

Introduction

Walking is the oldest and most universal form of travel. Every personal trip involves some element of walking, whether it is a pure pedestrian trip, or combined with other modes of travel such as, transit, driving or cycling. A pedestrian is legally defined as a person who walks from one place to another either by foot or using an assisted mobility device. Pedestrians include citizens of Fort Collins and visitors of all ages and abilities. If people are to walk safely, conveniently, efficiently and comfortably they need an environment and facilities designed to meet their travel needs.

A safe and efficient pedestrian system has long been an established goal and integral part of the City of Fort Collins' transportation and land use network. According to the community goals contained in the City's comprehensive plan, *City Plan* (2004), the *Transportation Master Plan* (2004), and *Pedestrian Plan* (1996), pedestrian mobility will be a practical and enjoyable means of travel as part of the City's vision for a balanced transportation system.

The Problem

Citizen concerns regarding pedestrian safety at intersections and crosswalks have grown considerably within the last few years. As vehicle traffic volumes increase throughout the City, people have become apprehensive about being able to cross the street safely. Complaints have primarily centered on motorists not yielding to pedestrians in crosswalks when making left or right turns at intersections, as well as not yielding to pedestrians in mid-block or unmarked crosswalks.

In Fort Collins from 1996 to 2002, motor vehicle collisions involving pedestrians increased 31 percent, from 29 in 1996 to 38 in 2002, according to reports filed with the Fort Collins Police Service Department. National studies, however, have shown that pedestrian crash data is notoriously underreported. It is anticipated that the actual number of pedestrian related collisions throughout Fort Collins are much higher. In addition, to the actual reported collisions, there are many anecdotal incidents of pedestrians experiencing "near misses" or intimidation by aggressive motorists.

During the seven year time period there were a total of 223 reported pedestrian-motor vehicle collisions, of which 164 (74 percent) resulted in pedestrian injuries. Of the 164 injury crashes, six resulted in pedestrian fatalities. Nearly half of these injury crashes occurred at intersections, leaving the remaining crashes happening along the street between intersections. Further analysis of the police reports is necessary to accurately attribute these collisions to the appropriate cause and best determine the proper countermeasures.

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Consequently, the perception concerning lack of pedestrian safety while crossing the street negatively affects the overall vision and goals for the community. *City Plan* calls for a

practical and enjoyable walking environment, where the public street is designed in a matter that elevates the importance of the pedestrian.

Crash data and the City's long term vision plus a growing desire and need for a safe and walkable community that efficiently link pedestrians to transit, schools, shopping centers, employment areas and recreational facilities indicate a need to reexamine and update the City's current practices.

Community Vision, Policies and Goals

The City of Fort Collins is committed to providing safe and efficient transportation choices for all of its citizens. Vision statements and goals within *City Plan* and the *Transportation Master Plan*, address this very issue.

“Fort Collins will confront and mitigate the negative impacts of the car on our lives. The vision recognizes the importance of the automobile as a means of transportation, but begins to shift the balance towards a future in which different modes of transportation are also used. Our community will have an overall transportation system and urban form that supports a wide choice of efficient ways to travel,”... and an environment in which “All modes of travel will be safe and efficient.” (*City Plan*, 2004)

In addition to the Community Vision statement above, *City Plan* outlines several community goals that relate to a safe and



balanced transportation system, including a viable pedestrian system. Some of these goals include the following statements.

- 1) “Our community will develop and sustain a safe, convenient, and efficient transportation system incorporating and integrating many modes of travel including automobiles, transit, bicycles, and pedestrians.” (*City Plan*, 2004)
- 2) “Walking will be a practical and enjoyable means of travel.
 - a) Our City will provide a safe and convenient pedestrian system to support all other aspects of the overall transportation system.
 - b) Pedestrian facilities will elevate the importance of the pedestrian. The pedestrian will be given equal consideration with other modes within the shared public space of the street system...” (*City Plan*, 2004)

Specific transportation policies regarding pedestrian mobility are principal elements of *City Plan* and the *Transportation Master Plan*. Policies T-5 through T-8 specifically refers to pedestrian facilities, street crossings, intersection improvements, and developing a secure pedestrian environment.

“The City will design street crossings consistent with adopted standards with regard to crosswalks, lighting, median refuges, corner sidewalk widening, ramps, signs, signals, and landscaping. Crosswalks should be well marked and visible to motorists. They should be designed to fit and enhance the context and character of the area, and provide for safety for all age groups and ability groups.” (*City Plan*, 2004)

To achieve this vision and the goals set forth in *City Plan* and the *Transportation Master Plan*, the City has drafted two legally enforceable documents, the *Land Use Code* and the *Larimer County Urban Areas Street Standards*. These documents attempt to create a walkable city through development design and construction of infrastructure.

