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CALIFORNIA PATH PROGRAM
INSTITUTE OF TRANSPORTATION STUDIES
UNIVERSITY OF CALIFORNIA, BERKELEY

Driver/Pedestrian Behavior at Marked and Unmarked Crosswalks in the Tahoe Basin

Meghan Fehlig Mitman, Douglas Cooper, Brooke DuBose, Swati Pande

California PATH Research Report
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Final Report

Driver/Pedestrian Behavior at Marked and Unmarked Crosswalks in the Tahoe Basin

Submitted by:

FEHR & PEERS
TRANSPORTATION CONSULTANTS

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EXECUTIVE SUMMARY

For more than thirty years, pedestrian safety studies have considered pedestrian-vehicle collision history and pedestrian and driver behavior at marked and unmarked crosswalks at uncontrolled crossings. From 2005-2007, the UC Berkeley Traffic Safety Center, in a study funded by the California Department of Transportation (Caltrans), focused on developing a better understanding of driver and pedestrian behavior and safety in both marked and unmarked crosswalks in an effort to recommend more informed crosswalk policies. As a part of these efforts, a 2007 paper, *"The Marked Crosswalk Dilemma: Uncovering Some Missing Links in a 35-Year Debate"* was designed to fill key gaps in the literature by analyzing pedestrian and driver behavior and knowledge of right-of-way laws regarding marked and unmarked crosswalks throughout the Bay Area.

The UC Berkeley study, as with most previous studies, focused on urban or suburban areas where the driver characteristics do not change significantly from day to day. Following this study was the recognition that similar research was needed in rural and recreational locations. As such, this paper summarizes results from field observations of driver and pedestrian behavior at marked and unmarked crosswalks at uncontrolled crossings during the summer in the Tahoe Basin of California.

This study concludes that the behavior trends identified in the urban/suburban Bay Area study are largely similar in a rural/recreational context. The multiple threat scenario, however, is detected less frequently for the observed multi-lane roads.

INTRODUCTION

In 2007 over 74,000 pedestrians were injured or killed in the United States (*1*). While the majority of pedestrian crashes occur in urban areas, the National Highway Traffic Safety Administration (NHTSA) reports that in 2007, 27% of all pedestrian fatalities occurred in rural areas.

For more than thirty years, pedestrian safety studies have considered pedestrian-vehicle collision history and pedestrian and driver behavior at marked and unmarked crosswalks at uncontrolled crossings. However, most of the studies have focused on urban or suburban areas where the driver characteristics do not change significantly from day to day. The focus area for this study, California's Tahoe Basin, is recreational and semi-rural in nature and driver and pedestrian characteristics change due to the many tourists that frequent the area.

As much of the California State Highway System traverses rural and/or recreation areas, the findings from this pedestrian safety study may be beneficial for Caltrans, as well as other state transportation agencies. District 03 Caltrans receives citizen requests for marked crosswalks within the Tahoe Basin on a regular basis. The results of this study could inform district decisions on the installation of marked crosswalks/ enhancements (based on pedestrian and driver behavior), and help the public understand why a location is suitable or not for a marked crosswalk/ enhancements.

BACKGROUND

Previous research focusing on uncontrolled crosswalks can generally be grouped in two key areas: (1) safety research regarding collision trends, and (2) behavioral research analyzing driver and pedestrian behavior within crosswalks.

SAFETY RESEARCH ON UNCONTROLLED CROSSWALKS

Significant research on the safety impacts of marked and unmarked crosswalks provides an important background for this study. Herms' prominent 1972 study in San Diego found that marked crosswalks were the sites of twice as many crashes as unmarked crosswalks, controlling for pedestrian volume (*2*). Several other studies found similar results (Gibby, 1994), but their methodologies, as with the Hermes' study, have been criticized (Campbell, 1997) (*3, 4*).

A landmark study conducted by Zegeer, *et al.* in 2001 for the Federal Highway Administration (FHWA) analyzed five years of pedestrian collisions at 1,000 marked crosswalks and 1,000 matched unmarked comparison sites in 30 U.S. cities (*5*). The study concluded that no meaningful differences in crash risk exist between marked and unmarked crosswalks on two-lane roads or low-volume multi-lane roads. However, the researchers found that on multi-lane roads with traffic volumes greater than about 12,000 vehicles per day, marked crosswalks without other substantial roadway treatments were associated with higher pedestrian crash rate than having an unmarked crosswalk. The study concluded that, particularly on high-speed, high volume and multi-lane roads, painted white lines are not enough to improve pedestrian safety (*5*).

A recent research effort jointly sponsored by the Transit Cooperative Research Program (TCRP) and the National Cooperative Highway Research Program (NCHRP) and conducted by the Texas Transportation Institute (TTI) focused on determining the effectiveness of many of the pedestrian safety engineering countermeasures for uncontrolled crossings recommended in the 2001 FHWA study. As a result of this study, specific engineering guidelines for selecting effective pedestrian crossing treatments for uncontrolled intersections and midblock locations are now available based on key input variables such as:

pedestrian volume, street crossing width, and traffic volume. The study also suggested modifications to the pedestrian traffic signal warrant in the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) (*6*).

BEHAVIORAL RESEARCH ON UNCONTROLLED CROSSWALKS

One of the central debates regarding pedestrian behavior in crosswalks is whether pedestrians are less cautious in marked crosswalks than in unmarked crosswalks or non-crosswalk locations. Herms' 1972 analysis hypothesized that this "lack of caution" may lead to the higher rate of crashes observed in marked crosswalks compared to unmarked crosswalks (2).

However, Knoblauch, et al. (2001) measured the effects of crosswalk markings on driver and pedestrian behavior at uncontrolled intersections on two- and three-lane roads (7). Knoblauch (2001) and Nitzburg (2001) found no difference in pedestrian assertiveness in marked and unmarked crosswalks, while pedestrian searching behavior (looking left and right for oncoming traffic) actually improved at crossings after they were marked (7, 8). Others (for example, Hauck, 1997) have also found that pedestrian behavior improves in well-marked crosswalks compared to unmarked or poorly marked crosswalks (9).

There have been fewer studies of driver behavior, but it is generally agreed that drivers often fail to yield to pedestrians at both marked and unmarked crosswalks. The effects on driver behavior of marking a crosswalk have remained unclear.

In a before-after study, Knoblauch (2001) found that marking a crosswalk had no effect on driver yielding. However, he found a slight reduction in speed by drivers approaching a pedestrian in a marked crosswalk compared to a crossing that is unmarked (*7*). Nitzburg (2001) found strong differences between day and nighttime driver behavior, with drivers yielding less frequently to pedestrians at night. Nitzburg's study also found differences in both driver and pedestrian behavior when the pedestrian was in the second half of the crosswalk compared to the first half. Drivers yielded to pedestrians more frequently in the second half and fewer pedestrians stayed within the marked crosswalk (in the "magnet study") in the second half of the crosswalk (*8*).

To bolster this area of research, Mitman, Ragland, and Zegeer (2008) published a paper on driver and pedestrian behavior and knowledge of right-of-way laws regarding marked and unmarked crosswalks. The study also focused on driver and pedestrian behavior in multiple threat scenarios. Findings from this study revealed that (1) pedestrians are more cautious crossing at unmarked crosswalks as compared to marked crosswalks; (2) drivers are more likely to yield to pedestrians at marked crosswalks rather than at unmarked crosswalks; and (3) multiple threat scenarios arise most frequently at marked crosswalks (*10*).

PEDESTRIAN RESEARCH IN RURAL AREAS

In the studies cited above, all data was collected from urban and/or suburban locations within the U.S. Current pedestrian research in rural areas is limited, largely based on analysis of collision data to determine contributing factors.

In 2000, Ivan et al. analyzed roadway and area type features from motor-vehicle-pedestrian collision data in rural Maine to determine which variables were of the greatest significance to pedestrian crashes. Variables considered included crosswalk marking, signals, central barrels/cones, speed, and number of lanes. Ivan compared the number of model-predicted crashes at study locations to actual crash numbers. Overall the study found the safest crossing type is the unsignalized, unmarked, low-speed crossing (*11*).

In 2004, Hall, et al. published an FHWA study of pedestrian collision data in rural areas. Major characteristics of rural pedestrian fatalities and overall crashes were identified, as were possible countermeasures. The goal of the research was to identify the characteristics of rural pedestrian fatalities in ten states with above-average rates of rural pedestrian fatalities. The most prominent characteristics of

rural pedestrian fatalities in these states were clear weather, hours of darkness, weekends, non-intersection locations, and level, straight roads (*12*). However, Hall did not consider crosswalk type or other intersection geometry in this research.

Hall also examined all rural pedestrian collisions in New Mexico for a three-year period. Safety recommendations included improved visibility and a selected application of pedestrian amenities such as walkways, crosswalks, and warning signs.

THIS STUDY'S CONTRIBUTION

This paper summarizes results from field observations of driver and pedestrian behavior at marked and unmarked crosswalks on two, three, and four-lane rural roads in a recreational setting and interprets these results in light of the previously reported findings by Mitman, et al. for the San Francisco Bay Area.

METHODS

Building on the prior behavioral research by Knoblauch (2001) and recent methodologies used in UC Berkeley Traffic Safety Center research, this study focused on roads with two, three, and four-lane cross-sections. Utilizing a matched pair approach, driver and pedestrian behavior within marked and unmarked crosswalks at intersections with similar characteristics were compared.

Nine sites were selected for the purposes of the study. The locations were chosen with the following guidelines:

- One matched pair of marked/unmarked crossings on a two-lane rural highway.
- One matched pair of marked/unmarked crossings on a three-lane rural highway.
- One matched pair of marked/unmarked crossings on a four-lane rural highway – for this pair two marked crosswalk locations were studied: one on the edge of a town where drivers may not expect pedestrians, and another in the center of town where drivers are accustomed to pedestrian activity and may behave differently.
- One matched pair of marked/unmarked crossings at a "mid-block" location on a two-lane rural highway. These locations provided data about pedestrian and driver behavior in remote, recreational settings. A Class I multi-use path crosses the roadway in both areas, which also provided an opportunity to study bicyclist behavior at marked and unmarked crossings.

Previous studies have noted that driver yielding is related to vehicle speeds. All matched pair observation locations had similar speed limits in an effort to reduce potential yielding behavior discrepancies based on speed. Table 1 presents these sites by major road type. All nine sites are located in the North Lake Tahoe Basin, California.

At each of the observation locations, the following study questions were addressed:

- Whether pedestrians use more, less, or the same amount of caution when crossing at a marked crosswalk (as compared to an unmarked crosswalk) — by recording the pedestrian's "looking behavior" and level of assertiveness when using a marked versus unmarked crosswalk.
- Whether the age or gender of the pedestrian are correlated with his or her behavior — by recording the gender and approximate age of the pedestrian observed.

- Whether drivers yield more often to pedestrians in marked crosswalks than unmarked crosswalks — by recording whether or not the driver yielded when encountering a pedestrian in the crosswalk.

One of the mid-block study locations was a multi-use trail crossing used by both bicyclists and pedestrians. Data was collected for both user groups at this location.

