Chapter 3. User Needs Assessment

This chapter presents an overview of the needs of existing and potential pedestrians and bicyclists in Normal. Adequately identifying user needs enables system planners and policy-makers to develop logical solutions for improving the community's walkway and bikeway network. The chapter first describes general bicyclist types and their associated needs, then it outlines a demand analysis that was used to estimate existing and future walking and bicycling demand.

The third part of this analysis uses reported crash data supplied by the Town of Normal for crashes involving pedestrians or bicyclists from 2005 through 2007. Analyzing crash data sheds light on potential streets or intersections that should be targeted for improvements. Increasing safety for pedestrians and bicyclists yields tremendous potential to increase the rate of non-motorized use (e.g., more people are willing to walk bicycle if they believe that it is a safe activity). Improving conditions at known problem sites is therefore a key element of this Plan.

Needs and Types of Bicyclists

It is important to understand that the needs and preferences of bicyclists vary depending on the cyclist's skill level and the type of trip a rider wishes to take. For example, bicyclists who ride for recreational purposes may prefer scenic, winding, off-street trails, while bicyclists who ride to work or for errands may prefer more direct on-street bicycle facilities. Child bicyclists, seniors, and adults new to bicycling may prefer shared use paths, while adult bicyclists with more experience may prefer bicycle lanes. Cyclists also include utilitarian cyclists who choose to live with one fewer car and people who ride because they have no other transportation option due to economic reasons. A bicycle plan should consider these differences when planning a system that serves all user types. The following sections describe the different types of bicyclists, the different reasons for bicycling, and the respective needs of these categories of bicyclists.

Needs of Casual and Experienced Riders

For the purposes of this Plan, bicyclists are separated into two skill levels: casual and experienced. Casual bicyclists typically include youth, adults and seniors who are intermittent riders. Some casual bicyclists, such as youths under driving age, may be unfamiliar with operating a vehicle on roads and related laws. Experienced bicyclists typically include commuters, long-distance road bicyclists, racers, and those who use their bicycle as a primary means of transportation. Table 1 summarizes the needs of casual and experienced bicyclists.

Table 1. Characteristics of Casual and Experienced Bicyclists

Casual Riders	Experienced Riders
Prefer off-street shared use paths or bike lanes along low-volume, low-speed streets	Prefer on-street or bicycle-only facilities as opposed to shared use paths
May have difficulty gauging traffic and may be unfamiliar with the rules of the road. May walk bicycle across intersections	Comfortable riding with vehicles on streets. Negotiate streets like a motor vehicle, including "taking the lane" and using left-turn pockets
May use a less direct route to avoid Arterials with heavy traffic volumes	May prefer a more direct route
May ride on sidewalks and ride the wrong way on streets and sidewalks	Avoid riding on sidewalks or on shared use paths. Rides with the flow of traffic on streets
May ride at speeds comparable to walking, or slightly faster than walking	Ride at speeds up to 20 MPH on flat ground, up to 40 mph on steep descents
Bicycle for shorter distances: up to 2 miles	May cycle longer distances, sometimes more than 100 miles

The casual bicyclist will benefit from route markers, shared use paths, bike lanes on lower-volume streets, traffic calming, and educational programs. Casual bicyclists may also benefit from a connected network of marked routes leading to parks, schools, shopping areas, and other destinations. To encourage youth to ride, routes must be safe enough for their parents to allow them to ride. The experienced bicyclist will benefit from a connected network of bike lanes on higher-volume arterials, wider curb lanes and loop detectors at signals. The experienced bicyclist who is primarily interested in exercise will benefit from loop routes leading back to their point of origin. Due primarily to the existing Constitutional Trail, the Town of Normal offers many opportunities for casual bicyclists. In several locations, the Constitution Trail is accessible from residential neighborhoods. Many experienced bicyclists, including those who bicycle longer distances to commute for exercise or training, also use the Constitution Trail. This combination of fast-moving bicyclists on training rides with slower-moving casual bicyclists and pedestrians may result in user conflicts.

Characteristics of Recreational and Utilitarian Trips

For purposes of this Plan, bicycle trips are separated into two trip types: recreational and utilitarian. Recreational trips can range from a 50-mile weekend group ride along rural roads to a short family outing to a local park, and all levels in between. Many utilitarian trips are made by commuter bicyclists, who are a primary focus of State and Federal bicycle funding, as well as bicyclists going to school, shopping or running other errands. Utilitarian cyclists include those who choose to live with one less car as well as those who have no other alternative transportation due to economic reasons.

Table 2 summarizes general characteristics of recreational and utilitarian bicycle trips.

Table 2. Characteristics of Recreational and Utilitarian Bicycle Trips

Recreational Trips	Utilitarian Trips
Directness of route not as important as visual interest, shade, protection from wind	Directness of route and connected, continuous facilities more important than visual interest, etc.
Loop trips may be preferred to backtracking	Trips generally travel from residential to shopping or work areas and back
Trips may range from under a mile to over 50 miles	Trips generally are 1-5 miles in length
Short-term bicycle parking should be provided at recreational sites, parks, trailheads and other activity centers	Short-term and long-term bicycle parking should be provided at stores, transit stations, schools, workplaces
Varied topography may be desired, depending on the skill level of the cyclist	Flat topography is desired
Cyclists may be riding in a group	Cyclists often ride alone
Cyclists may drive with their bicycles to the starting point of a ride	Cyclists ride a bicycle as the primary transportation mode for the trip; may transfer to public transportation; may or may not have access to a car for the trip
Trips typically occur on the weekend or on weekdays before morning commute hours or after evening commute hours	Trips typically occur during morning and evening commute hours (commute to school and work); shopping trips also occur on weekends
Cyclists' preferred type of facility varies, depending on the skill level of the cyclist	Generally use on-street facilities, may use trails if they provide easier access to destinations than on-street facilities

Recreational bicyclists' needs vary depending on their skill level. Road bicyclists out for a 100-mile weekend ride may prefer well-maintained roads with wide shoulders and few intersections, with few stop signs or stop lights. Casual bicyclists out for a family trip may prefer a quiet shared use path with adjacent parks, benches, and water fountains.

