IMPLEMENTING **BUS RAPID TRANSIT** ALONG FAIRVIEW CORRIDOR

By

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INTRODUCTION

Abstract

Public Transportation is an important service that is needed in an urban setting. It is a difficult task to provide transportation service along all arterial and collector roadways but if we can provide public transportation service along busy congested roads we can eliminate different problems at the same time. Public transportation service is essential in an urban city because not all residents have access to personal vehicles. Since there is a high percentage of employment in city centers like downtown Boise, more residents relocate towards the city centers to prevent a long commute. Fairview Avenue currently has only two small public transportation routes along the corridor and the bicycle lanes are at segments throughout the corridor.

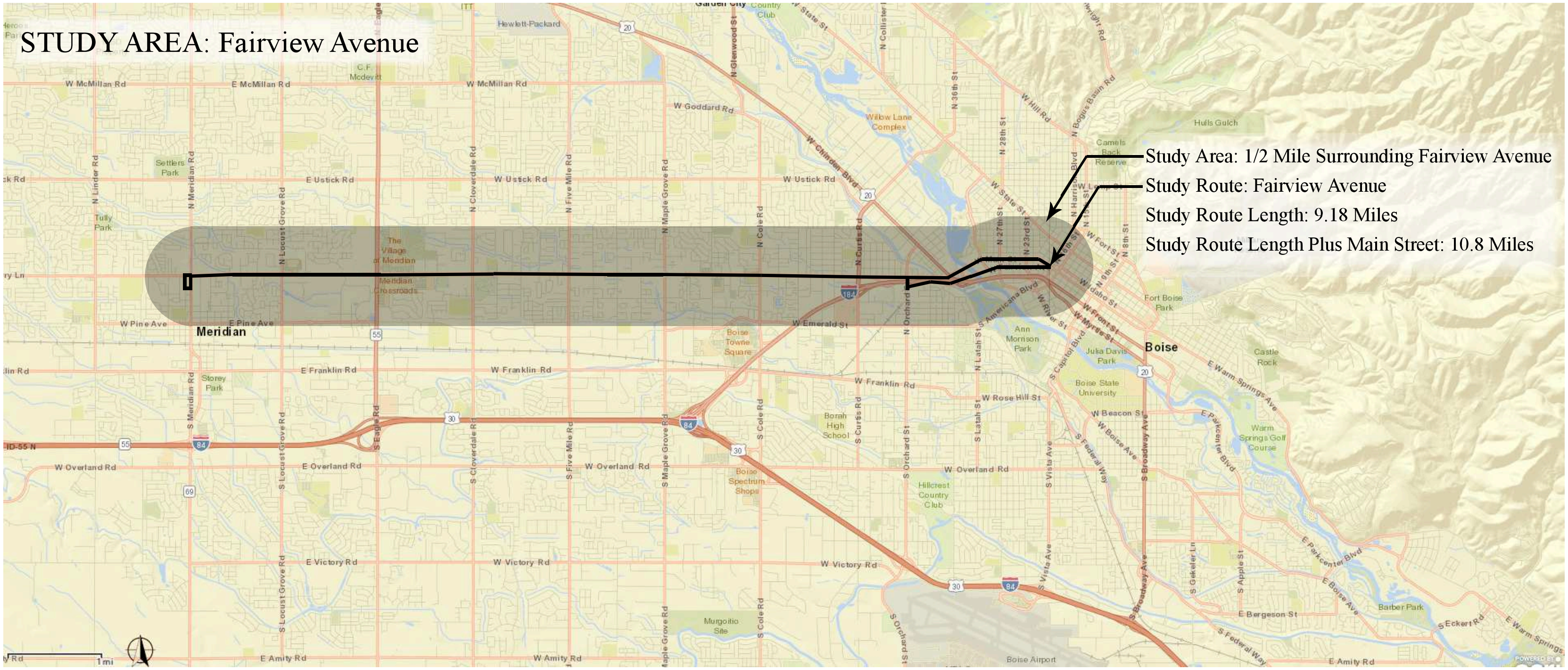
The research for this project includes literature review concepts from sustainability mobility, bus rapid transit, design principles/standards, network design and benefits of transit. In addition, case studies have been conducted to get design inspirations and implications. The primary object of this project is to provide bus rapid transit service along Fairview Avenue and improve the overall pedestrian infrastructure along the corridor. Some of the primary goals of this project are to encourage more users to use public transportation, analyze existing routes, reduce vehicular congestion, improve pedestrian environment, and improve the user experience. The project design proposes a schematic plan representing a bus rapid transit service along Fairview Avenue and proposes schematic infrastructure improvements along the corridor.

Introduction

Boise is an urban city and the capital of Idaho. The population of Boise is around 223,000. Downtown Boise attracts a wide range of professionals from around the Treasure Valley. Since Boise is the capital of Idaho, Downtown is filled with offices that employ a wide range of professionals. They include architects, law firms, dentists, medical offices and businesses. Many of the employees of these businesses commute to Boise, or they reside within city limits. University students also come to Boise because of the educational opportunity at Boise State University and University of Idaho offers. Downtown Boise is also filled with a wide range of different activities that attract a high number of visitors from the Treasure Valley. With the population of Boise and its workers, professionals, and students, Boise has become an undesirable city to drive in. The City of Boise offers public transportation to different destinations around Boise communities as well as communities around the Treasure Valley. There is a current transportation plan in place to improve public transportation along West State Street corridor. The State Street Transit and Traffic Operational Plan breaks down the futuristic plans and describes the design along the corridor. As the population of Boise continues to grow and more offices opening downtown attract more workers, the amount of personal vehicular usage is also on the rise. Downtown Boise has an outdated public transportation system that needs to be revised in order to promote alternative transportation. An improved transit system will reduce private vehicular usage, vehicular accidents, harmful greenhouse gases, fuel consumption, and improve vehicular flow. With the implementation of Bus Rapid Transit (BRT), the City of Boise could see an increase in business growth, commuting numbers, shared transportation, increase ridership and passenger satisfaction. This project explores the redesign of the current public transportation system that needs to be updated and improved in order to encourage residents to utilize public transportation so that they can experience the economic, ecological and environmental benefits. There are many factors that must be taken into consideration in order to design a desirable and effective BRT system for Fairview Corridor.

Background

Over the past decades, public transportation has evolved worldwide. The main reason for public transportation is to provide affordable transportation in the urban cities. With the attention of public transportation raising over the past years, different powertrain, energy efficiency, traffic technology, design details and time efficiency have improved. Since the beginning of public transportation conventional diesel/gas vehicles have been used. Today, there is a wide range of different power sources that will power public vehicle. Some of the different power sources include battery electric vehicle, compressed natural gas, hybrid electric and fuel cell hybrid. With each power source having different benefits and disadvantages which may include energy efficiency, capital cost, maintained cost, and infrastructure cost. In the past, technology for public transportation wasn’t as advance as today public transportation technology. Today, some technology includes but isn’t limited to exclusivity of running way, degrees of grade separation, vehicle location, fare collection, and intelligent transportation system. These advancements have been implemented on public transportation in order to improve time travel and to compete against personal vehicles.



Why Fairview Corridor?

Over the past years, Fairview Avenue has seen new business along the corridor. The reason why new businesses are stationing along Fairview Avenue is because of the business center Fairview has become over the past years. Fairview Avenue is mainly C-2D zone, which represents General Commercial. There is a small portion of zoning that changes toward downtown which changes to C-5, which is Central Business zoning, and allows for a greater mix of land uses. With a busy business center comes with vehicle congestion. There are only two existing routes that provide public transportation on a small section along Fairview Avenue. The first route is route 7A provides service heading towards Ustick from Downtown. The second route is route 7B providing service to Towne Square Mall from Main Street Station. Pedestrian infrastructure along Fairview Avenue need to be improvement as well. The bicycle lane along Fairview Avenue needs to be improved in order to provide additional method of transportation along Fairview Avenue. With more bicycle usages along Fairview corridor, the more share transportation can occur. Today, Fairview Avenue only provides bicycle at some segments along the corridor, but the segments are extremely small, undesirable and aren't connected. Where the bicycle lane is absent, the sidewalk because multiuse for both pedestrian and bicycle which because undesirable. The image above shows the length of Fairview Corridor.

Research Question/Problem

How can the implementation of a bus rapid transit system impact the communities surrounding Fairview Avenue between Cherry Lane in central Meridian and Downtown Boise? What are the potential infrastructure improvements needed along the corridor in order to design a desirable and effective bus rapid transit system? What are the design principles and standards that will encourage current and potential riders?

Goals & Objectives

The Fairview Corridor concentrates a lot of commercial use, but also serves as a main arterial connection from the center of Meridian to downtown Boise. It has the potential to provide efficient commuter transportation between the two areas, but existing service along the route isn't a cost or time efficient choice for most residents along or near the corridor. Since Fairview Avenue serves as an arterial connection between the two centers and is a commercial center, it is expected to see a rise of commuters during peak times. To persuade users to utilize public transportation along Fairview Corridor, it must compete with personal vehicles. In order to compete with personal vehicles, public transportation needs to be more time efficient and economical beneficial. There are several different routes that could help reach different suburbs near the corridor but to do so existing routes need to be expanded and rerouted to accumulate the expansion of Fairview's public transportation. With the attention that public transportation has been receiving the past years, advancement in technology and powertrain has been made. These advancements have improved the ridership and have reduce the time travel. Currently, the public transportation services along Fairview Avenue are missing these advancements and technology which make the current public transportation undesirable user experience.

1. Goal: *Encourage locals and visitors to use transit service.*

a. Objective: Show the economical benefits for using public transportation on a daily basis rather than using personal vehicle.

b. Objective: Reduce individual transportation costs by demonstrating how much less public transportation costs.

c. Objective: Make public transportation more time efficient than using personal vehicle. Apply technologies that have been used in other cities that have been successful.

d. Objective: Enhance personal opportunities by connecting desirable destinations. Some desirable destinations could be universities, grocery store, and offices (Downtown).

2. Goal: *Expanding and rerouting existing routes*

a. Objective: Analyze existing routes and proposed a location for transit stops. Look at each stop on the bus route, stops at and look at the amenities surrounding the stop. Look at the trip duration for a round-trip bus route and the alternatives of trip routes.

b. Objective: Evaluate daily trips and the frequency of the ridership.

c. Objective: Strengthen connectivity with local neighborhoods and desirable destinations. Look at the demographics of neighborhoods along the Fairview corridor and see how different income housing and age can affect the usage of public transportation.

d. Objective: Look at what might be more desirable destinations to the community. University might be one of the most desirable destinations for students.

e. Objective: Look at the existing routes and propose new routes as well as extend current routes.

3. Goal: *Reduce Vehicular Usage*

a. Objective: Demonstrate that by reducing personal vehicular usage fuel consumption and air pollution will be reduced.

b. Objective: By reducing personal vehicular usage the risk of vehicular accidents will be reduced because traffic flow will be reduced within the city.

4. Goal: *Improve the current pedestrian environment at key routes stops*

a. Objective: Design attractive bus stops that the community would want to utilize as well design bus stops for year-round usage.

5. Goal: *Improve User Experience*

a. Objective: Look at the current time table and analyze where improvements are needed. Look at technology that has been used in other cities, to improve efficiency. With new proposed and extended routes, a new time table will need to be created in order to suit the new changes.

b. Objective: Look into how public transportation can reduce traffic jams within city limits. Identify different elements that can help to reduce traffic jams like reducing personal vehicle usage.

c. Objective: Propose express lines to make public transportation more time efficient and help to improve users' experience. Look at design details that have been used in the past to persuade residents to use public transportation.

d. Objective: Improve level of service

e. Objective: Scale Routes

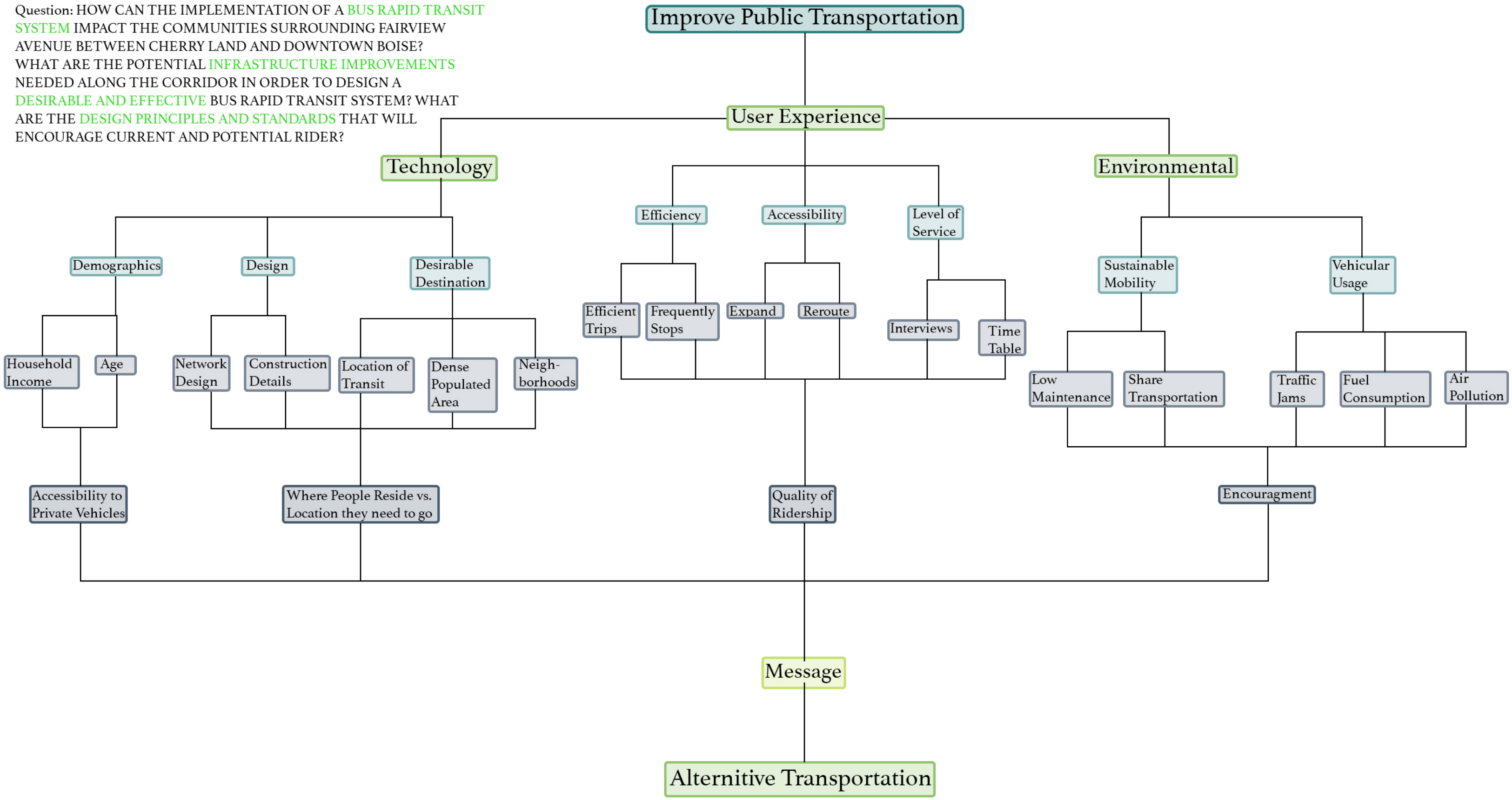
METHODS DESCRIPTION

Research Description

Multiple research methods have been used for this project including interviewing transportation experts in local agencies, case studies, map and demographic analysis, and analysis of existing and potential transit timetables. Interviewees include people involved in public transportation planning at agencies including Valley Rapid Transit (VRT), City of Boise, COMPASS, Capital City Development Corp (CCDC), and Ada County Highway District (ACHD). All of the people that were interviewed have some type of background working on public transportation. Different case studies have been conducted of cities that have had a specifically bus rapid transit system and evaluating what makes those public transportation systems so successful with the community as well as analyzing problems they encountered during the process. Map analysis along Fairview Corridor includes mapping demographics that include median household annual income, autos per household, population density, Fairview zoning and average commuters per household. The demographic information that has been collected is used to strengthen the argument for the proposed route along the Fairview Corridor. The public transportation system map that the City of Boise offers to the community is analyzed to examine where the gap is between where public transportation is accessible and where it is not accessible. The proposed Fairview Corridor timetable is based on the travel time needed for each stop. The timetables will have new technology that will make it more beneficial and easier to be utilized. This time table will be based on the time travel and distance from each station along Fairview Corridor.

Conceptual Framework

Question: HOW CAN THE IMPLEMENTATION OF A BUS RAPID TRANSIT SYSTEM IMPACT THE COMMUNITIES SURROUNDING FAIRVIEW AVENUE BETWEEN CHERRY LAND AND DOWNTOWN BOISE? WHAT ARE THE POTENTIAL INFRASTRUCTURE IMPROVEMENTS NEEDED ALONG THE CORRIDOR IN ORDER TO DESIGN A DESIRABLE AND EFFECTIVE BUS RAPID TRANSIT SYSTEM? WHAT ARE THE DESIGN PRINCIPLES AND STANDARDS THAT WILL ENCOURAGE CURRENT AND POTENTIAL RIDER?



LITERATURE REVIEW

Literature Review Summary

The following topics are important to understand the promising future for Bus Rapid Transit, as well to understand how traditional public transportation needs to be updated and modified, but also the overall design of the streetscape along Fairview Corridor in order to achieve a desirable bus rapid transit system. It is important to understand how land use and demographic shifts in the local population might change the need for transit and other transportation facilities. Some of the benefits that public transportation has along a corridor are economical, socially and environmentally. What makes bus rapid transit so unique from the other public services is the availability of switching transportation modes with ease. Not just that but what makes bus rapid transit stand out from the rest is the flexibility and the affordability from the rest. One design element that makes bus rapid transit time efficient is the usage of an exclusive lane or high occupancy vehicle lane. Over the past years, the emission of greenhouse gases from public transportation vehicles has risen concerns. Different power sources to power vehicles have been studied in the past. Some of the different power sources include bio-diesel, compressed natural gas, and battery electric. Each power sources have its disadvantages and advantages which comprises of cost parameters. Identifying common Public Transportation network morphologies that might fit with Boise with the content and infrastructure of the community of Boise is the main goal of this project and evaluating where the travel demand generators along the corridor or surrounding are located. It is important to examine where those travel demand generators, in order to see how stations will be spaced and the location along the corridor. In order to compete with personal vehicles, principles and standards of a bus rapid transit design should be set high. The span of service is crucial because it is the hours of service during the day and days of the week community has access to the service. In conclusion, the current public transportation service along Fairview Avenue needs to be updated to bus rapid transit service.

1. Benefits of Transit

This section will discuss the benefits of public transit system has to a community. A public transit service provides more than just a service to a community it also "has several significant impacts to a city: economically, since public transit service could reduce the over transport cost of the city, socially since public transit service ensures all members of the city are able to travel and environmentally, since public transit service generally saves more energy than private transport" (Zeng, 2014). Section 3, Sustainable Mobility, of this section talks about the environmental benefits public transportation has to the environment. Since the beginning phases of the city's planning, a city should have a public transportation plan for future planning but that's not the case for Fairview Avenue. Public transportation provides different economic benefits along the corridor. For starters, there is job creation tread within .25 to .50 miles of public transportation transit. This tread could be seen on the Springfield, Eugene case study that has been done for this project. By providing public transportation along a corridor it provides easy connectivity to local/regional residents to those jobs and businesses and will be transported with time efficiency. On the same case study, about 52,000 residents will be connected with 81,500 jobs that lay within .5 mile of the route (Taubenkibel, 2015). Using public transportation will eliminate expensive expenses that personal vehicle has. Some of the expensive include but are not limited to vehicle insurance, vehicle registration, maintenance cost, fuel cost, and vehicle cost. Some of these cost for each expense could range from individual to individual. In Chapter 4, Section 3 in the Median Household Annual Income analysis, shows that the average household income along the Fairview Corridor is about $53,211. In Chapter 4, Section 3 in the Average Commuters per Household and Autos per Household, shows that there is an average of 1.7 autos per household and 1.15 commuters per household. With the implementation of this service along Fairview Corridor, there should be a decrease in personal autos per household and the commuters per household should increase. By having this service along Fairview Corridor, it will eliminate auto usage and will reduce greenhouse gases being emitted in our precious atmosphere. By having more riders using public service it will distribute greenhouse gases being emitter equally among the riders equally. Different power sources to power vehicles have been studied in the past to minimizing gases being emitted. Different technology and infrastructure have been studied in the past to minimizing time travel to compete with time travel of personal vehicles.

Shared Passenger Transportation

The term 'shared transportation' means, travelers sharing different types of transportation and being able to switch travel modes with ease. Santa Clarita, California has seen an increase in bicycles and public transportation over the past years. Metrolink rail station was equipped with bicycle lockers that "are large enough to secure bicycles and other equipment for long periods of time without risk of damage" (Amundsen, 2001). This system helps the bicycles to switch to alternative transportation with ease without having to worry about their equipment. "Santa Clarita has two other rail stations outfitted with bicycle lockers, and it has found that 50 to 100 residents use those lockers daily" (Amundsen, 2001). Full-time staff or security video cameras will need to be implemented at the station lockers in order to make bicyclists feel secure on leaving their personal property in the lockers. The community of Boise is very similar to the community of Santa Clarita because Boise has seen an increase in bike users within the city. Another technique to accommodate bicyclists is having buses equipped with exterior bike racks, usually in the front of the buses. Having exterior bike racks on buses has many disadvantages over having lockers. One of those disadvantages is delaying the travel time while people secure their bikes in the racks. The reason why exterior bike racks add time is that the bicyclist needs to put the rack downward and mount and tie up the bike in a secure position. If the bicyclist is new to racking up the bike on the exterior of the bus this could add additional time because of the inexperience. In some systems, they have added interior bike racks to minimize delay time but the main disadvantage of having interior bike racks is the valuable carrying capacity space it will take up. The community of Boise will benefit from implementing lockers as Santa Clarita did. This is going to make the bikers transition to the bus with ease. One of the main target user's BRT tries to persuade in utilizing BRT as a transportation method is personal vehicle users. Over the past years, BRT has improved ridership experience in order to compete with the ridership in personal vehicles. With such improvements, "it has led to BRT designs to attract people who might otherwise drive by car, with air-conditioned buses, leather seats and in-bus features such as Wi-fi" (Hodgson, 2012). Such improvements will attract certain individuals but BRT is designed for everyone including ADA accessibility. BRT services around the world are using wheelchairs ramps in order to accommodate customers using wheelchairs. Although there are similar disadvantages to the exterior bike rack, the wheelchairs also add travel time because the wheelchair ramp needs to be deployed and lift the wheelchair to slide inside the bus. BRT service should be designed for everyone in the community to use regardless of the potential for delays.

2. Bus Rapid Transit

"BRT is, at a minimum faster than conventional local bus service and, at a maximum, includes grade-separated bus operations" (Amundsen, 2001). Bus Rapid Transit or BRT has an advantage over the other types of transportation because of the flexibility and time efficiency. "BRT systems can range from the simple to the complex" (Amundsen, 2001). A simple system is a multiple vehicles (wheel buses) which is more efficient than the complex system because it is reserved lanes. A complex system is a few rail cars that tend to be more expensive and more maintenance than multiple vehicle systems or a simple system. "The cost of light rail infrastructure as 2.64 times more than bus rapid transit (BRT), and metro rail around 12.82 times more expensive than BRT, per distance unit" (Zhang, 2009). The study has also shown that BRT is in advantaged over TRAM. One of those advantages is cost. "Model shows that the capital costs of the high-spec BRT system are two-thirds those of tram" (Hodgson, 2012). Some of the advantages that BRT has over Light Rail Transit are than LRT is "too costly when compared to buses, existing schemes financial performance is poor, the planning timescales are excessively long, and local funding is necessary for addition to central government funding but is difficult to obtain" (Hodgson, 2012). What makes BRT more time efficient than traditional public transit buses is that they have their own exclusive driving lane that can be multi-purpose, by BRT and emergency vehicles like ambulances and fire trucks. The lane would be separated from vehicle lanes by having some type of special pavement or sidewalks with walls. The sidewalks would have to be raised higher than normal for faster loading and unloading.

Road Infrastructure

The road infrastructure along Fairview Avenue must change due to the exclusive lane that is needed for BRT. More exclusive lanes will allow for more flexibility in the future. In general, Boise's road system is designed to accommodate commercial and personal vehicles but was not necessarily designed with transit in mind. The Fairview corridor is no exception. Fairview Avenue typically has four to six transit lanes and some parts of Fairview corridor has bicycle lanes but the majority of it doesn't. Land uses along Fairview Avenue vary, but commercial uses are common, and the traffic in the corridor reflects those uses. Where bus rapid transit has been implemented in other cities, it is common to have at least part of the system in exclusive lanes or lanes dedicated to high occupancy vehicles. Eugene, Oregon is one of the case studies that has been conducted for this project and 80% of the route is an exclusive lane. But due to the fact that the State of Idaho Legislations doesn't allow exclusive lanes along any roads, for the purpose of this project High Occupancy Vehicle lanes will be using to replace exclusive lanes. High Occupancy Vehicle lanes work the same way as exclusive lanes but HOV lanes allow mix-traffic to utilize the lane. The only difference between the two lanes are some design elements. High occupancy vehicle lanes require more design elements infrastructure. Unlike exclusive lane, HOV lanes are integrated along the roadway but on the outer lane. Exclusive lane is usually on the edge of the roadway but separated with some type of buffer whether being a curbside or raisin median. Some of the design elements that HOV lane has are bus bays, access to businesses, curbside HOV lane, raised median, sidewalk and landscape buffer. Bus bays are used in HOV lane as a designated area where buses can pull away from the HOV lane and provide opportunities for mixed-used vehicles to pass the stop bus without having interruptions. Figure 3.2 shows how bus bays function within a

Figure 3.1 Source: State Street Transit and Traffic Operation Plan

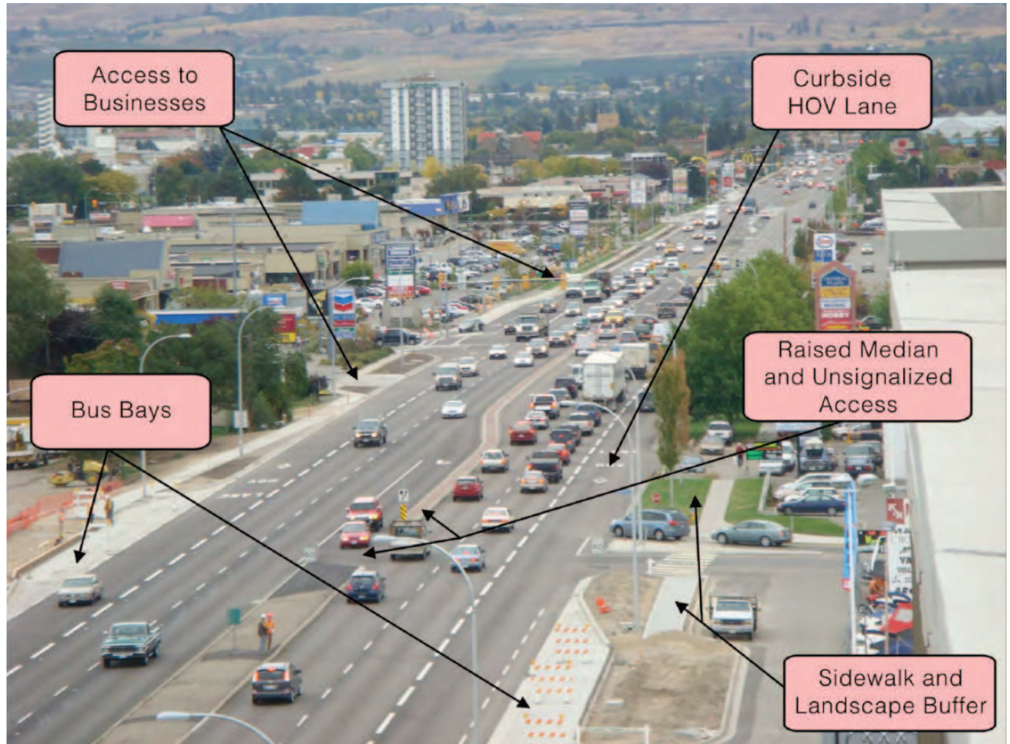


Figure 3.2 Source: State Street Transit and Traffic Operation Plan

roadway. A "yield to bus" policy is needing to be adopted with the addition of bus bays to require mixed-used vehicles using the HOV to yield when the buses are pulling on the HOV lane from bus bays. Access to businesses is just an access point where the vehicle can access businesses parking lot. The curbside HOV lane is a lane located on the adjacent to the outside curb. The curbside HOV lane is not separated from the general-purpose lanes because right turning vehicles or vehicles that are accessing driveways along the corridor. The curbside HOV lane can be distinguished by pavement markings or different pavement color from general-purpose lanes. The raised median is to direct traffic trying to enter or turn into a driveway or parking lot of a business along the corridor. The raised median also helps to minimize the cross-over of the HOV lane. For the purpose of this project, the sidewalk and landscape buffer will be redesign to accommodate the HOV lane and bicycle lane will be added along the corridor since Fairview is missing bicycle lanes along the road.

Idaho Legislations on High Occupancy Vehicle Lanes

Under title 49 Motor Vehicles, Chapter 14 Traffic Enforcement and General Provisions, it talks about rules and regulations regarding High Occupancy Vehicle Lanes (HOV) within city limits. The first regulation mention on the document is the number of occupants allowed to be driving on the HOV lanes which two or more occupants in the car including the driver. A motorcycle can drive on the HOV lane regardless of the time and number of occupants on the motorcycle without penalties. A person may ride/drive a public transportation vehicle in the HOV lane regardless of the time and number of occupants without penalties. Public transportation vehicle included but are not limited to public transportation vehicles and public-school transportation vehicles. A person may ride/drive an emergency vehicle in the HOV lane regardless of the time and number of occupants in the vehicle without penalties. This includes police cars, fire trucks, and ambulance when only responding to emergency calls or in pursuit. Maintenance vehicle may also drive on the HOV lane only when performing maintenance to the lane. If any provision mentioned prior are violated a citation of one hundred dollars will be penalized to the driver. Figure 3.1 shows that only mixed-traffic can use the HOV lane or the right lane to turn right without having to follow the number of occupancies, (Motor Vehicles, Traffic and General Provisions, ISL 49-1421a, 2006)

Citation URL- https://legislature.idaho.gov/statutesrules/idstat/title49/t49ch14/sect49-1421a/

Complete Street Level of Service

In 2009, the Community Planning Association (COMPASS) adopted the Complete Street Policy that provides a vision of complete street throughout the Treasure Valley. Since the adoption of the policy, COMPASS has been implementing complete street to projects throughout Treasure Valley including the long-range transportation plan. The vision of the Complete Street Policy address that streets should be designed to be used by all transportation modes. This includes pedestrians, bicyclists, motorists, and public transportation. By providing a community with a complete street it is ensuring the user's safety regardless of the transportation mode, age or ability. A complete street emphasizes safety, accessibility, and convenience. Because of these emphases, a complete street promotes different transportation options, provides a safe environment, and promotes physical health and economic development.
The Complete Street policy was developed by COMPASS member agencies, which produced the principles and vision of the policy. The policy reads, "We envision a Treasure Valley where roadways are designed to be safe, efficient, and viable and provide an appropriate balance for all users including, motorists, bicyclists, transit, and pedestrians of all ages and abilities" (COMPASS). The complete street policy will vary between urban and rural communities but overall should have the same goals and emphasis regardless of the setting. Compass develops and updates the regional long-range transportation plan every four years and highlights the Communities in Motion 2040 Plan for Ada and Canyon Counties. Communities in Motion 2040 identifies three goals which are transportation, health, and land use. The Complete Level of Service document provides the process to determine the current status of a street, percentage complete, and the level of service for pedestrians, bicycles and transit. The process is a multi-modal analysis that determines the Quality of Service for an expressway, principal

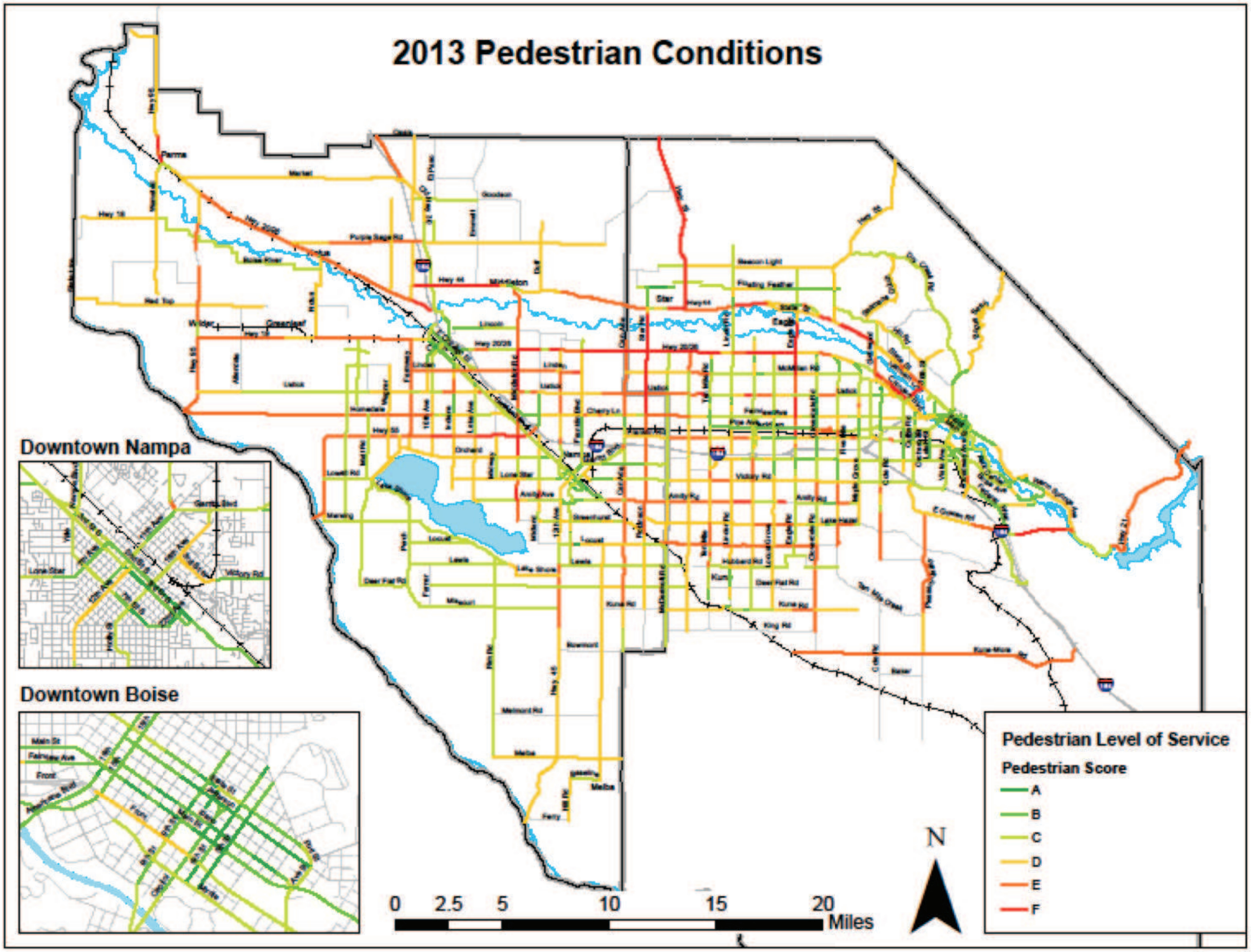


Figure 3.3 Source: COMPASS: Complete Street Level of Service

arterial, minor arterials, and selected collectors. The main goal of the complete street analysis is to identify the level of service for pedestrians, bicycle, and transit modes. This analysis also identifies the current and future road conditions. Both software that are used while doing this analysis are Multimodal Level of Service (MMLOS) and Quality/Level of Service (Q/LOS). The Multimodal Level of Service software will be used to identify how a new design will be utilized by users and will analyze current and future conditions. The Quality/Level of Service software is used to identify the raking priorities for roadways current and future projects. The Q/LOS uses "quality of service" to score Level of Service(LOS) for pedestrian, bicyclists, and transit along arterial roads. The score level range for A-F with A being the best scenario and F being the worst scenario. The software uses "quality of service" to rate the level of service. The Optimal Level of Services to score A/B for the bicycle category is to have dedicated bicycle lane, for the pedestrian is to some form of buffer from vehicles, and for transit is to provide transit centers. This software can determine "the design concept and scope for a roadway facility and conducting alternative analyses" (COMPASS). The Primary structure of the Q/LOS software is a roadway system; the Highway Capacity Manual has set an analysis techniques structure for LOS. The first technique structure is a point, which is a point between segments or at an intersection. The second technique is segments which are a portion of the road that has two points. The third technique is a section which has multiple points and consists of a group of segments. The fourth technique is the facility, which is the overall length of the roadway and which consists of points and segments. The Q/LOS software uses tabs to input data of roadways, intersection, different transportation modes. Some models are affected by other modes of input data. The four primary variables that rank pedestrian LOS are existing sidewalks, the separation between sidewalk/road and volume of vehicle and speed. The separation between the sidewalk and the roadway include but are not limited to trees, planters, furniture and streetscape lighting. Other safety factors that are included in the analysis are crosswalks and bicycle lanes. Figure 3.3, shows the pedestrian LOS score for Ada and Canyon County for one side of the road along expressways, principal arterials, minor arterials, and selected collectors. The image shows the majority of city centers are often more focus on pedestrian safety and prevails with ranking A and B. With the score of pedestrians prevailing throughout the city center, it may become less favorable for the bicycles and transit which will cause for a lower score.

