CITY OF WHITWELL

TN TDOT Department of Transportation

Whitwell Bicycle and Pedestrian Facilities Masterplan

SEPTEMBER 2016

CDM Smith

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1 Introduction

1.1 Project Background

The City of Whitwell lies within the Sequatchie Valley, which is located in the southern portion of the state of Tennessee in Marion County. The main roadway corridor in Whitwell is Tennessee State Highway 28 (SR 28), which is a two lane road with a two-way center turn lane running throughout the corridor.

1.2 Project Purpose

The purpose of the City of Whitwell Pedestrian and Bicycle Master Plan for Tennessee State Highway 28 Corridor (Master Plan) is to analyze the link between its major transportation artery, land use, the need for multimodal transportation options, and economic impact analysis on adjacent land uses of transportation improvements. The study will evaluate improving access control and points of conflict along the corridor as part of a broader multimodal improvement strategy. This plan will also include long term strategies for improving transportation options along the corridor in combination with its land use plan, access management policies, and zoning regulations.

2 Goals/Objectives

In order to successfully form and implement multimodal infrastructure recommendations for Whitwell's transportation network, it is important to develop specific goals designed to achieve these objectives. There are four main goals that can be seen as paramount when hoping to implement recommendations from this plan.

2.1 Safety

As with many transportation plans, safety is always a concern and is often considered the number one priority. Providing safe and efficient methods of traveling throughout a city is important for a city's economic health, and also the physical health of its citizens.

2.2 Connectivity

Similar to that is connectivity, or the ability for people to travel from one place to another using a particular mode of transportation. Typically, it is relatively easy for people to travel using their vehicles. Alternatively, the same may not able to be said if you are wanting to use a bicycle or walk to your destination. This may not be as simple because a sidewalk or bicycle lane may not be available to you during part of your trip or even at all in some cases. Providing this additional infrastructure provides that increased connectivity in an area's transportation network and ultimately giving people more options overall.

2.3 Encouraging Walking and Bicycling

Additional safety and connectivity can be greatly capitalized on if people are encouraged to walk and bicycle. This can be done partly by increasing the amount of infrastructure available for these modes of transportation. It's also important to hold events that inform people about walking and bicycling in an area, as well as to teach them about appropriate safety

2.4 A Sense of Place

One of the most important goals is that people need to have a sense of place when traveling from one area to another. Specifically, they need to feel that when they are in an area that they know it. This technique is called placemaking and there is a wide variety of methods to implement a "sense of place" in an area. For example, one method could be to create unique signage for a town or city that highlights its history and directs people to significant elements of the area. As Whitwell has a significant history from the coal industry, it could be beneficial to have try and incorporate that history into "placemaking" around Whitwell.

Also, it's important to understand that this pedestrian and bicycle masterplan seeks to increase the transportation options for the people in Whitwell as well as provide improved health, educational and environmental benefits. These goals and objectives can allow for the people in Whitwell to live better lives and improve their quality of life.

3 Existing Conditions

3.1 Existing Land Uses

In the recent *City of Whitwell Land Use & Transportation Policy Plan (2013-2033)*, there was an analysis of the existing land uses in 2013 and the results are shown below in Table 3-1. Residential, agricultural and timber/forest lands contribute to the majority of the acreage for Whitwell. In terms of number of parcels within Whitwell, residential, vacant and commercial are the largest in this comparison. From this we can determine that the residential land use is a significant factor within Whitwell due to the number of parcels and acreage.

Land Use	Parcels	Acres	Percent
Residential	667	680	33.37%
Commercial	64	80	3.93%
Industrial	13	29	1.42%
Public/Semi-Public	38	137	6.72%
Utilities	2	2	0.10%
Vacant	175	176	8.64%
Agricultural	13	369	18.11%
Timber/Forest	15	342	16.78%
Water	1	4	0.20%
Transportation	12	219	10.75%
TOTALS	1000	2038	100.00%

Table 3-1 Land Use Analysis, *Whitwell Land Use & Transportation Policy Plan (2013-2033)*

In order to determine the existing land uses for Whitwell, TN, the Southeast Tennessee Development District (SETDD) provided the technical team with existing land use data to analyze the city. The existing land use map for Whitwell, TN is shown in Figure 3-1. Beginning from School Drive near Whitwell High School and ending at Veterans Memorial Park, there are a variety of land uses that comprise the State Route 28 corridor and some of the same conclusions can be drawn as from the analysis from the recent Land Use Plan. For example, there is a significant amount of the existing land use that is currently residential, farmland and agricultural. One additional conclusion we can draw from Figure 3-1 is that much of the commercial land uses are currently along the SR 28 corridor within Whitwell and overall leads to a mix of land uses. Finally, we can conclude that the northern and central portions of Whitwell are more densely developed overall due to the mixture of land uses when compared to the southern portion, which mainly consists of agricultural and farmland.

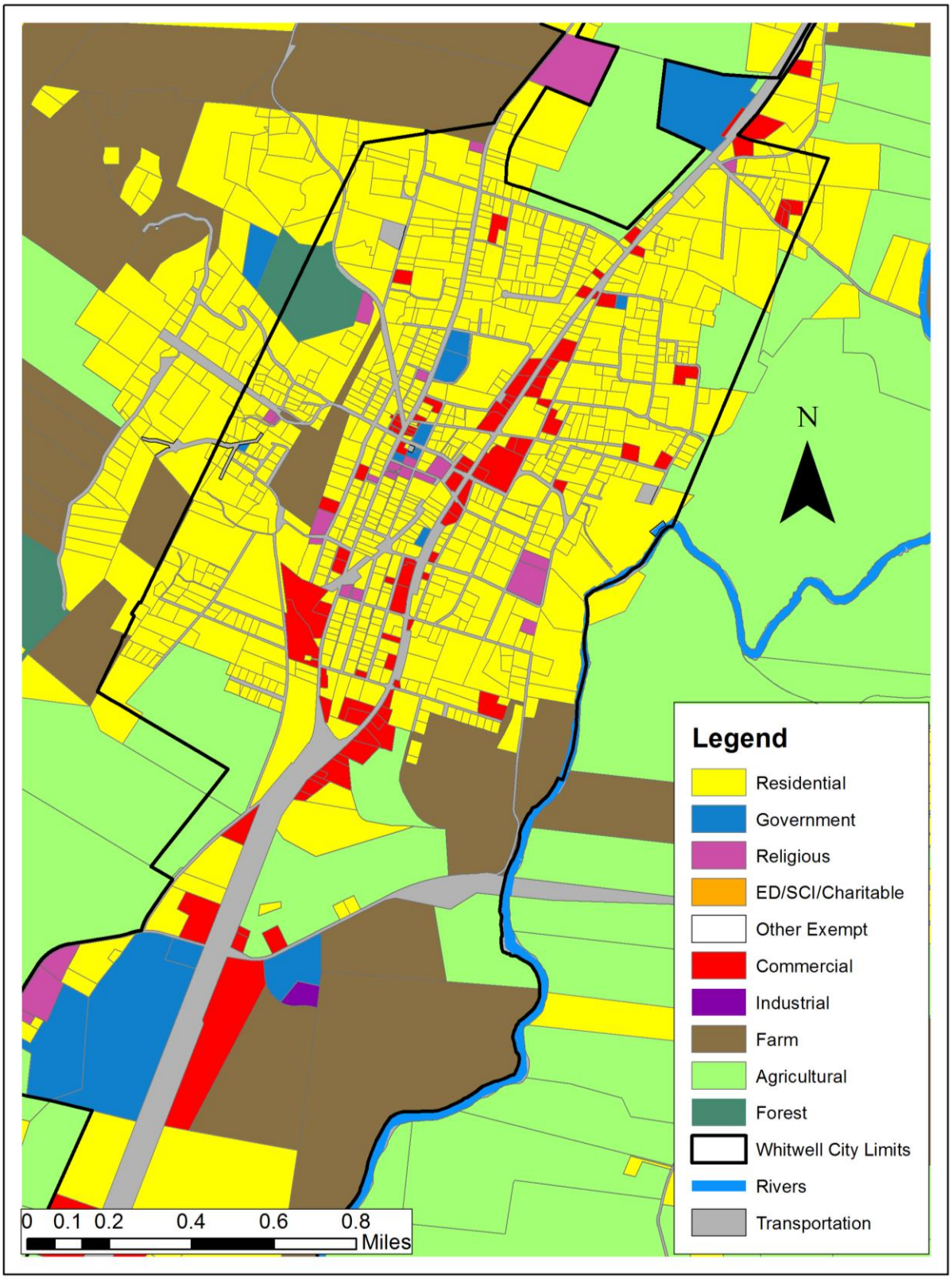


Figure 3-1 Whitwell Existing Land Uses Map

3.2 Socio Economic Factors

In order to better understand the City of Whitwell and its future opportunities, we must first examine its past and how it has developed and grown. Some important statistics to review are the current population of Whitwell, what modes of transportation the residents use to commute and their current health factors and educational attainment levels. They all impact how the city has grown over time and can give us a strong understanding on how to shape the future and what factors should be considered critical.

Housing

Within the City of Whitwell, there are 998 housing structures in total with 858 of those being occupied according to the 2010-2014 American Community Survey (2014 ACS). Figure 3-2 displays the types of housing that are currently occupied within Whitwell. The two largest categories of types of housing are 1-unit detached homes (643) and mobile homes (199). The figure below shows that the housing in Whitwell has typically followed two main development patterns of either single unit detached housing and mobile homes and thus is not diverse.

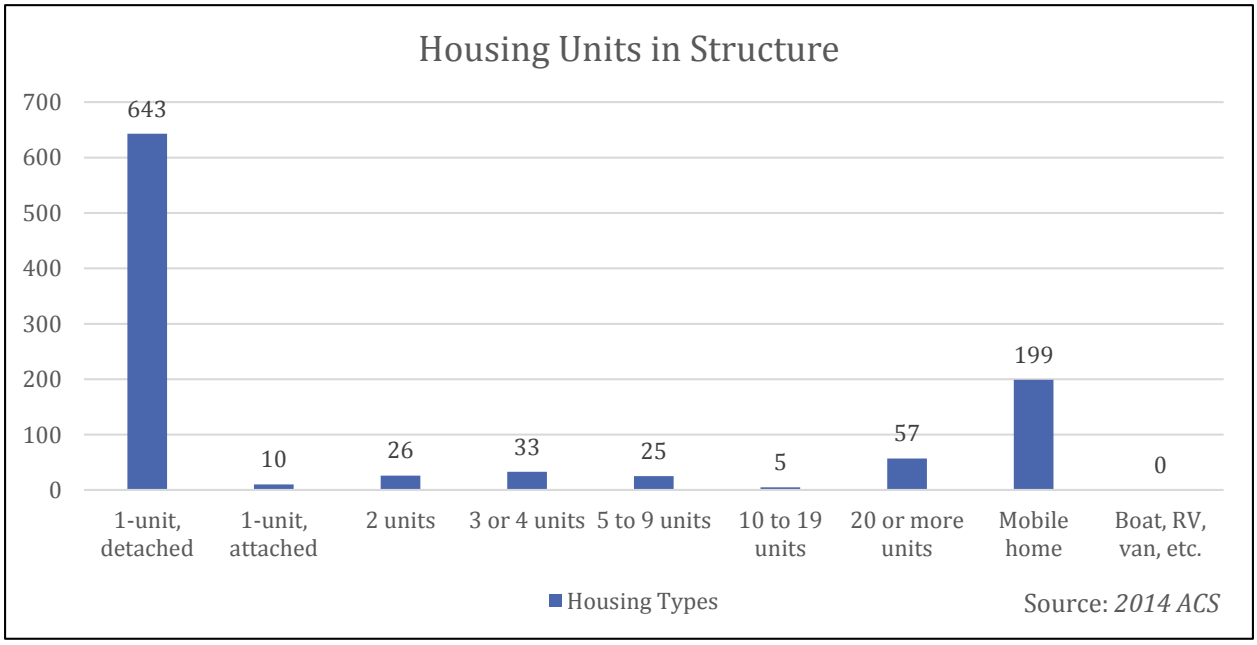


Figure 3-2 Housing Units per Structure

Income

A person's income has a direct effect on the transportation options which are available to them, as well as their overall quality of life. Those who have a lower income may find it more difficult to buy and maintain a private vehicle due to the varying costs of ownership. For example, large increases in the cost of gasoline could force people to abandon their vehicles and seek alternate forms of transportation. In Figure 3-3, you can see the current household incomes reported by the 2014 ACS for Whitwell. The median household income for Whitwell is $26,400 annually, which is significantly less when compared to Marion County, TN at $40,998. Many of the reported household incomes in Whitwell fall below the median household income of Marion County, meaning that the residents of Whitwell are likely poorer and may face more challenges than the rest of the county.

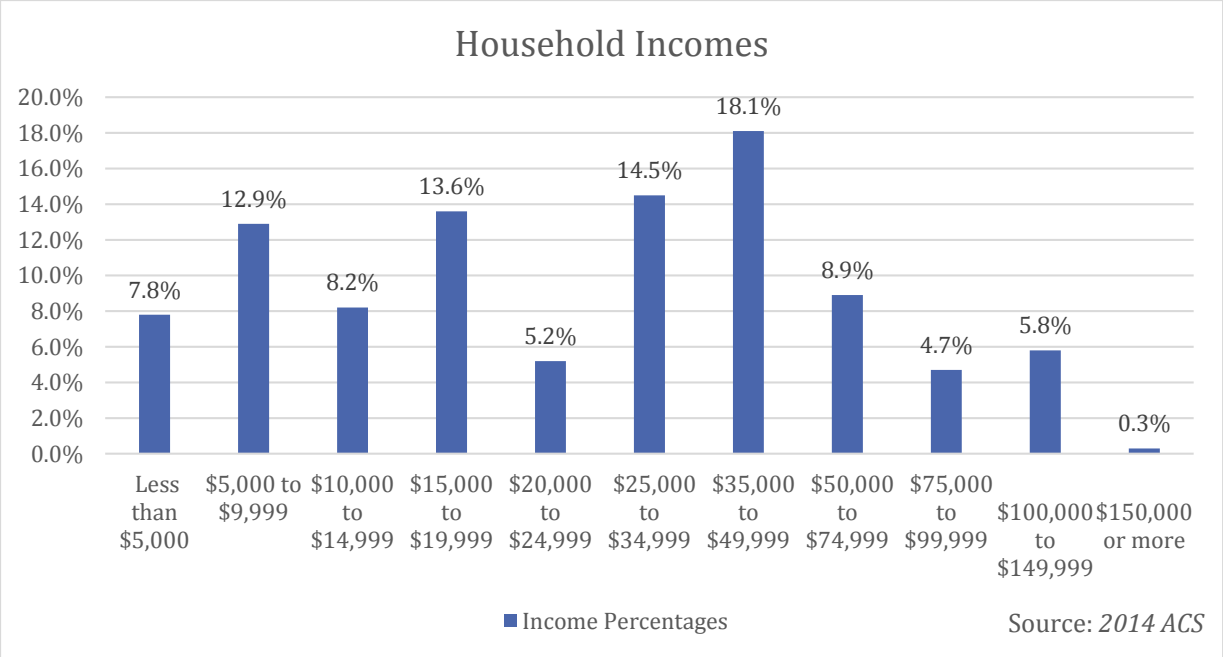


Figure 3-3 Household Incomes in Whitwell, TN

Another important factor is the amount of poverty within a city and how many of its citizens are currently below that level. According to the 2014 ACS, in the City of Whitwell, 30.7% of the people that lived there were considered to be in a poverty status within the last 12 months. In comparison, Marion County has a much lower poverty status rate at 20.3%. Poverty status was determined based on how many people were living within the household, the household income and whether it fell below a certain threshold. For example, in 2015 if a household income fell below $19,078 with three people living there then it was considered below the threshold.

From these two income factors we can discern that there is a significant portion of the population of Whitwell which may face financial challenges and that many who live within Whitwell are poorer on average than the rest of Marion County, TN.

Health

It has been well established that the results of limited exercise and physical activity can lead to major health problems for individuals. This is one of the reasons that Heart Disease is so prevalent throughout the United States (Center for Disease Control and Prevention, 2016). In particular, the rise of obesity in the United States is one such condition that has dominated health statistics in recent decades due to lack of sufficient exercise by Americans. In Figure 3-4, the BMI rates for all students within Marion County, TN schools from 2007 – 2016 are compared. Overall, there was not any significant changes in the BMI rates during this time period. While there are portions of the student population which are considered obese and overweight, the majority of them are considered to be within the healthy weight category.

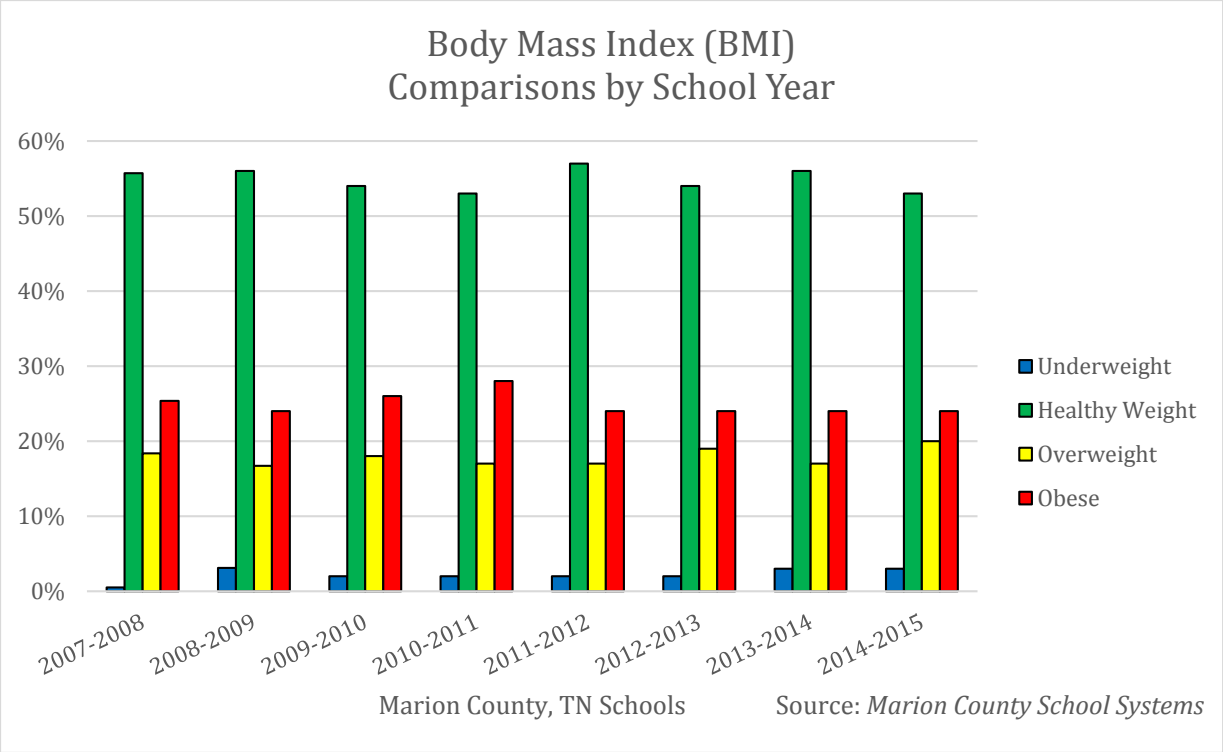


Figure 3-4 BMI Comparison by School Year for Marion County, TN (2007-2016)

In Figure 3-5, Figure 3-6, and Figure 3-7, you can see the BMI rates for all of the Whitwell schools during the same time period as Figure 3-4. The BMI rates for the Whitwell Elementary and Middle school are similar to the overall Marion county schools, but the high school rates are much different, especially in the past five years. For example, in the 2015-2016 school year there were more students in the obese category than in the other categories, and in the 2014-2015 school year there were significantly more students in the healthy weight category. This means that there is something happening to the students in the high school which is causing their BMI rates to rise in comparison to the students at the Elementary and Middle schools. While lack of exercise and poor diets can certainly attribute to rising BMI levels, this may not fully explain the variances in the high school.

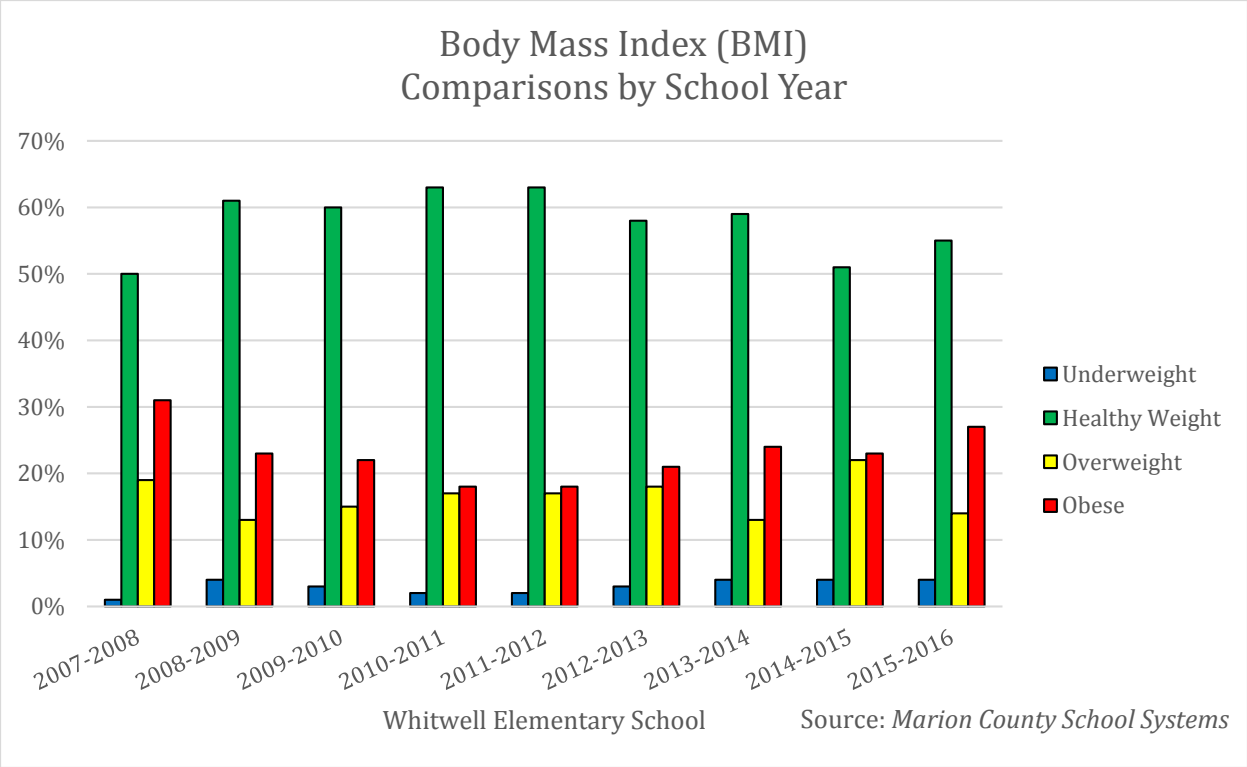


Figure 3-5 BMI Comparison by School Year for Whitwell Elementary School (2007-2016)

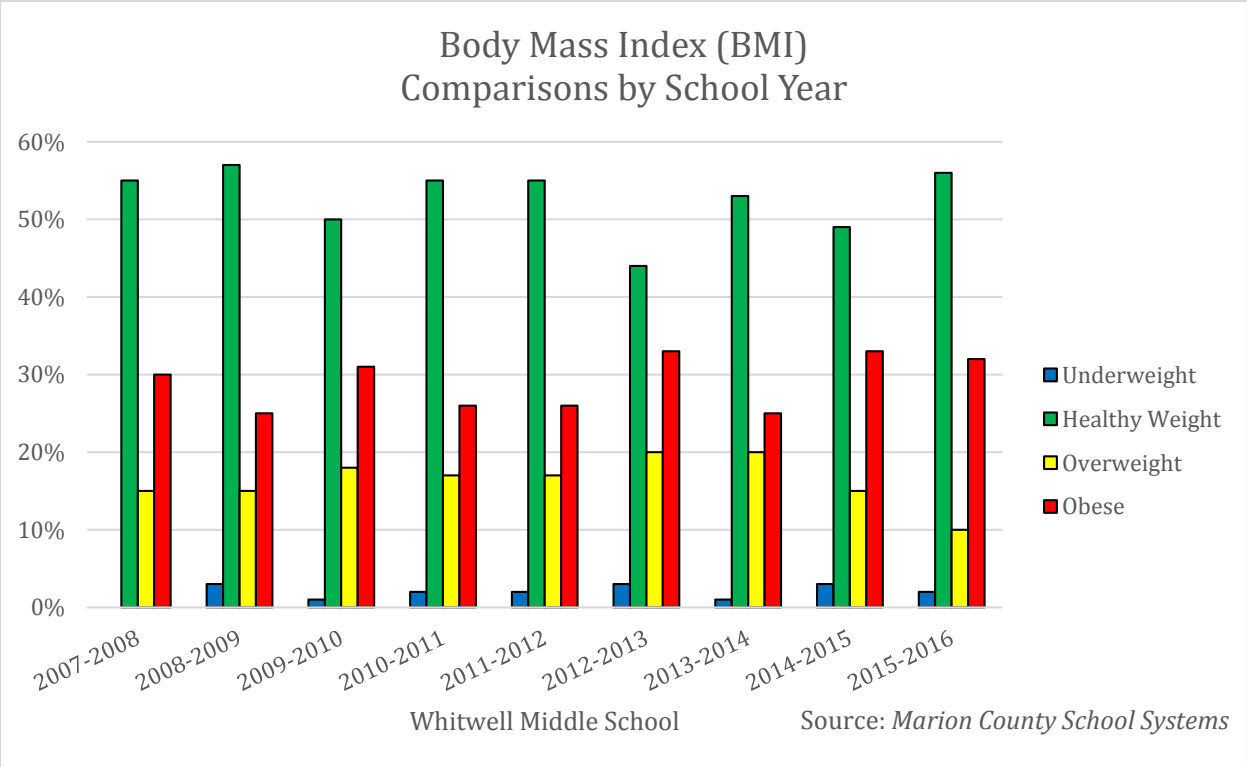


Figure 3-6 BMI Comparison by School Year for Whitwell Middle School (2007-2016)

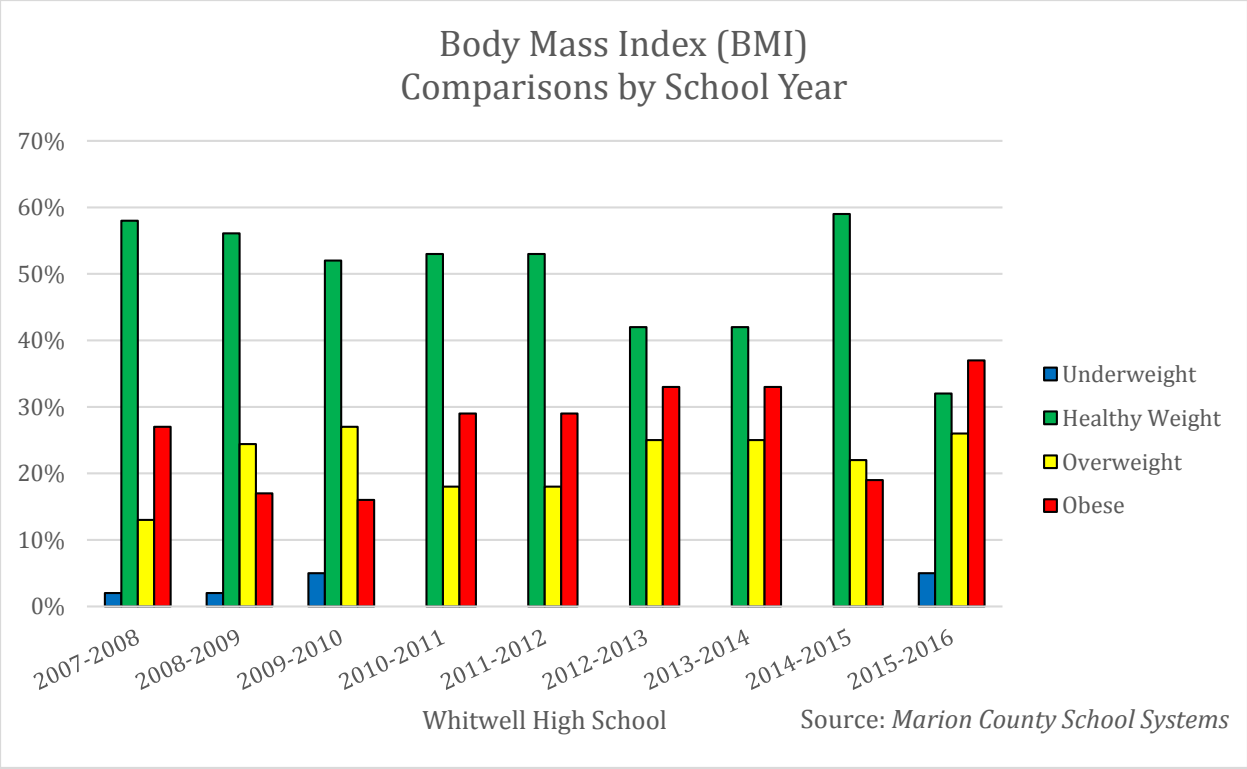


Figure 3-7 BMI Comparison by School Year for Whitwell High School (2007-2016)

Population

The population of a city greatly affects the needs it will have in the future. The age distribution of a city, how much it has grown in the past and its overall density can reveal what direction the city is currently traveling towards.