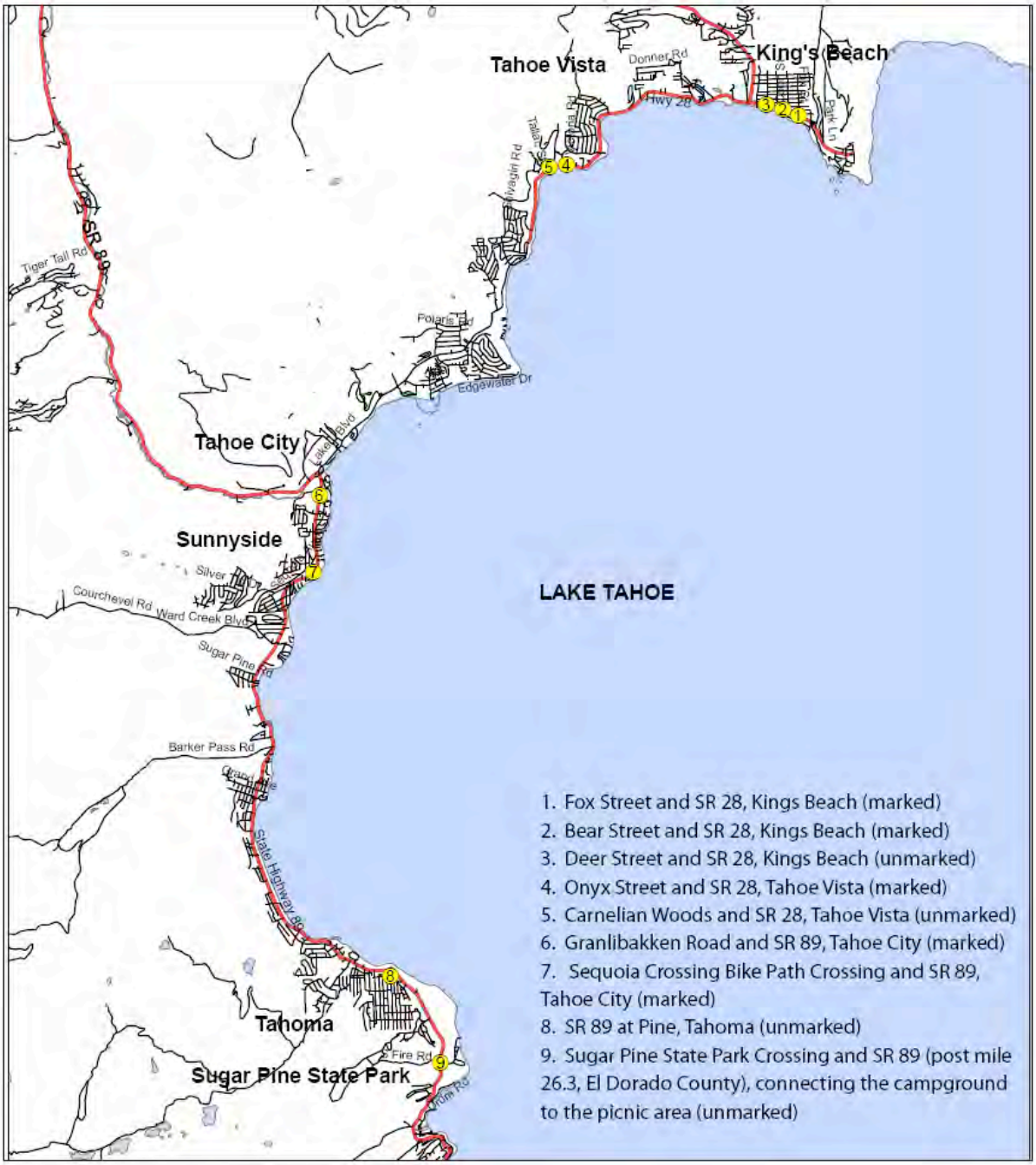
FIELD OBSERVATION SITES

All observation sites were located along North Lake Boulevard/SR 28 and West Lake Boulevard/SR 89, a rural highway that circles the northwest shore of Lake Tahoe. Figure 1 shows a map of the study area. Figures 2 through 10 present diagrams of each study location.

TABLE 1: FIELD OBSERVATION SITES

Location	*Number of Lanes*	*Marked/ Unmarked Crosswalk*	*Speed Limit*	*Estimated Pedestrian Volume (hour)*
Fox Street and SR 28, Kings Beach	4	Marked	30	48
Bear Street and SR 28, Kings Beach	4	Marked	30	96
Deer Street and SR 28, Kings Beach	4	Unmarked	30	24
Onyx Street and SR 28, Tahoe Vista	3	Marked	45	2
Carnelian Woods and SR 28, Tahoe Vista	3	Unmarked	45	6
Granlibakken Road and SR 89, Tahoe City	2	Marked	35	2
Sequoia Crossing and SR 89, Tahoe City	2 midblock	Marked	35	52
SR 89 at Pine Street, PLA 89 PM 0.00, Tahoma	2	Unmarked	35	18
Sugar Pine State Park Crossing and SR 89 (post mile 26.3, El Dorado County)	2 midblock	Unmarked	40	2

FIGURE 1 – MAP



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Lake Tahoe Crosswalk Locations

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NOT TO SCALE

1. **Fox Street and SR 28, Kings Beach** – This intersection features the first marked crosswalk in Kings Beach, California that drivers encounter when approaching from the Nevada side of Lake Tahoe. This three-legged, side-street stop controlled intersection has a marked crosswalk on the east side of SR 28. In this location SR 28 has four lanes and a speed limit of 30 MPH. Area destinations include several shops, restaurants, and a movie theater. Signage and an (informal) pedestrian flag program have been installed at this crosswalk due to ongoing yielding issues. Pedestrian volumes were expected to be higher here than at most other study locations.

2. **Bear Street and SR 28, Kings Beach** – This intersection is centrally located in downtown Kings Beach, approximately a quarter mile west of the Fox Street/SR 28 intersection. This location provides direct access to the Kings Beach State Park, parking lot and weekly farmers' market. This site has similar attributes to the Fox Street/SR 28 intersection (four travel lanes, marked crosswalk, side-street stop controlled, speed limit of 30 MPH), and was chosen to compare and contrast driver and pedestrian behavior at a peripheral/unexpected location to a more centralized/expected crossing location. A marked ladder crosswalk is located on the west side of SR 28. Motorists' failing to yield to pedestrians has been an issue at this intersection. Signage and an (informal) pedestrian flag program have been installed at this crosswalk. Bear Street/SR 28 was estimated to have the highest pedestrian volumes of all the study locations.

3. **Deer Street and SR 28, Kings Beach** – The third location in Kings Beach is located approximately 700 feet west of the Bear Street/SR 28 site, at the western edge of town. SR 28 has four travel lanes at this location. The intersection is side-street stop controlled and does not have a marked crosswalk. This area was expected to have lower pedestrian volumes than the other Kings Beach locations. Area destinations include motels, shops, and restaurants.

4. **Onyx Street and SR 28, Tahoe Vista** – This location has a four-legged intersection and is side-street stop controlled. SR 28 has three lanes (two travel lanes and a center turn lane), and sidewalks on the north and south sides. A ladder crosswalk is striped on the east side of SR 28, connecting to a walking path that accesses the Lake Tahoe shoreline. Area destinations include public lake access, Placer County Health and Human Services, and a mini-golf course. The posted speed limit is 45 MPH.

5. **Carnelian Woods Avenue and SR 28, Tahoe Vista** – This site was chosen as the matched pair to the Onyx Street/SR 28 location, which is 400 feet to the east. Carnelian Woods Avenue/SR 28 is a three-legged intersection and side-street stop controlled. Area destinations include a marina and mini-golf course. The posted speed limit is 45 MPH.

6. **Granlibakken Road and SR 89, Tahoe City** – Granlibakken Road/SR 89 is on the south side of Tahoe City, a popular tourist town on Lake Tahoe. SR 89 is a two-lane road in this area. The intersection has three legs and is side-street stop controlled. A class I multi-use trail runs parallel to SR 89 and crosses the road at this intersection. A marked crosswalk has been striped across Granlibakken Road. Area destinations include shops and residential neighborhoods, although this location is outside the downtown area of Tahoe City and has low pedestrian volumes. The posted speed limit on SR 89 is 35 MPH.

7. **Sequoia Crossing and SR 89, Tahoe City** – This "mid-block" location is a Class I multi-use trail crossing on SR 89, and is only accessed by pedestrians and bicyclists using the trail. Caltrans has significantly enhanced the crossing with an advanced flashing beacon, yield to pedestrians signage, camera-actuated flashing LED crosswalk signage, and ladder crosswalk striping. SR 89 is a two-lane road in this area, and sight distances to the crossing are limited. The posted speed limit in this area is 35 MPH.

8. **SR 89 at Pine Street, Tahoma** – SR 89 is a typical two-lane rural road in this location. The four-way intersection with Pine Street is side-street stop controlled with an unmarked crosswalk. Area destinations include lake access, local shops and restaurants and residential neighborhoods. The posted speed limit in this area is 35 MPH.

9. **Sugar Pine State Park Crossing and SR 89** – This site was chosen as the second "mid-block" crossing, and is located at the main entrance to Sugar Pine Point State Park on SR 89 in Tahoma, California. The three-way intersection is side-street stop controlled, and the speed limit on SR 89 is 40 MPH. A Class I multi-use path runs parallel to SR 89 and crosses the road in this location. Pedestrians are recreational users of the state park and cross SR 89 to access the Lake Tahoe waterfront to the east.

Insert Figure 2 – Fox Street

Caltrans Tahoe Crosswalks

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FOX STREET AND SR 28

Insert Figure 3 – Bear Street

Insert Figure 4 – Deer Street

Caltrans Tahoe Crosswalks

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DEER STREET AND SR 28

Insert Figure 5 – Onyx Street

Insert Figure 6 – Carnelian Woods

Insert Figure 7 – Granlibakken Road

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GRANLIBAKKEN ROAD AND SR 89

Insert Figure 8 – Sequoia Crossing

Insert Figure 9 – Pine Street

Insert Figure 10 – Sugar Pine State Park

DATA COLLECTION

Data collection occurred during daylight hours on non-rainy days in June 2008. As the Lake Tahoe area is a popular tourist destination, data was collected during the weekday and on weekends to record pedestrian behavior from both local residents and tourists that may have varying degrees of familiarity with local traffic patterns. As pedestrian volumes varied depending on the study location, certain locations were observed more frequently to capture a significant number of pedestrian crossing occurrences.

Based on prior UC Berkeley Traffic Safety Center studies, clipboard-based (manual) data collection was selected as the best method for the purposes of this study. Observers included planning and engineering consultants from Fehr & Peers, as well as paid graduate students from the University of Nevada – Reno who completed a full-day training tailored to this project. The graduate students entered their data into the database, with each students performing cross-check quality control for all data entry.

The data collection protocol and form are included in Appendix A.

DATA ANALYSIS

The statistical analysis package SAS was utilized to compare driver and pedestrian behavior observations in marked versus unmarked crosswalks at each of the six observation locations with five comparison tests (matched pairs). These comparisons were typically accomplished via a Chi-Squared test, a non-parametric test of statistical significance appropriate for bivariate tables. However, in some instances comparison cells had expected values of less than five. In these cases, the Fisher's Exact Test was used instead of the Chi-Squared test. The Fisher's Exact Test is used for categorical data with small, sparse, or unbalanced data. It assumes a hypogeometric distribution.

In addition to the observation variables included on the data collection form, the following derived variables were analyzed for each observation location:

- Gap acceptance (lanes): This variable measures the number of times that no vehicle was present in a lane encountered during a pedestrian's crossing. The maximum number of gaps is equal to the number of lanes across which the crosswalk extends. The total number of gaps for pedestrians in marked versus unmarked crosswalks was compared in the statistical analysis for each site.

- Immediate yields (drivers): This variable is the sum of the number of times the first driver encountered by a pedestrian in each lane yielded (as opposed to not yielding and trapping the pedestrian on the curb or within the street). The number of immediate yields for pedestrians in marked versus unmarked crosswalks was compared in the statistical analysis for each site.

- Multiple threat opportunity: This variable measures for each pedestrian the number of times in which a driver yielded in one lane (the first encountered in the crossing direction) while a driver in the adjacent lane of the same direction of travel (the next encountered) did not yield. The incidence of multiple threat opportunities was applicable only for the crosswalks across the multi-lane intersections. Two pairs of multiple threat opportunities were considered, the first set of same direction lanes encountered in a crossing and the second set. The incidence of multiple threat opportunities for pedestrian crossings in marked versus unmarked crosswalks was compared in the statistical analysis for each site. Multiple threat scenarios were specifically addressed in this analysis because the 2001 FHWA study noted, "The greatest difference in

pedestrian crash types between marked and unmarked crosswalks involved 'multiple-threat' crashes (1)." Multiple-threat crashes occur on multi-lane roads when the pedestrian and/or driver's line of sight is blocked by a driver yielding to the pedestrian in an adjacent lane.

RESULTS

This section presents the statistical analysis results for behavior observations across the marked versus unmarked crosswalk comparisons. Reported p-values are for the statistical test of each variable (age, sex, etc.) in marked versus unmarked crosswalks.

