

DATE: January 31, 2012

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*Pre-taped staff presentation: available
at fcgov.com/clerk/agendas.php*

WORK SESSION ITEM FORT COLLINS CITY COUNCIL

SUBJECT FOR DISCUSSION

Traffic Safety in Fort Collins.

EXECUTIVE SUMMARY

The recently updated Transportation Master Plan places a strong emphasis on safety for all travelers using all modes of travel in Fort Collins. Safety performance measures are necessary in order to determine how well the City is meeting those safety goals. In 2011, the City Traffic Operations Department produced a “Traffic Safety Summary” (found online at: www.fcgov.com/traffic). The Summary is intended to be used as a benchmarking tool to track progress on efforts to reduce the number of crashes as well as crash severity. The information in the Traffic Safety Summary is also used by City staff to guide efforts to improve safety.

Staff will present crash information and discuss how data is being used to improve traffic safety. In addition, staff will present information regarding the City’s crosswalk policy which was developed as part of the Pedestrian Plan, adopted in 2011.

GENERAL DIRECTION SOUGHT AND SPECIFIC QUESTIONS TO BE ANSWERED

1. Does City Council have any questions or feedback regarding the City’s overall approach to traffic safety?
2. Does City Council have any questions or feedback regarding the City’s crosswalk policies?

BACKGROUND / DISCUSSION

In 2011 Allstate Insurance Company released its seventh annual “Allstate America’s Best Drivers Report”. Fort Collins topped the list for the second year in a row, as America’s safest drivers. While this suggests that the safety record in Fort Collins is good relative to other communities, in 2010 there were still more than 700 people injured and four people killed in traffic crashes in Fort Collins. Deaths and injuries resulting from traffic crashes continue to be a serious public health concern. Even crashes that only result in property damage are costly to society and negatively impact quality of life. In 2010 it was estimated that the overall economic impact from traffic crashes in Fort Collins was nearly \$94 million. The City Transportation Master Plan places a high priority on safety of our transportation system. City staff is committed to ongoing efforts to make our system as safe as possible.

Citywide Crash Trends

The Traffic Operations Department works cooperatively with Police Services to obtain electronic copies of reports for all traffic crashes on public streets. Quality data is essential to the success of a traffic safety program. In keeping with the City's philosophy to be data driven, in 2009, Traffic Operations staff conducted a comprehensive review of all crash data back through 2007 to ensure accuracy and consistency prior to entry into a computerized database. This effort involved a review of over 10,000 records for crashes that occurred between 2007 and 2009. Since that time, ongoing training and quality control procedures have been established to help maintain good data quality as Traffic Operations has moved forward. Using this data, a Traffic Safety Summary was produced in 2011 which identified specific crash trends for the years 2007 – 2010. Highlights include:

- The number of crashes in Fort Collins remained steady, averaging about 3,600 crashes per year.
- Injury crashes also remained steady, averaging about 750 per year.
- Fatal crashes varied, with four in 2007, two in 2008, eleven in 2009 and three in 2010. The eleven fatal crashes in 2009 were the highest number ever recorded in Fort Collins. However, a review by both staff traffic engineers and police crash investigators did not identify a consistent, correctable pattern in these fatal crashes. They were not location specific. Speed, alcohol, drugs, reckless driving, driver inattentiveness, driver inexperience, motorcycle use, medical conditions, bicycle violations and pedestrian violations were all noted as contributing factors in the fatal crashes.
- Taking traffic volumes into account, crashes were significantly higher than expected on weekends in the evening and early morning hours (9:00 p.m. – 4:00 a.m.).
- About 71% of crashes occurred at intersections (43% at signalized intersections, 19% at unsignalized intersections, 8% at driveway/street intersections and 1% at alley/street intersections).
- Drivers 15-19 were more than five times as likely to be involved in a crash as expected, given the number of licensed drivers in that age group. 20 – 24 year old drivers were over twice as likely to be in a crash, as expected.
- Alcohol related crashes remained steady, averaging about 142 per year.
- Drivers 15-19 were more than three times as likely to be involved in an alcohol related crash – this despite the fact that they are not of legal drinking age. 20 – 24 year old drivers were also about three times as likely to be involved in an alcohol related crash.

Types of Crashes

Crashes are classified by type. Six types of crashes accounted for 87% of all incapacitating injury/fatal crashes in Fort Collins from 2007 - 2010:

Bicycle Crashes – Crashes involving bicyclists, usually bike/motor vehicle crashes -- 22% of all serious injury/fatal crashes.

Right Angle Crashes – Two motor vehicles traveling on perpendicular streets; one fails to yield or passes a traffic control device at an intersection and strikes the other – 16% of all serious injury/fatal crashes.