Furthermore, five recommended action items from the City’s *Pedestrian Plan* completed in 1996 were incorporated into the two documents. Through these action items, the City has placed a higher emphasis on pedestrians in the ongoing effort to shape and design the streets and better manage traffic. The Plan’s multiple recommendations primarily focus on the “Three E’s” strategy of creating a walkable city.

Education Engineering Enforcement

Statistics

Pedestrian Crash Factors

Pedestrians are the most at risk and vulnerable street user, and collisions with motor vehicles often result in injury or death. Nationally, each year approximately 5,000 pedestrians are killed and 90,000 are injured in motor vehicle collisions. Approximately 34 percent of these injuries and 18 percent of the deaths occur at intersections.

In Fort Collins, a total of 223 pedestrian-motor vehicle collisions were reported to the police department between 1996 and 2002. Of those, 164 resulted in injuries and six resulted in pedestrian deaths. Roughly half of these injury crashes occurred at intersections, with the remaining collisions occurring along the street between intersections. Approximately 51 percent of the collisions occurring at intersections resulted in injuries and 25 percent in fatalities.

Location of Pedestrian Collisions

Most pedestrian and motor vehicle collisions occur downtown and along College Avenue. Downtown is the highest pedestrian activity area in the City. The majority of intersections along College Avenue in the downtown area have automatic pedestrian phases programmed into the signal cycle. In addition, pedestrian ‘Walk / Don’t Walk’ signal heads have been installed elevating the safety for pedestrians at those intersections.

Analysis of the police reports indicate that about half of these pedestrian collisions occurred at mid-block or between

intersections. This may be attributed to the center aisle parking along College Avenue and pedestrians darting out across the street at numerous locations to get to their cars or the local businesses.

The second highest pedestrian and motor vehicle collision area was West Elizabeth Street between City Park Avenue and Shields Street. This street also has very high pedestrian traffic as it functions as a primary gateway for Colorado State University students heading to and from campus. Even though there is no defining pattern to the pedestrian and motor vehicle collision factors, it appears that most are related to pedestrians crossing the street mid-block outside a crosswalk, pedestrians crossing against a traffic controlled signal, or motorists pulling in or out of driveways and striking a pedestrian.

Ironically, two intersections that have been recently improved appeared as problem areas for pedestrian-motor vehicle collisions, according to the police reports. These intersections are South College Avenue at Drake Road and Shields Street at Drake Road.

Figure 1 locates several areas of the City that have the highest pedestrian-motor vehicle collision occurrences. These areas are referred to as “hot spots.” While useful for locating problem areas, it also tends to highlight the areas with the highest pedestrian traffic. It does not identify areas where people avoid walking because it is perceived as too dangerous to walk due to lack of pedestrian facilities or facilities that are in disrepair. This shortcoming should be addressed and needs to be kept in mind when areas are identified for improvements or a City capital improvement project.