Density

Population density is an important factor as it can provide insight into how the area has developed and what type of development patterns have occurred. According to the *Land Use & Transportation Policy Plan (2013 – 2033)*, the population density of the town is around 2.5 persons per acre.

Growth

One of the most important factors to understand about a city is how it has grown in the past. Table 3-2 shows the population of Whitwell beginning from 1960 to 2010 and the percentage of change when compared to the previous decade, according to the US Census Bureau. According to the *Land Use & Transportation Policy Plan (2013 – 2033)*, the population of Whitwell is forecasted to decline in the coming decades due to changes in demographics within the city. Overall, the population of Whitwell has decreased since 1960 from 1,857 people to 1,699 but the population has increased in the last few decades. Some of that population decrease has been attributed to the decline in the coal industry, which was one of the leading economic drivers for the city. The coal mines in the area have since been closed, leading to a population decline.

Census Year	1960	1970	1980	1990	2000	2010	Total Change
Total Population	1857	1669	1783	1523	1660	1699	-158
Percent Change		-10%	7%	-15%	9%	2%	-9%

Table 3-2 Population Changes in Whitwell by Decade (1960-2010), 2010 US Census Bureau

Age Distribution

Population growth is one of the most important factors in how a city grows over time and greatly affects the overall age distribution of a city's population. A period of time with rapid population growth, followed by a dramatic decline in growth can lead to age groups that are significantly larger than the ones before or after them. This situation is currently happening in the United States with the generation of Baby Boomers and is having vast impacts on the country (The Baby Boom Cohort in the United States: 2012 to 2060, US Census Bureau).

In order to successfully depict the population figures for Marion County and the City of Whitwell, poplation pyramids were developed. These pyramids depict the amount of people by gender and cohort and are shown in Figure 3-8 and Figure 3-9. In Figure 3-8, you can see the aforementioned phenomena occurring in Marion County, TN with a large population bubble in the age groups between 40-60 year olds distorting the pyramid. The reason that these graphs are referred to as "pyramids" is due to the fact that as people die, there are less and less of a particular age group each year and thus more people in the younger cohorts and less in the older cohorts.

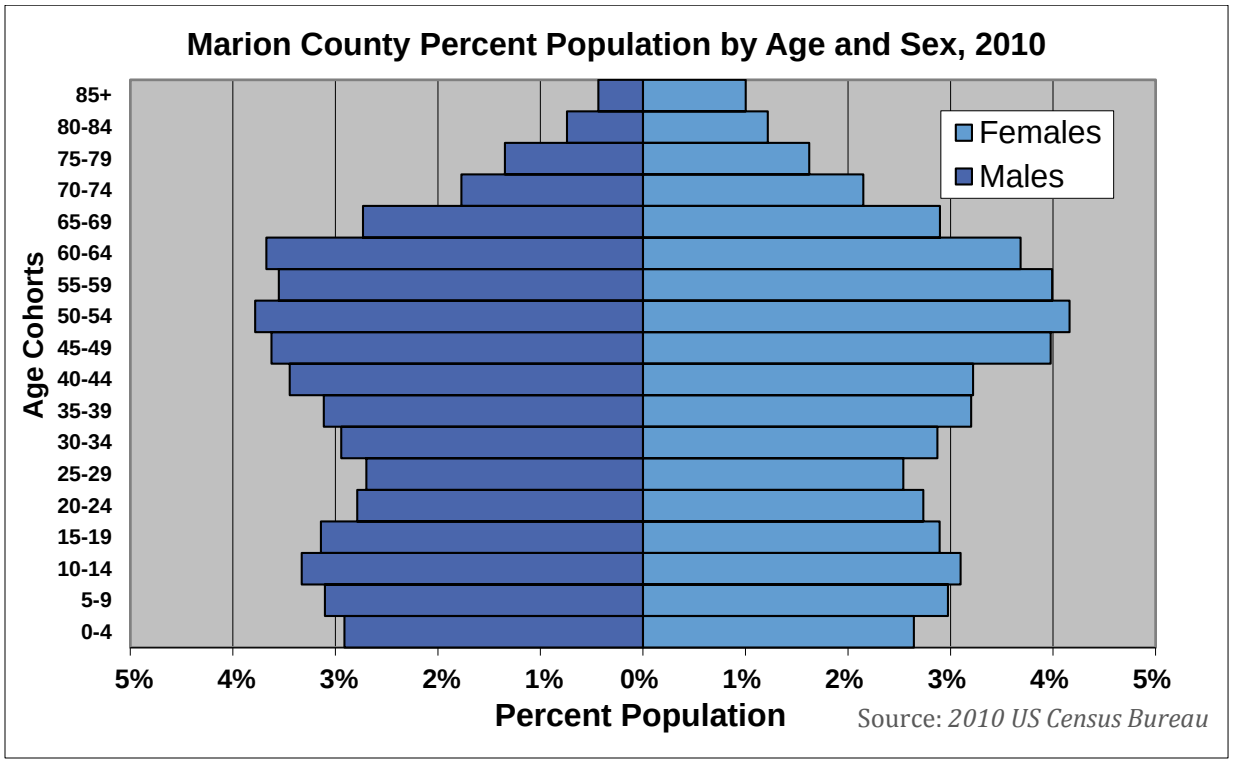


Figure 3-8 Marion County Population Pyramid

In Figure 3-9, the population pyramid is shown for the City of Whitwell and is significantly different in comparison to Marion County. From this we can infer that the younger population is smaller in size when compared to the older population and does not have as significant of a "bubble". Some implications from this are that there is a significant portion of the Whitwell population that is older and must be considered when planning for the future of the city.

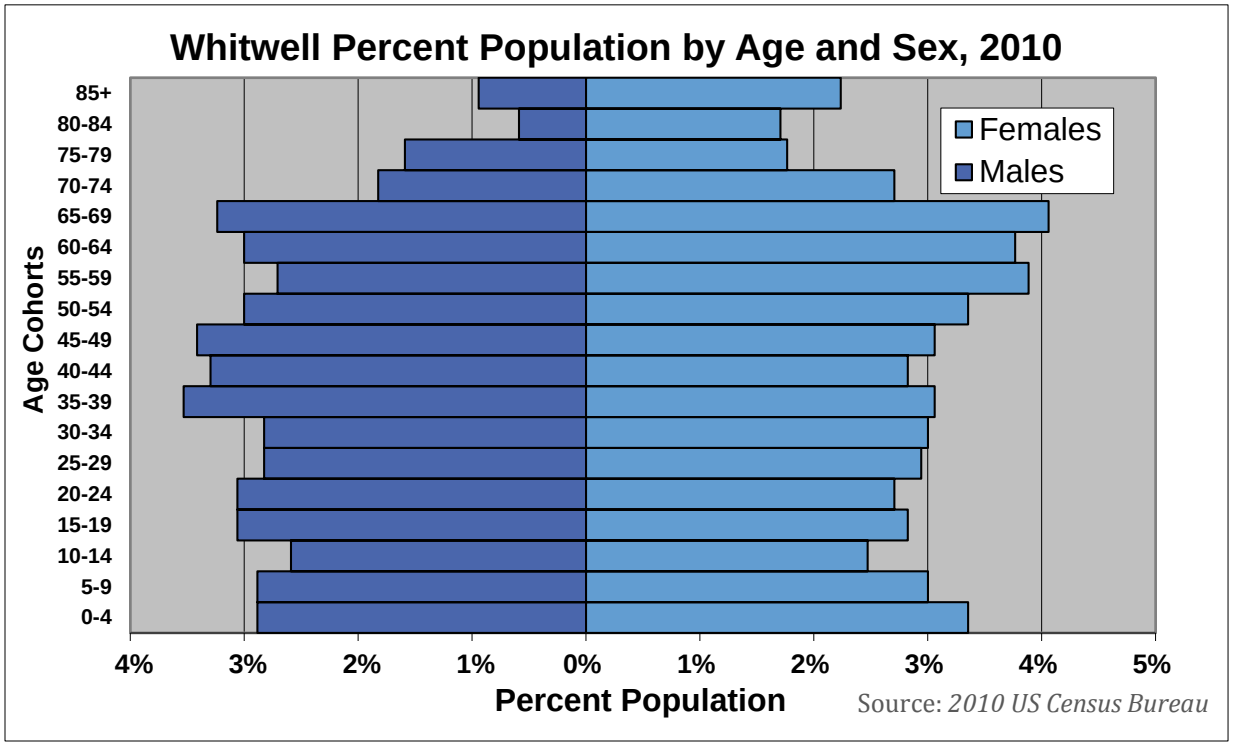


Figure 3-9 Whitwell, TN Population Pyramid

Commuting

As was mentioned earlier, there are 858 occupied households within Whitwell, TN according to the 2014 ACS survey and Figure 3-10 breaks down the number of housing structures available. While many of the households do have access to a vehicle, nearly 14% of them do not. This potentially leaves many people unable to travel reliably and so they must seek other alternative modes of transportation. Unfortunately, there are limited alternative modes of transportation for people to use within the City of Whitwell or to travel outside the area. There is some public transportation provided by SETHRA, but it is limited and cannot be used reliably by everyone in the city.

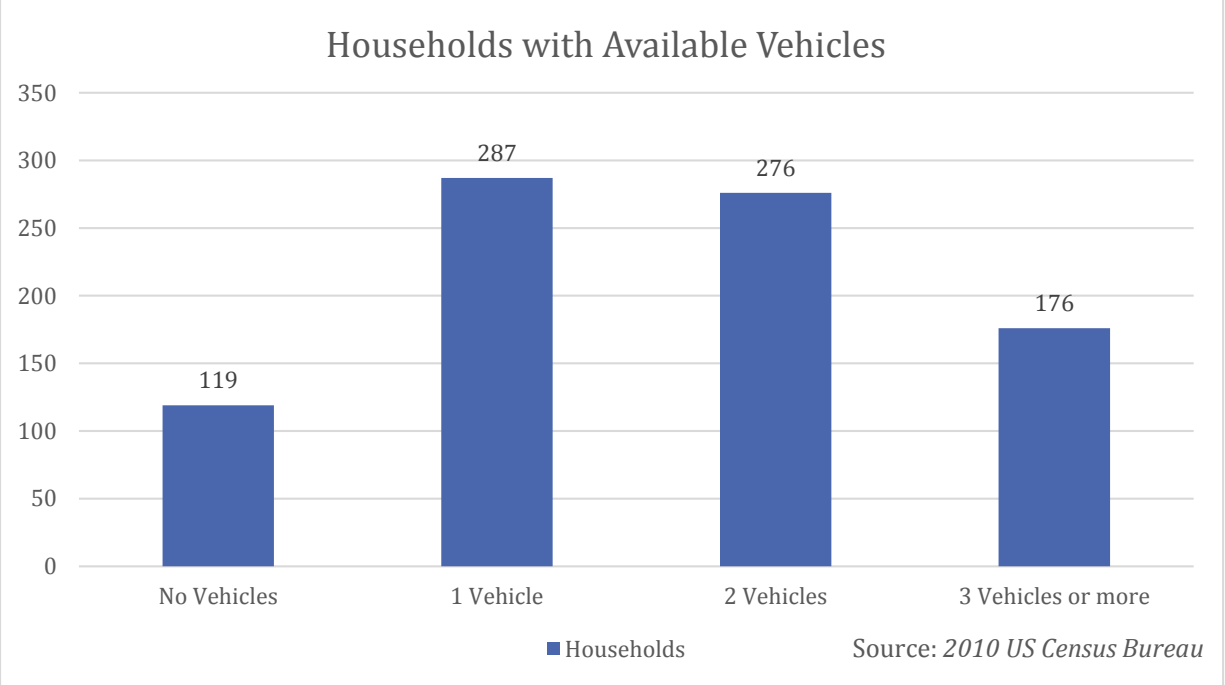


Figure 3-10 Households with Available Vehicles in Whitwell, TN

In addition to the number of households without vehicles is an equally important statistic; the number of workers over 16 who commute by specific transportation modes. Figure 3-11 displays how workers in the City of Whitwell commute to work each day based on varying transportation modes. With 89.8% of the workforce commuting by car and 7.2% working from home, there is not a significant portion of the current workforce that uses public transportation or walking to get to work and no one reported using bicycling as a form of transportation for commuting. What is not clear though is whether people would consider walking or bicycling if there was safe bike infrastructure and sidewalks available. Currently, there is no option for people to use public transportation in order to get to work. More varied transportation infrastructure could allow residents to travel to work with an alternative mode.

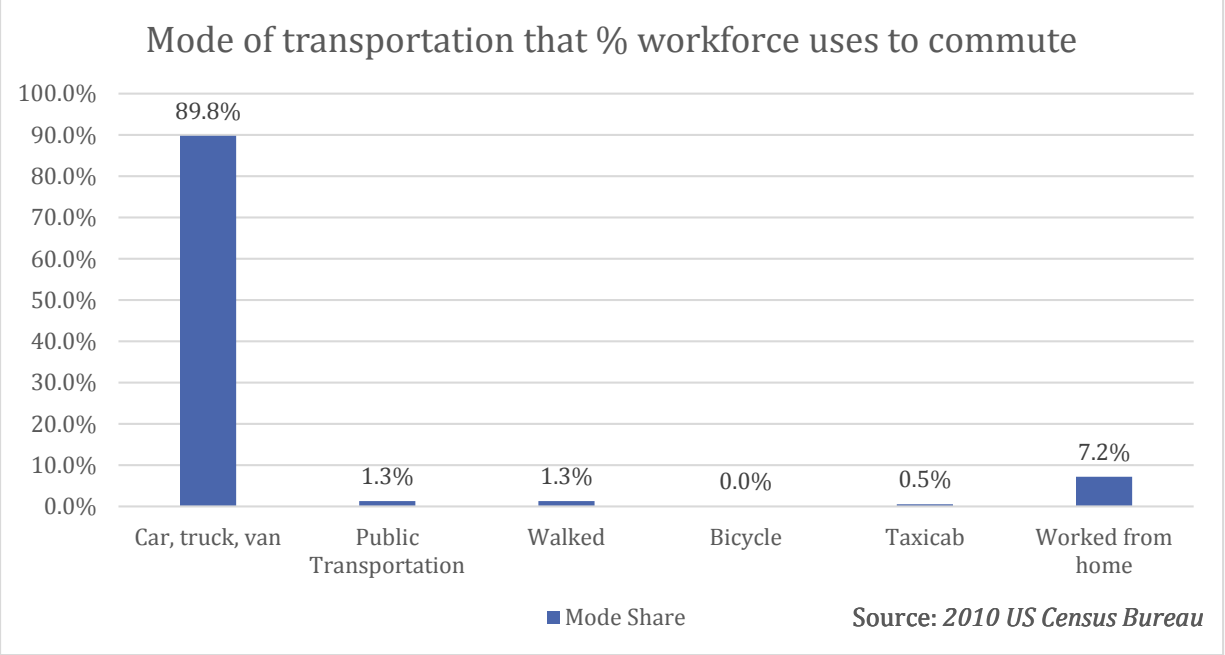


Figure 3-11 Transportation modes used by workforce

Another important factor when reviewing a city's transportation options is how long it takes for its citizens to travel to work every day. Figure 3-12 shows the amount of time, in minutes, for people to travel to work every day according to the 2014 ACS for the City of Whitwell. While the largest portion of workers are able to get to their workplace in under 10 minutes, the next group takes at least 45 minutes to an hour and the next largest group takes between 20 and 24 minutes. This means that even though there is a large portion of workers that work far away from their home, there is a significant amount of population that do not need to travel far to get to their workplace. Some of this could be the population that works from home but some of them may work within Whitwell and may not need to travel a significant distance. More transportation options could allow this segment of the population to use a different transportation mode other than a vehicle.

After reviewing these two figures, it can be estimated that there is a potential for carpooling or vanpooling for some of the workforce in Whitwell. This could be particularly useful for those who are traveling outside of Marion County. Providing more resources/information to the Whitwell workforce could allow them to carpool/vanpool to work and thus reduce their transportation costs.

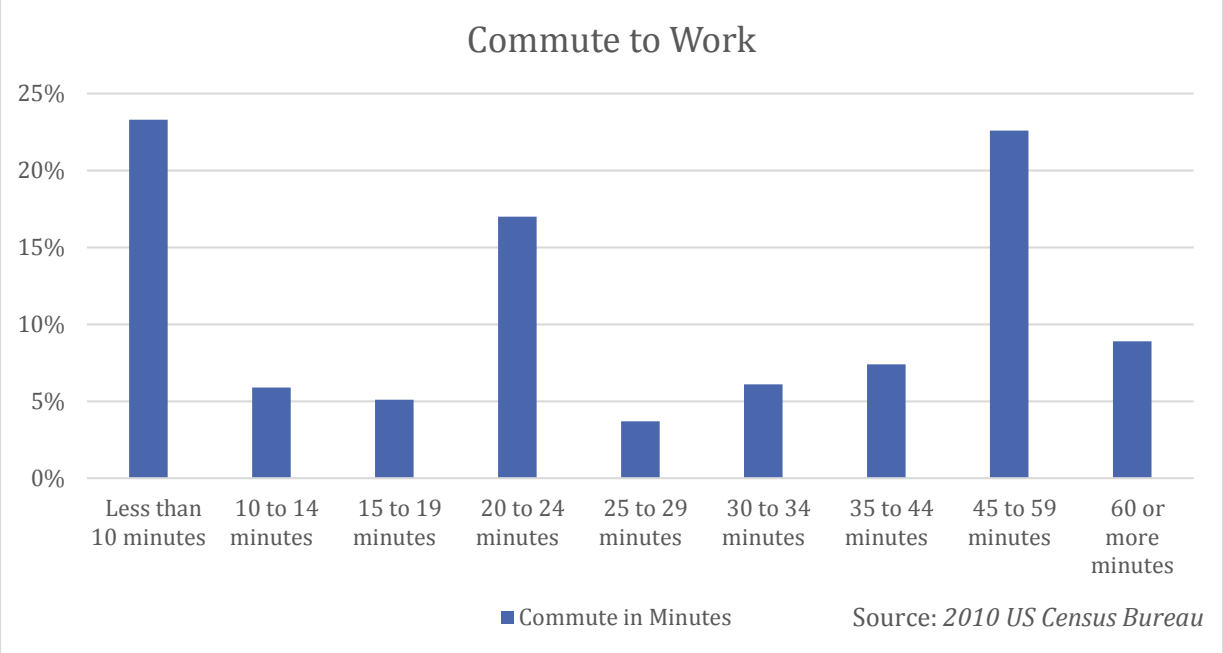


Figure 3-12 Commute to workplace in minutes

Education

There are three schools which are co-located within the southern portion of the City of Whitwell; the Elementary, Middle, and High school. These schools provide the main educational opportunities for the children within Whitwell and thus serve a significant population of the city.

Student Demographics

According to the 2014 ACS, there are 2,139 people within Whitwell and 376 of them were enrolled in some form of education facility. Figure 3-13 displays a breakdown of this selected population by varying grade levels. A significant amount of this population is enrolled in a K-12 facility and the

rest are enrolled in a college or university. This means there is potentially a large portion of the population of Whitwell that needs to travel to the local schools nearly every day.

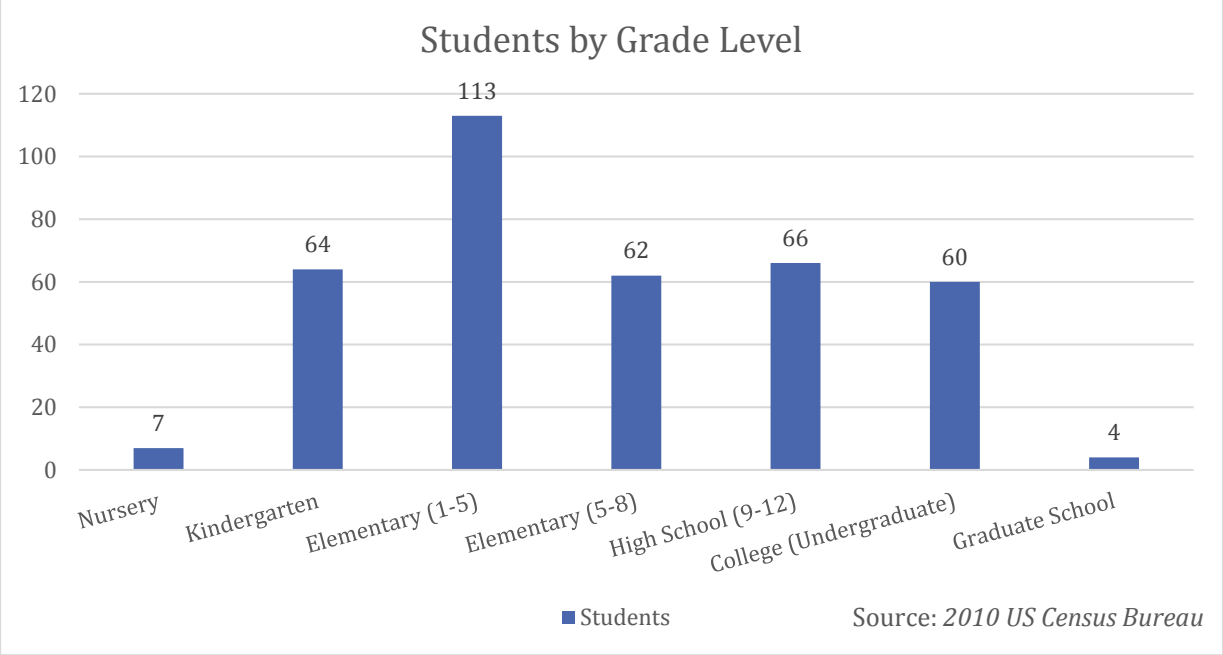


Figure 3-13 Students in Whitwell by Grade Level

Sidewalk Facilities & Connectivity

Currently, there are some sidewalk facilities on the school campuses, but there are none that connect to the main roads or provide any other type of connection between the campuses. There are sidewalks at each of the three schools to allow for students to be picked up/dropped off but there aren't any that allow for any connectivity between them.

Bicycle Facilities & Connectivity

Currently, there are no bicycle facilities on the school campuses for the students to park their bicycles safely and securely. There are also no bicycle lanes in the area either to allow for the students to travel to the school.

Transportation to Schools

According to Whitwell School administration, the majority of the students are brought to the schools by either bus or vehicle. The students that attend these schools do not typically travel to school by walking or bicycling. At the elementary school, there are an estimated 10 buses and 165 cars that pick-up/drop-off students. At the middle school, there are 9 buses and 50-75 cars that pick up/drop off students and an estimated 9 buses and 125-175 cars that pick up/drop off the high school students.

The amount of students who travel to school by bus is 60% for the elementary and high school, with the remainder traveling by automobile or personal vehicle. The middle school is estimated to have 50% of its student arrive by bus and 50% by vehicle.

Safe Routes to School Program

TDOT currently has a Safe Routes to School (SRTS) program within their administration, which is funded through the federal government. They provide funding for projects that could provide safe transportation alternatives for students when traveling to school each day. Some of these alternatives include providing shared-use paths, sidewalks or bicycle lanes. In 2015, they received 25 applications for SRTS projects.

National Walk & Bike to School Day

There is currently a national Walk & Bike to School day that many schools around the nation participate in with their students. This day typically takes place around September or October of every year; this year it will take place on October 5th, 2016. The Whitwell schools currently do not participate in this day due to safety concerns from the current traffic to and from the school, though there is a strong desire from the staff and administration to do so. Participation in this national event allows for students to learn about safety when walking or bicycling and understand that walking or bicycling can help the environment and make them healthier.

Free/Reduced School Lunch Program

The amount of students on a free/reduced lunch program is a possible indicator of the income levels of the student's families and thus their overall transportation options.

School	Percentage of Students on Free/Reduced Lunch
Whitwell Elementary School	68.25%
Whitwell Middle School	68.93%
Whitwell High School	65.72%
Marion County Schools	64.80%

Table 3-3 Percentage of Students in Whitwell on Free/Reduced Lunch (2016), Marion County Schoolboard

Table 3-3 shows the percentage of students in the three schools in Whitwell and for all of the schools in Marion County, TN. All of the schools in Whitwell have a higher percentage of students who are on free/reduced lunch in comparison to Marion County.

Senior Population

Within the City of Whitwell, there are currently 351 people who are within the 65+ age group, according to the 2010 US Census. This particular age group has specific needs that must be addressed when a city is developing and changing. Access to pharmacies, doctor's offices and places to stay social and active are of key importance to this demographic.

Whitwell's Senior Citizen Center

Within the City of Whitwell, there is a Senior Citizen Center that is available to provide entertainment, exercise options and support to the senior citizen population.

Sidewalk Facilities & Connectivity

The Whitwell Senior Citizen Center does not have any sidewalk connectivity but there are some sidewalks near the area itself. They are currently in disrepair and would require reconstruction in order to be used often by seniors as they are not ADA compliant in their current state. The senior

citizens have expressed that they would use these facilities if they were built. The areas of particular importance for them would be to have safe pathways from the Senior Citizen Center to the pharmacy and the doctor.

Bicycle Facilities & Connectivity

The Whitwell Senior Citizen Center does not have any significant bicycle facilities nor connectivity.

Fitness Program

The Senior Citizen Center does not have a structured fitness program available, however there is exercise equipment available to everyone at any time during the week. This equipment is well utilized.