Bicycle LOS

Figure 3.4, shows the bicycle LOS score for Ada and Canyon County. The five-primary variable that rank bicycle LOS are the condition of existing pavement, vehicle volume and speed, and the width of the vehicle lane. The current condition of pavement is important for safety and efficiency. The minimum requirement for a dedicated bicycle lane is at least four feet wide which will be identified by striping, signs, and markings showing that only for bicyclists usage. Within the Q/LOS software, it has the ability to select the current condition for the pavement between desirable, typical and undesirable. With bicycles having to share the road with the automobile, there is a strong relationship between both. When bicycle LOS score drops it is probably because there is a high volume of vehicle at high speed. There are two important variables when using the Q/LOS software which includes the presence of bicycle lanes and the volume of vehicles. Making the bicycle land less desirable. When there is a balance between the different modes of transportation there is a compromise on the LOS score for each mode. The following image shows the LOS for bicycle along expressways, principals, arterials, and selected collectors. The image shows the majority of city centers are focused on bicycle safety and prevails with ranking A-D. The bicycle score ranges because of the vehicle number being higher than average this will make bicycling less desirable. If the number and speed of vehicles drops than the LOS score will rise. The current condition of bicycle lanes will also affect LOS score. Where bicycle lane does not exist, it is important to mention that the width of the outside lane is important, in determining bicycle LOS. The Q/LOS uses four classifications which are narrow (10'), typical (12'), wide (14') and custom.

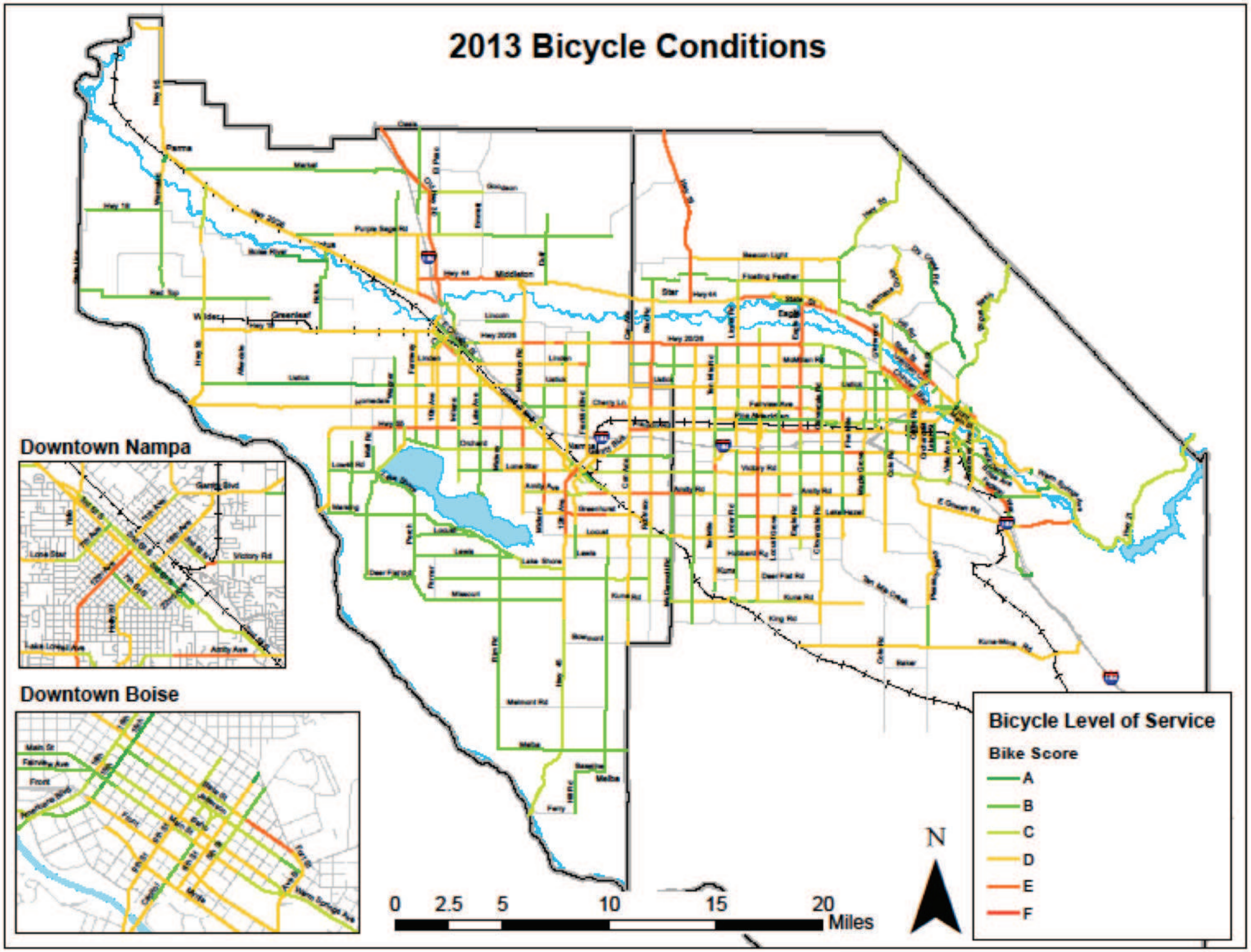


Figure 3.3 Source: COMPASS: Complete Street Level of Service

Transit LOS

Figure 3.5, shows the LOS score for public transportation throughout Ada and Canyon Counties. The LOS score for public transportation is important because it shows where the service needs to be improved. An important reference document that helps to measure transit availability and the Q/LOS is the Transit Capacity and Quality of Service Manual(TCQSM). The Q/LOS software uses techniques form the TCQSM to evaluate LOS for buses. The primary factor that determines the LOS is service frequency. Figure 3.6, shows how the TCQSM level of service standards work. COMPASS and VRT determined the LOS score base on transit LOS. Figure 3.7, shows how COMPASS level of service standards work. Some of the other factors that contribute to the LOS in

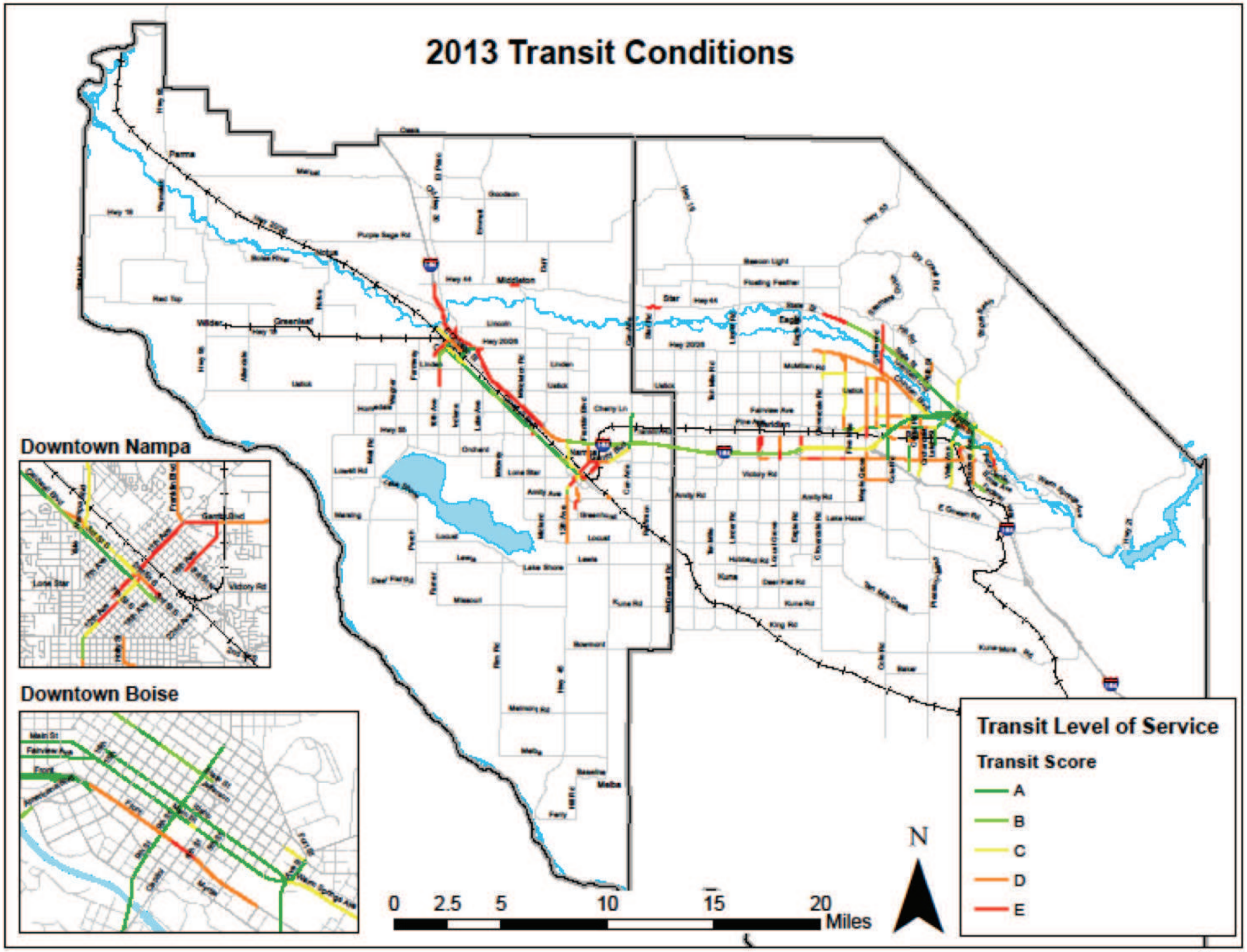


Figure 3.4 Source: COMPASS: Complete Street Level of Service

COMPASS LOS Scoring Standards		
Transit Level of Service	Transit LOS Score	Generalized Frequency (minutes)
A	6+	<10
B	4.1-5.9	10-14
C	3-4	15-20
D	2-2.9	21-30
E	1-1.9	31-60
F	<1	60+

Figure 3.5 Source: COMPASS: Complete Street Level of Service

COMPASS LOS Scoring Standards		
Transit Level of Service	Transit LOS Score	Generalized Frequency (minutes)
A	4+	10-14
B	3-3.9	15-20
C	2-2.9	21-30
D	1-1.9	31-60
E	<1	60+
F	N/A	Demand Response Service

Figure 3.6 Source: COMPASS: Complete Street Level of Service

Q/LOS include bus stop amenities, bus stop types, and passenger load factor. When talking about bus stop amenities this is talking about benches, shelters, and ADA accessibility features. When talking about bus stop types and load factors something to think about are aspects that contribute to the experience the rider gets. Bus stop relates to the ease of identifying bus stop to the user. While the passenger load factor relates to the number of riders on the bus. It is important to note that pedestrian LOS score has an important role on the bus LOS for routes segment and facilities. There are three factors to take into consideration while defining the transit LOS while using Q/LOS. The three factors are pedestrian LOS, crossing difficulty at an intersection, and obstacles to bus stops. Figure 3.7, shows the bus LOS scored as A-F. This scoring is based on the bus frequency and other factors previously mentioned. As seen on the map, the favorable scores are mostly concentrated in the city centers and along bus routes with LOS scores ranging from A-C.

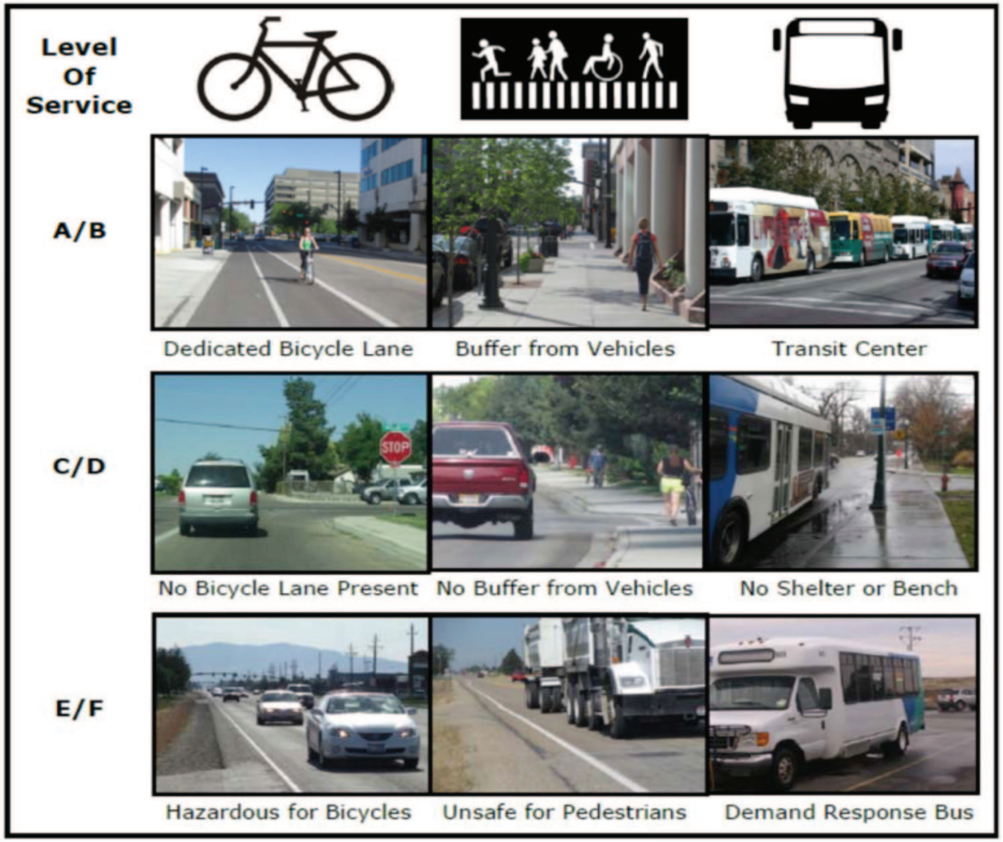


Figure 3.7 Source: COMPASS: Complete Street Level of Service

Future LOS Complete Street

In addition to the Complete Street LOS, COMPASS also developed the optimal future model for pedestrians, bicyclists, and transit along Treasure Valley. The model reflects on local comprehensive plans like VRT valley connect plan, livable streets design guide, and ACHD master street map. The result of the future model was obtained by evaluating future construction projects with the current LOS score model. The optimal comprehensive future system helps to understand the transportation network for Treasure Valley. As seen on future maps, some of the LOS scores haven't changed this could be for many reasons. One of the main reasons could be lack of funding. Percent Completed. The last model for the Complete Street LOS is a map showing the percent complete map. This map helps to understand how the percent complete of each mode was determined. The process to find the percent complete required the current LOS score of each mode and the optimal score. While examining the percent complete of each mode, it is clear that some of the road segments are near to the optimal LOS score goal and which road segments still needs to be worked on. Figure 3.8-3.10, show the different optimal travel mode.

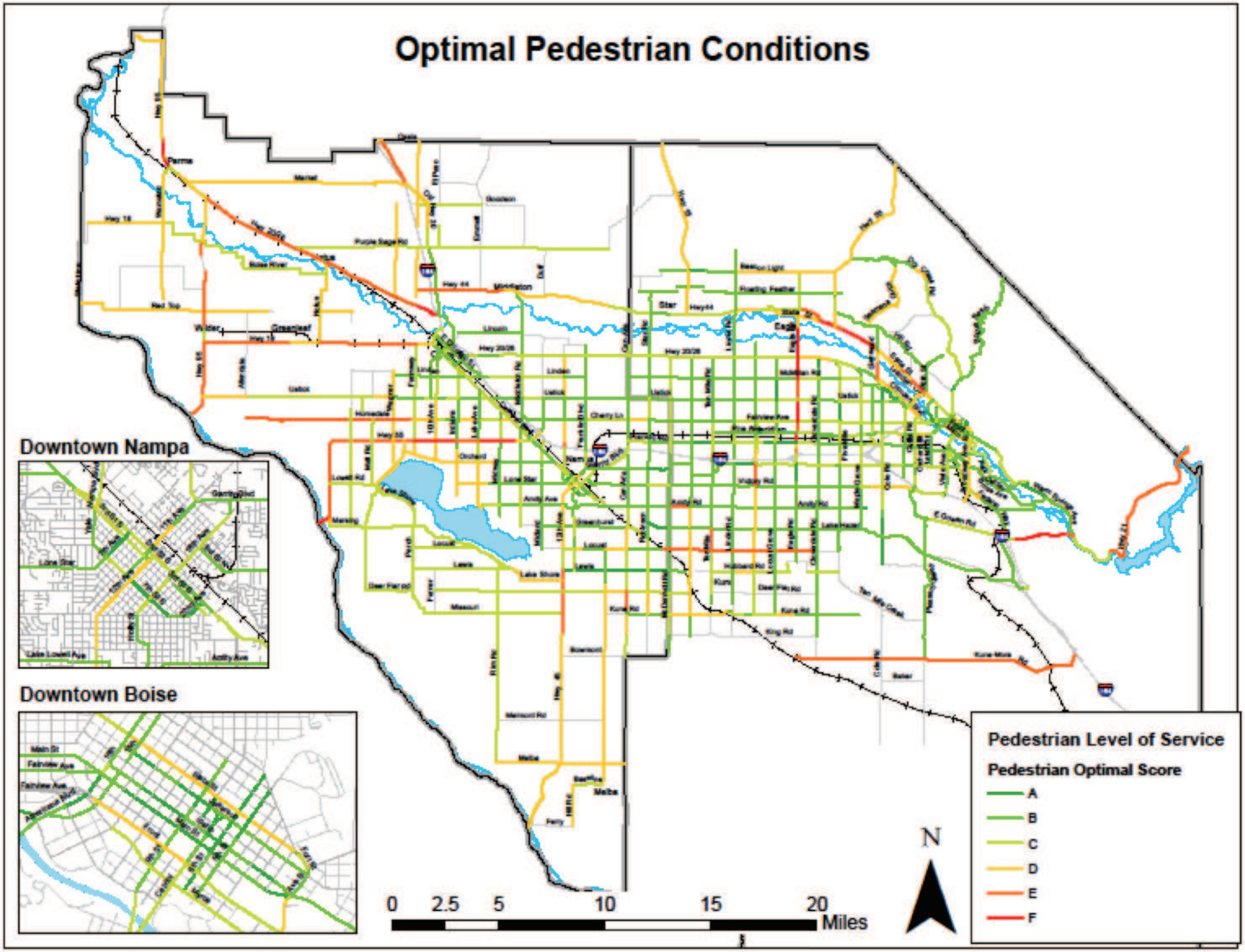


Figure 3.8 Source: COMPASS: Complete Street Level of Service

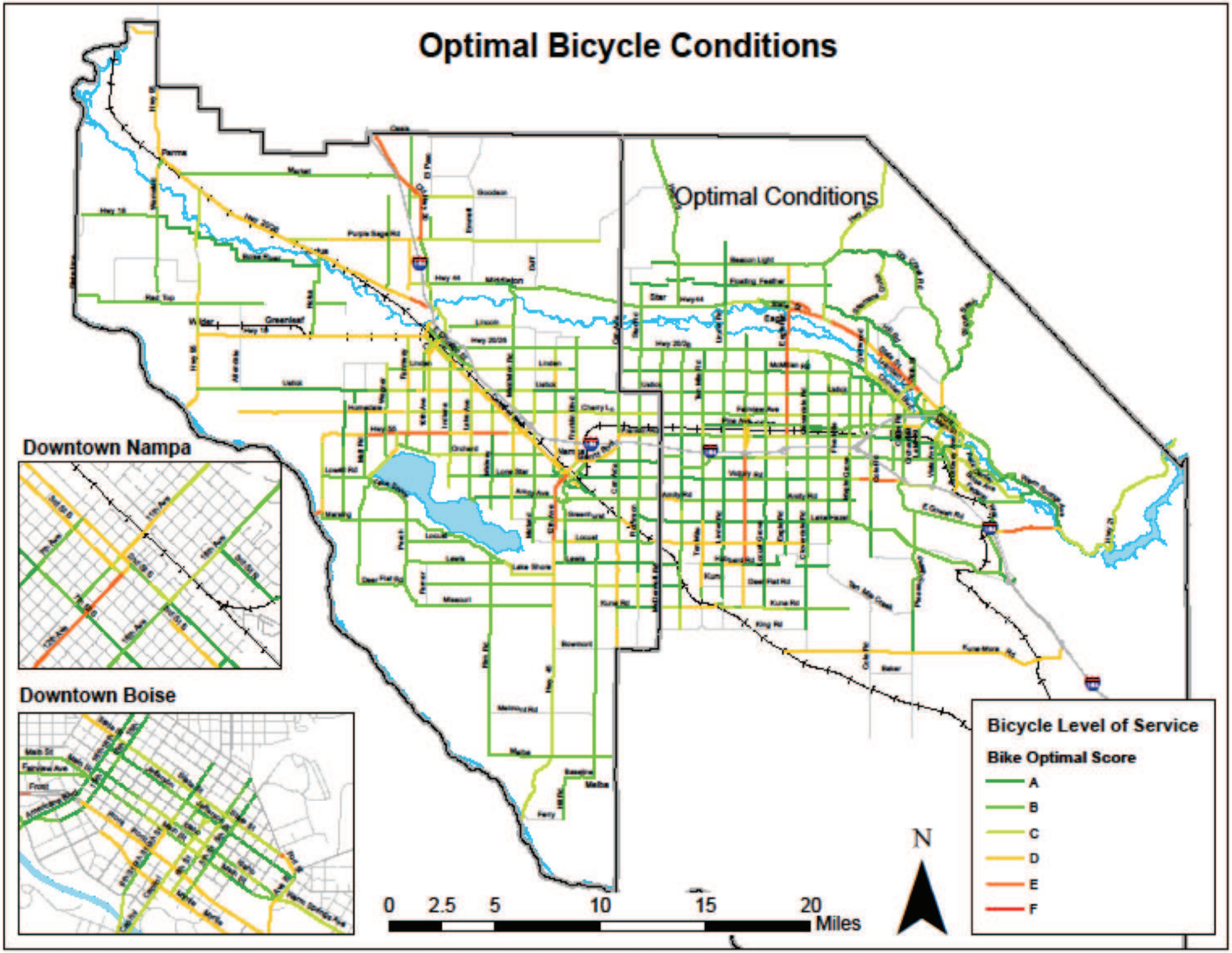


Figure 3.9 Source: COMPASS: Complete Street Level of Service

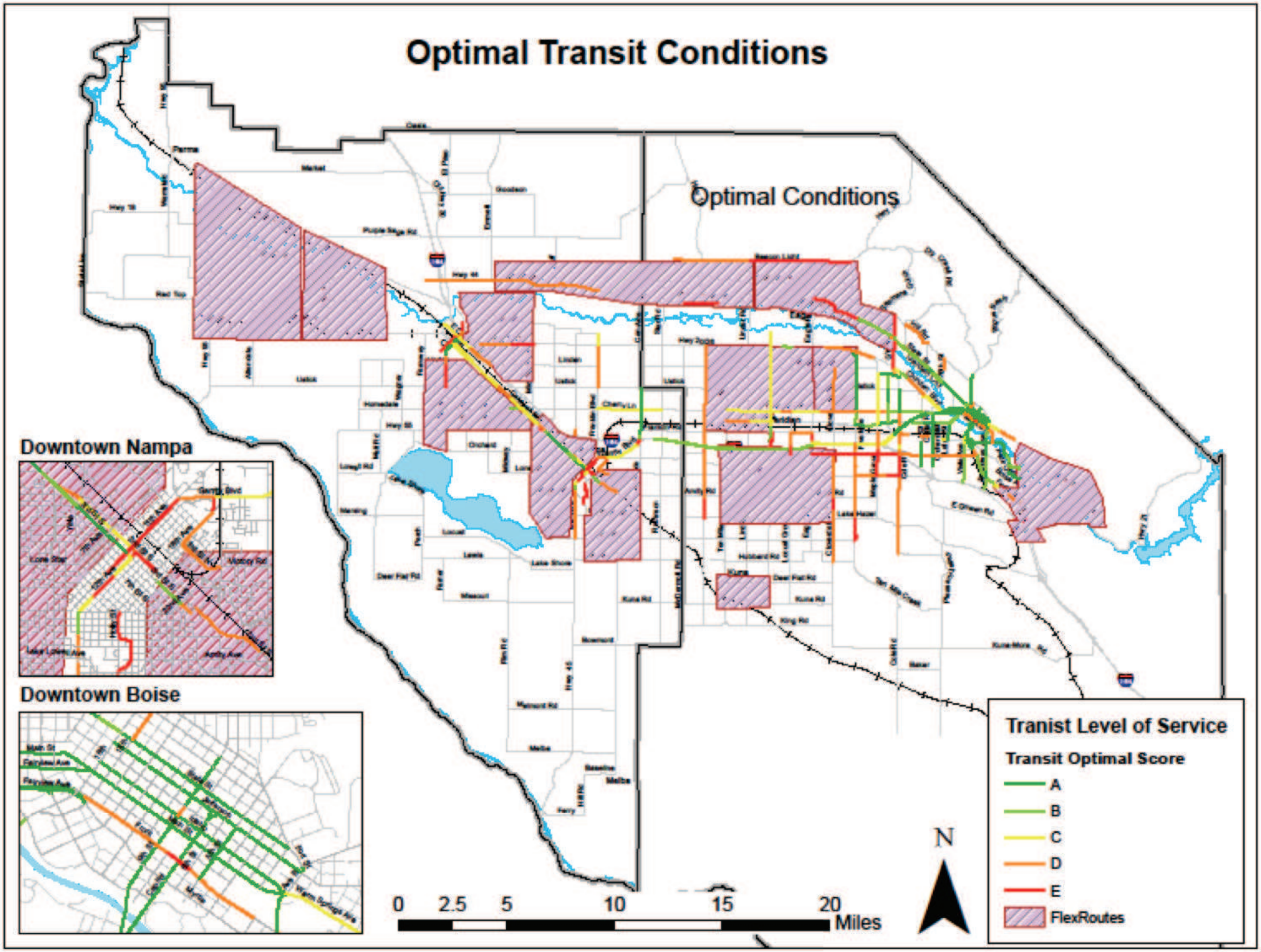


Figure 3.10 Source: COMPASS: Complete Street Level of Service

3. Sustainable Mobility

"Sustainable urban mobility typically describes movement patterns or city transport networks which are energy efficient, utilizing active travel modes, renewable forms of energy, or shared vehicles wherever possible, resulting in low carbon output per passenger journey" (Banister, 2005). Throughout the last half of the twentieth century, concern for the degradation of our environment has raised many concerns about growing urban areas. One of those concerns has been the release of harmful greenhouse gases that are being emitted into our atmosphere. Vehicles, motorcycles and buses have been releasing many of the greenhouse gases. Over the years, new technology has been invented on vehicles, motorcycles and buses to reduce the release of those harmful greenhouse gases. There are different powertrain power buses used around the world. Some of those include conventional diesel, bio-diesel, compressed natural gas, two different hybrids diesel-electric, fuel cell hybrid, and battery electric. Currently, in Eugene, Oregon, they are using Hybrid Diesel-Electric bus vehicles. Those vehicles have "low emissions, better fuel economy and longer brake life and maintenance costs are lower than conventional diesel vehicles" (WSP). These are just some of the sustainable features that the hybrid diesel-electric vehicles can offer. Other than sustainable performance on board there are also sustainable features off the board as well. One of the outside sustainable features that the exclusive lanes can offer is a "sustainable grass strip between the wheel tracks to absorb and filter stormwater" (WSP). Studies have looked at different public transportation methods to better understand which method releases more emissions. They found that tram is fairly close to the emissions of BRT but BRT has the flexibility, and affordability over TRAM. They found that "Using hybrid-engine BRT vehicles, CO2 emissions are similar, BRT has lower PM10 emissions, but NOx from BRT remains higher than for trams" (Hodgson, 2012).

Powertrain

When deciding which of the different source of power for public transportation is the best, something to think about is the lifecycle costs of each mode of power and the emission it releases into the atmosphere. The different power sources for buses that are being considered for this report include conven-

Figure 3.11 Source: Bus Rapid Transit Service Design Guidelines

tional diesel, compress natural gas, and battery electric. Electric buses are typically powered by lithium-ion batteries and store energy. The performance of lithium batteries overweight diesel and natural gases but the costs of these batteries are quite high but over the past years batteries electric buses have increased which makes the cost decreases (Lajunen, 2016).