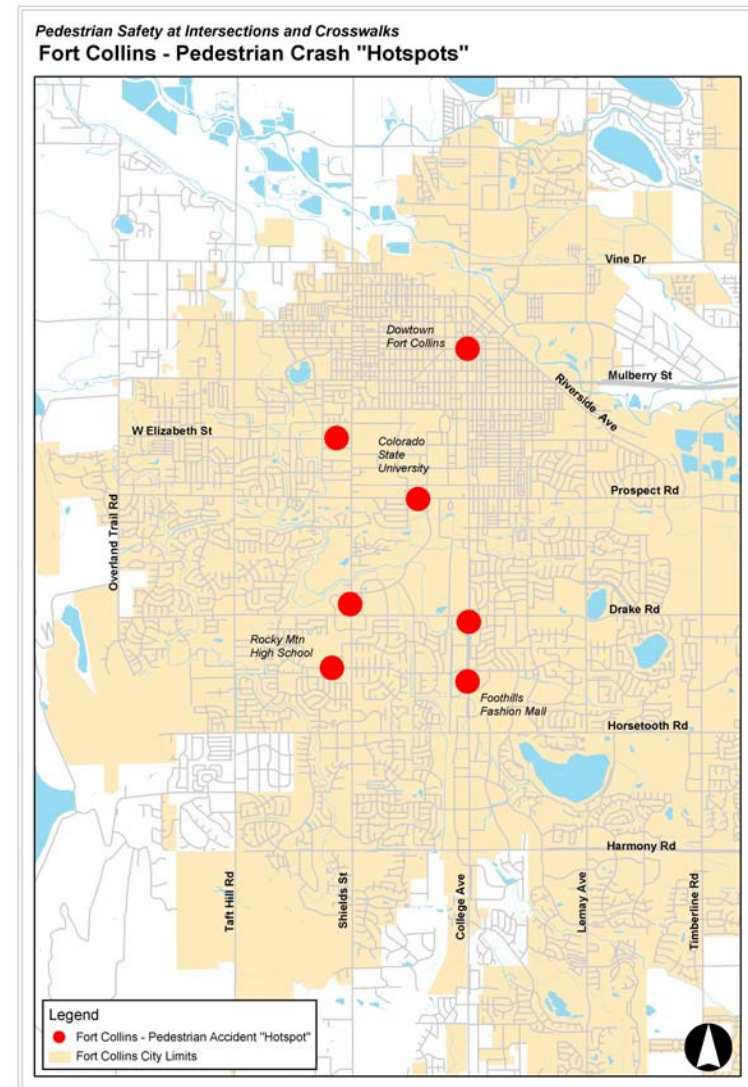


Figure 1
Pedestrian-Motor Vehicle Collision Map - “Hot Spots”

Causes for Pedestrian Collisions

Motorists are not always at fault in pedestrian-motor vehicle collisions. In collisions where fault was determined, a total of 44 citations were issued to motorists and 20 were issued to pedestrians. The majority of the crashes resulted in no citation being issued since fault could not be determined. Figure 2 demonstrates that failure to yield the right-of-way by the motorist to the pedestrian was the most common motorist citation (48%). Other common motorist movements included right turn on red, improper turning, and improper backing. Citations were also issued for crashes that involved motorists with alcohol or drug use.

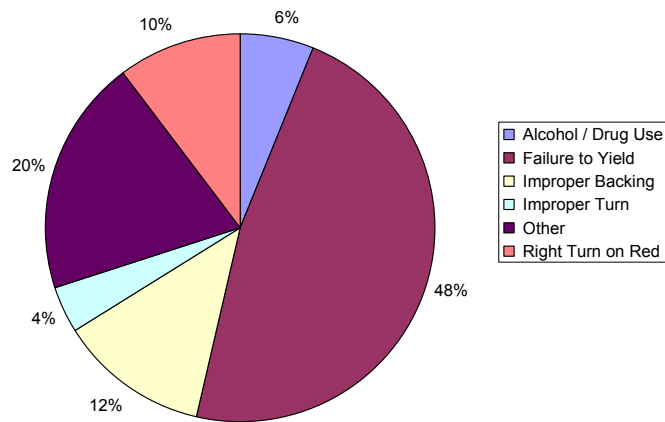


Figure 2
Motorists Contributing Circumstances

Pedestrian citations primarily were issued for failure to yield to the motorists, this includes ‘jaywalking,’ followed by crashes involving alcohol or drug use. The “other” category is the largest because it becomes a catch-all due to the limitations of the data tracking software. Examples of the “other” category are people playing in the street or parking lots, or being struck by a motor vehicle while walking along side the road. These data are represented in Figure 3.

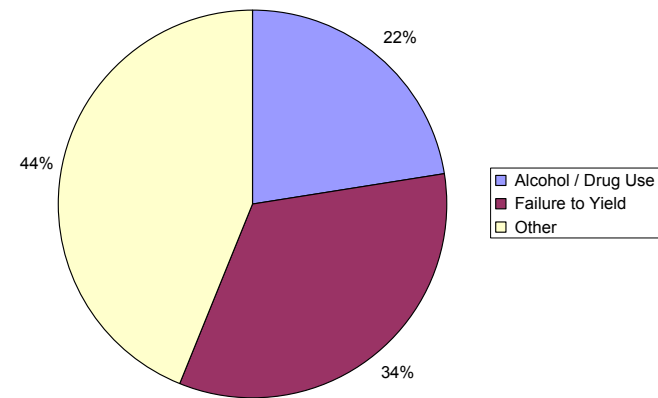


Figure 3
Pedestrian Contributing Circumstances

National studies have shown that turning movements at intersections account for a high collision rate between pedestrians and motor vehicles. Left turning vehicles created an environment almost four times more hazardous as through movements to the pedestrian. The problem was even greater at signalized intersections. Studies attribute this to motorists

being fixated on looking for a gap in traffic and not looking for pedestrians that may be in the crosswalk.¹

Further analysis of the Fort Collins’ police reports including field investigations are required to better understand the causes of the pedestrian-motor vehicle collisions in Fort Collins. Proper countermeasures can then be recommended for specifically identified problem areas.