Utilitarian bicyclists have needs that are more straightforward. Key commuter needs are summarized below:

- Commuter routes should be direct, continuous, and connected
- Protected intersection crossing locations are needed for safe and efficient bicycle commuting
- Bicycle commuters must have secure places to store their bicycles at their destinations
- Bicycle facilities should be provided on major streets

The Town of Normal's trail system provides excellent access to several parks, recreation areas, and Uptown. However, not all neighborhoods have easy bicycle access to employment centers, schools and shopping. For casual recreational riders, this may not be a serious deterrent, since they may be willing and able to drive their bicycle to the trailhead. However, this may not be an option for experienced recreational riders or commuters, as they generally would like to use their bicycle for the whole trip. Bicycle-friendly on-street connections between residential areas and the trails and between residential areas and shopping and commute centers would likely increase the prevalence of bicycle commuting, as well as increase the prevalence of recreational riding.

Predicting Walking and Bicycling Demand

When the Normal Bicycle and Pedestrian Master Plan is implemented, more Normal residents will choose to walk and bicycle, rather than driving for commuting, shopping and recreation. This shift can be directly translated into reduced vehicle miles traveled and results in air quality benefits by reducing emissions.

A variety of demand models are often used to quantify usage of existing bicycle facilities and to estimate the potential usage of new facilities. The purpose of these models is to provide an overview of the demand and benefits for bicycling and walking in Normal. As with all models, the results show a range of accuracy that varies based on a number of assumptions and available data. The models used for this study incorporated information from existing publications as well as data from the U.S. Census 2005-2007 American Community Survey (ACS) three-year estimate. All data assumptions and sources are noted in the tables following each section of the analysis.

Existing Pedestrian and Bicycle Demand

The Town of Normal pedestrian and bicycle demand models consist of several variables, including the commuting patterns of working adults and predicted travel behaviors of area college students and school children. For modeling purposes, the study area included all Normal residents according to the 2005-2007 ACS. The year 2007 was used as the baseline for the demand analysis, as it was the most recent year for which data was available.

For this analysis, population data for the existing labor force (including the number of workers and percentage of pedestrian and bicycle commuters) were obtained from the 2007 ACS findings for Normal. In addition to people commuting to the workplace via walking or by bicycle, the model also incorporates a portion of the labor force working from home. Specifically, it was assumed that about a quarter of people working from home would make at least one walking trip, and another five percent would make at least one bicycling trip during the workday.

The 2007 ACS was also used to estimate the number of school children in Normal. This figure was combined with data from National Safe Routes to School surveys, which found that approximately 11 percent of school children walk to and from school every day. College students constitute a third variable in the model due to the presence of Illinois State University, Heartland Community College and Lincoln College in Normal. Enrollment information for those schools was obtained from their websites and is shown in Table 3.

Table 3. College and University Enrollment in Normal and Bloomington, 2007-2008

College/University	2007-2008 Enrollment
Illinois State University	20,419
Heartland Community College	1,661
Lincoln College	550
Total	**22,630**

Data from the Federal Highway Administration regarding walking and bicycling mode share in university communities was used to estimate that 60 percent of students commuting to college walk to school. While this number may be appropriate for the large, centrally-located ISU where a large proportion of students live on campus, it is unlikely that such a large proportion of students at Heartland College walk. The walking mode split for Heartland College was therefore assumed to be five percent of students. The 2001 *National Household Transportation Survey* found that commute trips (including work and school trips) only comprise approximately a third of total trips; trips for shopping, recreation and socializing are a significantly greater proportion of total trips than just commuting, as reported by the ACS. Table 4 shows results of the pedestrian demand model and identifies the variables and assumptions used in the model.

For the bicycling model, many of the same assumptions from the pedestrian model were used. The National Safe Routes to School surveys found that approximately two percent of school children bike to school. For university communities, the Federal Highway Administration found that ten percent of college students bicycle. Again, the large proportion of trips that are non-commute requires a multiplier of 2.73 to estimate the number of total bicycle trips in Normal. Table 5 summarizes results and assumptions of the bicycle demand model and the estimated existing daily bicycle trips in Normal.

The tables indicate that almost 131,000 walking trips occur in the Normal area each day, along with over 20,000 bicycle trips. The largest group of pedestrians are college students (more than 13,500), and the largest walking trip purpose is for non-commute trips (more than 96,000). Most bicycle commute trips are made by college students (more than 2,000). These numbers are applicable to weekdays only, and averaged over the course of the year.

Table 4. Existing Pedestrian Demand Model Results

Variable	Quantity	Source
Study area population	50,398	ACS 2005-2007 for the Town of Normal
Employed population	25,001	ACS 2005-2007 Population of workers over 16
Walk-to-work mode share	12.4%	ACS 2005-2007 Means of transportation to work for workers 16 and older
Number of walk-to-work commuters	3,111	(employed persons) * (walking mode share)
Work-at-home mode share	1.8%	ACS 2005-2007 Means of transportation to work for workers 16 and older
Number of work-at-home walk commuters	115	Assumes 25% of population working at home makes at least one daily walking trip
Transit-to-work mode share	1.9%	ACS 2005-2007 Means of transportation to work for workers 16 and older
Transit pedestrian commuters	387	Assumes 80% of transit riders access transit by foot
School children, ages 6-14	5,377	ACS 2005-2007 School enrollment by level of school
School children walking mode share	11.0%	*National Safe Routes to School surveys*, 2003
School children walk commuters	591	(school children pop.) * (walking mode share)
Number of college students	22,630	School enrollment at ISU, Heartland Normal Campus, and Lincoln Normal Campus
Estimated college walking mode share	60.0% - ISU & Lincoln	*National Bicycling & Walking Study*, FHWA, Case Study No. 1, 1995
	5% - Heartland	Based on lack of on-campus housing
College walk commuters	13,578	(college student pop.) * (walking mode share)
Total number of walk commuters	17,616	(walk-to-work trips) + (school trips) + (college trips) + (utilitarian trips)
School and commute walking trips subtotal	35,232	Total walk commuters x 2 (for round trips)
Other utilitarian and discretionary trips		
Ratio of "other" trips to commute trips	2.73	*National Household Transportation Survey*, 2001
Estimated non-commute trips	96,184	(school and commute trips) * 2.73
Current Estimated Daily Pedestrian Trips:	**131,416**	