COMPARISON 1: FOX STREET (MARKED) VERSUS DEER STREET (UNMARKED)

Descriptive Statistics:

TABLE 2 Pedestrian and Driver Behavior by Crosswalk Type, Fox versus Deer Descriptive Statistics

	Fox (Marked) n (column %)	Deer (Unmarked) n (column %)	Total N (column %)	*p*-value
Pedestrians	276	286	562	
Age				Fisher's Exact Test (p<0.001)
Child	5 (1.81)	4 (1.40)	9 (1.60)	
Teen	37 (13.41)	28 (9.79)	65 (11.57)	
Young adult	100 (36.23)	136 (47.55)	236 (41.99)	
Older adult	120 (43.58)	116 (40.56)	236 (41.99)	
Elderly	14 (5.07)	1 (0.35)	15 (2.67)	
Not recorded	0 (0.00)	1 (0.35)	1 (0.18)	
Sex				Fisher's Exact Test (p<0.0001)
Male	154 (56.80)	199 (69.82)	353 (62.92)	
Female	122 (44.20)	86 (30.18)	208 (37.08)	
Not recorded	0 (0.00)	1 (0.35)	1 (0.18)	

Analysis Results:

TABLE 1 Pedestrian and Driver Behavior by Crosswalk Type, Fox versus Deer Analysis Results

	Fox (Marked) n (column %)	Deer (Unmarked) n (column %)	Total N (column %)	p-value
Pedestrian Assertiveness				Fisher's Exact Test (p=0.0757)
Waited on curb	53 (19.2)	79 (27.62)	132 (23.49)	
Waited on street	130 (47.1)	127 (44.41)	257 (45.73)	
Did not wait	91 (32.97)	78 (27.27)	169 (30.07)	
Forced driver to yield	2 (0.72)	1 (0.35)	3 (0.53)	
Not recorded	0 (0.00)	1 (0.35)	1 (0.18)	
Pedestrian Looking				Fisher's Exact Test (p<0.001)
Didn't look	1 (0.36)	1 (0.35)	2 (0.36)	
Looked one way	18 (6.52)	3 (1.05)	21 (3.74)	
Looked both ways	243 (88.04)	207 (72.38)	450 (80.07)	
Looked more than 2 times	14 (5.07)	74 (25.87)	88 (15.66)	
Not recorded	0 (0.00)	1 (0.35)	1 (0.18)	
Pedestrian Pace				Fisher's Exact Test (p<0.0001)
Slow	1 (0.36)	0 (0)	1 (0.18)	
Normal	220 (79.71)	96 (33.57)	316 (56.23)	
Fast	23 (8.33)	36 (12.59)	59 (10.5)	
Ran	13 (4.71)	125 (43.71)	138 (24.56)	
Not recorded	19 (6.88)	29 (10.14)	48 (8.54)	
Driver Behavior / Traffic	**Marked**	**Unmarked**	**Total**	**p-value**
Total Vehicle Exposure	276	288	564	
Lane Gaps				Chi square (p<0.0001)
0	23 (8.33)	1 (0.35)	24 (8.68)	
1	52 (18.84)	2 (0.69)	54 (19.53)	
2	64 (23.19)	16 (5.56)	80 (28.75)	
3	61 (22.1)	49 (17.01)	110 (39.11)	
4	76 (27.54)	220 (76.39)	296 (103.93)	
Immediate Yields				Chi square (p<0.001)
0	83 (30.07)	229 (79.51)	312 (55.32)	
1	68 (24.64)	42 (14.58)	110 (19.5)	
2	70 (25.36)	15 (5.21)	85 (15.07)	
3	37 (13.41)	1 (0.35)	38 (6.74)	
4	18 (6.52)	1 (0.35)	19 (3.37)	
Multiple Threat Scenarios				Chi square (p=0.14)
0	268 (97.1)	284 (98.61)	552 (97.87)	
1	8 (2.9)	4 (1.39)	12 (2.13)	

Summary of Statistically Significant Findings, Fox versus Deer:

- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to be young adults.
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to be male.
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to run when crossing.
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to look two or more times.
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to wait for larger gaps in traffic before crossing.
- Pedestrians in the unmarked crosswalk were less likely than pedestrians in the marked crosswalk to have drivers immediately yield the right-of-way to them.

COMPARISON 2: BEAR STREET (MARKED) VERSUS DEER STREET (UNMARKED)

Descriptive Statistics:

TABLE 4 Pedestrian and Driver Behavior by Crosswalk Type, Bear versus Deer

	Bear (Marked) n (column %)	Deer (Unmarked) n (column %)	Total N (column %)	*p*-value
Pedestrians	278	286	564	
Age				Fisher's Exact Test (p<0.001)
Child	4 (1.44)	4 (1.44)	8 (1.42)	
Teen	12 (4.32)	28 (9.79)	40 (7.09)	
Young adult	146 (52.52)	136 (47.55)	282 (50.00)	
Older adult	99 (35.61)	116 (40.56)	215 (38.12)	
Elderly	17 (6.12)	1 (0.35)	18 (3.19)	
Not recorded	0 (0.00)	1 (0.35)	1 (0.18)	
Sex				Fisher's Exact Test (p<0.001)
Male	127 (45.68)	199 (69.58)	326 (57.80)	
Female	151 (54.32)	86 (30.07)	237 (42.02)	
Not recorded	0 (0.00)	1 (0.35)	1 (0.18)	

Analysis Results:

TABLE 5 Pedestrian and Driver Behavior by Crosswalk Type, Bear versus Deer

	Bear (Marked) n (column %)	Deer (Unmarked) N (column %)	Total N (column %)	p-value
Pedestrian Assertiveness				Fisher's Exact Test (p=0.2632)
Waited on curb	61 (21.94)	79 (27.62)	140 (24.82)	
Waited on street	144 (51.8)	127 (44.41)	271 (48.05)	
Did not wait	72 (25.9)	78 (27.27)	150 (26.6)	
Forced driver to yield	1 (0.36)	1 (0.35)	2 (0.35)	
Not recorded	0 (0.00)	1 (0.35)	1 (0.18)	
Pedestrian Looking				Fisher's Exact Test (p<0.0001)
Didn't look	1 (0.36)	1 (0.35)	2 (0.35)	
Looked one way	51 (18.35)	3 (1.05)	54 (9.57)	
Looked both ways	218 (78.42)	207 (72.38)	425 (75.35)	
Looked more than 2 times	5 (1.8)	74 (25.87)	79 (14.01)	
Not recorded	3 (1.08)	1 (0.35)	4 (0.71)	
Pedestrian Pace				Fisher's Exact Test (p<0.001)
Slow	5 (1.8)	0 (0)	5 (1.8)	
Normal	230 (82.73)	96 (33.57)	326 (116.3)	
Fast	11 (3.96)	36 (12.59)	47 (16.55)	
Ran	18 (6.47)	124 (43.36)	142 (49.83)	
Not recorded	14 (5.04)	29 (10.14)	43 (15.18)	
Driver Behavior / Traffic				
Total Vehicle Exposure	288	276	564	
Lane Gaps				Chi square (p<0.0001)
0	32 (11.51)	1 (0.35)	33 (5.83)	
1	63 (22.66)	2 (0.69)	65 (11.48)	
2	85 (30.58)	16 (5.56)	101 (17.84)	
3	61 (21.94)	49 (17.01)	110 (38.95)	
4	37 (13.31)	220 (76.39)	257 (19.43)	
Immediate Yields				Chi square (p<0.0001)
0	38 (13.67)	229 (79.51)	267 (47.17)	
1	68 (24.46)	42 (14.58)	110 (19.43)	
2	94 (33.81)	15 (5.21)	109 (19.26)	
3	51 (18.35)	1 (0.35)	52 (9.19)	
4	27 (9.71)	1 (0.35)	28 (4.95)	
Multiple Threat Scenarios				Chi square (p=0.214)
0	265 (95.32)	284 (98.61)	549 (97.86)	
1	8 (2.90)	4 (1.39)	12 (2.14)	

Summary of Statistically Significant Findings, Bear versus Deer:

- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to be teens.
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to be male.
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to run when crossing.
- Pedestrians in the unmarked crosswalk were more likely to be assertive than pedestrians in the marked crosswalk
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to look two or more times.
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to wait for larger gaps in traffic before crossing.
- Pedestrians in the unmarked crosswalk were less likely than pedestrians in the unmarked crosswalk to have drivers immediately yield the right-of-way to them.

COMPARISON 3: ONYX STREET (MARKED) VERSUS CARNELIAN WOODS (UNMARKED)

Descriptive Statistics:

TABLE 6 Pedestrian and Driver Behavior by Crosswalk Type, Onyx versus Carnelian Woods

	Onyx (Marked) n (column %)	Carnelian Woods (Unmarked) N (column %)	Total N (column %)	*p*-value
Pedestrians	248	232	480	
Age				Fisher's Exact Test (p=0.1214)
Child	3 (1.21)	2 (0.86)	5 (1.04)	
Teen	20 (8.06)	8 (3.45)	28 (5.83)	
Young adult	98 (39.52)	84 (36.21)	182 (37.92)	
Older adult	122 (49.19)	135 (58.19)	257 (53.54)	
Elderly	5 (2.02)	3 (1.29)	8 (1.67)	
Sex				Fisher's Exact Test (p=0.1214)
Male	146 (58.57)	158 (68.1)	304 (63.33)	
Female	102 (41.13)	74 (31.90)	176 (36.67)	

Analysis Results:

TABLE 7 Pedestrian and Driver Behavior by Crosswalk Type, Onyx versus Carnelian Woods

	Onyx (Marked) n (column %)	Carnelian Woods (Unmarked) n (column %)	Total N (column %)	p-value
Pedestrian Behavior				
Assertiveness				Fisher's Exact Test (p<0.0001)
Waited on curb	69 (27.82)	28 (12.07)	97 (20.21)	
Waited on street	114 (45.97)	117 (50.43)	231 (48.13)	
Did not wait	65 (26.21)	86 (37.07)	151 (31.46)	
Forced driver to yield	0 (0)	1 (0.43)	1 (0.21)	
Looking				Fisher's Exact Test (p=0.079)
Didn't look	3 (1.21)	0 (0)	3 (0.63)	
Looked one way	226 (91.13)	203 (87.5)	429 (89.38)	
Looked both ways	18 (7.26)	25 (10.78)	43 (8.96)	
Looked more than 2 times	1 (0.4)	4 (1.72)	5 (1.04)	
Pace				Chi Square (p=0.0359)
Slow	6 (2.42)	2 (0.86)	8 (1.67)	
Normal	169 (68.15)	110 (47.41)	279 (58.13)	
Fast	22 (8.87)	43 (18.53)	65 (13.54)	
Ran	26 (10.48)	52 (22.41)	78 (16.25)	
Not Recorded	25 (10.08)	25 (10.78)	50 (10.42)	
Driver Behavior / Traffic				
Total Vehicle Exposure	248	232	480	
Lane Gaps				Chi square (p<0.001)
0	47 (18.95)	5 (2.16)	52 (10.83)	
1	80 (32.26)	37 (15.95)	117 (24.38)	
2	121 (48.79)	190 (81.9)	311 (64.79)	
Immediate Yields				Chi square (p<0.001)
0	151 (60.89)	213 (91.81)	364 (75.83)	
1	87 (35.08)	19 (8.19)	106 (22.08)	
2	10 (4.03)	0 (0)	10 (2.08)	

Summary of Statistically Significant Findings, Onyx versus Carnelian Woods:

- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to run when crossing.
- Pedestrians in the unmarked crosswalk were more likely to be assertive than pedestrians in the marked crosswalk

- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to wait for larger gaps in traffic before crossing.
- Pedestrians in the unmarked crosswalk were less likely than pedestrians in the unmarked crosswalk to have drivers immediately yield the right-of-way to them.

COMPARISON 4: GRANLIBAKKEN STREET VERSUS PINE STREET (UNMARKED)

Descriptive Statistics:

TABLE 8 Pedestrian and Driver Behavior by Crosswalk Type, Granlibakken versus Pine

	Granlibakken (Marked) n (column %)	Pine (Unmarked) n (column %)	Total N (column %)	*p*-value
Pedestrians	227	177	404	
Age				Fisher's Exact Test (p<0.001)
Child	2 (0.88)	5 (2.82)	7 (1.73)	
Teen	9 (3.96)	11 (6.21)	20 (4.95)	
Young adult	61 (26.87)	79 (44.63)	140 (34.65)	
Older adult	142 (62.56)	76 (42.94)	218 (53.96)	
Elderly	12 (5.29)	6 (3.39)	18 (4.46)	
Not recorded	1 (0.44)	0 (0.00)	1 (0.25)	
Sex				Fisher's Exact Test (p<0.001)
Male	97 (42.73)	105 (59.32)	202 (50)	
Female	129 (56.83)	72 (40.68)	201 (50)	

Analysis Results:

TABLE 9 Pedestrian and Driver Behavior by Crosswalk Type, Granlibakken versus Pine

	Granlibakken (Marked) n (column %)	Pine (Unmarked) n (column %)	Total N (column %)	p-value
Pedestrian Assertiveness				Fisher's Exact Test (p<0.001)
Waited on curb	173 (76.21)	57 (32.2)	230 (56.93)	
Waited on street	13 (6.17)	53 (29.94)	67 (16.58)	
Did not wait	39 (17.18)	67 (37.85)	106 (26.24)	
Forced driver to yield	1 (0.44)	0 (0.00)	1 (0.25)	
Pedestrian Looking				Fisher's Exact Test (p<0.001)
Didn't look	2 (0.88)	0 (0.00)	2 (0.50)	
Looked one way	12 (5.29)	1 (1.00)	13 (3.00)	

Looked both ways	138 (60.79)	102 (57.63)	240 (59.41)	
Looked more than 2 times	75 (33.04)	74 (41.81)	149 (36.88)	
Pedestrian Pace				Fisher's Exact Test (p<0.001)
Slow	2 (0.88)	0 (0.00)	2 (0.00)	
Normal	108 (48.00)	107 (60.45)	215 (53.22)	
Fast	45 (19.82)	11 (6.21)	56 (14.00)	
Ran	33 (14.54)	26 (14.69)	59 (14.60)	
Not recorded	39 (17.18)	33 (18.64)	72 (17.82)	
Driver Behavior / Traffic				
Total Vehicle Exposure	227	177	404	
Lane Gaps				Chi square (p<0.001)
0	70 (30.84)	1 (0.56)	71 (17.57)	
1	93 (40.97)	13 (7.34)	106 (26.24)	
2	64 (28.19)	163 (92.09)	227 (56.19)	
Immediate Yields				Chi square (p<0.001)
0	80 (35.24)	167 (94.35)	247 (61.14)	
1	101 (44.49)	9 (5.08)	110 (27.23)	
2	46 (20.26)	1 (0.56)	47 (11.63)	

Summary of Statistically Significant Findings, Granlibakken versus Pine:

- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to be young adults.
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to be male.
- Pedestrians in the marked crosswalk were more likely than pedestrians in the unmarked crosswalk to run when crossing. (It should be noted that a high number of pedestrians did not have an observed pace in this data set.)
- Pedestrians in the unmarked crosswalk were more likely to be assertive than pedestrians in the marked crosswalk
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to look two or more times.
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to wait for larger gaps in traffic before crossing.
- Pedestrians in the unmarked crosswalk were less likely than pedestrians in the unmarked crosswalk to have drivers immediately yield the right-of-way to them.