At Risk Groups

National statistics show that children and the elderly are the most at-risk age groups and are most likely to be killed or injured in a collision with a motor vehicle. Almost one fourth (23%) of children between the age of five and nine killed in traffic crashes were pedestrians. Studies have shown that children under the age of 10 are not capable of crossing busy streets on their own. They have not yet developed proper

judgment of a car’s speed and distance, peripheral vision, or the awareness of the direction of sound, such as an approaching car, and the proper concentration or focus level.²

However, according to a Swedish study, the elderly street users between the age of 65 and 84 years are the highest at risk group.³ The study reports that they are 25 times more likely to be killed in a motor vehicle collision when crossing the street than people 25 – 44 years old. It also concludes that at-risk population fatalities equalize in environments with lower traffic speeds.

The table below shows the age distribution in Fort Collins for pedestrians that sustained injuries in motor vehicle collisions. Adults over the age of 65 years make up the largest number of fatalities (50%), but only about 8 percent of the City’s population.

Age Group	Under 5 years	5 to 9 years	10 to 14 years	15 to 19 years	20 to 24 years	25 to 34 years	35 to 44 years	45 to 54 years	55 to 64 years	65 and over	Total
Injuries	2	12	13	28	31	15	23	18	10	12	164
Fatality	0	0	0	1	0	1	1	0	0	3	6
% of all injuries	1.22%	7.32%	7.93%	17.07%	18.90%	9.15%	14.02%	10.98%	6.10%	7.32%	*
% of all fatalities	0.00%	0.00%	0.00%	16.67%	0.00%	16.67%	16.67%	0.00%	0.00%	50.00%	*
% of Fort Collins Population	5.90%	5.94%	6.17%	9.53%	16.04%	16.95%	14.57%	11.68%	5.37%	7.86%	*

¹ U.S. Department of Transportation, Federal Highway Administration. *A Review of Pedestrian Safety Research in the United States and Abroad.*

² National Highway Traffic Safety Administration, *Intersection - Pedestrian Safety*

³ Swedish National Road Administration, *Pedestrians and Cyclists, Exposure and Injury Risks In Different Traffic Environments for Different Age Groups.*

Additionally, it is generally accepted that people with disabilities are considered an at-risk group even though there is no data on these collision rates.

When Most Crashes Occur

Overall, pedestrian-motor vehicle collisions in Fort Collins occur during the times of highest pedestrian activity on the street. Injuries to pedestrians rise during the day and peak during the evening rush hour. Peak collision times for children are before and after school. Figure 4 demonstrates the hours of day when most pedestrian-motor vehicle collisions have occurred.