Table 5. Existing Bicycle Demand Model Results

Variable	Quantity	Source
Study area population	50,398	ACS 2005-2007 for the Town of Normal
Employed population	25,001	ACS 2005-2007 Population of workers over 16
Bike-to-work mode share	1.2%	ACS 2005-2007 Means of transportation to work for workers 16 and older
Number of bike-to-work commuters	301	(employed persons) * (bicycling mode share)
Work-at-home mode share	1.8%	ACS 2005-2007 Means of transportation to work for workers 16 and older
Number of work-at-home bike commuters	23	Assumes 5% of population working at home makes at least one daily bicycle trip
Transit-to-work mode share	1.9%	ACS 2005-2007 Means of transportation to work for workers 16 and older
Transit bicycle commuters	48	Assumes 10% of transit riders access transit by bicycle
School children, ages 6-14	5,377	ACS 2005-2007 School enrollment by level of school
School children bicycling mode share	2.0%	*National Safe Routes to School surveys*, 2003
School children bike commuters	108	(school children pop.) * (bicycling mode share)
Number of college students	22,630	School enrollment at ISU, Heartland Normal Campus, and Lincoln Normal Campus.
Estimated college bicycling mode share	10.0%	*National Bicycling & Walking Study*, FHWA, Case Study No. 1, 1995
College bicycling commuters	2,263	(college student pop.) * (bicycling mode share)
Total number of bike commuters	2,694	(bike-to-work trips) + (school trips) + (college trips) + (utilitarian trips)
School and commute bicycling trips subtotal	5,389	Total bicycle commuters x 2 (for round trips)
Other utilitarian and discretionary trips		
Ratio of "other" trips to commute trips	2.73	*National Household Transportation Survey*, 2001
Estimated non-commute trips	14,712	(school and commute trips) * 2.73
Current Estimated Daily Bicycle Trips	**20,101**	

Current Air Quality Benefits

In addition to models estimating existing and future demand for bikeway facilities, a variety of models can also quantify the benefits of such facilities. The expected number of walking and biking trips produced as soon as a new facility opens can be directly translated into reduced vehicle trips. This number can be used to determine the approximate reduction in vehicle miles traveled (VMT), which has the direct effect of reducing vehicular emissions.

The number of reduced vehicle trips, VMT and the ensuing vehicle emissions reduction was estimated based on the results of the demand models described above. It was assumed that about 73 percent of pedestrian and bicycle trips would directly replace vehicle trips for adults and college students. For school children, the reduction was assumed to be 53 percent.

ACS 2007 Travel to Work data were used to determine average trip lengths in Normal. The average travel time in minutes reported for bicyclists and pedestrians was 10.6 minutes, which roughly translates to a half-mile for pedestrians (assuming a 3 MPH walking speed) and slightly more than two miles for bicyclists (assuming a 12 MPH riding speed). However, these distances only account for commuting trips, which tend to be shorter than other trip types, particularly recreational. The analysis estimated that the average pedestrian round trip is roughly 1 mile in length for adults, whereas for children the distance is one-half mile. A bicycle roundtrip distance of four miles was used for adults and college students, and one mile for school children. The vehicle emissions reduction estimates also incorporated calculations commonly used in other models.

Table 6 and Table 7 show the model of vehicle trips and miles reduction, as well as the resulting air quality benefits of existing walking and bicycling, respectively. From the estimate of current levels of bicycling and walking in Normal, estimated bicycling and walking currently remove almost 15,000 vehicle trips per weekday, translating to an annual reduction of nearly four million vehicle trips and 2,500 tons of emissions.

Table 6. Estimated Vehicle Trips, Miles Reduction and Air Quality Benefits from Existing Pedestrian Trips

Reduced Vehicle Trips and Miles from Existing Pedestrian Trips		
Variable	**Quantity**	**Source**
Reduced Vehicle Trips per Weekday	12,929	Assumes 73% of walking trips replace vehicle trips for adults/college students and 53% for school children
Reduced Vehicle Trips per Year	3,347,367	Reduced number of weekday vehicle trips multiplied by 261 (weekdays in a year)
Reduced Vehicle Miles per Weekday	12,585	Assumes average round trip travel length of 1 mile for adults/college students and 0.5 mile for school children
Reduced Vehicle Miles per Year	3,284,606	Reduced number of weekday vehicle miles multiplied by 261 (weekdays in a year)
Air Quality Benefits from Existing Pedestrian Trips		
Variable	**Quantity**	**Source**
Reduced HC (lb/weekday)*	78	(daily mileage reduction) * (0.0062 lb per reduced mile)
Reduced CO (lb/weekday)†	580	(daily mileage reduction) * (0.046 lb per reduced mile)
Reduced NOX (lb/weekday)‡	39	(daily mileage reduction) * (0.003 lb per reduced mile)
Reduced CO2 (lb/weekday)§	11,528	(daily mileage reduction) * (0.916 lb per reduced mile)
Reduced HC (tons/year)	10	(yearly mileage reduction) * (0.0062 lb per reduced mile) / (2000 lbs per ton)
Reduced CO (tons/year)	76	(yearly mileage reduction) * (0.046 lb per reduced mile) / (2000 lbs per ton)
Reduced NOX (tons/year)	5	(yearly mileage reduction) * (0.003 lb per reduced mile) / (2000 lbs per ton)
Reduced CO2 (tons/year)	1,504	(yearly mileage reduction) * (0.916 lb per reduced mile) / (2000 lbs per ton)

* Hydrocarbons
† Carbon Monoxide
‡ Nitrous Oxides
§ Carbon Dioxide

Table 7. Estimated Vehicle Trips, Miles Reduction and Air Quality Benefits from Existing Bicycle Trips

Reduced Vehicle Trips and Miles from Existing Bicycle Trips		
Variable	**Quantity**	**Source**
Reduced Vehicle Trips per Weekday	2,050	Assumes 73% of bicycle trips replace vehicle trips for adults/college students and 53% for school children
Reduced Vehicle Trips per Year	535,175	Reduced number of weekday vehicle trips multiplied by 261 (weekdays in a year)
Reduced Vehicle Miles per Weekday	7,752	Assumes average round trip travel length of 4 miles for adults/college students and 1 mile for school children
Reduced Vehicle Miles per Year	2,023,291	Reduced number of weekday vehicle miles multiplied by 261 (weekdays in a year)
Air Quality Benefits from Existing Bicycle Trips		
Variable	**Quantity**	**Source**
Reduced HC (lb/weekday)**	48	(daily mileage reduction) * (0.0062 lb per reduced mile)
Reduced CO (lb/weekday)††	357	(daily mileage reduction) * (0.046 lb per reduced mile)
Reduced NOX (lb/weekday)‡‡	24	(daily mileage reduction) * (0.003 lb per reduced mile)
Reduced CO2 (lb/weekday)§§	7,1011	(daily mileage reduction) * (0.916 lb per reduced mile)
Reduced HC (tons/year)	6	(yearly mileage reduction) * (0.0062 lb per reduced mile) (2000 lbs per ton)
Reduced CO (tons/year)	47	(yearly mileage reduction) * (0.046 lb per reduced mile) (2000 lbs per ton)
Reduced NOX (tons/year)	3	(yearly mileage reduction) * (0.003 lb per reduced mile) (2000 lbs per ton)
Reduced CO2 (tons/year)	927	(yearly mileage reduction) * (0.916 lb per reduced mile) (2000 lbs per ton)