COMPARISON 5: SEQUOIA CROSSING (MARKED) VERSUS SUGAR PINE CROSSING (UNMARKED)

Descriptive Statistics:

TABLE 10 Pedestrian and Driver Behavior by Crosswalk Type, Sequoia versus Sugar Pine

	Sequoia (Marked) N (column %)	Sugar Pine (Unmarked) n (column %)	Total N (column %)	*p*-value
Pedestrians	346	259	605	
Age				Fisher's Exact Test (p<.0001)
Child	12 (3.47)	3 (1.16)	15 (2.48)	
Teen	23 (6.65)	17 (6.56)	40 (6.61)	
Young adult	170 (49.13)	21 (8.11)	191 (31.57)	
Older adult	137 (39.60)	215 (83.01)	352 (58.18)	
Elderly	3 (0.87)	3 (1.16)	6 (0.99)	
Not recorded	1 (0.29)	0 (0.00)	1 (0.17)	
Sex				Fisher's Exact Test (p=0.0494)
Male	186 (53.76)	161 (62.16)	347 (57.36)	
Female	159 (45.95)	98 (37.84)	257 (42.48)	

Analysis Results:

TABLE 11 Pedestrian and Driver Behavior by Crosswalk Type, Sequoia versus Sugar Pine

	Sequoia (Marked) N (column %)	Sugar Pine (Unmarked) N (column %)	Total N (column %)	p-value
Pedestrian Assertiveness				Fisher's Exact Test (p<0.001)
Waited on curb	2 (0.58)	1 (0.39)	3 (0.5)	
Waited on street	7 (2.02)	0 (0.00)	7 (1.16)	
Did not wait	297 (85.84)	192 (74.13)	489 (80.83)	
Forced driver to yield	33 (9.54)	66 (25.48)	99 (16.36)	
Not recorded	7 (2.02)	0 (0.00)	7 (1.16)	
Pedestrian Looking				Fisher's Exact Test (p<0.001)
Didn't look	2 (0.58)	1 (0.39)	3 (0.5)	
Looked one way	7 (2.02)	0 (0)	7 (1.16)	
Looked both ways	297 (85.84)	192 (74.13)	489 (80.83)	
Looked more than 2 times	33 (9.54)	66 (25.48)	99 (16.36)	
Not recorded	7 (2.02)	0 (0.00)	7 (1.16)	
Pedestrian Pace				Fisher's Exact Test (p<0.001)
Slow	1 (0.29)	10 (3.86)	11 (1.82)	
Normal	26 (7.51)	13 (5.02)	39 (6.45)	

Fast	189 (54.62)	75 (28.96)	264 (43.64)	
Ran	128 (36.99)	48 (18.53)	176 (29.09)	
Not recorded	0 (0.00)	113 (43.63)	113 (18.68)	
Driver Behavior / Traffic				
Total Vehicle Exposure	346	259	605	
Lane Gaps				Chi square (p<0.001)
0	105 (30.35)	13 (5.02)	118 (19.50)	
1	132 (38.15)	36 (13.90)	168 (27.77)	
2	109 (31.50)	210 (81.08)	319 (52.73)	
Immediate Yields				Chi square (p<0.001)
0	143 (41.33)	219 (84.56)	362 (59.83)	
1	137 (39.60)	32 (12.36)	169 (27.93)	
2	66 (19.08)	8 (3.09)	74 (12.23)	
Bicyclist Behavior				Chi square (p<0.0001)
Rode Bicycle through Crosswalk	190 (62.91)	157 (83.96)	347 (70.96)	
Walked Bicycle through Crosswalk	112 (37.09)	30 (16.04)	142 (29.04)	

Summary of Statistically Significant Findings, Sequoia versus Sugar Pine:

- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to be older adults. (Note this is more likely associated with land use differences.)
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to be male.
- Pedestrians in the unmarked crosswalk were more likely to be assertive than pedestrians in the marked crosswalk
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to look two or more times.
- Pedestrians in the marked crosswalk were more likely than pedestrians in the unmarked crosswalk to run when crossing. (It should be noted that a high number of pedestrians did not have an observed pace in this data set.)
- Pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to wait for larger gaps in traffic before crossing.
- Pedestrians in the marked crosswalk were more likely than pedestrians in the unmarked crosswalk to have drivers immediately yield the right-of-way to them.
- Bicyclists in the marked crosswalk are more likely than bicyclists in the unmarked crosswalk to walk their bicycle when crossing the street.

SUMMARY OF STATISTICALLY SIGNIFICANT RESULTS ACROSS ALL STUDY LOCATIONS

Several overall trends are evident from the study's comparison of pedestrian and driver behavior at nine uncontrolled crosswalks. These trends are summarized in Table 12 and discussed in detail below.

Age

Age was a statistically significant variable for the Fox/Deer, Bear/Deer, Pine/Granlibakken, and Sequoia/Sugar Pine pairs. In all but the Sequoia/Sugar Pine case, pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to be teens or young adults, while pedestrians in the marked crosswalk were more likely than pedestrians in the unmarked crosswalk to be children or elderly. The pattern was different at Sequoia/Sugar Pine, but the different land uses at these sites (the Sugar Pine crossing connects a campground to the Lake while the Sequoia crossing is away from major destinations) may partially account for the difference in age groups using marked versus unmarked crosswalks.

Gender

Gender was a statistically significant variable for all but the Onyx/Carnelian comparison. For the four comparisons where it was statistically significant, pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to be male.

Assertiveness

Pedestrian assertiveness was a statistically significant variable for the Onyx/Carnelian, Pine/Granlibakken, and Sequoia/Sugar Pine comparison sites. For these comparisons, pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to be assertive, waiting in the street instead of on the curb before crossing.

Looking Behavior

Pedestrian looking behavior was a statistically significant variable for all but the Onyx/Carnelian comparison. For the four comparisons where it was statistically significant, pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to look more than twice before crossing.

Pace

Pedestrian pace (walking speed) was a statistically significant variable for all five comparisons. At the three locations where a clear pattern is discernable (Fox/Deer, Bear/Deer, and Onyx/Carnelian), pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to run when crossing.

Gap Acceptance

Gap acceptance was a statistically significant variable for all five comparisons. For all comparisons, pedestrians in the unmarked crosswalk were more likely than pedestrians in the marked crosswalk to wait for larger gaps in traffic before crossing.

Driver Yielding

Driver yielding behavior (immediate yielding) was a statistically significant variable for all five comparisons. In all cases, pedestrians in the unmarked crosswalk were less likely than pedestrians in the marked crosswalk to have drivers immediately yield the right-of-way to them.

Multiple Threat

The incidence of multiple threat opportunities was a not a statistically significant variable for either of the two four-lane comparisons. For both comparisons, pedestrians in the marked crosswalks were involved in a potential multiple threat scenario more often than pedestrians in the unmarked crosswalk. However, this is not a statistically significant finding. The low traffic volumes on SR28 and SR89 may be associated with the lack of statistical significance.

TABLE 12 Summary of Analysis Results – Unmarked Crosswalks Compared to Marked Crosswalks

Comparison		Fox/ Deer	Bear/Deer	Onyx/ Carnelian Woods	Granlibakken / Pine	Sequoia/ Sugar Pine
Lanes		4	4	3	2	2 (midblock)
Speed Limit		30 MPH	30 MPH	45 MPH	35 MPH	35 MPH/ 40 MPH
Estimated Hourly Pedestrian Volume		50/25	100/25	5/10	5/20	55/5
Number of Pedestrian Observations		276/286	278/286	248/232	227/177	346/259
Factors	**Age**	More Young Adults	More Teens		More Young Adults	(excluded)
	Gender	More Males	More Males		More Males	More Males
	Assertiveness			More Assertive	More Assertive	More Assertive
	Looking	More Looking	More Looking		More Looking	More Looking
	Pace	Faster Pace	Faster Pace	Faster Pace		
	Gap	More Gaps	More Gaps	More Gaps	More Gaps	More Gaps
	Yield	Less Yielding	Less Yielding	Less Yielding	Less Yielding	Less Yielding
	Multiple Threat					

DISCUSSION AND INTERPRETATION OF FINDINGS

These study results generally apply to two- and three-lane roads as well as four-lane roads. They also apply to the midblock crossings. However, the differences in marked versus unmarked crosswalks do illustrate that a faster crossing pace is more associated with the multi-lane unmarked crossings versus the marked comparisons, whereas assertiveness is greater for the two and three-lane unmarked crossings versus the marked comparisons.

As with the previous crosswalk study in the San Francisco Bay Area, differences in pedestrian behavior in this study suggest pedestrians exhibit an enhanced level of caution (looking more than two ways, waiting for gaps in traffic, and hurrying across the street) when crossing in unmarked crosswalks compared to crossing in marked crosswalks. This finding is particularly robust in terms of looking behavior and gap acceptance, although it is also evident for pace and assertiveness.

Also similar to the San Francisco study, results from this study suggest that drivers yield more frequently to pedestrians in marked crosswalks compared to unmarked crosswalks. This finding is likely at least partially explained by previous studies that illustrate differences in the knowledge of the right-of-way law with respect to marked and unmarked crosswalks.

Table 13 presents a comparison of the San Francisco study results with the Lake Tahoe study results for the key variables:

TABLE 13 Comparison of Analysis Results – San Francisco versus Lake Tahoe Study

Comparison Variable	San Francisco Unmarked versus Marked Crosswalks	Lake Tahoe Unmarked versus Marked Crosswalks
Age	1 of 6 comparisons significant: more teens (multi-lane only)	3 of 5 comparisons significant: more teens/young adults
Gender	3 of 6 comparisons significant: more males	4 of 5 comparisons significant: more males
Assertiveness	1 of 6 comparisons significant: more assertive (multi-lane only)	3 of 5 comparisons significant: more assertive (two and three-lane only)
Looking	2 of 6 comparisons significant: more looking	4 of 5 comparisons significant: more looking
Pace	4 of 6 comparisons significant: faster pace	5 of 5 comparisons significant: 3 are faster pace (multi-lane only) and 2 are not definitive
Gap	5 of 6 comparisons significant: more gaps	5 of 5 comparisons significant: more gaps
Yield	6 of 6 comparisons significant: less yielding	5 of 5 comparisons significant: less yielding
Multiple Threat	3 of 5 comparisons significant: less multiple threat	0 of 2 comparisons significant

The primary difference in the two studies is with respect to the multiple threat variable. The incidence of multiple threat opportunities was a statistically significant variable at three of the five multi-lane observation sites for the San Francisco study, including three of the four sites with four or more lanes, and both sites with median refuges. The variable was not statistically significant for the Lake Tahoe study. The most likely explanation for this is the low traffic volumes at the four-lane crosswalks. Observations and discussions with Caltrans staff indicate volumes are likely not sufficient to warrant a four-lane facility. A road diet has previously been proposed for this section in Kings Beach for this reason. With low traffic volumes, the pedestrian observation sample size may have been insufficient to detect any potential significant difference in this variable at marked versus unmarked locations. The data does illustrate a trend in greater multiple threat incidences at marked crosswalks.

The primary finding for this study is that the statistically significant trends demonstrated between marked and unmarked crosswalks in the San Francisco urban/suburban study hold for the rural/recreational context at Lake Tahoe. For this reason, the recommendations for engineering, education, and enforcement presented in the San Francisco study are likely applicable for this context as well and thus for Caltrans in general.

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APPENDIX A
DATA COLLECTION PROTOCOL AND FORM

LAKE TAHOE CROSSWALK STUDY DATA COLLECTION PROTOCOL

Observations

Observers should make every effort to be inconspicuous to drivers and pedestrians in the intersection. Observers may sit in a chair or car if observations are not obstructed. Refer to the attached maps and diagrams for driving directions and suggested parking locations.