Public Transportation Options

There are no significant transportation options available to the people at the Senior Citizen Center. The Southeast Tennessee Human Resource Agency, SETHRA, has some dial-a-ride options for those at the Senior Citizen Center so they can travel for doctor appointments. There are also some private carpool options available, but there are no other significant options available to them. The individuals at the Senior Citizen Center would like to expand their overall transportations options, especially the dial-a-ride services.

3.3 Transportation Conditions

The transportation for the City of Whitwell, TN consists mainly of a network of streets and roads that connect the town's residents to their homes, businesses, parks, schools and other destinations. The main roadway for Whitwell is SR 28, which runs through the center of the town and connects North and South through the Sequatchie Valley to the surrounding cities. SR 28 also connects to Interstate 24 to the South of Whitwell to provide connectivity to other parts of the state. Additionally, SR 283 and SR 27 provide east/west connections to Chattanooga, which is the nearest metro area to Whitwell. All of these roadways interact with Whitwell and influence the overall transportation conditions of the city.

Current Pedestrian/Bicycle Facilities & Connectivity

According to the *2013 City of Whitwell Land Use & Transportation Policy Plan*, there are no significant bicycle or pedestrian facilities. It is mentioned that there are areas with small stretches of sidewalk in differing conditions, but no specific bicycle facilities and no signed bicycle routes throughout or within the city.

Bicycle Routes & Trails

While there are not many official bicycle routes or trails within the City of Whitwell, there are informal routes which are used by recreational riders from the Chattanooga, TN area. They are typically located in mountainous areas on the narrow roadways. This often leads to conflicts between bicyclists and drivers and has led to multiple fatalities in the past decade.

Figure 3-14 shows a map from The Tennessee Department of Transportation (TDOT) with a proposed system of State Highway Bicycle Routes to be built or designated throughout the state. The Fall Creek Falls route is designated to be on SR28 and thus passes through the City of Whitwell.

While there is no construction or designation planned at this time, it could be considered an economic development opportunity for the city.

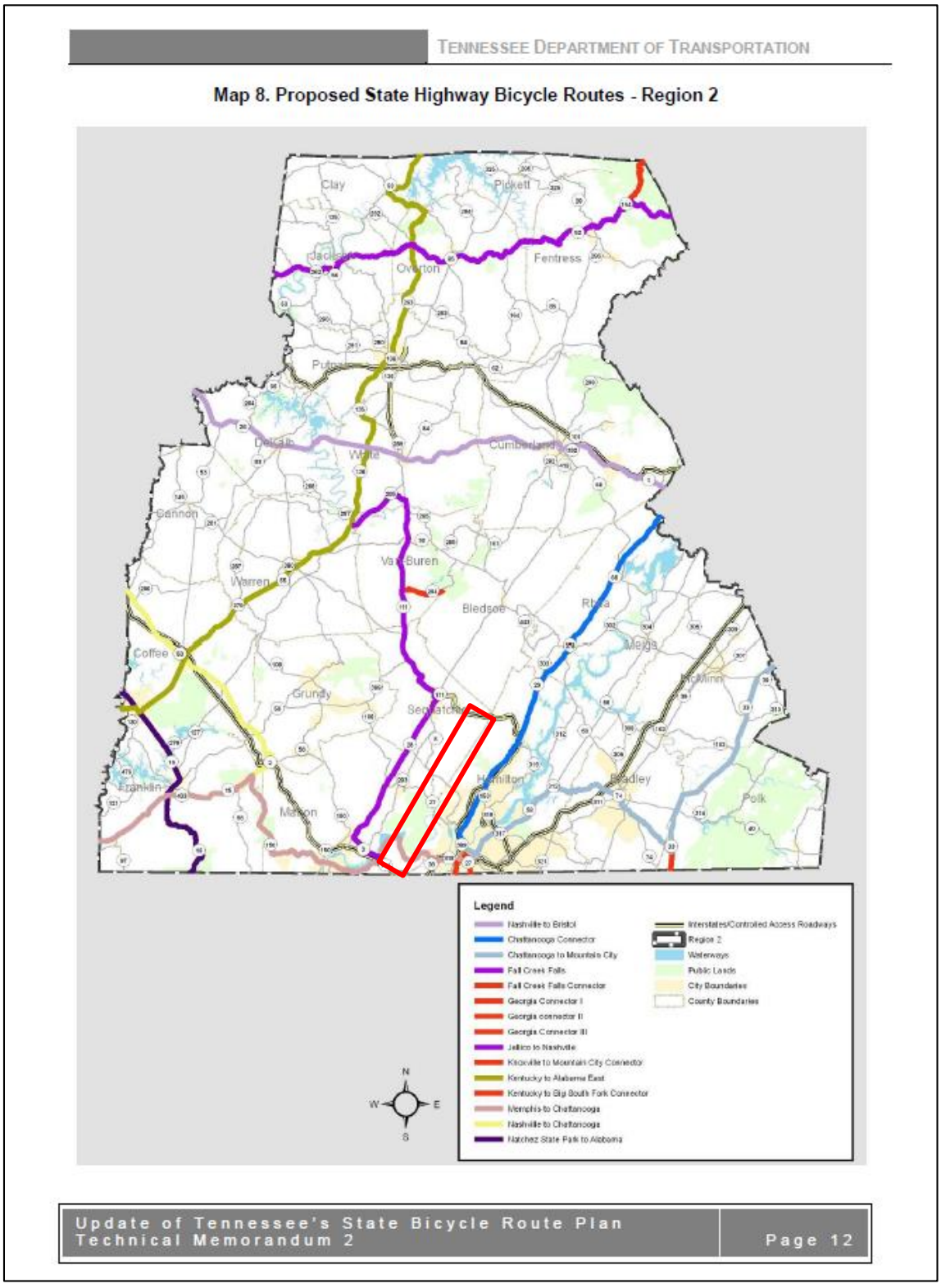


Figure 3-14 TDOT Region 2 - State Bicycle Route, TDOT

Most of the cycling activity was recreational in nature and came out of Chattanooga. Clubs and individuals are drawn to the mountains on both sides of Whitwell. These are extremely scenic narrow mountain roadways. There are many conflicts between cyclists and motorists as there is little room to share. There have been some notable fatalities over the years. There is great potential for the town to cater to cyclists in much the same way they do to the hang glider community. Combined there is an economic development opportunity.

Sidewalks

As has been discussed before, there is minimal sidewalk coverage within the City of Whitwell. While there are a few streets that have sidewalks, they are in disrepair and would require improvements so they can be used frequently. Main St. (SR 108) has some sidewalks along the roadway but they are either incomplete or in disrepair. Also, some of the areas that do have sidewalks are not owned by the city or county, but by the individual property owners themselves. This could lead to potential right-of-way issues in the future if sidewalks were attempted to be repaired or built in new areas. Figure 3-15 and Figure 3-16 are two examples or the current sidewalk conditions along Main St.

Figure 3-15 Main St. (SR 108) looking south across from the Coal Miners Museum

Figure 3-16 Main St. (SR 108) looking north across from the Coal Miners Museum

Main St. at one point was the commercial center of the town and thus the reason for the name of the street, as well as the sidewalks that are currently there. When SR 28 was realigned to the southern portion of the town parallel to Main St., it moved most of the activity to that roadway instead.

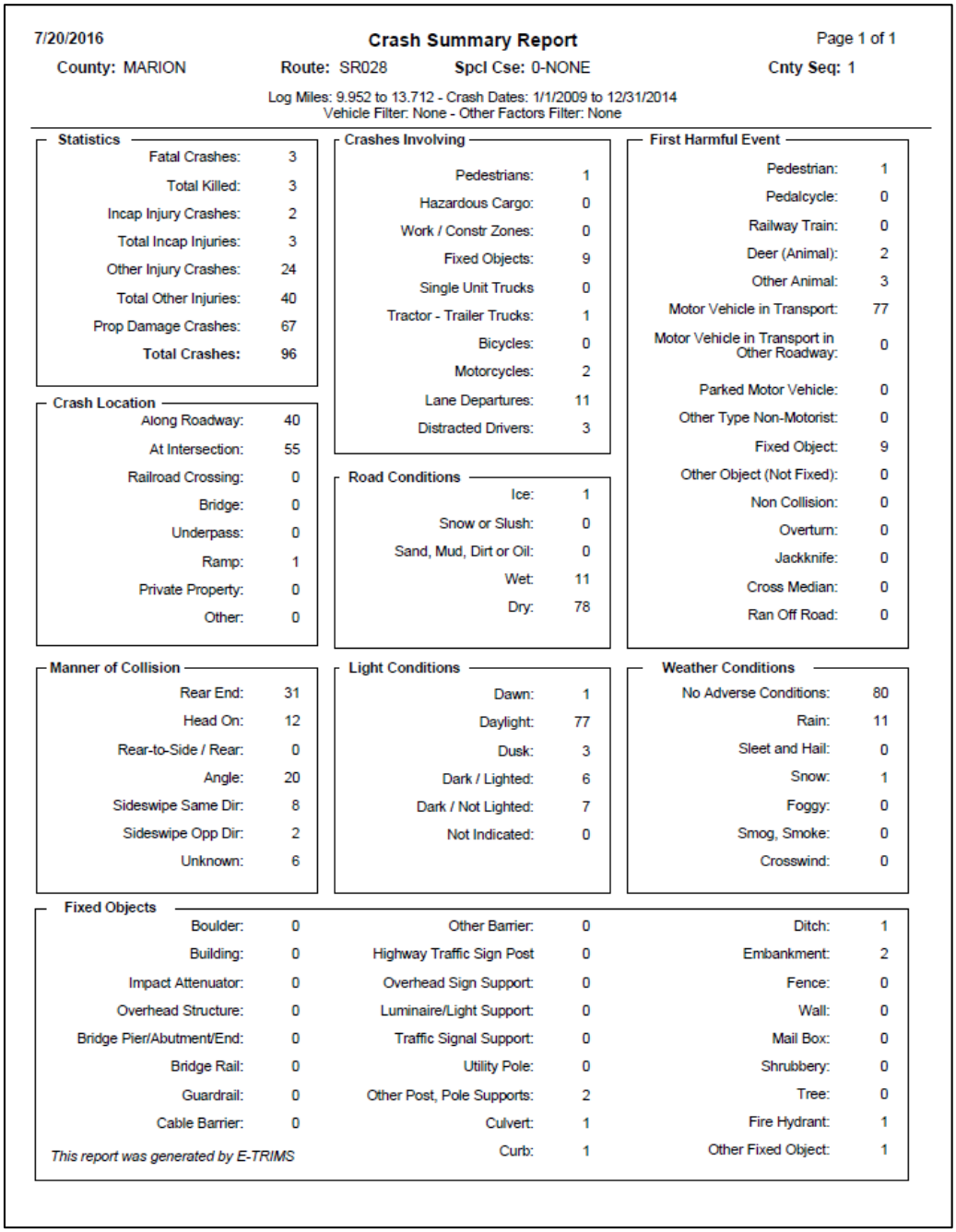
Walking, Running and Cycling Organizations

These organizations can be important to a city and its transportation and recreational efforts. The overall transportation and parks impacts these groups and their options. Within Whitwell, there are no formal groups or organizations but there is the occasional run or event from nearby areas.

TDOT Crash Data

In order to better understand the overall transportation conditions in Whitwell, it is important to understand the crash rates along the SR 28 corridor. In this situation, we specifically want to collect and discuss the bicyclists and pedestrians that have been involved in crashes with motor vehicles. In Figure 3-17, you can see that there has been one pedestrian crash reported overall in the City of Whitwell between January 1st, 2009 and December 31st, 2014. After speaking with Whitwell city staff and citizens, it was reported that there have been notable pedestrian deaths over the past years.

Figure 3-18 shows the locations of vehicular and pedestrian crashes along SR 28 in Whitwell, TN that have been reported to TDOT from January 2005 to December 2015. The color of the roadway segment provides an indication of the number of crashes that have occurred there, with blue equaling a low amount of crashes and red indicating a higher amount of crashes. In the aforementioned figure, it is clear that one of the pedestrian crashes is located in an area where a large amount of crashes has occurred. According to the data, this pedestrian crash was fatal. This area is the intersection of SR 28 and Spring St., which has a significant amount of driveways and destinations. If a person were to walk in this area, it would be unsafe due to these conditions.



7/20/2016 **Crash Summary Report** Page 1 of 1

County: MARION **Route:** SR028 **Spcl Cse:** 0-NONE **Cnty Seq:** 1

Log Miles: 9.952 to 13.712 - Crash Dates: 1/1/2009 to 12/31/2014
Vehicle Filter: None - Other Factors Filter: None

Statistics

Fatal Crashes:	3
Total Killed:	3
Incap Injury Crashes:	2
Total Incap Injuries:	3
Other Injury Crashes:	24
Total Other Injuries:	40
Prop Damage Crashes:	67
Total Crashes:	96

Crash Location

Along Roadway:	40
At Intersection:	55
Railroad Crossing:	0
Bridge:	0
Underpass:	0
Ramp:	1
Private Property:	0
Other:	0

Manner of Collision

Rear End:	31
Head On:	12
Rear-to-Side / Rear:	0
Angle:	20
Sideswipe Same Dir:	8
Sideswipe Opp Dir:	2
Unknown:	6

Crashes Involving

Pedestrians:	1
Hazardous Cargo:	0
Work / Constr Zones:	0
Fixed Objects:	9
Single Unit Trucks	0
Tractor - Trailer Trucks:	1
Bicycles:	0
Motorcycles:	2
Lane Departures:	11
Distracted Drivers:	3

Road Conditions

Ice:	1
Snow or Slush:	0
Sand, Mud, Dirt or Oil:	0
Wet:	11
Dry:	78

Light Conditions

Dawn:	1
Daylight:	77
Dusk:	3
Dark / Lighted:	6
Dark / Not Lighted:	7
Not Indicated:	0

First Harmful Event

Pedestrian:	1
Pedalcycle:	0
Railway Train:	0
Deer (Animal):	2
Other Animal:	3
Motor Vehicle in Transport:	77
Motor Vehicle in Transport in Other Roadway:	0
Parked Motor Vehicle:	0
Other Type Non-Motorist:	0
Fixed Object:	9
Other Object (Not Fixed):	0
Non Collision:	0
Overturn:	0
Jackknife:	0
Cross Median:	0
Ran Off Road:	0

Weather Conditions

No Adverse Conditions:	80
Rain:	11
Sleet and Hail:	0
Snow:	1
Foggy:	0
Smog, Smoke:	0
Crosswind:	0

Fixed Objects

Boulder:	0	Other Barrier:	0	Ditch:	1
Building:	0	Highway Traffic Sign Post	0	Embankment:	2
Impact Attenuator:	0	Overhead Sign Support:	0	Fence:	0
Overhead Structure:	0	Luminaire/Light Support:	0	Wall:	0
Bridge Pier/Abutment/End:	0	Traffic Signal Support:	0	Mail Box:	0
Bridge Rail:	0	Utility Pole:	0	Shrubbery:	0
Guardrail:	0	Other Post, Pole Supports:	2	Tree:	0
Cable Barrier:	0	Culvert:	1	Fire Hydrant:	1
This report was generated by E-TRIMS		Curb:	1	Other Fixed Object:	1

Figure 3-17 Crash Summary Report (2009-2014), TDOT

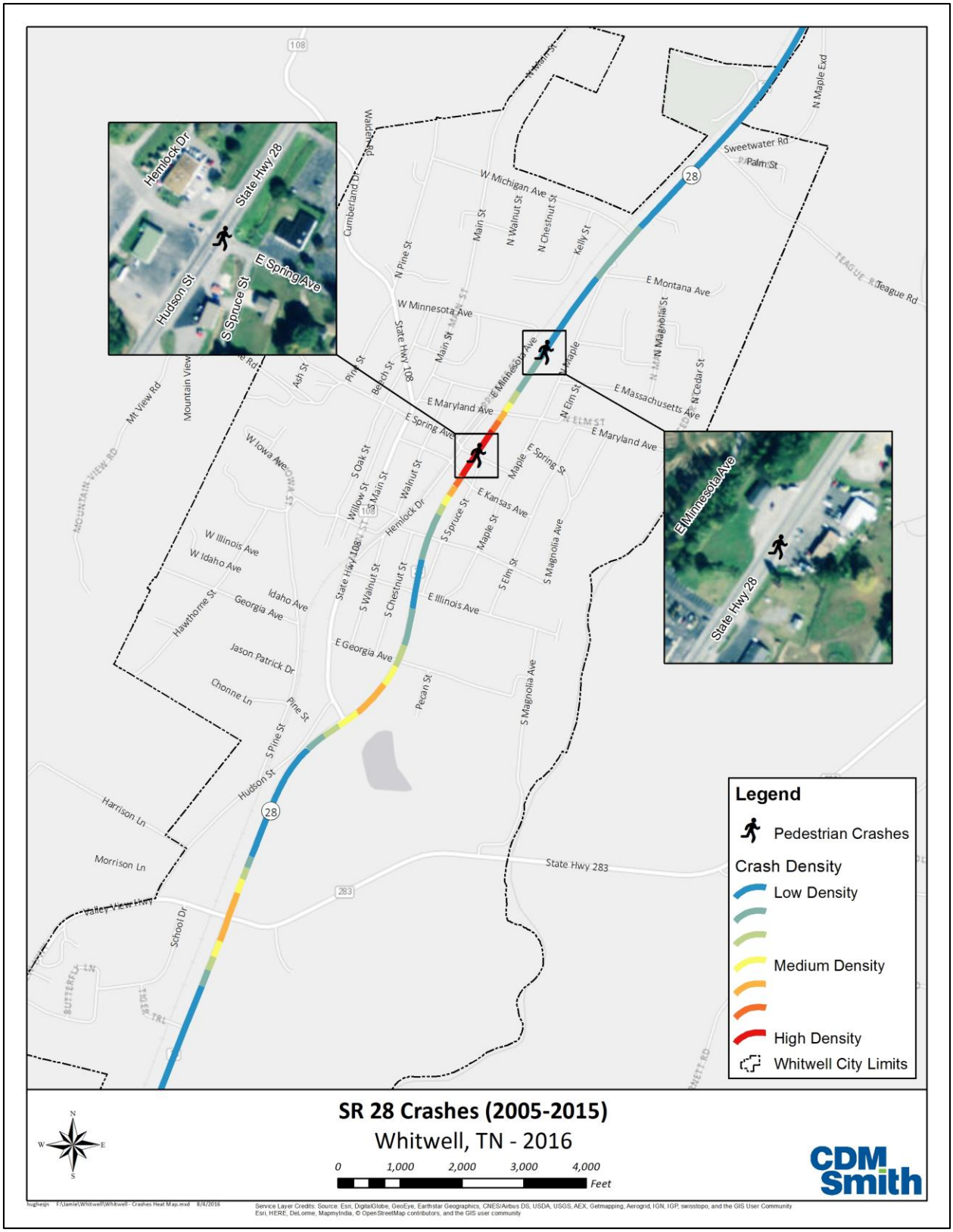


Figure 3-18 SR 28 Crash Map (2005-2015), TDOT

Multimodal Traffic Counts

While it is important to understand and document the transportation infrastructure of a city, it does not provide enough information on how people are using it and their current needs. The amount of vehicular, pedestrian and bicycle traffic using the roadway can assist us with answering this question.

There were three intersections that were reviewed in Whitwell using video recording to document and count the amount of vehicles and people traveling through them, over a 24-hour period, as well as what direction they were traveling at the time. This provides us with more information on who is using the transportation infrastructure and help define what the city's needs are for the future. There were no recorded bicycle movements with the video recording so we will focus on what inferences we can gather from the vehicle and pedestrian movements.

Figure 3-19 shows the vehicular movements for the intersection of SR 28 and Spring St. We can see from this figure that the majority of the vehicular traffic travels along in the through lane of SR 28 with a small portion turning left and right onto SR 28 from Spring St. During this same time period, there were two pedestrians that traveled through the intersection. Figure 3-20 is an aerial of this intersection.

Figure 3-21 shows the vehicular movements at the intersection of SR 28 and Main St (SR 108). This intersection does not have any records for Main St. westbound (WB) direction because it is a "T-Intersection" and thus does not allow any traffic movement. The majority of the vehicular traffic traveled through SR 28 with a small portion traveling onto Main St. (SR 108). There were 7 pedestrians overall that were recorded at this intersection. Figure 3-22 is an aerial of this intersection.

Finally, Figure 3-23 shows the amount of vehicles which were recorded at the intersection of SR 28 and SR 283. The majority of the vehicles traveled along SR 28 through the intersection, but there was also a portion of the traffic which also traveled through SR 283. This traffic continued through the intersection. There were no pedestrians which were recorded at this intersection, which was particularly interesting as it is near the Whitwell Elementary, Middle and High school. Figure 3-24 is an aerial of this intersection.

After reviewing these figures, there are specific conclusions which can be drawn. For example, a majority of the vehicular traffic travels along SR 28 and continues through the intersection without turning onto the side streets. There is a portion of the traffic which travels through SR 283 but overall this is not the case for the other intersections. There was also a lack of significant pedestrian and bicycle movements at these intersections, which could signal that they require greater transportation infrastructure in order to make these transportation modes more viable overall.

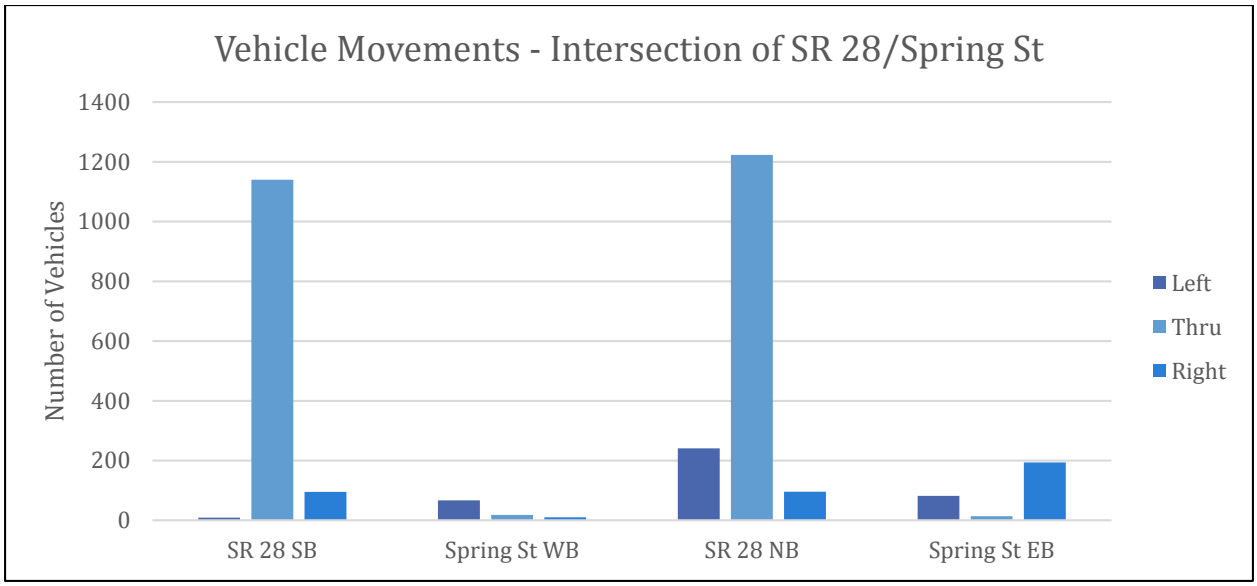


Figure 3-19 Vehicle Movements - Intersections of SR 28/Spring St.