The lithium batteries on electric buses need to be replaced every 5-6 years compare to conventional buses which last 12+ years. The batteries will need to be changed because over time batteries degrade which causes to decrease the range. One of the disadvantages that battery electric buses have is that it uses a significant amount of energy in the winter to heat the interior of the buses. There are different methods for electric buses to charge the lithium-ion batteries that power the buses. Some of the methods that the battery can be charged are overnight at the depot station, at the end of the bus route, or in dedicated bus stops. There are some cities that swap the low power battery to a fully charged battery at swapping station but more investment must be made for the station. Over the past years, there has been some improvement for the lithium-ion batteries. One of the major improvement of the lithium-ion batteries is that the batteries are now able to function throughout the day without being charged. The range of battery is determined by the battery capacity of power. Although batteries with a longer range tend to be more expensive than batteries with low range. The downside to this improvement is that the battery size has increase which causes more room specified for the bigger batteries and sees an increase in the cost of buses. With the bigger batteries, there is a faster charging method at every bus stop usually charges the battery for only 30 seconds. The biggest advantage battery electric buses have over diesel and compressed natural gas is that it produces no pollutant emissions and their energy utilization is lower when idling compare to diesel in cities. All the pollution emissions are upstream related. With battery electric buses increasing in the US, the technology development of the powertrain has brought more attention. Each different power source has its advantages and disadvantages. Electric and hybrid buses have shown the potential to reduce CO_2 (carbon dioxide) and other greenhouse gases being emitted (Lajunen,2016). Although electric and hybrid buses have not been able to replace conventional diesel buses even though conventional diesel buses haven't improved much during the last decade. "Natural gas buses actually have higher energy consumption than diesel buses but their pollutant emissions are lower" (Lajunen, 2016). Even though compress natural gas has higher energy consumption than diesel, the CO_2 being emitted are lower than diesel buses. A major challenge for the natural gas bus is the lack of fueling stations. Not to mention that the equipment used for the fueling stations are expensive. Some of the equipment needed for a fueling station include compressors, storage tanks, and dispensing equipment. A study in Beijing, China shows that compress natural gas buses releases the same CO_2 amount than conventional diesel buses (Lajunen, 2016). Currently, the most common type bus used for public transportation is the diesel bus but over the previous years, there has been a decrease. This is because natural gas buses are becoming a more attractive choice for cities because of the lower cost of natural gas.

Cost Parameters

Calculating the lifecycle cost of buses involves different factors that are needed to calculate for the lifecycle cost. Some of these factors include the bus purchase, operating cost, cost, and the CO_2 emission cost (Lajunen, 2016). The bus purchase cost resembles the costs of the buses at the beginning of the utilization of the buses. The operational costs resemble the "fuel and electricity usage, components replacement costs, and regular maintenance cost" (Lajunen, 2016). The fuel and electricity cost will vary from state to state. The component replacement costs under the operational cost include the replacement of batteries for battery electric buses. And maintenance costs under the operational cost includes repairs and parts.

Conclusion

Overall battery electric buses have a higher energy efficiency than conventional buses and compressed gas-powered buses (Lajunen, 2016). A compressed natural gas bus has a 25% higher consumption of power than conventional diesel buses but with the prices of natural gas being lower than diesel it balances out. With battery electric bus the power usage is reduced by about 75%. This is because the buses have the ability to recover power from braking and high-efficiency powertrain. Although when the energy consumption will increase when different driving cycle change. For example, in colder months battery electric bus will consume more energy because of heating the interior of the bus. The emission of CO_2 for diesel and natural gas, are very similar alike. The emission for battery electric bus is lower than diesel and compressed natural gas. Therefore, the purpose of this report is to find a power source with low emission of CO_2. The best power source for this project would be battery electric buses because of their lower CO_2 emission and having capability of recharging the battery different ways. Another important benefit to mention about battery electric bus is it has low energy consumption. The major challenge that battery electric bus has is to reduce the battery cost. As technology continues to improve for battery electric buses, improvements on the energy efficiency are increasing, making it more competitive for diesel and natural gas.

4. Network Design

Identifying common Public Transportation network morphologies that might fit with Boise with the content and infrastructure of the community of Boise is the main goal of this project. There are four models that represent network morphologies which include ubiquitous/distributed, timed-transfer hub, radial, and grid/network (McLeod, Sam, et al.). With the city morphology of Boise and the street layout, it is more feasible to use the grid/network morphology in the City of Boise. The other city morphologies are far from being close to Boise's morphology. With the new implementation of Bus Rapid Transit to the City of Boise, it will benefit most by using the grid/network design because of the one-way road network the city currently has in the core of Downtown. The Bus Rapid Transit will use an exclusive lane whenever the city morphology allows it and the land use allows it. This will also give BRT more flexibility to upgrade to Light Rail Transit when the City of Boise is ready for it. Population and financial support will determine when the city is ready to upgrade to Light Rail Transit (LRT).

Travel Demand Generators

Street network isn't the only thing that can influence the network design of a BRT system. "When considering BRT during a transportation master planning or transit system development process, communities typically consider all their major travel demand generators and decide how best to connect them" (APTA, 2010). The beginning phases of developing a BRT system are extremely important because of all of the travel demand generators that are needed to be counted for as well as seeking to connect most of the destinations with one or two travel demand generators are basically destinations that will attract a high number of people on a daily base. "Typical travel demand generators that can be effectively connected by rapid transit services include central business district, colleges and universities, regional shopping centers, hospitals and other medical facilities, entertainment and sports complexes, intercity transportation facilities (airports, rail stations, bus terminals), and concentrations of high-density residential or commercial development" (APTA, 2010). Downtown Boise has the majority of the travel demand generators listed above that will be needed to be taken into consideration in order to produce a successful BRT network.

Figure 3.12 Source: State Street Transit and Traffic Operation Plan

Stop Spacing

It is important to establish the spacing and the location of each bus station during the planning process. The spacing and the location of each bus station shall be determined depending on land use, intersection of transit lines, and travel demand destinations. A major factor to consider when establishing station spacing are maximum acceptable and desirable walking distance, whether or not a parallel local service is available, and speed and service objective for the BRT service (APTA, 2010). If the distance between the bus stop and destination are to spread apart it will become undesirable walking distance for the user and will become an unattractive trip. The distance between the bus stop and the destination should be at a desirable walking distance to encourage people to use BRT. The recommended distance that a person is willing to walk is typically 0.25 to 0.33 miles which is usually a ten-minute walk (APTA, 2010). When there is a big gap between each station, there should be an increase in frequent stops. Typical frequent stops should occur at intersections or parallel service line in order to minimize walking distance.

Stop Location

When selecting the locating of the stations it is important to remember that the typical distance a person is willing to walk and travel demand generators. Other major factors to take into consideration are locations of major origins, destinations and activity nodes, locations of major cross streets and transfer points, and density and land-use pattern in the corridor (APTA, 2010). The factors listed above are locations that should receive priority as a possible location for BRT stations. Other factors that will determine the best location for BRT stations are the availability of pedestrian infrastructure, quality of the pedestrian environment, the width of the street, stops shared with or separate from conventional service, topography, customer demographics, spacing for non-BRT service in the region, and local conditions (APTA, 2010). When deciding whether or not to combine BRT and conventional stops it is important to think about which service will get the preferential location. Since BRT is branded as premium service it should receive preferential location over conventional service.

5. BRT Design Principles and Standards

The principles and standards of a BRT design should be set high because it needs to compete against other methods of transportation like personal vehicles. BRT needs to out-compete personal vehicles in order to persuade people to use BRT. Some of the characteristics that are needed to differentiate from traditional bus service and personal vehicles are faster travel time than traditional fixed-route bus service, short wait times at stations, limited stops or stations, and unique branding (APTA, 2010). BRT standards should be similar to the standards and characteristics that are found on Rail Rapid Transit. Policies that will change the service and quality of services include service levels, stop/stations spacing, exclusivity of running way or lack thereof, including degrees of grade separation, vehicle type, fare collection, intelligent transportation system technology and branding (APTA, 2010). Designs aspects that are found with Light Rail Transit should be implemented on the Bus Rapid Transit design. Some of those aspects range from service frequencies, all-door boarding, and stations (APTA, 2010). Design services should be very similar to the services found with Light Rail Transit. Some of the services that should be similar are the span of service, service frequencies, the degree of reliability, and ridership goals (APTA, 2010). There are two general types of BRT that are used around the world. BRT Service and BRT Facilities. BRT Services is a single route serving station that operates in mixed traffic within a bus lane and transit signal priorities. BRT Facilities are the infrastructure at-grade intersections. The most suitable BRT system for Boise is BRT services because of the state law that does not allow exclusive lanes for BRT and therefore needs to operate in mixed traffic. The use of technology was very limited but very efficient. They equipped the buses with GPS tracker that could locate the bus location every 90 seconds. This would help the user know when the bus would arrive instead of a timetable. The GPS tracker would also sensor the traffic lights so when the bus was approaching the intersection the traffic light would be turning green. They also added this GPS tracker to emergency vehicles. (Amundsen, 2001)

Span of Service

The span of service for a Bus Rapid Transit service is really important because it is the hours of service during the day and days of the week community has access to the service. The span of service should be identical to the span of service that a true rapid transit has. The reasoning for this is to set a high level of confidence in the riders that the service will be at their disposal whenever it is desired throughout the year. Since this project is being proposed a new service to the City of Boise it is important to take into consideration whether the service is going to be full service or limited service during the beginning phases of service. If the service starts as a limited service, then when the service has grown or financial support is available, it can potentially change to full service. Once the service grows and becomes full service to the community the next principles to take into consideration are days of the week and hours of the day that the community will have access to the service. It is important to offer service for all seven days of the week with holidays included as well because the service should give the impression of a true rapid transit. When considering the span of service during the day the typical service time for BRT is approximately 18 to 20 hours per day (APTA, 2010). The time frame guarantees covering times potential service demands like opening/closing of a work shift, mall and other retail service, classes at colleges and universities, open/closing times of institutions and community facilities, entertainment, and intercity transportation services (APTA, 2010). The minimum span of service a based bus service is required to serve a minimum of 14 hours per day under the FTA guidelines. Once the span of service is addressed the next step is to create a reliable schedule for BRT service. Creating a reliable schedule is critical because the riders and potential riders need to be aware of the time travel. The riders need to see how beneficial changing habits will be when they switch between using personal vehicles and BRT. ITS Technology needs to be a consideration while developing a service schedule. ITS Technology can reduce both capital costs and operating costs. ITS technology allows the system to track vehicle locations and can lower the time a bus stands idle at a terminal, which results in a faster service. Knowing where the bus is located can also allow the bus to recover time that was lost or gained in route. The recovery time should be scheduled at the endpoint of the terminal. One way a bus can recover time is to decide whether or not a bus is going to stop on request or at compulsory stops. These are two different BRT operation choices. One is compulsory stops, which means the bus stops at every stop during the route and opens all of the bus doors. Compulsory stops should be implemented if the BRT service is going to replicate Rail Rapid Transit. The other choice is to stop by request, which will allow for a faster travel time and will only stop and open its doors by request. Some things to take into consideration when selecting which operational stop service will be implemented are, do the stops appear as RTS or upgraded bus stops, are stop request features on the vehicle, will boarding use all doors or just the front doors, will the stop add length to travel time, will the name of the station be announced or displayed upon arrival, and what is the climate inside and outside like (APTA, 2010).

On Board Vs. Off Board

Another way travel time can be reduced or added is with on or off-board fare collections. Some services across the world have fare payments collected at the front door, while others have payments collected off board like subways and other rapid transits. The difference between these is that off payment collection collects money off board which implies the installation of tickets and ticket validation equipment at the terminals. On-board payment collection collects money in a fare box while riders are on the vehicle. Both collection services have different advantages and disadvantages. The biggest advantage that off boarding payment had over onboarding payment is that it allows for faster travel time because it allows boarding at all doors and eliminates just the front door boarding. The biggest disadvantage of off-boarding payment is that there is an additional cost because an inspector needs to inspect all the fare payment booths. The ticketing payment booths also added additional cost because it is an additional technology that off-board payment collections has over on board.

Service Capacity

The Service Capacity Standards of a BRT service should be addressed during the design phases to ensure the peak load point of a route. Some factors to take into consideration when addressing Service Capacity Standards are vehicle type and model, number of seats and standing space, length and speed of route, ADA space, and interior or exterior bike accommodation (APTA, 2010).

Interviews

Different people have been interviewed from different regional transportation and planning agencies. Each of the interviewees have different perspectives on transportation planning. Valuable knowledge and information has been gathered from interviewing each one, especially those involved with transit services.

Interview Questions

The following questions were asked during the first interview. Other questions that came up during the interview are discussed in the following pages.

• How can the current public transportations system be improved or mortified to increase number of users?

• Which are the communities that benefit or utilize Pubic Transportations the most frequently?

• Which are the destinations or stops that are highly desirable?

• Do you believe that the City of Boise is ready to implement BRT system?

• What are the technologies that are currently being utilized on the current public transit?

• Is there any technology that would benefit current transit?

• How can the current system be more alternative transportation friendly?

Daren Fluke from Ada County Highway District (ACHD) 1/25/

How can the current public transportation system be improved or mortified to increase number of users?

It can also be land use. "On the land use side, we always need transit supporting density you need people concentrated around the transit facilities where they are at. From the transit side, anything we can do to make the transit service safer, affordable, reliable, and convenience to people. Perhaps the most important one is the last one convenience and with regards convenience the service needs to be more frequent and it needs to run earlier and later in the seven days a week. When it is available like that people tend to use it at higher rates."

Which are the destinations or stops that are highly desirable?

"Well what you want the transit to do is connect those attractors or activity centers within a within the city and so obviously downtown is a big one for us but BSU and if you look at our Community Plan Blue Print Boise it identifies all the neighborhood and regional activities centers within the city. And so, it is important to connect those destination where people either want to go or need to go because they work. Hospitals are also large employer of course the mall area but even areas that we think of neighborhood actives centers just where you have a cross road of primary street or arterials. You want to connect actives center where people work and access services.

What are the technologies that are currently being utilized on the current public transit?

"We have ITS installed right now in the conventional buses but the utilization will increase and be more efficient for BRT that what is on the conventional buses."

Stephen Hunt from Valley Regional Transit (VRT) 1/29/18
Duane Waken from Community Planning Association (COMPASS Idaho) 1/29/18

The interview with Duane and Stephen was crucial to the project because they shared tools and data that could be utilized during the analysis phase of the project. The list above shows the files and documents they shared. This interview wasn't like the others. The reason why this interview stood out from the rest is because the agencies that both Stephen and Duane work for. Both of these agencies (VRT and COMPASS) are crucial for this document because of the information that has been gathered and used on this project. Two interviews had to be schedule because of the information and data both agencies have contributed for this document.

What are the potential routes that will best utilized the most?
(Talk about Design Details)

"Using what is existing can help out that argument in other words the reason we are talking about Fairview Street is because it is in the Boise Transportation Action Plan." (Duane) So, the reason why we are proposing Fairview St. is because it is also labeled under the State St. TTOP Valley Connect Plan, and Connect 2.0. The things that I think that you will want to look at are how are we using the space between the curves and access management. How you route BRT in between intersections is one thing but how you get them through intersection is another thing. You usually have more room at the intersections." (Stephen)

Maureen H. Gresham Ada County Highway District (ACHD) and Commuteride 1/29/18

How can the current public transportations system be improved or mortified to increase number of users?

"Increasing service frequency and targeting specific corridors for shorter headways. Longer hours much longer span. They picked a few routes that will go past 6PM. One of the hardest populations to serve is the service workers because they aren't the regular commuting hours which are 8-5. It is hard to set up a something like a van pool for that industry. We cannot do that because buses don't run during certain hours. The other real thing that I think that need to be addressed is that is our land use patterns aren't really supporting smart commuting. I use smart commuting as carpool, walking, vanpooling, biking, and bus service. Our land use pattern makes it very difficult to finding a smart commuting alternative to and from work. We are always going to have suburbanization and people need those choices, however we are not addressing activity center activity development where people can get from one point to the other. We also need affordable housing because if we are not building affordable housing in our core areas then those individuals are having to go elsewhere to live and to be able to afford. All of those people are now having to drive to and from work. Unfortunately, where they are moving is very low-density areas and it is super hard to serve those areas. The vanpool and carpool those are option for those areas but again you start looking in all the different patterns and it hard to match them up." (Maureen)

Which are the communities that benefit or utilize Pubic Transportations the most frequently?

"Well, I can look at my ridership (COMMUTERIDE) our biggest routes are Caldwell and Nampa to Boise, Boise to Mountain Home because the Air Force Base is down there and we have a couple of vans that go to Mountain Home. As far as other modes like the bus, they serve Nampa, Caldwell to Downtown but they really don't serve Kuna, Eagle, and Meridian very well.

Max Clark from Capital City Development Corp (CCDC) Matt Edmond from Capital City Development Corp (CCDC) 2/2/18

How can the current public transportations system be improved or mortified to increase number of users?
"You need land use to change, as well you need density along the corridor so that people can walk to the station and signal family often times doesn't get you that. You need designated transit funding. You need a lot more than what we have here." (Matt)

"Transportation to the State of Idaho means basically roads and potholes they don't think outside the box. Our culture here in Idaho partly because of and history and density is still auto focus." (Max)

Secure Bicycle Parking
"We got bike lockers in the garages. (Matt)
"We have about 8 lockers in this garage and 5-4 lockers in the other garage which we have about half of them rented out. They haven't been too popular because people like old cruiser bikes with wide handlebars and can't fit in the lockers. We always have this fear which hasn't happen yet that they are used for only god knows for what or a place for someone to place a bomb in. We haven't had anything like that happened. (Max)

Second Interview with Valley Regional Transit and COMPASS Idaho

Stephen Hunt from Valley Regional Transit (VRT) 9/3/18 Liisa Itkonen and Rachel Haukkala form Community Planning Association (COMPASS Idaho) 9/3/18

Who reports to who? Who is in charge a transportation project?

"If we would be doing a project on BRT we would be working with ACHD. Primary because they own the Right-of-Way. Any of the treatments we are looking into doing. Even if it is a transit priority. On State Street for example, there is a vision on having HOV lanes on the 6th and 7th lanes. We would have to be required to work with ACHD to see how they were built. Right now, isn't legal authority to have HOV lanes in Canyon County. For the question to who reports to who for example, a street like Fairview would be operated and maintained by ACHD. It's possible that if you are on state routes that ITD would be involved because they manage the highway system. So, along Fairview the Right-of-Way belongs to ACHD. They report to then the commission. We also would to the City of Boise and Meridian to see if there is a land use permitting to happen. To increase the density along the corridor. They would have to report to their city council. We (VRT) report to our board which our board representation of each jurisdiction. So, we would report any progress on any project that we have. In addition, the capital funds would be partly federal dollars so we would have to report Federal Transit Administration (FTA) on the development, updates and progress of the project we have. We would report to COMPASS as part of our regional efforts. This is because the project would need to be included in our Regional Long-Range Transportation Plan and that's how COMPASS board would get involved. There is Transportation Improvement Plan looking out five years on capital project. So, it would need to be included in the Transportation Improvement Plan. We provide updates on those projects and work to be included in those long-range plans and would need to get into those plans so it's up to COMPASS board (Stephen)."

"So, if your question is 'whose project is going to be' it would be the one who is actually getting the money. It would probably be VRT (Liisa)."

"This is tough is because (this is happening on State Street Corridor) a lot of capital project are supporting infrastructure is actually (at least right now) under the direct authority of ACHD. There are trying to figure out what it would mean if ACHD would build transit only infrastructure.? If transit specific infrastructure where to be built who would maintain it? Its public Right-of-Way clearly falls back into ACHD Right-of-Way. So those are things that are definitely at play and we are trying to figure out what that would mean. It would mean an arrangement between VRT and ACHD at minimum. Potentially, change legislation at state level. ACHD maintains all public Right-of-Way in Ada County but they don't believe they have authority to build transit specific infrastructure. If transit specific infrastructure built not by ACHD, who would be the ownership and who would maintain it. If it was VRT building it there would need to be an arrangement to who would maintain and own the Right-of-Way. (Stephen) "

What is the state law that does not allow exclusive lanes for BRT?

"The only place we you can have HOV lanes is counties with 20,000 people or less (Liisa)." So, it doesn't say Ada County can't HOV. Which it says HOV lanes are authorized in counties that are less than 20,000. So, to my knowledge there is no reference to transit only lanes in state code. If it is not specifically stated in the state code it is prohibited. Because exclusive lanes aren't expressed in state code they are prohibited. (Stephen)"

How are time table for the duration of the travel made/designed?

"The time table would be design after the route is built and what level you would be providing. That is a public phasing document. But what we need to take into consideration is how the level of service is determined along the corridor. Which will be included in the time table. That gets determine by a process where VRT would proposed a certain level of service on the corridor based on what that corridor need to do for the network. In terms of how many people you are able to connect to different destinations. So, you are looking at population density and job density. Because the way we are funded we would be working with our funding partners to determine the level of investment they are willing to invest along that corridor. As well working with the public to get input on how we allocate those services along the neighborhood. Level of service is the number of time that the service comes in a day. To determine how long it take to one end of the route to the other end. That's either a receiving process in a sense that we just drive the route and see how long the drive takes, the other is proactive approach on this is how long we wanted it to take and what we can do to better the time travel. That decision would be in congestion with ACHD. So it would require us to work that out with ACHD because they are the ones who operate traffic signals and right turns only. The City of Boise as far on how many stops location and where they are located at. (Stephen)"

What buses will be utilized for State Street project?

"The expectation is that we would be using the 60-foot articulation coaches. Currently we have all compress natural gas (CNG). There is some interest on getting electric articulating buses. It would be preferable with lower noise than CNG and electric could be cheaper than compress gas (Stephen)."

What environmental benefits will these buses have?

"The biggest environmental benefit will come from change in use. Having more people riding public transportations will you'll see the largest change in environment benefits. That's the reason for having coaches rather than buses, you'll be able to fit more people which you'll be able to distribute the emission over more people than few people. Currently there is not a sixty-foot electric coaches only trollies. If you would want to see environmental benefits you would want to look into CNG vs. electric emission per miles. Both of them would require supporting infrastructure. Like CNG you would need compressors where coaches would be able to fill up. Which can be very expensive. Electric has the capacity to have more outlet. With the CNG you'll have to have a compressor and you have to be connected to the natural gas or by truck. And with electric you'll need to take into account the batteries (Stephen)."

Who is in charge of park and rides?

"Most of our park and rides are a joint development. For joint park and ride the owner of the parking lot would be the owner of the park and ride parking lot. Park and ride are only being used where there is good transit service and vanpools (Stephen)."

Who decided the names for each station on a route?

"Back in 2005 there was a plan where they would renumber the routes starting at the Boise River then going to south and west going back to the river. You would name the route number in sequentially. Intercounty would have 40's, Canyon County would be 50's. As routes have been added or changed since then, we try to keep the same convention but it a VRT convention. If we did a different structure where we would call them something different like type of potatoes those would be done by VRT and with a public process. Bus stops typically default to street names. On occasion where there has been a historical reason it would have different name (Stephen)."

Case Studies

Case Studies Summary

The following section describes two successful BRT systems that serve different communities in a specific way. Each system experienced conflicts during the preliminary design phases. The Emerald Express BRT System was beneficial the agencies discovered how hard it is to implement exclusive lanes. The demographics of Eugene, Oregon are similar to the demographics found in Boise, Idaho. The Health Line case study has contributed to the project by demonstrating how hard it is to get financial support from the state and how there are different opportunities for funding. Health Line BRT project was an expensive project because they need to do a lot of infrastructure reconstruction along the corridor including protecting and restoring historical buildings along the corridor.

The Emerald Express Bus Rapid Transit(BRT) Project

Eugene, Oregon

Introduction

The Emerald Express is located in Eugene, Oregon and is a Lane Transit District(LTD) that operates using Bus Rapid Transit(BRT) that mimics Light Rail Transit(LRT). The first express line that the city adapted was for the Franklin Corridor that launched in 2007. The second extension was to Gateway Corridor that launched in 2011. Now the city is extending an express line to the West Eugene EmX Corridor that was launched in 2017. Throughout the decision-making process, the City of Eugene went through many challenges to decided which public transportation system was better for the city. Some of the characteristics that the city based their decision on included flexibility, affordability, time efficiency, sustainability, demographics, economic development and beneficial for the future. The City of Eugene finally came to the conclusions that Bus Rapid Transit was the best option for city because of the flexibility, affordability, and demographics. Also, LRT needs more population and financial support than BRT and Eugene. "BRT was identified as an innovative low-cost transit strategy to meet the needs of the Eugene-Springfield, Oregon" (Carey, 2006). Although throughout the years, BRT has expanded in Eugene, there are some lessons to learn for each of the corridor that were designed. This is good because the city can learn and adapt from these lessons as each corridor continues to be constructed. With the construction of the first Springfield BRT transit there was a job creation tread within .25 to .50 miles of the transit. "According to rankings by BRT proponents at the Institute for Transportation and Development Policy, the Eugene BRT system is the second best in the nation, after Cleveland's" (Goldmark, 2013). The EmX BRT is the best example for comparison to Boise because of the similarity size they shares. The population of Boise is around 223,000 and the population of Eugene, Oregon is around 166,000(Springfield is around 61,000). The median household income is around $42,000 with Boise, Idaho is around $49,000. So, while comparing both cities it is clear that they are very similar to each other. The BRT EmX Eugene-Springfield is a great example to do a case study to compare Boise, Idaho with because of the flexibility, demographics, affordability and economic growth.

Full Case Study

In December 17, 2006, the first BRT launched in the Land Transit District (LTD is the Client) from Springfield to Eugene, Oregon. The construction for the first BRT started in 2004 and service began in 2007. The Springfield-Eugene BRT is four miles long and has 8 stations with a cost total of $24 million (Starcic, 2016). Since the launch of the first BRT, the City of Eugene has expanded new route to new destination. The second extension happen in 2007 with the extension to Gateway. Gateway extended from Springfield station to Gateway Mall adding 7.8 miles to the EmX. The most recent extension happened in 2017 to West Eugene Corridor. This new extension would add an additional 9 miles with 26 new stations and 7 new hybrid diesel-electric buses. The total cost of this new extension was $96 million dollars (Starcic, 2016). The "Federal Transit Administration award $77 million in federal grant funds" (Taubenkibel, 2015). This new extension from Eugene, "will improve access to employment, education, and medical facilities in downtown Eugene, Springfield, and Gateway area in North Springfield, including major destinations such as the University of Oregon and the Sacred Heart Medical Center at River Bend" (Taubenkibel, 2015). With this new extension, it will provide fast and frequent service and connect residents to new job opportunities. About 52,000 residents will be connect with 81,500 jobs that lay within .5 mile of the route (Taubenkibel, 2015). With the new expansion of BRT transit surrounding the City of Eugene, the city has seen and intensive usage of the BRT transportation. "The four-mile franklin line had a little over 1.4 million boarding the first year in operation" (Starcic, 2016). With the boarding number being that high, the city could see the potential service that the BRT Transit had to the community. With the results of the first-year boarding number the community sow a potential to expand different routes to different surrounding communities. As the expansions continue to grow the city also sow a growth in boarding numbers. "As of 2015, the line totaled an estimated 2.7 million boarding" (Starcic, 2016). With each route, there was a trend of growing jobs within .5 miles of the route. "BRT has many promises, one of which is enhancing the economic development prospects of firms locating along the route" (Nelson, 2013). The City of Eugene wanted to connect local neighborhoods to downtown because of the job commuting as well as education opportunities. The Metropolitan Research Center

Figure 4.1, Source: Bus Rapid Transit Looks Set for Growth in Oregon

at the University of Utah did a study to see how the implementation of a BRT will improve overall economic performance of the surrounding route. The study was focused for the years 2004-2010, they looked at employment rates and change and growth of job. The study found three thing one was that "the metropolitan area outside the 0.50-mile BRT station areas, jobs fell by about 5 percent or more than 5,000 jobs" (Nelson, 2013). The second and third things that the study found was that "jobs stayed about the same between 0.25 and 0.50 miles of station area but increased by about 10 percent or nearly 3,000 within 0.25 miles of station areas" (Nelson, 2013). As this study shows, BRT could improve employment rates that lay within 0.50 mile of a BRT route. The design detail or design elements that is used for EmX is one of the reasons why BRT is so time efficient. The new 60 foot vehicles that will be used in the new extension to West Eugene will be New Flyer diesel-electric hybrid Xcelsior bus that have at- grade loading with five doors and two ramps for accessibility (Starcic, 2016). The new buses will have "low emissions, better fuel economy and longer brake life lower maintenance cost than conventional diesel vehicles" (WSP). The new vehicles will be driving on an exclusive lane that is just dedicated for the buses. The lane has a grass strip between the concrete where the wheels of the bus will be driving on. "The grass reduces impervious surface areas and improves the aesthetics of the facility" (Graham, 2006). This will improve traffic congestion and will make the trip uninterrupted. The Springfield BRT, "will open with approximately two-thirds of the route using exclusive lane" (Graham, 2006). The rest of the routes are share with personal vehicles but the city tried to make as much exclusive lanes as possible. Since the City of Eugene only had certain areas where they could implement executive lane for BRT, this allowed the buses to operate in public roads. "BRT is incredibly flexible, so we can operate in mixed traffic, which we do in certain areas, and we can also have exclusive curb lanes that

Figure 4.2, Source: Bus Rapid Transit Looks Set for Growth in Oregon

we have running in front of the university and in other parts of the corridor" (Starcic, 2016). Another reason that makes BRT better than LRT is the flexibility BRT has over LRT. This was a big driving force why the City of Eugene decided to go with BRT instead of LRT. The City of Eugene did not have an easy route during the planning process to accomplishing the successful alternative transportation the city has. The planning process started in 1996 with conceptual planning and sketching desired system. During the conceptual planning the city would do concepts that would highlight routes. "Selection was based on existing travel needs in the community and the desire to have a successful first corridor" (Graham, 2006). The LTD board and congressional representatives put some condition on the project before approval. "The purpose of these conditions was to ensure full community buy-in to the project and to ensure that the project's success was due to it attracting riders rather than forcing user of other travel modes to use transit as the result of other punitive measure" (Graham, 2006). After approval, the proposed plan needed to also be approved by all of jurisdiction of the plan. Than after approval of the jurisdiction, the plan was moved to the preliminary design for the corridors. Then the entire group needed to me meet to fix minor flaws in the design. Throughout the whole process the input of the community was crucial even people with disabilities and cyclists had input. After the Springfield BRT station was built the city and the design team encountered problems that needed to be address for future extensions. The first BRT extension had parts of the route that were not possible to have two-way traffic. "To solve this, they implemented share lanes, which use block signaling to ensure that only one direction is in the share lane at a time" (Starcic, 2016). This was a learning lesson because what the city found is the that share lane would take too long clear one direction. Another problem that the team encounter was that it was hard to obtain state-owned corridor simply because the state did not understand the project. Since the city has implemented different extension throughout each one they have learned valuable lessons from each one.