Approach Turn Crashes - Two motor vehicles traveling in opposite directions on the same street; one turns left at an intersection in front of the oncoming vehicle and is struck – 16% of all serious injury/fatal crashes.

Fixed Object Crashes – Single vehicle runs off the road and strikes a fixed object on the side of the road or on a median. – 15%

Rear End Crashes – Two motor vehicles traveling in the same direction; leading vehicle struck by following vehicle – 9% of all serious injury/fatal crashes.

Pedestrian Crashes – Any crash that involves a pedestrian; usually a pedestrian/motor vehicle crash – 9% of all serious injury/fatal crashes.

High Crash Locations

Through recent national research crash prediction models have been developed that allow analysts to predict the number of crashes at intersections given the traffic volumes, the intersection geometry and the type of traffic control, (i.e., traffic signals versus stop signs etc.) If a location has more crashes than predicted, (more than comparable intersections) it may indicate an issue at the location. Staff applied these national models calibrated to local conditions at intersections throughout Fort Collins to identify high crash locations. Locations were ranked by excess crash costs (cost of crashes above and beyond what the models predicted). Since injury crashes tend to have higher crash costs associated with them, the ranking method gives more weight to locations with more injury crashes compared to locations with only “fender benders”. Using 2007 – 2010 crash data, the top ten high crash intersections are listed below:

STREET 1	STREET 2	Model Predicted Crashes/Year	Model Predicted FI Crashes/Year*	Adjusted Actual Crashes/Year	Adjusted Actual FI Crashes/Year*	Excess PDO Crashes/Year**	Excess FI Crashes/Year*	Excess Crash Costs/Year
TIMBERLINE RD	HARMONY RD	17.4	3.8	43.3	7.4	22.3	3.6	\$470,696
LEMAY AV	HARMONY RD	15.8	3.5	32.0	6.7	13.0	3.2	\$359,109
COLLEGE AV	HORSETOOTH RD	21.3	4.8	36.8	7.6	12.6	2.9	\$328,736
SHIELDS ST	DRAKE RD	17.3	3.8	28.7	6.5	8.8	2.7	\$278,913
COLLEGE AV	TRILBY RD	13.7	2.9	21.2	5.8	4.6	2.9	\$255,318
LEMAY AV	MULBERRY ST	14.6	3.2	26.3	4.4	10.4	1.3	\$187,781
COLLEGE AV	MONROE DR	17.8	3.9	28.7	5.2	9.7	1.2	\$179,793
COLLEGE AV	LAUREL ST	11.2	2.6	20.9	4.0	8.3	1.4	\$179,777
SHIELDS ST	PROSPECT RD	14.9	3.3	22.8	4.8	6.4	1.5	\$170,312
COLLEGE AV	HARMONY RD	16.5	3.6	28.8	4.3	11.6	0.7	\$159,605

* FI = Fatal/Injury Crashes

** PDO = Property Damage Only Crashes

Traffic Safety Improvement Program

Fort Collins utilizes an approach to traffic safety focused on engineering, education, and enforcement. Below is a discussion of transportation safety activities occurring within each of these focus areas.

Engineering

Safety is implicitly a part of street maintenance programs such as snow removal, signal operations and traffic sign/pavement marking policies. Beyond these maintenance activities, three main engineering strategies are used to address safety concerns:

1. **Capital Projects** – The prioritized Capital Improvement Projects list shown in the Transportation Master Plan uses crash history as one of the criteria for prioritization. In addition, the Engineering Department’s recent Arterial Intersection Prioritization Study weighted crash history heavily in the prioritization process. Conceptual design of those projects identified in the intersection prioritization study for further evaluation used detailed crash analysis to develop improvements targeted at specific crash types and patterns.

Specific upcoming Capital Projects that stemmed from this analysis include:

- Harmony Road widening from Timberline to Boardwalk (design components were added to address high crash locations at Timberline/Harmony and Lemay/Harmony).
- Shields/Drake and Shields/Davidson – addition of turn lanes at Shields/Drake and access control improvements on Shields at Davidson.
- College/Horsetooth – addition of dual left turn lanes on College.

Note that these three projects address the top four locations on the high crash list shown above.