Figure 3-20 Aerial of SR 28/Spring St. Intersection

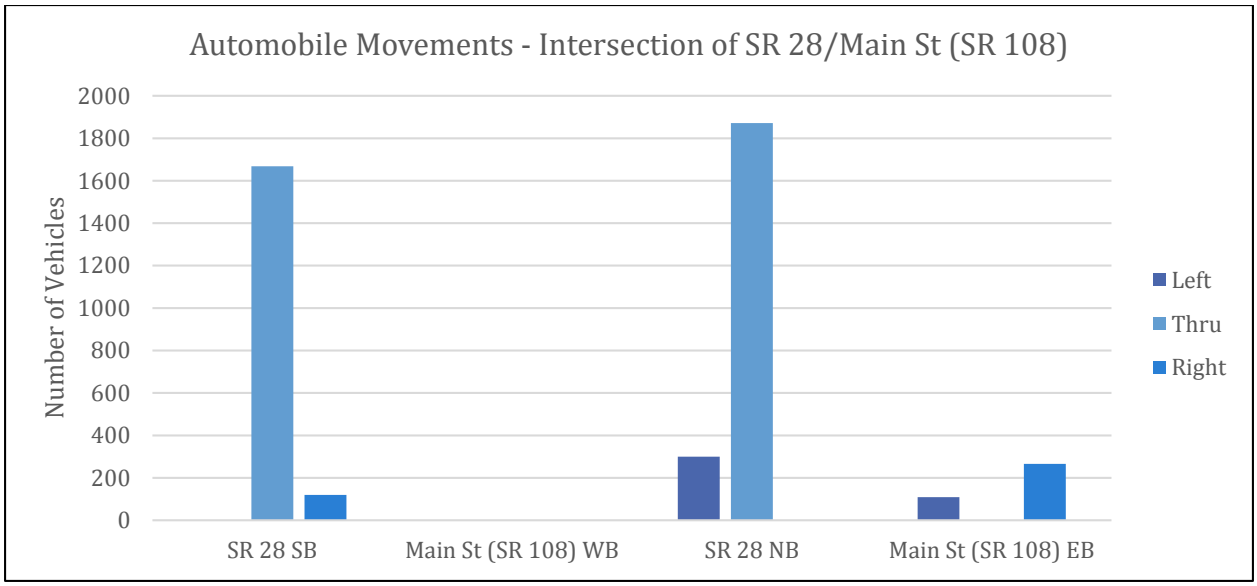


Figure 3-21 Vehicle Movements - Intersections of SR 28/Main St. (SR 108)

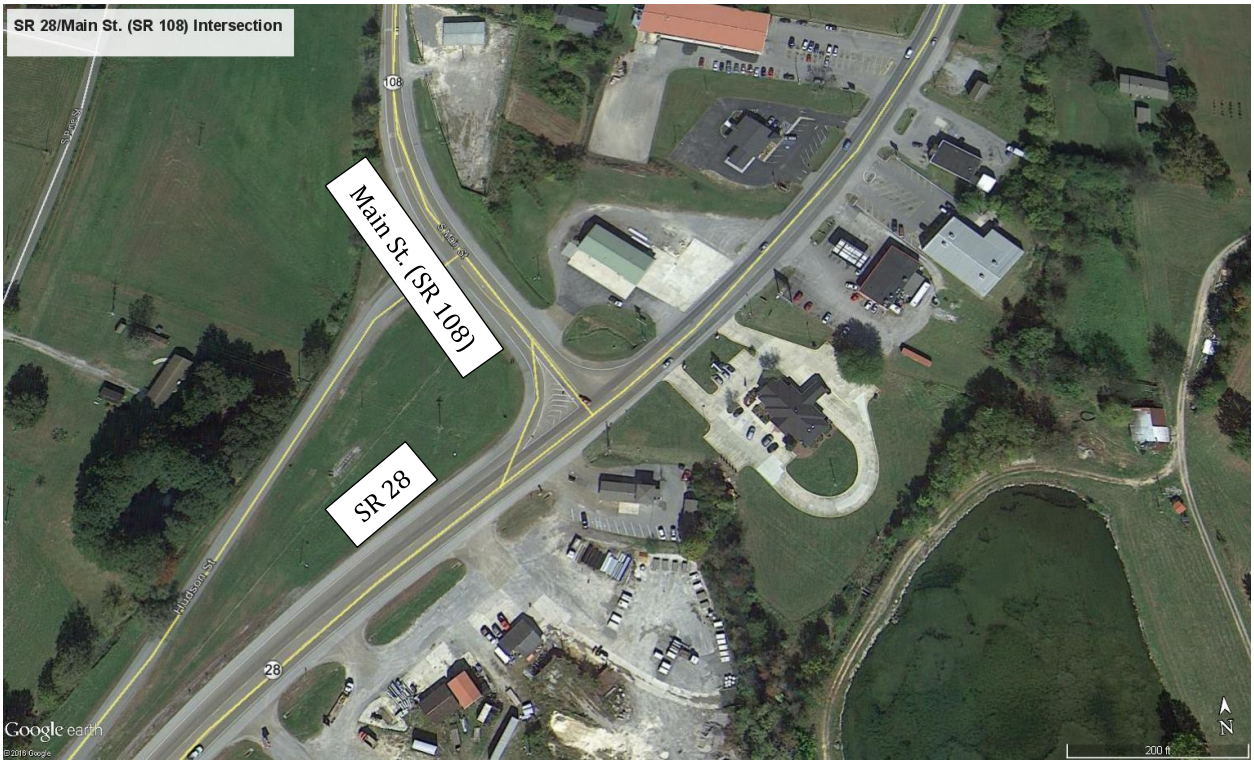


Figure 3-22 Aerial of SR 28/Main St. (SR 108) Intersection

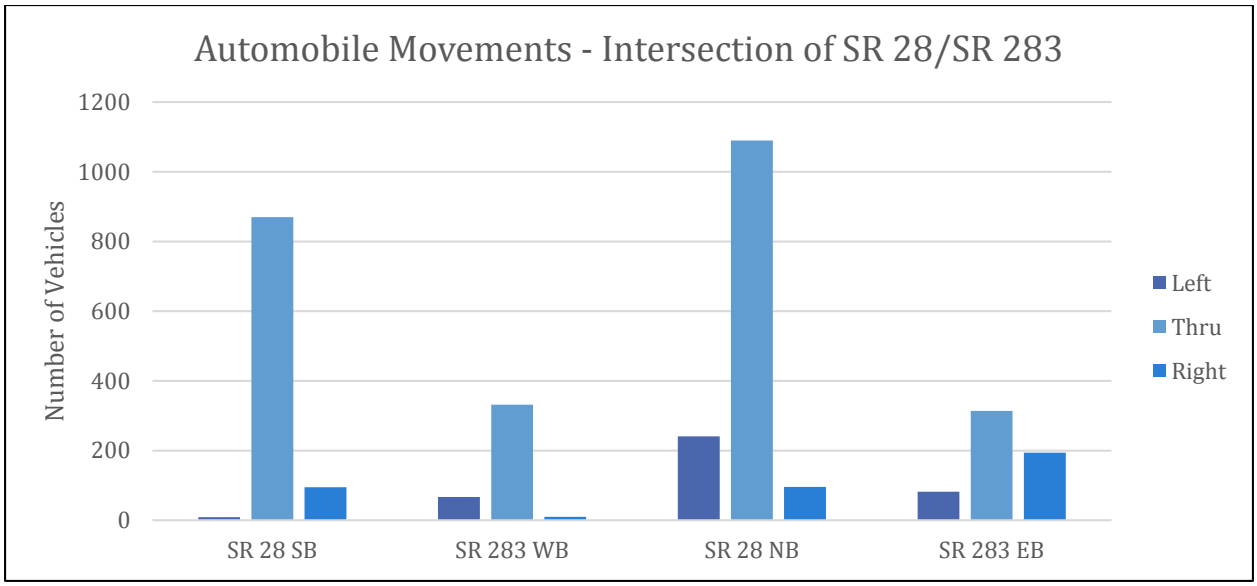


Figure 3-23 Vehicle Movements - Intersections of SR 28/SR 283

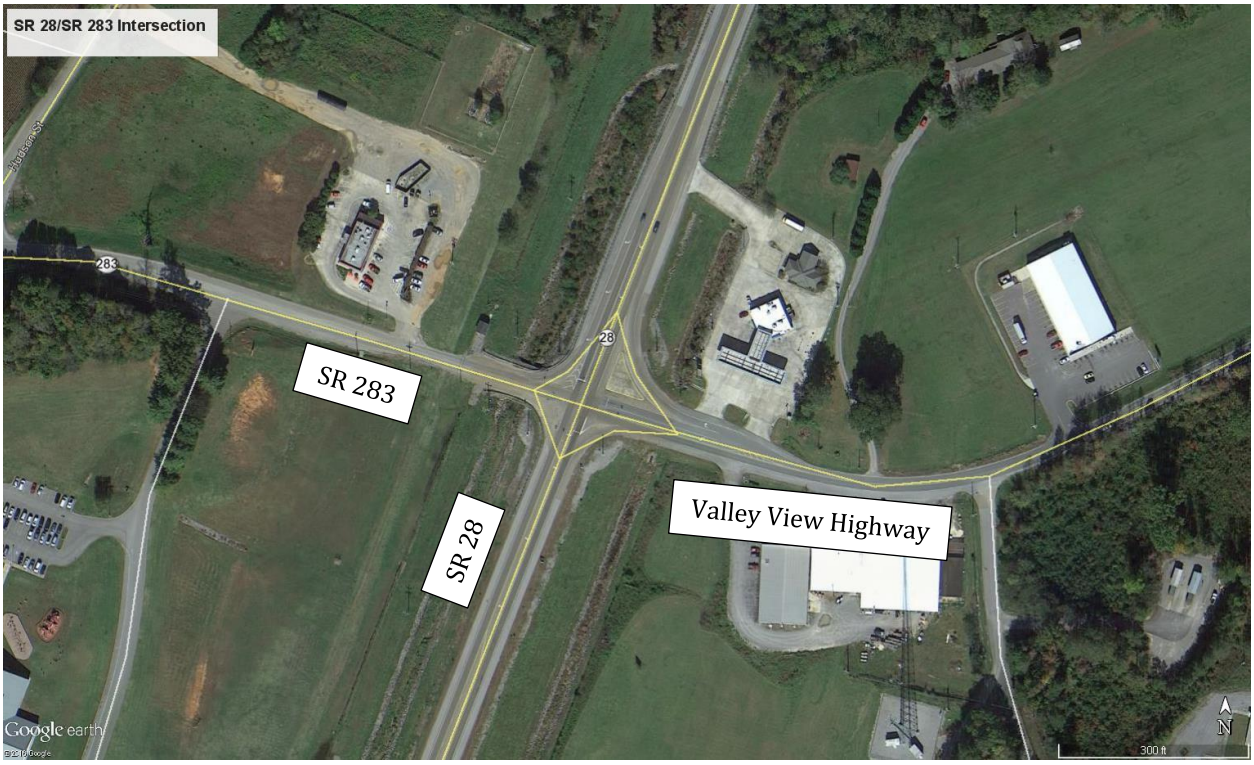


Figure 3-24 Aerial of SR 28/SR 283 Intersection

Planned and Future Conditions

Figure 3-25 shows some of the planned and future transportation conditions for Whitwell over the next few decades. A major transportation infrastructure project which is currently planned for the City of Whitwell is a sidewalk improvements project, which is to be built over four phases, beginning from the Whitwell schools and ending at the Veteran's Memorial Park. There is also a proposed park-and-ride station to be built near the Coal Miner's Park at the intersection of SR 28 and Main St/SR 108. This park-and-ride would give individuals to park their vehicles and travel on public transportation to other cities or outside the county.

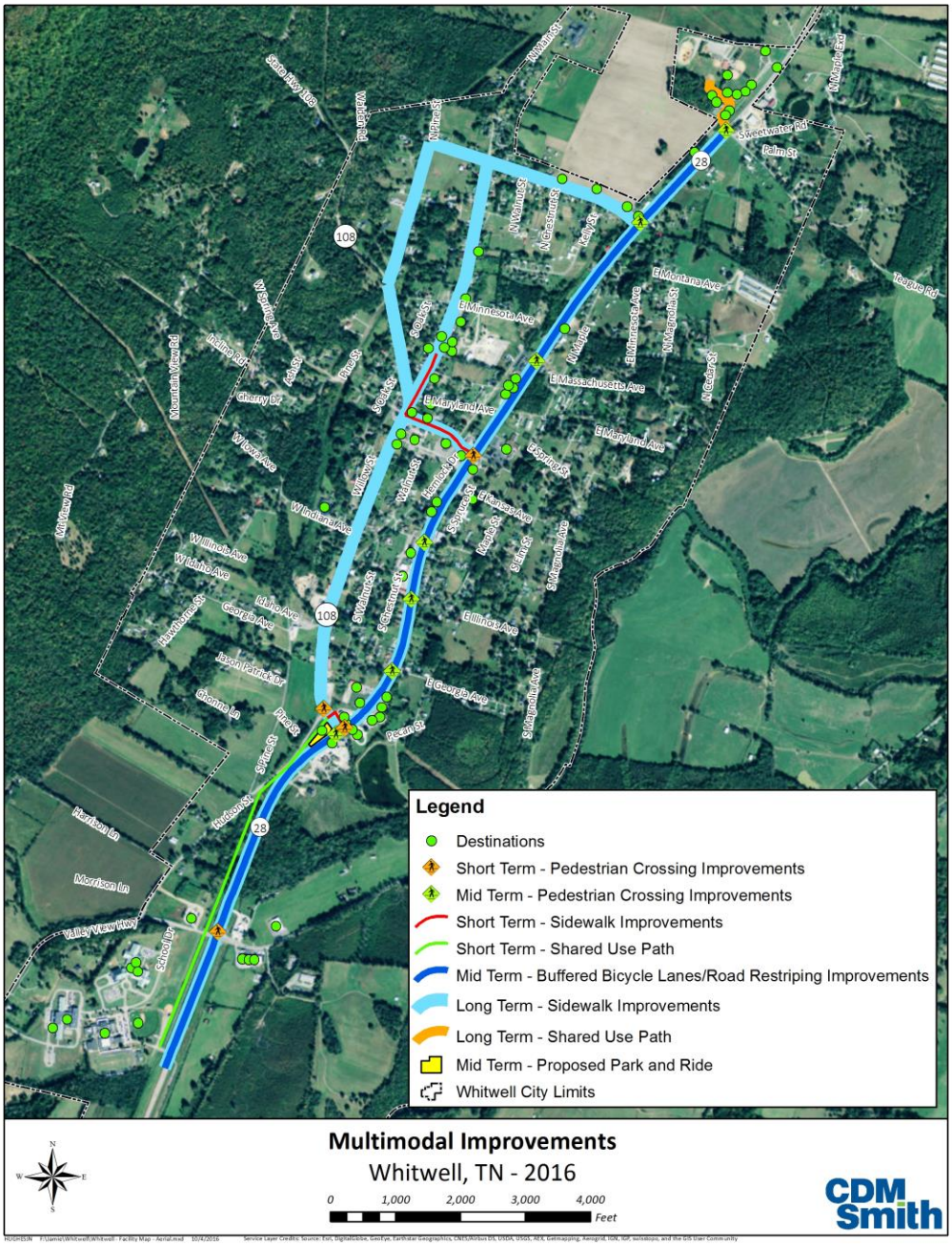


Figure 3-25 Planned and Recommended Multimodal Improvements

3.4 Summary

In order to understand the needs of a city, you need to understand the history of a city and how it grew throughout the years, as well as its residents and who lives there. After reviewing the existing land uses, socio-economic factors and transportation conditions of Whitwell, we now have an understanding of what has shaped the city and how it can best be developed in the coming years.

Of particular note is the large and growing senior population that has mobility needs, which could be better served. As this population transitions from driving a vehicle to a motorized scooter or walking, it will be imperative that the region consider other options for them to continue to be mobile. A greater connected sidewalk network would be a strong benefit for seniors to maintain their overall independence and mobility.

For those who are younger, the ability to walk and bike safely to school, parks and other destinations in Whitwell could help quell and reduce obesity and diabetes epidemics facing the younger generations.

The City has a popular walking track at Veterans Memorial Park that shows that people would like the opportunity to walk. By connecting this to the City by sidewalk or shared-use path, it provides access to this facility by those without a car.

4 Public Involvement

Involving the public and listening to their comments and concerns about an area is always considered to be a critical step when developing any sort of planning document. They will often have local knowledge about a problem or issue, allowing you to develop a solution that may work more efficiently. They also can provide you with information about potential stakeholders that may have not been originally considered due to the lack of local knowledge. Meeting and engaging the public in a planning document can often times lead to a more successful implementation overall.

4.1 Project Advisory Team

The project team consisted of the following officials:

- Stacy Terry, City Manager
- Tina Green, City Recorder
- Linda Hooper, City Commissioner
- Cindy Easterly, Mayor
- City of Whitwell Planning Commission
- Stacy Morrison TDOT Long Range Planning Division
- Madeline Skelton, SETDD City Planner
- Greg Davis, SETDD GIS Technician

The Project Advisory Team served to guide and approve the approach for Public Involvement for the CDM Smith team. The Project Advisory Team met initially for a project kickoff meeting, on February 2, 2016, to develop and refine the goals and objectives for this project, approve proposed project schedule, develop public involvement strategy, and define key stakeholder groups.

4.2 Public Meeting Description

The project team met with public from the City of Whitwell on April 21st to discuss the project and the city's needs associated with bicycle and pedestrian movements through the city. The public outreach meeting was advertised throughout the city with flyers and through social media with the Project Advisory Team.

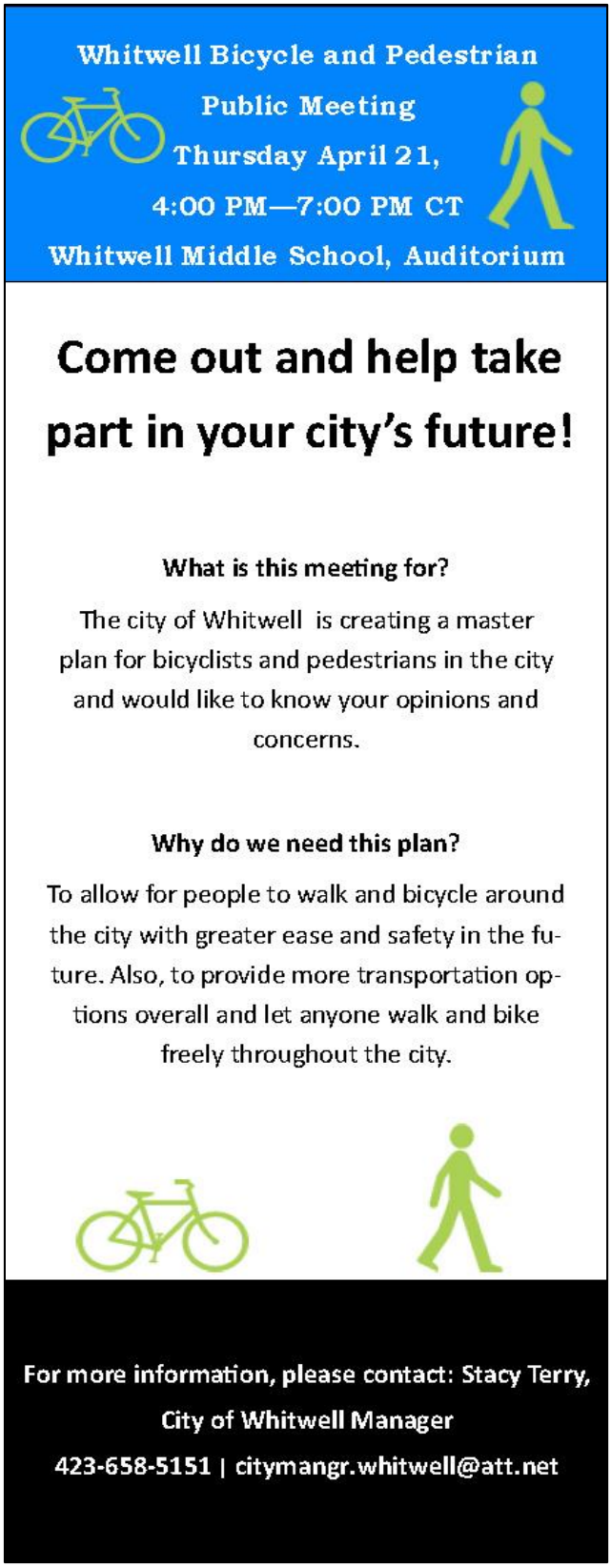


Figure 4-1 Sample Handout Flyer

Figure 4-2 Sample Graphics from Social Media

The public meeting included approximately fifty local residents and interested parties. CDM Smith provided general information about the project and gathered feedback from all the attendees on potential destinations and features of the plan. This feedback was gathered in a variety of ways including graphically on a map (Figure 5-1) and comment feedback forms as including in Appendix A: Public Meeting Information. Several important items to note from the meeting are:

- The public was particularly interested in having separate bike and pedestrian facilities wherever possible.
- The public was concerned about access management and how that would change the way vehicles move through the city.
- Many attendees commented on the sense of place that could be developed by making these changes to the city's infrastructure. Many were interested in planning for future upgrades that would further accommodate the sense of place, for example benches and lighting.

Main Areas to Connect

The main areas or land uses to connect are the commercial corridor that runs throughout Whitwell along SR 28. There were multiple comments from citizens that mentioned they would walk more if the infrastructure was in place to accommodate them. The schools, park, library, medical facilities grocery stores and tourist attractions (Coal Miners Museum and Children's Holocaust Memorial).

Main Barriers

The main barrier that was mentioned in the public meeting was the limited availability of sidewalks or bicycle lanes throughout the city. It was noted that this lack of infrastructure causes people to feel unsafe when walking and keeps them from walking or bicycling to their destinations. Specifically, a lack of pedestrian crossings along SR 28 limits their ability to cross safely due to the high speed of traffic along the corridor.

4.3 Walking Audit(s) and Main Points

A Walking Audit was conducted on April 19, 2016 and consisted of the Project Advisory Team and the CDM Smith Team walking through the corridor to gain a better perspective of the potential challenges associated with bicycle and pedestrian travel through the State Route 28 Corridor. Ultimately, the project team found that the current state of pedestrian travel through the city is unsafe. The following observations were made:

- The speed at which the cars were traveling, approximately 45 mph or more, and the lack of any grade separation made the pedestrian at high risk for accident.
- The lack of access control further increased the conflict points, making the pedestrian at even more risk.

At many areas throughout the walking audit, a lack of sight distance further added to the danger for pedestrians.

4.4 Stakeholder Outreach

Multiple stakeholder meetings were held in order to hear from groups that may have specific concerns. These groups which were defined by the Project Advisory Team, were met with individually, in order to speak with them about their needs and desired outcomes for this project.

List of Groups and Feedback Summary

Whitwell Schools

The Whitwell School System provided two representatives from each school to discuss the current state and potential needs to accommodate pedestrians and cyclists through the plan. This group provided feedback on the at the Whitwell Schools Stakeholder meeting conducted on April 19, 2016, at the Whitwell Elementary School. The school representatives provided thorough feedback on the traffic, pedestrian, and bus movements on campus, between campuses, and traveling to/from the campuses. This information was instrumental in the development of potential areas for improvement as indicated on Figure 5-6.

Business Owners

Business Owners were identified and contacted throughout the city of Whitwell and the State Route 28 corridor. With over thirty businesses contacted directly with an invitation to provide feedback, five business owners attended the Business Owners Stakeholder meeting conducted on May 17, 2016, at the Whitwell City Hall. Overall the business owners where divided on their opinions of the potential for sidewalk improvements thought the city. Two business owners were very concerned about how the changes to access control would affect their business and the traffic around the business. These two business owners were also concerned about the potential right of way needs, should Whitwell and TDOT decide to construct facilities adjacent to their place of business. The remaining business owners were excited about the additional pedestrian traffic in Whitwell and the potential for alternate modes of traffic throughout the town.

Church Groups

The local church group leaders were also invited to provide feedback on the plan. Two local pastors attended the Church group stakeholder meeting at Whitwell City Hall on May 17, 2016 and provided feedback on the plan. One church representative was concerned about the potential impacts to his church's property due to its location adjacent to a high pedestrian traffic area on Spring Street. It was also noted by this group that these facilities would be of particular use to several low income residents in town, who could safely navigate to and from a place of work. Both Pastors noted that they currently have minimal walkers or bikers to their respective congregations, but that the local residents would consider this mode of transportation if safe facilities were in place.

Whitwell Park Board/Sequatchie Valley Saddle Club

The Whitwell Park Board Members, which includes the Sequatchie Valley Saddle Club, provided feedback on the connectivity and uses at the Whitwell Park and associated facilities (Veterans Memorial Park, Tennis Courts, Ball Fields, and Horse Arena). This group also provided feedback on the connectivity throughout the town, identifying several areas where protected pedestrian crossings would be required to navigate through town.

Senior Center

For stakeholder outreach at the Whitwell Senior Center, the CDM Smith team conducted interviews with the Director of the Senior Center, Barbara Johnson. The team also observed operations at the Senior Center and interacted with individuals there, to gain a better perspective of how this stakeholder group might utilize the potential facilities. The Senior Center does not currently have any walkers or cyclists, but Director Barbara Johnson stated that locals would utilize with sidewalks, if they were available. The Whitwell Senior Centers average user is approximately 78 years old and many are dependent on others for their transportation needs. SETHRA bus is available, on a first come basis, for appointments and is seldom accessible for these seniors, so they have to rely on friends and family for their transportation needs. It was noted that the senior citizens who use this facility could benefit from safe paths to pharmacy and doctor's offices from the senior center.

5 Multimodal Infrastructure Recommendations

5.1 Connectivity Analysis

The ease and ability for people to move around within a city is an important indication of the level of connectivity of an area. Connectivity is often discussed in regards to specific transportation modes as well. For example, the vehicular connectivity of an area may be thorough and thus allowing for people to use that mode of travel with ease. In comparison, lack of sidewalks or bicycle lanes would cause the connectivity for pedestrians or bicyclists to be severely different and not as reliable. This would lead to most people using their vehicles to travel for their needs because that is a reliable form of transportation. In order to better understand the connectivity for bicyclists and pedestrians, we must analyze what infrastructure is currently available, as well as where people are traveling throughout the city.

Origins and Destinations

For any city, it's important to understand not only the demographics and history of an area, but also where its citizens work, live, learn and play. This is best defined by determining the origins and destinations throughout a city. Figure 5-1 reflects the origin and destination input received during the public meeting in April 2016.

The green dots in Figure 5-1 show many of the common destinations in the City of Whitwell and give an idea of where people travel to each day. The destinations center around the various schools, parks, churches and other civic institutions in the city. Currently, many of these destinations are centered along the SR 28 corridor. There are also origins listed on this map in pink and many of these are residential, showing where people live around Whitwell.

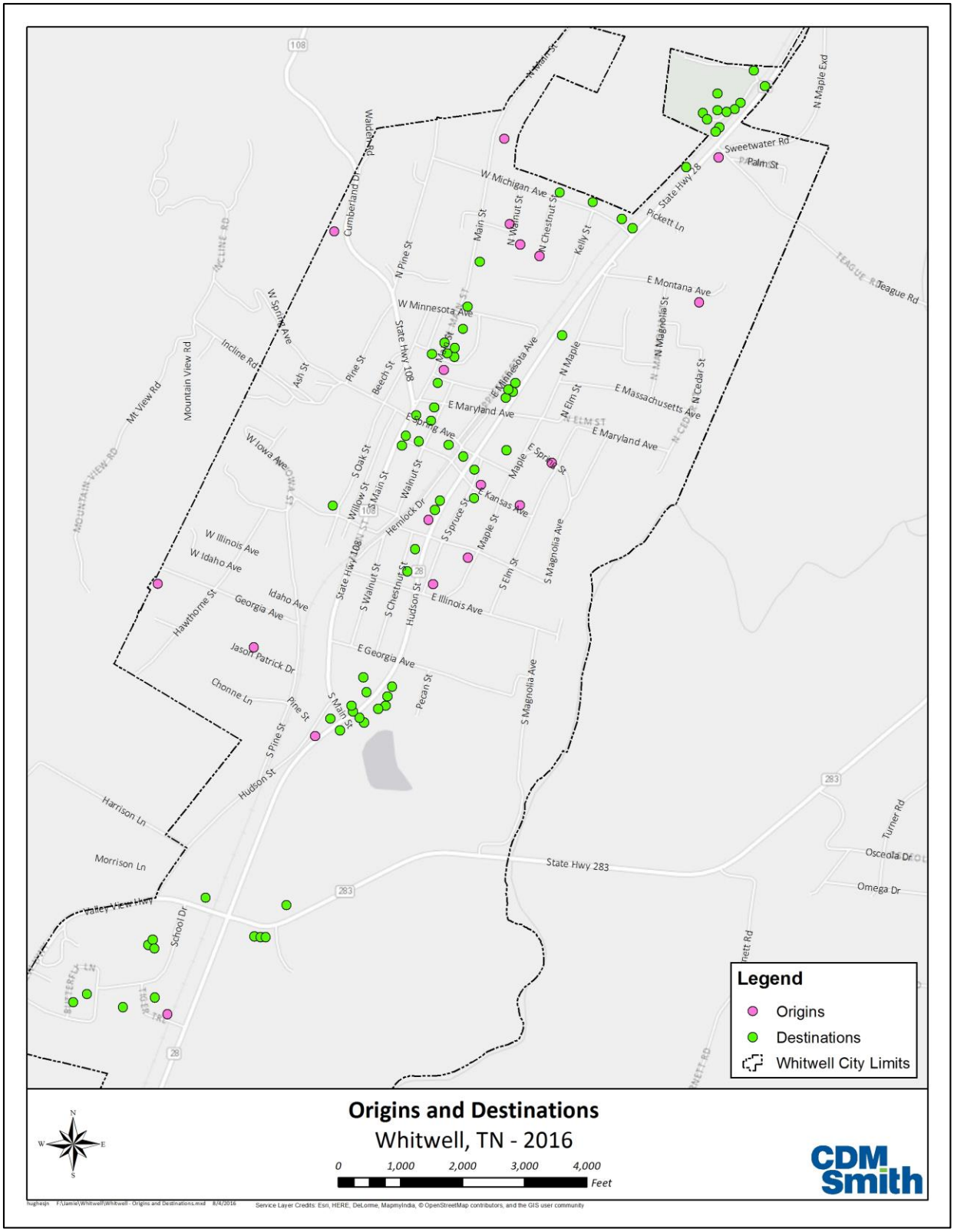


Figure 5-1 Origins and Destinations in Whitwell, TN

Phase 1 Sidewalk Project

The 2014 grant award indicated the sidewalk being built in four different phases, with phase 1 beginning from the schools and ending at the intersection of SR 28 and Main St. (SR 108). The City of Whitwell recently received grant funds from the Multimodal Access Grant program from TDOT to build the sidewalk that was shown within Phase 1 of the report. While this does not connect the entire area with the sidewalks, it does at the least connect the schools with a sidewalk and the southern portion of the City at the location of the new Coal Miner Monument Park which is currently planned for this location.

The phase 1 portion of this sidewalk will be built starting at the Whitwell High School entrance and ending at the intersection of SR 28 and Main St. (SR 108). It will be built into the existing shoulder of the roadway and will be constructed with a curb and gutter. Also, the sidewalk will be constructed with 5’ in width along the corridor.