Definitions and Key Points

- Place an "X" in any field that was missed for each entry (row).
- Ped crossing direction: this indicates the direction of the crossing from one curb to the opposite. Refer to the respective intersection diagram for direction references.
- Ped level assert: this is the position/action of the ped *immediately* before she begins crossing the street (0=wait on curb/ outside crosswalk; 1=wait on street/ inside crosswalk; 2=no wait (includes slowing pace but not stopping); 3=force driver to yield)
- Ped look behavior: this is the behavior of the ped before she enters the *first* lane of vehicle traffic as she is crossing
- Driver Behavior
    - Lane 1 is the first lane the ped enters when crossing. Lane C refers to a center turning lane. Note N/A for any lane number not relevant at a given location.
    - Place a "Y" if the first driver the pedestrian encounters yields (this is an "immediate yield") in each lane. Yielding is defined as a driver slowing or stopping to allow a pedestrian to cross in front of the vehicle.
    - If there is not an immediate yield (meaning the pedestrian must wait until the 2nd, 3rd, etc. vehicle has passed before she can cross):
    - Record Wn if the pedestrian waits for n vehicles and then proceeds with a gap in traffic after the nth car passes in that lane. Note that W3 would indicate the ped waited for three vehicles to pass (none yielding) and then had a gap in that lane.
    - Record Yn if the nth vehicle yields. Note that Y3 would indicate two vehicles did not yield but the third vehicle yielded.
    - If no vehicle is present in the lane, or if a vehicle present in the lane is far enough back from the crosswalk that yielding is not necessary, record a "0" for no vehicle.

- In the first lane the pedestrian will enter when crossing, place a "U" if the driver in that lane is unable to yield because the vehicle is too close to the crosswalk when the ped arrives, and thus the stopping distance required by the vehicle prevents the vehicle from yielding.[1] A U may accompanied by a Wn or Yn (i.e., UW2) to indicate the actions of subsequent vehicles (if any). A U by itself implies the first vehicle was unable to yield and a gap in traffic followed.
- Driver Speeding: Note the lane number of any drivers who appear to be speeding. This will be recorded in the database as percentage of drivers speeding for this observation event.

- Ped age: Determine approximate age range with the following designations:
  - C: child (ages: less than 13)
  - T: teen (ages: 13 to 18)
  - YA: younger adult (ages: 19-35)
  - OA: older adult (ages: 36-64)
  - E: elderly (ages 65+)[2]
- Ped Pace: "Ran" is defined as "ran at all" during the crossing.[3]
- Bicycle: note if someone rode or walked their bicycle across crosswalk ("rode", "walked", or "N/A")
- Group: A group is defined as 2 or more people crossing together. They may or may not have arrived at the intersection together. Observe and record only the actions and interactions of the group leader (usually the first pedestrian in a group; randomly choose one pedestrian to observe if crossing side-by-side). Note the group size in the group size column.
- Both Directions: note if pedestrians crossed in both directions simultaneously
- Evasive: Note whether or not the pedestrian made any evasive maneuvers (such as stopping/turning around in the middle of crossing to allow a vehicle to pass or running to complete crossing before an approaching vehicle gets too close).
- Baby: note if the ped was pushing a stroller or carrying a baby

---

[1] Where possible, a flag or other marker should be placed in advance of the crosswalk to note required stopping distance based on the roadway speed and geometry. If this marker is present, record "U" when the vehicle is beyond the marker when a pedestrian arrives at the crosswalk.

[2] We may remove this variable (subjective) if needed

[3] We may remove this variable (subjective) if needed

- Assistive Device: enter “cane”, “wheelchair”, or other assistive device
- Notes: include any additional notes to describe the event (including use of a flag)

Logistics

Materials required: observation form, clip board, pen/pencil, protocol, intersection diagram

Observation periods should be at least 2 hours. Choose the location and time period you will observe and post this on the Google Crosswalk Schedule at least 24 hours in advance (http://spreadsheets.google.com/ccc?key=pw4u8kJ6TPymEva487D_FYA).

Begin a new sheet with each new observation period (make sure to complete the date and time fields at the top). Enter number of peds observed and cumulative number of peds at the intersection into the Google Schedule after completing an observation period. We will conclude observations when 150 ped entries have been recorded for each marked crosswalk (we will do these first). For the unmarked crosswalks, we will conclude when at least 60 pedestrians have been observed (but ideally also 150).

At the end of each observation period, type the observations into the master database. Have another observer perform a quality control check of your entries versus your field notes. Scan your observation form as a PDF and email to Doug Cooper. Email the master database to Doug at the completion of the observations.

Any questions, contact:

Meghan Mitman at m.mitman@fehrandpeers.com or 415-348-0300

Doug Cooper at dcooper@berkeley.edu or 510-657-2000

Key for for Lane 1, 2, C, 3, 4 Driver Behavior
W=ped had to wait* (see protocol)
Y1=driver immediately yielded
U=driver unable to yield
0=no car

Draft 3, 7/1/08

Intersection: _____

Data Collected by: _____ Start Time: _____ Observation location (i.e. southeast corner): _____

Data Collected on: _____ End Time: _____

	LEAD/ISOLATED PEDESTRIAN				DRIVERS						LEAD/ISOLATED PEDESTRIAN									
Event #	Time Ped Arrived (elapsed)	Ped Crossing Direction (N, E, S, W)	PED LEVEL ASSERT 0=wait on curb 1=wait on street 2=no wait 3=force driver to yield	PED LOOK BEHAVIOR 0=did not look 1=look 1 direction 2=look both directions 3=look more times	Lane 1 Driver	Lane 2 Driver	Lane C Driver	Lane 3 Driver	Lane 4 Driver	Driver Speeding Behavior (new number(s) for any drivers who were speeding)	AGE C=13 T=13-18 YA=19-35 OA=36-64 E=65+	GENDER M=male F=female	PED PACE S=slow N=normal F=fast R=run	BICYCLE Rode/Walked Bike	GROUP SIZE (if the ped crossed in a group)	BOTH DIRECTIONS (yes/no) peds Xing at same time	EVASIVE Did ped have to make evasive maneuvers to avoid a collision when crossing?	BABY Was the ped carrying a baby or pushing a stroller	Assistive Device Enter wheelchair, cane, etc.	Notes (e.i.e. peds used a flag to cross)
1	0:00																			
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				

APPENDIX B
SAS OUTPUT

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Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of AGE by INTERSECTION			
AGE	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**3-Bear**	**Total**
Child	4 1.40	4 1.44	8
Elderly	1 0.35	17 6.12	18
Older Adult	116 40.70	99 35.61	215
Teen	28 9.82	12 4.32	40
Young Adult	136 47.72	146 52.52	282
Total	285	278	563
Frequency Missing = 3			

Statistics for Table of AGE by INTERSECTION

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of AGE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	22.2374	0.0002
Likelihood Ratio Chi-Square	4	25.4250	<.0001
Mantel-Haenszel Chi-Square	1	0.0376	0.8462
Phi Coefficient		0.1987	
Contingency Coefficient		0.1949	
Cramer's V		0.1987	

Fisher's Exact Test	
Table Probability (P)	3.281E-09
Pr <= P	5.422E-05

Effective Sample Size = 563
Frequency Missing = 3

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GENDER by INTERSECTION			
GENDER	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**3-Bear**	**Total**
----	1 0.35	0 0.00	1
F	86 30.07	151 54.32	237
M	199 69.58	127 45.68	326
Total	286	278	564
Frequency Missing = 2			

Statistics for Table of GENDER by INTERSECTION

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GENDER by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	34.6223	<.0001
Likelihood Ratio Chi-Square	2	35.3640	<.0001
Mantel-Haenszel Chi-Square	1	31.4963	<.0001
Phi Coefficient		0.2478	
Contingency Coefficient		0.2405	
Cramer's V		0.2478	
WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	1.519E-09
Pr <= P	7.159E-09

Effective Sample Size = 564
Frequency Missing = 2

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LOOK_BEHAVIOR by INTERSECTION			
PED_LOOK_BEHAVIOR	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**3-Bear**	**Total**
Did not look	1 0.35	1 0.36	2
Look 1 direction	3 1.05	51 18.55	54
Look both directions	207 72.63	218 79.27	425
Look more times	74 25.96	5 1.82	79
Total	285	275	560
Frequency Missing = 6			

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	103.0715	<.0001
Likelihood Ratio Chi-Square	3	124.0342	<.0001
Mantel-Haenszel Chi-Square	1	96.8632	<.0001
Phi Coefficient		0.4290	
Contingency Coefficient		0.3943	
Cramer's V		0.4290	
WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	2.794E-29
Pr <= P	2.430E-27

Effective Sample Size = 560
Frequency Missing = 6

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LEVEL_ASSERT by INTERSECTION			
PED_LEVEL_ASSERT	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**3-Bear**	**Total**
Wait on curb/outside crosswalk	79 27.72	61 21.94	140
Wait on street/inside crosswalk	127 44.56	144 51.80	271
No wait	78 27.37	72 25.90	150
Force driver to yield	1 0.35	1 0.36	2
Total	285	278	563
Frequency Missing = 3			

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	3.5342	0.3164
Likelihood Ratio Chi-Square	3	3.5409	0.3155
Mantel-Haenszel Chi-Square	1	0.4971	0.4808
Phi Coefficient		0.0792	
Contingency Coefficient		0.0790	
Cramer's V		0.0792	
WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	5.429E-04
Pr <= P	0.2592

Effective Sample Size = 563
Frequency Missing = 3

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_PACE by INTERSECTION			
PED_PACE	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**3-Bear**	**Total**
----	29 10.14	14 5.04	43
F	36 12.59	11 3.96	47
N	96 33.57	230 82.73	326
R	124 43.36	18 6.47	142
S	0 0.00	5 1.80	5
S-R	1 0.35	0 0.00	1
Total	286	278	564
Frequency Missing = 2			

Statistics for Table of PED_PACE by INTERSECTION

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_PACE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	5	158.6554	<.0001
Likelihood Ratio Chi-Square	5	173.1858	<.0001
Mantel-Haenszel Chi-Square	1	4.8970	0.0269
Phi Coefficient		0.5304	
Contingency Coefficient		0.4686	
Cramer's V		0.5304	
WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	6.277E-41
Pr <= P	1.207E-36

Effective Sample Size = 564
Frequency Missing = 2

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of TOTAL_DRV_YIELD by INTERSECTION			
TOTAL_DRV_YIELD	**INTERSECTION**		
Frequency **Col Pct**	**2-Deer**	**3-Bear**	**Total**
0	220 76.39	37 13.31	257
1	49 17.01	61 21.94	110
2	16 5.56	85 30.58	101
3	2 0.69	63 22.66	65
4	1 0.35	32 11.51	33
Total	288	278	566

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	265.0285	<.0001
Likelihood Ratio Chi-Square	4	306.3582	<.0001
Mantel-Haenszel Chi-Square	1	241.8064	<.0001
Phi Coefficient		0.6843	
Contingency Coefficient		0.5647	
Cramer's V		0.6843	

Fisher's Exact Test	
Table Probability (P)	5.342E-70
Pr <= P	.

Sample Size = 566

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of VEHICLES_BEFORE_YIELDS by INTERSECTION			
VEHICLES_BEFORE_YIELDS	**INTERSECTION**		
Frequency **Col Pct**	**2-Deer**	**3-Bear**	**Total**
0	220 76.39	37 13.31	257
1	49 17.01	61 21.94	110
2	16 5.56	85 30.58	101
3	1 0.35	63 22.66	64
4	2 0.69	32 11.51	34
Total	288	278	566

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	265.1943	<.0001
Likelihood Ratio Chi-Square	4	307.6685	<.0001
Mantel-Haenszel Chi-Square	1	239.5391	<.0001
Phi Coefficient		0.6845	
Contingency Coefficient		0.5648	
Cramer's V		0.6845	

Fisher's Exact Test	
Table Probability (P)	2.794E-70
Pr <= P	.

Sample Size = 566

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of IMMEDIATE by INTERSECTION			
IMMEDIATE	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**3-Bear**	**Total**
0	229 79.51	38 13.67	267
1	42 14.58	68 24.46	110
2	15 5.21	94 33.81	109
3	1 0.35	51 18.35	52
4	1 0.35	27 9.71	28
Total	288	278	566

Statistics for Table of IMMEDIATE by INTERSECTION

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of IMMEDIATE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	272.1634	<.0001
Likelihood Ratio Chi-Square	4	313.8437	<.0001
Mantel-Haenszel Chi-Square	1	240.7527	<.0001
Phi Coefficient		0.6934	
Contingency Coefficient		0.5698	
Cramer's V		0.6934	

Fisher's Exact Test	
Table Probability (P)	1.763E-71
Pr <= P	.