2. **Federal Hazard Elimination Funds** - Funding is available for specific safety projects through the Federal Hazard Elimination program. These funds are allocated by the Colorado Department of Transportation (CDOT) through a competitive process. The City has been successful in the past obtaining some of this funding. For example, \$385,000 in hazard elimination funds are being used for the intersections of College/Hickory and College/Conifer as part of the North College improvement project. These funds are being used to increase the length of the left turn lanes between these two closely spaced intersections and also to add separate, dedicated right turn lanes. Also, \$120,000 in hazard elimination funds were part of the overall funding for the College/Harmony project completed last year. Staff has made an application to CDOT for Hazard Elimination funding for the Shields/Drake project to help offset the costs of that planned project.
3. **Low cost safety improvements** – Minor, inexpensive solutions funded through maintenance budgets can often be implemented that provide a very high benefit to cost ratio. Again, crash data was used to inform this approach to traffic safety. Specific examples of recent low cost safety improvements include:

- College/Trilby -- Traffic signal retimed to change arrival patterns and thereby reduce the amount of southbound through traffic arriving when the signal changes from green to red on College. This was done in response to a high number of approach turn crashes involving northbound left turners conflicting with southbound through motorists during the signal change from green to red.
- Mason/Mulberry – Identified as the #1 red light running crash location. Converted 8-inch signal displays to 12-inch displays and worked with the Forestry Department to do major trimming of overhanging trees.
- College/Monroe – Implemented flashing yellow arrow displays and protected only (turn on green arrow only) left turn movements during peak volume times in response to approach turn crashes during those time periods.
- Lady Moon/Harmony – Installed protected only left turn phasing.
- Shields/Plum – Made signal timing adjustments to improve progression and reduce rear end crash potential.

4. **Other safety improvements** recently completed in Fort Collins include:

- Lady Moon/Kechter – New traffic signal to address right angle crash problem.
- Laurel Street Road Diet – Intended to address pedestrian safety issues as well as provide left turn lanes at intersections thereby reducing rear end and approach turn crash potential.
- Neighborhood Traffic Mitigation Projects
 - Laporte Avenue Road Diet
 - Dynamic speed displays (radar speed signs) in five locations
- School Safety – Ongoing school safety program working in conjunction with the Poudre School District. Recent activity includes upgrades to school crossing signs throughout the City and the installation of a new crosswalk on Swallow at Rocky Mountain High School.
- Shields/Plum – Installation of a “bike box” pavement marking intended to reduce the risk of “right hook” bike crashes.

Enforcement

Police Services is the lead entity for enforcement. Starting in 2006, Police Services put an increased emphasis on traffic enforcement. The results from this increased effort are noticeable. The percentage of 2010 Citizen Survey respondents that rated traffic enforcement good or very good was 63% compared to 49% in 2003.

The Traffic Unit currently has six officers and three camera radar operators dedicated to a strategy of high visibility traffic enforcement. The intent of this strategy is two-fold: provide direct enforcement to violators while also deterring other violators through a high visibility presence.

Two types of photo enforcement are used in Fort Collins: speed enforcement and red light enforcement. Speed enforcement units are deployed primarily in neighborhood complaint areas and also in problem areas identified by officers. Data from the camera radar units show that compliance with neighborhood speed limits has improved from 25% to over 50% since 2004.

Red light cameras are located at Timberline/Harmony and College/Drake. The impact of the red light cameras is difficult to measure due to other, varying conditions such as signal changes, road construction etc., that also contribute to crashes. At this time it is not possible to show a specific change in crashes related to these cameras.

The other area of emphasis for enforcement is in school zones. The Police Traffic Unit makes the forty eight school zones in the City an enforcement priority. Other patrol officers also supplement enforcement as call load allows. School zones are selected for enforcement based on calls from schools, parents and Traffic Operations (who also receives some of the calls from residents).

Six Traffic Unit officers work to enforce traffic laws on the 1,800 miles of streets within the City. This is a challenging task, but officers are committed to targeting enforcement of contributing factors in crashes such as speed, alcohol, drugs, reckless driving, inattention and right-of-way violations in an effort to improve traffic safety.

Education

During development of the Traffic Safety Summary and the evaluation of serious injury/fatal crash types, numerous driving behaviors were identified as contributing factors in crashes. This realization was the impetus for declaring October 2011 “Traffic Safety Awareness Month”.

Throughout October and into November Traffic Operations staff made presentations to community groups and employee groups. In addition, a “Studio 14” program focusing on traffic safety was produced and aired. Also, the first in what is intended to be a series of “commercials” was developed that demonstrates the most common bicycle crash and a way to avoid it. Lastly, traffic safety web pages that include a variety of safety information from the Traffic Safety Summary were added to the Traffic Operations website.

In addition to Traffic Safety Month, other traffic safety educational efforts are ongoing. Examples include:

- The Bicycle Safety Education Plan adopted by City Council in 2011.
- The City Pedestrian Plan adopted as part of the Transportation Master Plan in 2011.
- Neighborhood traffic education programs including yard signs, radar speed displays and public service radio messages conveying traffic safety messages.

- The Safe Routes to School Program (SRTS) utilizes Federal grant money in conjunction with local funds to develop safety education and encouragement programs for school children.

Pedestrian Crosswalk Policy

As noted previously, pedestrian crashes account for 9% of the serious injury/fatal crashes in Fort Collins and are one of six crash types that the City is focused on reducing. Pedestrian crossing improvements are part of that focus.