The phase 1 portion of this sidewalk project, which was originally meant to be a five-foot sidewalk, has been changed and will now be built as a ten-foot shared-use path, beginning from the entrance of the Whitwell High School and ending at the intersection of SR 28 and Main St. (SR 108). It will utilize right-of-way that was previously used for a railroad and be separated from the roadway itself. The shared-use path will be ten feet in width to allow for groups of people to travel comfortably, as well as bicyclists.

Phases 2 - 4 Sidewalk Project

Each year, TDOT reviews grant applications from counties and cities for their Multimodal Access Grants Program. In 2015, the City of Whitwell was selected to receive a portion of these funds from their recent grant application to build a sidewalk from the campus of the three schools in the southern part of the city to the Marion County Veterans Memorial Park in the northern part of the city. This application displayed the sidewalk being built in four different phases along the SR 28 corridor, which is shown in Figure 5-2. While phase 1 is set to be built as a shared-use path, the limits of each phase are still the same.

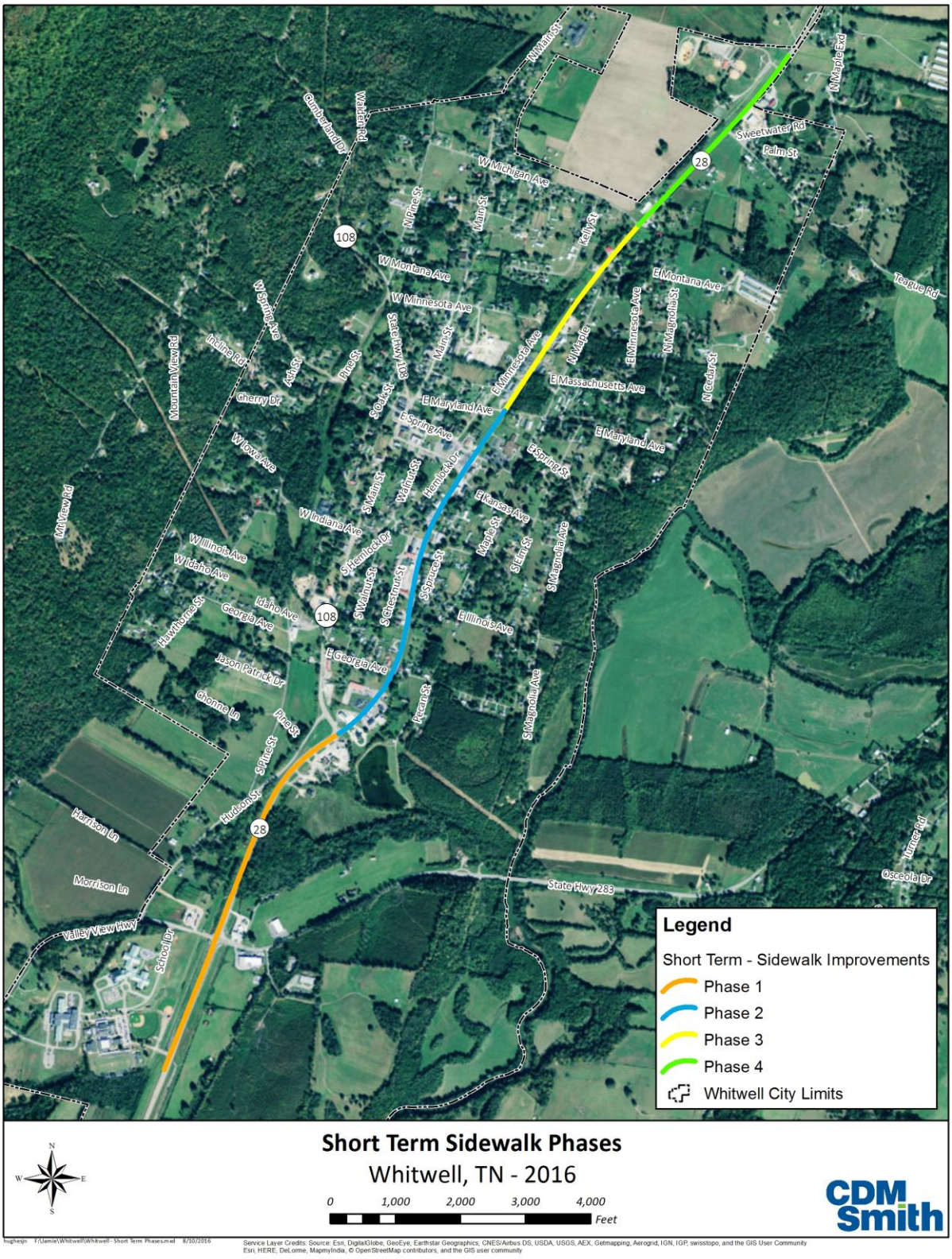


Figure 5-2 Short-Term Sidewalk Improvements - Four Phases

Pedestrian Infrastructure

Within Whitwell, there is currently minimal sidewalk coverage to allow for people to travel from one destination to another in a safe and efficient manner. This situation leads to people needing to use a vehicle to travel around the city each day. If a person does not own a vehicle, they must walk through grassy areas, navigate the few sidewalks that are available or use the roadway. None of these options are inherently safe and can lead to conflicts between pedestrians and vehicles.

It is suggested that the current sidewalks within Whitwell be repaired or replaced, where possible, so that space can be used again. It is important to leverage the current infrastructure that is available while also repairing it in such a way that allows for people to use them safely. Figure 5-3, Figure 5-4, and Figure 5-5 show current sidewalk conditions within Whitwell along Main St. (SR 108). SR 28 does not have any sidewalks along the corridor and most of the sidewalks lie along the Main St. (SR 108) corridor instead.

Figure 5-3 is located at the intersection of Main St. (SR 108) and Spring St., known as "The four-way stop". There are some sidewalks visible in this intersection but they have mostly deteriorated condition and would need to be rebuilt.

Figure 5-3 The intersection of Main St. (SR 108) and Spring St.

Figure 5-4 and Figure 5-5 are taken in the same location along Main St. facing south and north. While there are sidewalks shown, it is clear that their conditions have deteriorated to a significant point and there is a need to rebuild them.

Figure 5-4 Main St. (SR 108) looking South

Figure 5-5 Main St. (SR 108) looking North

Bicycle Infrastructure

As was mentioned in section 3.3, there is no significant bicycle infrastructure throughout the City of Whitwell. There are sections of SR 28 that have paved shoulders, which have the potential as an option for bicyclists, but some of them have rumble strips. This poses a hazard for bicyclists trying to use the paved shoulders as a way to travel along SR 28. Bicyclists can easily fall when attempting to ride over rumble strips. This forces bicyclists to either ride in the roadway or at the far edge of the shoulder where debris accumulates which can also cause a bicyclist to either fall or get a flat tire.

5.2 School Connectivity

The following recommendations could allow the schools within Whitwell to connect to the overall future sidewalk/bicycle network along SR 28 and also to the other schools themselves. The schools currently have no pedestrian or bicycle connections to one another, other than a narrow strip of sidewalk connecting the high school and middle school. This requires students to walk through the grass, parking lots or the roadway in order to get to the other schools. With the current configuration of the schools and roads, there is a significant amount of vehicular traffic in the area, leading to safety concerns for students who may be walking in the area.

School Drop-off/Pick-up Analysis

The three schools in Whitwell have areas located in the front where students can be dropped off or picked up by vehicles each day. While these are served by vehicles, there are currently no connections for pedestrians to the other schools or SR 28. These are the critical entry points for the school and where connections must be made in the future.

External Connectivity

In order to provide more connectivity by bicycle and foot between the schools and the City of Whitwell, there must be connections to sidewalks and bicycle lanes along the SR 28 corridor. Providing connections to sidewalks and bicycle lanes could allow for students to travel to the schools without needing to be driven or bused there, thus reducing the amount of vehicular traffic around the schools and overall. There are three possible entrances to the schools which could be used for additional multimodal connections. School Drive connects the schools to SR 283 near the Whitwell Elementary school, Tiger Trail connects to SR 28 near the Whitwell High School and Butterfly Lane connects to Valley View Highway near the Whitwell Middle School.

Internal Connectivity

The main recommendation for greater internal connectivity is to build sidewalks between the three schools so students are able to travel between them without using the roadway. Figure 5-6 is a preliminary map of the Whitwell schools and where some of the sidewalks and roadways could be located. As was mentioned earlier, there are safety concerns with students traveling along the main roadway, so sidewalks would provide for a safer alternative for students wishing to walk to school. The best areas to include the sidewalks would be from the sidewalk that is being planned along SR 28 to the entrances of the three schools. It also includes changes to the roads around the school to manage the traffic more efficiently and provide a direct sidewalk connection to the Children's Holocaust Memorial from SR 28. Overall, the additional sidewalk and roadway connections will

provide better opportunities for the students and school staff to travel to the school without a vehicle.

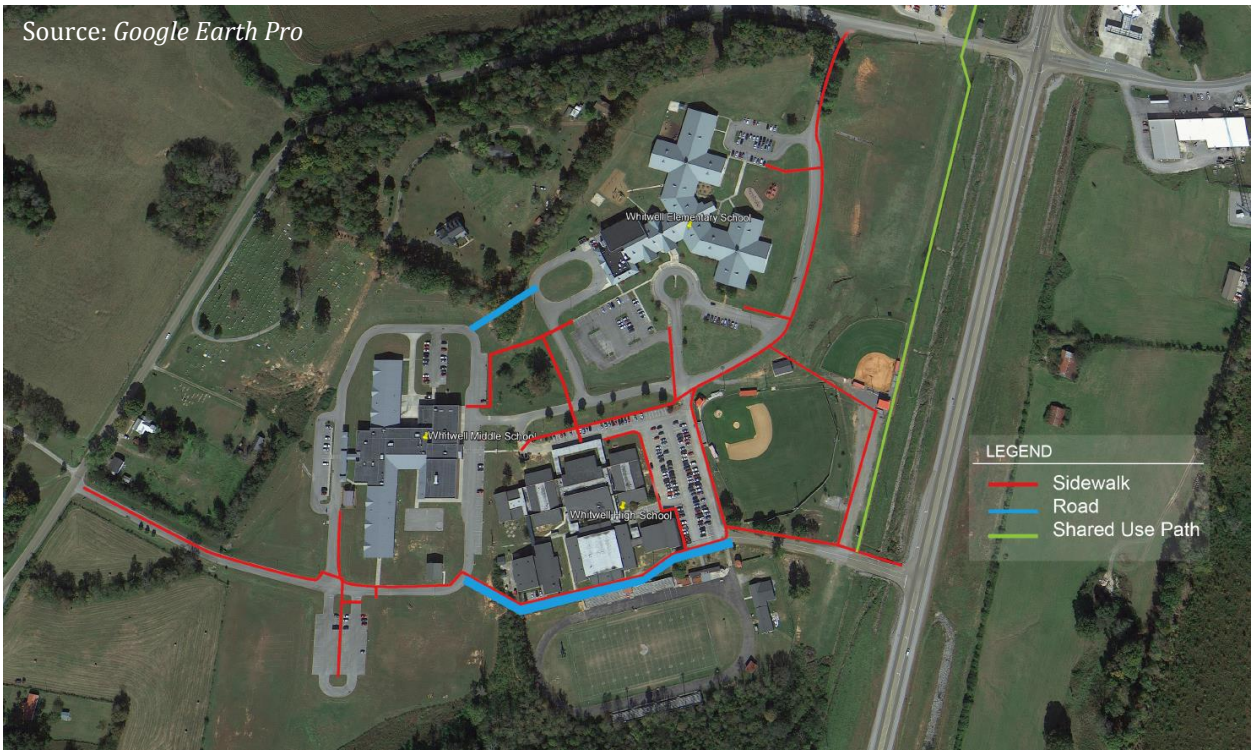


Figure 5-6 Whitwell School Connectivity Recommendations

5.3 Bicycle & Pedestrian/Multimodal Corridor LOS Analysis

In order to better understand the corridor, an analysis of its current conditions is necessary. One method for analyzing a corridor is to use multimodal Level of Service (LOS) and to quantify it based on its physical and operating conditions for each mode of transportation. The ARTPLAN2012 software was used to conduct an LOS analysis of the corridor.

Existing Conditions

Using the data that was collected in the Existing Conditions section, we calculated the multimodal level of service for the entire SR 28 corridor within Whitwell. The corridor LOS analysis is based upon roadway segments and signalized intersections along the corridor with the full results shown in Appendix C: ARTPLAN Analysis Results. The auto LOS for the entire corridor is LOS C, the pedestrian and bicycle LOS were E and the bus LOS was F. The auto LOS C is a standard result, showing that the corridor is performing well for automobiles and trucks from a driver perspective based on their average travel speed. The other LOS results for bicycles, pedestrians and buses though show that the corridor is failing for these other modes of transportation. For bicyclists and pedestrians, LOS is determined by the amount of interaction with motorized vehicles and presence of bicycle and pedestrian facilities. For transit (bus), it is based on the frequency of bus service and the pedestrian environment at and leading to bus stops.

Full Plan Implementation

The multimodal improvements we recommend can be found in section 5.8 Multimodal Transportation Options. Using these recommendations, we can estimate the level of service (LOS) for the SR 28 corridor and compare them to existing conditions. After all of the recommendations are implemented, the automobile average travel speed would decrease throughout the corridor slightly but. The explanation for the auto LOS and how it is calculated can be found in Appendix C: ARTPLAN Analysis Results. The decrease in automobile average travel speed would actually improve LOS for pedestrians and bicycles slightly. With the added facility improvements, bicycles and pedestrians LOS would improve to B, but buses would still be LOS F. The park-and-ride and accompanying transit service was not included in the LOS analysis as it is not a part of this plan. If the park-and-ride were built, then the LOS for buses would improve. These recommendations could benefit bicyclists and pedestrians significantly, while reducing the average travel speed for automobiles slightly.

5.4 Street Intersection Geometrics

Along the SR 28 corridor, there are no pedestrian or bicycle facilities for people to use reliably. The design of the roadway on SR 28 is well-suited for automobiles but not pedestrians or bicyclists. This is especially true for the intersections, which are rather wide currently and do not lend themselves to being crossed easily or safely by pedestrians.

Curbs & Turn Radius

The intersections in Whitwell are currently not amenable to pedestrians or bicyclists who wish to cross them. The main issue is that they are wide due to the lengths of the roadway lanes, as well as the radii of the turns and curbs. For example, the turn radii for the intersection of SR 28 and Main St. (SR 108) are wide to allow for vehicular traffic to make turns without needing to slow down significantly. The issue with this is that is it creates longer crossing distances for pedestrians who may want to cross the intersection. They must wait for no vehicles to turn in order to safely cross. If curb radii were decreased along SR 28, this would yield significant benefits for pedestrians and bicyclists with shorter crossing distances and slower vehicle speeds. The radii would need to be calculated based on the speed of the roadway and the amount of traffic in the area.

Figure 5-7 is an example of how a driveway could be changed with the reduction in curb radii. The smaller curb radii forces cars to slow down while approaching the turn, thus providing benefits to those who may be walking in the area. Figure 5-8 is an example of a turn with a large curb radius that is summarily shortened to be more amendable to pedestrians and bicyclists. Another recommendation of this plan is to lower the speed limit of SR 28 in the City to 35 MPH from its current speed limit of 40 MPH. This could allow for some of the curb radii to be shortened even further and make it safer for bicyclists and pedestrians.

If these changes were able to be made along the SR 28 corridor, it would provide significant benefits to those who may choose to bicycle or walk.

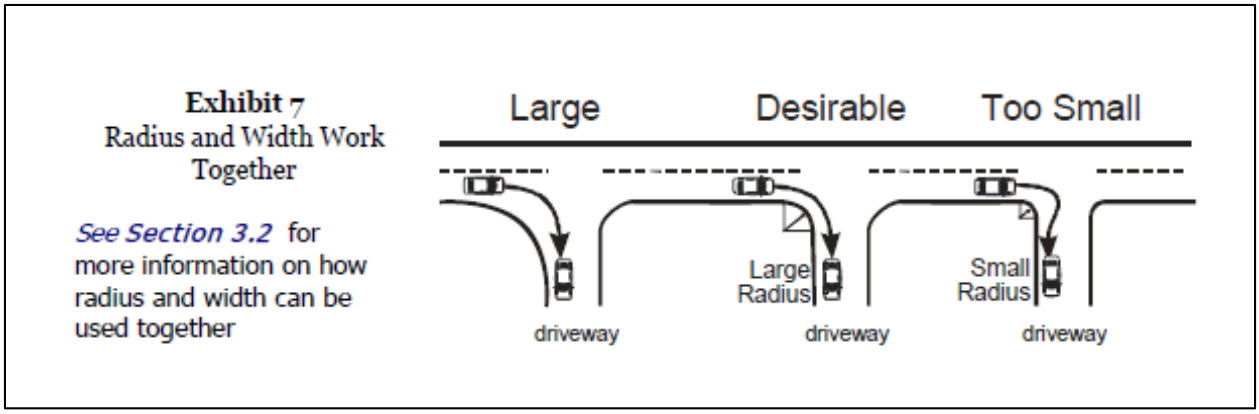


Figure 5-7 Example of Curb Radius Design Changes, FDOT Driveway Information Guide

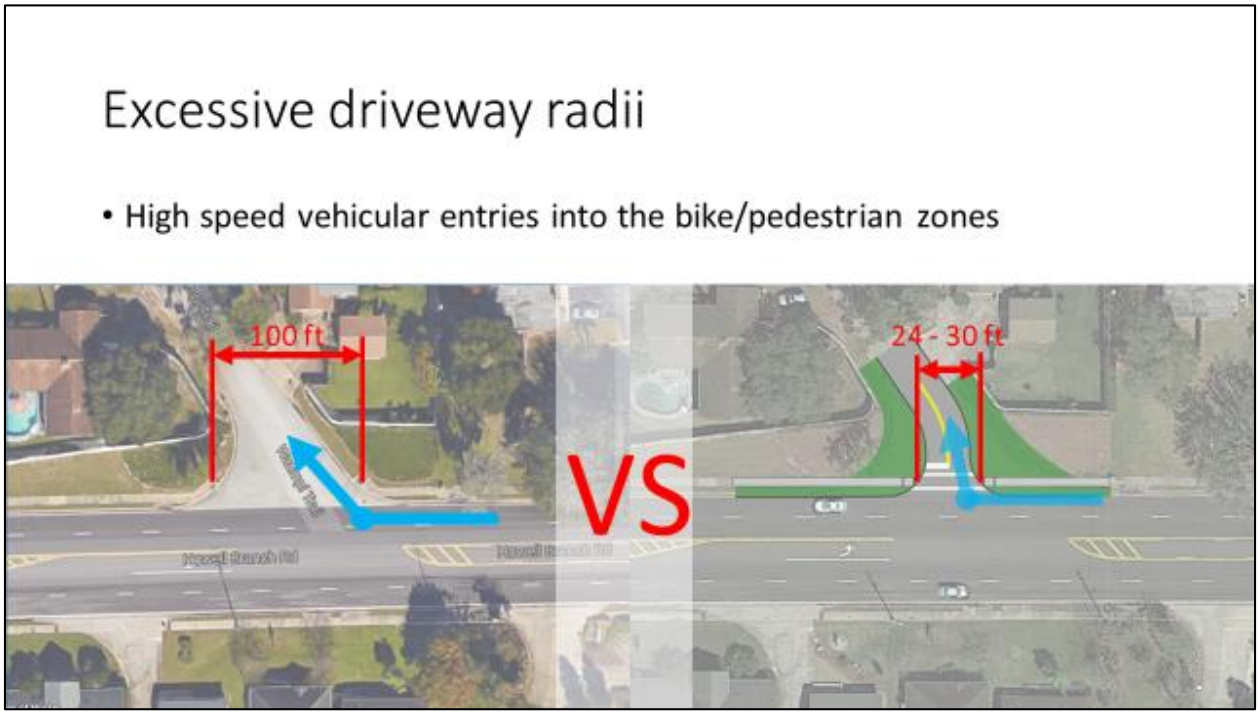


Figure 5-8 Example of Curb Radii Comparisons

5.5 Corridor Driveway Access

When developing bicycle and pedestrian infrastructure, driveway access along a corridor can oftentimes become a concern. This is due to the fact that too many driveways can lead to a hostile environment for people having to cross them on foot or bike and continually look for traffic along the corridor and within the driveways. Within Whitwell, there are some driveways that could be safety hazards and should be modified or moved.

Driveway Issues

Throughout the SR 28 corridor, there are locations that have large, open driveways for vehicles to use. These particular driveways could cause issues by not channeling vehicles into specific areas and reducing safety for pedestrians and bicyclists. One particular driveway or location that needs to be modified is City Hall. Currently, there is not a designated driveway for City Hall and cars may enter or exit across the entire front of the location. If a sidewalk were placed between the parking lot and the road, pedestrians would have no sense of security from vehicular traffic. By enclosing the parking lot and designating one or two driveways with curb cuts, pedestrians and motorists alike would only have a short area where conflicts would occur.

In Figure 5-9 and Figure 5-10 you can see the Whitwell City Hall, which has a large open driveway. As it stands, cars may enter the property at any point and there is no channelization. If a pedestrian or bicyclist were to be in the same area, there may be a conflict between them and the vehicle, so some changes would be necessary to ensure that does not happen. One example of changes in a driveway can be seen in Figure 5-11, which shows a driveway that was modified to allow for a sidewalk and bicycle lane to be built on the shoulder of the roadway, but also to continue to allow for cars to enter the property. Similar changes may help improve the safety along SR 28 for bicyclists and pedestrians. These improvements would also improve safety for motorists and improve the appearance of the roadway and businesses.

Figure 5-9 SR 28 looking south near Whitwell City Hall

Figure 5-10 SR 28 looking north near Whitwell City Hall

Existing Conditions

Reduce curb cuts and define parking areas; add bike lane, curbing, street trees, sidewalk and clearly define pedestrian crossing areas. Close driveway nearest to the intersection and share access with interconnected parking and signage at edge.

Figure 5-11 Example of Driveway Changes

Sight Distance Issues

Not only can driveways cause issues for pedestrians and bicyclists, but they can cause issues for drivers if they are not designed and placed correctly. Proper sight distance is important to being able to see far enough away to ensure that there are no vehicles traveling on the road preventing you from exiting safely. For example, along SR 28 there are areas that may need to be changed in order for people to see properly at driveways. From Spring St. to East Indiana Ave. there are numerous locations which can cause issues with sight distance for vehicles. Also, the intersection of SR 283 and Industrial Pike was an area that was mentioned as requiring changes for safety reasons. These two locations were discussed as having potential issues and may need to be reconfigured.

While sight distance may be fixed by a change in a driveway, another potential method is to reduce the speed limit of a roadway. It is recommended that the speed limit be reduced from forty miles per hour to thirty-five. This changes the stopping distance for a car from 475 feet to 415 feet. This will improve the SR 28 corridor for pedestrians and bicyclists, as well as drivers who are turning in and out of driveways.

5.6 Need and Access to Public Transportation

Within the City of Whitwell, there is currently limited access to public transportation. There is some on-call service for senior citizens provided by SETHRA, but no specific service is provided for just the City of Whitwell. Capacity currently does not meet the demand and trips need to be scheduled in advance or at least the day before.

Public transportation needs were identified within section 3.2 after reviewing the current demographics of the area. There were three main reasons that show a need for more public transportation access; an aging population, high rates of poverty and no automobile ownership. These segments of the population would benefit significantly from having more access to public transportation. For those that are aging and older, the public transportation would provide them more options for traveling to the doctor or a pharmacy.

5.7 Future Land-Use/Development

In addition to documenting and reviewing future transportation infrastructure, it is important to review any future land use changes or developments within or near Whitwell. After speaking with the public and officials, it was determined that there are no significant land developments in the future for the city. There is an industrial facility that is being built near the city which could provide some economic benefit for Whitwell in terms of jobs, but it that project was still being completed.

Also, there has been a park-and-ride facility proposed near the intersection of SR 28 and Main St. (SR 108). This facility would provide 35 parking spots for people to use, as well as bicycle racks, benches and a pedestrian shelter. It would connect with the Coal Miner's Park that is also being proposed in that same area and could provide additional connectivity for future public transportation options and be expanded upon with more parking or transit service.

5.8 Multimodal Transportation Options

Typical Section Scenarios

Infrastructure can play an integral role for a city and how it affects each aspect of a city. As we discussed in 5.1, many of the destinations are located along the SR 28 corridor in Whitwell. Connecting these destinations with more transportation modes can provide a significant of benefits for the people who live in Whitwell. In order for this to happen, there must be more types of transportation infrastructure along the SR 28 corridor for people to utilize. A typical section is a diagram that shows the different types of infrastructure that are built, or to be built, within a roadway.

Figure 5-12 shows a "typical section" of SR 28 in Whitwell with these changes implemented. The main features of this are the 5' sidewalks that are built on both sides of SR 28, the 8.5' buffered bicycle lanes and the reduction in length of the vehicular travel lanes to 11'.

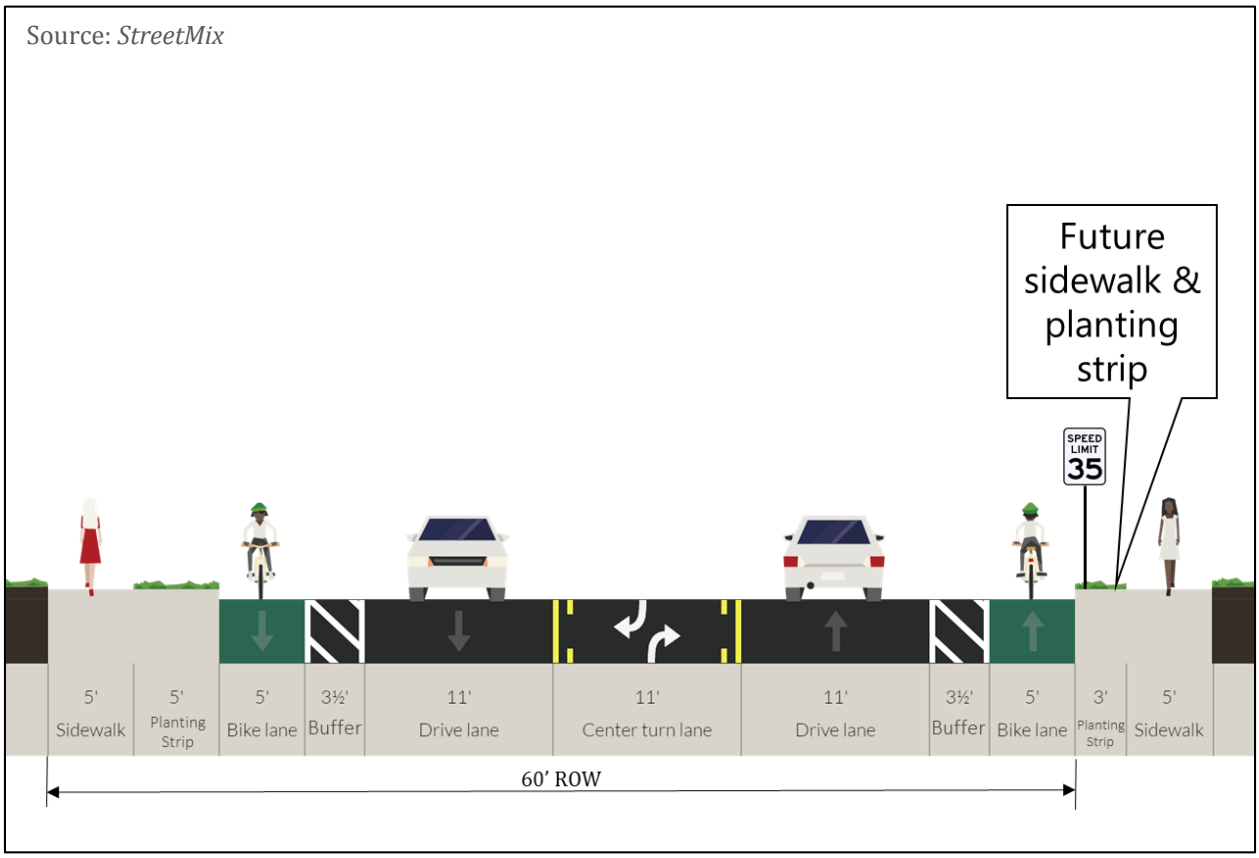


Figure 5-12 SR 28 Roadway Typical Section - 60' ROW

Figure 5-13 depicts two similar typical roadway sections but with wider sidewalks and bicycle lanes due to the removal of the two-way center turn lane. The lower roadway depicts a typical section with a turn lane instead of a center turn lane, showing that it would still be possible to

include all of these elements. The upper roadway exhibits a different scenario than the lower in that there is no turn lane and instead there is a planting strip. What these show is that it is still possible to build the buffered bicycle lanes and sidewalks while still keeping the two vehicular travel lanes and center turn lane. It also shows that removing the center turn lane can provide a significant amount of space for larger sidewalk or bicycle lanes, as well as still including a turn lane later throughout the corridor and minimizing a sidewalk or bicycle lane to acquire the extra space.