Sample Size = 566

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GAPS by INTERSECTION			
GAPS	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**3-Bear**	**Total**
0	1 0.35	32 11.51	33
1	2 0.69	63 22.66	65
2	16 5.56	85 30.58	101
3	49 17.01	61 21.94	110
4	220 76.39	37 13.31	257
Total	288	278	566

Statistics for Table of GAPS by INTERSECTION

Bear_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GAPS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	265.0285	<.0001
Likelihood Ratio Chi-Square	4	306.3582	<.0001
Mantel-Haenszel Chi-Square	1	241.8064	<.0001
Phi Coefficient		0.6843	
Contingency Coefficient		0.5647	
Cramer's V		0.6843	

Fisher's Exact Test	
Table Probability (P)	5.342E-70
Pr <= P	.

Sample Size = 566

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of AGE by INTERSECTION			
AGE	**INTERSECTION**		
Frequency Col Pct	**1-Fox_**	**2-Deer**	**Total**
Child	5 1.82	4 1.40	9
Elderly	14 5.09	1 0.35	15
Older Adult	120 43.64	116 40.70	236
Teen	37 13.45	28 9.82	65
Young Adult	99 36.00	136 47.72	235
Total	275	285	560
Frequency Missing = 4			

Statistics for Table of AGE by INTERSECTION

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of AGE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	18.3445	0.0011
Likelihood Ratio Chi-Square	4	20.5471	0.0004
Mantel-Haenszel Chi-Square	1	8.3147	0.0039
Phi Coefficient		0.1810	
Contingency Coefficient		0.1781	
Cramer's V		0.1810	

Fisher's Exact Test	
Table Probability (P)	2.759E-08
Pr <= P	5.151E-04

Effective Sample Size = 560
Frequency Missing = 4

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GENDER by INTERSECTION			
GENDER	**INTERSECTION**		
Frequency Col Pct	**1-Fox_**	**2-Deer**	**Total**
----	0 0.00	1 0.35	1
F	122 44.20	86 30.07	208
M	154 55.80	199 69.58	353
Total	276	286	562
Frequency Missing = 2			

Statistics for Table of GENDER by INTERSECTION

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GENDER by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	12.7934	0.0017
Likelihood Ratio Chi-Square	2	13.2228	0.0013
Mantel-Haenszel Chi-Square	1	10.6491	0.0011
Phi Coefficient		0.1509	
Contingency Coefficient		0.1492	
Cramer's V		0.1509	
WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	9.595E-05
Pr <= P	6.414E-04

Effective Sample Size = 562
Frequency Missing = 2

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LOOK_BEHAVIOR by INTERSECTION			
PED_LOOK_BEHAVIOR	**INTERSECTION**		
Frequency Col Pct	**1-Fox_**	**2-Deer**	**Total**
Did not look	1 0.36	1 0.35	2
Look 1 direction	18 6.52	3 1.05	21
Look both directions	243 88.04	207 72.63	450
Look more times	14 5.07	74 25.96	88
Total	276	285	561
Frequency Missing = 3			

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	54.3730	<.0001
Likelihood Ratio Chi-Square	3	59.5038	<.0001
Mantel-Haenszel Chi-Square	1	49.7253	<.0001
Phi Coefficient		0.3113	
Contingency Coefficient		0.2973	
Cramer's V		0.3113	
WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	1.877E-15
Pr <= P	1.369E-13

Effective Sample Size = 561
Frequency Missing = 3

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LEVEL_ASSERT by INTERSECTION			
PED_LEVEL_ASSERT	**INTERSECTION**		
Frequency Col Pct	**1-Fox_**	**2-Deer**	**Total**
Wait on curb/outside crosswalk	53 19.20	79 27.72	132
Wait on street/inside crosswalk	130 47.10	127 44.56	257
No wait	91 32.97	78 27.37	169
Force driver to yield	2 0.72	1 0.35	3
Total	276	285	561
Frequency Missing = 3			

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	6.3468	0.0959
Likelihood Ratio Chi-Square	3	6.3863	0.0943
Mantel-Haenszel Chi-Square	1	5.6034	0.0179
Phi Coefficient		0.1064	
Contingency Coefficient		0.1058	
Cramer's V		0.1064	
WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	1.170E-04
Pr <= P	0.0738

Effective Sample Size = 561
Frequency Missing = 3

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_PACE by INTERSECTION			
PED_PACE	**INTERSECTION**		
Frequency Col Pct	**1-Fox_**	**2-Deer**	**Total**
----	19 6.88	29 10.14	48
F	23 8.33	36 12.59	59
N	220 79.71	96 33.57	316
R	13 4.71	124 43.36	137
S	1 0.36	0 0.00	1
S-R	0 0.00	1 0.35	1
Total	276	286	562
Frequency Missing = 2			

Statistics for Table of PED_PACE by INTERSECTION

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_PACE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	5	145.4084	<.0001
Likelihood Ratio Chi-Square	5	161.5383	<.0001
Mantel-Haenszel Chi-Square	1	15.6437	<.0001
Phi Coefficient		0.5087	
Contingency Coefficient		0.4534	
Cramer's V		0.5087	
WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	1.738E-38
Pr <= P	1.719E-34

Effective Sample Size = 562
Frequency Missing = 2

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of TOTAL_DRV_YIELD by INTERSECTION			
TOTAL_DRV_YIELD	**INTERSECTION**		
Frequency Col Pct	**1-Fox_**	**2-Deer**	**Total**
0	76 27.54	220 76.39	296
1	61 22.10	49 17.01	110
2	64 23.19	16 5.56	80
3	52 18.84	2 0.69	54
4	23 8.33	1 0.35	24
Total	276	288	564

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	166.4461	<.0001
Likelihood Ratio Chi-Square	4	187.7222	<.0001
Mantel-Haenszel Chi-Square	1	158.1820	<.0001
Phi Coefficient		0.5432	
Contingency Coefficient		0.4774	
Cramer's V		0.5432	

Fisher's Exact Test	
Table Probability (P)	2.388E-44
Pr <= P	.

Sample Size = 564

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of VEHICLES_BEFORE_YIELDS by INTERSECTION			
VEHICLES_BEFORE_YIELDS	**INTERSECTION**		
Frequency **Col Pct**	**1-Fox_**	**2-Deer**	**Total**
0	76 27.54	220 76.39	296
1	59 21.38	49 17.01	108
2	62 22.46	16 5.56	78
3	42 15.22	1 0.35	43
4	28 10.14	2 0.69	30
5	5 1.81	0 0.00	5
6	1 0.36	0 0.00	1
7	1 0.36	0 0.00	1
8	1 0.36	0 0.00	1
10	1 0.36	0 0.00	1
Total	276	288	564

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	9	168.5555	<.0001
Likelihood Ratio Chi-Square	9	192.2431	<.0001
Mantel-Haenszel Chi-Square	1	144.8865	<.0001
Phi Coefficient		0.5467	
Contingency Coefficient		0.4797	
Cramer's V		0.5467	
WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	2.533E-45
Pr <= P	.

Sample Size = 564

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of IMMEDIATE by INTERSECTION			
IMMEDIATE	**INTERSECTION**		
Frequency Col Pct	**1-Fox_**	**2-Deer**	**Total**
0	83 30.07	229 79.51	312
1	68 24.64	42 14.58	110
2	70 25.36	15 5.21	85
3	37 13.41	1 0.35	38
4	18 6.52	1 0.35	19
Total	276	288	564

Statistics for Table of IMMEDIATE by INTERSECTION

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of IMMEDIATE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	159.1867	<.0001
Likelihood Ratio Chi-Square	4	177.5607	<.0001
Mantel-Haenszel Chi-Square	1	147.0143	<.0001
Phi Coefficient		0.5313	
Contingency Coefficient		0.4692	
Cramer's V		0.5313	

Fisher's Exact Test	
Table Probability (P)	5.236E-42
Pr <= P	2.645E-37

Sample Size = 564

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GAPS by INTERSECTION			
GAPS	**INTERSECTION**		
Frequency Col Pct	**1-Fox_**	**2-Deer**	**Total**
0	23 8.33	1 0.35	24
1	52 18.84	2 0.69	54
2	64 23.19	16 5.56	80
3	61 22.10	49 17.01	110
4	76 27.54	220 76.39	296
Total	276	288	564

Statistics for Table of GAPS by INTERSECTION

Fox_ Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GAPS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	166.4461	<.0001
Likelihood Ratio Chi-Square	4	187.7222	<.0001
Mantel-Haenszel Chi-Square	1	158.1820	<.0001
Phi Coefficient		0.5432	
Contingency Coefficient		0.4774	
Cramer's V		0.5432	

Fisher's Exact Test	
Table Probability (P)	2.388E-44
Pr <= P	.

Sample Size = 564

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of AGE by INTERSECTION			
AGE	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**CombinedFox_Bear**	**Total**
Child	4 1.40	9 1.63	13
Elderly	1 0.35	31 5.61	32
Older Adult	116 40.70	219 39.60	335
Teen	28 9.82	49 8.86	77
Young Adult	136 47.72	245 44.30	381
Total	285	553	838
Frequency Missing = 4			

Statistics for Table of AGE by INTERSECTION

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of AGE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	14.3908	0.0061
Likelihood Ratio Chi-Square	4	19.8136	0.0005
Mantel-Haenszel Chi-Square	1	2.9964	0.0834
Phi Coefficient		0.1310	
Contingency Coefficient		0.1299	
Cramer's V		0.1310	

Fisher's Exact Test	
Table Probability (P)	2.755E-08
Pr <= P	0.0010

Effective Sample Size = 838
Frequency Missing = 4

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GENDER by INTERSECTION			
GENDER	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**CombinedFox_Bear**	**Total**
----	1 0.35	0 0.00	1
F	86 30.07	273 49.28	359
M	199 69.58	281 50.72	480
Total	286	554	840
Frequency Missing = 2			

Statistics for Table of GENDER by INTERSECTION

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GENDER by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	29.9599	<.0001
Likelihood Ratio Chi-Square	2	30.8192	<.0001
Mantel-Haenszel Chi-Square	1	26.0826	<.0001
Phi Coefficient		0.1889	
Contingency Coefficient		0.1856	
Cramer's V		0.1889	
WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	1.273E-08
Pr <= P	6.499E-08

Effective Sample Size = 840
Frequency Missing = 2

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LOOK_BEHAVIOR by INTERSECTION			
PED_LOOK_BEHAVIOR	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**CombinedFox_Bear**	**Total**
Did not look	1 0.35	2 0.36	3
Look 1 direction	3 1.05	69 12.52	72
Look both directions	207 72.63	461 83.67	668
Look more times	74 25.96	19 3.45	93
Total	285	551	836
Frequency Missing = 6			

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	117.1666	<.0001
Likelihood Ratio Chi-Square	3	122.8922	<.0001
Mantel-Haenszel Chi-Square	1	102.6598	<.0001
Phi Coefficient		0.3744	
Contingency Coefficient		0.3506	
Cramer's V		0.3744	
WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	2.456E-29
Pr <= P	4.802E-27

Effective Sample Size = 836
Frequency Missing = 6

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LEVEL_ASSERT by INTERSECTION			
PED_LEVEL_ASSERT	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**CombinedFox_Bear**	**Total**
Wait on curb/outside crosswalk	79 27.72	114 20.58	193
Wait on street/inside crosswalk	127 44.56	274 49.46	401
No wait	78 27.37	163 29.42	241
Force driver to yield	1 0.35	3 0.54	4
Total	285	554	839
Frequency Missing = 3			

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	5.5366	0.1365
Likelihood Ratio Chi-Square	3	5.4389	0.1423
Mantel-Haenszel Chi-Square	1	3.2411	0.0718
Phi Coefficient		0.0812	
Contingency Coefficient		0.0810	
Cramer's V		0.0812	
WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	1.310E-04
Pr <= P	0.1226

Effective Sample Size = 839
Frequency Missing = 3

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_PACE by INTERSECTION			
PED_PACE	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**CombinedFox_Bear**	**Total**
----	29 10.14	33 5.96	62
F	36 12.59	34 6.14	70
N	96 33.57	450 81.23	546
R	124 43.36	31 5.60	155
S	0 0.00	6 1.08	6
S-R	1 0.35	0 0.00	1
Total	286	554	840
Frequency Missing = 2			

Statistics for Table of PED_PACE by INTERSECTION

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_PACE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	5	230.6000	<.0001
Likelihood Ratio Chi-Square	5	231.8869	<.0001
Mantel-Haenszel Chi-Square	1	14.9209	0.0001
Phi Coefficient		0.5240	
Contingency Coefficient		0.4641	
Cramer's V		0.5240	
WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	5.250E-54
Pr <= P	.