Timeline:
- 1996- Planning for Emerald Express Transit began
- 2001- LTD selected BRT over light rail
- 2003- Vehicle Selection
- 2006- Vehicle Where delivered
- 2007- EmX first BRT opens
- 2011- Launch of new extension from Springfield transit to Gateway
- 2017- Service begins for new extension from Springfield to West Eugene

Primary Objective:
- Extension to other communities
- Time Efficient
- Flexible
- Economic Growth
- Improvement of transit
- Persuade users to use BRT rather than personal vehicles.
- Enhance share transportation
- Approval of all jurisdiction
- Sustainability
- Environmentally Friendly

The Health Line Bus Rapid Transit(BRT) Project
Cleveland, Ohio
A Case Study by Rafael Hernandez

Full Study

The Health Line began operating on October 24, 2008 serving the community of Cleveland, Ohio. The Bus Rapid Transit route consist of 58 stops on the 9.8 miles long route running on the Euclid Avenue or Corridor. The Health Line BRT service would be offered for 24 hours a day to the community including holidays. The Health Line is operated by Grater Cleveland Regional Transit Authority (GCRTA). The GCRTA started planning for a new BRT service in 2005. During the begin phases BRT was chosen over Rail Transit because of financial reasons. Once BRT was the service option, "the Regional Transit Authority specifies three main goals for the Health Line: (1) improve transit system efficiency, (2) promote long-term economic and community development, and (3) improve quality of life along Euclid Corridor" (Parker,

Figure 4.3, Source: Recommendations for Implementing Bus Rapid Transit in Pittsburgh's Oakland-Uptown-Downtown Transit Corridor

2009). The Health Line BRT service will be replacing route 6 which used traditional transit service. When the RTA set the three main goals they also they looked at existing conditions and determined that Euclid Corridor was a valuable corridor to the city because of the neighborhoods it connects. Some of the connections that the Euclid Corridor connects are Downtown (Central Business District), University Circle, commercial and residential communities, major cultural, medical and

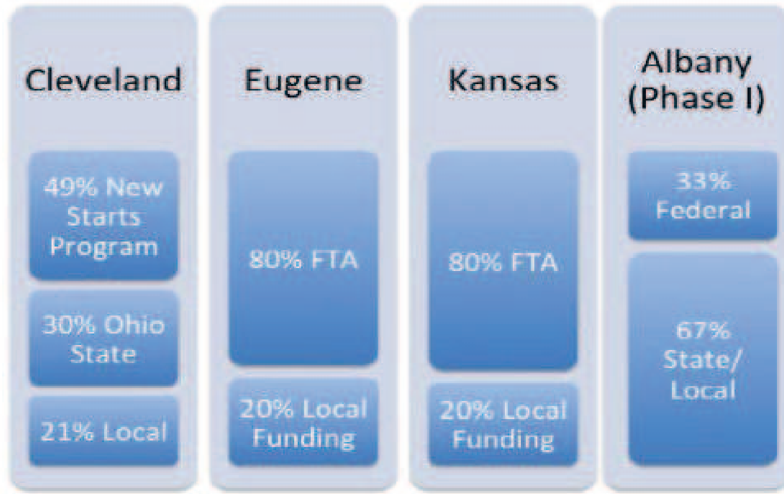


Figure 4.4, Source: Recommendations for Implementing Bus Rapid Transit in Pittsburgh's Oakland-Uptown-Downtown Transit Corridor

educational districts. When the Euclid Corridor was Route 6 it would serve "an average of 15,000 to 18,000 riders per day" (Parker, 2009). Since the operation of the Health Line, RTA has seen an increase of 39% ridership per month (Parker, 2009). The Health Line is the first and only operating BRT line service in the City of Cleveland there is another BRT Line that is in the primary stages. Cleveland has other methods of transportation that include one heavy rail line, two light rail lines, and an extensive bus system. Some of the technology/ design features that the Health Line has are 21 diesel/electric

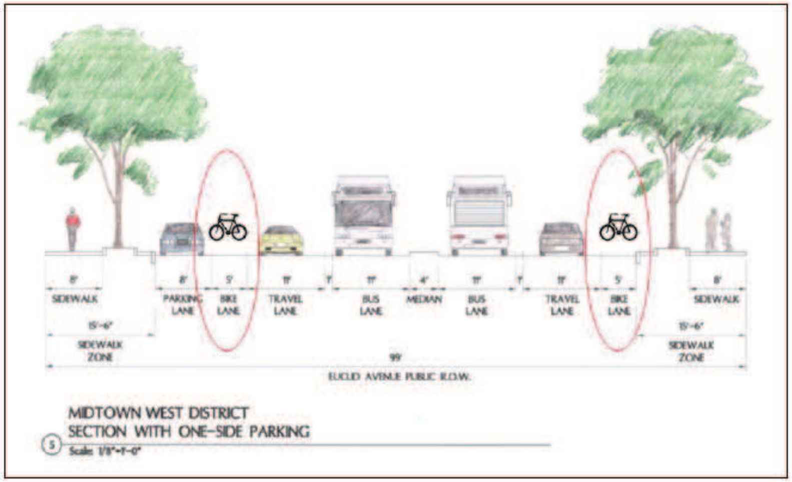


Figure 4.5, Source: Recommendations for Implementing Bus Rapid Transit in Pittsburgh's Oakland-Uptown-Downtown Transit Corridor

vehicles, off board collection payment, fast loading/unloading boarding platforms, multiple door boarding, dedicated bus lanes, ADA accessible, GPS communication, text display and audio technology, and frequent service. Some of these elements designed listed above also allows to improve travel time for the ridership such as off-board payment. With this method, it allows riders to purchase ticket ahead of time at the stations. Some of the design features that are found at the stations are security cameras, text display, fare vending machines and audio announcement (Hu, 2011). Some of these features can also be found on the Emerald Express. Something that would distinguish the Health Line from Emerald Express is the funding source. The economic plan that the Greater Cleveland Region Transit Authority prepared to be implemented through 2025 which included the "rehabilitation of old buildings into housing and retail centers, new construction for business startups, and major expansions of universities, museums and hospitals" Hu, 2011. So far over $4.3 million has already been invested along the Euclid Corridor. For comparison, the Emerald Express funding came mainly from Federal Transit Administration which provided with 80% of the total cost of the project and the rest 20% came from local funding (Parker, 2009). The funding for the Health Line came mainly from New Start Programs which granted 49% of the total cost and the rest of the cost came from Ohio State with 30% and Local funding with 21% (Parker, 2009). State and Local funding played an important role during the funding because the New Start Program is extremely difficult to be granted more than 50% of the Capital Cost. The City of Cleveland, non-profits, community development, private and public sectors where very strong supports and wanted the Heart Line Bus Rapid Transit to be a success. All of these sectors promoted economic development programs for the system. "GCRTA announced many attractive financial incentives for developers including: Land assembly and land banking initiatives, street improvements, GCRTA's art in transit program, tax increments financing, tax abatements, federal empowerment zone, city loans and grants, brownfield incentives, Ohio Job Creation Tax Credit, Historic Preservation Tax Credit, Cleveland-Cuyahoga County Port Authority financing, City officials established the "First Five" Programs, and "Circle Living" housing assistance program" (Hu, 2011). With each of these financial incentives it helps the GCRTA achieve the total capital cost for the system. The total capital cost of the Health Line was $168.4 million dollars an average of $17.18 million dollars per mile (Hu, 2011). A major reason why the Health Line capital cost was so high was because they needed to reconstruct a large-scale area along the corridor and adding new BRT stations. Some other infrastructure improvements that were required to be constructed throughout the corridor "includes exclusive bus lanes, pedestrians zone enhancements, building front to building front, underground infrastructure, roadway reconstruction and design, traffic signal equipment installation, elimination of on street parking and location of loading zones" (Hu,2012). Another infrastructure improvement that was essential to be constructed along most of the BRT route was bicycle lanes. With the implementation of bicycles lanes this was going to allow capture riders from farther distances. The method that the Health Line decided to accumulate for bicyclist was to have designated space inside the BRT buses to allow bicyclist to bring their bicycles inside the bus with them. Exclusive lanes play an important part in the design and operation of a BRT system. Exclusive or dedicated lanes allow buses to travel free from congestion and provide an additional use for emergency vehicle. The operational cost of the Health Line service was eligible to receive funding for operating cost because it meets the guidelines to be grated financial assistance through the Congestion Mitigation Air Quality (CMAQ). The financial assistance period that was grated is from August 1, 2009 through October 26, 2011. During this period, the Health Line was able to cover 80% of the total operational cost (Hu, 2011). The operational cost is usually covered by revenue, local taxes, and federal transfer funds when supporting assistance isn't there (Hu, 2011). Since the Euclid Corridor had all of this financial support, it has become a successful BRT service providing many benefits to the City of Cleveland and the surrounding communities. Since the start of the operation, the City has seen an increase within and around the city and "according to the DeRosa (2008), by 2025, it is expected that Euclid Avenue will create: 7.9 million Sq. Ft. in commercial development, more that 5,400 new or renovated residential units, $1.3 billion in capital investments, $62.1 million in annual GCRTA sale tax revenues, and 13,000 new jobs" (DeRosa, 2008). These are predictions that are well underway to becoming a reality.

Primary Objectives/Goals:

- Improve Transit System Efficiency
- Promote Long-Term Economic and Community Development
- Improve Quality of Life Along Euclid Corridor

Timeline:

- 2005-GCRTA Started Planning for a New BRT Service
- October 24, 2008 Health Line Began Operating
- 2009-2011 CMAQ
- 2011- Juvenile Violation Fare Program

Analysis of Fairview Corridor

Urban demographics of a city can mitigate the performance of public transportation. Urban demographics can range from household income, population growth, population density, urban development, zoning, commuters per household, employers, and autos per household. Household income can dictate what type of public transportation is more valuable to their financial status. “Busing, for example, was argued to attract lower income population to neighborhoods, while rapid transit, such as the subway, was argued to attract higher income peoples” (Barton, 2017). While taking a closer look, higher household income is more likely to use rapid transit like rail transportation while lower income is more likely to use buses because of lower fees (Barton, 2017). Where household income is lower, greater concentration of bus stops could be found due to slower travel times, which makes it an undesirable form of transportation. Also, a greater concentration of public transportation could attract lower household income because it is more affordable than private transportation (using a personal vehicle). This is one of many reasons why low household income could be found concentrated in cities because of the availability to public transportation to commute to work inexpensively and not having to use personal transportation. If low household income were to be found outside the city, the residents would have to provide their own private transportation because it would be less beneficial and more expensive for a public transportation system to travel outside the city. The following graphics were gathered from the following sources Center for Neighborhood Technology, and City of Boise. These graphics are the most current graphics available for Fairview Corridor. The Center for Neighborhood Technology is a non-governmental organization that promotes more livable and sustainable urban communities by delivering research, data tools and solutions that will address environmental challenges for neighborhoods like those in the city of Boise.

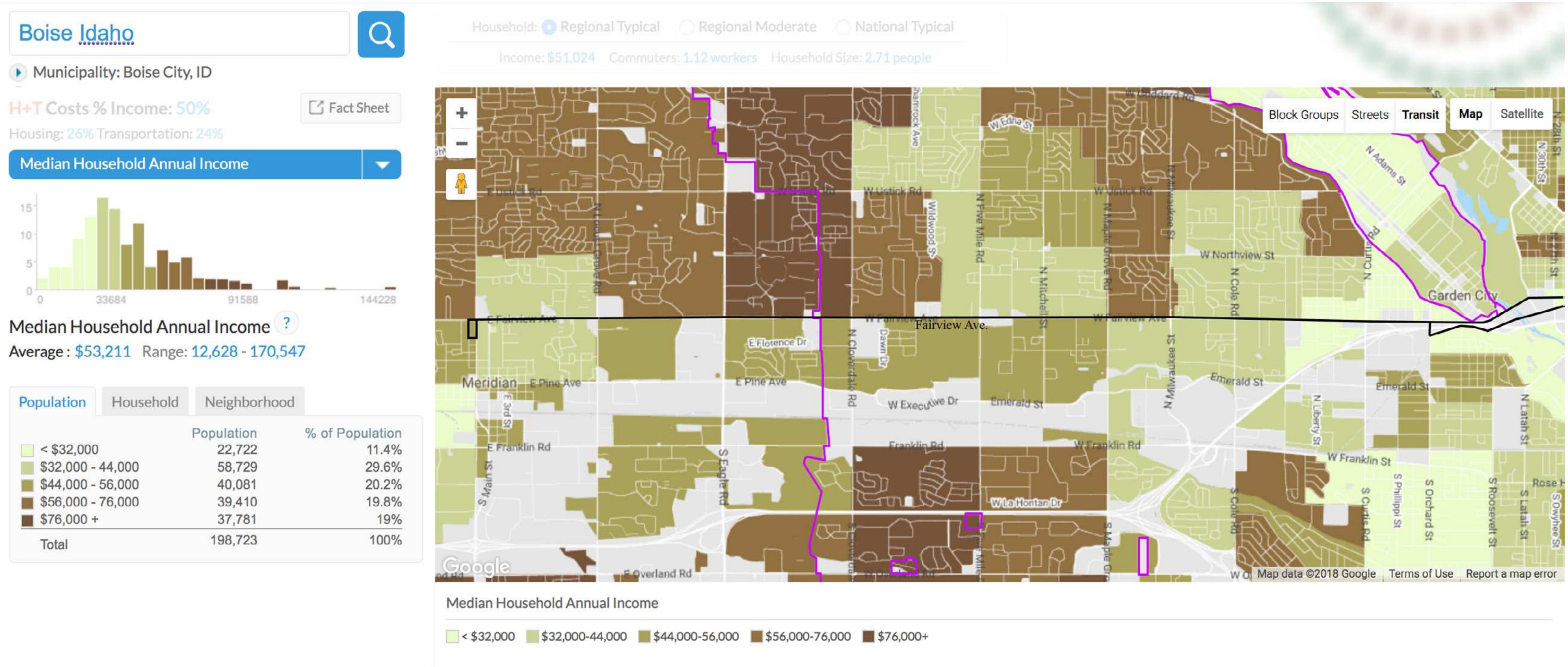


Figure 4.6, Source: Center for Neighborhood Technology

Median Household Annual Income

The following information has been gathered from Center for Neighborhood Technology and is the most current data available to date for Median household annual income in Boise. The data includes annual income of anyone above the age of 15 and older which may or may not be related to anyone in the household. The average household size is 2.17 with 1.12 of those being commuters and $53,211 being household average. The table legend shows the number of people that falls within a certain income gap and the total percent of that population. The graph legend shows a graph of the percentage and the corresponding population. The map image shows a wide range of colors that correspond to household income. Some of the lighter brown colors include the lower range of household income while one whole block along Fairview is in the high range of household income being the darkest brown. One can surmise that there are far more blocks on the lower household range than high household income, and could benefit from having bus rapid transit due to the mixture of incomes.

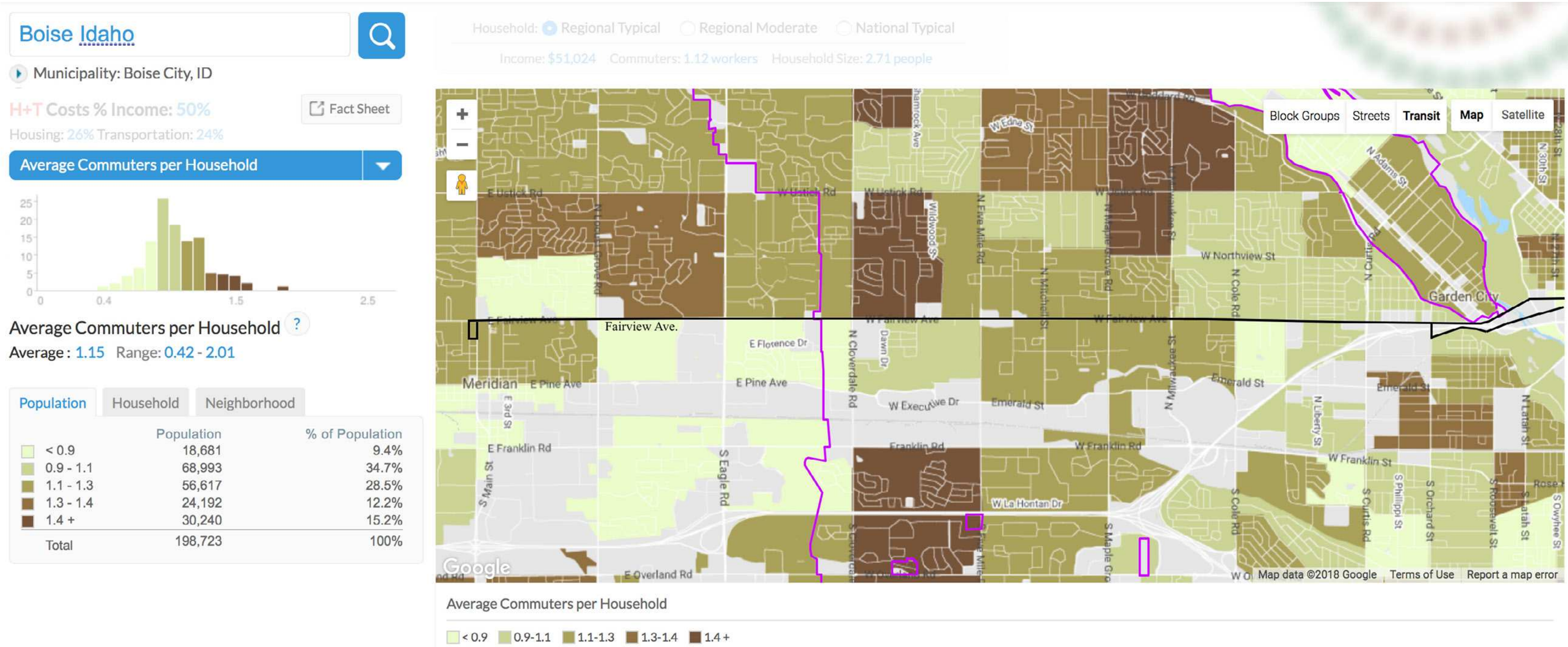


Figure 4.7, Source: Center for Neighborhood Technology

Average Commuters per Household

The following information has been gathered from Center for Neighborhood Technology and is the most current data available to date for average commuters per household in Boise. The average commuters per household is 1.15 per household and the range is from 0.42-2.01. The number of commuters per household is represented by a color scheme depending on the number of commuters. The highest number is dark brown which represents 1.4+ commuters per block. The lowest number is light brown which represents 0.9 commuters per block. There is a large variety of different brown colors throughout Fairview Ave. There are dark brown blocks heading outward towards the northern and western direction on Fairview. This is good evidence that feeder routes will be needed along those streets. The feeder routes will move commuters from those corridors to a main, faster route, like the proposed BRT route along Fairview. Without routes along those feeder corridors, the BRT route will be inefficient and will not be utilized because commuters will not have access to public transportation.

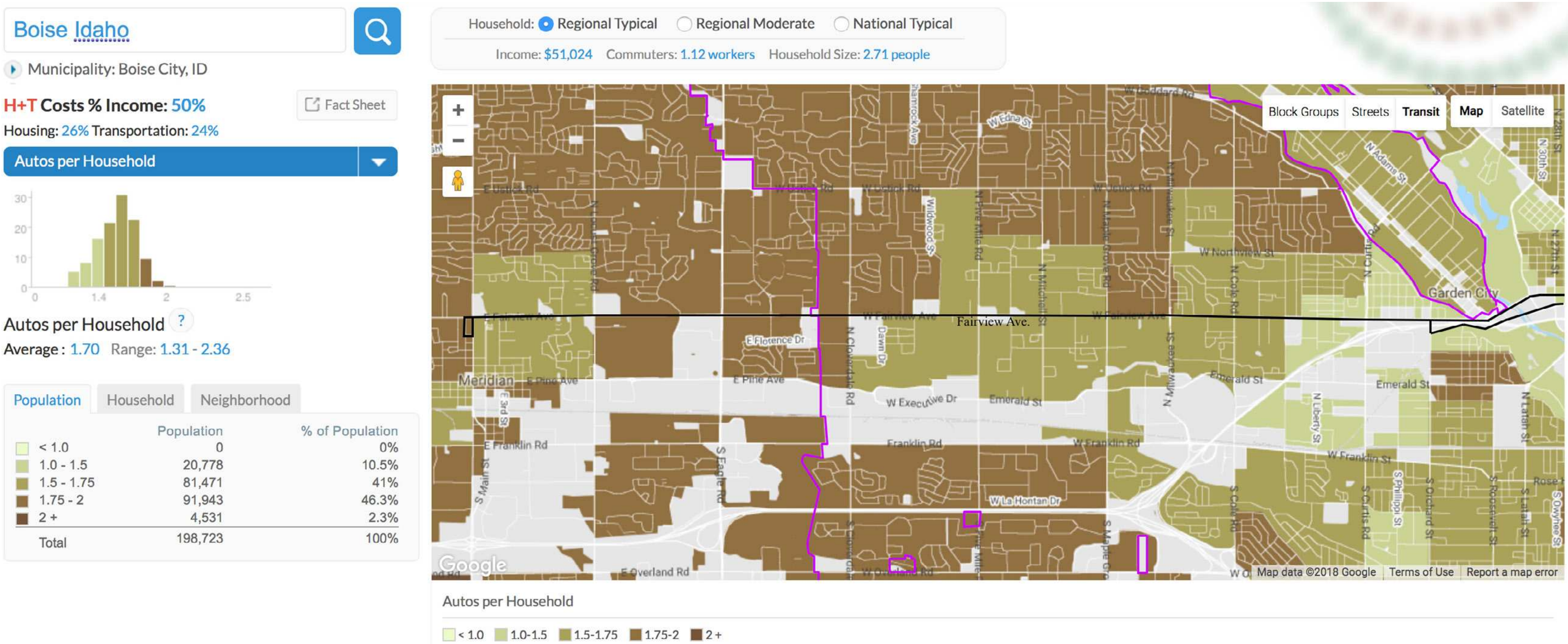


Figure 4.8, Source: Center for Neighborhood Technology

Autos Per Household

The following information has been gathered from Center for Neighborhood Technology and is the most current information available to date for autos per household in Boise. The data includes personal vehicles owned by each household. The data is categorized by color range correlating the number of vehicles per household and the population percentage. The table legend shows a wide range of colors that correspond to the number of autos per household. The average auto per household is 1.7 autos per household and the range varies form 1.31-2.36. The map shows a wide range of color variation. The majority of the dark brown color blocks are along the western part of Fairview Ave towards Meridian. The dark brown color blocks represent 2+ autos per household. The majority of the lighter brown color blocks are towards downtown Boise. This could be for numerous different reasons higher access to public transportation which will cause for lower need for personal vehicle.

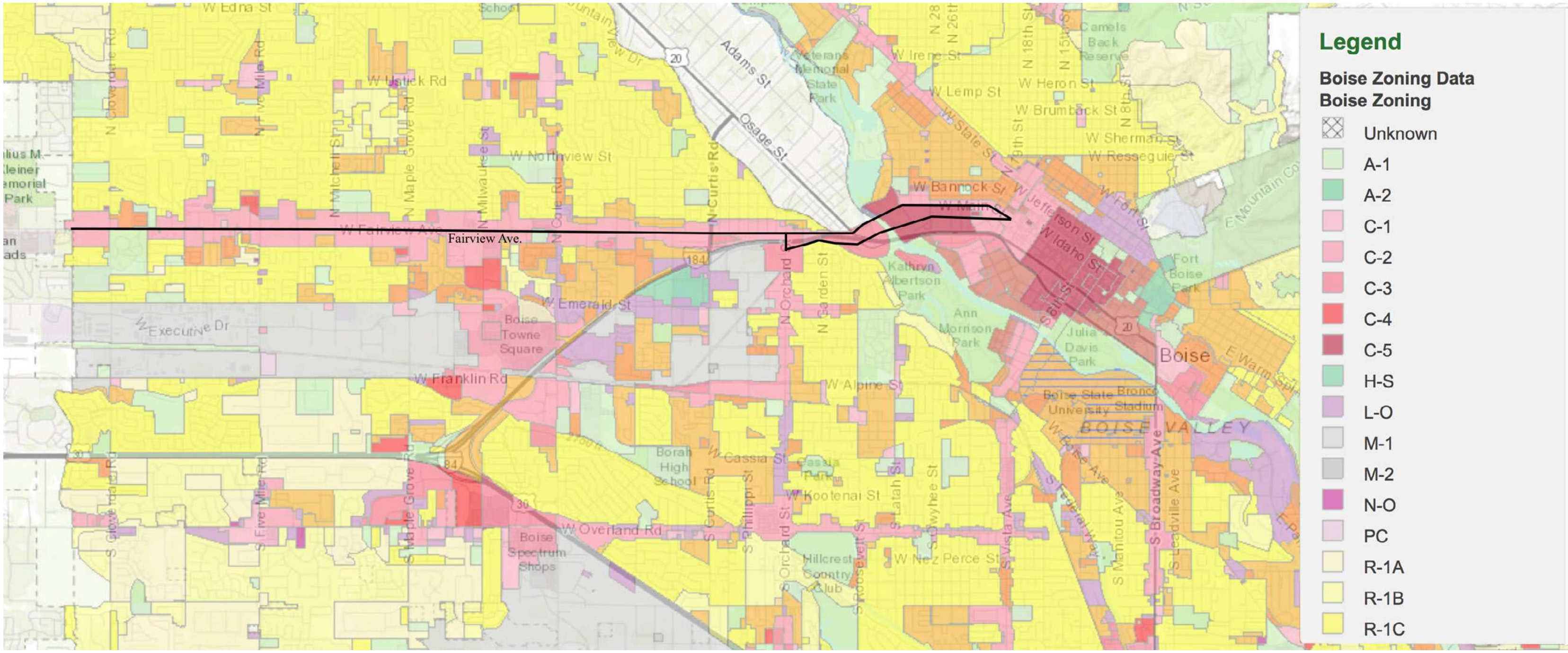


Figure 4.8, Source: City of Boise

Zoning

The following image shows the different zones within Boise's city limits. Each zone is signified by a distinct color on the legend. For example, the darkest yellow color on the legend represents R-1C which is single family residential. The single family residential zone could be found surrounding Fairview corridor. The Fairview corridor is mainly C-2D zone, which represents General Commercial. A small portion toward downtown is C-5, which is Central Business zoning, and allows for a greater mix of land uses. The small portion of zone C-5 starts where Fairview Ave. splits with Main St. The General Commercial zone allows the following development uses auto sale, television station, garden supply, theater, motel, and commercial parking lots. The Central Business zone allows for the following developments uses banks, club, retail store, pharmacy, restaurant, hotel, office, parking structure, indoor recreation, multiple-family dwellings and theater.

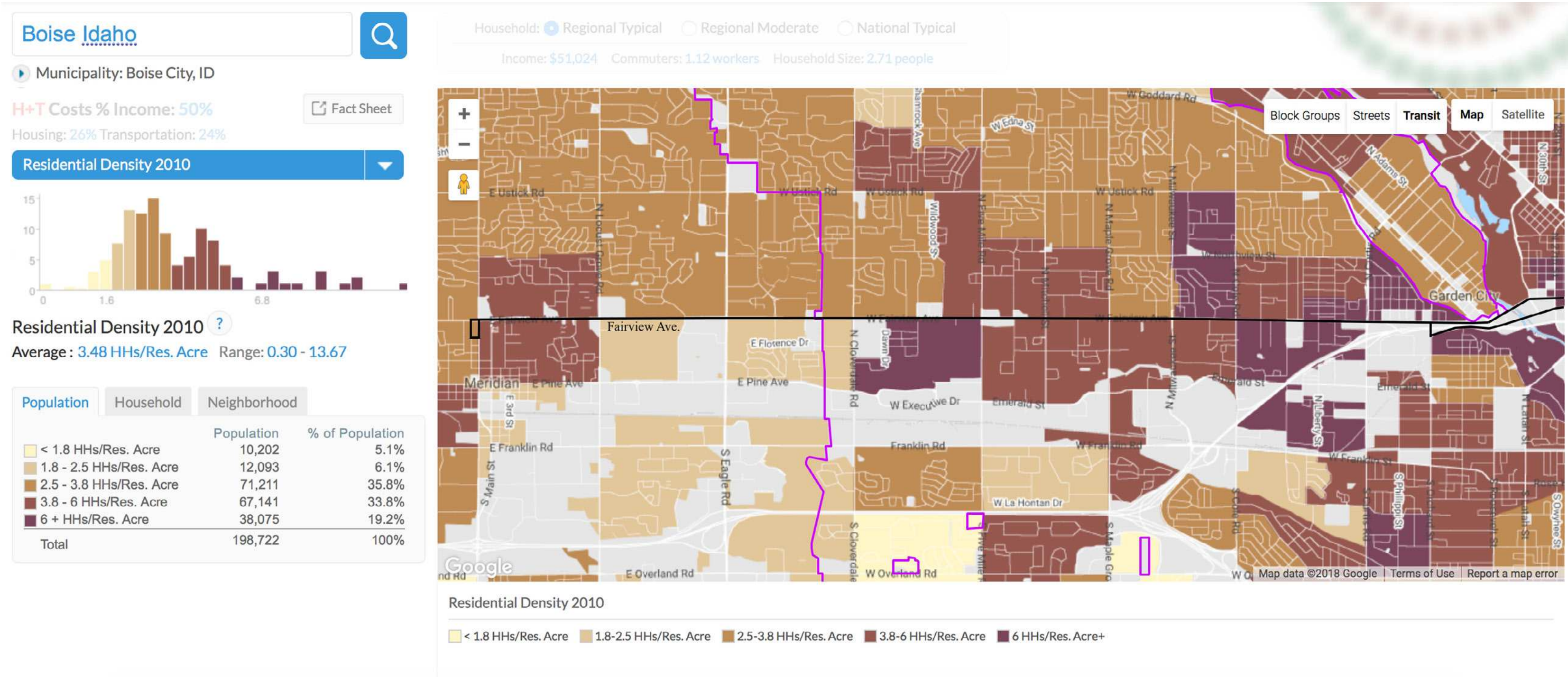


Figure 4.9, Source: Center for Neighborhood Technology

Population Density

The following images show residential density for the city of Boise. The first image is from the Center for Neighborhood Technology. This image shows residential density in color blocks. Each different color block represents different household residents per acre. The data that the first image shows is data collected from 2010 census and is the only map image that shows residential density for the city of Boise to date. The darkest color represents 6+ household residents per acre and the lightest color block represents 1.8 household residents per acre. The average household residents per acre are 3.48 and the range is .30 to 13.67. There is a consistent brown color along the most northern part of map which represents 2.5 to 3.8 household residents per acre. There is more variety of dark brown toward Downtown Boise represents a higher population density per household per acre. This consists of the darkest brown which is 6+ household residents per acre and 3.8 to 6 household residents per acre. On the most southern part of the map there are blocks that are not associated with a color. This could be for many reasons like the land usage could be used for something different like storage, business, and retail stores. The second image shows a table of historical population estimates within city limits of communities that are within the Treasure Valley. The table is from Community Planning Association or COMPASS Idaho. The estimated population is from 1990 (census) to 2018. The estimated population uses the census data for the years 1990, 2000, and 2010. The previous image shows the data gathered from the 2010 census. Since 1990, the population has grown from 125,738 to 232,300 in 2018. The biggest growth being from 1990 to 2000. The regional population has grown from 295,851 to 688,110 in 2018.

Population Heat Maps

Figure 4.10, show the population growth for the Treasure Valley from 2010 to 2040. The following heat map shows the population for 2010. The light green areas are the most populated with 10-15 people per acre. There is some yellow areas within the light green areas. The yellow areas show 15-20 people per acre. Figure 4.11, shows the population for 2040. There are more range of color for this map because of the population growth. One of the new colors added to this map is red which shows 40-50 people per acre. More of the higher density colors occur towards downtown. This is common because of the proximity to employment centers (downtown). The yellow area from last map expands, and is starting to overcome the green areas, showing a predicted shift to higher population density in these areas. More green areas have been added, mainly along the most northern part of the map which are the hillsides. Of course, the green areas from the heat map for 2010 grow as well.