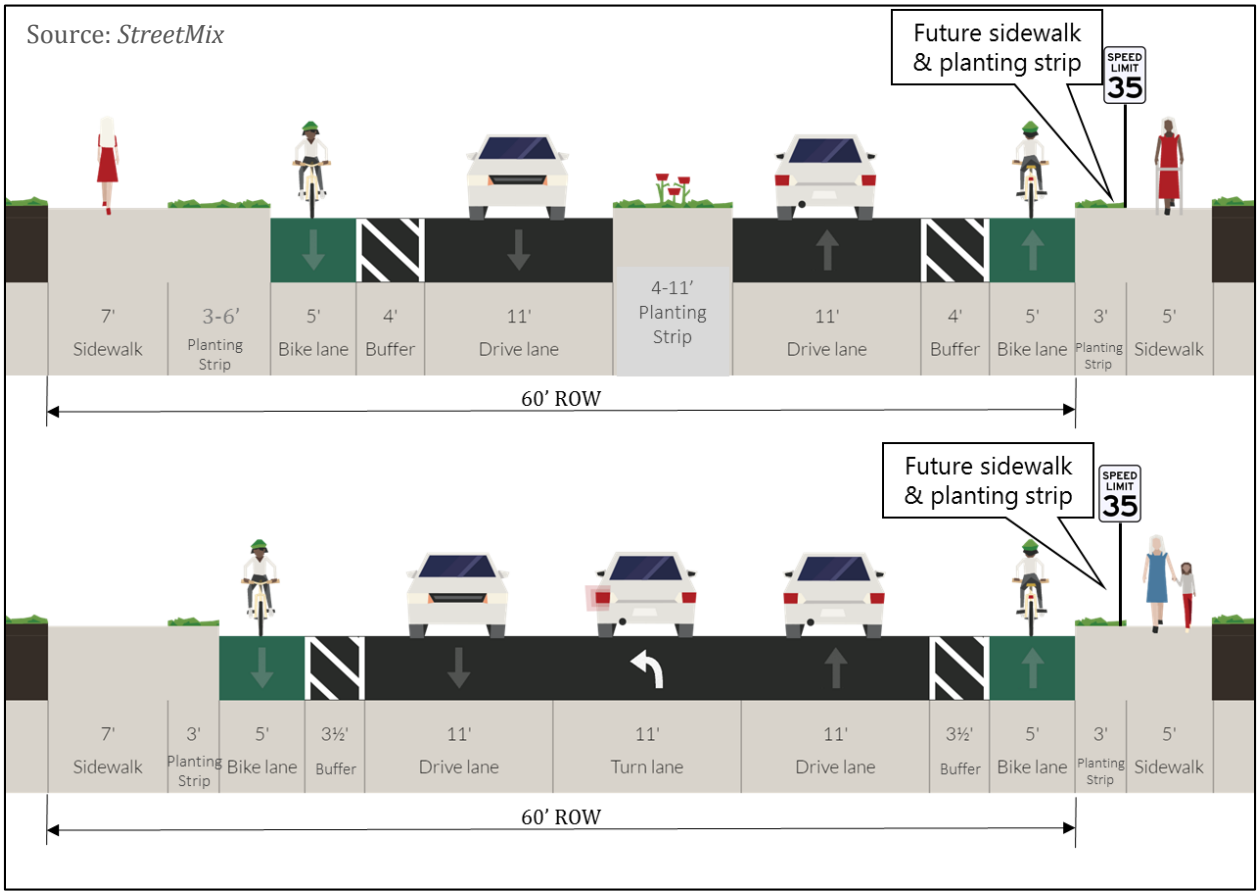


Figure 5-13 SR 28 Roadway Typical Sections - 60' ROW Alternatives

Figure 5-14 is similar to Figure 5-12 but with a restricted amount of ROW available, 55'. In cases where there is not enough ROW, Figure 5-14 is a more viable option. It still allows for the necessary

components to be included throughout the corridor, such as the sidewalks, buffered bicycle lanes and vehicular travel lanes, but removes a planting strip and minimizes some of the infrastructure widths to still accommodate pedestrians, bicycles and motor vehicles.

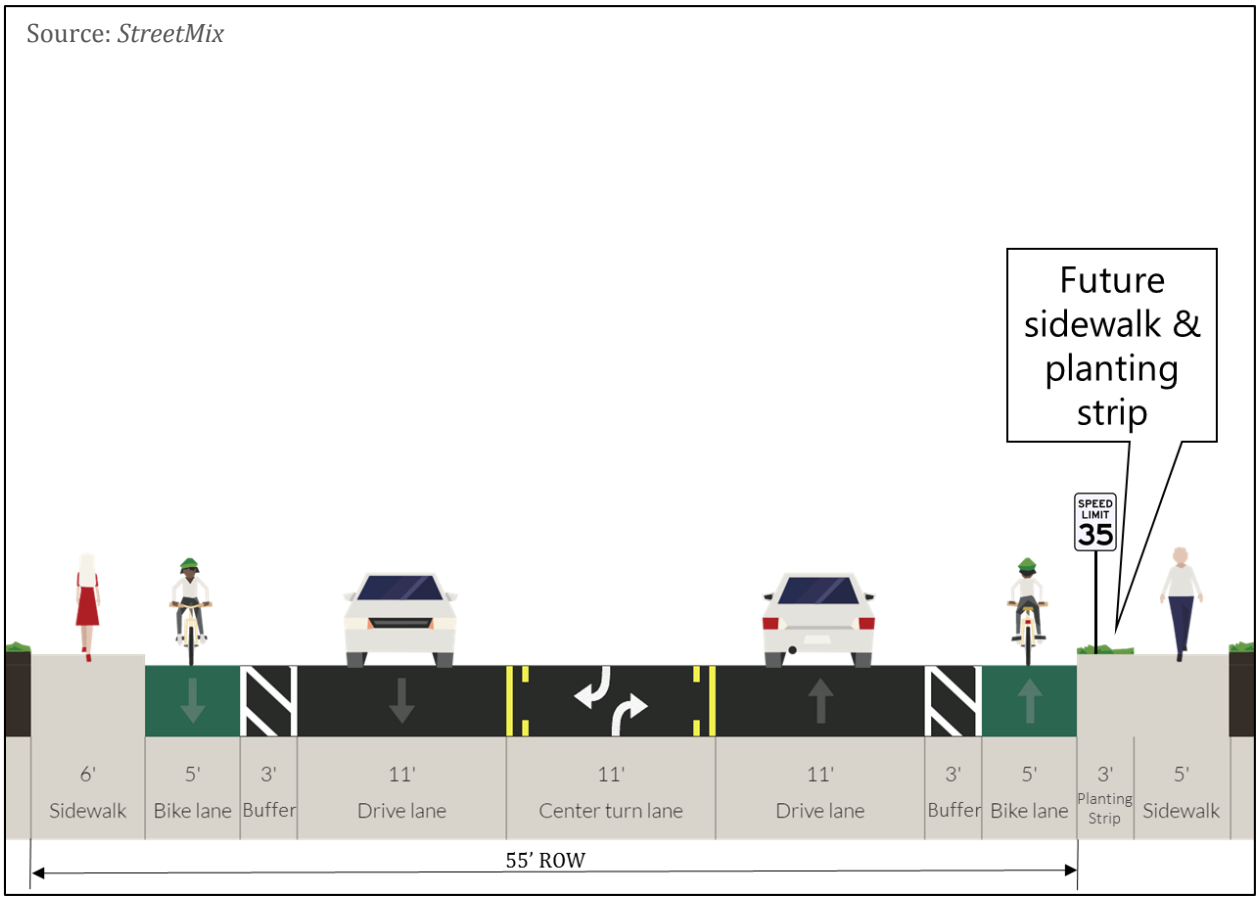


Figure 5-14 SR 28 Roadway Typical Section - 55' ROW

Recommended Typical Section Scenario

While there are multiple typical roadway scenarios which are possible for Whitwell, the section which was favored the most was the one that included sidewalks on both sides of the roadway, as well as buffered bicycle lanes and reduced lane widths for the vehicular through lanes. An example has been provided of what SR 28 may look like using this type of typical section in Figure 5-15. While providing this amount of bicycling and pedestrian infrastructure would be significant for Whitwell, it will more than likely be completed in separate phases over a long period of time. It also should be noted that the 5' sidewalk and 3' planting strip on the right side of the roadway are recommended improvements but should be built only after the other improvements along the corridor are built. While not depicted specifically within this typical section, some other possible improvements for the SR 28 corridor could be trees planted in the planting strip as well as streetlights to improve safety at night.

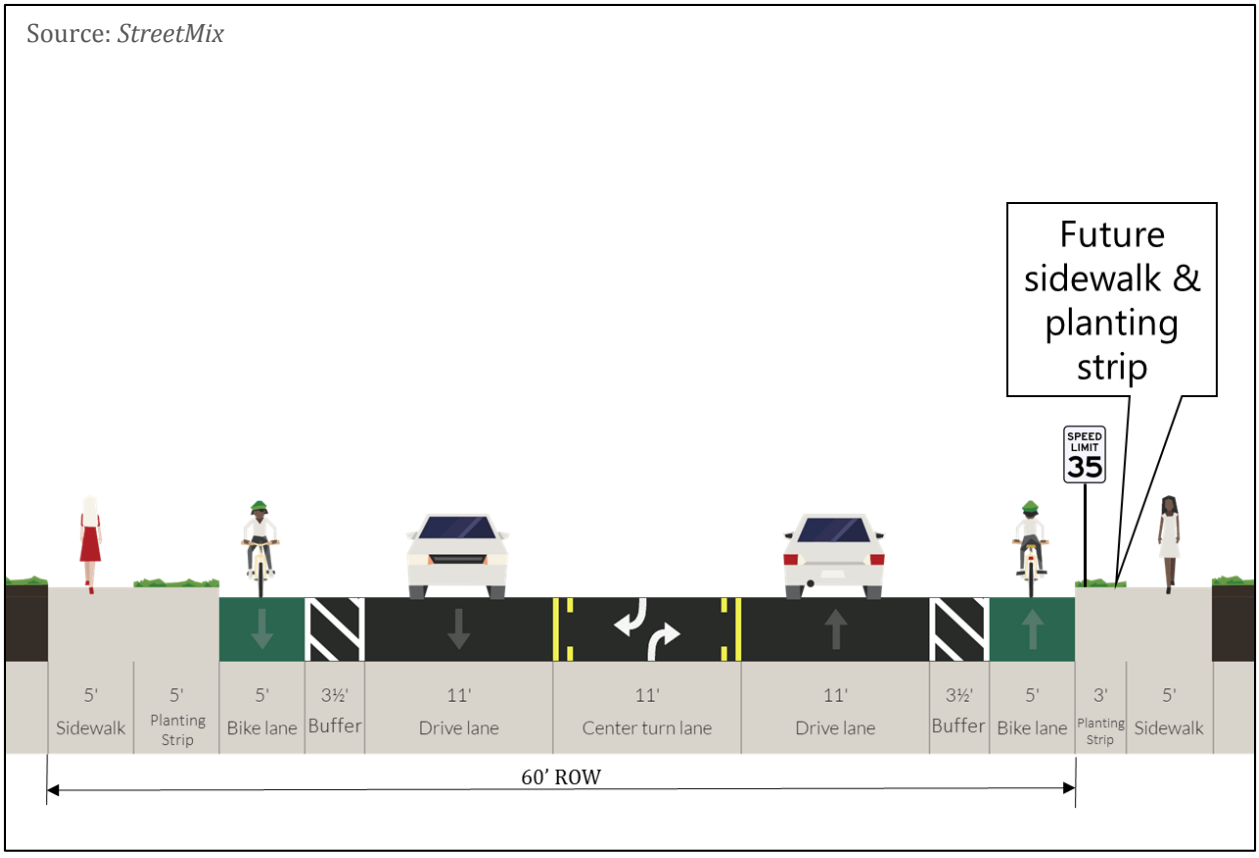


Figure 5-15 SR 28 Recommended Roadway Typical Section - 60' ROW

Short-Term

In the short-term (1-3 years), there is an opportunity to build a 10' shared-use path from the high school entrance of the schools, Tiger Trail, to the intersection of SR 28 and Main St. (SR 108). In the past, there was a railroad that traveled through this area and so there is ROW available for this shared-use path to be built. The recommended improvements for the short-term period can be seen in Figure 5-16.

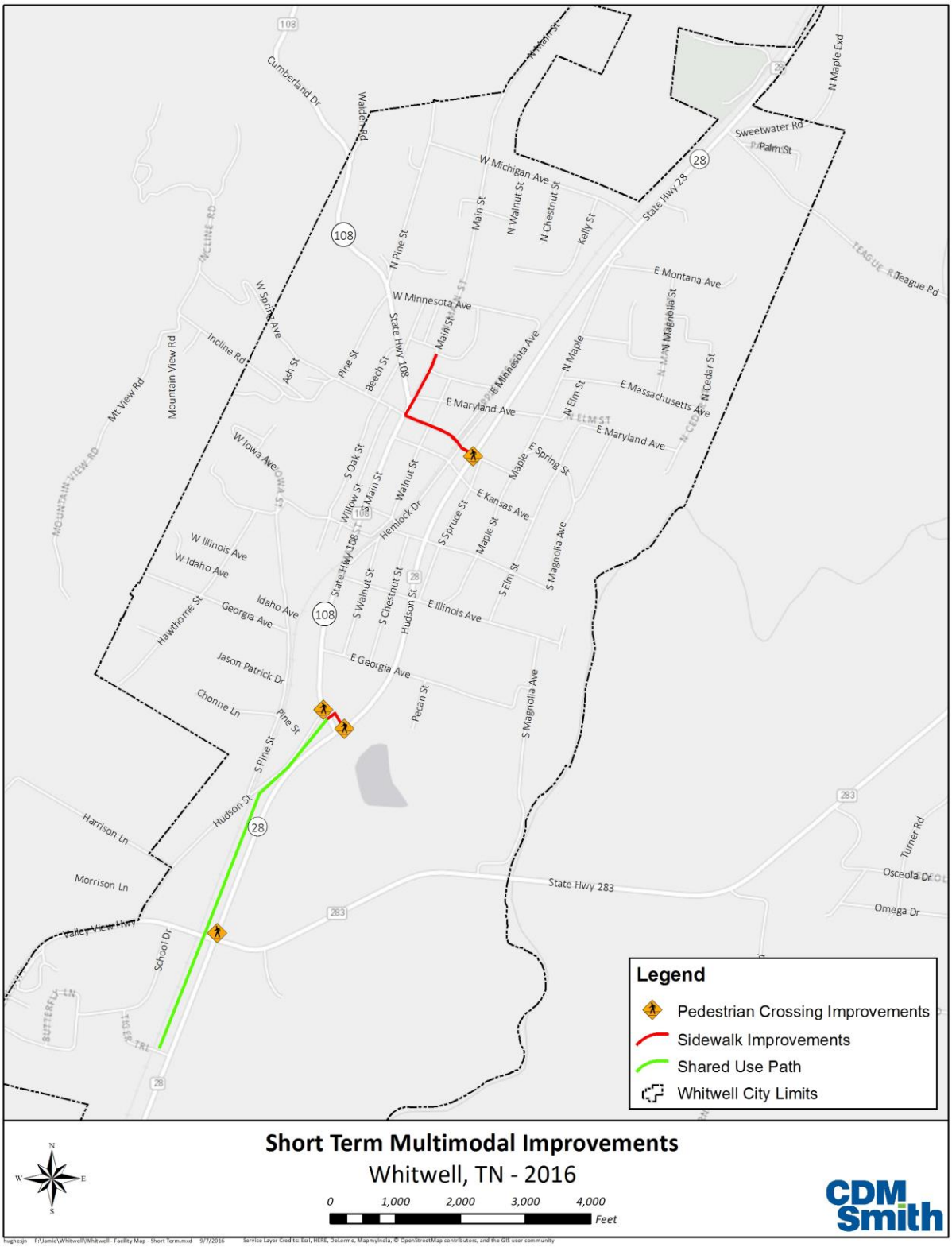


Figure 5-16 Short-Term Multimodal Improvements

Mid-Term

In the mid-term (3-7 years), the sidewalk along SR 28 would be completed and some or most of the buffered bicycle lanes would be completed. The roadways within Tennessee are typically resurfaced on a ten-year cycle, creating an opportunity for the buffered bicycle lanes and smaller vehicular lanes to be implemented throughout Whitwell. The planting strips and buffers could change in width depending on the amount of ROW available throughout the corridor. The key pieces of infrastructure are the sidewalk, bicycle lanes and vehicular travel lanes, so those pieces must be kept consistent throughout the corridor where possible. The improvements can be seen in Figure 5-17.

Figure 5-17 Mid-Term Multimodal Improvements

Long-Term

In the long-term (7+ years), the sidewalk and buffered bicycle lanes would be completed and ROW would begin to be acquired for sidewalk on the other portion of the roadway. As this sidewalk is built, pedestrian crossings can be completed to ensure safe crossing from one side to another. Other sidewalks could potentially be built throughout Whitwell to connect other portions of the city to SR 28. The pedestrian crossings should be built at all the intersections which are improved and include the appropriate signage notifying drivers of pedestrians and bicyclists, as well as proper lighting. The improvements can be seen in Figure 5-18.

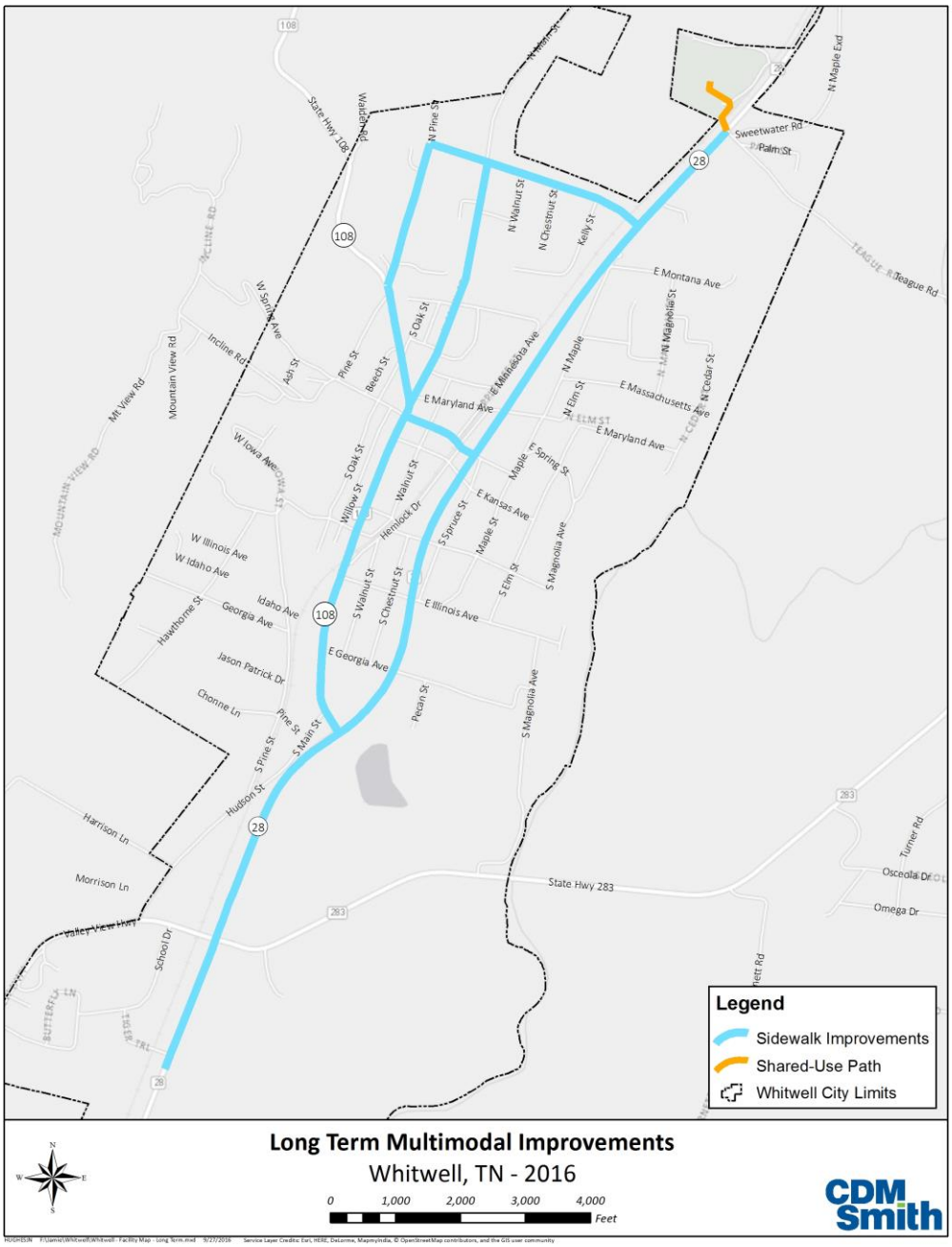


Figure 5-18 Long-Term Multimodal Improvements

Overall Improvements

The infrastructure improvements that have been recommended over the short, mid and long-term have been combined into an overall map shown in Figure 5-19 and Figure 5-20. The locations of pedestrian crossings, sidewalk improvements, buffered bicycle lanes, road re-channelization and park-and-ride are all located within this map. The residents would enjoy better connectivity with the bicycle lanes and sidewalks connecting the various destinations in the town. While the recommended improvements are primarily located on the SR 28 corridor, connecting Main St. (SR 108) and Spring St. to the SR 28 with sidewalks is also important due to the amount of origins and destinations on these roadways.

Another key infrastructure improvement are the numerous pedestrian crossings that are located along SR 28. In the short-term, one pedestrian crossing should be built, located at the intersection of SR 28 and Main St. (SR 108) as there are a significant amount of destinations in that area and thus pedestrian activity. The remainder of the pedestrian crossings are located at the intersections of the side streets and SR 28. They would allow for people to cross SR 28 in a safe and efficient manner. Currently, there is no infrastructure in place for this to happen so people must wait for vehicles to either stop and let them cross or the pedestrian must stand there and wait for there to be no vehicles. Neither of these options are safe and can lead to pedestrian incidents.

There are also improvements which are recommended to the roadway in order to make it pedestrian and bicycle friendly. For example, the vehicle lanes are currently 12’ in width; if these were to be reduced to 11’ then there wouldn’t be any significant impacts to the vehicles but would provide benefits to pedestrians and bicyclists by reducing vehicle speeds and shortening crossing distances. Also, if the roadway speed along SR 28 were to be reduced from 40 MPH to 35 MPH, this would slow the vehicular traffic traveling along the corridor and make it safer for people walking or biking. These improvements are recommended for the mid-term time period and would useful to complete if the roadway was resurfaced as it would allow for changes in the roadway configuration.