** Hydrocarbons
†† Carbon Monoxide
‡‡ Nitrous Oxides
§§ Carbon Dioxide

Potential Future Walking and Bicycling Trips

Estimating future benefits requires additional assumptions regarding population and anticipated commuting patterns in 2025 for Normal. The variables used as model inputs generally resemble the variables used in the demand model discussed earlier and represent a realistic, achievable goal of what the daily number of pedestrian and bicycle trips could be with a more complete walkway and bikeway system. Future population and employment projections developed by McLean County were used in this model.

The *Town of Normal Comprehensive Plan* projects Normal's 2025 population to be about 62,300. Employment in the Town is predicted to increase to approximately 35,000 jobs as suburbs grow and commuting to the town increases. The population of school children is assumed to maintain its proportion, or about 10.7 percent of the total population. Based on *The Master Plan: Achieving Distinctiveness and Excellence in Form, Function and Design at Illinois State University (2000)*, enrollment at ISU is expected to remain stable. The other universities do not have expansion plans, therefore the population of college students was assumed to remain relatively constant.

Comparing mode split in the region between the 2000 Census and 2007 American Community Survey indicates trends that may continue in the future. Table 8 shows that transit use, bicycling and walking have increased in Normal since 2000.

Table 8. Percent Change in Mode Split, 2000 to 2007

	2000 Census		2007 ACS		
Variable	Number	Percent	Number	Percent	Percent Change, 2000 to 2007
Population, workers 16+	23,193	-	25,001	-	-
Public Transportation	341	1.5%	484	1.9%	31.67%
Bicycle	173	0.7%	301	1.2%	61.41%
Walk	2,555	11.0%	3,111	12.4%	12.96%
Work at home	585	2.5%	458	1.8%	-27.37%

For the model, the walking and bicycling mode shares were increased to also address the higher use that will be potentially generated by the addition of new facilities and enhancements to the existing system. The estimated proportion of residents taking transit to work was slightly increased, and the population working from home was assumed to remain relatively constant. In addition, it was assumed the rate of elementary and high school students walking and bicycling to school increased dramatically, based on experience with Safe Routes to School Programs. Participating students in Marin County increased walking by 64 percent and bicycling by 114 percent.[3] This large increase is likely to taper off over time, and is likely to be smaller in Normal, considering weather and housing density.

Table 9 summarizes data on potential future pedestrian demand in the year 2025, while Table 10 shows the results of the demand model predicting 2025 bicycle demand. Both of these analyses assume a more complete pedestrian and bicycle network and concurrent

[3] Marin County Bicycle Coalition, 2001. *Safe Routes to School demonstration final project.* Marin.

program development to encourage use. The models predict that over 150,000 pedestrian trips and 25,000 bicycle trips will occur in Normal each day by 2025.

Table 9. Future Pedestrian Demand Model Results

Variable	Quantity	Source
Future study area population	62,300	*Town of Normal Comprehensive Plan*
Future employed population	35,000	*Town of Normal Comprehensive Plan*
Future walk-to-work mode share	14.8%	Increase from previous mode split due to mode split trends and improvements in the pedestrian network (1% increase over 18 years)
Future number of walk-to-work commuters	5,180	(employed persons) * (walking mode share)
Future work-at-home mode share	1.8%	Remaining stable from ACS 2007
Future number of work-at-home walk commuters	160	Assumes 25% of population working at home makes at least one daily walking trip
Future transit-to-work mode share	5.0%	Increase from previous mode split due to mode split trends and improvements in the transit network
Future transit pedestrian commuters	1,400	Assumes 80% of transit riders access transit by foot
Future school children, ages 6-14 (grades K-8)	6,647	Maintains the proportion of total population who are school children at 10.7%
Future school children walking mode share	15.0%	*Based on experience with other Safe Routes to School programs*
Future school children walk commuters	997	(school children pop.) * walking mode share)
Future number of college students in study area	22,630	*The Master Plan: Achieving Distinctiveness and Excellence in Form, Function and Design at Illinois State University* (2000); assumes that enrollment will remain constant
Future estimated college walking mode share	60.0% - ISU & Lincoln	*National Bicycling & Walking Study*, FHWA, Case Study No. 1, 1995
	5% - Heartland	Based on lack of on-campus housing
Future college walk commuters	13,331	(college student pop.) * (walking mode share)
Future total number of walk commuters	21,068	(walk-to-work trips) + (school trips) + (college trips) + (utilitarian trips)
Future total daily walking trips	42,137	Total walk commuters x 2 (for round trips)
Other utilitarian and discretionary trips		
Ratio of "other" trips to commute trips	2.73	*National Household Transportation Survey*, 2001
Estimated non-commute trips	115,033	(school and commute trips) * 2.73
2025 Estimated Daily Pedestrian Trips:	**157,107**	