Effective Sample Size = 840
Frequency Missing = 2

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of TOTAL_DRV_YIELD by INTERSECTION			
TOTAL_DRV_YIELD	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**CombinedFox_Bear**	**Total**
0	220 76.39	113 20.40	333
1	49 17.01	122 22.02	171
2	16 5.56	149 26.90	165
3	2 0.69	115 20.76	117
4	1 0.35	55 9.93	56
Total	288	554	842

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	277.6346	<.0001
Likelihood Ratio Chi-Square	4	314.9257	<.0001
Mantel-Haenszel Chi-Square	1	242.4475	<.0001
Phi Coefficient		0.5742	
Contingency Coefficient		0.4980	
Cramer's V		0.5742	

Fisher's Exact Test	
Table Probability (P)	4.673E-72
Pr <= P	.

Sample Size = 842

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of VEHICLES_BEFORE_YIELDS by INTERSECTION			
VEHICLES_BEFORE_YIELDS	**INTERSECTION**		
Frequency **Col Pct**	**2-Deer**	**CombinedFox_Bear**	**Total**
0	220 76.39	113 20.40	333
1	49 17.01	120 21.66	169
2	16 5.56	147 26.53	163
3	1 0.35	105 18.95	106
4	2 0.69	60 10.83	62
5	0 0.00	5 0.90	5
6	0 0.00	1 0.18	1
7	0 0.00	1 0.18	1
8	0 0.00	1 0.18	1
10	0 0.00	1 0.18	1
Total	288	554	842

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	9	278.5549	<.0001
Likelihood Ratio Chi-Square	9	317.9827	<.0001
Mantel-Haenszel Chi-Square	1	225.0568	<.0001
Phi Coefficient		0.5752	
Contingency Coefficient		0.4986	
Cramer's V		0.5752	
WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	1.020E-72
Pr <= P	.

Sample Size = 842

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of IMMEDIATE by INTERSECTION			
IMMEDIATE	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**CombinedFox_Bear**	**Total**
0	229 79.51	121 21.84	350
1	42 14.58	136 24.55	178
2	15 5.21	164 29.60	179
3	1 0.35	88 15.88	89
4	1 0.35	45 8.12	46
Total	288	554	842

Statistics for Table of IMMEDIATE by INTERSECTION

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of IMMEDIATE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	277.8197	<.0001
Likelihood Ratio Chi-Square	4	312.2462	<.0001
Mantel-Haenszel Chi-Square	1	232.9542	<.0001
Phi Coefficient		0.5744	
Contingency Coefficient		0.4981	
Cramer's V		0.5744	

Fisher's Exact Test	
Table Probability (P)	2.516E-71
Pr <= P	.

Sample Size = 842

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GAPS by INTERSECTION			
GAPS	**INTERSECTION**		
Frequency Col Pct	**2-Deer**	**CombinedFox_Bear**	**Total**
0	1 0.35	55 9.93	56
1	2 0.69	115 20.76	117
2	16 5.56	149 26.90	165
3	49 17.01	122 22.02	171
4	220 76.39	113 20.40	333
Total	288	554	842

Statistics for Table of GAPS by INTERSECTION

Bear_Fox__combined_Deer Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GAPS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	277.6346	<.0001
Likelihood Ratio Chi-Square	4	314.9257	<.0001
Mantel-Haenszel Chi-Square	1	242.4475	<.0001
Phi Coefficient		0.5742	
Contingency Coefficient		0.4980	
Cramer's V		0.5742	

Fisher's Exact Test	
Table Probability (P)	4.673E-72
Pr <= P	.

Sample Size = 842

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of AGE by INTERSECTION			
AGE	**INTERSECTION**		
Frequency Col Pct	**4-Onyx**	**5-Carnelian**	**Total**
Child	3 1.21	2 0.86	5
Elderly	5 2.02	3 1.29	8
Older Adult	122 49.19	135 58.19	257
Teen	20 8.06	8 3.45	28
Young Adult	98 39.52	84 36.21	182
Total	248	232	480

Statistics for Table of AGE by INTERSECTION

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of AGE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	7.0519	0.1332
Likelihood Ratio Chi-Square	4	7.2223	0.1246
Mantel-Haenszel Chi-Square	1	1.1232	0.2892
Phi Coefficient		0.1212	
Contingency Coefficient		0.1203	
Cramer's V		0.1212	
WARNING: 40% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	3.513E-05
Pr <= P	0.1214

Sample Size = 480

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GENDER by INTERSECTION			
GENDER	**INTERSECTION**		
Frequency Col Pct	**4-Onyx**	**5-Carnelian**	**Total**
F	102 41.13	74 31.90	176
M	146 58.87	158 68.10	304
Total	248	232	480

Statistics for Table of GENDER by INTERSECTION

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GENDER by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	1	4.3998	0.0359
Likelihood Ratio Chi-Square	1	4.4139	0.0356
Continuity Adj. Chi-Square	1	4.0112	0.0452
Mantel-Haenszel Chi-Square	1	4.3906	0.0361
Phi Coefficient		0.0957	
Contingency Coefficient		0.0953	
Cramer's V		0.0957	

Fisher's Exact Test	
Cell (1,1) Frequency (F)	102
Left-sided Pr <= F	0.9859
Right-sided Pr >= F	0.0225
Table Probability (P)	0.0084
Two-sided Pr <= P	0.0376

Sample Size = 480

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LOOK_BEHAVIOR by INTERSECTION			
PED_LOOK_BEHAVIOR	**INTERSECTION**		
Frequency **Col Pct**	**4-Onyx**	**5-Carnelian**	**Total**
Look 1 direction	3 1.21	0 0.00	3
Look both directions	226 91.13	203 87.50	429
Look more times	18 7.26	25 10.78	43
Unknown	1 0.40	4 1.72	5
Total	248	232	480

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	6.6467	0.0841
Likelihood Ratio Chi-Square	3	7.9312	0.0475
Mantel-Haenszel Chi-Square	1	5.1291	0.0235
Phi Coefficient		0.1177	
Contingency Coefficient		0.1169	
Cramer's V		0.1177	
WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	0.0010
Pr <= P	0.0790

Sample Size = 480

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LEVEL_ASSERT by INTERSECTION			
PED_LEVEL_ASSERT	**INTERSECTION**		
Frequency **Col Pct**	**4-Onyx**	**5-Carnelian**	**Total**
Wait on curb/outside crosswalk	69 27.82	28 12.07	97
Wait on street/inside crosswalk	114 45.97	117 50.43	231
No wait	65 26.21	86 37.07	151
Force driver to yield	0 0.00	1 0.43	1
Total	248	232	480

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	20.7791	0.0001
Likelihood Ratio Chi-Square	3	21.7086	<.0001
Mantel-Haenszel Chi-Square	1	17.6570	<.0001
Phi Coefficient		0.2081	
Contingency Coefficient		0.2037	
Cramer's V		0.2081	
WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	1.623E-07
Pr <= P	4.208E-05

Sample Size = 480

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_PACE by INTERSECTION			
PED_PACE	**INTERSECTION**		
Frequency Col Pct	**4-Onyx**	**5-Carnelian**	**Total**
----	25 10.08	25 10.78	50
F	22 8.87	43 18.53	65
N	169 68.15	110 47.41	279
R	26 10.48	52 22.41	78
S	6 2.42	2 0.86	8
Total	248	232	480

Statistics for Table of PED_PACE by INTERSECTION

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_PACE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	29.4273	<.0001
Likelihood Ratio Chi-Square	4	29.8736	<.0001
Mantel-Haenszel Chi-Square	1	0.0789	0.7787
Phi Coefficient		0.2476	
Contingency Coefficient		0.2403	
Cramer's V		0.2476	

Fisher's Exact Test	
Table Probability (P)	1.518E-10
Pr <= P	4.070E-06

Sample Size = 480

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of TOTAL_DRV_YIELD by INTERSECTION			
TOTAL_DRV_YIELD	**INTERSECTION**		
Frequency **Col Pct**	**4-Onyx**	**5-Carnelian**	**Total**
0	121 48.79	190 81.90	311
1	80 32.26	37 15.95	117
2	47 18.95	5 2.16	52
Total	248	232	480

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	64.5736	<.0001
Likelihood Ratio Chi-Square	2	70.2495	<.0001
Mantel-Haenszel Chi-Square	1	64.0463	<.0001
Phi Coefficient		0.3668	
Contingency Coefficient		0.3443	
Cramer's V		0.3668	

Fisher's Exact Test	
Table Probability (P)	1.034E-17
Pr <= P	8.305E-16

Sample Size = 480

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of VEHICLES_BEFORE_YIELDS by INTERSECTION			
VEHICLES_BEFORE_YIELDS	**INTERSECTION**		
Frequency **Col Pct**	**4-Onyx**	**5-Carnelian**	**Total**
0	121 48.79	190 81.90	311
1	79 31.85	35 15.09	114
2	45 18.15	7 3.02	52
4	1 0.40	0 0.00	1
5	1 0.40	0 0.00	1
6	1 0.40	0 0.00	1
Total	248	232	480

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	5	62.5966	<.0001
Likelihood Ratio Chi-Square	5	67.4940	<.0001
Mantel-Haenszel Chi-Square	1	56.5676	<.0001
Phi Coefficient		0.3611	
Contingency Coefficient		0.3397	
Cramer's V		0.3611	
WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	3.635E-17
Pr <= P	2.333E-14

Sample Size = 480

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of IMMEDIATE by INTERSECTION			
IMMEDIATE	**INTERSECTION**		
Frequency **Col Pct**	**4-Onyx**	**5-Carnelian**	**Total**
0	151 60.89	213 91.81	364
1	87 35.08	19 8.19	106
2	10 4.03	0 0.00	10
Total	248	232	480

Statistics for Table of IMMEDIATE by INTERSECTION

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of IMMEDIATE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	63.7205	<.0001
Likelihood Ratio Chi-Square	2	71.1964	<.0001
Mantel-Haenszel Chi-Square	1	62.1262	<.0001
Phi Coefficient		0.3644	
Contingency Coefficient		0.3423	
Cramer's V		0.3644	

Fisher's Exact Test	
Table Probability (P)	4.060E-17
Pr <= P	5.330E-16

Sample Size = 480

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GAPS by INTERSECTION			
GAPS	**INTERSECTION**		
Frequency Col Pct	**4-Onyx**	**5-Carnelian**	**Total**
0	47 18.95	5 2.16	52
1	80 32.26	37 15.95	117
2	121 48.79	190 81.90	311
Total	248	232	480

Statistics for Table of GAPS by INTERSECTION

Onyx_Carnelian Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GAPS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	64.5736	<.0001
Likelihood Ratio Chi-Square	2	70.2495	<.0001
Mantel-Haenszel Chi-Square	1	64.0463	<.0001
Phi Coefficient		0.3668	
Contingency Coefficient		0.3443	
Cramer's V		0.3668	

Fisher's Exact Test	
Table Probability (P)	1.034E-17
Pr <= P	8.305E-16

Sample Size = 480

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of AGE by INTERSECTION			
AGE	**INTERSECTION**		
Frequency Col Pct	**8-Sequoia**	**9-Sugar Pine**	**Total**
Child	12 3.47	3 1.16	15
Elderly	3 0.87	3 1.16	6
Older Adult	137 39.60	215 83.01	352
Teen	23 6.65	17 6.56	40
Unknown	1 0.29	0 0.00	1
Young Adult	170 49.13	21 8.11	191
Total	346	259	605

Statistics for Table of AGE by INTERSECTION

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of AGE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	5	131.0183	<.0001
Likelihood Ratio Chi-Square	5	145.4014	<.0001
Mantel-Haenszel Chi-Square	1	100.0580	<.0001
Phi Coefficient		0.4654	
Contingency Coefficient		0.4219	
Cramer's V		0.4654	
WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	3.234E-35
Pr <= P	2.773E-31

Sample Size = 605

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GENDER by INTERSECTION			
GENDER	**INTERSECTION**		
Frequency Col Pct	**8-Sequoia**	**9-Sugar Pine**	**Total**
M	0 0.00	1 0.39	1
C	1 0.29	0 0.00	1
F	159 45.95	98 37.84	257
M	186 53.76	160 61.78	346
Total	346	259	605

Statistics for Table of GENDER by INTERSECTION

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GENDER by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	6.0467	0.1094
Likelihood Ratio Chi-Square	3	6.7917	0.0788
Mantel-Haenszel Chi-Square	1	3.2455	0.0716
Phi Coefficient		0.1000	
Contingency Coefficient		0.0995	
Cramer's V		0.1000	
WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	0.0023
Pr <= P	0.0494

Sample Size = 605

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LOOK_BEHAVIOR by INTERSECTION			
PED_LOOK_BEHAVIOR	**INTERSECTION**		
Frequency **Col Pct**	**8-Sequoia**	**9-Sugar Pine**	**Total**
Did not look	2 0.58	1 0.39	3
Look 1 direction	7 2.02	0 0.00	7
Look both directions	297 85.84	192 74.13	489
Look more times	33 9.54	66 25.48	99
Unknown	7 2.02	0 0.00	7
Total	346	259	605