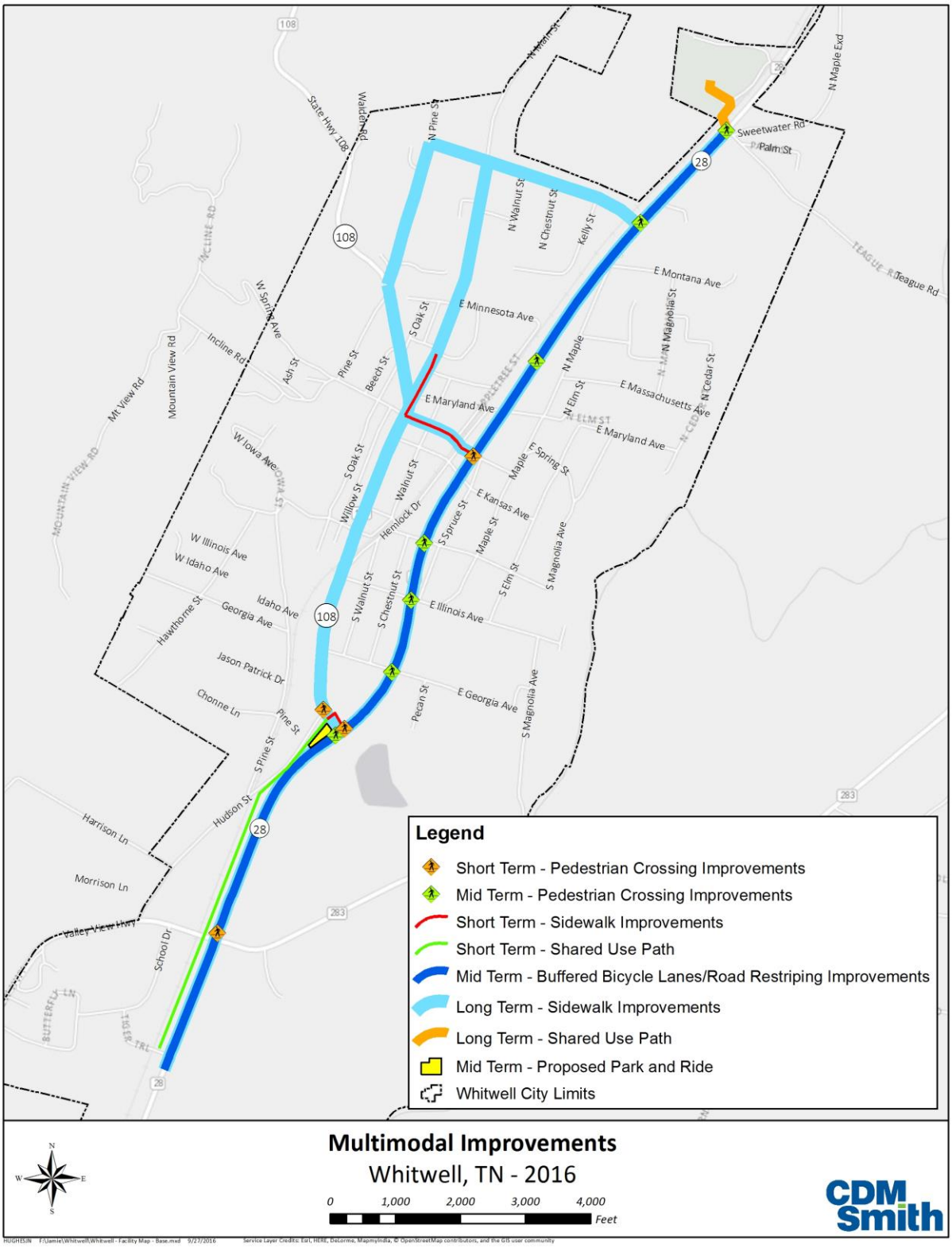


Figure 5-19 Recommended Improvements Timeline in Whitwell, TN

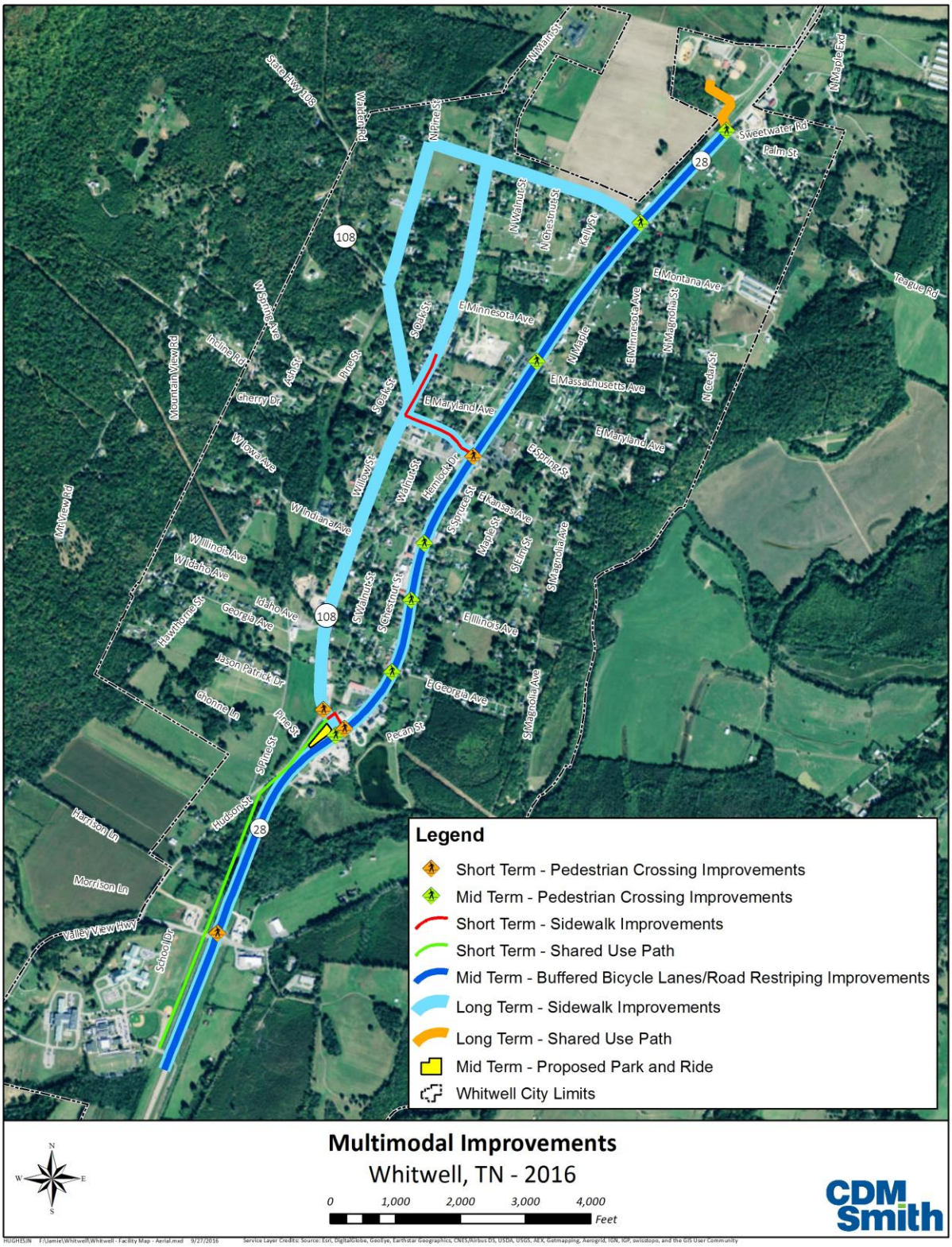


Figure 5-20 Recommended Improvements Timeline in Whitwell, TN (Aerial)

Multimodal Improvements Costs

While not all transportation infrastructure costs the same, multimodal infrastructure often costs less than other types of roadway infrastructure while still yielding significant benefits. From the improvements that are recommended in this section, the costs for them are detailed in the tables below based on the three time periods. The costs which were used to determine the total costs of the multimodal improvements are found in Table 5-1.

Improvement	Cost per Unit	Unit
Sidewalk 5' (1 side)	$300,000	Mile
Sidewalk 5' (1 side)	$500,000	Mile
Sidewalk 5' (2 sides)	$800,000	Mile
Shared-Use Path 12' (1 side)	$1,000,000	Mile
Buffered Bicycle Lane 8' (1 side)	$47,000	Mile
Pedestrian Crossing	$8,000	Each

Table 5-1 Improvement Cost Estimates

After speaking with TDOT staff, it was determined that there was no readily available information with costs of all the multimodal facilities that are listed within the recommendations.

A 5' concrete sidewalk was estimated to cost around $500,000 per mile for one side of the roadway and $800,000 for both sides of the roadway. When a sidewalk is constructed on one side of the roadway and then continued on the other, a cost estimate of $300,000 was used. The $500,000 and $800,000 cost estimates include drainage under the sidewalks while the $300,000 cost estimate includes minimal drainage structures. All 5' sidewalk cost estimates include construction of curb and gutter.

The bicycle lane estimate was taken from the recent FHWA report *Incorporating On-Road Bicycle Networks into Resurfacing Projects* and costs $32,000 per mile. The 5' buffered bicycle lane was estimated to cost $47,000 per mile in order to account for the extra paint necessary to create the buffer for the bicycle lane. The 12' shared-use path constructed with asphalt was estimated to cost around $1,000,000 per mile. The pedestrian crossing costs were estimated to be around $8,000 for signage and other high visibility markings. The facilities are estimated to include the complete costs for constructing and designing them to ADA standards.

The lengths of the corridor for each of the phases were estimated and can be found in Table 5-2.

Phase	Segment	Segment Boundaries	Length	Type of Improvement
Short	SR 28	Tiger Trail/SR 28 intersection to SR 28/Main St. intersection	4,740 ft.	5' Concrete Sidewalk
Short	Spring St.	SR 28/Spring St. intersection to Main St./Spring St. intersection	1,000 ft.	5' Concrete Sidewalk
Short	Main St. (SR 108)	Main St./Sprint St. intersection to Orena Humphrey Public Library	1,165 ft.	5' Concrete Sidewalk
Short	SR 28	Tiger Trail/SR 28 intersection	Entire intersection	Pedestrian crossing (Crosswalk)

Short	SR 28	SR 28/Spring St. intersection	Entire intersection	Pedestrian crossing (Crosswalk)
Short	SR 28	Tiger Trail/SR 28 intersection to SR 28/Main St. intersection	4,650 ft.	Shared-Use Path 12’
Mid	SR 28	Tiger Trail/SR 28 intersection to Marion County Veterans Memorial Park	14,480 ft.	Buffered 5’ Bicycle Lane (both sides)
Mid	SR 28	SR 28/Main St. intersection	Entire intersection	Pedestrian crossing (Crosswalk)
Mid	SR 28	SR 28/E Georgia Ave.	Entire intersection	Pedestrian crossing (Crosswalk)
Mid	SR 28	SR 28/E Illinois Ave.	Entire intersection	Pedestrian crossing (Crosswalk)
Mid	SR 28	SR 28/E Indiana Ave.	Entire intersection	Pedestrian crossing (Crosswalk)
Mid	SR 28	SR 28 (Area in front of Citizens Tri-County Bank)	Entire intersection	Pedestrian crossing (Crosswalk)
Mid	SR 28	SR 28/ W Michigan Ave.	Entire intersection	Pedestrian crossing (Crosswalk)
Mid	SR 28	SR 28/Teague Rd.	Entire intersection	Pedestrian crossing (Crosswalk)
Long	SR 28	School Dr./SR 28 intersection to Marion County Veterans Memorial Park	14,480 ft.	5’ Concrete Sidewalk
Long	Main St. (SR 108)	SR 28/Main St. intersection to Main St./Spring St. intersection	4,150 ft.	5’ Concrete Sidewalk
Long	Cumberland Dr.	Main St./Cumberland Dr. intersection to N Pine St./Cumberland Dr. intersection	1,500 ft.	5’ Concrete Sidewalk
Long	N Pine St.	N Pine St./Cumberland Dr. intersection to W Michigan Ave./N Pine St. intersection	1,825 ft.	5’ Concrete Sidewalk
Long	W Michigan Ave.	W Michigan Ave./N Pine St. intersection to SR 28/W Michigan Ave. intersection	2,800 ft.	5’ Concrete Sidewalk

Table 5-2 Masterplan Improvements and Segments

The improvements costs above were calculated in order provides estimates for each of the time periods in the recommendations. In order to simplify the cost estimates, they were all estimated based on a per mile basis.

Improvement	Cost per unit	Unit	Total Units	Construction Cost
Short-Term Period (0-3 Years)				
Sidewalk 5’	$500,000	Mile	0.90	$450,000
Sidewalk 5’	$800,000	Mile	0.19	$152,000
Pedestrian Crossing	$8,000	Each	2	$16,000
Shared-Use Path 12’	$1,000,000	Mile	0.88	$880,000
Mid-Term Period (3-7 Years)				
Buffered Bicycle Lane 8’	$47,000	Mile	2.74	$128,780
Pedestrian Crossings	$8,000	Each	7	$56,000
Long-Term Period (7-10+ Years)				
Sidewalk 5’	$500,000	Mile	1.95	$975,000
Sidewalk 5’	$300,000	Mile	2.74	$822,000

Table 5-3 Improvement Cost Totals

Time Period	Construction Cost	Preliminary Engineering (10%)	Contingency (20%)	Total Project Cost
Short	$1,498,000	$149,800	$299,600	$1,947,400
Mid	$184,780	$18,478	$36,956	$240,214
Long	$1,797,000	$179,700	$359,400	$2,336,100
Total				$4,523,714

Table 5-4 Total Project Costs

In Table 5-4, these costs are only for the infrastructure and do not include any right-of-way that may need to be purchased to construct the projects. Also, the costs for the mid-term and long-term time period have not been adjusted in terms of inflation factors. It should be understood that the figures from this table are general planning level costs and are subject to change.

5.9 Potential Funding Sources

One of the most difficult challenges today when planning any transportation project is finding sufficient funding in order to complete them in a timely manner. This section contains a review of the various federal, state and local funding sources that are available for implementing transportation and multimodal improvements within the City of Whitwell, TN. The focus has mainly been around funding that can allow for multimodal improvements such as sidewalks, bicycle lanes, shared-use paths and other infrastructure.

TDOT Multimodal Access Grant Program

The TDOT Multimodal Access Grant Program was "created to support the transportation needs of transit users, pedestrians and bicyclists through infrastructure projects that address existing gaps along state routes". The City of Whitwell received a portion of the funds from this program in order to construct a sidewalk along SR 28 in 2015, so there is potential for more funding from this program. Currently, the program is not funded for FY2017 but could potentially be a useful resource in the future if more funds are approved.

TDOT Transportation Enhancement Grant

In addition to the Multimodal Access Grant, TDOT also accepts applications for their Transportation Enhancement Grant program. These applications are designed to fund 80% of the costs to build sidewalks, greenways, downtown revitalization and historic transportation structure rehab. While the multimodal access grant has funded the first phase of the four phases of sidewalk in Whitwell, this program could potentially provide additional funding for the other three phases.

TDOT Spot Safety Improvement Program

This program is designed to make improvements on state routes or at an intersection of a state route, and for municipalities that have a population of less than 5,000 people. One notable aspect of this program is that it will cover 100% of the cost of installing flashing beacons near a school area. This is an opportunity for the schools in Whitwell to improve the safety for any children that may need to cross SR 28.

Tennessee Department of Economic & Community Development (TDEC) – ThreeStar Program

This department provides funding from its ThreeStar Program and "is designed to help communities build a healthy and educated workforce supported by a strong and stable local government that provides security and safety and promotes county progress in the areas of economic development, responsible fiscal management, public safety, health and education." There are grant amounts of $10,000 for smaller projects such as bicycle racks, signs or other small infrastructure improvements.

USDOT Safe Routes to Schools Program (SRTS)

The SRTS program provides federal funding "to improve safety for children and the community and provide opportunities to increase physical activity". Improvements like bicycle lanes and sidewalks could be funded by this program if they would provide a safe alternative for students to travel to school. A sidewalk was built in Nolensville in 2007 using SRTS funds, so it could be possible for Whitwell to apply for this as well. This could allow for the schools in Whitwell to participate in the National Walk to School Day, which is usually on October 5th every year.

Within the National SRTS program, there are "mini" grants that are given out to recipients every year. In 2015, there were 25 total and each received $1,000 in order "to support educators, communities and families in encouraging children to safely bike to school." It's unclear if this funding was made available in 2016, but it could be a potential source of funding to kick-start participation in the national Walk & Bike to School Day for the schools in Whitwell.

Public Health Agency Partnerships

Another potential funding source could come from partnerships or grants from public health agencies. It's becoming more common for these departments to assist with funding of multimodal transportation projects like sidewalks or bicycle lanes as it allows for people to more easily use these modes instead of vehicles. This increased usage allows for people to become more active and thus fits with their overall department goals.

The Tennessee Department of Health has a grant funding program called Project Diabetes that can allow for funding of some infrastructure. It's awarded on a three-year cycle and the next round of projects will be held in 2019. The program is designed to fund "innovative primary prevention projects to halt the increasing rate of obesity in Tennessee". The City of Whitwell could apply for funding from this program in order to assist with building infrastructure for pedestrians and bicyclists if it were to show that a significant amount of people would use the newly built facilities.

5.10 Economic Impact Analysis

The health of a city is often dictated by the state of its economy. There are often positive economic benefits from the development of infrastructure in an area and these benefits vary by the type of improvements that are built. Multimodal infrastructure, such as sidewalks and bicycle lanes, have the ability to bring with them a different variety of economic benefits in comparison to roadway improvements. Some of these benefits are felt more directly, such as money that is saved due to a reduction in transportation costs. On the other hand, health benefits due to increased physical

exercise are felt more indirectly and may take longer to be realized in comparison to something that is more directs.

Economic Benefits

Multimodal infrastructure can provide direct economic benefits to an area and help to stimulate the businesses near them. A report from Advocacy Advance titled "Bicycling means Business: The Economic Benefits from Bicycle Infrastructure" detailed how bicycling infrastructure has benefits for states and cities by providing tourism dollars, as well as jobs to support the industry. In Memphis, TN, there was a network of bicycle lanes installed in an arts district. The businesses in the district was reported as having 16 new businesses and 29 renovated areas, part of which was directly attributed to the new bicycle lanes. Multimodal infrastructure, such as sidewalks and bicycle lanes can also lead to an increase in property values in the nearby properties where they are built.

Fewer Vehicle Trips

One significant impact which could occur from the implementation of the recommendations within this plan is the potential for fewer vehicle trips to be taken by people when traveling throughout Whitwell. With sidewalks and bicycle lanes available, it could allow for trips to the park, schools, churches or various stores to be taken instead by walking or a bicycle. This gives people the opportunity to save money on transportation costs if they were able to do that on a regular basis. While transportation costs are lower than they have been in previous years, specifically the cost of gasoline, this trend may not hold true for the coming years and investing in other types of transportation infrastructure now could be beneficial.

Health Benefits

Another impact from the multimodal improvements from this plan are that they could provide positive health benefits for people due to increases in physical exercise. In section 3.2, we note that the rise in BMI for students in the Whitwell High School has changed dramatically between 2013-2015 while the elementary and middle school are fairly consistent with the rates in Marion County, TN. Rises in obesity and other diseases have been causing serious health concerns throughout the US in recent decades. Moderate increases in physical activity can lead to significant health benefits for people. These recommendations can provide benefits for anyone if they were to use the bicycle lanes or sidewalks often, but children, seniors and parents are three groups that stand to gain substantial health benefits.

Seniors

For seniors, access to facilities that allow them to exercise and stay physically fit are important for maintaining their overall health. Bicycle lanes and sidewalks are two types of multimodal facilities that provide the opportunity to exercise, but also to connect the area around them. Having sidewalks and bicycle lanes connect to the Whitwell Senior Citizens Center gives the seniors there a chance to walk around the city and possibly to the pharmacy or doctor's office. In addition, it is important for seniors to have social activity and not be dependent on others for a ride to visit friends, the senior center, parks, the doctor etc. Sidewalks and bicycle lanes at least provide an additional transportation option for these groups.

Children & Parents

Much like seniors, children have the opportunity to benefit greatly from the increased availability of multimodal transportation options. Being physically active at a young age can lead to significant health benefits later in life as an adult and thus reducing their overall health costs as well. The bicycle lanes and sidewalks could provide a way for the students to travel to the school, parks and activities and then return home without being driven to each of these destinations. The parents of the students would benefit as well because they would no longer need to drive them around as often. This means the parents require less time in the car and sitting down, which has been linked to significant health issues (Pronk, Katz, Lowry, & Payfer, 2011).

Learning Benefits

In addition to the health benefits that stem from increased exercise, people benefit by having increased cognition and thus have the potential to perform better in school. This would be particularly important for young children in school and could provide significant benefits to them in later years. Increased walking or bicycling would certainly be an effective method for increasing physical activity for children.

Tourism

While Whitwell is a small city, there are a number of locations and communities that draw people to visit the area. The multimodal recommendations from this plan have the potential to lead to some short term benefits by the way of increased tourism to the city of Whitwell. A city which is more walkable or bikeable may lead others to visit and experience the area due to the ease of traveling throughout the city. Also, the businesses in the area could see benefits if there were an increase in the amount of people visiting the town. The following are examples of groups in Whitwell that have the potential to draw tourists to the city or are potential areas of growth in the future years.

Children's Holocaust Memorial

In 1998, students at Whitwell Middle School were working on a project that centered around the Holocaust and tolerance. The students began to collect paper clips in order to try and understand the sheer scale of the Holocaust and eventually these were kept in a railcar that had been used during the Holocaust. This railcar was donated to Whitwell Middle School and is one of the main attractions for Whitwell. The railcar was thus turned into the Children's Holocaust Memorial and is situated on the Whitwell Middle School campus.

Coal Miner's Museum

This museum is located in the northern portion of Whitwell and showcases the history of the coal industry within Whitwell. The purpose of the museum is "to collect, catalog and display as many of the coal mining artifacts as possible from the mines and miners of our county." The coal industry within Whitwell was a major economic driver in the past decades and thus affected how the city grew. Changes in the coal industry over time led to the mines being closed and abandoned in Whitwell, thus eliminating this industry for the city. This museum's purpose is to document that history of the town and how it grew over time.

Buttonwillow Civil War Dinner Theater

Whitwell has strong ties to its local history and the Buttonwillow Civil War Dinner Theater is a perfect example of this connection. Located within the Historic Old Buttonwillow Church, this theater gives shows throughout the year and are based on a fictional story that takes place during the Civil War era. The fictional story draws upon real world accounts from memoirs and journals in order to develop it with a historical accuracy. This theater is mentioned in many tourism documents that highlight the attractions in Tennessee. Specifically, the Pie in the Sky Guide lists this attraction, along with others, and shows that there are things which can draw people into Whitwell.

Hang Gliding Community

Within the Sequatchie Valley, there is a strong hang gliding community that uses the surrounding mountains to launch from and land in nearby areas within the valley. There are multiple areas within Whitwell where the hang gliders launch and then land around the city. This community meets regularly and shows that the natural environment of Whitwell can lead to developing attractions that help the economy of Whitwell.

Cycling Community

While cyclists are not currently a significant group or community within Whitwell, they could be considered an economic development opportunity if bicycle lanes and sidewalks were to be built throughout the city. Doing so could indicate to bicyclists in the surrounding areas that this is an area to ride and visit. It could also connect to other trails and roadways in the mountainous areas that cyclists wish to ride through and visit. It could also make it easier for TDOT to implement or establish part of the "Fall Creek Falls" route from the State Highway Bicycle Route map that is shown on Figure 3-14.

5.11 Performance Measures

There are numerous types of performance measures which can be used to understand projects when they are implemented, and many are detailed by the Federal Highway Administration (FHWA) in their guidebook *Developing Pedestrian & Bicycle Performance Measures*. These measures can provide some insight if newly constructed multimodal infrastructure is successful or how much of an impact it might have on the environment. Three common performance measures which are used for roadways are the number of crashes in an area, the level of service and overall volume of a roadway. Utilizing these types of performance measures can provide comparisons with different roadway projects and their success. Also, the familiarity with these measures means they can be more widely understood. Finally, the amount of overall pedestrian/bicycle space is another important performance measure which can highlight the space dedicated for these modes of transportation.

Crashes

This performance measure is defined as the number and severity of crashes, over a specific period of time for different modes of transportation. Crash information should be able to be gathered from TDOT and compared to historical rates in order to determine how well the new infrastructure helps improve safety.

Level of Service (LOS)

LOS is a measure that looks at the quality of service on a street or corridor for a particular mode of transportation. For bicyclists and pedestrians, this measure gives a good indication of the comfort for these users. LOS ranges from A through F, with A providing high quality service and F providing rather low quality service. Typically, if there are bicycle lanes and sidewalks then this will indicate a better bicycle or pedestrian LOS score such as a "B" or "C".

Pedestrian Space

This performance measure looks at the amount of space in an area or city that is dedicated for pedestrians to use and compares it to some specific "standard" to determine if there is more or less pedestrian space than average. The space dedicated to parks, plazas, sidewalks and median refuges are often considered to be within the pedestrian realm. One way to measure pedestrian space would be to dictate that a 5' sidewalk is considered the standard for Whitwell and then measure the current sidewalks to see how much they underperform.

Volume

The amount of pedestrians or bicyclists using a facility is an important indicator that can demonstrate a facility's success over time. By measuring these users, the City could determine which times throughout the year people are using the facility in order to better plan and understand when people are using them. This measure also can be helpful when applying for infrastructure and program grants to demonstrate that people use these facilities when they are provided.

There are different procedures for counting bicyclists and pedestrian on a sidewalk or bicycle lane, but the most common comes from the National Bicycle and Pedestrian Documentation Project. Bicyclists and pedestrians are counted on several days each year for a specific amount of time in order to better understand the number of users. Utilizing this data, bicycle and pedestrian counts are estimated for the remainder of the year for these locations which were counted. While this methodology is used nationwide, there are concerns with using it in Whitwell. For example, there may not be enough data collected during that time period to properly estimate the pedestrian and bicyclists which will use the new facilities. Also, as was mentioned earlier, this methodology can be costly due to the amount of time needed for data collection and processing. This activity is typically conducted by volunteers to keep costs down. Another option instead of using a formal methodology, would be to monitor bicycle and pedestrian efforts such as the National Safe Routes to Schools Day and count how many people are involved.

5.12 Future Efforts

While these recommendations could provide numerous benefits to the people in Whitwell, there needs to be efforts by the Whitwell city staff and other local leaders to ensure that these multimodal improvements are implemented.

Local Team

There should be a local team or group that seeks updates and progress reports on any construction happening from these improvements to ensure they are being monitored. Also, there needs to be efforts to seek more funding opportunities in order to implement the recommended multimodal

improvements. While section 5.9 does contain many potential programs for providing funding, it is always possible that new funding opportunities are created and thus should be researched.

Partnerships

There should also be efforts to coordinate with local health agencies as these recommended multimodal improvements could provide significant health benefits to people. This would provide better options for people to better their overall and would certainly be of interest to any public health agency.

Bicycle and Pedestrian Monitoring

In section 5.11, there were multiple performance measures which were discussed as possibilities for measuring the success of implementing multimodal improvements. Monitoring the volume of people using a newly built sidewalk or bicycle lane is one such performance measure. One way to do this would be during the National Safe Routes to School day. The children in Whitwell could participate in this event by walking to school that day and the number of them could be counted. After a portion of these recommendations are implemented, such as the sidewalk along SR 28, it may be possible for this event to take place within Whitwell. While this is not a perfect measure for understanding the overall volume of people using a sidewalk or bicycle lane, it does provide strong insight.

Another effort which would be useful for the city of Whitwell to participate in would be the National Bicycle and Pedestrian Documentation Project (NBPD). This national initiative calls for agencies to record bicycle and pedestrian traffic for certain hours throughout the year. By doing this, it allows for agencies around the nation to compare bicycle and pedestrian traffic with one another. It would be important for the city to monitor how many people use the shared-use path that is set to be built so they understand who uses it and when. Also, it would be useful because when the entire corridor is completed there may be more people using the shared-use path, so there would be a need to compare traffic.

The main reason why there should be monitoring of bicyclists and pedestrians is so that the city can understand how many people are using the infrastructure, which will help understand how successful the grant was in providing alternative transportation options for people in Whitwell.

6 Summary

There is currently a lack of multimodal transportation options in Whitwell, which creates unsafe conditions for people walking or bicycling to their destinations in the city. As a result, people must use a vehicle for traveling to these destinations safely. The demographics of the area show that there is an aging population, which require specific transportation needs which aren't met with the current transportation options. There are also health and economic concerns within Whitwell. With BMI rates rising in the High School, a large percentage of the students in the schools partaking in free/reduced lunch and 30.7% of people considered to be in poverty status, there is a significant need for additional transportation options. There is a need for additional transportation options which are cheaper, as well as opportunities for people to exercise and better their overall health.

Additional sidewalks, buffered bicycle lanes, reduced speed limits, and road restriping along with resurfacing and are all components of the multimodal infrastructure recommendations. The infrastructure improvements are recommended to be completed over time. During the short term, it's recommended that a sidewalk or shared use path be built from the Whitwell schools to the intersection of SR 28 and Main St. (SR 108). During the mid-term, the buffered bicycle lanes and pedestrian crossings should be constructed throughout SR 28, as well as the additional sidewalk to the Marion County Veteran's Memorial Park and to the public library. Finally, in the long term, additional sidewalks should be built throughout Whitwell in order to connect more origins and destinations.

These multimodal infrastructure recommendations would allow for people to use other transportation options like bicycles, scooters, walkers, wheelchairs or to simply walk in order to travel to their destinations. They would provide additional safety for those who are traveling around Whitwell, as well as significant health benefits.