Table 10. Future Bicycling Demand Model Results

Variable	Quantity	Source
Future study area population	62,300	*Town of Normal and City of Bloomington Comprehensive Plans*
Future employed population	35,000	*Town of Normal and City of Bloomington Comprehensive Plans*
Future bike-to-work mode share	2.5%	1% increase over 18 years increased slightly from previous mode split due to trends and improvements in the bikeway network
Future number of bike-to-work commuters	875	(employed persons) * (bicycling mode share)
Future work-at-home mode share	1.8%	Remaining stable from Census 2000 and ACS 2007
Future number of work-at-home bike commuters	64	Assumes 10% of population working at home makes at least one daily bicycling trip
Future transit-to-work mode share	5.0%	Increase from previous mode split due to mode split trends and improvements in the transit network
Future average daily transit bicycle commuters	438	Assumes 10% of transit riders access transit by bicycle
Future school children, ages 6-14 (grades K-8)	6,647	Maintains the proportion of total population who are school children at 10.7%
Future school children bicycling mode share	3.0%	*Portland Safer Routes to School Survey*, Spring 2007
Future school children bike commuters	199	(school children pop.) * (bicycling mode share)
Future number of college students in study area	22,630	*The Master Plan: Achieving Distinctiveness and Excellence in Form, Function and Design at Illinois State University* (2000); assumes that enrollment will remain constant
Future estimated college bicycling mode share	10.0%	*National Bicycling & Walking Study*, FHWA, Case Study No. 1, 1995.
Future college bike commuters	2,263	(college student pop.) * (bicycling mode share)
Future total number of bicycle commuters	3,402	(bike-to-work trips) + (school trips) + (college trips) + (utilitarian trips)
Future total daily bicycling trips	6,803	Total bike commuters x 2 (for round trips)
Other utilitarian and discretionary trips		
Ratio of "other" trips to commute trips	2.73	*National Household Transportation Survey*, 2001
Estimated non-commute trips	18,572	(school and commute trips) * 2.73
2025 Estimated Daily Bicycle Trips:	**25,375**	

Potential Air Quality Improvements

Based on population growth and the expected increase in walking and bicycling, in the future bicycling and walking together will replace about 18,000 weekday vehicle trips, eliminating more than 11 million vehicle miles traveled per year, shown in Table 11. Walking and bicycling in Normal will prevent almost 41,500 pounds of vehicle emissions from entering the ambient air each weekday and more than 5,400 tons per year. Pedestrian and bikeway network enhancements are expected to generate more walking and bicycling trips in the future. This growth is expected to improve air quality by further reducing the number of vehicle trips, vehicle miles traveled, and associated vehicle emissions.

Table 11. Estimated Vehicle Trips and Miles Reduction from Future Pedestrian Trips

Reduced Vehicle Trips and Miles from Future Pedestrian Trips		
Variable	**Quantity**	**Source**
Reduced Vehicle Trips per Weekday	15,181	Assumes 73% of walking trips replace vehicle trips for adults/college students and 53% for school children
Reduced Vehicle Trips per Year	3,962,112	Reduced number of weekday vehicle trips multiplied by 261 (weekdays in a year)
Reduced Vehicle Miles per Weekday	31,899	Assumes average round trip travel length of 1 mile for adults/college students and 0.5 mile for schoolchildren
Reduced Vehicle Miles per Year	8,325,667	Reduced number of weekday vehicle miles multiplied by 261 (weekdays in a year)
Air Quality Benefits from Future Pedestrian Trips		
Variable	**Quantity**	**Source**
Reduced HC (lb/weekday)*	197	(daily mileage reduction) * (0.0062 lb per reduced mile)
Reduced CO (lb/weekday)†	1,470	(daily mileage reduction) * (0.046 lb per reduced mile)
Reduced NOX (lb/weekday)‡	98	(daily mileage reduction) * (0.003 lb per reduced mile)
Reduced CO2 (lb/weekday)§	29,220	(daily mileage reduction) * (0.916 lb per reduced mile)
Reduced HC (tons/year)	26	(yearly mileage reduction)*(0.0062 lb per reduced mile) / (2000 lbs per ton)
Reduced CO (tons/year)	192	(yearly mileage reduction)*(0.046 lb per reduced mile) / (2000 lbs per ton)
Reduced NOX (tons/year)	13	(yearly mileage reduction)*(0.003 lb per reduced mile) / (2000 lbs per ton)
Reduced CO2 (tons/year)	3,813	(yearly mileage reduction)*(0.916 lb per reduced mile) / (2000 lbs per ton)

* Hydrocarbons
† Nitrogen Monoxide
‡ Nitrous Oxides
§ Carbon Dioxide

Table 12. Estimated Vehicle Trips and Miles Reduction from Future Bicycle Trips

Reduced Vehicle Trips and Miles from Future Bicycle Trips		
Variable	**Quantity**	**Source**
Reduced Vehicle Trips per Weekday	2,763	Assumes 73% of bicycle trips replace vehicle trips for adults/college students and 53% for school children
Reduced Vehicle Trips per Year	721,040	Reduced number of weekday vehicle trips multiplied by 261 (weekdays in a year)
Reduced Vehicle Miles per Weekday	10,733	Assumes average round trip travel length of 4 miles for adults/college students and 1 mile for schoolchildren
Reduced Vehicle Miles per Year	2,801,409	Reduced number of weekday vehicle miles multiplied by 261 (weekdays in a year)
Air Quality Benefits from Future Bicycle Trips		
Variable	**Quantity**	**Source**
Reduced HC (lb/weekday)*	66	(daily mileage reduction) * (0.0062 lb per reduced mile)
Reduced CO (lb/weekday)†	495	(daily mileage reduction) * (0.046 lb per reduced mile)
Reduced NOX (lb/weekday)‡	33	(daily mileage reduction) * (0.003 lb per reduced mile)
Reduced CO2 (lb/weekday)§	9,832	(daily mileage reduction) * (0.916 lb per reduced mile)
Reduced HC (tons/year)	9	(yearly mileage reduction)*(0.0062 lb per reduced mile) / (2000 lbs per ton)
Reduced CO (tons/year)	65	(yearly mileage reduction)*(0.046 lb per reduced mile) / (2000 lbs per ton)
Reduced NOX (tons/year)	4	(yearly mileage reduction)*(0.003 lb per reduced mile) / (2000 lbs per ton)
Reduced CO2 (tons/year)	1,283	(yearly mileage reduction)*(0.916 lb per reduced mile) / (2000 lbs per ton)

* Hydrocarbons
† Nitrogen Monoxide
‡ Nitrous Oxides
§ Carbon Dioxide

Safety Analysis

Safety is a major concern of both existing and potential bicyclists and pedestrians. For those who currently walk or bike regularly, safety is typically an on-going concern or even a distraction. For those who do not walk or ride, it is one of the most compelling reasons not to do so.

This section evaluates existing conditions with respect to bicycle and pedestrian safety in Normal. The evaluation included a review of representative existing bicycle education programs being offered in Normal and surrounding areas. An analysis of crash data in Normal between 2005 and 2007 also indicates which intersections and other locations are particularly problematic. In addition, feedback from the December 2008 community workshop helped identify problem areas and needed safety countermeasures.