According to City ordinance and State law, a crosswalk exists (whether marked or not) as the extension of the sidewalk through every intersection. Thus, it is not necessary to have markings at every street crossing in order to create a legal crosswalk where pedestrians have the right of way.

In 2005, the Federal Highway Administration (FHWA) published a landmark study on the “Safety Effects of Marked versus Unmarked Crosswalks at Uncontrolled Locations.” A total of 1,000 marked crosswalk sites and 1,000 matched unmarked crosswalk sites in 30 cities across the United States were analyzed. The study results revealed that under no condition was the presence of a marked crosswalk alone at an uncontrolled location associated with a significantly lower pedestrian crash rate compared to an unmarked crosswalk. On multilane roads with traffic volumes greater than 12,000 vehicles per day, marked crosswalks were associated with a higher pedestrian crash rate compared to unmarked crosswalks.

In 2006, the Transportation Research Board, a division of the National Research Council published a report titled “Improving Pedestrian Safety at Unsignalized Crossings”. This report used recommendations from the 2005 FHWA study along with other research to create the current state of the art for the use of pedestrian crossing treatments.

In 2011, the City adopted an updated Pedestrian Plan. The Pedestrian Plan includes a detailed discussion of the City’s current pedestrian crossing policy that is based on this prior national research.

As per the Pedestrian Plan, marked crosswalks are installed at all signalized locations where pedestrian signals are present. In addition, marked crosswalks may be installed at locations controlled by stop signs if there is a documented need (school crossings etc.) Pedestrian crossing treatments at uncontrolled locations (i.e., no stop signs or traffic signals) are broken down into four categories that escalate the treatment depending on conditions:

- No improvement.
- Level 1 - Marked crosswalks and standard pedestrian crossing warning signs.
- Level 2 - Marked crosswalks with enhanced crossing treatments such as additional signage, pedestrian activated warning beacons (yellow lights), pedestrian refuge islands etc.
- Level 3 - Marked crosswalks with traffic signals or pedestrian hybrid beacons (devices that control traffic using a red signal indication).

An assessment to determine the proper crossing treatment includes an evaluation of pedestrian volumes, pedestrian delay, traffic volumes, traffic speed and available sight distance.

Consistency in application of pedestrian crossing treatments is important to ensure proper response by both motorists and pedestrians. In the past we have not always been consistent in our approach to pedestrian crossing treatments. Until recently, the only devices approved for use were marked crosswalks or traffic signals. At the same time, there was a real need for crossing treatments that fall somewhere between a standard marked crosswalk and a traffic signal (what is now called Level 2 crossings). Until recently, there was not much guidance nationally for application of pedestrian crossing treatments. Communities were mostly left on their own to experiment with different devices to try to meet the need. As a result, there has been a variety of different devices implemented throughout the country.

Staff's goal moving forward is to apply a consistent approach to crossing treatments based on the level of protection they require. There is still flexibility, particularly with level 2 devices, but it is staff's intent to provide more consistent treatments in the future.

Summary

Fort Collins continues to be recognized nationally for its safe drivers. We are fortunate to have so many conscientious drivers who help keep city streets safe. There is still room for improvement. Through engineering, operations and maintenance, education, and enforcement, the City continues to strive for improved safety. These efforts involve many departments in the City, including Traffic Operations, Police, Engineering, Streets, Transportation Planning, and Forestry. Using a data driven approach allows staff to coordinate efforts to target specific crash patterns and problem locations. Moving forward, staff will continue to monitor crashes as a way of benchmarking the effectiveness of the various safety improvement strategies being applied.