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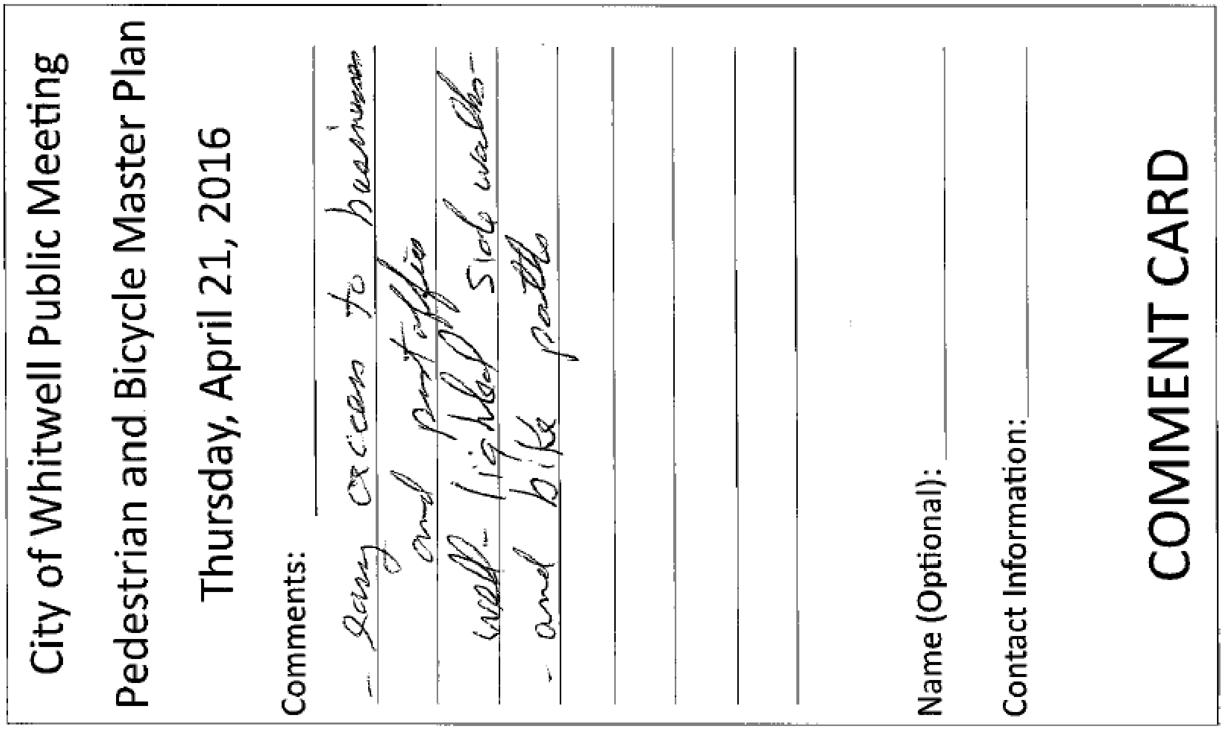
8 Appendix A: Public Meeting Information

Figure 8-1 is an example of the comment card that was given to participants to provide the CDM Smith team with information and comments about their thoughts on the Whitwell Bicycle & Pedestrians Masterplan.

Figure 8-1 Whitwell Public Meeting Comment Card

The following figures are the comment cards which were provided to the CDM Smith team at the Whitwell Public Meeting.



City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

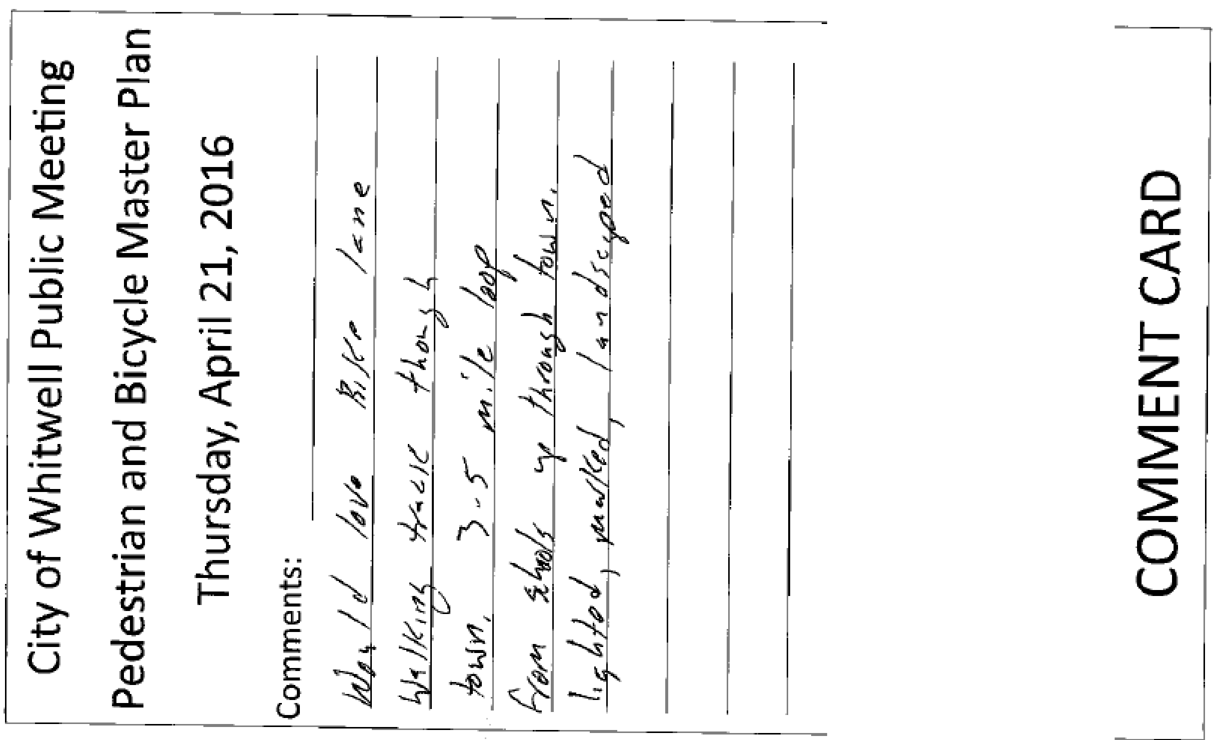
Thursday, April 21, 2016

Comments: - easy access to businesses and post office - well lighted side walks - and bike paths

Name (Optional):

Contact Information:

COMMENT CARD



City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: Would love bike lane walking track through town. 3.5 mile loop from schools up through town. lighted, marked, landscaped

COMMENT CARD

City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: I think sidewalk should go on east side - more ground for sidewalk to be built on ~~and~~ not sure how sidewalk will go on west side w/the some houses right on ROW and road. It would go from schools to park + need two safe crosswalks at school + park Bike lane + sidewalk should be

COMMENT CARD

City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: I enjoy running & prefer to run a 4-5 mile route vs. in circles on a track. However, I do not feel safe running on streets with no sidewalks.

COMMENT CARD

City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: THIS WOULD BE A GREAT ADDITION TO A PROGRESSING WHITWELL COMMUNITY. THE SIDEWALK SEEMS TO PROMOTE SAFER PEDESTRIAN TRAVEL. IT WOULD ALSO CONTRIBUTE TO AN OVERALL, HEALTHY LIFESTYLE.

COMMENT CARD

City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: Would like landscaping and lighting also — to beautify city

COMMENT CARD

City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: As a 5x's a week runner through Whitwell at 5:00 am, a sidewalk would add to my safety. In cities that I have ran in with sidewalks, the sidewalks were extremely busy! (with walkers) joggers This is so needed.

COMMENT CARD

City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: I'm excited to be a part of this project, I would like to see a sidewalk for walking and a designated bike lane. The sidewalks should connect the schools to the park. The path needs to be well lit as well.

COMMENT CARD

City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: I would love to see the old railroad track turned into a cycle / pedestrian park connecting Whitwell to Dunlap

COMMENT CARD

City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: For easier safer access path would seem best routing thru. 28
Separate bike & walk path
Both go from schools to park

COMMENT CARD

City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: Concerns

- stripping down
- utility poles
- sewer / excess drainage
- existing curbs
- lease law
- speed limit

COMMENT CARD

City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: Concerns

- Uturn(s)
- Safety Project 108
- turning at 108 intersection
- ~~X~~ Harden's crossing for 6' paths
- Busy Saw A-lot traffic

COMMENT CARD

City of Whitwell Public Meeting

Pedestrian and Bicycle Master Plan

Thursday, April 21, 2016

Comments: Would love to see a beautification project that transforms our "wide place in the road" look into a town with comfortability through-out & between the park & high school area — Give an appealing look to draw new business into Whitwell.

COMMENT CARD

The comment cards listed above were written by the public who attended the Whitwell Public Meeting. The names and phone numbers were removed in order to protect their privacy.

9 Appendix B: Local Newspaper Articles

Whitwell sidewalk/bike path public hearings begin

By Marilyn Frazier
Special Correspondent to
The Jasper Journal

Brandy Cookston, Adam Ivory, and Martin Guttenplan along with Stacy Morrison, and other representatives from the Tennessee Department of Transportation (TDOT) had one meeting after another with Business Owners, School officials, Whitwell's Park Board, representatives from the library, Sequatchee Valley Saddle Club, and Senior Center to discuss pros and cons of the Bicycle

Jasper Journal/Marilyn Frazier
Officials answer community questions about the grant.

Pedestrian Plan that is to start at the Whitewall High School and continue to the Whitwell City Park. They began the day at the Western Sizzlin' and ended at Whitwell City Hall. The goal of the Corridor is to improve safety and accessibility, create a safe route to schools and the park, provide transportation choices, make the community more livable with complete streets, develop a sense of place and focus on the community identity, and a lot more. I attended the last meeting with the park board, the library

SEE **PATHWAY** PAGE 3

2016 National Safe Boating Week, May 21 through May 27

The 2016 National Safe Boating Week is May 21 through 27, and the Tennessee Wildlife Resources Agency will be participating to promote the wear of life jackets as the summer boating season begins.

The Wear Your Life Jacket to Work Day was Friday, May 20, with the goal of demonstrating how easy it is to wear a life jacket. Participants wore a life jacket to work, demonstrating how easy it is to wear one, even while at work. Those who wear a life jacket to work are asked to have a photograph taken and email it to tennesseewearit@gmail.com. Group photos are also welcome.

Jasper Journal/Robert Keahey
The staff of Marion County Newspapers has a little fun with a serious safety reminder.

Saturday, May 21, was Ready, Set, Wear It! day, which is now in its seventh year trying to bring awareness

SEE **BOATING** PAGE 3

Coke Ovens Bluegrass Festival
The Coke Ovens Bluegrass Festival will be held in Dunlap June 3 and 4. PG 14

INSIDE TODAY

Opinion	page 4	Vitality	page 12
Tributes	page 7	Classifieds	page 16
Society	page 11	Business Ads	page 18

OUTSIDE TODAY

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growth boundary," she continued, "We don't want to annex because we're doing well to police what we got."

The next meeting will be

approve digital game systems and educational software, which passed without dissent. The balance of the remaining funds will still need to be allo-

quirement for sprinkler systems citing, if nothing else, there would be a considerable strain on the city's current water supply

Don Ridge.

The Whitwell Police Department cordoned off the building in anticipation of

of boarding the building closed. As of noon on Thursday, May 19, though widely reported that there

Jerry Don Ridge's services were held Sunday, May 22 at First Baptist Church of Whitwell.

BOE: Fiscal best practices looked at

From Page 1

"The consent agenda is more for…approval of coaches, classroom curriculum and things." Case allowed for the possibility that there had been changes in the state law that allowed such matters to be included in the consent agenda, but asked that it be confirmed for future votes. No members seemed opposed to the confirmation for future meetings.

There was some confusion regarding the service provider agreement for mandated school-based rehabilitative services. The school district as a whole was providing the contract to one local provider while the Marion County High School football boosters program is providing a similar service to a different local provider, however the board has to approve that agreement. No money from the district's budget was involved in that agreement.

Hooper expressed concern over the actual availability of summer field trips to all students regardless of the socio-economic wherewithal of the students. Additionally, the exclusionary requirement of attending some of these summer camps affected some students in the school year. "I know the law says, 'You don't have the money, you can still participate,' but I also understand the reality you've got to have the money from somewhere." Griffith said, "I can say this about when I relay the message to the principals, I think they understand that no child will be excluded for financial reasons."

The board selected to keep the same-day schedule for all three high school graduations for next school year. They unanimously approved May 20, 2017 with South Pittsburg's graduation at 10 a.m., Marion County High School at 12 p.m. and Whitwell High School commencement at 2 p.m.

Also included in the consent agenda was the approval to release request for proposal for the demolition of the Old Jasper Elementary School Building. Many years ago, asbestos was found in the entire building from when it was built. Subsequent conversation with Dr. Griffith clarified specifically what is being requested. "The 'front building,' that runs closest to Betsy Pack is what we're looking at taking down. The front part has been [stirred up] while we've not disturbed the tile in the back building so we're going to keep the storage and offices that we have in that back building for the time being and clean the lot up and do some cosmetic work to the outside of that back building to improve the curb appeal in the neighborhood."

The next board meeting will be June 21 at 4:30 p.m. at the district offices at 204 Betsy Pack in Jasper.

Pathway:

From Page 1

group, BJ for the Seniors, Stacy Terry, City Manager, Tina Green City Recorder, Commissioner, Linda Hooper, Wendell Sweeton, Rockie Brown for the Park Board, Polly Copeland with Orena Humphreys Library, and city commissioner Steve Atterton. It was very informative.

The first phase will be funded by a grant from TDOT. It is specially designed for smaller communities like Whitwell. Another purpose is to get folks out walking and motivating for their health and well-being. I personally being, a "Whitwellite", would like to see connectivity brought to town. Since everything has moved to Highway 28, I would like Whitwell to look like a town not just a series of strip malls. (This is my personal point of view.) This first phase will start at the high school and stop at Highway 108 where the old road goes through old town and up the mountain.

The plan is to give people like students, workers, older adults, and people without cars an alternative safe path to reach different destinations in Whitwell. Of course there are a lot of potential challenges to solve but with the input coming from Whitwell residents and businesses the future plans are in our favor. We are in the planning phase right now and I've heard inklings it may be 2 years before we will see construction. Brandy is going to give the library and city hall aerial photos of the plan. Please make an effort to come by and voice your opinion on the plan.

10 Appendix C: ARTPLAN Analysis Results

The ARTPLAN2012 software was used to conduct the LOS corridor analyses for the SR 28 corridor within Whitwell, TN due to its ease of use and methodology stemming from TRB's Highway Capacity Manual (HCM) 2010. ARTPLAN2012 allows a user to estimate a corridor's LOS using the HCM 2010 methodology and thus produce reliable and simple results. All LOS grades are based on the roadway users' perception and expectations.

ARTPLAN2012 uses a two class system for roadways in order to determine their LOS results. Class 1 roadways are roads with speed limits of 40 MPH or faster and class 2 roadways are roads with speed limits of 35 MPH or lower. In the existing conditions LOS analysis of SR 28, the corridor was considered to be class 1 due to the speed limit of 40 MPH. One aspect of the recommendations is to reduce the speed limit to 35 MPH, which then changes the categories for converting the average travel speed to a letter grade LOS score. In the Bicycle & Pedestrian/Multimodal Corridor LOS Analysis section, it was noted that while the results from the fully implemented plan yielded a slightly lower average automobile speed, the LOS was graded higher than the existing conditions score of C. The lower average speed with the plan being fully implemented allowed for the automobile LOS to be considered LOS B. This reflects a change of expectation of drivers based on the lower speed environment. The scoring categories can be seen below in Figure 10-1, which was taken from the ARTPLAN2012 program.

The bicycle, pedestrian and transit (bus) LOS does not change based on whether the roadway is class 1 or 2 as it uses a different LOS scoring formula.

The SR 28 existing conditions LOS analysis, as well as the LOS analysis for when the proposed multimodal recommendations have been implemented can be found on the follow pages.

Segment & Arterial LOS

The **Segment** LOS is based on the combination of travel time delay due to the signal control and the speed traveled below the free-flow speed for each segment. The **Arterial LOS** represents the average LOS across all segments. The chart below shows how the LOS is related to the average speed of a Class 1 or Class 2 arterial. Class 1 arterials have a posted speed greater than or equal to 40 mph, while Class 2 arterials have a posted speed less than 40 mph.

	Class 1	**Class 2**
	Average Speed (mph)	Average Speed (mph)
A	> 40	> 28
B	> 31 and ≤ 40	> 22 and ≤ 28
C	> 23 and ≤ 31	> 17 and ≤ 22
D	> 18 and ≤ 23	> 13 and ≤ 17
E	> 15 and ≤ 18	> 10 and ≤ 13
F	< 15	< 10

Note that if the d/c ratio for any intersection exceeds the value of 1/PHF, the arterial LOS is automatically set to "F", and the arterial speed will be set to the same speed as the lowest segment speed.

Figure 10-1 ARTPLAN2012 Auto LOS Scoring Categories

Existing Conditions LOS Analysis

ARTPLAN 2012 Conceptual Planning Analysis

Project Information

Analyst	Nathan Hicks	Arterial Name	SR 28	Study Period	Standard K
Date Prepared	7/11/2016 12:19:04 PM	From	School Drive	Modal Analysis	Multimodal
Agency	CDM Smith	To	Spring St	Program	ARTPLAN 2012
Area Type	Transitioning/Urban	Peak Direction	Northbound	Version Date	12/12/2012
Arterial Class	1				

File Name	C:\Users\hicksna\OneDrive - CDM Smith\Whitwell Pedestrian and Bicycle Master Plan\MasterPlan\SR 28 - Whitwell.xap
User Notes	This analysis is for SR 28 within the city of Whitwell.

Arterial Data

K	0.09	PHF	1	Control Type	FullyActuated
D	0.65	% Heavy Vehicles	6	Base Sat. Flow Rate	1950

Automobile Intersection Data

Cross Street	Cycle Length	Thru g/C	Arr. Type	INT # Dir.Lanes	% Left Turns	% Right Turns	Left Turn Lanes	Left Turn Phasing	# Left Turn Lanes	LT Storage Length	Left g/C	Right Turn Lanes
SR 283	120	0.44	3	1	5	28	Yes	Protected	1	320	0.15	No
SR 108	120	0.44	3	1	15	0	No	None	N/A	N/A	N/A	No
Spring St	120	0.44	3	1	16	5	Yes	Protected	1	115	0.15	No

Automobile Segment Data

Segment #	Length	AADT	Hourly Vol.	SEG # Dir.Lanes	Posted Speed	Free Flow Speed	Median Type	On-Street Parking	Parking Activity
1 (to SR 283)	1560	5720	335	1	40	45	Non-Restrictive	No	N/A
2 (to SR 108)	3100	5720	335	1	40	45	Non-Restrictive	No	N/A
3 (to Spring St)	3950	9120	534	1	40	45	Non-Restrictive	No	N/A

Automobile LOS

Segment #	Thru Mvmt Flow Rate	Adj. Sat. Flow Rate	v/c	Control Delay	Int. Approach LOS	Queue Ratio	Speed (mph)	Segment LOS
1 (to SR 283)	318	1571	0.460	23.75	C	0.04	22.02	D
2 (to SR 108)	335	1284	0.593	26.49	C	0.00	28.34	C
3 (to Spring St)	449	1618	0.630	27.09	C	0.59	30.25	C

Arterial Length	1.6511	Weighted g/C	0.44	FFS Delay	84.26	Threshold Delay	0.00	Auto Speed	27.68	Auto LOS	C

Automobile Service Volumes

Note: The maximum normally acceptable directional service volume for LOS E in Florida for this facility type and area type is 1000 veh/h/ln.

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1					
2					
3					
4					
*					
Lanes	**Hourly Volume In Both Directions**				
2					
4					
6					
8					
*					
Lanes	**Annual Average Daily Traffic**				
2					
4					
6					
8					
*					

Multimodal Segment Data

Segment #	Outside Lane Width	Pave Cond	Pave Shldr /Bike Lane	Side Path	Side Path Separation	Side walk	Sidewalk Roadway Separation	Sidewalk Roadway Protective Barrier	Bus Freq	Passenger Load Factor	Amenities	Bus Stop Type
1 (to SR 283)	Wide	Typical	No	No	N/A	No	N/A	No	0	0.4	Fair	None
2 (to SR 108)	Wide	Typical	No	No	N/A	No	N/A	No	0	0.4	Fair	None
3 (to Spring St)	Wide	Typical	No	No	N/A	No	N/A	No	0	0.4	Fair	None

Pedestrian SubSegment Data

	% of Segment			Sidewalk			Separation			Barrier		
Segment #	1	2	3	1	2	3	1	2	3	1	2	3
1 (to SR 283)	100			No			N/A			No		
2 (to SR 108)	100			No			N/A			No		
3 (to Spring St)	100			No			N/A			No		

Multimodal LOS

	Bicycle Street		Bicycle Sidepath		Pedestrian					Bus	
Link #	Score	LOS	Score	LOS	1	2	3	Score	LOS	Adj. Buses	LOS
1 (to SR 283)	4.85	E	N/A	N/A				4.29	E	0.00	F
2 (to SR 108)	4.88	E	N/A	N/A				4.33	E	0.00	F
3 (to Spring St)	5.11	F	N/A	N/A				4.77	E	0.00	F
Bicycle LOS	4.98	E			Pedestrian LOS			4.54	E	Bus LOS	0.00	F

MultiModal Service Volume Tables

Bicycle

	A	B	C	D	E
Lanes	Hourly Volume In Peak Direction				
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
*	0	0	0	0	0
Lanes	Hourly Volume In Both Directions				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0
Lanes	Annual Average Daily Traffic				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0

Pedestrian

	A	B	C	D	E
Lanes	Hourly Volume In Peak Direction				
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
*	0	0	0	0	0
Lanes	Hourly Volume In Both Directions				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0
Lanes	Annual Average Daily Traffic				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0

Bus

A	B	C	D	E
Buses Per Hour In Peak Direction				
Buses in Study Hour in Peak Direction (Daily)				

* Service Volumes for the specific facility being analyzed, based on # of lanes from the intersection and segment data screens.
** Cannot be achieved based on input data provided.
*** Not applicable for that level of service letter grade. See generalized tables notes for more details.
# Under the given conditions, left turn lane storage is highly likely to overflow. The number of directional thru lanes should be reduced accordingly.
Facility weighted g/C exceeds normally acceptable upper range (0.5); verify that g/C inputs are correct.
Intersection capacity (ies) are exceeded for the full hour; an operational level analysis tool is more appropriate for this situation.

Full Plan Implementation LOS Analysis

ARTPLAN 2012 Conceptual Planning Analysis

Project Information

Analyst	Nathan Hicks	**Arterial Name**	SR 28	**Study Period**	**Standard K**
Date Prepared	7/11/2016 12:19:04 PM	**From**	School Drive	**Modal Analysis**	Multimodal
Agency	CDM Smith	**To**	Spring St	**Program**	ARTPLAN 2012
Area Type	Transitioning/Urban	**Peak Direction**	Northbound	**Version Date**	12/12/2012
Arterial Class	2				

File Name	C:\Users\hicksna\Downloads\SR 28 - Whitwell - Improvements.xap
User Notes	This analysis is for SR 28 within the city of Whitwell.

Arterial Data

K	0.09	**PHF**	1	**Control Type**	FullyActuated
D	0.65	**% Heavy Vehicles**	6	**Base Sat. Flow Rate**	1950

Automobile Intersection Data

Cross Street	Cycle Length	Thru g/C	Arr. Type	INT # Dir.Lanes	% Left Turns	% Right Turns	Left Turn Lanes	Left Turn Phasing	# Left Turn Lanes	LT Storage Length	Left g/C	Right Turn Lanes
SR 283	120	0.44	3	1	5	28	Yes	Protected	1	320	0.15	No
SR 108	120	0.44	3	1	15	0	No	None	N/A	N/A	N/A	No
Spring St	120	0.44	3	1	16	5	Yes	Protected	1	115	0.15	No

Automobile Segment Data

Segment #	Length	AADT	Hourly Vol.	SEG # Dir.Lanes	Posted Speed	Free Flow Speed	Median Type	On-Street Parking	Parking Activity
1 (to SR 283)	1560	5720	335	2	35	40	Restrictive	No	N/A
2 (to SR 108)	3100	5720	335	2	35	40	Restrictive	No	N/A
3 (to Spring St)	3950	9120	534	2	35	40	Restrictive	No	N/A

Automobile LOS

Segment #	Thru Mvmt Flow Rate	Adj. Sat. Flow Rate	v/c	Control Delay	Int. Approach LOS	Queue Ratio	Speed (mph)	Segment LOS
1 (to SR 283)	318	1524	0.475	23.95	C	0.04	20.75	C
2 (to SR 108)	335	1245	0.612	27.03	C	0.00	26.22	B
3 (to Spring St)	449	1569	0.650	27.64	C	0.59	27.98	B

Arterial Length	1.6511	**Weighted g/C**	0.44	**FFS Delay**	84.38	**Threshold Delay**	0.00	**Auto Speed**	25.72	**Auto LOS**	B

Automobile Service Volumes

Note: The maximum normally acceptable directional service volume for LOS E in Florida for this facility type and area type is 1000 veh/h/ln.

	A	B	C	D	E
Lanes	**Hourly Volume In Peak Direction**				
1					
2					
3					
4					
*					
Lanes	**Hourly Volume In Both Directions**				
2					
4					
6					
8					
*					
Lanes	**Annual Average Daily Traffic**				
2					
4					
6					
8					
*					

Multimodal Segment Data

Segment #	Outside Lane Width	Pave Cond	Pave Shldr /Bike Lane	Side Path	Side Path Separation	Side walk	Sidewalk Roadway Separation	Sidewalk Roadway Protective Barrier	Bus Freq	Passenger Load Factor	Amenities	Bus Stop Type
1 (to SR 283)	Wide	Typical	Yes	No	N/A	Yes	Typical	No	0	0.4	Fair	None
2 (to SR 108)	Wide	Typical	Yes	No	N/A	Yes	Typical	No	0	0.4	Fair	None
3 (to Spring St)	Wide	Typical	Yes	No	N/A	Yes	Typical	No	0	0.4	Fair	None

Pedestrian SubSegment Data

	% of Segment			Sidewalk			Separation			Barrier		
Segment #	1	2	3	1	2	3	1	2	3	1	2	3
1 (to SR 283)	100			Yes			Typical			No		
2 (to SR 108)	100			Yes			Typical			No		
3 (to Spring St)	100			Yes			Typical			No		

Multimodal LOS

	Bicycle Street		Bicycle Sidepath		Pedestrian					Bus	
Link #	Score	LOS	Score	LOS	1	2	3	Score	LOS	Adj. Buses	LOS
1 (to SR 283)	2.22	B	N/A	N/A				2.13	B	0.00	F
2 (to SR 108)	2.25	B	N/A	N/A				2.16	B	0.00	F
3 (to Spring St)	2.74	B	N/A	N/A				2.38	B	0.00	F
	Bicycle LOS	2.50	B			Pedestrian LOS		2.26	B	Bus LOS	0.00	F

MultiModal Service Volume Tables

Bicycle

	A	B	C	D	E
Lanes	Hourly Volume In Peak Direction				
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
*	0	0	0	0	0
Lanes	Hourly Volume In Both Directions				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0
Lanes	Annual Average Daily Traffic				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0

Pedestrian

	A	B	C	D	E
Lanes	Hourly Volume In Peak Direction				
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
*	0	0	0	0	0
Lanes	Hourly Volume In Both Directions				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0
Lanes	Annual Average Daily Traffic				
2	0	0	0	0	0
4	0	0	0	0	0
6	0	0	0	0	0
8	0	0	0	0	0
*	0	0	0	0	0

Bus

A	B	C	D	E
Buses Per Hour In Peak Direction				
Buses in Study Hour in Peak Direction (Daily)				

* Service Volumes for the specific facility being analyzed, based on # of lanes from the intersection and segment data screens.
** Cannot be achieved based on input data provided.
*** Not applicable for that level of service letter grade. See generalized tables notes for more details.
# Under the given conditions, left turn lane storage is highly likely to overflow. The number of directional thru lanes should be reduced accordingly.
Facility weighted g/C exceeds normally acceptable upper range (0.5); verify that g/C inputs are correct.
Intersection capacity (ies) are exceeded for the full hour; an operational level analysis tool is more appropriate for this situation.