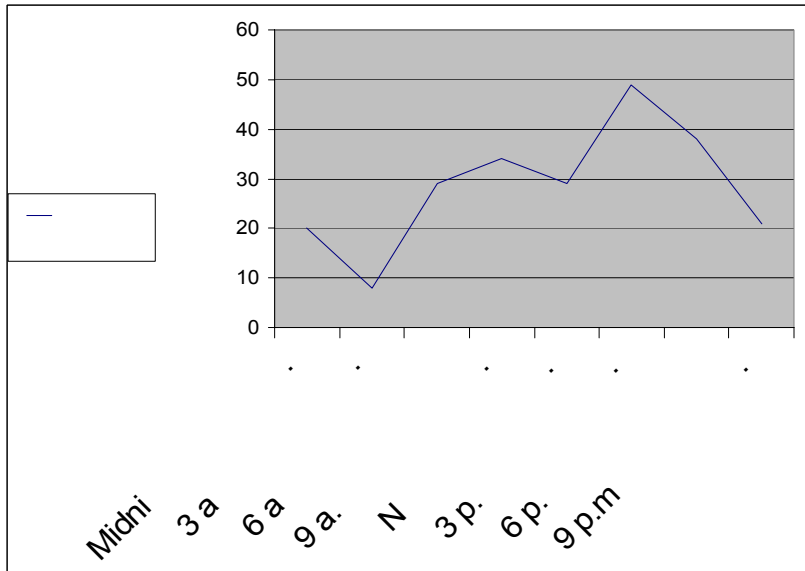


Figure 4
Pedestrian-Motor Vehicle Collisions by Time of Day

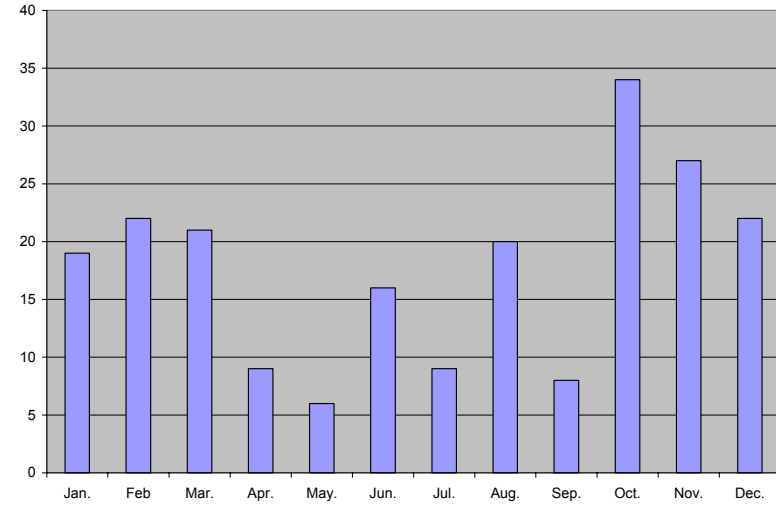


Figure 5
Reported Pedestrian Crashes by Month

Motor vehicle collisions with pedestrians occur throughout the year. However, there is a spike in collisions during October through March. Additional analysis is required to determine what contributing factors, such as school year, day light saving time, weather conditions, etc... could be causing the increase in collisions. Figure 5 shows the break down for reported collisions during the calendar year for Fort Collins.

Stop Sign Compliance Study

According to the National Highway Traffic Safety Administration, nationally, each year stop sign violations are associated with approximately 200 fatal crashes and 17,000 non-fatal injuries. When pedestrian right-of-way laws are

violated by either motorists or pedestrians, pedestrians are placed at risk.

In conjunction with the Larimer County Safe Kids Coalition and Federal Express, the City conducted a joint stop sign compliance survey in pedestrian areas where children are present. The survey determined the frequency of motorist's compliance at stop signs for marked and unmarked crosswalks in the City. Data were gathered at intersections with one travel lane in each direction whether pedestrians were present or not present.

The study resulted in the following findings:

- Overall approximately 41 percent of local motorist surveyed violated the stop signs by not coming to a full stop at the intersection or totally ignoring the stop sign (one percent), while nationally 45 percent of motorists failed to comply putting pedestrian and other vehicles at risk.
- Roughly 39 percent of motorists fully complied with the stop sign and crosswalk regulations.
- Twenty percent of motorists who completed a stop, either stopped in or past the crosswalk, impeding the pedestrian path and increasing the risk to people crossing the street.



- When pedestrians were present at the intersection motorists were more likely to stop.
 - Over 50 percent (54%) of motorists fully stopped when pedestrians were present.
 - Nearly 31 percent did not come to a complete stop and 15 percent stopped in or past the crosswalk.
- Motorists were more likely to stop for pedestrians crossing the street rather than people waiting to cross.
 - Nearly 22 percent of motorists did not stop while people were crossing the street.
 - More than half (54 percent) of motorists did not stop for people waiting to cross the street.

Efforts to Increase Pedestrian Safety in Fort Collins

Safe Walk Fort Collins Pilot Program

To better address citizen concerns for pedestrian safety in Fort Collins, the City's Transportation Planning Department is recommending the Safe Walk Fort Collins (SWFC) pilot program. This program's concept was created as a result of the recommendations of the City's *Pedestrian Plan* and has become an annual on-going element of the Plan's implementation. The program deals not only with pedestrian safety concerns at intersections and crosswalks, but all safety concerns regarding the pedestrian transportation system. Program elements include public outreach and education, special pedestrian safety studies, such as neighborhood walkability audits, and conducting pedestrian safety campaigns.

Tasks Completed to Date

At present the SWFC program staff has completed the following tasks for this study:

- ✓ In partnership with the Larimer County Safe Kids (LCSK) Coalition, a stop sign compliance survey was conducted at intersections with pedestrian traffic and children present.
- ✓ The program staff has analyzed and catalogued pedestrian and motor vehicle crash data for the years,

1996 to 2002. This data is summarized in the Pedestrian Crash Factors section of this report.