ATTACHMENTS

1. Powerpoint presentation

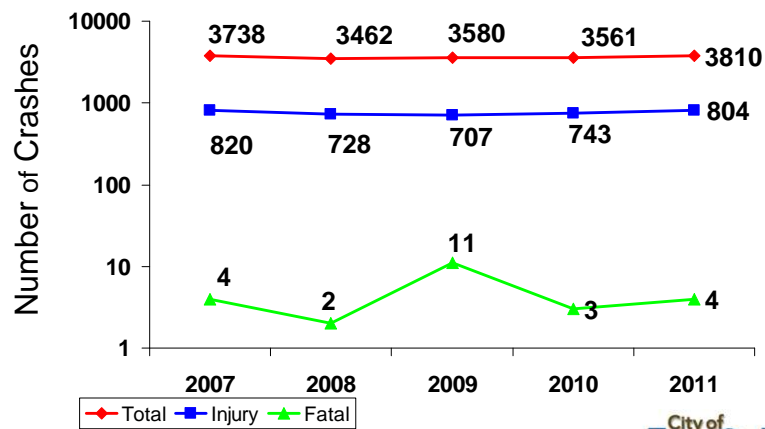
Traffic Safety Summary

Presentation for:
City Council
January 31, 2012



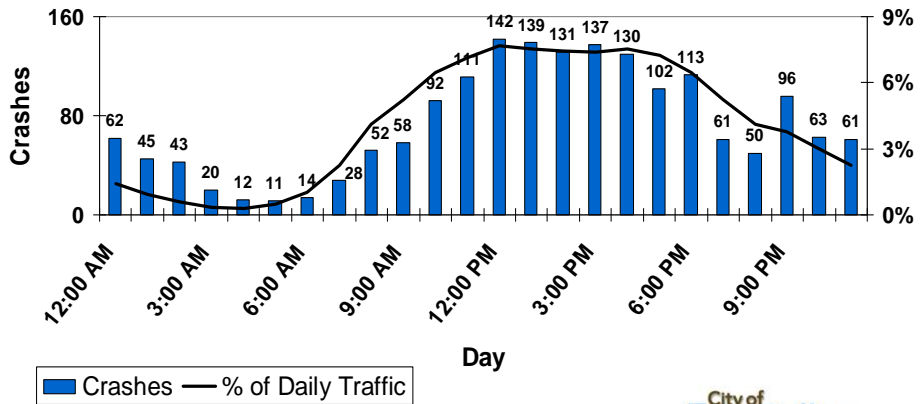
1

Total Crashes, 2007 – 2011



2

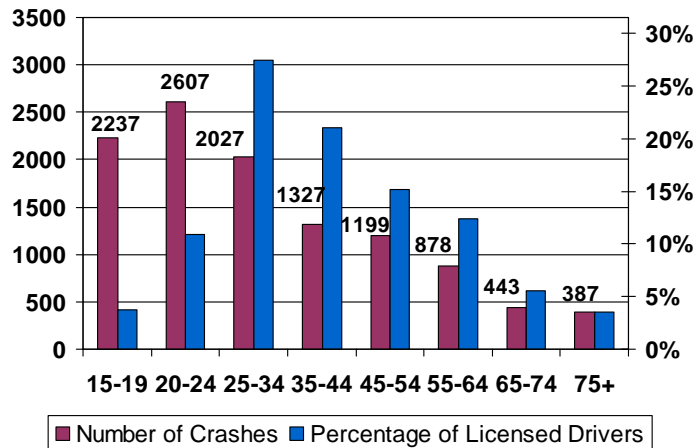
Crashes by Time of Day, Saturday



3



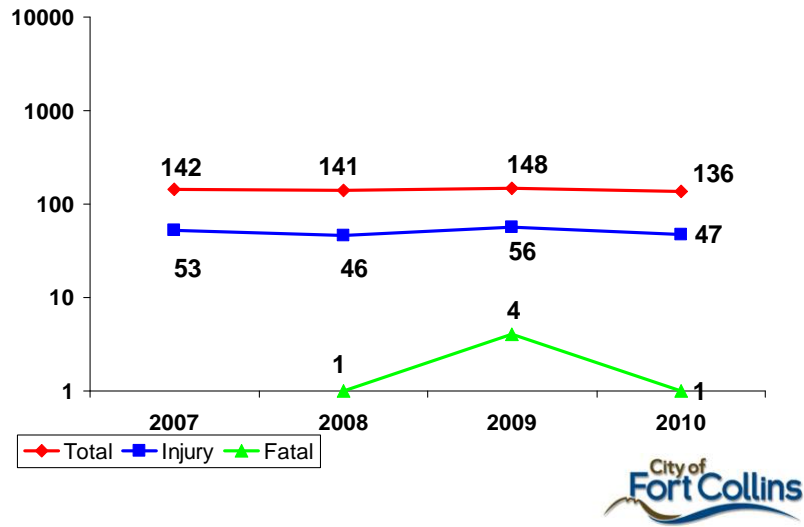
Crashes by Age



4

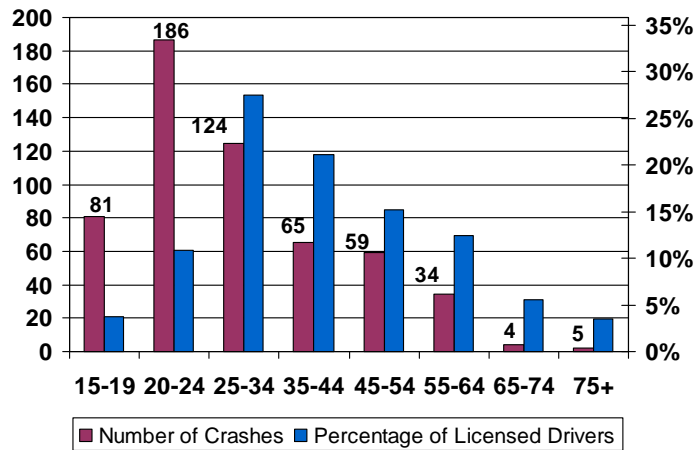


DUI Crashes



5

DUI Crashes by Age



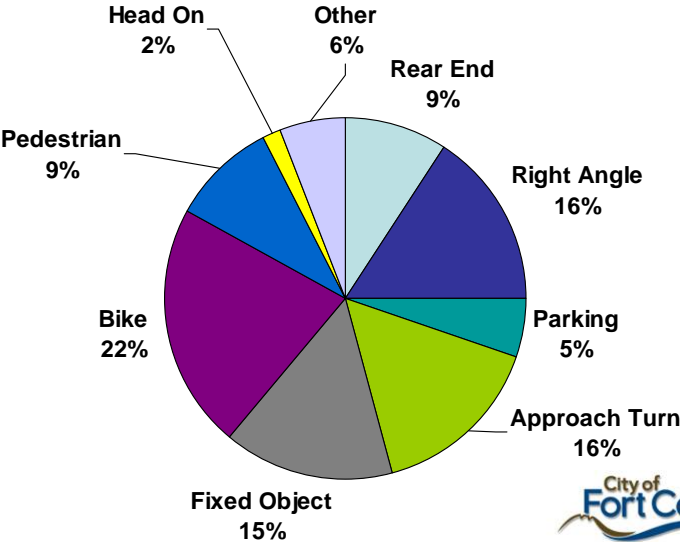
6

Types of Crashes



7

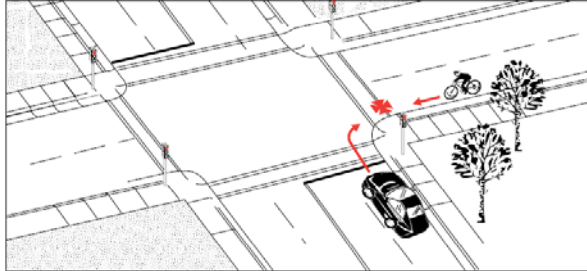
Severe Injury/Fatal Crashes by Type



8

Bicycle Crashes

- 83% of bicycle crashes occurred at intersections. Most involved right of way violations by motorists and/or bicyclists



- 36% of bike crashes involved bikes riding against traffic (usually from the sidewalk) conflicting with cross street vehicles



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Bicycle Crashes

Bicyclists:

- Don't ride against traffic
- Avoid riding on the sidewalk. If necessary slow to walking speed to cross intersections, driveways, alleys etc.

Motorists:

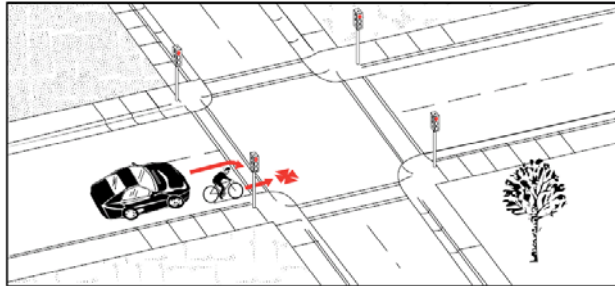
- Check to the right even when turning right



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Bicycle Crashes

Bicyclists: Don't pull up to the right of a motorist that may be turning right. Take the lane behind the motorist.



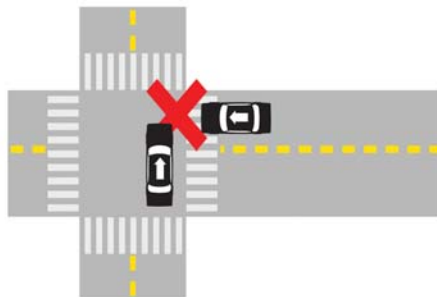
“Right Hook”

Motorists: Check for bicyclists then move as far right as possible (into the bike/parking lane is ok) when making a right turn.



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Right Angle Crashes



• 65% of Right Angle Crashes Occurred at Unsignalized Intersections

• 28% of Right Angle Crashes Involved Red Light Running at Signals



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Right Angle Crashes

Most Right Angle accidents occur after stopping at a STOP sign

- Sight Distance Obstructions
- Heavy Cross Street Traffic
- Right Turn Vehicles Shadowing Through Vehicles

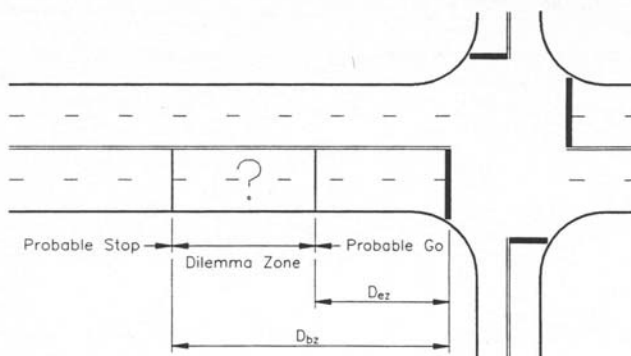
Red Light Running

- Inattention
- Dilemma Zone



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Dilemma Zone Boundaries on a Typical Intersection Approach.