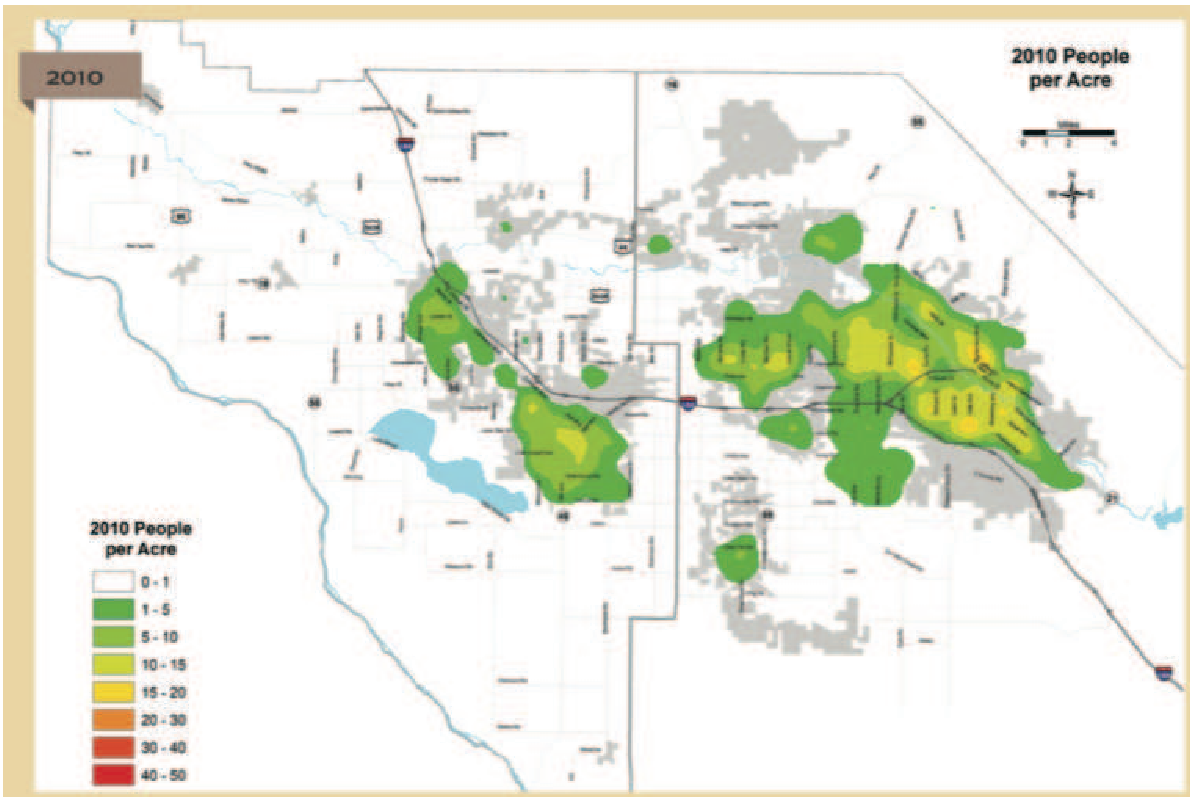


Figure 4.10, Source: COMPASS Communities in Motion 2040

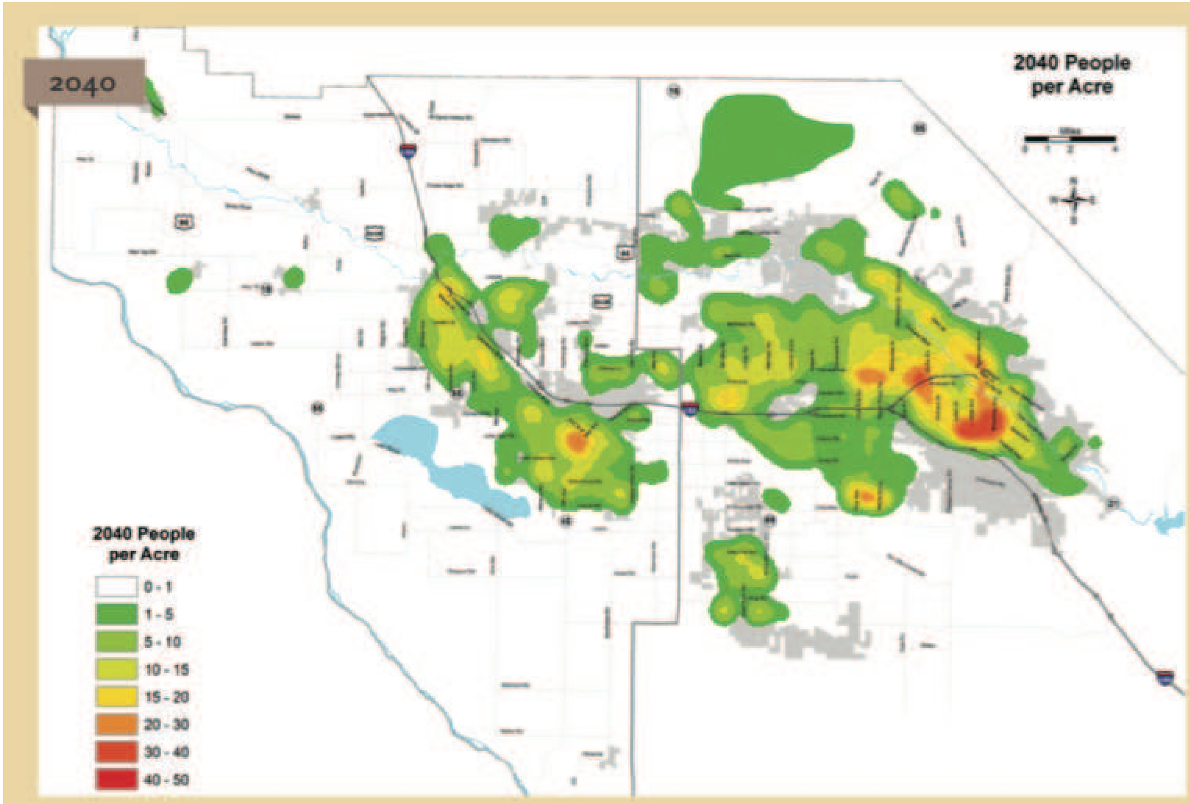


Figure 4.11, Source: COMPASS Communities in Motion 2040

Land Usage

The Communities in Motion 2040 Vision document highlights different maps and scenarios on how Treasure Valley should look like by 2040. This document was developed by COMPASS and association of local governments. In this document, they include a growth scenario master vision map that highlights important land use like future mixed use and employment centers. They also highlight future neighborhoods and existing neighborhoods. Figure 4.12, shows the master vision map. The dashed purple line is high capacity transit which in this case it is highlighting railroad. Warehouses and storage facilities are highlighted with the gray area surrounding the railroad tracks. The brown areas are highlighting transit-oriented development. Along Fairview Corridor there are two

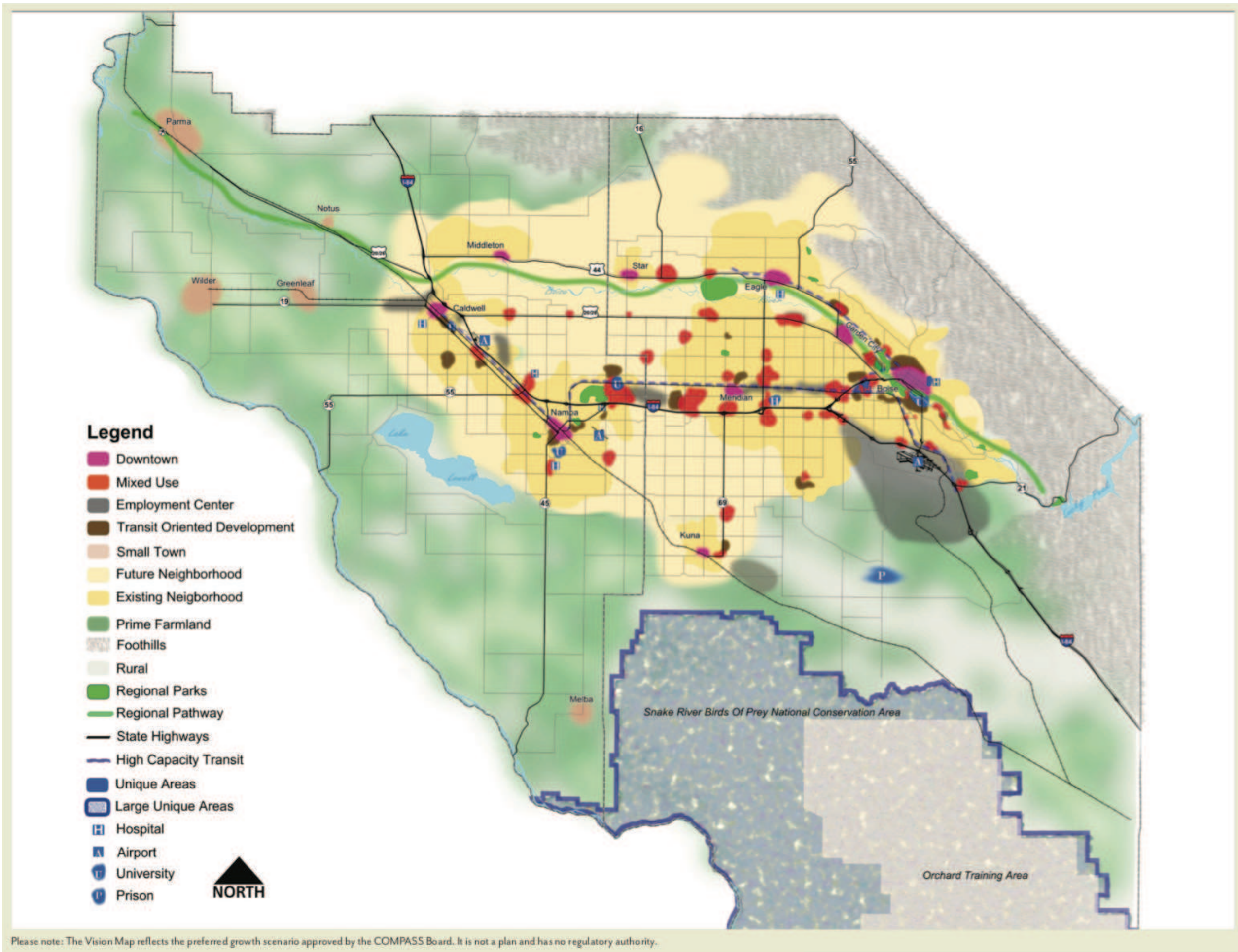


Figure 4.12, Source: COMPASS Communities in Motion 2040

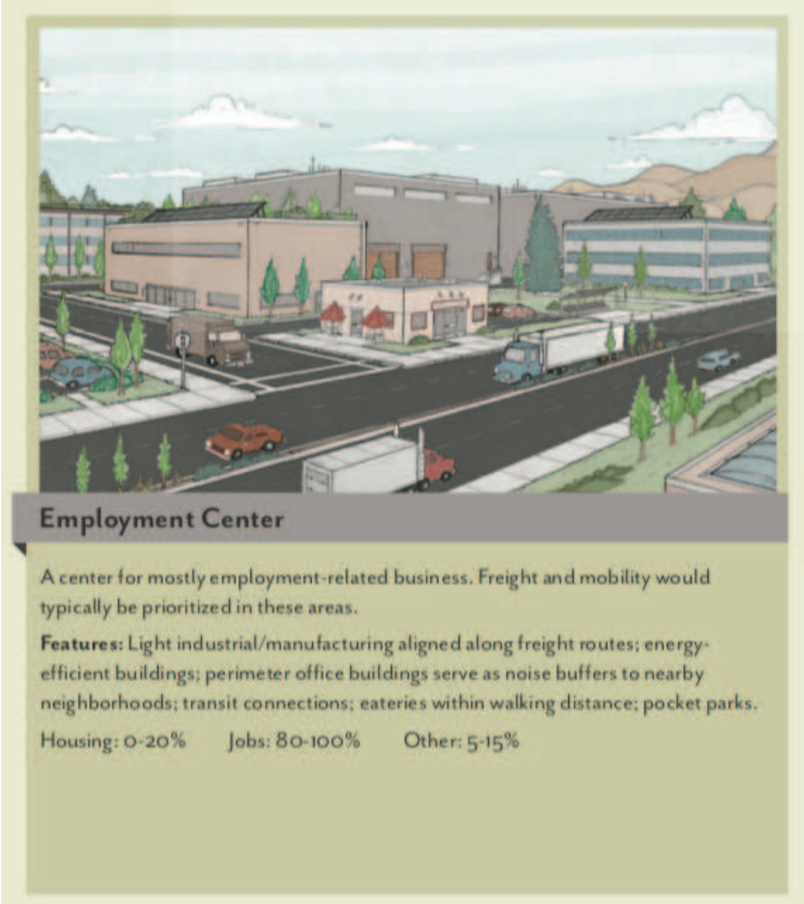


Figure 4.13, Source: COMPASS Communities in Motion 2040

brown areas denoting future TOD. These are key areas where bus stops or park and ride will be placed for the purpose of this project. The darker yellow areas are existing neighborhoods. Fairview is surrounded by residential neighborhoods which also shows a light-yellow area surrounding the darker yellow which means that the light-yellow areas show future neighborhoods. There are three big red areas along Fairview Corridor which represents mixed land use. These areas are critical for this project because it will be utilized for mixed-use residential to provide new housing along Fairview Corridor. Additional mixed land use might be added if percentage requirements aren't met as per the vision for land use types in Communities in Motion 2040. Figure 4.13, shows the vision land use in the Community in Motion 2040. The first image shows Employment Centers land use types which is concentrated with employment business. The image shows what features should

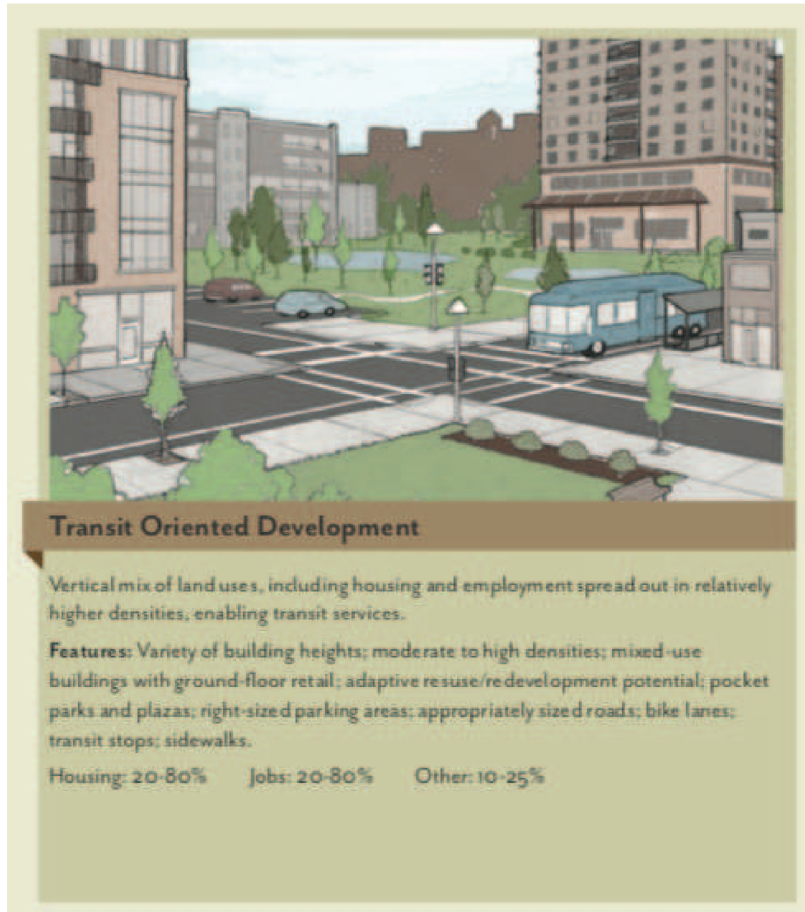


Figure 4.14, Source: COMPASS Communities in Motion 2040

be found along the Employment Center land use. Within the Employment Center land use a user would find high vehicle traffic, mostly freights. The land use of the Employment Center is divided into three categories which are housing, jobs, and other. The lowest percentage land use of the categories is housing with 0-20% following other with 5-15%. The highest percentage land use of the categories is jobs with 80-100%. This is common being the Employment Center land use type

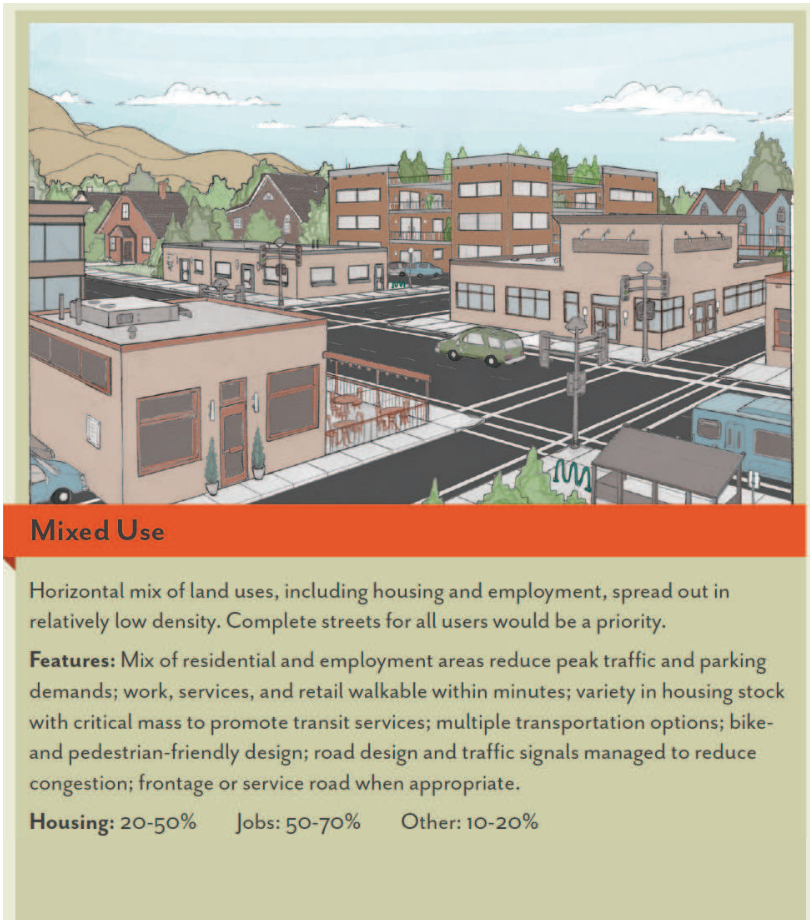


Figure 4.15, Source: COMPASS Communities in Motion 2040

is concentrated with business. The Employment Center land use image and data will be used because there is a high number of employment business along Fairview Corridor. Figure 4.13, shows the vision land use for Transit Oriented Development. The image shows what features should be find along the Transit Oriented Development. Some of those features include mixed-use buildings with different building heights and parking and bike lanes. The land use percentages are quite similar to the Employment Center land use. The lowest percentage for Transit Oriented Development is other with 10-25% following with housing and jobs both with 20-80%. It is common to find both jobs and housing with the same percentage along the Transit Oriented Development land use. Figure 4.15, shows the vision land use for mixed use. The following image shows some features that would be found along a mixed-use land use. Some of these features include different transportation methods and a balance between residential and employment. The percentage for mixed-use land use range. The lowest percentage is other with 10-20% following housing with 20-50%. The highest percentage is jobs which is 50-70%. The outcome for the percentage is what you could expect finding along a mix use land use. The lowest percentage for mixed use is other with 10-20% following housing with 20-50% and the highest being jobs both with 50-70%. These percentages are common to be found along a mixed-use corridor.

Existing Parks

The list below are existing parks that are around Fairview Corridor between I-84 and Chinden Blvd. It is important to take existing parks into consideration when designing a public transportation route as parks could be a destination that requires transportation whether by bus or bicycle. Looking at the existing road condition to and from the park and evaluating what infrastructure adjustments are needed to become a much desirable travel. Whether it is bike lanes needed, bus route, or sidewalks. For the purpose of this project the existing parks below will be shown on the same map as existing bicycle lane map. The following list are existing parks and size surrounding Fairview Corridor.

Julian Davis Park (90.33 Acres)
Storey Park (20.12 Acres)
Sycamore Park (7.19 Acres)
Julius M. Kleiner Memorial Park (56.87 Acres)
Redwood Park (6.76 Acres)
Champion Park (5.98 Acres)
Charles F. McDett Youth Sports Complex (38.7 Acres)
Hobble Creek Park (19.96 Acres)
DeMeyer Park (12.36 Acres)
Cottonwood Park (8.11 Acres)
Hewett Park (6 Acres)
Hyatt Hidden Lakes (10.01 Acres)
Hyatt Hidden Lakes Reserve (40.86 Acres)
Milwaukee Park (9.96 Acres)
Mountain View Park (8.68 Acres)
Winstead Park (11.07 Acres)
Fairmont Park (10.32 Acres)
Sterling Site (8.08 Acres)
Florence Park (3.52 Acres)
Pine Grove Park (4.5 Acres)
Liberty Park (6.27 Acres)
Borah Park (9.28 Acres)
Cassia Park (12.84 Acres)
Morris Hill Park (7.94 Acres)

Existing Schools

The following list is of existing schools around Fairview Corridor. Schools could be an important destination that a rider might be interested in traveling to. Majority of the schools listed below are either public and some private. For the purpose of this project the following schools will just be shown on the school map because of the high number of schools surrounding Fairview Corridor.

Meridian High School
Meridian Middle School
Meridian Elementary School
Peregrine Elementary
Cole Valley Christian
Crossroad Middle School
Meridian Academy
Renaissance High School
Linder Elementary
Chief Joseph Elementary
River Valley Elementary
Lewis and Clark Middle School
Sawtooth Middle School
Hunter Elementary
Rocky Mountain High School
Paramount Elementary
Heritage Middle School
Prospect Elementary
Discovery Elementary
Medical Arts Charter High School
Meridian Tech Charter High School
Lowell Scott Middle School
Central Academy High School
Pioneer Elementary
Cecil D. Andrus Elementary

ITT Technical Institute
Centennial High School
Joplin Elementary School
Frontier Elementary School
Summerwind Elementary School
Capital High School
Valley View Elementary School
Cole Christian Elementary School
Morley Nelson Elementary School
Fairmont Jr. High School
Koelsch Elementary School
Whittier Elementary School
Maddison Early Childhood Center
Boise Christian
Jefferson Elementary School
South Jr. High School
Monroe Elementary School
Sacred Heart Elementary School
Boise Christian School
Borah High School
Grace Jordan Elementary
Bishop Kelly High School
Language Academy
Horizon Elementary School
Eliza Spalding Elementary
Morris Hill Cemetery

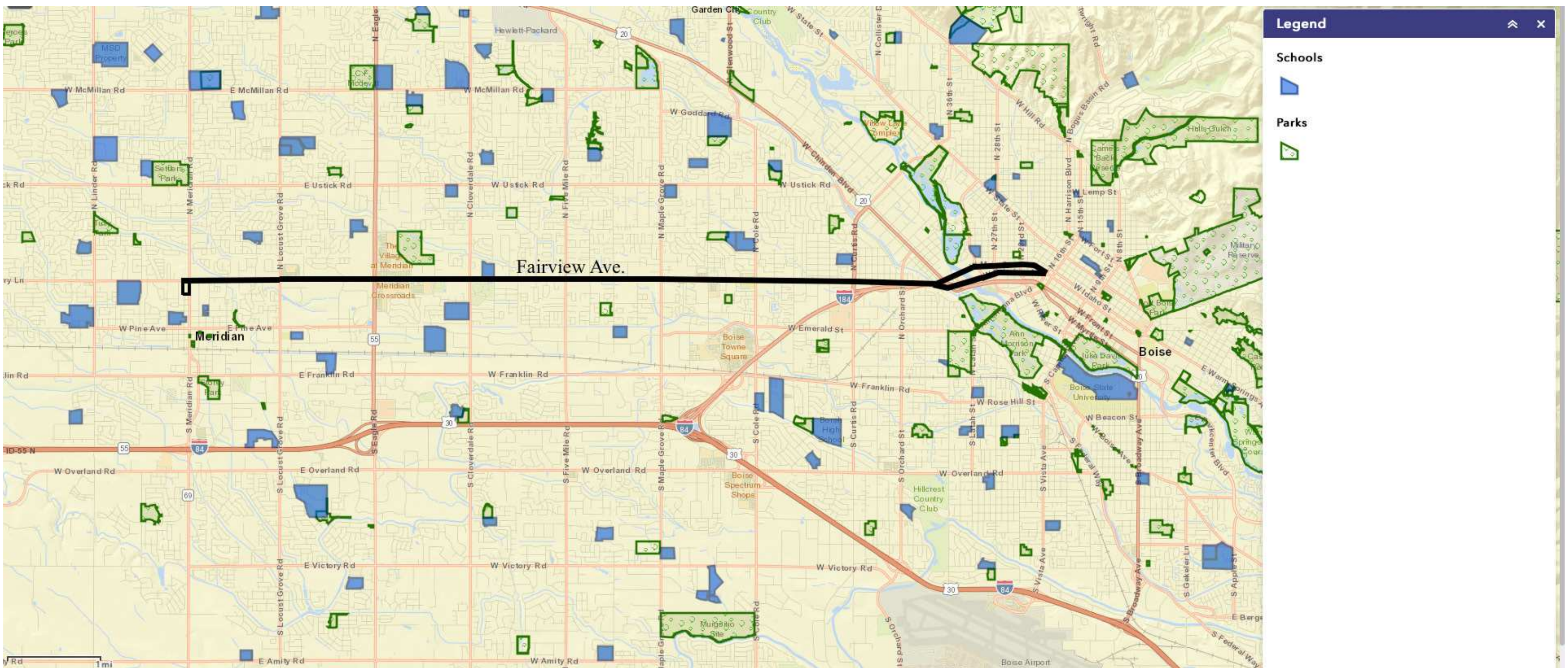


Figure 4.16, Source: ACHD Bike Map

State Street

State Street Transit and Traffic Operational Plan
Implementations plan
Ada County, Idaho
June 14, 2011

State Street Transit and Traffic Operational Plan (TTOP) is a futuristic implementation plan for both transportation and land use plan along State Street Corridor. In the TTOP three different timeframes are identified for implementing roadways, transit, and land use. The three different terms are near, medium and long-term improvements. The reason why State Street needs improvements is that it is the only connection between communities in Canyon and Ada Counties and because it has the highest ridership in the VRT system. More reasons why State Street needed the improvements listed previously is because the corridor is listed as a "major multimodal connection" in the Communities in Motion report and the existing and future different land uses along the corridor. The existing land use consists of residential, office, and retail. The vision of TTOP is "A long-term vision for the corridor that includes State Street as a heavily emphasized "transit" corridor with dedicated lanes in a seven-lane cross-section; and land use policy changes and transit-oriented development within the corridor to support the high capacity transit" (Kittelson, 2011). State Street/ State Highway 44 Corridor is between 9th Street Downtown to State Highway 16. The TTOP plan has five goals with each one being critical to the implementation plan. A short summarization of all the goals are moving pedestrians along State Street Corridor using a transit service from Downtown Boise to communities in the west, support local growth along the corridor, use existing transit plans to support future transit plans, create an implementation plan and financial plan to fund future improvements along the corridor, and involve the community. The Implementation Plan has several documents and reports supporting it all in which can be found in the TTOP in pg. 9. Apart from the documents and reports supporting the Implementation Plan it also had agencies supporting the plan. There are nine agencies signed to the TTOP which consist of Ada County, Ada County Highway District (ACHD), Capital City Development Corporation (CCDC), City of Boise, City of Eagle, City of Garden City, COMPASS, Idaho Transportation Department (ITD), and Valley Regional Transit (VRT). The background section consists of the existing condition, existing land use and current transportation facilities conditions. The existing conditions along the corridor are two to six lanes. Valley Ride bus has three current routes along State Street Corridor, route 9, 9x, and 44. Each route runs at different times throughout the day and night with route 44 operating 24 hours a day. ACHD Commuteride also has existing Park and Ride lots along adjacent arterial intersections along the corridor. Bike lanes along the corridor also provide a different option for transportation along the corridor except at a few limited locations only. With the newly proposed plan implementations, bicyclists will have bike lane access throughout the whole route. The new proposed improvements have been based on the conditions for the future year 2035. Other improvements along the corridor include transit and HOV lanes, and BRT. Different roadway network scenarios have been designed for the year 2035 with each scenario serving different means. Scenario one is a roadway system that is funded, scenario two is State Highway 44 Corridor study system, scenario three is five mixed traffic lanes with two exclusive lanes (for transit) one going each direction, and the fourth scenario is seven mixed traffic lanes (Kittelson, 2011). Throughout the proposed street scenarios, the proposed locations for TOD have been identified based on certain characteristics. The characteristics that base the location of TOD are size, land use, and density of development. There are five density developments typologies which are Transit Employment Center, Neighborhood Transit Zone, Urban Neighborhood Center, Urban Town Center, and Enhanced Bus Rapid Transit Stations (Kittelson, 2011). There are many tools that can be used to encourage TOD some of them include Public Funding, Public-Private Partnerships, and Creative Urban Design (Kittelson, 2011). Technology like Signal Priority Treatment will also be updated throughout the route to improve travel time but buses will still have to operate with mixed traffic and still cause congestions throughout the travel. Widening State Street to five or seven lanes will also help reduce the travel time for both cars and buses but does minimal auto travel time reduction because of the additional traffic demands throughout the corridor. In this transit study, different methods of widening the street were evaluated. The different methods that were studied are the median runway, curbside runway, and mixed traffic runway. The Median Runway is a located at the middle of the roadway and it usually has raised curb to prevent mixed traffic to use it. It is also known as an exclusive lane and is the preferred runway for BRT. The Curbside Runway is located in between the roadway and the sidewalk but is not separated to allow mixed traffic to turn at intersections. Pavement markers and signs are used to inform mixed traffic about land use. Mixed Traffic Runway is a lane that both transit and mixed traffic can operate throughout the corridor. By operating with mixed traffic time travel will see an increase than exclusive lane. High Occupancy Vehicle (HOV) Lane is a dedicated lane for strictly for buses, carpools with high occupants, motorcycles, emergency vehicles, and vehicles wanting to turn right. The HOV utilizes markers, signs and bus bays to manage buses and HOV. What describes BRT is high occupancy bus service that uses runway, vehicles, branding, stations and ITS technology to improve the time trip, capacity and reliability (Kittelson, 2011). BRT service along State Street will help to reduce the future over capacity. The implementation strategy was to divide into three phases: near term, medium term, and long term. The near-term improvement is to fill the gaps in bicycle lanes and pedestrian sidewalks, and expand existing transit service. ITS technologies also need to be implemented in the near-term phase. Each of the phases are divided into milestones. For near-term, the milestones are upfront corridor improvements, expand existing transit, and preparing for the medium-term. The medium-term improvements are to expand existing transit service, provide additional roadway capacity, and to increase TOD and park and ride lots (Kittelson, 2011). The milestones for the medium-term are pre-HOV improvements, land development changes, and roadway expansions. The long-term improvements are to fulfill the vision of the integrated corridor plan along State Street. The long-term milestones are land development in progress and high capacity transit corridor (Kittelson, 2011). Along with the milestones, ITS transit technology should be implemented at the stations, like off-board fare collections and traveler information. The near-term improvements should begin when traffic ADT meet at a certain peak hour throughout the corridor, certain number for riders per day, and land use changes. The implementation tables in the plan described the cost, leading agency, project number, and where the project is applicable. In the cost description, it identifies whether the project has been funded or is unfunded and the total cost of the project. The leading agency is identified for each project regarding which agency might be responsible for funding. Funding might be shared between multiple agencies and should be labeled in the table. Although the financial strategy is primary funding from public agencies, the private sector is responsible for the land use investments. About 43% of the total cost ($475 Million) of improvements along State Street corridor have been funded by ACHD, ITD, and VRT. Each of the term improvements have been divided into three categories: roadway, transit, and land use. Each term also shows the funded percentage of the project. The near-term improvement has over 78% improvement involving roadways, and 84% of the improvements have been funded. The medium-term improvement has 50% improvement involving roadways, and 33% of improvements have been funded. The long-term improvement has 62% improvement involving transit activities, and 100% of improvements are unfunded. Based on the total amount of the improvements minus the funded amount, the funding for improvements falls short about $270 million. Funding strategies have been proposed for each section. The proposed strategy for roadway is to get funding from local/state funding, property tax, Highway User's Fund, Ada County Registration Fees, Development Impact Fees and federal sources (Kittelson, 2011). Additional sources are Surface Transportation Program-Transportation Management Area (STP-TMA), Congestion Mitigation and Air Quality (CMAQ), FTA 5307 and 5309 (Kittelson, 2011). Each funding source can vary from term to term but it is a difficult project to develop funding for. There are currently existing funding sources that are funding operating costs and capital costs. Sources that are funding operating costs are fees collected at fare boxes, local agencies, and federal. Federal funding usually funds about 80% of the capital cost. Future funding tools to fund operation costs are local sale/resort taxes, property tax, and fees/fares. Future funding tools that can help the capital cost include 5307/5340 Formula Funds, CMAQ Funds, Surface Transportation Program Funds, and New Starts/Small Stats Grant.

Timeline

2009: State Street TTOP was Initiated by Valley Regional Transit (VRT), Ada County Highway District (ACHD), and the City of Boise.
2010- Analysis and Evaluation
2010-201- Plan Development
2011- Planned for Adoption

Existing Transportation Conditions

Existing Bus Routes

Valley Reginal Transit is in charge of providing public transportation for three counties which are Ada County, Canyon County, and Intercounty. Each route is providing public transportation to different attraction centers and employment centers. All the routes differ from one another but may have common transfer location. Each route has a primary destination it is trying to provide service to. The following routes are routes that provide service running along Fairview Ave. or crosses Fairview. Some of the following routs listed may have the same transfer location but does not cross or runs along Fairview Ave. The following routes will be used to analysis the existing routes that will have a direct impact on the usage of public transportation along Fairview.

Route 5 Emerald

The first route that utilizes the same transfer location as other routes that crosses Fairview Ave. is Route 5 Emerald. Route 5 has 5 time points throughout the route. Route 5 provides service from Main Street Station to Towne Square Mall. The route takes 20 minutes to complete the travel. The level of

ROUTE
5
Emerald

DOWTOWN TO TOWNE SQUARE MALL

	1 Main Street Station	2 13th at Post Office	3 Americana & Emerald	4 Emerald & Curtis	5 Towne Square Mall
WEEKDAY					
	6:15	6:18	6:22	6:27	6:35
	6:45	6:48	6:52	6:57	7:05
	7:15	7:18	7:22	7:27	7:35
	7:45	7:48	7:52	7:57	8:05
	8:15	8:18	8:22	8:27	8:35
	8:45	8:48	8:52	8:57	9:05
	9:45	9:48	9:52	9:57	10:05
	10:45	10:48	10:52	10:57	11:05
	11:45	11:48	11:52	11:57	**12:05**
	12:45	**12:48**	**12:52**	**12:57**	**1:05**
	1:45	**1:48**	**1:52**	**1:57**	**2:05**
	2:45	**2:48**	**2:52**	**2:57**	**3:05**
	3:15	**3:18**	**3:22**	**3:27**	**3:35**
	3:45	**3:48**	**3:52**	**3:57**	**4:05**
	4:15	**4:18**	**4:22**	**4:27**	**4:35**
	4:45	**4:48**	**4:52**	**4:57**	**5:05**
	5:15	**5:18**	**5:22**	**5:27**	**5:35**
	5:45	**5:48**	**5:52**	**5:57**	**6:05**
	6:45	**6:48**	**6:52**	**6:57**	**7:05**
SATURDAY					
	7:45	7:48	7:52	7:57	8:05
	8:45	8:48	8:52	8:57	9:05
	9:45	9:48	9:52	9:57	10:05
	10:45	10:48	10:52	10:57	11:05
	11:45	11:48	11:52	11:57	**12:05**
	12:45	**12:48**	**12:52**	**12:57**	**1:05**
	1:45	**1:48**	**1:52**	**1:57**	**2:05**
	2:45	**2:48**	**2:52**	**2:57**	**3:05**
	3:45	**3:48**	**3:52**	**3:57**	**4:05**
	4:45	**4:48**	**4:52**	**4:57**	**5:05**
	5:45	**5:48**	**5:52**	**5:57**	**6:05**

TOWNE SQUARE MALL TO DOWNTOWN

	5 Towne Square Mall	4 Emerald & Curtis	3 Emerald & Latah	2 13th at Post Office	1 Main Street Station
WEEKDAY					
	6:15	6:21	6:26	6:29	6:36
	6:45	6:51	6:56	6:59	7:06
	7:15	7:21	7:26	7:29	7:36
	7:45	7:51	7:56	7:59	8:06
	8:15	8:21	8:26	8:29	8:36
	8:45	8:51	8:56	8:59	9:06
	9:15	9:21	9:26	9:29	9:36
	10:15	10:21	10:26	10:29	10:36
	11:15	11:21	11:26	11:29	11:36
	12:15	**12:21**	**12:26**	**12:29**	**12:36**
	1:15	**1:21**	**1:26**	**1:29**	**1:36**
	2:15	**2:21**	**2:26**	**2:29**	**2:36**
	3:15	**3:21**	**3:26**	**3:29**	**3:36**
	3:45	**3:51**	**3:56**	**3:59**	**4:06**
	4:15	**4:21**	**4:26**	**4:29**	**4:36**
	4:45	**4:51**	**4:56**	**4:59**	**5:06**
	5:15	**5:21**	**5:26**	**5:29**	**5:36**
	5:45	**5:51**	**5:56**	**5:59**	**6:06**
	6:15	**6:21**	**6:26**	**6:29**	**6:36**
SATURDAY					
	8:15	8:21	8:26	8:29	8:36
	9:15	9:21	9:26	9:29	9:36
	10:15	10:21	10:26	10:29	10:36
	11:15	11:21	11:26	11:29	11:36
	12:15	**12:21**	**12:26**	**12:29**	**12:36**
	1:15	**1:21**	**1:26**	**1:29**	**1:36**
	2:15	**2:21**	**2:26**	**2:29**	**2:36**
	3:15	**3:21**	**3:26**	**3:29**	**3:36**
	4:15	**4:21**	**4:26**	**4:29**	**4:36**
	5:15	**5:21**	**5:26**	**5:29**	**5:36**

BOLD = PM

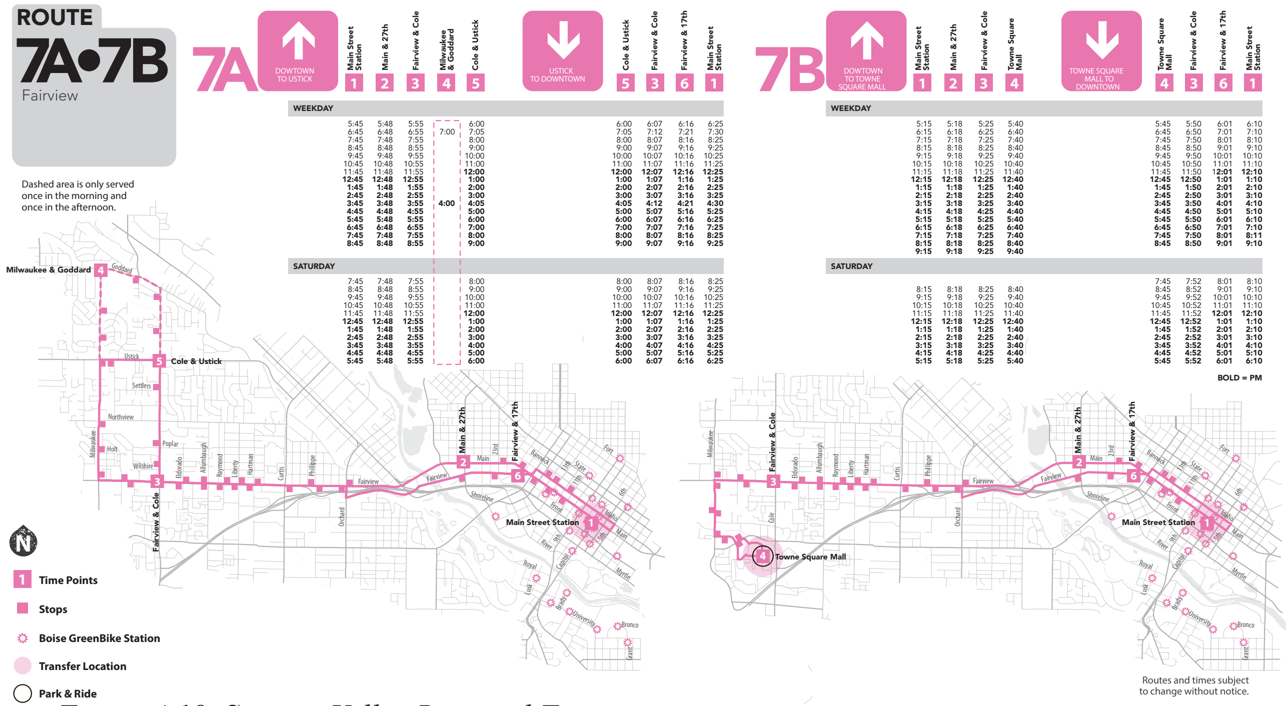
Routes and times subject to change without notice.