- ✓ Program staff attended several public outreach events to inform the public of the problem and the program.
- ✓ In 2003 the program staff, in partnership with the LCSK Coalition, Poudre Valley Hospital, the Poudre School District, and the City's Smart Trips Department, had Mayor Ray Martinez proclaim the month of October as Pedestrian Month.
- ✓ Program staff, working in conjunction with the Smart Trips Department, and the LCSK Coalition, and the City's Safe Routes to School Program participates annually in the "Walk to School Day" event to talk with children, teachers, and parents to gather information on safety problems that children encounter everyday on their way to school.
- ✓ A study is currently being conducted at Riffenberg Elementary School. This study is a joint venture with the SWFC and the Safe Routes to School programs the LCSK Coalition, the Poudre School District, and the Center for Disease Control (CDC). This study will perform a walkability audit of the school's walking zone and will collect data and map unsafe conditions that need improvement.

Pedestrian Plan

In 1996 the City created and adopted the *Pedestrian Plan* to address the viability of walking in the community. It was developed by Transportation Planning staff and a team of citizens concerned with improving the City's walkability. "Fort Collins is one of a handful of cities that not only recognizes the value to its community of restoring equity to

those on foot, but is also preparing to bring about necessary changes and make substantial investments to make walking a viable and attractive mode of travel.”(*Pedestrian Plan*)

Outlined in the *Pedestrian Plan* are five action items intended to create a walkable city. These five items include:

- Create a pedestrian Level of Service (LOS) measurement and target LOS standards by development area. There are five LOS measurements that development, public or private, must address. They are directness, continuity, street crossings, visual interest and amenity, and security.
- Change the pedestrian right-of-way (ROW) ordinance to give pedestrians the ROW over vehicles at all crosswalk types and driveways. The action item also recommended active education and enforcement of this ordinance.
- Require development to perform a Transportation Impact Study (TIS) to deal with pedestrian impacts created by the proposed development and identify mitigation measures. This study would include an analysis of the above mentioned pedestrian LOS measurements.
- Revise the sidewalk, corner ramps, and other street design standards that elevate the pedestrian mode of transportation.

- Implement and secure a funding mechanism to achieve the “Walkable City” envisioned by the City of Fort Collins.

All five of these action items have been incorporated into either the City’s *Land Use Code* (LUC), which addresses development, or the *Larimer County Urban Area Street Standards* (LCUASS) (Fort Collins standards). Both of these documents have been adopted by City Council. These action items are not intended to be complete or have a set ending date. These are evolving elements of *City Plan* and the *Transportation Master Plan*, and as such, are part of a living document that goes through periodic updates and changes. Most recently it was recommended in the *Transportation Master Plan* update (2004) to revisit the *Pedestrian Plan* and explore possible revisions to the five action items.

Described below is a brief status report of the five action items listed in the *Pedestrian Plan*’s executive summary.

- ✓ The measurements and standards for pedestrian LOS have been incorporated into the *City of Fort Collins Level of Service Manual*, the LUC and the LCUASS. A detailed analysis of pedestrian mobility is required with all new development proposals as outlined in the LOS manual.
- ✓ The pedestrian right-of-way (ROW) ordinances were recodified as part of the Fort Collins Traffic Code in 2003 from the State’s Model Traffic Code.
- ✓ The pedestrian traffic impact analysis is part of the required *Transportation Impact Study* with new

development. The Study requires an impact analysis for pedestrian mobility be performed. This is determined by the City's Traffic Engineer. Within the TIS, all elements of the pedestrian LOS standards are to be addressed.

- ✓ The sidewalk, corner ramps and stop bars have been incorporated into the LCUASS for new construction and development.
- ✓ The *Pedestrian Plan* was instrumental in gaining funding for pedestrian improvements as part of the 1997 Building Community Choices (BCC) sales tax initiative. Since the *Pedestrian Plan* funds have been available, over 45 pedestrian construction improvement projects have been completed throughout Fort Collins, such as the Taft Hill

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Road mid-block pedestrian crossing at Blevins Junior High School (see before and after photos below). In addition, numerous improvements have been implemented through the Safe Routes to School Program, such as installation of pedestrian signals, traffic calming measures, and roadway signing and striping. However, there is still a large backlog of pedestrian improvement projects in older areas of the community. It is important to note that the existing BCC *Pedestrian Plan* funding expires in 2005. Even if existing funding levels were to continue into the future, it would likely take another 20 years to correct existing deficiencies and bring the entire

pedestrian transportation system up to the City's current standards.



Taft Hill Road Before



Taft Hill Road After

For a complete list of *Pedestrian Plan* improvement projects since 1999 please reference Appendix B.

Another objective of the Pedestrian Plan is to make street crossings and areas in the community more accessible for people with disabilities. To achieve this goal *Pedestrian Plan* funds are often used to install access ramps and sidewalk connections at intersections.