D_{bz} = distance to the beginning of the dilemma zone

D_{ez} = distance to the end of the dilemma zone

Approach Turn Crashes



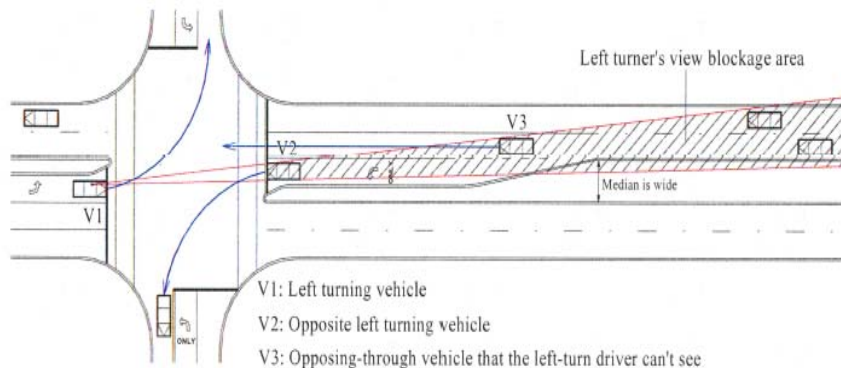
- 75% of Approach Turn Accidents Occurred at Signalized Intersections

- Confusion During the Yellow Light is a Major Contributing Factor



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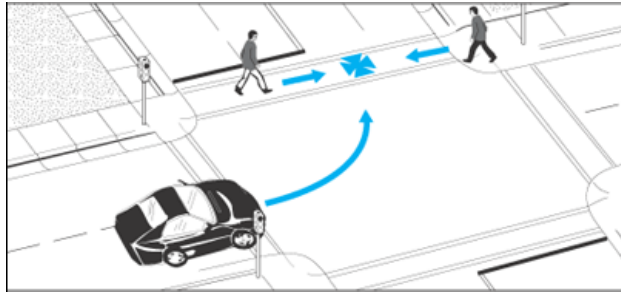
Approach Turn Crashes



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Pedestrian Crashes

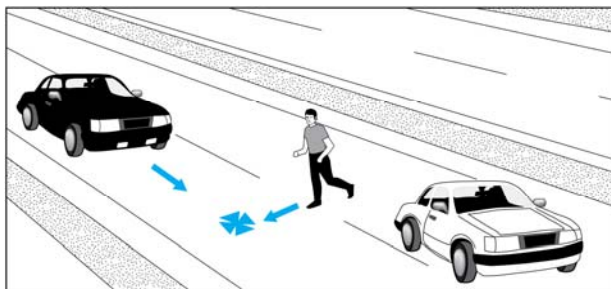
- Motorists Failing to Yield at Intersections Account for 46% of Pedestrian Crashes



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Pedestrian Crashes

- Pedestrians Darting Out or Failing to Yield Account for 69% of Severe Injury/Fatal Crashes



- 81% of Serious Injury/Fatal Crashes Occur at Night



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Traffic Safety Improvement Program



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Traffic Safety Improvement Program

October 2011 – “Traffic Safety Awareness Month”

- Presentations to Community Groups
- Website Describing Crash Types and Tips How to Avoid Them
- Studio 14
- YouTube Video
- Ongoing



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Safety Improvements



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Mason/Mulberry Eastbound "Before"