Figure 4.17, Source: Valley Regional Transit

service of route 5 is 19 times throughout the day on weekdays and 11 times on the weekend. Route 5 has only one park and ride parking lot along the route and two transfer location which are Main Street Station and Towne Square Mall. Route 5 provides service from 6:15 AM to 6:36 OM on weekday and 7:45 AM to 5:36 PM on Saturday.

Route 7A Fairview

Routes 7A and 7B are only routes that run along part of Fairview Ave. Route 7A has 5 time points heading towards Ustick and 4 time points heading back to Downtown. One of those time points is only used twice throughout the day and adds five minutes to the time travel. Route 7A provides service from Main Street Station to Cole and Ustick. Route 7A takes 15 minutes to



7A – Downtown to Ustick

	1 Main Street Station	2 Main & 27th	3 Fairview & Cole	4 Milwaukee & Goddard	5 Cole & Ustick
WEEKDAY					
	5:45	5:48	5:55		6:00
	6:45	6:48	6:55	7:00	7:05
	7:45	7:48	7:55		8:00
	8:45	8:48	8:55		9:00
	9:45	9:48	9:55		10:00
	10:45	10:48	10:55		11:00
	11:45	11:48	11:55		**12:00**
	12:45	**12:48**	**12:55**		**1:00**
	1:45	**1:48**	**1:55**		**2:00**
	2:45	**2:48**	**2:55**		**3:00**
	3:45	**3:48**	**3:55**	**4:00**	**4:05**
	4:45	**4:48**	**4:55**		**5:00**
	5:45	**5:48**	**5:55**		**6:00**
	6:45	**6:48**	**6:55**		**7:00**
	7:45	**7:48**	**7:55**		**8:00**
	8:45	**8:48**	**8:55**		**9:00**
SATURDAY					
	7:45	7:48	7:55		8:00
	8:45	8:48	8:55		9:00
	9:45	9:48	9:55		10:00
	10:45	10:48	10:55		11:00
	11:45	11:48	11:55		**12:00**
	12:45	**12:48**	**12:55**		**1:00**
	1:45	**1:48**	**1:55**		**2:00**
	2:45	**2:48**	**2:55**		**3:00**
	3:45	**3:48**	**3:55**		**4:00**
	4:45	**4:48**	**4:55**		**5:00**
	5:45	**5:48**	**5:55**		**6:00**

7A – Ustick to Downtown

	5 Cole & Ustick	3 Fairview & Cole	6 Fairview & 17th	1 Main Street Station
WEEKDAY				
	6:00	6:07	6:16	6:25
	7:05	7:12	7:21	7:30
	8:00	8:07	8:16	8:25
	9:00	9:07	9:16	9:25
	10:00	10:07	10:16	10:25
	11:00	11:07	11:16	11:25
	12:00	**12:07**	**12:16**	**12:25**
	1:00	**1:07**	**1:16**	**1:25**
	2:00	**2:07**	**2:16**	**2:25**
	3:00	**3:07**	**3:16**	**3:25**
	4:05	**4:12**	**4:21**	**4:30**
	5:00	**5:07**	**5:16**	**5:25**
	6:00	**6:07**	**6:16**	**6:25**
	7:00	**7:07**	**7:16**	**7:25**
	8:00	**8:07**	**8:16**	**8:25**
	9:00	**9:07**	**9:16**	**9:25**
SATURDAY				
	8:00	8:07	8:16	8:25
	9:00	9:07	9:16	9:25
	10:00	10:07	10:16	10:25
	11:00	11:07	11:16	11:25
	12:00	**12:07**	**12:16**	**12:25**
	1:00	**1:07**	**1:16**	**1:25**
	2:00	**2:07**	**2:16**	**2:25**
	3:00	**3:07**	**3:16**	**3:25**
	4:00	**4:07**	**4:16**	**4:25**
	5:00	**5:07**	**5:16**	**5:25**
	6:00	**6:07**	**6:16**	**6:25**

7B – Downtown to Towne Square Mall

	1 Main Street Station	2 Main & 27th	3 Fairview & Cole	4 Towne Square Mall
WEEKDAY				
	5:15	5:18	5:25	5:40
	6:15	6:18	6:25	6:40
	7:15	7:18	7:25	7:40
	8:15	8:18	8:25	8:40
	9:15	9:18	9:25	9:40
	10:15	10:18	10:25	10:40
	11:15	11:18	11:25	11:40
	12:15	**12:18**	**12:25**	**12:40**
	1:15	**1:18**	**1:25**	**1:40**
	2:15	**2:18**	**2:25**	**2:40**
	3:15	**3:18**	**3:25**	**3:40**
	4:15	**4:18**	**4:25**	**4:40**
	5:15	**5:18**	**5:25**	**5:40**
	6:15	**6:18**	**6:25**	**6:40**
	7:15	**7:18**	**7:25**	**7:40**
	8:15	**8:18**	**8:25**	**8:40**
	9:15	**9:18**	**9:25**	**9:40**
SATURDAY				
	8:15	8:18	8:25	8:40
	9:15	9:18	9:25	9:40
	10:15	10:18	10:25	10:40
	11:15	11:18	11:25	11:40
	12:15	**12:18**	**12:25**	**12:40**
	1:15	**1:18**	**1:25**	**1:40**
	2:15	**2:18**	**2:25**	**2:40**
	3:15	**3:18**	**3:25**	**3:40**
	4:15	**4:18**	**4:25**	**4:40**
	5:15	**5:18**	**5:25**	**5:40**

7B – Towne Square Mall to Downtown

	4 Towne Square Mall	3 Fairview & Cole	6 Fairview & 17th	1 Main Street Station
WEEKDAY				
	5:45	5:50	6:01	6:10
	6:45	6:50	7:01	7:10
	7:45	7:50	8:01	8:10
	8:45	8:50	9:01	9:10
	9:45	9:50	10:01	10:10
	10:45	10:50	11:01	11:10
	11:45	11:50	**12:01**	**12:10**
	12:45	**12:50**	**1:01**	**1:10**
	1:45	**1:50**	**2:01**	**2:10**
	2:45	**2:50**	**3:01**	**3:10**
	3:45	**3:50**	**4:01**	**4:10**
	4:45	**4:50**	**5:01**	**5:10**
	5:45	**5:50**	**6:01**	**6:10**
	6:45	**6:50**	**7:01**	**7:10**
	7:45	**7:50**	**8:01**	**8:11**
	8:45	**8:50**	**9:01**	**9:10**
SATURDAY				
	7:45	7:52	8:01	8:10
	8:45	8:52	9:01	9:10
	9:45	9:52	10:01	10:10
	10:45	10:52	11:01	11:10
	11:45	11:52	**12:01**	**12:10**
	12:45	**12:52**	**1:01**	**1:10**
	1:45	**1:52**	**2:01**	**2:10**
	2:45	**2:52**	**3:01**	**3:10**
	3:45	**3:52**	**4:01**	**4:10**
	4:45	**4:52**	**5:01**	**5:10**
	5:45	**5:52**	**6:01**	**6:10**

Figure 4.18, Source: Valley Regional Transit

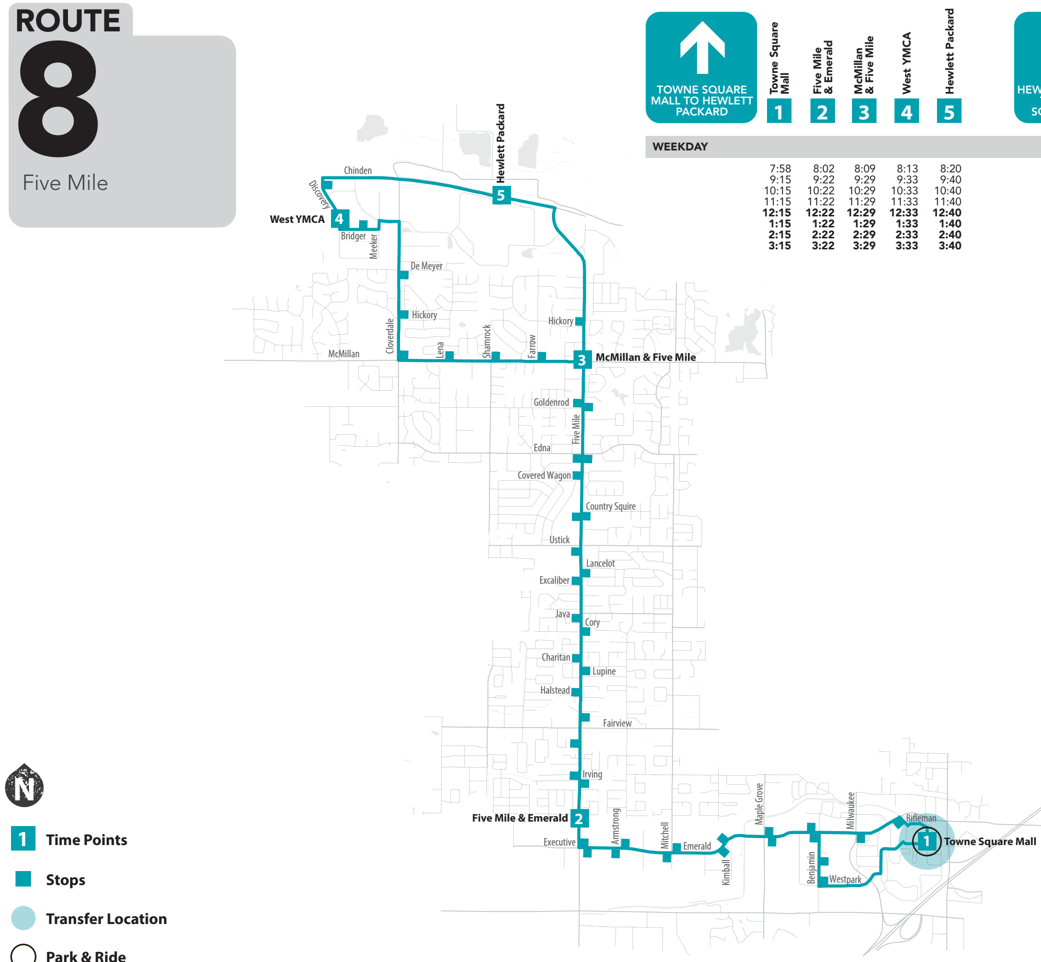
complete the travel one-way. The level of service of route 7A is 16 times on weekdays and 11 times on Saturday. Route 7A has only one transfer location which is Main Street Station with no park and ride. Route 7A provides service from 5:45 AM to 9:25 PM on weekdays and 7:45 AM to 6:25 PM on Saturday.

Route 7B Fairview

Route 7B runs along part of Fairview Ave. Route 7B has 4 time points heading towards Towne Square Mall from Main Street Station. Route 7B provides service from Main Street Station towards Towne Square Mall with 25 minutes to complete the travel one-way. The level of service for route 7B is 17 times throughout the day on weekdays and 10 times on Saturday. Route 7B has only one park and ride parking lot and two transfer locations. Route 7B provides service form 5:15 AM to 9:10 PM on weekdays and 8:15 AM to 6:10 PM on Saturday.

Route 8 Five Mile

Route 8 runs along Five Mile Road and cuts thru Fairview. Route 8 has 5 time points heading towards Hewlett Packard from Towne Square Mall. Route 8 provides service form Town Square Mall to Hewlett Packard with 25 minutes to complete the travel one-way. The level of service for route 8 is 8 times throughout the day on weekdays and no service on Saturday. Route 8



TOWNE SQUARE MALL TO HEWLETT PACKARD: Towne Square Mall (1)	Five Mile & Emerald (2)	McMillan & Five Mile (3)	West YMCA (4)	Hewlett Packard (5)	HEWLETT PACKARD TO TOWNE SQUARE MALL: Hewlett Packard (5)	McMillan & Five Mile (3)	Five Mile & Emerald (2)	Towne Square Mall (1)
WEEKDAY								
7:58	8:02	8:09	8:13	8:20	8:20	8:23	8:31	9:05
9:15	9:22	9:29	9:33	9:40	9:40	9:43	9:51	10:05
10:15	10:22	10:29	10:33	10:40	10:40	10:43	10:51	11:05
11:15	11:22	11:29	11:33	11:40	11:40	11:43	11:51	**12:05**
12:15	**12:22**	**12:29**	**12:33**	**12:40**	**12:40**	**12:43**	**12:51**	**1:05**
1:15	**1:22**	**1:29**	**1:33**	**1:40**	**1:40**	**1:43**	**1:51**	**2:05**
2:15	**2:22**	**2:29**	**2:33**	**2:40**	**2:40**	**2:43**	**2:51**	**3:05**
3:15	**3:22**	**3:29**	**3:33**	**3:40**	**3:40**	**3:43**	**3:51**	**4:05**

BOLD = PM

Routes and times subject to change without notice.

Figure 4.19, Source: Valley Regional Transit

has only one park and ride parking lot and one transfer location. Route 8 provides service from 7:58 AM to 4:05 PM on week-days and no service on weekends.

Route 8X Five Mile and Chinden

Route 8X runs along Five Mile Road and cuts thru Fairview then goes onto Chinden and Hickory. Route 8X has 12 time points heading from Towne Square Mall to Main and 8th. Route 8X provides service from Towne Square Mall to Main Street & 8th and then back to Towne Square Mall with 70 minutes to complete the travel one-way. The level of Service for Route 8X is

ROUTE 8X

Five Mile • Chinden

TOWNE SQUARE MALL TO DOWNTOWN

WEEKDAY	1 Towne Square Mall	2 Emerald & Maple Grove	3 Five Mile & Emerald	4 McMillan & Five Mile	5 West YMCA	6 Hewlett Packard	7 Chinden & Garett	8 Chinden & Kent	9 Chinden & 39th	10 Fairview & 17th	11 Main & 8th	1 Towne Square Mall
	6:25	6:30	6:35	6:41	6:43	6:49	6:53	6:55	6:57	7:00	7:22	7:35
	6:45	6:50	6:55	7:01	7:03	7:09	7:13	7:15	7:17	7:20	7:42	7:55
	7:35	7:40	7:45	7:51	7:53	7:59	8:03	8:05	8:07	8:10	8:30	8:45

DOWNTOWN TO TOWNE SQUARE MALL

WEEKDAY	11 Main & 8th	12 Main & 27th	9 Chinden & 39th	8 Chinden & Kent	7 Chinden & Garrett	6 Hewlett Packard	13 Cloverdale & Hickory	4 McMillan & Five Mile	3 Five Mile & Emerald	1 Towne Square Mall	11 Main & 8th
	2:45	**2:50**	**2:54**	**2:57**	**3:00**	**3:05**	**3:15**	**3:20**	**3:25**	**3:35**	**4:05**
	4:05	**4:10**	**4:14**	**4:17**	**4:20**	**4:25**	**4:35**	**4:40**	**4:45**	**4:55**	**5:25**
	5:25	**5:30**	**5:34**	**5:37**	**5:40**	**5:45**	**5:55**	**6:00**	**6:05**	**6:15**	**6:45**

BOLD = PM

Routes and times subject to change without notice.

Figure 4.20, Source: Valley Regional Transit

3 times throughout weekdays and 3 times throughout the day on the weekdays. Route 8X has only one park and ride parking lot and two transfer location. Route 8X provides service from 6:25 AM to 8:45 AM on weekdays and on weekends from 2:45 PM to 6:45 PM.

Route 12 Towne Square Mall to Maple Grove

Route 12 runs along Maple Grove and cuts thru Fairview towards Glendwood. Route 12 has 5 time points heading from Towne Square Mall to Gary and Bunch. Route 12 provides 5 time points with one transfer location and on park and ride location. The time travel to complete the route is 20 minutes. The level of service for route 12 is 14 time throughout weekday and no

ROUTE 12

Towne Square Mall to Maple Grove

WEEKDAY: TOWNE SQUARE MALL TO MAPLE GROVE				
1 Towne Square Mall	2 Maple Grove & Fairview	3 Maple Grove & Ustick	4 Goddard & Glenwood	5 Gary & Bunch
5:40	5:48	5:50	5:53	6:00
6:40	6:48	6:50	6:53	7:00
7:45	7:48	7:50	7:53	8:00
8:45	8:48	8:50	8:53	9:00
9:45	9:48	9:50	9:53	10:00
10:45	10:48	10:50	10:53	11:00
11:45	11:48	11:50	**11:53**	**12:00**
12:45	**12:48**	**12:50**	**12:53**	**1:00**
1:45	**1:48**	**1:50**	**1:53**	**2:00**
2:45	**2:48**	**2:50**	**2:53**	**3:00**
3:45	**3:48**	**3:50**	**3:53**	**4:00**
4:45	**4:48**	**4:50**	**4:53**	**5:00**
5:45	**5:48**	**5:50**	**5:53**	**6:00**
6:45	**6:48**	**6:50**	**6:53**	**7:00**

WEEKDAY: MAPLE GROVE TO TOWNE SQUARE MALL				
5 Gary & Bunch	4 Goddard & Glenwood	3 Maple Grove & Ustick	2 Maple Grove & Fairview	1 Towne Square Mall
6:11	6:18	6:23	6:26	6:35
7:11	7:18	7:23	7:26	7:35
8:11	8:18	8:23	8:26	8:35
9:11	9:18	9:23	9:26	9:35
10:11	10:18	10:23	10:26	10:35
11:11	11:18	11:23	11:26	11:35
12:11	**12:18**	**12:23**	**12:26**	**12:35**
1:11	**1:18**	**1:23**	**1:26**	**1:35**
2:11	**2:18**	**2:23**	**2:26**	**2:35**
3:11	**3:18**	**3:23**	**3:26**	**3:35**
4:11	**4:18**	**4:23**	**4:26**	**4:35**
5:11	**5:18**	**5:23**	**5:26**	**5:35**
6:11	**6:18**	**6:23**	**6:26**	**6:35**
7:11	**7:18**	**7:23**	**7:26**	**7:35**

BOLD = PM

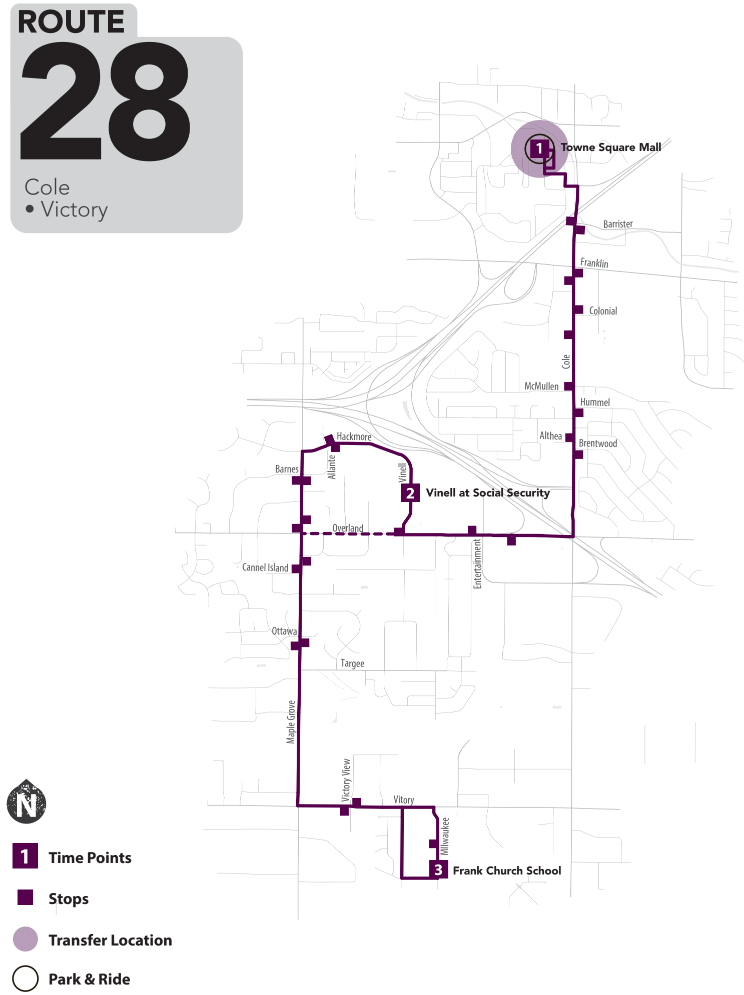
Routes and times subject to change without notice.

Figure 4.21, Source: Valley Regional Transit

service on weekend. Route 12 provides service from 5:40 AM to 7:00 PM on weekdays and no service on weekend.

Route 28 Cole and Victory

Route 28 utilizes the same transfer location as other routes that crosses Fairview Ave. Route 28 has 3 time points throughout the route. Route 3 provides service from Towne Square Mall Frank Church School. The route takes 25 minutes to complete the travel. The level of service of route 28 is 12 times throughout the day on weekdays and no service on the weekend. Route 28



TOWNE SQUARE MALL TO FRANK CHURCH SCHOOL — WEEKDAY

Towne Square Mall (1)	Vinell at Social Security (2)	Frank Church School (3)
7:40		*7:55
8:45	8:55	9:10
9:45	9:55	10:10
10:45	10:55	11:10
11:45	11:55	**12:10**
12:45	**12:55**	**1:10**
1:45	**1:55**	**2:10**
2:45	**2:55**	**3:10**
3:45	**3:55**	**4:10**
4:45	**4:55**	**5:10**
5:45	**5:55**	**6:10**
6:45	**6:55**	**7:10**

* This trip follows the dotted line on Overland.

FRANK CHURCH SCHOOL TO TOWNE SQUARE MALL — WEEKDAY

Frank Church School (3)	Vinell at Social Security (2)	Towne Square Mall (1)
7:10	7:21	7:36
8:10	8:21	8:36
9:10	9:21	9:36
10:10	10:21	10:36
11:10	11:21	11:36
12:10	**12:21**	**12:36**
1:10	**1:21**	**1:36**
2:10	**2:21**	**2:36**
3:10	**3:21**	**3:36**
4:10	**4:21**	**4:36**
5:10	**5:21**	**5:36**
6:10	**6:21**	**6:36**

BOLD = PM

Routes and times subject to change without notice.

Figure 4.22, Source: Valley Regional Transit

has only one park and ride parking lot along the route and one transfer location which is Towne Square Mall. Route 28 provides service from 7:40 AM to 7:10 PM on weekday and no service on the weekend.

Route 29 Overland

Route 29 utilizes the same transfer location as other routes that crosses Fairview Ave. Route 29 has 5 time points throughout the route. Route 29 provides service from BSU Transit Center to Towne Square Mall. The route takes 20 minutes to complete the travel. The level of service of route 29 is 19 times throughout the day on weekdays and 11 times on the weekend. Route

ROUTE 29
Overland

BSU TO TOWNE SQUARE MALL

	BSU Transit Center (1)	Overland & Vista (2)	Overland & Orchard (3)	Overland & Cole (4)	Towne Square Mall (5)
WEEKDAY					
	6:45	6:50	6:55	7:00	7:05
	7:15	7:20	7:25	7:30	7:35
	7:45	7:50	7:55	8:00	8:05
	8:15	8:20	8:25	8:30	8:35
	8:45	8:50	8:55	9:00	9:05
	9:15	9:20	9:25	9:30	9:35
	10:15	10:20	10:25	10:30	10:35
	11:15	11:20	11:25	11:30	11:35
	12:15	**12:20**	**12:25**	**12:30**	**12:35**
	1:15	**1:20**	**1:25**	**1:30**	**1:35**
	2:15	**2:20**	**2:25**	**2:30**	**2:35**
	3:15	**3:20**	**3:25**	**3:30**	**3:35**
	3:45	**3:50**	**3:55**	**4:00**	**4:05**
	4:15	**4:20**	**4:25**	**4:30**	**4:35**
	4:45	**4:50**	**4:55**	**5:00**	**5:05**
	5:15	**5:20**	**5:25**	**5:30**	**5:35**
	5:45	**5:50**	**5:55**	**6:00**	**6:05**
	6:15	**6:20**	**6:25**	**6:30**	**6:35**
	6:45	**6:50**	**6:55**	**7:00**	**7:05**
SATURDAY					
	7:45	7:50	7:55	8:00	8:05
	8:45	8:50	8:55	9:00	9:05
	9:45	9:50	9:55	10:00	10:05
	10:45	10:50	10:55	11:00	11:05
	11:45	11:50	11:55	**12:00**	**12:05**
	12:45	**12:50**	**12:55**	**1:00**	**1:05**
	1:45	**1:50**	**1:55**	**2:00**	**2:05**
	2:45	**2:50**	**2:55**	**3:00**	**3:05**
	3:45	**3:50**	**3:55**	**4:00**	**4:05**
	4:45	**4:50**	**4:55**	**5:00**	**5:05**
	5:45	**5:50**	**5:55**	**6:00**	**6:05**

TOWNE SQUARE MALL TO BSU

	Towne Square Mall (5)	Overland & Cole (4)	Overland & Orchard (3)	Overland & Vista (2)	BSU Transit Center (1)
WEEKDAY					
	6:45	6:50	6:55	7:00	7:05
	7:15	7:20	7:25	7:30	7:35
	7:45	7:50	7:55	8:00	8:05
	8:15	8:20	8:25	8:30	8:35
	8:45	8:50	8:55	9:00	9:05
	9:15	9:20	9:25	9:30	9:35
	9:45	9:50	9:55	10:00	10:05
	10:45	10:50	10:55	11:00	11:05
	11:45	11:50	11:55	**12:00**	**12:05**
	12:45	**12:50**	**12:55**	**1:00**	**1:05**
	1:45	**1:50**	**1:55**	**2:00**	**2:05**
	2:45	**2:50**	**2:55**	**3:00**	**3:05**
	3:45	**3:50**	**3:55**	**4:00**	**4:05**
	4:15	**4:20**	**4:25**	**4:30**	**4:35**
	4:45	**4:50**	**4:55**	**5:00**	**5:05**
	5:15	**5:20**	**5:25**	**5:30**	**5:35**
	5:45	**5:50**	**5:55**	**6:00**	**6:05**
	6:15	**6:20**	**6:25**	**6:30**	**6:35**
	6:45	**6:50**	**6:55**	**7:00**	**7:05**
SATURDAY					
	8:15	8:20	8:25	8:30	8:35
	9:15	9:20	9:25	9:30	9:35
	10:15	10:20	10:25	10:29	10:35
	11:15	11:20	11:25	11:29	11:35
	12:15	**12:20**	**12:25**	**12:29**	**12:35**
	1:15	**1:20**	**1:25**	**1:29**	**1:35**
	2:15	**2:20**	**2:25**	**2:29**	**2:35**
	3:15	**3:20**	**3:25**	**3:29**	**3:35**
	4:15	**4:20**	**4:25**	**4:29**	**4:35**
	5:15	**5:20**	**5:25**	**5:29**	**5:35**

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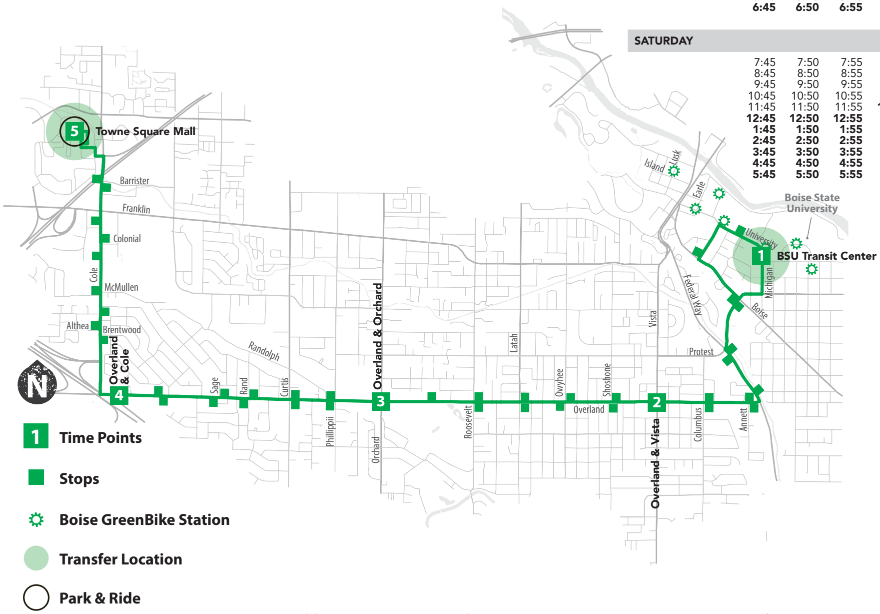


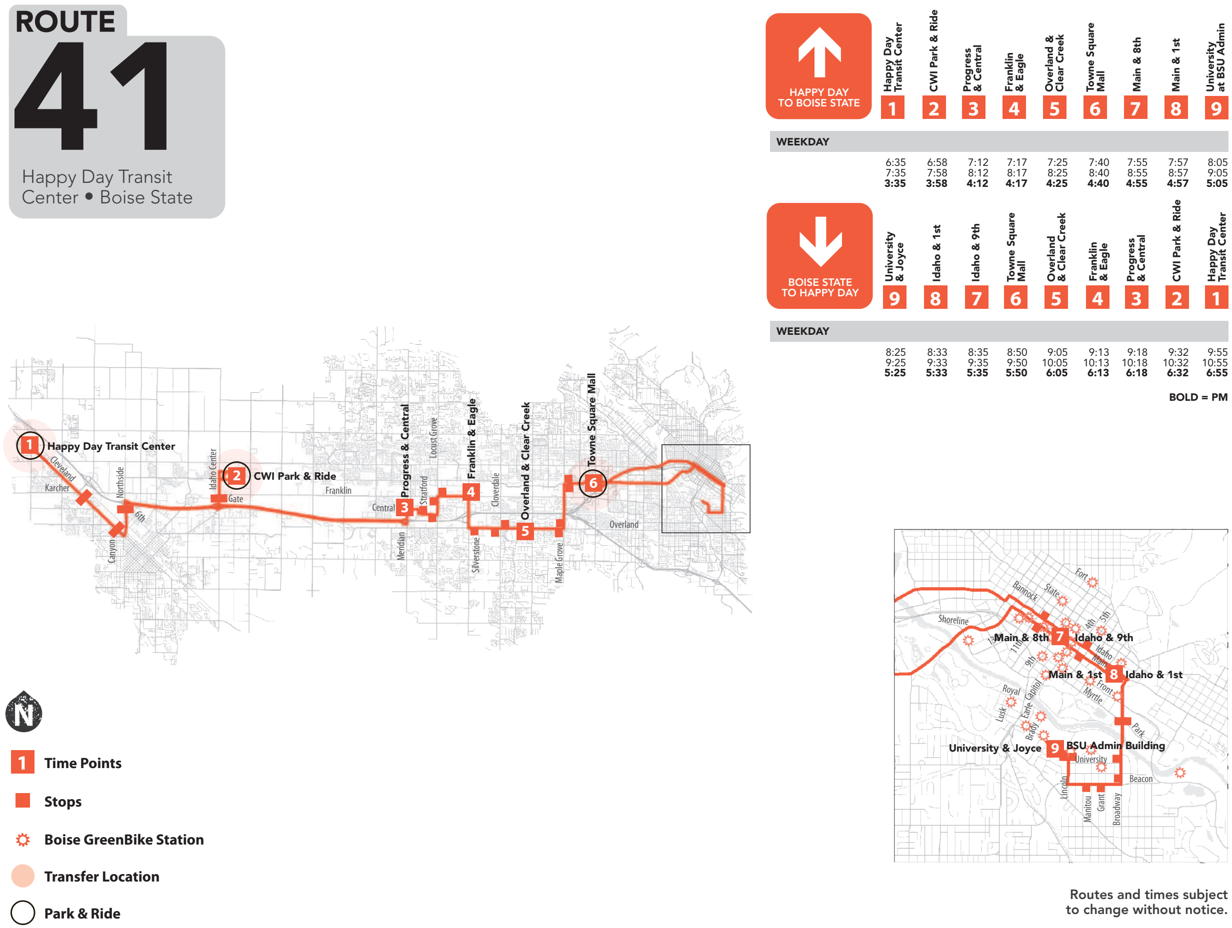
Routes and times subject to change without notice.