Codes and Design Standards

Fort Collins Traffic Code

The Fort Collins Traffic Code (FCTC) is a legal document that regulates traffic pertaining to streets. Traffic can apply to both vehicular traffic and pedestrian traffic. The code is designed to promote uniformity with the State’s traffic law. By creating consistency between State and local laws drivers and pedestrians can expect similar rules that govern vehicles and pedestrians throughout Colorado, thus making it safer for all users of the streets.

According to the FCTC, a pedestrian must obey the instructions of any official traffic control device specifically applicable to the pedestrian unless directed to do otherwise by a police officer. This includes special pedestrian control signals that exhibit the “Walk” or “Don’t Walk” words or symbols. Poor pedestrian compliance to the “Walk” and “Don’t Walk” signals have been observed throughout Fort Collins.

The FCTC also states that all vehicles must yield the right-of-way to a pedestrian crossing in a marked or unmarked crosswalk, but only if the pedestrian is on the half of the roadway upon which the vehicle is traveling or if the pedestrian is approaching so closely from the opposite half of the roadway as to be in danger, Section 802 (1). However, motor vehicle drivers’ poor compliance with this law has been reported by people throughout Fort Collins.

Crosswalks are defined in the FCTC as “that portion of the roadway ordinarily included within the prolongation or connection of the lateral lines of sidewalks at intersection or any portion of a roadway distinctly indicated for pedestrian crossing by lines or other markings on the surface.” In other words, every intersection where streets with sidewalks meet at or about right angles has a crosswalk for pedestrians to cross the street even though there may be no painted lines. **The crosswalk is that part of the pavement where the sidewalk would extend across the street.** Most crosswalks especially in residential areas are considered unmarked.

The FCTC also states that all vehicles must yield the right-of-way to a pedestrian crossing in a marked or unmarked crosswalk...

Additionally the FCTC states that, no pedestrian shall suddenly leave a curb or other place of safety and walk or run into the path of a moving vehicle, including a bicycle, which is so close as to constitute an immediate hazard, Section 802 (3). Furthermore, Section 807 of the FCTC requires that, "every driver of a vehicle shall exercise due care to avoid colliding with any pedestrian upon any roadway and shall give warning by sounding the horn when necessary and shall exercise proper precaution upon observing any child or any obviously confused or incapacitated person upon a roadway."

The FCTC was adopted by the City in 2003 to supplant the Model Traffic Code. This new code includes the requirement that all vehicles that approach a person with an obvious disability come to a full stop and take such precautions before proceeding to avoid an accident or injury to said person. This is consistent with changes in the State law.

Municipal Land Use Code

The City of Fort Collins has adopted the Land Use Code (LUC) as one mechanism to achieve the vision, policies, and the goals outlined in *City Plan* and the *Transportation Master Plan*. The code is a legal tool to implement development standards that strive to achieve the objectives set forth in *City Plan* and the *Transportation Master Plan*.

It is organized into five Articles;

- 1) General Provisions
- 2) Administration
- 3) General Development Standards
- 4) District Standards
- 5) Definitions

The General Provisions section addresses the organization of the LUC. Article 2 guides the reader through the process and the Definitions section provides explanations of terms used throughout the LUC. It is the codes contained within the General Development Standards and the District Standards that are primarily used to achieve a walkable community.

Within these sections of the LUC are specific codes that address site planning, design standards, transportation and circulation, and particular development standards that apply to

designated zone districts in Fort Collins. Examples of some of these pedestrian-related codes include the following.

- “The on-site bicycle and pedestrian system must be designed or provide for direct connections to major pedestrian and bicycle destinations including, but not limited to, parks, schools, Neighborhood Centers, Neighborhood Commercial Districts and transit stops that are located either within the development or adjacent to the development, to the maximum extent feasible.” [LUC 3.2.2 (C.6)]
- “Street crossings. Where it is necessary for the primary pedestrian access to cross drive aisles or internal roadways, the pedestrian crossing shall emphasize and place priority on pedestrian access and safety. The material and layout of the pedestrian access shall be continuous with a break in continuity of the driveway paving (not the pedestrian access paving).” [LUC 3.2.2 (C.5b)]
- “Pedestrian crossings must be well-marked using paving treatments, signs, striping, signals, lighting, traffic calming techniques, median refuge areas and landscaping.” [LUC 3.2.2 (C.5.b)]
- “Curb cuts and ramps shall be located at convenient, safe locations for the physically disabled, bicyclist, and people pushing strollers, carts, etc... Location and design shall conform to ADA and UBC standards” [LUC 3.2.2 (C.2)]

- “All development plans shall adequately provide vehicular, pedestrian and bicycle facilities necessary to maintain the adopted transportation Level of Service standards contained in Part II of the City of Fort Collins Multi-modal Transportation Level of Service Manual for the following modes of travel: motor vehicle, bicycle and pedestrian.” [LUC 3.6.4 (A)].