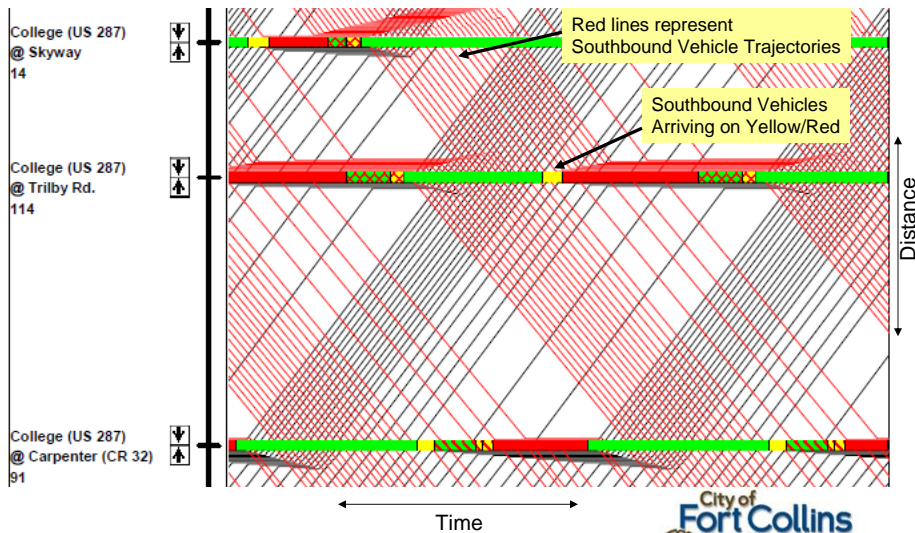
Safety Improvements



22

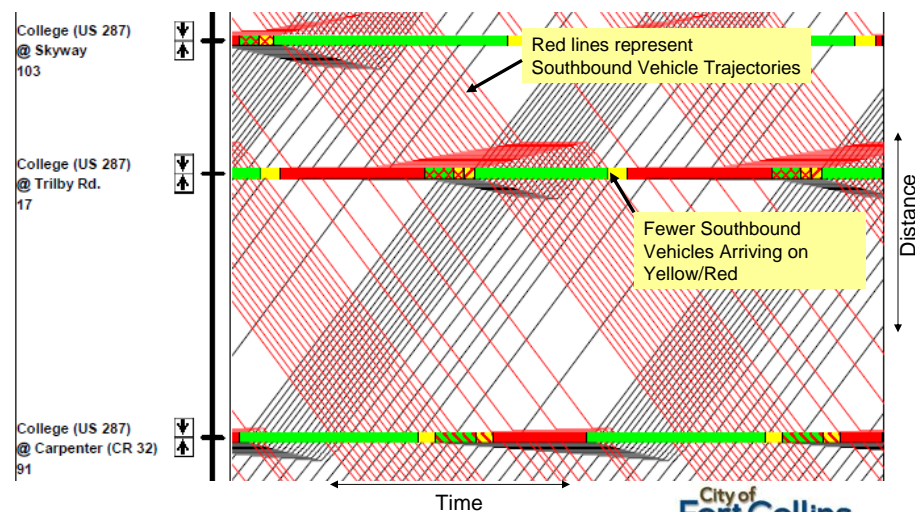
Mason/Mulberry Eastbound "After"

Safety Improvements



23 College/Trilby Platoon Flow "Before"
Southbound Vehicles Arriving on Yellow/Red

Safety Improvements



College/Trilby Platoon Flow "After" to
24 Reduce Southbound Arrivals on Yellow/Red and Thereby
Approach Turn Crash Potential

Safety Improvements



New left-turn signal

Flashing Yellow Arrow

- College/Monroe
- Allows Protected Only Left Turn Mode by Time of Day



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Safety Improvements

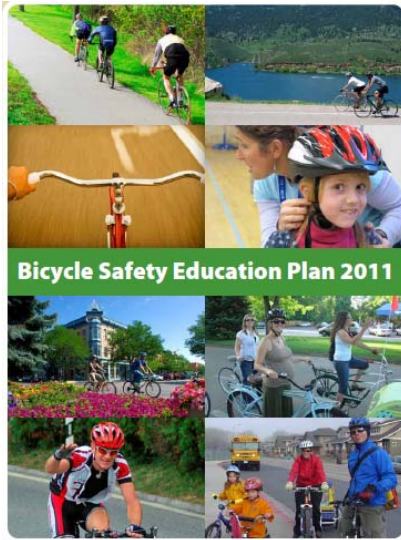


Lady Moon/Kechter – Traffic Signal



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Safety Improvements



Traffic Safety Data Informed
The Bike Safety Education
Plan



27



Safety Improvements



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Capital Projects

Arterial Intersection Prioritization Study

- Harmony Road – Widening to six lanes from Timberline to Boardwalk
- Shields/Drake – Turn Lanes
- Shields/Davidson – Access Control
- College/Horsetooth – Turn Lanes



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Pedestrian Crossings



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Pedestrian Crossings

Pedestrian Plan Adopted in February 2011

- Includes Pedestrian Crossing Policy
- Based on Latest Research on Pedestrian Crossing Safety
- Where crossings are needed, three levels of improvement are considered based on conditions
 - Pedestrian Volumes
 - Pedestrian Delay
 - Traffic Volume and Speed
 - Sight Distance



31

Pedestrian Crossings – Level 1



32

Pedestrian Crossings – Level 2



Mountain/Remington

Laurel/Sherwood



33

Pedestrian Crossings – Level 3



34

Pedestrian Crossings – Level 3



35