	No. of Crashes	Percent of All Pedestrian Crashes
Motorized Wheelchair	6	5.5%
Go-Ped	2	1.8%
Skateboard	1	0.9%
Push Scooter	5	4.6%
Motorized Scooter	2	1.8%
TOTAL	***16***	***14.7%***

ALCOHOL/DRUG RELATED PEDESTRIAN CRASHES

There were ten pedestrian crashes in which alcohol/drugs were involved. These crashes accounted for 9.2% of all pedestrian crashes. The pedestrian was under the influence of alcohol in 60.0% of these ten crashes.

HIT AND RUN RELATED PEDESTRIAN CRASHES

There were 26 hit and run pedestrian crashes recorded in 2005 as compared to 24 in 2004. This number accounted for 23.9% of all pedestrian crashes. This number has remained fairly constant over the past five years.

ICE CREAM VENDOR RELATED PEDESTRIAN CRASHES

In 2005, there were two pedestrian crashes that involved young pedestrians crossing the travelway midblock either going to or departing from motor vehicles selling ice cream products.