Larimer County Urban Area Street Standards

The City of Fort Collins, in conjunction with Larimer County and the City of Loveland, developed and adopted the *Larimer County Urban Area Street Standards* (LCUASS). These design standards and procedures also help create a more walkable city, and incorporate many recommendations first identified in the *Pedestrian Plan*.

The LCUASS was first adopted by City Council on January 2, 2001 and repealed and reenacted, effective October 1, 2002. The document encompasses all design elements for improving Fort Collins streets, including sidewalks, intersection design, crosswalk design, and paths. Design elements that create walkable communities are incorporated into this document. Areas developed under these standards have been able to create the walkable community vision as called for in *City Plan* and the *Transportation Master Plan*. However, areas that have developed over the last 20 to 50 years have primarily focused on automobiles and have created an unfriendly environment for pedestrian travel. It is these areas that need the most assistance to develop a viable pedestrian system. The design elements of the LCUASS can support converting these areas to acceptable pedestrian environments.

Design elements are arranged into many chapters, such as street design, intersections, traffic control devices, pedestrian facilities, and neighborhood traffic safety. Good pedestrian design elements may include curb extensions to reduce the width of the street crossing, pedestrian median refuges, directional access ramps at intersections, or continuous sidewalks along the street. All of these design elements are contained within the standards of the LCUASS, including the following:

- “Median islands are standard on all new 6-Lane and 4-Lane Arterial streets. These islands shall be designed to provide pedestrian refuge.” [LCUASS 8.2.10 (4)]. High pedestrian traffic areas, such as downtown, have specific design standards.

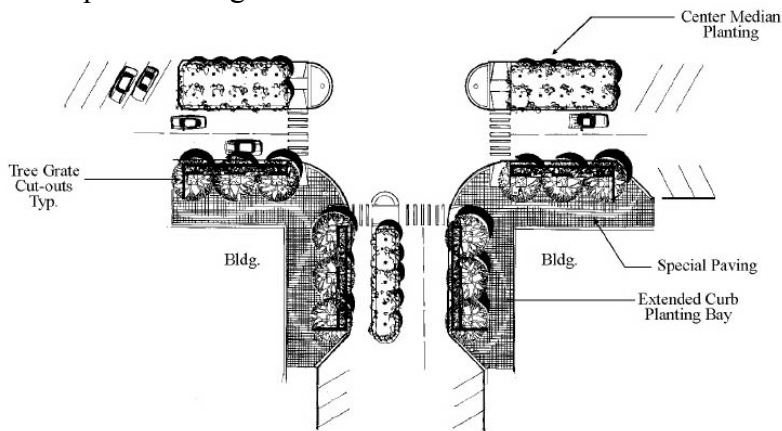


Figure 6
Downtown Intersection Design

- “All stop bars shall be white and a minimum of 18 inches wide. Stop bars are required at new signalized

locations and other locations specified by the Local Entity Engineer.” [LCUASS 14.4.2 (D)].

- New intersection construction and intersection alterations require the use of directional access ramps.
- “Pedestrian safety is a concern on streets experiencing speeding vehicles, cut-through traffic, or a combination of these problems. The high concern areas are the vicinity of neighborhood schools and parks or mid-block crossings, particularly on streets with on-street parking. These areas require special consideration for the mobility and safety of the pedestrian.” [LCUASS 18.2.4]
- Within the Neighborhood Traffic Safety chapter are illustrations for calming traffic speeds and designing safer pedestrian crossings, such as raised intersections, or turn prohibitors.

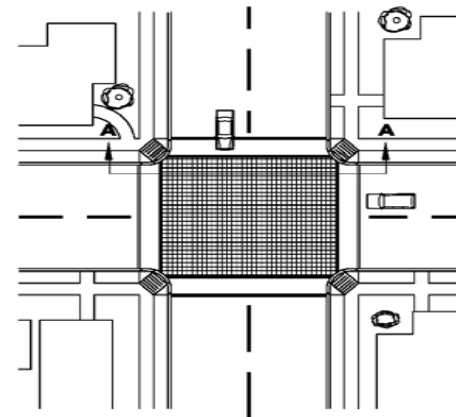


Figure 7
Raised Intersection Design