Figure 4.23, Source: Valley Regional Transit

29 has only one park and ride parking lot along the route and two transfer location which are BSU Transit Center and Towne Square Mall. Route 29 provides service from 6:45 AM to 7:05 PM on weekday and 7:45 AM to 6:05 PM on Saturday.

Route 41 Happy Day Transit Center and Boise State

Route 41 utilizes the same transfer location as other routes that crosses Fairview Ave. Route 41 has 9 time points throughout the route. Route 41 provides service from Happy Day Transit Center to University at BSU Admin. The route takes 90 minutes to complete the travel. The level of service of route 41 is 3 times throughout the day on weekdays and 3 times on



HAPPY DAY TO BOISE STATE — WEEKDAY

1 Happy Day Transit Center	2 CWI Park & Ride	3 Progress & Central	4 Franklin & Eagle	5 Overland & Clear Creek	6 Towne Square Mall	7 Main & 8th	8 Main & 1st	9 University at BSU Admin
6:35	6:58	7:12	7:17	7:25	7:40	7:55	7:57	8:05
7:35	7:58	8:12	8:17	8:25	8:40	8:55	8:57	9:05
3:35	3:58	4:12	4:17	4:25	4:40	4:55	4:57	5:05

BOISE STATE TO HAPPY DAY — WEEKDAY

9 University & Joyce	8 Idaho & 1st	7 Idaho & 9th	6 Towne Square Mall	5 Overland & Clear Creek	4 Franklin & Eagle	3 Progress & Central	2 CWI Park & Ride	1 Happy Day Transit Center
8:25	8:33	8:35	8:50	9:05	9:13	9:18	9:32	9:55
9:25	9:33	9:35	9:50	10:05	10:13	10:18	10:32	10:55
5:25	5:33	5:35	5:50	6:05	6:13	6:18	6:32	6:55

Figure 4.24, Source: Valley Regional Transit

the weekend. Route 41 has only three park and ride parking lot along the route and three transfer location which are Happy Day Transit Center, CWI Park and Ride and Towne Square Mall. Route 41 provides service from 6:35 AM to 6:55 PM on weekday and no service on weekend.

Route 42 Happy Day Transit Center and Towne Square Mall

Route 42 that utilizes the same transfer location as other routes that crosses Fairview Ave. Route 42 has 7 time points throughout the route. Route 42 provides service from Happy Day Transit Center to Towne Square Mall. The route takes 63 minutes to complete the travel. The level of service of route 42 is 5 times throughout the day on weekdays and no service on the

ROUTE

42

Happy Day Transit Center
• Towne Square Mall

NAMPA TO BOISE — WEEKDAY

Happy Day Transit Center (1)	CWI Main Campus (2)	Progress & Central (3)	Franklin & Eagle (4)	Overland & Clear Creek (5)	Maple Grove & Overland (6)	Towne Square Mall (7)
9:35	9:58	10:12	10:17	10:25	10:28	10:38
10:35	10:58	11:12	11:17	11:25	11:28	11:38
12:35	**12:58**	**1:12**	**1:17**	**1:25**	**1:28**	**1:38**
1:35	**1:58**	**2:12**	**2:17**	**2:25**	**2:28**	**2:38**
5:35	**5:58**	**6:12**	**6:17**	**6:25**	**6:28**	**6:38**

BOISE TO NAMPA — WEEKDAY

Towne Square Mall (7)	Maple Grove & Overland (6)	Overland & Clear Creek (5)	Franklin & Eagle (4)	Progress & Central (3)	CWI Main Campus (2)	Happy Day Transit Center (1)
10:50	11:00	11:05	11:13	11:18	11:32	11:55
11:50	**12:00**	**12:05**	**12:13**	**12:18**	**12:32**	**12:55**
1:50	**2:00**	**2:05**	**2:13**	**2:18**	**2:32**	**2:55**
2:50	**3:00**	**3:05**	**3:13**	**3:18**	**3:32**	**3:55**
6:50	**7:00**	**7:05**	**7:13**	**7:18**	**7:32**	**7:55**

BOLD = PM

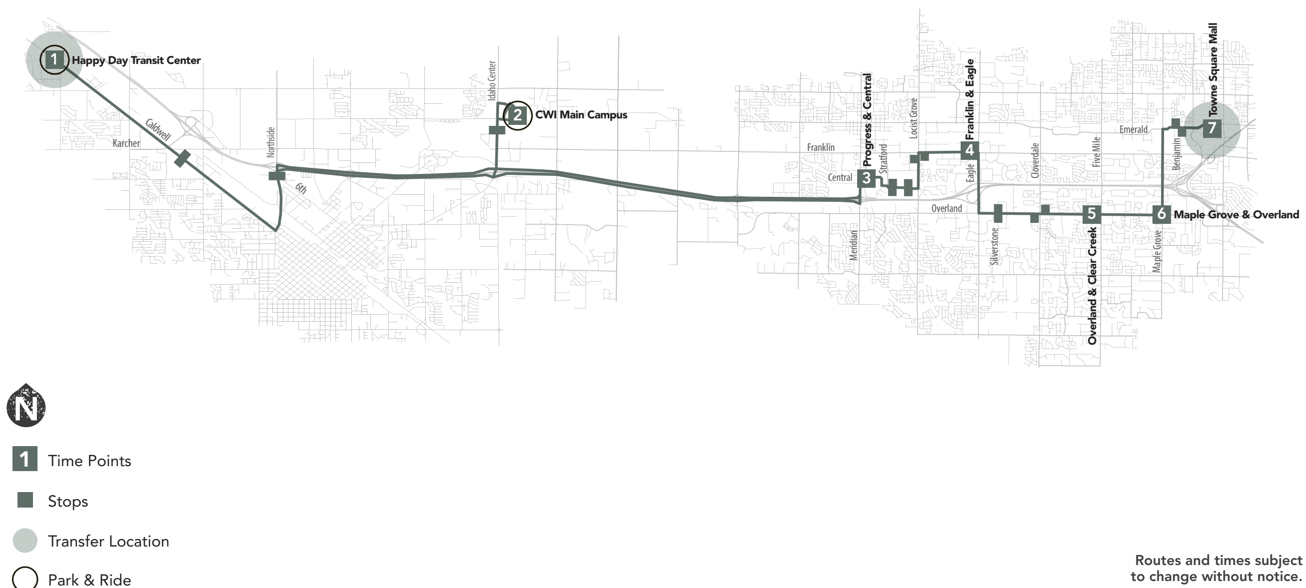


Figure 4.24, Source: Valley Regional Transit

weekend. Route 42 has three park and ride parking lot along the route and two transfer location which are Happy Day Transit Center and Towne Square Mall. Route 42 provides service from 9:35 AM to 7:55 PM on weekday and no service on the weekend.

Existing Park and Ride Parking Lots

Park and Ride parking lots allows drivers an adequate place to park their vehicle or bicycles so that the users will be able to catch a bus, carpool or vanpool. Along the region there are existing park and ride parking lots and future park and ride. Some park and ride parking lots use existing parking lots that are not being utilized to the parking lot capacity. When this happens there

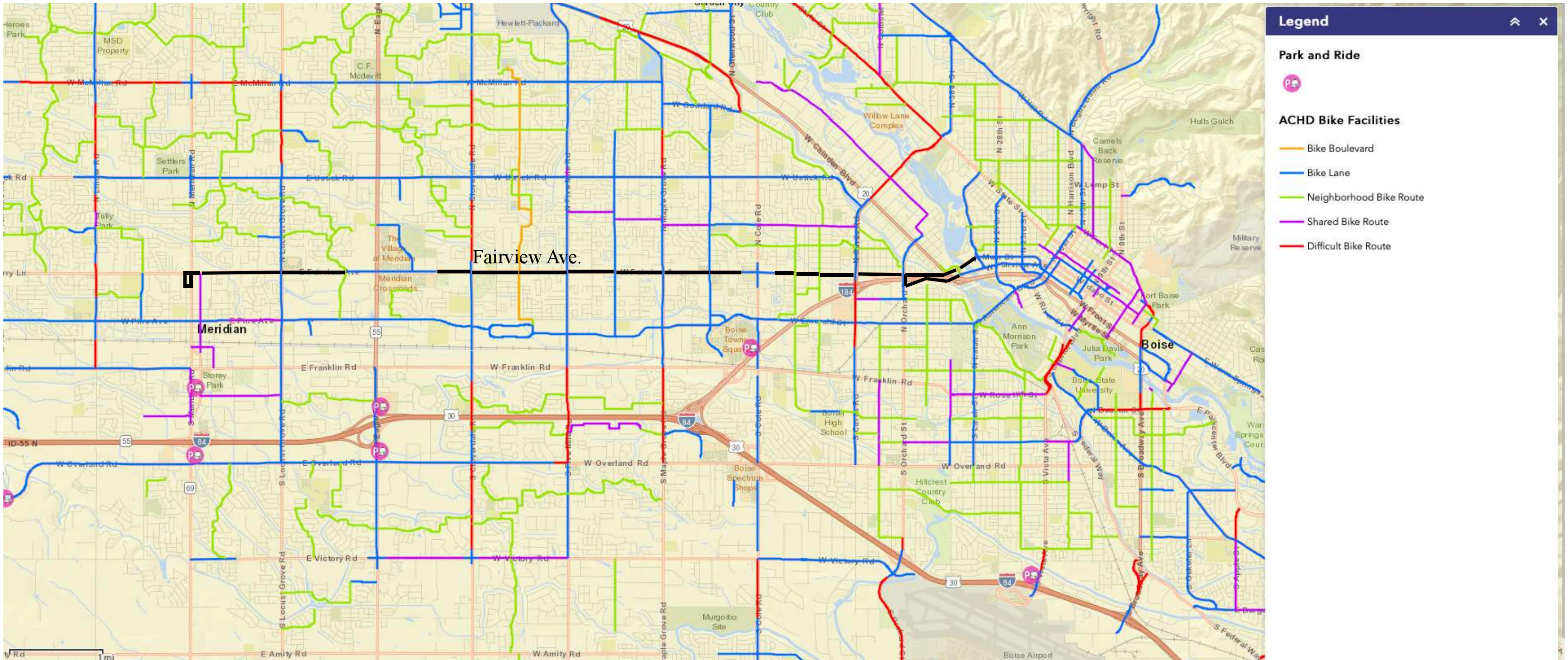


Figure 4.25, Source: ACHD Bike Map

has to be an agreement between the parking lot owner and the agency proposing the park and ride on who will be in charge of maintaining. The biggest challenge when proposing a park and ride parking lot is finding the location and parcel it will be used. Community in Motion 2040 document list current and future park and ride parking lots near and medium term. Community in Motion 2040 document lists certain existing park and ride parking lots to expand or upgrade. The existing park and ride parking lots that are relatively close to Fairview Corridor. The following park and ride parking lots are relatively close to Fairview Corridor and will be used for the purpose of this project.

1. Ten Mile Park and Ride, Corner of Overland Rd. and Ten Mile, Owner: ACHD
2. County Terrace Park and Ride, From Overland on County Terrace Way, Owner: ACHD
3. Gem St. Park and Ride, Back Side of Meridian Lanes, Owner: Franklin United Inc.
4. College of Western Idaho Park and Ride, Off Idaho Center Blvd. and 2nd Entrance N of Franklin, Owner: College of Western Idaho
5. St. Luke’s Park and Ride, N of I-84 on Eagle Rd., Owner: St. Luke’s Regional Medical Center LTD
6. Rackham Rd. Park and Ride, NE corner of Eagle and Overland, Owner: ITD

7. Towne Square Mall Park and Ride, NE of Dillards off of Emerald and Cole, Owner: Boise Towne Square Anchor Acquisition LLC

Vehicular Circulation Along Fairview

The following data has been collected from Compass Idaho and various other sources. The traffic counts have been used for planning purposed for Ada County. The vehicle counts are placed in an Excel document. Each study varies from year, day, and time the study has been conducted and the location/intersection of each study. The location/intersection that the study has been conducted have been along Fairview Ave. The top five intersections on Fairview in order for highest are Wildwood St., Maple Grove Rd., Shamrock Ave., Mitchell St., and Five Mile Rd. The lowest five intersections on Fairview in order from least are Orchard St., 23rd St., Curtis St., Garden St. and Cole Rd. The study that has seen the most total vehicle count was the study conducted at Fairview and Wildwood St with a total of 36,464. In this study, the highest vehicle count was at 5 PM with a count of 2853. The date of this study was September 9, 2014. The study that has seen the least total vehicle counts was the study conducted at Fairview and Orchard St with a total of 5,191. The date of this study was June 18, 2014. Looking at different peak times throughout the day, in which time the highest vehicle count was throughout the day. Looking at the first peak time, which is between 7 AM and 8 AM when commuters are heading to work. Fairview Ave and Wildwood St. has the highest vehicle count at 7 AM with 2247. This study was conducted on September 14, 2014. Fairview Ave and Shamrock Ave. has the highest vehicle count at 8 AM with 2331. This study was conducted on September 9, 2014. Another peak time is between 5 PM and 6 PM where commuters are heading home from work. Fairview Ave. and Maple Grove Rd. has the highest vehicle count of 2968 at 5 PM. The date of this study was November 4, 2015. Fairview and Wildwood St. have seen the highest vehicle count of 2484 at 6 PM. The date of this study was September 9, 2014. This data is utilized to examine which intersection/location need less vehicular congestion at what time and should be prioritized for having HOV lanes to allow for more efficient time travel using public transit.

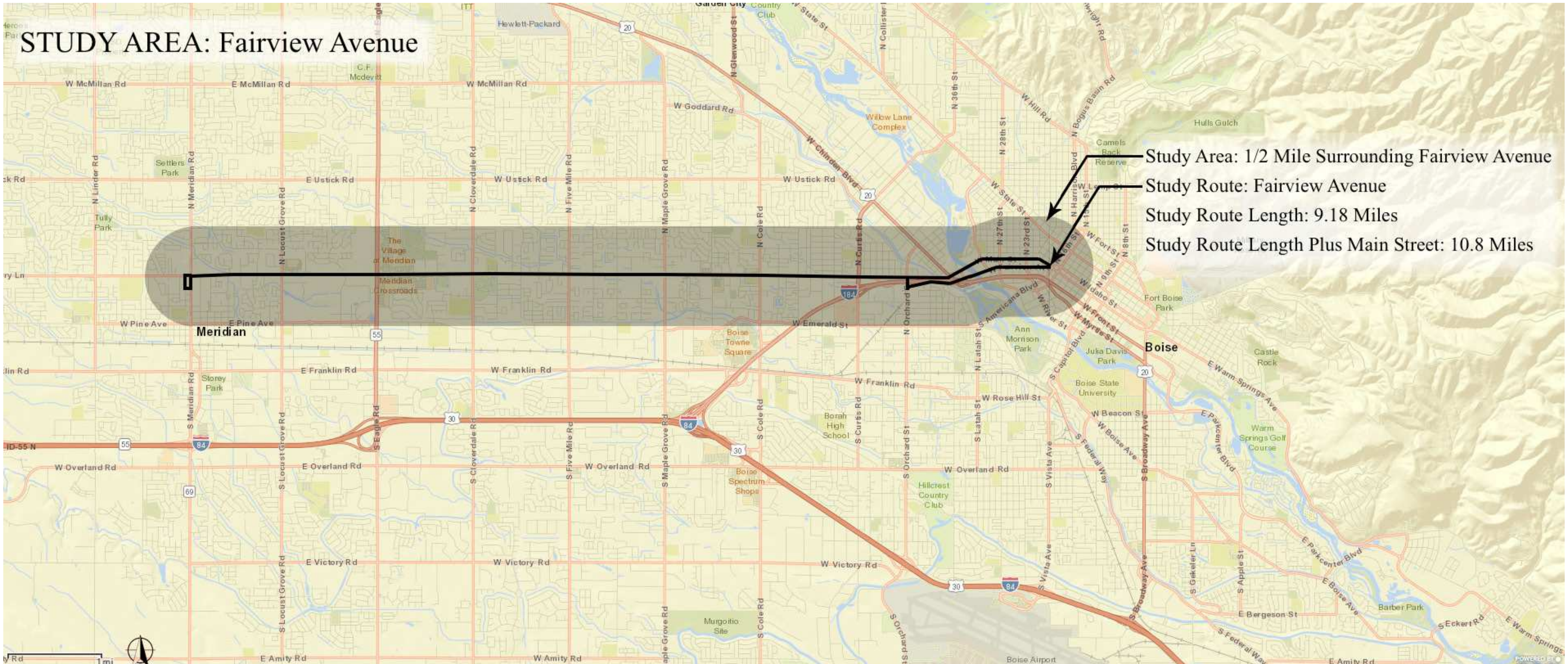


Figure 5.1, Study Area

Study Area

Figure 5.1, shows the study area for this document. The black line on the map shows the study route for this project. The length of Fairview Avenue is 9.18 miles long and with Main St. include it is 10.8 miles. The study area encompass ½ mile surrounding Fairview Avenue. The part of the router that becomes difficult is where Fairview Avenue become a one way and becomes Main St. As well this is beneficial because it will function as a turn around. For the other end the roundabout will be around a neighborhood block.

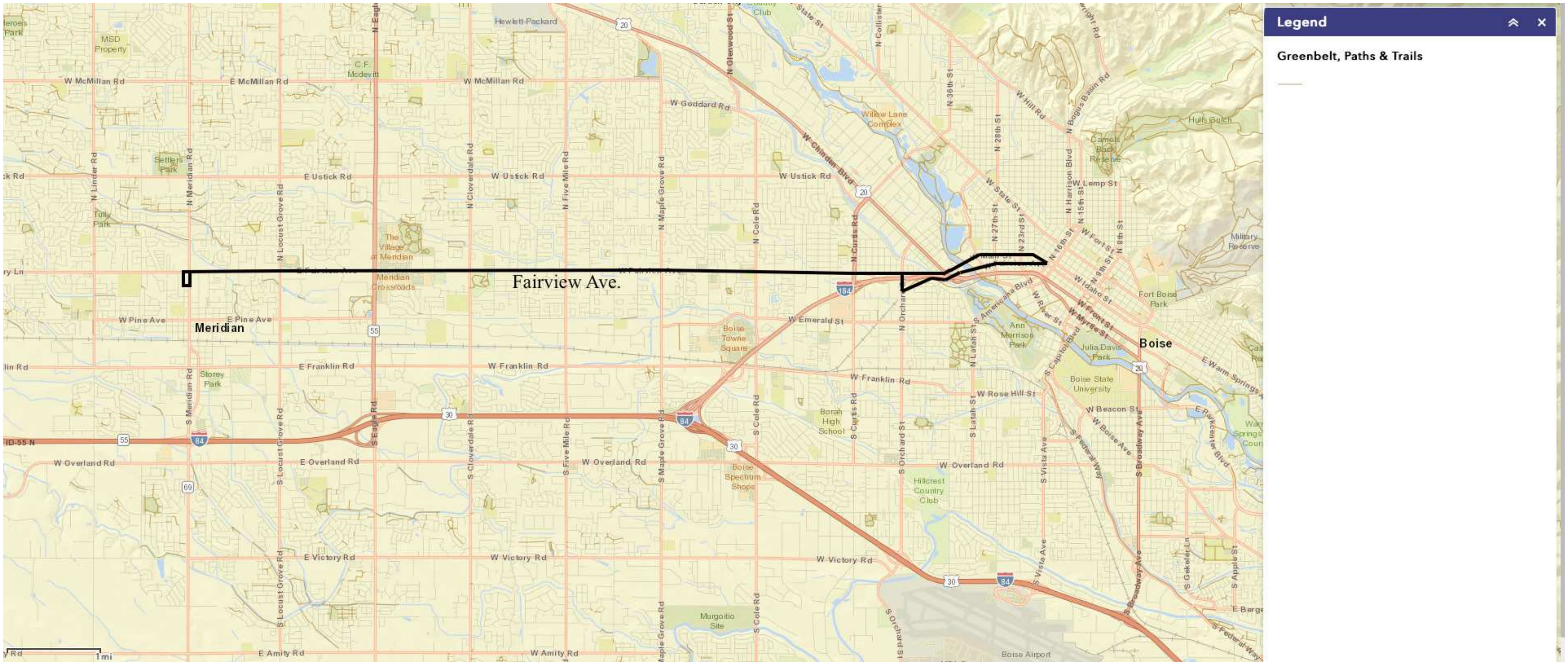


Figure 5.2, Greenbelt and Trails

Existing Greenbelt and Trails

Figure 5.2, shows the greenbelt trails and paths. The greenbelt along the Boise rives is a major activity attraction which attracts many users from all over the region. There are also trails and paths within the parks which should be noted but for the purpose of the project it is critical to point out how the greenbelt crosses Fairview Avenue and Main St. where they turn into a one way. The greenbelt runs along the Boise river and runs thru major parks that are located along the river.

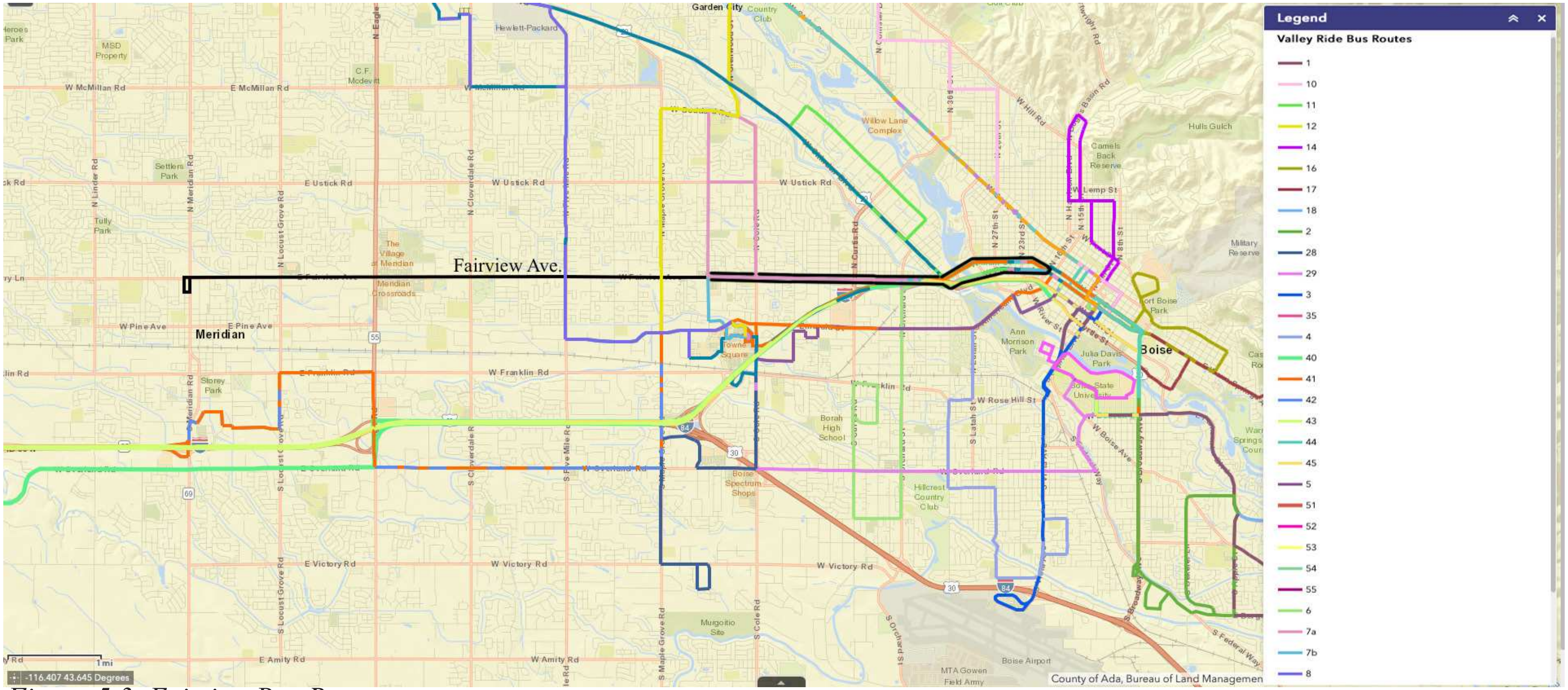


Figure 5.3, Existing Bus Routes

Existing Bus Route

Figure 5.3, shows all the existing bus routes for the region. Majority of the routs start within the transit center Downtown Boise. There are a few routes that runs towards the City of Nampa but majority of the routes stay within the City of Boise. The routes that stay within the City of Boise runs along the north and west of Boise. The black line that runs along Fairview Avenue shows that public transportation service missing. There is a section of Fairview Avenue that provided public transportation but this service is not using HOV lane.

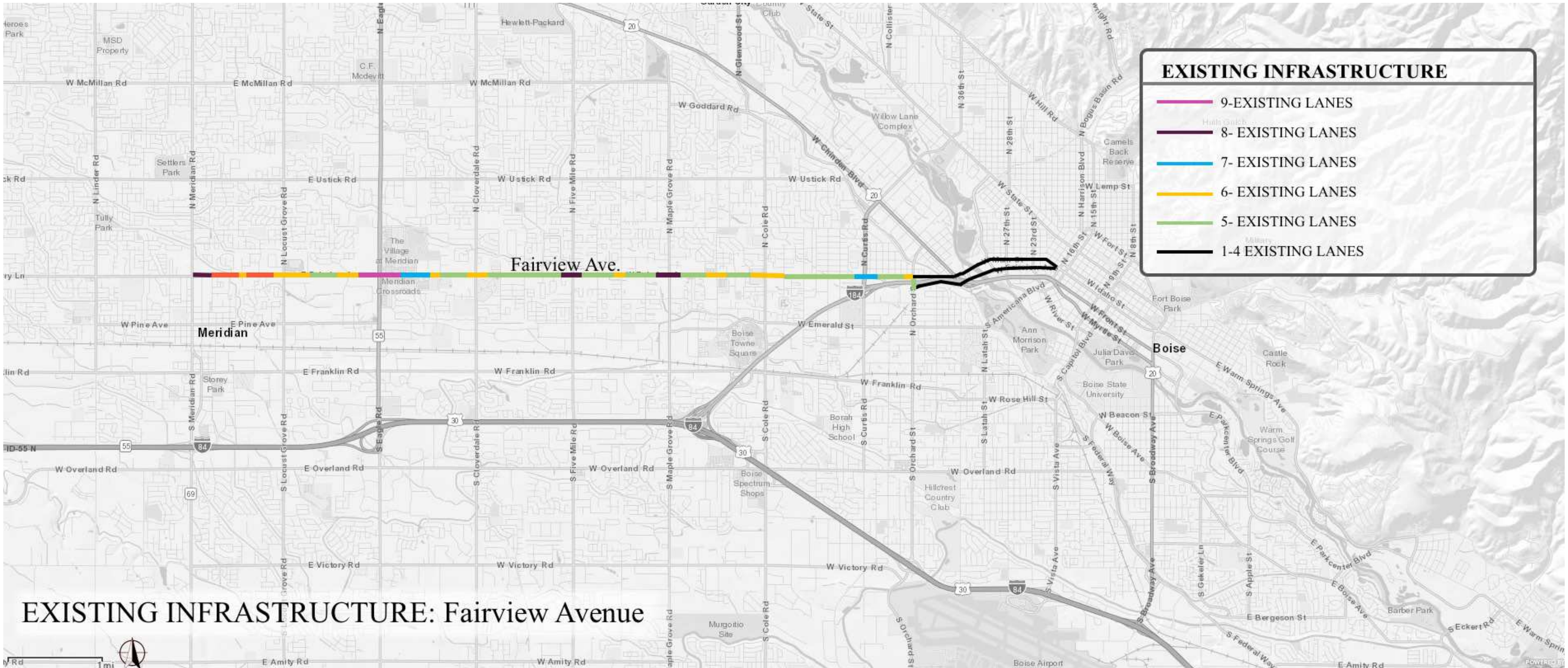


Figure 5.4, Existing Infrastructure

Existing Infrastructure

Figure 5.4, shows the existing road infrastructure along Fairview Avenue. The road infrastructure conditions that could be found along Fairview Avenue could range from one to nine lanes. The transition in between the different lanes could be typically found at the intersections with the nine lane intersection being the busiest. The busiest intersection could be found at Eagle Rd. and Fairview Ave. The second intersections that are also busy include Maple Grove Rd. and Five Mile Rd. The typical roadway that could be found throughout Fairview Avenue is five or six lanes throughout the roadway. The shortest amount of lanes could be found toward Downtown Boise where Fairview becomes into a one way road and becoming Main St.