Existing Bicycle Education Programs

While no formal bicycle education programs exist in Normal, several organizations encourage and educate residents about bicycling. The League of Illinois Bicyclists (LIB) is an active organization that provides information, maps, club rides, and safety education in Illinois. The organization has developed a short video on motorist-vehicle safety.4 In addition, The McLean County Wheelers is a club that sponsors rides in the area. In Spring 2008, they ran a "Win a Bike" essay contest.

Crash Data Analysis

This analysis is based on collision data provided by Town of Normal Staff. In the period from 2005 through 2007, 105 crashes involving a bicyclist or a pedestrian were reported in Normal. Reported crashes remained steady at approximately 35 per year for those three years. The majority of reported crashes occurred at intersections as shown on Map 3. Locations that experienced more than two crashes during that time period include:

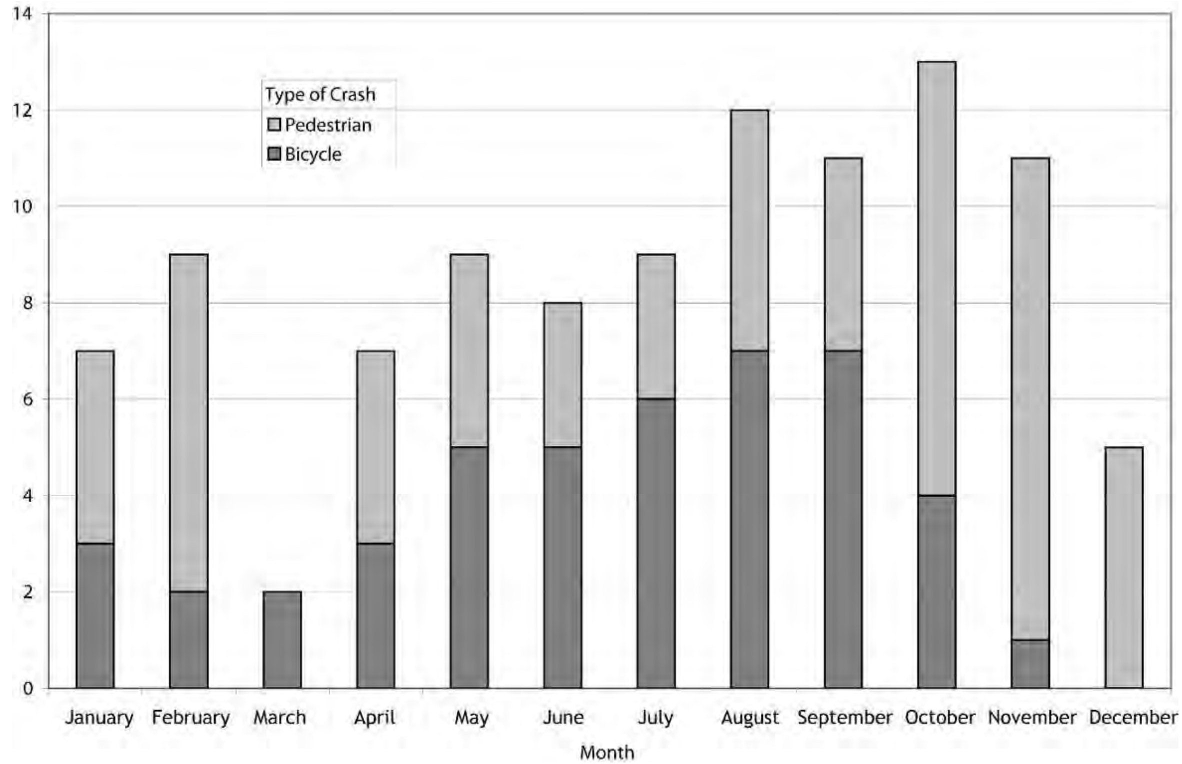
- Main Street at Gregory Street
- Linden Street at Vernon Avenue
- University Street at College Avenue
- 300 N Greenbriar Drive
- Fell Avenue at North Street
- Beaufort Street at University Street

Furthermore, many crashes occurred along the same corridors. College Avenue experienced the most total crashes (20), followed by Main Street (16), Linden Street (14), Fell Avenue (nine), University (nine), Beaufort Street (eight) and Vernon Avenue (eight). Other streets with several crashes include Greenbriar Drive, Gregory Street, North Street, Parkside Road, School Street, Willow Street, Hovey Avenue, Mulberry Street, Raab Road, and Towanda Avenue. Map 3 shows the location of crashes by severity.

Most reported crashes occurred in the center of town, near Illinois State University and Uptown Normal. This trend may correlate with higher levels of walking and bicycling activity in these areas. Between 2005 and 2007, crashes occurred most commonly during the late summer and early spring, with the fewest pedestrian crashes occurring in March, as shown in Figure 30. Crashes involving bicyclists were lower from November through April, possibly correlating with seasonal variations in the frequency of walking and bicycling.

[4] Available at: *http://www.bikelib.org/video/*

Figure 30. Reported Pedestrian and Bicycle Crashes by Month, 2005-2007



Town of Normal staff track the severity of a crash by recording whether it resulted in an individual being transported to the hospital or if a fatality was involved. The severity of reported crashes is shown in Figure 31. Between 2005 and 2007, one pedestrian was involved in a fatal crash, 35 were transported to the hospital, and 22 refused medical assistance or had no injury. Nineteen bicyclists were transported to the hospital and 24 refused medical assistance or had no injury. No bicyclists were involved in fatal crashes.