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	36.1154	<.0001
Likelihood Ratio Chi-Square	4	41.1296	<.0001
Mantel-Haenszel Chi-Square	1	14.1419	0.0002
Phi Coefficient		0.2443	
Contingency Coefficient		0.2373	
Cramer's V		0.2443	
WARNING: 60% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	4.977E-11
Pr <= P	1.938E-08

Sample Size = 605

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LEVEL_ASSERT by INTERSECTION			
PED_LEVEL_ASSERT	**INTERSECTION**		
Frequency **Col Pct**	**8-Sequoia**	**9-Sugar Pine**	**Total**
Wait on curb/outside crosswalk	254 73.41	166 64.09	420
Wait on street/inside crosswalk	12 3.47	0 0.00	12
No wait	76 21.97	93 35.91	169
Force driver to yield	4 1.16	0 0.00	4
Total	346	259	605

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	24.1365	<.0001
Likelihood Ratio Chi-Square	3	29.9149	<.0001
Mantel-Haenszel Chi-Square	1	7.7371	0.0054
Phi Coefficient		0.1997	
Contingency Coefficient		0.1959	
Cramer's V		0.1997	
WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	2.388E-08
Pr <= P	3.898E-06

Sample Size = 605

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_PACE by INTERSECTION			
PED_PACE	**INTERSECTION**		
Frequency Col Pct	**8-Sequoia**	**9-Sugar Pine**	**Total**
'----	0 0.00	113 43.63	113
----	189 54.62	75 28.96	264
F	26 7.51	13 5.02	39
N	128 36.99	48 18.53	176
R	1 0.29	10 3.86	11
X	2 0.58	0 0.00	2
Total	346	259	605

Statistics for Table of PED_PACE by INTERSECTION

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_PACE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	5	203.9955	<.0001
Likelihood Ratio Chi-Square	5	248.4509	<.0001
Mantel-Haenszel Chi-Square	1	60.8784	<.0001
Phi Coefficient		0.5807	
Contingency Coefficient		0.5022	
Cramer's V		0.5807	
WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	6.501E-57
Pr <= P	.

Sample Size = 605

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of TOTAL_DRV_YIELD by INTERSECTION			
TOTAL_DRV_YIELD	**INTERSECTION**		
Frequency **Col Pct**	**8-Sequoia**	**9-Sugar Pine**	**Total**
0	109 31.50	210 81.08	319
1	132 38.15	36 13.90	168
2	105 30.35	13 5.02	118
Total	346	259	605

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	149.1373	<.0001
Likelihood Ratio Chi-Square	2	160.0209	<.0001
Mantel-Haenszel Chi-Square	1	135.5894	<.0001
Phi Coefficient		0.4965	
Contingency Coefficient		0.4447	
Cramer's V		0.4965	

Fisher's Exact Test	
Table Probability (P)	2.237E-37
Pr <= P	2.509E-35

Sample Size = 605

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of VEHICLES_BEFORE_YIELDS by INTERSECTION			
VEHICLES_BEFORE_YIELDS	**INTERSECTION**		
Frequency **Col Pct**	**8-Sequoia**	**9-Sugar Pine**	**Total**
0	109 31.50	210 81.08	319
1	132 38.15	36 13.90	168
2	105 30.35	13 5.02	118
Total	346	259	605

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	149.1373	<.0001
Likelihood Ratio Chi-Square	2	160.0209	<.0001
Mantel-Haenszel Chi-Square	1	135.5894	<.0001
Phi Coefficient		0.4965	
Contingency Coefficient		0.4447	
Cramer's V		0.4965	

Fisher's Exact Test	
Table Probability (P)	2.237E-37
Pr <= P	2.509E-35

Sample Size = 605

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of IMMEDIATE by INTERSECTION			
IMMEDIATE	**INTERSECTION**		
Frequency Col Pct	**8-Sequoia**	**9-Sugar Pine**	**Total**
0	143 41.33	219 84.56	362
1	137 39.60	32 12.36	169
2	66 19.08	8 3.09	74
Total	346	259	605

Statistics for Table of IMMEDIATE by INTERSECTION

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of IMMEDIATE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	116.5514	<.0001
Likelihood Ratio Chi-Square	2	125.6704	<.0001
Mantel-Haenszel Chi-Square	1	104.9445	<.0001
Phi Coefficient		0.4389	
Contingency Coefficient		0.4019	
Cramer's V		0.4389	

Fisher's Exact Test	
Table Probability (P)	7.763E-30
Pr <= P	6.891E-28

Sample Size = 605

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GAPS by INTERSECTION			
GAPS	**INTERSECTION**		
Frequency Col Pct	**8-Sequoia**	**9-Sugar Pine**	**Total**
0	105 30.35	13 5.02	118
1	132 38.15	36 13.90	168
2	109 31.50	210 81.08	319
Total	346	259	605

Statistics for Table of GAPS by INTERSECTION

Sequoia_Sugarpine Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GAPS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	149.1373	<.0001
Likelihood Ratio Chi-Square	2	160.0209	<.0001
Mantel-Haenszel Chi-Square	1	135.5894	<.0001
Phi Coefficient		0.4965	
Contingency Coefficient		0.4447	
Cramer's V		0.4965	

Fisher's Exact Test	
Table Probability (P)	2.237E-37
Pr <= P	2.509E-35

Sample Size = 605

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of AGE by INTERSECTION			
AGE	**INTERSECTION**		
Frequency Col Pct	**6-Granlibokken**	**7-Pine**	**Total**
Unknown	1 0.44	0 0.00	1
Child	2 0.88	5 2.82	7
Elderly	12 5.29	6 3.39	18
Older Adult	142 62.56	76 42.94	218
Teen	9 3.96	11 6.21	20
Young Adult	61 26.87	79 44.63	140
Total	227	177	404

Statistics for Table of AGE by INTERSECTION

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of AGE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	5	20.9139	0.0008
Likelihood Ratio Chi-Square	5	21.3691	0.0007
Mantel-Haenszel Chi-Square	1	11.9630	0.0005
Phi Coefficient		0.2275	
Contingency Coefficient		0.2219	
Cramer's V		0.2275	
WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	2.438E-08
Pr <= P	3.721E-04

Sample Size = 404

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GENDER by INTERSECTION			
GENDER	**INTERSECTION**		
Frequency Col Pct	**6-Granlibokken**	**7-Pine**	**Total**
----	1 0.44	0 0.00	1
F	129 56.83	72 40.68	201
M	97 42.73	105 59.32	202
Total	227	177	404

Statistics for Table of GENDER by INTERSECTION

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GENDER by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	11.4686	0.0032
Likelihood Ratio Chi-Square	2	11.8873	0.0026
Mantel-Haenszel Chi-Square	1	11.2873	0.0008
Phi Coefficient		0.1685	
Contingency Coefficient		0.1661	
Cramer's V		0.1685	
WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	2.157E-04
Pr <= P	0.0013

Sample Size = 404

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LOOK_BEHAVIOR by INTERSECTION			
PED_LOOK_BEHAVIOR	**INTERSECTION**		
Frequency Col Pct	**6-Granlibokken**	**7-Pine**	**Total**
Did not look	2 0.88	0 0.00	2
Look 1 direction	12 5.29	1 0.56	13
Look both directions	138 60.79	102 57.63	240
Look more times	75 33.04	74 41.81	149
Total	227	177	404

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LOOK_BEHAVIOR by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	10.6900	0.0135
Likelihood Ratio Chi-Square	3	12.9666	0.0047
Mantel-Haenszel Chi-Square	1	7.3485	0.0067
Phi Coefficient		0.1627	
Contingency Coefficient		0.1606	
Cramer's V		0.1627	
WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	4.969E-05
Pr <= P	0.0069

Sample Size = 404

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_LEVEL_ASSERT by INTERSECTION			
PED_LEVEL_ASSERT	**INTERSECTION**		
Frequency Col Pct	**6-Granlibokken**	**7-Pine**	**Total**
Wait on curb/outside crosswalk	173 76.21	57 32.20	230
Wait on street/inside crosswalk	14 6.17	53 29.94	67
No wait	39 17.18	67 37.85	106
Force driver to yield	1 0.44	0 0.00	1
Total	227	177	404

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_LEVEL_ASSERT by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	3	84.7115	<.0001
Likelihood Ratio Chi-Square	3	88.1424	<.0001
Mantel-Haenszel Chi-Square	1	53.8131	<.0001
Phi Coefficient		0.4579	
Contingency Coefficient		0.4163	
Cramer's V		0.4579	
WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.			

Fisher's Exact Test	
Table Probability (P)	1.053E-21
Pr <= P	1.513E-19

Sample Size = 404

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of PED_PACE by INTERSECTION			
PED_PACE	**INTERSECTION**		
Frequency Col Pct	**6-Granlibokken**	**7-Pine**	**Total**
----	39 17.18	33 18.64	72
F	45 19.82	11 6.21	56
N	108 47.58	107 60.45	215
R	33 14.54	26 14.69	59
S	2 0.88	0 0.00	2
Total	227	177	404

Statistics for Table of PED_PACE by INTERSECTION

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of PED_PACE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	4	18.0666	0.0012
Likelihood Ratio Chi-Square	4	20.0527	0.0005
Mantel-Haenszel Chi-Square	1	0.9048	0.3415
Phi Coefficient		0.2115	
Contingency Coefficient		0.2069	
Cramer's V		0.2115	

Fisher's Exact Test	
Table Probability (P)	7.839E-08
Pr <= P	5.446E-04

Sample Size = 404

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of TOTAL_DRV_YIELD by INTERSECTION			
TOTAL_DRV_YIELD	**INTERSECTION**		
Frequency **Col Pct**	**6-Granlibokken**	**7-Pine**	**Total**
0	64 28.19	163 92.09	227
1	93 40.97	13 7.34	106
2	70 30.84	1 0.56	71
Total	227	177	404

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of TOTAL_DRV_YIELD by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	166.9794	<.0001
Likelihood Ratio Chi-Square	2	194.4231	<.0001
Mantel-Haenszel Chi-Square	1	149.4830	<.0001
Phi Coefficient		0.6429	
Contingency Coefficient		0.5408	
Cramer's V		0.6429	

Fisher's Exact Test	
Table Probability (P)	3.865E-44
Pr <= P	1.121E-42

Sample Size = 404

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of VEHICLES_BEFORE_YIELDS by INTERSECTION			
VEHICLES_BEFORE_YIELDS	**INTERSECTION**		
Frequency **Col Pct**	**6-Granlibokken**	**7-Pine**	**Total**
0	64 28.19	163 92.09	227
1	93 40.97	13 7.34	106
2	70 30.84	1 0.56	71
Total	227	177	404

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of VEHICLES_BEFORE_YIELDS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	166.9794	<.0001
Likelihood Ratio Chi-Square	2	194.4231	<.0001
Mantel-Haenszel Chi-Square	1	149.4830	<.0001
Phi Coefficient		0.6429	
Contingency Coefficient		0.5408	
Cramer's V		0.6429	

Fisher's Exact Test	
Table Probability (P)	3.865E-44
Pr <= P	1.121E-42

Sample Size = 404

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of IMMEDIATE by INTERSECTION			
IMMEDIATE	**INTERSECTION**		
Frequency Col Pct	**6-Granlibokken**	**7-Pine**	**Total**
0	80 35.24	167 94.35	247
1	101 44.49	9 5.08	110
2	46 20.26	1 0.56	47
Total	227	177	404

Statistics for Table of IMMEDIATE by INTERSECTION

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of IMMEDIATE by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	146.7337	<.0001
Likelihood Ratio Chi-Square	2	170.7751	<.0001
Mantel-Haenszel Chi-Square	1	127.6567	<.0001
Phi Coefficient		0.6027	
Contingency Coefficient		0.5162	
Cramer's V		0.6027	

Fisher's Exact Test	
Table Probability (P)	5.719E-39
Pr <= P	1.255E-37

Sample Size = 404

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Table of GAPS by INTERSECTION			
GAPS	**INTERSECTION**		
Frequency Col Pct	**6-Granlibokken**	**7-Pine**	**Total**
0	70 30.84	1 0.56	71
1	93 40.97	13 7.34	106
2	64 28.19	163 92.09	227
Total	227	177	404

Statistics for Table of GAPS by INTERSECTION

Pine_Granlibokken Pedestrian and Driver characteristics stratified by crosswalk type

The FREQ Procedure

Statistics for Table of GAPS by INTERSECTION

Statistic	DF	Value	Prob
Chi-Square	2	166.9794	<.0001
Likelihood Ratio Chi-Square	2	194.4231	<.0001
Mantel-Haenszel Chi-Square	1	149.4830	<.0001
Phi Coefficient		0.6429	
Contingency Coefficient		0.5408	
Cramer's V		0.6429	

Fisher's Exact Test	
Table Probability (P)	3.865E-44
Pr <= P	1.121E-42

Sample Size = 404