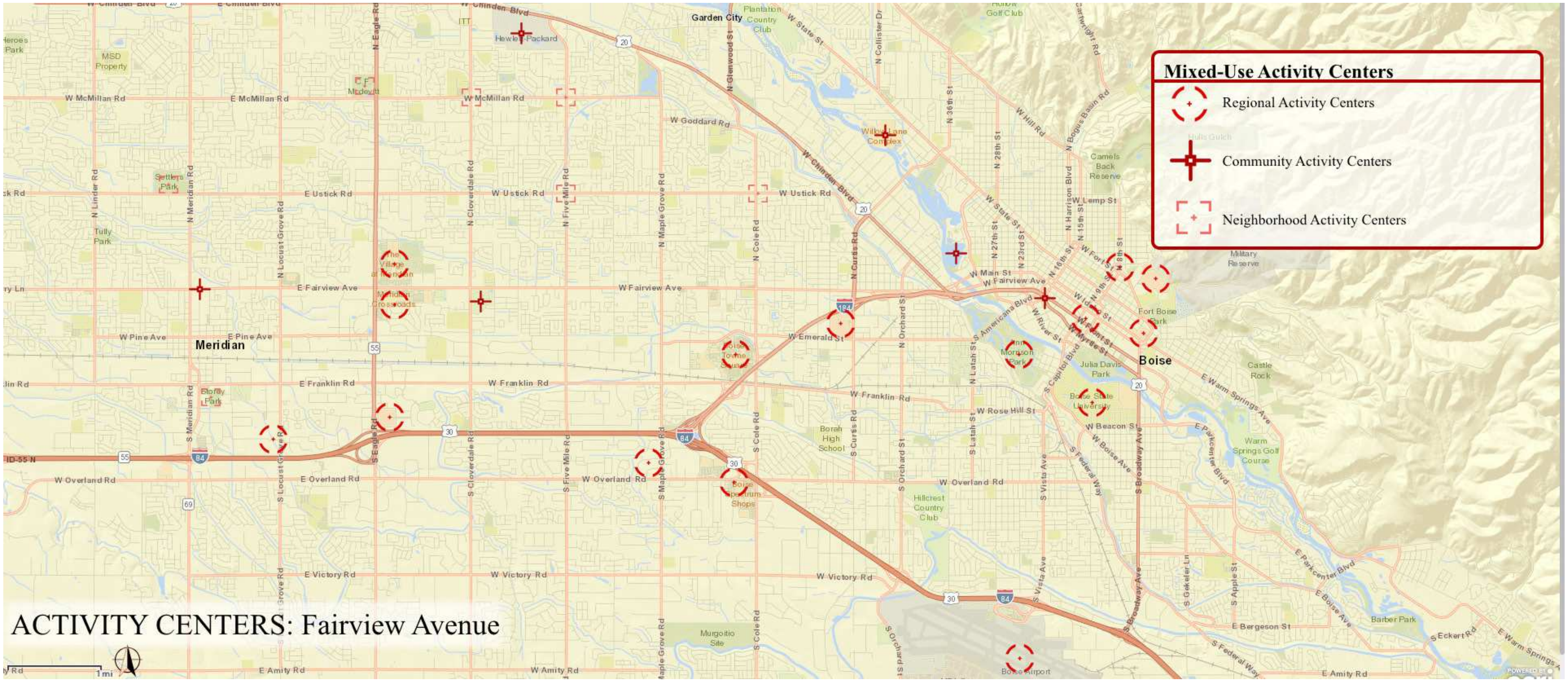


Figure 5.5, Existing Bus Routes

Activity Centers

Figure 5.5, shows the activity center that surround Fairview Avenue. ¬The activity centers are divided into three different categories depending on the scale of users they attract and from where. The three different categories are regional activity centers, community activity centers and neighborhood activity centers. The regional activity centers category includes attraction centers like the Boise Towne Square Mall, Meridian Village, College of Western Idaho, Idaho State University, St. Luke's and Saint Alphonsus. The regional activity centers are attraction centers that could attract different people from the region. The community activity centers category includes attraction centers like the greenbelt, skateboard park, Willow Lane Complex, Hewlett Packard and Meridian Crossroads. The community activity centers are attraction centers that could see less people usages than regional activity centers. The neighborhood activity centers category includes attraction centers like community parks and busy intersection that could attract people from the local neighborhood**.**

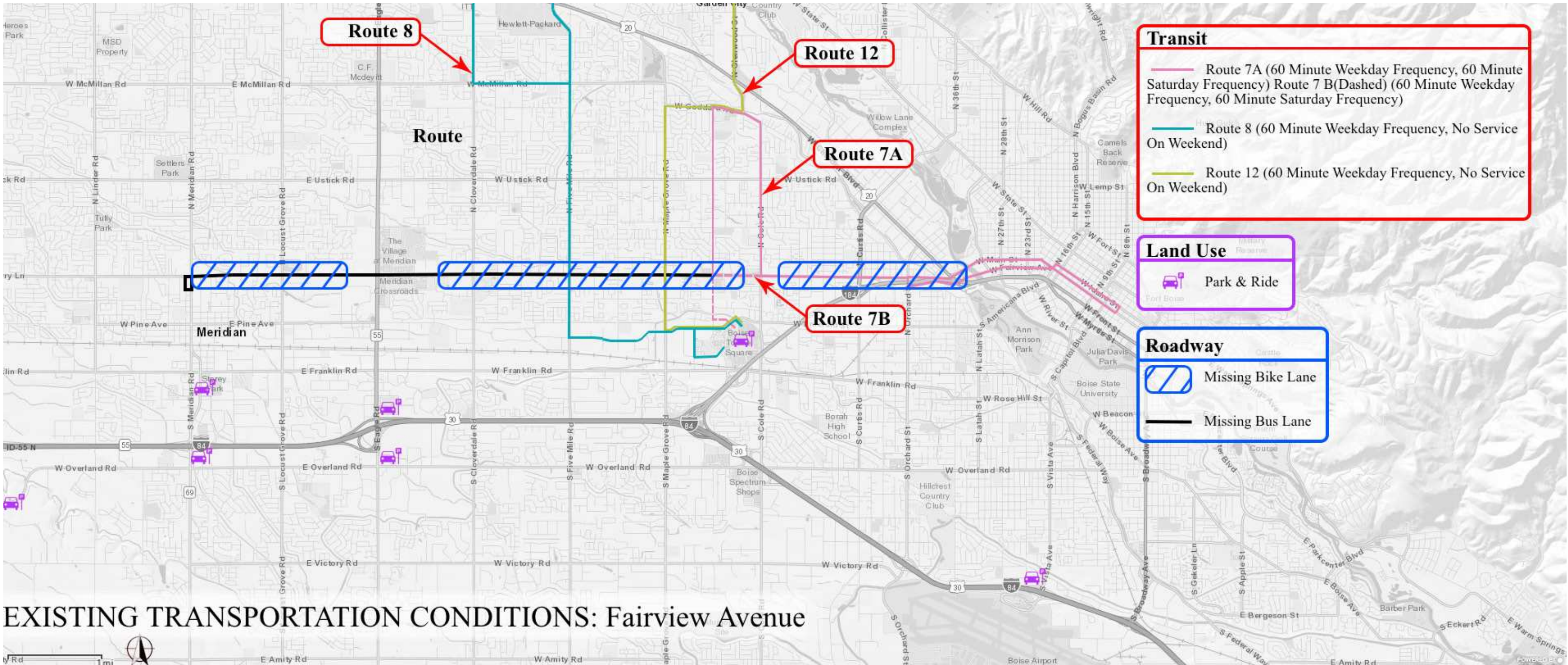


Figure 5.6, Existing Transportation Conditions

Existing Transportation Conditions

Figure 5.6, shows the existing transportation condition along and surrounding Fairview Avenue. There are four existing public transportation routes that run part Fairview Avenue and two routes that cut thru Fairview. The two routes that run along part Fairview Avenue are route 7A and route 7B. Route 7A frequency is 60 minutes during the weekdays and 60 minutes Saturday. Route 7B frequency is 60 minutes during the weekdays and 60 minutes Saturday. Route 8 frequency is 60 minutes during the weekdays and no service on the weekend. Route 12 frequency is 60 minutes during the weekdays and no service on the weekend. There are currently seven park and ride parking lot but majority of the lots are alongside I-84. One park and ride lot that is highly used is that parking lot located at Boise Towne Square Mall. Route 7B, 12 and 8 utilized this park and ride lot. Where there is a blue dashed line along the roadway this means it is missing bike lanes. The blue dashed line could be find majority of the Fairview Avenue. Where there is a black line along the route this is where public transportation is missing. This black line could be find majority of route.

Figure 5.7, Proposed Park and Ride

Proposed Park & Ride

Figure 5.7, shows the proposed park and ride lots for the purpose of this project. Each park and ride lot has its purpose on why it was proposed at each location. Some of the proposed parking and ride lots will use undeveloped lane and some of the proposed lots will use existing parking lots that are owned and developed (paved). Each lot will try to achieve usage from areas surrounding the park and ride lots as well as a way to connect user to business along Fairview Corridor.

BIRD'S EYE VIEW: Fairview Avenue

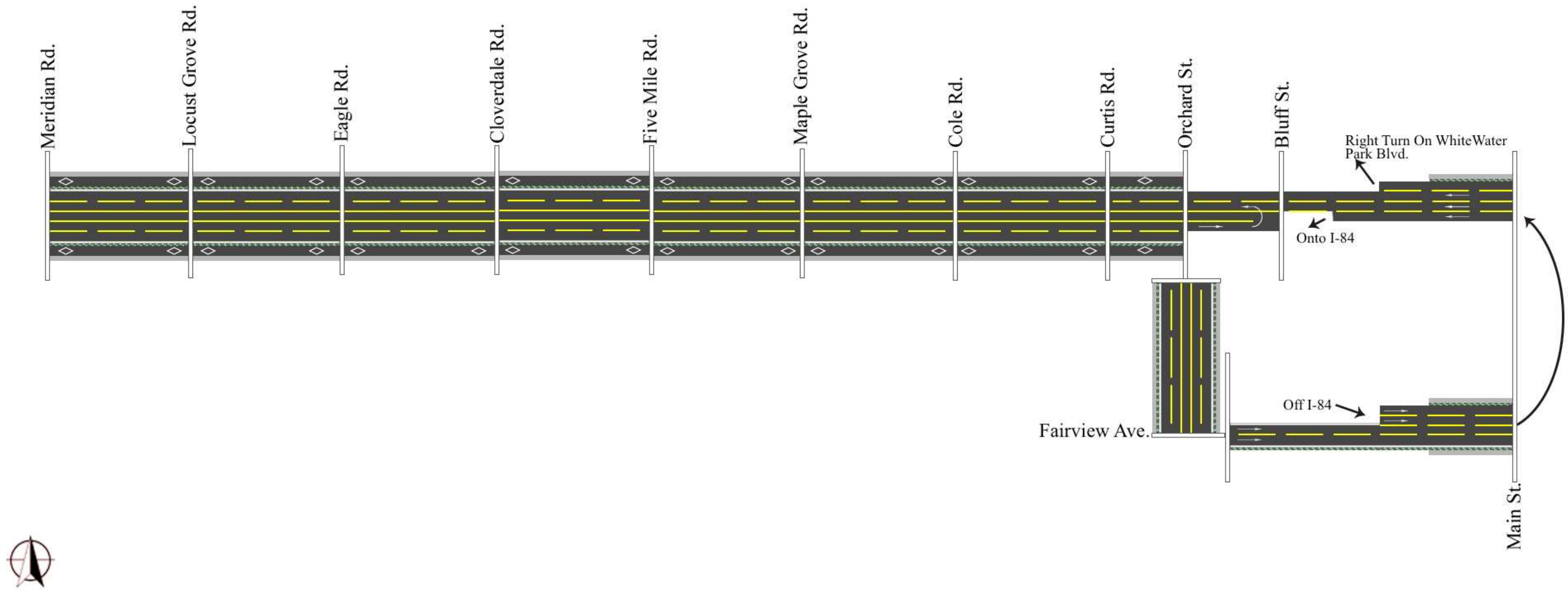


Figure 5.8, Bird's Eve View

Bird's Eye View

Figure 5.8, shows the bird's eye view for Fairview Avenue. This images shows the type of roadway that is being proposed between each segments of the route. The majority of the route will include pedestrian sidewalk and bike lanes for both directions. There will be high occupancy vehicle lanes for both directions from Meridian Rd. to Orchard St. The bus route will need to take a right onto Orchard St. heading toward Downtown Boise. Then turn into Fairview Avenue where it becomes one way into Downtown. Then it will loop around onto Main St. heading westbound heading toward Meridian. This is where Main St. turns into a one way heading westbound. The biggest take away from this image is the roadway sections the are being purposed between Meridian Rd. and Orchard St.

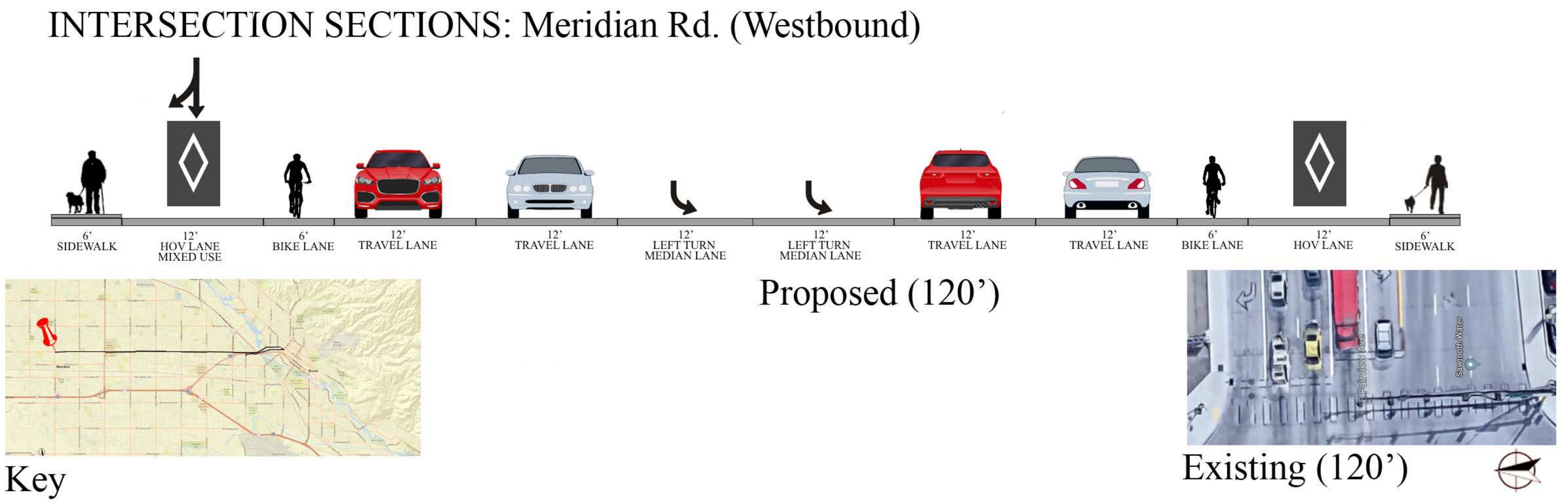
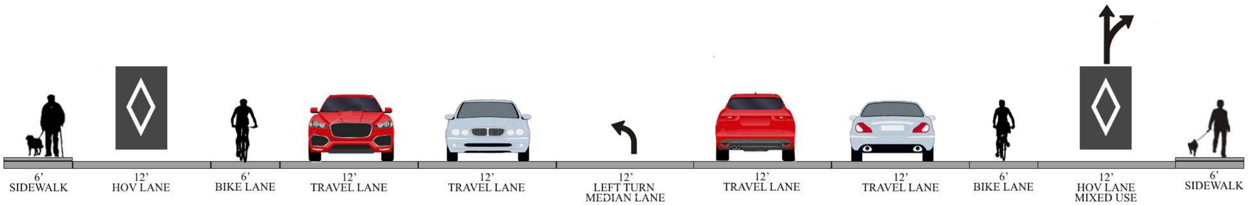


Figure 5.9, Meridian Rd.

Street Sections

Figure 5.9-5.16, shows how the intersections will need to change for the accumulation for both the new proposed bike lanes and high occupancy vehicle lanes. Most of the vehicle infrastructure stays the same but just the integration of the new bike lanes. One of the biggest change that the corridor will see is the right hand turn will need to utilize the HOV lanes to turn. This lane will also allow vehicles using the HOV lanes to continue forward on the next segment of the road. This will be typical at each intersection. Each image shows the existing conditions of each intersection and a picture showing the existing lanes, bike lanes, easements and sidewalks. Each images has two sections for each intersections to account for both direction of Fairview Avenue. The biggest take away for this sections is that the infrastructure doesn't change just the way it functions.

INTERSECTION SECTIONS: Locust Grove Rd. (Eastbound)

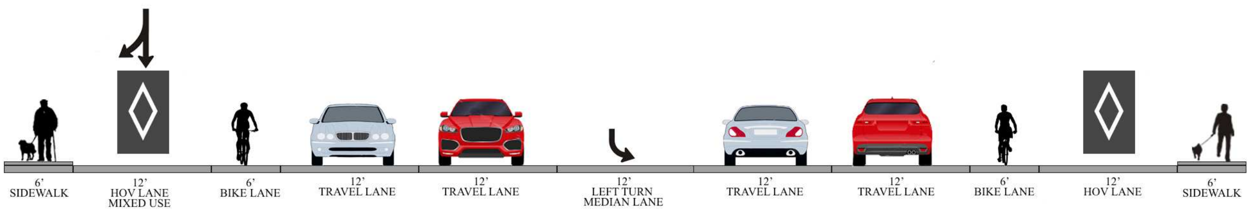


Proposed (108')

Key

Existing (110')

INTERSECTION SECTIONS: Locust Grove Rd. (Westbound)

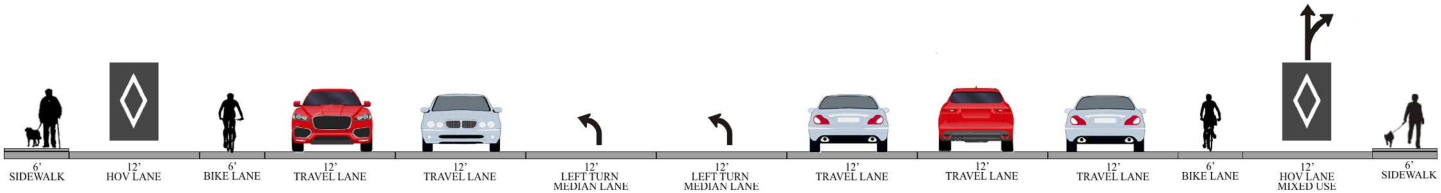


Proposed (108')

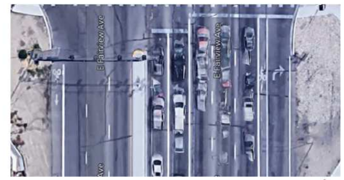
Existing (110')

Figure 5.10, Locust Grove Rd.

INTERSECTION SECTIONS: Eagle Rd. (Eastbound)



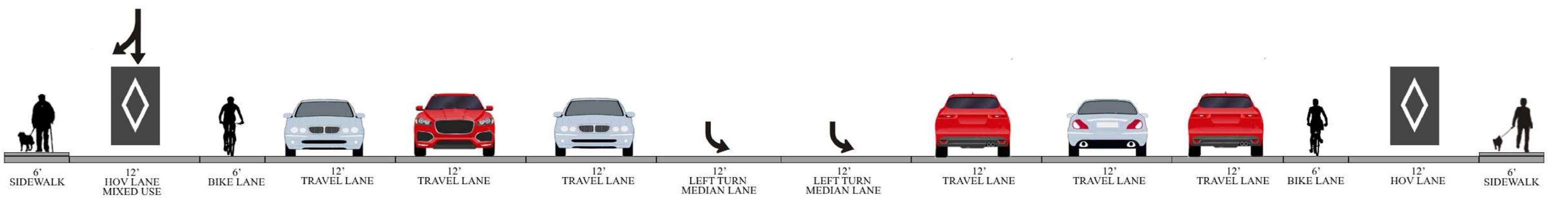
Proposed (132')



Existing (163')

Key

INTERSECTION SECTIONS: Eagle Rd. (Westbound)

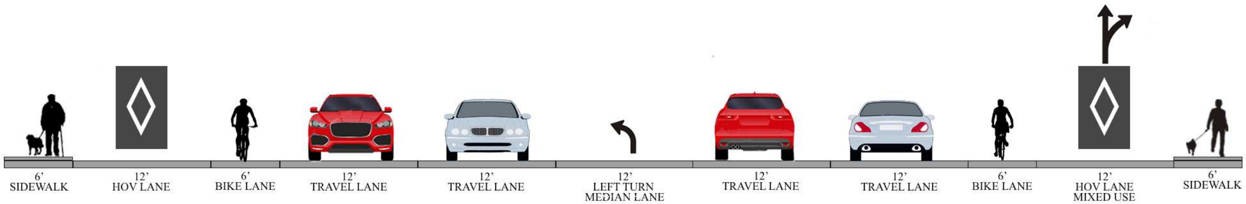


Proposed (144')

Existing (160')

Figure 5.11, Eagle Rd.

INTERSECTION SECTIONS: Cloverdale Rd. (Eastbound)

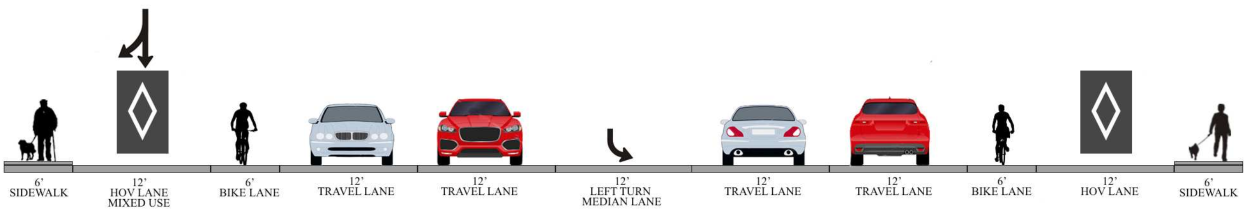


Proposed (108')

Key

Existing (128')

INTERSECTION SECTIONS: Cloverdale Rd. (Westbound)

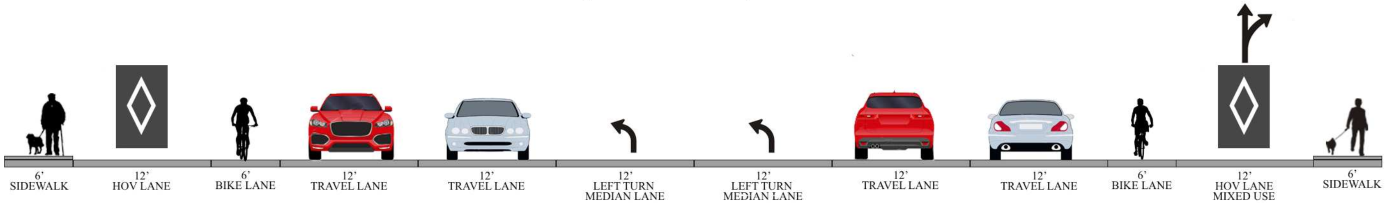


Proposed (108')

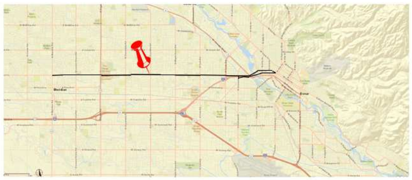
Existing (106')

Figure 5.12, Cloverdale Rd.

INTERSECTION SECTIONS: Five Mile Rd. (Eastbound)



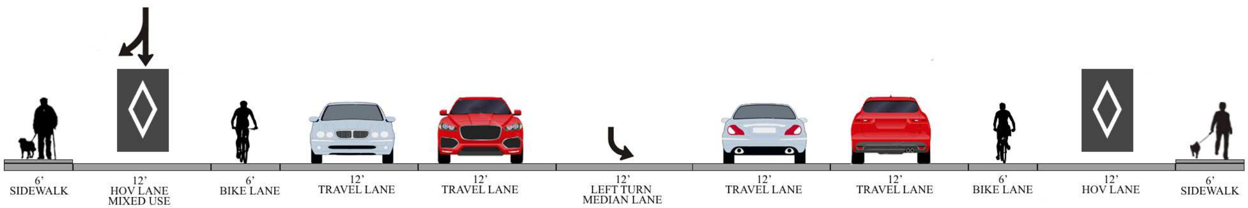
Proposed (120')



Key

Existing (111')

INTERSECTION SECTIONS: Five Mile Rd. (Westbound)

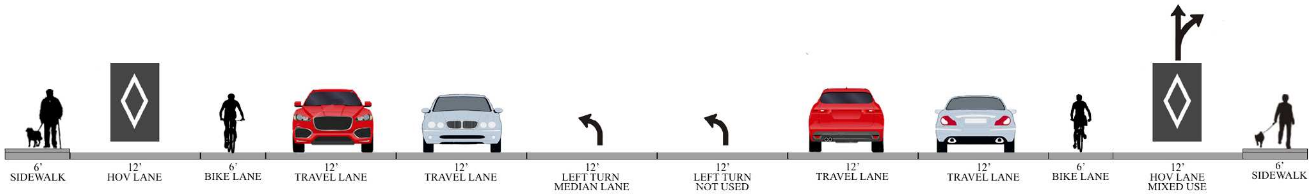


Proposed(108')

Existing (122')

Figure 5.13, Five Mile Rd.

INTERSECTION SECTIONS: Maple Grove Rd. (Eastbound)

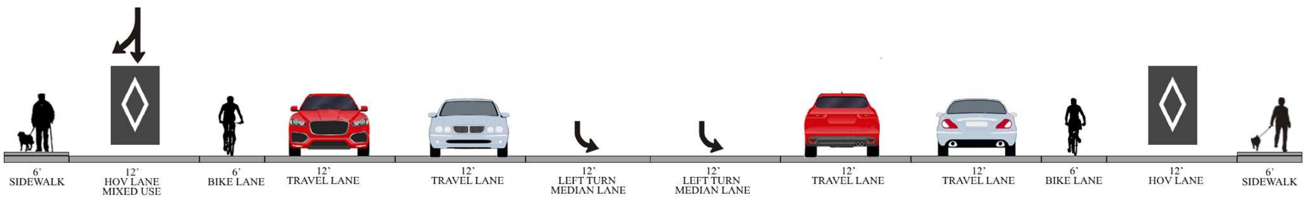


Proposed (120')

Key

Existing (119')

INTERSECTION SECTIONS: Maple Grove Rd. (Westbound)

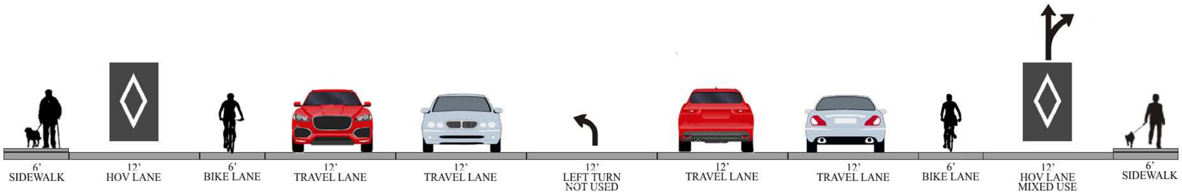


Proposed (120')

Existing (122')

Figure 5.14, Maple Grove Rd.

INTERSECTION SECTIONS: Cole Rd. (Eastbound)

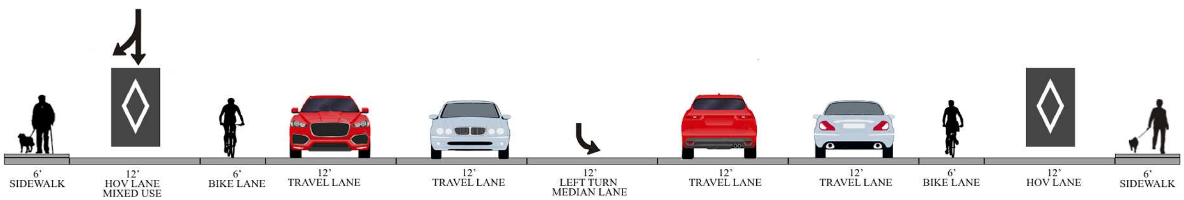


Proposed (108')

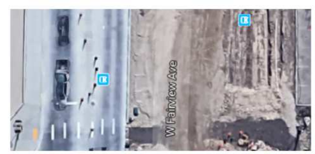
Key

Existing (138')

INTERSECTION SECTIONS: Cole Rd. (Westbound)



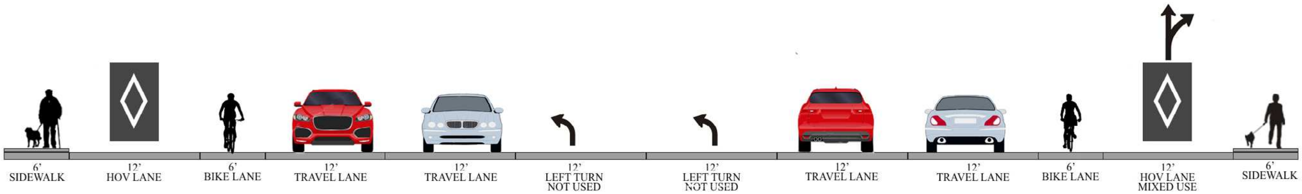
Proposed (108')



Existing (135')

Figure 5.15, Cole Rd.

INTERSECTION SECTIONS: Curtis Rd. (Eastbound)

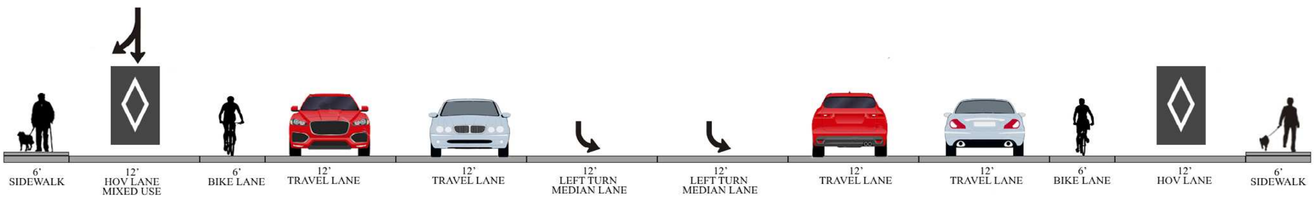


Proposed (120')

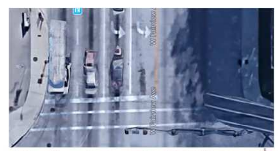
Key

Existing (106')

INTERSECTION SECTIONS: Curtis Rd. (Westbound)



Proposed (120')



Existing (108')

Figure 5.16, Curtis Rd.

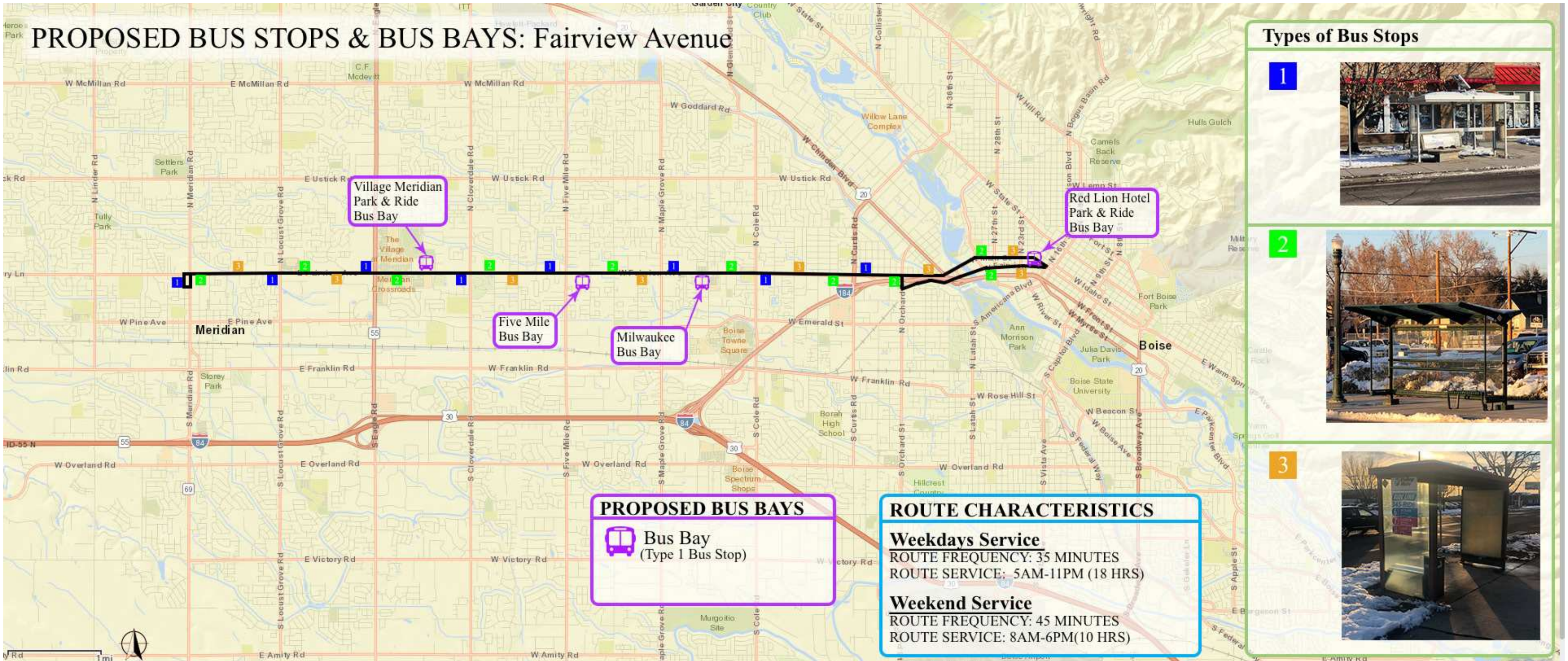


Figure 5.17, Proposed Bus Stops and Bus Bays

Proposed Bus Stops and Bus Bays

Figure 5.17, shows the proposed bus stops and the proposed bus bays. There is four proposed bus bays which are located at Meridian Village, Five Mile intersection, Milwaukee intersection, and Red Lion Hotel. Bus bays will used type one bus stop facility. This location will expect a high amount of users so the bus bays are necessary at this location. The Meridian Village bus bay is needed because of the high number of users that will use the proposed park and ride at the Meridian Village. The Five Mile and Milwaukee intersection because there is a bus route that cuts at these intersection. The Red Lion Hotel bus bays is needed because of the high number of users that will use the proposed park and ride at the Red Lion Hotel. There are three different types of bus stops being proposed throughout the route. The three images shown in the figure shows the three different stop types being proposed throughout the right. The three different stop types all have shelter to take cover when weather conditions are harsh. Majority of the bus stops are within 1/2 mile from each other. The route service on the weekdays will have a frequency of 35 minutes and provide service from 5 AM to 11 PM (18 HRS). The route service on the weekend will have a frequency of 45 minutes and provide service from 8 AM to 6 PM (10 HRS).

CONCLUSION

Conclusion

The conclusion of this project examines what is the current state of Fairview Corridor and the propose final product. The conclusion also examines the possible missed opportunities and limitations that could have been designed. Elements and opportunities that where not resolved in this project include but are not limited to time tables, funding, exclusive lanes and business analysis.

Overall, with the information gathered for the purpose of this project demonstrates that there is a need for Bus Rapid Transit along Fairview Avenue. Since Fairview is a business center corridor the need to provide public transportation is a must to provide alternative transportations. Fairview Avenue is missing bike lanes along the majority of the route, with the implementation of HOV lanes, it will allow the city to also implement a bike lane because the constructions of the corridor is happening already. With the different demographic images gathered for this project, it demonstrates that there is a need for public transportation along Fairview Avenue. The State Street Transit and Traffic Operational Plan was helpful for this project because it sets a guideline of what is currently being built along a corridor that is similar to Fairview Avenue. Another document that has been important for this project was the Complete Level of Service document. This document showed the current level of service that could be found throughout Fairview Corridor and the optimal level of service the agency want to see Fairview Corridor. Two case studies were conducted for the purpose of this project each with different challenges and advantages. Both of them were very helpful to see other communities that had a similar problem and the fix was similar to the one in Fairview.

A time table was not created for this project because the time tables are usually design once the route is functioning to set time where each buses will be at each stop. Funding for the route was not proposed but there is a funding section describing how funding was meet for State Street project. Since this is a Bus Rapid Transit project one of the crucial elements that distinguish BRT from the rest is the usage of exclusive lanes but since the State of Idaho doesn't allow exclusive lanes the alternative lane usage was HOV lanes. A business analysis was not conducted for this project, this could be used to see what type of businesses could be found along Fairview Corridor.

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