Figure 31. Severity of Crashes by Year, All Reported Crashes, 2005-2007

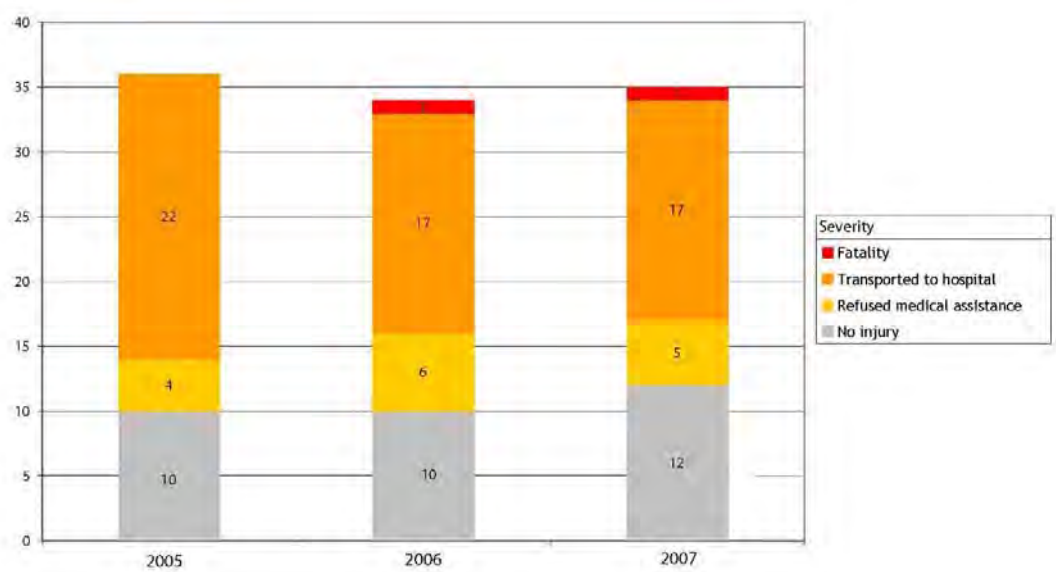
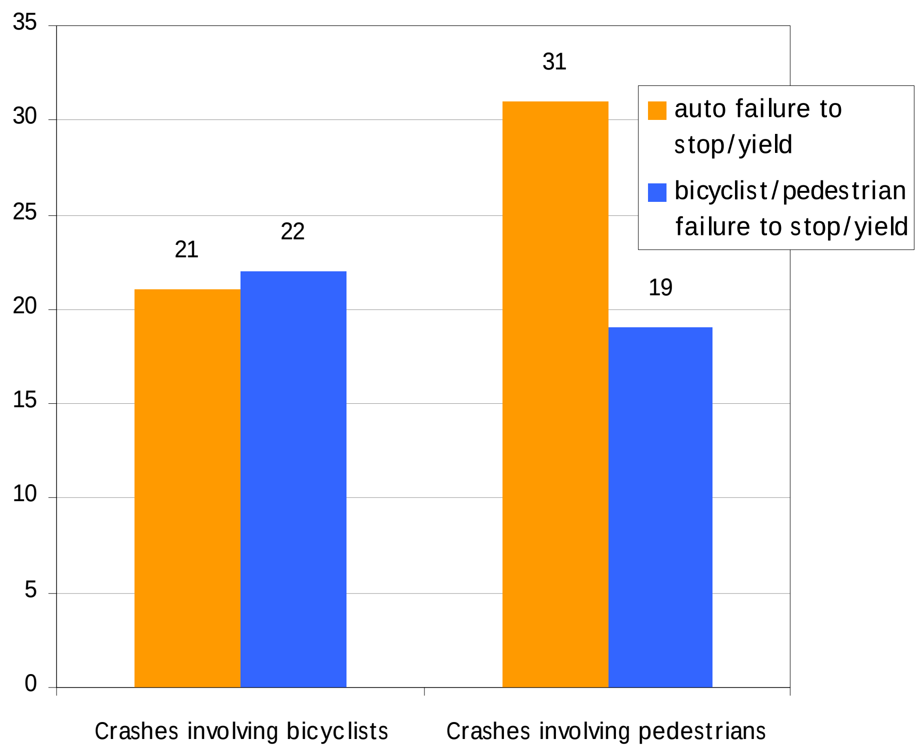


Figure 32 summarizes contributing crash causes. The majority of reported crashes were caused by motorists failing to yield to pedestrians. Forty-six crashes involved a motorist failing to yield, and another 18 were due to the pedestrian or bicyclist failing to stop or yield to a motorist.

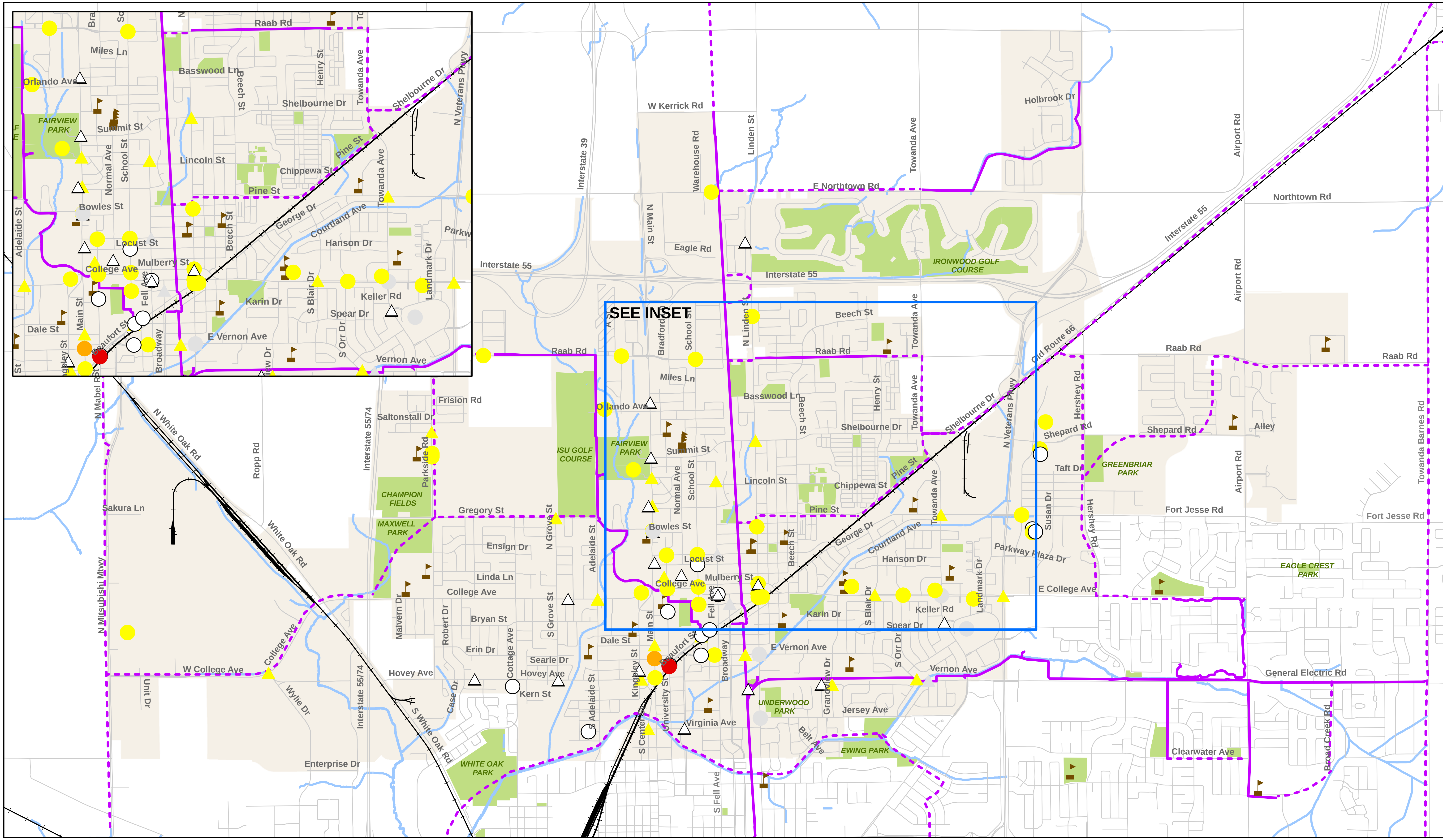
Overall, 58 crashes involved pedestrians during this time period. Nine of these crashes were caused by pedestrians failing to stop or yield.[5] Pedestrians walking in the road caused four reported crashes. In at least one case, the pedestrian was walking in the street due to a sidewalk closure. In addition, six pedestrian crashes involved a child, and nine occurred in parking lots.

Crashes involving bicyclists totaled 45, with seven due to a cyclist's failure to yield and another 14 due to a cyclist's failure to stop. Three crashes occurred when a bicyclist was riding on the wrong side of the road, and another was due to a bicyclist riding in the wrong lane. Other contributing causes included a motorist not paying attention, neither party paying attention, and a fence obscuring the cyclist's and motorist's view of each other.

Figure 32. Cause of Crash by Type, 2005-2007



[5] Note: Crashes identified as being caused by "pedestrian failure to stop or yield" likely occurred when a pedestrian crossed a street against a light or at a mid-block location.



Map 3. Reported Crash Locations (2005-2007)

Normal Bicycle and Pedestrian Master Plan

Source: Town of Normal, Illinois
Author: HK
Date: July, 2009

Pedestrian Collisions
- No injury
- Refused medical attention
- Transported to hospital
- Transported to hospital (2 people)
- Fatality

Bicycle Collisions
- No injury
- Refused medical attention
- Transported to hospital

- Existing Shared Use Path
- Previously Proposed Shared Use Path
- Schools
- Parks
- Normal Town Boundary
- Streets
- Railroad
- Waterways

0 0.25 0.5 Miles

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The analysis reveals that opportunities exist to increase pedestrian and bicycle safety in Normal. Providing adequate sidewalks or bike lanes could have prevented ten of the reported crashes. Clarifying which party has the right-of-way in potential conflict areas could also improve safety by regularizing interactions. Finally, increasing the visibility of pedestrians and cyclists with signage and pavement markings would remind drivers to be aware of other, more vulnerable roadway users.

A few limitations of this data should be noted. Crashes involving bicyclists or pedestrians often do not result in injury requiring hospitalization or in property damage, and these may not be reported. Contributing cause information was recorded in police reports, which in some cases may not adequately specific.

Community Safety Concerns

Community members' feedback regarding safety concerns was gathered as part of the first Normal Bicycle and Pedestrian Master Plan Community Workshop, held in December 2008. Safety issues that were discussed included conflicts between bicyclists and pedestrians (e.g., along the Constitution Trail) and conflicts between motorized and non-motorized travelers.

Community members identified difficult roadway crossings at various locations, including along Veterans Parkway, on Main Street near Fairview Park, and on Gregory Street at Adelaide Street. Difficult bicycling conditions were identified on Raab Road between the existing Constitution Trail segments, on Towanda Avenue between Vernon Avenue and Interstate 55.

Community members also had the opportunity to suggest system improvements. Signage and pavement markings were determined to be a good short-term strategy to increase the visibility of pedestrians and bicyclists. Other recommended policies and programs included increased enforcement of laws requiring motorists to yield to pedestrians, bike safety education, encouragement programs for school children, and establishing standards for bike lane width as new bike lanes are constructed in Normal.

Workshop participants were also asked to complete a questionnaire discussing their thoughts on Normal's existing bicycle/pedestrian system, and to provide input on what could make the system better. Responses to the question, "What would make bicycling and walking safer in Normal?" are shown below. Responses generally fell into categories of engineering, education/signage, enforcement and maintenance.

Engineering issues:

- More on-street bike lanes
- Safer crossings of Veterans Parkway
- Improved access through Uptown Normal
- Improved crossings of Fort Jesse Road
- Improved routes to Normal's west side
- More designated pedestrian crossings
- Better connections between White Oak Park and Constitution Trail
- Traffic calming measures
- Improved on-street connections to the Constitution Trail
- Improved pedestrian crossing treatments on roadways leading to the Constitution Trail

- Improved bicycle/pedestrian/transit facilities on north-south roadways
- Dedicated bike lanes on higher-volume streets
- Constitution Trail extension to the west side of town
- "Complete Streets" treatments on all roadways in Normal
- A more streamlined connection between the Constitution Trail and ISU
- Improved pedestrian connections between hotels and surrounding areas

Education/signage issues:

- Education of all transportation users
- Education of cyclists (to ride more predictably)
- Improved bicyclist behavior on trails to minimize conflicts with pedestrians
- Posted "trail etiquette" signs intended for bicyclists, walkers, joggers
- Warning signage alerting motorists to the presence of bicyclists
- Bicycle/pedestrian wayfinding signage

Enforcement issues:

- Motorists' and bicyclists' compliance with traffic laws
- Motorists' compliance with crosswalks
- Increased enforcement of traffic laws
- Reduced speed limits

Maintenance issues:

- Upgrade damaged pavement and potholes where street pavement abuts concrete curb gutters
- Snow/ice removal from Constitution Trail
- Ordinance requiring property owners to clear sidewalks of snow and ice
- Trimming of overgrown vegetation that impedes pedestrian movement on sidewalks